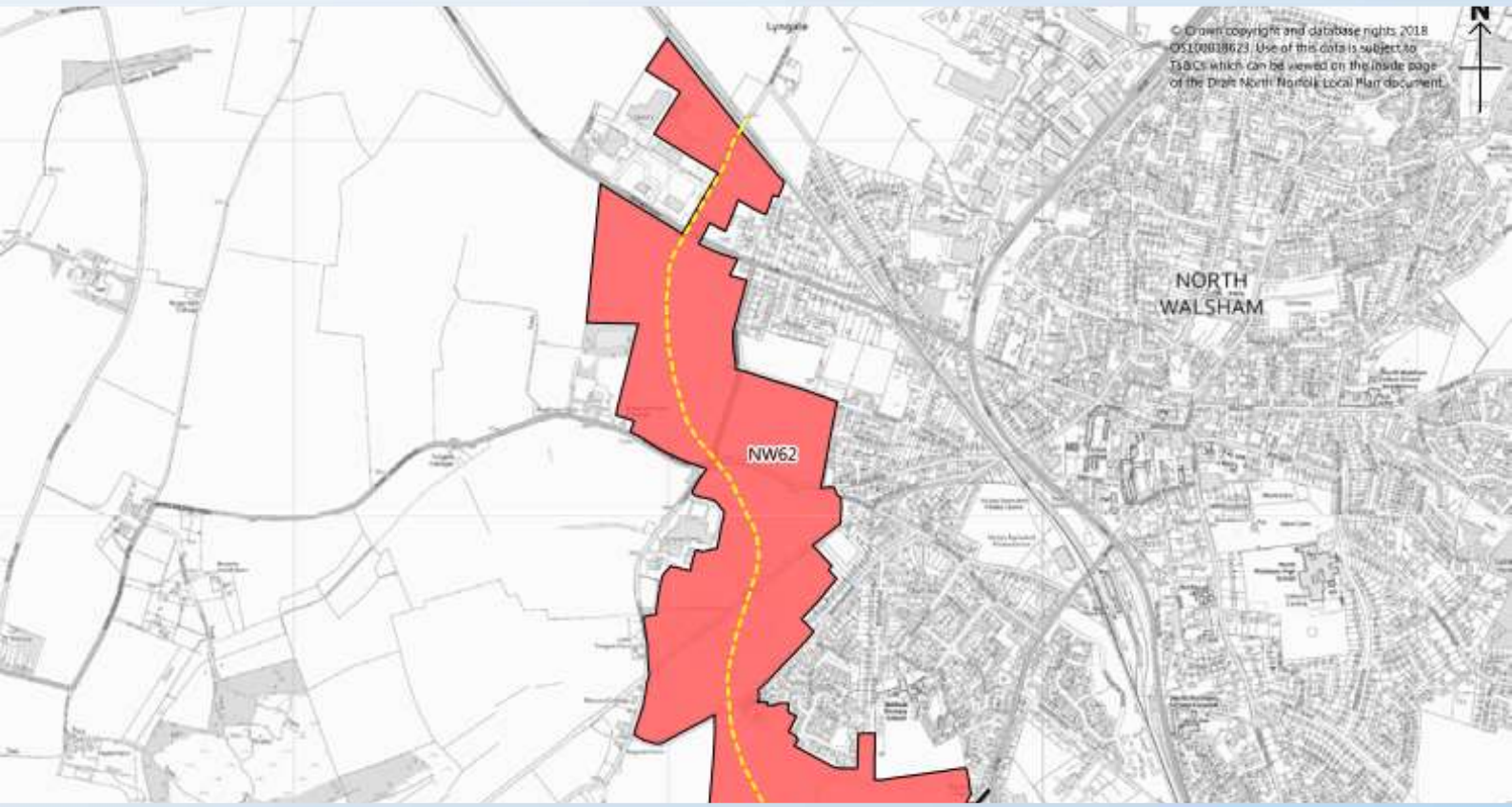
Norfolk County Council

NORTH WALSHAM LINK ROAD

Feasibility Study



001
NOVEMBER 2020

CONFIDENTIAL

REPORT (002) CONFIDENTIAL

PROJECT NO. 70063212

OUR REF. NO. 001

DATE: NOVEMBER 2020

WSP

County Hall
Martineau Lane
Norwich
NR1 2DH

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	First Draft	Second Draft	With RAG score	
Date	17/09/2020	02/11/2020	18/11/20	
Prepared by	UKCLG003 UKCMS004	UKCLG003	UKCLG003	
Signature				
Checked by	UKIXG600 UKADG002	UKIXG600	UKIXG600	
Signature				
Authorised by	UKBXS601 UKLXM005	UKBXS601	UKBXS601	
Signature				
Project number	70063212			
Report number	001			
File reference	70063212-001 – North Walsham Link Road V1.0	70063212-001 – North Walsham Link Road V2.0	70063212-001 – North Walsham Link Road V3.0	

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EXECUTIVE SUMMARY

INTRODUCTION

North Norfolk District Council (NNDC) is preparing a new Local Plan which will guide development decisions across the district up to 2036. It identifies land for development which will be needed over the 20-year plan period in order to meet the housing, employment and other needs of the area and includes policies which NNDC will use to determine planning applications.

Two sites for mixed-use development have been identified within North Walsham which, if allocated, would be suitable for approximately 2,150 new dwellings and various other land uses. Additionally, a site for employment has been identified at Cornish Way. When added to potential small-scale developments within the town, approximately 23% of all housing growth within the District is to be located in North Walsham, which by the end of the Plan period would see the population of the town increase by approximately 5,000 people.

Norfolk County Council (NCC), as the Local Highway Authority (LHA), require a high-level understanding of the impact of the possible allocated growth in North Walsham on the local highway network. For this reason, NCC has commissioned WSP to carry out a high-level traffic assessment of the growth allocated in the emerging Local Plan of NNDC in North Walsham.

Additionally, this study includes a high-level feasibility study of delivering a Western Link Road (WLR), which is also to be included within the emerging Local Plan. Possible northern and southern extensions of the WLR have also been investigated, to determine whether this could bring additional benefits to the highway network and its users.

LOCAL PLAN GROWTH IMPACT

At the time of executing this study, it was not possible to carry out traffic surveys due to the reduced traffic movements caused by the Covid-19 pandemic. However, an alternative methodology (agreed with NCC and NNDC), sufficient to produce a high-level estimate of the traffic impact of the allocated growth, the WLR and its possible extensions, was developed to carry out the impact assessment.

If the sites that are to be allocated, supporting 2,150 dwellings and 12.1ha of employment land, are to be built out, these are expected to generate 1,618 (708 arrivals and 910 departures) additional trips in the morning peak and 1,114 (677 arrivals and 437 departures) additional trips in the evening peak. These additional trips are expected to cause the following impacts:

- traffic increase on the main junctions of the town, including the A149 junctions;
- traffic increase, especially of HGVs, on Aylsham Road and Station Road; and
- traffic increase on the railway crossings.

A Red-Amber-Green ("RAG") score has been given to the traffic impacts found in the high-level traffic impact assessment. These impacts are shown in Figure 1.

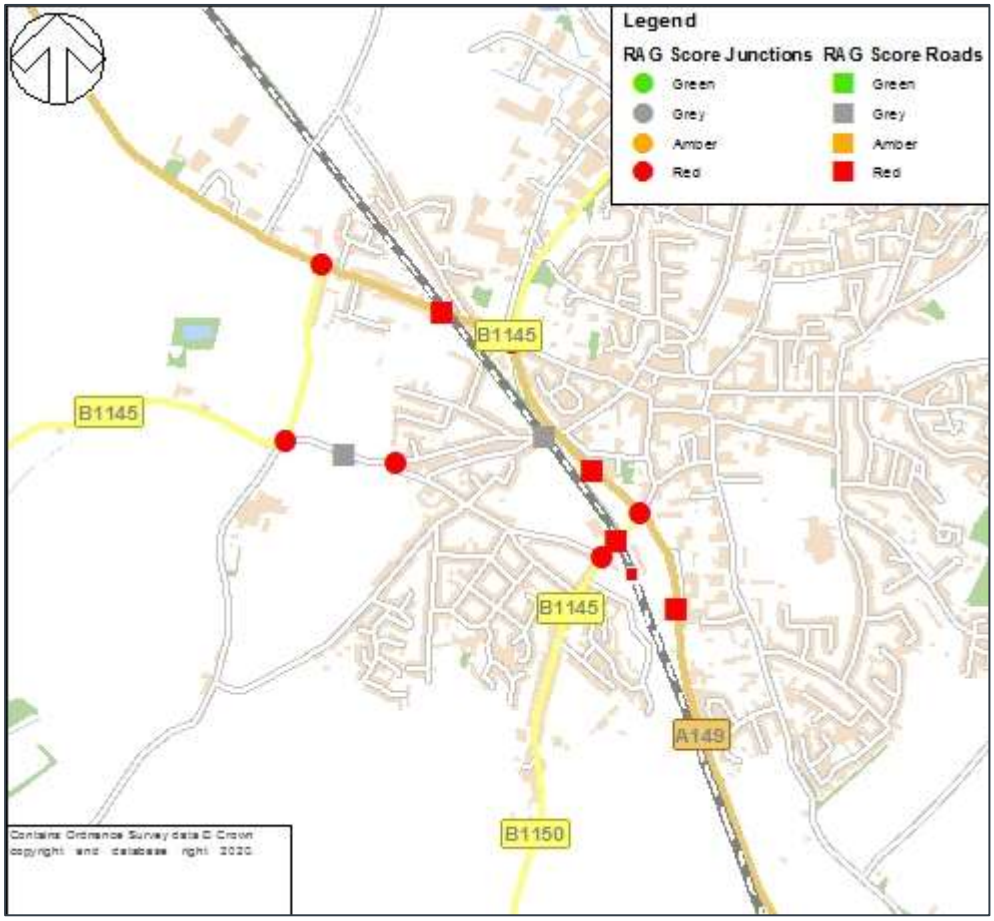

Figure 1 - RAG Score - Local Plan Growth

The high-level traffic impact assessment concluded that the impact of these additional trips would cause an adverse impact on the highway network; therefore, in order to support the planned growth a WLR will be required to mitigate the traffic impacts.

WESTERN LINK ROAD FEASIBILITY

REQUIREMENT

The high-level traffic impact has identified the need for a WLR to facilitate and support the proposed growth sites in North Walsham. To the west of the town, Site NW62, is forecast to deliver up to 1,800 new dwellings and 7ha of employment land and is likely to require the construction of a WLR. There are also opportunities to provide extensions to a WLR to ease the HGV movement restrictions and to serve other growth sites:

- Northern Extension: serving Site E10 (up to 5.11ha of employment land); and
- Southern Extension: serving Site NW01/B (up to 350 dwellings and 2 ha of employment land).

Furthermore, the WLR and the possible extensions, will mitigate existing routing problems for HGVs in North Walsham caused by numerous low bridges.

Overall, the allocated growth and delivery of a WLR should help with safeguarding jobs, promoting economic growth and building homes to address current housing shortages, whilst also improving resilience of local areas to support themselves at the same time as increasing accessibility by more sustainable and active travel modes.

DELIVERABILITY

Alternative road alignments and junction types for the WLR (and its possible northern and southern extensions) have been developed to a preliminary level. This has enabled a high-level feasibility study for delivering an acceptable highways scheme to be undertaken.

The high-level feasibility study concludes that, subject to land availability and finance, there are no technical issues (arisen from work undertaken so far) in delivering an acceptable scheme. It is however noted that more detailed highway design, drainage and environmental assessment work will be required.

TRAFFIC IMPACT

The WLR is expected to result in shorter trips between Cromer Road, Aylsham Road and Norwich Road, reduce general traffic (and HGV movements) around the residential areas (Station Road), reduce traffic within the town centre (Park Lane) and reduce some traffic routing through the A149 / Norwich Road and A149 / Cromer Road junctions. However, the WLR is not expected to mitigate all traffic impacts generated by the planned growth identified in the emerging Local Plan, and there could still be traffic impacts on the A149 Bypass; A149 / Norwich Road junction; A149 / Cromer Road junction and HGVs on Aylsham Road and Station Road.

The WLR is expected to carry approximately 360 vehicles in the AM and 300 in the PM on the section between Norwich Road and Aylsham Road. On the section between Aylsham Road and Cromer Road it is expected to carry 700 vehicles approximately in the AM and 680 in the PM. The worst case between AM and PM of the expected traffic impacts is shown in Figure 2.

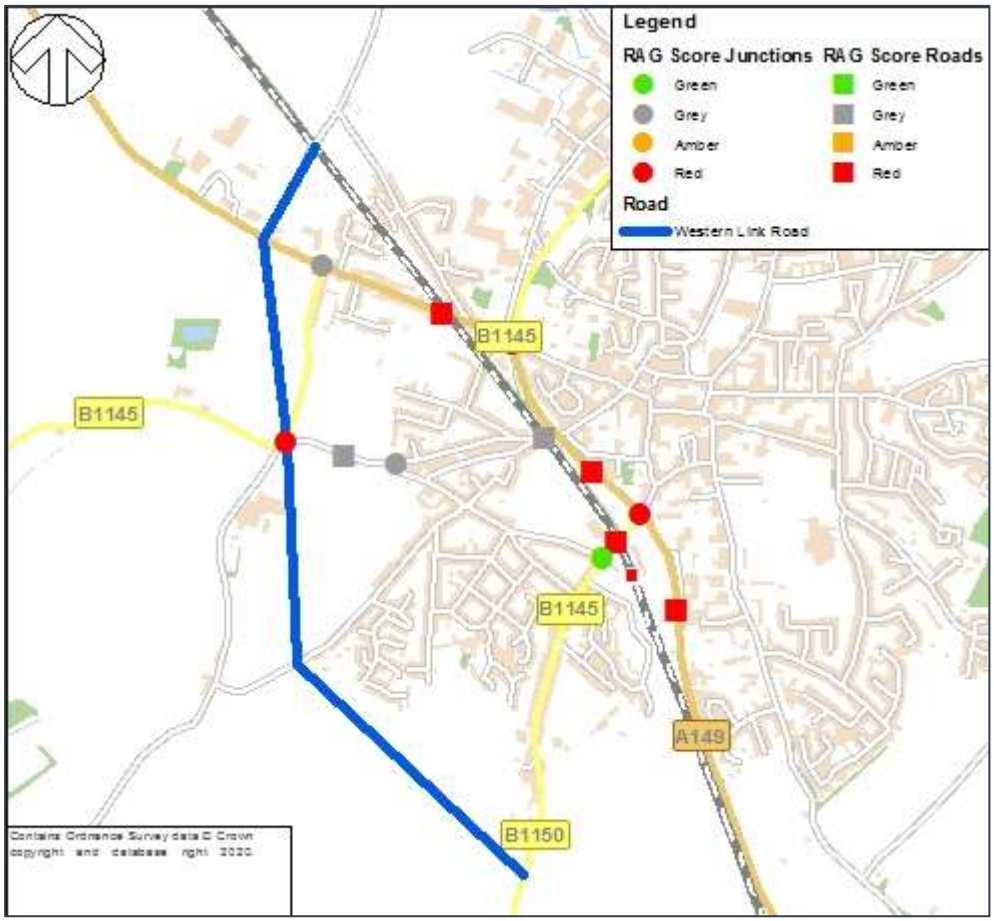

Figure 2 - RAG Score - WLR

Some of these remaining impacts can be mitigated by the northern extension. This section of the link road is expected to result in a significant traffic flow reduction on Cromer Road and a significant reduction of right-turn movements from the B1145 into the A149 Cromer Road, which is likely to release additional capacity from the junction.

The northern extension of the WLR is expected to capture 215 vehicles in the AM peak and 110 in the PM. The worst case between AM and PM of the expected traffic impacts is shown in Figure 3.

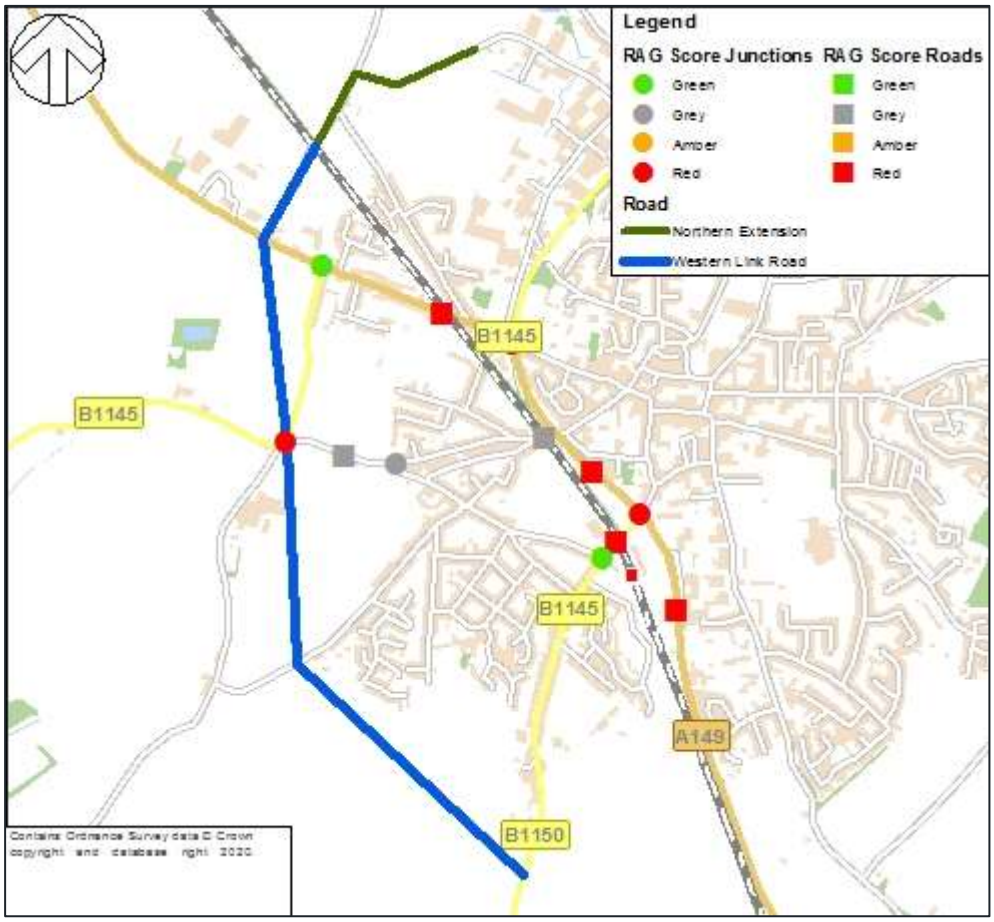

Figure 3 - RAG Score - WLR plus northern extension

Additionally, the southern extension is also expected to mitigate some additional traffic impacts. This section of the link road is expected to result in a significant traffic flow reduction on Norwich Road and considerably reduce HGV movements on Aylsham Road and Station Road.

The southern extension of the WLR is expected to carry approximately 480 vehicles in the AM peak and 410 in the PM peak. The worst case between AM and PM of the expected traffic impacts is shown in Figure 4.

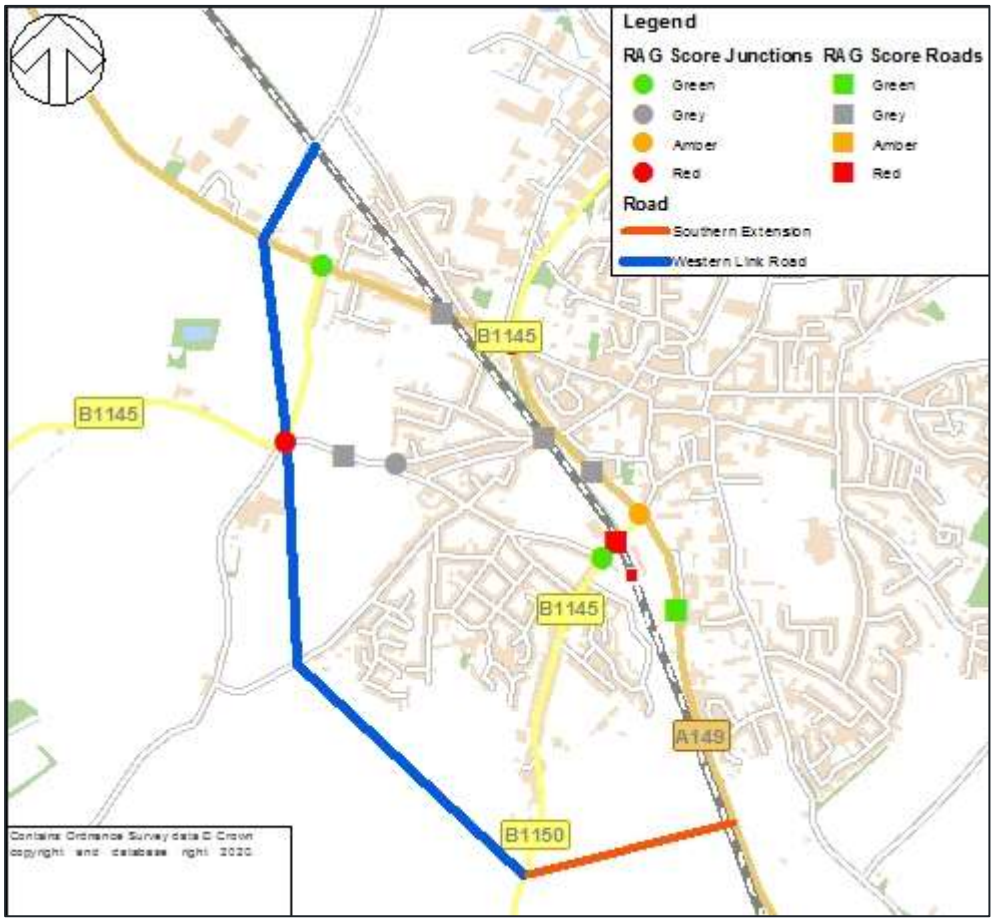

Figure 4 - RAG Score - WLR plus southern extension

The benefits to the North Walsham highways network are even bigger with both extensions to the link road constructed in comparison with the extensions separately. However, there could still be a few minor traffic impacts:

- Aylsham Road is on the desire line from the Western Extension towards the town centre, which could cause a traffic increase of vehicles and Non-Motorised Users (NMUs), and it is not suitable for any of these. Therefore, other alternative routes (i.e. Cromer Road or Norwich Road) should be signposted to encourage drivers not to use Aylsham Road. The Weavers Way could be improved to accommodate the increased number of NMUs, as an alternative to Aylsham Road.
- The travel patterns on the A149 / Cromer Rd and A149 / Norwich Rd signalised junctions are expected to change considerably and therefore the traffic signals may require some adjustment to adapt to the new traffic volumes.

The worst case between AM and PM of the expected traffic impacts is shown in Figure 5.

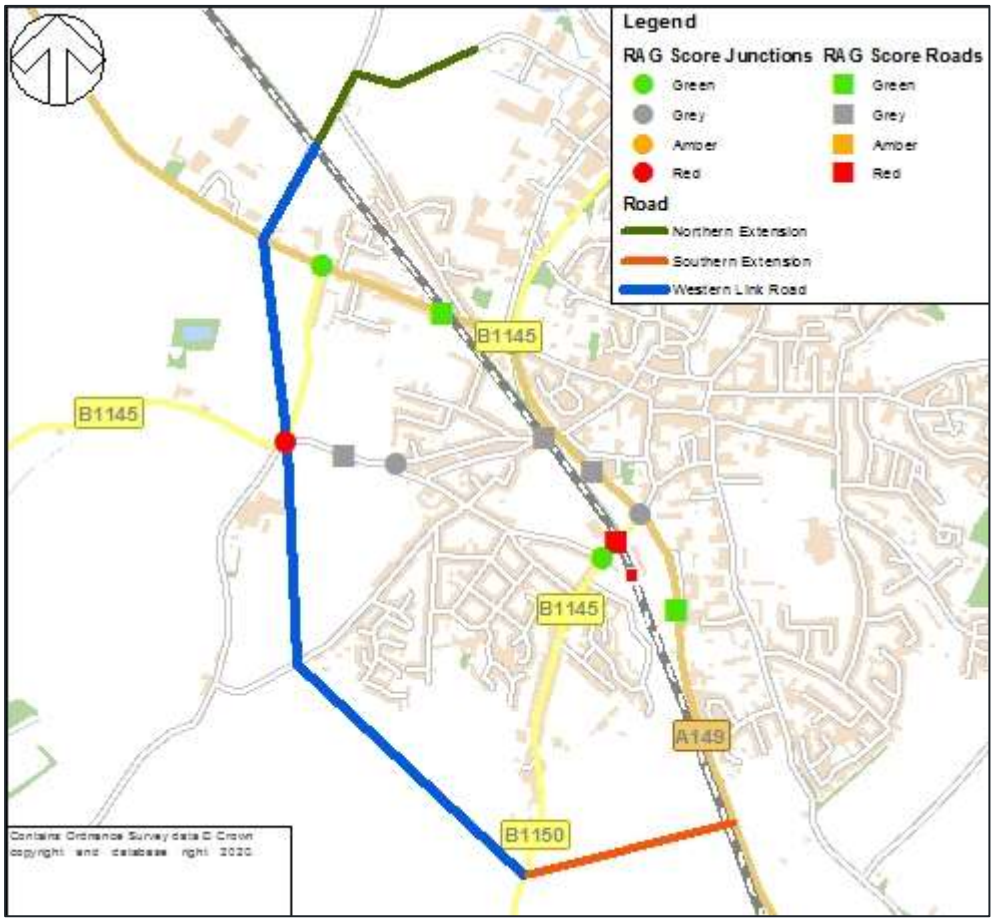

Figure 5 - RAG Score - WLR plus both extensions

COSTING

High-level cost estimates are provided for all options of the WLR (£17.7-£18.4 million) and the possible northern (£3.5-£19.8 million) and southern (£11 million approx.) extensions and the likely mitigation measures required to improve the connectivity by all modes from the Western Extension towards the town centre via Aylsham Road.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

It is expected that the existing highway network of North Walsham may not be able to cope with the traffic growth associated with the sites proposed for allocation in the Emerging NNDC Local Plan. However, the WLR is expected to mitigate the majority of the traffic impacts that the growth proposed in North Walsham could cause. Additionally, the WLR is expected to solve some of the existing routing issues for HGVs caused by the low bridges in the town. This high-level study also identifies that the possible WLR extensions should potentiate the benefits of the WLR and that it is feasible to deliver the WLR and its possible northern and southern extensions.

RECOMMENDATIONS

The main recommendations from this study are as follow:

- Traffic surveys should be conducted to understand the current traffic conditions in North Walsham and the impact of the Covid 19 pandemic.
- In next stages, a detailed transport model should be developed to assess in more detail the impact of the allocated growth and the highways improvements. This should allow assessing multiple scenarios for phased delivery and inform the development and selection of junction layouts.
- The design methodology should be agreed and the option selection process should be investigated further, with additional information.
- Undertake full WebTAG complaint economic appraisal to support the option selection process.

1

INTRODUCTION & CONTEXT

1 INTRODUCTION & CONTEXT

1.1 INTRODUCTION

1.1.1. This report has been prepared by WSP for Norfolk County Council (NCC) to inform the emerging North Norfolk District Council (NNDC) Local Plan, which identifies land for development which will be needed over the 20-year plan period (up to 2036) in order to meet the housing, employment and other needs of the area and includes policies which NNDC will use to determine planning applications.

1.2 STUDY OBJECTIVE

1.2.1. The purpose of this work is to inform the emerging Local Plan of the suitability of bringing forward the proposed growth allocations in North Walsham.

1.2.2. Two sites for mixed-use development have been identified within North Walsham which, if allocated, would be suitable for approximately 2,150 new dwellings and various other land uses. Additionally, a site for employment has been identified at Cornish Way. When added to potential small-scale developments within the town, approximately 23% of all housing growth within the District is to be located in North Walsham, which by the end of the Plan period would see the population of the town increase by approximately 5,000 people.

1.2.3. NCC, as the Local Highway Authority (LHA), require a high-level understanding of the impact of the possible allocated growth in North Walsham on the local highway network. Therefore, the objective of this study has been to carry out a high-level assessment of the traffic impact on North Walsham, as a result of the planned growth sites, and evaluating the effect of a proposed Western Link Road (WLR) which would also facilitate future employment and mixed-use development proposals as well as planned residential growth. In addition, the impacts of potential northern and southern extensions to the WLR have been assessed. A high-level feasibility study has been carried out to consider conceptual design options for the WLR and high-level cost estimates have been provided for the highway options and associated mitigation measures.

1.2.4. As well as informing the emerging Local Plan, this study has considered the *North Walsham Network Improvement Strategy*[1], which highlighted existing network constraints for HGVs routing throughout the town.

1.3 STUDY AREA

1.3.1. North Walsham is a market town located within the district of North Norfolk (see Figure 1-1). The study area includes the built-up area of the North Walsham, including all key traffic routes into the town (A149, B1150 and B1145) and all HGV diversionary routes used to avoid low bridges.

[1] https://www.norfolk.gov.uk/-/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/roads-and-transport/draft-north-walsham-network-improvement-strategy.pdf

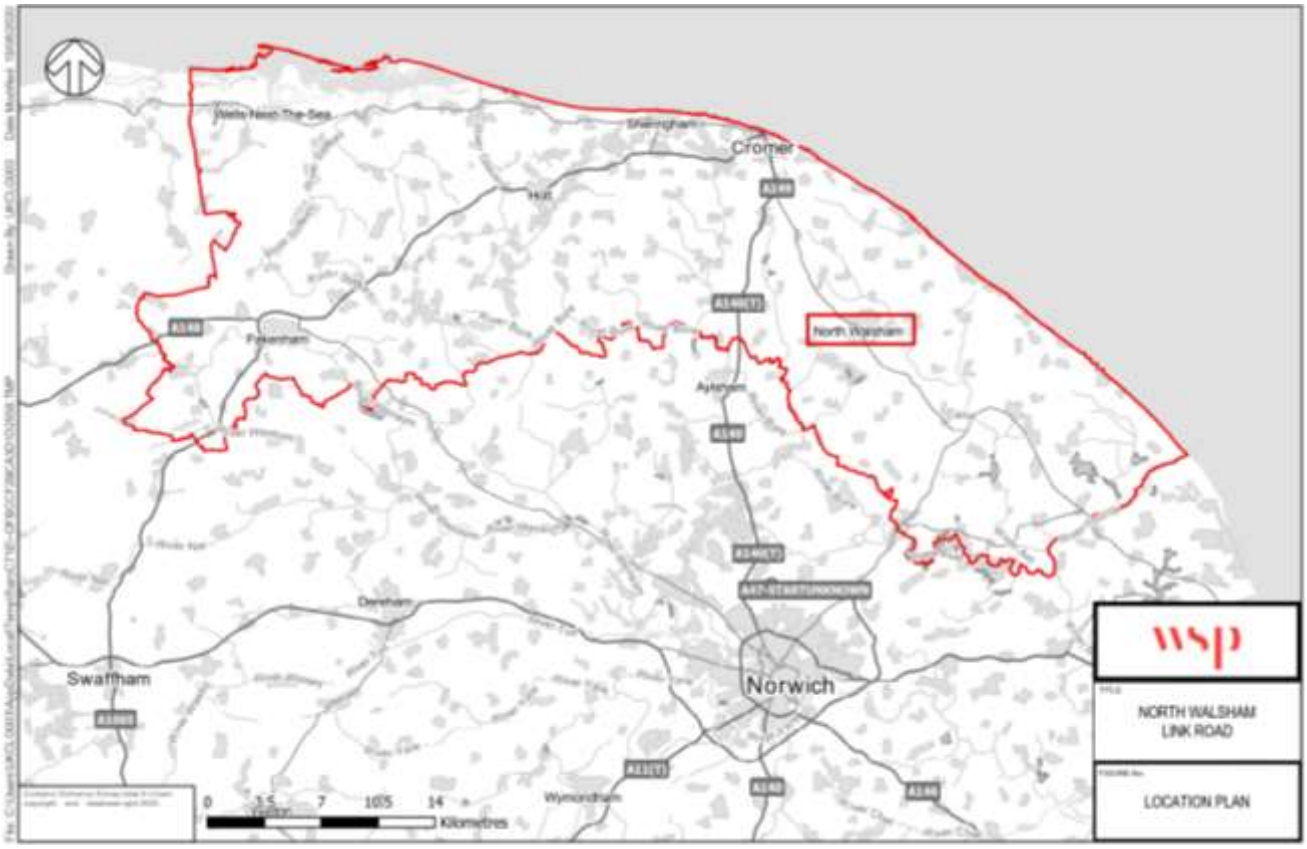

Figure 1-1 - North Walsham Location Plan

1.4 REPORT STRUCTURE

1.4.1. The remainder of this report is structured as follows:

- Chapter 2 – Development Areas & Associated Highway Options
- Chapter 3 – Existing Conditions
- Chapter 4 – Traffic Impact Assessment Methodology
- Chapter 5 – Traffic Impact Assessment
- Chapter 6 – Link Road Design Methodology
- Chapter 7 – Highway
- Chapter 8 – Cost Estimates
- Chapter 9 – Summary

2

DEVELOPMENT AREAS & ASSOCIATED HIGHWAY OPTIONS

2 DEVELOPMENT AREAS & ASSOCIATED HIGHWAY OPTIONS

2.1 INTRODUCTION

2.1.1. The proposed sites for allocation identified by the NNDC emerging Local Plan are outlined in Figure 2-1 and described in Section 2.2.

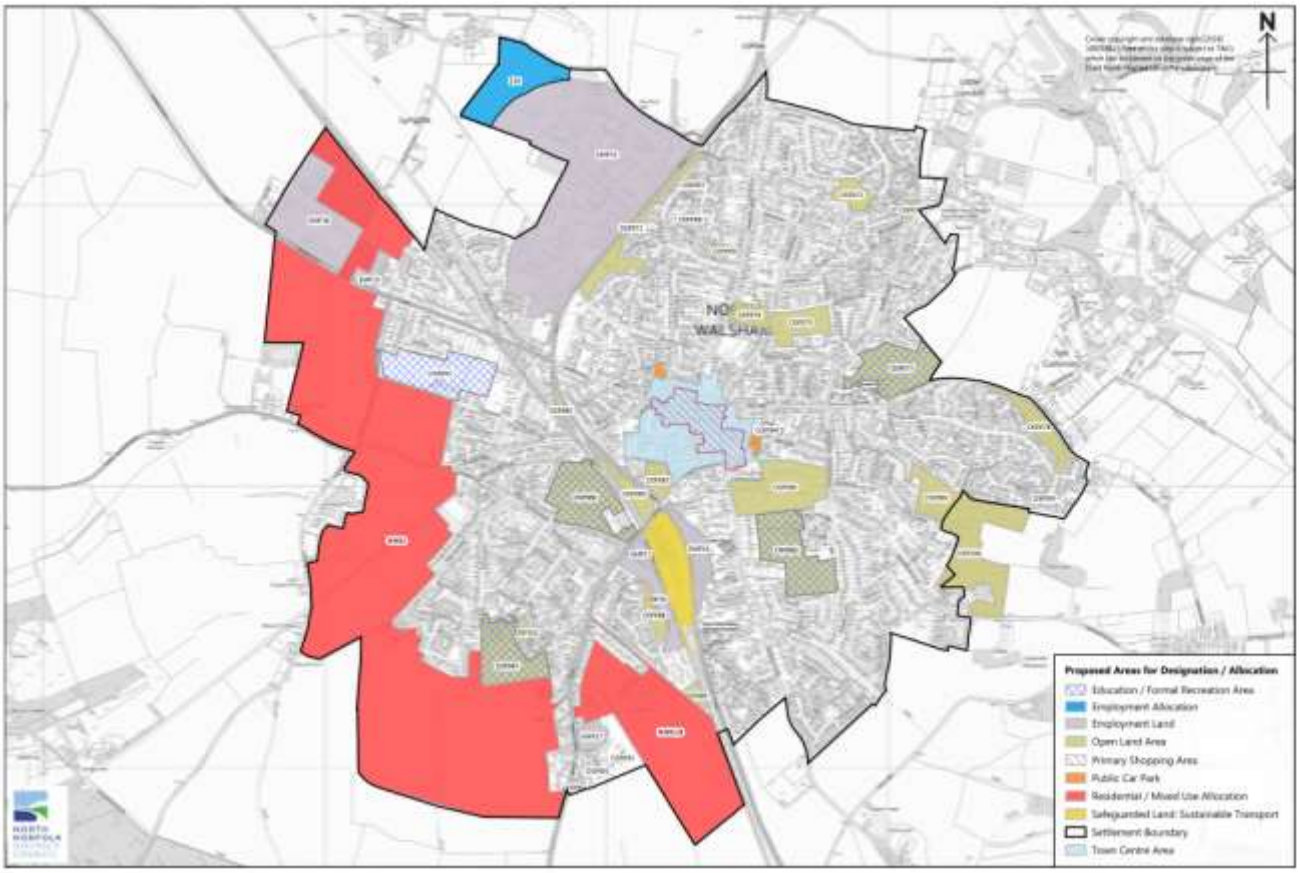

Figure 2-1 - North Walsham Allocations Map

2.2 POTENTIAL ALLOCATION SITES

SITE NW62 (WESTERN EXTENSION)

2.2.1. Site NW62 (the 'Western Extension') is a Sustainable Urban Extension to the west of North Walsham comprising of up to 1,800 new houses, 7ha of employment land, a new primary school and significant new public open space. To bring this site forward, NNDC has identified the need for a WLR linking the B1150 Norwich Road with the railway bridge on Bradfield Road, as shown indicatively in Figure 2-2 (yellow dashed line). This study seeks to provide a high-level transport impact and feasibility assessment of delivering a WLR.

2.2.2. In terms of highway options considered, the WLR is hereafter referred to as Option 1 (see Table 2-1 on page 8) and represents the core length of link road that applies throughout all other options.

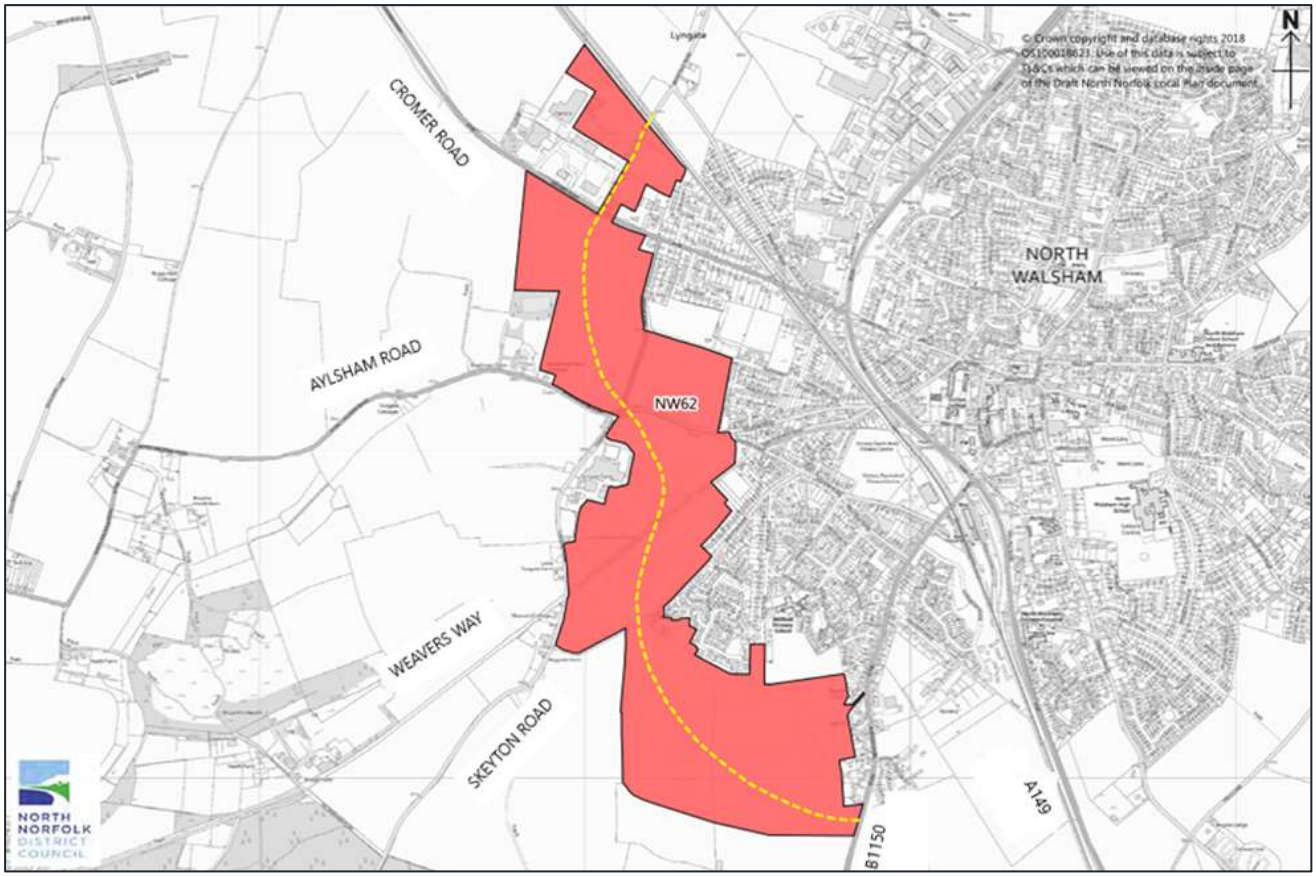

Figure 2-2 - Site NW62: North Walsham Western Extension

SITE E10

2.2.3. Site E10 is a large greenfield site adjacent to the Cornish Way employment area to the north-west of North Walsham. Its allocation will allow for the extension of the existing employment area by 5.11ha and will provide a continued supply of greenfield employment land in North Walsham over the plan period. Site E10 is located north-east of the Bradfield Road railway bridge (see Figure 2-3) at the northern end of the WLR (Option 1).

2.2.4. Additional highway infrastructure over and above the WLR (Option 1) could be required to serve the site. This additional infrastructure is hereafter referred to as Option 2 (see Table 2-1 on page 8), which represents a northern extension of Option 1 and would form a connection with Cornish Way.

Figure 2-3 - Site E10: Land off Cornish Way

SITE NW01/B

2.2.5. Land at Norwich Road and Nursery Drive comprises an allocation of up to 350 dwellings, 2ha of employment land and 3ha of public open space. This site is located between the B1150 Norwich Road and the A149 to the south of the town, as shown in Figure 2-4.

2.2.6. Additional highway infrastructure over and above the WLR (Option 1) could be required to serve the site. This additional infrastructure is hereafter referred to as Option 3 (see Table 2-1 on page 8), which represents a southern extension of Option 1 and would form a connection with a connection with the A149 to the south.

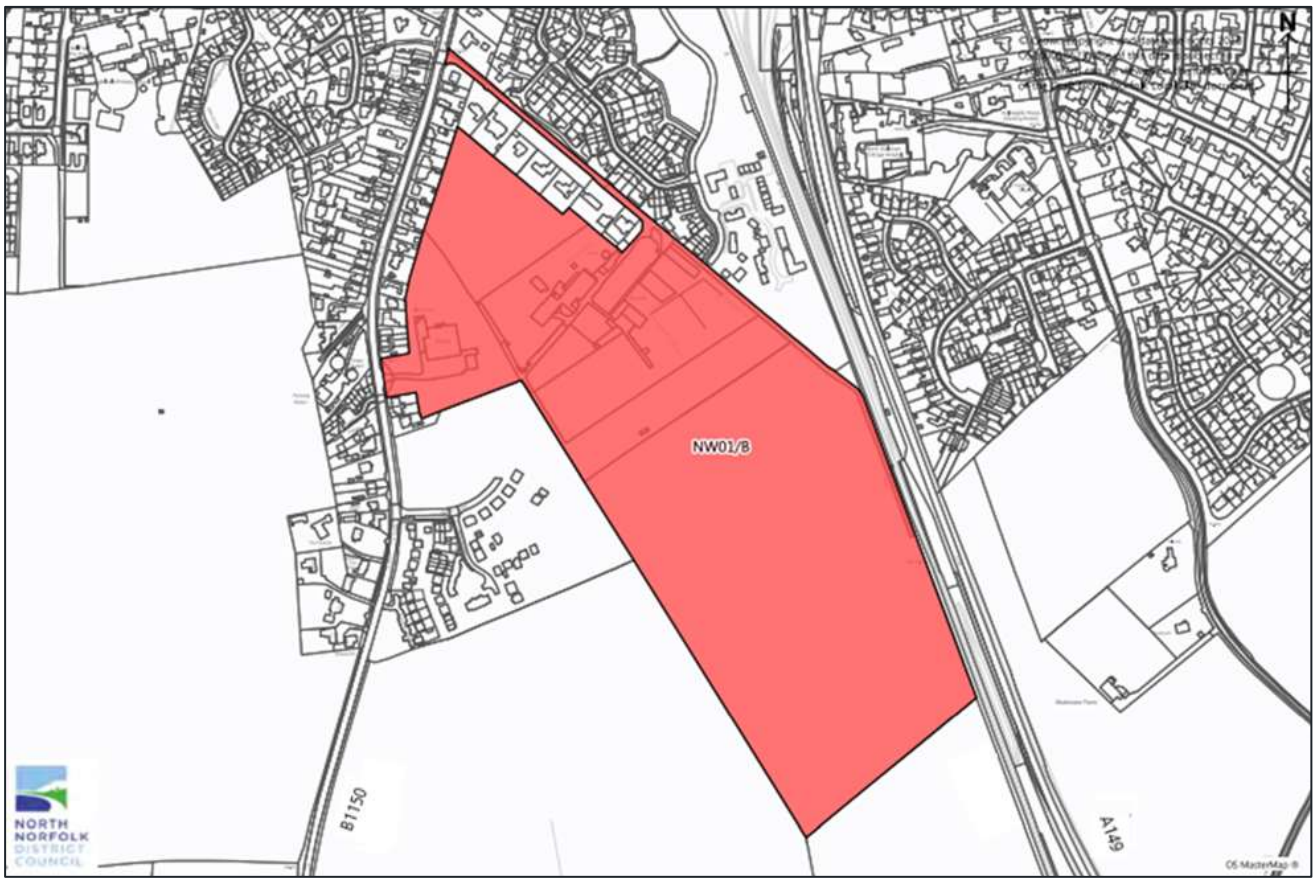

Figure 2-4 – Site NW01/B: Land at Norwich Road and Nursery Drive

2.3 HIGHWAY OPTIONS FOR INVESTIGATION

2.3.1. In Section 2.2, three highway options have been identified for investigation. An additional option, combining Option 2 and Option 3, hereafter referred to as Option 4, has also been considered. Table 2-1 summarises the highway options whilst Figure 2-5 provides a schematic layout of Option 4 including the junctions that have been assessed and included within the outline option designs.

Table 2-1 - Highways Options for Investigation

Option	Description	Extents	Junctions Included	Approximate Length
1	WLR	From Bradfield Road railway bridge to B1150 North Walsham Road	Junctions 3 to 7	2.7km
2	WLR + Northern Extension	From Cornish Way industrial area to B1150 North Walsham Road	Junctions 1 to 7	3.4km
3	WLR + Southern Extension	From Bradfield Road railway bridge to A149 south	Junctions 3 to 8	3.1km
4	WLR + Both Extensions	From Cornish Way industrial area to A149 south	Junctions 1 to 8	4.1km

Figure 2-5 - Schematic Link Road Layout and Junction Locations

2.4 SUMMARY

2.4.1. NNDC's emerging Local Plan will allocate a considerable amount of land for housing and employment growth within North Walsham distributed across three key sites, summarised in Table 2-2.

Table 2-2 - Summary of Sites Proposed in the NNDC Emerging Local Plan

Site	Site Name	Land Use	Size
NW62	North Walsham Western Extension	Mixed	1,800 dwellings Primary School 7 ha employment Western Link Road
NW01/B	Land at Norwich Road and Nursery Drive	Mixed	350 dwellings 2 ha employment 3 ha public open space
E10	Land off Cornish Way	Employment	5.11 ha employment

2.4.2. In order to facilitate bringing forward the allocated development sites in North Walsham, four highways options have been considered as part of this study (see Table 2-1 on page 8). The allocated growth and delivery of a WLR within the emerging Local Plan should help with safeguarding jobs, promoting economic growth and building homes to address current housing shortages, whilst also improving resilience of local areas to support themselves at the same time as increasing accessibility by more sustainable and active travel modes.

2.4.3. The traffic impact of the growth allocated in the emerging Local Plan and of the four potential highways options considered within this study has been assessed in Chapter 4. The highways design of these options has been assessed in more detail in Chapter 6, to establish the future direction that is most appropriate in terms of socio-economic and environmental factors and considering value for money.

3

EXISTING CONDITIONS

3 EXISTING CONDITIONS

3.1 INTRODUCTION

3.1.1. This chapter provides a summary of the existing transport and traffic conditions as well as key environmental and engineering constraints identified as part of this study.

3.2 NORTH WALSHAM TOWN CHARACTERISTICS

3.2.1. North Walsham is the largest town in the North Norfolk District, with a population of 12,634 (2011 Census). The market town is situated approximately 15-miles north of Norwich and 10-miles south of Cromer. According to the 2011 Census, of the usual resident population (aged 16-74) of North Walsham, 59.2% are in employment, which is comparable to the district overall (58.2%).

3.2.2. North Walsham can be divided approximately into three areas, which is also reflected in the workplace population distribution, shown in Figure 3-1:

- The historic town centre where most retail and leisure land uses are located;
- The industrial / commercial areas adjacent to the B1145; and
- The remaining residential areas which include various schools.

3.2.3. The west of the town, where the new Western Extension is proposed, comprises predominantly of residential areas with a number of local amenities, including Millfield Primary School.

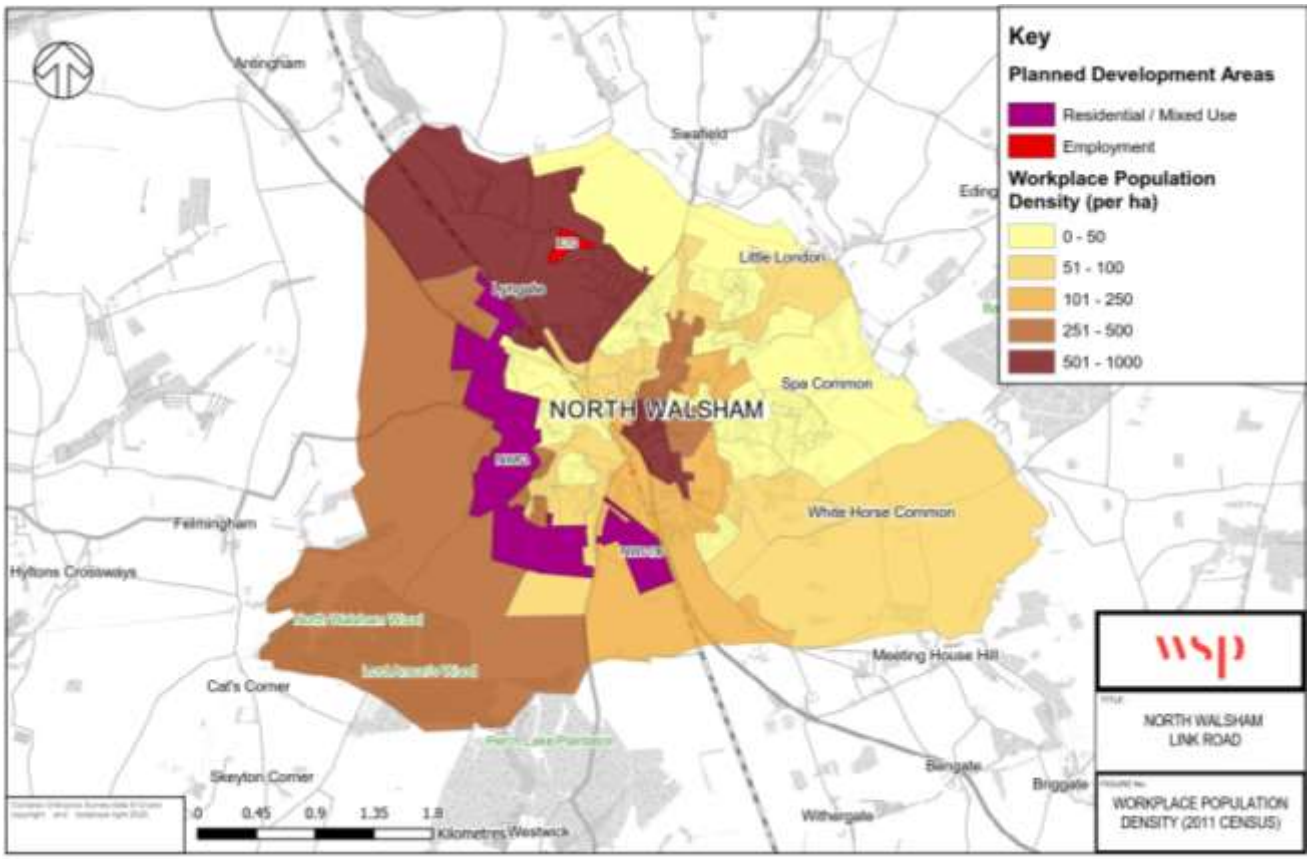

Figure 3-1 - Workplace Population Thematic Map (2011 Census)

3.3 TRANSPORT CONTEXT

3.3.1. Figure 3-2 illustrates that the primary traffic routes into North Walsham are the A149 Yarmouth Road / Cromer Road, the B1145 The Street / Aylsham Road, the B1150 North Walsham Road, Bacton Road and Happisburgh Road. The A149 is the main highway connection routing through the town from the north-west to the south.

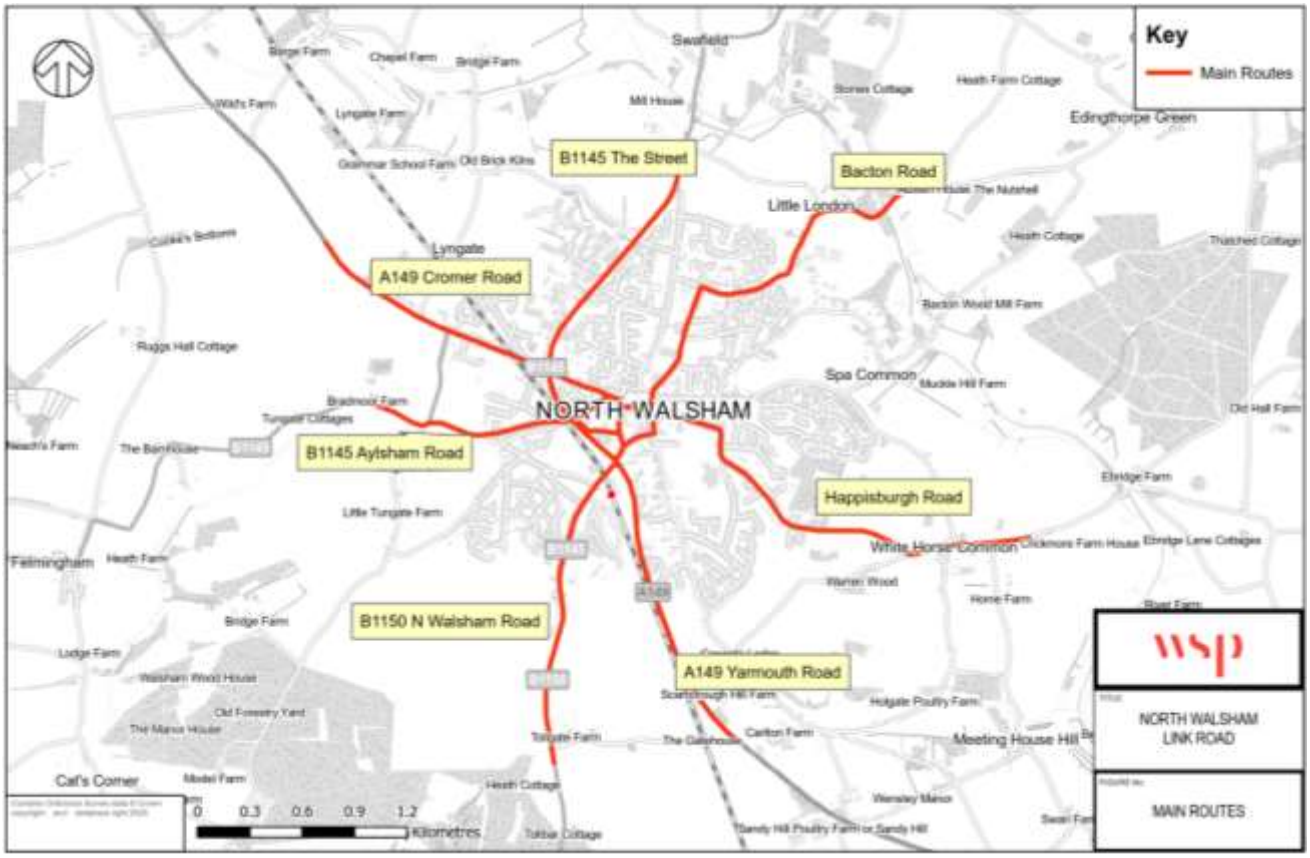

Figure 3-2 - Main Routes serving North Walsham

3.3.2. North Walsham town centre has a historic core with narrow streets, limiting the potential not only for high volume transport movements (especially by HGVs), but also the ability to segregate walkers and cyclists, as shown in Figure 3-3. Throughout the town where footways do exist, they are often narrow and can be located on only one side, as shown in Figure 3-4. The narrow streets and town centre one-way system could be significant barriers to both walking and cycling. Not only is the proximity of vehicular traffic off-putting, but journey lengths can be increased by the one-way road system.

Figure 3-3 - Narrow Streets on Aylsham Road (source: Google Maps)

Figure 3-4 - Narrow footways on King's Arms Street (Source: Google Maps)

3.3.3. North Walsham has limited designated cycle routes but offers plenty of quiet roads that could be suitable for cycling. One of the main connections between the Western Extension and the town centre is Aylsham Road, which has a 200m narrow section without footway, a clear barrier to active travel for new and existing residents. Fortunately, Weavers Way runs parallel to Aylsham Road, which offers a dedicated walking and cycling route via a disused railway line linking the North Walsham town centre with Aylsham (6.5-miles south-west) and Stalham (8-miles south-east). However, the Weavers Way is not practicable for commuters due to its lack of hard surfacing and street lighting on most of the route.

3.3.4. Paston Way is another local trail providing a 22-mile signed walking route to the north of the town centre to the North Norfolk Coast Path. Both could be ideal for encouraging more leisure cycling and walking, as well as commuting by bicycle to and from Aylsham, with improvements.

3.3.5. Figure 3-5 illustrates the walking and cycling infrastructure within North Walsham town centre and plots existing local services and amenities (non-exhaustive). It demonstrates that the town centre has many local services and amenities that are all within a reasonable 25-minute walk or 15-minute cycle ride from the allocated growth sites within the emerging Local Plan. With regards specifically to the Western Extension, North Walsham Railway Station, Millfield Primary School, the library and Victory Swim and Fitness Centre are all convenient on foot or bicycle.

3.3.6. A wider range of services are available in Norwich and can be reached by public transport which is covered in the following sections.

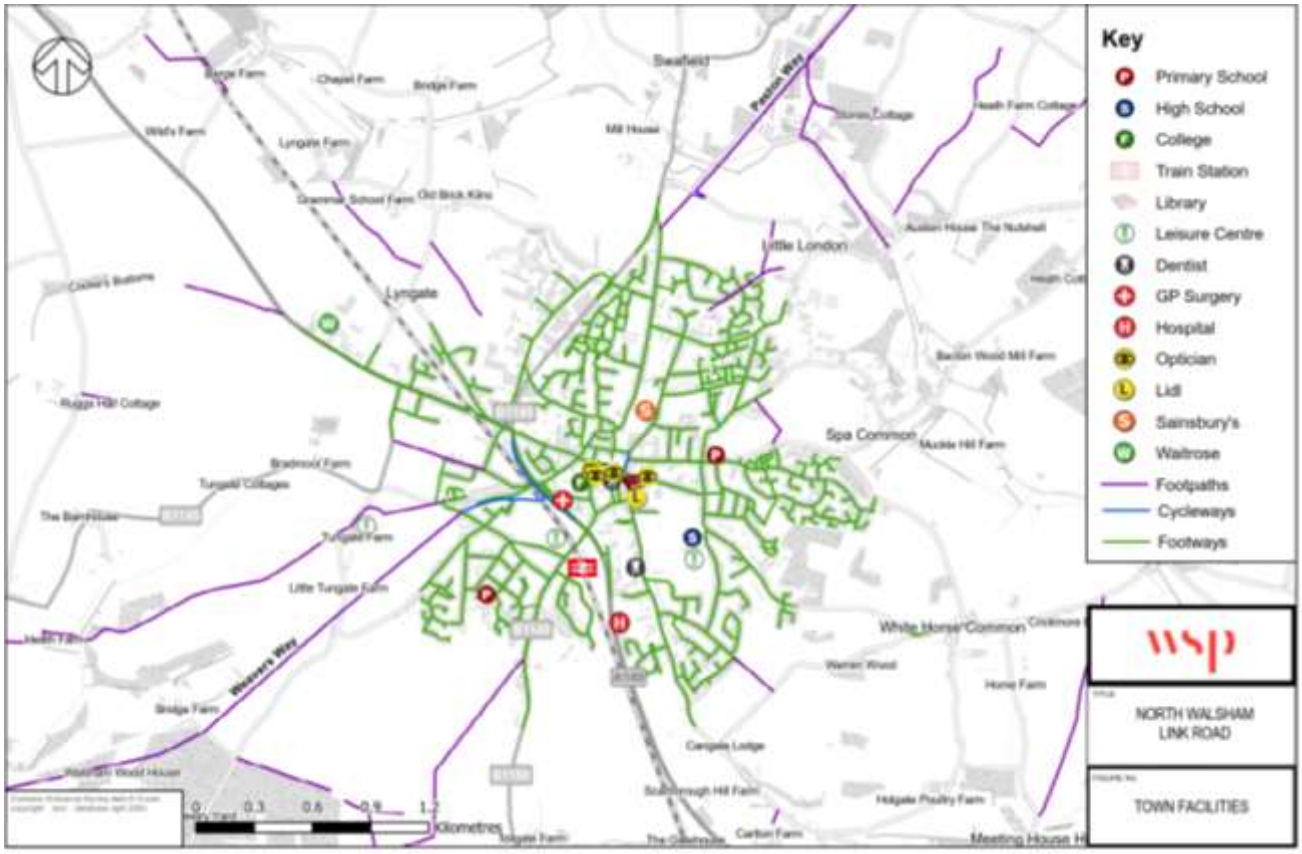

Figure 3-5 - Walking and Cycling Infrastructure and Town Facilities

RAIL

3.3.7. As noted previously, North Walsham Railway station is situated to the south of the town centre on Norwich Road. It is operated by Greater Anglia running services between Norwich and Sheringham, details of which are shown in Table 3-1. The station is located within reasonable walking and cycling distance of the Western Extension and offers wheelchair access and sheltered cycle parking with CCTV operation. Patronage has grown, up over 2% (7,000) in 2018/19 on the previous year's 265,000 passengers[2].

Table 3-1 - Key Train Services from North Walsham

Departing Station	Destination	Mon-Fri	Duration	Frequency
North Walsham	Norwich	06:11 to 00:13	24-32 minutes	Hourly
North Walsham	Sheringham	05:34 to 23:13	29-39 minutes	Hourly

[2] Office of Rail and Road

BUS

3.3.8. As a principal town within the North Norfolk District, North Walsham acts as a focal point for local bus routes. The largest local operator, Sanders Coaches, operates services across the area including to Norwich, Cromer, Aylsham and Mundesley for example, as shown in Figure 3-6. A list of scheduled local bus services provided by all operators is shown in Table 3-2. Bus stops within the centre of the town are identified in Figure 3-7.

Figure 3-6 - Map of Sanders Coaches Routes Serving North Walsham

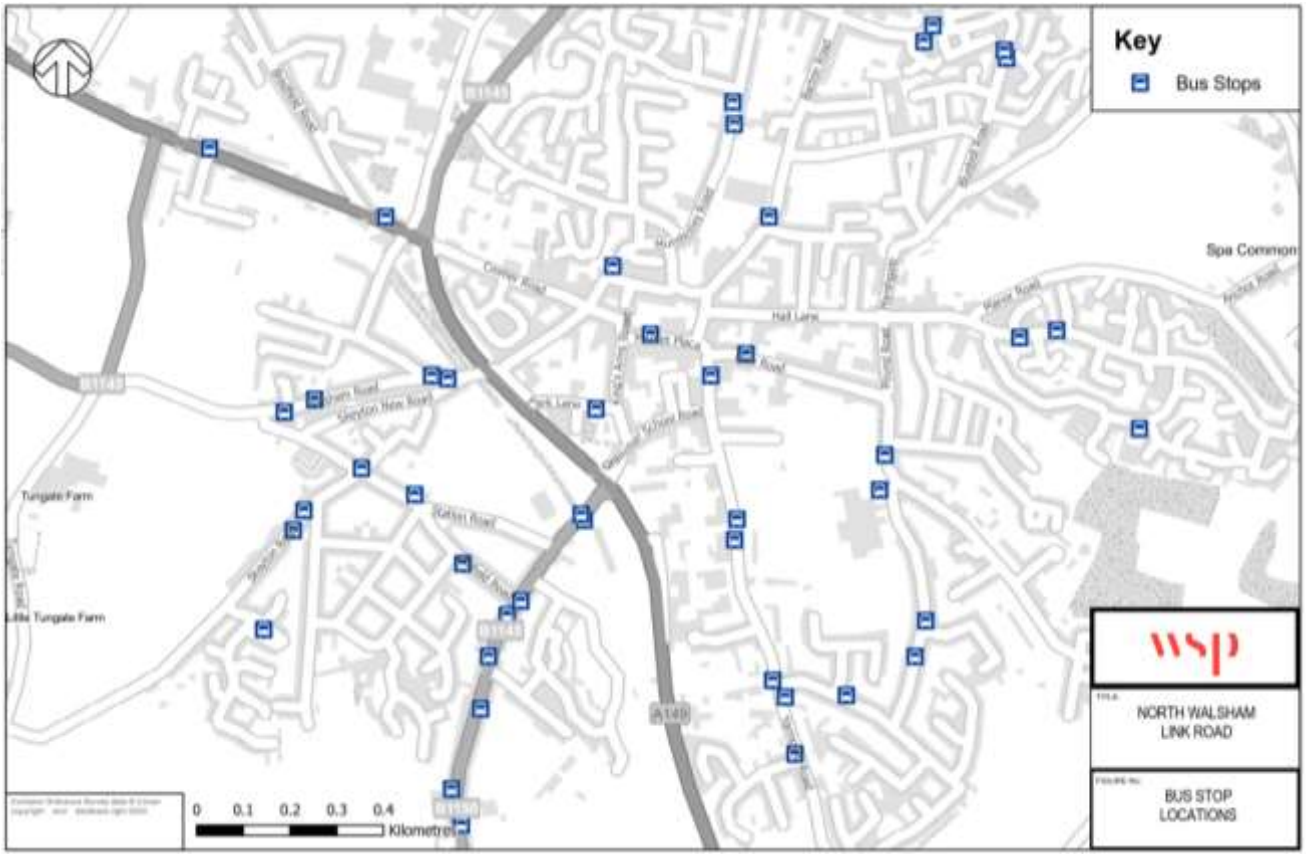

Figure 3-7 - Town Centre Bus Stop Locations

Table 3-2 - Bus Services in North Walsham

Service	Frequency	Operator	Route	Bus Stops
1B	Monday only	Feline Travel	Worstead - North Walsham	Market Place
2	Tuesday only	Feline Travel	Aldborough - North Walsham	Waitrose, Sainsbury's, Roys
4	Thursday only	Feline Travel	Worstead - North Walsham	Waitrose, Sainsbury's, Market Cross
5/CH2	Mon – Sat (hourly) Sun (hourly/bihourly)	Sanders Coaches - Coasthopper	North Walsham – Mundesley – Cromer	Market Place, Post Office, Bluebell Road, Park Lane/ Aylsham Road, Lyngate Road, Plummers New Road
5A	Sundays and Bank Holidays (hourly/bihourly)	Sanders Coaches	North Walsham - Norwich City Centre	Lyngate Road, Market Place, Roys

Service	Frequency	Operator	Route	Bus Stops
6/6A/X6	Mon – Sat (hourly/bihourly)	Sanders Coaches	Cromer - North Walsham - Gorleston	Market Place, Plummers New Road, Spencer Avenue, North Walsham Hospital, Post Office/Roys, Park Lane
18	Mon – Fri (3 buses per day - *more during school term*) Sat (2 buses per day)	Sanders Coaches	Cromer - North Walsham	Roys, Park Lane, Mayfield Way, Acorn Road, Brick Kiln Road
33	Mon – Fri (5 buses per day)	Our Bus	Cromer - North Walsham	Post Office/Roys, Park Lane, Aylsham Road, Waitrose
33A	Mon – Fri (5 buses per day)	Our Bus	North Walsham Town Service	Waitrose, Market Place, Roys, New Road, Park Lane, Sainsbury's, Swafield Rise, Mayfield Way, Acorn Road, Bluebell Road, Brick Kiln Road, Post Office
34	Mon – Fri (hourly/bihourly)	Sanders Coaches	North Walsham – Stalham - Ridlington	Plummers New Road, North Walsham High School, Bluebell Road, Roys, Park Lane
55/X55	Mon – Sat (hourly)	Sanders Coaches	Norwich City Centre - North Walsham	Market Place, Roys, Park Lane, Station Road, Norwich Road, Millfield Road, Lyngate Road
210	Mon – Sat (approx. bihourly)	Sanders Coaches	Norwich City Centre - North Walsham	Brookes Drive, Station Road, Market Place

3.3.9. Of the routes serving North Walsham, Sanders 55/X55 service connecting North Walsham, Coltishall and Norwich is one of the most frequent and late serving services, operating at an hourly basis Monday to Saturday. Other services are less frequent and operate at irregular intervals.

3.3.10. The west of the town is reasonably well served by buses with several stops located in close proximity including on Brookes Drive and Skeyton Road. These stops are within a reasonable walking distance from the proposed Western Extension (less than 400m distance).

3.3.11. The primary bus stops within the town centre are at Market Place and near the post office and are served by numerous services linking North Walsham to Norwich, Aylsham, Cromer and other towns.

HGV TRANSPORT NETWORK

3.3.12. The *North Walsham Network Improvement Strategy*, highlighted a number of existing constraints on the transport network that require HGVs to divert around the west of North Walsham utilising some sections that are unsuitable for HGV traffic. This not only increases HGV journey times, but also inconveniences local residents and the overall operation of the town centre. Figure 3-8 shows the existing HGV restrictions and one-way roads within the town that influence HGV routing.

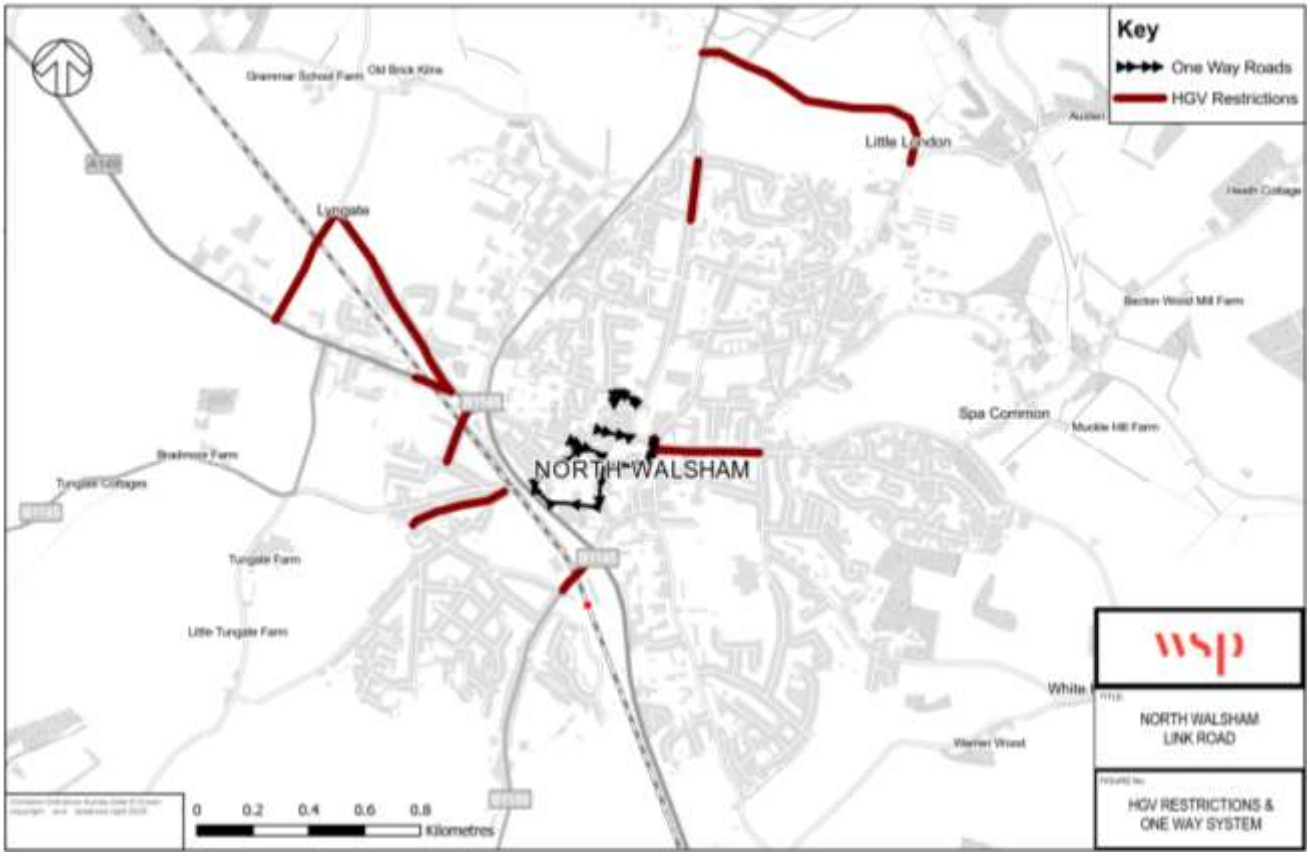

Figure 3-8 - HGV Restrictions and One-Way System

3.3.13. As seen from Figure 3-8, existing constraints for HGVs on the transport network include:

- A149 Cromer Road – low bridge with 4.0m restriction;
- B1150 Norwich Road – low bridge with 3.9m restriction;
- Bradfield Road – narrow bridge over railway line / unsuitable for HGVs;
- Cherry Tree Lane – low bridge with 4.4m restriction;
- Skeyton New Road – unsuitable for HGVs;
- Hall Lane – unsuitable for HGVs;
- Mundesley Road – unsuitable for HGVs; and
- Little London Road – unsuitable for HGVs.

3.3.14. The railway line bisects the town (north / south) making the low bridge on Aylsham Road (4.8m restriction) the only viable HGV route over the railway line. Table 3-3 and Figure 3-9 detail typical HGV diversion routes that result in increased HGV journey times, disruption to local traffic, and inconvenience to local residents and vulnerable road users.

Table 3-3 - HGV Diversions

Location	Restriction	Diversion
A149 Cromer Road	Low bridge with 4.0m restriction.	▪ HGVs travelling northbound are required to use Park Lane, Aylsham Road and Green Road, this is 0.6km longer and Aylsham Road is predominantly a narrow residential road. ▪ HGVs travelling southbound are required to use Green Road, Aylsham Road, Mundesley Road, Lyngate Road and the B1145, this is 3.1km longer and passes through the town centre and along residential routes.
B1150 Norwich Road	Low bridge with 3.9m restriction.	▪ HGVs approaching northbound will need to use Millfield Road and Station Road to link with Aylsham Road to access the town.
Bradfield Road	Narrow road and bridge over railway line.	▪ HGV traffic from the northwest (A149) and the west (B1145) and south (B1150) is required to use the diversions described above.

Figure 3-9 - HGV Diversion Routes

3.4 EXISTING TRAFFIC ASSESSMENT

3.4.1. New traffic surveys were proposed to understand the existing traffic volumes and network movement patterns in and around North Walsham. However, due to the disruptions to travel and traffic patterns during the Covid-19 pandemic, an alternative methodology was discussed and agreed to carry out the assessment for the study. Existing Manual Traffic Count (MCC) and Automatic Traffic Count (ATC) surveys (see Table 3-4) have been used to assess the traffic impact on several junctions in the town and updating the local area of the Norwich Area Transport Strategy (NATS) SATURN Transport Model to estimate the through traffic in North Walsham.

Table 3-4 Traffic Count Survey Locations

Type	Date	Location
ATC	19/01/17-25/01/17	A149 Cromer Road
ATC	28/06/14-04/07/14	Norwich Road
MCC	26/11/14	A149 Cromer Road / A149 / B1145
MCC	26/11/14	A149 / Norwich Road
MCC	26/11/14	Aylsham Road / Station Road
MCC	26/11/14	Aylsham Road / Tungate Road / Greens Road
MCC	26/11/14	Cromer Road / Greens Road
MCC	26/11/14	Norwich Road / Station Road

3.4.2. The existing traffic surveys were converted to 2019 flows, to establish a 2019 base year, using growth factors for North Walsham obtained from the Trip End Model Presentation Program (TEMPro) developed by the Department for Transport (DfT) used for viewing the National Trip End Model (NTEM) information. The NTEM model forecasts the growth in trip origin-destinations up to 2051 for use in transport modelling. The forecasts take into account national projections of: population, employment, housing, car ownership and trip rates. These growth factors are shown in Table 3-5.

Table 3-5 - TEMPro growth factors for North Walsham

Period	AM	PM
2014-2019	1.0570	1.0627

3.5 ENVIRONMENTAL & ENGINEERING CONSTRAINTS

3.5.1. Figure 3-10 illustrates the constraints facing the delivery of the WLR and the possible northern and southern extensions. This plan can also be found at Appendix A. Specific junction constraints are discussed in Chapter 7. It is to be noted that:

- Buffer areas are based on Option 4, the WLR with both the northern and southern extensions;
- Whilst none of the four high-pressure gas mains cross the proposed WLR, one is within the 500m and 1km buffer area. Whilst it is considered unlikely that they would be affected, National Grid should be consulted once there is greater certainty over the WLR route;
- As the scope of this study does not extend to obtaining New Roads and Street Works Act (NRSWA) C2 information from statutory undertakers, potential constraints resulting from another statutory undertakers' apparatus have not been considered;
- Two public footpaths cross the proposed WLR, one between Junctions 4 and 5, the other between Junctions 6 and 7. Subject to further investigation, potential highway improvements to cater for pedestrians at both sites could take the same form as those described in Section **7.2**, where Weavers Way crosses the WLR.

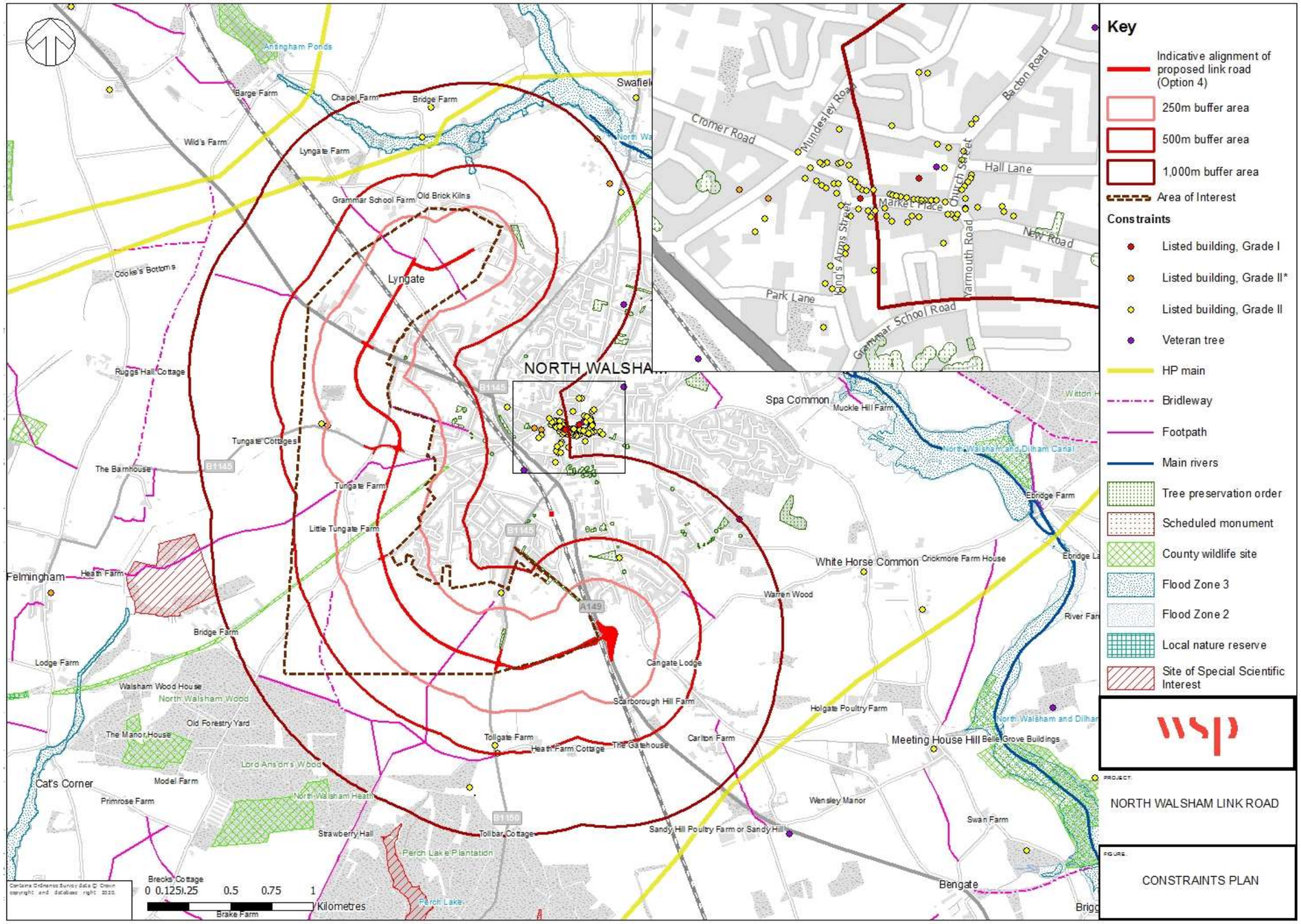

Figure 3-10 - North Walsham Constraints Plan

4

TRAFFIC IMPACT ASSESSMENT METHODOLOGY

4 TRAFFIC IMPACT ASSESSMENT METHODOLOGY

4.1 INTRODUCTION

4.1.1. This chapter sets out the methodology used for deriving future year traffic flows, quantifies the trip generation associated with each scenario, and the method of distributing and assigning new development trips to the existing highway network and the future network incorporating the various highways options assessed within this study.

4.1.2. For the purposes of the assessment within this report, a future year of 2036 was selected to coincide with the emerging Local Plan that covers planned growth in the district up to 2036. The future year assessment assumes the complete build out and occupancy of all new dwellings.

4.2 FORECAST SCENARIOS DEFINITION

4.2.1. The forecast scenarios, summarised in Table 4-1, have been defined to assess the traffic impact of the growth planned in the Local Plan in North Walsham and the new WLR and its potential northern and southern extensions.

Table 4-1 - Forecast Scenarios Definition

Number	Forecast Scenario	Network	Demand
1	2036 Do Nothing (DN) Without Local Plan growth	Existing	Existing plus background growth
2	2036 Do Minimum (DM) With Local Plan growth only	Existing	Existing plus background and Local Plan growth
3	2036 Do Something (DS) With Local Plan growth and Option 1	Existing + Option 1	Existing plus background and Local Plan growth
4	2036 Do Something (DS) With Local Plan growth and Option 2	Existing + Option 2	Existing plus background and Local Plan growth
5	2036 Do Something (DS) With Local Plan growth and Option 3	Existing + Option 3	Existing plus background and Local Plan growth
6	2036 Do Something (DS) With Local Plan growth and Option 4	Existing + Option 4	Existing plus background and Local Plan growth

4.2.2. The 2036 Do Nothing scenario has been calculated by uplifting the existing traffic counts using TEMPro 7.2 growth factors from 2019 to 2036 for light vehicles for the peak AM and PM periods in North Walsham. The alternative assumptions shown in Table 4-2 have been applied to forecast the traffic growth in North Walsham without the housing and employment growth expected in the Local Plan. This methodology ensures that there is no double counting of the trips, as it considers that there will not be any development in North Walsham, apart from the Local Plan growth that is assessed separately, and all the traffic changes will be caused by planned growth elsewhere.

Table 4-2 - TEMPro Alternative Assumptions Applied

Assumptions	Base Household	Base Jobs	Future Household	Future Jobs
Default	6384	5467	7801	5792
Alternative	6384	5467	6384	5467

4.2.3. To estimate the growth factors for HGVs, a combination of the DfT's Road Traffic Forecasts (RTF) 2018 growth factor (that provides the growth factor by vehicle and road type for the East of England for the 2020-35 period but only for daily flows) and the TEMPro growth factor, has been applied. The proportion of growth between Light Vehicles and HGVs forecasted on the RTF18 has been applied to the TEMPro growth factors to estimate the HGV background growth factors. The background growth factors applied to Light Vehicles and HGVs are summarised in Table 4-3.

Table 4-3 - Background Growth Factors (2019-2036)

Time Period	Light Vehicles	HGVs
AM Growth Factor	1.0701	0.9478
PM Growth Factor	1.0643	0.9427

4.2.4. The impact of the planned growth and WLR upon the existing traffic has been assessed by analysing the routing of through traffic in North Walsham. The usual Automatic Number Plate Recognition (ANPR) method to collect the sample travel pattern data was not available, as a result of the Covid-19 pandemic, hence an alternative methodology, as set out in Section 4.3, has been used to estimate the through traffic routing.

4.3 THROUGH TRAFFIC ASSESSMENT

4.3.1. For through traffic assessment we have relied on the Norwich Area Transport Strategy (NATS) traffic model. Whilst the NATS model can assess the traffic impact of highway schemes around Norwich in greater detail, for the area of North Walsham, it was not suitable for testing the traffic impact of the WLR. However, using the available existing data, the NATS model was updated in for the North Walsham area in enough detail to enable an estimation the town's through traffic and therefore support an assessment of the potential impact of the WLR.

4.3.2. The NATS model has been updated in the local area using Mobile Network Data (MND) from 2019 and with the key main roads of North Walsham including:

- The entire A149;
- The B1145 north towards Swafield;
- The B1145 Aylsham Road;
- New Road and Happisburgh Road;
- Bacton Road;
- The B1150; and
- Station Road.

4.3.3. The MND identifies road (bus / car / LGV), rail, and HGV traffic and is combined with National Trip End Model data to account for missing short trip elements within the NATS model matrix development process.

4.3.4. To ensure the updated NATS model was fit for purpose, model calibration focused upon the junction turning movements at the two signalised junctions on the A149 within North Walsham at Cromer Road and Norwich Road. The predicted model outputs were validated by individual route checks to ensure they were realistic. Sense checks were also made so that trips travelling to / from the town centre, towards the A149 and other key routes, were using the appropriate links and junctions.

4.3.5. Alterations were made to link speeds, distances and signal timings where necessary to improve the network, using the junction turning counts at the two key junctions as a reference base. Only when the network was deemed to provide sufficient detail was model calibration and validation undertaken. More details about this process can be found on Appendix B.

4.4 LOCAL PLAN GROWTH ASSESSMENT

LOCAL PLAN ALLOCATIONS

4.4.1. The three proposed allocations in North Walsham (NW01/B, NW62 and E10) have been split into eight areas, with one access point to each allocation, as seen in Figure 4-1. The six areas of the Western Extension (NW62) site have been split as per Table 4-4.

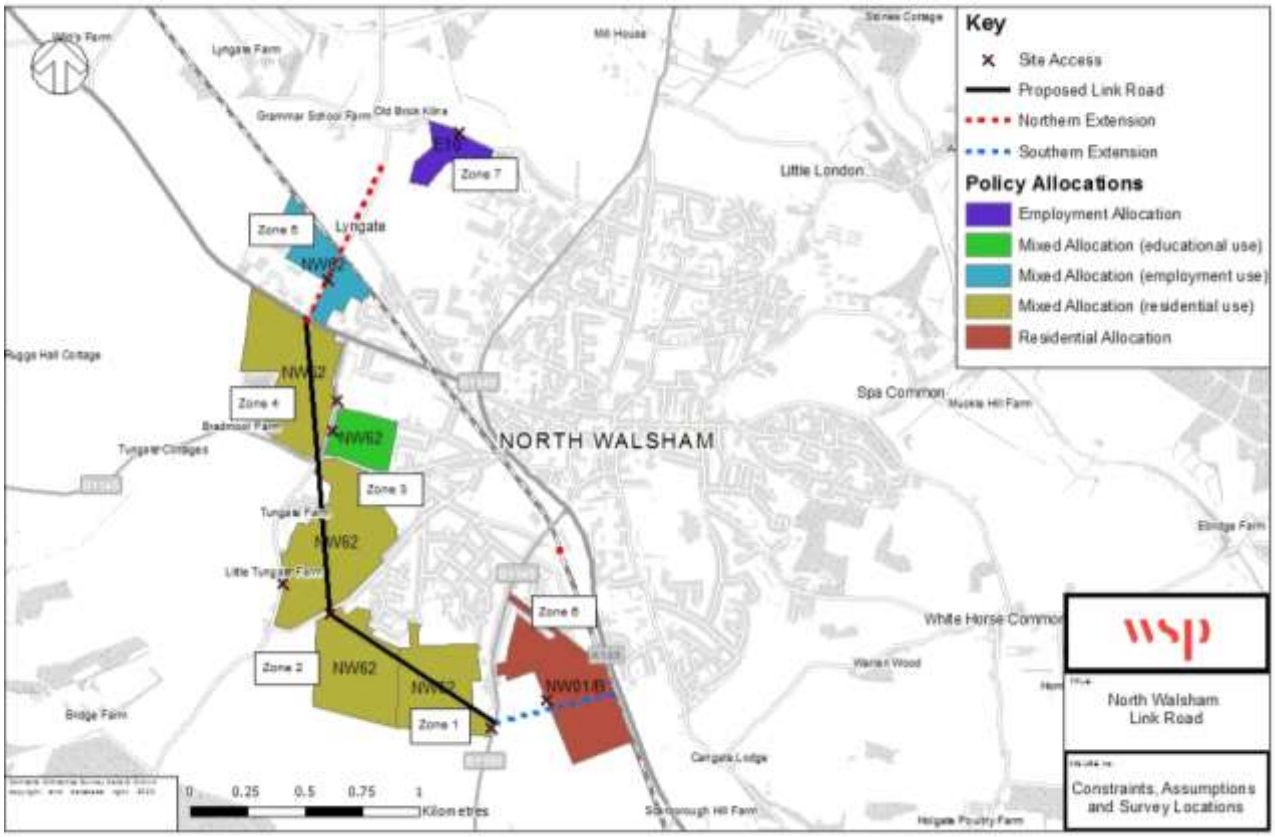

Figure 4-1 - Assumptions and Policy Allocations

Table 4-4 - Split of Western Extension Site

Zone	Location	Land Use	Area	Dwellings
1	Land to the west of Norwich Road	Residential	14ha	347
2	Land to the south of Skeyton Road	Residential	15ha	380
3	Land between Skeyton Road and Aylsham Road	Residential	23ha	587
4	Land between Aylsham Road and Cromer Road	Residential	19ha	486
5	Land to the north of Cromer Road	Employment	7ha	N/A
6	Land between Aylsham Road and Greens Road	Educational		N/A

4.4.2. Trips generated by the Primary School on land between Aylsham Road and Greens Road have not been included in the transport model as it is anticipated to have a minimal impact on the highway network given:

- the afternoon trips will be outside the evening peak hour;
- some trips will already be accounted for from new development; and
- some trips will be existing trips that will be reallocated.

4.4.3. It has been agreed with NCC and NNDC that for the purpose of this study the Gross Floor Area (GFA) of employment space will be 35% of total area designated for employment.

TRAFFIC IMPACT ASSESSMENT METHODOLOGY

4.4.4. The transport methodology used for assessing Local Plan growth is a simplified three-stage model, (where the 'Modal Split' stage is carried out simultaneously with the 'Trip Generation' stage). The stages follow a sequential procedure of:

- Trip Generation / Modal Split: the number of trips generated and attracted by each zone are estimated by mode of transport;
- Trip Distribution: the trips between origins and destinations are estimated, taking into account constraints, such as distance. This produces a flow matrix between spatial units;
- Traffic Assignment: all the estimated trips by origin, destination and mode are "loaded" onto the transportation network, assuming that travellers want to minimise journey times.

4.4.5. This simplified methodology means that the assignment has been carried out with 'fixed demand' rather than 'variable demand'. A 'fixed demand' assignment means that the matrices that will be assigned will be the same for each forecast scenario and, therefore, the transport model will not consider the traffic induced by the link road.

Trip Generation / Modal Split

4.4.6. The trip generation and modal split combined stage has been carried out simultaneously by interrogating the Trip Rate Information Computer System (TRICS 7.7.1) database to calculate the vehicular trip rates of each zone. TRICS is the national standard system of trip generation.

4.4.7. The TRICS 'Houses Privately Owned' has been reviewed for the proposed residential sites. The search has been restricted to "Edge of Town" sites that are located in Norfolk and Suffolk, to obtain a sample that reflects the locational characteristics of proposed sites. The sub-category of sampled sites falls under the "Residential Zone" category. The sites selected within this sample have been surveyed on weekdays only.

4.4.8. The 'Business Park' category has been reviewed for the proposed employment use. The search has been restricted to "Edge of Town" sites within the South and East of England, in order to obtain a sample that reflect the locational characteristics of the proposed sites. The sub-category of sampled sites falls under the "Industrial Zone", "Commercial Zone" and "Development Zone" categories. The sites selected within this sample have been surveyed on weekdays only.

4.4.9. Table 4-5 and Table 4-6 show the trip rates obtained from TRICS after applying the aforementioned filters. Full TRICS output are shown in full in Appendix C. Table 4-7 and Table 4-8 subsequently summarise the trips generated by each of the seven areas considered in this study.

Table 4-5 - Car Trip Rates By Land Use

Land Use		Units	AM		PM	
			Arrivals	Departures	Arrivals	Departures
02/B	Business Park	GFA (100 sqm)	0.891	0.103	0.058	0.269
03/A	Residential/Houses Privately Owned	Dwellings	0.143	0.395	0.298	0.148

Table 4-6 - OGV Trip Rates By Land Use

Land Use		Units	AM		PM	
			Arrivals	Departures	Arrivals	Departures
02/B	Business Park	GFA (100 sqm)	0.005	0.005	0.002	0.001
03/A	Residential/Houses Privately Owned	Dwellings	0.01	0.007	0.005	0.002

Table 4-7 - Trips (By Car) Generated By Zone

Zone		Land Use	AM		PM	
			Arrivals	Departures	Arrivals	Departures
O1	Land to the west of Norwich Rd	Residential	50	137	103	51
O2	Land to the south of Skeyton Rd	Residential	54	150	113	56
O3	Land between Skeyton Rd and Aylsham Rd	Residential	84	232	175	87
O4	Land between Aylsham Rd and Cromer Rd	Residential	69	192	145	72
O5	Land to the north of Cromer Rd	Employment	218	25	14	66
O6	NW01/B	Residential	50	138	104	52
O7	E10	Employment	159	18	10	48

Table 4-8 - Trips (By OGV) Generated By Zone

Zone		Land Use	AM		PM	
			Arrivals	Departures	Arrivals	Departures
O1	Land to the west of Norwich Rd	Residential	3	2	2	1
O2	Land to the south of Skeyton Rd	Residential	4	3	2	1
O3	Land between Skeyton Rd and Aylsham Rd	Residential	6	4	3	1
O4	Land between Aylsham Rd and Cromer Rd	Residential	5	3	2	1
O5	Land to the north of Cromer Rd	Employment	1	1	0	0
O6	NW01/B	Residential	4	2	2	1
O7	E10	Employment	1	1	0	0

TRIP DISTRIBUTION

4.4.10. The resultant trip generation quantifies the number of car or van drivers on the highway network during the peak hourly periods generated by the emerging Local Plan allocations. These have been distributed onto the main access roads to North Walsham (external trips) and the main areas in the town (internal trips). Table 4-9 shows the seven external zones and four internal zones considered in this study on top of the zones described in the trip generation section.

Table 4-9 - Destination zones considered

Type	Zone	Zone Name
External	E1	A149 Cromer Road
	E2	B1145 Aylsham Road
	E3	B1150 Norwich Road
	E4	A149 Yarmouth Road
	E5	Happisburgh Road
	E6	Bacton Road
	E7	B1145 The Street
Internal	I1	Town Centre (NN 010 A-F)
	I2	North Norfolk 010G
	I3	North Norfolk 010H
	I4	North Norfolk 010I

4.4.11. The trip distribution has been based upon analysis of origin-destination (O-D) data for car journeys to work from the 2011 Census. Two datasets have been used for the distribution of external and internal trips (WU03EW – Location of usual residence and place of work by method of travel to work (MSOA level) and WF01BEW – Location of usual residence and place of work (LSOA level) respectively). Hence, two sets of trip distributions, one for each type of land use (residential and employment), have been carried out for internal and external trips.

4.4.12. It has been assumed that the distribution of the external trips will be the same for all allocations. A high-level gravity model was conducted to distribute the external trips from / to North Walsham (MSOA North Norfolk 010), meaning that the percentage of trips which will use each of the seven main routes accessing / exiting the town have been estimated, in order to assign trips to / from outside North Walsham to one of the seven access points (external zones).

Table 4-10 - External Trip Distribution

Origin / Destination	Employment		Residential	
	Number of Trips	% Trips	Number of Trips	% Trips
E1 - A149 Cromer Rd	399	15%	360	13%
E2 - B1145 Aylsham Rd	205	8%	275	10%
E3 - B1150 Norwich Rd	394	15%	878	31%
E4 - A149 Yarmouth Rd	497	19%	414	15%
E5 - Happisburgh Rd	95	4%	75	3%
E6 - Bacton Rd	254	10%	82	3%
E7 - B1145 The St	63	2%	21	1%
Internal	693	27%	693	25%
Total	**2600**	**100%**	**2798**	**100%**

4.4.13. The distribution of the internal trips, shown in Table 4-11 has been directly based upon the data from table WF01BEW of the 2011 Census, with the exception of the grouping of the Output Areas of North Norfolk 010A, B, C, D, E and F into one zone which for the purpose of this study has been called Town Centre.

Table 4-11 - Distribution of Internal Trips

Zone	Type	LSOA	I1	I2	I3	I4	E1	E2	E3	E4	E5	E6	E7	Total
O1	Residential	North Norfolk 010G	6%	4%	7%	7%	13%	10%	31%	15%	3%	3%	1%	100%
O2	Residential	North Norfolk 010G	6%	4%	7%	7%	13%	10%	31%	15%	3%	3%	1%	100%
O3	Residential	North Norfolk 010G	6%	4%	7%	7%	13%	10%	31%	15%	3%	3%	1%	100%
O4	Residential	North Norfolk 010G	6%	4%	7%	7%	13%	10%	31%	15%	3%	3%	1%	100%
O5	Employment	North Norfolk 010G	16%	4%	3%	3%	15%	8%	15%	19%	4%	10%	2%	100%
O6	Residential	North Norfolk 010H	7%	3%	8%	6%	13%	10%	31%	15%	3%	3%	1%	100%
O7	Employment	North Norfolk 010I	16%	3%	3%	4%	15%	8%	15%	19%	4%	10%	2%	100%

TRIP ASSIGNMENT

4.4.14. As mentioned previously, the transport model used for this study considers that the assignment is with 'fixed demand'. This means that the purpose of previous stages is to calculate the matrices that will be assigned to the North Walsham network for Scenarios 2 to 6. The assignment method used for this study is 'All or Nothing', meaning that all trips for an O-D pair have been assigned to the most attractive route, for each scenario.

4.4.15. An exhaustive analysis of the existing and proposed highways network of North Walsham has been carried out in order to determine the attractiveness of each possible route. All these findings are shown in Figure 4-1 (page 27), which illustrates the policy allocations and site accesses considered, the WLR plus northern and southern extensions, the one-way roads in the town and the HGV restrictions.

4.4.16. As seen in Figure 4-1 (page 27), the WLR plus the northern and southern extensions were categorised into sections for accuracy when assessing which sections of link road would be included in the route for individual trips.

4.5 SUMMARY & MODEL LIMITATIONS

4.5.1. The purpose of this study is to carry out a high-level traffic assessment of the growth allocated in the emerging Local Plan for North Norfolk and the WLR and its potential extensions. The updated and calibrated NATS model used in this study is considered suitable to provide a robust assessment. However, it is acknowledged that this simplified transport model has the following limitations:

- The traffic data used is not the most appropriate and the study will need to be undertaken at a later stage with up to date traffic surveys;
- The split of the Western Extension and the access points have been assumed due to the lack of information at this stage and these will need to be revisited once more information is available;
- The 'All or Nothing' assignment used assigns all the traffic to the most attractive route and does not assign any traffic to other alternative routes. This assignment method could over-estimate the traffic on the most direct routes and under-estimate others;
- This assessment does not take into account any induced demand that the link road may generate or changes in modal shift; and
- The transport model is simple spreadsheet based and therefore it does not take into account real-time changes in the network conditions.

5

TRAFFIC IMPACT ASSESSMENT

5 TRAFFIC IMPACT ASSESSMENT

5.1 INTRODUCTION

5.1.1. This Chapter explores the high-level traffic impact of the emerging Local Plan planned growth together with the WLR and potential extensions upon the existing highway network and its users. The following junctions of North Walsham have been assessed:

- A149 / Norwich Road (Table 5-6 and Table 5-7);
- Norwich Road / Station Road (Table 5-8 and Table 5-9);

Aylsham Road / Station Road (Table 5-10 and

- Table 5-11);
- Aylsham Road / Tungate Road / Greens Road (Table 5-12 and Table 5-13);
- Cromer Road / Greens Road (Table 5-14 and Table 5-15);
- A149 / B1145 / Cromer Road (Table 5-16 and Table 5-17); and
- B1150 North Walsham Road / Link Road (Table 5-18 and Table 5-19).

5.1.2. For all junctions, forecast traffic flows for all movements can be viewed in Appendix D.

This high-level traffic impact assessment is based on the methodology described in Chapter 5 and therefore it has the limitations described in that Chapter. Please note that the traffic volumes in this Chapter are only indicative and should not be used for detailed design.

5.1.3. In order to assess the traffic impact on these junctions, the scenarios described in Section 4.2 have been analysed. The traffic surveys used for this assessment are provided in Appendix E.

5.2 THROUGH TRAFFIC ASSESSMENT

5.2.1. Assessment of the town's through traffic has been carried out following the methodology described in Chapter 4 to estimate the proportion of existing traffic that will divert onto the WLR with or without the extensions. Table 5-1 to Table 5-4 show the 2019 base year modelled through traffic flows for the morning and afternoon peak periods.

Table 5-1 - Modelled through traffic in Base Year 2019 AM (light vehicles)

From\To	A149 Cromer Rd	B1145 Aylsham Rd	B1150 Norwich Rd	A149 Yarmouth Rd	Bacton Rd	B1145 The Street
A149 Cromer Rd	0	0	23	58	84	48
B1145 Aylsham Rd	21	0	7	6	35	61
B1150 Norwich Rd	59	9	0	2	96	80
A149 Yarmouth Rd	95	12	15	0	39	52
Bacton Rd	34	65	96	39	0	11
B1145 The Street	68	52	145	38	13	0

Table 5-2 - Modelled through traffic in Base Year 2019 AM (HGVs)

From\To	A149 Cromer Rd	B1145 Aylsham Rd	B1150 Norwich Rd	A149 Yarmouth Rd	Bacton Rd	B1145 The Street
A149 Cromer Rd	0	0	0	5	3	4
B1145 Aylsham Rd	0	0	0	0	2	3
B1150 Norwich Rd	1	0	0	0	4	6
A149 Yarmouth Rd	17	0	0	0	0	3
Bacton Rd	4	3	3	2	0	1
B1145 The Street	1	0	0	14	0	0

Table 5-3 - Modelled through traffic in Base Year 2019 PM (light vehicles)

From\To	A149 Cromer Rd	B1145 Aylsham Rd	B1150 Norwich Rd	A149 Yarmouth Rd	Bacton Rd	B1145 The Street
A149 Cromer Rd	0	0	19	46	25	63
B1145 Aylsham Rd	16	0	4	19	27	46
B1150 Norwich Rd	116	14	0	6	118	161
A149 Yarmouth Rd	72	36	13	0	41	82
Bacton Rd	26	53	104	36	0	27
B1145 The Street	28	49	118	69	5	0

Table 5-4 - Modelled through traffic in Base Year 2019 PM (HGVs)

From\To	A149 Cromer Rd	B1145 Aylsham Rd	B1150 Norwich Rd	A149 Yarmouth Rd	Bacton Rd	B1145 The Street
A149 Cromer Rd	0	0	0	0	1	0
B1145 Aylsham Rd	0	0	0	0	0	0
B1150 Norwich Rd	1	0	0	0	3	0
A149 Yarmouth Rd	16	0	0	0	0	0
Bacton Rd	0	2	0	0	0	0
B1145 The Street	0	0	0	0	1	0

5.2.2. The base year 2019 modelled traffic volumes have been uplifted using the background growth factors of Table 4-3 to estimate the 2036 through traffic flows. This has then been manually assigned to the quickest route available to identify which movements are impacted once the additional traffic is attracted by the link road, these routes are in Appendix D. It has been assumed that all through traffic will use the link road for the scenarios shown in Table 5-5.

Table 5-5 - Scenarios when the through traffic uses the link road

Origin/Destination	A149 Cromer Rd	B1145 Aylsham Rd	B1150 Norwich Rd	A149 Yarmouth Rd	Bacton Rd	B1145 The Street
A149 Cromer Rd	N/A	Always	Always	With southern extension	Never	HGVs with northern extension
B1145 Aylsham Rd	Always	N/A	Always	With southern extension	Never	HGVs with northern extension
B1150 Norwich Rd	Always	Always	N/A	With southern extension	Never	HGVs with northern extension
A149 Yarmouth Rd	With southern extension	With southern extension	With southern extension	N/A	Never	Never
Bacton Rd	Never	Never	Never	Never	N/A	Never
B1145 The Street	HGVs with northern extension	HGVs with northern extension	HGVs with northern extension	Never	Never	N/A

5.3 JUNCTION ASSESSMENTS

5.3.1. The forecast impact of the growth proposed in the emerging Local Plan, the WLR and its possible extensions on the main junctions of North Walsham is summarised in this section. The tables in this section show the forecast change in peak hour traffic flow on each approach to the junctions. More details about the turning movements can be found on Appendix D.

5.3.2. A “RAG” score is then derived as follows:

- Traffic reduces for DS compared to DN
- Traffic increases by fewer than 100 vehicles per hour
- Traffic increases by more than 100 veh/hr, but less than 10%
- Traffic increases by more than 100 veh/hr and more than 10%

A149 / NORWICH ROAD JUNCTION

5.3.3. The A149 / Norwich Road junction is a four-arm signalised junction with segregated left turn lanes on the two A149 approaches. The allocated growth within the Local Plan is expected to have a significant impact increasing traffic volumes on all approaches. The WLR is not expected to mitigate this traffic increase without a southern extension.

5.3.4. With a southern extension, traffic increase from the planned growth is expected to reduce considerably on all approaches except the Norwich Road northern approach. Traffic volumes on the A149 eastern approach are expected to decrease to below base year 2019 levels. With the southern extension, it is expected to lead to minimal traffic increase in the morning peak hour and a small reduction in the evening peak.

Table 5-6 - Forecast traffic flows for A149 / Norwich Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Norwich Rd S	462	735	735	700	603	569
A149 W	445	543	539	533	427	421
Norwich Rd N	496	609	609	607	609	607
A149 E	335	456	456	456	218	218
Total	**1,738**	**2,342**	**2,338**	**2,297**	**1,857**	**1,815**

Table 5-7 - Forecast traffic flows for A149 / Norwich Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Norwich Rd S	597	691	691	668	615	592
A149 W	476	601	591	582	513	505
Norwich Rd N	470	524	524	522	524	522
A149 E	381	483	483	483	228	228
Total	**1,924**	**2,299**	**2,289**	**2,256**	**1,880**	**1,847**

NORWICH ROAD / STATION ROAD JUNCTION

5.3.5. The Norwich Road / Station Road junction is a narrow three-arm priority junction, with Norwich Road having a dedicated right-turn lane to turn into the minor arm, Station Road. The Local Plan allocated growth is expected to increase traffic on all approaches, significantly so on Station Road, and could discomfort local residents. However, the WLR could considerably reduce traffic volumes on Station Road and Norwich Road North to below base year 2019 levels. Additionally, the WLR could mitigate all the traffic increase on Norwich Road South.

Table 5-8 - Forecast traffic flows for Norwich Road / Station Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Station Rd	60	284	10	10	-	-
Norwich Rd N	515	521	156	154	140	137
Norwich Rd S	495	576	464	430	461	427
Total	**1,070**	**1,381**	**630**	**593**	**602**	**565**

Table 5-9 - Forecast traffic flows for Norwich Road / Station Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Station Rd	79	178	17	17	-	-
Norwich Rd N	498	515	141	134	127	120
Norwich Rd S	622	672	571	548	565	542
Total	**1,199**	**1,365**	**729**	**699**	**692**	**662**

AYLSHAM ROAD / STATION ROAD JUNCTION

5.3.6. The Aylsham Road / Station Road junction is a three-arm priority junction, with Aylsham Road the main road and Station Road the minor arm. The Local Plan planned growth could increase traffic on all approaches. Main traffic increases are expected for the:

- Right turn into Station Road; and
- Left turn out from Station Road.

5.3.7. The increased right turns into Station Road could cause long delays along Aylsham Road due to insufficient passing width on the carriageway; however, the WLR could considerably reduce both movements returning the junction operation similar to that of the base year 2019 situation.

Table 5-10 - Forecast traffic flows for Aylsham Road / Station Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Aylsham Rd E	152	172	178	186	155	155
Station Rd	225	365	177	185	158	158
Aylsham Rd W	189	337	259	250	262	254
Total	**566**	**874**	**614**	**621**	**575**	**567**

Table 5-11 - Forecast traffic flows for Aylsham Road / Station Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Aylsham Rd E	129	157	158	179	137	137
Station Rd	164	264	62	74	54	54
Aylsham Rd W	215	309	232	228	220	216
Total	**509**	**730**	**452**	**481**	**411**	**408**

AYLSHAM ROAD / TUNGATE ROAD / GREENS ROAD JUNCTION

5.3.8. The Aylsham Road / Tungate Road / Greens Road junction is a four-arm staggered priority junction, with Aylsham Road the main road. With the WLR, this junction will require highway alterations as the proposed WLR would tie in at this location (see Junction 4 in Chapter 7).

5.3.9. The Local Plan allocated growth is not expected to increase traffic, that is unless the WLR comes forward, in which case it is expected to double traffic volumes at the required new WLR junction here. The WLR is expected to increase considerably the traffic volumes on Aylsham Road east, which could put more pressure on the narrow bridge under the railway line.

Table 5-12 - Forecast traffic flows for Aylsham Road/ Tungate Road/ Greens Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Greens Rd	114	132	81	59	81	59
Aylsham Rd E	266	418	677	676	672	670
Tungate Rd	27	27	27	27	27	27
Aylsham Rd W	181	222	227	227	227	227
Link Road S	-	-	225	259	405	420
Link Road N	-	-	78	103	138	170
Total	**588**	**798**	**1,315**	**1,350**	**1,550**	**1,573**

Table 5-13 - Forecast traffic flows for Aylsham Road/ Tungate Road/ Greens Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Greens Rd	192	229	159	134	159	134
Aylsham Rd E	211	257	499	498	458	457
Tungate Rd	41	41	41	41	41	41
Aylsham Rd W	158	180	192	192	192	192
Link Road S	-	-	187	210	345	361
Link Road N	-	-	94	127	141	188
Total	**602**	**707**	**1,172**	**1,201**	**1,336**	**1,372**

CROMER ROAD / GREENS ROAD JUNCTION

5.3.10. The Cromer Road / Greens Road junction is a narrow three arm priority junction, with Cromer Road the main road. Local Plan allocated growth is expected to increase traffic on all approaches, especially in the AM by up to 43.5%. However, the WLR would reduce considerably traffic, potentially to below base year 2019 levels were either extension built.

Table 5-14 - Forecast traffic flows for Cromer Road / Greens Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Cromer Rd E	344	481	481	411	338	268
Greens Rd	209	452	167	139	125	97
Cromer Rd W	429	508	434	373	367	305
Total	**983**	**1,441**	**1,081**	**923**	**829**	**671**

Table 5-15 - Forecast traffic flows for Cromer Road / Greens Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Cromer Rd E	449	482	482	439	403	359
Greens Rd	190	262	86	75	70	60
Cromer Rd W	556	676	559	540	498	479
Total	**1,196**	**1,420**	**1,127**	**1,054**	**971**	**898**

A149/ B1145 / CROMER ROAD JUNCTION

5.3.11. The A149 / B1145 / Cromer Road junction is a four-arm signalised junction. Currently, the junction has three arms with equal amounts of traffic, being three of the main roads in the town. The Cromer Road East approach can only be accessed from a residential area.

5.3.12. The Local Plan allocated housing and employment growth is expected to increase traffic by 34% in the morning peak hour and 14% in the evening peak hour. The WLR is not expected to reduce traffic without both extensions in which case, the traffic levels could reduce to levels akin to the Do Nothing 2036 scenario.

Table 5-16 - Forecast traffic flows for A149/ B1145/ Cromer Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Cromer Rd E	16	16	16	16	16	16
A149	431	699	699	669	541	516
Cromer Rd W	454	582	579	484	470	375
B1145	442	530	530	455	527	452
Total	**1,343**	**1,827**	**1,824**	**1,624**	**1,553**	**1,358**

Table 5-17 - Forecast traffic flows for A149/ B1145/ Cromer Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
Cromer Rd E	8	8	8	8	8	8
A149	540	609	609	597	498	496
Cromer Rd W	517	593	583	553	506	476
B1145	592	704	704	652	703	651
Total	**1,656**	**1,914**	**1,904**	**1,810**	**1,715**	**1,631**

B1150 NORTH WALSHAM ROAD / LINK ROAD

5.3.13. This would be a brand-new junction where the WLR would tie in to the existing network (see Junction 7 in Chapter 7). The Local Plan allocated growth is not expected to increase traffic volumes significantly, however, the WLR especially with a southern extension would. This junction will need to be designed to accommodate these traffic volumes.

Table 5-18 - Forecast traffic flows for B1150 North Walsham Road / Link Road in AM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
North Walsham Rd N	573	763	962	990	1,122	1,156
Link Rd E	-	-	-	-	222	222
North Walsham Rd S	408	536	517	517	517	517
Link Rd W	-	-	653	656	788	791
Total	**981**	**1,298**	**2,132**	**2,163**	**2,649**	**2,686**

Table 5-19 - Forecast traffic flows for B1150 North Walsham Road / Link Road in PM

Approach	DN 2036	DM 2036	DS 2036	DS+N 2036	DS+S 2036	DS+NS 2036
North Walsham Rd N	384	469	770	781	852	875
Link Rd E	-	-	-	-	220	220
North Walsham Rd S	587	729	693	693	693	693
Link Rd W	-	-	497	504	603	611
Total	**970**	**1,198**	**1,960**	**1,978**	**2,369**	**2,399**

5.4 SUMMARY & MITIGATION MEASURES

IMPACT OF THE LOCAL PLAN GROWTH

5.4.1. If the sites that are to be allocated, supporting 2,150 dwellings and 12.1ha of employment land, are to be built out, these are expected to generate 1,618 (708 arrivals and 910 departures) additional trips in the morning peak and 1,114 (677 arrivals and 437 departures) additional trips in the evening peak. These additional trips are expected to cause the following impacts:

- significant traffic increase on the main junctions of the town, including the A149 junctions;
- significant traffic increase, especially of HGVs, on Aylsham Road and Station Road; and
- significant traffic increase on the railway crossings.

5.4.2. The worst case between AM and PM of the expected traffic impacts is shown in Figure 5-1.

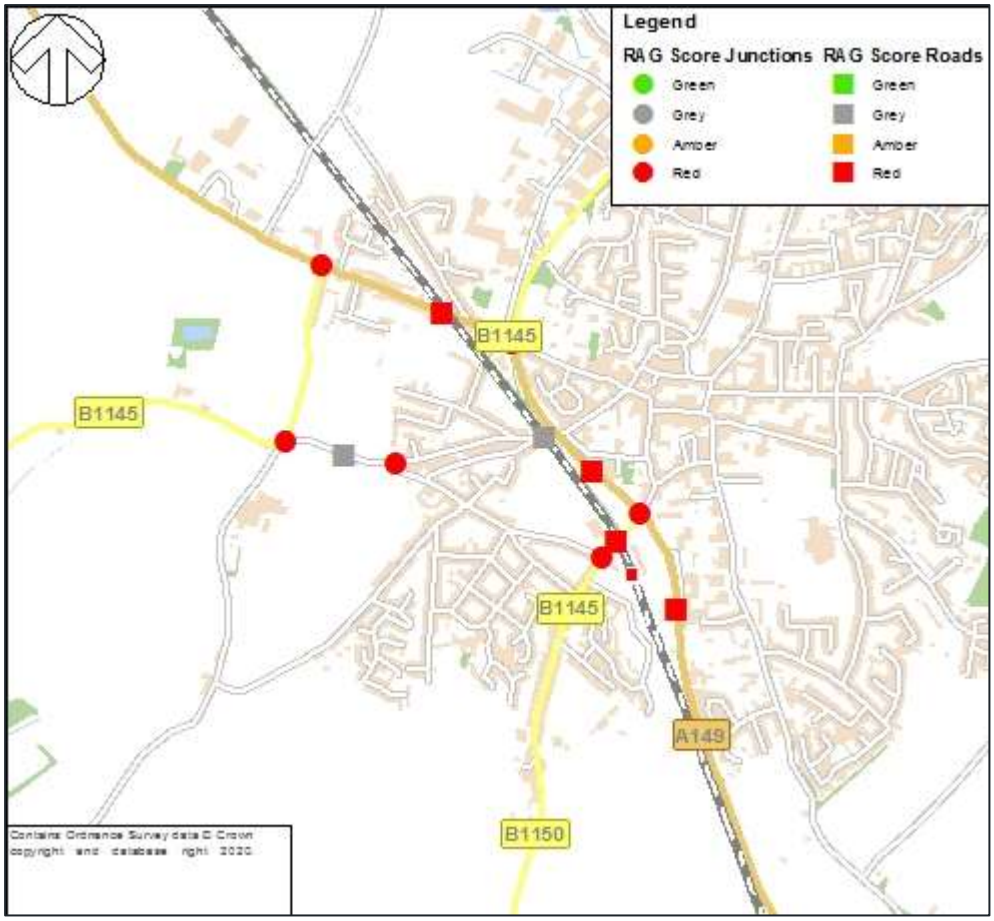

Figure 5-1 - RAG score - Local Plan Growth

5.4.3. The high-level traffic impact assessment concluded that the impact of these additional trips would cause an adverse impact on the highway network; therefore, in order to support the planned growth a WLR will be required to mitigate the traffic impacts.

TRAFFIC IMPACT OF THE WLR

5.4.4. The WLR is expected to result in shorter trips between Cromer Road, Aylsham Road and Norwich Road, reduce general traffic (and HGV movements) around the residential areas (Station Road), reduce traffic within the town centre (Park Lane) and reduce some traffic routing through the A149 / Norwich Road and A149 / Cromer Road junctions. However, the WLR is not expected to mitigate all traffic impacts generated by the planned growth identified in the emerging Local Plan, and there could still be traffic impacts on the A149 Bypass; A149 / Norwich Road junction; A149 / Cromer Road junction and HGVs on Aylsham Road and Station Road.

5.4.1. The WLR is expected to carry approximately 360 vehicles in the AM and 300 in the PM on the section between Norwich Road and Aylsham Road. On the section between Aylsham Road and Cromer Road it is expected to carry 700 vehicles approximately in the AM and 680 in the PM. The worst case between AM and PM of the expected traffic impacts is shown in Figure 5-2.

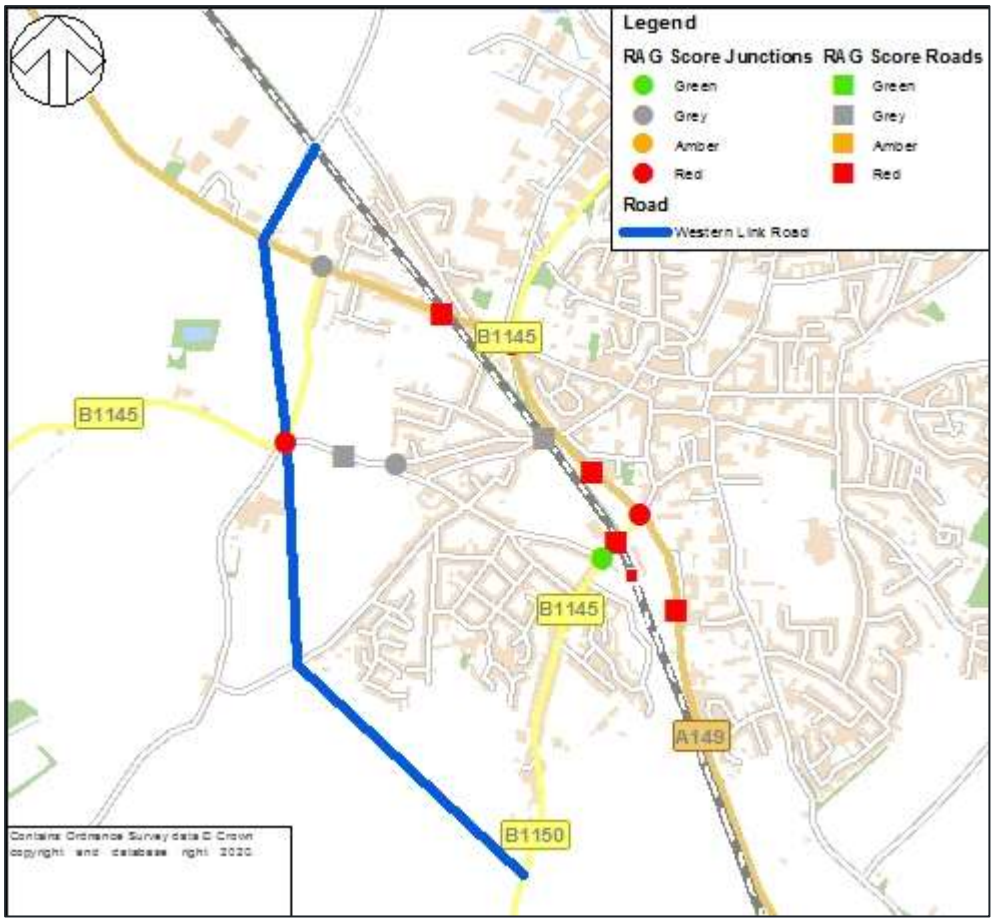

Figure 5-2 - RAG score - WLR

5.4.2. Some of these remaining impacts can be mitigated by the northern extension. This section of the link road is expected to result in a significant traffic flow reduction on Cromer Road and a significant reduction of right-turn movements from the B1145 into the A149 Cromer Road, which is likely to release additional capacity from the junction.

5.4.1. The northern extension of the WLR is expected to capture 215 vehicles in the AM peak and 110 in the PM. The worst case between AM and PM of the expected traffic impacts is shown in Figure 5-3.

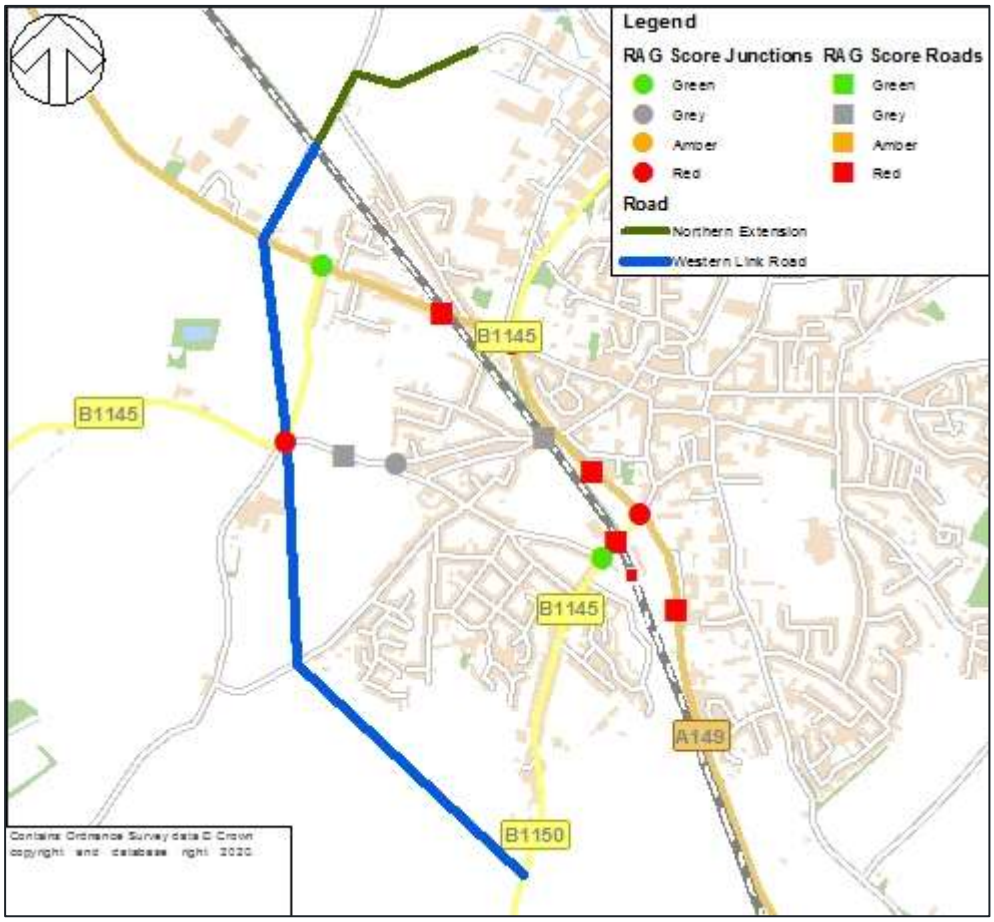

Figure 5-3 - RAG score - WLR plus northern extensions

5.4.2. Additionally, the southern extension is also expected to mitigate some additional traffic impacts. This section of the link road is expected to result in a significant traffic flow reduction on Norwich Road and considerably reduce HGV movements on Aylsham Road and Station Road.

5.4.1. The southern extension of the WLR is expected to carry approximately 480 vehicles in the AM peak and 410 in the PM peak. The worst case between AM and PM of the expected traffic impacts is shown in Figure 5-4.

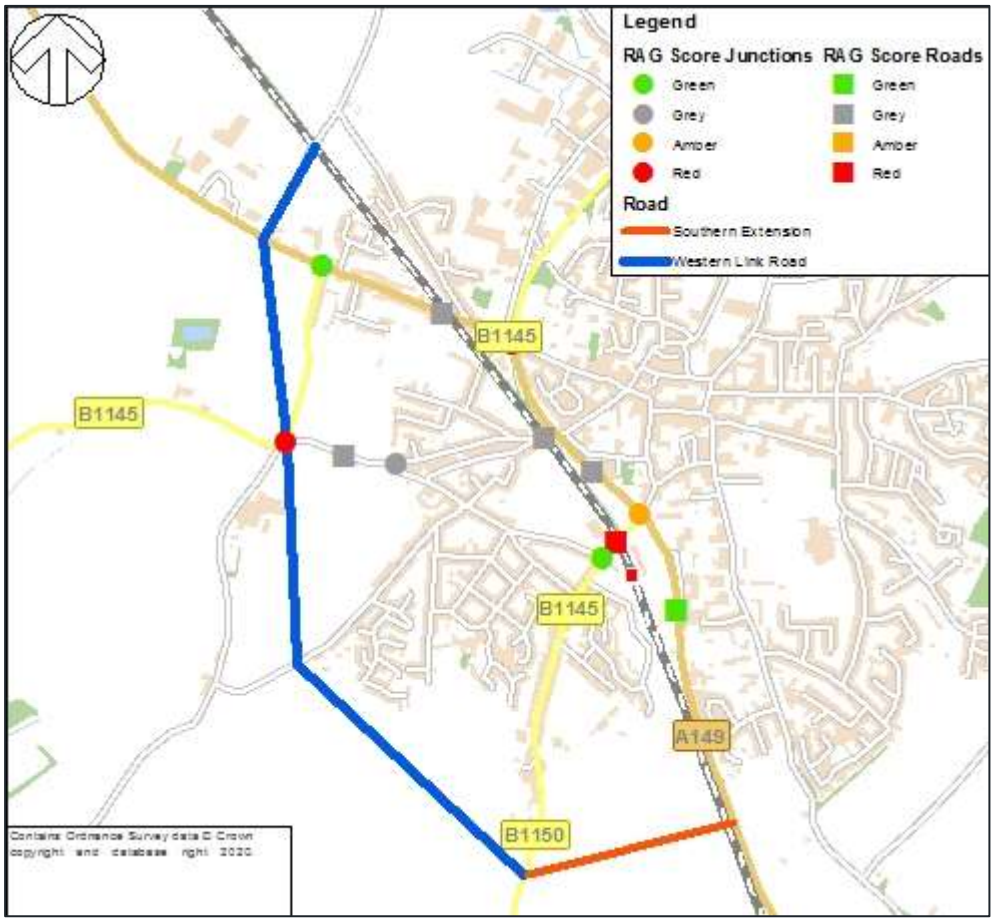

Figure 5-4 - RAG score - WLR plus southern extensions

5.4.2. Even if both extensions to the link road are constructed, there could still be a few minor traffic impacts. The worst case between AM and PM of the expected traffic impacts is shown in Figure 5-5.

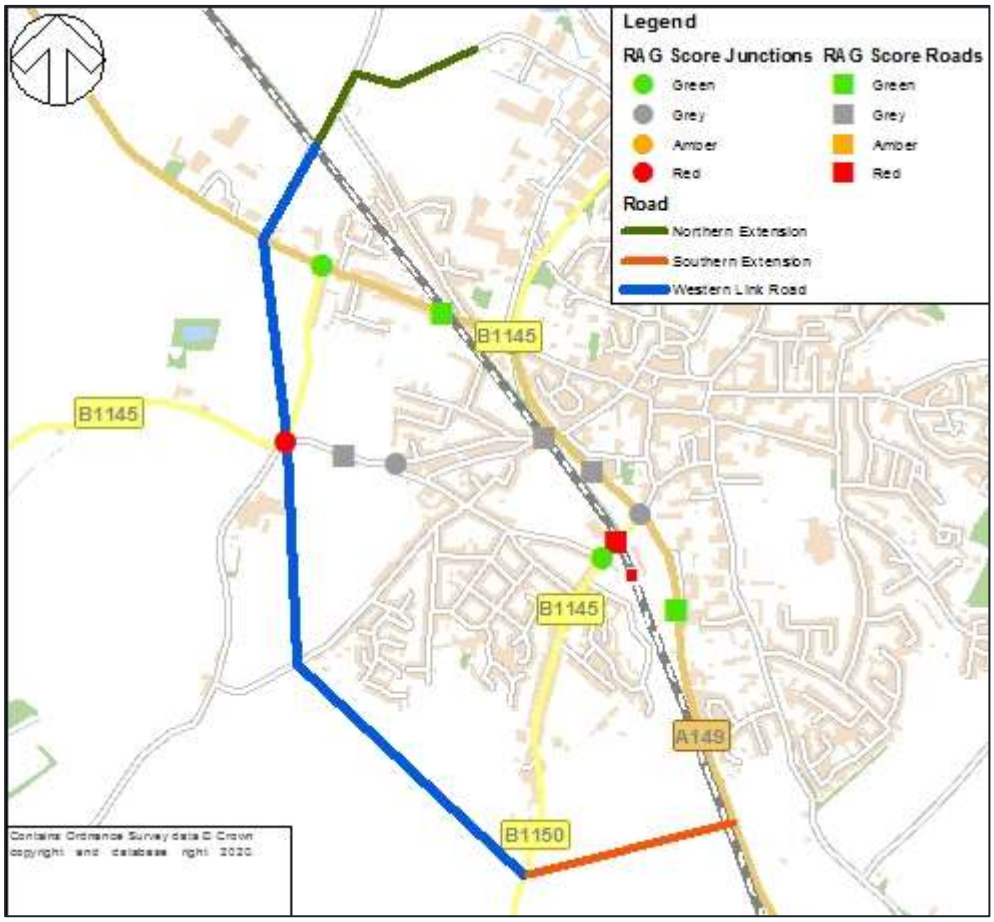

Figure 5-5 - RAG score - WLR plus both extensions

MITIGATION MEASURES

5.4.3. It is recommended that the A149 signalised junctions are monitored and the traffic impacts analysed at a later stage. The expected traffic impacts on these two junctions could be mitigated by the vehicle activated systems that are already in place. Therefore, it may not be required to improve these junctions.

5.4.4. The model highlights that Aylsham Road could be on the desired line from the Western Extension towards the town centre. This road should not be suitable for a significant traffic increase and therefore a signage strategy should be put in place to direct drivers to other alternative routes, i.e. Cromer Road or Norwich Road.

5.4.5. NMUs are not likely to follow an alternative route to Aylsham Road that requires a long diversion, and therefore a different signage strategy should be in place to direct pedestrians and cyclists towards the city centre via Weavers Way. However, Weavers Way may not be suitable for heavy movements of pedestrians and cyclists, especially during winter. For this reason, the following improvements to Weavers Way could be consider:

- paving the Weavers Way from Tungate Road to Oak Road,
- putting street lights from Tungate Road to Station Road; and
- implementing a pedestrian crossing on Station Road.

6

LINK ROAD DESIGN METHODOLOGY

6 LINK ROAD DESIGN METHODOLOGY

6.1 LIMITATIONS & EXCLUSIONS

6.1.1. Traffic flow data and outputs from relevant traffic modelling software was not available during the course of preparing the highways feasibility designs. Analysis of this information is critical in determining robust junction layouts that not only provide sufficient capacity but also are geometrically compliant with relevant design standards and adequately accommodate the swept paths of large vehicles. As a result, the junction layouts included in this study must be regarded as conceptual and subject to further modification in respect of geometric considerations, including associated visibility requirements.

6.1.2. In addition, the scope of this study does not extend to examining the feasibility of options in 3-D and therefore no detailed consideration of vertical alignment or earthworks has been undertaken at this stage. It should be noted that the vertical curvature requirements for the design speed of the road have not been assessed either. This also means that the CD 109 stopping sight distance requirements cannot be fully assessed at this stage.

6.1.3. Another aspect outside of the scope of this study, and one which would have an effect on likely land-take requirements, is the consideration of a drainage strategy and potential drainage infrastructure for a new link road. Similarly, ancillary infrastructure including road-side facilities for highway maintenance and accommodation works for adjacent properties and land have not been considered.

6.1.4. It should also be noted that the potential junction arrangements discussed in Chapter 7 of this study relate only to existing roads that would be affected by the proposed link road, as there is currently no information regarding access requirements to the proposed development areas in Chapter 2 of this study.

6.2 SPEED LIMIT & CLASSIFICATION

6.2.1. From discussions with NCC and NNDC officers we understand that the proposed link road would have a 30mph speed limit throughout. According to CD 109 ‘Highway Link Design’, which is part of the Design Manual for Roads and Bridges (DMRB), roads with a 30mph speed limit are classified as urban.

6.3 DESIGN SPEED & HORIZONTAL CURVATURE

6.3.1. Design speed is a key parameter in the design process that sets the requirements for horizontal and vertical curvature, stopping sight distance and visibility around junctions.

6.3.2. The NCC document “Safe, Sustainable Development (revised November 2019)” contains aims and guidance notes for local highway authority requirements in development management. Policy G3.1 of the above document requires that residential development should accord with the following:

- Manual for Streets (MfS)
- Manual for Streets 2 (MfS 2)
- Norfolk Residential Design Guide
- Estate Road Construction and Specification

6.3.3. Chapter 8 of MfS 2, notes that design speeds in urban areas have tended to be based on the advice in TD 9/93 (now CD 109) which determines design speed from the existing or proposed local speed limit but with some allowance for vehicles travelling at higher speeds.

6.3.4. Based on research in MfS which found that drivers tend to adopt higher speeds in response to more generous highway geometry, MfS2 considers that it is inappropriate in areas subject to a 30mph speed limit to adopt a design speed of more than 30mph (48kph). This advice is in contrast to Table 2.5 of CD 109 which requires the selection of a 60kph design speed for roads with a posted speed limit of 30mph.

6.3.5. For the purposes of this study, a 60kph design speed and the associated horizontal curvature requirements set out in CD 109 Table 2.10 (see Figure 6-1) have been adopted as, notwithstanding the exclusions highlighted in section 1.2, this would illustrate a 'worse-case' scenario in terms of potential land-take requirements for the link road. However, in subsequent stages of scheme development, it is recommended that NCC's requirements regarding design speed for the link road are confirmed at the earliest opportunity particularly with reference to the MfS 2 recommendations outlined above and that the concept design is reviewed as appropriate.

Table 2.10 Design speed related parameters

Design speed kph	120	100	85	70	60	50	V2/R
Stopping sight distance (metres)							
Desirable minimum	295	215	160	120	90	70	-
One step below desirable minimum	215	160	120	90	70	50	-
Horizontal curvature (metres)							
Minimum R* with adverse camber and without transitions	2880	2040	1440	1020	720	520	5
Minimum R* with superelevation of 2.5%	2040	1440	1020	720	510	360	7.07
Minimum R* with superelevation of 3.5%	1440	1020	720	510	360	255	10
Desirable minimum R (superelevation 5%)	1020	720	510	360	255	180	14.14
One step below desirable Minimum R (superelevation 7%)	720	510	360	255	180	127	20
Two steps below desirable minimum radius (superelevation 7%)	510	360	255	180	127	90	28.28
Vertical curvature							
Desirable minimum* crest K value	182	100	55	30	17	10	-
One step below desirable min crest K value	100	55	30	17	10	6.5	-
Desirable minimum sag K value	37	26	20	20	13	9	-
Overtaking sight distances							
Full overtaking sight distance FOSD (metres)	-	580	490	410	345	290	-
FOSD overtaking crest K value	-	400	285	200	142	100	-
* Not recommended for use in the design of single carriageways (see Section 9)							
The V^2/R values shown above simply represent a convenient means of identifying the relative levels of design parameters, irrespective of design speed.							

Figure 6-1 - Design parameters for a 60kph design speed. Source: DMRB CD 109 Table 2.10

6.3.6. It should be noted that the vertical curvature requirements for a 60kph design speed have not been assessed as the scope of this study does not extend to examining the link road in three dimensions. This also means that the CD 109 stopping sight distance requirements cannot be fully assessed at this stage.

6.4 JUNCTIONS

6.4.1. The following DMRB standards have been referred to in developing conceptual junction layouts as part of this study:

- CD 116 - Geometric design of roundabouts
- CD 123 - Geometric design of at-grade priority and signal-controlled junctions

6.4.2. We note, however, the comments in MfS 2 chapter 8 regarding applying DMRB standards to non-trunk road situations, as is the case with this study. It is recommended that NCC's requirements as highway authority for the link road are confirmed in subsequent stages of scheme development and that the conceptual junction layouts are reviewed if appropriate.

6.4.3. Visibility splays are a very important safety feature associated with safe junction design. Due to the conceptual nature of the junction layouts and the likelihood of geometric changes being required once traffic data is available (see section 6.1) to satisfy capacity requirements, visibility splays have not been considered in detail as part of this study. Again, this aspect of the link road design should be reviewed in more detail in subsequent stages of scheme development.

6.5 CROSS SECTION

6.5.1. It has been assumed that the link road would comprise of a single carriageway throughout but this should be confirmed once appropriate traffic modelling data is available.

6.5.2. In terms of cross section, Figure 2.1.1N1g from DMRB standard 'CD 127 Cross sections and headrooms' shows the cross-sectional requirements for a single carriageway urban all-purpose road and comprises traffic lanes 3.65m wide (total carriageway width 7.3m). This cross-section has been used as the basis for this study, however, noting the comments in MfS 2 chapter 8 regarding lane widths it is recommended that NCC's requirements as highway authority for the link road are confirmed in subsequent stages of scheme development and that the cross section described above is reviewed if appropriate.

6.6 WALKING & CYCLING

6.6.1. We note that the preferred design approach described in MfS and MfS 2 is essentially to create suitable conditions so that cyclists can be accommodated on the carriageway and that this may require reductions in the volume and or speed of traffic and the reallocation of space away from traffic that may involve reduced vehicle lane widths.

6.6.2. Figure 6-2 below is an extract from the Sustrans Design Manual (April 2014) which illustrates how traffic volume and speed may influence the suitability of on-carriageway cycle facilities and the decision on the need to potentially segregate cyclists from other traffic, via off-carriageway facilities. Without traffic flow information for the proposed link road, it is not possible to draw any firm conclusions at this stage regarding Figure 6-2. However, it is considered likely that the anticipated two-way vehicle flows and 85th percentile vehicle speeds would indicate that a form of physical segregation should be provided. This should be confirmed once appropriate traffic modelling data is available.

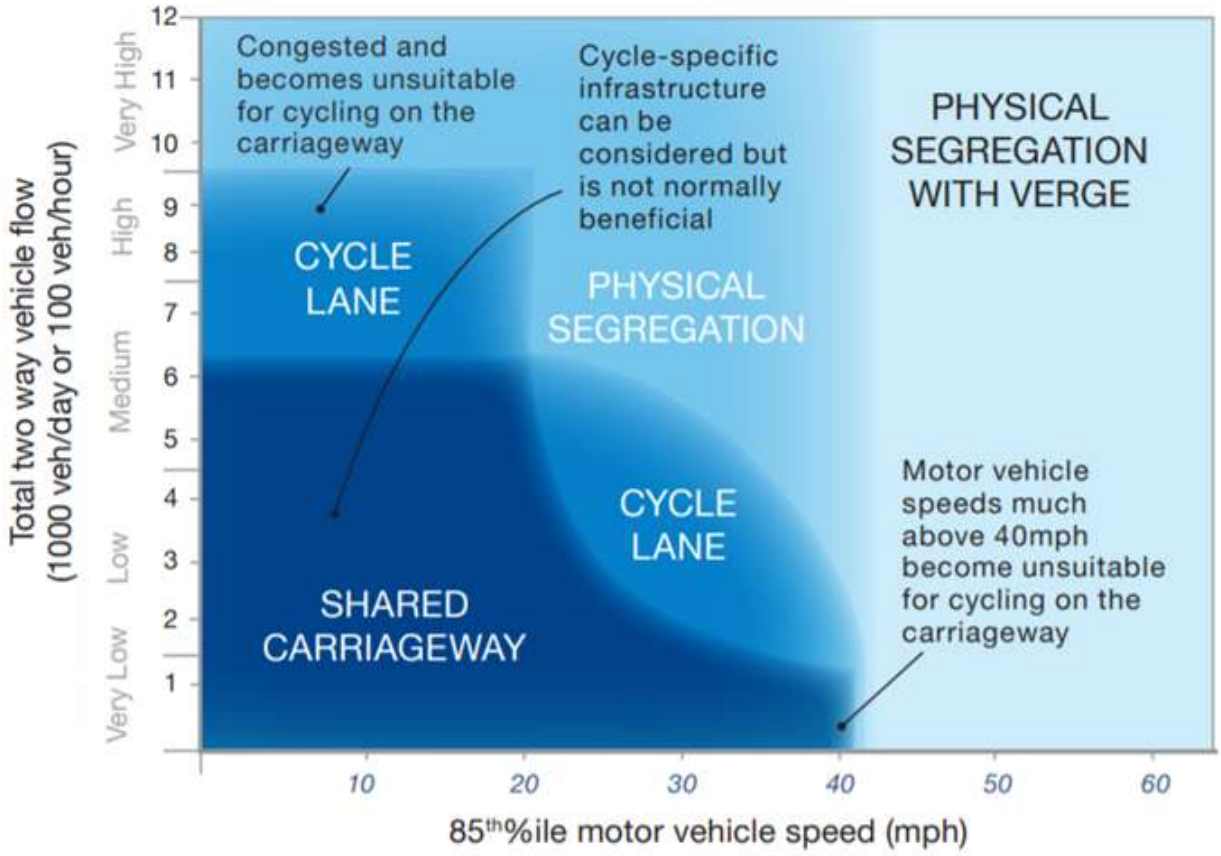

Figure 6-2 - Suggested cycle provision on links. Source: Sustrans Design Manual (April 2014)

6.6.3. For the purposes of this study, where gaining an understanding of the likely worse-case scenario footprint of the new link road is important, it has been assumed at this stage that off-carriageway cycle facilities would be provided and that these would consist of a 3m wide unsegregated shared use path for pedestrians and cyclists, generally on both sides of the link road with a 1m wide verge between the edge of carriageway and path.

6.6.4. We have referred to DMRB standard CD 143 'Designing for walking, cycling and horse-riding' in identifying the above proposal, noting that:

- A 3m unsegregated shared use path width is the minimum width where there are 200 users an hour or more; and
- On roads with a speed limit of 40mph or less, the minimum separation from an unsegregated shared use path and the carriageway should be a minimum of 0.5 metres

6.6.5. We also note the comments in Local Transport Note 1/20 regarding the need for early engagement with relevant interested parties when shared use facilities are being considered, particularly those representing disabled people and user groups representing both pedestrians and cyclists.

6.6.6. Again, it is recommended that NCC's requirements as highway authority for the link road are confirmed in subsequent stages of scheme development and that the walking and cycling facilities described above are reviewed if appropriate.

7

HGHWAY FEASIBILITY

7 HGHWAY FEASIBILITY

7.1 INTRODUCTION

7.1.1. This chapter aims to demonstrate that there are feasible highways options to deliver the WLR and its possible extensions. It should be noted that the alternatives described below are not the only feasible junction layouts and highways alignments.

7.1.2. As part of the options described in Sections 7.2 to 7.5 below, it is important to note that potential junction arrangements shown relate only to existing roads that would be affected by the proposed link road, as there is currently no information regarding access requirements to the proposed development areas described in Sections 0 and 0.

7.2 WESTERN LINK ROAD – OPTION 1

7.2.1. This option forms the WLR and runs from a point immediately south of the Bradfield Road railway bridge to the B1150 North Walsham Road, incorporating junctions 3 to 7. Figure 7-1 shows two different conceptual link road alignments between junction 3 and junction 6, this is shown in full as Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0101 P01 in Appendix F.

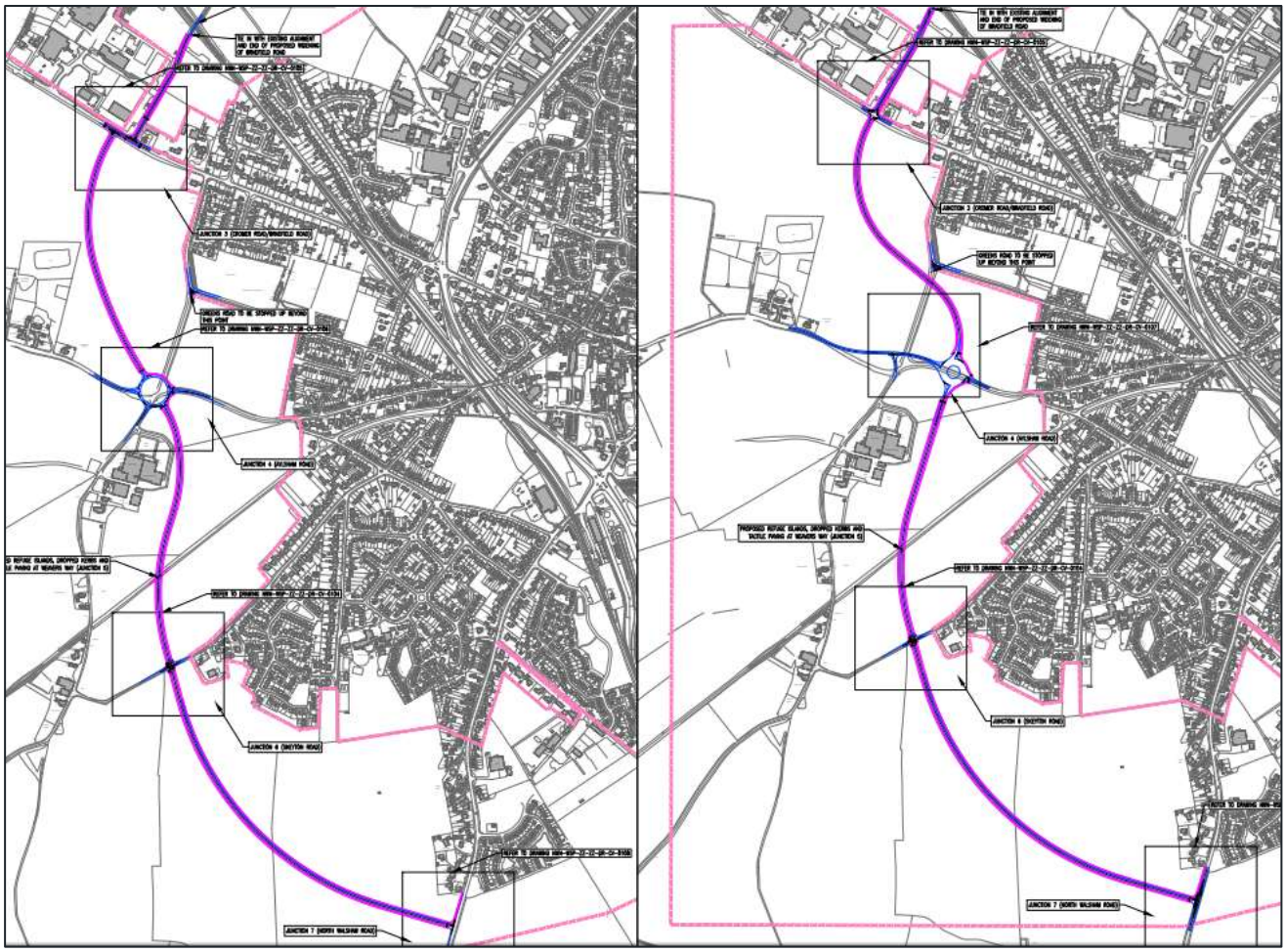

Figure 7-1 - Option 1 – Proposed Western Link Road alignments 1A and 1B

WESTERN LINK ROAD ALIGNMENT OPTIONS

7.2.2. The principle issue that has driven the identification of two different alignments for the WLR, reference 1A and 1B, is the potential different junction layouts at the Aylsham Road / Greens Road / Tungate Road junction (junction 4), namely JN4.A and JN4.B (see 7.2.16 to 7.2.21 for further details), and also relevant is the junction layouts options for junction 3, namely JN3.A and JN3.B (see 7.2.9 to 7.2.14 for further details).

7.2.3. The centre line of alignment 1A between junctions 3 and 4 consists largely of a sweeping left-hand radius that runs to within approximately 20m of the northeast corner of a property referred to as The Old Stables. Whilst 3-D design has not been undertaken regarding this alignment at present, due to the relatively flat topography of this part of the site it would appear feasible to accommodate any earthworks that may be required without impacting on the above property. This should be confirmed in subsequent stages of scheme development.

7.2.4. Alternatively, link road alignment 1B essentially consists of a sweeping S bend alignment between junctions 3 and 4, mostly due to junction 4.B. It is sited approximately 80m further east than JN4.A. This alignment complies with the desirable minimum horizontal radius for a 60kph road except for the southernmost section east of Greens Road, which is one step below the desirable minimum radius, but, according to CD 109 Table 2.10, would attract superelevation of 7%. This is 2% above that recommended under CD 109 para. 4.4 for urban areas, however, so a departure from standards would be required.

7.2.5. At the point where alignment 1B crosses the stopped-up part of Greens Road (see 7.2.19), the centre line is approximately 35m from the point of stopping-up. Whilst 3-D design has not been undertaken, due to the relatively flat topography of this part of the site, it would appear feasible to accommodate any earthworks that may be required for the link road and still tie-in adequately to the existing topography at the point where Greens Road is proposed to be stopped up. This should be confirmed in subsequent stages of scheme development.

7.2.6. Between junctions 6 and 7, link road alignments 1A and 1B are broadly similar and have horizontal radii greater than the desirable minimum horizontal radius for a 60kph design speed stipulated in CD 109.

7.2.7. As part of option 1, the WLR between junction 3 and the Bradfield Road railway bridge would provide a significant improvement, in terms of carriageway width and provision for pedestrians and cyclists, compared to the existing Bradfield Road.

7.2.8. Option 2 commences immediately north of this section and is described further in Section 7.3 of this report. If Option 1 was implemented without Option 2, which includes a new railway bridge, there would be a significant change in the level of cross-sectional provision for all road users at this point that could introduce road safety issues.

JUNCTION 3: BRADFIELD ROAD / A149 CROMER ROAD / NEW LINK ROAD

7.2.9. This is currently a priority T junction with the A149 forming the major road and Bradfield Road the minor. The A149 has an existing speed limit of 40mph, a carriageway width of approximately 7.3m and a footway width of approximately 2m on the northern side of the A149 with an uncontrolled crossing located on the desire line across Bradfield Road.

7.2.10. It is noted that the existing 30mph speed limit on Cromer Road starts approximately 190m east of the Bradfield Road junction, near the B1145 Greens Road junction. Given the close proximity of the WLR and A149 Cromer Road junction to the existing 30mph speed limit, on road safety grounds it is recommended that the 30mph speed limit is extended in a westerly direction to include this new junction. For the purposes of this study, it has therefore been assumed that the speed limit on Cromer Road is 30mph and the design speed is 60kph.

7.2.11. Two potential layouts have been developed for this junction shown in Figure 7-2 and described below, this is shown in full as Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0105 P01 in Appendix F. Subject to further investigation, a roundabout could be a feasible alternative to the junction types shown in Figure 7-2 below. The anticipated land required for a roundabout layout at this junction would encroach into land currently occupied by the derelict property in the northeast corner of the junction.

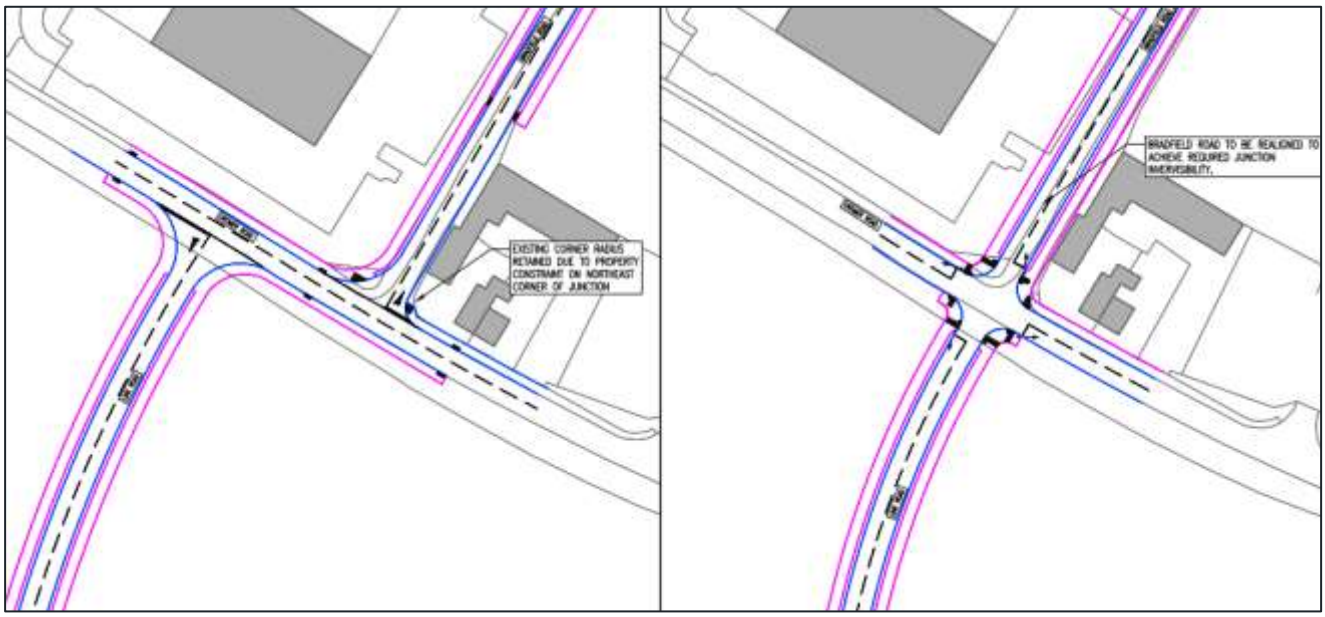

Figure 7-2 - Junction 3 layouts - JN3.A & JN3.B

JN3.A: Staggered priority junction with A149 Cromer Road

7.2.12. Initially, this junction layout was developed as a priority crossroads arrangement, however, it has since been modified to a staggered priority junction (right/left stagger) with reference to the road safety considerations associated with priority crossroads described in CD 123 para 2.21.

7.2.13. A 50m stagger distance between side roads has been provided as recommended in CD 123 although it should be noted that the option presented in NWN-WSP-ZZ-ZZ-DR-CV-0105 P01 in Appendix F currently shows no widening of the A149.

7.2.14. Pending receipt of relevant traffic modelling data, and with reference to CD 123 Figure 2.3.1, localised widening of the A149 may be necessary in order provide a ghost island or alternative junction type to ensure sufficient junction capacity.

JN3.B: Signalised Junction

7.2.15. This junction layout comprises a signalised crossroads that would incorporate controlled crossing facilities for pedestrians and cyclists on all arms. The conceptual layout presented on Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0105 P01 in Appendix F shows single lane approaches to the junction on all arms and it is acknowledged that the performance of such a layout may be unsatisfactory from a traffic modelling perspective. Localised carriageway widening could be required on the junction approaches and exits in order to provide sufficient junction capacity. This layout should be reviewed and amended accordingly once appropriate traffic data is available.

JUNCTION 4: NEW LINK ROAD / B1145 GREENS ROAD / B1145 AYLSHAM ROAD / TUNGATE ROAD

7.2.16. Currently, this is a staggered junction with Aylsham Road forming the major road. The existing B1145 Greens Road and Aylsham Road are approximately 6m wide and Tungate Road is a single-track road approximately 3.5m wide.

7.2.17. The junction is within a rural setting without footways and subject to the 60mph national speed limit.

7.2.18. The Local Plan planned growth in this vicinity will significantly alter the character and general nature of the area and junction towards a more urban appearance. Accordingly, in developing the conceptual options below, it has been assumed that the design speed of Aylsham Road and Tungate Road would be 60kph. This is consistent with the design speed adopted for the proposed link road.

7.2.19. To simplify the potential junction arrangements described as JN4.A and JN4.B below, it is recommended that the B1145 Greens Road is stopped up immediately south of the access to the football ground, shown in Figure 7-3 and in full on Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0101 P01 in Appendix F. As a result, the section of the B1145 between Cromer Road and Aylsham Road would need to be re-routed onto the link road between junctions 3 and 4.

7.2.20. The principal reason why Greens Road was not considered as an appropriate link between Cromer Road and Aylsham Road is because, taking into account the likely locations of junctions (fixed points) on Cromer Road and Aylsham Road relative to Greens Road, it is unlikely that the resulting horizontal alignment on the link would satisfy appropriate design standards for a 60kph design speed. However, as noted in section 6.3.5 of the report, in subsequent stages of scheme development it is recommended that NCC's requirements regarding design speed for the link road and adherence to Manual for Streets 2 design advice are confirmed at the earliest opportunity and that the concept design is reviewed as appropriate.

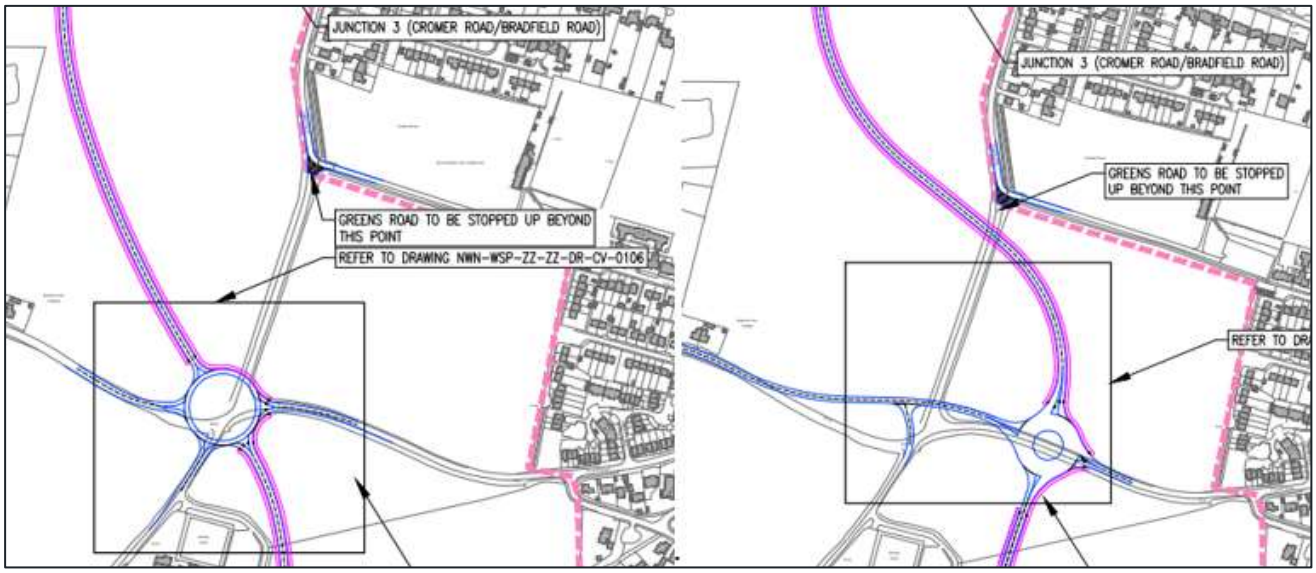

Figure 7-3 – B1145 Greens Road conceptual designs

7.2.21. Two conceptual roundabout layouts have been identified at junction 4 shown in Figure 7-4 and Figure 7-5 and described below, these layouts are shown in full on Drawing No's NWN-WSP-ZZ-ZZ-DR-CV-0106 and 0107 P01 in Appendix F. Junction types other than a roundabout may be appropriate at this location and should be investigated further once appropriate traffic data is available.

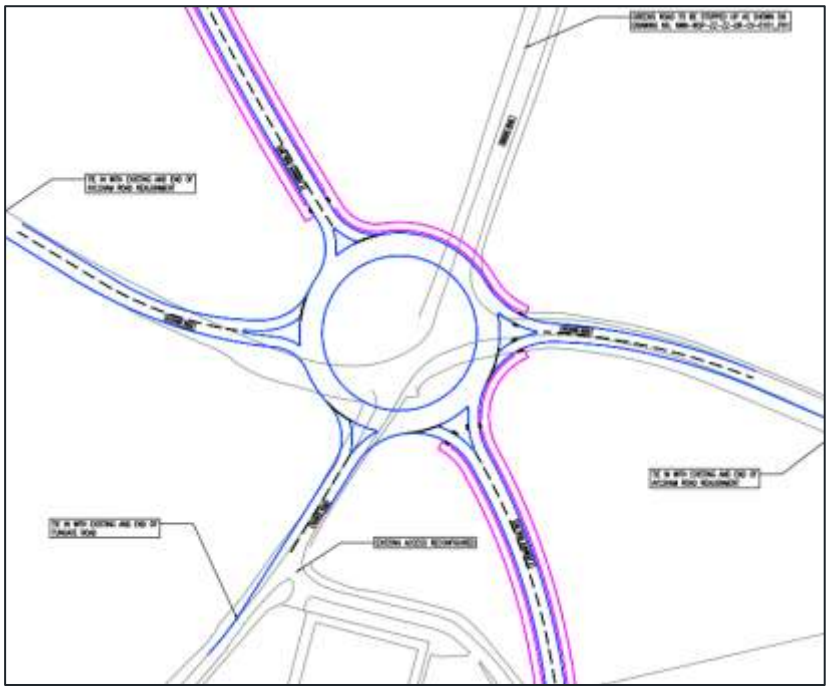

Figure 7-4 - Junction 4 layout - JN4.A and link road alignment 1A

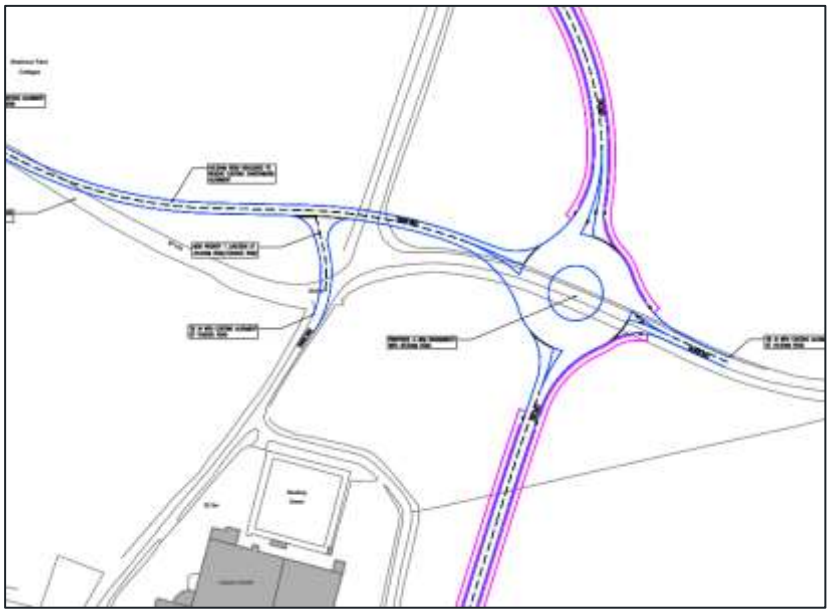

Figure 7-5 - Junction 4 layout - JN4.B and link road alignment 1B

JN4.A: 5-arm roundabout:

7.2.22. This layout would comprise a 5-arm normal roundabout (see Figure 7-4) that, unlike JN4.B, would accommodate all affected roads in a single junction. In addition, the substandard horizontal alignment of Aylsham Road through the existing junction could be addressed by locating the roundabout broadly in the same position and locally realigning the Aylsham Road approaches.

JN4.B: 4- arm roundabout:

7.2.23. This layout would comprise a normal 4-arm roundabout that would accommodate the two new link road arms and two Aylsham Road arms (see Figure 7-5). Tungate Road would be accommodated through a new priority T junction with Aylsham Road and a length of Aylsham Road to the west of JN4.B would be realigned and moved to the north in order to address the existing substandard geometry (S bend).

JUNCTION 5: NEW LINK ROAD / WEAVERS WAY

7.2.24. Weavers Way is a 61-mile track between Cromer and Great Yarmouth primarily used by walkers and off-road cyclists that would cross the new link road between Aylsham Road (junction 4) and Skeyton Road (junction 6).

7.2.25. According to the NCC website, where it crosses the proposed link road is described as, being suitable for cyclists and horse-riders, as well as pedestrians. However, the existing infrastructure and available width of Weavers Way where it meets Station Road and Tungate Road does not appear to be appropriate for use by cyclists or particularly for horse-riders. This is illustrated in Figure 7-6 and Figure 7-7.

Figure 7-6 – Gate on Weavers Way at Station Road/Skeyton New Road junction (view looking west)

Figure 7-7 – Gates on Weavers Way where it crosses Tungate Road (view looking east)

7.2.26. Establishing the current level of usage by cyclists and equestrians on Weavers Way and obtaining feedback from relevant user groups will be important in developing an appropriate layout where the new link road would meet Weavers Way. In the absence of this information and at this conceptual stage, the initial proposals shown in full on Drawing No. NWN-ZZ-ZZ-DR-CV-0101 P01 in Appendix F and in the extract (see Figure 7-8), have been developed to cater for pedestrians and cyclists only and it has also been assumed that an uncontrolled at-grade crossing of the proposed link road for pedestrians and cyclists would be sufficient. The proposed segregated shared use paths either side of the proposed link road (shown indicatively in pink in Figure 7-8) would form a connection with Weavers Way, and a refuge island with dropped kerbs would facilitate crossing movements by pedestrians and cyclists.

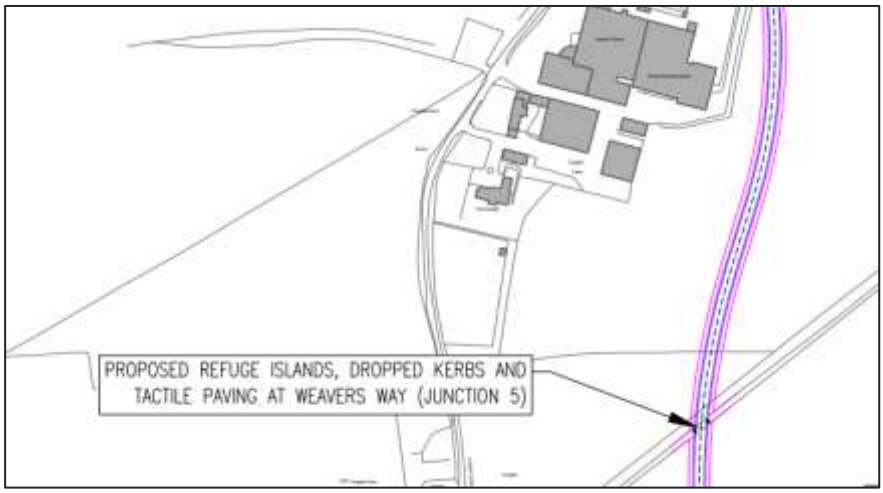

Figure 7-8 – Proposed Link Road walking and cycling arrangements

7.2.27. If, during future stages of scheme development, it is determined that equestrians should also be catered for here, the provision of an at-grade equestrian crossing as described in CD 143 para. 5.24 should be considered requiring additional land.

JUNCTION 6: NEW LINK ROAD / SKEYTON ROAD

7.2.28. The existing Skeyton Road is a single-track rural road approximately 4m wide without footways.

7.2.29. The recommended conceptual layout for this junction is a priority crossroads with localised widening at the junction to allow for two opposing lanes at the give way lines, this is shown in Figure 7-9 and in full on Drawing No. NWN-ZZ-ZZ-DR-CV-0104 P01 in Appendix F. It is also recommended that the existing 30mph speed limit on Skeyton Road is extended west to start to the west of the proposed link road.

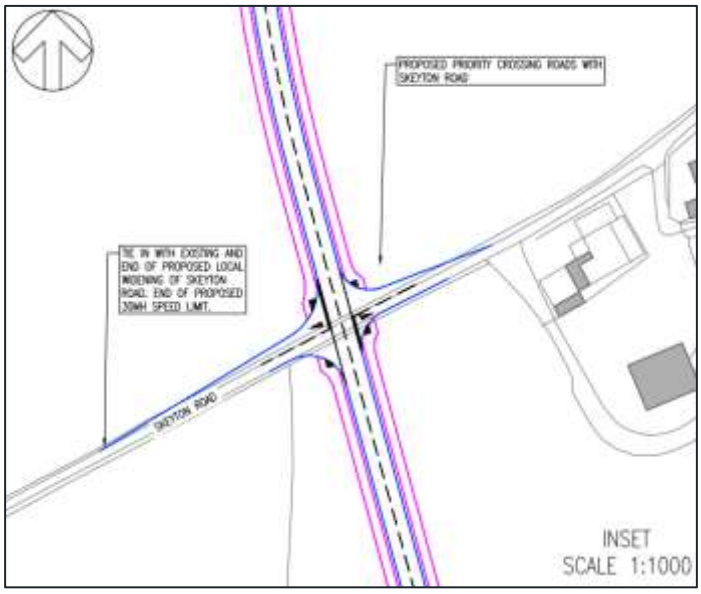

Figure 7-9 - Junction 6 conceptual design

7.2.30. A priority crossroads arrangement is proposed at this junction, given cross movements on the minor road arms (Skeyton Road) are not expected to be significant. However, this assumption should be reviewed once appropriate traffic data is available. Should minor road cross movements be greater than predicted, a staggered priority junction, similar to that described as JN3A, should be considered.

JUNCTION 7: NEW LINK ROAD / NORTH WALSHAM ROAD (B1150)

7.2.31. The B1150 North Walsham Road is a single carriageway road connecting Norwich and North Walsham. The existing speed limit where the proposed link road would cross is 50mph. There are no footways.

7.2.32. The existing speed limit on the B1150 changes to 30mph approximately 65m northeast of the proposed new junction and given this close proximity, on road safety grounds, it is recommended that the 30mph speed limit be extended to the southwest to include the new junction. For the purposes of this study, it has therefore been assumed that the speed limit on the B1150 is 30mph and the design speed is 60kph.

7.2.33. The junction layouts presented as JN7.A and JN7.B are shown in Figure 7-10 and in full on drawing no NWN-WSP-ZZ-ZZ-DR-CV-0108 P01 in Appendix F and described below, would only apply to Option 1 as the southern extent of Option 1 is at this junction. Alternative layouts for this junction, as part of Option 3, are discussed in Chapter 7.4.

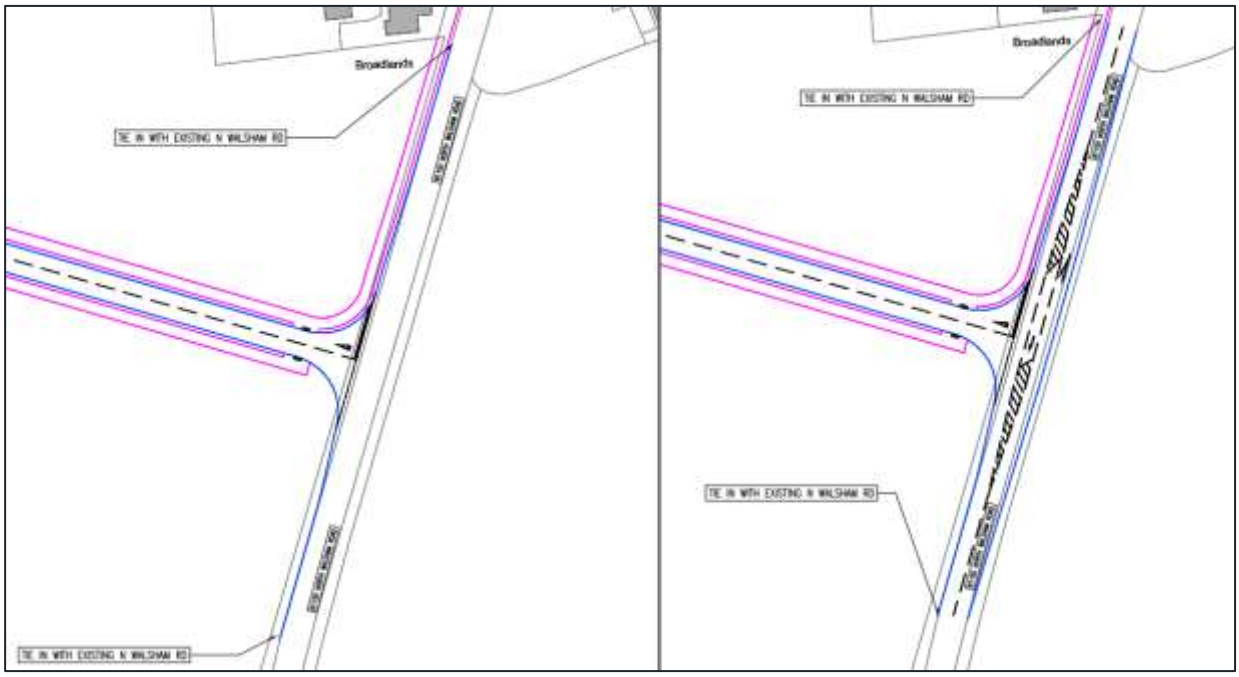

Figure 7-10 - Junction 7 layouts – JN7.A & JN7.B

JN7.A: Priority T-junction

7.2.34. This layout is a simple priority T-junction with a new 3m wide footway connecting the Link Road to B1150 North Walsham Road. No measures on the B1150 are proposed to facilitate right-turning vehicles into the new link road.

7.2.35. The performance of this junction in terms of capacity and delays should be assessed once appropriate traffic data is available.

JN7.B: Priority T-junction with ghost island for right turning vehicles

7.2.36. JN7.B is an enhanced version of JN7.A as it incorporates a ghost island on the B1150 for right-turning vehicles into the new link road. Localised carriageway widening of the B1150 would be required in order to provide a ghost island layout, which should satisfy the geometric requirements of CD 143 for ghost islands.

7.2.37. The performance of this junction in terms of capacity and delays should be assessed once appropriate traffic data is available. If the predicted capacity of JN7. A or JN7.B is unsatisfactory for the forecast traffic flows and turning movements, alternative junction types should be investigated.

7.3 WESTERN LINK ROAD NORTHERN EXTENSION – OPTION 2

7.3.1. Option 2 includes the core section of the WLR as described in 7.2 with the northern extension from the Bradfield Road railway bridge northwards to connect into the western end of Cornish Way.

7.3.2. Junctions 1 and 2 are located within this northern extension and are described further in 7.3.3 below. Please refer to Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0102 P01 in Appendix F which shows the extent of link road covered by option 2 and the associated off-carriageway provision for pedestrians and cyclists.

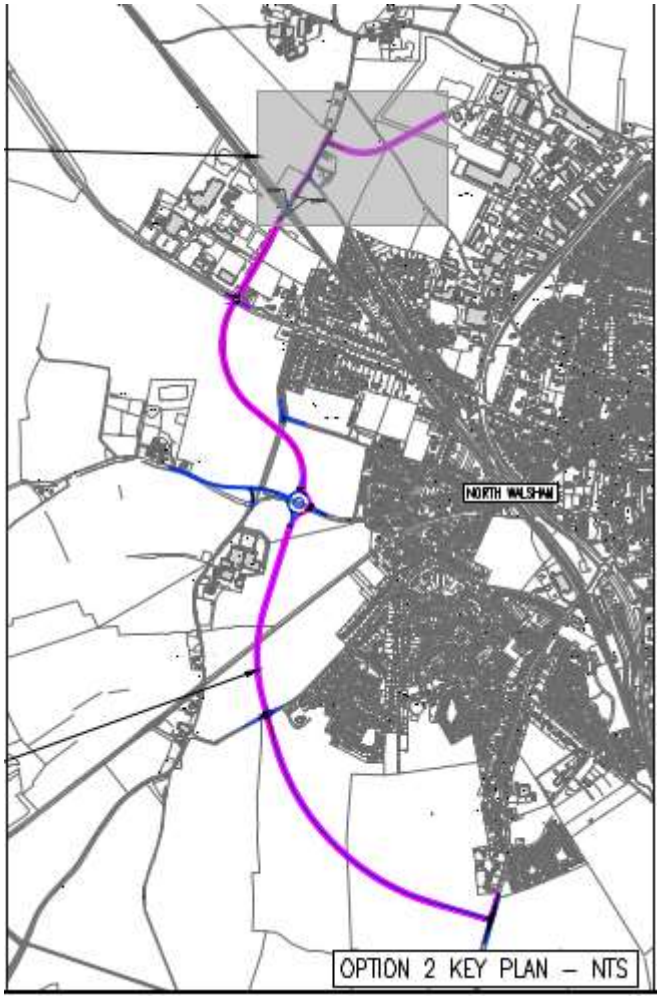

Figure 7-11 - Option 2 – Proposed alignment of northern extension

JUNCTIONS 1 AND 2: NEW LINK ROAD / BRADFIELD ROAD / CORNISH WAY LINK

7.3.3. Bradfield Road is a single-track rural road providing local access to a small number of private properties. It is approximately 4m wide and has no road markings or footways. Under Option 2, Bradfield Road would be widened to approximately 7.3m to accommodate two-way traffic and significantly higher traffic flows.

7.3.4. Junction 1 would comprise of a new priority T-junction between the widened Bradfield Road and the WLR connection into Cornish Way. Its performance in terms of capacity and delays should be assessed once appropriate traffic data is available. Alternative junction layouts may need to be considered depending on the outcome of this analysis and could require investigating a revised alignment that would make the Cornish Way link the major road and Bradfield Road (north) the minor road.

7.3.5. Junction 2 would also comprise a priority T junction with the part of Bradfield Road that runs in a south-easterly direction into North Walsham. Again, the performance of this junction in terms of capacity and delays should be assessed once appropriate traffic data is available. Alternative junction layouts may need to be considered depending on the outcome of this analysis.

BRADFIELD ROAD RAILWAY BRIDGE

7.3.6. A main constraint of the northern extension is the existing narrow humped back bridge over the railway. Two options to address this have been identified for further consideration as shown in Figure 7-12 and Figure 7-13, and included in more detail on drawing no. NWN-WSP-ZZ-ZZ-DR-CV-0102 P01:

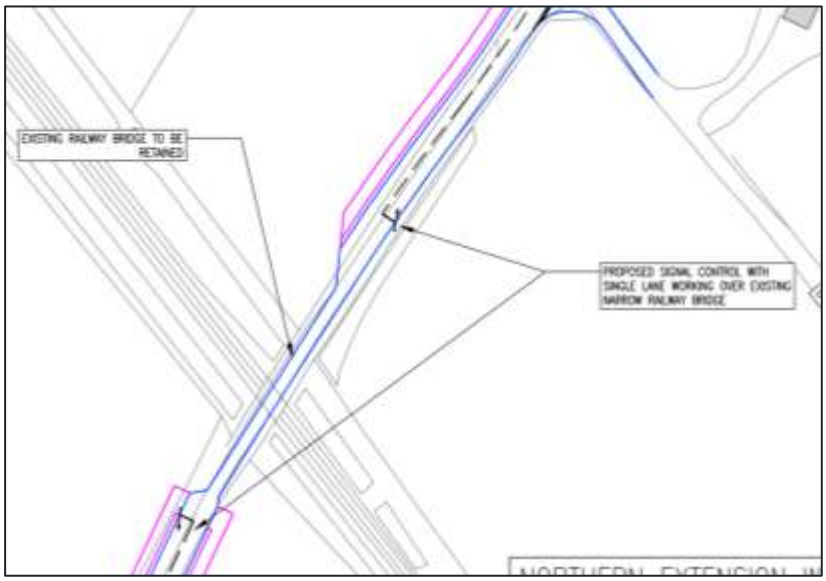

Figure 7-12 - Northern extension with traffic signals at existing railway bridge

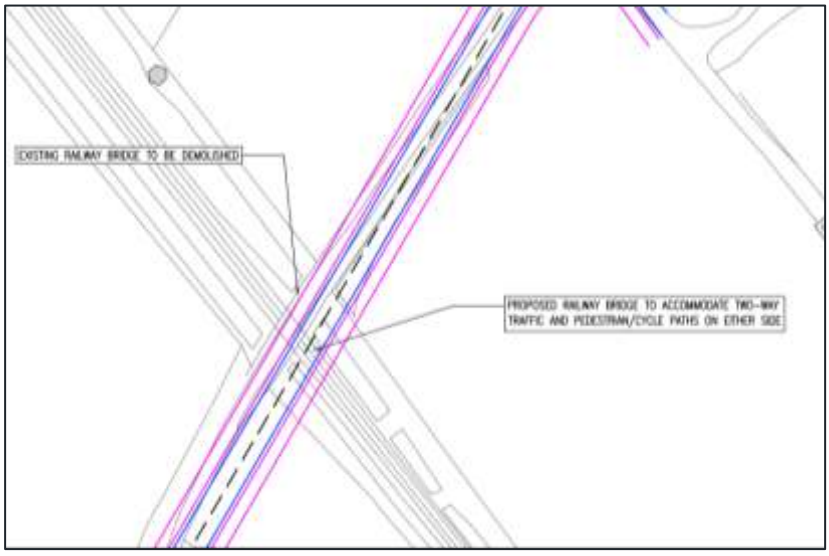

Figure 7-13 - Northern extension with new railway bridge

- A low-cost option, comprising of a single lane working over the railway bridge controlled by traffic signals (see Figure 7-12). However, journey time delays from such a proposal could count against the overall viability of the northern extension. Further, the width of the bridge between parapets (3.7m approximately) is insufficient to accommodate traffic and pedestrians or cyclists, highly undesirable given the proposed improvements for pedestrians and cyclists on either side of the railway bridge as part of Option 1 and the northern extension.

- A high-cost option, involving a new bridge over the railway providing adequate width for two-way traffic, pedestrians and cyclists, as well as addressing the forward visibility issues associated with the existing bridge (see Figure 7-13). Clearly, this option is significantly more expensive, but this could be mitigated by improved journey times and the continuous off-carriageway facilities for pedestrians and cyclists throughout the northern extension.

7.4 WESTERN LINK ROAD SOUTHERN EXTENSION – OPTION 3

7.4.1. Option 3 includes the WLR core as described in 7.2 with a southern extension from junction 7, the B1150 North Walsham Road, to junction 8, the A149 south; Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0103 P01 in Appendix F provides the scheme layout, an extract of which is shown below in Figure 7-14. At its western end, the horizontal curvature of the proposed link road comprises a horizontal radius greater than the CD 109 desirable minimum horizontal radius for a 60kph design speed. This horizontal radius then connects with a straight up to junction 8.

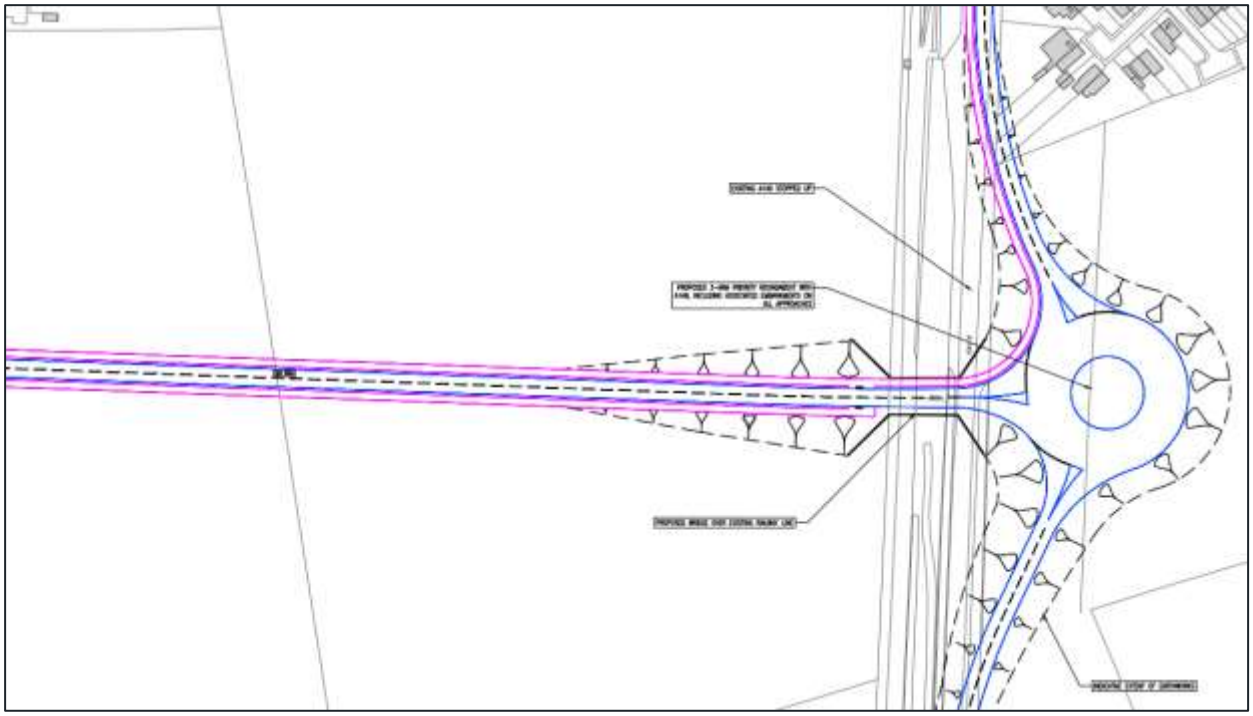

Figure 7-14 - Proposed Link Road with southern extension

JUNCTION 7: NEW LINK ROAD / B1150 NORTH WALSHAM ROAD

7.4.2. With a southern extension, the junction layouts proposed in Section 7.2.31 would not be suitable, thus alternatives as below are proposed (see Figure 7-15).

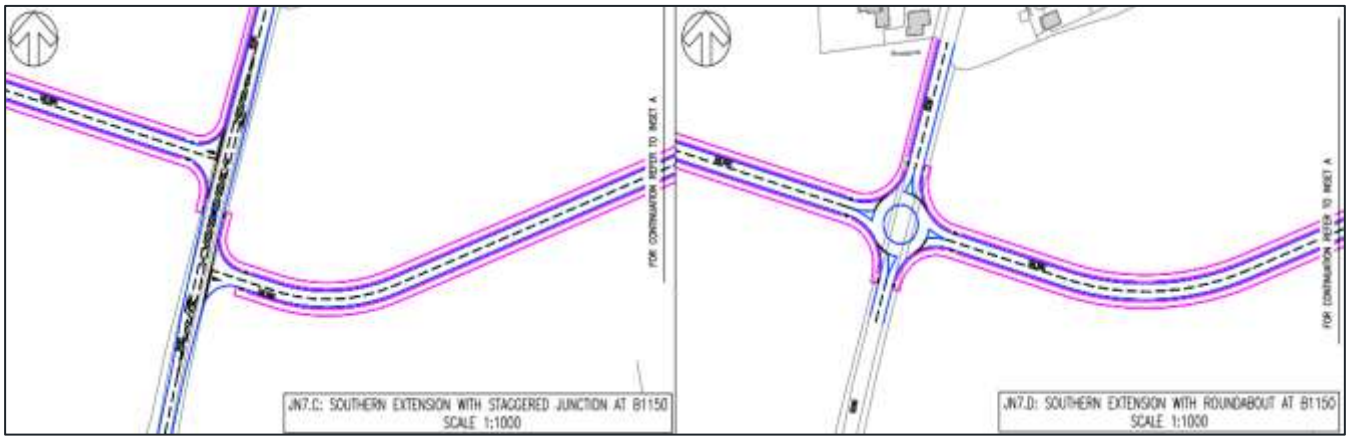

Figure 7-15 - Junction 7 layouts - JN7.C & JN7.D

JN7.C: Staggered priority junction

7.4.3. This junction layout comprises a staggered priority junction with a right/left stagger of 50m between side road centrelines, as recommended in CD 123. The layout prioritises traffic on the B1150 and provides a ghost island arrangement on the major road, however, unacceptable queuing and delays may occur on the minor road (new link road) arms. The performance of this junction in terms of capacity and delays should be assessed once appropriate traffic data is available.

JN7.D: 4-arm roundabout

7.4.4. This junction layout comprises a 4-arm roundabout with the B1150 and the new link road. The circulatory width and other geometric components of the conceptual roundabout layout shown in Figure 7-15 and included on Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0103 P01 in Appendix F may need to be modified to achieve sufficient capacity and meet CD 116 requirements. Again, this should be reviewed in more detail once appropriate traffic modelling data is available.

JUNCTION 8: NEW LINK ROAD / A149 SOUTH

7.4.5. A main consideration in the junction layout shown on Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0103 P01 has been the line and level of the A149 south relative to the adjacent railway line. Not only does the A149 run parallel to the railway line approximately 5metres apart, but the level of the road and railway are broadly similar.

7.4.6. The creation of a new level crossing, to connect the new link road with the A149 south has been discounted, taking into account Policy 2.13 of the NCC document described in Section 6.3 resulting in a new bridge over the railway line being proposed. Furthermore, the line and level of the A149 would be increased locally through earthworks to tie-in appropriately with the WLR and to facilitate a new roundabout at this point. The performance of this junction type in terms of capacity and delays should be assessed once appropriate traffic data is available, and may result in modifications to the layout as presented.

7.4.7. Whilst other solutions than a roundabout may be acceptable here in terms of safety and capacity and after appropriate assessment using appropriate traffic data, a bridge over the railway is recommended regardless.

7.5 WESTERN LINK ROAD WITH BOTH EXTENSIONS – OPTION 4

7.5.1. Option 4 includes the WLR as described in Section 7.2 with both the northern extension as described in Section 7.3 and the southern extension as described in Section 7.4. Option 4 includes all junctions 1 to 8; at junction 7, options as described in Section 7.4 *only* apply, however. The extent of Option 4 is shown in Figure 7-16 and in more detail on Drawing No. NWN-WSP-ZZ-ZZ-DR-CV-0104 P01 in Appendix F.

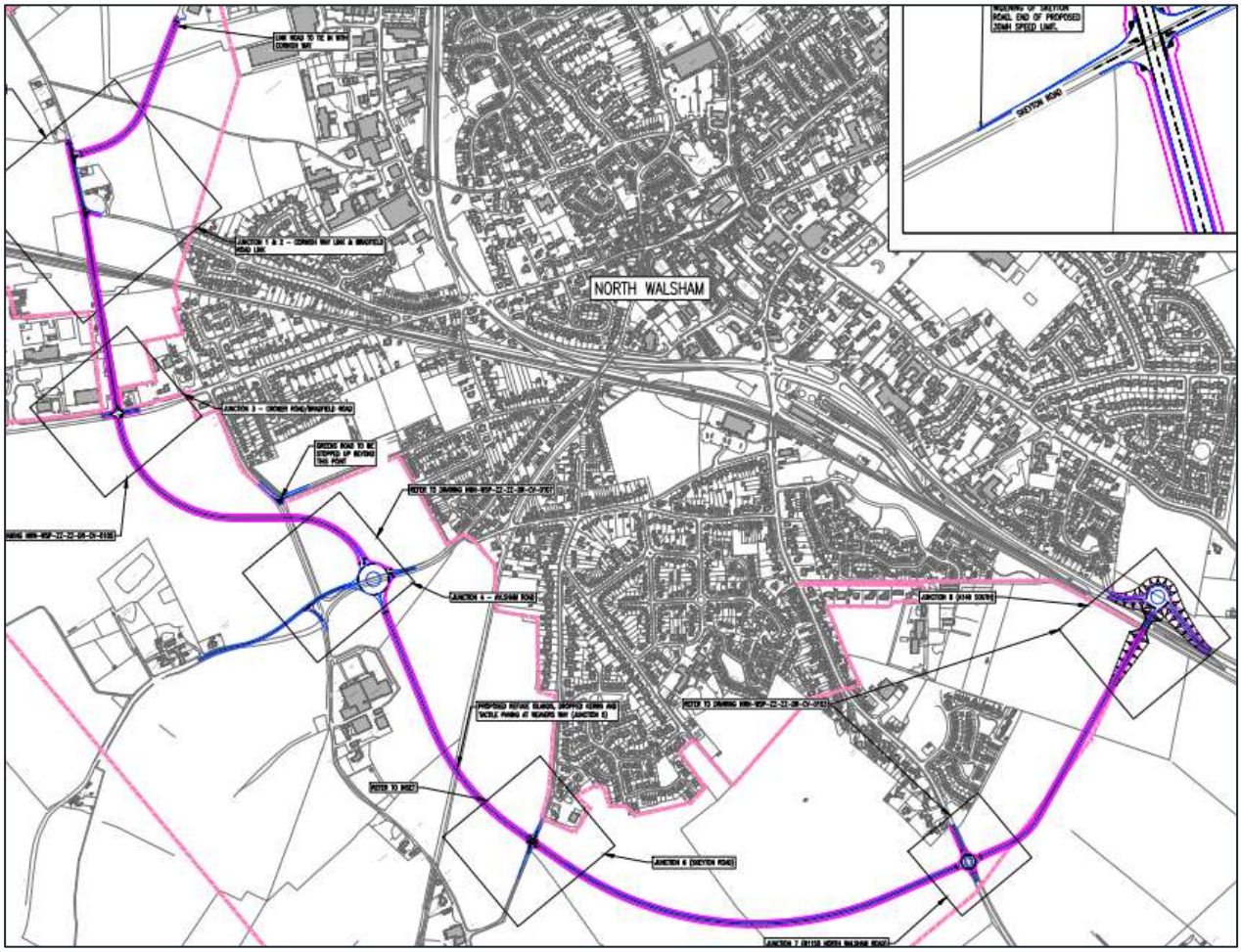

Figure 7-16 - Option 4 - Proposed Link Road (alignment 1B) with northern and southern extensions

7.5.2. Option 4 is the most expensive option given its length, however, it would provide a continuous link covering all development areas from the A149 south to Cornish Way and is likely to realise the most benefits for the whole Town, existing and proposed.

7.6 DELIVERABILITY OF WESTERN LINK ROAD

7.6.1. Various feasible road alignments and junction types for the WLR and its possible northern and southern extensions have been designed to a preliminary level.

7.6.2. It should be noted that the junctions described above have been designed without traffic information and therefore it is not possible at this stage to assess the optimum junction layout for the junctions described in this chapter. The preliminary design undertaken has been used to produce a high-level feasibility assessment for delivering an acceptable highways scheme.

7.6.3. The high-level feasibility study concludes that subject to land availability and finance, and accepting that more detailed highway design, drainage and environmental assessment work would be required, WSP have found no technical issues with the work undertaken so far in delivering an acceptable scheme.

8

COST ESTIMATES

8 COST ESTIMATES

8.1 INTRODUCTION & ASSUMPTIONS

8.1.1. High-level estimates have been produced to cover the options identified within this Study using the plans included within the Appendices. Given lack of information, some elements have been excluded from the cost projections.

8.1.2. Costs of works have been based upon previous projects and cost rate libraries such as Spons. Estimates include all preliminaries, contractor overheads and profit margins, project / design team fees, and project management team fees. An allowance for risk is also included. No allowance for inflation is included and must be applied when more information regarding start dates is known. It should be noted that the cost estimates produced do not include any land costs at this stage. A whole list of exclusions can be found in Appendix G.

8.2 HIGH-LEVEL COST ESTIMATES

8.2.1. High-level summaries of the estimates for the WLR construction and its possible extensions are provided in the tables below and full cost breakdowns are available in Appendix G. As described in Chapter 7, two alignments have been studied for the WLR:

- Option 1.1: including a 5-arm roundabout at New Link Road/B1145 Greens Road/B1145 Aylsham Road/Tungate Road.
- Option 1.2: including a new 4-arm roundabout and a priority T-junction at New Link Road/B1145 Greens Road/B1145 Aylsham Road/Tungate Road.

Table 8-1 - Cost Estimate for Western Link Road

Cost Item	Option 1.1	Option 1.2
Direct Construction Works	£5,629,868	£5,862,940
Indirect Construction Costs	£2,301,209	£2,396,477
Total Base Construction Cost	**£7,931,077**	**£8,259,417**
Project, Design and Development Costs	£1,722,036	£1,793,327
Base Cost Estimate	**£9,653,113**	**£10,052,744**
Risk	£3,861,245	£4,021,097
Optimism Bias	£4,247,369	£4,423,207
Anticipated Final Cost	**£17,761,727**	**£18,497,048**

8.2.2. Two extensions have been considered for the Northern extension are as follows:

- Option 2.1: comprising of a single lane working over the railway bridge on Bradfield Road controlled by traffic signals.

- Option 2.2: involving a new bridge over the railway on Bradfield Road providing adequate width for two-way traffic, pedestrians and cyclists.

Table 8-2 - Cost Estimate for Western Link Road Northern Extension

Cost Item	Option 2.1	Option 2.2
Direct Construction Works	£1,122,797	£6,288,427
Indirect Construction Costs	£458,943	£2,570,394
Total Base Construction Cost	**£1,581,740**	**£8,858,821**
Project, Design and Development Costs	£343,436	£1,923,472
Base Cost Estimate	**£1,925,176**	**£10,782,294**
Risk	£770,070	£4,312,917
Optimism Bias	£847,078	£4,744,209
Anticipated Final Cost	**£3,542,324**	**£19,839,420**

8.2.3. Same for the southern extension, two options have been considered:

- Option 3.1: including a staggered priority junction at the new junction of the new link road with Norwich Road.
- Option 3.2: including a 4-arm roundabout at the new junction of the new link road with Norwich Road.

Table 8-3 - Cost Estimate for Western Link Road Southern Extension

Cost Item	Option 3.1	Option 3.2
Direct Construction Works	£3,451,639	£3,406,149
Indirect Construction Costs	£1,410,857	£1,392,263
Total Base Construction Cost	**£4,862,496**	**£4,798,412**
Project, Design and Development Costs	£1,055,770	£1,041,856
Base Cost Estimate	**£5,918,266**	**£5,840,268**
Risk	£2,367,306	£2,336,107
Optimism Bias	£2,604,037	£2,569,718
Anticipated Final Cost	**£10,889,609**	**£10,746,093**

8.2.4. No combined cost for building the WLR and any of the possible extensions have been estimated due to the unlikelihood of the whole link road to be delivered at the same time.

8.3 HIGH-LEVEL COST ESTIMATES OF THE MITIGATION MEASURES

8.3.1. Following the traffic impact assessment, an initial mitigation measure has been identified (see 5.4.5). This is summarised as follows:

- Improvements to the Weavers Way from Tungate Road to Oak Road. This would require paving the entirety of the route, putting street lights from Tungate Road to Station Road and implementing a pedestrian crossing on Station Road.

8.3.2. High-level cost estimates have been devised for the aforementioned mitigation measure, as shown in Table 8-4.

Table 8-4 - Cost estimate for mitigation measures

Cost Item	Improving Weavers Way
Direct Construction Works	£292,775
Indirect Construction Costs	£119,672
Total Base Construction Cost	**£412,447**
Project, Design and Development Costs	£89,552
Base Cost Estimate	**£501,999**
Risk	£250,999
Optimism Bias	£220,880
Anticipated Final Cost	**£973,878**

9

SUMMARY

9 SUMMARY

9.1 CONCLUSIONS

TRAFFIC IMPACT ASSESSMENT

9.1.1. The allocated growth and the WLR should help safeguarding jobs, promoting economic growth, building homes to address housing shortages, whilst improving resilience of local areas to support themselves at the same time as increasing accessibility by more sustainable modes, such as walking, cycling and public transport. Furthermore, the WLR and the possible extensions will mitigate the routing problems for HGVs in North Walsham caused by the low bridges.

9.1.2. A high-level assessment of the traffic impacts from the proposed growth allocations outlined in the NNDC Emerging Local Plan has been carried out. The methodology used to carry out the high-level traffic impact assessment in this study is considered sufficient to produce a high-level estimate of the traffic impact of the allocated growth, the WLR and its possible extensions.

9.1.3. The high-level traffic impact assessment concludes that the growth in the town is expected to have a significant impact on several junctions in the town, however the WLR is expected to mitigate some of the impacts. Furthermore, the possible northern and southern extensions of the WLR are likely to mitigate the traffic impacts on the A149 signalised junctions. However, it is anticipated that Aylsham Road could suffer a traffic increase, this could be mitigated by a signage strategy that encourages drivers to use alternative routes.

9.1.4. For these reasons, it is anticipated that the WLR and its possible northern and southern extensions should be required to unlock the North Walsham Western Extension and mitigate the current and forecasted traffic issues in the town.

HIGHWAYS FEASIBILITY

9.1.5. This study also looks into the possible highway designs of the WLR and its possible extensions. As a first step, this feasibility study has identified a series of potential options and junction layouts for a new link road around the southern and western sides of North Walsham to facilitate planned areas of development identified in the NNDC Local Plan.

9.1.6. Whilst at this stage it is not possible to undertake a full cost benefit analysis of all the options and all the junction layouts identified from a highway design perspective, due to the limitations and exclusions discussed in Section 6.1, the study has highlighted the following which should be taken forward for further investigation in the next stage of scheme development:

- The Bradfield Road railway bridge is a significant existing physical constraint. Retaining it as part of Option 2 is likely to have a negative impact on the economic appraisal of the northern extension due to anticipated journey time delays. Also, its width is insufficient to provide a shared use facility for pedestrians and cyclists as well as maintain a single running lane for traffic. A new, wider bridge would address these issues, however, its cost could render the northern extension being unviable economically;
- As part of Option 1, improvements to junction 3 presented in Section 7.2.9 could be realised if the derelict property in the northeast corner of the existing junction was available for demolition; this should be confirmed by NCC/NNDC;.

- As part of Option 1, a roundabout is recommended at junction 4 given the arrangement of the existing roads, although this should be confirmed by further analysis of traffic data. It should be confirmed whether to proceed with a 5-arm or 4-arm roundabout at this junction as this influences the WLR alignment on either side of this junction, namely Alignments 1A and 1B;
- As part of Option 1, existing usage by cyclists and equestrians on Weavers Way should be established and user feedback obtained to help inform proposed improvements where the WLR crosses this important non-motorised user route;
- As part of Option 3, a bridge over the railway is recommended regardless of the type of junction proposed as set out in Section 7.4.5.
- Option 4 would provide the greatest capacity improvement to the local network and serve all planned growth areas. However, it would be the most expensive and therefore may not be acceptable financially.

9.2 RECOMMENDATIONS

9.2.1. The following recommendations are made to support the next stages of scheme development

- Traffic surveys should be collected to understand the impact of the Covid 19 Pandemic on the travel patterns in North Walsham and to allow estimating the AADTs of the WLR and its possible extensions to refine the highways design;
- Due to the scale of the growth allocated in the local plan and the likely town wide impacts, it is recommended that a Transport Assessment is carried out in order to progress the development of the Western Extension or the Western Link Road;
- Agree the design methodology proposed within this study, particularly regarding the approach to use DMRB standards to illustrate a worse-case scenario in terms of potential land-take requirements;
- Utilise traffic flow data once available to inform the development and selection of junction layouts that provide sufficient capacity, are geometrically compliant with relevant design standards, and adequately accommodate the swept paths of large vehicles;
- Investigate items in paragraph 9.1.6 to support the option selection process;
- Undertake full WebTAG complaint economic appraisal to support the option selection process;
- NCC/NNDC should confirm proposals for any additional junctions on the WLR required to accommodate any other existing roads not already identified within the Study, such as to serve new planned growth areas;
- To help inform potential land-take requirements, undertake investigations regarding the WLR vertical alignment and associated earthworks;
- Undertake a flood risk assessment (FRA) and drainage strategy to understand the likely infrastructure and associated land-take requirements for this aspect of the link road;
- Consult the Lead Local Flood Authority regarding the FRA and drainage strategy;
- Commission environmental scoping and assessment work to identify in more detail the likely environmental constraints and mitigations required;
- Undertake NRSWA C2 preliminary enquiries and obtain C3 budget estimates; and
- Liaise with National Grid to confirm that their high-pressure gas mains to the north-west of North Walsham are not affected by the proposed link road.

County Hall
Martineau Lane
Norwich
NR1 2DH

wsp.com