Norfolk County Council

NORWICH WESTERN LINK

Outline Business Case

70041922-WSP-OBC
MAY 2021

CONFIDENTIAL

Norfolk County Council

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Outline Business Case

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GLOSSARY

Acronym	Meaning
AADT	Annual Average Daily Traffic
AMCB	Analysis of Monetised Costs and Benefits
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ARN	Affected Road Network
ATC	Automatic Traffic Count
BCR	Benefit to Cost Ratio
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CDM	Construction Design and Management
CO_2	Carbon Dioxide
CPO	Compulsory Purchase Order
CWS	County Wildlife Site
DBA	Desk Based Assessment
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Model
DMRB	Design Manual for Roads and Bridges
EAST	Early Assessment and Sifting Tool
EA	Environment Agency
ECC	Engineering Construction Contract
ECI	Early Contractor Involvement
EHV	Extra High Voltage
EIA	Environmental Impact Assessment
ES	Environmental Statement
FBC	Full Business Case

Acronym	Meaning
FEZ	Food Enterprise Zone
GDP	Gross Domestic Product
GEH	Geoffrey E. Havers
GNDP	Greater Norwich Development Partnership
GVA	Gross Value Added
HER	Heritage Environment Record
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
ICT	Information and Communications Technology
IMD	Indices of Multiple Deprivation
ITS	Integrated Transport Strategy
JCS	Joint Core Strategy
JTV	Journey Time Variability
KSI	Killed or Seriously Injured
LDO	Local Development Order
LEP	Local Enterprise Partnership
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
LIDAR	Light Detection and Ranging
LLG	Local Liaison Group
LLM	Large Local Majors
LMVR	Local Model Validation Report
LNR	Local Nature Reserve
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LTB	Local Transport Board

Acronym	Meaning
LTP	Local Transport Plan
MCC	Manual Classified Count
MRN	Major Road Network
MWG	Member Working Group
NATS	Norwich Area Transport Strategy
NCA	National Character Area
NCC	Norfolk County Council
NCN1	National Cycle Network Route 1
NDR	Northern Distributor Road *(now named A1270 Broadland Northway)*
NIA	Noise Important Area
NIS	National Institute of Statistics
NMU	Non-Motorised User
NNUH	Norfolk and Norwich University Hospital
NO_2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NPV	Net Present Value
NRP	Norwich Research Park
NRTF	National Road Traffic Forecasts
NSES	Norfolk and Suffolk Economic Strategy
NSIP	Nationally Significant Infrastructure Project
NTEM	National Trip End Model
NVQ	National Vocational Qualification
NWL	Norwich Western Link
NWQ	Norwich Western Quadrant
OAN	Objectively Assessed Need
OAR	Option Assessment Report
OBC	Outline Business Case

Acronym	Meaning
OGV	Ordinary Goods Vehicle
OJEU	Office Journal of the European Union
ONS	Office for National Statistics
PCU	Passenger Car Unit
PIA	Personal Injury Accident
PICS	Personal Injury Collisions
PRA	Preferred Route Announcement
PRoW	Public Rights of Way
PVB	Present Value of Benefit
PVC	Present Value of Costs
QRA	Quantified Risk Assessment
RIS	Road Investment Strategy
RNR	Roadside Nature Reserve
SAC	Special Area of Conservation
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SERTM	South East Regional Transport Model
SHMA	Strategic Housing Market Assessment
SOBC	Strategic Outline Business Case
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
STS	Sustainable Transport Strategy
SuDS	Sustainable Drainage System
TBM	Tunnel Boring Machine
TCF	Transforming Cities Fund
TCPA	Town and Country Planning Act
TEE	Transport Economic Efficiency
TEMPro	Trip End Model Presentation Program

Acronym	Meaning
TEN-T	Trans-European Transport Network
TfN	Transport for Norwich
TIS	Transport Investment Strategy
TUBA	Transport User Benefit Appraisal
TTV	Travel Time Variability
UEA	University of East Anglia
VfM	Value for Money
VOC	Vehicle Operating Costs
VoT	Values of Time
WebTAG	Transport Analysis Guidance
WebTRIS	Highways England Traffic Information System
WFD	Water Framework Directive

EXECUTIVE SUMMARY

This Outline Business Case has been prepared on behalf of Norfolk County Council (NCC), for consideration by the Department for Transport (DfT).

BACKGROUND

Despite improvements being made to Norfolk's road network in recent years, plans to link the A1270 from its junction with the A1067 to the A47 near Honingham have not yet been progressed. This has resulted in a lack of strategic north-south and orbital connectivity, with only the A140 (outer ring road) and relatively few low-standard rural local access roads linking the two. The physical and environmental challenges that the area presents have left this area without a primary A-Road standard route to cater for demand of over 45,000 journeys per day.

Communities including Weston Longville, Hockering, Ringland, Costessey, and Taverham experience rat-running and inappropriate traffic, resulting in severance in these areas, directly impacting the quality of life of local residents from an environmental and safety perspective.

Strategic employment sites to the north and west of Norwich have inadequate connectivity, increasing congestion, journey times, reducing productivity for businesses, and limiting their potential for targeted growth in future years.

This need for improved connectivity around the western side of Norwich has been identified by a range of local partners including New Anglia LEP, Norwich City Council, Broadland, South Norfolk, Breckland and North Norfolk district councils, the Norfolk and Norwich University Hospital, the Norwich Research Park and Norwich International Airport. This is underscored by continued local interest. Public consultations in 2018 and 2019 attracted over 4,000 responses, with 77% of respondents expressing a preference for the development of a new road between the A1270 and the A47.

Norfolk's recovery and growth ambitions, which support the Government's wider support for levelling up economic centres outside of London, require a transport network that is future-proofed. The NWL will increase capacity around Tier One Employment Sites identified as part of Norfolk's Strategic Planning Framework, which lists the scheme as a priority project. In addition, communities' sense of place will be enhanced by the NWL, with rat-running, inappropriate traffic, and the resulting severance being alleviated.

The case for the NWL is not only about relieving congestion in a small area. Unlocking orbital connectivity to the west of Norwich will strengthen the resilience of the network, improve the quality of life for locals and visitors, and prepare Norfolk for years of future growth.

THE NORWICH WESTERN LINK

From July 2018 to November 2018 an optioneering and appraisal process was carried out to identify and assess options. A long list of 82 options was identified across a range of modes and assessed using the DfT's Early Assessment Sifting Tool. A shortlist of four highway and 10 non-highway options, including sustainable transport interventions, were taken forward for further consideration. A preferred route was announced in July 2019.

The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

The scheme is comprised of:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain
- A connection to a new "grade separated" junction with the A47
- An "at grade" junction with the A1067
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout
- A bridge carrying the NWL over Ringland Lane
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required
- A wider network of walking and cycling-friendly route options, as per the Sustainable Transport Strategy
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network
- Surface water drainage – principally infiltration basins, sediment forebays and associated carrier drains/ channels.

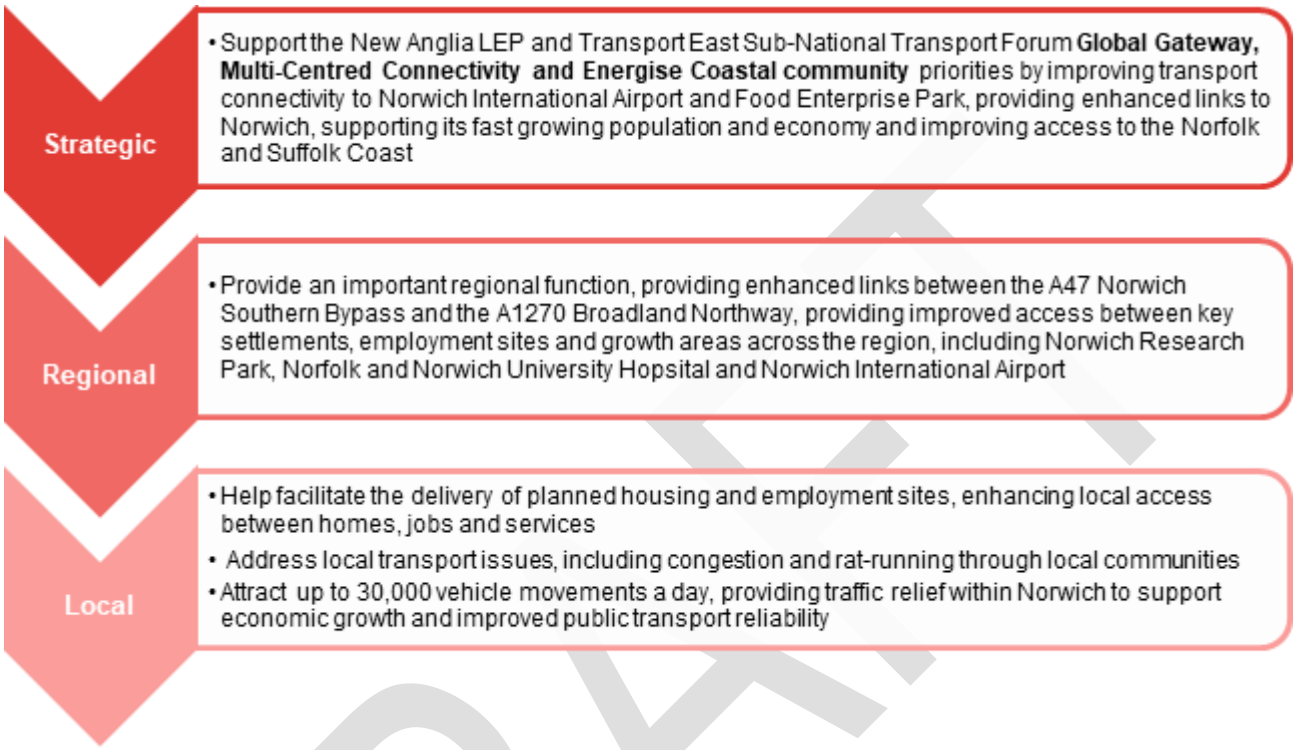
The scheme also includes landscaping, planting, ancillary works, and significant environmental mitigation work. Environmental net gain and biodiversity net gain measures are also considered as part of the NWL design philosophy.

Closely aligned with national, regional and local policies and plans, the NWL contributes to the Government's goal of levelling up communities, both on a national scale, and within Norfolk. It is designed to close the gap in the orbital network, strengthen the surrounding routes, and safeguard the network from increased congestion future growth will bring.

The cost of the scheme preparation and construction, excluding inflation, client costs and non-recoverable VAT is £140.77m. The scheme outturn cost will be £198.39m, including risk and inflation. It will be funded through a combination of government funding (85%) and a local contribution of (15%).

The scheme offers High value for money, with the initial monetised benefits of the scheme (£310.79m) being greater than the monetised costs of the scheme (£127.13m). The resulting initial benefit-cost ratio is 2.4. The adjusted monetised benefits of the scheme total £434.55m. The adjusted benefit-cost ratio is therefore 3.4, which remains within the High category.

Norfolk will benefit from improved access to Norwich, the primary economic centre for the wider sub-region, and to the wider western area. This will facilitate the delivery of new and expanded business sites. Quicker more reliable journeys will reduce business costs, increase labour market catchments, improve access to key strategic growth sites and support the visitor economy. This will also help support the delivery of new and existing housing sites.



The NWL scheme is commercially viable and is employing a robust contracting and procurement strategy. This has already included the use of the OJEU 'competitive dialogue procedure' procurement route, a two-stage design and build contract, with early contractor involvement, and the use of NEC4 Engineering and Construction contracts, with different options utilised, as appropriate for the different stages of work.

A robust set of processes either are in place or are being put in place to ensure that the project is effectively delivered, and properly evaluated. Subject to funding approval, the NWL is planned to be open to traffic in 2025.

In summary, the scheme is financially affordable, commercially viable, and offers high Value for Money and benefits to people, place and businesses at a local, regional, and strategic level.

1

INTRODUCTION

1 INTRODUCTION

1.1 OVERVIEW

1.1.1. This Outline Business Case (OBC) for the Norwich Western Link scheme (NWL; the scheme) has been prepared on behalf of Norfolk County Council (NCC) for consideration by the Department for Transport (DfT).

1.1.2. The content and preparation of the business case adheres to published DfT guidance, including the most up to date transport appraisal guidance (TAG) and Value for Money framework.

1.1.3. It updates and builds on the Strategic Outline Business Case submission, which was approved in May 2020. The business case demonstrates that the proposed scheme is based on analysis of the current situation, a clear vision of how things should be in the future, a careful consideration of options, a robust appraisal of costs and benefits, and a clear plan for delivering the scheme.

1.2 LOCATION OF THE SCHEME

1.2.1. The NWL scheme is located north-west of Norwich, in the Norwich Western Quadrant (NWQ) illustrated in **Figure 1-1**. The broad study area includes the key routes of the proposed dual carriageway section of the A47, the A1074 (Dereham Road), the A1270 (Broadland Northway), the A140, and the A1067 (Fakenham Road / Drayton Road).

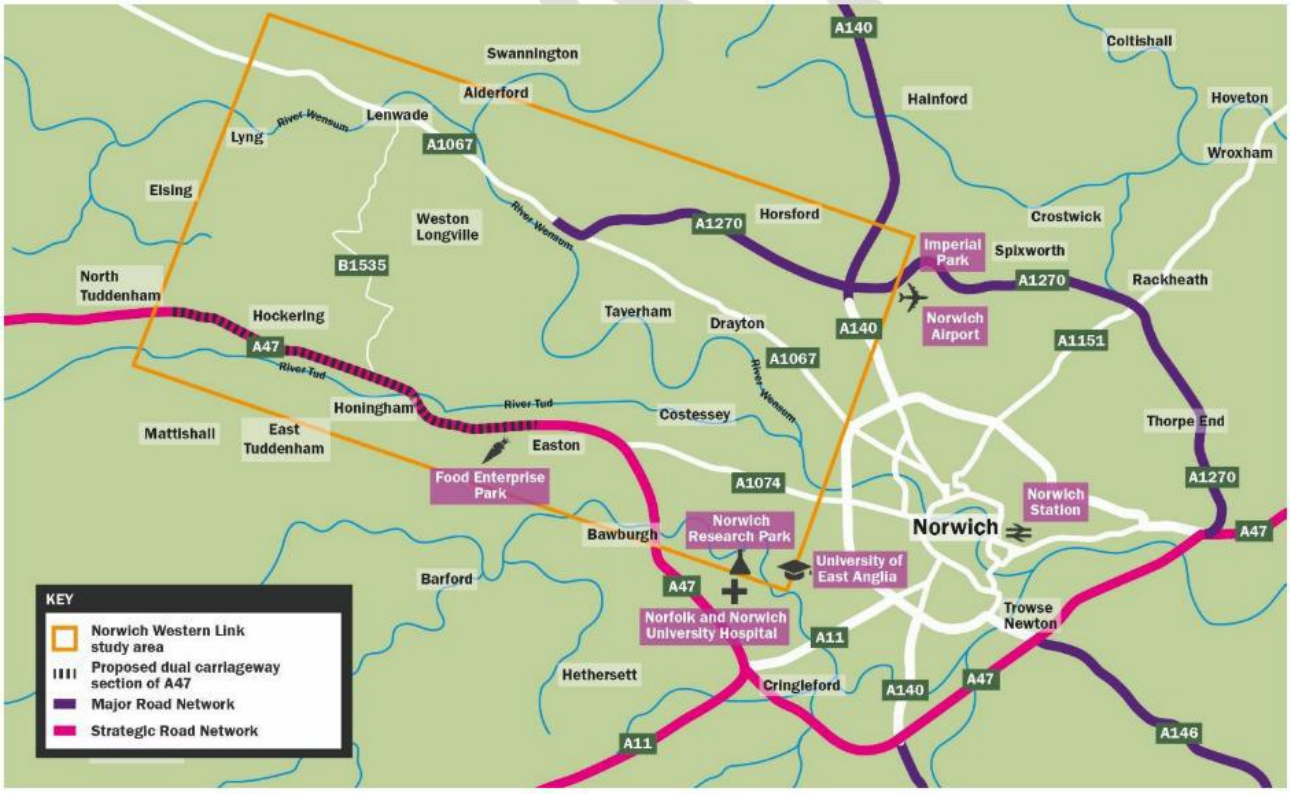


Figure 1-1 - NWL Study Area

1.2.2. The study area is bounded to the south by the A47, part of the Strategic Road Network (SRN). It provides a link from Lowestoft and Great Yarmouth in the east, via Norwich towards King's Lynn,

Peterborough and the A1. The A47 is to be dualled by Highways England between North Tuddenham and Easton; this will provide a continuous dual carriageway from Dereham to Acle.

1.2.3. Just outside of the study area to the south-east, the A47 connects with the A11, a continuous dual carriageway from Norwich to Cambridge and provides connections to London via the M11.

1.2.4. The A1270 (Broadland Northway) is located to the north. This is part of the Major Road Network (MRN), which forms a middle tier of the country's busiest and most economically important local authority 'A' roads, sitting between the national SRN and the rest of the local road network.

1.3 THE NEED FOR THE NWL

1.3.1. Despite improvements being made to Norfolk's road network in recent years, plans to link the A1270 from its junction with the A1067 to the A47 near Honingham have not yet been progressed. This has resulted in a lack of strategic north-south and orbital connectivity, with only the A140 (outer ring road) and a relatively few low-standard rural local access roads linking the two.

1.3.2. Strategic employment sites to the north and west of Norwich, including Norwich Airport, have inadequate connectivity, increasing congestion, journey times, reducing productivity for businesses, and limiting their potential for targeted growth in future years.

1.3.3. Communities including Weston Longville, Hockering, Ringland, Costessey, and Taverham experience rat-running and inappropriate traffic, resulting in severance in these areas, directly impacting the quality of life of local residents from an environmental and safety perspective.

1.3.4. Norfolk was hit hard by the Covid-19 pandemic. Oxford Economics and the Institute of Chartered Accountants in England and Wales (ICAEW)[1] have worked together to assess the impact of Coronavirus on growth forecasts in different regions. Between December 2019 and May 2020 forecasts, 2025 GVA forecasts for the East of England dropped by 2%, with the region's reliance on manufacturing, public sector and tourism jobs underscoring the challenges brought on by the pandemic.

1.3.5. This makes Norfolk's plans for both post-pandemic recovery and economic development ambitious, but all the more badly needed. Over the next decade, it aims to have 57,000 new jobs, many of which are expected to be located in its Tier One Employment Sites (see **Figure 1-2**). Tourism remains a core component of regeneration, with the promotion of the visitor economy part of the medium-term recovery efforts in Broadland and South Norfolk. Levelling up takes on an increased importance within those regions hit hardest by the pandemic, both in terms of driving economic growth, and the wider benefits it will bring to deprived communities.

1.3.6. The NWL will also support existing businesses and unlock opportunities for economic growth in Norwich by reducing traffic movements in and around the city. The NWL is expected to reduce through movements from the outer ring road, freeing up capacity to better accommodate planned housing and employment growth, improve public transport journey times and reliability and the

[1] www.icaew.com Coronavirus economic outlook: differences between regions

conditions for active travel. The sustainable travel proposals fit with the aspirations of Transport for Norwich (TfN), which seeks a mode shift away from private cars and improvement in air quality, including the geographical linkage where the NWL and TfN interface at the western fringe of Norwich. This offers an integrated approach which offers good synergy with wider sustainable transport proposals across Norwich.

1.3.7. Strategic road connectivity around northwest Norfolk is vital in achieving that growth and recovery. The Norwich Western Link is designed to close the gap in the orbital network, strengthen the resilience of the surrounding routes, and provide better quality routes to the employment opportunities presented by more diverse development.

1.4 BACKGROUND

1.4.1. Ambitious transport plans for Norwich are being developed and delivered as part of Transport for Norwich (TfN, see **sections 2.2.120 to 2.2.124** for detail). Planned interventions aim to manage traffic levels, increase the capacity of the road network, and encourage sustainable modes of transport.

1.4.2. The NWL is designed to connect the A1270 (referred to during its development as the Northern Distributor Road) from the A1067 to the A47 west of Norwich and improve journeys between these two major A-roads, in the surrounding area, and for onward travel.

1.4.3. In 2003, public consultation on the revised Norwich Area Transportation Strategy (NATS) showed strong support for transport improvements to the north and west area of Norwich.

1.4.4. The revised NATS was agreed in 2004, which included a provision for a Northern Distributor Road (NDR), with the aim of reducing the impact of high traffic volumes and congestion in Norwich. Further consultation was undertaken on a variety of NDR route options throughout 2004 and 2005, before the adoption of a preferred route in September 2005. The NDR (now the A1270) opened in 2018.

1.4.5. Early plans to link the A47 (west) to the A47 (east) via the proposed NDR, which included a link between the A1067 and A47 (west), were not progressed. This was, in part, due to the added complexity related to the environmental challenge of crossing the River Wensum with its status as a Special Area of Conservation (SAC). Since 2017, further discussions have since been held with Natural England and the Environment Agency regarding the type and positioning of the proposed viaduct for crossing the River Wensum. Such a viaduct with sufficient clearance over the River Wensum and its flood plain is anticipated not to affect the integrity of the SAC and is a feature of the current NWL proposals.

1.4.6. In 2005, the Council's Cabinet agreed that the objectives of the wider Norwich Area Transport Strategy (NATS) – now known as the Transport for Norwich delivery plan – could still be delivered without the link to the A47 (west). It was also acknowledged during the delivery of the A1270 that traffic and transport issues in the west of Norwich would need to be kept under review.

1.4.7. The emergence of the government's national Roads Investment Strategy (RIS1) in 2014 included in its first funding period (2015 to 2020) improvements to the A47 around Norwich. One of those projects was the dualling of the section from Easton to North Tuddenham. This occurred as the A1270 was moving to its construction phase, and further highlighted the notable gap in dual carriageway infrastructure around Norwich.

1.4.8. The A47 Alliance, a collective of businesses, local authorities, MPs and others from across the region, have also set out their ambition to see the entire A47 completed to dual carriageway standard from Lowestoft to the A1 at Peterborough, which will remove existing constraints on traffic movements to and from Norwich from the west. The funded improvements in RIS1, carried forward into RIS2, to the A47 have been planned since 2015 and, when delivered, would further exacerbate the traffic problems and issues already experienced in communities to the west of Norwich, unless adequate mitigatory measures are introduced. The County Council has therefore been working closely with Highways England to ensure that the A47 improvements are integrated with the measures that are part of the NWL proposals (see **section 2.10.6** for detail).

1.4.9. The traffic issues highlighted by communities have become more pronounced with the passage of time. The physical and environmental challenges that the area presents have left this area without a primary A-Road standard route to cater for demand of over 45,000 journeys per day. The emergence of the Food Enterprise Zone is also expected to drive future traffic growth. This area benefits from a Local Development Order, which will allow greater flexibility for new, business-related development within the site.

1.4.10. There is continued local interest in the provision of an NWL to ease traffic problems in the local area and enhance strategic connectivity. Over 4,000 comments were submitted as part of two public consultations in 2018 and 2019 to understand people's experience of living in, and travelling through, the area to the west of Norwich. Respondents perceived the roads in the area to be unsuitable for the current levels and type of traffic (1,395). Rat-running (1,103) and slow journey times (1,001) were frequently mentioned concerns. Key stakeholders have also been engaged with the scheme since 2017, with a Local Liaison Group and Member Working Group meeting bi-monthly.

1.4.11. These concerns are explored in **section 2.3**, which demonstrates how the small, often single-track rural roads are being congested with traffic. The type of traffic involved is also a concern: on the north-south routes that pass close to residential areas such as Taverham, Costessey, Lyng and Weston Longville, over 1,000 HGVs were observed in a 24-hour period.

1.4.12. A pre-feasibility study[2] was completed in June 2016, which reviewed previous work, including a scoping study[3] from 2014 that investigated potential NWL options, including both road and public transport options. A resulting series of actions to support the next stage of development were presented to NCC's Environment, Development and Transport Committee in July 2016.

1.4.13. The 2016 study concluded that further work was needed to develop a business case and set out a compelling case for the scheme. This included demonstrating that:

- There was a real problem to be solved

[2] Norwich Western Link Project Technical Report (Mouchel, June 2016)

[3] A47-A1067 Western Link Road Scoping Study (WSP, September 2014)

- There was a strategic alignment to policy
- The scheme formed part of a coherent wider strategy
- A full range of options had been considered, with the best scheme selected
- The scheme represented a high or very high value for money
- That the scheme was feasible and affordable

1.4.14. A further study[4], undertaken in October 2017, looked at mitigating the environmental impacts of crossing the River Wensum. Bridge (dual / single carriageway) and tunnel (dual / single carriageway) options were considered, with a viaduct option being taken forward for any new link road schemes that cross the River Wensum.

1.4.15. In 2018, NCC undertook a non-statutory public consultation to understand people's experience of living in and travelling through the area to the west of Norwich. A total of 4,426 website visitors were recorded, with 2,327 comments submitted.

1.4.16. A majority of respondents (64%) expressed a preference for the development of a new road between the A1270 and A47 in order to tackle the transport issues highlighted in the area (1,492 respondents). This option was selected by three times as many respondents as the next most popular option of improving the existing roads (473 respondents, 20%).77% of respondents either agreed or mostly agreed when asked to what extent they agreed there was a need for a Norwich Western Link.

1.4.17. From July 2018 to November 2018 an optioneering and appraisal process was carried out to identify and assess options. A long list of 82 options was identified across a range of modes and assessed using the DfT's Early Assessment Sifting Tool (EAST). The assessment areas are listed in **section 2.12.4**, and the process and outcomes detailed in the Option Assessment Report (OAR).

1.4.18. Four highway options and 10 non-highway options were shortlisted. The non-highway options, including sustainable transport interventions, were taken forward to be considered as part of a wider intervention package of measures in a Sustainable Transport Strategy (STS). The four highway options that scored highest against the appraisal criteria consisted of three new highway options and an existing highway upgrade option.

1.4.19. A second round of public consultation commenced on 26 November 2018, with a series of public events held in late 2018 and January 2019. This maximised the opportunity for local residents and affected stakeholders to participate, whilst avoiding conflict with the seasonal holidays.

1.4.20. In 2019, an Option Selection Report (OSR) was produced drawing together information relating to the shortlisted highway link options. It considered a wide range of engineering and environmental criteria, as well as feedback from the public consultation, and subsequently recommended a preferred option be taken forward.

1.4.21. Concurrently, a Strategic Outline Business Case (SOBC) was developed and submitted to Transport East as part of the Regional Evidence Base to inform the Transport East Transport Strategy.

[4] NWL Technical Report (WSP, October 2017)

Transport East assessed the NWL against other schemes in the area as part of a prioritisation process, and the SOBC was subsequently submitted to the DfT. Transport East continue to support the scheme as one of their prioritised large local major projects.

1.4.22. The SOBC was approved in May 2020, and the NWL was accepted for inclusion in the Major Road Network (MRN).

1.4.23. Further work has since been undertaken to determine what sustainable transport options would be delivered alongside the highway works. This includes improvements to the existing walking and cycling networks as well as the existing public transport provision. To aid this, an STS has been developed; proposed improvements were put forward at a Local Access public consultation, which ran from July to September 2020.

1.4.24. This included a Non-Motorised User Strategy for diversions and extensions of Public Rights of Way, side road closures to limit traffic within the immediate area around the NWL, wider sustainable transport interventions (cycle friendly route options and pedestrian/cycle crossing improvements) and options for a potential new bus service.

1.5 LOCAL CONTEXT

1.5.1. Norwich is the county city of Norfolk and a key regional centre in the East of England. It is approximately 185km north-east of London and occupies a strategically significant position within East Anglia. Norwich is one of the fastest growing cities in the UK. The work-day population of Norwich was estimated at just over 280,000 people in the 2011 census. The Office of National Statistics (ONS) estimates that this figure now likely exceeds 300,000. The percentage of residents aged between 16 and 64 is higher than both the East and Great Britain average.[5]. The Greater Norwich area (comprising the Norwich City Council, South Norfolk District Council and Broadland District Council areas) has a combined population of 408,600 (based on 2018 ONS data).

ECONOMIC CONTEXT

1.5.2. As of 2015, Norfolk's economy was valued at £18.6bn. It has grown faster than the non-London UK average since the recession, and, as of 2020, had an employment rate of 78.2% - almost 2% higher than England's average[6]. Norfolk aims to continue that growth, with 73,000 new homes, 57,000 jobs and 5,300 new businesses planned by 2026.

1.5.3. Tourism also remains a pivotal sector for spearheading future growth, supporting 65,398 jobs (18.4% of all employment) and contributing £3.2 billion to the local economy.[7]

1.5.4. In 2017, Norfolk's planning authorities collaborated to create the Norfolk Strategic Planning Framework (NSPF) – a set of shared spatial objectives for growing the county. This was updated in

[5] https://www.nomisweb.co.uk/reports/lmp/la/1946157237/printable.aspx

[6] ONS, Annual Population Survey, June 2020

[7] https://www.visitnorfolk.co.uk/Tourism-info-and-stats.aspx

December 2020 and is expected to be adopted shortly. The report[8] stresses that despite Norfolk's economic strengths, its dependence on lower wage, lower-skill sectors (e.g. food production, agriculture and tourism), and high concentrations of deprivation and hidden rural poverty, will pose serious challenges in the future.

1.5.5. To maintain a positive trajectory, the NSPF identifies a number of strategic employment sites that offer opportunities for inward investment and strategic growth. These are shown in **Figure 1-2**.

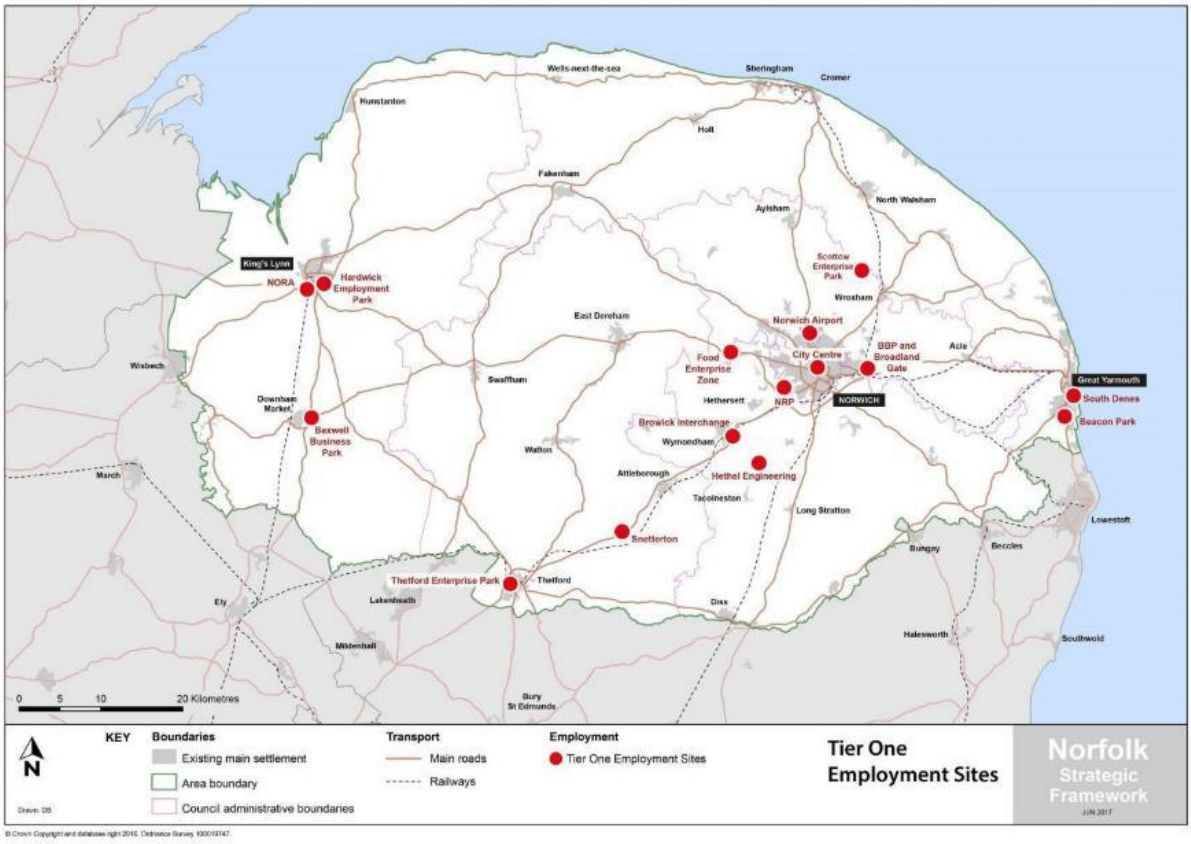


Figure 1-2 – Strategic (Tier One) Employment Sites, Norfolk

1.5.6. The Norwich Research Park (NRP), is accessed from the B1108 south of the A47/A1074 Longwater interchange. It currently employs 12,000 people in over 150 businesses and has an annual research budget of £130 million. It is home to a number of internationally renowned research facilities leading the world in plant and microbial sciences, environmental science, food, diet and health.

1.5.7. The Food Enterprise Park, situated within the Greater Norwich Food Enterprise Zone, is located to the west of Easton and includes 100 acres of potential development. 46 acres of the site benefit

[8] Norfolk Strategic Planning Framework, updated December 2020

from a Local Development Order to encourage and support food production, processing and agriculture through the co-location of commercial enterprises.

1.5.8. Norwich Airport is located approximately three miles north of Norwich city centre and less than five miles from the NWQ. Total passenger numbers for 2018 were recorded as 536,578 and the Airport is worth some £70 million to the local economy. It is also the centre for aviation operations for the southern sector of the North Sea Oil, Gas and Renewables sector.

1.5.9. The airport is growing and has published a masterplan setting out a vision for the airport's continued growth over the next 30 years. By 2045, passenger numbers are targeted to rise to 1.4 million, with a projected worth of £170 million to the local economy. Planning consent has been secured to deliver Imperial Park – a 115-acre business park directly to the north of the Airport. It is estimated that Norwich Airport would support up to 3,350 direct, indirect and induced jobs. Of these, around 3,250 jobs would contribute to the local economy. Norwich Airport has stated that these growth ambitions remain in place post-pandemic.

1.5.10. Movements from the south/south west of Norwich to the airport are currently constrained. The airport is sign-posted via the A1074 and Longwater interchange with the A47, which already suffers from delays and unreliability due to peak period congestion.

1.5.11. The NWL is expected to provide a more reliable primary route to strategic employment sites, supporting future employment growth at the airport, the Food Enterprise Zone and the Norwich Research Park. Without the scheme, the targeted employment growth is likely to increase congestion on existing routes, and limit expansion.

1.5.12. In line with the Government's Levelling Up strategy, these improved linkages to employment sites will help to address economic inequalities within Norfolk. Additional detail on areas of deprivation in the study area are shown in **sections 1.5.17** and **1.5.18**.

DEMOGRAPHIC PROFILE

Resident population

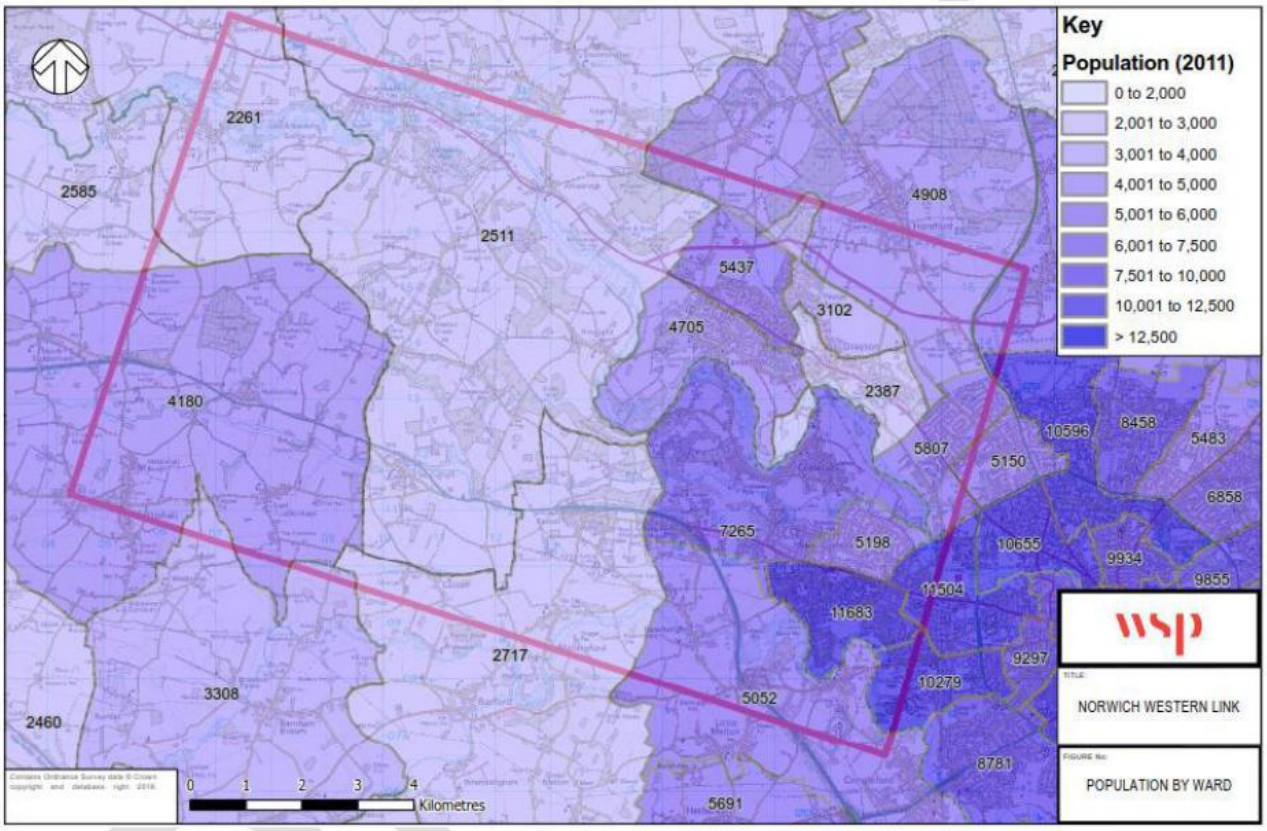
1.5.13. With an estimated work-day population of over 280,000 people, Norwich is one of the largest urban areas in the East of England. The NWQ has an estimated population of 77,600[9], excluding the population of Morton on the Hill and Alderford. **Figure 1-3** indicates the total population by ward, whilst **Table 1-1** identifies the top five populated areas within the study area, by age.

Table 1-1 – Top five most populated areas within study area (Census 2011)

Location	Total	Age 0-14 (%)	Age 15-64 (%)	Age 65+ (%)
Parish – Costessey	12,463	2,059 (17%)	8,000 (64%)	2,404 (19%)
Residential area – Bowthorpe	11,683	2,377 (20%)	7,978 (68%)	1,328 (11%)

[9] Census, 2011

Residential area – North Earlham	11,504	2,299 (20%)	7,902 (69%)	1,303 (11%)
Parish – Hellesdon	10,957	1,336 (12%)	6,548 (60%)	3,073 (28%)
Parish – Taverham	10,142	1,780 (18%)	6,549 (65%)	1,813 (18%)
NWQ study area	77,600	13,246 (17%)	50,183 (65%)	14,171 (18%)



Source: 2011 Census

Figure 1-3 – Population by ward

1.5.14. **Table 1-2** provides the trend in total population between 2012 and 2019 (based on available mid-year estimates to 2019), as well as a projected estimate for 2041. The population of South Norfolk and Beckland increased by 11.82% and 6.15% respectively between 2012 and 2019, with the populations of Norwich and Broadland increased more slowly when compared to regional and country rates.

Table 1-2 – Population increase between 2012 and 2019 and predicted increase to 2041

Year	Norwich	Breckland	Broadland	South Norfolk	Norfolk	East of England	England
2012	133,867	131,857	125,173	125,987	864,847	5,905,914	53,493,729

Year	Norwich	Breckland	Broadland	South Norfolk	Norfolk	East of England	England
2013	135,118	132,995	125,499	127,682	870,296	5,951,934	53,865,817
2014	136,587	134,287	125,956	129,345	877,388	6,017,250	54,316,618
2015	138,097	135,698	126,626	131,199	884,748	6,075,970	54,786,327
2016	139,865	137,123	127,402	132,965	891,731	6,129,005	55,268,067
2017	140,353	138,602	128,535	135,471	898,390	6,168,432	55,619,430
2018	141,137	139,329	129,464	138,017	903,680	6,201,214	55,977,178
2019	140,573	139,968	130,783	140,880	907,760	6,236,072	56,286,961
2020	142,790	142,019	131,671	142,705	917,736	6,277,257	56,678,470
2021	143,134	143,322	132,781	145,008	924,146	6,312,979	56,989,570
% Increase	5.01%	6.15%	4.48%	11.82%	4.96%	5.59%	5.22%
2041	151,733	162,835	149,437	174,933	1,021,749	6,794,441	61,353,965
% Increase	8.87%	19.50%	17.60%	33.31%	15.03%	11.27%	11.38%

Source: Population Projections (Office for National Statistics)

1.5.15. Norfolk has an ageing population, with 24.5% of its population over 65 years of age.[10] This is almost 5% higher than the wider East of England population estimate.

1.5.16. Projections suggest that this trend will only increase. The population in the Norfolk area (including Norwich, Breckland, Broadland and South Norfolk) is expected to increase by approximately 15.03% over the 25-year period from 2016 to 2041. Of this increase, the working group population (15-64 years of age) will increase by approximately 2%, equating to 55% of the total population. The retired population (65+ years of age) will grow by approximately 44%, accounting for 31% of the total population.

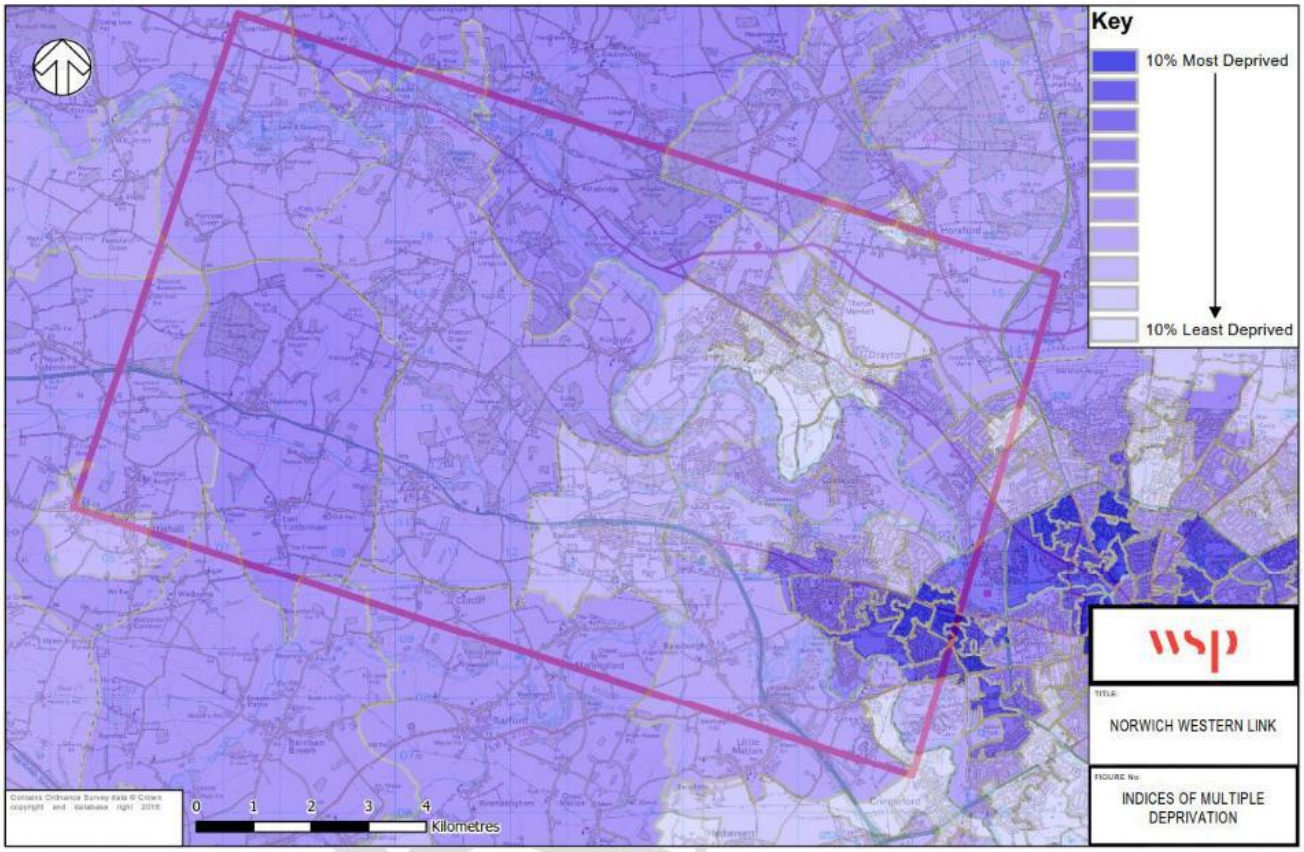
Deprivation

1.5.17. The NWQ has two of its Lower Layer Super Output Areas (LSOAs[11]) in the 10% most deprived areas of the country, measured against the Indices of Multiple Deprivation (IMD). The IMD includes

10 ONS, 2019

11 Geographical areas of a consistent size with similar social characteristics, created to allow for the comparison of data sets, including Indices of Deprivation. Lower Layer Super Output Areas (LSOAs) contain a population of between 1,000 and 3,000, or between 400 and 1,200 households. (ONS)

various factors influencing the level of affluence in an area including income, employment, education, health, crime, barriers to housing services and the living environment. The areas experiencing the highest levels of multiple deprivation are located west of Norwich and include parts of the Bowthorpe and North Earlham residential areas, as shown in **Figure 1-4**.



Source: Indices of Multiple Deprivation (Ministry of Housing, Communities and Local Government)

Figure 1-4 – Levels of multiple deprivation

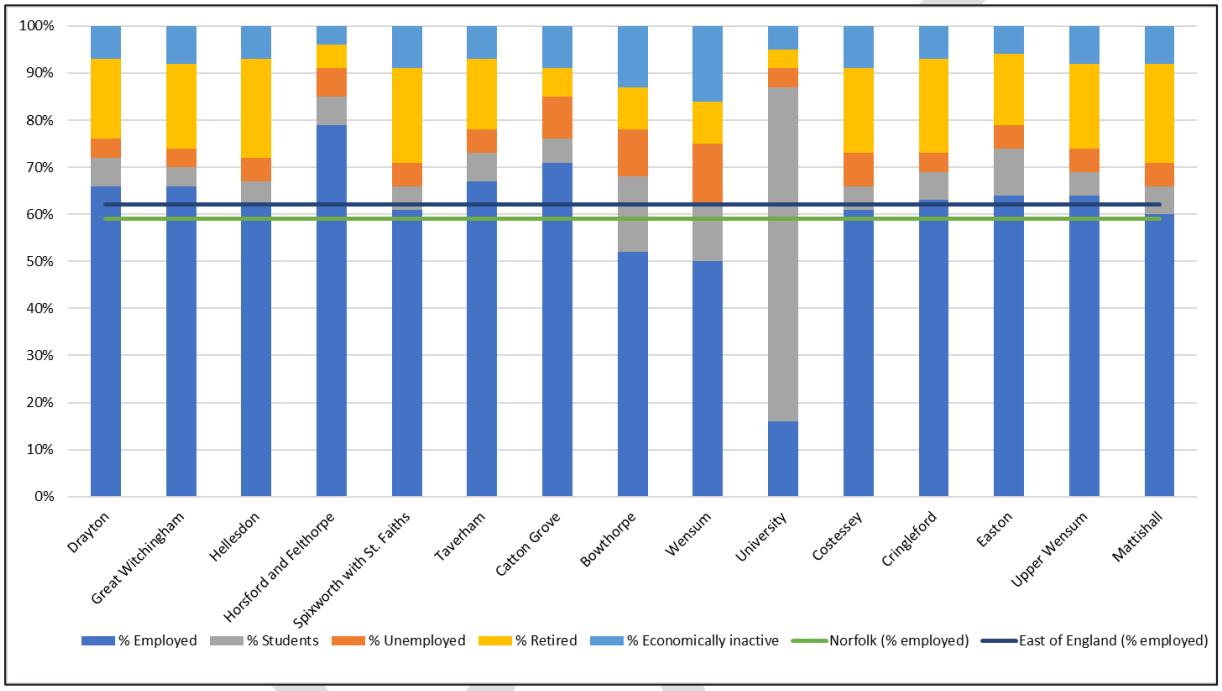
1.5.18. Higher deprivation exists across the NWQ when education and training indices are considered. The most deprived LSOAs are located south-east in Bowthorpe and North Earlham. The total estimated population in the most deprived wards is approximately 15,800, which accounts for 20% of the NWQ population.

Employment

1.5.19. Norwich is the largest labour market in the region, accounting for approximately 60% of all jobs in Norfolk, and as such, creates large volumes of movements of goods and people. Transport efficiency is a critical component of economic growth nationally and locally. **Figure 1-5** shows the economic activity of the population aged 16 to 74 within the NWQ, derived from Norfolk Insight

Statistics[12]. The graph includes the percentage of population in employment (including those in full or part-time employment and self-employed), unemployed, in full time education, retired, and economically inactive (including those looking after family or suffering from long-term sickness or disabilities).

1.5.20. Across the NWQ, the employment rate ranges from 16% around University and 50% in Wensum (located to the south-east and including North Earlham) to 79% in Horsford and Felthorpe located to the north-east. Unemployment rates range from 4% in Cringleford, University, Drayton and Great Witchingham to 13% in Wensum.



Source: Norfolk Insight Statistics

Figure 1-5 – Economic activity across the study area

TRANSPORT CONTEXT

Highway network

1.5.21. The NWQ is bounded to the south by the A47, part of the SRN. To the south-east, the A47 connects with the A11, which provides connections from Norwich to Cambridge (via the A14) and London (via the M11). To the north of the study area is the A1067, which provides a key radial route from Norwich to surrounding residential communities and out to the market town of Fakenham.

12 https://www.norfolkinsight.org.uk/

1.5.22. Within the NWQ, there is a 'gap' between the A47 (west) and A1067, with no existing A roads between the two. The existing links are of a lower standard, rural single carriageway roads and pass through residential areas including Costessey, Taverham, Ringland and Weston Longville.

1.5.23. Improvements have been delivered along Sandy Lane, Walnut Tree Lane, Wood Lane, Stone Road and Lyng Road to provide an enhanced link between the A47 and north Norwich for Heavy Goods Vehicle (HGV) movements, primarily to reduce long-standing HGV traffic problems in Hockering. This route has been designated as a B-Road (B1535). The alignment of the B1535, however, remains constrained by existing property boundaries and consequently includes a number of tight bends. It does not provide a direct link between the A47 and A1270, doing little to alleviate HGV traffic in rural communities.

1.5.24. **Figure 1-6** shows the NCC Trunk Road and resilience network, indicating the gap between the A47 and A1067.

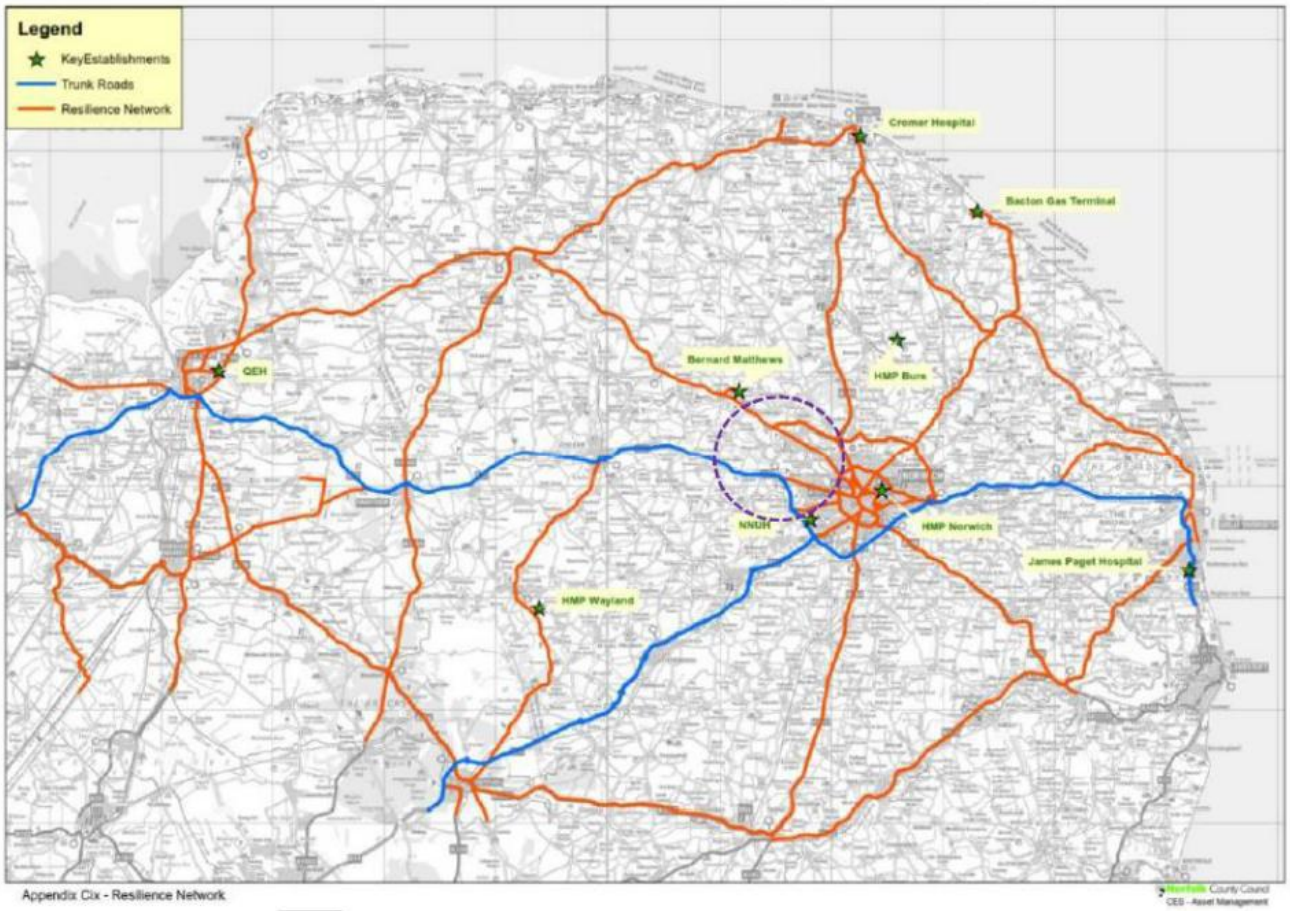
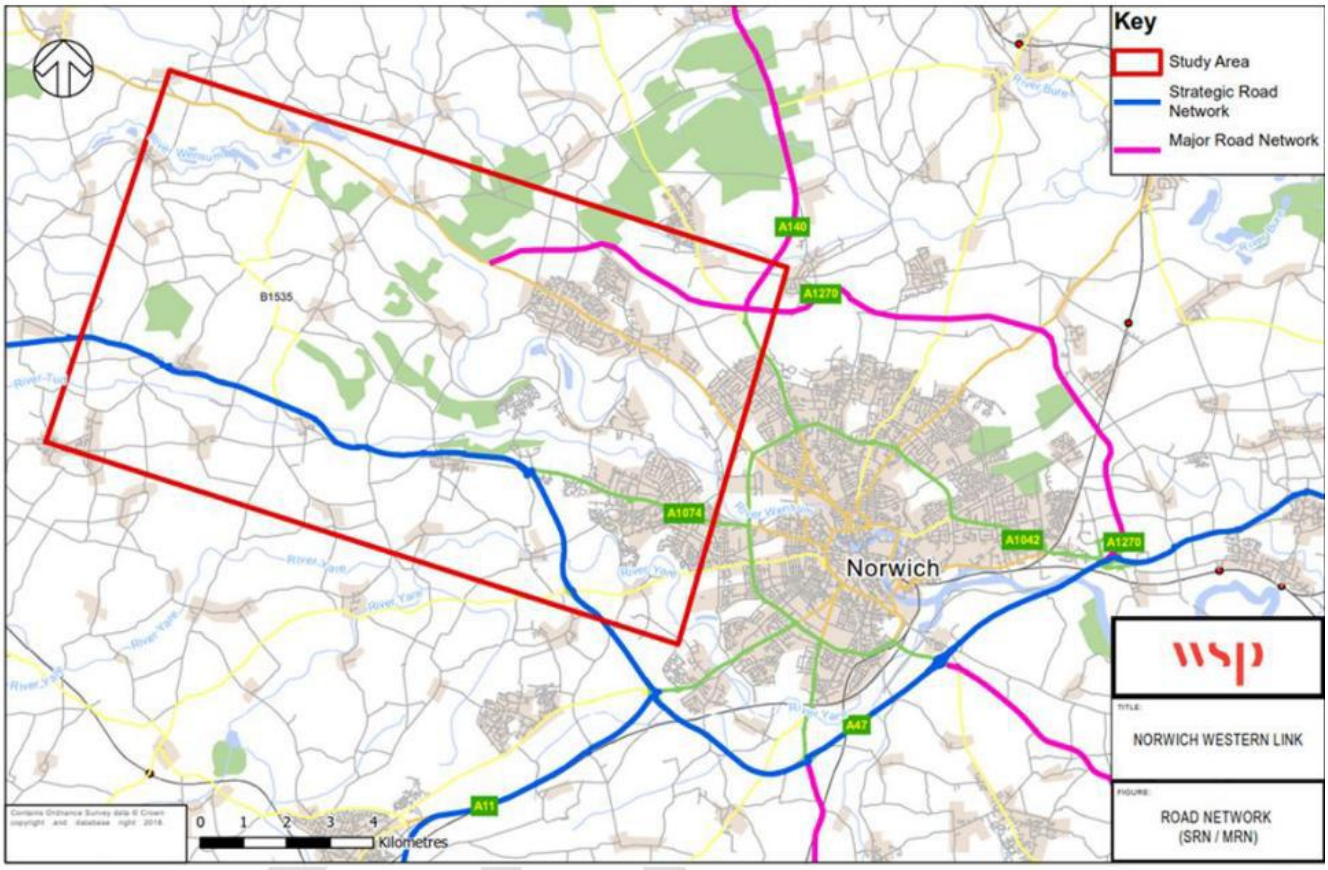


Figure 1-6 – NCC Trunk Road and Resilience Network

1.5.25. The final section of the A1270, from the A1151 Wroxham Road to the A47 at Postwick, opened on Tuesday 17 April 2018. The A1270 significantly increases network capacity, providing an improved route for trips whilst relieving traffic pressures and congestion on existing routes. However, the lack of a western link reduces the orbital connectivity, and existing traffic issues within the NWQ remain.

1.5.26. The A140 and A1270 are MRN routes, connecting to the A47 at the Postwick Hub, as shown in **Figure 1-7**. The NWL would fill in the missing MRN link between the A47 and A1067 in the west,

extending the A1270 to meet the A47 on the west of Norwich. This route would increase orbital connectivity and provide a suitable north-south alternative for vehicles to circumnavigate Norwich to the west.



Source: Proposals for the creation of a Major Road Network, Map (Department for Transport)

Figure 1-7 – SRN and MRN routes

COVID-19

1.5.27. As mentioned in section 1.3, the impacts of Covid-19 are still being explored. While current traffic monitoring is indicating that traffic levels are already recovering to near pre-pandemic levels, the change in travel demand, need for employment-related journeys and associated growth assumptions will become clear as recovery progresses.

1.5.28. Revised economic and population projections were issued by the Office for Budget Responsibility (OBR) in March 2020, along with updated medium-term economic projections published in July 2020. These reflect the OBR assessment of the impact of COVID-19 on economic growth. In line with DfT guidance, sensitivity testing was undertaken as part of the appraisal efforts for this OBC to account for the impact of these revisions as well as for updated fleet assumptions.

1.5.29. The New Anglia LEP has published a Covid-19 Economic Recovery Restart Plan, which identifies investment in infrastructure as one of the measures identified for economic recovery. The plan states that “we will support the construction sector through continued investment in key infrastructure and make a compelling case to Government to fund priority infrastructure schemes.”

STRUCTURES

1.5.30. **Figure 1-8** indicates the locations of structures within the NWQ and classifies them into dual carriageway, single carriageway, single lane carriageway, footway / cycleway structures and existing track bridges.

1.5.31. Limited infrastructure is in place to enable the crossing of the River Wensum. Between Hockering, Longwater interchange, Taverham and Attlebridge there are two single carriageway structures at Queen's Hills and Taverham. The only dual carriageway structure is currently in New Costessey serving the A1074.

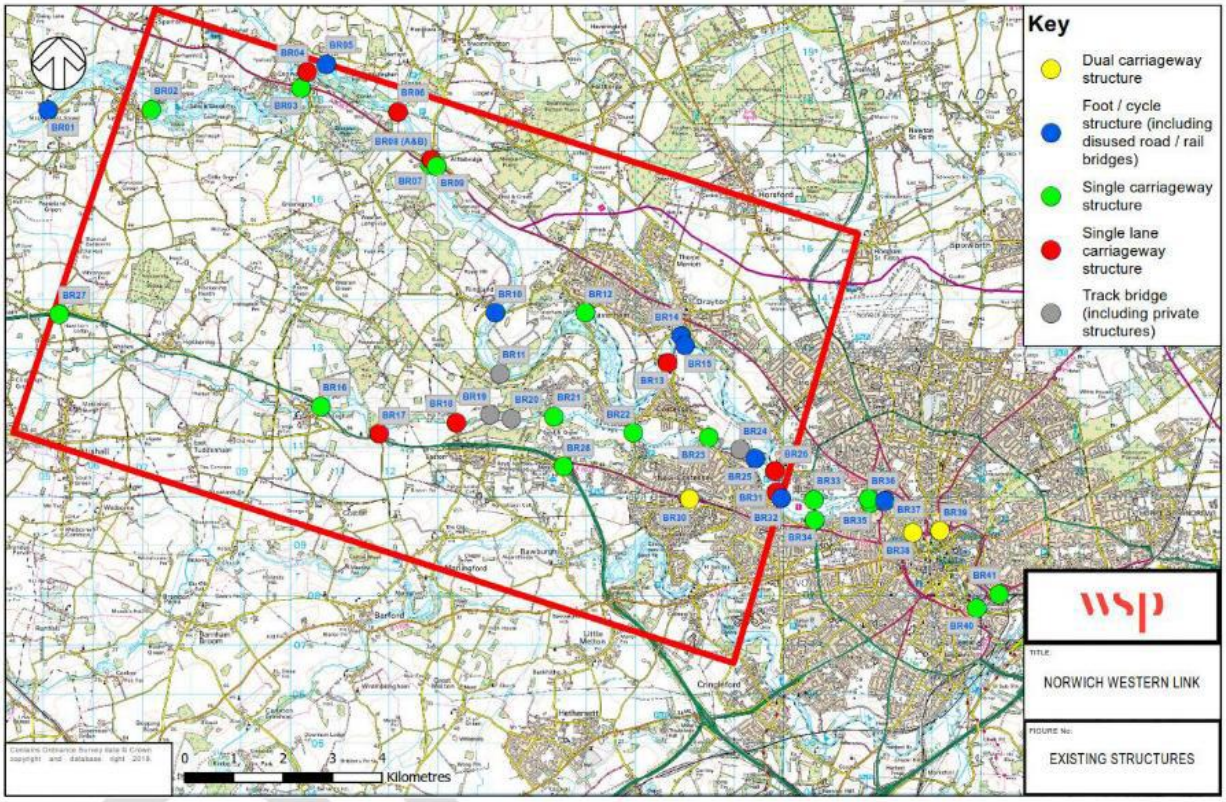


Figure 1-8 - Existing structure locations

WIDER TRANSPORT CONTEXT

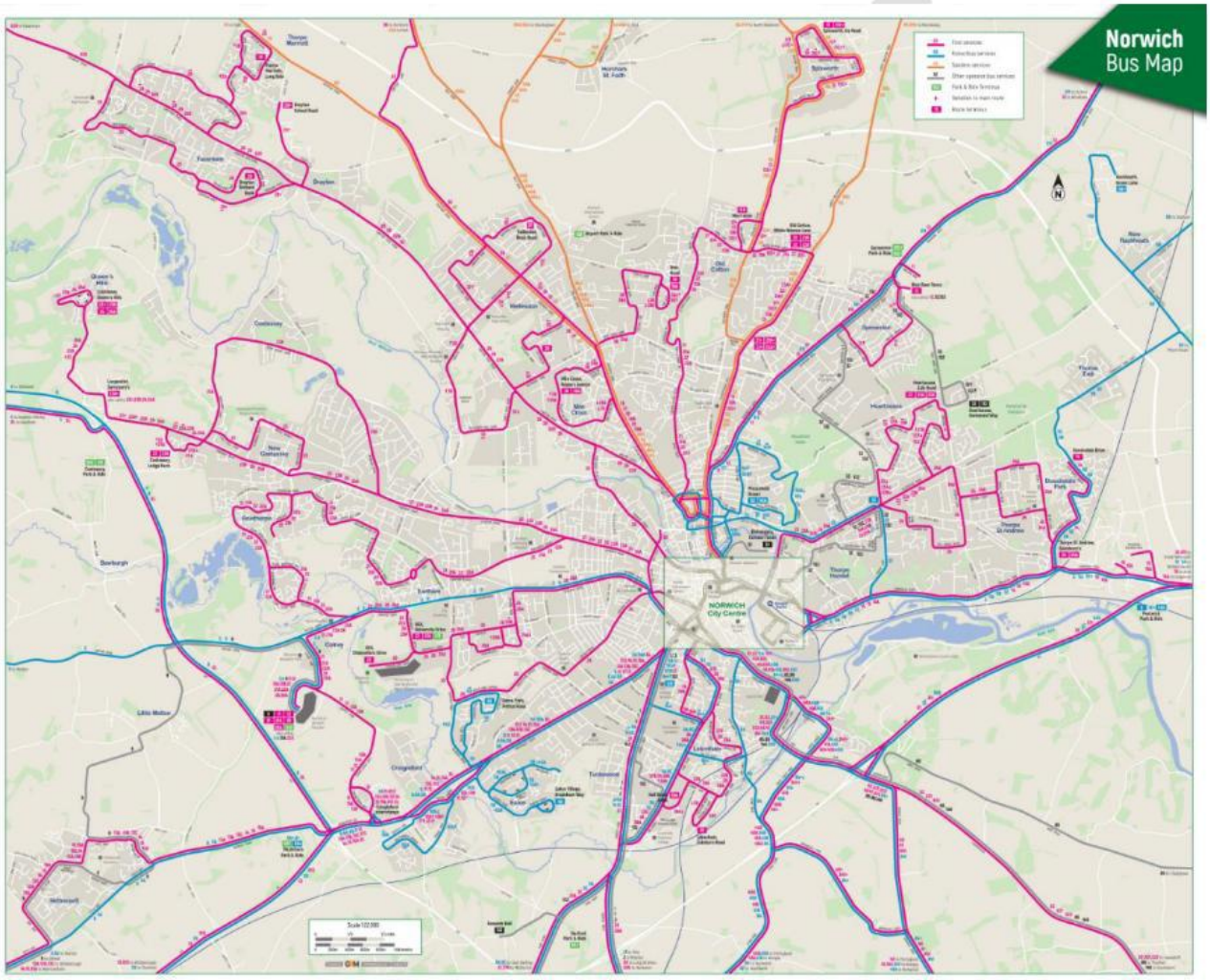
Rail

1.5.32. Norwich Railway Station is located approximately 8km south-east of the NWQ study area, and to the south-east of the city centre. Norwich is generally well placed on the rail network, with Norwich Railway Station located on the Great Eastern Mainline and served by several secondary railway lines such as the Breckland Line, Bittern Line and Wherry Line. The station is served by two rail operators (Abellio Greater Anglia and East Midlands Railway) providing access to destinations within the Norfolk area as well as further afield.

1.5.33. There are no connecting stations within the NWQ, or to key employment locations on the west side of Norwich. While Norwich Railway Station can be accessed by bus services from Costessey (including Queen's Hills) and Taverham, access to the station from more rural locations within the NWQ is challenging.

Bus and coach links

1.5.34. The bus network in the study area is largely radial, providing routes to and from Norwich city centre along key corridors. The eastern part of the study area is well connected with Norwich city centre, particularly during the day. First Bus provides several services connecting Queen's Hills, Costessey, Easton, Hellesdon and Taverham with destinations within and around Norwich city centre as shown in **Figure 1-9**. Bus services also operate within the study area, connecting residential areas to major employment sites. There is, however, a lack of traditional bus services within the identified gap to the west of Norwich, including Weston Longville, Weston Green and Ringland.



Source: Norwich City-Wide Network Map (First Bus)

Figure 1-9 - Bus service routes

1.5.35. There are bus stops in the NWQ located within walking distance from residential areas, however due to inadequate or limited pedestrian facilities (more detail provided in **section 1.5.43**) between villages and bus services, access by foot from many residential areas is less viable.

1.5.36. **Table 1-3** shows the bus services connecting the NWQ to the north and east of Norfolk, Norwich city centre and locations to the north and east of Norwich. While First Bus offers regular services connecting settlements within the study area with King's Lynn and Swaffham via Easton, Hockering,

and Dereham, connecting services to Holt and Cromer are more limited, with Holt being connected via a single school bus – open to the public – and operated by Sanders Coaches Monday to Friday.

Table 1-3 - Typical weekday bus timetable for NWQ

Service	Route	Operator	Frequency
4, 4A	Norwich to Swanton Morley	KonectBus	1 per hour
8 Fast	Norwich to Toftwood	KonectBus	2 per hour
Yellow (28 & 29)	Norwich to Thorpe Marriott	First Bus	1-4 per hour
Purple (36, 37, 38 & 39)	Long Stratton to Horsford (via Norwich City Centre)	First Bus	Up to 4 per hour
Red (23 & 24)	Queen's Hills / Costessey to Heartsease / Thorpe St Andrew (via Norwich City Centre & Rail Station)	First Bus	Up to 4 per hour
510	Costessey Park & Ride to Norfolk and Norwich University Hospital	KonectBus	Up to 2 per hour
Excel (A, B & C)	Norwich to King's Lynn	First Bus	2 per hour
X29	Norwich to Fakenham	First Bus	1 per hour
56	Sheringham – Easton College (via Holt)	Sanders Coaches	1 per day, Monday - Friday

Park & Ride

1.5.37. Currently, there are six Park & Ride sites located around Norwich, providing a total of almost 5,000 parking spaces on the urban fringe and enabling mode shift to non-car modes to be achieved. Of the six sites, five serve the city centre, as shown in **Figure 1-10**.

1.5.38. The Costessey Park & Ride is located within the NWQ study area (south-eastern section), next to the Royal Norfolk Showground. This only serves Norfolk and Norwich University Hospital (NNUH) and the University of East Anglia (UEA). Residents of western Norwich or users arriving from the west would need to use the Thickthorn Park & Ride or Airport Park & Ride sites to access the city centre. The latter results in journeys across the study area.

1.5.39. While there are no plans for additional Park & Ride sites, expansions to the Thickthorn Park & Ride were proposed as part of the Transforming Cities programme (TCF). NCC was successful in these applications and received funding towards schemes that will promote intra-city connectivity and significantly improve public and sustainable transport in Greater Norwich. In total the TCF is providing over £40m of investment.

1.5.40. First Eastern Counties, who provide around 80% of the bus services in Greater Norwich, are committing an additional £18m of investment in new buses, refurbished buses and increased service frequencies as part of the TCF. Recent investment by First saw the introduction of new, high specification buses on the Excel service operating from west Norfolk into Norwich, with fast, limited stop services and up to three buses per hour from Dereham.

1.5.41. Discussions are also in progress with Norwich Research Park to provide a new bus service from Thickthorn P&R site to the NRP, which would be in addition to the existing service to the city centre.

Source: Network Map (Park & Ride Norwich)

Figure 1-10 - Park & Ride routes and locations

1.5.42. Further transport intervention in the NWQ would improve strategic connectivity to the existing Park & Ride sites, catering for desire lines through the study area and making sustainable travel to central Norwich more convenient and efficient.

Walking infrastructure

1.5.43. Walking infrastructure in the study area is variable. Within more built-up areas, the provision is generally adequate, with footways in place adjacent to the roads. There is limited provision between villages, where connectivity is hindered either by roads or a lack of safe pedestrian infrastructure.

1.5.44. There are numerous Public Rights of Way (PRoW, **Figure 1-11**) within the study area, including footpaths and bridleways in Bowthorpe, Costessey, Drayton and Ringland. Pedestrian crossing points are generally on main roads and at key locations and junctions.

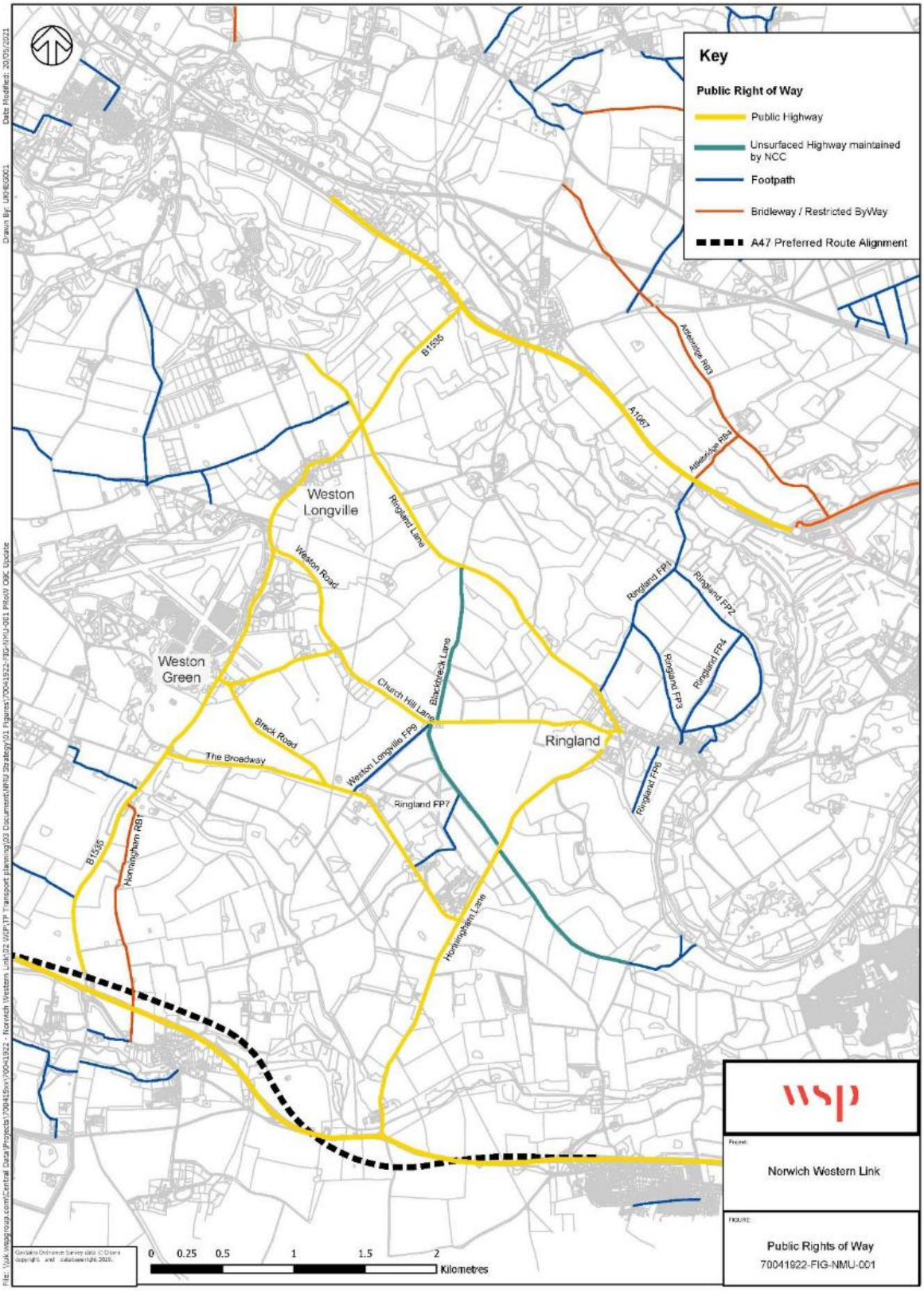

Key
Public Right of Way
Public Highway
Unsurfaced Highway maintained by NCC
Footpath
Bridleway / Restricted ByWay
A47 Preferred Route Alignment
Weston Longville
Weston Green
Ringland
B1535
A1067
Ringland Lane
Weston Road
Church Hill Lane
Blackbreck Lane
Breck Road
The Broadway
Weston Longville FP8
Ringland FP7
Honingham RB7
Honingham Lane
Attlebridge RB3
Attlebridge RB4
Ringland FP1
Ringland FP2
Ringland FP3
Ringland FP4
Ringland FP6
0 0.25 0.5 1 1.5 2
Kilometres
Norwich Western Link
Public Rights of Way
70041922-FIG-NMU-001

Figure 1-11 – Public Rights of Way

Cycling infrastructure

1.5.45. While cycling could provide a sustainable alternative means for short to medium length journeys, the infrastructure available to do so in the NWQ is extremely limited. Local (on-road) routes run to the south-east and the National Cycle Network Route 1 (NCR1) cross through the northern extents. This section of the NCR1, also known as Marriott's Way, is a 42km footpath, bridleway and cycle route, following the alignment of two disused railway lines. The route passes through Norwich city centre, Costessey, through Drayton crossing the A1067 and the A1270, and goes westward towards Lenwade. From there the route goes north towards Reepham and beyond.

1.5.46. **Figure 1-12** shows the NCR1 and other local cycle routes present within the study area.

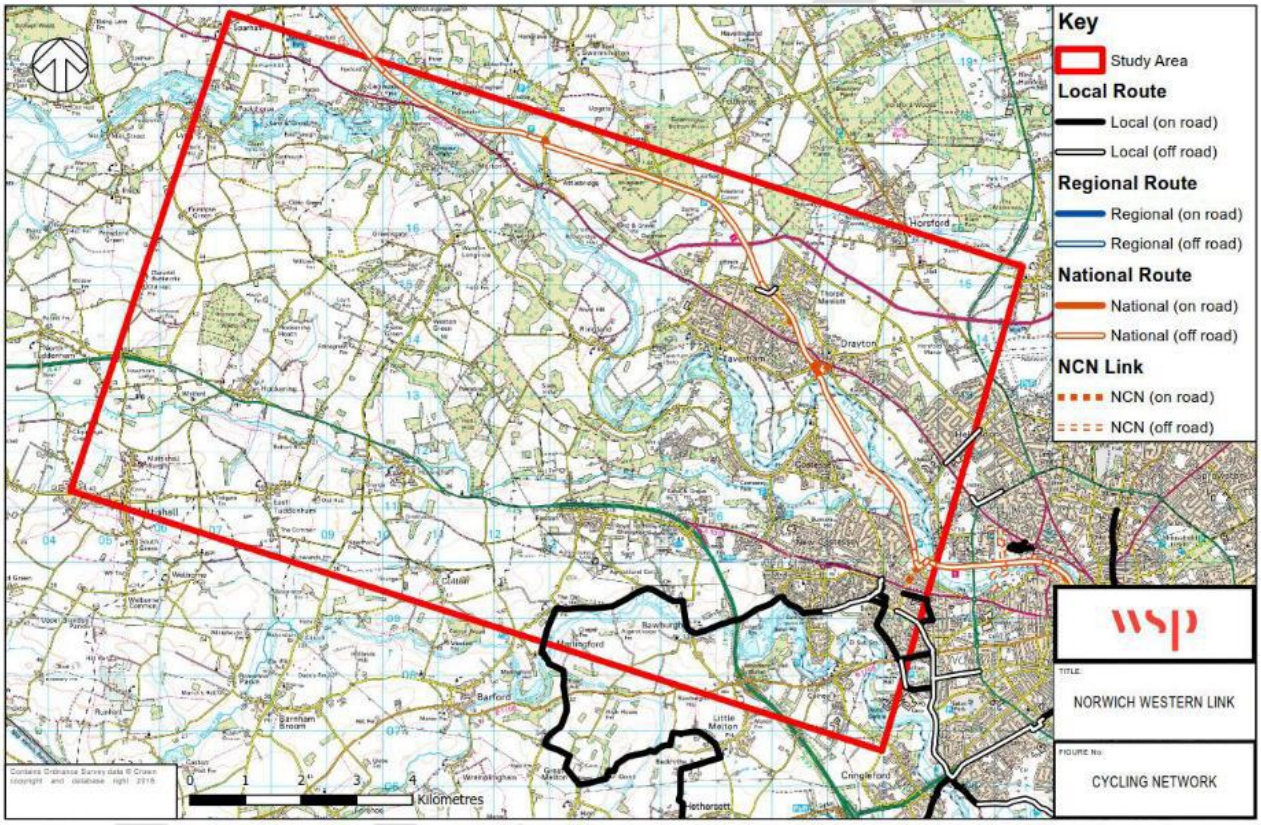


Figure 1-12 - Cycle network

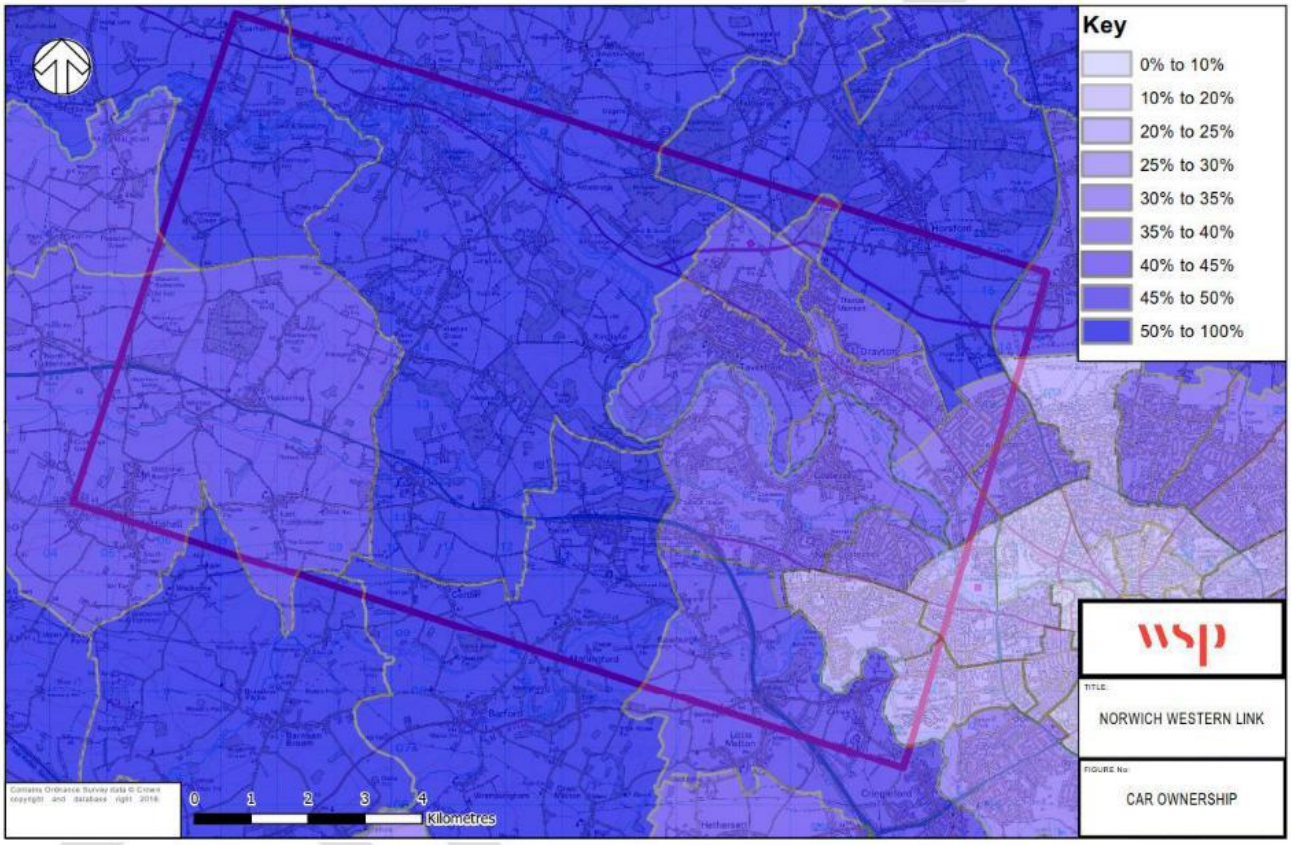
1.5.47. More widely, the Norwich cycle network is made up of seven colour-coded routes, known as 'Pedalways', which cross the city in all directions, and converge at St Andrews Plain in the city centre. The Pedalways in Norwich are as follows:

Green	between Bowthorpe and Broadland Business Park
Red	between Drayton and Whitlingham (NCN1)
Yellow	between Lakenham and Aviation Academy
Pink	between NNUH and Heartsease
Blue	between Wymondham and Sprowston
Orange	Inner circuit
Purple	Outer circuit

1.5.48. Norwich was awarded two significant Cycle City Ambition grants from the DfT. The first wave of funding saw improvements to the 13km Pink Pedalway and the connections leading to it, creating a higher quality cycle link from the NNUH and UEA, through Norwich city centre, to Heartsease and Broadland.

TRAVEL PATTERNS

1.5.49. Approximately three-quarters (75.1%) of residents within the NWQ travel to work by car, either as a driver (69.3%) or passenger (5.8%). As shown in **Figure 1-13**, the majority of residents within the study area has access to two or more cars.



Source: 2011 Census

Figure 1-13 - Households with two or more vehicles

1.5.50. Smaller proportions use public transport modes such as bus (7.8%) and train (0.6%) to travel to work. This could be attributed to areas within the NWQ having poor public transport connections to the city centre and / or the distance being too great to use active modes of transport such as cycling and walking. This suggests both the need for improved public transport connections between the western areas of the study area and Norwich city centre, and the need for improved transport links, to cope with the volume of journeys undertaken by road and the high percentage of car ownership within the study area.

1.5.51. According to the 2011 Census data for Breckland, Broadland, Norwich and South Norfolk, 49% of journeys to work are under 10km **(Figure 1-14**), indicating opportunities for encouraging modal shift away from private car usage to other, more sustainable modes of transport.

Figure 1-14 - Average distance travelled to work - 2011 Census

ORIGINS AND DESTINATIONS: 2015 TRAFFIC MODEL

1.5.52. As part of the evidence pack for the Options Assessment Report, analysis was performed on the traffic model to understand the origins and destinations of vehicles within the study area, and determine whether an NWL could impact upon the routes currently used. Analysis was undertaken on four routes in both directions, during the morning peak.

Outer A1067

1.5.53. In the eastbound direction, many trips utilised the B1535 to transfer from the A47 to the A1067 and continue to destinations to the north of Norwich. Some trips diverted through the study area via Taverham and Costessey to reach destinations to the south of Norwich. In the westbound direction, those same trips could utilise an NWL.

A1067

1.5.54. On the A1067 near Hellesdon, a large number of eastbound trips had a destination to the south of Norwich and were using the A140 to make the journey. An NWL could potentially attract trips off the A1067 and route them south before reaching the city, thus relieving pressure on the outer ring road.

1.5.55. Westbound, those trips utilising the A1067 originated in the south and south-west. They used the outer ring road to access destinations to the north and north-west. An NWL would allow them to take a more direct route and avoid the outer ring road.

A1074

1.5.56. Eastbound trips that originated from the A47 had a destination to the north of Norwich. Vehicles used the outer ring road to complete this journey. The introduction of an NWL could therefore attract trips from the A1074, helping to reduce current congestion.

1.5.57. In the westbound direction, the trips originating from the north-east of Norwich, which utilised the outer ring road and the A1074 to get to destinations along the A47, could utilise the A1270 and NWL to avoid Norwich city centre.

A47

1.5.58. Eastbound trips had origins from the A47 as well as the A1067 to the north-west via the B1535. Destinations tended to be to the south of Norwich, though some travelled north via routes through Costessey and Taverham.

1.5.59. Those trips that used the B1535 to access the south of Norwich would benefit from the NWL, as would those using routes through the surrounding villages and the inner ring road to reach destinations in the north and centre of Norwich. This would relieve the local road network and potentially part of the inner ring road traffic.

1.5.60. In the westbound direction the reverse is evident, and as such, trips would benefit in both directions from an NWL.

ORIGINS AND DESTINATIONS: 2019 TRAFFIC MODEL

1.5.61. The 2019 base year transport model was used to assess the origin and destination of trips on the north – south routes between the A47 and the A1067. This included:

- B1535 Sandy Lane
- Paddy's Lane

1.5.62. **Figure 1-15** to **Figure 1-18** show the scale of trips using north-south routes that would benefit from the introduction of an NWL.

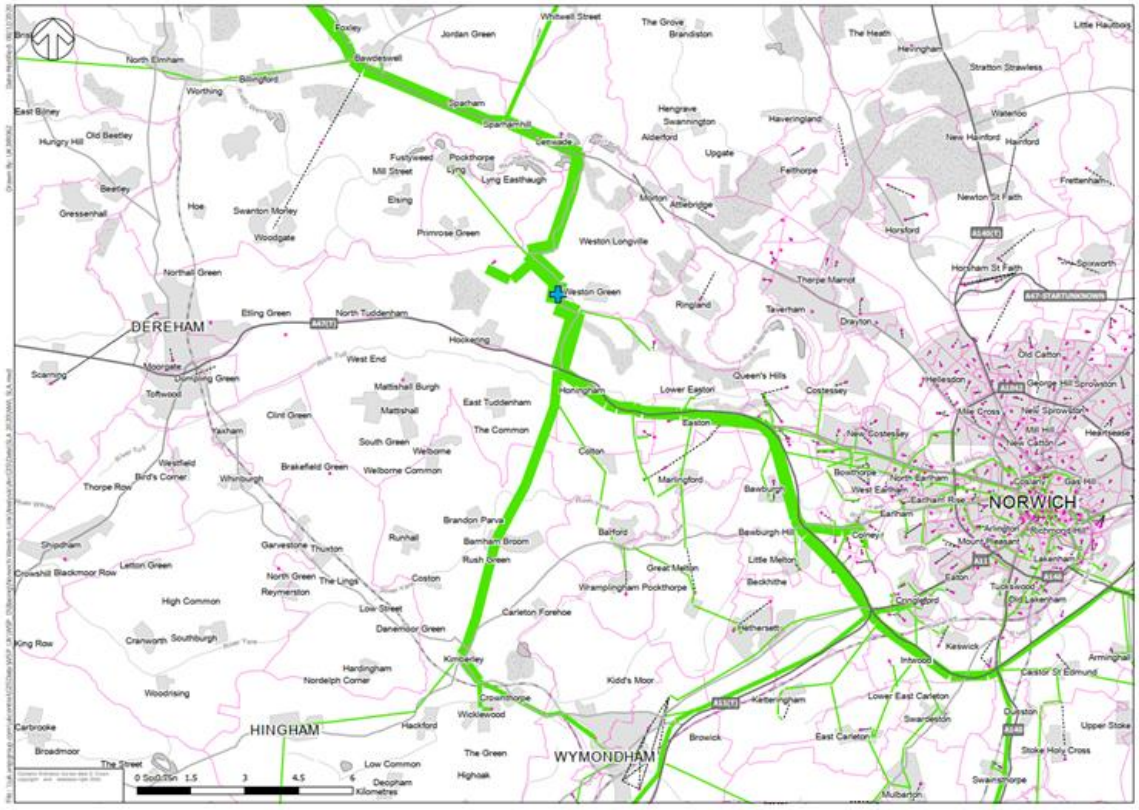


Figure 1-15 - Select Link Analysis - B1535 Sandy Lane (northbound)

Figure 1-16 - Select Link Analysis - B1535 Sandy Lane (southbound)

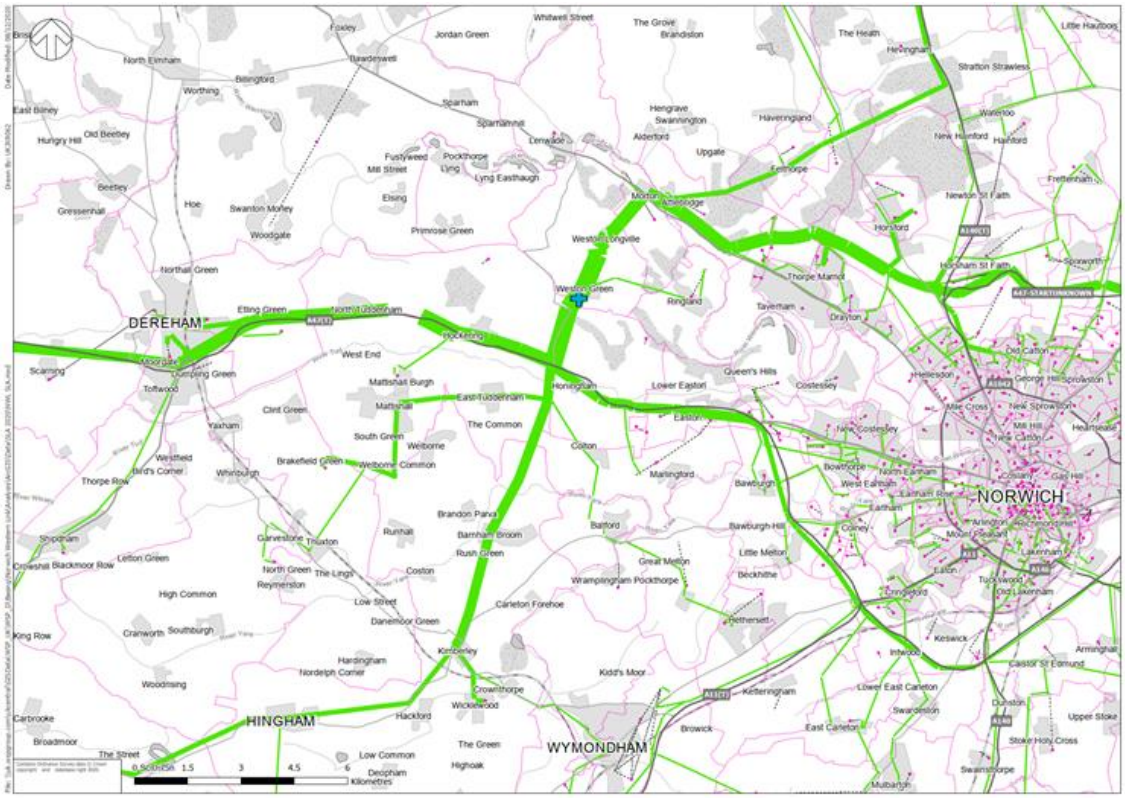
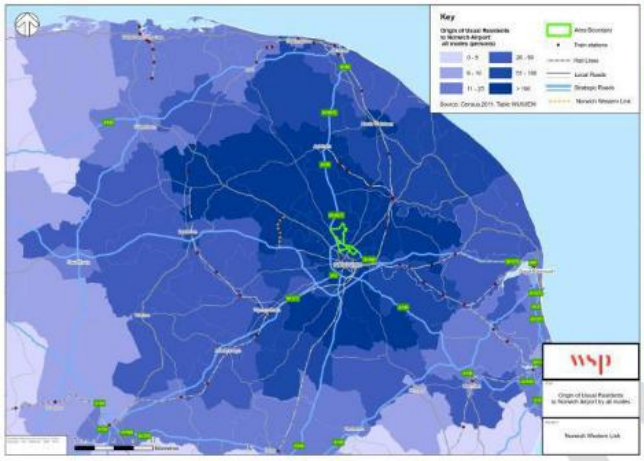


Figure 1-17 - Select Link Analysis - Paddy's Lane (northbound)

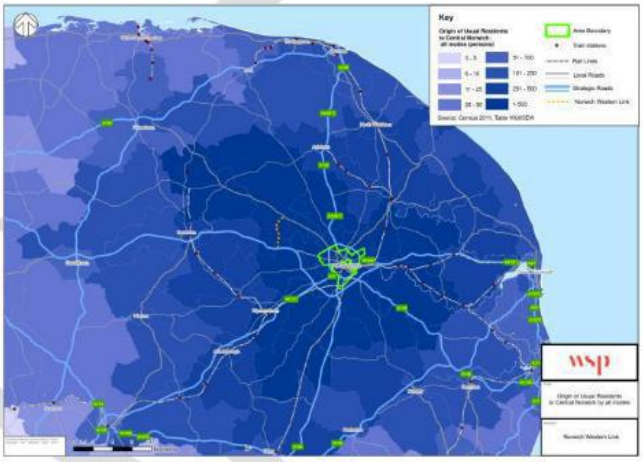
Figure 1-18 - Select Link Analysis - Paddy's Lane (southbound)

EMPLOYMENT SITES

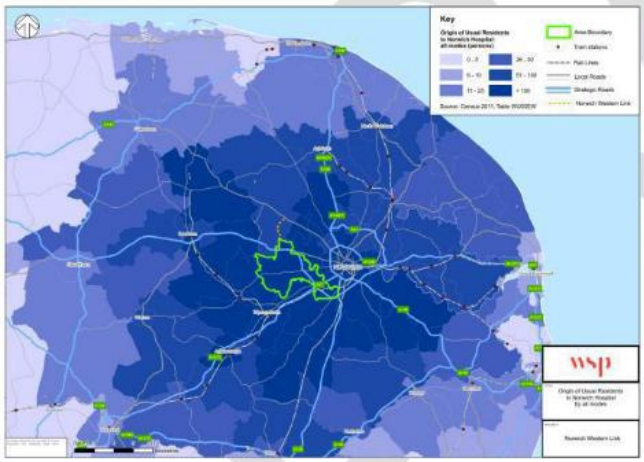
1.5.63. Using Census journey to work data, the origins of residents to various employment centres was analysed. This is shown in **Figure 1-19**. The Census data indicates that many commuter journeys have potential desire lines through the NWQ, which, dependent on whether their location of work is to the north or south of the city, could benefit from an NWL. Key workplaces such as NNUH, UEA, Norwich Research Park, and Norwich Airport attract a large proportion of journeys to work from the NWQ, and could benefit from an NWL, avoiding the need to use the local road network, or the outer ring road of Norwich to access the A11 heading south-west out of the city.



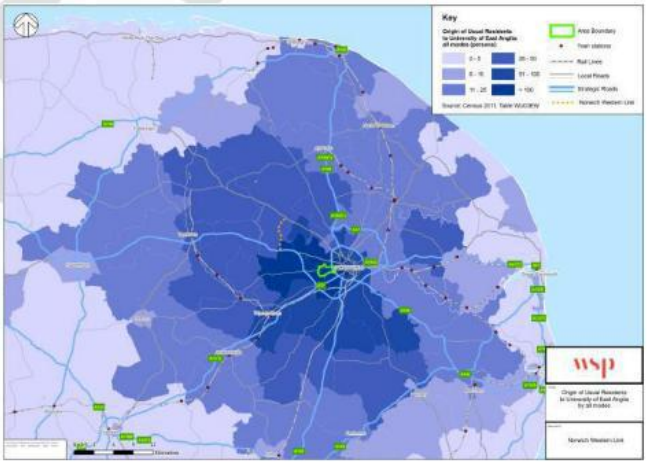
Norwich International Airport



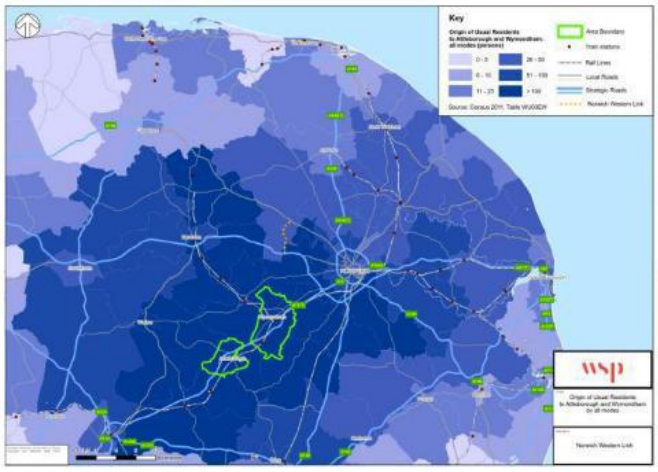
Norwich city centre



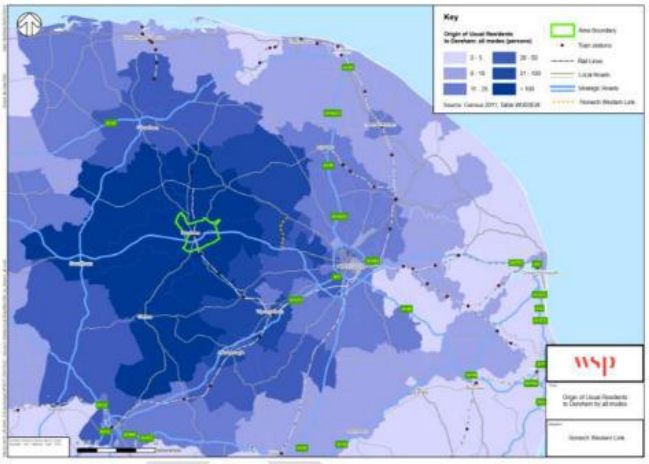
NNUH / Norwich Research Park



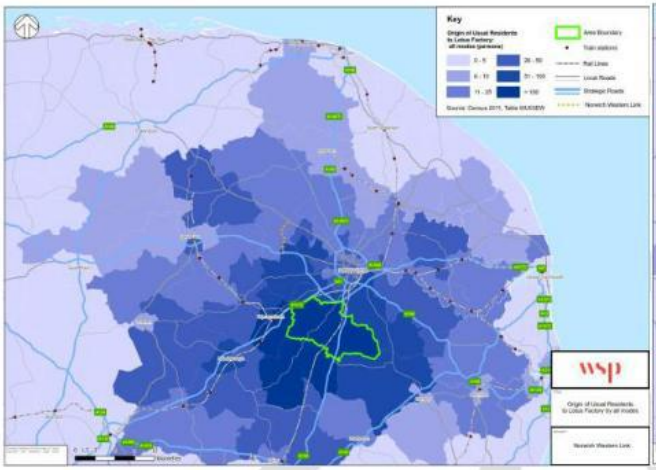
University of East Anglia



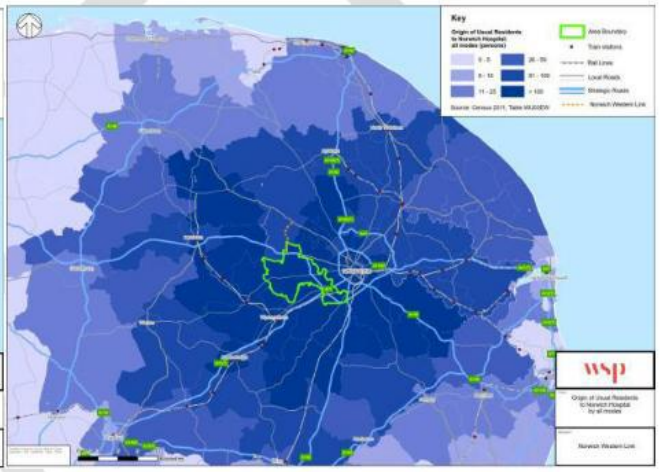
Attleborough / Wymondham



Dereham



Lotus Factory



Norfolk & Norwich University Hospital

Figure 1-19 - Origins of residents to various employment sites

CARBON AND AIR QUALITY

1.5.64. Norwich and North Norfolk have both declared climate emergencies and are preparing an Environmental Sustainability & Climate Change Strategy, as well as an action plan and route map for a sustainable, low carbon future. This includes reducing carbon dioxide emissions in Norwich and North Norfolk.

1.5.65. The closest Air Quality Management Area (AQMA) to the study area is the Central Norwich AQMA. This, as well as the air quality study area analysed as part of the OBC is shown in **Figure 1-20**.

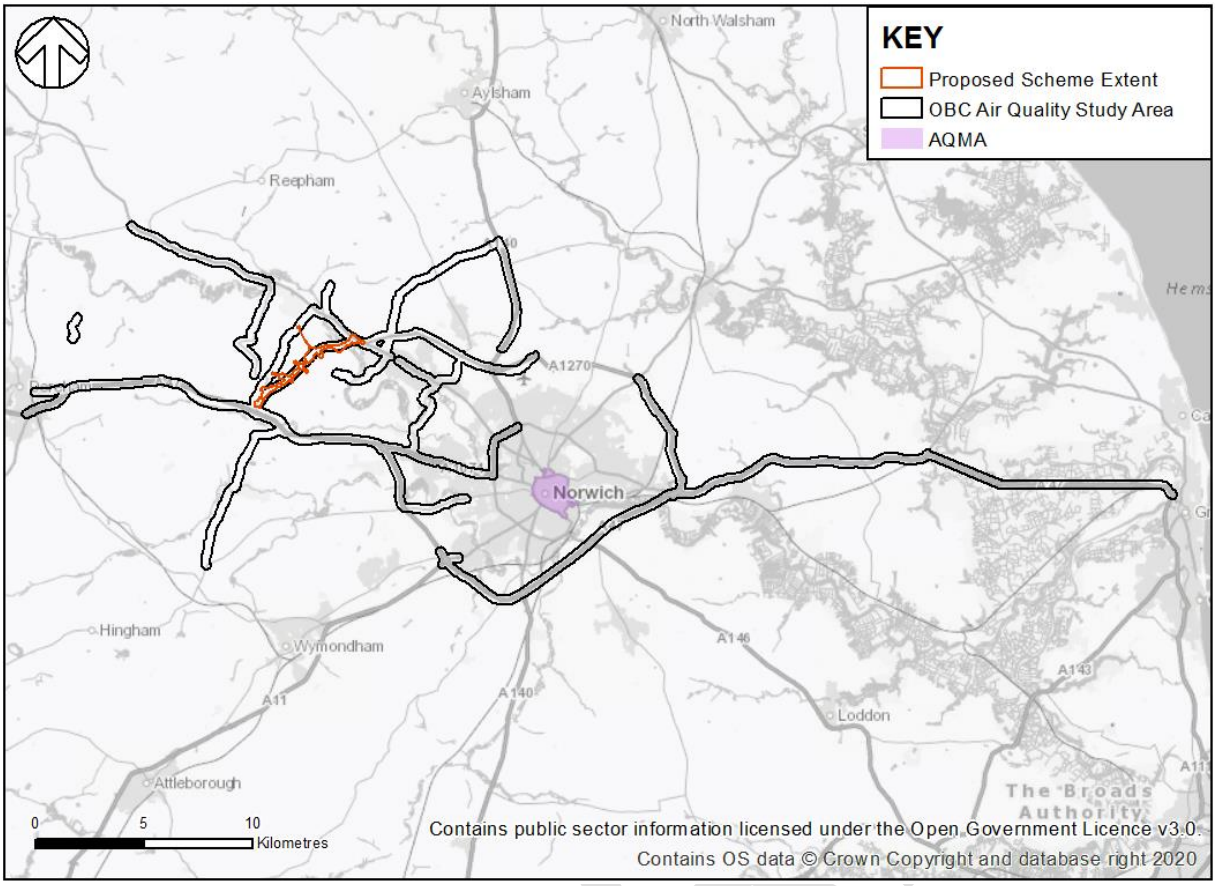


Figure 1-20 – Norwich city centre AQMA

1.6 DESCRIPTION OF THE SCHEME

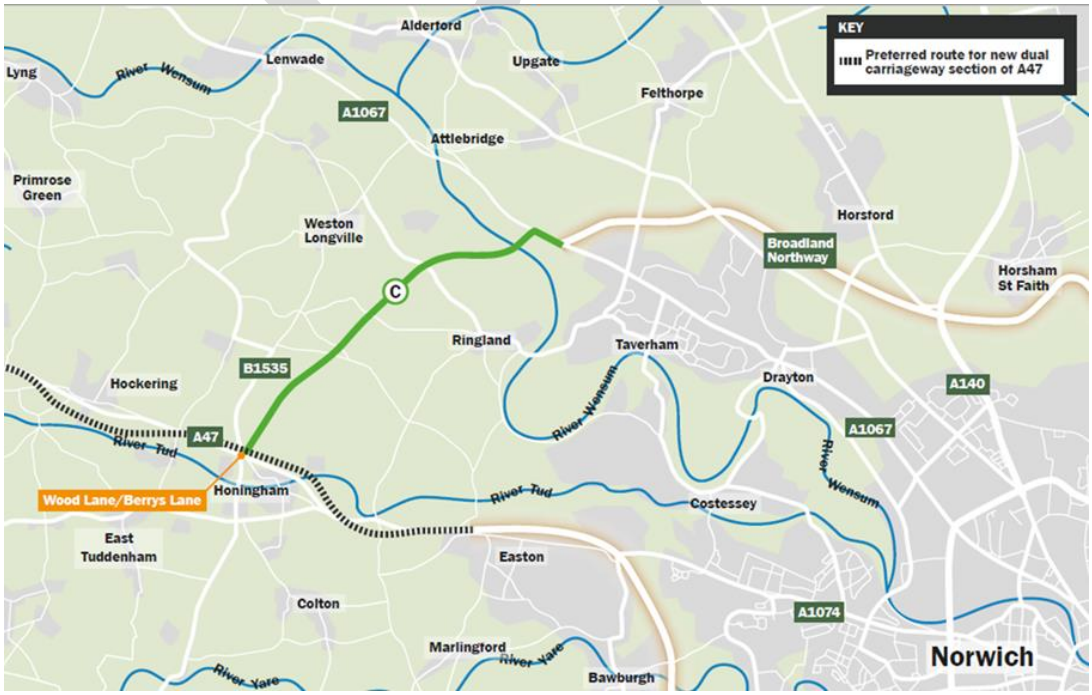


Figure 1-21 - Norwich Western Link Route

1.6.1. The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

1.6.2. The scheme is comprised of:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain
- Connection to a new "grade separated" junction with the A47
- An "at grade" junction with the A1067
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout
- A bridge carrying the NWL over Ringland Lane
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required
- A wider network of walking and cycling-friendly route options, as per the Sustainable Transport Strategy
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network
- Surface water drainage – principally infiltration basins, sediment forebays and associated carrier drains/ channels.

1.6.3. The scheme also includes landscaping, planting, ancillary works, and significant environmental mitigation work. Environmental net gain and biodiversity net gain measures are also considered as part of the NWL design philosophy.

1.6.4. The Sustainable Transport Strategy **Appendix 1A** provides a framework for a wider package of measures that support the sustainable travel objectives of the NWL. The package of measures would encourage mode shift away from private car use by providing the means to travel sustainably by cycle, on foot or by bus, as well as linking up the existing network of Public Rights of Way to maximise local connectivity for pedestrians, cyclists and equestrians. Detail on the shortlisted options can be found in **section 2.12**.

1.6.5. A Bus Strategy has also been produced as part of the STS to connect key residential and employment areas to the west of Norwich with those in the city centre. The Bus Strategy will complement other aspects of the STS and make use of routes that will experience lower traffic levels following construction of the NWL, making bus travel more attractive for use and improving journey time reliability.

1.7 DESIGN PHILOSOPHY

1.7.1. As part of the development of the Norwich Western Link, NCC engaged with Local Planning Authorities (LPA) through a Design Workshop with appropriate officers, to establish a Design and Landscape Strategy (DALS) that sets out NCC's commitment to delivering good design for the scheme. It presents guidance to enable the design to be developed in such a way that it responds to the sensitive landscape within which the scheme will be situated, and maximises the benefits of the scheme through good design.

1.7.2. The DALS is set out around a core design philosophy:

- Norwich Western Link is a scheme committed to conserving and enhancing natural assets and providing community benefits in its delivery of a new link road for Norwich.

1.7.3. This is supported by six design principles:

- Respond to the character and landscape in which the scheme is situated, with engineered forms integrated with the landscape to minimise their physical and visual impact and provide wider benefits or features
- Make a positive contribution to the landscape through conserving and enhancing the natural environment and biodiversity net gain
- Strive to minimise adverse impacts on the landscape and seek sustainability in its use of materials, construction techniques, and maximising multi-functional features wherever possible
- Maintain and enhance the local Rights of Way where possible, for community accessibility, amenity, and to encourage sustainable modes of travel – with consideration of this beyond the scheme extent
- Adhere to a design narrative which provides a commonality and theme to unify all components of the scheme
- Respond to the constraints imposed by statutory bodies and internal constraints on the lifespan of the scheme including capital and maintenance costs.

1.7.4. The DALS applies these principles to each component of the scheme to consider how the design should be refined. This guidance is particularly important for the River Wensum Viaduct design, to ensure a solution that responds to the environmental constraints of the site - for example, to minimise the number of piers in the floodplain that affect aquatic ecology, geomorphology, water/flooding, the use of the land by the landowner, as well as visual impact and aesthetics. The DALS also sets out the process by which the design will be developed, ensuring continuity in the design philosophy, and continuation of the Design Workshops with the LPA group.

1.7.5. A design-led approach allows for creative problem solving within a multi-disciplinary team – allowing the best solution to be brought forward, and all potential benefits of the scheme to be realised.

1.7.6. The scheme has been developed so it can be delivered in an environmentally responsible way. Through understanding the local landscape and habitats and investment in appropriate measures, we can minimise and mitigate adverse effects the NWL may have on nature and wildlife. We are following Biodiversity Net Gain (BNG) and Environmental Net Gain (ENG) principles, which means we will aim to leave all applicable habitats for wildlife in a measurably better state than before construction began.

1.8 THE FIVE CASES

1.8.1. The business case is made up of five separate cases. Together these show that:

- There is a robust case for change that is closely aligned to strategic, regional and local policy objectives – the Strategic Case
- The scheme provides high value for money – the Economic Case
- The scheme is affordable – the Financial Case
- The scheme is commercially viable – the Commercial Case
- The scheme is achievable in practical terms, and how it will be managed to ensure it achieves its objectives – the Management Case.

1.9 SUMMARY OF THE STRATEGIC CASE

STRATEGIC FIT

1.9.1. The proposed NWL scheme is closely aligned with national, regional and local policies and plans, and contributes to the Government's goal of levelling up communities, both on a national scale, and within Norfolk.

1.9.2. The scheme is designed to close the gap in the orbital network, strengthen the surrounding routes, and safeguard the network from increased congestion future growth will bring.

1.9.3. Investment in priority infrastructure schemes has been identified as a component of the long-term post-pandemic recovery plan, as published by the New Anglia LEP. Addressing existing congestion and connectivity challenges via the Norwich Western Link will create a more resilient network as these plans are realised, and linking housing and employment sites around Norwich together will provide a greater scale of opportunity for local communities.

PROBLEMS

1.9.4. The main problems that the proposed scheme aims to address are:

- **Connectivity** – closing the gap in orbital connectivity on the western side of Norwich, and addressing the missing MRN link between the A47 and the A1067
- **Congestion and delay** – addressing current and predicted congestion and delay on the radial routes and ring roads around Norwich, which results in reduced **journey time reliability** and associated environmental externalities
- **Productivity gap** –addressing the worsening gap in GVA between Norwich and the rest of the UK and enhancing recovery efforts
- **Impact of road use on rural communities** – removing unsuitable vehicles from rural roads, and reducing **speeding** on roads with lower speed limits
- **Severance** –providing an additional structure across the River Wensum suitable for heavy, two-way traffic, including freight
- **Barriers to walking and cycling** – enhancing options for pedestrians and cyclists
- **Personal injury collisions** – reducing accidents, particularly with regard to vulnerable users, where the percentage of incidents on rural north-south routes is higher than the area average.

1.9.5. If the scheme is not provided, these problems are expected to get worse. Growth in Norfolk will come at a price of increased congestion – particularly on rural roads – and a less resilient network overall.

1.9.6. The overall aim of the scheme is therefore to: support sustainable economic growth; improve the quality of life for local communities; promote an improved environment; and improve strategic connectivity with the national road network.

1.9.7. A comprehensive selection process was adopted to assess options for the scheme. This included assessing a range of new highway options, existing route upgrade options, public transport interventions as well as freight and demand management options.

1.9.8. A dual carriageway road, including a viaduct over the River Wensum and associated floodplain, was identified as the preferred option, with over 60% of consultation respondents considering this option to be an effective way of managing the identified problems. This option was selected by three times as many respondents as the next most popular option of improving the existing roads. It offers high

value for money, is publicly acceptable but less environmentally intrusive than other comparable options, and is most likely to deliver the objectives.

1.9.9. The scheme will also include a package of sustainable transport measures to complement the Norwich Western Link and encourage mode shift away from private car use for those travelling shorter distances within the study area.

1.10 SUMMARY OF THE ECONOMIC CASE

1.10.1. The cost benefit analysis for the scheme shows that the initial monetised benefits of the scheme (£310.79m), are greater than the monetised costs of the scheme (£127.13m). The resulting initial benefit-cost ratio is **2.4**, which demonstrates that the scheme offers **High** Value for Money.

1.10.2. The adjusted monetised benefits of the scheme total £434.55m. The adjusted benefit-cost ratio is therefore **3.4**, which remains within the **High** category.

1.10.3. Switching value analysis indicates that the scheme would need an increase in benefits of £74.0m to bring the scheme into the Very High category, or a decrease of £180.3m to drop it into the Medium Value for Money category. Costs would need to rise by £90.1m to bring the scheme into the Medium Value for Money category, or fall by £18.5m to bring it into the Very High value for money category.

1.10.4. When changes to the TAG Sensitivity Databook (V1.14) and optimism bias have been applied, the scheme delivers an adjusted BCR that still remains in the **High** Value for Money Category for all of the methodological approaches.

1.11 SUMMARY OF THE FINANCIAL CASE

1.11.1. The cost of the scheme preparation and construction, excluding inflation, client costs and non-recoverable VAT is £140.77m. The scheme outturn cost will be £198.39m, including risk and inflation.

1.11.2. Funding is sought via the Large Local Majors programme through the National Roads Fund. Central government/DfT funding of £168.63m (85%) is sought to deliver the scheme, with the majority of the funds being spent during the financial years 2023-2026. A local contribution of £29.76m (15%) of the scheme implementation costs is required.

1.11.3. NCC's Section 151 Officer has provided a Letter of Intent to confirm the Council's financial obligations towards the scheme.

1.12 SUMMARY OF THE COMMERCIAL CASE

1.12.1. The NWL scheme is commercially viable and is employing a robust contracting and procurement strategy. This includes the use of the OJEU 'competitive dialogue procedure' procurement route, a two-stage design and build contract, with early contractor involvement, and the use of NEC4 Engineering and Construction contracts, with different options utilised, as appropriate for the different stages of work.

1.12.2. The Contract for the NWL is split into three sections:

- Stage one: the development of the detailed design by the contractor, including support to NCC during the statutory consents process; completing such surveys and investigations as are required; and the setting of the total of the Prices for Stage Two Work
- Stage two: construction

- Stage three: landscape maintenance

1.13 SUMMARY OF THE MANAGEMENT CASE

1.13.1. The NWL scheme is capable of being delivered successfully and in line with recognised best practice. A robust set of processes either are in place or are being put in place to ensure that the project is effectively delivered, and properly evaluated.

1.13.2. The NWL is a stand-alone scheme in principle, which could be delivered independently of any other scheme or development. Similarly, no other future schemes or developments are dependent upon it. However, in its present form it has an interaction with the A47 North Tuddenham to East improvement scheme being delivered by Highways England.

1.13.3. The Management Case also describes the membership, responsibilities and accountability of various project bodies and groups, including the relationship between them. It details how stakeholders have been involved in the development of the scheme, and how they will continue to be involved as the scheme moves into the construction phase.

1.13.4. The NWL is programmed to open to traffic in 2025.

2 THE STRATEGIC CASE

2.1 INTRODUCTION

2.1.1. The Strategic Case demonstrates that the Norwich Western Link (the scheme, NWL) is needed for Norfolk. It shows how the scheme fits into a wider strategy for the city's development, and demonstrates that it aligns with national, regional and local strategic policy objectives.

2.1.2. Norfolk has tremendous growth ambitions over the next decade, aiming to attract inward investment and achieve strategic economic growth. The inadequacy of the road network to the West of Norwich for orbital and north-south movements is seen by local people and businesses as an obstacle to that growth. Communities within the NWQ are subject to speeding, rat-running, and inappropriate traffic, resulting in severance and safety concerns. For these reasons, a link between the A1270 (part of the Major Road Network) and the A47 Norwich Southern Bypass has been identified as one of the County Council's Top 3 infrastructure priorities, and is supported by the emerging Greater Norwich Local Plan.

2.1.3. The provision of the NWL will enable NCC to push forward with its plans for growth, secure in the knowledge that the road network will be able to accommodate future demand in a safe, reliable, and effective manner.

2.1.4. The Strategic Case is structured in line with Department for Transport guidance, describing:

- The policy and legislative context in which the scheme has been developed
- The existing problems which the scheme needs to address
- The effect on the study area if the scheme is not delivered – the impact of not changing
- What options were considered and the results of assessment
- The objectives of the scheme
- How success will be measured.

2.1.5. It also addresses the practical delivery of the scheme, outlining:

- What the scheme will, and will not include
- Any constraints (physical, financial, political, environmental. etc.) which could affect delivery of the scheme
- Interdependencies - other factors, schemes or projects that interact with the NWL
- The stakeholders – what they require from the scheme, how they have been involved so far, and how they can support the delivery of the scheme.

2.2 POLICY, LEGISLATION AND BUSINESS STRATEGY

2.2.1. This section describes NCC's strategic aims and responsibilities and sets out the policy context in which the scheme has been developed. It considers the relevant legislation, policy, plans and strategies at a national, regional and local level, to identify the key themes and priorities. The proposed NWL scheme is closely aligned with the following national, regional and local transport plans, policies and strategies:

National policies and plans

- Objectives for Major Road Network (MRN) schemes
- National Infrastructure Strategy (2020)

- Ten Point Plan for a Green Industrial Revolution (2020)
- Gear Change (2020)
- Cycling and Walking Investment Strategy / LTN 1/20 (2020)
- Roads Investment Strategy (RIS1 / RIS2) (2020)
- National Planning Policy Framework (2019)
- Industrial Strategy (2017)
- Transport Investment Strategy (2017)
- National Infrastructure Delivery Plan (2016)

Regional policies and plans

- Covid-19 Economic Recovery Restart Plan – New Anglia LEP (2020)
- Draft Norfolk and Suffolk Local Industrial Strategy (2019)
- Regional Evidence Base, Transport East (2019)
- Integrated Transport Strategy for Norfolk and Suffolk (2018)
- Norfolk and Suffolk Economic Strategy (2017)

Local policies and plans

- Broadland and South Norfolk Recovery Plan (2020)
- Norfolk Infrastructure Delivery Plan (2019)
- Norfolk Environmental Policy (2019)
- Together for Norfolk (2019)
- Norfolk Strategic Framework (2017)
- South Norfolk District Local Plan (2015)
- Joint Core Strategy for Broadland, Norwich and South Norfolk (2014)

Emerging Policy

- Local Transport Plan 4 Strategy, 2021 – 2036 (expected 2021)
- Transport East Transport Strategy
- Greater Norwich Local Plan (expected 2022)
- Transport for Norwich Strategy (expected 2021)

APPLICABLE LEGISLATION

Town & Country Planning Act 1990

2.2.2. The Town and Country Planning Act 1990 regulates the development of land in England and Wales. The development of the NWL is a scheme that will come under the remit of this Act, as any new highway would constitute 'development' (as defined in the Act) and would therefore require planning permission from the relevant authority prior to construction commencing.

Town & Country Planning (Environmental Impact Assessment) Regulations 2017 (England)

2.2.3. The NWL scheme will come under the remit of these regulations due to the scale of the proposals. The Environmental Impact Assessment (EIA) regulations require any substantial application for planning permission to be accompanied by an Environmental Statement (ES), which assesses the impacts of the project upon the environment. The preparation of the ES and its consideration by the planning authority is a process known as the EIA.

2.2.4. These regulations identify, in Schedule I and Schedule II, a variety of projects and developments that require planning permission. Schedule I developments, including new power stations, oil

refineries and motorways are projects for which EIA is compulsory, and Schedule II developments are projects for which EIA is not necessarily required, but should be undertaken should the project exceed certain thresholds and have the potential for significant effects upon the environment. As the scheme will occupy a footprint of over 1ha, the NWL will be a Schedule II development. A Scoping Opinion was submitted in October 2020 to define the scope of assessment.

The Conservation of Habitats and Species Regulations 2017

2.2.5. The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) into UK law. The Habitats Regulations provide for the designation and protection of 'European sites' and the adaptation of planning and other controls for the protection of European sites. Under the Habitats Regulations, competent authorities are required to consider plans or projects and restrict or revoke planning permission where the integrity of a European site would be adversely affected. The River Wensum is a Special Area of Conservation, and as such strictly protected under the Habitats Regulations.

NATIONAL POLICY

Objectives for Major Road Network schemes

2.2.6. The NWL was accepted for inclusion in the Major Road Network (MRN) in May 2020. The government's objectives for the MRN are set out as follows, together with the government's reasons for each objective:

- Reducing congestion – alleviating local and regional congestion, reducing traffic jams and bottlenecks.
  - Congestion creates delays and bottlenecks on heavily-used routes and has an economic impact. Investments will upgrade and enhance roads on the MRN, making it better able to cope with demand by adding capacity to reduce congestion and crowding. This will make journeys more comfortable and reliable for users and make possible new trips that were previously impractical due to frequent or unpredictable delays.
- Support economic growth and rebalancing – supporting the delivery of the Industrial Strategy, contributing to a positive economic impact that is felt across the regions.
  - Investments on the MRN can better connect people and businesses to markets and international gateways, boosting economic productivity. This makes places more attractive to businesses and people, encouraging further investment.
  - By improving the capacity, reliability, safety and connectivity of the network, road investment facilitates journeys for people and businesses and improves economic performance.
- Support housing delivery - unlocking land for new housing developments.
  - We face an immense challenge to provide the houses that will support communities to grow sustainably. Transport infrastructure is key to unlocking development and delivering places people want to live.
  - Road schemes can create new links between communities and workplaces to deepen local labour markets, connect housing developments to the network, provide new routes on city and commuter networks or contribute to creating places that promote wellbeing through the management of congestion or provision for public transport.

- Support all road users – recognising the needs of all users, including cyclists, pedestrians and disabled people.
    - MRN investments need to consider the needs of all road users. Proposals to improve the MRN should consider the needs of both motorised and non-motorised users. In bringing forward proposals for improvements to the MRN, the Government expects the needs of all users, including cyclists, pedestrians and disabled people and public transport users, to be considered and benefits for them delivered as part of the solutions proposed.
- Support the Strategic Road Network – complementing and supporting the existing SRN by creating a more resilient road network in England.
    - Users need to pass seamlessly between the MRN and the SRN. To support users' journeys and ensure a seamless transition between the two networks, MRN investments will also seek to improve flows between the SRN and the MRN.

2.2.7. A lack of an appropriate link restricts access to business both locally and regionally. The NWL will close a 'missing link' on the MRN, providing better connectivity, and the associated improvements in network resilience and safety.

2.2.8. Both housing and employment growth in Norfolk will come at the price of increased congestion, particularly on rural roads. The implementation of the NWL will allow traffic to switch from local roads to the MRN network, decreasing links with delays in the surrounding areas.

2.2.9. Non-motorised users have also been considered as part of the NWL, with their needs being reviewed and addressed as part of a Non-Motorised User strategy and a Sustainable Transport Strategy to consider wider sustainable transport interventions (cycle friendly route options and pedestrian/cycle crossing improvements) and options for a potential new bus service.

National Infrastructure Strategy (2020)

2.2.10. The National Infrastructure Strategy, published in November 2020, sets out the Government's plans to transform infrastructure across the UK by 2050 by focusing on four overarching subject matters:

- Levelling up – boosting growth and productivity by investing in rural areas, towns and cities
- Zero emissions by 2050 – transforming infrastructure to decarbonise the UK's power, heat and transport networks, and adapting to the risks posed by climate change
- Supporting private investment – providing clarity on government plans to ensure confidence
- Accelerate and improve delivery – reforming the planning system, and improving the way projects are chosen, procured and delivered

2.2.11. The National Infrastructure Strategy shares the National Infrastructure Commission's ambitions for levelling up cities outside of London. Improved transport links will allow cities to 'act as an anchor' for growth across a region, enabling the rebalancing of the economy through infrastructure.

2.2.12. The Strategy underscores the Government's commitment to creating rural communities with strong transport networks, thereby unlocking opportunity and supporting local economies. Active and sustainable travel remains a priority, with future funding having been committed for cycling (through active travel funds referenced in Gear Change [**see 2.2.18**]) and bus improvements.

2.2.13. A number of infrastructure investment measures are listed in the National Infrastructure Strategy. £39m has been allocated to Norwich for key transport improvements, including a mobility hub at Norwich Station.

2.2.14. Connectivity is central to the NWL scheme. Linking the A47 to the A1067/A1270 will provide a purpose-built alternative to rural roads and close the gap in orbital connectivity to the west of Norwich. Feedback from stakeholders during consultation exercises noted that not only would residents benefit from improved links to centres of excellence, but haulage firms would benefit from the reduced journey times, further driving economic growth.

Ten Point Plan for a Green Industrial Revolution (2020)

2.2.15. The '*Ten Point Plan'* commits to mobilising £12 billion of government investment as part of what has been termed Green Industrial Revolution. The ten points cover ways to decarbonise the UK across the sectors of across energy, buildings, transport, innovation and the natural environment, while also striving to transform the economy, creating new (green) jobs and delivering growth. Points 4 and 5 of the plan relate to transport infrastructure (accelerating the shift to zero emissions vehicles and green public transport, cycling and walking), but the underlying objective is to reduce carbon from our transport networks. This is supported by the 'National Infrastructure Strategy', which states infrastructure investment is fundamental to delivering the Carbon Net Zero targets.

2.2.16. The NWL aims to remove slow-moving traffic (known to increase vehicle emissions) from rural roads, and places them on an appropriately designed link road at a higher speed. With HGV traffic forecast to grow to over 10% of traffic flows between 2019 and 2050, the NWL will redirect a significant amount of traffic away from rural communities. Forecast traffic flows and speeds with the scheme in place result in carbon emissions dropping by a total of 456,434 tonnes of carbon over the 60-year appraisal period (the difference between the do minimum and do something scenarios). The operational phase of the scheme therefore shows a strong strategic fit to the government's Carbon Net Zero policy objective.

2.2.17. As part of the Environmental Statement, both the construction and operational phases will be quantified in line with current guidance, and set out in the context of the UK carbon budgets. This will include materials, the transport of materials to site, and the operation of plant and materials.

Gear Change: A bold vision for cycling and walking (2020)

2.2.18. This plan describes the vision to make England a great walking and cycling nation. It sets out the actions required at all levels of government to make this a reality, grouped under four themes:

- Better streets for cycling and people
- Cycling and walking at the heart of decision-making
- Empowering and encouraging local authorities
- Enabling people to cycle and protecting them when they do

2.2.19. While the NWL scheme is predominantly a highway scheme, it is supported by a Sustainable Transport Strategy that seeks to improve the existing walking and cycling facilities in the surrounding area. It seeks to divert the existing routes, where they are severed by the scheme, via new grade-separated crossings and improve the tie-in to existing routes both to the north and south of the scheme. The scheme includes new green bridges and new signalised crossings.

Cycling and Walking Investment Strategy / LTN 1/20

2.2.20. The statutory Cycling and Walking Investment Strategy (CWIS) sets a clear ambition to make cycling and walking the natural choices for short journeys or as part of a longer journey with supporting objectives to increase cycling and walking levels.

2.2.21. The Local Transport Note (LTN) provides guidance and good practice for the design of cycle infrastructure, in support of the CWIS. It supports the delivery of high-quality cycle infrastructure and reflects current good practice, standards and legal requirements. Inclusive cycling is the underlying theme so that people of all ages and abilities are considered.

2.2.22. The NWL scheme includes a Sustainable Transport Strategy, which seeks to improve the existing walking and cycling facilities in the surrounding area. The scheme includes green bridges, improved walking and cycling infrastructure and crossing facilities. It will also tie in to existing walking and cycling infrastructure to the north and the south of the scheme.

Roads Investment Strategy (RIS1 / RIS2), 2020-2025 (2020)

2.2.23. The first Roads Investment Strategy (RIS1) included improvements to the A47 around Norwich. One of these projects was the dualling of the single carriageway section from Easton to North Tuddenham. This was committed as part of the second Road Investment Strategy (RIS2), with funding made available during the second Road Period (RP2). Highways England submitted a Development Consent Order (DCO) Application to the Planning Inspectorate in March 2021 for this scheme. It was accepted in April 2021 and now progressing to examination in public.

2.2.24. RIS2 sets a long-term strategic vision for Highways England's road network. It specifies the performance standards Highways England must meet, lists planned enhancement schemes that are expected to be built, and states the funding that Highways England will make available during the second Road Period (RP2), covering the financial years 2020/21 to 2024/25.

2.2.25. The vision seeks a network that:

- Supports the economy
- Is greener
- Is safer and more reliable
- Is more integrated
- Is smarter.

2.2.26. The NWL will provide a direct connection between the Strategic Road Network and the A1270, which forms part of the Major Road Network. It would provide a shorter, more efficient route between the A47 west and north of Norwich than the currently provided route via the existing A47, which passes around Norwich to the east or via the outer ring road. This more efficient route would support the economy of Norwich and the wider Norfolk area. The addition, the NWL would strengthen the reliability of the existing road network by providing another route in times of accidents or maintenance on the existing A47.

National Planning Policy Framework (2019)

2.2.27. The National Planning Policy Framework (NPPF), published by the Ministry of Housing, Communities and Local Government in February 2019, contains the Government's planning policies for England and how these are expected to be applied.

2.2.28. The NPPF advises that planning policies and decisions should play an active role in guiding development towards sustainable solutions, and recognises three interlinked dimensions in achieving this: economic, social and environmental. The policies within the framework seek to improve health, social and cultural wellbeing for all, deliver adequate community and cultural facilities, provide services to meet the demand of local people, and create a good standard of amenity for all existing and future occupants of land and buildings. Development that takes place

under the framework is expected to contribute to the conservation and enhancement of the natural and historic environments as well as prevent development that leads to unacceptable levels of pollution.

2.2.29. The NPPF emphasises good design, which is a key aspect of sustainable development and should contribute positively to making places better for people and should avoid significant adverse impacts that can affect health and quality of life.

2.2.30. The NPPF sustainable development objectives are:

- **Economic** – To help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support existing, planned and potential growth, innovation and improved productivity, and by identifying and coordinating the provision of infrastructure.
- **Social** – To support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations, and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.
- **Environmental** – To contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

2.2.31. Chapter 9 of the NPPF sets out policies to promote sustainable transport, including the expectation that the environmental impacts of traffic and transport infrastructure are identified, assessed, and taken into account, and that appropriate opportunities are taken for avoiding and mitigating adverse effects and achieving net environmental gains. The NWL has been formulated with these objectives in mind.

2.2.32. The NWL will increase accessibility to existing, planned, and emerging areas of growth. Improved transport links will improve access to existing and new homes/development in the NWQ.

2.2.33. Rerouting traffic away from villages and narrow lanes will help provide a safer environment for road users and pedestrians and encourage active travel modes. This would benefit the local natural and built environment in these locations, reducing emissions and noise and improving air quality.

Industrial Strategy (2017)

2.2.34. The Government published its Industrial Strategy in 2017, which aims to improve living standards and economic growth by driving productivity and growth across the whole country. It focuses on five foundations:

- Ideas: the world's most innovative economy
- People: good jobs and greater earning power for all
- Infrastructure: a major upgrade to the UK's infrastructure
- Business environment: the best to start and grow a business
- Places: prosperous communities across the UK.

2.2.35. The strategy identifies priority areas for infrastructure, stating that infrastructure choices provide the basics for the economy and actively support our long-term productivity. Efficient transport systems are identified as a priority area.

2.2.36. Norwich Research Park is a world-renowned centre of agri-tech research and innovation, with an annual research expenditure of over £230m. It is included in the Industrial Strategy as a case study for research laboratories and agri-tech innovation in Norwich and has been identified as a Tier One Employment Centre. The NWL will improve connections between Norwich Research Park and the area north of Norwich, including the airport and the A140 towards the coast.

Transport Investment Strategy (2017)

2.2.37. The Transport Investment Strategy (TIS) sets out how the Government plans to invest in transport infrastructure. The Strategy is seen as an enabler to help deliver the Industrial Strategy, which, by improving connections between communities and businesses, will help deliver planned growth across the country.

2.2.38. Investment decisions should focus on the main objectives set out in the TIS. The objectives and policy in the TIS are:

- Create a more reliable, less congested, and better-connected transport network that works for the users who rely on it
- Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities
- Enhance our global competitiveness by making Britain a more attractive place to trade and invest
- Support the creation of new housing

2.2.39. The proposed NWL would complete an orbital route around Norwich that forms part of the MRN. It will improve accessibility to business and employment, providing reduced journey times and transport costs, and encouraging investment.

National Infrastructure Delivery Plan (2016)

2.2.40. The National Infrastructure Delivery Plan 2016-2021 sets out the Government's plans for economic infrastructure over a five-year period, alongside plans to support delivery of housing and social infrastructure. It reflects the Government's commitment to invest over £100 billion by 2020-2021 to drive wider economic benefits, including:

- Supporting growth and creating jobs in the short term as projects are built – especially where public investment is used to attract private investment
- Raising the productive capacity of the economy in the long term as the benefits of new infrastructure are felt; reduced transaction costs; larger and more integrated labour and product markets; and better opportunities to collaborate and innovate
- Driving efficiency – enabling greater specialisation and economies of scale
- Boosting international competitiveness – attracting inward investment and enabling trade with foreign partners.

2.2.41. The NWL connects the A1067 and A1270 to the A47 west of Norwich, providing a high quality and more direct link between the west and north. This will improve productivity and efficiency for business through reduced journey costs. The NWL will improve the capacity and connectivity around Norwich providing improved resilience and supporting economic growth.

REGIONAL POLICY

Covid-19 Economic Recovery Restart Plan (2020)

2.2.42. This restart plan sets out the actions and interventions being taken by a wide range of partners, including New Anglia LEP, local authorities, business, industry councils and sector groups, voluntary, community and social enterprise (VCSE) organisations, colleges and universities. It demonstrates the strong local appetite and energy for getting the economy going again and helping those who have been hit hardest.

2.2.43. One of the identified measures for economic recovery is investing in infrastructure. The plan states that “we will support the construction sector through continued investment in key infrastructure and make a compelling case to Government to fund priority infrastructure schemes.”

2.2.44. The NWL has been identified as a key infrastructure scheme in the Norfolk and Suffolk region, as detailed in the Integrated Transport Strategy for Norfolk and Suffolk.

Draft Norfolk and Suffolk Local Industrial Strategy (2019)

2.2.45. The Norfolk and Suffolk Local Industrial Strategy sets out a series of coherent and specific actions that will drive productivity and growth across the economy as a whole. It reflects the opportunities and needs of Norfolk and Suffolk’s growing economy and how it will respond in a fast-changing world.

2.2.46. Clean growth sits at the heart of the Local Industrial Strategy. Norfolk and Suffolk are at the forefront of tackling the challenges and opportunities of climate change. The area's major strengths in energy generation and usage, and high-tech sustainable agri-food, present major opportunities. The strategy has three areas of focus:

- Clean Energy: Powering the world
- Agri-food: Feeding the world
- ICT and Digital Creative: Connecting the world.

2.2.47. Norfolk and Suffolk have the largest agri-food sector in the UK, and world-leading research into plant and soil technology and agricultural systems. The region has strong innovation assets, concentrated in a small number of firms, and world-class research assets, including Norwich Research Park.

2.2.48. The strategy sets out a range of actions that will be taken forward to maximise the clean agri-food opportunity, one of which is to ”Invest in a Food Innovation Hub based at the Honingham Food Enterprise Zone to deliver business growth through innovation, productivity, processing, exports and supporting new start-ups”.

2.2.49. The NWL will improve access to the Food Enterprise Zone and Norwich Research Park from the area north of Norwich.

Regional Evidence Base, Transport East (2019)

2.2.50. In 2019, Transport East produced a Regional Evidence Base to inform the development of its Transport Strategy (see **Transport East Transport Strategy**, section 2.2.106). This report draws on existing and future challenges and opportunities for strategic transport infrastructure investment across the Transport East region.

2.2.51. It sets out Transport East's vision to create "a thriving economy for the East, with fast, reliable and resilient transport infrastructure that drives forward a future of inclusive and sustainable growth for decades to come".

2.2.52. It lays out three key themes that are foundational for the Transport East Transport Strategy:

- Global gateways – better connected ports and airports to help UK businesses thrive
- Multi-centred connectivity – enhanced links between places and business clusters to improve productivity
- Energised coastal communities – delivering on the region's ambition to become the UK's foremost all-energy coast and a competitive visitor offer

2.2.53. The NWL scheme is identified as a part of that vision in the Regional Evidence Base. The increased connectivity between communities and employment sites, including Norwich Airport, that the NWL offers contributes to the first two of these themes. Enhanced links between the MRN and SRN also enables onward travel for coastal tourism, a significant contributor to the region's economy.

Integrated Transport Strategy (ITS) for Norfolk and Suffolk (2018)

2.2.54. The New Anglia Local Transport Board partners developed an ITS, which sets out the ambition to create an integrated, total transport solution that serves Norfolk and Suffolk's growing economy, their collective goals for delivery, and how they might be brought to fruition. It also provides a robust foundation for Transport East, the sub-national transport body. Most importantly, it sets out how the transport network can help to continue to make Norfolk and Suffolk a great place to trade, live, work, visit and learn.

2.2.55. It states that "for the East to continue to thrive, we must work together to develop a network that meets our aspirations both now and, in the decades, to come. If implemented successfully future businesses will benefit from better connected opportunities for growth, a wider pool of accessible skilled labour and the opportunity to engage in more markets than ever before."

2.2.56. The Strategy looks ahead to the 2040s but focuses on the actions that need to be taken over the next three to five years to help secure the foundations for long-term success.

2.2.57. The relevant transport strategy themes are:

Connecting the East, Accessing the World

2.2.58. International access is a key strength and opportunity for the East. Access to the Port of Felixstowe as the nation's largest container gateway and other ports including Great Yarmouth, which is expanding to meet the demand for off-shore wind, as well as airports at London Stansted and Norwich are clear priorities for the area. Connectivity between the East and the rest of the UK is essential to enabling businesses to have strong links to customers and supply chains.

2.2.59. The NWL will improve connectivity between the west/south of Norwich and the airport to the north. This will enable quicker, more reliable, and resilient strategic connections.

Regional Connectivity and our Priority Places

2.2.60. Improving accessibility between the East's economic centres is essential to the realisation of the future aspirations. It provides better access to jobs, education and healthcare, encourages the clustering benefits of development and services and attracts inward investment. A strong digital and

transport network across the East will link businesses and suppliers to markets and provide the backbone for the East to thrive.

2.2.61. As part of this, the ITS seeks to "deliver a reliable Major Road Network (MRN) with improved journey times between our Priority Places, through the creation of an integrated MRN Action Plan for delivery". This includes the NWL, connecting the new A1270 from the A1067 to the A47 west of Norwich, which will improve the flow of traffic around the growing local communities and ensure the network is kept in a good state of repair.

2.2.62. It also seeks to "facilitate better connectivity, which provides more reliable and resilient journey times within and between our Priority Places. This will be through making the strategic case for and the delivery of infrastructure investment. It will include new river crossings (in Great Yarmouth, Ipswich and Lowestoft), orbital links and relief roads (including the Ipswich Northern Route(s) and the NWL, connecting the new A1270 from the A1067 to the A47 west of Norwich), and junction improvements, prioritising infrastructure that will facilitate the delivery of significant housing and jobs growth."

Local and Coastal

2.2.63. The Norfolk and Suffolk Energy Coast is a significant contributor to the East's economy and serves Sizewell nuclear power station, Bacton Gas Terminal and the significant offshore energy sector as part of the wider East of England Energy Zone. It is a global centre of oil, gas, nuclear and renewable energy generation and infrastructure.

2.2.64. East Anglia attracts tourists every year, the latest information available (2013 ONS) shows that the East accounted for over £10.2 billion of Total Tourism Consumption with £5.2 billion of that associated with the East Anglia area.

2.2.65. The NWL will improve connectivity to the coast by completing orbital connectivity around Norwich, and providing a route option around the north of Norwich, rather than the current option to the south.

Making it happen

2.2.66. Local and collaborative delivery is important, having the potential to make a real difference and the skills, experience and resources from a number of new and existing partners are needed to help bring the stated ambitions to fruition.

2.2.67. The ITS states that the "transport network is recognised as a seamless enabler helping our business and communities thrive, helping to make the East one of the UK's most attractive places to do business, live, learn, work and visit."

Norfolk and Suffolk Economic Strategy (NSES) (2017)

2.2.68. The New Anglia Local Enterprise Partnership (LEP) covers Norfolk and Suffolk. It works with businesses, local authority partners and education institutions to drive growth and enterprise in Norfolk and Suffolk. The NSES builds on the 2014 Strategic Economic Plan. The NSES sets out the LEP's ambition to establish the New Anglia area as:

- The place where high growth businesses with aspirations choose to be
- An international facing economy with high value exports
- A high performing, productive economy
- A well-connected place
- An inclusive economy with a highly skilled workforce
- A centre for the UK's clean energy sector

- A place with a clear, ambitious offer to the world.

2.2.69. This will be achieved through actions and investment in priority places and themes. The priority places are the areas where the evidence shows there are significant opportunities and commitment for continued growth. Norwich and Greater Norwich are named as a priority place.

2.2.70. The NSES states that Norfolk and Suffolk should be "a well-connected place, locally, national and internationally. Investment in housing, roads, rail and broadband [should be] coordinated to build the communities and connections that people and businesses need. This will drive housing and GVA."

2.2.71. Creating new jobs and businesses requires focused investment by local partners and Government to improve the area's infrastructure and to ensure that business has a supply of skilled workers and the right support to grow. Some of the key sectors identified are agriculture, food and drink, visitor economy and financial services and insurance.

2.2.72. Norwich is home to a cluster of financial and insurance companies, life science, advanced food tech and biotech cluster and the Food Enterprise Zone, all of which are situated to the west of Norwich and will benefit from improved accessibility and travel efficiencies provided by the NWL. The improved accessibility will also benefit the visitor economy especially people travelling north of Norwich to the coast and the Norfolk Broads.

LOCAL POLICIES AND PLANS

Broadland and South Norfolk Recovery Plan (2020)

2.2.73. South Norfolk Council and Broadland District Council have produced a joint coronavirus recovery plan, that aims to deliver the retention and recovery of local jobs and businesses. Modelling by the Centre for Progressive Policy[13] shows that while the economic impacts within the East of England are expected to be lower than a large proportion of the UK, Broadland is expected to show a 32% decline in GVA, and South Norfolk a 25% decline in GVA. Before returning to a position of economic growth, the region first needs to undergo a recovery.

2.2.74. Plans for rebuilding, restoring and rehabilitating the communities and economy are built around a strategic six-point plan and three core themes:

- Create clean, safe and vibrant public spaces (economy)
- Support every business to drive the growth of the economy and employment (economy)
- Develop our Community Hub and partnership working model (communities)
- Support individuals and families through an effective Hardship Offer (communities)
- Secure our finances through transformation and commercialisation (governance)
- Reimagine our service delivery and ways of working (governance).

2.2.75. Tactical actions are matched against each of these objectives for the short, medium and long-term.

13 https://www.progressive-policy.net/publications/which-local-authorities-face-biggest-immediate-economic-hit

2.2.76. The Norwich Western Link both contributes to and is specifically mentioned as a component of the long-term plan for supporting businesses to drive the growth of the economy and employment. This intervention is targeted at unblocking constraints to growth via the delivery of infrastructure projects that will transform the area.

Norfolk Infrastructure Delivery Plan (2020)

2.2.77. The Infrastructure Delivery Plan (IDP) sets out the key infrastructure needed to deliver economic growth in Norfolk. As a working document, it is reviewed on a regular basis as information becomes available and projects progress. The Plan will help NCC and partners to coordinate implementation, prioritise activity and respond to any funding opportunities. Updated in December 2020, the Norfolk Infrastructure Delivery Plan now also takes fallout from the pandemic into account.

2.2.78. The plan lists several key infrastructure projects that NCC, in collaboration with partners, is seeking to progress over the next 10 years. These were judged on four criteria:

- Delivering significant housing and jobs growth
- Identified in existing plans/programmes
- Have a committed route to delivery
- Significant Local Authority control or interest

2.2.79. **Figure 2-1** provides a summary of the location of the proposed Norfolk infrastructure projects.

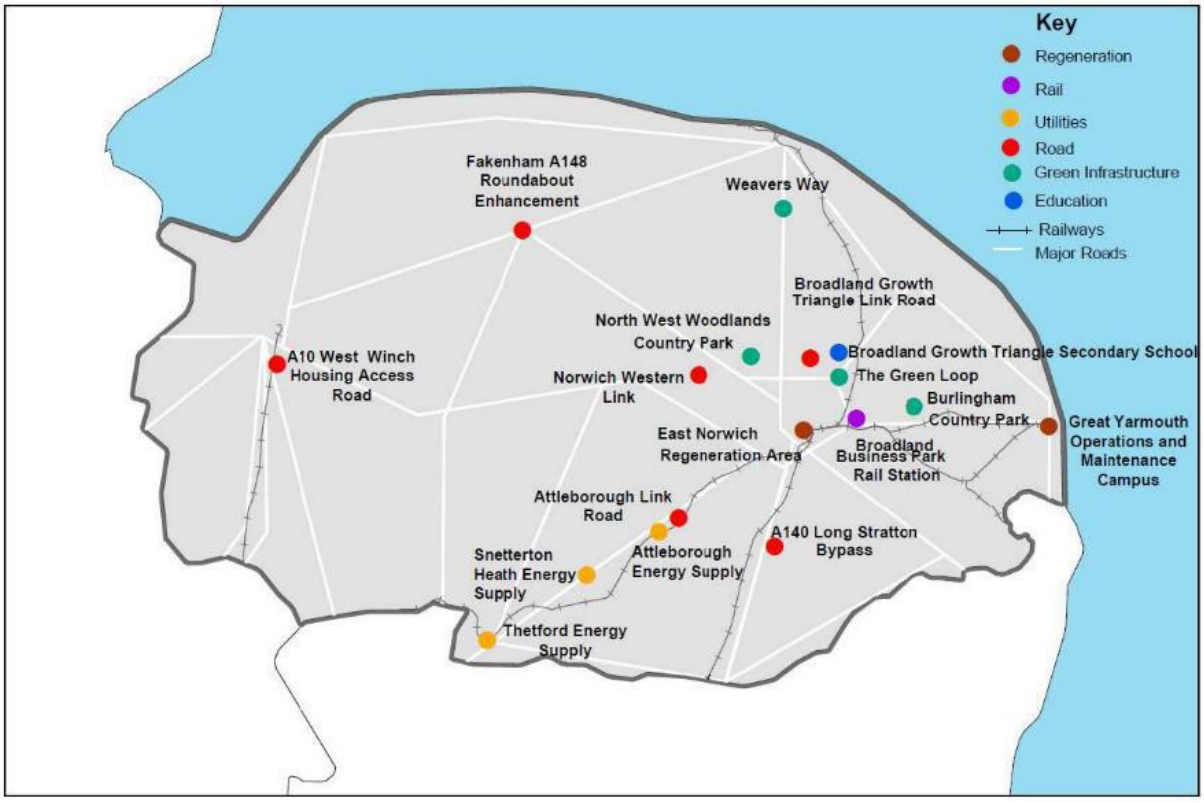


Figure 2-1 - Strategic Infrastructure projects in Local Authority control

2.2.80. The Plan states that “Norwich Western Link… has been identified as one of the County Council’s priority road infrastructure schemes”. The scheme is listed as:

- Supporting sustainable housing growth in the western quadrant
- Improving the quality of life for local communities
- Supporting economic growth
- Protecting and enhancing the natural environment
- Improving strategic connectivity with the national road network

2.2.81. The NWL also improves connectivity between employment growth locations and enterprise zones that the Norfolk Infrastructure Delivery Plan considers key, as shown in **Figure 2-2**.

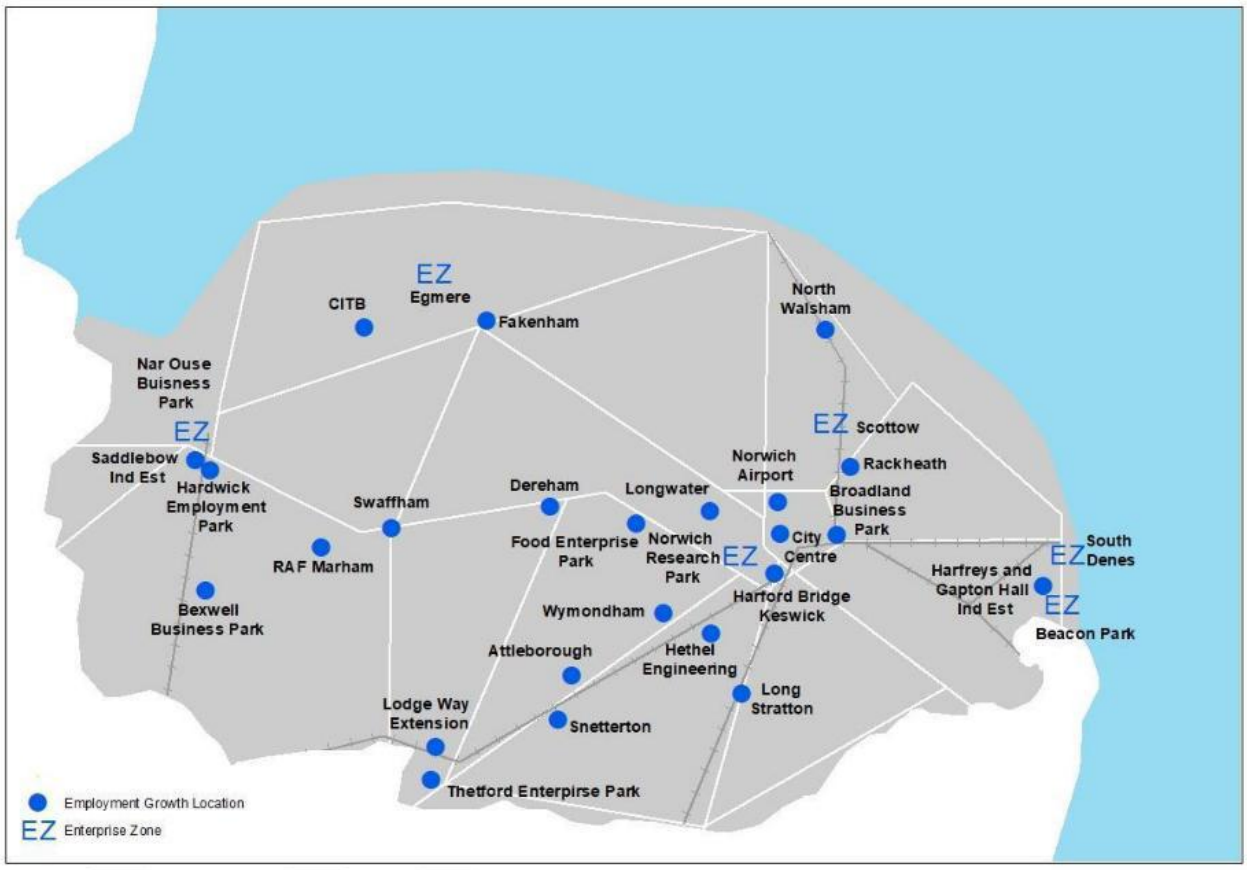


Figure 2-2 - Employment Growth Locations

Norfolk Environmental Policy (2019)

2.2.82. In 2019, Norfolk County Council published an Environmental Policy, building on the Government's 25-year plan. This policy is designed to guide the Council's future decision-making, and is framed around the following goals:

- Clean air for the population
- Ensuring a clean and plentiful water supply
- Encouraging a thriving plant and wildlife community
- Reducing the risk of harm from environmental hazards such as flooding and drought
- Using resources from nature more sustainably and efficiently
- Enhancing beauty, heritage and engagement with the natural environment
- Mitigating and adapting to climate change
- Minimising waste

- Managing exposure to chemicals
- Enhancing biosecurity

2.2.83. These goals are supported by key policy aims, including embedding an 'environmental net gain' principle for both housing and infrastructure development.

2.2.84. The NWL scheme will support improvements in local air quality in terms of NO_2 and $PM_{2.5}$, and therefore aligns with NCC's goal of ensuring clean air for the population. Carbon emissions are expected to reduce by a total of 456,434 tonnes of carbon over the 60-year appraisal period.

2.2.85. The NWL will provide the missing connection to a fully linked road around Norwich. In doing so this will help reduce travel times and improve connectivity to a variety of areas on the outskirts of the city. Removing slow moving traffic from rural roads in the area in combination with mitigation and enhancement measures proposed on the scheme will help improve local air quality and encourage biodiversity.

2.2.86. NCC are in close communication with the Environment Agency in relation to the design of the River Wensum viaduct and the impact of the NWL on the surrounding biodiversity and how this can be mitigated/offset. The NWL will also divert traffic away from existing lower standard routes helping to protect and enhance the local natural and built environments adjacent to these existing routes.

Together for Norfolk (2019)

2.2.87. Together for Norfolk is an ambitious plan released by NCC that makes Norfolk a place that "puts people first, where everyone works together to create a better place to live". It lists Norfolk's priorities for growth, with the goal of addressing drivers of poverty: unemployment, low wages, a lack of job security, low skill levels, and high housing costs.

2.2.88. Investment in infrastructure to drive growth across the County is one aspect that enables change. Norfolk is determined to contribute resources and energy to an inclusive economy, that provides opportunities to everyone, including the 120,000 people living in areas classed as deprived. This includes parts of the Bowthorpe and North Earlham residential areas, for whom connectivity is expected to be improved by the NWL. Investment in this scheme is listed alongside the A47 dualling scheme as part of Together for Norfolk's critical planned infrastructure.

Norfolk Strategic Framework (2017)

2.2.89. This document sets out shared objectives and strategic priorities for Norfolk, to be considered in developing plans to at least 2036. This approach enables NCC to work collaboratively in developing evidence and securing external funding for natural and built environments and infrastructure within the region.

2.2.90. The Norfolk Strategic Framework objectives are:

- To realise the economic potential of Norfolk and its people
- To reduce Norfolk's greenhouse gas emissions as well as the impact from, exposure to, and effects of climate change
- To address housing needs in Norfolk
- To improve the quality of life for all the population of Norfolk
- To improve and conserve Norfolk's environment.

2.2.91. The NWL is identified as a priority road project for promotion in the framework where it is listed as "key infrastructure needed to deliver economic growth in Norfolk and will help to coordinate

implementation, prioritise activity and respond to funding opportunities". It aims to improve access and connectivity, encourage investment in the local area through increased links to targeted employment areas.

2.2.92. The NWL will improve journey times while reducing delay and congestion. It will, through reassignment of traffic, lead to improved air quality within local villages and urban areas adjacent to existing routes, helping to improve the health of residents and visitors. This will also support the delivery of new and existing housing sites and provide greater connectivity between employment and housing areas.

2.2.93. Access to a wider range of goods and services will be improved for those currently constrained by the lack of an appropriate route or those impacted by rat running on existing local roads.

South Norfolk District Local Plan (2015)

2.2.94. South Norfolk District Council's Site-Specific Allocations and Policies Document (adopted October 2015) designates areas of land for development, including housing, employment, recreation, open space and community uses. Policy 10 of the Greater Norwich Joint Core Strategy identifies a list of major new or expanded communities in the Norwich Policy Area, including Easton and Costessey within South Norfolk.

2.2.95. Policies EAS 1 and EAS 2 of the document state that the settlement of Easton has 52.6ha of land allocated for 900 dwellings and associated infrastructure, as well as 1.4ha of land allocated for a new Gymnastics Centre. Costessey has a number of policies within the document (COS 1, COS 2 and COS 3), which outline an allocation of 29.6ha of land for 500 dwellings and associated infrastructure (with an additional 5.5ha for green infrastructure), and 13.3ha of land allocated for employment uses.

2.2.96. While none of the developments at Easton or Costessey are dependent on the NWL, the inclusion of the NWL will help to future-proof the network against planned growth.

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

2.2.97. The Joint Core Strategy for Broadland, Norwich and South Norfolk (JCS) was adopted in 2011 and updated in 2014. The JCS sets out the long-term vision and objectives for the area, identifying broad locations for housing and employment growth, and improvements to transport infrastructure. At the time of its publication, the JCS noted that it could not be delivered without the implementation of the Norwich Area Transportation Strategy.

2.2.98. The JCS lays out a number of spatial planning objectives for the region, including:

- The promotion of economic growth and diversity to provide a wide range of jobs
- The promotion of regeneration and reduction of deprivation, particularly in towns, villages and rural areas
- The enhancement of transport provision to meet the needs of existing and future populations while reducing travel need and impact

2.2.99. The NWL will enhance strategic connectivity between employment sites, including Norwich Airport, Imperial Park, the Food Enterprise Zone, and the Norwich Research Park. Improved links to diverse employment areas will not only encourage economic growth, but also work to reduce deprivation in local communities. By creating a more resilient network and providing additional route options, the

NWL will help safeguard Broadland, Norwich and South Norfolk from the impact of planned future growth.

EMERGING POLICY

Local Transport Plan 4 Strategy, 2021 – 2036 (expected 2021)

2.2.100. The draft Local Transport Plan (LTP4) sets out NCC's plans, policies and programmes on transport infrastructure to 2036. The plan is expected to be adopted in August 2021 and will be accompanied by an implementation plan for the short, medium, and long-term.

2.2.101. The draft LTP4 reflects on the achievements since the 2011 Local Transport Plan, including the completion of A1270, Government commitment to A47 improvements, and the acceptance of the SOBC for the Norwich Western Link.

2.2.102. It responds to the challenges ahead, including addressing air quality and carbon reduction, infrastructure deficits, and the impact of the Covid-19 pandemic.

2.2.103. Enhancing connectivity is a core principle, referring to the connections that people make between the major places within the county, as well as the major places outside. It also refers to how people access vital services such as employment, education, health services and retail. For these trips, connectivity must be improved from surrounding rural areas.

2.2.104. The NWL is identified as a strategic priority. It will provide improved accessibility and connectivity to Tier One Employment Areas, and transport gateways such as Norwich Airport, all of which aim to encourage local investment.

2.2.105. The NWL will significantly improve connectivity in the local area through the provision of a more direct north to south link while also removing some east to west movements from the A47 and A1067. The scheme will provide a shorter, more direct route with improved journey times, enabling more efficient fuel use on journeys due to continuous speeds (no deceleration/acceleration caused by junctions and bends). The new link should also reduce traffic at the Longwater interchange.

Transport East Transport Strategy (emerging)

2.2.106. Transport East is the sub-national transport body for Norfolk, Suffolk, Essex, Thurrock and Southend-on-Sea. Transport East was launched to deliver a collective vision for the future of transport and infrastructure:

- "A thriving economy for the East, with fast, reliable and resilient transport infrastructure driving forward a future of inclusive and sustainable growth for decades to come."

2.2.107. As of February 2021, the Transport East Transport Strategy is under development. It will "set out ambitions and priority areas for improved connectivity and build upon established growth strategies and corridor-specific evidence-based campaigns."

2.2.108. Transport East has identified three key themes that together define the unique transport geography and provide an overarching narrative for the strategy:

- **Global Gateways** – Better connected ports and airports to help UK businesses thrive and boost the nation's economy through greater access to international markets and facilitating Foreign Direct Investment.
- **Multi-Centred Connectivity** – Enhanced links between our fastest growing places and business clusters; enabling the area to function as a coherent economy and improving productivity.

- **Energised Coastal Communities** – A reinvented, sustainable coast for the 21st century, which delivers on our ambition to become the UK's foremost all-energy coast, as well as a competitive visitor offer.

2.2.109. 59 miles to the south of Norwich lies Felixstowe Port, the region's and nation's largest freight gateway. Currently goods movements to Felixstowe from the coastal areas north of Norwich are constrained for potential routing alternatives.

2.2.110. Improved access to international markets is critical for future growth, which will help business-to-business connectivity for realising opportunities and developing trade. Currently, the missing link within the NWQ constrains existing goods movements and equates to higher transport costs for businesses. The provision of a higher quality and more direct route for goods movement would prove more economically efficient for business and produce a more freight and goods friendly environment for the region as whole.

2.2.111. The NWL will improve connectivity to centres of excellence and improve the flow of traffic around the growing communities. It will provide improved connectivity to Norwich Airport and the Space to Innovate Enterprise Zone sites (Norwich Research Park, Scottow Enterprise Park, Egmere Business Zone) and The Great Yarmouth and Lowestoft Enterprise Zone along with the Norfolk and Suffolk Energy Coast.

2.2.112. Tourism is a significant contributor to the regional economy with visitors attracted to the Norfolk Broads and the Norfolk coastline as well as other locations. Many visitors travel via the A140, which runs north-south from the northern edge of Norwich adjacent to the Airport towards Cromer. Visitors accessing this route from the A11 or A47 will have a desire line through the NWQ.

2.2.113. The NWL will provide better connectivity to the North Norfolk coast from the west. At peak seasonal times of the year, the NWL would help to further alleviate pressure on the Norwich outer ring road and prevent strategic long-distance visitor traffic from routing inappropriately via local minor roads within the NWQ.

Greater Norwich Local Plan (expected 2022)

2.2.114. The Greater Norwich Local Plan (GNLP) (Regulation 19) will set out the planning strategy across the three districts of Broadland, Norwich and South Norfolk until 2038. The Plan is currently at Publication Stage, and is expected to go to Public Examination in November 2021, and to be adopted by September 2022.

2.2.115. The strategy, along with adopted site allocation plans, area action plans and neighbourhood plans for each district, will set out the locations where a high proportion of growth will be needed. It aims for Greater Norwich to have 'vibrant, healthy, inclusive and growing communities', through 'clean and resource efficient' growth that allows Greater Norwich to meet is national commitments on tackling climate change.

2.2.116. It will be part of a wider package of joined up measures the councils are taking to work with the Government, New Anglia LEP, the development industry and service and infrastructure providers to fund and deliver the high-quality growth.

2.2.117. It will include policies that:

- Provide jobs and services for a rising population and develop Greater Norwich's role as an engine of the regional economy

- Facilitate enhanced growth potential with a target of at least 33,000 additional jobs in the period 2020 – 2038
- Increase the proportion of higher value, knowledge economy jobs, while ensuring that opportunities are available for development that can support all types and levels of jobs in all sectors of the economy and for all the workforce
- Be supported by investment strategies that focus on overcoming constraints to the release and development of key employment sites

2.2.118. The GNLP establishes a settlement hierarchy with associated strategic policies for growth. The Norwich urban area and its fringe areas are classified together; this includes the parishes of Costessey, Easton, Taverham, among others). This urban area is considered to play 'a key role on meeting employment growth needs, providing sites for the growth of both strategic and local employment uses.'

2.2.119. Finally, the current draft discusses planned enhancements to the transport system by 2038. This includes improvements to connectivity via road improvements to the A11, A47, A140 and the Norwich Western Link.

Transport for Norwich (TfN) Strategy, (2004 [NATS], under review)

2.2.120. The existing Transport for Norwich Strategy (previously the Norwich Area Transport Strategy, NATS) was prepared by NCC in partnership with Norwich City Council, Broadland District Council and South Norfolk Council and adopted in 2004. The strategy covered the city of Norwich, its suburbs and the first ring of surrounding villages. In 2010, NCC agreed an Implementation Plan, which also re-aligned a small number of policies to reflect the evolution of national policy The Implementation Plan was also updated in 2013.

2.2.121. The document set out a transportation strategy for the Norwich area until 2021 to help deliver growth within the Norwich area and address the problems, such as congestion. The strategy also promoted sustainable travel choices, recognising the need to maintain the economic health of the Norwich area. The NATS includes six strategic themes and objectives, which underpin the vision and are:

- Accessibility
- Congestion
- Pollution
- Safety
- Economic viability
- Liveability and community

2.2.122. Development of the NWL will improve the area's and region's accessibility. Rerouting trips away from the existing routes between the A1067 and A47 will help to improve accessibility to employment and services. both locally and regionally. This will improve the journey times of both the reassigned trips and those trips remaining on the existing routes. This will, in turn, help promote an efficient economic environment, with reduced traffic flows on existing routes encouraging more tourism.

2.2.123. The introduction of the NWL is also expected to reduce the incidence of rat running and associated speeding. Removing traffic from local roads would also reduce severance in local villages and affected residential areas.

2.2.124. The Transport for Norwich strategy is currently under review, having undertaken a consultation exercise in 2018. This will build on the work already completed and being delivered through TCF, and will set out the transport proposals for the future across the Greater Norwich area.

2.2.125. Part of the plan to improve the way people travel is to provide improved transport infrastructure so that trips that do not need to be routed through the city have viable alternatives. The NWL forms part of this improved infrastructure.

SUMMARY OF THE BUSINESS STRATEGY

2.2.126. The NWL scheme is closely aligned with national, regional, and local transport policies and plans.

2.2.127. Regional and local strategies reflect the Government's view, expressed in the National Infrastructure Plan and Transport Investment Strategy, that high quality infrastructure is needed to improve productivity and support jobs and growth.

2.2.128. The Norfolk and Suffolk Economic Strategy underscores this with a focus on well-connected places, that have the links people and businesses need to prosper.

2.2.129. Norfolk's recovery and growth ambitions, which support the Government's wider support for levelling up economic centres outside of London, require a transport network that is future-proofed. The NWL will increase capacity around Tier One Employment Sites identified as part of Norfolk's Strategic Planning Framework, which lists the scheme as a priority project. In addition, communities' sense of place will be enhanced by the NWL, with rat-running, inappropriate traffic, and the resulting severance being alleviated.

2.2.130. The case for the NWL is not only about relieving congestion in a small area. Unlocking orbital connectivity to the west of Norwich will strengthen the resilience of the network, improve the quality of life for locals and visitors, and prepare Norfolk for years of future growth.

2.3 PROBLEMS IDENTIFIED

2.3.1. There are a number of problems that the proposed scheme has been developed to address. These include:

- Connectivity
- Congestion and delay
- Productivity gap
- Journey time reliability
- Road use in rural communities
- Speeding
- Severance
- Barriers to walking and cycling
- Personal injury collisions

CONNECTIVITY

2.3.2. As shown in **Figure 2-3**, there is a gap in orbital connectivity on the western side of Norwich, with no Primary A Road standard routes available between the A140, and the A1065 route, some 35km west of the A140.

2.3.3. The NWL would fill in the missing MRN link between the A47 and A1067 in the west, extending the A1270 to meet the A47 on the west of Norwich. This route would increase orbital connectivity and provide a suitable north-south alternative for vehicles to circumnavigate Norwich to the west.

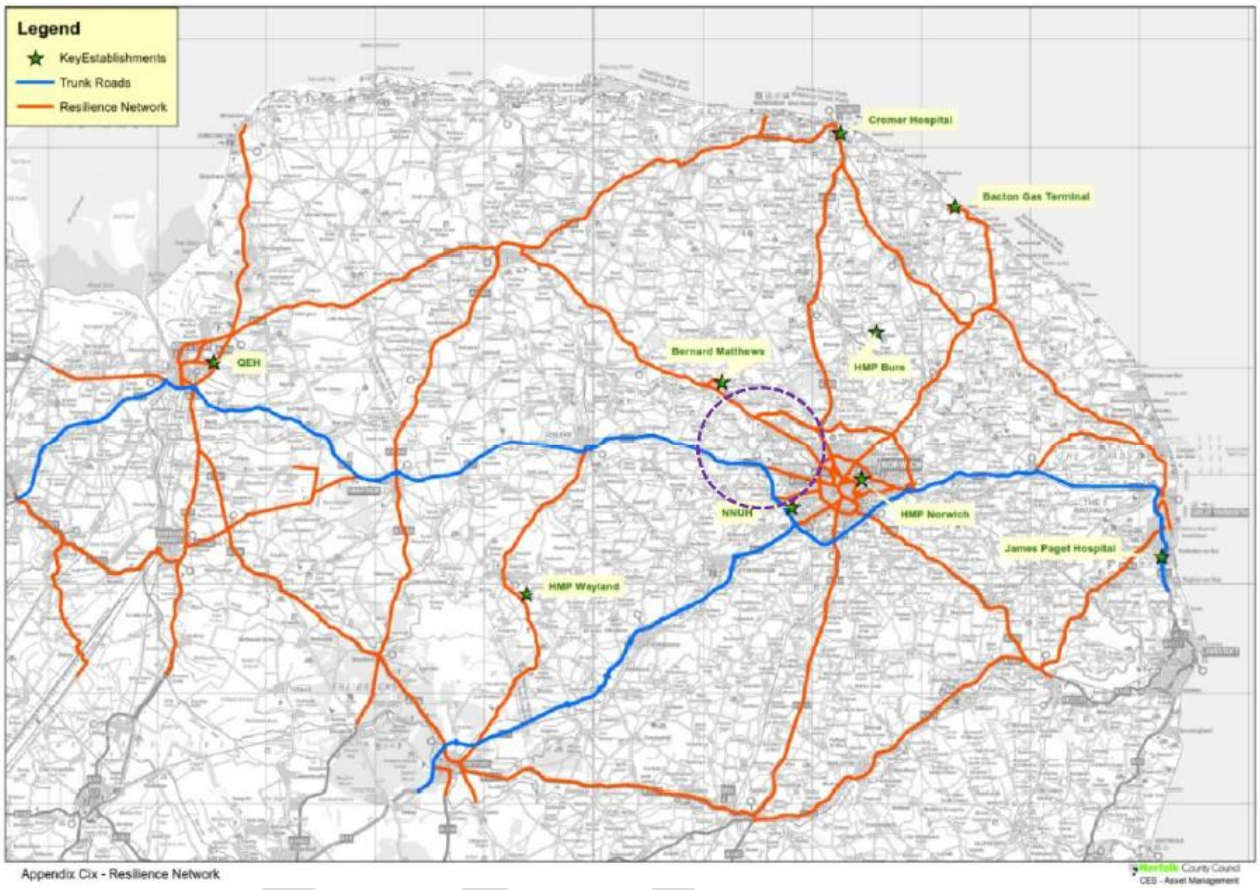


Figure 2-3 - NCC Trunk Road and Resilience Network

2.3.4. The other alternative north-south routes within the study area are predominantly rural minor single carriageway roads, which offer indirect and inefficient travel routes. While efforts have been made by NCC to prevent attracting additional through traffic to these routes, many network users have local knowledge of the area and access to satellite navigation devices and use the routes on a daily basis to avoid congestion on higher standard routes.

Freight

2.3.5. The A47 is the main route connecting Norwich and Norfolk to the Midlands and the North of England. Freight movements are currently constrained within the study area by the lack of high-standard routes for north-south movements.

2.3.6. Currently, freight traffic is directed along the B1535 or via the A1074 and A140/Cromer Road. The signed HGV route between the A1067 and the A47 via the B1535 is remote from Norwich, some 10km west of the A140. The recent upgrade of the B1535 has helped reduce HGV movements on some local roads, but the alignment of the B1535 remains constrained by existing property boundaries and includes a number of tight bends

2.3.7. The A1074/A140 route experiences congestion and delay leading to journey time reliability issues. The current routes used for freight lead to journey time inefficiencies, which will have productivity

consequences. As noted by the Road Haulage Association, the NWL "would make the area North of Norwich, which contains critical infrastructure, considerably more accessible."

2.3.8. Improved access to national and international markets is critical for future growth which will help business to business connectivity for realising opportunities and developing trade. The missing link within the NWQ lengthens journey times for freight, and may impact potential for growth within the NWQ. The provision of a more appropriate route for goods movements would prove more economically efficient for business.

2.3.9. This will also support the delivery of new and existing housing sites, and provide greater connectivity between employment and housing areas, which is a consideration for employers planning to locate to new areas.

CONGESTION AND DELAY

2.3.10. The radial routes and ring roads around Norwich suffer from congestion and delay during both AM and PM peaks. **Figure 2-4** and **Figure 2-4** - AM Peak Junction Capacity

2.3.11. show those junctions around Norwich that are operating at over 75% practical capacity – Volume / Capacity (V/C), during the AM peak and PM peak.

2.3.12. During the AM peak[14], five junctions around the A47 are above 75% in practical capacity. While this number is lower during the PM Peak, congestion shifts to the city of Norwich itself.

[14] AM peak (08:00-09:00); interpeak (average 10:00-16:00); PM peak (17:00-18:00)

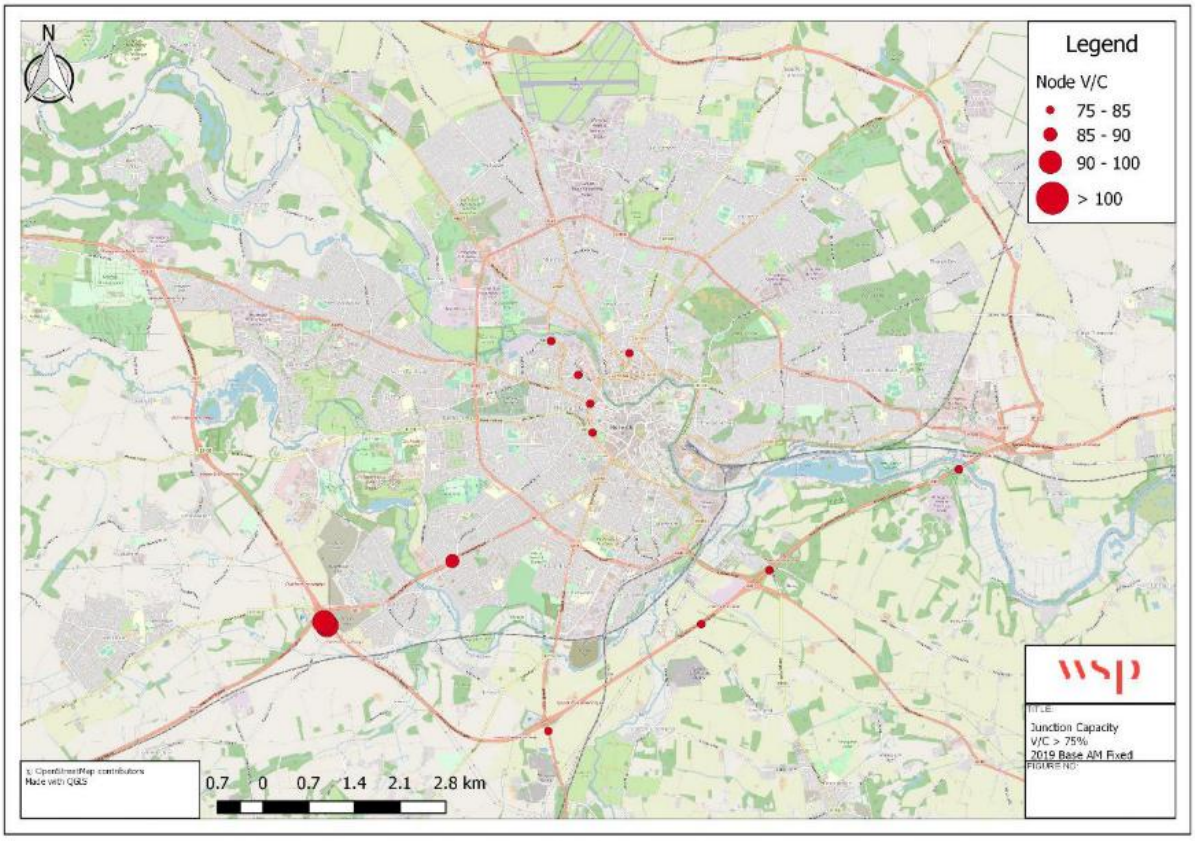


Figure 2-4 - AM Peak Junction Capacity

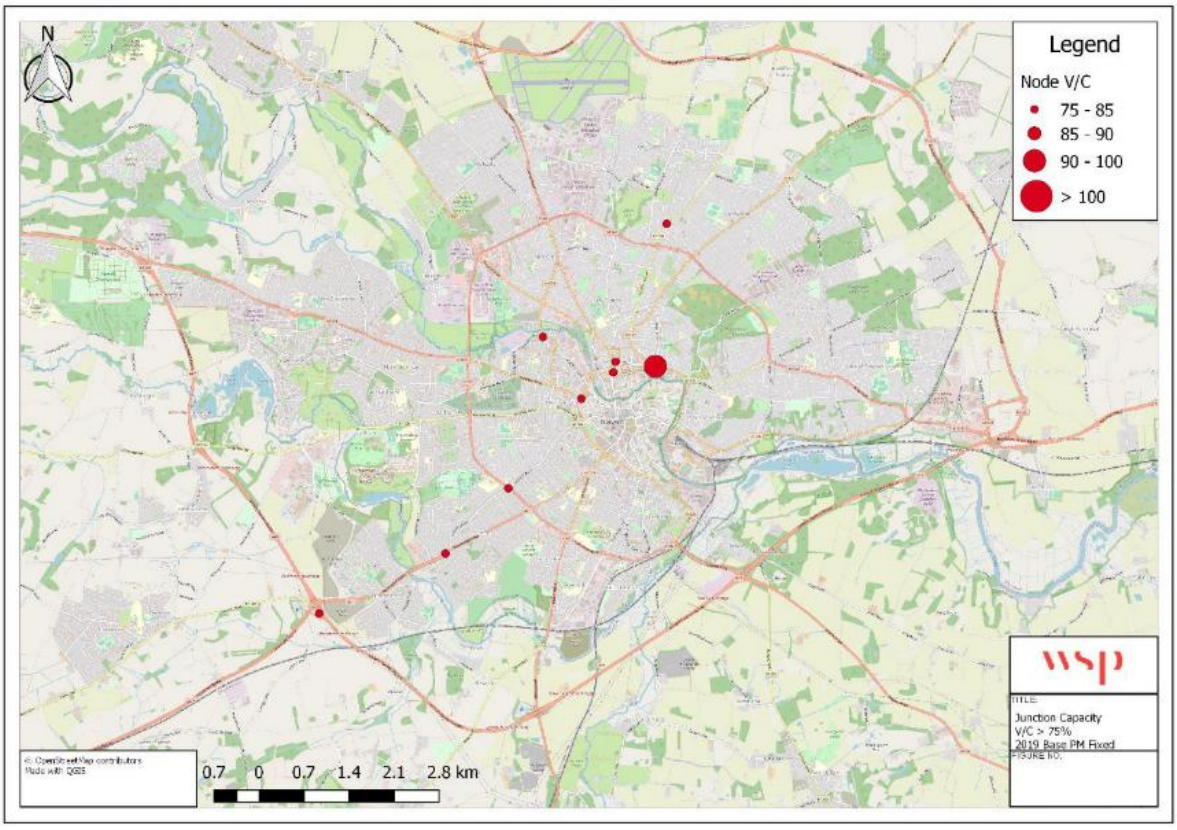


Figure 2-5 - PM Peak Junction Capacity

2.3.13. **Figure 2-6** and **Figure 2-7** show those links in the study area where delay exceeded 25 seconds in the 2019 AM peak and PM peak. This includes some sections of the A1074, including the junction of A1074 /Longwater Lane and the A1074 /Norwich Road junction. Sections of the A146 Lakenham Road and A140 (Colman Road) were found to have delays of over one minute.

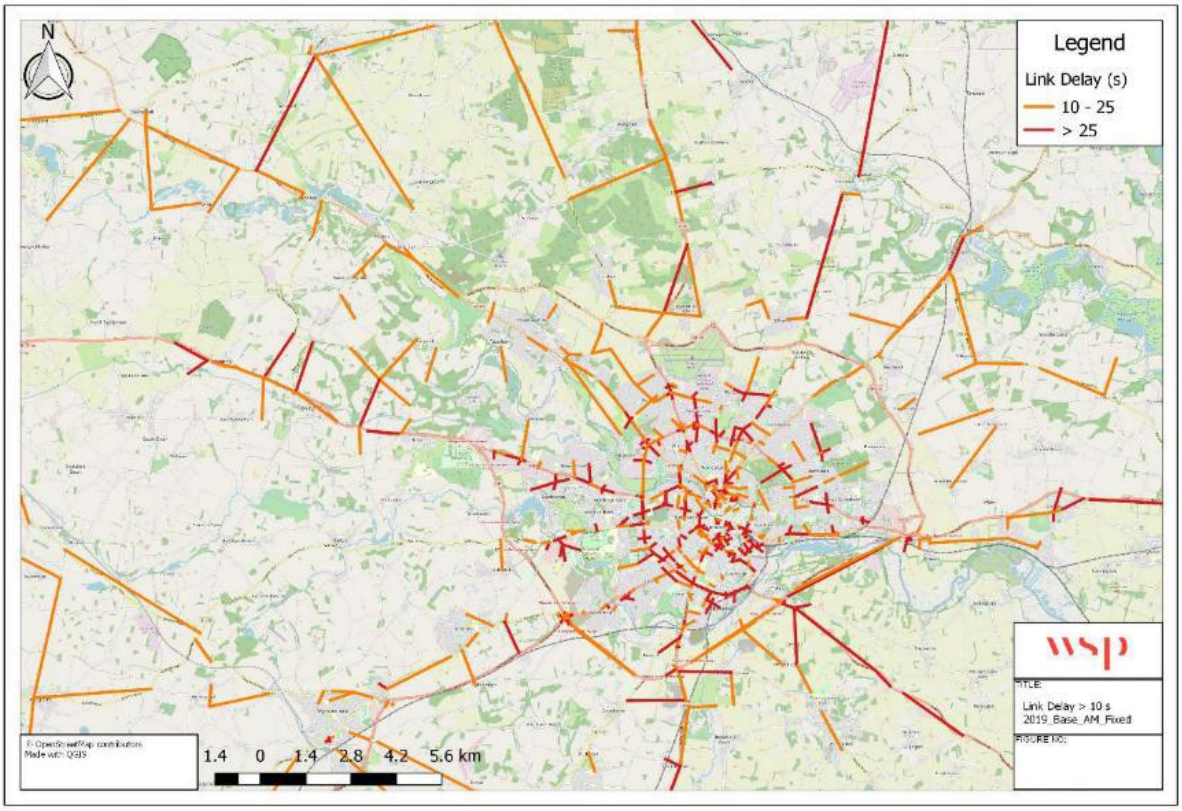


Figure 2-6 - AM Peak Road Delay (seconds)

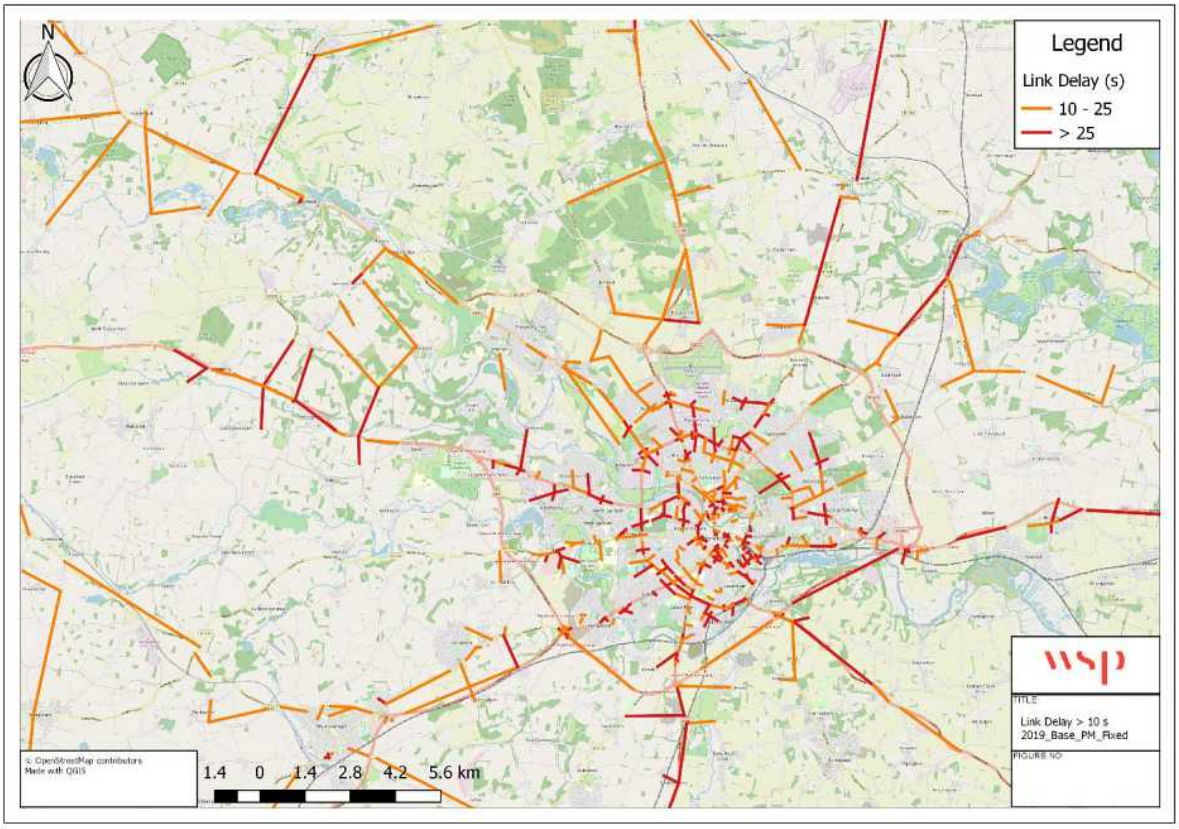


Figure 2-7 – PM Peak Road Delay (seconds)

PRODUCTIVITY GAP

2.3.14. Prior to the pandemic, the East of England's economy had been performing strongly since the 2010 recession, with three of the ten fastest growing cities in the UK (Norwich, Ipswich and Peterborough) located in the region.

2.3.15. Norwich is a key driver of the East of England's economy, as well as a major regional centre for new homes and jobs, leisure, cultural, and educational development. Norwich was ranked eighth nationally for annual GVA growth in Quarter 1 (Q1) of 2019, with a growth rate of 2.4%[15].

2.3.16. Despite this steady growth trajectory, Norwich still lags behind some other areas in the UK, including London, with respect to economic indicators. ONS data collated in December 2018 shows that Gross Value Added (GVA) per head in Norwich and East Norfolk lags behind the national average, which the Norfolk Strategic Planning Framework attributes to the area's dependence on lower-wage, lower-skill sectors.

15 https://www.irwinmitchell.com/newsandmedia/2019/july/uks-most-sustainable-cities-revealed-in-new-report

2.3.17. Figure 2-8 shows that in 2018, the average wage in Norwich was £501.40 per week, lower than the £558.10 and £570.90 average for the East of England and Great Britain respectively. This gap has widened over the last decade, increasing from £54.80 to £56.70 in the East of England, and from £64.80 to £69.50 across Great Britain.

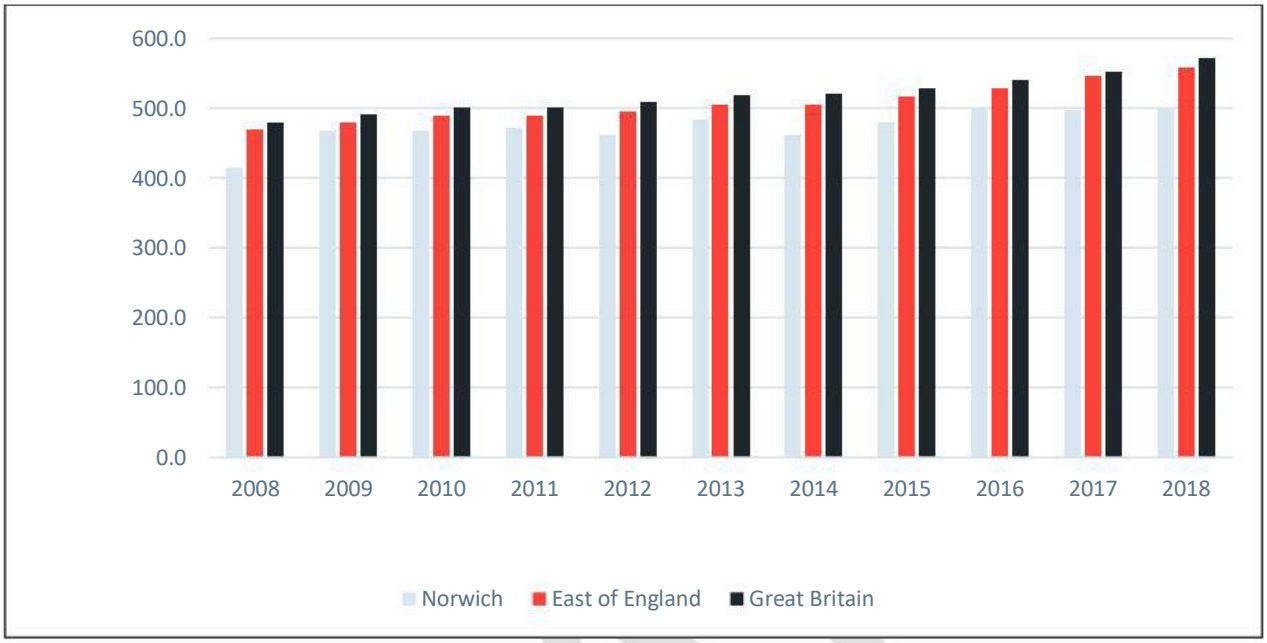


Figure 2-8 - Gross Weekly Earnings 2008-2018 (ONS Nomis)

2.3.18. As shown in Figure 2-9 and Table 2-1, not only has the GVA per head in Norwich historically lagged behind that of the UK, but the productivity gap has been widening over time. A significant gap in GVA has opened up between Norwich and the rest of the UK since 2010, with the difference being at its largest for the latest available year, 2017.

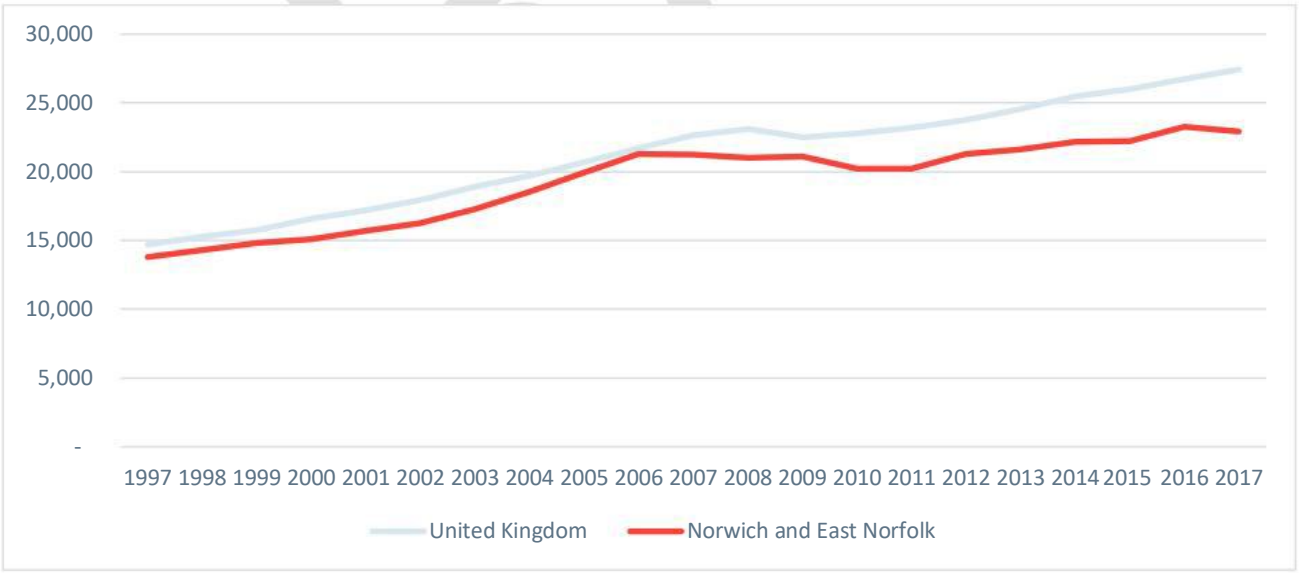


Figure 2-9 - GVA per head trends 1997 to 2017 (ONS)

Table 2-1 - GVA 2010-2017, selected areas (ONS)

	2010 – GVA (Income Approach) per head of population at current basic prices	2017 – GVA (Income Approach) per head of population at current basic prices	Growth between 2010-2017, %
East of England	21,034	25,217	19.9%
East Anglia	20,810	24,850	19.4%
Norwich and East Norfolk	20,228	22,926	13.3%
England	22,998	27,949	21.5%

2.3.19. The links between transport investment and productivity are widely accepted, with transport infrastructure changing both the effective density of people in an affected area, and the jobs that are available to skilled workers.

2.3.20. Continued economic development is dependent on attracting new businesses and increasing the productivity of existing firms. Enhancing regional labour mobility will be essential to unlocking further economic growth if the area is to remain competitive.

2.3.21. In line with evolving government policy on Levelling Up, assessment on the economic impact of the scheme on the local economy has been undertaken to better understand place-based impacts. The greatest productivity benefits stemming from the introduction of a Norwich Western Link are expected in Broadland and Breckland (£21.6m and £23.9m respectively). More detail can be found in **section 2.5.6**.

2.3.22. In addition, **section 3.8** breaks down the scheme's monetised benefits into business and commuting trips, showing an economic benefit of £81.7m across 60 years in terms of time and distance travelled on business trips, and £66.1m on commuting trips.

JOURNEY TIME RELIABILITY

2.3.23. To assess the extent to which journey time variation impacts network users, open access mapping data was used to compare journey times across the local road network at different times of the day. Journey times were found to be significantly longer during peak periods than in the off-peak (10:00 – 16:00).

2.3.24. Modelled journey time data has been extracted from the 2019 base year model for the morning peak and evening peak periods for the routes shown in **Figure 2-10**, where:

- JT1: junction of Dereham Road and Marlingford Road (Easton) to the A1270 Broadland Northway (Fir Covert roundabout), via Ringland Hills and Taverham
- JT2: junction of Berrys Lane and Mattishall Road (Honingham) to the A1270 Broadland Northway (Fir Covert roundabout), via Weston Longville
- JT3: junction of A47 / B1535 / Berrys Lane (north-west of Honingham) to the A1270 Broadland Northway (Cromer Road roundabout), via Dereham Road and the A140

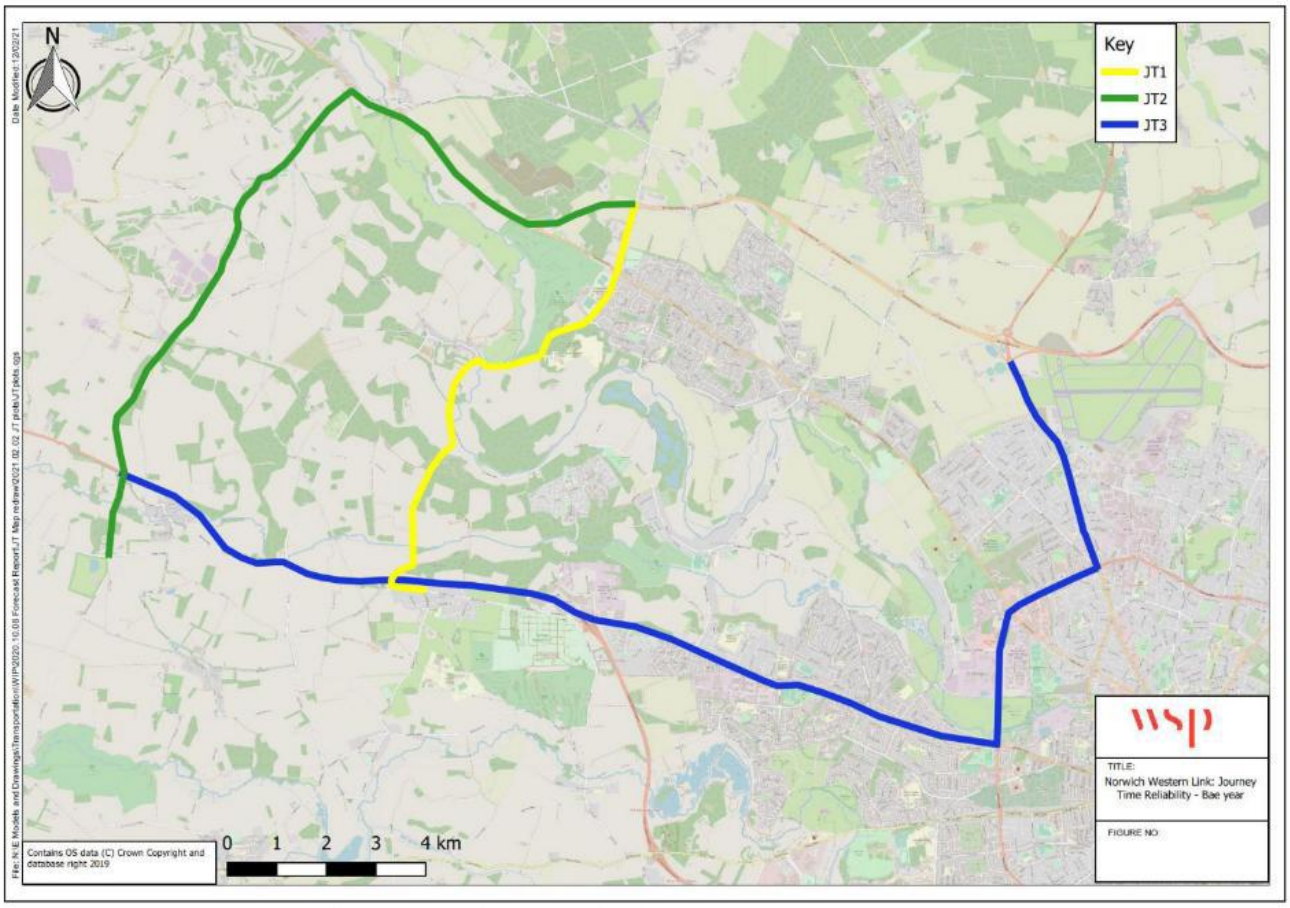


Figure 2-10 - Journey Time Reliability 2019

2.3.25. In **Table 2-2**, the journey times during the AM peak and PM peak periods have been compared to the off-peak period to show the delay experienced by vehicles due to the congestion. Where the difference between peak and off-peak exceeds a minute, it has been marked in red.

Table 2-2 – Journey times within NWQ for north-south routes 2019

Name	Distance (m)	AM peak (s)	PM peak (s)	Off-peak (s)	Variation between AM peak and Off-peak (s)	Variation between PM peak and Off-peak (s)
JT1: Northbound	6,747	647	643	585	62	58
JT1: Southbound	6.747	618	637	587	31	50
JT2: Northbound	11,036	771	780	647	124	133
JT2: Southbound	11,036	773	780	647	126	133

Name	Distance (m)	AM peak (s)	PM peak (s)	Off-peak (s)	Variation between AM peak and Off-peak (s)	Variation between PM peak and Off-peak (s)
JT3: Eastbound	17,341	1,771	1,463	1,200	571	263
JT3: Westbound	17,341	1,653	1,525	1,279	374	246

2.3.26. As of 2019, the JT1 route in the northbound direction experienced approximately 1 minute of delay in the AM peak and PM peak when compared to the off-peak i.e. free flow conditions. JT2 experienced over two minutes delay in both the northbound and southbound directions in the AM peak and PM peak periods.

2.3.27. JT3 experienced between 4 minutes of delay on the westbound direction in the PM peak to approximately 9.5 minutes of delay in the eastbound direction in the AM peak. This route terminates at Norwich Airport and Imperial Park, a key employment site for the region.

ROAD USE IN RURAL COMMUNITIES

2.3.28. Those living in communities to the west of Norwich have raised concerns about traffic problems they were seeing and experiencing on a daily basis, most notably during the peak hours when their villages, and the small, often single-track rural roads running through and between them, were congested with traffic. There were concerns raised relating to the volume and speed of traffic, the severance it causes and the loss of amenity within their communities. People reported not feeling safe to walk or cycle within and between their local communities due to the level of traffic on local roads.

2.3.29. With drivers having access to satellite navigation that prioritises the fastest route via inbuilt navigation systems or their smart phone, commuters are using rural roads to bypass the increased journey times associated with trips into Norwich city centre, Norwich Airport and other identified employment areas.

2.3.30. The lack of a direct, high-capacity, high-standard route between the A1067 and the A47 results in trips on existing local routes such as Lyng Road, Heath Road, Sandy Lane, Paddy's Lane, Taverham Road and Ringland Road.

2.3.31. **Figure 1-15** show the scale of trips using these six north-south routes in the northbound direction, while **Figure 1-16** shows the same in the southbound direction. Each would benefit from the implementation of the NWL, with traffic rerouting from local routes onto a more suitable and direct link.

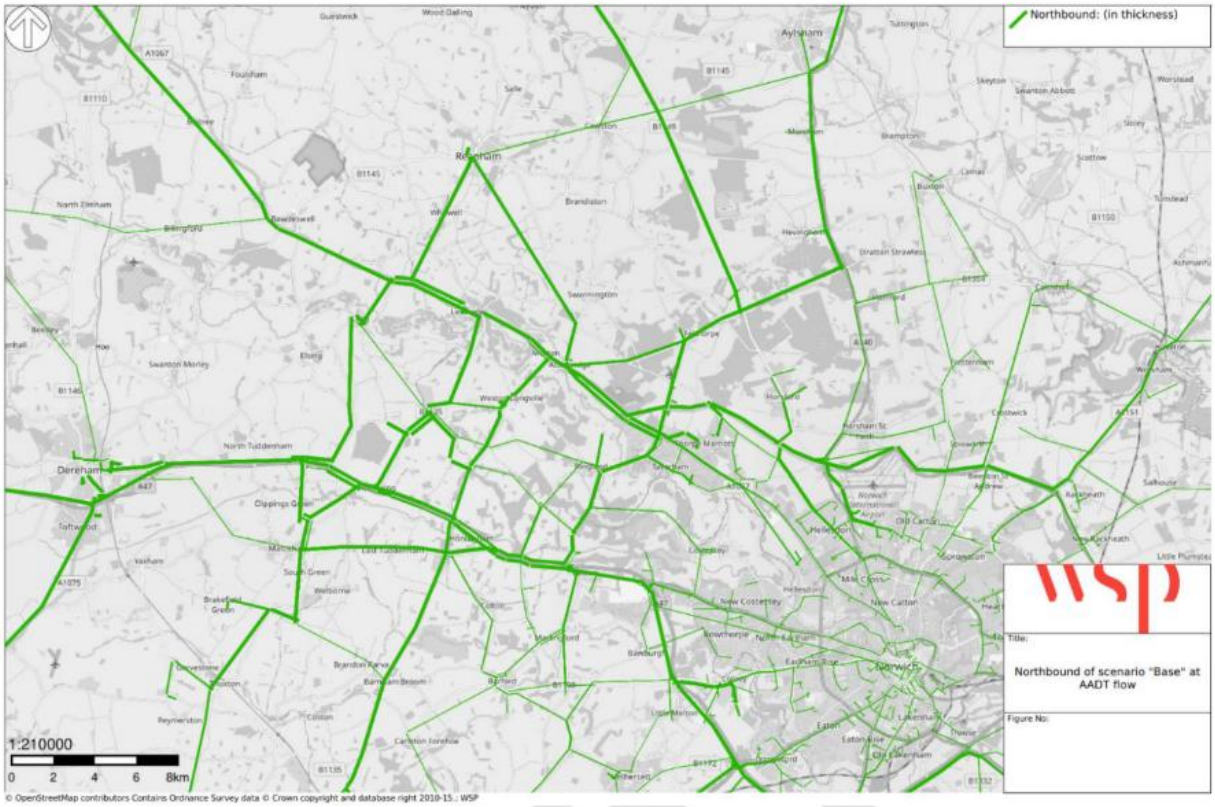


Figure 2-11 - Select Link Analysis across six routes: 2019 Northbound

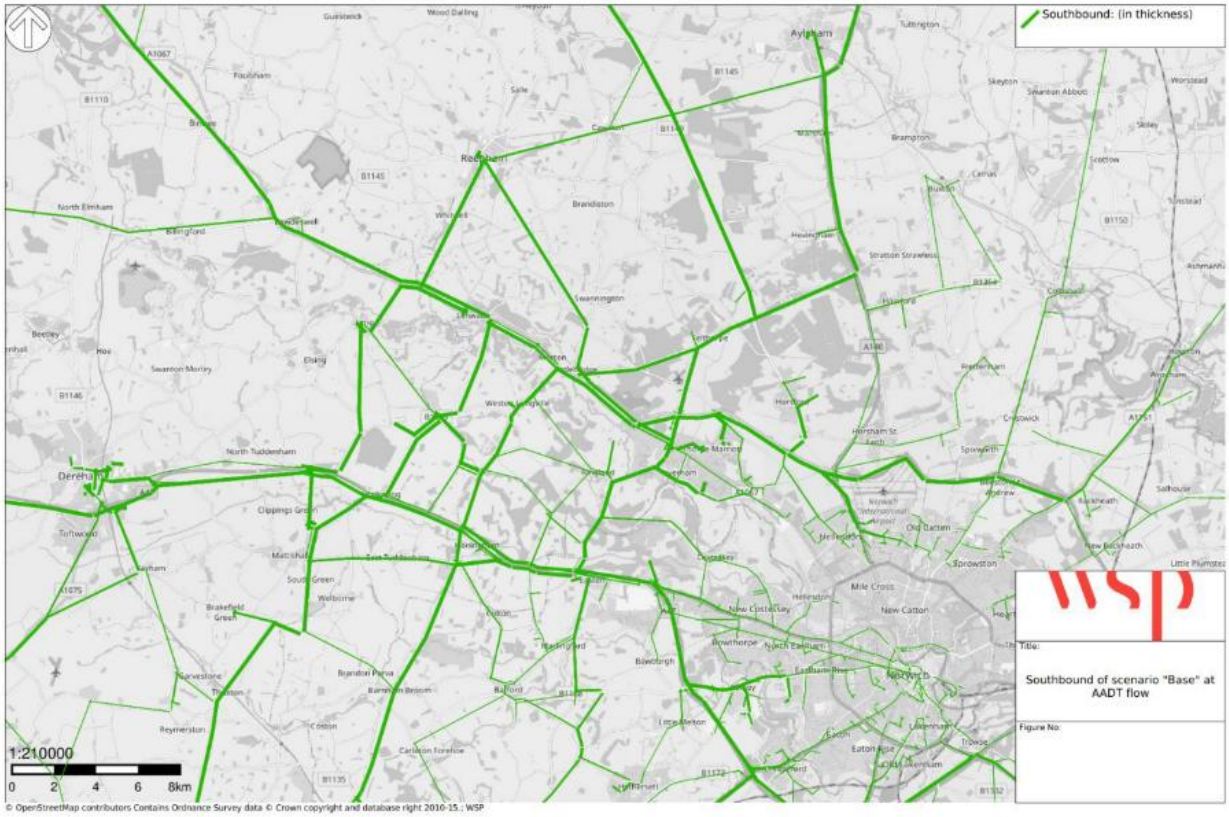


Figure 2-12 - Select Link Analysis across six routes: 2019 Southbound

2.3.32. These routes within the NWQ are predominantly unclassified roads, unsuitable for carrying more than 5,000 vehicles per day. These rural roads are less than 6m in width, often with tight bends and narrow verges or protected verges. There are also pinch points on some of the routes where the road width is substantially less than 5.5m or where the radii of bends are less than 10m. These parameters are set out as desirable minimums within Manual for Streets 2 Guidance for through routes carrying two-way traffic to enable safe passing of two large vehicles. Several examples of tight roads, often with traffic calming measures or signage, as well as their corresponding location are shown in **Figure 2-13.**

Figure 2-13 – Rural roads, Woodforde Close, Church Road, Heath Road (Google maps)

2.3.33. **Table 2-3** indicates the count locations (where data was collected in 2019) on the north-south routes that pass close to residential areas such as Taverham, Costessey, Lyng and Weston Longville. The data summarises the total flow (across a 24-hour period), the number of Heavy Goods Vehicles (HGVs) and the associated HGV percentage.

Table 2-3 – 2019 Survey Data - Composition

ATC Site	Location	Traffic Flow	HGVs	HGV%
1	C198 The Common, Lyng	2,035	19	0.9%
2	B1535 Weston Hall Road, Weston Longville	4,019	380	7.7%
3	C167 Marl Hill Road, Morton on the Hill	3,327	18	0.5%
4	C167 Honingham Road, Weston Longville	3,113	13	0.4%
5	C167 Paddy's Lane, Weston Longville	2,788	23	0.8%
6	C173 Heath Road, Hockering	1,631	13	0.8%
7	C198 Lyng Road, North Tuddenham	2,721	94	3.5%
8	B1535 Wood Lane, Honingham	5,375	326	6.1%
68	C172 Ringland Road, Taverham	4,312	6	0.1%
69	C461 Taverham Lane, Costessey	5,264	16	0.3%
76	C171 West End, Costessey	7,389	58	0.8%
77	C171 Townhouse Road, Costessey	4,781	18	0.4%
78	C162 Longwater Lane, Costessey	10,808	57	0.5%

2.3.34. While there are relatively low numbers of HGVs using the north-south routes between the A47 and A1067, the areas of Weston Longville and Honingham are experiencing 7.7% and 6.1% HGVs respectively. As the majority of these rural routes are under 6m wide, they are not ideally suited to this type of traffic, particularly when coming into conflict with vehicles from the opposite direction.

SPEEDING

2.3.35. Traffic survey data, collected in 2019, was also used to assess the speed of vehicles using these routes. **Table 2-4** shows the speed limit at the point of survey and the proportion of vehicles exceeding this limit.

2.3.36. The Royal Society for the Prevention of Accidents notes that two-thirds of all crashes in which people are killed or injured happen on roads with a speed limit of 30mph or less. As shown below, those roads with lower speed limits (20 and 30 mph) have the highest incident of vehicles exceeding the stated speed limit. Two of the sites measured had over 75% of vehicles exceeding the stated speed limits at the time of the surveys.

Table 2-4 – 2018 Survey Data - Speed

ATC Site	Location	Speed Limit (mph)	85th Percentile (mph)	% > Speed Limit
1	C198 The Common, Lyng	30	29	11.9%
2	B1535 Weston Hall Road, Weston Longville	60	43	0.0%
3	C167 Marl Hill Road, Morton on the Hill	60	49	1.9%
4	C167 Honingham Road, Weston Longville	20	35	**93.8%**
5	C167 Paddy's Lane, Weston Longville	60	45	3.0%
6	C173 Heath Road, Hockering	30	39	**72.3%**
7	C198 Lyng Road, North Tuddenham	60	47	0.3%
8	B1535 Wood Lane, Honingham	50	49	13.0%
68	C172 Ringland Road, Taverham	60	40	0.1%
69	C461 Taverham Lane, Costessey	60	50	1.7%
75	Taverham Road, east of Penn Road, Taverham	30	36	**53.9%**
76	C171 West End, Costessey	30	28	7.5%
77	C171 Townhouse Road, Costessey	40	37	7.1%
78	C162 Longwater Lane, Costessey	30	33	**34.3%**

SEVERANCE

2.3.37. North-south movement for freight between the A47 and A1067 is constrained by the River Wensum, and to a lesser extent the River Tud.

2.3.38. **Figure 2-14** shows the existing bridge structures within the study area. Four bridges within the study area that cross the River Wensum are suitable for use by vehicular traffic:

- Costessey Lane
- Taverham Lane/Costessey Road
- Ringland Road
- A1067

2.3.39. The Costessey Lane and Ringland Road bridges have weight limit restrictions of 7.5 tonnes, constraining HGV movement. Only the A1067 bridge has a carriageway of over 6m width, with the other three bridges unsuitable for heavy, two-way vehicle traffic. These bridges cannot be appropriately widened or strengthened in their current position due to the Special Area of Conservation and SSSI ecological designations that apply to the River Wensum.

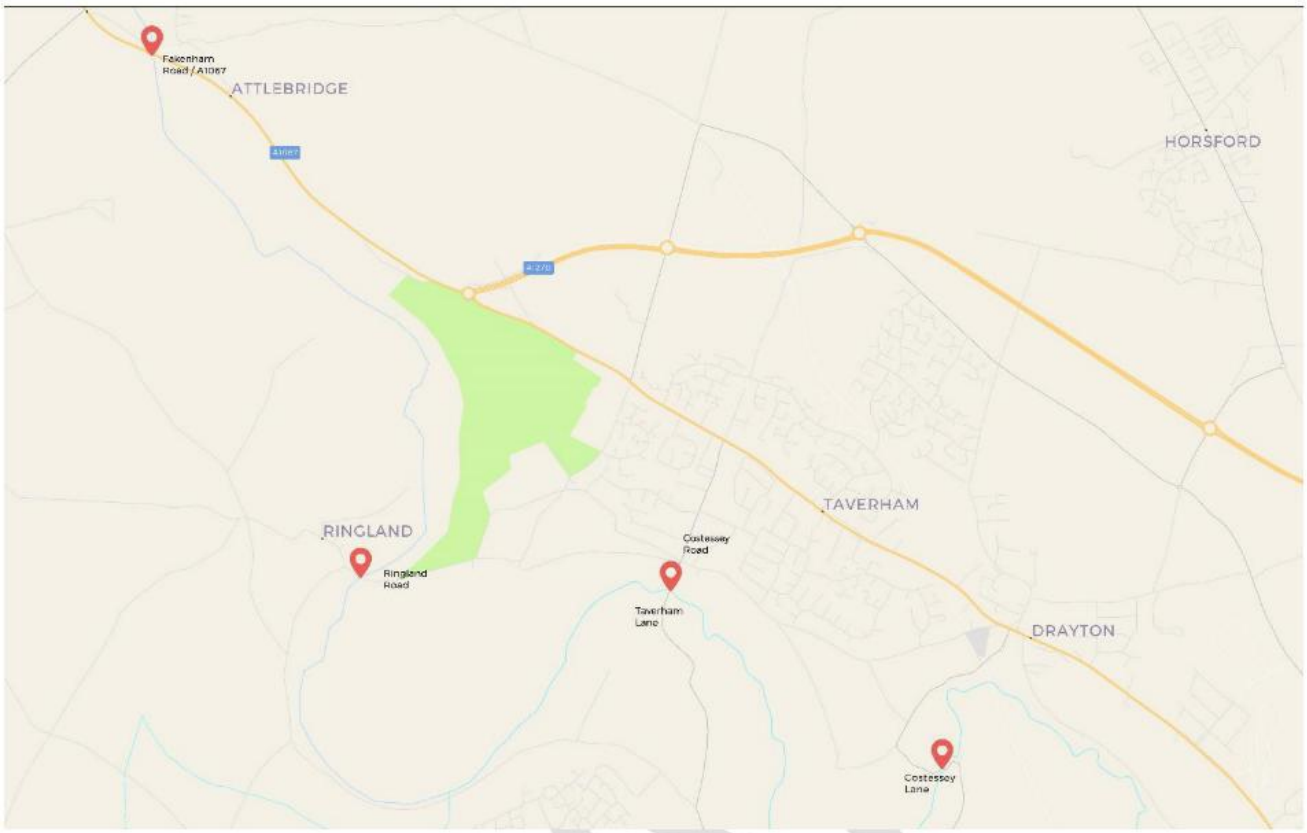


Figure 2-14 - Existing structures within NWQ

2.3.40. **Figure 2-15** shows an example of the potential for conflict between oncoming vehicles that can occur at Costessey Lane bridge. This two-way crossing cannot accommodate two vehicles, and there would be little space to the right or left of the road to allow an oncoming vehicle to pass. This problem is exacerbated by light goods vehicles.

Figure 2-15 - Costessey Lane Bridge

WALKING AND CYCLING INFRASTRUCTURE

2.3.41. Walking infrastructure across the study area varies in quality. The NWQ has a number of PRoWs available for use (**Figure 2-16** and **Figure 2-17**). A breakdown of the accessible areas via walking and cycling from each settlement is shown in the Walking, Cycling and Horse-Riding assessment report.

2.3.42. Within more built-up areas, the provision is generally adequate, with footways in place adjacent to roads. Provision between different villages and towns, however, varies in quality, with villages such as Horsford and Taverham unable to reach many other settlements within a 30-minute walk. In other cases, including Attlebridge, Hockering, Lenwade, access is constrained in some directions by busy roads, or by a lack of safe pedestrian infrastructure.

2.3.43. The A47 corridor and Longwater interchange are major barriers to pedestrian access, with limited infrastructure available for users wishing to access local community facilities, such as Saint Peter's Church (Easton) or Saint Andrew Honingham Church, or access shops and services on William Frost Way.

2.3.44. Easton College and the Food Enterprise Zone are both located south of the A47. Both sites are poorly connected for north-south trips, with the A47 currently presenting a physical barrier with no crossing facilities. The A1067 also creates a barrier to pedestrian access, with limited opportunities to cross safely to shops and services along the corridor.

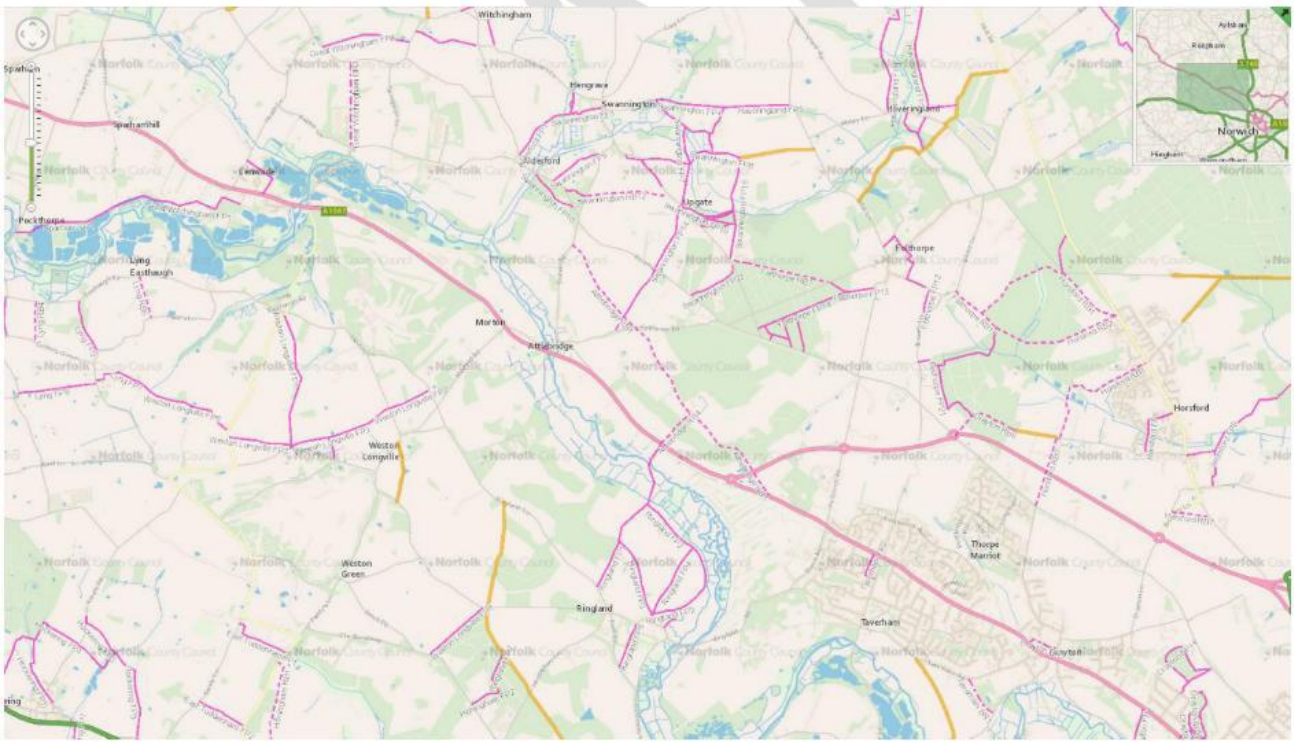


Figure 2-16 - PRoWs - Study Area, North View (Source: Norfolk County Council)

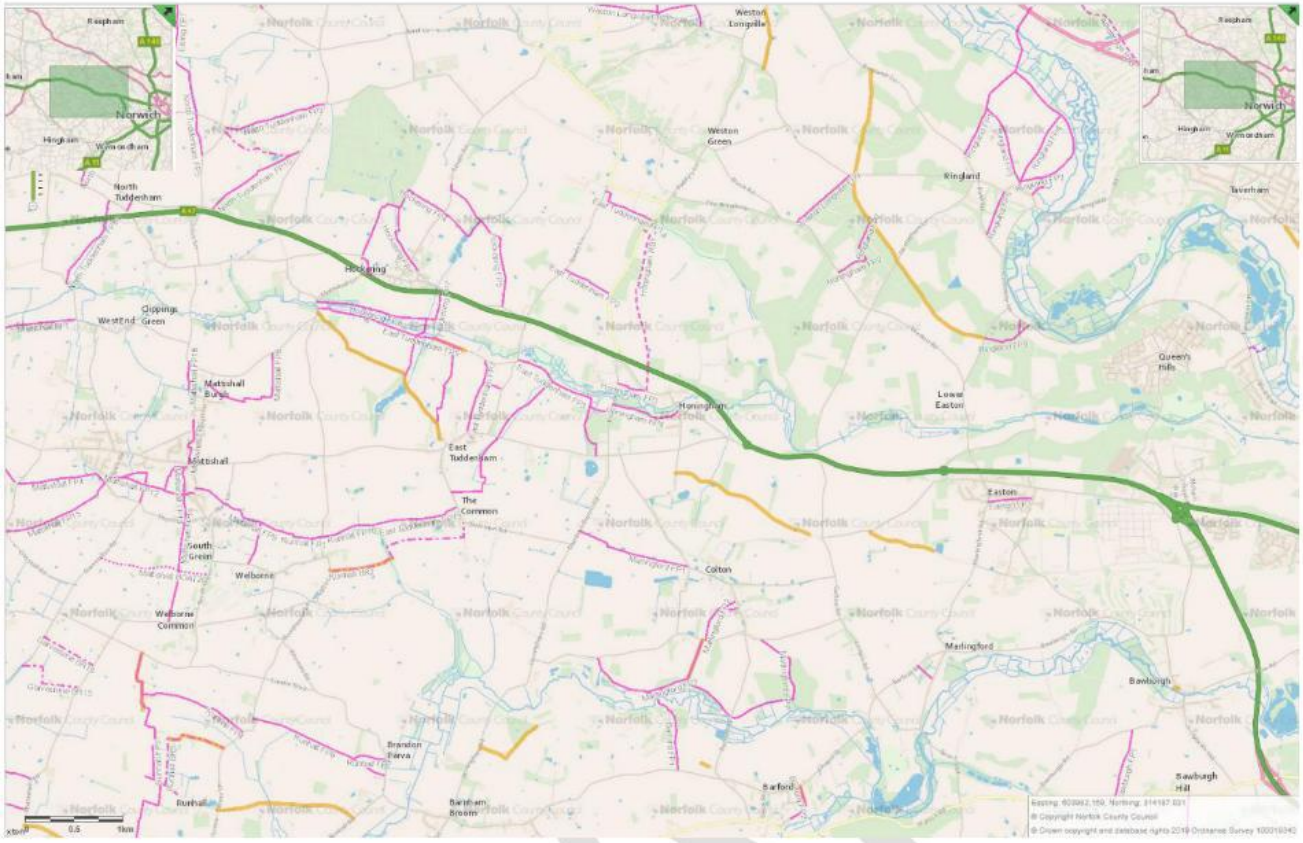


Figure 2-17 - PRoWs - Study Area, South (Source: Norfolk County Council)

2.3.45. As noted in **Section 1.5.45,** cycling infrastructure within the study area is limited, with local (on-road) routes running to the south-east and the NCN1 crossing through the northern extents. There is no existing north-south cycle route within the NWQ. The lack of cycling infrastructure linking residential areas and employment areas is likely to limit the number of commuting journeys made.

2.3.46. The NWL scheme will seek to improve the existing walking and cycling facilities in the surrounding area by reducing traffic on rural minor roads, enabling them to be made more suitable for all users, whilst also enhancing off-road connections.

PERSONAL INJURY COLLISIONS

2.3.47. During the five-year period from 2016 to 2020, there were 550 recorded collisions within the study area (**Figure 2-18**), involving 699 casualties. Of these, 8% (54) were pedestrians, 13% (94) were cyclists, and 12% (83) were motorcyclists or motorcycle passengers. Collisions are primarily located along the main arterial routes to, or from, Norwich city centre. **Table 2-5** lists the frequency and number of casualties, as well as their severity.

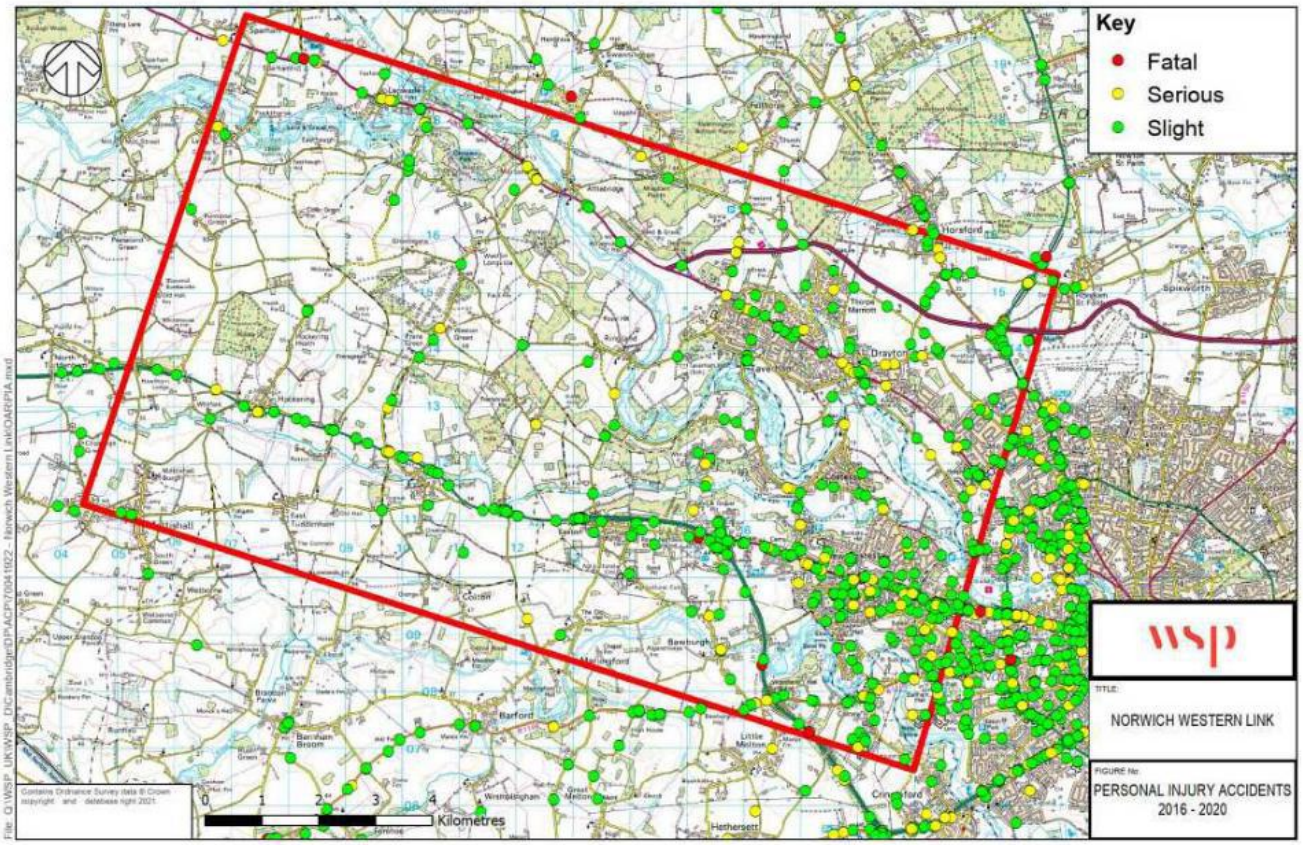


Figure 2-18 Study Area PIAs (2016-2020)

Table 2-5 Severity & Casualties of Accidents in Study Area (2016-2020)

Severity	Collisions	Casualties
Fatal	8	12
Serious	113	156
Slight	429	531
Total	**550**	**699**

A1067

2.3.48. Figure 2-19 shows the accident record between 2016 and 2020 along the A1067 from Drayton to Morton. The A1067 between the A1270 and Morton demonstrates a low collision rate, with a small cluster of accidents (7) located at the Marl Hill Road / A1067 junction. Through Taverham there are significantly more accidents, with clusters located at most junctions along the A1067. Three accidents are located at the Sandy Lane / The Street / Taverham Road / Costessey Road roundabout and four accidents at the School Road / A1067 signalised junction.

Attlebridge

Drayton

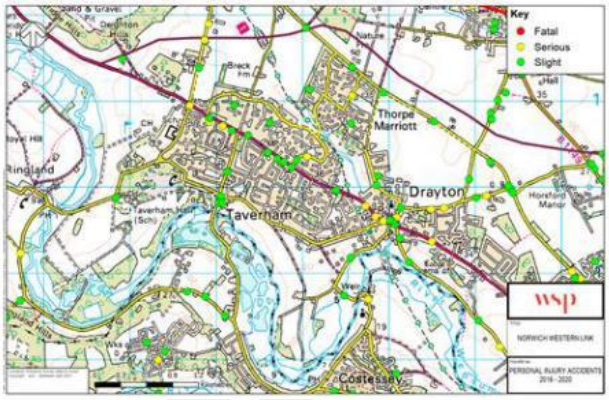


Figure 2-19 PIAs – A1067 (Attlebridge & Drayton)

A47

2.3.49. **Figure 2-20** shows the accident record between 2016 and 2020 along the A47 from Easton to the A1074 through New Costessey. The Longwater interchange and the Taverham Road junction shows 14 accidents, all of which were slight; 8 accidents at the A47 / Taverham Road / Blind Lane junction; and 12 accidents at the A47 / Church Lane / Dereham Road roundabout. The introduction of an NWL, in addition to the Highways England A47 scheme, which includes a key objective to improve road safety for all users, is likely to support improved highway safety.

2.3.50. The A1074 through New Costessey shows a number of accidents, including two fatal accidents that occurred in 2019. Particular clusters are located at Longwater Lane / Dereham Road junction (5); Dereham Road / Barnard Road / Wendene / Breckland Road roundabout (9); and Dereham Road / Norwich Road junction (9).

Easton

New Costessey

Figure 2-20 PIAs – A47 / A1074

A1270

2.3.51. There have been low number of accidents recorded along the A1270, with the only cluster site located at the A1270 / A140 roundabout (8). **Figure 2-21** shows the location of accidents along the A1270 between Drayton and Horsford.

Drayton & Horsford

Figure 2-21 PIAs – A1270

2.4 IMPACT OF NOT CHANGING

2.4.1. As shown in section 2.3, there are a number of existing problems that the NWL aims to address. By leaving these problems unaddressed, the current situation will only worsen.

2.4.2. Large-scale employment and housing growth are planned for the north and south west of Norwich over the next decade. Strategic employment sites that have been identified and integrated into policy include Norwich Airport to the north (see **Section 1.5.5**), and the Food Enterprise Zone and Norwich Research Park to the south west. Major housing development is either planned or already underway at Hethersett, Cringleford, Costessey and Easton.

2.4.3. The traffic associated with this growth is expected to exacerbate the problems already identified. The dualling of the A47 between North Tuddenham and Easton will also increase traffic accessing Norwich through the NWQ, with the existing single carriageway section currently acting as a bottleneck and constraining traffic approaching from the west.

CONNECTIVITY

2.4.4. The lack of an appropriate western link restricts access to businesses both locally and in areas to the west of Norfolk and the Midlands.

2.4.5. Transport modelling undertaken to assess the need for the scheme predicts that traffic volumes are expected to grow by approximately 20% between 2019 and 2040 in the NATS model area. **Table 2-6** shows forecast traffic growth figures to 2040, split by AM peak, interpeak, and PM peak periods.

Table 2-6 – Forecast traffic growth to 2040

	Vehicle Class	2019 to 2025	2019 to 2040
AM peak	Car	6.23%	19.60%
	Light Goods Vehicles	6.66%	27.85%
	Heavy Goods Vehicles	1.89%	10.36%
	All vehicles	**6.01%**	**19.66%**

	Vehicle Class	2019 to 2025	2019 to 2040
Inter peak	Car	7.38%	22.86%
	Light Goods Vehicles	6.66%	27.84%
	Heavy Goods Vehicles	1.90%	10.37%
	All vehicles	**6.92%**	**22.30%**
PM peak	Car	5.99%	18.91%
	Light Goods Vehicles	6.65%	27.83%
	Heavy Goods Vehicles	1.88%	10.36%
	All vehicles	**5.88%**	**19.05%**

CONGESTION AND DELAY

2.4.6. The increase in traffic growth shown in **Table 2-6** is expected to impact the local road network. **Figure 2-22** shows the modelled link delay information for the 2040 forecast year during the AM Peak, for the Do Minimum scenario (i.e. without the NWL), while **Figure 2-23** shows the same for the Do Something scenario (i.e. with the NWL).

2.4.7. Due to traffic switching from local roads to the NWL scheme, there is a decrease in links with delays greater than 24 seconds in the surrounding area.

2.4.8. The same pattern can be seen in the PM peak for 2040, as shown in **Figure 2-24** and **Figure 2-25**.

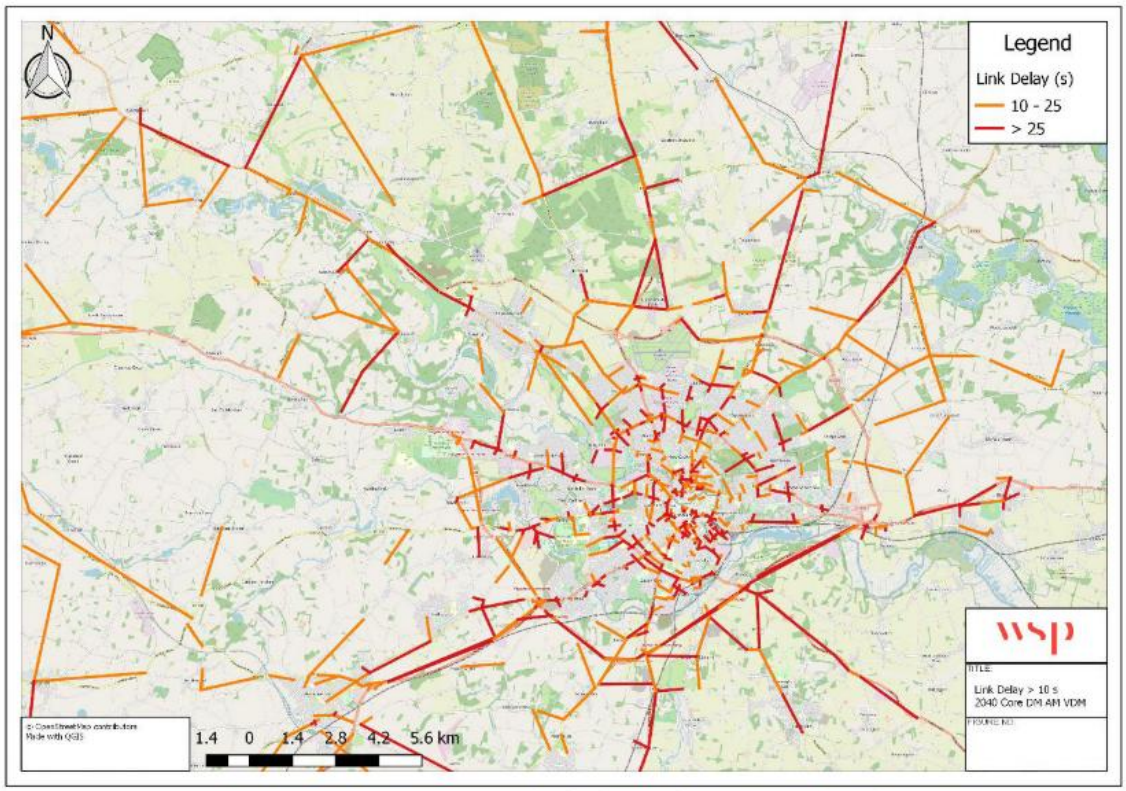


Figure 2-22 - Link delays AM Peak 2040 – Do Minimum (without NWL)

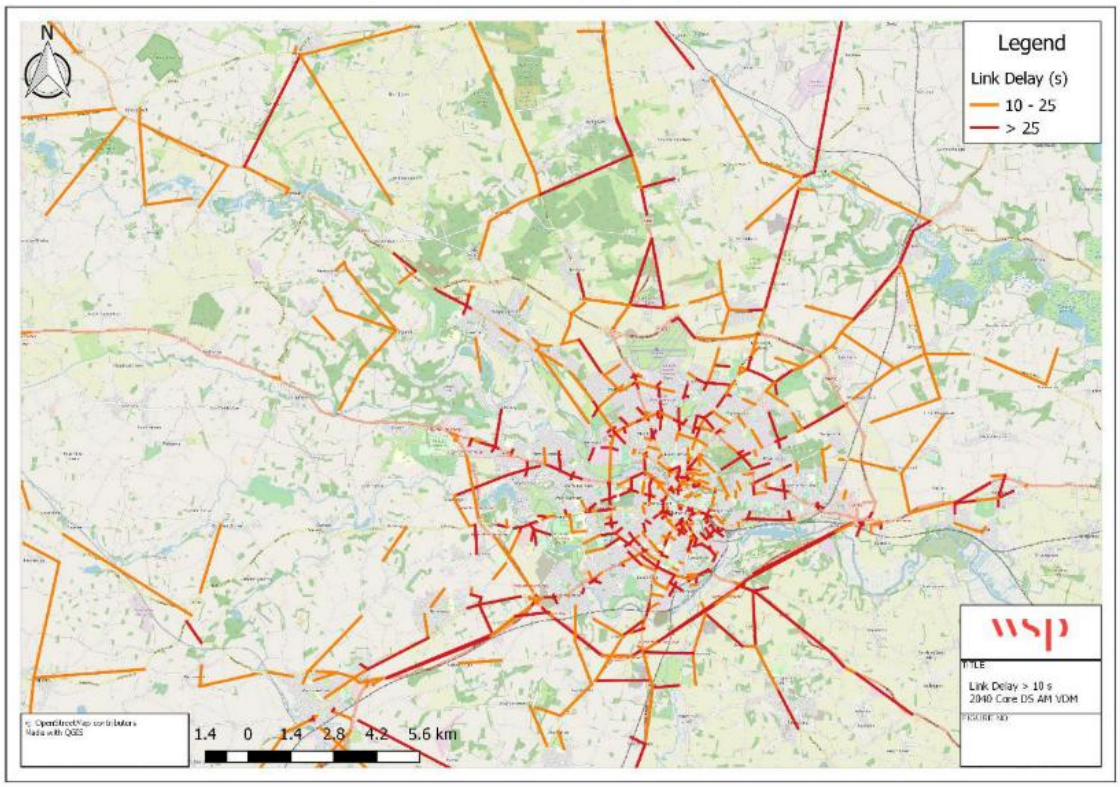


Figure 2-23 – Link delays AM Peak 2040 – Do Something

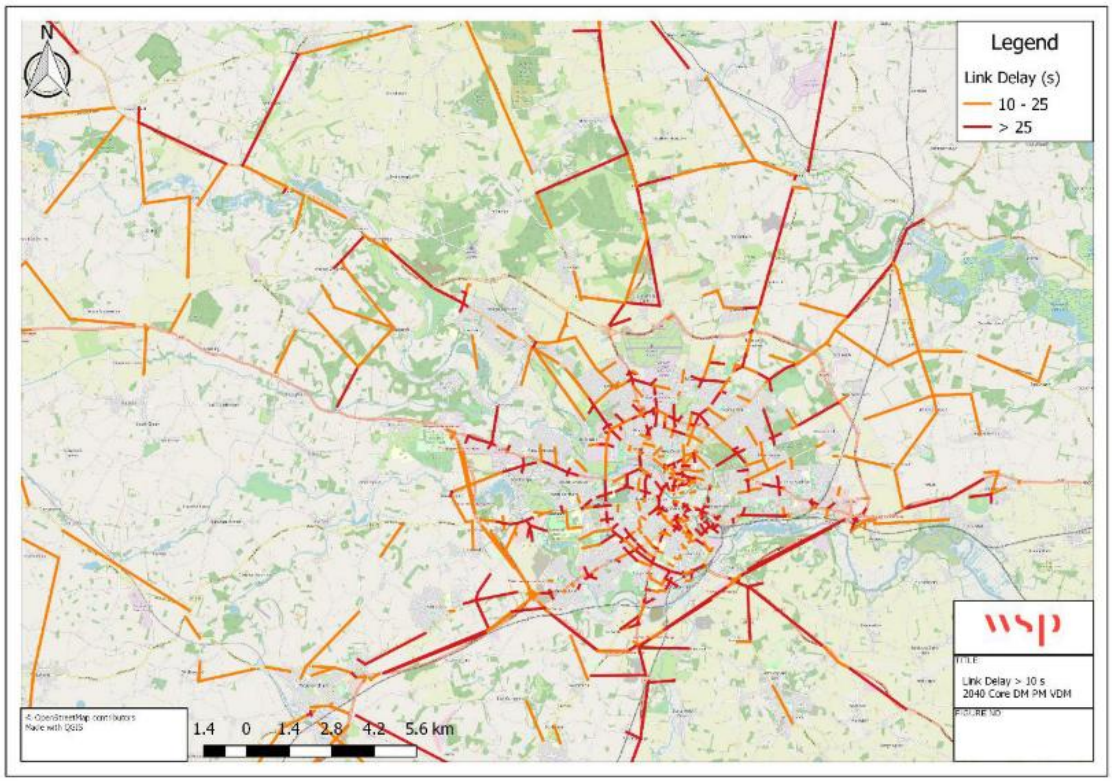


Figure 2-24 - Link delays PM Peak 2040 – Do Minimum (without NWL)

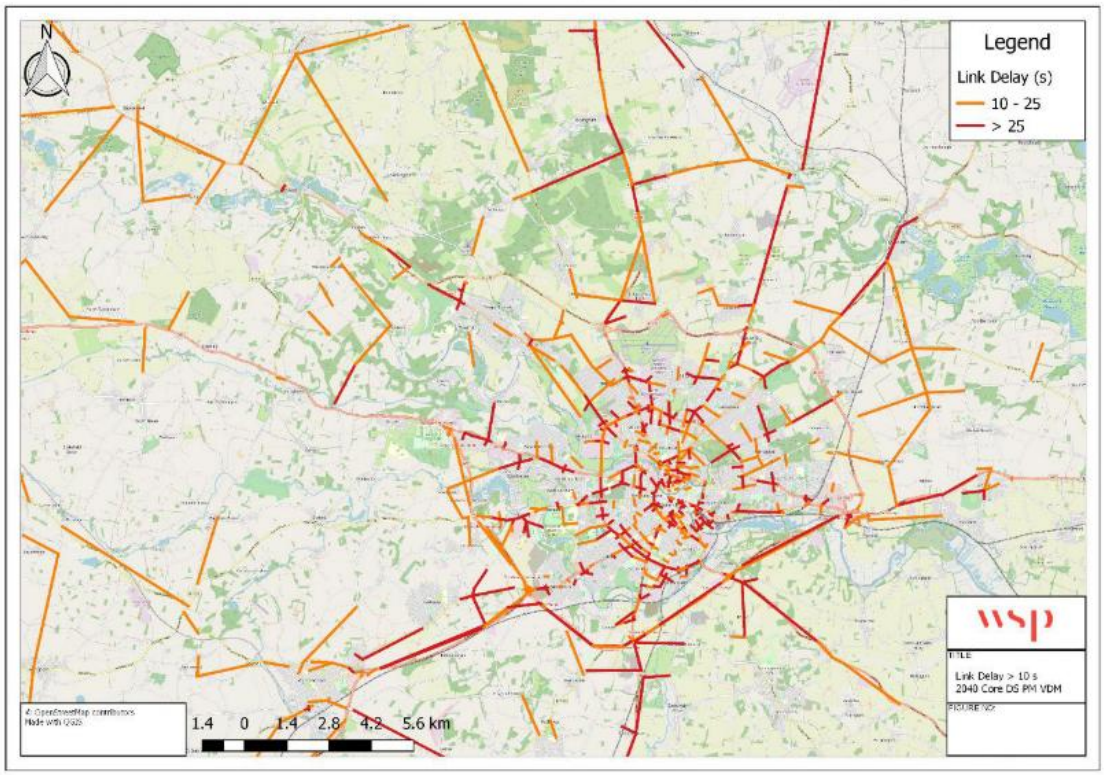


Figure 2-25 - Link delays PM Peak 2040 – Do Something

FUTURE GROWTH AND ADDRESSING THE PRODUCTIVITY GAP

Housing

2.4.9. The Strategic Housing Market Assessment carried out in 2017 indicated that there is an Objectively Assessed Need (OAN) for an estimated 39,586 dwellings across the Broadland, South Norfolk and Norwich areas between 2015 and 2036.

2.4.10. In Broadland, parishes forming part of the Norwich Policy Area have a combined allocation of between 1,462 and 1,662 new houses. The Easton / Costessey area plans to accommodate 1,500 new homes, as well as enhanced local services.

2.4.11. The NWL is expected not only to provide connectivity to those housing sites, but also link housing and employment areas around Norwich.

Employment

2.4.12. Broadland District Council, Norwich City Council and South Norfolk Council are working together with NCC to prepare the Greater Norwich Local Plan (GNLP, expected 2022), which will include strategic planning policies to address the area's productivity gap and allocate individual sites for development.

2.4.13. In addition to the City Deal, which seeks to deliver 13,000 jobs by 2031, the Joint Core Strategy plans for 27,000 new jobs by 2036.

2.4.14. Broadland District Council has also progressed a Local Development Order to facilitate a Food Enterprise Zone (FEZ) west of Easton Village (**Figure 2-26**). Once complete, the FEZ is expected to provide 2,000 agri-food jobs by 2050. The first phase of development is already under construction.

2.4.15. Given the economic importance of Norwich Airport, the NWL will help to provide a more appropriate and reliable primary route to the airport and will support future employment growth at the airport. With Norwich Airport's draft masterplan targeting an increase in passenger numbers from 530,000 to 1.4 million and an additional £170 million generated in the local area, the scope for the NWL to support this planned expansion is considerable.

2.4.16. This need is strengthened by the recent granting of a planning consent for Imperial Park Norwich, a 115-acre business park for industrial and office occupiers located on the north side of Norwich Airport (**Figure 2-27**).

Figure 2-26 - Proposed Development

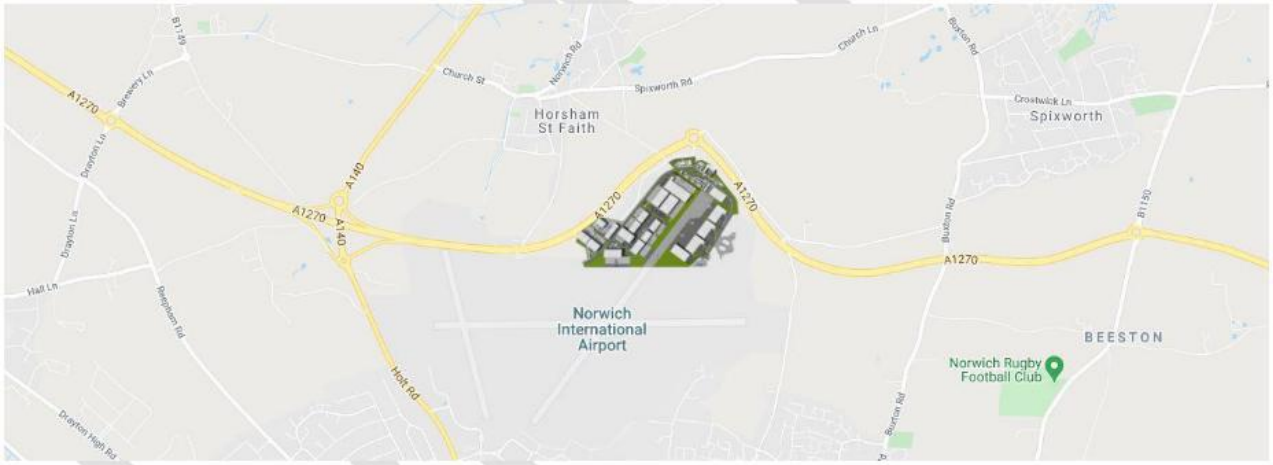


Figure 2-27 - Imperial Park Norwich (Source Rigby Real Estate)

2.4.17. The absence of an NWL is likely to affect business investment and growth, both locally and regionally. Key employers are located in or adjacent to the study area (including the FEZ, the Norfolk and Norwich University Hospital, the Norwich Research Park and Norwich Airport). The increased journey times along the signposted freight routes for north to south movements between the A1067 and the A47 will lead to increased vehicle operating costs and productivity inefficiencies.

JOURNEY TIME RELIABILITY

2.4.18. Journey times have been extracted from the 2025 model for those routes set out in **section 2.3.24**. **Figure 2-28**.

2.4.19. As with the 2019 data, journey times during the morning and evening peak periods have been compared to the off-peak period to demonstrate the delay experienced by vehicles as a result of

congestion. The variation between the off-peak and peak periods is shown in **Table 2-7**. Where the difference between peak and off-peak exceeds a minute, it has been highlighted in red.

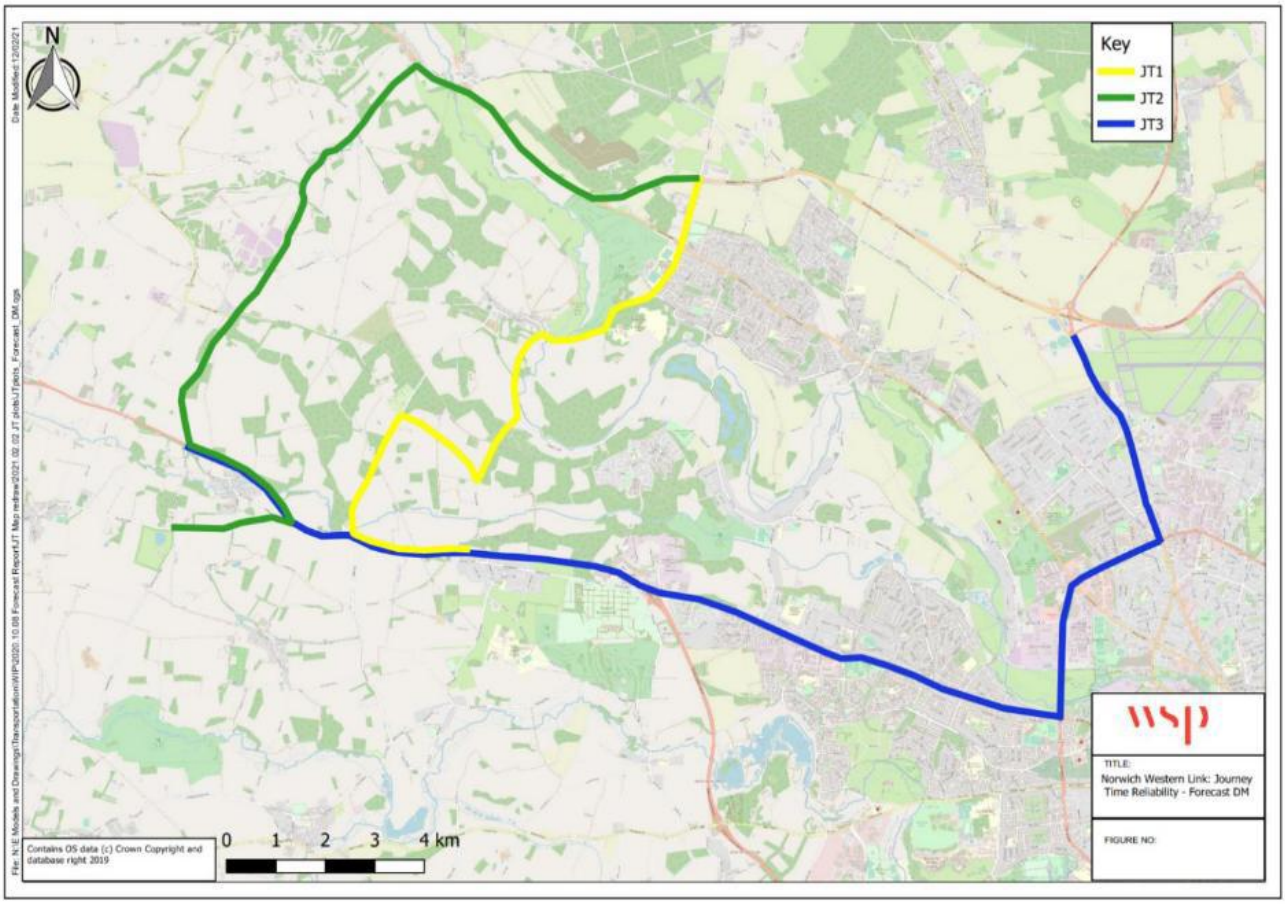


Figure 2-28 - Journey Time Reliability, Do Minimum north-south routes 2025

Table 2-7 – Journey times within NWQ for north-south routes 2025

Name	Distance (m)	AM peak (s)	PM peak (s)	Off-peak (s)	Variation between AM peak and Off-peak (s)	Variation between PM peak and Off-peak (s)
JT1: Northbound	10,594	978	971	914	+64	+57
JT1: Southbound	10.594	927	1,022	857	+70	+165
JT2: Northbound	13,562	854	857	850	+4	+7
JT2: Southbound	13,751	850	849	843	+7	+6
JT3: Eastbound	18,089	1,675	1,545	1,218	+457	+327
JT3: Westbound	17,365	1,595	1,463	1,239	+356	+224

2.4.20. The introduction of the A47 North Tuddenham to Easton scheme results in the distance of the JT1 route being increased by almost 4km, and the JT2 route being increased by 2km. The variation between 2019 and 2025 figures has therefore not been shown. It is notable, however, that even with the A47 scheme improving journey times, the variation between peak and off-peak travel is still significant, particularly for the JT3 route ending at the key employment areas of Norwich Airport and Imperial Park.

2.4.21. Forecast journey times have also been extracted from the 2040 model. The results are shown in **Table 2-8**. As the route length is unchanged from the 2025 forecast, the variation between 2025 and 2040 data is also shown.

Table 2-8 – Journey times within NWQ for north-south routes 2040

Name	Distance (m)	AM peak (s)	PM peak (s)	Off-peak (s)	Variation between AM peak and Off-peak (s)	Variation between PM peak and Off-peak (s)	Variation between 2025 and 2040 (AM)	Variation between 2025 and 2040 (PM)
JT1: Northbound	10,594	1,112	1,116	914	+198	+202	+134	+145
JT1: Southbound	10,529	1,002	1,053	857	+145	+196	+75	+31
JT2: Northbound	13,562	1,069	1,032	850	+219	+182	+215	+175
JT2: Southbound	13,751	940	921	843	+97	+78	+90	+72
JT3: Eastbound	18,089	1,932	1,779	1,218	+714	+561	+257	+234
JT3: Westbound	17,365	1,750	1,654	1,239	+511	+415	+155	+191

2.4.22. Without the NWL scheme, those routes already expected to suffer from journey time delays in 2025 will worsen. Congestion is expected to spread to rural roads, with most routes now showing a variation of over a minute when compared to off-peak levels.

Do something versus do minimum journey time

2.4.23. A comparison of the journey times has been undertaken for those routes shown in **Figure 2-28**, which use existing routes, and those shown in **Figure 2-29** (JT1, JT2 and JT3), using the Norwich Western Link.

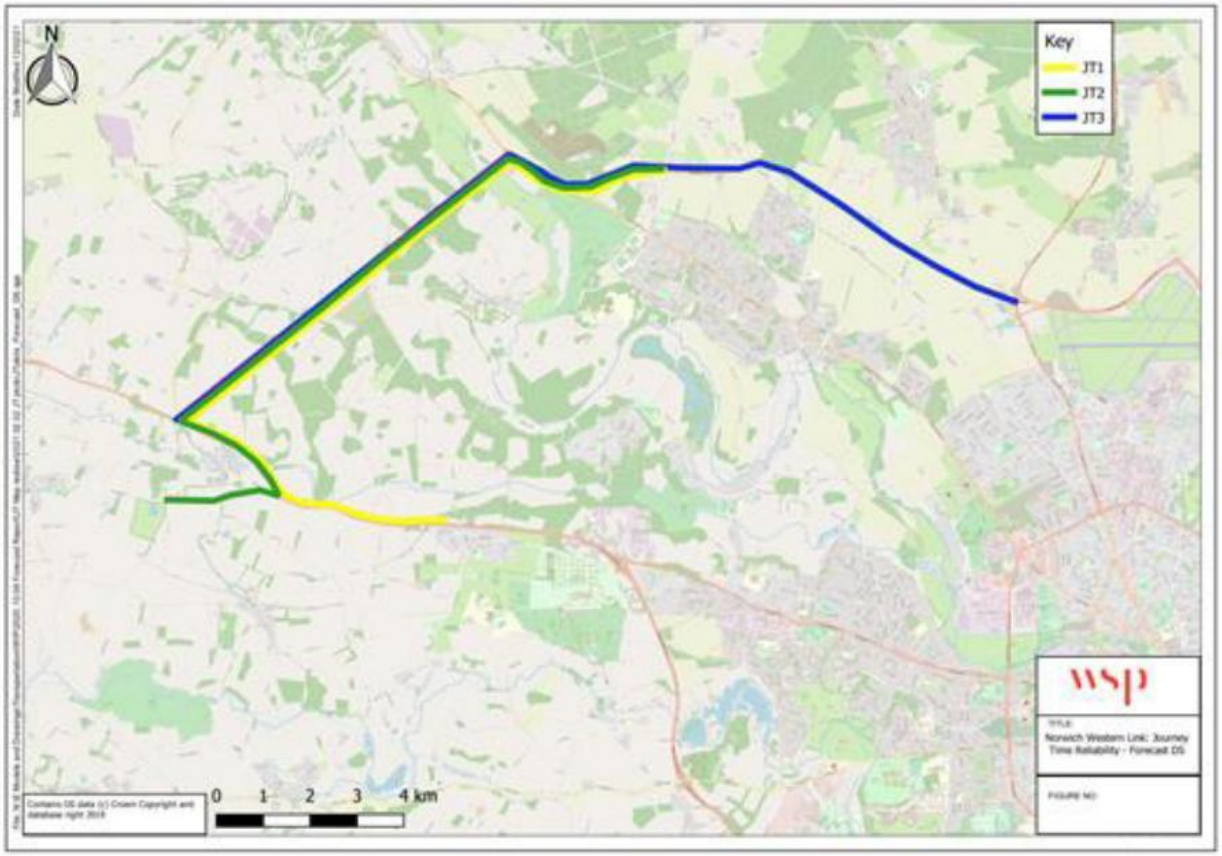


Figure 2-29 - Journey Time Reliability, Do Minimum north-south routes 2025

2.4.24. **Table 2-9** shows the modelled journey time improvements on these routes for the 2025 and 2040 forecast years in the AM peak, inter-peak and PM peak periods.

Table 2-9 - Journey times improvements – DS versus DM (2025 and 2040)

Name	2025 AM peak (s)	2025 inter-peak (s)	2025: PM peak (s)	2040: AM peak (s)	2040 inter-peak (s)	2040: PM peak (s)
JT1 Northbound	444	424	480	456	426	484
JT1 Southbound	451	511	524	479	510	535
JT2 Northbound	429	379	427	472	404	458
JT2 Southbound	434	380	400	445	405	430
JT3 East/ Northbound	1241	948	1085	1310	1019	1189
JT3 South/ Westbound	1119	946	967	1224	1017	1129

2.4.25. The inclusion of the NWL creates from a 379 second improvement in journey time for JT2 (northbound) in the 2025 inter-peak time period, to a 1,310 second improvement in journey time for JT3 (eastbound and northbound) in the 2040 AM peak time period.

2.4.26. As can be seen from **Table 2-9** there are journey time savings on the three specific routes chosen, with the transport model showing a reduction in both the total travel time and the total travel distance across the whole network. This is reflected in the level of scheme benefits as shown in the Economic Case.

2.4.27. Outputs from the forecast year transport models (2025 and 2040) are used in the assessment of the scheme economics using the Transport User Benefits Appraisal (TUBA) program. The outputs from the TUBA scheme economic assessment splits the monetised benefits into Business, Commuting and Other user classes for road traffic. Along with the input information from the transport model (time, distance and trip matrices) the TUBA program uses information on Economic Parameters, reflecting economic data from the DfT Transport Analysis Guidance (TAG) Data Book i.e. v1.13.1 (July 2020).

2.4.28. The economic assessment of Business, Commuting and Other (including leisure) trips all show a positive monetised benefit over the 60 years of the economic appraisal period. This can be related to reductions in the time and distance spent travelling between home and work or travelling on business. A reduction in these can be related to an increase in productivity as the NWL helps to provide a more appropriate and reliable primary route to employment sites.

2.4.29. In economic terms there is a monetised benefit, across 60 years, within the transport model area for:

- Business: £81.766m
- Commuting: £66.192m
- Other: £83.580m

2.4.30. In the Opening Year of the NWL (2025), the monetised benefits are:

- Business: £1.459m
- Commuting: £1.784m
- Other: £1.464m

2.4.31. In the Design Year (2040), the monetised benefits are:

- Business: £1.666m
- Commuting: £1.244m
- Other: £1.711m

IMPACT OF ROAD USE ON RURAL COMMUNITIES

2.4.32. Average Annual Daily Traffic (AADT) flows have been produced from the 2025 opening year and 2040 design year. **Table 2-10** shows flow changes at key locations on the network, rounded to the nearest 1,000 vehicles between the 2019 base year and the forecast years of 2025 and 2040. The forecast year models (2025 and 2040) include the proposed Highways England A47 North Tuddenham to Easton dualling scheme.

Table 2-10 – 'Do Minimum' AADT changes

Location	2019-2025	2019-2040
A47 west of Sandy Lane (2 way)	+15,000	+23,000

Location	2019-2025	2019-2040
A47 east of Wood Lane (2 way)	+17,000	+26,000
B1535 Wood Lane	+1000	+3,000
Weston Longville	+1700	+2,600
Total on existing North-south routes through study area (Taverham Road, Lyng Road, Heath Road)	-3,000	+5,000
A1067 Attlebridge to A1270	+1,000	+5,000

2.4.33. The existing routes between the A47 and A1067 (including Lyng Road, Ringland Road, Honingham Road and Taverham Road) are also predicted to show increases in traffic of an estimated 5,000 vehicles by 2040. This would nearly double the existing flow on these routes and put them well over capacity. The village of Weston Longville is predicted to show an increase of 1,700 vehicles between 2019 and 2025 and by 2,600 vehicles between 2019 and 2040.

2.5 PLACE-BASED IMPACTS

2.5.1. In response to the evolution of government policy on Levelling Up and emerging DfT guidance, assessment has been undertaken to understand the place-based impact of the NWL on the surrounding local communities (area of impact).

2.5.2. Measures against three categories have been assembled to provide insight on the local context and drive outcomes around economic growth:

- **Socio-economic measures**: showing the socio-economic profile of the targeted area
- **Transport measures**: reviewing the performance of the transport network, which may constrain people's ability to access employment sites
- **Economic impact measures**: the impact of the scheme on the local economy

2.5.3. In **Table 2-11** and **Table 2-12**, a Red-Amber-Green (RAG) rating has been used to categorise socio-economic and transport connectivity metrics.

2.5.4. Breckland, South Norfolk and Norwich all perform worse than the regional and national average in terms of gross weekly earnings and proportion of the population educated to a degree level. With the exception of South Norfolk, which benefits from employment opportunities including the Norfolk and Norwich University Hospital, the area of impact performs lower than the regional and national averages across all metrics.

Table 2-11 – Place-based impacts: socio-economic measures

	Breckland	South Norfolk	Norwich	Regional average	National average
Gross weekly earnings	£516 🔴	£602 🟡	£505 🔴	£610	£587
Unemployment rate	2.9% 🟡	2% 🟢	4.4% 🔴	3.2%	3.9%
Employment rate	78% 🟡	83% 🟢	72% 🔴	77%	76%

Proportion of population educated to degree level or equivalent.	27% 🔴	35% 🟡	32% 🔴	37%	40%
Deprivation ranking out of 317 LADs	142 🟡	235 🟢	52 🔴		

2.5.5. **Table 2-12** shows the level of transport connectivity for a selection of built-up areas within NWQ. The measures indicate that the study area is poorly connected by both car and public transport, both within the built-up areas themselves, and between urban and rural centres. The City of Norwich's inter-urban connectivity is the exception, with strong links into London, Ipswich and other regional cities placing it in the ‘Green’ category.

Table 2-12 – Place-based impacts: transport measures

Connectivity measures	Norwich	Hethersett	Wymondham	Dereham
Intra-urban connectivity (car)	1 🔴	3 🔴	4 🟡	4 🟡
Intra-urban connectivity (public transport)	1 🔴	5 🟡	3 🔴	4 🟡
Inter-urban connectivity (car)	6 🟡	5 🟡	6 🟡	7 🟡
Inter-urban connectivity (public transport)	10 🟢	7 🟡	6 🟡	6 🟡

2.5.6. The evolving guidance also assesses the economic impacts of the scheme. A breakdown of the expected productivity impacts across each Local Authority in Norfolk is shown in **Table 2-13**. The greatest benefits are to be found in Broadland and Breckland (over 51% of total) in the Producer and Consumer Services sector.

Table 2-13 – Place-based impacts: productivity

Local Authority	Productivity gains (£m, 2010 prices and values)
Breckland	£23.9m
Broadland	£21.6m
Norwich	£11.1m
South Norfolk	£6.0m
Great Yarmouth	£6.0m
King's Lynn and West Norfolk	£13.6m
North Norfolk	£7.1m
Total	**£89.3m**

2.5.7. The NWL scheme is also expected to support the delivery of housing and employment sites that could come forward as a result of the improved connectivity the scheme creates. With the NWL in place, there will be benefits for those making commuting journeys as well as for those who are currently unemployed and looking to re-enter the labour market. Changes in transport costs can incentivise individuals to work, thus increasing the numbers choosing to work and the amount of labour supplied in the economy.

2.5.8. To examine this impact, regional housing, commercial and industrial developments were compared against the Greater Norfolk Local Plan (GNLP). The focus was on developments that have not been allocated in the Local Plan due to reasons associated with poor transport connectivity in the area.

2.5.9. A total of 735 of new homes within Broadland and South Norfolk were found to be viable with improved transport links.

2.5.10. In addition, new commercial and industrial sites identified are expected to create 904 new jobs in Broadland, including those expected to be introduced through supply chain expenditure and wage growth.

2.5.11. Taking socio-economic, transport, and economic factors into account, NWL is therefore expected to help Norfolk Level Up, improving access to diversified employment opportunities and addressing deprivation in local communities through a better-connected transport network.

2.6 OBJECTIVES

2.6.1. The objectives for the NWL have been developed in line with the national, regional and local policies set out in **section 2.2**, and in response to the specific problems set out in **section 2.3**.

2.6.2. It is anticipated that the NWL will improve strategic north-south and orbital connectivity, addressing congestion and journey time delays, as well as local issues in the NWQ related to rat-running and severance.

2.6.3. The scheme is designed to close the gap in the orbital network, strengthen the resilience of the surrounding routes, and safeguard the network from increased congestion future growth will bring.

2.6.4. In line with DfT guidance in TAG: The Transport Appraisal Process (DfT May 2018), these are presented as a hierarchy of objectives comprising:

- **High-level or strategic outcomes** – the desired end state, reflecting the aims and ambition for the area. The scheme will contribute to these, but not always in a direct manner
- **Specific or intermediate objectives** – representing the direct effects of the scheme
- **Operational objectives** – the outputs necessary for the specific objectives to be achieved

2.6.5. As far as possible, the specific and operational objectives are SMART (specific, measurable, achievable, realistic and timed).

HIGH LEVEL OBJECTIVES

2.6.6. The NWL's high-level objectives support the principal aim of a modern and efficient transport system. These have been refined since the submission of the SOBC, with the previously separate objectives of supporting sustainable growth and supporting economic growth combined to form objective H1, thereby emphasising the need for sustainable economic growth. The high-level objectives are:

- H1 Support sustainable economic growth

- H2 Improve the quality of life for local communities
- H3 Promote an improved environment
- H4 Improve strategic connectivity with the national road network

SPECIFIC OBJECTIVES

2.6.7. The specific objectives for the NWL have been developed to both support the high-level objectives and respond to the local challenges identified. These have been reviewed and revised since the SOBC. There are now six scheme specific objectives, which are:

- S1 Improve connectivity and journey times on key routes within the Greater Norwich area
- S2 Reduce the impact of traffic on people and places within the western area of Greater Norwich
- S3 Encourage and support walking, cycling and public transport use in Greater Norwich
- S4 Improve safety on and near the road network, especially for pedestrians and cyclists
- S5 Protect and improve the natural and built environment, including the integrity of the River Wensum SAC
- S6 Improve accessibility to key sites in Greater Norwich

OPERATIONAL OBJECTIVES

2.6.8. The operational objectives are:

- To provide the NWL, which will provide an additional crossing of the River Wensum for vehicles and ancillary cyclist and pedestrian facilities
- To reduce overall journey times in the wider Norwich area
- To minimise environmental impact, compulsory purchase and the demolition of residential and commercial property

2.7 MEASURES FOR SUCCESS

2.7.1. In alignment with the objectives identified within **section 2.5**, measurable outcomes are to be developed using the 'SMART' target methodology. This involves the development of Specific, Measurable, Attainable, Realistic and Time bound targets, which provide a structured approach to measuring the success of the scheme. These are outlined in **Table 2-14**. The interdependencies of the scheme impacts, and objectives are summarised within **Figure 2.30.**

Table 2-14 – Scheme impacts

Objective	Impacts
S1 Improve connectivity and journey times on key routes within the Greater Norwich area.	Improve journey times on routes through the area west of Norwich Reduce congestion and delay through the area west of Norwich Reassignment of traffic away from existing routes Provide a more suitable direct route for HGV/LGV vehicles Reduce trips on local minor roads for vehicular traffic
S2 Reduce the impacts of traffic on people and places in the Greater Norwich area	Reassignment of trips onto appropriate routes

Objective	Impacts
	Reduce net emissions of CO2 and other greenhouse gases Improve NMU connectivity Improve air quality, especially in the built-up areas of West Norwich Minimise traffic impacts on local residents during construction
S3 Encourage and support walking, cycling and public transport use in Greater Norwich	Increase in number of trips taken by walking, cycling and public transport over current levels Increase access to public transport, walking and cycling facilities
S4 Improve safety on and near the road network, especially for pedestrians and cyclists	Reduce overall network accident rate Reduce the number of people killed or seriously injured on roads in the area west of Norwich Minimise highway safety impacts and severance
S5 Protect and improve the natural and built environment including the integrity of the River Wensum SAC.	Biodiversity net gain Minimise impact on landscape Minimise impact on heritage Not affect the integrity of the River Wensum SAC Supports improvements in local air quality Minimise impact of scheme on climate change Minimise adverse environmental impacts arising from construction
S6 Improve accessibility to key sites (employment, leisure, education and healthcare) in Greater Norwich	Improve accessibility to Norwich Airport, Norfolk and Norwich University Hospital and key employment, housing and education sites Improve accessibility to green areas Improve access to the cycle and Public Right of Way networks

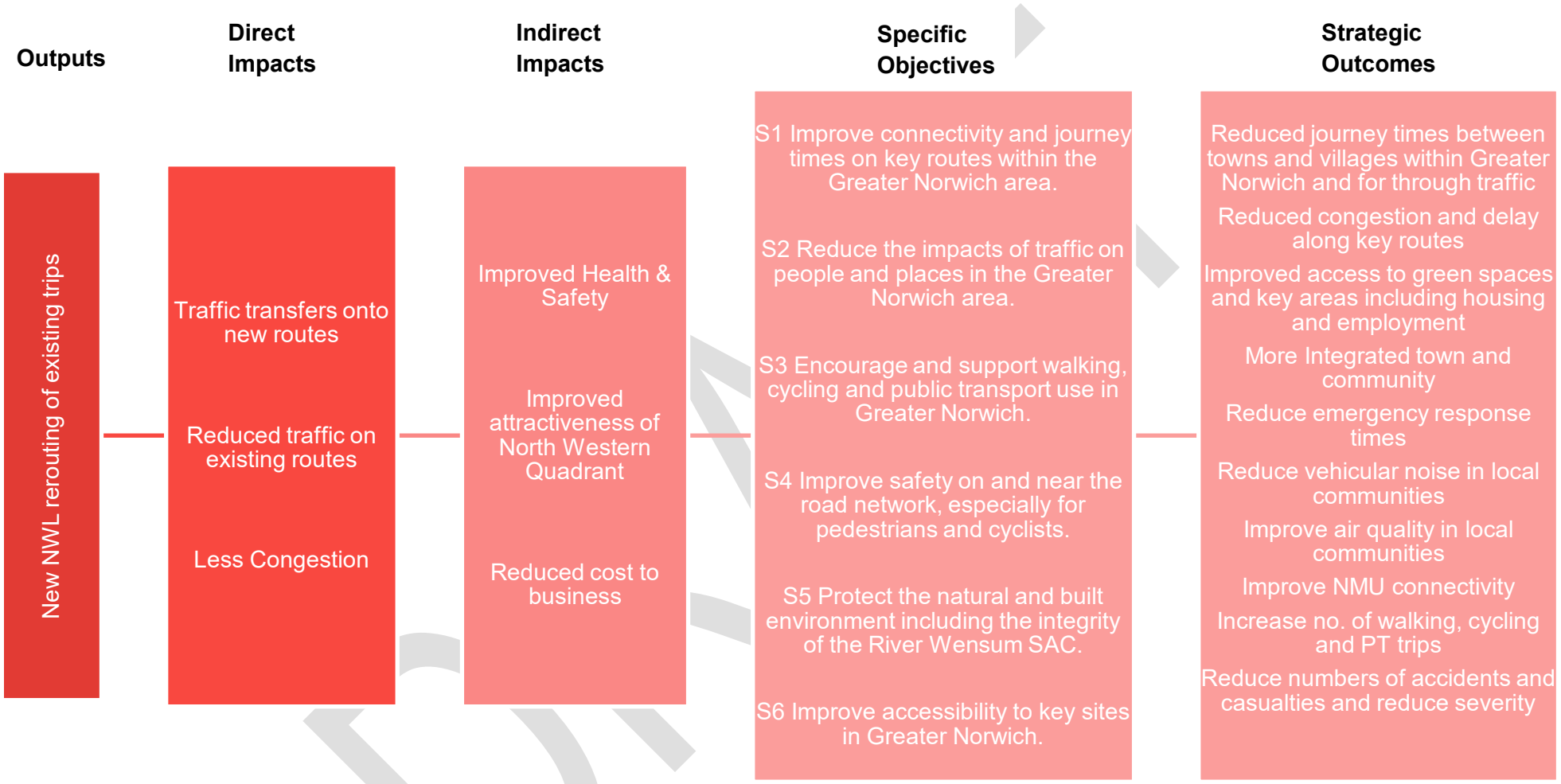


Figure 2.30 - Scheme objectives

2.8 SCOPE

2.8.1. The scheme is comprised of:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain
- A “grade separated” junction with the A47
- An “at grade” junction with the A1067
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout
- A bridge carrying the NWL over Ringland Lane
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required
- A wider network of walking and cycling-friendly route options, as per the Sustainable Transport Strategy
- Diversion and extension of existing Public Rights of Way to create a coherent joined up network
- Surface water drainage – principally infiltration basins, sediment forebays and associated carrier drains/ channels

2.8.2. The scheme also includes landscaping, planting, ancillary works, and significant environmental mitigation work. Environmental net gain and biodiversity net gain measures are also considered as part of the NWL design philosophy.

2.9 CONSTRAINTS

2.9.1. A number of physical, and environmental constraints were considered in the development of the preferred option. These are outlined at length as part of the Options Assessment Report, and summarised as follows.

PHYSICAL CONSTRAINTS

2.9.2. The main physical constraints are:

- The limited number of locations where a bridge across the River Wensum could be constructed
- The need to tie into the existing SRN and MRN. The simplest location for a tie in to the A47 is at one of the new junctions being constructed as part of the Highways England North Tuddenham to Easton dualling scheme
- The need to acquire land for the construction of the scheme, in addition to the land already acquired by NCC.

ENVIRONMENTAL CONSTRAINTS

2.9.3. NCC is progressing the NWL scheme on the basis that a crossing of the River Wensum is compatible with the indicative proposals already provided to Natural England and the Environment Agency.

2.9.4. A number of environmental constraints and considerations act upon the scheme and will be considered as part of the design. The Construction Environmental Management Plan (CEMP) sets out a comprehensive list of the statutory and non-statutory designated sites and natural features of the site and provides control measures proposed for construction. Designated and significant features include:

- River Wensum Special Area of Conservation and Site of Special Scientific Interest

- Fakenham Road, Road Side Nature Reserve
- County Wildlife Sites
- Ancient and veteran trees, hedgerows, and woodland including their route protection areas
- Important environmental features and species present on site.

2.9.5. Environmental constraints within the study area are shown in **Figure 2-31**.

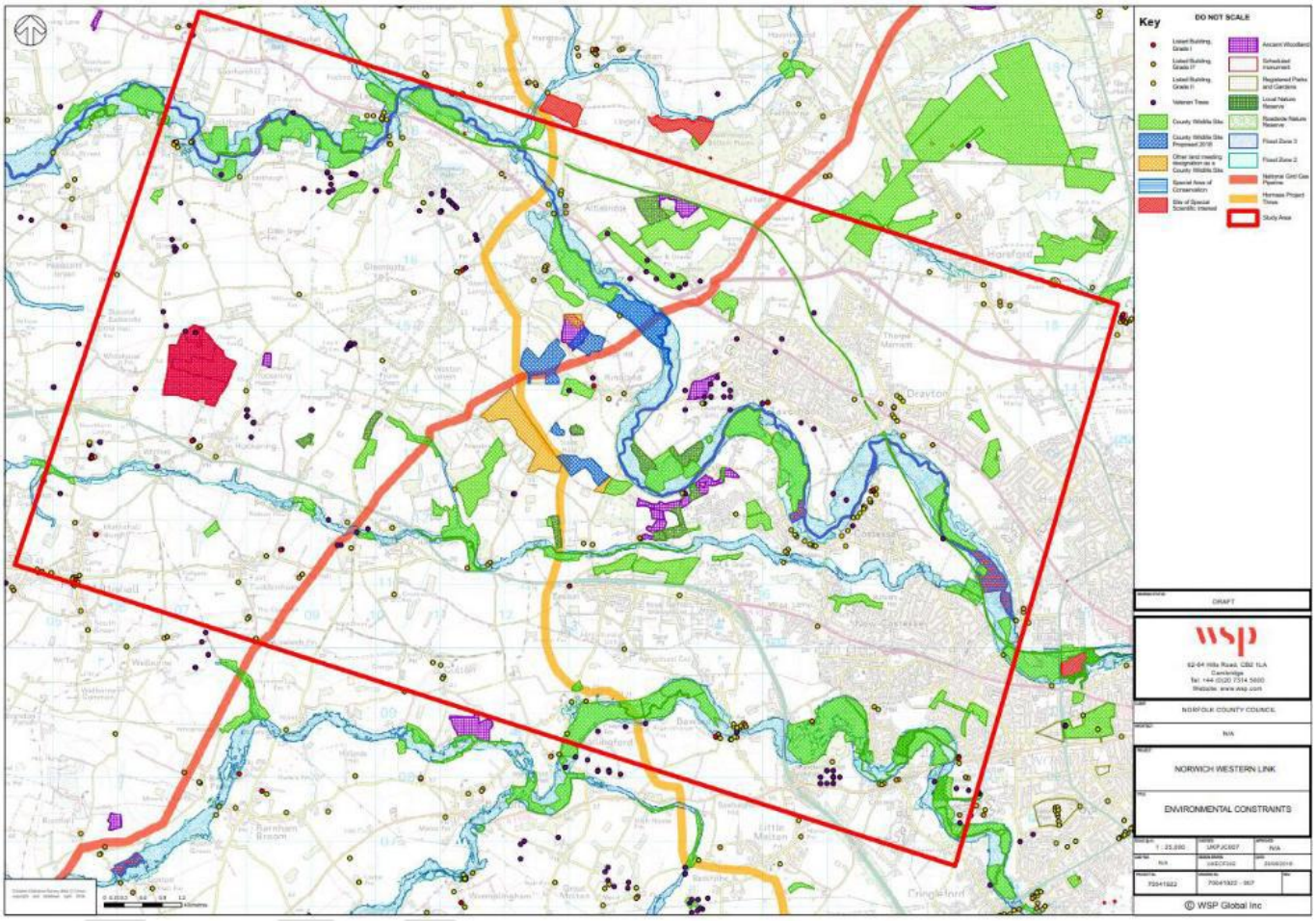


Figure 2-31 – Environmental Constraints

2.9.6. The Options Assessment Report details the environmental constraints acting on the NWL. While additional information can be found in this supplementary report, a table summarising the key environmental challenges affecting the NWL study area and the potential mitigation measures is outlined in **Table 2-15**. The role of environmental considerations in the options assessment process is described in **Section 2.12.18**.

Table 2-15 – Potential Mitigation Measures

Challenge	Description	Mitigation
River Wensum SAC / SSSI	Need to demonstrate no adverse effects on the integrity of the River Wensum SAC	▪ Regular consultation is being held with key consultees including Natural England and the Environment Agency to ensure key project information is communicated

Challenge	Description	Mitigation
		and concerns from these bodies are understood and addressed ▪ Habitat Regulations Assessment (HRA) will address the Scheme in detail identifying any potential adverse effects on the River Wensum SAC
Surface water runoff	Highway runoff into the River Wensum. Attenuation of this runoff to the greenfield runoff rate will require lagoons, swales, which all require land.	▪ Structural best management practices and appropriate mitigation measures will be outlined in the Construction Environmental Management Plan (CEMP) and will reduce significant impacts of runoff into the river ▪ Development of the Drainage Strategy to incorporate pollution prevention measures ▪ A detailed Water Framework Directive (WFD) and geomorphology assessment is being undertaken using 2D modelling of geomorphological processes. This will identify any potential adverse impacts and inform the required mitigation ▪ Indicative mitigation concepts are being developed, aligned with ecological mitigation and taking into account the River Wensum Restoration Plan
Flood risk	No increase in flood risk due to the structures in the floodplain	▪ Flood modelling is being undertaken to identify potential requirements of flood risk mitigation and changes in the floodplain.
Archaeological deposits	Unknown archaeology present along the river corridor leading to potential impacts on archaeological features and the setting of heritage assets along the river corridor. Land access for surveys along the river corridor. Considerable cost that can be incurred.	▪ Construction and demolition will need to be carried out with relevant mitigation and best practice guidance in mind ▪ A Written Scheme of Investigation (WSI) has been produced and trial trenching is recommended as part of the planning application ▪ The final mitigation strategy will be determined on the basis of the results of the geophysical survey and trial trenching ▪ Continued consultation will be held with the county archaeologist to gain a better understanding of the setting of potentially unknown heritage and archaeology
Protected species	Particularly bats. Land access may be an issue for some surveys. Timing of all of the surveys at an appropriate time of year and ensuring sufficient data capture will be important.	▪ Regular discussions are being held with Natural England and the NCC county ecologist to keep them abreast of the surveys, findings and emerging likely mitigation ▪ Land access for surveying is being agreed in advance to ensure availability

Challenge	Description	Mitigation
		▪ Data is regularly being reviewed and updated to ensure quality and robustness for the EIA
Air Quality	A new road in a rural location will introduce a pollution source into an area with relatively unpolluted air. The challenge is to identify through the application that the benefits outweigh the disbenefits and to keep any increases as low as possible.	▪ Good site practice and mitigation will reduce the effects of dust and particulate matter during construction ▪ A CEMP will be provided as part of the ES which will outline key construction mitigation measures ▪ Quantitative modelling and assessment of the potential air quality and greenhouse gas (GHG) impacts has been undertaken as part of the OBC process and presented within TAG worksheets. Further assessment on the impacts of air quality and GHGs will be undertaken as part of the EIA
Landscape and visual	A new link will potentially contribute to a loss of agricultural land, field boundaries, hedgerows and some woodland due to the rural nature of the study area. The challenge is to ensure that the route does not cause significant loss of tranquillity and sense of place of the area and to ensure suitable mitigation is provided.	▪ Appropriate mitigation to reduce the conflict in the landscape character as a result of the new route through it will be and the requirement for landscape planting and screening will be identified as part of the EIA ▪ Combined mitigation between landscape and other environment specialists may help take into account multiple potential impacts. Combined compensation is being considered as part of the Habitat Compensation Strategy
Built heritage	The Scheme passes in proximity to Listed Buildings and could impact upon the setting of these built heritage assets.	▪ Appropriate desk-based and field survey assessment will be undertaken as part of the EIA to understand the nature of any Listed Building affected ▪ Suitable mitigation such as bunds and suitable planting will be considered as part of the EIA in locations where the setting of a Listed Building is adversely affected ▪ Photomontages have been produced which will inform the EIA of setting and there will be liaison with English Heritage as appropriate with regard to the location of these photomontages and the scope of the assessment

FINANCIAL CONSTRAINTS

2.9.7. Without funding support from the Government, NCC does not have the resources to deliver the NWL. The scheme is not eligible for Growth Deal funding, as it exceeds the New Anglia LEP's guideline threshold of £75 million.

2.9.8. NCC will undertake to contribute 15% of the scheme's capital cost, including previous expenditure on land acquisitions and scheme preparation, and is able to meet anticipated future operating and maintenance costs.

2.10 INTERDEPENDENCIES

STATUTORY PROCESSES

2.10.1. Delivery of the scheme depends on the successful completion of a number of statutory processes.

2.10.2. A planning application for the NWL is due to be submitted in October 2021. It is envisaged that a Compulsory Purchase Order (CPO) will be required to secure the land to construct the NWL, with some land and property along the route having already been acquired by NCC. The remaining land required is owned by approximately 15 different landowners. This is subject to detailed land referencing works, which will be undertaken to establish all parties with interests in the land required.

2.10.3. A Side Road Order (SRO) will be required to cover alterations made to the existing highway network e.g. where existing roads are stopped up, diverted or where they connect to the new highway. Traffic Regulation Orders will also be required, this includes both permanent orders, as well as temporary orders to cover the construction period.

2.10.4. It is likely that Public Inquiries for the various Orders and planning permission will be required. These are expected to run concurrently.

2.10.5. If all Orders and permissions are obtained, the completion of CPO powers will not take place until after the final funding has been confirmed. Possession of land would be taken via General Vesting Declarations (GVD) or Notice to Treat & Notice to Enter.

PROJECT LINKS

2.10.6. The NWL connects with the A47 North Tuddenham to Easton scheme via a proposed grade separated junction on the A47 at Wood Lane / Berry's Lane in Honingham. This proposed dualling scheme, shown in **Figure 2-32**, is expected to relieve the congested single carriageway section of the A47. Highways England submitted a DCO Application to the Planning Inspectorate in March 2021. This was accepted in April 2021 and is now progressing to examination in public. Should the DCO be unsuccessful or the scheme not brought forward for delivery this would have an effect on the NWL in its present form as Highways England have included for the improvements to the Wood Lane junction and the NWL connection.

2.10.7. NCC and Highways England are working collaboratively to plan the interface of the NWL with the A47. The cumulative impact of the A47 and other relevant schemes, including the NWL, will be assessed as part of Highways England's environmental statement.

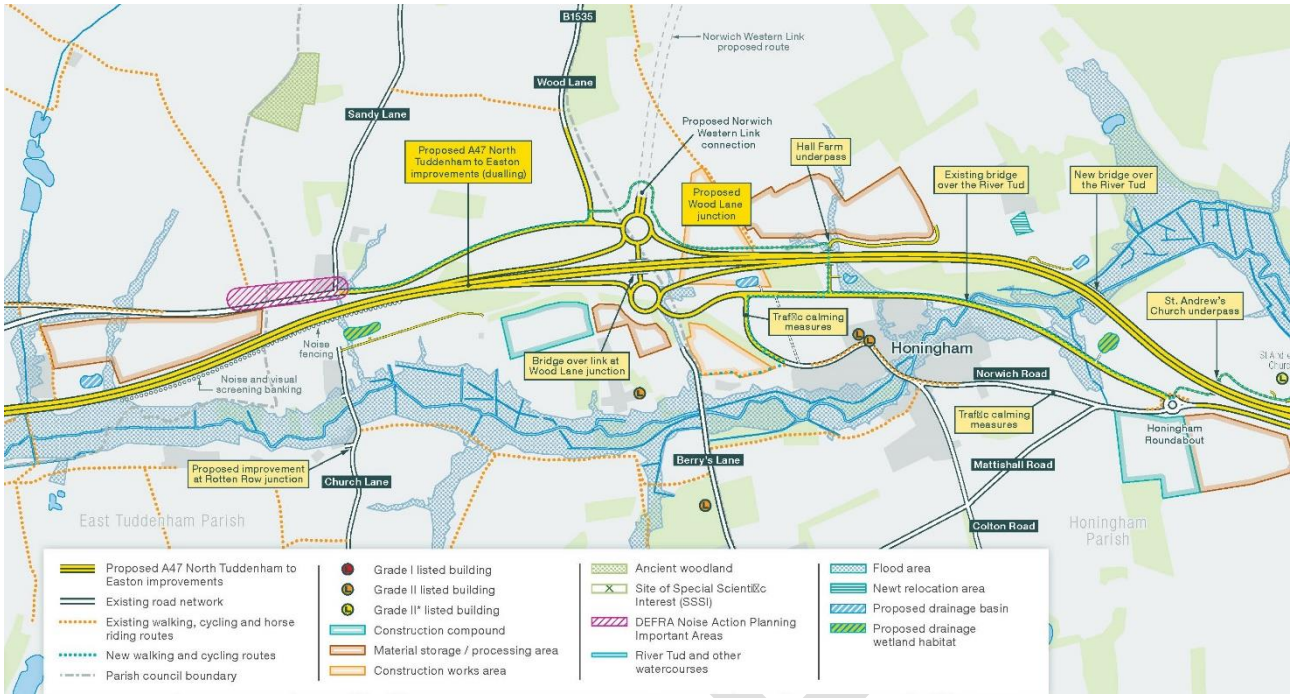


Figure 2-32 – A47 North Tuddenham to Easton scheme – Crop as of December 2020

2.10.8. Based on the two scheme programmes, elements of both projects are likely to proceed in parallel. The construction of the NWL is currently scheduled to commence 6-9 months after that of the A47.

2.10.9. The majority of the A47 dualling scheme and NWL main alignment will be constructed offline, which will help to minimise disruption to the surrounding network. Prior to the opening of the NWL, the B1535 will remain as the designated HGV route for strategic traffic through the western quadrant of Norwich, allowing some traffic to avoid the works on the A47.

2.10.10. Since July 2019, monthly interface calls between the Highways England design team and the NWL design team have taken place. Sharing of drawings and surveys commenced in September 2019, seeking to maximise integration opportunities. Discussion points have included junction design, transport modelling, constructability, strategic utilities, Non-Motorised User strategies, surveys and data collection, ecology and environmental mitigation measures.

2.10.11. Highways England is part of the NWL Project Board and has been attending Project Board meetings since December 2018. They have also provided updates to the Local Liaison Group meetings with local parish representatives. Discussions between the project teams for both schemes will be maintained throughout the construction phase.

2.10.12. The funded improvements to the A47 will, when delivered, exacerbate the traffic problems and issues already experienced in communities to the west of Norwich. The NWL will provide a direct, high-standard transport link between the western end of the A1270 and the A47, alleviating local transport issues, improving orbital connectivity, and reducing the need for traffic to enter the city.

2.11 STAKEHOLDERS

STAKEHOLDER GROUPS

2.11.1. Key stakeholders have been actively engaged with the scheme since 2017 via a series of bi-monthly Local Liaison Group (LLG) workshops with Parish Council representatives from within the study area. A group of elected Council Members has also provided guidance via bi-monthly Member Working Group (MWG) meetings. Both the LLG workshops and MWG meetings have included other relevant stakeholders as necessary.

2.11.2. The NWL team maintains a database of stakeholders, with whom it shares project information in line with its Stakeholder Communication Strategy (see **section 6.7** of the Management Case), rolled out in December 2020. This database includes:

- Norfolk county councillors, particularly the Leader and Deputy Leader, cabinet members, the Norwich Western Link member group and local members
- Norwich City Council
- The NWL Project Board
- The NWL Local Liaison Group (made up of local parish council representatives)
- Parish council clerks
- Local MPs
- District councils, particularly chief executives and councillors
- Natural England
- English Heritage
- The Environment Agency
- The Norwich Western Link ecology liaison group (made up of groups with an interest and expertise in wildlife and habitats and their preservation and management)
- Norfolk Chamber of Commerce
- New Anglia Local Enterprise Partnership
- Highways England
- Department for Transport
- Businesses in the area to the west of Norwich
- Local landowners
- Norwich Airport
- Norfolk and Norwich University Hospital
- Norfolk Constabulary
- Norfolk Fire and Rescue Service
- East of England Ambulance Service
- Norwich Research Park
- Easton and Otley College
- Road Haulage Association
- Regional haulage companies
- Public transport providers
- The Food Enterprise Park at Easton
- Walking and cycling groups
- Local Access Forum
- Campaign groups

2.11.3. Many of these stakeholders have provided feedback on the proposed scheme; response summaries are set out in **Table 2.16**.

Table 2.16 - Stakeholder feedback

Organisation	Position	Summary
Breckland Council	Support	Breckland Council believe the NWL is of key importance, as traffic congestion is having a negative impact on local industry. Breckland Council mentioned that the NWL would remove HGVs from local roads, providing a positive impact for local residents.
Broadland District Council	Support	Broadland District Council strongly recognises the benefits the NWL would have for the local community and people visiting the area. It is felt that the NWL will reduce rat-running through smaller villages and result in an overall positive outcome.
Landowners	Neutral	Landowners identified as affected by the proposed options were invited to take part in the public consultation. Owners tended to provide the route preferences that least directly impacted their land or adjacent environmental concerns.
Chantry Place Shopping Centre	Support	Chantry Place Shopping Centre has stated that the NWL will directly benefit the businesses that operate there, as well as the full and part time jobs provided by the site. They feel the NWL will also benefit the retail and visitor offer across Norwich, as journey times, reliability, and safety are improved.
Cringleford Parish Council	Support	Cringleford Parish Council has stated that the NWL will have a positive impact on the parish and wish to see a new road connecting with the A47 west of Easton, easing traffic congestion for local residents. However, there are concerns about the River Wensum SAC as a conservation site, with the protection of wildlife habitats being noted as an area of utmost importance
East Winch Parish Council	Support	East Winch Parish Council supports the principle of the NWL, but have outlined some concerns, such as the proximity to the city of Norwich. The Parish Council noted that additional local road improvements are needed, including improvements to the crossroads at Necton.
Great Yarmouth Borough Council	Support	Great Yarmouth Borough Council believes that the NWL will have a positive impact on the local economy and wider county, bringing further investment to the City. The Council acknowledges the environmentally sensitive area of the project, but believes that with careful planning and consideration the NWL can be successfully implemented.
First Bus	Support	First Bus states that a significant amount of traffic uses Dereham Road, the outer ring road, and rural roads to travel between the A47 and A067 and beyond. The NWL will reduce congestion as traffic is able to take a route offering more reliable journey times, and support access to the proposed Food Hub in Easton, enabling light goods vehicles to avoid using the roads within Norwich.
Green Party	Oppose	The Green Party expressed opposition due to the location of the scheme and the presence of the River Wensum SAC, believing the NWL would cause adverse harm. The Green Party also believes the NWL would

Organisation	Position	Summary
		increase carbon emissions surrounding the route and, with the financial cost of such a project, the public should be focused on more sustainable modes of transport.
Highways England	Neutral	Highways England has not expressed a view on a preferred link road option, save opting for a route which maximises the design life of the A47. Highways England will work with Norfolk County Council as both schemes are taken forward, to ensure the outcome of work provides an improved and connected road network.
Jerome Mayhew, MP for Broadland	Support	The MP for the constituency of Broadland in Norfolk confirmed strong local support for the Norwich Western Link. He supports the scheme in terms of its impact on local communities, the environment, value for money, and benefits it will bring to local transport links and safety.
New Anglia Local Enterprise Partnership (LEP)	Support	The LEP outlined that the new link will help deliver the economic strategy for Norfolk and Suffolk, will improve connectivity to centres of excellence, improve journey reliability to economic opportunities, and will enhance the quality of life for residents in the area.
Norfolk Chamber of Commerce	Support	Representing over 900 Chamber members, the Norfolk Chamber of Commerce expressed their support for the scheme, and its intent to embrace growth and development to enable the jobs and house the region needs. It feels that the NWL will facilitate access to both Norwich IAirport and Great Yarmouth port, and help to manage the additional traffic future growth will create. This, in turn, will improve the quality of life for people living in the area.
Norfolk Constabulary	Support	The Norfolk Constabulary feels that a western link road would allow for delivery vehicles to avoid the city centre and improve journey time, as well as reduce the amount of unnecessary traffic, noise and visual intrusion passing through the western area of Greater Norwich. They feel that the NWL would reduce the occasions for stop/start traffic, particularly with HGVs, which are slower running. Less congestion would be beneficial in reducing police response times and reducing driver frustrations. This, in turn, would increase safety.
Norfolk Fire and Rescue Service	Support	The Norfolk Fire and Rescue Service would welcome reduced traffic congestion and increased traffic flow, which they believe will reduce their overall attendance time to incidents in the affected area. They would also welcome a reduction in the number of heavy goods vehicles using minor roads around the Norwich area.
Norfolk and Norwich University Hospital	Support	NNUH stated that the improved infrastructure will make the hospital more accessible, particularly to residents living in North Norfolk.
North Norfolk District Council	Support	North Norfolk District Council supports the Norwich Western Link in principle, urging for the completion of a dual carriageway orbital route around Norwich.
Norwich Airport	Support	Norwich Airport expressed enthusiastic support for the scheme, seeing the NWL as vital to the continued and long-term support of the county. This is particularly true in light of the coronavirus pandemic, after which the local community, economy, and Airport need to recover as quickly as possible.

Organisation	Position	Summary
		The NWL is expected to provide significant benefits, not only by improving accessibility of the commercial development at Imperial Park, but helping to reduce the number of heavy good vehicles using minor roads.
Norwich City Council	Neutral	The City Council's support for the scheme is dependent on being satisfied that certain conditions are fulfilled. In particular, the NWL needs to be set in the context of a clear and environmentally progressive strategy for the development of transport in Norwich.
Norwich Friends of the Earth	Oppose	Friends of the Earth outlined a number of concerns, including the location (in regard to the presence of the River Wensum SAC), the reasoning, cost, air quality and the impact on climate change.
Road Haulage Association Ltd (RHA)	Support	The RHA feel the NWL would reduce journey times, improve air quality and assist in the economic growth of Greater Norwich. Ideally, the RHA would like a dual carriageway solution linking the A47 and A1067. The link would enable traffic to take a shorter route to the area north of Norwich, making critical infrastructure more accessible, and providing resilience in the event of the existing road network failing.
South Norfolk Council	Support	South Norfolk Council believes the NWL will enable the strengthening of residents' connections to jobs, leisure, education and each other, as well as taking traffic off local roads, improving the resilience of the road network, and improving air quality in residential areas.
Stop the Wensum Link Group	Oppose	The Stop the Wensum Link Group argues that the proposed road is environmentally damaging and does not provide good value for money. It argues in favour of a pause to the project to undertake a full and comprehensive consideration of alternative solutions, particularly in light of the pandemic and a gap in post Covid 19 origin and destination data.
The Friends of North Norfolk	Oppose	The Friends of North Norfolk opposed the principle of the NWL, due to the harm that they believe will be caused to the River Wensum and the overall financial cost of the project.
Transport East	Support	Transport East has endorsed the NWL, stating that it will better connect people to key employment, health, leisure and educational sites in and around Norwich, as well as providing an attractive link to Norwich Airport and areas north of the city. In addition, Transport East notes that through a combination of reducing traffic congestion on the local road network and the inclusion of targeted sustainable transport measures, the project will support people to walk, cycle and use public transport.
Wensum Valley Alliance	Oppose	The Wensum Valley Alliance outlined a number of concerns, including: the location (in regard to the presence of the River Wensum SAC), the reasoning, cost, air quality and the impact on climate change.
Weston Longville Parish Council	Support	Weston Longville Parish Council offered conditional support for the scheme, supporting the strategic objectives of an NWL, though advocating for a route that connected the A47 closer to Norwich. Provided proposed mitigation measures were fully implemented, the WLPC would support the scheme.
Wild Wings Ecology	Oppose	Wild Wings Ecology questioned the adequacy of the ecological surveys carried out by NCC, particularly as regards the protected Barbastelle Bat

Organisation	Position	Summary
		species. It feels that the NWL would be damaging to a nationally important area, and that the scheme cannot be delivered in compliance with wildlife laws.
Norfolk Wildlife Trust	Oppose	Norfolk Wildlife Trust believes that the NWL would be damaging to the environment and the impacts would not be adequately mitigated. It expressed concern about loss of habitat by the implementation of the road and the consequent loss to protected species that would occur.
CPRE Norfolk	Oppose	CPRE Norfolk holds the principle that any major road scheme is inappropriate and unsustainable in relation to the global environmental crisis as well as concerns about damage to precious local irreplaceable countryside. Also concerned about release of additional land for development related to construction of the road.
Norfolk Labour Group	Oppose	Norfolk Labour Group position is that the NWL is environmentally damaging and funding should be used to promote sustainable modes of transport, including the improved bus routes and separated carriageway links for walkers and cyclists.
Clive Lewis MP	Oppose	Clive Lewis expressed opposition to the need for roadbuilding and proposed the prioritisation of sustainable modes over car travel to protect the environment by cutting CO2 emissions and allowing wildlife to remain in their natural habitat unaltered.
Bat Conservation Trust	Oppose	The Bat Conservation Trust position statement advises that they have significant concerns that the impacts of the NWL, as proposed, on the barbastelle bat population cannot be adequately mitigated or compensated for based on current available information.

STAKEHOLDER ENGAGEMENT

2.11.4. NCC will build upon the extensive stakeholder engagement undertaken for the Outline Business Case, and on the relationships developed with businesses, residents and all other interested parties. Stakeholders will continue to be involved throughout the development of the Full Business Case, and the delivery phase.

2.11.5. Letters of support that have been received in relation to the development of the NWL have been included within **Appendix 2A.**

2.11.6. Additional detail on stakeholder management activities undertaken to date, as well as the ongoing stakeholder engagement strategy, can be found in the Management Case.

CONSULTATIONS

2.11.7. Extensive stakeholder consultation has been undertaken in preparation for the NWL scheme. The first public consultation, in 2003, showed extensive support for transport improvements to the north and west area of Norwich. As the scheme developed, specific consultation was undertaken on the NWL, the details of which can be found in **section 6.7** of the Management Case.

2.11.8. Between November 2018 and January 2019, NCC consulted on the four shortlisted road options for an NWL, with the following objections:

- Understand the degree of public support for each of the four options

- Understand how each option may rank against one another
- Gauge support for each option from statutory and non-statutory organisations
- Gain knowledge of potential scheme risks and local effects of each of the proposed options that may influence design or cost
- Seeking to identify additional potential social and economic scheme benefits and opportunities, which may arise as a result of each option and any aspects requiring mitigation which may influence the scheme cost.

2.11.9. A total of 1,929 respondents provided feedback to the consultation. Three key themes emerged: connectivity, environment, and rat running.

2.11.10. The need for improved bus services and facilities for cycling and walking was highlighted by respondents. Roads and traffic improvements were strongly supported. Concern over environmental impacts arose for all options, with particular concerns noted over impact on wildlife, woodland, and on the Wensum Valley.

2.11.11. The resulting measures for non-motorised users focus on enhancing accessibility and safety on existing routes, where there would be traffic relief as a result of the scheme.

2.11.12. Concerns regarding the environmental aspects of the scheme were key to scheme development, with NCC liaising extensively with the Environment Agency and various environmental groups, creating a Design and Landscape Strategy as a commitment to delivering good design that conserves and enhances natural assets, and undertaking environmental mitigation works.

2.12 OPTIONS

2.12.1. To address the project evolution between the OAR and the OBC, an OAR Addendum **Appendix 2B** has been created (May 2021) to consider the impact of new information that has become available since the original OAR was prepared. This should be read alongside the OAR for additional detail on the option development process.

OPTION DEVELOPMENT

2.12.2. Following DfT TAG: Transport Appraisal Process guidance, a long list of options was developed to address current and future problems identified within the study area. A long list of 82 options was considered in the Option Assessment Report (October 2018) prior to shortlisting for public consultation.

2.12.3. In an effort to tackle demand-based issues, a number of demand management, freight and improved information schemes were identified. Active travel and public transport options were also developed to encourage modal shift and reduce private vehicle trips on the existing road network. The long list of options is summarised by category in **Table 2-17**.

Table 2-17 – Long list categories

Category	Number of interventions
New link highway options	44
Network improvement schemes	8
Demand management	3
Active travel	8
Information	3
Freight	3
Public transport options	12
Do nothing	1
Total	**82**

2.12.4. A multi-criteria assessment framework (MCAF) was then utilised to assess and sift the options. To allow for greater differentiation between options and a wider consideration of environmental factors, the assessment criteria were expanded to include the categories listed as part of the TAG Environmental Impact Appraisal. The resulting assessment areas are shown in **Table 2-18**.

Table 2-18 – Assessment Areas

Element	Assessment Area
Strategic	▪ Scale of impact against specific objectives ▪ Fit with high-level objectives ▪ Degree of consensus over outcomes
Economic	▪ Economic growth ▪ Socio-distributional impacts and regions ▪ Local environment ▪ Wellbeing ▪ Expected Value for Money (VfM) ▪ Environmental • Air quality • Noise • Greenhouse gases • Landscape / townscape • Biodiversity • Cultural heritage • Water environment
Management	▪ Implementation timetable (years) ▪ Public acceptability ▪ Practical feasibility ▪ Quality of supporting evidence ▪ Key uncertainties

Element	Assessment Area
Financial	▪ Affordability ▪ Capital cost (£m) ▪ Overall cost risk
Commercial	▪ Flexibility of options ▪ Funding source ▪ Income generated

2.12.5. The sifting process was also informed by an initial round of public consultation in summer 2018, in which respondents answered a question about which options they thought would best tackle transport issues in the area. 86% selected the option of a new road link between the A47 and A1270.

2.12.6. An initial sifting led to the removal of all options that did not score as highly as the do-nothing scenario, as these would not represent good value for money. After the first round of sifting, 34 options remained, including 22 new link highway options, five network improvement schemes, three active travel options, three public transport options and a freight option.

2.12.7. At this stage, it was also decided that new single carriageway highway link options would be omitted from the study. These options were discounted on the basis that dual carriageway options would produce the most robust assessment in consideration of potential land take, costing and environmental concerns. It should also be noted that dual carriageway options, in general, provide more benefit in terms of increased capacity and therefore network resilience, improved journey time and associated economic benefit and safer design. The increased speed limit for HGVs on dual carriageways would also significantly improve chances to attract HGVs away from rural routes.

2.12.8. Discounting the single carriageway options removed a further eight options, resulting in a total of 26 options after Round 1. The remaining options were subsequently re-categorised into ‘non-highway options’ (10), ‘new link highway options’ (14) and ‘existing link upgrade options’ (2).

2.12.9. These were then scored against 12 specific objectives for scheme, with their likelihood of addressing the objective scored on a scale of 1 (unlikely) to 5 (fully address the scheme). The final percentage score for each option was compared to the ‘do nothing’ score of 27%.

2.12.10. The new highway link options performed significantly better against a higher number of the specific scheme objectives. The lower scoring non-highway options were found to either not be viable in isolation or not to make a sufficiently significant contribution towards meeting the study objectives. It was, however, decided that they should be carried through as potential schemes that could be packaged up with the shortlisted highway options at a later stage.

2.12.11. A second round of sifting compared the remaining highway options geographically and removed the weaker options from similar competing pairs. Three new highway options and the upgrading of an existing highway route through straightening and widening were chosen as the shortlisted options and taken forward for further assessment. **Figure 2-33** provides an overview of the proposed option routes.

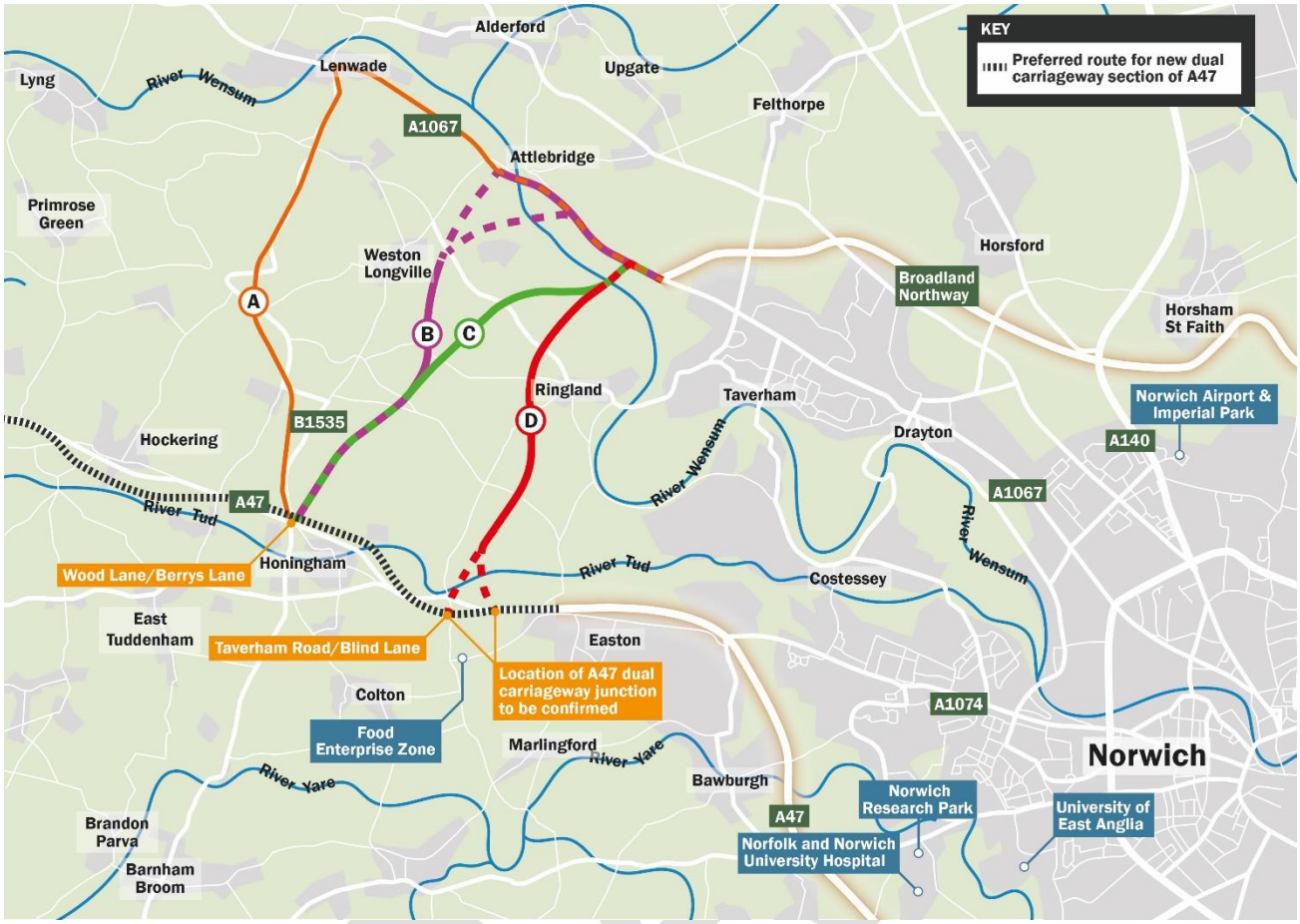


Figure 2-33 - Shortlisted Highway Options

Option A

2.12.12. Option A consisted of a single carriageway upgrade to the B1535 and A1067, linking to the A47 at the Wood Lane junction north of Honingham. This option would significantly realign the current B road, straightening it and widening it to deliver a higher standard route. The route would join the A1067 via a new junction at Lenwade and make use of the existing bridge across the River Wensum at Attlebridge.

Option B West (Existing Bridge) and Option B East (New Viaduct)

2.12.13. Option B consisted of a new dual carriageway route and dual carriageway upgrade of the A1067, with the new route to the east of Weston Longville and linking to the A47 at Wood Lane. At the northern end of this route, two alternatives were given as to how it could join the A1067. One would be via a new junction near Attlebridge, which would include widening the existing River Wensum bridge at Attlebridge, Option B West. The other would see a new viaduct crossing of the Wensum created, joining the A1067 further to the east and is named Option B East.

Option C

2.12.14. Option C consisted of a new dual carriageway route and dual carriageway upgrade of the A1067, linking to the A47 at Wood Lane. A short section of the A1067 would be dualled before a new junction would take the route between Weston Longville and Ringland, crossing the River Wensum on a viaduct.

Option D West and East

2.12.15. Option D consisted of a new dual carriageway route and dual carriageway upgrade of the A1067. The route is similar to Option C at its northern end; it then runs to the west of Ringland and links to the A47 further east. A short section of the A1067 would be dualled with a new junction provided. The NWL would route between Weston Longville and Ringland, crossing the River Wensum on a viaduct, then crossing the River Tud on a second viaduct, before it meets the A47.

2.12.16. Two alternatives for how Option D could join the A47 were shown. This was due to Highways England's plans to dual the section of the A47 between North Tuddenham and Easton. During the development of the SOBC, a limited level of detail was available in relation to the new junction location near Easton, with the possibility of the junction being located near Blind Lane and Taverham Road or closer to the current Easton roundabout junction.

Do Nothing

2.12.17. Do nothing – This option has no proposed measures and was carried through in order to provide a base from which to make comparisons. The A47 dualling scheme was included as part of the Do Minimum scenario, as this Highways England scheme would progress as a standalone scheme irrespective of the scheme selected for the NWL.

OPTION ASSESSMENT

2.12.18. In 2019, an Option Selection Report (OSR) was produced drawing together information relating to the shortlisted highway link options. It considered a wide range of engineering and environmental criteria, as well as feedback from the public consultation.

2.12.19. The six shortlisted options were assessed in line with TAG guidance and the findings set out in the SOBC and the OSR. The decision on a Preferred Route Alignment (PRA) took on board engineering scheme design considerations, such as drainage, geotechnical, structural and topographical considerations, in addition to environmental effects, scheme risks, cost and transport impacts. Feedback from two rounds of public consultation was also incorporated. Additional detail on determining the PRA is set out in the OSR.

2.12.20. The route option assessment compared the route options for the proposed NWL, considering the proposed A47 upgrade, the existing road network, and how the road would traverse through the Wensum Valley with minimal impact.

Engineering

2.12.21. The main engineering challenges identified were related to the provision of new roads within constrained corridors. The options linking the NWL to the A1067 closer to the A1270 were generally dual carriageways, and the structures provided to enable local road crossings. These options would involve more land take, earthworks and have higher corresponding scheme costs.

2.12.22. Considerable access disruption and traffic management was anticipated for those route options that required online construction.

2.12.23. While the engineering challenges identified were not significant enough to completely discount any of the options under consideration, Option C ranked ahead of other options when assessed against design fit with topography, layout constraints, utility and traffic management/disruption during construction (**Table 2.19**).

2.12.24. All NWL shortlisted options were considered as being acceptable for connection to the proposed A47 North Tuddenham to Easton dualling scheme, however due to the physical constraints of the River Tud and steep topography, Options D (East and West) were assessed as more challenging in comparison to the other options.

Table 2.19 - Engineering Decision Matrix for Route Selection

Engineering	Route A	Route B (west)	Route B (east)	Route C	Route D (west)	Route D (east)
Horizontal Alignment, Land Use and Constraints	6	5	4	1	3	2
Junctions and roads	6	3	2	1	4	4
Topography and Profile	1	3	4	2	6	5
Structures	1	4	2	3	6	5
Drainage	1	1	1	1	1	1
Public Utilities	4	3	2	1	6	5
A47 Tie-in	1	2	2	2	5	6
Departures from Standard	1	6	5	1	1	1
Buildability	4	3	2	1	6	5
Overall	3	4	2	1	6	5

Traffic

2.12.25. An updated traffic model was used to assess each route option and test a future year scenario comprised of the proposed NWL and the major developments most likely to be developed by the 2025 (opening year), 2040 (design year), and 2050 (horizon year).

2.12.26. Predicted traffic flow, journey time, and accident changes were analysed, and generally, all routes generated the most journey time savings for local roads nearest to them, with Option C attracting the most NWL traffic, and Option A attracting the least NWL traffic.

Economic analysis

2.12.27. An appraisal of the economic elements associated with the scheme was undertaken in accordance with TAG Unit A1.1 Cost-Benefit Analysis (May 2018). Based on the additional monetised impacts, the scheme options resulted in adjusted Value for Money (VfM) categories in the range of Low to High.

2.12.28. Option A returned the lowest BCR, placing it in the Low VfM range. Option D West reported a Medium VfM, while Options B (east and west), C, and D East all showed High VfM. The breakdown of results is shown in **Table 2-20**.

Table 2-20 –BCR and VfM Summary

	Route Options					
	Option A	**Option B West**	**Option B East**	**Option C**	**Option D West**	**Option D East**
Benefit Cost Ratio (BCR)	1.42	2.62	2.21	2.51	1.87	2.00
VfM Category	Low	High	High	High	Medium	High

Environmental

2.12.29. The environmental impacts of the NWL route options were assessed in line with TAG, where appropriate, as well as best practice, and included the identification of: baseline conditions, environmental effects; mitigation; and consultation, for the topics of noise; air quality; greenhouse gases; landscape; historic environment; biodiversity; and water environment.

2.12.30. These assessments indicated that all six route options would have varying degrees of environmental impacts. **Table 2-21**, which summarises the assessment outcomes, indicates that Option A would have the least overall environmental impact, while Option D (west and east) would have the highest overall impact.

Table 2-21 - Environmental Appraisal Summary Table

Environmental Impacts	Route Options				
	Option A	**Option B West**	**Option B East**	**Option C**	**Option D (west and east)**
Noise	Considered to be the best option as it adversely affects (moderate and major impacts) the fewest properties.	Considered to be the worst option as it adversely affects (moderate and major impacts) the highest number of properties.	Considered the third best option moderate and major adverse impacts on properties.	Considered the second best option moderate and major adverse impacts on properties.	Considered the second worst option moderate and major adverse impacts on properties.
Air Quality	Slight beneficial local air quality impact; affects fewest	Negative local air quality impact	Negative local air quality impact	Negative local air quality impact	Worst negative local air quality impact; affects largest numbers of properties

Environmental Impacts	Route Options				
	Option A	Option B West	Option B East	Option C	Option D (west and east)
	numbers of properties				
Greenhouse Gases	Net present value $(CO_2)_e$ of £8,622,855; lowest emissions of greenhouse gases	Net present value $(CO_2)_e$ of -£1,358,528; second lowest emissions of greenhouse gases	Net present value $(CO_2)_e$ of -£4,900,284; second highest emissions of greenhouse gases	Net present value $(CO_2)_e$ of -£4,149,699; third highest emissions of greenhouse gases	Net present value $(CO_2)_e$ of -£10,575,555; highest emissions of greenhouse gases
Landscape	Slight Adverse	Slight Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Historic Environment	Large Adverse	Large Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Biodiversity	Very Large Adverse	Very Large Adverse	Very Large Adverse	Large Adverse	Large Adverse
Water Environment	Minor Adverse	Minor Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Geology and Soils	This Option has the least exposure to the construction of embankments /piled structures over Alluvium layer.	This Option has a limited exposure to construction of embankments and piled structure over Alluvium layer.	This Option has a considerable exposure to construction of embankments and piled structure over Alluvium layer.	This Option has a considerable exposure to construction of embankments and piled structure over Alluvium layer.	This Option has the greatest exposure to construction of embankments and piled structure over Alluvium layer.

2.12.31. Where significant impacts were identified and where feasible, mitigation will be outlined and adopted to minimise impacts at design and construction. To ensure the scheme is adequately addressing environmental issues, regular consultation is being undertaken with the Environment Agency, Natural England and other key stakeholders to ensure their concerns are raised and appropriately addressed.

Stakeholder Acceptability

2.12.32. Feedback was collected from members of the public and a range of stakeholders across two rounds of public consultation. The majority of stakeholders were supportive of an NWL in principle, as long

as adequate environmental mitigation and supporting traffic management measures were put in place to enable the solution to be sustainable. The majority of stakeholders supported Options D or C.

2.12.33. The feedback also included notable responses from the Environment Agency and Natural England. Both require a solution that does not impact on the integrity of the River Wensum SAC and SSSI. The Environment Agency also highlighted that the River Tud is classed as a Priority Habitat as a chalk river in the WWF-UK 2014 report 'The State of England's Chalk Streams'.

2.12.34. The Environment Agency and Natural England consistently indicate a preference to minimise the number of river crossings, though noted that Option A was expected to have the least impact on flood risk and did not require a new crossing. Both confirmed that a new viaduct was considered an acceptable solution – subject to appropriate design and construction methodology – should a new road crossing be required.

OPTION RECOMMENDATION

2.12.35. Considering all factors, it was therefore recommended that Option C be taken forward as the preferred route (**Figure 2-34**). This offers a solution that has high value for money, is publicly acceptable and less environmentally intrusive, easier to build, cheaper to install and lower risk to deliver through the statutory process.

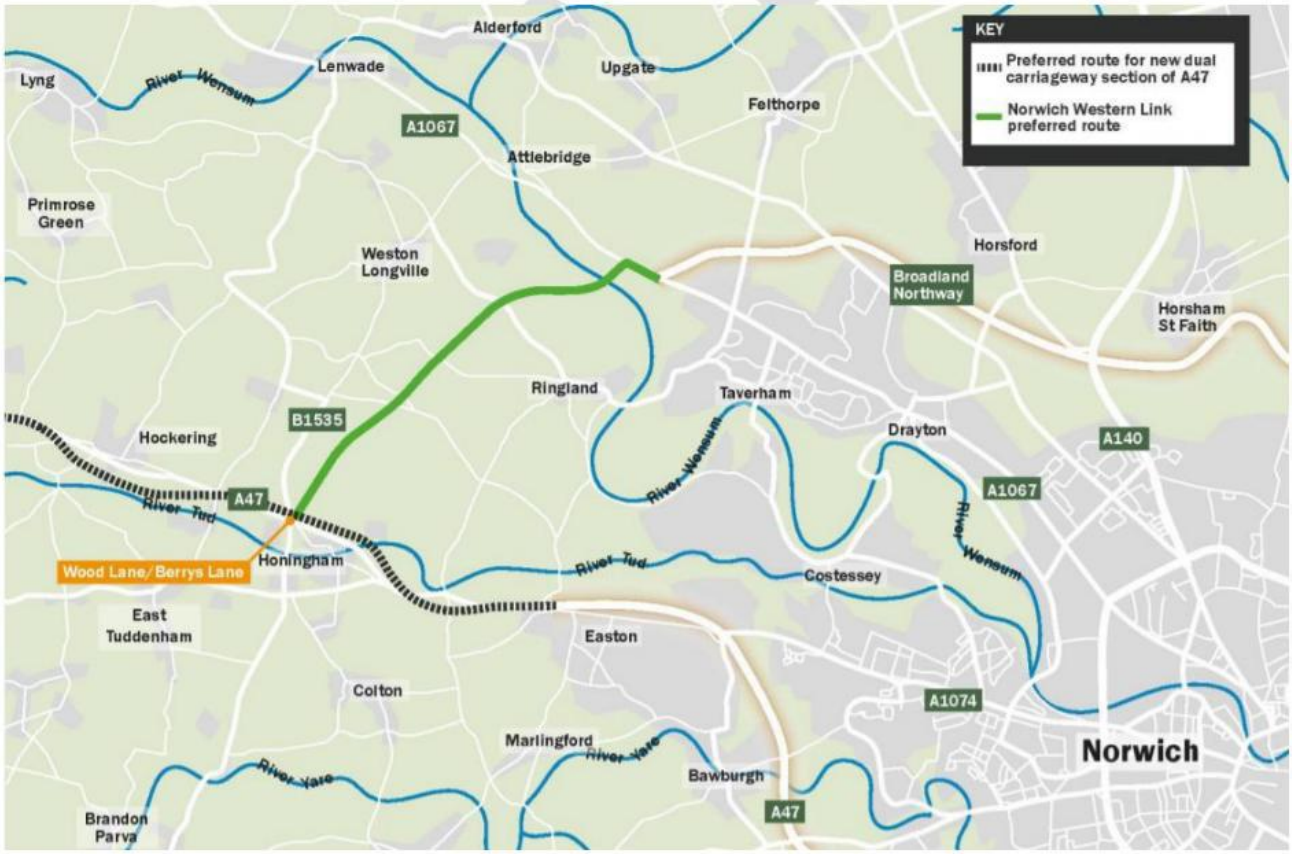


Figure 2-34 – The Preferred Route

2.12.36. It was also recommended that any option taken forward be accompanied by a package of supporting non-motorised user interventions to encourage mode shift away from private car use for those travelling shorter distances within the study area. These are further explored as part of the Sustainable Transport Strategy (STS).

Background

2.12.37. The Sustainable Transport Strategy (STS) provides a framework for a package of measures that will complement the Norwich Western Link scheme and supports the sustainable travel objectives of the NWL.

2.12.38. The scheme creates an opportunity to link up the existing network of Public Rights of Way to maximise local connectivity for pedestrians, cyclists and equestrians. The land take associated with the delivery of the new road, enables the creation of new non-motorised user routes and mitigate severance issues where the NWL crosses existing roads, with local residents supportive of closing the majority of the rural roads crossing the link.

2.12.39. The scheme will offer a comprehensive network of new Public Rights of Ways and joining up the existing fragmented network and improving quality and attractiveness of the routes on the ground. At the southern end of the route, working has been completed jointly with Highways England to secure connections provided to the Walking Cycling and Horse Riding routes proposed as part of their North Tuddenham to Easton dualling scheme; this includes new grade separated crossings of the A47 at Honingham and Easton at the southern part of the route.

2.12.40. Further north the NWL scheme includes a new underpass available to all users with priority given to non-motorised users where the new link crosses. Two new green bridges will also include non-motorised user provision which introduce new routes that cross the scheme and at the north eastern end of the route, onward connections are provided to the Broadland Northway cycleway alongside A1270. The traffic relief provided to the surrounding rural road network will also free up capacity and make conditions safer and more pleasant for cycling in mixed traffic. This will be enhanced via a series of cycle priority measures and crossing improvements, linking to the Marriott's Way (National Cycle Route 1, which offers direct connectivity to the centre of Norwich).

2.12.41. The measures have been generated through three rounds of public consultation and stakeholder engagement to maximise local benefit, most recently a local Access Consultation was held in July 2020 which demonstrated good levels of support for the sustainable transport proposals.

2.12.42. Subsequently, the proposals have been updated to suit new guidance published in July 2021, including LTN 1/20. The recently published Gear Change guidance document, which responds the climate change agenda, describes a vision to make England a great walking and cycling nation, with a target set to double cycling use and increase the numbers walking. This ambition has been partly derived from direct experience during the Covid-19 pandemic in 2020, with a 100% increase in cycling observed and close to 300% in some locations across the UK (Gear Change 2020). The NWL scheme has embraced this vision and is also following the Healthy Streets guidance, as pioneered by Transport for London, at the urban fringe places where people choose to walk and cycle, where they feel safe, and where there are areas for suitable shade and shelter.

Supporting strategies

2.12.43. The STS includes a number of additional strategies that are being developed in tandem, namely the Non-Motorised User (NMU) Strategy, Public Transport (Bus) Strategy, and Side Road Strategy and was informed by a Walking, Cycling and Horse-Riding Assessment (WCHAR).

2.12.44. The NMU Strategy offers increased opportunities for recreational walking, cycling and horse riding in the immediate vicinity of the NWL route, as well as improving connectivity of existing Public Rights of Way and encouraging healthy and active travel by non-car modes on trips within shorter distance bands, informed by the WCHAR. The proposed Strategy includes a mix of over bridges and underpasses to provide grade separated crossings of the NWL dual carriageway, and either on or off site mitigation in the area surrounding the NWL.

2.12.45. The Bus Strategy has been produced as part of the STS to connect key residential and employment areas to the west of Norwich with those in the city centre – these include Norfolk and Norwich University Hospital, Norwich Research Park and UEA. The Bus Strategy will complement other aspects of the STS and make use of routes that will experience lower traffic levels following construction of the NWL, making bus travel more attractive for use and improving journey time reliability.

Shortlisted routes

2.12.46. The STS measures are forecast to increase the number of walking and cycling trips across the study area by making the routes attractive and safe for users, and logically placed to connect key amenities. The shortlisted sustainable transport interventions include two crossing improvements along the A1067 and three cycle friendly links connecting Attlebridge, Taverham, Easton, UEA, NNUH and NRP, with 1,125 daily new trips able to be supported by the proposed cycle friendly route options. The proposals fit well with the aspirations of Transport for Norwich (TfN), which seeks a mode shift away from private cars and an improvement in air quality. There are good opportunities for geographical linkage where the NWL and TfN projects interface at the western fringe of Norwich. The preferred options are shown below:

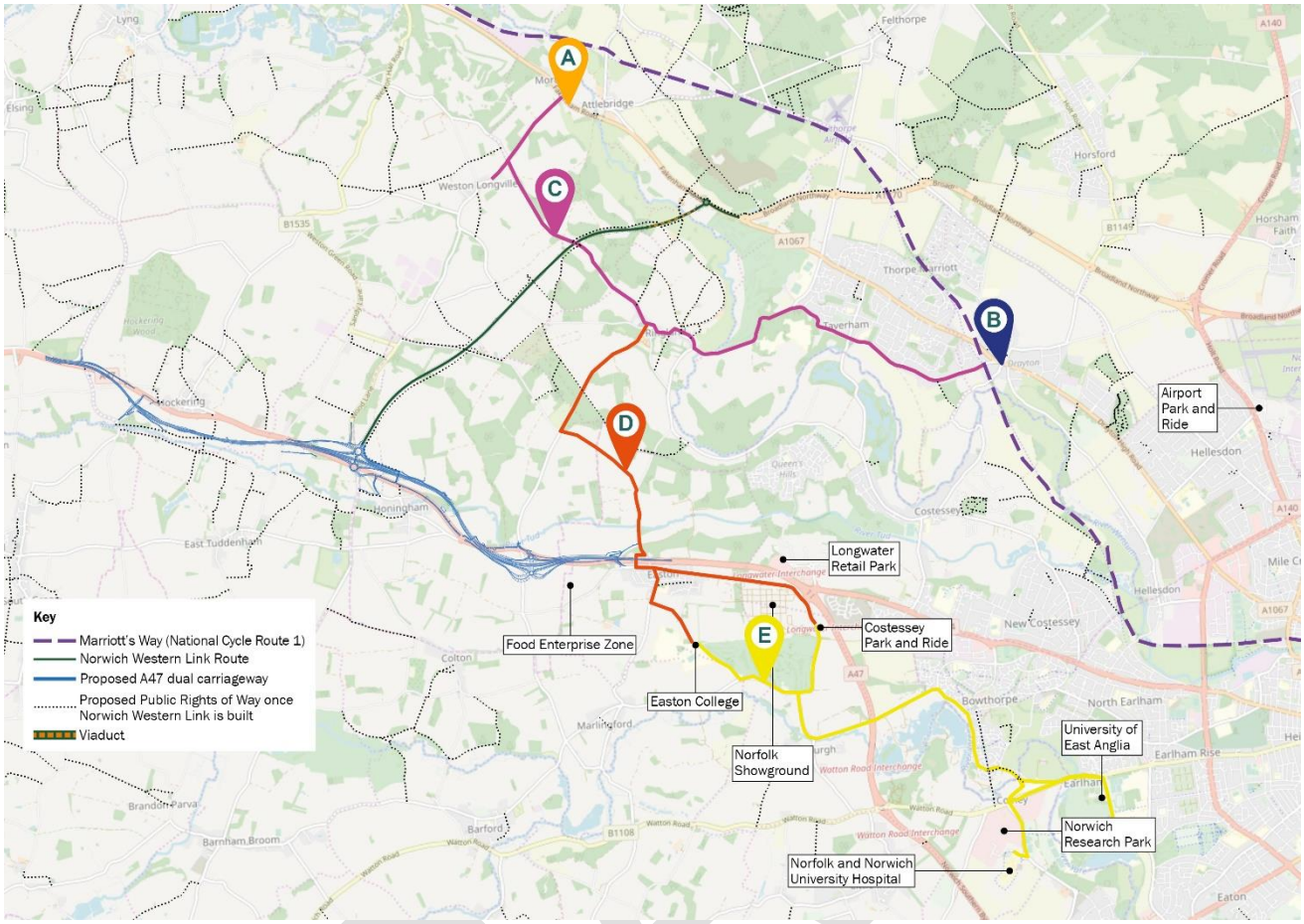


Figure 2-35 - Sustainable Transport Measures Shortlist

2.13 SUMMARY OF STRATEGIC CASE

2.13.1. The proposed NWL scheme is closely aligned with national, regional and local policies and plans, and contributes to the Government's goal of levelling up communities, both on a national scale, and within Norfolk.

2.13.2. The scheme is designed to close the gap in the orbital network, strengthen the resilience of the surrounding routes, and safeguard the network from increased congestion future growth will bring.

2.13.3. Norfolk's plans for post-pandemic recovery and economic growth are ambitious. Over the next decade, it aims to have 57,000 new jobs, many of which are expected to be located in its Tier One Employment Sites. Housing growth is needed to accommodate the need for almost 40,000 new dwellings, and major development is either planned or already underway in Hethersett, Cringleford, Costessey and Easton.

2.13.4. The NWL has been identified as a component of the long-term post-pandemic recovery plan for Broadland and South Norfolk. Addressing existing congestion and connectivity challenges will create a more resilient network as these plans are realised, and linking housing and employment sites around Norwich together will provide a greater scale of opportunity for local communities.

2.13.5. The main problems that the proposed scheme aims to address are:

- Connectivity

- Congestion and delay
- Productivity gap
- Journey time reliability
- Road use in rural communities
- Speeding
- Severance
- Barriers to walking and cycling
- Personal injury collisions.

2.13.6. If the scheme is not provided, these problems are expected to get worse. Growth in Norfolk will come at a price of increased congestion – particularly on rural roads – and a less resilient network overall.

2.13.7. The overall aim of the scheme is therefore to: support sustainable economic growth; improve the quality of life for local communities; promote an improved environment; and improve strategic connectivity with the national road network.

2.13.8. Stakeholder engagement has been key to the scheme's development, with Local Liaison Group workshops being held since 2017. Letters of support have been offered from local organisations and businesses. NCC will continue to build upon the extensive stakeholder engagement undertaken to date, and on the relationships developed with businesses, residents, and all other interested parties as the NWL progresses.

2.13.9. A comprehensive selection process was adopted to assess options for the scheme. This included assessing a range of new highway options, existing route upgrade options, public transport interventions as well as freight and demand management options.

2.13.10. A dual carriageway road, including a viaduct over the River Wensum and associated floodplain, was identified as the preferred option, with over 60% of consultation respondents considering this option to be an effective way of managing the identified problems. It offers high value for money, is publicly acceptable but less environmentally intrusive than other comparable options and is most likely to deliver the objectives.

2.13.11. The scheme will also include a package of sustainable transport measures to complement the Norwich Western Link and encourage mode shift away from private car use for those travelling shorter distances within the study area.

3 ECONOMIC CASE

3.1 INTRODUCTION

3.1.1. This section presents the economic case for the NWL scheme. The economic case appraises the proposed scheme to identify its economic impacts, and the resulting Value for Money (VfM). The appraisal of impacts will not be limited to the monetised measured economy and will include economic and environmental impacts as well as social and distributional impacts.

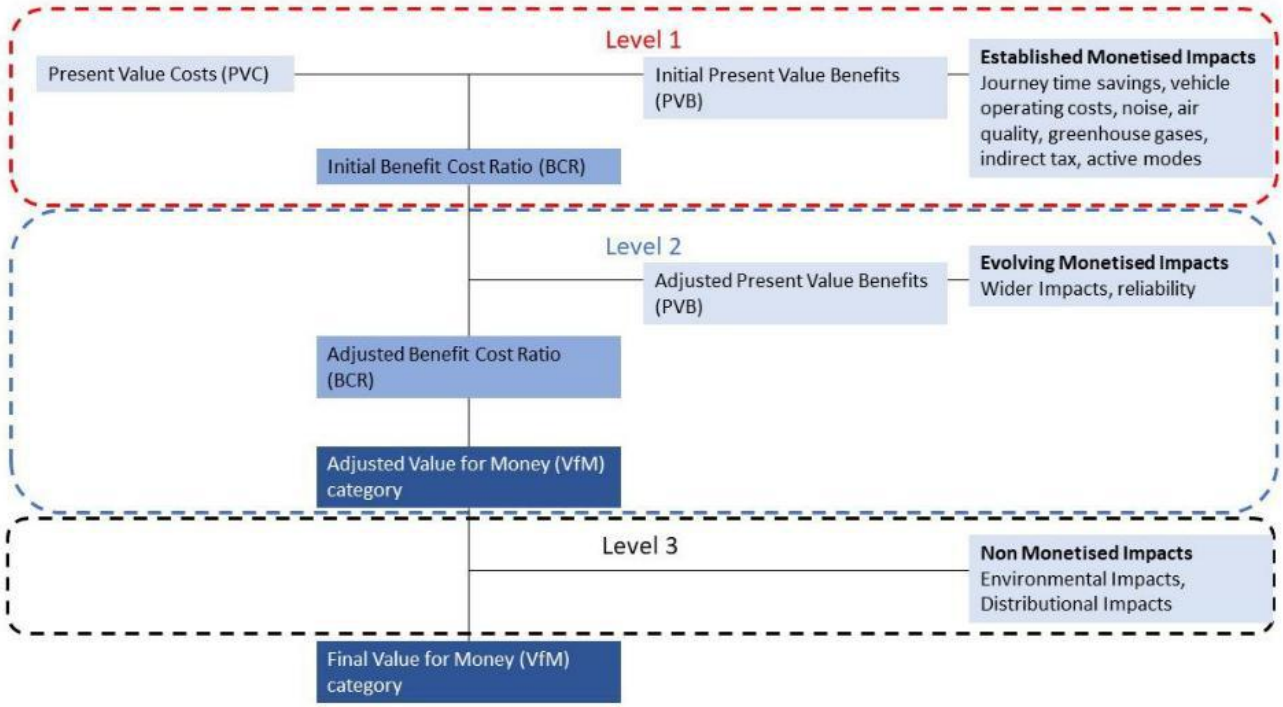
3.2 ECONOMIC APPRAISAL METHODOLOGY

3.2.1. The economic appraisal of the scheme has been undertaken in accordance with current TAG guidance, including:

- TAG Unit A1 cost-benefit analysis
- TAG Unit A2 economic impacts
- TAG Unit A3 environmental impacts
- TAG Unit A4 social and distributional impacts
- TAG Unit A5-1 Active Mode Appraisal and
- DfT Value for Money Framework

3.2.2. The methodology is based on the DfT Value for Money Framework (July 2017) and is illustrated in **Figure 3-1**.

Figure 3-1 - Process to derive BCR and Value for Money Category



3.2.3. The DfT Value for Money Framework identifies three categories of monetised impacts and a set of non-monetised impacts:

- **Established:** where the method for estimating the impact and the monetary value is tried-and-tested (these impacts can be captured in **Level 1** of the VfM analysis and contribute to the initial Benefit Cost Ratio (BCR) calculation)
- **Evolving:** where some evidence exists to support the estimation of a monetary value but is less widely accepted and researched (these impacts can be captured in **Level 2** of the VfM analysis and contribute to the adjusted BCR)
- **Indicative**: where monetary valuation methods are not considered widely accepted or researched to be definitive, with a high degree of uncertainty in terms of the magnitude of the impact (these impacts can be captured in **Level 3** of the VfM analysis)

3.2.4. In line with the DfT Value for Money Framework, both established and evolving impacts were combined to derive the monetised impacts. These were compared with costs to produce the initial and adjusted BCRs.

3.2.5. The final stage of the Value for Money assessment requires consideration of indicative monetised impacts and non-monetised impacts. This involves determining whether these impacts have the potential to alter the overall Value for Money category. This analysis is termed sensitivity or 'switching-value' analysis.

3.2.6. Distributional Impact analysis has been undertaken to support the economic analysis of the scheme.

3.2.7. The methods used to appraise each scheme and how these fit within the Value for Money Framework is summarised in **Table 3-1** below:

Table 3-1 – Impacts appraised

Analysis Level	Scheme Impacts	Selected Appraisal Method
Level 1 - Initial BCR	Journey times and vehicle operating costs	Monetised – Transport Users Benefit Appraisal ("TUBA") software
	Greenhouse gas emissions	Monetised – TAG Unit A3 method
	Noise	Monetised – TAG Unit A3 method
	Air quality	Monetised – TAG Unit A3 method
	Government tax revenues	Monetised – Transport Users Benefit Appraisal ("TUBA") software
	Accidents	Monetised – Cost and Benefits to Accidents – Light Touch ("COBALT") software
	Active mode benefits from walking and cycling	Monetised – Active Mode Appraisal Toolkit (AMAT)
Level 2 - Adjusted BCR	Wider Benefits	Monetised – Wider Impacts in Transport Appraisal (WITA) toolkit emulator
	Reliability	Monetised – Reliability tool
Level 3 – Monetised and non-monetised impacts	Environment	Qualitative – Evaluation of changes in the environmental impacts directly related to the scheme (TAG Unit A3)
	Distributional	Qualitative – evaluation of the impact on selected social and user groups (TAG Unit A4.2)

3.2.8. The economic, environmental, social and distributional impacts of the scheme have all been examined, using qualitative, quantitative and monetised information as appropriate and proportional to the level of the scheme. In assessing Value for Money, all of these are consolidated to determine the extent to which the proposed scheme impacts compare to its costs.

OPTIONS APPRAISED

3.2.9. The scheme option development process and the appraisal of options was summarised in **section 2.12** of the Strategic Case and described more fully in the Options Assessment Report and Option Selection Report. A large number of options were considered to identify the best solution for the NWL. The appraisal has been undertaken for the preferred route alignment (Option C) which comprises a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

3.3 OVERVIEW OF METHODOLOGY AND ASSUMPTIONS OF THE TRAFFIC MODELLING

3.3.1. The development, validation and use of the Highways Assignment (SATURN) model are described in the following reports, with a summary provided in the following paragraphs.

- Local Model Validation Report (LMVR)[16]
- Traffic Forecasting Report (TFR)[17]

3.3.2. The Norwich Area Transport Strategy (NATS) model originally developed in 2012 but updated to a 2019 base has been used in the assessment of the NWL. The existing NATS model consists of:

- A highway assignment model developed in Simulation and Assignment of Traffic to Urban Road Networks (SATURN) modelling software, which is an industry standard tool
- A Public Transport (PT) model developed using PTV's VISUM and
- A Variable Demand Model (VDM) set up in DIADEM

3.3.3. The LMVR details the development of the updated NATS model in line with TAG guidance and the calibration and validation of the model which is within acceptable industry recognised standards.

3.3.4. The NATS model has the following time periods:

- Morning peak hour (AM) 08:00-09:00
- Average inter-peak hour (IP) 10:00-16:00 and

[16] Norwich Western Link Local Model Validation Report, 2020

[17] Norwich Western Link Traffic Forecasting Report (TFR), November 2020

- Evening peak hour (PM) 17:00-18:00

3.3.5. The highway assignment model groups traffic into 'user classes'. These segmentations differentiate between the characteristics of road users, both in terms of their use and their physical attributes. The user classes are summarised as follows:

- User Class 1: Cars used for Employers Business (Work)
- User Class 2: Cars used for Commuting
- User Class 3: Cars used for Other purposes
- User Class 4: Light Goods Vehicles (LGVs) and
- User Class 5: HGVs

3.3.6. The PT model is split into three user classes:

- PT Work
- PT Commuting and
- PT Other

3.3.7. The future year scenario development has been detailed within the TFR.

3.3.8. A Core Scenario has been developed that reflects growth due to 'near certain' and 'more than likely' development within the county of Norfolk.

3.3.9. Traffic growth in the Core Scenario has been constrained to the level of growth in the latest NTEM (TEMPro dataset version 7.2). The Traffic Forecasting Report (TFR) provides further detail on which development sites are explicitly represented in the Core Scenario and includes details of highway and public transport improvement schemes that have been added to the network.

3.3.10. For the purpose of the Economic Appraisal two scenarios have been considered:

- Do Minimum – Base year network with all committed (near certain and more than likely) schemes due for completion by the corresponding forecast year (including the Highways England A47 North Tuddenham to Easton upgrade scheme) and
- Do Something – Do Minimum plus the Norwich Western Link

3.3.11. Each scenario has been created for the following years:

- 2025 – Scheme opening year
- 2040 – Scheme Design Year (scheme opening plus 15 years)

3.3.12. Traffic flow information from the transport models has been utilised in the environmental appraisal, which uses air quality and noise models. For each modelled year and design option, the following data has been provided:

- Average link flow data:
  - 24-hour annual average daily traffic (AADT) data for air quality modelling
  - 24-hour annual average weekday traffic (AAWT) data for noise modelling
- Percentage mix of HGV traffic (all vehicles greater than 3.5 tonnes)

3.3.13. In line with TAG, High and Low growth scenarios have been developed around the Core Growth scenario.

3.3.14. In addition, a further scenario has been developed using updated Office for Budget Responsibility (OBR) projections, providing an OBR Core growth scenario. The OBR scenario includes updates to

long-term economic and population projections as well as updated medium-term economic projections which reflect the impact of COVID-19 on economic growth. These updates are due to become definitive in February 2021, however until they are, scheme developers have been asked to include these as sensitivity tests. All these scenarios are described in greater detail in the TFR.

3.4 COSTS

3.4.1. The cost of the proposed scheme has been estimated at 2020 prices, as set out in the Financial Case. It includes all costs associated with scheme preparation and construction, including land costs.

3.4.2. The costs have been calculated in line with TAG A1.2 Scheme Costs (July 2017), which uses the following methodology:

- Estimation of a base cost estimate
- Incorporation of a real cost increases
- Application of risk-cost adjustment
- Application of optimism bias-cost adjustment
- Rebase cost to Department base year
- Discount cost to Department base year
- Convert costs to market prices

3.4.3. Costs have been estimated under two broad headings:

- Investment costs (scheme preparation and construction)
- Maintenance and renewal costs

3.4.4. The breakdown of costs presented above, align with breakdown required for the DfT Cost Pro-forma (See Appendix 3A).

ESTIMATION OF BASE COST ESTIMATES

3.4.5. The initial capital cost estimate of the scheme is **£140.77 million** in 2020 Q3 prices. This includes costs for construction, statutory undertakers work, land and other costs such as professional fees.

3.4.6. In line with TAG Unit A1.2 (Scheme Costs), sunk costs have not been included in the following tables as these are costs that represent expenditure prior to the economic appraisal, and cannot be retrieved apart from land costs.

Table 3-2 - Investment Costs, £000s at 2020 Q3

Investment costs	Total Cost (£000s)	Cost excluding Sunk Costs
Construction cost	103,513,730	103,454,395
Statutory undertakers	732,210	732,210
Professional fees	23,780,932	14,825,127
Land	12,742,825	12,742,825
Total	**140,769,697**	**131,754,557**

3.4.7. This base cost estimate does not take account of real increases in costs and must therefore be adjusted to provide real costs that account for the effects of inflation (this is addressed from **section 3.4.10**).

SCHEME MAINTENANCE AND RENEWAL COSTS

3.4.8. The whole life costs of the scheme have also been estimated. A breakdown of the estimated capital renewal, annual maintenance and operation costs is presented in **Table 3-3**.

Table 3-3 - Breakdown of capital maintenance, renewal and operating costs

Year after opening	Costs (£000s) at base price 2020 Q3	Costs (£000s) adjusted for inflation
Total (60 years)	**30,070**	**63,614**

INFLATION ADJUSTMENT

3.4.9. The current forecast is based on 2.50% per annum for general activities (i.e. fees, utilities and land), 1.60% per annum for Stage One activities as the contract mechanism relies on CPI and 3.96% per annum for Stage Two activities as the contract mechanism relies on a set of weighted BCIS indices. This comes in at £17.68 million, giving an outturn cost of £149.44 million.

INCORPORATION OF REAL COST INCREASES

3.4.10. The first step of cost adjustment is to incorporate real cost increases. A real cost adjustment is calculated by inflating base costs by the construction cost index to bring them to their nominal values, and then dividing by the rate of general inflation to give their 'real' value. For this calculation general inflation is assumed to be around 2.50% per year as provided in the TAG Databook, while construction costs are forecast to increase by 2.1% per year. Using the real cost adjustment to multiply by the initial base estimate derives a 'real' capital cost estimate.

3.4.11. Only the general inflation rate has been applied to the maintenance and renewals costs. Therefore, it assumes zero real cost inflation over the appraisal period.

Table 3-4 - Real adjusted Costs (£000s)

Costs (£000s)	2020	2021	2022	2023	2024	2025	Total
Scheme Base Cost including inflation	2,535	9,264	8,530	27,879	69,849	31.378	149,438
Real Adjustment Factor	1	1.02	1.04	1.06	1.10	1.12	
Investment Cost w/Real adjustment	2,535	9,089	8,205	26,222	63,774	28,005	137,831

APPLICATION OF RISK-COST ADJUSTMENT

3.4.12. Once the base cost estimate has been adjusted to incorporate real cost increases, the risk contribution is calculated. A Quantified Risk Assessment (QRA) of scheme investment costs was undertaken. The QRA provides the weighted average of all risk outcomes and probabilities. The process of capturing and quantifying risk for the scheme is presented in **section 5.7** in the Management Case.

3.4.13. As noted in the Financial Case, the total quantified risk value added to the scheme base costs is £39.975 million at 2020 Q3 prices. This equates to approximately 28.2% of base costs.

3.4.14. No risk-adjustment has been applied to the maintenance and renewal costs.

Table 3-5 – Risk adjusted Costs (£000s)

Costs (£000s)	2020	2021	2022	2023	2024	2025	Total
Total real costs (without risk)	2,535	9,089	8,205	26,222	63,774	28,005	137,831
Total quantified risk cost in real prices		3,211	4,825	6,311	17,392	8,236	39,975
Total risk adjusted costs with real cost adjustment	2,535	12,300	13,030	32,533	81,166	36,241	177,806

OPTIMISM BIAS (OB)

In line with the guidance in TAG Unit A1.2, an optimism bias (OB) uplift to scheme costs, which is necessary to counter the systematic tendency of appraisers to be overly optimistic (and underestimate scheme costs) has been applied. The recommended optimism bias uplifts for each stage of a transport project and type of scheme for Local Authority schemes are set out in **Table 3-6**.

Table 3-6 - Recommended Optimism Bias uplifts

Stage Category	Type of Project	Stage 1 Strategic Outline Business Case	Stage 2 Outline Business Case	Stage 3 Full Business Case
Road	Motorway, Trunk roads, local roads	44%	15%	3%

Source: TAG Unit A1.2, Scheme Costs, Table 8

3.4.15. As funding is sought via the production of an Outline Business Case, and the scheme is comprised of both roads and structures, optimism bias has been applied at 15% of the scheme.

Table 3-7 - Costs adjusted for Optimism Bias

Costs (£000s)	2020	2021	2022	2023	2024	2025	Total
Public Sector Risk adjusted costs	2,535	12,300	13,030	32,533	81,166	36,241	177,806
Optimism bias (15%)	380	1,845	1,954	4,880	12,175	5,436	26,671
Public investment costs with 15% optimism bias	2,915	14,145	14,984	37,413	93,341	41,677	204,477

REBASE COST TO DFT BASE YEAR

3.4.16. For appraisal purposes, all costs should be presented in the DfT's base year, 2010. Costs are deflated to the correct price base by multiplying them by the ratio of the inflation index in the desired base year to the inflation index in the year currently being used.

3.4.17. Costs have been adjusted to 2010 prices using TAG data book (July 2020) values as set out in **Table 3-8**.

Table 3-8 - Adjustment to 2010 prices

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	202
GDP Deflator	100.00	102.04	103.73	105.70	107.63	108.26	110.57	112.66	115.07	117.21	119.37	121.66	124.04	126.50	129.41	132.

Table 3-9 - Rebased Costs to 2010 Prices

Costs (£000s)	2020	2021	2022	2023	2024	2025	Total
Public investment costs with 15% optimism bias	2,915	14,145	14,984	37,413	93,341	41,677	204,477
GDP deflator factor	0.8337	0.8337	0.8337	0.8337	0.8337	0.8337	
Public investment costs with deflation	2,431	11,793	12,492	31,192	77,821	34,747	170,479

DISCOUNT COST TO DFT BASE YEAR

3.4.18. For the purposes of the Economic Appraisal, all the costs have been adjusted to 2010 prices using TAG data book (v1.13.1 July 2020) values as set out in the annual parameters table.

3.4.19. A discount factor based on the HM Treasury "Green Book" is applied, to adjust costs occurring in different periods to a standard base year of 2010. An annual discount rate of 3.5% was applied for the first 30 years and 3% for years 31 to 60. This reflects the lower weighting placed on costs (and benefits) incurred at a future date compared to those incurred in the present.

Table 3-10 - Scheme Costs Discounted to 2010 Present Value

Costs (£000s)	2020	2021	2022	2023	2024	2025	Total
Public investment costs with deflation	2,431	11,793	12,492	31,192	77,821	34,747	170,479
Discount factor	0.7089	0.6849	0.6618	0.6394	0.6178	0.5969	
Public investment costs with deflation & discounting	1,723	8,078	8,267	19,944	48,077	20,540	106,126

CONVERT COSTS TO MARKET PRICES

3.4.20. The last stage in preparing costs for appraisal is to convert them from the factor cost to the market price unit of account. This is done by using the indirect tax correction factor of 1.190, as per the TAG Data Book.

3.4.21. In line with TAG Unit A1.2 (Scheme Costs), the Present Value of Costs (PVC) only includes investment and operating costs incurred by the public sector. Private sector contributions to the scheme costs are not included in the PVC but are recorded as negative values in the Transport Economic Efficiency (TEE) table and Present Value of Benefits (PVB).

3.4.22. The Present Value of Costs (PVC) is presented in **Table 3-11**.

Table 3-11 - Present Value of Costs £(000s)

Risk adjusted costs in £	Scheme Preparation and Construction Cost	Maintenance, Renewal and Operation (60 yrs)	Total
Public Sector risk adjusted costs	177,806	30,070	207,876
Public investment costs with 15% optimism bias	204,477	27,166	231,643
Public investment costs with deflation & discounting	106,831	5,986	112,817
PVC with Market Price Adjustment - Public sector costs only	127,129	7,124	134,253

3.4.23. The total discounted Present Value of Costs (PVC) is £127.13 million.

PUBLIC ACCOUNTS TABLES

3.4.24. The full Public Accounts (PA) Table in the format required by DfT is set out in **Appendix 3B**. The apportionment of costs between local and central government is discussed in the Financial Case.

3.5 APPRAISAL OF SCHEME IMPACTS

ASSUMPTIONS

3.5.1. Table 3-12 sets out the assumptions used in the Transport Users Benefits Appraisal (TUBA) and COBALT appraisals.

Table 3-12 - TEE TUBA/COBALT assumptions

Item	Assumptions/Notes
Software	TUBA Version 1.9.14 COBALT V2.0 (February 2021)
Current year	2020 (defines the first year in which the discount rate is applied)
Appraisal period / Horizon year	60 years after scheme opening, in line with TAG requirements
Forecast year trip, time and distance matrices from traffic model	Construction Period: 2023-2025 Opening year: 2025 Design year: opening + 15 (2040)
User classes	Trip, time and distance matrices for the following user classes will be input into TUBA: Cars used for Employers Business Cars used for Commuting Cars used for Other purposes

Item	Assumptions/Notes
	Light Goods Vehicles (LGVs) HGVs
Economic Parameters	Economic parameters (such as Value of Time) are defined in the standard TUBA economic file. This is *Economics_TAG_db1_13_1.txt* for the Core Growth scenario, Low Growth scenario and the High Growth scenario. For the Sensitivity Testing Growth scenario, the *Economics_TAG_db1_14_0.txt* has been used COBALT V2.0 has used *cobalt-tag-parameters .txt* for the Core Growth scenario, Low Growth scenario and the High Growth scenario. or the Sensitivity Testing Growth scenario, the *cobalt-tag-parameters-sensitivity-testing.txt* has been used..
PCU Factor	The trip matrices obtained from SATURN are in passenger car units (PCUs). These will be converted into vehicles as TUBA requires matrices in vehicles. A PCU factor of 2.3 will be applied to the HGV matrices, with no adjustment made to the car or LGV matrices which have a PCU factor of 1.
Annualisation factors for modelled time periods (AM, IP, PM weekday)	In accordance with the TUBA guidance, the modelled time periods will be converted to annual time periods using annualisation factors derived from local traffic counts. Modelled peak periods (AM and PM) will be extended using annualisation factors to include any adjacent periods where there is no significant change in traffic volume. These annualisation factors will be derived using ATC traffic flow data and will include flow factors to convert the average modelled flows to average annual flows. The modelled flows will be converted to AADT for the COBALT Scheme Input file

3.6 ECONOMIC NARRATIVE

3.6.1. An Economic Narrative has been developed for the scheme and the surrounding area. It sets out the expected economic and other wider impacts of the NWL scheme. The narrative sets out the economic context in the area and describes the types of economic impacts that are in scope. The full narrative has been included as **Appendix 3C**.

3.7 SCHEME IMPACTS

3.7.1. The Appraisal Summary Table (AST) summarises the impacts of the scheme across Economic, Environmental, Social and Public Accounts categories. Reporting the impacts as monetised, qualitative or quantitative dependent on the aspect and the method of the appraisal. The completed AST is shown in **Appendix 3D**.

ECONOMIC IMPACTS

3.7.2. Economic Impacts cover the Transport Economic Efficiency, Reliability and Wider Economic Impacts.

3.7.3. The full assessment results are reported in the Economic Assessment Report.

ENVIRONMENTAL IMPACTS

3.7.4. Environmental Impacts have been assessed across six environmental categories, which are:

- Noise
- Landscape and Visual
- Heritage
- Air Quality and Greenhouse Gases
- Biodiversity
- Water Resources.

3.7.5. The full assessment can be found in the Environmental Impact Appraisal Report

SOCIAL IMPACTS

3.7.6. Social Impacts across the nine categories are reported in full in the Social Impacts Report.

3.8 LEVEL 1 IMPACTS

Transport Economic Efficiency (TEE)

3.8.1. TEE benefits for the scheme were assessed using the DfT's TUBA software. TUBA calculates the benefits associated with journey time savings and vehicle operating cost savings using information taken from the traffic model, in accordance with the procedures and economic parameters in TAG Unit A1.

3.8.2. The transport user benefits for the DS scenario relative to the DM scenario have been assessed using TUBA v1.9.14 with the standard TUBA 1.9.14 economics file. Transport user impacts as forecast by TUBA are shown in **Table 3-13** for the Core Growth scenario, **Table 3-14** for High Growth and Table 3-15 for Low Growth. **Table 3-13** - TEE Impacts (TUBA Results) – Core Growth Scenario **Table 3-16** shows the TUBA results for the OBR sensitivity test growth scenario.

3.8.3. The TEE impacts for the NWL are £314.86 million for the Core Growth scenario, this drops to £265.34 million for the Low Growth scenario and increases to £408.75 million for the High Growth scenario.

Table 3-13 - TEE Impacts (TUBA Results) – Core Growth Scenario

Benefit	Non-Business – Commuting	Non-Business – Other	Business	Total
Travel Time	66,192	83,680	81,766	**231,638**
Vehicle Operating Costs	-7,704	84,124	6,803	**83,223**
Present Value of Transport Economic Efficiency Benefits (TEE)	**58,488**	**167,804**	**88,569**	**314,861**

Results ('£000's, 2010 prices discounted to 2010)

Table 3-14 - TEE Impacts (TUBA Results) – Low Growth Scenario

Benefit	Non-Business – Commuting	Non-Business – Other	Business	Total
Travel Time	58,603	67,572	65,818	**191,993**
Vehicle Operating Costs	-6,369	74,700	5,018	**73,349**
Present Value of Transport Economic Efficiency Benefits (TEE)	**52,234**	**142,272**	**70,836**	**265,342**

Results ('£000's, 2010 prices discounted to 2010)

Table 3-15 - TEE Impacts (TUBA Results) – High Growth Scenario

Benefit	Non-Business – Commuting	Non-Business – Other	Business	Total
Travel Time	92,611	115,804	105,664	**314,079**
Vehicle Operating Costs	-8,292	92,559	10,407	**94,674**
Present Value of Transport Economic Efficiency Benefits (TEE)	**84,319**	**208,363**	**116,071**	**408,753**

Results ('£000's, 2010 prices discounted to 2010)

Table 3-16 - TEE Impacts (TUBA Results) – OBR Sensitivity Test Growth Scenario

Benefit	Non-Business – Commuting	Non-Business – Other	Business	Total
Travel Time	51,625	64,540	,64,269	**180,434**
Vehicle Operating Costs	-8,468	75,572	5,222	**72,326**
Present Value of Transport Economic Efficiency Benefits (TEE)	**43,157**	**140,112**	**69,491**	**252,760**

Results ('£000's, 2010 prices discounted to 2010)

3.8.4. The scheme is expected to provide a net benefit in terms of journey times to all users both within the study area and for those beyond and passing through the study area.

Accidents

3.8.5. COBALT (COst and Benefit to Accidents – Light Touch) V2.0 (February 2021) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) have been appraised for a period of 60 years from the first year of scheme opening.

3.8.6. COBALT V2.0 has used *cobalt-tag-parameters .txt* for the Core Growth scenario, Low Growth scenario and the High Growth scenario. or the Sensitivity Testing Growth scenario, the *cobalt-tag-parameters-sensitivity-testing.txt* has been used. The scheme input file has been created containing details of all junctions and links in the study network, along with traffic flows in the base, opening and design years. The traffic flow information was derived from the current NATS traffic model developed to assess the scheme.

3.8.7. The results indicate that the scheme will result in a reduction of 529 accidents over the 60-year appraisal period, leading to a reduction of 674 casualties (2 Fatal, 56 Serious and 616 Slight) and a cost saving of £18.6m.

Physical Activity

3.8.8. Physical activity is concerned with whether the intervention is likely to generate significant additional numbers of walking or cycling trips. The assessment has been undertaken in line with the following guidance:

- TAG Unit A5.1 Active Mode Appraisal
- TAG Unit A5.5 Highway Appraisal Appendix A: and
- Design Manual for Roads and Bridges (DMRB) LA 112.

3.8.9. The methodology for monetising the scheme impacts has focused on estimating the increase in the amount of cycling and walking associated with implementing the scheme. The method considers:

- Mode shift
- Changes to health
- Changes to journey quality

3.8.10. DfT's Active Mode Appraisal Toolkit (AMAT), has been utilised to understand the likely impact of the scheme. The tool monetised costs and benefits for the following impacts:

- Congestion benefit
- Infrastructure
- Accidents
- Local Air Quality
- Noise
- Greenhouse Gases (GHGs)
- Reduced risk of premature death
- Absenteeism
- Journey Ambience
- Indirect Taxation

3.8.11. The active mode appraisal has been conducted over a 20-year appraisal period, in line with TAG Unit A5.1. The benefits have been discounted and reported in present values using the schedule of discount rates provided in the TAG data book (July 2020). Again, in line with TAG, the values have

included real growth in line with forecast GDP per capita. The assumptions used within the appraisal are based on scheme data, Travel-to-Work Census data and default TAG values from the AMAT.

3.8.12. A sustainable transport strategy has been developed through public and key stakeholder consultation, seeking to maximise opportunities for transferring shorter distance band trips to non-motorised modes of travel such as walking and cycling where possible. The Sustainable Transport Strategy is three-fold - it includes a Non-Motorised User Strategy, wider interventions for creating 'cycle friendly' strategic routes and a bus strategy.

3.8.13. To inform the development of Non-Motorised User interventions, a Walking, Cycling and Horse-Riding Assessment (WCHRA) has been undertaken as part of the scheme design process. This has been used to identify the routes used by pedestrians and others and the community facilities which are likely to be affected by the scheme.

3.8.14. The Non-Motorised User (NMU) Strategy element predominantly consists of Public Rights of Way diversions and extension of the PRoW network in the immediate vicinity of the NWL highway works, which also helps to mitigate severance issues caused by the road, where existing routes that cross the scheme are to be closed. The proposed NMU strategy also assists with joining up what was found through the WCHAR process to be an existing but fragmented local PRoW network with limited coverage and in some cases poor connectivity to existing settlements.

3.8.15. Eight potential sustainable transport measures across the wider area were consulted on. Following the consultation four of the eight measures were identified to be delivered as part of the NWL scheme.

3.8.16. The impacts on Physical Activity have been assessed with DfT's AMAT for three of the four shortlisted options. Based on the AMAT results, the NWL is forecast to have a beneficial impact of £8.9 million.

Noise

3.8.17. A noise appraisal has been undertaken following the methodology presented in TAG Unit A3, Environmental Impact Appraisal, dated May 2019.

3.8.18. A 3-dimensional digital acoustic model has been generated based on the guidance contained within Calculation of Road Traffic Noise and the DMRB LA 111.

3.8.19. The affected population has been estimated and the monetary valuation of changes in noise impact has been determined using the TAG Unit A3 Noise Appraisal Workbook.

3.8.20. The overall appraisal indicates that the operation of the NWL, without mitigation, is likely to generate a beneficial noise impact, and the 'net present value of change in noise' is calculated to be £38,490. Whilst this indicates a positive scheme from a noise perspective, it should be noted that large adverse impacts are predicted at a number of receptors within the study area, although these receptors have ambient low levels and will still have low levels with the scheme (which in turn means they have less influence on the overall monetised value of the NWL on noise impacts).

Air Quality

3.8.21. The appraisal has been undertaken following TAG Unit A3 on Air Quality Impacts.

3.8.22. With the NWL there are modest improvements in local air quality in terms of NO_2 and $PM_{2.5}$ at locations with relevant human exposure. The overall monetary valuation takes into account

ecosystem damage costs. No Air Quality Management Areas are included in the air quality study area. The NWL links map onto Pollution Climate Mapping links which are all compliant with the NO_2 limit value both with and without the scheme. No exceedances of air quality standards are predicted.

NO_2

3.8.23. In 2025 there are there are 7,860 properties with improvement, 35 properties with no change, and 2,180 properties with deterioration. In 2040 there are 7,733 properties with improvement, 32 properties with no change, and 2,310 properties with deterioration.

3.8.24. The Net Present Value (NPV) of change for NO_2 over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £9,803.

$PM_{2.5}$

3.8.25. In 2025 there are 8,002 properties with improvement, 6 properties with no change, and 2,067 properties with deterioration. In 2040 there are 7,747 properties with improvement, 282 properties with no change, and 2,046 properties with deterioration.

3.8.26. The NPV of change for $PM_{2.5}$ over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £62,165.

Greenhouse Gases

3.8.27. The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 Greenhouse Gases. The calculations are based on the traffic forecasts for the Do Minimum and Do Something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the NATS 2019 traffic model for the OBC. Non-traded CO_2e emissions (petrol and diesel vehicles) and CO_2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114 'Climate' methodology.

3.8.28. The NWL scheme gives rise to lower CO_2e emissions compared to the Do Minimum situation, with savings (benefits) over the 60-year appraisal period (2025 - 2084 inclusive) of 443,429 tonnes in non-traded carbon associated with conventional (petrol and diesel) vehicles, and 13,005 tonnes from traded carbon associated with electric vehicles (i.e. electrical power generation sources).

3.8.29. The differences are generally associated with lower values of total annual vehicle kilometres in each year that are predicted due to the NWL scheme. For 2025, the distance travelled over the simulated road network is predicted to be approximately 4,136 million vehicle kilometres in the Do Minimum scenario compared to 4,087 million vehicle kilometres in the Do Something scenario - a reduction of approximately 49 million vehicle kilometres. For 2040, the distance travelled over the simulated road network is predicted to be approximately 4,904 million vehicle kilometres in the Do Minimum scenario compared to 4,767 million vehicle kilometres in the Do Something scenario - a reduction of approximately 137 million vehicle kilometres.

3.8.30. Over the 60-year appraisal period, the monetised benefit in terms of carbon savings from the operation of vehicles in the road transport sector due to the NWL Scheme is estimated at £19,474,620.

3.9 INITIAL BENEFIT COST RATIO (BCR)

3.9.1. The BCR considers the impact to the economy, society, the environment and the public accounts. It offers an estimate of the value of benefit generated for every £1 of public expenditure. Therefore, any BCR above one shows value for money for every £1 of invested cost. The Value for Money (VfM) category is defined by the BCR, these are:

- BCR <0.0 Very Poor
- BCR between 0.0 and 1.0 Poor
- BCR between 1.0 and 1.5 Low
- BCR between 1.5 and 2.0 Medium
- BCR between 2.0 and 4.0 High
- BCR > 4.0 Very High

3.9.2. The initial BCR includes the monetised impacts associated with Economy for business users and providers, Environment for Greenhouse Gases, Air Quality and Noise, Social for non-business users, physical activity and safety, and Public Accounts for the cost to the broad transport budget and indirect tax. **Table 3-17** shows the Initial Analysis of Monetised Costs and Benefits (AMCB) results and the Initial BCR associated with the scheme.

Table 3-17 – Analysis of Monetised Costs and Benefits – Initial £(000s)

	Scenarios			
	Core Growth	Low Growth	High Growth	Economic Uncertainty
Noise	38	0	0	0
Air Quality	72	0	0	0
Greenhouse Gases (Environmental assessment)	19,475	17,445	0	0
Physical Activity	8,876	8,876	8,876	8,876
Accidents/Safety	18,582	12,793	12,778	11,496
Economic Efficiency: Consumer Users (Commuting)	58,488	52,234	84,319	43,158
Economic Efficiency: Consumer Users (Other)	167,804	142,272	208,363	140,112
Economic Efficiency: Business Users and Providers	88,569	70,836	116,071	69,491
Wider Public Finances (Indirect Taxes)	-53,272	-46,916	-59,742	-39,398
Initial Present Value of Benefits (PVB)	**308,632**	**257,540**	**370,665**	**233,735**
Present Value of Costs (PVC)	**127,129**	**127,129**	**127,129**	**127,129**
Net Present Value (NPV)	181,503	130,411	243,536	106,606
Benefit Cost Ratio (BCR)	**2.43**	**2.03**	**2.92**	**1.84**

£000s 2010 prices, discounted to 2010

This is not a direct comparison as only the Core Growth scenario includes impacts for Noise, Air Quality and Greenhouse Gases, the Low Growth scenario includes Greenhouse Gases impacts

3.9.3. Therefore, based on the scheme impacts and costs the scheme has an initial VfM Category of High for the core growth scenario. Considering the other scenario tests the initial VfM Category is in the range of Medium to high. The monetised benefits for the scheme range from £233.735 million for the Economic Uncertainty growth scenario to £370.665 million for the High growth scenario. Three of the four scenarios sit within the high VfM category, with one in the medium category.

3.9.4. The Economic Uncertainty scenario returns the lowest monetised benefits of any of the scenarios, followed by the low growth and core growth scenarios. The highest monetised benefits are returned by the high growth scenario.

3.9.5. With the current present value of costs only one of the growth tests assessed will sit in a lower category. For the scheme outputs to sit in a different category the costs of the scheme would need to change.

3.9.6. Looking at the core growth scenario, and assuming no change to the monetised benefits, the scheme costs would need to increase by £27.962m (2.00%) for the BCR of the scheme to sit in the next category down.

3.10 LEVEL 2 IMPACTS

Reliability impacts

3.10.1. Travel time variability (TTV), is defined as variation in journey times that travellers are unable to predict. Journey times vary due to a large number of factors including the time of day, the location of the origin and destination, the distance and the roads along the route.

3.10.2. The standard deviation of travel time (for private travel) has been used as the method to measure travel time variability. The travel distance, time and number of vehicles making the journey have been extracted from the traffic model for each time period for the Do Minimum and Do Something scenario to allow the standard deviation to be calculated for each journey and time period.

3.10.3. Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) using the relationships shown in Figure 3-2, based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair.

Reliability benefit $= -\sum \Delta\sigma_{ij} \left(\frac{T_{ij2}+T_{ij1}}{2}\right) \times 0.4 \times VOT$

Where: $\Delta = 0.0018\left((t_{ij2})^{2.02} - (t_{ij1})^{2.02}\right) d_{ij}^{-1.41}$

VOT = value of time (£/sec)

t_{ij1} and t_{ij2} = the journey times, before and after the change, from i to j (seconds)

d_{ij} = the journey distance from i to j (km)

Figure 3-2 - Reliability impacts

3.10.4. The reliability impacts for the Norwich Western Link over the 60-year appraisal period have been calculated as £26.29 million (2010 prices discounted to 2010).

Wider Economic Impacts

3.10.5. As set out in the Economic Narrative, Level 2 wider economic impacts associated with enhanced connectivity due to the NWL scheme have been assessed.

3.10.6. WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used. The tool has been approved by the DfT and has been used in the analysis of other projects, including the Trans-Pennine scheme. The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:

- Agglomeration - the concentration of economic activity in an area can be improved by transport schemes as accessibility between businesses and workers is improved by reduced journey times, thus generating productivity benefits from the 'closer' proximity
- Changes to tax revenues arising from labour supply impacts - changes in transport costs can incentivise individuals to work, the number choosing to work and thus the amount of labour supplied in the economy. The changes in tax revenues associated with these impacts are not captured within commuter user benefits (but are included within the WITA tool) and
- Output change in imperfectly competitive markets - a reduction in transport costs (for business and freight) allows businesses to profitably increase their output (goods and services) that require the use of transport in their production

3.10.7. Agglomeration impacts arise from improving accessibility to an area for businesses and workers as they can cluster together and benefit from improved productivity. The NWL scheme will improve connectivity between different areas within Greater Norwich and Norwich, the latter a key economic hub for employment and services in East Anglia. The Western Link will bring firms closer together and generate a total increase in GDP, as existing workers become more productive due to connectivity improvements.

3.10.8. With the scheme in place, impacts will also be felt by those making commuting journeys as well as currently unemployed people looking to enter the labour market. If commuting costs fall, then the net returns from working increase. This could influence the trade-off decisions people need to make; whether or not they choose to work or how much they choose to work. The private benefits to these people are captured in transport user benefits. The value of time used for travel time savings does not include exchequer benefits that accrue when people make different decisions about employment as a result of a transport scheme.

3.10.9. Companies will benefit from time savings due to the scheme, which is effectively a reduction in production costs, incentivising firms to increase their output whilst maintaining an attractive profit margin. Firms can pass on these cost savings to consumers, reflecting a net benefit to consumers which is in addition to the transport cost change.

3.10.10. As there is more certainty surrounding these types of wider economic impacts compared to the high-level impacts covered under Level 3, they will be included in the Adjusted BCR for the NWL scheme and are thus a key part of the overall economic case for the scheme.

3.10.11. Agglomeration improvements are in scope for the NWL scheme as:

- It is located within one of DfT's Functional Urban Regions (FURs) and
- The scale of journey time improvements (and other improvements generating a significant decrease in drivers' generalised costs) will mean that agglomeration impacts are likely to be significant.

Results

Agglomeration with Other Modes adjustment

3.10.12. The agglomeration impacts are calculated across the four sectors of the economy within the appraisal guidance. **Table 3-18** presents the agglomeration impacts across the Construction, Consumer Services, Manufacturing and Producer Services sectors.

3.10.13. To represent travel by all modes within the average cost calculations, an allowance has been made to account for the impact of the other modes. To account for public transport, walking and cycling,

the proportion of car driver trips for each Local Authority District (LAD) examined in the WITA analysis was extracted from the TEMPRO database. Adjustment factors were calculated for each WITA zone based on the proportion of car trips compared to total trips. These factors were applied to the WITA agglomeration and labour supply impacts. This is based on data for the year 2020 from the TEMPRO database

Table 3-18 - Agglomeration Benefits

Agglomeration Sector	Original Benefits (£000s, 2010 prices and values)	Adjusted for other modes (£000s, 2010 prices and values)
Manufacturing	18,039	8,784
Construction	16,208	7,929
Consumer Services	51,394	24,616
Producer Services	99,102	47,928
Sub-Total	**184,744**	**89,257**

3.10.14. The agglomeration impacts form the majority of total wider impacts with Producer Services accounting for the largest proportion of agglomeration benefits at 54% of the adjusted total. This is where the scheme will have the largest impacts in terms of reductions in Generalised Travel Costs. This is closely followed by Consumer Services with Construction capturing the fewest benefits. A breakdown of the agglomeration benefits by Local Authority District is provided in **Table 3-19**.

Table 3-19 - Agglomeration Benefits by Local Authority District

Local Authority	Original Agglomeration Benefits (£000s, 2010 prices and values)	Adjusted for other modes (£000s, 2010 prices and values)
Breckland	48,562	23,878
Broadland	41,413	21,640
Norwich	27,678	11,133
South Norfolk	11,345	5,986
Great Yarmouth	13,391	5,972
King's Lynn and West Norfolk	27,666	13,579
North Norfolk	14,689	7,070
Total	**184,744**	**89,257**

3.10.15. The greatest agglomeration benefits are in Broadland and Breckland (51% of the adjusted total) as this is where the scheme is located18 and will have the largest impact in terms of improving accessibility. As stated above, the WITA analysis is only looking at benefits attributed to Zones within the study area (Norfolk only).

3.10.16. The results above are impacted by the fact the Western Link would be located in one of DfT's core Functional Urban Regions (FURs) and has a substantial economic hinterland surrounding Norwich. This means that a significant new infrastructure investment such as the Western Link will generate agglomeration improvements in this relatively urbanised area via the substantial improvements in journey times. Of particular note is the fact that Norwich is the only FUR in the East of England, thus reinforcing the point that the city is a major regional generator of economic activity and will benefit further from the scale of transport connectivity associated with a scheme such as the Western Link.

Output change in imperfectly competitive markets

3.10.17. The total additional benefits arising due to output change in imperfectly competitive markets is approximately £7.9 million and assumes that benefits would be incurred across all time periods. This shows the extent to which business users benefit from improved accessibility in Norwich as well as the subsequent reductions in congestion brought about by the scheme.

Labour supply impacts

3.10.18. The total benefits arising due to labour supply impacts over the 60-year appraisal period are approximately £0.4 million. These impacts are considered to be very minor as the analysis only considers the increased tax revenues associated with changes in the labour supply to be additional at UK level. Calculations for this element are based on the link between the cost of commuting and the increase in labour supply.

Summary

3.10.19. A summary of the wider economic impacts is presented in **Table 3-20**.

Table 3-20 - Summary of Results

Summary of Wider Economic Impact	Benefits (£000s, 2010 prices and values)
WI1: Agglomeration impacts	89,257
WI2: Output change in imperfectly competitive markets impacts	7,881
WI3: Tax revenues arising from labour market impacts	330

[18] The scheme is mostly within Broadland and is on the boundaries with both Breckland and South Norfolk

Summary of Wider Economic Impact	Benefits (£000s, 2010 prices and values)
Total Wider Impact Benefits	**97,468**

3.10.20. The WITA analysis shows that the scheme is expected to deliver approximately £97.5 million of wider economic impacts. The highest contributions come from agglomeration impacts and output change in imperfectly competitive markets impacts. This suggests that businesses will benefit greatly from the enhanced connectivity and consequent congestion reductions brought about by the scheme.

3.10.21. With respect to the scale of these likely agglomeration impacts, it is worth noting that although TAG guidance suggests that these can range between 10% and 30% of user benefits, the agglomeration impacts can be above this threshold. For the NWL the agglomeration impacts represent 29% of user benefits. As discussed earlier, agglomeration improvements are expected to be significant for the NWL, driven by:

1) it is located within the Norwich FUR; and
2) the scale of generalised travel cost savings generated by the scheme.

3.11 ADJUSTED BCR

3.11.1. For the study the additional impacts which have been monetised are:

- Reliability;
- Output change in imperfectly competitive markets impacts
- Agglomeration; and
- Labour supply impacts.

3.11.2. **Table 3-21** shows the adjusted AMCB results and the adjusted BCR associated with the scheme.

Table 3-21 – Analysis of Monetised Costs and Benefits – Adjusted

	Core Growth
Initial Present Value of Benefits (PVB)	308,632
Reliability	26,291
Output Change	7,881
Agglomeration	89,257
Labour Supply	330
Adjusted Present Value of Benefits (PVB)	**432,391**
Present Value of Costs (PVC)	**127,129**
Net Present Value (NPV)	305,262
Benefit Cost Ratio (BCR)	**3.40**

3.11.3. Following the inclusion of wider economic impacts in appraisal the BCR increases to **3.40** and remains in the **High** VfM category.

3.12 LEVEL 3 IMPACTS

ENVIRONMENTAL IMPACTS

3.12.1. A qualitative assessment has been undertaken for the following impacts:

- Landscape/Townscape
- Historic Environment
- Biodiversity
- Water Environment

3.12.2. The methods used in undertaking the environmental appraisal followed the principles set out in TAG Unit A3 Environmental Impact Appraisal (December 2015).

3.12.3. The full reporting of the assessment is contained within the Environmental Impact Appraisal Report. The following paragraphs provide a summary of the appraisal and results.

Landscape

3.12.4. The landscape is predominantly gently undulating arable farmland, with plateau to the south, located between two shallow river valleys. River Tud in the south and River Wensum in the north being the larger of the valleys with noticeable difference in character of wet meadow and mosaic of lakes and drainage ditches. There is some human influence, of note is the overhead line and two wind turbines to the west, with the A47 and A1067 roads noticeable from the plateau. Settlement is sparse, mainly small farmsteads - the biggest settlement is Honingham located to the south. Land cover is predominately arable fields, contained by clipped hedgerow and infrequent mature trees, with some fields turned to pig rearing. Mixed plantation woodland is common throughout this landscape, often following field boundaries. Roads are generally small lanes, gently curved, and following the field boundaries.

3.12.5. The NWL would alter the local landscape character through the introduction of the viaduct, loss of woodland and the width of the new road (dual carriageway). There would be subdivision of fields and sections of embankment and cutting through the landscape which would affect the field pattern and tranquillity locally, however, the viaduct would have a wider impact introducing a new feature into this landscape and will have a significant impact on tranquillity in the north.

3.12.6. An Environmental Statement (ES) is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

Historic Environment

3.12.7. the NWL would have a **moderate adverse** effect on the setting (context) of listed buildings located beyond the site boundary. It will adversely affect the appreciation and understanding of the characteristic historic environmental resource. Impacts may be mitigated by design, such as the introduction of screening or an appropriate road lighting scheme.

3.12.8. The NWL also would result in a number of **low, moderate** or **major adverse** effects on the undesignated heritage assets recorded on the Historic Environment Records along with any previously unrecorded buried heritage assets. The impacts can be reduced where feasible and warranted, through either mitigation by design, allowing remains to be preserved in-situ, or through preservation by record (i.e. archaeological excavation).

3.12.9. Further surveys are planned in 2020 and 2021 which will complete the Archaeological baseline and will feed into the future assessment work for the NWL. The Environmental Statement (ES) is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

Biodiversity

3.12.10. The TAG assessment has concluded that there are Large Adverse impacts on the following features:

- Bats (all species) including barbastelle bat.

3.12.11. The NWL will require removal of habitat used by the local bat population that includes rarer species, notably the barbastelle bat. The designs are subject to refinement, and in line with the mitigation hierarchy habitat loss will be avoided where possible. A mitigation strategy is being developed that both seeks to reduce impacts of habitat fragmentation primarily through the provision of underpasses and green bridges and avoid net loss in habitat available to bats through the provision of a comprehensive landscaping and biodiversity net gain strategy.

3.12.12. Habitat creation and enhancement seeking to maintain habitat availability will be completed within the core sustenance zone for known barbastelle bat colonies near to the scheme. This approach reduces medium to long-term impacts upon the local bat population. The combination of habitat enhancement and creation is proposed to limit shorter term impacts, with enhancement contributing towards a greater area of mature woodland suitable for use by foraging and commuting bats in the shorter term while habitat creation areas become established. In combination, the mitigation strategy seeks to increase the area of habitat available to the local bat assemblage in the longer term.

3.12.13. It will be important to maintain habitat permeability and reduce the effects of habitat fragmentation that may otherwise occur. The scheme includes the following:

- a viaduct across the River Wensum and associated floodplain habitat;
- three wildlife underpasses - in The Nursery woodland in the north, along Ringland Lane (dual use) and along the stream south of the Foxburrow Plantation in the south;
- three green bridges - along the Broadway, in the Foxburrow Plantation and along the hedgerow north of Weston Road; and
- landscaping to promote the use of these features by bats and avoid direct flightlines into the traffic corridor.

3.12.14. The mitigation strategy remains under development, reflecting the design stage and ongoing nature of baseline surveys. Data gathered during 2021 will influence the strategy. As the strategy is not yet fixed a precautionary approach must be taken, and as such the magnitude of effect upon bats is assessed to be 'intermediate negative' defined as '*The key environmental resource's integrity will not be adversely affected, but the effect on the resource is likely to be significant in terms of its ecological objectives.'*. This may be updated subject to completion of baseline surveys and finalisation of the associated mitigation strategy.

3.12.15. The combination of a high value biodiversity feature and an effect of intermediate negative magnitude gives a large adverse effect. It should be noted that this assessment is precautionary and reflects the status of the mitigation strategy which is yet to be finalised as set out above.

3.12.16. The TAG assessment has concluded that there are Moderate Adverse impacts on the following features:

- Wensum Pastures at Morton Hall CWS;
- Land adjoining Foxburrow Plantation CWS;
- Broom & Spring Hills CWS;
- Primrose Grove CWS
- Fakenham Road RNR;
- Ancient/veteran trees;
- Important Hedgerows;
- Wet Woodland HPI; and
- Lowland mixed deciduous woodland HPI.

3.12.17. A Moderate Adverse impact is expected on the above CWS's due to habitat loss and/or severance which could impact the integrity of the CWS. The habitat creation strategy for the scheme will seek to compensate for this habitat loss, and an underpass will be included to ensure the stream within the Land adjoining Foxburrow Plantation will maintain flow post construction into the River Tud.

3.12.18. The Fakenham Road RNR is designated because of the presence of hoary mullein *Verbascum pulverulentum*. This site will be lost due to the construction of the NWL. A compensation strategy will be developed which will aim to recreate the habitat and lead to an increase in hoary mullein within the study area.

3.12.19. Approximately twelve ancient/veteran trees will be removed as a result of the NWL. A strategy for ancient/veteran trees is under development which will help to mitigate the impact of the loss of the trees however they are regarded as an irreplaceable habitat and will not be factored into BNG calculations.

3.12.20. It is anticipated that two hedgerows that met the criteria for 'Important' under the Hedgerow Regulation 1997 will be directly impacted by the Scheme[19]. Mitigation will involve creation, enhancement and translocation.

3.12.21. The NWL bisects areas of lowland mixed deciduous woodland and wet woodland HPI. The woodland to be lost is not ancient. As part of the compensation strategy new woodland will be planted and existing woodland will be enhanced for biodiversity benefit in the longer term.

3.12.22. The assessment for all other features ranges from slight adverse or neutral impacts based on the adoption of preliminary mitigation and compensation measures.

3.12.23. This assessment is based on the data which has been collected and analysed up to March 2021. It is a provisional impact assessment and has been undertaken before the Ecological Impact Assessment, Habitats Regulations Assessment and Water Framework Directive (WFD) assessment have been completed.

3.12.24. The overall assessment score for the NWL is a Large Adverse Impact due to the loss of woodland foraging habitat available to the local bat assemblage which includes the rarer barbastelle bat. This is a precautionary assessment and reflects the status of the mitigation strategy which is yet to be finalised as set out above. Effects upon all other biodiversity features are assessed to be moderate adverse or of lesser significance.

3.12.25. Further surveys are planned in 2021 which will complete the ecological baseline and will feed into the future assessment work for the NWL. The ES is in preparation and will contain more detailed design information and a full assessment of ecological impacts (in line with CIEEM guidelines). The ES will take into account the final design and final mitigation strategies designed to avoid and reduce impacts upon biodiversity features and where possible deliver enhancements.

Water Environment

3.12.26. The overall Summary Assessment score for the NWL is predicted to be **Moderate Adverse.** This is attributable to the high importance to the River Wensum and the **Negligible** impact on the ecological and hydromorphological quality of the River Wensum and the low risk associated with works to the new bridge crossing. A **Moderate Adverse** impact is predicted to the tributary of the River Tud; the mapped fluvial floodplain; and the underlying groundwater body (combined superficial and bedrock aquifer). Measures are being developed to further mitigate and compensate for these issues.

3.12.27. A conservative approach to the loss of floodplain has been taken until quantitative analysis of potential effects is undertaken to inform the need for compensatory storage or other mitigation.

[19] Eight hedges qualified as Important Hedgerows, but only two of the hedgerows qualified on botanical criteria. One qualified on archaeological and historical criteria, and five only qualified on the basis of protected or notable faunal records associated with them.

3.12.28. The ES is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

DISTRIBUTIONAL IMPACTS

3.12.29. Distributional Impacts (DIs) across the eight categories (Table 3-22) are reported in full in the Distributional Impacts Report. The appraisal has been undertaken in accordance with TAG Unit A4.2: Distributional Impact Appraisal. The appraisal process consists of 3 major steps:

- Screening Process (Step 1) - identification of likely impacts for each indicator;
- Assessment (Step 2) - identification of impact area, social groups and amenities; and
- Appraisal of impacts (Step 3) - analysis of impacts, full appraisal and input into Appraisal Summary Table (AST).

3.12.30. The results of the appraisal process are summarised in the following sections.

Screening

3.12.31. Each indicator has been assessed individually using the TAG screening proforma. The output of this assessment determines whether the intervention needs to be assessed further. Consideration has been given to:

- Whether there might be positive or negative impacts on different social groups;
- If changes to scheme design can mitigate any potential negative impacts; and
- How dispersed the impact is likely to be, to understand if the scale of the impact is disproportionate to the potential impact.

3.12.32. A summary of the screening outcomes and decision on whether to progress to the next step is included in **Table 3-22**.

Table 3-22 – Initial Screening

Impact Area	Conclusion	Next Step
User Benefits	There are likely to be beneficial impacts with respect to journey time, based on the SOBC TUBA analysis.	Proceed to Step 2
Noise	The SOBC assessment estimated minor impacts both adverse and beneficial with respect to a change in road traffic generated noise levels.	Proceed to Step 2
Air Quality	The SOBC assessment indicated adverse impacts for air quality and greenhouse gases emissions	Proceed to Step 2
Accidents	The new link is likely to attract traffic currently using low standard rural routes and congested urban routes. The new link will have reduced number of junctions and will be designed to current standards.	Proceed to Step 2
Security	There is no planned change to public transport waiting/interchange facilities with the scheme.	Do not proceed to step 2
Severance	The new link is likely to sever existing PRoWs.	Proceed to Step 2

Impact Area	Conclusion	Next Step
Accessibility	There is no planned change to public transport services routing or timings or provision with the scheme.	Do not proceed to step 2
Affordability	The scheme will have an impact on car fuel and non-fuel operating costs, only. As a result of rerouting it is expected that there will be changes to these costs. For car fuel and non-fuel operating costs, the outputs from TUBA can be used, and indicate positive benefits. The remaining areas of affordability (parking charges, road user charges, public transport fares and concession availability) are not affected by the scheme.	Proceed to Step 2

Assessment

3.12.33. The assessment stage investigated the impacts in more detail to confirm where both spatial impacts will be experienced, and where socio-economic, social and demographic characteristics needed to be considered further.

3.12.34. The area impacted by the NWL will vary for each indicator.

3.12.35. Analysis of the characteristics of people in the area likely to be affected has been undertaken by mapping social characteristics at Lower Super Output Area (LSOA) levels. **Table 3-23** shows the groups of people that need to be identified in the analysis for each indicator.

Table 3-23 – Socio-demographic analysis for DIs

Dataset/ Social Group	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young Adults: proportion of population aged 16-25				✓			✓	
Older People: proportion of population aged 70+		✓		✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children.							✓	

Source: TAG Unit A4.2 Table 2

3.12.36. The assessment output summary is set out in **Table 3-24**.

Table 3-24 – Assessment (Step 2) Output summary

Social group and amenities indicators			User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Resident population in the impact Area	Income Distribution Quintiles	0-20%	12.3	0	4.9					12.3	12.0%	12..5%	20.1%
		20%-40%	12.8	0	6.7					12.8	12.6%	14.3%	20.0%
		40%-60%	26.6	17.4	19.5					26.6	27.0%	34.2%	20.0%
		60%-80%	31.3	82.6	52.3					31.3	31.6%	26.4%	20.0%
		80%-100%	17.0	0	16.5					17.0	16.9%	12.5%	19.9%
	Children <16			17.8	18.3						16.1%	15.8%	17.6%
	Young People				11.6						12.7%	11.9%	13.2%
	Older People			9.5							13.3%	14.4%	10.9%
	People with a disability										25.7%	27.0%	25.9%
	Black Minority Ethnic										4.2%	3.5%	14.0%
	No Car Households										18.5%	18.8%	25.6%
	Households with dependent children										25.8%	25.3%	29.1%
	Indicator population in the impact area		542,961	7,182	813,552					542,961	511,661	857,888	56,075,912
Amenities	Schools / Nurseries			✓	✓	✓							

Social group and amenities indicators	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Playgrounds		✓	✓	✓							
Parks and open Spaces			✓	✓							
Hospitals			✓	✓							
Care homes / Day Centres		✓	✓	✓							
Community Centre		✓	✓	✓							

Appraisal

3.12.37. This step sets out the assessment of the impact of the scheme on each indicator's social groups. This step covers the core analysis of impacts which provides an assessment score for each indicator and each of the social groups. A qualitative assessment has also been undertaken for each relevant indicator which has been summarised in the DI appraisal matrix table and the AST entries.

3.12.38. The DI appraisal is summarised in the Appraisal Matrix shown in **Table 3-25** - Distributional Impact Appraisal Matrix1 and the AST entry is summarised in **Table 3-26**.

Table 3-25 - Distributional Impact Appraisal Matrix1

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements
	Quintile 1 0-20%	Quintile 2 20%-40%	Quintile 3 40%-60%	Quintile 4 60%-80%	Quintile 5 80%-100%		
User Benefits	✓	✓	✓✓✓	✓✓✓	✓✓✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits
Noise			✓	××		No	Noise impacts are experienced by those in the middle-income quintiles. Residents living in quintile 4 experience noise disbenefits while residents in quintile 3 experience noise benefits.
Air Quality	✓	✓	✓✓	✓✓	✓	No	Air quality impacts are experienced across all quintiles. Those in quintiles 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.
Affordability	✓✓✓	✓✓✓	✓	✓	✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintiles 4 and 5) experience a smaller than expected proportion of benefits
Accessibility						N/A	

Table 3-26 – AST Entry

Impact	Social Groups						User Groups				Qualitative statement
	Children & Young People	Older People	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motorcyclists	Young Male Drivers	
Noise	×										Children and young people experience noise disbenefits
Air Quality	✓										Children and young people experience air quality benefits
Accidents	✓	✓					✓	✓	✓	✓	All relevant social groups and user groups experience accident benefits
Security	-	-		-	-	-					
Severance	✓	✓	✓		✓						All relevant social groups and user groups experience severance benefits
Accessibility	-	-	-	-	-	-					n/a

3.13 VALUE FOR MONEY STATEMENT

3.13.1. Value for money is determined by considering the relationship between the costs and benefits of a proposal. Where a monetised assessment has been undertaken, the DfT's approach to assigning a category starts by considering the appropriate metric (Benefit Cost Ratio or Net Present Public Value).

3.13.2. The initial and adjusted BCR for the NWL scheme have been calculated as 2.43 and 3.40 respectively demonstrating a High Value for Money. The adjusted Present Value of Benefits (PVB) is £432.391 million which consists of transport user benefits and environmental benefits of £281.174 million, accidents benefit of £18.582 million, active mode benefits of £8.876 million, wider economic impacts of £97.468 million and reliability impacts of £26.291 million.

3.13.3. The Present Value of Costs (PVC) consist of £127.129 million of scheme costs. Optimism Bias of 15% has been applied, in line with TAG Unit A1.2 for a road scheme at Outline Business Case stage. **Table 3-27** shows the initial BCR and adjusted BCR.

Table 3-27 - Analysis of Monetised Costs and Benefits

£000s, 2010 prices and values	Core Growth
Noise	38
Local Air Quality	72
Greenhouse Gases	19,475
Journey Quality (AMAT)	8,876
Accidents	18,582
Economic Efficiency: Consumer Users (Commuting)	58,488
Economic Efficiency: Consumer Users (Other)	167,804
Economic Efficiency: Business Users and Providers	88,569
Wider Public Finances (Indirect Taxation Revenues)	-53,272
Present Value of Benefits (PVB)	308,632
Broad Transport Budget	127,129
Present Value of Costs (PVC)	127,129
Net Present Value (NPV)	181,503
Initial BCR	2.43
Level 2 Benefits	123,759
Adjusted PVB (Level 1 + Level 2)	432,391

£000s, 2010 prices and values	Core Growth
PVC (same as above)	127,129
Adjusted BCR	3.40

3.13.4. The overall Biodiversity assessment score for the NWL is a **Large Adverse** Impact due to the loss of woodland foraging habitat for bats including the barbastelle bat. A strategy for woodland creation and enhancement is currently being developed which will help to compensate for the habitat loss.

3.13.5. The overall summary assessment score for Water Quality for the NWL is predicted to be **Moderate Adverse.** This is attributable to the high importance to the River Wensum and the **Negligible** impact on the ecological and hydromorphological quality of the River Wensum and the low risk associated with works to the new bridge crossing. A **Moderate Adverse** impact is predicted to the tributary of the River Tud; the mapped fluvial floodplain; and the underlying groundwater body (combined superficial and bedrock aquifer). Measures are being developed to further mitigate and compensate for these issues.

3.13.6. At this stage, and as presented in this Business Case, it is anticipated that the scheme will deliver significant quantified and non-quantified benefits and provide High VfM for public sector expenditure.

3.14 SWITCHING VALUE ANALYSIS

3.14.1. Switching value analysis has been undertaken to determine how a change in costs or benefits would alter the Value for Money category.

3.14.2. **Table 3-28** provides the changes that would be required, either in scheme costs or benefits, for the scheme to shift from High VfM category (as indicated by its adjusted BCR) to the Medium or Very High categories on either side of its current position.

Table 3-28 - Changing the Adjusted BCR to Medium

Factor	Core Growth
Benefits	Benefits would need to decrease by £179.404m or 41.49%
Costs	Costs would need to increase by £9.153m or 70.91%

3.14.3. If the costs were to remain the same, benefits would need to decrease by 41.49% to lower the scheme into the medium VfM category.

3.14.4. If benefits were to stay the same, costs would need to increase by 70.91% to lower the scheme into the medium VfM category.

Table 3-29 - Changing the Adjusted BCR to Very High

Factor	Core Growth
Benefits	Benefits would need to increase by £76.125m or 17.61%
Costs	Costs would need to decrease by £19.031m or 14.97%

3.14.5. To switch the scheme into the Very High VfM category, if the costs were to remain the same, benefits would need to increase by 17.61%.

3.14.6. If benefits were to stay the same, costs would need to decrease by 14.97% to switch the scheme into the Very High VfM Category.

3.15 SENSITIVITY AND RISK PROFILE

3.15.1. There are key uncertainties which can affect the scheme costs and impacts/benefits, these include changes to the scheme cost which affect the PVC of the scheme and changes to demand and economic growth which can affect the PVB of the scheme.

3.15.2. The cost of the scheme can be influenced by a number of factors, including cost of materials, cost of labour, and delay to programme.

3.15.3. In order to understand how sensitive the benefits described above are to a range of alternative parameters, a number of tests have been performed.

- TAG Sensitivity Databook
- High and low traffic growth scenarios
- Alternative levels of Optimism Bias (different stages of the business case)
- Alternative levels of Additionality applied to dependent development impacts

3.15.4. The results of these tests are summarised as follows.

TAG SENSITIVITY DATABOOK

3.15.5. A sensitivity test has been undertaken using the TAG Sensitivity Databook (V1.14). The Databook reflects changes in economic and population parameters projects provided by the Office for Budget Responsibility (OBR).

Table 3-30 – TAG Sensitivity Databook testing (2010 prices and values)

£000s in 2010 prices and values	• Values
Initial PVB	233,735
Wider Economic Impacts & reliability	90,692
Adjusted Present Value of Benefits (PVB)	**324,427**
Present Value of Costs (PVC)	**127,129**
Net Present Value (NPV)	**197,298**
Adjusted BCR	**2.55**

3.15.6. These results show that the BCR remains above 2 and within the High Value for Money category. This increases the level of certainty in the VfM associated with a reduction in Transport User Benefits and COBALT.

HIGH AND LOW TRAFFIC GROWTH SCENARIOS

3.15.7. Another key uncertainty identified regards demand growth in the vicinity of the proposed scheme. To assess the impact of this uncertainty, sensitivity tests have been devised in line with guidance in TAG Unit M4. The tests are documented in detail on the Traffic Forecasting Report and Economic Assessment Report[20]. These sensitivity tests are provided in **Table 3-31**.

Table 3-31 – High and low traffic growth scenario testing (2010 prices and values)

£000s in 2010 prices and values	Low Growth	High Growth
Initial PVB	257,540	370,665
Wider Economic Impacts & Reliability	108,767	126,742
Adjusted Present Value of Benefits (PVB)	**366,307**	**497,407**
Present Value of Costs (PVC)	**127,129**	**127,129**
Net Present Value (NPV)	**239,178**	**370,278**
Adjusted BCR	**2.88**	**3.91**

3.15.8. These results show that the BCR remains above 2 and within the High Value for Money category for the low growth scenario. This increases the level of certainty in the VfM associated with a significant reduction in Transport User Benefits. For the High growth scenario the adjusted BCR is pushed to the top of High Value for Money category.

ALTERNATIVE OPTIMISM BIAS

3.15.9. The PVC for the economic case already includes an allowance for optimism bias at 15% of scheme costs. As part of the switching value assessment the PVC will be varied up and down by % changes to ascertain what effect these cost changes will have on the scheme PVC and NPV.

3.15.10. The effect on PVC, BCR and VfM for the core scenario of changing OB to 3% and 44% is set out in **Table 3-32**.

[20] NWL Economic Appraisal Report, March 2021

Table 3-32 - Alternative optimism bias sensitivity tests (2010 prices and values)

£000s in 2010 prices and values	15% OB	3% OB	44% OB
Adjusted Present Value of Benefits (PVB)	432,391	432,391	432,391
Present Value of Costs (PVC)	127,129	113,863	159,187
Net Present Value (NPV)	305,262	318,528	273,204
Adjusted BCR	3.40	3.80	2.72
VfM Category	High	High	High

3.16 APPRAISAL SUMMARY TABLE

3.16.1. The AST presents all the evidence from the economic appraisal a single table. It records all the impacts which have been assessed and described above – economic, fiscal and environmental impacts – assessed using monetised, quantitative or qualitative information as appropriate. The AST for the scheme, in line with TAG requirements, is included in **Appendix 3D**.

3.17 SUMMARY OF THE ECONOMIC CASE

3.17.1. The Economic Case identifies and assesses all the impacts of the scheme to determine its overall Value for Money. It takes account of the costs of developing, building, operating and maintaining the scheme, and a full range of its impacts, including those impacts which can be monetised.

BENEFIT COST RATIO

3.17.2. The initial BCR is 2.43, indicating **High** Value for Money according to the DfT Value for Money Framework. The adjusted BCR is 3.40, strengthening the **High** category.

3.17.3. Once the full scheme impacts are included, the scheme still remains in the **High** Value for Money Category. The scheme would need to deliver greater than the calculated benefits to reach the Very High Value for Money category.

SENSITIVITY TESTING

3.17.4. The sensitivity tests applied to the appraisal results confirm the High Value for Money position is not sensitive to cost increases, or a reduction in benefits (as the BCR does not drop into the Medium Value for Money category). This increases the level of certainty that the scheme will deliver High Value for Money. When changes to the TAG Sensitivity Databook (V1.14) and optimism bias have been applied, the scheme delivers an adjusted BCR which still remains in the **High** Value for Money Category.

4 FINANCIAL CASE

4.1 INTRODUCTION

4.1.1. The Financial Case outlines the proposed financing of the scheme in terms of the affordability of the proposal, the source of funding, annual breakdown of provisions and outturn costs. This section considers the potential costs and associated financial case for the preferred scheme and describes:

- How much the scheme is expected to cost, and how this has been calculated
- The anticipated profile of expenditure (including whole life costs)
- Risks that could affect the cost of the scheme
- How the scheme will be paid for, and by whom

4.2 COSTS

4.2.1. Scheme costs have been developed for the preferred option in line with TAG A1.2.

4.2.2. The cost estimate is based upon a price base of 2020 Q3. The estimated cost of the scheme at out-turn prices excluding VAT is £198.39 million. The estimated cost of the scheme is shown in **Table 4-1**.

SCHEME PREPARATION AND CONSTRUCTION

4.2.3. The cost of scheme preparation and construction has been estimated based on discussions held with tenderers as part of the competitive dialogue process. NCC have undertaken an independent review of these costs, and any differences were discussed to generate a revised, robust cost base.

4.2.4. Subject to funding, construction of the NWL will start in late 2023 and the new scheme will open to traffic in late 2025.

Table 4-1 – Breakdown of Scheme Costs

Scheme element	pre 20/21	20/21	21/22	22/23	23/24	24/25	25/26	26/27	Total
Design, Investigations, Surveys, Procurement, Supervision and Client Costs	4,890,040	4,065,765	8,868,606	5,373,427	565,596	17,499			23,780,932
Statutory Undertakers Works	-			549,157		183,052			732,210
Land	1,466,232	1,068,772	326,579	128,603	8,638,319	2,888,253	-1,773,935		12,742,825
Construction Contracts	7,248	52,087	5,480	594,813	8,430,527	63,045,131	31,190,221	188,223	103,513,730
Total Cost (excluding risk)	6,363,520	5,186,624	9,200,665	6,646,000	17,634,442	66,133,936	29,416,286	188,223	140,769,697
Risk			3,094,368	4,765,253	6,315,301	17,440,652	8,310,496	7,934	39,934,004
Total Cost at 2020:Q3 Prices	6,363,520	5,186,624	12,295,033	11,411,253	23,949,743	83,574,588	37,726,783	196,157	180,703,701
Adjustment to outturn (inflation)			1,279	63,823	1,884,031	10,244,653	5,489,221		17,683,007
Scheme Cost (outturn prices)	6,363,520	5,186,624	12,296,312	11,475,076	25,833,774	93,819,241	43,216,004	196,157	198,386,708

SPEND PROFILE

4.2.5. The assumed annual profile of expenditure is shown in **Table 4-2**.

Table 4-2 – Annual Spend Profile %

Scheme Element	pre 20/21	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Design, Investigations, Surveys, Procurement, Supervision and Client Costs	20.27%	17.10%	37.29%	22.60%	2.38%	0.07%		
Statutory Undertakers Works				75.00%		25.00%		
Land	11.49%	8.39%	2.56%	1.01%	67.79%	22.67%	-13.92%	
Construction Contracts		0.05%	0.01%	0.57%	8.14%	60.91%	30.13%	0.18%

RISK ALLOWANCE

Estimating uncertainty

4.2.6. The final cost of delivering the schemes will not be known until after completion of the detailed design and land purchase, and completion of the statutory process. For this reason, the scheme cost estimates include allowances to account for this uncertainty, or risk. During the project lifecycle, the risk associated with cost estimates is determined by the level of detailed knowledge at each respective stage. As the level of detail increases, the level of risk, and the risk-adjusted costs usually reduce.

4.2.7. To reflect the uncertainty associated with known risks, a Quantified Risk Assessment (QRA) has been undertaken[21]. The QRA has been developed from an understanding of each specific risk and the probable effects of that risk along with an assessment of the likelihood of occurrence and cost, based on a detailed understanding of the projects costs which is driven from the cost plan/forecast. The treatment of risk, and the calculation of quantified risk is described in the Management Case (**section 6.9**).

[21] Risk allowance is a factor applied to project costs to act as a contingency for unforeseen circumstances.

4.2.8. The current risk adjustment has been calculated as £39.93m, 28% of the total scheme costs.

OUT-TURN PRICE ADJUSTMENT

4.2.9. The cost estimates assume a price base of Q3 2020. An allowance is therefore made for expected inflation between the date of the cost estimate and the date when the expenditure is expected to occur. This is influenced by the profile of expenditure set out in Table 4-2. The uplift factors to reflect price inflation are based on 2.50% per annum for general activities (i.e. fees, utilities and land), 1.60% per annum for Stage One activities as the contract mechanism relies on CPI and 3.96% per annum for Stage Two activities as the contract mechanism relies on a set of weighted BCIS indices.

4.3 BUDGETS/FUNDING COVER

FUNDING STRATEGY

4.3.1. It is anticipated that the scheme will be funded entirely from public finances.

4.3.2. The most appropriate funding solution for the scheme is via the Large Local Majors (LLM) programme. LLM schemes should aim for the local or third-party contribution to be at least 15% of the total scheme costs.

4.3.3. The proposed funding breakdown for the scheme is detailed in **Table 4-3**. This assumes a maximum LLM funding contribution of 85%.

Table 4-3 - Funding request (£000's)

	17/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	Total
Government/ DfT funding		1,024	12,245	9,754	21,959	86,746	36,734	167	168,629
Local contribution	6,364	4,163	51	1,721	3,875	7,073	6,482	29	29,758
Total	**6,364**	**5,187**	**12,296**	**11,475**	**25,834**	**93,819**	**43,216**	**196**	**198,387**

LOCAL AUTHORITY CONTRIBUTION

4.3.4. A local contribution, underwritten by NCC, will account for 15% of the scheme costs, which totals **£29.76 million**.

4.3.5. The exact composition of the local authority contribution from 2021/22 has not yet been finalised, but is expected to come from a combination of the following:

- Funding through the New Anglia LEP
- Possible borrowing through Public Works Loan Board (PWLB)
- Consideration of borrowing via the new UK National Infrastructure Bank

4.3.6. The details of the local funding mechanism will be clarified as the scheme is developed. In view of the uncertainty about the sources of local funding, Norfolk County Council will underwrite these costs. The local contribution is confirmed in the signed declaration by Norfolk County Council's Section 151 officer, which is included in the Bid Cover Sheet. The declaration also confirms that the Council will underwrite any increase in costs above those set out in the Business Case.

4.3.7. The Council is also prepared to enter into credit arrangements under the prudential borrowing powers from the Local Government Act 2003.

4.3.8. On the basis of the above, the scheme is therefore considered to be affordable from a local perspective.

4.4 EXPECTED WHOLE LIFE COSTS

4.4.1. Although the request for funding is for a contribution towards the capital costs of delivering the scheme, the business case must also consider its whole-life costs. These include the costs of operating and maintaining the highway (including any structures) and associated infrastructure as well as the longer-term costs of infrastructure renewal. This will include the costs associated with maintaining the landscaping and the environmental mitigation measures.

Maintenance and renewals

4.4.2. Maintenance and renewals costs include:

- Highways maintenance liabilities including communication equipment, drainage clearance, road and street lighting operation, winter maintenance (i.e. application of salt and snow clearance) and infrastructural and safety inspections
- Longer term highways renewals, including re-surfacing and renewing the road pavement, care and upkeep of the verge, winter gritting and any associated works
- Structures maintenance liabilities including inspection, deck waterproof replacement, concrete repairs and VRS replacement.

4.4.3. An indicative cost of has been developed based on structures, length of highway and planned renewals programme for each aspect. This would be included as part of NCC annual maintenance programme. This will be further developed as the detailed design is produced.

4.5 ACCOUNTING IMPLICATIONS

4.5.1. The preferred option is expected to have the following implications on public accounts:

- Central government/DfT funding of £168.63m (85%) is sought to deliver the scheme, with the majority of the funds being spent during the financial years 2023-2026
- A local contribution of £29.76m (15%) of the scheme implementation costs is required
- The maintenance costs for the scheme are expected to cost £30.07m in 2020:Q3 prices over a 60 year period, the funding for which will be sourced from the annual maintenance budget.

FUNDING COVER FOR WHOLE LIFE COSTS

4.5.2. The whole life costs will also need to be met by NCC, and provision will be made for this in the Council's budgets for highways and bridge maintenance, which are funded through LTP allocations. It is considered that the NWL will form part of the MRN and would be maintained as part of that network with funding provision specific to the MRN.

4.6 SUMMARY OF THE FINANCIAL CASE

4.6.1. The base scheme costs are £140.77 million. The scheme costs include a risk allowance taken from the latest QRA.

4.6.2. The total scheme costs, including risk and inflation, are £198.39 million at out-turn costs.

4.6.0. Funding is sought via the Large Local Majors programme through the National Roads Fund. Central government/DfT funding of £168.63m (85%) is sought to deliver the scheme, with the majority of the funds being spent during the financial years 2023-2026. A local contribution of £29.76m (15%) of the scheme implementation costs is required.

4.6.1. NCC's Section 151 Officer has provided a Letter of Intent to confirm the Council's financial obligations towards the scheme.

5 COMMERCIAL CASE

5.1 INTRODUCTION

5.1.1. The Commercial Case outlines the commercial viability of the proposed scheme and the procurement strategy used to engage the market. It outlines the approach to risk allocation and transfer, contract and implementation timescales, and the approach to managing of the contract.

5.1.2. Risk allocation is based on guidance contained within the Outsourcing Playbook[22], with a clear delineation between the contractor's and client's risk ownership. Additional detail on NCC's approach to risk management can be found in **section 6.9** of the Management Case.

5.2 OUTPUT BASED SPECIFICATION

5.2.1. The Commercial Case is based on strategic outputs and outcomes, against which alternative procurement and contractual options are assessed.

5.2.2. The outcomes that the preferred procurement strategy and contract must deliver are:

- A new road is to be built in accordance with the principles of the Specification of Highways Works[23] to connect the A1270 Broadland Northway, at its junction with the A1067 Fakenham Road, via the preferred route to a new junction with the A47, being constructed by Highways England
- The NWL is planned to tie-into the A47 North Tuddenham to Easton dualling scheme at the northern section of the new Wood Lane junction via an arm on the northern roundabout
- Overpasses/underpasses needed where the NWL crosses existing roads, or those roads will need to be stopped up
- A viaduct over the River Wensum will need to be constructed, and there will be a given exclusion zone, within which no temporary or permanent works will be permitted. This is to ensure that there is no effect on River Wensum itself nor banks or aquatic vegetation on these, limit the impact of shading on River Wensum habitat / species and to avoid any impact of construction on River Wensum and on floodplain floor
- Diversions to existing Public Rights of Way (PRoW) where they are severed/affected by the new link
- There will be requirements for:
  - Landscaping
  - Drainage works
  - Green bridges/underpasses/ecological mitigation

[22] The Outsourcing Playbook, Central Government Guidance on Service Delivery, including Outsourcing, Insourcing, Mixed Economy Sourcing and Contracting, version 2.0, June 2020

[23] Standards for Highways.co.uk

- Associated works

5.3 PROCUREMENT STRATEGY

5.3.1. Norfolk County Council has extensive experience procuring complex highway and structural engineering projects. Additional detail can be found in Section 1.2 of the Management Case. These schemes have created the foundation for Norwich Western Link's preferred procurement strategy.

FORM OF CONTRACT

5.3.2. For civil engineering works in the UK, there are two main forms of contract: the Institution of Civil Engineers Conditions of Contract (ICE), which since August 2011 has been rebadged as the Infrastructure Conditions of Contract (ICC); or the New Engineering and Construction Contract NEC suite of contracts. These two options are discussed in more detail as follows.

Infrastructure Conditions of Contract (ICC)

5.3.3. The Infrastructure Conditions of Contract (ICC) suite of contracts is one of the main forms of standard contracts for UK civil engineering and infrastructure work. ICC provides a clear and standardised contract specifically tailored for civil engineering and infrastructure projects. It is endorsed by the sponsoring bodies, Association for Consultancy and Engineering and the Civil Engineering Contractors Association.

5.3.4. Separate versions of the ICC Conditions of Contract cater for a variety of types of contract strategy including measurement, target cost and design and construction. The different conditions provide options for delivery with each offering a comprehensive and clear set of conditions with clear risk allocation between Employer and Contractor. The contract is administered by an independent engineer.

5.3.5. The procedures set out in the Contract provide a cooperative form of contract that aim to prevent or reduce delays and allow control of costs at any stage of a Contract.

NEC Engineering and Construction Contract

5.3.6. The NEC Engineering and Construction Contract suite of contracts, originally known as New Engineering Contract, has been used to deliver building and engineering schemes globally since its first publication in 1993. The NEC suite uses plain language and promotes good communication and management to deliver projects.

5.3.7. The NEC offers five Conditions of Contract options for delivery of engineering projects, including priced, target cost and cost reimbursable contracts. The different conditions, based around common core clauses, seek to allocate risk management to the appropriate party and promote non-adversarial working. The Contract is administered by an appointed Project Manager.

5.3.8. The NEC suite encourages a collaborative approach to deliver schemes and promotes proactive management of risks to deliver schemes on programme and budget.

Preferred Form of Contract

5.3.9. The ICC and NEC contract suites both provide a robust contracting framework through which the NWL could be delivered. They have proven track records for the delivery of infrastructure schemes and are widely accepted within the UK civil engineering industry. The NEC is considered a less adversarial form of contract although the most recent revisions of the ICC have attempted to promote collaboration.

5.3.10. Both the ICC and NEC offer a range of Conditions of Contract that would enable NCC to select conditions that best align to the NWL procurement objectives.

5.3.11. NCC has selected the NEC Engineering and Construction Contract for the NWL. Not only is this the standard form of contract for infrastructure works in the UK, but NCC has previously adopted the NEC for tendered civil engineering, maintenance and professional services contracts. The additional flexibility and existing in-house familiarity with the NEC suite make it the preferred option for the delivery of the NWL.

Contract Strategy

5.3.12. The contract strategy considers which contractual mechanism aligns best with the procurement objectives. The NEC Engineering and Construction Contract suite offers five main conditions of contract options for scheme delivery. They all stimulate best practice management and encourage relationships between the two parties to the contract and hence the work involved in the contract.

- Option A: Priced contract with activity schedule
- Option B: Priced contract with bill of quantities
- Option C: Target cost with activity schedule;
- Option D: Target cost with bill of quantities
- Option E: Cost reimbursable

5.3.13. **Option A** is a priced contract with an activity schedule where the risk of carrying out the work at the agreed price is largely borne by the contractor. Contractors tender for an Option A contract based on lump sum prices for each activity based on their own assessment of the requirements of the activities.

5.3.14. **Option B** is a priced contract with a bill of quantities where the risk of carrying out the work at the agreed prices is largely borne by the contractor. Contractors tender for an Option B contract by completing a bill of quantities prepared by the employer. The quantities required to complete the NWL works are therefore specified by NCC, and NCC would bear the risk of the quantities being wrong.

5.3.15. **Option C** is a target cost contract with an activity schedule where the out-turn financial risks are shared between the client and the contractor in an agreed proportion. Contractors tender a target price based on a list of activities which is then adjusted through the delivery to reflect agreed changes. The contractor is then paid for completed works and a percentage of any savings made during the delivery or the amount paid is reduced by a percentage of any over-spend.

5.3.16. **Option D** is a target cost contract with a bill of quantities where the out-turn financial risks are shared between the client and the contractor in an agreed proportion. Contractors tender and are paid similarly to Option C, but based on a bill of quantities rather that an activity schedule.

5.3.17. **Option E** is a cost reimbursable type contract where the financial risk is taken largely by the client. Under Option E the contractor is paid for works completed plus a fee.

5.3.18. The Options, A to E, offer varying levels of risk exposure, incentivisation and flexibility depending on the procurement objectives and the level of design undertaken prior to tender.

5.3.19. **Figure 5-1** summarises the characteristics of the different NEC Options:

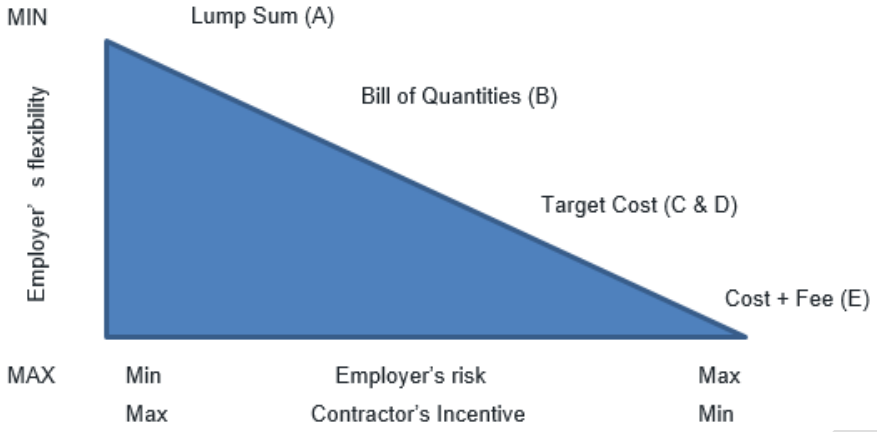


Figure 5-1 - Comparison of NEC Options

5.3.20. The fixed-price contracts offered by Options A and B require a high degree of design maturity. Option A and, to a lesser extent, Option B minimise NCC risk exposure following contract award and incentivise the contractor to deliver the NWL in the most efficient manner. This results in increased cost and programme certainty. As a high degree of design fixity is assumed at the point of tendering, scope for post-award amendment to the scheme is limited. Option B has been discounted as Option A minimises risk exposure more.

5.3.21. A target cost contract strategy, through Option C or D, provides a more balanced allocation of risk between the client and contractor, and incentivises both parties to work together to achieve an efficient delivery. In practice, target cost contracts are usually tendered with activity schedules, Option C, rather than with a bill of quantities, Options D. This is because the contract strategy looks to take programme benefit from the reduced need for design maturity, and the contractor's input into the final scheme proposals.

5.3.22. The cost reimbursable strategy offered by Option E places maximum risk with NCC and little incentive for the contractor to deliver works efficiently. A cost reimbursable contract would not generally be considered an appropriate delivery strategy for the main contract works of a large civil engineering infrastructure scheme.

Preferred Contract Strategy

5.3.23. The Contract for the NWL is split into three sections:

- Stage One Work: the development of the detailed design by the Contractor, including support to the Client during the statutory consents process, completing such surveys and investigations as are required, and the setting of the total of the Prices for Stage Two Work.
- Stage Two Work: the construction of the Norwich Western Link.
- Stage Three Work: landscape maintenance.

5.3.24. NEC4 Engineering and Construction Contract June 2017 has been chosen for the NWL with different options chosen for different stages. The main options are:

- A (in respect of the Stage One Lump Sum Work)
- E (in respect of the Stage One Cost Reimbursable Work),
- C (in respect of the Stage Two Work) and
- A (in respect of the Stage Three Work)

5.3.25. The pros and cons of Option A (lump sum) and Option C are set out in **Table 5-1**.

Table 5-1 – Option Comparison

Option	Advantages	Disadvantages
A	Somewhat greater price predictability at start of Stage Two Simpler to administer Quantity and price risks borne by Contractor	Contractor incentivised to cut corners at the expense of quality Contractor's price likely to include high contingency Adversarial relationship more likely to develop Less commercial transparency around compensation events
C	More incentive on Contractor to innovate to achieve a better outturn cost Contractor commercially rewarded for performance Contractor encouraged to identify supply chain efficiency to benefit of both contractor and client Collaborative behaviour incentivised Commercial transparency	Particularly tight project controls needed Reduced cost predictability Reliant on audit accuracy; administratively burdensome

5.3.26. NCC has concluded that the contractor would include a significant amount of contingency in their tendered price if Option A had been adopted for Stage Two, thereby making the works more expensive, and may even choose not to tender due to risk. Incentivising the contractor to innovate and identify supplier chain efficiencies is seen as very positive.

5.3.27. Option A was chosen for Stage One and Three as there is much greater definition of the scope of work required for these stages.

5.3.28. Option E was adopted for Stage One reimbursable work as we cannot accurately define the requirements for the support through the statutory processes, so an allowance has been made on the basis of cost reimbursement.

TYPE OF CONTRACT

5.3.29. A number of contract options were considered:

- Traditional
- Design and Build
- Partnering with Early Contractor Involvement

5.3.30. The advantages and disadvantages of each, and the likely contract form, are summarised as follows.

Traditional

5.3.31. The programme constraint would not impact the delivery of a Traditional contract in the same way. Under a Traditional form of procurement, NCC would deliver the scheme through planning and Public Inquiry. The main works contract would therefore be tendered later in the overall programme

when the scheme design is fully matured. Under the Traditional option, NCC would therefore retain design responsibility and have more control over the final scheme design. Whilst NCC retain more risk to the point of contract award, the risk of change post-contract award is significantly reduced. This leads to increased cost certainty under a Traditional model compared to the other forms of procurement leading to significant cost risk until the procurement process is completed.

5.3.32. A significant constraint is that Traditional contracts typically require certainty of detailed design input, which necessitates adequate time to provide the contractor with buildable design information prior to commencement the procurement process. Where the programme allows for pre-tendering activities to be undertaken in sequence this would extend the overall programme. However, the funding window available for the NWL dictates that detailed design is undertaken in parallel with planning determination. The necessity for detailed design prior to tendering is therefore not critical to the overall programme duration.

5.3.33. A traditional contract would offer the following advantages:

- Principles developed over many years and widely understood
- Client develops the specification
- Risk managed by the Client
- Client retains control and flexibility to change specification
- Award of contract on lowest price basis demonstrates Value for Money

5.3.34. The disadvantages of a traditional contract are as follows:

- Client retains risk of delivery on time and to budget
- No incentive for contractor to innovate
- No link between design and construction
- Nature of all risks are not fully realised at the point of award resulting in the potential for an increase in outturn cost and delays with completion

Design and Build

5.3.35. The advantages of a Design and Build contract include:

- Integration of design and construction leads to efficiencies in cost and time
- Single point of responsibility for the Client
- Risks clearly identified and allocated during the procurement phase
- Stimulates innovation, reducing cost
- Allows the contractor to review the buildability of the design

5.3.36. The disadvantages are as follows:

- There can be reduced competition with fewer companies interested
- Contractor takes on greater risk and prices accordingly
- Lack of flexibility to change the scope
- Quality may be overridden by cost efficiency

5.3.37. The Design and Build model requires a clearly defined brief and requirements.

5.3.38. The Design and Build model generally has a reduced design period when compared to a traditional form of procurement, as design and construction activities can overlap. To achieve the NWL programme, it has been necessary to overlap with pre-construction activities. It is intended that further design be completed in parallel with the planning determination period.

5.3.39. If engaged prior to planning, the risk is shared. If there is a need to amend the contract scope as a result of the planning process, this will need to be an instructed change by the client. If the change is required but does not change the scope, then the risk remains with the contractor.

5.3.40. Two Design and Build options therefore exist. Firstly, the contract be procured based on pre-planning requirements and the contractor's designer is able to undertake further design in parallel to the determination period. This includes the design being developed as part of the negotiation process of the competitive procedure. Secondly, the contract is tendered post-planning and the overall programme is extended to facilitate design post-planning but prior to the Public Inquiry. In both scenarios, knowledge transfer will be critical between the pre-planning designer and the contractor's team who will manage the scheme through Public Inquiry. Both scenarios would benefit from retaining the parties involved in preparing the planning application and the draft Orders through a Public Inquiry.

5.3.41. In order to pursue a Design and Build model, NCC would need to accept either the risk of change through the planning process or a delay to the programme. A delay to the overall delivery programme is not considered acceptable based on the available funding window. The Design and Build model would therefore require acceptance of the planning risk by NCC.

Partnering with Early Contractor Involvement (ECI)

5.3.42. Partnering with ECI would have the following advantages:

- Collaboration between parties
- Risks are better defined than in a more traditional contract
- Opportunities to link design and construction

5.3.43. The disadvantages of ECI include:

- Many of the disadvantages of traditional procurement remain
- Difficult to get the right people involved at an early stage in the development of the project

5.3.44. The ECI model, wherein the Design and Build team can have greatest influence over the scheme proposals, is most effective when procurement is undertaken pre-planning. To achieve the overall NWL delivery programme, however early commencement of the planning preparation is essential. The planning application is programmed for submission in late 2021 and to achieve this pre-application planning discussions have already commenced.

Preferred Contract Type

5.3.45. Although the highways elements of the project are relatively straightforward, the design and construction of the River Wensum Viaduct is complex and would benefit from the collaborative advantages of the Design and Build or ECI models.

5.3.46. With a Design and Build contract the Contractor would take on the responsibility and risk related to the detailed design and construction of complex elements. This reduces risk to the Client, whilst the integration of detailed design with construction could bring about efficiencies. Ensuring affordability and reducing the risk of cost increases are key considerations, because the funding from DfT is likely to be capped at a level which cannot be increased.

5.3.47. A partnering contract with early contractor involvement (ECI) would provide a link between design and construction, though it may not result in full integration of design and construction disciplines. It would however provide a better definition of risks than a conventional contract. It would add value by

enabling some input into construction methodology or impacts during the anticipated planning process. However, the procurement process would take longer than with a Design and Build contract if substantial contractor involvement, such as detailed design work, was required prior to planning submission, and this would lengthen the overall timescale for delivery.

5.3.48. A traditional contract would not provide an active link between design and construction. Risks would not be fully known at the point of award, resulting in the potential for increased outturn costs and delays.

5.3.49. A Design and Build form of contract has therefore been chosen as the most appropriate for this project. NCC's approach captures the benefits of D&B and ECI. The major disadvantage of the Traditional contract is that NCC would not get any contractor input to the design of the viaduct or any scope for the contractor to innovate. NCC would also not know what the approved solution would cost until the tender was received – all clear reasons why we have not selected a Traditional approach

5.3.50. NCC has established the contractors D&B team at tender stage and their design has been developed through the tender process and will be used through the planning process based on a scope provided by the NCC.

PROCUREMENT ROUTE

OJEU Competitive Tender Options

5.3.51. At the time of procurement, schemes valued above £4,733,252 are required to be advertised in the Official Journal of the European Union (OJEU)[24]. Four options within the OJEU procurement process have been considered:

- Open Tender (Regulation 27)
- Restricted Tender (Regulation 28)
- Competitive Dialogue (Regulation 30)
- Competitive with Negotiation (Regulation 29)

5.3.52. These are described as follows and illustrated in **Figure 5-2**.

[24] OJEU thresholds are reviewed annually. Level quoted applies to January 2020.

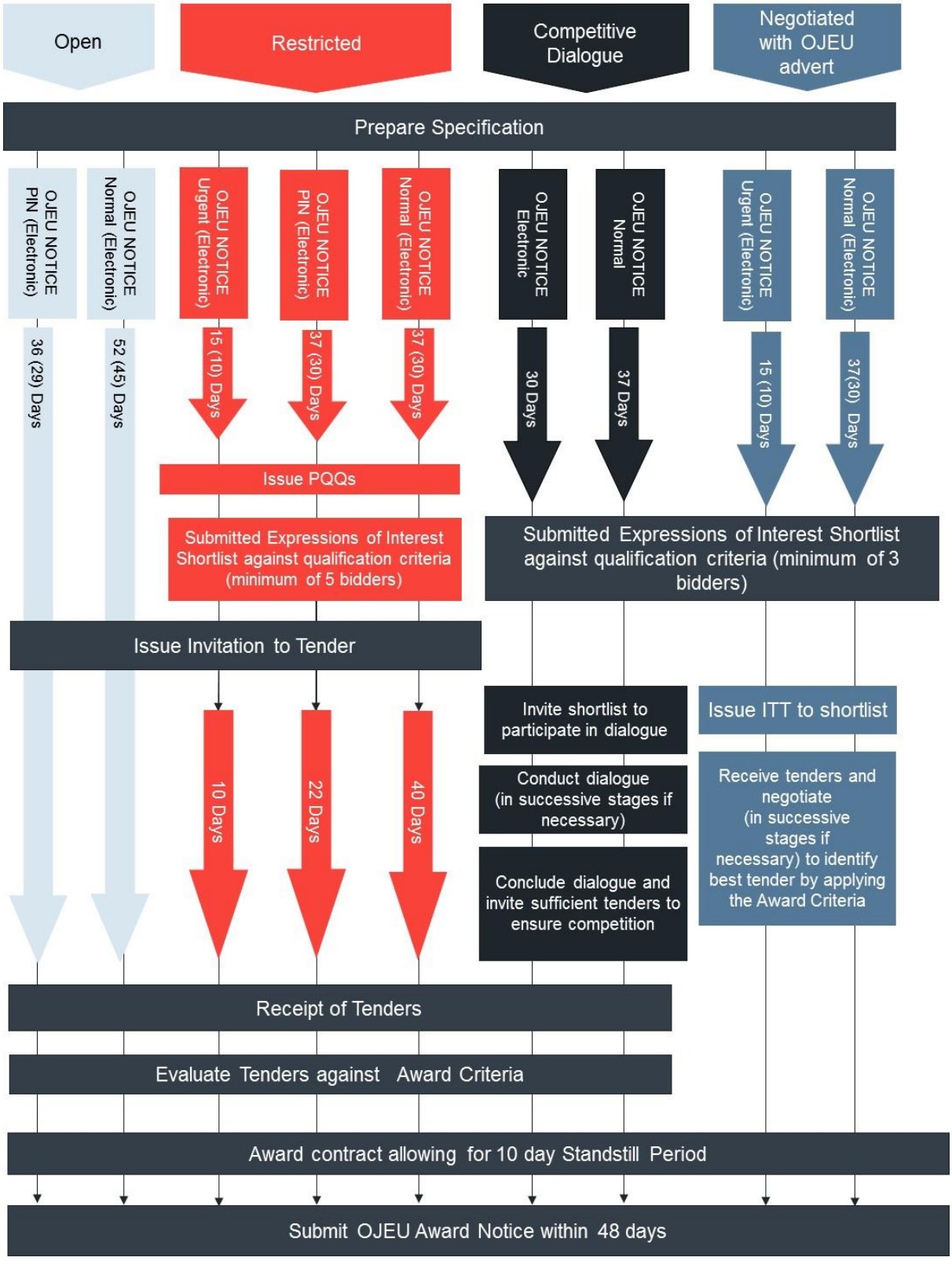


Figure 5-2 - Procurement Options

Open Procedure (Regulation 27)

5.3.53. This procedure allows an unlimited number of interested parties to tender against defined parameters. There are no restrictions (e.g. pre-qualification) on the parties who are permitted to tender, meaning that some parties may not be suitable to carry out the work. This procedure is straightforward and transparent but can attract a large number of potential bidders, consequently requiring a greater degree of assessment and associated resources.

Restricted Procedure (Regulation 28)

5.3.54. This is a two-stage procedure with a pre-qualification process. The first stage allows the contracting authority to set the minimum criteria relating to technical, economic and financial capabilities that the potential bidders have to satisfy. Following evaluation of the responses to the first stage a minimum of five bidders (unless fewer qualify) are invited to tender in the second stage. It is possible to do this over an accelerated timescale, referred to as an Accelerated Restricted Procedure.

Competitive Procedure with Negotiation (CPN, Regulation 29)

5.3.55. This procedure is intended to be used where minimum requirements are able to be specified but negotiations with bidders may be needed to improve the initial tenders. The grounds for using this procedure are as follows:

- Where needs cannot be met without adaptation of readily available solutions
- Where the contract includes design or innovative solutions
- Where the requirement is complex in nature, in its legal and financial make-up or because of its risks
- Where the technical specifications cannot be established with sufficient precision
- In the case of unacceptable/irregular tenders

5.3.56. Within this procedure, bidders initially submit tenders based on the information issued by the contracting authority. The contracting authority is then able to review the tenders it has received and negotiate with the bidders, after which the tenders will be resubmitted.

5.3.57. This procedure may therefore be useful where the requirements are well developed initially, and full tender documents can be produced but it is felt that there may be advantage in retaining the ability to negotiate if there are certain aspects which bidders raise.

Competitive Dialogue (CD, Regulation 30)

5.3.58. This procedure is appropriate for complex contracts where contracting authorities:

- Are not objectively able to define the technical means capable of satisfying their needs or objectives and/or
- Are not objectively able to specify the legal and/or financial make-up of a project

5.3.59. This is a multi-stage procedure. The first stage is a pre-qualification to select the potential bidders to participate in the dialogue. In the second stage the contracting authority enters into a dialogue with the potential bidders to identify and define the means best suited to satisfying their needs.

5.3.60. Any aspect of the contract may be discussed, including technical requirements for the works to be delivered and the commercial/contractual arrangements to be used. The dialogue may be conducted in successive phases with the remaining bidders being invited to tender. By the end of the dialogue phase the contracting authority's requirements will have been determined such that the scheme can

be tendered. In the final stage, the remaining bidders from the dialogue phase are invited to tender for the scheme.

Preferred Procurement Route

5.3.61. There are a number of credible sourcing routes for the NWL. The open procedure is not considered appropriate for a scheme of this scale and complexity. There will be a need for dialogue or negotiation during the process.

5.3.62. The Restricted Procedure is not considered suitable for a scheme of this value and complexity. It does not permit any substantive discussion with the shortlisted bidders. As a result, there is a high probability either that bidders will withdraw, because they are unwilling to accept the Council's terms, that they will price in perceived risk, increasing costs, or the optimum solution will not be delivered.

5.3.63. The procurement routes that are candidates for this tender are the Competitive Procedure with Negotiation (CPN) and the Competitive Dialogue Procedure (CDP).

5.3.64. While the characteristics of the CDP and CPN are largely similar, CDP allows for more flexibility. As noted in the Government Commercial Function's Guidance Note[25], allows:

- For all aspects of the procurement to be discussed
- For limited discussions of final tenders and negotiation on the winning tender to confirm commitments or other terms"

5.3.65. As noted in **section 5.3** and in **section 6.2** of the Management Case, NCC has extensive experience of procuring schemes with Competitive Dialogue. Given the desire for flexibility and this track record, the Norwich Western Link has been procured using the Competitive Dialogue Procedure. Dialogue has been based on the lean sourcing principles developed by the Cabinet Office and successfully implemented by the authority.

5.3.66. The Procurement Team in NCC has extensive experience of running competitive dialogue procurements using the lean principles advocated by the Cabinet Office and consider that competitive dialogue has de-risked the project, as it allows the bidders to challenge the scope, including the design, and helps the bidders have a much greater understanding of the Council's requirements and the rationale for the reference design. The pre-procurement market engagement allowed NCC to test the market's appetite for participating in a competitive dialogue procurement (8 PQQs received). NCC's legal team (nplaw) was fully briefed on the project and NCC also engaged an external lawyer (Geldards) to provide quality assurance.

[25] Government Commercial Function, Competitive Dialogue and Competitive Procedure with Negotiation Guidance Note, June 2020

PROCUREMENT PROCESS

5.3.67. A selection of the milestones listed in the programme (Section 6.5, Management Case) for the tender process are shown in **Table 5-2**. The dates shown in this table are preliminary and may be subject to further review.

Table 5-2 – Procurement Milestones

Task Name	Date
Publication of Tender Notice (Competitive Dialogue)	30 June 2020
Issue of Invitation to Participate in Dialogue to shortlisted Bidders; inform unsuccessful Bidders	21 August 2020
Close dialogue and issue ITT	22 January 2021
Final tender submission	10 February 2021
Tender review process	10 May 2021
Expected date for issuing intention to award letters and for standstill period to commence	11 May 2021
Expected date for standstill period to finish	Midnight UK time on 21 May 2021
Conclude County Council Governance for Approval	24 June 2021
Contract Award (Design Phase)	25 June 2021

5.3.68. On 30 June 2020, an OJEU Contract Notice was published (OJEU 305185-2020). The PQQ was based on PAS91:2017, with the following minimum standards set out:

- A track record of reliably delivering projects of a similar scope and nature, as evidenced by satisfactory references
- Evidence that:
  - Candidates comply with regulatory requirements relating to the filing of statutory accounts
  - Candidates' statutory accounts (if any) have received a 'clean' audit opinion or, where the audit opinion is qualified, suitable, appropriate and timely action has been taken to deal with the issues raised
  - The financial aspects of candidates' businesses (including but not limited to the payment of tax and social security authorities and of other creditors) are properly managed
  - Candidates' businesses are financially sustainable, including adequate liquidity, turnover, profitability, balance sheet strength and cash flow
- Evidence of compliance with equality legislation, health and safety management and measures, Environmental management policy and capability, and environmental management policy and capability.

5.3.69. The criteria shown in **Table 5-3** were applied to shortlist three bidders.

Table 5-3 – Shortlisting Criteria

Subject area	Weighting
Bridge and highways design and construction experience	40%
Efficiencies and savings through innovation and early contractor involvement (ECI)	15%
Supply chain management capability	10%
Stakeholder management capability	15%
Experience in dealing with environmental constraints and statutory bodies	20%
Total	100%

5.3.70. **Table 5-4** shows the technical and commercial award criteria, and their corresponding weightings.

Table 5-4 – Award Criteria

Award Criteria Subject area	Weighting
Construction methodology, such as ▪ Organisation, experience and qualifications of key construction personnel ▪ Environmental management – relevant parts of Construction Environmental Management Plan ▪ Approach to viaduct installation, working in flood plain and protecting the flood plain and the SAC ▪ Logistics ▪ Traffic management ▪ Working with others, including the A47 dualling contractor	25
Engineering design, such as ▪ Organisation, experience and qualifications of key engineering design personnel ▪ Ease and safety of maintenance and minimisation of whole-life maintenance costs ▪ Achievement of environmental objectives for the operational phase	20
Architectural design, such as ▪ Experience and qualifications of key architectural design personnel ▪ Evidence of robust design decision-making to inform Design and Access Statement ▪ Aesthetic quality of proposed viaduct design	13
Programme, such as ▪ Sequencing ▪ Robustness and realism of proposed programme	12
Supply chain, such as ▪ Experience and qualifications of contractor's commercial personnel ▪ Robustness of arrangements with key package suppliers	7

Award Criteria Subject area	Weighting
▪ Approach to tendering packages ▪ Arrangements to encourage bidding by local suppliers	
Health and Safety management approach	Pass/Fail
Landscape Maintenance	Pass/Fail
Total for technical criteria	77
Commercial Aspects including: a) Price composed of: ▪ Price for Stage One (Phase One) Lump Sum Work (preparation for the planning process) ▪ Price for notional basket for Stage One (Phase Two) Cost Reimbursable Work (response to the planning process) ▪ Price for Stage One (Phase Three) Lump Sum Work (detailed design and costing) ▪ Including priced Contractor's risks ▪ Including price of a notional compensation event of 10% ▪ Price for Stage Two Work ▪ Including priced Contractor's risks ▪ Including price of a notional compensation event of 10% b) Robustness of price: ▪ Detail and realism of Contractor's priced risks ▪ Detail of sub-contractor quotations for key packages and alignment with commercial terms in contract	23
Total for commercial criteria	23
Total	100

5.3.71. Eight responses were received to the PQQ, which have been shortlisted down to three, and competitive dialogue was undertaken to determine the preferred delivery partner for the scheme.

5.4 SOURCING OPTIONS

5.4.1. NCC has existing frameworks and contracts in place. The main Highways contracts are with Tarmac, WSP and Norse Highways. They also have access to the Eastern Highways Alliance framework agreement, which is managed by Essex CC. They also use NPS for property matters.

5.4.2. As described above, the scheme has been sourced through advertisement in the Official Journal of the European Union (OJEU) due to its value and complexity. This allowed companies from across the EU to bid for the work.

5.5 PAYMENT MECHANISMS

5.5.1. It is anticipated that payment will be made to the contractor by monthly valuation with a BACS payment within 21 days after the due date for payment.

5.6 PRICING FRAMEWORK AND CHARGING MECHANISMS

5.6.1. The council will make payments in accordance with the form of contract selected, which are.

Table 5-5 – Payment types

Contract Stage	Element	Payment mechanism
Stage One	Design	Lump sum
Stage One	Support to planning process	Cost-reimbursable
Stage Two	Construction	Target cost
Stage Three	Landscape maintenance	Lump sum

5.6.2. Tenderers have been invited to bid on a pricing model, based on the illustrative design material available.

5.6.3. The purpose of the pricing model is to provide:

- A basis for comparison of tenders
- A basis for building up the Stage Two Prices, tied to the Contractor's tendered rates and prices.

5.6.4. The model includes all the major quantities, allowing the Client to compare the bids against each other. Greater detail will be requested on those elements of work where it is envisaged that significant design changes may occur.

5.6.5. The tenders are to be fully inclusive Volume 1 Part E and the Contract Data sets out the only reasons why the tendered budget for Stage two will be varied.

5.6.6. The Contractor would then work with the NCC project team to develop the Target Price over a number of months as the design is finalised (during Stage One).

5.6.7. The Contractor and the NCC project team will hold regular risk and opportunities workshops (possibly on a monthly basis) to develop and manage the avoidance of risk, develop mitigation strategies and review the risk pot. The Contractor will use this information, and the ongoing detailed design to produce a monthly indicative Target Price which will be reviewed by the project team.

5.6.8. Once the Client is satisfied with the Target Price the Contractor would be given the go-ahead to start construction (Stage Two). If the Client is not satisfied with the Target Price the Client has the option of cancelling the contract and going out to tender on the full design.

CONTRACTUAL CLAUSES

5.6.9. The decision has been taken to use NEC4, this will to some extent reduce the need to use ‘Z’ clauses to deal with known issues in NEC3.

5.6.10. The engineering and construction contract (ECC) is considered the most appropriate form of NEC for a contract of this complexity.

5.6.11. The NEC X22 option will be used to enable Contractor design and ECI, to avoid the complexity of integrating a separate Professional Services Contract.

5.6.12. The inevitable risks arising from losing leverage during Stage One (Design and Planning), which is non-competitive, will be mitigated by:

- Clear NEC Pricing Information, setting the ground rules for arriving at the target price from the tendered price
- The backstop position that the Council can go out to tender using the completed design at the end of Stage One if the contractor failed to achieve performance requirements, or if funding consent is not received within six months of Stage One completion, or the total cost of the Norwich Western Link exceeds a stated value.

Dispute resolution

a. As the Construction Act applies, dispute resolution option W2 will be used.

b. An additional tiered dispute resolution process will be included to encourage resolution of disputes without resort to adjudication or the courts.

Additional clauses

a. Clause Z will apply, and 'Z' clauses will cover, amongst other things:

(i) Transparency, as required by the Freedom of Information Act and the Environmental Impact Regulations

(ii) The passing of prompt payment obligations down through the supply chain, as required by the Public Contracts Regulations 2015

(iii) Bribery and corruption

(iv) Social value obligations

b. 'Z' clauses will also be used to join together the three stages of the contract – design, construction, and landscape maintenance – and to allow for the use of different main option clauses at each stage

Insurance and limits of liability

a. The Council will take an approach to insurance and limits of liability based on market norms, as advised by our professional advisers and subject to testing in dialogue.

Environmental law

b. Additional clauses have been added to the contract to ensure that "there is no breach of Environmental law and no harm is caused to the environment".

Table 5-6 – Additional commercial considerations

Issue	Approach	Rationale
Specification	Based on the DfT Specification for Highway Works. Because this is a Design and Build contract, the Contractor's designer will be responsible for completion of aspects of the works specification in accordance	The DfT specification is the industry standard and is an integrated system including the standards for the works and the approach to testing.

Issue	Approach	Rationale
	with its design. It will do so in conformance to the performance specification developed by the Council and its advisers.	
Landscape maintenance period	Bidder to do landscape maintenance for the first 3 years.	Experience suggests (and our advisers confirm) that most attrition to the planting occurs within the first 3 years. It is logical for the maintenance period to correspond with this period during which the Contractor must replace any dead plants and trees.
Delay damages	Delay damages will be required to cover the cost of keeping the Client project team mobilised for any delay period.	A delay in completing the project does not have a direct monetary impact on the Council, other than the cost of its project team.
Performance bond	NCC have reserved the right to request a performance bond.	The premium for a performance bond is significant and would be passed on to the authority. In practice performance bonds are heavily caveated and hard to claim against.
Retention	There will be no retention of any part of the price.	Retentions have a significant impact on cash flow and as such are usually limited such that they are of limited effect. This means that the administrative burden outweighs their effectiveness.

5.7 RISK ALLOCATION AND TRANSFER

5.7.1. The general principle of risk allocation is that risks should be passed to the party best able to manage them, subject to value for money. As discussed in **section 5.3**, the use of Option C will share the risk more between the Client and Contractor when compared to Options A and B. This incentivises both parties to work together to achieve an efficient delivery.

5.7.2. **Table 5-7** provides an assessment of how the associated risks might be apportioned between the Council and the Contractor.

Table 5-7 – Potential Risk Allocation

Risk Category	Potential allocation	
	Council	Contractor
Design risk		The Contractor will have single-point design responsibility
Construction and development risk	The starting point will be the standard risk allocation in the NEC4 ECC contract. This will be tailored to reflect the specifics of the scheme. See further discussion below.	

Risk Category	Potential allocation	
	Council	Contractor
Transition and implementation risk	Risks associated with vehicle traffic flow will be borne by the Client	Successful commissioning will be a Contractor risk
Availability and performance risk	The contract will contain a performance specification; failure to meet this would be a defect. As this will be a target cost contract, the cost of rectification would be shared.	
Operating risk	Not applicable	
Variability of revenue risks	Not applicable	
Termination risks	The contract will enable the Council to terminate in Stage One in the event that funding is not made available or if the final target price exceeds a set limit (subject to indexation). Otherwise, the standard ECC termination position applies, with additional grounds for termination if the Contractor: ▪ is convicted or has been convicted of a criminal offence relating to the conduct of its business or profession; or ▪ commits or is found to have committed an act of grave misconduct in the course of its business or profession; or ▪ fails or has failed to comply with any obligations relating to the payment of any taxes or social security contributions; or ▪ has made any serious misrepresentations in the tendering process for any project or matter in which the public sector has or had a significant participation; or ▪ fails to obtain any necessary licences or to obtain or maintain membership of any relevant body; or ▪ demerges into two or more firms, merges with another firm, incorporates or otherwise changes its legal form or there is a change of control as defined by section 416 of the Income and Corporation Taxes Act and, in any such change of control, there are reasonable grounds relating to the financial standing of the new entity that is proposed to Provide the Works for the Client to withhold its consent.	
Technology and obsolescence risks	Not applicable.	
Residual value risks	Residual value risk is retained by the Council	
Financing risks	Financing risk is retained by the public sector	

Risk Category	Potential allocation	
	Council	Contractor
Legislative risks	A post-contract change in customs tariffs as a result of Brexit will be a compensation event.	NEC option X2 will not be used

Construction Risk

5.7.3. The standard NEC position will be tailored as follows.

Table 5-8 - Construction risk assumptions

Risk	Position
COVID 19	Dealt with differently between the three stage. In Stage One the occurrence of a Coronavirus Event is the Contractor's liability, i.e. a contractor risk, in Stage Two and Stage Three the occurrence of a Coronavirus Event is a Client liability, i.e. a client risk
Physical conditions – flood	The Contractor bears the risk of normal flooding in the flood plain, but NCC bears the risk of exceptional events.
Utilities	The consequences of delay caused by utilities issues will be a compensation event unless the Contractor contributed to the reason for the delay. The contractor and NCC will work together to minimise utility related issues.

5.7.4. Extensive ground investigation (GI) has been undertaken (including in the flood plain) to enable the standard NEC position on physical conditions (Clause 60.1 (12)) to be tightened. The Contractor will be undertaking further GI during Stage One, which could lead to a budget event, but the risk of ground conditions in Stage Two is the Contractor's.

5.7.5. As part of the dialogue process the risk that COVID and other potential pandemics could present to the construction of the scheme was discussed.

5.7.6. Based on the current scheme costs the quantified risk as set out in the Financial Case is allocated in the following proportions: Client risk 83.63%; Contractor risk 16.37%.

5.7.7. The scheme risks will be managed in line with the risk management strategy set out in the Management Case of the OBC.

5.8 CONTRACT LENGTH

5.8.1. From contract signature, it is envisaged that the support to the planning process, the development of the detailed design, appointment of any sub-contractors not forming part of the original consortium, enabling works and mobilisation will together take up to 30 months.

5.8.2. Construction is expected to commence by October 2023 and commissioning is expected to be complete by October 2025.

5.8.3. It is envisaged that the contractor will be contracted to do the landscape maintenance for a period of 3 years after the scheme is open.

5.9 HUMAN RESOURCE ISSUES

5.9.1. No significant human resources issues have been identified that could affect the deliverability of the scheme. No TUPE issues are expected. The Council will provide personnel to perform the role of Project Manager and create a small site supervision team.

5.9.2. More information on the governance and management of the project, including details of the people involved, is set out in the Management Case.

5.10 CONTRACT MANAGEMENT

5.10.1. NCC's highway team will manage the project after award of contract, it is likely that they will be externally resourced to do this.

5.10.2. The form of contract selected provides NCC with a suitable contract at construction to minimise risk, but with increased ability to bring forward the detailed design process in the programme.

5.10.3. Design, procurement, and construction supervision will be managed by NCC and if necessary supported by NCC's Consultants WSP. Both the Council and the consultant has experience in delivering major schemes including the Norwich Northern Distributor Road (NDR), A47/A1042 Postwick Hub Junction Improvement, the A12/A143 Link Road and the Great Yarmouth 3rd River Crossing (currently under construction).

5.10.4. The Project Manager is named within Contract Data as the individual who will administer the contract on behalf of the Employer. The Project Manager will have the designated authority to issue all instructions, notifications and other communications required under the contract. As well as providing general management support and advice to the Project Manager, NCC will undertake the role of Supervisor under the contract with responsibility to check for compliance to the Works Information. Under the contract the responsibilities of the Project Manager or the Supervisor may be delegated but this is not anticipated at this stage.

5.10.5. The Procurement Lead is Joan Murray (Head of Sourcing) MBA MCIPS FCMI FBCS and procurement follows PCR2015 and Cabinet Office guidance including Procurement Policy Notes.

5.10.6. After each major procurement project, there will be a post-procurement 'lessons learnt' review. Each procurement is of course different and has its own unique challenges, but the Broadland Northway (aka NDR) and Great Yarmouth 3rd River Crossing (GYTRC) are both comparable projects, which provided NCC with lessons learnt that have been useful for the NWL project from design through to contract award and beyond. A lesson's learnt report was published in 2019 for Broadland Northway[26]:

5.10.7. The key lessons learnt relating to procurement discussed in the above-mentioned report are summarised as follows:

[26] https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/norwich/broadland-northway/post-construction-reports

- Early project investment and resourcing of the Infrastructure Delivery team to ensure the Council is better positioned to meet the needs and demands of these major projects.
- Early development of robust contract documents and specifications to reduce the potential for change and the resultant cost of revision and disruption resulting in more efficient delivery and greater predictability of outturn.
- Use of a construction contracts such as Design and Build that gives the contractor the ownership and responsibility for the fully integrated design where there was the need for specialist engineering skills such as for bridge design. This captures the contractors innovation and expertise but also transfers the risk to the contractor.
- Use of a price ceiling 'break point' in the contract at target cost stage. This means if costs increase significantly before the build begins then the contract can be ended.
- Use of experienced commercial specialists to support the contract development and procurement process to provide a firm base for project objectives, reduce the potential for contractual ambiguity and provided the necessary commercial controls to ensure contractor delivery compliance.
- The use of competitive dialogue within the procurement process with bidders to help ensure that the project objectives are understood and draw out potential issues for early resolution.

5.10.8. The outcomes from the NWL post-procurement review can be shared once this has been completed. From a procurement challenge perspective, the Council has a robust process, which has been developed and enhanced to take account of new case law. The feedback provided to bidders contains the detailed rationale for the scoring. There is a full audit trail of evaluation process. The evaluators are subject matter experts, who make their own assessments before meeting as a group to agree the scores."

5.10.9. More detail on contract management will be provided in the Full Business Case.

Commercial Viability

5.10.10. The information above provides evidence that the scheme is commercially viable, with a robust contracting and procurement strategy. The Council has confidence that the contractual and commercial arrangements are appropriate and workable. Specifically:

- The OJEU "competitive dialogue" procurement strategy has been successfully used by the Council on a number of large-scale works and other schemes. The proposed approach is in full accordance with the Council's procurement systems and processes.
- The procurement route includes risk management as a core principle, using strategies of risk allocation and transfer to the contractor. It includes the use of disincentives, such as penalties for programme overruns or missing key milestones, in order to achieve delivery on time and to the required quality.
- There has been considerable interest in the project. Eight responses were received to the PQQ, which included joint ventures between different companies. The three bidders shortlisted demonstrated a wealth of experience on similar projects.

5.11 SUMMARY OF THE COMMERCIAL CASE

5.11.1. The scheme will use the OJEU 'competitive dialogue procedure' procurement route. This is appropriate for a large-scale infrastructure project as it provides for the pre-qualification of suppliers based on their financial standing and technical or professional capability and for dialogue on cost and risk.

5.11.2. A Design and Build form of contract is considered to be the most appropriate for this project. It will involve the Contractor at an early stage to develop the design and help ensure that a buildable and affordable scheme is available.

5.11.3. The contract also includes an initial landscape maintenance period of 3 years.

5.11.4. The Contract for the NWL is split into three sections:

- Stage One Work: the development of the detailed design by the Contractor, including support to the Client during the statutory consents process, completing such surveys and investigations as are required, and the setting of the total of the Prices for Stage Two Work.
- Stage Two Work: the construction of the Norwich Western Link.
- Stage Three Work: landscape maintenance.

5.11.5. NEC4 Engineering and Construction Contract June 2017 has been chosen for the NWL with different options chosen for different stages. The main options are:

- A (in respect of the Stage One Lump Sum Work)
- E (in respect of the Stage One Cost Reimbursable Work),
- C (in respect of the Stage Two Work) and
- A (in respect of the Stage Three Work)

5.11.6. The Commercial Case demonstrates that the scheme is commercially viable, with a robust contracting and procurement strategy.

6 MANAGEMENT CASE

6.1 INTRODUCTION

6.1.1. The Management Case sets out the processes and controls in place to manage the implementation of the scheme, and track and realise future benefits. It demonstrates the way in which the scheme will be delivered in accordance with best practice, project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance.

6.1.2. Specifically, this chapter sets out:

- Evidence of similar, large-scale projects that have been successfully delivered
- Programme and project dependencies and interfaces
- Governance arrangements that have been put in place to oversee delivery
- The stakeholder management process
- The strategy for identifying and managing project risks
- The programme for delivery
- How the intended benefits of the scheme will be realised
- How the performance of the scheme will be monitored.

6.2 EVIDENCE OF SIMILAR PROJECTS

6.2.1. NCC has successfully procured and delivered large-scale infrastructure projects since 1999, using the NEC Engineering and Construction Contract. Projects vary in size and complexity and include:

- Broome Ellingham Bypass
- King's Lynn Household Waste Recycling Centre
- Nar Ouse Regeneration Scheme
- Sprowston, Harford and Thickthorn park and ride sites
- Cringleford Cluster (including new development link road)
- A140 refurbishment at Scole
- King's Lynn South Lynn Transport Major
- King's Lynn Major Developments (including new development link road)
- King's Lynn Transport Interchange
- A47/A1042 Postwick Hub Junction
- A12/A143 Link Road
- Norwich Northern Distributor Road (NNDR)

6.2.2. Three of the most recent successful NCC schemes are listed in **Table 6-1**, which sets out the scope of the works, costs, timescales for implementation, and the procurement strategy employed.

Table 6-1 – Experience of Similar Recent Projects

Scheme name	Description	Contract	Form of contract	Approximate total project value	Construction date
A47/A1042 Postwick Hub Junction Improvement	Construction of a new bridge over the A47 and the construction of associated link roads, slip roads, roundabout junctions, a signal-controlled junction and new access arrangements to the existing Park and Ride site	NEC3 Engineering and Construction Contract	Option C, with a Target Price developed from first principles and an incentivised approach, which aimed to deliver the construction works below the target figure	£28m	Construction commenced in May 2014 and opened to traffic in December 2015
A12/A143 Link Road	Construction of a new link between the A12 trunk road and the A143	NCC Term Service Contract - NEC3 Engineering and Construction Contract	Option C, with a Target Price developed from first principles and an incentivised approach, which aimed to deliver the construction works below the target figure	£8m	Construction commenced in September 2014 and opened to traffic in December 2015
Norwich Northern Distributor Road	Construction of 20km dual carriageway, including eight bridges (one over a railway), a grade separated junction, and associated link roads and roundabout junctions	NEC3 Engineering and Construction Contract	Option C, with a Target Price developed from first principles and an incentivised approach, which aimed to deliver the construction works below the target figure	£177m	Construction commenced December 2015 and fully opened to traffic April 2018

6.2.3. The schemes were developed by NCC, and tendered either directly by NCC, or by using the Council's Strategic Partnership Contract or the Highways Term Service Contract. All three used an Option C Target Cost Contract. NCC has fulfilled the role of Project Manager.

6.2.4. Construction started on the Great Yarmouth 3rd River Crossing in January 2021, it is funded by DfT and has been approved. The river crossing scheme is using the NEC4 Engineering and Construction Contract Option C.

6.2.5. The proposed form of Contract for the construction of the NWL scheme is the NEC4 Engineering and Construction Contract Option C.

6.2.6. Wherever possible, the delivery process for NWL will be improved by acting on the lessons learned on previous schemes. This includes:

- Using knowledge and experience gained during the Town and Country Planning Act (TCPA) process to assist with the development of the **TCPA application** submission, preparation for and attendance at Public Inquiry.
- **Resourcing** – Early project investment, and therefore resource, is essential in delivering the project. In recognition of this lesson learnt the NWL delivery team is resourced to ensure that it is better positioned to meet the needs and demands of the project.
- **Contract Strategy** – The NWL contract is a 'design and build' performance arrangement, reflecting the need for specialist bridge engineering input. This form of contract also gives the contractor ownership and responsibility for the design and delivery of the works and reduces NCC's exposure to the cost risks inherent in a project of this nature.
- **Commercial** – There is benefit in investing in the preparation of carefully considered contract documents. For the NWL, NCC has engaged industry specialists to support the contract development and procurement processes. In addition, the NCC project team includes a dedicated specialist commercial manager to ensure adherence to the contract.
- **Design and Specification** – Design change can result in design, supervision and/or administration costs in addition to those related to construction or delay. For the NWL a 'design and build' approach has been adopted that requires the contractor to provide an output solution. This reduces NCC's exposure to design liability and buildability risks.
- **Third Parties** – Utility companies and transport network operator related works can be sources of considerable cost increase and delay. The NWL project team has engaged with both at an early stage in an effort to build third parties into the planning of the scheme and mitigate against unforeseen challenges.
- **Early Contractor Involvement** - Having a collaborative, open and honest relationship with the contractor enables both parties to work together to achieve the target completion date and to identify efficiencies in the programme through value engineering. Early Contractor Involvement allows the contractor to provide construction advice earlier in the process, helping to reduce costs. For the NWL a 'design and build' approach has been adopted, with the contractor developing their design proposals during the procurement process and then being part of the project team from appointment.
- Carrying out as much of the **utility diversion works** as possible prior to the main start of works.
- Carrying out necessary and significant **archaeological excavation** prior to the main start of works wherever possible.

CONSULTANT EXPERIENCE

6.2.7. NCC is being advised by WSP Ltd, the Council's consultant, and a major provider of highway consultancy services to local authorities.

6.2.8. WSP has experience and expertise in developing business cases, securing funding, planning applications and detailed design for major infrastructure projects for central and local government clients. Recent projects include the Shrewsbury North Western Relief Road, the Lowestoft Lake Lothing Third Crossing for Suffolk County Council, Long Stratton Bypass and the Great Yarmouth 3rd River Crossing. WSP is also one of the UK's leading providers of support services to the statutory procedures required to plan, deliver and maintain infrastructure projects, providing land referencing, stakeholder engagement and consultation services, and order management.

CONTRACTOR EXPERIENCE

6.2.9. The contractor selection process used a competitive tender process. The bidders were asked to provide experience of "bridge and highway design and construction experience", and "experience of dealing with environmental constraints and statutory bodies". The bidders were asked to provide credible evidence that their experience and their capabilities are a close match to the specific subject matter of the contract and the specific circumstances and constraints within which it is to be delivered.

6.2.10. The selection and procurement of the contractor is summarised in the Commercial Case.

6.3 PROGRAMME / PROJECT DEPENDENCIES

6.3.1. The NWL is a stand-alone scheme in principle, which could be delivered independently of any other scheme or development. Similarly, no other future schemes or developments are dependent upon it. However, in its present form it has an interaction with the A47 North Tuddenham to East improvement scheme being delivered by Highways England and this is discussed further below.

A47 North Tuddenham to Easton Improvement Scheme

6.3.2. Highways England is currently progressing plans to dual the section of the A47 between North Tuddenham and Easton as part of the Government's Road Investment Strategy for 2021 – 2025. The scheme has a planned construction date of 2022/2023 to 2024/2025. A statutory consultation ran between 26 February and 30 April 2020. A Development Consent Order (DCO) submission was made in March 2021 and accepted for examination by the Planning Inspectorate in April 2021. The NWL intersects with this via a proposed grade separated junction at Wood Lane / Berry's Lane in Honingham. **Figure 6-1** shows the location of the interface of the NWL with the dualling scheme. Should the DCO be unsuccessful or the scheme not brought forward for delivery this would have an effect on the NWL in its present form as Highways England have included for the improvements to the Wood Lane junction and the NWL connection. Both Highways England and NCC are taking advantage of the concurrent delivery of both schemes to collaborate on the junction design.

6.3.3. The construction of the NWL and the A47 North Tuddenham and Easton dualling scheme will be across the same time period with construction of the NWL due to commence in late 2023 with completion due in 2025. The impact of construction of the two schemes being delivered concurrently will be set out in the Environmental Statement and mitigation will be set out in the Construction Environmental Management Plan (CEMP).

6.3.4. The A47 scheme includes improvements to walking and cycling facilities including a new footbridge across the A47, which will tie-in to existing walking and cycling facilities in the area. There is also an underpass at Honingham (linked to PROW improvements near the Wood Lane junction), an underpass at Honingham Church, and an underbridge south of Hockering (linking towards Mattishall and East Tuddenham).

6.3.5. NCC are working with Highways England and their design and build contractor team (Galliford Try / SWECO) to manage the interface the NWL with the A47 dualling scheme. Since July 2019, there have been monthly calls with the Highways England design team, aiming to align the A47 junction works. The agenda for the monthly meetings includes (amongst others) discussion of junction design, transport modelling, constructability, strategic utilities, Non-Motorised User strategy, surveys and data collection, ecology and environmental mitigation.

6.3.6. Sharing of drawings commenced between the two teams in September 2019, seeking to minimise duplication and maximise integration opportunities. Highways England has also provided input to NWL Project Board meetings and provided updates to the Local Liaison Group meetings.

Figure 6-1 - Highways England Wood Lane Junction Northern Roundabout Interface for NWL

Source: Highways England DCO Report

Transforming Cities Fund (TCF)

6.3.7. Following successful applications Norfolk Councy Council is delivering Tranche 1 and 2 of TCF which is an ambitious programme of works that aims to make significant improvements to the level of public transport services available within the Greater Norwich area and also included a significant private-sector contribution for new and refurbished buses, reflecting confidence and support for the proposals from the area's largest bus operator. In additional to this, a series of walking and cycling improvements across the area is proposed. In combination these improvements aim to reduce

reliance on private cars to access areas on employment and education. Part of the plan to improve the way people travel is to provide improved transport infrastructure so that trips that don't need to be routed through the city have viable alternatives, such as the outer ring road, associated radial routes and Broadland Northway.

6.3.8. The NWL scheme and associated sustainable transport measures are not dependent on these schemes but will be complementary. The NWL scheme will improve walking and cycling infrastructure in the vicinity of the programme and will include tie-ins/connections to existing infrastructure. The Dereham Road improvements include widening of the off-carriageway path for use by cyclists and introduction of new bus lanes on the approaches to a key junction (due to be completed by July 2021), upgrading an existing crossing with a shared path facility (due to be completed December 2021) and provision of a bus gate and mobility hub for Costessey and Bowthorpe (due for completion April 2022). All these schemes are due to be implemented prior to the construction of the NWL.

Sustainable Transport Strategy

6.3.9. An NWL Sustainable Transport Strategy has been developed through public and key stakeholder consultation, seeking to maximise opportunities for transferring shorter distance band trips to non-motorised modes of travel such as walking and cycling where possible.

6.3.10. The Sustainable Transport Strategy also seeks to improve links between existing and growing communities, and helping to alleviate congestion in the inner routes close to Norwich. It is three-fold - it includes a Non-Motorised User Strategy, wider interventions for creating 'cycle friendly' strategic routes and a bus strategy.

6.3.11. To inform the development of Non-Motorised User interventions, a Walking, Cycling & Horse Riding Assessment and Review was undertaken in accordance with DMRB GG142. This guidance is prepared in line with Highways England's Strategic Business Plan and Road Investment Strategy, as well as the Infrastructure Act 2015. This identified opportunities for improving the network of routes available to Non-Motorised Users within a 5km study area around the NWL.

6.3.12. Working with local transport stakeholders and the established Local Liaison Group to help generate ideas, initial options for enhancing Non-Motorised User provision were discussed and developed via a series of workshops. Key themes emerging from the workshops highlighted a desire to avoid closing existing PROWs, but it was recognised that some localised diversions would be necessary and this may also be helpful in joining up the scheme with existing PROWs and responding to the NWL highway design.

6.3.13. Connecting nearby rural communities such as Ringland, Weston Longville and Attlebridge which share local facilities was also a key focus, as well as improving access to the Marriott's Way which is a major well-used NMU route (on the line of a former railway), offering a segregated and direct route from the west of the study area, north of A1067 to central Norwich.

6.3.14. Consideration was given to improve non-car access to schools, medical facilities and enhance sustainable links with key workplaces on the western fringe of Norwich (such as Norfolk and Norwich University Hospital and Norwich Research Park), as well as supporting future growth of the Food Enterprise Zone.

6.4 GOVERNANCE, ORGANISATIONAL STRUCTURE AND ROLES

6.4.1. The governance structure for the delivery of the NWL builds on a tried and tested structure utilised by NCC for the successful delivery of previous schemes.

6.4.2. To ensure successful delivery of the scheme, NCC has established and will continue to resource the following bodies:

- Project Board
- Project Delivery Team
- Member Group
- Stakeholder Groups

6.4.3. The organisational and governance structure is illustrated in **Figure 6-2,** which shows the essential lines of accountability and responsibility. At the heart of project governance is the Project Board, which is accountable through the Project Sponsor to NCC, and responsible for reviewing the scheme and taking key decisions. The Senior Responsible Officer is accountable to the Project Board and is responsible for the work of the Delivery Team. The diagram also shows how the Local Enterprise Partnership and stakeholders relate to project governance.

PROJECT SPONSOR

6.4.4. The Project Sponsor is NCC, represented by Tom McCabe, the Council's Executive Director of Community and Environmental Services, and who is also the Head of Paid Service. As Chair of the Project Board, the Project Sponsor is responsible for reviewing the scheme and taking key decisions.

SENIOR RESPONSIBLE OFFICER

6.4.5. The Senior Responsible Officer is David Allfrey, Infrastructure Delivery Manager, Highways and Waste, Communities and Environmental Services at NCC. He is responsible for the successful delivery of the project, ensuring that it meets its objectives and delivers its intended benefits.

6.4.6. David Allfrey is a Chartered Civil Engineer and a Member of the Institution of Civil Engineers (ICE). He has over 30 years' experience working in the construction industry. For the last 25 years he has worked for NCC specialising in highways design and maintenance, and supervising and delivering a wide range of highway maintenance and major improvement schemes, including:

- The Nar Ouse Regeneration Route in King's Lynn
- A47/A1042 Postwick Hub Junction
- Norwich Northern Distributor Road
- Great Yarmouth 3rd River Crossing

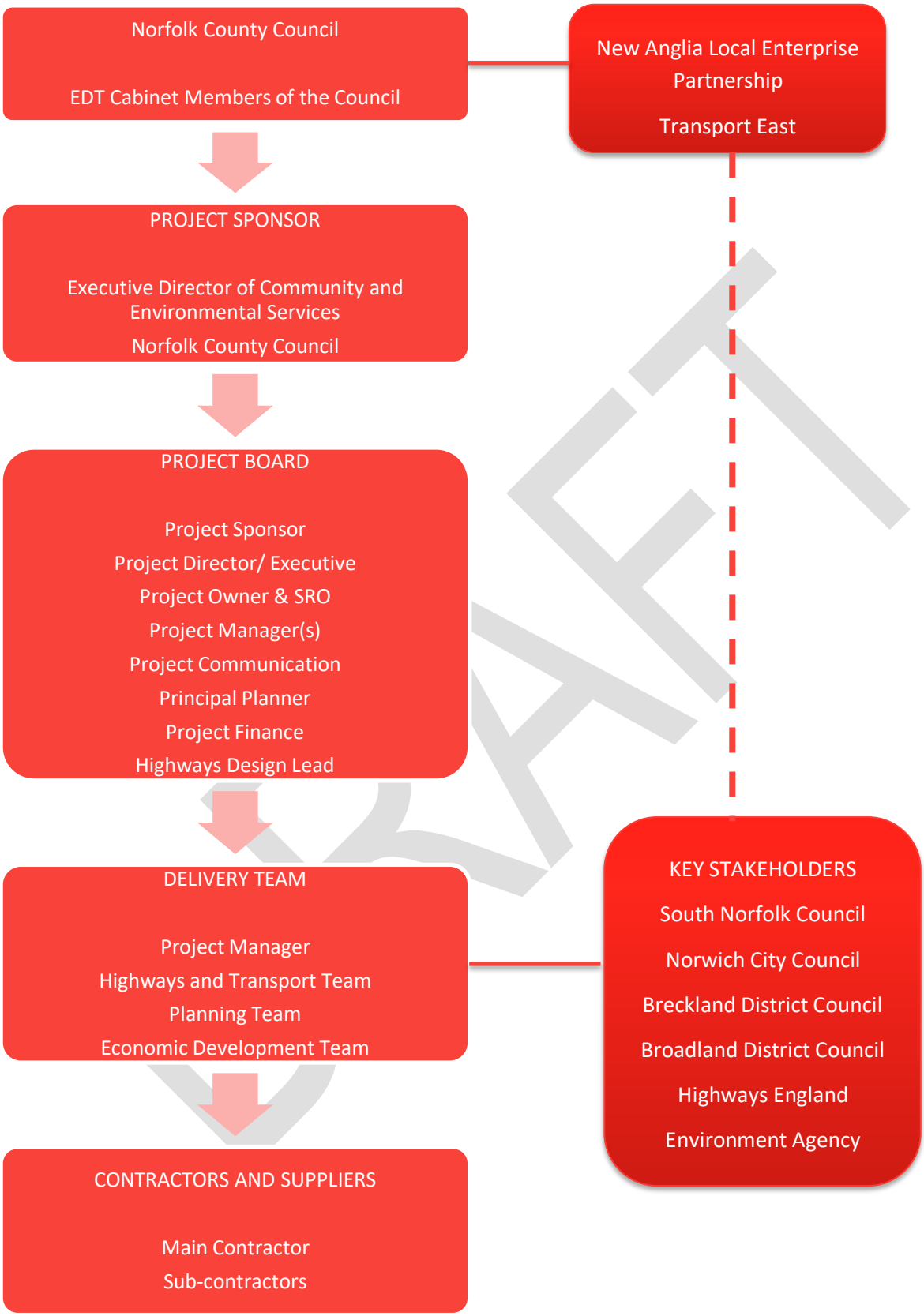


Figure 6-2: - Project Governance Diagram

PROJECT BOARD

6.4.7. NCC has established a Project Board for the scheme. In line with best practice, the board includes representatives of NCC, district councils and Highways England. The main roles of the board are decision making and review. The board enables stakeholders the ability to feed information into the decision-making process and produce a more holistic approach to the management of the project.

6.4.8. The Project Board meets monthly and will continue to do so until the project has been completed. It will subsequently make arrangements for ongoing oversight and the reporting of monitoring and evaluation.

6.4.9. The current Project Board is shown in **Table 6-2**, as follows.

Table 6-2 – Project Board

Role	Responsibilities	Name	Position
Project Sponsor	Chair of Project Board	Tom McCabe	Executive Director of Community and Environmental Services (NCC)
Project Director/Executive	Oversee the development and coordination of the case for the project and ensure it remains in line with the wider county council and LEP priorities	Grahame Bygrave	Assistant Director Highways & Waste (NCC)
Project Owner and Senior Responsible Owner (SRO)	Responsible for the successful delivery of the project, ensuring that it meets its objectives and delivers its intended benefits	David Allfrey	Infrastructure Delivery Manager (NCC)
Principal Planner	Responsible for Economic Development including transport policy	Stephen Faulkner	Principal Planner (NCC)
Project Finance	Review budget and costs to ensure funding is available	Andrew Skiggs	Finance lead and CES Business Partner (NCC)
Project Stakeholder and Engagement Manager	Responsible for communication planning and management	Susie Lockwood	Project communication lead officer (NCC)
Project Manager – NWL Project	Managing the project to ensure that it delivers the required products within the agreed constraints. Coordinating the work of the delivery team	Chris Fernandez	Project Manager (NCC)

Role	Responsibilities	Name	Position
Director of Procurement	Responsible for the procurement delivery	Al Collier	Director of Procurement (NCC)
Transport East and Local Transport Plan Lead	Provides a link with Transport East and Local Transport Plan	David Cumming	Strategic Transport Team Manager
Land Access and acquisition Lead (NPS)	Norfolk Property Services (NPS) representative to provide an update on land access for surveys and land purchases like blight notices	Grant Brewer	Associate – Valuation & Estates Management
Technical & Stakeholder Manager (WSP)	Responsible for communicating with external stakeholders to ensure successful delivery of the project	Paula Cuthbertson	Stakeholder Manager (WSP)
Project Manager (WSP)	Managing the project to ensure that WSP delivers the required product within the agreed constraints	Shay Goane	Project Manager (WSP)
New Anglia LEP Representative	Represents the interests of the LEP	Ellen Goodwin	Infrastructure Manager (NA LEP)
Broadland District Council & South Norfolk District Council Representative	Represents the interest of Broadland District Council & South Norfolk District Council	Phil Courtier	Head of Planning (Broadland & SNDC)
Breckland Council Representative	Represents the interest of Breckland Council	Matthew Hogan	Executive Manager for Growth (Breckland Council)
Norwich City Council Representative	Represents the interest of Norwich City Council	Graham Nelson	Director of Place (Norwich City Council)
Highways England Representative	Highways England representative, feeding in to the A47 project	Glen Owen	Project Leader A47 Schemes (Highways England)

DELIVERY TEAM

6.4.10. NCC's Delivery Team is led by Chris Fernandez as the NWL Project Manager. It includes representatives of the disciplines and work streams involved in delivering the project to completion. The delivery team meets monthly, or as required. The NWL Project Manager is responsible for determining which disciplines or work streams need to be represented at any particular meeting.

6.4.11. The Delivery Team approach runs from 'cradle to grave', right through the design and construction stages. Each work stream has an individual, detailed, programme to meet the target milestones for the coming year and beyond. These are established by the work stream leads together with the NWL Project Manager at the beginning of the work stream, and these are regularly reviewed and are updated as and when required.

6.4.12. Highlight reports are produced by each work stream to update on programme and progress. These are issued to the WSP Project Manager and fed back to NCC via the NWL Project Manager to ensure coordination of activities and prompt action on any arising challenges. The NWL Project Manager also liaises directly with the Project Owner/SRO on any emerging issues, and they also agree the scope of the reporting to the Project Board.

6.4.13. A monthly delivery team meeting provides an additional forum for discussing challenges as they arise.

6.4.14. The main responsibilities of the delivery team are to:

- Coordinate the different activities that make up the project
- Provide direction to the technical delivery of the project
- Undertake monthly reviews of progress against targets and programme, feeding into the Project Board via the WSP and NWL Project Managers
- Undertake monthly review of the risk register, and initiate corrective action where appropriate to feed into the Project Board via the WSP and NWL Project Managers
- Provide as a minimum quarterly progress reports for the Project Board. The Board will consider any matters of a strategic nature and advise accordingly.

6.4.15. Costs are monitored on a monthly basis. The Commercial Manager maintains the system and takes account of any known committed costs in updating the forecast outturn.

6.4.16. The Project Manager, Commercial Manager and Finance Business Partner review the actual and forecast expenditure against profile and budget and this is reported by exception to the Project Board.

6.4.17. The current Delivery Team is shown in **Table 6.3**.

Table 6.3 – Delivery Team members and roles

Role	Responsibility	Name
Senior Responsible Officer/ Project Owner (NCC)	Provides reports to Project Board	David Allfrey (Infrastructure Delivery Manager)
NWL Project Manager (NCC)	Project delivery lead, coordinating work streams and key activities	Chris Fernandez (Project Manager)
NWL Commercial Manager (NCC)	Maintains the costs system and takes account of any known committed costs	Brett Rivett

Project Manager NEC (NCC)	Manages the Design & Build Contractor	Mark Kemp
Stakeholder & Communications Lead (NCC)	Develop communications plan Consultation Stakeholder management Press liaison	Susie Lockwood (Project communications lead officer)
Finance Team (NCC)	Financial monitoring and reporting	Andrew Skiggs (Finance Business Partner)
Legal Team (NCC)	Specialist legal advice	NPLaw
Highways and Transport Team (NCC)	Supporting project delivery	Rob Holl (Design Lead) Marcin Kurek (Procurement Lead) John Wetton (Planning Lead) Rebecca Howard (Project Delivery Coordinator) Lydia Deih (Engineer) Kris Pye (Technician) Grahame Johnson (Technician) Ben Levin (Technician)
Programme Team (NPS)	Programme Management	Tony Fletton (Programme Manager, Survey Access) Sophie Taylor (Assistant Programme Officer)
Project Director (WSP)	WSP Project Owner	Luke Wooller (Project Director)
Technical & Stakeholder Manager (WSP)	Reporting on the technical delivery Communicating with external stakeholders	Paula Cuthbertson (Technical & Stakeholder Manager)
WSP Project Manager (WSP)	Develop Full Business Case Coordinate design and delivery Monitoring and evaluation	Shay Goane (Project Manager)
Assistant Project Manager (WSP)	Support the WSP Project Manager to deliver the project	Hayley Brewer (Assistant Project Manager)

Specialist Teams (WSP)	Technical delivery	
Project Support (NCC)	Support to project manager and delivery team	

6.5 PROJECT PLAN/PROGRAMME

6.5.1. A programme has been developed, setting out key project tasks and their duration, the interdependencies between each of the tasks, and key milestones and gateways.

6.5.2. The programme is a live document, with progress against planned task completion monitored against actual progress on a weekly basis by the NWL and WSP Project Managers. The NWL Project Manager reports progress against plan to the Project Board.

6.5.3. Construction is programmed to commence in late 2023 and be completed in late 2025. A detailed project programme is located in **Appendix 6A**. The key milestones are included in **Table 6-4**.

Table 6-4 – Key Delivery Milestones

Milestone	Current estimate
Large Local Majors (LLM) approval to progress to the next stage of development	May 2020
OJEU notice (start of procurement process)	June 2020
Outline Business Case (OBC) submission	June 2021
Design and Build Contractor appointment	June 2021
Formal Pre-application Public Consultation	September 2021
Planning Application submission	February 2022
Completion of design stage of Design and Build Contract	September 2023
Confirmation of all statutory orders and consents	June 2023
Full Business Case (FBC) submission	June 2023
Start of construction work	Late 2023
Road open	Late 2025

6.6 ASSURANCE & APPROVALS PLAN

APPROVALS

6.6.1. The scheme will follow applicable assurance and approval processes at both a national and local level. As the scheme has a value of over £20 million, the business case has been developed in line with the required TAG processes. The business case will need to be signed off to the satisfaction of the NCC Section 151 Officer in their role as the Chief Financial Officer.

6.6.2. The business case will be approved by NCC Cabinet at a local level and follow the relevant Large Local Majors (LLM) funding approval processes. The scheme is fully supported by Transport East (the sub-national transport body) and they have provided a letter of support.

6.6.3. The DfT will assess the technical content of the business case in order to confirm that the scheme meets the relevant criteria across all five cases. After confirming that the scheme meets the criteria, the DfT will then advise Transport Ministers to approve (or decline) the Business Case.

6.6.4. The local funding contribution is discussed within **section 4.3.4** of the Financial Case. The NCC Section 151 Officer has underwritten the local contribution and will approve the release of local funding, when satisfied and appropriate to do so.

ASSURANCE - GATEWAY REVIEWS

6.6.5. It is essential that large, complex and long-running projects are monitored effectively. All major transport schemes must demonstrate that a system for monitoring progress is part of the management structure and plan. The Gateway Review process is a formal assessment of the progress of a project at key stages in its development.

6.6.6. Gateway Reviews will be undertaken in line with the principles set out in the Project Control Handbook[27]. A Gateway review is a 'peer review' in which independent project managers from outside the project use their experience and expertise to examine the progress and likelihood of successful delivery of the project. In the case of the NWL these peer reviews have been undertaken by Local Partnerships.

6.6.7. A Gateway Review provides assurance and support to the SRO that:

- Suitable skills and experience are deployed on the project
- All stakeholders understand the project status and issues
- There is assurance that the project can progress to the next phase
- Time and cost targets have a realistic basis
- Lessons are learned
- The project team are gaining input from appropriate stakeholders.

[27] Highways Agency, April 2013

6.6.8. Gateway Reviews are a mandated assurance process for all publicly funded major projects, although not all reviews will apply to all projects. The SRO and NWL Project Manager will engage early with the relevant parties to agree which gateways are required and when. Throughout the process, guidance and advice will be sought from relevant centres of expertise (e.g. finance, procurement, economists).

6.6.9. The Gateway Reviews will assess the project's viability, the value for money to be achieved, and the proposed approach for achieving delivery of the project's objectives. This approach will allow the review to assure the Project Board that the selected delivery approach is appropriate.

6.6.10. The following are the normal stages for Gateway Reviews, as part of the process of managing stage boundaries:

Gateway Major project phase/stage

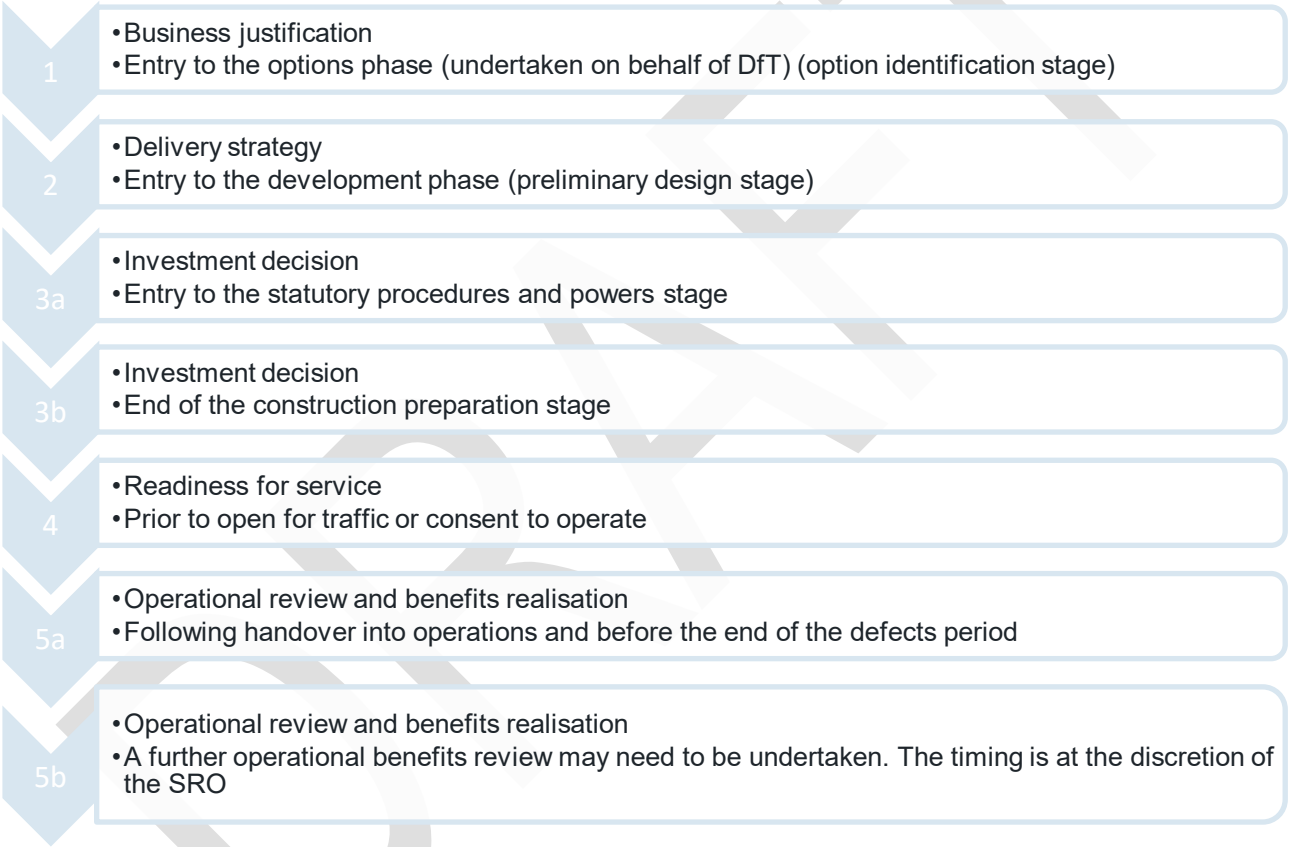


Figure 6-3 - Gateway Review Stages

6.6.11. A Gateway Review covering stages 1 and 2 (option identification and selection) was conducted in November 2019. As part of this review an Action Plan was developed. The following tasks were reviewed as part of the action plan.

- The project team should develop the procurement competitive dialogue phase details as a matter of urgency, alongside the approvals required for the evaluation criteria. This will include, scoping roles, responsibilities and objectives, as well as the careful structuring of each dialogue day, intervals between days, plenary sessions and workstream sessions.

- The project team should ensure that, to avoid a funding shortfall, robust resource management, project cost control and effective change control measures across the project team and advisors are in place and maintained.
- The Review Team recommend that the risk register is reviewed, particularly in light of the controversial nature of project and those risks highlighted above should be reconsidered. Risks should also have an owner and manager.
- The governance structure should be reviewed and membership of both Project Board and project management group rationalised to make sure the focus is on decision making and deliverables.

6.6.12. As of Q2 2021, the NWL is at the Stage 3a Investment decision stage. The assurance and approvals milestones are set out in **Table 6-5**.

Table 6-5 – Assurance and Approvals Milestones

Milestone	Current estimate
NCC Cabinet approval to submit Outline Business Case	June 2021
DfT OBC Approval (anticipated)	September 2021
NCC Cabinet authority to conduct Pre-Application Consultation	June 2021
NCC Cabinet approval to appoint Design and Build Contractor	June 2021
NCC Cabinet authority to submit Planning Application	January 2022
NCC approval to submit Full Business Case	June 2023
DfT Full Business Case decision (anticipated)	September 2023

6.6.13. A gateway review was carried out for the project by Local Partnerships in January 2021, as part of this review an Action Plan was developed. The following review tasks were included in the action plan and are regularly reviewed by the project team. The latest action plan review is attached as Appendix 6B.

- Undertake a review of the current communications and stakeholder engagement strategy ahead of the next phase. Ensure that these strategies are cognisant of the project risk log and the communications function is regularly informed of any project issues and problems as they occur.
- NCC should develop and maintain a programme level financial model, to ensure risks and obligations around local contribution funding are fully understood across the various projects as well as undertaking sensitivity [sic] and scenario tests on the financial and economic case.
- NCC to develop the strongest possible strategic case for the project to support the planning and inquiry processes and ensure its strategic significance is fully reflected. Also consider producing a strategic vision document to assist this.

- NCC should undertake further risk analysis and establish financial contingencies for possible cost growth. Close monitoring of cost and changes during Stage 1 of the contract will be essential and should be regularly reviewed by the Project Board.
- NCC invests in building the commercial skills, knowledge and expertise within the project team as part of the wider creation of an NCC internal resilience plan.
- NCC should consider formalising their lessons learned approach such that a more permanent record of key learning is maintained.

6.7 COMMUNICATIONS AND STAKEHOLDER MANAGEMENT

6.7.1. Susie Lockwood is identified as the Stakeholder and Engagement Manager. Her responsibilities include:

- The delivery of the communications strategy
- Creating and reviewing key communications
- Managing relationships with key stakeholders
- Media relations
- Providing regular updates to the Project Board
- Supporting the project team in planning for events/consultations
- Providing direct support for Members (particularly the Cabinet Member) and senior officers
- Being a key point of contact with the NCC communications team and communications leads at partner organisations.

COMMUNICATION STRATEGY

A communication strategy has been developedThe objectives of the communication strategy are to:

- Clearly and effectively communicate the benefits of and need for the Norwich Western Link, using evidence and independent advocacy to make the case
- Provide reassurance and counter misinformation regarding the ecological and environmental impacts of the project
- Ensure local residents, elected representatives, businesses and affected landowners are kept informed and given opportunities to ask questions and comment on the proposals (including but not limited to public consultations)
- Help raise the profile of, and obtain funding for, the project by securing and evidencing support from key stakeholders and providing compelling information to decision makers
- Reduce or remove negative reputational impacts by anticipating likely criticisms, concerns and controversies and take mitigating action
- Advise the project team around public perception and engagement approaches relating to the technical development of the project.
- Ensure there is clear connectivity with appropriate messaging and engagement relating to Transport for Norwich and Transforming Cities.

6.7.2. The strategy sets out the communication methods to be used and how enquiries from members of the public should be dealt with. It is a live document, which will be regularly updated to reflect changes to the programme and emerging details. It covers the database of stakeholders with whom information and updates are shared. This includes media, landowners and other interested parties.

6.7.3. The local media and community newsletters are informed at key points throughout the project via briefings, press releases and targeted content such as copy, photos, maps and artist's impressions. The NCC website has a dedicated NWL section, which is updated regularly and features a frequently asked questions page[28].

STAKEHOLDERS

6.7.4. Stakeholders have a crucial role in the successful delivery of the scheme. Engagement and consultation give all stakeholder groups a voice that is heard. It allows concerns to be addressed at an early stage to ensure a successful outcome.

6.7.5. NCC has engaged with local stakeholders as part of the preparation of the Outline Business Case.

6.7.6. NCC will build upon the extensive stakeholder engagement already undertaken, and on the relationships developed with businesses, residents and all other interested parties. Stakeholders will continue to be involved throughout the development of the Full Business Case, and the delivery phase. A Stakeholder Management Plan has been developed as part of the wider Communication and Engagement strategy for the scheme.

6.7.7. A stakeholder database is maintained by the NWL project team. Information and updates on the project are shared with them as appropriate in order to keep people with an interest in the project informed. This database comprises:

- Norfolk county councillors, including the Leader and Deputy Leader, cabinet members, the Norwich Western Link member group and local members
- The Norwich Western Link Project Board
- The Norwich Western Link Local Liaison Group (made up of local parish council representatives)
- Parish council clerks
- Local MPs
- Relevant district councils, including chief executives and councillors
- Natural England and the Environment Agency
- The Norwich Western Link Ecology Liaison Group (made up of groups with an interest and expertise in wildlife and habitats and their preservation and management)
- Norfolk Chamber of Commerce
- New Anglia Local Enterprise Partnership
- Highways England
- Department for Transport
- Businesses in the area to the west of Norwich
- Norwich Airport
- Norfolk and Norwich University Hospital

[28] https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/norwich/norwich-western-link/your-questions-answered

- Norfolk Police
- Norfolk Fire and Rescue Service
- East of England Ambulance Service
- Norwich Research Park
- Easton and Otley College
- Road Haulage Association
- Regional haulage companies
- Public transport providers
- Anglia Farmers
- Walking and cycling groups
- Local Access Forum
- Campaign groups

6.7.8. Members of the local and regional media are communicated with via press releases, briefings and reactive enquiries and in accordance with NCC's media protocols.

6.7.9. NCC has engaged NPS Property Consultants to be the primary liaison with affected landowners. NPS are experts in this field and advise on the County Council's legal obligations, as well as the implications of the scheme on landowners and their rights.

COMMUNICATION METHODS

6.7.10. The main communications methods used are:

- Website – the Norwich Western Link webpages on the Norfolk County Council website (www.norfolk.gov.uk/nwl) will remain the core information resource, serving both as a comprehensive reference library for background information and a source of the latest updates, utilising maps, visualisations, photos and videos. A frequently asked questions section is maintained. All other communications will direct people to the webpages to find out more about the project. The webpages are reviewed monthly and updated regularly to ensure up-to-date information is provided, with substantial updates planned to coincide with significant project milestones.
- Email – Updates about the project are sent to a database of stakeholders and those registered to receive updates through the consultation websites. A project email address has been set up and this will be promoted as the primary means to get in touch with the project team.
- Social media – updates are posted on Norfolk County Council's Facebook and Twitter accounts, which are well-established and have strong followings.
- Briefings – meetings are offered and arranged with key stakeholders as appropriate ahead of announcements and project milestones, and in response to any concerns being raised. In many instances, these briefings will also serve the purpose of encouraging the stakeholders to share the information via their own channels and advocate for the project. As the Coronavirus pandemic and associated restrictions continue, it is likely that these will need to be carried out remotely, via phone or internet calls. This will be reviewed as and when restrictions are relaxed.
- Local media – good relationships have been built and will be maintained with local editors and reporters. Regular information and multimedia content are provided to them via press releases, interview and photo opportunities, media briefings and site visits.
- Events and meetings – opportunities to attend relevant groups, events and council committees that grant access to multiple key stakeholders are sought out, with the intention of providing updates and answering questions. As the Coronavirus pandemic and associated restrictions

continue, alternatives to face-to-face events and meetings will be sought where appropriate, for example making use of video calling and presenting and providing written updates where this isn't possible (for example, due to digital exclusion). This will be reviewed as and when restrictions are relaxed

- **E-newsletter** – As the project progresses and more detail is confirmed, an e-newsletter will be established to provide a trusted and regular source of information and project updates. This will commence when the contractor has been appointed and people will be encouraged to sign up to receive the newsletter by signing up via the county council website. As the e-newsletter becomes established, it is likely that the stakeholder database will be refined and fewer updates may be sent to this list to avoid information overload and duplication of work.

LIAISON GROUPS

6.7.11. Proactive and regular engagement has been established via four liaison groups:

- Member Group - a cross-party group of county councillors chaired by Cllr Stuart Clancy that meets bi-monthly to receive updates on the project and provides advice and insight to the project team.
- Local Liaison Group - a group comprised of parish council representatives from a wide area to the west of Norwich. The group is chaired by Cllr Martin Wilby, the County Council's Cabinet Member for Highways and Infrastructure and meets bi-monthly to receive updates on the project, provide advice and insight to the project team. The intention is that representatives can then share information with their fellow parish councillors and the wider community.
- Ecology Liaison Group - a group comprising representatives from wildlife groups and organisations with an interest in the Norwich Western Link area. The group is chaired by Ian Ellis, the lead ecologist on the project, and meets every two to three months to receive updates on the project (with an emphasis on the ecological elements) and provide advice and support to the project team, most specifically in relation to mitigation measures and biodiversity net gain approaches.
- **Sustainable transport stakeholder group** – a group comprising representatives from organisations and groups with an interest in measures to support more sustainable forms of transport, including walking, cycling and public transport. The group is chaired by Paula Cuthbertson, who leads on the project's sustainable transport strategy. The group meets to provide input and receive updates on the project's sustainable transport measures. These meetings coincide with relevant project timings rather than being held at regular intervals.

6.7.12. As well as providing a means to keep these key stakeholders updated, it is intended that these groups will limit time and resource demands on the project team by reducing reactive enquiries and one-on-one briefings. Meetings with individual stakeholders and organisations will still be arranged as appropriate.

6.7.13. During the Coronavirus pandemic, meetings with these groups have been carried out remotely via Microsoft Teams. While this presents some challenges, it has generally been an effective means of continuing engagement with groups which otherwise, according to current restrictions, we would not be able to meet all together. In some instances, meetings with individuals, both remotely and in person, have been arranged due to the limitations of the Teams platform e.g. due to technical issues or a hearing disability.

PUBLIC CONSULTATION

6.7.14. Three public consultations have been carried out to date:

- May to July 2018 - Initial consultation on traffic issues to the west of Norwich
- November 2018 to January 2019 - Consultation on shortlist of options
- July to September 2020 - Local Access Consultation on how the council could best support people to walk, cycle and use public transport in the area to the west of Norwich, and for opinions on proposals for local roads that cross the planned Norwich Western Link, as well as for Public Rights of Way in the vicinity of the new road.

Public consultation on transport issues (May to July 2018)

6.7.15. This consultation had two elements - a text-based 'Initial Views' questionnaire and a complementary map on which people could highlight transport issues in specific locations.

6.7.16. The Initial View consultation received more than 1,700 responses, with more than 750 comments from just over 530 contributors 'pinned' to the consultation map.

6.7.17. The results show that the majority of people (64%) who took part in the consultation believe a new road linking the A47 to Broadland Northway (previously the Northern Distributor Road) would help tackle transport issues in the area. This option was selected more than three times as much as the next most popular option, 'Improving existing roads'.

Public consultation on shortlisted options (November 2018 to January 2019)

6.7.18. More than 1,900 people responded to the options consultation, with 1,825 responding via the consultation survey available on the consultation website and 104 sending their responses by letter or email. The consultation website was viewed by 3,475 people and a total of 1,245 people came to 17 consultation events staffed by members of the Norwich Western Link project team.

6.7.19. There was strong support for creating the link road and 77% of respondents either agreed or mostly agreed when asked to what extent they agreed there was a need for a Norwich Western Link. Further details of the public consultation is provided in the Strategic case.

Local Access Consultation (July to September 2020)

6.7.20. The third public consultation; the Local Access Consultation, ran for eight weeks between Monday 27 July and Sunday 20 September 2020. The consultation asked for people's views on how the council could best support people to walk, cycle and use public transport in the area to the west of Norwich, and for opinions on proposals for local roads that cross the planned Norwich Western Link, as well as for Public Rights of Way in the vicinity of the new road. Further details of the public consultation is provided in the Strategic case.

KEY COMMUNICATIONS ACTIVITY SCHEDULE

6.7.21. With construction due to start in late 2023, the communications activity schedule provides high-level milestones for later stages of the project. As the project proceeds and more detail is known, the schedule will be updated.

6.7.22. This schedule is based on the project programme, which assumes statutory processes are completed as anticipated.

Dates	Project activity	Communications activity	Audience
Summer 2021	Cabinet report to seek permission to submit OBC and appoint contractor	Press release, briefings, email and news update, website and social media updates, reactive statements and Q&As prepared	Everyone
Summer 2021	Contractor appointed	Press release, briefings, email and news update, website and social media updates	Everyone
Summer 2021	Outline Business Case submission	Press release, briefings, email and news update, website and social media update	Everyone
Summer 2021	n/a	Provide advice and information as appropriate on Norwich Western Link-related aspects of Transport for Norwich Strategy public consultation and prepare relevant Q&As	Everyone
Summer/autumn 2021	Lobbying work to support Outline Business Case submission and maintain/gain support	Briefings, events and meetings, supported by targeted material (e.g. briefing notes and brochures	Key stakeholders and decision makers
Summer/autumn 2021	n/a	Launch e-newsletter	Everyone
Autumn 2021	Pre-planning application public consultation	Pre-publicity, briefings, design work (brochure, leaflets, exhibition boards), press releases and media briefings, email and news updates, website and social media updates	Everyone
Autumn 2021	DfT OBC approval	Press release, briefings, email and news update, website and social media update	Everyone
Early 2022	Cabinet report seeking approval for planning application	Press release, email and news update, website and social media updates, briefings and meeting	Everyone
Early 2022	Planning application submission	Email to key stakeholders, website update (	Everyone

Dates	Project activity	Communications activity	Audience
Mid 2022	Determination of planning decision (if not called in)	Press release, briefings, email and news update, website and social media update.	Everyone
Late 2022	Public Inquiry (if occurs)	TBC	
June 2023	Full Business Case (FBC) submitted to DfT	TBC	
Late 2023	Start of works on site	Photo call with key stakeholders. Press release, email and news update. Update website and social media	Everyone
Late 2025	Norwich Western Link open to the public	Official opening event and announcement. Press release, email and news update, update website and social media	Everyone

6.8 PROJECT REPORTING

6.8.1. Project reporting is a live process throughout the life cycle of the project, addressing the reporting of progress, risks and change. This involves the following regular actions, as well as additional reporting as and when required:

- The NWL Project Manager reports to the Project Board at each Project Board meeting
- The WSP Delivery Team leads report to the WSP Project Manager monthly in advance of Project Board meetings and hold bi-weekly calls to discuss progress. The WSP Project Manager then reports to the NWL Project Manager, who also raises any key issues with the Project Owner/SRO.

6.8.2. Progress is reported by the project team to the NCC's Cabinet, which has executive powers. Intervening reports are prepared where decisions by the Cabinet are needed. The Senior Responsible Officer provides updates to the responsible Cabinet Member. This ensures appropriate involvement of the elected members in this important project.

6.8.3. In specific circumstances, Cabinet can give powers to either the Project Board or the Chair of the Project Board (Executive Director of Community and Environmental Services) to make specific decisions on projects.

6.8.4. The Senior Responsible Officer reviews the actual and forecast expenditure against profile and budget and reports by exception to the Project Board.

6.9 RISK MANAGEMENT STRATEGY

6.9.1. In line with project reporting, the risk management strategy will be updated on an ongoing basis to capture the progress of the scheme and assist with programme management.

6.9.2. Annex 5 of the HM Treasury Green Book states that “effective risk management helps the achievement of wider aims, such as effective change management, the efficient use of resources, better project management, minimising waste and fraud, and supporting innovation”.

6.9.3. A four-stage risk management process has been followed, as illustrated in **Figure 6-4**:

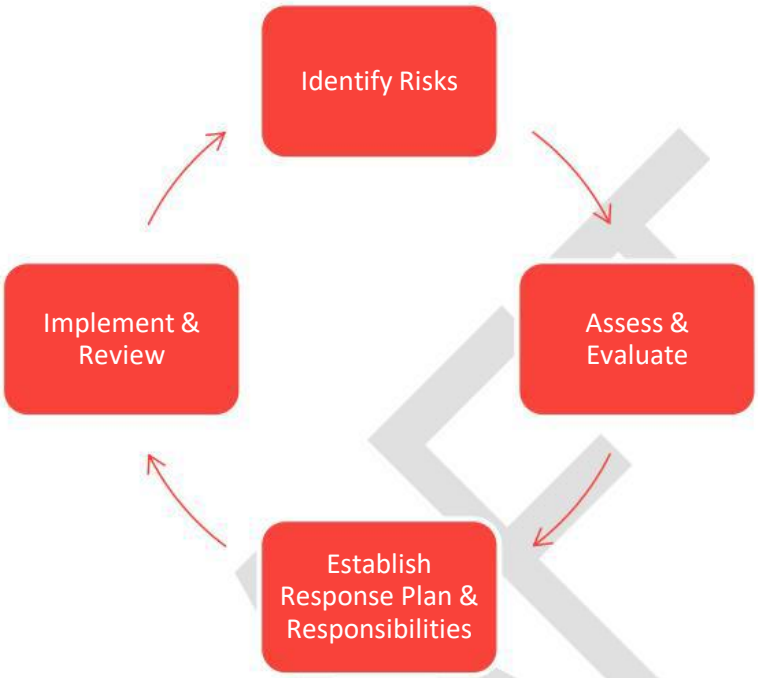


Figure 6-4 - The 4-stage risk management process

IDENTIFYING RISKS

6.9.4. A Risk Register was initially developed in June 2018 to consider risks associated with the options and preferred scheme, and to provide up-to-date input to the above process. Risks were identified by specialists in highways and structural engineering, geotechnics, transport planning, quantity surveying and the environmental disciplines and entered into the Risk Register. This risk register is a live document, which is a continuous process and new risks are identified by specialists as the scheme progresses. The risk register is updated monthly by the project team and reported to Project Board for challenge / review

6.9.5. Some of the early risks identified included:

- Environmental challenge for the River Wensum Special Area of Conservation (SAC)
- River Wensum SAC prevents crossing of River Wensum (Natura 2000 site)
- Poor surface water drainage design - inadequate pollution control designed into scheme
- Funding for continued scheme development.

6.9.6. Following submission of the OBC and when the Contractor is appointed, quarterly risk workshops are planned with attendees from WSP, NCC and the D&B Contractor

6.9.7. Risks are categorised as strategic or operational and are further classified as:

- Funding/Third Parties
- Programme/Contract
- Scope Change

- Weather
- Design Risk
- Environmental
- Statutory undertakers' services
- Existing structures
- Approvals
- Planning
- Procurement
- Site conditions
- Construction

6.9.8. These are catalogued in the Risk Register. This is a live document, which is continually updated as the project progresses adding new risks and updating progress on existing risks, as well as marking some as closed when appropriate. The current highest scoring risks are summarised in **Table 6-6**.

Table 6-6 – Top Risks from Current risk register (May 2021)

Risk Description (lack of, failure to…)	Impact of Risk	Risk Score	Mitigation	Score Post Mitigation
Objectors disrupt environmental surveys	1. Incomplete surveys and hence assessments may not be suitable for submission to the determining authority 2. Delay to programme while surveys are rescheduled 3. Increase in survey costs 4. Impact on staff physical and mental wellbeing	16	Monitor social media and assess whether disruption to surveys is likley. If disruption is likley, take additional measures such as increasing staff numbers, informing the police and other security measures	3
Award of contract delayed from 01/04/2021 to 25/06/2021.	1. Programme delay resulting in additonal costs.	15	Programme review to consider mitigation to minimise or eliminate the effects on Stage Two. Carry out activities at risk.	15
The programme for adoption of the GNLP and LTP are delayed	1. The NWL programme does not align with the plan making process 2. Reference to these policies would need to consider their stage in development	12	Engagement with the GNLP, LTP team and Counsel to understand the programme for inclusion of the NWL.	1
There may be a variation between actual site conditions and assumptions used in design, such as the GI and topographical survey.	1. Ground works costs increase 2. Land take may increase, 3. The drainage design may need revision	12	Intrusive ground investigation surveys to be undertaken sufficiently soon in programme (including ground water monitoring and infiltration testing). Ensure surveys are robust to minimise unknown changes in conditions	6
Sustainable transport strategy - provisions. Development of the shortlisted wider measures (1, 3, 4, 5 and 7E).	1. Additional design, construction and programme implications.	12	As designs develop further, continue to monitor costs and implications of the proposals.	12

Risk Description (lack of, failure to…)	Impact of Risk	Risk Score	Mitigation	Score Post Mitigation
Sufficiency of the Contractor's Budget for Stage Two Work	1. Increases the total of the Prices for Stage Two. 2. Programme effects, works not included in the Accepted Programme.	12	1. Further work with the preferred bidder to confirm robustness of price and suitable risk allowances	12
The project red line boundary may increase due to ecology mitigation or the release of further requirements for constructability.	1. Programme delays to reach agreement with landowns/CPO additional land 2. Cost and programme implications of increasing the project red line.	12	Confirm 'potential' compound areas in procurement process. Ensure the worst case scenario is captured and Ecology and other teams have input	2
The planning application takes longer than 24 weeks to determine.	1. Programme delay	12	Early engagement with LPA ensure sufficient resource available for determination.	2
The planning application is viewed by NCC (acting as the Local Planning Authority) as being 'contrary to the development plan'.	This would make getting planning permission more difficult. The Scheme would have to be justified based on 'material considerations', which is a higher bar than getting planning permission for a scheme that is in accordance with the development plan. Also increase the risk that the Secretaty of State calls the application in.	12	Early engagement with the LPA. Ultimately accordance with the development plan is a mattter of judgement, and the planning statement be used to seek NCC's feedback on the approach that has been taken to the issue.	9
Ecology and environment survey data becoming 'out of date' in relation to the planning application date. This is dependant upon the type of flora/fauna and associated habitat.	1. Cost implications of repeating surveys 2. Delay to planning application 3. Design changes as a result of further information	12	Plan re-surveying in case of programme slippage.	2

Risk Description (lack of, failure to…)	Impact of Risk	Risk Score	Mitigation	Score Post Mitigation
Late receipt of data or feedback from stakeholders relating to EIA/ES.	1. Delay to submission of the planning application 2. Costs associated with updating assessments and planning documents 3. Challenge to submission based on new evidence	12	Bring forward surveys as much as possible. Ensure comprehensive early engagement with stakeholdrs and the public to minimise unexpected late changes.	2
The traffic modelling could show the scheme does not have sufficient benefits for a business case resulting from the updated traffic model, HE changes on the A47 or alternative developments emerge as part of the Local Plan 2036.	1. Insufficient BCR to progress scheme. Project costs (including mitigation) may outweigh benefits 2. Model forecasts change	12	1. Update traffic modelling and undertake scenario testing. 2. Consider mitigation costs. 3. Regular engagement with Local Plan team. 4. Engagement with HE as schemes develop so they are coordinated.	1
Design change required to maintain connectivity for walking and cycling. The A47 scheme includes a new walking and cycling route towards Hockering which passes to the north of the Wood Lane junction, across the proposed NWL.	Additonal crossing or other design changes to accommodate the re-routing of the new route leading to 1. Additional costs 2. Objection to proposals from stakeholders	10	1. Discussions with HE to consider design solution. 2. Consider alternative routing of NMU's on the NWL	10

6.9.9. While not included in the highest risk items in the May risk register, risks due to COVID are being tracked, including delays to ecological surveys incurred due to the first lockdown.

Quantified risk

6.9.10. *TAG Unit A1.2* requires that all project related risks that may impact on the scheme costs should be identified and quantified in a Quantified Risk Assessment (QRA), in order to produce a risk-adjusted cost estimate.

6.9.11. Risks have been quantified in order to produce a risk-adjusted cost estimate. The range of possible costs associated with each risk has been estimated and each risk assigned a high, medium or low value. The likelihood of each risk occurring was then estimated, and assigned a high, medium, or low value, both before and, where appropriate, after mitigation. For each risk, the cost multiplied by its likelihood gives an expected value. Further detail is provided in the Financial Case Section 4.2.

MANAGING RISKS

6.9.12. NCC managers are encouraged and supported to be innovative whilst understanding the risk and implications so they might make informed decisions. By being risk aware, reviewing its risk appetite and tolerance, NCC is better placed to both take advantage of opportunities and manage threats.

6.9.13. Risk management is a continual process involving the identification and assessment of risks, prioritisation of them and the implementation of actions to mitigate the likelihood of them occurring and potential impact. The Project Board's approach to risk management is proportionate to the decision being made or the impact of the risk, to enable NCC to manage risks in a consistent manner, at all levels.

6.9.14. Each risk receives a description and impact of risk, with each entry assigned a likelihood, impact and risk score. Risk mitigation measures are identified, and progress is recorded against each item. An assessment is made against every item recording the opening risk level, the current risk level and the mitigated risk level.

6.9.15. Having identified scheme risks and undertaken an initial assessment, responsibilities for the management of individual risks are allocated to the most appropriate party with one of four possible strategies adopted:

- **Accept or tolerate consequences** in the event that the risk occurs – In the event that a) the cost of taking any action exceeds the potential benefit gained; or b) there are no alternative courses of action available
- **Treating the risk** – Continuing with the activity that caused the risk by employing four different types of control including preventative, corrective, directive and detective controls
- **Transferring the risk** – Risks could be transferred to a third party e.g. insurer or contractor
- **Terminating the activity** that gives rise to the risk.

6.9.16. The effectiveness of the mitigation will depend on the proper implementation and review of the residual risk, including any secondary risk associated with implementation, at key decision points in the life of the scheme.

6.9.17. To achieve this, scheme risk assessments and their associated mitigation will be regularly reviewed and reported to the Project Board throughout the detailed design and construction stages.

6.9.18. Development of the mitigation to manage risks has been undertaken and will be taken where the likelihood of occurrence and impact can be cost effectively managed.

Transfer of risk to the contractor

6.9.19. The Commercial Case describes how the contract and procurement strategy will seek to place risk with the party best placed to manage or mitigate that risk or manage the consequences should they transpire. Early involvement with the contractor will include an assessment of the appropriate balance of risk. Design risk could be retained by the Council or transferred to the contractor. Delivery and programme risk will substantially rest with the contractor.

6.9.20. The contractor will be required to produce a priced risk register. This will be reviewed as part of the process of target setting and decisions made on the mechanism for sharing risk between the contractor and NCC, ensuring that the proposed allocation provides the best value for money for the project. The risks on which NCC will need to take a view are noted within the Commercial Case **section 5.7**.

6.10 BENEFITS MANAGEMENT AND EVALUATION

BENEFIT REALISATION

6.10.1. This section outlines the approach that will be taken to the preparation of a Benefits Realisation Plan. This enables the benefits and disbenefits that are expected to derive from the project to be planned, tracked, managed, and realised. It helps to demonstrate whether the scheme objectives identified in the Strategic Case are being achieved in terms of the desired "measures for success".

6.10.2. The desired outputs are those tangible effects that are funded and produced directly as a result of the scheme. The desired outcomes are the final impacts brought about by the scheme in the short, medium and long term. The strategic objectives, together with the desired outputs and outcomes are summarised in **Table 6-7** in consideration of the strategic objectives**.**

Table 6-7 – Strategic Objectives (High Level), outputs and outcomes

Strategic objectives	Desired outputs	Desired outcomes
H1 Support sustainable economic growth	A scheme encourages growth locally and regionally, giving easy access to housing and economic drivers while minimising the impact on the environment	Sustain growth Journey time improvements Improved: ▪ connection to airport ▪ connection to new or existing housing ▪ connection to Norwich Research Park ▪ connection to Norfolk Broads – Tourism significant to local economy ▪ connection to Food Enterprise Zone Environmental assets protected, and adverse impacts minimised or mitigated. Improved access to potential housing and business
H2 Improve the quality of life for local communities	Improve access to local facilities while reducing severance	Improve accessibility to local amenities Reduce severance Reduce injury and or death

Strategic objectives	Desired outputs	Desired outcomes
H3 Promote an improved environment	A scheme which helps reduce traffic in environmentally sensitive areas, and which will aim to minimise its total emissions of greenhouse gases and pollutants where possible, particularly in areas with lower air quality. A scheme which has been designed to minimise its own impact on the local built and natural environment	Contribution towards carbon reduction targets wherever possible. Improved health and well-being. Impacts on environmental assets and adverse impacts minimised or mitigated wherever possible The route should avoid or minimise harm to above ground heritage assets and valued landscape resulting from changes to setting
H4 Improve strategic connectivity with the national road network	A scheme which provides a direct road link between the A1067/A1270 and A47 and which reduces journey time for people moving between the respective destinations	Reduced journey time and distance between the A1067/A1270 and the A47. Improved access to the strategic road network Easier, quicker, access between employment, education, social and recreational destinations

6.10.3. The scheme objectives, together with the desired outputs and outcomes are summarised in **Table 6-8** in consideration of the scheme objectives.

Table 6-8 - Scheme Objectives, outputs and outcomes

Scheme specific objectives	Desired outputs	Desired outcomes
S1 Improve connectivity and journey times on the key routes within the Greater Norwich area	A scheme which reduces traffic on existing routes including the those between A1067 and the A47 and the A1067 and A47 themselves	Improved journey time and journey reliability on routes through the area west of Norwich Reduce congestion and delay through the area west of Norwich Reassignment of traffic away from existing routes reducing delay and congestion improving existing accessibility. Reduce emergency response times Improve network resilience
S2 Reduce the impacts of traffic on people and places within the Western area of Greater Norwich	A scheme which reduces traffic on existing routes including the those between A1067 and the A47 and the A1067 and A47 themselves	Reassignment of trips onto appropriate routes Reduce noise in local communities overall in the western area of Greater Norwich Reduce net emissions of CO2 and other greenhouse gases in local communities overall in the area west of Norwich Improve NMU connectivity

Scheme specific objectives	Desired outputs	Desired outcomes
		Improve air quality, especially in the built-up areas of West Norwich Minimise traffic impacts on local residents during construction
S3 Encourage and support walking, cycling and public transport use	Improved/new walking, cycling facilities and PT facilities	Increase in number of trips taken by walking, cycling and public transport Increased access to public transport, walking and cycling facilities
S4 Improve safety on and near the road network, especially for pedestrians and cyclists	Reduced traffic on existing highway network, improved/new walking and cycling facilities	Reduced overall network accident rate Reduce the number of people killed or seriously injured on roads in the area west of Norwich Minimise highway safety impacts and severance during construction.
S5 Protect the natural and built environment, including the integrity of the River Wensum SAC	Greenbridges, onsite and offsite provision of compensatory habitat	Biodiversity Net Gain Minimised impact on landscape Minimised impact on heritage Not affect the integrity of the River Wensum SAC Minimise impact of scheme on climate change Minimise adverse environmental impacts arising from construction
S6 Improve accessibility to key sites in Greater Norwich	New/improved facilities for all modes of transport.	Improved accessibility to Norwich Airport, Norfolk and Norwich University Hospital, Food Enterprise Zone, other key employment sites and education sites Improved accessibility to green areas Improved access to the cycle and Public Rights of Way network

6.10.4. The Benefits Realisation Plan will be linked to the Monitoring and Evaluation Plan described below and will be owned by the NWL Project Manager.

6.11 MONITORING AND EVALUATION PLAN

6.11.1. Monitoring and evaluation are important elements of any major project. They help to determine the extent to which it is meeting its objectives and delivering the expected benefits, helping to improve future decision making. They are defined in HM Treasury's 'Magenta Book' as follows:

- **Monitoring** seeks to check progress against planned targets. It can be defined as the formal reporting and evidencing that spend and outputs are successfully delivered, and milestones met.
- **Evaluation** is the assessment of the initiative's effectiveness and efficiency during and after implementation. It seeks to measure the causal effect of the scheme on planned outcomes and impacts and assessing whether the anticipated benefits have been realised, how this was achieved, or if not, why not.

6.11.2. DfT guidance sets out three levels of monitoring and evaluation as part of the document 'Monitoring and Evaluation for Local Authority Major Schemes':

- Standard monitoring
- Enhanced monitoring
- Fuller evaluation

6.11.3. All schemes are required to conduct the 'Standard' approach; schemes costing more than £50m are expected to follow the 'Enhanced' guidance. Only selected schemes identified by the DfT are expected to conduct 'Fuller' evaluation.

6.11.4. The monitoring process will be undertaken in three stages:

- Pre-construction and during construction (monitoring)
- One year after (monitoring and evaluation)
- Five years after (monitoring and evaluation)

6.11.5. The 'One Year After' report will be published within two years of scheme opening, focusing on the scheme's outcomes. The final 'Five Years After' report will be published within six years of scheme opening, based on analysis of relevant data, including an assessment of the wider impacts of the scheme.

6.11.6. The following measures will be monitored to meet DfT requirements for fuller evaluation:

- Scheme build
- Scheme costs
- Delivered scheme
- Scheme objectives
- Travel demand
- Travel times and reliability
- Impact on the economy
- Carbon
- Noise
- Local air quality
- Accidents

6.11.7. In addition, an assessment will be undertaken to determine the extent to which the scheme has delivered the Value for Money (VfM) that was anticipated in the appraisal set out in the FBC Economic Case. This will be done by re-calculating the benefit-cost ratio (BCR) in both the 'One Year After' and 'Five Years After' reports and comparing it to the BCR calculated in the FBC.

6.11.8. The Monitoring and Evaluation Plan will set out how data will be collected to monitor the scheme's performance in each of these areas.

6.11.9. A logic model is shown in **Figure 6-5**. It provides an illustrative overview of the inputs and activities of the scheme and refers to its outcome measures of performance.

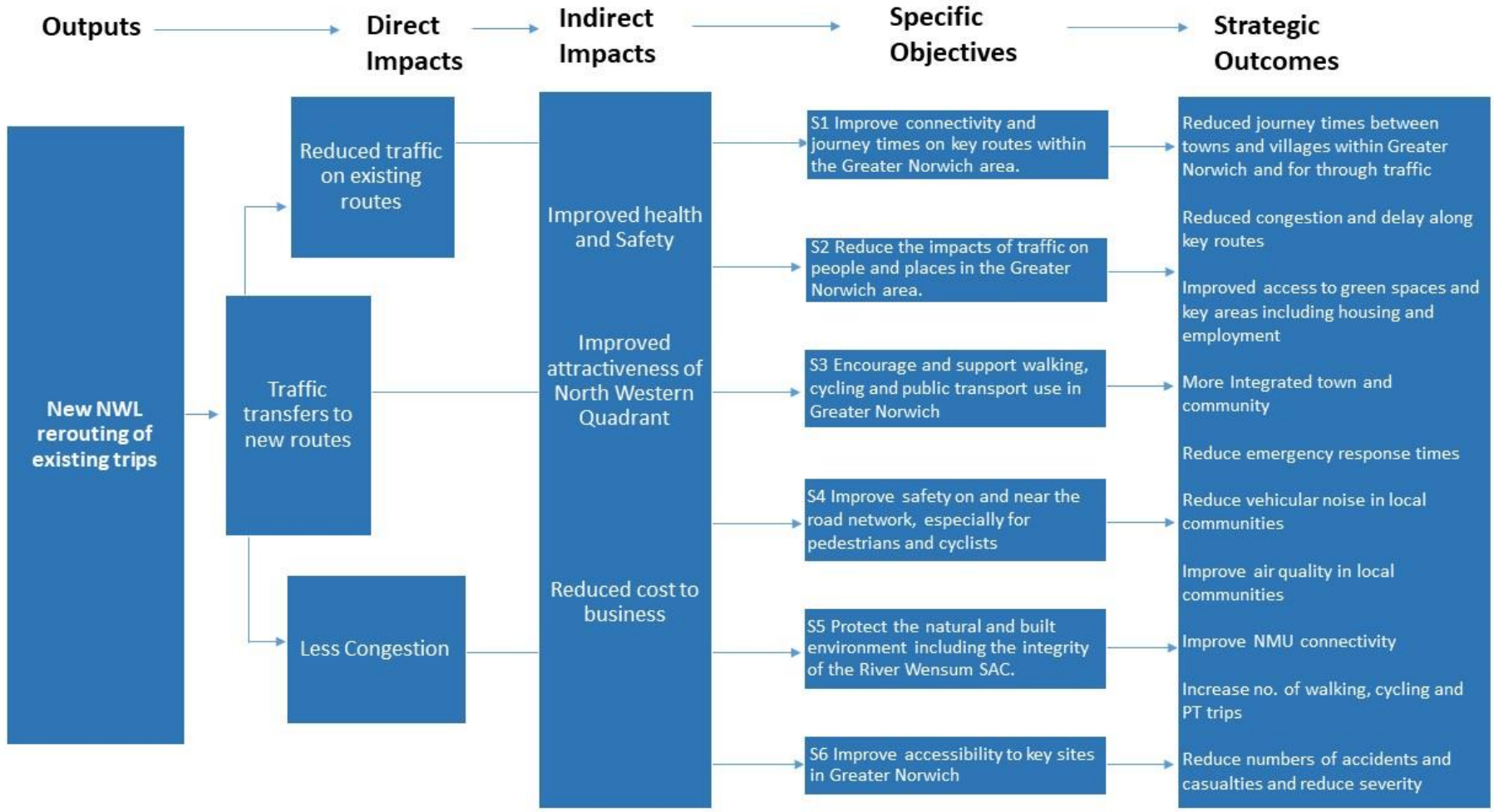


Figure 6-5 - Logic Model

6.11.10. The scheme will be subject to an outcome evaluation. This will compare the existing situation (before construction of the NWL) against the situation with the scheme in place. Any observed changes in the measurements outlined below are assumed to be attributable to the scheme.

Data requirements

6.11.11. The proposed measurements, data required, and frequency of data collection are set out in **Table 6-9:**

Table 6-9 - Data requirements (outline)

Metric	Frequency	Data
INPUTS		
Expenditure	Post Opening	Financial monitoring of project
Funding Breakdown	Post Opening	Financial monitoring of project
In kind resources provided	During delivery	Monitoring of resources delivering the project (use of project diary)
OUTPUTS		
Delivered scheme	Post Opening	Full description of implemented scheme outputs including design changes post funding approval with reasons for such changes, post scheme as built drawings of works completed
OUTCOMES		
Air quality	Pre- and post-construction, Annual up to 5 years post opening	Data from Broadland Council review and assessment of Local Air Quality (statutory duty)
Average daily traffic and by peak / non-peak periods	Pre- and post-construction, Years 1 and 5 post opening	Annual ATCs and turning counts, collected at junctions where interventions made and at wider ATCs across the network
Average AM and PM peak journey time on key routes (journey time measurement)	Pre- and post-construction, Years 1 and 5 post opening	Journey time surveys and DfT Congestion Statistics on Local Authority class 'A' Roads
Cycling and walking usage	Pre- and post-construction, Years 1 and 5 post opening	Cyclist and pedestrian counts on existing routes.
Accident and casualty rates	Pre- and post-construction, Years 1 and 5 post opening	Annual monitoring of collisions (STATS 19)
Average annual CO_2 emissions	Pre- and post-construction, Years 1 and 5 post opening	DfT's Local Authority Carbon Toolkit

6.11.12. The Monitoring and Evaluation Plan will be developed further and included within the Full Business Case.

6.11.13. Following completion of the scheme, environmental monitoring will need to be undertaken. This will be contained within an Operational Environmental Management Plan (OEMP). The OEMP will be produced by the Operational Maintenance Contractor and will be informed by the findings and future monitoring outlined in the Environmental Statement (ES).

Data sources

6.11.14. The monitoring and evaluation for the NWL project will be undertaken by NCC. The following surveys will be undertaken:

- Journey times
- Automatic Traffic Counts
- Turning counts

6.11.15. Manual traffic count data will be collected by NCC on an annual basis, including accidents (STATS19), financial and planning data (e.g. Annual Monitoring Report).

6.11.16. The survey costs will be calculated at Full Business Case stage and will be funded through the County Council's monitoring budget.

6.11.17. The COVID pandemic may have impacts on the data collected. As data is normally collected remotely through CCTV, tubes and digital sources (Bluetooth and satellite navigation), the way that data is collected, however, should not be impacted. It is currently unknown what the long-term impacts of the pandemic on traffic will be, however by the time the baseline traffic is surveyed in 2022/2023 prior to construction starting, the impacts are expected to have levelled out and longer-term impacts will become clearer.

Timescale for evaluation

6.11.18. Prior to starting on site, any gaps in the required baseline evidence will be collected. A baseline evidence report will be completed prior to construction of the scheme. Quarterly reports on progress against programme, costs and risks will be provided to the Project Board during construction of the scheme, and an annual monitoring summary will be produced. Principles of monitoring and evaluation will be in line with Highways England Post Opening Project Evaluation (POPE) requirements.

6.11.19. Monitoring and evaluation will be conducted in line with the main funding bodies' criteria. It is considered that it is likely to adhere to the following methodology:

6.11.20. Data will be collected one year and five years after opening and will be compared against the baseline data. Evaluation reports will be developed at these stages, containing an analysis of all scheme evaluations carried out to date, highlighting any interesting and emerging trends. It is, however, anticipated that wider economic benefits may take longer time frames to manifest. This would invariably have a bearing on the timing of surveys and subsequent reporting.

Setting targets

6.11.21. The Council recognises the importance of setting specific indicators and targets. These will be set at the Full Business Case stage and included in the Monitoring and Evaluation Plan.

Summary of analysis

6.11.22. The monitoring and evaluation will be used to answer the following key questions:

- Have the anticipated outcomes and impacts been achieved?
- To what extent are the observed changes additional to what would have happened in the absence of the intervention?
- Were there any unanticipated impacts / displacement effects?
- Which elements of the scheme were particularly influential in achieving the overall goals?
- What lessons can be learnt for future scheme / policy development?
- What is the contribution of the policy to the LEP's strategic goals?
- To what extent did the anticipated costs and benefits match the actual outcome?
- Has the scheme been successful? If not, why not?

6.11.23. The evaluation of the scheme will:

- Measure the level of traffic congestion on the existing network
- Measure the level of traffic congestion on the improved network
- Measure the levels of accidents on the existing and improved network

6.11.24. The initial one-year impact assessment will be used to understand the impact mainly on journey times and travel patterns. There may be some evidence at this stage of the scheme impact in terms of developments and jobs. The five-year assessment will look at longer term benefits including accidents, travel patterns and jobs / additional investment.

6.12 OPTIONS

6.12.1. The NWL scheme has been identified only after consideration of a wide range of options. An initial long list of potential solutions was drawn up, and these have been, sifted, refined and evaluated to ensure that the NWL scheme is the best possible option.

6.12.2. The process of generating, refining and appraising options is detailed in the 2019 Options Assessment Report (OAR). The OAR was submitted with the application for scheme development costs, and describes the assessments undertaken. The OAR identified a preferred corridor for the scheme.

6.12.3. A summary of the option assessment process is given in the Section 2.12 of the Strategic Case.

6.12.4. The Economic Case describes the most recent assessment of the proposed scheme using models and analytical tools developed subsequent to the OAR.

6.13 SUMMARY OF MANAGEMENT CASE

6.13.1. The Management Case demonstrates that the NWL scheme is capable of being delivered successfully in line with recognised best practice. It describes the processes that are being put in place to ensure that the project is effectively delivered, and properly evaluated.

6.13.2. NCC has extensive recent experience in delivery major infrastructure projects.

6.13.3. The NWL is in principle "stand-alone" scheme, which could be delivered independently of any other scheme or development. Similarly, no other future schemes or developments are dependent upon it.

6.13.4. NCC will continue to liaise very closely with Highways England as the NWL scheme is taken forward and will actively co-operate with any further appraisal or design work that HE may decide to undertake in relation to improvements to the A47 trunk road.

6.13.5. NCC has established and will continue to resource the following bodies:

- Project Board
- Project Delivery Team
- Stakeholder Groups
- Member Group

6.13.6. The Management Case describes the membership, responsibilities and accountability of these groups including the relationship between them.

6.13.7. The NWL scheme continues to be programmed to open to traffic in 2025. The detailed project programme is included in Appendix 6A.

6.13.8. The Management Case details how stakeholders have been involved in the development of the NWL scheme and how they will continue to be involved as the scheme moves into the construction phase.

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Appendix 1A

SUSTAINABLE TRANSPORT STRATEGY

Norfolk County Council

NORWICH WESTERN LINK

Sustainable Transport Strategy

70041922-WSP-NWL-STS-001
MARCH 2021

PUBLIC

Norfolk County Council

NORWICH WESTERN LINK

Sustainable Transport Strategy

TYPE OF DOCUMENT (VERSION 3.55) PUBLIC

PROJECT NO. 70041922

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Signature				
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WCHAR STRATEGY PLAN

ACRONYMS

AADT	Annual Average Daily Traffic
ATC	Automatic Traffic Count
BR	Bridleway
CO2e	Carbon Dioxide equivalent
DfT	Department for Transport
DM	Do Minimum Scenario
DS	Do Something Scenario
EAST	Early Appraisal Sifting Tool
EqIA	Equality Impact Assessment
FP	Footpath
GIS	Geographical Information System
HE	Highways England
JtW	Journey to Work
LLG	Local Liaison Group
LTN	Local Transport Note
MCC	Manual Classified Count
MP	Member of Parliament
NATS	Norwich Area Transport Strategy Model
NCC	Norfolk County Council
NCN	National Cycle Network
NDR	Norwich Northern Distributor Road (now the Broadland Northway)
NMU	Non-Motorised User
NNUH	Norfolk & Norwich University Hospital
NRP	Norwich Research Park

NTS	National Travel Survey
NWL	Norwich Western Link
NWQ	Norwich Western Quadrant
OAR	Options Assessment Report
OBC	Outline Business Case
ONS	Office for National Statistics
OSR	Option Selection Report
PCT	Propensity to Cycle Tool
P&R	Park and Ride
PROW	Public Rights of Way
SAC	Special Area of Conservation
SOBC	Strategic Outline Business Case
STS	Sustainable Transport Strategy
TCF	Transforming Cities Fund
TfN	Transport for Norwich
ToR	Terms of Reference
TRO	Traffic Regulation Order
UEA	University of East Anglia
WCHAR	Walking, Cycling & Horse Riding Assessment Report
WCHR	Walking, Cycling and Horse Riding (Highways England Assessment)

EXECUTIVE SUMMARY

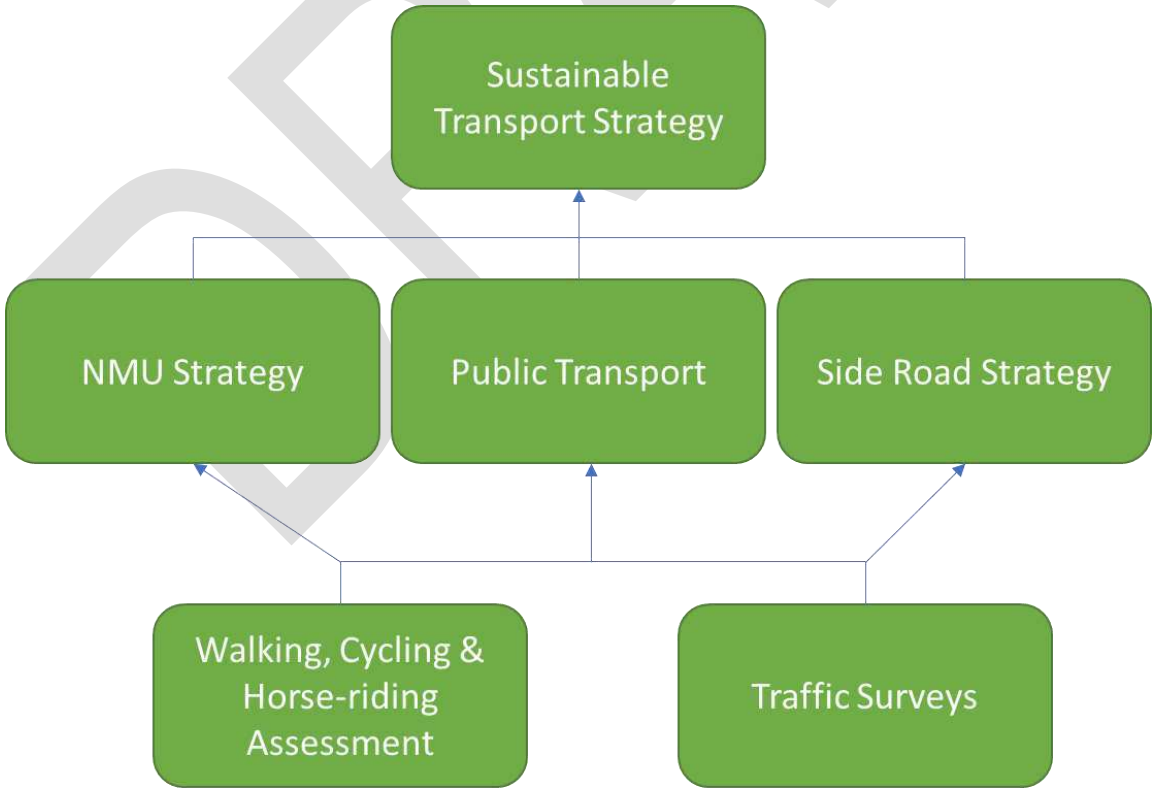
WSP have been commissioned by Norfolk County Council (NCC) to prepare a Sustainable Transport Strategy to support the Outline Business Case for a proposed link road to the west of Norwich, known as the Norwich Western Link (NWL).

The NWL will be approximately 3.9 miles in length and will include provision of sustainable transport measures. It will provide an alternative access route for vehicles travelling into Norwich and surrounding settlements, connecting the A47 with A1067 and A1270 Broadland Northway improving travel for orbital movements and preventing strategic traffic using minor rural roads that exist in the west of Norwich.

It is predicted that the majority of existing strategic traffic will re-route and alter their existing journey patterns to use the new road once built. A strategic transport model has been used to predict future travel patterns with and without the proposed Norwich Western Link and this work is described in the Outline Business Case for the scheme.

The Sustainable Transport Strategy (STS) is an overarching document that provides a framework for complementing the transport effects of the scheme. It includes the additional strategies being developed in tandem, namely the Non-Motorised User Strategy, Public Transport (Bus) Strategy, and Side Road Strategy and was informed by a Walking, Cycling and Horse Riding Assessment (prepared in accordance with DMRB Guidance GG142).

The scope of the STS covers the items as shown in the diagram below, with the detail of each component provided in appendices of this report which summarises the overall package:



A Traffic Management Strategy is also being developed separately as part of the Transport Assessment which will form part of the planning application submission and will also be considered as part of the pre-application public consultation planned for autumn 2021, with designs fixed for the planning application to be submitted in early 2022.

The NWL Project Team are working closely with Highways England, seeking to achieve a joined-up strategy that assists with minimising and mitigating potential severance issues associated with the Norwich Western Link Scheme and the A47 North Tuddenham to Easton improvement scheme.

OVERVIEW OF PROPOSED INTERVENTIONS

This STS has been developed alongside the main NWL highway design proposals and presents a range of measures within an appropriate radius of the new road. The measures provide a complementary package of interventions to support the sustainable travel objectives of the NWL. The proposals also fit well with the aspirations of Transport for Norwich (TfN) which seeks a mode shift away from private cars and improvement in air quality. There are opportunities for geographical linkage where the NWL and TfN projects interface at the western fringe of Norwich. This offers good synergy with wider sustainable transport proposals across Norwich.

The package of measures would encourage mode shift away from private car use by providing the means to travel sustainably by cycle, on foot or by bus, as well as linking up the existing network of Public Rights of Way to maximise local connectivity for pedestrians, cyclists and equestrians. An Equalities Impact Assessment is being carried out at each stage of the project to ensure that the proposals do not discriminate against those with protected characteristics.

INPUT FROM STAKEHOLDERS AND LOCAL RESIDENTS

The Strategy has been shaped by public consultation and stakeholder liaison to generate a package of measures that will maximise benefit to local users. Further engagement events are to be held as the project continues to evolve prior to planning submission to ensure that the project is as publicly acceptable as possible and joined up with other initiatives and infrastructure proposals in the west of Norwich.

KEY BENEFITS

The complementary measures will provide enhanced access to the Public Rights of Way network, with the standard of routes improved and the existing fragmented network would be joined up. Routes would connect to the Broadland Northway at the northern end, and to routes crossing the A47 at the south, connecting the villages of Honingham, Ringland and Weston Longville; the Marriott's Way; Costessey Park & Ride; Norwich Research Park; Taverham; and Drayton.

The measures are forecast to increase the number of walking and cycling trips across the study area by making the routes attractive and safe for users, and logically placed to connect key amenities. The local roads across the wider area are also expected to receive levels of traffic reduction which would help to make walking and cycling on the carriageway more attractive (supported by additional speed management measures where appropriate).

A Bus Strategy has been produced to connect key residential and employment areas to the west of Norwich with those in the city centre. The Bus Strategy will complement other aspects of the STS and make use of routes that will experience lower traffic levels following construction of the NWL, making bus travel more attractive for use and improving journey time reliability. There is ongoing

collaboration with bus operators to ensure that the service would be competitive and operate at suitable frequency to be financially viable.

The Side Road Strategy has been developed under the umbrella of the STS to deter rat-running through local villages close to the scheme and protect residential amenity. This has been tested with local residents via a Local Access Consultation in July 2020 which indicated good levels of support for the closure of existing roads crossing the NWL, other than Ringland Lane.

Economic Benefits of the proposed STS have been assessed and this indicates that the scheme contributes towards encouraging more healthy and active lifestyles with monetised benefits of £8.9 million and a BCR in excess of 2.0 which indicates the STS offers High Value for Money.

There are also expected to be carbon savings from the proposed package of measures, due to an equivalent of 1.5 million vehicle kms in the opening year of 2025 following construction, making it more efficient to travel from / to the west of Norwich by non-car means. Over the 60-year appraisal period this would offer a financial benefit of approximately £600,000.

MEETING SCHEME OBJECTIVES

The Sustainable Transport Strategy contributes to meeting the objectives listed below and enables the NWL scheme to satisfy the full range of high level and strategic objectives:

- High Level Objectives
  - **H1** - Support sustainable economic growth;
  - **H2** - Improve the quality of life for local communities;
  - **H3** - Promote an improved environment; and
  - **H4** - Improve strategic connectivity with the national road network
- Specific Objectives
  - **S1** - Improve connectivity and journey times on key routes in Greater Norwich;
  - **S2** - Reduce the impact of traffic on people and places within the western area of Greater Norwich;
  - **S3** - Encourage and support walking, cycling and public transport use;
  - **S4** - Improve safety on and near the road network, especially for pedestrians and cyclists;
  - **S5** - Protect the natural and built environment, including the integrity of the River Wensum SAC; and
  - **S6** - To improve accessibility to key sites in Greater Norwich.

KEY RISKS

With increased traffic restrictions/lower speed limits, the proposed interventions may cause additional traffic redistribution which has yet to be modelled within the strategic transport model. However, since in most cases, the forecast link flows on the affected routes are already expected to be low, the magnitude of impact of associated redistribution in response to the STS package of interventions is unlikely to have a significant effect on the wider network.

Furthermore, the implications of LTN 1/20 guidance is relatively new and local authorities are still becoming accustomed to its application and whilst the guidance is relatively clearly defined for urban areas, there is scope for differing interpretations in respect of rural roads. As the study area is

predominantly rural, the project team is seeking guidance via Sustrans and Transport East on how this can be specifically applied to rural routes.

There is also a risk that as the measures are developed further the estimated costs could fluctuate. This is dealt with in the quantitative risk assessment included in the Outline Business Case.

NEXT STEPS

The measures within the Sustainable Transport Strategy will be subject to further development with input from key stakeholders, so that a suitable level of detail is available for planning submission.

The Transport Assessment will consider sensitivity testing for the NWL scheme with the final proposed set of mitigation measures and sustainable transport interventions included in the NATS model.

Further engagement with stakeholders and landowners will continue to inform the scheme development, including advice from Sustrans and other groups on the application of LTN 1/20 guidance to the rural context.

The costs of the NMU elements will be already included in the scheme tender price from the preferred contractor. However, additional work will be carried out to refine the costs of the STS measures as the detail is worked up moving forwards though the design process.

This document will be included as part of the OBC submission, but will continue to be updated and reviewed as the project develops, such as for planning purposes.

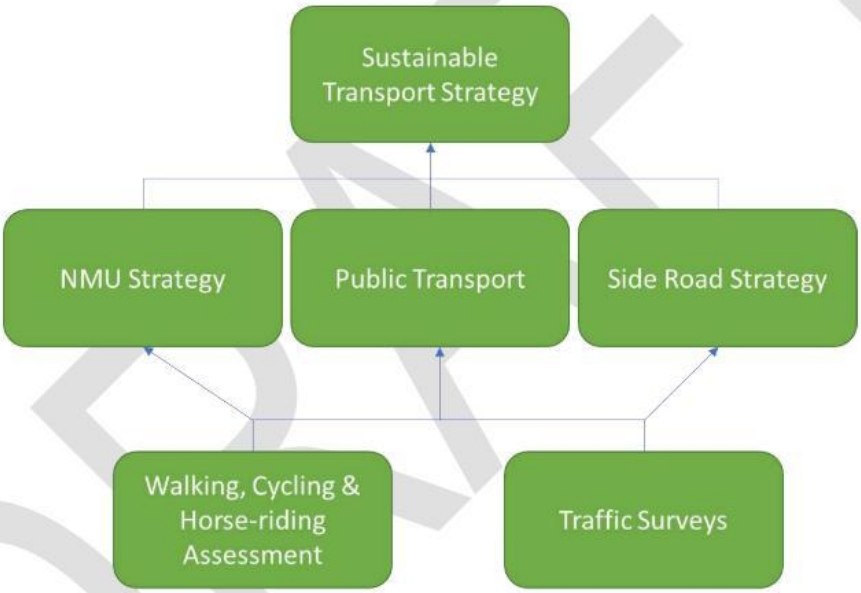
1 SUSTAINABLE TRANSPORT STRATEGY

1.1 INTRODUCTION

1.1.1. This Sustainable Transport Strategy (STS) has been developed on behalf of Norfolk County Council with the NWL design proposals and presents a range of measures in the immediate vicinity of the NWL and within a suitable radius of the new road at a more strategic level. The measures proposed will comprise a package of interventions to support the sustainable travel objectives of the NWL.

1.1.2. The STS is an umbrella term which encompasses a package local transport improvements which is proposed to support sustainable travel patterns within the study area west of Norwich once the Norwich Western Link is in place. The STS therefore contains several daughter documents in the appendices of this report explaining in more detail the proposed elements. The structure of the STS is shown in **Figure 1-1**.

Figure 1-1 - Sustainable Transport Strategy Elements



1.2 PROJECT OBJECTIVES

1.2.1. A range of project objectives have been developed to align with the current overarching themes presented in national, regional and local policy, as well as associated guidance. The objectives are in two tiers as high-level and specific local objectives, which have been discussed with stakeholders and are subject to ongoing refinement; the specific objectives are shown in **Table 1-1**.

1.2.2. The high-level objectives that the NWL will follow reflect issues and opportunities to support the principal aim of a modern and efficient transport system, which include:

- H1 - Support sustainable economic growth;
- H2 - Improve the quality of life for local communities;
- H3 - Promote an improved environment; and
- H4 - Improve strategic connectivity with the national road network.

1.2.3. The Sustainable Transport Strategy seeks to address the non-highway orientated scheme objectives from the list below, as highlighted in green in **Table 1-1** below:

Table 1-1 – Norwich Western Link Specific Objectives

Specific Objective	Strategic Outcomes
S1 Improve connectivity and journey times on key routes in Greater Norwich	i) Improve journey time and journey time reliability, on routes through the area west of Norwich ii) Reduce congestion and delay through the area west of Norwich iii) Reassignment of traffic away from existing routes reducing delay and congestion improving existing accessibility. iv) Reduce emergency response times v) Improve network resilience vi) Provide a more-suitable direct route for HGV/LGV vehicles vii) Reduce trips on local minor roads for vehicular traffic
S2 Reduce the impacts of traffic on people and places within the western area of Greater Norwich	i) Reassignment of trips onto appropriate routes ii) Reduce noise in local communities overall in the western area of Greater Norwich iii) Reduce net emissions of CO2 and other greenhouse gases in local communities overall in the area west of Norwich iv) Improve Non-Motorised User connectivity v) Improve air quality, especially in the built-up areas of west Norwich vi) Minimise traffic impacts on local residents during construction
S3 Encourage and support walking, cycling and public transport use	i) Increase in number of trips taken by walking, cycling and public transport ii) Increased access to public transport, walking and cycling facilities
S4 Improve safety on and near the road network, especially for pedestrians and cyclists	i) Reduced overall network accident rate ii) Reduce the number of people killed or seriously injured on roads in the area west of Norwich. iii) Minimise highway safety impacts and severance during construction
S5 Protect the natural and built environment, including the integrity of the River Wensum SAC.	i) Biodiversity Net Gain ii) Minimised impact on landscape iii) Minimised impact on heritage iv) Not affect the integrity of the River Wensum SAC v) Reduce carbon emissions to contribute to the Council's net zero aspiration by 2030 vi) Minimise impact of the scheme on climate change vii) Minimise adverse environmental impacts arising from construction
S6 To improve accessibility to key sites in Greater Norwich	i) Improved accessibility to Norwich International Airport, Norfolk & Norwich University Hospital and key employment, housing and education sites i) Improved accessibility to green areas ii) Improved access to the cycle and Public Rights of Way network

1.3 DELIVERING A JOINED-UP STRATEGY

1.3.1. The Norwich Western Link not only connects the A47 with the A1067 and A1270 Broadland Northway to complete an orbital route for vehicles around Norwich, but also addresses gaps in the network to the west of Norwich for non-car users via this Sustainable Transport Strategy.

1.3.2. The selection of a preferred highway alignment was announced by NCC Cabinet in July 2019. The Option Selection Report included recommendations to develop a complementary package of supporting Sustainable Transport improvements to accompany the scheme as two previous rounds of public consultation had highlighted support for improving non-car means of access in the west of Norwich as well as a highway scheme.

1.3.3. In accordance with the DMRB guidance GG142, a WCHAR study was carried out to identify gaps in the network covering at least a 5km radius around the scheme and opportunities for enhancement of connectivity and accessibility for non-car users. This formed the starting point for the current strategy, which now includes measures within a wider, strategic study area. It noted that the existing Public Rights of Way network was sparse and fragmented and better connectivity to the Marriott's Way (part of the National Cycle Route Network) would be beneficial.

1.3.4. Key interfacing projects to the west of Norwich have also been recognised as part of the project and engagement with the delivery teams has been ongoing since 2019, seeking to maximise the synergy between the proposals being brought forward in parallel. These projects include the Highways England A47 North Tuddenham to Easton improvement scheme, the Food Enterprise Zone and Transport for Norwich.

1.4 TRANSFORMING CITIES FUND / TRANSPORT FOR NORWICH

1.4.1. NCC, in partnership with Norwich City Council, Broadland District Council and South Norfolk Council, have successfully made an application to the Department for Transport as part of the Transforming Cities Fund (TCF), securing £32 million funding to support new walking, cycling and public transport infrastructure and services be delivered through Transport for Norwich (TfN). The fund aims to make it easier for people to access jobs, education and retail, whilst also seeking to improve air quality.

1.4.2. Through the TCF programme, a number of highway and public transport service improvements are to be delivered over the period up to end March 2023. The Thickthorn Park and Ride (P&R) site is to be expanded to provide an additional circa 400 parking spaces and NCC is in discussion with Norwich Research Park to provide a new service to the site from Thickthorn P&R, which would be in addition to the existing service to the city centre.

1.4.3. The TCF programme is also seeking to extend the Beryl bike share scheme, which now provides electric bikes and scooters in addition to standard bikes, to the P&R sites across Norwich, which would provide greater flexibility in terms of transport choices for local people and visitors.

1.4.4. First Eastern Counties, who provide around 80% of the bus services in Greater Norwich, are also committing £18 million of investment in new buses, refurbished buses and increased service frequencies as part of the Transforming Cities programme.

2 PUBLIC AND KEY STAKEHOLDER ENGAGEMENT

2.1 ENGAGEMENT ACTIVITIES AND KEY STAKEHOLDERS

2.1.1. Stakeholder and local user group engagement has been a core part of the NWL project from conception, allowing for local residents, other interested parties and professionals to comment on proposals and provide local insights. The following engagement work has been undertaken to date as shown in **Table 2-1.**

Table 2-1 - Stakeholder Engagement Timeline

Date	Activity
February 2017 - onwards	Local Liaison Group Meetings with local Parish Councils
May - July 2018	Transport Issues Public Consultation
November 2018 - January 2019	Options Public Consultation
August 2019 - onwards	Working with HE for joined up delivery of the NWL and A47 North Tuddenham to Easton dualling scheme
October 2019	Sustainable Transport Stakeholder Workshop 1
January 2020	Sustainable Transport Stakeholder Workshop 2
July - September 2020	Local Access Public Consultation
August 2020	Sustainable Transport Stakeholder Workshop 3 - Briefing on content of Local Access Consultation
August 2020 - onwards	Joint Local Liaison Group meetings with both HE and NCC
February 2021	Local Liaison Group 23 February
March 2021	Sustainable Transport Stakeholder Workshop 4

2.1.2. Ad hoc meetings have also been held with parish councils, organisations, local user groups and NCC to discuss additional topics, outside of the planned events above.

2.2 TRANSPORT ISSUES PUBLIC CONSULTATION – SUMMER 2018

2.2.1. A first round of public consultation ran from May 2018 to July 2018, initiated by NCC as part of their non-statutory early engagement. More than 1,700 responses were received which demonstrated there was strong support for a new link road between the A1270 Broadland Northway and the A47 west of Norwich.

2.2.2. The consultation asked people for their views on any transport issues that exist to the west of Norwich. Of the 1,732 responses to the main consultation survey that were received, 773 comments pinned to the consultation map and 42 letters or emails highlighted problems in a specific location.

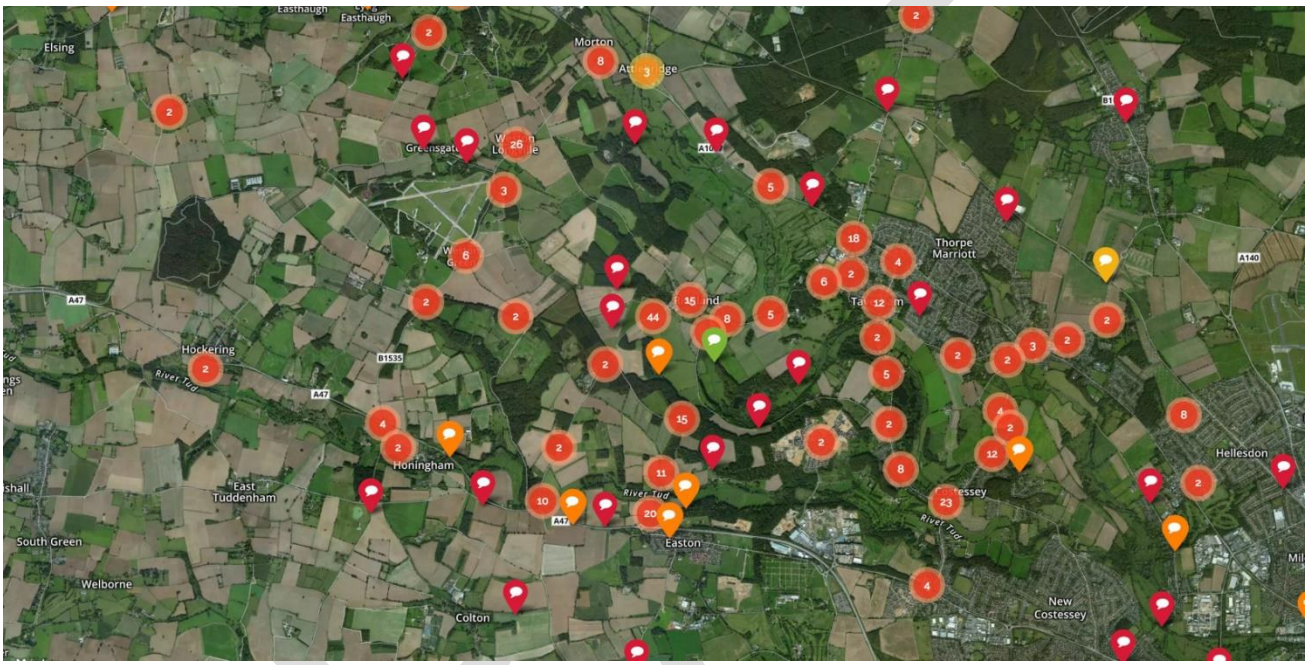
2.2.3. The following figures show where comments on grouped themes were pinned to maps of the local area through the consultation.

2.2.4. The plans show response icons with the following coloured symbology:

- Red - very negative;
- Orange - negative;
- Yellow - neutral;
- Light green - positive; and
- Dark Green - very positive.

(Note: the numbered orange circles show where there are comment location clusters)

Figure 2-1 - Location tagged with 'rat-running'



Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

2.2.5. The above plan shows that rat running is perceived to be a problem within Costessey, Taverham, Ringland, Honingham and Weston Longville. Honingham Lane received 44 responses noting that the route experienced high levels of traffic and rat-running, with suggestions that a link between the A47 and Broadland Northway likely to be able to reduce this issue, creating opportunities to increase walking and cycling.

Figure 2-2 - Locations tagged with 'roads unsuitable for level of traffic'

Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

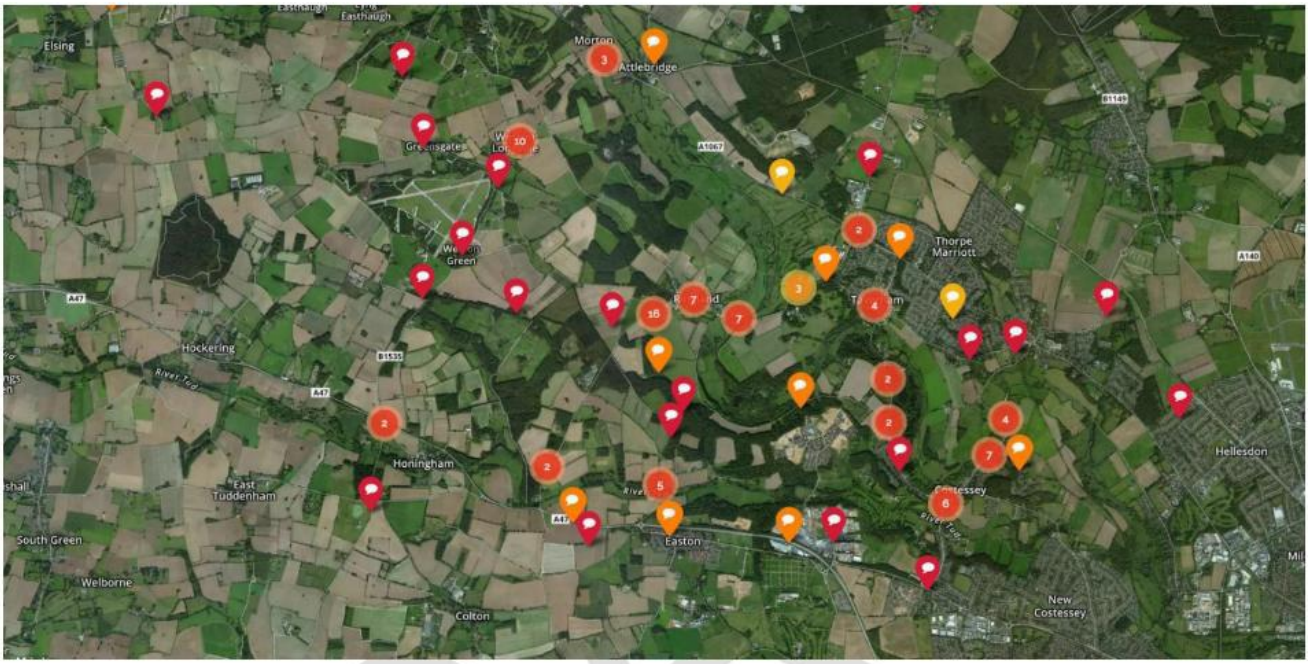
2.2.6. The above plan correlates with **Figure 2-1**, with comments suggesting that the areas of Honingham, Ringland, Weston Longville and Taverham have local roads experiencing traffic levels that are not considered by residents to be suitable for the current standard. Again, Honingham Lane, south of Ringland received the greatest number of responses (51), showing that respondents strongly believe the route receives more traffic than it should, with some respondents noting that this is anticipated to increase in the future.

Figure 2-3 - Locations tagged with 'public transport options'

Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

2.2.7. **Figure 2-3** shows the areas where respondents have concerns relating to the existing public transport provision within the study area. The general view is that across the study area there is a negative opinion of existing provision, with services perceived to be lacking in Ringland, Weston Longville and Costessey.

Figure 2-4 - Locations tagged with 'poor walking routes'



Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

2.2.8. The above plan shows that there are a number of areas that people view as having poor walking routes, with the greatest number of comments on poor routes pinned to the area in and around Ringland.

2.2.9. Ringland and in particular Honingham Lane is shown to be an area where the greatest number of respondents identified a poor standard of walking routes (16). Comments received highlight that the route is narrow with limited visibility and high volumes of traffic, making it unattractive for use. Ringland Road and The Street in Ringland are also highlighted as containing poor walking routes.

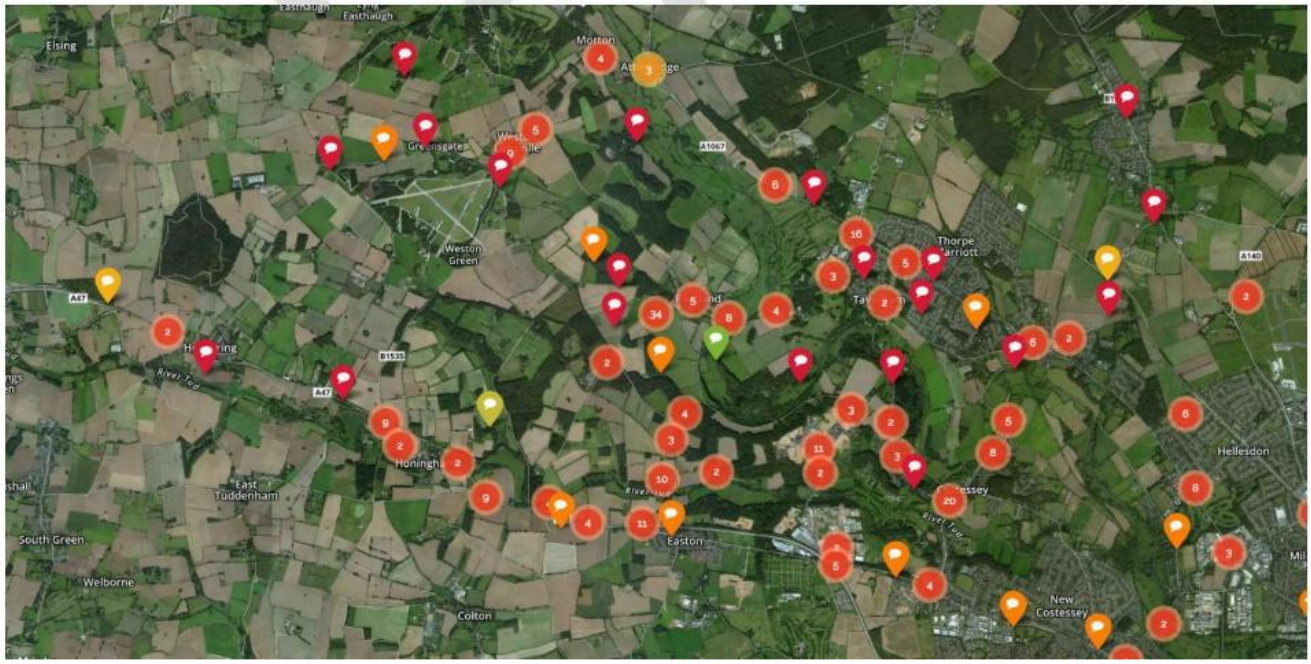
2.2.10. The Street, Costessey was highlighted by 11 comments as having poor walking provision as was Woodforde Close / Church Street, Weston Longville (8 comments); and Ringland Road towards Easton (7 comments).

Figure 2-5 - Locations tagged with 'poor cycling network'

Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

2.2.11. Poor cycling connections were identified in similar locations to **Figure 2-4**, with areas within and surrounding Ringland shown to be in the greatest need of connections. Similarly, Costessey and Weston Longville are highlighted as poor connectors, highlighting the limited access of areas to the west of Norwich to travel sustainably.

Figure 2-6 - Locations tagged with 'traffic congestion'



Source: Norwich Western Link - Consultation Report for Norfolk County Council, Commonplace, 2018

2.2.12. The plan above shows that traffic congestion is experienced by respondents to the consultation across the study area, especially along key road links including the A47 and A1067. Local hotspots for this issue are shown in:

- Honingham Lane, Ringland - 34 comments;
- Ringland Road, Ringland - 29 comments;
- West End, Costessey - 16 comments;
- Queen's Hills - 13 comments
- Fakenham Road, Thorpe Marriot / Taverham - 28 comments; and
- A47 / Berry's Lane / B1535 Wood Lane junction, Honingham - 9 comments;
- A47 / Church Lane / Dereham Road, Easton - 9 comments;
- Weston Hall Road, Lenwade - 9 comments.

2.2.13. The above plans highlight that respondents perceive significant negative effects associated with congestion issues and suggest walking and cycling in the study area is limited due to a lack of sustainable transport infrastructure provision.

2.3 OPTIONS PUBLIC CONSULTATION- WINTER 2018/2019

2.3.1. Between 26th November 2018 to 18th January 2019 a second non-statutory public consultation was held to inform the selection of a preferred option of the shortlisted road options. **Figure 2-7** below shows the options presented for public consultation in 2018. A total of 1,931 responses were received for the second public consultation, which included over 12,000 comments regarding the proposed route options.

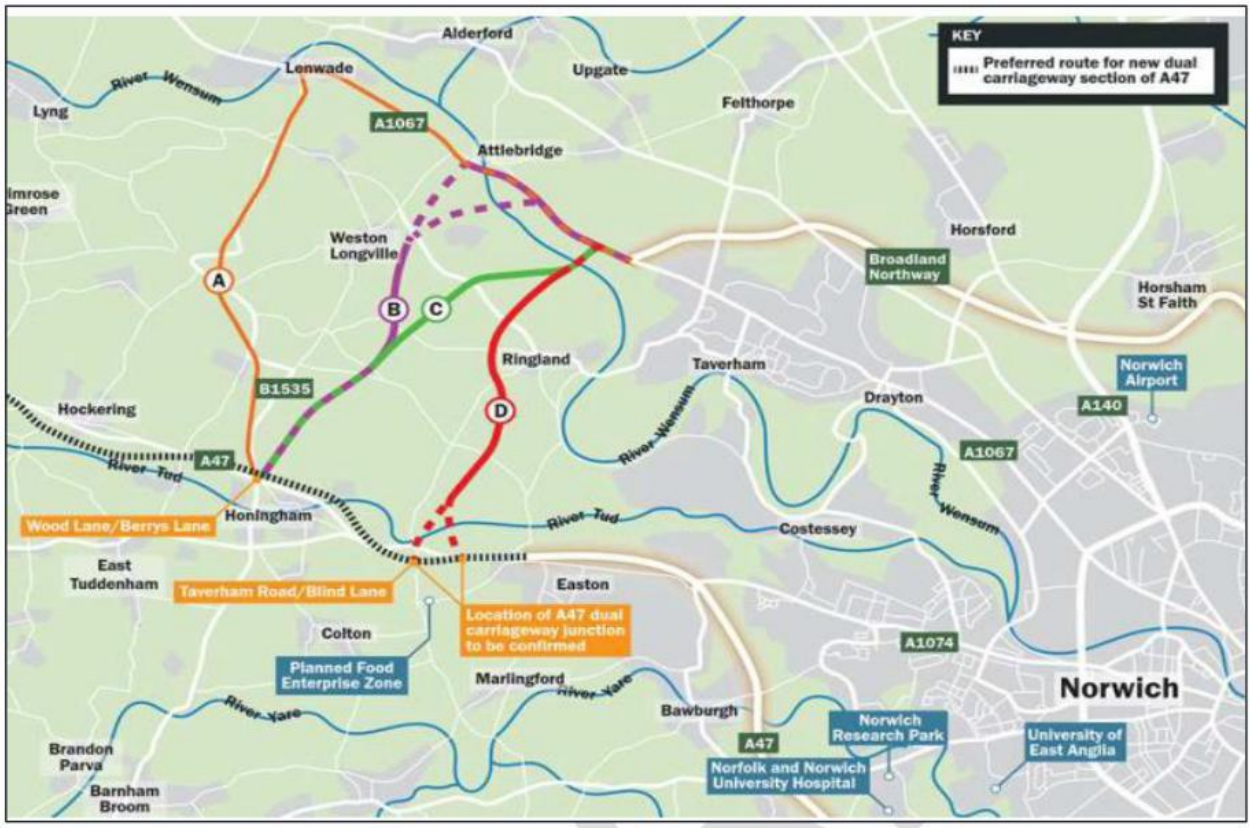
2.3.2. Respondents were asked how effective they thought the options would be as a Norwich Western Link and which of the top 10 issues that were identified through the first consultation they believed the options would tackle. The top 10 issues were:

- Boosting the economy;
- Improving emergency response times;
- Better access to Norfolk and Norwich Hospital;
- Better journey reliability;
- Shortening journey times;
- Road safety;
- Reducing emissions from queuing vehicles;
- Reducing congestion;
- Reducing rat-running; and
- Protecting the environment.

2.3.1. Regarding Option C, which was subsequently identified as the preferred route option, 62.2% of respondents thought that it would provide a very effective or fairly effective Western Link, and 29.7% thought that it would either be fairly ineffective or not very effective. The remaining proportion of respondents were neutral about Option C.

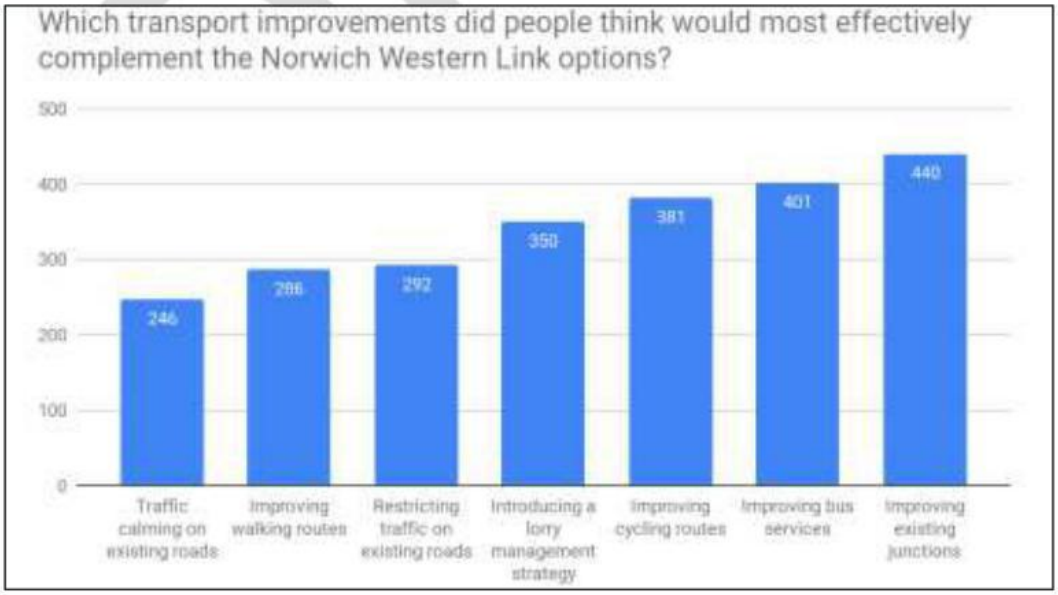
2.3.2. Respondents to the consultation believed that Option C would tackle rat-running the most effectively of each of the options, as well as being effective at reducing congestion and shortening journey times.

Figure 2-7 - Options presented for Public Consultation (November 2018)



2.3.3. Comments were also received on the other transport improvements which would be packaged to complement the overall NWL scheme. Question 5 of the consultation questionnaire asked whether there were any other transport improvements people felt could complement the NWL. As shown in **Figure 2-8**, Improving bus services and cycling routes were in the top three responses to this question.

Figure 2-8 - Quantitative Feedback on Other Transport Improvements



2.3.4. A total of 724 comments were received for Question 6 which asked respondents why they thought the transport improvements they had selected would most effectively complement the Norwich Western Link options selecting responses to Question 5. **Figure 2-9** below provides an outline of the comments raised, highlighting a clear desire for improved bus services and improvements to walking and cycling facilities.

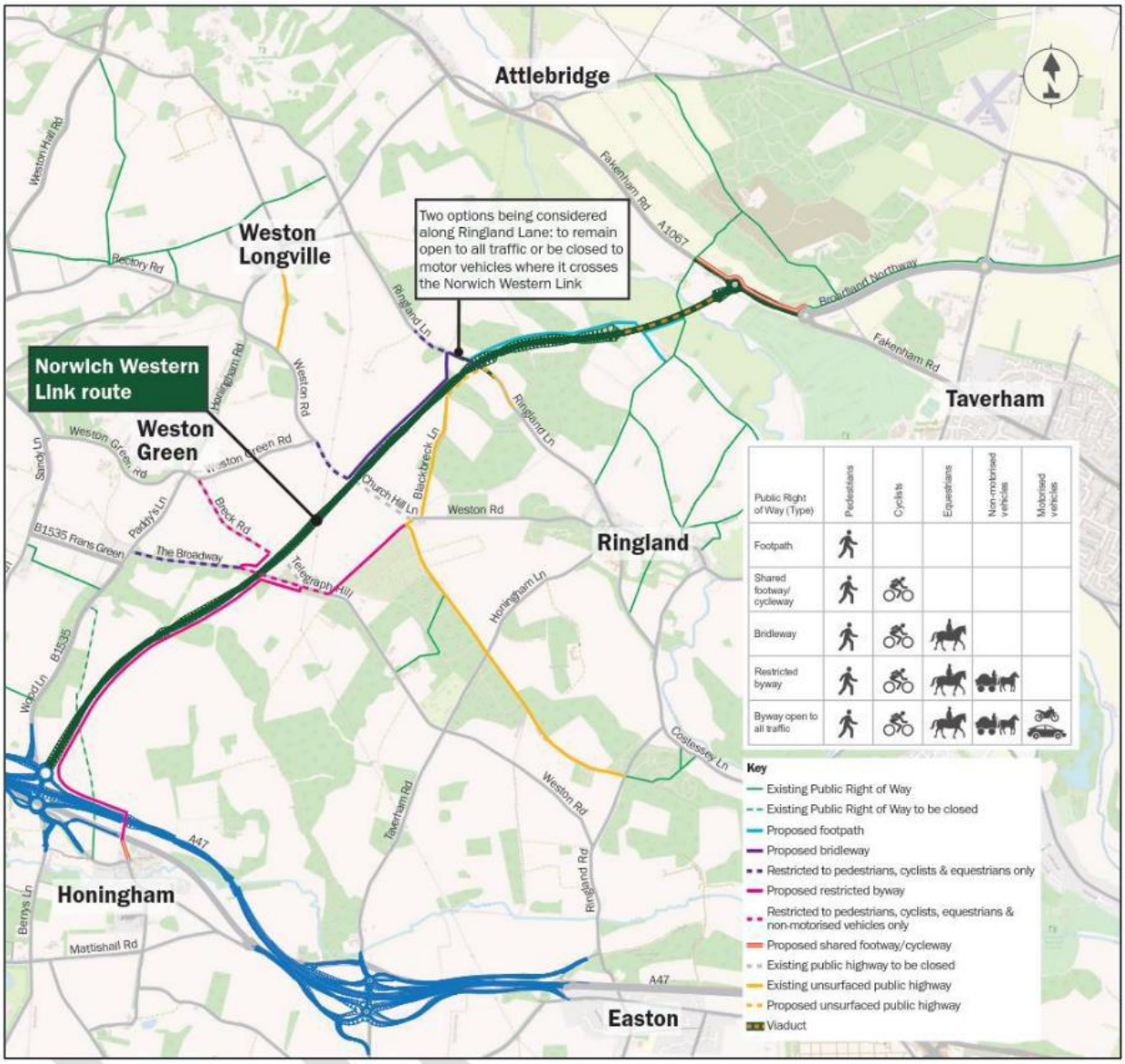
Figure 2-9 - Comments received regarding other transport improvements (extract)

2.4 LOCAL ACCESS PUBLIC CONSULTATION SUMMER 2020

2.4.1. A Local Access Public Consultation took place in Summer 2020 (from Monday 27th July to Sunday 20th September 2020). This consultation sought views on the proposals for roads that cross the NWL, the Non-Motorised User Strategy and Public Rights of Way proposals adjacent to the scheme. The consultation also included high level bus strategy options and initial concepts for wider Sustainable Transport Interventions. A copy of the consultation brochure and feedback report is in **Appendix A**.

2.4.2. The proposals for the Non-Motorised User Strategy as consulted on are shown in **Figure 2-10**. They excluded highway bridges at Breck Road and Weston Road/Church Hill Lane and proposed that a green bridge for ecological movement and non-motorised users only would be installed at The Broadway. Two options were presented for Ringland Lane – either open to all traffic or restricted to non-motorised users only.

Figure 2-10 - Local Access Consultation NMU Strategy

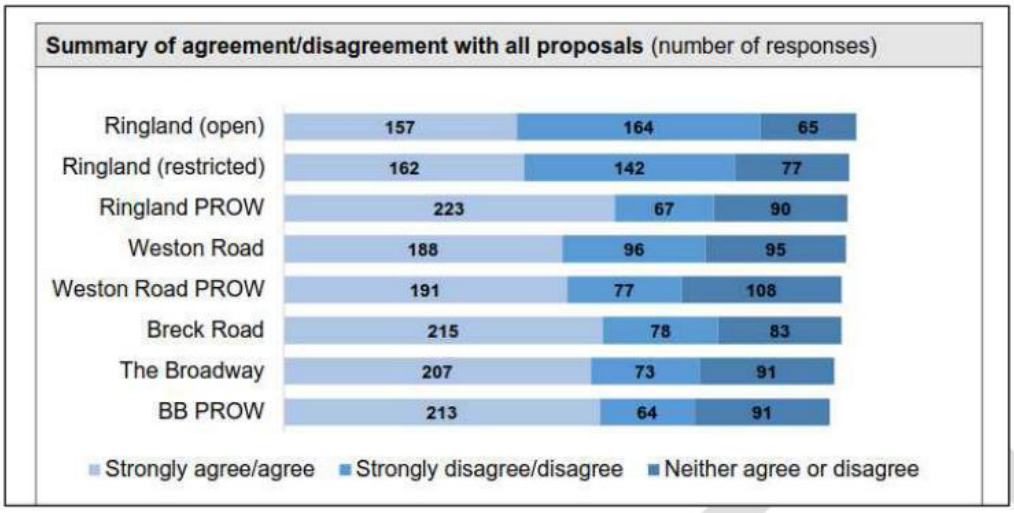


2.4.3. Almost three-quarters (316) of the 438 consultation respondents stated that they were responding as ‘a local resident’; forty respondents said they were replying on behalf of a local business, local organisation or community organisation. The consultation indicated good levels of support for the NMU strategy in principle. A summary of the headline results for each section of route is provided below in **Figure 2-11**. The quantitative and qualitative responses received via public consultation have been reviewed and explained further in **Appendix A**.

The following local businesses / organisations / community groups responded to the consultation:

- Arnolds Keys;
- Ashill Parish Council;
- Barford and Wramplingham Parish Council;
- Barnham Broom Parish Council;
- Brown and Co. on behalf of Easton Estate;
- Car-free Norwich;
- Costessey District Councillor;
- Costessey Town Council;
- Countryside Access Officer (North and East);
- CPRE Norfolk (x2);
- Easton Estate;
- Green Infrastructure Officer NCC;
- Green Party;
- Heaton Vences Chartered Accountants;
- Hockering Parish Council;
- Honingham Parish Council;
- Intu Chapelfield;
- IR and JK Copplestone;
- Kimberley and Carleton Forehoe Parish Council;
- Kixx Norwich;
- Morton on the Hill Parish Councillor;
- National Grid Gas plc;
- Norfolk Chamber of Commerce;
- Norfolk Labour Group and Clive Lewis MP;
- Norfolk Local Access Forum;
- Norfolk Sheet Lead Ltd / Zink It Ltd;
- North Norfolk District Council;
- Norwich Airport Ltd;
- Norwich Cycling Campaign;
- Permaculture Gardening Norwich;
- Ramblers' Association: Norfolk Area;
- Ringland Parish Council;
- RM Rutterford;
- Stop the Wensum Link;
- Weston Longville Parish Council; and
- Woodland Owner [not named].

Figure 2-11 - Summary of Local Access Consultation Feedback



2.4.4. Overall, the majority of respondents to the Local Access Consultation agreed with the proposals. However, opinion was fairly evenly split for the two options that were presented for Ringland Lane.

2.4.5. Wider options for potential sustainable transport interventions across a wider area were also consulted on and respondents were asked to prioritise their top three to assist with shortlisting. The options proposed are shown in **Figure 2-12Error! Reference source not found.** and feedback is summarised in **Table 2-2** below.

Figure 2-12 - Wider Sustainable Transport Interventions

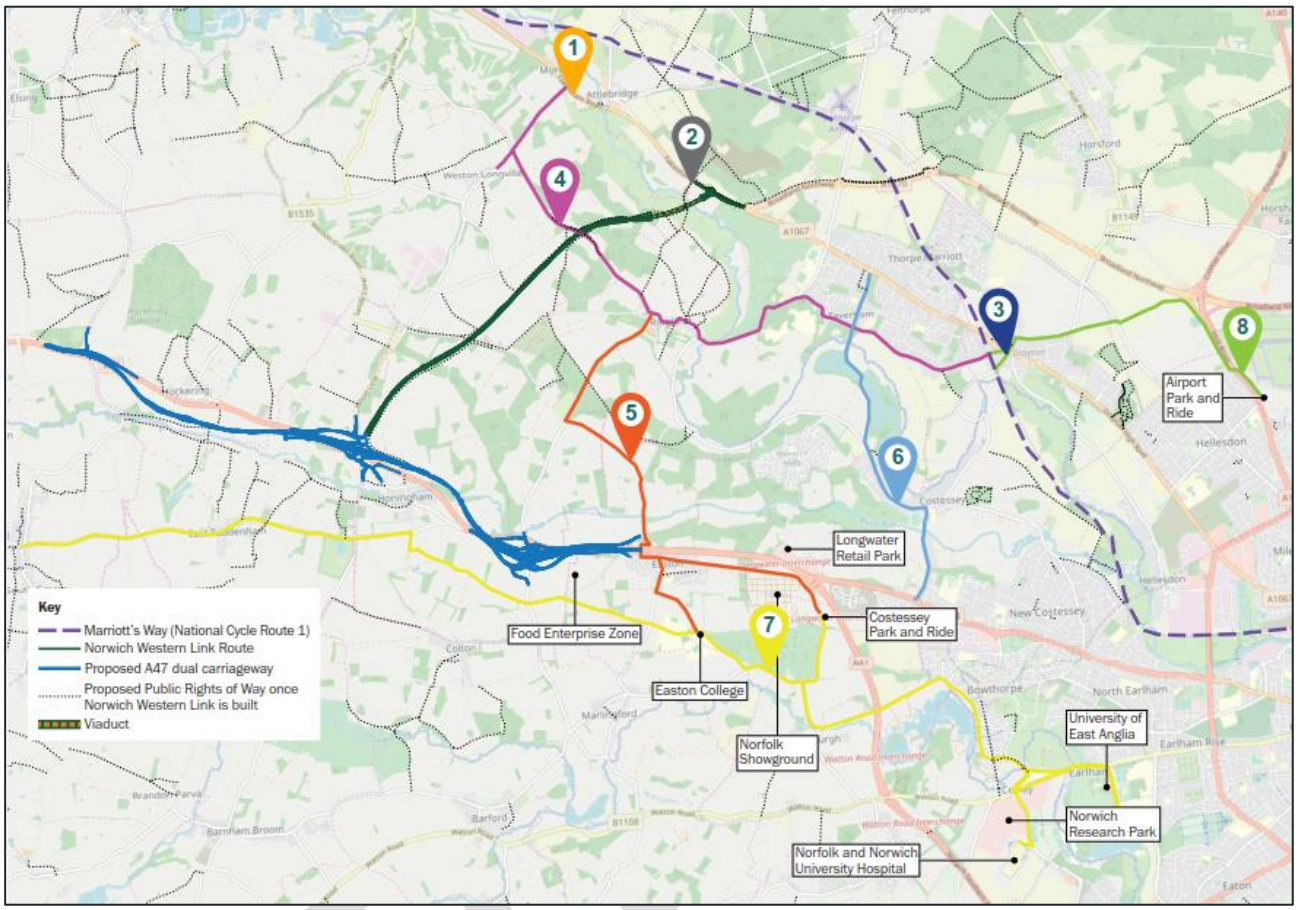


Table 2-2 – Quantitative Feedback in Response to Wider Sustainable Interventions

Option	Total	Percent
1) Create a new pedestrian and cycle crossing on the A1067 Fakenham Road at Attlebridge	130	40.88
2) Create a new pedestrian crossing on the A1067 Fakenham Road to connect Ringland Footpath 1, south of the A1067, with Attlebridge Restricted Byway 4, north of the A1067	116	36.48
3) Create a new pedestrian and cycle crossing on Drayton High Road to improve connectivity with the Marriott's Way	139	43.71
4) Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham	145	45.60
5) Create a cycle friendly on-road link from Ringland to Easton	114	35.85

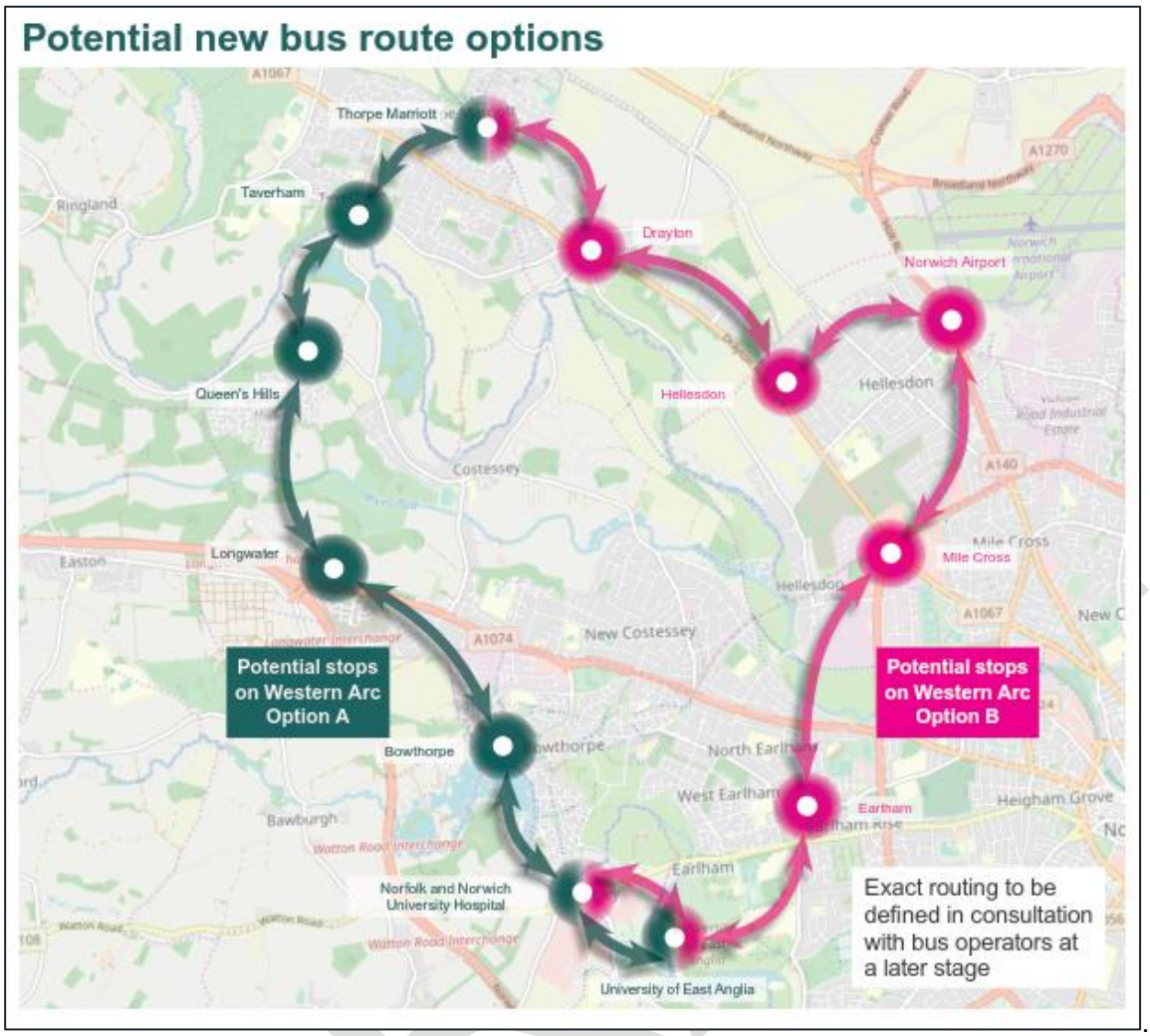
6) Create a cycle-friendly on-road link from Taverham to Dereham Road	119	37.42
7) Create a cycle-friendly on-road link south of A47 from Mattishall to the Norfolk and Norwich University Hospital & University of East Anglia	131	41.19
8) Improve cycle parking at, and access to, the Airport Park and Ride site	65	20.44
Note: % does not total 100% as respondents could pick multiple options		

2.4.6. The measure most respondents said would best support people to walk and/or cycle in the area to the west of Norwich was option 4: Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham (145 people).

2.4.7. Options 3 and 7 were also highlighted as within the top three measures overall with Option 1 also receiving only marginally less support.

2.4.8. Two options for a potential 'Western Arc' bus service were also proposed as shown below in **Figure 2-13**. Feedback indicated that Route A (Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Taverham, Queen's Hills, Longwater and Bowthorpe) was the preferred Western Arc bus route. Route A was preferred by 119 people, and Route B by 67 people.

Figure 2-13 - Western Arc Bus Service Options



2.5 WORKING WITH HIGHWAYS ENGLAND

2.5.1. Since August 2019, when Highways England confirmed their appointment of a main contractor for the delivery of their A47 North Tuddenham to Easton dualling scheme, NCC and WSP have been working closely with Highways England and their appointed designers SWECO.

2.5.2. Regular meetings have been held with HE and discussions have focussed on achieving a joined-up approach to delivery of the two projects as they are closely linked and have a key interface at the Wood Lane junction with Berry's Lane and A47. The A47 proposed northern dumbbell roundabout will provide grade separated access to the Norwich Western Link.

2.5.3. In relation to WCHAR routes and the Side Road Strategy, the NCC PROW team and Highways Teams have provided guidance on local preferences and the NWL team has sought to achieve connectivity of the NMU strategy with the HE proposals particularly in the vicinity of Honingham and Easton. In August 2020, a joined-up approach between Highways England and the NWL Project Team was created for the lifecycles of both projects going forward. Highways England agreed to attend all future LLG meetings (a meeting attended by local parish councillors, NCC, WSP and HE, explained in further detail in **Section 2.8**), allowing for greater transparency in how the projects link

with each other. Highways England also attended the NWL Sustainable Transport Workshops and LLG meetings as set out below.

2.6 TRANSPORT FOR NORWICH

2.6.1. As noted in **Section 1.4**, the NWL Project Team is liaising with Transport for Norwich to ensure that the measures set out in this STS align with their project objectives, providing the greatest benefit possible. The TfN Manager has attended the Sustainable Transport Stakeholder Workshops and is kept informed of the progress made through the NWL project lifecycle.

2.7 SUSTAINABLE TRANSPORT STAKEHOLDER WORKSHOPS

2.7.1. As set out in **Appendix B** (which includes the minutes and slides) there have been a number of sustainable transport stakeholder workshops held which have helped to generate ideas for inclusion within the Sustainable Transport Strategy.

2.7.2. Following selection of a preferred option in July 2019, four meetings were held with the sustainable transport group in October 2019, January 2020, August 2020 and March 2021 in order to develop a complementary set of measures to accompany the NWL proposals, covering walking, cycling, equestrian movement and public transport. Full outputs from the meetings are explained in detail in the WCHAR, included in **Appendix C.**

WORKSHOP 1

2.7.3. On Friday 18th October 2019, a stakeholder engagement workshop was organised to gain understanding of what measures non-motorised user groups and individuals with an interest in non-motorised and sustainable transport would like packaged with NWL. Representatives of the following groups and organisations were in attendance:

- Norfolk Horse Driving Club;
- Norwich Cycle Campaign;
- NCC Countryside Access;
- Norfolk Local Access Forum;
- Ramblers;
- Pathmakers;
- NCC Passenger Transport;
- Transport for Norwich;
- Galliford Try;
- Sweco;
- Konectbus; and
- Highways England.

2.7.4. A questionnaire was distributed at the end of the workshop to gain understanding of how members or users of the groups currently use the routes that the NWL will sever and how they would like to see them improved, if possible. The results were used to guide the proposals set out in the Local Access Consultation and to write the NMU Strategy and WCHAR documents.

WORKSHOP 2

2.7.5. A second stakeholder workshop was held on Friday 24th January 2020 to give an update on the emerging Sustainable Transport Strategy, underpinned by the WCHAR, NMU and Bus Strategy and to receive feedback on the emerging ideas.

2.7.6. Representatives from Norfolk County Council, Norwich Cycle Campaign, The Ramblers, First Bus and Konectbus were in attendance to receive feedback on the emerging ideas.

2.7.7. The Bus Strategy was first presented, and operator feedback from First Bus on the potential loop service suggests that if it is to be subsidised in the early stages of operation, it cannot be seen to compete with existing services. Konectbus have reviewed the loop route, which is longer than an ideal one hour, and so a shorter linear route will be examined to allow the service to operate at a higher frequency.

2.7.8. Norwich Cycle Campaign queried why there was no cycle route proposed alongside the viaduct structure – NCC PROW Team highlighted that it has been agreed at the previous workshop that this would not be appropriate through the floodplain below the viaduct. A bridleway designation would require the upgrading of routes within the sensitive landscape and poor ground conditions. The NWL team further explained that to include cycling facilities on the viaduct would require a wider structure crossing the Wensum Special Area of Conservation, which would impact on the ecological sensitivity of the SAC and would most likely outweigh the benefits as no overwhelming evidence base shows there is a need for a cycle route crossing the River Wensum.

2.7.9. The provision of north-south cycling routes had been explored as part of the wider cycle friendly route options, and it was concluded that on-road links with traffic reduction measures would become more attractive to cyclists. The existing routes offer more direct connectivity between origins and destinations and can be improved with additional speed management measures, so that they become less intimidating for users than a route over the viaduct in close confines with high volumes of high speed traffic. This is considered to eliminate the need for a cycleway along the viaduct.

2.7.10. The NCC PROW Team suggested that Weston Longville FP9 should be upgraded to restricted byway status to allow horse drawn carriages to continue north to Blackbreck Road – possibly with structures such as Kent carriage gaps to prevent access to motor vehicles, although this will need to be explored with the consent of the landowners.

WORKSHOP 3 - BRIEFING SESSION ON LOCAL ACCESS CONSULTATION

2.7.11. A third meeting was held on Friday 14th August 2020 as a briefing session where members of the NWL Project Team were able to explain the latest proposals included in the Local Access Consultation and show how the feedback received at previous meetings has shaped the NMU Strategy and wider STS. The following groups were in attendance:

- Konectbus;
- First Bus
- Norwich Cycling Campaign;
- Ramblers;
- Pathmakers;
- British Horse Driving Society;
- Transport for Norwich;
- NCC Head of Passenger Transport;
- Highways England;
- Norfolk Local Access Forum; and
- NCC Countryside Access Officer.

2.7.12. Questions raised during this meeting requested explanations around how the public consultation proposals had been created, how the routes would deter motorised vehicles from using them and how the bus options will be commercial but not compete with existing services.

2.7.13. Konectbus announced that a new service would operate from Norwich Airport Park & Ride to UEA from the 14th September 2020. The new route would include The Boundary roundabout and Earlham Road, so a section of the Western Arc service Option B would be provided. The feedback from the Local Access Consultation had shown that Option A was the most popular and therefore there is the possibility to operate both routes in the future.

WORKSHOP 4 - UPDATE SESSION OUTCOMES OF LOCAL ACCESS CONSULTATION

2.7.14. A fourth meeting was held on Tuesday 2nd March 2021 as a further update session in which members of the NWL Project Team were able to explain the outcomes of the July 2020 Local Access Consultation and show how the feedback received has shaped the NMU Strategy and wider STS for OBC submission. The following groups were in attendance:

- Konectbus;
- First Bus
- Norwich Cycling Campaign;
- Ramblers;
- British Horse Driving Society;
- Transport for Norwich;
- NCC Head of Passenger Transport;
- Norfolk Local Access Forum;
- NCC Green Infrastructure Officer; and
- NCC Countryside Access Officer.

2.7.15. Questions raised during this meeting included the rationale for option selection and treatment of cycle friendly routes. Connectivity with Wood Lane and routes crossing the Wensum valley for cycling were also discussed.

2.7.16. The updated Non-Motorised User Strategy and shortlisted Cycle Friendly Route Options were explained and in general the proposals were well received by the group, with additional comments requested to follow on from the meeting for inclusion in the notes.

2.7.17. Konectbus updated that their new bus service had been tested between Norwich Airport Park & Ride site and UEA from September to December 2020. The new route covered a section of the Western Arc service Option B route. The service had been discontinued due to COVID-19 impacts on bus patronage, however, the operator acknowledged there had been positive signs of a commercial market for this route which was encouraging. The feedback from the Local Access Consultation had shown that Option A was the most popular and therefore there still remains the possibility to operate both routes in the future.

2.8 LOCAL LIAISON GROUP WORKSHOPS

2.8.1. Bi-monthly meetings are held with representatives from 33 local parishes around the scheme; the list of parishes is set out within the LLG Terms of Reference (ToR) which are reproduced in **Appendix D**.

2.8.2. An interactive workshop session involving the LLG was hosted by NCC in October 2019 to formulate ideas for consideration as part of the STS. Along with the Sustainable Transport Group ideas, this helped shape the early emerging draft NMU strategy which was initially shared with the LLG in December 2019.

2.8.3. From August 2020, Highways England have also taken a more involved role in the Local Liaison Group, leading to revised ToR agreed in October 2020 for a joint approach to LLG meetings going forward.

2.9 LOCAL PARISHES CLOSE TO THE SCHEME

2.9.1. In addition to the Local Liaison Group forum, there have also been several meetings with parishes closest to the NWL alignment, and these informal discussions in smaller groups have influenced the detail of the STS proposals.

2.10 TASKFORCE SOUTH OF A47

2.10.1. Following the selection of a preferred option in July 2019, concerns were raised by parishes to the south of NWL and the A47 about potential traffic impacts through parishes south of A47 on their communities. In response to this, a taskforce group was set up by local MP George Freeman. This has led to a series of meetings involving both NCC and Highways England, which have influenced the design of Highways England's proposals for the Wood Lane junction and its connectivity with Berry's Lane.

3 THE OPTION DEVELOPMENT AND SELECTION PROCESS

3.1 EARLY STAGE SCOPING AND FEASIBILITY WORK

3.1.1. In 2014, Mott MacDonald prepared an early stage appraisal report which considered previous options which had been developed when the Western Link formed part of the Norwich Northern Distributor Road (NDR) proposals (in a 2004 consultation). New options were also considered and a public transport option was included in the appraisal.

3.1.2. The public transport option was similar to the Western Arc Option A route (Hospital to Thorpe Marriott) which was the preferred option in the Local Access Consultation 2020. In the 2014 study this option scored well in the multi-criteria assessment sifting process, against the majority of EAST (Early Appraisal Sifting Tool) criteria other than the Specific Scheme Objectives. Hence other options were prioritised for further development.

3.2 OPTIONS ASSESSMENT REPORT

3.2.1. Once the need for a Western Link solution was identified, via the summer 2018 public consultation, 82 potential options were considered as the starting point for the study. An Option Assessment Report (OAR) was prepared following WebTAG methodology known as EAST. The process considered how well the options scored against high level and specific objectives for the scheme and DfT East criteria on economic appraisal; an environmental matrix was also incorporated into the process due to the sensitivity of the surrounding landscape. The highest performing options which were expected to offer best value for money were shortlisted for further development. Following the systematic process of option sifting, the following 10 non-highway options were short-listed for consideration:

- Option 39: Improvements to existing junctions;
- Option 40: Signing and lining improvements;
- Option 41: Signal improvements;
- Option 44: New / improved crossing points;
- Option 49: Improvements to existing bus services (28, 29 and X29);
- Option 50: Improvements to existing bus services (23, 23A and 24);
- Option 55: Promote cycling schemes;
- Option 58: Mobility as a service scheme;
- Option 68: Lorry management strategy; and
- Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport.

3.2.2. Further sifting found that the non-motorised user options were less effective at meeting some of the scheme objectives (particularly specific objectives S1 and S2) and were less able to offer a resilient future-proofed solution in isolation. However, non-highway options were found to assist with meeting objectives S3 and S6. Therefore, the measures were set aside for future packaging and feedback during the Round 2 Public Consultation.

3.3 STRATEGIC OUTLINE BUSINESS CASE (SOBC)

3.3.1. A Strategic Outline Business Case was prepared in accordance with WebTAG guidance (and the agreed Appraisal Specification Report) for submission to DfT, seeking to initially secure approval for

development funding as a precursor to preparing a more detailed OBC and FBC in the later stages of the project.

3.3.2. The SOBC considered four shortlisted options and two sub options, comparing their contribution towards a strategic case, as well as estimating in high level terms their financial and economic performance, as well as setting a range of options for the commercial and management cases.

3.3.3. A draft was submitted to DfT in Autumn 2019 and this was revised in December 2019 to include increased emphasis on a package of sustainable transport interventions which was being developed following the selection of a preferred option. The update also included additional policy on achieving reducing Carbon emissions going forward which sustainable transport interventions would potentially assist with.

3.4 OPTION SELECTION REPORT (OSR)

3.4.1. The OSR concluded that Option C should proceed as the preferred option for the NWL main highway alignment. This was the second most popular option from public consultation. The OSR also recommended based on feedback from consultation that the preferred option should be accompanied by a series of complementary sustainable transport proposals.

3.4.2. The STS was envisaged to encourage active and sustainable travel for shorter distance trips, for example creating new cycle and equestrian routes on minor rural roads that will receive a traffic reduction, linking existing and growing communities and helping to alleviate congestion on the inner routes close to Norwich for instance between Taverham and Costessey, Ringland and Weston Longville, as well as improving access to workplaces and the proposed food hub.

3.4.3. To inform the development of a complementary package of non-motorised user interventions, a Walking, Cycling & Horse Riding Assessment and Review was undertaken in accordance with DMRB GG142. This guidance is prepared in line with Highways England's Strategic Business Plan and Roads Investment Strategy, as well as the Infrastructure Act 2015.

3.4.4. A Sustainable Transport Strategy would then be produced for input to the Outline Business Case which seeks to maximise opportunities for transferring shorter distance band trips to non-motorised modes of travel such as walking and cycling where possible.

3.4.5. The measures would focus on enhancing accessibility and safety for non-motorised users on existing routes where there would be traffic relief as a result of the NWL scheme. This could include targeted access restrictions to through traffic on some routes or dedication of Quiet Lanes to keep traffic volumes low (for example by implementing Traffic Regulation Orders and partial route closures but retaining essential vehicle access only for landowners with property accesses directly onto these routes). This would help make the routes more attractive and safer for Non-Motorised Users.

3.4.6. Given the rural setting of the area and attractiveness of the landscape, the NWL could also assist with supporting longer distance leisure trips by equestrians and cyclists. For leisure and commuting use, this would generally consist of giving priority to cycles/equestrians on quieter existing roads where parallel routes exist, installing minor highway interventions to keep traffic speeds sufficiently low and raising driver awareness of vulnerable users on these routes whilst appropriately managing conflicts between vehicles and vulnerable users.

3.4.7. At the time of the OSR it was anticipated that the assessment and strategy would focus on the following key routes, based on initial scoping discussions with cycle officers at NCC.

- Longwater to Taverham via Queens Hills;
- Ringland to Easton and Costessey P&R;
- Ringland to Lenwade via Weston Longville;
- Hockering to Honingham;
- Great Witchingham to Attlebridge;
- Identify A1067 crossing opportunities at Attlebridge and Drayton;
- Identify how best to achieve Marriott's Way connectivity; and
- Connectivity with Highways England proposals for A47 multi-user crossings.

3.4.8. The need for commercial viability of public transport services is noted as the key driver for efficient bus operation, with bus companies attracted to routes which have higher density development alongside to maximise patronage and viability. Since the NWL is not coupled directly with development, it is unlikely that the NWL route itself would support new bus service routes directly.

3.4.9. However, the NWL scheme is envisaged to support important bus services such as the X29/29 service from the North West of the county by intercepting some of the traffic that currently uses Fakenham Road and road routes parallel with the NWL such as the outer ring road. This would potentially assist with improving bus journey time reliability on existing routes by freeing up road space and capacity on the western edge of the City. Coupled with the A47 dualling scheme from North Tuddenham to Easton and removal of existing roundabouts on the A47, the two schemes would also assist with speeding up bus journey times for 23/ 23A and 24 which operate on A1074 Dereham Road. With improved reliability, existing services would be more likely to attract patronage and investment, leading to improved frequency.

3.4.10. Following the NWL Preferred Route Announcement, meetings have been held with bus operators to understand opportunities in more detail, exploring whether the provision of a new link through the study area would create new commercial opportunities for additional bus services as a result of traffic relief to alternative routes. For example, exploring whether more direct links between settlements to the north of Norwich (such as North Walsham and Aylsham amongst others) could be established with key destinations on the south west of the city (e.g. NNUH, UEA and NRP) with the NWL in place, or whether enhanced Park and Ride services could be facilitated with improved vehicle accessibility to the Costessey and Airport sites.

3.4.11. All of the above would assist with meeting the specific NWL scheme objectives and strategic outcomes; and any associated mode shift would also contribute towards strengthening the business case for the scheme.

3.5 EQUALITY IMPACT ASSESSMENT

3.5.1. The Equalities Act and Human Rights Act has made it a legal requirement to ensure that the needs of all users are considered within the design of new public infrastructure. It is also essential to avoid discriminating against groups of users with protected characteristics (such as race, gender, age, mobility, maternity, religion, sexual orientation and ethnicity).

3.5.2. An Equality Impact Assessment (EqIA) is being prepared by NCC and will be updated at each stage of the project as the level of detail increases.

3.5.3. The EqIA produced in January 2020, and distributed to members of the LLG, forecast that the scheme is likely to have an impact on all people living and working or travelling through the area. The EqIA notes that Norfolk has a higher than average number of older residents, compared to other areas of the UK, and a growing number of disabled young people.

3.5.4. Having identified the people who may be affected by the NWL proposal, the potential impact was analysed, so that solutions could be set out:

- Severance - During Construction
  - A new dual carriageway through an existing rural landscape consisting of a number of small rural communities has the potential to cause severance and leave vulnerable member of the community isolated from vital services.
  - The construction phasing will need to be carefully considered to ensure impact on local communities is limited and that essential services remain accessible to all through the works.
  - Early contractor involvement and early design consideration should aid with appropriate planning.
- Severance - Post Construction
  - Due consideration will be given to which sections of the highway, if any, can be stopped up and impact on access to vital services considered throughout the design process.
- Cycling, Walking and Public Transport Improvements
  - Any sustainable transport improvements will consider all users with particular consideration given to those protected characteristics likely to effected by the scheme. Appropriate guidance will be used, and safety and design audits carried out throughout the design processes.
- Accessibility During and Post Construction;
  - Due consideration will need to be given to accessibility during the construction phase of the project and throughout the design phase and monitored closely during construction. All temporary traffic and pedestrian management will need to be designed with vulnerable users in mind, appropriate levels of design carried out at appropriate levels of detail included in the contract document.

3.5.5. To overcome any adverse impacts, the NWL Project Team will continue to engage with vulnerable user groups and ensure accessibility issues are resolved in a practical and appropriate way, throughout the project lifecycle. At each stage of the design the EqIA will be updated to reflect the latest developments of the scheme and assess any changes in impacts on people with protected characteristics.

3.6 NEW TRANSPORT GUIDANCE

3.6.1. New cycle design guidance was published by the Department for Transport (and UK Government) in July 2020, which encouraged a high quality of cycle provision for new routes going forward. These have been considered in this strategy and will inform the ongoing design of the NMU strategy.

Gear Change (July 2020)

3.6.2. This plan describes the vision to make England a great walking and cycling nation. It sets out the actions required at all levels of government to make this a reality, grouped under four themes:

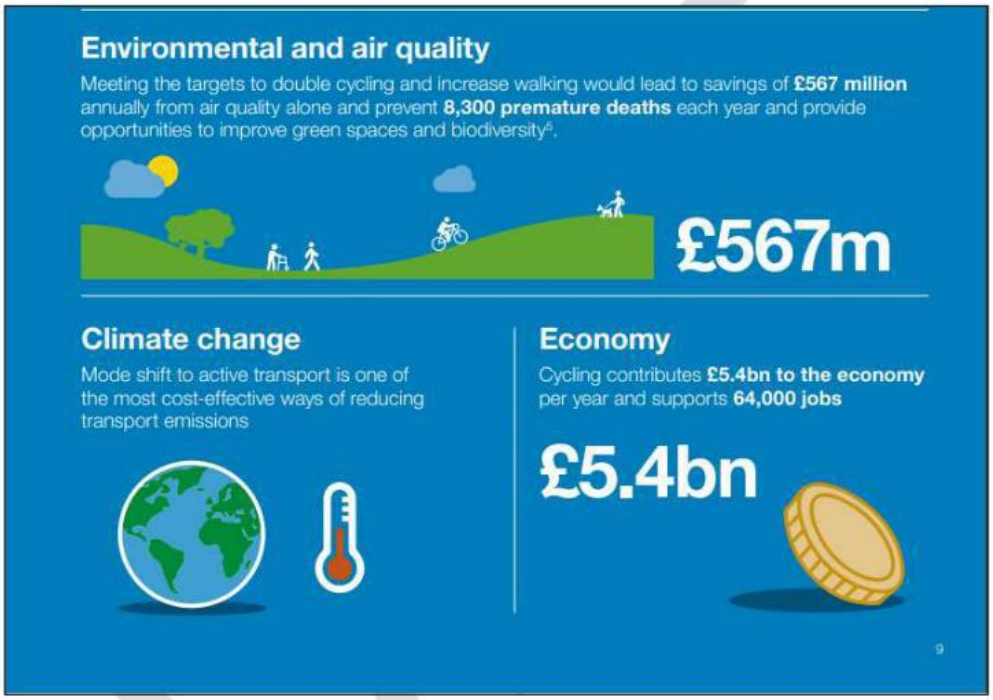
- Better streets for cycling and people;
- Cycling and walking at the heart of decision-making;

- Empowering and encouraging local authorities; and
- Enabling people to cycle and protecting them when they do.

3.6.3. In accordance with the Gear Change policy, the NWL is supported by this Sustainable Transport Strategy that seeks to improve the existing walking and cycling facilities and provide new facilities in the surrounding area. It seeks to divert the existing routes, where they are severed by the scheme, with new green bridges providing grade-separated crossings and an improved and extended Public Rights of Way network around the link. The wider measures offer improved priority for cycling on routes that receive traffic reduction as a result of the highway scheme. They also create safer crossing facilities on A1067 to provide onward connectivity with the Marriott's Way strategic cycle corridor that takes Non-Motorised Users into central Norwich.

3.6.4. Gear Change responds to the Climate change agenda emphasising the environmental benefits of encouraging and supporting sustainable travel, with a target to double cycle and increase walking.

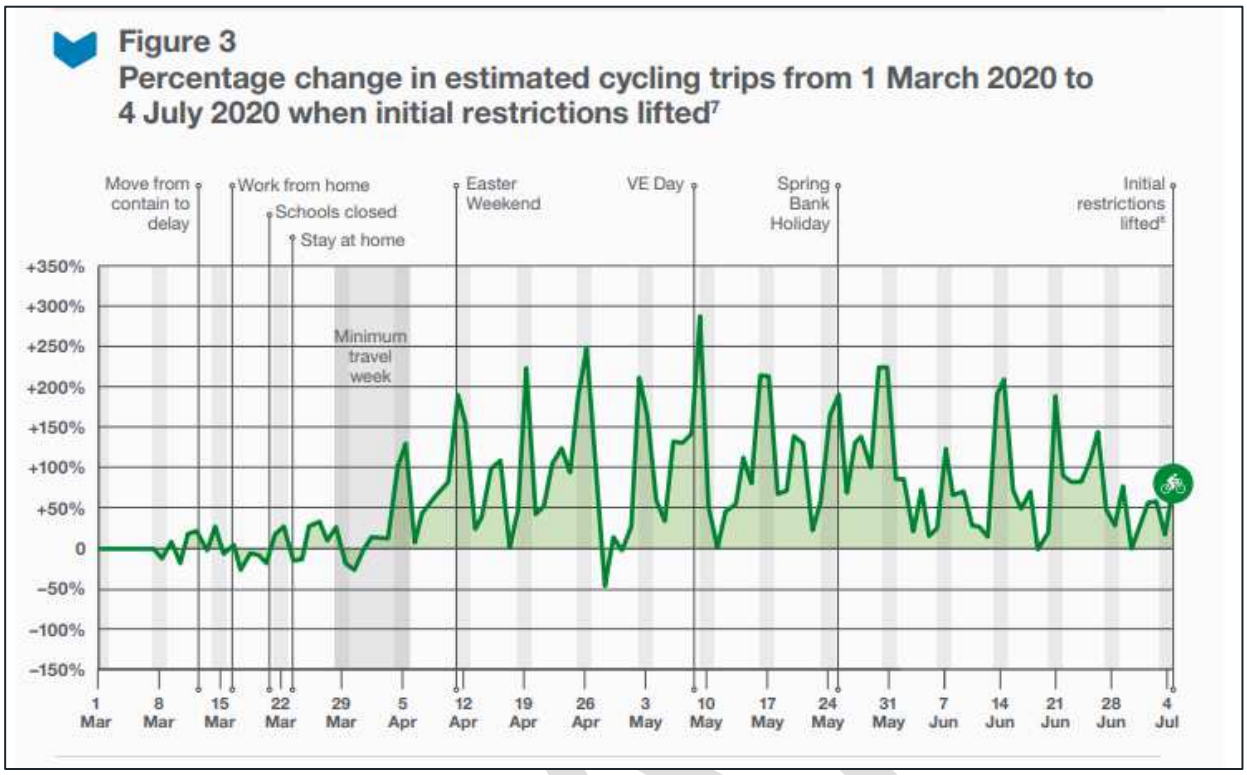
Figure 3-1 - Targets for and Benefits of Doubling Cycling and Increasing Walking



Source: Gear Change: A bold vision for cycling and walking, Department for Transport, 2020

3.6.5. This ambition has been partly derived from direct experience during the COVID-19 Pandemic in 2020, with a 100% increase in cycling observed and close to 300% in some locations across the UK (as noted in **Figure 3-2**):

Figure 3-2 - Gear Change Figure 3 Impacts of COVID-19 Travel Restrictions on Cycling



Source: Gear Change: A bold vision for cycling and walking, Department for Transport, 2020

3.6.6. The NWL sustainable transport strategy responds to this new guidance by providing improved network conditions for cycling by reducing traffic on rural minor roads around the NWL to low levels, enabling them to be made more suitable for cycling with supporting measures to control vehicle speeds.

Cycling and Walking Investment Strategy

3.6.7. The statutory Cycling and Walking Investment Strategy (CWIS) sets a clear ambition to make cycling and walking the natural choices for short journeys or as part of a longer journey with supporting objectives to increase cycling and walking levels.

3.6.8. This STS sets out how the NWL scheme seeks to improve the existing walking and cycling facilities in the surrounding area. The scheme includes green bridges, improved walking and cycling infrastructure and crossing facilities. It will also tie in to existing walking and cycling infrastructure to the north and the south of the scheme.

LTN 1/20 (July 2020)

3.6.9. Local Transport Note LTN 1/20 provides guidance and good practice for the design of cycle infrastructure, in support of the CWIS. It supports the delivery of high quality cycle infrastructure and reflects current good practice, standards and legal requirements. It sets clearer guidance on how to design for cycling in different types of conditions in both urban and rural areas and also offers direction on types of intervention suitable for different thresholds of traffic speed and volumes.

3.6.10. The majority of routes close to the NWL are rural lanes through small hamlets and villages, many of which currently carry more traffic than is suitable for the scale of existing highway infrastructure and constrained network conditions.

3.6.11. However, with the NWL in place, traffic relief will be provided to local villages, with traffic flows on many links reduced to below 2,000-2,500 vehicles per day AADT in the opening year of 2025. This enables the existing infrastructure to be re-purposed to prioritise cycling and walking without building extensive extra new links (albeit with speed management measures required to control speeds to low levels). The sentiment of the guidance is indicated below in **Figure 3-3** – Chapter 7 of the guidance applies to rural lanes and quiet lanes. This guidance has been considered and will be used to inform the ongoing design.

Figure 3-3 - LTN1/20 Chapter 7 Overview

Source: Local Transport Note 1/20 - Cycle Infrastructure Design, Department for Transport (July 2020)

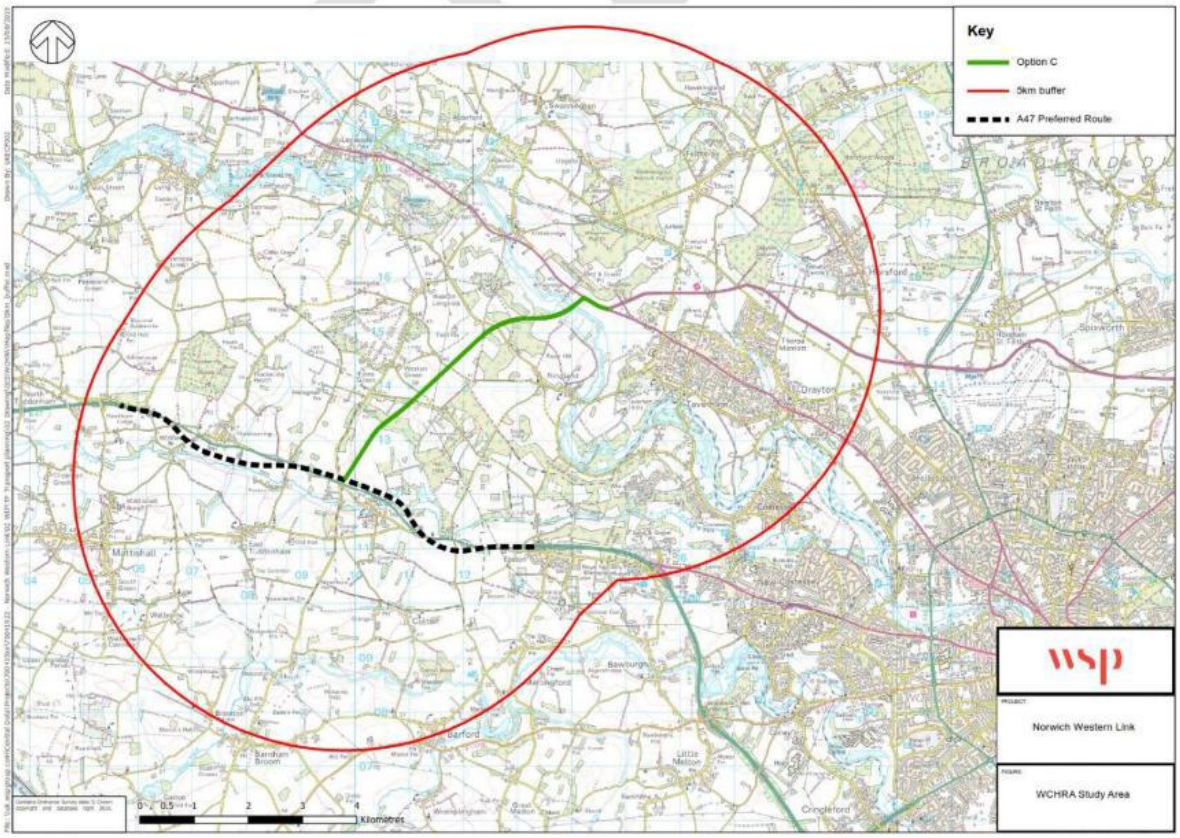
4 WALKING, CYCLING & HORSE RIDING ASSESSMENT REPORT

4.1.1. An Assessment Report was prepared in accordance with DMRB GG142 Walking, Cycling and Horse-Riding Assessment and Review (WCHAR) [Superseding HD 42/17 in November 2019], which is Highways England's overall process for the consideration of walking, cycling and horse-riding facilities within highway schemes. In accordance with GG142, the scale of the scheme has been judged (by the Lead Assessor) to qualify as a large scheme for the purposes of the Assessment. With the following information requirements:

- Review of the walking, cycling and horse-riding policies / strategies;
- Collision data;
- Description of public transport facilities;
- Key trip generators and local amenities;
- Site visit;
- Consultation with key stakeholders;
- Description / review of existing walking, cycling and horse-riding network facilities at a local and county wide (strategic) level;
- Collation and analysis of walking, cycling and horse-riding data; and
- Evidence of consultation with local user groups and the wider public.

4.1.2. The study area for the WCHAR has been set by the Lead Assessor and is approximately 5km from the centre of the scheme, as per GG142 guidance. The study area includes parts of the districts of Breckland, Broadland and South Norfolk, as shown in **Figure 4-1**.

Figure 4-1 - WCHAR Study Area



4.1.3. The WCHAR provides the design team with relevant background information and identifies opportunities to facilitate the inclusion of all walking, cycling, and horse-riding modes in the highway schemes design process. The study was developed with input from transport stakeholders and the Local Liaison Group of Parish Council Representatives. **Figure 4-2** shows a sustainable transport workshop carried out with the LLG in September 2019.

Figure 4-2 - Local Liaison Group Workshop September 2019

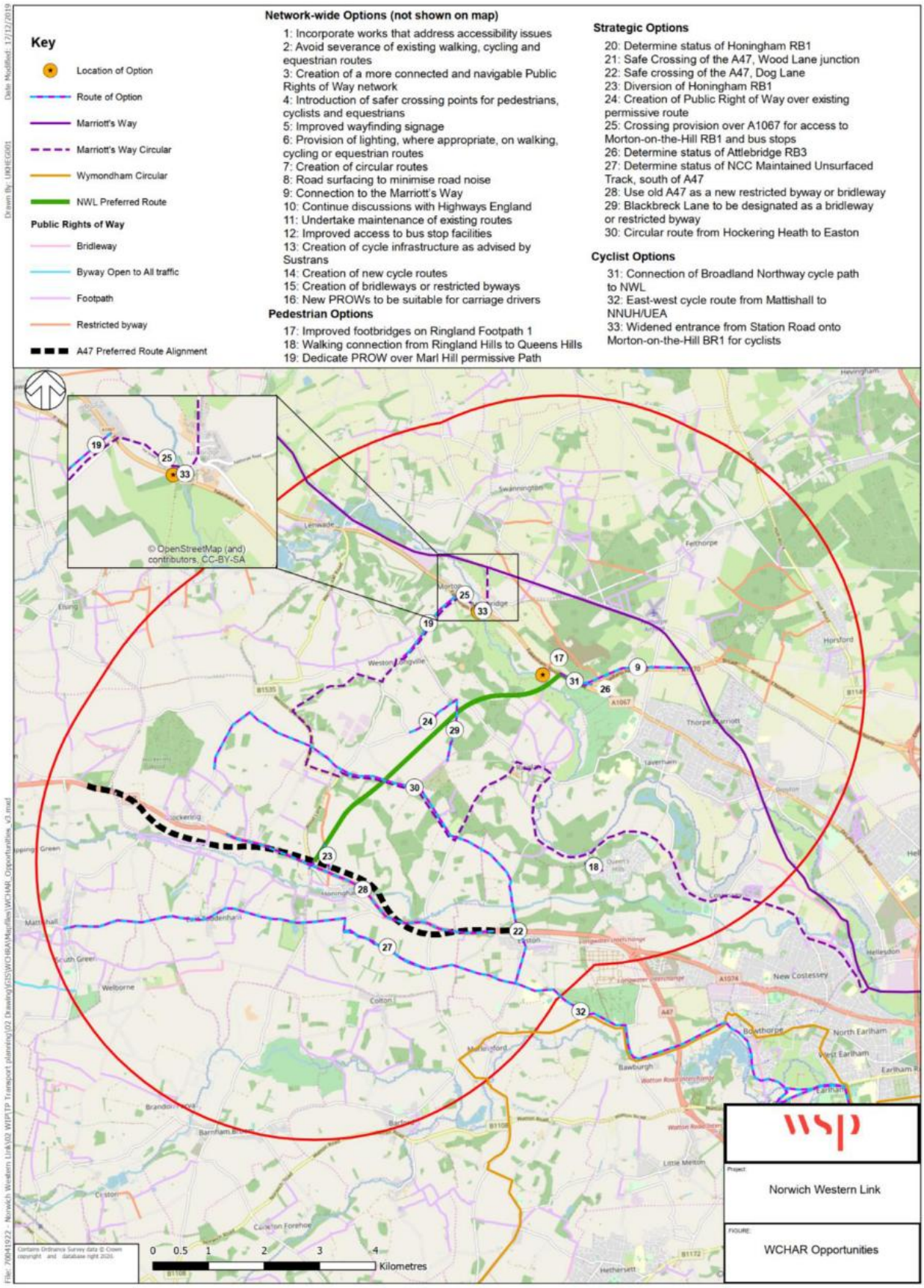
4.1.4. The output helped inform the NMU Strategy and the wider sustainable transport interventions set out within the Local Access Consultation.

4.1.5. The full WCHAR report is included in **Appendix C**. However, the process can be summarised as follows:

- Initial public consultation in Summer 2018 to seek feedback from local residents;
- WCHAR Study of existing network within 5km radius of the NWL;
- Options Consultation in November 2018 which sought identification of potential opportunities for connectivity and accessibility enhancement;
- Development of options for new highway bridges and underpasses to retain access where the NWL crosses existing public highways;
- Preparation of NMU Strategy to inform Reference Design for procurement of a Design and Build Contractor;
- Development of green bridge proposals that can be shared with Non-Motorised Users;
- Consideration of an alternative strategy with the majority of sideroads closed to reduce through traffic through villages on minor roads;
- Local Access Consultation in Summer 2020 to seek feedback on proposals for routes that cross the NWL and proposed Non-Motorised User strategy excluding highway bridges;
- Option refinement in response to feedback from consultation and updated ecological mitigation proposals; and
- Revisions to include an additional green bridge to be shared with NMUs.

4.1.6. Key opportunities identified as an output from the WCHAR are summarised below in **Figure 4-3**. A larger copy of the plan is included in **Appendix G**. These opportunities have been taken forward and developed as part of the various strands of the Sustainable Transport Strategy explained in the remaining chapters of this report:

Figure 4-3 - WCHAR Opportunities

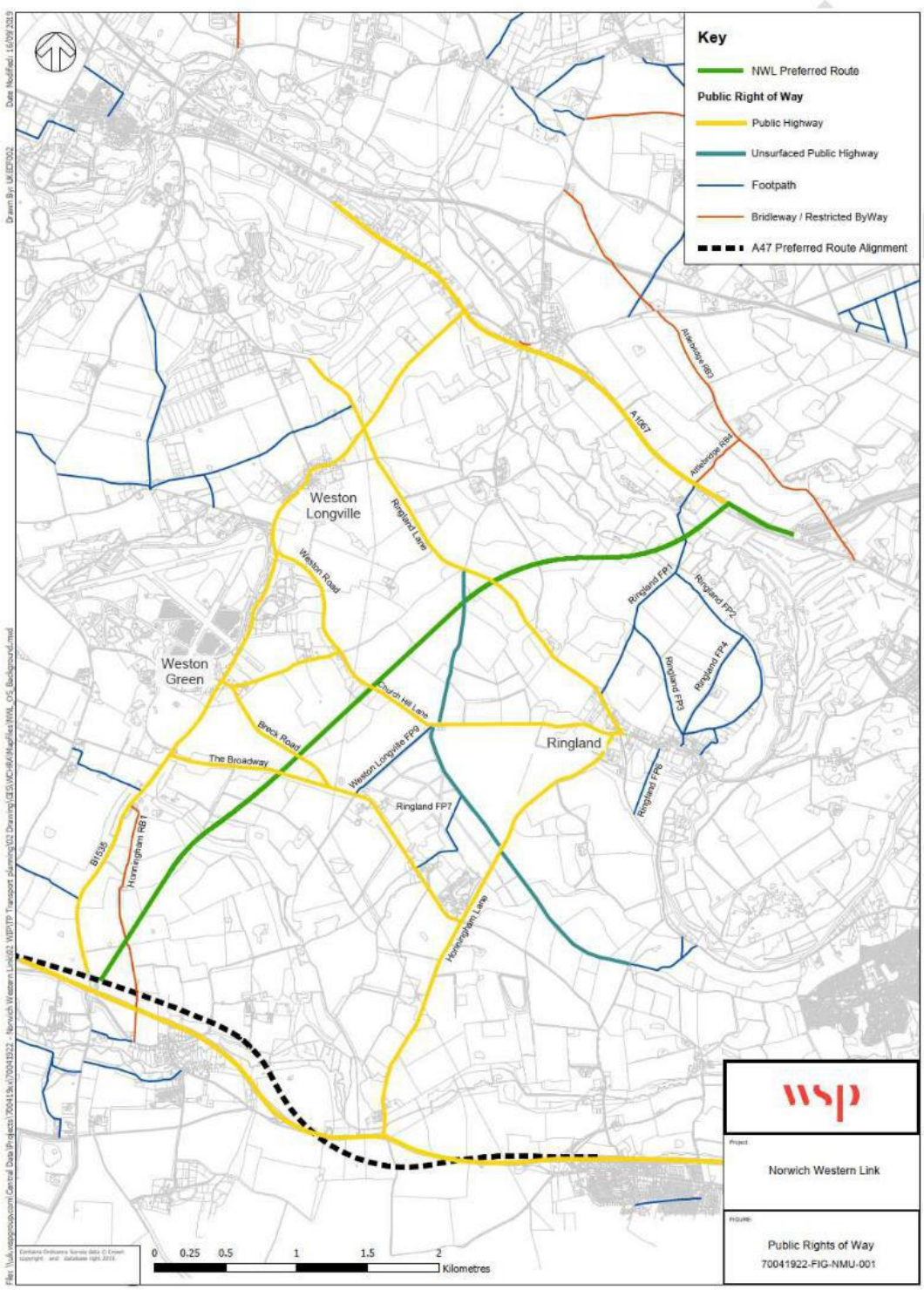


5 NON-MOTORISED USER STRATEGY

5.1 EXISTING CONDITIONS

5.1.1. There are five existing Public Highways and two existing Public Rights of Way which cross the NWL, as shown in **Figure 5-1**:

Figure 5-1 - Existing Public Rights of Way



5.2 BACKGROUND

5.2.1. The intention of the NMU (Non-Motorised User) strategy is to offer increased opportunities for recreational walking, cycling and horse riding in the immediate vicinity of the NWL route, as well as improving connectivity of existing Public Rights of Way and encouraging healthy and active travel by non-car modes on trips within shorter distance bands.

5.2.2. To inform the development of Non-Motorised User interventions, a Walking, Cycling & Horse Riding Assessment and Review (WCHAR) was undertaken in accordance with DMRB GG142. This guidance is prepared in line with Highways England's Strategic Business Plan and Roads Investment Strategy, as well as the Infrastructure Act 2015. This identified opportunities for improving connectivity and quality of existing Public Rights of Way in the vicinity of the scheme, which are currently fragmented and do not function as a joined-up network. The NMU Strategy proposals associated with the NWL scheme aim to address these issues, seeking to connect up the existing routes and make them more usable whilst also mitigating potential severance issues caused by the provision of a new Highway link which crosses several existing roads and PROWs.

5.2.3. Working with local transport stakeholders and the established Local Liaison Group to help generate ideas, initial options for enhancing Non-Motorised User provision were discussed and developed via a series of workshops. Key themes emerging from the workshops highlighted a desire to avoid closing existing Public Rights of Way (PROWs) but it was recognised that some localised diversions would be necessary, and this may also be helpful in joining up the scheme with existing PROWs and responding to the NWL highway design.

5.2.4. Connecting nearby rural communities such as Ringland and Weston Longville who share local facilities was also a key focus. The NMU strategy was initially developed with the intention of preserving existing access, so all existing roads that cross the scheme were initially designed to be grade separated crossings, open to all users. However, this principle was challenged by the local communities living close to the scheme and a revised approach was requested with all existing roads closed to vehicles to minimise opportunities for rat running through the nearby villages. In response to this feedback, the approach was tested through the local access consultation in Summer 2020.

5.2.5. In addition to dealing with severance issues, the proposed NMU strategy also assists with joining up what was found through the WCHAR process to be an existing but fragmented local PROW network with limited coverage and in some cases poor connectivity to existing settlements. There are two existing PROWs which cross the scheme – Ringland Footpath FP1 in the north which passes under the future viaduct and Honingham Restricted Byway RB1 at the southern end of the route.

5.2.6. In the north of the NWL route the existing FP1 was able to remain unchanged post construction with the route passing under the proposed NWL viaduct. This path was observed to be in low usage currently and was away from potential desire lines from the nearest settlements of Ringland and Weston Longville towards existing key facilities that NMUs would potentially wish to access. It was recognised that any improvement works to the existing FP1 surfacing and its bridge crossing the River Wensum SAC would have potential significant ecological effects on the habitats within the SAC. The extent of height clearance required to overcome this issue would also potentially lead to the introduction of ramps and steps which would increase visual intrusion and inconvenience to users.

5.2.7. It was also noted that existing highway bridges that cross the River Wensum elsewhere (for example in Ringland village) would have low traffic and were more closely aligned with people's desire lines for cycling to key facilities. It was therefore agreed with stakeholders (including the NCC Public Rights of Way officers) that there would be no changes to FP1 as part of the NWL scheme and no provision would be made for NMUs within the viaduct design as this would widen the structure and increase shadowing over the SAC. However, new maintenance tracks alongside the viaduct would improve connections to FP1. The proposed maintenance tracks are within the scheme footprint and do not cross the River Wensum SAC.

5.3 EVIDENCE BASE AND ENGAGEMENT

5.3.1. The Strategy considers the relevant policy and design guidance at both the national and local level, in particular DMRB guidance GG142, which informed the WCHAR process, and more recently LTN 1/20.

5.3.2. Traffic surveys and public / stakeholder engagement were carried out to ensure the scheme is incorporating the key elements considered important in the overall scheme design. The traffic surveys showed that the roads crossed by the NWL have low existing flows, so the impact of closure would not be detrimental to the operation of the highway network.

5.3.3. Engagement specifically on NMU design aspects has included meetings and workshops with the following:

- Local Liaison Group (Parish Council Representatives);
- NMU Stakeholder Workers;
- Local Access Forum & Public Rights of Way Sub-Group;
- County and District Council Members;
- Norfolk County Council Officers;
- Highways England; and
- Environmental Groups.

5.3.4. At the southern end of the NWL route, work was completed jointly with Highways England to develop a diversion route for an existing Restricted Byway (Honingham RB1) which would be severed by both the NWL and A47. Site visits and surveys carried out to inform the WCHAR Assessment noted that the existing route was of poor quality, not well connected to Wood Lane or Honingham village and was not in regular use due to existing severance issues caused by an at-grade crossing of the A47.

5.3.5. It became clear that an improved route could be provided that connects Honingham with Weston Green more effectively. Working with adjacent landowners, a new route for RB1 was agreed following the east side of NWL, connecting The Broadway green bridge to Honingham Village via a new underpass of A47 to be provided by Highways England as part of their North Tuddenham to Easton dualling scheme.

5.4 GUIDING PRINCIPLES

5.4.1. The engagement process resulted in the development of a set of guiding principles, the Strategy has been formulated with these in mind:

- Aim to retain and enhance PROWs where possible;
- Diversion routes to be kept at a reasonable length and development in accordance with the DfT guidance [CD143];
- Seek to improve surfacing and accessibility where possible aligned with Sustrans and British Horse Society guidance. Where possible the Sustrans Traffic-free routes and greenways design guidance (November 2019) should be used to inform design for shared-used cyclists, pedestrian and equestrian facilities;
- Avoid or minimise disturbance to adjacent landowners and farm operations;
- Proposed maintenance tracks can be utilised as new links between PROWs and local roads;
- Where minor roads or private accommodation routes to be retained cross the NWL, bridges or underpasses will be provided where practicable for use by NMUs and equestrians;
- Around the A47 junction, the design and development of NMU routes should be coordinated with Highways England to create a joined-up strategy;
- Landscaping proposals will take into account security of footpath users, particularly in remote rural areas, promoting enjoyment of routes where possible with appropriate landscape mitigation where possible with appropriate landscape mitigation where routes pass close to noisy edges of the project or A47 routes; and
- Wayfinding and signage should be provided in accordance with Sustrans guidance.

5.5 LOCAL ACCESS CONSULTATION

5.5.1. The Local Access Consultation was held between July and September 2020 to seek feedback from the public on proposals for Public Rights of Way diversions and extensions, and the treatment of existing routes which cross the Norwich Western Link alignment.

5.5.2. The proposals for the Non-Motorised User Strategy as consulted are shown in **Figure 2-10** and relevant brochure extracts are enclosed in **Appendix A**. This excluded highway bridges at Breck Road and Church Hill Lane and proposed that a green bridge for ecological movement and Non-Motorised Users only would be installed at The Broadway. Two options were presented for Ringland Lane – either open to all users or restricted to Non-Motorised Users only.

In addition to the vehicle access changes, new public rights of way and diversions of existing were also proposed around the NWL. The proposals are summarised as follows (from north to south):

- **Options for Ringland Lane - Open to All Traffic or Restricted (Route 6):**
  - Kept open to all traffic, including motor vehicles (as it currently is), with footways installed to improve pedestrian access and connectivity with the wider Public Rights of Way network. OR
  - Restricted to walkers, cyclists and horse riders at the point where the road crosses the NWL. This means Ringland Lane would become a no-through road to motorised traffic except for vehicle access to adjacent land and property

- **Ringland Public Rights of Way Proposals (Routes 7, 9, 10, 10a, 10b and 11):**
  - A shared footway/cycleway is proposed to the north side of the section of Fakenham Road. This would connect existing Public Rights of Way with the cycleway at Broadland Northway and provide a safe, off carriageway cycling route along the dualled section of the A1067.
  - A new public footpath is proposed alongside the NWL to provide a link to other existing footpaths around Ringland and close to the River Wensum.
  - On the north west side of the NWL, a new section of bridleway would be provided, linking to the hamlet of Weston Green, via a green bridge.
- **Weston Road Proposals (Route 4):**
  - It is proposed to permanently close Weston Road/Church Hill Lane to through traffic between Weston Green Road and Blackbreck Lane. Access would be maintained to properties, businesses and agricultural land with access restrictions at either end.
- **Weston Road PROW proposals (Route 5):**
  - Weston Green Road would be promoted as a shared space between vehicles and other road users with appropriate speed limits and signage
  - A section of an existing track (known as Blackbreck Lane) would be diverted to join Ringland Lane immediately to the east of the Norwich Western Link to prevent it being severed.
  - To the east of NWL an existing public footpath (Weston Longville Footpath 9) would be changed to restricted byway standard so that it can also be used by, amongst others, cyclists and horse riders.
- **Breck Road Proposals (Route 3):**
  - It is proposed to close Breck Road to through traffic where it crosses the Norwich Western Link route, with access maintained to properties, businesses and agricultural land and provide a link to The Broadway.
- **The Broadway Proposals (Route 2):**
  - It is proposed to close The Broadway to motorised through traffic (with a traffic restriction to allow property access only). A green bridge would be installed over the Norwich Western Link.
- **The Broadway and Breck Road PROW Proposals (Routes 1a, 1b and 8):**
  - The green bridge would create an environmental crossing for bats and other species, as well as pedestrians, cyclists and horse riders.
  - A new short section of restricted byway would be created along the west side of the Norwich Western Link, connecting Breck Road to The Broadway for pedestrians, cyclists and equestrians.
  - To the south of The Broadway, Honingham Restricted Byway RB1 would be removed between Wood Lane and the former A47 and replaced with a new section of restricted byway along the east side of the Norwich Western Link. This route would provide connectivity from The Broadway to a new underpass crossing of the A47 proposed by Highways England.

5.5.3. Feedback on the proposals indicated good levels of support for the proposals in general.

5.6 FURTHER WORK COMPLETED SINCE JULY 2020

5.6.1. The strategy has been further developed in response to the feedback from the Local Access Consultation and to align the strategy with the latest engineering proposals being priced for competitive tender. The most significant change is the inclusion of an extra NMU crossing between Weston Road and Ringland Lane.

5.6.2. This new route crosses the NWL via an additional green bridge which is required for ecology mitigation. The requirement for the bridge has been informed by bat surveys that the ecology team have undertaken in 2019 and in 2020. The proposed bridleway route to the west of NWL is now shown diverted over the bridge to connect with Blackbreck Lane (unsurfaced public highway) to the east of the NWL.

5.6.3. Minor amendments have also been made to the RB1 connection to The Broadway green bridge to minimise ecological effects on an area of woodland to the south of The Broadway – this is now instead routed to the north, passing under the bridge alongside NWL.

5.6.4. The scheme plans have also been updated to acknowledge the latest emerging (December 2020) Highways England proposals for the A47 North Tuddenham to Easton dualling scheme, prior to their DCO submission. The updated strategy is shown in **Appendix E**

5.7 GREEN BRIDGES FOR ECOLOGY AND NON-MOTORISED USERS

5.7.1. The Local Access Consultation gave people an early look at the proposals for ecological mitigation, including visualisations of a potential indicative green bridge design that could be shared with Non-Motorised Users. This would not only mitigate ecological effects of the scheme but would also provide an attractive vegetated route crossing the NWL for pedestrians, cyclists and horse riders that is grade separated and segregated from motor vehicles (with the exception of a small number of permitted agricultural vehicles). An extract of the imagery used in the consultation is shown in **Figure 5-2**.

Figure 5-2 - The Broadway potential green bridge design

Artists impression of The Broadway green bridge (looking west)

5.8 PROPOSED STRATEGY

5.8.1. The proposed Strategy includes a mix of over bridges and underpasses to provide grade separated crossings of the NWL dual carriageway, and either on or off site mitigation in the area surrounding the NWL. To enable the PROW network to be preserved and enhanced as part of the scheme.

5.8.2. The NMU Strategy Plan is included in **Appendix E** and the proposals are explained in more detail below.

Route 1a: Honingham Pedestrian / Cycle link

- Provision of a shared pedestrian/cycleway linking Honingham village centre to the old A47 and Honingham Restricted Byway 1. The route begins at The Street in the centre of Honingham, with a pedestrian and cycle path passing the village hall, linking to the old A47 to create a non-motorised user link to further onward routes.

Route 1b: Honingham Restricted Byway 1

- Route 1b is intended to mitigate severance of the existing Honingham RB1 a consequence of both the proposed A47 and Project works. Route 1b comprises the creation of a new diversionary route linking Route 1A and the old A47 to the south, with The Broadway to the north. Where the route crosses the new A47, an underpass will be constructed to allow safe passage of users, shared with private access to Easton Estate. The new route will closely follow the Project along the highway boundary to minimise the extent of land take, with adequate separation from the highway to minimise disturbance to users of the new route. To the north, this route will connect with The Broadway, with onward connection to Weston Green and Ringland.
- Public access rights over the remnants of the original Honingham RB1 north of the former A47 will be extinguished.

Route 2: The Broadway (Public Highway)

- This route requires the implementation of a Traffic Regulation Order (TRO) to prohibit motor vehicles and horse drawn carriages (except for access), to create a tranquil green lane for NMU access and ecology. The route will benefit from an overbridge crossing the Project to retain access and avoid severance over this route. Although access to motor vehicles will be prohibited, access will be preserved for private vehicles serving private property, including agricultural land holdings. Vehicle gates with the inclusion of an NMU bypass will be introduced to deter unauthorised and indiscriminate access by motor vehicles.

Route 3: Breck Road (Public Highway)

- Breck Road to be closed to all traffic, except for access. The south-east section of Breck Road is to be stopped up and diverted to The Broadway proposed overbridge and designated as a Restricted Byway.

Route 4: Church Hill Lane / Weston Road (Public Highway)

- Church Hill Lane is to be stopped up at the crossing of the NWL and the section of the west of the NWL will be designated as a Bridleway. Users will then be diverted to Route 5 alongside the NWL and over the new green bridge for onward connections towards Ringland and Attlebridge.

Route 5: Blackbreck Lane (unsurfaced highway maintained by Norfolk County Council)

- Blackbreck Lane is an existing unsurfaced public highway provides connectivity between Church Hill Lane and Ringland Lane to the east of the Project. The northern extent of Blackbreck Lane will be severed by the Project, and so a short diversion to the east side of the Project will be created to preserve connectivity with Ringland Lane. The remainder to the north side will be stopped-up, with all rights extinguished.

Route 6: Ringland Lane

- Retention of this route open to all traffic with Ringland Lane crossing under the Project, preserving access to all users. Given the low traffic use on Ringland Lane, we expect the majority of users to use the carriageway, however a reinforced earth trod will be constructed on the south verge, to create an off-highway link between Routes 5 and 10.

Route 7: Ringland FP1 (Public Footpath)

- Retention of this public footpath to preserve access over this pedestrian route. This footpath will pass under the Project's viaduct, and so access will be preserved, however some local disruption may be experienced during construction. The footpath will remain as unmade where it crosses through the floodplain of the Wensum Valley and wetland paddocks to minimise impact on flooding and existing habitats and protected species.

Route 8: Weston Longville Footpath 9

- To improve connectivity with neighbouring PROWs, it is proposed to upgrade Weston Longville Footpath No.9, to the east of the Project to a Restricted Byway with links to The Broadway and Honingham RB1 diversionary route. This will create a continuous link from Honingham to Ringland Lane via Blackbreck Lane. As this route follows an existing agricultural access track comprised of a stoned surface, no changes to the surface construction are proposed.

Route 9: New Bridleway

- Dedication of a new bridleway from Weston Road, along the west of the NWL, crossing at a new green bridge and connecting to Blackbreck Lane.

Route 10: New Public Footpath

- Dedication of a new public footpath over the NWL maintenance track from Ringland Lane, connecting to Route 10a and Route 10b.

Route 10a: New Public Footpath

- Dedication of a new public footpath 'Trod' constructed linking Route 10 and Route 10b with existing Ringland Footpath 1 and 2 to the east.

Route 10b: New Public Footpath

- Dedication of a new public footpath over a proposed maintenance access track to be constructed to serve the Project with access from Ringland Lane to the south and extending to the tie-in with Ringland Footpath No.1 to the north. The existing Ringland Footpath 1 will remain and pass under the viaduct, for onward connections to Route 11.

Route 11: New Pedestrian / Cycle Link

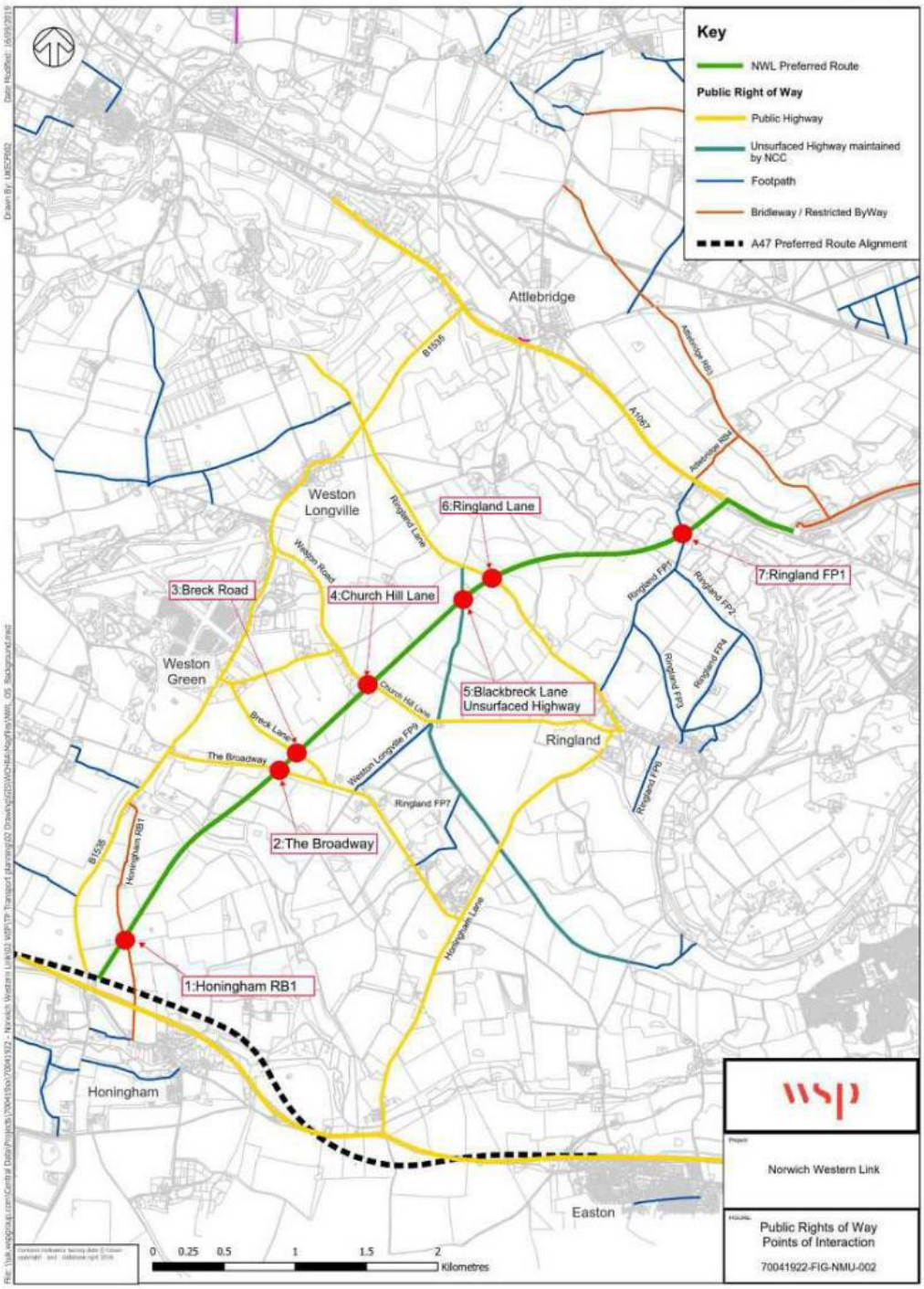
- A new pedestrian / cycle link is proposed to the north of the A1067 Fakenham Road, linking the existing Attlebridge Restricted Byway 4 (RB4) and Bridleway 6 (BR6) The route will create a safe link for users to access existing Public Rights of Way to the north of the Project and the non-motorised infrastructure provision along the Broadland Northway. Existing uncontrolled pedestrian crossing at Fakenham Road/NDR Roundabout will be removed.

6 SIDE ROAD STRATEGY

6.1 EXISTING CONDITIONS

There are five existing Public Highways and two existing Public Rights of Way which cross the NWL, as shown in **Figure 6-1**:

Figure 6-1 - Existing Routes which cross the NWL



6.2 TRAFFIC SURVEYS OCTOBER 2019

6.2.1. To understand existing usage of the routes which cross the NWL, traffic surveys were carried out in October 2019 (during school term time). The results for the routes which cross are shown below in **Figure 6-2**. This indicates that existing public highways are in very 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. The 2025 Do Something (DS) predicted flows have been added to **Figure 6-2** to show how the usage will change following the construction of the NWL. The DS scenario includes the closure of all side roads, except Ringland Lane, which will remain open.

6.2.2. There is also evidence of existing use by Non-Motorised Users with Ringland Lane also being more well used than other routes.

Figure 6-2 - October 2019 Traffic Surveys

Total	Pedal cycle	Equestrian	Motorcycle	Car		LGV, OGV & PSV	Pedestrians – lone adult	Pedestrian – adult with dog	Pedestrian – adult with child	Wheelchair / mobility scooter
				2019 Base	2025 DS					
The Broadway	0	0	0	13	0	6	1	1	0	0
Breck Lane	5	0	0	66	0	13	3	0	0	0
Church Hill Lane	7	3	1	60	0	17	4	1	0	0
Blackbreck Lane	0	1	0	0	0	0	0	1	0	0
Ringland Lane	32	0	2	260	286	63	2	0	0	0

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

6.3 CONSULTATION FEEDBACK

6.3.1. As set out in **Appendix A**, the Local Access Consultation proposals in 2020 were generally well received, with good levels of public support evident for the closure of existing public highways that cross the NWL at The Broadway, Breck Road, Weston Road/Church Hill Lane and Blackbreck Lane. These routes are therefore proposed to be stopped up to motor vehicles ('except for access' where local land access is required). Turning facilities will be installed to enable errant users to turn around and where sections of carriageway are no longer required there would be a reduction in highway maintenance costs.

6.3.2. Public access rights over the routes retained would be reduced to allow non-motorised users only. Restricted access will be imposed via width restriction features such as gates and bollards.

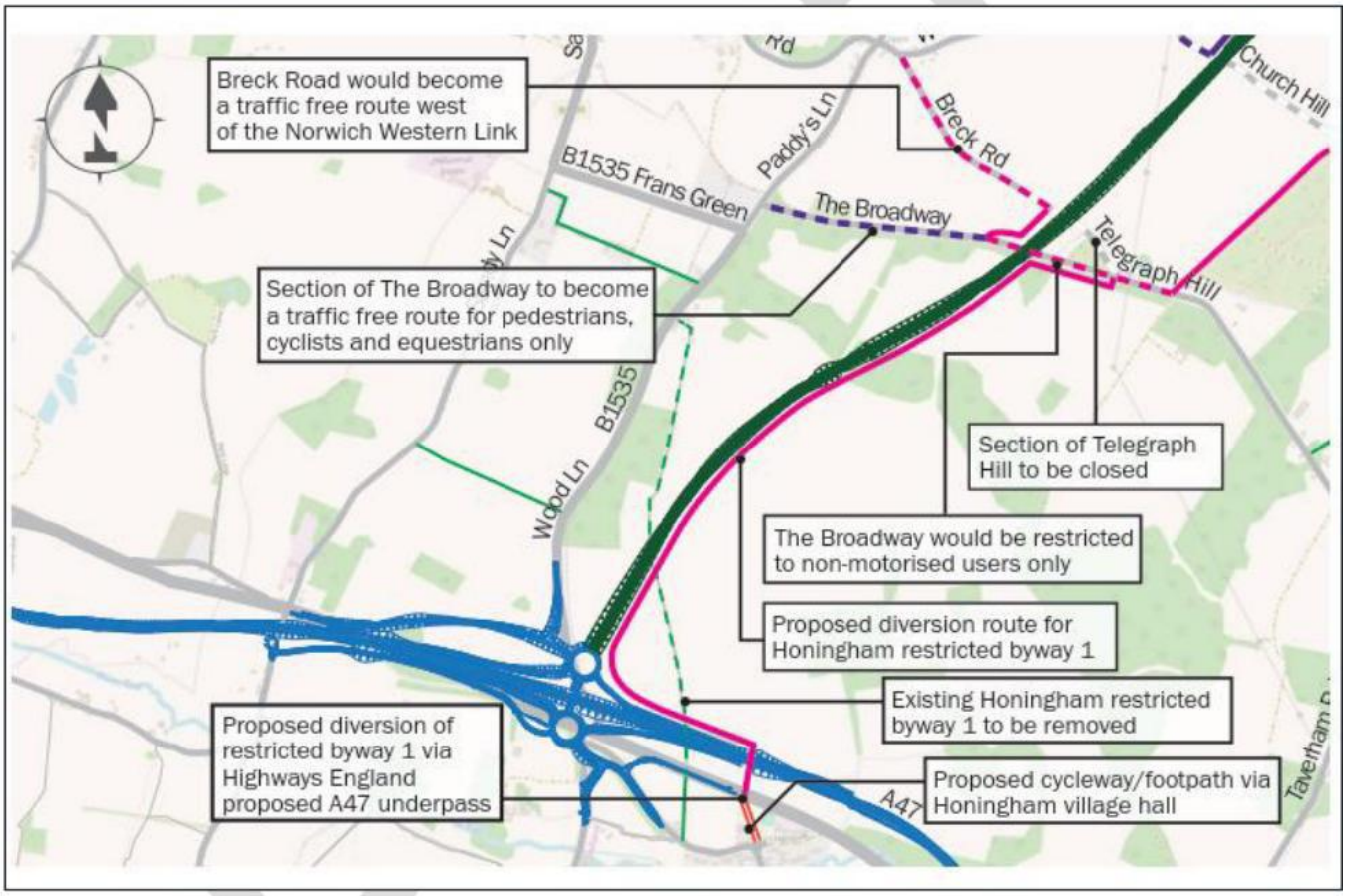
6.3.3. However, it was also evident that it would be practical for one route to remain open to all traffic to facilitate local access between nearby communities (for example Weston Longville and Ringland).

This would enable residents to access key facilities in the two villages such as pubs, shops and village halls, as well as avoiding long diversion routes via A47 or A1067. The feedback from consultation is considered for each route that crosses the NWL below to inform a decision on a preferred option.

6.4 PROPOSALS FOR BRECK ROAD AND THE BROADWAY

6.4.1. **Figure 6-3** shows the Local Access proposals for Breck Road and The Broadway which were identified for consolidation due to geographic proximity with localised Public Rights of Way diversions to connect with a new green bridge which is required for ecological mitigation at The Broadway.

Figure 6-3 - Breck Road and The Broadway Proposals



6.4.2. There were 376 responses to the question **'To what extent do you agree or disagree with the proposal for Breck Road?'**. Over half of respondents (215) strongly agreed/agreed and just over a fifth (78) disagreed/strongly disagreed.

Table 6-1 – Local Access Consultation Feedback on Proposals for Breck Road

Option	Total	Percent
Strongly agree	86	23%
Agree	129	34%
Neither agree nor disagree	83	22%
Disagree	13	4%
Strongly disagree	65	17%

6.4.3. Textual comments received include the following points supporting the proposals:

- Provided access remains for cyclists, and the surface is firm (preferably tarmac)
- It will open up an excellent walking and riding route and coupled with the proposed cycleway alongside the NWL to Honingham make it a pleasant new route.
- Will remove passing traffic and maintain walking and cycling links – good.
- I agree but only on the basis that Ringland Lane stays open. If Ringland Lane is closed to cars then Breck Road should stay open. In other words, one of the 3 roads East / West should be open to local traffic.
- Subject to signage so that Breck Road east doesn't become a dead end for anti-social behaviour or the turning area a nocturnal car parking zone.

6.4.4. Textual comments received opposing the proposals for Breck Road were generally not related to the proposed closure of the highway and were opposing the NWL scheme in principle.

6.4.5. In response to the question **'To what extent do you agree or disagree with the proposal for The Broadway?'** There were 371 responses to this question. Over half of respondents (207) strongly agreed/agreed and just under a fifth (73) disagreed/strongly disagreed.

Table 6-2 - Local Access Consultation Feedback on Proposals for The Broadway

Option	Total	Percent
Strongly agree	81	22%
Agree	126	34%
Neither agree nor disagree	91	26%
Disagree	13	4%
Strongly disagree	60	16%

6.4.6. Textual comments received include the following points:

- My 'strong agreement' with the proposal for the Broadway is conditional on the proposed green bridge properly fulfilling the functions described.
- The above proposals seem sensible in the light of the low car usage, and the benefits to wildlife of the green bridge.
- Sustainable transport please not expensive new roads.
- This 'green bridge' will not reduce the impact on bats.

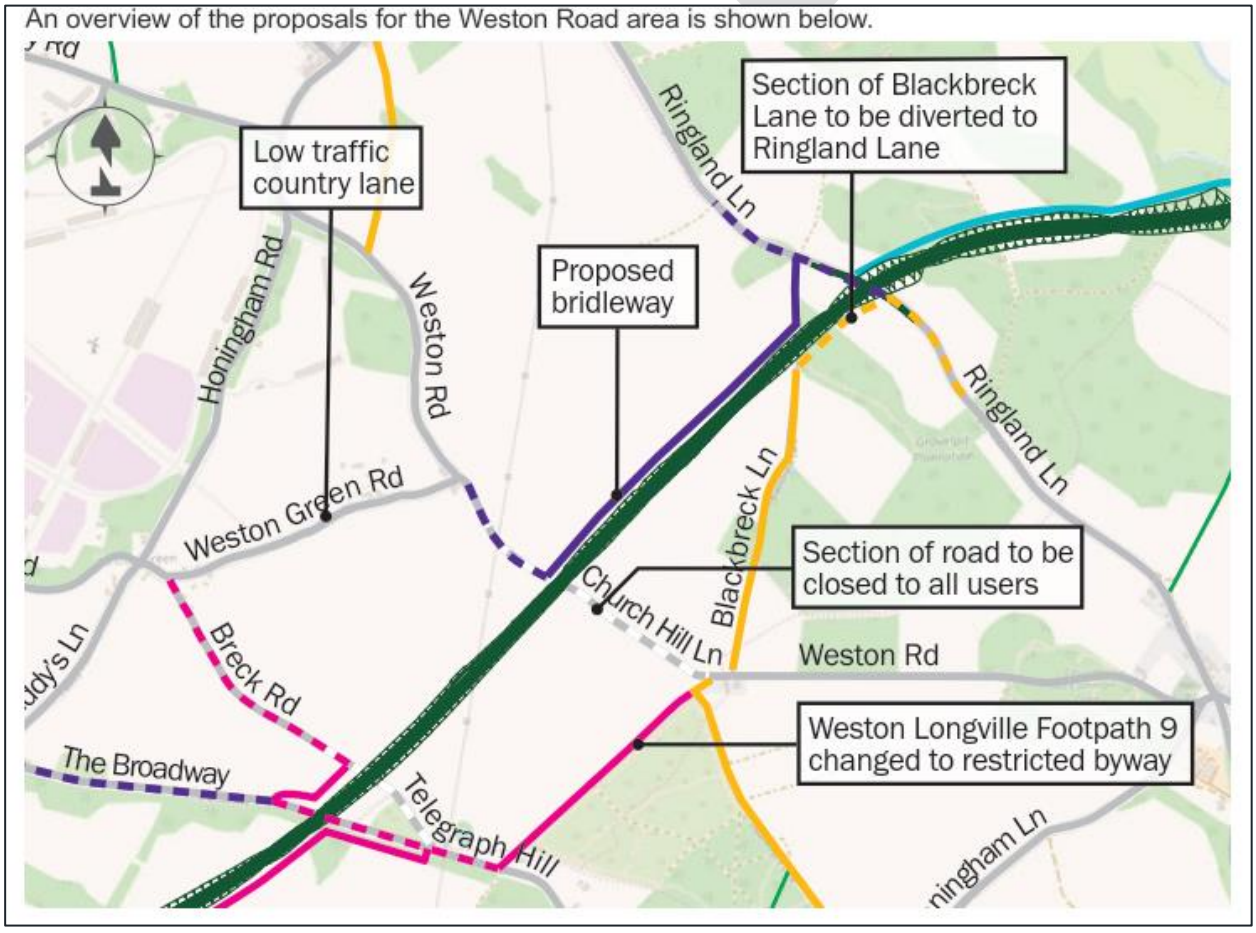
6.4.7. Again, in this case, the negative comments were not related to specific logistical issues or practical reasons for keeping The Broadway open to traffic.

6.4.8. Based on the feedback set out above, it appears there is support evident for the proposed approach of closing The Broadway and Breck Road, with Non-Motorised Users diverted to the proposed green bridge at The Broadway.

6.5 PROPOSALS FOR WESTON ROAD/CHURCH HILL LANE

6.5.1. **Figure 6-4** shows the proposals for Weston Road.

Figure 6-4 - Proposals for Weston Road



6.5.2. When asked **'To what extent do you agree or disagree with the proposal for Weston Road?'** 379 respondents answered this question. About half of the respondents (188) strongly agreed/agreed and just over a quarter (96) disagreed/strongly disagreed.

Table 6-3 - Local Access Consultation Feedback on Proposals for Weston Road

Option	Total	Percent
Strongly agree	83	22%
Agree	105	28%
Neither agree nor disagree	95	25%
Disagree	25	6%
Strongly disagree	71	19%

6.5.3. Textual feedback indicated support for closing Weston Road to through-traffic but various respondents wanted to see a route kept open for Non-Motorised Users in this location:

- This will help reduce traffic and for riding/walking/cycling as other routes are being lost plus it will be much safer for horse riding;
- It will be brilliant to remove motor vehicles from this stretch of road which is used by pedestrians for exercise and dog walking;
- It is right to close Weston Road/Church Hill Lane to through traffic. To the west of the link road it should be a place where pedestrians, cyclists and equestrians can enjoy access without vehicles;
- As long as residents can get to and from home without lots of extra mileage;
- Agree that Weston Road be closed to through motorised traffic. However, there should be access for non-motorised traffic (walkers, riders, cyclists) via a ramped bridge or an underpass;
- Weston Road is already popular with walkers, cyclists and riders creating a much valued natural circular route from Ringland to Weston. Closing the road completely would cut off access for this existing group of users;
- Keeping Weston Road/Church Hill Lane open for non-motorised traffic would significantly reduce the need for the creation of new restricted byways;
- Close Weston Road to motorised traffic;
- The proposals would maintain our walking and cycling links but still maintain existing vehicle access to the A47, Lenwade and the Fakenham Road which is essential for us;
- The proposal will prevent use of the road by cyclists;
- Despite low usage, this is a valuable route for cycling;
- I could not encourage a proposal that reduces pedestrian access;
- Weston Road is needed to provide direct connection from Weston Green to Ringland, certainly for walkers and cyclists;
- Closing this to all road users, completely disconnecting rural communities and destroying local wildlife habitats is unacceptable;
- I use this route frequently to walk and cycle;
- All existing routes should be retained to allow all users the option to take the most fuel and time efficient routes;
- Given the price of fuel and the push to reduce CO2 emissions it is the "Green" option;
- I think this road should be kept open and have its function improved; and
- By using already existing infrastructure we will protect the area's wildlife and environment.

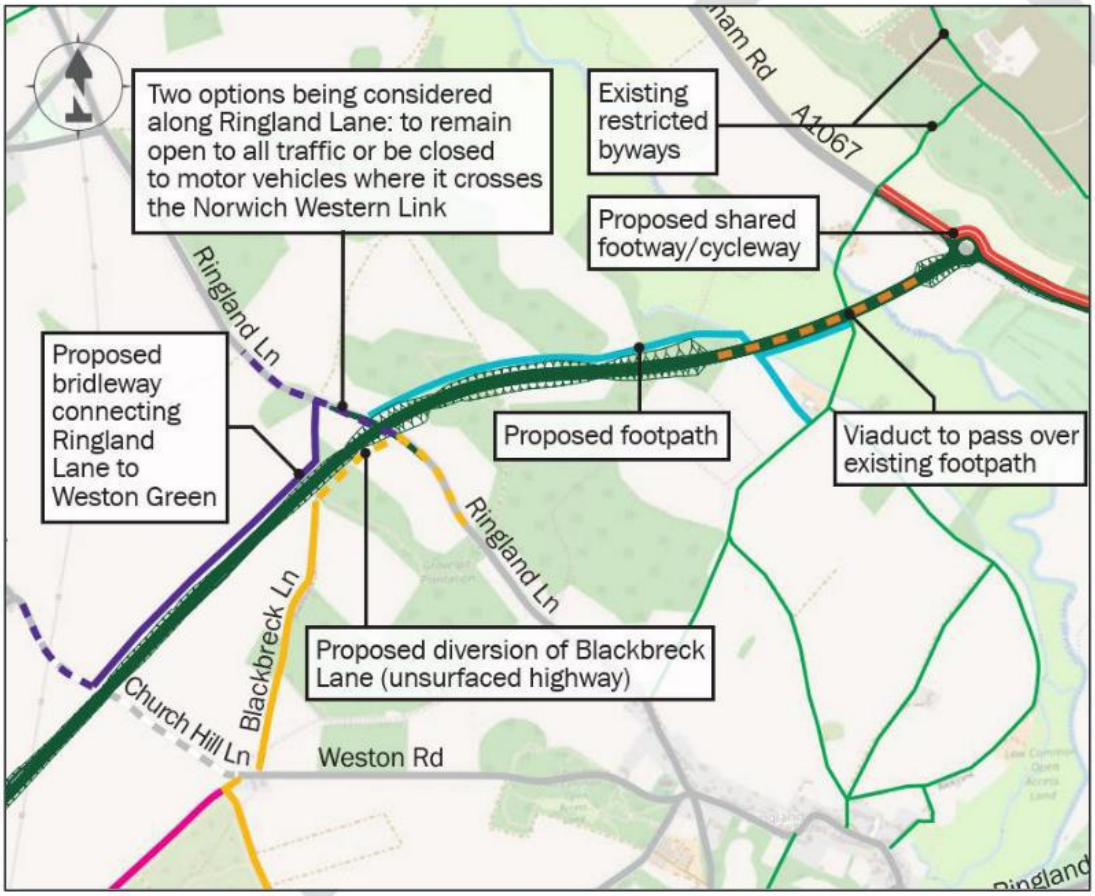
6.6 RINGLAND LANE PROPOSALS

6.6.1. Ringland Lane is a rural road that connects the villages of Ringland and Weston Longville, with the following proposals considered:

- Kept open to all traffic, including motor vehicles (as it currently is), with footways installed to provide to improve pedestrian access and connectivity with the wider Public Rights of Way network;
  OR
- Restricted to walkers, cyclists and horse riders at the point where the road crosses the NWL. This means that Ringland Lane would become a no-through road to motorised traffic except for vehicle access to adjacent lane and property.

6.6.2. **Figure 6-5** shows the proposals for the area around Ringland Lane in order to improve connectivity.

Figure 6-5 - Ringland Lane proposals



6.6.3. The feedback results for Ringland Lane have been explored in more detail as the overall result indicated similar levels of support for keeping this route open to all traffic and closing it to motor vehicles.

Table 6-4 – Ringland Lane Local Resident Feedback and Frequent User Responses

Question	Strongly agree / agree	Disagree / strongly disagree	Total including Neither agree or disagree
To what extent do you agree or disagree with the option to keep Ringland Lane open to all through traffic? (Daily and Weekly Users only - all postcodes)	**51 (48%)**	45 (42%)	107 (100%)
To what extent do you agree or disagree with the option to keep Ringland Lane open to all through traffic? (respondents living within Postcodes NR8 & NR9 only)	**40 (48%)**	36 (43%)	83 (100%)
To what extent do you agree or disagree with the option to keep Ringland Lane open to all through traffic? (respondents within Postcodes NR8 & NR9 who used Ringland Lane Daily	**20 (61%)**	12 (36%)	33 (100%)

6.6.4. The above analysis indicates that of the frequent users there is a more pronounced majority in favour of keeping Ringland Lane open to all traffic, this also remains to be the case when responses are restricted to local residents only from postcode sectors in the immediate vicinity of the NWL works.

6.6.5. On review of the textual feedback in response to this question, potential reasons cited for keeping Ringland Lane open to all users and advantages of closing it to motor vehicles were listed as stated in **Table 6-5**.

Table 6-5 - Ringland Lane Respondent's Reasons for Option Preference

Reasons to keep open to all traffic	Reasons for closing to motor vehicles
Maintains connectivity between parishes of Ringland and Weston Longville including access to local facilities for residents either side of NWL (e.g. shop, pub, village hall etc).	Will help prevent rat-running through the village of Ringland (albeit some said they would prefer to avoid closure if Honingham Lane is also closed).
Retains access for farm vehicles, emergency services and refuse vehicles.	Encourages use by cyclists and pedestrians
Minimises diversion length for users of other roads to be closed (Breck Road and Weston Road/Church Hill Lane).	Additional traffic will conflict with frontage development in Ringland making it difficult to exit properties safely
This road is better quality, and more suitable to keep open than other roads that cross NWL	Concern over traffic speeds and volumes if kept open.

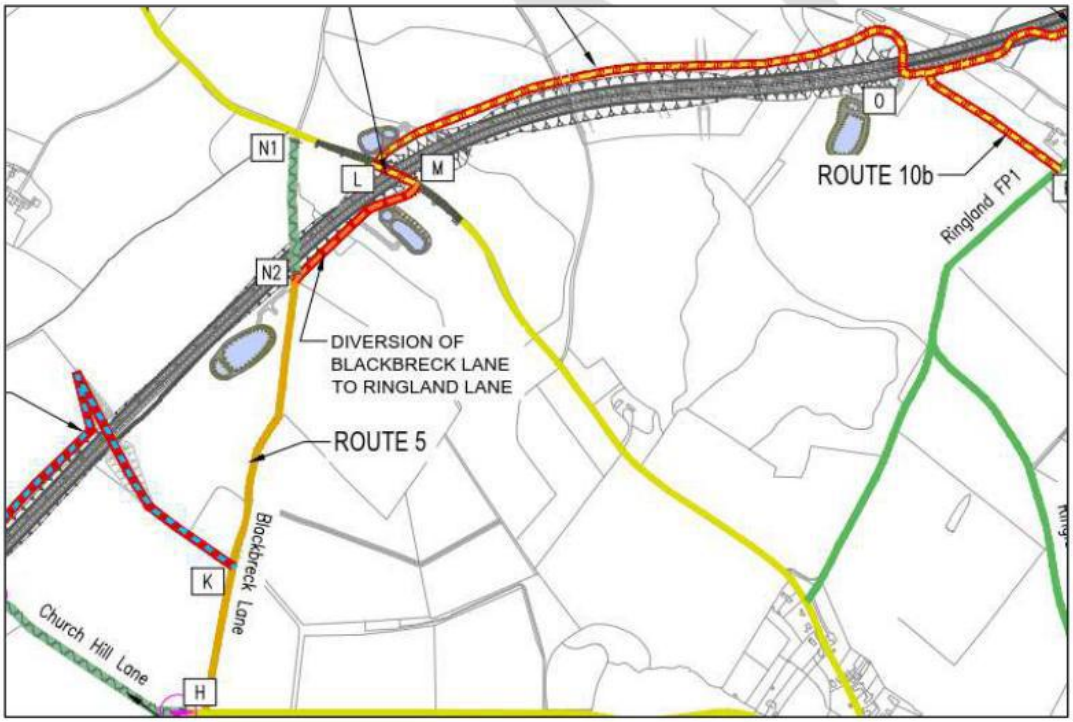
6.7 PREFERRED OPTION – RINGLAND LANE OPEN TO ALL TRAFFIC

6.7.1. Keeping Ringland Lane open to all traffic would also assist emergency access, refuse servicing and farm vehicle access which, in the context of a rural network, is more appropriate to be retained on the rural roads, rather than diverting these large slow vehicles to the A47 and A1067 strategic routes.

6.7.2. Whilst it is recognised that there are local resident concerns about rat running and speed and volume of traffic on Ringland Lane, this route is predicted to carry less than 2,000 vehicle movements per day and already has a signed 30mph speed limit east of Ringland village to Taverham (to the east of NWL).

6.7.3. The route was also identified in the shortlist of Options prioritised to become a 'cycle friendly route' within the wider Sustainable Transport Strategy. This would involve speed management features being placed every 200m along Ringland Lane enabling this route to operate as a mixed priority route whilst remaining open to all traffic, in accordance with Figure 4.1 in LTN 1/20. A wide range of measures could be implemented at each location and could include painted roundels, interactive signs, road narrowings, horizontal or vertical deflection (chicanes, speed humps/cushions etc), lines and signs to raise awareness of cyclists and influence slower vehicle speeds along the route.

Figure 6-6 - Updated Ringland Lane proposals - Open to All Traffic

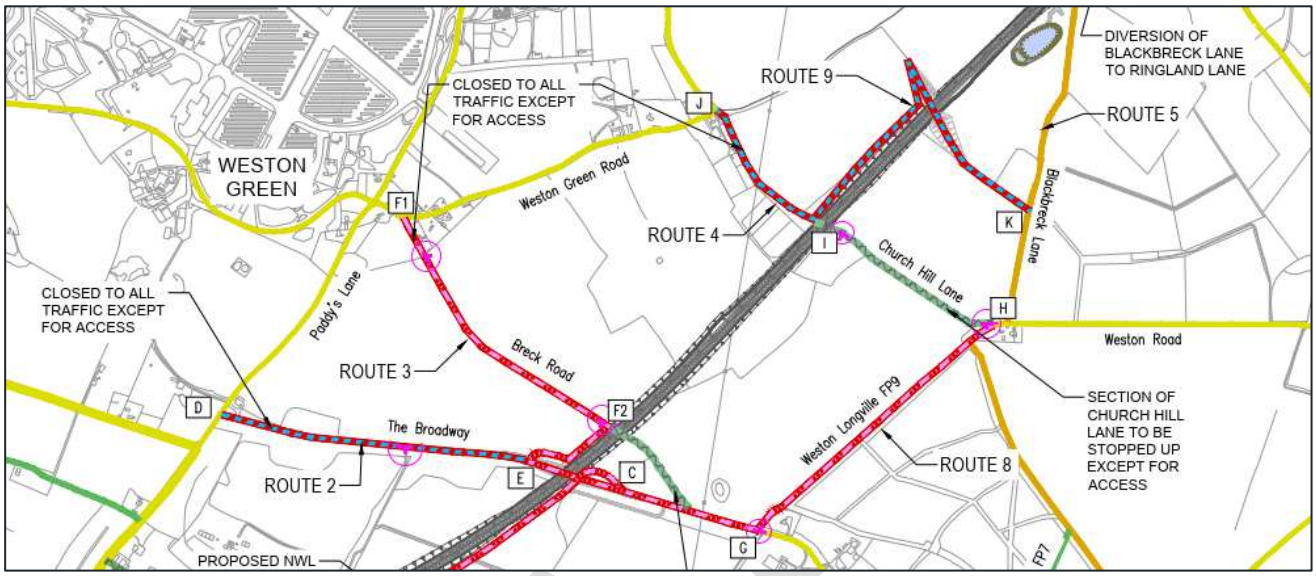


6.8 PREFERRED OPTION – GREEN BRIDGE NORTH OF WESTON ROAD

In response to the feedback in relation to the proposal to close Weston Road/Church Hill Lane to all users and aligned with the ecological mitigation work on the project, an additional green bridge is to be included between Weston Road and Ringland Lane. **Figure 6-7** shows the revised strategy with the additional green bridge. The proposed bridleway route (shown as Route 9) to the west of NWL is

now shown diverted over the bridge to connect with Blackbreck Lane (unsurfaced public highway) to the east of NWL.

Figure 6-7 - Revised NMU Strategy to include an additional green bridge



6.8.1. The revised Side Road Strategy will retain access for Non-Motorised Users using Weston Road and Church Hill Lane whilst closing the routes to vehicles where the NWL crosses as originally proposed.

7 PUBLIC TRANSPORT STRATEGY

7.1 EXISTING PUBLIC TRANSPORT CONDITIONS

RAIL

7.1.1. Norwich Railway Station is located approximately 8km south-east of the study area, and to the south-east of the city centre. Norwich is generally well placed on the rail network, with Norwich Railway Station located on the Great Eastern Mainline and served by several secondary railway lines such as the Breckland Line, Bittern Line and Wherry Line. The station is served by two rail operators (Abellio Greater Anglia and East Midlands Railway) providing access to destinations within the Norfolk area as well as further afield. Whilst Norwich Railway Station can be accessed by bus services from Costessey (Queen's Hills) and Taverham, access to the station by public transport from more rural towns or villages to the west of Norwich is challenging.

BUS AND COACH LINKS

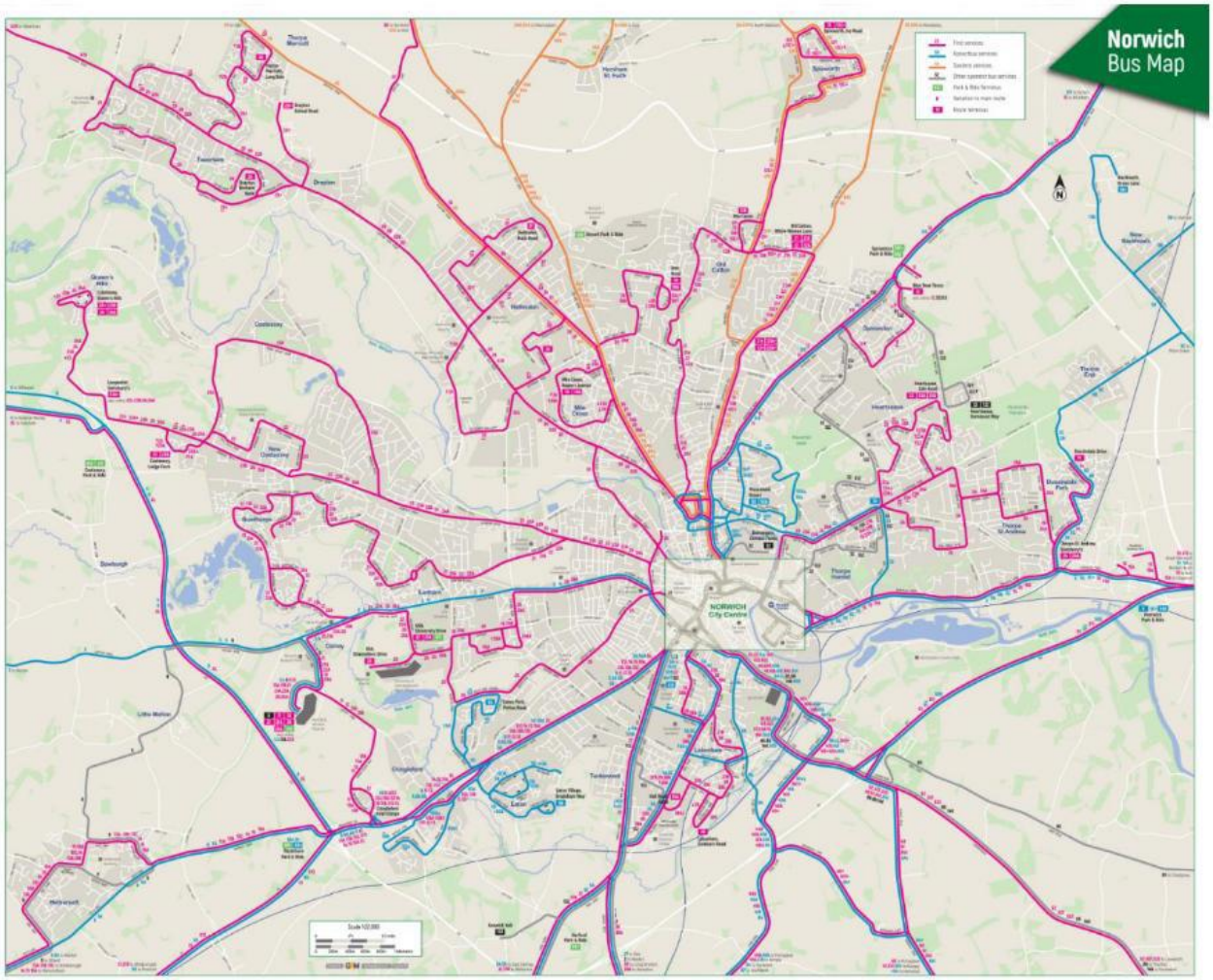
7.1.2. The bus network in the study area is largely radial, providing routes to and from Norwich city centre along key corridors. The eastern part of the study area is well connected with Norwich city centre, particularly during the day. First Bus provides several services connecting Queen's Hills, Costessey, Easton, Hellesdon and Taverham with destinations within and around Norwich city centre as shown in **Figure 7-1**. Bus services also operate within the study area, connecting residential areas to major employment sites. There is, however, a lack of traditional bus services within the identified gap to the west of Norwich, including Weston Longville, Weston Green and Ringland.

Table 7-1 - Typical weekday bus timetable for NWQ

Service	Route	Operator	Frequency
4, 4A	Norwich to Swanton Morley	KonectBus	1 per hour
8 Fast	Norwich to Toftwood	KonectBus	2 per hour
Yellow (28 & 29)	Norwich to Thorpe Marriott	First Bus	1-4 per hour
Purple (36, 37, 38 & 39)	Long Stratton to Horsford (via Norwich City Centre)	First Bus	Up to 4 per hour
Red (23 & 24)	Queens Hills / Costessey to Heartsease / Thorpe St Andrew (via Norwich City Centre & Rail Station)	First Bus	Up to 4 per hour
510	Costessey Park & Ride to Norfolk and Norwich University Hospital	KonectBus	Up to 2 per hour
Excel (A, B & C)	Norwich to King's Lynn	First Bus	2 per hour
X29	Norwich to Fakenham	First Bus	1 per hour
56	Sheringham – Easton College (via Holt)	Sanders Coaches	1 per day, Monday - Friday

7.1.3. **Table 7-1** shows the bus services connecting the NWQ to the north and east of Norfolk, Norwich city centre and locations to the north and east of Norwich. While First Bus offers regular services connecting settlements within the study area with King's Lynn and Swaffham via Easton, Hockering, and Dereham, connecting services to Holt and Cromer are more limited, with Holt being connected via a single school bus – open to the public – and operated by Sanders Coaches Monday to Friday.

Figure 7-1 – Existing Bus Service Routes



Source: Norwich City-Wide Network Map (First Bus)

7.1.4. There are bus stops located on the radial routes into central Norwich (i.e. A1067 and A47). These are within walking distance from a small catchment of residential dwellings. There is limited pedestrian access between villages and bus stops, so access on foot from some hamlets and rural villages is less viable. However, due to the sparsely distributed rural nature of the study area, it is not expected that every dwelling would have a bus stop within 400m as is typically sought in densely populated urban areas. The majority of dwellings in the less dense areas are beyond walking distance of the radial routes currently served. Despite this, diverting bus services away from the main arterial corridors has been tried previously and led to increased journey times and patronage reductions. Therefore, the emphasis for developing a viable bus strategy has naturally focussed upon the areas in the western urban fringe of Norwich which have more dense population catchments.

PARK & RIDE

7.1.5. Currently, there are six Park & Ride sites located around Norwich, providing a total of almost 5,000 parking spaces on the urban fringe. Of the six sites, five serve the city centre, as shown in **Figure 7-2**.

7.1.6. The Costessey Park & Ride is located within the NWQ study area (south-eastern section), next to the Royal Norfolk Showground. This only serves Norfolk and Norwich University Hospital (NNUH) and the University of East Anglia (UEA). Residents of western Norwich or users arriving from the west would need to use Thickthorn Park & Ride or the airport Park & Ride sites to access the city centre. The latter results in journeys across the study area.

7.1.7. While there are no plans for additional Park & Ride sites, expansions to the Thickthorn Park & Ride were proposed as part of the Transforming Cities programme. Should funding be allocated, the Thickthorn Park & Ride site is to be expanded to provide around 400 additional parking spaces.

7.1.8. First Eastern Counties, who provide around 80% of the bus services in Greater Norwich, are committing £18m of investment in new buses, refurbished buses and increased service frequencies as part of the Transforming Cities programme. Recent investment by First saw the introduction of new, high specification buses on the Excel service operating from west Norfolk into Norwich, with fast, limited stop services and up to three buses per hour from Dereham.

7.1.9. Discussions are also in progress with Norwich Research Park to provide a new bus service from Thickthorn P&R site to the NRP, which would be in addition to the existing service to the city centre.

Figure 7-2 - Park & Ride routes and locations

Source: Network Map (Park & Ride Norwich)

7.1.10. Further transport intervention in the NWQ would improve strategic connectivity to the existing Park & Ride sites, catering for desire lines through the study area and making sustainable travel to central Norwich more convenient and efficient.

7.2 TRANSPORT FOR NORWICH UPDATE SURVEY 2018

7.2.1. A survey was carried out by NCC in 2018 to seek views on local transport issues and suggestions for improving the local network as part of the Transport for Norwich Project. The survey consisted of a short questionnaire to find out how people travel around Norwich and what their priorities are for the city's transport in the future. The survey ran between 15th January and 22nd March 2018 alongside the Greater Norwich Local Plan (GNLP) consultation.

7.2.2. Results from the Transport for Norwich strategy review survey show that the top priority for people in the area is investment in public transport. Nearly 90% of those who took part rated it as "important" or "very important" while 52% included it in their overall top three priorities.

7.2.3. The second priority identified was putting in place measures to tackle congestion, which came in just behind, with 87% rating it as "important" or "very important" and 47% putting it in their top three priorities.

7.2.4. The responses relating to priorities for investment in bus services have been mapped for those who supplied their home postcode in the survey. The results are shown in **Figure 7-3** and **Figure 7-4** below. This shows that residents in the Norwich urban area and urban fringe place a high priority on investment in public transport.

7.2.5. The responses have been filtered by postcode and textual comments have been reviewed to understand feedback on bus services from the urban fringe of the Norwich western link study area.

7.2.6. There were 254 responses from postcodes NR4, NR5, NR6 and NR8 - key themes are summarised below:

- Public transport needs joining up - co-ordinate timetables and routes
- Price of tickets is more expensive than travelling by car, especially for families and groups
- Travelling into the city centre and changing buses is inefficient
- No public transport connection to the Airport
- Bus services are not cheap and often unreliable
- Need better evening bus frequency
- Need more flexible ticketing (rather than one ticket for one bus ride)
- Too much emphasis has been placed on cycling in recent years – investment in better bus services would be helpful to a more diverse range of people and buses are good in all weathers
- Improve options for Student bus fares
- Avoid a monopoly of service provision from one main operator
- Bus stops need improving. Electronic displays are often unreliable
- Consider access for elderly and disabled people who can't often walk far to get a bus
- Encourage more people to use park and ride instead of city centre car parks
- Journey times often inefficient – takes 2 hours to get to work by bus as I need to change buses
- Need to consider cost of city centre parking to make buses more competitive with car.

7.2.7. Overall, within the western urban fringe of Norwich, 221 respondents (87%) thought that improving the bus network was either Important or Very Important. Hence it is expected that the NWL bus strategy would be welcomed and well supported by local residents.

Figure 7-3 - TfN Update Survey Feedback - Bus Service Investment

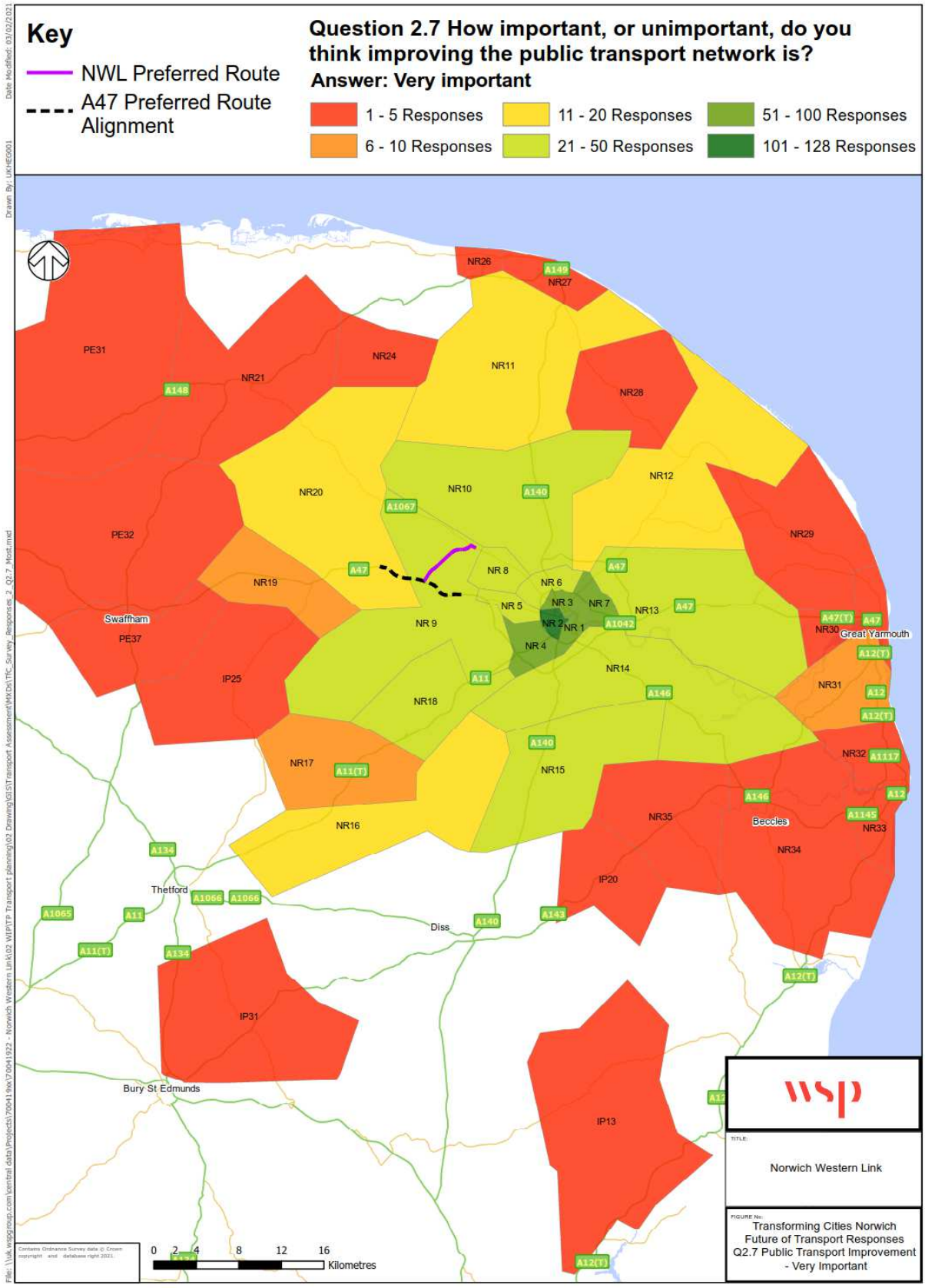
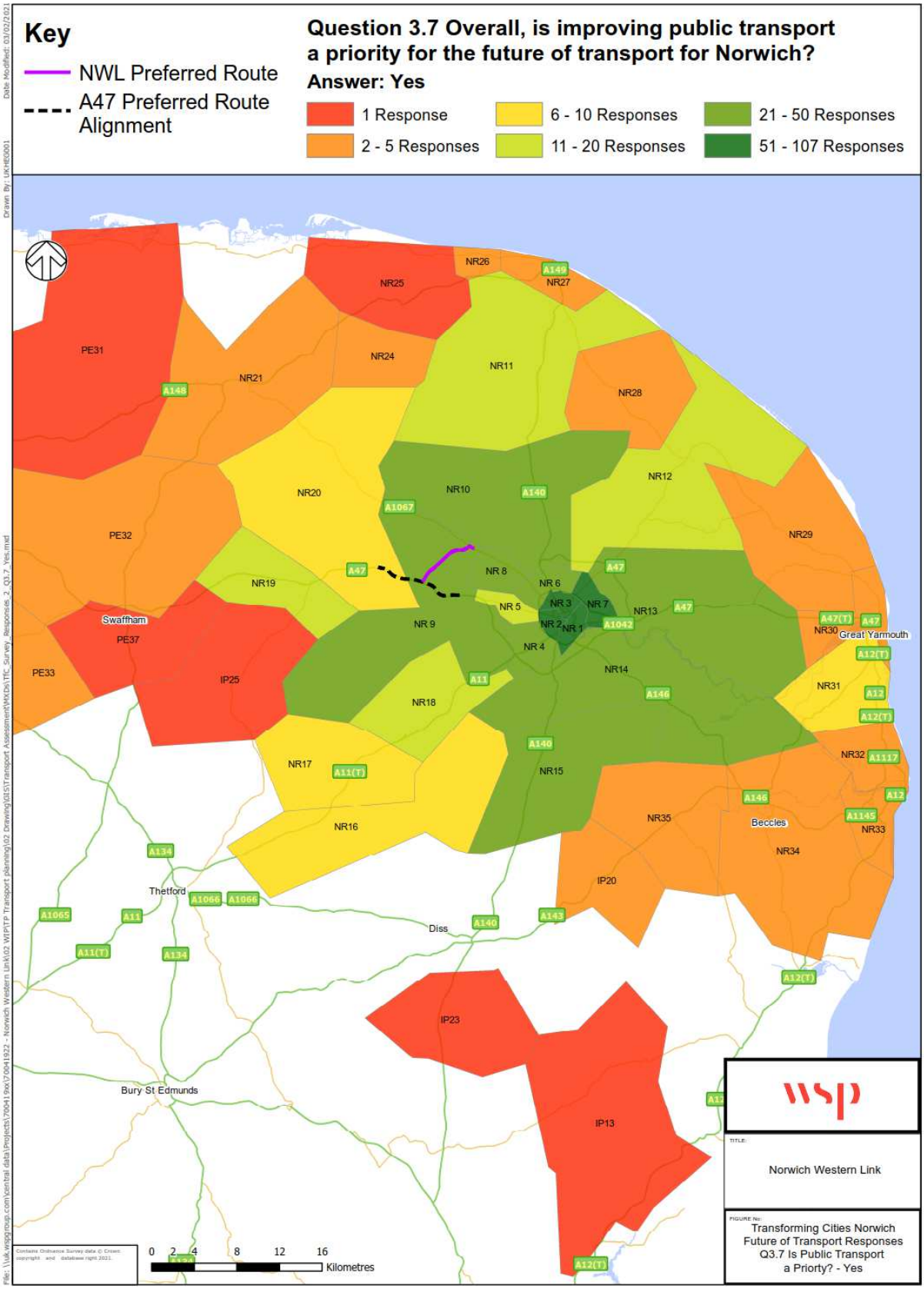


Figure 7-4 - TfN Update Survey Feedback - Bus Service Investment



7.3 DEVELOPING A BUS STRATEGY

7.3.1. In relation to public transport, the need for commercial viability of services is noted as the key driver for bus operators, with bus companies attracted to routes which have higher density development alongside to maximise patronage and viability. Since the NWL is located away from residential dwellings, and not coupled directly with new development, it is unlikely that the NWL route itself would support new local bus service routes directly.

7.3.2. The NWL scheme is also envisaged to support important existing bus services such as the X29/29 service from the North West of the County by intercepting some of the traffic that currently uses Fakenham Road and road routes parallel with the NWL such as the outer ring road. This would potentially assist with improving bus journey time reliability on existing routes by freeing up road space and capacity on the western edge of the City. Coupled with the A47 dualling scheme from North Tuddenham to Easton and removal of existing roundabouts on A47, the two schemes would also assist with speeding up bus journey times for 23/23A and 24 which operate on A1074 Dereham Road. With improved reliability, existing services would be more likely to attract patronage and investment, leading to improved frequency.

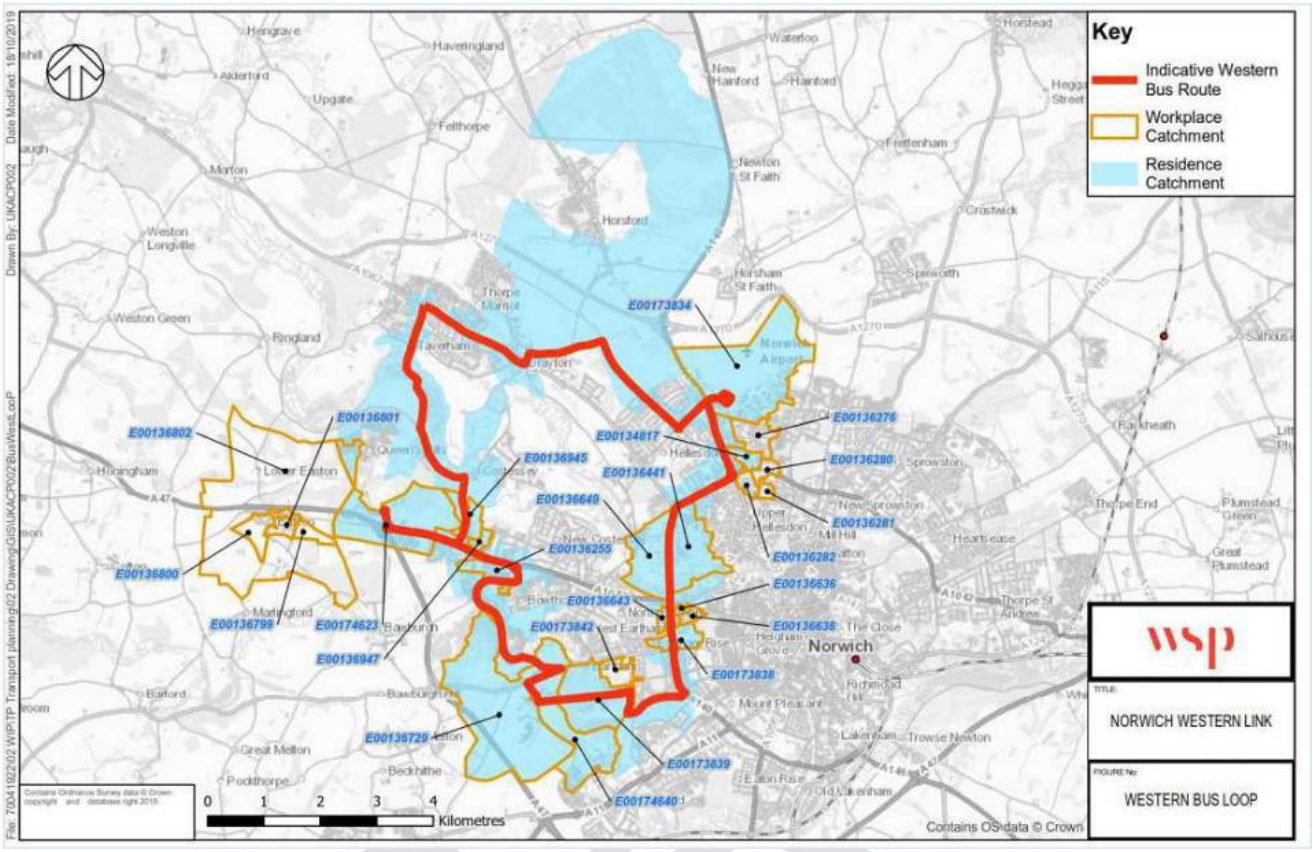
7.3.3. However, with the NWL providing traffic relief to the nearby existing route between Taverham and Costessey which connects a more densely populated area, there was identified to be scope for a potential viable bus service.

7.3.4. It was also noted, via a review of existing bus service routes that there was a gap in service provision between residential areas in the north western fringe of Norwich (such as Taverham, Drayton, Queens Hills, Costessey) and employment areas in the south west (including Norwich Research Park/UEA and Norfolk and Norwich University Hospital). Residents of Taverham and Thorpe Marriott travelling to the Norfolk and Norwich University Hospital (NNUH) by public transport currently have to catch two buses, changing in the city centre and involving journey times from the centre of Taverham of between 56 and 65 minutes.

7.3.5. A route linking the Hospital to Thorpe Marriott had first been considered in the initial 2014 study carried out by Mott MacDonald and the concept of an orbital bus route had also been suggested by local residents in response to the summer 2018 consultation. This option would offer significant journey time savings for public transport trips to the NNUH and NRP, from the north-western suburbs of Norwich. The option would also facilitate the delivery of forthcoming housing allocations for example 1,400 homes allocated in Taverham.

7.3.6. Engagement with local bus operators, Konectbus and First Bus, was undertaken to ensure that any improvements proposed would be appropriate and supported. An initial loop service was developed and discussed with operators at a Sustainable transport workshop in January 2020. The original loop option was reviewed against census data to understand the potential catchment it might serve. The routing considered in the early stage high level review is shown below.

Figure 7-5 - Initial Western Loop Bus Option Catchment



7.3.7. However, following timetable testing by Konectbus operators raised concerns that the loop would take more than an hour to traverse by bus, so would require more than one bus to operate an hourly service and an orbital loop route may not be sufficiently attractive to passengers.

7.3.8. Further discussions were subsequently held with bus operators Konectbus and First, which led to two sub-loop options emerging. Both options were taken forward to public consultation in July 2020 as part of the Local Access proposals. The two potential route options presented for consultation in 2020 were:

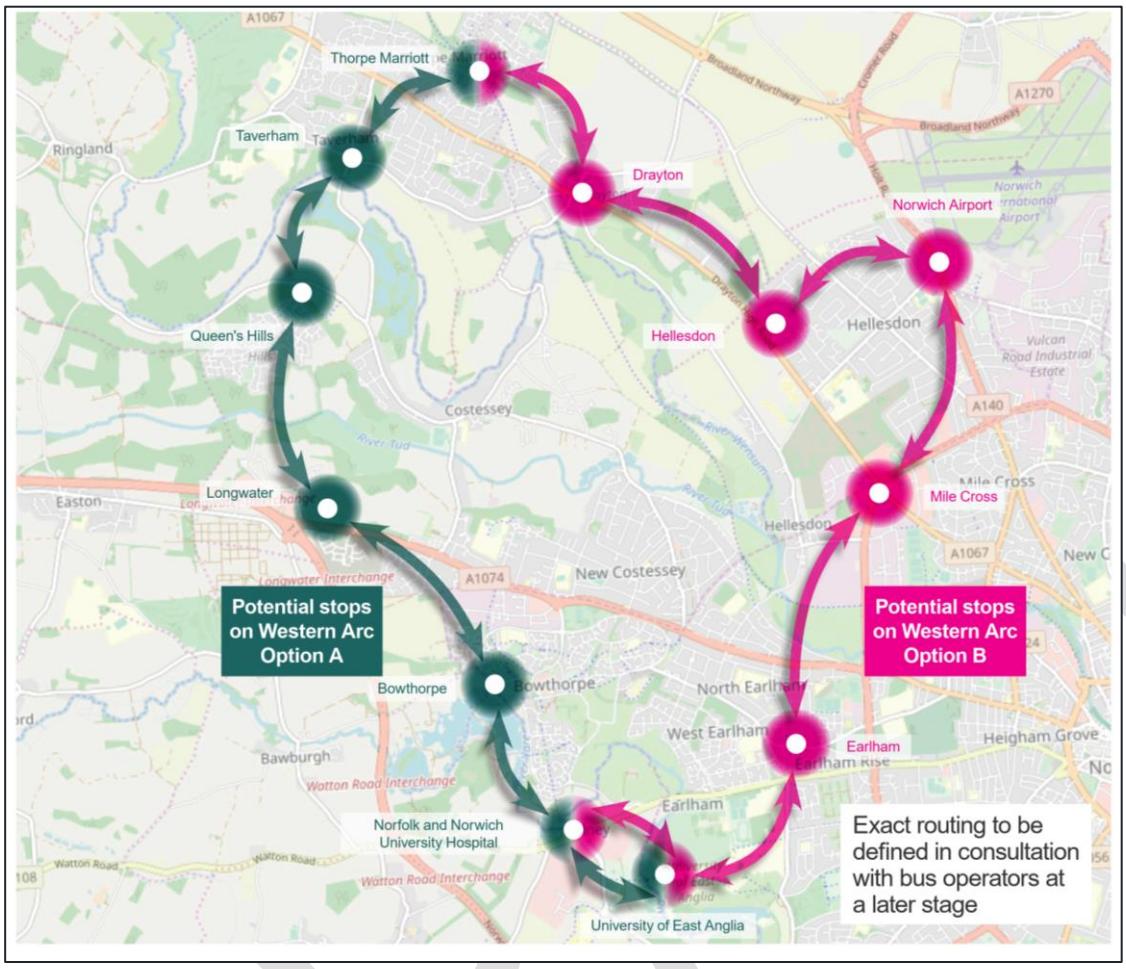
- Western Arc Bus Service Option A – Thorpe Marriott to NNUH via Longwater
- Western Arc Bus Service Option B – Thorpe Marriott to NNUH via Outer Ring Road.

7.3.9. The two 'Western Arc' bus route options are shown in **Figure 7-6**.

7.3.10. To accompany the new western arc service, it is proposed that facilities at bus stops on the A1067 Fakenham Road are improved and along the rest of the route, such as raised kerbs, shelters and electronic display boards to help make bus services more attractive to users.

7.3.11. Bus journey times are likely to improve with the NWL in place and congestion reduced on the existing road network. As a result, it may be viable for a bus operator to provide a 'Western Arc' service through the more densely populated suburbs of Norwich. The route would connect communities to shops, medical facilities and employment areas (for example the University of East Anglia, Norfolk and Norwich University Hospital and Norwich Research Park) without the need to travel into central Norwich to change buses.

Figure 7-6 - Proposed Western Arc Service route alignment



7.4 LOCAL ACCESS CONSULTATION FEEDBACK

7.4.1. There were 348 responses to the question: 'Of the two options shown for a potential Western Arc bus service which, if any, would you be more likely to use?' Option A was the preferred choice of just over a third of respondents (119) but just under half of respondents wanted neither option A or B (162). A summary of the quantitative feedback is provided below showing the percentage split between those who selected one of the two options:

Table 7-2 – Local Access Consultation Feedback on 'Western Arc' Bus Options

Option	Total	Percent
Option A – Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Taverham, Queen's Hills, Longwater and Bowthorpe	119	64%
Option B – Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Drayton, Norwich Airport, Hellesdon and Earlham	67	36%

7.4.2. There was a high proportion of responses showing no interest in either option but is expected to be related to consultation being predominantly focussed on the geographic area further west, away from the bus service proposals. However, within postcodes covered by the specific bus catchment there was good support for Option A and some support for Option B. The below summary of textual feedback shows positive support for improving bus services as part of the NWL project and commentary provided on the two options:

- The proposed Option B route improves access to Norwich airport;
- Improved bus routes obviating the need to go into the city and out again;
- It would connect places I am more likely to travel to/from and is more accessible for me;
- I need to access at Longwater and Option A enables onward travel to Norwich;
- Option A Covers Longwater which the other one doesn't;
- Option A opens up new links;
- Option A would provide a 'cross county' link across the area which would provide an effective link across the area;
- Would encourage greater use of public transport in the area;
- The proposed route would offer improved access to NNUH (and UEA);
- Option A - If you live anywhere across this region, there is no sensible Bus route to get to the UEA/Hospital;
- Many car journeys could be avoided by having the option A bus route;
- Very helpful to have good bus links to NNUH and UEA. Current services are useless and we do not use them;
- I am in my 70s. If I become unable to drive, Option A would allow me to travel to the shopping area at Easton and to the hospital;
- The proposed route(s) would connect up (more) places currently poorly connected;
- The proposed route would improve access for people in Queens Hills;
- Queens Hill is only has one bus option & this means having to travel into the city & then back out again to get anywhere. Therefore everyone has to rely on their cars;
- A direct route from Queen's Hills to Taverham for residents needs to happen as many children on the estate attend Taverham high school. open the existing not used bus lane;
- Why not combine option A & B and start the journey for option A at the airport? ;
- Option A provides a route not provided now;
- Option B is partly provided by the Horsford Mulbarton service;
- The proposed route improves access to Norwich airport;
- There is a need to improve public transport access to the airport;
- Option B Covers a wider area and would link to Airport park & ride;
- Connecting via the airport is important;
- Improved bus routes obviating the need to go into the city and out again;
- Option B would connect places I am more likely to travel to/from;
- Option B is more accessible for me;
- A bus service from Drayton to UEA and the hospital would be absolutely marvellous;
- I suspect Option B would be a long trip;
- I would prefer Option A if there was a stop near me - can it be extended to Drayton?; and
- An alternative could be a return route for both sides of the loop.

7.5 OPTION DEVELOPMENT SINCE JULY 2020

7.5.1. In August 2020, Konectbus announced that they would be operating a new bus route, service 521, from the 14th September between Norwich Airport and the University of East Anglia / Norfolk and Norwich University Hospital, serving the northern ring road. This route would serve the retail area around Sweetbriar Road, Hellesdon, Cromer Road, Mile Cross, Boundary Road and Earlham Road.

Figure 7-7 - Konectbus 521 Service Overview

7.5.2. This route covers much of the Option B route, allowing more focus to be given to Option A and that both options could be delivered, substantially improving bus access to the west of Norwich. The timetable is shown below.

Figure 7-8 - Konectbus 521 Timetable

park&ride NORWICH

Timetable commences 14 September 2020

w: norwichparkandride.co.uk
t: 03300 539358
e: feedback@konectbus.co.uk
nparkandride

Airport P&R - Boundary Road - University - N&NU Hospital **521**

Mondays to Fridays (except public holidays)

Airport (Park & Ride)	0715	0810	0930	1030	1130	1230	1330	1430	1530	1645	1752
Hellesdon, Cromer Road, Tesco	0717	0812	0932	1032	1132	1232	1332	1432	1532	1647	1754
Boundary Road, opp ASDA	0720	0817	0935	1035	1135	1235	1335	1435	1535	1652	1758
Earlham Road, Fiveways	0730	0830	0945	1045	1145	1245	1345	1445	1545	1702	1808
UEA, University Drive [C]	0733	0835	0948	1048	1148	1248	1348	1448	1548	|	|
N&NU Hospital	0740	0845	0956	1056	1156	1256	1356	1456	1556	1712	1818

N&NU Hospital - University - Boundary Road - Airport P&R **521**

Mondays to Fridays (except public holidays)

N&NU Hospital [B]	.	0742	0847	1000	1100	1200	1300	1400	1500	1605	1715	1820
UEA, University Drive [B]	0650	|	|	1010	1110	1210	1310	1410	1510	1620	1730	1830
Earlham Road, Fiveways	0653	0750	0855	1013	1113	1213	1313	1413	1513	1625	1735	1833
Boundary Road, ASDA	0705	0800	0905	1020	1120	1220	1320	1420	1520	1635	1743	1841
Hellesdon, Cromer Road, opp Tesco	0710	0805	0910	1024	1124	1224	1324	1424	1524	1640	1748	1846
Airport (Park & Ride)	0712	0807	0912	1026	1126	1226	1326	1426	1526	1642	1750	1848

7.5.3. However, after a short trial period in December 2020, Konectbus announced that the route had been withdrawn due to low passenger numbers under Coronavirus restrictions. The limited period of operation had shown signs that the route would potentially be viable under normal circumstances and would have potentially had a higher uptake. Due to uncertainty on future bus patronage due to the impacts of COVID-19, both options are being considered in more detail to enable a decision to be made regarding possible future uptake.

OPTION A - THORPE MARRIOTT TO NNUH VIA LONGWATER

7.5.4. Following the results gathered from the Local Access Consultation, the Western Arc Service A was the most popular choice from respondents and was explored in more detail to assess for suitability. Analysis was carried out by drawing the possible route, overlaid with the current locations of bus stops and 2011 Census data to quantify the possible numbers of passengers likely to use the service via several routes.

7.5.5. **Figure 7-9** outlines the plan, showing the Western Arc Service split into 4 further options. Included on the plans are two large areas of growth in Taverham and Easton, totalling 900 and 1,400 dwellings respectively. Depending on which option is selected the routes could serve the future development, boosting up the number of potential passengers using the service. **Table 7-3** shows the number of passengers that could potentially use the service per route option.

Table 7-3 - Potential passenger numbers - Option A

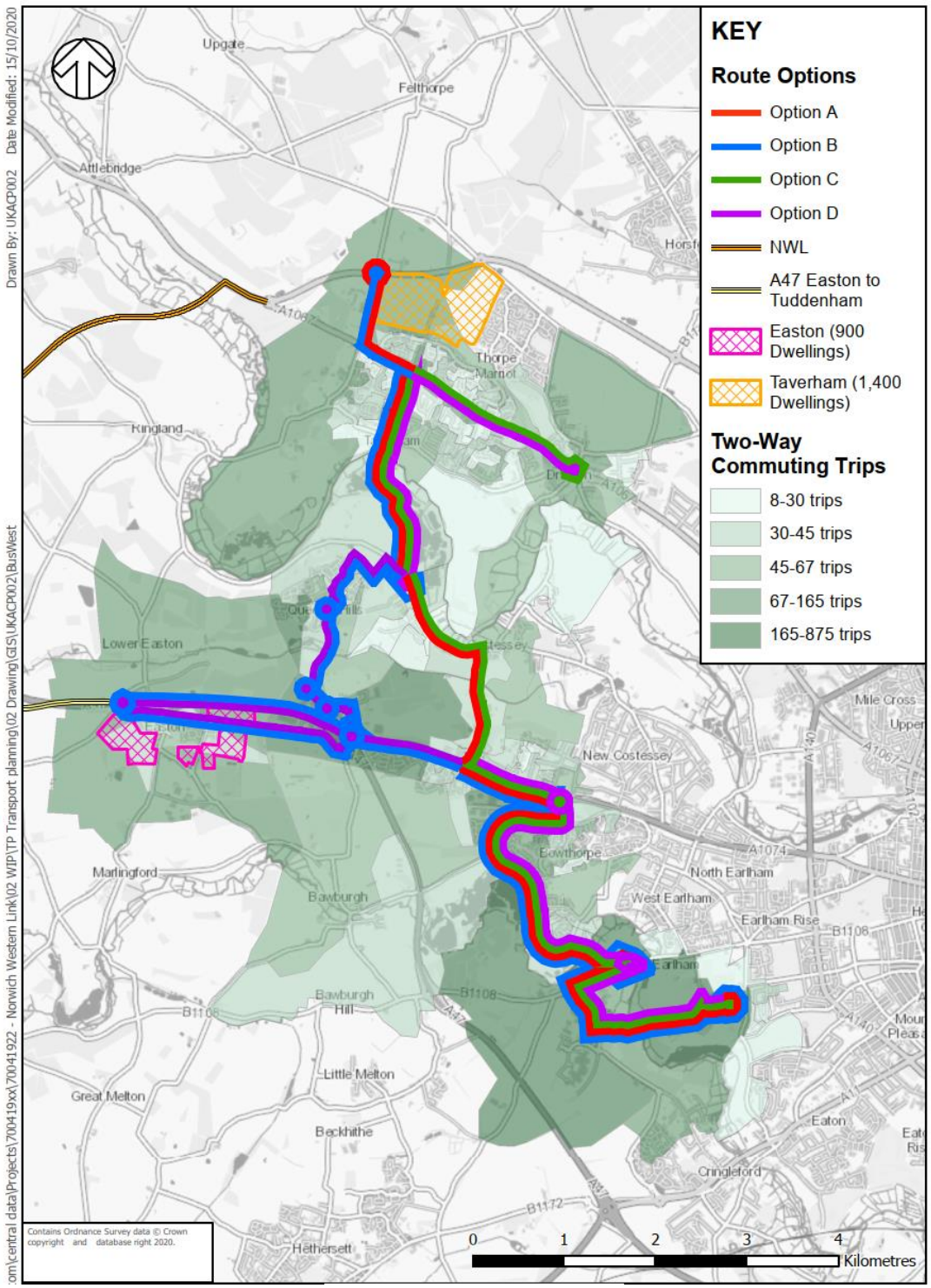
Route Option	Number that currently live and work in the catchment	Number of residents included in Local Plan allocations	Total daily trips by bus
Option A-A	511	3,500	309
Option A-B	757	5,750	481
Option A-C	585	3,500	316
Option A-D	934	2,250	234

7.5.6. Option B could potentially provide the greatest number of trips by bus, which are boosted by the future growth planned with the Local Plan.

7.5.7. The Head of Passenger Transport at NCC was contacted in relation to the proposal to extend the potential bus service to Easton College, to gather any evidence to support the need for the service. In response, the Officer mentioned that a route was created in September 2020, using Department for Education funding during the COVID-19 pandemic, which sought to avoid having students having to travel into Norwich and then out again to access the college.

The route served Drayton, Taverham and Costessey, however only two students used the service and so it was discontinued after two weeks. This was useful in helping to decide that the diversion to Easton would not be worthwhile.

Figure 7-9 - Western Arc Service - Option A Overview



OPTION B - THORPE MARRIOTT TO NNUH VIA OUTER RING ROAD

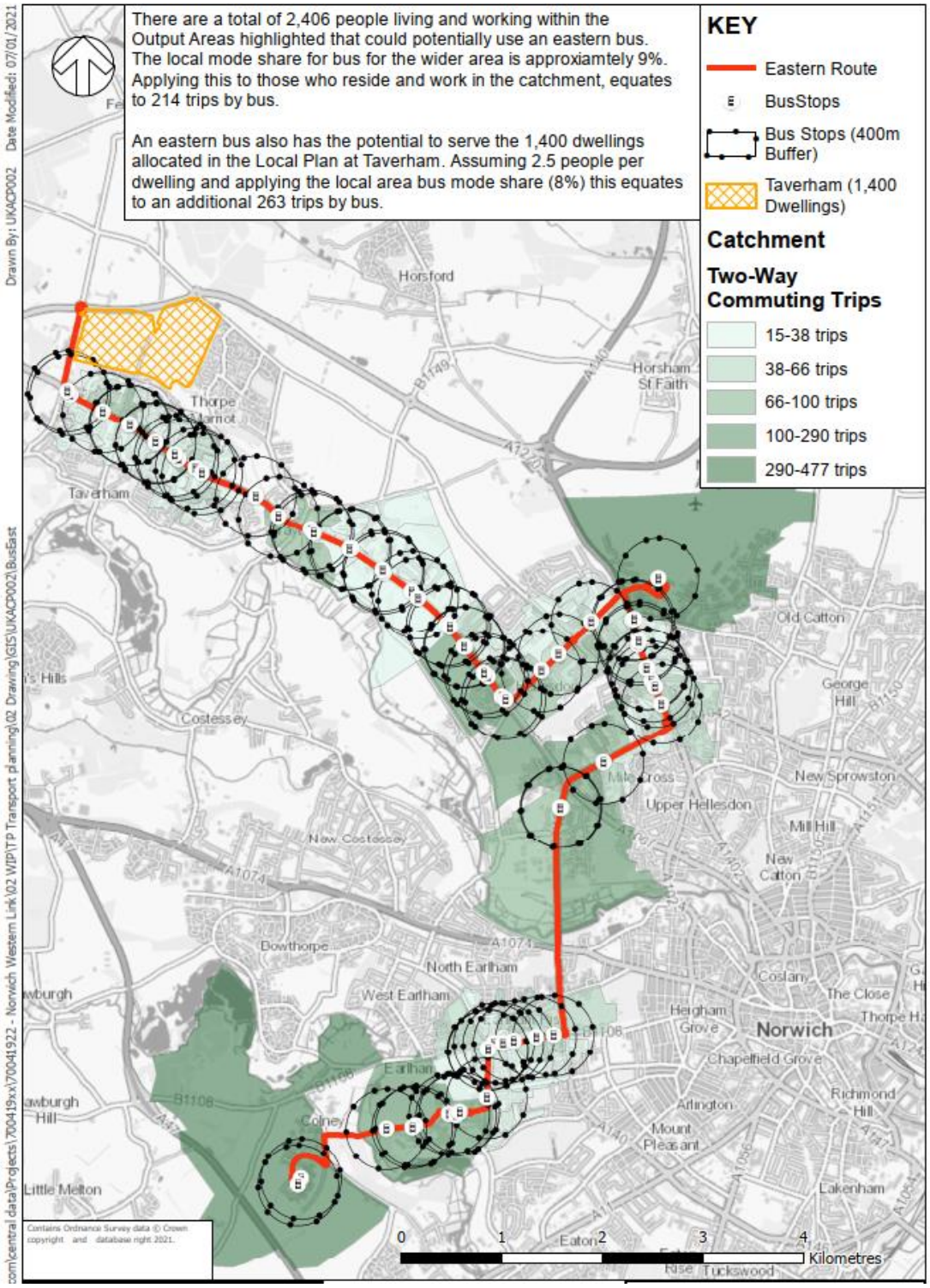
7.5.8. Option B was assessed for viability following the use of the route for the 521 Konectbus service from Norwich Airport to UEA. Similar to the assessment carried out for Options A, a possible route was drawn, overlaid with the locations of bus stops and 2011 Census data to calculate the possible level of patronage.

7.5.9. **Figure 7-10** shows the plan of the Western Arc service proposed, including the key growth area in Taverham, totalling 1,400 homes. **Table 7-4** shows the number of passengers that could use the service if the option was taken forward.

Table 7-4 - Potential passenger numbers - Option B

Route Option	Number that currently live and work in the catchment	Number of residents included in Local Plan allocations	Total daily trips by bus
B	2,406	1,400	263

Figure 7-10 - Western Arc Service - Option B Overview



7.5.10. The plan above shows that greatest patronage would be from the NNUH, UEA and Norwich Airport areas. There could also be a number of leisure trips that could be attracted to the service, continuing to improve the level of use.

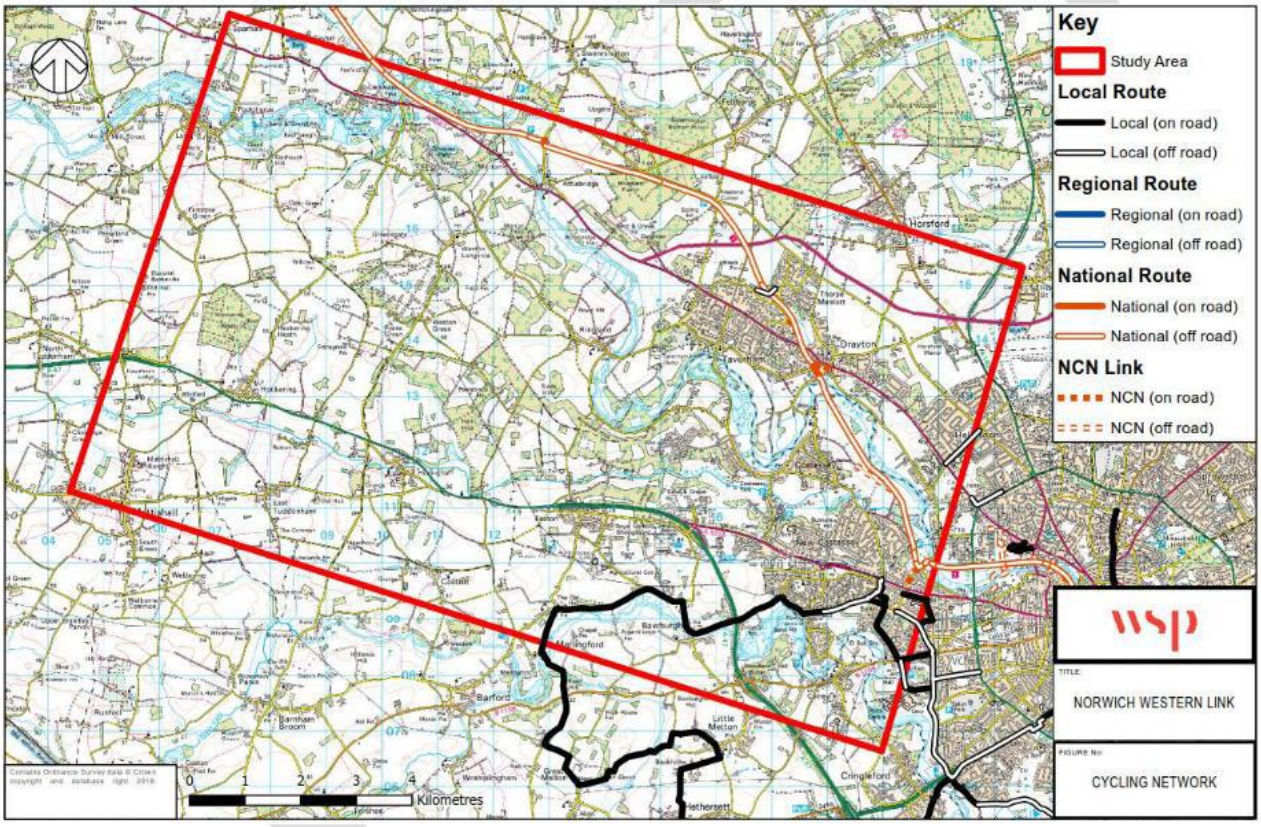
8 CYCLE FRIENDLY ROUTE OPTIONS

8.1 EXISTING CONDITIONS

8.1.1. While cycling could provide a sustainable alternative means for short to medium length journeys, the infrastructure available to do so is extremely limited. Local (on-road) routes run to the south-east and the National Cycle Network Route 1 (NCN1) cross through the northern extents. This section of the NCN1, also known as Marriott's Way, is a 42km footpath, bridleway and cycle route, following the alignment of two disused railway lines. The route passes through Norwich city centre, Costessey, through Drayton crossing the A1067 and the A1270, and goes westward towards Lenwade. From there the route goes north towards Reepham and beyond.

8.1.2. **Figure 8-1**Error! Reference source not found. shows the NCN1 and other local cycle routes present within the study area.

Figure 8-1 - Cycle Network



8.1.3. More widely, the Norwich cycle network is made up of seven colour-coded routes, known as 'Pedalways', which cross the city in all directions, and converge at St Andrews Plain in the city centre. Since 2013, Norwich has been awarded two significant Cycle City Ambition grants from the DfT and, with additional contributions from local partners, the cycle network has seen £14.1 million of investment by 2019.

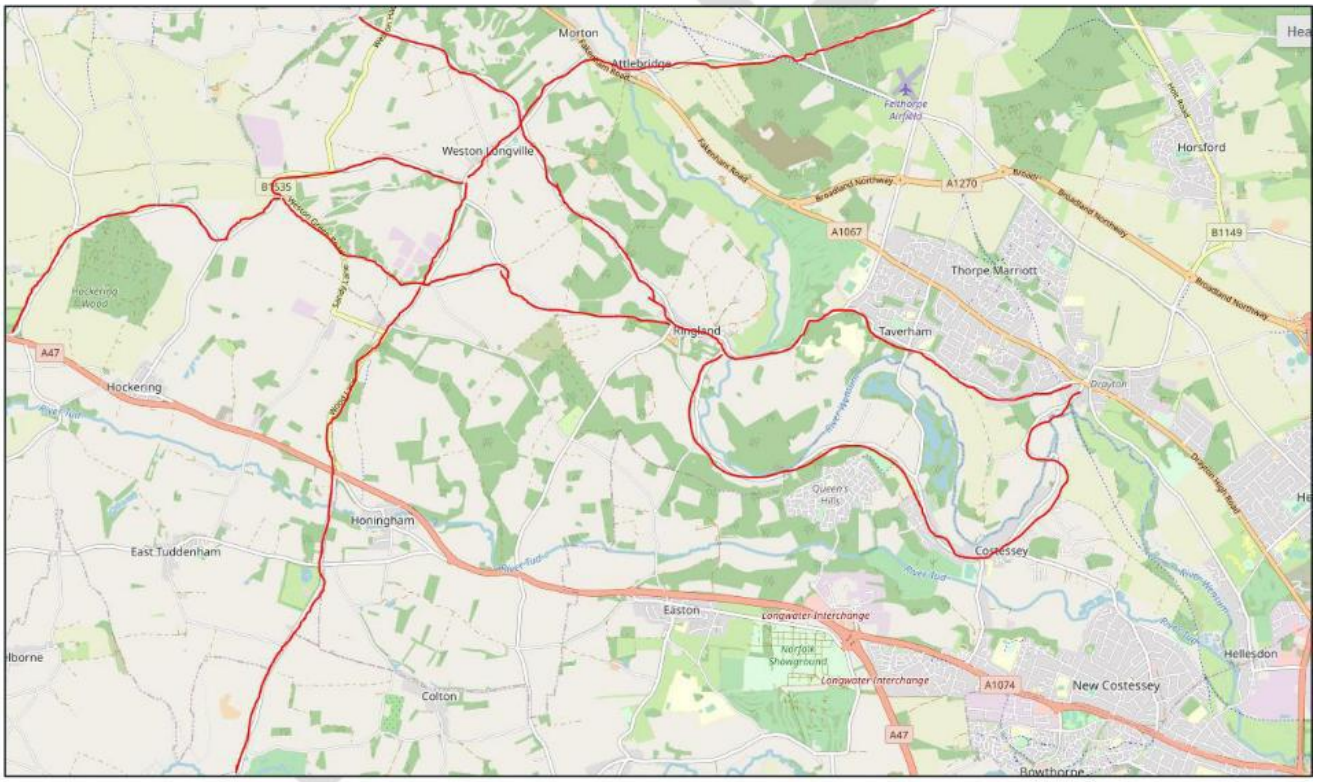
8.1.4. The Pedalways in Norwich are as follows:

Green	between Bowthorpe and Broadland Business Park
Red	between Drayton and Whitlingham (NCN1)
Yellow	between Lakenham and Aviation Academy
Pink	between NNUH and Heartsease
Blue	between Wymondham and Sprowston
Orange	Inner circuit
Purple	Outer circuit

WENSUM VALLEY CYCLING

8.1.5. The Wensum Valley Cycling group, which operates within the Weston Longville and Ringland Parishes, was contacted to define what routes are currently used and how the NWL proposals may affect them. Although the group had been suspended during the coronavirus pandemic, individual members of the group would make use of the local road network in and around Weston Longville. The cycling routes currently used by the group are shown in **Figure 8-2**.

Figure 8-2 - Wensum Valley Cycling – Routes Currently Used



8.1.6. The group notes that since the introduction of the Broadland Northway, there has been limited opportunity to leave Norwich and travel north without using a roundabout, making it less attractive for users. Following review of the Local Access Consultation material, the group would like to see improved crossing facilities on the A1067 where the above routes intersect.

8.2 LOCAL ACCESS CONSULTATION 2020

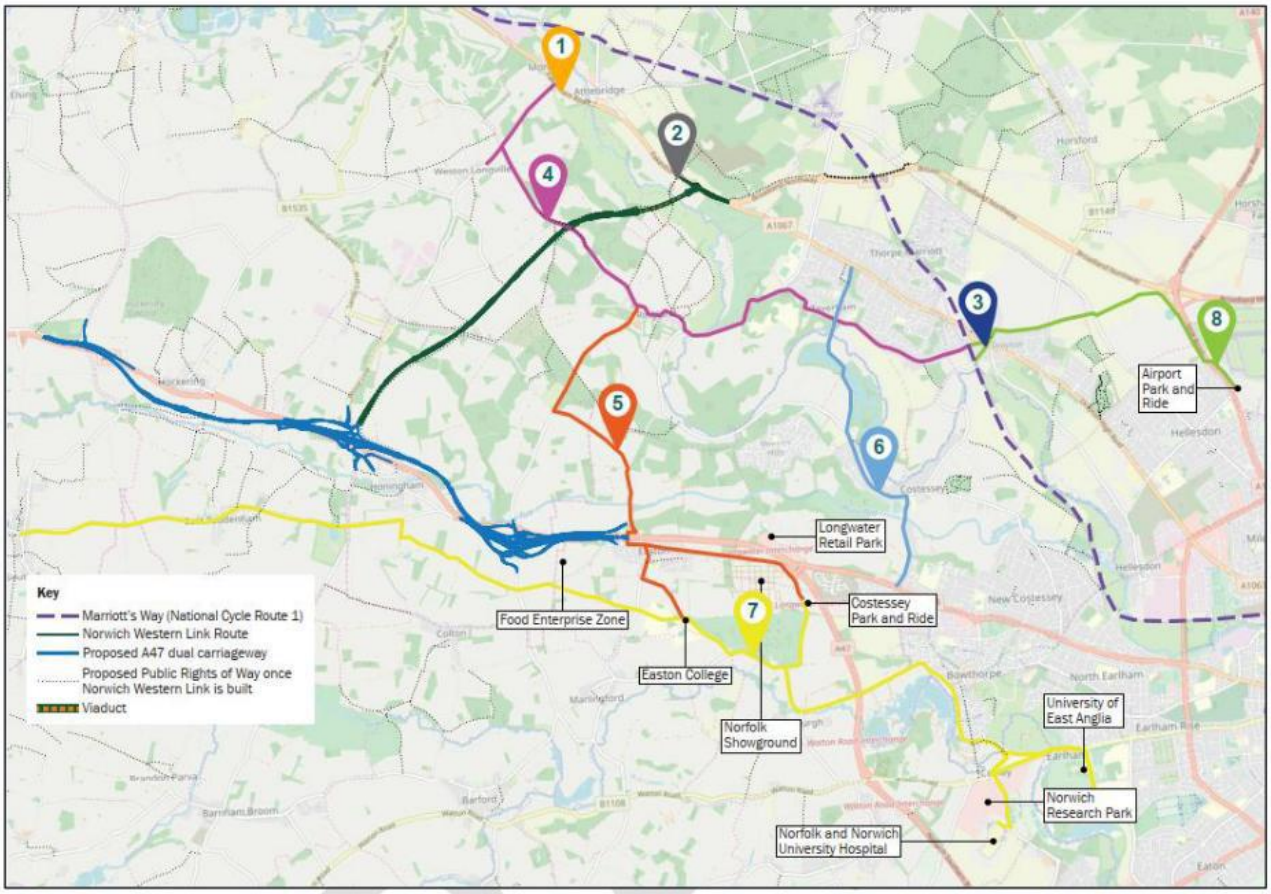
8.2.1. Building upon the opportunities identified through the WCHAR process and via stakeholder workshops, additional options for creating Cycle Friendly Routes and improved crossing facilities on A1067 were included in the 2020 Local Access Consultation. The ideas for the sustainable transport improvements included suggestions from local parish councils and user groups, which were intended to support more people to walk, cycle and use public transport across the wider area around the NWL. The potential measures consulted on were:

- 1) Create a new crossing facility on the A1067 Fakenham Road at Attlebridge to help pedestrians and cyclists cross safely and confidently;
- 2) Create a new pedestrian crossing on the A1067 Fakenham Road to connect Ringland Footpath 1, south of the A1067, with Attlebridge Restricted Byway 4, north of the A1067;
- 3) Create a new pedestrian and cycle crossing of Drayton High Road to improve connectivity with the Marriott's Way;
- 4) Create a cycle-friendly on-road link towards central Norwich from Weston Longville via Ringland and Taverham - improving cycle priority at junctions and on bridges on this lower traffic route would enhance access to school and workplaces on the western edge of Norwich and improve connectivity to the Marriott's Way (part of National Cycle Network 1);
- 5) Create a cycle friendly on-road link from Ringland to Easton. Once the Easton roundabout is removed as part of the A47 upgrade, this route would have lower traffic. Cycle safety could be improved at key junctions and pinch points. This would help to improve access to educational sites, such as Easton College, and Costessey Park and Ride site;
- 6) Create a cycle friendly on-road link from Taverham to Dereham Road - with the Norwich Western Link in place, this route would have reduced traffic. Creating section of cycle lane and introducing cycle priority measures at junctions would improve access to schools, shops and medical facilities and link to existing cycle paths on Dereham Road;
- 7) Create a cycle friendly on-road link south of A47 from Mattishall to the Norfolk and Norwich University Hospital and University of East Anglia - this route would benefit from reduced traffic once the nearby A47 is dualled. Introducing cycle priority measures would improve access between residential areas, medical facilities and employment areas, including the Food Enterprise Zone at Easton, Norwich Research Park and Costessey Park and Ride site; and
- 8) Improve cycle parking at and access to the Airport Park and Ride site from Drayton - this would provide opportunities to access Park and Ride bus services by cycling and improve connectivity to the Marriott's Way and onward destinations in the western fringe of Norwich.

8.2.2. **Figure 8-3** shows the locations of the eight potential sustainable transport interventions.

8.2.3. Respondents to the consultation were asked to select up to three of the above interventions that they believe would best support people to walk / or cycle in the area to the west of Norwich.

Figure 8-3 - Sustainable Transport Intervention Options



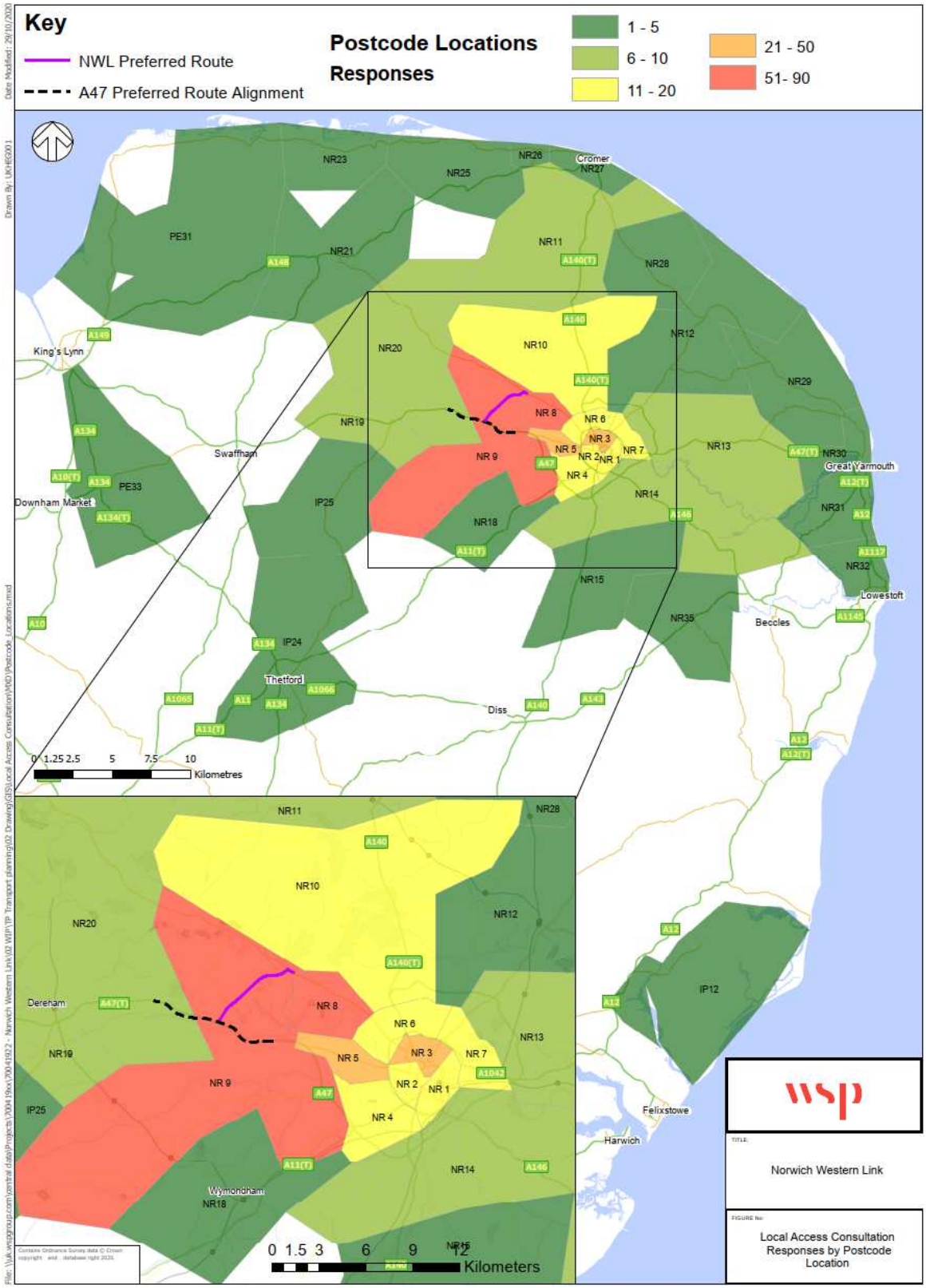
8.2.4. 438 people responded to the Local Access Consultation, where almost three-quarters (316) of respondents noted that they were responding as 'a local resident and a further 40 responses received from those replying on behalf of a local business, organisation or community group and provided the organisation name. Postcode data was collected from respondents, and their location in proximity to the scheme is shown in **Figure 8-4**.

8.2.5. The plan shows that the greatest volume of responses was received from the NR8 and NR9 postcodes, which is where the NWL will be routed, and therefore residents in these areas will be more directly affected. All responses were received through Citizen Space (NCC's online consultation tool), apart from 36 by email and 35 by letter.

8.2.6. The overall feedback indicates very similar levels of support for options 1-7 (ranging from 145 responses to 114) but a noticeably lower level of support (65 responses) for option 8. The top four options were as follows:

- **Option 4**: Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham (145 responses)
- **Option 3**: Create a new pedestrian and cycle crossing on Drayton High Road to improve connectivity with the Marriott's Way (139 responses)
- **Option 7**: Create a cycle-friendly on-road link south of A47 from Mattishall to the Norfolk and Norwich University Hospital & University of East Anglia (131 responses).
- **Option 1**: Create a new pedestrian and cycle crossing on the A1067 Fakenham Road at Attlebridge (130 responses)

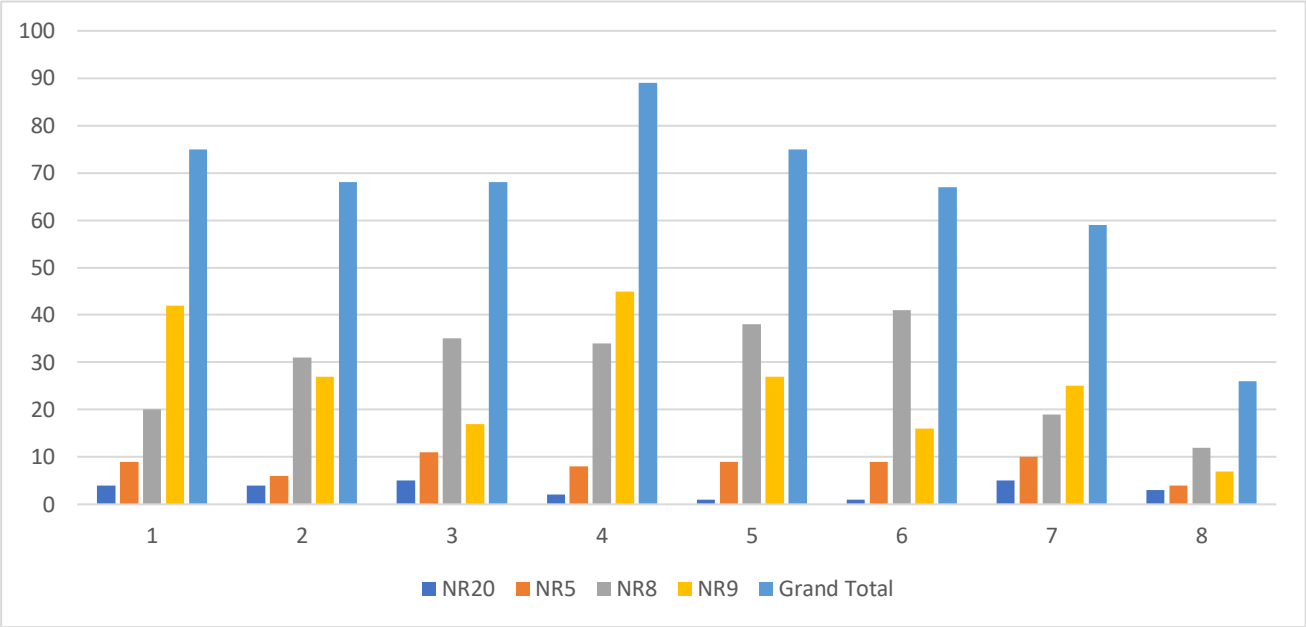
Figure 8-4 - Local Access Consultation responses by postcode location



8.3 SHORTLISTING

8.3.1. The above consultation results have been checked against a more localised view based on responses from residents stating that their home postcodes were located in NR5, NR8, NR9 or NR20 only. The results are summarised below.

Figure 8-5 - Wider Sustainable Transport Options



8.3.2. Whilst Option 4 is again the top ranked option amongst local residents in the west of Norwich and Option 8 was again least popular, this more localised view provides a slightly different picture of feedback with Options 1 and 5 in joint second place and Options 2 and 3 in joint third place. Option 6 also had very similar response levels to those in joint third place.

8.3.3. Since the top 3-4 priorities from public consultation, (other than the top and bottom ranking options), are not clearly defined, it is recommended that other performance criteria also need to be taken into account when prioritising a shortlist of 3-4 options, which include:

- Traffic changes as a result of the NWL scheme;
- Existing Catchment and Future Propensity to Walk and Cycle (National Travel Survey);
- Connectivity with key employment sites and non-residential land uses;
- Synergy with other proposals (A47 scheme, TfN, proposed developments) and NWL options; and
- Cost of proposed options.

8.4 TRAFFIC CHANGES

8.4.1. The 2025 opening year forecast Traffic Model results have been reviewed to understand which routes would be more attractive for cycling and walking. The Do Something scenario from the updated NATS model has been used to represent the situation with the proposed NWL in place.

8.4.2. For the cycle friendly options (4-8), the routes with the lower levels of future traffic would create more attractive conditions for cyclists. Based on maximum and minimum flows, the top three routes are Options 4, 7 and 5 with AADTs less than 2,500 per day expected with the NWL in place, along the majority of the route length. These routes would be less likely to require segregation, as set out

in LTN 1/20, although traffic speeds would need to also be close to 20mph for this to be achievable. Figure 4.1 of LTN 1/20 also notes that "In rural areas … shared routes with speeds of up to 30mph will be generally acceptable with motor vehicle flows of up to 1,000 pcu per day."

8.4.3. NCC are currently reviewing the applicability of the new LTN 1/20 guidance in very rural locations such as these. It is noted that a review of major scheme proposals such as NWL is currently being carried out by Sustrans in this regard on behalf of Transport East.

8.4.4. The more urban routes 6 and 8 currently have lower speed limits but higher traffic volumes, so are likely to require segregation which would have a higher infrastructure cost. A section of Marl Hill Road (which connects Weston Longville with Attlebridge) and part of the Option 5 route between Honingham Lane and Ringland Road have also been assumed to include potential segregated facilities due to traffic volumes and/or vehicle speeds in excess of 30mph.

8.4.5. For the pedestrian / cycle crossing options (1-3), the proposed interventions would potentially have a more beneficial effect in mitigating severance issues caused by road traffic where flows are highest. 2025 opening year AADT (Annual Average Daily Traffic) flows for the Do Minimum Forecast year have been compared with Do Something flows for each of the option locations. The NWL increases traffic more significantly at the Option 3 location than at Option 2 or Option 1 locations. This suggests that Option 3 would have a more beneficial effect in mitigating severance issues in the Do Something scenario by making it easier to cross the road. Despite this, Options 1 and 2 would have higher traffic speeds, as well as forecast traffic flows on A1067 in excess of 10,000 AADT, and there have been road traffic accidents close to the Option 1 and Option 3 locations in the last five years, so new crossings in these locations would potentially provide additional benefits.

EXISTING POPULATION CATCHMENT

8.4.6. In order to identify the likely number of people the proposed interventions may benefit; GIS analysis was used to identify a 400m buffer around each of the option locations or routes to create a catchment buffer (this is equivalent to a 5-minute walk). Census 2011 data by Output Area on population has been overlaid and interrogated. The approximate total population within each catchment has been tabulated below. Since Option 7 is a substantially longer route, this route has been split into two sections – east and west of Easton.

8.4.7. The crossing options ranked lowest for this metric as they have the smallest footprint and therefore the smallest scheme catchment. However, within this group, Option 3 has slightly more catchment population than Options 1 and 2, so would provide greater benefit to more users. For the cycle-friendly route options, Option 7 has more than double the catchment of any other option, but this is also the longest route option with the largest footprint and geographic catchment area. Option 7 has therefore been split into an eastern and western section (east and west of Easton where the route meets Option 5 as shown in **Figure 8-3**). Options 7E, 6 and 4 have the biggest catchment and would potentially offer more benefit to more people, creating wider opportunities for mode shift.

Table 8-1 - Existing Population Catchment - 400m Buffer

Option	Population	Rank
Option 1	200	2
Option 2	23	1
Option 3	1,272	3
Option 4	7,420	7
Option 5	5,122	6
Option 6	9,504	8
Option 7W	4,134	4
Option 7E	14,320	9
Option 8	5,095	5

FUTURE PROPENSITY TO WALK AND CYCLE

Propensity to Cycle Tool

8.4.8. Mode share assumptions used within the Propensity to Cycle Tool (PCT) have been applied to understand the number of potential future trips that could benefit from each of the proposed options, based on forecast commuting patterns. For this analysis, there are several scenarios available within the PCT. The Government Target (Equality) scenario within the PCT assumes that active travel in the UK is doubled by 2025, in line with the recently published 2020 Gear Change guidance. For high level assessment purposes, this is taken as the proposed situation with the STS interventions in place. This is compared with the Do Minimum scenario which takes observed NMU mode share uplifts between 2011 and 2018 from NTS (East of England Region data) and extrapolates them to the opening year of 2025 (equivalent to a 15% increase on current levels). The changes in mode shares as a result of the various scenarios are shown on the www.PCT.bike website – the below extract shows the mode shares predicted for the Norfolk area as follows:

Figure 8-6 - Propensity to Cycle Tool Website Extract

Scenario	% cyclists	% walking	% car drivers	% all other modes
Census 2011	4.9 %	11.8 %	68.8 %	14.5 %
Government Target (equality)	8.2 %	11.1 %	66.6 %	14.1 %
Government Target (near market)	8.3 %	10.9 %	66.7 %	14.1 %
Gender Equality	7.2 %	11.3 %	67.4 %	14.1 %
Go Dutch	20.3 %	8.4 %	59.0 %	12.3 %
Ebikes	25.7 %	7.8 %	55.1 %	11.4 %

Source: Propensity to Cycle Tool, www.PCT.bike, January 2021

8.4.9. Population data from the 2011 Census has been used as the starting point, with an assumption of household occupancy of 2.3 people per dwelling (based on the average household size for the Norfolk area, E10000020, taken from Table HO1UK from the 2011 UK Census), along with an assumed trip rate of 8 trips per household per day (Data on all day trip rates per household taken from TRICS 7.7.4 2021 with residential sites selected in England outside London, excluding town centre sites and excluding sites with population of more than 20,000 residents within 1 mile).

8.4.10. The Walking and Cycling mode shares from the above PCT table for Norfolk have been used for the three crossing options (1-3) and the cycling mode shares only have been used for the cycle friendly route options (4-8). For the crossing options, 40% of NMU trips are assumed to be on routes that would be catered for and for the cycle route options, 30% of trips are assumed to be on the desire line. Trip rates and mode shares for the baseline (Do Minimum) scenario are shown in **Table 8-2**.

Table 8-2 - Calculation of Trip Rates and Mode Shares for the Do Minimum (without NWL)

Option	Population	HH	All trips per day	% trips on Desire Line	%NMU PCT census	NMU trips per day	2025 NTS forecast (+15%) DM
Option 1	200	87	696	40%	17%	46	53
Option 2	23	10	80	40%	17%	5	6
Option 3	1,272	553	4,424	40%	17%	296	340
Option 4	7,420	3,226	25,809	30%	5%	379	436
Option 5	5,122	2,227	17,816	30%	5%	262	301
Option 6	9,504	4,132	33,057	30%	5%	486	559
Option 7W	4,134	1,797	14,379	30%	5%	211	243
Option 7E	14,320	6,226	49,809	30%	5%	732	842
Option 8	5,095	2,215	17,722	30%	5%	261	300

8.4.11. For comparison, the process has been repeated for the Do Something scenario, taking the PCT forecast mode shares for Government Target scenario as shown below in **Table 8-3**.

Table 8-3 - Calculation of Trips Rates and Mode Shares for the DO something (with NWL) scenario

Option	Population	HH	All trips per day	% trips on desire line	%NMU PCT Govt Tgt	NMU trips per day	2025 NTS forecast (+15%) DS
Option 1	200	87	696	40%	19%	54	62
Option 2	23	10	80	40%	19%	6	7
Option 3	1,272	553	4,424	40%	19%	342	393
Option 4	7,420	3,226	25,809	30%	8%	635	730
Option 5	5,122	2,227	17,816	30%	8%	438	504
Option 6	9,504	4,132	33,057	30%	8%	813	935
Option 7W	4,134	1,797	14,379	30%	8%	354	407
Option 7E	14,320	6,226	49,809	30%	8%	1,225	1,409
Option 8	5,095	2,215	17,722	30%	8%	436	501

8.4.12. Comparing the Do Something and Do Minimum scenarios shows the following changes in daily trip making as a result of the options as shown in **Table 8-4**.

Table 8-4 - Comparison of Do Minimum and Do Something Scheme Benefits

Option	2025 DM	2025 DS	2025 DS New Trips	Rank
Option 1	53	62	+8	2
Option 2	6	7	+1	1
Option 3	340	393	+53	3
Option 4	436	730	+294	7
Option 5	313	524	+203	6
Option 6	559	935	+376	8
Option 7W	253	423	+164	4
Option 7E	842	1,409	+567	9
Option 8	300	501	+202	5

8.4.13. The above results show that of the proposed crossings Option 3 is likely offer benefit to more users than Options 1 and 2. Whilst for the cycle friendly routes, Option 7E, 6 and 4 are likely to cater for more users.

Connectivity with key land uses in the west of Norwich

8.4.14. Whilst all options were developed with a key objective of improving connectivity to schools, shops, jobs and the Marriott's Way, some offer more connections to non-residential land uses than others.

A high-level review of the connectivity benefits has been carried out and surmised in the table below.

Table 8-5 - High Level Option Connectivity with Local Facilities

	Improves access to key facilities (Yes - Y or No - N)										
Option	Schools	Shops	Jobs	Medical Facilities	Village Hall	Marriott's Way	PROW Network	Bus Stops	Park and Ride	Total	Rank
1	Y	N	N	N	Y	Y	Y	Y	N	5	5
2	N	N	N	N	N	N	Y	N	N	1	4
3	Y	Y	Y	Y	N	Y	N	Y	N	6	6
4	Y	Y	Y	N	Y	Y	Y	Y	N	7	7
5	Y	Y	Y	N	Y	N	N	Y	Y	6	6
6	Y	Y	Y	Y	Y	N	Y	Y	Y	7	6
7W	Y	Y	Y	Y	Y	N	Y	N	N	6	6
7E	Y	Y	Y	N	N	N	Y	Y	Y	6	6
8	Y	Y	Y	Y	N	Y	Y	Y	Y	8	8

8.4.15. Of the Cycle route options, Option 8 and 4 offer the best opportunity for connectivity improvements with various land uses along each of these routes, with options 5, 6, 7 and 3 also offering good connections.

8.4.16. Option 8 connects to key employment areas and the Airport, the Park and Ride site, schools, shops and medical facilities near Drayton High Road, The Marriott's Way and cycleways alongside the A1270 Broadland Northway.

8.4.17. Option 4 connects the villages of Attlebridge, Weston Longville and Ringland, and their village halls as well as onward routes to schools, shops, a medical centre and local jobs in Taverham and Drayton in addition to the Marriott's Way.

8.4.18. Option 7E offers enhanced connections to major employment sites at NRP and NNUH as well as higher and further education facilities at Easton College and UEA. This route also includes Easton where housing development and the Food Enterprise Zone are planned.

8.4.19. Option 7W connects residential areas south of A47 to local facilities such as GP surgery and schools in Mattishall.

8.4.20. Option 5 links Lower Easton and Ringland villages with Easton including Easton College and Costessey Park and Ride.

8.4.21. Option 6 would improve links between Taverham and Costessey which include schools, shops and village halls. Costessey also includes Roundwell Medical Centre.

8.4.22. Of the crossing locations, Option 3 at Drayton High Road is at a key intersection of routes at a busy junction which is difficult for pedestrians and cyclists to negotiate. The location is surrounded by land uses on both sides of A1067 which creates desire lines crossing the busy road. It is also located on

a desire line close to the Marriott's Way. This option offers much greater connectivity enhancement than the other two crossing options and links well with Option 4. However, Option 1 provides onward linkage to the Marriott's Way.

SYNERGY WITH OTHER OPTIONS AND WIDER SCHEMES

8.4.23. The way in which the cycle friendly route options fit with other transport proposals and developments in the surrounding areas also needs to be taken into account.

8.4.24. Options 5 and the eastern part of Option 7 offer good synergy with the A47 North Tuddenham to Easton dualling scheme and the Food Hub, plus potential new housing developments at Easton. Option 6 also supports development at Taverham and Costessey and offers connectivity with Transforming Cities schemes at Dereham Road. Option 7W runs parallel with improvements being proposed by Highways England, so would potentially duplicate and reduce the benefit provided by the HE scheme.

8.4.25. The other cycle route options have less synergy with committed developments and wider transport investment schemes. Of the crossing options, Option 3 is located closer to new developments than Options 1 and 2.

8.4.26. In terms of synergy between the options to create a logical Sustainable Transport package, Option 4 connects directly with Options 1 and 3 and together these create a loop connecting to the Marriott's Way. Option 2 links directly with the proposed NWL works and NMU strategy, Option 5 connects with Option 4 and also Option 7.

8.4.27. All options fit well with Transport for Norwich strategic objectives by improving opportunities for walking and cycling, reducing air quality impacts of transport and reducing congestion. Those with higher concentrations of non-residential land uses and more densely populated catchments are likely to have the greatest synergy with the TfN aspirations. However, for recreational walking and cycling, the more rural routes benefitting from traffic reduction as a result of the scheme are also able to contribute by opening up new opportunities for walking and cycling on parts of the network that are currently intimidating for vulnerable users due to the presence of through-traffic. The NWL will help to unlock this opportunity by providing a strategic road that alleviates pressure on minor rural routes, making them more attractive for walking and cycling.

OPTION COSTS

8.4.28. The cost of the proposed works has been estimated in high level terms based on benchmarking with other recently implemented schemes associated with the NDR and the recent Transforming Cities bid. Option costs are based on a number of assumptions, with further design development work required to accurately estimate costings.

8.4.29. For the pedestrian/cycle crossing options, it is assumed that speeds could be managed to achieve an acceptable at grade crossing in accordance with LTN1/20 guidance which has come forward since the NDR was constructed. For a robust cost, a signalised crossing is assumed, with power supply connections required unless solar power can be achieved, however, the crossing type will be reviewed as the options are developed further.

8.4.30. No allowance has been made for street lighting in the immediate vicinity of the crossings as lighting is already present at Option 3 location and there are ecology implications to consider in rural locations and the surrounding network is unlit. It is therefore expected that the costs for each crossing would be in the region of £100K-£125K.

8.4.31. For the cycle friendly route options, the implications of new LTN 1/20 guidance published in July 2020 are still being interpreted by NCC Highways in respect of how these should be applied in a rural context. At this stage it has been assumed that cycling in mixed traffic would be possible for routes which are forecast to have low traffic flows in the NWL opening year 2025 (Options 4, 5 and 7).

8.4.32. However, Chapter 7 of the guidance and Table 4.1 advocates that vehicle speeds need to be managed to below 30mph in order to make the routes attractive for cycling in mixed traffic. For lower traffic routes, for costing purposes, in advance of developing a detailed scheme design, allowances have been made for TROs (Traffic Regulation Orders) for a low speed traffic zone along each route, with gateway features at each end (any bespoke signage unique to the scheme would potentially require DfT approval).

8.4.33. Within such zones, it is anticipated that speed management features would be implemented at least every 200m. A wide range of measures could be implemented at each location – these include painted roundels, interactive signs, road narrowings, horizontal or vertical deflection (chicanes, speed humps/cushions etc), lines and signs to raise awareness of cyclists and influence slower vehicle speeds along the route. A cost of £50K per km has been applied to each of the route options 4,5 and 7), assuming no requirement for street lighting along the routes.

8.4.34. For Options 6 and 8 segregation of some sections is more likely to be required due to higher traffic volumes. For Option 5 there is also a section of about 1.2km that may require segregation. Therefore, a higher cost of £200K per km has been applied to affected sections. An additional allowance for improved crossing facilities has also been included in Options 6 and 8. The cost of Option 5 also assumes that the HE proposed NMU bridge over A47 at Easton is in place as a Do Minimum scheme. A summary of high-level construction costs is provided in **Table 8-6** below.

Table 8-6 - High Level Cost Estimates

Option	Construction Cost	Construction Cost Rank	Maintenance Cost Rank
Option 1	£112,500	1	6
Option 2	£112,500	1	6
Option 3	£112,500	1	6
Option 4	£590,000	2	2
Option 5	£605,000	4	1
Option 6	£1,075,000	7	6
Option 7W	£650,000	5	4
Option 7E	£600,000	3	3
Option 8	£945,000	6	6

8.4.35. Maintenance is also expected to be a key issue, hence this has also been factored into the ranking below – signalised solutions are anticipated to be more onerous for maintenance so the crossing options have been allocated a higher cost per km for maintenance (albeit over a very short distance)

and the remaining route options are expected to have maintenance costs proportionate to the route length.

8.4.36. It should be noted that in locations where speeds cannot be managed to within the range 20-30mph and flows below 2,500 AADT cannot be achieved, there is a risk that additional segregation may be required to comply with LTN 1/20. An additional allowance for 40% optimism bias is therefore to be added to the above costs at this stage.

8.4.37. In addition to the above construction costs, lessons learnt from other schemes such as Quiet Lanes projects across Norfolk, indicate that promotion and monitoring of the proposals as part of an area-wide strategy is helpful in securing uptake of the routes and influencing driver awareness of vulnerable users. An additional cost allowance of £50K has been included for these items as non-infrastructure measures also prior to applying Optimism bias.

SCHEME PRIORITISATION

8.4.38. In the event that delivering all options is not affordable a multi-criteria ranking system has been used to enable scheme options to be prioritised as explained above. A summary of the scheme option ranking is set out below in **Table 8-7**.

8.4.39. Options 4, 5, 6, 3 and 7E were the top ranked options taking into account all benefit factors. However, cost is expected to be a key consideration.

Table 8-7 - Scheme Ranking Against Appraisal Criteria

Option	1	2	3	4	5	6	7W	7E	8
Consultation (all)	5	3	7	8	2	4	6	6	1
Local Feedback	7	6	6	8	7	6	5	5	4
Severance (Peds)	6	7	8	N/A					
Traffic Reduction (Cycles)	N/A			8	7	6	3	5	4
Connectivity	5	4	6	7	6	6	6	6	8
Synergy with HE Scheme & Development	3	3	5	4	8	6	7	2	4
NMU Trips per Day	2	1	3	7	6	8	4	9	5
Total Benefit	28	24	35	42	36	36	31	33	26
Overall Rank	6	8	3	1	2	2	5	4	7

VALUE FOR MONEY

8.4.40. For comparative scoring of costs and benefits on an equivalent basis, the two cost elements have been given an increased weighted score in comparison with other factors to reflect that construction cost and maintenance cost are equally important to the six benefit categories considered for each option. In order to provide guidance on which options represent the best value for money, a proxy Benefit-Cost Ratio (BCR) is derived by comparing the relative costs (sum of construction cost and

maintenance costs scores multiplied by three) with the relative benefits on an equal basis. The results are summarised in **Table 8-8** below.

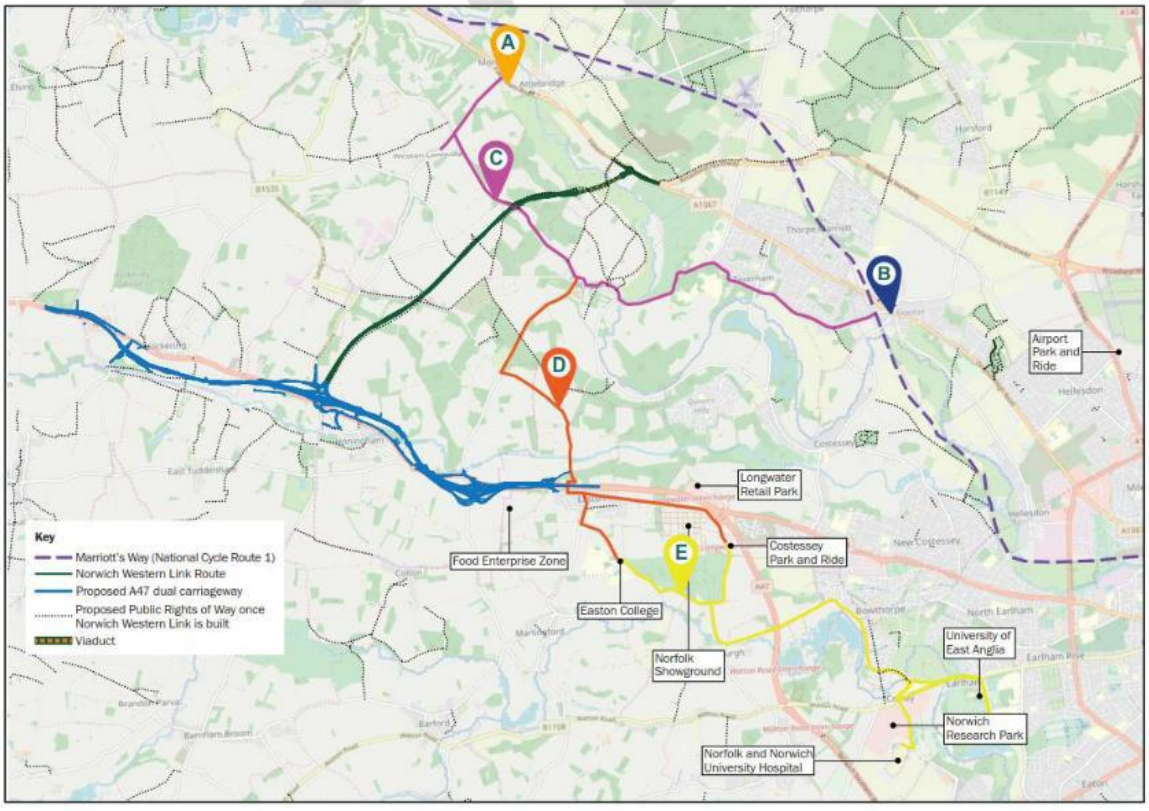
Table 8-8 - Summary of High Level Costs and Benefits

Option	1	2	3	4	5	6	7W	7E	8
Construction Cost	£112.5K	£112.5K	£112.5K	£445K	£605K	£1.075m	£650K	£600K	£945K
Construction Cost Rank	1	1	1	2	4	7	5	3	6
Maintenance Cost Rank	6	6	6	2	1	6	4	3	6
Weighted Total Cost	21	21	21	12	15	39	27	18	36
Total Benefit	28	24	35	42	36	36	31	33	26
Proxy BCR	1.33	1.14	1.67	3.50	2.40	0.92	1.15	1.83	0.72
BCR Rank	5	7	4	1	2	8	6	3	9

8.4.41. With the exception of Options 6 and 8, all options have a proxy BCR greater than 1.0 so would offer benefit in terms of Active Modes, including health and life expectancy benefits. When value for money is taken into account the top-ranking options are Option 4, 5, 7E and 3.

8.4.42. The preferred options prioritised for inclusion in the NWL scheme are shown in **Figure 8-7** below.

Figure 8-7 - Wider Sustainable Transport Interventions – Preferred Options



NEXT STEPS

8.4.43. As set out above a multi-criteria high level appraisal has been used to identify the best performing options for shortlisting. The textual comments from public consultation we received in response to the July 2020 Local Access Consultation also support this and have also helped guide the selection of shortlisted options.

8.4.44. It is proposed that further development of the shortlisted options (3, 4, 5 and 7E) is taken forward. It is also recommended that Option 1 is included as this would provide synergy with Option 4 and 3 offering improved connectivity with Marriott's Way. There was also local support from residents in the immediate vicinity of the scheme for Options 5, and Option 7 was generally well supported too. Option 5 has good synergy with the proposals that Highways England are bringing forward and offers connectivity to Easton College and the Costessey Park and Ride site. Option 7 (east of the Food Hub) has good synergy with Option 5 and was well supported in consultation, as well as offering connectivity to key land uses in the western fringe of Norwich such as the NNUH, NRP and UEA (amongst others). East of the Food Hub, this route has a more densely populated catchment and connects with the Wymondham circular route and Transport for Norwich projects, as well as supporting new developments that are proposed in the local area.

8.4.45. The schemes which are proposed to be omitted from the next stage of work going forward are Options 2, 6 and 8. These options had lower levels of support in the public consultation and would have higher levels of traffic using the affected roads, so whilst they have good catchment and lower cost, they may be more efficiently served by bus.

8.4.46. Additionally, the current proposals for the Western Arc bus route duplicate part of the Option 6 route and a new bus service has recently commenced that caters for the desire line embodied within Option 8. The western part of Option 7 (Mattishall to the Food Hub at Easton) is also less well populated and may also be more efficiently served by bus.

8.5 ASSOCIATED IMPLICATIONS, KEY RISKS & OPPORTUNITIES

TRAFFIC MODEL TESTING

8.5.1. The proposed interventions will be tested within the strategic NATS model. With increased traffic restrictions, this may show that the proposed interventions cause traffic redistribution which may require further or more widespread mitigation. However, since in most cases, the forecast link flows on the affected routes are already expected to be low, the magnitude of impact of associated redistribution in response to the STS package of interventions is unlikely to have a significant effect on the wider network.

RESPONDING TO NEW TRANSPORT GUIDANCE

8.5.2. The LTN 1/20 guidance is relatively new and local authorities are still becoming accustomed to its application and whilst the guidance is relatively clearly defined for urban areas, there is scope for differing interpretations in respect of rural roads. Norfolk being predominantly a rural county, is seeking guidance via Sustrans and Transport East on how this specifically applies to rural routes.

LANDOWNER AGREEMENT

8.5.3. Throughout the design process, there has been dialogue with local landowners, to ensure they are aware of how the proposals may affect their landholding. Final agreement will need to be sought when the design for the complementary package of measures are completed.

CONSTRUCTION PHASE

8.5.4. During the construction phase, there will be potential risks to Non-Motorised User, vulnerable users and those with protected characteristics. All efforts will be made to ensure that access to Public Rights of Way and other existing pedestrian, cyclist and equestrian infrastructure remains open and available for use, where possible. A full assessment will be provided in the TA and Environmental statement and mitigation will be provided via a Construction Environmental Management Plan which will specify (amongst others):

- Access routes to site for construction traffic;
- Time of site operation;
- Construction phasing;
- Import and export of materials;
- Locations of earthworks and borrow pits;
- Abnormal load delivery arrangements;
- Location of site compounds and access tracks;
- Pedestrian, cycle and equestrian diversion routes;
- Temporary closure of sideroads during construction;
- Temporary Stopping up and diversion of Public Rights of Way;
- Temporary Traffic Regulation Orders;
- Temporary Traffic Management;
- Measures to minimise noise impacts;
- Measures to attenuate dust arising during construction; and
- Co-ordination with Highways England works to construct the A47 dualling.

ØRSTED HORNSEA PROJECT 3 CABLES

8.5.5. Ørsted Hornsea Project Three (UK) Ltd submitted a DCO application to the Planning Inspectorate in 2018 to secure permission to construct, operate and maintain a 300 turbine, offshore wind farm covering approximately 696 km^2. The DCO application was approved in December 2020 (*https://infrastructure.planninginspectorate.gov.uk/projects/eastern/hornsea-project-three-offshore-wind-farm/*).

8.5.6. The routing of the onshore cables towards the Norwich Main National Grid Substation west of Dunston, would travel across the study area, through Morton, Weston Longville, Ringland, and Easton. The proposed route is shown in **Appendix F**. An option is also being considered to locate a construction compound along Honingham Road, within the former RAF Attlebridge airfield site.

8.5.7. There will be limited restrictions on farming over the cable route once instated, such as the prohibition of double depth ploughing, structures or tree planting. During construction, haul roads are expected to be laid down, with likely locations chosen to follow field boundaries to minimise the loss of productive agriculture. The cable routing may provide an opportunity to designate a PROW / cycleway over new maintenance access tracks to be laid in relation to the cable, with permission obtained from landowners to dedicate a PROW over the track. This is an option for further exploration but has not been assumed within the Outline Business Case for the scheme.

9 ACTIVE MODE BENEFITS AND MODE SHIFT

9.1.1. The benefits of including the proposed Sustainable Transport Strategy in the Norwich Western Link scheme are required to be incorporated into the Outline Business Case (OBC).

9.2 ACTIVE MODES ASSESSMENT TOOL INPUTS - NMU STRATEGY

9.2.1. An Active Modes Assessment Tool (AMAT) has been used to quantify the wide range of benefits that cycling and walking interventions can bring, compared between a 'Do Minimum (DM)' and 'Do Something (DS)' scenario.

9.2.2. A 15% NMU uplift has been used to factor up existing trips to 2025 levels based on NTS Journey to Work (JtW) data for the East of England observed change in cycle mode share since 2011 to 2019 extrapolated to 2025.

Table 9-1 - Do Minimum - AMAT Scenario

Route	Output Areas	Area	Census JtW Cycling	Census JtW Walking	Census JtW Work from Home	NMU Observed Trips	Total NMU Trips	NTS uplift to 2025 DM
RB1 / The Broadway	E00134783	Honingham	3	2	32	2	44	51
Breck Road / Weston Road	E00134786	Weston Longville	8	5	36	23	85	98
Ringland Lane / FP1	E00134778	Attlebridge	1	7	27	34	77	89
Blackbreck Lane	E00134784	Ringland	2	4	20	2	34	39
Total			14	18	115	61	240	277

9.2.3. The above table summarises the Do Minimum Scenario (i.e. the number of trips potentially using the local PROW network within the immediate vicinity of the scheme without the NWL in place). This is to be compared with the proposed Do Something scenario as set out below in **Table 9-2**. The uplift to the future opening year in the DoSomething scenario is based on the PCT government target scenario for Norfolk, which is consistent with the 'Gear Change' policy of doubling cycling across the UK.

9.2.4. For the local area, since the existing network is relatively fragmented, it is assumed that the government target would only be met in the event that new infrastructure is provided. The NWL scheme contributes towards joining up and increasing the length of PROW routes available, a distance-based uplift is therefore applied in the calculation based on the extent to which the length of PROW available within each output area is extended.

Table 9-2 - Do Something - AMAT Scenario

Route	Output Areas	Area	Census JtW Cycling	Census JtW Walking	Census JtW Work from Home	NMU Observed Trips	Total NMU Trips	NTS uplift to 2025 DM
RB1 / The Broadway	E00134783	Honingham	3	2	32	2	44	151
Breck Road / Weston Road	E00134786	Weston Longville	8	5	36	23	85	270
Ringland Lane / FP1	E00134778	Attlebridge	1	7	27	34	77	243
Blackbreck Lane	E00134784	Ringland	2	4	20	2	34	75
Total			14	18	115	61	240	740

9.2.5. Comparing the above **Table 9-1** and **Table 9-2** indicates that the proposed NMU strategy is capable of supporting an extra 464 trips per day over and above the Do Minimum scenario.

9.3 AMAT SCENARIO INPUTS – CYCLE FRIENDLY ROUTES

9.3.1. Population data from 2011 Census has been used as the starting point, with an assumption of household occupancy of 2.3 people per dwelling (based on the average Household size for Norfolk area E10000020 taken from Table HO1UK from the 2011 UK Census), along with an assumed trip rate of 8 trips per household per day (data on all day trip rates per household taken from TRICS 7.7.4 (2021) with residential sites selected in England outside London, excluding town centre sites and excluding sites with population of more than 20,000 residents within 1 mile).

9.3.2. The Walking and Cycling mode shares from the above PCT table for Norfolk have been used for the three crossing options (1-3) and the cycling mode shares only have been used for the cycle friendly route options (4-8). For the crossing options,40% of NMU (Non-Motorised User) trips are assumed to be on routes that would be catered for and for the cycle route options, 30% of trips are assumed to be on the desire line. Trip rates and mode shares for the baseline (Do Minimum) scenario are shown in **Table 9-3**.

Table 9-3 - Do Something - AMAT Scenario

Option	Population	HH	All trips per day	% trips on Desire Line	%NMU PCT census	NMU trips per day	2025 NTS forecast (+15%) DM
Option 1	200	87	696	40%	17%	46	53
Option 3	1,272	553	4,424	40%	17%	296	340
Option 4	7,420	3,226	25,809	30%	5%	379	436
Option 5	5,122	2,227	17,816	30%	5%	262	301
Option 7E	14,320	6,226	49,809	30%	5%	732	842

9.3.3. For comparison, the process has been repeated for the Do Something scenario, taking the PCT forecast mode shares for Government Target scenario as shown below in **Table 9-4**.

Table 9-4 - Trip Rates and Mode Shares for the Do Something (with NWL) Scenario

Option	Population	HH	All trips per day	% trips on desire line	%NMU PCT Govt Tgt	NMU trips per day	2025 NTS forecast (+15%) DS
Option 1	200	87	696	40%	19%	54	62
Option 3	1,272	553	4,424	40%	19%	342	393
Option 4	7,420	3,226	25,809	30%	8%	635	730
Option 5	5,122	2,227	17,816	30%	8%	438	504
Option 7E	14,320	6,226	49,809	30%	8%	1,225	1,409

9.3.4. Comparing the Do Something and Do Minimum scenarios shows the following changes in daily trip making as a result of the options as shown in **Table 9-5**.

Table 9-5 - Comparison of Do Something and Do Minimum Results

Option	2025 DM	2025 DS	2025 DS New Trips
Option 1	53	62	8
Option 3	340	393	53
Option 4	436	730	294
Option 5	313	524	203
Option 7E	842	1,409	567
Total	**1984**	**3118**	**1125**

9.3.5. The above results show that 1,125 daily new trips would be able to be supported by the proposed cycle friendly route options.

9.4 SOCIO-ECONOMIC EFFECTS FOR PUBLIC TRANSPORT

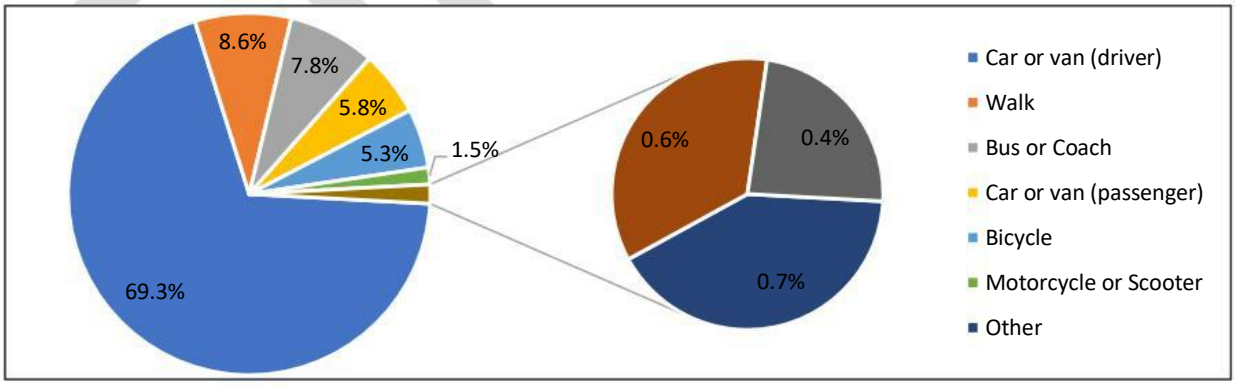
9.4.1. This has not been assessed within the OBC as the public transport options are still under development and there is uncertainty around future bus operating costs and viability due to COVID-19 impacts on bus services throughout 2020 and 2021. However, a preferred option will be selected based on historic trends and taken forward in consultation with bus operators. Both options have been shown to be able to achieve potential viability within year one (if market conditions return to 2011 levels) but if subsidy is required to kick start the service local funding would be used to support an initial trial of the service.

9.4.2. Based on feedback from the Local Access Consultation and Transport for Norwich 2018 update surveys, a direct bus service which avoids the need for residents in the west of Norwich to travel into the city centre and change buses to access the hospital and key employment sites in the west would be welcomed by local residents. This would offer residential areas in the north west urban fringe of Norwich (e.g. Thorpe Marriott, Taverham, Drayton etc) a substantial improvement in accessibility to key facilities such as schools in Taverham and Costessey, shops at Longwater, Roundwell Medical Centre and the NNUH hospital as well as key employment sites such as NRP and UEA. Journey times by bus would be considerably reduced and the traffic relief on the Taverham to Costessey Option A route provided by the NWL highway scheme would also contribute towards delivering a reliable bus service.

9.5 ANTICIPATED MODE SHIFT

9.5.1. Existing mode shares from the UK Census 2011 data on Method of Travel to Work has been interrogated to understand existing travel patterns within the area to the west of Norwich. **Figure 9-1** indicates the mode share for all usual residents aged 16 to 74, excluding those who work from home or are unemployed. Approximately three-quarters (75.1%) of residents within the NWQ travel to work by car, as either a driver (69.3%) or a passenger (5.8%).

Figure 9-1 - mode – Modal share for journeys to work



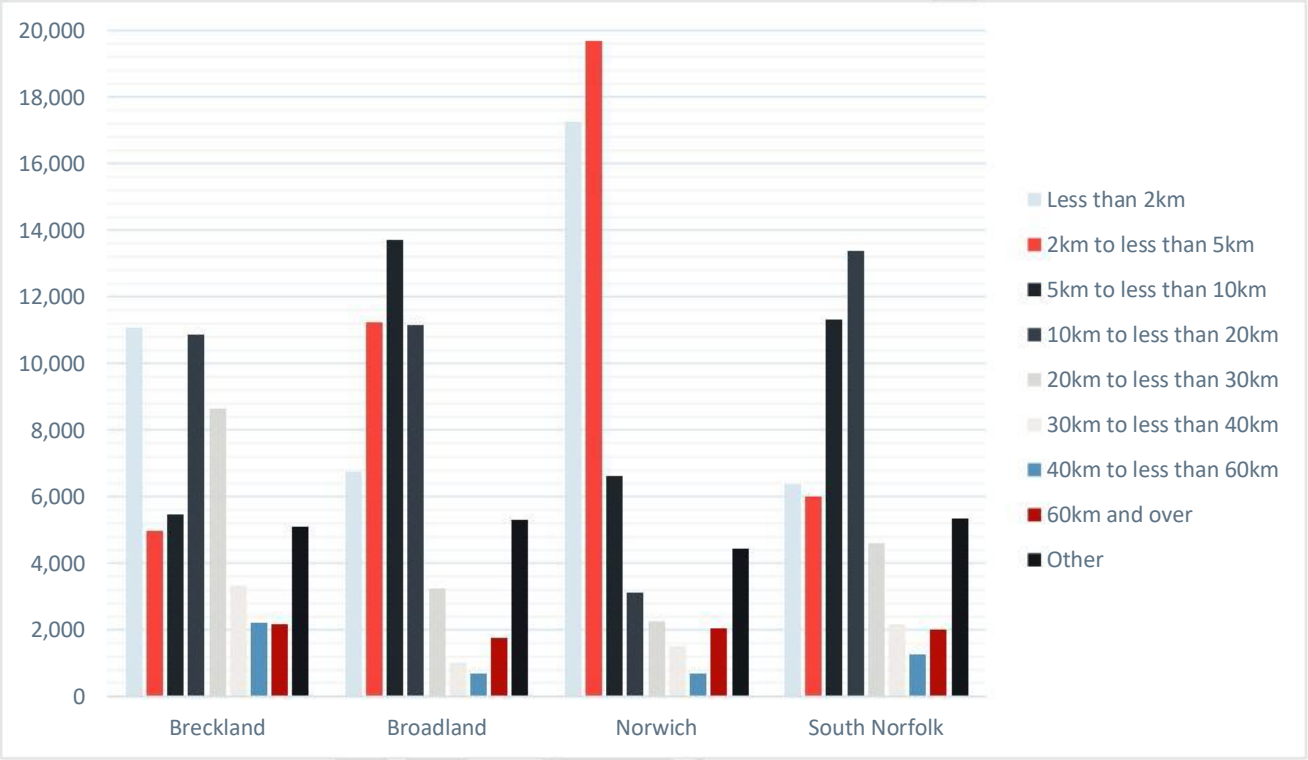
Source: 2011 Census

9.5.2. Due to the rural nature of the study area, it is understandable that a high proportion of trips are currently made by car, with sparsely populated settlement patterns which are often difficult and

inefficient to serve by public transport and more than 60% of trips in longer distance bands (as shown below in **Figure 9-2**) beyond easy walking and cycling distance.

9.5.3. Distance travelled to work 2011 Census data has been gathered from ONS 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 9-2 - Distance Travelled to Work



Source: Table QS702EW, Office for National Statistics, 2011

9.5.4. The above graph shows that in total 38% of residents travel no more than 5km to work. This distance can easily be travelled by bicycle, indicating that there is potential for mode shift in the shorter distance bands. The measures proposed within the Sustainable Transport Strategy are intended to encourage and support travel by non-car means and with promotion and monitoring should help to persuade residents to travel more sustainably. Therefore, increased access to safe walking routes, joined up cycling routes, combined with more direct and frequent bus services as proposed within this document, should allow for a reduction in personal vehicle use for shorter trips.

9.5.5. Assumptions consistent with the Norfolk dataset for the PCT (Propensity to Cycle Tool) indicate that a mode shift to walking and cycling in response to the proposed Cycle Friendly Route options and NMU strategy is likely to reduce the car driver percentage mode share within the study area by 3% in the government target scenario.

9.5.6. The PCT assumptions for Norfolk in the Government Target scenario have been applied to reach a Do Something scenario with the NWL scheme in place. This indicates a total increase of 1,125 daily cycling trips and 464 daily walking trips within the study area (i.e. 1,589 total daily NMU journeys).

9.5.7. The viability assessment for the bus strategy demonstrates that the scheme is also capable of intercepting a further 234 daily journeys by bus (taking the Option A scenario without proposed residential development as a robust assessment).

9.5.8. Assuming an average trip length of 1km for NMUs, 3km for cycles and 5km for bus users, the proposed package of STS measures is capable of saving around 5,009 vehicle km per day. Applying an annualisation factor of 300 days per year, gives a total of 1,502,700 vehicle km per annum.

9.6 ECONOMIC PERFORMANCE

9.6.1. The costs associated with the NMU Strategy are largely an integral part of the scheme design (for example, the proposals make use of green bridges and underpasses which are needed for ecological and topographical alignment purposes and new Public Rights of Way are dedicated over proposed maintenance tracks that would be needed in any case). Hence the strategy increases the benefits of these scheme components without substantially adding cost.

9.6.2. Whilst there are some additional Public Rights of Way diversions and new sections of off-road tracks to be installed, the NMU elements are already embedded within the overall tender pricing for the Highway scheme.

9.6.3. The package of 'Cycle Friendly Routes' and pedestrian and cycle crossing facilities have an additional cost but where possible the options shortlisted for inclusion make use of additional public highways where traffic relief is to be provided by the NWL highway scheme, with modest enhancements to control vehicle speeds, in accordance with LTN 1/20 guidance. These improvements aim to make best use of existing infrastructure on key desire lines. This approach minimises cost, land take and environmental impact. All of the shortlisted options were considered in a high-level multi-criteria sifting process which scored costs against benefits. The proposed shortlist of options taken forward were selected on the basis that they would offer medium to high value for money.

9.6.4. The impacts on Physical Activity has been assessed with DfT's AMAT for shortlisted options. As a result of the Sustainable Transport Strategy the NWL is forecast to have a beneficial impact of £8.9 million. This indicates a BCR in excess of 2.0 which is high value for money.

9.7 CARBON SAVINGS

9.7.1. The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 'Greenhouse Gases'. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the NATS traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114 'Climate' methodology.

9.7.2. Based on a reduction of approximately 1.5 million vehicle kilometres in the opening year of 2025 in comparison with the Do-Minimum scenario (as set out in paragraph 9.5.8 above), over the 60-year appraisal period, the financial benefit in terms of carbon savings from mode shift to sustainable modes as a result of the NWL Scheme is estimated at approximately £600,000.

10 CONCLUSION

10.1 SUMMARY

10.1.1. This Sustainable Transport Strategy has been developed alongside the main NWL highway design proposals and presents a range of measures in the immediate vicinity of the NWL and within a suitable radius of the new road at a more strategic level. The proposed measures provide a complementary package of interventions to support the sustainable travel objectives of the NWL. The proposals also fit well with the aspirations of Transport for Norwich which seeks a mode shift away from private cars and improvement in air quality. There are opportunities for geographical linkage where the NWL and TfN projects interface at the western fringe of Norwich. This offers a combined strategy which offers good synergy with wider sustainable transport proposals across Norwich.

10.1.2. The package of measures would encourage mode shift away from private car use by providing the means to travel sustainably by cycle, on foot or by bus, as well as linking up the existing network of Public Rights of Way to maximise local connectivity for pedestrians, cyclists and equestrians. An Equalities Impact Assessment is being carried out at each stage of the project to ensure that the proposals do not discriminate against those with protected characteristics.

10.2 INPUT FROM STAKEHOLDERS AND LOCAL RESIDENTS

10.2.1. The Strategy has been shaped by on-going public and stakeholder liaison to generate a package of complementary measures that will be of the greatest benefit to local users. Further engagement events are to be held as the project continues to evolve to ensure that the project is as transparent as possible.

10.3 KEY BENEFITS

10.3.1. The complementary measures will provide enhanced access to the Public Rights of Way network, with the standard of routes improved and the existing fragmented network would be joined up. Routes would connect to the Broadland Northway at the northern end, and to routes crossing the A47 at the south, connecting the villages of Honingham, Ringland and Weston Longville; the Marriott's Way; Costessey Park & Ride; Norwich Research Park; Taverham; and Drayton. The measures are forecasted to increase the number of walking and cycling trips across the study area by making the route attractive and safe for users, as well as logically placed to connect key amenities. The local roads across the wider area are also expected to receive levels of traffic reduction which would help to make walking and cycling on the carriageway more attractive (supported by additional speed management measures where appropriate).

10.3.2. A Bus Strategy has been produced to connect key residential and employment areas to the west of Norwich with those in the city centre. The Bus Strategy will complement other aspects of the STS and make use of routes that will experience lower traffic levels following construction of the NWL, making bus travel more attractive for use and improving journey time reliability. There is on-going collaboration with bus operators to ensure that the service would be competitive and operate suitable frequency to be financially viable.

10.3.3. The Side Road Strategy has been developed under the umbrella of the STS to deter rat-running through local villages close to the scheme and protect residential amenity. This has been tested with Local residents via a Local Access Consultation in July 2020 which indicated good levels of support for the closure of existing roads crossing the NWL, other than Ringland Lane.

10.3.4. Economic Benefits of the proposed STS have been assessed and this indicates that the scheme contributes towards encouraging more healthy and active lifestyles with monetised benefits of £8.9 million and a BCR in excess of 2.0 which indicates the STS offers High Value for Money.

10.3.5. There are also expected to be carbon savings from the proposed package of measures, due to an equivalent of 1.5 million vehicle kms in the opening year of 2025 following construction, making it more efficient to travel from / to the west of Norwich by non-car means. Over the 60-year appraisal period this would offer a financial benefit of approximately £600,000.

10.4 MEETING SCHEME OBJECTIVES

10.4.1. The Sustainable Transport Strategy contributes to meeting the objectives listed below and enables the NWL scheme to satisfy the full range of high level and strategic objectives:

- High Level Objectives
  - **H1** - Support sustainable economic growth;
  - **H2** - Improve the quality of life for local communities;
  - **H3** - Promote and improved environment; and
  - **H4** - Improve strategic connectivity with the national road network
- Strategic Objectives
  - **S1** - Improve connectivity and journey times on key routes in Greater Norwich;
  - **S2** - Reduce the impact of traffic on people and places within the western area of Greater Norwich;
  - **S3** - Encourage and support walking, cycling and public transport use;
  - **S4** - Improve safety on and near the road network, especially for pedestrians and cyclists;
  - **S**5 - Protect the natural and built environment, including the integrity of the River Wensum SAC; and
  - **S6** - To improve accessibility to key sites in Greater Norwich.

10.5 KEY RISKS

10.5.1. With increased traffic restrictions/lower speed limits, the proposed interventions may cause additional traffic redistribution which has yet to be modelled within the strategic transport model. However, since in most cases, the forecast link flows on the affected routes are already expected to be low, the magnitude of impact of associated redistribution in response to the STS package of interventions is unlikely to have a significant effect on the wider network.

10.5.2. Furthermore, the implications of LTN 1/20 guidance is relatively new and local authorities are still becoming accustomed to its application and whilst the guidance is relatively clearly defined for urban areas, there is scope for differing interpretations in respect of rural roads. As the study area is predominantly rural, the project team is seeking guidance via Sustrans and Transport East on how this can be specifically applied to rural routes.

10.5.3. There is also a risk that as the measures are developed further the estimated costs could fluctuate. This is dealt with in the quantitative risk assessment included in the Outline Business Case.

10.6 NEXT STEPS

10.6.1. The measures within the Sustainable Transport Strategy will be subject to further development with input from key stakeholders, so that a suitable level of detail is available for planning submission.

10.6.2. The Transport Assessment will consider sensitivity testing for the NWL scheme with the final proposed set of mitigation measures and sustainable transport interventions included in the NATS model.

10.6.3. Further engagement with stakeholders and landowners will continue to inform the scheme development, including advice from Sustrans and other groups on the application of LTN 1/20 guidance to the rural context.

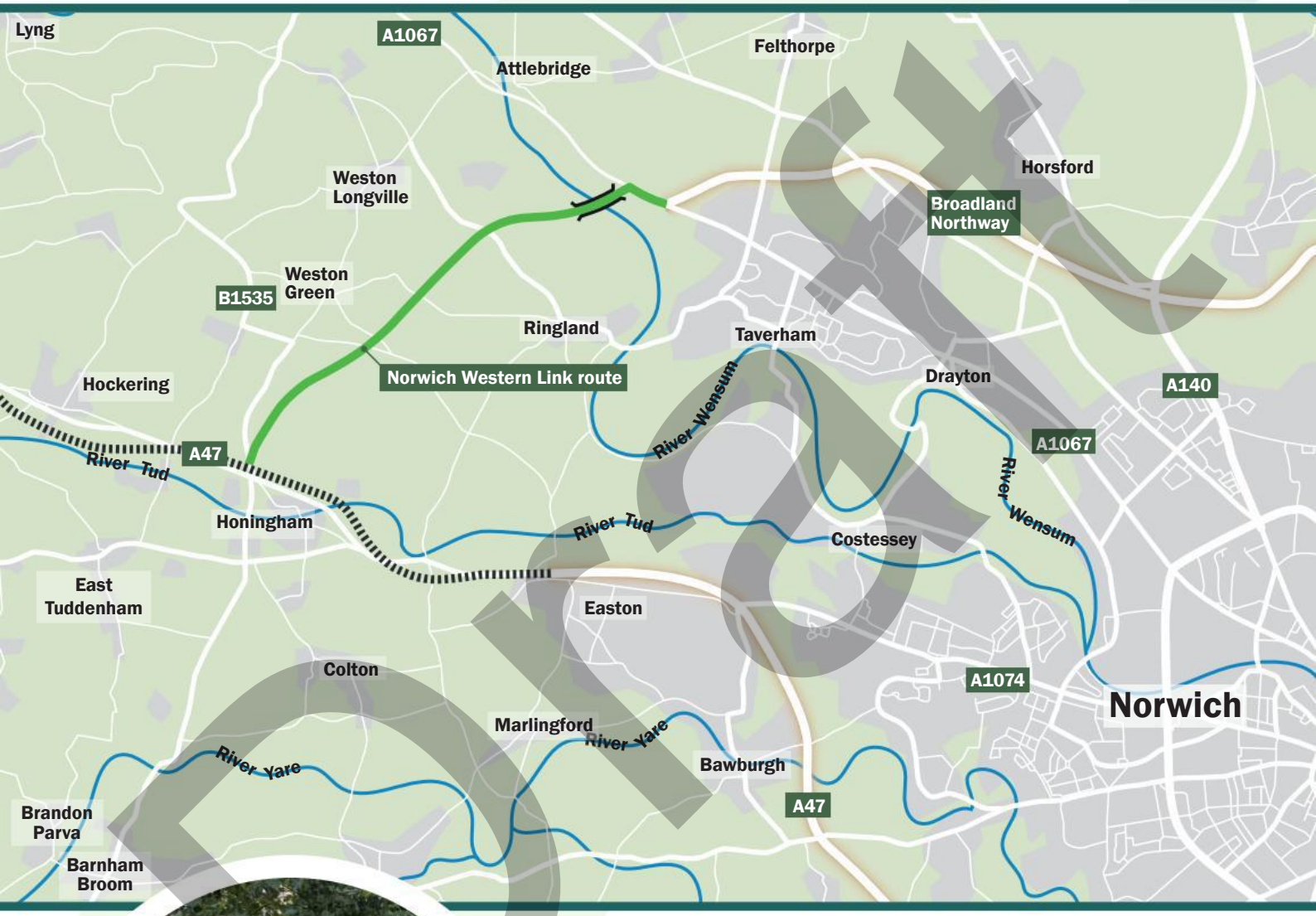
10.6.4. The costs of the NMU elements will be already included in the scheme tender price from the preferred contractor. However, additional work will be carried out to refine the costs of the STS measures as the detail is worked up moving forwards though the design process.

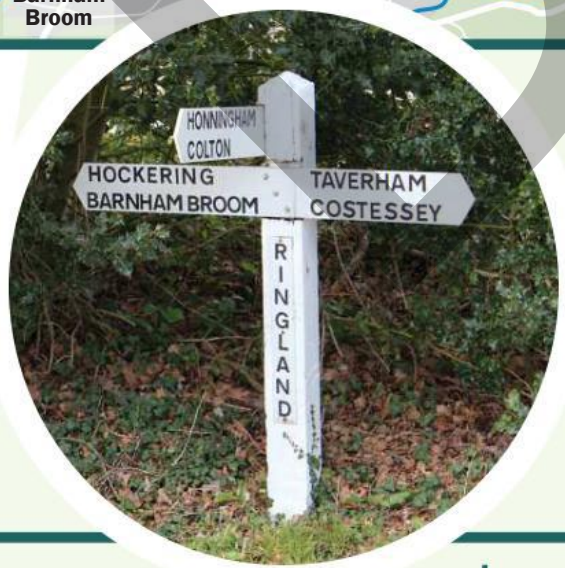
10.6.5. This document will be included as part of the OBC submission but will continue to be updated and reviewed as the project develops, such as for planning purposes.

Appendix A

LOCAL ACCESS CONSULTATION BROCHURE & REPORT

Local Access Consultation





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Introduction

With significant job and population growth anticipated in the Greater Norwich area, it's vital we have the transport infrastructure in place so communities can grow successfully and people and goods can get where they need to go safely and efficiently.

Creating a Norwich Western Link to connect the western end of Broadland Northway (formerly the Northern Distributor Road) to the A47 is one of Norfolk County Council's top infrastructure priorities. Since before Broadland Northway fully opened in spring 2018, there have been calls to fill in what many people saw as the 'missing link' between where the new dual carriageway road ends at the A1067 Fakenham Road and the A47.

Together with the A47 dualling between North Tuddenham and Easton, due to start construction during 2022, the 3.8 mile Norwich Western Link would complete a dual carriageway orbital route around Norwich. This would reduce the need for traffic to enter the city and alleviate local transport issues to the west of Norwich.

Project objectives

There are many things we need to consider as we continue to work on our plans for the Norwich Western Link, including what we want it to achieve. We have therefore developed a set of objectives to guide our work. These are aligned with national and local policy and have taken account of the priorities of local residents.

Support sustainable economic growth

Improve the quality of life for local communities

Promote an improved environment

Improve strategic connectivity with the national road network

Improve connectivity and journey times on key routes in Greater Norwich

Encourage and support walking, cycling and public transport use

Reduce the impacts of traffic on people and places within the western area of Greater Norwich

Protect the natural and built environment, including the integrity of the River Wensum Special Area of Conservation

Improve safety on and near the road network, especially for pedestrians and cyclists

Improve accessibility to key sites in Greater Norwich

Work to date

Our first Norwich Western Link consultation in summer 2018 showed there was strong support for creating a new road link between the A47 and Broadland Northway west of Norwich.

Following this, we assessed more than 80 options that could address the transport problems that exist in the area to the west of Norwich and reduced these down to a shortlist of four road options. We held a further public consultation on these options from November 2018 to January 2019 and considered the responses alongside other crucial information – such as transport benefits, environmental data and effects, value for money and impacts on local communities – to agree a preferred route in July 2019.

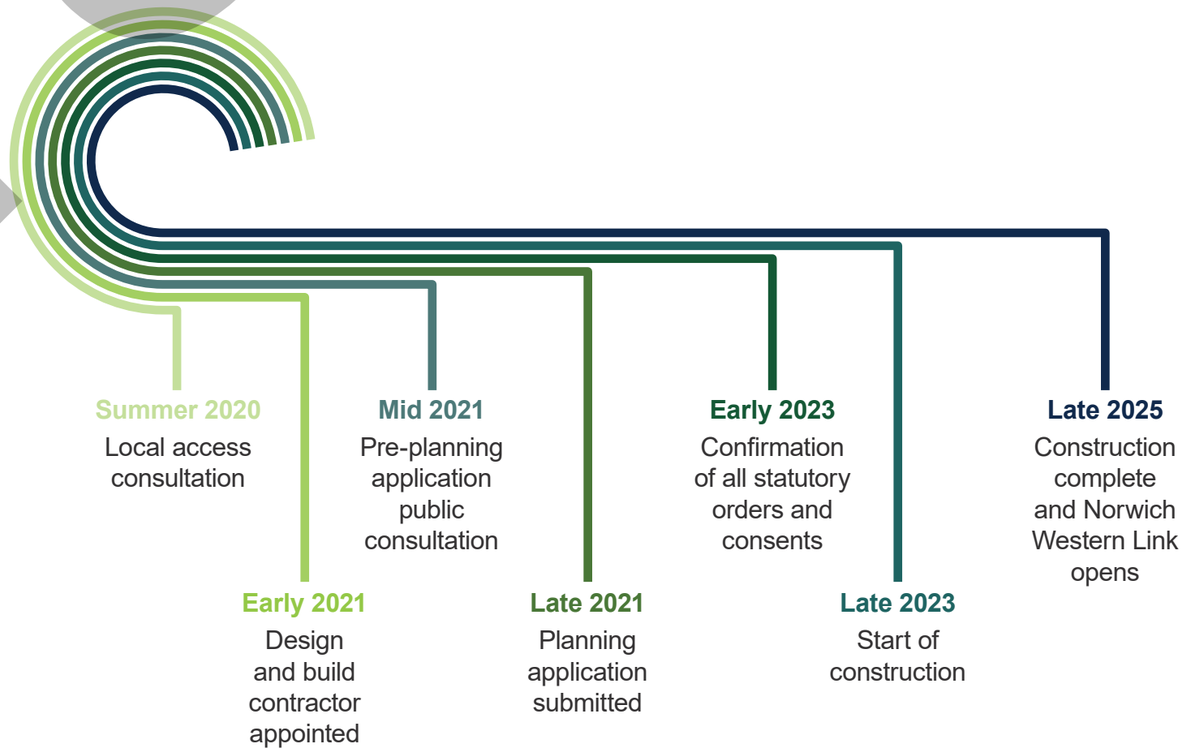
Since last July, we've been doing a lot of work to develop the design of the route and progress the project, including:

- **Further surveys to continue building on our knowledge and provide up-to-date information to be taken into account in our decision-making on the project**
- **Refining the alignment of the route to respond to further information gathered such as environmental constraints and to link in to the new A47 junction planned as part of the North Tuddenham to Easton dualling scheme being delivered by Highways England**
- **Initial work on developing environmental mitigation and enhancement measures.**

In May 2020 the Department for Transport (DfT) approved our initial business case, which provided more than £1 million of development funding and means the Norwich Western Link has been given conditional entry into DfT's 'Large Local Majors' project funding programme.

Project timeline

We are working to the following timetable, some of which is subject to all the necessary statutory processes for a project of this kind being completed.



Why are we consulting?

We began the process to find a contractor for the Norwich Western Link in June 2020 by advertising the opportunity. Once appointed, the contractor will be responsible for the design of the road and its construction.

Following the preferred route announcement and subsequent work to develop the project, we are now in a position to share some of our proposals and get people's feedback. We want to do this now so that this feedback can be taken into account and inform our ongoing work and the bidding contractors during the procurement process. The contractors will be expected to progress their proposed design for the Norwich Western Link in the run-up to one of them being appointed.

What's in this consultation?

This consultation will focus on local access in the vicinity of the Norwich Western Link for vehicles, cyclists, walkers and other users.

We want to gauge views and receive people's thoughts on our proposals for the local roads that cross the route of the Norwich Western Link. The project has been developed to have no junctions with local roads between the A1067 Fakenham Road and A47 so that it would be effective at preventing rat-running, reducing journey times and improving journey reliability.

We do however need to decide what to do with the local roads that cross the route in light of the new link road and how this will change the way people travel. We also need to consider impacts on Public Rights of Way in the area and how we should support people to get where they want or need to go via various means of transport.

To complement this, we would like to gain feedback on early proposals to support walking, cycling and public transport use across a wider area to the west of Norwich. Over shorter distances and between residential areas and key destinations, we're keen to support people to choose an alternative to getting in their car where practical.

We will also take the opportunity to share some details of the initial design that has been developed since the preferred route was agreed in July 2019.

In arriving at these proposals, we have considered the needs of all users to make what we're suggesting as inclusive as possible. We have already had a lot of really useful input from a range of groups and representatives including parish councils, walking and cycling groups, bus companies and others with an interest in local access and Public Rights of Way.

We're looking forward to hearing what you think and every response will be considered. Thanks in advance for taking the time to give us your opinions and insight.

What will be in the next consultation?

We intend to submit the planning application for the Norwich Western Link in 2021. Before then, we will hold another public consultation to gain feedback on the details of the scheme that we plan to include in the planning application.

The pre-application consultation will provide more detail about the project and include elements such as:

The design of the viaduct over the River Wensum

The route of the Norwich Western Link includes a 670 metre-long viaduct which will be designed and constructed so as to not affect the integrity of the River Wensum Special Area of Conservation. Due to the specialist design and construction methods required, the contractor will be responsible for developing these details following their appointment.

Traffic mitigation

The Norwich Western Link will reduce traffic congestion and rat-running on many local roads by creating a higher quality connection between the A47 and Broadland Northway. However all likely changes to how traffic will use the road network will need to be considered and we will also determine whether any traffic management measures are needed. We use traffic modelling to predict how traffic flows and movements are likely to alter as a result of the Norwich Western Link and other factors, such as dualling of the A47 and population growth. We're currently updating our traffic model to take account of new data and once complete, we'll use this to provide more details of the final design of the scheme and of any wider traffic mitigation measures.

Environmental mitigation

We are committed to building the Norwich Western Link in an environmentally-responsible way. Finding ways to limit the road's impact on wildlife, the landscape and local residents is a priority, and we will carry out an environmental impact assessment ahead of submitting the planning application which will inform what mitigation measures are needed and would be most effective. However current proposals for wildlife crossings along the Norwich Western Link are shown on the route map in these consultation materials.

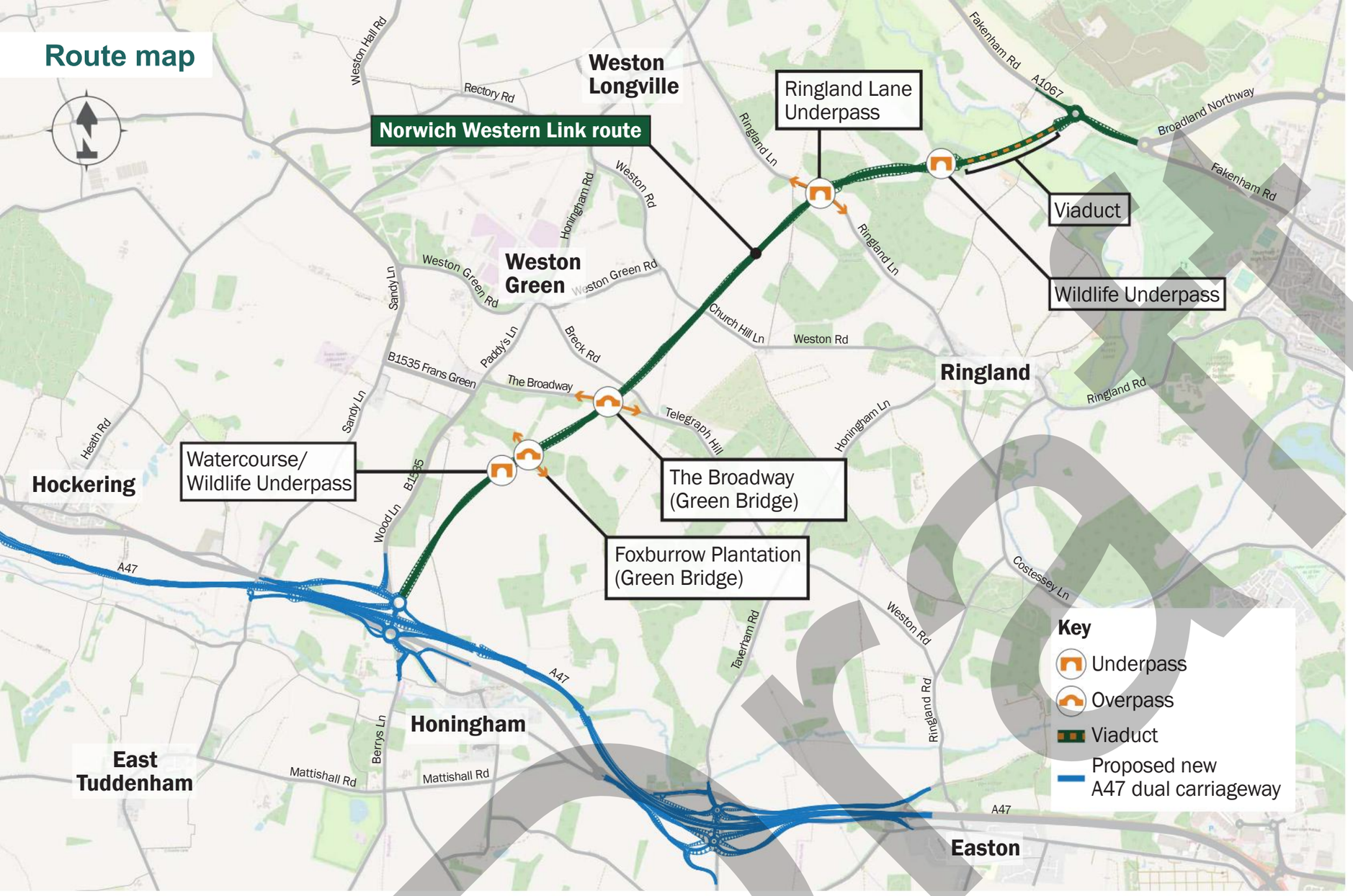
Improvements to the A47

Highways England are planning to replace the existing single carriageway A47 between North Tuddenham and Easton with a dual carriageway, and have indicated construction will start in 2022. A statutory consultation on their proposals for this stretch of road, which included the proposed junction into which the Norwich Western Link would connect, was held in spring 2020. Details of this proposed junction, and the other junction Highways England are proposing at Taverham Road and Blind Lane, are shown on the route map in these consultation materials.

We've been in regular contact with Highways England since our work on the Norwich Western Link began and we will continue to share information and work together to ensure we're taking account of each other's plans and to minimise potential disruption to local residents and people travelling through the area once construction begins.

Highways England are also planning to improve the A47/A11 Thickthorn interchange and dual the A47 between Blofield and North Burlingham.

Route map



Local roads that cross the Norwich Western Link

Four existing roads cross the route of the proposed Norwich Western Link. Our proposals for these roads are summarised below and more details on our proposals for each road are provided further ahead in these consultation materials. Please note that where we are proposing to close any roads, access to property will be maintained.

- **Ringland Lane –** two options: to keep the road open to all through traffic; or for it to be restricted to walkers, cyclists and horse riders only. Both options would see Ringland Lane cross under the Norwich Western Link.
- **Weston Road (a section of which is also known as Church Hill Lane) –** to be entirely closed to through traffic.
- **Breck Road (also known as Breck Lane) –** to be entirely closed to through traffic.
- **The Broadway –** kept open as a through route to walkers, cyclists and horse riders only via a green bridge over the Norwich Western Link, which would also serve as a wildlife crossing.

In developing these proposals, we have considered a number of factors, including: feedback from local parish councils; current usage of these roads and potential impacts on journeys across the wider transport network; local topography, environmental considerations and mitigation requirements, and value for money.

Illustrative profile of the Norwich Western Link within the existing landscape

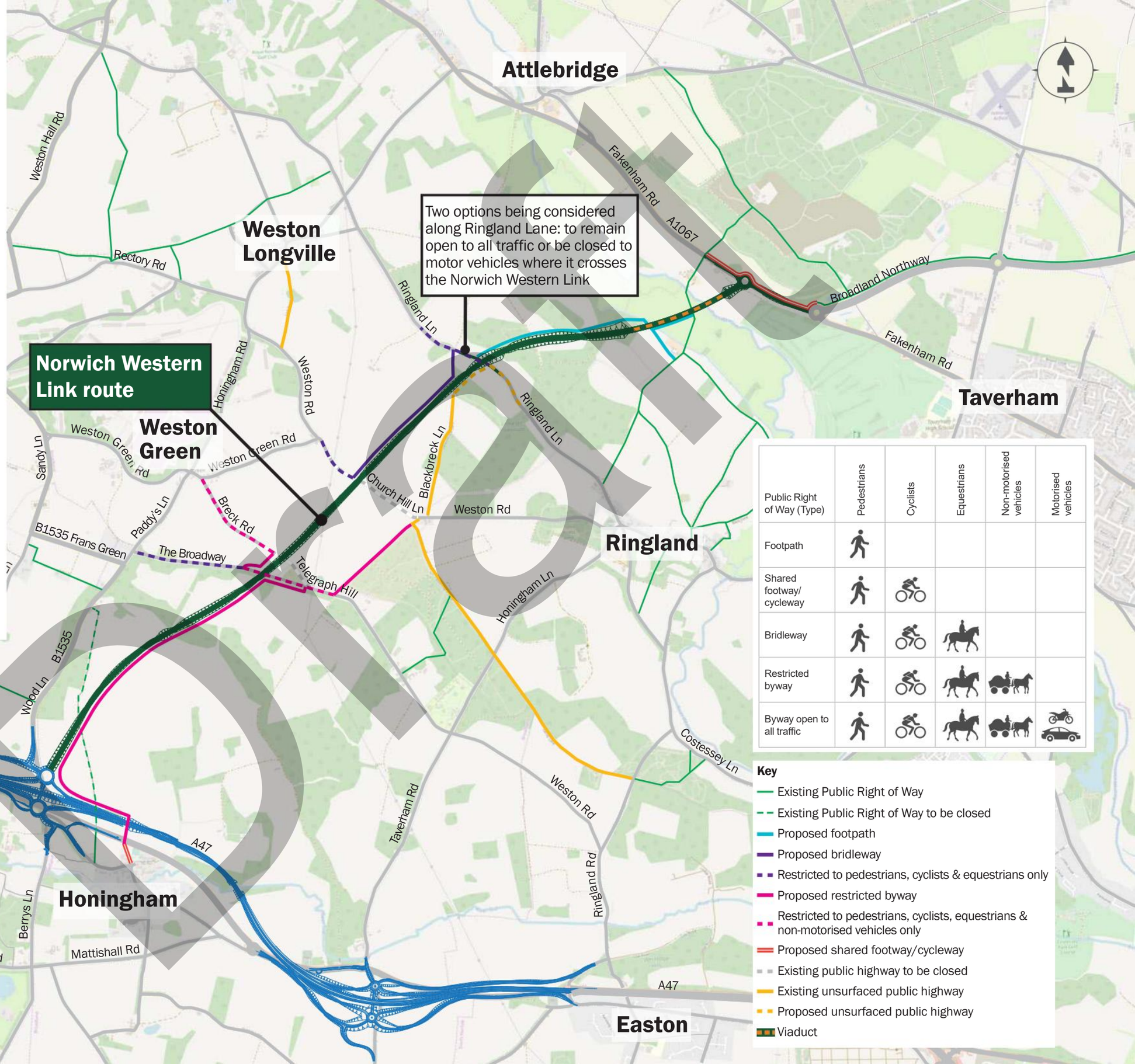
Please note: the vertical scale has been exaggerated for clarity.

Changes to Public Rights of Way close to the Norwich Western Link

To help encourage travel by more sustainable forms of transport, such as walking and cycling, we've been looking at how we could improve the Public Rights of Way close to the Norwich Western Link route. A Public Right of Way is a route over which the public have the right to pass - footpaths, bridleways, restricted byways and byways are all Public Rights of Way.

An overview of our proposals close to the route is shown here, and more detail is given further ahead in these consultation materials. In coming up with these proposals, we've sought ideas from representatives of local parish councils and others including walking, cycling and horse-riding groups. We have also been working with Highways England, so that our proposals at the southern end of the Norwich Western Link connect with theirs for the North Tuddenham to Easton dualling scheme. Together our plans will help people to safely cross the A47.

At the north end of the route we're proposing that the Public Right of Way which currently crosses the River Wensum is kept as a public footpath, for consistency with onward routes to which it connects and to avoid impacts on the integrity of the River Wensum Special Area of Conservation.



Public Right of Way (Type)	Pedestrians	Cyclists	Equestrians	Non-motorised vehicles	Motorised vehicles
Footpath					
Shared footway/ cycleway					
Bridleway					
Restricted byway					
Byway open to all traffic					

Key

- Existing Public Right of Way
- Existing Public Right of Way to be closed
- Proposed footpath
- Proposed bridleway
- Restricted to pedestrians, cyclists & equestrians only
- Proposed restricted byway
- Restricted to pedestrians, cyclists, equestrians & non-motorised vehicles only
- Proposed shared footway/cycleway
- Existing public highway to be closed
- Existing unsurfaced public highway
- Proposed unsurfaced public highway
- Viaduct

Proposals for Ringland Lane and nearby Public Rights of Way

Ringland Lane is a rural road connecting the villages of Ringland and Weston Longville. We are proposing to keep Ringland Lane open, but we would like your views on whether it should be either:

- **Kept open to all traffic, including motor vehicles (as it currently is), with footways installed to improve pedestrian access and connectivity with the wider Public Rights of Way network, or**
- **Restricted to walkers, cyclists and horse riders at the point where the road crosses the Norwich Western Link. This means Ringland Lane would become a no-through road to motorised traffic except for vehicle access to adjacent land and property.**

Due to its location in a natural dip in the landscape, a bridge would be built over Ringland Lane to take the Norwich Western Link across. The bridge would provide clearance of at least 5.3 metres from Ringland Lane so that, for example, farm vehicles from adjacent land could still use the route.

If Ringland Lane is closed to motorised through traffic, a restriction would be imposed over a short section of the existing carriageway on each side of the Norwich Western Link to prevent motor vehicle access, with a barrier, such as bollards or gates, preventing access for vehicles. Vehicular traffic would be diverted to the A1067 Fakenham Road. Suitable turning points would be provided on each side of the restriction.

Artist's impression of Ringland Lane kept open to all traffic (looking north west).

Artist's impression of Ringland Lane closed to motor vehicles where it passes under the Norwich Western Link (looking north west).

Why are we proposing this?

Ringland Lane forms part of our proposals to help people walk and cycle in the local area, with enhanced links to nearby Public Rights of Way. The proposed underpass at Ringland Lane would also provide connectivity for wildlife to habitats either side of the Norwich Western Link.

Traffic flows on Ringland Lane measured in October 2019 were around 360 users per day, of which around 10% were pedestrians, cyclists or equestrians. It is the widest and most frequently used route crossing the Norwich Western Link, with better visibility for road users and as a C class road, it is maintained to a higher standard. If Weston Road, Breck Road and the Broadway are all closed to motorised through traffic, a small number of vehicles may divert to Ringland Lane if it were kept open to traffic. However, with the dualling of the A47 in place and the creation of the Norwich Western Link, we expect the amount of motorised traffic on Ringland Lane would reduce in comparison with 2019 levels.

What other options could we consider?

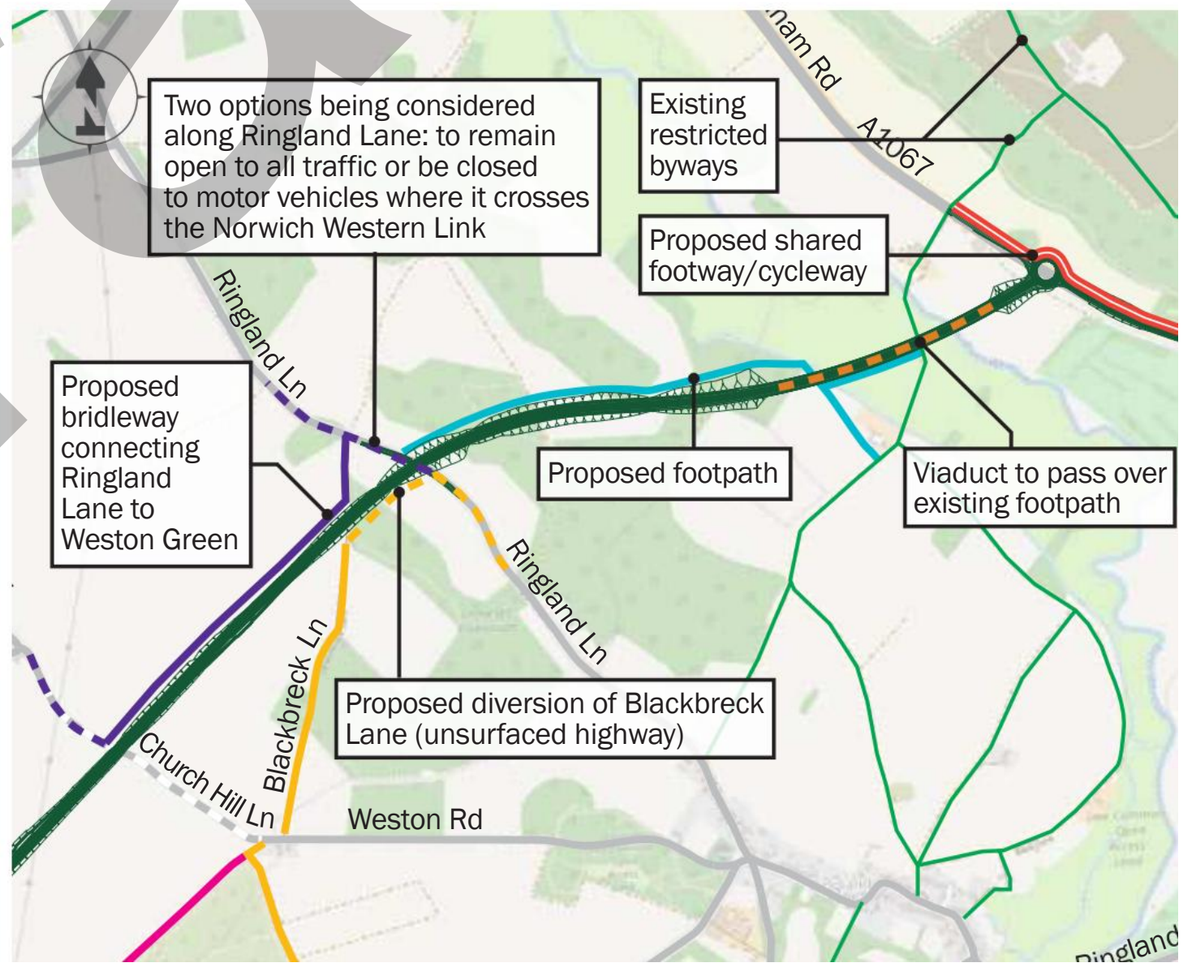
We could fully close Ringland Lane to all users. However, we are not proposing this as we want to maintain connectivity between the villages of Weston Longville and Ringland. Closing Ringland Lane entirely would also limit our ability to support walking and cycling in the local area. Due to the natural topography at Ringland Lane, it would not be feasible to reduce the height of the Norwich Western Link at this location even if Ringland Lane were closed to all users.

Nearby Public Rights of Way

In the vicinity of Ringland Lane, we are proposing the following changes to Public Rights of Way in order to improve connectivity:

- **A shared footway/cycleway is proposed to the north side of the section of Fakenham Road. This would connect existing Public Rights of Way with the cycleway at Broadland Northway.**
- **A new public footpath is proposed alongside the Norwich Western Link to provide a link to other existing footpaths around Ringland and close to the River Wensum.**
- **On the north west side of the Norwich Western Link, a new section of bridleway would be provided, linking to the hamlet of Weston Green.**

An overview of the proposals for the Ringland Lane area is shown below.



Proposals for Weston Road (also known as Church Hill Lane) and nearby Public Rights of Way

In the centre of the route, Weston Road – a section of which is also known as Church Hill Lane – provides a connection between communities at Ringland and Weston Green.

We are proposing to permanently close Weston Road/Church Hill Lane to through traffic between Weston Green Road and Honingham Lane. The section to the west of the Norwich Western Link would be restricted to pedestrians, cyclists and equestrians only while the section to the east would be entirely closed approximately to the point where the road meets Blackbreck Lane. Access would be maintained to properties, businesses and agricultural land with access restrictions at either end.

With the Norwich Western Link in place the existing route between Weston Green and Ringland Hills would therefore be severed and vehicles would be diverted to alternative routes such as Ringland Lane (if it were kept open to all traffic), the A1067 Fakenham Road or the A47.

Weston Road near its junction with Honingham Lane at Ringland

Why are we proposing this?

The existing road is a narrow rural lane with limited forward visibility in places and the amount of traffic using it currently is low. Traffic flows on Weston Road were measured at around 80 users per day in October 2019, of which around 15% were pedestrians, cyclists or equestrians.

Based on existing levels of usage, installing a bridge to keep Weston Road open to through traffic would not represent good value for money and there is no requirement for habitat connectivity in this location.

What other options could we consider?

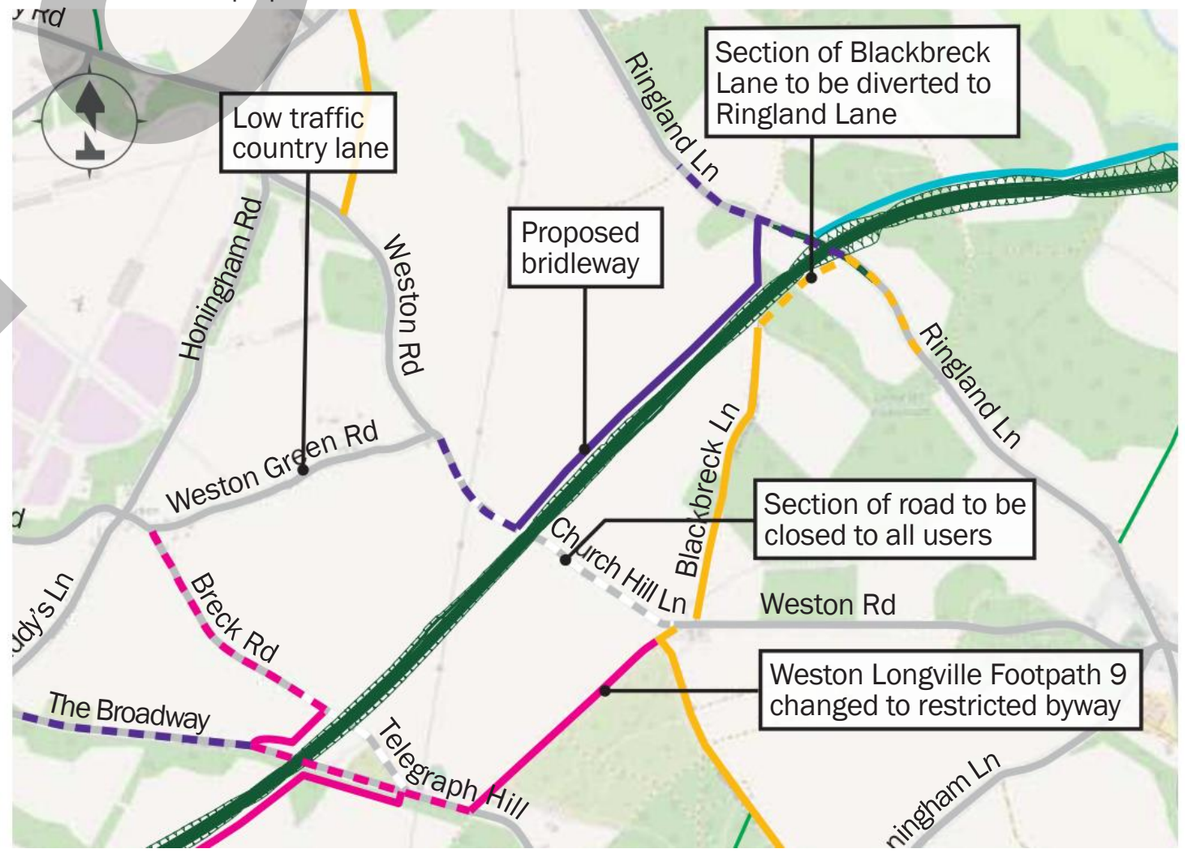
We could keep Weston Road/Church Hill Lane open to all through traffic, or to walkers, cyclists and horse riders only. However, we are not proposing this due to the low level of usage of this road and the ability of Ringland Lane to maintain connectivity across the Norwich Western Link more effectively. If Weston Road was to be maintained as a through road and an overbridge of the Norwich Western Link provided, there would be additional landscape and visual impacts due to the height of the new structure, in addition to the costs involved with constructing a new bridge.

Nearby Public Rights of Way

With Weston Road/Church Hill Lane closed to all users, we are proposing to provide upgraded walking, cycling and horse-riding routes parallel to the Norwich Western Link that would connect to crossing points further north and south:

- **Weston Green Road is a tranquil rural route that is already attractive for non-motorised users due to its low traffic volumes. This would be promoted as a shared space between vehicles and other road users with appropriate speed limits defined and signage to warn vehicle users of cycles and pedestrians.**
- **A section of an existing track (known as Blackbreck Lane) would be diverted to join Ringland Lane immediately to the east of the Norwich Western Link to prevent it being severed by the new road. Also on the eastern side, an existing public footpath (Weston Longville Footpath 9) would be changed to restricted byway standard so that it can also be used by, amongst others, cyclists and horse riders.**
- **To the north west of the Norwich Western Link, a new section of public bridleway would be created to connect Weston Green with Ringland Lane.**

An overview of the proposals for the Weston Road area is shown below.

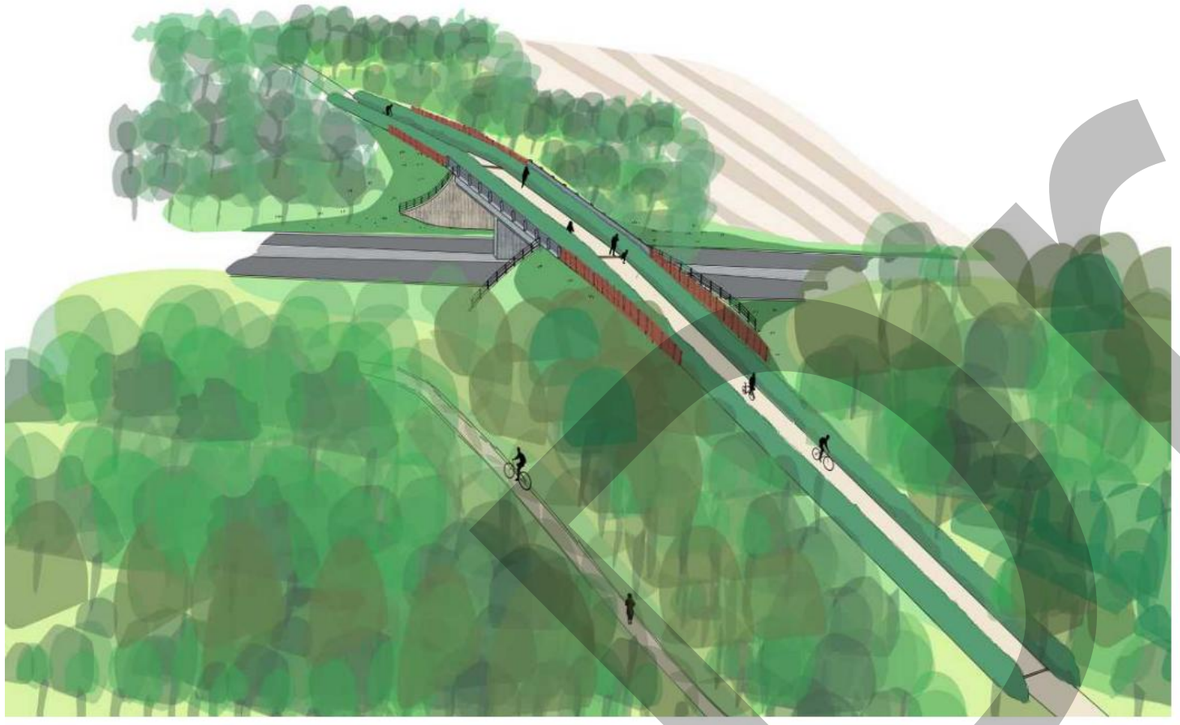


Proposals for Breck Road (also known as Breck Lane), The Broadway and nearby Public Rights of Way

Breck Road (also known as Breck Lane) and The Broadway are the southern-most roads crossing the Norwich Western Link route. The Broadway is a narrow, tree-lined, rural lane running broadly east-west from Telegraph Hill in the east to Paddy's Lane in the west. Breck Road is a narrow rural lane with restricted forward visibility in places. It runs broadly in a south-easterly direction from Weston Green, connecting with Telegraph Hill at its south-eastern extent. Breck Road becomes Telegraph Hill about 150m east of Weston Green Road.

We are proposing to close Breck Road to through traffic where it crosses the Norwich Western Link route, with access maintained to properties, businesses and agricultural land. To the west of the Norwich Western Link, Breck Road would be restricted to pedestrians, cyclists and equestrians only while the section on the east side, where the road becomes Telegraph Hill, would be closed entirely. Suitable turning facilities would be provided on Telegraph Hill on the east side of the Norwich Western Link.

We are proposing to close The Broadway to motorised through traffic (with a traffic restriction to allow property access only). A green bridge would be installed over the Norwich Western Link, with a clearance of at least 5.3 metres. The new bridge would create an environmental crossing for bats and other species, as well as pedestrians, cyclists and horse riders. Motorised through-traffic from both Breck Road and The Broadway would be diverted to alternative routes such as the A47 to the south.



Artists impression of The Broadway green bridge (looking west)

Why are we proposing this?

The Broadway has been identified as a key location to support habitat connectivity across the Norwich Western Link, which is why a green bridge is proposed in this location. This would also be available to walkers, cyclists and horse riders.

Surveys indicate that these routes carry a low volume of traffic currently, with Breck Road carrying about 90 users per day and The Broadway carrying about 20 users per day in October 2019. In both cases about 10% of the total users were pedestrians, cyclists or equestrians.

What other options could we consider?

We could keep Breck Road open to all through traffic, or to walkers, cyclists and horse riders only. However, we are not proposing this due to the low level of usage of this road, and the proximity of The Broadway, which will maintain connectivity. If an extra bridge was provided at Breck Road, there would be additional landscape and visual impacts, in addition to the extra construction costs.

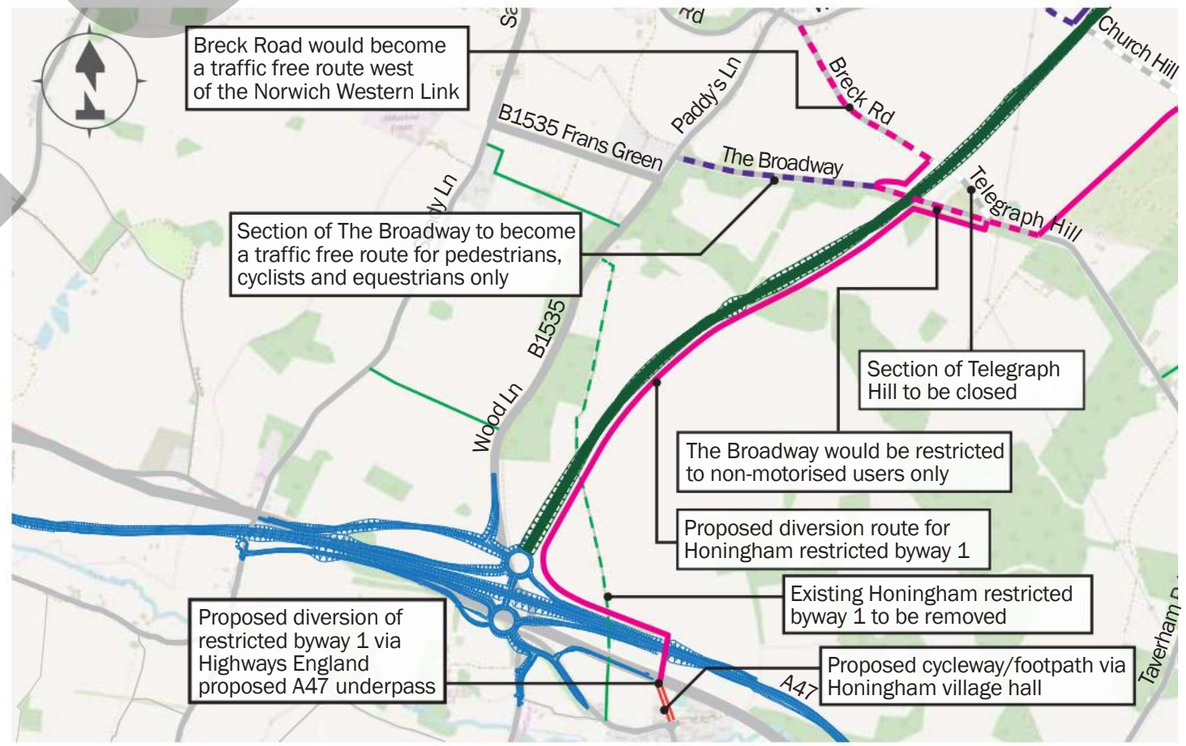
We could keep The Broadway open to vehicles. We are not proposing this due to the low level of traffic on this road. We could also prevent pedestrians, cyclists and horse riders from using the green bridge. However, we want to maintain connectivity for non-motorised users across the Norwich Western Link in key locations, both for local communities and for wildlife. Closing The Broadway entirely would also limit our ability to support people to walk and cycle in the local area.

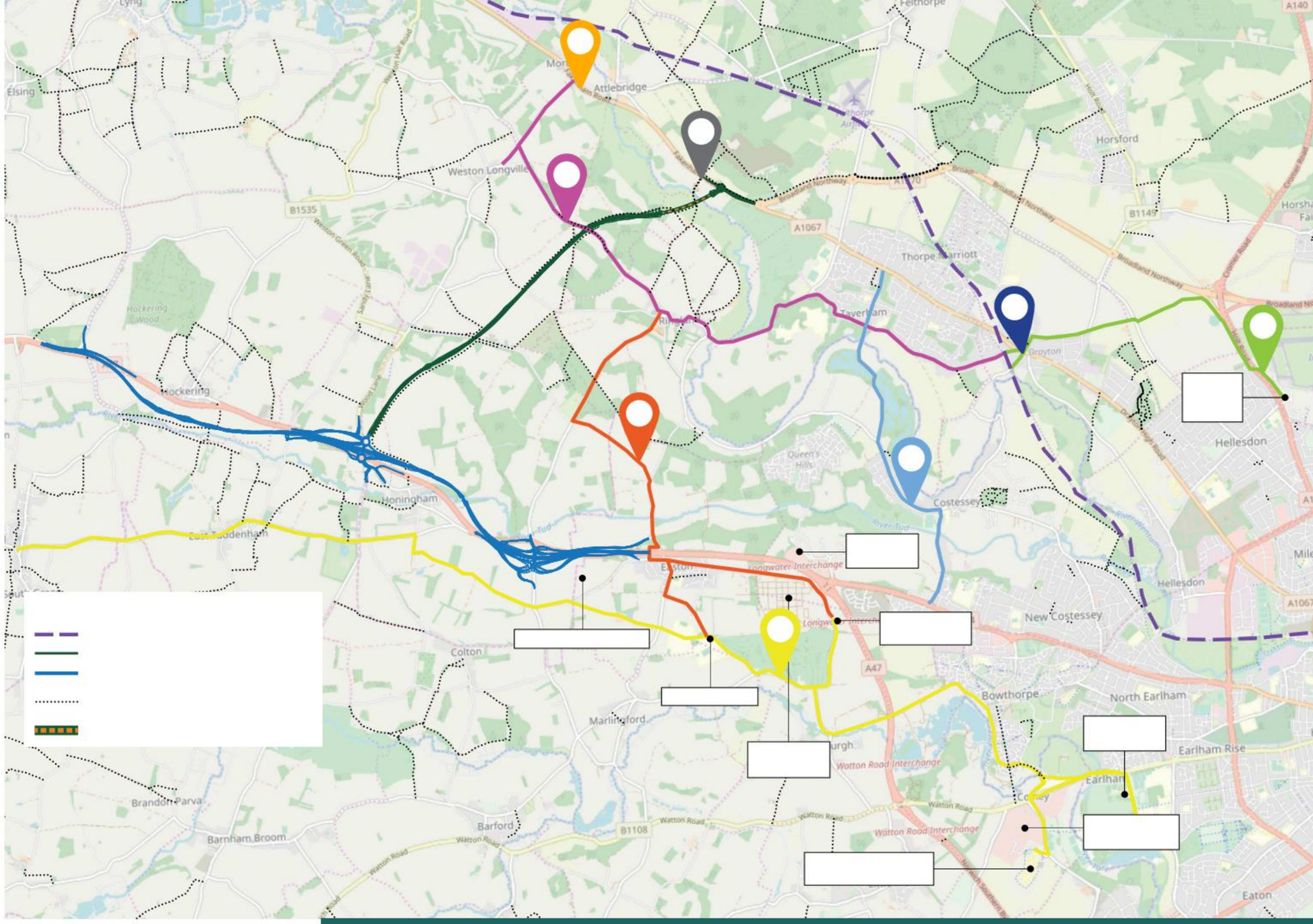
Nearby Public Rights of Way

The following improvements are proposed in the vicinity of Breck Road and The Broadway:

- **A new short section of restricted byway would be created alongside the west side of the Norwich Western Link, connecting Breck Road to The Broadway for pedestrians, cyclists and equestrians.**
- **To the south of The Broadway, Honingham restricted byway 1 would be removed between Wood Lane and the former A47 and replaced with a new section of restricted byway along the east side of the Norwich Western Link. People using this route would be separated from traffic by landscape screening. This route would provide connectivity from The Broadway to a new underpass crossing of the A47 proposed by Highways England. The route would cross the former A47 and a new shared cycleway/footway access to Honingham village hall would be provided through the village hall overflow car park.**

An overview of the proposals for the Breck Road and The Broadway area is shown below:




Attlebridge
Weston Longville
Horsford
Thorpe Marriott
Taverham
Hockering
Hellesdon
Costessey
New Costessey
Colton
Marlingford
Bowthorpe
North Earlham
Earlham Rise
Barnham Broom
Barford
Eaton
A1067
B1535
B1149
B1108
A47
Watton Road
Watton Road Interchange
Longwater Interchange

Bus strategy

We have been talking to bus operators about opportunities to improve bus services which could be supported by the Norwich Western Link.

Bus journey times would be likely to improve with the Norwich Western Link in place and congestion reduced on the existing road network. As a result, it may be viable for a bus operator to provide a new 'Western Arc' service through the more densely populated western suburbs of Norwich.

This would connect communities to medical facilities and employment areas including Norwich Research Park, the University of East Anglia (UEA) and the Norfolk and Norwich University Hospital (NNUH) without the need to travel into central Norwich to change buses.

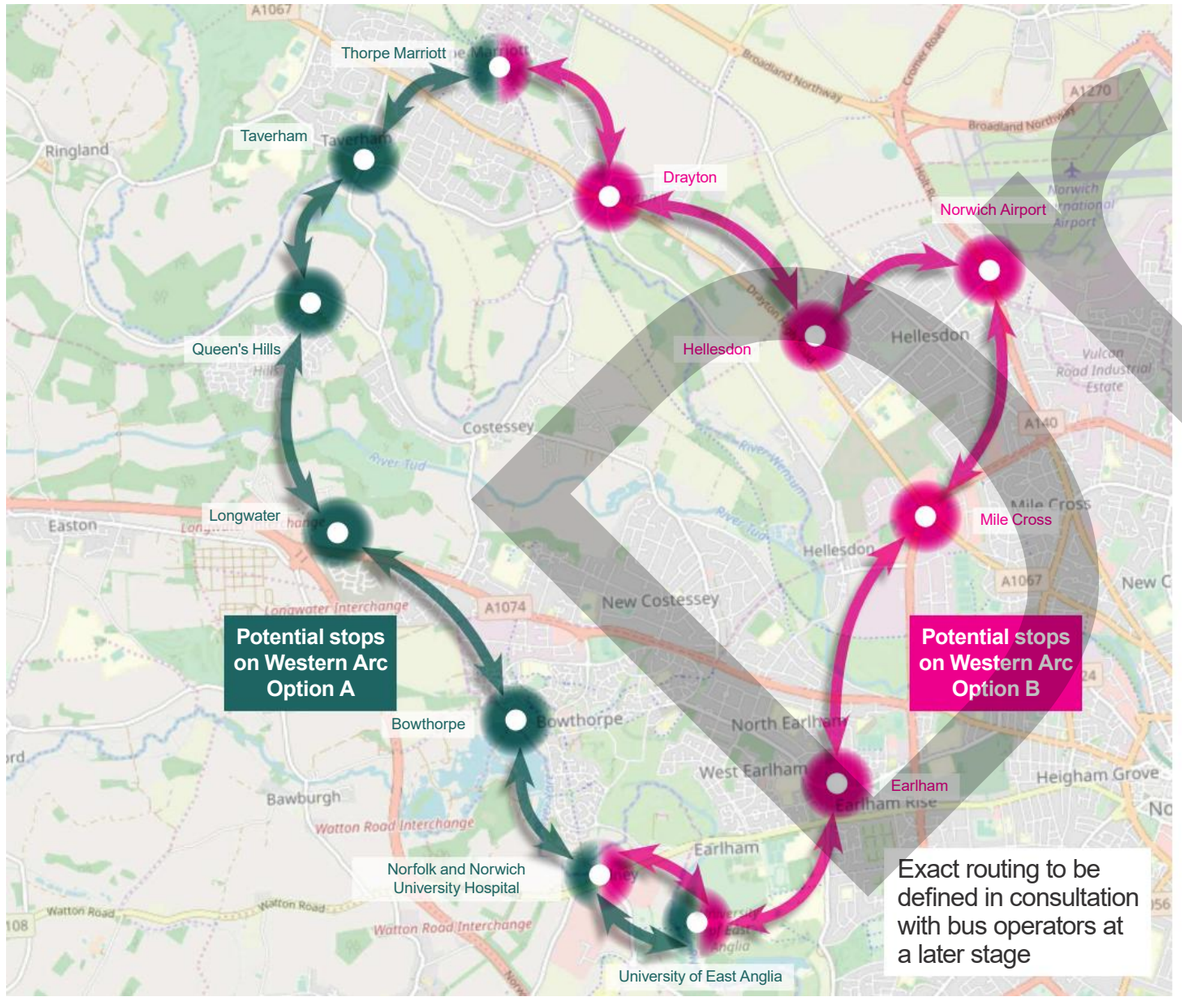
We have identified two potential Western Arc bus service route options:

» **Option A: Thorpe Marriott to NNUH/UEA via Taverham, Queen's Hills, Longwater and Bowthorpe.**

» **Option B: Thorpe Marriott to NNUH/UEA via Drayton, Airport, Hellesdon and Earlham.**

To support the Western Arc service we would also improve facilities at bus stops on the A1067 and along the route of the proposed 'Western Arc' bus route. This could include raised kerbs, new or improved shelters and electronic displays.

Potential new bus route options



Protecting the environment

We are committed to building the Norwich Western Link in an environmentally responsible way. We are continuing to carry out ecological and environmental surveys in the area and taking advice from statutory environmental bodies to inform our work and ensure we can take up-to-date information into account in our planning application.

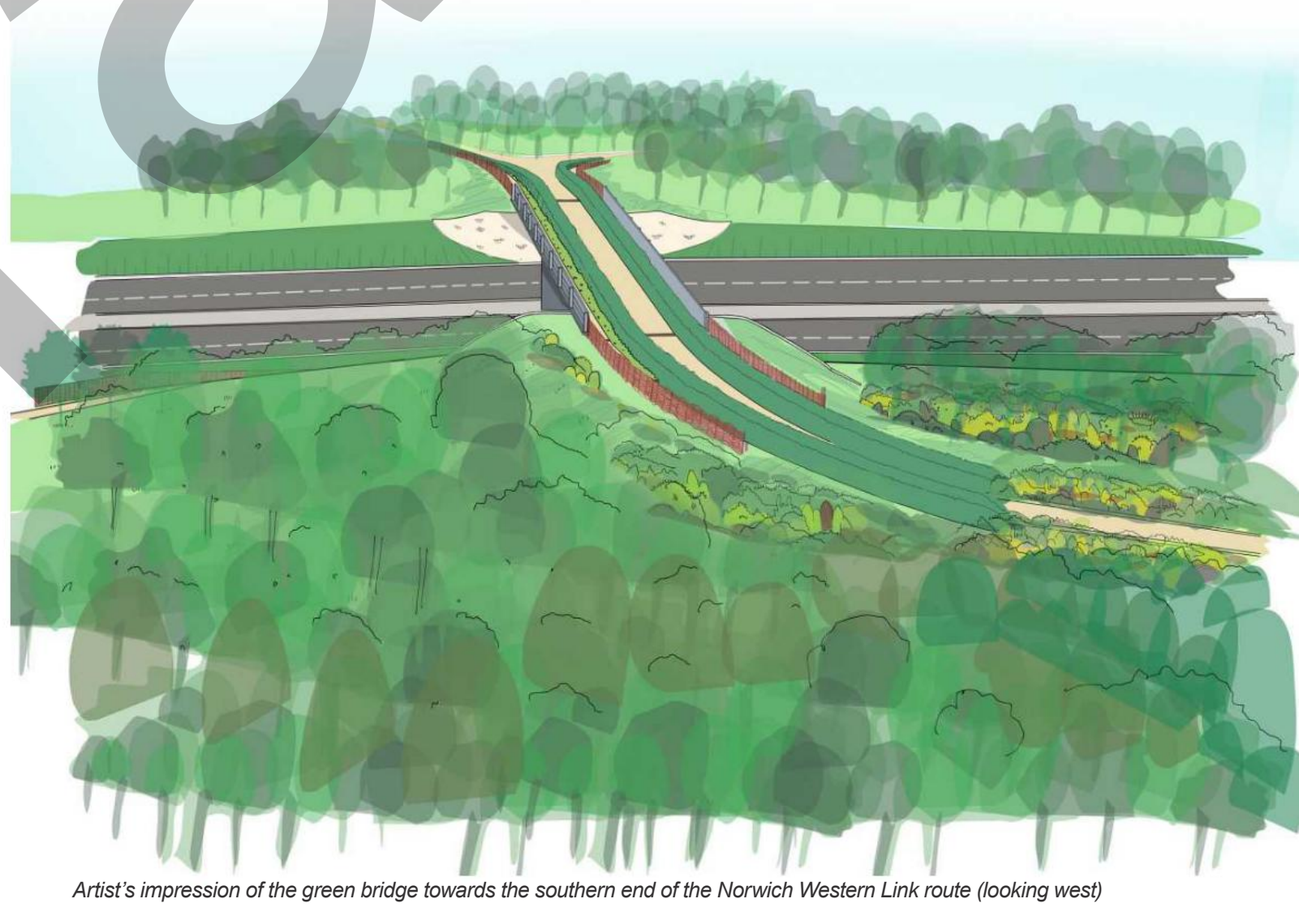
We want to limit any adverse environmental impacts the new road may have and seek opportunities to enhance the environment in the area. We're currently developing these proposals and more detailed information will be shared in our next public consultation. However, our aims include:

» **Creating new habitats and improving existing ones** in the local area to support a wide range of wildlife. We are likely to focus on creating and improving significant areas of woodland and wetland habitat.

» **Maintaining connectivity for wildlife** in the area by creating structures across the road designed to help species cross safely. Our current proposals include two green bridges and two underpasses designed for use by wildlife, and these would be complemented by planting. The proposed location of these structures is shown on the Norwich Western Link Route Map in these consultation materials.

» **Not affecting the integrity of the River Wensum which is designated as a Special Area of Conservation,** which can be achieved through the design of the viaduct on which the Norwich Western Link would cross the river and its flood plain, as well as through the construction methods used.

» **Minimising other environmental impacts** such as noise and visual impact through, for example, landscaping, planting and screening. In addition, we would compensate for any areas of floodplain affected, meaning there would be no increased risk of flooding as a result of the project.



Artist's impression of the green bridge towards the southern end of the Norwich Western Link route (looking west)

Find out more

The consultation runs from **Monday 27 July to midnight on Sunday 20 September 2020.**

We would encourage everyone to look through all the information available as part of the consultation before making their response. This information will be available to view via **www.norfolk.gov.uk/nwl** throughout the consultation period, where people can also respond by filling in the consultation questionnaire.

People who can't access the internet can request for paper copies of the consultation brochure and questionnaire to be posted to them – contact details for how to get in touch about this are below.

If you would like to request hard copies of the consultation brochure and consultation questionnaire…

Please email us at **norwichwesternlink@norfolk.gov.uk** or ring us on 0344 800 8020 and give us your postal address. We'll then put a copy of the brochure and consultation questionnaire in the post to you as soon as possible. The questionnaire can be returned to a freepost address (details below), meaning you won't need to put a stamp on your envelope.

If you would like to discuss the consultation proposals with staff involved in the project before responding to the consultation…

Staff will be available to discuss the consultation proposals via phone or internet calls during the consultation period. To book an appointment to discuss the proposals with members of the project team, please email **norwichwesternlink@norfolk.gov.uk** or ring us on 0344 800 8020 and we'll aim to arrange a time that is convenient for you. We will make weekday evening appointments available for people who have commitments during the day.

We would recommend people contact us as soon as possible after the consultation period has started to organise an appointment so that we can do our best to accommodate your request.

Have your say

There are several ways you can respond to the consultation. You can:

- Complete the consultation questionnaire online via **www.norfolk.gov.uk/nwl**
- Complete a paper copy of the consultation questionnaire and post it to: **Freepost Plus RTCL-XSTT-JZSK, Norfolk County Council, County Hall, Martineau Lane, Norwich, NR1 2DH**
- Email comments to **norwichwesternlink@norfolk.gov.uk**
- Write to: **Freepost Plus RTCL-XSTT-JZSK, Norfolk County Council, County Hall, Martineau Lane, Norwich, NR1 2DH**

The deadline for responses to this consultation is **midnight on Sunday 20 September 2020.**

If you need further assistance please email us on **norwichwesternlink@norfolk.gov.uk** or ring us on 0344 800 8020 and we'll do our best to assist you. However, please could all responses to the consultation be made in writing using one of the methods outlined above.

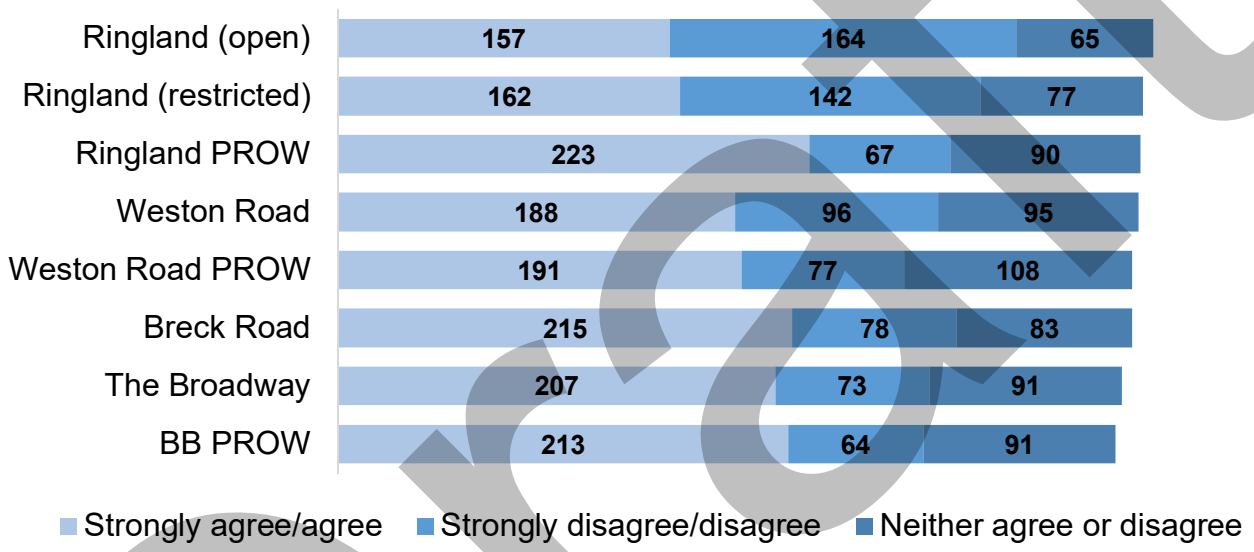
Norfolk County Council

Norwich Western Link – Local Access Consultation

Respondents

438 people responded to the consultation. Almost three-quarters (316) of respondents said they were responding as 'a local resident'; forty respondents said they were replying on behalf of a local business, local organisation or community organisation and provided the organisation name.

Summary of agreement/disagreement with all proposals (number of responses)



Overall, respondents agreed with all proposals except the option to keep Ringland Lane open to all traffic. For most proposals there was a large proportion of respondents who neither agreed or disagreed.

Walking, cycling and public transport measures

The measure most respondents said would **best support people to walk and/or cycle in the area to the west of Norwich** was option 4: Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham (145 people).

Option A (Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Taverham, Queen's Hills, Longwater and Bowthorpe) was the preferred **Western Arc bus route** (119 people). Route B was chosen by 67 people but 162 people did not want either option.

Contents

Section 1: Respondent Information

Respondent Numbers

438 people responded to the consultation.

423 people answered the question 'Are you responding as ...? Please select all that apply'. The majority of people identified themselves as 'a local resident'.

Option	Total	Percent
A local resident	316	74.70
On behalf of a local business	20	4.73
On behalf of a local organisation	22	5.20
On behalf of a community organisation	8	1.89
Someone who works in the area	35	8.27
A visitor to the area	21	4.96
Someone who travels through the area	131	30.97
% does not total 100% as people could pick multiple options		

How we received the responses

All responses were received directly through Citizen Space (NCC's online consultation tool) apart from 36 by email and 35 by letter.

Responses by groups, organisations and businesses

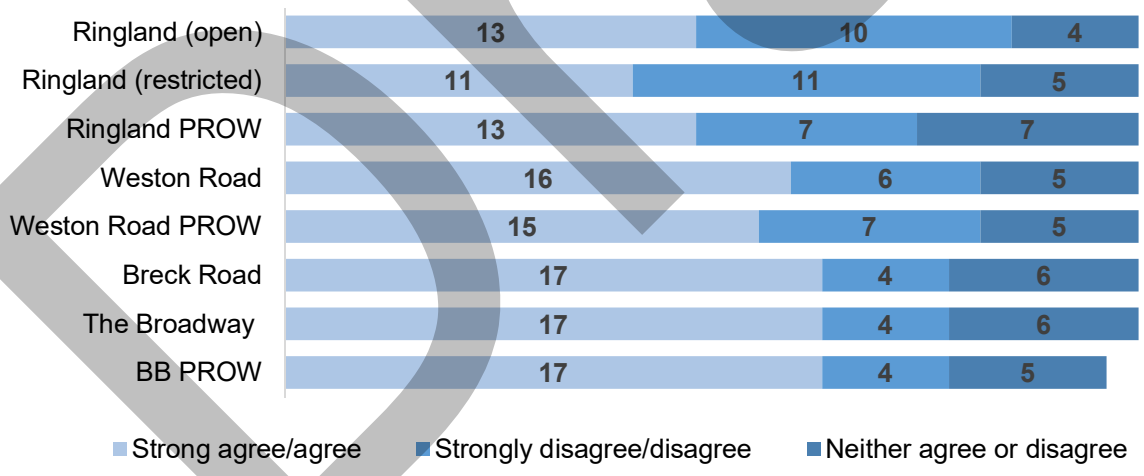
Thirty-three respondents answered the question: 'If you are responding on behalf of another organisation, what is the name of the organisation, group or business?'. However only thirty respondents provided a name (shown below).

- Arnolds Keys
- Ashill Parish Council
- Car-Free Norwich
- Costessey Town Council
- CPRE Norfolk (x2)
- District Councillor (Costessey)
- Easton Estate
- Elected member on the Norwich Western Link Local Liaison Group representing the Parish of Morton on the Hill.
- Green Infrastructure Officer (assess) Norfolk County Council

- Heaton Vences Chartered Accountants
- Honingham Parish Council
- Intu Chapelfield
- IR and JK Copplestone
- Kimberley and Carleton Forehoe Parish Council
- Kixx Norwich Ltd
- National Grid Gas plc
- Norfolk Chambers of Commerce
- Norfolk Labour Group and Clive Lewis MP
- Norfolk Local Access Forum
- Norfolk Sheet Lead Ltd / Zink It Ltd
- North Norfolk District Council
- Norwich Airport Ltd
- Norwich Cycling Campaign
- Permaculture Gardening Norwich
- Ramblers' Association: Norfolk Area
- RM Rutterford
- Stop the Wensum Link
- Weston Longville Parish Council
- Woodland Owner [not named]

Overall, the response from local businesses, local organisations and community organisations reflected wider views.

Summary of responses from local businesses, local/community organisations



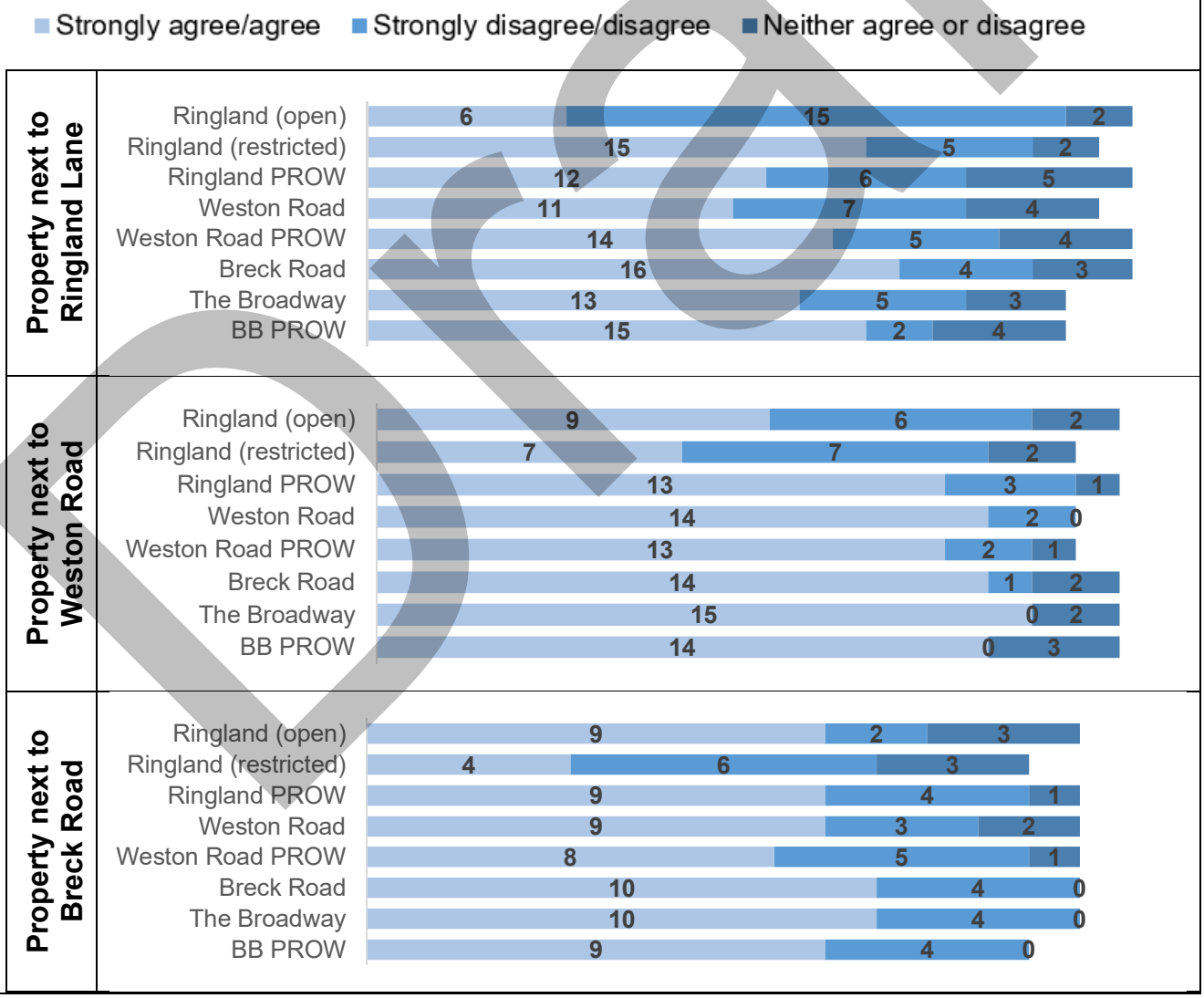
Responses from local business, local organisations and community organisations, in particular from councils, tended to be complex, extremely detailed and often included references to: individual features within a parish (such as a village hall), specific local problems (such as illegal encampments), requests or suggestions for re-routing, or previous or ongoing discussions. Wider issues which were noted by many respondents - such as potential effects on pedestrians and cyclists, risk of environmental damage, and road building programmes - were also recorded by local business, local organisations and community organisations.

Respondents' proximity to Norwich Western Link Route

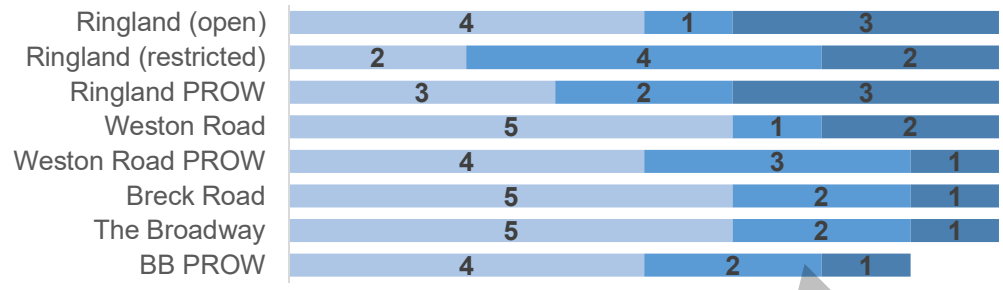
There were 47 responses to the question 'If you own a property that has direct access onto any of the roads that cross the Norwich Western Link route, please select which road/s your property is next to from the list below' (people could select more than one option). Ringland Lane was most frequently cited by respondents.

Option	Total	Percent
Ringland Lane	24	51.06
Weston Road (also known as Church Hill Lane)	17	36.17
Breck Road (also known as Breck Lane)	14	29.79
The Broadway	8	17.02
% does not total 100% as people could pick multiple options		

Summary of responses from residents with properties on Ringland Lane, Weston Road, Breck Road and The Broadway.



Property next to The Broadway



Section 2: Ringland Lane

Summary of responses for each proposal relating to Ringland Lane (boldest indicates highest number).

Question	Strongly agree/ agree	Disagree/ strongly disagree	Neither agree or disagree
To what extent do you agree or disagree with the option to keep Ringland Lane open to all through traffic?	157 (40.67%)	**164 (42.48%)**	65 (16.84%)
To what extent do you agree or disagree with the option to restrict Ringland Lane to walkers, cyclists and horse riders only at the point where the road crosses the Norwich Western Link (with landowner access for motorised vehicles as appropriate)?	**162 (42.52%)**	142 (37.27%)	77 (20.21%)
To what extent do you agree or disagree with our proposals for Public Rights of Way in the Ringland Lane area?	**223 (58.69%)**	67 (17.64%)	90 (23.68%)

How often do you usually travel on Ringland Lane?

There were 385 responses to this question. Just over a quarter of respondents (108) said they travel on Ringland Lane daily or weekly but this was fewer than respondents who said they travel on Ringland Lane infrequently (160).

Option	Total	Percent
Daily	34	8.83
Weekly	74	19.22
Monthly	89	23.12
Infrequently	160	41.56
Never	28	7.27
Totals	385	100.00

To what extent do you agree or disagree with the option to keep Ringland Lane open to all through traffic?

There were 386 responses to this question. Responses to this question were fairly evenly divided: 157 people strongly agreed/agreed and 164 people disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	95	24.61
Agree	62	16.06
Neither agree nor disagree	65	16.84
Disagree	71	18.39
Strongly disagree	93	24.09
Totals	386	100.00

Of the 157 people who **strongly agreed (95) or agreed (62)** with the proposal to keep Ringland Lane open to all through traffic, 73 people made additional comments. Using existing roads to avoid building new roads (and therefore reducing risk of environmental damage) was the main reason given by respondents for agreeing with the proposal.

Please note: all quotations used throughout this consultation report are printed as provided and a sample is shown which represents the range of comments within each theme/issue.

Theme/issue	Number of times mentioned	Quotation
Comments about keeping Ringland Lane open to all through traffic to reduce the need for new roads.	21	All roads should remain open. Radial roads should be left open and reviewed … The link road should not be built, and the roads should remain open as they are. Instead the £300M should spent investing in public transport and active travel measures to improve capacity. The road should be kept open as the North West Link should not consist of any roadbuilding just the development of sustainable modes to protect the environment, promote Norfolk's economy in line with the county councils and governments CO2 targets.
Comments about environmental impact	21	As a local resident of Costessey with family living in both Ringland and Taverham our journey would be much longer and therefore bad for the involvement [environment?]. I consider the £300 million allocated to this road would be better spent on exploring alternative traffic solutions that do not cause serious environmental damage and to look to see how existing roads/paths/cycle lanes can be made safer and more public transport friendly.
Comments about the effect on animals	17	By using already existing infrastructure we will protect the area's wildlife and environment from the serious damage that it would suffer through the construction of the NWL. Closing Ringland Lane, along with several other proposals will ensure NCC is able to progress with the NWL, a scheme I wholeheartedly disagree with. … This disdain shown towards the numerous wildlife habitats, species and ecosystems are clear to see, especially with the more recent saga around surveying for the barbastelle bats in and around the Ringland Woods. I have little or no confidence that NCC will make this scheme 'wildlife friendly', anything within the local press is saturated with 'biodiversity net gain' touted by those in post with little or no comprehension of how the 'net gain' hierarchy works.
Comments about keeping Ringland Lane open for pedestrians.	14	We would wish to see footways installed to improve pedestrian access and connectivity with the wider Public Rights of Way network. We would also wish to see strong traffic calming measures adopted to protect non motorised users of this route. All roads should remain open. The safety of people wishing to cycle or walk across the valley should be looked at.
Comments about the effect on local people of closing Ringland Lane to all through traffic	14	By keeping this open to all through traffic you will allow egress from and access to the A1067 by residents of Ringland. This is the best local link road between Weston & Ringland and should only be open for local traffic between the villages, not lorries or rat

		running. Local residents shouldn't have to go miles round simply to travel the 2 mile distance
Comments about the impact on safety of closing Ringland Lane to all through traffic	14	In short if Ringland lane was also closed there would be a real risk to the village being cut off and inaccessible to emergency vehicles, deliveries and its residents. A rat run at the moment. Dangerous for walking.
Comments about keeping Ringland Lane open for cyclists	13	It would be better to keep this road open to through traffic with the aim of improving bus routes and other bike and pedestrian access. By all means create separate walking and cycle paths away from the road, but please keep it open to traffic.
Comments about project costs (saving money by keeping existing roads open).	13	The link road should not be built, and the roads should remain open as they are. Instead the £300M should spent investing in public transport and active travel measures to improve capacity. The existing road should remain open and be well maintained, possibly improved for all users, with priority for active travel and public transport options. Discarding the embodied carbon of the old and embodying more in a new road are not justified, and the money could be better spent.
Comments about keeping Ringland Lane open but improving public transport	12	All these radial roads should be kept open. Explore the options for Public transport to cross the valley directly (B1535) and give safe access for pedestrians and cyclists. The road should be kept open. The 300 million pounds spent on this road could be spent on a bus service and improved cycle routes on existing roads. This is a shocking waste of money set to damage one of norfolks beauty spots.
General comments about keeping Ringland Lane open	12	Keep it open, consider all users and you have offered flexibility and access to all. This should be kept open.
Comments about traffic flow, volume of traffic using Ringland Lane	11	Ringland Lane staying open will cause little change to the traffic numbers going Ringland. The road that really needs to be closed is Honingham Lane. Keep all roads open - move space for traffic - close it and the traffic has to go elsewhere.
Comments about the need to keep Ringland Lane open for access to adjacent villages	9	It is essential to keep Ringland Lane open to all through traffic to ensure vehicles can travel from Ringland to Weston Longville and vice versa by the most direct route. Need to maintain one local road link between the villages on either side of the NWL alignment
Comments including a proviso	5	But with a 20mph speed limit through Ringland village, and the closure of Honingham Lane to motorised traffic. Agree – BUT There should be a means to restrict the speed of traffic.

Of the 164 people who **strongly disagreed (93) or disagreed (71)** with the proposal to keep Ringland Lane open to all through traffic, 72 people made additional comments. The effect on cyclists and walkers and issues of safety were the main reasons respondents gave for disagreeing with the proposal.

Theme/issue	Number of times mentioned	Quotation
Comments about the effect of closing Ringland Lane on cyclists	26	It would be safer for cyclists to close the road. However, this must be a permanent closure, unlike the road between Bowthorpe and Bawburgh, which was intended to be for cyclists only but then reopened while retaining a narrow and unpleasant underpass under the A47. I would be greatly in favour of shutting down Ringland Lane to through traffic - I believe this option would create an excellent cycle-friendly route towards Norwich, where none exists at the moment. Closing the road to through traffic would encourage cycle commuting.
Comments about the effect of closing Ringland Lane for walkers	24	This road is very dangerous when it is open to traffic, we have nearly been hit by cars when walking down this road. As a local resident and keen walker I would welcome closing the road to traffic, allowing it to be opened up safely for walkers, cyclists and riders to enjoy when the NWL is built. I regularly walk this road with my dog but very rarely drive along it. Closing it to traffic would provide a safe and pleasant route that connects with other footpaths and bridleways. This option would reduce traffic through Ringland Village. It is part of my regular walking habit, so this option of restricting the Lane to walkers, cyclists and horse riders would improve safety and the pleasure of using this road.
Comments about the effect of closing Ringland Lane to all through traffic on safety issues	24	Close it to traffic, it's too narrow & dangerous & having it open to traffic encourages rat running. Cars drive too fast down here & it's impossible to walk down here safely. Please close this road. Houses are situated directly onto this road or very close to the road. It is an incredibly dangerous road to pull out of properties onto.
Comments about the effect of closing Ringland Lane on ratrunning	17	We live on West End in Costessey and experience the effects of being on a rat run. We think it would be a mistake to allow motorised traffic along Ringland Lane. Closing this road will help reduce rat running on unsuitable road. Will continue to be used as a rat run if left open to cars.
Comments about the environmental impact of closing Ringland Lane	16	The county, indeed the country, needs to make car travel less acceptable and easy and protect our environment by building fewer roads (we already have more than we need) and by encouraging walking and cycling in a way that does not necessitate digging up natural habitat and green spaces. I strongly disagree with this proposal per sae. No amount of ameliorating measures can make up for the massive environmental damage which will the result of this plan.
Comments about the impact of closing Ringland Lane on animals	15	This will remove important wildlife habitat forever. With the additional impact on wildlife that the NWL will cause any reductions of traffic around it will be of significant benefit and support.
Comments about traffic numbers/ flow or speed of	15	Leaving Ringland Lane open to all traffic, when all the other roads are being closed, would result in all their current traffic diverting to Ringland Lane.

vehicles using Ringland Lane		Traffic on this road has increased considerably in the last few years. This must not remain fully open to all modes of transport!!
Comments about the effect of closing Ringland Lane for horse riders (in conjunction with walkers/cyclists)	12	Cars will have alternative routes. This is not a high use road and leaving it open to walkers cyclists and horse riders would be a much better use and in keeping with the area. It would provide a safe place away from cars. Closing this road would enhance the pedestrian, equestrian and cycling uses of this area that the NWL is proposing.
Comments about road construction.	11	I disagree with the building of the Western Link road. I think the whole road should be put on hold for a few years, post Covid. The western link road must not be built. Scrap it now!!
Comments about the impact on local people	10	As a local resident and keen walker and cyclist I am very supportive of making the roads closed to traffic and opened up for walkers, cyclists and riders when the NWL is built.

Of the 65 people who **neither agreed or disagreed** with the proposal to keep Ringland Lane open to all through traffic, 22 made comments, 13 of which concerned the Western Link, or road construction more generally ("The western link does not need to be built, for many reasons, hence there is no need for any changes to Ringland Lane." / "There is no need to change the current status of Ringland Lane at all, not for the sake of this unaffordable, outdated vanity project. The NWL is not needed.") Fifty-two people did not choose an agree/disagree option and of these, ten made comments.

To what extent do you agree or disagree with the option to restrict Ringland Lane to walkers, cyclists and horse riders only at the point where the road crosses the Norwich Western Link (with landowner access for motorised vehicles as appropriate)?

There were 381 responses to this question. Slightly more people strongly agreed/agreed (162) than disagreed/strongly disagreed (142).

Option	Total	Percent
Strongly agree	102	26.77
Agree	60	15.75
Neither agree nor disagree	77	20.21
Disagree	52	13.65
Strongly disagree	90	23.62
Totals	381	100.00

Of the 162 people who **strongly agreed (102) or agreed (60)** with the proposal to restrict Ringland Lane to walkers, cyclists and horse riders only at the point where the road crosses the Norwich Western Link, 44 people made additional comments. Most responses reflected comments for the previous question regarding the impact of the proposal for walkers, cyclists and on issues of safety.

Theme/issue	Number of times mentioned	Quotation
Comments about walking in the area and benefits of the proposal for walkers.	19	This is an opportunity to calm the area for walkers and cyclists and one of the few green credentials the whole project could claim. This option would reduce traffic through Ringland Village. It is part of my regular walking habit, so this option of restricting the Lane to walkers, cyclists and horse riders would improve safety and the pleasure of using this road.
Comments about cycling in the area and benefits of the proposal for cyclists.	18	There's so little provision for cyclists around the City, and what there is, is an afterthought, so this would finally be a good statement of intent that you're serious about making it safe and encouraging exercise. With the Marriotts Way on our doorstep we have traffic free cycling for our family with two young children. A route which would allow us to visit other areas like Ringland would be hugely beneficial to local cyclists and families.
Comments about the impact of the proposal on issues of safety.	18	As I said above, it will encourage more people to exercise in this area as it will be much safer to do so. This road already forms part of a regular walking circuit used by myself and my wife and other local residents and dog walkers. I would like it to be quieter and safer than it is now as compensation for the noise and intrusion of the NWL we will suffer from when it is built.
Eight comments related to the impact on local people (there were also eight comments about noise and eight about traffic flow around Ringland Lane): • "This option would considerably improve the quality of life for residents living on Ringland lane and the village of Ringland." • "I think this is an excellent idea and would benefit the residents to the Western side of Ringland, and those to the east of Weston Longville."		

Of the 142 people who **strongly disagreed (90) or disagreed (52)** with the proposal to restrict Ringland Lane to walkers, cyclists and horse riders only at the point where the road crosses the Norwich Western Link, 63 people made additional comments. Most responses concerned road construction projects, potential risk to the environment, and wider comments about walkers and cyclists.

Theme/issue	Number of times mentioned	Quotation
Comments about road construction	13	The link road should not be built, it is a scandalous waste of money, and flies in the face of the climate crisis and all the warnings that we are failing to address it. Scrap this project please..
Comments about the impact of roads on the environment	13	The Norwich Western Link is not needed and will contribute to harmful emissions leading to more problems from climate change. This road will cause unforgivable damage to a beautiful and special ecosystem.
Comments about cycling in the area	13	The close proximity of a four-lane carriageway to pedestrian and cycle traffic also raises issues health issues due to pollution. I also consider the £153 to 300 million allocated to this road would be better spent on exploring alternative traffic solutions that do not cause

		serious environmental damage and to look to see how existing roads/paths/cycle lanes can be made safer and more public transport friendly.
Comments about walking in the area	12	Traffic needs to use the new bypass. Additionally with all current considerations all these roads should be made available for non motorised transport (walking, cycling etc) to encourage green and healthy transport links. Walking and cycle paths should be created away from roads.
Comments about safety	9	Agree with pedestrians and cyclists but horses will pose a real safety problem with vehicles at speed. Congestion effects elsewhere would be worse. It would be more dangerous elsewhere.
Eight comments related to the impact on local people (there were also eight comments about wildlife): • "Strongly disagree. Motorised access is needed for local people, and restrictions should be on that basis." • "I don't understand why anyone who lives in the area would want it closed to traffic."		

Of the 77 people who **neither agreed or disagreed** with the proposal to keep Ringland Lane open to all through traffic, 28 made comments, 18 of which concerned the Western Link, or road construction more generally ("A suggestion: you could leave it as it is and not build the western link road and encourage people to use other forms of transport so there will be no need for a western link road." / "Scrap the Western Link Road. Norfolk remains a comparative haven unlike much of the midlands which is criss-crossed with similar roads. You really don't have to emulate the mistakes of elsewhere.") Fifty-seven people did not choose an agree/disagree option and of these, 17 made comments.

To what extent do you agree or disagree with our proposals for Public Rights of Way in the Ringland Lane area?

There were 380 responses to this question. More people strongly agreed/agreed (223) than strongly disagreed/disagreed (67).

Option	Total	Percent
Strongly agree	100	26.32
Agree	123	32.37
Neither agree nor disagree	90	23.68
Disagree	21	5.53
Strongly disagree	46	12.11
Totals	380	100.00

Of the 223 people who **strongly agreed (100) or agreed (123)** with the proposals for Public Rights of Way in the Ringland Lane area, 45 people made additional comments. The main reasons for agreeing were that Public Rights of Way encourage walking or cycling (people noted that horse riders would also benefit).

Theme/issue	Number of times mentioned	Quotation
Comments about walking and pedestrians	20	More public rights of way is better in any location, circular routes and those that allow people to walk and cycle away from main roads and those which make active travel more convenient. Any efforts to improve access for walkers and cyclists would be very welcome.
Comments about cycling and cyclists	16	A shared footpath and cycle way will be a great improvement to the current state. Any efforts to improve access for walkers and cyclists would be very welcome.
Comments including a proviso	6	Anything to improve walking/cycling in the area is welcome. However, it will be important to adequately protect users from harmful effects and visual impact of the proximity of cars travelling at speed along the new link road. Agree but only if an INDEPENDENT environmental assessment considers this to be of no impact to existing environment and species.

Of the 67 people who **strongly disagreed (46) or disagreed (21)** with the proposals for Public Rights of Way in the Ringland Lane area, 45 people made additional comments. The effect on wildlife and the environment and the impact on cyclists and walkers were the main reasons respondents gave for disagreeing with the proposal, but pollution (including noise pollution and the effect of pollution on health) was also mentioned.

Theme/issue	Number of times mentioned	Quotation
Comments about the impact of the proposal on wildlife	19	The proposed underpass at Ringland Lane will not provide connectivity for wildlife. The construction of the NWL will cause fragmentation. The development will reduce the total amount of habitat, squeezing remaining wildlife into smaller and more isolated patches, the high-speed traffic of the road will also eliminate more and more of the remaining populations. Isolated pockets of habitat are not a viable alternative to an old established one. Animal territories do not conform to human boundaries. The underpass and green bridge are token offerings and similar measures in other schemes have proved ineffective..
Comments about the impact of the proposal on the environment	18	The whole of the WLR should be rethought. It has become incresingly clear that the council has no regard for the environmental impact of this scheme, and has repeatedly refused to take note of the ecological damage it will cause. NCC should avoid adding new structures where a path already exists. The aim should be leave as much of the environment as possible untouched.
Comments about walking and pedestrians	17	Footpaths running alongside a major road are inherently unpleasant for walking. All existing footpaths and roads should be kept. If there is insufficient money to so then a different route for the NWL should be found.

Comments about cycling and cyclists	16	I disagree with roads being blocked off for cyclists. Cycle routes in and out of Norwich have been badly affected by the Southern Bypass and especially the NDR. The NDR now makes it difficult to enter/leave Norwich along its route. This must not be repeated if a Western Link is built. All existing rights of way should be kept open for walking and cycling.
Comments about general/wider disagreement	14	I believe the demand for this is low, although I do concede that they are restrictive to the public in their current form. The closure of Church Hill Lane to pedestrians and cyclists, and adding long unpleasant diversions is not consistent with government ambitions to provide more walking and cycling routes to encourage healthy lifestyles. The proposals go against government guidance and NCC's own environmental policies. It is not good enough and the whole project needs to be rethought.
Comments about pollution	11	The close proximity of a four-lane carriageway to pedestrian and cycle traffic also raises issues health issues due to pollution. While traffic has dropped, and with it nitrogen dioxide levels, there are widespread concerns over a rise in speeding endangering those walking and cycling. Evidence suggests air pollution, including from exhaust fumes, significantly harms the survival chances of those with Covid-19. Pollution will also impact on the local environment. Pollution from roads begins with construction. An immediate impact is noise from construction equipment, and noise remains a problem along roads with traffic.
Comments about noise	9	Pollution from roads begins with construction. An immediate impact is noise from construction equipment, and noise remains a problem along roads with traffic. Absolutely no point in having a bridleway and footpath alongside a major road that will generate huge amounts of traffic. The road will already have destroyed the peace and tranquility that has been a huge part of my life for 35 years
Comments about health	9	Having a 4 lane road near to footpaths and cycle ways will not be conducive to human health. The council may want to consider what the monitoring statistics are likely to be along the pedestrian routes. Will the road be another area of the country where air quality laws are broken daily?

Of the 90 people who **neither agreed or disagreed** with the proposals for Public Rights of Way in the Ringland Lane area, 28 made comments, 12 of which concerned cyclists ("Can the footpath link from Ringland lane to Fakenham road be upgraded to cyclepath? Otherwise there seems little point in extending the cyclepath on the Fakenham Road. Surely right now we should be building in as many cycling route options as possible if we are to encourage greater cycle usage." / "There needs to be cycle paths along the whole route, separated from the new road, with cycles prohibited from using the vehicle carriage ways. This works well in many European countries, reduces accidents and maintains average speeds/reduces pollution for vehicles." Eleven (mainly negative) comments concerned road construction more generally. Fifty-eight people did not choose any agree/disagree option and of these, 18 made comments.

Section 3: Weston Road

Summary of responses for each proposal relating to Weston Road (boldest indicates highest number).

Question	Strongly agree/ agree	Disagree/ strongly disagree	Neither agree or disagree
To what extent do you agree or disagree with the proposal for Weston Road?	**188 (49.60%)**	96 (25.33%)	95 (25.07%)
To what extent do you agree or disagree with our proposals for Public Rights of Way in the Weston Road area?	**191 (50.80%)**	77 (20.48%)	108 (28.72%)

How often do you usually travel on Weston Road?

There were 379 responses to this question. Almost a fifth of respondents (75) said they travel on Weston Road daily or weekly but almost half (182) said they travel on Weston Road infrequently.

Option	Total	Percent
Daily	24	6.33
Weekly	51	13.46
Monthly	58	15.30
Infrequently	182	48.02
Never	64	16.89
Totals	379	100.00

To what extent do you agree or disagree with the proposal for Weston Road?

There were 379 responses to this question. Almost half of respondents (188) strongly agreed/agreed and just over a quarter (96) disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	83	21.90
Agree	105	27.70
Neither agree nor disagree	95	25.07
Disagree	25	6.06
Strongly disagree	71	18.73
Totals	379	100.00

Of the 188 people who **strongly agreed (83) or agreed (105)** with the proposal for Weston Road, 42 people made additional comments. The positive impact of the proposal for cyclists and walkers was the main reason for agreement.

Theme/issue	Number of times mentioned	Quotation
Comments about the impact on cyclists	11	Again this will help reduce traffic and for riding/walking/cycling as other routes are being lost plus it will be much safer for horse riding. We live on Weston Green Road at the junction between Paddy's Lane and Honningham Road and the proposals would maintain our walking and cycling links but still maintain existing vehicle access to the A47, Lenwade and the Fakenham Road which is essential for us.
Comments about the impact for pedestrians	11	It will be brilliant to remove motor vehicles from this stretch of road which is used by pedestrians for exercise and dog walking. The road is narrow and winding but motorists do not appreciate that walkers may be in the vicinity when they travel at 60 mph along this very stretch. Yes it's right to close Weston Road/Church Hill Lane to through traffic. To the west of the link road it should be a place where pedestrians, cyclists and equestrians can enjoy access without being on constant alert for motor vehicles which may be approaching them on this narrow lane.
There were 11 comments in which people agreed with the proposal but did not say why, or they agreed with a proviso, or said the road should remain the same. • "As long as residents can get to and from home without lots of extra mileage." • "[Organisation] strongly agrees that Weston Road be closed to through motorised traffic. However, [organisation's] mitigation strategy proposed that there should be access for non-motorised traffic (walkers, riders, cyclists) via a ramped bridge or an underpass. Weston Road is already popular with walkers, cyclists and riders creating a much valued natural circular route from Ringland to Weston. Closing the road completely would cut off access for this existing group of users. Keeping Weston Road/Church Hill Lane open for non-motorised traffic would significantly reduce the need for the creation of new restricted byways." • "Close Weston Road to motorised traffic."		

Of the 96 people who **strongly disagreed (71) or disagreed (25)** with the proposal for Weston Road, 66 people made additional comments. Most comments related to the negative effect of road construction, potential detrimental impact on cyclists and walkers and on wildlife and the environment, broader issues connected with the overall approach and costs.

Theme/issue	Number of times mentioned	Quotation
Comments about road construction	22	By all means add in cycle / walking paths but as I disagree with the link road being built due to it impact on local biodiversity and air quality I am forced to say that i disagree with this proposal. The radial roads should be left open and public transport investment increased significantly to give existing towns and villages viable public transport alternatives to the private car.

Comments about the impact on cyclists	21	The proposal will prevent use of the road by cyclists. Despite low usage, this is a valuable route for cycling. Would it be possible to keep access for pedestrians/cyclists only?
Comments about the impact on pedestrians	20	I could not encourage a proposal that reduces pedestrian access. Strongly disagree. Weston Road is needed to provide direct connection from Weston Green to Ringland, certainly for walkers and cyclists.
Comments about the impact on wildlife	14	Closing this to all road users, completely disconnecting rural communities and destroying local wildlife habitats is unacceptable. I use this route frequently to walk and cycle. It is a Roadside Nature Reserve. and the verge contains many species that are particular to this unusual sandy habitat. This is species rich aside grassland.
Comments about the impact on the environment	13	All existing routes should be retained to allow all users the option to take the most fuel and time efficient routes. Given the price of fuel and the push to reduce CO2 emissions it is the "Green" option. Besides this, they can always be closed off at anytime in the future. I think this road should be kept open and have its function improved in such a way that the NWL doesn't need to be built. … By using already existing infrastructure we will protect the area's wildlife and environment from the serious damage that it would suffer through the construction of the NWL.
Comments about this proposal in the context of the wider consultation	10	Before any final decision is made there should be a review or pause of the NWL project to see exactly how the A47 adjustments, the long term impact of the NDR and the consequences of Covid affect traffic numbers and flows. Disagree with this proposal. I'd rather see a county wide approach to encourage the use of public transport and cycling, and schemes that encourage people to drive less.
Comments about cost	10	The 300 million pounds allocated for this road extension would be better spent on public transport with expanded cycling and walking infrastructure, The £300 million to be spent on the NWL is an appalling waste of money. We are all crying out for better alternatives that include proper public transport systems. Radial roads need to be kept open and traffic calming measures instituted.

Of the 95 people who **neither agreed or disagreed** with the proposal for Weston Road, 21 made additional comments which tended to reflect comments made by people who strongly disagreed or disagreed (ten about wider road construction project, seven about environmental impacts, and six about finance). Fifty-nine people did not choose any agree/disagree option and of these, 13 made comments.

To what extent do you agree or disagree with our proposals for Public Rights of Way in the Weston Road area?

There were 376 responses to this question. Just over half of respondents (191) strongly agreed/agreed and just over a fifth (77) disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	86	22.97
Agree	105	27.93
Neither agree nor disagree	108	28.72
Disagree	22	5.85
Strongly disagree	55	14.63
Totals	376	100.00

Of the 191 people who **strongly agreed (86) or agreed (105)** with the proposal for Public Rights of Way in the Weston Road area, 27 people made additional comments. Most comments related to benefits for cyclists and walkers.

Theme/issue	Number of times mentioned	Quotation
Comments about the impact on pedestrians	14	We should have access to Weston Longville on foot or horse or bike, eg pedestrian access over or under the new road. There should be through access to pedestrians, horses, so that they can continue a journey through to Weston Longville. Eg a pedestrian type bridge, walkway
Comments about the impact on cyclists	12	I am very happy with the proposals. They maintain our walking routes and will eliminate all traffic. I am fully supportive of making traffic free cycling routes. However you do need to put in a safe cycling route to access Taverham.
Comments including a proviso	7	If the Norwich Western Link as envisaged is inevitable then the suggested changes appear to be sensible - although walking/riding in close proximity to a busy dual carriageway is clearly less likely to be enjoyable than on the current pathways; in giving a positive response to this question I assume that 'natural' barriers will be created between the new road and the new/changed pathways to reduce noise and exhaust pollution and to hide the road as much as possible. If the new Bridleway is constructed to an adequate standard then this is a suitable solution for cyclists - PROVIDED it has a reasonable surface that road bikes (EG not just mountain bikes) can use. Ideally it would have a tarmac or other firm, non loose surface

Of the 77 people who **strongly disagreed (55) or disagreed (22)** with the proposal for Public Rights of Way in the Weston Road area, 42 people made additional comments. Most comments related to environmental concerns and climate change, negative effects of road construction, and the impact on cyclists, walkers and wildlife.

Theme/issue	Number of times mentioned	Quotation
Comments about environmental impact	14	I don't agree with anything about the Great Western Link for its destruction of natural habitat, pollution and degrading of the environment to bring runaway climate change ever closer.

		[NCC needs to show …] environmental leadership: deliver on CO2 emissions, air quality and biodiversity.
Comments about the impact on cyclists	13	Changing Weston Longville Footpath 9 to a restricted byway to accommodate cyclists is not necessary. There will be sufficient access via minor roads especially if a crossing is provided on Weston Road. Please leave as much of the existing environment as possible intact and don't urbanise it. Routes running alongside the NWL will be unpleasant and put people off walking and cycling.
Comments about road construction and road usage	13	Public rights of way should be preserved and protected. This road is taking us in the opposite direction to what is needed. Put the money into public transport not roads.
Comments about impact on wildlife	11	These [PROW] are old historic routes many are important wildlife corridors which will be irreparably damaged by road proposal. There cannot be biodiversity net gain when a green corridor is severed. Norfolk has a number of important wildlife environments which need to be enhanced rather than put under pressure from road building. With stark warnings from international and local wildlife organisations such as Norfolk Wildlife Trust on the threat to biodiversity - look at County Council priority should be to protect and enhance biodiversity in the County.
Comments about the impact on pedestrians	11	A long diversion is not going to encourage walking and cycling, neither is diverting to a road used by motorised vehicles. Strongly disagree. There is little justification for making Weston L footpath no 9 into a restricted by-way, which would allow carriages. It is fine now as a footpath. Good to have a bridleway on W side of NWL.
Comments about the impact on climate change	10	Norfolk faces an existential threat from storm surges and sea level rise as a result of global warming. The Council has a duty to future generations of Norfolk citizens to minimise the consequences of global warming. To this end the council should be focusing on reducing carbon dioxide emissions and supporting communities already under threat. The planet is in a state if climate emergency and we HAVE to stop building roads over our precious landscapes.

Of the 108 people who **neither agreed or disagreed** with the proposal for Public Rights of Way in the Weston Road area, 31 made additional comments which tended to reflect comments made by people who strongly disagreed or disagreed. There were 15 comments about road construction: ("There is no need to change the current status of PRoWs in the Weston Road area at all, not for the sake of this unaffordable, outdated vanity project. The NWL is not needed." / "I think that the most responsible way forward is to review the currently existing radial roads in this area, and use the NWL budget to improve these sufficiently. These roads need to be, and can be, redesigned."). Nine people expressed concern about environmental issues, eight commented on climate change and eight commented on wildlife. Sixty-four people did not choose any agree/disagree option and of these, 19 made comments.

Section 4: Breck Road and The Broadway

Summary of responses for each proposal relating to Breck Road and The Broadway (boldest indicates highest number).

Question	Strongly agree/ agree	Disagree/ strongly disagree	Neither agree or disagree
To what extent do you agree or disagree with the proposal for Breck Road?	**215 (57.18%)**	78 (20.75%)	83 (22.07%)
To what extent do you agree or disagree with the proposal for The Broadway?	**207 (55.79%)**	73 (19.87%)	91 (24.53)
To what extent do you agree or disagree with our proposals for Public Rights of Way in the area around Breck Road /The Broadway?	**213 (57.88%)**	64 (17.39%)	91 (24.73%)

How often do you usually travel on Breck Road?

There were 377 responses to this question. Just over two-thirds of respondents (260) never travel on Breck Road or use it infrequently. Under a fifth of respondents (66) travel on Breck Road daily or weekly.

Option	Total	Percent
Daily	21	5.57
Weekly	45	11.94
Monthly	51	13.53
Infrequently	177	46.95
Never	83	22.02
Totals	377	100.00

To what extent do you agree or disagree with the proposal for Breck Road?

There were 376 responses to this question. Over half of respondents (215) strongly agreed/agreed and just over a fifth (78) disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	86	22.87
Agree	129	34.31
Neither agree nor disagree	83	22.07
Disagree	13	3.46
Strongly disagree	65	17.29
Totals	376	100.00

Of the 215 people who **strongly agreed (86) or agreed (129)** with the proposal for Breck Road, 33 people made additional comments. Most comments related to benefits for cyclists and walkers.

Theme/issue	Number of times mentioned	Quotation
Comments about the impact on cyclists	10	The cycle path must be tarmac to join with existing roads or cycle paths otherwise people won't use it. I cycle 150 miles a week and we don't need cycle paths everywhere, just getting in/out of the urban area and to connect with quiet roads. They also need to be properly laid flat. The paths on the NDR are shockingly bad for a new road and generally more dangerous to ride than the road. Small bumps seem like nothing at 8mph, but at 15 they are really dangerous. Do the infrastructure as planned here but attention has to be given to surfacing quality not just the route. Provided access remains for cyclists, and the surface is firm (preferably tarmac), it all sounds good to me!
Comments about the impact on pedestrians	8	It will open up an excellent walking and riding route and coupled with the proposed cycleway along side the NWL to Honingham make it a pleasant new route. Will remove passing traffic and maintain walking and cycling links – good.
Agreement with a caveat (primarily that Ringland Lane stays open)	8	I agree but only on the basis that Ringland Lane stays open. If Ringland Lane is closed to cars then Breck Road should stay open.In other words one of the 3 roads East / West should be open to local traffic. Subject to signage so the Breck Road east doesn't become a dead end for anti social behaviour or the turning area a nocturnal car parking zone.
Other comments (9) about partial access which did not appear frequently but which are relevant here include: • "I agree it should be closed but no public right of way." • "Close Breck Road to motorised traffic apart from access to properties, residences and agricultural land." • "Close it but keep access for non-motorised traffic. Pedestrians, cyclists & horses."		

Of the 78 people who **strongly disagreed (65) or disagreed (13)** with the proposal for Breck Road, 45 people made additional comments. Most comments related to negative effects of road construction, environmental concerns, the impact on wildlife and cyclists, and climate change.

Theme/issue	Number of times mentioned	Quotation
Comments about road construction	18	The WL road itself should not be built and instead, investment in better connections and routes for public transport and other personal transport should be made instead. I like the idea of green bridges over existing roads please build some over the NDR but please don't build the NWL.

		Just abandon this plan altogether. There are other more sustainable options.
Comments about environmental impact	17	The 'green bridge' is a nice idea but it is not enough. The NWL will destroy the local landscape, protected wildlife sites, over 4 hectares of mature woodland and negatively impact the Wensum river and its valley if it goes ahead as planned. This green bridge is not good enough to mitigate these negative effects, nor of those on local communities. NCC should be looking at improving the current infrastructure as opposed to destroying the local environment.
Comments about the impact on wildlife	12	The construction of the road is likely to have an adverse effect on bat populations and wildlife. I highly doubt the connectivity argument. I believe that this scheme will displace wildlife, disturb birds and bats. Norfolk has a number of important wildlife environments which need to be enhanced rather than put under pressure from road building
Comments about cyclists and cycling	9	No evidence that the design would actually be fit for cyclists (especially based on experience of NDR). Need a proper tarmac surface of sufficient width. I feel the route should be left open for cyclists as a family of course with two young children we crave safe cycling routes and unfortunately the current proposals would leave us with a one way there and back route, allowing some other roads in the area to stay open to allow for circular routes would be good for cyclists, walkers and local businesses.
Comments about climate change	9	The planet is in a state if climate emergency and we HAVE to stop building roads over our precious landscapes.
Other comments which did not appear frequently but which are relevant here related to the broader rationale behind the project (8), potential of increased pollution and the impact of such pollution (8) and the need for a joined up approach to transport links and plans throughout the county, including road building projects (7) to ensure a coherent county-wide plan (7): • "Seems a white elephant to make it non motor users and I'm not convinced on how well used this would be by those you are trying to attract / cater for." • "I support the establishment of new public rights of way and cycle lanes, but as explained above these need to be incorporated as part of a major review of the existing network of radial roads. There is a need to make sure traffic congestion is approached and considered in a greener and more integrated way." • "Air pollution is now known to be a major public health crisis, bringing early death to over 60,000 Britons each year. Although the research is at an early stage, there is building evidence that air pollution is a significant and sensitive factor in people being more prone to COVID-19 infection and more serious COVID-19 illness and mortality. Footpaths and bridal paths should not be placed right next to a source of NO2 and PM2.5. The road should not be built in first place."		

Of the 83 people who **neither agreed or disagreed** with the proposal for Breck Road, 21 people made additional comments. There were 12 comments about road construction ("The road should be kept open as the North West Link should not consist of any roadbuilding just the development of sustainable modes to protect the environment, promote Norfolk's economy in line with the county councils and governments CO2 targets.") and six people commented on environmental and climate change issues. Sixty-two people did not choose any agree/disagree option and of these, 14 made comments.

How often do you usually travel on The Broadway?

There were 370 responses to this question. Just over two-thirds of respondents (256) never travel on The Broadway or use it infrequently. Fewer respondents (53 or 14.32%) travel on The Broadway daily or weekly.

Option	Total	Percent
Daily	13	3.51
Weekly	40	10.81
Monthly	61	16.49
Infrequently	169	45.68
Never	87	23.51
Totals	370	100.00

To what extent do you agree or disagree with the proposal for The Broadway?

There were 371 responses to this question. Over half of respondents (207) strongly agreed/agreed and just under a fifth (73) disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	81	21.83
Agree	126	33.96
Neither agree nor disagree	91	24.53
Disagree	13	3.50
Strongly disagree	60	16.17
Totals	371	100.00

Of the 207 people who **strongly agreed (81) or agreed (126)** with the proposal for The Broadway, 27 people made additional comments. The main reason for agreement was the impact on wildlife.

Theme/issue	Number of times mentioned	Quotation
Comments about wildlife	9	My 'strong agreement' with the proposal for the Broadway is conditional on the proposed green bridge properly fulfilling the functions described. I am slightly bemused by the idea that a green bridge facilitates crossing the new road by flying creatures such as bats but assume that is in keeping with the expert advice you have received. The above proposals seem sensible in the light of the low car usage, and the benefits to wildlife of the green bridge.

Of the 73 people who **strongly disagreed (60) or disagreed (13)** with the proposal for The Broadway, 15 people made additional comments. Most comments related to negative effects of road construction, environmental concerns and the impact on wildlife.

Theme/issue	Number of times mentioned	Quotation
Comments about road construction	13	Sustainable transport please not expensive new roads. Roads cause pollution levels to rise. Covid-19 has higher death rate linked to pollution. Don't build the road.
Comments about environmental impact	13	Abandon this expensive environmentally disastrous plan altogether. I don't agree with anything about the Great Western Link for its destruction of natural habitat, pollution and degrading of the environment to bring runaway climate change ever closer.
Comments about wildlife	13	This scheme can not be comply with your promise of net biodiversity gain. The adjacent woodland is a known Babestelle bat roost. The adjacent woodland is ancient woodland, it can not be known quite how old it is but a Highway engineer can not reproduce this or make a richer habitat elsewhere that the bats will justly off to. During the construction period the wildlife will suffer terribly, there will be no habitat for it to move into. The green bridge will require a huge embankment, this will cover over important habitat. These bridge embankments are about 100m long and 30m wide. this will take out most of the road side trees along the Broadway. This 'green bridge' will not reduce the impact on bats. The evidence for thus is limited and the council is ignoring its Environmental obligations for thus protected species.

Of the 91 people who **neither agreed or disagreed** with the proposal for The Broadway, 22 people made additional comments. There were 12 comments about road construction: ("There is no need to change the current status of The Broadway at all, not for the sake of this unaffordable, outdated vanity project. The NWL is not needed."). Sixty-seven people did not choose any agree/disagree option and of these, 15 made comments.

To what extent do you agree or disagree with our proposals for Public Rights of Way in the area around Breck Road /The Broadway?

There were 368 responses to this question. Over half of respondents (213) strongly agreed/agreed and under a fifth (64) disagreed/strongly disagreed.

Option	Total	Percent
Strongly agree	79	21.47
Agree	134	36.41
Neither agree nor disagree	91	24.73
Disagree	10	2.72
Strongly disagree	54	14.67
Totals	368	100.00

Of the 213 people who **strongly agreed (79) or agreed (134)** with proposals for Public Rights of Way in the area around Breck Road/The Broadway, 25 people gave reasons or made additional comments, mainly about cycling in the area.

Theme/issue	Number of times mentioned	Quotation
Comments about cycling	8	I'm particularly glad to see that a new crossing for cyclists/pedestrians etc. is proposed for the new section of A47.

Of the 64 people who **strongly disagreed (54) or disagreed (10)** with proposals for Public Rights of Way in the area around Breck Road/The Broadway, 39 people gave reasons or made additional comments. Most comments related to the impact on the environment, wildlife and cyclists.

Theme/issue	Number of times mentioned	Quotation
Comments about the environment	12	The irreplaceable environmental damage, noise and air pollution the new road will bring is unjustifiable and none of the mitigations you propose to put in place will repair or replace the damage to species and woodlands which are under threat through the construction of this road. Al these proposals are ridiculous. Expensive, disastrous environmentally
Comments about wildlife	11	The NWL will be even more unnecessary devastation, no doubt cause extinctions to species that are on the red list for conservation and protection. Bat colonies have left the route of the NDR, so therefore the attempted mitigation schemes did not work. These mistakes must not be made again, the existing habitats must not be destroyed.
Comments about cycling	10	The A47 underpass and then route parell to the NWL will be unpleasant to ride, cutting off what is currently a pleasant loop available to the citizens of West Norwich for exercise. This runs counter to government calls for more exercise routes. The priority should be to make it easier for people to cycle and walk or use public transport.

Of the 91 people who **neither agreed or disagreed** with proposals for Public Rights of Way in the area around Breck Road/The Broadway there were 18 comments including eleven about road construction projects. Seventy people did not choose any agree/disagree option and of these, 20 made comments.

Section 5: Walking, Cycling and public transport measures

Please select up to three of the following measures that you think would best support people to walk and/or cycle in the area to the west of Norwich.

There were 318 responses to this question. The three measures respondents said would best support people to walk and/or cycle in the area to the west of Norwich are (in order of most frequently selected):

- Option 4: Create a cycle friendly on-road link from **Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham** (145)
- Option 3: Create a new pedestrian and cycle crossing on **Drayton High Road to improve connectivity with the Marriott's Way** (139)
- Option 7: Create a cycle-friendly on-road link south of A47 from **Mattishall to the Norfolk and Norwich University Hospital & University of East Anglia** (131).

It should be noted that Option 1: Create a new pedestrian and cycle crossing on the A1067 Fakenham Road at Attlebridge was selected 130 times which was almost as many times as the third most popular choice (option 7, 131 times).

Option	Total	Percent
1) Create a new pedestrian and cycle crossing on the A1067 Fakenham Road at Attlebridge	130	40.88
2) Create a new pedestrian crossing on the A1067 Fakenham Road to connect Ringland Footpath 1, south of the A1067, with Attlebridge Restricted Byway 4, north of the A1067	116	36.48
3) Create a new pedestrian and cycle crossing on Drayton High Road to improve connectivity with the Marriott's Way	139	43.71
4) Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham	145	45.60
5) Create a cycle friendly on-road link from Ringland to Easton	114	35.85
6) Create a cycle-friendly on-road link from Taverham to Dereham Road	119	37.42
7) Create a cycle-friendly on-road link south of A47 from Mattishall to the Norfolk and Norwich University Hospital & University of East Anglia	131	41.19
8) Improve cycle parking at, and access to, the Airport Park and Ride site	65	20.44
% does not total 100% as people could pick multiple options		

Of the two options shown for a potential Western Arc bus service which, if any, would you be more likely to use?

There were 348 response to this question. Option A was the preferred choice of just over a third of respondents (119) but just under half of respondents wanted neither option A or B (162).

Option	Total	Percent
Option A – Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Taverham, Queen's Hills, Longwater and Bowthorpe	119	34.20
Option B – Thorpe Marriott to Norfolk and Norwich University Hospital and University of East Anglia via Drayton, Norwich Airport, Hellesdon and Earlham	67	19.25
Neither	162	46.55
Totals	348	100.00

Of the 119 people who picked **Option A** (just over a third of respondents), 61 people made additional comments. Most comments concerned the usefulness of the route, additional access it would provide to places currently poorly connected, and the impact on people who live in Queens Hill.

- **The proposed route would be useful to respondent /offers new opportunities**: "This option gives me cycle access to the gym and shops I need to access at Longwater and enables onward travel to Norwich ." / "Covers Longwater which the other one doesn't." / "It opens up new links." / "This would provide a 'cross county' link across the area which would provide an effective link across the area - and perhaps encourage greater use of public transport in the area." (16 comments)

- **The proposed route would offer improved access to NNUH (and UEA)**: "Option A - If you live anywhere across this region, there is no sensible Bus route to get you to the UEA/Hospital. Many car journeys could be avoided by having the option A bus route". / "Very helpful to have good bus links to NNUH and UEA. Current services are useless and we do not use them." / "I am in my 70s. If I become unable to drive, Option A would allow me to travel to the shopping area at Easton and to the hospital." (13 comments)

- **The proposed route would connect up (more) places currently poorly connected**: "It seems like this option would grant increased public transport to areas that are less connected to the city and in general." / "This better serves the currently most poorly connected areas." / " Option A provides a route not provided now." (12 comments)

- **The proposed route would improve access for people in Queens Hills**: "Queens Hill is only has one bus option & this means having to travel into the city & then back out again to get anywhere. Therefore everyone has to rely on their

cars." / "There is no public link to taverham from queens hills, a direct route from queens hills to taverham for residents needs to happen as many children on the estate attend taverham high school , and ideal for hospital journeys, open the existing not used bus lane, review access from queens hills to taverham and make this happen, queens hills is treated as lost world and needs some forward planning to improve logistics on and off the estate." / "Queens hills desperately needs better roads due to the amount of traffic now using it and because the ambulance station needs to be able to respond quicker to emergencies." (8 comments)

- **The proposed route would improve access to/from the respondent's home**: "I live in Bowthorpe and so this route would pass very close to my home.." / "I'd be more likely to use this because it comes far closer to where I live, i.e. Ringland." / "Closer to where I live." (7 comments)

Of the 67 people who picked **Option B** (just under a fifth), 35 people made additional comments, most of which related to access to the airport and the usefulness of the proposed route.

- **The proposed route improves access to Norwich airport**: "There is a need to improve public transport access to the airport." / "B Covers wider area and would link to Airport park & ride." / "Connecting via the airport is important." (11 comments)

- **The proposed route would be useful to respondent /offers new opportunities:** "Improved bus routes obviating the need to go into the city and out again." / "It would connect places i am more likely to travel to/from and is more accessible for me." (8 comments)

Of the 162 people who said they would **not choose neither Option A or B** (just under half of respondents), 92 people made additional comments. The main reason people said they would not pick either option was that the routes were not relevant to them, there were related public transport issues, wider concerns about road construction projects or issues with the routes.

- **Comments about the relevance of routes to the respondent**: "I have no need to travel in this area." / "Too far away from where I live." (30 comments)

- **Comments about other aspects of public transport which affect the proposal**: "I have not selected any option suggested by NCC as there is nothing that really comes across as an improvement?" / "No need as no public transport from my village to link to this, would have to access by car so may as well do the whole journey by car." (18 comments)

- **Comments about roads**: "How about improving bus services without building an expensive road which we can never repay in two generations or more?" / "The funds for this outdated vanity project (the NWL) should be diverted

towards wider sustainable transport schemes in and around Norwich." (17 comments)

- **Comments about the proposed route**: "Neither particularly serve Weston Longville well." / "I would like to see bus routes that connect Norwich bus station with the Wensum Valley area. so that as a non car user I could get to these areas for recreation." (15 comments)

Alternative suggestions for routes included:

- "Why not combine option A & B and start the journey for option A at the airport? Option A provides a route not provided now. Option B is partly provided by the Horsford Mulbarton service."
- "Connect Queens Hill Estate to the North!!! Right now it is one way ghetto."
- "The North/South public transport route proposals from Thorpe Marriott to the UEA/Hospital. The bus companies are not too keen on a complete loop proposal, but an alternative could be a return route for both sides of the loop - i.e. Thorpe Marriott to the UEA/Hospital and return and vice versa for the other side of the loop/ark; or alternatively, the bus companies could decide to develop/use only one half of the loop. The western ark/loop from Thorpe Marriott, via Taverham, queen's Hills, Longwater, and Bowthorpe seems to be the most beneficial route for costessey for this north/south public transport proposal."
- "With the expansion of Easton a bus hub could be set up feeding from the villages to the Park and Ride site then on to all parts of the city and wider network. I live in Drayton. I would prefer Option A if there was a stop near me - can the route be extended to Drayton? A bus service from Drayton to UEA and the hospital would be absolutely marvellous but I suspect Option B would be a long trip."

There were 196 additional comments. The issues most frequently commented on were: cyclists and pedestrians; road construction projects in general and the NDR/NWL specifically; traffic; and safety

Theme and number of times mentioned	Quotation
Cycling (80) Safety of cyclists, cycling as a sustainable form of transport, need for safe cycle paths, NCC's role in promoting cycling, health benefits of cycling, cycling as an alternative to motorised transport	I feel that it would be beneficial to all classes of road user for cycle routes to be complete, well signposted, and sensibly routed for both the existing NDR and western link roads, in conjunction with local traffic orders prohibiting cycling on the main carriageways. There needs to be cycle routes that are safe and separate from traffic. These need to actually go somewhere useful as the ones on NDR don't seem to link up and are not much use. Proposed cycle routes will remain unattractive to new cyclists whilst they are still National Speed Limit routes with no segregation. Unless speed limits are lowered, or segregated lanes are built, these routes will have no purpose.

	Ensure any cycle routes are properly planned and maintained. Too many end in a ramp and dip that just fills with water, leaves and debris and becomes a dirty slippery puddle. The NDR was a missed opportunity to provide a family friendly cycle route around North of the City, it is often too difficult to follow for people who have never cycled before and fails to connect to many other safe cycling routes for families. With Sustrans about to declassify many of Norfolk's NCN routes and NCN Regional Routes as they fail to be safe for families it is imperative that tou take this opportunity to involve Sustrans in achieving family friendly off road cycle routes. Just painting a cycle lane on the existing road roads is not a good option and it doesn't work. It is not safe and motorist often ignore it. In order too encourages more cyclists cycle lanes need to be separated from the traffic by a curb. Also cycle lanes need to not just stop at difficult junctions. The Government's stated target is to encourage more people to cycle and walk. If this target is to be realised, any major road building project should be closely scrutinised for its ability to contribute towards the cycling target. It should be a general principle that every new road construction should also seek to exploit opportunities to expand and improve the local cycling and walking pathways affected by the construction. The social and health benefits of good cycling and walking opportunities are well-evidenced.
Pedestrians (57) Safety of pedestrians, necessity of pedestrianised routes.	Though I broadly support the need to improve cycling and walking facilities this should not be conditional on the building of the NWL. There is a significant lack of public footpaths and bridleways being considered in the area to the south of the A47 We must have a footpath directly from Ringland to Taverham. Making Taverham Lane safe by adding a pavement or safe footpath would be wonderful, similarly a cycle Lane would help. At the moment it is too scary to use. We tried once, never again. It is very important that a pedestrian / cycle access is provided from Weston Longville to Morton & Attlebridge & the crossing of the A1067 These three villages share the Hall for All. The existing permissive path which runs alongside Marl Hill from the A1067 to Church Street is inadequate and therefore unused and should be upgraded to provide easy pedestrian access from Morton and Attlebridge to the playing field, village hall, Church and Parson Woodforde pub and to bus services on the A1067. I am a resident of Attlebridge and strongly agree with a new crossing facility on the A1067 to help pedestrians cross safely and to access the playing field as there isn't one in Attlebridge. However, a big oversight is the village itself to access these pedestrians areas, the blind bend round the church as no footpath so extremely dangerous for pedestrians and needs to be addressed to ensure it is safe to access crossing. There should be adequate provision for a safe walking and cycling route which shadows the whole route of the Western Link Road. A safe pedestrian route from A1067 Lenwade to Dinosaur Park/Golf course. (Weston Longville have been pressing for this for years)

	There is a desperate need, greater in my opinion than any of these proposed, to provide a safe way for pedestrians to cross from the north to the south side of the roundabout where Broadland Northway interlinks with the Reepham Road. It is just crazy that well maintained and used footpaths on either side (Drayton Drewray on the north, link to Marriott's Way on the south) lead pedestrians straight to the roundabout where they have several lanes of traffic to cross. It's clear from the popularity of Marriott's Way that a riverside footpath route between Attlebridge and Drayton would be well used and a great local asset.
Road construction (53)	Please see comments in the Cross-cutting Themes section below
Traffic (53) Increased traffic as a result of proposals, traffic flow, speed of traffic, rerouting of traffic to detriment of other villages	I also object because the scheme would generate further traffic and result in development pressures and further entrench reliance on car and lorry use. Very concerned about the speed and level of traffic currently coming through west end and how this plan doesn't seem to effect that for the future. To consider the effect of increased traffic through villages south of the A47 ie the closing of Berry lane so that traffic does not cross from the A47 to Wymondham via Barnham Broom. The crossroad in Barnham Broom is already dangerous. If this is to be a through route traffic calming and speed limits must be put in place to deter traffic from using this route. Failure to close Honningham Lane to protect the centre of Ringland village from a massive increase in through traffic as a result of the A47 junctions. We are aware that proposals have been voiced to remove the HGV status from the B1535 other than for access only. We disagree with these suggestions as we feel it would be a retrograde step in managing traffic coming from the Fakenham side & potentially push traffic through the villages again. It would make better sense to put a roundabout ie at the junction of the B1535 and 1067 at Lenwade. Potentially slowing all traffic down and improving road safety. Access only – doesn't work - it is not able to be policed & generally increases the speed of traffic using the road illegally. Another road will just lead to more traffic. For those who are now subject to high levels of traffic using very minor roads between the NDR and the A47, the link is the only way they see for dealing with the situation. The Planners presume that Longwater Lane will have much reduced traffic, but the Catholic School on the junction with West End has a catchment area of about 25 miles, bringing in vehicles from far and wide. There may be more traffic that just the local traffic anticipated. West End and Longwater Lane are already pollution black spots. We do not need more traffic. The reason we will still get the traffic, is because a standard sat nav will the quickest and shortest route, which from Fir Covet Road to UEA/NNUH is through Old Costessey. Please also consider closing Honingham Lane. With the dualling of the A47, there is a real concern that cars will cut through Ringland to access Taverham and the city. The roads in the village are not wide enough to accommodate a significant increase in traffic.
Safety (52) Safety of cyclists and pedestrians, unsafe roads, perceptions of safety	… Highways England have advised the Council that it would not be safe to create a walking route which crosses the current A47 between Berrys Lane and the Mattishall Road roundabout yet this proposed cycle route appears to do just that before entering the proposed underpass under the new A47.

	When this link to the A47 is complete using whatever route agreed the existing stretches of the 'NDR' will see an increase in traffic especially at night. With this increase and the lack of lighting on and in the approach to the roundabouts I would expect the collisions currently regularly occurring on all roundabouts will increase with the risk of fatalities. It is for this reason I think the provision of lighting at all roundabouts should be considered in this build phase if this is to be prevented. The cycle route along the NDR is dangerous since the County chose not to provide safe crossings at roundabouts, nor safe cycle routes along radial roads leading to the NDR, in order to cut costs. Anyone cycling along the NDR takes their lives in their hands. Surveys have shown that a modal shift to sustainable forms of transport such as cycling and walking will take place only if it is safe, and seen to be safe. Safety is seen to be in the form of dedicated routes for cycling and walking, segregated from motorised traffic. Improve the existing PRoW, don't dangle the NWL as a way of getting people to opt for cycle routes and the provision to make them safer. Currently, it's far too risky to either walk or bike from Ringland along Ringland Road to Taverham to get a bus into Norwich. An dedicated cyclepath / pavement would allow this to happen There is a significant lack of public footpaths and bridleways being considered in the area to the south of the A47. This needs to be addressed to allow safe routes to be available should there be the significant increase in traffic that is expected. Need to further invest in safe cycle into Norwich from other routes, of particular interest to me is Wroxham into Norwich. The current road is very precarious.
Environmental concerns (49)	Please see comments in the Cross-cutting Themes section below
Rationale for proposals (39)	Please see comments in the Cross-cutting Themes section below
Cost of proposals (38)	Please see comments in the Cross-cutting Themes section below
Public transport (34)	I am in favour of better public transport systems that encourage cycling and use of public transport and reduce car ownership for those who can use carshare or public transport. A much greater emphasis should be put on providing low-carbon/zero-carbon public transport connections for villages in the Wensum valley that are currently unserved (e.g. Ringland, Weston Longville). People need an alternative transport option if they are to leave their car at home. Promotion of walking, cycling and accessible public transport should not piggybank an outdated vanity project like the NWL; these modes of transport should be backed because they are the sustainable future alternative. Giving people an alternative to their cars will reduce car use and remove the need for this latest road scheme (and others like it). We should be using the £300 million proposed for this link road to develop cycling and walking. And develop a green sustainable public transport system. Tram network should be considered. The orbital bus routes around Norwich are a welcome step towards giving the area a proper public transport network. However more consideration needs to be

	given to facilitating and encouraging use of public transport to the Norwich Science Park/UEA/NNUH employment hub, including the adequate provision of park and ride services around the whole orbital bus route to and from this major employment hub, health service hub. We would like to see this scheme revised to include no road building but the construction of a "green link" between the Norwich Airport and the Norwich Norfolk University Hospital. This would allow buses to make speedy connections, walkers to access the countryside and cyclists to make meaningful journeys on separated carriageway. This would allow green modes to be prioritised over car movement and allow the generalised cost of travel of sustainable travel to be lowered to generate behavioural change.
Wildlife (32)	Please see comments in the Cross-cutting Themes section below
Ratruns (28) Risk of diverting rat running to other places, risk of creating ratruns	Anything which will divert rat runners from West End Costessey would be fantastic. With the new road coming onto the A47 directly opposite Berrys Lane, please can you tell me what provision is being made to prevent traffic using Berrys Lane as a rat run into Wymondham, cutting off a significant corner. Honingham Lane should be closed to motorised traffic to stop drivers travelling from Taverham/Hellesdon to the new Norwich Road junction by driving through the village of Ringland thus creating a rat run. This new road is just going to shift rat running to other areas including straight through barnham broom. You have not considered rat runs south of the A47. Cutting through some of these villages rather than using the Southern Bypass will cut a considerable distance off for people who want to connect with the A11, mainly at Wymondham.
Covid 19 (28)	Please see comments in the Cross-cutting Themes section below
Pollution (25)	Please see comments in the Cross-cutting Themes section below
Wider transport policy (23) Proposals must be seen in wider context of countywide transport issues and plans	The major failing of this consultation is that it does not take account of the proposals for the A47 dualling, and the consequential impact on the local road network - the two projects are closely connected. This consultation does not take into account the impact of the A47 Easton to North Tuddenham dualling project and the fact that the two projects will not completed at the same time. In addition the local road connections related to the A47 project have been amended and are no longer as shown on the maps provided. With regard to road closures, all existing public rights of way should be protected and a review of radial roads carried out to explore options for new public transport routes. The Council should now step back, quash the decision of July 15th 2019. Working out the best sustainable transport options for this area requires a full and detailed review over the transport options over the Norwich western quadrant in the whole. Radial roads should be left open and reviewed to explore the opening of new bus and other public transport routes (e.g B1535 and through W Longville and Ringland (past Swan) to cross the valley directly as well as providing safer pedestrian and cyclist access as part of the Western Quadrant transport review proposed above.
Routing (23) Detailed comments about particular	Please also consider closing Honingham Lane. With the dualling of the A47, there is a real concern that cars will cut through Ringland to access Taverham and the city.

routes (particularly from Parish Councils), requests for changes to proposed routing	Would like Paddy's Lane to be closed to prevent traffic using Weston Longville as a cut through to the A1067. An alternative route for the section from the new A47 underpass to the old A47 in Honingham would be for it to run beside the hedge west of Heather Cottage. This would replace the unusable original lane/restricted byway to the West and enable the possible upgrading of it to a restricted byway as per the rest of the route. Any persons from outside the village wishing to start their journey from Honinhham could park in the redundent layby on the existing A47. Retain Honingham restricted byway no 1 from Mousewood Farm to A47, with suitable crossing of the NWL.
Climate change (19)	Please see comments in the Cross-cutting Themes section below
Effect on local people (16)	Most people who will use this road will be passing through, we will be living with it day in and day out, mourning the loss of our local habitat and vistas and bemoaning the drone of traffic - as they reach their journey's end a few minutes sooner, I doubt they will even give us a passing thought. Too much emphasis on cycle use - I and my wife are both in our 80's and how we can manage to shop and carry our bags on a bike is beyond me. As one of the few most impacted residents on the proposed route of the NWL I don't want it! We in Honingham are going to be cut off from our church as the new dualled A47 will go between the church and the village. We have asked for an underpass to get to the church but instead there is a circuitous route that is at least a mile out of our way and up and down a hill. Older folk who do not drive, but wish to visit the church to attend a service or tend a family grave, are going to be effectively cut off. We [Ringland residents] have to tolerate too many now for a small community. The only mention of Ringland in this online form is pretty talk about cycle routes - what about our daily lives and welfare?
Health issues (15)	Please see comments in the Cross-cutting Themes section below
Ideas	Ideas included: • Time restriction to lower rush hour traffic (Ringland) • Speed restrictions for farm traffic (Ringland) • Visually separate cycle/footpath/bridlepath by different surfaces (Ringland) • Time road access restrictions to make walking safer (Ringland) • Pelican/Puffin crossings, wider footpaths, better street lighting/signage (Breck and Broadway PROW) • Reintroduction of trams (Western Arc) • Return of light railways (general comments) • Commission local artist to make underpass attractive (general comments) • Add trailers to buses so they can carry more bikes (general comments)

Section 6: Cross-cutting Themes

This section records four 'cross-cutting' themes (the environment, climate and wildlife; road construction; the cost of proposals; health issues including Covid-19) which emerged in responses to the consultation. It is important to note the high frequency of times these themes are mentioned because, even when they are not cited as a reason to agree or disagree with a proposal, they reflect respondents' values and concerns. The quotations shown are a sample only.

The cross-cutting theme mentioned most times by respondents (943 times) related to concerns about wildlife, climate change including flooding, environmental impacts and pollution. Second, in the 673 comments about roads, it was often unclear whether the respondent was referring to the Norwich Western Link road or a different programme (the NDR was frequently referenced). Many respondents who referred to an aspect of road construction said the NWL should not be built, regardless of the proposal's subject matter. Third, in the 204 comments about the cost of proposals, diverting money for road construction into greener projects was a recurring theme. Last, respondents queried whether plans devised in a pre-Covid-19 world were still relevant and also commented (163 comments) on possible links between Covid-19 and existing health issues.

Cross-cutting Theme 1: Comments about the environment including climate change and risk of flooding, pollution and impact on wildlife (943 comments)
The road will destroy local woodlands, ancient trees and wildlife habitat. It will further pollute the River Wensum and the surrounding land and air.
75% of people want a greener future post Covid - show true leadership and embrace the new now - don't wait until it's all late and there's no wildlife left.
The planet is in a state if climate emergency and we HAVE to stop building roads over our precious landscapes. The Building the Western Link road would be ecological vandalism. A site of SSI would be unacceptably ruined, mature and ancient trees would be lost, any saplings planted to replace them would take decades to grow to a size where they could possibly support the amount of biodiversity which is currently there, or offset the amount of carbon which the current trees do. By the time they mature it would be far too late for everything.
We face a climate breakdown unless we act much more robustly. While I appreciate that the council is far stronger than most that will be of little help if the governments own planned forecast of 4 degrees Celsius comes to pass.
I don't agree with anything about the Great Western Link for its destruction of natural habitat, pollution and degrading of the environment to bring runaway climate change ever closer.
Do not build this road - it is a crime against nature, stuck in 20th century thinking. All efforts must instead be focussed on dramatically reducing car ownership levels, as this is the only way to reduce CO2 emissions and air pollution.
The NWL will be even more unnecessary devastation, no doubt cause extinctions to species that are on the red list for conservation and protection.
This will remove important wildlife habitat forever.
This road will cut through a maternity roost of Barbastelle Bats and put at risk a wider "Super Colony". The Rare medium sized Barbastelle Bats is Red listed Barbastelle Bats foisted [?] only occasionally and for short periods. They like the very Best of environments that's why they chose the Wensum valley Norfolk so many of

them will die if they lose their precious Habitat the alternative accommodation being offered is not suitable and they refuse to be moved.

The Building the Western Link road would be ecological vandalism. A site of SSI would be unacceptably ruined, mature and ancient trees would be lost, any saplings planted to replace them would take decades to grow to a size where they could possibly support the amount of biodiversity which is currently there, or offset the amount of carbon which the current trees do. By the time they mature it would be far too late for everything. Bat colonies have left the route of the NDR, so therefore the attempted mitigation schemes did not work. These mistakes must not be made again, the existing habitats must not be destroyed.

This awful road is not necessary, if it is built it will devastate the local environment and wildlife. The Wensum is a rare Chalk stream and should be protected. We are living in a Climate and Ecological Emergency, this project would be insane.

This road cannot improve or protect the environment as you say. Just look at the barren landscape of the NDR. Dead saplings and grass. Plantings untended and strewn with litter, dead wildlife on the road.

The cost to our wonderful natural habitats is way too high. I expect my council to protect the environment not destroy it.

In 2020 I'm so so disappointed that as a council you cannot come up with something better than a four lane tarmac race track across a SSSI site.

West End and Longwater Lane are already pollution black spots. We do not need more traffic.

There is no mention in your questionnaire about the effects of air pollution caused by traffic (tyre particles particulates etc.

I object to the road because it will be extremely environmentally destructive in an area which is renowned for its internationally protected chalk stream species. Contrary to the usual specious claims of uninformed developers, no amount of "mitigation work" will compensate for the destruction of habitats and species-niches which have taken centuries to establish naturally.

The Western Link is an act of ecocide, and no amount of green-washing can change this.

Please do not destroy this Special Conservation Area, all the established woodland, sites of Special Scientific Interest and the health and wellbeing of countless humans and creatures.

There is nothing in the proposals that comes close to providing enough protection for wildlife from the destruction the road would cause. It would result in severe fragmentation of habitats, and a single underpass at Ringland Lane will not address this. There is also evidence that pollution from roads has a negative impact on wildlife in the area. The idea of biodiversity ‘net gain’ is totally laughable and the council should be honest about the relative importance it attaches to different aims and interests: in this proposal, cars and convenience for the few are clearly being prioritised above widely accessible transport options, health and wildlife.

Governments around the world, including our own, have announced a CLIMATE EMERGENCY. …. The Wensum Valley is as important as the rain forest. It would be hypocritical to condemn other countries for their carbon emissions and habitat destruction but go ahead with building the NWL and other roads.

By building the western link you will be contributing to the climate crisis. We have only 11 years to make a drastic change to the emissions we throw out into the atmosphere and the serious of this only requires drastic action to slow down climate change.

A link road would cause serious and lasting damage to a sensitive mosaic of habitats, landscapes and complex hydrology in and around the Wensum and Tud valleys. It would further increase in carbon emissions and air pollution. Transport's share of carbon in Norfolk is already shockingly high and has contributed to the rise in global emissions and to forest fires and rising sea levels.

Cross-cutting Theme 2: Comments about proposed roads and rationale for road building (674 comments)

All the credible research over the past many years has demonstrated that projects such as dualling & building of new roads bring considerable INCREASES to traffic in their wake, so your assertion that "motorised traffic on Ringland Lane would reduce" does not align with the available evidence.

A decision on which road to close and which road to keep open is not possible when there is no evidence available on how Covid has impacted on traffic numbers and flows. Nor is there any up to date origin and destination evidence.

Only a few people would see the benefits of their daily commute being shorter. Everyone will have to bear the economic and environmental costs.

Most of the proposals for enhancement of rights of way, safer crossings of the A1067, bus routes, cycleways etc, (which are beneficial) could be done now; the building of the Norwich Western Link would not make them easier or cheaper.

Truly supporting active travel and your obligations to the environment would mean accepting that this dual carriageway is a folly and should not be built.

The whole NWL proposal should be scrapped and local and through traffic road users should be made to use existing main roads such as A146, A11, A47 and A140.

Build the Western Link Road where it should have been in the first place.

Despite the high level of opposition, the road became reality, even (against our wishes) being extended as far as the A1067 Fakenham Road. This put it in close proximity to the A47, and by this very fact has led to increased rat running and a call from many for a link to be built. This would effectively make the NDR a northern bypass to Norwich, a purpose for which the road was not designed or built for.

Fix it first: focus on the roads we have rather than building new one.

The money set aside for the NWL would be better spent on such measures together with a review of the existing radial road network to see how traffic congestion can be addressed in a less environmentally destructive way.

Buidling an expensive new road for motor vehicles is simply the wrong thing to do in this day and age.

Mitigation is not a solution as you can see by the failed attempts on the NDR.

Unfortunately, the County Council's past actions have shown that the public cannot take at face value anything that the County Council says or proposes when it comes to road building. At the NDR examination, the County Council told the Panel that a Wensum Link was not needed. Yet towards the end of the examination, the County Council published a paper on options for a Wensum Link.

The money for the NWL would be better spent on such measures together with a review of the existing radial road network to see how traffic congestion can be addressed in a less environmentally destructive way.

Cross-cutting Theme 3: Comments about the cost of proposals (204 comments)

The huge financial cost cannot be justified at a time when local services continue to be cut and the full impact of the Covid-19 crisis has yet to be realised.

I also consider the £153 to 300 million allocated to this road would be better spent on exploring alternative traffic solutions that do not cause serious environmental damage and to look to see how existing roads/paths/cycle lanes can be made safer and more public transport friendly.

It is utterly incomprehensible to me that Norfolk County Council is considering spending £3million on building this road when it would be preferable to spend it on developing more environmentally sensitive alternatives such as pedestrian footpaths and cycling routes.

We can use the NWL budget to improve the pre-existing infrastructure to address congestion issues (as well as pedestrian, cyclist and public transport facilitation) in a far less environmentally destructive way.

I am also concerned about the large amount of public funds to be committed to the road and its ongoing maintenance. This could be better spent on care and there essential services.

We should be using the £300 million proposed for this link road to develop cycling and walking. And develop a green sustainable public transport system.

Secondly, the millions of pounds saved by the abandonment of the scheme can be used for the construction of cycle-ways and adapted public transport routes. These huge sums of money saved can also be transferred to social services, education and the health service, all of which need to be funded better in the wake of both immense cuts in Central Government funding and the COVID crisis.

Cross-cutting Theme 4: Comments about Covid 19 and other health issues (163 comments)

Since lockdown my use of Ringland Lane has changed: I have been walking along this road several times a week. I drive along it perhaps once a month. This, it appears to me, raises the general issue that your modelling for motor vehicle, pedestrian, equine and cycling journeys will have been gathered either before or during the Covid pandemic and therefore may not represent the situation in which we will find ourselves in the future, which may be different again.

In a post -COVID world, we don't need this massive road network. Just improve existing roads.

The close proximity of a four-lane carriageway to pedestrian and cycle traffic also raises issues health issues due to pollution. While traffic has dropped, and with it nitrogen dioxide levels, there are widespread concerns over a rise in speeding endangering those walking and cycling. Evidence suggests air pollution, including from exhaust fumes, significantly harms the survival chances of those with Covid-19. …There are a [of] number studies showing higher levels of pollutants in proximity to roads."

I totally oppose the Western Link Road. In the light of Covid-19 (expected to be with us for a considerable time) and more people working from home, this road is not needed.

Air pollution is now known to be a major public health crisis, bringing early death to over 60,000 Britons each year. Although the research is at an early stage, there is building evidence that air pollution is a significant and sensitive factor in people being more prone to COVID-19 infection and more serious COVID-19 illness and mortality. Footpaths and bridal paths should not be placed right next to a source of NO2 and PM2.5. The road should not be built in first place.

A recent parliamentary report showed how short term exposure to air pollution increases risk of coronavirus infection and poorer COVID-19 clinical outcomes. Why are Norfolk CC not following latest science to minimise COVID-19 risks in future?

Since the beginning of the Covid 19 Pandemic it has become clearer than ever that we must improve our health and rethink our priorities for transport.

Section 7: Demographic Information

Demographic Information

There were 398 responses to the question: '**Are you...?**'.

Option	Total	Percent
Female	145	36.43
Male	**227**	**57.04**
Prefer to self-describe (please specify below)	7	1.76
Prefer not to say	19	4.77
Totals	398	100.00

There were 395 responses to the question: '**How old are you?'**.

Option	Total	Percent
0-15	0	0.00
16-29	28	7.09
30-44	75	18.99
45-64	**164**	**41.52**
65-84	104	26.33
85+	2	0.51
Prefer not to say	22	5.57
Totals	395	100.00

There were 386 responses to the question: 'Do you have any **long-term illness, disability or health problem** that limits your daily activities or the work you can do?'.

Option	Total	Percent
Yes	36	9.33
No	**321**	**83.16**
Prefer not to say	29	7.51
Not Answered	386	100.00

There were 394 responses to the question: 'How would you describe your **ethnic background**?'.

Option	Total	Percent
White British	**339**	**86.04**
White Irish	2	0.51
White other	7	1.78
Mixed	3	0.76
Asian or Asian British	2	0.51
Black or Black British	0	0.00
Chinese	0	0.00
Other ethnic background	1	0.25
Prefer not to say	40	10.15
Totals	394	100.00

Section 8: Equality and Rural Impact Assessment

Comments for Equality and Rural Impact Assessments (16 comments)

- The millions of pounds allocated to the NWL would be much better spent on a really excellent reliable public transport system that would give a real alternative to the car, especially as we have an **aging population** who will not be able to drive all their lives.
- By cutting off Access to and use of nearly all local routes [by closing Ringland Hills) this will in turn make access to local beauty spots etc difficult for those with **reduced mobility**.
- Integrated local transport - so someone can link cycling, public transport and walking. This is especially important for **women** who often have more complicated multiple journeys to do and are less likely to have access to a car.
- So far NCC have offered nothing except cycle and walking routes, no mention of including Weston Longville or Weston Green on any public transport routes. There is an **aging population** within the parish of Weston Longville, how many will have the opportunity to use cycle lanes or PRoW? How many will be cut off from the outside world should commuting route be closed.
- If the bridge is green does it mean that it will have hedging and trees or just that it will be a raised pavement going over the road ... if it is hedged how safe will it be for **unaccompanied minors & women** to cross in the dark ?
- It seems that the County Council is expecting there to be hundreds of cyclists, walkers and horse riders descending on the area, which I find difficult to believe. Most people (especially **the elderly**) require a car to get about in this **rural** area, which has no bus service.
- Building bridleways and footpaths so close to a major road will cause health risks to people using these facilities, particularly **children**.
- The map showing the bus route option does not have our village on it. For **older residents** who cannot walk far or cycle we have to use our car. There has not been any provision for public transport for many yars and it may not be viable. Ringland forgotten yet again.
- There is no public link to taverham from queens hills, a direct route from queens hills to taverham for residents needs to happen as many **children** on the estate attend taverham high school , and ideal for hospital journeys, open the existing not used bus lane, review access from queens hills to taverham and make this happen, queens hills is treated as lost world and needs some forward planning to improve logistics on and off the estate.
- The people (especially the **younger ones ie. 11-19 year olds**) are so trapped either through being priced out of transport or by not having transport routes to places they want to visit or work or have appointments for etc. Broadland and Norfolk as a whole need to realise that children of this County have been seriously hampered through lack of affordable links to work and this is your chance to show the country that Norfolk can lead the way to cheaply priced essential transport for all residents and visitors and you will have busy buses and less private cars.
- There are a high proportion of **low income families** living along the River Wensum. To get people to use buses the fares have to be much cheaper.
- We in Honingham have been pushing for public transport through the village for at least 10 years but no one is interested. As we have an **aging population** it is probably too costly.

- Older folk who do not drive but wish to visit the church [in Honingham] to attend a service or tend a family grave, are going to be effectively cut off. The new proposed route does not serve an **elderly population.** In fact most of your proposals do not serve the **elderly**, we need buses not a cycle route.

- This paper seem to only worry about how people will walk or cycle or go on a horse not people who go out in a car for pleasure as they are not able to go on all of these walks etc. etc. through various **health problems.**

- Too much emphasis on cycle use – I and my wife are both in our **80s** and how we can manage to shop and carry our bags on a bike is beyond me – keep as many roads open as possible to facilitate the majority of people and stop pandering to minorities.

- The consultation focuses on improving walking and cycling routes in the area of the NWL but does not address an improvements to a vital bus service for a village where a significant amount of the population is **elderly** and unable to access and make use of these new footpaths and cycleways.

Also note, with regard to **carers**: "Ringland & Weston have a degree of interdependence & **carers** & other local workers require motorised easy access between the villages."

Section 9: Feedback on the consultation

Comments about the consultation process (69 comments)

There were 69 comments about the consultation (many were repeated in the response to different questions and are shown in the text below only once, the quotations shown are a sample).

- Consultation document doesn't mention Ringland Lane in Costessey or the bus lane from Queen's Hills to / from Ringland Lane in Costessey.
- This a biased consultation, offering people the opportunity to have limited, superficial input on a highly expensive, environmentally destructive, raised four-lane highway that would cut through the rural landscape. No genuine alternatives to the proposal are being offered.
- This consultation assumes I already agree with the proposed road. This is a biased consultation.
- There is no option listed above to enable us to choose the status quo, ie for the Western Link road to not be built. By not having this option this consultation is biased toward the assumption that the road should be built and does not cater for those of us who do not want our countryside to be destroyed, therefore this consultation is not fit for purpose.
- This consultation is a travesty: greenwash.
- For what it's worth this consultation like the previous is nothing but a tick box exercise to demonstrate to the planning inspectorate NCC has 'consulted' with local residents.
- This consultation does not give me the option of objecting to the road being constructed here.
- Just don't build the road. Are all questions like this? Anyone would think you are giving leading questions that will be used to support your expensive and environmentally damaging obsession with increasing car use by building yet more roads.
- This questionaire seems to be human centric.
- To achieve Net Gain NCC should be in partnership with stakeholders where possible, seeking to share any benefits fairly among stakeholders, however as the council is not the greenest I believe this is an area where you are trying to hood-wink those invited to provide feedback via this consultation.
- I think this is quite a poorly formed question. It would be better if you could actually clarify what your proposals are for PRE in the question so as to clearly differentiate it from.
- Terrible question. I support public rights of way.
- This consultation is very confusing. Just scrap the project.
- The drawings which accompany the proposals are dreadful images of an over engineered, urban environment completely out of character with the actual landscape. Having only one choice of box to tick makes agreeing with some proposals and disagreeing with others, albeit under the same overall heading, extremely difficult.
- This consultation is a waste of time. The decision to build the road has been taken (alhough I don't know how you can afford it), and no-one on your committee gives a stuff about the little people who choose to walk or cycle.
- The artists impression is a joke, you have bridge engineers and have recently completed the NDR Broadland Northway.

- And you should not rig this consultation to leave out the "don't even do it" option.
- This consultation is very narrow as it specifies, and these needs to be greater transparency about current issues, design targets at remedial measures available as well as funding to implement them if peoples environment access utility and quality of life are impacted, which appears inevitable.
- It is unclear in the consultation document which pathways (and for which users) will cross the new road at the Foxburrow green bridge - this is an unhelpful omission.
- Great to see the cycleway linking to Honingham which will hopefully encourage use of it to access the other side of the A47 which is too dangerous at present. It looks like you have listened to the feedback you had in the consultation phase of user Groups, well done.
- This consultation is very very weak on deliverables.
- Quite staggering that this consultation doesn't include the elephant in the room, namely "Do you still see a need for this road in view of the massive increase in home working?" or "Do you think a 720m viaduct to cross a 30ft river seems like overkill?
- Please note that responding as an organisation rather than as an individual means that some boxes cannot be ticked and having only one choice of box to tick makes agreeing with some proposals and disagreeing with others, albeit under the same overall heading, extremely difficult.
- This consultation does not take into account the impact of the A47 Easton to North Tuddenham dualling project and the fact that the two projects will not completed at the same time.
- I'm disappointed by how misleading and obfuscated this survey has been.
- This consultation focuses on the local roads in the immediate vicinity of the proposed Norwich Western Link route, however the potential impacts cover a far wider area south towards the A11.
- It is a pity that the Local Access Consultation document is relatively silent on matters south of the A47 but I do understand that the key focus of the document is upon matters north of the A47.
- “I do not wish to see astronomically expensive infrastructure constructed in our county which comes with huge climate emergency risks and penalties, and is not Paris agreement compliant, and is planned to cause irreplaceable ecological damage which is not lawful under UK habitats and wildlife laws.” Please put an option for this in future consultation, I am not alone.
- Following the public consultation held back in March/April of this year the scheme to upgrade the Easton to North Tuddenham stretch of the A47 to dual carriageway has been updated with more detailed designs for the junctions and the connections from those junctions into the local road network. Unfortunately this latest re-design has removed the proposed link road that was to join the new junction at Blind Lane to Church Lane in Lower Easton.

Report author: Ellie Phillips, Insight and Analytics, NCC

Updated version 6 November 2020

Appendix B

SUSTAINABLE TRANSPORT STAKEHOLDER WORKSHOPS NOTES & SLIDES

Norfolk County Council

Sustainable Transport Workshop 2
Notes of Meeting

Norwich Western Link
Held on: Friday 24th January 2020 Time: 15:30pm
Venue: Rooms 1 & 2, Floor 8, Norfolk County Hall

Present:	Job Title/Organisation:
	NWL Stakeholder Manager, WSP
	Associate, WSP
	Principal Landscape Designer, WSP
	Norwich Cycling Campaign
	NCC Countryside Access Officer
	Sweco, Highways England (HE)
	Norfolk Local Access Forum (NLAF)
	Ramblers Norfolk Area Footpath Co-ordinator
	First Bus
	Transport for Norwich Manager
	Strategic Transport Team Manager
	NCC Councillor
	Konectbus
Note Taker:	
	Assistant Engineer, WSP
Apologies:	
	NCC Equalities Officer
	Sustrans
	Carriage Driving (NLAF)
	Pathmakers (NLAF)
	NCC Head of Passenger Transport
	Galliford Try
	Pathmakers (NLAF)
	Norfolk Local Access Forum
	NCC Major and Estate Development Team Manager

1.0	**Introductions**
	Members introduced themselves – HE rep joined via Skype. Comments and questionnaires received via the previous (October 2019) workshop from stakeholders have informed the next steps in the NWL process.
2.0	**NWL Project Update**
	• Surveys ongoing, e.g. ecology, geotechnical, traffic and topography • Development underway to define the horizontal / vertical alignment, and how the side roads will be crossed and whether there will be bridges or underpasses • Traffic data has been gathered across the study area • Intrusive site testing along the proposed route • Seasonal surveys for species • HE's main contractor is on board from August, to ensure that the A47 and NWL schemes interface correctly. • Change to Strategic Outline Business Case to increase emphasis on sustainable modes and include linkages with Transport for Norwich and Transforming Cities • Procurement for the preferred alignment is due to commence later this year • Traffic management discussions ongoing with neighbouring parishes **A47 Scheme** • HE is accelerating their programme, with a statutory consultation from late February to April 2020 • Currently working together with NCC/WSP on draft proposals for side road connections to southern dumbbell roundabouts **Since Sustainable Transport Workshop 1 – October 2019** • Feedback incorporated from NWL Local Liaison Group and Workshop 1 • Walking, Cycling & Horse riding Assessment Report baseline review complete • Identified a range of opportunities that are included in the draft strategy
3.0	**Summary of Previous Feedback**
	See presentation slides for background and key themes • Completed questionnaires were received from stakeholders and members of the NWL Local Liaison Group • Feedback has informed the emerging strategies put forward in the WCHAR and NMU documents • LLG feedback noted that improved walking routes was ranked highest and that all efforts should be made to keep existing PROWs open and improve them • Stakeholder feedback notes that a number of routes are already used by cyclists and may need improvement, crossings need to be introduced / improved and connectivity improvements are needed to remove gaps in the PROW network • Feedback identified an east-west desire line, crossing facilities needed on A47 and A1067 to overcome severance issues. This may assist users to access buses & PROWs to the north and south. • NWL could remove traffic from rural roads which could make active travel more attractive – eg routes would be less intimidating for cyclists.
4.0	**Emerging Sustainable Transport & NMU Strategy**
	See presentation slides for background and key themes. • NMU (Non-Motorised User) strategy close to the route is aimed at addressing severance issues that may be caused by the scheme and wider sustainable

Transport Strategy aims to support people to travel on foot, by bike and by public transport in the wider study area

- Improves travel choices for short journeys so there is an opportunity for modal shift

Bus Strategy

- Feedback from public consultation was that there need to be more buses at an increased frequency
- Western loop service to connect residential and employment areas proposed, currently at a journey time of 90 minutes
    - Route must be commercially viable
    - Longwater to Taverham route does not exist
    - A need to find out whether large numbers of people would use the service
    - Need to work out which parishes were interested in a new bus route
    - Key is to keep the route simple so that funding can be secured for a future route
- Representatives questioned how successful an hourly service would be
- Operator feedback from First Bus on the potential loop service suggests that if it is to be subsidised in the early stages it cannot be seen to compete with existing services.
- Timetable review by Konectbus shows the loop would take longer than an ideal one-hour service; it would perhaps be better to have a shorter linear route at a higher frequency rather than a full loop (e.g. Taverham to NNUH via Longwater or Airport to NNUH) splitting the loop into two sections.
- First Bus experience shows that currently people travel into central Norwich then out again to get from Taverham to NNUH and can do this on one ticket. Whilst away from the desire lines, this could be quicker than the loop if it only operates hourly. A previous three-year trial of an orbital loop service showed poor uptake.

NMU Strategy

- Retain private access routes
- Some roads identified as being in low usage could be changed
- Representatives noted that a PROW may be less attractive if it is next to the NWL – WSP stated routes can be screened and users segregated from traffic to improve enjoyment where they run parallel to the NWL.
- NCC officer queried why no cycle route was proposed alongside the viaduct structure, PROW officer highlighted that it had been agreed at the previous workshop that a bridleway would not be appropriate through the floodplain, as it would require the upgrading of routes within the sensitive landscape and routes would potentially be susceptible to flooding. NWL Team explained that a route over the viaduct would also require a much wider structure crossing the River Wensum Special Area of Conservation (SAC) and the ecological sensitivity of the SAC would most likely outweigh the benefits. There is currently no overwhelming evidence that there is a need for a cycle crossing over the River Wensum. All of the connecting onward routes are also currently public footpaths, so there would be no onward connectivity benefit of a cycle crossing of the River Wensum and existing bridges crossing the river could be more readily used by cyclists once NWL alleviates traffic from parallel routes.
- Concerns expressed over motorcycles using bridleway and restricted byways
- PROW team suggested that FP9 should be upgraded to restricted byway status to allow carriage drivers to continue north of Breck Road – possibly with structures such as Kent Carriage gaps to prevent access by motor vehicles. NWL Team

	highlighted that this would need consent of the landowner, especially if the track is currently used by vehicles, but will consider the merit of upgrading to Restricted Byway to create a contiguous route for all NMU's between Honingham and Ringland Lane.
5.0	**Next Steps and Public Consultations**

	See presentation slides for background and key themes.
	• Future work to include:
	  ○ Ongoing engagement with relevant groups
	  ○ Signage Strategy
	  ○ NMU Strategy
	  ○ Bus Strategy
	  ○ Air quality and noise assessments
	  ○ Public consultation

6.0	**AOB**
	LAF Representative mentioned that the next PROW Sub-Group will be held on 16th March, and WSP / NCC are invited to attend to give an update on NWL project. This may be good timing for the NWL Team to come along to highlight the Spring public consultation. HE / Sweco highlighted their statutory consultation is starting 26th February 2020.
	Close meeting at 16:30.

Norfolk County Council

Sustainable Transport Briefing 3
Notes of Meeting

Norwich Western Link
Held on: Friday 14th August 2020 Time: 14:00pm
Venue: Microsoft Teams

Present:	Job Title/Organisation:
	NWL Stakeholder Manager, WSP
	Associate, WSP
	NWL Stakeholder and Engagement Manager, NCC
	Senior Engineer, NCC
	Konectbus
	Norwich Cycling Campaign
	NLAF - Ramblers
	NLAF - Pathmakers
	Norwich Cycling Campaign
	NCC NLAF PROW Sub-Group organiser
	British Horse Driving Society
	Ramblers Norfolk Area Footpath Co-ordinator
	Transport for Norwich Manager
	NCC Head of Passenger Transport
	Highways England
	NLAF
	NCC Countryside Access Officer, North and East
Note Taker:	
	Assistant Engineer, WSP
Apologies:	
	NCC

1.0	**Introductions**
	WSP introduced the Local Access public consultation that had been launched by NCC and explained the purpose of the meeting was to give the group an update on how the scheme was progressing and latest proposals since the previous workshop in January 2020. WSP apologised that we were unable to run a meeting in person due to the COVID-19 restrictions and government guidance in place at the time. However, we hoped that an online meeting was still helpful to provide an update an gives an opportunity to talk through the proposals. WSP thanked everyone for their previous input to the emerging proposals, albeit the options and ideas provided for consultation are still work in progress so getting feedback from the organisations on the call was important to help NCC finalise the scheme working towards a planning application next year.
2.0	**NWL Progress Update**
	• First workshop involved brainstorming ideas to take forward as sustainable travel ideas for the NWL scheme • The NWL will remove traffic from local residential areas to make it more attractive for walking, cycling and horse riding • To progress with the scheme, the tender process commenced in June 2020 • Ensure we have input from all groups to inform further planning ideas • Followed guidance for large-major road schemes e.g. WCHAR CD195 • Bi-monthly LLG meetings had been held prior to the lockdown to involve local parishes with the sustainable transport schemes. Expect to reconvene the LLG next week for an online meeting 18 August. • All work refers to design guidance for technical design in the NMU Strategy • All documents are ready for the tender process • The project has a significant cost, so OJEU (Official Journal of the European Union) notices are required. • NCC are working closely with Highways England as they are progressing with the A47 dualling scheme, especially in relation to the common grade separated roundabout interface at Wood Lane/Berry's Lane junction. • New guidance has been released in July – LTN 1/20, which is being analysed to understand how it will impact our design but has not yet been taken into account. This would be considered in design work moving forward.
3.0	**Public Consultation**

	See presentation slides for background and key themes.
	• Overview
	  ○ NCC launched a Local Access consultation 27th July – 20th September
	  ○ Instead of public events, NCC are offering opportunities for online appointments with members of the public and stakeholder groups to speak to members of the project team. Details of how to book an appointment were provided.
	  ○ Ecology team are undertaking extensive surveys across the area and designing up ideas for green bridges to help ecology/wildlife to cross safely
	  ○ In the next consultation will be the detailed design of the viaduct and road; traffic mitigation will be considered (new traffic surveys were undertaken to revalidate the NATS model to a 2019 base year so the model is currently being updated) This will then inform the OBC and Environmental Assessment. Environmental mitigation is also being worked up

- The EIA scoping statement was submitted to the LPA in June 2020 and is publicly available on the planning portal
- Working towards submission of a planning application in Autumn next year.

- Timeline
  - Planning application to be submitted in late 2021 with construction expected to begin late 2023. Road likely to open by the end of 2025.
- Objectives
  - 4 high level objectives, as part of our business case, we need to measure how we are preforming against the objectives to see how beneficial it will be to the wider area.
  - 6 specific objectives that apply to the local area
- Proposals for local roads that cross the NWL
  - Ringland Lane to become an underpass with options to either prohibit motor vehicles and restrict access to NMU's only, or remain open to all traffic
  - Closure of Church Hill Lane/Weston Lane to all users, with construction of a local diversion route for NMU's to the west side linking with Ringland Lane
  - Closure of Breck Road to all users, with construction of a local diversion route for NMU's to the west side linking with The Broadway
  - The Broadway to be bridged over the NWL as a Green Bridge with NMU access
  - Possible tweaks to Berry's Lane / Wood Lane following the HE public consultation
- Feedback from Stakeholder Workshops and LLG
  - Make more connections into the existing PROW network
  - Reducing vehicle movements on local roads (LLG, particularly parishes most affected in close proximity to the NWL would like to see roads that cross the scheme closed to traffic where possible – hence consultation considers this more radical approach. Previously it had been assumed that all roads would be kept open so this is an important change to consult local residents on to understand how acceptable the proposals are)
  - A full route along the NWL may not be well used – and focus should instead be placed on east-west routes
  - Work with HE to reduce severance of the A47
- WSP explained the changes to PROWs and expansion of existing network in the immediate vicinity of the NWL, providing an overview of the NMU Strategy describing the proposals and approach to developing an integrated and joined-up network:
  - Acknowledged that the NWL would sever existing east-west routes – so mitigation is required to preserve access for NMU's.
  - Localised diversions would accommodate PROW users where NWL would sever existing routes at Breck Road and Weston Road/Church Hill Lane
  - The Broadway would become a traffic-free route other than to landowners, and new link with Breck Road. A barrier will be added to The Broadway to prevent motorised vehicles and protect the local landowners. A green bridge would enable non-motorised users to cross the NWL.
  - Honingham RB1 to be diverted to the east side of the NWL linking Honingham with The Broadway via a new underpass of the A47 provided by HE and this would connect with onward routes around Honingham and the Village Hall. Working with HE to integrate the NWL NMU Strategy with the A47 proposals

- Existing public footpath between Telegraph Hill and Church Hill Lane will be upgraded to Restricted Byway status
- Blackbreck Lane to remain as a relatively traffic-free route for NMUs
- To mitigate closure of Church Hill Lane, a bridleway link is proposed on the western side of the NWL linking Church Hill Lane with Ringland Lane to preserve connectivity between Weston Green and Ringland.
- Footpaths to the north of Ringland Lane will not be upgraded, this avoids environmental concerns of adding a further crossing of the River Wensum
- New footway / cycleway to the north side of the new dualled section of A1067.

- Proposals to Ringland Lane
  - Option 1
    - Retain Ringland in its current state as open to all traffic
    - Due to low traffic flows, there is no expectation to provide a segregated surface for NMUs other than a footway to the south side of Ringland Lane to link Blackbreck Lane with the proposed Bridleway to the west side.
  - Option 2
    - Closed to all motorised traffic and make it a no-through road
    - Only open to NMUs and local private access

- Local roads around the scheme are likely to experience reduced traffic flows and will be more attractive to NMUs

Rep – suggested that cyclists will want to cross the NWL to go towards Dereham at the south-west of the NWL scheme, there doesn't appear to be any provision for this. WSP responded that HE were currently updating their scheme and would be better placed to consider east west links to Dereham.

Rep asked if there was a favoured option for Ringland Lane – WSP responded that NCC don't have a preference, hence we are seeking feedback from the public on two options.

Rep – asked if Blackbreck Lane was to be downgraded to Restricted Byway status and prohibit motor vehicles (Green Laners)? -WSP – responded that we are not proposing to change the status of Blackbreck Lane. WSP added that this is one of the few routes available for some users in the area, so previous feedback had indicated it was preferable to retain the current status.

Rep – suggested improved surface on Blackbreck Lane to make it more suitable for cyclists? – WSP – not considered currently, but a proposal that could be considered in the future

Rep agreed that an asphalt surface would encourage increased motor vehicle use – WSP agrees that this is why an upgraded surface is not being considered.

Rep– queried if Ringland Lane was closed to traffic would it be a restricted byway, as it is used frequently for carriage drivers? Carriage drivers look for circular routes? WSP – on the east side it will be open for carriage users.

	Rep wondered why just a bridleway from Weston Road to Ringland, not a Restricted Byway? WSP – this is something we are consulting on to get the best balance, the option is there for Ringland Lane to remain open as is and alternative routes are available for carriage drivers. Rep suggested to add staggered barriers to allow carriage drivers through but limit vehicles. WSP – we had considered Kent carriage gaps previously but if we had low level posts in the ground this would be a potential safety issue especially in hours of darkness. PClk added that we also need to consider access for agricultural vehicles, so a gate appears to be the most appropriate solution Rep offered to send over an example of successful barriers in place to allow continued use for carriage drivers. • WSP explained that LLG parish reps had requested that NCC close all roads that cross NWL to motor vehicles, the consultation is now open to see how this proposal would impact the NMU groups Rep– commented on the idea of having all roads closed to traffic - why is Ringland Lane the only one to remain open? He feels it should be kept open. WSP stated that it may turn out not be viable to close all routes that cross the NWL, in which case Ringland Lane could be kept open to motor vehicles, but NCC team does not have a preference, so the decision will be influenced by feedback from the public and affected landowners. • Concept design for Green Bridges was indicated with an artist's impression of The Broadway – an important bat crossing, a green bridge would support wildlife and NMU movement. Hedges along the bridge could provide shelter and protection for protected species, plus continuation of foraging habitat over the NWL for creatures to follow. The team is working with Natural England and an Ecology Group to get evidence from other examples for green bridges.
4.0	**Wider Sustainable Transport Measures**
	• WSP gave an overview of the wider sustainable transport options being considered for inclusion in the scheme. • The consultation asks for feedback on what people would like us to consider (top 3 options), as it may not be possible to do all of them, so they are being prioritised. • Options 1-3 include three new crossing options for the A1067 • Option 4-8 are cycle-friendly routes proposed on roads that are likely to experience traffic relief following the opening of the NWL road scheme – priority measures on these routes would potentially make cycling less intimidating • Route 5 considers a crossing of the A47 into the Food Enterprise Zone – would require a joined up approach with HE, and would encourage journeys to the Park and Ride in Costessey and improve access to Easton College. Rep – a better crossing is also needed for NMUs at the Longwater Junction, as it is currently very dangerous – WSP – potential junction improvements at the Longwater Interchange are being considered – this would also look at NMU provision.

5.0	**Bus Strategy**
	• WSP explained the bus strategy and how it had evolved since the last workshop. • Following the previous comments, the initial idea of a full loop around the western fringe of Norwich had been split into two sub options to form an eastern and western Arc service. We were seeking feedback on which option would offer most benefit and have most uptake. • This would connect local residential development to workplaces such as UEA and NNUH without the need to travel to central Norwich to change buses. • As previously proposed by bus operators, two sub-loop options would help to speed up journey times and could operate more frequently than a full loop service so would potentially attract more patronage. • Specific routing for the buses have not been confirmed yet but NCC would work with operators to find a solution that was workable with appropriate vehicles. Konectbus updated on a new service they were about to launch with UEA to support their plans to displace car parking to the Norwich Airport Park and Ride, as the Costessey Park and Ride site is at capacity. New route to begin on the 14th September to include the boundary roundabout and Earlham road, so a section of the western arc option will be served from September 2020. WSP thanked Konectbus for the update and felt that it was positive that part of the Arc was being implemented. NCC officer – asked if we are expecting it to be commercial? If subsidised, we need to be careful that it doesn't compete with other services. Could potentially use the bus gate to come in from Queen's Hills to link it to Costessey? – WSP – this is not something we have ruled out. We had a call with Costessey Town Council and they would like us to consider routing via West End too so we are looking at which is most practical and viable. NCC officer – students living in this area (Thorpe Marriott / Drayton / Taverham) find it hard to get to Easton College as they have to go into the City and out again. WSP – we can look into this. NCC officer asked to make sure the consultation brochure will get to Easton College for a response. • WSP final decisions on bus service viability will consider funding and passenger numbers – which the consultation feedback can help us to evidence.
6.0	**AOB**
	Konectbus – to build a sustainable bus route, it is helpful to build upon a strong peak movement, need to identify a large number of student movements from Taverham / Costessey / Drayton into Easton College, this could then encourage a new bus service. Rep – the route through Ringland Hills is very steep and not attractive to cyclists so a bus route here would possibly be better. Rep – good to see the improvements, are you expecting responses from individuals or organisations? WSP – if you could respond as an organisation it would be ideal and then if you would like to provide a further response as a local resident, that would also be very helpful. Rep would like to see the wider transport proposals overlaid on an OS 1:25 scale map, so that impacts on the Public Rights of Way can be seen.
	Close meeting at 15:30

Stakeholder Workshop

Norwich Western Link

18th October 2019

Agenda

1 – Introductions and apologies

2 – Background to the NWL scheme

3 – NWL scheme programme

4 – Sustainable Transport for NWL

5 – Next steps and seeking your feedback

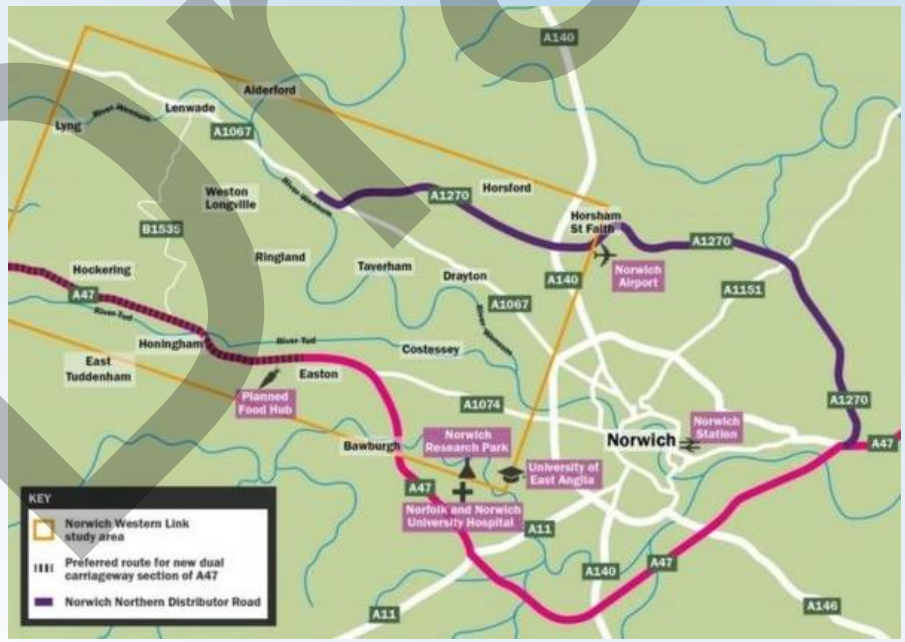
2

Background to the NWL scheme

The need for the scheme:

- Calls to fill in the ‘missing link’ between A47 and Broadland Northway (NDR)
- Made an infrastructure priority in 2016

- Two public consultations to date
- Strong support to create a link road from
  - *Members of the public*
  - *Businesses*
  - *MPs and local councils*
  - *Emergency services*



Missing link

2

Background to the NWL scheme

Progress to date:

- Route Option Selection process undertaken
- Preferred Route (C) confirmed on 15th July by NCC cabinet
- Transport East confirmed NWL as a regional road infrastructure priority in July
- Strategic Outline Business Case (SOBC) submitted to DfT on 31st July.

Preferred route

2

Background to the NWL scheme

Relevant scheme objectives:

- Make the transport network safer for all users (including non-motorised users such as walkers, cyclists, horse-riders)

- Encourage a shift to more sustainable modes of transport, such as public transport, walking and cycling

- Improve access to green space

- Contribute to the improved health and well-being of local residents

- Provide traffic relief (and reduce noise and emissions) within residential areas

- Reduce congestion and delay, and improve journey time reliability, on routes in the area to the west of Norwich

2

Background to the NWL scheme

Ongoing activities:

- Preparation of the Outline Business Case
- Tender specification work to procure a contractor
- Design development for the preferred route
- Traffic modelling
- Geotechnical site investigation
- Surveys including ecology (fish, macrophytes, reptiles, bats, badgers etc), and topographical
- Ongoing engagement with relevant groups and organisations e.g. Parish Councils, Public Transport Operators
- Walking, Cycling, Horse Riding Assessment
- Sustainable Transport Strategy

3

NWL scheme programme

Milestone	Current estimate
Regional priority status agreement – Transport East meeting	July 2019
Preferred route established – decision at July Cabinet	15th July 2019
Strategic Outline Business Case (SOBC) together with the Regional Evidence Base (REB) submission to DfT	July 2019
Outline Business Case (OBC) submission	Autumn 2020
Design and Build Contractor appointment	Autumn 2020
Formal Pre-application Public Consultation	Late 2020
Planning Application submission	Spring 2021
Full Business Case (FBC) submission	Summer 2022
Start of construction work	End 2022
Road open	Early 2025

The Sustainable Transport Strategy

- It is aimed at:
  1. **Mitigating severance issues that may be caused by the scheme.**
  2. **Supporting people to travel on foot, by bike and by public transport in the study area**

- The NWL crosses several existing non-car routes – there may be opportunities to divert some routes or retain and improve the quality of those that are well used.

- In some cases, improvements to facilities in the wider study area can result in greater user benefits than incorporating dedicated facilities along the scheme preferred route alignment.

- For example, enhancing accessibility and safety for non-motorised users on existing routes where there would be traffic relief as a result of the NWL scheme.

Sustainable transport for NWL

Seeking your input is important to us to inform the mitigation design and Non-Motorised User Strategy:

This workshop will explore how we can design for the following user groups:

- *Pedestrians*
- *Cyclists*
- *Equestrians*
- *Mobility impaired users*
- *Public transport users*
- *Other users, and traffic management measures*

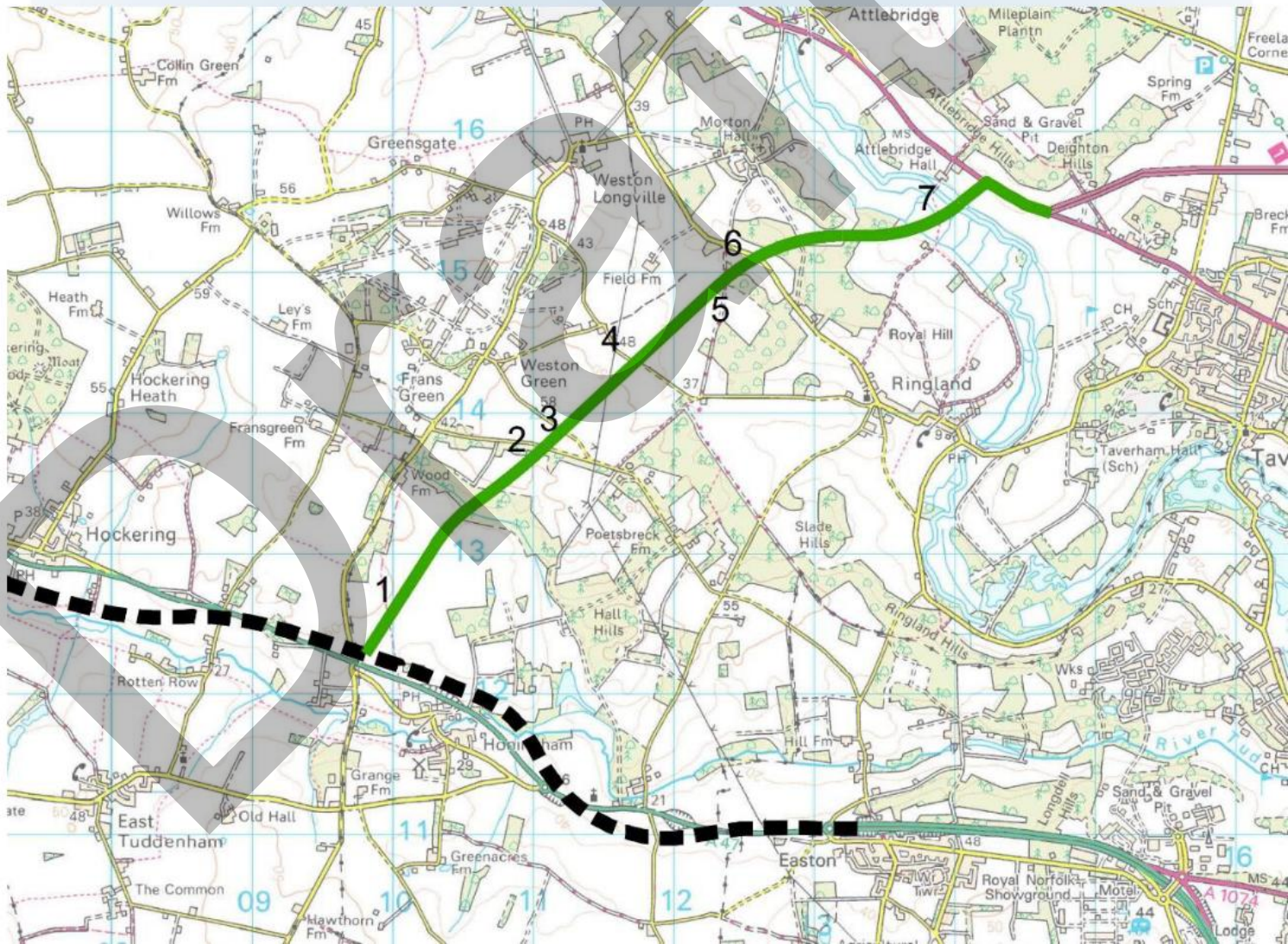
We would like to understand your priorities so we can factor this into the scheme, and communicate ideas to others in the council, if they align better with other local initiatives.

Mitigating Severance

Part 1. Mitigating Severance Issues

We would like to understand how you use the existing routes crossed by the scheme currently, and how you would like to see them treated as part of the NWL scheme.

1. Honingham Restricted Byway 1
2. The Broadway
3. Breck Road
4. Weston Road
5. NCC Maintained Track
6. Ringland Lane
7. Ringland Footpath 1



Sustainable transport for NWL

We would also like to hear your views on how we can improve opportunities for Sustainable Travel in the west of Norwich:

We would like to understand how you use routes in the wider study area around the NWL, where you are travelling to and from and how you what improvements would be helpful to local transport user groups:

- *Pedestrians*
- *Cyclist*
- *Equestrians*
- *Mobility impaired users*
- *Public Transport Users*
- *Other users, and traffic management measures*

We would like to understand your priorities for each of the above user groups, so we can factor this into the scheme where relevant, and communicate ideas to others in the council, if they align better with other local initiatives.

Designing for Pedestrians

- What are the key issues faced by pedestrians?
- Where are the gaps in the local network?
- What can we do to help improve things?

- Pedestrians typically walk up to about 25 mins to access jobs, schools, shops and local facilities.
- This equates to about a 2km walking distance at a typical average walking speed.
- Less mobile users travel more slowly
- Pedestrians tend to prefer:
  - Infrastructure on key desire lines
  - Shallow gradients
  - Minimal Steps/Ramps
  - Safe Crossing points
  - Secure environment
  - All weather surfacing

Designing for Cyclists

- What are the key issues faced by cyclists?
- Where are the gaps in the local cycle network?
- What can we do to help improve things?

- Cyclists typically ride about 25 mins to access jobs, schools, shops and local facilities.
- This equates to about a 5km distance at a typical average cycling speed.
- Electric bikes may extend this range and make hills easier to negotiate
- Cyclists tend to prefer:
  - Good cycle parking at key destinations
  - Cycle Lanes on carriageway in 30 mph zones
  - Segregated cycleways/bridleways for leisure
  - Shared surface separated by a verge
  - All weather surfacing
  - Toucan Crossings in urban areas
  - Underpasses or ramped bridges
  - Ramps preferred - Avoid Steps

Designing for Equestrians

- What are the key issues faced by equestrians?
- Where are the gaps in the local network?
- What can we do to help improve things?

- Where possible new cycle routes to be provided for NWL would be multi-user routes which are also suitable for equestrians
- Equestrians tend to prefer:
  - Mounting blocks if dismount required
  - Ramps preferred - Avoid Steps
  - Taller parapets for riders
  - Shared surface widened beyond 3m
  - Grass horse margin
  - Quieter low traffic routes
  - Pegasus crossings
  - Height clearance of 2.8m

Inclusive Design

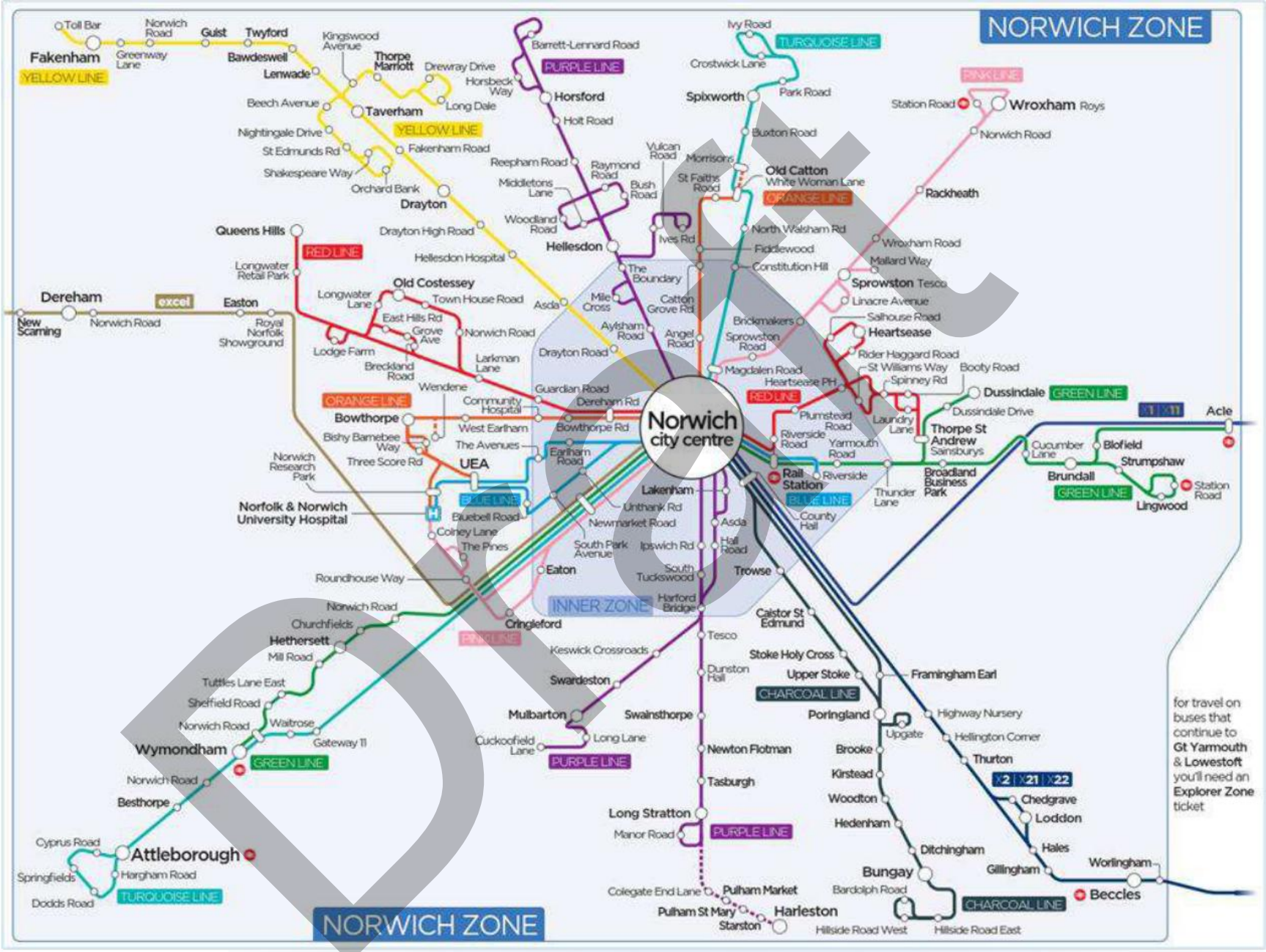
- What are the key issues faced by impaired users?
- Which local facilities are difficult to access?
- What can we do to help improve things?

- The Equalities Act 2010 requires any new infrastructure to be accessible to all – this means we cannot discriminate against people who have protected characteristics including (amongst others):
- Age and Gender
- Visually impairment
- Hearing impairment
- Wheelchair users or difficulty walking
- Disabled Users tend to prefer:
  - Shallow ramp gradients no steeper than 1:20
  - Contrasting surfacing
  - Tactile paving
  - Kerbed roads
  - Short diversions
  - Resting places/seats

Public Transport

- What are the key issues faced by bus users?
- What facilities are difficult to access by bus?
- What can we do to help improve things?

- The Public Transport System in Norwich is a competitive market industry with local bus operators responding to market demand.
- Bus routes are naturally focussed on radial routes to central Norwich from market towns as these generally have good catchments.
- Bus infrastructure improvements could include:
  - New or improved bus stops
  - Bus shelters
  - Information display boards
  - Raised Kerbs at bus stops
  - Bus Lanes on key bus routes
  - Bus gates/bus only links
  - Bus priority at junctions


NORWICH ZONE
Norwich city centre
Toll Bar
Norwich Road
Guist
Twyford
Fakenham
Greenway Lane
YELLOW LINE
Bawdeswell
Lenwade
Kingswood Avenue
Thorpe Marriott
Drewray Drive
Beech Avenue
Taverham
Long Dale
Nightingale Drive
St Edmunds Rd
Fakenham Road
Shakespeare Way
Orchard Bank
Drayton
Barrett-Lennard Road
PURPLE LINE
Horsford
Horsbeck Way
Holt Road
Reepham Road
Raymond Road
Middletons Lane
Bush Road
Woodland Road
Drayton High Road
Hellesdon
Hellesdon Hospital
Queens Hills
RED LINE
Longwater Retail Park
Old Costessey
Longwater Lane
Town House Road
East Hills Rd
Grove Ave
Norwich Road
Lodge Farm
Breckland Road
Larkman Lane
Dereham
excel
New Scarning
Norwich Road
Easton
Royal Norfolk Showground
Wendene
ORANGE LINE
Community Hospital
Bowthorpe
West Eartham
Bishy Barnebee Way
Three Score Rd
The Avenues
UEA
Norwich Research Park
Norfolk & Norwich University Hospital
BLUE LINE
Bluebell Road
Colney Lane
The Pines
Roundhouse Way
Guardian Road
Dereham Rd
Bowthorpe Rd
Eartham Road
Lakenham
Unthank Rd
Newmarket Road
South Park Avenue
Ipswich Rd
Eaton
South Tuckswood
Harford Bridge
INNER ZONE
Trowse
Norwich Road
Churchfields
Hethersett
Mill Road
Tuttles Lane East
Sheffield Road
Norwich Road
Waitrose
Gateway 11
Wymondham
GREEN LINE
Norwich Road
Besthorpe
Cringleford
PINK LINE
Keswick Crossroads
Swardeston
Mulbarton
Cuckoofield Lane
Long Lane
PURPLE LINE
Swainsthorpe
Tesco
Dunston Hall
Newton Flotman
Tasburgh
Long Stratton
Manor Road
PURPLE LINE
Colegate End Lane
Pulham Market
Pulham St Mary
Starston
Harleston
Caistor St Edmund
Stoke Holy Cross
Upper Stoke
Framingham Earl
CHARCOAL LINE
Poringland
Upgate
Highway Nursery
Hellington Corner
Brooke
Thurton
Kirstead
Woodton
Hedenham
Ditchingham
Bungay
Bardolph Road
Hillside Road West
Hillside Road East
CHARCOAL LINE
Hales
Gillingham
Worlingham
Beccles
Chedgrave
Loddon
x2 x21 x22
for travel on buses that continue to Gt Yarmouth & Lowestoft you'll need an Explorer Zone ticket
Ivy Road
TURQUOISE LINE
Crostwick Lane
Spixworth
Park Road
Buxton Road
Vulcan Road
Morrisons
St Faiths Road
Old Catton
White Woman Lane
ORANGE LINE
North Walsham Rd
Fiddlewood
Constitution Hill
Ives Rd
The Boundary
Mile Cross
Asda
Catton Grove Rd
Aylsham Road
Angel Road
Drayton Road
Sprowston Road
Magdalen Road
Heartsease PH
RED LINE
Plumstead Road
Riverside Road
Yarmouth Road
Rail Station
Riverside
Thunder Lane
BLUE LINE
County Hall
Laundry Lane
Brickmakers
Heartsease
Salhouse Road
Rider Haggard Road
St Williams Way
Booty Road
Spinney Rd
Dussindale
GREEN LINE
Dussindale Drive
Thorpe St Andrew
Sainsburys
Broadland Business Park
PINK LINE
Station Road
Wroxham Roys
Norwich Road
Rackheath
Wroxham Road
Mallard Way
Sprowston Tesco
Linacre Avenue
x1 x11
Acle
Cucumber Lane
Blofield
Strumpshaw
Brundall
GREEN LINE
Station Road
Lingwood


bus routes in the Norwich cityzone
Hockering
Honingham
Mattishall
East Tuddenham
South Green
Welborne
Colton
Marlingford
Barnham Broom
Barford
Thuxton
Wramplingham
Great Melton
Little Melton
Hethersett
Kimberley
Hardingham
Wicklewood
Wymondham
Deopham
Deopham Green
Attleborough
Queen's Hills
Easton
Costessey
New Costessey
Costessey Park & Ride
Norwich City Centre
Eaton Park
Eaton Bradenham Way
N & NUH
Cringleford Cantley Lane
Thickthorn Park & Ride
Harford Park & Ride
Keswick
East Carleton
Mulbarton
Tacolneston
Wymondham Cross/NatWest
Attleborough Shrub Close
Connects to X6 to Thetford
to East Harling
Key
Straight8
park & ride bus route
konectbus route
section of route served by some journeys
direction of travel
terminus point
bus stop
cityzone boundary
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Digital Cartography by Pindar Creative www.pindarcreative.co.uk

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Traffic Management

- By introducing additional delay or inconvenience, strategic traffic can be deterred from rural routes and encouraged to use NWL once in place.
- Traffic management measures can also encourage walking, cycling and public transport use.
- Types of traffic calming could include:
  - Horizontal Deflection (Chicanes, width restrictions, priority give way systems, speed limit gateway features)
  - Vertical Deflection (speed humps, cushions, raised tables)
  - Pedestrian crossings can also cause delay to traffic whilst improving opportunities for mitigating severance issues
  - Reduced speed limits
  - Weight restrictions
  - Reallocation of road space
  - Revisions to junctions
  - Interactive signs
  - Changes to road markings

5

Next steps and seeking your feedback

We need your local knowledge and views on current walking / cycling / horse-riding / public transport facilities and traffic management to help answer questions like:

- How are the existing routes crossing the proposed route alignment used?
- Are there any gaps in the local network?
- What are the main barriers to sustainable travel?
- How might you travel differently with NWL in place?
- What traffic management measures on the existing road network would you like us to consider?

Please use the questionnaire forms to answer, drawing feedback from your users, and return by 1st November 2019 to *Hattie.Gibbs@wsp.com.*
Max 200 words per question

Stakeholder Workshop

Norwich Western Link

24th January 2020

Image: Sustrans

Agenda

1 – Introductions and apologies

2 – NWL Project Update

3 – Summary of Previous Feedback

4 – Emerging Sustainable Transport & NMU Strategy

5 – Next steps and Public Consultation

6 - AOB

2

Project Update

NWL Project Update

Surveys – Ecology, Geotech, Traffic, Topo
Developing Preferred Route Alignment

- Horizontal Alignment
- Vertical Alignment
- Side road crossings
- Wildlife structures

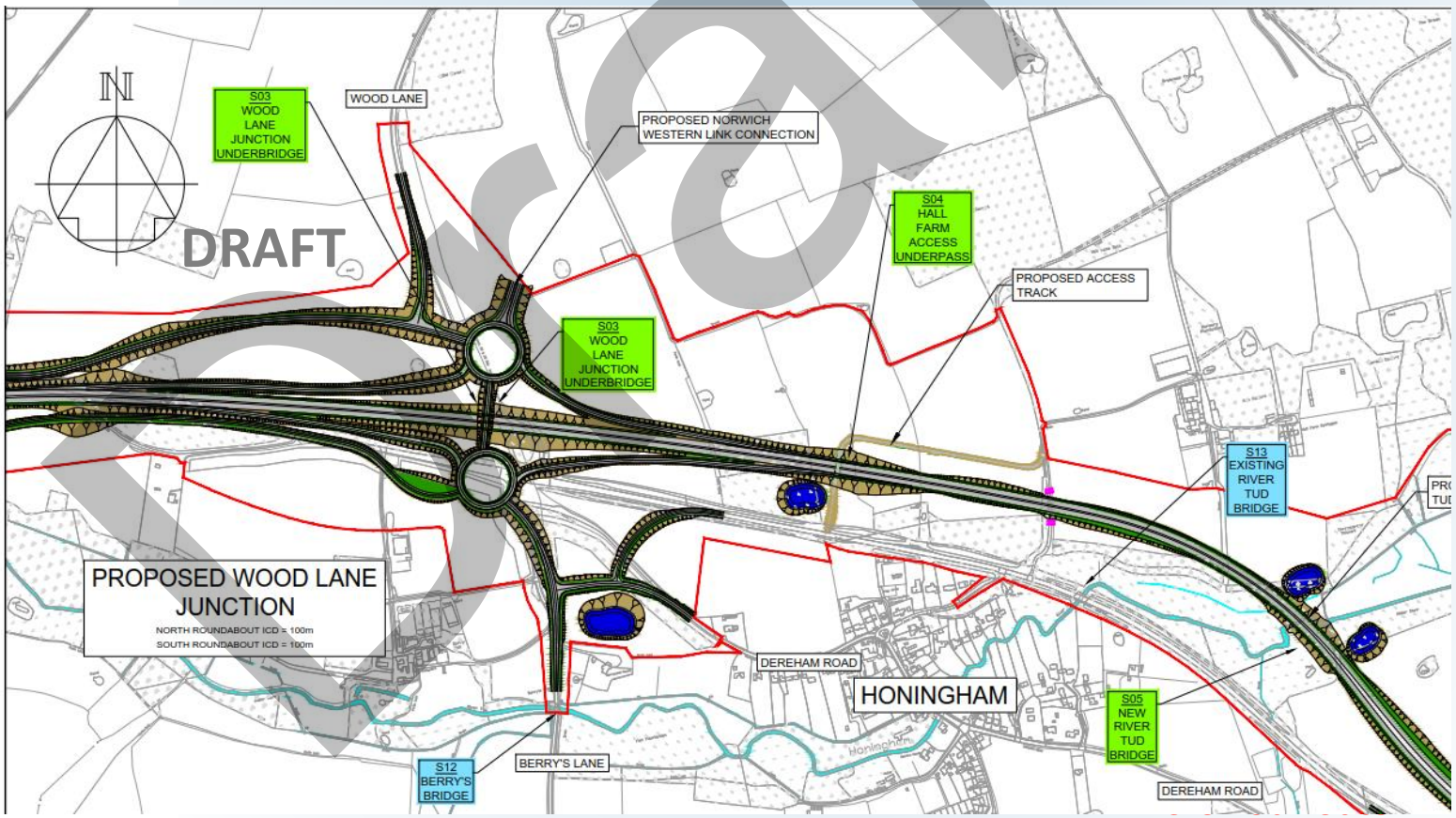
Interface with Highways England A47 dualling
SOBC edits following DfT Comments
Liaison with DfT regarding update to Traffic Model
Procurement preparation
Developing the Sustainable Transport Strategy
EIA and TA scoping commenced

A47 Scheme Interface

2

A47 Upgrade

- HE now working to accelerated programme
- Statutory Consultation likely to be early 2020
- NWL team reviewed HE work-in-progress designs
- A47 & A1067 junction modelling



Sustainable Transport tasks since October:

- **Ongoing engagement with relevant groups and organisations e.g. Parish Councils, Public Transport Operators**
  - Next Local Liaison Group meeting scheduled 4th February

- **Non-Motorised User Strategy**
  - To inform the procurement package
  - Focussed along NWL route and sideroad crossings
  - Measures proposed, include new bridleways, improved signage and creation of new walking and cycling routes
  - Working with landowners

- **Walking, Cycling, Horse Riding Assessment – WIP Draft**
- Baseline review
- Input from stakeholders
- Identification of wider opportunities
- Covering 5km study area around the NWL scheme

- **Bus Strategy**
  - Underway and informed through liaison with bus operator
  - Western Loop Bus route option being developed

- **Traffic Management Discussions with Parishes South of A47**

3

Stakeholder Feedback

Stakeholder Feedback

- Completed questionnaires received from stakeholders and members of Local Liaison Group.
- Feedback informed emerging strategy put forward in the Walking, Cycling & Horse Riding Assessment and NMU Strategy

- Improvements suggested include:
  - Providing improved circular connectivity for recreational walks and active movement;
  - Commuting and purpose driven desire lines tend to be East-West;
  - Create new routes or divert existing PROWs to improve opportunities for active movement
  - Improved signage and wayfinding to routes.
  - Improve crossing facilities at north and south edges of scheme (A1067 and A47)
  - Improve strategic connectivity to Mariotts Way and Pedalways
  - Improve access to buses and bus stops

3

Stakeholder Feedback

Stakeholder Feedback:

- Barriers to use of sustainable modes were:
  - Standard and safety of routes;
  - Maintenance issues;
  - Lack of bus services through study area;
  - Habit / attitude; and
  - Time taken in comparison to private car travel.

- **Sustrans** urges NWL to encourage active travel by continuing the infrastructure for active travel around the western link;
- Recommended that signing with blue way markers is used, as has been successful with the Marriott's
- Way to increase use by horse riders;
- Bridges/grade separated crossings are encouraged on the NWL crossing routes and desire lines; and
- Sustrans would be happy to help contribute to early designs to improve the design of the project.

3

Stakeholder Feedback

Stakeholder Feedback:

Routes already used by cyclists (may need improvement)

- For commuting and access to key facilities the desire lines are generally east-west
- Weston Longville to Taverham/Drayton/Costessey
- Lenwade/Attlebridge to Norwich via Marriott's Way
- Low traffic route parallel with A47 via East Tuddenham, Honingham, Easton, Bawburgh

Crossings that need to be introduced / improved

- New crossing on A1067 at Attlebridge
- Upgrade existing crossing at Lenwade
- New crossing of A47 at Dog Lane, Easton
- New crossing of A47 west of Hockering

Missing links/potential new links/connectivity improvements:

- Weston Green to Easton via The Broadway
- Easton to Ringland
- East-west routes through Costessey from West End to Marriott's Way.

3

LLG Feedback

Local Liaison Group Feedback:

- Key destinations for local parishes were key facilities (medical, shops, services, community facilities and jobs within their local area), Norwich City Centre, Longwater, Mattishall and Dereham and NNUH
- Routes utilised were the A140, A1067, A11, B1108, B1149 and rural roads.
- Along all the routes crossed by NWL, the key mode used across all seven was walking.
- Improvements people would like to see:
  - Improved walking routes was ranked highest;
  - Side roads closed to through traffic;
  - Improved crossing facilities for NMUs;
  - Lower speed limits, introduce and enforce weight restrictions on local roads to discourage HGVs and through traffic
  - Existing PROWs to remain open and improved

Emerging Sustainable Transport Strategy

- It is aimed at:
  1. **Mitigating severance issues that may be caused by the scheme.**
  2. **Supporting people to travel on foot, by bike and by public transport in the study area**

- The NWL crosses several existing non-car routes – there may be opportunities to divert some routes or retain and improve the quality of those that are well used.

- In some cases, improvements to facilities in the wider study area can result in greater user benefits than incorporating dedicated facilities along the scheme preferred route alignment.

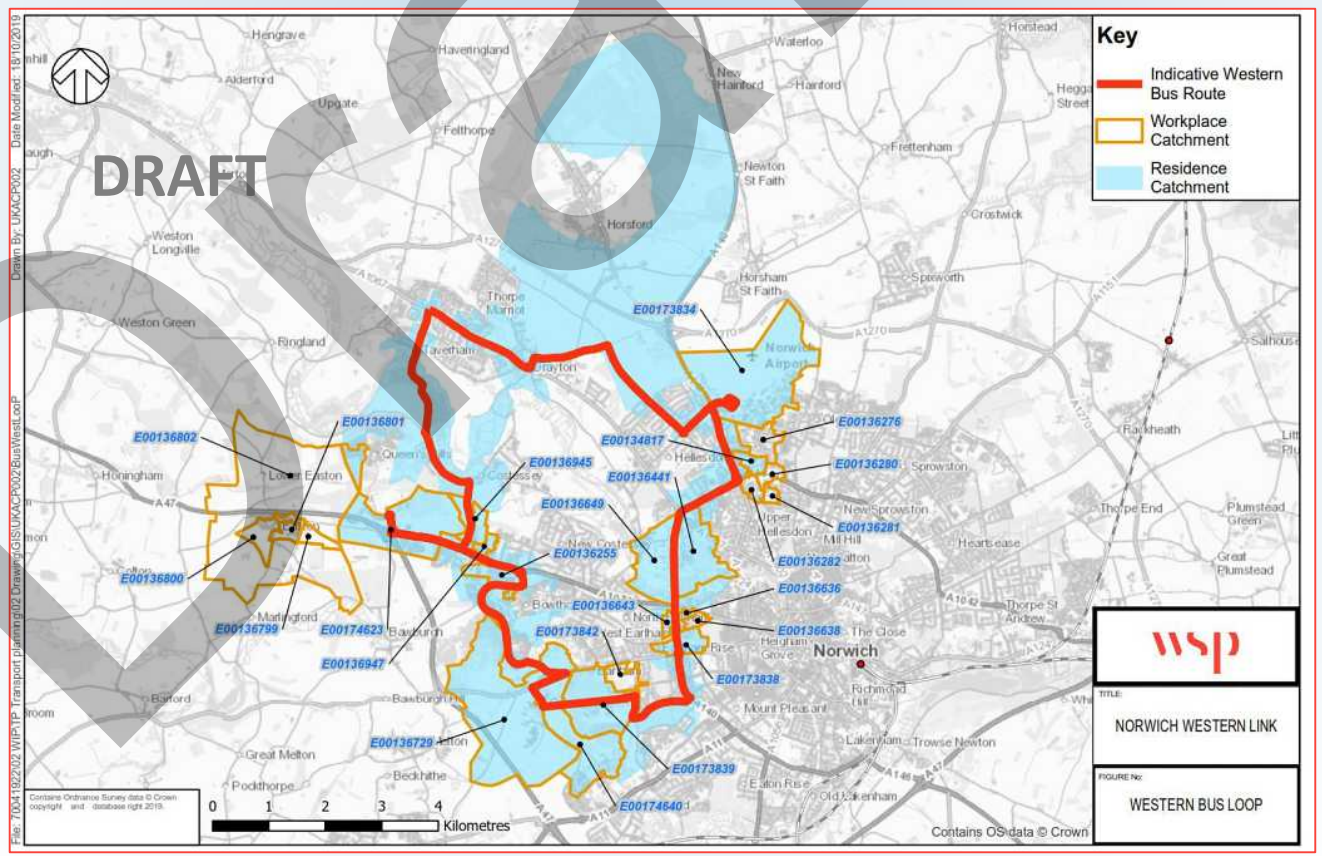
- For example, enhancing accessibility and safety for non-motorised users on existing routes where there would be traffic relief as a result of the NWL scheme.

Bus Strategy

- Prepared alongside the Walking, Cycling & Horse Riding Assessment and NMU Strategy which all feed into the STS
- Using data gathered through consultations, stakeholder engagement and catchment analysis, a western bus loop has been created.
- It would service large residential areas, Taverham, Drayton, Costessey, Longwater, Norwich Airport, UEA and NNUH.
- Possibly an hourly loop
- Indicative timetable
- Improvements

Bus Strategy

- Dialogue between bus operators is underway to examine the feasibility of a western loop service.
- Improved access to radial route services
- NWL improves connectivity with Park and Ride



NMU Strategy

NMU Strategy

Avoid where possible closing Public Rights of Way.

Where diversions are required, the length of alternative routes will be kept to a reasonable length

Diversion routes will be developed in accordance with the DfT guidance TD91/05.

Seek to improve surfacing and accessibility where possible aligned with Sustrans and BHS guidance

Avoid, or minimise disturbance to adjacent landowners and farm operations.

Proposed maintenance tracks can be utilised as new links between Public Rights of Way's and local roads.

NMU Strategy

Where minor roads or private accommodation routes to be retained cross the NWL, bridges or underpasses will be provided where practicable for use by NMU's including equestrians.

Some quieter routes are proposed for downgrade to Restricted Byway or Bridleway to restrict motorised vehicle traffic

NMU provision around the A47 junction will require coordination with Highway England to create a joined up strategy.

Landscaping proposals will take into account security threats to footpath users, particularly in remote rural areas.

4

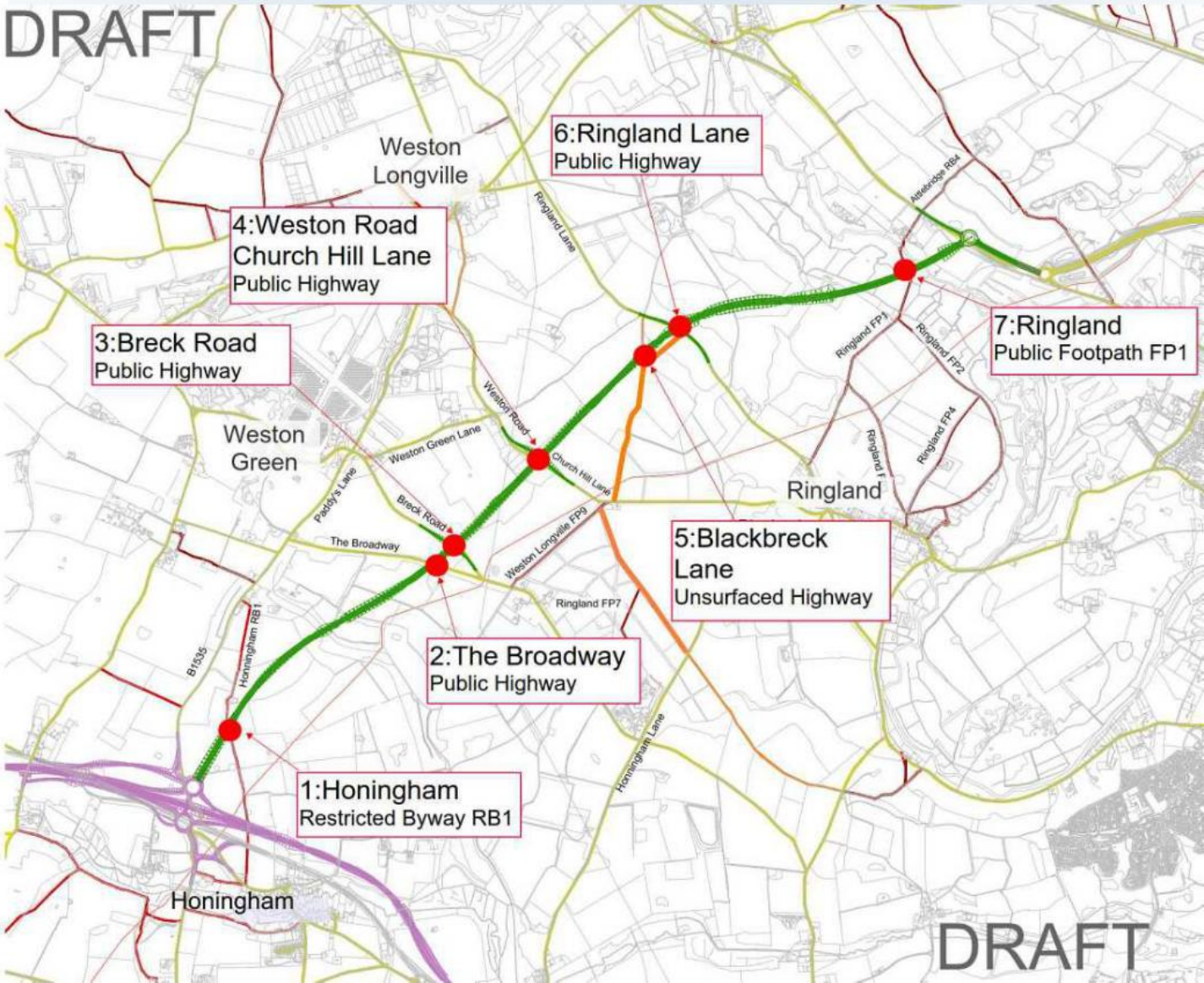
Sustainable transport for NWL

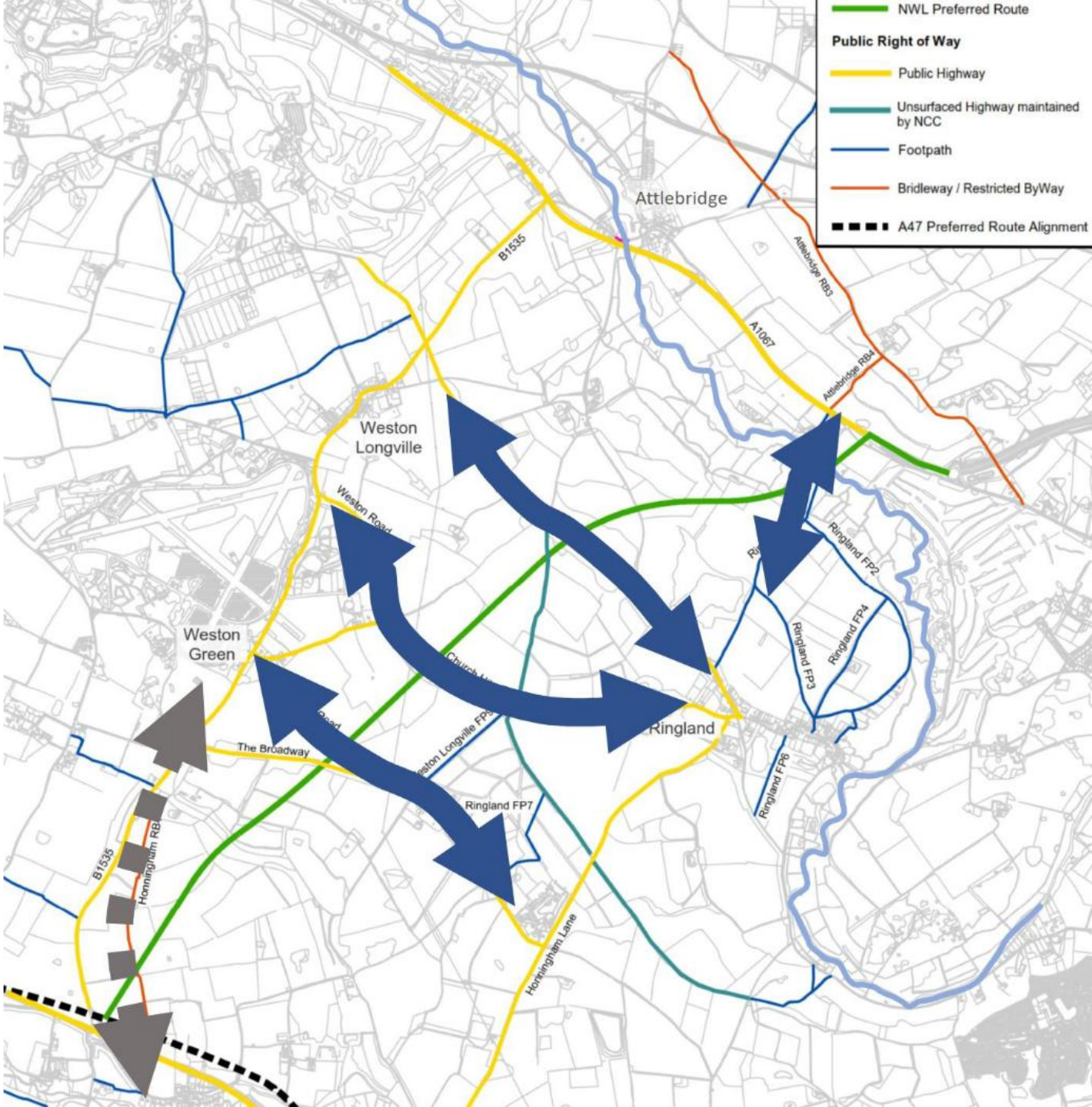
Existing

Public highway

Unsurfaced highway

Public Right of Way




NWL Preferred Route
Public Right of Way
Public Highway
Unsurfaced Highway maintained by NCC
Footpath
Bridleway / Restricted ByWay
A47 Preferred Route Alignment
Attlebridge
B1535
A1067
Attlebridge RB3
Attlebridge RB4
Weston Longville
Weston Road
Ringland FP2
Ringland FP3
Ringland FP4
Weston Green
Church
Ringland
The Broadway
Weston Longville FP5
Ringland FP6
Ringland FP7
B1535
Honningham RB1
Honningham Lane

Public right of way Type	Pedestrians	Equestrians	Cyclists	Non-motorised vehicles	Motorised vehicles
Footpath					
Bridleway					
Restricted byway					
Byway Open to All Traffic (BOAT)					

Existing

Public highway

Unsurfaced highway

Public Right of Way

Proposed

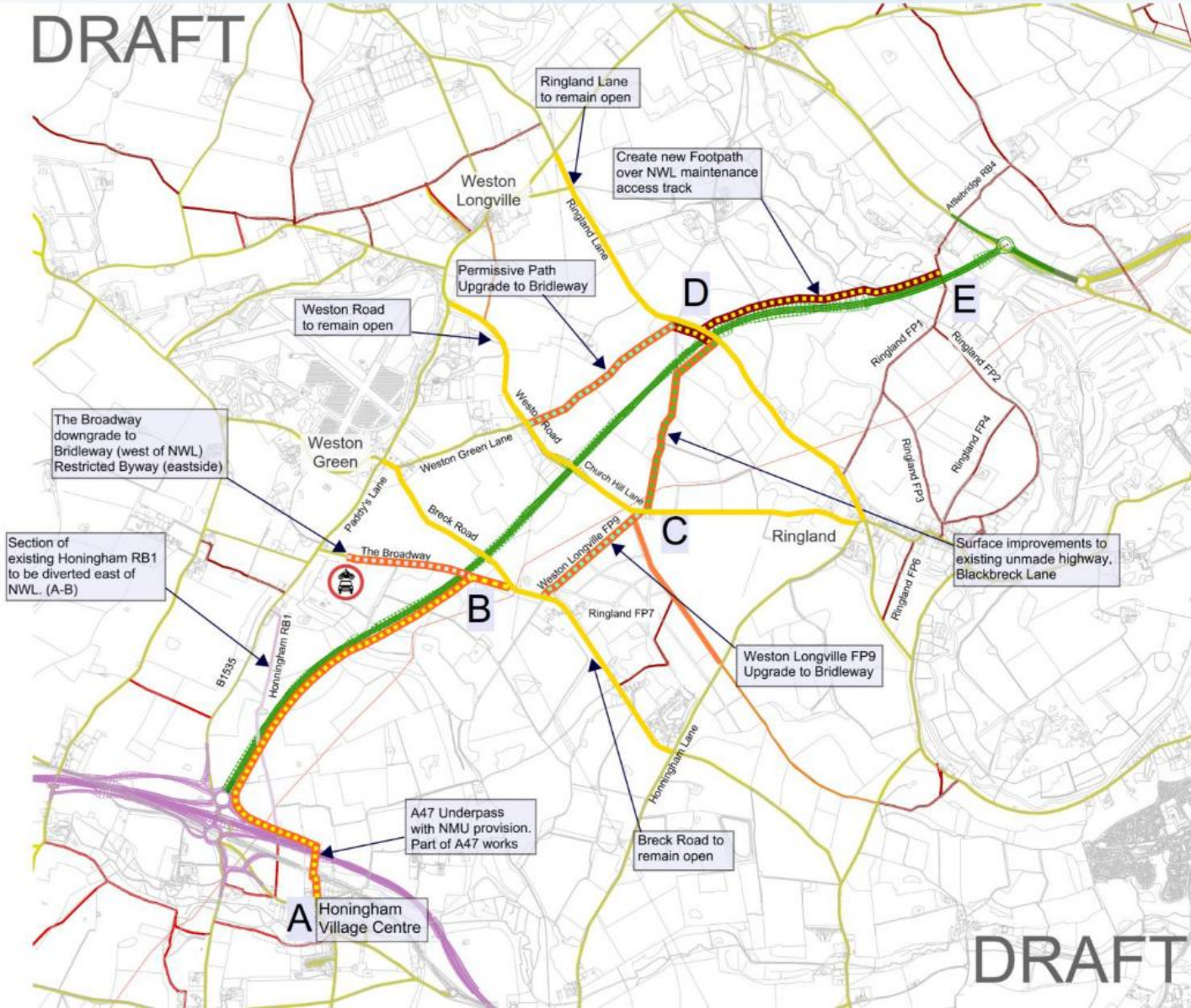
Restricted Byway

Surface improvements to existing Unsurfaced Highway

Bridleway

Footpath

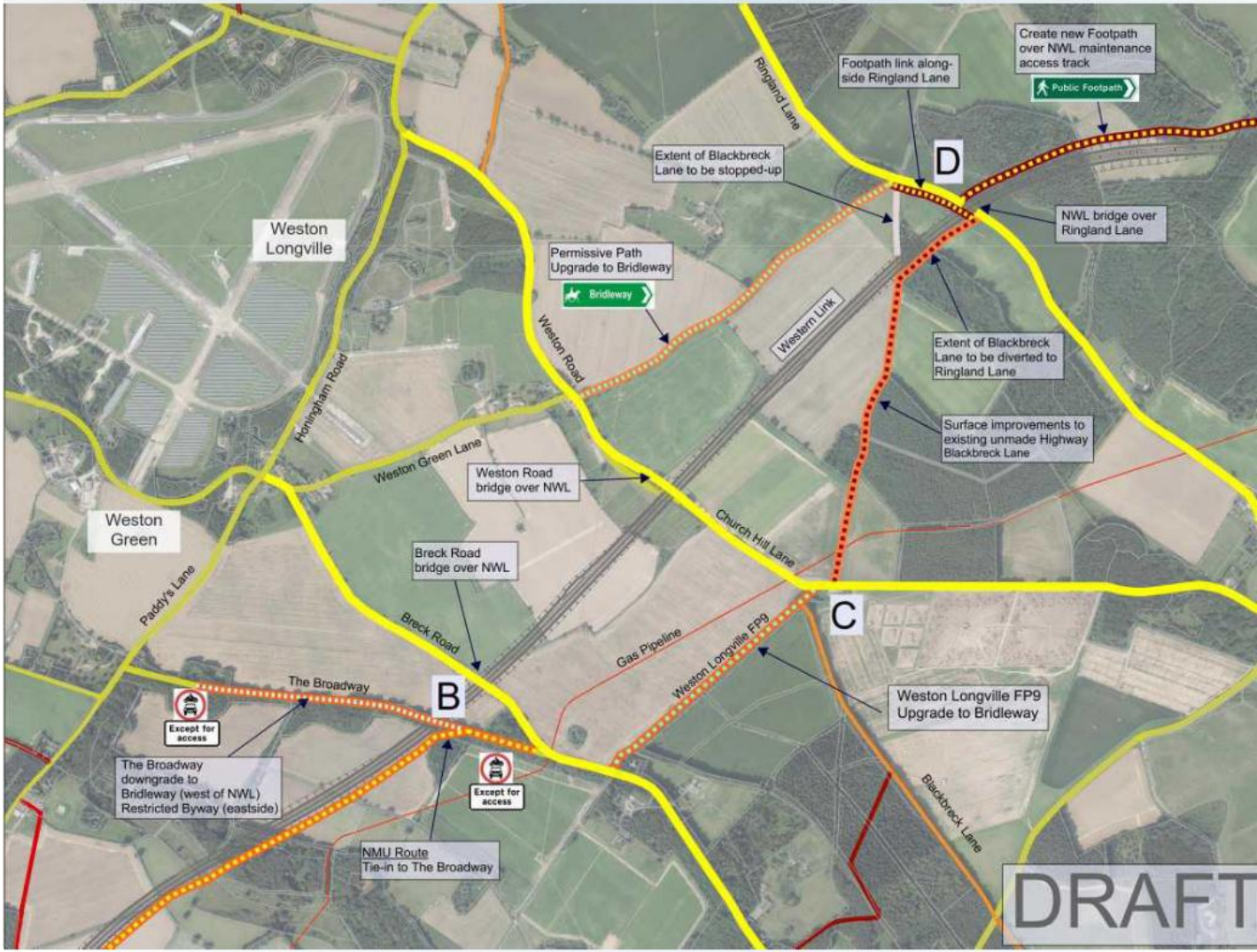
Norwich Western Link

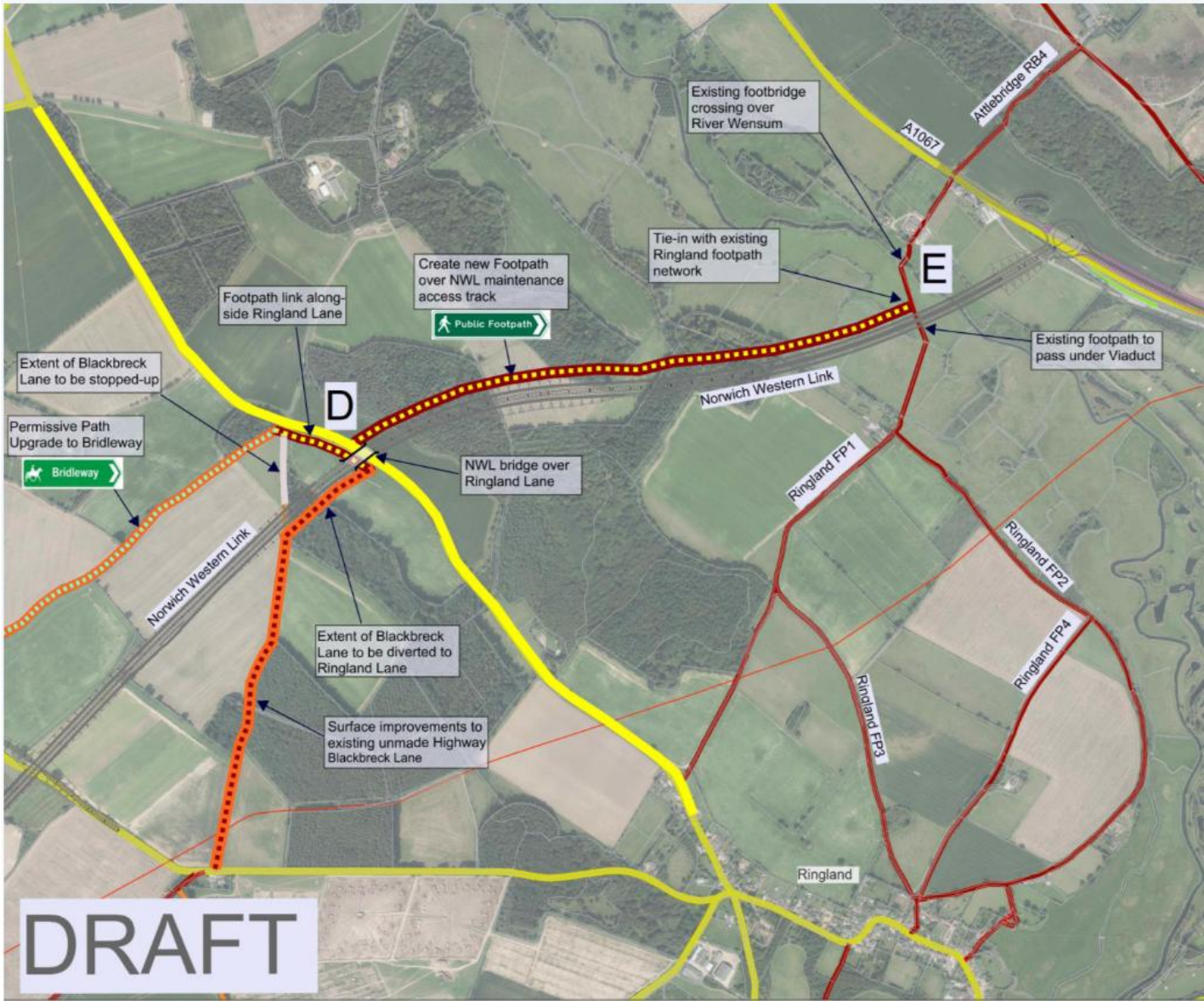


Sustainable transport for NWL

As part of the new A47 works, Highways England are providing an underpass north of Honingham to the east of Honingham Resticted Byway

Proposal to divert Honingham RB1 via underpass and continue along east side of NWL to The Broadway. A-B


Create new Footpath over NWL maintenance access track
Public Footpath
Footpath link along-side Ringland Lane
Ringland Lane
D
Extent of Blackbreck Lane to be stopped-up
NWL bridge over Ringland Lane
Weston Longville
Permissive Path Upgrade to Bridleway
Bridleway
Weston Road
Western Link
Extent of Blackbreck Lane to be diverted to Ringland Lane
Honingham Road
Surface improvements to existing unmade Highway Blackbreck Lane
Weston Green Lane
Weston Road bridge over NWL
Weston Green
Church Hill Lane
Breck Road bridge over NWL
Paddy's Lane
Breck Road
C
Gas Pipeline
Weston Longville FP9
The Broadway
B
Except for access
Weston Longville FP9 Upgrade to Bridleway
The Broadway downgrade to Bridleway (west of NWL) Restricted Byway (eastside)
Except for access
Blackbreck Lane
NMU Route Tie-in to The Broadway
DRAFT


Existing footbridge crossing over River Wensum
A1067
Attlebridge RB4
Tie-in with existing Ringland footpath network
E
Create new Footpath over NWL maintenance access track
Public Footpath
Footpath link along-side Ringland Lane
Existing footpath to pass under Viaduct
Extent of Blackbreck Lane to be stopped-up
D
Norwich Western Link
Permissive Path Upgrade to Bridleway
Bridleway
NWL bridge over Ringland Lane
Ringland FP1
Ringland FP2
Ringland FP4
Norwich Western Link
Extent of Blackbreck Lane to be diverted to Ringland Lane
Ringland FP3
Surface improvements to existing unmade Highway Blackbreck Lane
Ringland
DRAFT

NMU Strategy – Wayfinding Strategy

- Under Development in Accordance with Sustrans guidance

sustrans

Recommended effective widths of shared use routes

	Shared use	Separated use
Absolute minimum	2.5m	4.5m
Desirable minimum	3.0m	5.0m

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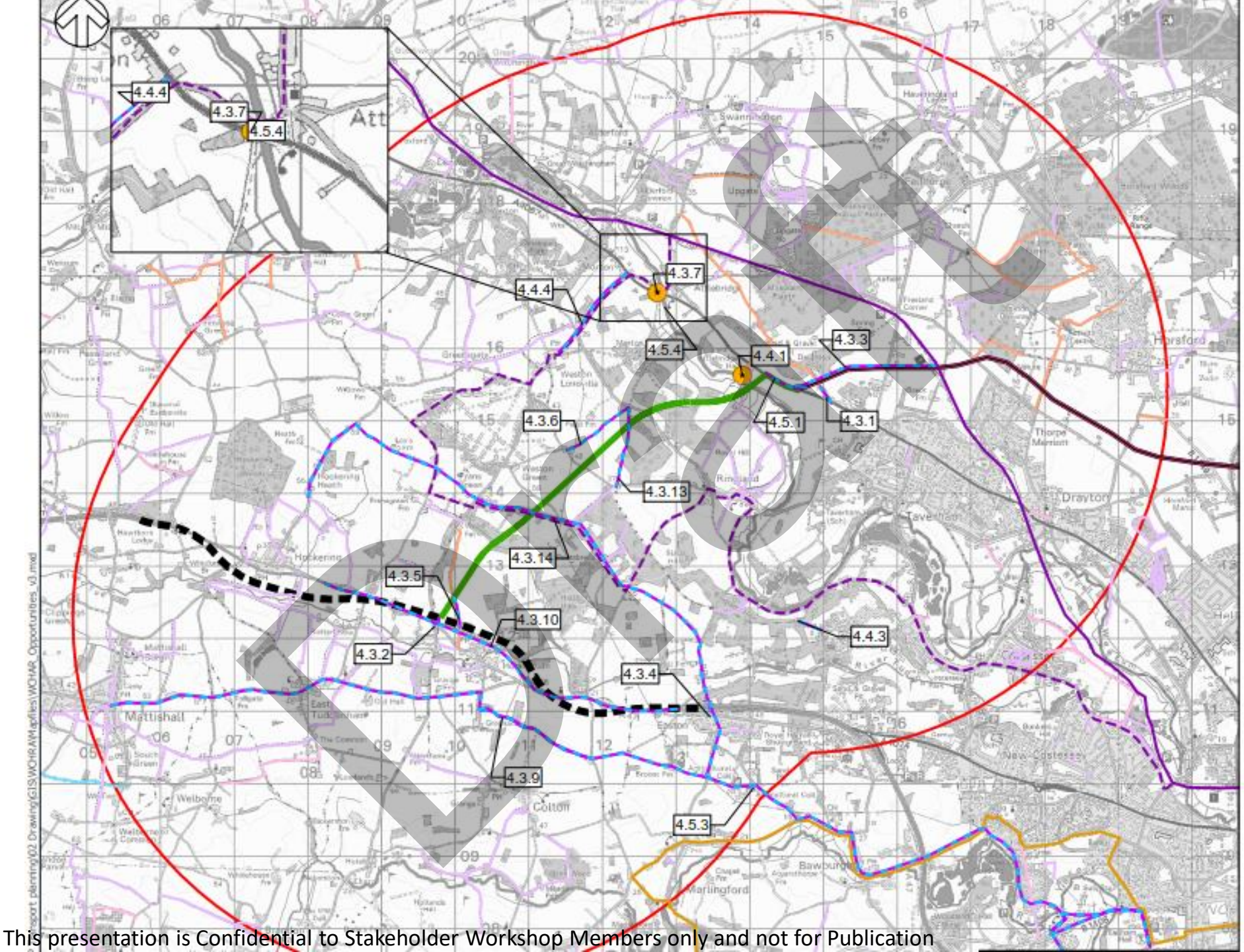

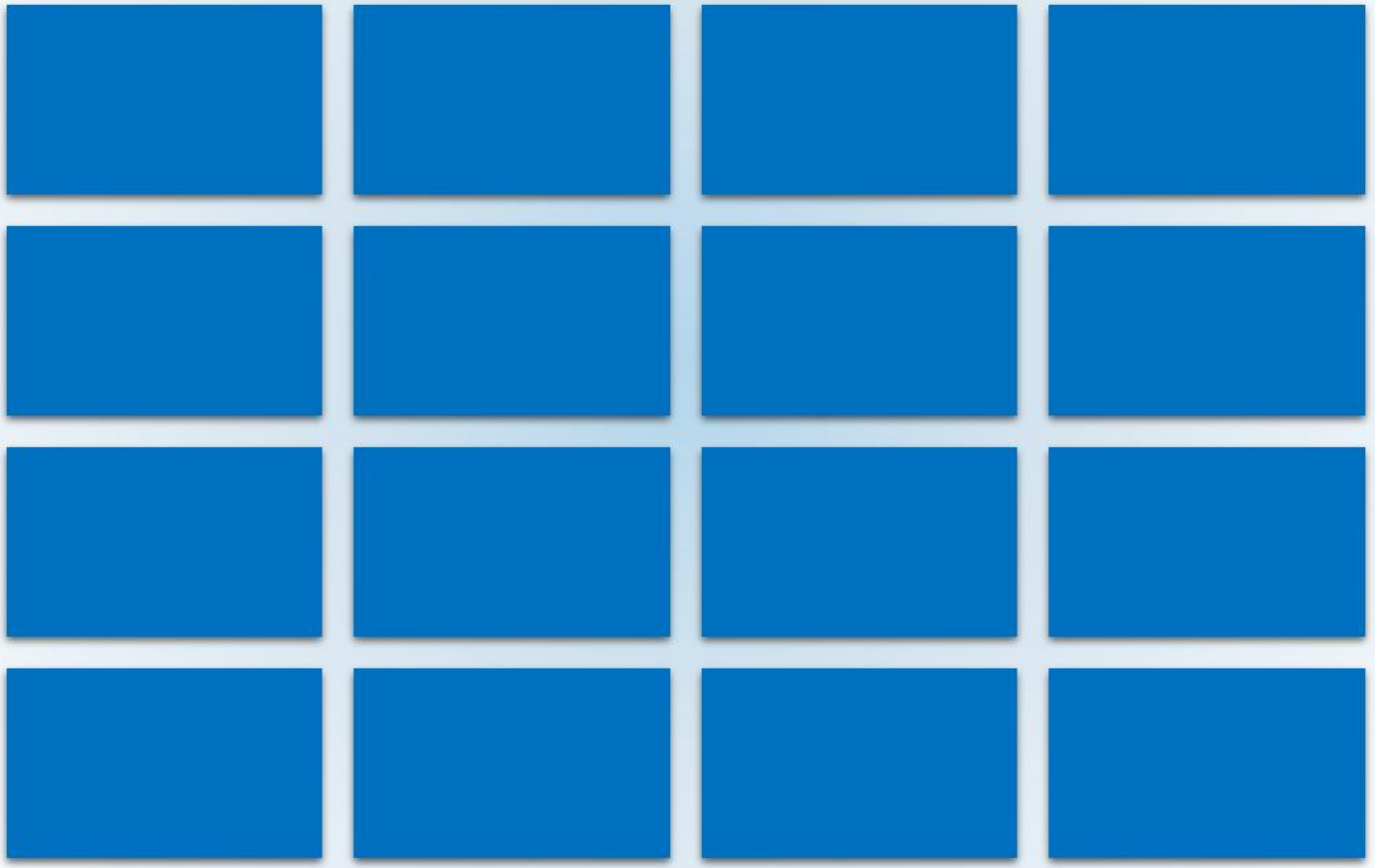

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NWL scheme programme

Milestone	Current estimate
Regional priority status agreement – Transport East meeting	July 2019
Preferred route established – decision at July Cabinet	15th July 2019
Strategic Outline Business Case (SOBC) together with the Regional Evidence Base (REB) submission to DfT	July 2019
Informal Public Consultation	Spring 2020
Outline Business Case (OBC) submission	Autumn 2020
Design and Build Contractor appointment	Autumn 2020
Formal Pre-application Public Consultation	Late 2020
Planning Application submission	Spring 2021
Full Business Case (FBC) submission	Summer 2022
Enabling Works and Mobilisation for Construction	End of 2022
Road open	2025

Comments and Discussion

Thank you for attending

Norwich Western Link

Stakeholder Briefing 3 – 14th August 2020

NWL Progress Update

- Workshops in October 2019 and January 2020
- Walking, Cycling & Horse Riding Assessment Report (WCHAR) baseline review completed in accordance with GG142 Guidance
- Consulted with Local Liaison Group of Parish Reps on local roads that cross the scheme
- Developed Non-Motorised User (NMU) strategy in the immediate vicinity of the scheme to be delivered by main contractor
- Referring to Design Guidance CD143 and CD142 for the technical design aspects of NMU and cycling infrastructure
- Published OJEU notices Mid-June 2020 to commence tendering process – currently in pre-qualification stage. The tender process includes the NMU Strategy
- Refined the potential opportunities for consideration as part of Wider Sustainable Transport Strategy (walking, cycling & bus)
- Working with Highways England to achieve joined up approach
- LTN 1/20 issued as new cycle infrastructure design guidance in July 2020 – we are currently reviewing this for future inclusion

Local Access Public Consultation

- Our public consultation is underway on local access proposals from Monday 27 July to Sunday 20 September 2020.
- The consultation focuses on:
  - Roads that cross the NWL
  - Changes to existing Public Rights of Way
  - Creation of new Public Rights of Way
  - Options for Ringland Lane
  - Proposals for Weston Road / Church Hill Lane
  - Proposals for Breck Road
  - Access restrictions for motor vehicles
  - Sustainable transport measures across the wider area
  - Bus Strategy Options
  - Concept design for Green Bridges

What will be in the next consultation?

The design of the viaduct over the River Wensum

The route of the Norwich Western Link includes a 670 metre-long viaduct which will be designed and constructed so as to not affect the integrity of the River Wensum Special Area of Conservation. Due to the specialist design and construction methods required, the contractor will be responsible for developing these details following their appointment.

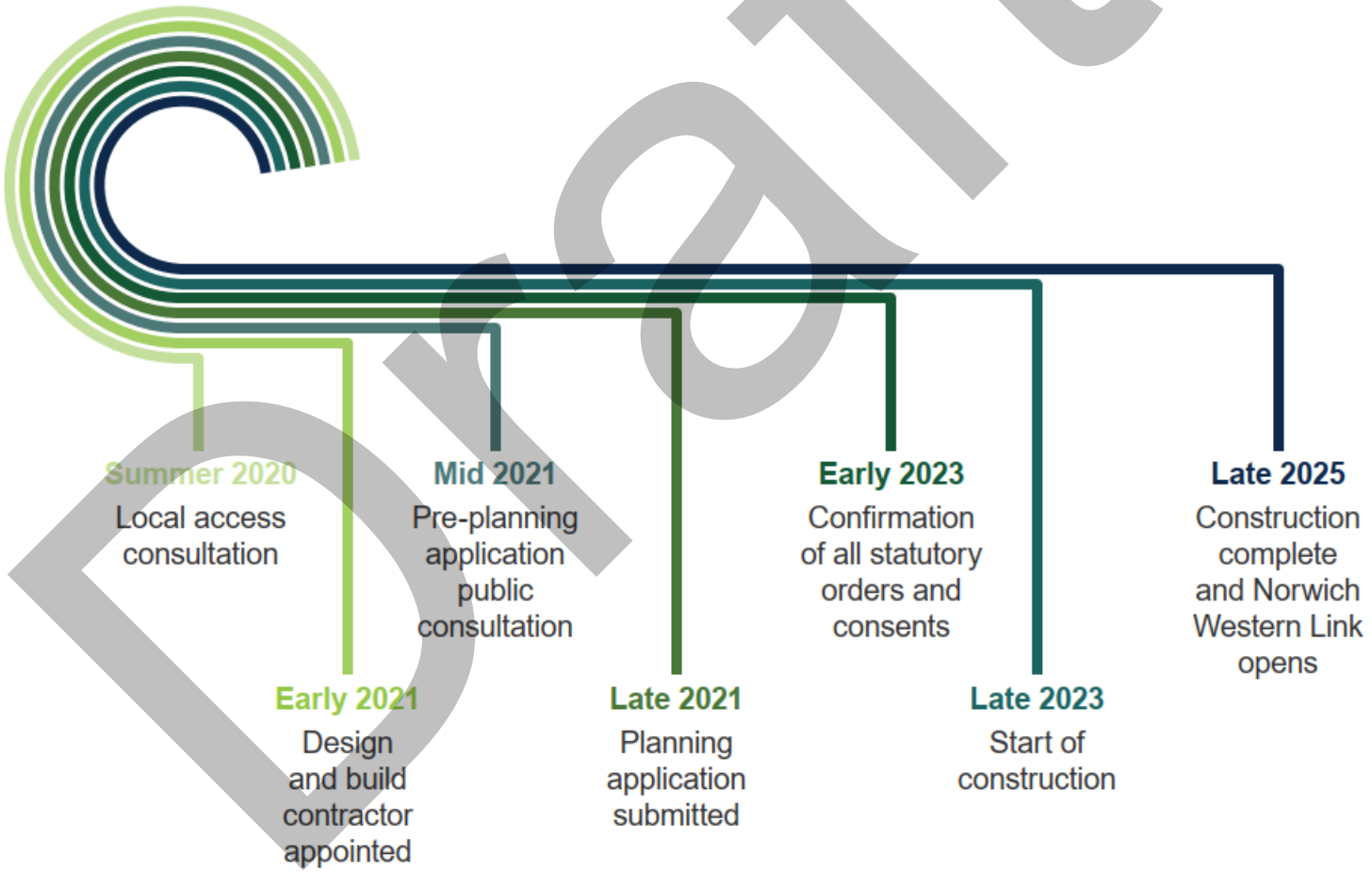
Traffic mitigation

The Norwich Western Link will reduce traffic congestion and rat-running on many local roads by creating a higher quality connection between the A47 and Broadland Northway. However all likely changes to how traffic will use the road network will need to be considered and we will also determine whether any traffic management measures are needed. We use traffic modelling to predict how traffic flows and movements are likely to alter as a result of the Norwich Western Link and other factors, such as dualling of the A47 and population growth. We're currently updating our traffic model to take account of new data and once complete, we'll use this to provide more details of the final design of the scheme and of any wider traffic mitigation measures.

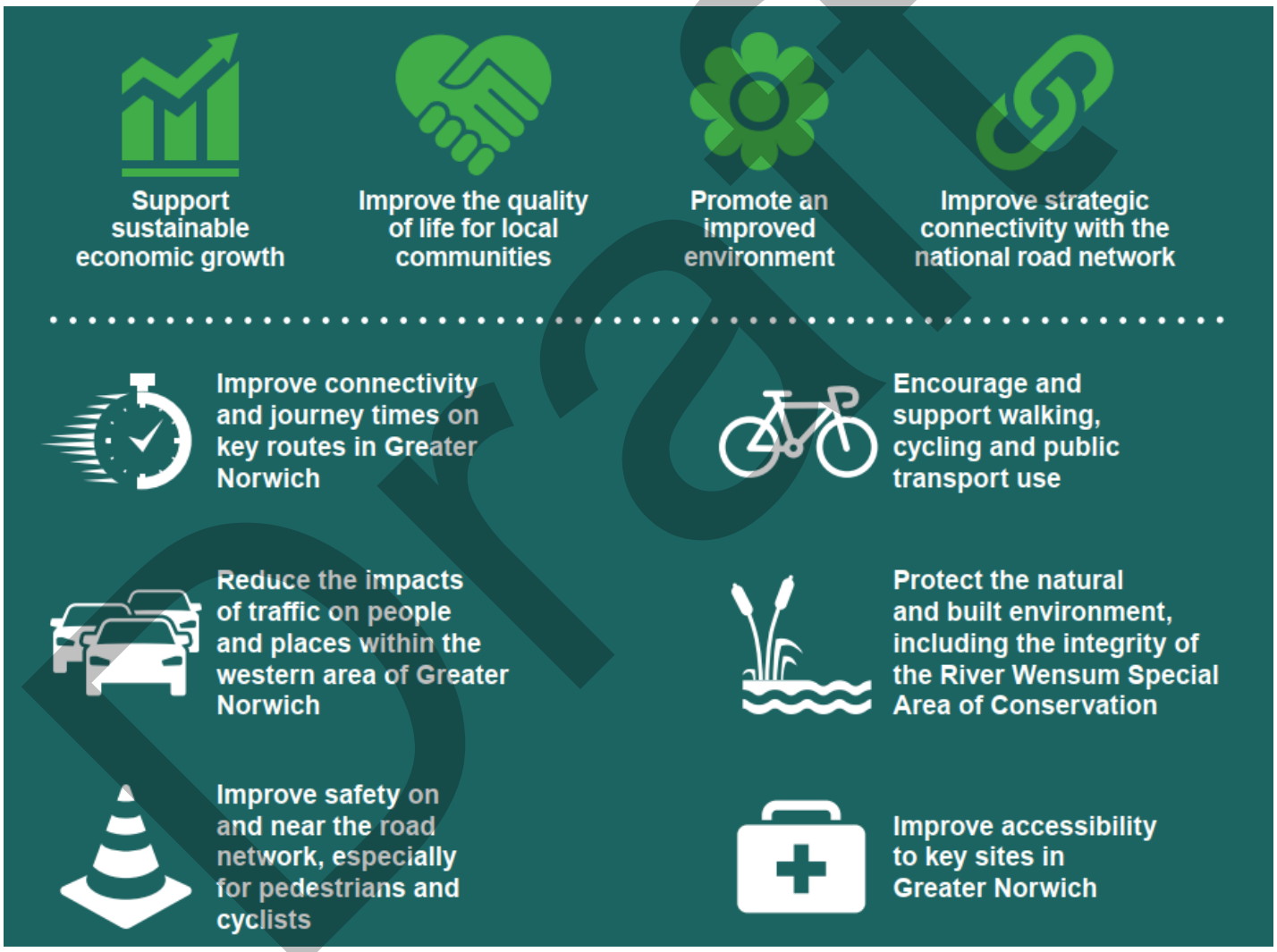
Environmental mitigation

We are committed to building the Norwich Western Link in an environmentally-responsible way. Finding ways to limit the road's impact on wildlife, the landscape and local residents is a priority, and we will carry out an environmental impact assessment ahead of submitting the planning application which will inform what mitigation measures are needed and would be most effective. However current proposals for wildlife crossings along the Norwich Western Link are shown on the route map in these consultation materials.

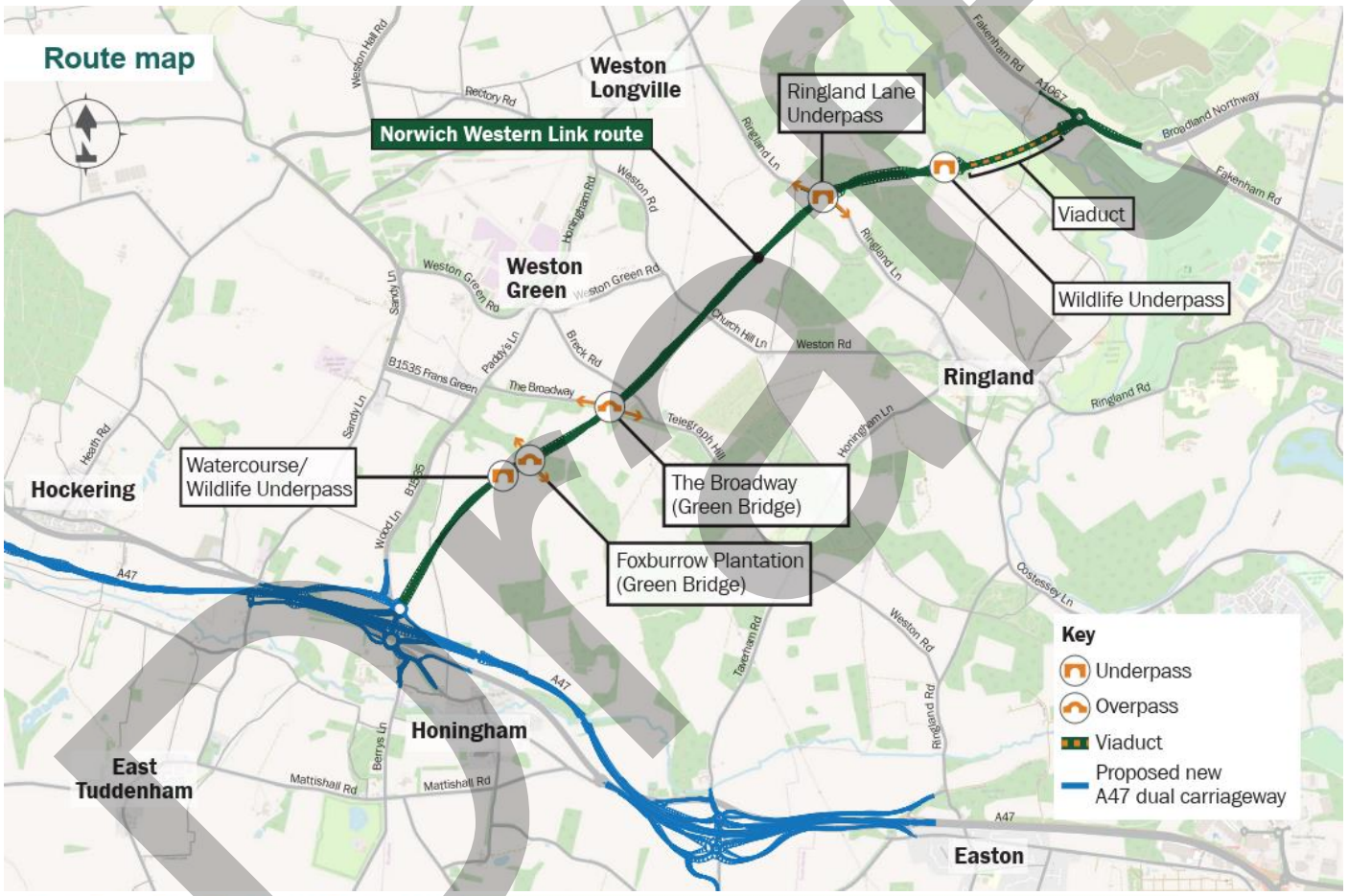
Public Consultation - Timeline



NWL Scheme Objectives



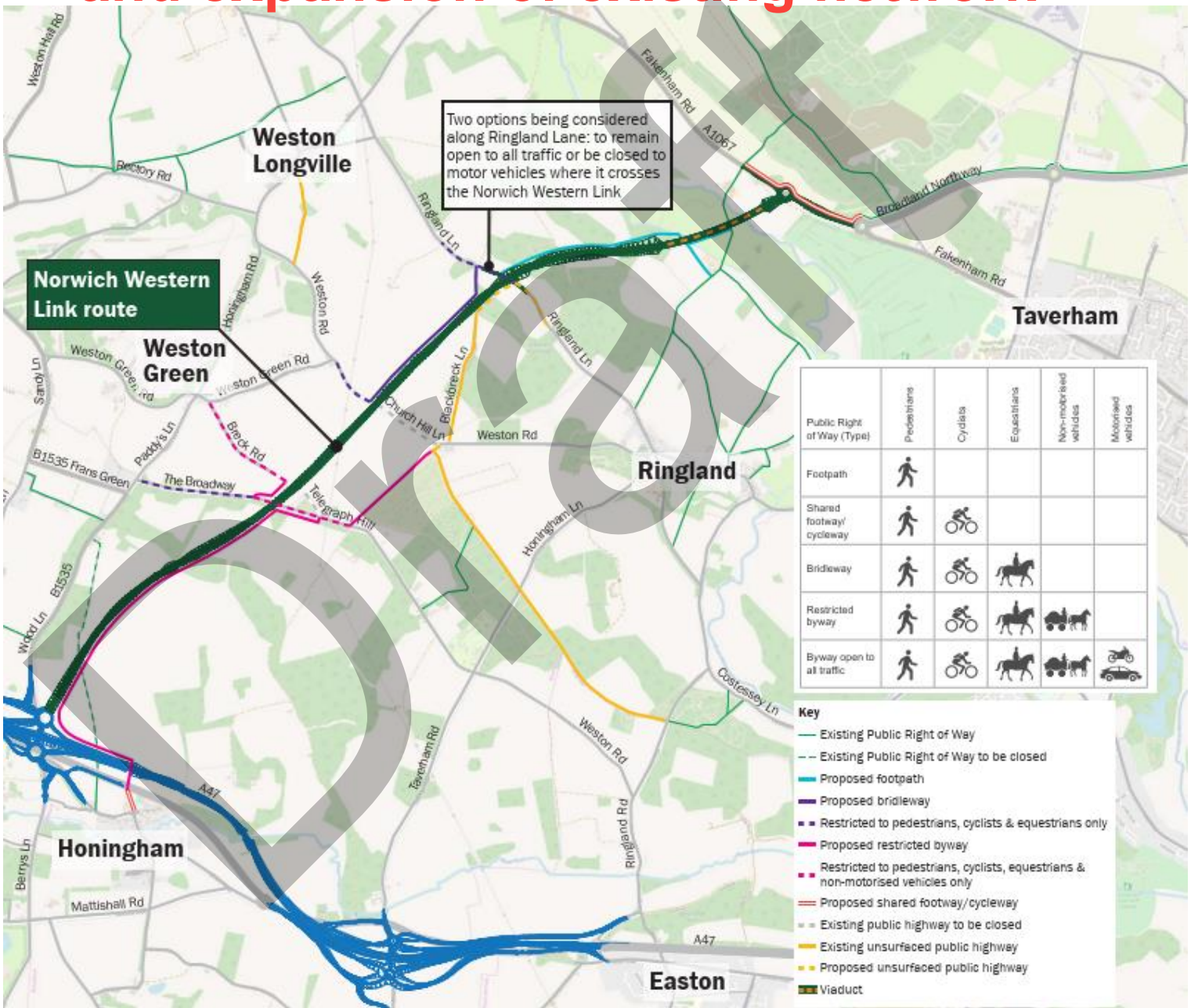
Proposals for Local Roads that cross the Norwich Western Link



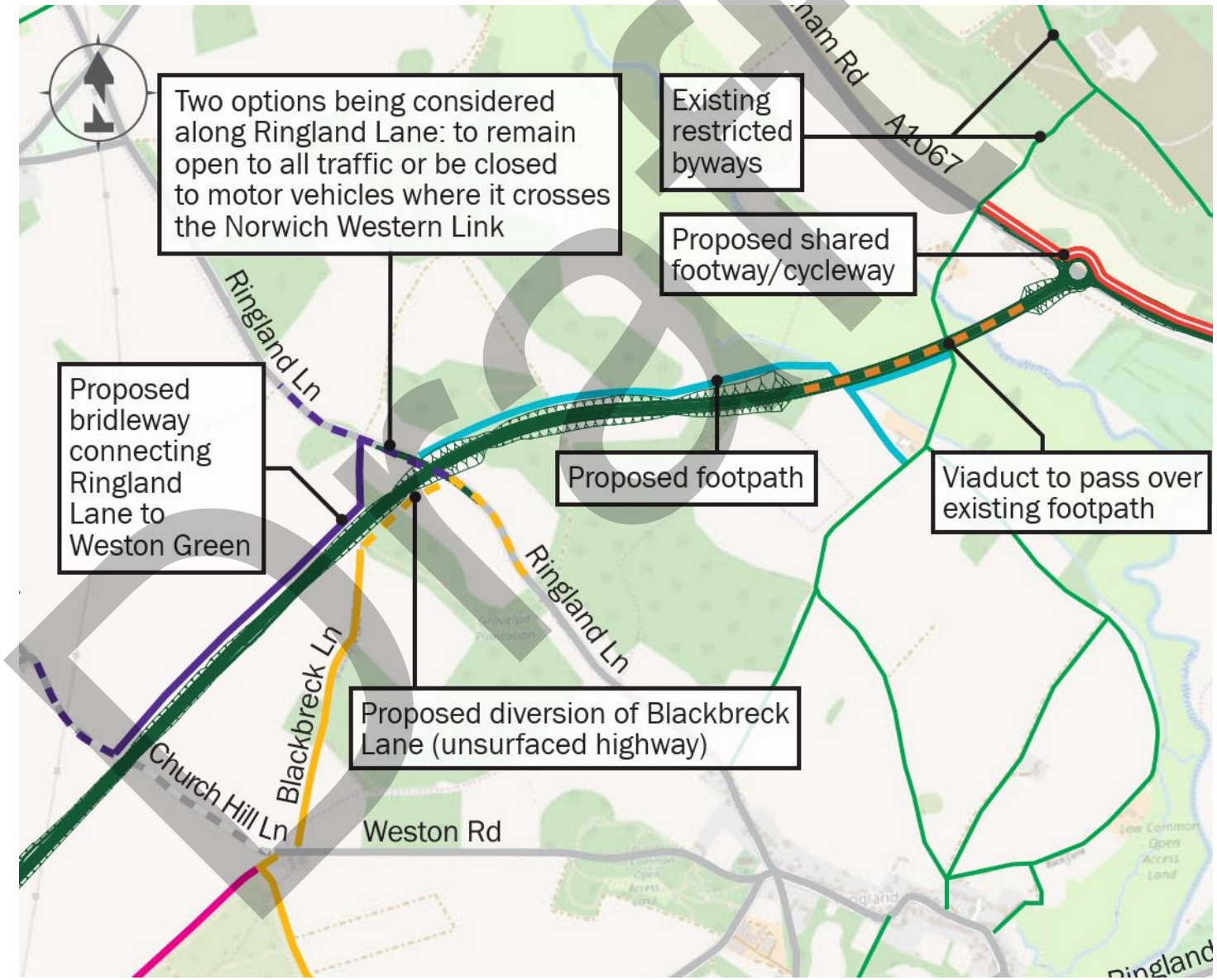
Feedback from Stakeholder Workshops

- Questionnaire Survey Feedback
  - Blackbreck Lane, Ringland Lane and The Broadway were highlighted as being the most well used, especially for walking
- Key themes from Stakeholders and Parishes
  - Retain private access routes
  - Extend existing rights of way network
  - Reduce vehicle movement on roads crossing NWL
  - Concerns expressed over motorcycles using bridleways and restricted byways
  - A full NMU route along the NWL may not be well utilised and so would prefer enhancement of existing routes for a better experience
  - Agreed at previous workshop there would be no upgrade to the existing footpath crossing the River Wensum
  - The A47 creates severance issues and people do not attempt to cross it

Changes to Public Rights of Way and expansion of existing network



Proposals Close to Ringland Lane



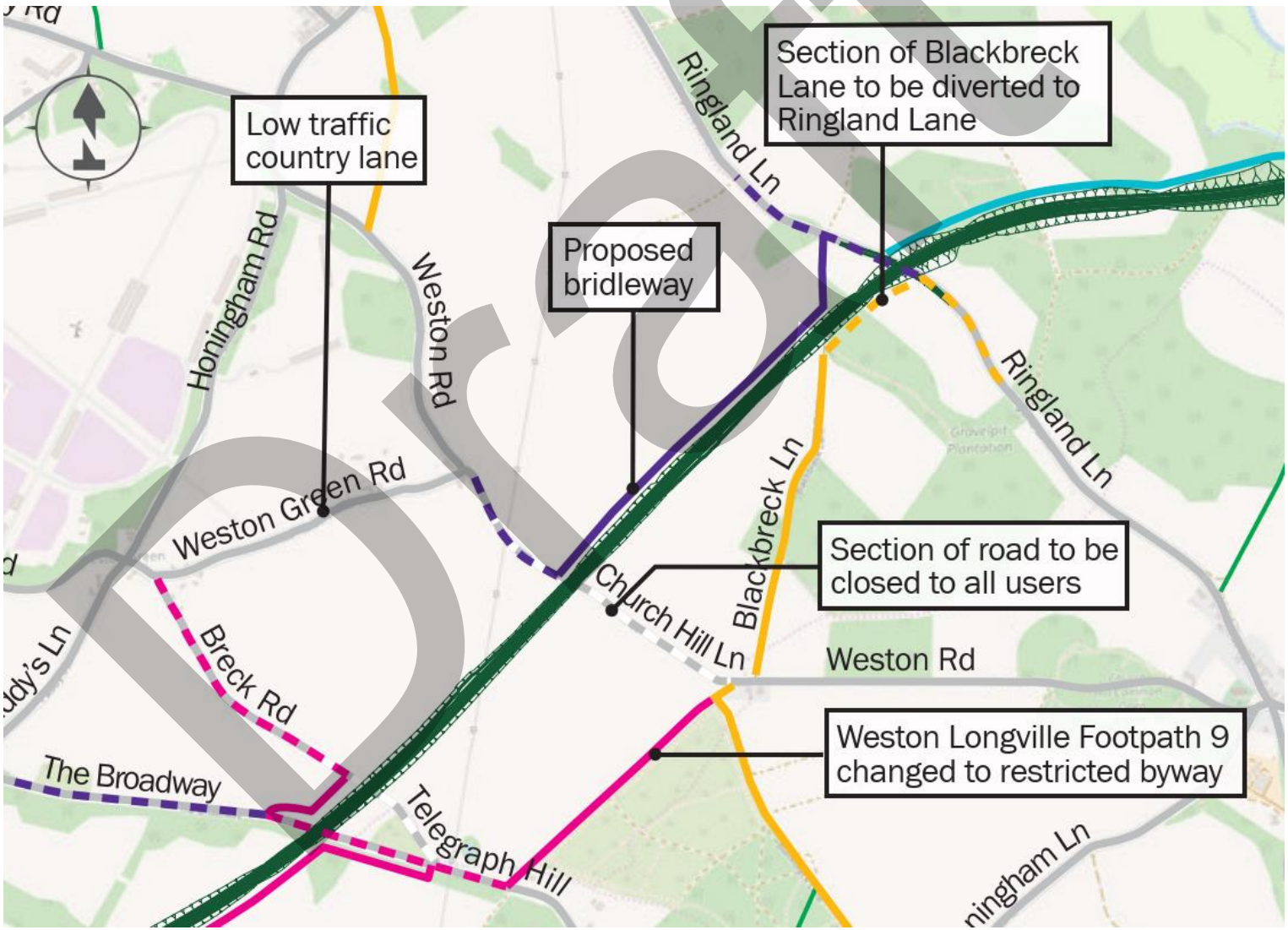
Ringland Lane Option 1

- Kept open to all traffic, including motor vehicles (as it currently is), with footways installed to improve pedestrian access and connectivity with the wider Public Rights of Way network.

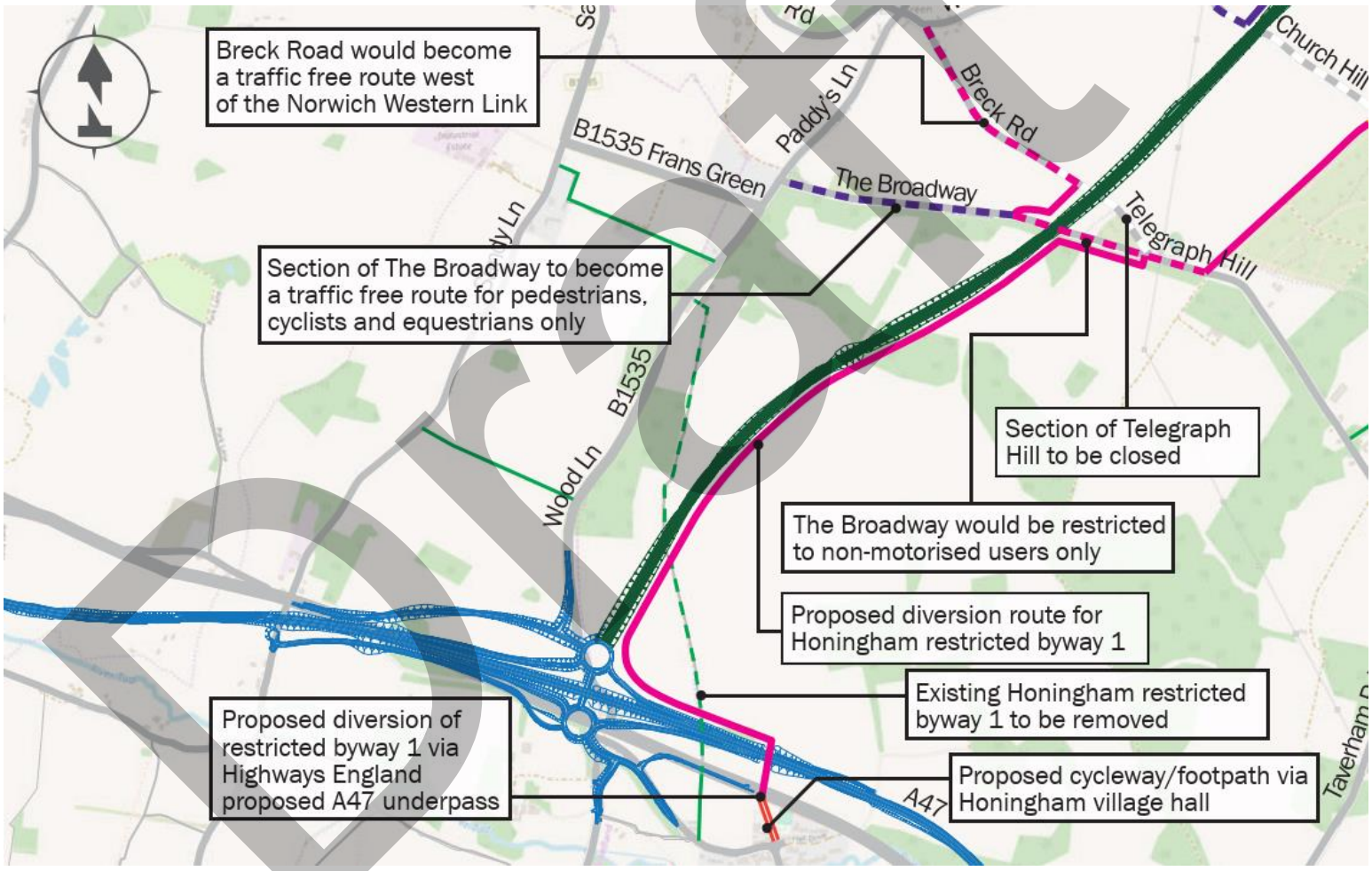
Ringland Lane Option 2

- Restricted to walkers, cyclists and horse riders at the point where the road crosses the NWL.
- Ringland Lane would become a no-through road to motorised traffic except for vehicle access to adjacent land and property

Proposals around Weston Road/Church Hill Lane



Proposals close to Breck Road and The Broadway



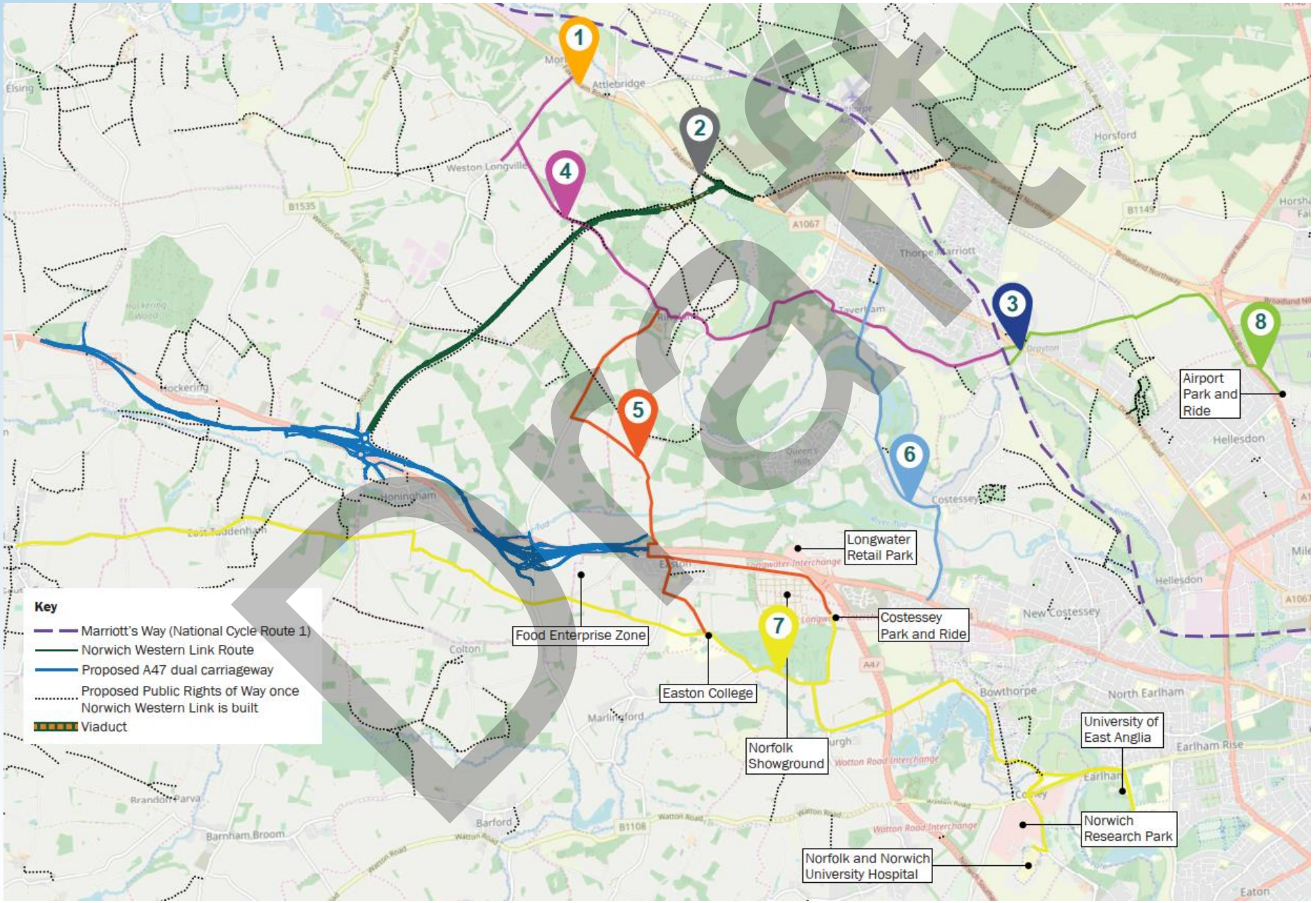
Concept Design for Green Bridges

Wider Sustainable Transport Measures

Previous Stakeholder Feedback Included:

- Improved cycling routes, roads closed to through traffic and improved pedestrian routes were highlighted as the most important improvements to be packaged with the NWL
- The main barriers to sustainable travel were noted to be the standard and safety of routes and the time taken to undertake non-motorised journeys (in comparison with travel by car)
- East-west to Norwich via Ringland and Weston Longville and Mattishall to NNUH/UEA were identified as routes that users would like to use more frequently on foot or by bike plus improved connectivity to Queen's Hills and Marriott's Way.
- Safer crossings are needed over busy roads, especially the A1067 for Weston Longville

Wider Sustainable transport measures



Bus Strategy

Previous Stakeholder Feedback Indicated a desire for:

- Improved and more frequent bus services,
- additional bus stops,
- faster and more reliable journeys,
- buses to have facilities to carry bicycles
- routes connecting residential areas to key facilities on the western edge of Norwich
- Bus operators input to initial ideas for a possible ‘western loop’ service – operator feedback suggests
  - Service would ideally need to be 60 minute timetable or less
  - Full Loop likely to require more than 60 minutes
  - Needs to have good residential catchment for viability
  - Could serve key destinations like NNUH, UEA and Airport
  - Previous three-year trial of an orbital loop around Norwich showed poor uptake
  - two options for a sub-loop (Western Arc) services are now being considered

Bus Strategy

Q&A

Any questions?

Thank you for attending

- Please submit any feedback via the online questionnaire:

www.norfolk.gov.uk/nwl

- Or email us during the consultation period:

norwichwesternlink@norfolk.gov.uk

March 2, 2021

Norwich Western Link
Sustainable Transport Workshop 4
2 March 2021

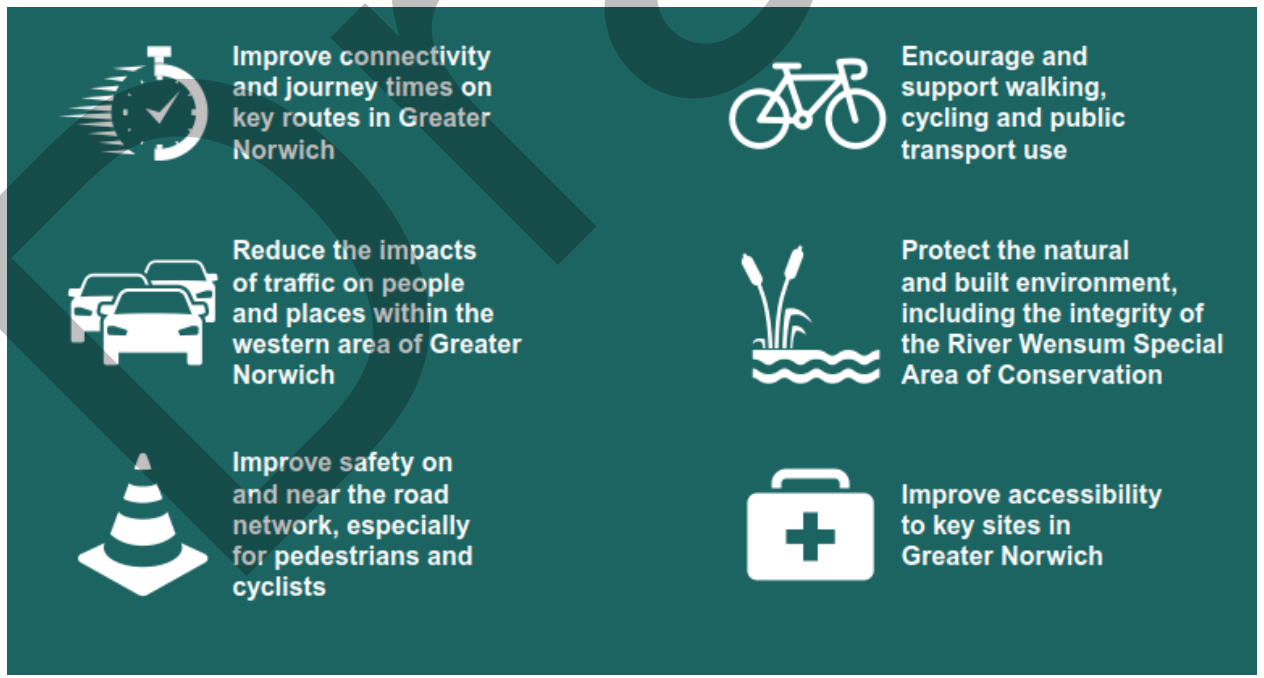
Norfolk County Council

Agenda

1.0 Sustainable Transport Update
2.0 New Guidance Update
3.0 Cycle Friendly Route Options
4.0 Non-Motorised Users & Side Roads
5.0 Bus Strategy
6.0 Next Steps

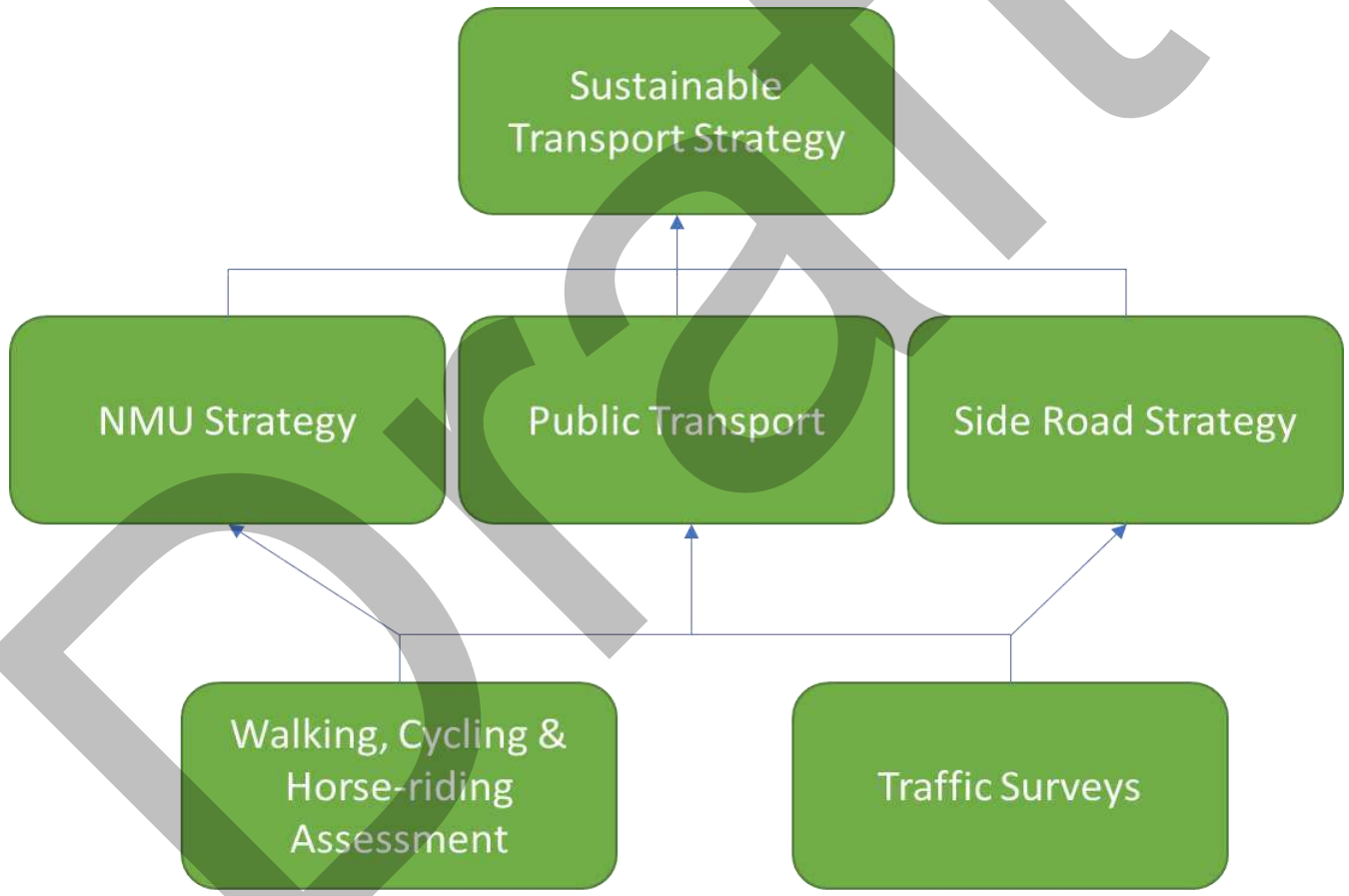
1.0 Sustainable Transport Update

- A Sustainable Transport Strategy has been prepared to accompany the OBC submission to DFT.
- This seeks to enhance the business case with Active Travel Benefits by increasing opportunities for non-car travel.
- The proposals sit within the context of Transport for Norwich/Transforming Cities projects, with the aim of creating a combined network of routes which offer a joined up strategy.
- The STS helps the NWL scheme meet the Strategic Objectives:



1.1 Sustainable Transport Update

- The Sustainable Transport Strategy covers a variety of elements which complement the main highway scheme:



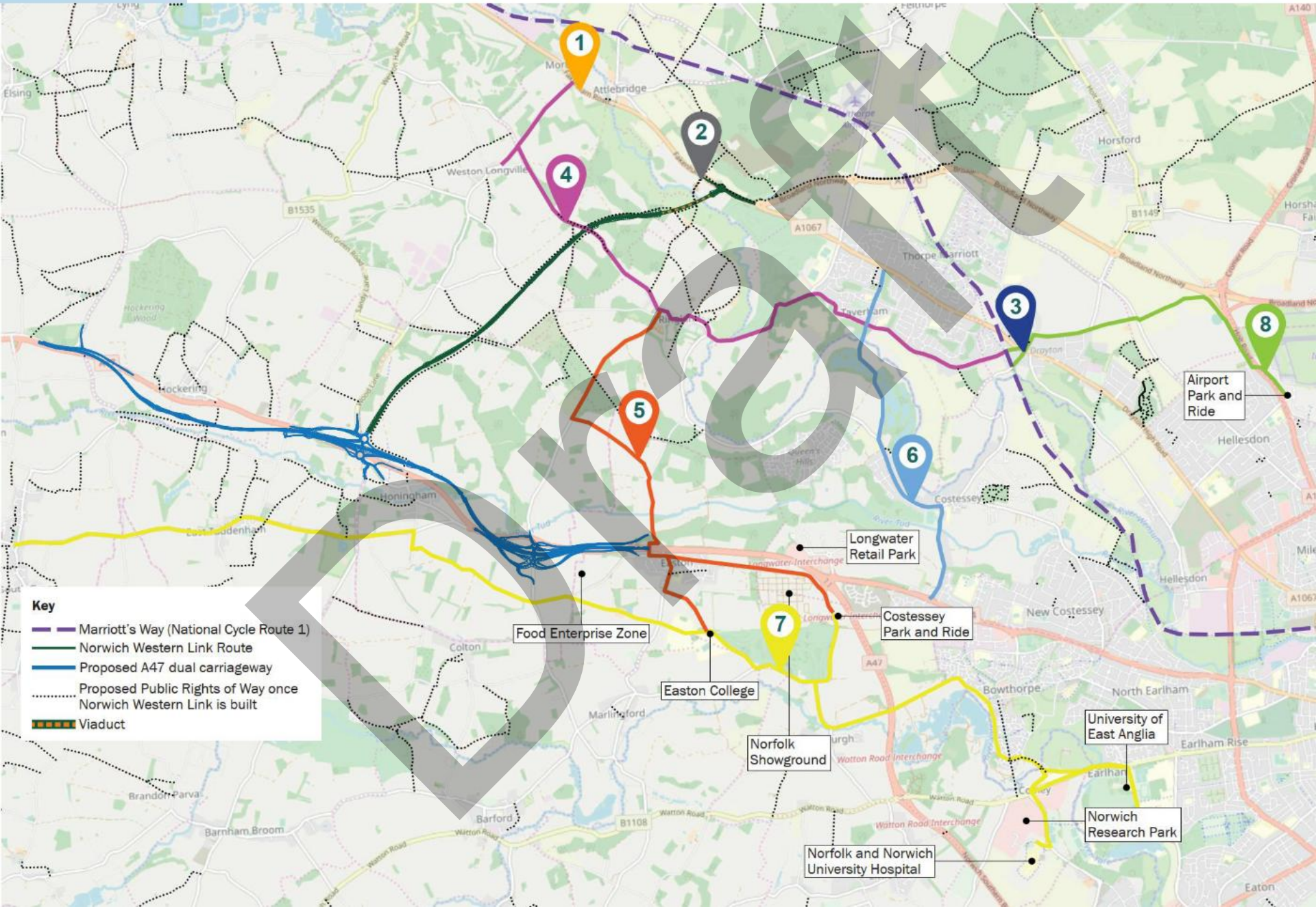
2.0 New Transport Guidance

- Local Transport Note LTN 1/20 (2020)
  - Supports the delivery of high-quality cycle infrastructure and reflects current good practice, standards and requirements.
  - Sets clearer guidance on how to design for cycling in different types of conditions in urban areas and also offers direction on types of intervention suitable for different thresholds of speed and volumes of traffic.
  - The majority of routes close to the NWL are rural lanes through small hamlets and villages, many of which currently carry more traffic than suitable for the scale of existing highway infrastructure and constrained network conditions.
  - With the NWL in place, traffic relief will be provided to local villages with traffic flows on many links reduced to below 2,000-2,500 vehicles per day AADT in the opening year of 2025.
  - Existing infrastructure can be re-purposed to prioritise cycling and walking without building extensive extra new links (albeit with speed management measures required to control speeds to low levels).

2.1 New Transport Guidance

- Gear Change (2020)
  - Gear Change responds to the climate change agenda emphasising the environmental benefits of encouraging and supporting sustainable travel, with a target to double cycle and increase walking.
  - In accordance with the Gear Change policy, the NWL is supported by a Sustainable Transport Strategy that seeks to improve the existing walking and cycling facilities in the surrounding area.
  - Where possible, existing PROW routes will be diverted, where they are severed by the scheme, with new green bridges providing grade-separated crossings and an improved and extended Public Rights of Way network around the link.
  - The wider measures offer improved priority for cycling on routes predicted to have low traffic with the highway scheme in place.
  - Safer crossing facilities on A1067 to provide onward connectivity with the Marriott's Way strategic cycle corridor which takes Non-Motorised Users into central Norwich.

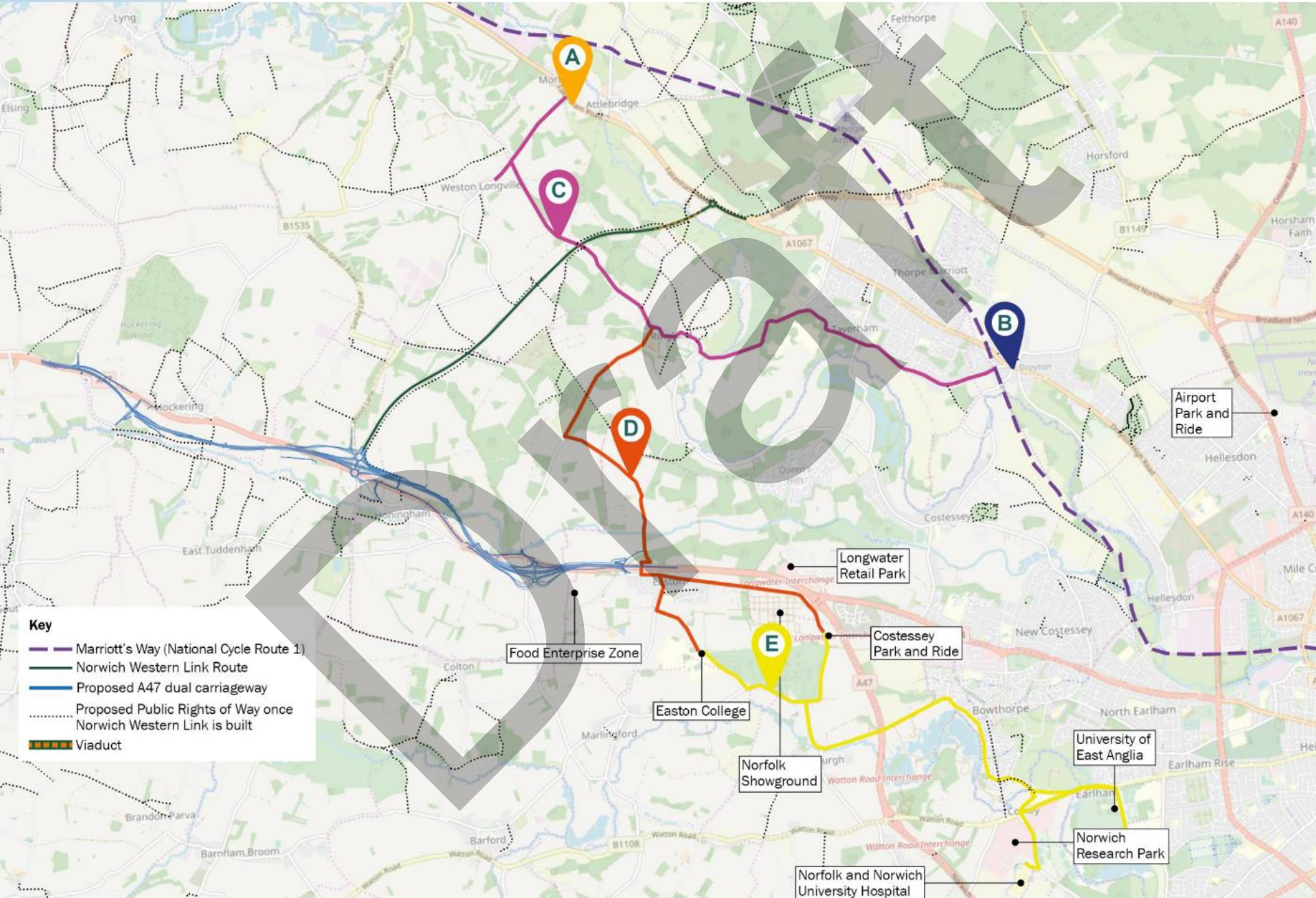
3.0 Sustainable transport measure options July 2020



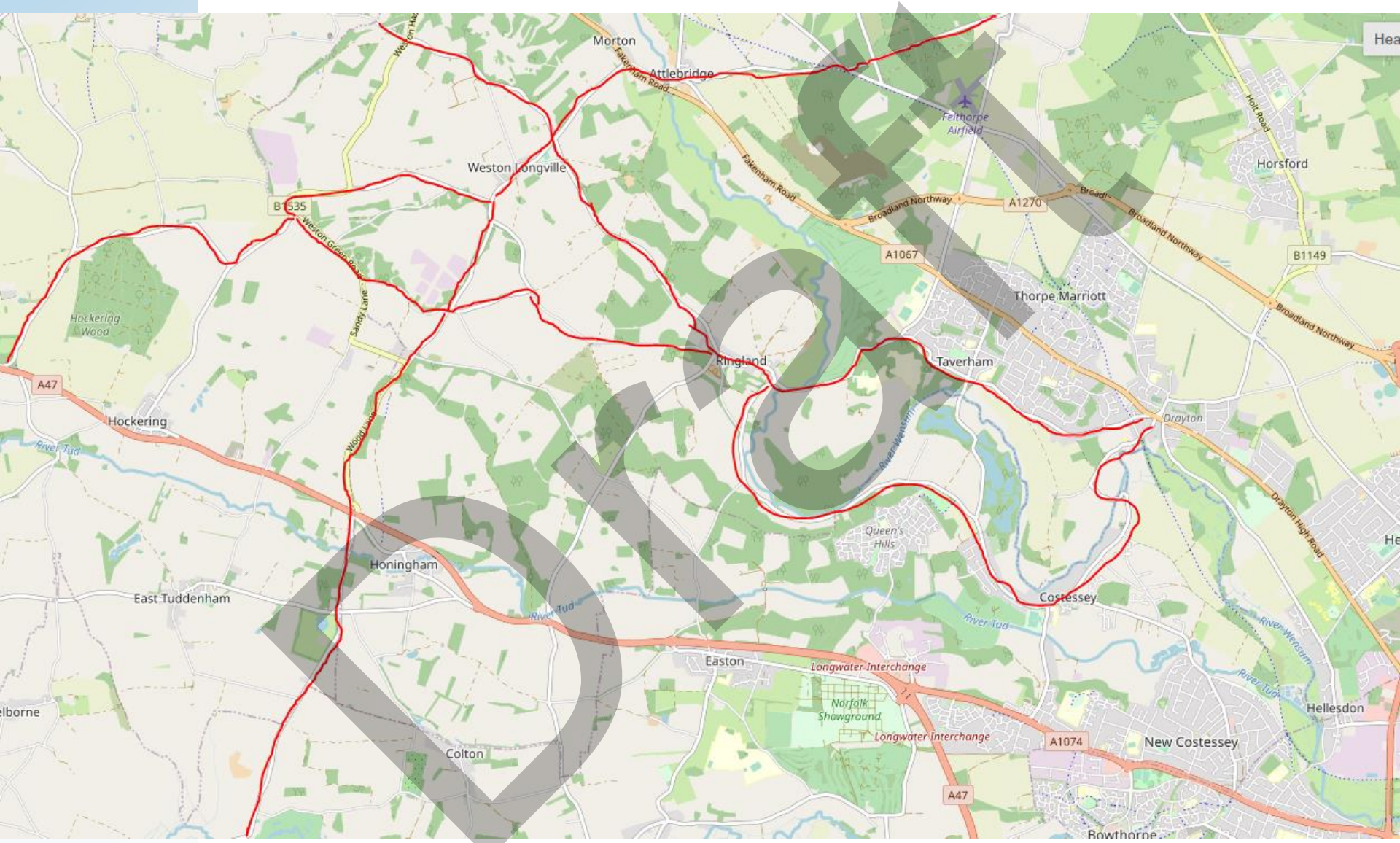
3.1 Sustainable Transport Measures

- Priorities were sought via the consultation for sustainable transport measures and a multi-criteria appraisal resulted in shortlisting as follows:
  - Option 4 (C): Create a cycle friendly on-road link from Attlebridge and Weston Longville and towards Norwich via Ringland and Taverham
  - Option 3 (B): Create a new pedestrian and cycle crossing on Drayton High Road to improve connectivity with the Marriott's Way
  - Option 5 (D): Create A cycle friendly on-road link from Ringland to Easton
  - Option 7E (E): Create a cycle-friendly on-road link south of A47 from Easton to the Norfolk and Norwich University Hospital & University of East Anglia
  - Option 1 (A): Create a new pedestrian and cycle crossing on the A1067 Fakenham Road at Attlebridge.

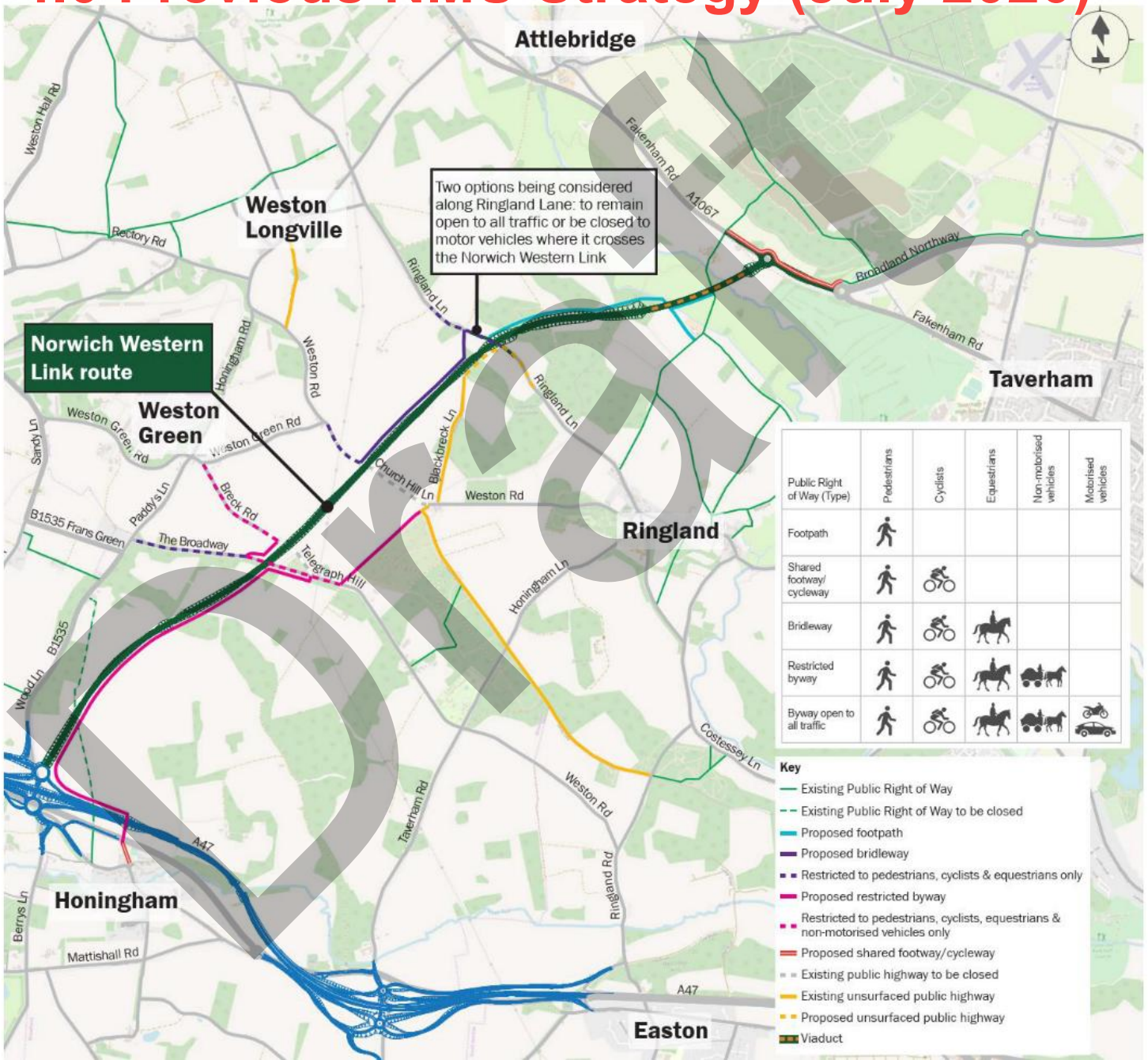
3.2 Shortlisted Options



3.3 Wensum Valley cyclist routes



4.0 Previous NMU Strategy (July 2020)

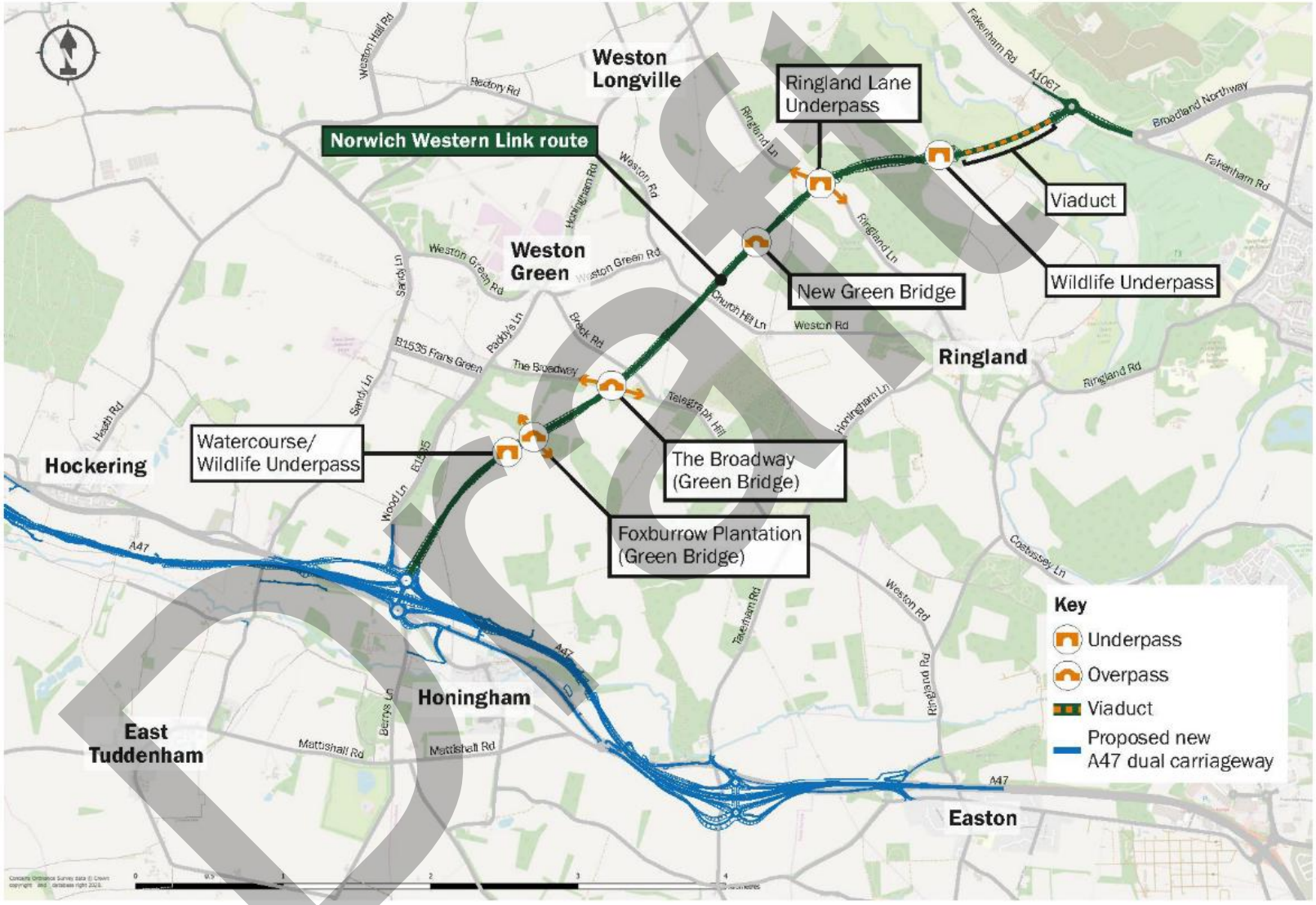


4.1 Non-Motorised Users & Side Roads

- The Non-Motorised User and Side Road strategy has been developed with input from local stakeholders and local communities close to the Norwich Western Link.
- The strategy has been amended in response to feedback gathered via a Local Access Consultation in July 2020 and technical work on the project since July 2020.
- The revised proposals include previously proposed elements:
  - A green bridge at The Broadway available to Non-Motorised Users (NMU)s but closed to motor vehicles
  - Closure of Weston Road/Church Hill Lane to through-traffic where it crosses the NWL.
  - Closure of Breck Road to all users with NMUs diverted to The Broadway

  Plus new/revised elements:
  - An additional Green Bridge between Weston Road and Ringland Lane with bridleway crossing the NWL to connect with Blackbreck Lane.
  - Ringland Lane to remain open to all traffic

4.2 Side Roads & Green Bridges



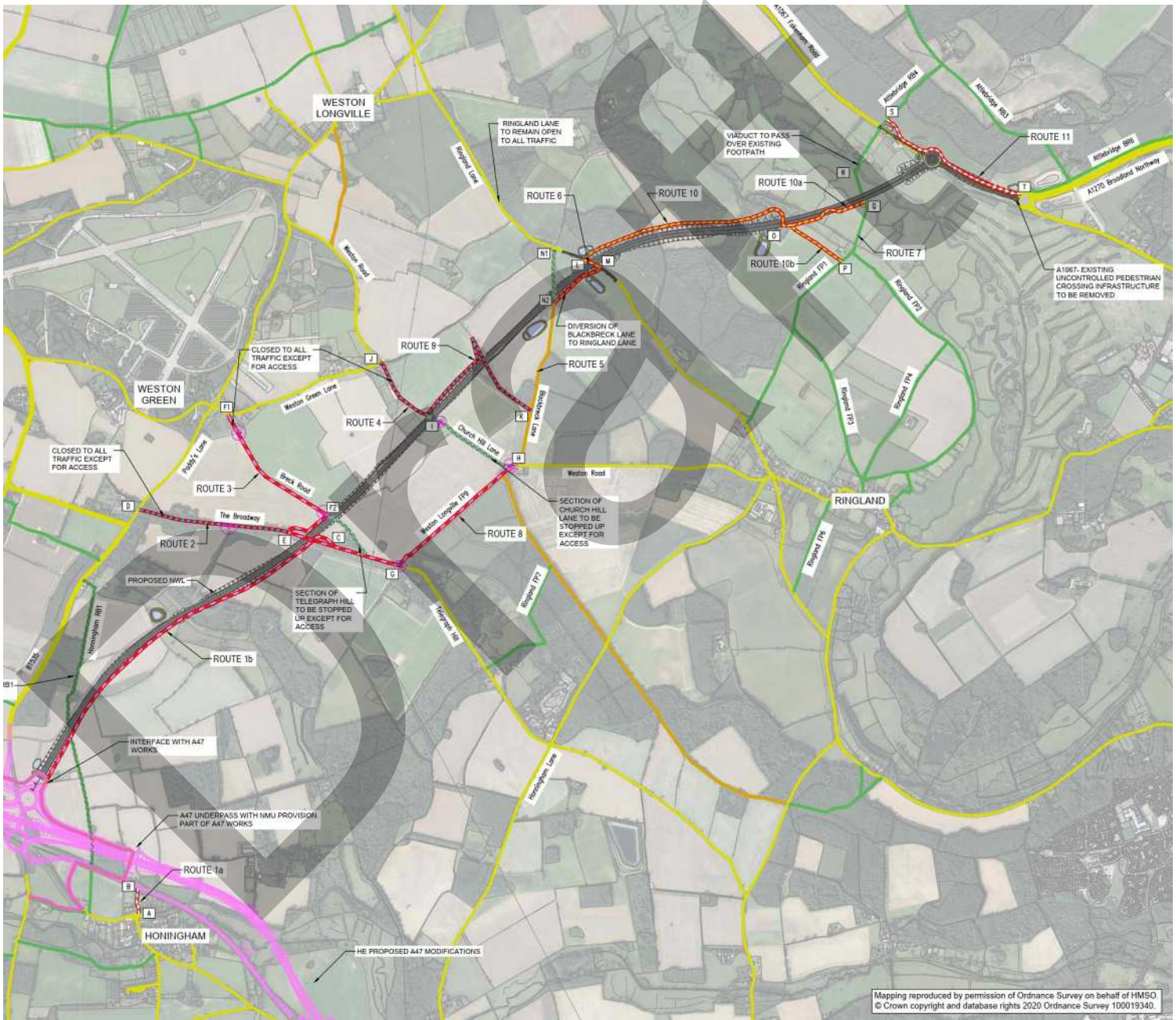
4.2 Green Bridges

Artists impression of The Broadway green bridge (looking west)

4.3 Side Roads & Traffic Mitigation

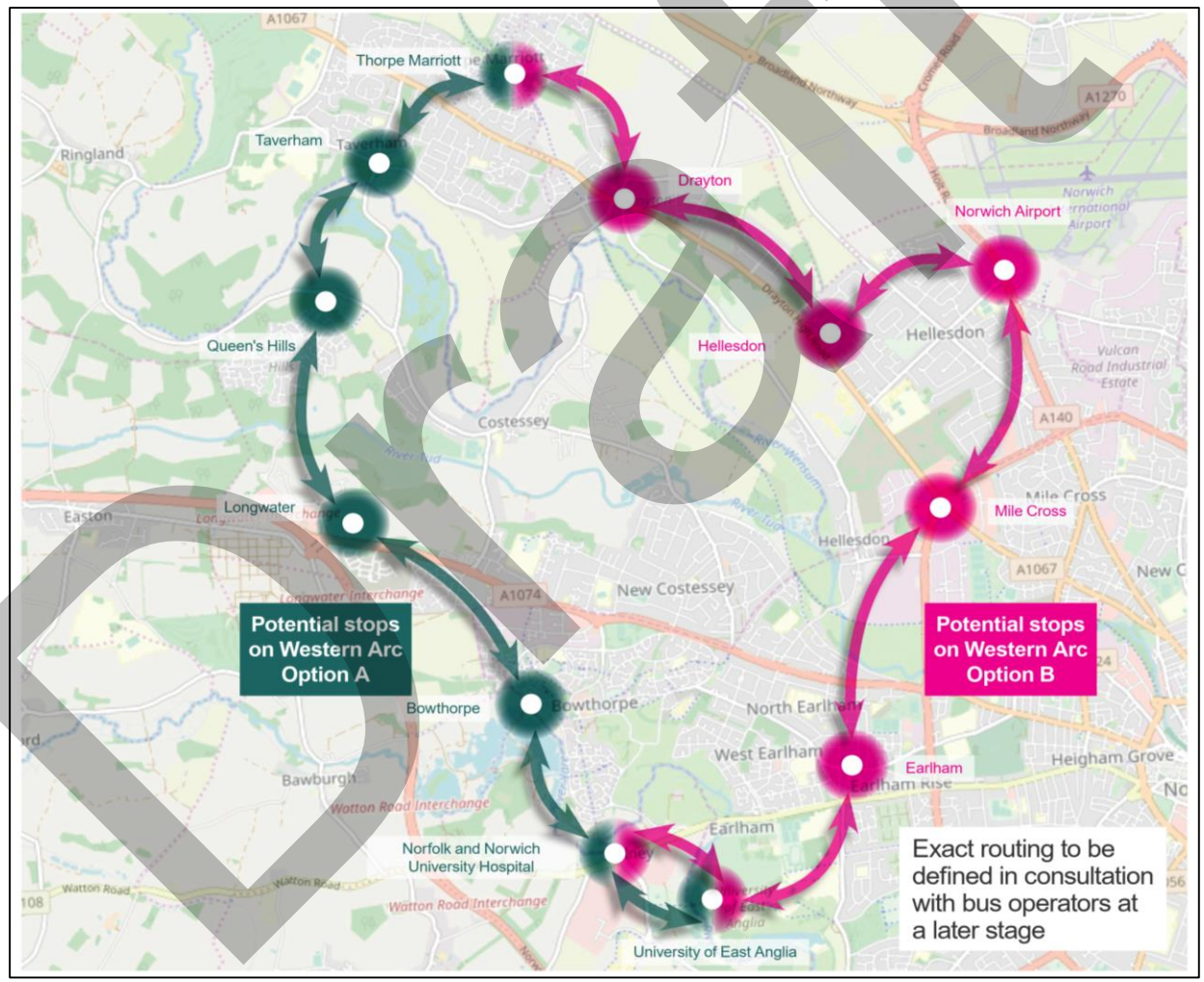
- The NWL team are working up potential traffic mitigation measures, focussing on links along the A1067 and to the north as well as south of A47 where traffic is potentially redistributed in response to the proposals.
- Additional transport model runs will be carried out to test the likely effects of potential mitigation ideas.
- Separate meetings will be held to discuss the proposals in more detail with affected groups of Parishes.

4.3 Updated NMU Strategy



5.0 Bus Strategy

- Two potential bus route options were considered in the Local Access Consultation:



5.1 Bus Strategy

- Consultation feedback indicated that Option A (Thorpe Marriott to UEA via Norwich Airport) was most popular amongst local residents.
- A viability assessment was carried out which indicated that both options have potential for becoming self supporting.
- Konectbus in partnership with UEA trialled part of the Option B service from the Airport Park and Ride to the Hospital (NNUH) from September 2020 as service 512 operating hourly.
- However due to Coronavirus the trial was unsuccessful. The 512 service was discontinued due to lack of uptake in December 2020.
- Both options therefore continue to be explored as part of the NWL Sustainable Transport Strategy with input from bus operators and the NCC Passenger Transport team.

6.0 Next Steps

- Meeting with Sustrans to seek more detailed guidance on the design of Cycle Friendly Route Options
- Continue working with bus operators and NCC Passenger Transport Team to agree a preferred option for the bus strategy
- Work to develop the shortlisted sustainable transport measures
- We will continue working in partnership with Highways England regarding A47 North Tuddenham to Easton Dualling scheme.

Thank you

Appendix C

WALKING, CYCLING & HORSE-RIDING ASSESSMENT REPORT

Norwich Western Link

NCCT41793

Volume 4

Part B

Annex 1: Walking, Cycling and Horse Riding Assessment (WCHAR)

CONFIDENTIAL | WSP
June 2020

Revision	Date	Issued by	Comments
V2.0	12 June 2020	UKPJC007	WCHAR updated for Procurement

Revision	Prepared by	Checked by	Authorised by
V2.0	Hattie Gibbs	David Minshall	Paula Cuthbertson

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WESTON LONGVILLE PARISH COUNCIL NWL SUGGESTIONS

1 SCHEME DESCRIPTION AND BACKGROUND

1.1 BACKGROUND

1.1.1. The Norwich Northern Distributor Route (NDR) A1270, or Broadland Northway, was completed in April 2018. Since that time there has been sustained calls for the NDR to be continued to connect from its western end to the A47 trunk road, to ease traffic problems in the local area and enhance strategic connectivity.

1.1.2. Highways England plan to improve the A47 between Easton and North Tuddenham to a dual carriageway, over a 9km section of route, with work currently planned to commence in 2022.

1.1.3. Norfolk County Council undertook an Option Assessment process to develop a shortlist of options for a new Norwich Western Link (NWL), connecting Broadland Northway to the A47. The outcome of this study was the selection of a preferred route option, Option C in July 2019.

1.1.4. The preferred route involves the construction of a new 6.1 kilometre / 3.8-mile dual carriageway. The construction of this new NWL link would complete an orbital route around the city of Norwich, in combination with the A47 dualling scheme.

1.1.5. This report has been prepared in accordance with DMRB GG 142 Walking, Cycling and Horse-Riding Assessment and Review (WCHAR) [*Superseding HD 42/12 in November 2019*], which is Highways England overall process for the consideration of walking, cycling and horse-riding facilities within highway schemes. In accordance with GG 142, the scale of the scheme has been judged (by the Lead Assessor) to qualify as a large scheme for the purposes of the Assessment, with the following information requirements:

- Review of walking, cycling and horse-riding policies / strategies;
- Collision data;
- Description of public transport facilities;
- Key trip generators and local amenities;
- Site visit;
- Consultation with key stakeholders;
- Description / review of existing walking, cycling and horse-riding network facilities at a local and county wide (strategic) level;
- Collation and analysis of walking, cycling and horse-riding user data; and
- Evidence of consultation with local user groups and the wider public.

1.2 PROJECT OBJECTIVES

1.2.1. A range of project objectives have been developed to align with the current overarching themes presented in national, regional and local policy, as well as associated guidance. The objectives are in two tiers as high-level and specific local objectives, which have been discussed at meetings with local communities and are subject to ongoing refinement (**Table 1-1**). Those relevant to the WCHAR have been highlighted in red below and the strategy has been developed with these in mind.

Table 1-1 – Norwich Western Link project objectives

Strategic Objective	Strategic Outcomes
S1 Improve connectivity and journey times on key routes in Greater Norwich.	i) Improved journey times and journey time reliability, on routes through the area west of Norwich ii) Reduced congestion and delay through the area west of Norwich iii) Reassignment of traffic away from existing routes reducing delay and congestion iv) **Improved existing accessibility.** v) Reduced emergency response times vi) Improved network resilience vii) A more-suitable direct route for HGV/LGV vehicles viii) **Reduced trips on local minor roads for vehicular traffic**
S2 Reduce the impacts of traffic on people and places within the western area of Greater Norwich	i) Reassignment of trips onto appropriate routes ii) Reduced noise impacts in built-up areas iii) **Improved Non-Motorised User connectivity** iv) Improved air quality in built-up areas v) Minimised traffic impacts on local residents during construction in the vicinity of the scheme
S3 Encourage and support walking, cycling and public transport use	i) **Increased number of trips taken by walking, cycling and public transport** ii) **Increased access to public transport, walking and cycling facilities**
S4 Improve safety on and near the road network, especially for pedestrians and cyclists	i) Reduced overall network accident rate ii) Reduce the number of people killed or seriously injured on roads in the area west of Norwich iii) **Minimise highway safety impacts and severance during construction**
S5 Protect the natural and built environment, including the integrity of the River Wensum SAC.	i) Biodiversity Net Gain ii) Minimised impact on landscape iii) Minimised impact on heritage iv) Not affect the integrity of the River Wensum SAC v) **Minimise impact of the scheme on climate change** vi) Minimise adverse environmental impacts arising from construction
S6 To improve accessibility to key sites in Greater Norwich	i) **Improved accessibility to Norwich International Airport, Norfolk & Norwich University Hospital and key employment and education sites** i) **Improved accessibility to green areas** ii) **Improved access to the cycle and Public Rights of Way network**

1.3 PROPOSED SCHEME & Preferred Route

1.3.1. Following the scheme appraisal and option shortlisting, the preferred route recommendation for NWL was made. A preferred route is required in order to continue delivery of the project through the statutory and funding processes, appoint a contractor to construct the scheme and interface with other stakeholders / projects such as the Highways England A47 Easton to North Tuddenham dualling scheme. In July 2019 Option C was recommended as the preferred option for the Norwich Western Link, shown in **Figure 1-1**.

1.3.2. Option C comprises a new dual carriageway, routed from the end of the Broadland Northway / A1067 roundabout, extending a short distance along the A1067 towards a new junction and linking to the B1535 Wood Lane junction with the A47. Works comprise dualling of the A1067 from the Broadland Northway roundabout for around 350m before a new A1067 junction and then continuing on a new dual carriageway in a south westerly direction between Weston Longville and Ringland, initially crossing the River Wensum on a viaduct.

1.4 STUDY AREA

1.4.1. **Figure 1-1** shows the approximate study area for this Assessment Report. The assessment area has been set by the Lead Assessor and is approximately a 5km radius from the centre of the scheme, as per GG 142 guidance. The study area includes parts of the Districts of Breckland, Broadland and South Norfolk, as well as the cusp of the city of Norwich.

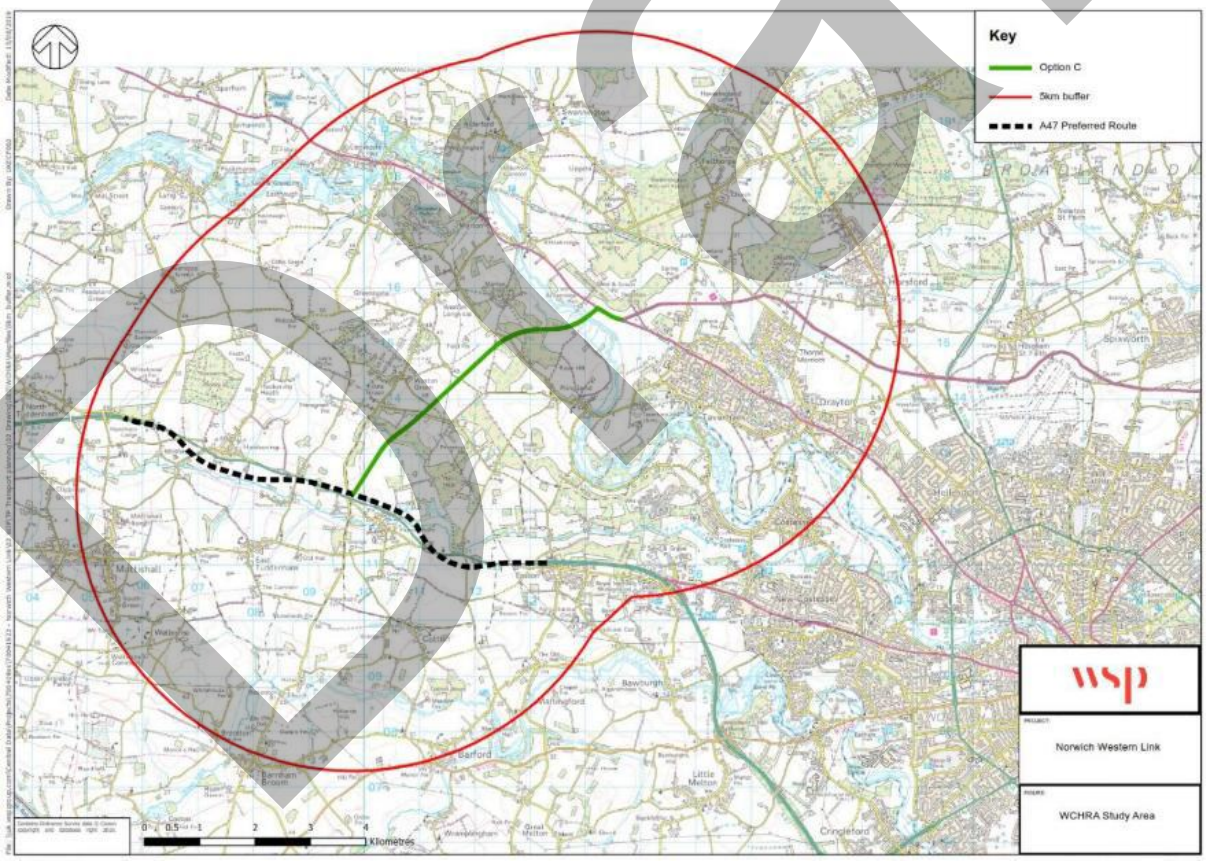


Figure 1-1 - WCHAR Study Area

2 WALKING, CYCLING AND HORSE-RIDING ASSESSMENT

2.1 INTRODUCTION

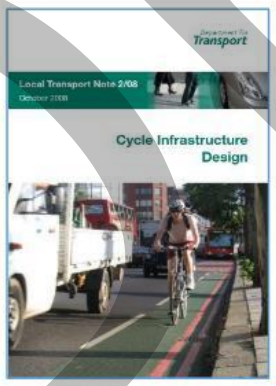
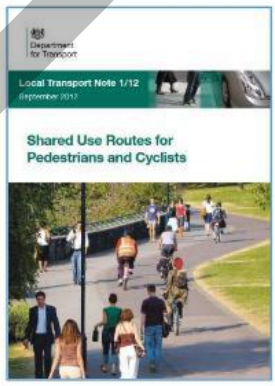
2.1.1. This section summarises the findings of the assessment undertaken in accordance with the methodology set out in Section 4 Walking, Cycling and Horse-Riding Assessment Requirements in DMRB GG 142.

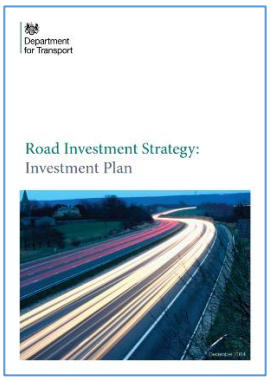
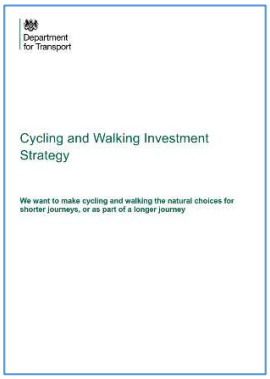
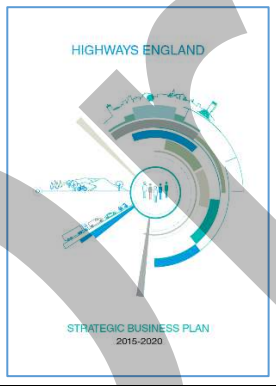
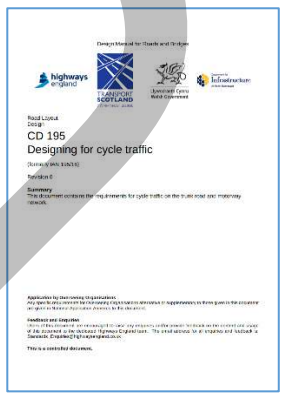
2.1.2. Section 8.4 of the Option Selection Report' (**Appendix A**), 'Packaging of Supplementary Transport Measures', identifies that a Walking, Cycling and Horse Riding Assessment would be undertaken to inform the development of a complementary package of non-motorised user interventions. This Assessment provides background user information that can be referred to throughout the design process and identifies opportunities for improvement for users. The opportunities presented will then be examined for feasibility in the WCHAR Review, which is the second stage of the WCHAR process. Reference to this Assessment will assist with development of a sustainable transport strategy, providing input to the Outline Business Case, and seeking to maximise opportunities for transferring shorter distance trips to non-motorised modes of travel, where possible.

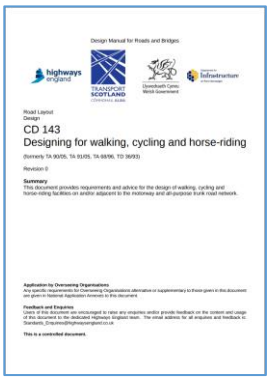
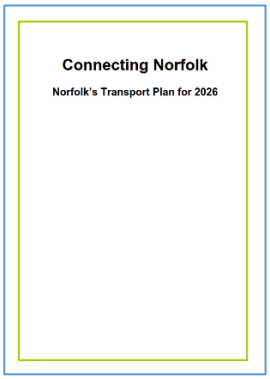
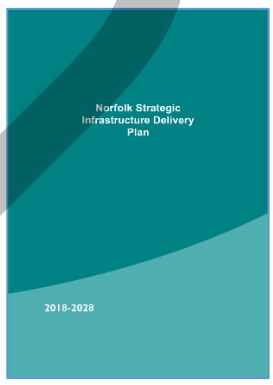
2.2 REVIEW OF WALKING, CYCLING & HORSE-RIDING POLICIES AND STRATEGIES

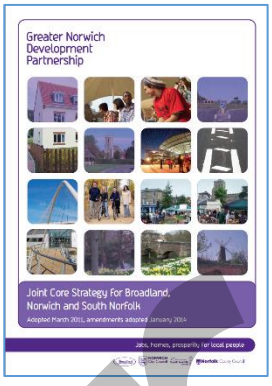
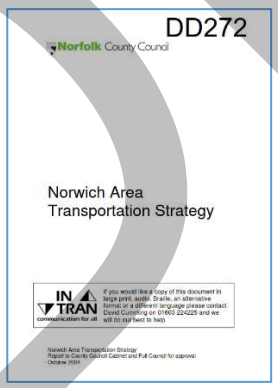
2.2.1. **Table 2-1** shows the documents that have been reviewed as part of this assessment:

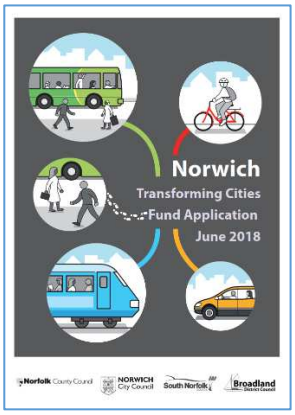
Table 2-1 – List of policies and documents reviewed

Policies			
National	DfT Local Transport Note 2/08: Cycle Infrastructure Design (2008)		The Note has been written to bring together guidance policy to encourage more people to cycle. The Note provides guidance on improving safety for cyclists and pedestrians through the design of cycle infrastructure
	DfT Local Transport Note 1/12: Shared Use Routes for Pedestrians and Cyclists (2012)		This Note provides guidance on the planning, design and provision of shared routes for pedestrians and cyclists.

	DfT Road Investment Strategy: Investment Plan (2014)		The RIS sets out how investment will be put towards the Strategic Road Network between 2015/16 and 2020/21 through an investment of £15.2bn in over 100 major schemes. The A47 / A12 trunk road is highlighted as an area for investment during the RIS period, in particular the North Tuddenham to Easton dualling is noted, which is within the study area.
	DfT Cycling and Walking Investment Strategy (2017)		The Strategy outlines the Government's ambition to make cycling and walking a natural choice for shorter journeys, or as part of longer journeys by 2040. By 2040, the ambition is to deliver "Better Safety, Better Mobility and Better Streets". The ambition will be delivered through more high-quality cycling facilities, rural roads which provide improved safety for walking and cycling, behaviour change shifts and places that are designed for people of all abilities so they can choose to work or cycle with ease.
	Highways England Strategic Business Plan / Delivery Plan 2015 – 2020 (2015)		The Strategic Business Plan applies between 2015 and 2020. Over this period, Highways England aims to modernise, maintain and continue operating the Strategic Road Network. Within the Plan, eight key areas are highlighted to measure the Plan's performance, including that to "*help cyclists, walkers and other vulnerable users*". This will be measured by the number of new or upgraded crossings.
	Design Manual for Roads and Bridges CD 195 Designing for Cycle Traffic		The document published in September 2019, replaces IAN 195/16 and contains the requirements for cycle traffic on the trunk road and motorway network.

	Design Manual for Roads and Bridges CD 143 Designing for Walking, Cycling and Horse-riding		The guidance document published in November 2019, replaces TA 91/05 'Provisions for Non-motorised Users' and shall be used for routes on and / or adjacent to the motorway and trunk road network. The general design principles are that routes shall be free from unnecessary diversions, frequent obstacles and fragmented facilities.
Regional	Connecting Norfolk - Norfolk County Council's Local Transport Plan 2011-2026 (2011)		Norfolk's 3rd Local Transport Plan sets the long-term strategy for transport delivery up to 2026. It provides the policy framework for improvements to transport as well as being a guide for future development or delivery. The Vision for Transport is "*a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the County*". **Policy 2** highlights the need to increase journey time reliability, especially for public transport to reduce traffic in the region.
	Norfolk Strategic Framework – Shared Spatial Objectives for a Growing County (2017)		The production of the framework aims to agree shared objectives and priorities which will inform future Local Plans. To reduce Norfolk's greenhouse gas emissions, there will be encouragement towards a modal shift in travel away from car use towards public transport, walking and cycling. The A47 Easton to Tuddenham dualling and Norwich Western Link are highlighted as key projects to improve transport in the region; this is within the study area.
	Norfolk Strategic Infrastructure Delivery Plan 2018-2028 (2018)		The Strategic Infrastructure Delivery Plan (SIDP) combines information on the key infrastructure needed to deliver economic growth in Norfolk. The SIDP highlights the Norwich Western Link as a key infrastructure initiative over the next 10 years; which is within the study area.

	Norfolk Access Improvement Plan (NAIP) 2019 – 2029 (2019)		The NAIP incorporates the Rights of Way Improvement Plan and sets out priorities for improving access to the countryside for residents and visitors over the next ten years. The Statement of Actions includes: development of integrated network, promotion of Norfolk's access network, increased community involvement for the development and acre of the local networks and a network that will improve the health and wellbeing of residents and visitors. The report highlights the priority needs for walkers, cyclists and horse riders, in order to provide guidance on improvement measures necessary during the plan period.
Local	Joint Core Strategy for Broadland, Norwich and South Norfolk 2011-2026		The Joint Core Strategy has been prepared by the three councils of Broadland, Norwich and South Norfolk, working together with Norfolk County Council as the Greater Norwich Development Partnership. The report includes strategic polices for shaping development and sets out he long-term vision of the Partnership. **Objective 7** and **12** support the enhancement of transport provision through the greater use of sustainable modes by public transport, walking and cycling. The report furthers the need for people to be offered the best opportunities to make healthy travel choices a part of their daily lives.
	Norwich Area Transportation Strategy (2010)		The Transport Strategy has been designed to help deliver the growth that will happen within the Norwich area and address transport problems. The Strategy aims to increase travel choice for all by improving facilities for walking and cycling and routes for public transport., such as bus priority measures on the core bus network. The strategy also considers the addition of further Park and Ride sites around Norwich, such as Trowse, Taverham and Drayton to reduce congestion.

	Norwich Transforming Cities Fund Application (2018)		The bid looks to transform the connectivity in Norwich through a coordinated package of improvements to economic growth areas on three transport corridors and in the city centre. The vision to "*invest in clean transport creating a healthy environment increasing social mobility and boosting productivity through enhanced access to employment and learning*." The project has two main objectives, which are to support employment growth and to cut carbon, whilst also support two secondary objectives of housing growth and air quality. The corridors are: Airport to Broadland Business Park, Wymondham to Sprowston and Easton to Rackheath. The scope covers the City Centre and the six radial routes of Newmarket Road, Dereham Road, Yarmouth Road, Sprowston Road, Aylsham Road and Cromer Road. The investment programme will transform the corridors by reducing bus times, improving connectivity between transport modes and cutting pollution.
	Transport for Norwich	Transport for Norwich	Transport for Norwich is a programme of work to improve accessibility by all forms of transport around the city until 2036. The aim is to encourage the use of more sustainable forms of transport such as public transport, cycling and walking, while also improving the capacity on the network, especially along the Broadland Northway. The project will be rolled out in partnership with Norfolk County Council, Norwich City Council and local authorities within Greater Norwich, A project of significant that is seeking funding from the bid is the Cross Valley Link, that will create a new bus link form UEA to NNUH, reduce travel times by avoiding congestion on the current route.

2.3 COLLISION DATA

2.3.1. A review of Personal Injury Accidents (PIA), including vulnerable road users (pedestrians and cyclists) has been undertaken in the vicinity of the proposed scheme, using data requested from NCC. The results are shown in **Figure 2-1**.

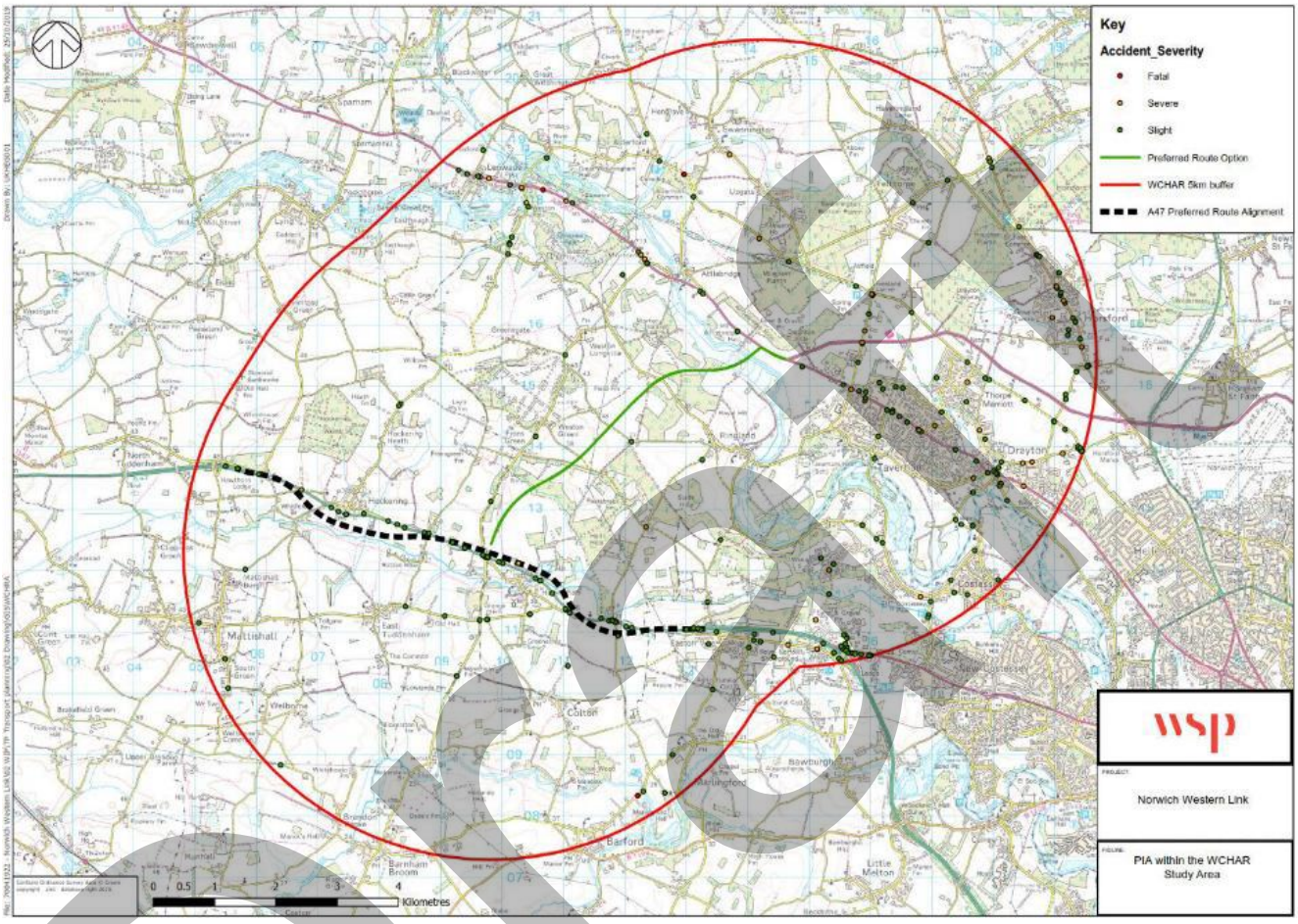


Figure 2-1 - PIAs within the WCHAR Study Area

2.3.2. **Figure 2-1** shows that in total there were five fatal, 52 serious and 247 slight collisions between 01/08/2014 – 11/07/2019, totalling 304 collisions in the study area.

2.3.3. Collisions were clustered in areas such as on the A47; 16 slight collisions were located on the approach to or on the Longwater A47 roundabouts; 12 slight collisions on the Easton roundabout; 6 slight and 2 serious collisions on the A47 Blind Lane / Taverham Road junctions; and 2 serious and 8 slight collisions on the A47 Berry's Lane / B1535 junctions.

2.3.4. It is anticipated that there will be some collision reduction along the A47 corridor brought about by the improvement works planned by Highways England.

2.3.5. Of the 304 reported PIAs, there were 404 casualties over the five-year period, of which 5 were fatal, 59 were serious and 340 were slight injuries. When this is split between those who are an adult or a child, 15% were adults killed or seriously injured, 1% were children killed or seriously injured and 84% were slight casualties (Adult or child).

2.3.6. Of all the accidents recorded, only three of slight severity were recorded to have been caused by a poor road layout or a poor / defective road surface.

2.3.7. Regarding the type and number of vehicles that were involved in the collisions, there were:

- 2 agricultural vehicles;
- 11 buses or coaches;
- 424 cars;
- 13 HGVs;
- 20 LGVs; and
- 31 Bicycles.

2.3.8. The A1067 presents a barrier to free movement between the central and northern parts of the study area. This corridor would benefit from improved or new crossings to improve safety and enhance connectivity with public transport. The A47 also presents an existing barrier to north south movement but NMU provision is expected to be included in the Highways England proposals for dualling, which should mitigate this issue and enable improved connectivity.

2.4 PUBLIC TRANSPORT SERVICES AND INTERCHANGE INFORMATION

BUS SERVICES

2.4.1. 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.

2.4.2. Along the proposed route alignment, Option C, there are no bus stops, with the nearest located on Norwich Road and Fakenham Road. **Figure 2-2** below shows the bus network for the greater Norwich area, the map highlighting 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 Norfolk or the Excel services to Fakenham and to Dereham, King's Lynn and Peterborough.

2.4.3. Norwich Bus Station is located outside of the study area in the centre of Norwich, off Surrey Street and Queens Road, which is managed and operated by Konectbus.

2.4.4. Konectbus provide the 3, 4 and 8 services to the west of Norwich, connecting Barnham Broom, Barford, Mattishall, East Tuddenham, Honingham, Easton and Hockering.

2.4.5. It is anticipated that NWL will support important bus services such as the First Bus X29 / 29 service from the North West of the County by intercepting some of the traffic that currently uses Fakenham Road and other roads parallel with NWL (Section 8.4 of the NWL Option Selection Report (OSR)). This would potentially assist with improving bus journey time reliability on existing routes by freeing up road space.

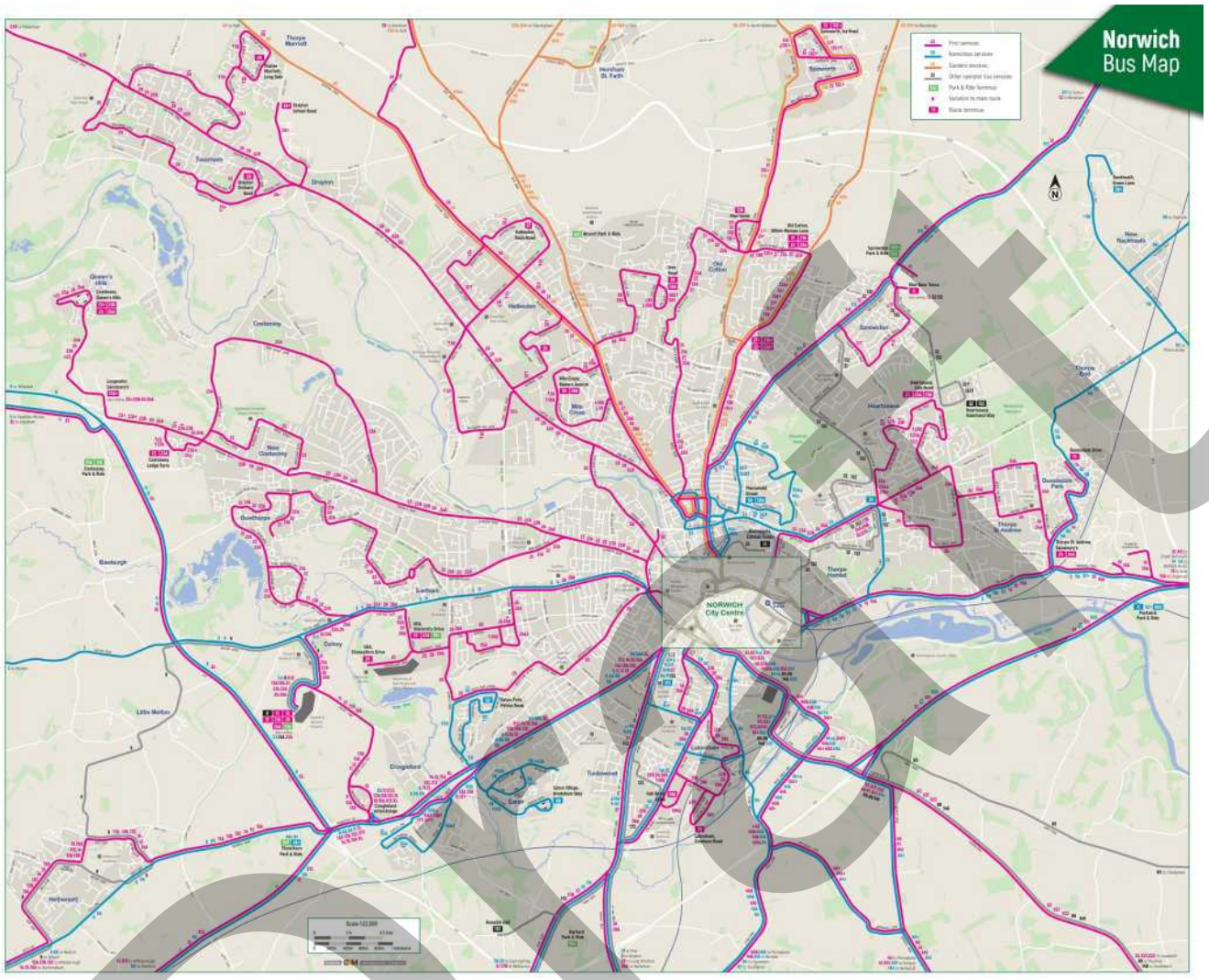


Figure 2-2 - Greater Norwich Bus Network Map

2.4.6. To the south-east, outside of the study area, is Wymondham Train Station on the Breckland Line; to the east, also outside of the study area, is Norwich Station, on the Wherry Line. Further services on the Bittern Line (Norwich to Cromer) and Great Eastern Mainline (Norwich to London Liverpool Street) allow for Norwich to have strong connectivity to key destination (**Figure 2-3**). Wymondham and Norwich Stations are operated by Greater Anglia and received 4.16 million and 187,000 passengers in 2017/2018 respectively (Office for Rail and Road, 2019).

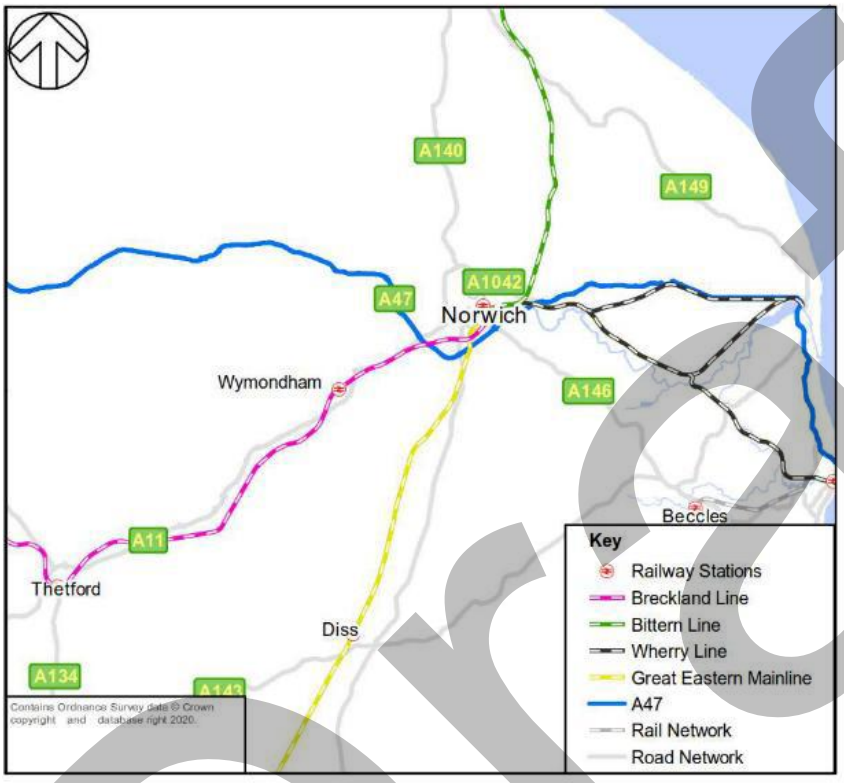


Figure 2-3 – Local Rail Map

2.4.7. 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. **Table** 2-2 below summarises the weekday services available from Wymondham Station.

Table 2-2 – Weekday Direct Services from Wymondham Station

Destination	Calling points	Frequency	First Service	Last Service	Average Journey Time
Cambridge	Attleborough, Thetford, Brandon, Ely and Cambridge North	Hourly	05:45	22:52	1 hour 7 minutes
Norwich	-	Hourly	07:11	00:01	15 minutes

Stansted Airport	Attleborough, Thetford, Brandon, Ely, Cambridge North, Cambridge, Whittlesford Parkway and Audley End	Hourly	08:45	19:39	1 hour 40 minutes

Source: National Rail, 2020

2.4.8. From Norwich Station, a number of key destinations can be accessed, namely to Liverpool Lime Street, Lowestoft, Great Yarmouth, Cambridge, London Liverpool Street and Sheringham. **Table 2-3** below summarises the weekday services available from Norwich Station.

Table 2-3 – Weekday Direct Services from Norwich Station

Destination	Calling points	Frequency	First Service	Last Service	Average Journey Time
Cambridge	Wymondham, Thetford, Ely and Cambridge North	Hourly	05:33	22:40	1 hour 20 minutes
Liverpool Lime Street	Direct services through Ely and Manchester In-direct services change at London	2 per Hour	05:00	23:05	5 hours 30 minutes
Lowestoft	Brundall, Reedham and Oulton Broad	2 per Hour	05:36	22:40	45 minutes
Great Yarmouth	Brundall, Lingwood and Acle	Hourly	05:06	23:00	35 minutes
London Liverpool Street	Stowmarket, Ipswich and Colchester	2 per hour	05:00	22:40	2 hours
Sheringham	Hoveton & Wroxham, North Walsham and Cromer	Hourly	05:10	22:45	1 hour
Stansted Airport	Wymondham, Thetford, Brandon, Ely, Cambridge North, Cambridge, Whittlesford Parkway and Audley End	Hourly	08:33	19:27	2 hours

Source: National Rail, 2020

2.5 EXISTING PEDESTRIAN, CYCLIST AND EQUESTRIAN FACILITIES WITHIN THE LOCAL AREA

PEDESTRIAN FACILITIES

2.5.1. The study area is located in the rural areas to the west of Norwich City Centre, where there are a number of PROWs available for use. Through interrogation of Norfolk County Council's online mapping tool, the location of PROWs through the study area have been identified.

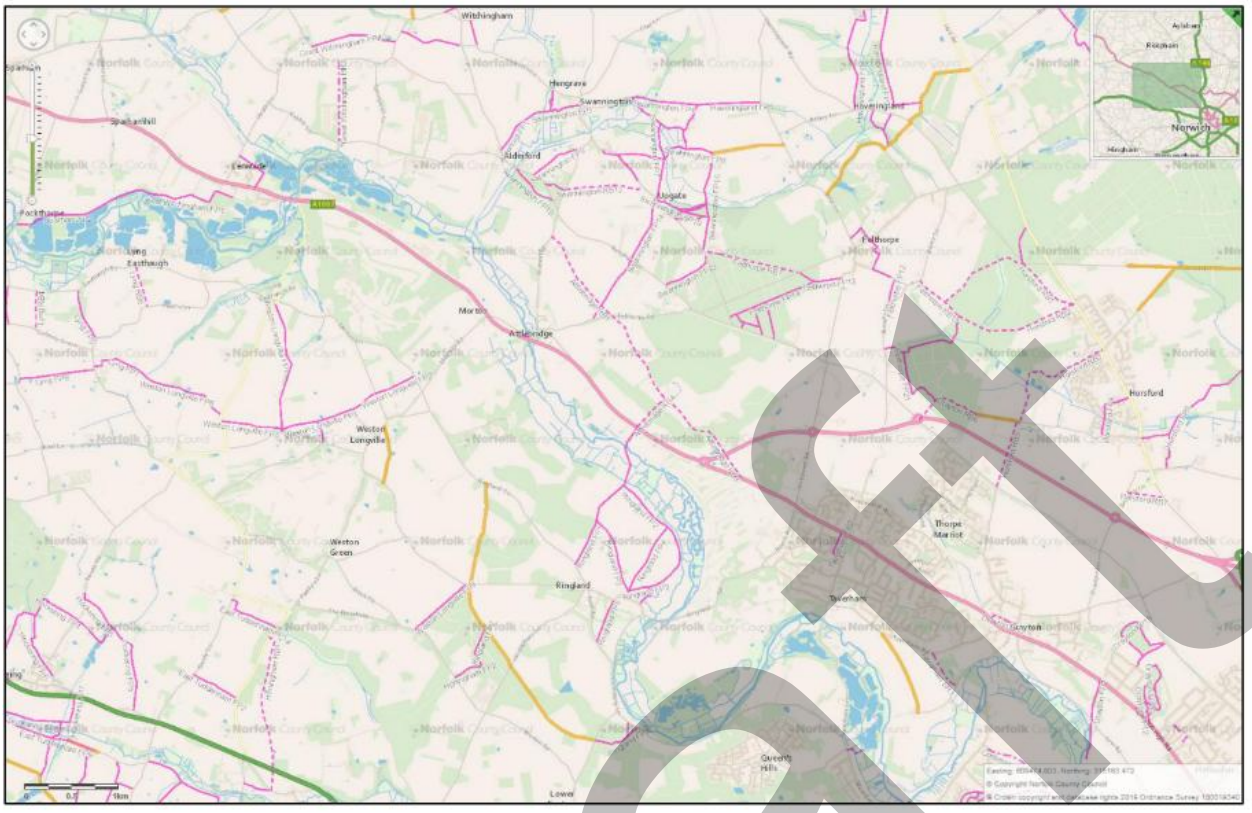


Figure 2-4 - PROWs - Study Area, North View (Source: Norfolk County Council)

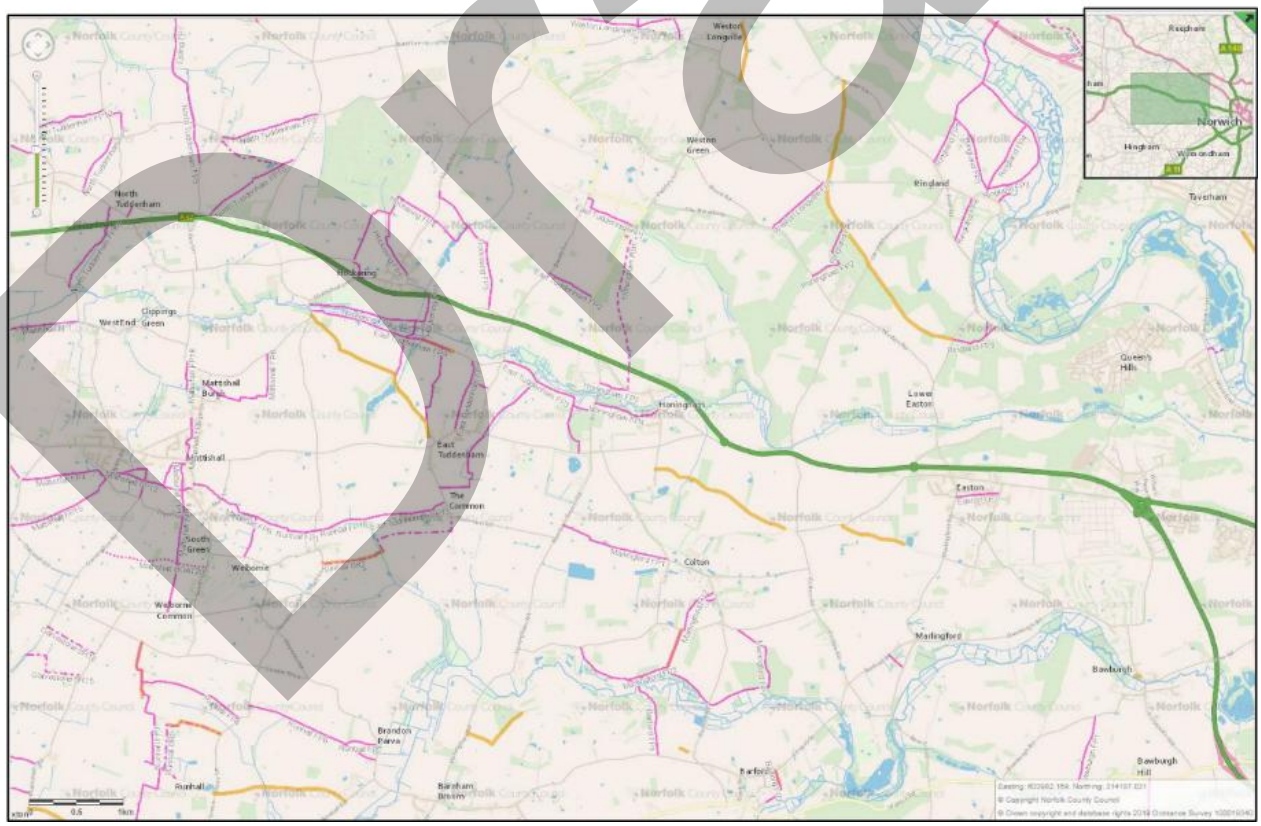


Figure 2-5 - PROWs - Study Area, South (Source: Norfolk County Council)

2.5.2. The proposed route alignment of the NWL and that of the preferred route for the North Tuddenham to Easton dualling scheme will sever some of the existing PROWs and Green Lanes:

- **Honingham RB1** – the restricted byway will be severed twice, once by the NWL and again by the North Tuddenham to Easton dualling;
- **Blackbreck Lane** (Ringland Lane to Weston Road), Green Lane – The unsurfaced highway maintained by Norfolk County Council will be severed;
- **Ringland FP1** – will be severed near Attlebridge Hall;
- **Hockering FP7** – The footpath will be severed by the North Tuddenham to Easton dualling project
- **Dog Lane / Ringland Lane** – A current pedestrian crossing on the A47 Southern Bypass will be impacted by the new dualling project.

2.5.3. Walking isochrones have been produced to show the walking accessibility from different origins, key settlements, within the study area. The isochrone outputs are included in **Appendix C**.

- **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;
- **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.
- **Drayton**, 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;
- **Hockering**, travel is not possible along the 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;
- **Horsford**, is quite isolated and so only Drayton and the neighbouring woodland are accessible on foot within 30 minutes;
- **Lenwade**, 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;
- **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;
- **Ringland**, is located towards the north portion for the proposed route alignment 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;
- **Taverham**, similar to that of 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
- **Weston Longville**, is located to the to the north-west of the proposed route alignment, 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.

2.5.4. In summary, walking can cover a wide area and the delivery of the NWL can enhance the level of pedestrian use and possibly open up new routes for local residents and enthusiasts to enjoy.

CYCLIST FACILITIES

2.5.5. The study area encompasses a number of cycling routes and facilities, including those of the Norfolk Trails as highlighted in **Figure 2-7**. Furthermore, there are a number of local cycling groups that will be impacted by the preferred route announcement, who have been consulted.

2.5.6. As identified in the OSR, through initial scoping discussions with cycle officers at NCC, the assessment of the sustainable transport strategy will focus on the following key routes:

- Longwater to Taverham via Queens Hills;
- Ringland to Easton and Costessey P&R;
- Ringland to Lenwade via Weston Longville;
- Hockering to Honingham;
- Great Witchingham to Attlebridge;
- Identify A1067 crossing opportunities at Attlebridge and Drayton;
- Identify how best to achieve improved Marriott's Way connectivity; and
- Connectivity with Highways England proposals for A47 multi-user crossings.

2.5.7. Cycling isochrones have been produced to show the cycling accessibility from different origins, key settlements, within the study area. The isochrone outputs are included in **Appendix D**.

- Attlebridge, the northern portion of the study area can be travelled to within a 30-minute cycle, with further travel possible due to the use of the A1067 and the Marriott's Way trail; areas also include East Tuddenham, Colton, New Costessey, Felthorpe, Lenwade and Hockering.
- **Costessey**, from the origin, central Norwich can be reached within 30-minutes and areas such as Cringleford, Sprowston, Horsham St Faith, Barford and Colton;
- 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.
- Hockering, is to the west of the study area on the 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;
- 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;
- Lenwade, located to the north-west of the study area, within 30 minutes, Honingham, Lyng, Sparham. Lenwade, Morton, Swannington, Taverham, Reepham and Hockering;
- 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;
- Ringland, is located in the centre of the study area, enabling cyclists to travel to Costessey, Bawburgh, Barford, Taverham, Drayton, Hockering, Felthorpe and Lenwade;

- **Taverham**, is close to Norwich City Centre, which can be reached within a 30-minute cycle journey, as well as Easton, Bawburgh, Hellesdon, Weston Green, Swannington and Horsford; and
- 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.

In summary, key settlements within the study area have strong cycling connectivity which can be enhanced through the delivery of NWL.

2.5.8. A number of equestrian facilities are located within the western part of the study area; these are shown in **Figure 2-6** below.

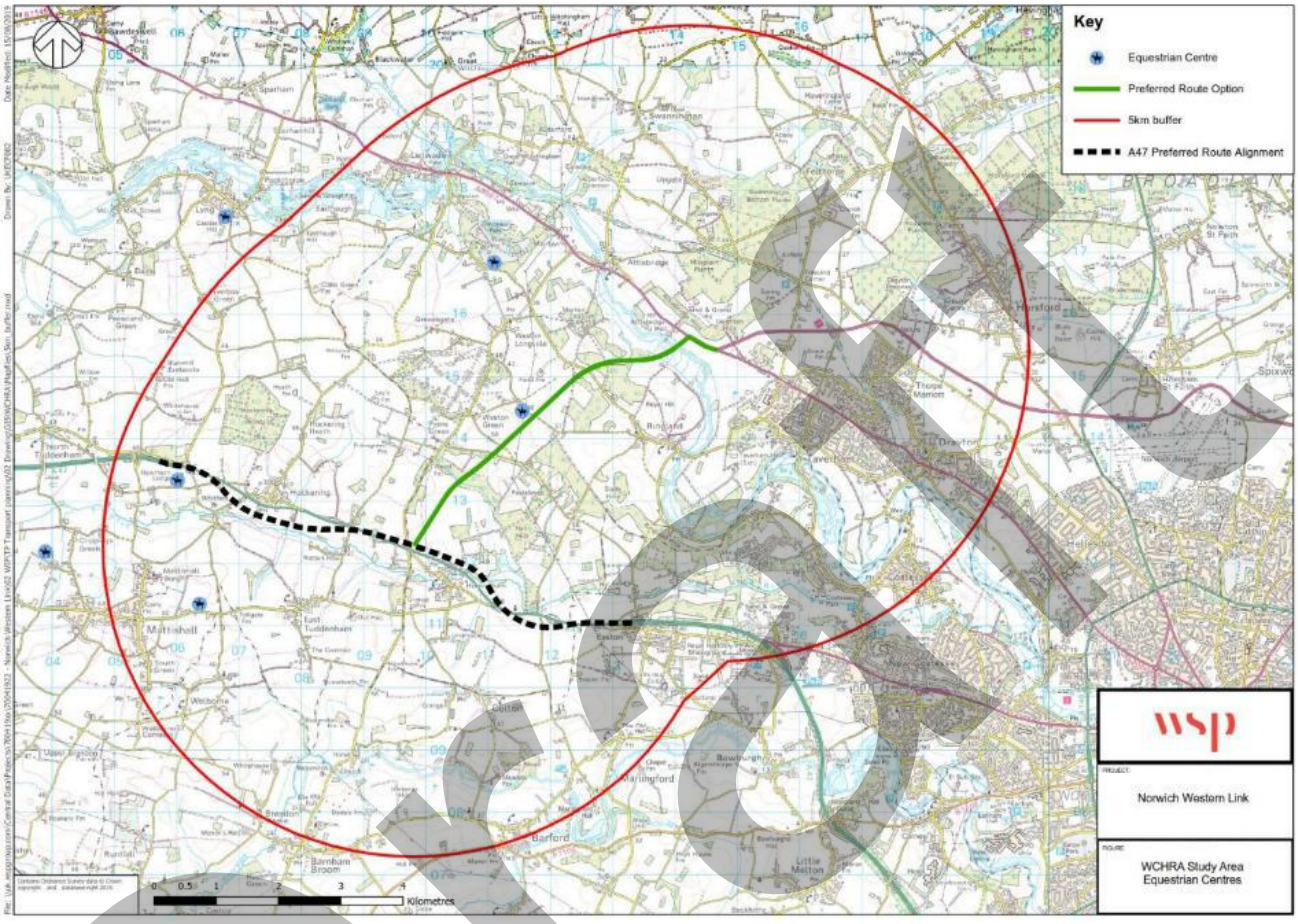


Figure 2-6 - Equestrian Facilities in the Study Area

2.5.9. Within the study area is Weston Equestrian Centre, Kimblewick Riding Centre and Burgh Farm Dressage, as well as one un-named stables along Weston Road.

2.5.10. The NWL programme could assist with supporting longer distance leisure trips by equestrians; this would consist of giving priority to equestrians / cyclists on quieter existing roads where parallel routes exist and looking at minor highway interventions to keep traffic speeds sufficiently low to raise awareness of the vulnerable users on the routes.

Marriott's Way

2.5.11. Not shown on the PROW map, is Marriott's Way in the north of the study area, which creates a 26-mile footpath, bridleway and cycle route following the route of two disused railway lines from Aylsham to Norwich. **Figure 2-7** below shows the location of the Marriott's Way and a further nine Norfolk Trails that can be used to explore the wider Norfolk area.

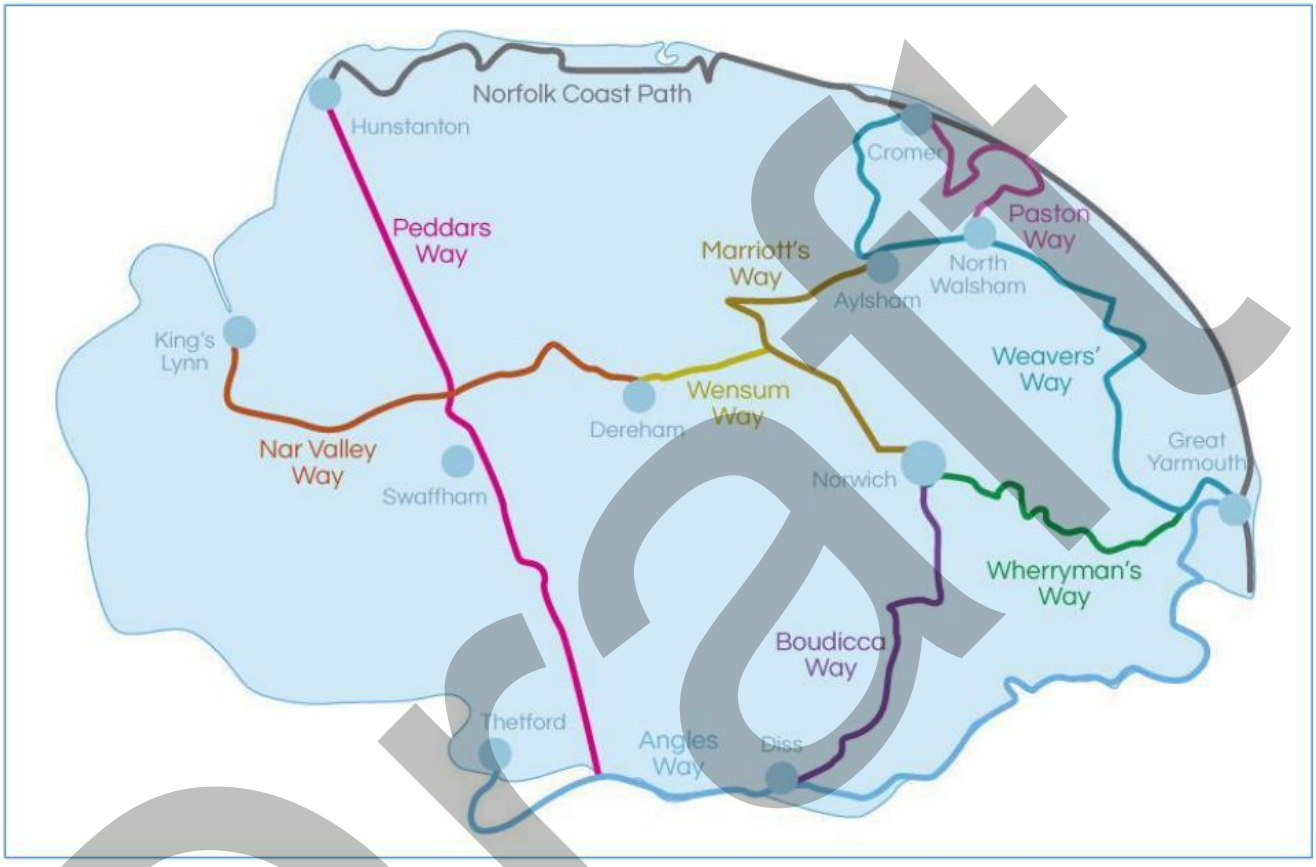


Figure 2-7 - Norfolk Trails Network

2.5.12. In 2017, Marriott's Way was audited for potential accessibility difficulties along the route. Maps are provided on NCC's Norfolk Trails website (https://www.norfolk.gov.uk/out-and-about-in-norfolk/norfolk-trails/access-tested-walks), which can be printed off to correspond to photographs and descriptions of the route. The entire route has not yet been audited, only the following sections below, totalling 11 miles, have been assessed for accessibility:

- Norwich to Hellesdon;
- Hellesdon to Drayton;
- Taverham to Attlebridge;
- Attlebridge to Lenwade; and
- Lenwade to Whitwell.

2.5.13. NCC have also released footage of the Norfolk Trails on their Trekker Trails webpage (https://www.norfolk.gov.uk/out-and-about-in-norfolk/norfolk-trails/trekker-trails), where the routes were filmed with Google's backpack Trekker camera over the summer of 2018. The Norwich to Aylsham route can be viewed on Google Maps, which allows users to see the nature of the route before visiting.

NMU COUNTS

2.5.14. A nine-day NMU survey was commissioned to video the levels of usage on the seven routes that will be severed by the NWL. Four of the nine days were counted by the survey company to cover two weekdays and the weekend, this helps to provide a clear idea of the level of use that the routes are experiencing. The survey period covered Saturday 12th October to Sunday 20th October, with the full classification carried out on the 17th-20th inclusive.

2.5.15. Due to the remote location of many of the routes it became difficult to find suitable street furniture to attach the counters to. The counters were therefore located at the access points where they connect with other roads, although this did result in minor risk that users may be missed if they began from the opposite end and did not travel the entire route.

2.5.16. The results from the surveys have been analysed and a summary is included below (**Table 2-4**); a full output of the survey results is included in **Appendix E**. The results have been displayed as the average daily two-way flows over the four-day survey period and shows relatively low usage over the Public Right of Way network.

Table 2-4 – NMU Survey Results

Route	Pedal cycle	Equestrian	Motorcycle	Car	LGV, OGV & PSV	Pedestrians – lone adult	Pedestrian – adult with dog (s)	Pedestrian – adult with child	Wheelchair / mobility scooter
Honingham RB1									
The Broadway	0	0	0	13	6	1	1	0	0
Breck Road	5	0	0	66	13	3	0	0	0
Weston Road	7	3	1	60	17	4	1	0	0
Blackbreck Lane	0	1	0	0	0	0	1	0	0
Ringland Lane	32	0	2	260	63	2	0	0	0
Ringland FP1									

Note: Honingham RB1 and Ringland FP1 have not been included, as further survey data is needed at a later date.

2.6 EXISTING PEDESTRIAN, CYCLIST AND EQUESTRIAN FACILITIES BEYOND SCHEME EXTENTS AND LINKS TO COUNTY / STRATEGIC NETWORK

Pedestrian Facilities

2.6.1. The Norfolk Trails website, published by NCC, promotes a number of walking routes suitable for all abilities.

Short and Circular Walks

- Angles Way (Great Yarmouth to Thetford)
- This has been tested for access by NCC along the Burgh Castle stretch of 1.2 miles;
- Norfolk Coast Path, National Trail (Hunstanton to Sea Palling)
- This has been access tested by NCC along four routes: Blakeney Freshers, Gorleston to Great Yarmouth, Haven Bridge to North Denes and Wells Quayside
- The Coast Path has also been uploaded to Google Maps using a Trekker camera;
- Railway Rambles – along the Bittern and Wherry Lines;
- Nar Valley Way (King's Lynn to Gressenhall);
- Paston Way (Cromer to North Walsham);
- Peddars Way, National Trail (Knettishall Heath to Holme-next-the-Sea)
    - The route has been uploaded to Google Maps using a Trekker camera;
- Weavers' Way (Cromer to Great Yarmouth)
    - This has been access tested by NCC along five sections of the route, including North Walsham, North Walsham to Honing, Honing to East Ruston, East Ruston to Stalham and Felmingham to North Walsham;
- Wensum Way (Gressenhall to Lenwade);
- Wherryman's Way (Norwich to Great Yarmouth);
- Burlingham Woodland Walks;
- Health, Heritage ad Biodiversity Walks; and
- Workhouse Walks.

Long Distance Trails

- Norfolk Coast Path, National Trail;
- Marriott's Way;
- Angles Way;
- Boudicca Way (Norwich to Diss);
- Ren Rivers Way (King's Lynn to Cambridge);
- Nar Valley Way;
- Paston Way;
- Weavers' Way;
- Wensum Way (Gressenhall to Lenwade);
- Peddars Way;
- Cross-Norfolk Trail (King's Lynn to Great Yarmouth);
- Wherryman's Way; and
- Three Rivers Way (Hoveton to Potter Heigham)

Proposed Greenways

2.6.2. NCC are conducting feasibility studies to look at developing a greenway network across the county, with the aim to extend across Norfolk and link into the Norfolk Trails network of walking and cycling routes. Work on the project began in April 2018, focusing on three disused railways: Weaver's Way between Aylsham and Stalham, King's Lynn to Fakenham and King's Lynn to Hunstanton.

2.6.3. Funding was secured in 2019 for work on the Weavers' Way and Norfolk Coast Path, along with new circular walks on the routes. Work will begin in November 2019 and will be completed in March 2020.

2.6.4. Broadland District Council published the West Broadland Green Infrastructure Project Plan in January 2018, with the aim to identify a series of green infrastructure opportunities.

2.6.5. The report proposed four new greenways:

- Thorpe Marriott Greenway – to develop a footpath within the tree belt and to connect walkers from the Marriott's Way to route north over the Broadland Northway;
- Drayton to Horsford Greenway – to develop a green corridor linking Drayton Wood to a new green bridge across the Broadland Northway and enhance current connectors;
- Hellesdon to Drayton Greenway – deliver new greenway connections between Clovelly Close, Hellesdon and the golf course; and
- South Drayton Greenway – to link Lodge Breck / Fairview Close to Drayton High Road.

Cyclist Facilities

CYCLE ROUTES

2.6.6. 11 cycle routes are promoted by Norfolk County Council, including:

Peddars Way

- Much of the route is suitable for cycling, with some of it being on quiet lanes and country roads. However, four sections are not suitable for cyclists: Between the start at Knettishall Heath through to Bridgham Heath, Between South and North Pickenham, between Fring and Ringstead and south of Holme-next-the-Sea.

Weavers' Way

- Two separate cycle rides have been suggested: Stalham to Bengate and North Walsham to Aylsham. The Marriott's Way can also be used to extend the cycle ride in this area.

Bure Valley Path

- The trail meets with the Marriott's Way and Wavers' Way at Aylsham, following the route of the former Great Eastern Railway.

North Norfolk Coast Cycleway

- The path follows the Sustrans National Cycle Network Route 1 from King's Lynn to Wighton and then along the Sustrans regional route 30 through to Cromer.

Norfolk Broads

- 16 routes allow for the Broads to be explored, ranging from 5.5 to 25 miles:
  - 01 Stokesby (Runham, Mautby and Thrigby)
  - 02 Martham (Thurne, Rollesby and West Somerton)

- 03 Clippesby (Thurne, Fleggbugh and Filby Broad)
- 04 Horsey (Sea Palling, Hickling, Potter Heigham and Martham)
- 06 Hickling (Sutton)
- 07 Stalham (Ingham, Honing and Worstead)
- 08 Hoveton (Neatishead, Barton Turf and Horning)
- 09 Horning (Wroxham, Salhouse, Ranworth, South Walsham and Ludham)
- 10 Bungay (Earsham, Ditchingham, Ellingham and Geldeston)
- 11 Bungay (Geldeston, Beccles, Barsham and Ilketshall St Andrew)
- 12 Three River Loop (Loddon, Reedham, Beccles and Geldeston)
- 13 Burgh St Peter Staithe (Aldeby, Toft Monks and Wheatacre)
- 14 Burgh St Peter Staithe (Aldeby, Raveningham, Thurlton and Haddiscoe)
- 15 Yare Valley (Strumpshaw, Cantley and Buckenham)
- 16 Whitlingham (Caistor St. Edmund, Framlingham and Bramerton)

Brecks

- The Angles Way and Peddars Way routes pass through the Brecks and the Brecks Cycling Discovery Route covers 20 miles, starting from Swaffham.

Yare Valley

- The route closely follows the Wherryman's Way form Norwich to Reedham on the southern side of the River Yare. It then crosses to the north at Reedham Ferry and back to Norwich on country lanes.

Three Rivers Way

- The route travels from Hoveton to Horning, covering 2.5 miles.

2.6.7. Within Norwich there are also a number of cycle roads, showing the connectivity in and around the city centre. The map of the routes is shown in **Figure 2-8** below; a full-size copy is also included in **Appendix F**. The map shows busy traffic areas and traffic-free part so the pedalways in the city. St Andrew's Plain is located at the centre of all the routes, providing a starting point for those already in the city centre. The pedalways include:

- Green – Bowthorpe to Broadland Business Park;
- Red – Drayton to Whitlingham;
- Yellow – Lakenham to Aviation Academy;
- Pink – Norfolk & Norwich University Hospital to Heartsease;
- Blue – Wymondham to Sprowston;
- Orange – Inner City Circuit; and
- Purple – Outer City Circuit.

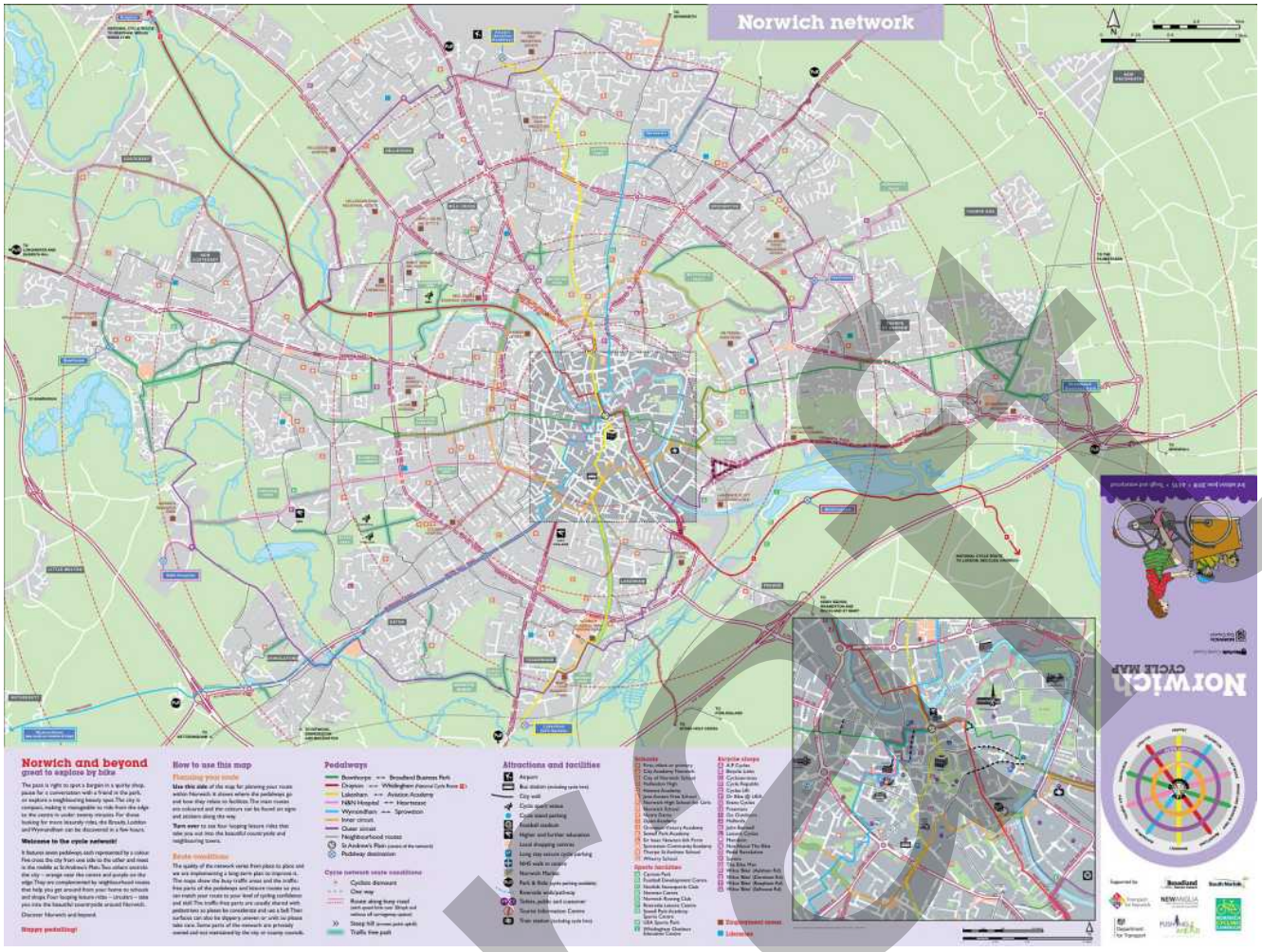


Figure 2-8 - Cycle Map of Norwich

2.6.8. Of the 10 Norfolk Trail routes, a further two are available to equestrians: Peddars Way and Weavers' Way.

2.6.9. The Peddars Way forms part of a National Trail, traveling from Knettishall Heath through to the North Norfolk Coast at Holme-next-the-Sea, totalling 46 miles. Combined with the Norfolk Coast Path, it forms the Peddars Way & Norfolk Coast Path National Trail, one of 15 National Trails in England and Wales.

2.6.10. The Weavers' Way is a trail mainly used by walkers, but with sections that could be suitable to equestrians. The route covers 61 miles between Cromer and Great Yarmouth, passing stately homes, market towns and farmland.

2.6.11. One of the existing equestrian facilities is located on the proposed route alignment, which could impede its ability to carry on operating.

2.7 TRIP GENERATORS

KEY TRIP GENERATORS & Local Amenities

2.7.1. The proposed scheme is located to the north-west of Norwich. The area surrounding the proposed scheme is of small villages and hamlets; to the north-west is Lenwade, Weston Longville and Attlebridge; to the east and south-east are Horsford, Drayton, Ringland, and Costessey; and to the south-west there is Hockering and Mattishall.

2.7.2. Land uses that are considered to be attractive to pedestrians, cyclists and equestrians are shown below.

Within the Study Area

- Key Settlements: Attlebridge, Costessey, Drayton, Hockering, Horsford, Lenwade, Mattishall, Ringland, Taverham and Weston Longville;
- Royal Norfolk Showground;
- Longwater Shopping Centre;
- Secondary Schools: Taverham High School and Costessey High School;
- Taverham Garden Centre;
- ROAR Dinosaur Adventure Park;
- Places of Worship: St Mary's Hockering, St Michael's Hockering, St Margaret's Drayton, St Edmund Taverham, etc.;
- Equestrian Centres;
- Village Halls;
- Post Offices;
- Food Stores;
- Supermarkets and convenience stores;
- Golf Courses and Clubs;
- Country Houses;
- Waterways: Rivers Wensum, Tud and Yare; and
- Opens paces, such as parks: Ringland Hills.

In the surrounding area

- Costessey Park and Ride;
- Norfolk and Norwich University Hospital;

- Riverside Shopping Centre;
- Intu Chapelfield Shopping Centre;
- Castle Quarter Shopping Centre;
- Norwich Train Station;
- University of East Anglia;
- Norwich City Football Club;
- Norwich Airport; and
- Norwich City Centre.

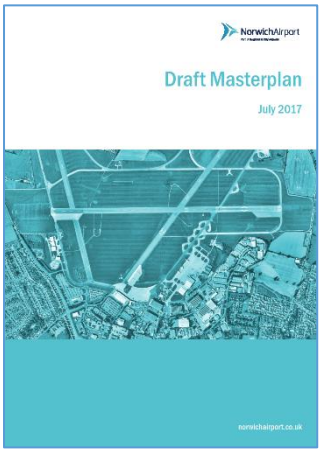
FUTURE TRIP GENERATORS

2.7.3. The documents reviewed in **Section 2.2**, set the planning strategy for the future of the wider Norwich area. The major development areas within the study area are:

Easton Food Enterprise Park / Zone

- 46 acres of land has received planning permission for a food enterprise zone to encourage and support food production, processing and agriculture. The FEP adjoins the A47, with works included in the development to dual the single carriageway section of the A47 between North Tuddenham and Easton to accommodate the growth forecasted for the FEP.
- The Local Development Order will support the following businesses: Agri-tech, processing of agricultural produce, manufacture of food products, storage and distribution of agricultural produce, food technology companies, food-related suppliers and haulage services related to agriculture and food companies.

Norwich Airport



- In 2017 Norwich Airport released a Draft Masterplan setting out their vision for the airport's continued growth over the next 30 years. The airport's vison is to be "the passenger airport of choice for Norfolk, Suffolk and adjoining counties; a leading provider of aircraft maintenance, repair and overhaul services; a supplier to the oil and gas industry and a location for business growth". To provide for growth to 2030, there will be:
  - An expansion of the existing terminal;
  - Exploring the need to lengthen the operational hours for the scheduling of flights beyond 23:00 for four days a week in the summer months;
  - Increased passenger parking provision; and
  - A proposed 500m extension to the eastern runway to accommodate larger aircraft.

University of East Anglia

- The 2030 Vision for UEA, involves investing £300 million in the campus and the creation of a 7-storey 'Sky House', as a new academic building. The building will be on the site on the current car park and will involve the removal of approximately 260 spaces. To mitigate the loss in spaces, the University has improved the current Park & Ride service from Costessey and from September 2019 there will be an improved service from Watton and

Dereham which will serve Newmarket Road. Construction of the Sky House is expected to begin in 2020, with a targeted completion date of May 2022.

Greater Norwich Local Plan

- The new joint plan is being produced by Broadland District Council, Norwich City Council and South Norfolk Council, working together with Norfolk County Council thro
- ugh the Greater Norwich Development Partnership. The plan aims to meet the local housing and economic growth needs, whilst also protecting and enhancing the natural environment. A public consultation was held until December 2018 where interested parties could voice their views on the proposed plans. From January 2020, the Stage C Regulation 18 Draft Plan Consultation will be held, which will include the preferred planning strategy for the areas to 2036 and the preferred site that will be allocates to achieve the strategy. The plan is expected to be adopted in late 2021.
- Within the Site Proposals document, initial sites have been put forward to be included in the local plan:
    - Land east of Drayton Lane and north of Hall Lane, Drayton – 273 dwellings
    - Honingham Thorpe, Norwich Road, Honingham – 360.96ha allocated for a mixed-use development
    - Land off Reepham Road, Horsford – 150-200 dwellings
    - Reepham Road / Holt Road, Horsford – 36.6ha allocated for residential development and employment
    - West of Reepham Road, Horsford – 128-192 dwellings
    - Land adjacent to Drayton Lane, Horsford – 136-200 dwellings
    - Land adjacent Drayton Lane, Horsford – 326-489 dwellings
    - Land at Holly Lane / Reepham Road, Horsford – 750 dwellings
    - Land to the east of Holt Road, Horsford – 266 dwellings
    - Land adjacent to Beech Avenue Business Park, Ringland Road, Taverham – 150-200 dwellings
    - Land between Fir Covert Road an Reepham Road, Taverham – 1,400 dwellings
    - Anglia Square, Norwich – 1,500 dwellings and 20,000m2 retail space
    - Land off Watton Road, Barford – 117 dwellings
    - Land off Bawburgh Lane and New Road, Bawburgh – 50ha for residential development
    - Land to the north-east of Town House Road, Costessey – 11.39ha for residential development
    - Land to the South of Cleves Way / East of Longwater Lane – 17.82ha for housing
    - Costessey Landfill Site, and adjoining land, Dereham Road, Costessey – 47ha for mixed-use
    - Land to the north of Tuttles Lane East, Wymondham – 54ha for residential development
    - North-east Wymondham – 195ha for mixed use development of up to 1,600 dwellings

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

- The JCS was published in 2014 to set out the long-term vision of the Greater Norwich Development Partnership and to identify broad locations for new housing and employment growth. The plan looks ahead to 2026, where a forecasted need for 36,820

dwellings are expected. Key sites allocated for over 1,000 dwellings in or near the study area are:

- Easton and Costessey – 1,000 dwellings
- Three Score, Bowthorpe – 1,200 dwellings
- Old Catton, Sprowston, Rackheath and Thorpe St Andrew – 7,000 dwellings
- Hethersett – 1,000 dwellings
- Cringleford – 1,200 dwellings

- Key sites allocated for over 5ha of employment land in or near the study area are:
  - Norwich Research Park – 55ha
  - Taverham – 6ha
  - Longwater Employment Park – 13ha
  - Norwich Airport Area – 30ha

2.8 SITE VISIT

17TH September 2019

2.8.1. An initial site visit was carried out on Tuesday 17th September, by the Project Assessors, Hattie Gibbs and Paula Cuthbertson, accompanied by Zeyna Soboh (NWL Design Coordinator, WSP) and Philip Clark (Associate, WSP), within the study area of the proposed NWL alignment. The site visit consisted of a walkover along the Public Rights of Way (PROWs) that are likely to be severed or impacted by the proposed route alignment. The analysis also focused on the level of use the routes were receiving and any safety, maintenance or wayfinding concerns were noted.

2.8.2. The proposed route alignment will sever seven existing PROWs or routes and so the site visits focused on walking these routes shown in **Figure 2-9**.

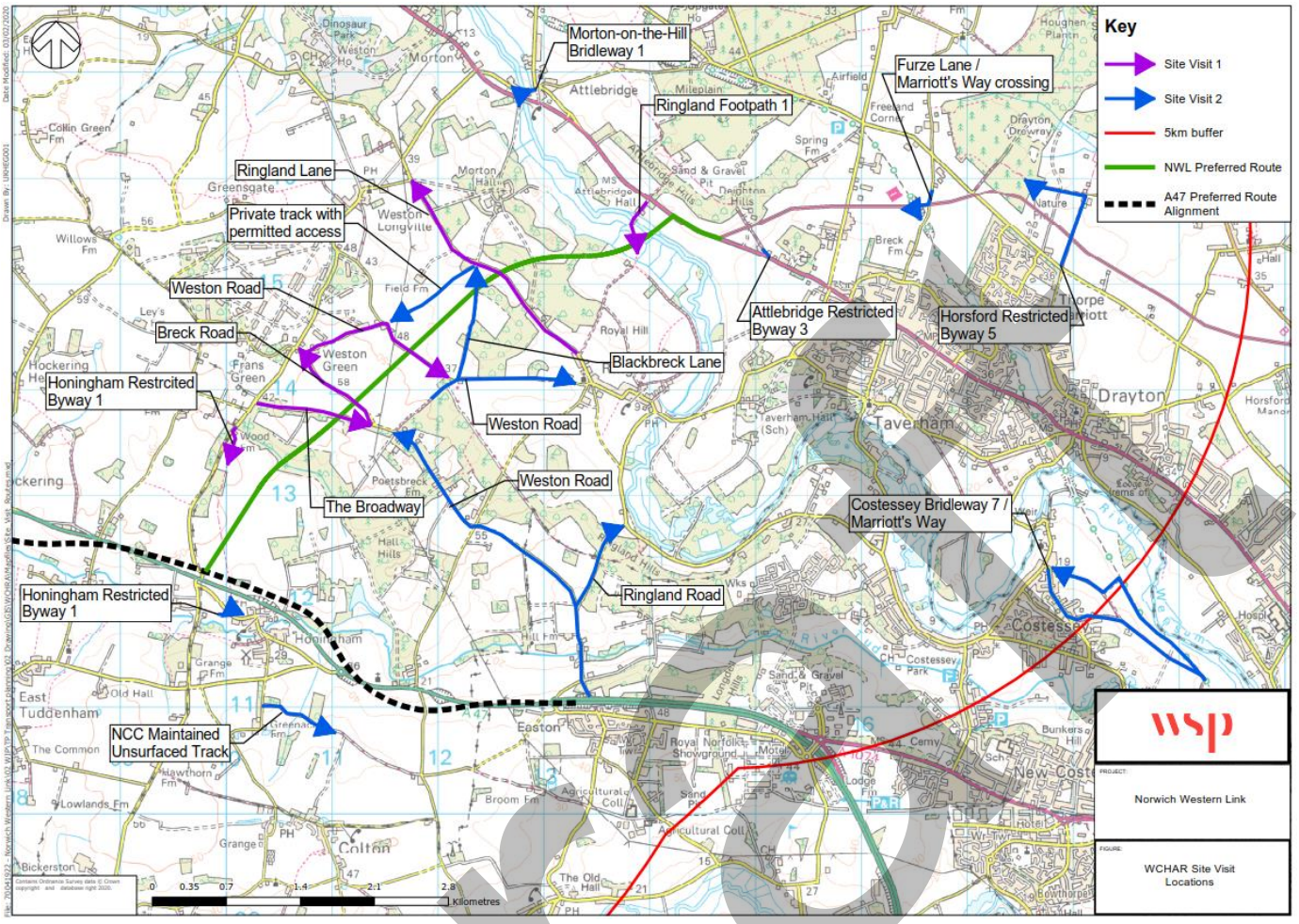


Figure 2-9 - Site Visit Locations - Routes Severed by NWL

Site 1 – Honingham Restricted Byway 1

- The restricted byway can only be accessed off the B1535 (**Figure 2-10**), which has a speed limit of 60mph. There is no footpath provision along the B1535 to the byway; pedestrians are having to use the narrow verges or walk on the carriageway to access it (**Figure 2-11**).

Figure 2-10 – Site 1, B1535 looking south

Figure 2-11 – Site 1, B1535 narrow verges

- The site walkover included walking the byway route. Wayfinding proved quite difficult as there was no signage or tracks to show where the route was. There is a kissing gate enabling entrance off the B1535 (**Figure 2-12**), yet no further infrastructure was noted. The gate does not enable access for cyclists or equestrians.

Figure 2-12 - Site 1, Kissing gate at byway entrance

- Through the gate, dilapidated barns are located (**Figure 2-13**), as well as some farms tracks along the field boundary (**Figure 2-14**), yet there were no signs of use for the byway. Tall grasses surrounded the fields (**Figure 2-15**), with no recent routes cut through; it was not clear whether users were on private property or on the byway. The route appeared to be potentially unsafe in its present state.

Figure 2-13 - Site 1, View south from kissing gate

Figure 2-14 - Site 1, vehicle tracks, 30m west of kissing gate

Figure 2-15 - Site 1, Tall grass limits access to the byway

- Heading back towards the B1535 from the restricted byway, East Tuddenham Footpath 1 is located to the west of Wood Lane. This was investigated to see how improvements to the byway may influence the footpath.
- At the entrance to the footpath, the footpath sign is visible on the fence post (Figure 2-16), however, the path was blocked by fallen branches and detritus (**Figure 2-17**).

Figure 2-16 - Site 1, East Tuddenham Footpath 1

Figure 2-17 - Site 1, Footpath blockage

Site 2 – The Broadway

- The Broadway is a single-track country lane, heading east from Paddy's Lane. There are few passing places, yet the speed limit of the lane is 60mph. The road is narrow and is lined with mature trees and the gradient increases further east (**Figure 2-18**).

Figure 2-18 – Site 2, The Broadway heading east

- No vehicles travelled on the Broadway during the site visit, possibly due to the narrowness of the route. There appears opportunity to encourage use of the Broadway by pedestrians, cyclists and equestrians, due to its picturesque nature and apparent light traffic use.
- Approximately 1km east from the junction with Paddy's Lane, the Broadway intersects with Breck Road. A priority junction on the Broadway allows for access onto Breck Road, although the layer of detritus on the ground suggests that this is used infrequently **(Figure 2-19**).

Figure 2-19 – Site 2, Priority junction from the Broadway (east), onto Breck Road

Site 3 – Breck Road

- Breck Road intersects with the Broadway to the east (Figure 2-20).
- Breck Road is of a similar standard to that of The Broadway, however, it is not lined by trees and so provides views of the wider countryside.
- There was evidence of use by pedestrians and equestrians, Figure 2-21, as well as use by vehicles, which suggests that Breck Road is used more frequently than The Broadway.
- There is no footpath provision and little space on either side of the road to act as passing places for vehicles or non-motorised users (Figure 2-22).

Figure 2-20 - Site 3, Breck Road / The Broadway junction

Figure 2-21 - Breck Road heading west

Figure 2-22 - Site 3, Narrowness of Breck Road

- Towards the western end of Breck Road, there are signs possibly placed by local residents, to 'Please slow, cats about' (**Figure 2-23**) and to 'Please slow, hedgehogs crossing' (**Figure 2-24**) This highlights that local residents are aware of traffic and speed issues and are encouraging efforts to reduce it.

Figure 2-23 - Site 3, Speed warnings for cats

Figure 2-24 - Site 3, Speed warnings for hedgehogs

Site 4 – Weston Road (Unclassified Road)

- Assessors walked down Breck Road to the junction with Weston Green Road, then onto the unclassified road to the east of Weston Green (**Figure 2-25**).
- The road was narrow, with few passing places and farm accesses (**Figure 2-26**).
- There was evidence of use by pedestrians, cyclists and equestrians (**Figure 2-27**), as well as a number of vehicles – likely local traffic.
- There were no footways and users would find it default to pass vehicles due to the narrow space.
- A riding school is located on the unclassified road, suggesting that the road is a frequent route used by equestrians.

Figure 2-25 - Site 4, Junction with Weston Green Road, looking west

Figure 2-26 - Site 4, Narrow road, with few passing places

Figure 2-27 – Site 4, Unclassified Road heading east

Site 6 – Ringland Lane

- This is a narrow, rural road with intermittent passing areas, similar in condition to the other roads observed, however, this was used far more frequently by vehicles, compared to the other roads observed during the site visit (**Figure 2-28**).
- There was farm / land access off the road, which were clearly used by tractors and other heavy machinery to access the fields on either side of the road (**Figure 2-29**).
- There is a grass verge either side of the carriageway, in some locations, only on one side of the road, which made it possible to walk along the length of the road; no walkers or cyclists were observed during the site visit (**Figure 2-31**).
- The topography slopes upwards towards the south and the roadside varies from dense woodland to open agricultural land on either (**Figure 2-30**).

Figure 2-28 - Site 6, Passing place on Ringland Lane

Figure 2-29 - Site 6, Farm access off Ringland Lane

Figure 2-30 - Site 6, Variety of landscapes along Ringland Road

Figure 2-31 – Site 6, Ringland Lane heading south-east

Site 7 – Ringland Footpath 1

- The footpath is accessed (**Figure 2-32**) from the busy junction on the A1067 Fakenham Road and leads down the Old Hall Farm driveway, past a farm building, across two timber planks over a watercourse filled with blue-green algae, to a gated field (**Figure 2-33** and **Figure 2-34**); which at the time of visiting contained livestock (cows).
- Across the first field is a timber footbridge which crosses the River Wensum. The footbridges are clearly for able-bodied walkers and would not be practical for elderly or disabled users (**Figure 2-35**).
- The main footbridge was situated beside a ford gated on the northern side – which is clearly used as an access across the River Wensum for vehicles as there is no aquatic vegetation present at this location (**Figure 2-36**).
- Once over the footbridge, another gate is visible diagonally across the field, although a clear path was not visible or trodden at the time in the knee-deep grass (**Figure 2-37**).

Figure 2-32 – Site 7, Ringland Footpath 1, heading south-west

Figure 2-33 - Site 7, Narrow bridge across watercourse

Figure 2-34 - Site 7, Algae-filled watercourse

Figure 2-35 - Site 7, Footbridge across the River Wensum

Figure 2-36 - Site 7, Gated ford

Figure 2-37 - Site 7, Footpath through open field

2.8.3. The results gathered from this visit have helped to inform a second site visit, which looked at routes away from the proposed highway alignment, but within the study area.

5th November 2019

2.8.4. The second site visit was on Tuesday 5th November 2019 was attended by Hattie Gibbs and David Minshall. On this visit, wider sustainable travel connections were explored to consider the linking of NWL with walking, cycling and horse riding facilities further afield. The figure below shows the location of the areas surveyed.

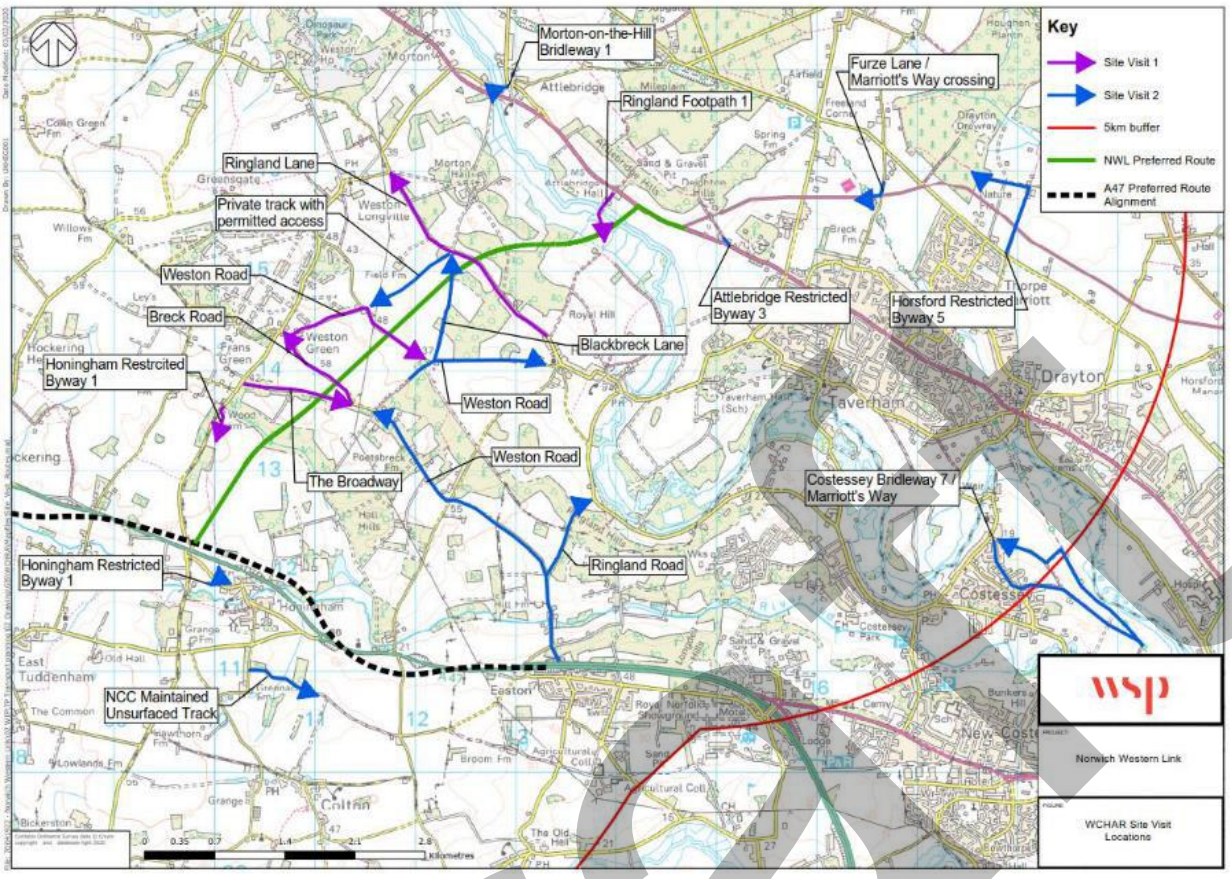


Figure 2-38 – Second site visit survey locations

Costessey BR7

2.8.5. To the east of the study area, BR7 connects Costessey to the Marriott's Way. The bridleway was accessed from good footway provision on St Edmunds Close and is signed at the beginning of the route (**Figure 2-39**).

2.8.6. The route consists of a well-trodden track, with good signage pointing to the Marriott's Way connections further ahead (**Figure 2-40**).

2.8.7. Along the route, pedestrians and cyclists were passed, evidencing the use the bridleway receives.

Figure 2-39 - Costessey BR7 wayfinding signage

Figure 2-40 - Costessey BR7 Marriott's Way signage

Marriott's Way

2.8.8. Across a track along a field boundary, the Marriott's Way is signed from BR7 which allows for travel to Norwich City Centre in the east.

Figure 2-41 - Marriott's Way

2.8.9. The route consists of an unsurfaced track, with clear evidence of use by pedestrians, cyclists and equestrians.

Figure 2-42 - Marriott's Way pedestrian use

Figure 2-43 - Marriott's Way cyclist use

Figure 2-44 - Marriott's Way equestrian use

2.8.10. Accesses on Costessey Lane were investigated to see the nature of the crossing facilities present for users. **(Figure 2-45**) shows that there are no crossing facilities present, however, there is clear signage of the cycle route towards Norwich and Costessey (**Figure 2-46**). On Ordnance Survey mapping, it appears that Marriott's Way continues up Station Road, after crossing Costessey Lane, however, this was not seen on the ground, with no signage pointing in that direction. Users were instead directed to use Costessey Lane and use other connections to return to the Marriott's Way.

Figure 2-45 - No crossing facilities on Costessey Lane

Figure 2-46 - Marriott's Way signage on Costessey Lane

2.8.11. The bridleway intersects the Marriott's Way, although it is not made particularly clear the route is a public right of way (through the opening between the gate (pictured, **Figure 2-47**)), however a route marker has been placed beyond the gate, on the right-hand side to direct users (**Figure 2-48)**.

Figure 2-47 - Costessey RB8

Figure 2-48 - Costessey RB8 signage marker

2.8.12. The route begins as being very narrow **(Figure 2-49**), but gradually widens out towards the west. There was evidence of use by equestrians (**Figure 2-50**), cyclists and pedestrians, and better signage would help to direct more users.

Figure 2-49 - Costessey RB8 narrow width

Figure 2-50 - Use of Costessey RB8 by an equestrian

Broadland Northway Crossings

Horsford RB5

2.8.13. RB5 is accessed from Reepham Road, Horsford. Good signage at the beginning of the route informs users that the RB connects to cycle routes to Drayton and Thorpe Marriott (**Figure 2-51**).

2.8.14. The route is of a very high standard, due to its recent creation as part of the Broadland Northway construction, and the parapet is of a good height, approximately two metres, although this could be raised for equestrians (**Figure 2-52**).

2.8.15. There was evidence of use by equestrians, cyclists and pedestrians, so the route is well used and there is knowledge of it. The route is also used by farm traffic, and during the site visit was seen to be used by construction plant.

Figure 2-51 - Horsford RB5 wayfinding signage

Figure 2-52 - Horsford RB5 bridge parapet

2.8.16. From Furze Lane, a bridge crossing the Broadland Northway (**Figure 2-53**), as part of the Marriott's Way was accessed. The route is of a very high standard, with clear signage (**Figure 2-54**), again possibly due to the construction of the Broadland Northway.

Figure 2-53 – Marriott's Way bridge, access from Furze Lane

2.8.17. Signage points towards onward bridleway connections, however, these routes are not yet shown on the definitive map (**Figure 2-55**).

Figure 2-54 – Marriott's Way bridge signage, access from Furze Lane

Figure 2-55 – Marriott's Way bridge crossing, further bridleway connections

2.8.18. Access was attempted to the RB3 from Fakenham Road, however, it now appears that the route is closed to the public, and only private access is permitted. This either needs to be investigated if it is indeed still a public right of way or removed from the definitive map.

Morton-on-the-Hill BR1

2.8.19. Through engagement with stakeholders, the bridleway and nearby bus stops were investigated on Fakenham Road. The bus stops are the only stops for Attlebridge and the wider community, travelling along the A1067.

2.8.20. The access from Station Road is very narrow and would be easy for cyclists or equestrians to negotiate (**Figure 2-7)**.

Figure 2-56 – Entrance to BR1, from Station Road

2.8.21. The route has a good surface; however, tree branches are very low and need cutting to avoid hitting users (**Figure 2-57**).

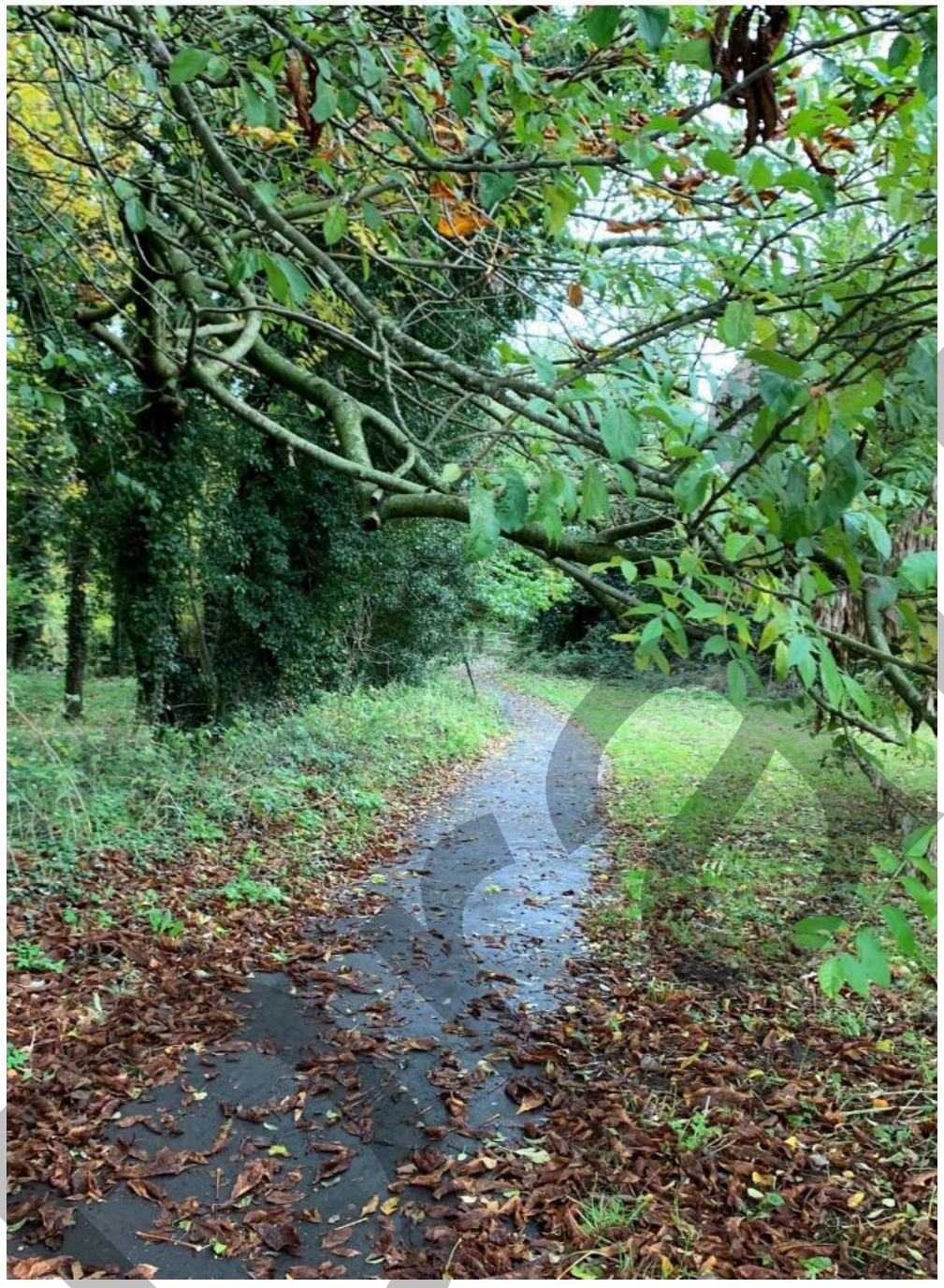


Figure 2-57 – RB1 from The Street

2.8.22. The bus stops along the A1067 were visited and it was seen that the stop on the eastbound side towards Norwich has no footway, which could be added to improve connectivity with RB1 **(Figure 2-58**).

2.8.23. On the westbound side, there is no shelter, and users have to cross the busy A1067, with no formal crossing provision (**Figure 2-59**).

Figure 2-58 – Eastbound bus stop

Figure 2-59 – Westbound bus stop

Route 5 – NCC Maintained Unsurfaced Track – Blackbreck Lane, and permissive link

2.8.24. Route 5, as identified on the study area map, will be severed by NWL. Assessors walked the route and back along permissive link towards Weston Green, which was referred to during stakeholder consultation.

2.8.25. The start of the route is very narrow (**Figure 2-60**) and comprises loose sandy material presenting possible difficulties for cyclists, although there were clear signs of use by pedestrians, equestrians and cyclists. The route begins to widen further along, until it opens into fields; **Figure 2-61** shows where the NWL corridor is likely to pass through the route.

2.8.26. The route continues down a gentle decline towards Ringland Road, where a permissive route is available that follows the field boundary back towards Weston Road (**Figure 2-62**). There was evidence of use by equestrians and pedestrians. The route is narrow in areas but opens up to support use by all modes; there is evidence of potential miss-use of this section by powdered two-wheeler riders. It would be beneficial if this was made a permanent public right of way to create better connectivity with surrounding routes.

2.8.27. The entrance from Weston Road is well hidden and signage would help to direct more users (**Figure 2-63**).

Figure 2-60 – Route 5, from Weston Road

Figure 2-61 – Route 5, where the NWL is likely to align

Figure 2-62 – Permissive route, from Ringland Lane

Figure 2-63 – Permissive route, from Weston Road

Honingham RB1

2.8.28. RB1 was visited on the first site visit through an access on Wood Lane, however it was not clear then where the route went. On 5 November RB1 was visited from the southern side - Dereham Road.

2.8.29. On both occasions, there were no clear signs of use; to the north there was no wayfinding signage, however **Figure 2-64** shows that signage is present on Dereham Road, but no route is present in the fields (**Figure 2-65**).

Figure 2-64 – Signage for RB1 on Dereham Road

Figure 2-65 – RB1 looking north towards A47

NCC Maintained Unsurfaced Track, south of A47

2.8.30. The track was visited, following comments during the Sustainable Transport Workshop and shown in the map marked up by Rob Holl, **Appendix B**. The track was accessed from Colton Road and creates a good route to the south of the A47 to connect with Easton. There was evidence of use by pedestrians and cyclists **Figure 2-66**, however, a fallen tree blocked the track (**Figure 2-67**) – this needs to be removed.

Figure 2-66 – NCC Maintained Unsurfaced Track, entrance from Colton Road

2.8.31. The track of a good size for use by all sustainable modes, similar to that of the Marriott's Way and provides a quiet route towards Norwich. If a safe crossing point was provided on the A47 this would provide a suitable route for sustainable travel and make the existing public right of way more connected.

Figure 2-67 – NCC Maintained Unsurfaced Track, tree debris blocking track

3 Engagement & CONSULTATION

3.1 KEY STAKEHOLDERS

3.1.1. Stakeholder engagement has been a core part of the Norwich Western Link project from conception, allowing for local residents and experts in their fields to comment on proposals and provide local insights. The following parties were approached for consultation; **Table 3-1** details the level of engagement with each stakeholder.

Table 3-1 – Stakeholder Engagement Timeline

Date	Stakeholder
18th October 2019 24th January 2020	Norfolk County Council Public Rights of Way Officers
18th October 2019 24th January 2020	Norfolk County Council Highways
18th October 2019 19th November 2019 24th January 2020	Highways England and contractors
9th December 2019 24th January 2020	Public Transport Operators – Bus

Norwich Western Link Stakeholder Workshop 1

3.1.2. On Friday 18th October 2019, WSP organised alongside NCC colleagues a stakeholder engagement workshop to gain understanding of what measures non-motorised user groups would like packaged with NWL. Representatives of the following groups were in attendance:

- Norfolk Horse Driving Club;
- Norwich Cycle Campaign;
- NCC Countryside Access;
- Norfolk Local Access Forum;
- Ramblers;
- Pathmakers;
- NCC Passenger Transport;
- Galliford Try;
- Sweco;
- Konectbus; and
- Highways England.

3.1.3. A representative from Sustrans was not able to attend on the day, but was able to provide feedback from their point of view, via email (**Appendix G**):

- Sustrans supported NCC for the Broadland Northway and would urge NWL to encourage active travel by continuing the infrastructure for active travel around the western link with tarmac surfaced paths separated from the traffic with wide verges/ landscaping.

- Sustrans would be surprised if many horse riders would make use of the routes provided on the NDR due to the proximity and speed of the traffic. It is therefore encouraged that signing with blue way markers is used, as has been successful with the Marriott's Way.
- The at-grade crossings on the NDR are unsafe. If NWL is seeking to increase active travel for commuting, leisure and healthy activity, bridge crossings are encouraged on the routes and desire lines.
- Sustrans would be happy to help contribute to early designs to improve the design of the project.

3.1.4. The workshop was split into two main sections – an initial overview was given of the project, then attendees split into groups with facilitators: Zeyna Soboh, Paula Cuthbertson, Philip Clark & Rob Holl. Summarised below are the comments created from the discussions.

Group 1, Facilitated by Zeyna Soboh, NWL Design Coordinator, WSP & Paula Cuthbertson, NWL Stakeholder Manager, WSP

- A safe crossing is needed at A1067 for Weston Longville;
- Access to the Marriott's Way is important and wayfinding should be considered for installation, to help users find it;
- There is unofficial access through private land near Field Farm, attendees questioned whether this could be formalised;
- Locals would support the closure of locations 2, 3 and 4 to vehicles, although Ringland Lane was noted as being the most used by vehicles;
- The A47 Byway and Wood Lane junction is very dangerous and people avoid this (anecdotal) – suitable provision is needed here, such as an underpass;
- An opportunity to downgrade the existing north-south route (Honingham Road / Paddy's Lane) to be more pleasant for walking and cycling;
- A general consensus was agreed that north-south travel was recreational and east-west travel was for commuting i.e. to Norwich;
- A further consensus was reached that a full route along the length of the NWL scheme may not be well utilised and so would prefer enhancement to existing routes for a better experience;
- Ringland Woods is a key destination for walkers;
- There is a route west of the scheme from Weston Longville to Morton Hall which is popular, but not formal, which needs to be enhanced; and
- The A47 creates huge severance and people do not attempt to cross it.

Group 2, Facilitated by Rob Holl, NWL Client Senior Engineer, NCC

- The route on Ringland Road form Taverham across the River Wensum is steep, but useable; any improvement would be appreciated;
- A link from Queens Hills to the Marriott's Way and further walking connections;
- Reinstate a new / improved crossroads to the east of the A47 Easton roundabout for better connectivity, especially with the Norwich cycle route map.
- The NCC Maintained Unsurfaced track route to the south of the proposed A47 dualling alignment in Colton is well used, but includes some poor bridleways that need improvement;
- In Honingham, a crossing or connection with the Restricted Byway 1;
- Propose an underbridge of the A47 for Church Lane / Sandy Lane to increase connectivity;
- A new crossing is needed for Fox Lane, east of North Tuddenham;

- A track is present east of Field Farm, with permitted access from the landowner to continue the route to Ringland Lane – formal agreed access to this route would be appreciated;
- The junction of the A1067 and B1535 in Lenwade has crossing provisions, but this needs improvement; and
- The Junction of Marl Hill Road with the A1067 is sufficient but could be improved.

3.1.5. The plan shown in **Figure 3-1** below captured the comments discussed between Rob Holl and representatives of Norwich Cycling Campaign. The following colour codes have been used on the plan:

- Pink – already used routes (although they may need some improvement)
- Green – missing links / links to be improved
- Red – comments / crossing that needs to be introduced / improved
- Yellow – potential links

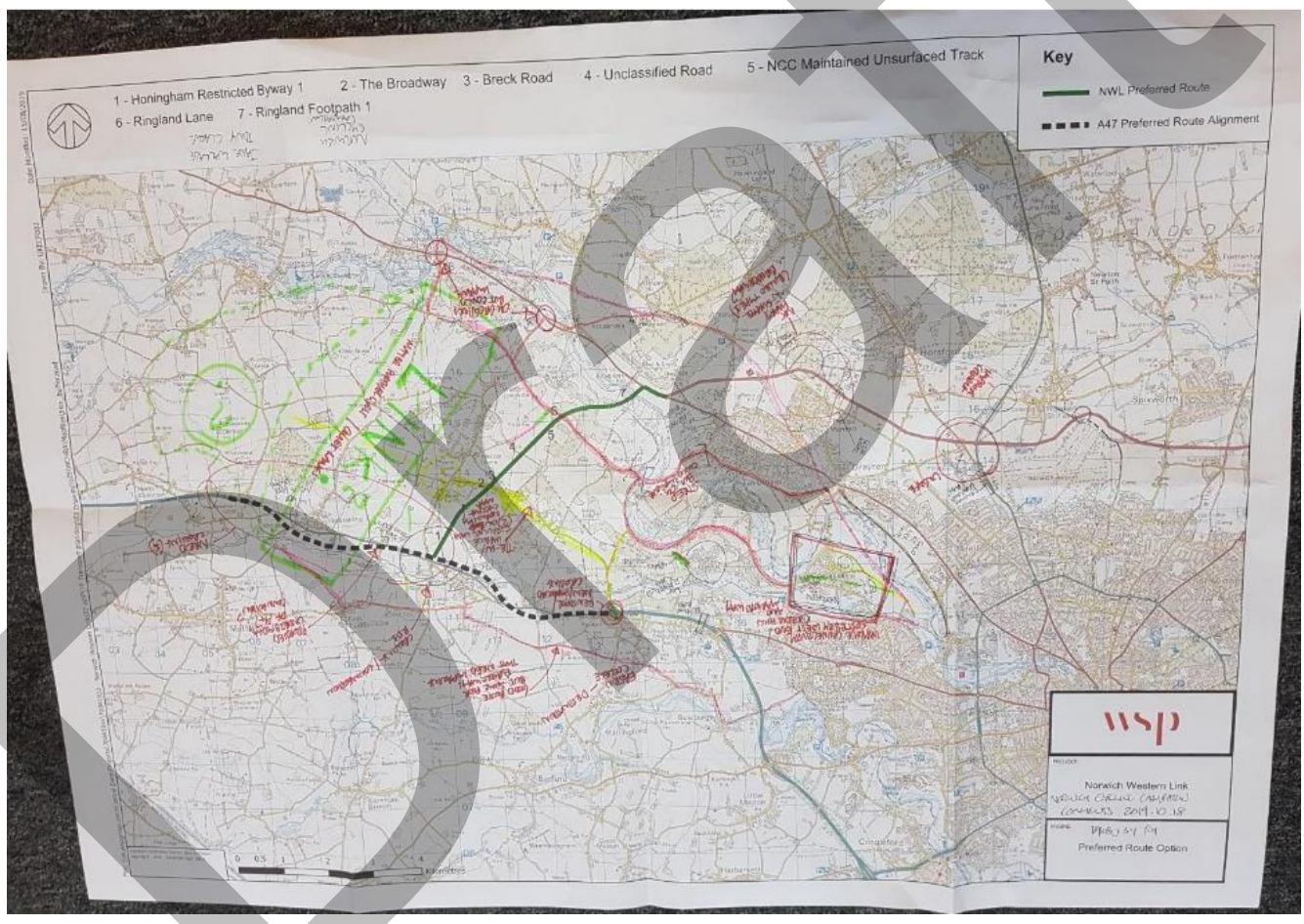


Figure 3-1 – Stakeholder Workshop, marked-up plan

3.1.6. A questionnaire, similar to that used at the NWL LLG meeting on 17th September, was distributed at the end of the workshop to gain understanding of how members or users of the groups currently use the routes that will be severed by NWL and how they would like to see them improved, if possible. A copy of this questionnaire is included in **Appendix H**.

3.1.7. The following questions were included in the questionnaire, split into 'Existing Use', 'Barriers to Use' and 'Future Use and Enhancement' sections;

- Question 2: What are the key origins and destinations that are accessed by your members / user by non-car modes in the west of Norwich? What routes do people currently take to get there?
- Question 3: Are any of the following routes crossed by the NWL currently well used or important in the local area for your users / members? If so, how are these currently used and by whom?
- Question 4: What do you feel are the main barriers to your members / users from walking / cycling, horse-riding / using public transport more in the area? Please number the top three barriers for each mode where 1 is the most significant barrier.
- Question 5: How do you think the NWL will affect travel behaviour for local users?
- Question 6: What journeys would a significant number of your members / users want to make on foot or by bike (e.g. to local amenities, bus stops, recreational areas, neighbouring communities, retail and employment sites) and what measures would help to support them to do this?
- Question 7: What sustainable transport improvements do you think should be prioritised for being packaged with the NWL scheme to better support people travelling by non-car modes?
- Question 8: Are there any gaps in the walking / cycling / horse-riding network that could be improved for better connectivity?
- Question 9: Some existing routes within the study area will be crossed by NWL; what is your preference for their treatment?
- Question 10: What improvements to public transport services, routes and infrastructure do you think would help make bus travel more attractive for your members / users?
- Question 11: How do you feel the existing Public Rights of Way could be enhanced?
- Question 12: If future changes to the road network, including the Norwich Western Link and A47 dualling were to contribute to an increase in traffic on roads in the study area, so you have any suggestions of potential measures that could help to mitigate traffic impacts of the NWL?

Stakeholder Responses

3.1.8. The following organisations and user groups filled in the questionnaire;

- Norwich Cycling Campaign;
- British Horse Driving Society;
- Norfolk Ramblers;
- Konectbus;
- Pathmakers;
- NCC Countryside Access Officer (PROW); and
- Norfolk Local Access Forum.

Question 2

The seven responses produced a list of key destinations and routes for users, as shown in **Table 3-2**.

Table 3-2 – Key destinations and routes used by user groups

Key destinations and routes
Norwich to Lyng
Costessey
Ringland
Barnham Broom to Ringland
Barford to Ringland
Taverham to Lyng
Costessey to Lyng
Bawburgh
Barford to Ringland
Colton

3.1.9. Four bus services were highlighted as key means to access the area: 4, 8, 510 and 511 operated by Konectbus, which allow for journeys to Dereham, Norwich City Centre, UEA and NNUH. The responses show that within the study area there are a number of destinations that users wish to access, and the NWL can help to facilitate this. The destinations are mainly to the north and south of the study area, which supports the proposal of the NWL to improve journeys to the west of Norwich.

Question 3

3.1.10. Some respondents did not fill in an answer to the question, however, from those that did, it was clear that walking was the main mode used across all seven of the severed routes. **Table 3-3** shows that the greatest number of user groups frequently used Route 5 and Route 7 which will be severed by the NWL. The routes that received the highest report of use by cyclists were Route 5, 6 and 2, suggesting that the routes are used to create a longer journey for enthusiasts.

Table 3-3 – Use of severed routes by various modes

All areas	Walk	Cycle	Riding	Driving
Route 1 - Honingham Restricted Byway 1	1	1	0	0
Route 2 - The Broadway	2	2	1	0
Route 3 - Breck Road	2	1	1	0
Route 4 - Unclassified Road	3	1	1	0
Route 5 - NCC Maintained Unsurfaced Track	4	3	2	1
Route 6 - Ringland Lane	1	2	1	0
Route 7 - Ringland Footpath 1	4	0	0	0

Question 4

3.1.11. This question seeks to identify what the main barriers are towards the use of sustainable travel, split by the four modes of walking, cycling, bus or riding.

3.1.12. The graphs below show the results from each user group, split by mode.

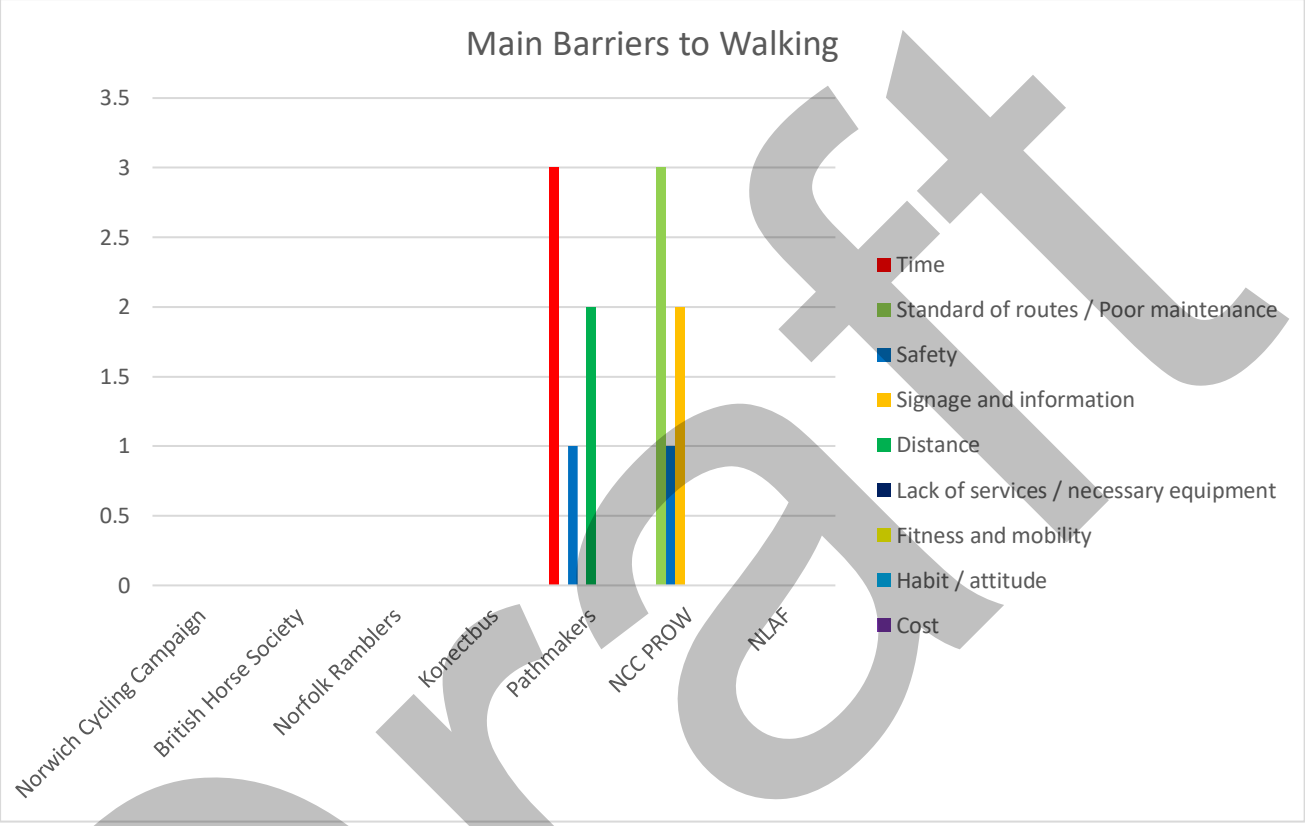


Figure 3-2 - Main barriers to walking

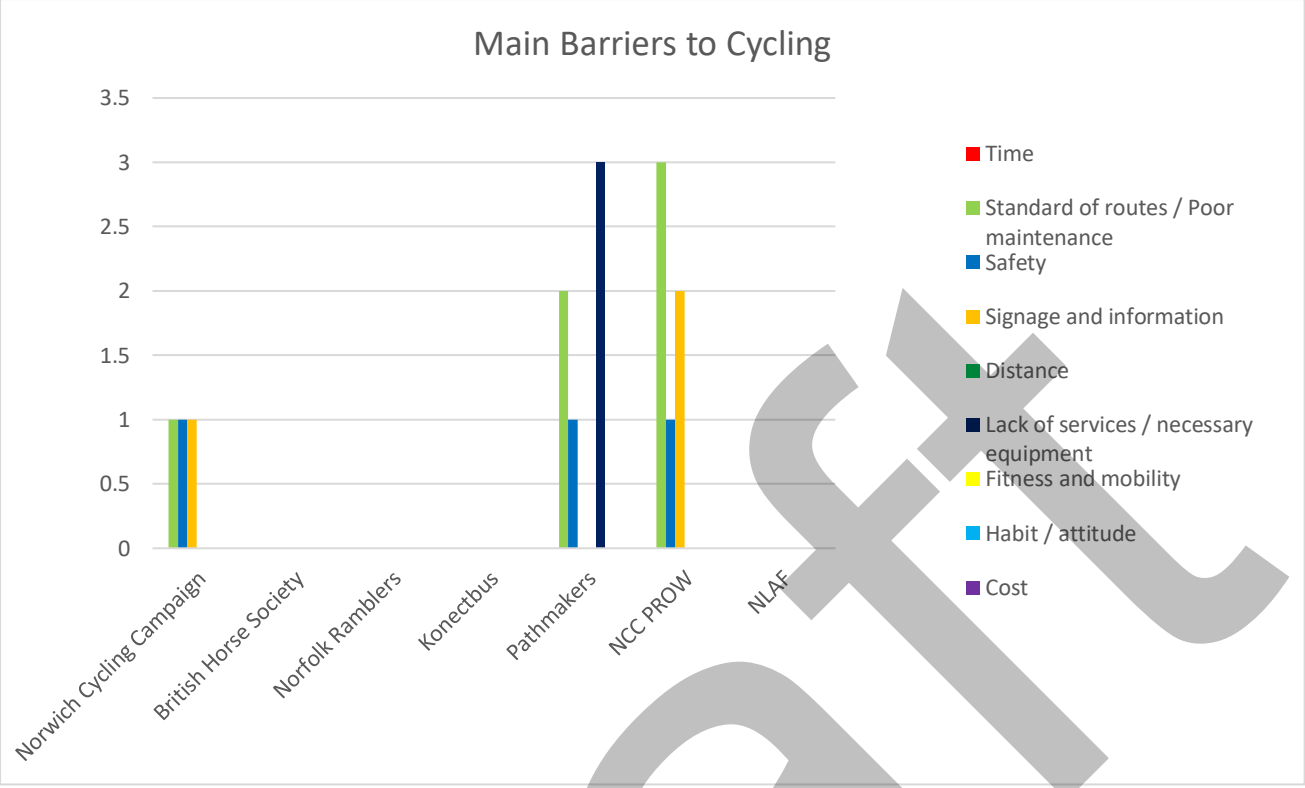


Figure 3-3 - Main barriers to cycling

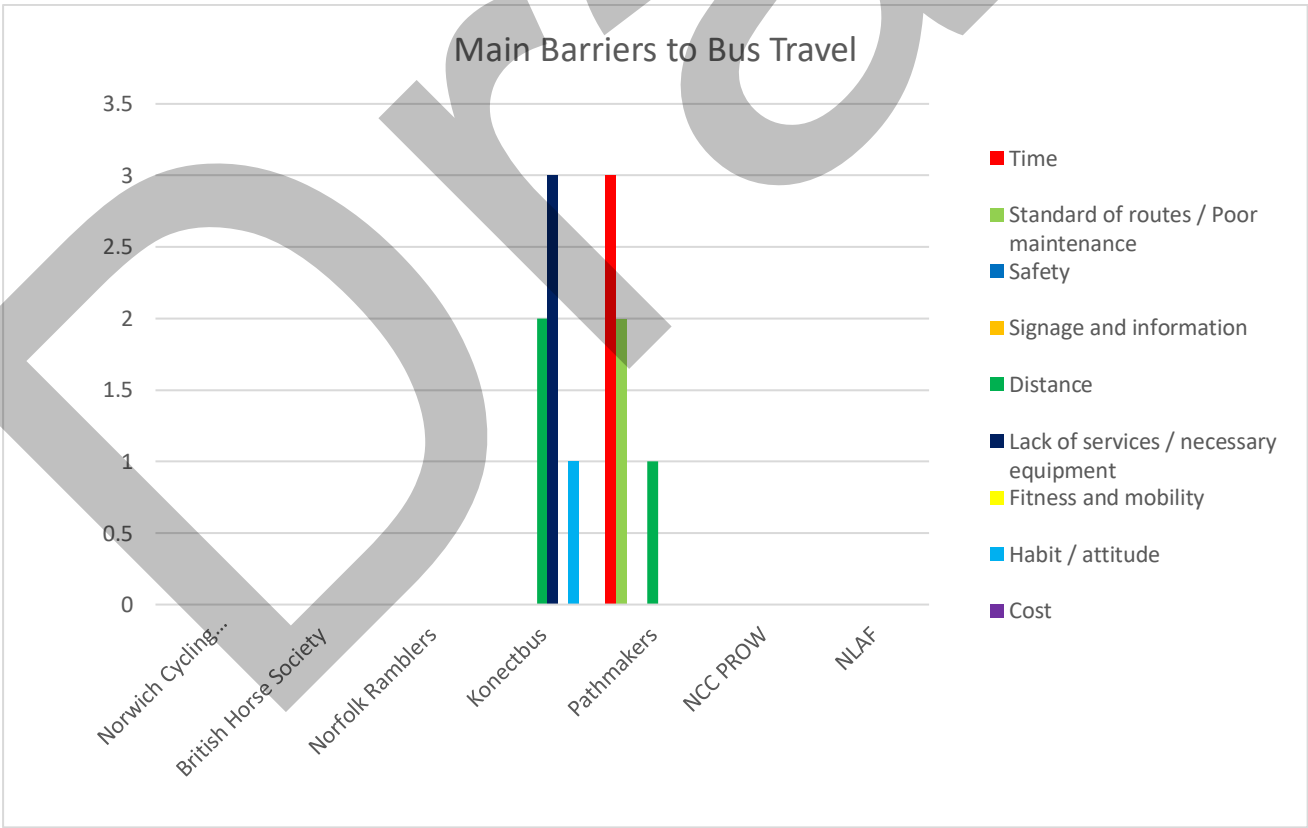


Figure 3-4 - Main barriers to bus travel

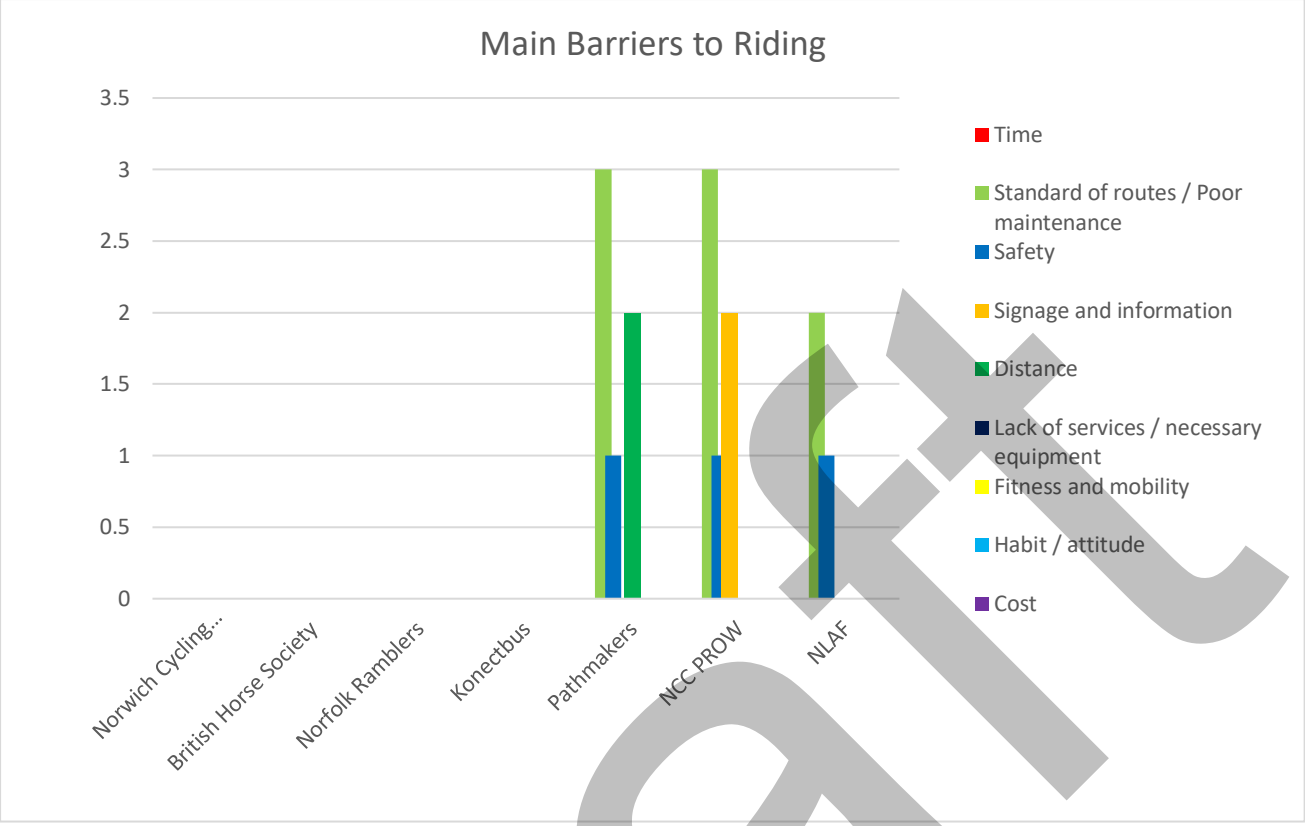


Figure 3-5 - Main barriers to riding

3.1.13. From the results gathered, the barriers that are common across all modes is that of standard and safety of the routes available. The main barrier to cycling is that of standard, safety and signage

3.1.14. The main barrier to bus travel is the attitude towards travel modes, distance and standard, which could be improved if the NWL could support a new bus route and improved timetable.

3.1.15. The main barrier to riding is that of safety, as many users rely on roads to access the Public Rights of Way and key trip attractors.

Question 5

3.1.16. The fifth question seeks to understand how the behaviour of user groups will change following the construction of NWL.

Table 3-4 – Perceptions towards the NWL construction

Suggestions	Frequency
Less traffic	3
Greater ease of driving	2
Sustainable travel less attractive	1
No rat running on local roads	1
Easier to travel to key destinations	1
Greater ease of sustainable travel	1
Rat running will still remain an issue	1
NWL will be a barrier to movement	1

3.1.17. The questionnaires have highlighted that the majority of respondents feel that NWL will improve journeys and provide greater opportunities for sustainable travel. However, there are still concerns that the link will not reduce rat running, as current users will continue to travel in the future as they currently do now.

Question 6

3.1.18. When asked what journeys a significant number of users make on foot or by bike, responses note that key routes travelled are:

- Norwich to Ringland;
- Norwich To Lyng
- Queen's Hills to Norwich;
- Barnham Broom to Norwich, via Ringland; and
- Taverham to Lenwade

3.1.19. To support more journeys to be made on foot or by bike, it is suggested that there should be safe access to the bus routes on the A1067, safe crossings to the Marriott's Way, better bus stop infrastructure and a route between Ringland Road and / or Queen's Hills and the Marriott's Way.

Question 7

3.1.20. Respondents were asked to rank sustainable transport improvements from 1 to 10 (1 being the most important) in terms of priority with the NWL scheme. **Table 3-5** below shows the improvement that was voted the highest by respondents was to improve cycling routes. Further improvements prioritised were to close roads to through traffic and to improve pedestrian routes. The improvements with the lowest frequency are those that should be prioritised first.

Table 3-5 – Sustainable transport improvements to package with the NWL

Sustainable Transport Improvement	Frequency
Improved cycling routes	10
Roads closed to through traffic	12
Improved pedestrian routes	15
Improved crossing facilities	17
Designation of quiet lanes	19
Revised speed limits and speed-reducing infrastructure e.g. chicanes	24
Other	28
Additional cycle parking at key facilities	32
Weight restrictions	34
Improved bus waiting facilities	39

Question 8

The questionnaires were used to establish whether there were any gaps in the walking, cycling and horse riding network that could be improved for connectivity.

Table 3-6 – Suggestions to improve connectivity

Suggestions	Frequency
Safer crossings over the A47	2
Connection to the Marriott's Way	1
Connection to Ringland	1
Routes beside the River Wensum	1
New underpass at Honingham	1
Cycleways linking the NWL and A1067	1
Re-designating Honingham FP5 and Weston Longville FP9 to restricted byways	1
Permissive route from 4 to 6 made a permanent PROW	1
Open up footpaths to cyclists	1

3.1.21. The responses obtained show that there is a mix of suggestions, but most suggest better linkage between all routes and making the dual carriageways less of a blockage to movement.

Question 9

3.1.22. Four of the routes that will be severed by NWL were put forward to respondents to seek their opinion as to how they should be treated as the project goes forward. The options available to choose from were:

- Maintain existing use;
- Close roads to through traffic, but maintain access for residents;

- Close to all traffic (allow walking, cycling, horse-riding users only); and
- Close to all users

Table 3-7 – Preferences towards treatment of severed routes

All Areas	Preference for treatment of the road			
Roads crossed by proposed scheme	Maintain existing use	Close roads to through traffic, maintain access for residents	Close to all traffic (walking, cycling, horse-riding users only)	Close to all users
Ringland Lane	3	2	0	0
Weston Road	1	1	2	0
Breck Road	2	0	2	0
The Broadway	1	0	3	0

3.1.23. The majority of respondents feel that Ringland Lane should remain open following existing use, Weston Road should be closed to all traffic, Breck Road should be either maintained for existing use or closed completely to traffic and The Broadway should be closed to all traffic.

Question 10

3.1.24. Suggestions received as to how public transport services could be improved as part of the NWL project included adding more frequent services, additional bus stops, faster journeys, buses to have facilities to carry bicycles and routes that cross the NWL to provide access to Weston Longville and Ringland.

Question 11

3.1.25. When asked how user groups feel the Public Rights of Way could be enhanced, a myriad of answers were received. Most consisted of introducing more restricted byways for use, so that they can be enjoyed by all user groups.

Table 3-8 – Suggestions to enhance existing Public Rights of Way

Suggestions	Frequency
Extending footpath along the banks of the Wensum on both sides	1
Weston Longville FP9 upgraded to Bridleway or RB	1
Increase public access routes	1
New link for Honingham RB1	1
Re-designating one of the Ringland footpaths to RB to make a link with Attlebridge RBs to the north of A1067	1
Improvements around Route 7 to ensure walkers can use the existing paths south of A1067	1
Upgrade Ringland FP1 and some of FP2-5 to wider use (mainly cycling) giving connectivity to Ringland	1

Question 12

3.1.26. If NWL or the A47 dualling led to an increase in traffic on the road network, suggestions were received to combat this; they included closure of roads to through traffic, reduction in speed limits, and the designation of quiet lanes

Norwich Western Link Stakeholder Workshop 2

3.1.27. A second stakeholder workshop was held on Friday 24th January 2020 to give an update on the emerging Sustainable Transport Strategy, underpinned by the WCHAR, NMU and Bus Strategy.

3.1.28. Representatives from Norfolk County Council, Norwich Cycle Campaign, The Ramblers, First Bus and Konectbus were in attendance so that feedback could be received on the emerging ideas.

3.1.29. The Bus Strategy was first presented, and operator feedback from First Bus on the potential loop service suggests that if it is to be subsidised in the early stages of operation, it cannot be seen to compete with existing services. Konectbus have reviewed the loop route, which is longer than an ideal one hour, and so a shorter linear route will be examined to allow the service to operate at a higher frequency.

3.1.30. Norwich Cycle Campaign queried why there was no cycle route proposed alongside the viaduct structure – NCC PROW Team highlighted that it has been agreed at the previous workshop that this would not be appropriate through the floodplain. A bridleway designation would require the upgrading of routes within the sensitive landscape and poor ground conditions. The NWL further explained that this would also require a wider structure crossing the Wensum Special Area of Conservation, which would impact on the ecological sensitivity of the SAC and would most likely outweigh the benefits as no overwhelming evidence base shows there is a need for a cycle route crossing the River Wensum.

3.1.31. The NCC PROW Team suggested that Weston Longville FP9 should be upgraded to restricted byway to allow carriage drivers to continue north to Breck Road – possibly with

structures such as Kent Carriage gaps to prevent access to motor vehicles, although this will need to be explored with the consent of the landowners.

3.2 LOCAL USER GROUPS AND WIDER PUBLIC

3.2.1. A number of key local user groups were contacted to establish the level of support for the proposed route alignment and how that would affect pedestrians, cyclists and horse riders. **Table 3-9** details below the responses received from the stakeholders

Table 3-9 – Local User Groups and Wider Public Engagement Timeline

Date	Stakeholder	Response to Scheme Proposals
May to July 2018	Round 1 Public Consultation	A new road link was deemed necessary due to rat running and levels of traffic on the narrow lanes and junctions. The long list of options was reduced to four, that would be consulted on in more detail later into 2018.
Late November 2018 to January 2019	Round 2 Public Consultation	The four short-listed options were consulted in detail respondents were shown the proposed route layouts and choose their preference of route.
17th September 2019	Norwich Western Link Local Liaison Group (including local Parish Councillors)	Parish representatives were involved in discussion around sustainable travel opportunities within their parishes. A questionnaire was distributed to be filled out at their next parish meeting to gather views on what sustainable transport measures should be packaged with NWL.
23rd September 2019	Local Access Forum, Public Rights of Way sub-group: including attendees from: CPRE Norfolk – Broads Local Access Forum; U3A; Pathmakers; Norfolk Horse Driving Club; The Ramblers; and Open Spaces Society	Attendees were pleased to be able to get involved in informing the Sustainable Transport Strategy. Members wished to know how the current routes could be enhanced and were interested in possibly linking the Broadland Northway cycleway to the new NWL. Representatives would like details, when available, on how the PROWs will be affected on the detailed route alignment and would like to be able to shape the proposals.
19th November 209	Norwich Western Link Local Liaison Group (including local Parish Councillors) Attended by Highways England	The members were pleased to see the emerging proposals for the linked NMU strategy and the feedback received from the questionnaires. Members were also pleased to see Highways England in attendance and look forward to taking part in the multi-parish working group in December.

3.2.2. On 17th September 2019, a Local Liaison Group meeting was held, with representatives from the local parishes in attendance. Images taken from the meeting are shown in **Figure 3-6** and **Figure 3-7** below. Representatives from the following parishes and groups were present:

- Barnham Broom Parish Council;
- Bawburgh Parish Council;
- Brandon Parva, Coston, Runhall & Welbourne Parish Council;
- Costessey Town Council;
- Drayton Parish Council;
- Elsing Parish Council;
- Felthorpe Parish Council;
- Great Witchingham Parish Council;
- Hockering Parish Council;
- Honingham Parish Council;
- Kimberley & Carleton Forehoe Parish Council;
- Morton on the Hill Parish Council;
- North Tuddenham Parish Council;
- Taverham Parish Council;
- Weston Longville Parish Council;
- Wensum Valley Alliance; and
- Yaxham Parish Council.

Figure 3-6 - Norwich Western Link, Local Liaison Group Meeting, 17th September 2019

Figure 3-7 - Norwich Western Link, Local Liaison Group Meeting, 17th September 2019

3.2.3. The main focus of the meeting was on the 'packaging' of complementary transport measures and mitigation to support the NWL scheme, specifically those that support walking, cycling and public transport. During this meeting the WCHAR process was explained and the role of the LLG in informing the future design of the NWL. The groups were then split into four groups, each facilitated by a member of Norfolk County Council or WSP staff.

3.2.4. The following feedback was received from the four groups:

Group 1, facilitated by Paula Cuthbertson, NWL Stakeholder Manager, WSP

- Discussions initially focused on the existing public rights of way and whether they are being used at present; representatives were concerned that opportunities for accessing the countryside may be lost.
- Representatives were concerned that NWL would not make it easier for bus services; new bus routes would be welcomed as there is a lack of services in the study area, such as to the Hospital. Potentially an outer circle orbital bus route is needed to allow for radial routes to connect with each other.

Group 2, facilitated by Zeyna Soboh, NWL Design Coordinator, WSP

- Representatives put forward an idea to create a new footpath from Ringland Road to the A47, and to make sure that the new road is inputted to satellite navigation systems, to avoid any rat-running. The footpath would be needed as there is no bus route to that location in the study area, and so will be used to travel to existing services further afield.
- Representatives agreed that Ringland Lane should remain open to traffic, but HGVs should be deterred, to reduce rat-running.

Group 3, facilitated by Chris Fernandez, NWL Project Manager, NCC

- The group agreed that mitigation is needed to the north of the study area, such as traffic calming and that three of the roads severed by NWL should have continual flow tunnels for all users, except HGVs.
- It was agreed that some areas will see traffic reductions and improved underpasses and so better use can be made of them. It was also understood that more traffic would be directed in the Honingham direction, and so traffic calming would be needed north of Barnham Broom to deter traffic cutting through to Wymondham.

Group 4, facilitated by Philip Clark, Associate, WSP

- It was agreed that NWL would help to relieve traffic in areas such as Great Witchingham, but additional traffic would go through Barnham Broom towards Wymondham. It was suggested that the access to Berry's Lane Honingham is closed, only allowing for local access along the old A47, but blocked to all other traffic.

3.2.5. A questionnaire was distributed during the session to understand existing usage of the walking / cycling / equestrian routes in the study area, thus enabling the design team to have a useful source of background information on any areas of opportunity. A copy of the questionnaire is included in **Appendix I**.

3.2.6. The following questions were included in the questionnaire, split into 'Existing Use', 'Barriers to Use' and 'Future Use and Enhancement' sections;

- Question 2: What are the key destinations that are accessed by your local residents by non-car modes? What routes do people currently take to get there?
- Question 3: Are you aware of any public walking/cycling/equestrian routes that the NWL intersects with, that are well-used or important to your local residents? If so how are these currently used, and by whom.
- Question 4: What do you feel are the main barriers to your parish residents walking/cycling/horse-riding/using public transport more in the area?
- Question 5: How do you think the NWL will affect travel behaviour within your local community?
- Question 6: What journeys would a significant number of your residents want to make on foot or by bike (e.g. to local amenities, bus stops, recreational areas, neighbouring communities, retail and employment sites) and what measures would help support them to do this?
- Question 7: What sustainable transport improvements do you think should be prioritised for being packaged with the NWL scheme to better support people travelling by non-car modes?
- Question 8: Are there any gaps in the walking / cycling / horse-riding network that could be improved for better connectivity?
- Question 9: What improvements to public transport services, routes and infrastructure do you think would help make bus travel more attractive for your local residents?
- Question 10: If future changes to the road network, including the Norwich Western Link and A47 dualling, were to contribute to an increase in traffic on roads in the study area, do you have any suggestions of potential measures that could help to mitigate traffic impacts of the NWL? (E.g. pedestrian crossings, speed restrictions, weight limits etc.)

NWL LLG Questionnaire Responses

3.2.7. Questionnaire responses were received by 18th October from the following 19 parishes:

- Bawburgh Parish Council;
- Felthorpe Parish Council;
- Hellesdon Parish Council;
- Kimberley and Carleton Forehoe Parish Council;
- Barford and Wramplingham Parish Council;
- Easton Parish Council;

- Elsing Parish Council;
- Taverham Parish Council;
- Weston Longville Parish Council;
- Hockering Parish Council;
- Brandon Parva, Coston, Runhall and Welborne Parish Council;
- Drayton Parish Council;
- Ringland Parish Council;
- Barnham Broom Parish Council;
- Honingham Parish Council;
- Mattishall Parish Council;
- North Tuddenham Parish Council;
- Costessey Town Council; and
- Marlingford and Colton.

3.2.8. The map below shows the location of the parishes who returned the questionnaires and their proximity to the proposed route alignment (Figure 3-8).

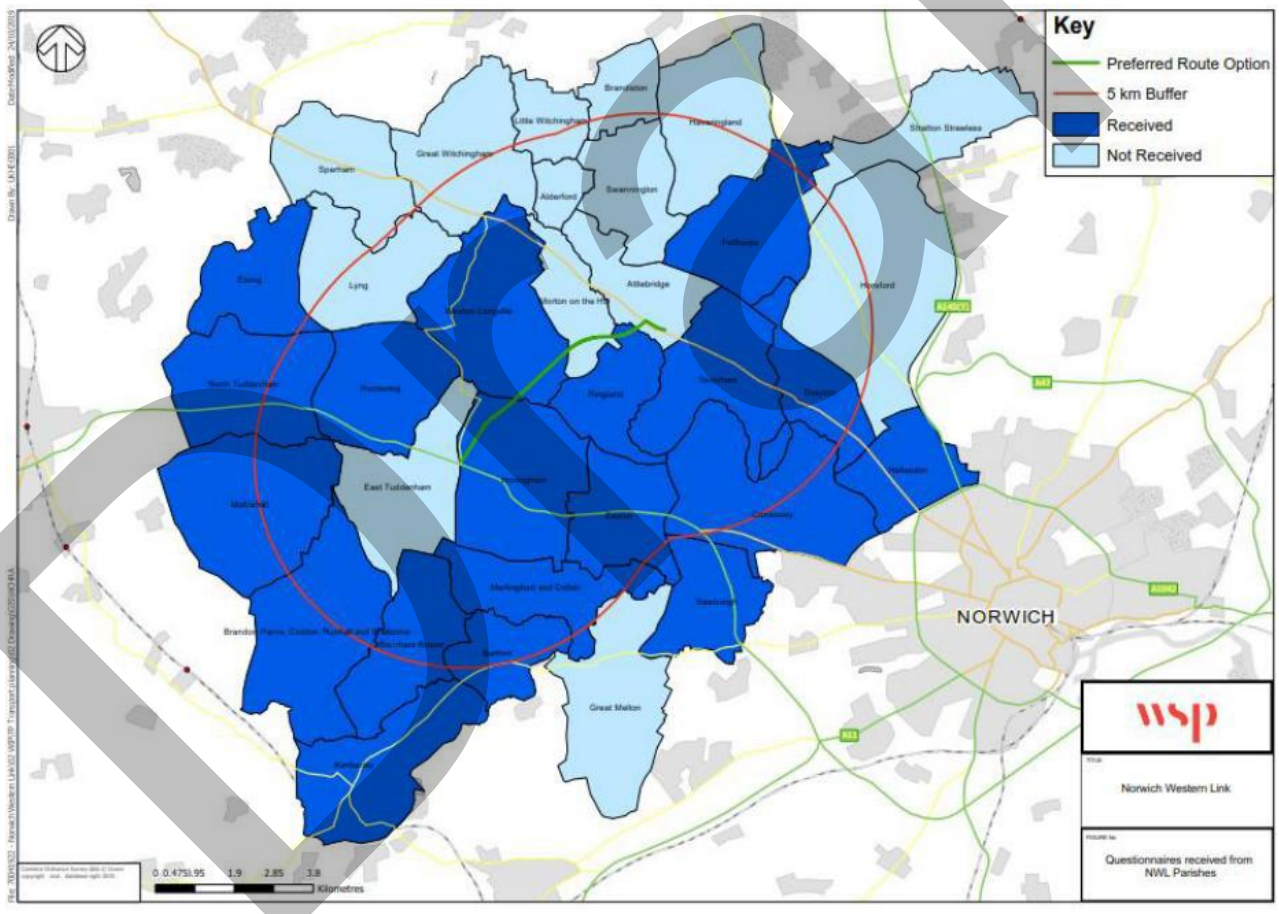


Figure 3-8 - Questionnaires received from local Parishes

Question 2

3.2.9. 16 of the parishes answered this question; two opted out due to their locations and so would not wish to comment. Of the responses, seven routes were highlighted as those most used: A140, A1067, A11, B1108, B1149 and rural roads. The NWL will help to improve connectivity to these key routes and allow for faster travel in and around the city. Three bus services were mentioned as key ways to travel the preferred destinations – Konectbus 3, Flexibus and Semmence for the areas of Barford & Wramplingham. A long list of key destinations were noted; these are shown in the table below (**Table 3-10**).

Table 3-10 – Key destinations accessed by local residents

Key Destinations	Origins (Parish)	Frequency
Local services e.g. shops, school etc.	Kimberley and Carleton Forehoe Barford and Wramplingham Easton Taverham Costessey Hockering Brandon Parva, Coston, Runhall and Welbourne Barnham Broom	8
Norwich City Centre	Felthorpe Hellesdon Drayton Honingham Mattishall	5
Longwater	Easton Honingham Costessey	3
Mattishall	Brandon Parva, Coston, Runhall and Welbourne Elsing Honingham	3
Wymondham	Barford and Wramplingham Honingham	2
Dereham	Elsing Honingham	2
Horsford	Felthorpe	1
Hethersett	Barford and Wramplingham	1

Costessey	Elsing	1
Lyng	Elsing	1
Bawdeswell	Weston Longville	1
Taverham	Weston Longville	1
Ringland	Taverham	1
Great Witchingham	Brandon Parva, Coston, Runhall and Welbourne	1
Drayton	Brandon Parva, Coston, Runhall and Welbourne	1
Runhall	Drayton	1
Barnham Broom	Felthorpe	1
Norfolk & Norwich University Hospital	Barford and Wramplingham	1

3.2.10. The above table shows that the destinations most frequently accessed by local residents are those closest to them, such as the schools and the shops within villages, Norwich City Centre is the second most popular destinations for shopping, commuting or leisure purposes, due to the greater choice available in the city. Other key service villages are noted, such as Costessey and Barnham Broom.

Question 3

3.2.11. 9 parishes did not answer the question, again due to their location within the study area not being applicable for the question. Of those who answered, Routes 2-6 were noted as being used for circular walks / rides by both local residents and local cycling groups. Felthorpe responded that all routes should remain open, such that they will always be available for use. Kimberley and Carleton Forehoe parish was sure that the routes important for sustainable travel in their parish would be negatively impacted as a result of increased rat-running when the NWL opens. Other comments noted were that Ringland Lane and the roads from Hockering to Ringland are well used by cyclists; the footpath from Mousewood Farm and Ringland FP1 are all important and should remain open.

Question 4

3.2.12. Parishes were asked to rank the three most significant barriers to sustainable travel within the area for the modes of walking, cycling, bus travel and horse riding, with the following options:

- Time;
- Standard of route / poor maintenance;
- Safety;
- Signage and information;
- Distance;
- Lack of services / necessary equipment;

- Fitness and mobility;
- Habit / attitude; and
- Cost.

3.2.13. The following graphs show the results for each parish, split by mode.

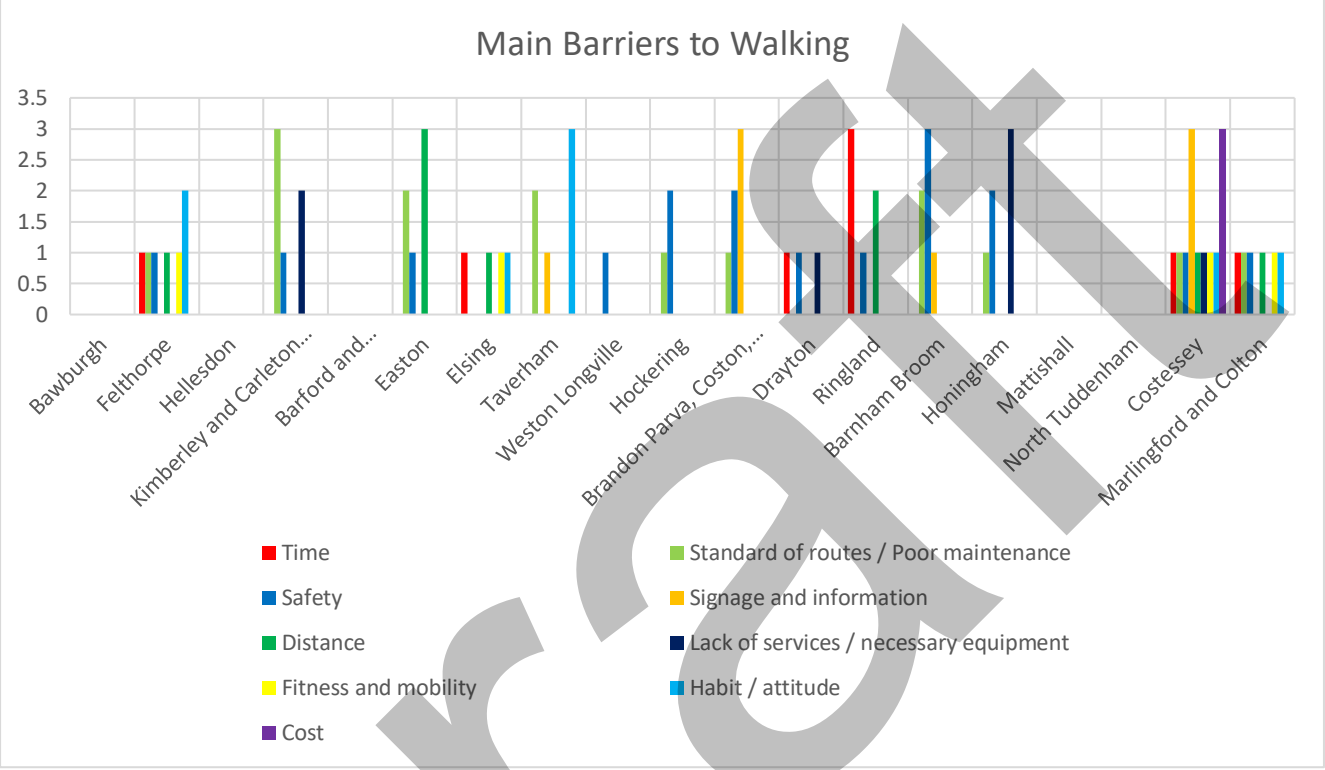


Figure 3-9 - Main barriers to walking

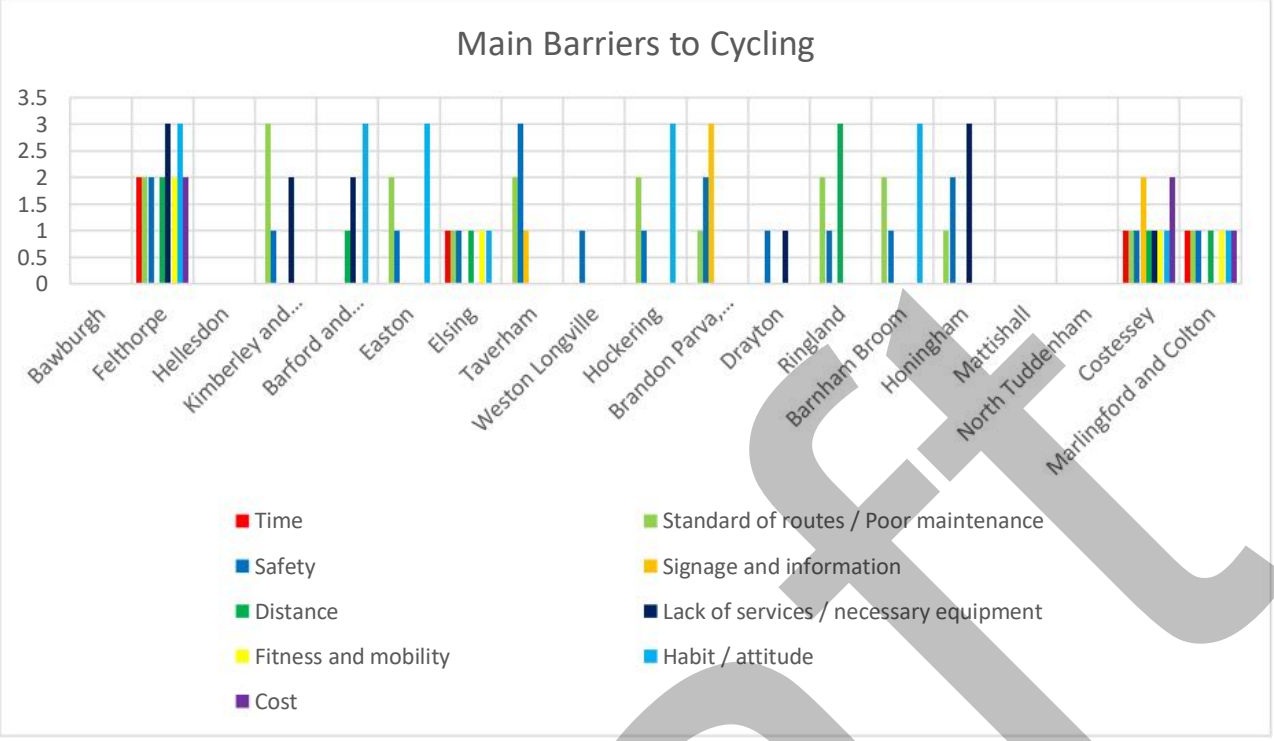


Figure 3-10 - Main barriers to cycling

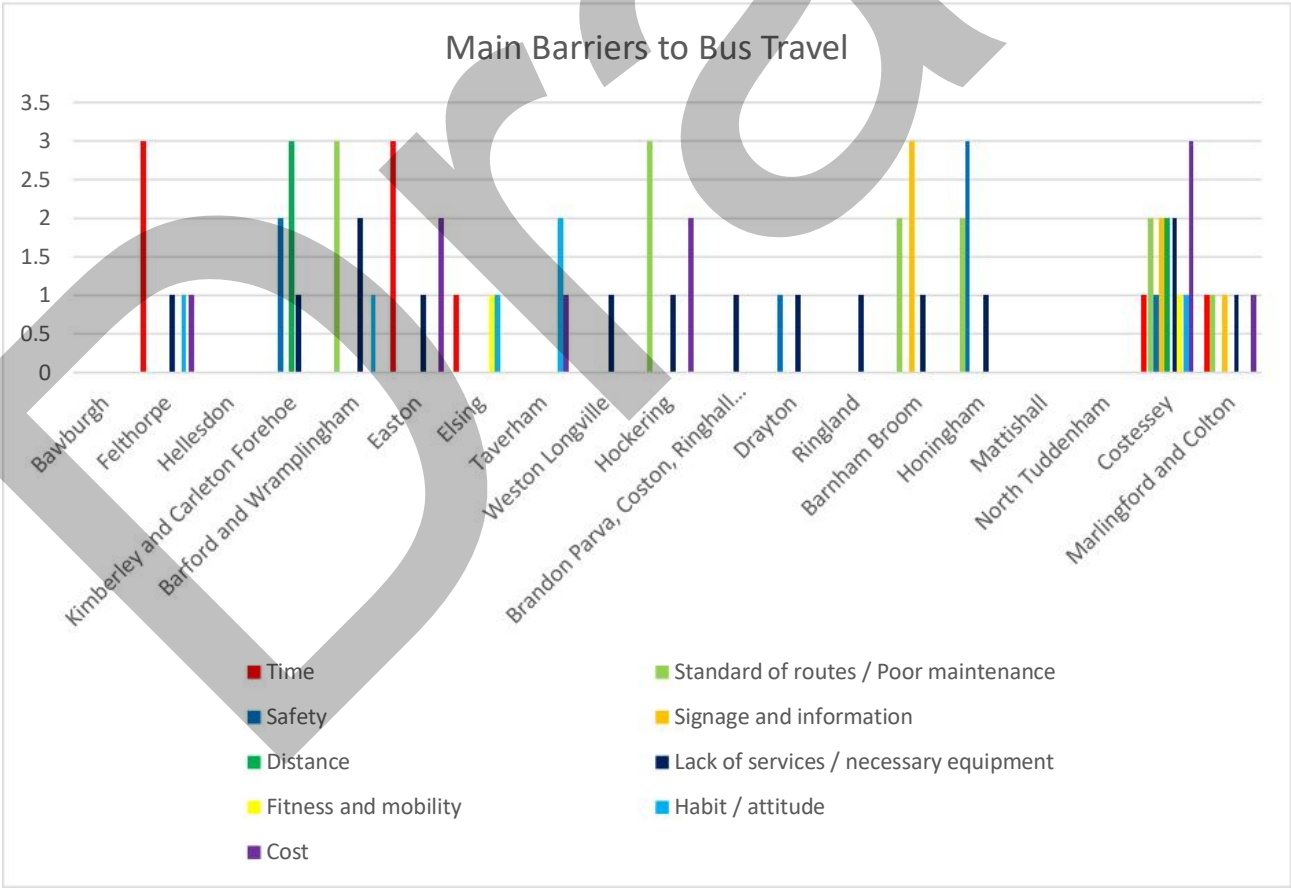


Figure 3-11 - Main barriers to bus travel

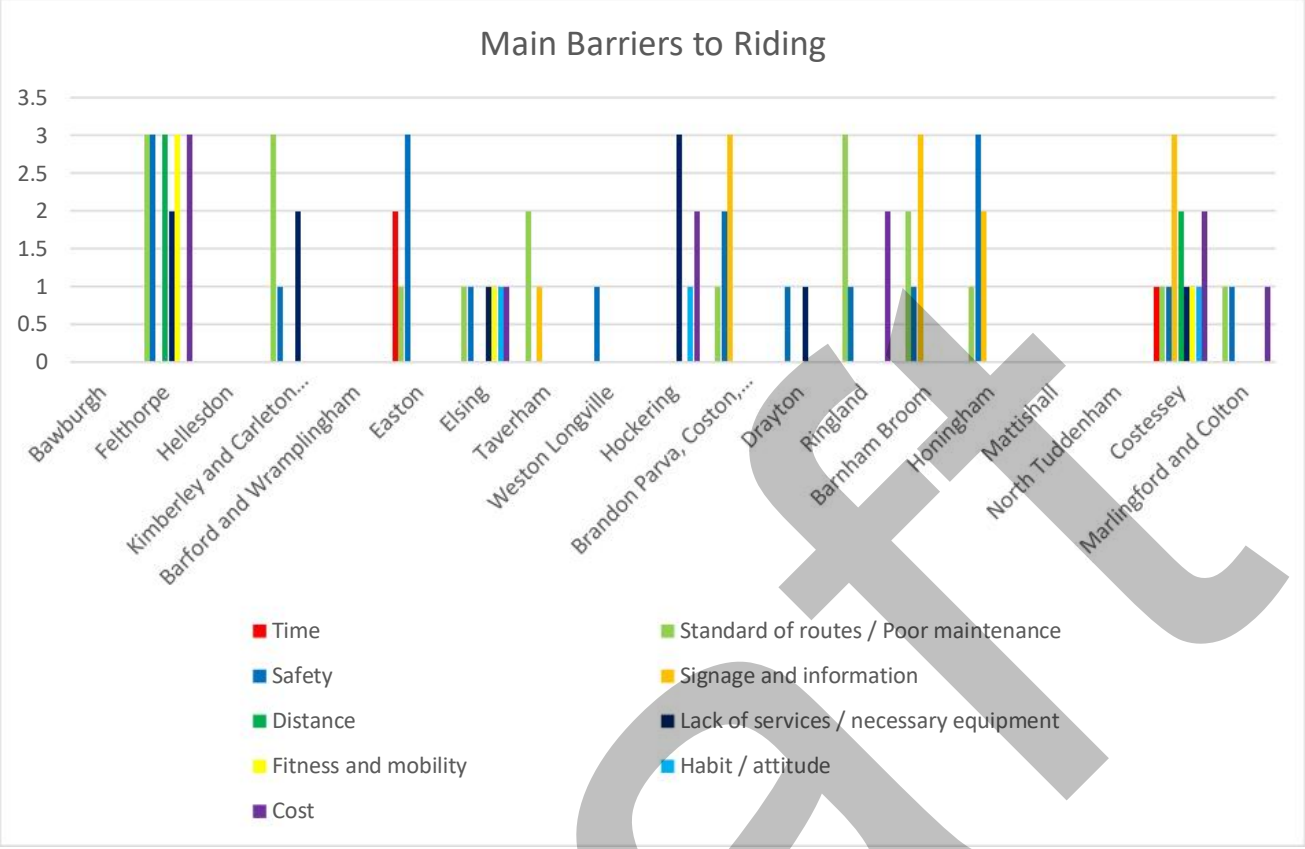


Figure 3-12 - Main barriers to horse riding

3.2.14. The main barriers for walking are the standard of routes / poor maintenance and issues of safety. Cycling was considered to have the same barriers as walking, as well as that of lack of services / necessary equipment, which could be due to the low number of cycle routes and infrastructure in place in the most rural zones.

3.2.15. The main barriers to bus travel were the lack of services to the rural parishes, habit / attitude and the time taken for bus journeys, especially in relation to the private car. For horse riding, the main barriers are that of the standard of routes / poor maintenance, lack of services / necessary equipment and safety.

3.2.16. The results from this question show that a lot more could be done to encourage increased use and enjoyment of sustainable modes within the study area.

Question 5

3.2.17. When asked how the NWL will affect their travel behaviour within their parish, the greatest majority said that the route would reduce rat-running, as it will provide a better alternative of travel into Norwich by avoiding the rural routes. However, it was also noted that some areas were concerned that the NWL would increase rat-running, including the parishes of Felthorpe, Kimberley and Carleton Forehoe, Ringland and Honingham. Other comments are those that believe NWL will improve journey times, encourage increased driving, increase traffic, increase HGV use, allow faster access to North Norfolk and that it will provide a new

route to the A47. Some comments suggest that there will be increased use of local roads, despite the new link and that it will allow for rat running to the A11.

Question 6

3.2.18. When asked what journeys would be made on foot or by bicycle, the main responses were for: recreation, school, shops, golf course, GP surgery or to bus stops. The measures suggested to improve access to these were to provide better links to Wymondham, Longwater Lane, Ringland or Costessey, such as to remove rat-running and make the routes more suitable to the current levels of traffic experiences.

3.2.19. Improved bus stop infrastructure was also a frequent comment, which could include the provision of real-time information and bus shelters, which would make bus travel more attractive. Better footpaths and cycle paths were mentioned, as well as to reduce traffic on minor roads, which would create a much safer environment for sustainable modes. Other comments included adding secure / covered bike storage, a footpath to Lenwade, improved foot and cycle access from Weston Park to A1067, improved signage, a new footpath on Honingham Road and keeping verges cut.

Question 7

3.2.20. This question considers what sustainable transport improvements should be prioritised for packaging with NWL, and the most popular answer was to increase bus frequency and route options. This would enable greater flexibility of travel options and could reduce the reliance on private car travel. Another common request was to introduce and enforce speed and weight restriction on the local roads, such to discourage use by HGVs and through traffic. This could then in turn make the rural roads much quieter and support the use of sustainable transport.

3.2.21. Improved road maintenance and footpath maintenance is important to the parishes to make the areas safer. Prevention of rat-running by the closure of Berry's Lane was mentioned by two parishes, as it currently allows for rat-running from Wymondham, which shouldn't be an issue with the construction of the NWL.

3.2.22. Additional comments include: a bus transfer hub at the airport, cheaper bus services, more bridleway designations, improved signage, tunnels under NWL that limit traffic size, and additional pavements.

Question 8

3.2.23. This question seeks to find out if there are any gaps in the walking / cycling / horse riding network that could be improved. With this in mind, the most popular answer was that there were no gaps, but the existing routes could be further improved. On the other hand, it was noted twice that parishes though there was a non-existent network, which further discouraged use of sustainable modes.

3.2.24. Other comments included: a reconnection of Easton to Lower Easton, better connectivity, lack of safe crossings, ensure all public rights of way are open for use at all times and the lack of off-road footpaths and safer cycling routes.

3.2.25. A suggestion was put forward to extend the footpaths to Barnham Broom Hotel and Mount Pleasant to improve connectivity.

Question 9

3.2.26. Public transport is also considered in the questionnaire, with suggestions sought as to how the services, routes and infrastructure should be improved to make bus travel more attractive.

3.2.27. Similar to that of Question 6, increased frequency and reliability was by far the most important factor for parishes in order to improve uptake of bus travel. This could also be supplemented by evening services, creating greater flexibility for users.

3.2.28. A circular route on the Broadland Northway / A47 / NWL was put forward, as well as a service through Horsford, Mattishall and Lenwade, which would give greater access to areas for those in the most rural zones.

3.2.29. Other comments included: bus lanes, a direct link to the airport or railway, services along the old A547 once the dualled section is opened, a Park & Ride facility at Easton, a bus transfer hub, lower fares, safer crossings near bus stops and hybrid buses.

Question 10

3.2.30. The final question considers if future changes to the network were to contribute to increased traffic on the road, what measures should be in place to mitigate this.

3.2.31. The most common answer was to lower the speed limit or add speed restrictions to the rural roads, as a measure to combat high levels of traffic. Other frequently mentioned measures were to add weight limits to deter HGVs, chicanes or road narrowing, such as that in Weston Longville to reduce speeds and lengthened journey time, so that other more arterial routes become more attractive.

3.2.32. Pedestrian crossings, closure of Berry's Lane, and weight restrictions on weak bridges were also put forward.

3.2.33. It was also suggested that satellite navigation systems should be updated as soon as possible to reflect the new road network to begin removing traffic through the rural areas. Other comments included: average speed cameras, closure of Low Road East and better signage.

3.2.34. In summary, the questionnaires showed that there is a division in opinion as to whether the NWL will improve travel or worsen it due to the location of the parishes. However, the complementary measures proposed will enable the NWL to be of benefit to all modes and users.

NORFOLK LOCAL ACCESS FORUM – Public Rights of Way Subgroup

3.2.35. On Monday 23rd September 2019, WSP attended the sub-group meeting for the Norfolk Local Access Forum, where the NWL project progress was explained and attendees were invited to attend the Stakeholder Workshop in October. Attendees noted during the meeting showed that they would like to have the opportunity to provide more access for non-car modes, not just to preserve those existing. Representatives were keen to provide an input to the shape the design process.

NWL Public Consultation Round 1

3.2.36. A round 1 public consultation ran from May 2018 to July 2018, initiated by NCC as part of their non-statutory early engagement. The purpose of the consultation was to understand people's experience of living in and travelling through the area to the west of Norwich. Further data was collected, and a report was produced for NCC by Commonplace which provided a summary of the data gathered through their platform on the multiple choice and geographic elements of the consultation.

3.2.37. Letters were posted and emails sent to key stakeholders before the launch of the consultation and advertisement was carried out through press releases, magazine, newsletters, posters, social media, leaflets and the NCC website. 11 public engagement events were held at various locations within the study area at village halls, the Norfolk and Norwich University Hospital and Norwich Research Park.

3.2.38. There were 4,426 unique visitors to the consultation website; 1,732 responses to the main consultation survey, 773 comments pinned to the consultation map that highlighted problems in a specific location and 42 letters or emails.

3.2.39. When asked about transport issues in question 1, 25% of respondents indicated that the major issues were traffic congestion (14%) and rat running (11%); a further 115 indicated that dangerous roads were and issue.

3.2.40. The section part of the questionnaire included a map, which allowed respondents to geotag a pin in a location on the map. The first question in this section was 'What transport issues, if any, do you feel currently affect this location?' the location of the points is shown below (**Figure 3-13**). The results spread out across the study area, but are clustered in areas such as Ringland, Weston Green, Weston Longville, Morton, Queens Hills, Costessey and at the western end of the Broadland Northway. The clustered tags mentioned that narrow roads and rat running was an issue, as well as concerns regarding safety as to where the new link would join the A1067. Other comments mention HGC and tractor congestion where the Broadland Northway ends and highlighted several junctions that are not suitable for current traffic.

3.2.41. The results from this consultation shortlisted the original long list of 82 options, down to four that would be consulted on in the second round of consultation.

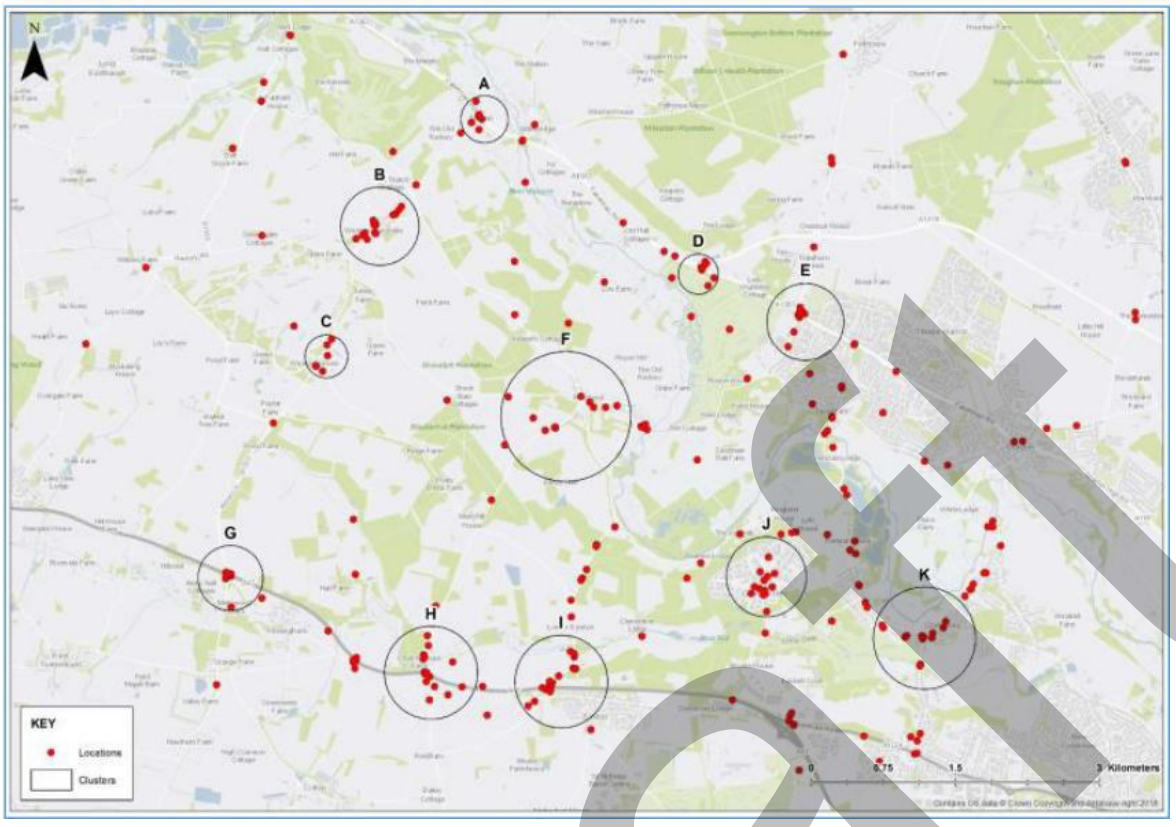


Figure 3-13 - Locations of comments left in section 2 of the R1 Consultation

NWL PUBLIC CONSULTATION ROUND 2 & NWL Option Selection Report (OSR) Responses

3.2.42. In consultation summer 2018, an initial consultation for Norwich Western Link proposals took place to seek feedback on the creation of a new link to the west of Norwich. More than 1,700 responses were received, demonstrating the very strong support for a link form the A1270 Broadland Northway and the A47.

3.2.43. Between 26th November 2018 to 18th January 2019 a second non-statutory public consultation was held to inform the selection of a preferred option of the shortlisted four road options. **Figure 3-14** below shows the options presented for public consultation in 2018. A total of 1,931 responses were received for the second public consultation, which included over 12,000 comments regarding the proposed route options.

3.2.44. Respondents were asked to provide feedback on each of the four presented options and asked to consider the following issues;

- Boosting the economy;
- Improving emergency response times;
- Better access to Norfolk and Norwich Hospital;
- Better journey reliability;
- Shortening journey times;
- Road safety;
- Reducing emissions from queuing vehicles;
- Reducing congestion;
- Reducing rat-running; and
- Protecting the environment.

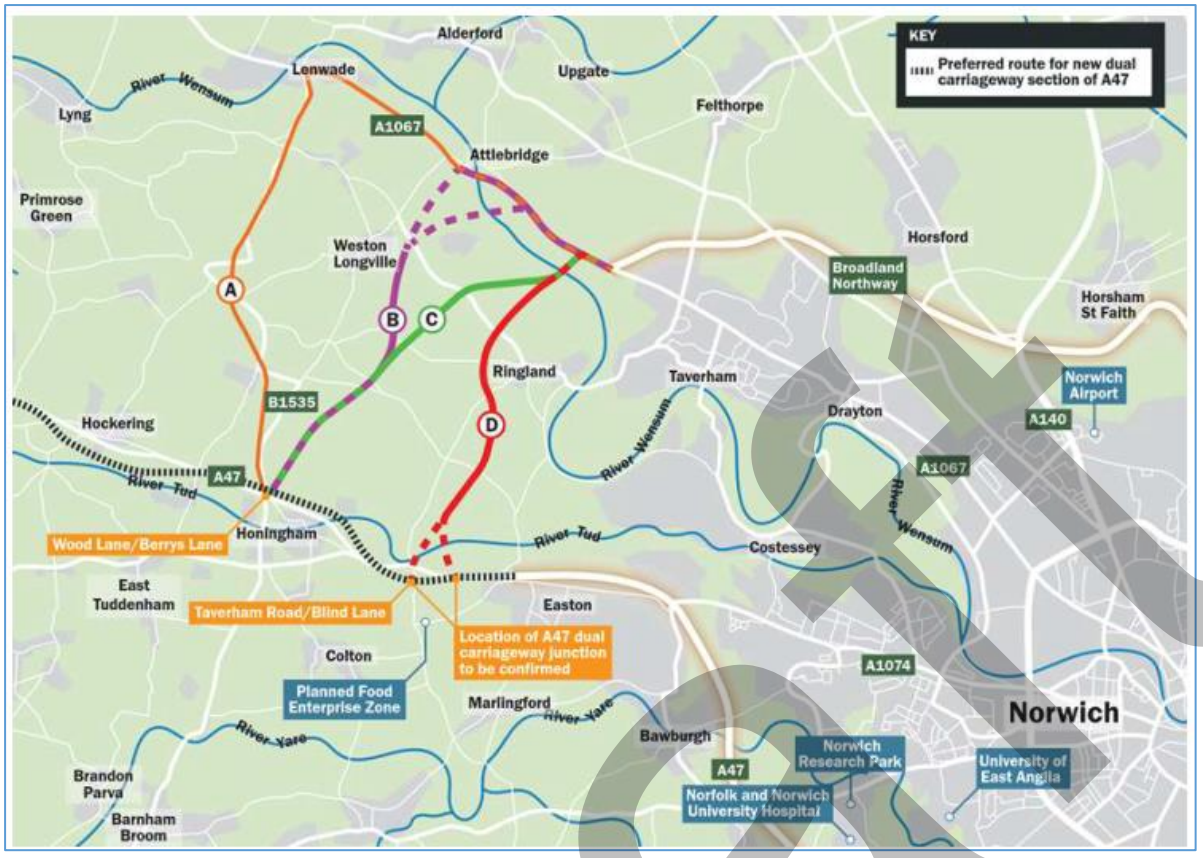


Figure 3-14 - Options Presented for Public Consultation (November 2018)

3.2.45. Regarding Option C, the preferred route option, 62.2% of respondents thought that it would provide a very effective or fairly effective Western Link, however, 29.7% thought that it would either be fairly ineffective or not very effective. The remaining proportion of respondents were neutral about Option C.

3.2.46. It was deemed that Option C would tackle rat-running the most effectively, as well ask reduce congestion and shorter journey times. However, responses indicate that people thought Option C would be less effective at boosting the local economy, protecting the environment and improving access to the NNUH.

3.2.47. Comments were also received on the other transport improvements which would be packaged to complement the overall NWL scheme. Question 5 of the consultation questionnaire asked respondents whether there were any other transport improvements they felt would complement NWL. 84% of respondents answered this question – improving bus services and cycling routes were in the top three responses to this question. Over 100 comments refer to the need for improved bus services.

3.2.48. The OSR builds on the findings generated through the public consultation to assess:

- The existing conditions of the road network and surrounding land;
- Produce the layouts for the route options;
- The impacts of each route on different environmental aspects;
- The traffic implications; and
- The results of the 2018/19 public consultation.

Other Feedback

3.2.49. Further feedback was received by the Parish of Weston Longville on 18th October, following agreement by the Parish Council on 7th October. The document sets out mitigation measures for the NWL preferred route, based on meetings held by the Parish with local residents, NCC and WSP.

3.2.50. The measures are intended to mitigate the impact of noise, air and visual pollution caused by NWL, which are included in **Appendix J**.

3.2.51. In summary, the document seeks clarification on:

- the final route alignment and how the new alignment may impact wildlife sites;
- the extent of land take; access to existing footpaths and bridleways should be maintained at all times during construction;
- access to bus services on the A47 through creation of a circular route from Ringland Lane;
- Footpath and cycleway Improvement;
- Road status changes to change permitted access for HGVs;
- Update of satellite navigation technology to reflect the new road layout;
- Upgrade of permissive path from A1067 to Church Street alongside Marl Hill to be upgraded to provide access to Morton and Attlebridge; and
- A footbridge or light traffic crossing across A1067.

4 USER OPPORTUNITIES

4.1.1. The opportunities highlighted below are considered to be relevant to the study and should be considered further during preliminary / detailed design in addition to any further opportunities that may arise through ongoing development and stakeholder engagement.

4.2 General Opportunities

General Opportunities
Opportunity 1: Incorporate multi-user routes that are inclusive and accessible for all non-motorised users within the NWL scheme Address the needs and access requirements of all users, to ensure that all pedestrians, cyclists and equestrians can access existing and new routes.
Opportunity 2: Avoid severance of existing walking, cycling and equestrian routes or minimise diversion length where severance cannot be avoided Where viable severance of existing routes should be avoided. Where severance is unavoidable, mitigation measures should be added to reduce the impact caused by the project.
Opportunity 3: Creation of a more connected and navigable Public Rights of Way (PROW) network Connectivity of PROW should be addressed within by the scheme, linking key desire lines to encourage the greatest level of use.
Opportunity 4: Introduction of safer crossing points for pedestrians, cyclists and equestrians on A1067 and close to key facilities in the west of Norwich Where pedestrians, cyclist and equestrian routes cross highways, facilities should be safe for all users, thereby improving connectivity between PROW encouraging their use.
Opportunity 5: Improved wayfinding signage Provide signage on key routes and junctions to ensure users can find their way. This should include village destinations, Norwich City Centre, leisure routes, etc.
Opportunity 6: Provision of lighting, where appropriate, on walking, cycling or equestrian routes Where proportionate and viable on pedestrian, cyclist and equestrian routes, the lighting should be provided to improve safety and make the routes more attractive to users.
Opportunity 7: Creation of circular routes for recreational journeys Where practicable, circular routes should be created for all users in addition to more linear 'commuter routes', thus establishing attractive leisure routes.
Opportunity 8: Road surfacing to minimise road noise Where practicable, the NWL should use noise-minimising road surfacing to reduce noise pollution from the route on local users, making sustainable travel for commuting and leisure purposes more attractive.
Opportunity 9: Improve connectivity to Marriott's Way and Pedalway network Provide improved or new routes connectivity to Marriott's Way for all users. Connections should be clearly sign posted and of an adequate standard to support safe travel. This could encourage greater levels of sustainable travel in Norwich and the wider area.

Opportunity 10: Continue discussions with Highways England, seeking to join up the NMU network where PROW routes intersect with A47 and NWL Continue to hold regular meetings with Highways England to understand the impact of the A47 dualling scheme on the NWL, and how the two can complement each other.
Opportunity 11: Ensure NMU route proposals have a maintenance plan in place Ensure that existing routes are well maintained and that there is a clear budget in place to support new PROWs proposed.
Opportunity 12: Improved access to bus stop facilities in the west of Norwich Provide improved access to frequently used bus stops within the study area and ensure that the infrastructure is of a high standard, with adequate crossing provision and shelter.

4.3 Pedestrian Opportunities

Pedestrian Opportunities
Opportunity 17: Improved footbridges on Ringland Footpath 1 The existing footbridges are very narrow and not fit for use by elderly or disabled users, who would benefit from improved facilities.
Opportunity 18 Walking connection from Ringland to Queens Hills Create a link for pedestrians to access Ringland footpaths from Queens Hills.
Opportunity 19: Dedicate PROW over Marl Hill permissive path An existing permissive path along Marl Hill from A1067 to Church Street should be upgraded to provide improved pedestrian access from Morton and Attlebridge to key services and the bus stops on A1067.

4.4 Strategic Opportunities

Strategic Opportunities
Opportunity 20: Determine status of Honingham RB1 Through the two site visits it appears that the restricted byway is no longer in use, despite user groups advocating to allow for continued access. Determine whether RB1 is still open to the public and whether improved signage and access could be included alongside NWL.
Opportunity 21: Work with Highways England to create a safe Crossing of the A47, at or close to the Wood Lane junction Incorporate safe crossing provision, open to all users, as part of the NWL and A47 dualling projects, that creates improved connectivity north and south of the A47.
Opportunity 22: Safe crossing of the A47, at or close to Dog Lane Develop in conjunction with Highways England. Safe crossing facilities of the A47 at Dog Lane for all users. Such facility may be grade-separated rather than crossing at-grade.
Opportunity 23: Diversion of Honingham RB1 Diversion of users to The Broadway underpass to the north, to bring RB1 alongside the east of the scheme. Re-route RB1 to the west of NWL to reduce impacts on Easton Estates and tie-in with maintenance tracks that are provided for the drainage basins on the east side of the route.
Opportunity 24: Creation of Public Right of Way over existing permissive route from Ringland Lane to Weston Lane Alongside Blackbreck Lane and Ringland Lane there is a permissive route along the field boundary that leads back to Weston Road. There was evidence of use by pedestrians, cyclists and equestrians during the site visit and further comments made through stakeholder and resident engagement. Creation of Public Right of Way over existing permissive routes would create a circular route for use by the public.
Opportunity 25: Crossing provision over A1067 for access to Morton-on-the-Hill RB1 and bus stops There is no safe crossing provision to allow users to access the bus stops on the A1067. A crossing may improve bus patronage and make the existing RB1 more attractive to use. This should also include shared-use paths to connect RB1 and the bus stops.
Opportunity 26: Determine status of Attlebridge RB3 The site visit has shown that the access from Taverham Road is no longer a PROW, contradicting the Definitive Map. It should be investigated if the PROW has been stopped up and identify whether there is the potential to open it up to allow for travel over/under the Broadland Northway.
Opportunity 27: Determine status of NCC Maintained Unsurfaced Track, south of A47 There may be possibility to re-designate the track as a Public Right of Way, e.g. bridleway to make the public aware of the track and increase usage. The track provides a good route south of the A47 and into Easton.
Opportunity 28: Use old A47 as a new restricted byway or bridleway Re-designate the old A47 when the dualling scheme is complete for use as a restricted byway or bridleway.
Opportunity 29: Blackbreck Lane to designated as a bridleway or restricted byway

Implement a formal change from an NCC Maintained Unsurfaced Track to a bridleway or restricted byway.
Opportunity 30: Circular route from Hockering Heath to Easton The circular route will connect existing routes, such as The Broadway and provide an east-west route across the study area.

4.5 Cyclist Opportunities

Cyclist Opportunities
Opportunity 13: Creation of appropriate cycle infrastructure Develop opportunities to continue the infrastructure for active travel with tarmac surface paths separated from traffic with wide verges / landscaping where feasible.
Opportunity 14: Creation of new cycle routes on east-west routes towards Norwich City Centre The possibility of a segregated cycle track, remote from the NWL or A47 dualling, would be more attractive to users, and so opportunities to explore relocation of cycle routes should be implemented.
Opportunity 31: Connection of Broadland Northway cycle path to NWL Continue the cycleway from the Broadland Northway to NWL to improve connectivity and create a sustainable link in and around the city.
Opportunity 32: East-west cycle route from Mattishall to NNUH/UEA Create an east-west cycle route to the south of the A47 from Mattishall to NNUH / UEA to follow a key desire line.
Opportunity 33: Widened entrance from Station Road onto Morton-on-the-Hill BR1 for cyclists The existing entrance is very narrow and forces cyclists to dismount; provide a wider entrance to make enable cyclists to continue without dismounting.

4.6 Equestrian Opportunities

Equestrian Opportunities
Opportunity 15: Creation of bridleways or restricted byways Where viable introduce or re-designate PROWs to bridleways or restricted byways to open up more route to equestrians and carriage drivers, which will improve safety and provide greater off-road route choices.
Opportunity 16: New PROWs to be suitable for carriage drivers Where viable, new PROWs should be accessible to carriage drivers. Access will require careful design development to enable carriage access but prevent abuse of routes by motorised users.

Date Modified: 17/12/2019

Drawn By: UKHEG001

Key

- Location of Option
- Route of Option
- Marriott's Way
- Marriott's Way Circular
- Wymondham Circular
- NWL Preferred Route

Public Rights of Way

- Bridleway
- Byway Open to All traffic
- Footpath
- Restricted byway
- A47 Preferred Route Alignment

Network-wide Options (not shown on map)

1: Incorporate works that address accessibility issues
2: Avoid severance of existing walking, cycling and equestrian routes
3: Creation of a more connected and navigable Public Rights of Way network
4: Introduction of safer crossing points for pedestrians, cyclists and equestrians
5: Improved wayfinding signage
6: Provision of lighting, where appropriate, on walking, cycling or equestrian routes
7: Creation of circular routes
8: Road surfacing to minimise road noise
9: Connection to the Marriott's Way
10: Continue discussions with Highways England
11: Undertake maintenance of existing routes
12: Improved access to bus stop facilities
13: Creation of cycle infrastructure as advised by Sustrans
14: Creation of new cycle routes
15: Creation of bridleways or restricted byways
16: New PROWs to be suitable for carriage drivers

Pedestrian Options

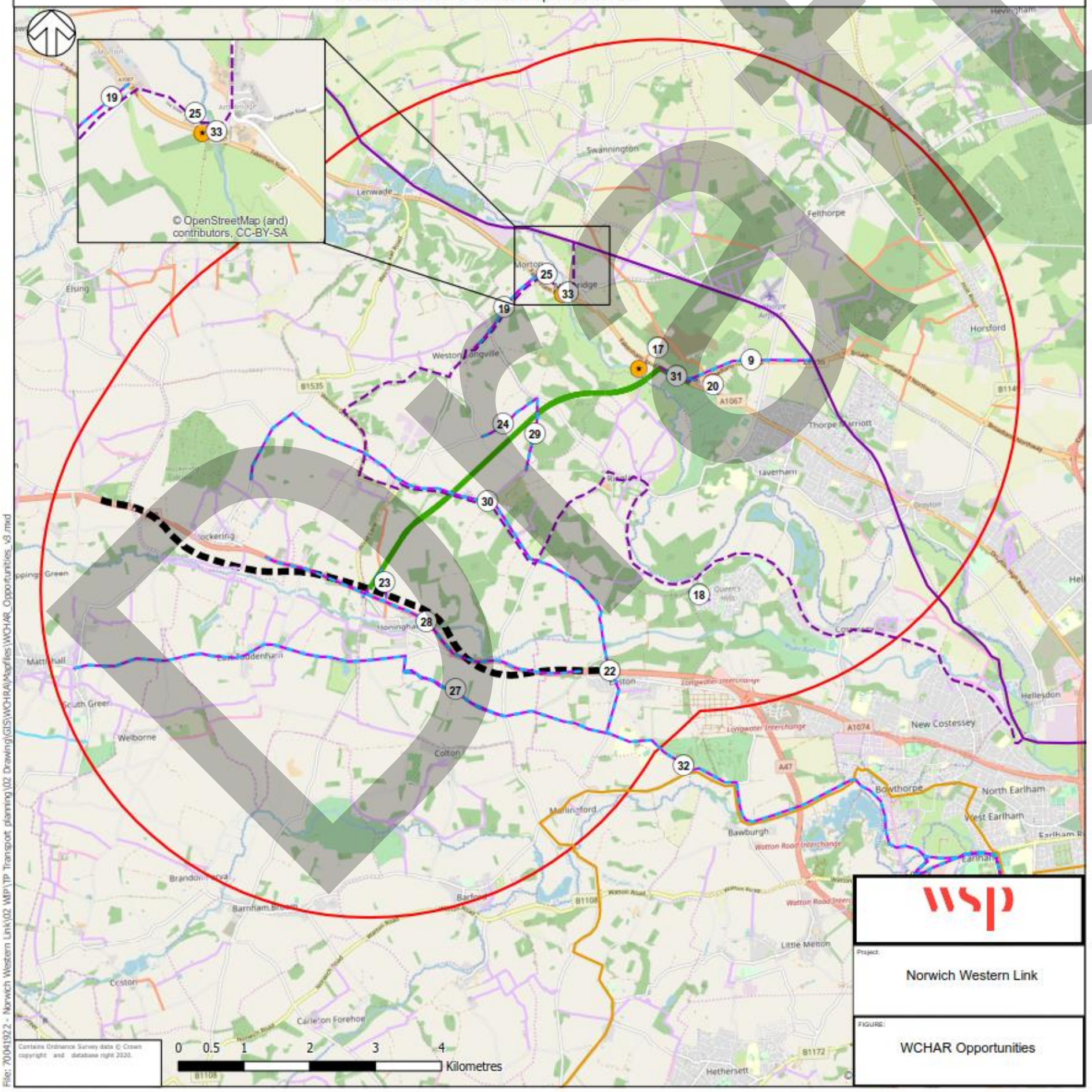
17: Improved footbridges on Ringland Footpath 1
18: Walking connection from Ringland Hills to Queens Hills
19: Dedicate PROW over Marl Hill permissive Path

Strategic Options

20: Determine status of Honingham RB1
21: Safe Crossing of the A47, Wood Lane junction
22: Safe crossing of the A47, Dog Lane
23: Diversion of Honingham RB1
24: Creation of Public Right of Way over existing permissive route
25: Crossing provision over A1067 for access to Morton-on-the-Hill RB1 and bus stops
26: Determine status of Attlebridge RB3
27: Determine status of NCC Maintained Unsurfaced Track, south of A47
28: Use old A47 as a new restricted byway or bridleway
29: Blackbreck Lane to be designated as a bridleway or restricted byway
30: Circular route from Hockering Heath to Easton

Cyclist Options

31: Connection of Broadland Northway cycle path to NWL
32: East-west cycle route from Mattishall to NNUH/UEA
33: Widened entrance from Station Road onto Morton-on-the-Hill BR1 for cyclists



File: 70041922 - Norwich Western Link\02 WIP\TP Transport planning\02 Drawing\GIS\WCHRA\Mapfiles\WCHAR_Opportunities_v3.mxd

Figure 4-1 – WCHAR Opportunities

4.7 NEXT STEPS

4.7.1. The WCHAR Assessment report provides the design team with relevant background information and identifies opportunities to facilitate the inclusion of all walking, cycling & horse-riding modes in the highway scheme design process. The output may also be used to inform Sustainable Transport Strategy, NMU Strategy and influence the design of the proposed route alignment.

4.7.2. Once the design team has had opportunity to consider and incorporate the findings from the Assessment Report into the highway scheme design, the Review phase can commence. This phase ensures that previously identified opportunities at the Assessment phase have been considered and implemented where achievable. It also identifies opportunities for improvement for pedestrians, cyclists and equestrians as a result of the developing highway scheme design. The review records action taken / outcomes alongside the identified opportunities.

4.7.3. In November 2019, GG 142 replaced HD 42/17, the full document being re-written to make it compliant with the new Highways England drafting rules.

Appendix D

LOCAL LIAISON GROUP TERMS OF REFERENCE

Norwich Western Link and A47 North Tuddenham to Easton dualling scheme

Local Liaison Group – Terms of Reference:

1. Introduction

1.1 The Norwich Western Link (NWL) Local Liaison Group was formed in February 2017 to support the development of the Norfolk County Council (NCC) project, which is one of its key infrastructure priorities.

1.2 It was agreed in August 2020 that the group's remit would be expanded to include Highways England's (HE) A47 dualling scheme between North Tuddenham and Easton, given the need for a joined-up approach across the two projects and the overlap in many of the issues.

1.3 This note updates the previous Terms of Reference for the Local Liaison Group in light of these changes.

2. Governance

2.1 Meetings of the Local Liaison Group will be held approximately every two months and will be aligned with the overall delivery programmes and key milestones of the two projects.

2.2 The LLG will, based on their feedback to the project as it moves through its delivery processes, help to advise and inform the NWL NCC Project Team, who will advise and update the NCC Member Working Group. The role of the Member Working Group is to advise NCC's Cabinet on decisions related to the NWL project. The Cabinet Member for Highways and Infrastructure is the chair of the LLG, and therefore also receives direct feedback from the LLG.

2.3 The LLG will also provide feedback to HE on the A47 North Tuddenham to Easton project and will help advise and inform the HR project team who will have suitable representation at meetings.

3. Working Group Purpose and Structure

3.1 The role of the Group is to support the development of the Norwich Western Link project and A47 North Tuddenham to Easton dualling scheme, providing in-depth local knowledge of the challenges and opportunities.

3.2 The purpose of the Local Liaison Group is to:

- Provide local insight to the concerns, problems and challenges faced;
- Provide a channel for information to be shared by and with local councils and their communities;
- Review and comment on the aims and objectives for the projects;
- Identify aspirations, priorities, potential interventions and opportunities;
- Raise and discuss issues which require consideration by both Norfolk

County Council and Highways England, including those related to the construction periods for both projects;

- Review and consider the projects in relation to other schemes and developments including other transport improvements and the Food Enterprise Park at Easton.

3.3 Group Membership and Chairperson:

3.3.1 The group is made up of one representative from each Parish / Town / Ward Council across an area to the west of Norwich extending from north of the A1067 Fakenham Road to south of the A47. More than one councillor from a single parish council may attend, however additional representatives are expected to attend as observers only. Substitutes may be sent if the usual representative is unable to attend. Requests for changes or additions to the membership will be considered by the group at meetings.

3.3.2 The membership has been expanded since the group was originally set up to take account of its increased remit and requests from parish councils to be invited. The current membership of the group is included at Appendix A. Cllr Martin Wilby, Norfolk County Council's Cabinet Member for Highways and Infrastructure, will continue as the chairperson. Officer representatives from Norfolk County Council and Highways England will also be part of the Group and consultants and contractors on each project will attend as necessary.

3.4 Meetings and papers

It is proposed that group meetings will be held approximately every two months. An agenda and relevant papers will be distributed in advance of each meeting, usually no later than one week beforehand, with details developed by the Chairperson and representatives from Norfolk County Council and Highways England. Agenda items for future meetings will be agreed by the Group at the previous meeting where possible. Minutes of each meeting will be circulated by email and agreed by the group at the following meeting.

3.5 Resources and meeting formats

Norfolk County Council will be responsible for arranging meetings and issuing meeting agendas and minutes. Both NCC and HE will provide reports and presentations at meetings as appropriate. Meetings will either be held in person at a local venue or virtually via Microsoft Teams, this will be agreed at the previous meeting. Meetings will be arranged to start in the early evening and be held for 90 minutes as standard.

3.6 Period of existence and updates to the Terms of Reference

It is envisaged that the Local Liaison Group will continue to meet throughout the planning and delivery phases of both projects. The Terms of Reference will be reviewed every 12 months and proposed updates to reflect new information or ways of working will be shared and agreed with the group.

Appendix A
Local Liaison Group Membership

- Barford
- Barnham Broom
- Bawburgh
- Bowthorpe Ward
- Brandon Parva, Coston, Runhall & Welbourne
- Carleton Forehoe
- Colney
- Costessey
- Drayton
- East Tuddenham
- Easton
- Elsing
- Felthorpe
- Great Melton
- Great Witchingham
- Hellesdon
- Hockering
- Honingham
- Horsford
- Horsham St Faith
- Lyng and Sparham
- Marlingford and Colton
- Mattishall
- Morton-on-the-Hill
- North Tuddenham
- Reepham
- Ringland
- Taverham
- University Ward
- Weston Longville
- Wensum Ward
- Wymondham
- Yaxham

Appendix E

NON-MOTORISED USER STRATEGY PLAN

Route Descriptions

Route 1a (A-B)
Dedication of new shared pedestrian-cycleway linking Honingham village centre and Village Hall to A47 NMU route and Honingham Restricted Byway.

Route 1b (B-C)
Diversion of Honingham Restricted Byway 1 to east side of NWL.

Route 2 (D-G)
The Broadway is to be closed to all traffic except for private access.
Creation of a traffic-free route for NMUs with the introduction of Traffic Regulation Orders to restrict access by motor vehicles except for private access.
D-E - Introduce a Traffic Regulation Order prohibiting motor vehicles and horse drawn carriages. Access equivalent to Bridleway status.
E-G - Introduce a Traffic Regulation Order prohibiting motor vehicles only. Access equivalent to a Restricted Byway.

Route 3 (E-F)
Breck Road is to be closed to all traffic except for access.
F1-F2 - Introduce a Traffic Regulation Order prohibiting motor vehicles. Access equivalent to a Restricted Byway.
F2-E - Dedication of a new Restricted Byway linking Breck Road and The Broadway to maintain NMU access over the NWL.
The east side of Breck Road is to be stopped-up and removed.

Route 4 (H-J)
Churchill Lane is to be closed to all traffic.
J-I - West side, introduce a Traffic Regulation Order prohibiting motor vehicles except for private access from point F. Access equivalent to a Bridleway.
H-I - East side, to be stopped-up and removed.

Route 5 (H-M)
Blackbreck Lane - the existing unsurfaced Highway to the east of the NWL is to be retained, with a localised diversion to Ringland Lane. The remainder of Blackbreck Lane, west of the NWL (from N1 to N2) will be stopped up.

Route 6 (M-L)
Ringland Lane retained open to all traffic.
NWL bridge passing over. Provision of footway alongside Ringland Lane.
Predominately unbound surface (Trod to NCC specification).

Route 7 (P-R)
Existing Ringland Footpath 1 (FP1) to remain and pass under Viaduct.

Route 8 (G-H)
Existing Weston Longville Footpath 9 (FP9) upgraded to Restricted Byway.

Route 9 (I-K)
Dedicated new Bridleway from Church Hill Lane to Blackbreck Lane.

Route 10 (L-O)
Dedicated new public footpath over NWL maintenance access track.

Route 10a (O-Q)
Dedicated new public footpath over NWL maintenance access track with link to Ringland FP1.

Route 10b (O-P)
Dedicated new public footpath creating link to Ringland FP1 & FP2. Unbound surface 'Trod' to NCC specification.

Route 11 (S-T)
Provision of a new shared pedestrian-cycleway to north side of A1067 Fakenham Road, creating an off-highway link alongside the new dualled A1067.

ATTLEBRIDGE
MARL HILL
WESTON LONGVILLE
WESTON GREEN
RINGLAND
HONINGHAM
A1067 Fakenham Road
Attlebridge RB4
Attlebridge RB3
Attlebridge BR6
A1270 Broadland Northway
Ringland Lane
Weston Road
Weston Green Road
Paddy's Lane
Breck Road
The Broadway
Church Hill Lane
Blackbreck Lane
Weston Longville FP9
Ringland FP1
Ringland FP2
Ringland FP3
Ringland FP4
Ringland FP6
Ringland FP7
Telegraph Hill
Honingham Lane
Honingham RB1
B1535
A47

ROUTE 1a
ROUTE 1b
ROUTE 2
ROUTE 3
ROUTE 4
ROUTE 5
ROUTE 6
ROUTE 7
ROUTE 8
ROUTE 9
ROUTE 10
ROUTE 10a
ROUTE 10b
ROUTE 11

RINGLAND LANE TO REMAIN OPEN TO ALL TRAFFIC
VIADUCT TO PASS OVER EXISTING FOOTPATH
DIVERSION OF BLACKBRECK LANE TO RINGLAND LANE
CLOSED TO ALL TRAFFIC EXCEPT FOR ACCESS
CLOSED TO ALL TRAFFIC EXCEPT FOR ACCESS
SECTION OF CHURCH HILL LANE TO BE STOPPED UP EXCEPT FOR ACCESS
SECTION OF TELEGRAPH HILL TO BE STOPPED UP EXCEPT FOR ACCESS
PROPOSED NWL
SECTION OF EXISTING HONINGHAM RB1 TO BE DIVERTED EAST OF NWL (A-B)
A1067- EXISTING UNCONTROLLED PEDESTRIAN CROSSING INFRASTRUCTURE TO BE REMOVED
DECEMBER 2020 HIGHWAYS ENGLAND A47 NORTH TUDDENHAM TO EASTON DUALLING EMERGING SCHEME PROPOSALS
INTERFACE WITH A47 WORKS
A47 UNDERPASS WITH NMU PROVISION. PART OF A47 WORKS
HE PROPOSED A47 MODIFICATIONS

A B C D E F1 F2 G H I J K L M N1 N2 O P Q R S T

Key

Existing
- Public highway
- Unsurfaced highway
- Public Right of Way

Proposed
- Proposed Restricted Byway / Existing Highway with prohibition of motor vehicles
- Localised diversion
- Proposed Bridleway / Existing Highway with prohibition of motor vehicles and carriages
- Footpath
- Shared pedestrian / cycleway
- Right of Way to be Permanently Stopped up
- Turning Head or Gate

General Notes
1. This drawing is confined to presenting the Non-Motorised User (NMU) strategy and modifications to the Public Rights of Way network. It outlines design intent for the proposed scheme as a reference design and should be read in conjunction with other associated drawings, relevant reports, specification, design requirements and supporting information provided.
2. The drawing shall only be used for the intended purpose it has been issued for and is not for setting out, or construction.
3. Any discrepancies and/or ambiguities found in this drawing, or between information contained within and that provided elsewhere, should be reported to the Project Manager for clarification.
4. All linear dimensions shown on plan are in metres unless otherwise indicated, and measurements must not be scaled from the drawing.
5. All spot elevations and contour levels where shown are in metres above Ordnance Datum (mAOD) unless otherwise indicated.
6. The topographical survey used as basis for the reference design scheme layouts is related to the ordnance survey grid. the Contractor's detailed designs are to be developed on a survey transformed to a DMRB IAN 99/07 grid, and design features currently shown will need to be repositioned/scaled as appropriate.
7. Refer to surfacing plans NCCt41793-03-C-18-700-0001 - 0015 for further information.

Series XXX General Arrangement
8. Refer to Volume 3 Part M for Non-Motorised User Strategy.
9. This drawing indicatively outlines scope and extent of proposed works as a composite plan, although some details are omitted for clarity.
10. For geometric details of proposed highway, refer to relevant Road Plan and Profile drawings.
11. For proposed Pavement layout and details, refer to the pavement drawings.
12. For extents and details of proposed Signs, refer to Wayfinding Strategy drawings.

P06	HG	PClk	PCu	03/02/2021
P05	HG	PClk	PCu	26/01/2021
P04	HG	PClk	PCu	22/01/2021
P03	HG	PClk	PCu	29/05/2020
P02	SL	PClk	PCu	15/05/2020
P01	SL	PClk	PCu	21/04/2020

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Norfolk County Council

PROJECT TITLE

NORWICH WESTERN LINK

DRAWING TITLE

NON-MOTORISED USER STRATEGY
GENERAL ARRANGEMENT LAYOUT

S2 - FOR INFORMATION

DRAWN	CHECKED	APPROVED	AUTHORISED
HG	PClk	PClk	PCu

SCALE @ A1 SIZE	DATE	REVISION
1:10000	JANUARY 2021	P06

DRAWING NUMBER

NCCT41793-03-M-0001

Appendix F

ORSTED HORNSEA 3 PROJECT CABLE ROUTING PLANS

Hornsea Project Three Offshore Wind Farm

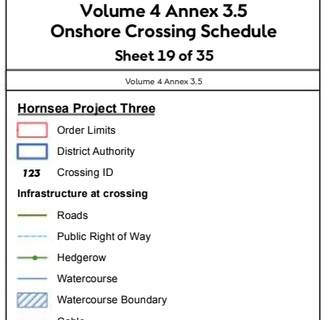
Volume 4 Annex 3.5
Onshore Crossing Schedule
Sheet 19 of 35

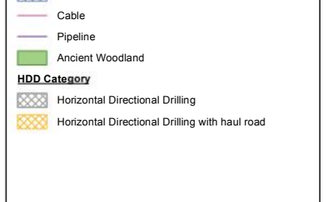
Volume 4 Annex 3.5

Hornsea Project Three
- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing
- Roads
- Public Right of Way
- Hedgerow
- Watercourse
- Watercourse Boundary
- Cable
- Pipeline
- Ancient Woodland

HDD Category
- Horizontal Directional Drilling
- Horizontal Directional Drilling with haul road





Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

0 25 50 100 150 200 Metres
0 25 50 100 150 200 Yards

REV	REMARK	DATE
00	First Issue	May 2018
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Hornsea Project Three Offshore Wind Farm
Application Document Number: Volume 4 Annex 3.5
Document no: HOW03APP19
Created by: NATMO
Checked by: ANGUY
Approved by: STLIV

Ørsted

611500 612000 612500 613000
320000 319500 319000

Sheet 18
Sheet 20

288 287 286 285 284 283 277 - 282 276 275
HDD 47 HDD 46

Broadland District Council

Church Farm Ln Hall Rd Reepham Road
Path (Um) Drain Def Rh Und Etl
40.6M 40.8M 33.6M 35.8M 43.0M 41.1M 35.1M 28.4M 21.2M 15.2M 21.6M
1.22M Rh

Hill View Council House
Church Farm Cottages
Church Farm
Halfmoon Plantation
Sandyhill Covert
Big Covert
Bite'S Pithole
Factory
Tanks
Mast (Telecommunication)
El Sta
Fb
Tank
Food Processing
Hall Road Farm
Pyghtle
St John The Church
Dovecote Dovecote Barn
Dairy Farm
Farm
Highland House
Kett'S Lane
New Forest
Welton'S Loke
Weltons Loke
View
Cottage
Honeysuckle
2 Keys

Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 20 of 35

Volume 4 Annex 3.5

Hornsea Project Three

- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Watercourse
- Watercourse Boundary
- Cable
- Ancient Woodland

HDD Category Description

- Horizontal Directional Drilling

Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

0 25 50 100 150 200 Metres
0 25 50 100 150 200 Yards

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Approved by: STLIV

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Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 21 of 35

Volume 4 Annex 3.5

Hornsea Project Three

- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Watercourse
- Watercourse Boundary
- Cable
- Pipeline
- Ancient Woodland

HDD Category Description

- Horizontal Directional Drilling
- Horizontal Directional Drilling with haul road over

Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

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0 25 50 100 150 200 Yards

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317000 316500 316000

Sheet 20 Sheet 22

HDD 43 261 260 259 258 253 - 257 HDD 42 250 - 252 249 HDD 41 248 HDD 40 247 246 245 244 243 HDD 39

Broadland District Council

Nirvana Morton Lodge Aylsham Road Hill Farm Pond Oak Ditch Etl Gravelpit Plantation 1.22M Rh 1.22M Rh White Horse Farm Corner The Old Rectory Mart Hill Road 15.6M Golf Course Und 41.0M Hardingham Hills 1.22M Rh Pond 33.4M Well Track White Cottage Und Ringland Ln Playing Field Woodforde Rail York The Rectory Coppins Track Weston Drive The Rookery Cattle Grid Track Cottage Morton Hall

Track 15.9M Ashbridge Ash Tree Lodge Ashtree Farm Church Field Church Field Station Road Old Shop 4A 8A Church Rectory Teh 12.5M Cottages Sunrise Cottage Morton Tee'S End Farm View The Old Smithy Stable Old Fakenham Road

611500 612000 612500

315500 315000 314500

Sheet 21

Sheet 23

242 241 240 239 238

HDD 38

Broadland District Council

Three Gp Memorial Cemetery The Rectory Coppins Church Farm Close Pond Old House Filter Bed Pond The Spinney Oak Grove Home Farm Morton Hall Garden Cottage Farm Tank Church Tank Broom Hills Track Track Track Long Plantation 27.9M 24.7M 20.2M 45.6M 43.6M 45.9M Pond Pond Pond Def Track 1.22M Rh Def Track 1.22M Rh Track Ringland Lane Green Farm Field Barn Holly Barn Green Lodge Hethercraigs Gp Pump Farm Pond

GRID NORTH

Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 22 of 35

Volume 4 Annex 3.5

Hornsea Project Three

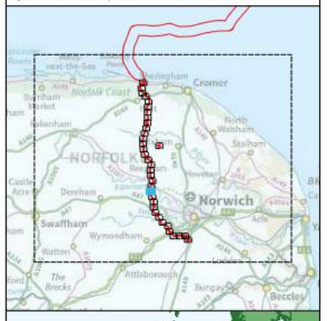
- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Watercourse Boundary
- Cable

HDD Category Description

- Horizontal Directional Drilling with haul road over



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Approved by: STLIV

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Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 23 of 35

Volume 4 Annex 3.5

Hornsea Project Three

- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Pipeline

HDD Category Description

- Horizontal Directional Drilling
- Horizontal Directional Drilling with haul road over
- Horizontal Directional Drilling with haul road over or Open Cut

Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

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0 25 50 100 150 200 Yards

REV	REMARK	DATE
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Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 24 of 35

Volume 4 Annex 3.5

Hornsea Project Three

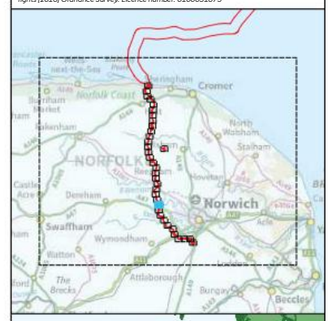
- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Watercourse Boundary
- Ancient Woodland

HDD Category Description

- Horizontal Directional Drilling



Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

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0 25 50 100 150 200 Yards

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Hornsea Project Three Offshore Wind Farm

Volume 4 Annex 3.5 Onshore Crossing Schedule

Sheet 25 of 35

Volume 4 Annex 3.5

Hornsea Project Three

- Order Limits
- District Authority
- 123 Crossing ID

Infrastructure at crossing point

- Roads
- Hedgerow
- Watercourse
- Watercourse Boundary
- Cable
- Pipeline
- Ancient Woodland
- National Highways A47

HDD Category Description

- Horizontal Directional Drilling
- Horizontal Directional Drilling with haul road over

Coordinate system: British National Grid
Vertical reference: ODN
Scale @ A1: 1:2500

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0 25 50 100 150 200 Yards

REV	REMARK	DATE
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Checked by: ANGUY
Approved by: STLIV

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612500 613000 613500
311500 311000 310500

GRID NORTH

Sheet 24 Sheet 26

220 - 222 219 HDD 32 218 217 216 215 214 211 - 213 210 209 208 200 - 207 HDD 31 198 199 HDD 30 196 195 194

River Tud

Broadland District Council

South Norfolk District Council

Harmans Grove Rookery Hill Farm Bellevue The Annexe Riverside Farm Ford Cottage West Lodge Westlodge Hills Church Plantation Hyford Easton Allot Four Acre Plantation Fir Covert Upper Farm Slurry Bed

Church Ln Track Dog Lane Reedham Road Dereham Road Peacock Close Vicarage Elsing Sta Kennedy Close Woodview Road John Rowe's Close Hall Rd Water Marlingford Way Playground El Sub Sta St Peter's Primary School Play Area Marlingford Road Hall Road

26.7M 26.1M 44.2M

Co Const. Cp and Ld Bdy

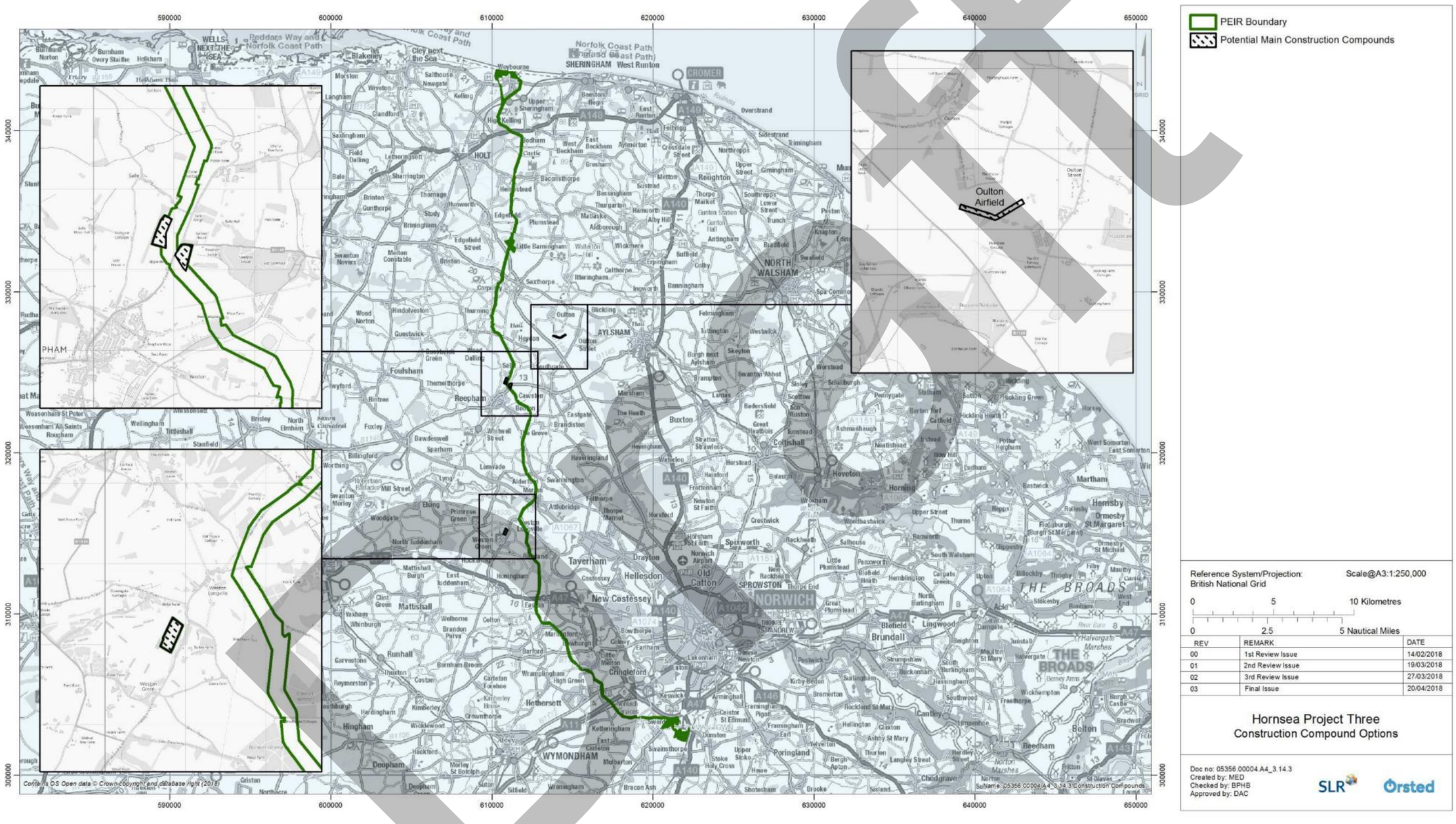


Figure 3.21 Construction Compound Options.

Appendix G

WCHAR STRATEGY PLAN

Date Modified: 17/12/2019

Drawn By: UKHEG001

Key

- Location of Option
- Route of Option
- Marriott's Way
- Marriott's Way Circular
- Wymondham Circular
- NWL Preferred Route

Public Rights of Way

- Bridleway
- Byway Open to All traffic
- Footpath
- Restricted byway
- A47 Preferred Route Alignment

Network-wide Options (not shown on map)

1: Incorporate works that address accessibility issues
2: Avoid severance of existing walking, cycling and equestrian routes
3: Creation of a more connected and navigable Public Rights of Way network
4: Introduction of safer crossing points for pedestrians, cyclists and equestrians
5: Improved wayfinding signage
6: Provision of lighting, where appropriate, on walking, cycling or equestrian routes
7: Creation of circular routes
8: Road surfacing to minimise road noise
9: Connection to the Marriott's Way
10: Continue discussions with Highways England
11: Undertake maintenance of existing routes
12: Improved access to bus stop facilities
13: Creation of cycle infrastructure as advised by Sustrans
14: Creation of new cycle routes
15: Creation of bridleways or restricted byways
16: New PROWs to be suitable for carriage drivers

Pedestrian Options

17: Improved footbridges on Ringland Footpath 1
18: Walking connection from Ringland Hills to Queens Hills
19: Dedicate PROW over Marl Hill permissive Path

Strategic Options

20: Determine status of Honingham RB1
21: Safe Crossing of the A47, Wood Lane junction
22: Safe crossing of the A47, Dog Lane
23: Diversion of Honingham RB1
24: Creation of Public Right of Way over existing permissive route
25: Crossing provision over A1067 for access to Morton-on-the-Hill RB1 and bus stops
26: Determine status of Attlebridge RB3
27: Determine status of NCC Maintained Unsurfaced Track, south of A47
28: Use old A47 as a new restricted byway or bridleway
29: Blackbreck Lane to be designated as a bridleway or restricted byway
30: Circular route from Hockering Heath to Easton

Cyclist Options

31: Connection of Broadland Northway cycle path to NWL
32: East-west cycle route from Mattishall to NNUH/UEA
33: Widened entrance from Station Road onto Morton-on-the-Hill BR1 for cyclists

0 0.5 1 2 3 4 Kilometres

wsp

Project: Norwich Western Link

FIGURE: WCHAR Opportunities

File: 70041922 - Norwich Western Link\02 WIP\TP Transport planning\02 Drawing\GIS\WCHRA\Mapfiles\WCHAR_Opportunities_v3.mxd

62-64 Hills Road
Cambridge
CB2 1LA

wsp.com

Appendix 2A

LETTERS OF SUPPORT

Norfolk County Council

Norfolk Fire and Rescue Service
Fire Headquarters
Room 8.2.6 OCC
Jubilee House
Falconers Chase
Wymondham
NR18 OWW

via email
Norwichwesternlink@norfolk.gov.uk

Website: ***www.norfolk.gov.uk/fire***

Please ask for: Stuart Ruff
Direct Dial: 01603 537489
Email: stuart.ruff@norfolk.gov.uk
My Ref: Norwich Western Link
Date: 09 December 2020

Dear Sir/Madam

Please accept this letter as my formal support for the proposal to create a Norwich Western Link road. Norfolk Fire and Rescue Service (NFRS) would welcome developments to improve the road infrastructure in the general area highlighted by the proposals.

In addition to the objective of improving overall road safety for our community, the key outcome of this proposal which NFRS would specifically welcome is reduced traffic congestion and increased traffic flow which we believe will bring a significant benefit in reducing our overall attendance time to incidents in the affected area. NFRS utilise a nearest available asset mobilising system for our emergency response model, and improved road infrastructure can have a positive impact on our response times.

We would also welcome the opportunity to reduce the number of heavy goods vehicles using minor roads around the Norwich area, in addition to the possible positive environmental vehicle emission efficiencies this proposal could deliver.

Please do not hesitate to contact me should you wish for further comment from NFRS.

Yours Sincerely,

Stuart Ruff
Chief Fire Officer

The Road Haulage Association

Tom Cotton
Head of Licensing and Infrastructure Policy
Road Haulage Association
The Old Forge, South Road
Weybridge, KT13 9DZ

14th December 2020.

Susie Lockwood,
Stakeholder and Engagement Manager
Infrastructure Delivery
County Hall,
Martineau Lane,
Norwich,
NR1 2DH

Dear Ms Lockwood,

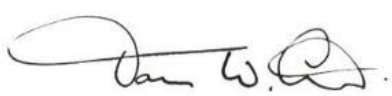
Re: Norwich Western Link

The RHA endorses and welcomes the above road scheme development, we encourage Norfolk County Council to progress this as quickly as possible. The economic benefits to the surrounding area and nationally cannot be underestimated.

The RHA supports the proposal to build a road, ideally dual carriageway, linking the A47 and A1067, as soon as possible. This would reduce journey time, improve air quality and assist the economic growth in the area north of Norwich. Also access to national critical infrastructure, such as the airport and hospital.

This link would enable traffic to take a much shorter route making the area north of Norwich, which contains considerable critical infrastructure, considerably more accessible. It would provide a resilience route in the event the existing A47 failing, or being closed.

Yours faithfully,



The Road Haulage Association

Tom W.Cotton
Head of Licensing and Infrastructure Policy
Road Haulage Association
t.cotton@rha.net.uk
Mobile: 07864 609064

NORTH NORFOLK DISTRICT COUNCIL

7 January 2021

To whom it may concern

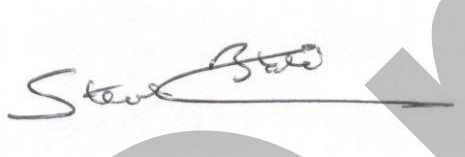
Dear Sirs

NORWICH WESTERN LINK – LETTER OF SUPPORT

On behalf of North Norfolk District Council, I write to provide our support, in principle, to the Norwich Western Link project.

Although we are unable to comment on the detail of the project, we would urge that Government give priority to the completion of this key piece of infrastructure in Norfolk to provide a dual carriageway orbital route around Norwich.

Yours faithfully



Steve Blatch
CHIEF EXECUTIVE

North Norfolk District Council
Holt Road, Cromer
Norfolk, NR27 9EN

Tel: 01263 513 811
Social: @northnorfolkdc
Web: north-norfolk.gov.uk

NORFOLK CONSTABULARY
Our Priority is You

SUFFOLK CONSTABULARY
Taking pride in keeping Suffolk safe

Chris Fernandez,
Norwich Western Link Project Manager
Infrastructure Delivery, Community and Environmental Services
Norfolk County Council.

Via Email: to
norwichwesternlink@norfolk.gov.uk

Roads and Armed Policing Unit,
Force Traffic Management Officer,
OCC Wymondham,
Falconers Chase,
WYMONDHAM,
Norfolk.
NR18 0WW.

Tel: 01953 424825
Fax: 01953 424898
Email: TMONorfolk@norfolk.pnn.police.uk

www.norfolk.police.uk
Non-Emergency Tel: 101

26th November 2020

Reference JA/A1270-WL/26.11.20

Dear Chris,

A1270 Broadland Northway – Western Link Support Consultation.

I am responding to your email dated 18th November 2020 in respect of consulting with Norfolk Constabulary Traffic Management eliciting support for the proposed A1270 Broadland Northway Western Link project.

I have looked at your objectives for the project and I will answer these as I go through them individually. The objectives which are not applicable to Police Traffic Management I have responded to as 'No Comment':

High-level objectives

- ***Support sustainable economic growth***

No comment

- ***Improve the quality of life for local communities***

More and more people are now using alternative means of transport which include walking, running and cycling. The Norfolk and Suffolk Constabularies Roads Policing strategies include reducing casualties on the road network.

Any improvement to enable people to drive, walk, run or cycle more safely, or by taking traffic away from the western area of greater Norwich has got to be welcomed and gets the support of Norfolk Constabulary.

I see the new A1270 western link as creating a safer environment for the motorist and at the same time encourages walking and cycling in the area which is highlighted in the 'Connecting Norfolk' Norfolk's Transport Plan 2011.

The current A1270 Broadland Northway distributor road from the east does this by removing unnecessary traffic from the eastern and northern area of greater Norwich whilst providing recreational areas such as cycleways and pedestrian walkways along its route.

I would like to see this continued with the western link project to provide a safer environment for all road users.

- ***Promote an improved environment***

There are a great number of delivery vehicles that pass through the northern and western area of greater Norwich which do not need to stop in the city but are just passing through. This is very much more prevalent around the Amazon distribution base in Caley Close, Norwich for example.

If a western link distributor road was built, this would allow all a good number of these vehicles to totally avoid the city and improve their journey time, reduce their costs and contribute to less pollution and creating a more environmentally friendly atmosphere.

The western area of greater Norwich at times is known to have regular congestion and long queues and any improvement to these perceptions would be very welcome. A western link distributor road would certainly greatly reduce the amount of unnecessary traffic, noise and visual intrusion passing through the western area of greater Norwich and certainly greatly improve the environment for the residents, business owners and visitors.

In my other comments I will refer to reducing pollution and greenhouse gasses. A western link distributor road should dramatically reduce pollution/greenhouse gasses in the city as a lot of the unnecessary vehicles will not need to pass through the western area of greater Norwich which on many occasions will be in a 'stop/start' fashion adding to the particulates and greenhouse gasses in the atmosphere and general pollution. This is particularly prevalent with HGV's.

- ***Improve strategic connectivity with the national road network***

Clearly from a policing point of view this objective is extremely important for us and dovetails into other objectives discussed here. The advantage of removing all unnecessary through traffic from the western area of greater Norwich is welcomed and, in this respect, we would very much support this objective.

For example: HGV's by their very nature are much slower than the general traffic in starting up from a standing start and in general are slower moving through the run of traffic than the majority of other vehicles. A distributor road which removes all the unnecessary HGV's from north and western area of greater Norwich will in turn speed up the general flow of traffic very much aiding our vison of reducing congestion.

There are a lot of residents of Norfolk and surrounding counties who use the current east/north A1270 as a corridor for work purposes, whether that be commuting to and from their place of work, or when travelling during the working day and using the A1270 corridor.

If the current east/north A1270 was linked via a western link distributor road to the western side of the A47 this would greatly improve journey times and also journey reliability which has got to be welcomed and help to ensure a better journey for these road users in particular.

Specific objectives

- ***Improve connectivity and journey times on key routes in greater Norwich***

As mentioned above, I see the new western link distributor road connecting the current A1270 to the A47 at the west of Norwich as a great asset to the road's infrastructure of Norfolk.

The western area of greater Norwich does get heavily congested particularly during peak times as outlined in my other comments.

Such congestion can seriously affect response times for the emergency services, which affects my police officer colleagues when they are attending emergency incidents. It also affects the other emergency services (namely Fire and Rescue Service and the Ambulance Service) in a similar respect.

As stated above, a western link distributor road would clearly be very beneficial in reducing police and other emergency services response times between the east and west of the County for all emergency services rather than having to drive through the northern/western end of greater Norwich.

By reducing the amount of unnecessary through traffic in the western area of greater Norwich itself will in turn enable the necessary traffic within that area to move around in a freer moving environment which also will assist with reducing congestion.

The anticipated reduced congestion in this part of greater Norwich, will also assist with operational policing in the area if police officers are able to travel more freely rather than be stuck in congested traffic queues which they can find themselves in quite often at present.

- ***Reduce the impacts of traffic on people and places within the western area of greater Norwich***

No comment

- ***Encourage and support walking, cycling and public transport use***

More and more people are now using alternative means of transport which include walking, running and cycling. The Norfolk and Suffolk Constabularies Roads Policing strategies include to reduce casualties on the road network.

Any improvement to enable people to walk, run or cycle more safely, or by taking traffic away from the western area of greater Norwich has got to be welcomed and gets the support of Norfolk Constabulary.

I see a new western link distributor road as creating a safer environment for travel that encourages walking and cycling in the western area of greater Norwich which is highlighted in the 'Connecting Norfolk' - Norfolk's Transport Plan 2011.

- ***Improve safety on and near the road network, especially for pedestrians and cyclists***

This for me is one of the biggest areas of concern. With the current build-up of traffic in the western area of greater Norwich, it does add to the risk to pedestrians and cyclists alike due to the amount of unnecessary traffic.

As previously stated one of the Norfolk and Suffolk Road Policing objectives is to reduce speed and casualty reduction. We do this by concentrating our efforts on the main fatal four collision causes:

- Excess speed
- Drink/Drug driving
- Failing to wear a seatbelt
- Use of mobile phones whilst driving/riding

I see a future western link distributor road as a great asset in reducing driver frustrations. A frustrated driver in my view is very much more likely to exceed a speed limit and take uncalculated risks if they are late for an appointment etc.

It is a well-known fact that road congestion can lead to aggressive driving which is very dangerous.

Aggressive, angry motorists not only create an intimidating driving environment on the roads, their actions can also lead to collisions which can cause casualties and even fatalities.

Vulnerable road users such as pedestrians and cyclists are particularly at risk from such behaviour, while inexperienced or physically impaired drivers may be more intimidated by certain behaviours than other motorists.

By building a western link distributor road and bringing the benefits of less congestion, improving journey time etc, this will in turn reduce driver frustration and hopefully will also lead to less drivers failing to comply to speed limits and less mobile phone use whilst driving which are two of our four main objectives. This in turn should lead to less collisions and hopefully reduce casualties.

The current A1270 provides areas for pedestrians and cyclists alike to use them for recreation in a safe environment away from the main roads. I would wish to see this continued on the western link distributor road again providing a very safe environment for pedestrians and cyclists alike.

- ***Protect the natural and built environment, including the integrity of the River Wensum Special Area of Conservation***

No comment

- ***Improve accessibility to key sites in greater Norwich***

No comment

In general, although a western link distributor road may increase the local response around policing fast roads incidents (these are incidents which occur on a road with a speed limit of 40mph and above), the benefits of a western link distributor road would certainly outweigh this possible extra workload.

Norfolk Constabulary are supportive of the project for a new A1270 western link distributor road.

If I can be of any further assistance, please do not hesitate to contact me,

Yours sincerely,

Mr. Jack Askew
Force Traffic Management Officer
Roads & Armed Policing Team.

Transport East

20th May 2021

Dear Secretary of State,

Norwich Western Link- Letter of Transport East Support

In July 2019, the Transport East partnership submitted a programme of Large Local Major (LLM) schemes and Major Road Network (MRN) schemes to the Department for Transport (DfT) for consideration for funding from the National Roads Fund between 2020 and 2025. Subsequently each authority has progressed their own projects through DfT's business case pathway on an individual basis with the department.

One of these is the Norwich Western Link, which is now seeking progression through a business case gateway, this being for the department to approve the Outline Business Case. I am writing to endorse Transport East's support for this project and to ask that it be given speedy authorisation by the department in order for it to proceed on its course to delivery.

The Norwich Western Link is a new 3.8 mile stretch of dual carriageway road to connect the western end of Broadland Northway to the A47. It will fill in the 'missing link' between these major roads, helping to create a fully dual carriageway orbital route around the city of Norwich and improving journey times and reliability.

Once construction is complete, due in 2025, the new road will better connect people to key employment, retail, health, leisure and educational sites in and around Norwich, and provide an attractive link to Norwich Airport and areas north of the city from the Midlands along the A47 trunk road. In addition, through a combination of reducing traffic congestion of the local road network and the inclusion of targeted sustainable transport measures, the project will support people to walk, cycle and use public transport.

Delivery of all of the projects endorsed by Transport East in its 2019 submission is important to enable the sub-region to reach its full potential. It is encouraging to see the local authorities progressing their schemes and we are grateful that government has put the LLM and MRN process in place to enable further confidence in taking these schemes towards delivery on the ground.

I look forward to hearing a positive outcome from the department on this scheme.

Yours Sincerely

Cllr Kevin Bentley
Chair of Transport East

NorwichAirport
Part of Regional & City Airports

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info@norwichairport.co.uk
Norwich Airport, Amsterdam Way,
Norwich NR6 6JA
www.norwichairport.co.uk

norwichwesternlink@norfolk.gov.uk

1 December 2020

Dear Sirs

Norwich Western Link Project

Norwich Airport wholeheartedly supports the ambition of Norfolk County Council to see the Norwich Western Link Project come to fruition. Securing infrastructure fit for the 21st century is essential to the continued and long-term prosperity of the county and the wider region, and the Western Link Project has a vital part to play in that. Whilst the coronavirus pandemic has inevitably altered the short-term landscape for the aviation sector, it is now more important than ever to deliver the required surrounding infrastructure to help ensure the local community, economy, and Airport can recover as quickly as possible. As the provider of key infrastructure to Norfolk and the wider region, Norwich Airport recognizes the need for our region to remain connected if it is to be successful.

The Western Link is a critical improvement that will have direct benefits to the accessibility and sustainability of the Airport. At present, traffic congestion, rat-running and delays to journeys are all significant issues on minor roads to the west of Norwich. The Western Link would provide the necessary orbital connections to improve the effectiveness of the Broadland Northway and open up the airport to a wider passenger market.

The Airport has also recently secured outline planning permission for commercial development at Imperial Park. This is a 90-acre development site on land located to the North of the Airport, which will become a key strategic employment site for the region. Planning permission allows for up to 47,517.5sqm of general employment development (including light industrial and warehouse uses) and 47,5175 sqm of aviation related employment development and has the potential to create 2,000 jobs for the region. The Western Link will provide significant benefits not only by improving accessibility of the site to employees, but also helping to reduce the number of heavy goods vehicles using minor roads in the region.

Through the provision of cycle and pedestrian routes and links, the Western Link will also improve modal shift towards sustainable forms of transport providing a more accessible and less intimidating environment for cyclists and pedestrians. This is an important aspect of the Airport's future surface access strategy and will contribute towards improved sustainability across the City.

As a major local business and local employer, we regularly work with other stakeholders and bodies to support investment in Norfolk, the creation of new jobs locally, and greater economic growth for our region. We firmly believe that the proposed investment in the Norwich Western Link Project will act as an enabler for further investment and growth, and we are keen to support Norfolk County Council in its ambition to progress this to a reality.

Yours faithfully

Richard Pace

Managing Director

Norwich Airport

Our ref:
Your ref:

Eric Cooper
Network Delivery & Development - East
Woodlands
Manton Lane
Bedford MK41 7LW

Direct Line:

Norfolk County Council
County Hall
Martineau Lane
Norwich
NR1 2DH

9 January 2019

Dear Sirs

Norwich Western Link Consultation

Thank you for consulting Highways England on proposals for a Norwich Western Link (NWL) road connecting the A47 to the west of Easton with the A1270/Fakenham Road corridor to the north.

As you will be aware Highways England is currently progressing with a Road Investment Strategy project to upgrade the A47 between North Tuddenham and Easton to a dual carriageway standard with a proposed start of works of 2021/2022. A date for a submission for a Development Consent Order (DCO) has yet to be established.

Currently, it is too early to confirm a junction strategy for the scheme, but at this stage of development, Highways England's assumption is that the upgraded A47 corridor will link to the existing local road network and a developing junction strategy will be based on this scenario. In the event the NWL is taken forward, and depending on NWL route corridor selection, it will be important to ensure that there is synergy between the two schemes with a coordinated approach on the junction design. It would be expected if there is any need to upgrade the emerging A47 junction designs to accommodate the NWL, the additional junction costs will be part of the NWL scheme budget.

In addition to a coordinated approach with the junctions, should there be a future change in government policy or through the DCO process, a change to our proposals, it will be important to ensure that there is a consistency of highway standard between the link road and the A47. Highways England would wish to avoid any short sections of single A47 trunk road between separate sections of dualling.

At this stage Highways England does not have a view on a preferred link road option, save opting for a route which maximises the design life of the A47. This is a strategic corridor linking the east coast ports and Norwich with the Midlands and the north, and it should have primacy over any local connecting road. Therefore in developing junction options and route choice, consideration will need to be given to ensuring no significant delay to through traffic.

Highways England looks forward to working in partnership with Norfolk County Council as both our schemes are taken forward, and where appropriate sharing data and knowledge to ensure the outcome of our work provides an improved and connected road network.

Yours faithfully

Eric Cooper

Asset Development Team Leader
Network Delivery & Development (East)
Email: @highwaysengland.co.uk

South Norfolk Council
Cygnet Court
Long Stratton
Norwich
NR15 2XE

Norwich Western Link
Via email

Date: 14 December 2020

Letter of support

Norwich Western Link

I write to confirm my wholehearted support for the Norwich Western Link. South Norfolk, along with its partners in the Greater Norwich Partnership, has worked hard to proactively deliver growth and as a result the area has enjoyed unprecedented levels of growth. However, our communities need to reassure of continued investment in infrastructure to support this growth to ensure that residents of South Norfolk and the wider population are well connected and have good access to jobs, leisure, education and to each other. To this end I consider that the Norwich Western Link will enable these connections to be strengthened and at the same time it will also ensure an attractive link to Norwich Airport and areas north of the city from the Midlands along the A47 trunk road.

Furthermore, the Norwich Western Link will take traffic off local roads and out of communities and improve the resilience of Norfolk's road network, making journeys more efficient and helping to improve air quality in residential areas. The associated reduction in congestion on the local road network and the inclusion of targeted sustainable transport measures will also support people to walk, cycle and use public transport.

Finally the Norwich Western Link will fill in the 'missing link' between Broadland Northway, part of the Major Road Network, and the A47, part of the Strategic Road Network, helping to create a fully dual carriageway orbital route around Norwich and improving journey times and reliability. South Norfolk has supported this long term ambition for an orbital route and I once again give my wholehearted support for the business case and the delivery of this long awaited and crucial connection in our wider road network.

Cllr John Fuller OBE – Leader
South Norfolk Council

Chantry Place

18th November 2020

Sent by email to

norwichwesternlink@norfolk.gov.uk

Dear Sir / Madam

Norwich Western Link

I'm writing today in support of Norfolk County Council's proposal for the development of the Norwich Western Link, connecting the Broadland Northway to the A47 west of Norwich.

I note the objectives that you have set for such a project to deliver and agree that they are all required and likely to be met by this crucial piece of infrastructure.

In addition to those, and drawing as we do from such a large catchment, this project will directly benefit the Chantry Place Shopping Centre (formerly intu Chapelfield) and help support the businesses that operate here and the thousands of full and part time jobs that are provided by this site. Moreover, it is likely to benefit the retail and visitor offer across Norwich as journey times, reliability and safety are all improved for those accessing the city from further afield.

Yours faithfully

Paul McCarthy
General Manager

Our ref:
Your ref:

Emma Wood
Operations - East
Woodlands
Manton Lane
Bedford MK41 7LW

Chris Fernandez
Norwich Western Link Project Manager
Infrastructure Delivery
Community and Environmental Services
Floor 2
County Hall
Martineau Lane
Norwich
NR1 2DH

16th December 2020

Dear Chris

Norwich Western Link Consultation

Highways England have been working closely with the Norfolk County Council Norwich Western Link team for more than two years now. With significant upgrades to the A47 trunk road planned to a similar timescale as delivery of the Norwich Western Link, both parties have recognised that there is a great need to share information and work collaboratively to ensure the work is coordinated. This is particularly the case on the North Tuddenham to Easton dualling scheme as the Norwich Western Link will tie in to a new grade-separated junction that is being created as part of the Western Link project.

In our view, our collaborative working has been very successful to date. A representative from Highways England sits on the Norwich Western Link Project Board, which oversees the project and includes senior officers from the council and key partners. Our project teams meet on a monthly basis and are in regular contact with each other between these meetings. We have also been pleased to attend the Norwich Western Link Local Liaison Group, made up of local parish council representatives, to provide updates and this summer, this arrangement was formalised as it became a joint liaison group for both projects. Highways England have also had a presence at the Norwich Western Link Ecology Liaison Group meetings, made up of local groups and organisations with an interest in wildlife.

We look forward to continue to work with the Norwich Western Link project team as our schemes are progressed and throughout delivery.

Yours sincerely

Emma Wood
Spatial Planner
Operations (East)
Email: emma.wood@highwaysengland.co.uk

NEWANGLIA
Local Enterprise Partnership
for Norfolk and Suffolk

Friday 4th December 2020

Western Link Outline Business Case

Dear Chris

New Anglia Local Enterprise Partnership fully supports the submission for an outline business case to deliver the Norwich Western Link. The Norwich Western Link, connecting the Broadland Northway from the A1067 to the A47 west of Norwich, will help deliver the Economic Strategy for Norfolk and Suffolk, which sets out ambitious targets to grow our economy by £17.5 billion, creating 88,000 new jobs and 140,000 new homes and increasing GVA by £39 per hour by 2036.

The scheme will support the ambitions of the Norfolk and Suffolk Economic Strategy by reducing city centre congestion, improving transport links and journey reliability to economic opportunities to the north and east of the city to the rest of the County and beyond to the Midlands and the north particularly Norwich Airport, a centre for operations for our internationally significant Energy Coast and home to the world's first Aviation Academy.

The project will also encourage further investment into Norwich and Greater Norwich, a Priority Place in the Norfolk and Suffolk Economic Strategy, covering Broadland District Council, Norwich City Council and South Norfolk Council areas to further boost economic growth. The city has a long tradition of creative, radical thinking, and has a fast growing digital and creative hub as well as an established cultural scene. The city also has a successful financial and insurance cluster, home to Aviva, Marsh and Virgin Money and a growing number start-ups and fin-tech companies.

The Norwich Western Link also presents the opportunity to add to the benefits that will be realised by Highways England's A47 improvements and improve connectivity to the centres of global excellence in food and health at Norwich Research Park, the Food Enterprise Zone at Easton and the Cambridge Norwich Tech Corridor.

Finally, the Norwich Western Link is also identified as a priority in our Integrated Transport Strategy and has been identified by Transport East in their Investment and Delivery Plan as a measure within one of six strategic corridors where investment is necessary to delivering an ambitious and cohesive transport strategy.

In summary, we can confirm that we fully support the proposal to submit the outline business case and we will continue to work with Norfolk County Council and partners on ways to bring forward the Western Link.

Yours Faithfully

Chris Starkie

Chris Starkie
Chief Executive

The Road Haulage Association

Tom Cotton
Head of Licensing and Infrastructure Policy
Road Haulage Association
The Old Forge, South Road
Weybridge, KT13 9DZ

14th December 2020.

Susie Lockwood,
Stakeholder and Engagement Manager
Infrastructure Delivery
County Hall,
Martineau Lane,
Norwich,
NR1 2DH

Dear Ms Lockwood,

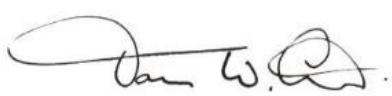
Re: Norwich Western Link

The RHA endorses and welcomes the above road scheme development, we encourage Norfolk County Council to progress this as quickly as possible. The economic benefits to the surrounding area and nationally cannot be underestimated.

The RHA supports the proposal to build a road, ideally dual carriageway, linking the A47 and A1067, as soon as possible. This would reduce journey time, improve air quality and assist the economic growth in the area north of Norwich. Also access to national critical infrastructure, such as the airport and hospital.

This link would enable traffic to take a much shorter route making the area north of Norwich, which contains considerable critical infrastructure, considerably more accessible. It would provide a resilience route in the event the existing A47 failing, or being closed.

Yours faithfully,



The Road Haulage Association

Tom W.Cotton
Head of Licensing and Infrastructure Policy
Road Haulage Association
t.cotton@rha.net.uk
Mobile: 07864 609064

Jerome Mayhew MP
Jerome Mayhew MP

HOUSE OF COMMONS
LONDON SW1A 0AA

To Whom it may concern,

25th November 2020

RE: Norwich Western Link Road

I am writing in support of the Norwich Western Link which has been found to be the best option for Norfolk in terms of its impact on local communities, environmental impact, value for money and through the benefits it will provide to local transport links and safety, by removing the rat runs between the A47 and the NDR.

In addition, there is strong local support with the consultation receiving more than 1,700 responses which showed that there is very strong support for the Western Link, with the majority of those responding suggesting a new road as their preferred solution. It is not only local residents who support the Western Link; the Norfolk and Norwich University Hospital, Norwich Airport, Norfolk Constabulary, Norfolk Fire and Rescue and the New Anglia Local Enterprise Partnership have all expressed their support too.

What is also particularly welcome is the Council are aiming to achieve a biodiversity net gain for all applicable habitats, as set out by Defra, which will see new areas of habitat created, including woodland and wetland, as well as improvements to existing ones.

Yours sincerely,

Jerome Mayhew.

Jerome Mayhew MP

T: 0207 219 4733 E: jerome.mayhew.mp@parliament.uk W: jeromemayhew.org.uk

Weston Longville Parish Council

Outline Business Case for the Norwich Western Link

Weston Longville Parish Council has been considering the issues of excessive volumes and speeds of traffic through our parish for more than 20 years. Over the years, various schemes have been proposed and considered, with the WLPC 's aim always being to reduce the impact of traffic through the parish.

Not surprisingly it become increasingly clear that once the NDR was built, and the growth strategy for Norwich was developed to the west and south of the city, the volume of traffic crossing from the A1067 to the A47, using two minor single track roads and an inadequate HGV route (B1535), would make the provision of a link road inevitable. The situation will be exacerbated still further if the section of the A47 between North Tuddenham and Easton is dualled without the NWL.

WLPC ,whilst supporting the generic strategic objectives of a NWL, did not support the route chosen by Norfolk County Council for the NWL and advocated a number of route possibilities which connected the NDR to the A47 closer to Norwich. Nonetheless WLPC has been working actively with officers and councillors to achieve the best outcome for the parish. WLPC have submitted a range of proposals to mitigate the impact of the NWL dealing with the reclassification of roads, safeguarding conditions, access, environmental protection, landscaping and design.

Our support for the Norwich Western Link is conditional on a level of funding being secured which will ensure that our mitigation measures are fully implemented.

Ruth Goodall
Weston Longville Parish Council
16 December 2020

Norfolk Chambers of Commerce

You're in good Co.mpany

9 Norwich Business Park
Whiting Road, Norwich
Norfolk NR4 6DJ
01603 625977
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norfolkchamber.co.uk

Chris Fernandez
Norwich Western Link Project Manager
Infrastructure Delivery, Community and Environmental Services
Norfolk County Council
County Hall
Martineau Lane
Norwich
NR1 2DH

Monday, 14 December 2020

Dear Chris

Norwich Western Link

Norfolk Chambers of Commerce is a business membership organisation representing over 900 Chamber members across the county, who employ over 100,000 people. On behalf of our members, we would like to express our support for the Norwich Western Link project.

The successful delivery of the Broadland Northway (formerly the NDR) is a clear signal that Norfolk is embracing growth and development in order to create the jobs and houses that our region needs and has been strongly welcomed by the Norfolk business community. However, to maximise the potential for this region – the missing link from the A1067 to the A47 must be completed as soon as possible.

The Norwich Western Link will facilitate easier access to both Norwich International Airport and Great Yarmouth port. It will further help to improve journeys into and around the west of the city, support potential housing and jobs growth; provide the infrastructure to manage the additional traffic this will create, and improve quality of life for people living in the area.

We believe that the Norwich Western Link meets many of the national infrastructure objectives including:

- **Reducing traffic congestion**
  - The Norwich Western Link will take traffic off local roads and out of communities and improve the resilience of Norfolk's road network, making journeys more efficient and helping to improve air quality in residential areas.

- **Supporting economic growth and rebalancing**
  - The Norwich Western Link will better connect people to key employment, retail, health, leisure and educational sites in and around Norwich, and provide an attractive link to Norwich Airport and areas north of the city from the Midlands along the A47 trunk road.

Norfolk Chambers of Commerce

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- **Supporting housing delivery**
  - The Norwich Western Link will help to ensure Norfolk has the right transport infrastructure to cope with planned housing and job growth, particularly in the Greater Norwich area, and link communities to employment sites, opening up local labour markets.

- **Supporting all road users**
  - The Norwich Western Link will, through a combination of reducing congestion of the local road network and the inclusion of targeted sustainable transport measures, support people to walk, cycle and use public transport.

- **Supporting the Strategic Road Network**
  - The Norwich Western Link will fill in the 'missing link' between Broadland Northway, part of the Major Road Network, and the A47, part of the Strategic Road Network, helping to create a fully dual carriageway orbital route around Norwich and improving journey times and reliability.

We would encourage a speedy delivery of the Norwich Western Link. As completing this 'missing link' will create stronger and more effective links to the Midlands and the North and will help Norfolk businesses to thrive and deliver greater economic growth and jobs in our region.

Yours sincerely

Nova Fairbank
Head of Policy, Governance & Public Affairs
& Company Secretary

Davey House
7B Castle Meadow
Norwich, Norfolk
NR1 3DE
Tel: 03456 020 121
Fax: 01603 408231

24th November 2020

RE: Proposed Norwich Western Link

As the main public transport provider in Norwich, we are acutely aware of the impact that traffic congestion has on our services and the lives of our passengers. With the planned introduction of thousands of new houses, not only in the Greater Norwich area, but specifically to the west of the city, this congestion is only going to get worse. A good public transport system is a key part of any thriving city and this is almost impossible to deliver if buses are stuck in traffic queues along with general traffic.

The Broadland Northway has already delivered viable alternative routes for general traffic to traverse the city, instead of going directly through the centre and we have as a result, seen a reduction in congestion on some corridors. There is however, still a significant amount of traffic that uses Dereham Road, the outer ring road and many of the rural roads through Costessey, Drayton and Taverham along with its surrounding areas to travel between the A47 and the A1067 and beyond, to link with the Broadland Northway.

The proposal to build a western link that connect Broadland Northway to the soon to be dualled section of the A47, will fulfil a number of your objectives.

Congestion will be reduced not only in the urban areas to the west of the city, but also in the rural areas between Fakenham Road and Dereham Road, as traffic is able to take a route offering more reliable journey times. The link will also support access to the proposed Food Hub in Easton, enabling large goods vehicles to avoid using the roads within Norwich. There are many benefits to delivering the western link road and it is a scheme that First Eastern Counties would entirely support.

Regards,

Paul Martin
Commercial Manager

Appendix 2B

OAR ADDENDUM

Norfolk County Council

NORWICH WESTERN LINK

Option Assessment Report (OAR) – Addendum

70041922-WSP-OAR-ADD
MAY 2021

PUBLIC

Norfolk County Council

NORWICH WESTERN LINK

Option Assessment Report (OAR) – Addendum

TECHNICAL REPORT (VERSION P04) PUBLIC

PROJECT NO. 70041922

OUR REF. NO. 70041922-WSP-OAR-ADD

DATE: MAY 2021

WSP

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	P01	P02 – Motts comments	P03 – Team comments	P04 – Team comments
Date	05 / 05 / 2021	18 / 05 / 2021	21 / 05 / 2021	24/05/2021
Prepared by	UKACP002 UKHEG001	UKACP002 UKHEG001	UKACP002 UKHEG001	UKACP002 UKHEG001
Signature				
Checked by	UKPJC007	UKPJC007	UKPJC007	UKPJC007
Signature				
Authorised by	UKPJC007	UKPJC007	UKPJC007	UKPJC007
Signature				
Project number	70041922	70041922	70041922	70041922
Report number	OAR-ADD-P01	OAR-ADD-P02	OAR-ADD-P03	OAR-ADD-P04
File reference	\\uk.wspgroup.com\central data\Projects\700419xx\70041922 - Norwich Western Link\02 WIP\TP Transport planning\03 Document\OAR\OAR_Addendum_2021			

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TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

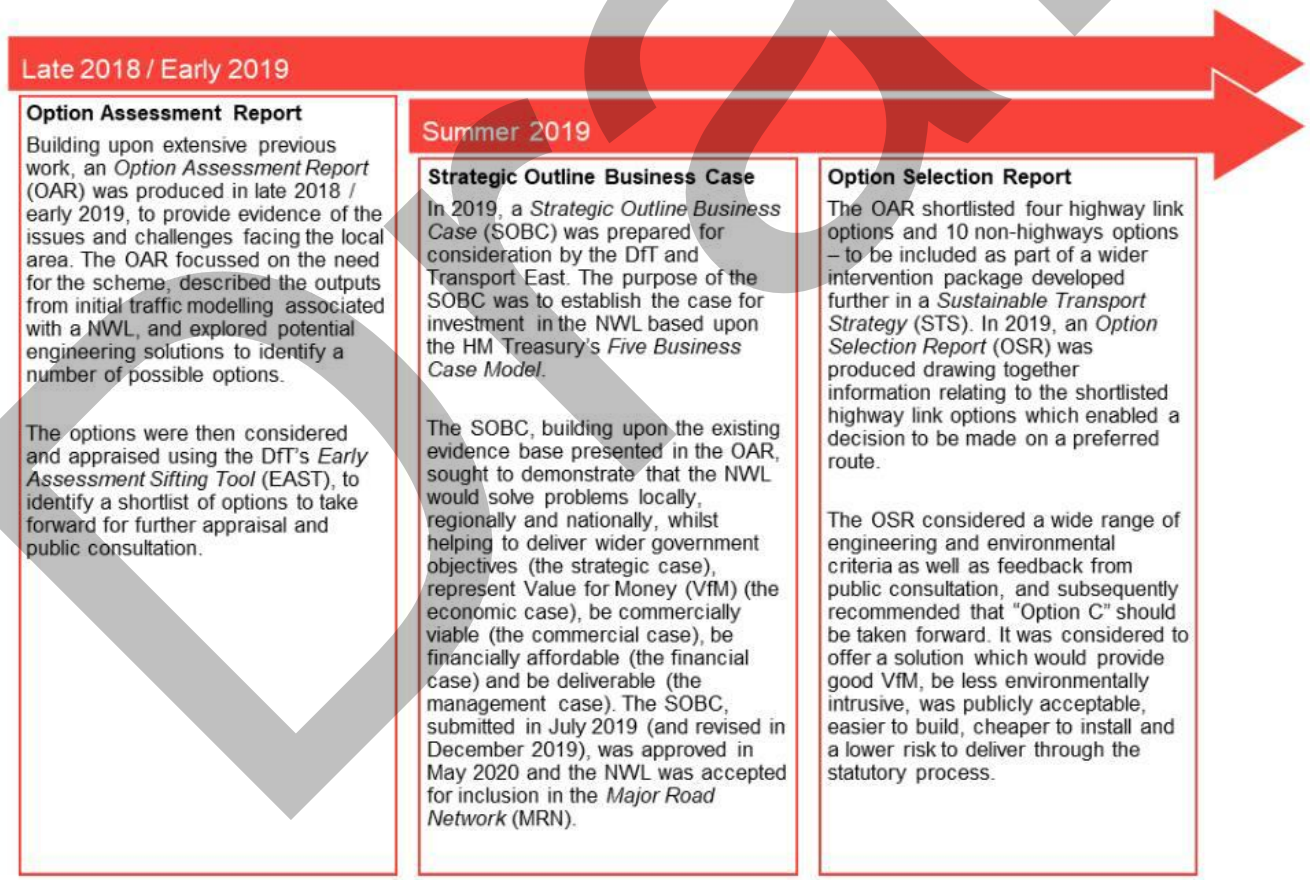
OVERVIEW

1.1.1. The development of a Norwich Western Link (NWL) to connect the A1270 Broadland Northway – formerly the Northern Distributor Road (NDR) – to the A47 is one of Norfolk County Council's (NCC) top three infrastructure priorities. Since construction began on the A1270 Broadland Northway, there have been sustained calls to fill in the 'missing link'.

HISTORY

1.1.2. In 2015, NCC committed to revisiting the feasibility and need for an NWL, whilst also considering wider public transport and Non-Motorised User (NMU) impacts, and the role of complementary measures to reduce traffic on existing routes. **Figure 1-1** summarises the key documentation that has been prepared to date – in accordance with the Department for Transport's (DfT) *Transport Analysis Guidance* (WebTAG) methodology – and how the scheme has subsequently evolved.

Figure 1-1 Evolution of the NWL Project



1.1.3. Following the announcement of the NWL preferred route alignment (Option C) in July 2019, the project team has been carrying out work to refine and inform the design of the road and associated measures. In parallel, the *Outline Business Case* (OBC) has been developed for submission to the DfT. The OBC builds upon the SOBC to demonstrate that the proposed scheme is based upon:

- analysis of the current situation;
- a clear vision of how things should be in the future;
- a careful consideration of options;
- a robust appraisal of costs and benefits; and,
- a clear plan for delivering the scheme.

1.1.4. The OBC work completed to date has included a major update of the *Norwich Area Transport Strategy* (NATS) *Model* to a 2019 base year and revalidation with a substantially enhanced evidence base.

1.2 REPORT PURPOSE & STRUCTURE

1.2.1. As the project has developed, in accordance with government *Green Book* and WebTAG guidance, new and more detailed information has been presented in support of the scheme. In addition, the scheme objectives have been consolidated and refined to make them Specific, Measurable, Achievable, Realistic and Timebound (SMART).

1.2.2. To address the differences between the OAR (work undertaken in 2018) and the draft OBC (currently in production), this *OAR Addendum* considers the impact of the new information that has become available since the original OAR was prepared (including changes to the objectives). This is considered a proportionate approach that will retain the original report but enable consistency to be achieved between the OAR stage and OBC documents.

1.2.3. The remainder of this *OAR Addendum* is structured as follows:

- **Chapter 2** Understanding the Current Situation
- **Chapter 3** Understanding the Future Situation
- **Chapter 4** Establishing the Need for Intervention
- **Chapter 5** Identifying Objectives
- **Chapter 6** Define Geographic Area of Impact

2 UNDERSTANDING THE CURRENT SITUATION

2.1 OVERVIEW

2.1.1. Chapter 2 of the OAR (Understanding the Current Situation) – forming Step 1 of the Transport Appraisal Process – sought to provide an understanding of the current situation within the study area, based upon data that was readily available at the time of preparing the original report – 2018.

2.1.2. It set out the relevant transportation, economic, planning and environmental policy applicable to the study area, before describing the demographic profile, transport context and current travel demands and levels of service. Since the production of the OAR, additional analysis has been undertaken, which is summarised in the following sections.

2.2 LEGISLATION & POLICY CONTEXT

2.2.1. The OAR considered the relevant legislation and policy at a national and local level, to identify the key themes and priorities that needed to be considered in the development of the NWL. In developing the scheme, and in response to evolving government guidance and a shifting landscape, NCC's strategic aims and responsibilities have led to additional policies being reviewed (as they have been developed) to ensure that the scheme is aligned with national, regional and local policies. **Table 2-1** indicates all of the legislation and policy (at all levels) that have been reviewed to date, and outlines those that are additional to those presented within the original OAR.

2.2.2. Table 2-1 also indicates the extent to which the scheme objectives are enshrined in the policies listed. A review has been carried out of the key policy themes for each of the High Level Objectives that have been developed for the NWL scheme, using the following classification:

✓✓ denotes the objective is a main focus of the policy

✓ indicates where the objective is mentioned within the policy

Table 2-1 Legislation & Policies Reviewed

Level	Document	Additional to OAR?	High Level Objective H1 Support sustainable economic growth	High Level Objective H2 Improve the quality of life for local communities	High Level Objective H3 Promote an improved environment	High Level Objective H4 Improve strategic connectivity with the national road network
Legislation	Town and Country Planning Act 1990	×	✓	✓	✓	✓
	Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (England)	×	✓	✓	✓	✓
	The Conservation of Habitats and Species Regulations 2017	×	×	✓	✓✓	×
National Policy	National Planning Policy Framework	×	✓✓	✓✓	✓✓	✓✓
	National Infrastructure Delivery Plan 2016-2021	×	✓✓	✓	✓✓	✓✓

Level	Document	Additional to OAR?	High Level Objective H1 Support sustainable economic growth	High Level Objective H2 Improve the quality of life for local communities	High Level Objective H3 Promote an improved environment	High Level Objective H4 Improve strategic connectivity with the national road network
	Highways England Strategic Business Plan 2015-2020	×	✓✓	✓	✓✓	✓✓
	Highways England Delivery Plan 2015-2020	×	✓✓	✓	✓✓	✓✓
	National Infrastructure Strategy (2020)	✓	✓✓	✓✓	✓✓	✓✓
	Ten Point Plan for a Green Industrial Revolution	✓	✓✓	✓✓	✓✓	×
	Gear Change: A bold vision for cycling and walking (2020)	✓	✓	✓✓	✓✓	×
	Cycling and Walking Investment Strategy / Local Transport Note (LTN) 1/20	✓	✓	✓✓	✓✓	×
	Roads Investment Strategy (RIS1 / RIS2), 2020-2025 (2020)	✓	✓✓	✓	✓✓	✓✓
	Industrial Strategy (2017)	✓	✓✓	✓	✓	✓
	Transport Investment Strategy (2017)	✓	✓✓	✓✓	✓✓	✓✓
Regional Policy	Norfolk and Suffolk Covid-19 Economic Recovery Restart Plan (2020)	✓	✓✓	✓✓	✓	✓
	Draft Norfolk and Suffolk Local Industrial Strategy (2019)	✓	✓✓	✓✓	✓✓	✓
	Regional Evidence Base, Transport East (2019)	✓	✓✓	✓✓	✓✓	✓✓
	Integrated Transport Strategy (ITS) for Norfolk and Suffolk (2018)	✓	✓✓	✓✓	✓✓	✓
	Norfolk and Suffolk Economic Strategy (NSES) (2017)	✓	✓✓	✓✓	✓✓	✓✓
Local Policy	Breckland District Council Local Plan	×	✓✓	✓✓	✓✓	✓
	Greater Norwich Joint Core Strategy	✓	✓✓	✓✓	✓✓	✓✓
	Greater Norwich Development Partnership	×	✓✓	✓✓	✓✓	✓
	Broadland District Council Local Plan	×	✓✓	✓✓	✓✓	✓✓
	Norwich City Council Local Plan	×	✓✓	✓✓	✓✓	✓✓

Level	Document	Additional to OAR?	High Level Objective H1 Support sustainable economic growth	High Level Objective H2 Improve the quality of life for local communities	High Level Objective H3 Promote an improved environment	High Level Objective H4 Improve strategic connectivity with the national road network
	South Norfolk District Local Plan	✓	✓✓	✓✓	✓✓	✓✓
	Norwich Area Transport Strategy	✓	✓✓	✓✓	✓✓	✓✓
	Norfolk County Council Local Transport Plan	×	✓✓	✓✓	✓✓	✓
	Norfolk Infrastructure Delivery Plan (2020)	✓	✓✓	✓✓	✓✓	✓✓
	Norfolk Environmental Policy (2019)	✓	✓	✓✓	✓✓	×
	Together for Norfolk (2019)	✓	✓✓	✓✓	✓	✓
	Norfolk Strategic Framework (2017)	✓	✓✓	✓✓	✓✓	✓
Emerging Policy	Proposals for the Creation of a Major Road Network	×	✓✓	✓	✓	✓✓
	Greater Norwich Local Plan	✓	✓✓	✓✓	✓✓	✓
	Local Transport Plan 4 Strategy, 2021 – 2036	✓	✓✓	✓✓	✓✓	✓
	Transport East Transport Strategy	✓	✓✓	✓✓	✓✓	✓✓

2.2.3. The table clearly demonstrates that the NWL scheme is closely aligned with national, regional, and local transport policies and plans, and the objectives for the scheme are derived from this overarching backdrop. The whole policy picture reinforces the need for the objectives that have been identified.

2.2.4. Regional and local strategies reflect the Government's view that high-quality infrastructure is needed to improve productivity and support jobs and growth. The case for the NWL is not only about relieving congestion in a small area. Unlocking orbital connectivity to the west of Norwich will strengthen the resilience of the network, improve the quality of life for locals and visitors, and prepare Norfolk for years of future growth.

SUPPORTING ECONOMIC RECOVERY

2.2.5. During the Coronavirus Pandemic in August 2020, Broadland and South Norfolk also published a recovery plan which sets out how they will support and drive the economic recovery and provide help for communities across the two districts in response to the coronavirus pandemic. It is based around three key themes as follows:

- Economy: Creating clean, safe and vibrant public spaces. Supporting every business to drive the growth of the economy and employment.
- Communities: Develop our Community Hub and partnership working model. Support our individuals and families through an effective Hardship offer.
- Organisation and Governance: Secure our finances through transformation and commercialisation. Reimagine our service delivery and ways of working.

2.2.6. It is clear that there is a drive to regain momentum in the local economy and recover rapidly from the pandemic. A transport scheme such as the NWL would help to improve access for local small businesses and the delivery of a major scheme such as this would create new local jobs in construction whilst supporting and stimulating economic growth.

2.3 EXISTING CONDITIONS

2.3.1. The OAR summarised the current situation in the study area by reviewing available data sources to provide an understanding of the local population, levels of deprivation, economic activity, land use, transport networks and associated problems in order to highlight key challenges facing the study area. The following sections summarise additional demographic data and transport analysis that has since been undertaken, which underscores the need for intervention.

DEMOGRAPHIC PROFILE

Productivity Gap

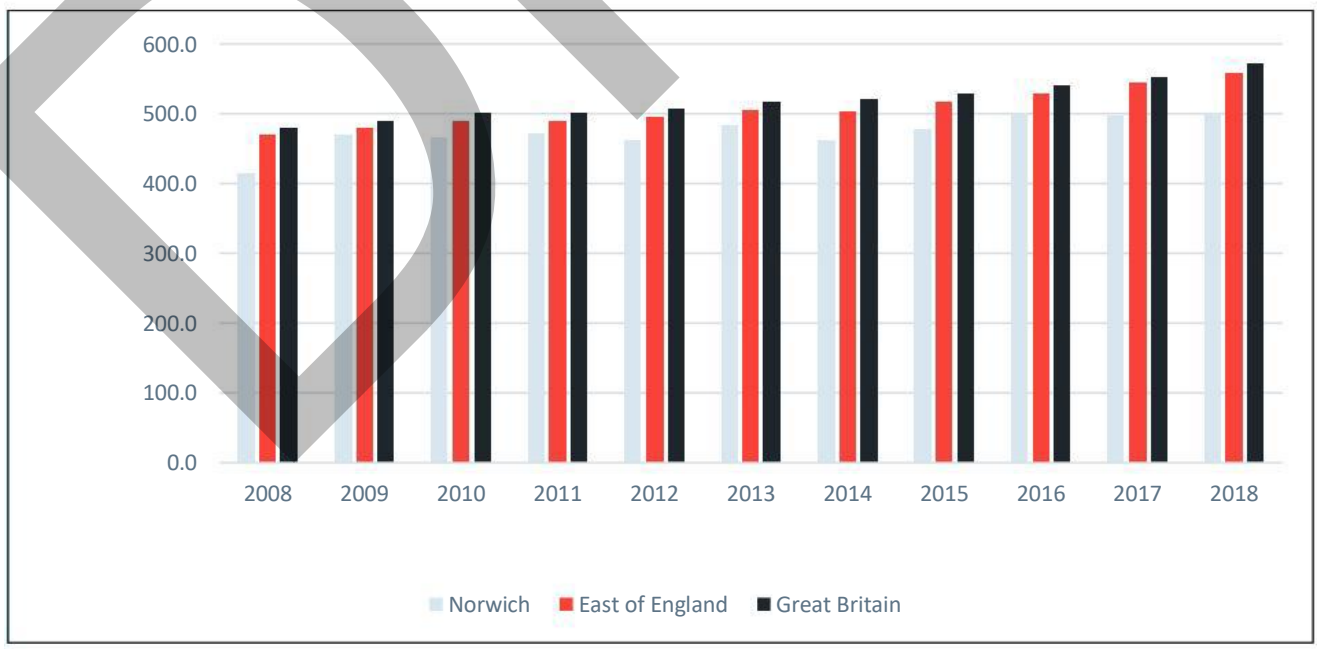
2.3.2. Prior to the pandemic, the East of England's economy had been performing strongly since the 2010 recession, with three of the ten fastest growing cities in the UK (Norwich, Ipswich and Peterborough) located in the region.

2.3.3. Norwich is a key driver of the East of England's economy, as well as a major regional centre for new homes and jobs, leisure, cultural, and educational development. Norwich was ranked eighth nationally for annual Gross Value Added (GVA) growth in Quarter 1 of 2019, with a growth rate of 2.4%. Despite this steady growth trajectory, Norwich still lags behind some other areas in the UK, including London, with respect to economic indicators.

2.3.4. Office for National Statistics (ONS) data, collated in December 2018, shows that GVA per head in Norwich and East Norfolk lags behind the national average, which the *Norfolk Strategic Planning Framework* attributes to the area's dependence on lower-wage, lower-skill sectors.

2.3.5. **Figure 2-1** shows that, in 2018, the average wage in Norwich was £501.40 per week, lower than the £558.10 and £570.90 average for the East of England and Great Britain respectively. This gap has widened over the last decade, increasing from £54.80 to £56.70 in the East of England, and from £64.80 to £69.50 across Great Britain.

Figure 2-1 Gross Weekly Earnings (2008-2018)



2.3.6. As shown in **Figure 2-2** and **Table 2-2**, not only has the GVA per head in Norwich historically lagged behind that of the UK, but the productivity gap has been widening over time. A significant gap in GVA has opened up between Norwich and the rest of the UK since 2010, with the difference being at its largest for the latest available year, 2017.

Figure 2-2 Gross Value Added per Head (1997-2017)

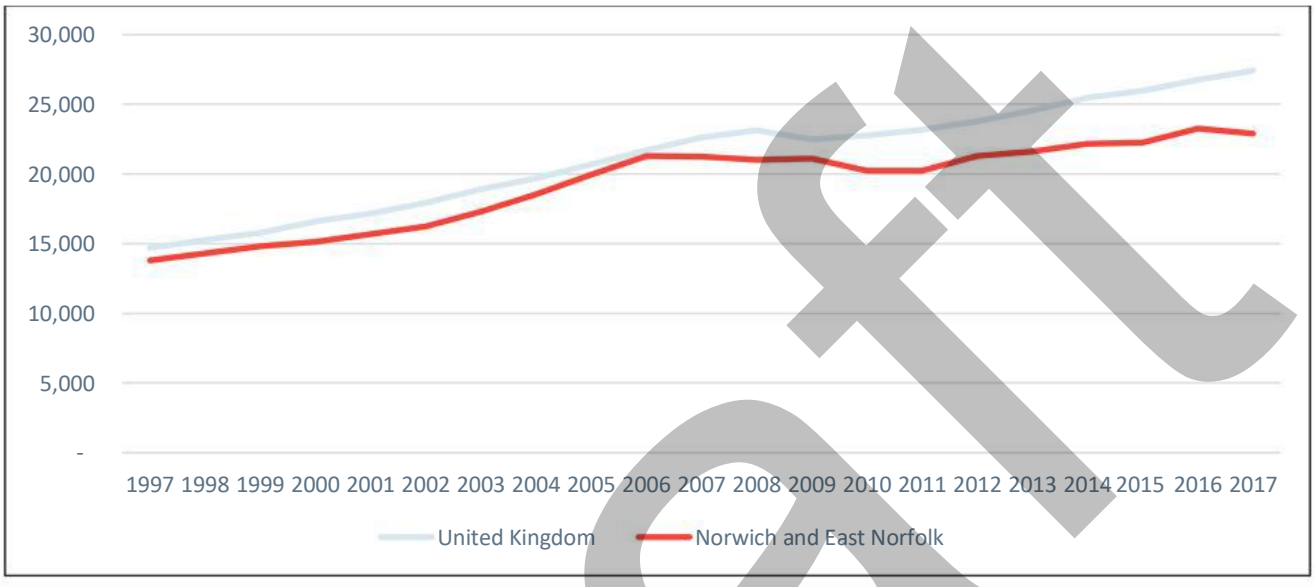


Table 2-2 Gross Value Added – Selected Areas (2010-2017)

Area	2010 GVA*	2017 GVA*	Growth (%)
East of England	21,034	25,217	19.9%
East Anglia	20,810	24,850	19.4%
Norwich and East Norfolk	20,228	22,926	13.3%
England	22,998	27,949	21.5%

* GVA (Income Approach) per head of population at current basic prices

2.3.7. Whilst the NWL scheme is not proposed to be development dependent, the links between transport investment and productivity are widely accepted, with transport infrastructure changing both the effective density of people in an affected area, and the jobs that are available to skilled workers.

2.3.8. Continued economic development is dependent upon attracting new businesses and increasing the productivity of existing firms. Enhancing regional labour mobility will be essential to unlocking further economic growth if the area is to remain competitive. This will be especially important in the next decade, whilst the economy is recovering from COVID-19 effects.

TRANSPORT CONTEXT

Traffic Model

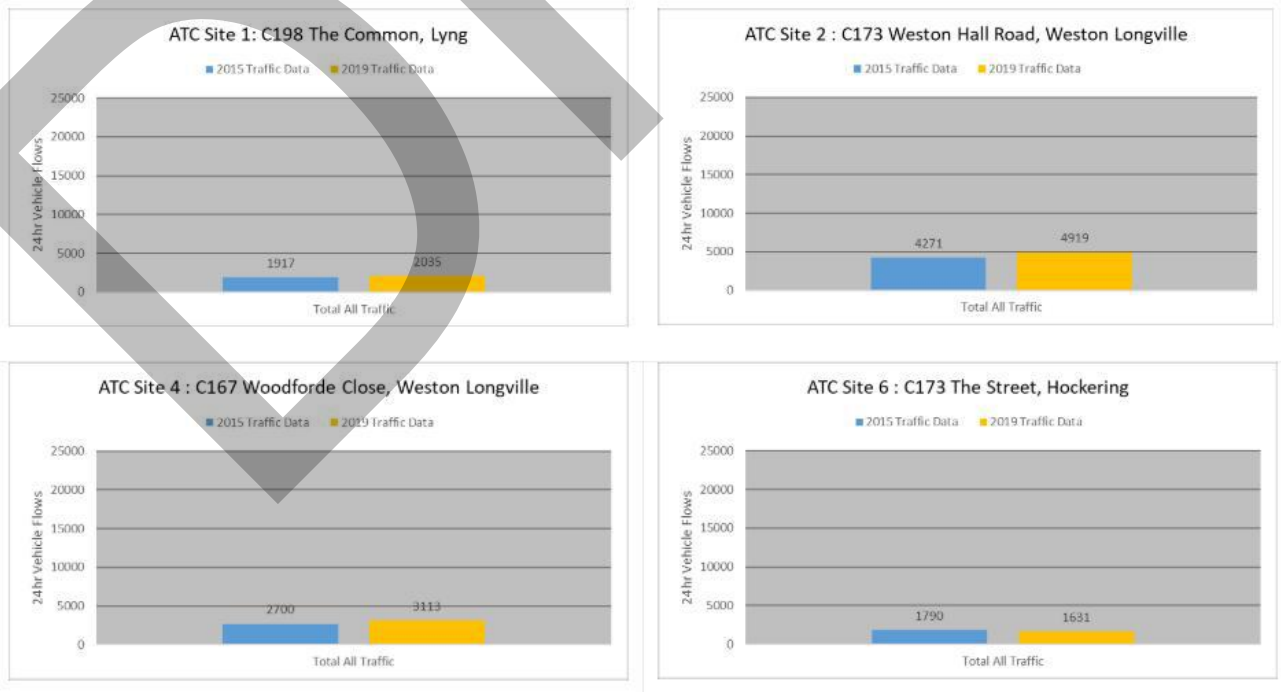
2.3.9. As outlined in the OAR, Highways England updated the 2012 NATS Model – developed to assess the impact of the A1270 Broadland Northway – to a 2015 base year using more detailed mobile phone data for the purpose of assessing their A47 schemes. Following a review of the 2015 base model, it was refined further by WSP – to improve the fit to observed data for minor road links within the North West Quadrant (NWQ) – for use within the NWL project. As the scheme has progressed, the age and detail of the model necessitated the need to collect new and extensive survey data (representative of 2019 traffic conditions) across the study area to update the model in order to support further appraisal of the NWL.

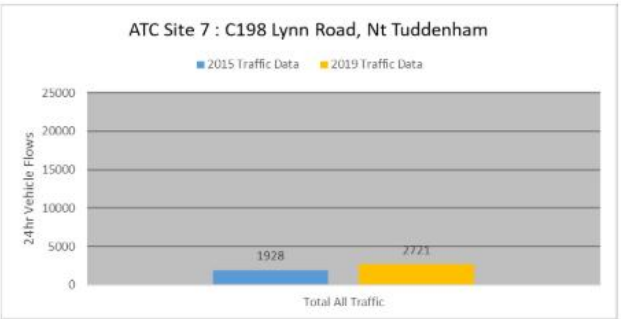
Traffic Flows

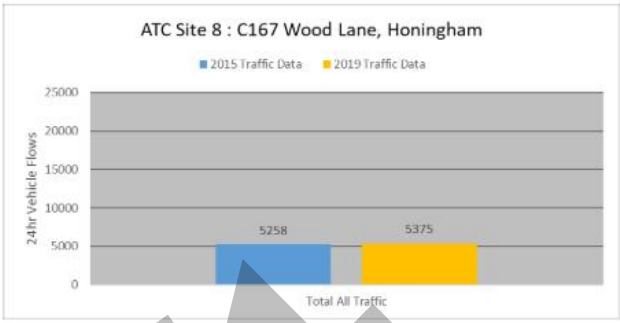
2.3.10. The OAR presented the survey results from Automatic Traffic Counts (ATC) carried out in 2015 and 2018 (after the final section of the A1270 Broadland Northway fully opened to the public). The data demonstrated that traffic volumes on key links within the study area generally increased following the opening of the A1270 Broadland Northway, which indicated increased pressure on the local road network. The data also indicated that the A1270 Broadland Northway was successful in providing a suitable alternative route, particularly for journeys to and from the north of Norwich, and relieved traffic on the A1067 Drayton High Road, in Hellesdon.

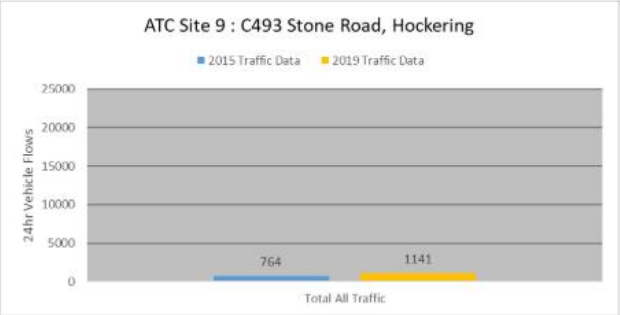
2.3.11. More extensive surveys in a greater number of locations were carried out in 2019, which provided a broader and more stable picture of traffic flows on the road network. **Figure 2-3** compares the results from the 2019 traffic surveys against those gathered in 2015 at various locations across the study area. It should be noted that some data sets are not present on the charts, this is due to no traffic data being available for the equivalent link in 2015.

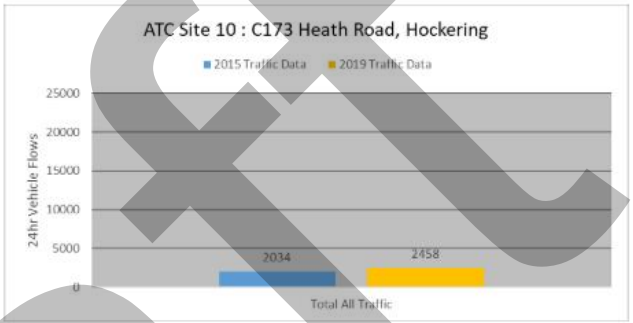
Figure 2-3 Comparison of Traffic Survey Data

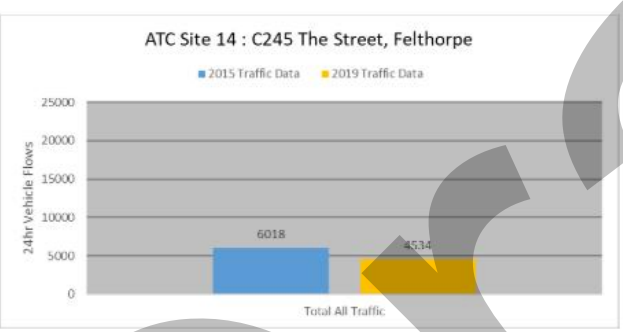


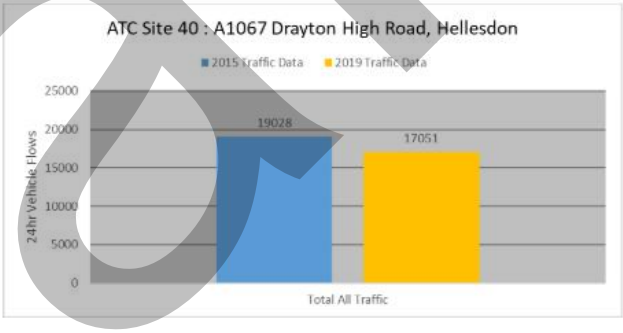

ATC Site 7 : C198 Lynn Road, Nt Tuddenham
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
1928
7721
Total All Traffic

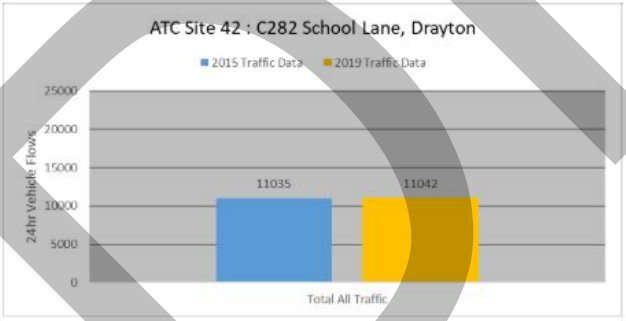

ATC Site 8 : C167 Wood Lane, Honingham
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
5258
5375
Total All Traffic

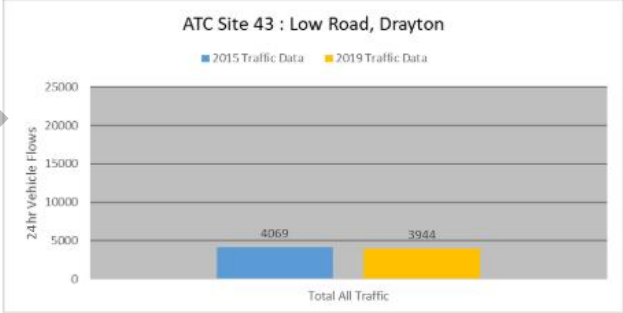

ATC Site 9 : C493 Stone Road, Hockering
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
764
1141
Total All Traffic

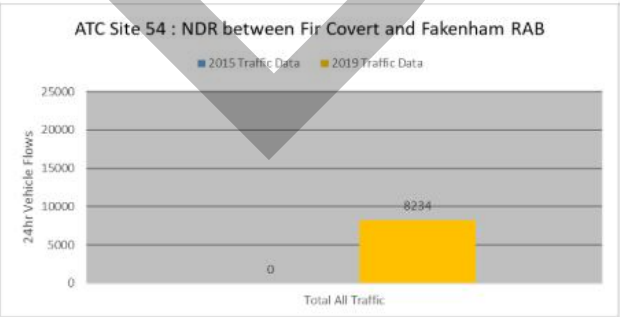

ATC Site 10 : C173 Heath Road, Hockering
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
2034
2458
Total All Traffic

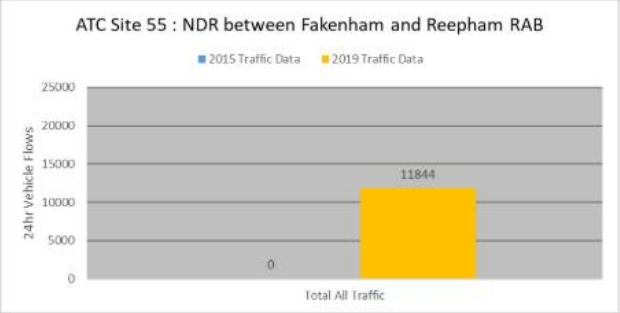

ATC Site 14 : C245 The Street, Felthorpe
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
6018
4534
Total All Traffic

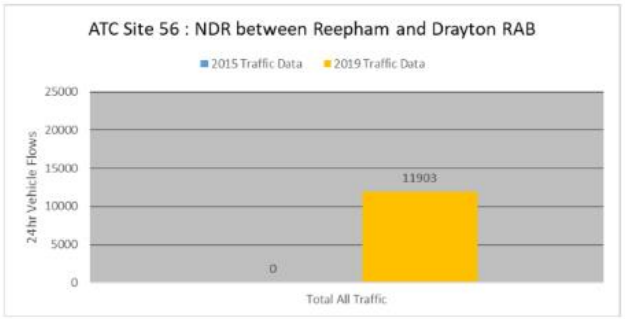

ATC Site 40 : A1067 Drayton High Road, Hellesdon
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
19028
17051
Total All Traffic

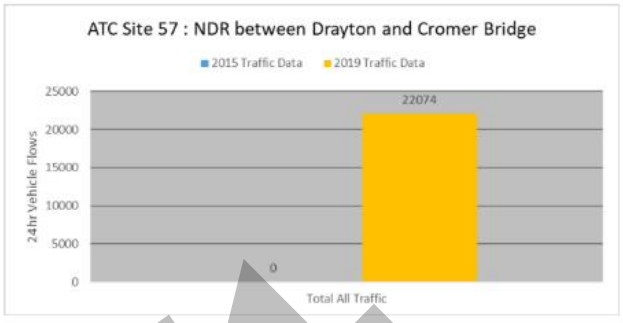

ATC Site 42 : C282 School Lane, Drayton
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
11035
11042
Total All Traffic

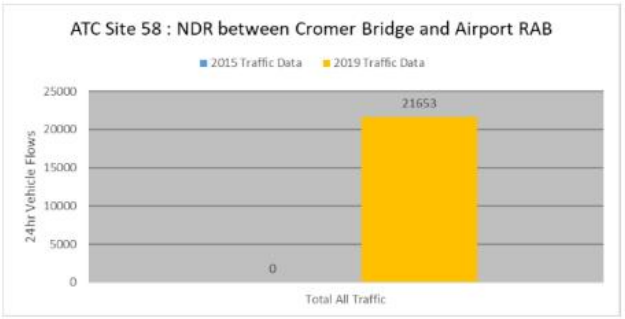

ATC Site 43 : Low Road, Drayton
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
4069
3944
Total All Traffic

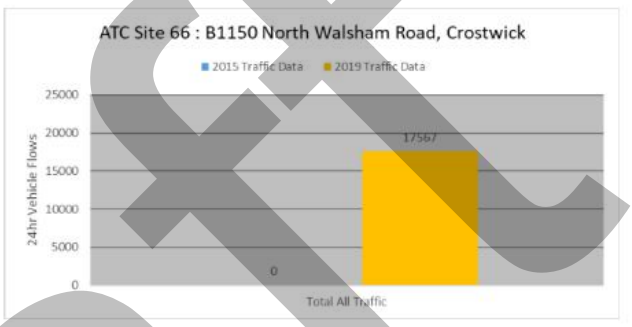

ATC Site 54 : NDR between Fir Covert and Fakenham RAB
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
0
8234
Total All Traffic

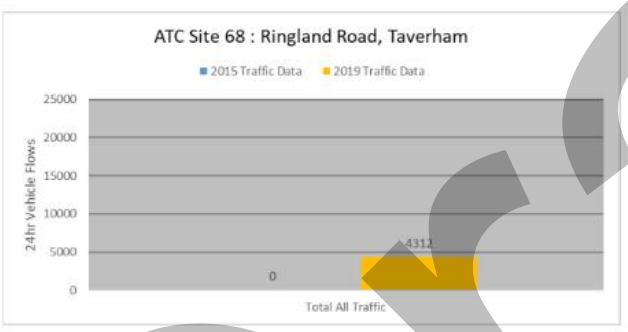

ATC Site 55 : NDR between Fakenham and Reepham RAB
2015 Traffic Data
2019 Traffic Data
24hr Vehicle Flows
25000
20000
15000
10000
5000
0
0
11844
Total All Traffic

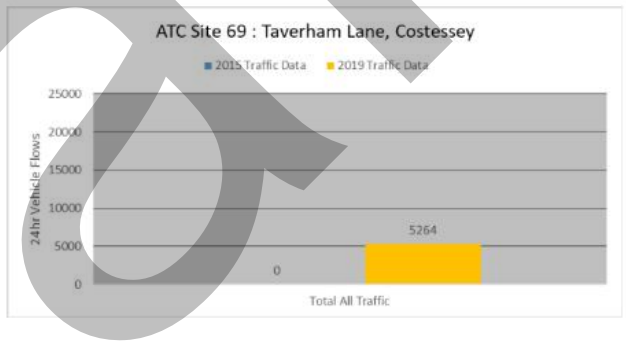


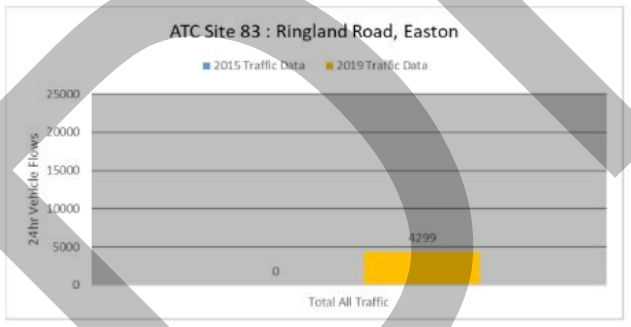


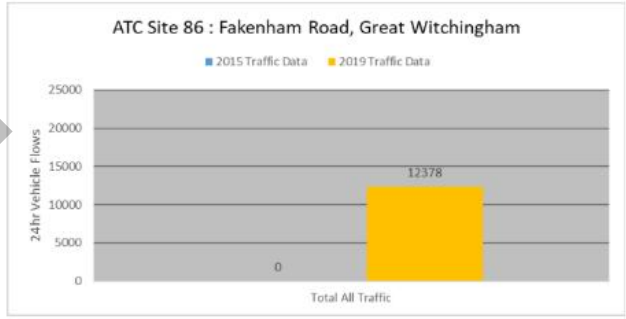












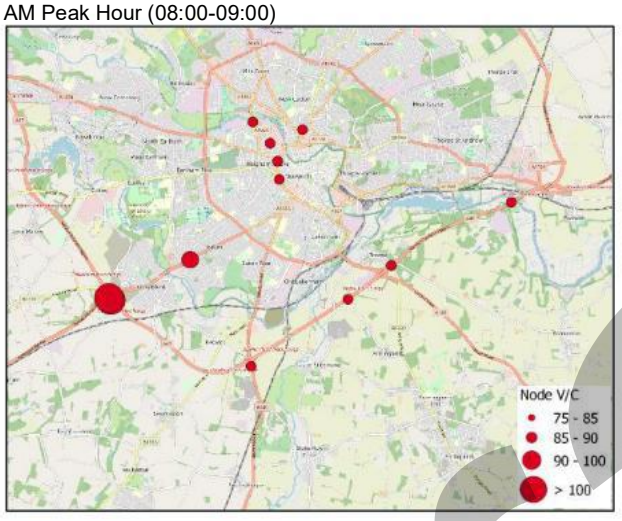
2.3.12. As expected, traffic volumes on key links within the study area have generally increased (between 2015 and 2019), which indicates increased pressure on the local road network. Across all sites, where data is available for both years, traffic is shown to have grown by 9%, on average, which is greater than that anticipated by the *Trip End Model Presentation Program* (TEMPro) for the NWQ (approximately 6%). The 2019 surveys substantiate the inferences made in the OAR, with the A1270 Broadland Northway experiencing high traffic volumes and more rural routes experiencing a slight reduction in traffic volumes. It is therefore envisaged that the introduction of a NWL could significantly reduce the traffic flow on competing parallel routes that are currently being used within the NWQ.

Congestion & Delay

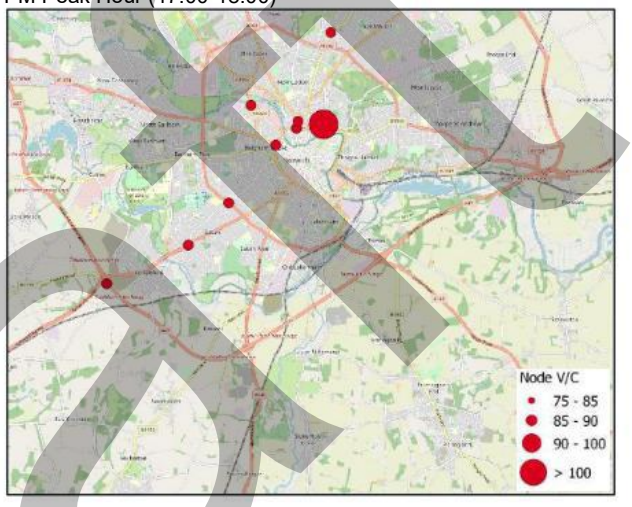
2.3.13. The radial routes and ring roads around Norwich suffer from congestion and delay during both the AM (08:00-09:00) peak and PM (17:00-18:00) peak hours. **Figure 2-4** identifies those junctions around Norwich that are operating at over 75% practical capacity – Volume / Capacity (V/C) – during the AM and PM peak hours. During the AM peak hour, five junctions around the A47 are above 75% in practical capacity. Whilst this number is lower during the PM peak hour, congestion shifts to the city of Norwich itself.

Figure 2-4 Peak Hour Junction Capacity (2019 Base)

AM Peak Hour (08:00-09:00)



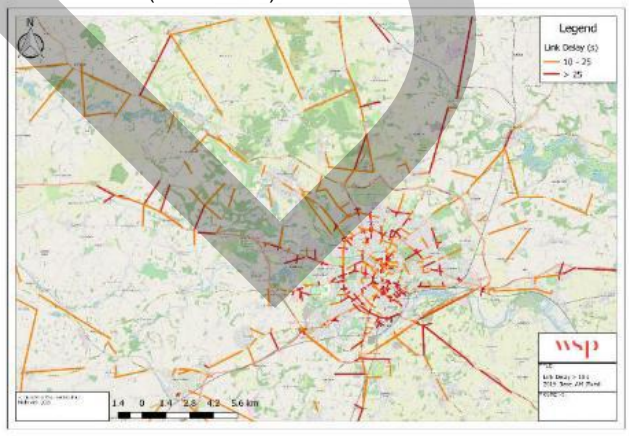
PM Peak Hour (17:00-18:00)



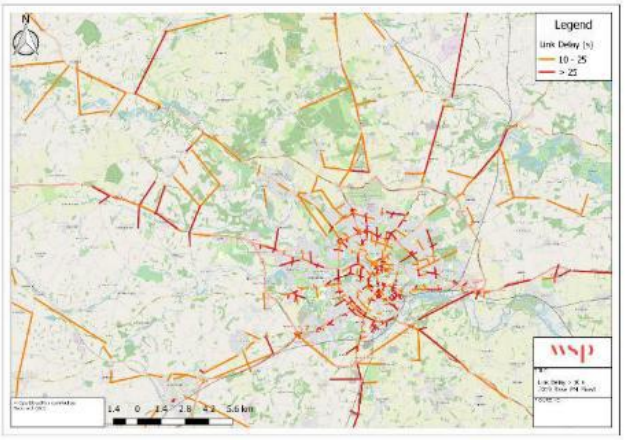
2.3.14. In addition to junctions that are operating at, or above, practical capacity, **Figure 2-4** demonstrates that delay exceeds 25 seconds in the 2019 AM peak and PM peak hours on links through the study area. This includes some sections of the A1074, including the junction of A1074 / Longwater Lane and the A1074 / Norwich Road junction. Sections of the A146 Lakenham Road and A140 (Colman Road) were found to have delays of over 1 minute.

Figure 2-5 Peak Hour Link Delay (2019 Base)

AM Peak Hour (08:00-09:00)



PM Peak Hour (17:00-18:00)



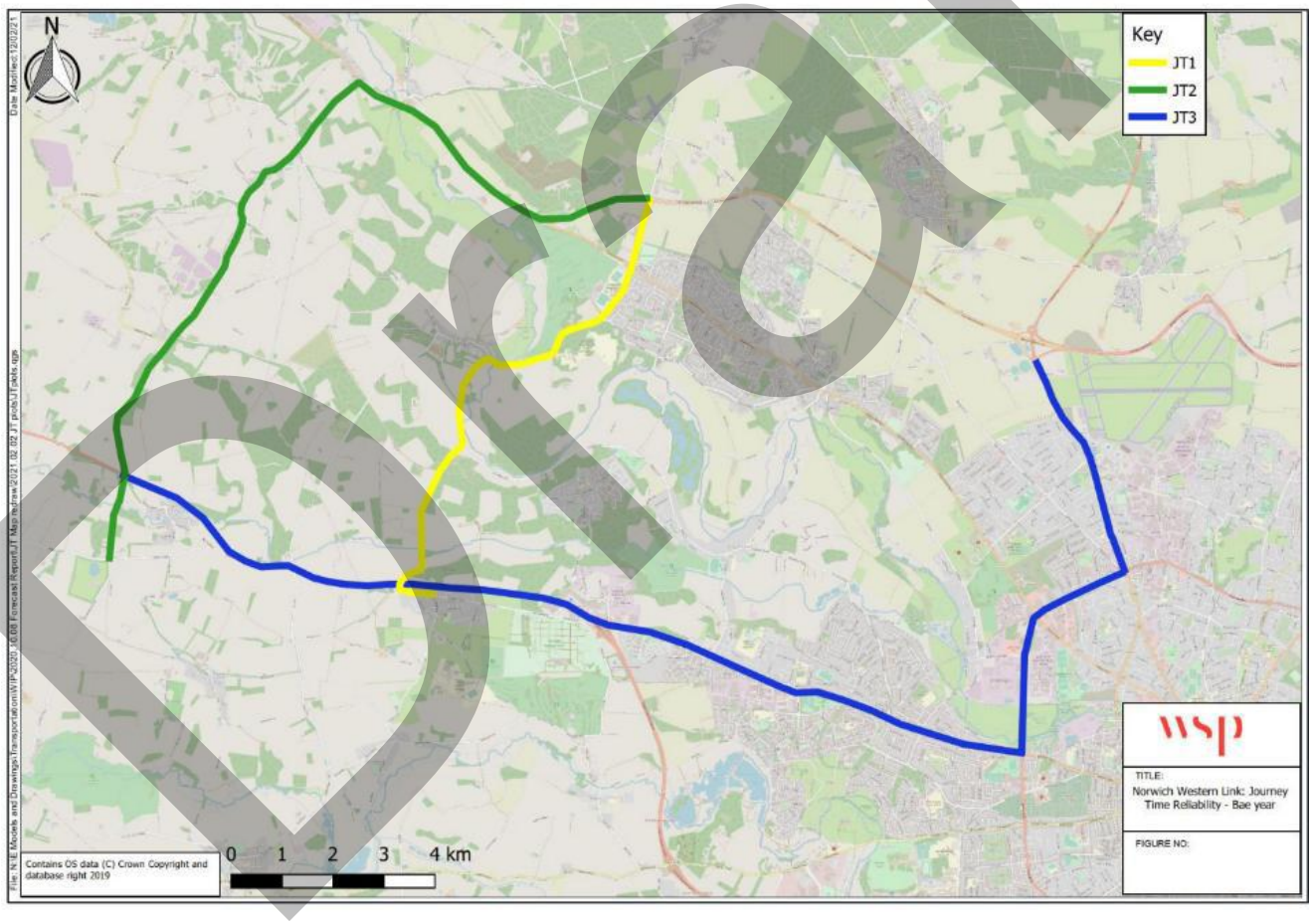
Journey Time Reliability

2.3.15. To assess the extent to which journey time variation impacts network users, open access mapping data has been used to compare journey times across the local road network at different times of the day. Journey times were found to be significantly longer during peak periods than in the off-peak (10:00-16:00).

2.3.16. Modelled journey time data has been extracted from the 2019 base year model for the morning peak and evening peak periods for the routes shown in **Figure 2-6**, where:

- JT1 = junction of Dereham Road and Marlingford Road (Easton) to the A1270 Broadland Northway (Fir Covert roundabout), via Ringland Hills and Taverham;
- JT2 = junction of Berrys Lane and Mattishall Road (Honingham) to the A1270 Broadland Northway (Fir Covert roundabout), via Weston Longville; and
- JT3 = junction of A47 / B1535 / Berrys Lane (north-west of Honingham) to the A1270 Broadland Northway (Cromer Road roundabout), via Dereham Road and the A140.

Figure 2-6 Journey Time Routes (2019)



2.3.17. In **Table 2-3**, the journey times during the AM and PM peak periods have been compared to the off-peak period to show the delay experienced by vehicles due to congestion. Where the difference between peak and off-peak exceeds 1 minute, it has been marked in **bold red text**.

Table 2-3 Journey Time Variability (2019 Base Year)

Route	Distance (m)	Journey Time (s)			Variation (s)	
		AM Peak	Inter-Peak (IP)	PM Peak	AM vs IP	PM vs IP
JT1 (northbound)	6,747	647	643	585	**62**	58
JT1 (southbound)	6.747	618	637	587	31	50
JT2 (northbound)	11,036	771	780	647	**124**	**133**
JT2 (southbound)	11,036	773	780	647	**126**	**133**
JT3 (eastbound)	17,341	1,771	1,463	1,200	**571**	**263**
JT3 (westbound)	17,341	1,653	1,525	1,279	**374**	**246**

2.3.18. As of 2019, the JT1 route in the northbound direction experienced approximately 1 minute of delay in the AM peak and PM peak when compared to the off-peak (free flow conditions). JT2 experienced over 2 minutes of delay in both the northbound and southbound directions in the AM peak and PM peak periods. JT3 experienced between 4 minutes of delay on the westbound direction in the PM peak to approximately 9.5 minutes of delay in the eastbound direction in the AM peak. This route terminates at Norwich Airport and Imperial Park, a key employment site for the region.

Road Use in Rural Communities

2.3.19. Those living in communities to the west of Norwich have raised concerns (through various rounds of consultation) about traffic problems they were experiencing on a daily basis, most notably during the peak hours when their villages, and the small, often single-track rural roads running through and between them, were congested with traffic. There were concerns raised relating to the volume and speed of traffic, the severance it causes and the loss of amenity within their communities. People reported not feeling safe to walk or cycle within and between their local communities due to the level of traffic on local roads.

2.3.20. With drivers having access to satellite navigation that prioritises the fastest route via inbuilt navigation systems or their smart phone, commuters are using rural roads to bypass the increased journey times associated with trips into Norwich city centre, Norwich Airport and other identified employment areas.

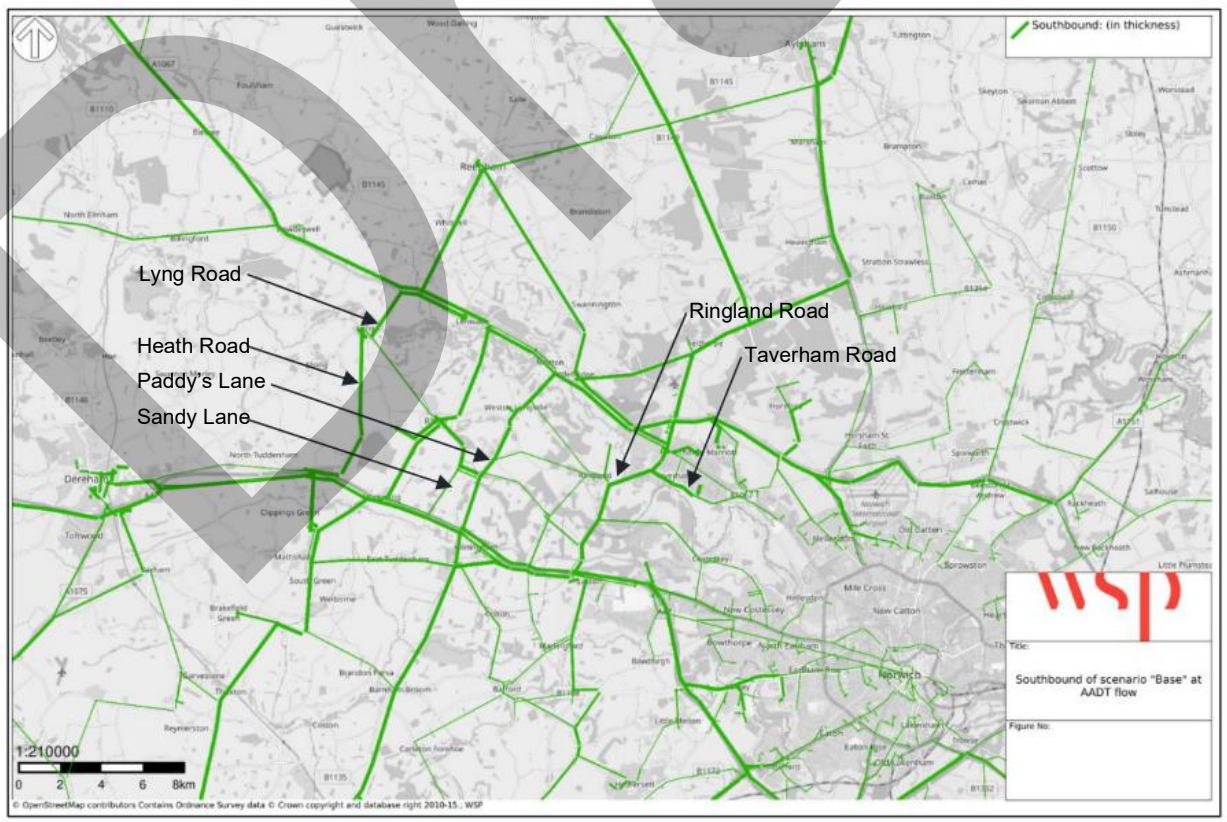
2.3.21. The lack of a direct, high-capacity, high-standard routes between the A1067 and the A47 results in trips on existing local routes such as Lyng Road, Heath Road, Sandy Lane, Paddy's Lane, Taverham Road and Ringland Road. These routes within the NWQ are predominantly unclassified roads, unsuitable for carrying more than 5,000 vehicles per day. These rural roads are less than 6m in width, often with tight bends and narrow verges or protected verges. There are also pinch points on some of the routes where the road width is substantially less than 5.5m or where the radii of bends are less than 10m. These parameters are set out as desirable minimums within *Manual for Streets 2* (MfS2) guidance for through routes carrying two-way traffic to enable safe passing of two large vehicles.

2.3.22. **Figure 2-7** shows the scale of trips using these six north-south routes in both the northbound and southbound directions. Each would benefit from the implementation of the NWL, with traffic rerouting from local routes onto a more suitable and direct link.

Figure 2-7 Select Link Analysis Across Six Routes (2019 Base Year)

Northbound

Southbound



2.3.23. **Table 2-4** indicates the count locations (where data was collected in 2019) on the north-south routes that pass close to residential areas such as Taverham, Costessey, Lyng and Weston Longville. The data summarises the total flow (across a 24-hour period), the number of Heavy Goods Vehicles (HGVs) and the associated HGV percentage.

Table 2-4 2019 Survey Data – Composition

ATC Site	Location	Traffic Flow	HGVs	HGV%
1	C198 The Common, Lyng	2,035	19	0.9%
2	B1535 Weston Hall Road, Weston Longville	4,019	380	7.7%
3	C167 Marl Hill Road, Morton on the Hill	3,327	18	0.5%
4	C167 Honingham Road, Weston Longville	3,113	13	0.4%
5	C167 Paddy's Lane, Weston Longville	2,788	23	0.8%
6	C173 Heath Road, Hockering	1,631	13	0.8%
7	C198 Lyng Road, North Tuddenham	2,721	94	3.5%
8	B1535 Wood Lane, Honingham	5,375	326	6.1%
68	C172 Ringland Road, Taverham	4,312	6	0.1%
69	C461 Taverham Lane, Costessey	5,264	16	0.3%
76	C171 West End, Costessey	7,389	58	0.8%
77	C171 Townhouse Road, Costessey	4,781	18	0.4%
78	C162 Longwater Lane, Costessey	10,808	57	0.5%

2.3.24. While there are relatively low numbers of HGVs using the north-south routes between the A47 and A1067, the areas of Weston Longville and Honingham are experiencing 7.7% and 6.1% HGVs respectively. As the majority of these rural routes are under 6m wide, they are not ideally suited to this type of traffic, particularly when coming into conflict with vehicles from the opposite direction.

Speeding

2.3.25. Traffic survey data, collected in 2019, has also been used to assess the speed of vehicles using these routes. **Table 2-5** shows the speed limit at the point of survey and the proportion of vehicles exceeding this limit.

2.3.26. The Royal Society for the Prevention of Accidents (RoSPA) notes that two-thirds of all crashes, in which people are killed or injured, happen on roads with a speed limit of 30mph or less. As shown below, those roads with lower speed limits (20mph and 30mph) have the highest incidence of vehicles exceeding the stated speed limit. Two of the sites measured (C167 Honingham Road, Weston Longville and C173 Heath Road, Hockering) had over 70% of vehicles exceeding the stated speed limits at the time of the surveys.

Table 2-5 2019 Survey Data – Speed

ATC Site	Location	Speed Limit (mph)	85th Percentile (mph)	% > Speed Limit
1	C198 The Common, Lyng	30	29	11.9%
2	B1535 Weston Hall Road, Weston Longville	60	43	0.0%
3	C167 Marl Hill Road, Morton on the Hill	60	49	1.9%
4	C167 Honingham Road, Weston Longville	20	35	**93.8%**
5	C167 Paddy's Lane, Weston Longville	60	45	3.0%
6	C173 Heath Road, Hockering	30	39	**72.3%**
7	C198 Lyng Road, North Tuddenham	60	47	0.3%
8	B1535 Wood Lane, Honingham	50	49	13.0%
68	C172 Ringland Road, Taverham	60	40	0.1%
69	C461 Taverham Lane, Costessey	60	50	1.7%
75	Taverham Road, east of Penn Road, Taverham	30	36	**53.9%**
76	C171 West End, Costessey	30	28	7.5%
77	C171 Townhouse Road, Costessey	40	37	7.1%
78	C162 Longwater Lane, Costessey	30	33	**34.3%**

Severance

2.3.27. North-south movement for freight between the A47 and A1067 is constrained by the River Wensum, and to a lesser extent the River Tud. Four bridges within the study area that cross the River Wensum are suitable for use by vehicular traffic (Costessey Lane; Taverham Lane / Costessey Road; Ringland Road; and the A1067).

2.3.28. The Costessey Lane and Ringland Road bridges have weight limit restrictions of 7.5 tonnes, constraining HGV movement. Only the A1067 bridge has a carriageway of over 6m width, with the other three bridges unsuitable for heavy, two-way vehicle traffic. These bridges cannot be appropriately widened or strengthened in their current position due to the Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) ecological designations that apply to the River Wensum.

Personal Injury Accidents

2.3.29. The OAR presented a summary of traffic accidents resulting in personal injury (the data excludes "damage-only" accidents) between 2011 and 2015. Additional accident data has now been obtained from NCC to cover the period of 2016 to 2020, providing an update to data presented in the OAR.

2.3.30. During the five-year period from 2016 to 2020, there were 550 recorded collisions within the study area (see **Figure 2-8**), involving 699 casualties. Of these, 8% (54) were pedestrians, 13% (94) were cyclists, and 12% (83) were motorcyclists or motorcycle passengers. Collisions are primarily located along the main arterial routes to, or from, Norwich city centre. **Table 2-6** lists the frequency and number of casualties, as well as their severity.

Figure 2-8 Study Area PIAs (2016-2020)

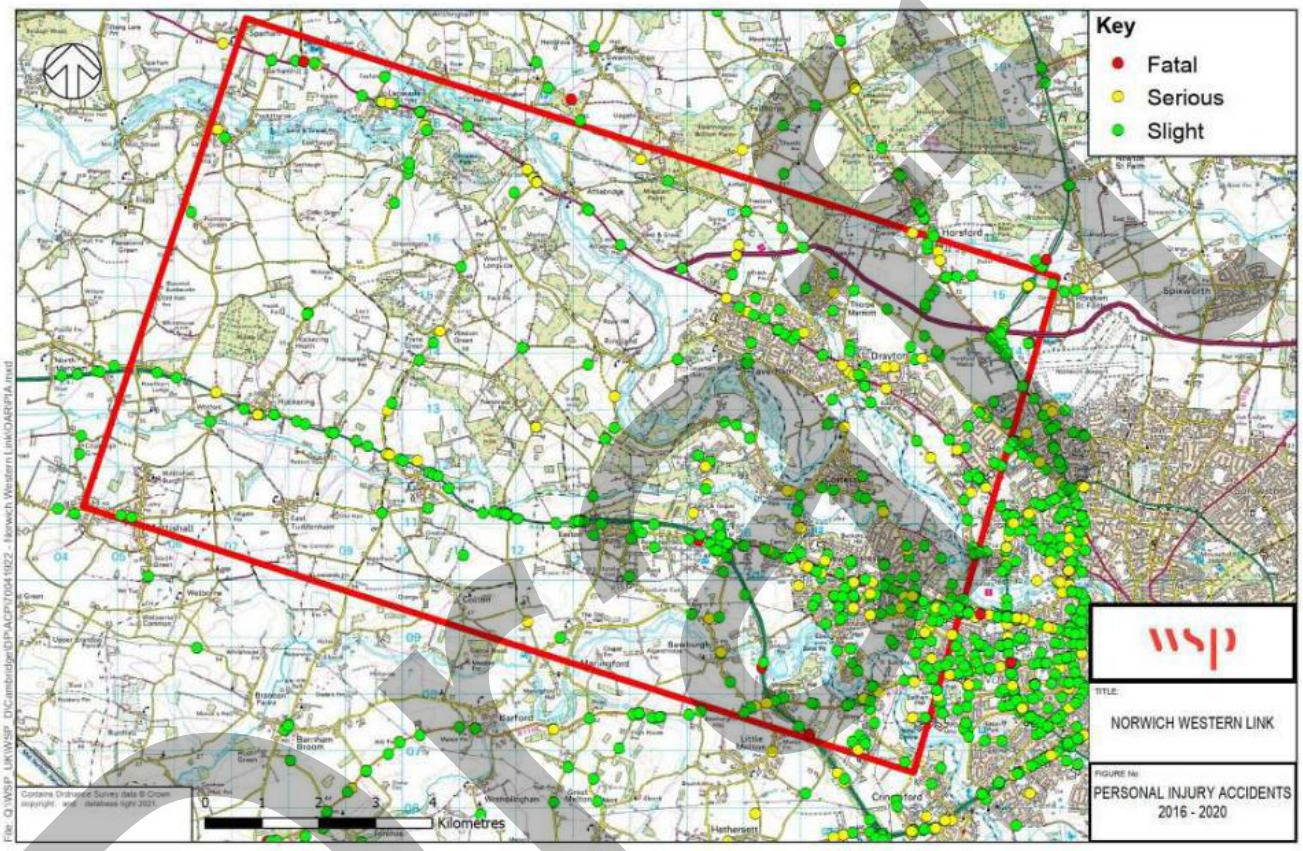


Table 2-6 Severity & Casualties of Accidents in Study Area (2016-2020)

Severity	Collisions	Casualties
Fatal	8	12
Serious	113	156
Slight	429	531
Total	**550**	**699**

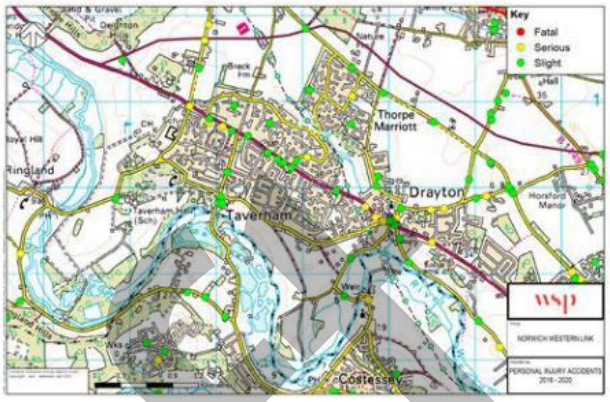
A1067

2.3.31. **Figure 2-9** shows the accident record between 2016 and 2020 along the A1067 from Drayton to Morton. The A1067 between the A1270 and Morton demonstrates a low collision rate, with a small cluster of accidents (7) located at the Marl Hill Road / A1067 junction. Through Taverham there are significantly more accidents, with clusters located at most junctions along the A1067. Three accidents are located at the Sandy Lane / The Street / Taverham Road / Costessey Road roundabout and four accidents at the School Road / A1067 signalised junction.

Figure 2-9 PIAs – A1067 (Attlebridge & Drayton)

Attlebridge

Drayton



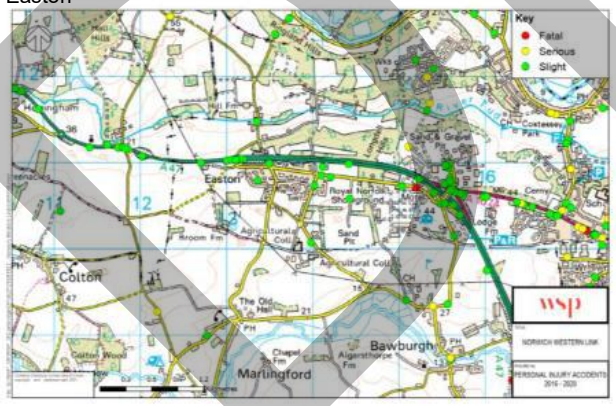
A47

2.3.32. **Figure 2-10** shows the accident record between 2016 and 2020 along the A47 from Easton to the A1074 through New Costessey. The Longwater interchange and the Taverham Road junction shows 14 accidents, all of which were slight; 8 accidents at the A47 / Taverham Road / Blind Lane junction; and 12 accidents at the A47 / Church Lane / Dereham Road roundabout. The introduction of an NWL, in addition to the Highways England A47 scheme, which includes a key objective to improve road safety for all users, is likely to support improved highway safety.

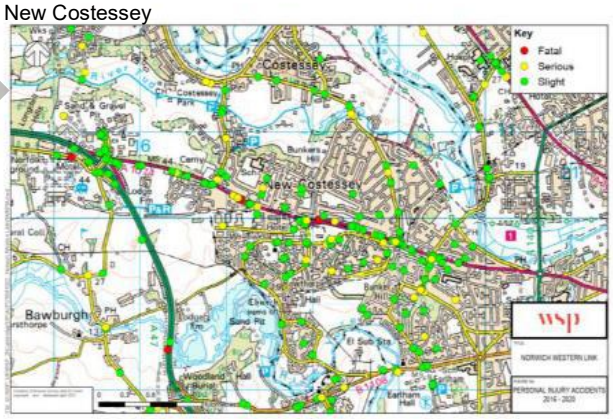
2.3.33. The A1074 through New Costessey shows a number of accidents, including two fatal accidents that occurred in 2019. Particular clusters are located at Longwater Lane / Dereham Road junction (5); Dereham Road / Barnard Road / Wendene / Breckland Road roundabout (9); and Dereham Road / Norwich Road junction (9).

Figure 2-10 PIAs – A47 / A1074

Easton



New Costessey

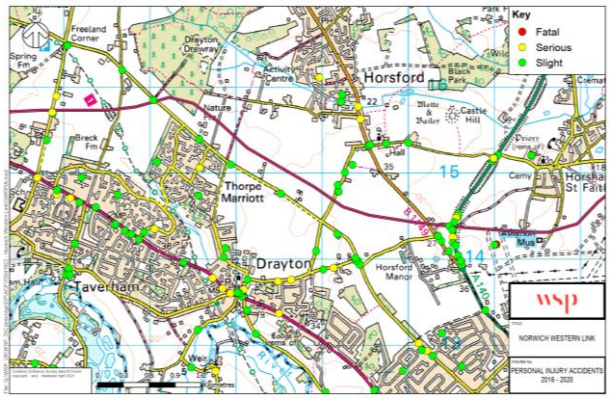


A1270

2.3.34. There have been low number of accidents recorded along the A1270 Broadland Northway, with the only cluster site located at the A1270 / A140 roundabout (8). **Figure 2-11** shows the location of accidents along the A1270 between Drayton and Horsford.

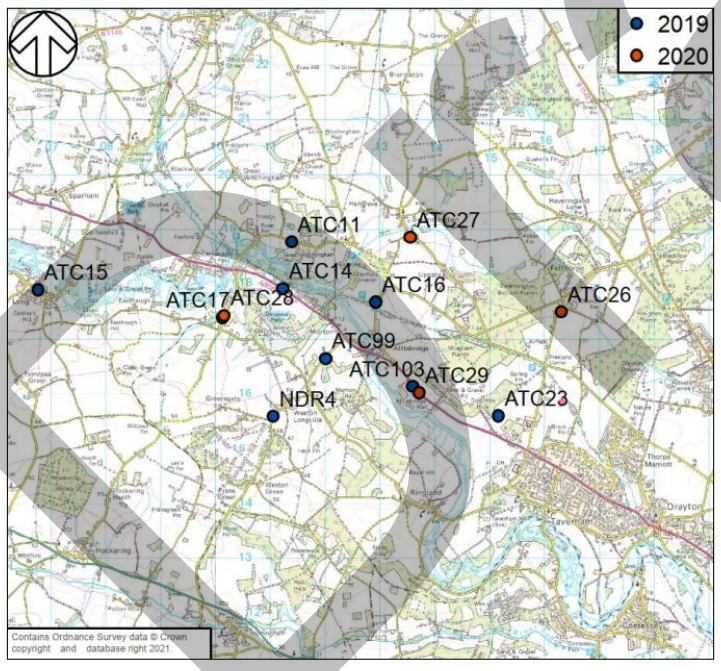
Figure 2-11 PIAs – A1270

Drayton & Horsford



2.3.35. Whilst there has been a reduction in overall travel demand during the pandemic across the study area, people have felt safer travelling by car than on public transport. A comparison of observed ATC data in the study area collected in October 2019 and October 2020 showed a 7.6% reduction in Annual Average Daily Traffic volumes on A1067 and a reduction of 2.1% in Weston Longville, as shown in **Figure 2-12**. This magnitude of reduction falls within typical daily variation of traffic.

Figure 2-12 – A1067 Comparison of Traffic Flows October 2019 versus October 2020



October 2019		October 2020		% Diff
Site ID	Two-way Vehicles	Site ID	Two-way Vehicles	
ATC11	971			
ATC14	11,441			
ATC15	1,826			
ATC16	730			
ATC17	4,401	ATC28	4,380	-2.1%
ATC23	7,338			
ATC99	2,971			
ATC103	13,223	ATC29	12,257	-7.6%
NDR4	2,857			
		ATC26	4,037	
		ATC27	254	

2.3.36. A review of traffic changes on the A47 between 2019 and 2020 based on monthly AADT data taken from the WebTris database also illustrates that in the months when government restrictions were fully in place (March-June 2020), there was a significant reduction in strategic traffic using the A47. However, in September and October, when restrictions were relaxed, traffic flows were much closer to the 2019 observed levels, with about a 10% reduction on average. This falls within the range of typical daily variation of traffic for a strategic road such as A47.

Walking & Cycling

2.3.37. Walking and cycling infrastructure in the study area is variable. A breakdown of the accessible areas via walking and cycling from each settlement is provided in the *Walking, Cycling and Horse-Riding Assessment* report.

2.3.38. Within more built up areas, the provision is generally adequate, with footways in place adjacent to the roads. However, away from residential areas, there is limited provision, especially between villages where there is very limited or no facility (for example villages such as Horsford and Taverham are unable to reach many other settlements within a 30-minute walk). In other cases, including Attlebridge, Hockering and Lenwade, access is constrained in some directions by busy roads, or by a lack of safe pedestrian infrastructure.

2.3.39. The A47 corridor and Longwater interchange are major barriers to pedestrian access, with limited infrastructure available for users wishing to access local community facilities, such as Saint Peter's Church (Easton) or Saint Andrew's Church (Honingham), or access shops and services on William Frost Way. Easton College and the Food Enterprise Zone (FEZ) are both located south of the A47. Both sites are poorly connected for north-south trips, with the A47 currently presenting a physical barrier with no crossing facilities. The A1067 also creates a barrier to pedestrian access, with limited opportunities to cross safely to shops and services along the corridor.

2.3.40. Cycling facilities are limited within the study area, with only local (on-road) routes to the south-east and the National Cycle Network Route 1 (NCN1) through the northern extents. There is no existing north-south cycle route within the NWQ. The lack of cycling infrastructure linking residential areas and employment areas is likely to limit the number of commuting journeys made.

2.3.41. The *Gear Change* policy guidance published in July 2020 describes the vision to make England a great walking and cycling nation. A NWL scheme will seek to improve the existing walking and cycling facilities in the surrounding area by reducing traffic on rural minor roads, enabling them to be made more suitable for all users, whilst also enhancing off-road connections. *Gear Change* responds to the Climate Change agenda emphasising the environmental benefits of encouraging and supporting sustainable travel, with a target to double cycling use and increase the numbers walking. This ambition has been partly derived from direct experience during the Covid-19 pandemic in 2020, which saw a 100% increase in cycling, with some areas in England close to 300%.

2.3.42. *Local Transport Note LTN 1/20* provides guidance and good practice for the design of walking and cycling infrastructure. The majority of routes close within the NWQ are rural lanes through small hamlets and villages, many of which carry more traffic than is suitable for the scale of the existing highway network. Interventions within the NWQ will seek to relieve traffic-related issues enabling existing infrastructure to be re-purposed to prioritise cycling and walking.

CONSTRAINTS

Environmental Constraints

2.3.43. The original 2018 OAR report was informed by a constraints plan showing statutory designated environmental constraints and strategic utilities. This was produced to inform the public consultation carried out in late 2018. Since this was produced additional County Wildlife Sites (CWS) sites have been designated as follows and have been taken into account within the Option Selection Report and subsequent project deliverables:

- River Wensum Pastures - Ringland Estate;
- Primrose Grove;
- Gravelpit Plantation and Church Hill;
- Dryhill Plantation; and
- Ave's Gap.

2.3.44. Other designated environmental constraints including SAC designation of the River Wensum remain unchanged. The Annex II species barbastelle bats also remain present within the study area.

2.3.45. Additional environmental surveys including various types of bat surveys, have been carried out since the date of the original OAR to inform the scheme development and option selection process to date and were reported upon in the Option Selection Report. Further seasonal ecology surveys are also being carried out on an ongoing basis throughout 2021 to inform the Environmental Statement for submission alongside the planning application.

3 UNDERSTANDING THE FUTURE SITUATION

3.1 OVERVIEW

3.1.1. Chapter 3 of the OAR (Understanding the Future Situation) – forming Step 2 of the Transport Appraisal Process – sought to outline the external factors that would shape the NWQ and network operation into the future.

3.1.2. It set out the future growth in terms of housing and employment, before presenting information on future investment within the transport system. It also set out modelling and forecasting that had been undertaken to inform the NWL study. Since the production of the OAR, additional analysis has been undertaken, using an updated and refined transport model, which is summarised in the following sections.

3.2 FUTURE CONDITIONS

DEMOGRAPHIC PROFILE

3.2.1. Broadland District Council, Norwich City Council and South Norfolk Council are working together with NCC to prepare the *Greater Norwich Local Plan* (GNLP) – expected in 2022 – which will include strategic policies to address the area's productivity gap and allocate individual sites for development.

Housing

3.2.2. The Strategic Housing Market Assessment, carried out in 2017, indicated that there is an Objectively Assessed Need (OAN) for an estimated 39,586 dwellings across the Broadland, South Norfolk and Norwich areas between 2015 and 2036. In Broadland, parishes forming part of the *Norwich Policy Area* have a combined allocation of between 1,462 and 1,662 new houses. The Easton / Costessey area plans to accommodate 1,500 new homes, as well as enhanced local services. The NWL is expected not only to provide connectivity to those housing sites, but also link housing and employment areas around Norwich.

Employment

3.2.3. In addition to the *City Deal*, which seeks to deliver 13,000 jobs by 2031, the *Joint Core Strategy* plans for 27,000 new jobs by 2036. The OAR references the FEZ located to the west of Easton which is expected to provide 2,000 agri-food jobs by 2050 (the first phase is already under construction). In addition to this, other significant employment growth is also expected, including the following in the west of Norwich:

- **Norwich International Airport**: there is a draft masterplan, targeting an increase in passenger numbers from 530,000 to 1.4 million which would generate an estimated additional £170 million in the local area. Given the economic importance of the airport, the scope for an NWL to support this planned expansion and provide a more reliable and resilient transport network is considerable. This masterplan has not changed in response to the COVID-19 pandemic.
- **Imperial Park**: planning consent has recently been granted for a 115-acre business park for industrial and office occupiers located on the north side of Norwich International Airport. Again, an NWL would provide a more reliable and accessible transport route to support this development.

3.2.4. The absence of an NWL is likely to affect business investment and growth, both locally and regionally. Key employers are located in or adjacent to the study area (including the FEZ, the Norfolk and Norwich University Hospital, the Norwich Research Park and Norwich International Airport). The increased journey times along the signposted freight routes for north to south movements between the A1067 and the A47 lead to increased vehicle operating costs and productivity inefficiencies.

TRANSPORT CONTEXT

Traffic Model

3.2.5. As previously mentioned, the age and detail of the traffic model used within the OAR (2015) necessitated the need to collect new and extensive survey data to update the model (2019) in order to support further appraisal of the NWL. As a part of this process, the model network and zone connectors have been updated to better reflect the local road network and a full audit process was undertaken to calibrate and validate the 2019 base year model, in line with the DfT's WebTAG guidance, ensuring the model represented on-site observed conditions.

3.2.6. The updated model still forecast to a 2025 opening year and a 2040 design year, taking into account background traffic growth and local development and infrastructure which is classified as 'Near Certain' or 'More than Likely'. This includes developments and schemes which have planning permission or are going through the planning process.

Highways England DCO Application

3.2.7. Highways England submitted a Development Consent Order (DCO) Application to the Planning Inspectorate in March 2021 for their A47 North Tuddenham to Easton dualling scheme. This was accepted in April 2021 and now progressing to examination in public. Members of the public are currently able to register to participate in the examination and provide a response to the application during the Relevant Representation period which closes on Thursday 17 June 2021. In the meantime, Highways England are continuing to carry out ground investigations and other survey works to inform the detailed design stage. Construction of the scheme is due to commence in early 2023 and the new section of dual carriageway is anticipated to open to the public in 2025.

3.2.8. An additional DCO Application was also submitted for improvements to A11 Thickthorn Junction in March 2021. Both of these Highways England enhancement schemes have been included into the baseline Do Minimum scenario forecasting within the updated 2019 NATS model.

Traffic Flows

3.2.9. The lack of an appropriate western link restricts access to businesses both locally and in areas to the west of Norfolk and the Midlands. The transport modelling undertaken predicts that traffic volumes are expected to grow by approximately 20% between 2019 and 2040 in the NATS Model area. **Table 3-1** shows forecast traffic growth figures to 2040, split by AM peak, interpeak, and PM peak periods.

Table 3-1 Forecast Traffic Growth (Base Year to Forecast Years)

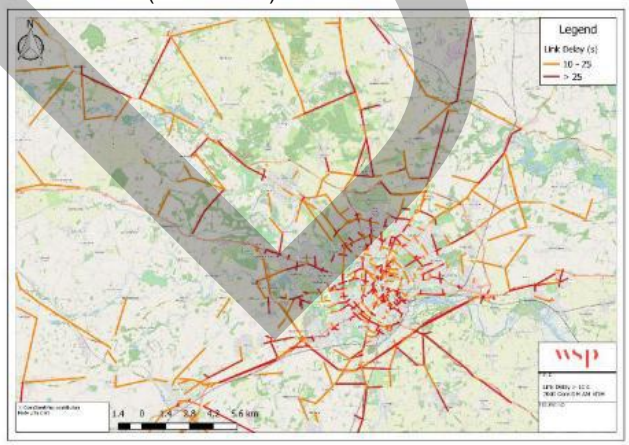
Time Period	Vehicle Class	2019-2025	2019-2040
AM Peak	Car	6.23%	19.60%
	Light Goods Vehicles	6.66%	27.85%
	Heavy Goods Vehicles	1.89%	10.36%
	All vehicles	**6.01%**	**19.66%**
Inter-Peak	Car	7.38%	22.86%
	Light Goods Vehicles	6.66%	27.84%
	Heavy Goods Vehicles	1.90%	10.37%
	All vehicles	**6.92%**	**22.30%**
PM Peak	Car	5.99%	18.91%
	Light Goods Vehicles	6.65%	27.83%
	Heavy Goods Vehicles	1.88%	10.36%
	All vehicles	**5.88%**	**19.05%**

Congestion & Delay

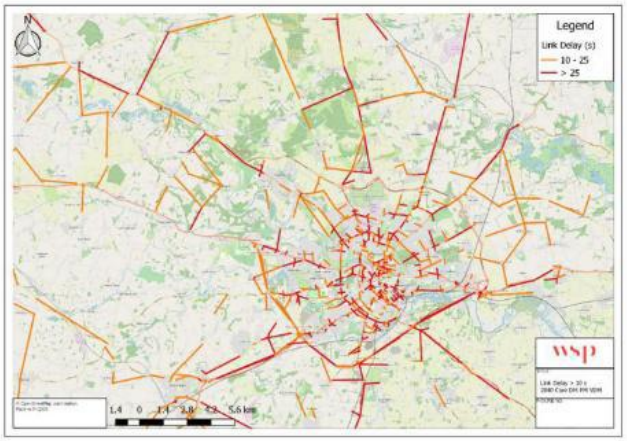
3.2.10. The increase in traffic growth shown in **Table 3-1** is expected to impact the local road network. **Figure 3-1** shows the modelled link delay information for the 2040 forecast year during the AM peak and PM peak periods, without an NWL. Delay is expected to worsen on key links through the study areas, including some sections of the A1074, including the junction of A1074 / Longwater Lane and the A1074 / Norwich Road junction. Delay on sections of the A146 Lakenham Road and A140 (Colman Road) are also exacerbated.

Figure 3-1 Peak Hour Link Delay (2040 Design Year – without NWL)

AM Peak Hour (08:00-09:00)



PM Peak Hour (17:00-18:00)



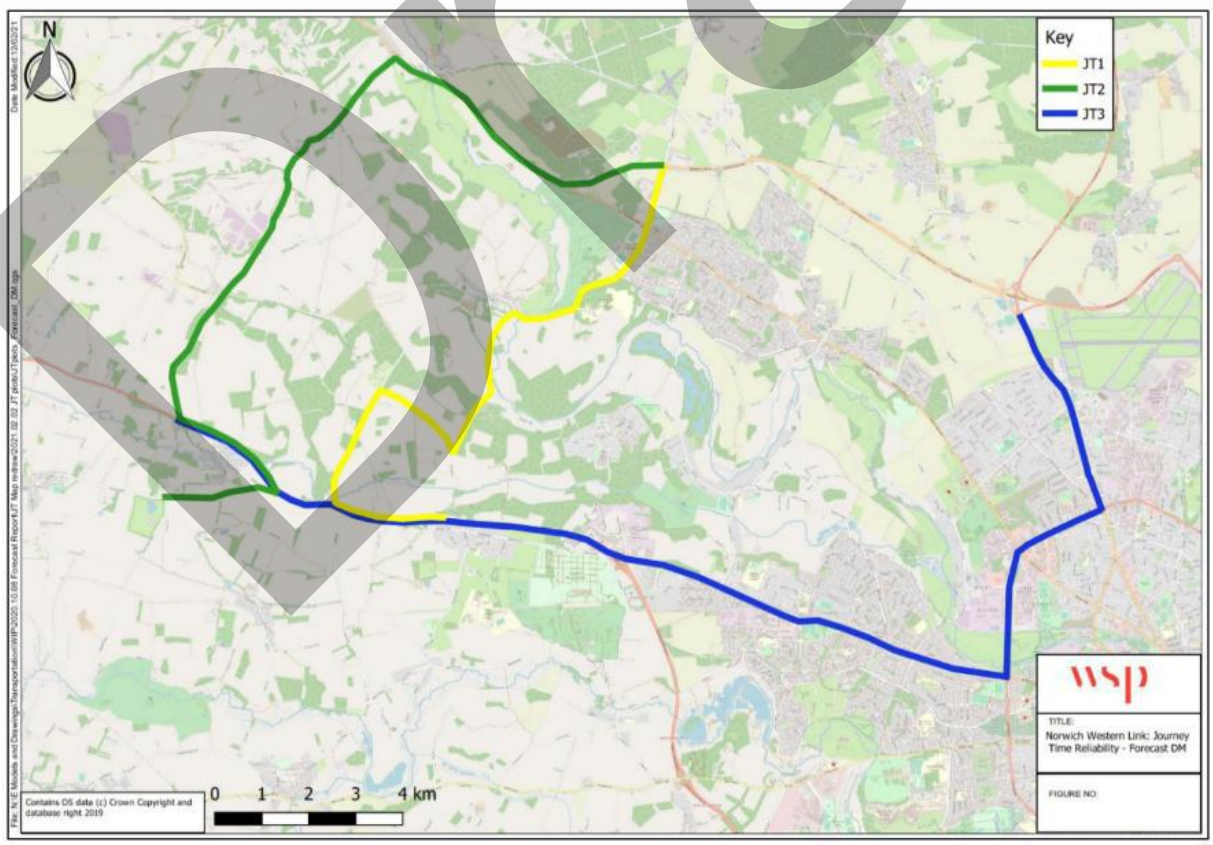
Journey Time Reliability

3.2.11. Modelled journey time data has been extracted from the 2040 base year model for the morning peak and evening peak periods for the routes shown in **Figure 3-2**, as outlined in **Table 3-2**. As with the 2019 data, journey times during the AM and PM peak periods have been compared to the off-peak period to show the delay experienced by vehicles due to congestion. Where the difference between peak and off-peak exceeds 1 minute, it has been marked in **bold red text**. Without an NWL scheme, journey time delays in 2040 will significantly worsen and congestion is expected to spread to rural roads, with all routes showing a variation of over 1 minute when compared to off-peak levels.

Table 3-2 Journey Time Variability (2040 Design Year – without NWL)

Route	Distance (m)	Journey Time (s)			Variation (s)	
		AM Peak	Inter-Peak (IP)	PM Peak	AM vs IP	PM vs IP
JT1 (northbound)	10,594	1,112	914	1,116	**+198**	**+202**
JT1 (southbound)	10,529	1,002	857	1,053	**+145**	**+196**
JT2 (northbound)	13,562	1,069	850	1,032	**+219**	**+182**
JT2 (southbound)	13,751	940	843	921	**+97**	**+78**
JT3 (eastbound)	18,089	1,932	1,218	1,779	**+714**	**+561**
JT3 (westbound)	17,365	1,750	1,239	1,654	**+511**	**+415**

Figure 3-2 Journey Time Routes (2040)



Road Use in Rural Communities

3.2.12. Average Annual Daily Traffic (AADT) flows have been produced for the 2025 opening year and 2040 design year. **Table 3-3** shows flow changes at locations on the highway network surrounding rural communities within the NWQ, rounded to the nearest 1,000 vehicles, between the 2019 base year and the forecast years of 2025 and 2040. The forecast year models (2025 and 2040) include the proposed Highways England A47 North Tuddenham to Easton dualling scheme.

Table 3-3 Average Annual Daily Traffic Growth – Rural Communities

Location	2019-2025	2019-2040
A47 west of Sandy Lane	+15,000	+23,000
A47 east of Wood Lane	+17,000	+26,000
B1535 Wood Lane	+1000	+3,000
Weston Longville	+1700	+2,600
Total on existing north-south routes (Taverham Road, Lyng Road, Heath Road)	-3,000	+5,000
A1067 Attlebridge to A1270	+1,000	+5,000

3.2.13. Traffic volumes on the existing routes between the A47 and A1067 (including Lyng Road, Ringland Road, Honingham Road and Taverham Road) are predicted to increase by an estimated 5,000 vehicles by 2040. This would nearly double the existing flow on these routes and put them well over-capacity.

Carbon Budgets and Greenhouse Gases

3.2.14. At the OAR stage, changes in emissions have been considered in high level terms and it is expected that without an NWL increases in CO2 and other greenhouse gas emissions will occur in the future 'do minimum' scenario e.g. vehicles travelling more slowly due to increased congestion which creates a risk of increased air pollution.

3.2.15. The presence of an NWL would increase transport network capacity, either by adding extra link capacity to the highway network or by enabling and supporting mode shift to less carbon intensive forms of transport.

3.2.16. A more detailed assessment will be carried out at the ES stage both in terms of the construction and operational phases with effects quantified in line with best practice and current guidance and emissions from the Proposed Scheme will be put into context of the UK carbon budgets.

4 ESTABLISHING THE NEED FOR INTERVENTION

4.1 OVERVIEW

4.1.1. Chapter 4 of the OAR (Establishing the Need for Intervention) – forming Step 3 of the Transport Appraisal Process – sought to outline the current transport-related problems, the problems likely to be encountered in the future and the underlying causes.

4.1.2. The problems and issues identified in **Chapter 2** and **Chapter 3** of this *OAR Addendum* (which build upon the evidence presented in the OAR), demonstrates a need for intervention within the NWQ. The demographic and transport challenges identified in the OAR are summarised in the following sections, with additional challenges identified through further analysis (since the production of the OAR) presented in red highlight.

4.2 EXISTING SITUATION CHALLENGES

DEMOGRAPHICS

- A significant increase in population, particularly of elderly residents, is likely to generate additional pressure on the transport and community infrastructure.
- The overall study area has varying levels of deprivation, which results in a complex mix of differing local needs and challenges.
- Levels of employment / economic activity vary across the study area, therefore implementing measures to support economic activity and growth, may vary between communities.
- Norwich has historically lagged behind the UK, in respect of economic indicators, and the gap continues to widen. Attracting new businesses and increasing the productivity of existing firms, as well as enhancing regional labour mobility, will be essential to unlocking further economic growth if the area is to remain competitive and attract and retain skilled workers.

TRANSPORT CONTEXT

- Limited connections exist between the A47 and A1067, reducing the orbital connectivity of the A1270, and creating pressure on the existing single carriageway roads.
- There are no railway connections within the study area, and significant infrastructure would be required to improve the rail network within the NWQ.
- There are limited direct bus connections within the study area. Limitations of the Costessey Park & Ride service is likely to generate trips through the study area.
- There are inadequate pedestrian facilities between villages and to services outside of built-up areas. The existing facilities are perceived as unsafe due to high volumes of traffic.
- Cycling facilities are located to the east of the study area, within the urban fringe of Norwich. To the west of the study area there are limited connections.
- Within the study area there is a limited number of existing structures that could support a potential NWL. Significant infrastructure will be required to provide for the standard needed.
- Rural communities within the NWQ experience rat-running and inappropriate traffic levels, directly impacting the quality of life of local residents from an environmental and safety perspective (severance).
- Strategic employment sites to the north and west of Norwich, including Norwich Airport and Imperial Park, have inadequate connectivity, resulting in increased congestion, increased journey times and reduced business productivity, thus limiting potential for targeted growth.

TRAVEL PATTERNS

- There is high car dependence and ownership, which puts pressure on local transport networks, despite a high number of journeys being short. There is potential to encourage modal shift.
- Increasing traffic volumes causes increased pressure on the highway network. An NWL could relieve congestion on the local road network and reduce rat-running.
- There is a high volume of traffic movement through the study area, with origin-destination data showing that an NWL could serve as a commuter link to key trip attractors.
- There were 550 accidents within the study area (2016 to 2020), eight of which were fatal, and one-fifth involved NMUs. An NWL scheme has the potential to help address safety issues at accident hotspots by routing vehicles via more appropriate and suitable routes, and by providing alternative, safer route options for NMUs as part of a wider package of interventions.

LOCAL ENVIRONMENT

- There is a mixture of land uses that will require a wide-ranging approach to ensure appropriate engagement is undertaken with local communities, stakeholders and landowners.
- The study area is environmentally sensitive, and designated sites will need to be considered when implementing any transport infrastructure within the study area.
- Car use is the key method of travel in the NWQ, leading to high levels of carbon emissions produced by road transport. An NWL scheme could reduce the annual vehicle kilometres travelled (by providing direct routing) and reduce CO_2 emissions resulting in monetised benefits (carbon saving and traded carbon from conventional vehicles to electric vehicles).

4.3 FUTURE SITUATION CHALLENGES

DEMOGRAPHICS

- Significant housing and employment growth is anticipated across the study area which will increase pressure on the local and strategic road network.
- Individual local and strategic improvements to the road network will assist with capacity issues; however, transport related problems within the NWQ will persist without intervention.
- Norfolk was hit hard by the Covid-19 pandemic. Between December 2019 and May 2020 forecasts, 2025 GVA forecasts for the East of England dropped by 2%, with the region's reliance on tourism jobs, manufacturing and the public sector underscoring the challenges brought on by the pandemic. This makes Norfolk's plans for both post-pandemic recovery and economic development ambitious, but all the more badly needed.

TRANSPORT CONTEXT

- HGV movements are forecast to grow to 10% of traffic flows between 2019 and 2050. This is likely to exacerbate issues (congestion, severance, safety etc.) on the local road network.
- West of Taverham Road, there is expected to be a large increase in modelled flow due to traffic generated from additional development within the A47 corridor.
- Traffic on existing routes between the A47 and A1067 is forecast to increase by up to 5,000 vehicles per day by 2040, which is nearly double the observed base flow.

- Delay is expected to worsen on key links through the study areas, including some sections of the A1074, including the junction of A1074 / Longwater Lane and the A1074 / Norwich Road junction. Journey time delays in 2040 will significantly worsen and congestion is expected to spread to rural roads. A NWL is expected to remove a large amount of traffic away from existing links and junctions at or near capacity, such as the Longwater Interchange.
- The dualling of the A47 between North Tuddenham and Easton will also increase traffic accessing Norwich through the NWQ, with the existing single carriageway section currently acting as a bottleneck and constraining traffic approaching from the west.

4.4 COVID-19 RECOVERY

4.4.1. The *Norfolk and Suffolk Covid-19 Economic Recovery Restart Plan*, produced in 2020, sets out the actions and interventions being taken by a wide range of partners, including New Anglia Local Enterprise Partnership (LEP), local authorities, businesses, industry councils and sector groups, Voluntary, Community and Social Enterprise (VCSE) organisations, colleges and universities. It demonstrates the strong local appetite and energy for getting the economy going again and helping those who have been hit hardest. One of the identified measures for economic recovery is investing in infrastructure. The plan states that "*we will support the construction sector through continued investment in key infrastructure and make a compelling case to Government to fund priority infrastructure schemes*."

4.4.2. The NWL has been identified as a key infrastructure scheme in the Norfolk and Suffolk region, as detailed in the *Integrated Transport Strategy for Norfolk and Suffolk*. An NWL will be vital to ensure that key facilities and services can be reached by all members of society.

- Norfolk's plan for both post-pandemic recovery and economic development is ambitious. Over the next decade, it aims to have 57,000 new jobs, many of which are expected to be located in its tier one employment sites. Tourism remains a focus for regeneration, with the promotion of the visitor economy part of the medium-term recovery efforts in Broadland and South Norfolk.

5 IDENTIFYING OBJECTIVES

5.1 OVERVIEW

5.1.1. The **Identifying Objectives** chapter of the OAR – forming Step 4a of the Transport Appraisal Process – considered the key themes from policy and strategy documents, challenges for the study area (baseline and future) and engagement with stakeholders and the public, to identify five high-level objectives and 13 specific objectives for the project. As the scheme has progressed towards the OBC stage and further evidence has been gathered, it was deemed prudent to review the original project objectives, in accordance with WebTAG, to reduce the overall number of objectives to a more presentable, manageable and SMART-orientated objectives group, in line with those typically required at the OBC stage.

5.1.2. The following sections indicate how the objectives have been consolidated in a manner that enabled the project to move forward in a way that retained consistency with previous work and minimised the potential impact on the OAR and OSR. It summarises the content of Technical Note 10: NWL – Review of Objectives for Stage 2 OBC (WSP, January 2020) provided as **Appendix A**.

5.2 CONSOLIDATING OBJECTIVES

HIGH LEVEL OBJECTIVES

5.2.1. After consideration of the individual high-level objectives, it was determined that *"Support sustainable growth"* and *"Support economic growth"* were closely related and could be condensed into a single high-level objective – *"Support sustainable economic growth"* – with emphasis placed on encouraging sustainable economic growth. **Table 5-1** provides a summary of how the high-level objectives have been consolidated.

Table 5-1 Consolidation of Objectives – High-Level Objectives

Previous High-Level Objectives	New High-Level Objectives
High-Level Objectives	
Support sustainable growth	Support sustainable economic growth
Support economic growth	
Improve the quality of life for local communities	Improve the quality of life for local communities
Promote an improved environment	Promote an improved environment
Improve strategic connectivity with the national road network	Improve strategic connectivity with the national road network

SPECIFIC OBJECTIVES

5.2.2. A review was undertaken of the scheme specific objectives, in order to identify whether they were SMART in nature or whether there were close relationships with other objectives that may allow for consolidation. The review identified a series of core themes represented by the original objectives including journey times together with speed, delay and congestion, resilience, vehicular flow related to vehicle type, accidents and wellbeing, environmental impacts and accessibility. The original specific objectives have been condensed into six new objectives, as shown in **Table 5-2**.

Table 5-2 Consolidation of Objectives Specific – Objectives

Previous Specific Objectives	New Specific (SMART) Objectives
Specific Objectives	
Reduce congestion and delay, and improve journey time reliability on routes through the study area	Improve connectivity and journey times on key routes within the Greater Norwich area
Improve network resilience and efficiency of the strategic and local transport network	
Improve emergency response times	
Reduce the number of Heavy Goods Vehicles using minor roads	Reduce the impacts of traffic on people and places within the Western area of Greater Norwich
Provide traffic relief (and reduce noise & emissions) within residential areas	
Contribute to the improved health and well-being of local residents	
Encourage modal shift to more sustainable modes of transport	Encourage and support walking, cycling and public transport use in Greater Norwich
Make the transport network safer for all users (including Non-Motorised Users)	Improve safety on and near the road network, especially for pedestrians and cyclists
Not affect the ecological integrity of the River Wensum Valley Special Area of Conservation	Protect the natural and built environment, including the integrity of the River Wensum SAC
Enable improved accessibility to existing and new housing and employment sites	Improve accessibility to key sites in Greater Norwich
Improve access to green space	
Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and NNUH	

5.3 IMPACT ON OPTION APPRAISAL

5.3.1. The process of consolidating the scheme objectives was carefully considered in terms of minimising the impact on the earlier OAR and OSR work. It is acknowledged that by consolidating the objectives, the performance scoring of the strategic case of the options may have been impacted; therefore, a sensitivity test has been undertaken to ascertain the magnitude of any change and whether this would have altered the outcome of the sifting process. The sensitivity test output is provided as **Appendix B**.

EAST

5.3.2. The 82 long-list options were again subjected to the DfT's EAST, as a mechanism for evaluating the options against a number of assessment areas relevant to the decision-making process. EAST is intended to quickly summarise and present evidence in a consistent format on how options perform and compare based upon the best practice five-case model approach (as shown in **Table 5-3**). Due to the highly sensitive nature of the proposed study in terms of environmental considerations, an additional environmental appraisal was undertaken to support the EAST assessment. As can be seen, the sensitivity test associated with the consolidation of the scheme objectives only altered the scoring of two strategic case elements.

Table 5-3 EAST Elements

Element	Assessment Area	Altered Score
Strategic Case	***Scale of impact against specific objectives*** ***Fit with high-level objectives*** Degree of consensus over outcomes	✓ ✓ ×
Economic Case	Economic Growth Socio-distributional impacts and the regions Local environment Well-being Expected VfM Environmental Criteria	× × × × × ×
Managerial Case	Implementation timetable (years) Public acceptability Practical feasibility Quality of supporting evidence Key uncertainties	× × × × ×
Financial Case	Affordability Capital Cost (£m) Overall cost risk	× × ×
Commercial Case	Flexibility of option Funding source Income generated	× × ×

STRATEGIC CASE

5.3.3. The strategic case determines if a project is needed, either now or in the future. This element of the sifting process allows the appraisal of scheme options against a set of identified problems. Objectives are used in order to measure the likely scale of success of the various options. Using **Table 5-1** and **Table 5-2**, which indicates how the initial objectives map onto the consolidated list of objectives, has allowed average scores to be calculated (for the consolidated objectives) and a new overall average score to be attributed to the strategic case scoring for "Scale of impact against specific objectives" and "Fit with high-level objectives". For the high-level objectives, scores were altered by +1 for a total of 17 options, whilst scores were altered by ±1 for 21 options.

SIFTING (ROUND 1)

5.3.4. As in the OAR, the first stage involved the removal of options which failed to perform at least as well as the "Do Nothing" option when compared against all assessment criteria. Performance scoring was derived from the EAST, where individual scores were given against each of the criteria within the assessment cases and environmental assessment for each option. These scores were combined and unweighted, giving equal regard to each of the cases, allowing an indication of option performance. A decimal score of between a minimum of 0 and a maximum of 1 was calculated for each of the assessment cases with a combined overall maximum score of six available. Those options that performed worse than the "Do Nothing" option were discounted.

5.3.5. After the Round 1 sift for the sensitivity test scoring, the same 34 options from the initial appraisal remained, including 22 new link highway options, five network improvement schemes, three active travel options, three public transport options and a freight option. The 34 options and their respective performance scores (from the original appraisal and the sensitivity test) against all the assessment cases are provided in **Table 5-4**. The "Do Nothing" option scored 3.61.

Table 5-4 Options (After Sift 1) with Respective Scoring

Type	Option	Previous Score	Sensitivity Test Score
Non-Highway Options	Option 39: Improvements to existing junctions	3.63	3.70
	Option 40: Signing and lining improvements	3.91	3.91
	Option 41: Signal improvements	3.69	3.76
	Option 44: New / improved crossing points	3.71	3.71
	Option 49: Improvements to existing bus services (28, 29 and X29)	3.66	3.72
	Option 50: Improvements to existing bus services (23, 23A and 24)	3.66	3.79
	Option 55: Promote cycling schemes	3.74	3.81
	Option 58: Mobility as a service scheme	3.62	3.69
	Option 68: Lorry management strategy	3.74	3.67
	Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport	3.85	3.92
New Highway Link Options	Option 2: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (1A), dual	3.73	3.73
	Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single	3.66	3.66
	Option 4: A1067 Attlebridge to A47 west of Honingham, 2014 Purple (2A), dual	3.73	3.73
	Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single	3.73	3.66
	Option 6: A1067 Attlebridge to A47 west of Easton, 2014 Brown, dual	3.78	3.78
	Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single	3.73	3.73
	Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton, 2014 Red, dual	3.77	3.84
	Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single	3.67	3.67
	Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton, 2014 Blue (1), dual	3.67	3.67
	Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single	3.62	3.62
	Option 12: A1067 / A1270 junction to A47 west of Easton, Blue (2), dual	3.67	3.67
	Option 16: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (2), dual	3.62	3.62
	Option 20: A1067 / A1270 junction to A47 / A1074 Longwater Interchange, 2014 Orange (4), dual	3.62	3.62
	Option 28: North Tuddenham via Attlebridge, 2018 Road Alignment (1), dual	3.68	3.68
	Option 30: A47 Honingham to Attlebridge (1), 2018 Road Alignment (2), dual	3.73	3.73
	Option 32: A47 Honingham to Attlebridge (2), 2018 Road Alignment (3), dual	3.67	3.67
	Option 69: Purple Line (2018 public consultation), single	3.78	3.71
	Option 70: Purple Line (2018 public consultation), dual	3.67	3.67
	Option 71: Blue Line (2018 public consultation), single	3.73	3.66
	Option 72: Blue Line (2018 public consultation), dual	3.73	3.73
	Option 79: Pink Line (2018), single	3.69	3.75
	Option 80: Pink Line (2018), dual	3.82	3.82
Existing Link Upgrade	Option 75: Black line (2018 public consultation), existing route, single	3.81	3.81
	Option 76: Black line (2018 public consultation), existing route, dual	3.92	3.86

5.3.6. The result of the sensitivity testing demonstrates that, despite the strategic case scoring altering slightly for a number of options as a result of consolidating the scheme objectives, the outcome of the sifting process remained the same. Therefore, it has been demonstrated that reducing the overall number of objectives to a more presentable, manageable and SMART-orientated objectives group did not have an impact upon the outcome of the OAR and the subsequent work presented within the OSR and SOBC.

6 DEFINE GEOGRAPHIC AREA OF IMPACT

6.1 OVERVIEW

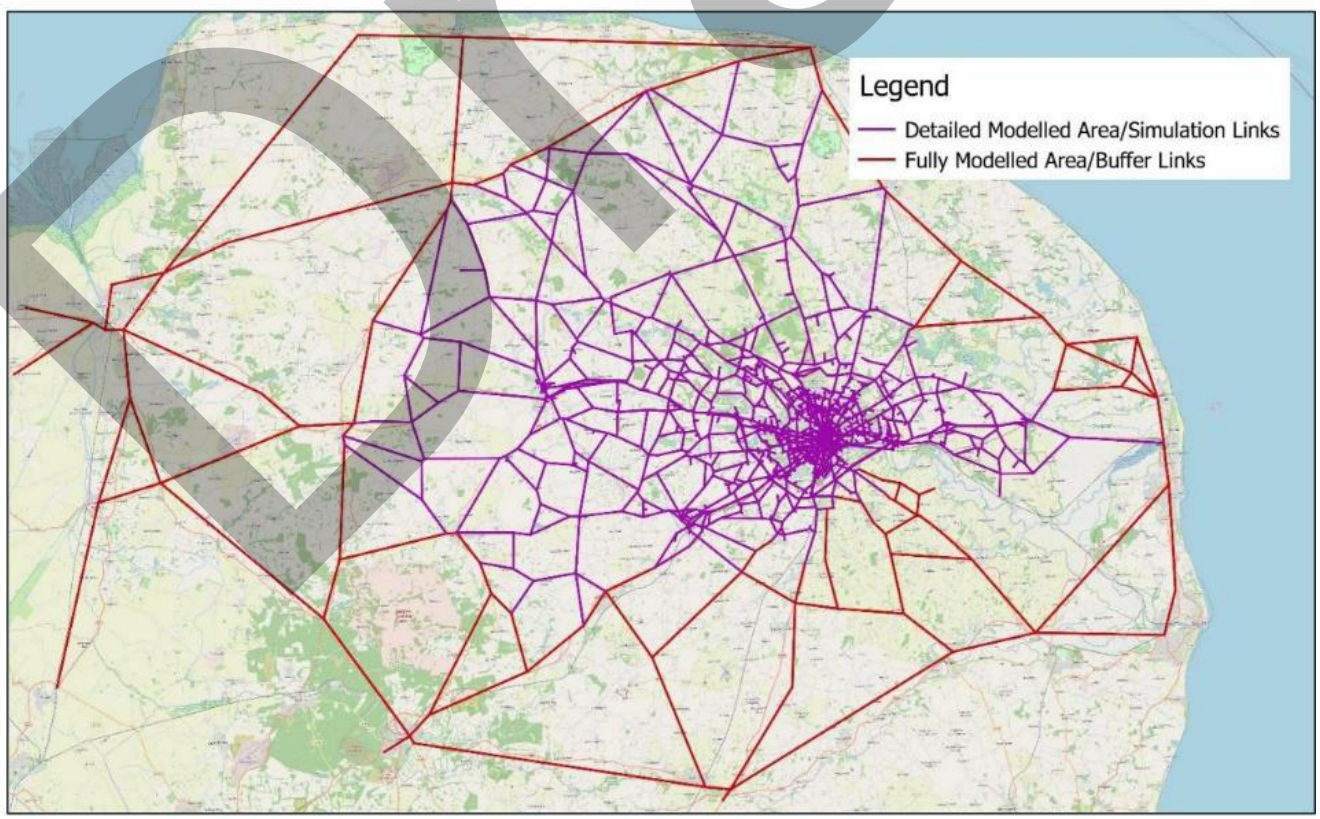
6.1.1. Chapter 5 of the OAR (Identifying Objectives & Geographic Scope) – forming Step 4b of the Transport Appraisal Process – identified the search area for potential options, which encompassed an area to the north-west of Norwich (the NWQ). The broad study area included the key radial routes of the A47, the A1074 (Dereham Road), and the A1067 (Drayton High Road / Fakenham Road) as well as the western fringe of Norwich and various settlements.

6.1.2. Since the production of the OAR, additional analysis has been undertaken to provide an understanding of the geographical scope of the current travel market and key origins and destinations in order to identify the potential geographic area of the interventions (following the sifting exercise).

6.2 AREA OF IMPACT

6.2.1. Following the sifting exercise, undertaken as a part of the OAR, a shortlist of three new highway link options, one existing link upgrade option and 10 non-highway options (to be included as part of a package within later stages of appraisal) were to be progressed for further appraisal. It was shown through this further assessment, that the selection of a highway option would better meet the project objectives, supporting both strategic and local movements. Due to the varying movements that would be accommodated by a new highway link (that will also form part of the MRN), it has been assumed that the area covered by the updated 2019 NATS Model – shown in **Figure 6-1** – represents the likely geographic area of impact of an NWL.

Figure 6-1 Modelled Area



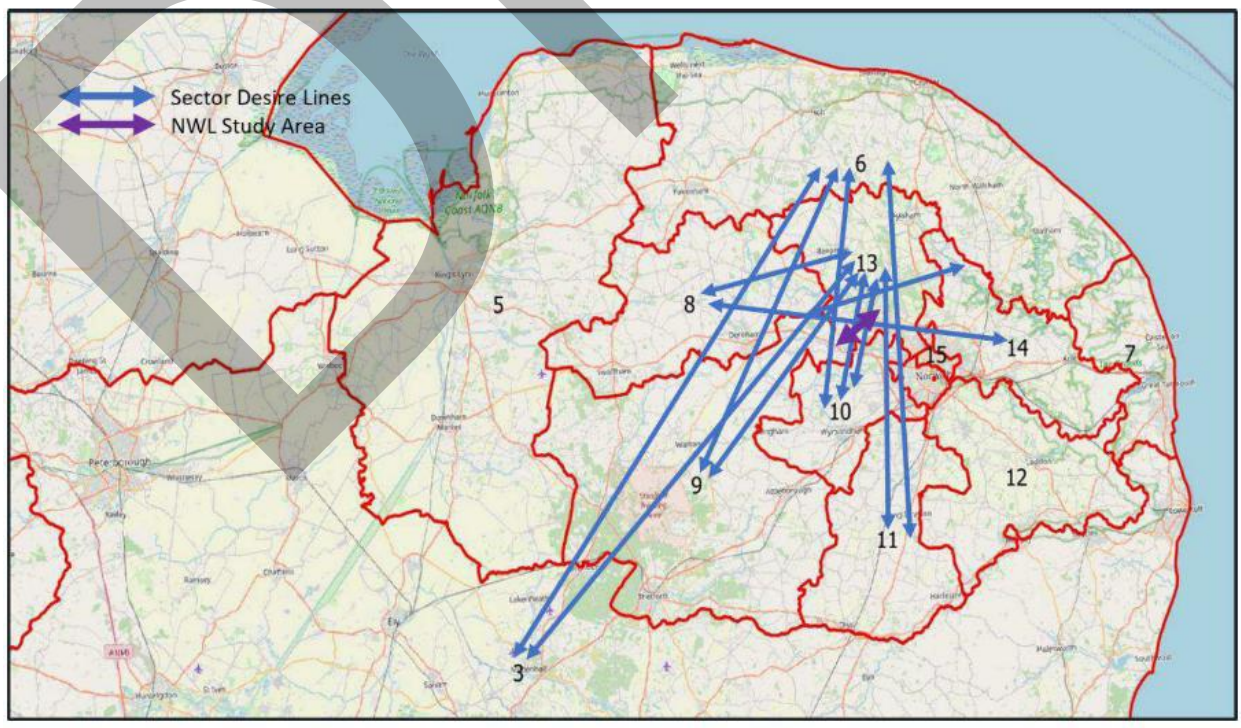
ORIGIN DESTINATION DATA

6.2.2. The model zoning system has been aggregated into 16 model sectors, which are listed in **Table 6-1** and displayed in **Figure 6-2**. Analysis has then been undertaken to assess the desire lines through each sector which would potentially be served by an NWL and the number of trips likely to reroute to a new link between the A47 and the A1067 through the NWQ.

Table 6-1 Model Sectors

Sector ID	Sector Description
1	Scotland/North
2	East/West Midlands (plus Wales)
3	South East (excluding London)
4	London
5	King's Lynn District
6	North Norfolk District
7	Great Yarmouth District
8	Breckland North (north of A47)
9	Breckland South (south of A47)
10	South Norfolk West (west of A11)
11	South Norfolk Central (between A11 and A140)
12	South Norfolk East (east of A140)
13	Broadland West (west of A140)
14	Broadland East (east of A140)
15	Norwich North (north of river)
16	Norwich South (south of river)

Figure 6-2 Local Model Sectors & Relevant Desire Lines



6.2.3. **Table 6-2** illustrates the number of trips (from 2019 observed Telefonica data) occurring between the nine key sectors that may encompass a desire line through the NWQ that could benefit from a new highway link. Those highlighted in red are the trips likely to re-route onto a NWL, with a desire line directly through the NWQ. This produces a two-way AADT demand of 51,334 trips per day travelling through the NWQ and an annual total of 15,400,207 two-way trips. This represents a conservative estimate as some other sector to sector movements may also include journeys through the NWQ.

Table 6-2 Origin-Destination AADT on Desire Lines Through the NWQ

		Sector Destination									
		3	6	8	9	10	11	13	14	15	Total
Sector Origin	3	14,260	**2,704**	2,408	22,915	3,694	13,368	**1,377**	2,960	1,279	64,967
	6	**2,666**	67,318	3,568	**1,142**	**1,403**	**257**	7,187	7,660	3,810	95,010
	8	1,947	3,364	17,697	6,647	2,924	409	**2,344**	**920**	828	37,081
	9	21,149	**1,014**	7,162	38,874	6,963	4,516	**1,172**	1,845	1,058	83,752
	10	3,373	**1,445**	2,857	6,091	15,578	3,859	**5,666**	7,107	5,372	51,348
	11	12,497	**349**	536	4,632	4,094	17,319	**790**	1,580	1,013	42,810
	13	**1,540**	7,283	**2,193**	**1,491**	**6,504**	**689**	**14,742**	11,317	5,734	51,492
	14	2,962	8,326	**929**	1,841	7,291	1,435	11,572	23,265	13,347	70,967
	15	1,516	3,748	809	1,074	5,269	1,050	6,575	12,456	6,030	38,527
	Total	61,911	95,550	38,158	84,706	53,719	42,903	51,425	69,110	38,472	535,954

Source: Telefonica, 2019

6.2.4. An NWL could support a significant number of local and strategic movements providing accessibility to a wide range of key facilities and services, whilst reducing the impact of travel through the NWQ on local highway networks, local communities and the surrounding environment. The number of trips is expected to grow into the future, with key areas across Norfolk forecasting high levels of employment and residential development. The transport system therefore requires future-proofing to support the level of future growth expected.

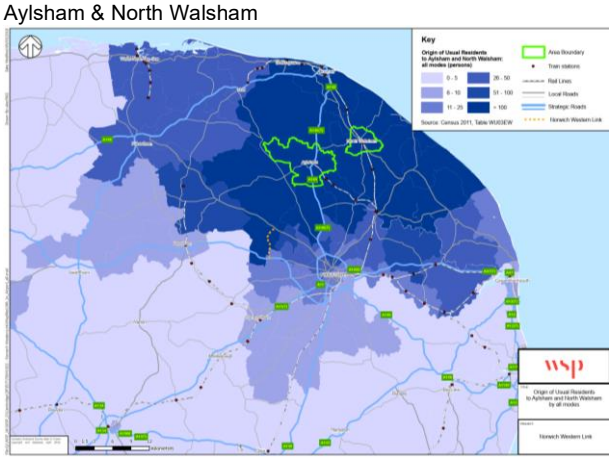
KEY DESTINATIONS

Employment

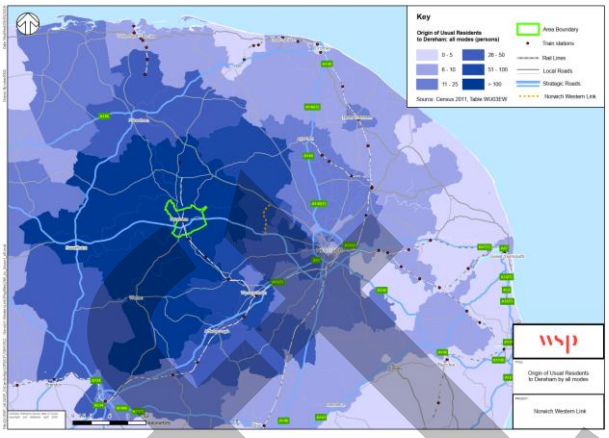
6.2.5. The OAR notes the location of key facilities, services and retail areas towards Norwich city centre, and close to the main urban populations in Norfolk. Local services are more dispersed to the west of the study area as it is more sparsely populated. The OAR, using 2011 Census journey to work data, displays the origins of usual residents to the key employment locations identified as Norwich International Airport, Lotus Factory, Norwich City Centre, NNUH, UEA and Attleborough / Wymondham. **Figure 6-3** demonstrates further key employment sites across the wider study area where there is potential for an NWL to assist with commuter journeys made by car.

Figure 6-3 Origins of Usual Residents to Various Key Employment Locations

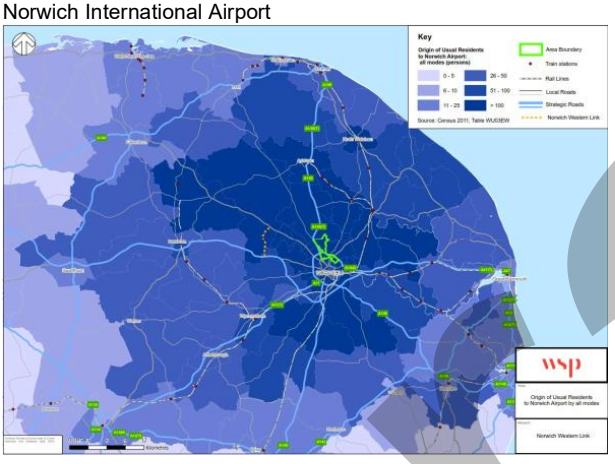
Aylsham & North Walsham



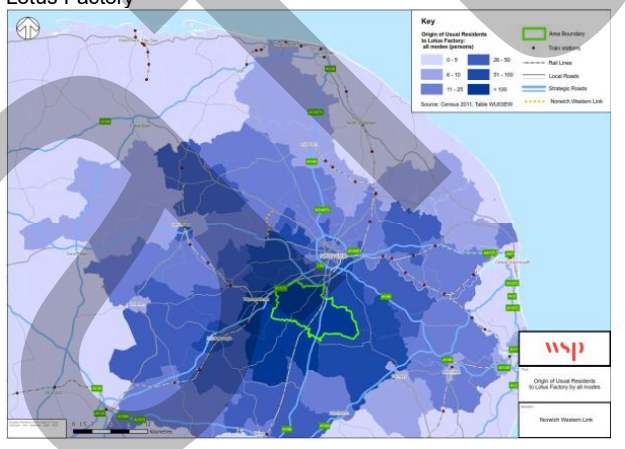
Dereham



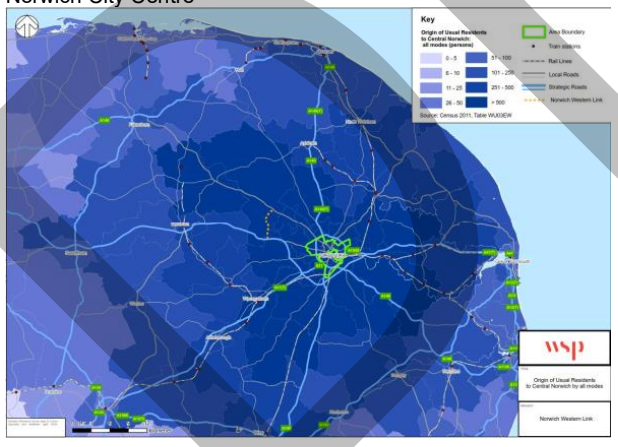
Norwich International Airport



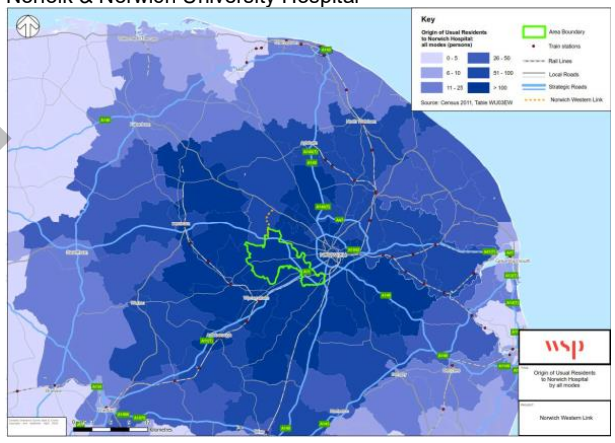
Lotus Factory



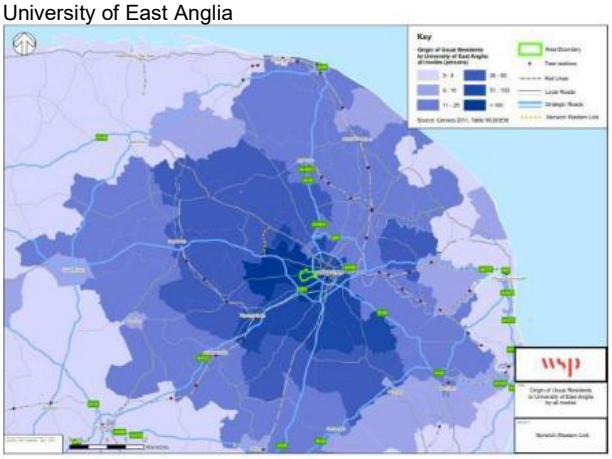
Norwich City Centre



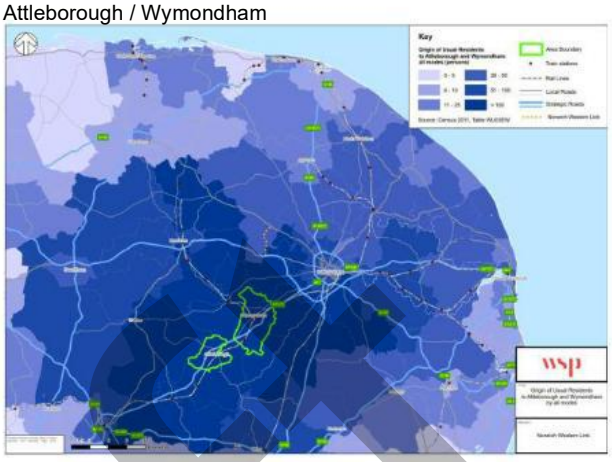
Norfolk & Norwich University Hospital



University of East Anglia



Attleborough / Wymondham



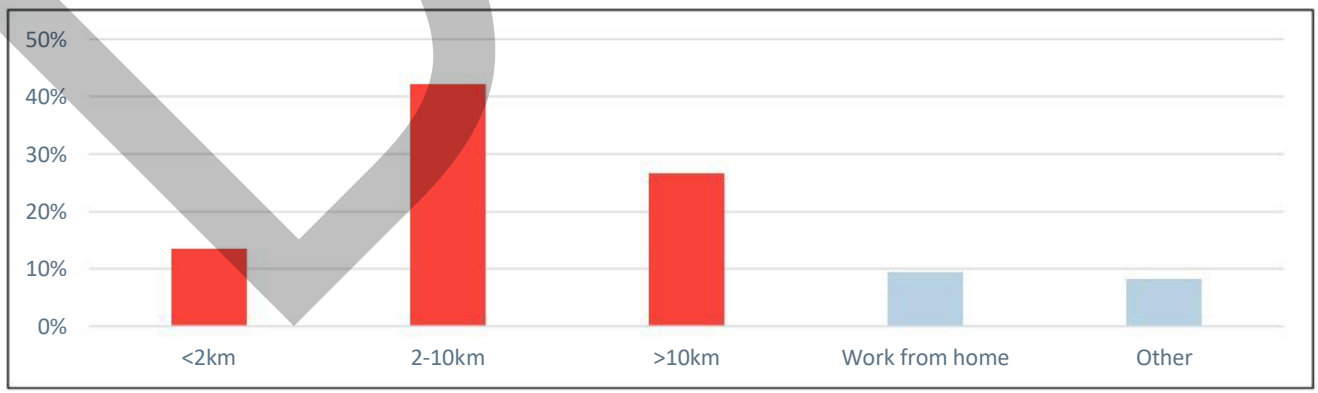
Source: Table WU03EW – Location of usual residence and place of work by method of travel to work (MSOA level), 2011 Census

6.2.6. The 2011 Census journey to work data indicates that a number of commuter journeys have potential desire lines through the NWQ, which could benefit from an NWL. In addition, key workplaces such as NNUH, UEA, Norwich Research Park, Norwich Airport and further afield location such as Aylsham and Dereham, attract a large proportion of journeys to work from the NWQ, and could benefit from a NWL, avoiding the need to use the local road network, or the outer ring road of Norwich to access the A11 heading south-west out of the city. An NWL could remove the need to travel through Norwich city centre, reducing journey times and making routes more direct.

DISTANCE TRAVELLED TO WORK

6.2.7. **Figure 6-4** shows that about 12% of journeys to work (by residents within parishes within the NWQ) are under 2km. This suggests that there are opportunities for encouraging modal shift – through the implementation of a wider package of measures supporting a new link road – to more sustainable forms of transport, although this alone is unlikely to fully address the problems identified in the study area. Over 65% of commuters travel more than 2km to work, with journeys in the longer distance band (>10km) likely to incorporate part of the MRN; therefore, there is a demand for improving strategic connectivity in the NWQ.

Figure 6-4 Average Distance Travelled to Work



Source: 2011 Census

6.2.8. The above highlights the need to define a large geographic area of impact, which has been input to the NATS Model to ensure that the scheme meets the aims of the project objectives.

Appendix A

TECHNICAL NOTE 10: NWL – REVIEW OF OBJECTIVES FOR STAGE 2

TECHNICAL NOTE 10

DATE:	16 January 2020	**CONFIDENTIALITY:**	Public
SUBJECT:	NWL – Review of Objectives		
PROJECT:	Norwich Western Link	**AUTHOR:**	SP EM LA
CHECKED:	SG	**APPROVED:**	LW/SG/PJC

REVIEW OF NWL OBJECTIVES FOR STAGE 2 OBC

This document has been prepared by WSP for Norfolk County Council (NCC), in order to record potential alterations to the Norwich Western Link (NWL) Business Case Objectives as the scheme moves forward to the Outline Business Case stage. It has been proposed in the joint NCC/ WSP lessons learned meeting that the current project objectives are reviewed to reduce the overall number of objectives to a more presentable, manageable and SMART-orientated objectives group in line with those typically required at OBC stage.

The NWL objectives were originally categorised at strategic and specific local scales, outlined below.

High Level Objectives

A range of objectives for the scheme were developed to align with high-level objectives presented in national, regional and local policy.

The NWL high-level objectives reflect issues and opportunities identified to support the principal aim of a modern and efficient transport system:

- H1 Support sustainable growth
- H2 Improve the quality of life for local communities
- H3 Support economic growth
- H4 Promote an improved environment
- H5 Improve strategic connectivity with the national road network

Specific Objectives

The specific objectives for the NWL were developed to both support the high-level objectives and respond to the local challenges identified and need for intervention and are outlined below:

- S1 Reduce congestion and delay, and improve journey time reliability, on routes through the study area
- S2 Improve network resilience and efficiency of the strategic and local transport network
- S3 Reduce the number of Heavy Goods Vehicles using minor roads
- S4 Make the transport network safer for all users (including Non-Motorised Users)
- S5 Encourage modal shift to more sustainable modes of transport
- S6 Provide traffic relief (and reduce noise & emissions) within residential areas
- S7 Enable improved accessibility to existing and new housing and employment sites
- S8 Improve emergency response times
- S9 Improve access to green space
- S10 Not affect the ecological integrity of the River Wensum SAC
- S11 Contribute to the improved health and well-being of local residents
- S12 Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and Norfolk & Norwich University Hospital
- S13 Minimise any detrimental impact on valued landscapes, the built environment and heritage assets, including through high quality design

OBC Objective Setting

The Department for Transport's *TRANSPORT ANALYSIS GUIDANCE, The Transport Appraisal Process* (May 2018) states that operational and intermediate objectives should generally be as SMART (Specific; Measurable; Accepted; Realistic; Time-defined) as possible given the nature of the evidence available at this stage of the process. Where appropriate, they should also be capable of quantification into specific targets by the end of Stage 1 Strategic Outline Business Case. High level or strategic objectives may need to be expressed in broader, more qualitative terms.

Objectives may need to evolve as further evidence is collected later in Stage 1. For example, assessment of options in Step 7 of Stage 1 – Option Development, might identify new environmental constraints which need to be reflected in the objectives.

The objectives defined here will influence the focus of the appraisal methodology specified in Step 9, and undertaken in Stage 2 – Further Appraisal.

REVIEW OF HIGH LEVEL OBJECTIVES

After consideration of the individual High Level Objectives, it was determined that *H1 Support sustainable growth* and *H3 Support economic growth* were closely related and could be condensed into a single high-level objective, *H1 Support sustainable economic growth* with the emphasis now placed on the encouragement of sustainable economic growth.

REVIEW OF SPECIFIC OBJECTIVES

A review was undertaken of specific objectives, identifying whether they were of a SMART nature or had relationships with other objectives which may allow for combinations. These are summarised below.

Objective	Type	SMART	Relationship
S1 Reduce congestion and delay, and improve journey time reliability, on routes through the study area	Speed journey time	SMART	S3 S8
S2 Improve network resilience and efficiency of the strategic and local transport network	Resilience	Hard to measure	None
S3 Reduce the number of Heavy Goods Vehicles using minor roads	Vehicular flow	SMART	S1
S4 Make the transport network safer for all users (including Non-Motorised Users)	Accidents	SMART	S1 S11
S5 Encourage modal shift to more sustainable modes of transport	Modal shift	Difficult to measure	S3
S6 Provide traffic relief (and reduce noise & emissions) within residential areas	Vehicular flow and environmental impact	SMART	S1 S3 S10 S13

Objective	Type	SMART	Relationship
S7 Enable improved accessibility to existing and new housing and employment sites	Accessibility	SMART	S9 S12
S8 Improve emergency response times	Speed Journey time	SMART	S1
S9 Improve access to green space	Accessibility	SMART	S12
S10 Not affect the ecological integrity of the River Wensum SAC	Environmental Impact	SMART through Biodiversity	S6 S13
S11 Contribute to the improved health and wellbeing of local residents	Wellbeing	NON- SMART	S4
S12 Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and Norfolk & Norwich University Hospital	Accessibility	SMART	S1 S2 S4 S5 S7 S8 S9
S13 Minimise any detrimental impact on valued landscapes, the built environment and heritage assets, including through high quality design	Environmental Impact	SMART	S6

The core themes represented by the original objectives include journey times together with speed, delay and congestion, resilience, vehicular flow related to vehicle type, accidents and wellbeing, environmental impacts and accessibility.

There is currently ongoing debate over the ability to both measure and forecast network resilience, including on possible methodologies which may be applied. Currently no definitive and agreed upon methodology exists and, therefore, *S2 Improve network resilience and efficiency of the strategic and local transport network* has been removed. While improved network resilience has been removed as an objective is has been included as a strategic outcome of *S1 Improve connectivity and journey times on key routes within the Greater Norwich area.* as it is assumed that the provision of a new link will in itself increase local resilience of the network as an outcome of the scheme.

The remaining 11 original specific objectives have been condensed into six new objectives and associated strategic outcomes to deliver a more transparent and measurable set of objectives.

Specific intermediate Objectives	Strategic Outcomes	Method of measure
S1 Improve connectivity and journey times on the key routes within the Greater Norwich area.	▪ Improve journey time and Journey time reliability, on routes through the area west of Norwich ▪ Reduce congestion and delay through the area west of Norwich ▪ Reassignment of traffic away from existing routes reducing delay and congestion improving existing accessibility. ▪ Reduce emergency response times	▪ Modelled outputs of speed flow and delay ▪ Survey Data, traffic count & Journey Time ▪ Improved journey time between key origins and destinations

Specific intermediate Objectives	Strategic Outcomes	Method of measure
	▪ Improve network resilience ▪ Provide a more suitable direct route for HGV/LGV vehicles. ▪ Reduce trips on local minor roads for vehicular traffic.	
	▪	▪
S2 Reduce the impacts of traffic on people and places within the Western area of Greater Norwich	▪ Reassignment of trips onto appropriate routes ▪ Reduce noise in local communities overall in the western area of Greater Norwich ▪ Reduce net emissions of CO2 and other greenhouse gases in local communities overall in the area west of Norwich ▪ Improve NMU connectivity ▪ Improve air quality, especially in the built-up areas of West Norwich ▪ Minimise traffic impacts on local residents during construction	▪ Modelled Noise and Emissions outputs ▪ Survey Data – traffic counts ▪ Air Monitoring stations ▪ Construction Environmental Management Plan
S3 Encourage and support walking, cycling and public transport use in Greater Norwich	▪ Increase in number of trips taken by walking, cycling and public transport over current levels ▪ Increase access to public transport, walking and cycling facilities	▪ Modal Shift – VDM outputs
S4 Improve safety on and near the road network, especially for pedestrians and cyclists	▪ Reduce overall network accident rate ▪ Reduce the number of people killed or seriously injured on roads in the area west of Norwich ▪ Minimise highway safety impacts and severance during construction	▪ COBALT outputs, STATS 19 data ▪ Construction Environmental Management Plan
S5 Protect the natural and built environment including the integrity of the River Wensum SAC.	▪ Biodiversity net gain ▪ Minimise impact on landscape ▪ Minimise impact on heritage ▪ Not affect the integrity of the River Wensum SAC ▪ Reduce carbon emissions to contribute to the Council's net zero aspiration by 2030 ▪ Minimise impact of scheme on Climate change ▪ Minimise adverse environmental impacts arising from construction	▪ Key environmental outputs ▪ Construction Environmental Management Plan ▪ High quality design
S6 Improve accessibility to key sites in Greater Norwich	▪ Improve accessibility to Norwich International Airport, Norfolk & Norwich University Hospital and key employment, housing and education sites ▪ Improve accessibility to green areas ▪ Improve access to the cycle and Public Right of Way network	▪ Modelled outputs of speed, flow and delay ▪ Survey Data, journey times ▪ GIS-based isochrone analysis of accessibility for key land uses.

Summary

The existing objectives for the Norwich Western Link have been considered in the context of the preferred option and stage 2 of the Outline Business Case. Initially 5 High Level Objectives and 13 Specific

Objectives existed. These have now been refined to four High Level Objectives (which tie in with national objectives) and six Specific Objectives (which consider desired outcomes at a regional and localised level) with improved network resilience included as an objective of S1 Improve connectivity and journey times on the key routes within the Greater Norwich area.

The NWL Project Board have also been consulted on proposed revisions to the scheme Objectives and their comments incorporated. The suggestion to include a specific objective about construction was considered but was concluded to be more appropriate as a strategic outcome since the reduced objectives are sufficiently comprehensive to include both the construction and operational phases of the scheme. NCC recently adopted policy on Carbon Emissions Targets for 2030 are also acknowledged in the strategic outcomes for S5 and S2. The geographic scope of some objectives has also been widened to Greater Norwich, rather than just west of Norwich to allow a more comprehensive assessment of scheme benefits.

HIGH LEVEL OBJECTIVES

- *H1 Support sustainable economic growth*
- *H2 Improve the quality of life for local communities*
- *H3 Promote an improved environment*
- *H4 Improve strategic connectivity with the national road network*

SPECIFIC OBJECTIVES

- S1 Improve connectivity and journey times on key routes within the Greater Norwich area.
- S2 Reduce the impacts of traffic on people and places within the Western area of Greater Norwich.
- S3 Encourage and support walking, cycling and public transport use in Greater Norwich.
- S4 Improve safety on and near the road network, especially for pedestrians and cyclists.
- S5 Protect the natural and built environment, including the integrity of the River Wensum SAC.
- S6 Improve accessibility to key sites in Greater Norwich.

These revised objectives will be adopted during the ongoing Outline Business Case stage once agreed by the NWL Project Board.

Appendix B

EAST SENSITIVITY TEST

Key	New High Level Objectives	Support sustainable economic growth									
1 - Unlikely to address the objective and may result in a negative impact 2 - Slightly / partially address the objective having a modest overall impact 3 - Moderately / somewhat addresses the objective having a reasonably significant impact 4 - Significantly / largely addresses the objective 5 - Fully addresses the objective	Superseded High Level Objectives	Support economic growth	Support sustainable growth	New Average	Unchanged High Level Objectives	Improve the quality of life for local communities	Protect and enhance the natural environment	Improve strategic connectivity with the national road network	Old Average Score	New Average Score	Difference
Name/No.											
Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway		4	3	4		3	3	3	3	3	0
Option 2: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), dual carriageway		5	3	4		4	3	3	4	4	0
Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway		4	3	4		3	3	4	3	4	1
Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway		5	3	4		4	3	5	4	4	0
Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway		4	5	5		3	3	4	4	4	0
Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway		5	4	5		4	3	5	4	4	0
Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway		4	4	4		3	3	4	4	4	0
Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, dual carriageway		5	4	5		5	3	5	4	5	1
Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway		4	4	4		3	3	4	4	4	0
Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway		5	5	5		4	3	5	4	4	0
Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway		4	4	4		3	3	4	4	4	0
Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway		5	5	5		4	3	5	4	4	0
Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway		4	3	4		3	3	4	3	4	1
Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway		5	4	5		4	3	5	4	4	0
Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway		4	3	4		3	3	4	3	4	1
Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway		5	4	5		4	3	5	4	4	0
Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway		4	4	4		3	3	4	4	4	0
Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway		5	5	5		4	3	5	4	4	0
Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway		4	4	4		3	3	4	4	4	0
Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway		5	5	5		4	3	5	4	4	0
Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway		4	4	4		3	3	4	4	4	0
Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway		5	5	5		4	3	5	4	4	0
Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway		4	4	4		3	3	4	4	4	0
Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway		5	5	5		4	3	5	4	4	0
Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway		4	5	5		3	3	4	4	4	0
Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway		5	5	5		4	3	5	4	4	0
Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway		4	3	4		3	3	4	3	4	1
Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway		5	3	4		4	3	5	4	4	0
Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway		4	3	4		3	3	4	3	4	1
Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway		5	3	4		4	3	5	4	4	0
Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway		4	3	4		3	3	4	3	4	1
Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway		5	3	4		4	3	5	4	4	0
Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway		4	4	4		3	3	4	4	4	0
Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway		5	4	5		4	3	5	4	4	0
Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway		4	4	4		3	3	4	4	4	0
Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway		5	4	5		4	3	5	4	4	0
Option 37: Tolled routes / bridges		2	1	2		1	3	1	2	2	0
Option 38: Improvements to existing routes		3	4	4		3	4	1	3	3	0
Option 39: Improvements to existing junctions		4	3	4		3	4	1	3	3	0
Option 40: Signing and lining improvements		4	3	4		3	4	1	3	3	0
Option 41: Signal improvements		3	2	3		3	3	1	2	3	1
Option 42: Speed limit changes		2	1	2		3	4	1	2	3	1
Option 43: Directional traffic management schemes		2	1	2		3	4	1	2	3	1
Option 44: New / improved crossing points		2	3	3		4	4	1	3	3	0
Option 45: New wider footpath		2	2	2		3	4	1	2	3	1
Option 46: New cycling links to key facilities and services		2	2	2		3	3	1	2	2	0
Option 47: Cycle parking facilities		3	1	2		3	4	1	2	3	1
Option 48: New orbital bus route		3	4	4		3	5	1	3	3	0
Option 49: Improvements to existing bus services (28, 29 and X29)		3	4	4		4	4	1	3	3	0
Option 50: Improvements to existing bus services (23, 23A, 24 and 24A)		3	4	4		4	5	1	3	4	1
Option 51: Improved public transport information: real-time app		3	4	4		4	5	1	3	4	1
Option 52: Improved public transport information: real-time information at stops		3	4	4		4	4	1	3	3	0
Option 53: Update the digital road map		4	4	4		4	5	1	4	4	0
Option 54: Develop local cycling and walking infrastructure plan		3	2	3		4	4	1	3	3	0
Option 55: Promote cycling schemes		3	2	3		4	4	1	3	3	0
Option 56: Develop green lung schemes		1	1	1		4	4	1	2	3	1
Option 57: Bike-on-bus schemes		3	3	3		4	4	1	3	3	0
Option 58: Mobility as a service scheme		4	3	4		4	4	1	3	3	0
Option 59: Light rail		4	3	4		4	3	1	3	3	0
Option 60: Very light rail		4	3	4		4	5	1	3	4	1
Option 61: Offline busway		4	3	4		4	4	1	3	3	0
Option 62: New orbital rail line		4	4	4		4	4	1	3	3	0
Option 63: Inner ring road widening		3	3	3		4	3	1	3	3	0
Option 64: Provision of sprint services: A47 / A1074		3	3	3		4	4	1	3	3	0
Option 65: Provision of sprint services: A1067 corridor		3	3	3		4	4	1	3	3	0
Option 66: Provision of a sustainable urban distribution centre		5	4	5		3	4	1	3	3	0
Option 67: Provision of improved freight route intelligence		5	4	5		3	4	1	3	3	0
Option 68: Lorry management strategy		5	4	5		3	3	1	3	3	0
Option 69: Purple line (2018 public consultation), single carriageway		4	4	4		3	3	4	4	4	0
Option 70: Purple line (2018 public consultation), dual carriageway		5	4	5		4	3	5	4	4	0
Option 71: Blue line (2018 public consultation), single carriageway		4	4	4		3	3	4	4	4	0
Option 72: Blue line (2018 public consultation), dual carriageway		5	4	5		4	3	5	4	4	0
Option 73: Relay Fakenham to Norwich rail line		4	2	3		4	4	1	3	3	0
Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport		4	4	4		4	3	1	3	3	0
Option 75: Black line (2018 public consultation), existing route, single carriageway		4	3	4		4	3	2	3	3	0
Option 76: Black line (2018 public consultation), existing route, dual carriageway		4	3	4		4	3	2	3	3	0
Option 77: Outer ring road widening		4	4	4		4	2	2	3	3	0
Option 78: Do nothing		1	2	2		1	3	1	2	2	0
Option 79: Pink line (2018), single carriageway		4	3	4		3	3	4	3	4	1
Option 80: Pink line (2018), dual carriageway		4	3	4		4	3	5	4	4	0
Option 81: Yellow line (2018), single carriageway		4	4	4		3	3	4	4	4	0
Option 82: Yellow line (2018), dual carriageway		5	4	5		4	3	5	4	4	0

Key	New Specific Objectives	Objectives																				Old Average Score	New Average Score	Difference
		Improve connectivity and journey times on key routes within the Greater Norwich area				Reduce the impacts of traffic on people and places within the Western area of Greater Norwich				Encourage and support walking, cycling and public transport use in Greater Norwich		Improve safety on and near the road network, especially for pedestrians and cyclists		Protect the natural and built environment, including the integrity of the River Wensum SAC		Improve accessibility to key sites in Greater Norwich						
1 - Unlikely to address the objective and may result in a negative impact		Reduce congestion and delay, and improve journey time reliability on routes through the study area	Improve network resilience and efficiency of the strategic and local transport network	Improve emergency response times	New Average	Reduce the number of Heavy Goods Vehicles using minor roads	Provide traffic relief (and reduce noise & emissions) within residential areas	Contribute to the improved health and well-being of local residents	New Average	Encourage modal shift to more sustainable modes of transport	New Average	Make the transport network safer for all users (including Non-Motorised Users)	New Average	Not affect the ecological integrity of the River Wensum Valley Special Area of Conservation	New Average	Enable improved accessibility to existing and new housing and employment sites	Improve access to green space	Improve connectivity and accessibility to Norwich International Airport, Norwich Research Park and NNUH	New Average			
2 - Slightly / partially address the objective having a modest overall impact	Superseded Specific Objectives																						
3 - Moderately / somewhat addresses the objective having a reasonably significant impact																							
4 - Significantly / largely addresses the objective																							
5 - Fully addresses the objective																							
Name/No.																							
Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	3	4	4	4	4	4	4	0
Option 2: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	4	5	4	4	4	4	4	0
Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	4	4	2	3	4	4	3	-1
Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	2	4	4	4	4	0
Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	4	4	2	3	4	4	3	-1
Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	4	5	2	4	4	4	4	0
Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	4	5	4	4	0
Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	3	4	4	4	4	0
Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	3	4	4	4	4	0
Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	3	4	4	4	4	0
Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	3	4	4	4	4	0
Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	3	4	4	4	4	0
Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	3	4	4	4	4	0
Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	3	4	4	4	4	0
Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	3	4	4	4	4	0
Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway		3	3	4	3	2	5	3	3	2	2	4	4	4	4	5	4	4	4	4	4	3	-1
Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway		4	5	5	5	3	5	3	4	2	2	4	4	4	4	5	5	4	5	4	4	4	0
Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway		4	4	4	4	4	3	3	3	2	2	4	4	3	3	3	4	1	3	3	3	3	0
Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway		5	5	5	5	5	4	3	4	2	2	4	4	3	3	5	5	1	3	4	4	4	0
Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway		4	4	4	4	4	4	3	4	2	2	4	4	3	3	4	4	2	3	4	4	3	-1
Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway		5	5	5	5	5	4	3	4	2	2	4	4	3	3	4	5	2	4	4	4	4	0
Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway		4	4	4	4	4	4	3	4	2	2	4	4	3	3	4	4	2	3	4	4	3	-1
Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway		5	5	5	5	5	4	3	4	2	2	4	4	3	3	4	5	2	4	4	4	4	0
Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway		4	4	4	4	4	5	3	4	2	2	4	4	3	3	5	4	4	4	4	4	4	0
Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway		5	5	5	5	5	5	3	4	2	2	4	4	3	3	5	5	4	5	4	4	4	0
Option 37: Tolled routes / bridges		1	1	1	1	5	1	4	3	1	1	3	3	5	5	1	1	1	1	2	2	0	
Option 38: Improvements to existing routes		3	3	3	3	5	1	3	3	2	2	3	3	5	5	2	3	3	3	3	3	0	
Option 39: Improvements to existing junctions		3	3	4	3	5	3	3	4	2	2	4	4	5	5	3	3	3	3	3	4	1	
Option 40: Signing and lining improvements		3	3	3	3	5	3	3	4	1	1	4	4	5	5	1	3	3	2	3	3	0	
Option 41: Signal improvements		4	4	4	4	1	2	1	1	4	4	4	4	3	3	1	1	1	1	2	2	0	
Option 42: Speed limit changes		1	1	1	1	5	4	5	5	4	4	4	4	3	3	1	1	1	1	3	3	0	
Option 43: Directional traffic management schemes		1	1	1	1	5	4	5	5	3	3	4	4	3	3	1	1	1	1	3	3	0	
Option 44: New / improved crossing points		1	1	1	1	1	4	5	3	4	4	4	4	3	3	2	3	2	2	3	3	0	
Option 45: New wider footpath		1	1	1	1	1	3	4	3	4	4	4	4	3	3	2	3	2	2	2	3	1	
Option 46: New cycling links to key facilities and services		2	1	1	1	1	3	5	3	5	5	4	4	3	3	2	3	2	2	3	3	0	
Option 47: Cycle parking facilities		1	1	1	1	1	3	4	3	5	5	1	1	5	5	2	3	2	2	2	3	1	
Option 48: New orbital bus route		3	1	1	2	1	4	4	3	5	5	3	3	5	5	2	3	5	3	3	4	1	
Option 49: Improvements to existing bus services (28, 29 and X29)		3	2	1	2	1	4	4	3	5	5	3	3	5	5	2	3	3	3	3	4	1	
Option 50: Improvements to existing bus services (23, 23A, 24 and 24A)		3	2	1	2	1	4	4	3	5	5	3	3	5	5	2	3	3	3	3	4	1	
Option 51: Improved public transport information: real-time app		3	2	1	2	1	4	4	3	4	4	3	3	4	4	2	3	3	3	3	3	0	
Option 52: Improved public transport information: real-time information at stops		3	2	1	2	1	4	4	3	4	4	3	3	3	3	2	3	3	3	3	3	0	
Option 53: Update the digital road map		4	4	3	4	4	4	3	4	1	1	4	4	3	3	4	3	3	3	3	3	0	
Option 54: Develop local cycling and walking infrastructure plan		1	2	1	1	1	2	5	3	5	5	2	2	5	5	1	3	1	2	2	3	1	
Option 55: Promote cycling schemes		1	2	1	1	1	2	5	3	5	5	2	2	5	5	1	3	1	2	2	3	1	
Option 56: Develop green lung schemes		1	1	1	1	1	2	5	3	3	3	2	2	5	5	3	5	1	3	3	3	0	
Option 57: Bike-on-bus schemes		2	2	1	2	1	2	5	3	5	5	2	2	5	5	3	3	2	3	3	3	0	
Option 58: Mobility as a service scheme		2	2	1	2	1	2	3	2	5	5	4	4	5	5	4	3	2	3	3	4	1	
Option 59: Light rail		3	2	1	2	1	3	3	2	5	5	2	2	2	2	3	3	2	3	3	3	0	
Option 60: Very light rail		3	2	1	2	1	3	3	2	5	5	2	2	2	2	3	3	2	3	3	3	0	
Option 61: Offline busway		3	2	1	2	1	3	3	2	5	5	4	4	3	3	3	3	2	3	3	3	0	
Option 62: New orbital rail line		3	2	1	2	1	3	3	2	5	5	2	2	3	3	3	3	4	3	3	3	0	
Option 63: Inner ring road widening		3	2	4	3	2	2	1	2	1	1	1	1	5	5	2	3	3	3	2	3	1	
Option 64: Provision of sprint services: A47 / A1074		4	3	1	3	1	3	3	2	5	5	3	3	5	5	3	3	2	3	3	4	1	
Option 65: Provision of sprint services: A1067 corridor		4	3	1	3	1	3	3	2	5	5	3	3	5	5	3	3	2	3	3	4	1	
Option 66: Provision of a sustainable urban distribution centre		3	3	3	3	5	5	5	5	1	1	4	4	4	4	1	2	1	1	3	3	0	
Option 67: Provision of improved freight route intelligence		3	3	3	3	5	5	4	5	1	1	4	4	4	4	1	2	1	1	3	3	0	
Option 68: Lorry management strategy		3	4	3	3	5	5	4	5	1	1	4	4	4	4	1	2	1	1	3	3	0	
Option 69: Purple line (2018 public consultation), single carriageway		4	4	4	4	5	4	4	4	2	2	3	3	3	3	3	4	4	4	4	3	-1	
Option 70: Purple line (2018 public consultation), dual carriageway		5	5	5	5	5	4	4	4	2	2	3	3	3	3	3	5	4	4	4	4	0	
Option 71: Blue line (2018 public consultation), single carriageway		4	4	4	4	5	4	4	4	2	2	3	3	3	3	3	4	4	4	4	3	-1	
Option 72: Blue line (2018 public consultation), dual carriageway		5	5	5	5	5	4	4	4	2	2	3	3	3	3	3	5	4	4	4	4	0	
Option 73: Relay Fakenham to Norwich rail line		3	3	1	2	3	4	3	3	5	5	3	3	4	4	2	3	1	2	3	3	0	
Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport		3	3	1	2	3	3	3	3	5	5	3	3	5	5	4	3	5	4	3	4	1	
Option 75: Black line (2018 public consultation), existing route, single carriageway		3	3	2	3	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	0	
Option 76: Black line (2018 public consultation), existing route, dual carriageway		4	4	2	3	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	3	-1	
Option 77: Outer ring road widening		3	4	4	4	4	4	3	4	1	1	2	2	5	5	1	2	3	2	3	3	0	
Option 78: Do nothing		1	1	1	1	1	1	2	1	1	1	1	1	3	3	1	1	2	1	1	1	0	
Option 79: Pink line (2018), single carriageway		4	4	3	4	4	4	3	4	2	2	4	4	3	3	3	4	3	3	3	4	0	
Option 80: Pink line (2018), dual carriageway		5	5	4	5	5	4	3	4	2	2	4	4	4	4	4	5	3	4	4	4	0	
Option 81: Yellow line (2018), single carriageway		4	4	3	4	4	4	3	4	2	2	4	4	3	3	3	4	4	4	4	4	0	
Option 82: Yellow line (2018), dual carriageway		5	5	4	5	5	4	3	4	2	2	4	4	3	3	4	5	4	4	4	4	0	

Option	Description	Strategic			Economic			Managerial			Financial			Commerical			Environmental			Total		
		Old	New	Difference	Old	New	Difference	Old	New	Difference	Old	New	Difference	Old	New	Difference	Old	New	Difference	Old	New	Difference
Opt 1	Option 1: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), single carriageway	0.73	0.73	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.53	0.53	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.60	3.60	0.00
Opt 2	Option 2: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (1A), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.73	0.00
Opt 3	Option 3: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), single carriageway	0.80	0.80	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.53	0.53	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.66	3.66	0.00
Opt 4	Option 4: A1067 Attlebridge to A47 west of Honingham; 2014 Purple (2A), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.73	0.00
Opt 5	Option 5: A1067 Attlebridge to A47 west of Easton; 2014 Brown, single carriageway	0.87	0.80	**-0.07**	0.65	0.65	0.00	0.80	0.80	0.00	0.53	0.53	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.66	**-0.07**
Opt 6	Option 6: A1067 Attlebridge to A47 west of Easton; 2014 Brown, dual carriageway	0.87	0.87	0.00	0.75	0.75	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.78	3.78	0.00
Opt 7	Option 7: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, single carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.73	0.00
Opt 8	Option 8: A1067 (west of A1067 / A1270 junction) to A47 west of Easton; 2014 Red, dual carriageway	0.87	0.93	**0.07**	0.80	0.80	0.00	0.80	0.80	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.77	3.84	**0.07**
Opt 9	Option 9: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), single carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.67	3.67	0.00
Opt 10	Option 10: A1067 (east of A1067 / A1270 junction) to A47 west of Easton; 2014 Blue (1), dual carriageway	0.87	0.87	0.00	0.80	0.80	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.67	3.67	0.00
Opt 11	Option 11: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), single carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.62	3.62	0.00
Opt 12	Option 12: A1067 / A1270 junction to A47 west of Easton; 2014 Blue (2), dual carriageway	0.87	0.87	0.00	0.80	0.80	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.67	3.67	0.00
Opt 13	Option 13: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), single carriageway	0.80	0.87	**0.07**	0.65	0.65	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.50	3.57	**0.07**
Opt 14	Option 14: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (1), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 15	Option 15: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), single carriageway	0.80	0.87	**0.07**	0.65	0.65	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.50	3.57	**0.07**
Opt 16	Option 16: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (2), dual carriageway	0.87	0.87	0.00	0.75	0.75	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.62	3.62	0.00
Opt 17	Option 17: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 18	Option 18: A1067 (east of A1067 / A1270 junction) to A47 / A1074 Longwater interchange; 2014 Orange (3), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 19	Option 19: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.52	3.52	0.00
Opt 20	Option 20: A1067 / A1270 junction to A47 / A1074 Longwater interchange; 2014 Orange (4), dual carriageway	0.87	0.87	0.00	0.75	0.75	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.62	3.62	0.00
Opt 21	Option 21: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 22	Option 22: A1067 (east of A1067 / A1270 junction) to A1074 east of Longwater; 2014 Orange (5), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 23	Option 23: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.80	0.80	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 24	Option 24: A1067 / A1270 junction to A1074 east of Longwater; 2014 Orange (6), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.32	0.32	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.57	3.57	0.00
Opt 25	Option 25: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, single carriageway	0.87	0.80	**-0.07**	0.60	0.60	0.00	0.67	0.67	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.44	3.37	**-0.07**
Opt 26	Option 26: A140 / A1270 junction to A1074 east of Longwater; 2014 Green, dual carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.67	0.67	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.44	3.44	0.00
Opt 27	Option 27: North Tuddenham via Attlebridge; 2018 Road Alignment (1), single carriageway	0.73	0.80	**0.07**	0.65	0.65	0.00	0.67	0.67	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.50	3.57	**0.07**
Opt 28	Option 28: North Tuddenham via Attlebridge; 2018 Road Alignment (1), dual carriageway	0.87	0.87	0.00	0.75	0.75	0.00	0.67	0.67	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.68	3.68	0.00
Opt 29	Option 29: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), single carriageway	0.80	0.80	0.00	0.65	0.65	0.00	0.73	0.73	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.54	3.54	0.00
Opt 30	Option 30: A47 Honingham to Attlebridge (1); 2018 Road Alignment (2), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.73	0.00
Opt 31	Option 31: A47 to Attlebridge (2), 2018 Road Alignment (3), single carriageway	0.80	0.80	0.00	0.65	0.65	0.00	0.73	0.73	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.54	3.54	0.00
Opt 32	Option 32: A47 to Attlebridge (2), 2018 Road Alignment (3), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.67	3.67	0.00
Opt 33	Option 33: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.67	0.67	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.49	3.49	0.00
Opt 34	Option 34: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (4), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.67	0.67	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.49	3.49	0.00
Opt 35	Option 35: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), single carriageway	0.87	0.87	0.00	0.65	0.65	0.00	0.67	0.67	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.49	3.49	0.00
Opt 36	Option 36: A47 Easton to A1067 / A1270 junction; 2018 Road Alignment (5), dual carriageway	0.87	0.87	0.00	0.75	0.75	0.00	0.67	0.67	0.00	0.37	0.37	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.54	3.54	0.00
Opt 37	Option 37: Tolled routes / bridges	0.40	0.40	0.00	0.30	0.30	0.00	0.67	0.67	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.08	3.08	0.00
Opt 38	Option 38: Improvements to existing routes	0.67	0.67	0.00	0.65	0.65	0.00	0.67	0.67	0.00	0.58	0.58	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.59	3.59	0.00
Opt 39	Option 39: Improvements to existing junctions	0.67	0.73	**0.07**	0.65	0.65	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.63	3.70	**0.07**
Opt 40	Option 40: Signing and lining improvements	0.67	0.67	0.00	0.65	0.65	0.00	0.73	0.73	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.91	3.91	**0.00**
Opt 41	Option 41: Signal improvements	0.47	0.53	**0.07**	0.65	0.65	0.00	0.67	0.67	0.00	0.74	0.74	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.69	3.76	**0.07**
Opt 42	Option 42: Speed limit changes	0.40	0.47	**0.07**	0.50	0.50	0.00	0.47	0.47	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.22	3.29	**0.07**
Opt 43	Option 43: Directional traffic management schemes	0.40	0.47	**0.07**	0.45	0.45	0.00	0.40	0.40	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.11	3.17	**0.07**
Opt 44	Option 44: New / improved crossing points	0.60	0.60	0.00	0.65	0.65	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.71	3.71	0.00
Opt 45	Option 45: New wider footpath	0.47	0.60	**0.13**	0.60	0.60	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.32	3.46	**0.13**
Opt 46	Option 46: New cycling links to key facilities and services	0.53	0.53	0.00	0.55	0.55	0.00	0.73	0.73	0.00	0.68	0.68	0.00	0.40	0.40	0.00	0.43	0.43	0.00	3.33	3.33	0.00
Opt 47	Option 47: Cycle parking facilities	0.47	0.60	**0.13**	0.50	0.50	0.00	0.53	0.53	0.00	0.79	0.79	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.26	3.39	**0.13**
Opt 48	Option 48: New orbital bus route	0.60	0.67	**0.07**	0.55	0.55	0.00	0.53	0.53	0.00	0.63	0.63	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.49	3.55	**0.07**
Opt 49	Option 49: Improvements to existing bus services (28, 29 and X29)	0.60	0.67	**0.07**	0.60	0.60	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.66	3.72	**0.07**
Opt 50	Option 50: Improvements to existing bus services (23, 23A, 24 and 24A)	0.60	0.73	**0.13**	0.60	0.60	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.66	3.79	**0.13**
Opt 51	Option 51: Improved public transport information: real-time app	0.60	0.67	**0.07**	0.60	0.60	0.00	0.67	0.67	0.00	0.68	0.68	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.52	3.59	**0.07**
Opt 52	Option 52: Improved public transport information: real-time information at stops	0.60	0.60	0.00	0.60	0.60	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.46	3.46	0.00
Opt 53	Option 53: Update the digital road map	0.67	0.67	0.00	0.60	0.60	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.52	3.52	0.00
Opt 54	Option 54: Develop local cycling and walking infrastructure plan	0.53	0.60	**0.07**	0.55	0.55	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.54	3.61	**0.07**
Opt 55	Option 55: Promote cycling schemes	0.53	0.60	**0.07**	0.55	0.55	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.80	0.80	0.00	0.57	0.57	0.00	3.74	3.81	**0.07**
Opt 56	Option 56: Develop green lung schemes	0.40	0.47	**0.07**	0.40	0.40	0.00	0.67	0.67	0.00	0.74	0.74	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.37	3.44	**0.07**
Opt 57	Option 57: Bike-on-bus schemes	0.47	0.53	**0.07**	0.60	0.60	0.00	0.53	0.53	0.00	0.63	0.63	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.20	3.27	**0.07**
Opt 58	Option 58: Mobility as a service scheme	0.60	0.67	**0.07**	0.70	0.70	0.00	0.47	0.47	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.62	3.69	**0.07**
Opt 59	Option 59: Light rail	0.60	0.60	0.00	0.55	0.55	0.00	0.47	0.47	0.00	0.16	0.16	0.00	0.20	0.20	0.00	0.43	0.43	0.00	2.40	2.40	0.00
Opt 60	Option 60: Very light rail	0.60	0.67	**0.07**	0.60	0.60	0.00	0.40	0.40	0.00	0.42	0.42	0.00	0.40	0.40	0.00	0.43	0.43	0.00	2.85	2.92	**0.07**
Opt 61	Option 61: Offline busway	0.60	0.60	0.00	0.60	0.60	0.00	0.53	0.53	0.00	0.32	0.32	0.00	0.40	0.40	0.00	0.43	0.43	0.00	2.88	2.88	0.00
Opt 62	Option 62: New orbital rail line	0.60	0.60	0.00	0.55	0.55	0.00	0.47	0.47	0.00	0.21	0.21	0.00	0.40	0.40	0.00	0.43	0.43	0.00	2.66	2.66	0.00
Opt 63	Option 63: Inner ring road widening	0.53	0.60	**0.07**	0.45	0.45	0.00	0.53	0.53	0.00	0.37	0.37	0.00	0.40	0.40	0.00	0.29	0.29	0.00	2.57	2.64	**0.07**
Opt 64	Option 64: Provision of sprint services: A47 / A1074	0.60	0.67	**0.07**	0.55	0.55	0.00	0.47	0.47	0.00	0.47	0.47	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.06	3.13	**0.07**
Opt 65	Option 65: Provision of sprint services: A1067 corridor	0.60	0.67	**0.07**	0.55	0.55	0.00	0.47	0.47	0.00	0.47	0.47	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.06	3.13	**0.07**
Opt 66	Option 66: Provision of a sustainable urban distribution centre	0.67	0.60	**-0.07**	0.70	0.70	0.00	0.40	0.40	0.00	0.53	0.53	0.00	0.40	0.40	0.00	0.43	0.43	0.00	3.12	3.05	**-0.07**
Opt 67	Option 67: Provision of improved freight route intelligence	0.67	0.60	**-0.07**	0.70	0.70	0.00	0.53	0.53	0.00	0.74	0.74	0.00	0.40	0.40	0.00	0.57	0.57	0.00	3.61	3.54	**-0.07**
Opt 68	Option 68: Lorry management strategy	0.67	0.60	**-0.07**	0.70	0.70	0.00	0.47	0.47	0.00	0.74	0.74	0.00	0.60	0.60	0.00	0.57	0.57	0.00	3.74	3.67	**-0.07**
Opt 69	Option 69: Purple line (2018 public consultation), single carriageway	0.87	0.80	**-0.07**	0.70	0.70	0.00	0.80	0.80	0.00	0.53	0.53	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.78	3.71	**-0.07**
Opt 70	Option 70: Purple line (2018 public consultation), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.67	3.67	0.00
Opt 71	Option 71: Blue line (2018 public consultation), single carriageway	0.87	0.80	**-0.07**	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.66	**-0.07**
Opt 72	Option 72: Blue line (2018 public consultation), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.73	3.73	0.00
Opt 73	Option 73: Relay Fakenham to Norwich rail line	0.60	0.60	0.00	0.50	0.50	0.00	0.47	0.47	0.00	0.26	0.26	0.00	0.20	0.20	0.00	0.43	0.43	0.00	2.46	2.46	0.00
Opt 74	Option 74: New bus route connecting Dereham, Hellesdon and Norwich Airport	0.60	0.67	**0.07**	0.65	0.65	0.00	0.60	0.60	0.00	0.68	0.68	0.00	0.60	0.60	0.00	0.71	0.71	0.00	3.85	3.92	**0.07**
Opt 75	Option 75: Black line (2018 public consultation), existing route, single carriageway	0.67	0.67	0.00	0.60	0.60	0.00	0.73	0.73	0.00	0.58	0.58	0.00	0.80	0.80	0.00	0.43	0.43	0.00	3.81	3.81	0.00
Opt 76	Option 76: Black line (2018 public consultation), existing route, dual carriageway	0.73	0.67	**-0.07**	0.65	0.65	0.00	0.73	0.73	0.00	0.58	0.58	0.00	0.80	0.80	0.00	0.43	0.43	0.00	3.92	3.86	**-0.07**
Opt 77	Option 77: Outer ring road widening	0.67	0.67	0.00	0.55	0.55	0.00	0.67	0.67	0.00	0.47	0.47	0.00	0.40	0.40	0.00	0.43	0.43	0.00	3.19	3.19	0.00
Opt 78	Option 78: Do nothing	0.27	0.27	0.00	0.40	0.40	0.00	0.53	0.53	0.00	0.84	0.84	0.00	1.00	1.00	0.00	0.57	0.57	0.00	3.61	3.61	0.00
Opt 79	Option 79: Pink line (2018), single carriageway	0.73	0.80	**0.07**	0.65	0.65	0.00	0.80	0.80	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.69	3.75	**0.07**
Opt 80	Option 80: Pink line (2018), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.80	0.80	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.43	0.43	0.00	3.82	3.82	0.00
Opt 81	Option 81: Yellow line (2018), single carriageway	0.80	0.80	0.00	0.65	0.65	0.00	0.67	0.67	0.00	0.47	0.47	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.48	3.48	0.00
Opt 82	Option 82: Yellow line (2018), dual carriageway	0.87	0.87	0.00	0.70	0.70	0.00	0.67	0.67	0.00	0.42	0.42	0.00	0.60	0.60	0.00	0.29	0.29	0.00	3.54	3.54	0.00

	Not taken forward for further analysis
	Taken forward for further analysis

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wsp.com

Appendix 3A

DFT COST PROFORMA

Appraisal Cost Proforma Summary Sheet

Type of Year ☑

Assumptions:

Price Year Base of Capital Costs	2020/21

Weighted Investment cost optimism bias (%)	15%
Weighted Operating cost optimism bias (%)	0%

QRA / Risk total	39,975	£000s
Design Year Operating Cost (usually 15 years from opening year)	757	£000s
Operating Cost (all years total) - outturn	63,615	£000s

COST BREAKDOWN:

All values in £,000's (thousands)

	CAPEX at Base Cost	CAPEX at Real (exc risk)	CAPEX with risk at Real	CAPEX at Real (with OB)	CAPEX - Real, OB, defl, disc, MP of all funding options
Year	Investment Cost (in price year base in cell C3, excluding risk)	Cost including real cost inflation (Base Cost)	Risk adjusted cost	Risk adjusted cost including Optimism Bias	Risk adjusted cost including OB deflated and discounted to 2010 Market Prices
2020/21	2,536	2,536	2,536	2,917	2,051
2021/22	9,264	9,089	12,300	14,145	9,613
2022/23	8,530	8,205	13,030	14,984	9,838
2023/24	27,879	26,222	32,533	37,413	23,734
2024/25	69,849	63,774	81,166	93,341	57,211
2025/26	31,378	28,005	36,241	41,677	24,681
2026/27	0	0	0	0	0
2027/28	0	0	0	0	0
2028/29	0	0	0	0	0
2029/30	0	0	0	0	0

Totals for remaining appraisal years:

	0	0	0	0	0
Totals:	149,438	137,831	177,806	204,477	127,128

Appendix 3B

PA TABLE

Public Accounts for the Appraisal of Major Highway Schemes

	ALL MODES		ROAD	BUS/COACH	RAIL	OTHER
Local Government F	**TOTAL**		**INFRASTRUCTURE**			
Revenue	0		0			
Operating Costs	0		0			
Investment Costs	19,069		0			
Developer and Oth	0		0			
Grant/Subsidy Pay	0		0			
NET IMPACT	**19,069**	*(7)*	**0**	**0**	**0**	**0**
Central Government						
Revenue	0		0			
Operating Costs	0		0			
Investment Costs	108,059		0			
Developer and Oth	0		0			
Grant/Subsidy Pay	0		0			
NET IMPACT	**108,059**	*(8)*	**0**	**0**	**0**	**0**
Central Government Funding:						
Indirect Tax Reve	53, 272	*(9)*	0			
TOTALS						
Broad Transport Bu	**127,128**	*(10) = (7) + (8)*				
Wider Public Financ	**53, 272**	*(11) = (9)*				

Appendix 3C

ECONOMIC NARRATIVE

TECHNICAL NOTE 5

DATE:	20 May 2021	**CONFIDENTIALITY:**	Public
SUBJECT:	Economic Narrative		
PROJECT:	Norwich Western Link	**AUTHOR:**	FG LA
CHECKED:	SG	**APPROVED:**	LW

INTRODUCTION

The purpose of the Economic Narrative is to articulate why the transport investment (the Norwich Western Link, NWL) is needed to achieve specified economic objectives and how it is expected to achieve these.

Economic Narratives are part of DfT's guidance for the Economic Case with the latest (May 2018) DfT TAG guidance clearly setting out how the narrative fits into a business case and how it is used to justify the economic types selected.[1]

Through this process, the narrative defines the scope of the analysis in terms of the impacts that are being considered and the mechanisms through which these are expected to occur. The Economic Narrative therefore sets out the context for the analytical methods that will capture and quantify the expected impacts. The narrative will thus provide an insight into the economic context of the scheme and covers the following:

- Transport links within the area;
- The economic context in Norfolk and Norwich;
- The public policy context in relation to the scheme; and
- The expected impacts of the scheme.

Economic narratives are now a recognised element of scheme business cases (including Outline Business Cases, OBCs) as they allow scheme promoters to set out the economic context in an area before describing the types of economic impacts that are in scope (and therefore included in the Economic Case of the OBC).

Although a significant amount of information on the need and rationale for the NWL scheme is provided in the Strategic Case chapter in the OBC, it is important to point out the distinct role the Economic Narrative plays and the link it provides between the economic objectives (and constraints) in the area, how these can be supported by the NWL and the types of economic impacts that are considered in the Economic Case.

THE LOCAL ECONOMY

Located in the largely rural East of England county of Norfolk and covering an approximate area of 40.55 square kilometres (km^2), Norwich is one of the fastest growing cities in the UK. As of 2018, the city had a population of 141,100, with the percentage of residents in the 16 to 64 age group being higher than both the East and Great Britain (GB) average.[2]. The Greater Norwich area (comprising the Norwich City Council, South Norfolk District Council and Broadland District Council areas) is considerably larger with a combined population of 408,600 (based on 2018 ONS data).

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712878/tag-unit-a2-1-wider-impacts-overview-document.pdf
[2] https://www.nomisweb.co.uk/reports/lmp/la/1946157237/printable.aspx

Norwich is strategically important as it is a key driver of the East of England's economy as well as being a major regional centre for new homes and jobs, leisure, cultural and education development. The local area specialises in biotechnology, food processing, financial services and creative industries.

The value of Norfolk's economy was £18.6 billion in 2015. The planning authorities in Norfolk have collaborated to create the Norfolk Strategic Planning Framework (NSPF) to identify the county's strategic employment sites through which it hopes to achieve several ambitious targets with respect to jobs, businesses, housing and GVA by 2026. The aim is to create 73,000 more homes, 57,000 more jobs and 5,300 new businesses by 2026. Tourism is also a pivotal sector for spearheading future growth, supporting 65,398 jobs (18.4% of all employment) and contributing £3.2 billion to the local economy. [3]

Despite this steady growth trajectory, Norwich still lags behind some other areas in the UK with respect to economic indicators. Taking the key metric of productivity, for example, Office of National Statistics (ONS) data collated in December 2018 shows how Gross Value Added (GVA) per head in Norwich and East Norfolk has lagged behind the national average. In other words, there is a clear "productivity gap". Figure 1 below demonstrates not only how GVA per head in the Norwich area has historically lagged behind that in the UK, but also how the gap has been widening over time. Before the recession in the late 2000s, for example, Norwich's GVA per head was approaching parity with the UK. Since then, however, a significant gap has opened up with the difference being at its largest for the last year in the dataset, 2017.

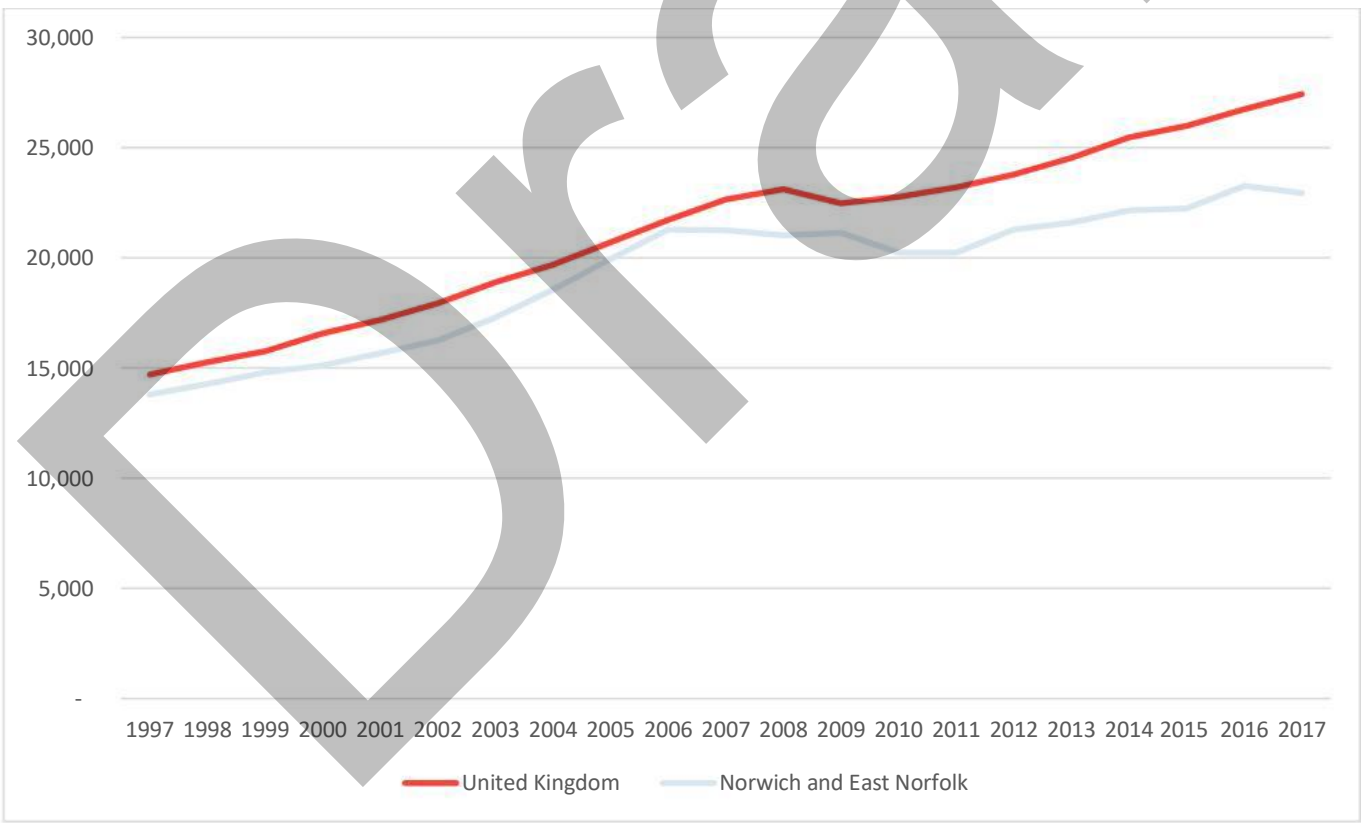


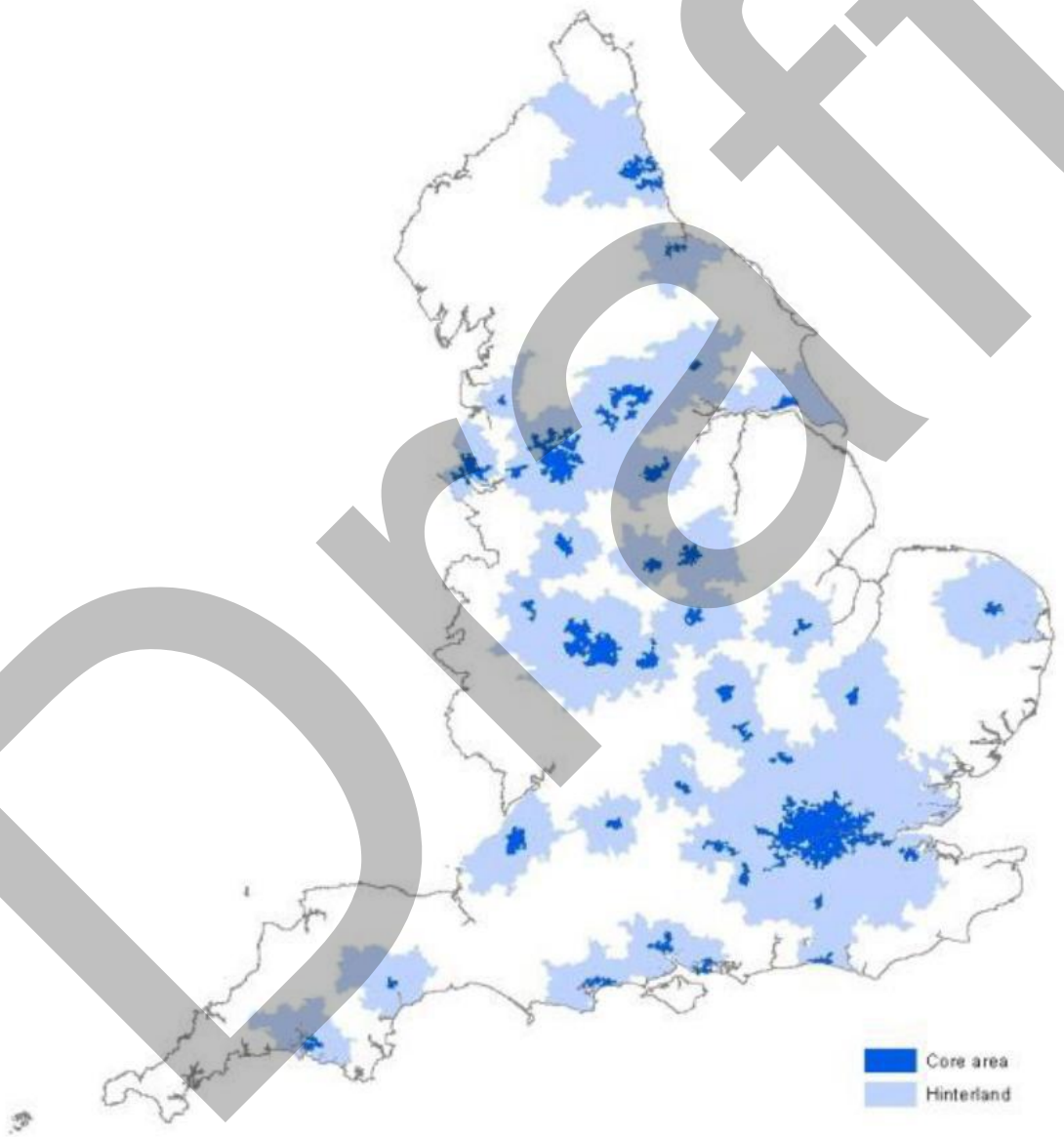
Figure 1 - GVA per head trends 1997 to 2017 (ONS)

It has been proven that enhanced transport connectivity can boost productivity by enabling workers to have better access to job opportunities whilst businesses have access to a wider pool of skilled labour. This is the theory underpinning agglomeration whereby productivity will be enhanced in areas where there is better transport connectivity.

[3] https://www.visitnorfolk.co.uk/Tourism-info-and-stats.aspx

As discussed later in this narrative, improvements in agglomeration (and hence productivity) are very much in scope for Norwich and the Western Link given that the city is one of DfT's core Functional Urban Regions (FURs) and has a substantial economic hinterland surrounding the city. This means that a significant new piece of transport infrastructure such as the Western Link will generate agglomeration improvements in this relatively urbanised area via the substantial improvements in journey times. Figure 2 is taken from DfT WebTAG[4] and clearly shows the FUR (core and hinterland) covering the Norwich area.

Of particular note is the fact that Norwich is the only FUR in the East of England, thus reinforcing the point that the city is a major regional generator of economic activity and will benefit further from the scale of transport connectivity associated with a scheme such as the Western Link.



Source: Office for National Statistics, Super Output Area Boundaries

Figure 2 – Functional Urban Regions in the UK (DfT WebTAG)

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712869/tag-unit-A2-4-productivity-impacts.pdf

As well as low productivity correlating with lower wages, the city's productivity gap can be attributed to high levels of congestion, which have resulted in poor labour mobility, impacted business operations and tourist movements.

Continued economic development is dependent on attracting new businesses and increasing the productivity of existing firms. It has been recognised by regional and local governing bodies that current conditions on major transport links in the Norfolk-Suffolk cluster and, more specifically, in the Greater Norwich area, are a constraint to development. Providing the necessary supporting infrastructure and upgrading and enhancing the Major Road Network (MRN) and part of the Strategic Road Network (SRN) will be essential if the area is to remain competitive, able to enhance regional labour mobility, unlock further housing and infrastructural developments and ultimately, help achieve economic growth.

KEY CHARACTERISTICS OF THE CURRENT ROAD NETWORK

In July 2019, a new 3.9-mile dual carriageway road, the Norwich Western Link (NWL), was outlined to provide crucial infrastructure between the western end of Broadland Northway and the A47 via a new junction at Wood Lane (B1535). The new Wood Lane junction forms part of Highways England's plan to dual the A47 between North Tuddenham and Easton. The NWL would significantly improve journey times between the two roads and thus serve the purpose of much faster, more reliable journeys through this part of Norwich.

The NWL is an urgent requirement to tackle increasing traffic congestion in the area. This is likely to worsen with expected long-term population and business growth anticipated to take place in and around Norwich. Delays and reduced network efficiency caused by congestion due to the poor quality and standard of the existing roads occur on the existing north-south corridors to the west of Norwich. These directly impact the quality of life of local residents from both an environmental and safety perspective as well as from a wider regional resident, business and visitor perspective.

The lack of strategic road connectivity around the north west of Norwich will constrain local and regional housing and economic growth as well as the future performance of Norwich as the primary economic centre for the sub-region. In the absence of investment in the proposed scheme, congestion on existing roads is expected to worsen, leading to increased journey times for residents, visitors and businesses.

Delays from increased congestion will be a cost borne by businesses and will restrict business efficiency, productivity, investment and access to local, regional and global markets. The continued routing of local and regional traffic on to capacity-constrained north-south roads (and through rural communities and Norwich's outer ring road) will continue to impact adversely on safety, the environment and quality of life.

The need for improved connectivity towards the west and north west of Norwich has been identified by various local stakeholders, including New Anglia LEP, Norwich City Council, Broadland, South Norfolk, Breckland and North Norfolk district councils, the Norfolk and Norwich University Hospital, the Norwich Research Park and Norwich International Airport. The NWL increases road capacity on the highway network to cater for this additional demand and provides traffic management and junction improvements on the current network. There is also overwhelming public support as identified in the 2018 and 2019 public consultations for a new road linking the A1270 Broadland Northway with the A47 Norwich Southern Bypass. This will reduce 'rat-running', improve journey times, reduce local air quality impacts, reduce congestion and improve the quality of life for local communities.

Transport Links

To provide further context for this economic narrative, a summary of the main transport modes is provided here. This 'sets the scene' with respect to transportation in the area served by the proposed NWL.

ROAD

One of the most important road corridors is the 100 kilometre section of the A11 connecting Cambridge and Norwich. This has benefited from substantial improvements in road connectivity following completion of the dualling on the A11, which has considerably reduced road journey times. Continued investment in the road network is required to fulfil aspirations for improved connectivity between the region (including Norwich and King's Lynn) and London.

The A47 trunk road is also important in the area as it is the main east to west road corridor linking Norwich with Great Yarmouth and the coast to the east as well as with King's Lynn and Peterborough to the west. Several sections of the A47 remain single carriageway, however, and as WSP's business consultation work revealed in Spring 2019 (in support of A47 improvements), this imposes significant delays and costs on local businesses. For several local haulage, distribution and logistics companies, congestion and delays on the A47 are adversely affecting their businesses.

The NWL will therefore help traffic flows on the A47 near Norwich and will reduce the congestion and delays that these types of companies typically face.

BRIDGE CROSSINGS

There are a small number of existing river bridge crossings that are also constrained. Some of these are unsuitable for heavy vehicles and others cannot be appropriately widened or strengthened in their current location due to the Special Area of Conservation and SSSI Ecological designations which apply to the River Wensum.

Additionally, the existing minor rural roads through the North Western Quadrant are less than six metres in width and often feature tight bends and narrow verges. Although improvements to local roads have been implemented to resolve long-standing HGV traffic problems in Hockering, there are still existing pressures on the local road network.

RAIL

Norwich has rail links to key cities and towns across the UK. Norwich is 114 miles from London Liverpool Street, 60 miles from Cambridge and 40 miles from Ipswich. Rail plays a key economic role through the provision of key commuting routes to the employment hub of London, as well as providing visitor access to and from major tourist attractions in the capital, Cambridge and Great Yarmouth. There has also been investment to improve rail connectivity for passengers and freight users, with rail passengers now able to travel from Norwich to London in 90 minutes (fastest journey time on selected services only) and from Norwich to Ipswich in 30 minutes.

Despite this investment, the network still requires extensive investment and there is a widespread perception across the region that the East of England and Anglia areas have not benefited as much as other areas with respect to rail infrastructure investment. The relatively poor rail connectivity to and within the region has added to the perception that certain parts of the region are peripheral and poorly connected. Although the current Train Operating Company (TOC) in the region is investing in a completely new train fleet, many infrastructure constraints remain and thus there is a need for further investment to improve capacity, reliability and frequency on the network.

AVIATION

Norwich's national and international transport links act as a catalyst for the local economy. Norwich is also served by an international airport, Norwich Airport, located 2.5 miles to the north of the city. The airport has a catchment area which encompasses 1.5 million people across Norfolk, Suffolk and North

Cambridgeshire. The airport handled 539,245 passengers in 2018/19, a 3.2% increase compared to the previous year, making the airport the busiest in East Anglia. Not only does the airport serve as a regional transport hub, it is also a major employment centre in its own right, directly employing 260 employees and indirectly supporting 1,240 jobs in the local economy and wider tourism sector (a key sector in the local economy). The airport contributes approximately £70 million to the regional economy and is further predicted to contribute £160 million to regional GVA through direct[5], indirect and induced employment by 2045.

Despite these positive impacts, passenger numbers are significantly lower than the 'peak' of 772,666 in 2007. The relative downturn in the airport's throughput since this time is due to several factors, including poor regional transport connectivity. Access to the airport from the west of Norwich is constrained by the lack of connectivity from the A47 to the A1270 Broadland Northway. This results in increased journey times and adversely affects potential business productivity as well as deterring visitors to the area.

Norfolk

THE ECONOMY OF NORFOLK

The economy of Norfolk is largely self-contained due to its peripheral/coastal location as well as the relatively poor connectivity associated with the transport network. In Norfolk, almost two thirds of VAT-registered enterprises are rurally-located, whereas the average in England is approximately one third[6].

Norfolk's labour market is constrained by its coastal location but also due to the distance from other regional cities and the limited connectivity of the transport network. The number of workless households in Norfolk stood at 16% between January and December 2018, higher than the East of England and Great Britain (GB) average of 12.2% and 14.3% respectively. Additionally, the employment by occupation breakdown shows that the types of jobs within Norfolk are lower-skilled compared to the East and GB, demonstrated by the higher percentage of workers in Major Group 6-7 and the low number of workers in high skilled occupations in Major Group 1-3.

Table 1 - Employment by occupation (Apr 2018 - Mar 2019, ONS Nomis)

Employment Group	Breakdown	Norfolk (%)	East of England (%)	Great Britain (%)
Major Group 1-3	1 - Managers, Directors and Senior Officials 2 - Professional Occupations 3 - Associate Professional & Technical	40.8%	46.5%	46.8%
Major Group 4-5	4 - Administrative & Secretarial 5 - Skilled Trades Occupations	21.6%	21.1%	20.1%

[5] https://www.norwichairport.co.uk/wp-content/uploads/Norwich-Airport-Draft-Masterplan.pdf
[6] https://www.norfolkinsight.org.uk/wp-content/uploads/2018/09/2013LEAupdate.pdf

Major Group 6-7	6 - Caring, Leisure and Other Service Occupations 7 - Sales and Customer Service Occupations	18.3	16.2%	16.5%
Major Group 8-9	8 - Process Plant & Machine Operatives 9 - Elementary Occupations	19.3%	16.1%	16.6%

The gross weekly pay received by residents in Norfolk is significantly lower than the East of England and Great Britain averages. The average pay in Norfolk was £515.10 in 2018 compared to £590.30 in the East of England and £571.10 in Great Britain, with the level of qualifications obtained impacting wages within the area. In the January 2018 to December 2018 period, only 29.6% of Norfolk's residents had a 'NVQ4 and above' qualification (Degree level and above) compared to 35.2% and 39.3% in the East of England and Great Britain respectively.

Another major factor within the area is underemployment. In 2017, Norfolk had a full-time employment rate of 63.7%, almost 4% lower than the Great Britain average of 67.5% and 1.5% lower than the East of England average[7]. The level of out-of-work benefits measured by the Claimant Count is also lower in Norfolk than the Great Britain average. Norfolk and the East of England had a rate of 2.1% in July 2019, 0.7% points lower than the GB average of 2.8%.

The lack of full time employment will have implications with respect to GVA per head. Following on from the earlier discussion about productivity (GVA per head) trends, Norfolk and Suffolk were severely affected by the 2008 recession, with GVA per head declining from 2006 and not recovering fully until 2011. Figure 3 and **Error! Reference source not found.** show the long-term reductions in economic performance compared with the UK average.

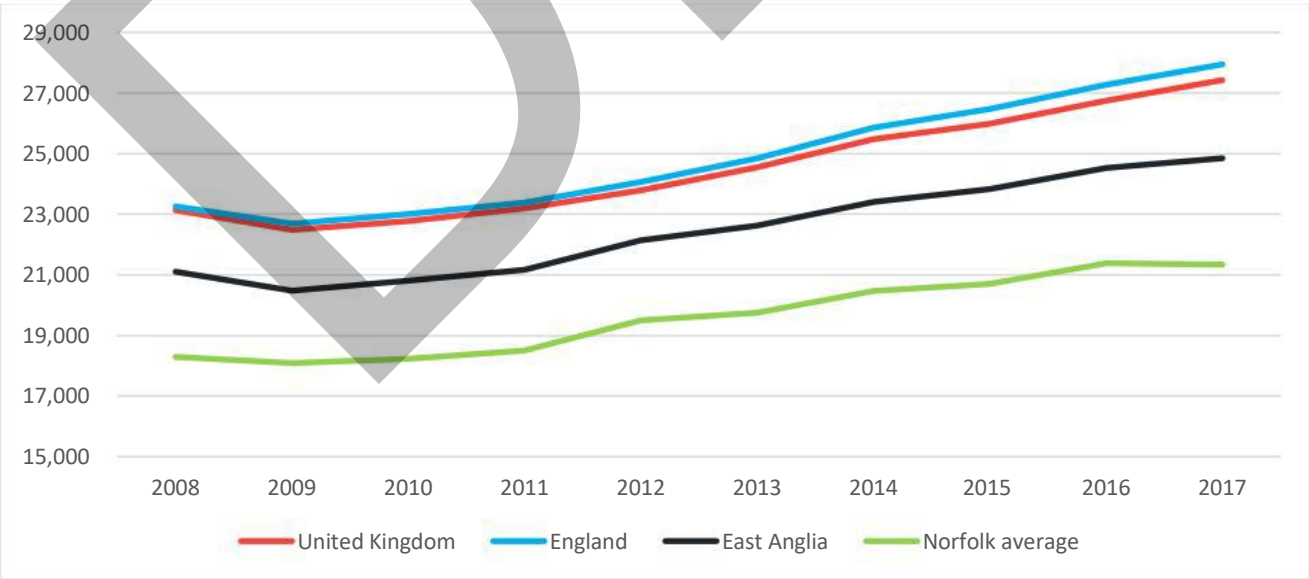


Figure 3 - GVA in Norfolk vs selected areas (ONS)

[7] https://www.nomisweb.co.uk/reports/lmp/la/1941962835/report.aspx

KEY INDUSTRIES

Norfolk has a diverse range of sectors that drive economic activity and growth in the area. As an example, Great Yarmouth and Lowestoft contain the world's largest market for offshore wind with several major infrastructure investments being made in recent years. Capital investment of £50 billion in the clean energy sector is planned for the region by 2020 with the investment funding the world's largest windfarm off the east coast. In addition, the proposed Sizewell C nuclear power station will generate 25,000 jobs and further opportunities with respect to the decommissioning of existing nuclear power facilities and provision of offshore installations.

Advanced manufacturing and engineering are also important sectors in the region and are typical of the area's economic diversity. This links into a supply chain of specialisms such as agriculture and food production, civil aviation, transport, pharmaceuticals and energy. Located in Norwich, Hethel Engineering Centre is the regional hub for innovation and technology and has the potential to expand to meet the demand for incubation space in this growing sector. Other companies in the area include Lotus at Hethel and Multimatic in Thetford (Multimatic is a specialist in vehicle dynamics).

Other key sectors cover the food processing industry with Bernard Mathews, Kettle Foods and Pasta Foods being major employers in Norfolk. Large manufacturers such as Group Lotus and Smurfitt Kappa can also be found in the rural areas of Norfolk[8]. The agriculture, food and drink sector is also important to the local economy as 111,136 jobs are supported in the county across a large number of well-known brand companies. Although traditional agricultural production has been in decline in recent years, higher value food processing has been rapidly increasing since 2010, with growth between 2010 and 2015 of 30.9%.

Within Norfolk, there is also a sizable aviation sector which specialises in maintenance and repairs. There is also a sector servicing the extensive offshore industry. In 2013, the International Aviation Academy was founded to address significant skill shortages across all areas of aviation in the UK including aircraft overhaul and maintenance. This partnership has been developed by Norfolk County Council, the New Anglia Local Enterprise Partnership and Norse Group, plus supporting partners Norwich City Council, Norwich Airport, KLM UK Engineering, University of East Anglia, City College Norwich and the WT Partnership. It was estimated that the Aeropark could create 1,400 jobs and generate over £50 million of economic benefit in the local economy when fully developed.

Norwich

THE ECONOMY OF NORWICH

The economy of the East of England has been performing strongly in recent years. The region now has three of the ten fastest growing cities in the UK (Norwich, Ipswich and Peterborough). Focusing on Norwich, according to The UK Powerhouse study, the city was ranked eighth nationally for annual GVA growth in Quarter 1 (Q1) of 2019, with a growth rate of 2.4%[9].

Despite this, Norwich's employment rate is still lower than the East of England average of 81.2% whilst it has also historically generated much lower GVA compared to the UK average (and compares poorly to the regional average for the East of England). As shown in Table 2Table 2, GVA growth in Norwich and East Norfolk between 2010 and 2017 has been lower, at 13.3%, when compared to regional and national rates.

[8] https://www.visitnorfolk.co.uk/Locate-Norfolk.aspx
[9] https://www.irwinmitchell.com/newsandmedia/2019/july/uks-most-sustainable-cities-revealed-in-new-report

Table 2 - GVA 2010-2017, selected areas (ONS)

	2010 – GVA (Income Approach) per head of population at current basic prices	2017 – GVA (Income Approach) per head of population at current basic prices	Growth between 2010-2017, %
East of England	21,034	25,217	19.9%
East Anglia	20,810	24,850	19.4%
Norwich and East Norfolk	20,228	22,926	13.3%
England	22,998	27,949	21.5%

The outcome of relatively low GVA growth includes an increasing 'productivity gap' whereby the amount of GVA produced on a per head basis is low with the gap to other areas' productivity levels also growing over time.

The productivity gap can be viewed as the total GVA Norwich would produce if the productivity per worker was at the UK average. Low productivity also correlates with low wages with gross weekly pay within Norwich significantly lower than both the East of England and Great Britain averages.

Figure 4 Error! Reference source not found.shows that in 2018, for example, the average wage in Norwich was £501.40 per week, which is lower than the £558.10 and £570.90 average for the East of England and Great Britain respectively. The wage gap has also widened over the last decade when compared to national and regional levels. The gap between Norwich and the East of England has increased marginally from £54.80 in 2008 to £56.70 in 2018, and the gap between Norwich and Great Britain also increased from £64.80 in 2008 to £69.50 in 2018.

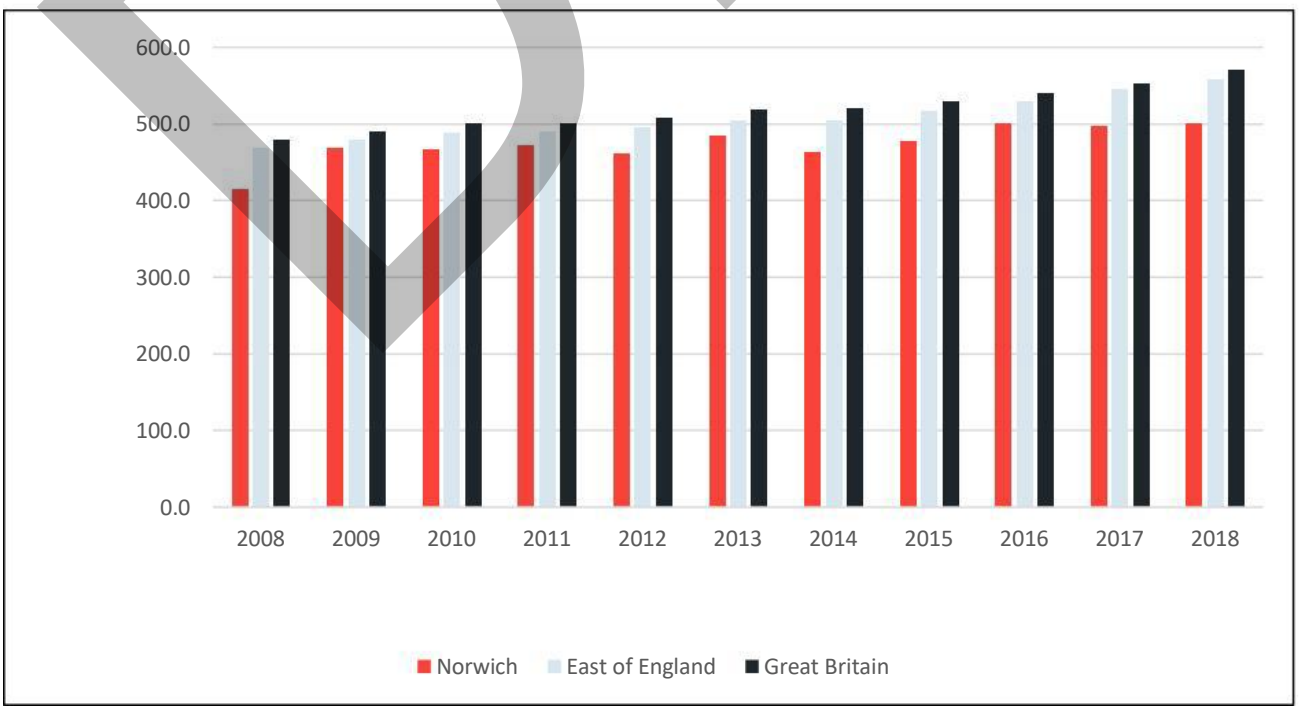


Figure 4- Gross Weekly Earnings 2008-2018 (ONS Nomis)

A further economic outcome of low paid work is a negative multiplier effect. Less disposable income reduces aggregate consumption levels, and the weaker demand for goods and services can lead to adverse economic consequences for firms as flat consumer spending leads to higher levels of spare capacity. These outcomes will present a further barrier to investment. In the long run, this will hold back GDP and growth in living standards.

One factor influencing future earnings is the educational attainment and worker skill levels within the area. Despite being home to many education institutions which include the UEA, Norwich currently has one of the worst GCSE attainment rates in the country and in terms of social mobility, Norwich is ranked in the bottom 10% of local authorities in the country. Only 38.5% of the population (aged 16-64) in Norwich have a NVQ4 and Above Qualification (Degree and above) compared to 39.3% in Great Britain.

All of the above indicators demonstrate that Norwich and the wider region will benefit from enhanced transport connectivity, especially as good connectivity is widely recognised as a prerequisite for development, economic growth and higher levels of productivity.

In this light, the NWL scheme will improve access to Norwich, the primary economic centre for the wider sub-region, and will help facilitate the retention and expansion of existing businesses whilst also encouraging additional inward investment and new businesses. Faster and more reliable journeys will reduce business costs, increase labour market catchments, improve access to key strategic growth sites and support the visitor economy. These are the factors that will help attract investment and will support advancements in innovation, research and development. There will then be scope for considerable 'trickle down' benefits in the form of higher skill levels within the local labour market.

KEY INDUSTRIES

Norwich has a highly active labour market with low levels of unemployment. To demonstrate this, 80.8% of the city can be classified as economically active, compared to 78.7% for Great Britain. This is reflected in the city maintaining a strong financial and insurance services sector. It has one of the largest general insurance markets in Europe, with one in three employees working in finance and business services. Over 50 regional, national and international companies are based in the city, including major companies such as Aviva and Virgin Money.

The city is also home to blue chip companies (such as Handelsbanken, Marsh, KPMG and Swiss Re – as well as Aviva and Virgin Money) and an increasing amount of national and local companies with an international reach (such as Validus-IVC, Williams Lea, Allan Boswell Insurance, Grant Thornton and Mills and Reeve). Although it is well connected to nearby cities (e.g. the A11 connects Norwich with the strong, fast-developing economy of Cambridge), traffic congestion and delays are commonplace and unless addressed, are likely to constrain Norwich's connectivity and hence economic potential. Given that the development of the cluster of financial industries within Norfolk (and Norwich) will be central to boosting inward investment and growth, transport connectivity will be vital and by helping access directly into and out of Norwich, the NWL has a major role to play.

Public Policy Context in Relation to the Scheme

STRATEGIC FIT

This section considers the relevant legislation and policy at a national, regional and local level, identifying how the NWL scheme links to a variety of different objectives.

The scheme has a strong strategic fit with national, regional and local plans and policies, as cited in the Strategic Case. The NWL aligns with and contributes to a variety of strategies at every level, most notably on how the transport infrastructure investment will unlock residential and employment growth while providing relief and added safety to existing road users in the west Norwich area. Table 3 summarises these plans and strategies and explains their link to the scheme.

Table 3: Public policy and strategies

Level	Strategy / Plan	How objectives relate to NWL
National	National Planning Policy Framework (NPPF)	▪ The provision of the new link will increase accessibility to existing planned and potential local and regional areas of growth through improved accessibility ▪ Will facilitate and encourage new development and therefore increase access to existing and new homes while opening up land on existing links to potential development ▪ The reassignment of traffic away from inappropriate routes through villages and on narrow lanes will help to reduce local emission levels, provide a safer environment for road users and pedestrians and encourage active travel modes
	National Infrastructure Delivery Plan 2016-2021	▪ The provision of a new link will improve accessibility to business and employment encouraging investment ▪ Improved accessibility and connectivity will help to streamline local business and improve accessibility to the SRN and MRN ▪ The provision of the new link will improve accessibility to new and existing housing while helping to encourage new housing locally
	National Policy Statement for National Networks (NPSNN)	▪ The NWL will improve network capacity and connectivity around Norwich providing improved resilience and supporting economic growth
	Highways England: Strategic Business Plan 2015-2020	▪ A new link will provide improved safety through the reduced accident rate associated with the higher standard of link while the new link will be more direct and shorter further reducing accidents. ▪ A new link will significantly improve user satisfaction by removing congestion and increasing accessibility and connectivity. ▪ A new highway link will help to support and encourage economic growth through: – new routing option and improved accessibility – reduced journey times – increased connectivity ▪ The proposed link will promote a more efficient transport system in the area, improving north-south access to the regional centre of Norwich. ▪ A new link will remove traffic from existing routes improving conditions for cyclists, walkers and other vulnerable users on the existing routes between the A47 and A1067.
	Highways England: Delivery Plan 2015-2020	▪ The Plan recognises the importance of supporting economic growth through the creation of a more free-flowing, integrated and accessible network. Investment in improved connectivity between the A47 and A1067 within the study area would help deliver Highways England's strategic outcomes.
	Norfolk and Suffolk Economic Strategy (NSES)	▪ The NWL would help to unlock future economic growth in the region creating significant accessibility and journey time efficiencies for the regions key sectors such as agri tech, energy, information and communications technology (ICT) and digital creative, and life sciences.

Level	Strategy / Plan	How objectives relate to NWL
	Integrated Transport Strategy (ITS)	▪ The ITS outlines that the NWL will help deliver the economic strategy for Norfolk and Suffolk, that it will improve connectivity to centres of excellence and will enhance the quality of life for residents in the area, connecting the new A1270 Broadland Northway from the A1067 to the A47 west of Norwich, to improve the flow of traffic around the growing communities prioritising infrastructure that will facilitate the delivery of significant housing and jobs growth.
Regional	Connecting Norfolk – Norfolk's Local Transport Plan for 2026 (April 2011)	▪ Provision of a new link will reassign traffic from existing links onto a higher standard new link thereby reducing maintenance requirements. ▪ Provision of a new link will remove traffic from existing corridors improving reliability. ▪ The route will either reassign traffic away from areas which may suffer from flooding or carry trips over areas of potential flooding through appropriately developed crossing infrastructure. ▪ The proposed options will encompass innovative design in order to protect the environment. ▪ The development of the new link will also divert traffic away from existing lower standard routes, helping to protect and enhance the local natural and built environments adjacent to these routes.
	Norfolk Strategic Framework – Shared Spatial Objectives for a Growing County (July 2017)	▪ The proposed link will significantly improve access and connectivity, encourage investment in the local area including high added-value jobs at the research park and UEA ▪ The proposed scheme will lead to an overall reduction in congestion currently experienced on and between the A47 and A1067, and will limit increases in greenhouse gas emissions ▪ The potential options will encourage investment locally of both employment and housing through increased accessibility ▪ The new link will improve journey times while reducing delay and congestion encouraging investment locally and regionally ▪ The new link will, through reassignment of traffic, lead to improved air quality within local villages and urban areas adjacent to existing routes helping to improve the health of locals and visitors ▪ Improved safety through the reduction of rat running trips and the associated speeding in certain locations will further benefit those in local communities.
	Norfolk Strategic Infrastructure Delivery Plan (2018 – 2028)	▪ With respect to the NWL the document states that "to connect the Norwich Northern Distributor Road at Taverham to the A47 west of Norwich – has been identified as one of the county council's priority road infrastructure schemes. Scheme development work has commenced, looking at the business case for such a link and to consider possible routes."

Level	Strategy / Plan	How objectives relate to NWL
Local	Norwich Area Transportation Strategy	▪ The reassignment of trips away from the existing routes between the A1067 and A47 will help to encourage more active travel trips on these routes, while the new link will improve accessibility to employment and services locally and regionally ▪ Reassignment of trips on to the new link will significantly improve the journey times of both the reassigned trips and those trips remaining on the existing routes ▪ Reassignment of trips onto the new direct higher speed link will help to limit increase in carbon emissions (this does not take account of electrification of vehicles) ▪ Removal of trips on local roads could encourage travel by sustainable modes ▪ The reassignment of trips from the existing lower standard roads on to the proposed higher standard NWL will produce a lower accident rate ▪ Development of a new link will improve the area's and region's accessibility. Improved journey times will help promote an efficient economic environment while reduced traffic flows on existing routes will encourage more tourism ▪ The introduction of the new link should reduce the incidence of rat running and associated speeding. Removing traffic from the local roads should reduce severance in the villages and residential areas affected
	Norwich City Council Local Plan	▪ With the provision of the new highway link it is considered that trips will reroute from roads within Norwich reducing congestion, improving accessibility and helping to support housing within Norwich, while also supporting investment to the west of the city and helping to provide jobs.
	South Norfolk District Local Plan	▪ The inclusion of the NWL into the road network will help to encourage growth in the Easton and Costessey areas as well as the region in general through improved accessibility and connectivity
	Breckland Council Local Plan	▪ The provision of a new highway link between the A47 and A1067 will improve accessibility and connectivity locally and regionally encouraging investment and new housing.
	Broadland District Council Local Plan	▪ The improved level of accessibility and connectivity associated with the new highway link will encourage investment in the local area and help to encourage housing

Based on the above, it is clear that the NWL scheme strategically aligns to many different objectives at a national, regional and local level. At all levels, these policies recognise the importance of delivering transport infrastructure to drive economic growth. The A47 and A1067 are recognised as congestion 'hot spots' and will benefit from the improved links that the NWL scheme will provide. The NWL scheme will also generate several positive outcomes, including improved safety levels, positive environmental outcomes and significantly enhanced journey times. As the agglomeration improvements described below indicate, the journey time improvements associated with the NWL will boost productivity levels and will ensure that living standards and economic growth continue in the city and wider region.

Impacts of the Proposed Scheme

The local and regional transport problems affecting the area's economic potential stem from the lack of strategic north-south connectivity between the A47 Norwich Southern Bypass, A1067 Fakenham Road Corridor and the orbital A1270 Broadland Northway to the west of Norwich. Without much improved road connectivity towards the north west of Norwich, the outcome will be a continuation of the constraints on

economic potential as well as more indirect outcomes such as lower than optimal inward investment and housing delivery.

In this section, the range of economic impacts (benefits) is described with the Level 1 to Level 3 approach adopted by DfT used to categorise the different impact types.

LEVEL 1 IMPACTS

These cover 'conventional' transport economics impacts and for the NWL Outline Business Case (OBC), will comprise all the outputs from the traffic modelling work. These cover user benefits such as modelled:

- Journey time savings;
- Vehicle operating cost savings; and
- Accident reduction benefits.

As well as these impacts, physical activity, journey quality, noise, air quality, greenhouse gases and indirect tax impacts can also be included under Level 1.

All Level 1 impacts are categorised as Established Monetary Impacts under DfT WebTAG and can be included in the Initial Benefit Cost Ratio (BCR) in the scheme Economic Case. Level 1 impacts are included in the Initial BCR as there is more certainty surrounding their calculation and robustness compared to other, more recently agreed types of impacts.

LEVEL 2 IMPACTS

These include the following three types of wider economic impacts associated with enhanced connectivity (due primarily to journey time savings – very much in scope for the NWL):

- Agglomeration improvements (i.e. each worker produces more GDP – this impact is also known as "static clustering" – the impact being 'static' as land use does not change);
- Output change in imperfectly competitive markets; and
- Labour supply (i.e. reduced journey times make it economically advantageous for workers to re-enter the labour market and thus generate GDP and taxation receipts for the Government).

As there is more certainty surrounding these types of wider economic impacts compared to the high level impacts covered under Level 3 (see below), they can be included in the Adjusted BCR for the NWL scheme and are thus a key part of the overall Economic Case for the scheme.

As discussed earlier, agglomeration improvements are in scope for the NWL scheme as 1) it is located within one of DfT's Functional Urban Regions (FURs) and 2) the scale of journey time improvements (and other improvements generating a significant decrease in drivers' generalised costs) will mean that agglomeration impacts are likely to be significant.

With respect to the scale of these likely agglomeration impacts, it is worth noting that although DfT WebTAG suggests that these can range between 10% and 30% of user benefits (i.e. agglomeration benefits can add between 10% and 30% to conventional benefits), more recent work by Highways England indicates that these can double conventional business user benefits as derived from the Transport Economic Efficiency (TEE) traffic modelling outputs[10].

WSP are familiar with calculating Level 2 impacts based on the outputs of traffic modelling work and a Wider Impacts in Transport Appraisal (WITA) emulator tool will be used to calculate all agglomeration, 'output change' and labour supply impacts. The emulator has been approved by DfT and calculates the same series of outputs as DfT's recently released updated WITA tool.

[10] Economic Growth Technical Annex: How you can assess the impact of improvements to the Strategic Road Network on the economy, Highways England, Chief Analyst's Division, 2 February 2018 (see Page 18)

The outputs from this will be a series of additional GDP impacts based on recognised methods and guidance. The additional GDP will be generated across a series of Local Authority Districts (LADs) within the modelled area. The input data used for these calculations, including employment and GDP data at LAD level, will be based on the recent dataset update provided by DfT.

A further Level 2 impact is improved reliability and this will also be calculated on the basis of the traffic modelling work (and included in monetised form within the Adjusted BCR).

LEVEL 3 IMPACTS

Level 3 economic impacts are those where there is less certainty with respect to their robustness and accuracy. This is the reason Level 3 impacts are not included in scheme BCRs. Where justified, however, they are important as they can be used to test the impact on a scheme's Value for Money (VfM) category with use of DfT guidance on 'switching values'.[11]

Use of switching values enables the extent to which the Present Value of Benefits (or Present Value of Costs) would need to increase or decrease for the VfM category of the scheme to change to be identified.

From a wider economic impact perspective, Level 3 impacts cover the following:

- Dependent development – land value uplift (and related external impacts) from new housing developments unlocked by the transport scheme; and
- Outputs from 'supplementary economic modelling' as defined in DfT WebTAG Unit M5.3. These are as follows:
  - Additionality modelling
  - S-CGE (general equilibrium) economic modelling
  - Land Use Transport Interaction (LUTI) modelling
  - Reduced form economic modelling (i.e. agglomeration modelling as described above but this time with adjustments to the elasticity parameters).

Based on our understanding of the NWL scheme, the scope to use these approaches will be limited as there is no evidence that the scheme will unlock specific housing developments or induce transformative land use change in the area (thus precluding dependent development and S-CGE / LUTI modelling within the Economic Case).

Although there is similarly no direct evidence to date of additional jobs supported by the scheme (i.e. at new business parks and commercial developments unlocked by the scheme), there is scope to explore potential additionality impacts whereby additional employment and related Gross Value Added (GVA) impacts can be evaluated.

Additionality impacts are one of the 'Supplementary Economic Modelling' methods listed in DfT TAG Unit M5.3[12]. Supplementary economic modelling methods are also listed in DfT's Value for Money Framework guidance[13] as one of the indicative monetised (or Level 3) impacts alongside induced investment (the latter covering dependent development referred to above).

Based on MHCLG (and Homes England) additionality guidance, it was possible to establish a baseline trajectory of employment and GVA without the NWL before calculating potential impacts with the scheme in place. Alongside the Level 1 and Level 2 impacts described, the results of this additionality analysis have been summarised in a "NWL Scheme Benefits Summary Note" issued in February 2021. This note sets out

[11] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627490/value-for-money-supplementary-guidance-on-categories.pdf (see sections on 'switching value(s)' throughout the document)
[12] https://www.gov.uk/government/publications/webtag-tag-unit-m5-3-supplementary-economic-modelling-may-2018
[13] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918479/value-for-money-framework.pdf

the overall potential economic benefits of the NWL scheme and is intended to demonstrate these to a wider audience.

The additionality impacts are different to dependent development-based housing land value gains that are typically reported in Economic Cases. Under the latter, dependency is based on traffic model runs with/without the new housing developments. As reported above, however, there is no evidence that the scheme will unlock specific housing developments so dependent development-based Level 3 impacts are not included in the Economic Case in the OBC.

Finally, as well as the economic impacts under Level 3, a range of other, non-monetised impacts can be included. These include security, severance, accessibility, townscape, historic environment, landscape, biodiversity, water environment, affordability and access to services. As the titles suggest, many of these are 'social and distributional' and 'environmental' impacts so will be covered by other workstreams as part of the OBC preparation process.

They are relevant, however, as they also inform the Economic Case and final VfM category.

This economic narrative concludes with a discussion of some of the overarching economic themes relevant to the NWL.

WIDER ECONOMIC IMPACTS - GENERAL

The NWL will help Norwich maintain its position as a driver of economic growth in the East of England. Productivity levels and economic activity are currently constrained without adequate infrastructure being in place. A longstanding partnership between the three district councils and the County Council has delivered a joint Core Strategy which includes plans for large-scale job creation. Given a central part of the strategy includes the need for 27,000 new jobs to be provided by 2026, the NWL will definitely assist this objective as much improved transport connectivity will help attract inward investment.

Tourism is also one of the key sectors within the area. Tourism supports 65,398 jobs in the region (18.4% of all employment) and contributes £3.2 billion to the local economy. Many visitors will travel via the A140 which runs north-south from the northern edge of Norwich adjacent to the Airport towards Cromer. Visitors accessing this route from the A11 or A47 will need to travel through the North Western Quadrant (NWQ) and the NWL will therefore provide better connectivity to the North Norfolk coast from the west. This will also alleviate pressure on the Norwich outer ring road during the seasonal peak times of the year.

IMPACTS ON BUSINESSES

The absence of the NWL is likely to affect business investment and growth in the future, both locally and regionally. Several key employers are located in or adjacent to the study area (including the Food Enterprise Zone, the Norfolk and Norwich University Hospital (NNUH), the Norwich Research Park (NRP) and Norwich International Airport). The lack of an appropriate western link restricts accessibility to these businesses both locally and in relation to areas to the west of Norfolk and the Midlands.

Given the economic importance of Norwich Airport, the NWL will help to provide a more appropriate and reliable primary route to the airport and will support future employment growth at the airport. With expected passenger numbers forecast to increase to 1.4 million and an additional £170 million generated in the local area, the scope for the NWL to support this planned expansion is considerable.

IMPACT ON COMMUTER TRIPS

Within the area, there is a high concentration of car journeys which puts pressure on the local road network (even though many of these journeys are relatively short distance). The Option Assessment Report (OAR) for the scheme clearly shows that the dominant mode of travel to work within the study area is by car whilst

there is a large concentration of commuting into Norwich city centre, NNUH and other wider locations, including Attleborough / Wymondham and Dereham. Many of these journeys will benefit from the NWL as they will be able to avoid the local road network and thus make faster, more reliable journeys. As origin-destination data demonstrates, these trips could potentially be removed from a large part of the existing network and attracted on to the NWL.

Appendix 3D

AST

Appraisal Summary Table: Core Growth scenario

Date produced:	23-May-21

Contact:	
Name	
Organisation	Norfolk County Council
Role	

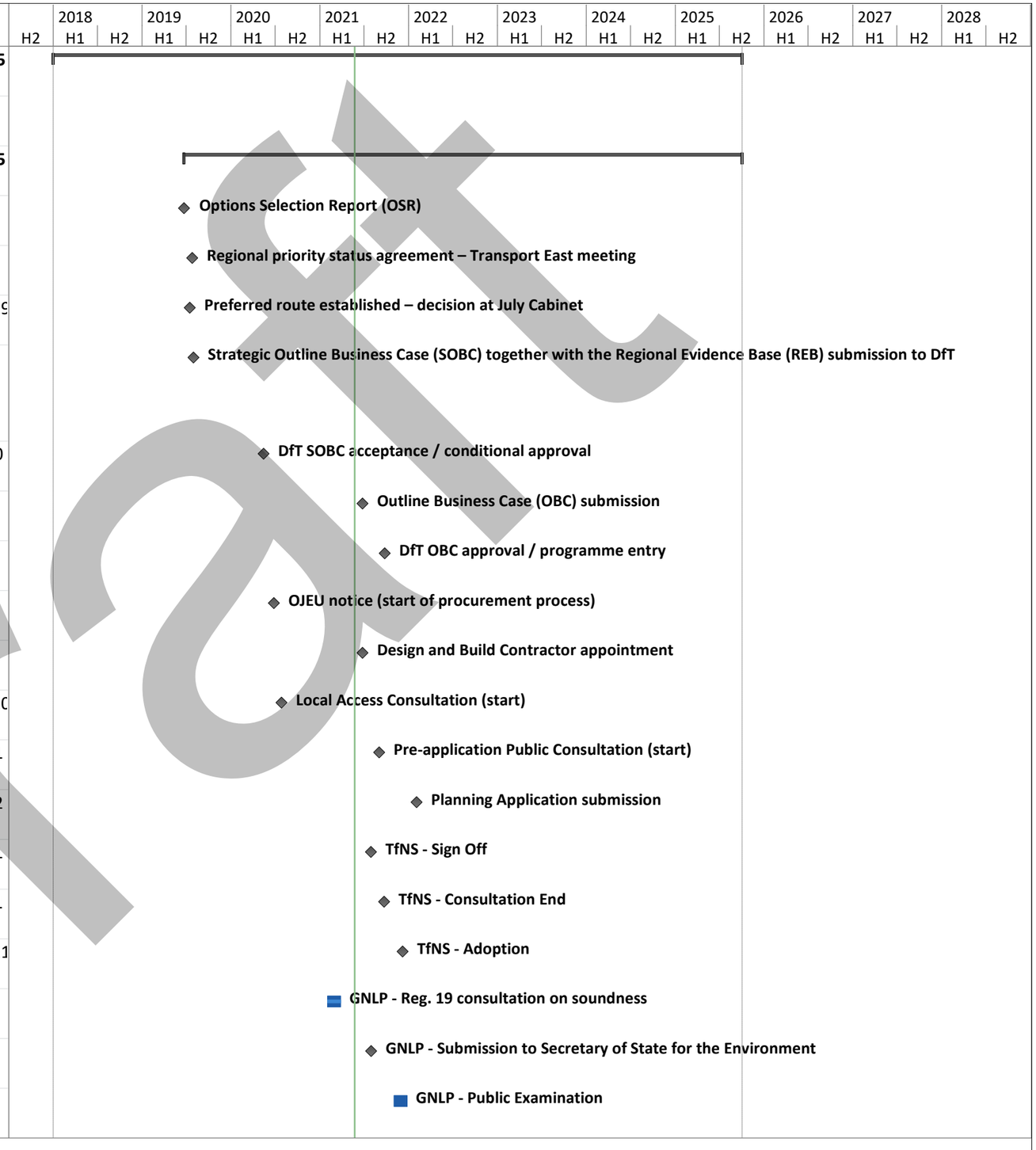
Name of scheme:	Norwich Western Link
Description of scheme:	The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

	Impacts	Summary of key impacts	Assessment: Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme provides business user benefits, with nearly all of the benefits being from journey time savings totalling with £81.766m in user benefits. There are increases in vehicle operating costs, with a benefit of over £6.803m	Value of journey time changes(£): 81,766,000 Net journey time changes (£): 0 to 2min: 37,958; 2 to 5min: 9,860; > 5min: 33,950		£88,569,000	
	Reliability impact on Business users	Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair				
	Regeneration	N/A				
	Wider Impacts	WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used.The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:	WI1: Agglomeration impacts £89.26m WI2: Output change in imperfectly competitive markets impacts £7.88m WI3: Tax revenues arising from labour market impacts £0.33m		£97,471,000	
Environmental	Noise	The study area for the assessment has been derived based on guidance within the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, May 2020 and is set to a distance of 600m from the kerb of any new roads associated with the scheme. There are 52 residential dwellings within the study area and no additional other sensitive receptors. Generally, within the study area, noise levels are predicted to increase as a result of the scheme, with large increases predicted at isolated receptors towards the centre of the study area where low baseline levels are anticipated. However, some receptors along Wood Lane and Paddy's Lane are predicted to experience noise level reductions as a result of less vehicles using these roads in favour of the scheme. The Highways England A47 dualling scheme has been included in both the Do-minimum (without scheme) and Do-something (with scheme) scenarios for the purpose of this assessment.	Households experiencing increased daytime noise in forecast year: 33 Households experiencing reduced daytime noise in forecast year: 10 Households experiencing increased night time noise in forecast year: 3 Households experiencing reduced night time noise in forecast year: 10	NA	£38,490	Noise impacts are experienced by those in the middle income quintiles. Children and young people experience noise
	Air Quality	The appraisal has been undertaken using the Impact Pathways approach. Overall, with the Proposed Scheme there are modest improvements in local air quality in terms of NO2 and PM2.5 at locations with relevant human exposure. The overall monetary valuation takes into account ecosystem damage costs. No Air Quality Management Areas are included in the air quality study area. The Proposed Scheme links map onto PCM links which are all compliant with the NO2 limit value both with and without scheme. No exceedances of air quality standards are predicted.	NO2 Change in NO2 assessment score over 60 year appraisal period: -10,684.21 (between 'with scheme' and 'without scheme' scenarios). In 2025 there are there are 7,860 properties with improvement, 35 properties with no change, and 2,180 properties with deterioration. In 2040 there are 7,733 properties with improvement, 32 properties with no change, and 2,310 properties with deterioration. PM2.5 Change in PM2.5 assessment score over 60 year appraisal period: -1,172.63 (between 'with scheme' and 'without scheme' scenarios). In 2025 there are 8,002 properties with improvement, 6 properties with no change, and 2,067 properties with deterioration. In 2040 there are 7,747 properties with improvement, 282 properties with no change, and 2,046 properties with deterioration.	N/A	NPV of change in NO2: £9,803 NPV of change in PM2.5: £62,165 Total NPV of change in air quality: £71,968	Air quality impacts are experienced across all quintiles. Children and young people experience air quality benefits
	Greenhouse gases	The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic. Comments on assumptions and uncertainty: 1) Emissions have been calculated across the whole of the NATS model simulation area. 2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years. 3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal. 4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.	Change in non-traded carbon over 60y (CO2e): -443,429 Change in traded carbon over 60y (CO2e): -13,005	N/A	£19,474,620	
	Landscape	There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. Field patterns are easily substitutable, although loss of mature hedgerow trees would take much longer to re-establish. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a significant impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.	N/A	Moderate Adverse	N/A	
	Townscape	Scoped out of WebTAG and AST appraisal.	N/A	N/A	N/A	
	Historic Environment	The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved).	N/A	Moderate adverse (built heritage) Low, moderate or major adverse (buried remains)	N/A	
	Biodiversity	The possible biodiversity impacts include loss of woodland, hedgerows and wetland, degradation of habitats and impacts to protected species through loss of habitat, disturbance, severance of habitat, fragmentation and killing/injury of individuals. Impacts could occur during construction and operation of the Proposed Scheme. Mitigation and compensation strategies are being developed to reduce the identified possible impacts. Mitigation measures include a range of design features such as sensitive timing of construction works and the use of green bridges and underpasses. Compensation measures include planting new areas of woodland and enhancing existing woodlands. The most significant impact which cannot be mitigated for, in the short term, is the loss of woodland which bats use as foraging habitat.	N/A	Large adverse	N/A	
	Water Environment	No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. The Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority (LLFA). A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into sustainable drainage systems (SuDS) should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the Proposed Scheme.	N/A	Slight Adverse	N/A	
Social	Commuting and Other users	The scheme provides Commuting and Other user benefits, with most of the benefits being from journey time savings totalling £149.872m in user benefits. This are increases in vehicle operating costs, with a benefit of £76.420m.	Value of journey time changes(£): 149.873 Net journey time changes (£): 0 to 2min: 67.061; 2 to 5min: 16.721; > 5min: 66.091		£226,292,000	The distribution across the quintile areas is not even with the majority of
	Reliability impact on Commuting and Other users					
	Physical activity	The impacts on Physical Activity has been assessed with DfT's AMAT for three of the four wider walking and cycling interventions. The NWL is forecast to have a beneficial impact of £8.876 million.			£8,876,000	
	Journey quality	Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.		Moderate Beneficial		
	Accidents	COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening. The results indicate that the scheme will result in a reduction of 529 accidents over the 60 year appraisal period, leading to a reduction of 674 casualties (2 Fatal, 56 Serious and 616 Slight).	The results indicate that the scheme will result in a reduction of 529 accidents over the 60 year appraisal period, leading to a reduction of 674 casualties (2 Fatal, 56 Serious and 616) Slight		£18,582,000	All relevant social groups and user groups experience accident benefits
	Security	Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic.		Moderate Beneficial		N/A
	Access to services	The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.		Neutral		N/A
	Affordability	The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs		Neutral		The distribution across the quintile areas is not even
	Severance	There are more roads forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement. Where existing routes are severed, new crossing facilities will be provided, which should mitigate the impact of the new road.		Slight Beneficial		All relevant social groups and user groups experience severance benefits
	Option and non-use values	The scheme will not substantially change the availability of transport services within the study area.		Neutral		
Public Accounts	Cost to Broad Transport Budget	The cost to the broad transport budget is £127.129m			£127,128,461	
	Indirect Tax Revenues	The indirect tax revenues are £53.272m			-£53,272,000	

Appendix 6A

DETAILED PROGRAMME

ID	Task Name	Duration	Start	Finish
1	**Norwich Western Link**	**1964 days**	**Mon 01/01/18**	**Thu 02/10/25**
2				
3	**Key Milestones**	**1592 days**	**Fri 21/06/19**	**Thu 02/10/25**
4	Options Selection Report (OSR)	0 days	Fri 21/06/19	Fri 21/06/19
5	Regional priority status agreement – Transport East meeting	0 days	Fri 26/07/19	Fri 26/07/19
6	Preferred route established – decision at July Cabinet	0 days	Mon 15/07/19	Mon 15/07/19
7	Strategic Outline Business Case (SOBC) together with the Regional Evidence Base (REB) submission to DfT	0 days	Wed 31/07/19	Wed 31/07/19
8	DfT SOBC acceptance / conditional approval	0 days	Thu 14/05/20	Thu 14/05/20
9	Outline Business Case (OBC) submission	0 days	Fri 25/06/21	Fri 25/06/21
10	DfT OBC approval / programme entry	0 days	Fri 24/09/21	Fri 24/09/21
11	OJEU notice (start of procurement process)	0 days	Fri 26/06/20	Fri 26/06/20
12	Design and Build Contractor appointment	0 days	Fri 25/06/21	Fri 25/06/21
13	Local Access Consultation (start)	0 days	Mon 27/07/20	Mon 27/07/20
14	Pre-application Public Consultation (start)	0 days	Thu 02/09/21	Thu 02/09/21
15	Planning Application submission	0 days	Thu 03/02/22	Thu 03/02/22
16	TfNS - Sign Off	0 days	Thu 29/07/21	Thu 29/07/21
17	TfNS - Consultation End	0 days	Tue 21/09/21	Tue 21/09/21
18	TfNS - Adoption	0 days	Mon 06/12/21	Mon 06/12/21
19	GNLP - Reg. 19 consultation on soundness	40 days	Mon 01/02/21	Fri 26/03/21
20	GNLP - Submission to Secretary of State for the Environment	0 days	Fri 30/07/21	Fri 30/07/21
21	GNLP - Public Examination	40 days	Mon 01/11/21	Fri 24/12/21



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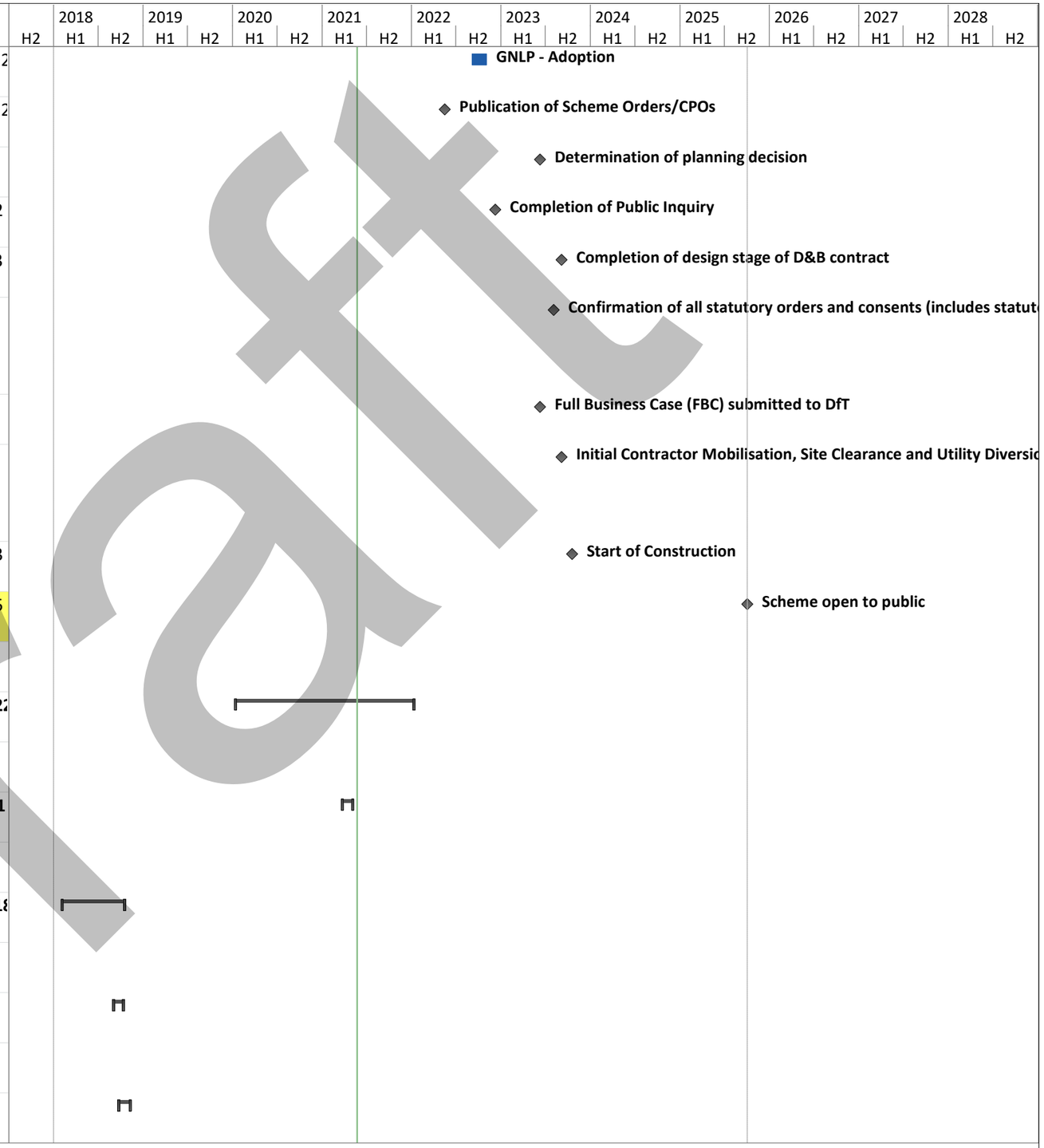
Version: OBC Version
Revision: 2.10 24/05/2021

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Critical
Critical Split
Progress

ID	Task Name	Duration	Start	Finish
22	GNLP - Adoption	43 days	Mon 05/09/22	Wed 02/11/22
23	Publication of Scheme Orders/CPOs	0 days	Mon 16/05/22	Mon 16/05/22
24	Determination of planning decision	0 days	Fri 09/06/23	Fri 09/06/23
25	Completion of Public Inquiry	0 days	Thu 08/12/22	Thu 08/12/22
26	Completion of design stage of D&B contract	0 days	Tue 05/09/23	Tue 05/09/23
27	Confirmation of all statutory orders and consents (includes statutory challenge period)	0 days	Fri 04/08/23	Fri 04/08/23
28	Full Business Case (FBC) submitted to DfT	0 days	Fri 09/06/23	Fri 09/06/23
29	Initial Contractor Mobilisation, Site Clearance and Utility Diversion Works	0 days	Wed 06/09/23	Wed 06/09/23
30	Start of Construction	0 days	Thu 19/10/23	Thu 19/10/23
31	Scheme open to public	0 days	Thu 02/10/25	Thu 02/10/25
32				
33	**Cabinet Dates**	**507 days**	**Mon 13/01/20**	**Wed 12/01/22**
56				
57	**Norfolk County Council Elections 2021**	**27 days**	**Thu 25/03/21**	**Thu 06/05/21**
60				
61	**Option Development and Appraisal**	**178 days**	**Mon 05/02/18**	**Wed 17/10/18**
68				
69	**October 2018 EDT Committee**	**30 days**	**Mon 03/09/18**	**Fri 12/10/18**
73				
74	**November 2018 EDT Committee**	**35 days**	**Mon 24/09/18**	**Fri 09/11/18**



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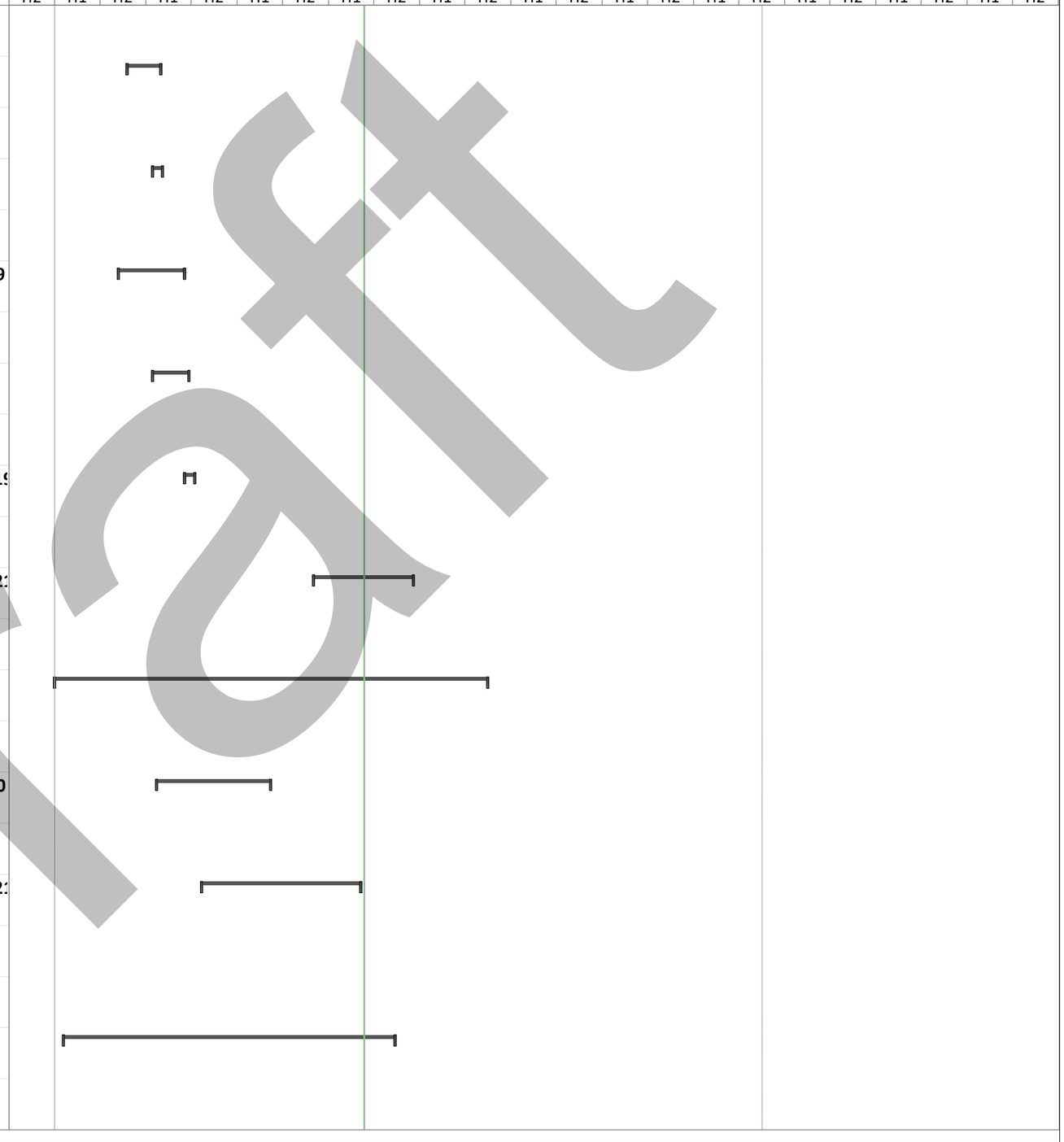
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Critical
Milestone	External Milestone	Manual Task	Start-only	Critical Split
Summary	Inactive Task	Duration-only	Finish-only	Progress

ID	Task Name	Duration	Start	Finish
78				
79	**Shortlist Consultation**	**94 days**	**Thu 18/10/18**	**Fri 01/03/19**
84				
85	**March 2019 EDT Committee**	**30 days**	**Mon 28/01/19**	**Fri 08/03/19**
89				
90	**Strategic Outline Business Case (SOBC)**	**182 days**	**Thu 13/09/18**	**Tue 04/06/19**
95				
96	**Options Assessment**	**101 days**	**Mon 28/01/19**	**Fri 21/06/19**
102				
103	**Preferred Route Announcement (PRA)**	**29 days**	**Wed 05/06/19**	**Mon 15/07/19**
108				
109	**Transport for Norwich Strategy (TfNS)**	**278 days**	**Mon 02/11/20**	**Mon 06/12/21**
115				
116	**Greater Norwich Local Plan (GNLP)**	**1203 days**	**Mon 01/01/18**	**Fri 30/09/22**
128				
129	**Regional Evidence Base (REB)**	**316 days**	**Wed 13/02/19**	**Thu 14/05/20**
137				
138	**Traffic Modelling**	**441 days**	**Mon 12/08/19**	**Mon 10/05/21**
162				
254				
255	**Outline Business Case (OBC)**	**921 days**	**Mon 05/02/18**	**Fri 24/09/21**
289				



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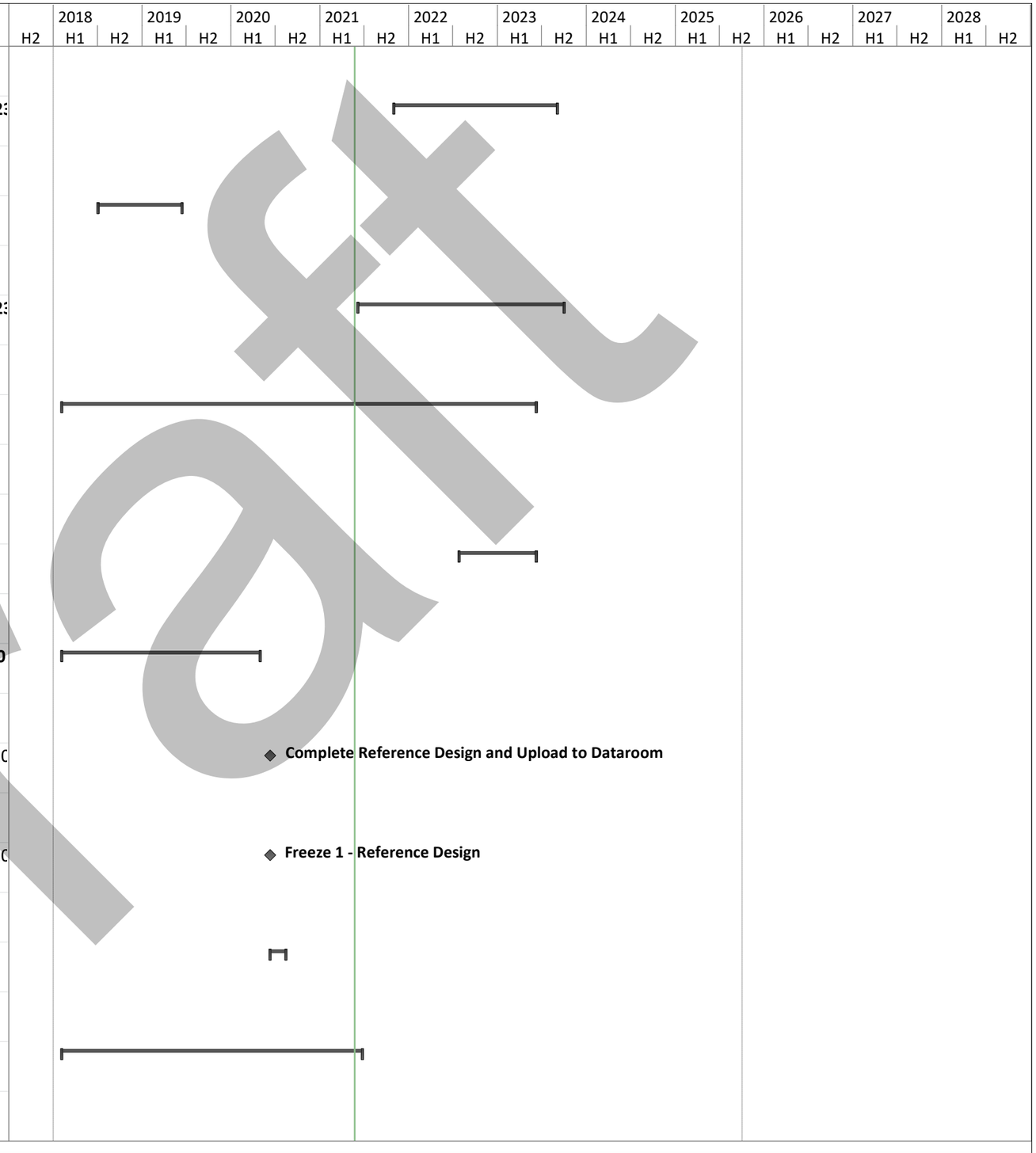
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Critical	
Milestone	External Milestone	Manual Task	Start-only	Critical Split	
Summary	Inactive Task	Duration-only	Finish-only	Progress	

ID	Task Name	Duration	Start	Finish
363				
364	**Full Business Case (FBC)**	**466 days**	**Tue 02/11/21**	**Mon 04/09/23**
370				
371	**Stakeholder Consultations**	**240 days**	**Wed 04/07/18**	**Fri 14/06/19**
374				
375	**Compulsory Purchase Order (CPO)**	**591 days**	**Mon 07/06/21**	**Mon 02/10/23**
401				
402	**Planning Application (T&C)**	**1353 days**	**Mon 05/02/18**	**Fri 09/06/23**
758				
777				
778	**Public Inquiry (Combined Planning/CPO/SRO)**	**220 days**	**Wed 27/07/22**	**Fri 09/06/23**
784				
785	**Pre-contractor design**	**566 days**	**Mon 05/02/18**	**Thu 30/04/20**
949				
950	**Complete Reference Design and Upload to Dataroom**	0 days	Wed 10/06/20	Wed 10/06/20
951				
952	**Freeze 1 - Reference Design**	0 days	Wed 10/06/20	Wed 10/06/20
953				
954	**Revised Cost Estimate**	**47 days**	**Thu 11/06/20**	**Fri 14/08/20**
958				
959	**D&B Contractor Appointment**	**856 days**	**Mon 05/02/18**	**Fri 25/06/21**
960				



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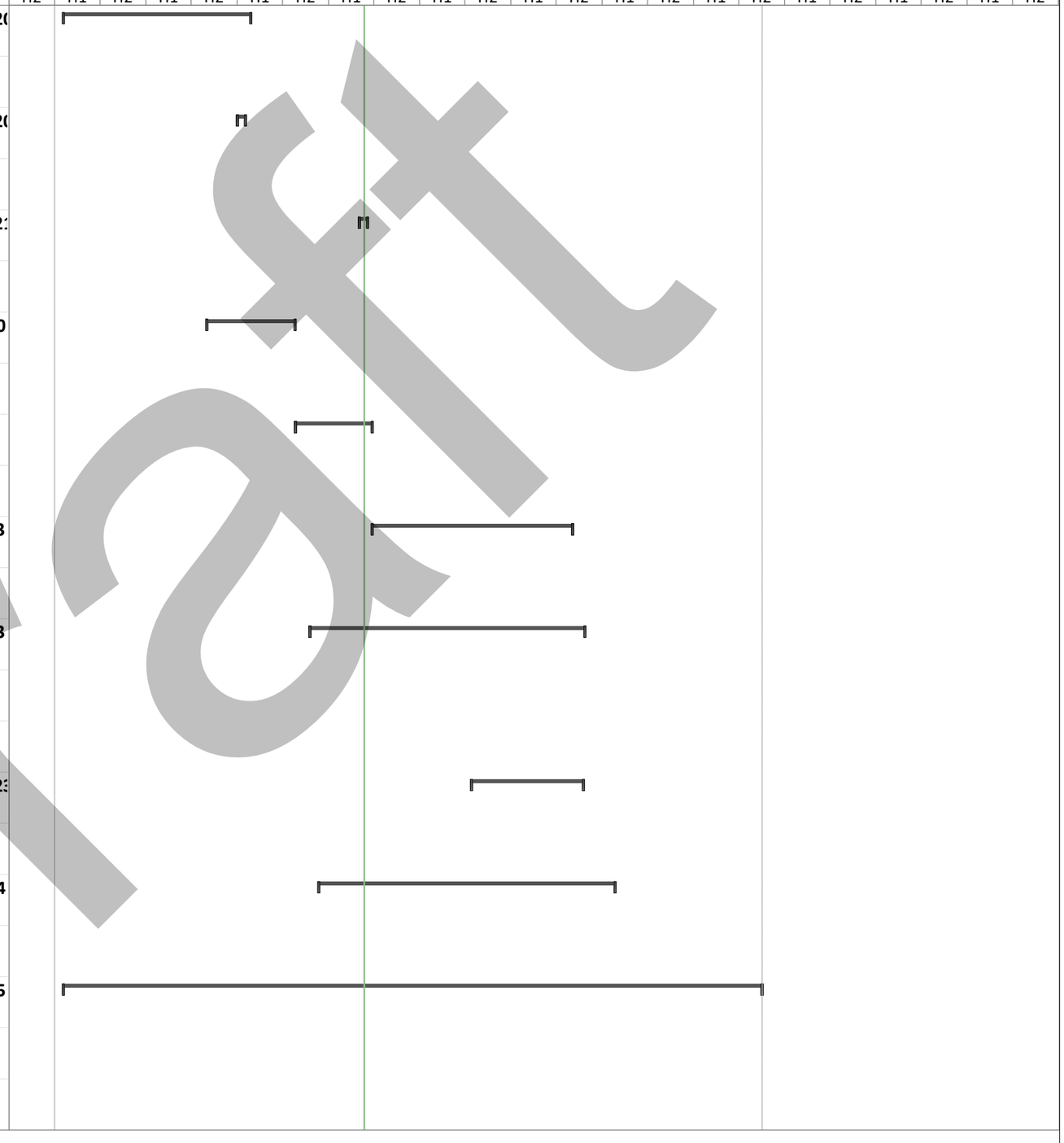
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Critical
Milestone	External Milestone	Manual Task	Start-only	Critical Split
Summary	Inactive Task	Duration-only	Finish-only	Progress

ID	Task Name	Duration	Start	Finish
961	**Contract Documentation**	**520 days**	**Mon 05/02/18**	**Mon 24/02/20**
4712				
4713	**Cabinet Meeting February 2020**	**22 days**	**Fri 03/01/20**	**Mon 03/02/20**
4717				
4718	**Cabinet Meeting June 2021**	**22 days**	**Wed 05/05/21**	**Mon 07/06/21**
4722				
4723	**Prequalification**	**247 days**	**Mon 02/09/19**	**Thu 20/08/20**
4733				
4734	**Stage 0 D&B Tender (Competitive Dialogue)**	**211 days**	**Fri 21/08/20**	**Fri 25/06/21**
4754				
4755	**Stage 1 D&B (Design Period)**	**558 days**	**Fri 25/06/21**	**Tue 05/09/23**
4772				
4773	**Highway Orders**	**765 days**	**Mon 19/10/20**	**Tue 24/10/23**
4785				
4807				
4808	**Discharge of Planning Conditions**	**312 days**	**Thu 28/07/22**	**Wed 18/10/23**
4813				
4814	**Environmental Mitigation in Stage 1**	**824 days**	**Mon 23/11/20**	**Thu 22/02/24**
4833				
4834	**Stage 2 D&B (Construction Period)**	**1940 days**	**Mon 05/02/18**	**Thu 02/10/25**
4842				
4844				



Project: Norwich Western Link
Version: OBC Version
Revision: 2.10 24/05/2021

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Critical
Milestone	External Milestone	Manual Task	Start-only	Critical Split
Summary	Inactive Task	Duration-only	Finish-only	Progress

Appendix 6B

ACTION PLAN REVIEW

NWL Gateway Review (January 2021) Action Plan (UPDATE April 2021):

	Gateway Review Task	Action Required	By who	By when	Progress	BRAG
1.	**Undertake a review of the current communications and stakeholder engagement strategy ahead of the next phase. Ensure that these strategies are cognisant of the project risk log and the communications function is regularly informed of any project issues and problems as they occur.**	Review project communications plan to generate clear alignment with risk log. Develop regular risk review discussions with a focus on communications and stakeholder engagement. Update the communications plan to provide clear guidance for the next project phases.	DA/SL	'Essential' in review report. (within 3 months) Target. End June 2021.	**March 2021:** SL/DA discussed and SL developing proposals as part of communications plan review. Also to be discussed with senior Communications Team managers. **April 2021:** Action above ongoing.	**AMBER**
2.	**NCC should develop and maintain a programme level financial model, to ensure risks and obligations around local contribution funding are fully understood across the various projects as well as undertaking sensitive and scenario tests on the financial and economic case.**	Discuss with Finance (via CES Business Partner) how current funding of major projects are tracked and assess any risks that relate to the NWL funding. Complete sensitivity and scenario testing to assess NCC funding capabilities and review other local contribution options.	DA/AS	'Critical' in review report. Target. Before Cabinet in June 2021.	**March 2021:** DA to arrange discussions with AS to review existing Finance arrangements for major projects across NCC. Assess risks to funding and capacity for NCC funding over project delivery cycles and arrange regular reviews. **April 2021:** AS meeting to be arranged, but initial thoughts from AS are that mechanisms already in place for this.	**AMBER**
3.	**NCC to develop the strongest possible strategic case for the project to support the planning and inquiry processes and ensure its strategic significance is fully reflected. Also consider producing a strategic vision document to assist this.**	Review strategic case in OBC to ensure this is as strong as possible. Develop proposals for a possible strategic vision document (perhaps linked to wider Transport for Norwich Strategy).	DA/DC	'Critical' in review report. Target. Part of finalising OBC to be presented to Cabinet in June 2021.	**March 2021:** DA to arrange discussions with DC (David Cumming) to discuss strategic case. Also need to arrange legal review of strategic case (via newly appointed PM team). **April 2021:** Review of Strategic Case completed as part of ongoing OBC development work. It has moved on since the Gateway Review process.	**AMBER**
4.	**NCC should undertake further risk analysis and establish financial contingencies for possible cost growth. Close**	All cost information will be updated as part of the OBC and reporting to Cabinet in June 2021. Risk reviews will include assessments of	CF/BR (and AS)	'Essential' in review report. (within 3 months) Target. End	**March 2021:** CF/BR to develop proposals for risk register in light of latest project position and appointment of contractor. Cost reviews also to be completed, with assessments for best and worst cases, with contingency assessment discussed with AS. Details to be regularly	**AMBER**

	monitoring of cost and changes during stage 1 of the contract will be essential and should be regularly reviewed by the project board.	financial impacts and contingencies will be developed for this, working with AS. Updates on costs will be routinely reported to the Board, including change controls as part of stage 1 of the contract.		June 2021.	reported to Board. Contract administration (stage 1) updates also to be provided to the Board. **April 2021:** Project finances and risk review being significantly updated as part of procurement processes and OBC close out. Expect re-based finances to then be tracked with best/worst cases reported to Board.	
5.	**NCC invests in building the commercial skills, knowledge and expertise within the Project Team as part of the wider creation of an NCC internal resilience plan.**	DA/BR to work together to ensure staffing of projects enables transference of commercial skills & experience. Staffing opportunities across all major projects to be considered and adopted where possible.	DA/BR	'Essential' in review report. (within 6 months) Target. End September 2021.	**March 2021:** DA to arrange discussions with BR on regular basis to consider opportunities for staff development. Already started with key support role to replace change engineer. Also developing rotation of staff to gain experience. **April 2021:** Discussions held in relation to support for projects (Change Control). Further discussions required for wider commercial awareness training and experience opportunities.	**AMBER**
6.	**NCC should consider formalising their lessons learned approach such that a more permanent record of key learning is maintained.**	DA to consider how lessons learnt can be routinely reported to inform other projects. Need to develop a system to capture information and then report findings. Also need to ensure it can be demonstrated that lessons learnt have been adopted/ actioned.	DA	'Recommended' in review report. Target. Future project reporting by late 2021.	**March 2021:** Lessons learnt from other projects being captured and have been applied to NWL. Need to also continue to review details for NWL, eg learning from recent procurement process. Will also need to capture details from stage 1 of the contract. **April 2021:** Lessons learnt capture to be completed post procurement process. Target July/August.	**AMBER**

NB. *Regular updates to Members to be provided through regular Committee reporting. Monthly updates to be provided at Board meetings.*

Key = BRAG Status

RED	AMBER	GREEN	BLUE	WHITE
Significant issues exist requiring consideration by COG or Programme Board and immediate action to be taken. Benefits - this benefit will not be achieved	Some (actual or anticipated) variation from the project plan but actions in hand to maintain progress. Benefits - some of the benefit may not be achieved	On schedule – progress in line with agreed project plan Benefits - this benefit will be achieved	Project / Work Package / Benefit completed	Being developed - Project has been approved but is in Initiation Stage

Norfolk County Council

NORWICH WESTERN LINK

Environmental Impact Report

70041922-WSP-EIR
MAY 2021

CONFIDENTIAL

Norfolk County Council

NORWICH WESTERN LINK

Environmental Impact Report

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70041922

OUR REF. NO. 70041922-WSP-EIR

DATE: MAY 2021

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
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Prepared by	H Smith/			
Signature				
Checked by	S Johnson/ H Bilston/ M Ashcroft	C Middleton		
Signature				
Authorised by	S Goane	S Goane / L Wooller		
Signature				
Project number				
Report number				
File reference				

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APPENDICES

1 INTRODUCTION

1.1 INTRODUCTION

This Environmental Impact Appraisal report has been developed as part of the Outline Business Case for the Norwich Western Link scheme (NWL) and has been prepared on behalf of Norfolk County Council (NCC) for consideration by the Department for Transport (DfT).

1.2 PURPOSE OF THIS APPRAISAL

1.2.1. This TAG Environmental Appraisal has been prepared in support of the Outline Business Case (OBC) for the Norwich Western Link.

1.2.2. The methods used in the undertaking of the environmental appraisal followed the principles set out in the Department for Transport (DfT) guidance Transport Analysis Guidance (TAG) Unit A3 Environmental Impact Appraisal (May 2019). This provides guidance for appropriately qualified environmental practitioners on appraising the impact of transport proposals on the built and natural environment, and on people. This appraisal is not intended to be an alternative to, or a replacement for, a statutory Environmental Impact Assessment (EIA) (if required).

1.2.3. The reporting of the environmental appraisal is provided in the form of a Worksheet for each of the topics and an Appraisal Summary Table (AST), provided as part of the Economic Case of the OBC.

1.2.4. The environmental topics covered in this environmental appraisal are:

- Noise;
- Air Quality;
- Greenhouse Gases;
- Landscape;
- Historic Environment;
- Biodiversity; and
- Water Environment.

1.2.5. This report presents the findings set out in the AST, supported by TAG Worksheets, for the environmental topics listed above. It also includes a short account of the impacts associated with each of the environmental topics.

1.3 SCHEME LOCATION

1.3.1. The NWL is located to the east of Norwich and seeks to provide a link between the A47 in the south and the A1067 in the north. The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network. The location is shown in Figure 1-1.

1.3.2. The scheme is comprised of:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain
- An "at grade" junction with the A1067;

- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout;
- A bridge carrying the NWL over Ringland Lane;
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required;
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network; and
- Surface water drainage - principally infiltration basins, sediment forebays and associated carrier drains/ channels.

1.3.3. The scheme also includes landscaping, planting, ancillary works, environmental mitigation work and Biodiversity Net Gain measures and a wider network of cycle-friendly route options where traffic relief from the NWL enables improved cycle priority.

Figure 1-1 - Scheme Location

2 NOISE

2.1 INTRODUCTION

2.1.1. This section presents the noise appraisal for the NWL Scheme, undertaken to help inform the OBC. The appraisal methodology and baseline conditions are described, followed by a summary of the findings of the noise appraisal, including the outcome of the TAG Unit A3 noise analysis.

2.1.2. Table 2-1 includes a definition of basic acoustic terms used in this chapter.

Table 2-1 - Glossary of Basic Acoustic Terms

Term	Definition
A-weighting, dB(A)	The human ear has a non-linear frequency response, being less sensitive at low and high frequencies and most sensitive in the mid-range frequencies. The A-weighting scale is applied to measured sound pressure levels so that these levels correspond more closely to the subjective response.
Decibel (dB)	The unit of measurement used for sound pressure levels. The decibel scale is logarithmic rather than linear. The threshold of hearing is 0 decibels while the threshold of pain is about 130 decibels.
Facade	Sound level that is determined 1 metre (m) in front of a window or door in a facade.
Free-field	The sound level that is measured or calculated, in the open, without any reflections from nearby surfaces except the ground.

2.2 BASELINE CONDITIONS

2.2.1. Initial consultation with Broadlands DC has been undertaken with regard to the noise and vibration assessment as part of the Environmental Impact Assessment (EIA) process. Further consultation will be undertaken as the EIA process continues and will be reported within the Environmental Statement.

2.2.2. At the northern end of the NWL, the noise climate is dominated by road traffic noise from Fakenham Road (A1067). Moving south, there is some contribution to the noise climate from road traffic on the nearby local roads. At the southern end of the NWL, the noise climate is dominated by road traffic noise from the A47. The disused RAF Attlebridge airfield is located approximately 3km west of the proposed route and is thought not to significantly affect the noise climate.

2.2.3. The A47 is managed by Highways England and is proposed to be dualled and slightly re-routed at the southern end of the NWL (not within the scope of the NWL). As the A47 dualling works are assumed to be complete prior to the opening of the NWL, the assessment of the NWL presented in

this report has assumed the A47 is dualled in both the 'with' and 'without' NWL traffic scenarios [1]. Consequently, the noise impacts from the A47 dualling and re-routing will not be considered in this OBC assessment. Based on information available at this stage it has been assumed that the A47 will be surfaced with a low noise road surface and this has been incorporated into the acoustic model.

2.2.4. Generally, except for receptors at the northern and southern ends of the NWL close to the A1067 or the A47, the NWL covers a fairly rural area, with existing ambient noise levels being relatively low.

2.2.5. To account for the potential contribution from sources of noise not included in the acoustic model or excluded from the calculation (for example, as a result of the vehicle flow falling below the threshold for valid calculations of $L_{A10,18h}$), an adjustment for existing ambient noise has been applied. This is especially relevant for more remote locations away from existing roads, where the acoustic model may potentially under-estimate noise levels.

2.2.6. From 30 April to 2 May 2019 a noise survey was undertaken as part of the options selection stage for the NWL. This survey was undertaken at three locations to inform the acoustic modelling that was undertaken at that stage. Measurement position 3 was located at 47 The Street, Ringland which, although outside the study area for the NWL (discussed below), is indicative of the area between the A47 and the A1067 where ambient noise levels are low. Based on the measured noise levels, 34 dB $L_{A10,18h}$ during the daytime and 26 dB L_{night} during the night-time have been added to the acoustic model. These underlying levels are sufficiently low not to affect the noise levels in areas where road traffic noise is dominant, but have been applied to help ensure that the existing noise levels in more remote areas are not under-estimated and hence that the future changes in noise levels are not over-estimated.

2.2.7. There are no Noise Important Areas (NIAs) within 600 metres of the NWL. The nearest NIA to the NWL is NIA 5201, located on the existing A47, approximately 1km from the southern end of the NWL.

2.3 METHODOLOGY

2.3.1. The appraisal has been completed in accordance with the TAG Unit A3 guidance for Noise Impacts. The methodology references DMRB guidance where appropriate, however, this is not a full and complete assessment under DMRB, as a proportionate appraisal has been undertaken, with the scope and methodology being tailored to support the OBC.

TAG UNIT A3 ENVIRONMENTAL IMPACT APPRAISAL, DEPARTMENT FOR TRANSPORT

2.3.2. With regards to noise impacts, the TAG Unit A3 impact appraisal used to focus on annoyance, however, this emphasis has now shifted in light of growing evidence on the links between

[1] The same approach will be adopted in the forthcoming Environmental Impact Assessment (EIA), with the outcomes being reported in the form of an Environmental Statement (ES).

environmental noise and health outcomes. Defra has produced guidance on transport-related noise using an 'impact pathway' approach to include:

- Annoyance;
- Sleep disturbance; and
- Health impact, including heart disease (acute myocardial infarction, or AMI), stress and dementia.

2.3.3. The methodology includes five steps as follows:

- Scoping;
- Quantification of noise and impacts;
- Estimation of the affected population;
- Monetary valuation of changes in noise impact; and
- Consideration of the distributional impacts of changes in noise.

SCOPING (STEP 1)

2.3.4. TAG Unit A3 requires that scoping should be consistent with the scoping of the environmental assessment, with the aim being to decide how noise impacts should be appraised and to define a study area for the NWL. The noise appraisal should be proportional to the NWL and its likely impact, with analysis being no more detailed than is required to support robust decision making.

2.3.5. TAG Unit A3 notes (in paragraph 2.2.3) that consideration needs to be given to how to address night-time noise and that for road-based schemes, "*conversion between different noise measures is considered sufficiently robust for the effects of night-time noise on sleep disturbance to be transformed from daytime measures*". This approach has been adopted for the NWL, through the use of the formulas contained in TRL Project Report PR/SE/451/02[2].

2.3.6. Paragraph 2.2.6 of TAG Unit A3 notes that the guidance "*does not specify any analysis for situations where noise impacts on potentially noise sensitive non-residential receptors such as schools or hospitals*". Where impacts are likely to be significant, the TAG Unit A3 guidance is that they should be reported separately.

[2] TRL Limited. Project Report PR/SE/451/02. Converting the UK Traffic Noise Index $L_{A10,18h}$ to EU Noise Indices for Noise Mapping. P G Abbott & P M Nelson (TRL Limited). 2002.

2.3.7. For road schemes, TAG Unit A3 makes reference to the DMRB Volume 11, Section 3, Part 7 Noise and Vibration[3]. This guidance was superseded in 2019 by DMRB LA 111 Noise and vibration[4], which itself was most recently updated in May 2020.

QUANTIFICATION OF NOISE IMPACTS (STEP 2)

2.3.8. The NWL is likely to affect noise levels in the area, as experienced at nearby sensitive receptors, in the following ways. It will:

- change the physical alignment of existing traffic links at their junction with the NWL and introduce new traffic along the length of the NWL; and
- have the potential to alter vehicle flow characteristics, such as traffic volumes, composition, and speeds on the existing road network.

2.3.9. TAG Unit A3 requires the likely noise impacts to be quantified and to this end reference is made to the Calculation of Road Traffic Noise (CRTN)[5]. A 3-dimensional digital acoustic model has been prepared using CadnaA® software to quantify the likely road traffic noise levels during the operational phase of the NWL, with calculations following the methodology in CRTN (see paragraph 2.3.22 onwards).

2.3.10. TAG Unit A3 includes some guidance on how to deal with property demolitions or house building, stating that "*where there are grounds to confidently predict changes in the affected number of households between the without scheme and with scheme cases, this should be reflected in the appraisal*". However, it is understood that no significant housing developments are currently proposed within the study area for the NWL. Therefore, no committed developments have been included in the monetary valuation of noise impacts. Potential noise impacts on any committed developments within the study area for the operational noise assessment will be considered within the EIA.

2.3.11. The CRTN has been used to predict road traffic noise levels in terms of $L_{A10,18h}$. The following corrections have been used to calculate relevant daytime and night-time noise levels for use in the TAG Unit A3 assessment:

- $L_{Aeq,16h} = L_{A10.18h} – 2$ dB (from paragraph 2.2.13 of TAG Unit A3); and

[3] Design Manual for Roads and Bridges (DMRB). Volume 11 Environmental Assessment. Section 3 Environmental Assessment Techniques. Part 7 HD 213/11 – Revision 1 – Noise and Vibration. The Highways Agency, Transport Scotland, Welsh Government and the Department for Regional Development Northern Ireland. 2011.

[4] Design Manual for Roads and Bridges. Sustainability & Environmental Appraisal. LA 111 Noise and Vibration Revision 2. Highways England. 2020.

[5] The Calculation of Road Traffic Noise. The Department of Transport and Welsh Office. 1988

- L_{night} = 0.90 x $L_{A10,18h}$ – 3.77 dB (from TRL Report PR/SE/451/02, Method 3 for non-motorway roads).

2.3.12. The output from the quantification process is a matrix of households experiencing different noise levels in the with-scheme and without-scheme scenarios. The noise levels are defined in 3 dB wide bands running from 45 dB to 81 dB for both $L_{Aeq,16h}$ and L_{night}.

2.3.13. The calculations have been carried out for the NWL opening year and a forecast (or future) year 15 years after opening:

- do-minimum, opening year 2025, (without-scheme)[6];
- do-something, opening year 2025, (with-scheme)[7];
- do-minimum, forecast year 2040, (without-scheme); and
- do-something, forecast year 2040, (with-scheme).

2.3.14. The acoustic model has been used to predict receptor specific noise levels at a height of 4 metres. The façade subject to the greatest magnitude of change has been used in the analysis in line with the guidance in DMRB LA 111.

2.3.15. It should be noted that paragraph 2.2.17 of TAG Unit A3 notes the following regarding night-time impacts "*As well as through the monetisation process described in step three below, night noise impacts should be assessed by determining the number of households where the WHO Interim Night Noise Target of 55 dB L_{night} noise level is exceeded for the last forecast year in the with and without scheme cases*". For this analysis, it is considered appropriate to use a different sift mechanism, based on the highest noise level, to derive a representative noise level for each dwelling. This is because the use of the façade with the greatest magnitude of noise change may not identify the highest noise level affecting the property.

ESTIMATION OF THE AFFECTED POPULATION (STEP 3)

2.3.16. The matrix of the numbers of residential receptors experiencing without-scheme and with-scheme noise levels in 3 dB bands for $L_{Aeq,16h}$ and L_{night} have been entered into the TAG Noise Workbook to estimate the likely affected population and to monetise the impact.

2.3.17. The TAG Noise Workbook contains dose-response functions for each impact pathway for road traffic noise. These functions describe, at different noise levels, the percentage of the population affected (for sleep disturbance and annoyance/amenity) or the increased risk of adverse health outcomes (for acute myocardial infarction (AMI), stroke and dementia).

[6] In this chapter the terms 'do-minimum' and 'without-scheme' have been used interchangeably

[7] In this chapter the terms 'do-something' and 'with-scheme' have been used interchangeably

2.3.18. These relationships, in combination with the matrix of information generated during Step 2 (regarding the number of households experiencing different with-scheme and without-scheme noise levels), can be used to estimate the number of people affected under each impact pathway.

2.3.19. The TAG Noise Workbook goes on to develop per household, marginal monetary values for each impact pathway (based on an average of 2.3 people per household). These values are contained within the workbook and so the estimation of the population affected for each impact pathway is effectively subsumed within the monetary valuation described in the next sub-section (Step 4).

MONETARY VALUATION OF NOISE IMPACTS (STEP 4)

2.3.20. The TAG Noise Workbook generates the following outputs, which are intended to complement each other:

- the net present value of the change in noise, both as an overall value and broken down into the five impact pathways; and
- quantitative results in the form of the number of households experiencing increased or decreased noise in the forecast year during the day and night.

2.3.21. The monetary valuation is based on the estimation of the number of Disability-Adjusted Life Years (DALYs) lost (or gained) under each impact pathway, taking into account a value of £60,000 per DALY.

CALCULATION OF ROAD TRAFFIC NOISE (CRTN), 1988

2.3.22. The CRTN memorandum describes the procedures for calculating noise from road traffic. The factors which may influence road traffic noise levels at source can be divided into two groups:

- road related factors - gradient and surface type; and
- traffic related factors - flow, speed and the proportion of heavy-duty vehicles.

2.3.23. The Basic Noise Level (BNL) is described in the CRTN. It does not relate to any specific receptor, but rather is a measure of source noise, at a reference distance of 10 m from the nearside carriageway edge of a specific length of highway. It is determined by obtaining the estimated noise level from the 18-hour traffic flow and then applying corrections for vehicle speed, percentage of heavy vehicles, gradient and road surface as described in CRTN.

2.3.24. The propagation of noise is also covered in CRTN and includes corrections for distance and, if appropriate, either ground cover or screening. Other receptor specific corrections include the (angle of) view of the road and reflections either from the façade of the receptor and or from reflecting structures on the far side of the road.

STUDY AREA

2.3.25. TAG does not provide guidance in relation to defining a noise study area, and so reference is made to the DMRB LA 111 which includes (in paragraph 3.44, Note 1) the following advice on the extent of a suitable study area for the operational road traffic assessment, although it is acknowledged that the study area can be varied for individual projects.

"An operational study area defined as the following can be sufficient for most projects, but it can be reduced or extended to ensure it is proportionate to the risk of likely significant effects:

1) *the area within 600 m of new road links or road links physically changed or bypassed by the project;*

2) *the area within 50 m of other road links with potential to experience a short term BNL change of more than 1.0 dB(A) as a result of the project."*

2.3.26. For this TAG Unit A3 assessment and in line with DMRB LA 111 guidance, the main study area has been determined based on a 600 metre buffer around the NWL and the existing road links replaced by the NWL. Detailed road traffic noise predictions have been undertaken at all receptors within this area.

2.3.27. Whilst there is the potential for the NWL to have an impact beyond the main study area, it would not be proportionate to quantify these impacts as part of the TAG calculations. It is expected that these impacts would be both positive and negative, with some roads relieved by the NWL and others busier as a result of traffic using different routes to access the NWL. Further consideration of the potential noise level impacts on the wider road network will be considered during the forthcoming EIA.

DATA SOURCES

- OS MasterMap from Ordnance Survey;
- OS AddressBase Plus from Ordnance Survey;
- 1 m 2019 DTM (digital terrain model) Lidar from the Defra survey data download website;
- 3d engineering drawings of the Highways England A47 Tuddenham to Easton dualling (interim design fix C, August 2020) that were available at the time of preparation of the OBC;
- 3d engineering drawings of the Norwich Western Link (reference design, Drawing No. NCCT41793-03-D-01 3D) that were available at the time of preparation of the OBC; and
- traffic data (flow, composition and speed) used in the development of the OBC for individual links within the Traffic Reliability Area.

2.3.28. These data have been utilised as follows.

Table 2-2 - Data Utilised in the TAG Unit A3 Appraisal

Model Layer	Existing Model	Future Model
Roads	All roads aligned to OS MasterMap base mapping. Relevant traffic data for the do-minimum scenarios (opening and forecast years) have been assigned to each link. It has been assumed that the A47 and A1270 have a low noise road surface.	For existing roads unaffected by the Proposed Scheme, as for Existing Model. The Proposed Scheme has been aligned with 3d engineering drawings. Relevant traffic data for the do-something scenarios (opening and forecast years) have been assigned to each link. It is assumed that the Proposed Scheme has a low noise road surface.
Viaducts	N/A	3d engineering drawings were used to align the viaduct carrying the Norwich Western Link over the River Wensum and associated flood plain in the do-something scenarios.

Topography	1 m 2019 DTM lidar used to generate height contours at 1 m spacing. 3d engineering drawings for the proposed A47 dualling have been used to generate height contours along the length of this route.	As for existing topography, except for the Proposed Scheme corridor where the 3d engineering drawings have been used to generate height contours at 0.1 m spacing along the length of this route.
Buildings	Polygonised footprints extracted from OS MasterMap	
Calculation points	OS AddressBase Plus data used to identify the use of the building	

2.3.29. The NWL reference design includes significant earth bunding at locations along the route which have been included in the acoustic modelling for the NWL. The reference design also includes a three metre high barrier on the outer carriageway edge of each of the River Wensum viaducts. This barrier has been assumed to have acoustic qualities, and so the associated noise level benefits have been included in the calculations.

2.4 IMPACT APPRAISAL AND POTENTIAL MITIGATION

SENSITIVE RECEPTORS

2.4.1. Existing residential receptors within the study area have been identified using OS AddressBase® data in combination with information on the location of buildings taken from provided OS MasterMap data. A total number of 52 dwellings are located within the main study area (see paragraph 2.3.25) and have, therefore, been included within the assessment.

2.4.2. In addition, TAG Unit A3 requires that consideration be given to other noise-sensitive non-residential receptors such as schools, hospitals and designated sites. Whilst no other sensitive buildings have been identified within the study area, the River Wensum is a Site of Special Scientific Interest (SSSI) and so should be considered as a noise sensitive receptor. However, as the TAG Unit A3 analysis focusses on human receptors, this area has not been included in the TAG calculations for the NWL. The effect of noise on the SSSI will be considered during the forthcoming EIA. At that time and given that the River Wensum occupies a large area within which the noise impacts are likely to vary, the impacts on this receptor will be considered across the area as a whole, rather than at specific locations.

IMPACT APPRAISAL

2.4.3. The output spreadsheet from the TAG Unit A3 Noise Workbook is provided in Appendix A.

2.4.4. The results of the noise appraisal are summarised below. These have been generated by analysing data for each residential receptor based on the façade with the greatest magnitude of noise change:

- In the forecast year, 33 households would experience an increase in daytime noise, whilst ten households would experience a decrease in daytime noise.
- In the forecast year, three households would experience an increase in night-time noise, whilst ten households would experience a decrease in night-time noise.
- The overall appraisal indicates that the operation of the NWL is likely to generate a beneficial noise impact and that the 'net present value of change in noise' is calculated to be £38,490.

- The impact pathways described earlier in this chapter have been assessed, and the NWL is likely to generate a beneficial effect for all pathways. The following net present values have been calculated:
  - Sleep disturbance: £40,071;
  - Amenity: -£5,219;
  - AMI: £7,142;
  - Stroke: -£1,387; and
  - Dementia: -£2,116.

2.4.5. Paragraph 2.2.7 of TAG Unit A3 states "*As well as through the monetisation process described in step three below, night noise impacts should be assessed by determining the number of households where the WHO Interim Night Noise Target of 55 dB L_{night} noise level is exceeded for the last forecast year in the with and without scheme cases*".

2.4.6. In the Do-minimum forecast year four receptors are predicted to exceed the target value of 55 dB L_{night}. In the Do-something forecast year the same four receptors are predicted to exceed the target value of 55 dB L_{night}.

DISCUSSION OF IMPACTS

2.4.7. Whilst the TAG Unit A3 assessment indicates an overall positive result in monetary terms for the NWL, it should be noted that a broad range of impacts is anticipated within the study area.

2.4.8. The properties expected to experience the largest beneficial changes in noise level are those located on Wood Lane and Paddy's Lane. Noise level decreases are predicted at these receptors as a result of fewer vehicles using these roads in favour of the NWL. It is likely that some of these receptors will experience significant beneficial effects in terms of the EIA.

2.4.9. Adverse impacts are predicted across the majority of the rest of the study area as a result of the NWL, particularly at isolated receptors towards the centre of the study area where ambient noise levels are currently low. Whilst the absolute noise levels are likely to be fairly low, a high magnitude of change is anticipated at many receptors.

2.4.10. Some of these adverse impacts are not reflected in the TAG calculations due to the 45 dB $L_{Aeq, 16h}/L_{night}$ cut-off value embedded within the TAG Unit A3 Noise Workbook, and this, in part, is the reason for the overall positive monetary value. During the forthcoming EIA assessment, further consideration will be given to all numerical and other contextual factors associated with these receptors when determining the significance of the predicted noise levels and changes. Nevertheless, it is likely that a number of receptors in the study area will be found to experience a significant adverse effect in terms of the EIA

2.4.11. An EIA is to be undertaken by WSP and an ES will be prepared, which will contain more detailed design information and a more thorough impact assessment. More detail will be provided in the ES regarding the predicted noise level changes and likely significant effects of the NWL and further consideration will also be given to mitigation measures where appropriate.

2.4.12. A high level Construction and Environment Management Plan (CEMP) and Mitigation Plan will be produced as part of the Environmental Statement (ES) submission which will detail the measures required to mitigate the identified impacts. This will help give certainty on the delivery of the

mitigation and compensation measures. A more detailed CEMP will be taken forward by the contractor post Planning Submission.

2.4.13. is between £26,981,450 (optimistic) and the lower estimate is £7,918,856 (pessimistic).

2.5 SUMMARY

2.5.1. A noise appraisal has been undertaken following the methodology presented in TAG Unit A3, Environmental Impact Appraisal, dated May 2019.

2.5.2. A 3-dimensional digital acoustic model has been generated based on the guidance contained within CRTN and the DMRB LA 111.

2.5.3. The affected population has been estimated and the monetary valuation of changes in noise impact has been determined using the TAG Unit A3 Noise Appraisal Workbook (see Appendix A).

2.5.4. The overall appraisal indicates that the operation of the NWL, without mitigation, is likely to generate a beneficial noise impact, and the 'net present value of change in noise' is calculated to be £38,490. Whilst this indicates a positive scheme from a noise perspective, it should be noted that large adverse impacts are predicted at many receptors within the study area, although these are mostly at low levels (which in turn means they have less influence on the overall monetised value of the NWL).

2.5.5. It is anticipated that the NWL would generate a characteristic pattern of noise impacts:

- Noise decreases for properties located adjacent to roads which will be relieved by the NWL; and
- Noise increases at isolated properties within the corridor of the new road where the baseline noise levels are expected to be low.

2.5.6. Whilst consideration has been given to mitigation measures at earlier stages, resulting in the inclusion of the River Wensum viaduct barriers and earth bunding along the NWL, further measures to minimise adverse impacts arising from the operation of the NWL will be considered during the forthcoming EIA assessment.

2.5.7. The ES is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

3 AIR QUALITY

3.1 INTRODUCTION

3.1.1. This section presents the air quality impacts appraisal for the NWL, which has been undertaken in accordance with TAG Unit A3.

3.2 LEGISLATION

3.2.1. The relevant ambient air quality legislation is given in **Table 3-1**.

Table 3-1 – Relevant Air Quality Standards and Legislation

Pollutant	Measured as	Concentration ($\mu g/m^3$)	Legislation	Requirement
Nitrogen dioxide (NO_2)	Annual mean	40	Part IV of the Environment Act 1995 and The Air Quality (England) Regulations 2000 (as amended 2002)	Standard set as an objective. Under the Environment Act, local authorities are required to review air quality within their areas and where objectives are not likely to be achieved are required to declare an Air Quality Management Area (AQMA) and put in place an Air Quality Action Plan to bring about improvement.
			Directive 2008/50/EC on ambient air quality and cleaner air for Europe The Air Quality Standards Regulations 2010 (as amended 2016)	Standard set as a limit value. The Secretary of State must ensure that levels of do not exceed the limit value.
$PM_{2.5}$ (particulate matter less than 2.5 micrometres in diameter)	Annual mean	25	Directive 2008/50/EC on ambient air quality and cleaner air for Europe The Air Quality Standards Regulations 2010 (as amended 2016)	Standard set as a target value. The Secretary of State must ensure that all necessary measures not entailing disproportionate costs are taken to ensure that concentrations do not exceed the target value.

3.3 CONSULTATION

3.3.1. Over the course of the project there has been consultation with the Environmental Health Officer for Broadland DC. Further consultation will be undertaken as part of the separate Environmental Impact Assessment process, which is to be reported within the Environmental Statement.

3.4 STUDY AREA

3.4.1. The air quality study area has been determined by defining the affected road network (ARN) using Design Manual for Roads and Bridges (DMRB) LA 105 scoping criteria[8]. For this appraisal, a link qualifies as part of the ARN where there is:

- Change in annual average daily traffic (AADT) flow of 1,000 vehicles or more; or
- Change in AADT flow of heavy duty vehicles of 200 or more; or
- Change in road alignment of 5 metres (m) or more.

3.4.2. As illustrated in **Figure 3-1**, the ARN, which includes the NWL, extends from Dereham in the west along the A47 to the A12 at Great Yarmouth in the east, and includes adjoining roads. The ARN does not extend into Norwich beyond the 'outer ring road' (A146/A140/A1042).

3.4.3. The air quality study area encompasses 200m around the ARN. All impacts beyond 200m will be imperceptible and are therefore scoped out.

3.4.4. The air quality study area intersects several local authority districts, including: Breckland District Council (DC), Broadland DC, South Norfolk DC, Norwich City Council (CC) and Great Yarmouth Borough Council (BC).

[8] DMRB HA 207/07 Air Quality guidance and associated Interim Advice Note 170/12, which are referred to in TAG Unit A3 (May 2019) guidance, have been superseded by LA 105, which is available to download at: https://www.standardsforhighways.co.uk/dmrb/ [accessed November 2020]

It should be noted that as the scheme is not part of the Strategic Road Network, the DMRB speed pivoting and banding approach to vehicle emissions has not been applied.

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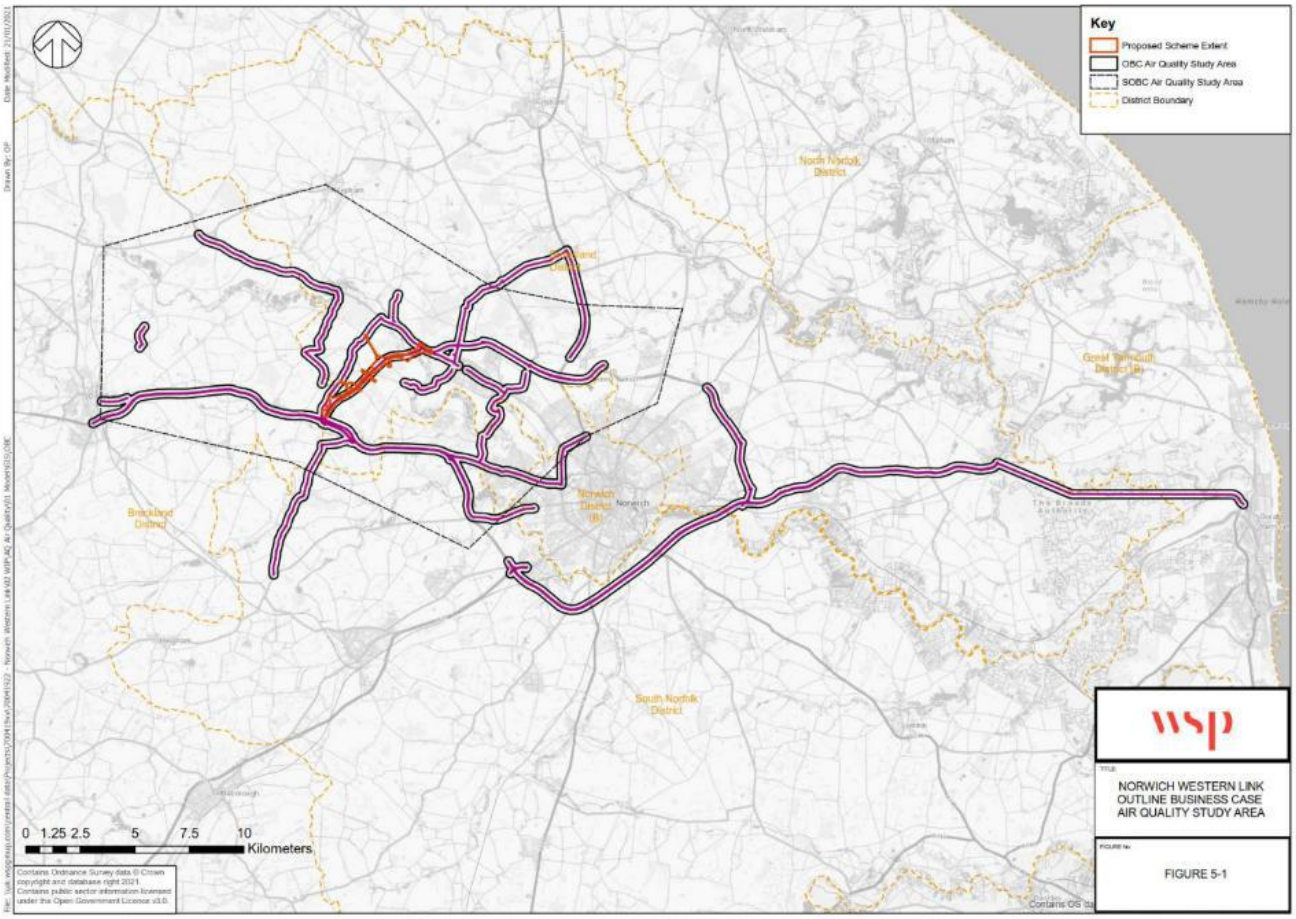

Figure 3-1 - Air Quality Affected Road Network

3.5 APPRAISAL METHODOLOGY

3.5.1. The appraisal has been undertaken following TAG Unit A3 on Air Quality Impacts and has involved:

- Quantitative assessment based on modelling to determine vehicle emissions of oxides of nitrogen (NO_x) and fine particulate matter ($PM_{2.5}$) with and without the Proposed Scheme in the opening year (2025) and design year (2040) scenarios, and dispersion modelling to determine annual mean concentrations of nitrogen dioxide (NO_2) and $PM_{2.5}$ at the relevant receptors in each scenario. Concentrations have been predicted by dispersion modelling using ADMS-Roads model software[9].

[9] Further information on ADMS-Roads can be found on the Cambridge Environmental Research Consultants webpage: http://www.cerc.co.uk/environmental-software/ADMS-Roads-model.html

- Monetary valuation of the Air Quality Impacts has been undertaken using the impact pathways approach, which accounts for changes in human exposure to annual mean NO_2 and $PM_{2.5}$ concentrations at relevant receptors and overall emissions of NO_x and $PM_{2.5}$ to determine the effects of impacts that do not directly affect households such as ecosystem damages.

3.5.2. Data sources used to inform this appraisal include:

- Breckland DC[10], Broadland DC[11], South Norfolk DC[11], Norwich CC[12] and Great Yarmouth BC[13] Local Air Quality Management reports;
- WSP baseline NO_2 diffusion tube survey undertaken between September 2019 and March 2020 (see **Appendix B** for details);
- Traffic data without and with the Proposed Scheme in 2025 (opening year) and 2040 (design year) from the Norwich Area Transport Strategy Model (2019 base year);
- Road source emissions data from Defra's Emissions Factors Toolkit (version 10.1)[14];
- Meteorological data for 2019 from Norwich airport – used in predicting pollutant concentrations at receptors;
- Background and roadside pollutant concentration data from Defra's 2018-based Pollution Climate Mapping (PCM) model[15,16];

[10] Breckland DC, Annual Air Quality Reports. Available at: https://www.breckland.gov.uk/article/13023/Annual-Air-Quality-Reports [accessed January 2021]

[11] Broadland District Council and South Norfolk District, Air Quality Reports. Available at: https://www.south-norfolk.gov.uk/residents/neighbourhood-issues/environmental-quality/air-quality [accessed January 2021]

[12] Norwich City Council, Air Quality Monitoring Reports and Assessments. Available at: https://www.norwich.gov.uk/downloads/download/1917/air_quality_monitoring_reports_and_assessments [accessed January 2021]

[13] Great Yarmouth Borough Council, Pollution – Advice on Local Air Quality. Available at: https://www.great-yarmouth.gov.uk/pollution [accessed January 2021]

[14] Defra (2020) Emissions Factors Toolkit (version 10.1). Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [accessed December 2020]

[15] Defra (2020) Background Maps (2018 reference year). Available at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [accessed December 2020]

[16] Defra (2020) NO_2 and PM projections data (2018 reference year). Available at: https://uk-air.defra.gov.uk/library/no2ten/2020-no2-pm-projections-from-2018-data [accessed November 2020]

- Conversion of modelled NO_x concentrations to NO_2 concentrations using Defra's NO_x to NO_2 calculator (version 8.1)[17]; and
- Ordnance Survey AddressBase data, provided by NCC under Contractor Licence, to identify sensitive receptor locations with relevant exposure to annual mean pollutant concentrations

3.6 BASELINE CONDITIONS

3.6.1. An overview of baseline air quality conditions is given in **Table 3-2**. Overall, it can be concluded that baseline air quality is likely to be good across the air quality study area.

Table 3-2 - Baseline Conditions

Local Authority	NO2	PM2.5	Summary
Breckland DC	At the time of writing, the latest information published by Breckland DC is for 2019. Except within Swaffham (approximately 17km to the west of the air quality study area), concentrations at NO_2 monitoring sites have been well below the 40µg/m^3 standard in recent years. The only AQMA for NO_2 within the district is the Swaffham AQMA. Within the air quality study area, the main sources of NOx are road traffic emissions from the A1067, A47 and A1075. There are no monitoring sites within the air quality study area (the nearest are just to the west within Dereham). Defra's predicted roadside NO_2 concentrations within the air quality study area are well below the 40µg/m^3 standard. The highest concentration for 2018 is 25.1µg/m^3 on the A47 (census ID 802074965). Defra's predicted background NO_2 concentrations are well below the 40µg/m^3 standard.	At the time of writing, the latest information published by Breckland DC is for 2019. There are no monitoring sites or AQMAs for $PM_{2.5}$ within the district. From monitoring of PM_{10} at East Wretham, Breckland DC has reported that $PM_{2.5}$ concentrations are likely to be well below the standard of 25µg/m^3. Within the air quality study area, the main sources of $PM_{2.5}$ are road traffic generated emissions from the A1067, A47 and A1075. Defra's predicted roadside $PM_{2.5}$ concentrations within the air quality study area are well below the 25µg/m^3 standard. The highest concentration for 2018 is 10.8µg/m^3 on the A1075 (census ID 802074967). Defra's predicted background NO_2 concentrations are well below the 25µg/m^3 standard.	Overall, baseline air quality is likely to be good within the air quality study area.

[17] Defra (2020) NOx to NO2 calculator (version 8.1). Available at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [accessed December 2020]

Local Authority	NO2	PM2.5	Summary
Broadland DC	At the time of writing, the latest information published by Broadland DC is for 2018. Concentrations at all NO_2 monitoring sites within the district have been well below the 40µg/m^3 standard in recent years. There are no AQMAs for NO_2 within the district. Within the air quality study area, the main sources of NOx are road traffic emissions from vehicles on the A1067, A1270, A140, A1042 and A47. In 2018, there were four NO_2 monitoring sites within the air quality study area: BN1 on the A47 at North Burlingham; BN11 on Reepham Road at Hellesdon; BN12 on Boundary Road at Hellesdon; BN13 on Mile Cross Lane at Hellesdon. The highest concentration was 29.6µg/m^3 at BN11. Five WSP roadside monitoring sites were within the air quality study area: NWL_2 and NWL_3 on the A1067 Fakenham Rd; NWL_5 on the A1067 over the River Wensum at Attlebridge; NWL_6 on the A1067 at Lenwade; and NWL_7 on the A47 north of Honingham. The highest concentration was 27.7µg/m^3 at NWL_7. Defra's predicted roadside NO_2 concentrations within the air quality study area are well below the 40µg/m^3 standard. The highest concentration for 2018 is 33.4µg/m^3 on the A140 (census ID 802026505). Defra's predicted background NO_2 concentrations are well below the 40µg/m^3 standard.	At the time of writing, the latest information published by Broadland DC is for 2018. There are no monitoring sites or AQMAs for $PM_{2.5}$ within the district. Within the air quality study area, the main sources of $PM_{2.5}$ are road traffic generated emissions from the A1067, A1270, A140, A1042 and A47. Defra's predicted roadside $PM_{2.5}$ concentrations within the air quality study area are well below the 25µg/m^3 standard. The highest concentration for 2018 is 11.2µg/m^3 on the A140 (census ID 802026505). Defra's predicted background NO_2 concentrations are well below the 25µg/m^3 standard.	Overall, baseline air quality is likely to be good within the air quality study area.
South Norfolk DC	At the time of writing, the latest information published by South Norfolk DC is for 2018. Concentrations at all NO_2 monitoring sites within the district have been well below the 40µg/m^3 standard in recent years. There are no AQMAs for NO_2 within the district.	At the time of writing, the latest information published by South Norfolk DC is for 2018. There are no monitoring sites or AQMAs for $PM_{2.5}$ within the district. Within the air quality study area, the main sources of $PM_{2.5}$ are road	Overall, baseline air quality is likely to be good within the air quality study area.

Local Authority	NO2	PM2.5	Summary
	Within the air quality study area, the main sources of NOx are road traffic emissions from vehicles on the A11 and A47. In 2018, there were three South Norfolk DC monitoring sites within the air quality study area: DT1 on Newmarket Rd at Cringleford; DT2 on Longwater Lane at Costessey; and DT11 at Thickthorn Cottages off the B1172 Norwich Rd. The highest concentration was 20.1µg/m^3 at DT2. Two WSP roadside monitoring sites were within the air quality study area: NWL_8 on the A47 west of Easton; and NWL_9 on the A1074 Dereham Rd at New Costessey. The highest concentration was 25.5µg/m^3 at NWL_9. Defra's predicted roadside NO_2 concentrations within the air quality study area are well below the 40µg/m^3 standard. The highest concentration for 2018 is 28.3µg/m^3 on the A1074 (census ID 802058422). Defra's predicted background NO_2 concentrations are well below the 40µg/m^3 standard.	traffic generated emissions from the A11 and A47. Defra's predicted roadside $PM_{2.5}$ concentrations within the air quality study area are well below the 25µg/m^3 standard. The highest concentration for 2018 is 11.2µg/m^3 on the A1074 (census ID 802058422). Defra's predicted background $PM_{2.5}$ concentrations are well below the 25µg/m^3 standard.	
Norwich CC	At the time of writing, the latest information published by Norwich CC is for 2019. Concentrations at NO2 monitoring sites have indicated exceedances of the 40µg/m^3 standard within the centre of Norwich. The only AQMA for NO_2 within the district is the Central Norwich AQMA. Within the air quality study area, the main sources of NOx are road traffic emissions from vehicles on the A11, A1074, A140, A1402 and A1042. There are no Norwich CC NO_2 monitoring sites or AQMAs within the air quality study area. One WSP roadside monitoring site was within the air quality study area: NWL_10 on the A1074 Dereham	At the time of writing, the latest information published by Norwich CC is for 2019. $PM_{2.5}$ is monitored at one roadside site (CM1, Castle Meadow) and one background site (CM2, Lakenfields). The annual mean concentrations are below the 25µg/m3 standard. There are no AQMAs for $PM_{2.5}$ within the district. Within the air quality study area, the main sources of $PM_{2.5}$ are road traffic generated emissions from the A11, A1074, A140, A1402 and A1042. There are no $PM_{2.5}$ monitoring sites within the air quality study area. Defra's predicted roadside $PM_{2.5}$ concentrations within the air quality study area are well below the	Overall, baseline air quality is likely to be good within the air quality study area.

Local Authority	NO2	PM2.5	Summary
	Road, where the annual mean concentration was 25.9µg/m^3. Defra's predicted roadside NO_2 concentrations within the air quality study area are well below the 40µg/m^3 standard. The highest concentration for 2018 is 33.4µg/m^3 on the A140 (census ID 802026505). Defra's predicted background NO2 concentrations are slightly higher than the surrounding rural areas but still well below the 40µg/m^3 standard.	25µg/m3 standard. The highest concentration for 2018 is 11.1µg/m^3 on the A140 (census ID 802026505). Defra's predicted background $PM_{2.5}$ concentrations are slightly higher than the surrounding rural areas but still well below the 25µg/m^3 standard.	
Great Yarmouth BC	At the time of writing, the latest information published by Great Yarmouth BC is for 2018. Concentrations at all NO_2 monitoring sites within the district have been well below the 40µg/m^3 standard in recent years. There are no AQMAs for NO2 within the district. Within the air quality study area, the main sources of NOx are road traffic emissions from vehicles on the A47. There are no NO_2 monitoring sites within the air quality study area. Defra's predicted roadside NO_2 concentrations within the air quality study area are well below the 40µg/m standard. The highest concentration for 2018 is 31.2µg/m^3 on the A47 (census ID 802048491). Defra's predicted background NO_2 concentrations are well below the 40µg/m^3 standard.	At the time of writing, the latest information published by Great Yarmouth BC is for 2018. There are no monitoring sites or AQMAs for $PM_{2.5}$ within the district. Within the air quality study area, the main sources of $PM_{2.5}$ are road traffic generated emissions from the A47. Defra's predicted roadside $PM_{2.5}$ concentrations within the air quality study area are well below the 25µg/m^3 standard. The highest concentration for 2018 is 12µg/m^3 on the A47 (census ID 802048491). Defra's predicted background $PM_{2.5}$ concentrations are well below the 25µg/m^3 standard.	Overall, baseline air quality is likely to be good within the air quality study area.

3.6.2. Baseline air quality is illustrated in Figure 3-2. This shows annual mean NO2 concentrations, as the most extensively measured pollutant

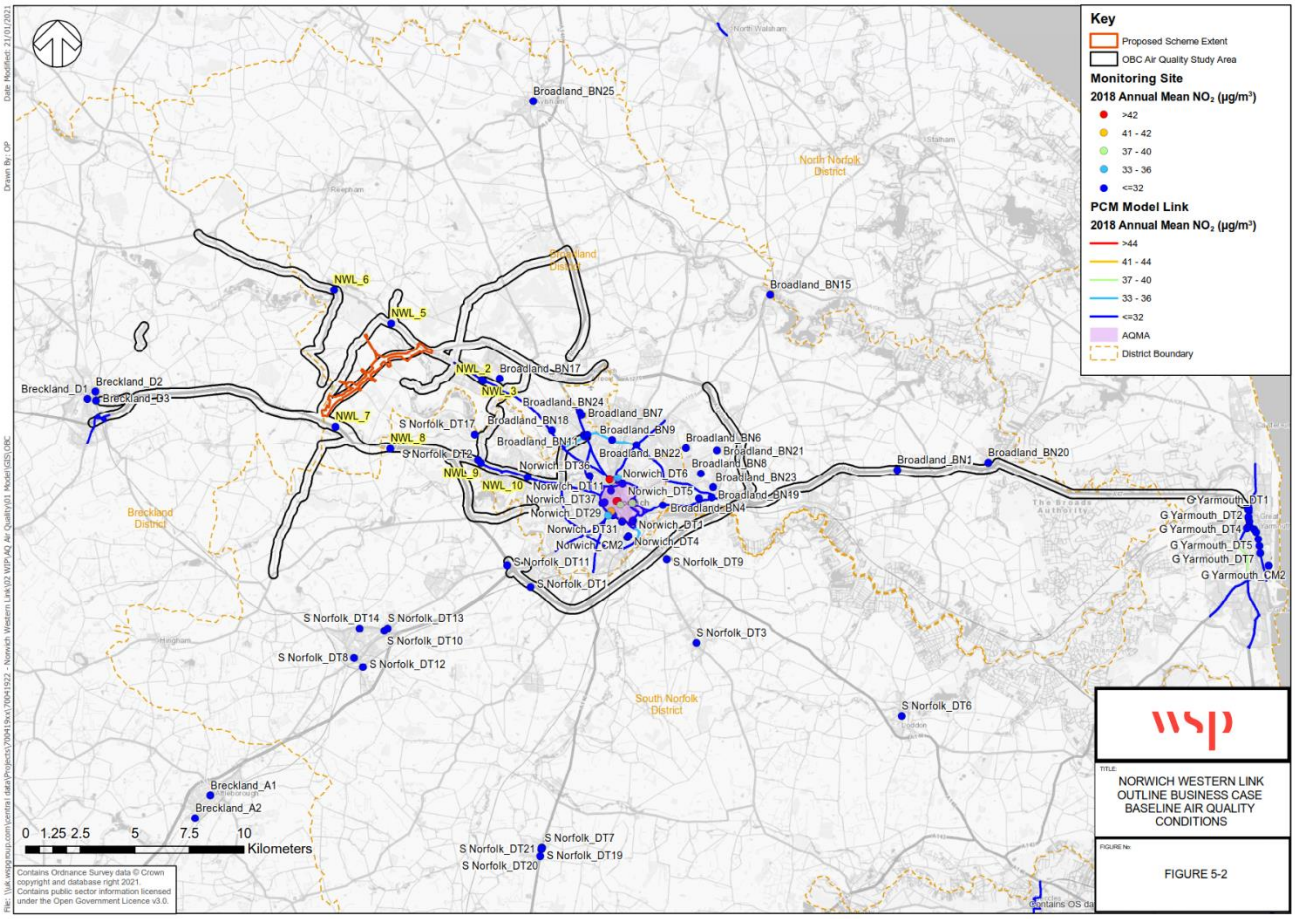

Figure 3-2 - Baseline Conditions within the Study Area

3.7 APPRAISAL SUMMARY

3.7.1. The Air Quality Impacts TAG sheet is provided in **Appendix C**.

3.7.2. As reported in the AST, with the NWL there are modest improvements in local air quality in terms of NO_2 and $PM_{2.5}$ at locations with relevant human exposure. The overall monetary valuation takes into account ecosystem damage costs. No AQMAs are included in the air quality study area. The NWL links map onto PCM links which are all compliant with the NO_2 limit value both with and without scheme. No exceedances of air quality standards are predicted.

3.8 MITIGATION

3.8.1. The NWL itself will mitigate traffic congestion on the road network and reduce journey times, which in-turn will reduce pollutant concentrations at receptors along routes that would otherwise experience higher volumes of traffic and emissions. The appraisal indicates no specific need for air quality mitigation.

3.8.2.

NO_2

3.8.3. In 2025 there are there are 7,860 properties with improvement, 35 properties with no change, and 2,180 properties with deterioration. In 2040 there are 7,733 properties with improvement, 32 properties with no change, and 2,310 properties with deterioration.

3.8.4. The NPV of change for NO_2 over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £9,803.

$PM_{2.5}$

3.8.5. In 2025 there are 8,002 properties with improvement, 6 properties with no change, and 2,067 properties with deterioration. In 2040 there are 7,747 properties with improvement, 282 properties with no change, and 2,046 properties with deterioration.

3.8.6. The NPV of change for $PM_{2.5}$ over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £62,165.

3.9 COMMENTS ON ASSUMPTIONS AND UNCERTAINTIES

3.9.1. Impacts in the design year (2040) are based on vehicle emissions factors and background concentrations for 2030 as the last forecast year in Defra's Emissions Factors Toolkit version 10.1 and 2018-based background map dataset. 2030 emissions factors and background concentrations are applied in all years thereafter, up to the end of the 60-year appraisal period (2084). Consequently, any improvements in air quality that may occur after 2030 are not factored into the appraisal. In this respect the appraisal is considered to be conservative.

3.9.2. Traffic growth has not been forecast beyond 2040 and so traffic levels are assumed to be the same in all years thereafter, up to the end of the 60-year appraisal period). This is a limitation, which is commonly encountered in TAG appraisal. It is not considered to be a significant limitation as vehicle emissions should continue to diminish into the future as 'zero emissions' vehicles replace conventional vehicles thereby neutralising the effect of further traffic growth.

3.10 CONCLUSION

3.10.1. Overall, the NWL results in modest local air quality benefits at properties within 200m of the ARN.

4 GREENHOUSE GASES

4.1 INTRODUCTION

4.1.1. This section presents the greenhouse gases (GHG) appraisal for the NWL, which was undertaken in accordance with TAG Unit A3.

4.2 LEGISLATION

4.2.1. The Climate Change Act 2008[18] introduced a legally binding target to reduce GHG emissions to at least 80% below base year (1990) levels by 2050. This target has more recently been amended to 100% by The Climate Change Act 2008 (2050 Target Amendment) Order 2019 [19].

4.2.2. The Act introduced 'carbon budgets', which set maximum GHG emission limits not to be exceeded during set periods, to achieve specified reductions in GHG emissions versus base year levels.

4.2.3. 'The Sixth Carbon Budget - The UK's path to Net Zero' was published in December 2020 [20]. This sets out the carbon budget that will run between 2033 and 2037. It is reported that under the 'Balanced Pathway', options to reduce emissions - including take-up of zero emission technologies and reduction in travel demand - combine to reduce surface transport emissions by around 70% to 32 million tonnes CO_2e by 2035 from 113 million tonnes for 2019, and to approximately 1 million tonnes CO_2e by 2050.

4.3 CONSULTATION

4.3.1. No formal consultation has been undertaken to date in relation to the GHG emissions, however discussions with the Norfolk County Council Sustainability Manager have been held to discuss the council's latest Environmental Policy which includes targets related to resource efficiency and carbon reduction. A key aspiration captured within the policy is for the council to collectively achieve 'net zero' carbon emissions on estates by 2030, but within wider areas, work towards 'carbon neutrality' also by 2030 [21].

[18] The Climate Change Act 2008 c.27. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents [accessed January 2021]

[19] The Climate Change Act 2008 (2050 Target Amendment) Order 2019 No.1056. Available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made [accessed January 2021]

[20] Climate Change Committee (2020), The Sixth Carbon Budget - The UK's path to Net Zero'. Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/ [accessed January 2021]

[21] Norfolk County Council. Environmental Policy. Presented and approved at Full Council on 25 November 2019. Available at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-

4.4 STUDY AREA

4.4.1. The GHG study area includes all road links within the simulation area of the Norwich Area Transport Strategy (NATS) model.

4.5 APPRAISAL METHODOLOGY

4.5.1. The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 Greenhouse Gases'[22]. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the NATS traffic model for the OBC. Non-traded CO_2e emissions (petrol and diesel vehicles) and CO_2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114 'Climate' methodology[23].

4.6 BASELINE CONDITIONS

EXISITNG BASELINE

4.6.1. GHG emissions occur constantly and widely as a result of human and natural activity including energy consumption (fuel, power), industrial processes, land use and land use change. Baseline transport emissions for 2018 within Norwich, Norfolk, and nationally are presented in **Table 4-1** for context[24].

Table 4-1 – Baseline Transport Emissions (Tonnes of CO_2) for 2018

Emissions Sources	Norwich	Norfolk	National
Road Transport (A roads)	57,800	1,061,100	54,229,200
Road Transport (Motorways)	-	-	29,936,400
Road Transport (Minor roads)	52,800	775,500	38,485,800
Transport Other	10,600	135,700	2,249,200

partnerships/policies-and-strategies/natural-environment-policies/environmental-policy [accessed January 2021]

[22] Available at: https://www.gov.uk/guidance/transport-analysis-guidance-tag

[23] Available at: https://www.standardsforhighways.co.uk/dmrb/

[24] Department for Business, Energy & Industrial Strategy. UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018. Available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018 [accessed January 2021]

Emissions Sources	Norwich	Norfolk	National
Diesel Railways	330	13,900	1,900,400
Transport Total	124,600	1,986,100	126,801,100

FUTURE BASELINE

4.6.2. Future baseline end-user traffic GHG emissions (modelled using data from the Proposed Scheme's traffic model) are presented in **Table 4-2** for the year 2025 (the first operational year of the NWL Scheme) and the future modelled year 2040. In addition, the average annual and total GHG emissions from 2025 to 2084 are presented for comparison with the 60-year operational period of the Proposed Scheme.

Table 4-2 - Baseline GHG Emissions (Tonnes of CO_2e) for 2025, 2040 and 2025-2084

Scenario	2025 (operational year)	2040 (future year)	Average per year (2025-2084)	Total (2025-2084)
Baseline ('Do Minimum')	546,863	471,454	481,343	29,361,946

4.7 APPRAISAL SUMMARY

4.7.1. The GHG TAG sheet is provided in **Appendix D**.

4.7.2. As reported in the AST, the NWL Scheme gives rise to lower CO_2e emissions compared to the do-minimum situation, with savings (benefits) over the 60-year appraisal period (2025 - 2084 inclusive) of 443,429 tonnes in non-traded carbon associated with conventional (petrol and diesel) vehicles, and 13,005 tonnes from traded carbon associated with electric vehicles (i.e. electrical power generation sources).

4.7.3. The differences are generally associated with lower values of total annual vehicle kilometres in each year that are predicted due to the NWL Scheme. For 2025, the distance travelled over the simulated road network is predicted to be approximately 4,136 million vehicle kilometres in the do-minimum scenario compared to 4,087 million vehicle kilometres in the do-something scenario - a reduction of approximately 49 million vehicle kilometres. For 2040, the distance travelled over the simulated road network is predicted to be approximately 4,904 million vehicle kilometres in the do-minimum scenario compared to 4,767 million vehicle kilometres in the do-something scenario - a reduction of approximately 137 million vehicle kilometres.

4.7.4. Over the 60-year appraisal period, the financial benefit in terms of carbon savings from the operation of vehicles in road transport sector due to the NWL Scheme is estimated at £19,474,620.

4.7.5. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic.

4.8 MITIGATION

4.8.1. As demonstrated by the NATS model, the NWL Scheme will provide shorter route options – bringing about shorter journeys by road vehicle and reducing traffic levels on strategic routes such as the A47. This in-turn is expected to bring down CO_2e emissions from road transport within the study area.

4.8.2. At this stage of the project, specific GHG mitigation requirements have not been identified. The GHG assessment that is to be undertaken for the EIA will be more detailed – including consideration of emissions from construction activities and embodied carbon and will confirm any specific requirements for mitigation.

4.8.3.

COMMENTS ON ASSUMPTIONS AND UNCERTAINTIES

4.8.4. The calculated emissions are predictions, which are based on the best available predicted traffic data and government supported methods for calculating emissions and monetary valuation.

4.8.5. Emissions have been calculated across the whole of the NATS model simulation area and smaller minor roads within this area may not be represented. However, it is expected that traffic levels and changes on such roads are likely to be relatively small compared the roads that are included. Any such omission is unlikely to substantially affect the findings of the GHG appraisal.

4.8.6. Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years.

4.8.7. The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal.

4.8.8. Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.

4.8.9. The DfT TAG GHG workbook addresses uncertainty in valuation by presenting upper and lower estimates of the net present value of the carbon impacts. For the NWL Scheme the upper estimate is £30,126,533 and the lower estimate is £8,833,474.

4.9 SENSITIVITY TEST

4.9.1. A sensitivity test has been taken with the outputs from the Low Growth model scenario.

With the Proposed Scheme and assuming low traffic growth, the total saving in carbon (as CO2e) emissions over the 60 year appraisal period (2025-2084 inclusive) is 410,434 tonnes (compared to 456,434 tonnes with the core scenario). This equates to a financial benefit of £17,445,270 over the same period (compared to £19,474,620 with the core scenario). The range of uncertainty in the monetary calculation of the benefit for the sensitivity test

4.10 CONCLUSION

4.10.1. Overall, the NWL Scheme is beneficial in achieving reductions in carbon emissions from the operation of vehicles in the road transport sector and supports national and regional policy initiatives towards the Net Zero target in 2050.

4.10.2. Whilst the assumption of low traffic growth reduces the carbon saving and monetary benefit of the scheme, there is still clear benefit.

5 LANDSCAPE

5.1 INTRODUCTION

5.1.1. This section presents the Landscape and Visual appraisal for the Proposed Scheme, required to identify any potential constraints in relation to landscape and visual features to help inform the OBC. This includes a summary of the baseline conditions, methodology and the likely operational impacts of the NWL on the environmental features.

5.2 BASELINE CONDITIONS

5.2.1. Consultation with Norfolk County Council Landscape Team, as well as Broadland District Council and Breckland District Council landscape officers, was conducted in March 2020 in order to discuss and agree the location of viewpoints for the Landscape and Visual Impact Assessment (LVIA). Design Workshops were also established with landscape officers from the relevant local authorities to ensure they were informed of the latest developments and emerging designs and were able to provide meaning full input and feedback to the design development.

5.2.2. The NWL runs through agricultural land to the north west of Norwich. The landscape is a wet lowland shallow valley in the northern section of the study area, whilst to the south, the land rises and gently undulates becoming a plateau. The River Tud valley is located to the south east of the study area. It is a landscape characterised by predominately regular fields of arable farming throughout, although mixed plantation woodland and emergence of pig rearing is present in various sections of the route. The Wensum Valley Hotel, Golf and Country Club is located to the north west of the study area.

5.2.3. The prevailing field pattern within the study area is small to medium sized fields contained by hedgerow and infrequent mature trees. There are medieval manors which form country house estates such as Morton Hall to the north and Easton Estate to the south. There are small ponds throughout this landscape, often uniform in shape. The river valley to the north and east following the River Wensum is wet meadow and contains a number of small lakes.

5.2.4. The closest large settlement to the study area is Norwich itself, however the study area encompasses a relatively rural landscape with small settlements and isolated dwellings. The biggest settlement is Honingham located to the south, with Ringland and Weston Longville other notable settlements within this landscape.

5.2.5. The study area has several minor roads which cross through the landscape and the more substantial A47 and A1067 highways to the south and north respectively. The wind turbines to the east of the proposed scheme on the old airfield and the overhead line which runs north to south, combined with roads, are notable influences within this landscape and potentially reduce the sense of tranquillity.

5.3 METHODOLOGY

5.3.1. An initial appraisal of potential landscape and visual impact has been undertaken for the NWL. This has followed guidance contained in Chapter 5 – The Environmental Capital Approach and Chapter 6

– Impacts on Landscape in TAG Unit A3[25]. Information on the pattern, tranquillity, cultural associations and land cover elements have been provided in a summary worksheet along with other key landscape environmental resources. An appraisal of how the NWL would fit within the landscape have been provided, along with an overall potential impact on landscape and visual receptors using the standard seven-point scale defined in TAG Unit A3.

5.3.2. The appraisal has been carried out based on the reference design, desk-based research and an awareness of the existing landscape context from a review of Ordnance Survey (OS) mapping, aerial mapping and a site visit. A brief review of National Character Areas[26] and the Broadland District Landscape Character Assessment[27] has been undertaken but there has been no detailed study of local character.

5.4 IMPACT APPRAISAL

TOWNSCAPE

5.4.1. The NWL is predominantly located within agricultural land, where the overriding character is of agricultural fields with sparse settlement. There is a lack of built environment that would warrant a townscape appraisal of the study area, other than that identified within a landscape appraisal.

5.4.2. It has therefore been concluded that this environmental topic area (Townscape) is not relevant to the decision-making process and an appraisal of this topic area has not been undertaken for the Scheme.

LANDSCAPE

5.4.3. The NWL is anticipated to introduce a major road into the landscape, which would cut through the landscape, disrupting field patterns, removing woodland and changing local land cover. This would likely result in a noticeable change in the landscape pattern. While not a totally uncharacteristic feature in the landscape, the A47 and A1067 run east to west at the northern and southern extents of the NWL, the scale of the NWL would be uncharacteristic and dissimilar to existing landscape elements, such as Ringland Lane, Breck Road, and The Broadway.

5.4.4. The NWL would be visible to receptors within the landscape and is likely to have adverse effects on the visual amenity of private and public receptors.

5.4.5. The proposed viaduct over the River Wensum is anticipated to introduce a highly visible, hard and linear feature into the landscape, dominating the River Wensum wet lowland valley and would be uncharacteristic and out of proportion with the surrounding landscape. Moving traffic (and

[25] Department for Transport, (2019). TAG UNIT A3 Environmental Impact Appraisal

[26] Natural England, (2014). National Character Area profiles: No.84. Mid Norfolk & No.78. Central North Norfolk

[27] Broadland District Council, (2013). Landscape Character Assessment - Supplementary Planning Document (SPD)

headlights) would become elevated in the landscape, making it more visible, reducing tranquillity and adding uncharacteristic movement into a static landscape.

5.4.6. There would be the loss of agricultural land, ponds, woodland, field trees, sections of hedgerow and hedgerow trees. Some of this loss could be replaced through mitigation planting. There would also be fragmentation of agricultural fields. The loss of existing landscape features would likely have an adverse effect on the overall landscape character, and the likely scale of the Proposed Scheme would detract and increase the presence of man-made influences into this landscape at the local scale.

5.4.7. The overall impact on the landscape is anticipated to be **moderate adverse**. This is because of the scale of the NWL, while not totally uncharacteristic of the surrounding landscape, is likely to be at a much larger scale. The proposed viaduct would be particularly uncharacteristic and out of proportion with the surrounding landscape. An appraisal of how the NWL would fit within the landscape has been provided, along with an overall potential impact on landscape and visual receptors using the standard seven-point TAG Unit A3 scale in Appendix E.

POTENTIAL MITIGATION

5.4.8. The appraisal of landscape and visual impact (through use of TAG and AST) are carried out prior to mitigation. A high-level Construction and Environment Management Plan (CEMP) and Mitigation Plan will be produced as part of the Environmental Statement (ES) submission which will detail the measures required to mitigate the identified impacts. This will help give certainty on the delivery of the mitigation and compensation measures. A more detailed CEMP will be taken forward by the contractor post Planning Submission.

5.4.9. Potential mitigation measures for adverse landscape and visual effects typically include replacing vegetation lost through construction of the NWL and to restore and enhance landscape character. The loss of existing vegetation will be avoided where possible and new bunds and native planting will be introduced to provide visual screening to sensitive receptors. Earthworks will be designed with appropriate slope profiles to integrate into the surrounding landscape. The design of proposed structures will consider landscape character and visual amenity, designed as a coherent ‘family’ in their visual appearance with a continuity of form and detailing. The viaduct, while still sitting within the ‘family’ of structures, is considered further due to its significance within the landscape. The viaduct is designed to complement its setting and achieve a distinctiveness without dominance that does not compete with the landscape. The broad principles are set out in the Environmental Scoping Report March 2020 and more detailed measures will be provided in the ES.

SUMMARY

5.4.10. The landscape is predominantly gently undulating arable farmland, with plateau to the south, located between two shallow river valleys. River Tud in the south and River Wensum in the north being the larger of the valleys with noticeable difference in character of wet meadow and mosaic of lakes and drainage ditches. There is some human influence, of note is the over-head line and two wind turbines to the west, with the A47 and A1067 roads noticeable from the plateau. Settlement is sparse, mainly small farmsteads - the biggest settlement is Honingham located to the south. Land cover is predominately arable fields, contained by clipped hedgerow and infrequent mature trees, with some fields turned to pig rearing. Mixed plantation woodland is common throughout this landscape, often following field boundaries. Roads are generally small lanes, gently curved, and following the field boundaries.

5.4.11. The NWL would alter the local landscape character through the introduction of the viaduct, loss of woodland and the width of the new road (dual carriageway). There would be subdivision of fields and sections of embankment and cutting through the landscape which would affect the field pattern and tranquillity locally, however, the viaduct would have a wider impact introducing a new feature into this landscape and will have a significant impact on tranquillity in the north.

5.4.12. An Environmental Statement (ES) is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

6 HISTORIC ENVIRONMENT

6.1 INTRODUCTION

6.1.1. This section of the report provides a high-level appraisal of the likely historic environment impacts specific to the NWL. The historic environment comprises above ground and buried heritage assets, including buildings, structures, monuments, and landscapes of heritage interest, including, where appropriate, the setting of sensitive (designated) heritage assets, along with archaeological remains and palaeoenvironmental deposits.

6.1.2. Statutory provision for the safeguarding of heritage assets has been made at a national and local level. For this reason, their presence or potential presence can constitute a constraint and may affect the initial appraisal of a scheme and in the subsequent design, planning and programming.

6.2 BASELINE CONDITIONS

6.2.1. Consultation has taken place with Norfolk County Council County Archaeologist, regarding the scope of the assessment for buried heritage assets and the scope of archaeological evaluation work required.

DESIGNATED HERITAGE ASSETS

6.2.2. There are no known statutorily designated heritage assets such as scheduled monuments, registered parks or gardens or registered battlefields within the area of NWL. There are no known conservation areas as defined by the Local Planning Authority (LPA). Norfolk does not have any Archaeological Priority Areas.

6.2.3. DMRB guidance state that the study area should include the setting of any designated heritage asset or other cultural heritage resource in the footprint of the NWL or within the zone of influence or potentially affected by noise. Professional judgement was used to define a 500m buffer around the Red Line Boundary for the identification of non-designated heritage assets and 1km buffer for designated heritage assets, due to the longer views and hence the potential impacts upon the setting of these assets.

6.2.4. The 1km study area around the site contains 17 listed buildings, of which two are listed Grade I (high heritage significance in accordance with DMRB criteria), one is listed Grade II* (high significance) and 14 are listed Grade II (medium significance).

6.2.5. The two Grade I listed buildings are the Church of St Peter (NHLE ref: 1171129) in Ringland, 905m south-east of the NWL, and the Church of All Saints including Boundary Wall to Churchyard (NHLE ref: 1372689) in Weston Longville, 385m south-west of the site of the NWL. The Grade II* listed building is the Church of St Margaret (NHLE ref: 1051548), a ruin of a former 11th–13th century church building, 515m north-east of the NWL. The Grade II listed buildings are located between 50m and 950m from the NWL. The presence of curtilage structures associated with these buildings within the site is considered unlikely, with the exception of Barn 50m north-west of Low Farm House, but it would be considered as part of a more detailed future assessment. Curtilage is the original property boundary of the listed building and, whilst an associated structure within the curtilage may not be specifically mentioned in the statutory description, is may be covered by the listing protection.

NON-DESIGNATED HERITAGE ASSETS

6.2.6. Two trial trench archaeological evaluations have been carried out within or extending into the northern part of the site. An evaluation on the Norwich Northern Distributor Road, in the area of the A1067 recorded ditches and possible pits. A potentially medieval pit was the only feature that could be convincingly dated. A small number of prehistoric finds included worked flints and single sherds of Middle Bronze Age and Late Bronze/Early Iron Age pottery. No features were recorded during an evaluation at Old Hall Farm. Consequently, current understanding of the nature and extent of past human activity over the majority of the NWL, in particular for the prehistoric, Roman and early medieval periods, for which there is no written record, is limited. This limitation is reflected in the assessment of the level of significance of non-designated heritage assets provided in the TAG.

6.2.7. Within the site boundary the following non-designated heritage assets are recorded on the Norfolk Historic Environment Record (HER). An initial indication of the likely significance of the assets has been included as part of this appraisal:

- A possible Roman field system, identified from cropmarks (HER ref: 53485). This asset is of medium or possibly high heritage significance, depending on nature and extent;
- An area of post-Roman features and prehistoric finds, found during the evaluation on the Norwich Northern Distributor Road (HER ref: 63365), the significance of which is low or medium;
- Possible Iron Age/Roman field boundaries and enclosures, identified from cropmarks (HER refs: 54357, 60610, 50615). These assets are of medium or high significance, depending on their nature and extent;
- Later medieval/post-medieval field systems; field boundaries/trackways, identified from cropmarks (HER refs: 50608, 50609, 50614, 50616, 54364). These assets are of likely low significance;
- Undated ditches and pits (HER refs: 50605, 50619, 53625, 53681), identified from cropmarks. These assets are of unknown significance;
- A World War 2 accommodation and training site (HER ref: 53474). This asset is of medium significance;
- Attlebridge Airfield (HER ref: 3063) and associated structures dating to World War 2 (HER refs: 40754, 40755, 40757, 41342, 41343, 40753). These assets are of low or medium significance;
- A World War 1 and 2 military training site (HER ref: 50618). This asset is of medium significance; and
- Honingham Park, a post-medieval landscape park (HER ref: 44183). This asset is of medium significance

POTENTIAL FOR POSSIBLE, PREVIOUSLY UNRECORDED ARCHAEOLOGICAL REMAINS

6.2.8. There is a moderate to high potential for previously unrecorded non-designated heritage assets within the site boundary. Any previously unrecorded assets could be of low, medium or high significance, depending on their nature, date, extent and survival.

6.2.9. The River Wensum and River Tud Valley geology includes areas of natural sand and gravel which, along with the riverine topography, provide an indication of suitability for early settlement due to the preference for well-drained gravels close to predictable resources provided by rivers. The study area therefore has moderate to high potential for archaeological remains, the value and integrity of which, are likely to be insufficiently understood to inform an assessment at this stage. River alluvium may

contain well-preserved (due to waterlogging) palaeoenvironmental remains. Such remains have evidential value for the past environment in which prehistoric and later people lived and would be of low or medium heritage significance.

6.2.10. The proposed site boundary is outside the known historic settlements of Weston Longville, Honingham and Ringland, and thus the potential for buried remains is likely to be low, other than agricultural features such as field ditches. In terms of the integrity of the historic landscape, this appears to have remained largely in terms of field parcels and boundaries that would have been established following Parliamentary enclosure, other than in the area of the airfield.

6.2.11. Due to the land being agricultural there is a high potential for buried archaeological remains from the prehistoric period onwards to survive along the NWL. Mechanised ploughing will have caused some disturbance to any archaeological remains present to a depth of around 0.3–0.4m, although cut features such as pits and ditches are likely to survive intact.

6.3 METHODOLOGY

6.3.1. This appraisal uses information derived from a Heritage Constraints Report for the Norwich Western Link which was produced by WSP in April 2019 as part of the initial optioneering exercise.[28] Baseline data was also consulted online to ensure that it is up to date. An accompanying TAG worksheet has been produced for according to the Department for Transport (DfT) TAG Unit A3 Environmental Impact Appraisal. The key data sources comprised:

- National Heritage List for England (NHLE). Statutory designations, including scheduled monuments; statutorily listed buildings; registered parks and gardens; and registered battlefields;
- Norfolk Historic Environment Record (HER) Primary repository of archaeological information including past investigations, local knowledge, find spots, and documentary and cartographic sources;
- Broadland District Local Planning Authority. Information on Conservation Areas;
- British Geological Survey (BGS). Solid and drift geology and topography, which can provide an indication of potential for early human settlement;
- National Library of Scotland. Online historic Ordnance Survey mapping from the 1st edition (1860s/70s) onwards; and
- Google Satellite imagery and Streetview. The imagery was scrutinised to assist with the appraisal of possible impacts to the setting of designated heritage assets.

6.3.2. The study area comprised a 500m buffer around the Red Line Boundary for the identification of non-designated heritage assets and 1km buffer for designated heritage assets, due to the longer views and hence the potential impacts upon the setting of these assets.

6.3.3. A site visit was undertaken on 6 June 2019 as part of the optioneering exercise. This was a rapid visual appraisal of above ground heritage assets potentially impacted by five route options that were under consideration at the time. Assets were viewed from publicly accessible areas.

[28] Norwich Western Link Heritage Constraints Report (WSP, April 2019)

6.3.4. A second site visit was undertaken on 7 November 2019 as part of the Strategic Outline Business Case (SOBC). Surveyors undertook an initial visual assessment of designated heritage assets potentially impacted by the preferred option, including possible impacts to heritage significance through changes to setting. Heritage assets were viewed from publicly accessible areas. Surveyors did not enter the internal spaces of any above ground heritage assets.

6.3.5. A third site visit was undertaken on 16 and 17 March 2021 as part of the Historic Environment Desk Based Assessment (HEDBA). Surveyors undertook a walkover of the whole of the proposed route and a visual assessment of designated heritage assets potentially impacted by the preferred option, including possible impacts to heritage significance through changes to setting. Surveyors did not enter the internal spaces of any above ground heritage assets. Surveyors were not able to view assets located within the Morton Hall Estate.

6.3.6. A geophysical survey was carried out from November 2020 to March 2021 over 102Ha of the site. Probable and possible archaeological activity was identified, including possible enclosures with internal features. Anomalies possibly relating to burnt/fired material have also been identified. Agricultural activity has been identified in the form of modern ploughing trends, former mapped and unmapped field boundaries and ridge and furrow cultivation.

6.4 IMPACT APPRAISAL

ABOVE GROUND HERITAGE ASSETS

6.4.1. There are unlikely to be any direct impacts (i.e. physical removal or alteration) on designated heritage assets.

6.4.2. The NWL has the potential to impact on the significance of designated heritage assets located beyond the site boundary through changes to their setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting.

6.4.3. The Church of St Peter, dating to the 13th–15th centuries, is located in Ringland, approximately 905m south-east from the site boundary at its closest point. The asset has a visual and historic relationship to its churchyard and to designated heritage assets in Ringland. The asset is also defined by its location in the village of Ringland. Long views out from the asset will be characterised by the surrounding rural and agricultural landscape. The NWL could potentially impact on long views out from the asset towards the site, through loss of the surrounding rural land and from impacts to views caused by traffic flow, traffic noise and road lighting. It would not impact on the asset's relationship to its churchyard or to Ringland, while distance from the site is likely to mitigate any impacts.

6.4.4. The Church of All Saints including Boundary Wall to Churchyard largely dating to the 13th–14th centuries, is located in Weston Longville, approximately 385m south-west of the site boundary at its closest point. The asset will have a visual and historic relationship to its churchyard and to designated heritage assets in Weston Longville. The asset is also defined by its location in Weston Longville and by surrounding rural and agricultural land. The NWL could potentially impact on views out from the asset towards the site through a loss of the rural landscape and from impacts caused

by traffic flow, traffic noise and road lighting. It would not impact on the asset's relationship to its churchyard or to Weston Longville.

6.4.5. The Grade II* listed Church of St Margaret is largely a ruin of a 11th–13th century church building, located approximately 515m north-east from the site boundary at its closest point. The asset is defined by its relationship to a group of Grade II listed buildings at Morton Hall. These are: Water Cistern at South East Corner of St Margaret's Churchyard (NHLE ref: 1170905), Garden Walls to West of Morton Hall (NHLE ref: 1170917), Morton Hall (NHLE ref: 1051549) and Garden Walls Including Owl House at Home Farm, Morton Hall Estate (NHLE ref: 1390577). The asset is also defined by its surrounding rural landscape. The NWL could potentially impact on views out from the asset towards the site through a loss of the rural landscape and from impacts caused by traffic flow, traffic noise and road lighting, although intervening tree belts would likely limit these impacts. It would not impact on the asset's relationship to the Morton Hall Estate.

6.4.6. The nearest Grade II listed building to the Proposed Scheme is Barn 50m north-west of Low Farm House (NHLE ref: 1051550), a 17th century threshing barn, located approximately 50m east of the site boundary. The proximity of the asset to the route means that the asset's immediate setting would be impacted with the loss of surrounding rural and agricultural land. A potential viaduct across the River Wensum would be prominent in views out from the asset towards the north-east. Traffic flow, traffic noise and road lighting would also be prominent in the asset's setting.

6.4.7. The Grade II listed buildings in Weston Longville and Honingham are defined by their relationships to each other and to the surrounding wider landscape. Potential impacts to long views out towards the site are possible, but the NWL would not impact on the assets' key relationships.

6.4.8. The NWL could also potentially impact on two isolated Grade II listed buildings located beyond the site boundary. These are Green Farm House (NHLE ref: 1372687), 575m north-west of the site boundary and Stables and Coach House to Honingham Hall (NHLE ref: 1372666), 950m south-east of the site boundary. This would primarily be though the loss of surrounding rural and agricultural land, as well as impacts from traffic flow, traffic noise and road lighting.

6.4.9. Taken overall, the NWL would have a **moderate adverse effect** on the setting (context) of listed buildings located beyond the site boundary. It will adversely affect the appreciation and understanding of the characteristic historic environmental resource.

BURIED HERITAGE ASSETS

6.4.10. Within the site boundary the non-designated heritage assets described in the Baseline Conditions and previously unrecorded non-designated assets could potentially be impacted. Possible palaeoenvironmental remains in the Wensum and Tud valleys could be affected.

6.4.11. Works carried out as part of the initial site set up, including preliminary topsoil stripping across the site and any temporary access roads and temporary work compounds and topsoil storage areas, the installation of site fencing and welfare facilities could cause an impact. The excavations for the proposed road would entirely remove any archaeological remains within the excavation footprint. The excavation of any new attenuation ponds, planting, landscaping, service trenches and drains would entirely remove any archaeological remains within the trench footprint.

6.4.12. Prior to the implementation of an agreed mitigation strategy, the NWL would result in a **number of low, moderate or major adverse effects** on the undesignated heritage assets recorded on the HER along with any previously unrecorded buried heritage assets, resulting in loss of features such

that their integrity is substantially compromised. The severity of environmental effect would depend on the significance of the asset. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved). A more detailed assessment for planning would consider the individual effects in greater detail.

6.4.13. An accompanying TAG worksheet has been produced in line with the Department for Transport (DfT) TAG Unit A3 Environmental Impact Appraisal.

6.5 POTENTIAL MITIGATION

6.5.1. Where any potential adverse effects resulting from the NWL are identified, strategies to reduce the impact of the NWL should be examined. Where the effects are on the setting of heritage assets, and where the setting is judged to contribute the significance of the asset, the impacts may be mitigated by design, such as the introduction of screening or an appropriate road lighting scheme.

6.5.2. For below ground remains, the impacts can be reduced where feasible and warranted, through either mitigation by design, allowing remains to be preserved *in-situ*, or through preservation by record (i.e. archaeological excavation).

6.5.3. The Norfolk County Archaeologist and the Historic England regional office for the East of England should be approached for an opinion, as well as the relevant conservation officers for the area. Following best practice, this should be undertaken in addition to and preferably before the formal scoping process.

6.5.4. Following further assessment and consultation, recommendations for preliminary site-based archaeological investigations will be made. This might typically include a staged programme of non-intrusive geophysical survey, followed by targeted archaeological trial evaluation trenches. Sufficient time should be allowed in the planning programme to allow the results of such work to feed into the planning submission documents. The results of the assessment and site-based evaluation, along with informal and formal consultations should enable the formulation of appropriate mitigation through design considerations, targeted archaeological excavation in advance of construction and recording, and/or archaeological monitoring during preliminary groundworks. The successful implementation of an agreed programme of archaeological mitigation would aim to reduce or offset any adverse effects to negligible.

6.5.5. A high-level Construction and Environment Management Plan (CEMP) and Mitigation Plan will be produced as part of the Environmental Statement (ES) submission which will detail the measures required to mitigate the identified impacts. This will help give certainty on the delivery of the mitigation and compensation measures. A more detailed CEMP will be taken forward by the contractor post Planning Submission.

6.6 SUMMARY

6.6.1. In conclusion, the NWL would have a moderate adverse effect on the setting (context) of listed buildings located beyond the site boundary. It will adversely affect the appreciation and understanding of the characteristic historic environmental resource. Impacts may be mitigated by design, such as the introduction of screening or an appropriate road lighting scheme.

6.6.2. The NWL also would result in a number of low, moderate or major adverse effects on the undesignated heritage assets recorded on the HER along with any previously unrecorded buried

heritage assets. The impacts can be reduced where feasible and warranted, through either mitigation by design, allowing remains to be preserved in-situ, or through preservation by record (i.e. archaeological excavation).

6.6.3. Further surveys took place in 2020 and 2021 to complete the Archaeological baseline and will feed into the future assessment work for the NWL. The Environmental Statement (ES) is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

7 BIODIVERSITY

7.1 INTRODUCTION

7.1.1. This section describes the existing biodiversity baseline and the anticipated impacts of the NWL on biodiversity features present within the Biodiversity Study Areas. Preliminary details on the proposed and developing mitigation and compensation strategies for the features have been provided. All biodiversity features scoped into the ES[29] (as described in the '2020 Scoping Report') have informed the TAG appraisal in support of the OBC. Biodiversity features scoped into the ES comprise: designated sites, habitats, flora and fauna. Further details specific to each feature are provided below.

7.1.2. Baseline data collection commenced in July 2018 based on the six potential highway alignment options. Survey work continued, focussing on the Preferred option (the NWL) from July 2019. Survey work is ongoing and is expected to be completed by the end of September 2021. This biodiversity section outlines the baseline findings gathered to date. It also identifies ongoing field surveys required to complete the baseline in line with defined Study Areas.

7.2 CONSULTATION

7.2.1. Over the course of the project there has been statutory consultation with Natural England and the Environment Agency to agree approaches to survey and assessment and to discuss mitigation and compensation proposals. Additionally, an Ecology Liaison Group has been set up with a good range of conservation groups who are active in recorded species and habitats in Norfolk, represented.

7.3 STUDY AREA

7.3.1. The Biodiversity section of the 2020 Scoping Report contains details on the approximate study areas for the biodiversity features potentially impacted by the NWL.

7.3.2. Table 7-1 sets out study areas for features considered further to the 2020 Scoping Report which will also be reported in the ES.

Table 7-1 - Study Area for Additional Scope in Biodiversity Features

Biodiversity Feature	Study Area
Non-vascular plants, fungi and lichens	Desk Study Biological records for all non-vascular plant, fungi and lichen species within and up to 2km from the NWL scheme.
	Field Survey National vegetation classification (NVC) within the NWL scheme. Fungi survey - all woodland and grassland within the NWL scheme. Lichen survey (subject to an initial scoping study) – within NWL scheme.

[29] NWL EIA Scoping Report 2020

Biodiversity Feature	Study Area
Ancient / veteran hedgerows	Desk Study Within and directly connected (root protection area) to the NWL scheme.
	Field Study Within and directly connected (root protection area) to the NWL scheme.

7.4 BASELINE CONDITIONS

7.4.1. The TAG provides details on the various biodiversity features of relevance to the NWL scheme.

BIODIVERSITY CONTEXT

7.4.2. The following sources were consulted to collate historical ecological records within the relevant study areas of the NWL scheme.

- Ordnance Survey (OS) website (www.ordnancesurvey.co.uk);
- Online photographic resources, including publicly accessible aerial photography;
- The Multi-agency Geographic Information for the Countryside (MAGIC) service;
- Norfolk Biodiversity Information Service (NBIS); and
- BirdTrack Data from the British Trust for Ornithology (BTO).

7.4.3. Records were limited to statutory and non-statutory designated sites and species records from 2010 onwards.

Designated Sites

7.4.4. The following internationally designated sites are within 10km of the NWL scheme, increased to 30km for bats (Table 7-2).

Table 7-2 – Internationally Designated Sites

Site and designation	Approximate distance and direction from Scheme
River Wensum Special Area of Conservation (SAC)	Within the NWL scheme footprint
Norfolk Valley Fens SAC	6.3km north-east
Paston Barns SAC	c. 26km from the NWL scheme at the closest point

7.4.5. Given the distance and lack of identifiable potential effect pathways from the Scheme to NWL Paston Barns SAC and Norfolk Valley Fens SAC, these sites have been scoped out of the assessment. This approach has been agreed with Natural England.

7.4.6. Nationally statutory designated sites have been considered up to 5km from the NWL scheme. Of the five sites identified, listed in the 2020 Scoping Report, the following have been scoped into the ES (Table 7-3).

Table 7-3 – Nationally Designated Sites Scoped into the ES

Site and designation	Approximate distance and direction from Scheme
River Wensum SSSI	Within the NWL scheme footprint

7.4.7. Non-statutory designated sites have been considered within a 2km buffer, or beyond where sites are potentially hydrologically linked to the NWL scheme. Impacts on County Wildlife Sites (CWS) at distances greater than 200m, or not hydrologically linked to the NWL are not considered likely and so have been discounted. Those sites within 200m have been considered based on potential air quality impacts. Table 7-4. includes those CWSs that will be considered within the ES.

Table 7-4 – Local Non-Statutory Designated Sites Scoped into the ES

Site and designation	Approximate distance and direction from Scheme
River Wensum Pastures, Ringland Estates CWS (Ref: 2303)	Within the NWL scheme
Broom & Spring Hills CWS (Ref: 1341)	Within the NWL scheme.
Wensum Pastures at Morton Hall CWS (Ref: 2070)	Within the NWL scheme.
Land adjoining Foxburrow Plantation CWS (Ref: 2116)	Within the NWL scheme.
Fakenham Road, Roadside Nature Reserve (RNR) (Ref: 2116)	Within the NWL scheme.
Primrose Grove CWS (Ref: 2305)	Within the NWL scheme.
Old Covert, Wood Lane CWS (Ref 2109)	10m west of the NWL scheme at the closest point.
Gravelpit Plantation and Church Hill CWS (Ref: 2304)	10m east of the NWL scheme at the closest point.
Mouse Wood CWS (Ref: 2050)	15m west of the NWL scheme at the closest point.
Attlebridge Hills CWS (Ref: 1343)	20m north of the NWL scheme at the closest point.
River Tud at Easton and Honingham (Ref: 250)	700m south-east of the NWL scheme at the closest point. (hydrologically connected)
Church Meadow, Alder Carr, Three Corner Thicket and Nursery Plantation (Ref: 2296)	1km south-east of the NWL scheme at the closest point. (hydrologically connected)
Taverham Mill (Ref: 256)	1.9km south-east of the NWL scheme at the closest point. (hydrologically connected)
Ringland Pits (Ref: 1339)	2km south-east of the NWL scheme at the closest point. (hydrologically connected)

HABITAT

Ancient Woodland

7.4.8. An Ancient Woodland Inventory site within 200m of the NWL scheme forms part of Primrose Grove CWS. In addition, Mouse Wood CWS is also listed as an Ancient Woodland Inventory site. The NWL scheme is over 30m from Primrose Grove ancient woodland (south) and Mouse Wood ancient woodland (west) is located adjacent to the pre-existing Wood Lane, a road considered as a possible access route to the NWL scheme. Although no direct impacts (i.e. woodland loss) are expected, both woodlands will be subject to botanical assessment in 2021 and may be scoped into the ES if potential effect pathways are identified (for example resulting from changes in air quality).

Important Hedgerow Survey

7.4.9. Hedgerows which met the criteria for 'Important' have been identified within the NWL scheme.

7.4.10. Additional arboriculture and heritage assessment work for hedgerows will also be undertaken to ensure any potential 'irreplaceable' hedgerows supporting veteran / ancient features are captured. This information is required to feed into the Biodiversity Net Gain strategy, as 'irreplaceable' habitat will not be included within the calculations.

Habitats of Principal Importance (HPI)

7.4.11. The desk study identified the following habitats on Natural England's Priority Habitat Inventory (PHI) within the Proposed Scheme, and up to 200m from the NWL footprint:

- Floodplain Grazing Marsh[30];
- Deciduous Woodland[31]; and
- Lowland Fens[32].

7.4.12. Field survey within and up to 50m from the NWL, identified the following HPI in addition to the floodplain grazing marsh and lowland mixed deciduous woodland above:

[30] UK Biodiversity Action Plan Priority Habitat Descriptions: Coastal and Floodplain Grazing Marsh - http://data.jncc.gov.uk/data/82b0af67-d19a-4a89-b987-9dba73be1272/UKBAP-BAPHabitats-07-CoastFloodGrazingMarsh.pdf

[31] UK Biodiversity Action Plan Priority Habitat Descriptions: Lowland Mixed Deciduous Woodland - http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-30-LowlandMixedDecWood.pdf

[32] UK Biodiversity Action Plan Priority Habitat Descriptions: Lowland Fens - http://data.jncc.gov.uk/data/6fe22f18-fff7-4974-b333-03b0ad819b88/UKBAP-BAPHabitats-27-LowlandFens.pdf

- Rivers[33];
- Hedgerows[34]; and
- Wet Woodland[35].

7.4.13. It should be noted that Lowland Fens although noted in desk study information, is not a habitat type which has been recorded within the NWL scheme.

7.4.14. All habitats (not just HPI) within the NWL footprint have been surveyed and mapped with reference to standard Phase 1 habitat survey methodology (JNCC 2010[36]). The dominant plant species were recorded, and habitats classified according to their vegetation types. Further detailed botanical survey work is scheduled for 2021 to complete the baseline.

7.4.15. River Habitat Survey (RHS) was completed in Summer 2020 on the River Wensum with reference to methodologies set out within the RHS guidance (Environment Agency 2003[37]).

Biodiversity Net Gain

7.4.16. The biodiversity baseline calculation will include all habitats (other than irreplaceable[38] habitats and statutory designated sites) within the NWL prior to development. This baseline is informed by the Phase 1 habitat data and results of the condition assessment, with reference to the Biodiversity Metric 2.0 (Natural England 2019[39]). The metric constitutes industry recognised best practice for quantifying whether a development is able to achieve biodiversity net gain.

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[33] UK Biodiversity Action Plan Priority Habitat Descriptions: Rivers - http://data.jncc.gov.uk/data/01d6ab5b-6805-4c4c-8d84-16bfebe95d31/UKBAP-BAPHabitats-45-Rivers-2011.pdf

[34] UK Biodiversity Action Plan Priority Habitat Descriptions: Hedgerows - http://data.jncc.gov.uk/data/ca179c55-3e9d-4e95-abd9-4edb2347c3b6/UKBAP-BAPHabitats-17-Hedgerows.pdf

[35] UK Biodiversity Action Plan Priority Habitat Descriptions: Wet Woodland - http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-64-WetWoodland.pdf

[36] Joint Nature Conservation Committee (2010). Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit. JNCC, Peterborough.

[37] Environment Agency (2003). River Habitat Survey In Britain and Ireland.

[38] Following Defra guidance, irreplaceable habitats (e.g. veteran trees) within the Proposed Scheme will be identified and excluded from biodiversity unit calculations. It is noted that net-gain or no net-loss of biodiversity cannot be achieved for the Proposed Scheme as a whole if there is a negative impact on an irreplaceable habitat or statutory designated site for nature conservation. As such a different approach will be taken for irreplaceable habitats.

[39] Natural England (2019). The Biodiversity Metric 2.0 – auditing and accounting for biodiversity. User Guide. Natural England Joint Publication JP029.

DETAILED BOTANICAL AND HABITAT ASSESSMENT

National Vegetation Classification (NVC)

7.4.17. NVC survey work is scheduled for 2021 to complete the baseline.

Macrophyte Survey

7.4.18. Macrophyte surveys have been undertaken on the River Wensum in 2019 and 2020 and on the adjoining floodplain ditches in 2020. Species of note recorded during the survey of the River Wensum include water crowfoot *Ranunculus fluitans*. This species is listed within the qualifying habitats description on the River Wensum SAC designation. Fragments of water crowfoot were recorded in the floodplain ditches however these were smothered in silt and displayed early signs of decomposition.

Non-vascular Plants, Fungi and Lichen Survey

7.4.19. These groups will be surveyed in 2021 to complete the baseline.

Veteran / Ancient Trees and Hedgerow Survey

7.4.20. An arboriculture assessment in 2020 has identified the presence of veteran/ancient trees within the NWL scheme. Further survey and assessment work will be undertaken to understand the presence of ancient hedgerows within the NWL.

FAUNA

Terrestrial Invertebrate Survey

7.4.21. Surveys for terrestrial invertebrates will be undertaken in 2021 to complete the baseline.

Aquatic Macroinvertebrate Survey

7.4.22. Surveys for aquatic macroinvertebrates have been undertaken in 2020. The macroinvertebrate communities identified in the samples taken were classified as Moderate to Fairly High conservation value (River Wensum, Foxburrow Stream and Ringland Ditch) with the exception of Hall Ditch, which achieved Fairly High conservation value in the spring and High conservation value in the autumn.

7.4.23.

White-clawed crayfish Survey

7.4.24. Surveys have been undertaken within the River Wensum in 2019. Survey work identified the presence of the non-native signal crayfish *Pacifastacus leniusculus* within the stretch of the River Wensum which was surveyed. No white-clawed crayfish *Austropotamobius pallipes* were recorded. No further surveys are required and this feature has been scoped out of the assessment.

Desmoulin's whorl snail Survey

7.4.25. Survey work in 2019 and 2020 has identified Desmoulin's whorl snail within the NWL scheme. This species is present within suitable vegetated ditches associated with the River Wensum floodplain.

Fish Survey

7.4.26. Electric fishing surveys in 2020 recorded a range of fish species including: chub *Squalius cephalus* pike *Esox lucius*, and dace *Leuciscus leuciscus* within the River Wensum. Brook lamprey *Lampetra*

spp were recorded in adjoining ditches of the River Wensum. No fish were recorded within the Foxburrow Plantation stream. Bullhead *Cottus gobio* were not caught during the fish surveys, however, were observed during the aquatic macroinvertebrate survey of the River Wensum.

Amphibians

7.4.27. Great crested newt (GCN) survey - eDNA surveys of ponds within the 500m of the NWL Scheme have been undertaken and will be completed in 2021. To date, two ponds located over 250m (but within 500m) of the NWL scheme have confirmed GCN presence.

7.4.28. Common toad survey - A dedicated common toad survey has not been undertaken. However, incidental records of common toad have been recorded in Rose Carr. Any evidence of common toad noted during other protected species surveys (e.g. GCN surveys) will be documented.

Reptile Survey

7.4.29. Reptile survey work in 2019 and 2020 has identified low numbers of common reptile species (common lizard *Zootoca vivipara*, grass snake *Natrix helvetica* and slow-worm *Anguis fragilis*), within the NWL scheme.

Birds

7.4.30. A wintering bird survey undertaken in 2018/19 small numbers of species of conservation value present within the survey area within the floodplain habitat immediately surrounding the River Wensum. A second year of survey work is has been undertaken in 2020/21 to complete the baseline.

7.4.31. B. Survey work for breeding birds is ongoing in 2021 , in order to complete the baseline.

The presence of barn owls *Tyto alba* has been established at NWL as established through incidental observations during other survey work. Specific barn owl surveys will be undertaken in 2021.

Bats

7.4.32. Bat surveys to identify bat roosts in trees and structures have been undertaken in 2019 and 2020. Bat roosts in both structures and trees have been recorded within the NWL scheme. Roosts used by species including soprano pipistrelle *Pipstrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, Natterer's bat *Myotis nattereri*, common pipistrelle *Pipistrellus pipistrellus* and barbastelle roost *Barbastella barbastellus* have been identified within the survey area which included land within the scheme footprint and defined buffers beyond this area... Further survey work is scheduled in 2021 to complete the baseline.

7.4.33. A range of bat activity surveys have been undertaken in 2019 and 2020 to identify commuting and foraging bat activity. These surveys have included: radiotracking surveys (focusing on barbastelle bat), vantage point surveys, static bat detector surveys, bat tracking surveys, hibernation surveys and emergence/re-entry roost surveys. Further survey work is scheduled in 2021. Activity surveys to date have recorded over eight species of bat. There has been a specific focus on the barbastelle in the development of the mitigation and compensation strategies given that this is one of the rarer species and is sensitive to impacts arising from road development.

7.4.34. Commuting routes and foraging areas for bats including barbastelle bats have been recorded within the 6km study area and within the NWL scheme.

Badger Survey

7.4.35. Badger *Meles meles* surveys have been undertaken in 2019 and 2020 and further surveys, including badger bait marking surveys have been completed 2021.

7.4.36. Survey work has identified the presence of badger within the NWL scheme. Evidence of setts, commuting and foraging activity have been recorded.

Otter Survey

7.4.37. Otter *Lutra lutra* surveys have been undertaken in 2020Evidence of otter has been recorded along the River Wensum and in the adjoining ditches in the floodplain.

Water Vole Survey

7.4.38. Water vole *Arvicola amphibius* surveys have been undertaken in 2020 and signs of water vole including latrines and burrows has been recorded along the River Wensum and in adjoining ditches.
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Other Species of Principal Importance (SPI) – Mammals

7.4.39. During ecological survey work undertaken to date, brown hare *Lepus europaeus* and hedgehog *Erinaceus europaeus* (both SPIs) have been recorded within the NWL scheme.

7.5 METHODOLOGY

7.5.1. The appraisal of the likely impacts on biodiversity has been undertaken in accordance with TAG Unit A3 Chapters 5 and 9. The appraisal highlights the importance of identified key resources (features), using guidance contained in Table 9 and 10 of TAG Unit A3, to ascribe biodiversity value.

7.5.2. The Scheme has been developed with consideration for the Mitigation Hierarchy. Ecological impacts upon features have been avoided where possible (e.g. the avoidance of ancient woodland loss). Where avoidance is not possible impacts have been mitigated (e.g. through the provision of green bridges and underpasses) and, where necessary, compensated for (e.g. through the provision of alternative habitat). The NWL scheme will look to achieve a minimum of 10% biodiversity net gain through following DEFRA guidance on The Biodiversity Metric 2.0.

7.5.3. It is important to note that the baseline data collection is ongoing and will not be completed until September 2021. The appraisal is based on data collected and analysed to end of March 2021 and professional judgement regarding the magnitude of possible impact arising from the Scheme design.

7.5.4. TAG assesses construction and operational impacts together and assumes that mitigation measures will be adopted as part of the development of the NWL. Table 7-5 provides high level details on possible impacts and the mitigation and compensation strategies which are currently being considered. Overall Assessment Scores are assigned to each feature based on the biodiversity value and magnitude of impact (with anticipated mitigation measures). The assessment scale ranges from Large Beneficial to Very Large Adverse.

7.5.5. Where schemes include plans for mitigation, this should generally be taken account of in the appraisal of impacts as set out by TAG guidance[40]. For the purpose of this assessment all mitigation including habitat creation in close proximity to the relevant key environmental resource to help conserve existing biodiversity interest is factored in. TAG requires mitigation not in close proximity to relevant key environmental resources to be excluded; in a scenario where habitat creation proposals alter this assessment would need to be revisited.

7.5.6. Preliminary mitigation strategies relevant to key biodiversity features are provided in Table 7-5.

7.5.7. The assessment presented here will be refined and updated as part of the Ecological Impact Assessment and Habitat Regulations Assessment which will feed into the EIA process. This assessment does not pre-empt the outcome of the EIA.

7.6 IMPACT APPRAISAL AND POTENTIAL MITIGATION

7.6.1. Surveys for habitats and species impacted by the NWL are ongoing. However, based on the data currently available, outline mitigation and compensation strategies have been developed. Table 7-5 provides preliminary details on the strategies which are currently being considered. The strategies have not yet been confirmed as it is expected that as further surveys are undertaken, and data is analysed, the strategies will evolve. They will also be further discussed and agreed with statutory consultees.

7.6.2. A high-level Construction and Environment Management Plan (CEMP) and Mitigation Plan will be produced as part of the Environmental Statement (ES) submission which will detail the measures required to mitigate the identified impacts. Ongoing strategic work will focus on the development of a framework for habitat creation that will focus on key ecological features known to be present at NWL. This will help give certainty on the delivery of the mitigation and compensation measures. A more detailed CEMP will be taken forward by the contractor post Planning Submission.

Table 7-5 – Potential impacts and high-level mitigation and compensation strategies for biodiversity features

Biodiversity feature	Possible impact (in the absence of mitigation)	Mitigation/compensation strategy being considered (not all confirmed) in construction and operation phases of development
Designated Sites		
River Wensum SAC and SSSI	Habitat loss, pollution, degradation of habitat, shading, disturbance.	High viaduct to avoid shading impacts. Pollution prevention measures. Measures to protect riparian and aquatic habitats from disturbance or loss.

[40] Department for Transport (2021). *TAG Unit A3, Environmental Impact Appraisal*. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/983703/tag-unit-a3-environmental-impact-appraisal.pdf

Biodiversity feature	Possible impact (in the absence of mitigation)	Mitigation/compensation strategy being considered (not all confirmed) in construction and operation phases of development
County Wildlife Sites (CWS) within Scheme boundaries: River Wensum Pastures, Ringland Estates CWS, Broom & Spring Hills CWS, Wensum Pastures at Morton Hall CWS, Primrose Grove CWS, Land adjoining Foxburrow Plantation CWS and Fakenham Road Roadside Nature Reserve (RNR) (Ref: 2116),	Habitat loss, degradation, pollution, disturbance.	Modification of footprint to reduce habitat loss. Protection measures for retained habitats. Creation of new habitat as part of landscaping and biodiversity net gain strategy. The Fakenham Road RNR is likely to be lost as a result of the NWL scheme and habitat creation targeted at hoary mullein is being considered.
County Wildlife Sites up to 200m of the Scheme boundaries: Old Covert, Wood Lane CWS, Gravelpit Plantation and Church Hill CWS, Mouse Wood CWS, Attlebridge Hills CWS, River Tud at Easton and Honingham CWS, Church Meadow, Alder Carr, Three Corner Thicket and Nursery Plnatation CWS, Taverham Mill CWS and Ringland Pits CWS	Habitat loss, degradation, pollution, disturbance.	Protection measures during construction and future enhancement to mitigate potential effects identified in relation to the operational phase.
Protected and notable species		
Terrestrial invertebrates	Habitat loss (subject to further survey), habitat degradation, pollution	Provision of compensatory habitat through a landscaping and biodiversity net gain strategy.
Aquatic invertebrates	Habitat loss (subject to further assessment), habitat degradation, pollution.	Protection of retained habitats. Pollution prevention measures. Provision of a viaduct over the River Wensum to minimise habitat loss. Enhancement of existing water courses.
Desmoulin's whorl snail	Killing/injury of individuals during construction, habitat loss, pollution, degradation	Protection of retained habitats. Pollution prevention measures. Habitat enhancement in areas of the River Wensum floodplain over 200m away from the Scheme. Translocation of

Biodiversity feature	Possible impact (in the absence of mitigation)	Mitigation/compensation strategy being considered (not all confirmed) in construction and operation phases of development
	of habitat, impacts from nitrogen deposition	supporting habitat. Provision of a viaduct over the River Wensum to minimise habitat loss.
Fish including brook lamprey and bullhead	Habitat loss, degradation of existing habitat, disturbance, pollution	Pollution prevention measures. Enhancement of existing water courses. Provision of a viaduct over the River Wensum.
Great crested newt	Possible habitat loss (subject to further survey), disturbance.	Works undertaken under a European Protected Species Mitigation Licence (EPSML) (if required). Provision of suitable/enhanced habitat (if required).
Common toad	Killing/injury of individuals during construction, habitat loss, pollution, death by vehicle collision	Enhancement of existing aquatic habitat within the floodplain, provision of new terrestrial habitat through a landscaping and biodiversity net gain strategy. Provision of a viaduct over the River Wensum reducing habitat loss. Provision of wildlife underpasses.
Reptile	Killing/injury of individuals during construction, death by vehicle collision habitat loss, pollution.	Provision of a viaduct over the Wensum reducing habitat loss. Sensitive timing of works. Habitat manipulation to encourage reptiles to move from the NWL prior to development. Provision of new foraging/basking/sheltering habitat through a landscaping and biodiversity net gain strategy.
Birds – breeding and winter	Habitat loss, degradation of habitat (subject to further survey), disturbance.	Protection of retained habitats. Sensitive timing of works. Provision of bird boxes to replace lost nesting habitat. Provision of compensatory bird habitat through a landscaping and biodiversity net gain strategy.
Barn owl	Habitat loss, death by vehicle collision.	Sensitive timing of works. Provision of compensatory habitat through a landscaping and biodiversity net gain strategy. Provision of barn owl boxes in the wider area adjacent to the NWL, at sufficient distance to avoid road traffic collision mortality.
Bats	Roost loss, severance of commuting routes and foraging areas, disturbance, death by vehicle collision.	Retention and enhancement of roosting, foraging and commuting habitat. Where habitat must be removed provision of replacement bat foraging and roosting habitat through a landscaping and biodiversity net gain strategy. Provision of suitable crossing features such as green bridges and underpasses to reduce effects of habitat fragmentation. Provision of bat boxes. Sensitive lighting strategy (largely avoiding lighting beyond baseline conditions). Works undertaken under a European Protected Species Mitigation Licence (EPSML) as

Biodiversity feature	Possible impact (in the absence of mitigation)	Mitigation/compensation strategy being considered (not all confirmed) in construction and operation phases of development
		necessary. Soft felling of trees. Sensitive timing of works.
Badger	Sett destruction, disturbance, death by vehicle collision.	Retention and enhancement of woodland habitat and other habitats used by badger. Where habitat must be removed provision of compensatory foraging habitat through a landscaping and biodiversity net gain strategy. Provision of pipe culverts, fencing, underpasses and green bridges to reduce effects of habitat fragmentation. Works will occur under a Badger Licence as necessary. Careful closure of existing setts and provision of replacement setts as dictated by licencing requirement. Sensitive timing of works.
Otter	Possible habitat loss (subject to further survey), disturbance, barrier to movement, death by vehicle collision.	Retention and enhancement of aquatic habitats. Provision of a viaduct over the Wensum and underpasses to reduce effects of habitat fragmentation. Works undertaken under an EPSML (if required).
Water vole	Killing/injury of individuals during construction, habitat loss (subject to further survey), disturbance, pollution.	Retention and enhancement of aquatic habitats. Provision of a viaduct over the Wensum and underpasses to reduce effects of habitat fragmentation. Works under a Conservation Licence (if required). Sensitive timing of works.
Brown hare	Killing/injury of individuals during construction, habitat loss, death by vehicle collision	Wildlife underpasses and green bridges to help reduce the severance impacts. Provision of replacement habitat through a landscaping and biodiversity net gain strategy.
Hedgehog	Killing/injury of individuals during construction, habitat loss, death by vehicle collision.	Wildlife underpasses and green bridges to help reduce severance impacts. Provision of habitat through landscaping and biodiversity net gain strategy.
Habitats and Protected/Notable Vascular and Non-Vascular Plant, Fungi and Lichens		
Ancient woodland	Degradation/disturbance of habitat (subject to further surveys), pollution.	Avoidance of habitat loss of ancient woodland. Protection of retained woodland.
Woodland and trees (non-ancient)	Habitat loss, degradation/disturbance of habitat (subject to further surveys).	Protection of retained habitats. Creation and enhancement of woodland habitat through a landscaping and biodiversity net gain strategy.

Biodiversity feature	Possible impact (in the absence of mitigation)	Mitigation/compensation strategy being considered (not all confirmed) in construction and operation phases of development
Floodplain grazing marsh	Habitat loss, degradation/disturbance of habitat, pollution (subject to further surveys).	Protection of retained habitats. Pollution prevention measures. Provision of compensatory habitat through a landscaping and biodiversity net gain strategy.
Hedgerows	Habitat loss, severance, degradation, pollution.	Protection of retained hedges. Creation and enhancement of hedgerows.
Rivers/streams	Habitat loss, pollution, degradation of habitat, shading.	Provision of a viaduct over the River Wensum to avoid direct habitat loss and shading impacts. Pollution prevention measures. Protection of retained habitat. Provision of underpasses. Enhancement of existing water courses.
Macrophytes	Habitat loss, pollution, degradation of habitat.	Provision of a high viaduct to avoid shading impacts. Pollution prevention measures. Enhancement of existing water courses.
Non-vascular plants, fungi and lichens	Habitat loss, pollution, degradation (subject to further surveys).	Provision of compensatory habitat through a landscaping and biodiversity net gain strategy.

BIODIVERSITY NET GAIN AND VETERAN / ANCIENT TREE AND HEDGEROW STRATEGY

Biodiversity Net Gain

7.6.3. Biodiversity Net Gain (BNG) is an objective and approach to development that leaves biodiversity in a better state than before. It is anticipated that BNG will be made mandatory within the new Environment Bill, with the expectation that developments deliver at least a 10% BNG. A BNG strategy for the NWL scheme is currently being developed.

7.6.4. BNG for the NWL scheme will be delivered with reference to the 10 good practice principles published by Chartered Institute of Ecology and Environmental Management (CIEEM), Construction Industry Research and Information Association (CIRIA) and Institute of Environmental Management and Assessment (IEMA) [41]. The NWL will impact veteran / ancient trees and important hedgerows which are considered in policy terms an irreplaceable habitat (see below) and crosses an SAC. Therefore, in line with the best practice principles, BNG cannot be claimed for the whole Scheme.

[41] CIEEM, CIRIA, IEMA (2016). Biodiversity Net Gain – Good practice principles for development (2016)

The aim is to achieve BNG for all applicable habitats. A separate strategy for veteran / ancient trees and important hedgerows is currently being developed.

7.6.5. Natural England advised that BNG should be considered on a landscape scale and that it should target woodland and wetland. Barbastelle bat will be a particular focal point for the BNG strategy. It is anticipated that BNG delivery will be focussed within the 6km core sustenance zone for barbastelle bat[42] roosts recorded in proximity to the NWL scheme. Approaches for BNG delivery are likely to include woodland creation and woodland management to enhance the woodlands in the long term for barbastelle bat and other species.

Veteran / Ancient Tree and Important Hedgerow Strategy

7.6.6. A veteran / ancient tree and hedgerow strategy is currently under development and further information regarding mitigation will be included within the ES following a complete baseline.

7.7 SUMMARY

7.7.1. The TAG assessment (see Appendix G has concluded that there are Large Adverse impacts on the following features:

- Bats (all species).

7.7.2. The NWL will require removal of habitat used by the local bat population that includes rarer species, notably the barbastelle bat. The designs are subject to refinement, and in line with the mitigation hierarchy habitat loss will be avoided where possible. A mitigation strategy is being developed that both seeks to reduce impacts of habitat fragmentation primarily through the provision of underpasses and green bridges and avoid net loss in habitat available to bats through the provision of a comprehensive landscaping and biodiversity net gain strategy.

7.7.3. Habitat creation and enhancement seeking to maintain habitat availability will be completed within the core sustenance zone for known barbastelle bat colonies near to the scheme. This approach reduces medium to long-term impacts upon the local bat population. The combination of habitat enhancement and creation is proposed to limit shorter term impacts, with enhancement contributing towards a greater area of mature woodland suitable for use by foraging and commuting bats in the shorter term while habitat creation areas become established. In combination, the mitigation strategy seeks to increase the area of habitat available to the local bat assemblage in the longer term.

7.7.4. It will be important to maintain habitat permeability and reduce the effects of habitat fragmentation that may otherwise occur. The scheme includes the following proposals:

- a viaduct across the River Wensum and associated floodplain habitat;
- three wildlife underpasses - in The Nursery woodland in the north, along Ringland Lane (dual use) and along the stream south of the Foxburrow Plantation in the south;
- three green bridges - along the Broadway, in the Foxburrow Plantation and along the hedgerow north of Weston Road; and

[42] Bat Conservation Trust (2016). Core sustenance zones: determining zone size. 04.02.19.

- landscaping to promote the use of these features by bats and avoid direct flight lines into the traffic corridor.

7.7.5. The mitigation strategy remains under development, reflecting the design stage and ongoing nature of baseline surveys. Data gathered during 2021 will influence the strategy. As the strategy is not yet fixed a precautionary approach must be taken, and as such the magnitude of effect upon bats is assessed to be 'intermediate negative' defined as '*The key environmental resource's integrity will not be adversely affected, but the effect on the resource is likely to be significant in terms of its ecological objectives.'*. This may be updated subject to completion of baseline surveys and finalisation of the associated mitigation strategy.

7.7.6. The combination of a high value biodiversity feature and an effect of intermediate negative magnitude gives a large adverse effect. It should be noted that this assessment is precautionary and reflects the status of the mitigation strategy which is yet to be finalised as set out above.

7.7.7. The TAG assessment has concluded that there are Moderate Adverse impacts on the following features:

- Wensum Pastures at Morton Hall CWS;
- Land adjoining Foxburrow Plantation CWS;
- Broom & Spring Hills CWS;
- Primrose Grove CWS
- Fakenham Road RNR;
- Ancient/veteran trees;
- Important Hedgerows;
- Wet Woodland HPI; and
- Lowland mixed deciduous woodland HPI.

7.7.8. A Moderate Adverse impact is expected on the above CWS's due to habitat loss and/or severance which could impact the integrity of the CWS. The habitat creation strategy for the scheme will seek to compensate for this habitat loss, and an underpass will be included to ensure the stream within the Land adjoining Foxburrow Plantation will maintain flow post construction into the River Tud.

7.7.9. The Fakenham Road RNR is designated because of the presence of hoary mullein *Verbascum pulverulentum*. This site will be lost due to the construction of the NWL. A compensation strategy will be developed which will aim to recreate the habitat and lead to an increase in hoary mullein within the study area.

7.7.10. Approximately twelve ancient/veteran trees will be removed as a result of the NWL. A strategy for ancient/veteran trees is under development which will help to mitigate the impact of the loss of the trees however they are regarded as an irreplaceable habitat and will not be factored into BNG calculations.

7.7.11. It is anticipated that two hedgerows that met the criteria for 'Important' under the Hedgerow Regulation 1997 will be directly impacted by the Scheme[43]. Mitigation will involve creation, enhancement and translocation.

7.7.12. The NWL bisects areas of lowland mixed deciduous woodland and wet woodland HPI. The woodland to be lost is not ancient. As part of the compensation strategy new woodland will be planted and existing woodland will be enhanced for biodiversity benefit in the longer term.

7.7.13. The assessment for all other features ranges from slight adverse or neutral impacts based on the adoption of preliminary mitigation and compensation measures stated in Table 7-5.

7.7.14. This assessment is based on the data which has been collected and analysed up to March 2021. It is a provisional impact assessment and has been undertaken before the Ecological Impact Assessment, Habitats Regulations Assessment and Water Framework Directive (WFD) assessment have been completed.

7.7.15. The overall assessment score for the NWL is a Large Adverse Impact due to the loss of woodland foraging habitat available to the local bat assemblage which includes the rarer barbastelle bat. This is a precautionary assessment and reflects the status of the mitigation strategy which is yet to be finalised as set out above. Effects upon all other biodiversity features are assessed to be moderate adverse or of lesser significance.

7.7.16. Further surveys are planned in 2021 which will complete the ecological baseline and will feed into the future assessment work for the NWL. The ES is in preparation and will contain more detailed design information and a full assessment of ecological impacts (in line with CIEEM guidelines). The ES will take into account the final design and final mitigation strategies designed to avoid and reduce impacts upon biodiversity features and where possible deliver enhancements.

[43] Eight hedges qualified as Important Hedgerows, but only two of the hedgerows qualified on botanical criteria. One qualified on archaeological and historical criteria, and five only qualified on the basis of protected or notable faunal records associated with them.

8 WATER ENVIRONMENT

8.1 INTRODUCTION

8.1.1. This section presents Water Environment appraisal for the NWL, required to identify any potential constraints in relation to the Water Environment to help inform the OBC. This includes a summary of the baseline conditions, methodology and the likely impact of the NWL on the nearby sensitive receptors.

8.2 BASELINE CONDITIONS

8.2.1. Over the course of the project there has been statutory consultation with Natural England and the Environment Agency to agree approaches to survey and assessment and to discuss mitigation and compensation proposals. In addition, consultation has also been held with Norfolk County Council as Lead Local Flood Authority.

SURFACE WATER

8.2.2. The NWL crosses the River Wensum. The River Wensum is a low gradient groundwater (chalk aquifer) dominated chalk stream. The River Wensum lies within the Anglian River Basin District (RBD); the Management Catchment is Broadland Rivers, and the Operational Catchment is the Wensum. The waterbody is designated as heavily modified and is currently achieving Moderate status. The hydromorphological status 'Supports Good' and hydrological regime currently 'Does Not Support Good'.

8.2.3. The floodplain of the River Wensum in this locality is mostly comprised of managed grassland with areas of fen, wet grassland, woodland and wet woodland. The floodplain has historically been drained for agricultural purposes by a series of Internal Drainage Board 'main drains' and other smaller land drains managed by Norfolk Rivers Internal Drainage Board (IDB). The main drains run parallel to the river, and then join the main channel below each impoundment.

8.2.4. The NWL crosses one unnamed ordinary watercourse, named the Tributary of the Tud or Foxburrow Stream, located between Honingham and Weston Green under the jurisdiction of Norfolk County Council (NCC) as Lead Local Flood Authority (LLFA). The watercourse flows south from Weston Green and joins the River Tud to the east of Honingham approximately 2km downstream of the NWL. In addition to this, the NWL crosses two significant overland flow paths between Weston Road (NGR TG 11652 14387) and Ringland Lane (NGR TG 12528 15116), believed to be ephemeral ordinary watercourses. The flow paths discharge to the River Wensum.

8.2.5. The River Tud, a main river and tributary of the River Wensum, is located approximately 300m to the south of the southern extent of the NWL. The River Tud rises from its source on East Dereham and flows in an easterly direction for approximately 27km to its confluence with the River Wensum below Hellesdon Mill approximately 14.8km downstream of the NWL crossing over the River Wensum (NGR 619831, 310153).

GROUNDWATER

8.2.6. The Study Area is dominated by White Chalk Subgroup (bedrock geology), designated a major aquifer and Principal Aquifer by the Environment Agency. These are deemed capable of supporting

water supplies and/or river baseflow at a regional scale, meaning they usually provide a high level of water storage.

8.2.7. The superficial deposits in the study area are dominated by Sheringham Cliffs Formation to the north and these deposits are composed of sands and gravels. Alluvium and River Terrace Deposits are present along the river channel. The Alluvium is composed of clay, silt, sand and gravel and the River Terrace Deposits are composed of sand and gravel. The south of the site is dominated by the Lowestoft Formation and its composition varies between clay, sand and gravel. There are also sporadic superficial Head Deposits and Happisburgh Glacigenic Formation deposits in the study area. Both are variable in composition and are generally composed of poorly sorted clay, silt, sand and gravel.

8.2.8. The Lowestoft Formation, Alluvium and River Terrace Deposits are classified as Secondary A Aquifers by the Environment Agency. Secondary A Aquifers are defined as permeable strata capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of baseflow to rivers. The Head Deposits are classified as Secondary B Aquifers and these are defined as having low permeability layers which may store and yield limited amounts of groundwater but may support local water supplies. The Sheringham Cliffs Formation is classified as both a Secondary A and Secondary Undifferentiated Aquifers by the Environment Agency. Secondary Undifferentiated Aquifers are geologies which have been classed as either Secondary A or B Aquifers historically.

8.2.9. The site is located within a Groundwater Source Protection Zone (SPZ) Total Catchment Zone 3. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon drinking water. Zones around location sites are defined by groundwater travel times to an abstraction. SPZ Total Catchment Zone 3 is defined as the area around a source within which all groundwater recharge is presumed to be discharged at source and defined by a 400-day travel time to the source.

FLOOD RISK

Fluvial Flood Risk

8.2.10. Review of the Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the majority of the study area is located in the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (0.1%) in any year. However, the study area does include sections located in the medium risk Flood Zone 2, where the risk of fluvial flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%) in any year, and the high-risk Flood Zone 3, where there is a greater than a 1 in 100 (1%) risk of fluvial flooding in any year. The mapped fluvial flood zones are associated with the River Wensum and the unnamed ordinary watercourse located between Honingham and Weston Green.

8.2.11. Flooding from the River Wensum in the vicinity of the NWL is largely confined to the surrounding rural floodplain and open green space. According to historic flooding records kept by the Environment Agency, the largest flood on the Wensum occurred in 1912. More recently, two rainfall events occurred on 27 May and 20 July 2014 and resulted in the flooding of 80 properties within the Norwich urban area. Along the reach of interest, no flooding incidents have been reported. There are a number of receptors within the wider area including villages both upstream and downstream of the NWL (Attlebridge and Ringland) as well as other isolated properties in the mapped fluvial floodplain within the study area.

Surface Water Flood Risk

8.2.12. Review of the Environment Agency Flood Risk from Surface Water map indicates that sections of the study area are at high, medium and low risk of flooding from surface water sources. Flooding from surface water is typically associated with natural overland flow paths and local depressions in topography where surface water runoff can accumulate during or following heavy rainfall events.

8.2.13. In this locality, it is believed that areas at risk of surface water flooding are limited to fluvial flow associated with ephemeral ordinary watercourses and drainage ditches that are not mapped on the flood map due to catchment size. This indicates that fluvial flood flows will broadly remain within the watercourse channels up to the 1 in 1000-year event. The most notable of these are between Weston Road (NGR TG 11652 14387) and Ringland Lane (NGR TG 12528 15116) where two significant overland flow paths are identified (as discussed above), believed to be ephemeral ordinary watercourses coinciding with the location of Head deposits in this area.

Other Sources

8.2.14. There is reservoir flood risk in the study area as indicated by the Environment Agency Flood Risk from Reservoirs map. Within the study area, the maximum breach extents are mapped to flow beneath the existing A1067 Fakenham road bridge and conveyed downstream within the River Wensum floodplain. The Flood Risk from Reservoirs Map only represents reservoirs designated under the Reservoirs Act 1975 with a volume of 25,000m^3 or greater and does not include other large storage features.

8.3 METHODOLOGY

8.3.1. The study area for the assessment of impacts to surface water features has been defined by the likely risk to these features. The risk of direct impacts has considered features within 0.5km of the Red Line Boundary (RLB). This is considered appropriate for assessment of risks such as spillage or overland migration of contaminants from professional judgement and experience of similar Schemes. The risk of indirect impacts to surface water features is dependent on hydraulic connectivity and flow characteristics (i.e. how easily pollutants could migrate downstream) however a study area of up to 1km is considered appropriate for the assessment of risks to downstream water quality and geomorphology from professional judgement and experience of similar Schemes.

8.3.2. The study area for the assessment of impacts to groundwater resources includes features up to 1km from the NWL. The importance of groundwater receptors greater than 1km from the NWL will be considered with regard to the connectivity to features within the study area. Receptors considered to be of high importance will be included in the study area. These features may include groundwater abstractions (public and private), local and regional aquifers. The study area is considered appropriate for the assessment of indirect effects.

8.3.3. The current study area for the assessment of flood risk is defined by the likely extent of changes to flood extents as a result of the NWL, although at this stage a distance of 1km is considered appropriate for identification of receptors that may be affected by the NWL.

8.3.4. The potential impacts of the proposed scheme on the Water Environment have been assessed in accordance with guidance and best practice. The following information sources have been used to inform the assessment:

- TAG Unit A3 – Environmental Impact Appraisal, Department for Transport, May 2019[44];
- Design Manual for Roads and Bridges LA 113 - Road drainage and the water environment[45];
- Geology of Britain Viewer, British Geological Survey, 2020[46];
- Catchment Data Explorer, Environment Agency 2020[47];
- Designated Sites View, Natural England, 2020[48];
- Transport Analysis Guidance (TAG), Department of Transport, 2019[49];
- Norwich Western Link, Environmental Scoping Report, Norfolk County Council, 2020[50];
- Magic Map (Nature on the Map), Defra, 2020[51]; and
- Environment Agency's online interactive maps, which hold flood risk and environment data for features including flood risk from rivers, surface water and reservoirs and aquifer and groundwater vulnerability mapping.

8.3.5. The guidance and best practice information listed above has been used to undertake a qualitative assessment of the potential impacts of the proposed scheme upon various features of the water environment. To appraise the magnitude and significance of the NWL, guidance in TAG Unit A3 – Environmental Impact Appraisal has been followed using best judgement for the most likely impact on each feature or group of features.

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[44] Environmental Impact Appraisal, Transport Analysis Guidance (TAG) Unit A3. Department for Transport, May 2019. Available at: https://www.gov.uk/transport-analysis-guidance-webtag. Last accessed October 2020.

[45] Highways England (2019) DMRB LA 113 Road drainage and the water environment. Available at https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727. Last accessed October 2020.

[46] Geology of Britain Viewer, British Geological Survey (2019) available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html Last accessed October 2020.

[47] Environment Agency's online Catchment Data Explorer, Environment Agency (2019) available at: https://environment.data.gov.uk/catchment-planning/. Last accessed October 2020.

[48] Designated Sites View, Natural England. https://designatedsites.naturalengland.org.uk/, Last accessed October 2020.

[49] Environmental Impact Appraisal, Transport Analysis Guidance (TAG) Unit A3. Department for Transport, May 2019. Available at: https://www.gov.uk/transport-analysis-guidance-webtag. Last accessed October 2020.

[50] Natural England, MAGIC Map. Available at: https://magic.defra.gov.uk/ Last accessed October 2020.

[51] Norwich Western Link, Environmental Impact Assessment Scoping

8.3.6. The data available online on the EA's interactive maps will only be accurate to when the maps and datasets were last updated by the EA. The maps are designed to be viewed at different scales, for example, groundwater, where data will be collated and interpreted at a higher level and therefore may not reflect local ground conditions at a location.

8.4 IMPACT APPRAISAL AND POTENTIAL MITIGATION

8.4.1. Receptors identified in this assessment include: The River Wensum; Tributary of the River Tud; mapped fluvial floodplains; and the underlying groundwater body (combined superficial and bedrock aquifer). The assessment presented below is post mitigation. A full appraisal of potential impacts to surface water and groundwater is provided in the Water Environment impacts worksheet in Appendix E; a summary of potentially significant impacts is given below.

SURFACE WATER

8.4.2. The appraisal considers the proposed superstructure crossing the River Wensum, comprising a viaduct with piers within the floodplain. No structures are proposed within the channel of the River Wensum or within 10m of River Wensum. This is expected to minimise impacts to the river flow and channel morphology.

8.4.3. The NWL requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. This will need to be assessed for potential impacts relating to fragmentation/disruption to floodplain connectivity.

8.4.4. The proposed crossing of the Tributary of the River Tud will introduce a culvert into the river channel that will remove natural bed substrate and bank-side habitat, as well as potentially change flow dynamics and sediment transport. This in turn could increase sediment deposition or scour. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements.

8.4.5. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. Surface water runoff is likely to contain high levels of sediment and hydrocarbons that can pollute surface water and groundwater features. A robust treatment system will therefore be required including measures to manage accidental spillages.

8.4.6. The impact of the NWL on the River Wensum is predicted to be **Negligible with Low Significance**. This is attributable to the high importance of the ecological and hydromorphological quality of the River Wensum and the low risk associated with works to the new bridge crossing.

8.4.7. The impact of the NWL on the Tributary of River Tud (Foxburrow Stream) is predicted to be **Minor Adverse with Insignificant Significance** to the ecological and hydromorphological quality of the Tributary of River Tud associated with the required culverting of this minor watercourse.

8.4.8. The impact of the NWL on the ecological quality of floodplain of the River Wensum is predicted to be **Minor Adverse with Low Significance** associated with the construction of the maintenance access track.

GROUNDWATER

8.4.9. Any potential changes to groundwater flow may impact the Public Water Supply and river baseflows. Local groundwater flooding can occur as a result of below ground structures (piles/foundations/lined ponds/SuDS) having the potential to create a groundwater flow barrier which could result in groundwater level rise in shallow aquifers and potentially cause groundwater flooding. The impact is considered to be **Negligible/Minor Adverse** with a significance of **Low Significance**. More detailed assessments are required for the River Wensum crossing which include the most significant below ground structures (bridge foundations).

8.4.10. Construction activities will require soil stripping and excavation, removing or reducing the protective cap on groundwater aquifers. Reducing the thickness of unsaturated layers increases groundwater vulnerability. This includes but is not limited to the construction of drainage structures proposed for the NWL. The scheme design will need to consider potential mitigation requirements during the construction and detail design phase to reduce the impact on the groundwater water bodies. Potential risks imposed may be reduced, mitigated and manged with the implementation of industry best practice and solutions tailored for the NWL.

8.4.11. A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into SuDS should be considered and adhered to during construction and operation of the NWL, to reduce the risk of contamination to the water environment. With the above mitigation measure in place the magnitude of impact to groundwater quality is considered to be **Minor Adverse** with a significance of **Low Significance.**

8.4.12. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the scheme. There is potential for a minor beneficial magnitude of positive impact the groundwater water bodies to be implemented during design phase of the mitigation measures.

FLOOD RISK

8.4.13. The north of the NWL will pass through the fluvial Flood Zones 2 and 3 associated with the River Wensum. As discussed above the proposed crossing of the River Wensum will comprise of a viaduct. Piers will be located in the floodplain spaced approximately 70m apart with no embankments proposed, and no structures will be located within the channel of the River Wensum or within 10m of River Wensum. The viaduct soffit will be situated above the 1 in 100-year flood level; the soffit levels and available freeboard will be confirmed at planning stage informed by detailed modelling. This is expected to minimise impacts to flood flow conveyance or loss of flood storage. The design of the structure will be agreed with the relevant authorities at Environmental Statement stage. It is also expected that the access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance.

8.4.14. Any loss of fluvial flood storage or impact associated with flood flow conveyance will be compensated to ensure no increased risk of flooding to the NWL or elsewhere up to the 1 in 100-year event considering the potential effects of climate change.

8.4.15. The proposed crossing of natural overland flow paths could increase surface water flood risks if hydraulic connectivity is not maintained, both through blockage of these flow paths or if overland flow inadvertently overwhelms the proposed scheme's surface water drainage system. In order to protect the NWL and maintain hydrological continuity, consideration will be given to maintaining these overland flow paths beneath the NWL.

8.4.16. The NWL will replace currently undeveloped land with impermeable surface that could increase the rate and volume of surface water runoff. A robust surface water drainage system will be expected to ensure discharge from the NWL does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects. The required attenuation and restriction of the rate and volume of discharge will be agreed with NCC as the LLFA.

8.4.17. The impact of the NWL on flood flow conveyance and storage in the floodplain of the River Wensum is predicted to be **Minor Adverse with a Low Significance** associated with the construction of the proposed viaduct and maintenance access track.

8.4.18. The impacts of the NWL on flood flow conveyance of the Tributary of River Tud (Foxburrow Stream) is predicted to be **Minor Adverse with Insignificant Significance** associated with the construction of the NWL crossing and culvert.

8.4.19. A high-level Construction and Environment Management Plan (CEMP) and Mitigation Plan will be produced as part of the Environmental Statement (ES) submission which will detail the measures required to mitigate the identified impacts. This will help give certainty on the delivery of the mitigation and compensation measures. A more detailed CEMP will be taken forward by the contractor post Planning Submission.

8.5 SUMMARY

8.5.1. The overall Summary Assessment score for the NWL is predicted to be **Moderate Adverse.** This is attributable to the high importance to the River Wensum and the **Negligible** impact of the ecological and hydromorphological quality of the River Wensum and the low risk associated with works to the new bridge crossing. A **Moderate Adverse** impact is predicted to the tributary of the River Tud; the mapped fluvial floodplain; and the underlying groundwater body (combined superficial and bedrock aquifer). Measures are being developed to further mitigate and compensate for these issues.

8.5.2. A conservative approach to the loss of floodplain has been taken until quantitative analysis of potential effects is undertaken to inform the need for compensatory storage or other mitigation.

8.5.3. The Environmental Statement (ES) is being prepared by WSP, which will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.

Appendix A

NOISE TAG WORKBOOK

Noise Workbook - Worksheet 1

Proposal Name:	Norwich Western Link
Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road, Rail or Aviation):	road

Net present value of change in noise (£):	£38,490

*positive value reflects a **net benefit** (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£40,071
Net present value of impact on amenity (£):	-£5,219
Net present value of impact on AMI (£):	£7,142
Net present value of impact on stroke (£):	-£1,387
Net present value of impact on dementia (£):	-£2,116

Quantitative results

Households experiencing increased daytime noise in forecast year:	33
Households experiencing reduced daytime noise in forecast year:	10
Households experiencing increased night time noise in forecast year:	3
Households experiencing reduced night time noise in forecast year:	10

Qualitative Comments:

The study area for the assessment has been derived based on guidance within the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, May 2020 and is set to a distance of 600m from the kerb of any new roads associated with the scheme. There are 52 residential dwellings within the study area and no additional other sensitive receptors. Generally, within the study area, noise levels are predicted to increase as a result of the scheme, with large increases predicted at isolated receptors towards the centre of the study area where low baseline levels are anticipated. However, some receptors along Wood Lane and Paddy's Lane are predicted to experience noise level reductions as a result of less vehicles using these roads in favour of the scheme.
The Highways England A47 dualling scheme has been included in both the Do-minimum (without scheme) and Do-something (with scheme) scenarios for the purpose of this assessment.

Data Sources:

Norwich Western Link Reference Design
Highways England A47 Dualling Interim Design Fix C Design
OS Mastermap data (from which buildings and roads were extracted)
OS Addressbase Plus Data
2019 LIDAR 1m DTM data
Road traffic flows as provided by project transport consultants

Appendix B

NO2 DIFFUSION TUBE SURVEY

Annualised Results for 2018 from WSP NO_2 Diffusion Tube Survey between 9 September 2019 and 6 March 2020

Site ID	Site Name	X, Y Coordinates	Annualised NO_2 Concentration (µg/m^3)
NWL_1	Castle Meadow	623203, 308616	Insufficient data capture
NWL_2	A1067 Fakenham Road	616984, 314157	21.0
NWL_3	A1067 Fakenham Road	617039, 314101	23.0
NWL_4	River Wensum at Scheme crossing	-	Site access not granted
NWL_5	A1067 over the River Wensum at Attlebridge	612822, 316727	20.0
NWL_6	A1067 at Lenwade	610205, 318259	18.5
NWL_7	A47 north of Honingham	610271, 311986	27.7
NWL_8	A47 west of Easton	612784, 310988	10.6
NWL_9	A1074 Dereham Rd, New Costessey	616934, 310350	25.5
NWL_10	A1074 Dereham Rd, Norwich	619069, 309691	25.9

Notes:

a) All sites were located at roadside.

b) Annualisation of survey data has been undertaken for 2018 in accordance with Defra LAQM.TG(16) procedure. This process used ratified monitoring data from established Automatic Urban and Rural Network background sites at Norwich Lakenfields and Wicken Fen covering the year 2018 and extending to the end of the survey in 2020, and a bias adjustment factor of 0.89 (national factor for 2018 Gradko 50% TEA/Acetone diffusion tube preparation).

c) The diffusion tube at site NWL_1 was co-located with the Norwich CC Castle Meadow (CM1) continuous automatic monitoring station. Only 2 months of data were collected due to tubes going missing between changeovers.

Appendix C

AIR QUALITY TAG WORKBOOK

Air Quality Valuation Workbook - Worksheet 3

Scheme Name:	Norwich Western Link
Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road/Rail or Road and Rail):	Road Transport (RT)

Overall Assessment Score:

Impact Pathways Approach (Concentrations)

Present value of change in NO2 concentrations (£):	£9,803
Of which:	
Concentration costs:	£69,555
Other impacts:	-£59,752
Present value of change in PM2.5 concentrations (£):	£62,165
Of which:	
Concentration costs:	£62,211
Other impacts:	-£46

Total Change

Total value of change in air quality (£):	£71,968

*positive value reflects a **net benefit** (i.e. air quality improvement)

Quantitative Assessment:

Impact Pathways Approach (Concentrations)

Change in NO2 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	-10,684.21
Change in PM2.5 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	-1,172.63

Qualitative Comments:

The air quality impacts appraisal has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC.

The affected road links map onto PCM links which are all compliant with the NO2 limit value both with and without scheme. The Impact Pathways approach has been applied in valuation. This accounts for impacts in terms of changes in human exposure to ambient concentations of air pollutants, and impacts that do not directly affect households such as ecosystem damages which are determined in terms of changes in emissions.

Comments on assumptions and uncertainties:
1) Impacts in the design year (2040) are based on vehicle emissions factors and background concentrations for 2030 as the last forecast year in Defra's Emissions Factors Toolkit version 10.1 and 2018-based background map dataset. 2030 emissions factors and background concentrations are applied in all years thereafter, up to the end of the 60 year appraisal period (2084). Consequently, any improvements in air quality that may occur after 2030 are not factored into the appraisal. In this respect the appraisal is considered to be conservative.
2) Traffic growth has not been forecast beyond 2040 and so traffic levels are assumed to be the same in all years thereafter, up to the end of the 60 year appraisal period). In this respect the appraisal is considered to be conservative.

Sensitivity Analysis:

Upper estimate net present value of change in air quality (£):	£284,764
Lower estimate net present value of change in air quality (£):	-£6,445

Data Sources:

Traffic data from NATS model output. Emissions from Defra Emissions Factors Toolkit v10.1. Defra 2018-based background pollutant maps. Pollution Climate Mapping model, 2017 reference year (Open Government Licence v3.0). Property counts derived from Ordnance Survey AddressBase data (under contractor licence from NCC).

Appendix D

GREENHOUSE GASES TAG WORKBOOK

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: Norwich Western Link

Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road/Rail or Road and Rail):	road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £19,474,620

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -456,434
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -13005

Change in carbon dioxide equivalent emissions in opening year (tonnes): -4,292
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £569,253
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	-269.0709127
Non-traded sector	0	0	0	-13371.33319

Qualitative Comments:

The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic.

Comments on assumptions and uncertainty:
1) Emissions have been calculated across the whole of the NATS model simulation area.
2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years.
3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal.
4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £30,126,533

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £8,833,474

Data Sources:

Traffic data for do-minimum and do-something scenarios in 2025 and 2040 were derived from the NATS model. 'Real-world' link length data used in the calculation of CO2 emissions were derived from Ordnance Survey Open Data and MasterMap base map products. CO2 emissions were calculated using EFT version 10.1.

Appendix E

LANDSCAPE TAG WORKBOOK

TAG Landscape Impacts Worksheet

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The landscape to the northern end of the proposed route is a wet lowland shallow valley containing the River Wensum. To the south, the land rises up and gently undulates, becoming a plateau of small to medium regular sized fields contained by hedgerow. The River Tud valley with its associated drainage features is located to the southeast. Irregular blocks of woodland cut through this landscape, reducing the order and regularity of field pattern. There are scattered farmsteads through the landscape, along with small settlements - the most notable being Honingham to the south and Weston Longville to the west. Small lanes also cut through the landscape, generally fairly straight with gentle curves.	Local	Common feature at a local scale	Important at the local and regional level	Easily substitutable, although loss of mature hedgerow trees would take much longer (over 25 years) to re-establish.	**Slight Adverse** The Proposed Scheme would bisect and subdivide fields locally, however the alignment is reflective of the pattern of existing roads within this landscape.
Tranquillity	There is some human influence within this landscape, including scattered farmsteads and small settlements, as well as historic estates such as Morton Hall to the north. Ringland and Weston Longville are notable settlements within this landscape. The wind turbines to the east on the old airfield and overhead line which runs north to south are also notable influences within this landscape. Some arable fields have been turned into pig rearing. Views from the plateau give a wider perception of human influence, particularly of traffic along the A47 and A1067. The eastern and western fringes of the study area have the greatest human influence. Perception/ actual tranquility levels likley to be reduced where large roads are visible or where certain human influences are more visible (pig rearing and wind turbines).	Local	Not rare locally	Important at the local level.	Not easily substitutable in the north, but easier to maintain in the south through replacement hedgerow planting.	**Moderate Adverse** The introduction of the viaduct over the River Wensum will substantially reduce tranquillity in the wider area, and locally to the south due to the road being largely in cutting or at-grade, with short sections on embankment influencing a wider area.
Cultural	The landscape has long been associated with farming. Field patterns are largely intact from 14th century, however there is evidence of larger fields and removal of hedgerows in some areas. There are medieval manors which form 18th-century country house estates such as Morten Hall to the north and Easton Estate to the south.	Local	Not rare locally or regionally	Important at local and regional scale.	Not easily substitutable, although former field boundaries can be readily replaced.	**Slight Adverse** The proposed route would bisect the landscape and alter the pattern of enclosure.
Landcover	Landcover is predominately arable farming throughout this landscape with mixed plantation woodland, although some fields have been turned over to pig rearing. There are small ponds throughout this landscape often regular in shape. The river valley to the north and east following the River Wensum is wet meadow and small lakes. Field are contained by hedgerows and infrequent mature trees.	Predominant landcover common at local to regional scale, others less common.	Not rare locally or regionally	Important at the local level.	Easily substitutable.	**Moderate Adverse** The Proposed Scheme would introduce a new viaduct and large dual carriageway through the landscape, and result in the loss of some of the plantation woodland and arable fields.
Summary of character	The landscape is gently undulating arable farmland, with plateau to the south, located between two shallow river valleys. River Tud in the south and River Wensum in the north being the larger of the valleys with noticeable difference in character of wet meadow and mosaic of lakes and drainage ditches. There is some human influence, of note is the over-head line and two wind turbines to the west, with the A47 and A1067 noticeable from the plateau. Settlement is sparse, mainly small farmsteads - the biggest settlement is Honingham located to the south. Land cover is predominately arable fields, contained by clipped hedgerow and infrequent mature trees, with some fields turned to pig rearing. Mixed plantation woodland is common throughout this landscape, often following field boundaries. Roads are generally small lanes, gently curved, and following the field boundaries.	Common locally	Not rare locally or regionally	Important at the local and regional level	The majority of elements are easily substituitable, although the loss of mature hedgerow trees would take much longer to re-establish. Tranquility is also difficult to substitute. Loss of long views along the river valley is not easily substitutable along with historic elements, which would not be easily replaceable.	**Moderate Adverse** The Proposed Scheme would alter the local landscape character through the introduction of the viaduct, loss of woodland and the width of the new road (dual carriageway). However, it's impact is limited to the immediate surroundings due to the road being largely in cutting or at-grade and the presence of woodland blocks.

Reference Sources

MAGIC, Google Earth, Ordnance Survey Mapping, Natural England - National Character Area 78: Central North Norfolk, Breckland District LCA (2007), South Norfolk Landscape Assessment (2001), Broadland District Council Local Development framework - Landscape Character Assessment SPD (2013)

Step 5 - Summary Assessment Score

Moderate Adverse

Qualitative Comments

There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a substantial impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.

Appendix F

HISTORIC ENVIRONMENT TAG WORKBOOK

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	**Designated heritage assets (physically affected by the scheme)** 1. None. **Designated heritage assets (possible setting impact)** 2. Two Grade I listed buildings. 3. One Grade II* listed building. 4. Fourteen Grade II listed buildings. **Non-designated heritage assets (palaeoenvironmental, prehistoric, Roman and undated/multi-period)** 5. Cropmarks of a possible Roman field system (53485). 6. Post-Roman and undated features and prehistoric finds (63365) 7. Cropmarks of undated and multi-period linear ditches (50605) 8. The findspot of prehistoric flint flakes (18044). 9. Cropmarks of undated and multi-period linear ditches (54356) 10. Cropmarks of possible Iron Age/Roman field boundaries (54357). 11. Cropmarks of possible Iron Age to Roman date enclosures (50610). 12. Cropmarks of possible Iron Age to Roman date enclosures (50615). 13. The cropmarks of undated linear ditches (50619). 14. Cropmarks of undated possible ditches (53625). 15. Cropmarks of undated ditch (53681). 16. **Moderate to high potential** for possible, previously unrecorded remains of these periods 17. **Moderate potential** for palaeoenvironmental remains in the Wensum and Tud valleys. **Non-designated heritage assets (medieval, post-medieval)** 18. World War Two accommodation and training site at Morton Hall (53474). 19. The findspot of a late Saxon brooch and medieval coin (44454) 20. Cropmarks of field boundaries and trackways of probable post medieval date (50608). 21. Cropmarks of probable post medieval date field boundaries (50609). 22. Cropmarks of probable post medieval former field boundaries (50614). 23. Cropmarks of a linear boundary or trackway of unknown, but possibly later medieval to post medieval date (50616). 24. World War One to Two date military training site (50618). 25. Attlebridge World War Two Airfield (3063).	1. N/A 2-4. The protection of Listed Buildings is a national concern (*Planning (Listed Buildings and Conservation Areas) Act 1990*). 5. The Roman field system is of regional importance. 6. The undated features and prehistoric finds are of local or regional importance. 7. The undated and multi-period linear ditches are of regional importance. 8. The findspot of prehistoric flint flakes is of local importance. 9 . The undated and multi-period linear ditches are of regional importance. 10. Iron Age/Roman field boundaries are of regional importance. 11. Iron Age/Roman enclosures are of regional or national importance. 12. Iron Age/Roman enclosures are of regional or national importance. 13. The undated linear ditches are of regional importance. 14. The undated possible ditches are of regional importance. 15. The undated ditch is of regional importance. 16. Previously unrecorded remains are of undetermined importance. 17. Possible palaeoenvironmental remains are of local importance. 18. The World War Two accommodation and training site at Morton Hall are of regional importance. 19. The late Saxon brooch and medieval coin are of local importance. 20. The field boundaries and trackways of probable post medieval date are of local importance. 21. The probable post medieval date field boundaries are of local importance.	1. N/A 2. The Grade I listed buildings are of High significance. 3. The Grade II* listed building is of High significance. 4. The Grade II listed buildings are of Medium significance. 5. The Roman field system is of Medium significance. 6. The undated features and prehistoric finds are of Low or Medium significance. 7. Cropmarks of undated and multi-period linear ditches are of Low or Medium significance. 8. The findspot of prehistoric flint flakes is of Low significance. 9 . The undated and multi-period linear ditches are of Medium significance. 10. Iron Age/Roman field boundaries are of Medium significance. 11. Iron Age/Roman enclosures are of Medium or High significance. 12. Iron Age/Roman enclosures are of Medium or High significance. 13. The undated linear ditches are of Low or Medium significance. 14. The undated possible ditches are of Low or Medium significance. 15. The undated ditch is of Low or Medium significance. 16. Previously unrecorded remains are of undetermined significance. 17. Possible palaeoenvironmental remains are of Low significance. 18. The World War Two accommodation and training site at Morton Hall are of Medium significance. 19. The late Saxon brooch and medieval coin are of Low significance. 20. The field boundaries and trackways of probable post medieval date are of Low significance. 21. The probable post medieval date field boundaries are of Low	1. N/A 2. Nationally, 2.5% of listed buildings are Grade I, making them rare and of 'exceptional interest.' 3. Nationally, 5.8% of listed buildings are Grade II*, making them rare and of 'more than special interest.' 4. Nationally, 92% of listed buildings are Grade II, making them less rare but still of national importance. 5. Roman field systems are relatively rare. 6. Post-Roman and undated features and prehistoric finds are relatively common. 7. Cropmarks of undated and multi-period linear ditches are common. 8. Findspots of prehistoric flint flakes are common. 9. The undated and multi-period linear ditches are relatively common. 10. Iron Age/Roman field boundaries are relatively rare. 11. Iron Age/Roman enclosures are relatively rare. 12. Iron Age/Roman enclosures are relatively rare. 13. Undated linear ditches are relatively common. 14. Undated possible ditches are relatively common. 15. Undated ditches are relatively common. 16. The rarity of any unrecorded remains is unknown. 17. Palaeoenvironmental remains are common within alluvial deposits. 18. World War Two accommodation and training sites are relatively rare. 19. Late Saxon brooch and medieval coins are relatively rare. 20. Field boundaries and trackways of probable post	Moderate Adverse (Built heritage) Low, Moderate or Major Adverse (Archaeology)

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
	26. Honingham Park, a post-medieval landscape park (44183). 27. Cropmarks of field boundaries of unknown but possible medieval to post-medieval date (54364). 28. World War Two air raid shelter at Attlebridge Airfield (40754). 29. World War Two air raid shelter at Attlebridge Airfield (40755). 30. World War Two fuel store at Attlebridge airfield (40757). 31. World War Two structure at Attlebridge Airfield (41342). 32. World War Two structure at Attlebridge Airfield (41343). 33. Site of the Officers' Quarters at Attlebridge airfield (40753). 34. **High potential** for possible, previously unrecorded remains of these periods. 35. Post-medieval Historic Landscape Characterisation areas.	22. The probable post medieval former field boundaries are of local importance. 23. The linear boundary or trackway of unknown, but possibly later medieval to post medieval date is of local importance. 24. The World War One to Two date military training site is of regional importance. 25. Attlebridge World War Two Airfield is of regional importance. 26. Honingham Park is of regional importance. 27. The field boundaries of unknown but possible medieval to post-medieval date are of local importance. 28. The World War Two air raid shelter at Attlebridge Airfield is of local importance. 29. The World War Two air raid shelter at Attlebridge Airfield is of local importance. 30. The World War Two fuel store at Attlebridge airfield is of local importance. 31. The World War Two structure at Attlebridge Airfield is of local importance. 32. The World War Two structure at Attlebridge Airfield is of local importance. 33. The Officers' Quarters at Attlebridge airfield is of local importance. 34. Previously unrecorded remains are of undetermined importance. 35. N/A.	significance. 22. The probable post medieval former field boundaries are of Low significance. 23. The linear boundary or trackway of unknown, but possibly later medieval to post medieval date is of Low significance. 24. The World War One to Two date military training site is of Medium significance. 25. Attlebridge World War Two Airfield is of Medium significance. 26. Honingham Park is of Medium significance. 27. The field boundaries of unknown but possible medieval to post-medieval date are of Low significance. 28. The World War Two air raid shelter at Attlebridge Airfield is of Low significance. 29. The World War Two air raid shelter at Attlebridge Airfield is of Low significance. 30. The World War Two fuel store at Attlebridge airfield is of Low significance. 31. The World War Two structure at Attlebridge Airfield is of Low significance. 32. The World War Two structure at Attlebridge Airfield is of Low significance. 33. The Officers' Quarters at Attlebridge airfield is of Low significance. 34. Previously unrecorded remains are of undetermined significance. 35. N/A.	medieval date are common. 21. Post medieval date field boundaries are common. 22. Post medieval former field boundaries are common. 23. Linear boundaries or trackways are common. 24. World War One to World War Two military training sites are relatively rare. 25. World War Two airfields are relatively rare. 26. Landscape parks are relatively rare. 27. The field boundaries of unknown but possible medieval to post-medieval date are of Low significance. 28. World War Two air raid shelters are relatively rare. 29. World War Two air raid shelters are relatively rare. 30. World War Two fuel stores are relatively rare. 31. World War Two structures are relatively rare. 32. World War Two structures are relatively rare. 33. World War Two Officers' Quarters are relatively rare. 34. The rarity of previously unrecorded remains is unknown. 35. Post-medieval Historic Landscape Characterisation areas are common.	

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Survival	1. N/A. 2-4. The listed buildings are likely to have a good level of survival. Note that the Grade II* listed Church of St Michael is largely a ruin. 5. The level of survival of the Roman field system is unknown. 6. The level of survival of the Post-Roman and undated features and prehistoric finds is unknown. 7. The level of survival of undated and multi-period linear ditches is unknown. 8. No survival, the flint flakes will have been removed. 9. The level of survival of undated and multi-period linear ditches is unknown. 10. The level of survival of Iron Age/Roman field boundaries is unknown. 11. The level of survival of Iron Age/Roman enclosures is unknown. 12. The level of survival of Iron Age/Roman enclosures is unknown. 13. The level of survival of undated linear ditches is unknown. 14. The level of survival of undated possible ditches is unknown. 15. The level of survival of undated ditch is unknown. 16. The level of survival of previously unrecorded remains is unknown. 17. The level of survival of palaeoenvironmental remains is unknown. 18. The level of survival of the World War Two accommodation and training site is unknown. 19. No survival, the late Saxon brooch and medieval coin will have been removed 20. The level of survival of field boundaries and trackways of probable post medieval date is unknown. 21. The level of survival of probable post medieval date field boundaries is unknown. 22. The level of survival of probable post medieval former field boundaries is unknown. 23. The level of survival of a linear boundary or trackway of unknown, but possibly later medieval to post medieval date, is unknown. 24. The level of survival of the World War One to Two date military training site is unknown. 25. Attlebridge World War Two Airfield has a good level of survival. 26. Honingham Park has a good level of survival. 27. The level of survival of field boundaries of unknown but possible medieval to post-medieval date is unknown. 28. The level of survival of the World War Two air raid shelter at Attlebridge Airfield is unknown. 29. The level of survival of the World War Two air raid shelter at Attlebridge Airfield is unknown.	2-34: The level of survival is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34: The level of survival is not directly relevant to the impacts on heritage assets.	2-34: The level of survival is not directly relevant to the impacts on heritage assets.	N/A

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
	30. The level of survival of the World War Two fuel store at Attlebridge airfield is unknown. 31. The level of survival of the World War Two structure at Attlebridge Airfield is unknown. 32. The level of survival of the World War Two structure at Attlebridge Airfield is unknown. 33. The level of survival of the Officers' Quarters at Attlebridge airfield is unknown. 34. The level of survival of previously unrecorded remains is unknown. 35. N/A.				
Condition	1. N/A. 2. The condition of the Grade I listed buildings is unknown. 3. The condition of the Grade II* listed building is unknown. 4. The condition of the Grade II listed buildings is unknown. 5. The condition of the Roman field system is unknown. 6. The condition of the Post-Roman and undated features and prehistoric finds is unknown. 7. The condition of the undated and multi-period linear ditches is unknown. 8. The condition of the flint flakes is unknown. 9. The condition of the undated and multi-period linear ditches is unknown. 10. The condition of the Iron Age/Roman field boundaries is unknown. 11. The condition of the Iron Age/Roman enclosures is unknown. 12. The condition of the Iron Age/Roman enclosures is unknown. 13. The condition of the undated linear ditches is unknown. 14. The condition of the undated possible ditches is unknown. 15. The condition of the undated ditch is unknown. 16. The condition of any previously unrecorded remains is unknown. 17. The condition of any palaeoenvironmental remains is unknown. 18. The condition of the World War Two accommodation and training site is unknown. 19. The condition of the late Saxon brooch and medieval coin will have been removed 20. The condition of the field boundaries and trackways of probable post medieval date is unknown. 21. The condition of the probable post medieval date field boundaries is unknown.	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	N/A

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
	22. The condition of the probable post medieval former field boundaries is unknown. 23. The condition of the linear boundary or trackway of unknown, but possibly later medieval to post medieval date, is unknown. 24. The condition of the World War One to Two date military training site is unknown. 25. The condition of the Attlebridge World War Two Airfield is unknown. 26. The condition of the Honingham Park is unknown. 27. The condition of the field boundaries of unknown but possible medieval to post-medieval date is unknown. 28. The condition of the World War Two air raid shelter at Attlebridge Airfield is unknown. 29. The condition of the World War Two air raid shelter at Attlebridge Airfield is unknown. 30. The condition of the World War Two fuel store at Attlebridge airfield is unknown. 31. The condition of the World War Two structure at Attlebridge Airfield is unknown. 32. The condition of the World War Two structure at Attlebridge Airfield is unknown. 33. The condition of the Officers' Quarters at Attlebridge airfield is unknown. 34. The condition of any previously unrecorded remains is unknown. 35. N/A.				
Complexity	1. N/A. 2. The complexity of the Grade I listed buildings will include their relationships to other heritage assets and to the wider rural landscape. 3. The complexity of the Grade II* listed building will include its relationship to other heritage assets and to the wider rural landscape. 4. The complexity of the Grade II listed buildings will include their relationships to other heritage assets and to the wider rural landscape. 5. The complexity of the Roman field system is unknown. 6. The complexity of the Post-Roman and undated features and prehistoric finds is unknown. 7. The complexity of the undated and multi-period linear ditches is unknown. 8. The complexity of the flint flakes is unknown. 9. The complexity of the undated and multi-period linear ditches is unknown. 10. The complexity of the Iron Age/Roman field boundaries is unknown. 11. The complexity of the Iron Age/Roman enclosures is unknown. 12. The complexity of the Iron Age/Roman enclosures is unknown.	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	N/A

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
	13. The complexity of the undated linear ditches is unknown. 14. The complexity of the undated possible ditches is unknown. 15. The complexity of the undated ditch is unknown. 16. The complexity of any previously unrecorded remains is unknown. 17. The complexity of any palaeoenvironmental remains is unknown. 18. The complexity of the World War Two accommodation and training site is unknown. 19. The complexity of the late Saxon brooch and medieval coin will have been removed 20. The complexity of the field boundaries and trackways of probable post medieval date is unknown. 21. The complexity of the probable post medieval date field boundaries is unknown. 22. The complexity of the probable post medieval former field boundaries is unknown. 23. The complexity of the linear boundary or trackway of unknown, but possibly later medieval to post medieval date, is unknown. 24. The complexity of the World War One to Two date military training site is unknown. 25. The complexity of the Attlebridge World War Two Airfield is unknown. 26. The complexity of the Honingham Park is unknown. 27. The complexity of the field boundaries of unknown but possible medieval to post-medieval date is unknown. 28. The complexity of the World War Two air raid shelter at Attlebridge Airfield is unknown. 29. The complexity of the World War Two air raid shelter at Attlebridge Airfield is unknown. 30. The complexity of the World War Two fuel store at Attlebridge airfield is unknown. 31. The complexity of the World War Two structure at Attlebridge Airfield is unknown. 32. The complexity of the World War Two structure at Attlebridge Airfield is unknown. 33. The complexity of the Officers' Quarters at Attlebridge airfield is unknown. 34. The complexity of any previously unrecorded remains of these periods is unknown. 35. N/A.				

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Context	1. N/A. 2. Grade I listed buildings: relationships to assets in Weston Longville and Ringland. Both Grade I listed buildings will have historic and visual relationships to their churchyards and to the immediate rural landscape. Rural. 3. Grade II* listed building: relationship to Grade II listed buildings at or in the vicinity of Morton Hall. Relationship to immediate rural landscape. Rural. 4. Grade II listed buildings: relationships to assets in Weston Longville and Honingham. Relationships to immediate rural landscapes. Rural. 5 - 35. Rural.	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	N/A
Period	1. N/A. 2. Later medieval. 3. Early and Later medieval. 4. Post-medieval. 5. Roman. 6. Undated/prehistoric. 7. Undated/multi-period. 8. Prehistoric. 9. Undated/multi-period. 10. Iron Age/Roman. 11. Iron Age/Roman. 12. Iron Age/Roman. 13. Undated. 14. Undated. 15. Undated. 16. Unknown. 17. Palaeoenvironmental. 18. Modern. 19. Early medieval/later medieval 20. Post-medieval. 21. Post-medieval. 22. Post-medieval. 23. Later medieval/post-medieval. 24. Modern. 25. Modern. 26. Post-medieval. 27. Later medieval/post-medieval. 28. Modern. 29. Modern. 30. Modern. 31. Modern. 32. Modern. 33. Modern.	2-35. The period is not impacted	2-35. The period is not impacted	2-35. The period is not impacted	N/A

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
	34. Unknown. 35. Post-medieval.				
Reference Sources					
National Heritage List for England Norfolk Historic Environment Record Norwich Western Link Heritage Constraints Report (WSP 2019)					
Step 5 - Summary Assessment Score					
Moderate Adverse (Built heritage) Low, Moderate or Major Adverse (Archaeology)					
Qualitative Comments					
The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved). The heritage significance will be determined through future assessment, including preliminary site-based archaeological investigations.					

Appendix G

BIODIVERSITY TAG WORKBOOK

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
River Wensum Special Area of Conservation (SAC)	**Biodiversity** Chalk-fed river, designated for: Annex I habitat as a primary reason for selection: - Watercourses of plain to montane levels with a water crowfoot *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. - The Wensum represents sub-type 1 in lowland eastern England. Annex II species as a primary reason for selection: - White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* Annex II species present as a qualifying feature: - Desmoulin's whorl snail *Vertigo moulinsiana* - Brook lamprey *Lampetra planeri* - Bullhead *Cottus gobio* To date surveys have confirmed the likely absence of white clawed crayfish from the stretch of the River Wensum which was considered relevant to the Proposed Scheme and the presence of: Water crowfoot *Ranunculion fluitantis*, Bullhead, Brook lamprey and Desmoulin's whorl snail either within the Wensum or in the supporting ditches within the floodplain.	**International**	**High** Primary habitat: Sub-type 1 has a limited distribution in the UK, being found only in those areas where chalk is present, and is therefore restricted to southern and eastern England. Primary species: White-clawed crayfish. One of only four watercourses in Norfolk that are known to support white-clawed crayfish. Other qualifying feature: Desmoulins's whorl snail. The site supports one of the largest populations in the UK. Other qualifying feature: Brook lamprey. The Wensum has a healthy population of brook lamprey, with clean water and suitable areas of gravels, silt or sand required for spawning. Other qualifying feature: Bullhead. Sites have been selected to encompass the natural geographical range of the species and to represent the range of ecological situations in which it occurs, e.g. both upland and lowland rivers, and both acidic and base-rich situations.	**Target Feature** Anthropogenic influences have had a dramatic effect on the ecology and hydrology of the River Wensum, in particular at sites up and downstream of mill structures, sites affected by channel modification inc. over-widening and deepening, sites affected by excessive silt ingress, sites that are heavily maintained and sites that lack natural riparian vegetation. The following document has been published that includes specific restoration targets for the qualifying features of the SAC: *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features (Natural England 2019).*	**Very high** Internationally important site with limited potential for substitution.	**Neutral**	**Neutral**

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
River Wensum Site of Special Scientific Interest (SSSI)	**Biodiversity** Overlaps with River Wensum SAC (see above cell). Notified for: - Flowing waters - Type I: naturally eutrophic lowland rivers with a high base flow. - Flowing waters - Type III: base-rich, low-energy lowland rivers and streams, generally with a stable flow regime - Population of RDB mollusc – Desmoulin's whorl snail. - S25 - *Phragmites australis* - Eupatorium cannabinum tall-herb fen. - S3 - *Carex paniculata* swamp. - S4 - *Phragmites australis* swamp and reed-beds - S5 - *Glyceria maxima* swamp - S7 - *Carex acutiformis* swamp - White-clawed crayfish To date, surveys have confirmed the likely absence of white clawed crayfish from the stretch of the River Wensum which was considered relevant to the Scheme and the presence of Desmoulin's whorl snail either within the Wensum or in the supporting ditches within the floodplain.	**National**	**High** The River Wensum is a SSSI of national importance, supporting a diverse range of protected habitats and species.	**Unknown** The trend for the SSSI is currently unknown. No assessments within the last five years. Target species - See above for trends regarding white-clawed crayfish and Desmoulin's whorl snail. Of the 36 SSSI units for this site, 6 were considered to be in 'Favourable' condition in 2010, with the remaining 30 considered to be in 'Unfavourable - Recovering' condition.	**High** Nationally important site with no potential for substitution.	**Neutral**	**Neutral**
River Wensum Pastures, Ringland Estates County Wildlife Site (CWS)	**Biodiversity:** Predominantly an improved cattle-grazed pasture adjacent to the River Wensum, crossed by a network of drains supporting a species-rich flora associated with aquatic habitats.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown -** The Norfolk BAP does not identify a trend in relation to the habitats associated with this CWS.	**Medium** - County value site with limited potential for substitution.	**Minor negative**	**Slight adverse**
Wensum Pastures at Morton Hall CWS	**Biodiversity:** Predominantly improved cattle-grazed pasture adjacent to River Wensum, crossed by a network of drains supporting a species-rich flora associated with aquatic habitats.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**
Land adjoining Foxburrow Plantation CWS	**Biodiversity:** Part of a larger area known collectively as Foxburrow Plantation and The Waterfence. It consists of an extensive area of wet, species-rich grassland situated in the bottom of a spring-fed valley.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Broom & Spring Hills CWS	**Biodiversity:** Semi-natural deciduous woodland dominated by oak and sycamore.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**
Primrose Grove CWS	**Biodiversity:** Structurally varied, predominately consisting of semi-natural broad-leaved and mixed woodland, with some compartments considered to be ancient. Broad-leaved woodland comprised with varying proportions of oak, beech, sycamore and ash. Mixed woodland is represented by Douglas Fir and Scot's Pine.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**
Attlebridge Hills CWS	**Biodiversity:** Structurally varied, broad-leaved semi-natural woodland. The canopy is dominated by mature oak, sycamore, sweet chestnut with extensive areas of mixed coppice of hazel, sycamore and sweet chestnut.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown -** The Norfolk BAP does not identify a trend in relation to the habitats associated with this CWS.	**Medium** - County value site with limited potential for substitution.	**Minor negative**	**Slight adverse**
Gravelpit Plantation and Church Hill CWS	**Biodiversity:** Closed canopy semi-natural broad-leaved and mixed plantation woodland, with some stands considered to be ancient in origin. Canopy dominated to varying degrees by oak, ash and sycamore, and the shrub layer is comprised of hawthorn, hazel and holly.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Minor negative**	**Slight adverse**
Old Covert, Wood Land CWS	**Biodiversity**: A coppice woodland with standards that are not listed on the Ancient Woodland Inventory, although it may have once been part of a larger, Ancient Woodland. The wood is managed as coppice and for shooting.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Minor negative**	**Slight adverse**
Mouse Wood CWS	**Biodiversity:** Citation refers to an ancient, replanted woodland which is now predominantly a commercially-managed conifer plantation surrounded mainly by arable farmland. The extent of the existing ancient woodland is unknown.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Minor negative**	**Slight adverse**
River Tud at Easton and Honingham CWS	**Biodiversity:** Citation refers to a watercourse supporting a spcies-rich aquatic, marginal and emergent riverine flora.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Neutral**	**Neutral**

Step 2		Step 3				Step 4	Step 5
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Church Meadow, Alder Carr, Three Corner Thicket and Nursery Plantation CWS	**Biodiversity:** Citation refers to a site comprising mainly cattle grazed, inimprove wet pasture, bisected by spring-fed ditches. With areas of wet and dry woodland.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Neutral**	**Neutral**
Taverham Mill CWS	**Biodiversity:** Citation refers to a fishing lake surrounded by marshy and neutral grassland and a mixture of planted and semi-natural woodland on acid soil.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Neutral**	**Neutral**
Ringland Pits CWS	**Biodiversity:** Citation refers to a flooded disused gravel workings adjacent to the River Wensum .	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with limited potential for substitution.	**Neutral**	**Neutral**
Fakenham Road Roadside Nature Reserve (RNR)	**Biodiversity:** Species: Hoary mullein V*erbascum pulverentum.* Phase 1 habitat surveys of this area have identified the presence of this species.	**County**	**Medium -** Site of county value, with only one qualifying feature behind the designation.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this species.	**Medium** - County value site with limited potential for substitution.	**Major negative**	**Moderate adverse**
Ancient Woodland	**Biodiversity**: Ancient Woodland is an irreplaceable habitat which is important for many reasons, including its value to wildlife, i.e. bats, birds and fungi. An Ancient Woodland Inventory site within 200m of the NWL scheme forms part of Primrose Grove CWS. In addition, Mouse Wood CWS is also listed as an Ancient Woodland Inventory site. The NWL scheme is over 30m from Primrose Grove ancient woodland (south) and Mouse Wood ancient woodland (west) is located adjacent to the pre-existing Wood Lane, a road considered as a possible access route to the NWL scheme.).	**National**	**High** - Detailed baseline data has not been collected, although the route has potential to impact on ancient woodland. Ancient woodland is considered one of the richest land-based habitats for wildlife.	**Declining** - Ancient woodland is in significant national decline, with a current UK coverage of only 2%.	**High** - National value habitat with no potential for substitution.	**Neutral**	**Neutral**
Ancient / Veteran Trees and Hedgerows	**Biodiversity:** A number of veteran and ancient trees are present within the Scheme, both as stand-alone features and within hedgerows or other important habitats. Veteran and ancient trees are considered irreplaceable habitats, and a BS5837 survey has been completed by Arboriculturists to identify trees which are veteran or ancient. Further assessment works will be completed in 2021 to consider hedgerows.	**County**	**High** - The BS5837 survey has identified a number of veteran and ancient trees within the Scheme. Veteran and ancient trees are considered to be an irreplaceable habitat and are of high value to a range of wildlife.	**Declining** - These habitat are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - County value species with no potential for substitution.	**Major negative**	**Moderate adverse**

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
	Hedgerows are Norfolk Biodiversity Action Plan habitats.						
Important Hedgerows	**Biodiversity:** Ecologically important hedgerows are recognised as hedgerows that are at least 30 years old which support a mixture of native woody species and other associated features such as mature trees, woodlands, parallel/connecting hedges, and important woodland ground flora as stated in the Hedgerow Regulations 1997. Hedgerow surveys have been completed this year which have identified the presence of a number of important hedgerows along the Scheme. Hedgerows are listed as a target species in the Norfolk Biodiversity Action Plan.	**County**	**High -** Hedgerow surveys have identified a number of important hedgerows within the Scheme, which will be impacted. Hedgerows are an important landscape feature and provide habitat connectivity and high value to a range of wildlife.	**Declining** - The lengths of managed hedgerow decreased by 6.1% between 1998 and 2007. Abundance and distribution of hedgerow trees are declining, as recognised by the Countryside Survey 2000.	**Medium** - County value habitat with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**
HPI - Hedgerows	**Biodiversity:** Hedgerows are a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. This habitat is present within the boundaries of the Proposed Scheme. Hedgerows provide habitat connectivity for a range of species throughout the landscape.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact hedgerows of county value.	**Declining** - The lengths of managed hedgerow decreased by 6.1% between 1998 and 2007. Abundance and distribution of hedgerow trees are declining, as recognised by the Countryside Survey 2000.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**
HPI - Floodplain Grazing Marsh	**Biodiversity:** Coastal and Floodplain grazing marsh is a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. This habitat is present within the boundaries of the Proposed Scheme. These habitats are known to support botanical diversity and provide value to a range of invertebrates and breeding and wintering birds.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact floodplain grazing marshes of county value.	**Declining** - This habitat is listed as priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**
HPI - Arable Field Margins	**Biodiversity:** Arable Field Margins are a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. Further	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact arable field margins of county value.	**Declining** - This habitat is listed as priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**

Step 2		Step 3				Step 4	Step 5
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	survey work in 2021 will determine the presence / absence within the boundaries of the Proposed Scheme.			in relation to these habitat types locally.			
HPI - Rivers and Streams	**Biodiversity:** The Proposed Scheme will intersect a number of watercourses, including the River Wensum and the River Tudd (a chalk stream), as well as a number of other small watercourses. The River Wensum is internationally designated (see site details above), whilst other watercourses within the boundaries of the Proposed Scheme are considered to be of County value.	**County**	**High** - More than 85% of all the chalk streams in the world are in England and they are threatened nationally due to impacts from agricultural and urban development. See above for details of River Wensum SAC and SSSI designation. Other watercourses within the Proposed Scheme are also likely to support a range of wildlife and botanical diversity although detailed habitat surveys are yet to be completed.	**Declining -** Increases in population pressure leading to water pumping.	**Medium** - Local value species with potential for substitution.	**Neutral**	**Neutral**
HPI - Lowland Mixed Deciduous Woodland	**Biodiversity**: Lowland mixed deciduous woodland is a Habitat of Principal Importance (HPI). All woodland types are considered ecologically valuable habitat, providing habitat features for a range of species.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact woodlands of county value.	**Declining** - HPI habitats (such as lowland deciduous woodlands) are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Major negative**	**Moderate adverse**
HPI - Wet Woodland	**Biodiversity**: Wet woodland is a Habitat of Principal Importance (HPI). All woodland types are considered ecologically valuable habitat, providing habitat features for a range of species.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact woodlands of county value.	**Declining** - HPI habitats (such as lowland deciduous woodlands) are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Major negative**	**Moderate adverse**
Vascular and Non-Vascular Plants	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable vascular and non-vascular plants. The presence/potential presence of protected and notable flora along the Proposed Scheme have been identified through Phase 1 habitat surveys and desk-based searches. Further surveys are due to be conducted in 2021 including a specific NVC survey. Species of vascular and non-vascular plants are listed as Norfolk Biodiversity Action Plan species.	**Local**	**Medium** - detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable vascular and non-vascular plants.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Slight adverse**

Step 2		Step 3				Step 4	Step 5
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Macrophytes	**Biodiversity:** Macrophyte surveys have identified the water crowfoot species associated with the River Wensum SAC designation.	**International**	**High** - See SAC information above.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Very high** - Designated features of SAC only.	**Neutral**	**Neutral**
Fungi	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable fungi. The presence/potential presence of protected and notable fungi along the Proposed Scheme have been identified through Phase 1 habitat surveys and desk-based searches. Species of fungi are listed as Norfolk Biodiversity Action Plan species.	**Local**	**Medium** - detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable flora, fungi, bryophyte and lichen surveys.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - County value species with potential for substitution.	**Minor negative**	**Slight adverse**
Lichens	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable lichens. The presence/potential presence of protected and notable lichens along the Proposed Scheme have been identified through Phase 1 habitat surveys and desk-based searches. Species of lichen are listed as Norfolk Biodiversity Action Plan species.	**Local**	**Medium** - detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable flora, fungi, bryophyte and lichen surveys.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - County value species with potential for substitution.	**Minor negative**	**Slight adverse**
Fish	**Biodiversity**: The River Wensum SAC and its tributaries are designated for brook lamprey and bullhead. A fish survey completed in 2020 confirmed the presence of a range of coarse fish on the River Wensum in the vicinity of the scheme which included pike, chub, dace, roach, gudgeon and minnow. It is also highly likely that other species including bullhead and European eel are also present in the River Wensum. A survey of the connected ditches on the floodplain in the vicinity of the scheme highlighted the presence of river/brook lamprey (*Lampetra* spp.), minnow and three-spined stickleback. A survey of the Foxburrow Stream (tributary of the River Tud) resulted in no fish	**International**	**High** - See SAC information above. Additionally the route will cross minor watercourses (including drains), that may support fish. The network of connected ditches on the floodplain adjacent to the River Wensum and the marginal sediment beds within them are a particularly important habitat for lamprey.	**Unknown** - No trend has been identified nationally or locally for the two fish for which the SAC is designated.	**Very high** - Designated features of SAC (bullhead and brook lamprey only).	**Neutral**	**Neutral**

Step 2		Step 3				Step 4	Step 5
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	being observed or captured within the survey area.						
Reptiles (common and widespread species)	**Biodiversity**: Areas of rough grassland and scrub present along the length of the Proposed Scheme are likely to be suitable to support reptiles. Reptile surveys completed in 2019 and 2020 have confirmed the presence of low numbers of reptiles including grass snake and slow worm.	**Local**	**Medium** - widespread species of reptile, including slow worm and grass snake are known to be present in areas of suitable habitat, and the Scheme is likely to impact reptile populations on a local level.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species.	**Medium** - reptiles are a species of medium biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
Great Crested Newt *Triturus cristatus*	**Biodiversity**: Great crested newts are protected under the following legislation: Annexe II and IV of the Habitats Directive Conservation of Habitats and Species Regulations (Schedule 2) Wildlife and Countryside Act (1981) (Schedule 5) Great crested newt habitat suitability and presence/absence surveys in relation to the Proposed Scheme were completed in 2020, where access allowed. These surveys identified the presence of GCN in two ponds, which will be subject to a population class assessment in 2021. A number of ponds were not accessible for survey in 2020 and will therefore be subject to presence/absence and population class survey (where appropriate) in 2021.	**Local**	**High** - the route has potential to affect terrestrial habitat and breeding ponds used by this species. This will be confirmed by further surveys completed in 2021.	**Target species** - GCN are targeted by the Norfolk BAP due to a major population decline in the Broads. The main objective in Norfolk is to maintain range and viability of the local population.	**High** - GCN are of high biodiversity value on a local and national level.	**Neutral**	**Neutral**

Step 2		Step 3				Step 4	Step 5
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Birds	**Biodiversity:** Habitats present are suitable for use by birds. The arable fields and grasslands provide potential foraging habitat for passage/over-wintering birds such as mixed thrush flocks, skylarks and other typical species. Arable fields and areas of the flood plain care used by a small number of wetland birds. The Proposed Scheme also supports extensive and diverse habitat which are likely to support breeding birds typical of these habitats (e.g. farmland, woodland) and confirmed the use of the habitats on-Site by a range of breeding bird species, including Barn Owl and king fisher, which are a Schedule 1 species under the Wildlife and Countryside Act (1981).	**Local**	**Medium -** Baseline data collected to-date suggests that the route will impact breeding and wintering birds at a local level.	**Unknown** - The Norfolk BAP identifies a range of bird species in significant decline on a county level.	**Medium** - The site is likely to support a diversity range of breeding and wintering bird species of local importance.	**Minor negative**	**Slight adverse**
Barn Owl	Barn owl *Tyto alba* are a Schedule 1 species under the Wildlife and Countryside Act (1981), and is a Norfolk Biodiversity Action Plan species. Incidental sightings of barn owl were recorded during surveys for other species, and barn owl tree and building roosts were identified during building surveys.	**Local**	**High** - barn owl are a Schedule 1 species and are targeted by the Norfolk Biodiversity Action Plan. The Scheme will result in the severance and/or loss of foraging habitat.	**Declining**- the Norfolk BAP states that barn owl populations crashed in the 20th century in England and Wales. A more recent study in 1997 indicated that, while still declining, the rate of decline was beginning to slow. The '*State of the UK Barn Owl population - 2019'* report suggests an overall rise in nesting occupancy of known barn owl nest locations across the UK. The surveys completed in Norfolk found that brood sizes of barn owl were small, and hypothesised that this may be due to poor food availability.	**High** - Barn owl are of high biodiversity value on a National and Local level.	**Minor negative**	**Slight adverse**

Step 2		Step 3				Step 4	Step 5
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Bats (General)	**Biodiversity**: Habitats present within the Proposed Scheme, including woodlands, hedgerows, mature trees, waterbodies and scrub provide suitable habitat for foraging, commuting and roosting bats. Surveys completed in 2019 and 2020 have confirmed the presence of brown long-eared, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's, serotine, *Myotis sp.* and barbastelle. Bat activity surveys have confirmed the use of habitats across the site as commuting routes and foraging areas, and tree emergence/re-entry surveys, radio-tracking and ground level tree assessment (GLTA) and climbing surveys have confirmed the presence of roosting bats within trees across the Proposed Scheme. Further bat activity and roost identification/categorisation surveys will be completed in 2021. There are four bat species listed in the Norfolk Biodiversity Action Plan: Noctule *Nyctalus noctula*, brown long-eared *Plecotus auritus,* soprano pipistrelle *Pipistrellus pygmaeus* and barbastelle *Barbastella barbastellus.*	**County**	**High -** Baseline data collected to date indicates that the route will sever bat commuting routes, and result in the loss of foraging and roosting habitat.	**Target species** - The Norfolk BAP targets four species (including barbastelle) to reduce decline.	**High** - Bats are protected under the Conservation of Habitat and Species Regulations 2017 and are notably in decline across the UK due to a range of factors including habitat loss. Barbastelle is an Annex II species of European importance.	**Intermediate negative**	**Large adverse**
Bats (Barbastelle *Barbastella barbastellus*)	**Biodiversity:** A rare bat species of national importance which is known to roost within the local area. The route is located within the Core Sustenance Zone (CSZ) for barbastelle. Barbastelle are offered specific protection under: Annex II and IV of the Habitats Directive Wildlife and Countryside Act 1981 (Schedule 5) Near Threatened on the IUCN Red List of Threatened species (Piraccini, 2016) Species of Principal Imporance (SPI) under section 41 of the Natural Environment and Rural Communities Act 2006 (NERC). Norfolk Biodiversity Action Plan Species. There is a known presence of barbastelle roosts within the local	**National**	**High -** Barbastelle are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981) and Annexe II and IV of the Habitats Directive. Baseline surveys completed to-date indicate that the Scheme will sever commuting routes and result in the loss of foraging habitat.	**Target species** - Although a trend in relation to the target species is not known the Norfolk BAP targets barbastelle (as well as three other bat species) to reduce decline.	**Very High** - Bats are protected under the Conservation of Habitat and Species Regulations 2017 and are notably in decline across the UK due to widespread habitat loss. Barbastelle is an Annex II species of European importance.	**Intermediate negative**	**Large adverse**

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	area, and this has been confirmed through radio-tracking studies in 2019 (to be completed in 2021), tree emergence surveys, tree-climbing surveys and various bat activity surveys.						
Badgers *Meles*	**Biodiversity**: Badgers are offered protection under the Protection of Badgers Act 1992. Woodlands, hedgerows and grassland provide suitable habitat for foraging badgers, and suitable locations for sett construction. Walkover badger surveys completed in 2019/2020 (as well as observations whilst completing other species surveys) have identified a number of badger setts along the Scheme. These setts were further surveyed thorugh bait marking techniques in March 2021.	**Local**	**High -** Two main badger setts have been identified within the Scheme alignment.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this species, although nationally badgers have shown a significant increase in numbers (c.88% since the 1980s).	**Medium** - badger are a species of medium biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
Otter *Lutra lutra*	**Biodiversity:** Otter are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981) and the Conservation of Habitats and Species Regulations (2017). In addition to the River Wensum and Tud a series of small watercourses and drains, in connection with the route may support otter. Otter signs and sightings have been recorded both during otter surveys and incidentally in 2020.	**Local**	**Medium** - Otter have been identified as being present in the watercourses to be intersected by the Scheme.	**Target species** - Otter populations are increasing both locally (Norfolk) and nationally.	**High -** Otter are a species of high biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**

Step 2		Step 3				Step 4	Step 5
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Water Vole *Arvicola amphibius*	**Biodiversity:** Water vole are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981). In addition to the River Wensum and Tud a series of small watercourses and drains, in connection with the route may support water vole. Watervole presence has been confirmed in the River Wensum and in other watercourses intersected by the Proposed Scheme.	**Local**	**Medium** - Water vole are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981).	**Target species** - Water vole decline in Norfolk is mainly due to population fragmentation and isolation.	**Medium -** Water vole are a species of medium biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
SPI - Brown Hare *Erinaceus europaeus*	**Biodiversity** Habitats within the Proposed Scheme include open arable farmland and fields, which offer value to brown hare Lepus europeaus, and many incidental sightings of brown hare have been recorded within the Scheme.	**Local**	**Low** - brown hare are not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining -** brown hare have been in decline for the last 30 years, however recent figures suggest that the species is recovering.	**Low** - brown hare are a species of low biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
SPI - Hedgehog *Erinaceus europaeus*	**Biodiversity** Habitats within the Proposed Scheme comprise a mosaic of woodland, grassland, wetland and arable, which offers value to hedgehog*Erinaceus europaeus.*	**Local**	**Low** - hedgehog are not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining -** it is estimated that hedgehog numbers have declined by almost 40% in the past decade.	**Low** - hedgehog are a species of low biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
SPI - Common Toad *Bufo bufo*	**Biodiversity** Habitats within the Scheme include floodplains, woodlands, the River Wensum and other watercourses, and a number of ponds are present within proximity of the Proposed Scheme. These habitats are likely to support common toads, a UK Biodiversity Action Plan species, and this species has been observed within habitats across the Scheme.	**Local**	**Low** - common toad it not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining** - recent research by Froglife has identified a decline in toad populations of 68% over the last 30 years, however this is still a widespread species.	**Low** - common toads are a species of low biodiversity value on a national and local level.	**Minor Negative**	**Slight adverse**
Desmoulin's Whorl Snail	**Biodiversity**: Records have been provided of Desmoulin's Whorl Snails in the local area. Surveys conducted in 2019 within suitable habitats to the north of the Proposed Scheme have confirmed the presence of Desmoulin's Whorl Snails.	**International**	**High** - See SAC information above.	**Target species** - Targeted because of its declining in Norfolk due to destruction of wetlands, habitat degradation, particularly as a result of changes in hydrology and possibly the introduction of grazing.	**Very high** - Primary feature of SAC. Internationally important site with limited potential for substitution.	**Minor Negative**	**Slight adverse**

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Aquatic Macroinvertebrates	**Biodiversity**: The watercourses and ponds present within the Proposed Scheme and the local area are likely to support a range of aquatic macroinvertebrates, which may include notable or protected species. Macroinvertebrate surveys were completed in 2020.	**County**	**High** - The River Wensum SAC and SSSI is designated for white-clawed crayfish and Desmoulin's whorl snail. The scheme will impact upon aquatic macroinvertebrates at a County level.	**Target species** - the only aquatic macroinvertebrate in decline across Norfolk and is targeted by the Norfolk BAP is the Norfolk hawker *Aeshna isoceles*. The local objective is to maintain the current range in Norfolk by preventing loss of freshwater sites and create new habitat with a view to increase the range in Norfolk by 2020.	**Medium** - freshwater habitats may support notable aquatic macroinvertebrate species.	**Minor negative**	**Slight adverse**
Terrestrial Invertebrates	**Biodiversity**: The diverse range of habitats present along the Scheme, including woodland, scrub and grassland are likely to support a range of terrestrial invertebrates. Invertebrate surveys are due to be completed in 2021.	**Local**	**Medium** - Although baseline surveys have not yet been completed, it is expected that the range of habitats along the route will support terrestrial invertebrates that are widespread and common throughout the UK.	**Target species** - The Norfolk BAP identifies a declining trend in certain invertebrate species. Ground beetle, brush-thighed seed-eater beetle, flixweed flea beetle and silver-studded blue butterfly are all target species of the Norfolk BAP. It is unknown whether these species are present in the vicinity of the route option.	**Medium** - The project has the potential to affect terrestrial invertebrate species.	**Minor Negative**	**Slight adverse**

Reference Sources

River Wensum. European Site Conservation Objectives: Supplementary advice on conserving and restoring site features (Natural England 2019).
Norfolk BAP: https://www.norfolkbiodiversity.org/assets/Uploads/Water-vole2.pdf.
Wildlife and Countryside Act 1981 Schedule 1: http://www.legislation.gov.uk/ukpga/1981/69/schedule/1.
Wildlife and Countryside Act 1981 Schedule 5: http://www.legislation.gov.uk/ukpga/1981/69/schedule/5.
NERC Act Section 41 Species of Principal Importance: http://publications.naturalengland.org.uk/publication/4958719460769792.
Froglife: https://www.froglife.org/2018/03/23/amphibian-and-reptile-declines-uk-perspective/
BTO: https://app.bto.org/birdtrends/species.jsp?&s=kingf

Summary Assessment Score

Large Adverse

Qualitative Comments

Overall the Assessment Score is Large Adverse due to the potential impacts on bats, largely associated with the loss of woodland leading to a reduction in available forgaging habitat. Compensation proposals are being developed which will include the enhancement of existing woodlands to benefit bats and the creation of new woodland which, in the long term, will help to compensate for the loss of woodland.

Appendix H

WATER ENVIRONMENT TAG WORKBOOK

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The study area includes features within 1km of the Red Line Boundary (RLB). **Potential Impacts:** Increased pollution risk to surface water and groundwater Increased sedimentation within watercourses Impacts to the hydromorphological, physio-chemical and ecological quality of watercourses Increased flood risk associated with new structures Impact to groundwater flow pathways	**River Wensum**	**Water supply**	**Medium** - main river, good chemical quality, supports private abstractions.	Regional	Medium	Cannot be substituted	Medium	Negligible	Insignificant
		Biodiversity	**Very High** - channel of the Wensum designated SAC and SSSI.	Regional	High	Cannot be substituted	Very High	Negligible	Low
		Transport and dilution of waste products	**Medium** - large catchment, receives local discharge, WWTW downstream of study area.	Regional	Medium	Limited potential for substitution	Medium	Negligible	Insignificant
		Recreation	**Medium** - flow through urban and public areas	Local	Low	Limited potential for substitution	Medium	Negligible	Insignificant
		Hydromorphology	**Medium** - heavily modified classification but supports good ecological status	Regional	Medium	Cannot be substituted	Very high	Negligible	Low
		Conveyance of flow and material	**High** - main river, large catchment, flows through mix of urban and rural areas	Regional	Medium	Cannot be substituted	High	Negligible	Insignificant
	Floodplain of the River Wensum	**Conveyance of flow and material**	**Medium** - provides local flood flow conveyance route, functional floodplain protecting the local area and downstream Norwich City.	Local	Medium	Cannot be substituted	Medium	Minor Adverse	Insignificant
		Biodiversity	**Very High -** functional floodplain, habitat of principal importance - floodplain grazing marsh.	Local	Medium	Limited potential for substitution	High	Minor Adverse	Low significance
	Tributary of River Tud or Foxburrow Stream	**Water supply**	**Low** - quality unknown, may support agricultural uses although likely to have low flow	Local	Low	Limited potential for substitution	Low	Negligible	Insignificant
		Biodiversity	**Medium** - significantly modified, potential supporting habitat for otter and water vole	Local	Medium	Limited potential for substitution	Medium	Minor Adverse	Insignificant
		Transport and dilution of waste products	**Low** - likely to receive runoff from adjacent land	Local	Low	Limited potential for substitution	Low	Negligible	Insignificant
		Recreation	**Low -** no known recreational or amenity value	Local	Low	Limited potential for substitution	Medium	Negligible	Insignificant
		Hydromorphology	**Low** - heavily modified	Local	Low	Limited potential for substitution	Low	Minor Adverse	Insignificant
		Conveyance of flow and material	**Medium** - provides local flood flow conveyance route	Local	Low	Limited potential for substitution	Medium	Minor Adverse	Insignificant
	Combined Groundwater Aquifers (Secondary	**Groundwater quality**	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple Private Abstractions	Regional	High	Limited potential for substitution	High	Minor Adverse	Low significance

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
	and Principal Aquifers)	**Groundwater flow (conveyance)**	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple private abstractions, provides River Wensum baseflow, shallow groundwater in the River Wensum floodplain	Regional	High	Limited potential for substitution	High	Minor Adverse	Low significance
		Water resource	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple private abstractions, important baseflow contribution to the River Wensum SSSI & SAC, River Tud	Regional	High	Limited potential for substitution	Very High	Negligible	Low significance
Reference Sources									
OS mapping, EA Flood Map for Planning, EA Flood Risk from Surface Water mapping, EA Catchment Data Explorer, Defra MAGIC geographical information portal, Geology of Britain Viewer									
Summary Assessment Score									
Minor Adverse									
Qualitative Comments									
No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effect to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council as the Lead Local Flood Authority. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into SuDS should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the scheme.									

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Norfolk County Council

NORWICH WESTERN LINK

Economic Appraisal Report

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MAY 2021

PUBLIC

Norfolk County Council

NORWICH WESTERN LINK

Economic Appraisal Report

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AST - CORE GROWTH (SENSITIVITY) SCENARIO

1 INTRODUCTION

1 INTRODUCTION

1.1 OVERVIEW

1.1.1. WSP was commissioned by Norfolk County Council (NCC) to undertake transport modelling to support the evidence base for the Norwich Western Link Outline Business Case (OBC) and the planning application.

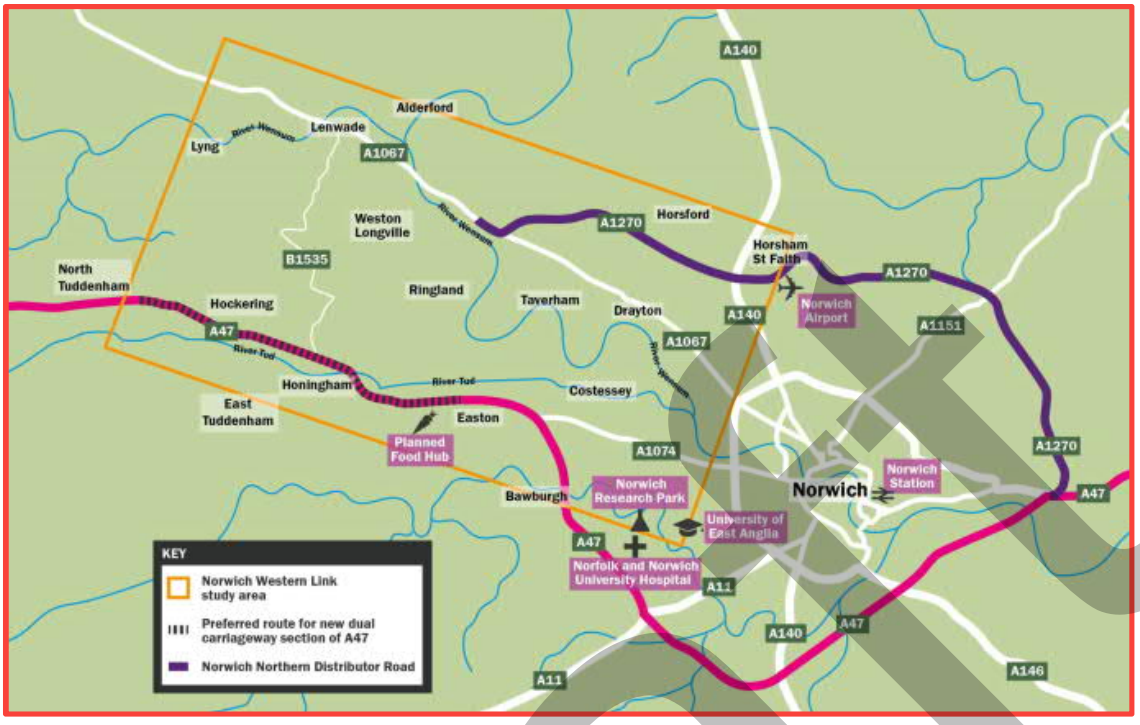
1.1.2. The Norwich Area Transportation Strategy (NATS) model is a multi-modal model with a Base Year of 2019. The Base Year model development has been detailed in the NATS 2019 Local Model Validation Report, November 2020. Development of the model has been undertaken in accordance with Department for Transport (DfT) Transport Appraisal Guidance (TAG) and has been satisfactorily checked for accuracy against TAG criteria. The report concluded that the 2019 NATS model gives a sufficiently accurate overall representation of highway and public transport conditions that provides a robust foundation to project forecasts from.

1.1.3. Future year scenarios, Do Minimum (without Norwich Western Link) and Do Something (with Norwich Western Link), have been developed from this base year for the forecast years 2025 and 2040. These scenarios form the basis of a comparison for the economic appraisal that provide the inputs for the Economic Case within the overall OBC.

1.1.4. This report provides an overview of the economic appraisal of the Norwich Western Link scheme.

1.2 NORWICH WESTERN LINK SCHEME

1.2.1. The Norwich Western Link scheme is located north-west of Norwich, in the Norwich Western Quadrant (NWQ) illustrated in Figure 1-1. The broad study area includes the key radial routes of the A47 trunk road, the A1074 (Dereham Road), and the A1067 (Drayton High Road / Fakenham Road).



SOURCE: ABOUT THE NORWICH WESTERN LINK, LOCATION MAP (NORFOLK COUNTY COUNCIL)

Figure 1-1: Norwich Western Link Study Area

1.2.2. Figure 1.2 shows the location of the Norwich Western Link route.

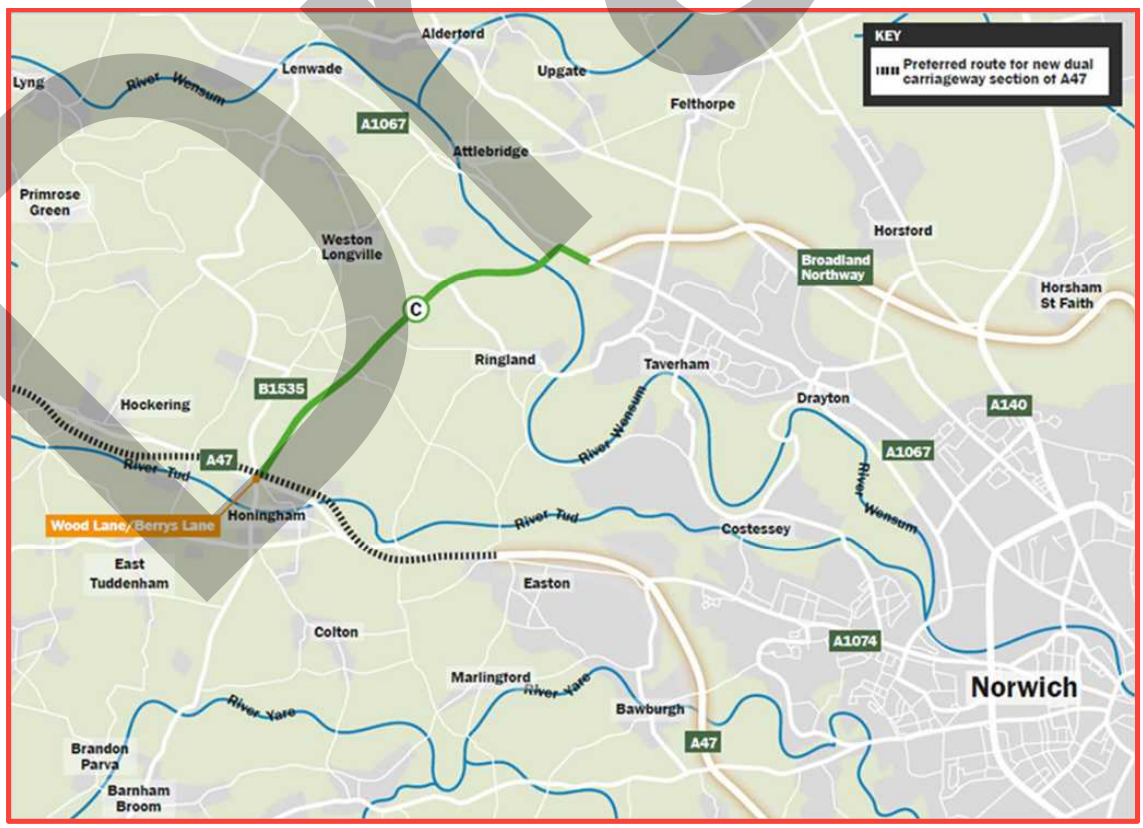


Figure 1-2: Norwich Western Link Route

1.2.3. The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network i.e. Highways England North Tuddenham to Easton scheme and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

1.2.4. The scheme is comprised of:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain
- An “at grade” junction with the A1067
- Dualling of a section of the existing A1067 between the proposed Norwich Western Link scheme roundabout and existing A1270 roundabout
- Changes to local road network and Public Rights of Way (PRoW)
- The scheme also includes landscaping, planting, ancillary works, environmental mitigation work and Biodiversity Net Gain measures.

1.2.5. Figure 1-3 shows the route of the Norwich Western Link scheme and where it connects into the Highways England A47 North Tuddenham to Easton scheme at the southern end and the A1067 Fakenham Road art the northern end.

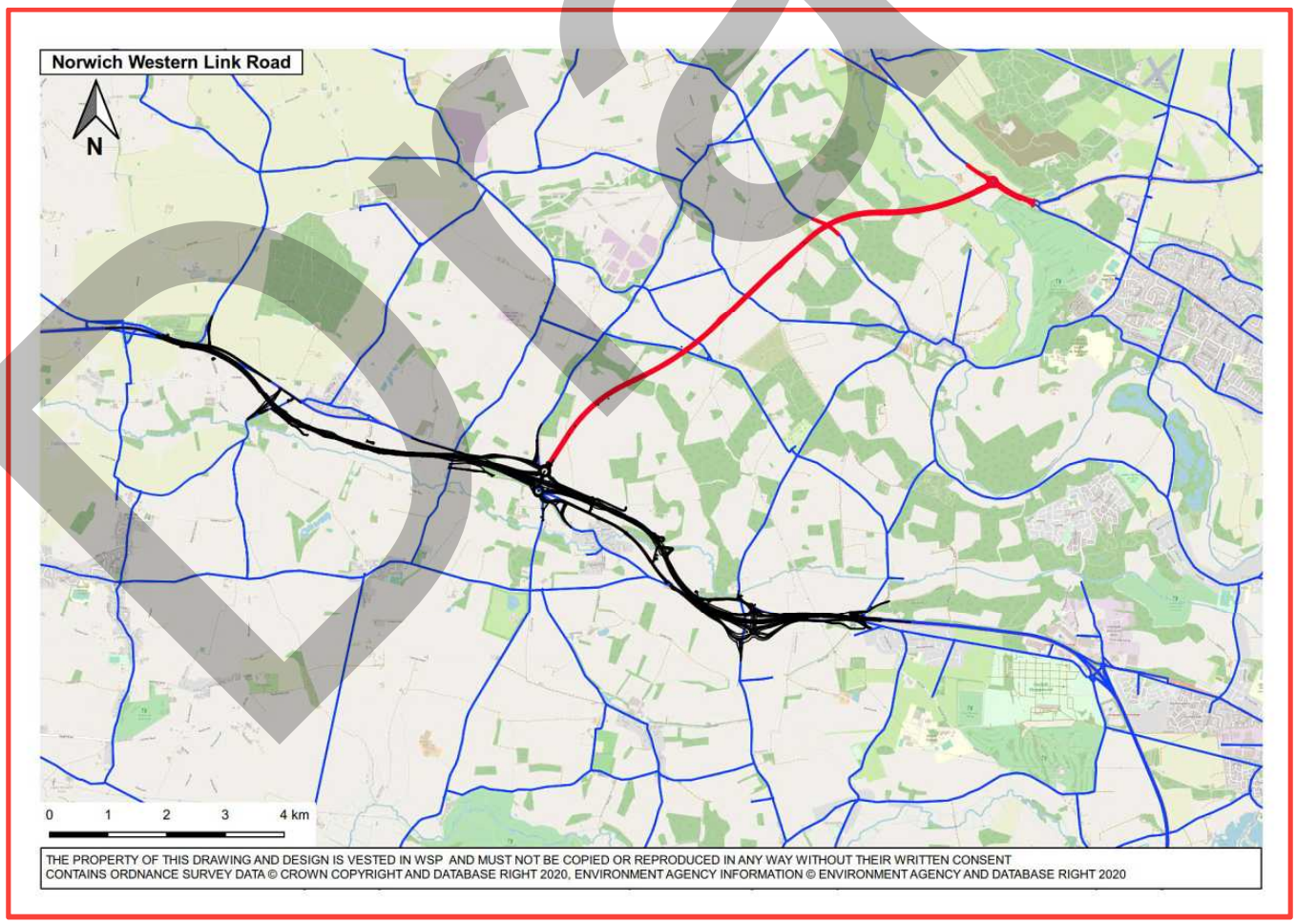


Figure 1-3: Norwich Western Link Route connection to A47 and to the A1067

1.3 PURPOSE OF THE REPORT

1.3.1. The purpose of this report is to document the details of the economic appraisal process used to assess the Norwich Western Link scheme. This EAR outlines the results for:

- Core Growth scenario
- Low Growth scenario
- High Growth scenario
- Core Growth (Sensitivity) scenario.

1.4 REPORT STRUCTURE

1.4.1. The report structure is as follows:

- Section 1: Introduction
- Section 2: Transport Model
- Section 3: Appraisal Methodology
- Section 4: Estimation of Costs
- Section 5: Estimation of Benefits
- Section 6: Economic Appraisal Results
- Section 7: Conclusion.

2 TRANSPORT MODEL

2 TRANSPORT MODEL

2.1.1. This section of the report describes the transport model that has been used for the economic appraisal. The calibration and validation of the model is detailed in the NATS 2019 Local Model Validation Report (November 2020).

2.2 MODELLED AREA

2.2.1. The Fully Modelled Area (FMA) of the NATS 2019 model is shown in Figure 2-1. The FMA encompasses the area of Norfolk between King's Lynn in the west and Lowestoft in the south-east. The FMA was chosen as it covers a sufficient area to accurately model the reassignment and redistribution effects that are likely to be produced by new development and infrastructure schemes in Norwich, specifically the Norwich Western Link.

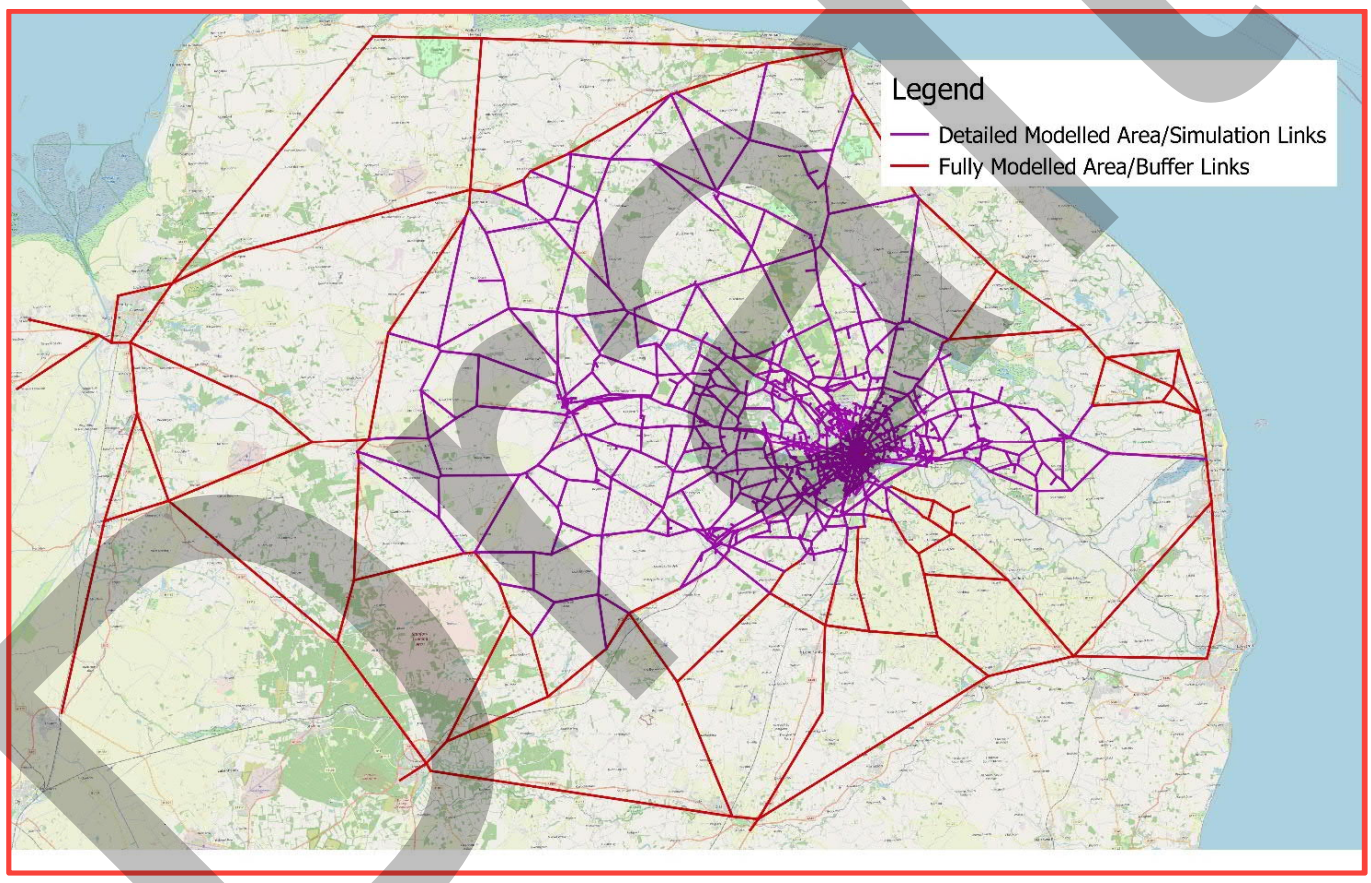


Figure 2-1: Fully Modelled Area

2.2.2. The FMA is further subdivided into:

- The Detailed Modelling Area (DMA) as shown in Figure 2-1. This is the area over which significant impacts of interventions are certain. Modelling detail in this area is characterised by representation of all trip movements, small zones, very detailed networks and junction modelling. This area has enough model network and zoning detail to be able to assess the likely impact of the scheme to an appropriate level for the purposes of the scheme appraisal
- The rest of the Fully Modelled Area. This is the area over which the impacts of interventions are considered to be quite likely but relatively weak in magnitude. It is characterised by representation of all trip movements, somewhat larger zones and less network detail than for the DMA, and speed/flow modelling (primarily link-based but possibly also including a representation of strategically important junctions)
- The rest of the UK represents the External Area. In this area impacts of interventions are likely to be negligible. The External Area is characterised by skeletal networks and simple speed/flow relationships or fixed speed modelling and a partial representation of demand (trips to, from and through the FMA).

2.3 ZONING SYSTEM

2.3.1. The zone plan in the NATS 2019 model was devised to give a fine level of detail in the Norwich urban area. The zoning system is coarser outside of the DMA, and ultimately covers the whole of the UK (excluding Northern Ireland) in 542 zones.

2.3.2. In the DMA, Census Middle Super Output Areas (MSOA) have been split up into model zones based on land use. This enables more detailed representation of trips loading onto the network and enhances the model calibration and validation. The zoning system is coarser further away from the Norwich urban area, and MSOA have been grouped together for areas a significant distance away from the study area e.g. North of England and Scotland.

2.3.3. Park and Ride (P&R) sites in Norwich have been modelled as separate zones.

2.3.4. The NATS 2019 model zone boundaries are shown in Figure 2-2.

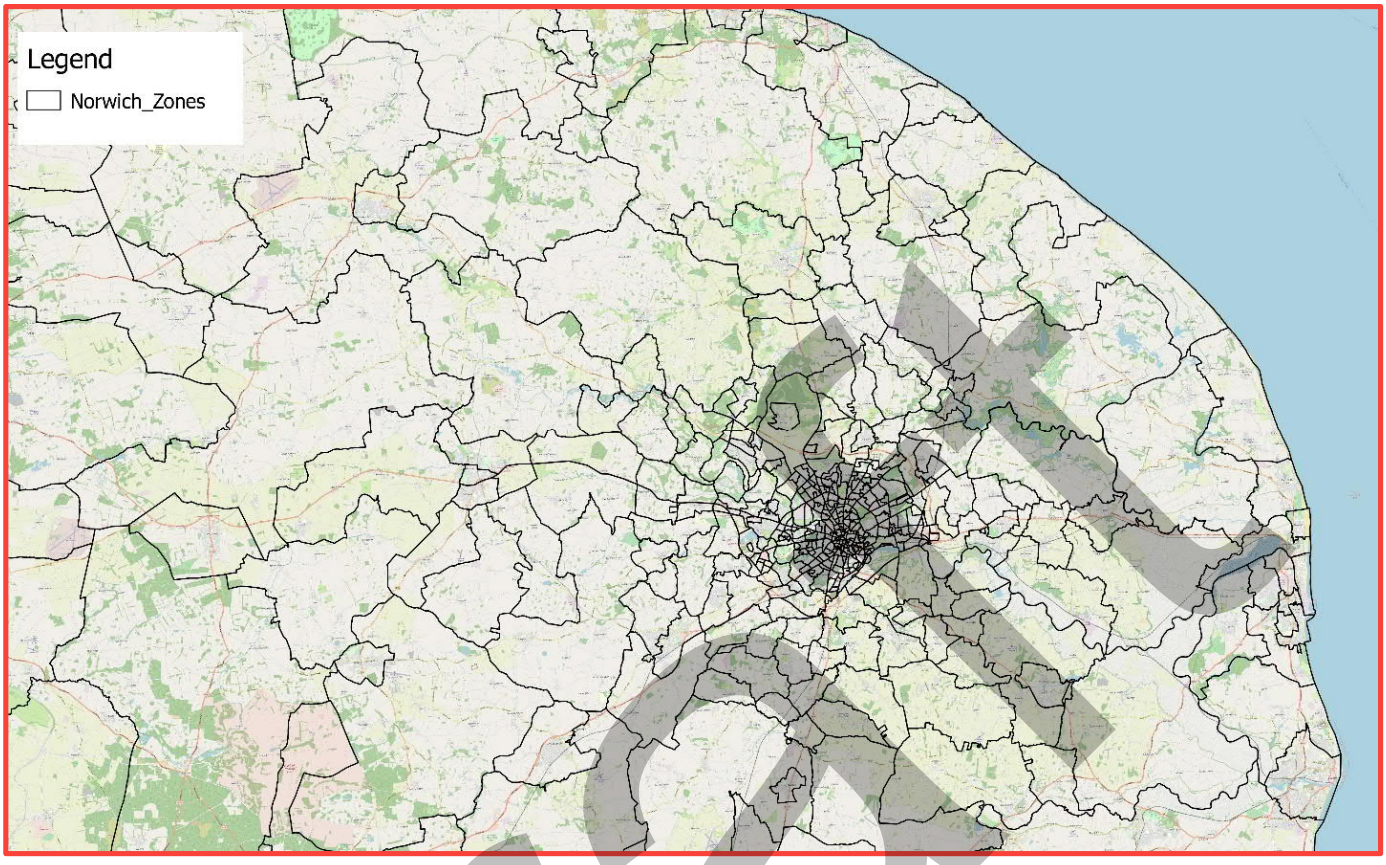


Figure 2-2: Zoning system

2.4 SECTORING SYSTEM

2.4.1. The zoning system has been aggregated into 16 model sectors, which are listed in Table 2-1 and displayed in Figure 2-3. The sectoring system enables data to be extracted and summarised into more strategic datasets.

Table 2-1: Sectoring System

Sector ID	Sector Description
1	Scotland/North
2	East/West Midlands (plus Wales)
3	South East (excluding London)
4	London
5	King's Lynn District
6	North Norfolk District
7	Great Yarmouth District
8	Breckland North (north of A47)
9	Breckland South (south of A47)
10	South Norfolk West (west of A11)
11	South Norfolk Central (between A11 and A140)
12	South Norfolk East (east of A140)
13	Broadland West (west of A140)
14	Broadland East (east of A140)
15	Norwich North (north of river)
16	Norwich South (south of river)

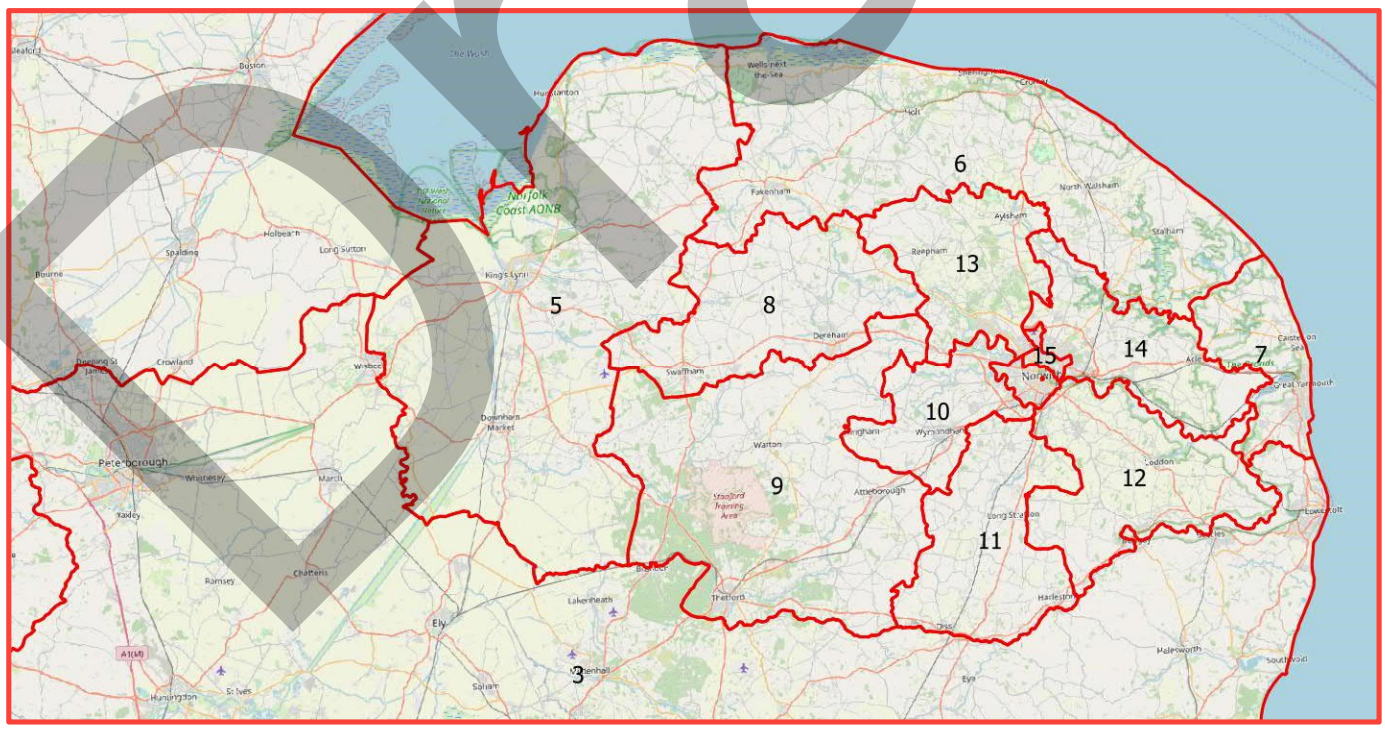


Figure 2-3: Sectoring System

2.5 MODEL YEARS

2.5.1. The base year of the NATS model is 2019.

2.5.2. The forecast years are 2025 and 2040.

2.6 TIME PERIODS

2.6.1. The models have been developed for the following time periods:

- Average weekday (Monday to Thursday) AM peak hour (08:00 – 09:00);
- Average weekday (Monday to Thursday) Inter peak hour (average 10:00 – 16:00); and
- Average weekday (Monday to Thursday) PM peak hour (17:00 – 18:00).

2.6.2. The time periods defined above have been used because traffic data analysis shows that 08:00-09:00 and 17:00-18:00 are the busiest hours within the FMA. Since traffic flow is reasonably consistent throughout the Inter peak period (10:00-16:00), an average Inter peak hour has been considered.

2.7 MODEL STRUCTURE AND DEMAND SEGMENTATION

2.7.1. The NATS 2019 model has inherited the structure of the previous NATS model which consists of the following sub-models:

- Highway model
- Public Transport (PT) model
- Variable Demand Model (VDM).

2.7.2. The PT model has been used to provide generalised cost information for input into the VDM.

2.7.3. The highway model includes the following five user classes, as consistent with advice presented in Section 2.6 of TAG Unit M3.1 (January 2014):

- Car Work
- Car Commuting
- Car Other
- LGV
- HGV.

2.7.4. The PT model includes the following three user classes:

- PT Work
- PT Commuting
- PT Other.

2.8 SOFTWARE PLATFORM

2.8.1. The NATS highway model has been developed in SATURN (Simulation and Assignment of Traffic in Urban Road Networks) version 11.5.05H MC N4. The NATS PT model has been developed using PTV's VISUM 2020. The VDM has been set up in DIADEM version 7.

2.9 DATA COLLECTION

2.9.1. The update of the model used the following datasets:

- Automatic Traffic Counts (ATC)
- Manual Classified Turning Counts (MCTC)
- DfT TrafficMaster Journey Time Data
- Mobile Network Data
- National Trip End Model Data (TEMPro)
- National Travel Survey
- Census journey to work
- INRIX Origin Destination and Journey Time Data.

2.9.2. The NATS LMVR (November 2020) provides detail on how the above datasets were used within the development and validation of the NATS model for the highway and public transport elements.

2.10 FUTURE YEAR CORE SCENARIO

2.10.1. The future year scenario development has been detailed within the Norwich Western Link Traffic Forecasting Report (TFR), March 2021.

2.10.2. A Core Growth Scenario has been developed that reflects growth due to 'near certain' and 'more than likely' development within the county of Norfolk.

2.10.3. Traffic growth in the Core Growth Scenario has been constrained to the level of growth in the latest NTEM (TEMPro dataset version 7.2). The Traffic Forecasting Report provides further detail on which development sites are explicitly represented in the Core Scenario and includes details of highway and public transport improvement schemes that have been added to the network.

2.10.4. For the purpose of the Economic Appraisal two scenarios have been considered:

- Do Minimum: Base year network with all committed (near certain and more than likely) schemes due for completion by the corresponding forecast year
- Do Something: Do Minimum plus the Norwich Western Link scheme.

2.10.5. Each scenario has been created for the following years:

- 2025 – Scheme opening year
- 2040 – Scheme Design Year (scheme opening plus 15 years).

2.10.6. Traffic flow information from the transport models has been utilised in the environmental appraisal, which uses air quality and noise models. For each modelled year and design option, the following data has been provided:

- Average link flow data:
  - 24-hour Annual Average Daily Traffic (AADT) flow data for air quality modelling
  - 24-hour Annual Average Weekday Traffic (AAWT) flow data for noise modelling
- Percentage mix of Heavy Goods Vehicles (HGV) traffic (all vehicles greater than 3.5 tonnes)
- Average speeds.

2.10.7. In line with TAG guidance, a Low Growth scenario and a High Growth scenario have been developed around the Core Growth scenario. In addition, a further scenario has been developed using updated Office for Budget Responsibility (OBR) projections, providing an OBR Core Growth (Sensitivity) scenario. The OBR scenario includes updates to long-term economic and population projections as well as updated medium-term economic projections which reflect the impact of COVID-19 on economic growth. All these scenarios are described in greater detail in the Traffic Forecasting Report (March 2021).

3 APPRAISAL METHODOLOGY

3 APPRAISAL METHODOLOGY

3.1 OVERVIEW

3.1.1. The economic appraisal includes monetisation of the following:

- Travel time benefits and vehicle operating costs
- Change in the number of accidents on the network
- Active modes appraisal
- Impact to Greenhouse Gas emissions
- Impact to Air quality
- Impact to Noise levels.

3.1.2. An overview of the assessment of each of these impacts is provided below.

3.1.3. In addition, other impacts have been considered and monetised:

- Wider impacts
- Regeneration impacts
- Reliability impacts.

3.2 PEAK HOURS AND DEMAND SEGMENTATION

3.2.1. The modelled peaks have been listed below:

- AM Peak hour (08:00 - 09:00)
- Inter peak hour (average hour for 10:00 until 16:00)
- PM Peak hour (17:00 - 18:00)

3.2.2. Highway trip matrices are disaggregated into multiple user classes by trip purpose and vehicle type as shown in Table 3-1. This procedure allows to distinguish the trips travelling within the network that have different perceived costs and values of time.

Table 3-1: Modelled Trip Purposes and Vehicle Types

User Class	Vehicle Type	Trip Purpose
1	Car	Commute [Home-based Work] (HBW)
2	Car	Home-based Employer's Business (HBEB)
3	Car	Home-based Other (HBO)
4	Car	Non Home-based Employer's Business (NHBEB)
5	Car	Non Home-based Other (NHBO)
6	Light Goods Vehicle	Employer's Business (EB)
7	Heavy Goods Vehicle	Employer's Business (EB)

3.3 VARIABLE DEMAND

3.3.1. DfT TAG Unit M2 (July 2020) states that “any change to transport conditions will, in principle, cause a change in demand. The purpose of variable demand modelling is to predict and quantify these changes.

3.3.2. Any transport improvement that reduces journey times and costs will, in principle, affect the level of demand for travel. Schemes that improve travel conditions can encourage travellers to make trips they did not make before the improvement, to change to a different mode, or to travel further to different destinations. This additional demand for travel mainly appears as induced traffic either through or around the scheme. To take into account these impacts, a Variable Demand Model (VDM) was developed to estimate the future year traffic matrices.

3.3.3. The calibration of the demand model parameters is shown in detail within the NATS LMVR (November 2020). The process involved calibrating demand response parameters that replicated a change in fuel cost called ‘Demand Realism Testing’.

3.3.4. The Norwich Western Link demand model uses the DIADEM software (v7) issued on behalf of the DfT for the purpose of producing the traffic forecasts. DIADEM is an incremental hierarchical logit model and works by adjusting an input reference demand matrix according to changes between forecast travel costs and input reference travel costs.

3.3.5. The VDM process consists of a series of iterations between DIADEM and SATURN (assignment model) during which demand matrices are assigned, skimmed cost matrices are extracted and, based on comparative travel costs, the demand matrices are updated;

3.3.6. DIADEM provides a means of achieving convergence between the assignment (supply) and demand models. It is to be noted that equilibrium between the demand and supply models is not found exactly and therefore, a TAG specified convergence criterion is used to determine when the solution is close enough to equilibrium. The VDM for the Norwich Western Link traffic model uses trip matrices in the Origin-Destination (OD) and Production-Attraction (PA) format.

3.4 ECONOMIC APPRAISAL

3.4.1. The appraisal of the economic elements associated with the scheme has been undertaken using the DfT’s standard appraisal software:

- Transport Users Benefit Appraisal (TUBA) version 1.9.14, that corresponds with TAG data book (July 2020, V1.13.1) (which were used in the model assignments), for the Core Growth scenario, Low Growth scenario and the High Growth scenario
- TUBA version 1.9.14, based on updated Office of Budget Responsibility (OBR) economic projection and fleet data using TAG Data Book (July 2020, V1.14) (as a result of the Covid-19 pandemic), as a sensitivity test for the Core Growth scenario
- COst and Benefit to Accidents – Light Touch (COBALT).

3.4.2. Both appraisals, using TAG Databook v1.13.1 (July 2020) and v1.14 (July 2020), were undertaken in accordance with TAG Unit A1.1 Cost-Benefit Analysis (May 2018).

3.4.3. The Norwich Western Link scheme, like most road projects, is considered to be an asset with an indefinite life, with maintenance and renewal taking place as required. Scheme appraisal has therefore been undertaken for a 60-year period in accordance with HM Treasury’s Green Book, from the assumed scheme opening in 2025 to 2084.

TUBA

3.4.4. Scheme benefits have been assessed using the DfT TUBA (Transport Users Benefit Appraisal) software. This is an industry-standard tool for undertaking economic appraisal in accordance with guidelines published in TAG Unit A1 (December 2018). The full economic assessment methodology adopted including choice of parameters, definition of inputs, discounting, and reporting is compliant with TAG Unit A1.

3.4.5. The following economic elements have been considered for the assessment of the Norwich Western Link:

- Time Savings
- Vehicle Operating Costs
- Carbon Savings
- Scheme Costs
- Indirect tax revenue.

COBALT

3.4.6. An appraisal of accident savings has been undertaken using the DfT COBALT-LT spreadsheet tool[1]. COBALT is a computer program developed by the DfT to undertake the analysis of the impact on accidents as part of economic appraisal for a road scheme.

3.4.7. This tool applies accident rates to traffic flows extracted from the traffic model to predict the change in the number of accidents with and without the scheme in place. The most recent version of the tool (COBALT 2013.02) has been used with parameters file version '2020.1 WebTAG 2020 parameters.

3.4.8. It uses detailed inputs of separate road links and road junctions impacted by the scheme. The assessment is based on a comparison of accidents by severity and associated costs across an identified network in 'Without-Scheme' and 'With-Scheme' forecasts, using details of link and junction characteristics, relevant accident rates and costs and forecast traffic volumes by link and junction.

1 https://www.gov.uk/government/publications/cobalt-software-and-user-manuals

4

ESTIMATION OF COSTS

4 ESTIMATION OF COSTS

4.1 INTRODUCTION

4.1.1. The cost of the proposed scheme has been estimated at 2020 Q3 prices, as set out in the Financial Case. It includes all costs associated with scheme preparation and construction, including land costs.

4.1.2. The costs have been calculated in line with TAG A1.2 Scheme Costs (July 2017), which uses the following methodology:

- Estimation of a base cost estimate
- Incorporation of real cost increases
- Application of risk-cost adjustment
- Application of optimism bias-cost adjustment
- Rebase cost to DfT base year
- Discount cost to DfT base year
- Convert costs to market prices.

4.1.3. Costs have been estimated under two broad headings:

- Investment costs (scheme preparation and construction)
- Maintenance and renewal costs.

4.1.4. The breakdown of costs presented above, aligns with the breakdown required for the DfT Cost Pro-forma (See Appendix A).

4.2 ESTIMATION OF BASE COST ESTIMATES

4.2.1. The initial capital cost estimate for the scheme is **£140.770m** in 2020 Q3 prices as shown in Table 4-1. This includes costs for construction, statutory undertakers work, land and other costs such as professional fees. In line with TAG Unit A1.2 (Scheme Costs), sunk costs have not been included in the following tables as these are costs that represent expenditure prior to the economic appraisal and cannot be retrieved apart from land costs.

Table 4-1: Investment Costs at 2020 Q3

Investment costs	Total Cost	Cost excluding Sunk Costs
Construction cost	103,513,730	103,454,395
Statutory undertakers	732,210	732,210
Professional fees	23,780,932	14,825,127
Land	12,742,825	12,742,825
Total	**140,769,697**	**131,754,557**

4.2.2. This base cost estimate does not take account of real increases in costs and must therefore be adjusted to provide real costs that account for the effects of inflation which is addressed in Section 4.4.

4.3 SCHEME MAINTENANCE AND RENEWAL COSTS

4.3.1. The whole life costs of the scheme have also been estimated. A breakdown of the estimated capital renewal, annual maintenance and operation costs is presented in Table 4-2.

Table 4-2: Breakdown of capital maintenance, renewal and operating costs (£m)

Year after opening	Costs at base price 2020 Q3	Costs adjusted for inflation
Total (60 years)	Still awaiting information so not included at this time	

4.4 INFLATION ADJUSTMENT

4.4.1. The current forecast is based on 2.50% per annum for general activities (i.e. fees, utilities and land), 1.60% per annum for Stage One activities as the contract mechanism relies on Consumer Price Index (CPI) and 3.96% per annum for Stage Two activities as the contract mechanism relies on a set of weighted Building Cost Information Service (BCIS) indices. Based on this information inflation accounts for a value of £17.683m.

4.5 INCORPORATION OF REAL COST INCREASES

4.5.1. The first step of cost adjustment is to incorporate real cost increases. A real cost adjustment is calculated by inflating base costs by the construction cost index to bring them to their nominal values, and then dividing by the rate of general inflation to give their 'real' value. Using the real cost adjustment to multiply by the initial base estimate derives a 'real' capital cost estimate.

4.5.2. Only the general inflation rate has been applied to the maintenance and renewals costs. Therefore, it assumes zero real cost inflation over the appraisal period.

4.5.3. Table 4-3 sets outs the profile of real adjusted costs between 2020 and 2025 (scheme opening year).

Table 4-3: Real adjusted Costs (£m)

Costs	2020	2021	2022	2023	2024	2025	Total
Costs excluding Sunk Costs	2.535	9.201	6.646	17.634	64.360	31.378	131.754
Inflation	0.001	0.064	1.884	10.245	5.489		17.683
Capital (outturn), public sector	2.536	9.265	8.530	27.879	69.849	31.378	149.437
Real Adjustment Factor	1	1.02	1.04	1.06	1.10	1.12	
Capital (real), public sector	2.536	9.089	8.205	26.222	63.774	28.005	137.831

4.5.4. The investment cost taking into account the real cost increase is **£137.831m**.

4.6 APPLICATION OF RISK-COST ADJUSTMENT

4.6.1. Once the base cost estimate has been adjusted to incorporate real cost increases, the risk contribution is calculated as set out in Table 4-4. A Quantified Risk Assessment (QRA) of scheme investment costs was undertaken The QRA provides the weighted average of all risk outcomes and probabilities. The process of capturing and quantifying risk for the scheme is presented in the Outline Business Case (OBC) Management Case.

4.6.2. As noted in the OBC Financial Case, the total quantified risk value added to the scheme base costs is **£39.975m** at 2020 Q3 prices. This equates to approximately 28.4% of base costs.

4.6.3. No risk-adjustment has been applied to the maintenance and renewal costs.

Table 4-4: Risk adjusted Costs (£m)

Costs	2020	2021	2022	2023	2024	2025	Total
Total real costs (without risk)	2.536	9.089	8.205	26.222	63.774	28.005	137.831
Total quantified risk cost in real prices		3.211	4.825	6.311	17.392	8.236	39.975
Total risk adjusted costs with real cost adjustment	2.536	12.300	13.030	32.533	81.166	36.241	177.806

4.6.4. The total risk adjusted costs with real cost adjustment is **£177.806m**.

4.7 OPTIMISM BIAS

In line with the guidance in TAG Unit A1.2, an Optimism Bias (OB) uplift to scheme costs, which is necessary to counter the systematic tendency of appraisers to be overly optimistic (and underestimate scheme costs) has been applied. The recommended optimism bias uplifts for each stage of a transport project and type of scheme for Local Authority schemes are set out in Table 4-5.

Table 4-5: Recommended Optimism Bias uplifts

Stage Category	Type of Project	Stage 1 Strategic Outline Business Case	Stage 2 Outline Business Case	Stage 3 Full Business Case
Road	Motorway, Trunk roads, local roads	44%	15%	3%

Source: TAG Unit A1.2, Scheme Costs, Table 8

4.7.1. As funding is sought via the production of an Outline Business Case, and the scheme is comprised of both roads and structures, optimism bias has been applied at 15% of the scheme costs as shown in Table 4-6.

Table 4-6: Costs adjusted for Optimism Bias (£m)

Costs	2020	2021	2022	2023	2024	2025	Total
Public Sector Risk adjusted costs	2.536	12.300	13.030	32.533	81.166	36.241	177.806
Optimism bias (15%)	0.380	1.845	1.954	4.880	12.175	5.436	26.670
Public investment costs with 15% optimism bias	2.917	14.145	14.984	37.413	93.341	41.677	204.477

4.7.2. The public investment costs with 15% Optimism Bias cost is **£204.77m**.

4.8 REBASE COST TO DFT BASE YEAR

4.8.1. For appraisal purposes, all costs should be presented in the DfT's base year, 2010. Costs are deflated to the correct price base by multiplying them by the ratio of the inflation index in the desired base year to the inflation index in the year currently being used.

4.8.2. Costs have been adjusted to 2010 prices using TAG data book (v1.13.1, July 2020) values as set out in Table 4-7 which are applied as set out in Table 4-8.

Table 4-7: Adjustment to 2010 Prices

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
GDP Deflator	100.00	102.04	103.73	105.70	107.63	108.26	110.57	112.66	115.07	117.21	119.37	121.66	124.04	126.50	129.41	132.39

Table 4-8: Rebased Costs to 2010 Prices (£m)

Costs	2020	2021	2022	2023	2024	2025	Total
Public investment costs with 15% optimism bias	2.917	14.145	14.984	37.413	93.341	41.677	204.477
GDP deflator factor	0.8337	0.8337	0.8337	0.8337	0.8337	0.8337	
Public investment costs with deflation	2.432	11.793	12.493	31.192	77.821	34.747	170.478

4.8.3. The public investment costs with deflation cost is **£170.478m**.

4.9 DISCOUNT COST TO DFT BASE YEAR

4.9.1. For the purposes of the Economic Appraisal, all the costs have been adjusted to 2010 prices using TAG data book (v1.13.1, July 2020) values as set out in the annual parameters table.

4.9.2. A discount factor based on the HM Treasury "Green Book" is applied, to adjust costs occurring in different periods to a standard base year of 2010 as set out in Table 4-9. An annual discount rate of 3.5% was applied for the first 30 years and 3% for years 31 to 60. This reflects the lower weighting placed on costs (and benefits) incurred at a future date compared to those incurred in the present.

Table 4-9: Scheme Costs Discounted to 2010 Present Value (£m)

Costs	2020	2021	2022	2023	2024	2025	Total
Public investment costs with deflation	2.432	11.793	12.493	31.192	77.821	34.747	170.478
Discount factor	0.7089	0.6849	0.6618	0.6394	0.6178	0.5969	
Public investment costs with deflation & discounting	1.724	8.078	8.267	19.945	48.077	20.740	106.831

4.9.3. The public investment costs with deflation & discounting cost is **£106.831m**.

4.10 CONVERT COSTS TO MARKET PRICES

4.10.1. The last stage in preparing costs for appraisal is to convert them from the factor cost to the market price unit of account. This is done by using the indirect tax correction factor of 1.19, as per the TAG Data Book.

4.10.2. In line with TAG Unit A1.2 (Scheme Costs), the Present Value of Costs (PVC) only includes investment and operating costs incurred by the public sector. Private sector contributions to the scheme costs are not included in the PVC but are recorded as negative values in the Transport Economic Efficiency (TEE) table and Present Value of Benefits (PVB).

4.10.3. The Present Value of Costs (PVC) is presented in Table 4-10.

Table 4-10: Present Value of Costs (£m)

Risk adjusted costs in £	Scheme Preparation and Construction Cost	Maintenance, Renewal and Operation (60 yrs)	Total
Public Sector risk adjusted costs	177.806	44,084	221.890
Public investment costs with 15% optimism bias	204.477	44,084	248.561
Public investment costs with deflation	106.831	7,073	113.904
Public investment costs with deflation & discounting	127.129	8,416	134.545
PVC with Market Price Adjustment - Public sector costs only	**127.129**		**127.129**

4.10.4. The total discounted Present Value of Costs (PVC) is **£127.129m**.

5 ESTIMATION OF BENEFITS

5 ESTIMATION OF BENEFITS

5.1.1. In developing the Economic Case, the Do Something scenario which includes the Norwich Western Link has been assessed against a Do Minimum scenario. The benefits have been assessed for the AM Peak, Inter peak and PM peak time periods.

5.2 ASSUMPTIONS

5.2.1. The Economic Case has been compiled in accordance with the guidance set out in TAG. However, there are some assumptions that have been made in relation to specific areas of the assessment, and these are discussed in the following sections.

5.3 TRAVEL TIME BENEFITS

5.3.1. Scheme benefits have been assessed using the DfT's TUBA (Transport Users Benefit Appraisal) software. This is an industry-standard tool for undertaking economic appraisal in accordance with guidelines published in TAG Unit A1 (December 2018). The full economic assessment methodology adopted including choice of parameters, definition of inputs, discounting, and reporting is compliant with TAG Unit A1.

5.3.2. TUBA v1.9.14 has been used for the appraisal as this was the latest version available at the time of undertaking the assessment.

5.3.3. The economics parameters file version 1.9.14 (file 'Economics_TAG_db1_13_1.txt') has been used. This is the latest version and is in line with current guidance.

5.3.4. Economic benefits are estimated for a 60-year period from the scheme opening year of 2025. Traffic model outputs are available for the following two future years:

- 2025
- 2040.

5.3.5. TUBA interpolates growth between these years, and after 2040 the default TUBA assumption of no growth beyond this point has been retained, in the absence of more detailed information. Calculated benefits are therefore likely to represent a conservative estimate.

5.3.6. TUBA requires the following inputs for the calculation of economic benefits:

- Trip matrices from the traffic model
- Skims of time and distance from the traffic model
- Annualisation factors to expand hourly model outputs to annual inputs for TUBA's calculations.

5.3.7. Various checks and analyses have been undertaken to ensure that the TUBA outputs are sensible and that there are unlikely to be errors in the traffic model outputs, nor any errors in the output's 'translation' into TUBA inputs. These include a review of TUBA warnings and analysis of delay changes in the traffic model with and without the scheme in place.

Trip Purposes

5.3.8. Table 5-1 shows that the trip matrices from the traffic model are already segmented into trip purposes equivalent to TUBA.

Table 5-1: User class definitions

User Class	Model Definition	TUBA Parameter		
		Vehicle Type	Purpose	Person Type
1	Car: Commuting Home-based Work (HBW)	Car	Commuting	All
2	Car: Home-based Employer's Business (HBEB)	Car	Business	All
3	Car: Home-based Other (HBO)	Car	Other	All
4	Car: Non Home-based Employer's Business (NHBEB)	Car	Business	All
5	Car: Non Home-based Other (NHBO)	Car	Other	All
6	LGV	LGV Personal	Business	All
6	LGV	LGV Freight	Business	All
7	OGV1	OGV1	Business	Driver
7	OGV2	OGV2	Business	Driver

5.3.9. TUBA requires that the trip matrices be entered as total trips, but SATURN defines trips in Passenger Car Units (PCU). It is, therefore, necessary to apply adjustment factors to convert the PCU matrices into total trips. These are set out in Table 5-2

Table 5-2: PCU to vehicle adjustment factors

User Class	Model Definition	PCU Factor	TUBA Factor
1	Car: Commuting	1.0	1.00000
2	Car: Employer's Business	1.0	1.00000
3	Car: Other	1.0	1.00000
4	LGV	1.0	1.00000
5	OGV	2.3	0.43478

5.3.10. Model skims were extracted for 2025 and 2040. The TUBA default assumption on growth has been applied, with no additional growth assumed beyond the final modelled year of 2040. The default assumptions on growth in the values of impacts have also been applied, meaning that the per unit benefits of the scheme decline over time.

5.3.11. The model forecasts have been completed in accordance with TAG principles, as set out in the Norwich Western Link Traffic Forecasting Report.

Annualisation Factors

5.3.12. Annualisation factors have been calculated to expand the user benefits for each modelled time period. Traffic count data from long term permanent traffic counters from six sites spread across the County of Norfolk has been used to derive suitable annualisation factors. The sites are listed in Table 5-3. The sites have been selected due to their proximity to the scheme and also as sites that will represent the trends within the peak hours and represent the tidal flow in and out of the City of Norwich.

Table 5-3: Annualisation Factors

Site No.	Site Location
ATC41	A140 Holt Road
ATC49	A47 Trunk Road
ATC56	A1074 Dereham Road
ATC61	A140 Sweet Briar Road
ATC80	A11 Newmarket Road
ATC103	A1067 Fakenham Road

5.3.13. The data has been used to create factors to convert the:

- AM peak hour (08:00-09:00) to the AM peak period (07:00-10:00)
- Inter peak average hour to Inter peak period (10:00-16:00)
- PM peak hour (10:00-18:00) to the PM peak period (16:00-19:00).

5.3.14. The conversion factors are shown in Table 5-4.

Table 5-4: Peak hour to peak period conversion factors

Peak hour	Peak hour to peak period factors
AM peak (08:00-09:00, weekdays)	2.71
Inter peak (10:00-16:00, weekdays, average hour)	6
PM peak (17:00-18:00, weekdays)	2.84

5.3.15. The conversion factors were then multiplied by 253 (number of working days in a year) to create annualisation factors to be input into TUBA.

5.3.16. Table 5-5 shows the annualisation factors used which convert modelled peak hour trips into annualised trip totals.

Table 5-5: Annualisation factors

Peak hour	Peak hour to peak period factors
AM peak (08:00-09:00, weekdays)	727
Inter peak (10:00-16:00, weekdays, average hour)	1,518
PM peak (17:00-18:00, weekdays)	685

5.3.17. The benefits at weekends and bank holidays are not considered within the process and therefore the calculated benefits are likely to represent a conservative estimate.

5.4 ACCIDENT ASSESSMENT

5.4.1. Assessment of the costs and benefits associated with accidents has been undertaken using the DfT's COBALT (COst – Benefit-Analysis Light Touch) software. Input parameters are the latest available, published February 2021.

5.4.2. COBALT uses information derived from the SATURN model, so a network has been built that replicates the NATS network. Traffic flows have been obtained from the SATURN model, for the following years:

- Base Year (2019)
- Opening year (2025)
- Design year with Scheme (2040).

5.4.3. Accident data for a period of five years from 2015 to 2019 has been obtained from NCC in order to provide accident rates for existing links in COBALT. The accidents have been geocoded to correspond to the selected highway network.

5.4.4. COBALT provides three options for assessment:

- Link only
- Junction only
- Link and junction combined.

5.4.5. The analysis for the Norwich Western Link has been carried out using the 'combined' method. This requires considerably less analysis than separate link and junction analysis, so is the appropriate proportional assessment for this scheme. TAG Unit A4-1 2.3.9 indicates that this is acceptable when local data is hard to distinguish between links and junctions.

5.4.6. A diagram of the network used in the COBALT assessment on accidents has been included in Appendix B.

5.5 ECONOMIC PARAMETERS

5.5.1. Economic parameters (such as Value of Time) are defined in the standard TUBA economic file. This is *Economics_TAG_db1_13_1.txt* for the Core Growth scenario, Low Growth scenario and the High Growth scenario. For the Sensitivity Testing Growth scenario, the *Economics_TAG_db1_14_0.txt* has been used

5.5.2. COBALT V2.0 has used *cobalt-tag-parameters .txt* for the Core Growth scenario, Low Growth scenario and the High Growth scenario. or the Sensitivity Testing Growth scenario, the *cobalt-tag-parameters-sensitivity-testing.txt* has been used.

5.6 ENVIRONMENTAL IMPACTS

5.6.1. Environmental Impacts have been assessed across six environmental categories, which are:

- Noise
- Landscape and Visual
- Heritage
- Air Quality and Greenhouse Gases
- Biodiversity
- Water Resources.

5.7 SOCIAL IMPACTS

5.7.1. Social Impacts across the nine categories are reported in full in the Social Impacts Report.

6 ECONOMIC APPRAISAL RESULTS

6 ECONOMIC APPRAISAL RESULTS

6.1 INTRODUCTION

6.1.1. The results of the economic appraisal of the Norwich Western Link are shown in the following sections.

6.2 TRAVEL TIME BENEFITS

6.2.1. Travel time savings are monetised as a perceived benefit, reflecting users' willingness to pay for a quicker journey. The value of those savings differs depending on the reason for the trip, of which three are defined in TAG; business users, commuters, and non-commuting consumers e.g. leisure trips.

6.2.2. The costs and benefits for travel time savings have been assessed using TUBA. The trip length, trip volume and journey time information needed for this has been taken from the relevant SATURN models.

TUBA WARNINGS

6.2.3. TUBA displays warnings when, for example, the ratio ('r') of the without-scheme (DM) scenario and with-scheme (DS) scenario travel time is lower than the limit. Warning messages have been checked in the output files and a sample of these was reviewed for each scenario.

6.2.4. The data checks that TUBA undertakes are shown in Table 6-1.

Table 6-1: TUBA - Data checks

Value of r	Action
r<A or r>D	Serious Warning
A<r<B or C<r<D	Warning
B<r<C	OK, No warning

6.2.5. The values of A, B, C and D are shown in Table 6-2.

Table 6-2: TUBA - Limit values

A	B	C	D
0.33	0.57	1.5	3.0

Core Growth scenario

6.2.6. Warnings reported by TUBA have been checked to verify that none indicated an issue in the models that required corrective action. There are 182,324 warnings in the Core Growth scenario which are split as follows (the second figure quoted in brackets is the number of warnings TUBA classes as serious):

- Ratio of DM to DS travel time lower than limit: 570 warnings (four serious) although the ratio is between 0.253 and 0.292
- Ratio of DM to DS travel time higher than limit: 15,275 warnings (none serious)
- Ratio of DM to DS travel distance lower than limit: 58,638 warnings (204 serious) with 106 having a ratio between 0.2 and 0.33
- Ratio of DM to DS travel distance higher than limit: 4,934 warnings (93 serious), with 48 have a ratio between 3.0 and 4.0
- DM speeds less than limit: 38,986 warnings
- DM speeds greater than limit: 10,146 warnings
- DS speeds less than limit: 42,123 warnings
- DS speeds greater than limit: 11,652 warnings.

6.2.7. All warnings have been investigated and a reasonable explanation has been found for all of them.

6.2.8. The “Ratio of DM to DS travel distance higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a shorter DS travel distance than the DM travel distance.

6.2.9. The “Ratio of DM to DS travel time higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a faster DS travel time than the DM travel time.

Low Growth scenario

6.2.10. Warnings reported by TUBA have been checked to verify that none indicated an issue in the models that required corrective action. There are 156,837 warnings in the Low Growth scenario which are split as follows (the second figure quoted in brackets is the number of warnings TUBA classes as serious):

- Ratio of DM to DS travel time lower than limit: 455 warnings (none serious)
- Ratio of DM to DS travel time higher than limit: 15,036 warnings (none serious)
- Ratio of DM to DS travel distance lower than limit: 49,426 warnings (190 serious) with 110 having a ratio between 0.2 and 0.33
- Ratio of DM to DS travel distance higher than limit: 5,167 warnings (73 serious), with 41 have a ratio between 3.0 and 4.0
- DM speeds less than limit: 30,494 warnings
- DM speeds greater than limit: 10,830 warnings
- DS speeds less than limit: 32,553 warnings
- DS speeds greater than limit: 12,876 warnings.

6.2.11. All warnings have been investigated and a reasonable explanation has been found for all of them.

6.2.12. The “Ratio of DM to DS travel distance higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a shorter DS travel distance than the DM travel distance.

6.2.13. The “Ratio of DM to DS travel time higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a faster DS travel time than the DM travel time.

High Growth scenario

6.2.14. Warnings reported by TUBA have been checked to verify that none indicated an issue in the models that required corrective action. There are 219,387 warnings in the High Growth scenario which are split as follows (the second figure quoted in brackets is the number of warnings TUBA classes as serious):

- Ratio of DM to DS travel time lower than limit: 200 warnings (two serious) although the ratio is 0.291 so only just less than 0.33
- Ratio of DM to DS travel time higher than limit: 18,208 warnings (six serious) although the ratio is between 3.053 and 3.575 so just above 3.0
- Ratio of DM to DS travel distance lower than limit: 69,137 warnings (247 serious) with 182 having a ratio between 0.2 and 0.33
- Ratio of DM to DS travel distance higher than limit: 5,815 warnings (99 serious), with 61 have a ratio between 3.0 and 4.0
- DM speeds less than limit: 51,773 warnings
- DM speeds greater than limit: 8,862 warnings
- DS speeds less than limit: 55,108 warnings
- DS speeds greater than limit: 10,284 warnings.

6.2.15. All warnings have been investigated and a reasonable explanation has been found for all of them.

6.2.16. The “Ratio of DM to DS travel distance higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a shorter DS travel distance than the DM travel distance.

6.2.17. The “Ratio of DM to DS travel time higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a faster DS travel time than the DM travel time.

Core Growth (Sensitivity) scenario

6.2.18. Warnings reported by TUBA have been checked to verify that none indicated an issue in the models that required corrective action. There are 187,739 warnings in the Core Growth (Sensitivity) scenario which are split as follows (the second figure quoted in brackets is the number of warnings TUBA classes as serious):

- Ratio of DM to DS travel time lower than limit: 636 warnings (four serious) although the ratio is between 0.129 and 0.32
- Ratio of DM to DS travel time higher than limit: 15,078 warnings (none serious).
- Ratio of DM to DS travel distance lower than limit: 56,583 warnings (173 serious) with 90 having a ratio between 0.2 and 0.33
- Ratio of DM to DS travel distance higher than limit: 5,616 warnings (130 serious), with 56 have a ratio between 3.0 and 4.0
- DM speeds less than limit: 42,270 warnings
- DM speeds greater than limit: 10,338 warnings
- DS speeds less than limit: 45,506 warnings
- DS speeds greater than limit: 11,712 warnings.

6.2.19. All warnings have been investigated and a reasonable explanation has been found for all of them.

6.2.20. The “Ratio of DM to DS travel distance higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a shorter DS travel distance than the DM travel distance.

6.2.21. The “Ratio of DM to DS travel time higher than limit” serious warnings were found to be due to the addition of the proposed infrastructure scheme which provides a faster DS travel time than the DM travel time.

TUBA tbn file information

6.2.22. Table 6-3, Table 6-4, Table 6-5 and Table 6-6 shows the analysis of the partitioned time benefits (*.tbn) file in TUBA for the Norwich Western Link Core Growth scenario, Low Growth scenario, High Growth scenario and Core Growth (Sensitivity) scenario respectively.

6.2.23. The partitioned time benefits files (*.tbn) cross-tabulates the percentage changes in travel time and trip numbers at OD level). TUBA uses the rule of a half (ROH) to calculate user benefits however, if the change in generalised cost between the DM and DS is too large then the ROH can become inaccurate.

6.2.24. As a general rule the ROH is acceptable, i.e. the error is less than ±10%, provided that the change in the generalised cost and the change in the number of trips are both less than 33%.

6.2.25. Table 6-3, Table 6-4, Table 6-5 and Table 6-6 shows that the majority of the total time benefits according to change in travel time and change in trip numbers are in the range 0% to 30% and 0% to -30% meaning that there is no need to include for an intermediate year between 2025 and 2040.

Table 6-3: TUBA - tbn file information for 2025 and 2040 (Core Growth scenario)

For Road and for Modelled Year: 2025																						
	Change in travel time																					
Change in trip	below	-100 to	-90 to	-80 to	-70 to	-60 to	-50 to	-40 to	-30 to	-20 to	-10 to	0 to	10 to	20 to	30 to	40 to	50 to	60 to	70 to	80 to	90 to	over
numbers	-100%	-90%	-80%	-70%	-60%	-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	1	0	1	2	2	0	0	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	3	2	2	-24	-3	0	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	1	1	6	2	2	-65	-9	-1	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	2	13	83	273	2	2	-64	-7	-3	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	4	52	2	2	-82	-1	-1	-1	0	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	1	5	57	2	2	-101	-3	-1	0	0	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	0	2	9	70	2	2	-54	0	-2	0	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	0	14	68	2	2	-14	0	0	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	3	17	71	2	0	-2	0	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	11	28	74	2	0	0	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	5	41	93	2	0	0	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	8	54	78	2	0	0	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	8	53	68	2	0	0	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	52	315	300	2	0	0	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
For Road and for Modelled Year: 2040																						
	Change in travel time																					
Change in trip	below	-100 to	-90 to	-80 to	-70 to	-60 to	-50 to	-40 to	-30 to	-20 to	-10 to	0 to	10 to	20 to	30 to	40 to	50 to	60 to	70 to	80 to	90 to	over
numbers	-100%	-90%	-80%	-70%	-60%	-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	20	-1	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	41	-3	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	59	-6	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	101	-12	-2	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	1	170	-27	-4	0	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	5	211	-44	-35	-13	-1	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	0	0	17	270	-110	-53	-10	-2	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	3	18	82	334	2510	-674	-78	-11	-2	-1	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	2	49	507	-438	-94	-3	-1	-1	-1	-1	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	4	2	65	314	-203	-118	-5	-2	-1	-1	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	0	4	7	88	184	-80	-78	-5	-1	0	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	5	15	93	92	-36	-42	0	-2	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	4	29	108	47	-17	-19	-1	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	5	36	98	29	-7	-9	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	7	40	88	22	-5	-2	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	4	48	76	11	-2	-1	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	5	49	68	9	-2	-3	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	62	347	385	45	-3	-6	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6-4: TUBA - tbn file information for 2025 and 2040 (Low Growth scenario)

For Road and for Modelled Year: 2025																						
	Change in travel time																					
Change in trip	below	-100 to	-90 to	-80 to	-70 to	-60 to	-50 to	-40 to	-30 to	-20 to	-10 to	0 to	10 to	20 to	30 to	40 to	50 to	60 to	70 to	80 to	90 to	over
numbers	-100%	-90%	-80%	-70%	-60%	-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	15	-1	0	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	0	32	-2	0	0	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	0	55	-15	-7	0	0	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	1	0	0	2	86	-19	-12	-1	0	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	2	22	182	438	1924	-232	-14	-3	0	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	1	19	347	-92	-6	-1	-1	0	0	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	4	2	31	126	-27	-4	-1	0	0	0	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	3	0	2	38	54	-8	0	0	0	0	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	0	6	36	26	0	0	0	0	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	1	9	40	20	0	0	0	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	7	19	44	10	0	0	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	3	27	56	10	0	0	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	3	30	49	7	0	0	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	4	33	39	7	0	0	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	1	29	199	189	17	0	0	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
For Road and for Modelled Year: 2040																						
	Change in travel time																					
Change in trip	below	-100 to	-90 to	-80 to	-70 to	-60 to	-50 to	-40 to	-30 to	-20 to	-10 to	0 to	10 to	20 to	30 to	40 to	50 to	60 to	70 to	80 to	90 to	over
numbers	-100%	-90%	-80%	-70%	-60%	-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	31	-1	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	44	-3	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	74	-6	0	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	2	122	-13	-1	-1	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	5	157	-31	-13	-2	0	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	0	0	10	197	-67	-19	-4	-1	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	3	13	76	282	1851	-456	-38	-5	-1	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	4	38	342	-306	-34	-21	-1	-1	-1	-1	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	0	2	51	219	-160	-47	-28	-1	-1	0	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	0	2	10	66	138	-67	-35	-27	0	0	-1	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	1	14	71	70	-33	-21	-4	-1	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	4	24	94	39	-16	-6	-3	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	4	35	83	23	-7	-4	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	7	38	75	17	-4	-1	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	4	43	63	10	-2	0	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	5	43	60	8	-2	-1	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	67	333	317	31	-3	-2	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6-5: TUBA - tbn file information for 2025 and 2040 (High Growth scenario)

id for Modelled Year: 2025																					
Change in travel time																					
Change in trip numbers	below -100%	-100 to -90%	-90 to -80%	-80 to -70%	-70 to -60%	-60 to -50%	-50 to -40%	-40 to -30%	-30 to -20%	-20 to -10%	-10 to 0%	0 to 10%	10 to 20%	20 to 30%	30 to 40%	40 to 50%	50 to 60%	60 to 70%	70 to 80%	80 to 90%	90 to 100%	over 100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	42	-1	0	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	1	95	-4	0	0	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	3	153	-29	-26	-2	0	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	0	1	12	211	-48	-73	-9	0	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	2	17	104	335	2411	-364	-76	-10	-1	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	2	7	95	950	-233	-83	-3	-1	-1	0	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	2	11	91	315	-61	-100	-2	-1	0	0	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	0	1	20	91	115	-20	-50	-2	0	0	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	1	21	82	48	-2	-13	0	0	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	3	24	78	31	-1	-1	0	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	12	38	77	16	0	0	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	7	48	98	17	0	0	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	11	60	80	12	0	0	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	1	9	68	65	15	0	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	0	2	66	359	309	38	0	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
id for Modelled Year: 2040																					
Change in travel time																					
Change in trip numbers	below -100%	-100 to -90%	-90 to -80%	-80 to -70%	-70 to -60%	-60 to -50%	-50 to -40%	-40 to -30%	-30 to -20%	-20 to -10%	-10 to 0%	0 to 10%	10 to 20%	20 to 30%	30 to 40%	40 to 50%	50 to 60%	60 to 70%	70 to 80%	80 to 90%	90 to 100%	over 100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	26	-1	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	54	-4	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	1	78	-9	-1	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	1	130	-17	-3	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	6	226	-38	-5	-1	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	1	2	13	286	-78	-41	-3	0	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	2	15	31	375	-176	-60	-7	0	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	1	0	3	41	198	451	3320	-989	-87	-4	0	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	14	36	80	740	-559	-66	-3	-1	-1	-1	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	15	36	92	440	-267	-84	-1	-1	-1	-1	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	2	10	28	120	243	-118	-61	-2	0	-1	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	11	39	119	116	-56	-33	0	0	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	6	40	116	68	-25	-20	0	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	1	0	0	7	43	109	40	-12	-9	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	5	47	98	32	-6	-2	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	5	54	86	15	-3	-1	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	1	1	0	5	50	83	12	-3	-3	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	58	326	493	67	-5	-6	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 6-6: TUBA - tbn file information for 2025 and 2040 (Core Growth (Sensitivity) scenario)

For Road and for Modelled Year: 2025																					
Change in travel time																					
Change in trip numbers	below -100%	-100 to -90%	-90 to -80%	-80 to -70%	-70 to -60%	-60 to -50%	-50 to -40%	-40 to -30%	-30 to -20%	-20 to -10%	-10 to 0%	0 to 10%	10 to 20%	20 to 30%	30 to 40%	40 to 50%	50 to 60%	60 to 70%	70 to 80%	80 to 90%	90 to 100%	over 100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	19	-1	0	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	0	46	-4	0	0	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	0	90	-20	-24	-4	-1	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	0	0	4	115	-34	-62	-13	-2	0	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	2	12	80	252	1596	-310	-69	-8	-2	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	4	38	606	-177	-87	-5	-1	0	0	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	1	7	47	209	-51	-100	-3	0	0	0	0	0	-1	0	0
20 to 30%	0	0	0	0	0	0	0	1	10	64	86	-11	-44	0	-2	0	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	0	1	11	56	46	-2	-8	0	0	0	0	0	0	0	0	0
40 to 50%	0	0	0	0	0	0	0	2	15	57	28	0	-2	0	0	0	0	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	7	24	70	22	0	0	0	0	0	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	8	34	75	14	0	0	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	3	42	73	13	0	0	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	6	63	59	7	0	0	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	48	312	315	45	0	0	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
For Road and for Modelled Year: 2040																					
Change in travel time																					
Change in trip numbers	below -100%	-100 to -90%	-90 to -80%	-80 to -70%	-70 to -60%	-60 to -50%	-50 to -40%	-40 to -30%	-30 to -20%	-20 to -10%	-10 to 0%	0 to 10%	10 to 20%	20 to 30%	30 to 40%	40 to 50%	50 to 60%	60 to 70%	70 to 80%	80 to 90%	90 to 100%	over 100%
below -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100 to -90%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-90 to -80%	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
-80 to -70%	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0
-70 to -60%	0	0	0	0	0	0	0	0	0	0	32	-3	0	0	0	0	0	0	0	0	0	0
-60 to -50%	0	0	0	0	0	0	0	0	0	0	48	-5	0	0	0	0	0	0	0	0	0	0
-50 to -40%	0	0	0	0	0	0	0	0	0	0	84	-11	-2	0	0	0	0	0	0	0	0	0
-40 to -30%	0	0	0	0	0	0	0	0	0	1	142	-24	-4	-1	0	0	0	0	0	0	0	0
-30 to -20%	0	0	0	0	0	0	0	0	0	3	182	-42	-29	-10	-1	0	0	0	0	0	0	0
-20 to -10%	0	0	0	0	0	0	0	0	0	12	245	-105	-46	-9	-1	-1	0	0	0	0	0	0
-10 to 0%	0	0	0	0	0	0	2	15	71	293	2198	-645	-68	-9	-3	0	0	0	0	0	0	0
0 to 10%	0	0	0	0	0	0	0	1	1	45	444	-390	-79	-3	0	-1	0	0	0	0	0	0
10 to 20%	0	0	0	0	0	0	0	0	1	59	263	-177	-105	-4	-1	0	0	0	0	0	0	0
20 to 30%	0	0	0	0	0	0	0	1	6	77	155	-83	-71	-5	-2	-1	0	0	0	0	0	0
30 to 40%	0	0	0	0	0	0	1	1	13	89	81	-43	-39	-2	0	-2	0	-1	0	-1	0	0
40 to 50%	0	0	0	0	0	0	3	4	27	94	42	-20	-21	-1	-1	-1	-1	0	0	0	0	0
50 to 60%	0	0	0	0	0	0	0	4	32	90	27	-8	-8	-1	0	-1	0	0	0	0	0	0
60 to 70%	0	0	0	0	0	0	0	7	36	76	19	-5	-3	0	0	0	0	0	0	0	0	0
70 to 80%	0	0	0	0	0	0	0	4	42	69	9	-3	-1	0	0	0	0	0	0	0	0	0
80 to 90%	0	0	0	0	0	0	0	5	48	62	9	-1	-3	0	0	0	0	0	0	0	0	0
90 to 100%	0	0	0	0	0	0	2	56	308	355	41	-3	-5	0	0	0	0	0	0	0	0	0
over -100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BENEFITS BY TIME SAVING AND DISTANCE TRAVELLED

6.2.26. The benefits for the Core Growth scenario, Core Growth (Sensitivity Assessment), Low Growth scenario and High Growth scenario as banded by size of travel time saving, as output by TUBA, are shown in Table 6-7 to Table 6-10 with the time bands being the defaults used in TUBA.

6.2.27. There are benefits delivered from journey time improvements of between 0 and >5 minutes, but also disbenefits from journey time reduction of between -5 and 0 minutes.

Table 6-7: Travel time benefits (TUBA) by size of travel time saving for the Core Growth scenario

Vehicle	Purpose	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins	Total
Car	Business	-£1,111,000	-£2,415,000	-£5,689,000	£19,146,000	£6,162,000	£11,814,000	**£27,907,000**
Car	Commuting	-£5,366,000	-£10,799,000	-£31,731,000	£55,385,000	£19,449,000	£39,254,000	**£66,192,000**
Car	Other	-£4,822,000	-£11,254,000	-£20,829,000	£63,571,000	£19,160,000	£36,522,000	**£82,348,000**
LGV	Other	-£11,000	-£72,000	-£224,000	£889,000	£237,000	£514,000	**£1,333,000**
LGV	Business	-£224,000	-£1,462,000	-£4,535,000	£17,965,000	£4,783,000	£10,395,000	**£26,922,000**
OGV1	Business	-£58,000	-£405,000	-£1,408,000	£7,276,000	£1,885,000	£6,989,000	**£14,279,000**
OGV2	Business	-£52,000	-£359,000	-£1,249,000	£6,452,000	£1,671,000	£6,197,000	**£12,660,000**
Total	**Total**	**-£11,644,000**	**-£26,766,000**	**-£65,665,000**	**£170,684,000**	**£53,347,000**	**£111,685,000**	**£231,641,000**

Table 6-8: Travel time benefits (TUBA) by size of travel time saving for the Core Growth (Sensitivity) scenario

Vehicle	Purpose	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins	Total
Car	Business	-£975,000	-£2,080,000	-£5,012,000	£14,930,000	£4,968,000	£9,852,000	**£21,683,000**
Car	Commuting	-£4,814,000	-£9,173,000	-£27,359,000	£44,003,000	£16,105,000	£32,863,000	**£51,625,000**
Car	Other	-£4,565,000	-£9,258,000	-£18,440,000	£49,801,000	£15,856,000	£30,100,000	**£63,494,000**
LGV	Other	-£10,000	-£70,000	-£193,000	£698,000	£192,000	£430,000	**£1,047,000**
LGV	Business	-£205,000	-£1,413,000	-£3,890,000	£14,107,000	£3,876,000	£8,698,000	**£21,173,000**
OGV1	Business	-£78,000	-£273,000	-£1,199,000	£5,663,000	£1,596,000	£5,640,000	**£11,349,000**
OGV2	Business	-£70,000	-£242,000	-£1,063,000	£5,022,000	£1,415,000	£5,002,000	**£10,064,000**
Total	**Total**	**-£10,717,000**	**-£22,509,000**	**-£57,156,000**	**£134,224,000**	**£44,008,000**	**£92,585,000**	**£180,435,000**

Table 6-9: Travel time benefits (TUBA) by size of travel time saving for the Low Growth scenario

Vehicle	Purpose	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins	Total
Car	Business	-£853,000	-£895,000	-£4,305,000	£13,863,000	£4,688,000	£10,205,000	**£22,703,000**
Car	Commuting	-£4,255,000	-£3,690,000	-£22,965,000	£40,992,000	£14,771,000	£33,750,000	**£58,603,000**
Car	Other	-£3,930,000	-£4,647,000	-£15,870,000	£44,627,000	£14,899,000	£31,448,000	**£66,527,000**
LGV	Other	-£7,000	-£22,000	-£170,000	£639,000	£167,000	£437,000	**£1,044,000**
LGV	Business	-£139,000	-£450,000	-£3,426,000	£12,913,000	£3,370,000	£8,828,000	**£21,096,000**
OGV1	Business	-£43,000	-£88,000	-£917,000	£5,357,000	£1,622,000	£5,741,000	**£11,672,000**
OGV2	Business	-£38,000	-£78,000	-£814,000	£4,750,000	£1,438,000	£5,091,000	**£10,349,000**
Total	**Total**	**-£9,265,000**	**-£9,870,000**	**-£48,467,000**	**£123,141,000**	**£40,955,000**	**£95,500,000**	**£191,994,000**

Table 6-10: Travel time benefits (TUBA) by size of travel time saving for the High Growth scenario

Vehicle	Purpose	< -5 mins	-5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	> 5 mins	Total
Car	Business	-£950,000	-£3,116,000	-£7,656,000	£24,756,000	£8,015,000	£15,550,000	**£36,599,000**
Car	Commuting	-£4,631,000	-£15,174,000	-£41,520,000	£74,323,000	£23,564,000	£56,048,000	**£92,610,000**
Car	Other	-£4,285,000	-£13,015,000	-£27,531,000	£86,474,000	£24,708,000	£47,672,000	**£114,023,000**
LGV	Other	-£8,000	-£107,000	-£290,000	£1,137,000	£337,000	£712,000	**£1,781,000**
LGV	Business	-£171,000	-£2,158,000	-£5,856,000	£22,984,000	£6,808,000	£14,383,000	**£35,990,000**
OGV1	Business	-£337,000	-£559,000	-£1,819,000	£9,102,000	£2,078,000	£9,063,000	**£17,528,000**
OGV2	Business	-£299,000	-£495,000	-£1,613,000	£8,072,000	£1,843,000	£8,037,000	**£15,545,000**
Total	**Total**	**-£10,681,000**	**-£34,624,000**	**-£86,285,000**	**£226,848,000**	**£67,353,000**	**£151,465,000**	**£314,076,000**

TRANSPORT ECONOMIC EFFICIENCY

6.2.28. The Transport Economic Efficiency (TEE) benefits are presented in Table 6-11 for the Core Growth scenario and Core Growth (Sensitivity) scenario, Table 6-12 for the Low Growth scenario and Table 6-13 for the High Growth scenario. All values are in 2010 prices, discounted to 2010.

Table 6-11: Transport Economic Efficiency benefits (2010 prices, discounted to 2010) for the Core Growth scenario

User	Item	Core Growth (£m)	Core Growth (Sensitivity) (£m)
Non-business: Commuting	Travel time	£66.192	£51.625
	Vehicles operating costs	-£7.704	-£8.468
	Sub-total	**£58.488**	**£43.158**
Non-business: Other	Travel time	£83.680	£64.540
	Vehicles operating costs	£84.124	£75.572
	Sub-total	**£167.804**	**£140.112**
Business	Travel time	£81.766	£64.269
	Vehicles operating costs	£6.803	£5.222
	Sub-total	**£88.569**	**£69.491**
TOTAL		**£314.861**	**£252.761**

Table 6-12: Transport Economic Efficiency benefits (2010 prices, discounted to 2010) for the Low Growth scenario

User	Item	Low Growth (£m)
Non-business: Commuting	Travel time	£58.603
	Vehicles operating costs	-£6.369
	Sub-total	**£52.234**
Non-business: Other	Travel time	£67.572
	Vehicles operating costs	£74.700
	Sub-total	**£142.272**
Business	Travel time	£65.818
	Vehicles operating costs	£5.018
	Sub-total	**£70.836**
TOTAL		**£265.342**

Table 6-13: Transport Economic Efficiency benefits (2010 prices, discounted to 2010) for the High Growth scenario

User	Item	High Growth (£m)
Non-business: Commuting	Travel time	£92.611
	Vehicles operating costs	-£8.292
	Sub-total	**£84.319**
Non-business: Other	Travel time	£115.804
	Vehicles operating costs	£92.559
	Sub-total	**£208.363**
Business	Travel time	£105.664
	Vehicles operating costs	£10.407
	Sub-total	**£116.071**
TOTAL		**£408.753**

6.2.29. The Core Growth scenario generates benefits of £314.861m, the Low Growth scenario generates benefits of £265.342m, the High Growth scenario generates benefits of £408.753m while the Core Growth (Sensitivity) scenario generate benefits of £252.761m. The Transport Economic Efficiency (TEE) worksheets are included in Appendix B.

PROFILE OF BENEFITS (TIME PERIOD)

6.2.30. The user benefits by time period are shown in Figure 6-1 for the Core Growth scenario, Figure 6-2 for the Core Growth (Sensitivity) scenario, Figure 6-3 for the Low Growth scenario and Figure 6-4 for the High Growth scenario.

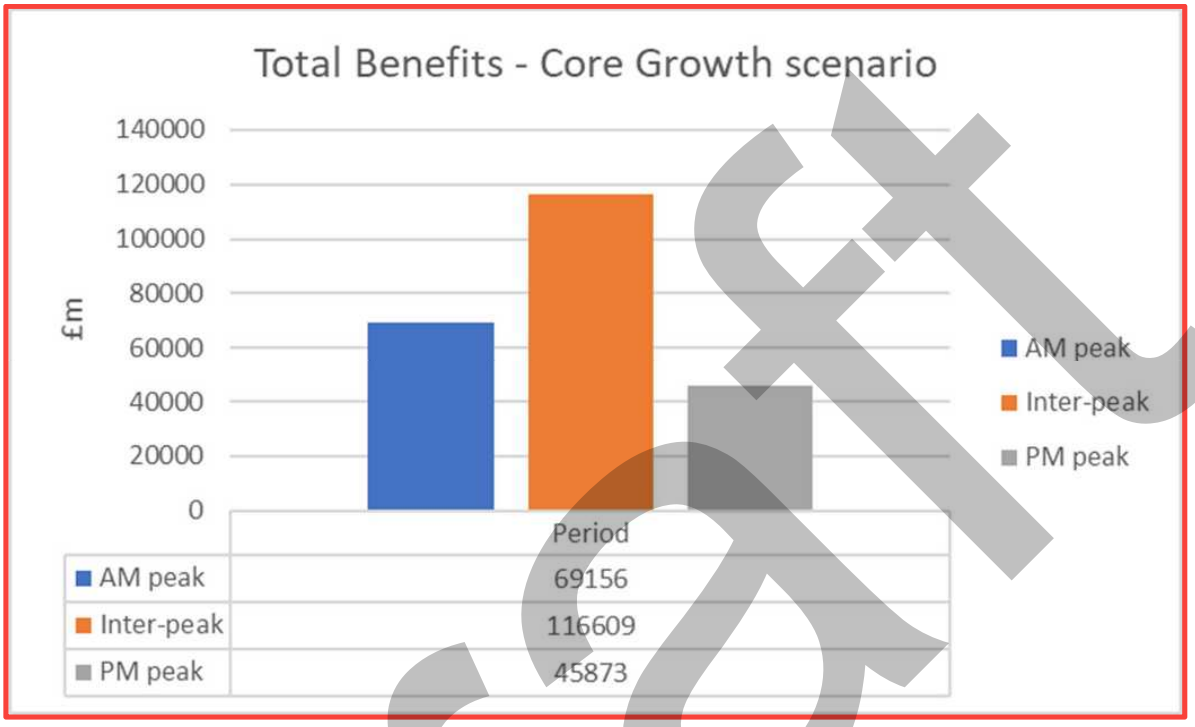


Figure 6-1: User Benefits by Time Period for the Core Growth scenario

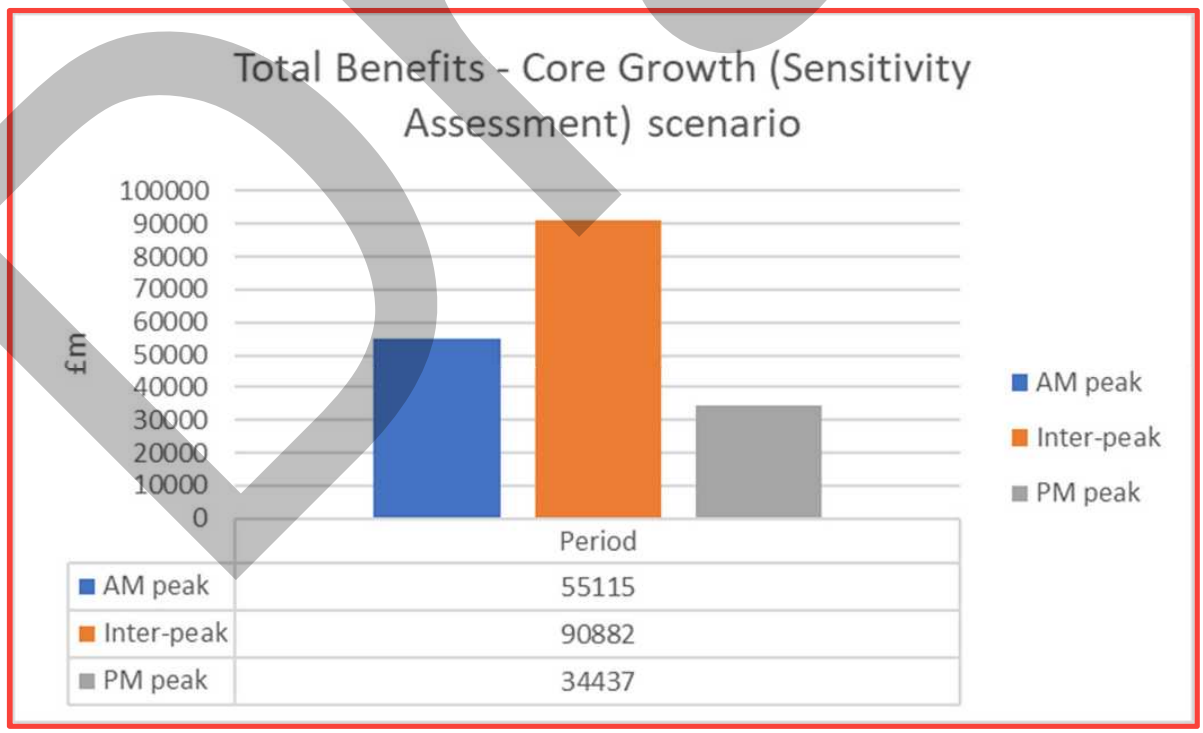


Figure 6-2: User Benefits by Time Period for the Core Growth (Sensitivity) scenario

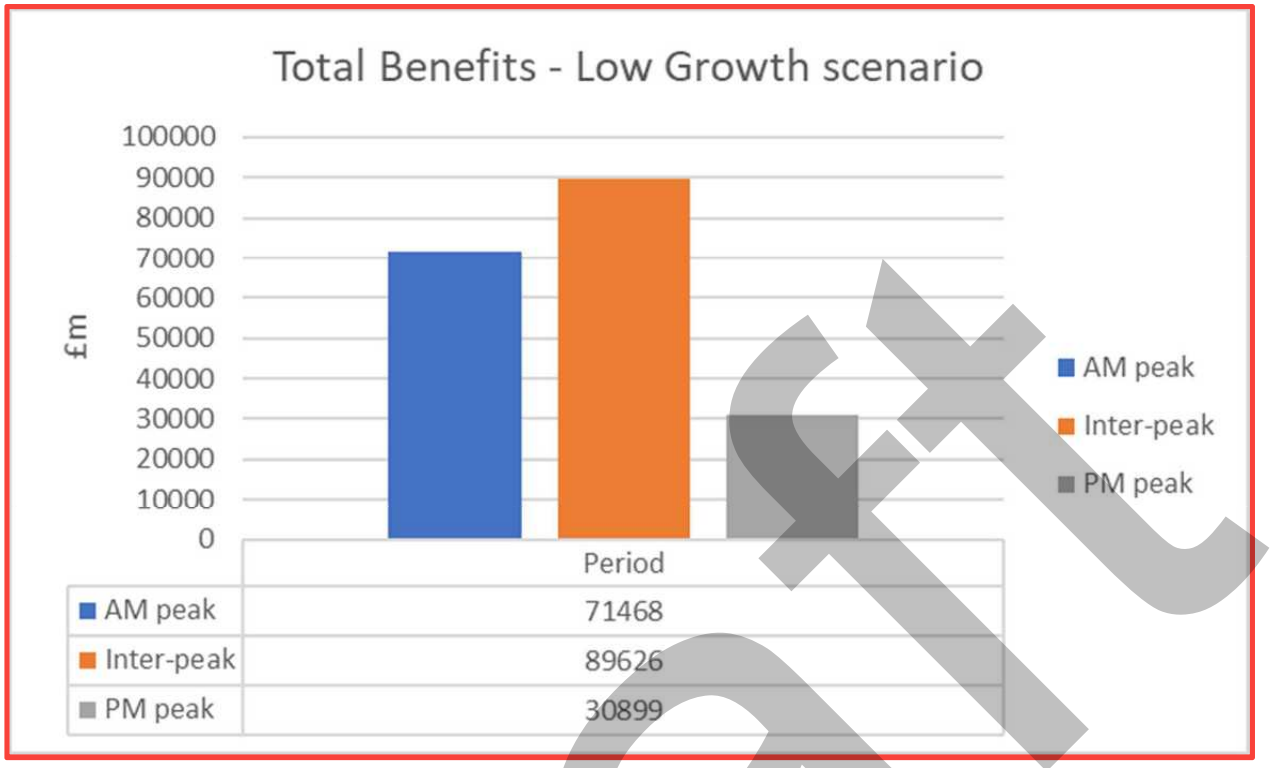


Figure 6-3: User Benefits by Time Period for the Low Growth scenario

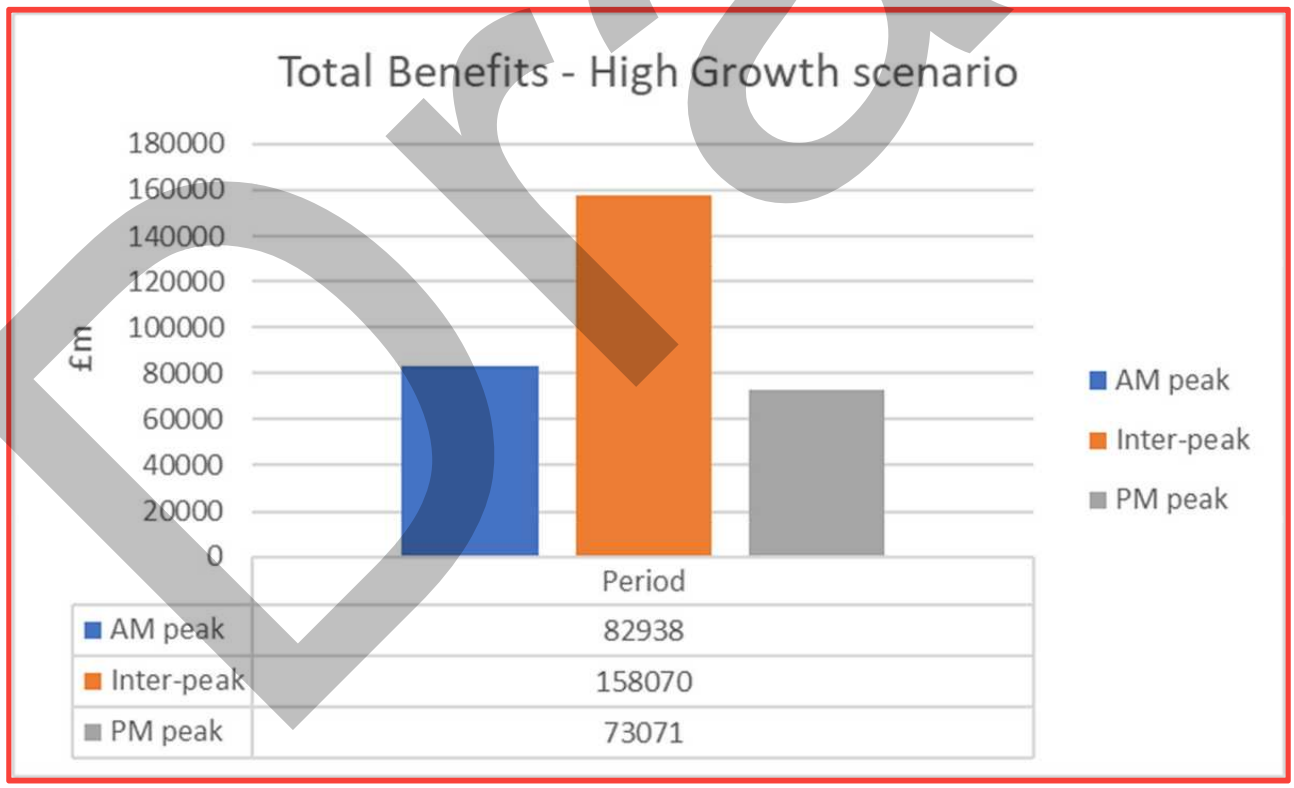


Figure 6-4: User Benefits by Time Period for the High Growth scenario

PROFILE OF BENEFITS (JOURNEY PURPOSE)

6.2.31. The user benefits by journey purpose are shown in Figure 6-5 for the Core Growth scenario, Figure 6-6 for the Core Growth (Sensitivity Assessment), Figure 6-7 for the Low Growth scenario and Figure 6-8 for the High Growth scenario.

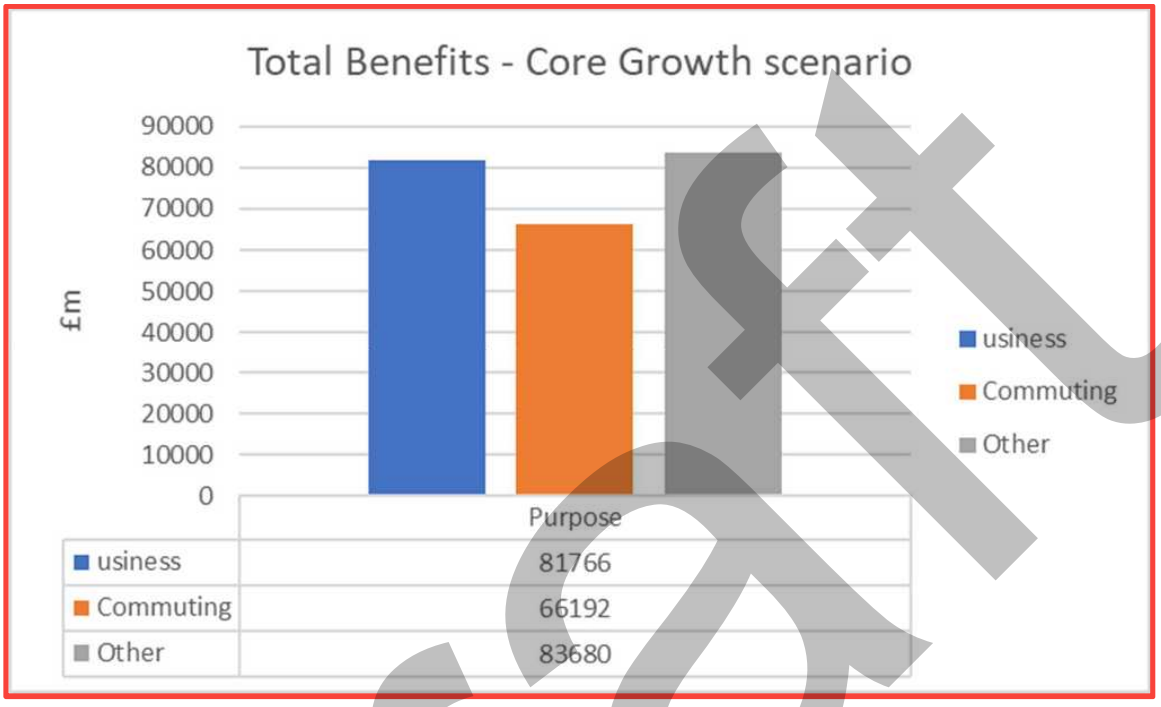


Figure 6-5: User Benefits by Journey Purpose for the Core Growth Scenario

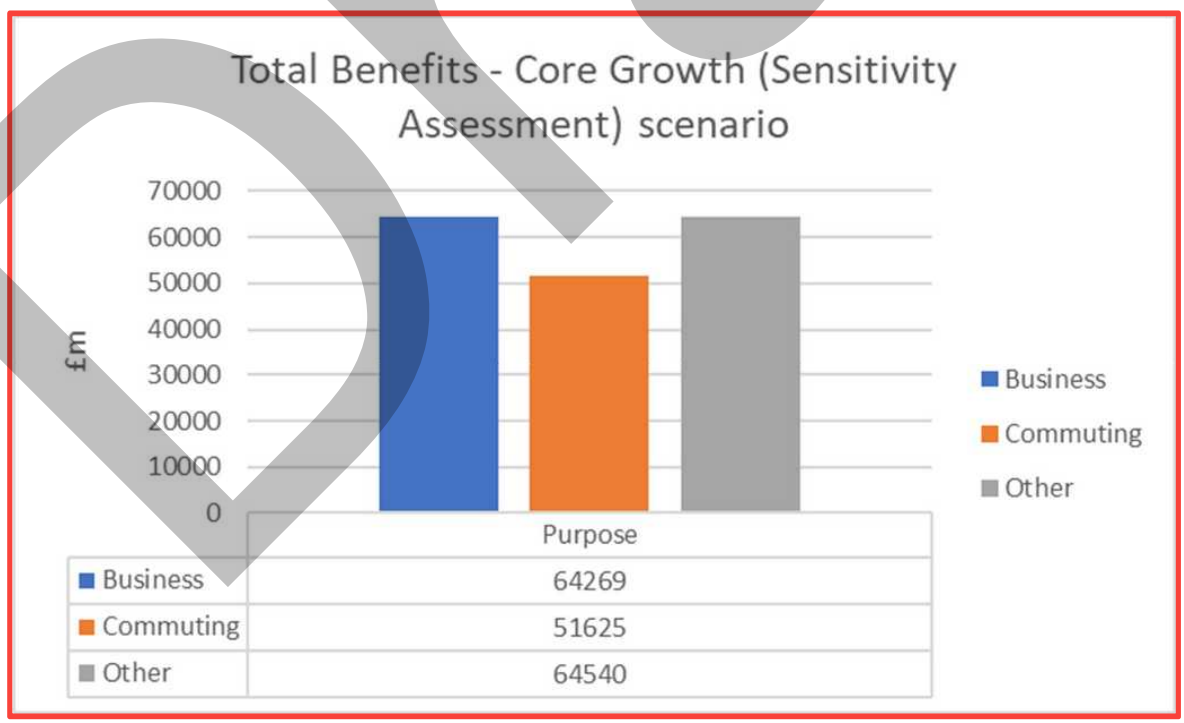


Figure 6-6: User Benefits by Journey Purpose for the Core Growth (Sensitivity Assessment) Scenario

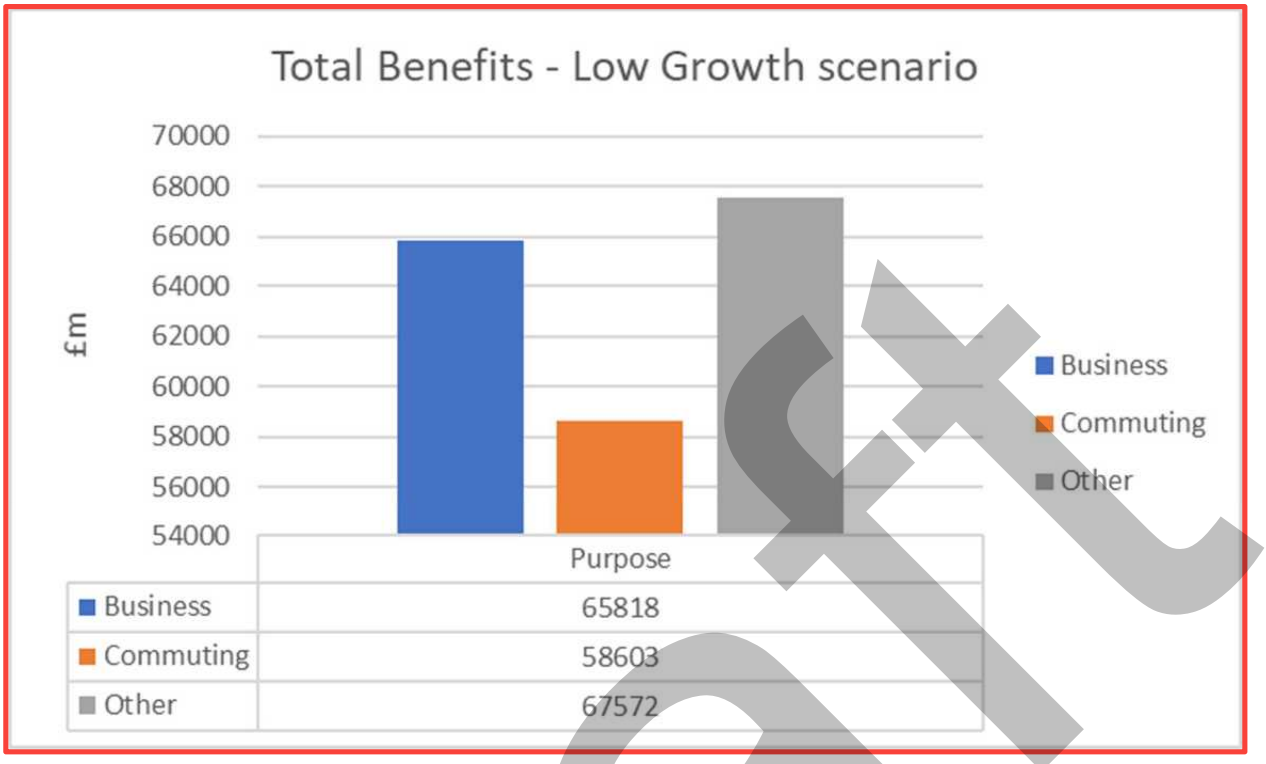


Figure 6-7: User Benefits by Journey Purpose for the Low Growth Scenario

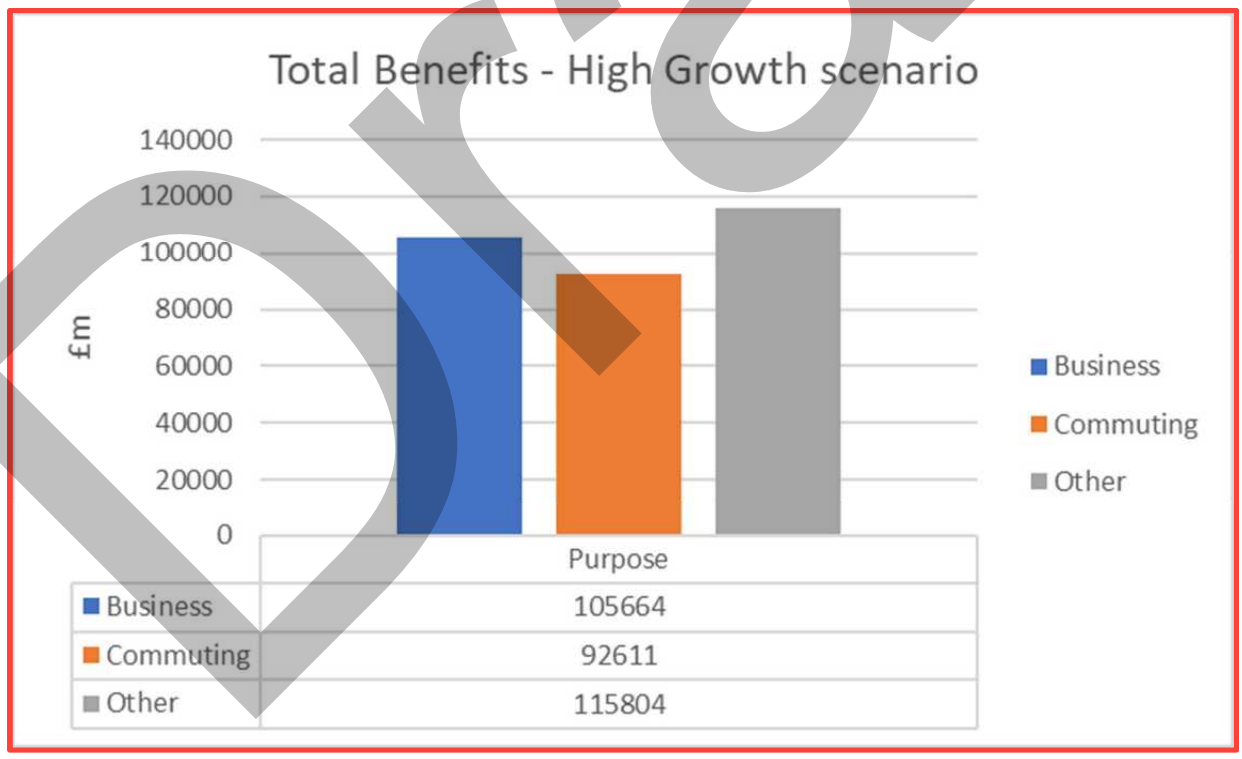


Figure 6-8: User Benefits by Journey Purpose for the High Growth Scenario

PROFILE OF BENEFITS OVER 60 YEARS

6.2.32. The scheme benefits are explicitly calculated only for the modelled years of 2025 and 2040. Benefits for each year between those years are interpolated from their outputs. The default assumption in TUBA is that there is no growth in the magnitude of impacts after the last modelled year, and this is assumed for the purposes of this scheme.

6.2.33. The benefits accrued in each year over the life of the scheme, given these assumptions, are shown in Figure 6-9. Scheme benefits peak in 2040 and thereafter scheme benefits are slowly reduced year-on-year after 2040 due to the effects of congestion, inflation and the discounting of benefits further into the future.

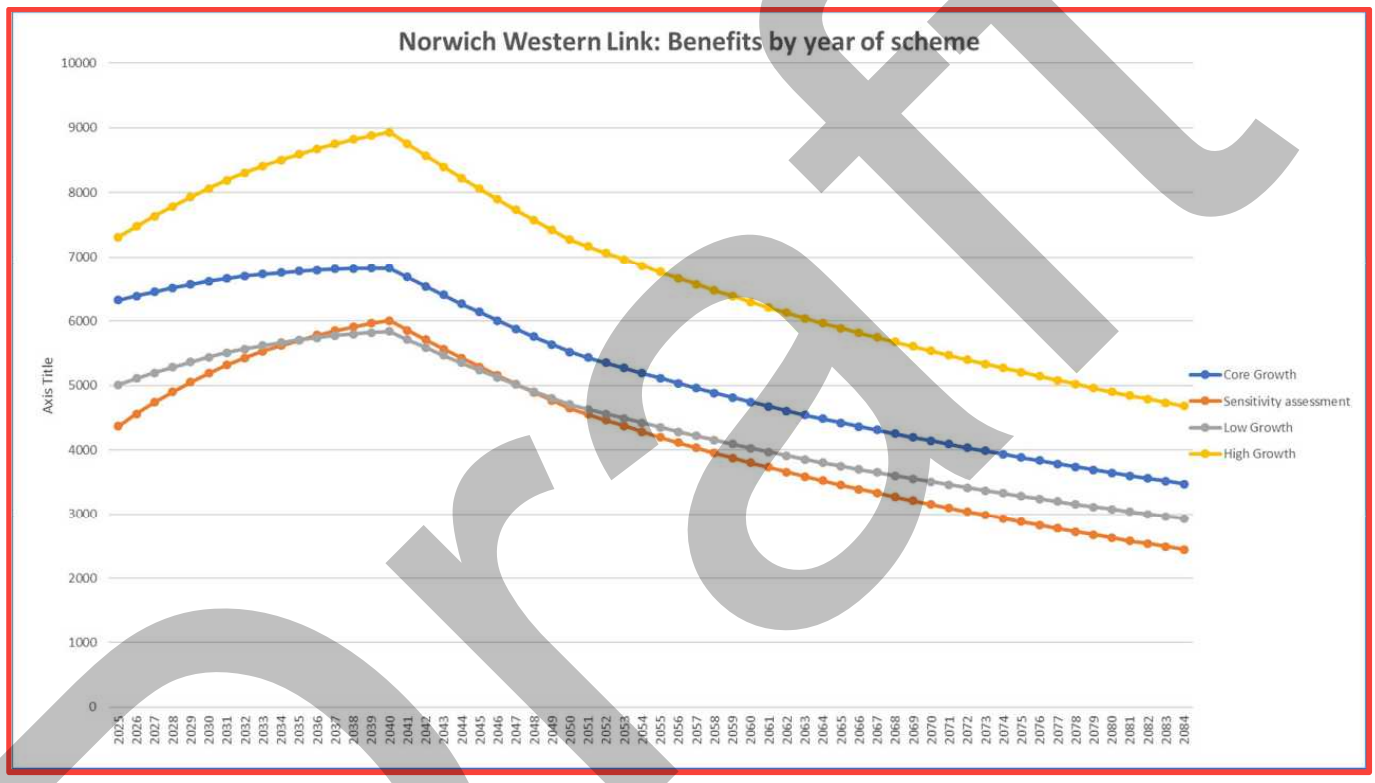


Figure 6-9: Benefits by year of scheme for all scenarios

SECTOR BENEFITS

6.2.34. Analysis has been carried out of benefits on a geographical basis. To do this TUBA was run with a sector file, which enables user benefits between each model zone origin and destination pair to be aggregated into larger geographical areas. The zoning system has been aggregated into 16 model sectors which are shown in Figure 6-10 and listed in Table 6-14. The scheme benefits have been shown in bands:

- Greater than -£30m
- Between -£10m and -£30m
- Between £0m and -£10m
- Zero
- Between £0m and £10m
- Between £10m and £30m
- Greater than £30m.

Table 6-14: Sectoring System

Sector ID	Sector Description
1	Scotland/North
2	East/West Midlands (plus Wales)
3	South East (excluding London)
4	London
5	King's Lynn District
6	North Norfolk District
7	Great Yarmouth District
8	Breckland North (north of A47)
9	Breckland South (south of A47)
10	South Norfolk West (west of A11)
11	South Norfolk Central (between A11 and A140)
12	South Norfolk East (east of A140)
13	Broadland West (west of A140)
14	Broadland East (east of A140)
15	Norwich North (north of river)
16	Norwich South (south of river)

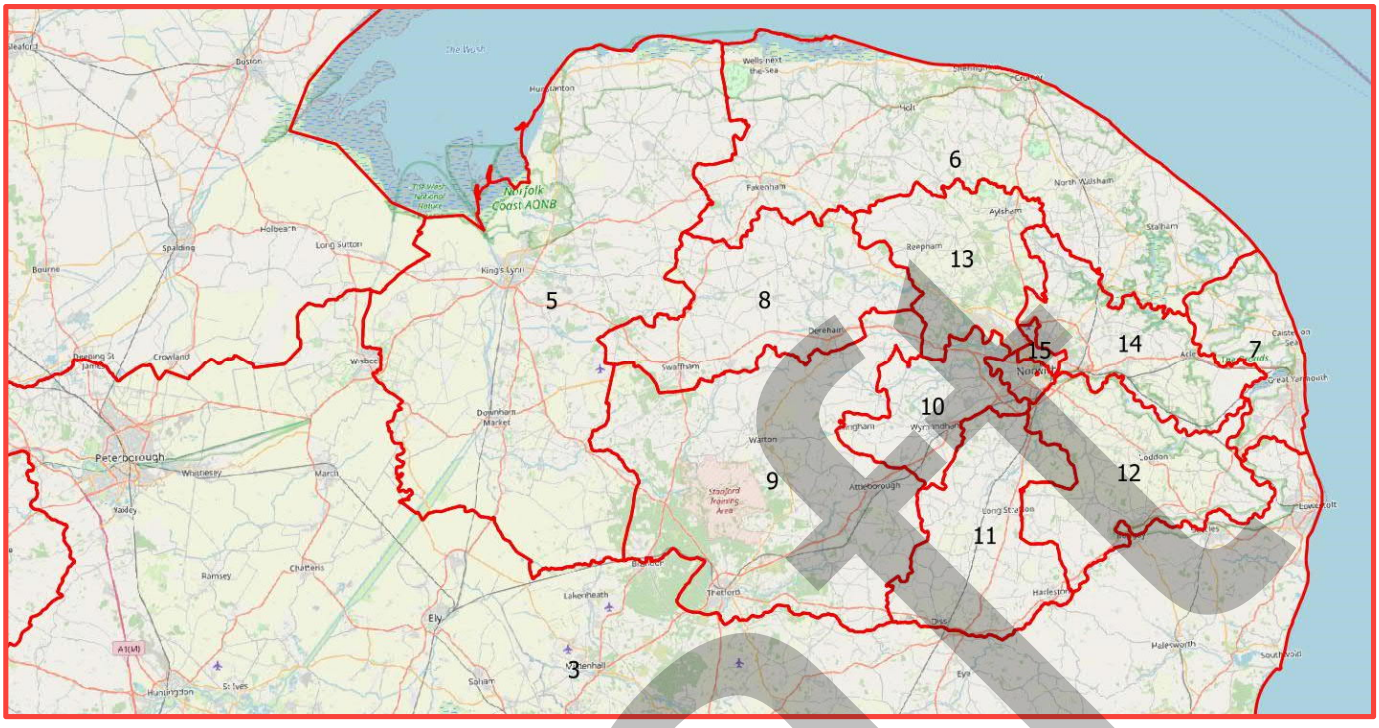


Figure 6-10: Sectoring System

Core Growth scenario

6.2.35. Figure 6-11 and Figure 6-12 and shows the sector to sector benefits for the 2025 and 2040 respectively for the Core Growth scenario.

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						492	216	-411	17	341	2	28	2190	637	246	431	4188
2		5879	4502		667	9948	12834	5650	2087	8628	658	1647	47502	65836	64835	24530	255202
3		3802	2847	32	1274	45144	25345	-6682	1811	12537	378	2906	61885	45160	19543	25521	241505
4		0	109			3878	3158	-585	4	95	9	126	1744	1000	357	1116	11010
5		3079	1615			13633	7635	1214	4775	36558	1694	4300	58552	56229	31105	68212	288600
6	699	26397	42527	6410	5806	9666	10124	28769	38799	53642	3988	2808	37199	11700	-3525	10055	285063
7	60	6761	9001	1203	6565	3867		15823	11635	17558	1989	1957	8558	24386	11358	27477	148200
8	459	6124	7648	97	5085	26941	17163	10998	21563	62526	13565	12878	184254	130706	105683	118947	724639
9	46	1193	1901	11	1845	32723	17612	-22125	4214	21382	4459	5846	128149	105944	53235	53358	409793
10	422	10112	15834	291	24373	48242	30466	71406	22386	63728	18549	25317	218563	124007	65786	168574	908055
11	3	461	909	37	954	5412	5774	22647	5300	13747	671	5121	27420	29407	5322	13428	136613
12	33	1576	3231	351	3913	4439	4305	19144	7547	23374	1787	754	14812	12573	11086	23825	132749
13	2515	44346	66891	6688	44855	20705	10258	122515	83540	152709	24458	6724	-1490	-36908	-32441	-71711	443652
14	685	51151	34170	1468	32176	24964	68097	138886	57944	80404	9973	11796	29285	19792	904	29576	591270
15	291	23600	22184	706	44604	8766	14809	72908	28123	32685	4908	3645	6639	9584	220	15651	289321
16	801	12383	19116	661	50891	27452	43843	121775	33625	41640	13181	4842	50424	-19945	-20285	-45712	334692
Grand Total	6014	196864	232483	17955	223009	286270	271639	601933	323367	621553	100270	90695	875686	580108	313428	463278	5204551

Figure 6-11: Sector benefits for Core Growth 2025 Opening Year (£m)

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						1031	376	-205	41	619	5	17	2691	776	-20	422	5753
2		12152	10750	0	1975	10445	24079	11598	4459	17327	1797	3625	44344	69218	69865	43016	324650
3		10192	6639	118	3151	63789	41586	2142	5204	20490	1145	3976	74846	52195	13305	19768	318545
4		0	260			5054	3785	-215	13	244	35	117	2706	1634	186	432	14252
5		4283	3211			8247	11054	19079	13242	68277	6789	7515	67162	102660	47404	120987	479909
6	1085	19123	53933	6593	5068	21018	13641	44686	44645	73032	7711	5716	40121	-11903	-28999	1581	297053
7	253	20525	28005	3455	12864	9580		22377	30998	31837	3667	4315	14155	52110	19367	43204	296711
8	507	11687	8219	42	20846	38804	23480	14500	26965	51935	14603	11456	174182	159473	110691	109402	776792
9	139	3013	4425	26	10241	40517	28441	-2844	17380	33881	14675	8102	119014	119736	47076	44399	488222
10	364	15381	-6075	57	43572	66745	32437	47458	2046	4800	5129	8944	228443	114889	20414	-10772	573830
11	14	1539	1560	100	4259	6426	4076	25841	18685	21068	985	-77	35646	-3931	-1384	-6503	108302
12	59	5078	6727	764	8554	7006	6418	21155	13129	22070	3188	1317	15179	15071	1614	8289	135615
13	2704	43228	84281	9227	68865	67216	18056	135719	103763	174488	30607	11189	11519	-57584	-36076	-64028	603173
14	1112	63431	47598	4016	73583	72045	128830	175367	87470	98979	8679	13910	-31845	14643	-31063	-109622	617133
15	269	33598	24218	853	65228	18689	27712	88300	34748	21469	2788	443	-15276	-3100	-9470	-56363	234107
16	1058	29588	29632	819	102079	40475	62745	119423	43304	7053	10507	7115	-1049	-102435	-80207	-155516	114589
Grand Total	**7563**	**272817**	**303382**	**26069**	**420285**	**477085**	**426716**	**724382**	**446091**	**647568**	**112309**	**87681**	**781837**	**523452**	**142702**	**-11305**	**5388635**

Figure 6-12: Sector benefits for Core Growth 2040 Opening Year (£m)

6.2.36. As you expect most of the benefits are from Sector 8, Sector 9 and Sector 10 to Sector, 13, Sector 14, Sector 15 and Sector 16 and vice versa given the traffic movements that the Norwich Western Link is accommodating.

Low Growth scenario

6.2.37. Figure 6-13 and Figure 6-14 and shows the sector to sector benefits for the 2025 and 2040 respectively for the Low Growth scenario.

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						356	107	-117	8	214	1	20	1908	368	181	319	3365
2		3580	2868		403	8734	8329	3891	863	5715	348	985	42230	56332	55394	17250	206923
3		1623	1603	24	294	33859	15296	-2054	1023	9001	145	1970	51682	32378	15293	14728	176864
4		1	39			3071	1512	-166	0	86	6	97	1280	654	256	756	7592
5		2283	902			12513	5548	1001	1669	21187	1075	2867	50468	46864	25994	44466	216837
6	734	24545	37467	6349	5538	6864	7267	17585	32449	44139	2961	2349	29661	10608	278	10800	239594
7	383	4150	9867	1179	5990	2932		11788	8559	12985	1873	1533	6305	16710	9297	23221	116772
8	94	3441	2922	51	3013	23846	11081	-88	3491	34794	5576	7732	156713	105797	89107	83832	531401
9	31	360	1479	9	1713	29280	10522	-11483	2559	13428	2669	4283	113045	87688	46104	39091	340777
10	292	6630	10121	245	11284	35922	18477	22665	13845	46321	11804	18005	169685	83411	49062	129527	627295
11	-1	233	504	21	615	2882	2153	4172	3537	9823	274	1248	21579	8524	2054	2280	59899
12	20	933	2778	390	1991	2369	2542	6988	6298	19580	1161	474	10258	6931	4028	11228	77970
13	1810	40749	58223	5400	40573	23007	7212	112703	82173	142129	22404	10714	22082	1458	-5056	-9760	555822
14	538	41860	27144	1310	25702	18357	39536	112720	48452	66622	7816	10632	21896	11277	3824	32505	470190
15	174	19115	17816	562	38769	6625	8894	58804	25075	32326	4588	3857	4826	2486	772	16790	241479
16	375	8118	12645	456	34654	25515	24465	38666	21608	55946	10242	6487	58235	19221	10078	14452	341162
Grand Total	**4450**	**157619**	**186378**	**15996**	**170539**	**236131**	**162942**	**377075**	**251607**	**514295**	**72942**	**73252**	**761855**	**490707**	**306667**	**431483**	**4213941**

Figure 6-13: Sector benefits for Low Growth 2025 Opening Year (£m)

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						655	217	-437	30	382	4	37	2312	574	4	320	4097
2		10020	9068	0	1391	8949	17846	8994	3908	14595	1610	3134	38072	60897	58953	34597	272033
3		7145	5053	80	2113	52781	28078	-6584	3457	10331	752	3429	64209	37187	11540	11720	231292
4		0	134			4218	2149	-600	8	128	21	61	2257	924	137	120	9556
5		4146	2969			9936	9618	13969	11404	60320	6113	6683	60361	94015	41201	105700	426436
6	560	19483	39478	5425	4814	16539	12042	39249	36098	52052	4252	3583	46585	-8018	-14566	-2412	255165
7	227	14053	17393	2272	8396	7147		18118	16252	18998	3024	2893	11295	40802	16185	31593	208647
8	368	10065	10040	164	18480	32876	18445	26152	29143	51971	13375	12312	159794	151131	98510	97216	730043
9	74	2634	3912	19	7953	34482	18591	-18470	11884	23861	11714	6202	107105	102327	41317	27834	381438
10	352	15169	2893	202	40265	58380	22206	49178	11538	8666	9047	9410	201916	95937	17241	-13280	529120
11	11	1362	1453	69	3752	5975	4193	22500	15462	14244	719	2724	31046	7459	155	1575	112699
12	34	3710	4101	373	6305	5334	4320	17128	8155	6429	2016	1355	14031	10049	4460	12566	100366
13	2146	35896	61186	5868	56361	54051	12581	115902	82484	137312	22897	8468	21150	-32405	-14233	-28425	541239
14	218	49208	32646	2237	62282	47996	87964	150001	64060	40059	334	10608	15710	14644	-10339	-77377	490252
15	155	25732	16544	123	54460	18447	18051	71855	22840	3476	-605	908	1701	2567	-3791	-35401	197062
16	411	26975	18566	238	86960	32158	42770	93046	19776	-34883	2775	5461	17647	-84050	-57567	-125112	45171
Grand Total	**4557**	**225599**	**225435**	**17071**	**353533**	**389922**	**299070**	**600001**	**336499**	**407942**	**78047**	**77267**	**795191**	**494040**	**189207**	**41235**	**4534617**

Figure 6-14: Sector benefits for Low Growth 2040 Opening Year (£m)

6.2.38. As you expect most of the benefits are from Sector 8, Sector 9 and Sector 10 to Sector, 13, Sector 14, Sector 15 and Sector 16 and vice versa given the traffic movements that the Norwich Western Link is accommodating.

High Growth scenario

6.2.39. Figure 6-15 and Figure 6-16 and shows the sector to sector benefits for the 2025 and 2040 respectively for the High Growth scenario.

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						787	230	-213	17	378	2	36	2838	1253	340	898	6567
2		7315	5525		901	10967	14877	7273	2584	10327	739	1939	52511	75419	75005	34722	300106
3		4504	3389	42	1494	62798	28316	-1111	1503	15405	438	3455	76665	61500	23434	35200	317030
4			148			5190	2500	-321	-89	118	11	144	2253	1449	401	1118	12921
5		3636	1881			14068	8569	4735	5164	39535	1929	4958	65029	64353	35296	75695	324849
6	704	27350	47996	8057	5740	11485	10619	30875	40638	62321	4498	2744	32629	-1093	-14494	7581	277648
7	164	8792	13210	1701	7460	4606		17722	15665	22833	2690	2586	9438	28105	11714	39566	186251
8	705	6717	8689	104	5210	29185	19186	16708	26696	70837	14790	14144	208114	152160	121887	145997	841129
9	62	1408	2200	15	3055	39352	19419	-12556	5246	25083	4779	6058	143639	128563	60898	64651	491871
10	439	12454	20840	348	26766	63901	34303	76308	27831	86590	22590	29996	274941	185207	87604	216971	1167087
11	6	413	492	57	1153	5085	1583	23267	6425	18956	842	-2171	36520	4410	6792	24284	128113
12	33	1841	4054	498	4614	7629	4283	20714	9397	32918	2108	902	23854	21853	12094	35400	182191
13	3358	47062	75768	9443	48192	23788	10261	129753	92913	186909	28733	8156	-8707	-52459	-40700	-72254	490217
14	942	56842	42233	1991	36154	25689	69316	155278	68337	110469	12472	13529	32457	13948	-7924	85535	717267
15	459	26017	27189	1020	50026	7433	15202	81287	33979	51088	6769	4388	-7550	-877	-1931	36742	331242
16	839	14420	21401	683	55211	18805	47959	131183	41147	67722	14135	3139	17702	-18358	-20658	-52197	343132
Grand Total	**7711**	**218771**	**275016**	**23960**	**245977**	**330768**	**286623**	**680903**	**377451**	**801490**	**117524**	**94000**	**962331**	**665432**	**349758**	**679908**	**6117622**

Figure 6-15: Sector benefits for High Growth 2025 Opening Year (£m)

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						1775	402	-186	50	805	7	23	3278	880	11	551	7595
2		9471	12895	0	2180	10688	31501	12993	4110	17511	1883	4236	51197	78261	82801	47712	367438
3		12070	6895	98	3496	70198	53393	4209	5334	26529	1138	4229	96157	62349	15883	23920	385900
4		-1	-9			7283	5080	-232	-5	344	40	112	3535	2380	472	988	19987
5		1417	3690			7362	14476	22734	14714	77293	7487	8468	77069	114766	56924	142210	548610
6	2337	20118	72458	8173	5348	22610	11375	57206	55575	99659	11570	9206	45383	-17753	-41443	25760	387580
7	285	26135	34410	4361	15795	11153		26486	35498	39198	4067	4512	16674	58870	24025	55156	356626
8	242	13380	7069	27	27577	49153	29204	21576	19807	58573	14737	12979	206844	177778	131508	138573	909027
9	152	3152	3628	32	13358	51692	37730	3512	21426	41286	15777	9045	136770	136852	55890	56154	586455
10	340	17377	-12812	-140	48753	89703	45941	52863	-7646	5500	3283	10332	282125	137182	31828	-5855	698774
11	15	1822	1979	164	4953	7616	5155	29601	24110	26183	1093	-1236	43869	-8594	-1775	-7116	127839
12	43	6066	7455	994	10506	9236	6633	25262	16591	33934	3745	1326	14900	16169	-3448	5223	154634
13	3734	52841	119643	12881	89713	101796	23476	173795	141771	265646	43285	22425	40264	-78197	-42833	1575	971816
14	2543	86192	86241	6983	86723	140271	263374	201999	115845	192174	23438	34743	-13683	25180	-32875	-43651	1175496
15	563	42555	36677	1878	77602	31442	37407	109228	49198	53399	7323	5455	-20155	-7901	-11091	-30643	382936
16	1115	36220	34322	1171	119465	56547	84854	150496	54350	53524	14446	10886	-26741	-106340	-87438	-161877	235000
Grand Total	11369	328815	414541	36619	505469	668525	650001	891542	550726	991557	153317	136743	957488	591882	178438	248678	7315713

Figure 6-16: Sector benefits for High Growth 2040 Opening Year (£m)

6.2.40. As you expect most of the benefits are from Sector 8, Sector 9 and Sector 10 to Sector, 13, Sector 14, Sector 15 and Sector 16 and vice versa given the traffic movements that the Norwich Western Link is accommodating.

Core Growth (Sensitivity) scenario

6.2.41. Figure 6-17 and Figure 6-18 and shows the sector to sector benefits for the 2025 and 2040 respectively for the Core Growth (Sensitivity) scenario.

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						272	132	-369	10	237	1	17	1972	362	134	211	2978
2		3762	2568		419	9016	8452	3125	1118	4727	326	895	43881	60015	59265	15988	213556
3		2201	1700	23	783	36559	16561	-6867	1053	8582	175	1615	55816	33722	15502	15907	183333
4			69			2993	1925	-522	-1	56	5	69	1447	607	257	646	7550
5		2158	943			12558	5390	-1817	2568	23905	1047	2728	51574	43440	24922	40900	210316
6	432	24183	36496	5484	5305	5291	6690	24553	34367	44664	2917	1564	23187	-2265	-12018	-9507	191346
7	72	4074	6311	810	4608	2536		10832	7734	11640	1331	1364	5277	18541	7415	17347	99891
8	379	3578	5794	122	1416	22068	11199	17024	18720	51892	10345	9784	173431	117016	97762	93607	634137
9	37	581	1218	7	202	27642	11207	-21895	3573	15826	2923	3672	121038	88905	46752	33200	334889
10	280	5463	10965	234	14962	37069	18702	55790	17272	53192	13502	17514	206907	92374	55326	137652	737203
11	0	202	508	26	534	2876	3196	17037	3430	9251	509	2323	24000	13960	3069	7301	88223
12	26	744	2060	222	2343	2509	2876	14154	4813	16638	1180	557	9592	7182	7856	19203	91955
13	2244	40074	60989	6069	37796	5080	5565	115813	76418	141020	22167	4183	-7917	-47980	-36416	-85303	339801
14	485	44721	26329	1035	23822	9325	49010	126516	44445	61441	6389	6902	16766	13430	-2071	15754	444299
15	245	19820	18654	525	37637	-1106	9445	66167	22444	25093	3442	1000	5218	4254	-491	6960	219304
16	623	4995	9340	277	29094	10026	25652	91915	16528	14365	5976	-1854	42416	-48164	-30369	-67888	102931
Grand Total	4823	156557	183944	14835	158922	184713	176000	511457	254495	482528	72232	52334	774604	395397	236895	241978	3901712

Figure 6-17: Sector benefits for Core Growth (Sensitivity) Growth 2025 Opening Year (£m)

Row Labels	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
1						896	323	-185	44	520	4	22	2340	623	-2	246	4832
2		10262	9080	0	1675	9330	20651	11670	4065	16863	1724	3422	40624	63248	63843	39196	295653
3		8674	5836	96	2698	55911	36062	2033	4618	17949	1019	3373	67291	44986	11784	13606	275936
4		1	322			4393	3306	-196	13	206	29	91	2389	1368	135	125	12182
5		3630	2713			7484	9434	16692	13468	75985	7188	6997	62900	96676	45268	127200	475635
6	755	17009	46890	5612	4499	20422	12674	42700	40100	60091	7050	5023	46741	-7206	-24050	-7453	270856
7	195	16990	23088	2840	10389	9144		23570	27715	28953	3425	3822	14201	51855	20016	38602	274805
8	474	11843	7884	53	20693	37378	24536	5926	27348	58831	16352	12813	153777	140481	97598	108695	724683
9	130	2909	3886	24	11168	36407	26238	-449	17479	38042	16419	7924	102730	108884	40461	38125	450376
10	348	15964	-5331	72	51277	56665	31158	56265	11199	6316	11060	8140	190420	90224	12177	-30613	505343
11	10	1554	1327	93	4508	5506	3588	28126	20679	23523	1904	-308	27672	-8817	-1017	-3692	104654
12	62	4845	6142	707	7989	6117	5933	22579	13106	20821	3635	1615	12945	13756	2012	7399	129664
13	2426	39676	74178	8475	66269	67795	18302	119449	87529	143246	25011	9351	15747	-47189	-30519	-66056	533691
14	970	58105	42556	3210	71286	71806	120741	156951	81800	70933	6495	12305	-21151	19954	-23487	-124651	547823
15	182	31230	20023	649	60861	20438	27857	77144	29106	11261	2004	772	-13267	809	-8539	-60647	199885
16	822	31450	23167	622	111592	31010	59791	119358	38872	-12122	9192	3654	-10998	-101881	-76598	-158607	69323
Grand Total	6374	254140	261759	22453	424905	440702	400593	681633	417140	561417	112511	79018	694364	467772	129086	-78525	4875341

Figure 6-18: Sector benefits for Core Growth (Sensitivity) 2040 Opening Year (£m)

6.2.42. As you expect most of the benefits are from Sector 8, Sector 9 and Sector 10 to Sector, 13, Sector 14, Sector 15 and Sector 16 and vice versa given the traffic movements that the Norwich Western Link is accommodating.

6.3 ACCIDENT ASSESSMENT RESULTS

6.3.1. An appraisal of accident savings has been undertaken using the DfT COBALT-LT (V2.0 Beta) spreadsheet tool. This tool applies accident rates to traffic flows extracted from the traffic model to predict the change in the number of accidents with and without the scheme in place. The COBALT network is included in Appendix C.

CORE GROWTH SCENARIO

6.3.2. The number of accidents calculated for the Core Growth scenario over the 60-year appraisal period is shown in Table 6-15.

Table 6-15: Total Accidents – Core Growth scenario

Scenario	Total Accidents		Number of Accidents saved by scheme
	Without Scheme	With Scheme	
Core Growth	35,433	34,904	529

6.3.3. Based on the number of accidents the number of casualties is then calculated. The total casualties over the 60-year appraisal period are summarised in Table 6-16.

Table 6-16: Total Casualties - Core Growth scenario

Scenario	Casualties						Total Casualties saved by scheme		
	Without Scheme			With Scheme					
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
Core Growth	381	4,751	42,827	379	4,696	42,211	2	56	616

6.3.4. The total number of casualties that the scheme is predicted to save has been monetised using the TAG 2020 parameters. The total accident benefits are summarised in Table 6-17.

Table 6-17: Total Benefits (£000s) - Core Growth scenario

Scenario	Accident Costs		Accident Benefits saved by scheme
	Without Scheme	With Scheme	
Core Growth	1,531,387	1,512,806	18,582

6.3.5. The COBALT-LT assessment for the Core Growth scenario has predicted that the scheme will generate over £18.582m in accident saving benefits. This benefit will be included within the overall Core Growth scenario Present Value of Benefits (PVB) of the scheme.

LOW GROWTH SCENARIO

6.3.6. The number of accidents calculated for the Low Growth scenario over the 60-year appraisal period is shown in Table 6-18.

Table 6-18: Total Accidents - Low Growth scenario

Scenario	Total Accidents		Number of Accidents saved by scheme
	Without Scheme	With Scheme	
Low Growth	31,549	31,162	386

6.3.7. Based on the number of accidents the number of casualties is then calculated. The total casualties over the 60-year appraisal period are summarised in Table 6-19.

Table 6-19: Total Casualties - Low Growth scenario

Scenario	Casualties						Total Casualties saved by scheme		
	Without Scheme			With Scheme					
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
Low Growth	339	4,226	38,140	338	4,188	37,690	1	38	451

6.3.8. The total number of casualties that the scheme is predicted to save has been monetised using the TAG 2020 parameters. The total accident benefits are summarised in Table 6-20.

Table 6-20: Total Benefits (£000s) - Low Growth scenario

Scenario	Accident Costs		Accident Benefits saved by scheme
	Without Scheme	With Scheme	
Low Growth	1,366,023	1,353,230	12,793

6.3.9. The COBALT-LT assessment for the Low Growth scenario has predicted that the scheme will generate £12.793m in accident saving benefits. This benefit will be included within the overall Low Growth scenario PVB of the scheme.

HIGH GROWTH SCENARIO

6.3.10. The number of accidents calculated for the High Growth scenario over the 60-year appraisal period is shown in Table 6-21.

Table 6-21: Total Accidents - High Growth scenario

Scenario	Total Accidents		Number of Accidents saved by scheme
	Without Scheme	With Scheme	
High Growth	41,319	40,909	410

6.3.11. Based on the number of accidents the number of casualties is then calculated. The total casualties over the 60-year appraisal period are summarised in Table 6-22.

Table 6-22: Total Casualties - High Growth scenario

Scenario	Casualties						Total Casualties saved by scheme		
	Without Scheme			With Scheme					
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
High Growth	425	5511	49745	426	5475	49282	0	37	463

6.3.12. The total number of casualties that the scheme is predicted to save has been monetised using the TAG 2020 parameters. The total accident benefits are summarised in Table 6-23.

Table 6-23: Total Benefits (£000s) - High Growth scenario

Scenario	Accident Costs		Accident Benefits saved by scheme
	Without Scheme	With Scheme	
High Growth	1,764,526	1,751,748	12,778

6.3.13. The COBALT-LT assessment for the High Growth scenario has predicted that the scheme will generate £12.778m in accident saving benefits. This benefit will be included within the overall High Growth PVB of the scheme.

CORE GROWTH (SENSITIVITY) SCENARIO

6.3.14. The number of accidents calculated for the Do Minimum and Do Something over the 60-year appraisal period is shown in Table 6-24.

Table 6-24: Total Accidents - Core Growth (Sensitivity) scenario

Scenario	Total Accidents		Number of Accidents saved by scheme
	Without Scheme	With Scheme	
Core Growth (Sensitivity)	35,294	34,862	432

6.3.15. Based on the number of accidents the number of casualties is then calculated. The total casualties over the 60-year appraisal period are summarised in Table 6-25.

Table 6-25: Total Casualties - Core Growth (Sensitivity) scenario

Scenario	Casualties						Total Casualties saved by scheme		
	Without Scheme			With Scheme					
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
Core Growth (Sensitivity)	377	4729	42646	377	4687	42148	1	42	498

6.3.16. The total number of casualties that the scheme is predicted to save has been monetised using the TAG 2020 parameters. The total accident benefits are summarised in Table 6-26.

Table 6-26: Total Benefits (£000s) - Core Growth (Sensitivity) scenario

Scenario	Accident Costs		Accident Benefits saved by scheme
	Without Scheme	With Scheme	
Core Growth (Sensitivity)	1,295,015	1,283,519	11,496

6.3.17. The COBALT-LT assessment for the Core Growth (Sensitivity) scenario has predicted that the scheme will generate £11.496m in accident saving benefits. This benefit will be included within the overall present value benefits of the scheme.

SUMMARY

6.3.18. Table 6-27 summarises the accident benefits saved by the Norwich Western Link scheme.

Table 6-27: Summary of COBALT benefits (£m)

Scenario	Accident Benefits saved by scheme
Core Growth	18.582
Low Growth	12.793
High Growth	12.778
Core Growth (Sensitivity)	11.496

6.4 DELAYS DURING CONSTRUCTION

6.4.1. Construction plans are still to be produced however most of the Norwich Western Link scheme will be built off-line i.e. connection to the Highways England A47 North Tuddenham to Easton scheme at the southern end as shown in Figure 1-3. There will have to be traffic management when the connection between the Norwich Western Link scheme and the A1067 Fakenham Road however it is felt that this would not affect the Benefit to Cost Ratio (BCR) in a meaningful way.

6.5 PHYSICAL ACTIVITY

6.5.1. Physical activity is concerned with whether the intervention is likely to generate significant additional numbers of walking or cycling trips. The assessment has been undertaken in line with the following guidance:

- TAG Unit A5.1 Active Mode Appraisal
- TAG Unit A5.5 Highway Appraisal
- Design Manual for Roads and Bridges (DMRB) LA 112.

6.5.2. The methodology for monetising the scheme impacts has focused on estimating the increase in the amount of cycling and walking associated with implementing the scheme. The method considers:

- Mode shift
- Changes to health
- Changes to journey quality

6.5.3. DfT's Active Mode Appraisal Toolkit (AMAT), has been utilised to understand the likely impact of the scheme. The tool monetised costs and benefits for the following impacts:

- Congestion benefit
- Infrastructure
- Accidents
- Local Air Quality
- Noise
- Greenhouse Gases (GHG)
- Reduced risk of premature death
- Absenteeism
- Journey Ambience
- Indirect Taxation.

6.5.4. The active mode appraisal has been conducted over a 20-year appraisal period, in line with TAG Unit A5.1. The benefits have been discounted and reported in present values using the schedule of discount rates provided in the TAG data book (July 2020). Again, in line with TAG, the values have included real growth in line with forecast GDP per capita. The assumptions used within the appraisal are based on scheme data, Travel-to-Work Census data and default TAG values from the AMAT.

6.5.5. A sustainable transport strategy has been developed through public and key stakeholder consultation, seeking to maximise opportunities for transferring shorter distance band trips to non-motorised modes of travel such as walking and cycling where possible. The Sustainable Transport Strategy is three-fold - it includes a Non-Motorised User Strategy, wider interventions for creating 'cycle friendly' strategic routes and a bus strategy.

6.5.6. To inform the development of Non-Motorised User interventions, a Walking, Cycling and Horse-Riding Assessment (WCHRA) has been undertaken as part of the scheme design process. This has been used to identify the routes used by pedestrians and others and the community facilities which are likely to be affected by the scheme.

6.5.7. The Non-Motorised User (NMU) Strategy element predominantly consists of Public Rights of Way diversions and extension of the PRoW network in the immediate vicinity of the Norwich Western Link highway works, which also helps to mitigate severance issues caused by the road, where existing routes that cross the scheme are to be closed. The proposed NMU strategy also assists with joining up what was found through the WCHAR process to be an existing but fragmented local PRoW network with limited coverage and in some cases poor connectivity to existing settlements.

6.5.8. Eight potential sustainable transport measures across the wider area were consulted on. Following the consultation four of the eight measures were identified to be delivered as part of the Norwich Western Link scheme.

6.5.9. The impacts on Physical Activity have been assessed with DfT's AMAT for three of the four shortlisted options. Based on the AMAT results as included in Appendix D, the Norwich Western Link is forecast to have a beneficial impact of £8.9 million.

6.6 AIR QUALITY

6.6.1. The appraisal has been undertaken following TAG Unit A3 on Air Quality Impacts with the Air Quality worksheet included as Appendix E.1.

6.6.2. With the Norwich Western Link there are modest improvements in local air quality in terms of NO_2 and $PM_{2.5}$ at locations with relevant human exposure. The overall monetary valuation takes into account ecosystem damage costs. No Air Quality Management Areas are included in the air quality study area. The Norwich Western Link links map onto Pollution Climate Mapping links which are all compliant with the NO_2 limit value both with and without the scheme. No exceedances of air quality standards are predicted.

NO_2

6.6.3. In 2025 there are there are 7,860 properties with improvement, 35 properties with no change, and 2,180 properties with deterioration. In 2040 there are 7,733 properties with improvement, 32 properties with no change, and 2,310 properties with deterioration.

6.6.4. The Net Present Value (NPV) of change for NO_2 over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £9,803.

$PM_{2.5}$

6.6.5. In 2025 there are 8,002 properties with improvement, 6 properties with no change, and 2,067 properties with deterioration. In 2040 there are 7,747 properties with improvement, 282 properties with no change, and 2,046 properties with deterioration.

6.6.6. The NPV of change for $PM_{2.5}$ over the 60-year appraisal period (2025-2084 inclusive) is a benefit of £62,165.

6.7 GREENHOUSE GASES

6.7.1. The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 Greenhouse Gases. The calculations are based on the traffic forecasts for the Do Minimum and Do Something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the NATS 2019 traffic model for the OBC. Non-traded CO_2e emissions (petrol and diesel vehicles) and CO_2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114 'Climate' methodology.

6.7.2. The Norwich Western Link scheme gives rise to lower CO_2e emissions compared to the Do-Minimum situation, with savings (benefits) over the 60-year appraisal period (2025 - 2084 inclusive) of 443,429 tonnes in non-traded carbon associated with conventional (petrol and diesel) vehicles, and 13,005 tonnes from traded carbon associated with electric vehicles (i.e. electrical power generation sources).

6.7.3. The differences are generally associated with lower values of total annual vehicle kilometres in each year that are predicted due to the Norwich Western Link scheme. For 2025, the distance travelled over the simulated road network is predicted to be approximately 4,136 million vehicle kilometres in the Do-Minimum scenario compared to 4,087 million vehicle kilometres in the Do-Something scenario - a reduction of approximately 49 million vehicle kilometres. For 2040, the distance travelled over the simulated road network is predicted to be approximately 4,904 million vehicle kilometres in the Do-Minimum scenario compared to 4,767 million vehicle kilometres in the Do-Something scenario - a reduction of approximately 137 million vehicle kilometres.

6.7.4. Over the 60-year appraisal period, the monitised benefit in terms of carbon savings from the operation of vehicles in the road transport sector due to the Norwich Western Link scheme is estimated at £19,474,620. The Greenhouse Gases worksheet is included as Appendix E.2.

6.8 NOISE

6.8.1. A noise appraisal has been undertaken following the methodology presented in TAG Unit A3, Environmental Impact Appraisal (May 2019).

6.8.2. A 3-dimensional digital acoustic model has been generated based on the guidance contained within Calculation of Road Traffic Noise and the DMRB LA 111.

6.8.3. The affected population has been estimated and the monetary valuation of changes in noise impact has been determined using the TAG Unit A3 Noise Appraisal Workbook.

6.8.4. The overall appraisal indicates that the operation of the Norwich Western Link, without mitigation, is likely to generate a beneficial noise impact, and the 'net present value of change in noise' is calculated to be £38,490. The Noise worksheet is included as Appendix E.3.

6.9 PUBLIC ACCOUNTS

6.9.1. Table 6-28 shows the Public Accounts for the Norwich Western Link scheme with the TAG worksheets included in Appendix F.

Table 6-28: Public Accounts (PA) for the scheme

User	Item	Core Growth (£m)	Core Growth (Sensitivity Assessment) (£m)	Low Growth (£m)	High Growth (£m)
Central government funding	Investment costs	£127.129	£127.129	£127.129	£127.129
Central government: non-funding	Indirect tax revenues	-£53.272	-£39.398	-£46.916	-£59.742
Broad transport budget		**£127.129**	**£127.129**	**£127.129**	**£127.129**
Wider public finances		**-£53.272**	**-£39.398**	**-£46.916**	**-£59.742**

6.9.2. The broad transport budget for the Norwich Western Link scheme is **£127.129m**.

6.10 INITIAL BENEFIT COST RATIO (BCR)

6.10.1. The Benefit to Cost Ratio (BCR) considers the impact to the economy, society, the environment and the public accounts. It offers an estimate of the value of benefit generated for every £1 of public expenditure. Therefore, any BCR above one shows a value for money for every £1 of invested cost. The Value for Money (VfM) category is defined by the BCR, these are:

- BCR <0.0 Very Poor
- BCR between 0.0 and 1.0 Poor
- BCR between 1.0 and 1.5 Low
- BCR between 1.5 and 2.0 Medium
- BCR between 2.0 and 4.0 High
- BCR > 4.0 Very High.

6.10.2. The initial BCR includes the monetised impacts associated with Economy for business users and providers, Environment for Greenhouse Gases, Air Quality, Noise, Social for non-business users, physical activity and safety, and Public Accounts for the cost to the broad transport budget and indirect tax.

6.11 ANALYSIS OF MONETISED COSTS AND BENEFITS (AMCB)

6.11.1. Table 6-29 outlines a summary of the results from TUBA for each scheme, providing the Analysis of Monetised Costs and Benefits (AMCB) for the proposed Norwich Western Link scheme. Values are rounded to the nearest million.

Table 6-29: Analysis of Monetised Costs and Benefits (AMCB)

Item	Core Growth (£m)	Core Growth (Sensitivity Assessment) (£m)	Low Growth (£m)	High Growth (£m)
Noise	£0.038	-	-	-
Air Quality	£0.072	-	-	-
Greenhouse Gases (Environmental assessment)	£19.475	-	£17.445	-
Physical Activity	£8.876	£8.876	£8.876	£8.876
Accidents	£18.582	£11.496	£12.793	£12.778
Economic Efficiency: Consumer Users (Commuting)	£58.488	£43.158	£52.234	£84.319
Economic Efficiency: Consumer Users (Other)	£167.804	£140.112	£142.272	£208.363
Economic Efficiency: Business Users and Providers	£88.569	£69.491	£70.836	£116.071
Wider Public Finances (Indirect Tax Revenues)	-£53.272	-£39.398	-£46.916	-£59.742
Present Value of Benefits (PVB)	**£308.632**	**£233.735**	**£257.540**	**£370.665**
Present Value of Costs (PVC)	**£127.129**	**£127.129**	**£127.129**	**£127.129**
OVERALL IMPACTS				
Net Present Value (NPV)	**£181.503**	**£106.606**	**£130.411**	**£243.536**
Initial Benefit to Cost Ratio (BCR)	**2.43**	**1.84**	**2.03**	**2.92**

Note: This is not a direct comparison as only the Core Growth scenario includes impacts for Noise, Air Quality and Greenhouse Gases. The Low Growth scenario includes Greenhouse Gases impacts.

6.11.2. Therefore, based on the scheme impacts and costs the scheme has an initial Value for Money (VfM) category of High for the Core Growth scenario.

6.11.3. Considering the other scenario tests the initial VfM category is in the range of Medium for the Core Growth (Sensitivity Assessment) scenario and High VfM for the Low Growth scenario and High Growth scenario.

6.11.4. The monetised benefits for the scheme range from **£233.735m** for the Core Growth (Sensitivity Assessment) scenario to **£370.665m** for the High Growth scenario.

6.11.5. The Core Growth (Sensitivity Assessment) scenario returns the lowest monetised benefits, followed by the Low Growth scenario and the Core Growth scenario, with the highest monetised benefits returned by the High Growth scenario.

6.11.6. The Analysis of Monitised Costs and Benefits (AMCB) TAG worksheets are included in Appendix G.

6.11.7. With the current present value of costs none of the growth scenarios assessed are in the Low VfM category. For the scheme outputs to sit in a different category the costs of the scheme would need to change.

6.11.8. Looking at the Core Growth scenario, and assuming no change to the monetised benefits, the scheme costs would need to increase by £27.962m (22.00%) for the BCR of the scheme to sit in the next category down i.e. Medium.

6.12 LEVEL 2 IMPACTS

RELIABILITY IMPACTS

6.12.1. Travel time variability (TTV), is defined as variation in journey times that travellers are unable to predict. Journey times vary due to a large number of factors including the time of day, the location of the origin and destination, the distance and the roads along the route.

6.12.2. The standard deviation of travel time (for private travel) has been used as the method to measure travel time variability. The travel distance, time and number of vehicles making the journey have been extracted from the traffic model for each time period for the Do Minimum and Do Something scenario to allow the standard deviation to be calculated for each journey and time period.

6.12.3. Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) using the relationships shown in Figure 6-10, based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair.

Reliability benefit $= -\sum \Delta\sigma_{ij} \left(\frac{T_{ij2}+T_{ij1}}{2}\right) \times 0.4 \times VOT$

Where: $\Delta = 0.0018\left((t_{ij2})^{2.02} - (t_{ij1})^{2.02}\right) d_{ij}^{-1.41}$

VOT = value of time (£/sec)

t_{ij1} and t_{ij2} = the journey times, before and after the change, from i to j (seconds)

d_{ij} = the journey distance from i to j (km)

Figure 6-19: Reliability impacts

6.12.4. The reliability impacts for the Norwich Western Link over the 60-year appraisal period have been calculated as **£26.291m** (2010 prices discounted to 2010).

WIDER ECONOMIC IMPACTS

6.12.5. As set out in the Economic Narrative, Level 2 wider economic impacts associated with enhanced connectivity due to the Norwich Western Link scheme have been assessed.

6.12.6. WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used. The tool has been approved by the DfT and has been used in the analysis of other projects, including the Trans-Pennine scheme. The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG Unit A2.1 to TAG Unit A2.4:

- Agglomeration - the concentration of economic activity in an area can be improved by transport schemes as accessibility between businesses and workers is improved by reduced journey times, thus generating productivity benefits from the 'closer' proximity
- Changes to tax revenues arising from labour supply impacts - changes in transport costs can incentivise individuals to work, the number choosing to work and thus the amount of labour supplied in the economy. The changes in tax revenues associated with these impacts are not captured within commuter user benefits but are included within the Wider Impacts in Transport Appraisal (WITA) tool
- Output change in imperfectly competitive markets - a reduction in transport costs (for business and freight) allows businesses to profitably increase their output (goods and services) that require the use of transport in their production.

6.12.7. Agglomeration impacts arise from improving accessibility to an area for businesses and workers as they can cluster together and benefit from improved productivity. The Norwich Western Link scheme will improve connectivity between different areas within Greater Norwich and Norwich, the latter a key economic hub for employment and services in East Anglia. The Western Link will bring firms closer together and generate a total increase in GDP, as existing workers become more productive due to connectivity improvements.

6.12.8. With the scheme in place, impacts will also be felt by those making commuting journeys as well as currently unemployed people looking to enter the labour market. If commuting costs fall, then the net returns from working increase. This could influence the trade-off decisions people need to make; whether or not they choose to work or how much they choose to work. The private benefits to these people are captured in transport user benefits. The value of time used for travel time savings does not include exchequer benefits that accrue when people make different decisions about employment as a result of a transport scheme.

6.12.9. Companies will benefit from time savings due to the scheme, which is effectively a reduction in production costs, incentivising firms to increase their output whilst maintaining an attractive profit margin. Firms can pass on these cost savings to consumers, reflecting a net benefit to consumers which is in addition to the transport cost change.

6.12.10. As there is more certainty surrounding these types of wider economic impacts compared to the high-level impacts covered under Level 3, they will be included in the Adjusted BCR for the Norwich Western Link scheme and are thus a key part of the overall economic case for the scheme.

6.12.11. Agglomeration improvements are in scope for the Norwich Western Link scheme as:

- It is located within one of the DfT Functional Urban Regions (FUR)
- The scale of journey time improvements (and other improvements generating a significant decrease in drivers' generalised costs) will mean that agglomeration impacts are likely to be significant.

RESULTS

Agglomeration with Other Modes adjustment

6.12.12. The agglomeration impacts are calculated across the four sectors of the economy within the appraisal guidance. Table 6-30 presents the agglomeration impacts across the Construction, Consumer Services, Manufacturing and Producer Services sectors.

6.12.13. To represent travel by all modes within the average cost calculations, an allowance has been made to account for the impact of the other modes. To account for public transport, walking and cycling, the proportion of car driver trips for each Local Authority District (LAD) examined in the WITA analysis was extracted from the TEMPro database. Adjustment factors were calculated for each WITA zone based on the proportion of car trips compared to total trips. These factors were applied to the WITA agglomeration and labour supply impacts. This is based on data for the year 2020 from the TEMPro database.

Table 6-30: Agglomeration Benefits

Agglomeration Sector	Original Benefits (£m, 2010 prices and values)	Adjusted for other modes (£m, 2010 prices and values)
Manufacturing	18.039	8.784
Construction	16.208	7.929
Consumer Services	51.394	24.616
Producer Services	99.102	47.928
Sub-Total	**184.744**	**89.257**

6.12.14. The agglomeration impacts form the majority of total wider impacts with Producer Services accounting for the largest proportion of agglomeration benefits at 54% of the adjusted total. This is where the scheme will have the largest impacts in terms of reductions in Generalised Travel Costs.

6.12.15. This is closely followed by Consumer Services with Construction capturing the fewest benefits. A breakdown of the agglomeration benefits by Local Authority District is provided in Table 6-31.

Table 6-31: Agglomeration Benefits by Local Authority District

Local Authority	Original Agglomeration Benefits (£m, 2010 prices and values)	Adjusted for other modes (£m, 2010 prices and values)
Breckland	48.562	23.878
Broadland	41.413	21.640
Norwich	27.678	11.133
South Norfolk	11.345	5.986
Great Yarmouth	13.391	5.972
King's Lynn and West Norfolk	27.666	13.579
North Norfolk	14.689	7.070
Total	**184.744**	**89.257**

6.12.16. The greatest agglomeration benefits are in Broadland and Breckland (51% of the adjusted total) as this is where the scheme is located[2] and will have the largest impact in terms of improving accessibility. As stated above, the WITA analysis is only looking at benefits attributed to Zones within the study area (Norfolk only).

6.12.17. The results above are impacted by the fact the Western Link would be located in one of the DfT core Functional Urban Regions (FUR) and has a substantial economic hinterland surrounding Norwich. This means that a significant new infrastructure investment such as the Western Link will generate agglomeration improvements in this relatively urbanised area via the substantial improvements in journey times. Of particular note is the fact that Norwich is the only FUR in the East of England, thus reinforcing the point that the city is a major regional generator of economic activity and will benefit further from the scale of transport connectivity associated with a scheme such as the Western Link.

Output change in imperfectly competitive markets

6.12.18. The total additional benefits arising due to output change in imperfectly competitive markets is approximately **£7.881m** and assumes that benefits would be incurred across all time periods. This shows the extent to which business users benefit from improved accessibility in Norwich as well as the subsequent reductions in congestion brought about by the scheme.

2 The scheme is mostly within Broadland and is on the boundaries with both Breckland and South Norfolk

Labour supply impacts

6.12.19. The total benefits arising due to labour supply impacts over the 60-year appraisal period are approximately **£0.330m**. These impacts are considered to be very minor as the analysis only considers the increased tax revenues associated with changes in the labour supply to be additional at UK level. Calculations for this element are based on the link between the cost of commuting and the increase in labour supply.

SUMMARY

6.12.20. A summary of the wider economic impacts is presented in Table 6-32.

Table 6-32: Summary of Results

Summary of Wider Economic Impact	Benefits (£m, 2010 prices and values)
WI1: Agglomeration impacts	89.257
WI2: Output change in imperfectly competitive markets impacts	7.881
WI3: Tax revenues arising from labour market impacts	0.330
Total Wider Impact Benefits	**97.468**

6.12.21. The WITA analysis shows that the scheme is expected to deliver approximately **£97.468m** of wider economic impacts. The highest contributions come from agglomeration impacts and output change in imperfectly competitive markets impacts. This suggests that businesses will benefit greatly from the enhanced connectivity and consequent congestion reductions brought about by the scheme.

6.12.22. With respect to the scale of these likely agglomeration impacts, it is worth noting that although TAG guidance suggests that these can range between 10% and 30% of user benefits, the agglomeration impacts can be above this threshold. For the Norwich Western Link the agglomeration impacts represent 29% of user benefits. As discussed earlier, agglomeration improvements are expected to be significant for the Norwich Western Link, driven by:

- it is located within the Norwich FUR
- the scale of generalised travel cost savings generated by the scheme.

6.13 ADJUSTED BENEFIT TO COST RATIO

6.13.1. The DfT guidance recommends that this Initial BCR be modified to include additional elements from the AST to create an Adjusted BCR.

6.13.2. The additional impacts which have been monetised are:

- Reliability
- Output change in imperfectly competitive markets impacts
- Agglomeration
- Labour supply impacts.

6.13.3. Following DfT guidance, the monetised values to be extracted from the Appraisal Summary Table (AST) are set out in Table 6-33.

Table 6-33: Adjusted BCR calculation for the Core Growth scenario

Impact	Core Growth (£m)
Initial Present Value of Benefits (PVB)	**£308.632**
Reliability	£26.291
Output Change	£7.881
Agglomeration	£89.257
Labour Supply	£0.330
Adjusted Present Value of Benefits (PVB)	**£432.391**
Present Value of Costs (PVC)	**£127.129**
Net Present Value (NPV)	**£305.262**
Benefit Cost Ratio (BCR)	**3.40**

6.13.4. Following the inclusion of wider economic impacts in appraisal the BCR increases to **3.40** and remains in the High VfM category.

6.14 LEVEL 3 IMPACTS

ENVIRONMENTAL IMPACTS

6.14.1. A qualitative assessment has been undertaken for the following impacts:

- Landscape/Townscape
- Historic Environment
- Biodiversity
- Water Environment

6.14.2. The methods used in undertaking the environmental appraisal followed the principles set out in TAG Unit A3 Environmental Impact Appraisal (December 2015).

6.14.3. The following paragraphs provide a summary of the appraisal and results.

Landscape

6.14.4. The landscape is predominantly gently undulating arable farmland, with plateau to the south, located between two shallow river valleys. River Tud in the south and River Wensum in the north being the larger of the valleys with noticeable difference in character of wet meadow and mosaic of lakes and drainage ditches.

6.14.5. There is some human influence, of note is the overhead line and two wind turbines to the west, with the A47 and A1067 roads noticeable from the plateau. Settlement is sparse, mainly small farmsteads - the biggest settlement is Honingham located to the south.

6.14.6. Land cover is predominately arable fields, contained by clipped hedgerow and infrequent mature trees, with some fields turned to pig rearing. Mixed plantation woodland is common throughout this landscape, often following field boundaries. Roads are generally small lanes, gently curved, and following the field boundaries.

6.14.7. The Norwich Western Link would alter the local landscape character through the introduction of the viaduct, loss of woodland and the width of the new road (dual carriageway). There would be subdivision of fields and sections of embankment and cutting through the landscape which would affect the field pattern and tranquillity locally, however, the viaduct would have a wider impact introducing a new feature into this landscape and will have a significant impact on tranquillity in the north.

6.14.8. The Norwich Western Link would have a **moderate adverse** effect on the Landscape with the TAG worksheet included as Appendix E.4.

6.14.9. **The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**.

Historic Environment

6.14.10. The Norwich Western Link would have a **moderate adverse** effect on the setting (context) of listed buildings located beyond the site boundary. It will adversely affect the appreciation and understanding of the characteristic historic environmental resource. Impacts may be mitigated by design, such as the introduction of screening or an appropriate road lighting scheme.

6.14.11. The Norwich Western Link also would result in a number of **low, moderate** or **major adverse** effects on the undesignated heritage assets recorded on the Historic Environment Records along with any previously unrecorded buried heritage assets. The impacts can be reduced where feasible and warranted, through either mitigation by design, allowing remains to be preserved in-situ, or through preservation by record (i.e. archaeological excavation).

6.14.12. The TAG worksheet is included as Appendix E.5

6.14.13. Further surveys are planned in 2021 which will complete the Archaeological baseline and will feed into the future assessment work for the Norwich Western Link.

6.14.14. **The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**.

Biodiversity

6.14.15. The TAG assessment has concluded that there are **Large Adverse** impacts on the following features:

- Bats (all species) including barbastelle bat.

6.14.16. The Norwich Western Link will result in the loss of foraging habitat for bats including barbastelle bat through the removal of woodland. A compensation strategy for the loss of woodland is currently being developed and will involve the enhancement of existing woodlands to benefit bats and the creation of new woodland areas.

6.14.17. The area for woodland enhancement and creation being targeted is within the 6km Core Sustenance Zone for the known barbastelle bat maternity and pre-maternity roosts.

6.14.18. In line with TAG guidance this compensation strategy cannot be accounted for in the appraisal and therefore the magnitude of impact has been precautionarily assessed as Intermediate Negative, making the Assessment Score Large Adverse.

6.14.19. It should be noted that the assessment of the magnitude of impact on bats of **Intermediate Negative** is based on the important commuting routes being adequately mitigated for through the provision of the following;

- viaduct across the River Wensum and associated floodplain habitat
- three wildlife underpasses - in The Nursery woodland in the north, along Ringland Lane (dual use) and along the stream south of the Foxburrow Plantation in the south
- three green bridges - along the Broadway, in the Foxburrow Plantation and along the hedgerow north of Weston Road
- other mitigation measures are being considered to reduce severance impacts.

6.14.20. The TAG assessment has concluded that there are Moderate Adverse impacts on the following features:

- Wensum Pastures at Morton Hall County Wildlife Site (CWS)
- Land adjoining Foxburrow Plantation CWS
- Broom & Spring Hills CWS
- Primrose Grove CWS
- Fakenham Road Roadside Nature Reserve (RNR)
- Ancient/veteran trees
- Important Hedgerows
- Wet Woodland Habitat of Principal Importance (HPI)
- Lowland mixed deciduous woodland HPI.

6.14.21. A Moderate Adverse impact is expected on the above CWS's due to habitat loss and/or severance which could impact the integrity of the CWS. A compensation strategy will be devised for the loss of habitat, and an underpass will be included to ensure the stream within the Land adjoining Foxburrow Plantation will maintain flow post construction into the River Tud.

6.14.22. The Fakenham Road RNR is designated because of the presence of hoary mullein *Verbascum pulverulentum*. This site will be lost due to the construction of the Norwich Western Link. A compensation strategy will be developed which will aim to recreate the habitat and lead to an increase in hoary mullein within the study area.

6.14.23. Approximately twelve ancient/veteran trees will be removed as a result of the Norwich Western Link scheme. A strategy for ancient/veteran trees is under development which will help to compensate for the loss of the trees however they are regarded as an irreplaceable habitat.

6.14.24. It is anticipated that two hedgerows that met the criteria for 'Important' under the Hedgerows Regulations 1997 will be directly impacted by the scheme. Mitigation will involve creation, enhancement and translocation.

6.14.25. The Norwich Western Link bisects areas of lowland mixed deciduous woodland and wet woodland HPI. The woodland to be lost is not ancient. As part of the compensation strategy new woodland will be planted and existing woodland will be enhanced for biodiversity benefit in the longer term.

6.14.26. The assessment for all other features ranges from slight adverse or neutral impacts based on the adoption of preliminary mitigation and compensation measures.

6.14.27. This assessment is based on the data which has been collected and analysed up to December 2020. It is a provisional impact assessment and has been undertaken before the Ecological Impact Assessment, Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) assessment have been completed.

6.14.28. The overall assessment score for the Norwich Western Link scheme is a **Large Adverse** Impact due to the loss of woodland foraging habitat for bats including the barbastelle bat. As detailed above, a strategy for woodland creation and enhancement is currently being developed which will help to compensate for the habitat loss.

6.14.29. The TAG worksheet is included as Appendix E.6.

6.14.30. Further surveys are planned in 2021 which will complete the ecological baseline and will feed into the future assessment work for the Norwich Western Link scheme.

6.14.31. **The Environmental Statement will contain more detailed design information and a more thorough impact assessment (in line with CIEEM guidelines) subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**.

Water Environment

6.14.32. The overall Summary Assessment score for the Norwich Western Link is predicted to be **Moderate Adverse.** This is attributable to the high importance to the River Wensum and the **Negligible** impact on the ecological and hydromorphological quality of the River Wensum and the low risk associated with works to the new bridge crossing. A **Moderate Adverse** impact is predicted to the tributary of the River Tud; the River Wensum mapped fluvial floodplain; and the underlying groundwater body (combined superficial and bedrock aquifer). Measures are being developed to further mitigate and compensate for these issues.

6.14.33. A conservative approach to the loss of floodplain has been taken until quantitative analysis of potential effects is undertaken to inform the need for compensatory storage or other mitigation.

6.14.34. The TAG worksheet is included as Appendix E.7.

6.14.35. **The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**.

DISTRIBUTIONAL IMPACTS

6.14.36. Distributional Impacts (DI) across the eight categories (Table 6-34) are reported in full in the Distributional Impacts Report. The appraisal has been undertaken in accordance with TAG Unit A4.2: Distributional Impact Appraisal. The appraisal process consists of three major steps:

- Screening Process (Step 1) - identification of likely impacts for each indicator
- Assessment (Step 2) - identification of impact area, social groups and amenities
- Appraisal of impacts (Step 3) - analysis of impacts, full appraisal and input into Appraisal Summary Table (AST).

6.14.37. The results of the appraisal process are summarised in the following sections.

Screening

6.14.38. Each indicator has been assessed individually using the TAG screening proforma. The output of this assessment determines whether the intervention needs to be assessed further. Consideration has been given to:

- Whether there might be positive or negative impacts on different social groups
- If changes to scheme design can mitigate any potential negative impacts
- How dispersed the impact is likely to be, to understand if the scale of the impact is disproportionate to the potential impact.

6.14.39. A summary of the screening outcomes and decision on whether to progress to the next step is included in Table 6-34.

Table 6-34: Initial Screening

Impact Area	Conclusion	Next Step
User Benefits	There are likely to be beneficial impacts with respect to journey time, based on the SOBC TUBA analysis	Proceed to Step 2
Noise	The SOBC assessment estimated minor impacts both adverse and beneficial with respect to a change in road traffic generated noise levels	Proceed to Step 2
Air Quality	The SOBC assessment indicated adverse impacts for air quality and greenhouse gases emissions	Proceed to Step 2
Accidents	The new link is likely to attract traffic currently using low standard rural routes and congested urban routes. The new link will have reduced number of junctions and will be designed to current standards	Proceed to Step 2
Security	There is no planned change to public transport waiting/interchange facilities with the scheme	Do not proceed to step 2
Severance	The new link is likely to sever existing PRoWs	Proceed to Step 2
Accessibility	There is no planned change to public transport services routing or timings or provision with the scheme	Do not proceed to step 2
Affordability	The scheme will have an impact on car fuel and non-fuel operating costs, only. As a result of rerouting it is expected that there will be changes to these costs. For car fuel and non-fuel operating costs, the outputs from TUBA can be used, and indicate positive benefits. The remaining areas of affordability (parking charges, road user charges, public transport fares and concession availability) are not affected by the scheme	Proceed to Step 2

Assessment

6.14.40. The assessment stage investigated the impacts in more detail to confirm where both spatial impacts will be experienced, and where socio-economic, social and demographic characteristics needed to be considered further.

6.14.41. The area impacted by the Norwich Western Link scheme will vary for each indicator.

6.14.42. Analysis of the characteristics of people in the area likely to be affected has been undertaken by mapping social characteristics at Lower Super Output Area (LSOA) levels. Table 6-35 shows the groups of people that need to be identified in the analysis for each indicator.

Table 6-35: Socio-demographic analysis for DI

Dataset/ Social Group	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young Adults: proportion of population aged 16-25				✓			✓	
Older People: proportion of population aged 70+		✓		✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children.							✓	

Source: TAG Unit A4.2 Table 2

6.14.43. The assessment output summary is set out in Table 6-36.

Table 6-36: Assessment (Step 2) Output summary

Social group and amenities indicators			User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Resident population in the impact Area	Income Distribution Quintiles	0-20%	12.3	0	4.9					12.3	12.0%	12..5%	20.1%
		20%-40%	12.8	0	6.7					12.8	12.6%	14.3%	20.0%
		40%-60%	26.6	17.4	19.5					26.6	27.0%	34.2%	20.0%
		60%-80%	31.3	82.6	52.3					31.3	31.6%	26.4%	20.0%
		80%-100%	17.0	0	16.5					17.0	16.9%	12.5%	19.9%
	Children <16			17.8	18.3						16.1%	15.8%	17.6%
	Young People				11.6						12.7%	11.9%	13.2%
	Older People			9.5							13.3%	14.4%	10.9%
	People with a disability										25.7%	27.0%	25.9%
	Black Minority Ethnic										4.2%	3.5%	14.0%
	No Car Households										18.5%	18.8%	25.6%
	Households with dependent children										25.8%	25.3%	29.1%
	Indicator population in the impact area		542,961	7,182	813,552					542,961	511,661	857,888	56,075,912
Am	Schools / Nurseries			✓	✓	✓							

Social group and amenities indicators		User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
	Playgrounds		✓	✓	✓							
	Parks and open Spaces			✓	✓							
	Hospitals			✓	✓							
	Care homes / Day Centres		✓	✓	✓							
	Community Centre		✓	✓	✓							

Appraisal

6.14.44. This step sets out the assessment of the impact of the scheme on each indicator's social groups. This step covers the core analysis of impacts which provides an assessment score for each indicator and each of the social groups. A qualitative assessment has also been undertaken for each relevant indicator which has been summarised in the DI appraisal matrix table and the AST entries.

6.14.45. The DI appraisal is summarised in the Appraisal Matrix shown in Table 6-37 and the AST entry is summarised in Table 6-38.

Table 6-37: Distributional Impact Appraisal Matrix1

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements
	Quintile 1 0-20%	Quintile 2 20%-40%	Quintile 3 40%-60%	Quintile 4 60%-80%	Quintile 5 80%-100%		
User Benefits	✓	✓	✓✓✓	✓✓✓	✓✓✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits
Noise			✓	××		No	Noise impacts are experienced by those in the middle income quintiles. Residents living in quintile 4 experience noise disbenefits while residents in quintile 3 experience noise benefits.
Air Quality	✓	✓	✓✓	✓✓	✓	No	Air quality impacts are experienced across all quintiles. Those in quintiles 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.
Affordability	✓✓✓	✓✓✓	✓	✓	✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintiles 4 and 5) experience a smaller than expected proportion of benefits
Accessibility						N/A	

Table 6-38: AST Entry

Impact	Social Groups						User Groups				Qualitative statement
	Children & Young People	Older People	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motorcyclists	Young Male Drivers	
Noise	×										Children and young people experience noise disbenefits
Air Quality	✓										Children and young people experience air quality benefits
Accidents	✓	✓					✓	✓	✓	✓	All relevant social groups and user groups experience accident benefits
Security	-	-		-	-	-					
Severance	✓	✓	✓		✓						All relevant social groups and user groups experience severance benefits
Accessibility	-	-	-	-	-	-					n/a

6.15 CORE GROWTH SCENARIO – BENEFIT TO COST RATIO (BCR)

6.15.1. Value for money is determined by considering the relationship between the costs and benefits of a proposal. Where a monetised assessment has been undertaken, the DfT approach to assigning a category starts by considering the appropriate metric (Benefit Cost Ratio or Net Present Public Value).

6.15.2. The Initial BCR and Adjusted BCR for the Core Growth scenario have been calculated as **2.43** and **3.40** respectively demonstrating a High Value for Money. The adjusted Present Value of Benefits (PVB) is **£432.391m** which consists of:

- Transport user benefits: £261.589m
- Environmental benefits: £19.585m
- Accidents benefit: £18.582m
- Physical activity benefits: £8.876m
- Wider economic impact benefits: £97.468m
- Reliability impact benefits: £26.291m.

6.15.3. The Present Value of Costs (PVC) consist of **£127.129m** of scheme costs. Optimism Bias of 15% has been applied, in line with TAG Unit A1.2 for a road scheme at Outline Business Case stage. Table 6-39 shows the Initial BCR and Adjusted BCR.

Table 6-39: Analysis of Monetised Costs and Benefits

Item	Core Growth £m, 2010 prices and values
Noise	£0.038
Local Air Quality	£0.072
Greenhouse Gases	£19.475
Physical Activity (AMAT)	£8.876
Accidents	£18.582
Economic Efficiency: Consumer Users (Commuting)	£58.488
Economic Efficiency: Consumer Users (Other)	£167.804
Economic Efficiency: Business Users and Providers	£88.569
Wider Public Finances (Indirect Taxation Revenues)	-£53.272
Present Value of Benefits (PVB)	**£308.632**
Broad Transport Budget	£127.129
Present Value of Costs (PVC)	**£127.129**
Net Present Value (NPV)	**£181.503**
Initial BCR	**2.43**
Level 2 Benefits	**£123.759**
Adjusted PVB (Level 1 + Level 2)	**£432.391**
PVC (same as above)	**£127.129**
Net Present Value (NPV)	**£305.262**
Adjusted BCR	**3.40**

6.15.4. Overall there will be a **Moderate Adverse** effect on Landscape as there would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a substantial impact on tranquillity in the north.

6.15.5. Overall there will be a **Moderate Adverse** effect on the Historic Environment setting (context) of listed buildings located beyond the site boundary.

6.15.6. Overall there is a **Large Adverse** impact on Biodiversity due to the loss of woodland foraging habitat for bats including the barbastelle bat. A strategy for woodland creation and enhancement is currently being developed which will help to compensate for the habitat loss.

6.15.7. Overall there will be a **Moderate Adverse** on the Water Environment due to the impact on the River Tud and River Wensum.

6.15.8. **The Environmental Statement (ES) will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**.

6.15.9. At this stage it is anticipated that the scheme will deliver significant quantified and non-quantified benefits and provide High Value for Money for public sector expenditure.

6.16 SWITCHING VALUE ANALYSIS – CORE GROWTH SCENARIO

6.16.1. Switching value analysis has been undertaken to determine how a change in costs or benefits would alter the Value for Money category.

6.16.2. Table 6-40 and Table 6-41 provides the changes that would be required, either in scheme costs or benefits, for the scheme to shift from High VfM category (as indicated by its adjusted BCR) to the Medium or Very High categories on either side of its current position.

Table 6-40: Changing the Adjusted BCR to Medium

Factor	Core Growth scenario
Benefits	Benefits would need to decrease by £179.404 or 41.49%
Costs	Costs would need to increase by £90.153m or 70.91%

6.16.3. If the costs were to remain the same, benefits would need to decrease by 41.49% to lower the scheme into the Medium VfM category.

6.16.4. If benefits were to stay the same, costs would need to increase by 70.91% to lower the scheme into the Medium VfM category.

Table 6-41: Changing the Adjusted BCR to Very High

Factor	Core Growth scenario
Benefits	Benefits would need to increase by £76.125m or 17.61%
Costs	Costs would need to decrease by £19.031m or 14.97%

6.16.5. To switch the scheme into the Very High VfM category, if the costs were to remain the same, benefits would need to increase by 17.61%.

6.16.6. If benefits were to stay the same, costs would need to decrease by 14.97% to switch the scheme into the Very High VfM Category.

6.17 OUTPUT OF HIGH CARBON ASSESSMENT

6.17.1. For the High Carbon value sensitivity test, all elements of benefit and cost have been maintained at the same level as the core assessment, with the exception of the values placed on carbon missions. There is no change to the assumed level of emissions, only to their economic value. The result of this assessment is set out in Table 6-42.

Table 6-42: Analysis of Monetised Costs and Benefits

Item	Core Growth	Core Growth (Lower estimate of Carbon)	Core Growth (Higher estimate of Carbon)
	£m, 2010 prices and values		
Noise	£0.038	£0.038	£0.038
Local Air Quality	£0.072	£0.072	£0.072
Greenhouse Gases	**£19.475**	**£8.833**	**£30.127**
Physical Activity (AMAT)	£8.876	£8.876	£8.876
Accidents	£18.582	£18.582	£18.582
Economic Efficiency: Consumer Users (Commuting)	£58.488	£58.488	£58.488
Economic Efficiency: Consumer Users (Other)	£167.804	£167.804	£167.804
Economic Efficiency: Business Users and Providers	£88.569	£88.569	£88.569
Wider Public Finances (Indirect Taxation Revenues)	-£53.272	-£53.272	-£53.272
Present Value of Benefits (PVB)	**£308.632**	**£297.990**	**£319.284**
Broad Transport Budget	£127.129	£127.129	£127.129
Present Value of Costs (PVC)	**£127.129**	**£127.129**	**£127.129**
Net Present Value (NPV)	**£181.503**	**£170.861**	**£192.155**
Initial BCR	**2.43**	**2.34**	**2.51**
Level 2 Benefits	**£123.759**	**£123.759**	**£123.759**
Adjusted PVB (Level 1 + Level 2)	**£432.391**	**£421.749**	**£443.043**
PVC (same as above)	**£127.129**	**£127.129**	**£127.129**
Net Present Value (NPV)	**£305.262**	**£294.620**	**£315.914**
Adjusted BCR	**3.40**	**3.32**	**3.48**

6.17.2. The VfM is not affect and remains in the **High** category for both the Initial and Adjusted BCR.

6.18 APPRAISAL SUMMARY TABLE

6.18.1. The AST presents all the evidence from the economic appraisal a single table. It records all the impacts which have been assessed and described above – economic, fiscal and environmental impacts – assessed using monetised, quantitative or qualitative information as appropriate. The AST for the scheme, in line with TAG requirements, is included in Appendix H.1 for the Core Growth scenario, Appendix H.2 for the Low Growth scenario, Appendix H.3 for the High Growth scenario and Appendix H.4 for the Core Growth (Sensitivity) scenario.

6.19 SUMMARY OF THE ECONOMIC CASE (CORE GROWTH SCENARIO)

6.19.1. The Economic Case identifies and assesses all the impacts of the scheme to determine its overall Value for Money. It takes account of the costs of developing, building, operating and maintaining the scheme, and a full range of its impacts, including those impacts which can be monetised.

6.19.2. The Initial BCR for the Core Growth scenario is **2.43**, indicating **High** Value for Money category according to the DfT Value for Money Framework.

6.19.3. Once the full scheme impacts are included the Adjusted BCR for the Core Growth scenario is **3.40** which strengthens the **High** Value for Money category. The scheme would need to deliver greater than the calculated benefits to reach the Very High Value for Money category.

6.20 SENSITIVITY AND RISK PROFILE

6.20.1. There are key uncertainties which can affect the scheme costs and impacts/benefits, these include changes to the scheme cost which affect the PVC of the scheme and changes to demand and economic growth which can affect the PVB of the scheme.

6.20.2. The cost of the scheme can be influenced by a number of factors, including cost of materials, cost of labour, and delay to programme.

6.20.3. In order to understand how sensitive the benefits described above are to a range of alternative parameters, a number of tests have been performed.

- TAG Sensitivity Databook
- High and low traffic growth scenarios
- Alternative levels of Optimism Bias (different stages of the business case)
- Alternative levels of Additionality applied to dependent development impacts.

SENSITIVITY TESTING GROWTH SCENARIO

6.20.4. A Sensitivity Testing Growth scenario has been undertaken using the TAG Sensitivity Databook (V1.14). The Databook reflects changes in economic and population parameters projects provided by the Office for Budget Responsibility (OBR). This Sensitivity Testing Growth scenario is shown in Table 6-43.

Table 6-43: Sensitivity Testing Growth scenario

£m in 2010 prices and values	Values
Initial PVB	£233.735
Wider Economic Impacts & reliability	£90.692
Adjusted Present Value of Benefits (PVB)	**£324.427**
Present Value of Costs (PVC)	**£127.129**
Net Present Value (NPV)	**£197.298**
Adjusted BCR	**2.55**

6.20.5. These results show that the BCR remains above 2 and within the High Value for Money category. This increases the level of certainty in the VfM associated with a reduction in Transport User Benefits and COBALT.

LOW GROWTH SCENARIO AND HIGH GROWTH SCENARIO

6.20.6. Another key uncertainty identified regards demand growth in the vicinity of the proposed scheme. To assess the impact of this uncertainty, sensitivity tests have been devised in line with guidance in TAG Unit M4. These sensitivity tests are provided in Table 6-44.

Table 6-44: Low Growth scenario and High Growth scenario testing

£m in 2010 prices and values	Low Growth	High Growth
Initial PVB	£257.540	£370.665
Wider Economic Impacts & Reliability	£108.767	£126.742
Adjusted Present Value of Benefits (PVB)	**£366.307**	**£497.407**
Present Value of Costs (PVC)	**£127.129**	**£127.129**
Net Present Value (NPV)	**£239.178**	**£370.278**
Adjusted BCR	**2.88**	**3.91**

6.20.7. These results show that the BCR remains above 2 and within the High Value for Money category for the Low Growth scenario. This increases the level of certainty in the VfM associated with a significant reduction in Transport User Benefits. For the High Growth scenario the adjusted BCR is pushed to the top of High Value for Money category.

6.21 VALUE FOR MONEY STATEMENT

6.21.1. In considering overall Value for Money, attention must be paid to the Initial BCR and Adjusted BCR, as well as non-monetised impacts. The Value for Money statement provides a summary of these considerations and is presented in Table 6-45 for the Core Growth scenario, Table 6-46 for the Low Growth scenario, Table 6-47 for the High Growth scenario and Table 6-48 for the Core Growth (Sensitivity) scenario.

Table 6-45: Value for Money Statement for the Core Growth scenario

	Core Growth scenario	Detail
Initial Benefit to Cost Ratio	2.43	Calculated using TAG guidance
Adjusted Benefit to Cost Ratio	3.40	Includes wider impacts
Qualitative Assessment	At this time these are considered to be Adverse	**The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**
Key Risk	There is a risk element of £39.975m	Risk allowance quantified to an appropriate level for this stage of scheme design
Value for Money category	High	Initial BCR and Adjusted BCR are in the High Value for Money category, which is supported by the qualitative assessment

Table 6-46: Value for Money Statement for the Low Growth scenario

	Low Growth scenario	Detail
Initial Benefit to Cost Ratio	2.03	Calculated using TAG guidance
Adjusted Benefit to Cost Ratio	2.88	Includes wider impacts
Qualitative Assessment	At this time these are considered to be Adverse	**The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**
Key Risk	There is a risk element of £39.975m	Risk allowance quantified to an appropriate level for this stage of scheme design
Value for Money category	High	Initial BCR is in the High Value for Money category, which is supported by the qualitative assessment. BCR based on Greenhouse gases, travel time benefits, accident benefits and physical activity

Table 6-47: Value for Money Statement for the High Growth Scenario

	High Growth scenario	Detail
Initial Benefit to Cost Ratio	2.92	Calculated using TAG guidance
Adjusted Benefit to Cost Ratio	3.91	Includes wider impacts
Qualitative Assessment	At this time these are considered to be Adverse	**The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**
Key Risk	There is a risk element of £39.975m	Risk allowance quantified to an appropriate level for this stage of scheme design
Value for Money category	High	Initial BCR is in the High Value for Money category, which is supported by the qualitative assessment. BCR based on travel time benefits, accident benefits and physical activity

Table 6-48: Value for Money Statement for the Core Growth (Sensitivity) scenario

	Core Growth (Sensitivity) scenario	Detail
Initial Benefit to Cost Ratio	1.84	Calculated using TAG guidance
Adjusted Benefit to Cost Ratio	2.55	Includes wider impacts
Qualitative Assessment	At this time these are considered to be Adverse	**The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further**
Key Risk	There is a risk element of £39.975m	Risk allowance quantified to an appropriate level for this stage of scheme design
Value for Money category	Medium	Initial BCR is in the High Value for Money category, which is supported by the qualitative assessment. BCR based on travel time benefits, accident benefits and physical activity

6.21.2. The information presented in the economic case for the Norwich Western Link shows that the Value for Money category for the Core Growth scenario is in the **High** Value for Money category for the Initial BCR and for the Adjusted BCR.

6.21.3. The Value for Money category for the Low Growth scenario and the High Growth scenario are in the **High** VfM category for the Initial BCR and for the Adjusted BCR. The Core Growth (Sensitivity) scenario is in the **Medium** (**1.84**) category for the Initial BCR but in the **High** (**2.55**) for the Adjusted BCR.

7 CONCLUSION

7 CONCLUSION

7.1 INTRODUCTION

7.1.1. This Economic Appraisal Report sets out the assessment of the benefits that the Norwich Western Link scheme is forecast to deliver to society as a whole.

7.2 CORE GROWTH SCENARIO: BENEFITS

7.2.1. The economic appraisal has been quantified in terms of the travel time benefits assessed by TUBA, accident benefits assessed by COBALT, Air Quality benefits and Noise benefits. Over 60 years, the Core Growth scenario for the scheme is expected to generate benefits of:

- Travel time benefits: £314.861m
- Accident benefits: £18.582m
- Indirect Tax Revenues: -£53.272m
- Air Quality benefits: £0.072m
- Greenhouse Gases: £19.475m
- Noise benefits: £0.038m
- Physical Activity benefits: £8.876m
- **Total: £308.632m**.

7.2.2. Other assessments undertaken qualitatively include:

- Landscape: Overall there will be a **Moderate Adverse** effect as there would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a substantial impact on tranquillity in the north
- Historic Environment: The Norwich Western Link would have a **moderate adverse** effect on the setting (context) of listed buildings located beyond the site boundary. The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further
- Biodiversity: The overall assessment score for the Norwich Western Link is a **Large Adverse** Impact due to the loss of woodland foraging habitat for bats including the barbastelle bat. The Environmental Statement will contain more detailed design information and a more thorough impact assessment (in line with CIEEM guidelines) subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further
- Water Environment: The overall Summary Assessment score for the NWL is predicted to be **Moderate Adverse**.

7.2.3. **The Environmental Statement will contain more detailed design information and a more thorough impact assessment subsequently providing more site-specific mitigation measures to attempt to reduce impacts and risks further.**

7.3 NORWICH WESTERN LINK: SCHEME COSTS

7.3.1. In line with TAG Unit A1.2 (Scheme Costs), the Present Value of Costs (PVC) only includes investment and operating costs incurred by the public sector. The total discounted Present Value of Costs (PVC) is **£127.129m**.

7.4 CORE GROWTH SCENARIO: BENEFIT TO COST RATIO (BCR)

7.4.1. This information for the Core Growth scenario shows that the Initial Present Value of Benefits (PVB) is **£308.632m** with a Present Value of Costs (PVC) of **£127.129m** which gives a Net Present Value of **£181.503m**. The results shown in Table 6-39 give an Initial Benefit to Cost Ratio (BCR) of the scheme, based on standard monetised values, of **2.43**.

7.4.2. This represents the benefits for the core elements of the scheme and is considered **High** Value for Money according to DfT guidance.

7.4.3. The DfT guidance recommends that this Initial BCR be modified to include additional elements from the AST to create an Adjusted BCR. This means that there is a need to include the assessment of the Wider Impacts which shows a benefit of **£123.759m**.

7.4.4. The Adjusted Present Value of Benefits (PVB) is **£432.391m** with a NPV of **£305.262m** giving an Adjusted BCR of **3.40**.

7.4.5. The information presented in this Economic Appraisal Report indicates that the Norwich Western Link for the Core Growth scenario is considered **High** Value for Money.

SENSITIVITY TESTING

7.4.6. The sensitivity tests applied to the appraisal results confirm the High Value for Money position is not sensitive to cost increases, or a reduction in benefits (as the BCR does not drop into the Medium Value for Money category). This increases the level of certainty that the scheme will deliver High Value for Money. When changes to the TAG Sensitivity Testing Databook (V1.14) and optimism bias have been applied, the scheme delivers an adjusted BCR which still remains **High** Value for Money Category.

Appendix A

DFT COST PRO-FORMA

Appraisal Cost Proforma Summary Sheet

Type of Year ☑

Assumptions:

Price Year Base of Capital Costs	2020/21

Weighted Investment cost optimism bias (%)	15%
Weighted Operating cost optimism bias (%)	0%

QRA / Risk total	39,975	£000s
Design Year Operating Cost (usually 15 years from opening year)	3,070	£000s
Operating Cost (all years total) - outturn	98,087	£000s

COST BREAKDOWN:

All values in £,000's (thousands)

	CAPEX at Base Cost	CAPEX at Real (exc risk)	CAPEX with risk at Real	CAPEX at Real (with OB)	CAPEX - Real, OB, defl, disc, MP of all funding options
Year	Investment Cost (in price year base in cell C3, excluding risk)	Cost including real cost inflation (Base Cost)	Risk adjusted cost	Risk adjusted cost including Optimism Bias	Risk adjusted cost including OB deflated and discounted to 2010 Market Prices
2020/21	2,536	2,536	2,536	2,917	2,051
2021/22	9,264	9,089	12,300	14,145	9,613
2022/23	8,530	8,205	13,030	14,984	9,838
2023/24	27,879	26,222	32,533	37,413	23,734
2024/25	69,849	63,774	81,166	93,341	57,211
2025/26	31,378	28,005	36,241	41,677	24,681
2026/27	0	0	0	0	0
2027/28	0	0	0	0	0
2028/29	0	0	0	0	0
2029/30	0	0	0	0	0

Totals for remaining appraisal years:

	0	0	0	0	0
Totals:	149,438	137,831	177,806	204,477	127,128

Appendix B

TRANSPORT ECONOMIC EFFICIENCY

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	66192		66192			
Vehicle operating costs	-7704		-7704			
User charges	0					
During Construction & Maintenance	0					
COMMUTING	58488	(1a)	58488	0	0	0

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	83680		83680			
Vehicle operating costs	84124		84124			
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: OTHER	167804	(1b)	167804	0	0	0

Business

User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	81767		53859	27908				
Vehicle operating costs	6803		6638	165				
User charges	0							
During Construction & Maintenance	0							
Subtotal	88570	(2)	60497	28073	0	0	0	0

Private sector provider impacts					Freight	Passengers	
Revenue	0						
Operating costs	0						
Investment costs	0						
Grant/subsidy	0						
Subtotal	0	(3)		0	0	0	0
Other business impacts							
Developer contributions	0	(4)					
NET BUSINESS IMPACT	88570	(5) = (2) + (3) + (4)					

TOTAL		
Efficiency Benefits (TEE)	314862	(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
values

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	58603		58603			
Vehicle operating costs	-6369		-6369			
User charges	0					
During Construction & Maintenance	0					
COMMUTING	52234	*(1a)*	52234	0	0	0

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	67572		67572			
Vehicle operating costs	74700		74700			
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: OTHER	142272	*(1b)*	142272	0	0	0

Business

User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	65818		43116	22702				
Vehicle operating costs	5017		4903	114				
User charges	0							
During Construction & Maintenance	0							
Subtotal	70835	*(2)*	48019	22816	0	0	0	0

Private sector provider impacts				Freight	Passengers	
Revenue	0					
Operating costs	0					
Investment costs	0					
Grant/subsidy	0					
Subtotal	0	*(3)*	0	0	0	0
Other business impacts						
Developer contributions	0	*(4)*				
NET BUSINESS IMPACT	70835	*(5) = (2) + (3) + (4)*				

TOTAL
Efficiency Benefits (TEE) 265341 *(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
values

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	92611		92611			
Vehicle operating costs	-8292		-8292			
User charges	0					
During Construction & Maintenance	0					
COMMUTING	84319	*(1a)*	84319	0	0	0

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	115804		115804			
Vehicle operating costs	92559		92559			
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: OTHER	208363	*(1b)*	208363	0	0	0

Business

User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	105664		69065	36599				
Vehicle operating costs	10407		9619	788				
User charges	0							
During Construction & Maintenance	0							
Subtotal	116071	*(2)*	78684	37387	0	0	0	0

Private sector provider impacts				Freight	Passengers	
Revenue	0					
Operating costs	0					
Investment costs	0					
Grant/subsidy	0					
Subtotal	0	*(3)*	0	0	0	0
Other business impacts						
Developer contributions	0	*(4)*				
NET BUSINESS IMPACT	116071	*(5) = (2) + (3) + (4)*				

TOTAL		
Efficiency Benefits (TEE)	408753	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
values

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	51625		51625			
Vehicle operating costs	-8468		-8468			
User charges	0					
During Construction & Maintenance	0					
COMMUTING	43157	*(1a)*	43157	0	0	0

Non-business: Other	ALL MODES TOTAL		ROAD Private Cars and LGVs	BUS and COACH Passengers	RAIL Passengers	OTHER
User benefits						
Travel time	64540		64540			
Vehicle operating costs	75572		75572			
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: OTHER	140112	*(1b)*	140112	0	0	0

Business

User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	64269		42585	21684				
Vehicle operating costs	5222		5172	50				
User charges	0							
During Construction & Maintenance	0							
Subtotal	69491	*(2)*	47757	21734	0	0	0	0

Private sector provider impacts			Freight	Passengers	
Revenue	0				
Operating costs	0				
Investment costs	0				
Grant/subsidy	0				
Subtotal	0	*(3)*	0	0	0	0
Other business impacts						
Developer contributions	0	*(4)*				
NET BUSINESS IMPACT	69491	*(5) = (2) + (3) + (4)*				

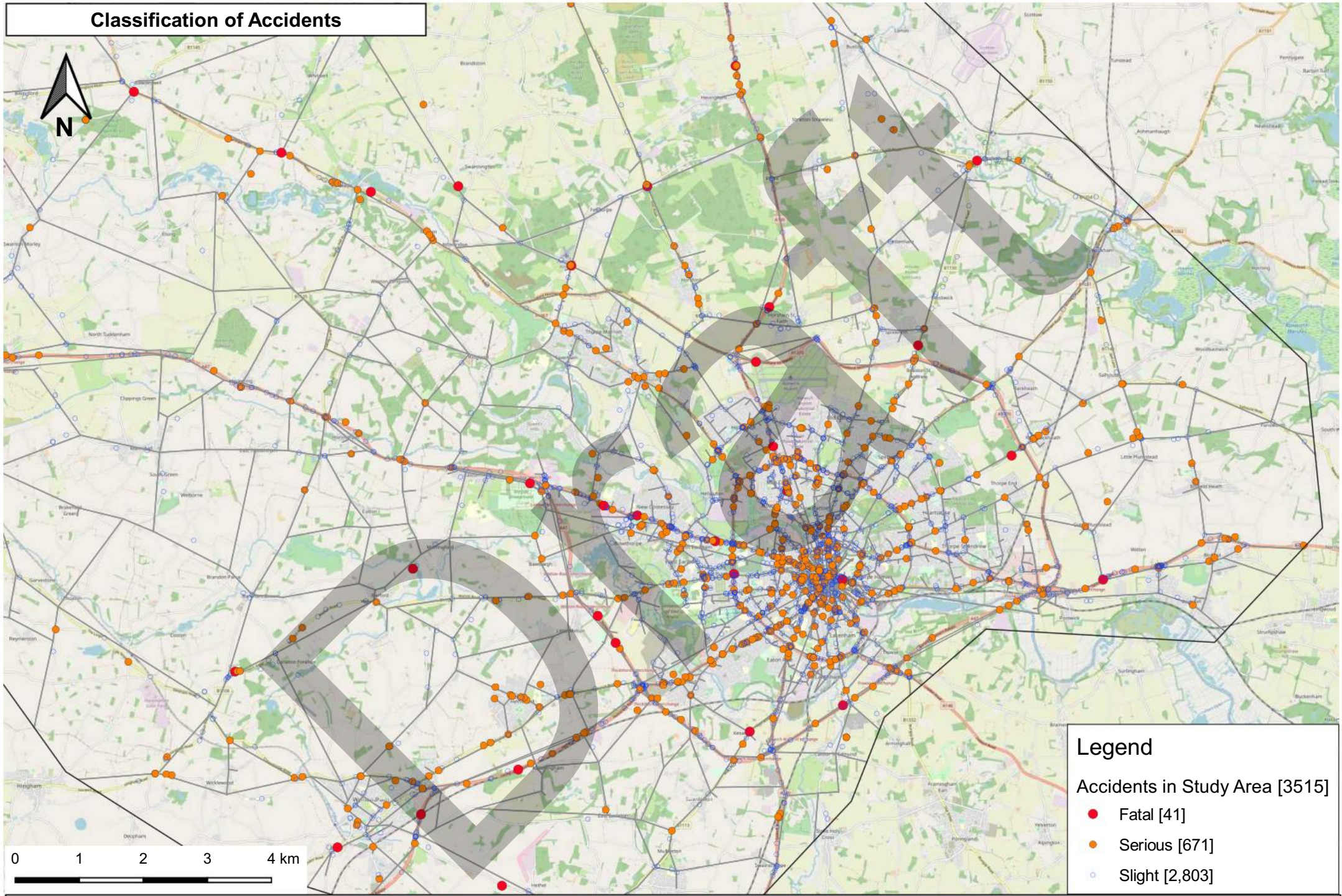
TOTAL		
Efficiency Benefits (TEE)	252760	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
values

Appendix C

COBALT NETWORK

Classification of Accidents



Appendix D

PHYSICAL ACTIVITY

Analysis of Monetised Costs and Benefits (in £'000s)	
Congestion benefit	22.18
Infrastructure maintenance	0.49
Accident	3.44
Local air quality	0.54
Noise	0.18
Greenhouse gases	3.01
Reduced risk of premature death	1648.51
Absenteeism	210.20
Journey ambience	552.60
Indirect taxation	-6.47
Government costs	0.00
Private contribution	0.00
PVB	2434.18
PVC	-0.49
BCR	**-4958.63**

Benefits by type:		
Mode shift	23.35	1.0%
Health	1858.72	76.3%
Journey quality	552.60	22.7%

Analysis of Monetised Costs and Benefits (in £'000s)	
Congestion benefit	15.92
Infrastructure maintenance	0.35
Accident	2.47
Local air quality	0.38
Noise	0.13
Greenhouse gases	2.16
Reduced risk of premature death	1183.12
Absenteeism	150.86
Journey ambience	396.68
Indirect taxation	-4.64
Government costs	0.00
Private contribution	0.00
PVB	1747.06
PVC	-0.35
BCR	**-4958.87**

Benefits by type:		
Mode shift	16.76	1.0%
Health	1333.98	76.3%
Journey quality	396.68	22.7%

Analysis of Monetised Costs and Benefits (in £'000s)	
Congestion benefit	42.77
Infrastructure maintenance	0.95
Accident	6.63
Local air quality	1.03
Noise	0.34
Greenhouse gases	5.80
Reduced risk of premature death	3179.28
Absenteeism	405.39
Journey ambience	1066.81
Indirect taxation	-12.48
Government costs	0.00
Private contribution	0.00
PVB	4695.57
PVC	-0.95
BCR	**-4959.77**

Benefits by type:		
Mode shift	45.04	1.0%
Health	3584.67	76.3%
Journey quality	1066.81	22.7%

Appendix E

ENVIRONMENTAL

Appendix E.1

AIR QUALITY

Air Quality Valuation Workbook - Worksheet 3

Scheme Name:	Norwich Western Link
Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road/Rail or Road and Rail):	Road Transport (RT)

Overall Assessment Score:

Damage Costs Approach (Emissions)

Present value of change in NOx emissions (£):	£0
Present value of change in PM2.5 emissions (£):	£0
OR	
Present value of change in PM10 emissions (£):	£0

Impact Pathways Approach (Concentrations)

Present value of change in NO2 concentrations (£):	£9,803
Of which:	
Concentration costs:	£69,555
Other impacts:	-£59,752
Present value of change in PM2.5 concentrations (£):	£62,165
Of which:	
Concentration costs:	£62,211
Other impacts:	-£46

Total Change

Total value of change in air quality (£):	£71,968

*positive value reflects a **net benefit** (i.e. air quality improvement)

Quantitative Assessment:

Impact Pathways Approach (Concentrations)

Change in NO2 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	-10,684.21
Change in PM2.5 assessment scores over 60 year appraisal period: (between 'with scheme' and 'without scheme' scenarios)	-1,172.63

Damage Costs Approach (Emissions)

Change in NOX emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios)	0
Change in PM2.5 emissions over 60 year appraisal period (tonnes): (between 'with scheme' and 'without scheme' scenarios) **OR** **Change in PM10 emissions over 60 year appraisal period (tonnes):** (between 'with scheme' and 'without scheme' scenarios)	0

Qualitative Comments:

The air quality impacts appraisal has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC.

The affected road links map onto PCM links which are all compliant with the NO2 limit value both with and without scheme. The Impact Pathways approach has been applied in valuation. This accounts for impacts in terms of changes in human exposure to ambient concentations of air pollutants, and impacts that do not directly affect households such as ecosystem damages which are determined in terms of changes in emissions.

Comments on assumptions and uncertainties:
1) Impacts in the design year (2040) are based on vehicle emissions factors and background concentrations for 2030 as the last forecast year in Defra's Emissions Factors Toolkit version 10.1 and 2018-based background map dataset. 2030 emissions factors and background concentrations are applied in all years thereafter, up to the end of the 60 year appraisal period (2084). Consequently, any improvements in air quality that may occur after 2030 are not factored into the appraisal. In this respect the appraisal is considered to be conservative.
2) Traffic growth has not been forecast beyond 2040 and so traffic levels are assumed to be the same in all years thereafter, up to the end of the 60 year appraisal period). In this respect the appraisal is considered to be conservative.

Sensitivity Analysis:

Upper estimate net present value of change in air quality (£):	£284,764
Lower estimate net present value of change in air quality (£):	-£6,445

Data Sources:

Traffic data from NATS model output. Emissions from Defra Emissions Factors Toolkit v10.1. Defra 2018-based background pollutant maps. Pollution Climate Mapping model, 2017 reference year (Open Government Licence v3.0). Property counts derived from Ordnance Survey AddressBase data (under contractor licence from NCC).

Appendix E.2

GREENHOUSE GASES

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: Norwich Western Link

Present Value Base Year 2010

Current Year 2020

Proposal Opening year: 2025

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £19,474,620

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -456,434
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -13005

Change in carbon dioxide equivalent emissions in opening year (tonnes): -4,292
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £569,253
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	-269.0709127
Non-traded sector	0	0	0	-13371.33319

Qualitative Comments:

The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic.

Comments on assumptions and uncertainty:
1) Emissions have been calculated across the whole of the NATS model simulation area.
2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years.
3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal.
4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £30,126,533

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):	£8,833,474

Data Sources:

Traffic data for do-minimum and do-something scenarios in 2025 and 2040 were derived from the NATS model. 'Real-world' link length data used in the calculation of CO2 emissions were derived from Ordnance Survey Open Data and MasterMap base map products. CO2 emissions were calculated using EFT version 10.1.

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: NWL (low traffic growth sensitivity test)

Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road/Rail or Road and Rail):	road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £17,445,270

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): -410,056
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded -12458

Change in carbon dioxide equivalent emissions in opening year (tonnes): -4,226
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £545,268
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	-258.9681217
Non-traded sector	0	0	0	-13020.77051

Qualitative Comments:

The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC, assuming low traffic growth. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic.

Comments on assumptions and uncertainty:
1) Emissions have been calculated across the whole of the NATS model simulation area.
2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years.
3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal.
4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £26,981,450

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):	£7,918,856

Data Sources:

Traffic data for do-minimum and do-something scenarios in 2025 and 2040 were derived from the NATS model. 'Real-world' link length data used in the calculation of CO2 emissions were derived from Ordnance Survey Open Data and MasterMap base map products. CO2 emissions were calculated using EFT version 10.1.

Appendix E.3

NOISE

Noise Workbook - Worksheet 1

Proposal Name: Norwich Western Link

Present Value Base Year	2010
Current Year	2020
Proposal Opening year:	2025
Project (Road, Rail or Aviation):	road

Net present value of change in noise (£):	£38,490

*positive value reflects a **net benefit** (i.e. a reduction in noise)

Net present value of impact on sleep disturbance (£):	£40,071
Net present value of impact on amenity (£):	-£5,219
Net present value of impact on AMI (£):	£7,142
Net present value of impact on stroke (£):	-£1,387
Net present value of impact on dementia (£):	-£2,116

Quantitative results

Households experiencing increased daytime noise in forecast year:	33
Households experiencing reduced daytime noise in forecast year:	10
Households experiencing increased night time noise in forecast year:	3
Households experiencing reduced night time noise in forecast year:	10

Qualitative Comments:

The study area for the assessment has been derived based on guidance within the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, May 2020 and is set to a distance of 600m from the kerb of any new roads associated with the scheme. There are 52 residential dwellings within the study area and no additional other sensitive receptors. Generally, within the study area, noise levels are predicted to increase as a result of the scheme, with large increases predicted at isolated receptors towards the centre of the study area where low baseline levels are anticipated. However, some receptors along Wood Lane and Paddy's Lane are predicted to experience noise level reductions as a result of less vehicles using these roads in favour of the scheme.
The Highways England A47 dualling scheme has been included in both the Do-minimum (without scheme) and Do-something (with scheme) scenarios for the purpose of this assessment.

Data Sources:

Norwich Western Link Reference Design
Highways England A47 Dualling Interim Design Fix C Design
OS Mastermap data (from which buildings and roads were extracted)
OS Addressbase Plus Data
2019 LIDAR 1m DTM data
Road traffic flows as provided by project transport consultants

Appendix E.4

LANDSCAPE

TAG Landscape Impacts Worksheet

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The landscape to the northern end of the proposed route is a wet lowland shallow valley containing the River Wensum. To the south, the land rises up and gently undulates, becoming a plateau of small to medium regular sized fields contained by hedgerow. The River Tud valley with its associated drainage features is located to the southeast. Irregular blocks of woodland cut through this landscape, reducing the order and regularity of field pattern. There are scattered farmsteads through the landscape, along with small settlements - the most notable being Honingham to the south and Weston Longville to the west. Small lanes also cut through the landscape, generally fairly straight with gentle curves.	Local	Common feature at a local scale	Important at the local and regional level	Easily substitutable, although loss of mature hedgerow trees would take much longer (over 25 years) to re-establish.	**Slight Adverse** The Proposed Scheme would bisect and subdivide fields locally, however the alignment is reflective of the pattern of existing roads within this landscape.
Tranquillity	There is some human influence within this landscape, including scattered farmsteads and small settlements, as well as historic estates such as Morton Hall to the north. Ringland and Weston Longville are notable settlements within this landscape. The wind turbines to the east on the old airfield and overhead line which runs north to south are also notable influences within this landscape. Some arable fields have been turned into pig rearing. Views from the plateau give a wider perception of human influence, particularly of traffic along the A47 and A1067. The eastern and western fringes of the study area have the greatest human influence. Perception/ actual tranquility levels likley to be reduced where large roads are visible or where certain human influences are more visible (pig rearing and wind turbines).	Local	Not rare locally	Important at the local level.	Not easily substitutable in the north, but easier to maintain in the south through replacement hedgerow planting.	**Moderate Adverse** The introduction of the viaduct over the River Wensum will substantially reduce tranquillity in the wider area, and locally to the south due to the road being largely in cutting or at-grade, with short sections on embankment influencing a wider area.
Cultural	The landscape has long been associated with farming. Field patterns are largely intact from 14th century, however there is evidence of larger fields and removal of hedgerows in some areas. There are medieval manors which form 18th-century country house estates such as Morten Hall to the north and Easton Estate to the south.	Local	Not rare locally or regionally	Important at local and regional scale.	Not easily substitutable, although former field boundaries can be readily replaced.	**Slight Adverse** The proposed route would bisect the landscape and alter the pattern of enclosure.
Landcover	Landcover is predominately arable farming throughout this landscape with mixed plantation woodland, although some fields have been turned over to pig rearing. There are small ponds throughout this landscape often regular in shape. The river valley to the north and east following the River Wensum is wet meadow and small lakes. Field are contained by hedgerows and infrequent mature trees.	Predominant landcover common at local to regional scale, others less common.	Not rare locally or regionally	Important at the local level.	Easily substitutable.	**Moderate Adverse** The Proposed Scheme would introduce a new viaduct and large dual carriageway through the landscape, and result in the loss of some of the plantation woodland and arable fields.
Summary of character	The landscape is gently undulating arable farmland, with plateau to the south, located between two shallow river valleys. River Tud in the south and River Wensum in the north being the larger of the valleys with noticeable difference in character of wet meadow and mosaic of lakes and drainage ditches. There is some human influence, of note is the over-head line and two wind turbines to the west, with the A47 and A1067 noticeable from the plateau. Settlement is sparse, mainly small farmsteads - the biggest settlement is Honingham located to the south. Land cover is predominately arable fields, contained by clipped hedgerow and infrequent mature trees, with some fields turned to pig rearing. Mixed plantation woodland is common throughout this landscape, often following field boundaries. Roads are generally small lanes, gently curved, and following the field boundaries.	Common locally	Not rare locally or regionally	Important at the local and regional level	The majority of elements are easily substituitable, although the loss of mature hedgerow trees would take much longer to re-establish. Tranquility is also difficult to substitute. Loss of long views along the river valley is not easily substitutable along with historic elements, which would not be easily replaceable.	**Moderate Adverse** The Proposed Scheme would alter the local landscape character through the introduction of the viaduct, loss of woodland and the width of the new road (dual carriageway). However, it's impact is limited to the immediate surroundings due to the road being largely in cutting or at-grade and the presence of woodland blocks.

Reference Sources

MAGIC, Google Earth, Ordnance Survey Mapping, Natural England - National Character Area 78: Central North Norfolk, Breckland District LCA (2007), South Norfolk Landscape Assessment (2001), Broadland District Council Local Development framework - Landscape Character Assessment SPD (2013)

Step 5 - Summary Assessment Score

Moderate Adverse

Qualitative Comments

There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a substantial impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.

Appendix E.5

HISTORIC ENVIRONMENT

TAG Historic Environment Impacts Worksheet

	Step 2	Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	**Designated heritage assets (physically affected by the scheme)** 1. None. **Designated heritage assets (possible setting impact)** 2. Two Grade I listed buildings. 3. One Grade II* listed building. 4. Fourteen Grade II listed buildings. **Non-designated heritage assets (palaeoenvironmental, prehistoric, Roman and undated/multi-period)** 5. Cropmarks of a possible Roman field system (53485). 6. Post-Roman and undated features and prehistoric finds (63365) 7. Cropmarks of undated and multi-period linear ditches (50605) 8. The findspot of prehistoric flint flakes (18044). 9. Cropmarks of undated and multi-period linear ditches (54356) 10. Cropmarks of possible Iron Age/Roman field boundaries (54357). 11. Cropmarks of possible Iron Age to Roman date enclosures (50610). 12. Cropmarks of possible Iron Age to Roman date enclosures (50615). 13. The cropmarks of undated linear ditches (50619). 14. Cropmarks of undated possible ditches (53625). 15. Cropmarks of undated ditch (53681). 16. **Moderate to high potential** for possible, previously unrecorded remains of these periods 17. **Moderate potential** for palaeoenvironmental remains in the Wensum and Tud valleys. **Non-designated heritage assets (medieval, post-medieval)** 18. World War Two accommodation and training site at Morton Hall (53474). 19. The findspot of of a late Saxon brooch and medieval coin (44454) 20. Cropmarks of field boundaries and trackways of probable post medieval date (50608). 21. Cropmarks of probable post medieval date field boundaries (50609). 22. Cropmarks of probable post medieval former field boundaries (50614). 23. Cropmarks of a linear boundary or trackway of unknown, but possibly later medieval to post medieval date (50616). 24. World War One to Two date military training site (50618). 25. Attlebridge World War Two Airfield (3063). 26. Honingham Park, a post-medieval landscape park (44183). 27. Cropmarks of field boundaries of unknown but possible medieval to post	1. N/A 2-4. The protection of Listed Buildings is a national concern (*Planning (Listed Buildings and Conservation Areas) Act 1990*). 5. The Roman field system is of regional importance. 6. The undated features and prehistoric finds are of local or regional importance. 7. Theundated and multi-period linear ditches are of regional importance. 8. The findspot of prehistoric flint flakes is of local importance. 9 . The undated and multi-period linear ditches are of regional importance. 10. Iron Age/Roman field boundaries are of regional importance. 11. Iron Age/Roman enclosures are of regional or national importance. 12. Iron Age/Roman enclosures are of regional or national importance. 13. The undated linear ditches are of regional importance. 14. The undated possible ditches are of regional importance. 15. The undated ditch is of regional importance. 16. Previously unrecorded remains are of undetermined importance. 17. Possible palaeoenvironmental remains are of local importance. 18. The World War Two accommodation and training site at Morton Hall are of regional importance. 19. The late Saxon brooch and medieval coin are of local importance. 20. The field boundaries and trackways of probable post medieval date are of local importance. 21. The probable post medieval date field boundaries are of local importance. 22. The probable post medieval former field boundaries are of local importance. 23. The linear boundary or trackway of unknown, but possibly later medieval to post medieval date is of local importance. 24. The World War One to Two date military training site is of regional importance.	1. N/A 2. The Grade I listed buildings are of High significance. 3. The Grade II* listed building is of High significance. 4. The Grade II listed buildings are of Medium significance. 5. The Roman field system is of Medium significance. 6. The undated features and prehistoric finds are of Low or Medium significance. 7. Cropmarks of undated and multi-period linear ditches are of Low or Medium significance. 8. The findspot of prehistoric flint flakes is of Low significance. 9 . The undated and multi-period linear ditches are of Medium significance. 10. Iron Age/Roman field boundaries are of Medium significance. 11. Iron Age/Roman enclosures are of Medium or High significance. 12. Iron Age/Roman enclosures are of Medium or High significance. 13. The undated linear ditches are of Low or Medium significance. 14. The undated possible ditches are of Low or Medium significance. 15. The undated ditch is of Low or Medium significance. 16. Previously unrecorded remains are of undetermined significance. 17. Possible palaeoenvironmental remains are of Low significance. 18. The World War Two accommodation and training site at Morton Hall are of Medium significance. 19. The late Saxon brooch and medieval coin are of Low significance. 20. The field boundaries and trackways of probable post medieval date are of Low significance. 21. The probable post medieval date field boundaries are of Low significance. 22. The probable post medieval former field boundaries are of Low significance. 23. The linear boundary or trackway of unknown, but possibly later medieval to post medieval date is of Low significance.	1. N/A 2. Nationally, 2.5% of listed buildings are Grade I, making them rare and of 'exceptional interest.' 3. Nationally, 5.8% of listed buildings are Grade II*, making them rare and of 'more than special interest.' 4. Nationally, 92% of listed buildings are Grade II, making then less rare but still of national importance. 5. Roman field systems are relatively rare. 6. Post-Roman and undated features and prehistoric finds are relatively common. 7. Cropmarks of undated and multi-period linear ditches are common. 8. Findspots of prehistoric flint flakes are common. 9. The undated and multi-period linear ditches are relatively common. 10. Iron Age/Roman field boundaries are relatively rare. 11. Iron Age/Roman enclosures are relatively rare. 12. Iron Age/Roman enclosures are relatively rare. 13. Undated linear ditches are relatively common. 14. Undated possible ditches are relatively common. 15. Undated ditches are relatively common. 16. The rarity of any unrecorded remains is unknown. 17. Palaeoenvironmental remains are common within alluvial deposits. 18. World War Two accommodation and training sites are relatively rare. 19. Late Saxon brooch and medieval coins are are relatively rare. 20. Field boundaries and trackways of probable post medieval date are common. 21. Post medieval date field boundaries are common. 22. Post medieval former field boundaries are common. 23. Linear boundaries or trackways are common. 24. World War One to World War Two military training sites are relatively rare. 25. World War Two airfields are relatively rare. 26. Landscape parks are relatively rare. 27. The field boundaries of unknown but possible medieval to post medieval date are of Low significance	Moderate Adverse (Built heritage) Low, Moderate or Major Adverse (Archaeology)
Survival	1. N/A. 2-4. The listed buildings are likely to have a good level of survival. Note that the Grade II* listed Church of St Michael is largely a ruin. 5. The level of survival of the Roman field system is unknown. 6. The level of survival of the Post-Roman and undated features and prehistoric finds is unknown. 7. The level of survival of undated and multi-period linear ditches is unknown. 8. No survival, the flint flakes will have been removed. 9. The level of survival of undated and multi-period linear ditches is unknown. 10. The level of survival of Iron Age/Roman field boundaries is unknown. 11. The level of survival of Iron Age/Roman enclosures is unknown. 12. The level of survival of Iron Age/Roman enclosures is unknown. 13. The level of survival of undated linear ditches is unknown. 14. The level of survival of undated possible ditches is unknown. 15. The level of survival of undated ditch is unknown. 16. The level of survival of previously unrecorded remains is unknown.	2-34: The level of survival is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34: The level of survival is not directly relevant to the impacts on heritage assets.	2-34: The level of survival is not directly relevant to the impacts on heritage assets.	N/A
Condition	1. N/A. 2. The condition of the Grade I listed buildings is unknown. 3. The condition of the Grade II* listed building is unknown. 4. The condition of the Grade II listed buildings is unknown. 5. The condition of the Roman field system is unknown. 6. The condition of the Post-Roman and undated features and prehistoric finds is unknown. 7. The condition of the undated and multi-period linear ditches is unknown. 8. The condition of the flint flakes is unknown. 9. The condition of the undated and multi-period linear ditches is unknown. 10. The condition of the Iron Age/Roman field boundaries is unknown. 11. The condition of the Iron Age/Roman enclosures is unknown. 12. The condition of the Iron Age/Roman enclosures is unknown. 13. The condition of the undated linear ditches is unknown. 14. The condition of the undated possible ditches is unknown. 15. The condition of the undated ditch is unknown. 16. The condition of any previously unrecorded remains is unknown. 17. The condition of any palaeoenvironmental remains is unknown. 18. The condition of the World War Two accommodation and training site is unknown. 19. The condition of the late Saxon brooch and medieval coin will have been removed	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The condition is not directly relevant to the impacts on heritage assets. 35. N/A.	N/A
Complexity	1. N/A. 2. The complexity of the Grade I listed buildings will include their relationships to other heritage assets and to the wider rural landscape. 3. The complexity of the Grade II* listed building will include its relationship to other heritage assets and to the wider rural landscape. 4. The complexity of the Grade II listed buildings will include their relationships to other heritage assets and to the wider rural landscape. 5. The complexity of the Roman field system is unknown. 6. The complexity of the Post-Roman and undated features and prehistoric finds is unknown. 7. The complexity of the undated and multi-period linear ditches is unknown. 8. The complexity of the flint flakes is unknown. 9. The complexity of the undated and multi-period linear ditches is unknown. 10. The complexity of the Iron Age/Roman field boundaries is unknown. 11. The complexity of the Iron Age/Roman enclosures is unknown. 12. The complexity of the Iron Age/Roman enclosures is unknown. 13. The complexity of the undated linear ditches is unknown. 14. The complexity of the undated possible ditches is unknown. 15. The complexity of the undated ditch is unknown. 16. The complexity of any previously unrecorded remains is unknown. 17. The complexity of any palaeoenvironmental remains is unknown. 18. The complexity of the World War Two accommodation and training site is	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	2-34. The complexity is not directly relevant to the impacts on heritage assets. 35. N/A.	N/A
Context	1. N/A. 2. Grade I listed buildings: relationships to assets in Weston Longville and Ringland. Both Grade I listed buildings will have historic and visual relationships to their churchyards and to the immediate rural landscape. Rural. 3. Grade II* listed building: relationship to Grade II listed buildings at or in the vicinity of Morton Hall. Relationship to immediate rural landscape. Rural. 4. Grade II listed buildings: relationships to assets in Weston Longville and Honingham. Relationships to immediate rural landscapes. Rural. 5 - 35. Rural.	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	2-34. Potential impacts to the context of the listed buildings through changes to their immediate setting. Setting is the way in which an asset is understood and experienced and is not an asset in itself. Changes to setting could include the loss of surrounding rural and agricultural land, impacts from traffic flow and noise, and impacts from road infrastructure, including road lighting. 5-35. The context is not impacted	N/A
Period	1. N/A. 2. Later medieval. 3. Early and Later medieval. 4. Post-medieval. 5. Roman. 6. Undated/prehistoric. 7. Undated/multi-period. 8. Prehistoric. 9. Undated/multi-period. 10. Iron Age/Roman. 11. Iron Age/Roman. 12. Iron Age/Roman. 13. Undated. 14. Undated. 15. Undated.	2-35. The period is not impacted	2-35. The period is not impacted	2-35. The period is not impacted	N/A

Reference Sources

National Heritage List for England
Norfolk Historic Environment Record
Norwich Western Link Heritage Constraints Report (WSP 2019)

Step 5 - Summary Assessment Score

Moderate Adverse (Built heritage)
Low, Moderate or Major Adverse (Archaeology)

Qualitative Comments

The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction.
The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved). The heritage significance will be determined through future assessment, including preliminary site-based archaeological investigations.

Appendix E.6

BIODIVERSITY

TAG Biodiversity Impacts Worksheet

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
River Wensum Special Area of Conservation (SAC)	**Biodiversity** Chalk-fed river, designated for: Annex I habitat as a primary reason for selection: - Watercourses of plain to montane levels with a water crowfoot *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. - The Wensum represents sub-type 1 in lowland eastern England. Annex II species as a primary reason for selection: - White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* Annex II species present as a qualifying feature: - Desmoulin's whorl snail *Vertigo moulinsiana* - Brook lamprey *Lampetra planeri* - Bullhead *Cottus gobio* To date surveys have confirmed the likely absence of white clawed crayfish from the stretch of the River Wensum which was considered relevant to the Proposed Scheme and the presence of: Water crowfoot *Ranunculion fluitantis* , Bullhead, Brook lamprey and Desmoulin's whorl snail either within the Wensum or in the supporting ditches within the floodplain.	**International**	**High** Primary habitat: Sub-type 1 has a limited distribution in the UK, being found only in those areas where chalk is present, and is therefore restricted to southern and eastern England. Primary species: White-clawed crayfish. One of only four watercourses in Norfolk that are known to support white-clawed crayfish. Other qualifying feature: Desmoulins's whorl snail. The site supports one of the largest populations in the UK. Other qualifying feature: Brook lamprey. The Wensum has a healthy population of brook lamprey, with clean water and suitable areas of gravels, silt or sand required for spawning. Other qualifying feature: Bullhead. Sites have been selected to encompass the natural geographical range of the species and to represent the range of ecological situations in which it occurs, e.g. both upland and lowland rivers, and both acidic and base-rich situations.	**Target Feature** Anthropogenic influences have had a dramatic effect on the ecology and hydrology of the River Wensum, in particular at sites up and downstream of mill structures, sites affected by channel modification inc. over-widening and deepening, sites affected by excessive silt ingress, sites that are heavily maintained and sites that lack natural riparian vegetation. The following document has been published that includes specific restoration targets for the qualifying features of the SAC: *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features (Natural England 2019).*	**Very high** Internationally important site with limited potential for substitution.	**Neutral**	**Neutral**
River Wensum Site of Special Scientific Interest (SSSI)	**Biodiversity** Overlaps with River Wensum SAC (see above cell). Notified for: - Flowing waters - Type I: naturally eutrophic lowland rivers with a high base flow. - Flowing waters - Type III: base-rich, low-energy lowland rivers and streams, generally with a stable flow regime - Population of RDB mollusc – Desmoulin's whorl snail. - S25 - Phragmites australis - Eupatorium cannabinum tall-herb fen. - S3 - Carex paniculata swamp. - S4 - Phragmites australis swamp and reed-beds - S5 - Glyceria maxima swamp - S7 - Carex acutiformis swamp - White-clawed crayfish To date, surveys have confirmed the likely absence of white clawed crayfish from the stretch of the River Wensum which was considered relevant to the Scheme and the presence of Desmoulin's whorl snail either within the Wensum or in the supporting ditches within the floodplain.	**National**	**High** The River Wensum is a SSSI of national importance, supporting a diverse range of protected habitats and species.	**Unknown** The trend for the SSSI is currently unknown. No assessments within the last five years. Target species - See above for trends regarding white-clawed crayfish and Desmoulin's whorl snail. Of the 36 SSSI units for this site, 6 were considered to be in 'Favourable' condition in 2010, with the remaining 30 considered to be in 'Unfavourable - Recovering' condition.	**High** Nationally important site with no potential for substitution.	**Neutral**	**Neutral**
River Wensum Pastures, Ringland Estates County Wildlife Site (CWS)	**Biodiversity:** Predominantly an improved cattle-grazed pasture adjacent to the River Wensum, crossed by a network of drains supporting a species-rich flora associated with aquatic habitats.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown -** The Norfolk BAP does not identify a trend in relation to the habitats associated with this CWS.	**Medium** - County value site with potential for substitution.	**Minor negative**	**Slight adverse**
Wensum Pastures at Morton Hall CWS	**Biodiversity:** Predominantly improved cattle-grazed pasture adjacent to River Wensum, crossed by a network of drains supporting a species-rich flora associated with aquatic habitats.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Intermediate negative**	**Moderate adverse**
Land adjoining Foxburrow Plantation CWS	**Biodiversity:** Part of a larger area known collectively as Foxburrow Plantation and The Waterfence. It consists of an extensive area of wet, species-rich grassland situated in the bottom of a spring-fed valley.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Intermediate negative**	**Moderate adverse**
Broom & Spring Hills CWS	**Biodiversity:** Semi-natural deciduous woodland dominated by oak and sycamore.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Intermediate negative**	**Moderate adverse**
Primrose Grove CWS	**Biodiversity:** Structurally varied, predominately consisting of semi-natural broad-leaved and mixed woodland, with some compartments considered to be ancient. Broad-leaved woodland comprised with varying proportions of oak, beech, sycamore and ash. Mixed woodland is represented by Douglas Fir and Scot's Pine.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Intermediate negative**	**Moderate adverse**

Attlebridge Hills CWS	**Biodiversity:** Structurally varied, broad-leaved semi-natural woodland. The canopy is dominated by mature oak, sycamore, sweet chestnut with extensive areas of mixed coppice of hazel, sycamore and sweet chestnut.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown -** The Norfolk BAP does not identify a trend in relation to the habitats associated with this CWS.	**Medium** - County value site with potential for substitution.	**Minor negative**	**Slight adverse**
Gravelpit Plantation and Church Hill CWS	**Biodiversity:** Closed canopy semi-natural broad-leaved and mixed plantation woodland, with some stands considered to be ancient in origin. Canopy dominated to varying degrees by oak, ash and sycamore, and the shrub layer is comprised of hawthorn, hazel and holly.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Minor negative**	**Slight adverse**
Old Covert, Wood Land CWS	**Biodiversity**: A coppice woodland with standards that are not listed on the Ancient Woodland Inventory, although it may have once been part of a larger, Ancient Woodland. The wood is managed as coppice and for shooting.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Minor negative**	**Slight adverse**
Mouse Wood CWS	**Biodiversity:** Citation refers to an ancient, replanted woodland which is now predominantly a commercially-managed conifer plantation surrounded mainly by arable farmland. The extent of the existing ancient woodland is unknown.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Minor negative**	**Slight adverse**
River Tud at Easton and Honingham CWS	**Biodiversity:** Citation refers to a watercourse supporting a spcies-rich aquatic, marginal and emergent riverine flora.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Neutral**	**Neutral**
Church Meadow, Alder Carr, Three Corner Thicket and Nursery Plantation CWS	**Biodiversity:** Citation refers to a site comprising mainly cattle grazed, inimprove wet pasutre, bisected by spring-fed ditches. With ares of wet and dry woodland.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Neutral**	**Neutral**
Taverham Mill CWS	**Biodiversity:** Citation refers to a fishing lake surrounded by marshy and neutral grassland and a mixture of planted and semi-natural woodland on acid soil.	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Neutral**	**Neutral**
Ringland Pits CWS	**Biodiversity:** Citation refers to a flooded disused gravel workings adjacent to the River Wensum .	**County**	**Medium -** Site of county value supporting Habitat of Principal Importance.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this CWS.	**Medium** - County value site with potential for substitution.	**Neutral**	**Neutral**
Fakenham Road Roadside Nature Reserve (RNR)	**Biodiversity:** Species: Hoary mullein V*erbascum pulverentum.* Phase 1 habitat surveys of this area have identified the presence of this species.	**County**	**Medium -** Site of county value, with only one qualifying feature behind the designation.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this species.	**Medium** - County value site with potential for substitution.	**Major negative**	**Moderate adverse**
Ancient Woodland	**Biodiversity**: Ancient Woodland is an irreplacable habitat which is important for many reasons, including its value to wildlife, i.e. bats, birds and fungi. Primrose Grove CWS is also partially designated as Ancient Woodland, as well as other woodland blocks in the local area.	**National**	**High** - Detailed baseline data has not been collected, although the route has potential to impact on ancient woodland. Ancient woodland is considered one of the richest land-based habitats for wildlife.	**Declining** - Ancient woodland is in significant national decline, with a current UK coverage of only 2%.	**High** - National value habitat with no potential for substitution.	**Minor Negative**	**Slight adverse**
Ancient / Veteran Trees and Hedgerows	**Biodiversity:** A number of veteran and ancient trees are present within the Scheme, both as stand-alone features and within hedgerows or other important habitats. Veteran and ancient trees are considered irreplacable habitats, and a BS5837 survey has been completed by Arboriculturists to identify trees which are veteran or ancient. Further assessment works will be completed in 2021 to consider hedgerows.	**County**	**High** - The BS5837 survey has identified a number of veteran and ancient trees within the Scheme. Veteran and ancient trees are considered to be an irreplaceable habitat and are of high value to a range of wildlife.	**Declining** - These habitat are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - County value species with no potential for substitution.	**Major negative**	**Moderate adverse**
Important Hedgerows	**Biodiversity:** Ecologically important hedgerows are recognised as hedgerows that are at least 30 years old which support a mixture of native woody species and other associated features such as mature trees, woodlands, parallel/connecting hedges, and important woodland ground flora as stated in the Hedgerow Regulations 1997. Hedgerow surveys have been completed this year which have identified the presence of a number of important hedgerows along the Scheme. Hedgerows are listed as a target species in the Norfolk Biodiversity Action Plan.	**County**	**High -** Hedgerow surveys have identified a number of important hedgerows within the Scheme, which will be impacted. Hedgerows are an important landscape feature and provide habitat connectivty and high value to a range of wildlife.	**Declining** - The lengths of managed hedgerow decreased by 6.1% between 1998 and 2007. Abundance and distribution of hedgerow trees are declining, as recognised by the Countryside Survey 2000.	**Medium** - County value habitat with limited potential for substitution.	**Intermediate negative**	**Moderate adverse**
HPI - Hedgerows	**Biodiversity:** Hedgerows are a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. This habitat is present within the boundaries of the Proposed Scheme. Hedgerows provide habitat connectivity for a range of species throughout the landscape.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact hedgerows of county value.	**Declining** - The lengths of managed hedgerow decreased by 6.1% between 1998 and 2007. Abundance and distribution of hedgerow trees are declining, as recognised by the Countryside Survey 2000.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**
HPI - Floodplain Grazing Marsh	**Biodiversity:** Coastal and Floodplain grazing marsh is a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. This habitat is present within the boundaries of the Proposed Scheme. These habitats are known to support botanical diversity and provide value to a range of invertebrates and breeding and wintering birds.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact floodplain grazing marshes of county value.	**Declining** - This habitat is listed as priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**
HPI - Arable Field Margins	**Biodiversity:** Arable Field Margins are a Habitat of Principal Importance (HPI habitat), and is a target habitat as part of the Norfolk Biodiversity Action Plan. Further survey work in 2021 will determine the presence / absence within the boundaries of the Proposed Scheme.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact arable field margins of county value.	**Declining** - This habitat is listed as priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Minor adverse**
HPI - Rivers and Streams	**Biodiversity:** The Proposed Scheme will intersect a number of watercourses, including the River Wensum and the River Tudd (a chalk stream), as well as a number of other small watercourses. The River Wensum is internationally designated (see site details above), whilst other watercourses within the boundaries of the Proposed Scheme are considered to be of County value.	**Local**	**High -** More than 85% of all the chalk streams in the world are in England and they are threatened nationally due to impacts from agricultural and urban development. See above for details of River Wensum SAC and SSSI designation. Other watercourses within the Proposed Scheme are also likely to support a range of wildlife and botanical diversity although detailed habitat surveys are yet to be completed.	**Declining -** Increases in population pressure leading to water pumping.	**Medium** - Local value species with potential for substitution.	**Neutral**	**Neutral**

HPI - Lowland Mixed Deciduous Woodland	**Biodiversity**: Lowland mixede deciduous woodland is a Habitat of Principal Importance (HPI). All woodland types are considered ecologically valuable habitat, providing habitat features for a range of species.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact woodlands of county value.	**Declining** - HPI habitats (such as lowland deciduous woodlands) are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk	**Medium** - Local value species with potential for substitution.	**Major negative**	**Moderate adverse**
HPI - Wet Woodland	**Biodiversity**: Wet woodland is a Habitat of Principal Importance (HPI). All woodland types are considered ecologically valuable habitat, providing habitat features for a range of species.	**Local**	**Medium -** Detailed habitat surveys have not yet been undertaken although it is expected that the route will impact woodlands of county value.	**Declining** - HPI habitats (such as lowland deciduous woodlands) are listed as a priority under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Major negative**	**Moderate adverse**
Habitat listed under the Priority Habitat Inventory (within 200m)	**Biodiversity**: The geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance.	**Local**	**Medium -** Detailed habitat surveys have not been undertaken although it is expected that the route will impact habitat listed under the Priority Habitat Inventory.	**Declining** - Priority habitats are under the Natural and Rural Communities Act (2006) due to the declining trend nationally. The Norfolk BAP does not identify a trend in relation to these habitat types locally.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Slight adverse**
Invasive Species	**Biodiversity**: Invasive plant and animal species may be present within the Scheme.	**N/A**	**N/A**	**N/A**	**Negligible**	**N/A**	**N/A**
Vascular and Non-Vascular Plants	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable vascular and non-vascular plants. The presence/potential presence of protected and notable flora along the Proposed Scheme have been identifed through Phase 1 habitat surveys and desk-based searches. Further surveys are due to be conducted in 2020 and 2021, and will include a specific NVC survey. Species of vascular and non-vascular plants are listed as Norfolk Biodiversity Action Plan species.	**Local**	**Medium -** detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable vascular and non-vascular plants.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - Local value species with potential for substitution.	**Minor negative**	**Slight adverse**
Macrophytes	**Biodiversity:** Macrophyte suveys have identified the water crowfoot species associated with the River Wensum SAC designation.	**International**	**High** - See SAC information above.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Very high** - Designated features of SAC only.	**Neutral**	**Neutral**
Fungi	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable fungi. The presence/potential presence of protected and notable fungi along the Proposed Scheme have been identifed through Phase 1 habitat surveys and desk-based searches. Species of fungi are listed as Norfolk Biodiversity Action Plan species.	**Local**	**Medium** - detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable flora, fungi, bryophyte and lichen surveys.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - County value species with potential for substitution.	**Minor negative**	**Slight adverse**
Lichens	**Biodiversity:** The Proposed Scheme supports a diverse range of habitats with the potential to support protected/notable lichens. The presence/potential presence of protected and notable lichens along the Proposed Scheme have been identifed through Phase 1 habitat surveys and desk-based searches.	**Local**	**Medium** - detailed baseline survey data has not yet been collected, however it is anticipated that the Proposed Scheme will impact areas of protected and notable flora, fungi, bryophyte and lichen surveys.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species locally.	**Medium** - County value species with potential for substitution.	**Minor negative**	**Slight adverse**
Fish	**Biodiversity**: The River Wensum SAC and its tributaries are designated for brook lamprey and bullhead. A fish survey completed in 2020 confirmed the presence of a range of coarse fish on the River Wensum in the vicinity of the scheme which included pike, chub, dace, roach, gudgeon and minnow. It is also highly likely that other species including bullhead and European eel are also present in the River Wensum. A survey of the connected ditches on the floodplain in the vicinity of the scheme highlighted the presence of river/brook lamprey (*Lampetra* spp.), minnow and three-spined stickleback. A survey of the Foxburrow Stream (tributary of the River Tud) resulted in no fish being observed or captured within the survey area.	**International**	**High** - See SAC information above. Additionally the route will cross minor watercourses (including drains), that may support fish. The network of connected ditches on the floodplain adjacent to the River Wensum and the marginal sediment beds within them are a particularly important habitat for lamprey.	**Unknown** - No trend has been identified nationally or locally for the two fish for which the SAC is designated.	**Very high** - Designated features of SAC (bullhead and brook lamprey only).	**Neutral**	**Neutral**
Reptiles (common and widespread species)	**Biodiversity**: Areas of rough grassland and scrub present along the length of the Proposed Scheme are likely to be suitable to support reptiles. Reptile surveys completed in 2019 and 2020 have confirmed the presence of low numbers of reptiles including grass snake and slow worm.	**Local**	**Medium** - widespread species of reptile, including slow worm and grass snake are known to be present in areas of suitable habitat, and the Scheme is ikely to impact reptile populations on a local level.	**Unknown** - The Norfolk BAP does not identify a trend in relation to these species.	**Medium** - reptiles are a species of medium biodiversity value on a national and local level.	**Neutral**	**Neutral**
Great Crested Newt *Triturus cristatus*	**Biodiversity**: Great crested newts are protected under the following legislation: Annexe II and IV of the Habitats Directive Conservation of Habitats and Species Regulations (Schedule 2) Wildlife and Countryside Act (1981) (Schedule 5) Great crested newt habitat suitability and presence/absence surveys in relation to the Proposed Scheme were completed in 2020, where access allowed. These surveys identified the presence of GCN in two ponds, which will be subject to a population class assessment in 2021. A number of ponds were not accessible for survey in 2020 and will therefore be subject to presence/absence and population class survey (where appropriate) in 2021.	**Local**	**High** - the route has potential to affect terrestrial habitat and breeding ponds used by this species.This wil be confirmed by further surveys completed in 2021.	**Target species** - GCN are targeted by the Norfolk BAP due to a major population decline in the Broads. The main objective in Norfolk is to maintain range and viability of the local population.	**High** - GCN are of high biodiversity value on a local and national level.	**Neutral**	**Neutral**
Birds	**Biodiversity**: Habitats present are suitable for use by birds. The arable fields and grasslands provide potential foraging habitat for passage/over-wintering birds such as mixed thrush flocks, skylarks and pipits. Arable fields and areas of grassland could also be used by flocks of migrant/over-wintering bird species such as geese. Wintering bird surveys will be completed in the winter of 2020/2021. The Proposed Scheme also supports extensive and diverse habitat which are likely to support breeding birds typical of these habitats (e.g. farmland, woodland) and confirmed the use of the habitats on-Site by a range of breeding bird speceis, including Barn Owl and king fisher, which are a Schedule 1 species under the Wildlife and Countryside Act (1981).	**Local**	**Medium -** Baseline data collected to-date suggests that the route will impact breeding and wintering birds at a local level.	**Unknown** - The Norfolk BAP identifies a range of bird species in significant decline on a county level.	**Medium** - The site is likely to support a diversity range of breeding and wintering bird species of local importance.	**Minor negative**	**Slight adverse**

Barn Owl	Barn owl *Tyto alba* are a Schedule 1 species under the Wildlife and Countryside Act (1981), and is a Norfolk Biodiversity Action Plan species. Incidental sightings of barn owl were recorded during surveys for other species, and barn owl tree and building roosts were identified during building surveys.	**Local**	**High** - barn owl are a Schedule 1 species and are targeted by the Norfolk Biodiversity Action Plan. The Scheme will result in the severence and/or loss of foraging habitat.	**Declining**- the Norfolk BAP states that barn owl populations crashed in the 20th century in England and Wales. A more recent study in 1997 indicated that, while still declining, the rate of decline was	**High** - Barn owl are of high biodiversity value on a National and Local level.	**Minor negative**	**Slight adverse**
Bats (General)	**Biodiversity**: Habitats present within the Proposed Scheme, including woodlands, hedgerows, mature trees, waterbodies and scrub provide suitable habitat for foraging, commuting and roosting bats. Surveys completed in 2019 and 2020 have confirmed the presence of brown	**County**	**High -** Baseline data collected to date indicates that the route will sever bat commuting routes, and result in the loss of foraging and roosting habitat.	**Target species** - The Norfolk BAP targets four species (including barbastelle) to reduce decline.	**High** - Bats are protected under the Conservation of Habitat and Species Regulations 2017 and	**Intermediate negative**	**Large adverse**
Bats (Barbastelle *Barbastella barbastellus*)	**Biodiversity:** A rare bat species of national importance which is known to roost within the local area. The route is located within the Core Sustenance Zone (CSZ) for barbastelle. Barbastelle are offered specific protection under: Annex II and IV of the Habitats Directive	**National**	**High -** Barbastelle are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981) and Annexe II and IV of the Habitats Directive. Baseline surveys completed to-date	**Target species** - Although a trend in relation to the target species is not known the Norfolk BAP targets barbastelle (as well as three other bat species) to reduce decline.	**Very High** - Bats are protected under the Conservation of Habitat and Species Regulations 2017 and	**Intermediate negative**	**Large adverse**
Badgers *Meles meles*	**Biodiversity**: Badgers are offered protection under the Protection of Badgers Act 1992. Woodlands, hedgerows and grassland provide suitable habitat for foraging badgers, and suitable locations for sett construction. Walkover badger surveys completed in 2019/2020 (as well as observations	**Local**	**High -** Two main badger setts have been identified within the Scheme alignment.	**Unknown** - The Norfolk BAP does not identify a trend in relation to this species, although nationally badgers have shown a significant increase in numbers (c.88% since the 1980s).	**Medium** - badger are a species of medium biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
Otter *Lutra lutra*	**Biodiversity:** Otter are tareted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981) and the Conservation of Habitats and Species Regulations (2017). In addition to the River Wensum and Tud a series of small watercourses and	**Local**	**Medium** - Otter have been identified as being present in the watercourses to be intersected by the Scheme.	**Target species** - Otter populations are increasing both locally (Norfolk) and nationally.	**High -** Otter are a species of high biodiversity value on a national and local level.	**Neutral**	**Neutral**
Water Vole *Arvicola amphibius*	**Biodiversity:** Water vole are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981). In addition to the River Wensum and Tud a series of small watercourses and drains, in connection with the route may support water vole. Watervole presence has been confirmed in the River Wensum and in other watercourses intersected by the Proposed Scheme.	**Local**	**Medium** - Water vole are targeted by the Norfolk Biodiversity Action Plan and are protected under Schedule 5 of the Wildlife and Countryside Act (1981).	**Target species** - Water vole decline in Norfolk is mainly due to population fragmentation and isolation.	**Medium -** Water vole are a species of medium biodiversity value on a national and local level.	**Neutral**	**Neutral**
SPI - Brown Hare *Erinaceus europaeus*	**Biodiversity** Habitats within the Proposed Scheme include open arable farmland and fields, which offer value to brown hare Lepus europeaus, and many incidental sightings of brown hare hare have been recorded within the Scheme.	**Local**	**Low** - brown hare are not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining -** brown hare have been in decline for the last 30 years, however recent figures suggest that the species is recovering.	**Low** - brown hare are a species of low biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
SPI - Hedgehog *Erinaceus europaeus*	**Biodiversity** Habitats within the Proposed Scheme comprise a mosaic of woodland, grassland, wetland and arable, which offers value to hedgehog*Erinaceus europaeus.*	**Local**	**Low** - hedgehog are not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining -** it is estimated that hedgehog numbers have declined by almost 40% in the past decade.	**Low** - hedgehog are a species of low biodiversity value on a national and local level.	**Minor negative**	**Slight adverse**
SPI - Common Toad *Bufo bufo*	**Biodiversity** Habitats within the Scheme include floodplains, woodlands, the River Wensum and other watercourses, and a number of ponds are present within proximity of the Proposed Scheme. These habitats are likely to support common toads, a UK Biodiversity Action Plan species, and this species has been observed within habitats across the Scheme.	**Local**	**Low -** common toad it not a target species in the Norfolk Biodiversity Action Plan and are relatively widespread within the UK.	**Declining** - recent research by Froglife has identified a decline in toad populations of 68% over the last 30 years, however this is still a widespread species.	**Low** - common toads are a species of low biodiversity value on a national and local level.	**Minor Negative**	**Slight adverse**
Desmoulin's Whorl Snail	**Biodiversity**: Records have been provided of Desmoulin's Whorl Snails in the local area. Surveys conducted in 2019 within suitable habitats to the north of the Proposed Scheme have confirmed the presence of Desmoulin's Whorl Snails. Further surveys are planned in 2020.	**International**	**High** - See SAC information above.	**Target species** - Targeted because of its declining in Norfolk due to destruction of wetlands, habitat degradation, particularly as a result of changes in hydrology and possibly the introduction of grazing.	**Very high** - Primary feature of SAC. Internationally important site with limited potential for substitution.	**Minor Negative**	**Slight adverse**
Aquatic Macroinvertebrates	**Biodiversity**: The watercourses and ponds present within the Proposed Scheme and the local area are likely to support a range of aquatic macroinvertebrates, which may include notable or protected species. Macroinvertebrate surveys were completed in 2020.	**Local**	**High** - The River Wensum SAC and SSSI is designated for white-clawed crayfish and Desmoulin's whorl snail. The scheme will impact upon aquatic macroinvertebrates at a County level.	**Target species** - the only aquatic macroinvertebrate in decline across Norfolk and is targeted by the Norfolk BAP is the Norfolk hawker *Aeshna isoceles* . The local objective is to maintain the current range in Norfolk by preventing loss of freshwater sites and create new habitat with a view to increase the range in Norfolk by 2020.	**Medium** - freshwater habitats may support notable aquatic macroinvertebrate species.	**Minor negative**	**Slight adverse**
Terrestrial Invertebrates	**Biodiversity**: The diverse range of habitats present along the Scheme, including woodland, scrub and grassland are likely to support a range of terrestrial invertebrates. Invertebrate surveys are due to be completed in 2021.	**Local**	**Medium** - Although baseline surveys have not yet been completed, it is expected that the range of habitats along the route will support terrestrial invertebrates that are widespread and common throughout the UK.	**Target species** - The Norfolk BAP identifies a declining trend in certain invertebrate species. Ground beetle, brush-thighed seed-eater beetle, flixweed flea beetle and silver-studded blue butterfly are all target species of the Norfolk BAP. It is unknown whether these species are present in the vicinity of the route option.	**Medium** - The project has the potential to affect terrestrial invertebrate species.	**Minor Negative**	**Slight adverse**

Reference Sources

River Wensum. European Site Conservation Objectives: Supplementary advice on conserving and restoring site features (Natural England 2019).
Norfolk BAP: https://www.norfolkbiodiversity.org/assets/Uploads/Water-vole2.pdf.
Wildlife and Countryside Act 1981 Schedule 1: http://www.legislation.gov.uk/ukpga/1981/69/schedule/1.
Wildlife and Countryside Act 1981 Schedule 5: http://www.legislation.gov.uk/ukpga/1981/69/schedule/5.
NERC Act Section 41 Species of Principal Importance: http://publications.naturalengland.org.uk/publication/4958719460769792.
Froglife: https://www.froglife.org/2018/03/23/amphibian-and-reptile-declines-uk-perspective/
BTO: https://app.bto.org/birdtrends/species.jsp?&s=kingf

Summary Assessment Score

Large Adverse

Qualitative Comments

Overall the Assessment Score is Large Adverse due to the potential impacts on bats, largely associated with the loss of woodland leading to a reduction in available forgaging habitat. Compensation proposals are being developed which will include the enhancement of existing woodlands to benefit bats and the creation of new woodland which, in the long term, will help to compensate for the loss of woodland.

Appendix E.7

WATER

TAG Water Environment Impacts Worksheet

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The study area includes features within 1km of the Red Line Boundary (RLB). **Potential Impacts:** Increased pollution risk to surface water and groundwater Increased sedimentation within watercourses Impacts to the hydromorphological, physio-chemical and ecological quality of watercourses Increased flood risk associated with new structures Impact to groundwater flow pathways	**River Wensum**	**Water supply**	**Medium** - main river, good chemical quality, supports private abstractions.	Regional	Medium	Cannot be substituted	Medium	Negligible	Insignificant
		Biodiversity	**Very High** - channel of the Wensum designated SAC and SSSI.	Regional	High	Cannot be substituted	Very High	Negligible	Low
		Transport and dilution of waste products	**Medium** - large catchment, receives local discharge, WWTW downstream of study area.	Regional	Medium	Limited potential for substitution	Medium	Negligible	Insignificant
		Recreation	**Medium** - flow through urban and public areas	Local	Low	Limited potential for substitution	Medium	Negligible	Insignificant
		Hydromorphology	**Medium** - heavily modified classification but supports good ecological status	Regional	Medium	Cannot be substituted	Very high	Negligible	Low
		Conveyance of flow and material	**High** - main river, large catchment, flows through mix of urban and rural areas	Regional	Medium	Cannot be substituted	High	Negligible	Insignificant
	Floodplain of the River Wensum	**Conveyance of flow and material**	**Medium** - provides local flood flow conveyance route, functional floodplain protecting the local area and downstream Norwich City.	Local	Medium	Cannot be substituted	Medium	Minor Adverse	Insignificant
		Biodiversity	**Very High -** functional floodplain, habitat of principal importance - floodplain grazing marsh.	Local	Medium	Limited potential for substitution	High	Minor Adverse	Low significance
	Tributary of River Tud or Foxburrow Stream	**Water supply**	**Low -** quality unknown, may support agricultural uses although likely to have low flow	Local	Low	Limited potential for substitution	Low	Negligible	Insignificant
		Biodiversity	**Medium** - significantly modified, potential supporting habitat for otter and water vole	Local	Medium	Limited potential for substitution	Medium	Minor Adverse	Insignificant
		Transport and dilution of waste products	**Low** - likely to receive runoff from adjacent land	Local	Low	Limited potential for substitution	Low	Negligible	Insignificant
		Recreation	**Low -** no known recreational or amenity value	Local	Low	Limited potential for substitution	Medium	Negligible	Insignificant
		Hydromorphology	**Low** - heavily modified	Local	Low	Limited potential for substitution	Low	Minor Adverse	Insignificant
		Conveyance of flow and material	**Medium** - provides local flood flow conveyance route	Local	Low	Limited potential for substitution	Medium	Minor Adverse	Insignificant
	Combined Groundwater Aquifers (Secondary and Principal Aquifers)	**Groundwater quality**	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple Private Abstractions	Regional	High	Limited potential for substitution	High	Minor Adverse	Low significance
		Groundwater flow (conveyance)	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple private abstractions, provides River Wensum baseflow, shallow groundwater in the River Wensum floodplain	Regional	High	Limited potential for substitution	High	Minor Adverse	Low significance
		Water resource	**Very High** - Groundwater aquifer (Combined Secondary A, Secondary B and Principal Aquifers), Source Protection Zone 3, Multiple private abstractions, important baseflow contribution to the River Wensum SSSI & SAC, River Tud	Regional	High	Limited potential for substitution	Very High	Negligible	Low significance

Reference Sources

OS mapping, EA Flood Map for Planning, EA Flood Risk from Surface Water mapping, EA Catchment Data Explorer, Defra MAGIC geographical information portal, Geology of Britain Viewer

Summary Assessment Score

Minor Adverse

Qualitative Comments

No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum.
Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effect to floodplain storage or flood flow conveyance.
Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements.
The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council as the Lead Local Flood Authority.
Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into SuDS should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment.
Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the scheme.

Appendix F

PUBLIC ACCOUNTS

Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Fund						
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*(7)*				
Central Government Funding: Transp						
Revenue	0					
Operating costs	0					
Investment Costs	127129					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	127129	*(8)*				
Central Government Funding: Non-Tr						
Indirect Tax Revenues	53272	*(9)*				
TOTALS						
Broad Transport Budget	127129	*(10) = (7) + (8)*				
Wider Public Finances	53272	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Func						
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*(7)*				
Central Government Funding: Trans						
Revenue	0					
Operating costs	0					
Investment Costs	127129					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	127129	*(8)*				
Central Government Funding: Non-T						
Indirect Tax Revenues	46916	*(9)*				
TOTALS						
Broad Transport Budget	127129	*(10) = (7) + (8)*				
Wider Public Finances	46916	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Func						
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*(7)*				
Central Government Funding: Trans						
Revenue	0					
Operating costs	0					
Investment Costs	127129					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	127129	*(8)*				
Central Government Funding: Non-T						
Indirect Tax Revenues	59742	*(9)*				
TOTALS						
Broad Transport Budget	127129	*(10) = (7) + (8)*				
Wider Public Finances	59742	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Core Growth Sens - PA

Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Func						
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	0	*(7)*				
Central Government Funding: Trans						
Revenue	0					
Operating costs	0					
Investment Costs	127129					
Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	127129	*(8)*				
Central Government Funding: Non-T						
Indirect Tax Revenues	39398	*(9)*				
TOTALS						
Broad Transport Budget	127129	*(10) = (7) + (8)*				
Wider Public Finances	39398	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Appendix G

ANALYSIS OF MONITISED COSTS AND BENEFITS

Analysis of Monetised Costs and Benefits

Noise	38	*(12)*
Local Air Quality	72	*(13)*
Greenhouse Gases	19475	*(14)*
Journey Quality	0	*(15)*
Physical Activity	8876	*(16)*
Accidents	18582	*(17)*
Economic Efficiency: Consumer Users (Commuting)	58488	*(1a)*
Economic Efficiency: Consumer Users (Other)	167804	*(1b)*
Economic Efficiency: Business Users and Providers	88569	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-53272	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	308632	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	127129	*(10)*
Present Value of Costs (see notes) (PVC)	127129	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	181503	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	2.43	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Analysis of Monetised Costs and Benefits

Noise	0	*(12)*
Local Air Quality	0	*(13)*
Greenhouse Gases	17445	*(14)*
Journey Quality	8876	*(15)*
Physical Activity	0	*(16)*
Accidents	12793	*(17)*
Economic Efficiency: Consumer Users (Commuting)	52234	*(1a)*
Economic Efficiency: Consumer Users (Other)	142272	*(1b)*
Economic Efficiency: Business Users and Providers	70836	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-46916	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	257540	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	127129	*(10)*
Present Value of Costs (see notes) (PVC)	127129	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	130411	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	2.03	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Analysis of Monetised Costs and Benefits

Noise	0	*(12)*
Local Air Quality	0	*(13)*
Greenhouse Gases	0	*(14)*
Journey Quality	0	*(15)*
Physical Activity	8876	*(16)*
Accidents	12778	*(17)*
Economic Efficiency: Consumer Users (Commuting)	84319	*(1a)*
Economic Efficiency: Consumer Users (Other)	208363	*(1b)*
Economic Efficiency: Business Users and Providers	116071	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-59742	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	370665	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	127129	*(10)*
Present Value of Costs (see notes) (PVC)	127129	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	243536	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	2.92	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Analysis of Monetised Costs and Benefits

Noise	0	*(12)*
Local Air Quality	0	*(13)*
Greenhouse Gases	0	*(14)*
Journey Quality	0	*(15)*
Physical Activity	8876	*(16)*
Accidents	11496	*(17)*
Economic Efficiency: Consumer Users (Commuting)	43158	*(1a)*
Economic Efficiency: Consumer Users (Other)	140112	*(1b)*
Economic Efficiency: Business Users and Providers	69491	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-39398	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	233735	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	127129	*(10)*
Present Value of Costs (see notes) (PVC)	127129	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	106606	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.84	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Appendix H

APPRAISAL SUMMARY TABLE

Appendix H.1

AST - CORE GROWTH SCENARIO

Appraisal Summary Table: Core Growth scenario

Date produced:	23-May-21

Contact:	
Name	
Organisation	Norfolk County Council
Role	

Name of scheme:	Norwich Western Link
Description of scheme:	The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

	Impacts	Summary of key impacts	Assessment				
			Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme provides business user benefits, with nearly all of the benefits being from journey time savings totalling with £81.766m in user benefits. There are increases in vehicle operating costs, with a benefit of over £6.803m	Value of journey time changes(£): 81,766,000 Net journey time changes (£) 0 to 2min: 37,958 / 2 to 5min: 9,860 / > 5min: 33,950				£88,569,000	
	Reliability impact on Business users	Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair						
	Regeneration	N/A						
	Wider Impacts	WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used.The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:	W11: Agglomeration impacts £89.26m WI2: Output change in imperfectly competitive markets impacts £7.88m WI3: Tax revenues arising from labour market impacts £0.33m				£97,471,000	
Environmental	Noise	The study area for the assessment has been derived based on guidance within the Design Manual for Roads and Bridges (DMRB), LA 111 Noise and Vibration, May 2020 and is set to a distance of 600m from the kerb of any new roads associated with the scheme. There are 52 residential dwellings within the study area and no additional other sensitive receptors. Generally, within the study area, noise levels are predicted to increase as a result of the scheme, with large increases predicted at isolated receptors towards the centre of the study area where low baseline levels are anticipated. However, some receptors along Wood Lane and Paddy's Lane are predicted to experience noise level reductions as a result of less vehicles using these roads in favour of the scheme. The Highways England A47 dualling scheme has been included in both the Do-minimum (without scheme) and Do-something (with scheme) scenarios for the purpose of this assessment.	Households experiencing increased daytime noise in forecast year: 33 Households experiencing reduced daytime noise in forecast year: 10 Households experiencing increased night time noise in forecast year: 3 Households experiencing reduced night time noise in forecast year: 10			NA	£38,490	
	Air Quality	The appraisal has been undertaken using the Impact Pathways approach. Overall, with the Proposed Scheme there are modest improvements in local air quality in terms of NO2 and PM2.5 at locations with relevant human exposure. The overall monetary valuation takes into account ecosystem damage costs. No Air Quality Management Areas are included in the air quality study area. The Proposed Scheme links map onto PCM links which are all compliant with the NO2 limit value both with and without scheme. No exceedances of air quality standards are predicted.	NO2 Change in NO2 assessment score over 60 year appraisal period: -10,684.21 (between 'with scheme' and 'without scheme' scenarios). In 2025 there are there are 7,860 properties with improvement, 35 properties with no change, and 2,180 properties with deterioration. In 2040 there are 7,733 properties with improvement, 32 properties with no change, and 2,310 properties with deterioration. PM2.5 Change in PM2.5 assessment score over 60 year appraisal period: -1,172.63 (between 'with scheme' and 'without scheme' scenarios). In 2025 there are 8,002 properties with improvement, 6 properties with no change, and 2,067 properties with deterioration. In 2040 there are 7,747 properties with improvement, 282 properties with no change, and 2,046 properties with deterioration.			N/A	NPV of change in NO2: £9,803 NPV of change in PM2.5: £62,165 Total NPV of change in air quality: £71,968	
	Greenhouse gases	The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic. Comments on assumptions and uncertainty: 1) Emissions have been calculated across the whole of the NATS model simulation area. 2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years. 3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal. 4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.	Change in non-traded carbon over 60y (CO2e): -443,429 Change in traded carbon over 60y (CO2e): -13,005			N/A	£19,474,620	
	Landscape	There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. Field patterns are easily substitutable, although loss of mature hedgerow trees would take much longer to re-establish. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a significant impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.	N/A			Moderate Adverse	N/A	
	Townscape	Scoped out of WebTAG and AST appraisal.	N/A			N/A	N/A	
	Historic Environment	The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved).	N/A			Moderate adverse (built heritage) Low, moderate or major adverse (buried remains)	N/A	
	Biodiversity	The possible biodiversity impacts include loss of woodland, hedgerows and wetland, degradation of habitats and impacts to protected species through loss of habitat, disturbance, severance of habitat, fragmentation and killing/injury of individuals. Impacts could occur during construction and operation of the Proposed Scheme. Mitigation and compensation strategies are being developed to reduce the identified possible impacts. Mitigation measures include a range of design features such as sensitive timing of construction works and the use of green bridges and underpasses. Compensation measures include planting new areas of woodland and enhancing existing woodlands. The most significant impact which cannot be mitigated for, in the short term, is the loss of woodland which bats use as foraging habitat.	N/A			Large adverse	N/A	
	Water Environment	No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. The Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority (LLFA). A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into sustainable drainage systems (SuDS) should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the Proposed Scheme.	N/A			Slight Adverse	N/A	
Social	Commuting and Other users	The scheme provides Commuting and Other user benefits, with most of the benefits being from journey time savings totalling £149.872m in user benefits. This are increases in vehicle operating costs, with a benefit of £76.420m.	Value of journey time changes(£): 149,873 Net journey time changes (£) 0 to 2min: 67,061 / 2 to 5min: 16,721 / > 5min: 66,091				£226,292,000	
	Reliability impact on Commuting and Other users							
	Physical activity	The impacts on Physical Activity has been assessed with DfT's AMAT for three of the four wider walking and cycling interventions. The NWL is forecast to have a beneficial impact of £8.876 million.					£8,876,000	
	Journey quality	Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.				Moderate Beneficial		
	Accidents	COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening. The results indicate that the scheme will result in a reduction of 529 accidents over the 60 year appraisal period, leading to a reduction of 674 casualties (2 Fatal, 56 Serious and 616 Slight).	The results indicate that the scheme will result in a reduction of 529 accidents over the 60 year appraisal period, leading to a reduction of 674 casualties (2 Fatal, 56 Serious and 616) Slight				£18,582,000	
	Security	Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic.				Moderate Beneficial		
	Access to services	The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.				Neutral		
	Affordability	The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs				Neutral		
	Severance	There are more roads forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement. Where existing routes are severed, new crossing facilities will be provided, which should mitigate the impact of the new road.				Slight Beneficial		
	Option and non-use values	The scheme will not substantially change the availability of transport services within the study area.				Neutral		
Public	Cost to Broad Transport Budget	The cost to the broad transport budget is £127.129m					£127,128,461	
	Indirect Tax Revenues	The indirect tax revenues are £53.272m					-£53,272,000	

Appendix H.2

AST - LOW GROWTH SCENARIO

Appraisal Summary Table: Low Growth scenario

Date produced:	23-May-21

Contact:	
Name	
Organisation	Norfolk County
Role	

Name of scheme:	Norwich Western Link
Description of scheme:	The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

	Impacts	Summary of key impacts	Assessment: Quantitative	Qualitative	Monetary £(NPV)	Distributio 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme provides business user benefits, with nearly all of the benefits being from journey time savings totalling with £65.818m in user benefits. There are increases in vehicle operating costs, with a benefit of over £5.018m	Value of journey time changes(£): 65.820 Net journey time changes (£): 0 to 2min: 27.421; 2 to 5min: 9.607; > 5min: 28.792		£70,836,000	
	Reliability impact on Business users	Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair				
	Regeneration	N/A				
	Wider Impacts	WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used.The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:	WI1: Agglomeration impacts £89.26m WI2: Output change in imperfectly competitive markets impacts £7.88m WI3: Tax revenues arising from labour market impacts £0.33m		£97,471,000	
Environmental	Noise	Not assessed for the Low Growth Scenario		NA		
	Air Quality	Not assessed for the Low Growth Scenario		N/A		
	Greenhouse gases	The greenhouse gases appraisal for road transport emissions has been undertaken in accordance with TAG Unit A3 methodology. The calculations are based on the traffic forecasts for the do-minimum and do-something model scenarios for 2025 (opening year) and 2040 (design year), as generated by the Norwich Area Transport Strategy (NATS) traffic model for the OBC. Non-traded CO2e emissions (petrol and diesel vehicles) and CO2e traded emissions (electric vehicles) have been calculated in accordance with DMRB LA 114. The substantial differences in the findings compared to those for Scheme 'Option C' those presented in the SOBC are largely attributed to the major updates to the NATS model for the OBC and DMRB methodology (previously HA 207/07) for calculating emissions of greenhouse gases from road traffic. Comments on assumptions and uncertainty: 1) Emissions have been calculated across the whole of the NATS model simulation area. 2) Emissions have been estimated for scenarios in 2025 and 2040. For each year between the emissions have been determined by linear interpolation. In the absence of any data for the intervening years, this pragmatic approach adds a degree of uncertainty to the TAG calculations for these years. 3) The NATS model future forecast year is 2040. Beyond 2040 no traffic growth has been assumed. In reality some inter-annual variations in traffic levels and emissions can be expected. This factor adds a degree of uncertainty to the appraisal. 4) Emissions have been estimated based on vehicle fleet composition forecasts which were published pre-COVID-19. The likely impact of COVID-19 on fleet composition in future years cannot be predicted with any certainty at this present time.	Change in non-traded carbon over 60y (CO2e): -397,598 Change in traded carbon over 60y (CO2e): -12,458	N/A	£17,445,270	
	Landscape	There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. Field patterns are easily substitutable, although loss of mature hedgerow trees would take much longer to re-establish. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a significant impact on tranquillity in the north. The road will also alter tranquility locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.	N/A	Moderate Adverse	N/A	
	Townscape	Scoped out of WebTAG and AST appraisal.	N/A	N/A	N/A	
	Historic Environment	The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved).	N/A	Moderate adverse (built heritage) Low, moderate or major adverse (buried remains)	N/A	
	Biodiversity	The possible biodiversity impacts include loss of woodland, hedgerows and wetland, degradation of habitats and impacts to protected species through loss of habitat, disturbance, severance of habitat, fragmentation and killing/injury of individuals. Impacts could occur during construction and operation of the Proposed Scheme. Mitigation and compensation strategies are being developed to reduce the identified possible impacts. Mitigation measures include a range of design features such as sensitive timing of construction works and the use of green bridges and underpasses. Compensation measures include planting new areas of woodland and enhancing existing woodlands. The most significant impact which cannot be mitigated for, in the short term, is the loss of woodland which bats use as foraging habitat.	N/A	Large adverse	N/A	
	Water Environment	No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. The Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority (LLFA). A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into sustainable drainage systems (SuDS) should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the Proposed Scheme.	N/A	Slight Adverse	N/A	
Social	Commuting and Other users	The scheme provides Commuting and Other user benefits, with most of the benefits being from journey time savings totalling £126.175m in user benefits. This are increases in vehicle operating costs, with a benefit of £68.331m.	Value of journey time changes(£): 126.174 Net journey time changes (£): 0 to 2min: 47.253; 2 to 5min: 21.478; > 5min: 57.433		£194,506,000	
	Reliability impact on Commuting and Other users					
	Physical activity	The impacts on Physical Activity has been assessed with DfT's AMAT for three of the four wider walking and cycling interventions. The NWL is forecast to have a beneficial impact of £8.876 million.			£8,876,000	
	Journey quality	Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.		Moderate Beneficial		
	Accidents	COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening. The results indicate that the scheme will result in a reduction of 386 accidents over the 60 year appraisal period, leading to a reduction of 490 casualties (1 Fatal, 38 Serious and 451 Slight).	The results indicate that the scheme will result in a reduction of 386 accidents over the 60 year appraisal period, leading to a reduction of 490 casualties (1 Fatal, 38 Serious and 451 Slight)		£12,793,000	
	Security	Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic.		Moderate Beneficial		
	Access to services	The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.		Neutral		
	Affordability	The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs		Neutral		
	Severance	There are more roads forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement. Where existing routes are severed, new crossing facilities will be provided, which should mitigate the impact of the new road.		Slight Beneficial		
	Option and non-use values	The scheme will not substantially change the availability of transport services within the study area.		Neutral		
Public Accounts	Cost to Broad Transport Budget	The cost to the broad transport budget is £127.129m			£127,128,461	
	Indirect Tax Revenues	The indirect tax revenues are £46.916m			-£46,916,000	

Appendix H.3

AST - HIGH GROWTH SCENARIO

Appraisal Summary Table: High Growth scenario

Date produced:	23-May-21

Contact:	
Name	
Organisation	Norfolk County
Role	

Name of scheme:	Norwich Western Link
Description of scheme:	The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

Impacts		Summary of key impacts	Assessment				
			Quantitative			Qualitative	Monetary £(NPV)	Distributi 7-pt scale/ vulnerabl e grp
Economy	Business users & transport providers	The scheme provides business user benefits, with nearly all of the benefits being from journey time savings totalling with £105.664m in user benefits. There are increases in vehicle operating costs, with a benefit of over £10.407m	Value of journey time changes(£) 105.620 Net journey time changes (£) 0 to 2min: 47.970 / 2 to 5min: 12.416 / > 5min: 45.276				£116,071,000	
	Reliability impact on Business users	Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair						
	Regeneration	N/A						
	Wider Impacts	WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used.The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:	WI1: Agglomeration impacts £89.26m WI2: Output change in imperfectly competitive markets impacts £7.88m WI3: Tax revenues arising from labour market impacts £0.33m				£97,471,000	
Environmental	Noise	Not assessed for the High Growth Scenario				NA		
	Air Quality	Not assessed for the High Growth Scenario				N/A		
	Greenhouse gases	Not assessed for the High Growth Scenario	Change in non-traded carbon over 60y (CO2e) Change in traded carbon over 60y (CO2e)			N/A		
	Landscape	There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. Field patterns are easily substitutable, although loss of mature hedgerow trees would take much longer to re-establish. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a significant impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.	N/A			Moderate Adverse	N/A	
	Townscape	Scoped out of WebTAG and AST appraisal.	N/A			N/A	N/A	
	Historic Environment	The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved).	N/A			Moderate adverse (built heritage) Low, moderate or major adverse (buried remains)	N/A	
	Biodiversity	The possible biodiversity impacts include loss of woodland, hedgerows and wetland, degradation of habitats and impacts to protected species through loss of habitat, disturbance, severance of habitat, fragmentation and killing/injury of individuals. Impacts could occur during construction and operation of the Proposed Scheme. Mitigation and compensation strategies are being developed to reduce the identified possible impacts. Mitigation measures include a range of design features such as sensitive timing of construction works and the use of green bridges and underpasses. Compensation measures include planting new areas of woodland and enhancing existing woodlands. The most significant impact which cannot be mitigated for, in the short term, is the loss of woodland which bats use as foraging habitat.	N/A			Large adverse	N/A	
	Water Environment	No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. The Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority (LLFA). A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into sustainable drainage systems (SuDS) should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the Proposed Scheme.	N/A			Slight Adverse	N/A	
Social	Commuting and Other users	The scheme provides Commuting and Other user benefits, with most of the benefits being from journey time savings totalling £208.415m in user benefits. This are increases in vehicle operating costs, with a benefit of £84.267m.	Value of journey time changes(£) 208.414 Net journey time changes (£) 0 to 2min: 92.593 / 2 to 5min: 20.313 / > 5min: 95.508				£292,682,000	
	Reliability impact on Commuting and Other users							
	Physical activity	The impacts on Physical Activity has been assessed with DfT's AMAT for three of the four wider walking and cycling interventions. The NWL is forecast to have a beneficial impact of £8.876 million.					£8,876,000	
	Journey quality	Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.				Moderate Beneficial		
	Accidents	COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening. The results indicate that the scheme will result in a reduction of 410 accidents over the 60 year appraisal period, leading to a reduction of 500 casualties (37 Serious and 463 Slight).	The results indicate that the scheme will result in a reduction of 410 accidents over the 60 year appraisal period, leading to a reduction of 500 casualties (37 Serious and 463 Slight)				£12,778,000	
	Security	Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic.				Moderate Beneficial		
	Access to services	The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.				Neutral		
	Affordability	The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs				Neutral		
	Severance	There are more roads forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement. Where existing routes are severed, new crossing facilities will be provided, which should mitigate the impact of the new road.				Slight Beneficial		
	Option and non-use values	The scheme will not substantially change the availability of transport services within the study area.				Neutral		
Public	Cost to Broad Transport Budget	The cost to the broad transport budget is £127.129m					£127,128,461	
	Indirect Tax Revenues	The indirect tax revenues are £59.742m					-£59,742	

Appendix H.4

AST - CORE GROWTH (SENSITIVITY) SCENARIO

Appraisal Summary Table: Core Growth (Sensitivity) scenario

Date produced:	23-May-21

Contact:	
Name	
Organisation	Norfolk County Council
Role	

Name of scheme:	Norwich Western Link
Description of scheme:	The Norwich Western Link will comprise a new dual carriageway all-purpose road to the west of Norwich, from the A47 to the A1067/A1270, including a new viaduct bridge over the River Wensum and its floodplain. The scheme will provide a direct connection between the Strategic Road Network and the A1270 Broadland Northway through the west of Norwich. This will complete an orbital route around Norwich, which forms part of the Major Road Network.

Impacts		Summary of key impacts	Assessment				
			Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The scheme provides business user benefits, with nearly all of the benefits being from journey time savings totalling with £64.269m in user benefits. There are increases in vehicle operating costs, with a benefit of over £5.222m	Value of journey time changes(£): 64.269 Net journey time changes (£) 0 to 2min: 28.558 / 2 to 5min: 7.847 / > 5min: 27.864				£69,491.000	
	Reliability impact on Business users	Reliability has been assessed in line with TAG Unit A1.3, Section 6.3 (Reliability – urban roads) based on the calculation of the standard deviation of journey times from journey time and distance for each O-D (origin-destination) pair						
	Regeneration	N/A						
	Wider Impacts	WSP's Wider Impacts in Transport Appraisal (WITA) tool has been used.The tool estimates the following impacts: agglomeration, labour supply and output change in imperfectly competitive markets as described in TAG units A2.1 to unit A2.4:	WI1: Agglomeration impacts £89.26m WI2: Output change in imperfectly competitive markets impacts £7.88m WI3: Tax revenues arising from labour market impacts ££0.33m				£97,471,000	
Environmental	Noise	Not assessed for the Core Growth (Sensitivity) Scenario				NA		
	Air Quality	Not assessed for the Core Growth (Sensitivity) Scenario				N/A		
	Greenhouse gases	Not assessed for the Core Growth (Sensitivity) Scenario	Change in non-traded carbon over 60y (CO2e) Change in traded carbon over 60y (CO2e)			N/A		
	Landscape	There would be subdivision of fields, disrupting field patterns locally. There would be sections of embankment and cutting through the landscape which would affect the pattern locally but the viaduct would have a wider impact. Field patterns are easily substitutable, although loss of mature hedgerow trees would take much longer to re-establish. The viaduct across the River Wensum will introduce a new feature into this landscape and will have a significant impact on tranquillity in the north. The road will also alter tranquillity locally along its entire length, although more limited than the viaduct due to it largely being at-grade or in cutting. The alignment, which is duelled, is larger than the existing road infrastructure through this landscape and therefore out of character. There will be some loss of woodland and arable farmland altering land cover locally.	N/A			Moderate Adverse	N/A	
	Townscape	Scoped out of WebTAG and AST appraisal.	N/A			N/A	N/A	
	Historic Environment	The Proposed Scheme would have a moderate adverse effect on the setting (context) of nearby listed buildings, and will adversely affect the appreciation and understanding of the characteristic historic environmental resource in the area of proposed road construction. The Proposed Scheme would have a low, moderate or major adverse effect on known non-designated assets. The Proposed Scheme would have a low, moderate or major direct impact on previously unrecorded significant historic environment non-designated assets, resulting in loss of features such that their integrity is substantially compromised. The heritage significance of such assets would depend on their nature, date, extent and survival but might be local or regional (potentially national if extensive and well preserved).	N/A			Moderate adverse (built heritage) Low, moderate or	N/A	
	Biodiversity	The possible biodiversity impacts include loss of woodland, hedgerows and wetland, degradation of habitats and impacts to protected species through loss of habitat, disturbance, severance of habitat, fragmentation and killing/injury of individuals. Impacts could occur during construction and operation of the Proposed Scheme. Mitigation and compensation strategies are being developed to reduce the identified possible impacts. Mitigation measures include a range of design features such as sensitive timing of construction works and the use of green bridges and underpasses. Compensation measures include planting new areas of woodland and enhancing existing woodlands. The most significant impact which cannot be mitigated for, in the short term, is the loss of woodland which bats use as foraging habitat.	N/A			Large adverse	N/A	
	Water Environment	No structures are proposed within the channel of the River Wensum or within 10m of the River Wensum. This is expected to minimise impacts to the river flow and channel morphology of the River Wensum. The Proposed Scheme requires the construction of a maintenance access track immediately adjacent to the proposed viaduct to enable inspection of the viaduct over its design life. The track will not require crossing of the River Wensum but will need to be constructed within the floodplain of the River Wensum and cross the land drains located within this area. The access track will be constructed at grade to prevent adverse effects to floodplain storage or flood flow conveyance. Structures such as culverts into a watercourse can potentially remove natural bed substrate and bank-side habitat, as well as change flow dynamics and sediment transport through the Tributary of the River Tud. Crossings of watercourses and any new watercourse channels are expected to maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with DMRB guidance, and be sensitive to ecological requirements. The Drainage Strategy at this stage of the assessment indicates that infiltration to ground and discharge to nearby watercourses will be utilised to discharge road runoff. A robust surface water drainage system will be expected to ensure discharge from the Proposed Scheme does not increase flood risk elsewhere up to and including the 1 in 100-year event and allowing for climate change effects and provides sufficient attenuation to restrict the rate and volume of discharge to those agreed with Norfolk County Council (NCC) as the Lead Local Flood Authority (LLFA). A broad range of potential runoff pollutants, such as hydrocarbons (fuel and lubricants), fuel additives, metal from corrosion of vehicles, de-icer and gritting material, can accumulate on road surfaces. These can subsequently be washed off the road during rainfall events, polluting the receiving groundwater water bodies. Implementation of a Construction Environmental Management Plan (CEMP) and passive treatment incorporated into sustainable drainage systems (SuDS) should be considered and adhered to during construction and operation of the Proposed Scheme, to reduce the risk of contamination to the water environment. Mitigation for reduced groundwater recharge due to the introduction of hardstanding should be considered during detail design stage of the Proposed Scheme.	N/A			Slight Adverse	N/A	
Social	Commuting and Other users	The scheme provides Commuting and Other user benefits, with most of the benefits being from journey time savings totalling £116.165m in user benefits. This are increases in vehicle operating costs, with a benefit of £67.104m.	Value of journey time changes(£): 116.166 Net journey time changes (£) 0 to 2min: 48.51 / 2 to 5min: 13.652 / > 5min: 54.004				£183,270,000	
	Reliability impact on Commuting and Other users							
	Physical activity	The impacts on Physical Activity has been assessed with DfT's AMAT for three of the four wider walking and cycling interventions. The NWL is forecast to have a beneficial impact of £8.876 million.					£8,876,000	
	Journey quality	Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.				Moderate Beneficial		
	Accidents	COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening. The results indicate that the scheme will result in a reduction of 432 accidents over the 60 year appraisal period, leading to a reduction of 541 casualties (1 Fatal, 42 Serious and 498 Slight).	The results indicate that the scheme will result in a reduction of 432 accidents over the 60 year appraisal period, leading to a reduction of 541 casualties (1 Fatal, 42 Serious and 498 Slight)				£11,496,000	
	Security	Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic.				Moderate Beneficial		
	Access to services	The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.				Neutral		
	Affordability	The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs				Neutral		
	Severance	There are more roads forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement. Where existing routes are severed, new crossing facilities will be provided, which should mitigate the impact of the new road.				Slight Beneficial		
	Option and non-use values	The scheme will not substantially change the availability of transport services within the study area.				Neutral		
Public Accounts	Cost to Broad Transport Budget	The cost to the broad transport budget is £127.129m					£127,128,461	
	Indirect Tax Revenues	The indirect tax revenues are £39.398m					-£39,398,000	

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Norfolk County Council

NORWICH WESTERN LINK

Distributional Impact Appraisal

70041922-WSP-DIA
MAY 2021

CONFIDENTIAL

Norfolk County Council

NORWICH WESTERN LINK

Distributional Impact Appraisal

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft	Updated following client comments		
Date	March 2021	May 2021		
Prepared by	L Agnew / J Page	L Agnew		
Signature				
Checked by	L Agnew	L Agnew		
Signature				
Authorised by	S Goane / L Wooller	S Goane / L Wooller		
Signature				
Project number	70041922			
Report number	70041922-WSP-DIA			
File reference				

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 INTRODUCTION

1.1.1. This Distributional Impact Appraisal report has been developed as part of the Outline Business Case for the Norwich Western Link scheme (NWL) and has been prepared on behalf of Norfolk County Council (NCC) for consideration by the Department for Transport (DfT).

1.2 SCHEME LOCATION

1.2.1. The NWL is located to the east of Norwich and seeks to provide a link between the A47 in the south and the A1067 in the north. The location is shown in Figure 1-1. The scheme comprises:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain;
- A tie in to the junction with the A47;
- An "at grade" junction with the A1067;
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout;
- A bridge carrying the NWL over Ringland Lane;
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required;
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network; and
- Surface water drainage - principally infiltration basins, sediment forebays and associated carrier drains/ channels.

1.2.2. The scheme also includes landscaping, planting, ancillary works, environmental mitigation work and Biodiversity Net Gain measures and a wider network of cycle-friendly route options where traffic relief from the NWL enables improved cycle priority.

Figure 1-1 - Scheme Location

1.3 OVERVIEW OF DISTRIBUTIONAL IMPACT APPRAISAL APPROACH

1.3.1. Distributional impacts (DI) considers the variance of transport intervention impacts across different social groups. The appraisal considers both beneficial and adverse impacts on the different social groups that might be affected, against the following indicators:

- User Benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Affordability.

1.3.2. The appraisal has been undertaken in accordance with Transport Appraisal Guidance (TAG) Unit A4.2: Distributional Impact Appraisal. The appraisal process consists of 3 major steps.

- Screening Process – identification of likely impacts for each indicator;
- Assessment – identification of impact area, social groups and amenities; and
- Appraisal of impacts – analysis of impacts, full appraisal and input into Appraisal Summary Table (AST).

1.3.3. The assessment and Appraisal steps are split down further into separate sub steps as shown in Figure 1-2.

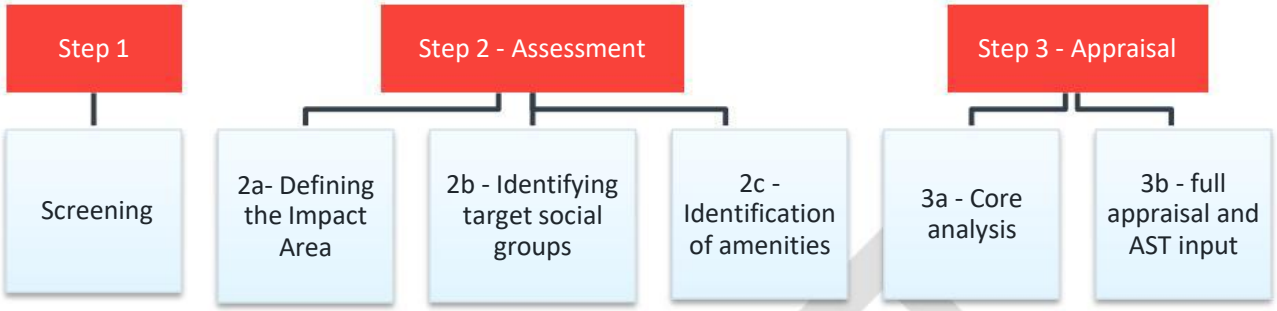

Figure 1-2 –TAG Distributional Impact Process

1.4 STRUCTURE OF THIS REPORT

1.4.1. The structure of this report reflects the stages in Web-based Transport Analysis Guidance (TAG) guidance.

- Chapter 2 outlines the first step in the analysis – Screening;
- Chapter 3 sets out the second step – Assessment;
- Chapter 4 details the third step – Appraisal; and
- Chapter 5 summarises the assessment.

2 STEP 1 SCREENING PROCESS

2.1 INTRODUCTION

2.1.1. The first step in the process involves undertaking initial screening to identify the likely impacts of the NWL against the key indicators specified in TAG Unit A4.2.

2.2 APPROACH

2.2.1. Each indicator has been assessed individually using the TAG screening proforma. The output of this assessment determines whether the intervention needs to be assessed further. Consideration has been given to:

- Whether there might be positive or negative impacts on different social groups;
- If changes to scheme design can mitigate any potential negative impacts; and
- How dispersed the impact is likely to be, to understand is the scale of eth impact is disproportionate to the potential impact.

2.2.2. The completed screening proforma is include in Appendix A. At this stage, previously anticipated impacts (based on the SOBC assessment) have been used to determine whether the indicator should be progressed to Step 2. The screening considered extent and dispersion of the likely impact across social groups and geographical area.

2.2.3. A summary of the outcomes and decision on whether to progress to the next step is include in Table 2-1.

Table 2-1 – Initial Screening

Impact Area	Conclusion	Next Step
User Benefits	There are likely to be beneficial impacts with respect to journey time, based on the SOBC TUBA analysis.	Proceed to Step 2
Noise	The SOBC assessment estimated minor impacts both adverse and beneficial with respect to a change in road traffic generated noise levels.	Proceed to Step 2
Air Quality	The SOBC assessment indicated adverse impacts for air quality and greenhouse gases emissions	Proceed to Step 2
Accidents	The new link is likely to attract traffic currently using low standard rural routes and congested urban routes. The new link will have reduced number of junctions and will be designed to current standards.	Proceed to Step 2
Security	There is no planned change to public transport waiting/interchange facilities with the scheme.	Do not proceed to step 2
Severance	The new link is likely to sever existing PROWs.	Proceed to Step 2
Accessibility	There is no planned change to public transport services routing or timings or provision with the scheme.	Do not proceed to step 2

Impact Area	Conclusion	Next Step
Affordability	The scheme will have an impact on car fuel and non- fuel operating costs, only. As a result of rerouting it is expected that there will be changes to these costs. For car fuel and non-fuel operating costs, the outputs from TUBA can be used, and indicate positive benefits. The remaining areas of affordability (parking charges, road user charges, public transport fares and concession availability) are not affected by the scheme.	Proceed to Step 2

3 STEP 2 ASSESSMENT

3.1 INTRODUCTION

The broad impact areas of the transport intervention are identified in Step 1. Step 2 investigates these impacts in more detail to confirm where both spatial impacts will be experienced, and where socio-economic, social and demographic characteristics need to be further considered.

3.2 STEP 2A: AREAS IMPACTED BY THE INTERVENTION

The area impacted by the NWL will vary for each indicator. The largest area is that covered by the transport model and the study area as shown in Figure 3-1.

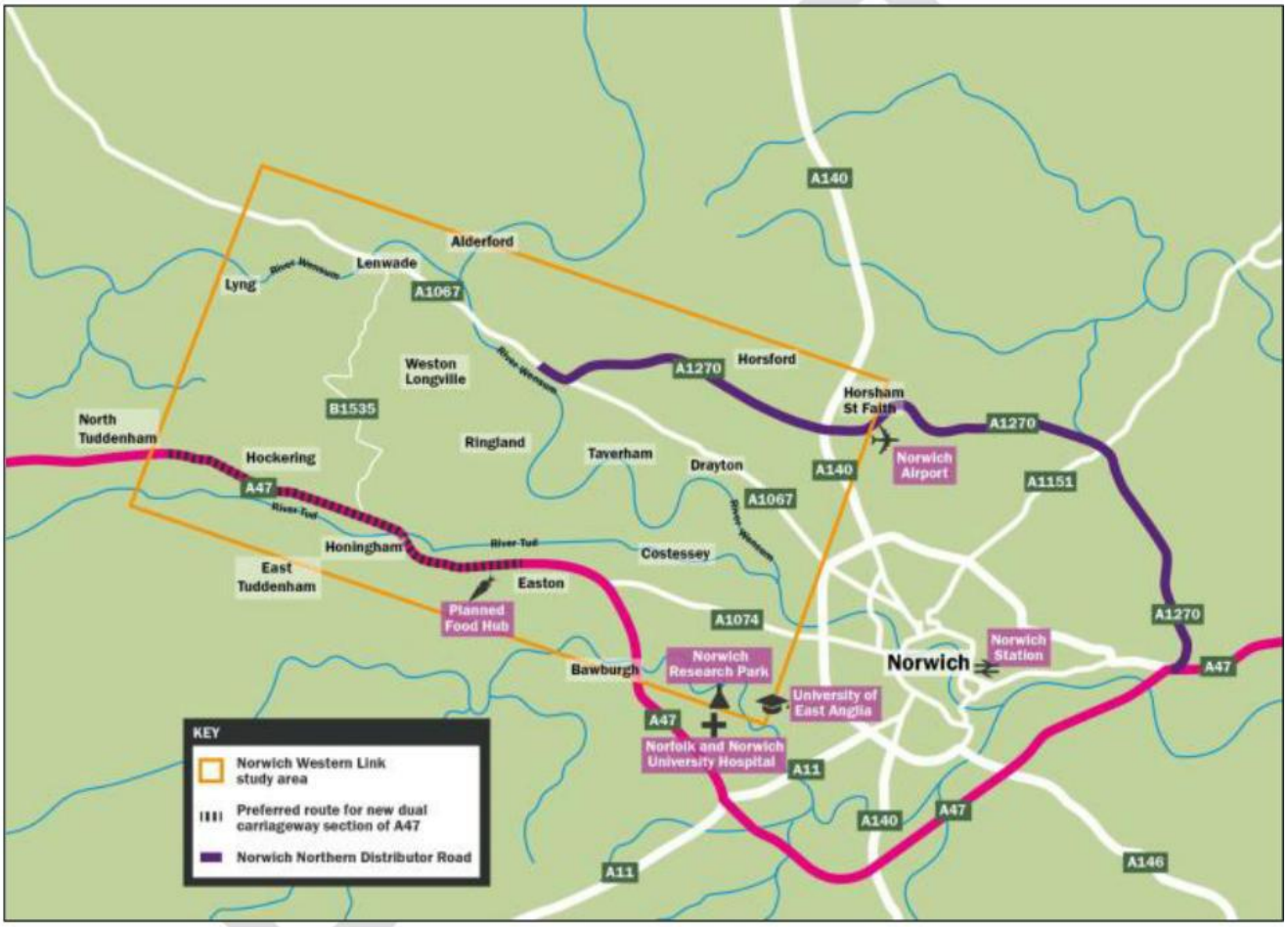

Figure 3-1 - NWL Study Area

Source: About the Norwich Western Link, Location Map (Norfolk County Council)

USER BENEFITS

3.2.1. The impact area is defined as the area in which the transport intervention will result in changes to the cost of travel for users (non-business) of the transport network. This is the area represented by the transport model.

3.2.2. Tests have been undertaken to establish the area impacted by changes in user costs for consideration of using a core modelled area (as set out in section 6.3 of the EAR). This showed that the impacts are spread across the sectors with the highest impacts occurring in those sectors closest to the scheme.

NOISE

3.2.3. The impact area for a highway scheme is defined in DMRB LA111 for operational noise impacts. The approach to defining the impact area is set out as follows:

- An area within 600m, from the carriageway edge, of new road links or road links physically changed or bypassed by the scheme;
- An area within 50m of other road links with potential to experience a short term (opening year) basic noise level change of more than 1dB(A) as a result of the scheme.

3.2.4. The Noise impact/study area is shown in Figure 3-2.

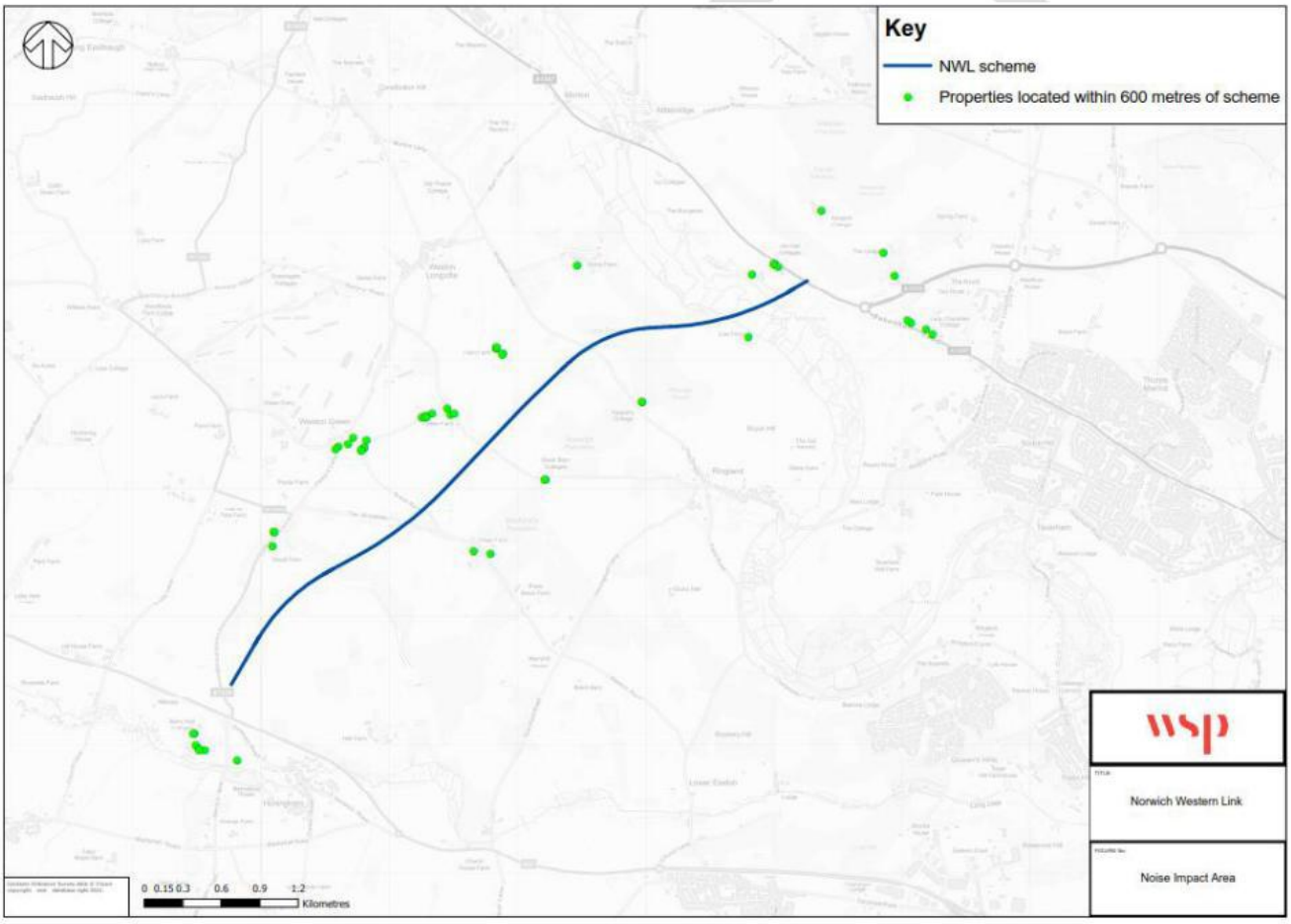

Figure 3-2 - Noise Impact Area

AIR QUALITY

3.2.5. The impact area for a highway scheme is defined in DMRB LA105 for air quality impacts. The approach to defining the air quality impact area is set out as follows:

- Identify any roads where:

- road alignment will change by 5 m or more; or
- daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- A change in speed bands.

- Identify all existing and planned properties where people might experience a change in local air quality, near the affected roads.

3.2.6. The air quality impact areas are shown in Figure 3-3.

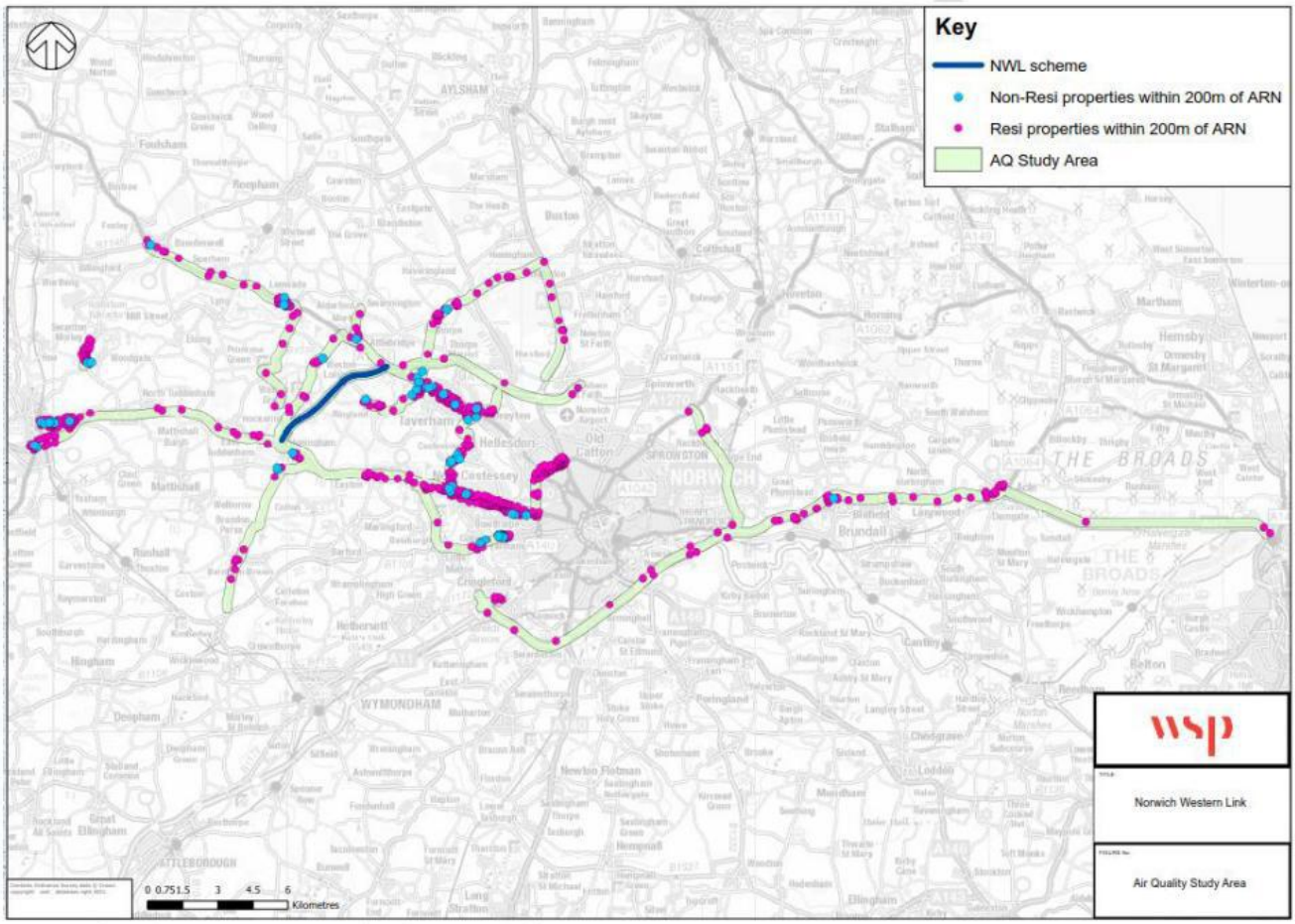

Figure 3-3 – Air Quality Impact Area

3.2.7. The study area above shows the affected road network for air quality analysis, covering a significant area of roads within Norfolk. In addition, residential properties and non-residential properties (schools, medical centres, community centres and care homes) within 200 metres of the affected roads are also presented.

ACCIDENTS

3.2.8. The impact area for accidents is set out in TAG Unit A4.2, and covers:

- Any roads which display a change in accident rates between the Do Minimum and Do Something scenarios, in particular any roads which display a change in traffic volume of >10%.

3.2.9. The analysis will look primarily at impacts on children and older people (both particularly as pedestrians), young males, motorcyclists and the more deprived population, to ensure that all accident impacts on those groups, adverse or beneficial, are accounted for in the appraisal.

SEVERANCE

3.2.10. The impact area has been defined in line with TAG Units A4.1 and A4.2, and covers:

- Any areas where there is a change in community severance due to the intervention, in particular any roads which display a change in traffic volume of >10%.

AFFORDABILITY

3.2.11. The impact area is the same as that considered for User Benefits.

3.3 STEP 2B: IDENTIFICATION OF SOCIAL GROUPS IN THE IMPACT AREA

3.3.1. This step identifies:

- The transport users that will experience changes in generalised travel costs;
- The people living in areas who may experience impacts of the intervention; and
- People travelling in areas identified as likely to be affected by the intervention.

3.3.2. Analysis of the characteristics of people in the area likely to be affected has been taken by mapping social characteristics at Lower Super Output Area (LSOA) levels. Table 3-1 shows the groups of people that need to be identified in the analysis for each indicator.

Table 3-1 – Socio-demographic analysis for DIs

Dataset/ Social Group	User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability
Income Distribution	✓	✓	✓				✓	✓
Children: proportion of population aged <16		✓	✓	✓	✓	✓	✓	
Young Adults: proportion of population aged 16-25				✓			✓	
Older People: proportion of population aged 70+		✓		✓	✓	✓	✓	
Proportion of Population with a disability					✓	✓	✓	
Proportion of population of Black and Minority Ethnic (BME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children.							✓	

Source: TAG Unit A4.2 Table 2

The majority of these social groups have been defined using the 2011 Census data, the only exception is the Income distribution which is obtained from the Income Deprivation domain of the English Indices of Deprivation (IoD) 2015.

The impact area sits across four local authorities within Norfolk, these are:

- Norwich City Council;
- Broadland District Council;
- South Norfolk District Council; and
- Breckland District Council.

3.3.3. Norwich covers the city and will reflect the more urban characteristics of the population, whereas the other three areas are mostly rural and will reflect the rural characteristics.

INCOME DISTRIBUTION

3.3.4. The Index of Multiple Deprivation (IMD) is an overall relative measure of deprivation constructed by combining seven domains of deprivation according to their respective weights. The income deprivation domain is one of the seven domains, it measures the proportion of the population experiencing deprivation relating to low income. The definition of low income used includes both those people that are out-of-work, and those that are in work but who have low earnings (and who satisfy the respective means tests). The income deprivation index is a proxy measure for the most vulnerable groups as it considers those living in areas ranked highest in terms of income deprivation.

3.3.5. The deciles are calculated by ranking the 32,844 LSOAs in England from most deprived to least deprived and dividing them into 10 equal groups. LSOAs in decile 1 fall within the most deprived 10% of LSOAs nationally and LSOAs in decile 10 fall within the least deprived 10% of LSOAs nationally.

3.3.6. The deciles are aggregated together to form quintiles, so decile 1 and 2 sit within Quintile 1, therefore Quintile 1 is the most deprived while Quintile 5 is the least deprived, Figure 3-4 illustrates the income deprivation deciles across the study area.

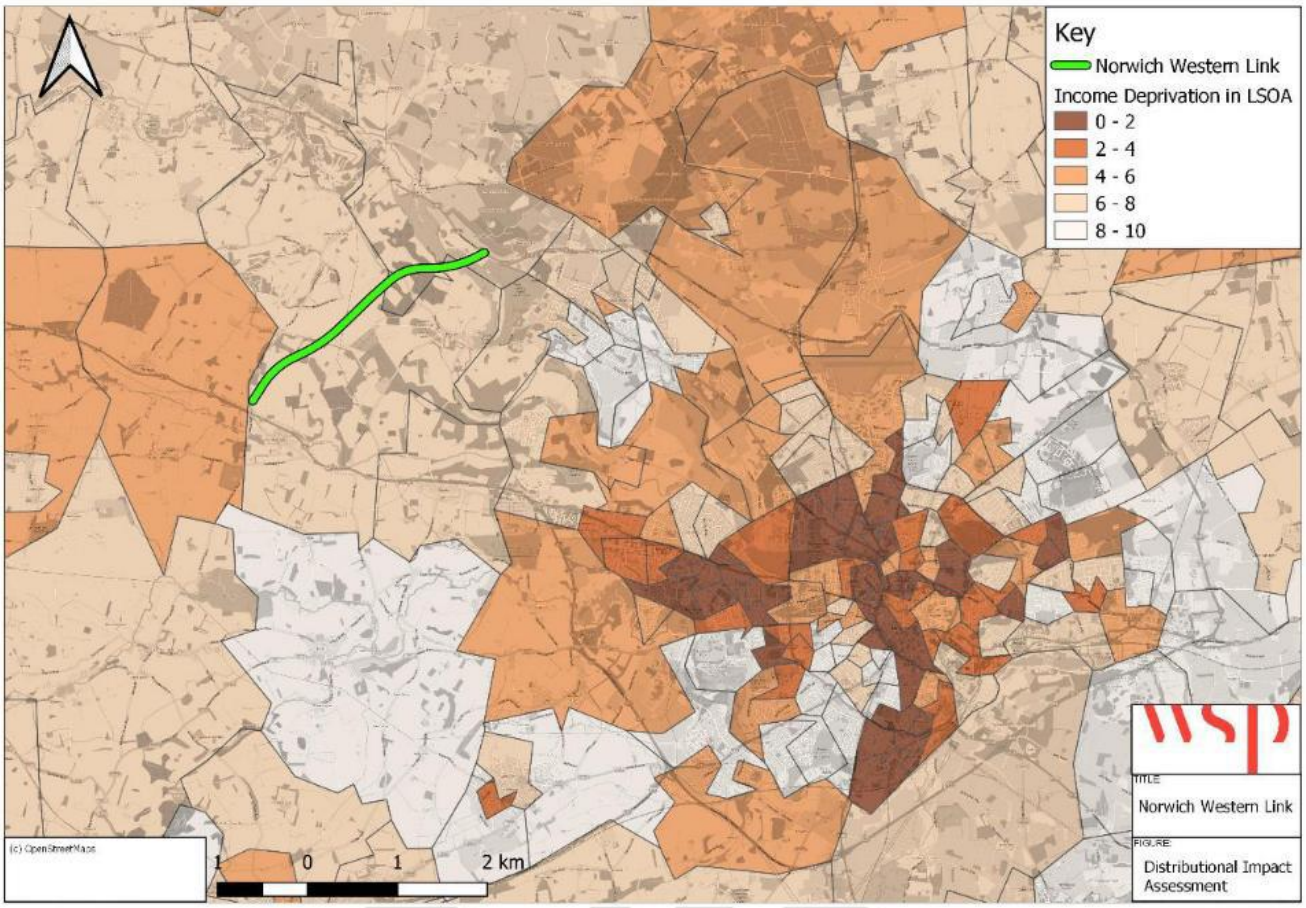

Figure 3-4 - Indices of Deprivation Income Domain by LSOA

3.3.7. As illustrated in Figure 3-4, the LSOAs that fall into the lowest deciles are located in the urban area, to the east of the NWL scheme.

3.3.8. Table 3-2 shows the proportion of the LSOAs by income domain quintile nationally as well as in Norfolk and in the Impact Area which is defined as the four local authority areas of Breckland, Broadland, North Norfolk and Norwich.

Table 3-2 - Income Quintiles in the Impact Area

Quintile	Description	No. of LSOAs	% of LSOAs	Nationally %	Norfolk %
1	0 – 20%	39	12.7%	20%	12.5%
2	20 – 40%	46	15.0%	20%	14.3%
3	40 – 60%	100	32.7%	20%	34.2%
4	60 – 80%	83	27.1%	20%	26.4%
5	80 -100%	38	12.4%	20%	12.5%
Total		**306**			

3.3.9. The highest proportion of the population in the impact area are in the 40 – 60 % deprived quintile, with Quintile 4 (60 – 80%) accounting for the second highest proportion of the population. This is similar to the results for Norfolk. Looking at the four areas separately, Norwich has 40% of its LSOAs with the most deprived income quintile, with 23% in the second most deprived income quintile. The rural authorities have low numbers of LSOAs that fall within the most deprived income quintiles, less than 20% in Quintiles 1 and 2. The majority of the LSOAs in these rural authorities are in income Quintiles 3 and 4 (40 – 80%), on average this accounts for 70%.

CHILDREN

3.3.10. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that are children (under 16 of age). Figure 3-5 shows the proportion of children within each LSOA within the study area.

Figure 3-5 – Proportion of population who are under 16

3.3.11. The analysis indicates that the study area has a lower proportion of children (15.3%) when compared to Norfolk (15.8%) and the national average (17.6%). When looking at the authorities individually both Breckland and Broadland have a higher proportion of children than Norfolk at 16.5% and 15.9% respectively, while North Norfolk and Norwich are below the Norfolk average at 13.5% and 15% respectively.

YOUNG ADULTS

3.3.12. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as a young adult (aged 16 to 25). Figure 3-6 shows the proportion of young adults within each LSOA within the study area.

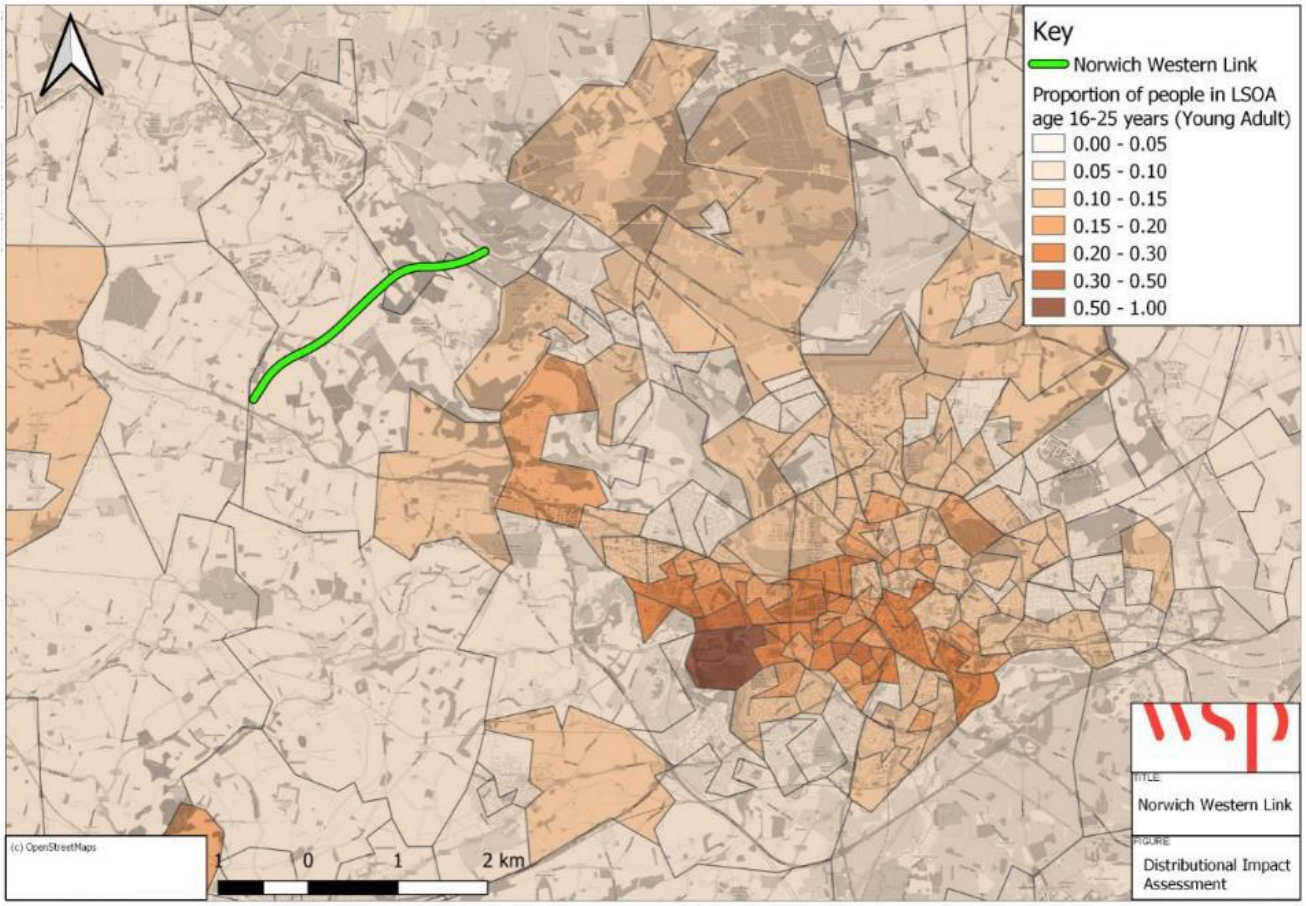

Figure 3-6 – Proportion of population who are young adults

3.3.13. The analysis indicates that the study area has a higher proportion of young adults (12.7%) than the Norfolk average (11.9%) but this is lower than the national average of 13.2%. When viewed individually the proportion of young people within Norwich is significantly higher than both the Norfolk and English average at 19.3% while the other three authorities have a lower proportion of young adults at 11.3% in Breckland, 9.7% in Broadland and 9.4% in North Norfolk. This indicates that the rural areas have a much lower number of young adults resident in the area compared to the urban area on Norwich.

OLDER PEOPLE

3.3.14. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as older people (70+). Figure 3-7 shows the proportion of older people within each LSOA within the study area.

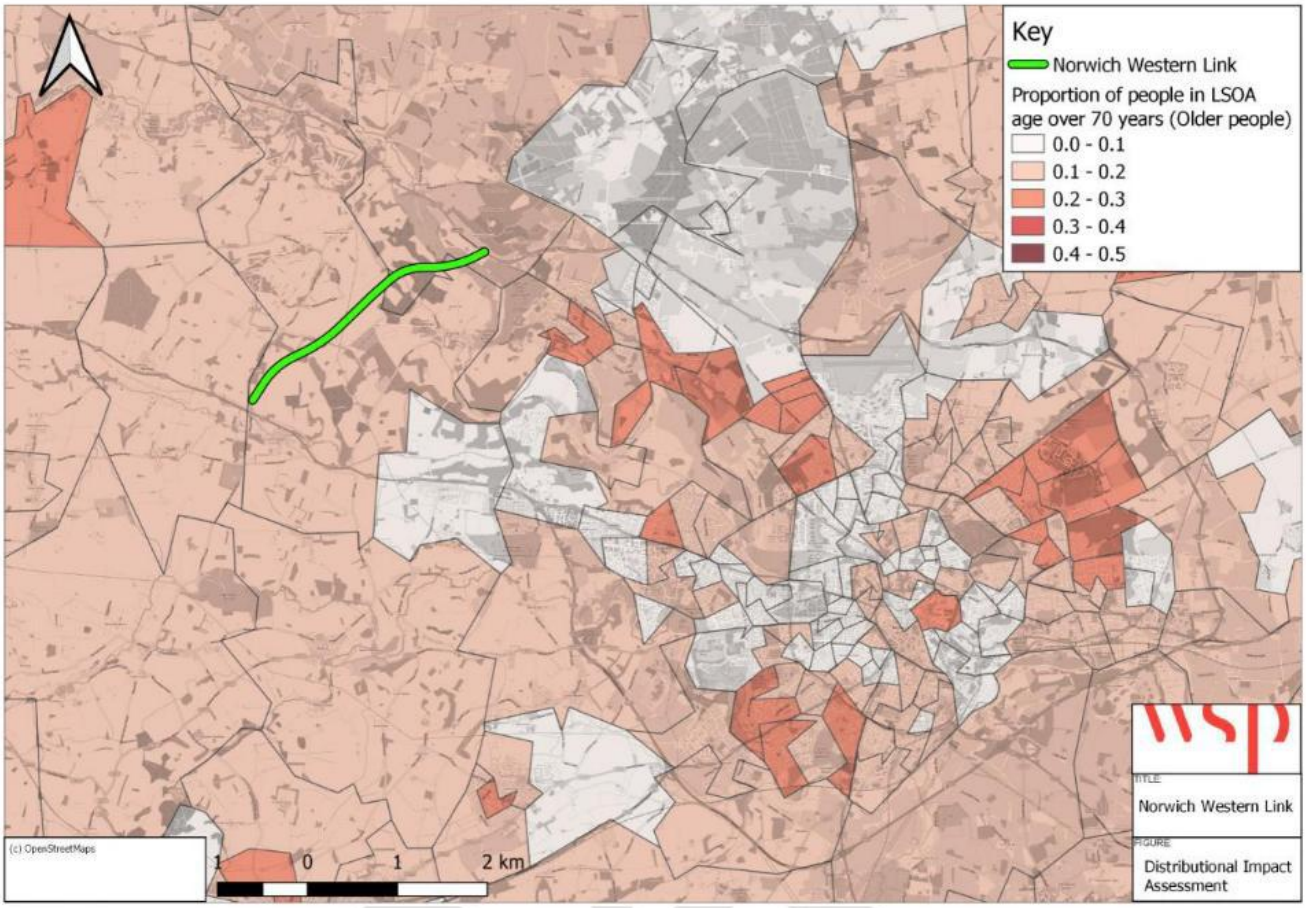

Figure 3-7 – Proportion of population who are older people

3.3.15. The analysis indicates that the study area has the same proportion of the population who are older (14.4%) as Norfolk, both of these are higher than the national average which is 10.9%. Looking at the four local authorities individually, North Norfolk's proportion is significantly higher at 19.4% while Norwich's is lower at 10.1% which is below the national average. Both Breckland and Broadland have levels similar to the Norfolk average at 14.3% and 14.9% respectively. This reflects the findings of the strategic case showing that the study area and Norfolk have an increased level of older people residents in the area when compared nationally.

PROPORTION OF PEOPLE WITH A DISABILITY

3.3.16. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as having a disability. Figure 3-8 shows the proportion of people with a disability within each LSOA within the study area.

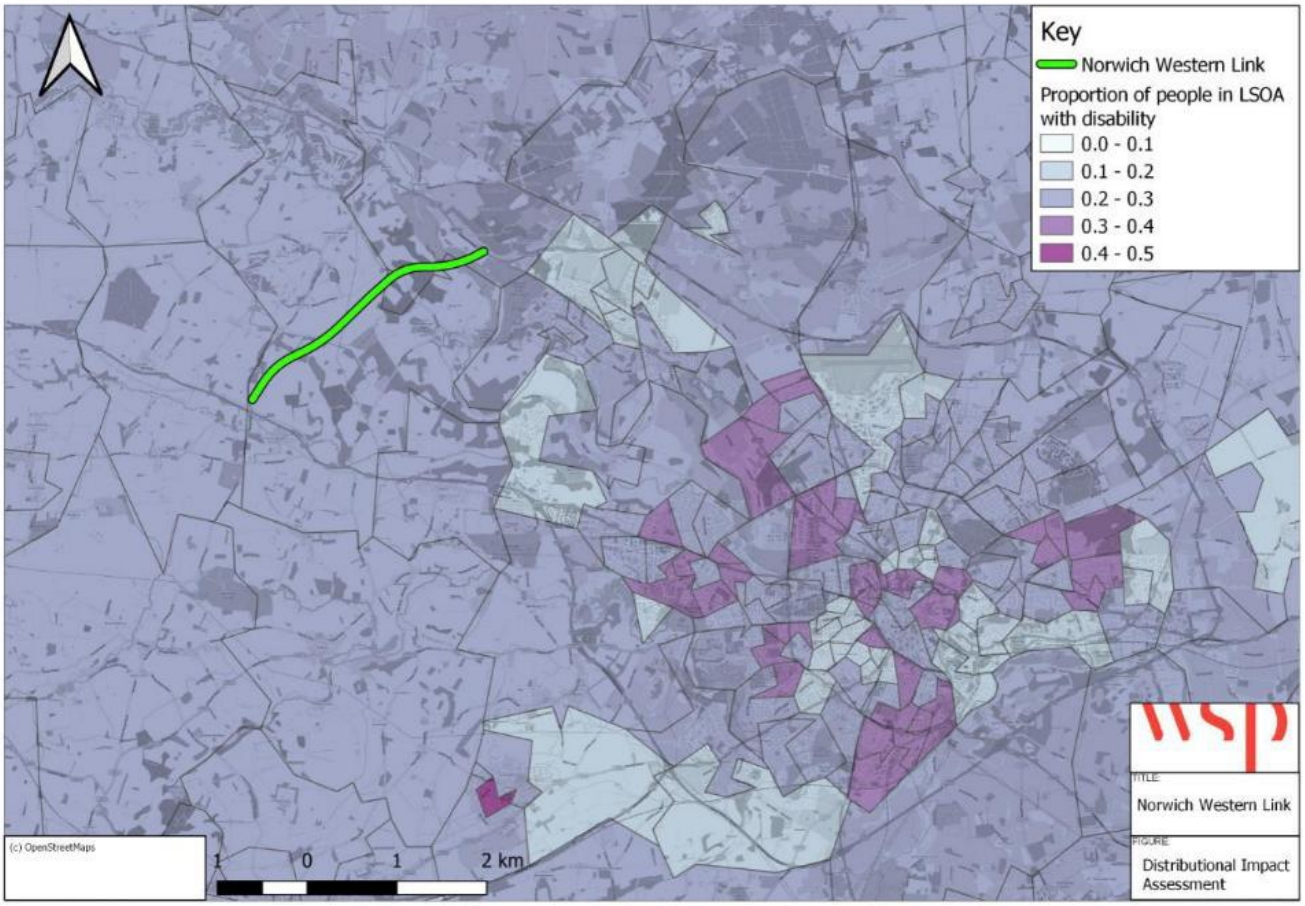

Figure 3-8 – Proportion of population with a disability

3.3.17. The analysis indicates that study area has a similar level of the proportion of the population with a disability as Norfolk (26.8% and 27%). Both of these are higher than the national average which is 25.9%, but not significantly. When viewed at local authority level, North Norfolk has a higher proportion of the population at 29.4% whilst the other three authorities' proportions are lower than the Norfolk average at 26.6% for Breckland, 25.3% for Broadland and 26.2% for Norwich. North Norfolk also had the highest proportion of population over 70 and these two results could be linked.

PROPORTION OF PEOPLE OF BME ORIGIN

3.3.18. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as being as Black or Minority Ethnic (BME) origin. Figure 3-9 shows the proportion of BME origin within each LSOA within the study area.

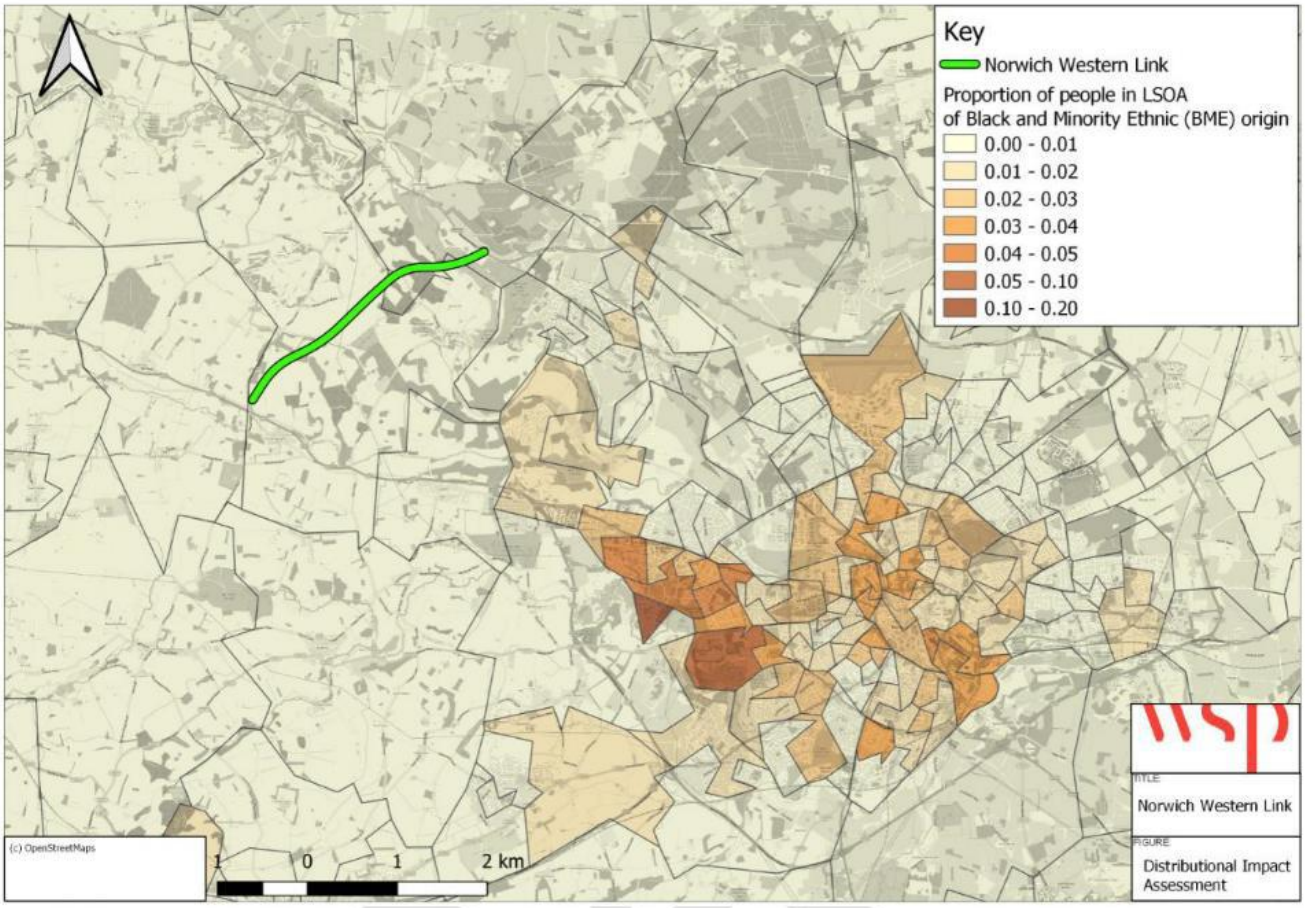

Figure 3-9 – Proportion of population Black or Minority Ethnic origin

3.3.19. The analysis indicates that the study area has a lower proportion (4%) of the population who are classed as of BME origin than the national average (14%), although it is broadly similar to the Norfolk levels (3.5%). When looking at the local authorities individually Norwich has a proportion which is significantly higher than the Norfolk average at 9.2%, although this is still well below the national average. The other three authorities have levels below the Norfolk average with Breckland at 2.6%, Broadland at 2.3% and North Norfolk the lowest at 1.4%.

PROPORTION OF HOUSEHOLDS WITHOUT ACCESS TO A CAR

3.3.20. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as not having access to a car. Figure 3-10 shows the proportion of people without access to a car within each LSOA within the study area.

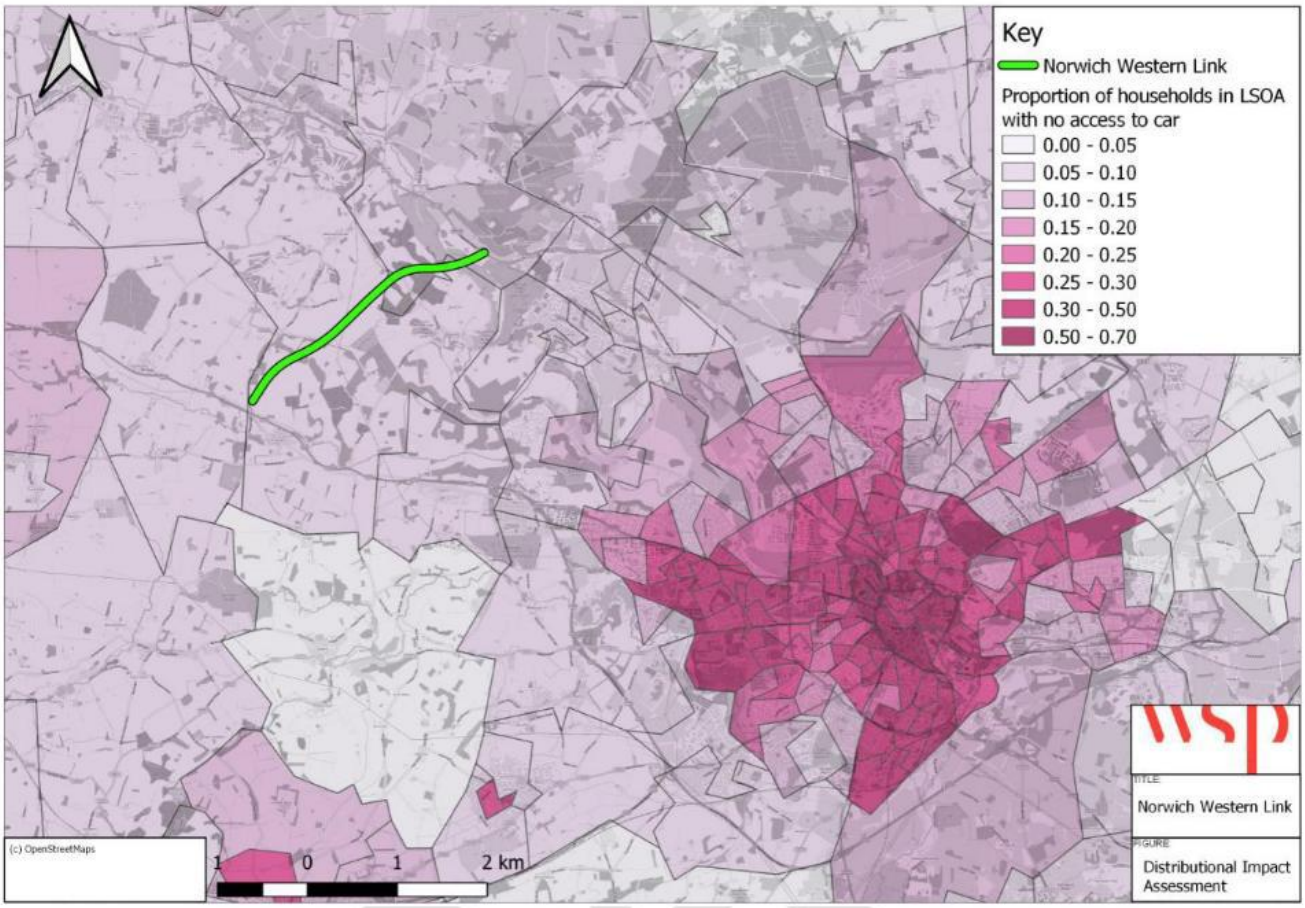

Figure 3-10 – Proportion of population without access to a car

3.3.21. The analysis indicates that the proportion of the population in the study area without access to a car (19.7) is higher than the Norfolk average (18.8%) but lower than the national average (25.6%). Looking at the local authorities individually Norwich's proportion is significantly higher (33.4%) than both the Norfolk and national average, the other three authorities have lower levels at 15.5% for Breckland, 11.4% for Broadland and 16.2% for North Norfolk. This reflects the more rural nature of these three authorities and possible reduced provision of public transport within these areas.

PROPORTION OF HOUSEHOLDS WITH DEPENDENT CHILDREN.

3.3.22. The 2011 Census data was utilised to determine the proportion of the population in each LSOA that was classed as having dependent children. Figure 3-11 shows the proportion of people with dependent children within each LSOA within the study area.

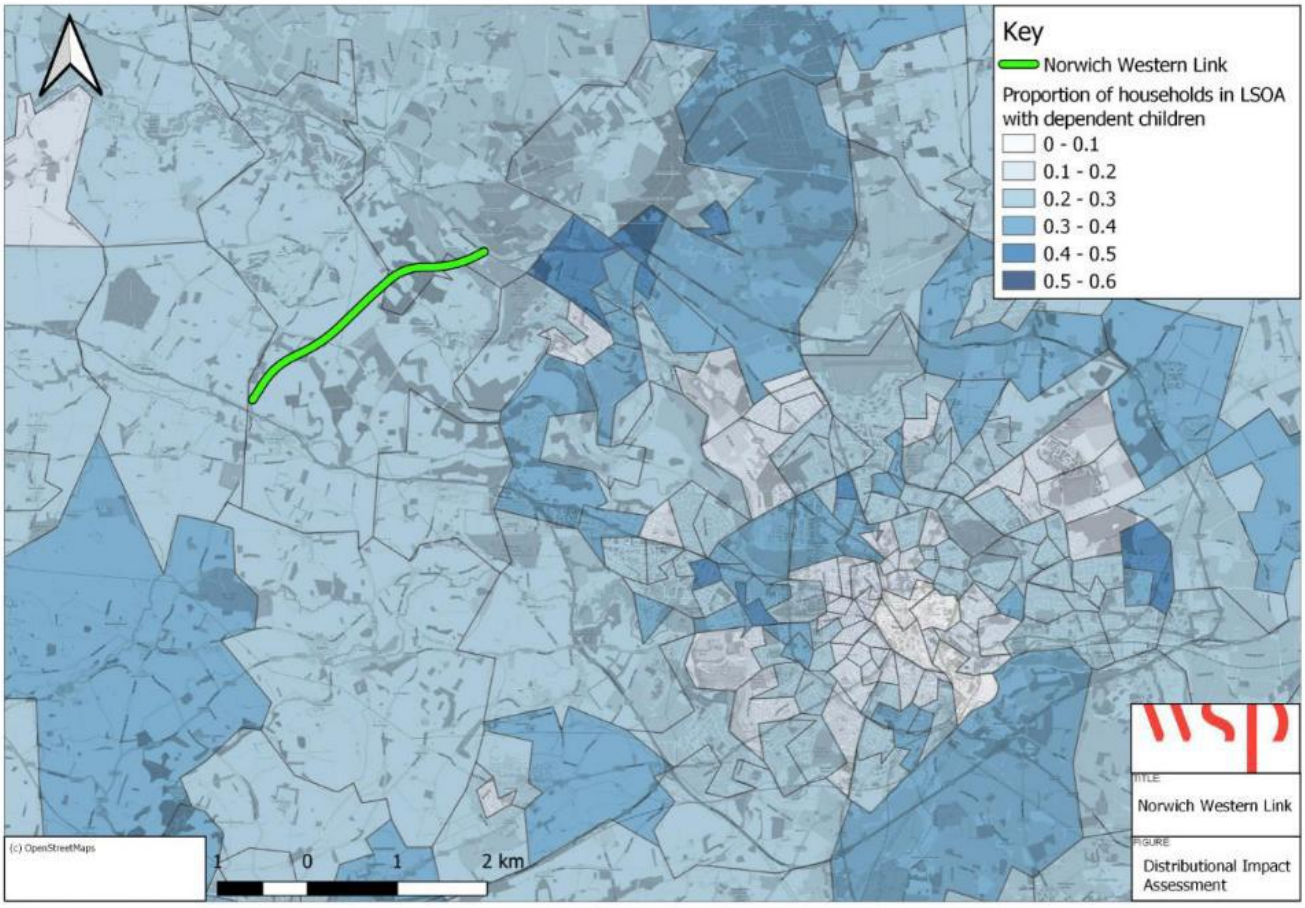

Figure 3-11 – Proportion of households with dependent children

3.3.23. The analysis indicates that the proportion of households with dependent children within the study area (24.5%) is broadly similar to the Norfolk average (25.3%) and lower than the national average (29.1%). Examining the results for each local authority shows that North Norfolk and Norwich have the lowest proportions at 20.7% and 23.3% respectively which are both lower than the Norfolk average, whilst Breckland and Broadland have proportions of 27.4% and 26.3% respectively which are both higher than the Norfolk average. All four authorities have proportions below the national average. This reflects the analysis conducted for the age composition of the population.

3.4 STEP 2C: IDENTIFICATION OF AMENITIES IN THE IMPACT AREA

3.4.1. This step identifies what trip attractors/amenities are within the impact area. Using desktop analysis, the local amenities which are likely to be used by the identified social groups for each DI indicator will be identified. This includes:

- Schools/nurseries;
- Playgrounds;
- Parks and open spaces;
- Hospitals;
- Care homes/day centres; and
- Community centres.

3.4.2. The trip attractors/amenities are shown in Figure 3-12.

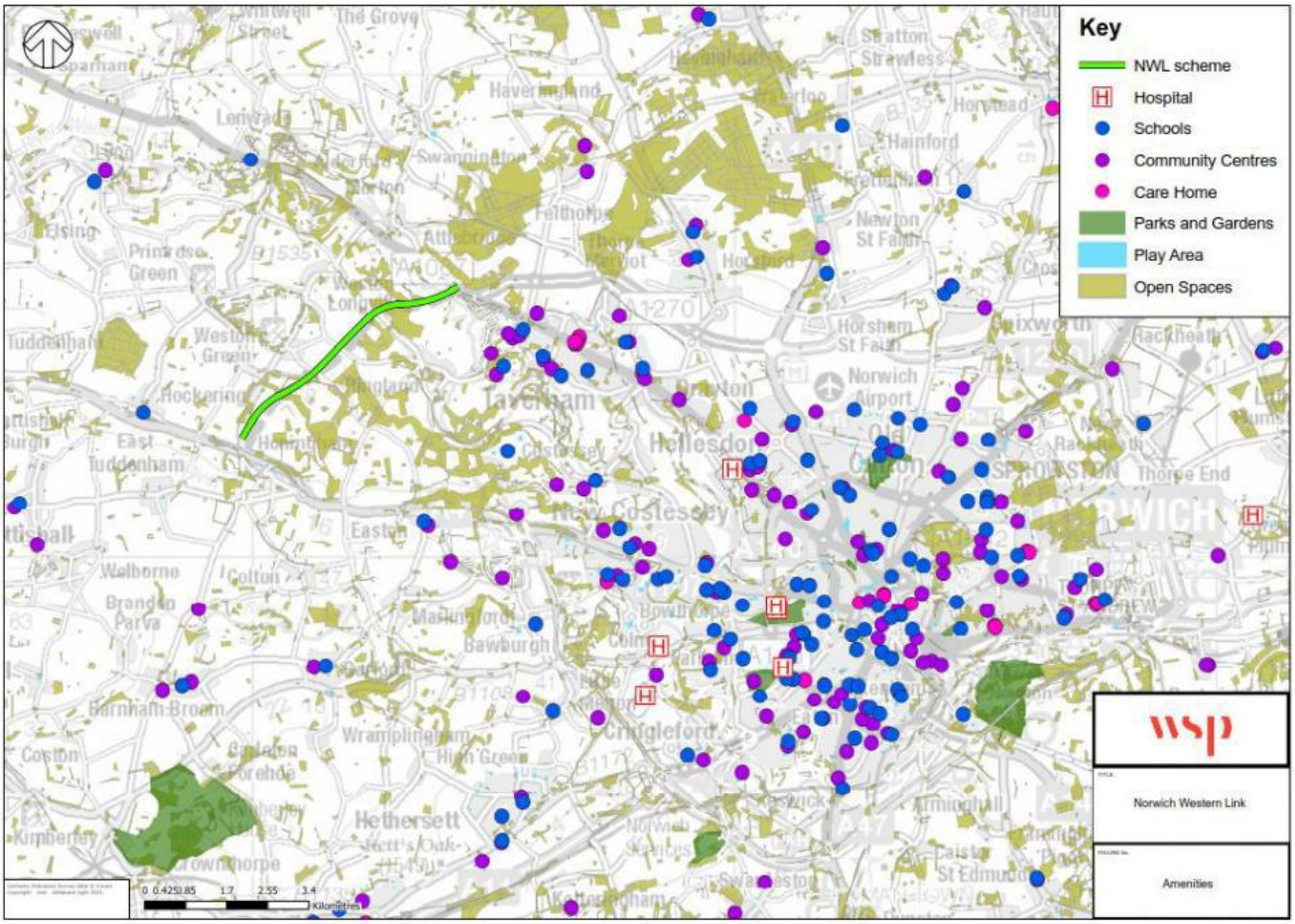

Figure 3-12 – Amenities in the impact area

3.4.3. The figure demonstrates that the majority of amenities (hospitals, schools, care homes and community centres) are located to the east of the NWL scheme, with a significant number of these trip attractors in the urban area of Norwich. In contrast, the opposite trend is demonstrated for parks and open spaces; these are spread out within the study area and are more prominent in rural areas rather than the urban area of Norwich.

3.5 STEP 2 OUTPUT SUMMARY

3.5.1. The assessment output summary is set out in Table 3-3.

Table 3-3 – Assessment (Step 2) Output summary

Social group and amenities indicators			User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Resident population in the impact Area	Income Distribution Quintiles	0-20%	12.3	0	4.9					12.3	12.0%	12..5%	20.1%
		20%-40%	12.8	0	6.7					12.8	12.6%	14.3%	20.0%
		40%-60%	26.6	17.4	19.5					26.6	27.0%	34.2%	20.0%
		60%-80%	31.3	82.6	52.3					31.3	31.6%	26.4%	20.0%
		80%-100%	17.0	0	16.5					17.0	16.9%	12.5%	19.9%
	Children <16			17.8	18.3						16.1%	15.8%	17.6%
	Young People				11.6						12.7%	11.9%	13.2%
	Older People			9.5							13.3%	14.4%	10.9%
	People with a disability										25.7%	27.0%	25.9%
	Black Minority Ethnic										4.2%	3.5%	14.0%
	No Car Households										18.5%	18.8%	25.6%
	Households with dependent children										25.8%	25.3%	29.1%
	Indicator population in the impact area		542,961	7,182	813,552					542,961	511,661	857,888	56,075,912

Social group and amenities indicators		User Benefits	Noise	Air Quality	Accidents	Security	Severance	Accessibility	Affordability	Local Authority	County	England
Amenities present within the impact area	Schools / Nurseries		✓	✓	✓							
	Playgrounds		✓	✓	✓							
	Parks and open Spaces			✓	✓							
	Hospitals			✓	✓							
	Care homes / Day Centres		✓	✓	✓							
	Community Centre		✓	✓	✓							

TAG Unit A4.2

4 STEP 3 APPRAISAL

4.1 INTRODUCTION

4.1.1. This step sets out the assessment of the impact of the scheme on each indicator's social groups. This step covers the core analysis of impacts which provides an assessment score for each indicator and each of the social groups.

4.1.2. A qualitative assessment has also been undertaken for each relevant indicator which has been summarised in the DI appraisal matrix table and the AST entries.

4.2 USER BENEFITS

4.2.1. The methodology used for the Distributional Impacts Assessment of User Benefits follows DfT's TAG unit A4-2 guidance. The input data used for the assessment is based on the zone-to-zone correspondence outputs of TUBA. All trips that are classified as having a business purpose within the TUBA output are excluded from the subsequent analysis in accordance with the TAG guidance

4.2.2. The TUBA outputs are aggregated from Origin-Destination pairs to benefits/disbenefits per zone. The default methodology used is to allocate all benefits and disbenefits in the AM peak to the origin zone as the majority of trips will be outbound trips to work. The reverse then is used for the PM peak hour where the benefits and disbenefits are allocated to the destination zone. In the Inter-peak hour, the benefits and disbenefits are averaged and allocated to both the origin and destination zones. This process is repeated for all years of the analysis included within the TUBA output.

4.2.3. Income segmentation data is provided at a number of standardised geographies and therefore the zonal data within the TUBA outputs must be converted ('reaggregated') to align with one of these geographies so comparisons can be made. The chosen geographical scale was Lower Super Output Areas (LSOAs) as this was recommended by the TAG guidance as an appropriate scale of analysis and in addition is the lowest level geography that the income segregation data used is available at.

4.2.4. This methodology uses Index of Multiple Deprivation (IMD) (2019) Income Domain at LSOA geography as a proxy for income as it was produced more recently than the Census 2011 income data.

4.2.5. The process followed is:

- The benefits or disbenefits associated with each LSOA are allocated to the corresponding IMD Income Domain quintile;
- The benefits and disbenefits are summed for each quintile;
- The proportion of the total benefits and disbenefits are calculated for each quintile;
- The proportion of the local population that falls within each quintile is calculated;
- Each quintile is graded according to the grading system given in Table 8 of the guidance.

Table 4-1 – User Benefits Distribution Analysis

	IMD Income Domains £m Most deprived areas ← →least deprived areas				
	Quintile 1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Total Benefits	2.54	9.03	30.20	37.68	18.74
Share of User Benefits %	2.6	9.2	30.8	38.4	19.1
Share of Population in impact area %	12.3	12.8	26.6	31.3	17.0
Assessment	✓	✓	✓✓✓	✓✓✓	✓✓✓

4.2.6. The distribution of user benefits across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits.

4.3 NOISE

4.3.1. The screening looked at the likely impact of the scheme on noise levels at properties adjacent and in close proximity to the proposed NWL scheme. The screening process identified that the change in traffic levels on the road network was likely to lead to changes in noise levels for residents. The noise assessment considers the impact of noise on LSOAs analysing income deprivation, children and older people.

4.3.2. Noise appraisal has been undertaken using the results from the noise model. During operation, potential noise impacts will be due to changes in traffic movements giving rise to a change in the distribution of vehicle trips and therefore noise. The noise impact area has been defined as those properties adjacent or in close proximity to the NWL scheme.

4.3.3. The noise appraisal looks to compare the changes in noise (decibels) between the Future Year Do-Something scenario against the Future Year Do-Minimum scenario, illustrated in Figure 4-1.

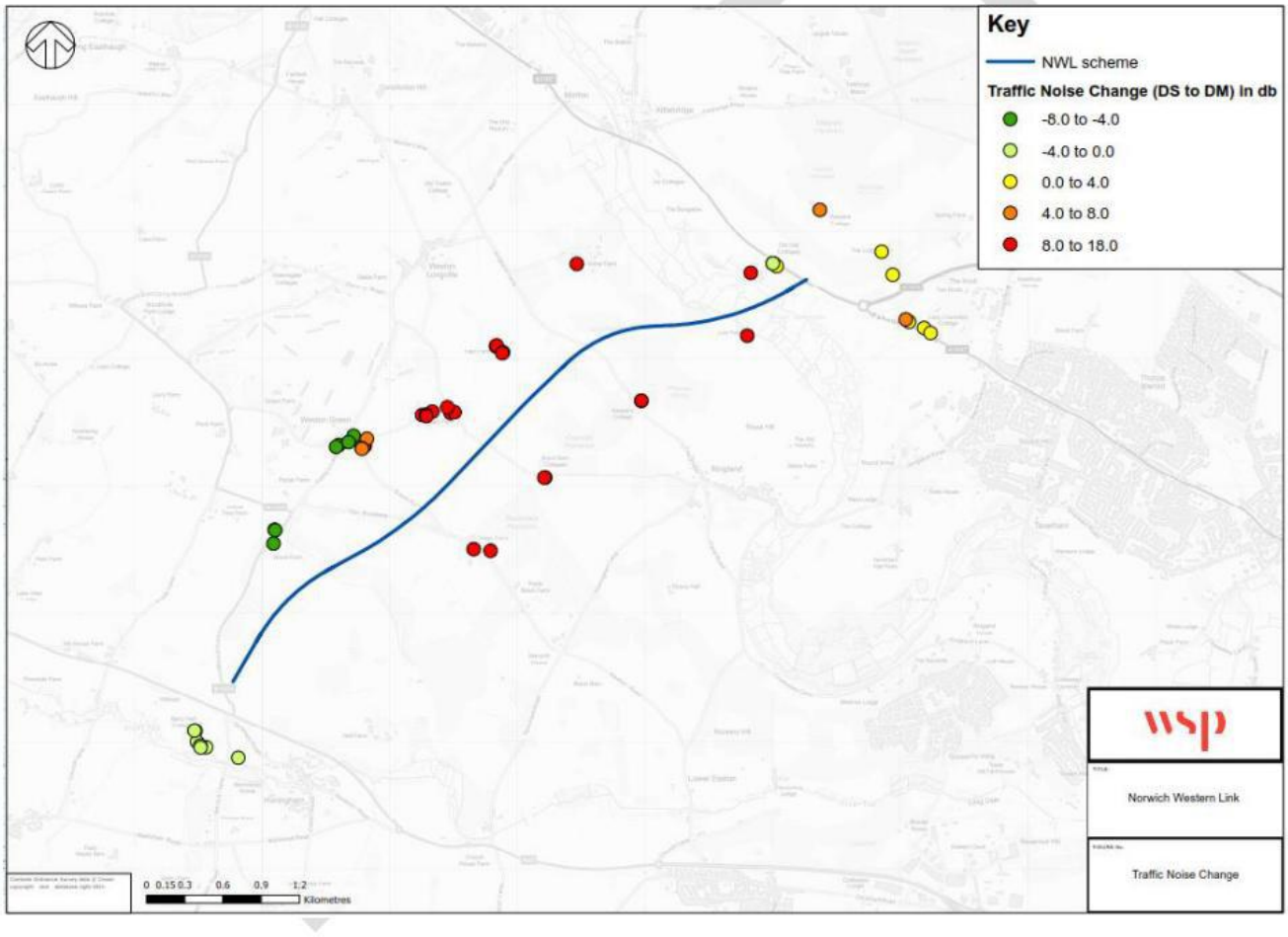

Figure 4-1 - Traffic noise change in dB at properties nearby to the NWL scheme

4.3.4. Figure 4-1 demonstrates that the highest increase in noise levels (8 to 18 decibels) are in the immediate scheme area, whereby properties adjacent to the east and west of the proposed NWL scheme are forecast to experience this level of increase in noise.

4.3.5. Properties to the south of the scheme (Honingham area) and west of the scheme (B1535 Wood Lane) are forecast to experience noise level reductions by 0 to -8 decibels. To the north east of the scheme, the impact of noise levels are anticipated to vary between -4 and +8 decibels.

DEPRIVATION

4.3.6. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are predominantly located in LSOAs in quintile 4 (60-80%), with a small number of properties in quintile 3 (40-60%). This is demonstrated in Figure 4-2.

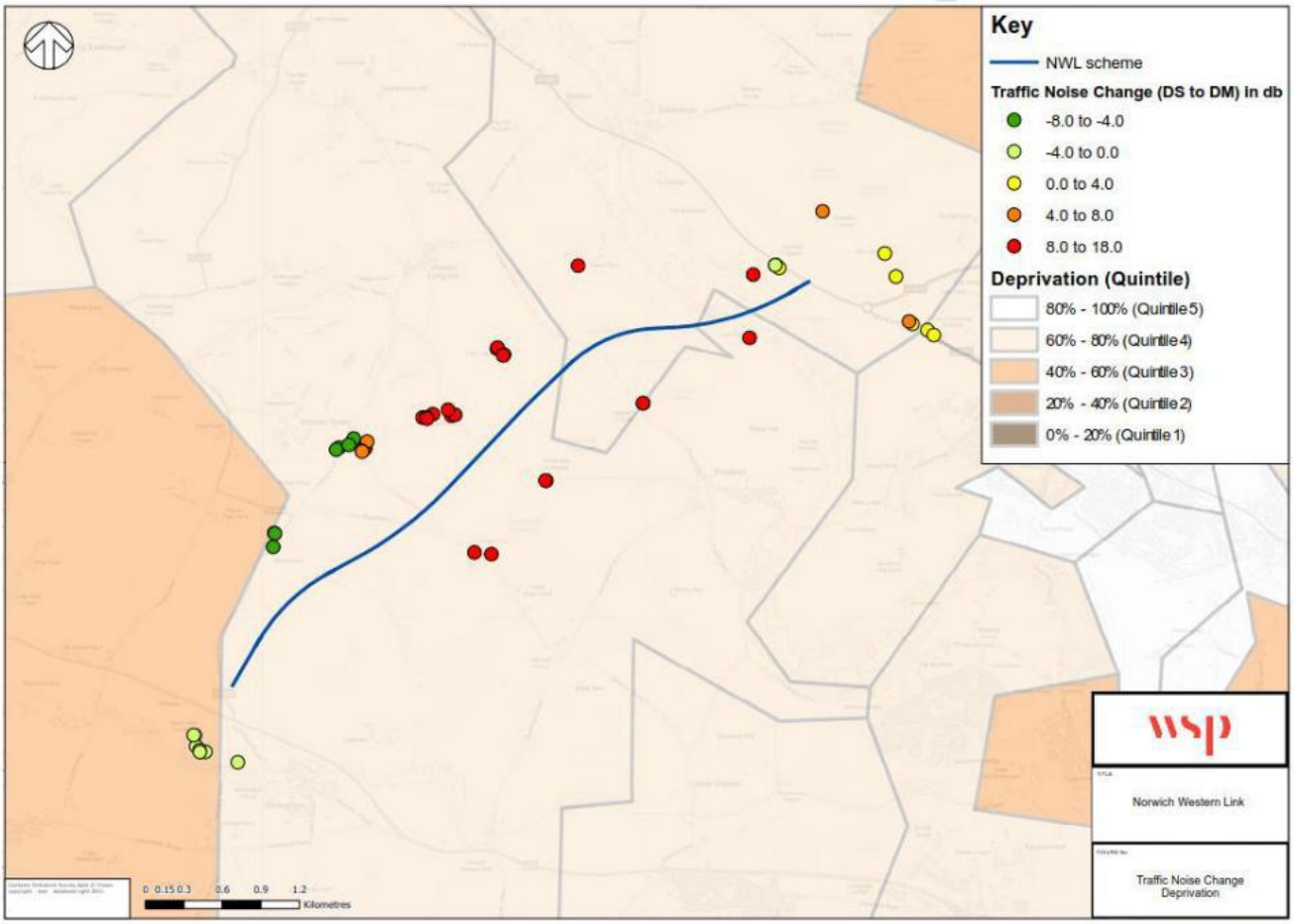

Figure 4-2 - Traffic noise change in dB with deprivation decile by LSOA

4.3.7. As aforementioned, LSOAs in decile 1 (quintile 1) fall within the most deprived 10% of LSOAs nationally and LSOAs in decile 10 (quintile 5) fall within the least deprived 10% of LSOAs nationally. Therefore, no properties impacted in this noise assessment are within areas that have higher than average levels of deprivation (such as quintiles 1 and 2); as such, the noise impact on the most deprived LSOAs is neutral.

CHILDREN

4.3.8. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are located in LSOAs with the proportion of children being between 10% and 20%. This is presented in Figure 4-3.

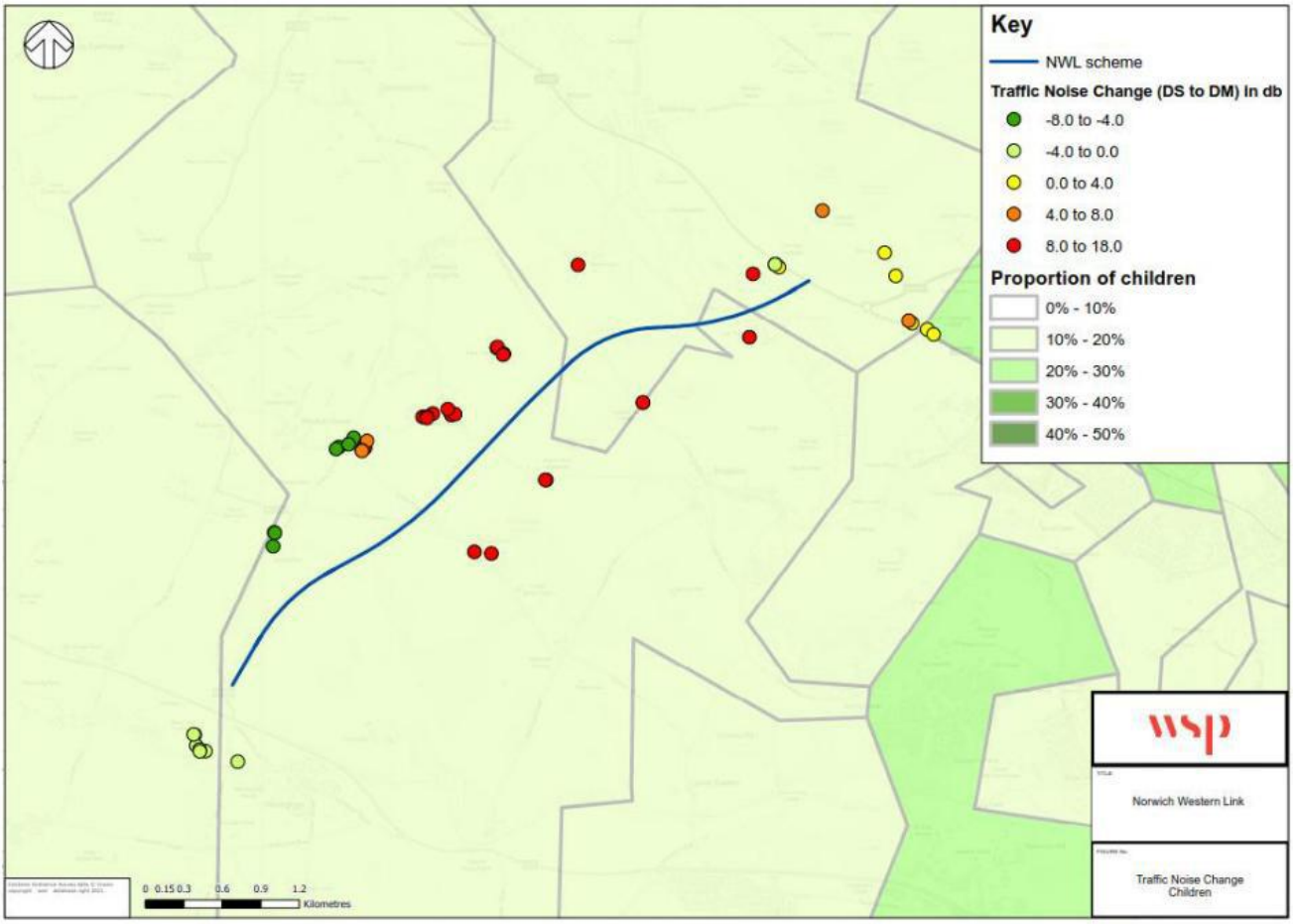

Figure 4-3 - Traffic noise change in dB with children proportions by LSOA

4.3.9. The national average for the proportion of children (under 16) is 17.6% and the LSOAs with properties analysed for noise impact are in the 10% to 20% range. Therefore, the impact of noise on LSOAs with disproportionately high proportions of children is neutral.

OLDER PEOPLE

4.3.10. Of the properties affected by the noise change adjacent or in close proximity to the proposed NWL scheme, these are located in LSOAs with the proportion of older people being between 10% and 20%. This is demonstrated in Figure 4-4.

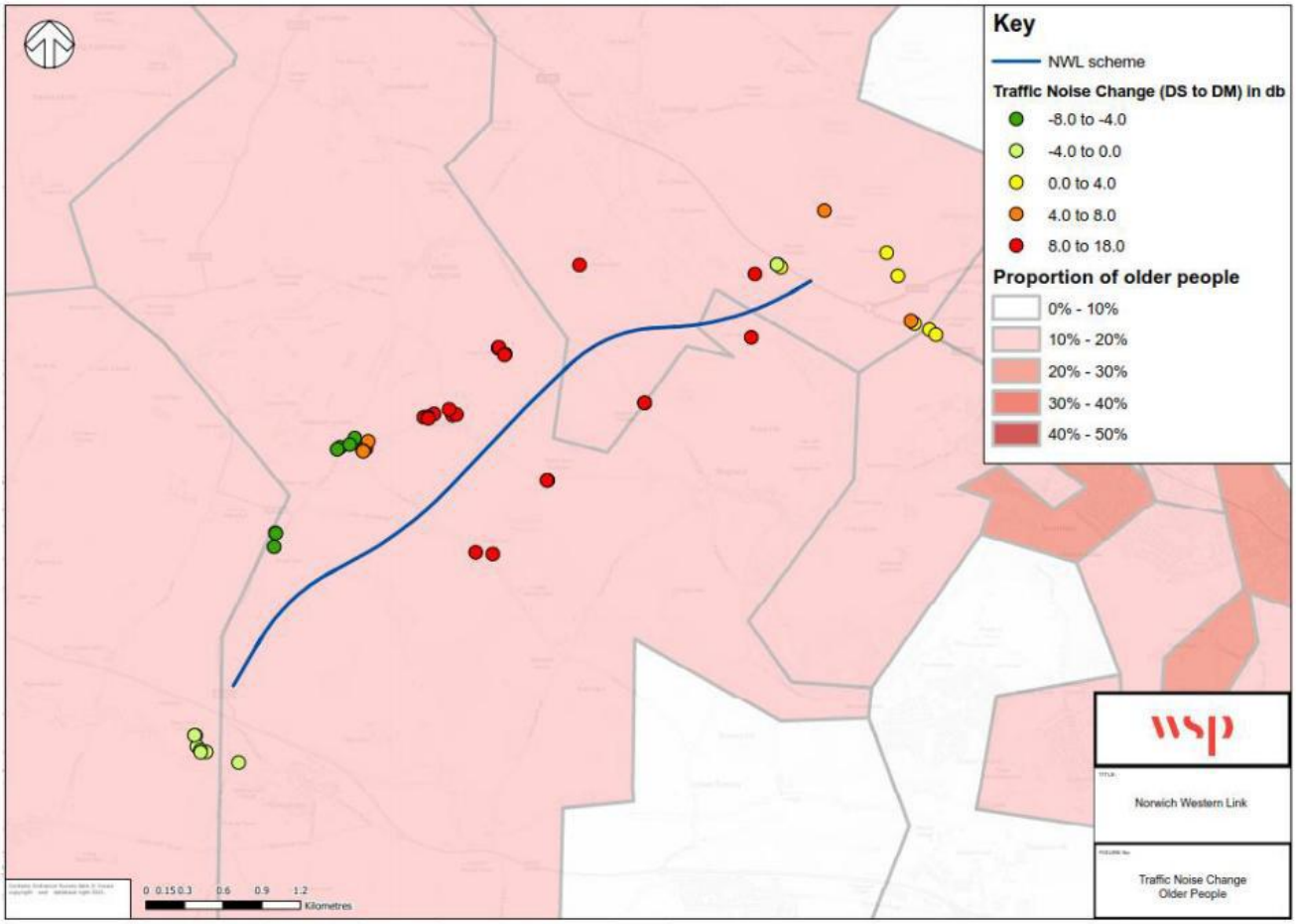

Figure 4-4 - Traffic noise change in dB with older people proportions by LSOA

4.3.11. The national average for the proportion of older people is 10.9% and the LSOAs with properties analysed for noise impact are in the 10% to 20% range. Therefore, the impact of noise on LSOAs with disproportionately high proportions of older people is neutral.

AMENITIES

4.3.12. A desktop exercise was undertaken to identify the amenities present within the area analysed for noise impact. The amenities located in the area analysed for noise impact include:

- Schools;
- Community centres;
- Play areas; and
- Care homes.

4.3.13. Assessment was conducted by comparing the impact of the nearby properties to the scheme with the relative location of identified amenities. Figure 4-5 demonstrates that the scheme is not located in the immediate vicinity of any amenities.

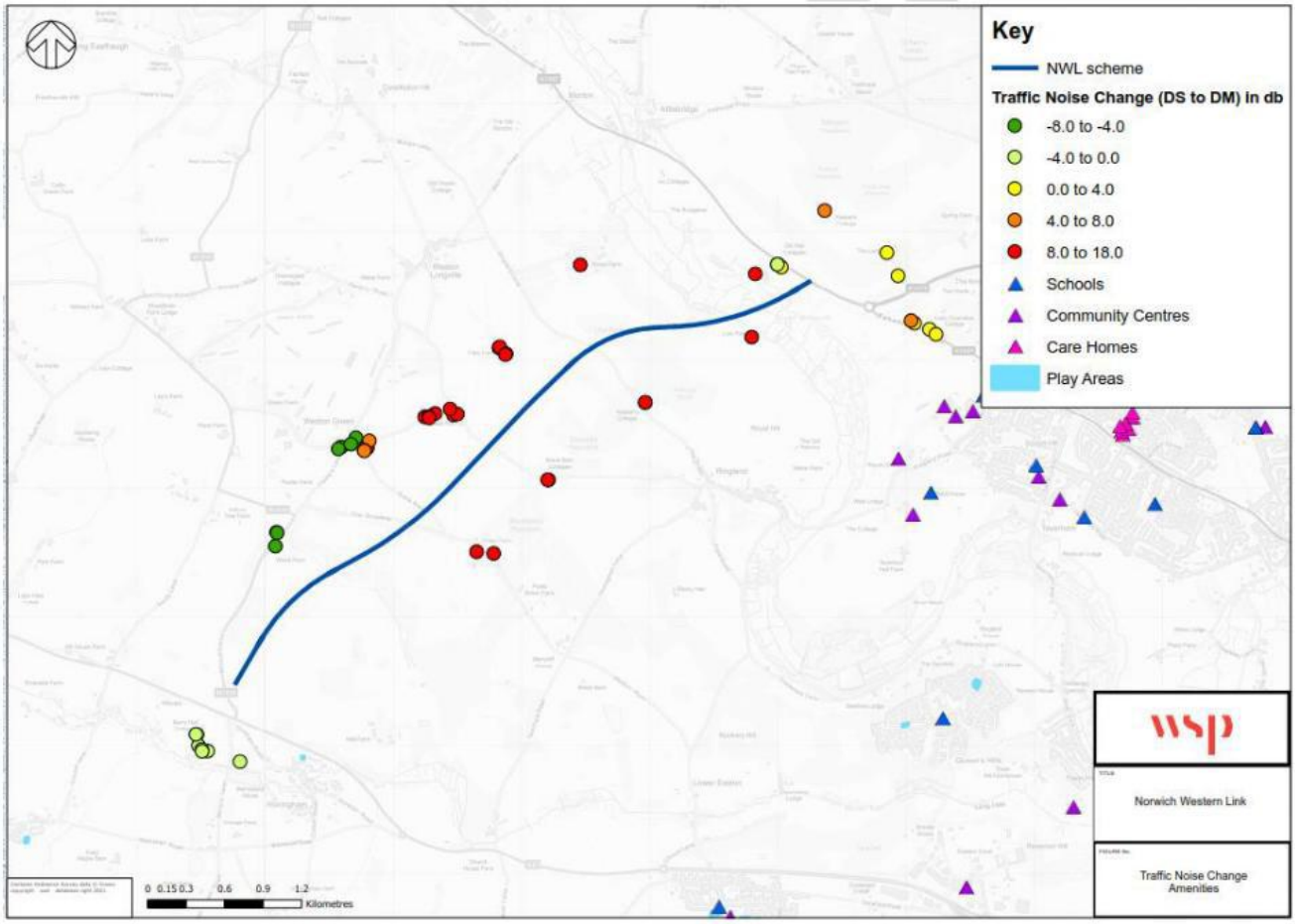

Figure 4-5 - Traffic noise change in dB with amenities

4.3.14. The figure demonstrates that the scheme is not located in the immediate vicinity of any amenities, with the closest schools, community centres and care homes located to the east.

4.3.15. As the scheme is not located in the immediate vicinity of any amenities, a light touch approach was conducted in relation to any changes in the surrounding areas. Due to the distance of any amenities to the scheme, there is deemed no adverse impact to specific amenities in the surrounding area.

NOISE IMPACT

4.3.16. Overall, it is forecast that highest increase in noise levels (8 to 18 decibels) are in the immediate scheme area at properties adjacent to the east and west. However, noise levels are also forecast to reduce to the south and west of the scheme.

4.3.17. It is also demonstrated that the noise impact on deprivation, children and older people is deemed neutral as the proportions in the impact area are average or low in comparison to national averages. Therefore, there is not a disproportionate impact on these groups.

4.3.18. Table 4-2 sets out a summary of the noise impact analysis for the five quintiles of deprivation.

Table 4-2 - Noise and Deprivation Analysis

	IMD Income Domain Most deprived areas ← →least deprived areas				
	Quintile1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Properties within 600m of scheme	0	0	6	46	0
% proportion of properties assessed	0%	0%	11.5%	88.5%	0%
Number of LSOAs	0	0	1	3	0
Assessment	-	-	✓	××	-

4.3.19. The table above summarises that noise impacts are experienced by those properties in the middle-income quintiles. Residents living in the three LSOAs that are quintile 4 (properties adjacent and north east of the scheme) are forecast to experience disbenefits. However, residents in in the LSOA that is quintile 3 (properties to the south west of the scheme) are forecast to experience noise benefits.

4.4 AIR QUALITY

4.4.1. TAG Unit A4.2 sets out that air quality has a strong distributional impact and that air quality impacts are likely to occur where an intervention results in changes to traffic flows or speeds or where the physical gap between people and traffic is altered.

4.4.2. The screening looked at the likely impact of the scheme on air quality in the impact area using analysis of changes the air pollutants NO_2 and $PM_{2.5}$ by comparing the future year (2040) do-something scenario against the future year do-minimum scenario. Consideration of air quality impacts has taken into account amenities (such as schools and playgrounds) where children are likely to spend time and also areas of deprivation.

4.4.3. Firstly, Figure 4-6 and Figure 4-7 demonstrate the changes in NO_2 and $PM_{2.5}$ respectively, comparing the 2040 do-something scenario with 2040 do-minimum scenario. These have been mapped to clearly demonstrate the changes in air pollutants, before overlaying amenity and deprivation layers on subsequent maps.

4.4.4. Figure 4-6 presents the difference in NO_2 levels comparing do-something to do-minimum.

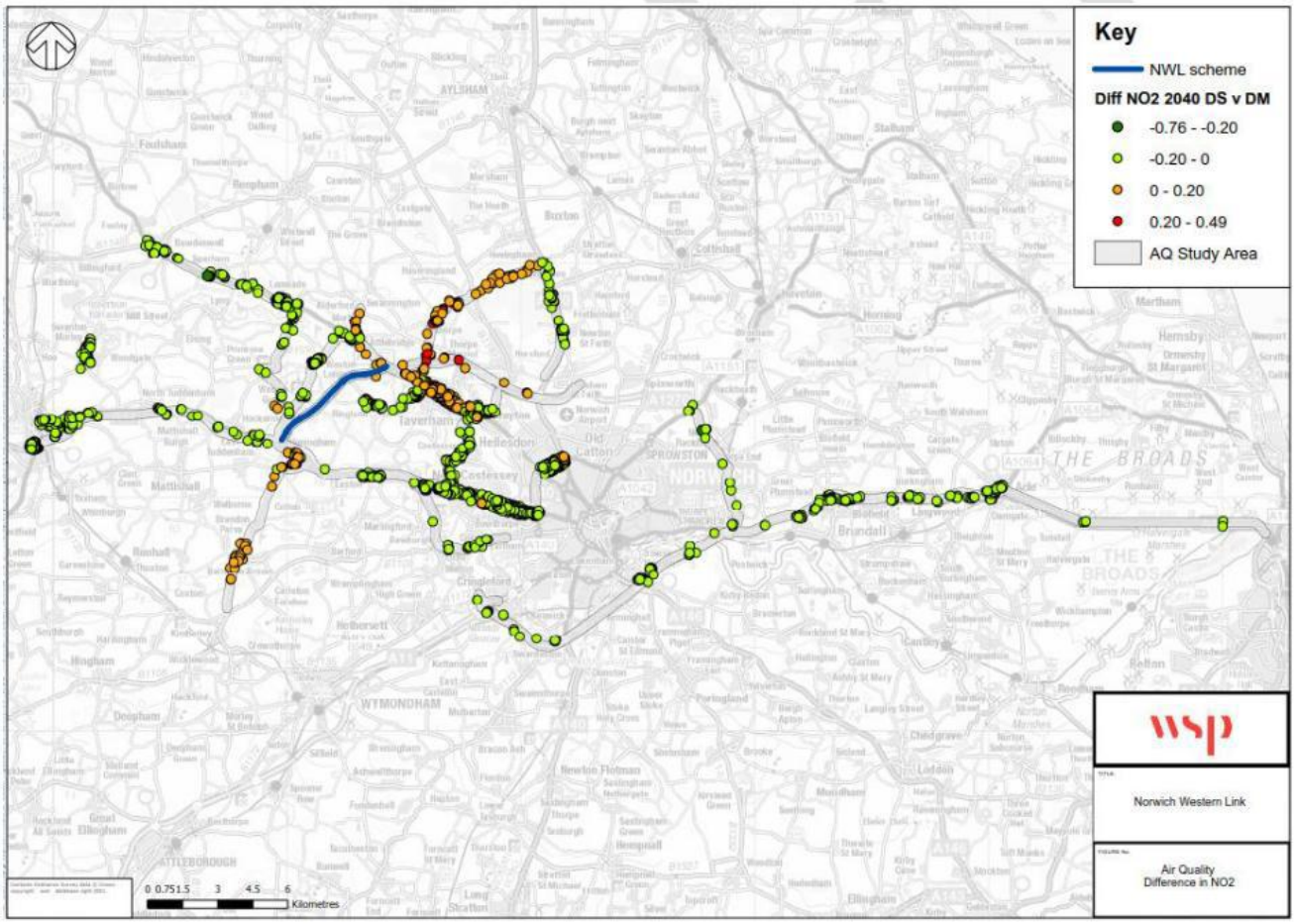

Figure 4-6 - Difference in NO2 (2040 DS v DM)

4.4.5. The figure demonstrates that overall, NO_2 levels in the air quality impact area are forecast to reduce. To the south of the NWL scheme, improvements to NO_2 levels are forecast along the A47 and Dereham Road between the scheme and Norwich city centre; and to the north west of the scheme,

NO_2 levels are forecast to reduce along the A1067. In addition, NO_2 levels are predicted to reduce on the parallel roads to the NWL scheme, such as the B1535 and in the Ringland and Costessey areas. Further to the east, NO_2 levels are also forecast to reduce on Boundary Road and the A140; as well as the A47 to the east of Norwich city centre.

4.4.6. Nevertheless, there are some areas whereby NO_2 levels are forecast to increase. These include roads to the north east of the scheme including the A1067, the A1270, Fir Covert Road and Shortthorn Road. To the south, NO_2 levels are forecast to increase at Mattishall Road, Bell Road and Honingham Road.

4.4.7. A similar trend is forecast for the change in $PM_{2.5}$ levels, as demonstrated in Figure 4-7.

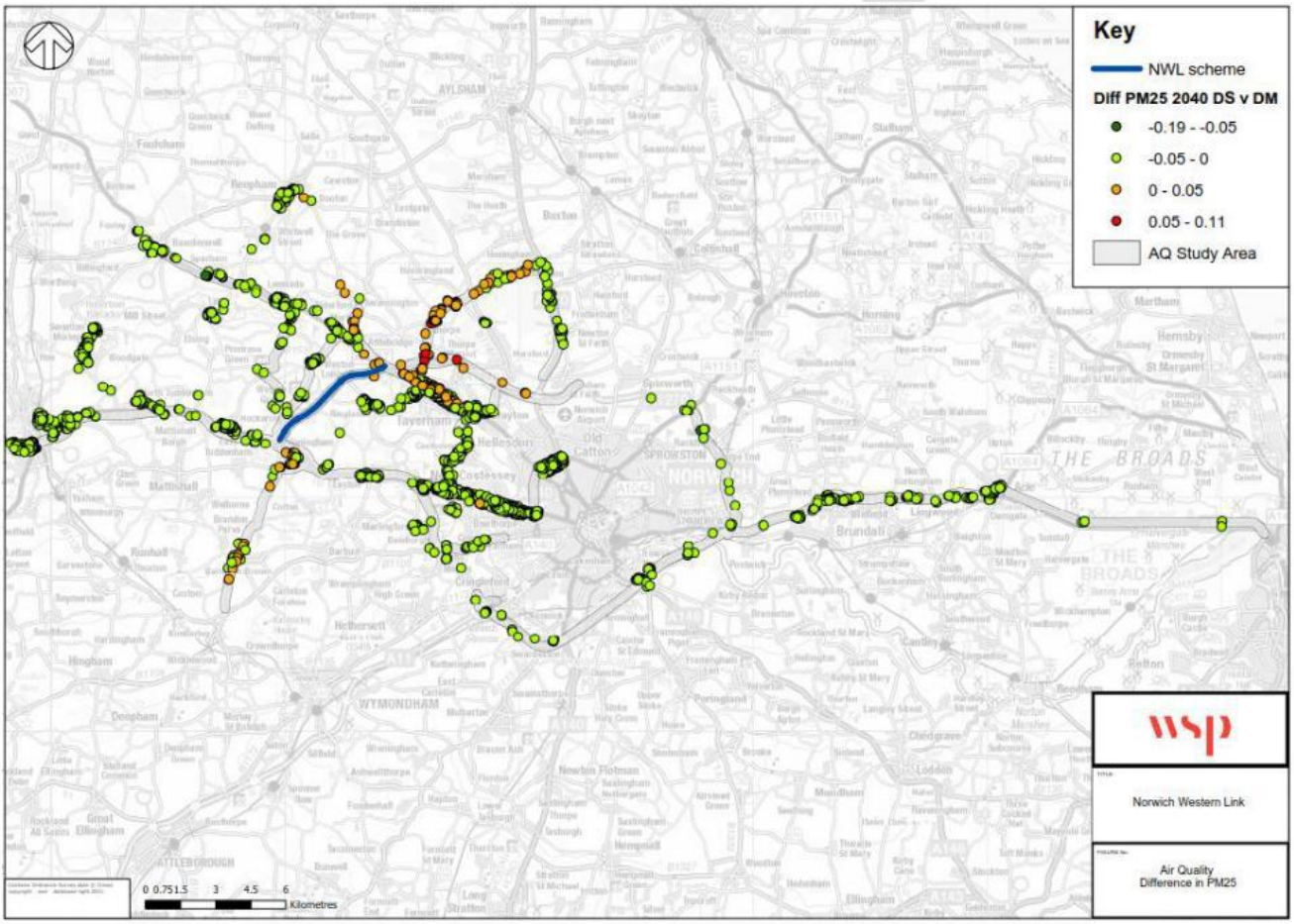

Figure 4-7 - Difference in PM 2.5 (2040 DS v DM)

4.4.8. Once again, Figure 4-7 demonstrates that overall, $PM_{2.5}$ levels are forecast to reduce. The trend of roads in the air quality impact area is comparable to the NO_2 analysis, with reductions in $PM_{2.5}$ along the A47, Dereham Road, the A1067 (to the west) and roads parallel to the NWL scheme; and increases in $PM_{2.5}$ along the A1067 (to the east) and A1270.

AMENITIES

4.4.9. Evidence suggests children are at more risk from air pollution, therefore this analysis of air quality focuses on amenities so that consideration is given to the changes in air quality experienced by children. In addition, consideration of care homes and hospitals as amenities have also been mapped.

4.4.10. Therefore, analysis has been undertaken to take into account the change in air pollutants mapped alongside the following non-residential properties (amenities) within 200 metres of the affected road network:

- Schools;
- Medical/dental facilities including hospitals;
- Care homes; and
- Community centres.

4.4.11. Figure 4-8 presents the difference in NO_2, overlaid with the amenities outlined above.

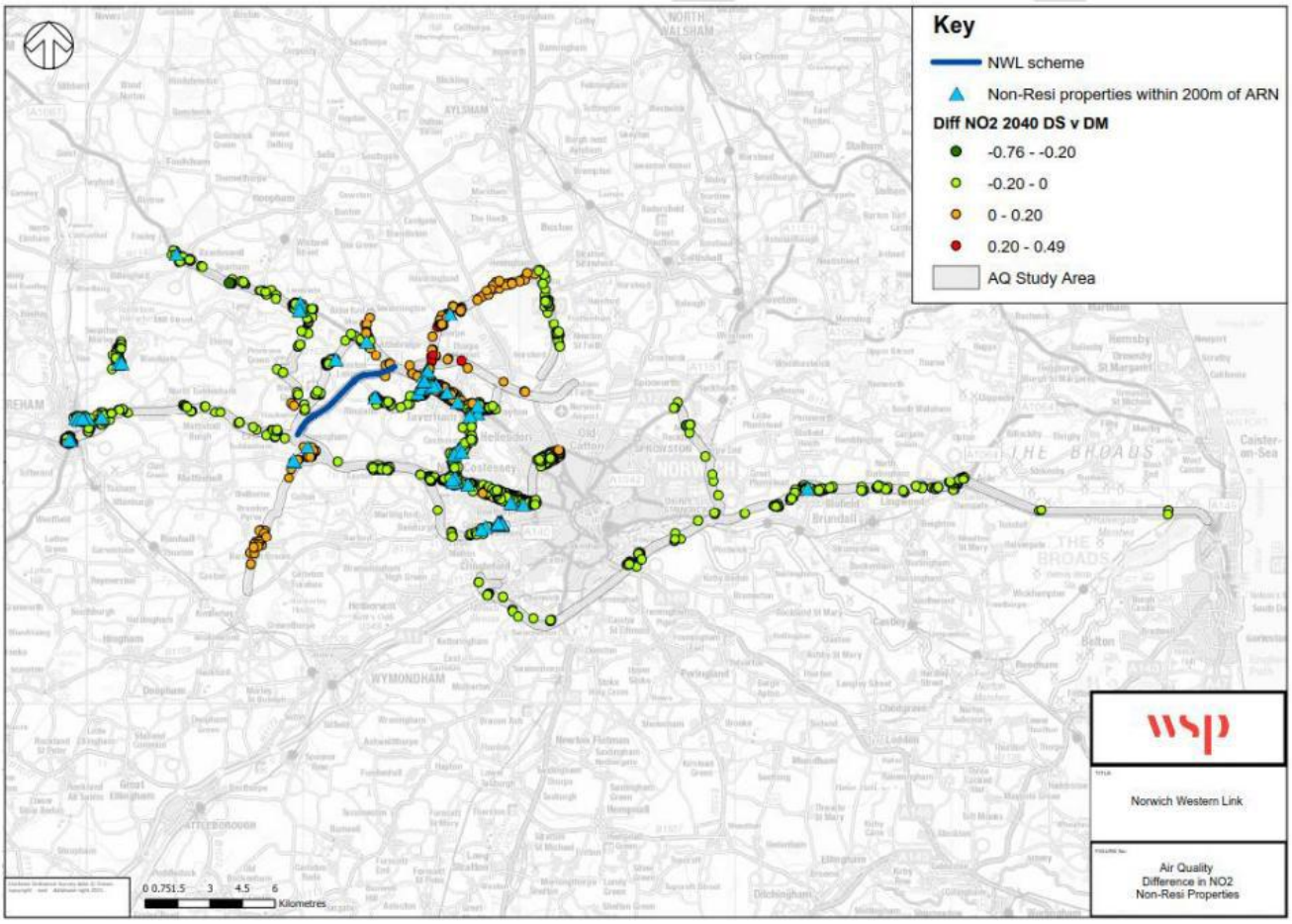

Figure 4-8 - Difference in NO2 (2040 DS v DM) and Non-Residential Properties (Amenities)

4.4.12. The figure demonstrates that the majority of mapped amenities fall within locations where there is forecast to be a reduction in NO_2 levels, such as Dereham, Costessey and Lyng. However, there are also amenities located in areas where NO_2 levels are forecast to increase, such as Felthorpe, Honingham and along the A1067 to the east of the NWL scheme.

4.4.13. Figure 4-9 presents the difference in $PM_{2.5}$, overlayed with amenities.

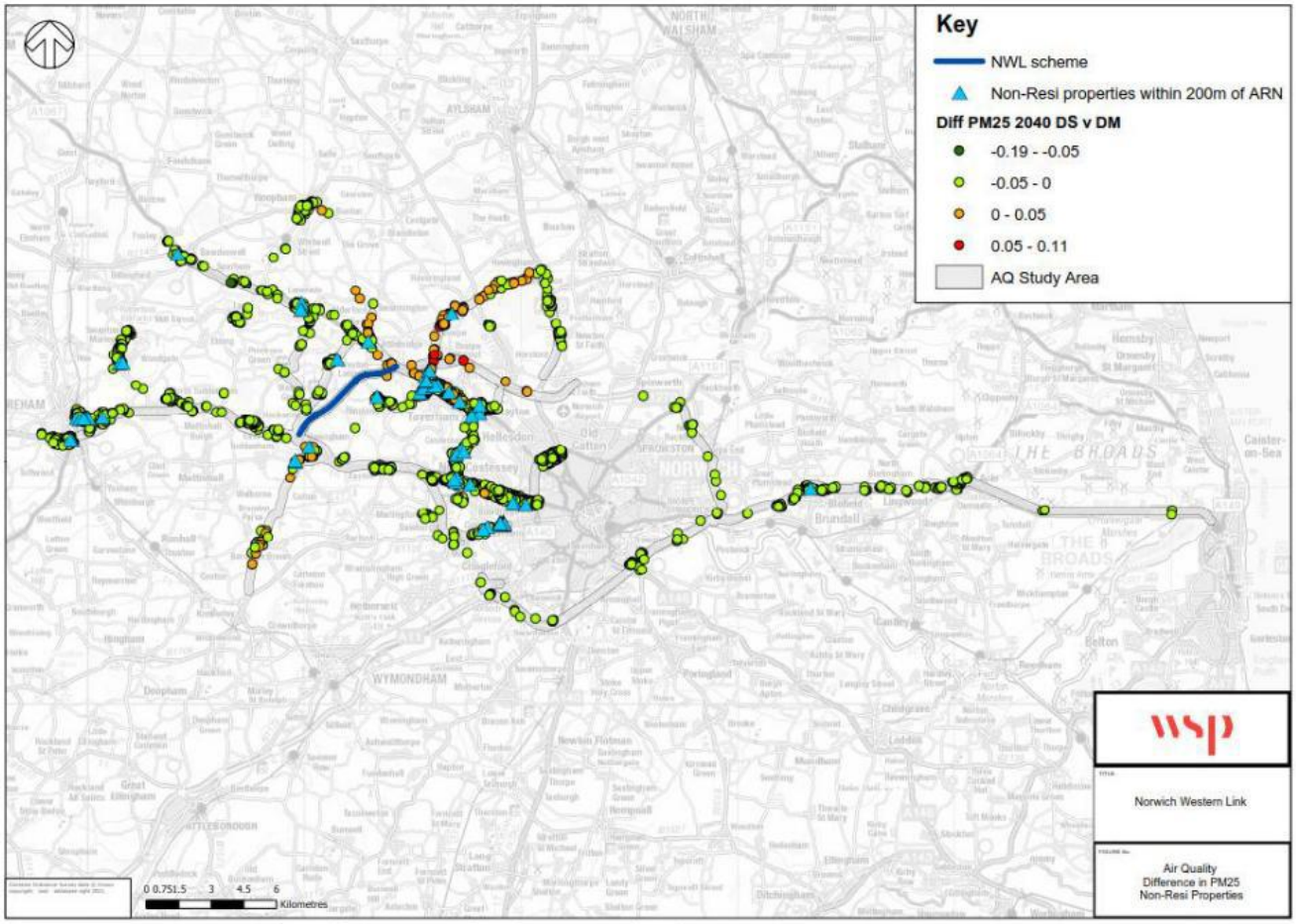

Figure 4-9 - Difference in PM2.5 (2040 DS v DM) and Non-Residential Properties (Amenities)

4.4.14. The change in $PM_{2.5}$ levels and impact on amenities is similar to the trend of NO_2 levels, whereby amenities will experience reductions or increases in levels dependent on location. To the west of the scheme and towards Norwich city centre, amenities are forecast to experience reductions in $PM_{2.5}$ levels, whereas locations south and north east of the NWL scheme are forecast to have increased levels of $PM_{2.5}$.

DEPRIVATION

4.4.15. It is important to also concentrate analysis of the changes in air quality on areas of high deprivation as health problems can often be exacerbated in deprived communities.

4.4.16. Figure 4-10 shows the difference in NO_2, overlaid with deprivation by LSOA.

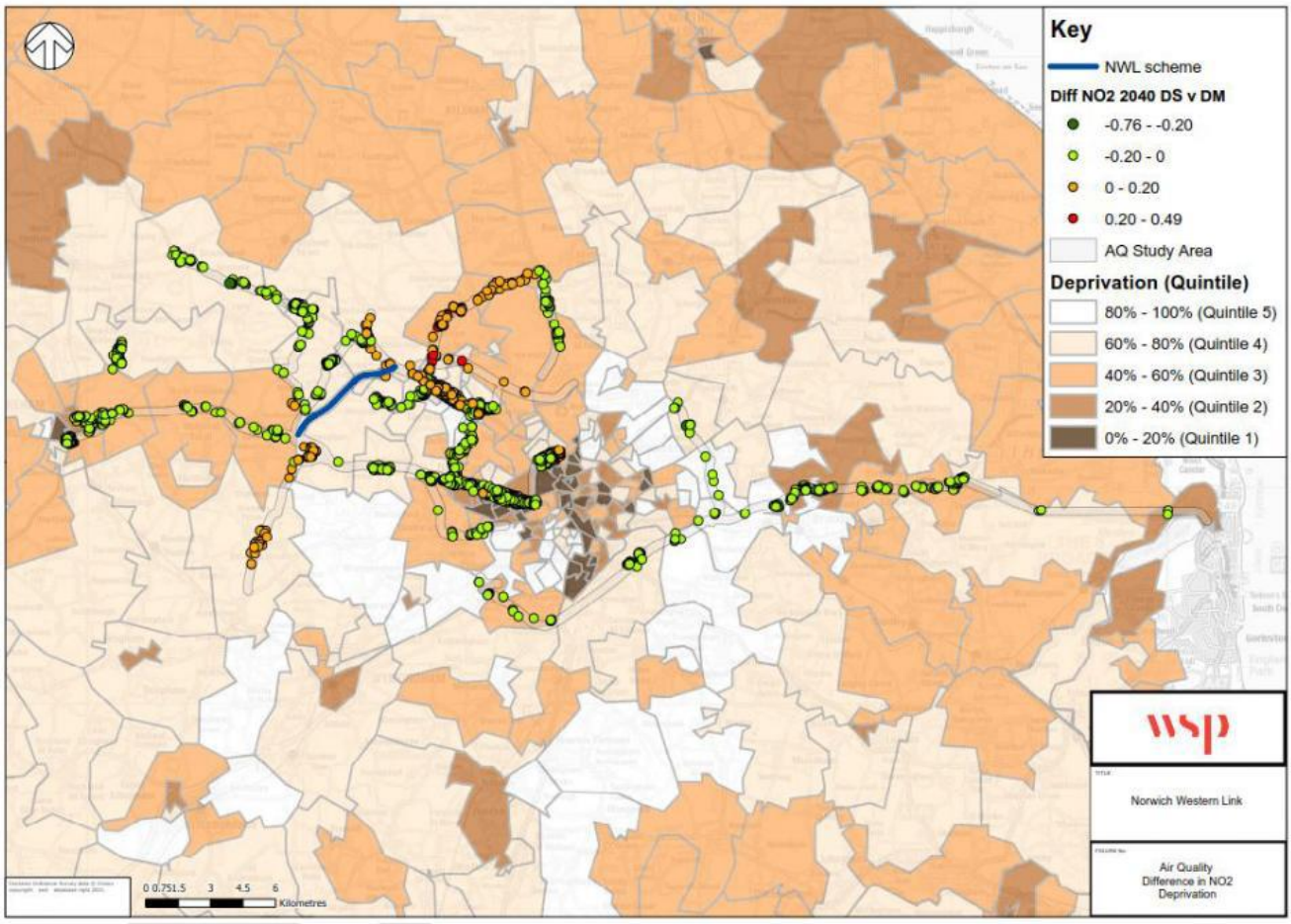

Figure 4-10 - Difference in NO2 (2040 DS v DM) and Deprivation by LSOA

4.4.17. As presented in the figure, the majority of the study area contains LSOAs with relatively low levels of deprivation. The study area mostly comprises quintiles 3, 4 and 5 (40% - 100%) and therefore demonstrates that the majority of changes in NO_2 occur on the affected road network in areas that do not have high levels of deprivation.

4.4.18. Higher levels of deprivation (quintiles 1 and 2) are found in Norwich city centre, with the main changes to NO_2 in this location to be a reduction, particularly when looking at Dereham Road which contains LSOAs with the lowest quintiles and sees a reduction in NO_2.

4.4.19. Where NO_2 levels are forecast to increase, these are in locations where LSOA deprivation falls within quintiles 3, 4 and 5. Therefore, even though NO_2 levels are forecast to reduce overall, where there are increases in NO_2 levels these are predominantly in areas that do not have high levels of deprivation.

4.4.20. Figure 4-11 demonstrates the difference in $PM_{2.5}$, overlayed with deprivation by LSOA.

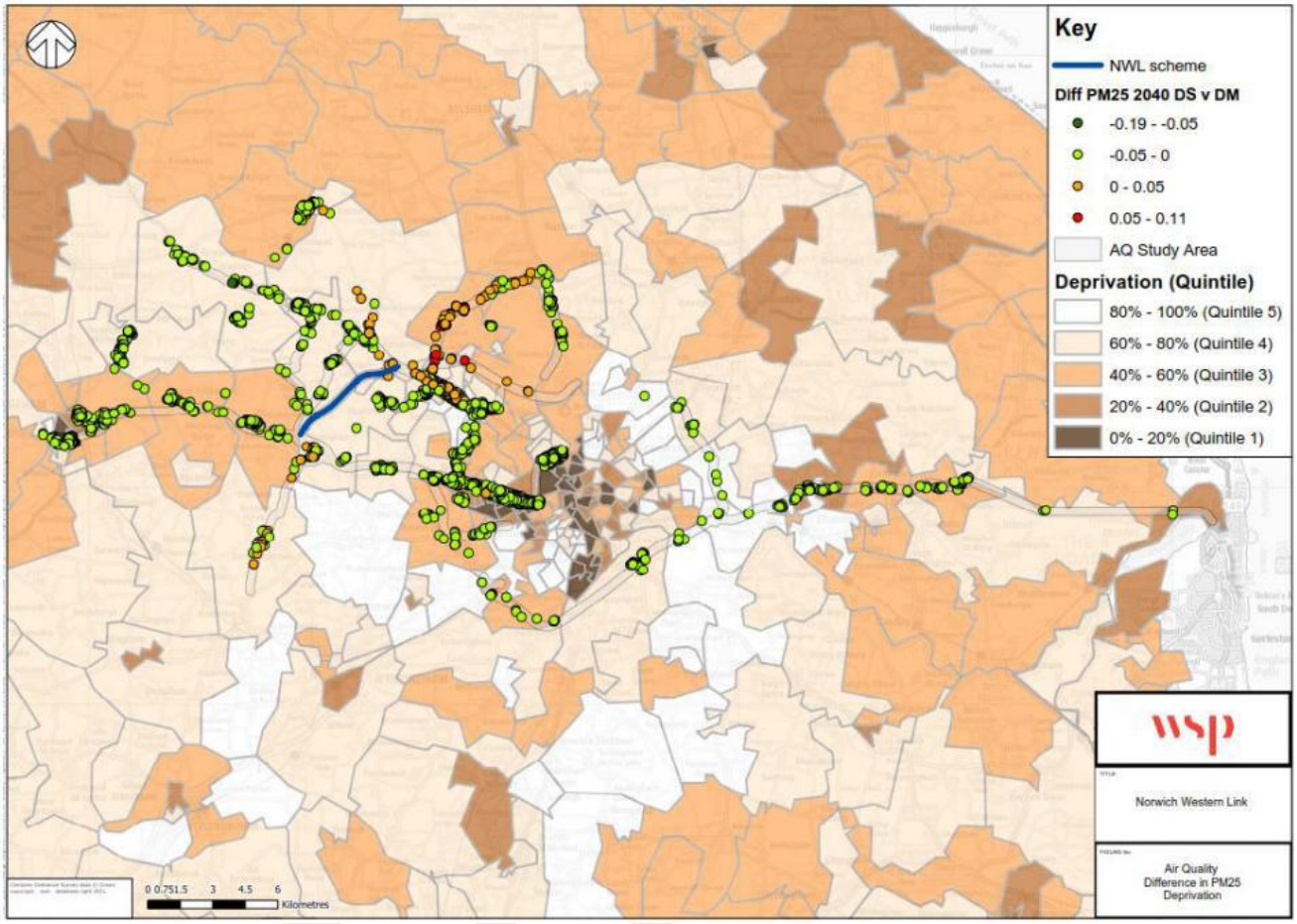

Figure 4-11 - Difference in PM 2.5 (2040 DS v DM) and Deprivation by LSOA

4.4.21. This figure presents a similar analysis to the changes in NO_2, whereby changes in $PM_{2.5}$ levels reduce on the Dereham Road which contains LSOAs with quintiles 1 and 2; and also that increases in $PM_{2.5}$ are mostly forecast in LSOAs that are quintiles 3, 4 and 5, thus demonstrating that these increases occur in areas that do not have high levels of deprivation.

4.4.22. As aforementioned, NO_2 and $PM_{2.5}$ levels are forecast to reduce overall in the study area, thus providing air quality benefits. In regard to air quality and deprivation, further analysis has been provided in Table 4-3 which sets out a summary of the air quality impact for the five quintiles of deprivation, analysing the change in NO_2 levels.

Table 4-3 - Air Quality and Deprivation Analysis

	IMD Income Domain Most deprived areas ← →least deprived areas				
	Quintile1 0-20%	Quintile 2 20-40%	Quintile 3 40-60%	Quintile 4 60-80%	Quintile 5 80-100%
Number of properties with improved air quality	325	270	578	761	182
Number of properties with no change in air quality	87	3	34	73	35
Number of properties with deteriorating air quality	1	4	116	357	122
Number of net winners / losers	324	266	462	404	60
Net winners/losers as a % of total	21%	18%	30%	27%	4%
Share of total population in the impact area	4.9%	6.7%	19.5%	52.3%	16.5%
Assessment	✓	✓	✓✓	✓✓	✓

4.4.23. The table demonstrates that air quality impacts are experienced across all quintiles of deprivation. Those in quintile 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.

4.5 ACCIDENTS

ROAD NETWORK

4.5.1. Following the screening process for accidents, this chapter analyses the impact of the Norwich Western Link on safety, utilising modelled flows and accident data. Consideration has been taken whether the intervention causes significant changes (>10%) in vehicle flow, speed, HDV use or a significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using the road network.

4.5.2. In this instance, vehicle flows were selected as the key consideration to analyse the impact of the NWL on safety and accidents. It is unlikely that the scheme will cause a significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using the road network.

4.5.3. Figure 4-12 demonstrates the differences in Average Annual Daily Traffic (AADT) flows between the 2025 do something and the 2025 do minimum scenario, whereby changes in flow (>10%) are identified by green links (reduction in flows by >10%) and red links (increase in flows by >10%). Any links that do not have changes in flows by >10% are identified as the black links.

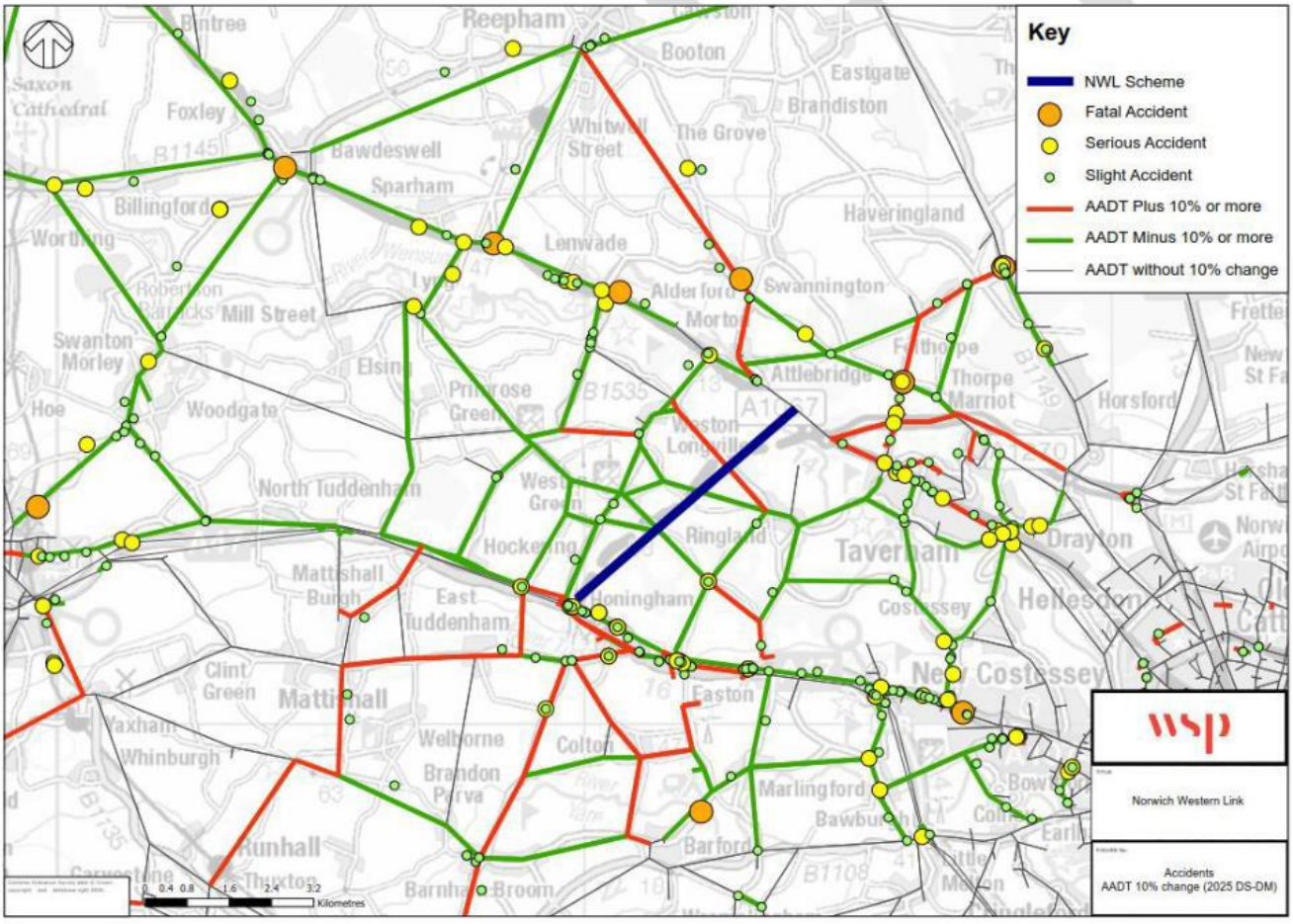

Figure 4-12 - Accidents and links with >10% AADT flow change

4.5.4. Figure 4-12 demonstrates that within the study area, there are significantly more links that have a >10% reduction in flows (green), in comparison to those links that have a >10% increase in flows (red).

4.5.5. It is noted that there is a significant number of links with >10% change in flows (both increase and decrease) situated in close proximity to the NWL scheme; with the number of links that do not have a >10% change in flows (black) gradually increasing as distance increases further afield from the NWL scheme.

4.5.6. Figure 4-12 demonstrates that the majority of parallel routes to the proposed NWL scheme, between the A47 and A1607, are forecast to have >10% reductions in flow when comparing 2025 Do Something with 2025 Do Minimum in the scheme opening year. Figure 4-12 also shows >10% reductions in flows along sections of the A47 and A1067. In contrast, there are some links, particularly at the northern and southern ends of the proposed scheme, which are forecast to have >10% in flows.

ASSESSMENT

4.5.7. Five-year accident data between 2015 and 2019, provided by Norfolk County Council, has also been mapped on Figure 4-12. Only accidents that occurred on links that have a >10% change (both increase and decrease) are presented on the map; therefore, all accidents that do not occur on links with a >10% have been removed, in order to clearly visualise accidents on links that do have a forecast >10% change.

4.5.8. The study area spans from Lyng in the west to the edge of Norwich city centre in the east; and includes key links such as the A47, A1067, A1270 and B1535.

4.5.9. The analysis will look primarily at impacts on children and older people (both particularly as pedestrians), young males, motorcyclists and the more deprived population.

APPRAISAL

4.5.10. As the number of casualties on the affected links is less than 50 over the five-year period a qualitative assessment has been undertaken.

4.5.11. Figure 4-12 demonstrates that significant reductions in traffic flows are anticipated along existing routes that are parallel to the proposed NWL scheme. The majority of parallel existing routes between the A47 and A1067 are forecast to have >10% reductions in flow when comparing do something with do minimum. These include the B1535, Sandy Lane, Heath Road, B1146, B1110, Taverham Road, Taverham Lane, Longwater Lane and Costessey Lane. To the south of the proposed NWL scheme, a section of the A47 is forecast to have a >10% reduction in flows. The A47 leads onto Dereham Road towards Norwich city centre, on which the modelling also forecasts a >10% reduction in flows along a significant section of the road. To the north west of the proposed NWL scheme, the A1067 between Morton on the Hill and Twyford is also anticipated to have >10% reduction in flows.

4.5.12. In contrast, there are some links which have a >10% increase in traffic flows when comparing the do something with the do minimum scenario. This includes sections of the A1270, A1067 and Shortthorn Road at the northern end of the NWL scheme. To the southern end of the proposed NWL scheme, links with >10% flows include Mattishall Road, Barnham Broom Road, Barford Road and Church Lane.

4.5.13. As visualised in Figure 4-12, there are nine fatal accidents mapped in the study area on links with a >10% change in flows. Three of these fatal accidents are where there is a >10% increase in flows and six fatal accidents where there is a >10% decrease in flows.

4.5.14. Casualty data was used to identify the number and proportion of vulnerable age group fatalities within the study area on affected links where there is a >10% increase in flows.

4.5.15. The casualty data showed that of the three fatal accidents on links where there is a >10% increase in flows in the study area, none were in the vulnerable age groups of children (under 16), young adults (16 to 25) or older people (over 70). However, of the three fatalities, one was on a pedal cycle and another was on a motorcycle.

4.5.16. The casualty data showed that of the six fatal accidents on links where there is a >10% reduction in flows in the study area, four were in vulnerable age groups; these being three young adults (16 to 25) group and one older person (over 70). Of the six fatalities, one was on a motorcycle and one was a pedestrian.

4.5.17. Casualty data was also interrogated for all accidents (slight, serious and fatal) on affected links with a >10% change. Overall, this identified that proportionately, pedestrian casualties accounted for 5% of all casualties on affected links, with 95% of casualties being driver/rider or passenger. The proportion of pedestrian casualties is lower than the national rate (14.2% 2019 figures). In terms of age groups, under 16s accounted for 6% of casualties; young adults accounted for 26% of casualties; and older people accounted for 9% of casualties. Both the children (under 16) and older people proportions are lower than the national figures, 8.9% for children and 14% for older people, while the proportion of young adults is higher than the national figures (17.6%).

4.5.18. In addition, vehicle data was analysed for all accidents on affected links with a >10% change. The analysis identified that of all vehicles involved in accidents on the affected links, 8% were motorcycles and 6% were pedal cycles. Cars made up a significant proportion of the vehicles involved in accidents (74%), with goods vehicles and vans representing the second highest proportion of vehicles involved in accidents (10%). The remaining 2% represented other vehicles such as bus, horse ridden and taxi.

4.5.19. Table 4-4 sets out the analysis summary for vulnerable social groups and networks users in the study area.

Table 4-4 – Summary Analysis - Accidents

Vulnerable group/user	Overall analysis
Children (under 16)	Slight Benefit
Young adults (16-25)	Moderate Benefit
Older People (over 70)	Slight Benefit
Pedestrians	Slight Benefit
Cyclists	Slight Benefit
Motorcyclists	Slight Benefit

4.5.20. Figure 4-13 demonstrates the accidents and change in flows by >10%, as well as the deprivation quintiles in the study area.

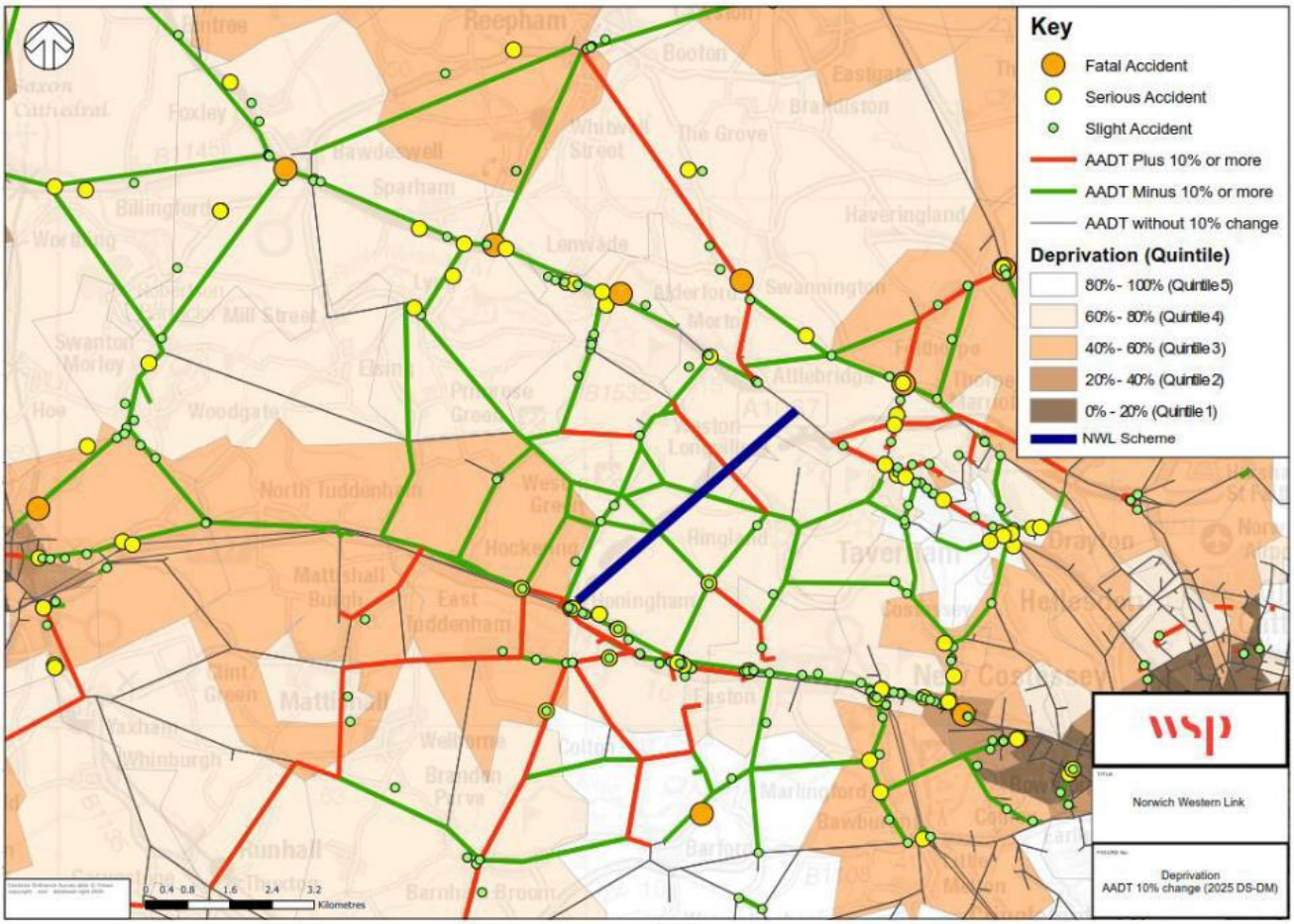

Figure 4-13 - Accidents with deprivation by LSOA with link flow change

4.5.21. Of the links with a >10% increase in flows, only a short section of A1067 Fakenham Road to the east of the northern end of the NWL scheme has a significant cluster of accidents (both slight and serious).

4.5.22. However, this does not correlate with deprivation; as this cluster of accidents on the A1607 is located in the Taverham area which has low levels of deprivation, as shown in Figure 4-13. Furthermore, the majority of the study area falls within quintiles 3 to 5, demonstrating lower levels of deprivation. The three fatal accidents, as well as the significant majority of accidents on links with >10% increase in flows are also not located in areas of high deprivation.

4.5.23. Of the links with a >10% reduction in flows, there are clusters of accidents (slight, serious and fatal) on the A47, Dereham Road and the A1067 (to the west of the northern end of the NWL scheme).

4.5.24. Overall, it is noted that more clusters of accidents are located on links with a >10% reduction in flows when compared with links with a >10% increase in flows.

4.5.25. Based on the qualitative appraisal undertaken none of the affected links have accidents including significant numbers or proportions of vulnerable groups or network users in their casualties apart

from young adults. As such the impact of the NWL scheme on these groups and users is likely to be slight.

4.5.26. As there are more links forecast to experience decreases in flow rather than increases the overall assessment for the affected links is beneficial, therefore the overall analysis is slight beneficial. As such, there is deemed to be no adverse impact on specific amenities in the surrounding area.

4.6 SEVERANCE

SCREENING AND ASSESSMENT

4.6.1. Severance is defined in TAG as the separation of residents from facilities and services they use within their community, caused by significant changes in transport infrastructure which impede pedestrian movement or present a physical barrier to movement.

4.6.2. The NWL scheme will increase highway capacity and improve journey times on the road network, any barriers to movement that may be caused as a result of the scheme will be mitigated. There are forecast changes to traffic flows on roads within the study area apart from the NWL, any roads with an increase or decrease of >10% in flows have been analysed in this section.

APPRAISAL

4.6.3. The focus for this stage was a light touch approach of severance in the study area based on LSOA social groups with reference to the scheme.

4.6.4. As aforementioned, the study area surrounding the scheme contains relatively low proportions of children and young adults, with slightly higher proportions of older people.

4.6.5. In relation to black and minority ethnic groups, these proportions are low in the areas immediately adjacent to the scheme, with the proportion increasing towards the east and Norwich city centre. The proportion of these groups is below or in line with the national average.

4.6.6. The severance assessment covers the following in more detail:

- Proportion of people under 16 (children) by LSOA and >10% link flow change;
- Proportion of people between 16-25 (young adult) by LSOA and >10% link flow change;
- Proportion of people over 70 (older) by LSOA and >10% link flow change;
- Proportion of people with a disability by LSOA and >10% link flow change;
- Proportion of black and minority ethnic people by LSOA and >10% link flow change; and
- Proportion of people with no car by LSOA and >10% change.

Children

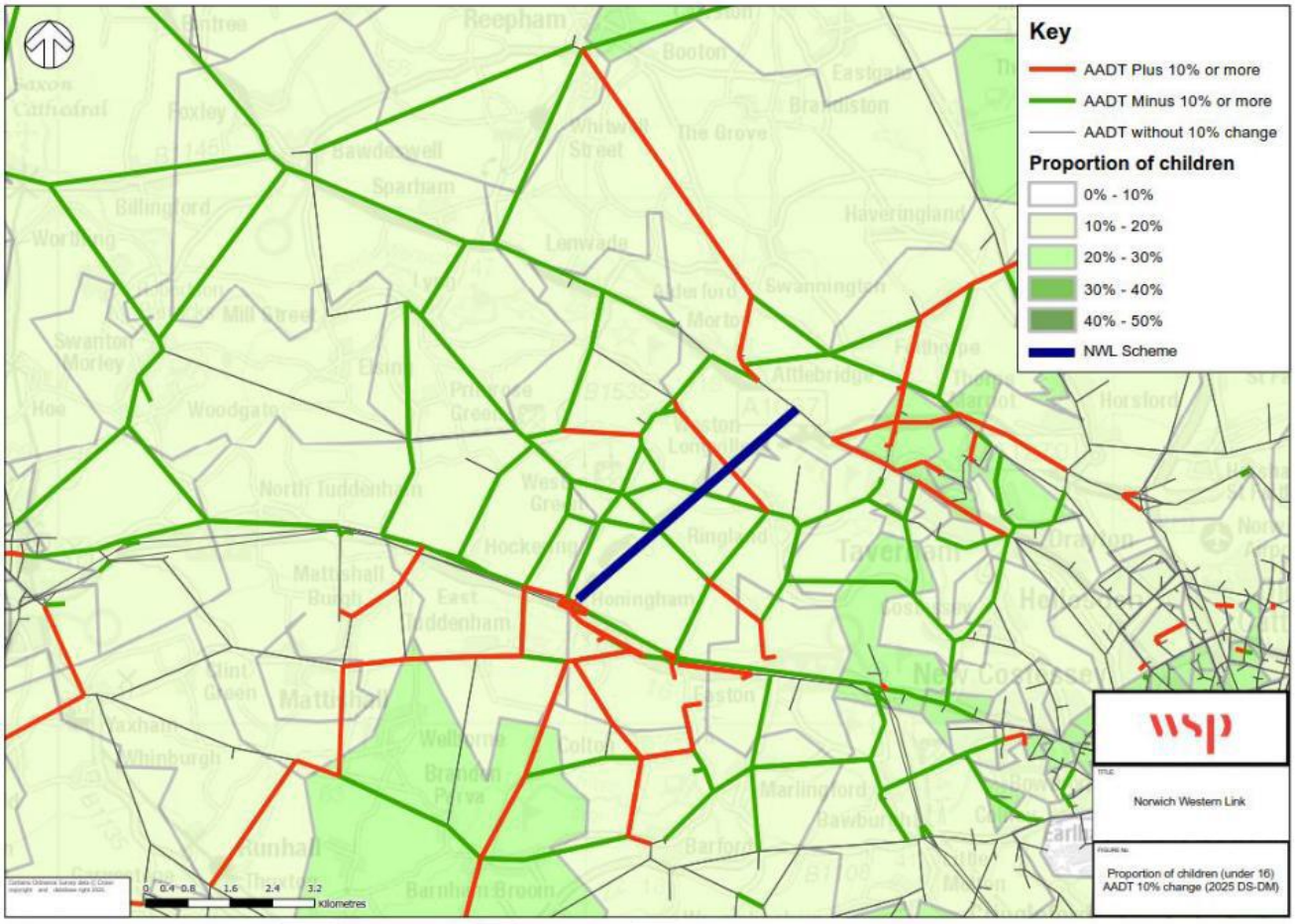

Figure 4-14 - Proportion of people under 16 (children) by LSOA and link flow change

4.6.7. Figure 4-14 shows that the affected roads are in areas with a low proportion of children, with the majority of LSOAs in the study area having children proportions between 10-20%. All of the study area contains children proportions of 30% or less, and overall have lower than the national average when comparing proportions of children.

4.6.8. As such, in areas where flow changes are present, they are not deemed to have a significant impact for this particular social group, as the majority of LSOAs have low proportions of children and no LSOAs have a significantly above national average proportion of children.

Young adults

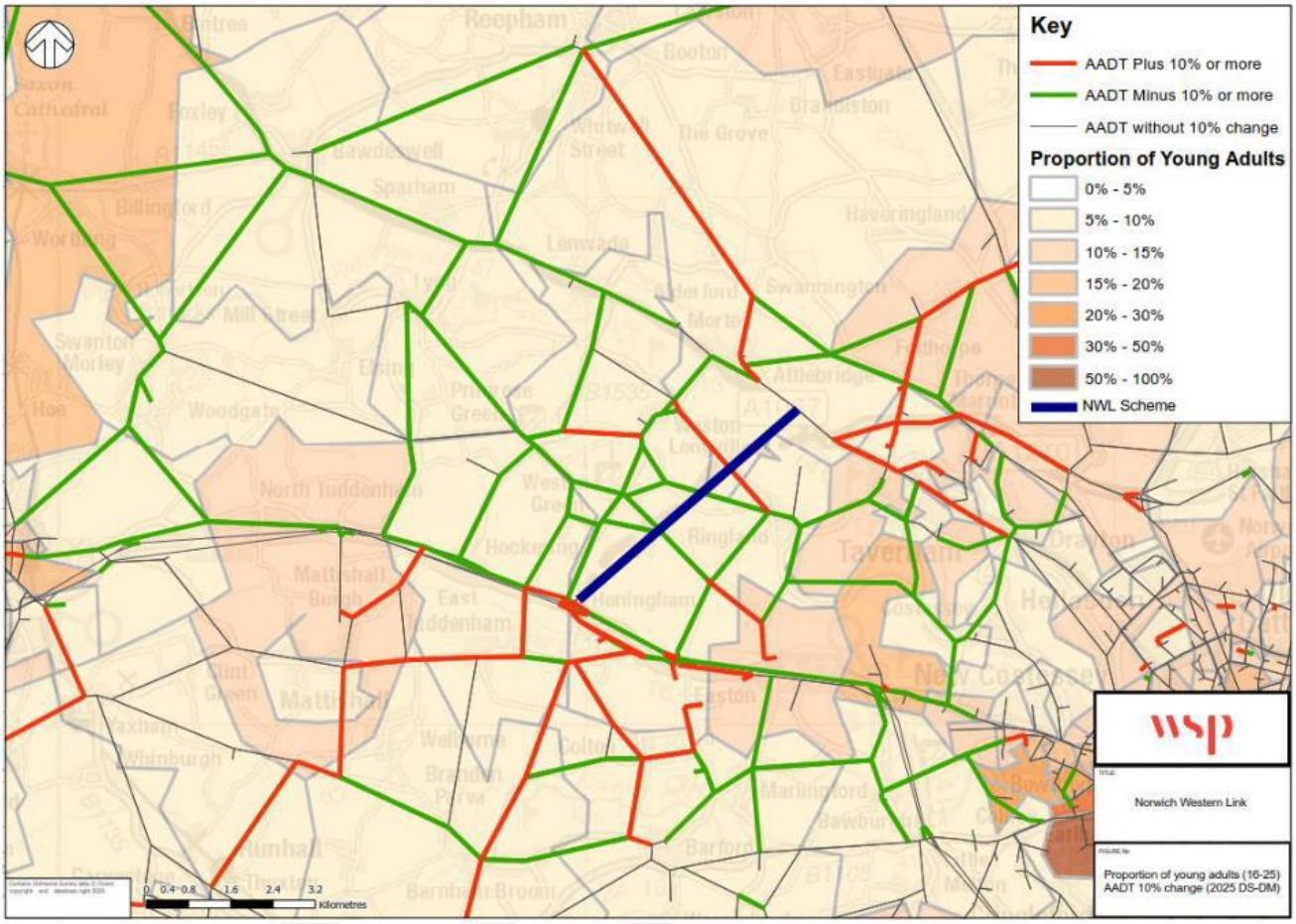

Figure 4-15 - Proportion of people between 16-25 (young adults) and link flow change

4.6.9. Figure 4-15 shows that there is a relatively low proportion of young adults in the study area, with the majority of the study area having a proportion of young adults between 5% and 20%. Directly adjoining the NWL scheme, the LSOAs have a proportion of young adults between 5% and 10%. However, the eastern section of the study area, which contains the urban area of Norwich, has a higher proportion of young adults, with proportions up to 50%. This is an area by the University of East Anglia. The study area contains roads which are forecast to have changes of flows of more than 10%, both increases and decreases, with the majority of the affected roads located in areas where the proportion of young adults is under 15%.

4.6.10. The significant majority of traffic flow changes of >10% are in LSOAs with lower than average proportions of young adults, therefore they are not deemed to have changed significantly for this particular social group.

Older People

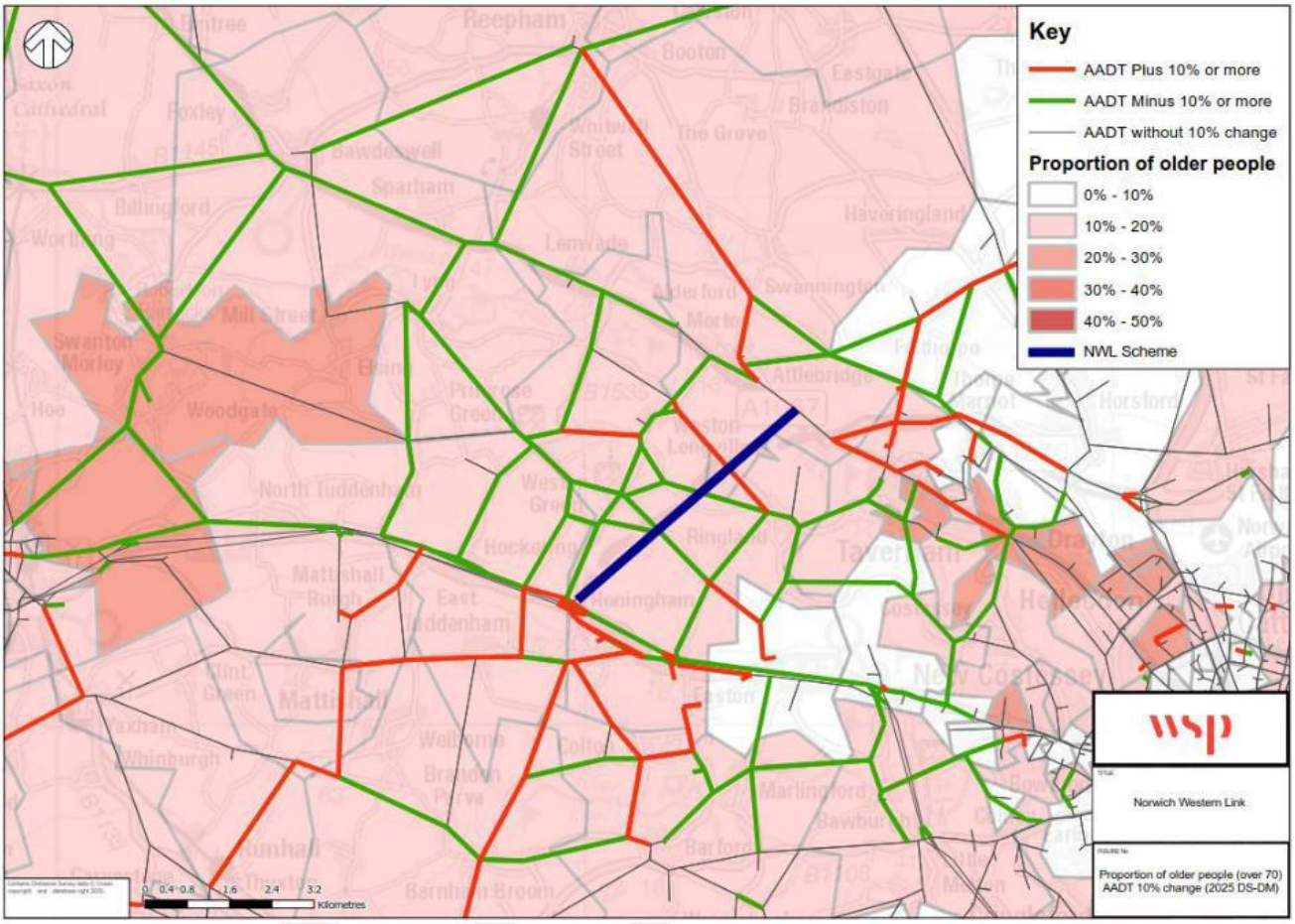

Figure 4-16 - Proportion of people over 70 (older) by LSOA and link flow change

4.6.11. Figure 4-16 shows that the area contains a higher proportion of older people in comparison to children and young adult proportions. Figure 4-16 demonstrates more variation in LSOAs, with proportions ranging from under 10% through to 40%, with the majority of the study area having LSOAs with 10% to 20%. With the national average being 10.9%, this demonstrates that the majority of the study area has LSOAs with a higher than average proportion of those over 70.

4.6.12. The majority of link flow changes in LSOAs with higher proportions of older people are where the links are forecast to have a >10% decrease in flows, particularly to the west of the NWL scheme. Therefore, the change is likely to be slightly beneficial for this particular social group.

Proportion of people with a disability

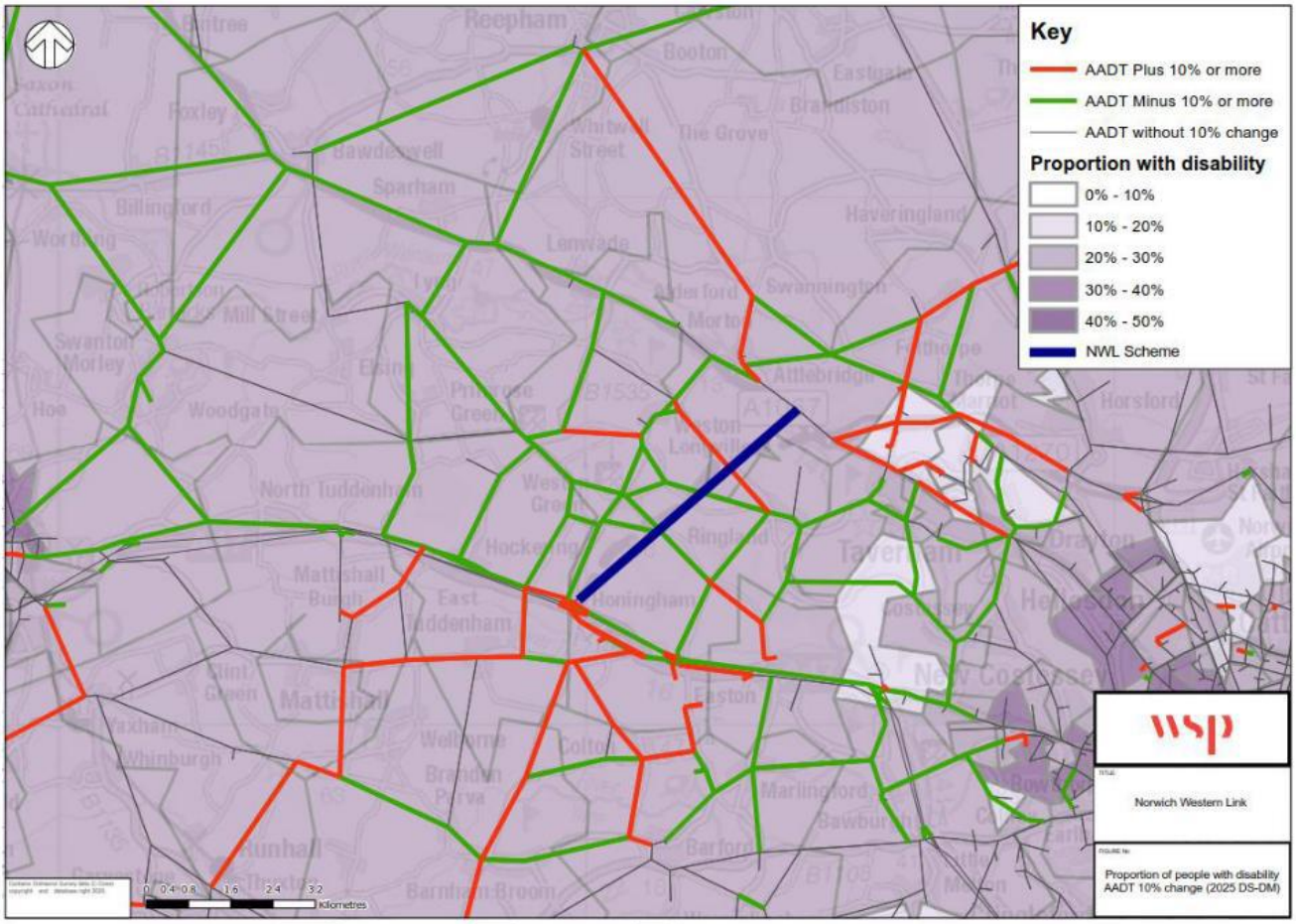

Figure 4-17 - Proportion of people with a disability by LSOA and link flow change

4.6.13. Figure 4-17 shows the area has a majority of LSOAs with the proportion of people with a disability in the 20% to 30% range, which is around the national average. There are some areas where the proportion of people with a disability is in the range 30% to 40%, these are located in the urban area of Norwich. There are also areas to the west of the scheme where the proportion is low, less than 10%, these are located on the outskirts of the urban area of Norwich.

4.6.14. Overall, in areas where link flow changes are present, they are not deemed to have had a significant effect on severance for this particular social group.

Proportion of people with BME origin

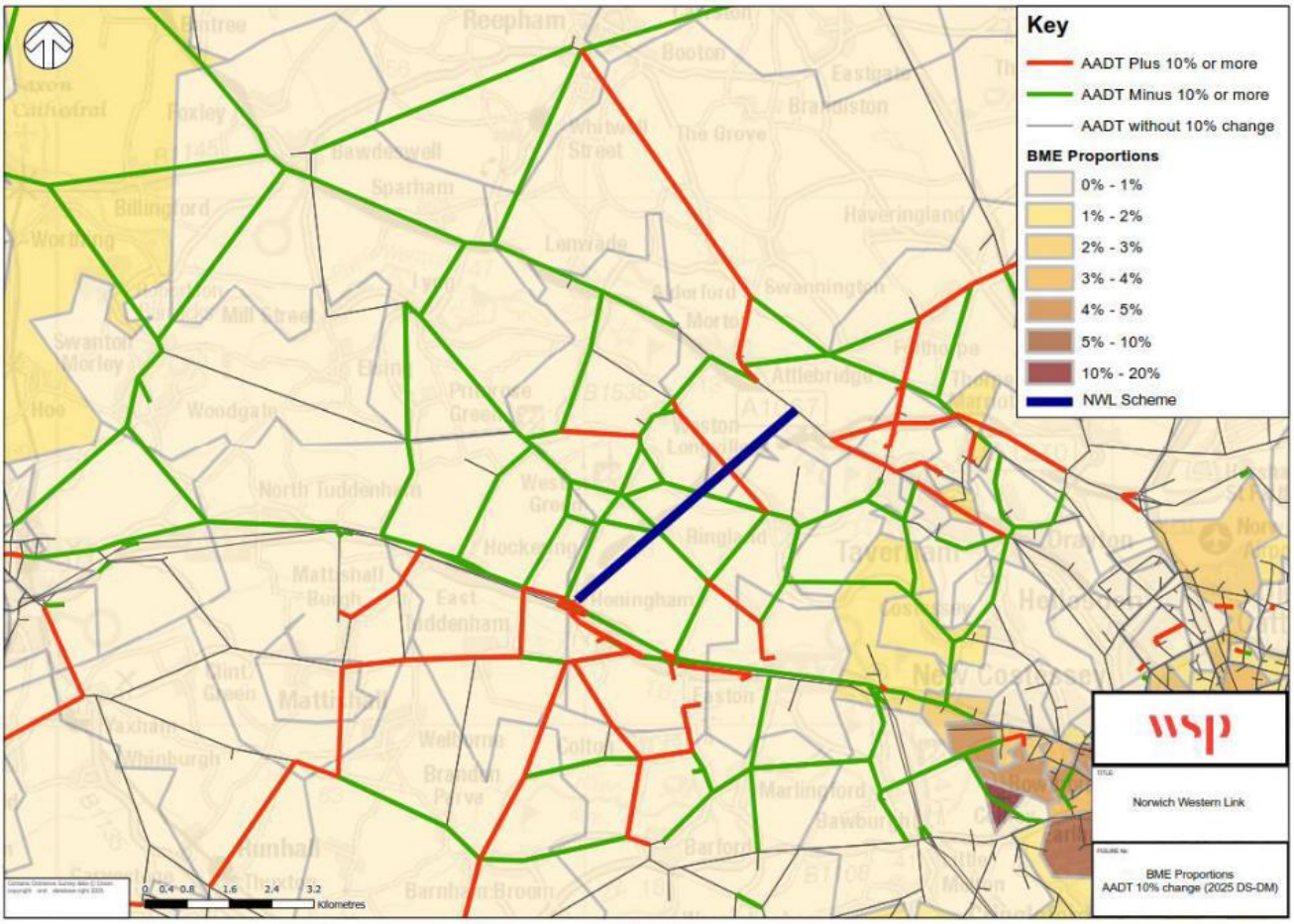

Figure 4-18 - Proportion of black and minority ethnic people by LSOA and link flow change

4.6.15. Figure 4-18 shows that the majority of LSOAs in the study area have a relatively low proportion of people with a black or minority ethnic origin compared to the national average. Norfolk as a whole also has low proportions of BME (3.5%). The majority of the study area has proportions of 2% or less, with Norwich containing LSOAs of mostly 5 to 10%, with some LSOAs with proportions up to 20%.

4.6.16. Overall, it is deemed the majority of affected roads are in areas with low proportions of BME, therefore they are not deemed to have a significant impact on severance for this particular social group.

Proportion of people without access to a car

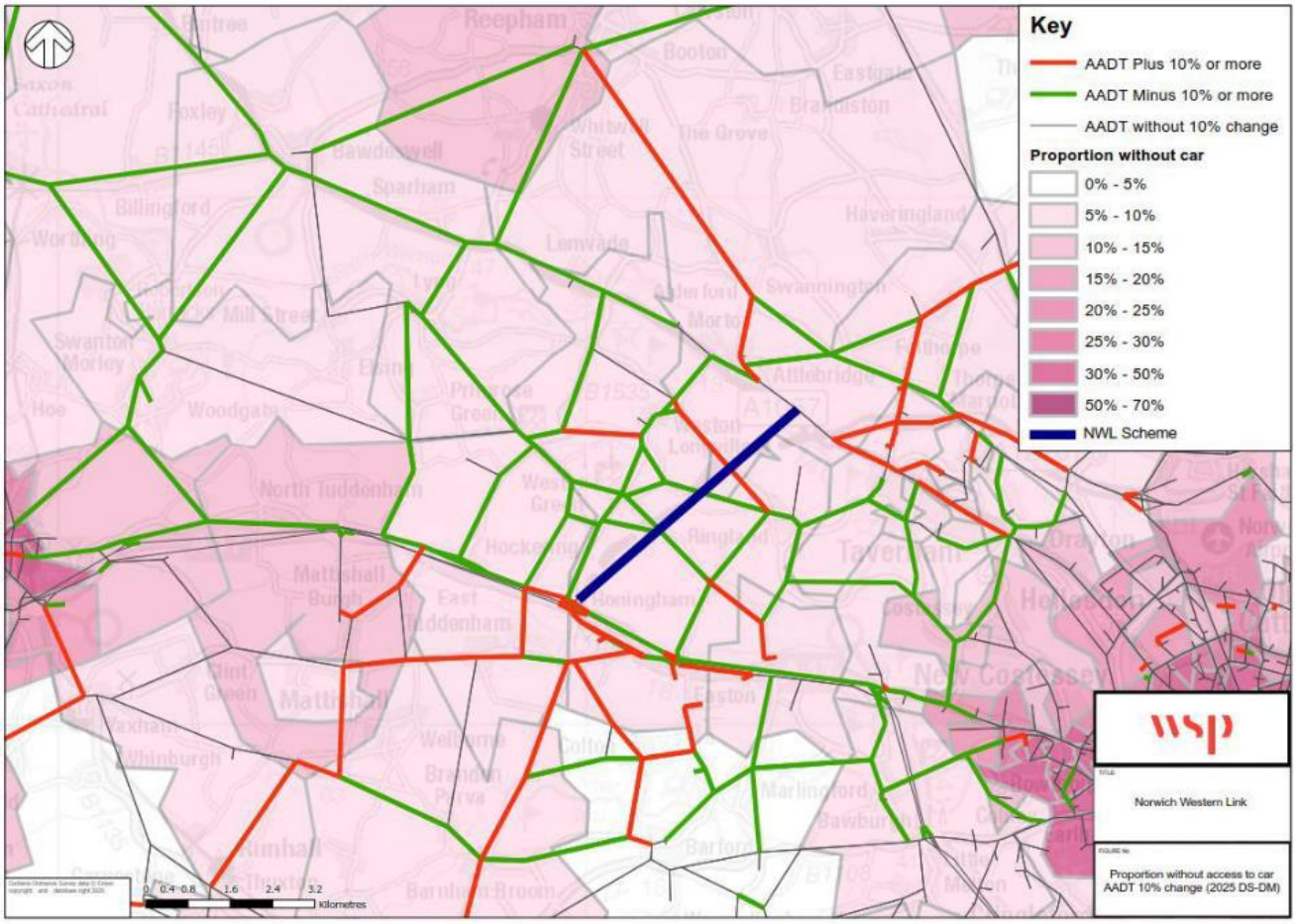

Figure 4-19 - Proportion of people with no car by LSOA and link flow change

4.6.17. Figure 4-19 shows that the study area has LSOAs which vary from under 5% in proportion to 70% when relating to the proportion of people without access to a car. Overall, the majority of the study area has proportions of 20% or less which do not have access to a car, which is lower than the national average of 25.6%.

4.6.18. Areas with a change in traffic flows of >10% care located in LSOAs with relatively low proportions of people without access to a car, the impacts are deemed neutral for this particular social group.

AMENITIES

4.6.19. As changes in severance were deemed neutral in the study area, there is deemed no adverse impact on specific amenities in the surrounding area. Amenities present consist of parks and open spaces, community centres, hospitals and schools.

4.7 AFFORDABILITY

4.7.1. The methodology used for the Distributional Impacts Assessment of Affordability follows DfT's TAG unit A4-2 guidance. The input data used for the assessment is based on the zone-to-zone correspondence outputs of TUBA for Fuel and Non-Fuel Vehicle Operating Costs. All trips that are classified as having a business purpose within the TUBA output are excluded from the subsequent analysis in accordance with the TAG guidance

4.7.2. The TUBA outputs are aggregated from Origin-Destination pairs to benefits/disbenefits per zone. The default methodology used is to allocate all benefits and disbenefits in the AM peak to the origin zone as the majority of trips will be outbound trips to work. The reverse then is used for the PM peak hour where the benefits and disbenefits are allocated to the destination zone. In the Inter-peak hour, the benefits and disbenefits are averaged and allocated to both the origin and destination zones. This process is repeated for all years of the analysis included within the TUBA output.

4.7.3. Income segmentation data is provided at a number of standardised geographies and therefore the zonal data within the TUBA outputs must be converted ('reaggregated') to align with one of these geographies so comparisons can be made. The chosen geographical scale was Lower Super Output Areas (LSOAs) as this was recommended by the TAG guidance as an appropriate scale of analysis and in addition is the lowest level geography that the income segregation data used is available at.

4.7.4. This methodology uses Index of Multiple Deprivation (IMD) (2019) Income Domain at LSOA geography as a proxy for income as it was produced more recently than the Census 2011 income data.

4.7.5. The process followed is:

- The benefits or disbenefits associated with each LSOA are allocated to the corresponding IMD Income Domain quintile;
- The benefits and disbenefits are summed for each quintile;
- The proportions of the total benefits and disbenefits are calculated for each quintile;
- The proportion of the local population that falls within each quintile is calculated;
- Each quintile is graded according to the grading system given in Table 8 of the guidance.

Table 4-5 – Affordability Distribution Analysis

	IMD Income Domains £m Most deprived areas ← →least deprived areas				
	Quintile1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Total Benefits	9.24	3.34	4.94	4.96	2.06
Share of User Benefits %	37.7	13.6	20.1	20.2	8.4
Share of Population in impact area %	12.3	12.8	26.6	31.3	17.0
Assessment	✓✓✓	✓✓✓	✓	✓	✓

4.7.6. The distribution of affordability related to vehicle operating costs across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintile 4 and 5) experience a smaller than expected proportion of benefits.

5 SUMMARY

5.1.1. The DI appraisal is summarised in the Appraisal Matrix shown in Table 5-1.

5.1.2. The AST entry is summarised in Table 5-2.

Table 5-1 - Distributional Impact Appraisal Matrix

	Distributional impact of income deprivation					Are the impacts distributed evenly?	Key impacts - Qualitative statements
	0-20%	20%-40%	40%-60%	60%-80%	80%-100%		
User Benefits	✓	✓	✓✓✓	✓✓✓	✓✓✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the least deprived income quintiles. Those in income quintile 4 (second least deprived income quintile) experience a higher than expected proportion of benefits whereas those in the most deprived areas (quintile 1 and to a lesser extent quintile 2) experience a smaller than expected proportion of benefits.
Noise			✓	××		No	Noise impacts are experienced by those in the middle income quintiles. Residents living in quintile 4 experience noise disbenefits while residents in quintile 3 experience noise benefits.
Air Quality	✓	✓	✓✓	✓✓	✓	No	Air quality impacts are experienced across all quintiles. Those in quintile 3 and 4 experience a higher proportion of air quality benefits than would be expected from an even distribution.
Affordability	✓✓✓	✓✓✓	✓	✓	✓	No	The distribution across the quintile areas is not even with the majority of impacts favouring those in the most deprived income quintiles. Those in income quintile 1 (most deprived income quintile) experience a higher than expected proportion of benefits whereas those in the least deprived areas (quintile 4 and 5) experience a smaller than expected proportion of benefits.
Accessibility						N/A	N/A

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Table 5-2 – AST Entry

Impact	Social Groups						User Groups				Qualitative statement
	Children & Young People	Older People	Carers	Women	Disabled	BME	Pedestrians	Cyclists	Motorcyclists	Young Male Drivers	
Noise	×										Children and young people experience noise disbenefits
Air Quality	✓										Children and young people experience air quality benefits
Accidents	✓	✓					✓	✓	✓	✓	All relevant social groups and user groups experience accident benefits
Security	-	-		-	-	-					N/A
Severance	✓	✓	✓		✓						All relevant social groups and user groups experience severance benefits
Accessibility	-	-	-	-	-	-					N/A

TAG Unit A4.2

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Norfolk County Council

NORWICH WESTERN LINK

Social Impact Appraisal

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FIGURES

1 INTRODUCTION

1.1 INTRODUCTION

1.1.1. This Social Impact Appraisal report has been developed as part of the Outline Business Case for the Norwich Western Link scheme (NWL) and has been prepared on behalf of Norfolk County Council (NCC) for consideration by the Department for Transport (DfT).

1.2 SCHEME LOCATION

1.2.1. The NWL is located to the east of Norwich and seeks to provide a link between the A47 in the south and the A1607 in the north. The scheme comprises:

- A dual carriageway road, including a viaduct over the River Wensum and associated floodplain;
- A tie-in to the junction with the A47;
- An "at grade" junction with the A1067;
- Dualling of a section of the existing A1067 between the proposed NWL roundabout and existing A1270 roundabout;
- A bridge carrying the NWL over Ringland Lane;
- New pedestrian crossing points, green bridges and bat underpasses where deemed to be required;
- Diversion and extension of existing Public Rights of Way and field paths to create a coherent joined up network; and
- Surface water drainage - principally infiltration basins, sediment forebays and associated carrier drains/ channels.

1.2.2. The scheme also includes landscaping, planting, ancillary works, environmental mitigation work and Biodiversity Net Gain measures and a wider network of cycle-friendly route options where traffic relief from the NWL enables improved cycle priority.

Figure 1-1 - Scheme Location

1.3 OVERVIEW OF SOCIAL IMPACT APPRAISAL APPROACH

1.3.1. Social impacts (SI) cover the human experience of the transport system and its impact on social factors, not considered as part of economic or environmental impacts. There are eight social impacts, namely:

- Accidents;
- Physical Activity;
- Security;
- Severance;
- Journey Quality;
- Option and Non-Use Values;
- Accessibility;
- Personal Affordability.

1.3.2. The appraisal has been undertaken in accordance with TAG Unit A4.1: Social Impact Appraisal. All impacts have been assessed qualitatively apart from Accidents and Physical Activity where the impact has been monetised.

1.4 STRUCTURE OF THIS REPORT

1.4.1. The structure of this report covers the assessment for each of the social impacts.

- Chapter 2 covers the assessment for Accidents;
- Chapter 3 covers the assessment for Physical Activity;
- Chapter 4 covers the Security assessment;
- Chapter 5 covers the Severance assessment;
- Chapter 6 covers the Journey Quality assessment;
- Chapter 7 covers the Option and Non-Use Values assessment;
- Chapter 8 covers the Accessibility assessment;
- Chapter 9 covers the Personal Affordability assessment; and
- Chapter 10 summarises the assessment.

2 ACCIDENTS

2.1.1. The appraisal is based on the principle that the implementation of a scheme, as well as any transport intervention, may alter the risk of individuals being killed or injured as a result of collisions.

2.1.2. The social impact derived from the collisions is therefore estimated by the difference in the number of collisions and casualties between the with-scheme and without-scheme scenarios over the appraisal period.

2.1.3. COBALT (COst and Benefit to Accidents – Light Touch) has been used to understand the likely impact of the scheme on accidents in the study area. The impacts on users and road safety (accidents) has been appraised for a period of 60 years from the first year of scheme opening.

2.1.4. The assessment is detailed in the Economic Appraisal Report.

3 PHYSICAL ACTIVITY

3.1.1. Physical activity is concerned with whether the intervention is likely to generate significant additional numbers of walking or cycling trips. The appraisal of physical activity reflects the health impacts based on estimating the change in premature death (mortality) resulting from a change in walking and cycling activity. An intervention which increases the number of active users is expected to reduce the relative risk of all-cause mortality.

3.1.2. The assessment has been undertaken in line with the following guidance:

- TAG Unit A5.1 Active Mode Appraisal
- TAG Unit A5.5 Highway Appraisal Appendix A: and
- Design Manual for Roads and Bridges (DMRB) LA 112.

3.1.3. The scheme itself is predominantly a highway scheme with some supporting sustainable transport measures. Therefore, the assessment has started with the determination of whether the scheme is likely to cause significant mode shift to/from active modes.

3.1.4. A Walking, Cycling and Horse-Riding Assessment and Review (WCHAR) has been undertaken as part of the scheme design process. This has been used to identify the routes used by pedestrians and others and the community facilities which are likely to be affected by the scheme. The WCHAR provides the design team with the relevant background information and identifies opportunities to facilitate the inclusion of all walking, cycling and horse-riding modes in the highway scheme design process.

3.1.5. The WCHAR sets out that the scale of the scheme has been judged to qualify as a large scheme for the purposes of its assessment, therefore the following information is presented in the WCHAR report:

- Review of walking, cycling and horse-riding policies / strategies;
- Collision data;
- Description of public transport facilities;
- Key trip generators and local amenities;
- Site visit;
- Consultation with key stakeholders;
- Description / review of existing walking, cycling and horse-riding network facilities at a local and county wide (strategic) level;
- Collation and analysis of walking, cycling and horse-riding user data; and
- Evidence of consultation with local user groups and the wider public.

3.1.6. The WCHAR identifies a study area of approximately 5km radius around the scheme for the purposes of its assessment. Furthermore, the report outlines the strategic objectives and outcomes for the NWL scheme and identifies those that are relevant to physical activity in red in Table 3-1.

Table 3-1 - Norwich Western Link Objectives and Outcomes relevant to physical activity (in red)

Strategic Objective	Strategic Outcomes
Improve connectivity and journey times on key routes in Greater Norwich	i) Improved journey times and journey time reliability, on routes through the area west of Norwich ii) Reduced congestion and delay through the area west of Norwich iii) Reassignment of traffic away from existing routes reducing delay and congestion iv) Improved existing accessibility v) Reduced emergency response times vi) Improved network resilience vii) A more-suitable direct route for HGV/LGV vehicles viii) Reduced trips on local minor roads for vehicular traffic
Reduce the impacts of traffic on people and places within the western area of Greater Norwich	i) Reassignment of trips onto appropriate routes ii) Reduced noise impacts in built-up areas iii) Improved Non-Motorised User connectivity iv) Improved air quality in built-up areas v) Minimised traffic impacts on local residents during construction in the vicinity of the scheme
Encourage and support walking, cycling and public transport use.	i) Increased number of trips taken by walking, cycling and public transport ii) Increased access to public transport, walking and cycling facilities
Improve safety on and near the road network, especially for pedestrians and cyclists	i) Reduced overall network accident rate ii) Reduce the number of people killed or seriously injured on roads in the area west of Norwich iii) Minimise highway safety impacts and severance during construction
Protect the natural and built environment, including the integrity of the River Wensum SAC	i) Biodiversity Net Gain ii) Minimised impact on landscape iii) Minimised impact on heritage iv) Not affect the integrity of the River Wensum SAC v) Minimise impact of the scheme on climate change vi) Minimise adverse environmental impacts arising from construction
To improve accessibility to key sites in Greater Norwich	i) Improved accessibility to Norwich International Airport, Norfolk & Norwich University Hospital and key employment and education sites i) Improved accessibility to green areas ii) Improved access to the cycle and Public Rights of Way network

3.1.7. The WCHAR report sets out that the study area is located in the rural areas to the west of Norwich city centre, where there are a number of Public Rights of Way (PROWs) available for use. The proposed route alignment of the NWL and that of the preferred route for the North Tuddenham to Easton dualling scheme will sever some of the existing PROWs and Green Lanes:

- Honingham RB1 – The restricted byway will be severed twice, once by the NWL and again by the North Tuddenham to Easton dualling;
- Blackbreck Lane (Ringland Lane to Weston Road), Green Lane – The unsurfaced highway maintained by Norfolk County Council will be severed;
- Ringland FP1 – Will be severed near Attlebridge Hall;
- Hockering FP7 – The footpath will be severed by the North Tuddenham to Easton dualling project; and
- Dog Lane / Ringland Lane – A current pedestrian crossing on the A47 Southern Bypass will be impacted by the new dualling project.

3.1.8. The WCHAR also outlined that the study area encompasses a number of cycling routes and facilities, including those of the Norfolk Trails. There are a number of local cycling groups that will be impacted by the proposed route alignment of the NWL, who have been consulted.

3.1.9. The WCHAR undertook various walking and cycling isochrones to show the walking and cycling accessibility from different origins, key settlements, within the study area. The report sets out that walking can cover a wide area and that key settlements within the study area have strong cycling connectivity. The report summarises that the delivery of the NWL can enhance the level of pedestrian use and cycling connectivity.

3.1.10. The WCHAR identified that a number of equestrian facilities are located within the western part of the study area. The NWL programme could assist with supporting longer distance leisure trips by equestrians; this would consist of giving priority to equestrians / cyclists on quieter existing roads where parallel routes exist and looking at minor highway interventions to keep traffic speeds sufficiently low.

3.1.11. As part of the WCHAR, a nine-day Non-Motorised Users survey was undertaken in October 2019 which recorded the level of usage on the seven routes that will be severed by the NWL. The results were analysed in the WCHAR and summarised in Table 3-2.

Table 3-2 - NMU Survey Results

Route	Pedal cycle	Equestrian	Motorcycle	Car	LGV, OGV & PSV	Pedestrians – lone adult	Pedestrian – adult with dog (s)	Pedestrian – adult with child	Wheelchair / mobility scooter
Honingham RB1									
The Broadway	0	0	0	13	6	1	1	0	0
Breck Road	5	0	0	66	13	3	0	0	0
Weston Road	7	3	1	60	17	4	1	0	0
Blackbreck Lane	0	1	0	0	0	0	1	0	0
Ringland Lane	32	0	2	260	63	2	0	0	0
Ringland FP1									

Note: Honingham RB1 and Ringland FP1 have not been included, as further survey data is needed at a later date

3.1.12. The WCHAR suggested a number of user opportunities which should be considered further during the design stage, these included general, pedestrian, cyclist, equestrian and strategic opportunities. These 33 opportunities are summarised in Figure 3-1.

3.1.13. Following the WCHAR, a Sustainable Transport Strategy (STS) was also developed. The STS is an overarching document that provides a high-level framework for mitigating the transport effects of the scheme. The STS has been developed alongside the main NWL design proposals and presents a range of measures beyond the immediate vicinity of the NWL at a more strategic level to support sustainable travel objectives of the scheme.

3.1.14. The STS outlines that a Non-Motorised User (NMU) Strategy has been developed, focussing on considering the localised issues of severance of existing PROWs arising from the construction of the NWL, aiming to offer a range of solutions to mitigate the impact on pedestrians, cyclists and pedestrians. In order to mitigate severance and loss of PROWs and footpaths/cyclepaths, the NMU Strategy proposes new, retained and enhanced PROWs, footpaths and pedestrian/cycle links.

3.1.15. In order to seek guidance on additional sustainable transport measures to prioritise for packaging with the NWL scheme, a Local Access Consultation was held in summer 2020. This included eight options for wider sustainable transport improvements that could additionally be included within the scheme to improve conditions for walking and cycling to the West of Norwich. The intention of the proposals would be to offer increased opportunities for healthy and sustainable travel by non-car modes on trips within shorter distance bands.

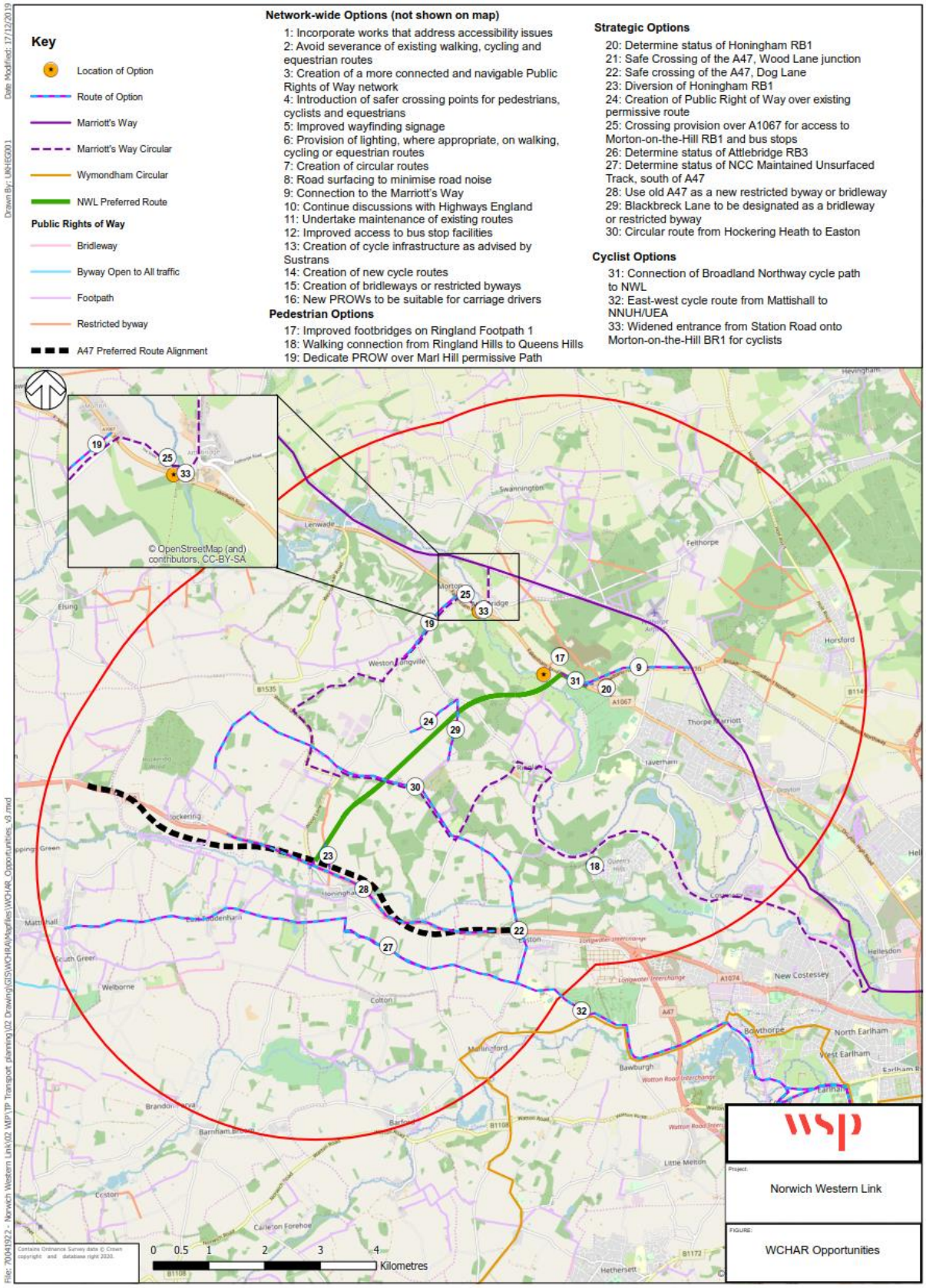


Figure 3-1 - WCHAR Opportunities

3.1.16. A multi-criteria appraisal was used to identify the best performing options for shortlisting. The textual comments from public consultation that were received in response to the July 2020 Local Access Consultation also support this and helped guide the selection of shortlisted options. Four Options were shortlisted:

- Option 3 - new pedestrian and cycle crossing of Drayton High Road to improve connectivity with the Marriott's Way;
- Option 4 - Create a cycle friendly on-road link towards central Norwich from Attlebridge and Weston Longville via Ringland and Taverham;
- Option 5 - Create a cycle friendly on-road link from Ringland to Easton; and
- Option 7E – Create a cycle friendly on-road link from Easton to the Norfolk and Norwich University Hospital and University of East Anglia.

3.1.17. The TAG Active Mode Appraisal Toolkit (AMAT) worksheet was used to assess the impact of each option apart from Option 3, a new crossing which is an intervention not covered in the AMAT. The worksheets are attached at Appendix B. The Impacts for each of the options are set out in Table 3-3.

Table 3-3 – AMAT Impacts

Impacts £000's	Option 4	Option 5	Option 7E	Total
Mode Shift	23.35	16.76	45.04	85.15
Health	1,858.72	1,333.98	3,584.67	6,777.37
Journey Quality	552.60	396.68	1,066.81	2,016.09
Indirect Taxation	-6.47	-4.64	-12.48	-23.59
PVB	2,434.18	1,747.06	4,695.57	8,876.81
Reduction in Infrastructure Maintenance	0.49	0.35	0.95	1.79

3.1.18. The implementation of the NWL will result in a benefit to physical activity, due to the wider complementary measures of the STS.

4 SECURITY

4.1.1. Transport interventions may affect the level of security (freedom from crime) for road users, public transport passengers and freight (all modes).

4.1.2. The impact of security for road users has been assessed using the security indicator list from Table 4.1 of TAG unit A4.1 and the Security Impacts Worksheet has been completed.

4.1.3. Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial. This is due to the provision of lighting and illuminated signs on the new link, and the reduction in junctions and stop start traffic. Based on the modelling over 20,000 vehicles are estimated to use the new link on a daily basis, these vehicles have rerouted from existing routes within the road network where they would have been more likely to be traveling at slower speeds due to congestion or approaching junctions.

4.1.4. The worksheet is attached at Appendix C.

5 SEVERANCE

5.1.1. TAG defines community severance as the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows. Severance will only be an issue where either vehicle flows are significant enough to significantly impede pedestrian movement or where infrastructure presents a physical barrier to movement. Severance primarily concerns those using non-motorised modes, particularly pedestrians.

5.1.2. Severance may be classified according to the following broad levels:

- **None** – Little or no hindrance to pedestrian movement.
- **Slight** – All people wishing to make pedestrian movements will be able to do so, but there will probably be some hindrance to movement.
- **Moderate** – Pedestrian journeys will be longer or less attractive; some people are likely to be dissuaded from making some journeys on foot.
- **Severe** – People are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity or to a permanent loss of access to certain facilities for a particular community. Those who do make journeys on foot will experience considerable hindrance.

5.1.3. The scheme will sever existing Public Rights of Way along the new road corridor. Where routes are severed new crossing facilities will be provided, which should mitigate the impact of the new road.

5.1.4. Severance has been assessed at a number of locations across the study area. Some locations will experience reductions in severance, while others will experience increases, this provides a wider picture of the impact of the scheme on severance within the study area. The assessment has been undertaken in line with TAG Unit A4.1 section 5 and DMRB LA 112. It covers new severance due to the new link and relief from severance on the existing rural roads due to the reduction in flow.

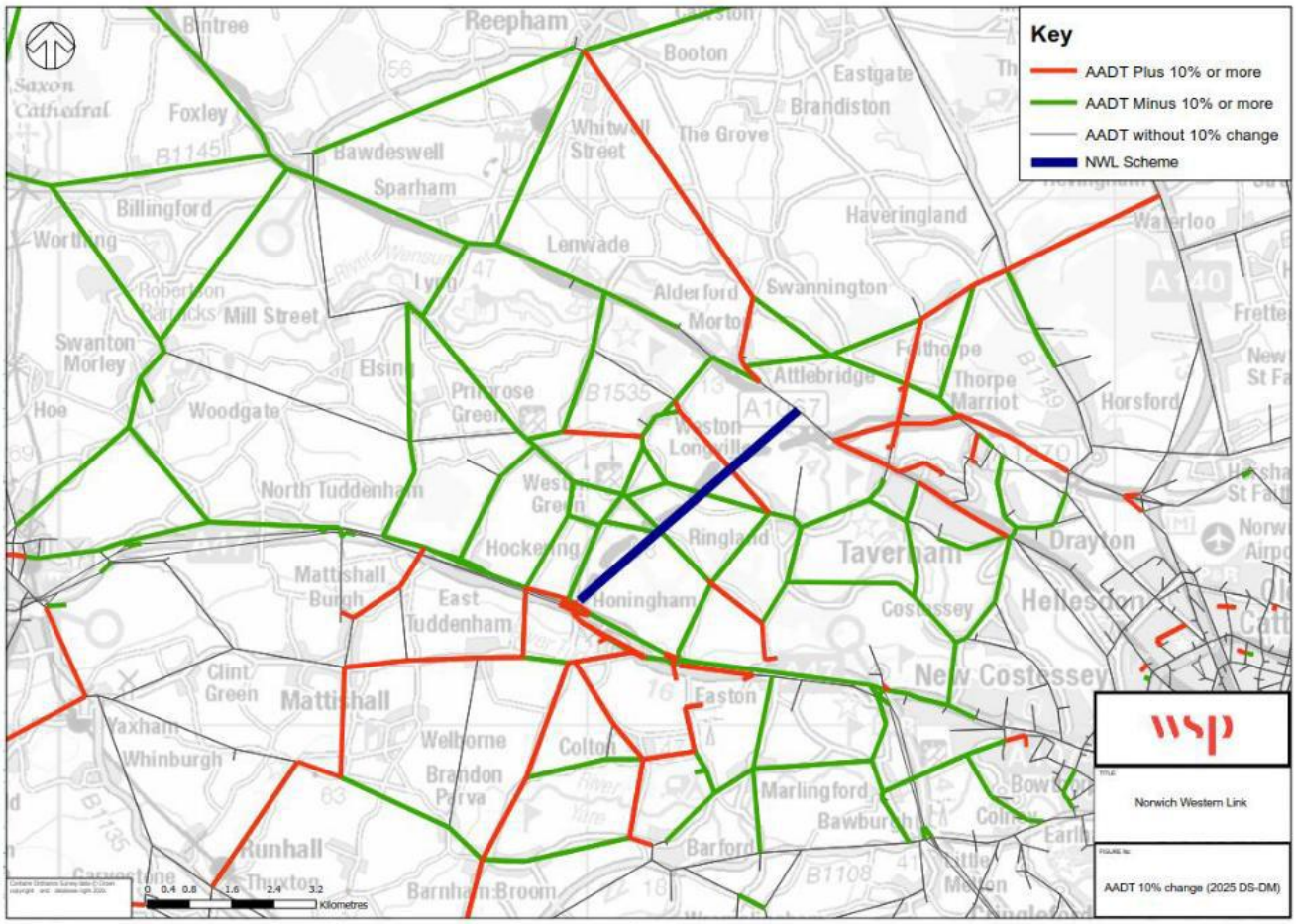
5.1.5. A Severance Impacts Worksheet has been completed and is attached in Appendix D.

5.1.6. As aforementioned, a Walking, Cycling and Horse-Riding Assessment and Review (WCHAR) has been undertaken as part of the scheme design process. This has been used to identify the routes used by pedestrians, cyclists and equestrians. The WCHAR provides the design team with the relevant background information and identifies opportunities to facilitate the inclusion of all walking, cycling and horse-riding modes in the highway scheme design process and mitigation measures.

5.1.7. The WCHAR recommended solutions with due regard for the needs of pedestrians, cyclists and equestrians, alongside any new opportunities identified as a result of developing the scheme design. This will support measures to provide for a neutral to beneficial impact for users of the local area around the scheme.

5.1.8. In regard to vehicle flow changes from the NWL scheme, Figure 5-1 demonstrates a comparison of Average Annual Daily Traffic (AADT) between the 2025 do something scenario and 2025 do minimum scenario. Changes in flows of >10% are presented, with green links demonstrating a reduction in flows by >10% and red links showing an increase in flows by >10%. Any links that do not have changes in flows by >10% are identified as black links.

Figure 5-1 - Change in AADT flows (comparison between do something and do minimum)



5.1.9. As shown in Figure 5-1, there are more links forecast to experience decreases in flow rather than increases in flow in the study area; thus, showing a beneficial impact of the scheme on traffic flow, therefore the change in vehicle flows are not anticipated to negatively impact pedestrian movement.

5.1.10. Overall, it is deemed that the scheme is likely to have a slight beneficial impact on severance.

6 JOURNEY QUALITY

6.1.1. Journey quality is a measure of physical and social environment (real and perceived) experienced when travelling. This considers traveller care, traveller views and traveller stress. Traveller care considers the impacts associated with cleanliness, facilities, information and environment. Travellers' views consider anything that may block the view and traveller stress considers the impacts associated with frustration, fear of potential accidents, and route uncertainty.

6.1.2. A qualitative approach has been undertaken as the intervention does not aim to directly influence quality factors. The assessment has been made comparing the without scheme and the with scheme cases for the sub-factors as listed in Table 6.1 of TAG unit A4.1.

6.2 TRAVELLER CARE

6.2.1. The description of the sub-factors as set out in Table 6.1 are more relatable to public transport schemes than highway schemes. Therefore, some adjustments have been made in considering the impacts.

6.2.2. For cleanliness the assessment has considered external cleanliness and the presence of graffiti. It is considered that the new link would have reduced levels of litter and graffiti than those currently experienced on the urban roads and the sub impact has been classed as moderate beneficial. Although the new link at opening year is expected to have over 20,000 vehicles a day using it, the majority of traffic is expected to transfer from the local rural roads where the levels of litter and graffiti are less than in the urban area.

6.2.3. No new facilities apart from the new link itself are being delivered, therefore the impact is neutral on the facilities sub-factor.

6.2.4. New signs will be provided as part of the new link, these will be illuminated making them visible at night, this is likely to be an improvement over the existing signage on the rural routes, therefore the information sub-factor has been assessed as moderate beneficial.

6.2.5. The new link is likely to be an improvement over the existing routes as there is unlikely to be potholes or other changes in level in the short to medium term. Therefore, the environment sub-factor has been classed as moderate beneficial.

6.2.6. Overall the traveller care impacts have been assessed as moderate beneficial.

6.3 TRAVELLER VIEWS

6.3.1. The travellers' views assessment has been undertaken for the vehicle occupants only as the impacts associated with walkers and cyclists are covered in the AMAT assessment. The assessment is qualitative and considers anything which may block views of the surrounding countryside or townscape.

6.3.2. The impact of the scheme on travellers' views is classed as neutral to beneficial as traffic is transferring off rural roads and the outer ring road to the new route. The difference in views will not be significant for those transferring from the rural routes while those transferring from the urban outer ring road will have an improved view.

6.4 TRAVELLER STRESS

6.4.1. The traveller stress assessment has been undertaken qualitatively and considers:

- Frustration;
- Fear of potential accidents; and
- Route uncertainties.

6.4.2. Frustration considers the road layout (including geometry), the condition of the road network and the ability to make good progress along a route. The existing rural routes are narrow in places with tight bends and junctions, while the outer ring road suffers from congestion and delay, both of these aspects are likely to cause frustration with road users. The new link will be built to current design standards and as such the road layout and condition of the road network will be better than the existing rural routes. Progress along a route which incorporates the new link will also be better than using the outer ring road as there will be less congestion and delay. Therefore, the impact for frustration is beneficial.

6.4.3. Fear of potential accidents considers numerous aspects including inadequate lighting, road/lane width, lane markings, and hard shoulders. The existing rural roads used currently used for north-south movements across the NWQ are narrow, mostly unlit, with limited lane markings. The NWL will provide an improved road layout and as such the impact for fear of potential accidents will be beneficial.

6.4.4. Route uncertainty covers provision of network maps and in vehicle route signs. There is adequate signage along the outer ring road, however the rural routes are not intended for long distance journeys and as such the signage that exists directs travellers to local locations. The NWL will include signage for through traffic and as such will provide better information than the rural routes do. Therefore, the impact on route uncertainty will be beneficial.

6.4.5. The overall impact for traveller stress is large beneficial as the number of affected travellers is over 10,000.

6.5 JOURNEY QUALITY SUMMARY

6.5.1. Journey Quality has been assessed for traveller care, traveller views and traveller stress. Traveller care considers the impacts associated with cleanliness, facilities, information and environment. Travellers' views consider anything that may block the view and traveller stress considers the impacts associated with frustration, fear of potential accidents, and route uncertainty.

6.5.2. A qualitative approach has been undertaken as the intervention does not aim to directly influence quality factors. The assessment has been made comparing the without scheme and the with scheme cases for the sub-factors as listed in Table 6.1 of TAG unit A4.1.

6.5.3. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial.

6.5.4. Considering all aspects of journey quality and the analysis undertaken the overall Journey Quality impacts are assessed as moderate beneficial.

7 OPTION AND NON-USE VALUES

7.1.1. The appraisal of impact on option and non-user values is only likely to be of importance where an intervention will substantially change the availability of transport services within a study area.

7.1.2. Currently the scheme will not result in the provision of new public transport services. Therefore, the option values impact is assumed as neutral.

8 ACCESSIBILITY

8.1.1. The appraisal of accessibility focuses on the public transport accessibility aspect of accessing employment, services and social networks. The scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system, although there may be complementary public transport measures considered separately to the NWL at a later time.

8.1.2. The accessibility impact is assumed as neutral.

9 PERSONAL AFFORDABILITY

9.1.1. The analysis of personal affordability is concerned with changes in the monetary costs of travel. The monetary costs of travel can, in some cases, be a major barrier to mobility for certain groups of people, and increases in travel costs can have particularly acute effects on their ability to access key destinations.

9.1.2. The scheme has not been designed to address the affordability of the transport system, there will be no change in fares/travel costs in users apart from those already identified through TUBA via Car Fuel and Non-Fuel operating costs. The affordability impact is assumed as neutral.

10 SUMMARY

10.1.1. This Social Impact Appraisal report has been developed as part of the Outline Business Case for the Norwich Western Link scheme and has been prepared on behalf of Norfolk County Council for consideration by the Department for Transport. The NWL is located to the east of Norwich and seeks to provide a link between the A47 in the south and the A1067 in the north.

10.1.2. The appraisal has been undertaken in accordance with TAG Unit A4.1: Social Impact Appraisal. All impacts have been assessed qualitatively apart from Accidents and Physical Activity where the impact has been monetised.

10.1.3. The impact on accidents has been assessed with COBALT. The results indicate that the scheme will result in a reduction of 515 accidents over the 60-year appraisal period, leading to a reduction of 655 casualties (2 Fatal, 54 Serious and 599 Slight) and a cost saving of £18 million.

10.1.4. The impact on Physical Activity has been assessed with DfT's AMAT. The NWL is forecast to have a beneficial impact of £8.9 million.

10.1.5. The impact on Security has been assessed using the security indicator list from Table 4.1 of TAG unit A4.1 and the Security Impacts Worksheet has been completed. Based on the assessment undertaken, the security impacts have been assessed as moderate/large beneficial.

10.1.6. The impact on Severance has been assessed undertaken in line with TAG Unit A4.1 section 5 and DMRB LA 112. The assessment covers new severance due to the new link and relief from severance on the existing rural roads due to the reduction in flow. Overall, it is deemed that the scheme is likely to have a slight beneficial impact on severance.

10.1.7. The impact on Journey Quality has been assessed considering traveller care, traveller views and traveller stress. A qualitative approach has been undertaken as the intervention does not aim to directly influence quality factors. The assessment has been made comparing the without scheme and the with scheme cases for the sub-factors as listed in Table 6.1 of TAG unit A4.1.

10.1.8. Traveller care impacts have been assessed as moderately beneficial. Traveller views impacts have been assessed as neutral to beneficial, and traveller stress impacts have been assessed as large beneficial. Considering all aspects of journey quality and the analysis undertaken the overall Journey Quality impacts are assessed as moderate beneficial.

10.1.9. The impact on Option and Non-Use Values has been assessed as neutral as the scheme will not substantially change the availability of transport services within the study area.

10.1.10. The impact on Accessibility is neutral as the scheme has not been designed to address accessibility, there is no change in the routes served by the public transport system.

10.1.11. The impact on Personal Affordability is neutral as the scheme has not been designed to address the affordability of the transport system.

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