

**SKANSKA**

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# Western Link Road

Wisbech Access Study

**August 2017**



## Wisbech Access Study

## Western Link Road

Cambridgeshire County Council / Fenland District Council

August 2017

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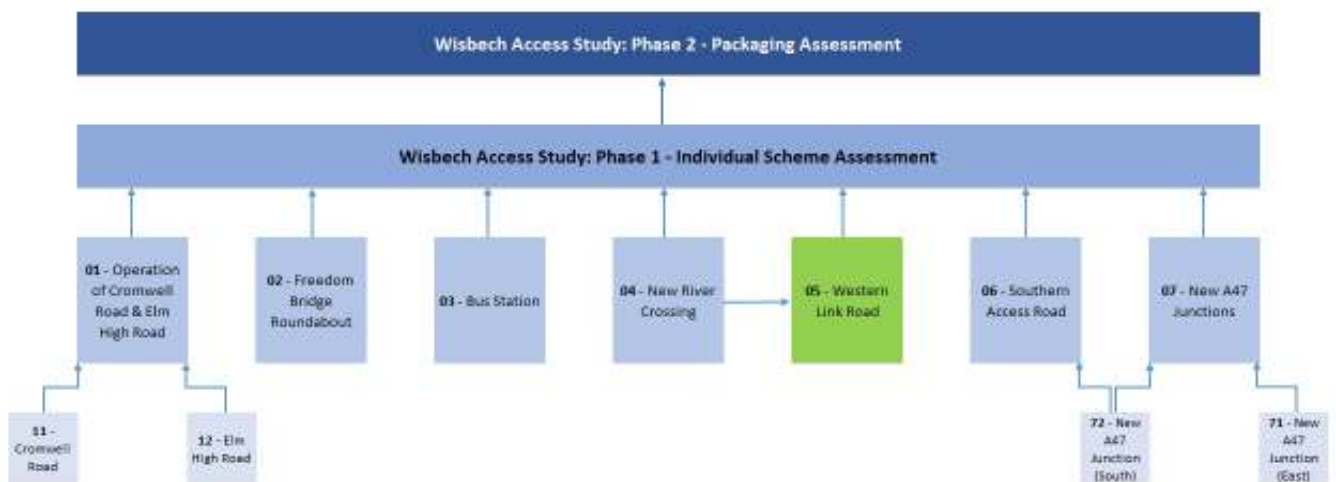
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## 1 Introduction

### Wisbech Access Study

This assessment forms part of the first phase of the Wisbech Access Study. The Wisbech Access Study consists of two distinct phases. The first phase is a series of individual scheme assessments, and the second phase of the study consists of a packaging assessment, as shown in Figure 1.1 beneath. Note that this assessment is highlighted in green to demonstrate its relationship to the wider study.



**Figure 1.1: Wisbech Access Study Components**

### Western Link Road

The Western Link Road is one of nine individual scheme areas included within in the Wisbech Access Study, which focuses on the creation of a new link road to the west of the River Nene and Wisbech Town Centre.

The dual purpose of the Western Link Road is to provide access into the West Wisbech Development area as outlined within the Fenland Local Plan (2014) (specifically policy LP8), as well as to alleviate congestion on the town centre network by providing an alternative route for vehicles currently travelling through Wisbech between the A17 to the north (via the A1101) and the A47 to the south.

The alignment of the Western Link Road is directly related to the location of a new river crossing which is considered separately within the 'New River Crossing' assessment (see Figure 1.1). The *New River Crossing Report* should be read in conjunction with this Report.

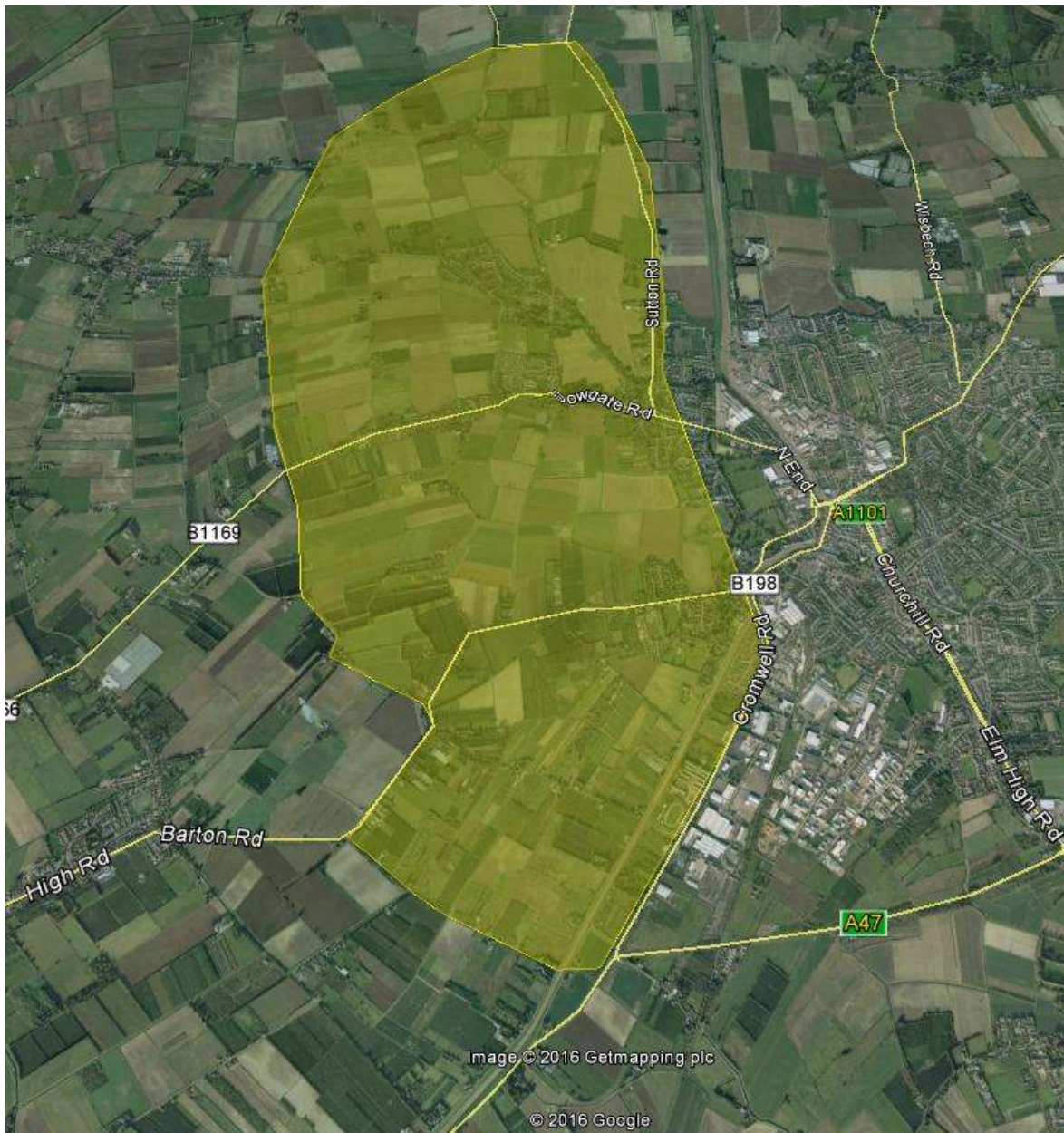
The assessment of the Western Link Road has been undertaken in the following stages:

- Alignment Assessment (Chapter Four) – which considers a preferred alignment for the Western Link Road;
- Junction Assessment (Chapter Five) – which considers the form of the junctions along the Western Link Road;
- Carriageway Assessment (Chapter Six) – which considers whether the Western Link Road should be single carriageway, dual carriageway or a combination of both; and,
- Phasing Assessment (Chapter Seven) – which considers whether the Western Link Road could be built in a phased approach.

## Scheme Location

Proposed alignments for the Western Link Road have been considered within the boundary indicated below, ranging from Little Ramper in the north and to the A47 / Cromwell Road roundabout in the south. Key routes within this boundary include the B1169 and the A1101.

This area encompasses the area of the Wisbech West Development site as well as the main components of the local highway network. Planning for the Wisbech West Development site is still in its infancy, and no detailed special or concept plans currently exist for the site.



**Figure 1.2: Boundary of the Western Link Road Scheme**



## 2 Existing Conditions

### Introduction

This chapter considers the existing conditions within the study area, including the cultural and heritage assets present within the boundary which impact on the alignment options for the Western Link Road scheme. This section also considers the current volume of traffic which passes through the town centre via Freedom Bridge Roundabout, which is directly impacted by the creation of a Western Link Road, and therefore relevant to this area of the Wisbech Access Study.

### Conservation Areas

The boundary for the Western Link Road covers three parishes including Newton, Leverington and Wisbech, the latter are listed as Conservation Areas. Figure 2.1 beneath highlights the positioning of both Leverington (red) and Wisbech (blue) conservation areas in relation to the West Wisbech site boundary.



**Figure 2.1: Conservation Areas within the Site Boundary**

Conservation appraisals and management plans associated with each of the conservation areas mentioned above can be viewed on the Fenland District Council website, at <http://www.fenland.gov.uk/conservationareas>.

## Listed Buildings

A total of 37 listed buildings fall within the identified scheme boundary (shown in blue). Figure 2.2 below highlights the locations of these buildings.

Note that, listed buildings included within the Wisbech Conservation Area only concerns assets that are located on North Brink.



**Figure 2.2: Location of Listed Buildings within the Site Boundary**

Listed buildings within this area consist of Grade I, Grade II and Grade II\*. The majority of listed buildings within these parishes are Grade II listed. The Grade I listed buildings (of exceptional interest), are primarily located within the area of Leverington.

Appendix A provides a summary by parish, of the listed buildings included within this boundary.

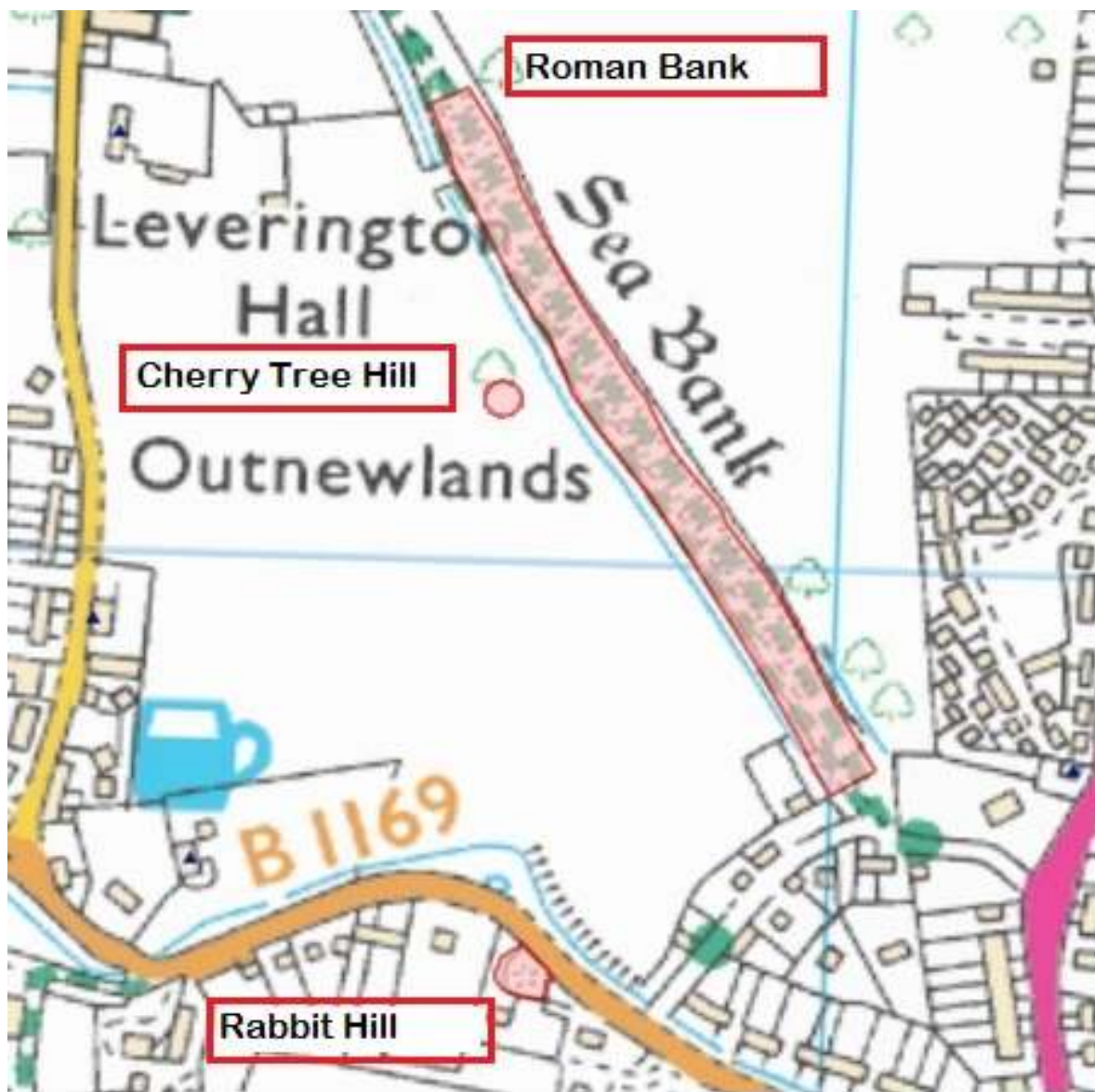


## Scheduled Ancient Monuments

Scheduled Ancient Monuments are a 'nationally important' archaeological site or historic building, given protection by law against unauthorised change.

Leverington contains three Scheduled Ancient Monuments, as outlined in Figure 2.3 below. These monuments include:

- Rabbit Hill Round Barrow;
- Cherry Tree Hill Round Barrow; and,
- Roman Bank (Ancient Sea Bank), NW of Little Dowgate.

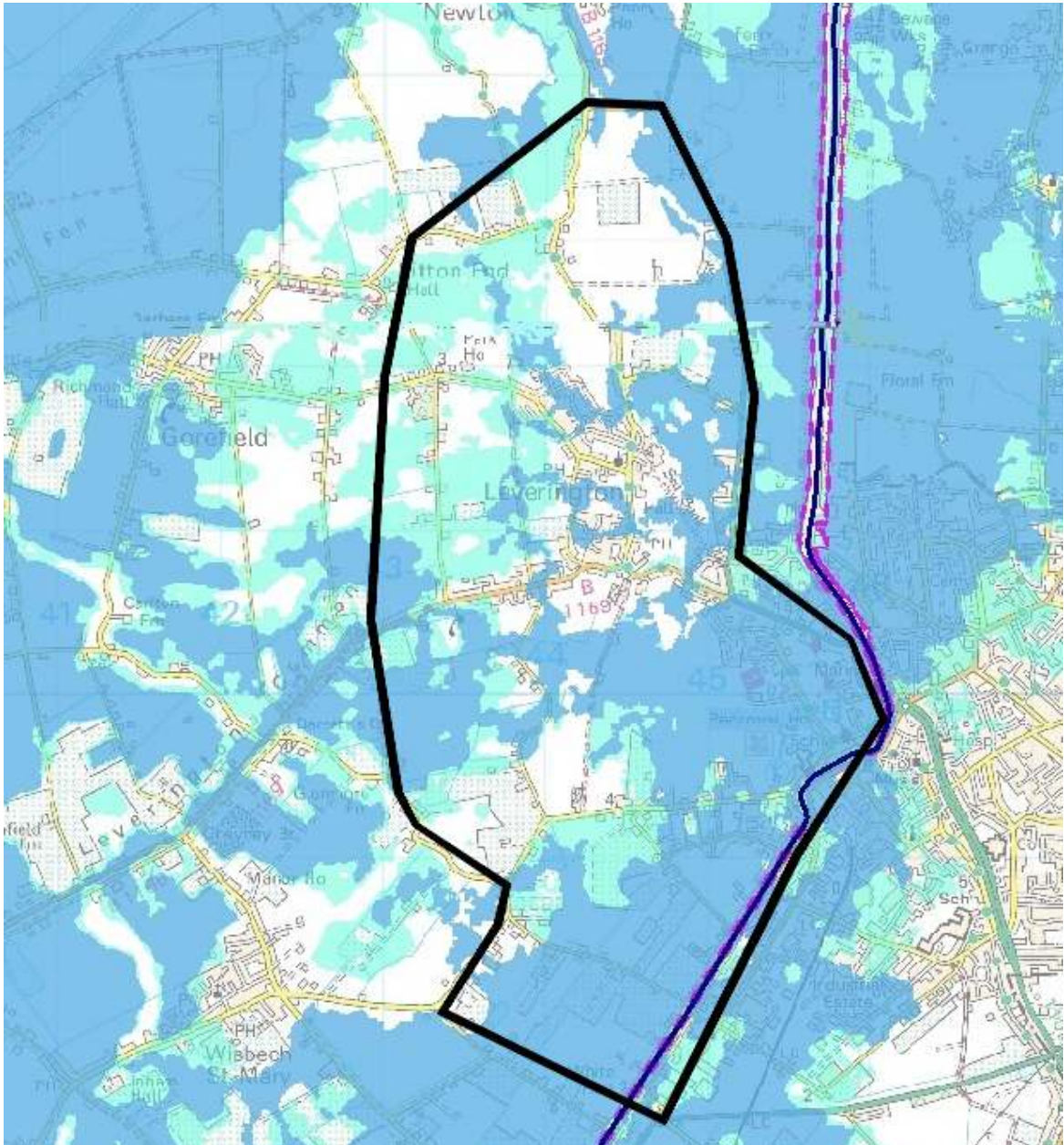


*Figure 2.3: Location of Scheduled Ancient Monuments within the Site Boundary*



## Flood Risk

Figure 2.4 shows flood risk information supplied by the Environment Agency, which shows that the West Wisbech Site lies on Flood Zones 2 (medium risk) and 3 (high risk). High risk areas appear to be predominantly located to the southeast of the site (running parallel to the river), south of Leverington Road.



**Figure 2.4: Flood Risk of the West Wisbech Development Site**

The location of the site within Flood Zones 2 and 3 mean that the Western Link Road will need to be designed appropriately, including building the road on embankments which will increase the cost of construction.

## Town Centre Traffic

The provision of a Western Link Road will have a direct impact on the amount of traffic currently travelling through Wisbech Town Centre, and particularly through Freedom Bridge Roundabout and Town Bridge.

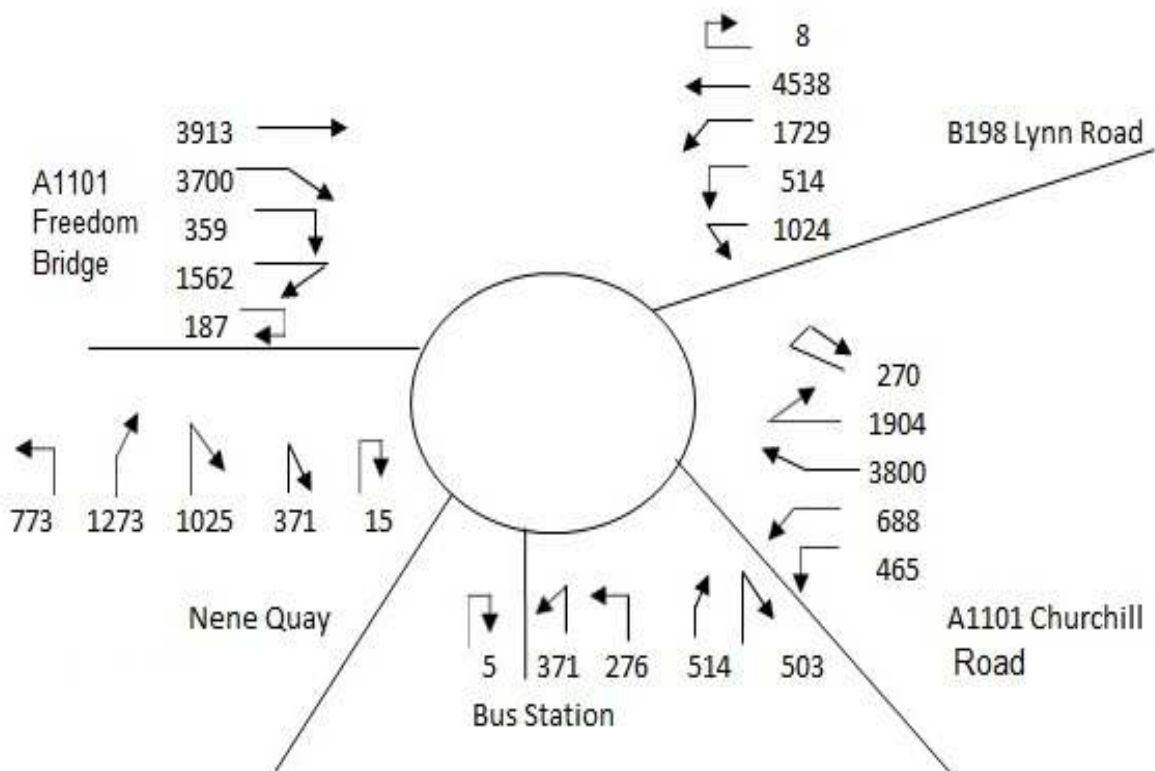
At present vehicles travelling north to south between the A17 to the north (via the A1101) and the A47 to the south, have no practical alternative to routing through the town centre via the heavily trafficked Freedom Bridge Roundabout and Town Bridge Junction.

To assess the daily volume of traffic currently passing through these two junctions, fully classified turning counts were undertaken at the junctions in January 2016. The results from these surveys are discussed beneath.

## Freedom Bridge Roundabout Turning Flows

Traffic surveys were undertaken at the junction on Tuesday 14<sup>th</sup> January 2016. The survey recorded vehicle turning movements at the junction over a twelve hour period between 07:00 - 19:00. Analysis of these surveys are provided beneath, with a particular focus on the trips travelling between A1101 Freedom Bridge and the A1101 Churchill Road.

Turning movement over the 12 hour duration is shown in Figure 2.5 beneath.

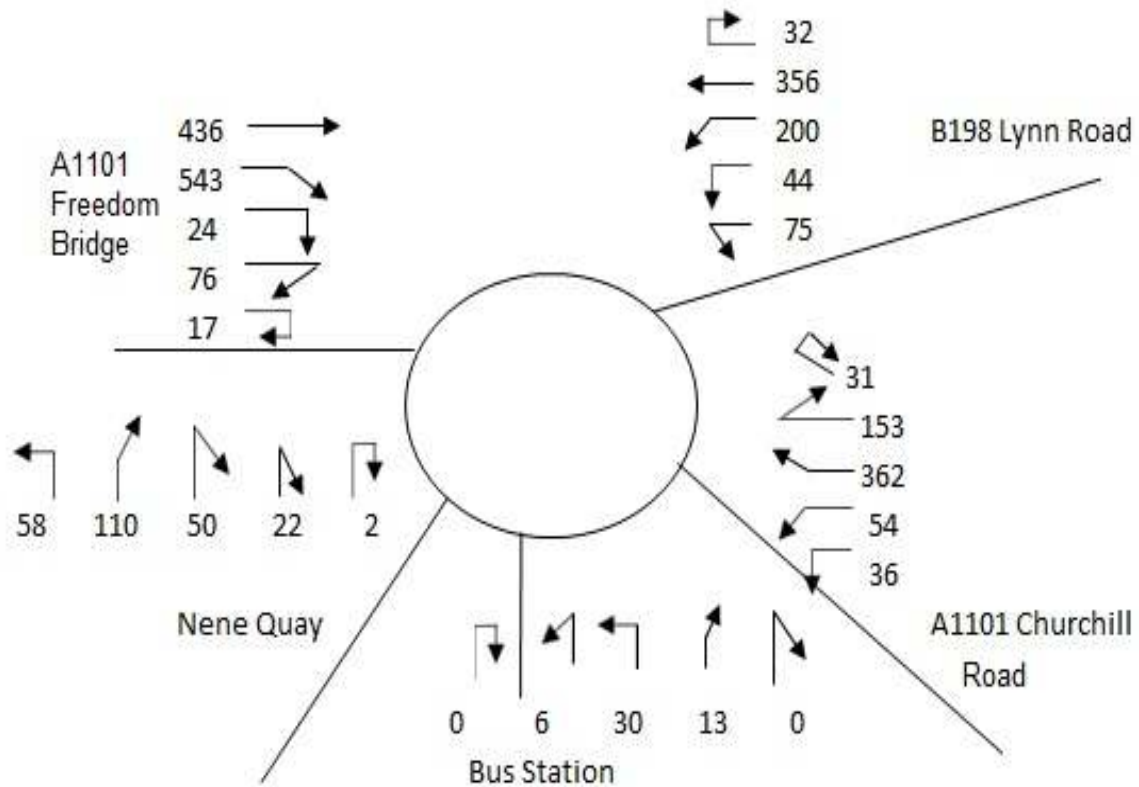


**Figure 2.5: Freedom Bridge Roundabout 12 Hour Turning Count (07:00 - 19:00)**

Figure 2.5 shows the main movements through Freedom Bridge Roundabout are from the A1101 Freedom Bridge to the B198 Lynn Road (and vice versa) and the A1101 Freedom Bridge to the A1101 Churchill Road (and vice versa).

Traffic flows between the A1101 Freedom Bridge and A1101 Churchill Road are well balanced, with 3,800 vehicles travelling northbound and 3,700 vehicles travelling southbound over a 12 hour period. In comparison the number of vehicles turning onto Nene Quay from the A1101 Freedom Bridge is approximately half, suggesting Churchill Road is the main route taken to reach the A47 from the north.

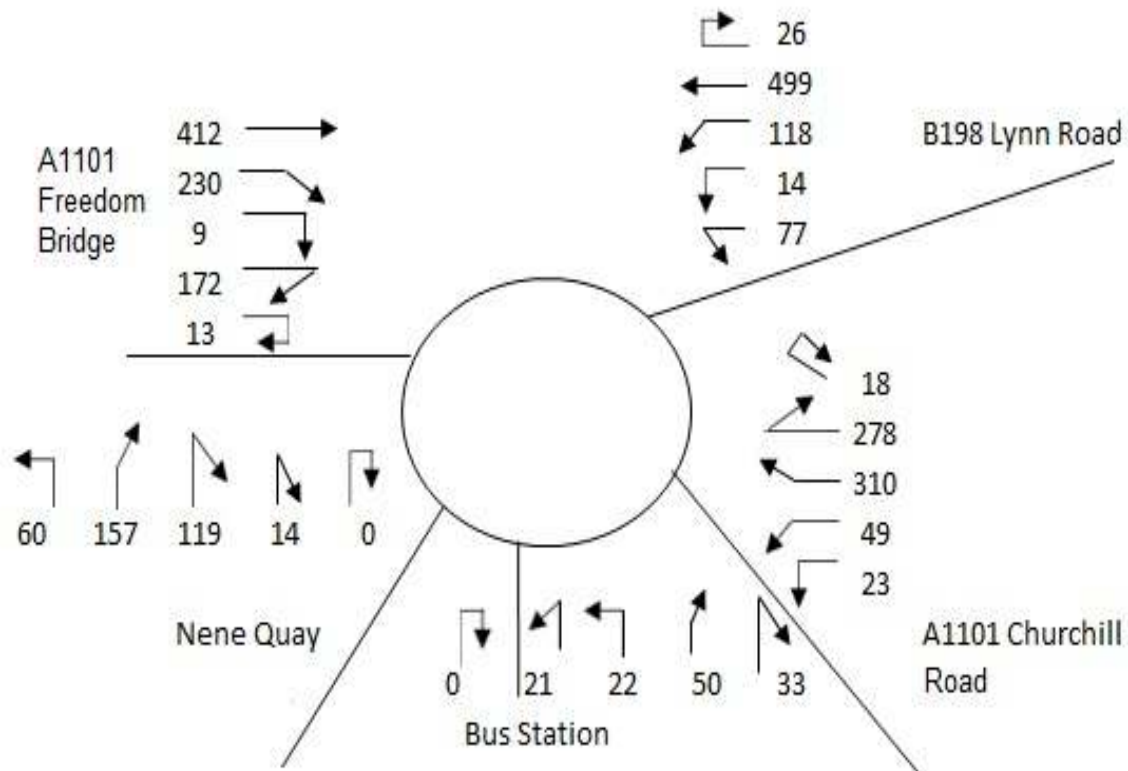
The results from the AM peak hour are shown in Figure 2.6 beneath.



**Figure 2.6: Freedom Bridge Roundabout AM Peak Turning Count (08:00 - 09:00)**

Figure 2.6 shows that the primary traffic flow through the junction during the AM peak hour is southbound from the A1101 Freedom Bridge to the A1101 Churchill Road, with a total of 543 vehicles making this movement. Traffic travelling in the opposite direction is slightly lower, with 362 vehicles from the A1101 Churchill Road to A1101 Freedom Bridge.

Traffic flows for the PM peak hour are shown on the following page.



**Figure 2.7: Freedom Bridge Roundabout PM Peak Turning Count (17:00 - 18:00)**

During the PM peak hour there is a change in the dominant movement, with a higher proportion of vehicles travelling between the A1101 Freedom Bridge and the B198 Lynn Road. Approximately 500 vehicles travel westbound and exit the circulatory at A1101 Freedom Bridge during this period.

PM peak hour results show a reduction in the number of vehicles using the A1101 north to south route. Compared to the AM peak, only 310 vehicles travel northbound from Churchill Road, and 230 vehicles travel southbound from the A1101 Freedom Bridge.

### Junction Summary

The A1101 Freedom Bridge is the most used approach of Freedom Bridge Roundabout, with approximately 1,100 vehicles originating from the approach during the AM peak, and 930 arriving at the approach during the PM peak.

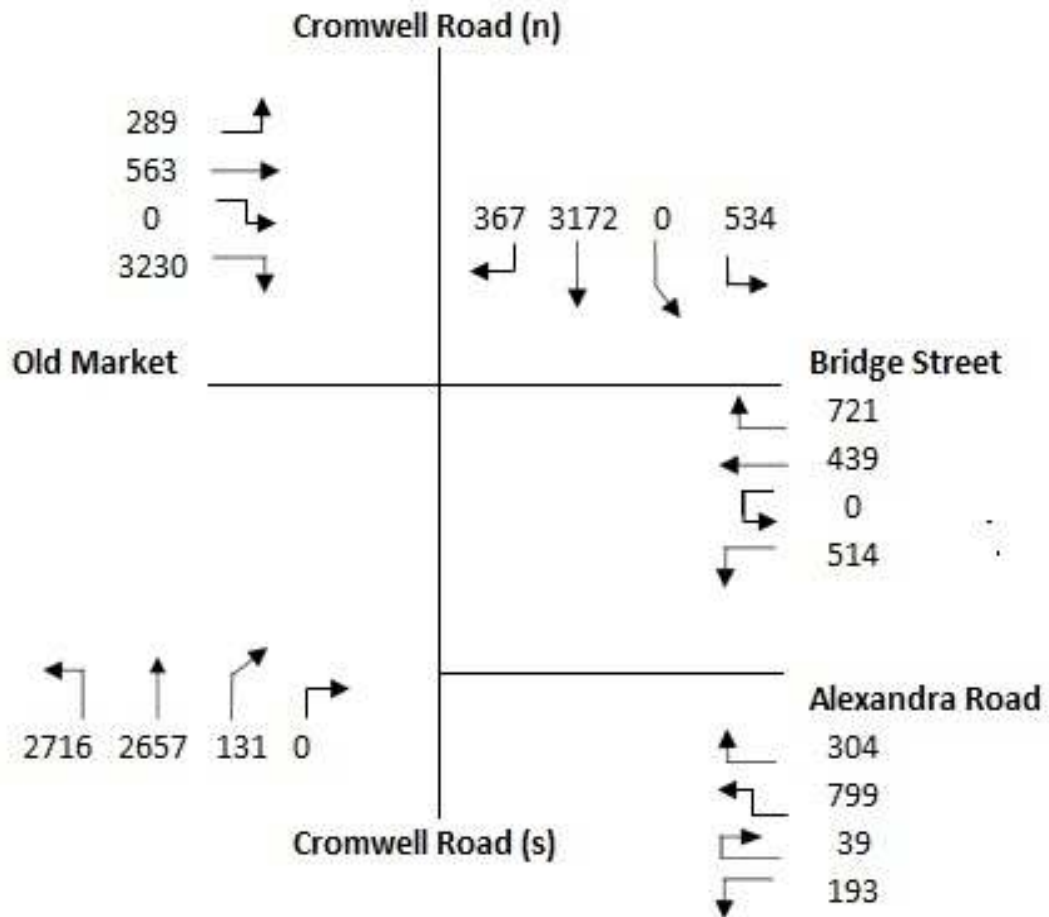
Higher traffic flows are observed between the A1101 Freedom Bridge and Churchill Road during the AM peak hour, which changes to the A1101 Freedom Bridge and Lynn Road during the PM peak hour.

### Town Bridge Junction Turning Flows

Traffic surveys were undertaken at the junction on Tuesday 24<sup>th</sup> January 2016. The survey recorded vehicle turning movements at the junction over a twelve hour period between 07:00 - 19:00. Analysis of these surveys are provided beneath, with a particular focus on the trips travelling along Nene Quay / Cromwell Road (both directions) to / from Freedom Bridge Roundabout and Old Market.



Turning movement over the 12 hour duration is shown in Figure 2.6 beneath.

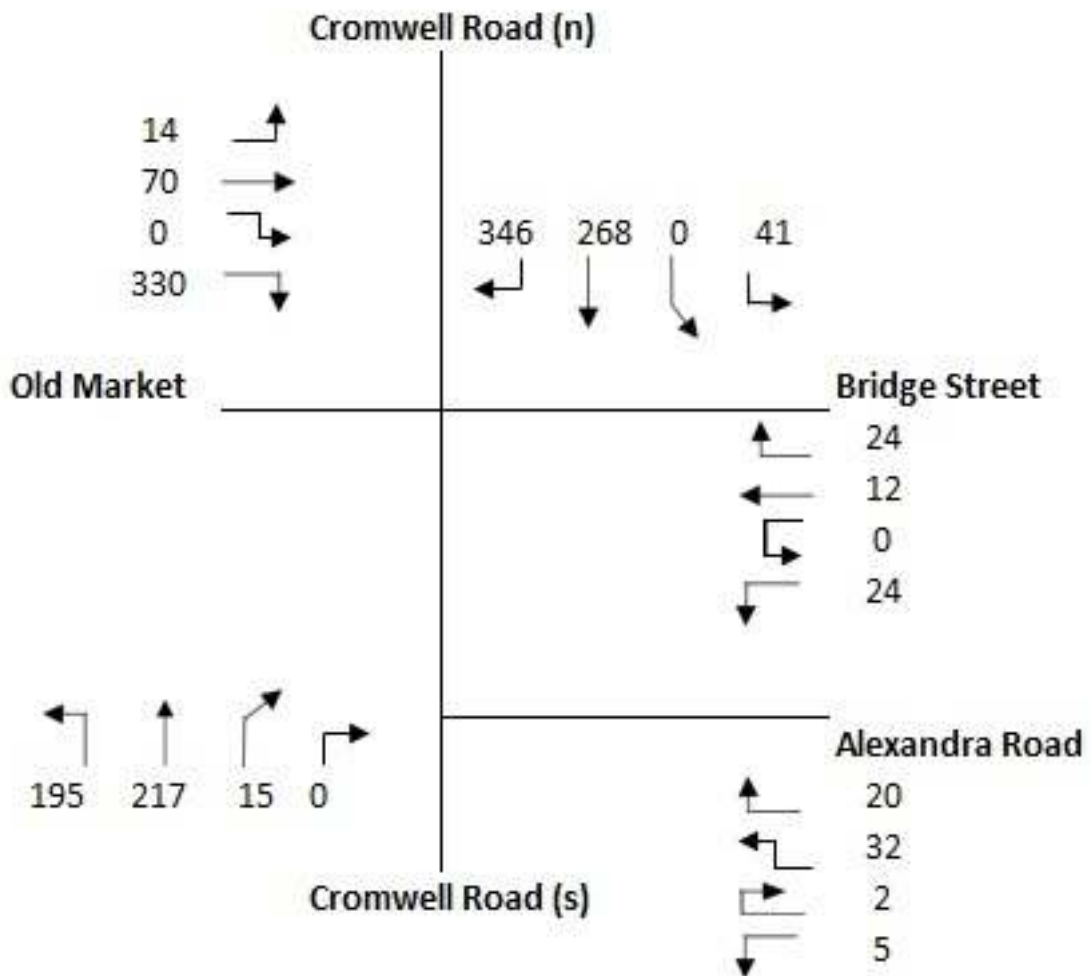


**Figure 2.8: Town Bridge Junction 12 Hour Turning Count (07:00 - 19:00)**

Over a 12 hour period, the number of vehicles originating from the north (most likely Freedom Bridge Roundabout) and arriving at the junction totals 4,073 of which 3,172 continue to travel southbound along the Cromwell Road corridor.

In looking at the reverse of this movement a total of 5,504 vehicles originate from Cromwell Road South, with the greatest proportion of vehicles (2,716) being destined for Old Market. This may suggest motorists use Town Bridge and Chapel Road as a way of bypassing Freedom Bridge Roundabout, joining the A1101 on the west gyratory.

The results for the AM peak hour are shown in Figure 2.9 beneath.



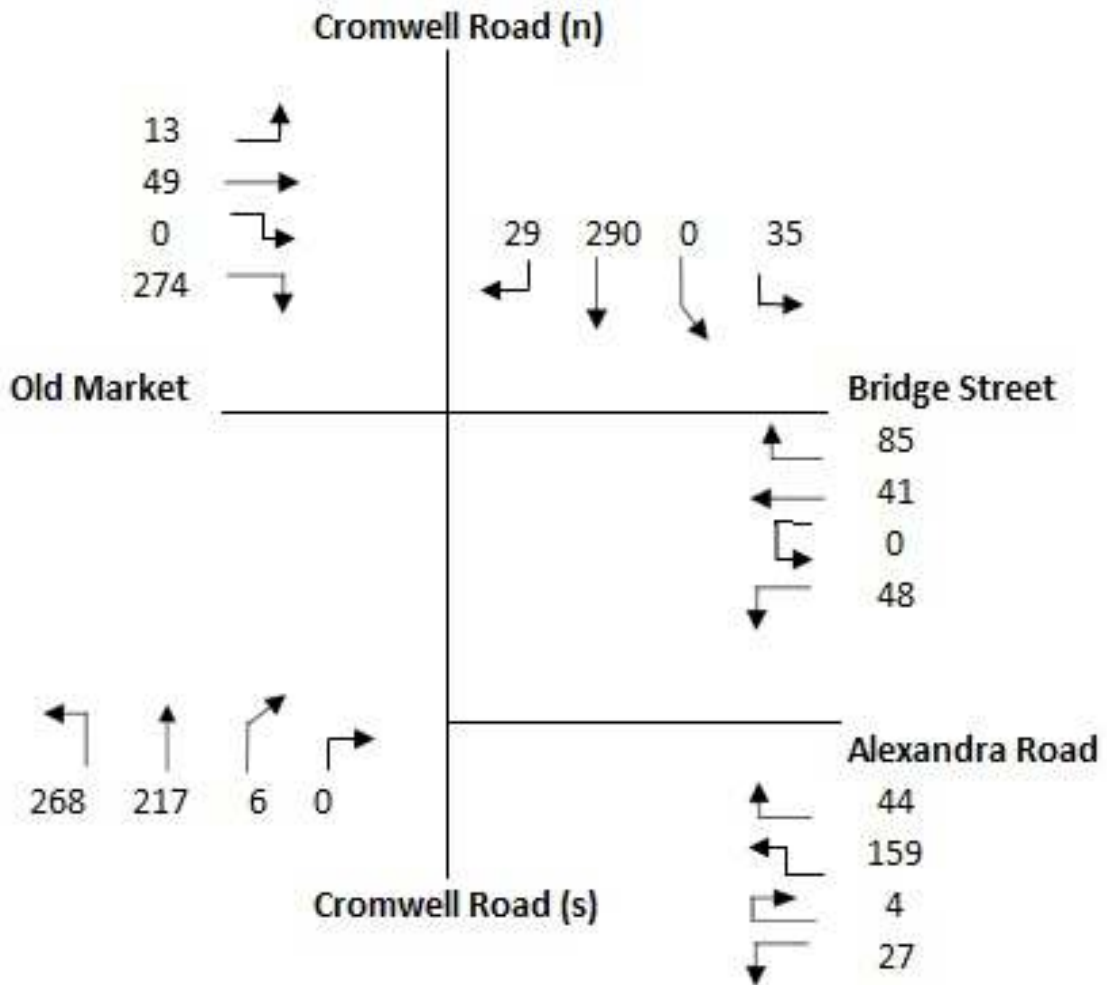
**Figure 2.9: Town Bridge Junction AM Peak Hour Turning Count (08:00 - 09:00)**

During the AM peak hour a total of 657 vehicles arrive at Town Bridge Junction from the north. During this time period the dominant turning movement is between Cromwell Road north and Old Market, with 346 vehicles making this movement.

Similarly to the pattern shown within the 12 hour period survey results, a high proportion of traffic originating from Cromwell Road South are shown to be destined for Old Market, suggesting Town Bridge may be used to bypass Freedom Bridge Roundabout.

The majority of vehicles (330) originating from old Market are shown to travel southbound along the corridor, again suggesting the possible bypassing of Freedom Bridge Roundabout to reach lower part of the corridor or the A47.

PM peak hour survey results are shown in Figure 2.10 below.



**Figure 2.10: Town Bridge Junction PM Peak Hour Turning Count (17:00 - 18:00)**

During the PM peak hour a total of 354 vehicles arrive at Town Bridge Junction from the north, with the majority (290) continuing straight ahead on the corridor.

Vehicles originating from Cromwell Road South totals 419, of which 268 vehicles are destined for Old Market. In looking at the reverse of this movement, a similar pattern is shown, with a greater number of vehicles originating from Old Market turning right onto Cromwell Road South.

### Junction Summary

Dominant turning movements at Town Bridge Junction (as reflected within the 12 hour and peak hour traffic surveys) is primarily shown to be between Cromwell Road South and Old Market (and vice versa).

Following this movement, a greater volume of traffic is shown to originate from Old Market during the AM peak hour, and be destined for this approach during the PM peak hour.

## 3 Development Proposals

### Introduction

This chapter provides an overview of the West Wisbech urban extension, outlining the development proposal, phasing of housing completion and predicted development traffic flows. The assessment of a western link road is directly associated with facilitating this development.

### West Wisbech Development

The West Wisbech Development site forms one of three major allocations of growth across Wisbech, with the site boundary identified within the Local Plan (Policy LP8) as being situated North of Mile Tree Lane, south of the B1169 (Leverington Common) and east of Gadds Lane and Barton Road. Figure 3.1 below highlights this boundary.



**Figure 3.1: Location and Boundary of the West Wisbech Development Site**



The proposed development will be predominantly residential and is planned to consist of:

- 750 dwellings allocated by FDC;
- Small area of employment;
- Open space;
- New education facilities;
- Local convenience shopping facilities and community services; and,
- Direct pedestrian and cycle routes to key facilities, including the town centre.

The spatial location of these elements is currently unknown and will be determined by the production of a Broad Concept Plan, which requires detailed assessments of flood risk and transport infrastructure to inform its formation.

Policy LP8 of the Local Plan (2014) states that the transport infrastructure should consist of, “a link connecting the A1101 in the north to the B198 Cromwell Road in the south including a new river crossing”, the alignment and form of which is the subject of this assessment. The primary junctions serving the development site are assumed to be roundabouts to provide an adequate level of accessibility into and out of the site.

In connection with this proposal policy LP8 states “*Transport infrastructure required to serve the area must ensure that there will be no unacceptable adverse impact on the local and strategic highway network, as well as the setting of nearby listed buildings, the Wisbech and Leverington Conservation Areas, and the scheduled monument at Rabbit Hill*”.

This statement has been taken into consideration when assessing the potential alignment of the Western Link Road, and this is discussed within the relevant sections of this report.

### WATS Model Formation

The West Wisbech development site is represented within the WATS model by two SATURN zones (30253 and 30201), as shown in Figure 3.2 on the following page.

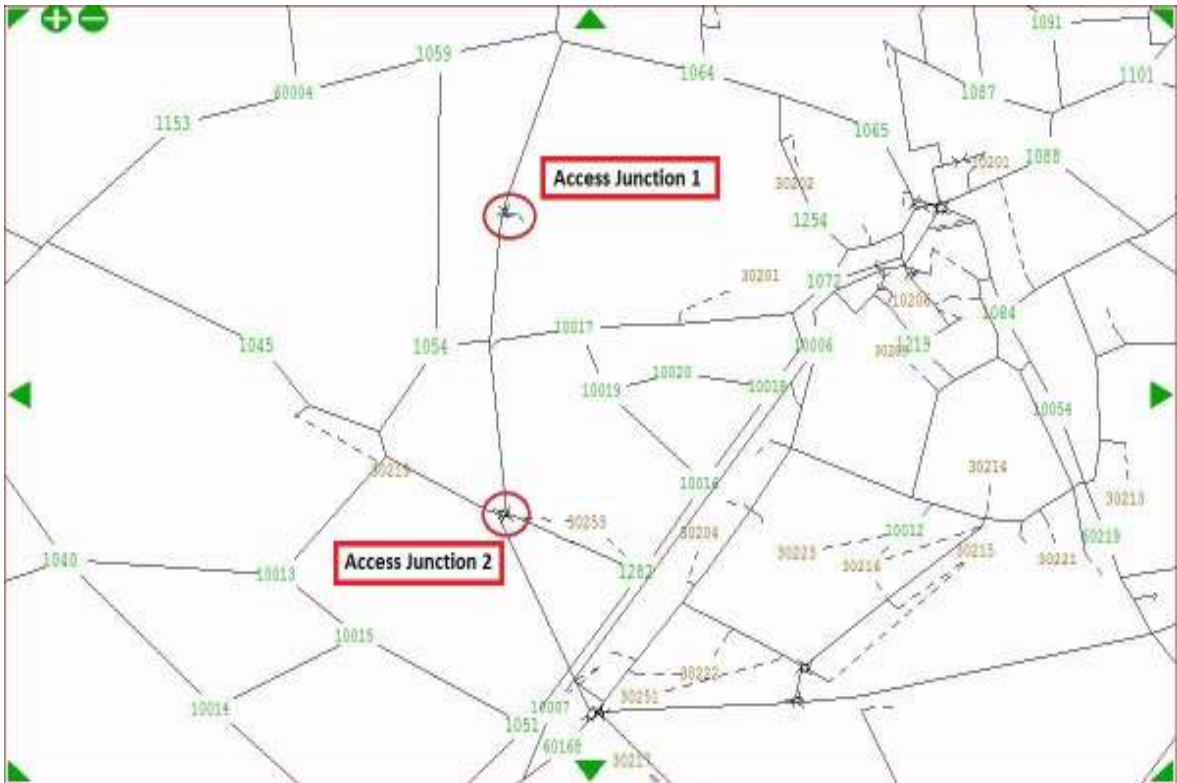
In this form, the zone 30253 represents the development of the southern half of the Western Link Road (south of Barton Road), whilst zone 30201 represents the development of the northern half of the link road (between Barton Road and Leverington Road).

It is assumed that the proposed 750 homes will be situated within the **southern half of the Western Link Road**, with development traffic joining the network via zone 30253. Despite this assumption being made, zone 30201 will remain within the WAT’s model to accommodate further housing growth if required, as part of the West Wisbech Development BCP.

Full details of the WATS model can be found in the Local Model Validation Report and the model forecasting report. In addition please visit the Fenland District Website using the link below, for information regarding the Wisbech Access Study.

<http://www.fenland.gov.uk/search?q=WATS+&continue=Continue&searchmethod=ANY>





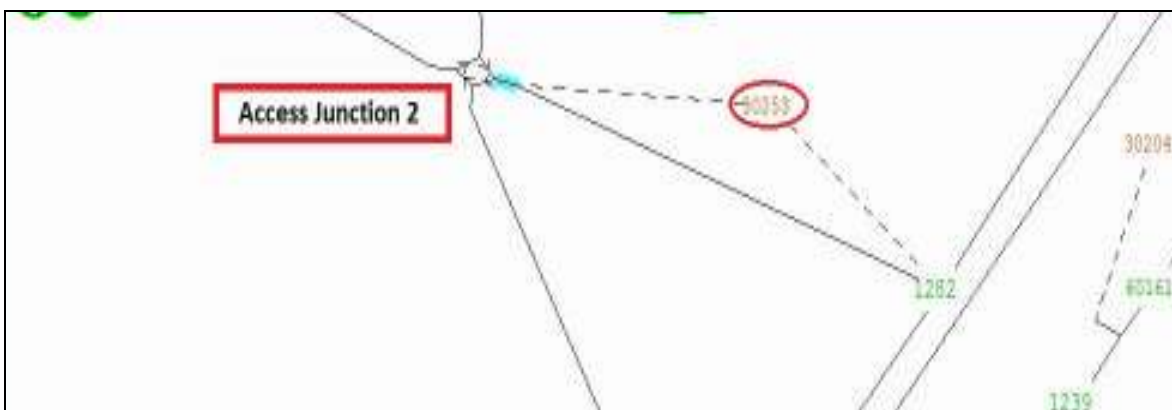
**Figure 3.3: Location of the Development Access Junctions**

### Development Traffic within the WATS Model

For the purpose of the proposed 750 homes, development traffic originating / arriving at the SATURN zone 30253, has been assigned to access the wider network via 'Development Access Junction 2', as shown in Figure 3.3 above.

Forecast traffic flows for the Western Link Road have been extracted from the WATS model for the forecast years of 2031 (whereby development traffic is greatest), using the Select Link Analysis (SLA) tool.

The SLA tool has been used at 'Development Access Junction 2', in order to determine the number of vehicles forecast to be generated by / attracted to the development by 2031. The link used during this analysis is indicated in blue within Figure 3.4 below.



**Figure 3.4: Select Link Analysis, Zone 30253 for West Wisbech Development Site**

Table 3.1 shows the Select Link Analysis of traffic flows for both the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours of 2031.

**Table 3.1: 2031 Peak Hour - Forecast Trips between the Development and Western Link Road (Access Junction 2)**

Development Access Junction 2	AM Peak	PM Peak
From Development to Western Link Road	153	98
From Western Link Road to Development	70	166

Table 3.1 shows a greater proportion of traffic join the Western Link Road via access Junction 2 during the AM peak hour, with a total of 223 trips being associated with this junction during this time period.

During the PM peak hour more vehicles are shown to originate from the Western Link Road and enter the development site. A total of 264 trips are generated at the junction on Mile Tree Lane during the PM peak, as a result of vehicles entering and leaving the development site.

### Western Link Road – Development Phasing

The assumption to first develop the **southern half** of the Western Link Road, and therefore facilitate a new river crossing, is supported by phasing sensitivity tests outlined below.

Note, the phasing sensitivity tests which have informed this decision were undertaken within the WATS model (2008 base). The purpose of using the old model within this assessment, was to use results to inform the zoning structure within the model update. See below for assessment details and results.

The following tests were completed for this phasing assessment:

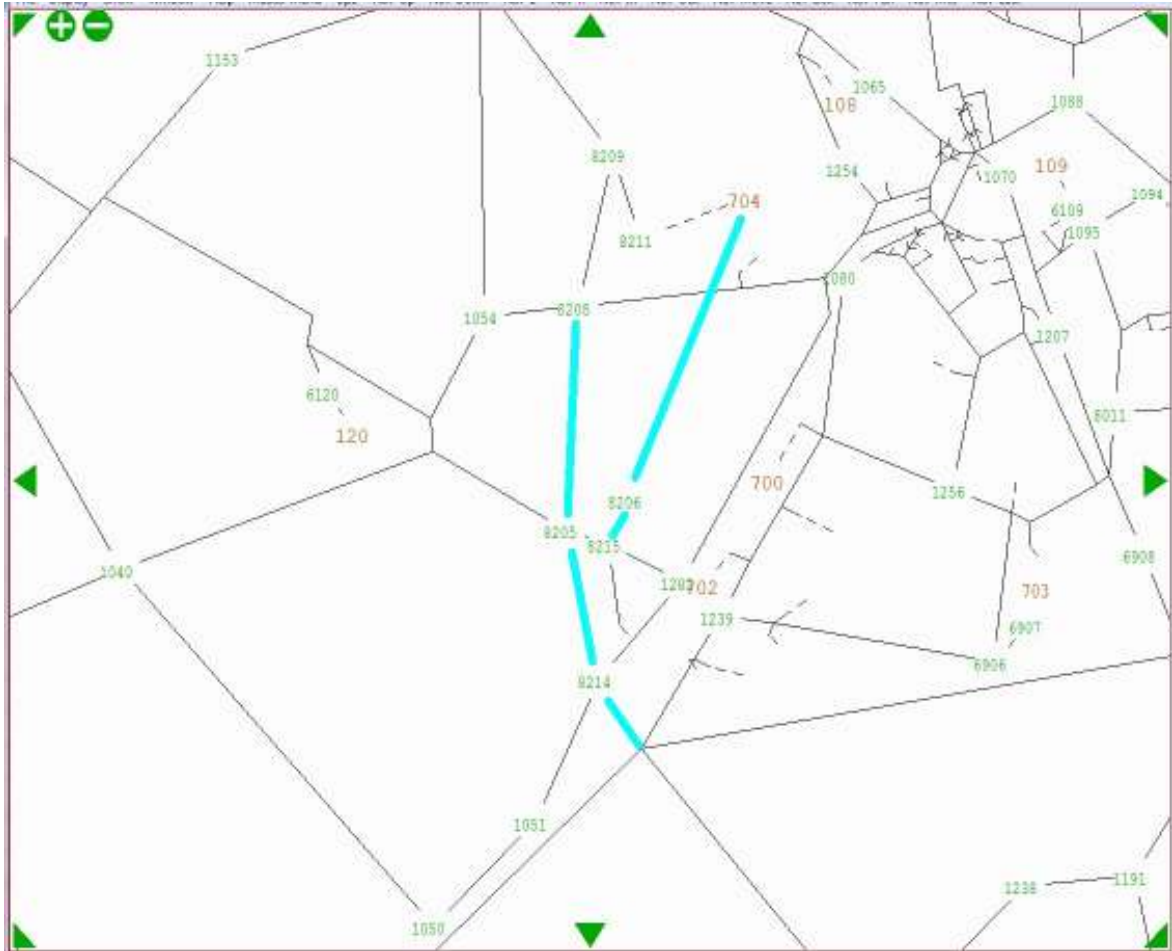
- Test 1 – Assuming only the northern half of the link road is constructed between Barton Road and Leverington Road; and,
- Test 2 – Assuming only the southern half of the link road is constructed between Barton Road and the A47 / Cromwell Roundabout.

### WATS Model

The Phasing Assessment was undertaken in the ‘Do Minimum’ model, which included a broad alignment of a Western Link Road between the A47 / Cromwell Road roundabout and Leverington Common. A series of movement bans were applied to various parts of the network, preventing their use, to replicate partial or full closure of the Western Link Road.

### Test 1 Model Assumptions

Figure 3.5 highlights the links whereby movements were banned (highlighted in blue) for this test. This test assumes that the 750 houses are built to the north of Barton Road, and that only the northern half of the Western Link Road is constructed.



**Figure 3.5: Test 1 Banned Link Locations**

### Test 2 Model Assumptions

Figure 3.6 on the following page highlights the banned movements (highlighted in blue) for this test. This test assumes that the 750 houses are built to the south of Barton Road, and that only the southern half of the Western Link Road is constructed







**Table 3.2: RFC Summary Test 1**

		VCR WLR Complete		RFC Test 1	
		AM	PM	AM	PM
A1101 Freedom Bridge Approach	Eastbound	67	55	108	85
	Westbound	56	80	80	80
A1101 Sutton Road Junction to Leverington Road	Northbound	7	9	7	9
	Southbound	64	47	89	55
Leverington Road to north Development access	Northbound	15	22	8	11
	Southbound	2	4	2	4
North Development access to Barton Road	Northbound	13	23	9	17
	Southbound	4	4	16	13

Table 3.2 shows several changes in capacity across the network as a result of the first phasing test.

The Western Link Road is shown to operate well within capacity during 2031, however capacity changes are expected between the Development Access and Barton Road when travelling southbound.

A higher RFC ratio is expected for the A1101 Sutton Road Junction and the A1101 Freedom Bridge approach of Freedom Bridge Roundabout, The southbound carriageway of Sutton Road junction during the AM peak hour is expected to be approaching capacity (RFC ratio 89%), whilst the A1101 Freedom Bridge is expected to operate over capacity Eastbound during the AM peak hour (RFC ratio 108%) and approaching capacity eastbound (85%) during the PM peak hour. Increased delay and queues will be common place along these junction approaches during this period.

Data presented in Table 3.2 suggests that with only the northern half of the link road built, more vehicles revert to travelling via the town centre network and the heavily trafficked Freedom Bridge Roundabout becomes over capacity.

### Test 2 Results (Development South)

Figure 3.9 and 3.10 show the RFC ratios which have been extracted from the WATS model for the AM and PM peak hours. Table 3.3 beneath summaries this information.



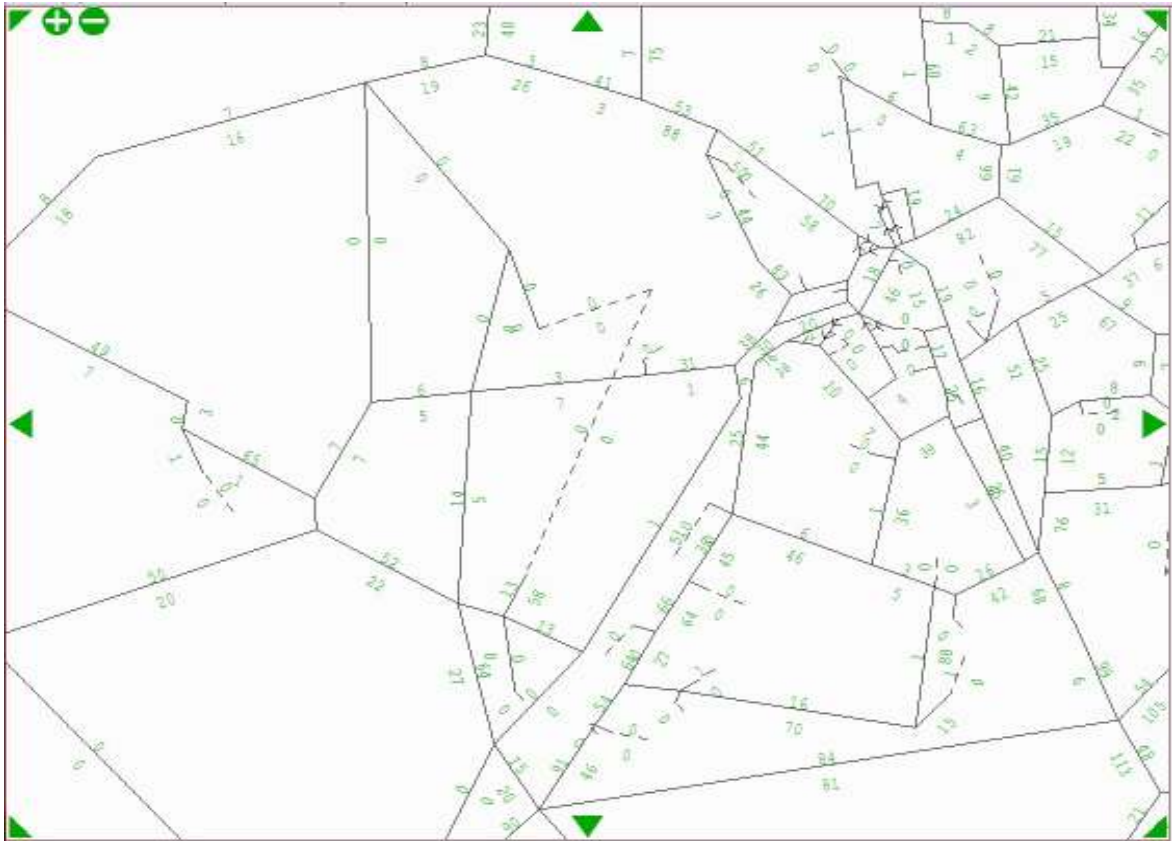


Figure 3.9: Test 2 RFC Outputs for AM Peak Change

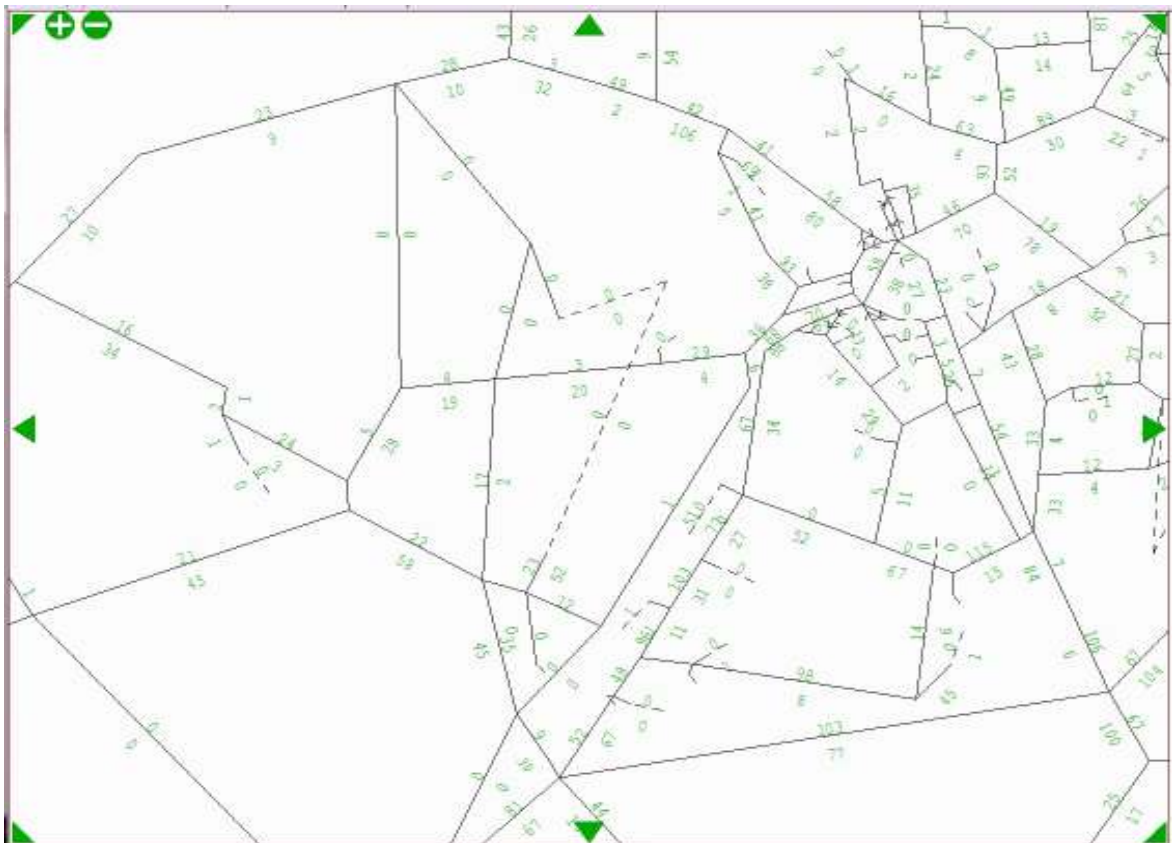


Figure 3.10: Test 2 RFC Outputs for PM Peak Change

The results of Test 2 are shown beneath in Table 3.3.

**Table 3.3: RFC Summary Test 2**

		VCR WLR Complete		RFC Test 2	
		AM	PM	AM	PM
Cromwell Road	Northbound	85	52	91	52
	Southbound	48	69	14	67
Barton Road to South Development Access 2	Northbound	16	24	15	17
	Southbound	4	2	5	2
South Development Access to Approach of River Crossing	Northbound	30	44	27	45
	Southbound	65	39	64	35
River Crossing to A47 roundabout	Northbound	23	38	20	30
	Southbound	15	10	15	9

Table 3.3 shows the southern half of the Western Link Road included within this phasing test operates within capacity across peak hours in 2031. Minimal changes in capacity are shown across all network links explored between Barton Road and the A47 roundabout.

Within this phasing test, the RFC ratio along Cromwell Road northbound increases from 85% to 91% during the AM peak hour, resulting in the carriageway approaching capacity. Congestion and delay are likely to increase at this location during this period, however it is still expected to operate within capacity.

Data presented in Table 3.3 suggests that with only the southern half of the link road built, slightly more vehicles use Cromwell Road to travel between the A47 and the A17 north of Wisbech.

## Phasing Summary

The results from the phasing tests undertaken have highlighted the following points:

- With only the northern half of the Western Link Road built, a higher proportion of traffic stick to using the existing route via the town centre. This results in approaches of Freedom Bridge Roundabout and the A1101 Sutton Road Junction operating over capacity.
- With only the southern half of the Western link Road built, the operation of the link road operates within capacity. As a result of this phasing slightly more trips travel via north along the southern section of Cromwell Road.

Based on the points made above, the preference for phasing the development of the West Wisbech Development site would be to facilitate development at the Southern half of the Western Link Road, between the A47 / Cromwell Road and Barton Road. As a result of this phasing, no adverse impact are predicted for the wider network, with all links remaining within capacity.

## Proposed Housing Development Phasing

The proposed phasing for the 750 dwellings currently identified for the Wisbech West Development is shown beneath. Note that construction of the housing is proposed to begin in 2023.

**Table 3.4: Proposed Phasing for West Wisbech Development**

Scenario	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Annual Build	-	-	83	83	83	83	83	83	83	83	86
Cumulative Total			83	166	249	332	415	498	581	664	750

## 4 Alignment Assessment

### Introduction

This chapter outlines the assessment undertaken to consider potential alignments for the Western Link Road, including the modelling assumptions made, the assessment of potential town centre traffic diversion and the consideration of other factors such as the impact on heritage and conservation of each of the alignments.

The alignment assessment has considered fourteen alignments which follow three core routes, each of which is associated with one of the new river crossing locations considered.

### Alignment Development Workshop

A workshop was held in the summer of 2016 to determine potential alignments for the Western Link Road. The workshop was attended by representatives from Fenland District Council, Cambridgeshire County Council and Skanska.

The workshop used the preferred river crossing sites (as identified within the *New River Crossing Report*) to devise three core routes to accommodate several suitable alignments each for the Western Link Road. The alignments were shaped to ensure that they could serve the West Wisbech development site. The river crossing sites which informed the workshop as well as the core routes developed within the workshop are detailed below.

### River Crossing Assessment

The new river crossing is directly linked to the provision of a Western Link Road. The three potential sites identified for a river crossing include:

- Barton Road – Where North Brink meets Barton Road;
- New Bridge Road Crossing – Where New Bridge Lane meets South Brink; and,
- Southern Crossing – West of the roundabout that forms the junction of the A47 / Cromwell Road / Redmoor Lane.

These sites were assessed for suitability of a crossing from a structural perspective as part of the New River Crossing assessment, and detail of this is included within the *New River Crossing Report*. This assessed each locations ability to serve the West Wisbech development site, its ability to connect with Cromwell Road and South Brink to the east of the river, as well as the availability of space on either bank to cater for approach ramps and associated infrastructure.

In addition to the structural assessment of these crossing locations, an assessment has been undertaken to determine what impact crossings at each of these locations would have on the diversion of traffic away from Freedom Bridge and the town centre. This second assessment has been undertaken as part of the Western Link Road assessment, and is reported beneath as part of a wider consideration of issues such as impact on conservation and heritage, requirement for land take and other constraints.

Figure 4.1 below highlights the locations of the three river crossings assessed.





**Figure 4.1: Preferred River Crossing Locations**

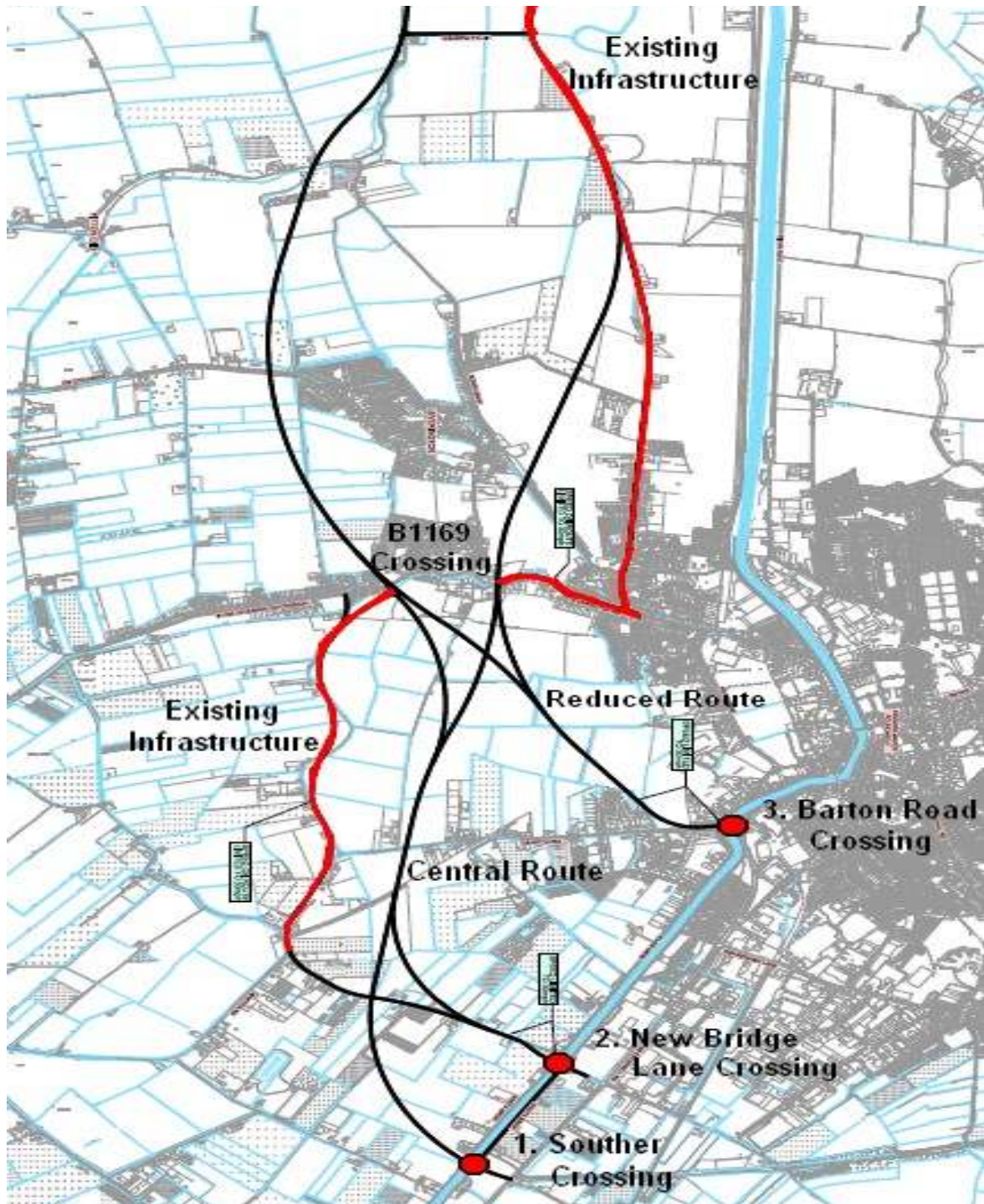
All three river crossing locations shown above are discussed in greater detail throughout this chapter.

### Three Core Routes

Using the river crossing locations described above, three core routes were identified for assessment. These were:

- Central Route – provides access to the core of the Wisbech West Development site;
- Existing Infrastructure Route – makes more use of the existing highway alignment (indicated in red below); and,
- Reduced Route – reduces the amount of new infrastructure required.

Figure 4.2 on the following page highlights the three core routes developed within the workshop. Please note that the new infrastructure is shown in black, and the existing infrastructure used is shown in red.



*Figure 4.2: Potential Western Link Road Alignments*

Several alignments for each of these core routes (as shown in the figure above) were identified, producing a total of twelve potential alignments.



## Twelve Alignment Options

The twelve alignments assessed are shown in Table 4.1 beneath. The names consist of a number and a letter. The number is associated with the Core Route (or river crossing location), whilst the letter refers to the alignment, as detailed in Figure 4.2 above.

**Table 4.1: Alignment Options**

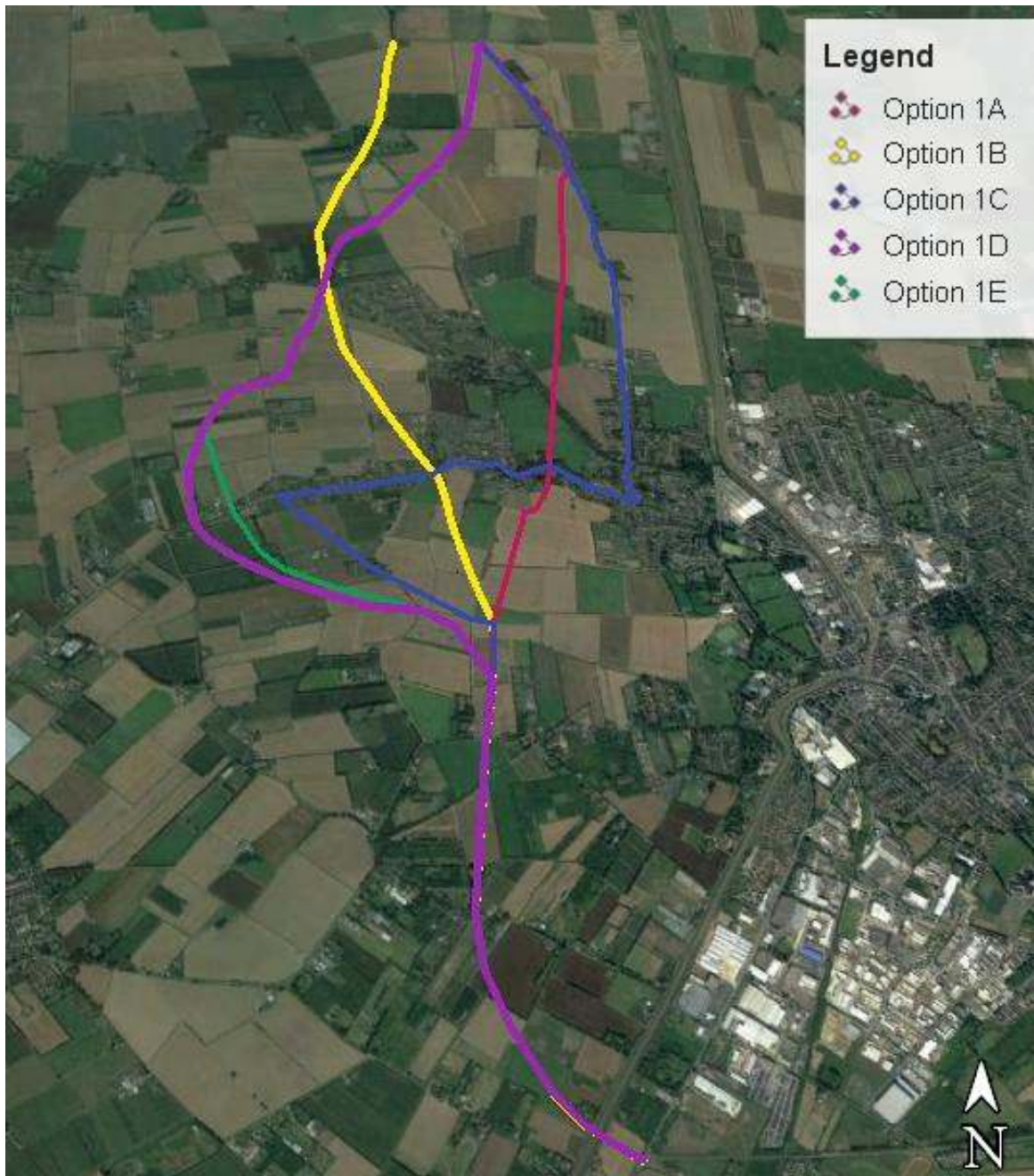
Core Route 1 (Set 1 Alignments - Southern Crossing)	Core Route 2 (Set 2 Alignments - New Bridge Lane Crossing)	Core Route 3 (Set 3 Alignments - Barton Road Crossing)
1A	2A	3A
1B	2B	3B
1C	2C	3C
1D	2D	
1E		

A description of each of these options is provided on the following pages, which is accompanied by an alignment image, which shows the alignments in relation to the West Wisbech Development site and remaining Wisbech town centre network.

Please note: Each alignment set are shown in turn.

**Table 4.2: Set 1 Alignment Description**

	Description
1A	Southern river crossing, with central alignment south of Leverington Road. New infrastructure connecting the A1101 with Leverington Road to the north.
1B	Southern river crossing, with central alignment south of Leverington Road. Circles west of Leverington re-joining to network at Little Ramper.
1C	Southern river crossing, with central alignment, uses existing infrastructure of Leverington Road and the A1101 / Sutton Road Junction.
1D	Southern river crossing, with central route up to Gadd's Lane. Circles west of Leverington Road, re-joining the network at Little Ramper in the north. No demolition required.
1E	Alignment 1D, however some demolition required on Leverington Common.

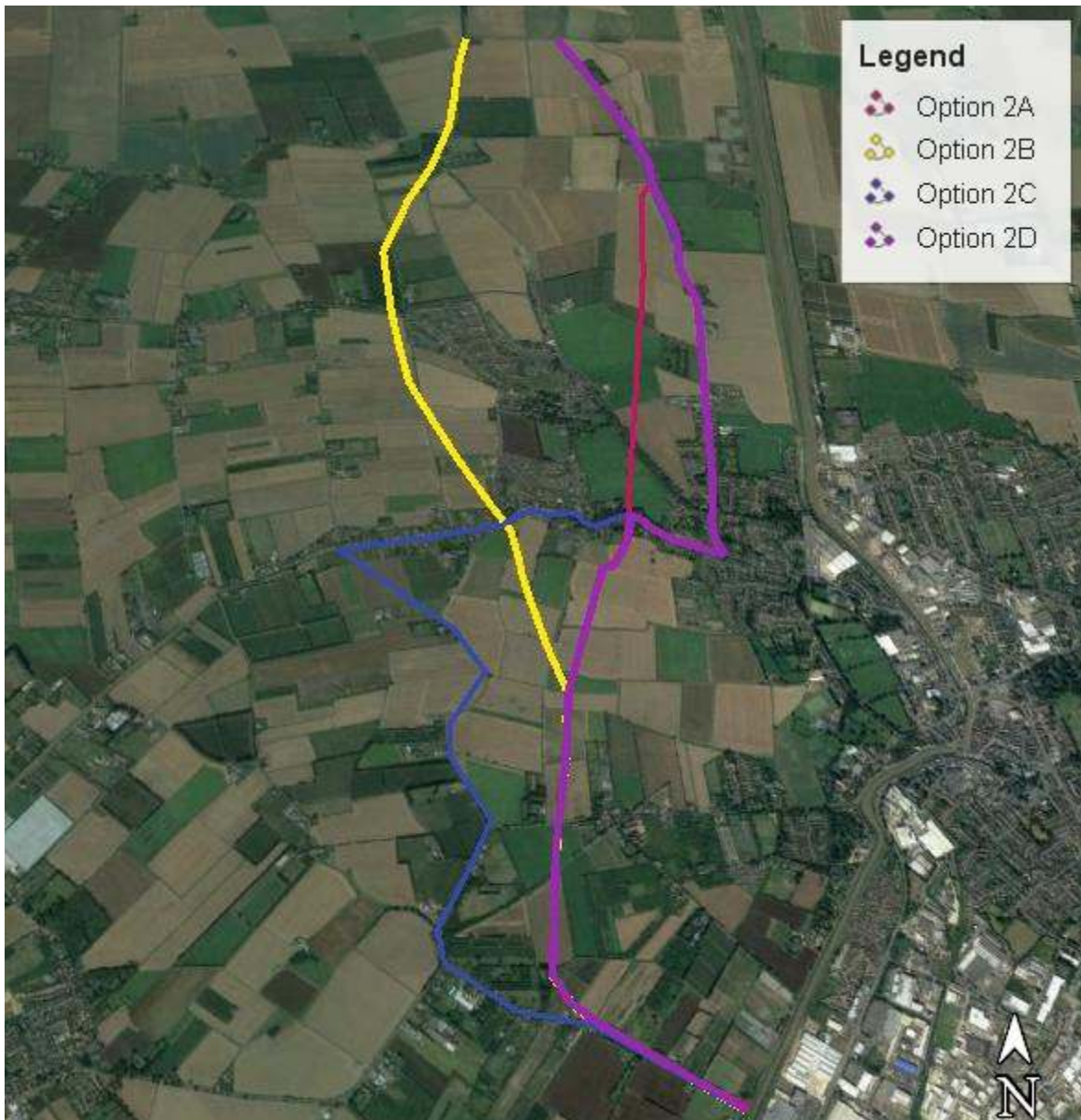


*Figure 4.3: Set 1 Alignments – Southern River Crossing*



**Table 4.3: Set 2 Alignment Description**

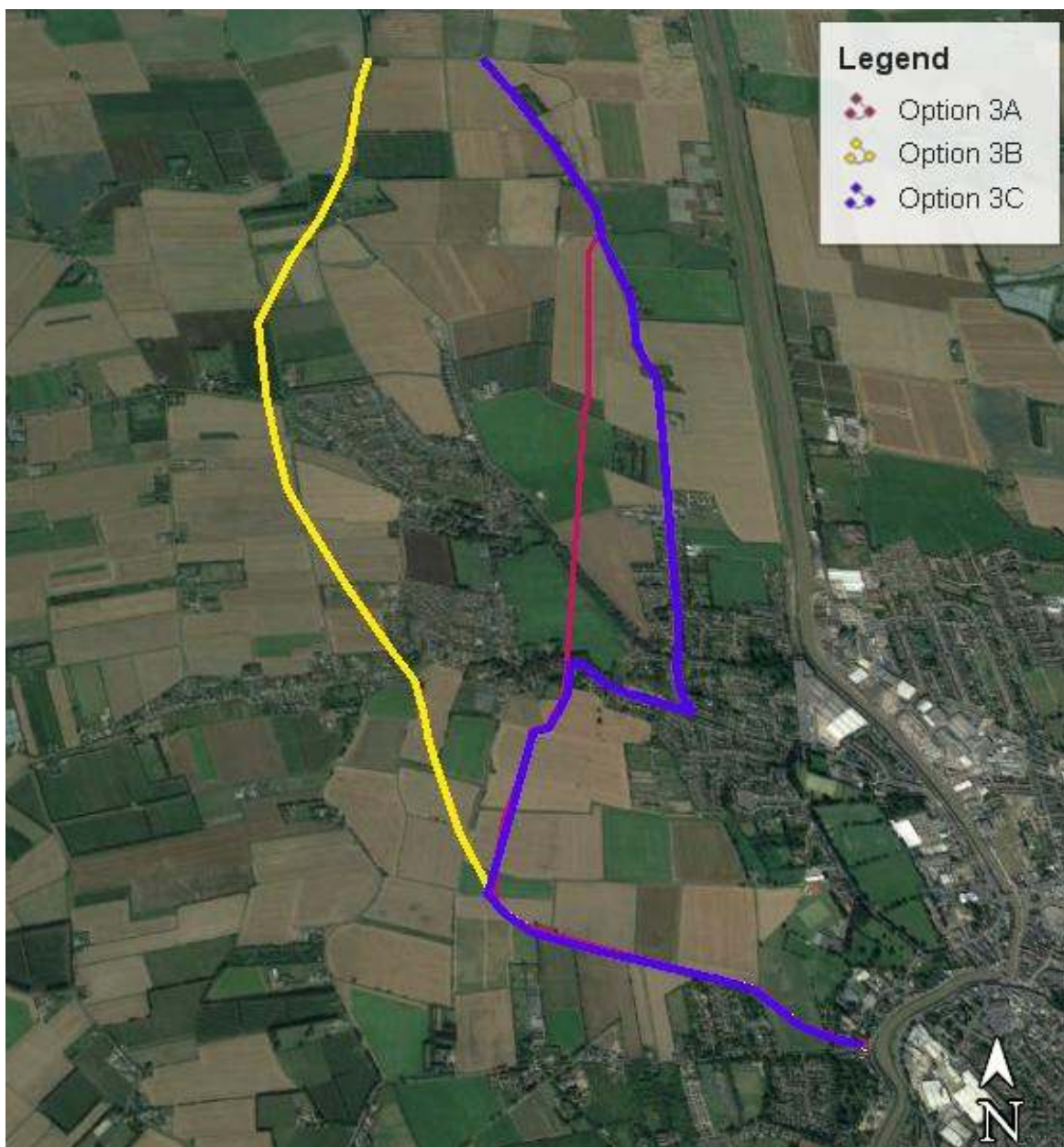
	Description
2A	New Bridge Lane river crossing, with central alignment south of Leverington Road. New infrastructure connecting the A1101 with Leverington Road.
2B	New Bridge Lane river crossing, with central alignment south of Leverington Road. Circles west of Leverington, re-joining to network at Little Ramper.
2C	New Bridge Lane river crossing, using existing infrastructure further west of the West Wisbech Development site (south of Leverington Road), continues to use Leverington Road and the A1101/ Sutton Road junction.
2D	New Bridge Lane river crossing, with central alignment. Uses existing infrastructure of Leverington Road and the A1101 / Sutton Road Junction.



**Figure 4.4: Set 2 Alignments – New Bridge Lane River Crossing**

**Table 4.4: Set 3 Alignment Description**

	Description
3A	Barton Road river crossing, with reduced alignment south of Leverington Road. New infrastructure connecting the A1101 with Leverington Road to the north.
3B	Barton Road river crossing with reduced alignment south of Leverington Road. Circles west of Leverington re-joining to network at Little Ramper in the north.
3C	Barton Road river crossing with reduced alignment, which uses existing infrastructure of Leverington Road and the A1101 / Sutton Road Junction.



**Figure 4.5: Set 3 Alignments – Barton Road River Crossing**

## Alignment Assessment

The criteria used to assess the potential alignments for a Western Link Road are listed beneath. Note, the criteria used is representative of local objectives as stated within the Local Plan (2014):

- Use of existing infrastructure;
- Potential impact on heritage assets including conservation areas, scheduled ancient monuments and wider setting of listed buildings;
- Extent of demolition / private land take required for the alignment;
- Site constraints and future proofing; and,
- Reduction in town centre traffic (see below)

## Town Centre Diversion Assessment

The potential for each alignment to divert trips away from the town centre network has been assessed. Town centre diversion within this assessment is defined as the number of vehicles removed from Freedom Bridge Roundabout.

Town centre diversion results for each alignment have been extracted using the 2015 WATS model (WAT15) by directly comparing two networks, one including the Western Link Road (for whichever alignment was being assessed), and the second network without any Western Link Road. Figure 4.6 on the below highlights the model output of SATURN when comparing two network scenarios.

Note that the red route is the alignment tested under the 'with WLR' network scenario (and which varied dependent on the alignment being assessed). This route is the only difference between the two network files used.

Blue bandwidths indicate the sections on the local network where traffic flow is reduced as a consequence of the scheme. Green bandwidths indicate sections where traffic flow has increased. The thickness of these bandwidths shows the extent of this traffic flow change, following the rule of the thicker the bandwidth the greater the change in the volume of traffic.





Note trip diversion was also initially assessed at Town Bridge (using the marker of Old Market approach), however was dismissed upon further assessment using the 2015 WATS model (WAT15).

Further assessments using the Select Link Analysis (SLA) tool within the WATS model, highlights the majority of trips facilitated by Town Bridge are localised trips within the town centre. Trips are highlighted to originate from / be destined for North Brink, Cromwell Road (north of A47), Harecroft Road, Coalwharf Road and Alexandra Road. Note these roads provide access to the town centre, industrial and residential areas within Wisbech.

With the majority of trips using Town Bridge found to be more local, it has been concluded that Town Bridge does not facilitate long distance / strategic trips (between the A1101 and A47) that could be attracted onto the Western Link Road in the future, as much as Freedom Bridge Roundabout. This is particularly the case for HGV traffic, following the weight restriction in place at this river crossing.

## Assessment Results

A recap of the criteria used within this assessment is detailed below:

- Use of existing infrastructure;
- Potential impact on heritage assets including conservation areas, scheduled ancient monuments and wider setting of listed buildings;
- Extent of demolition / private land take required for the alignment;
- Site constraints and future proofing; and,
- Reduction in town centre traffic.



The following series of tables discuss each alignment in turn in relation to the criteria stated above. Note, the reporting of this assessment has been grouped in relation to the alignments river crossing location (i.e. Set 1 – Southern crossing. Set 2 – New Bridge Lane, and Set 3 Barton Road).

Note: comments shown in green were considered to be of significant benefit, whilst comments in red were considered to be significant weaknesses.

## Set 1 Alignments

Set 1 alignments are facilitated by the Southern River Crossing, as shown in Figure 4.3. The strengths and weaknesses associated with this crossing location are detailed below.

**Table 4.5: Summary of the Southern River Crossing**

Strengths	Weaknesses
Site is fairly unconstrained, offering flexibility to accommodate the Western Link Road alignment and roundabout approach	Requires an upgrade to the Cromwell / A47 roundabout
Difference in height between the Brinks and flood defences is lowest at this site	
Lowest costing option, opportunity for variables designs	
Opportunity to minimise the impact of local stakeholders by setting back the junction on South Brink	
Town centre diversion is likely to be highest at this site, being closer to the A47.	

**Table 4.6: Alignment 1A Summary**

Criteria	Comment
Use of existing infrastructure	Use of existing infrastructure is minimal. Where existing network is utilised substantial junction improvements are required.
Potential Impact on heritage assets	High impact on Leverington Conservation Area due to greater volumes of travelling passing through Leverington Common. Scheduled Ancient Monument Roman Bank severed, with inadequate heritage buffer provided for Cherry Tree Hill.
Demolition / private land take	Demolition of approx. 3 houses along Leverington Common.
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 447 (AM) and 448 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact on Leverington Common and Sutton Junction. Upgrades along these area will be required for this alignment to be feasible.

**Table 4.7: Alignment 1B Summary**

Criteria	Comment
Use of existing infrastructure	No utilisation of existing infrastructure.
Potential Impact on heritage assets	Provides a buffer for Leverington Conservation area
	Northern section of the link road may impact the setting of a listed building on Gorefield Road.
Demolition / private land take	Demolition of approx. 2-3 dwellings required for a new junction on Leverington Common. Significant agricultural land take required.
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 491 (AM) and 447 (PM) vehicles away from Freedom Bridge Roundabout in 2031

**Table 4.8: Alignment 1C Summary**

Criteria	Comment
Use of existing infrastructure	Good use of existing infrastructure, including Leverington Common and the A1101 North from Sutton Junction
Potential Impact on heritage assets	Greater volumes of traffic will pass through Leverington, over time potentially impacting on the setting of heritage assets.
Demolition / private land take	No demolition of buildings is required, however large amount of private land is required to upgrade Leverington Common.
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 460 (AM) and 451 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact on Leverington Road / village access, alongside Sutton Junction with the A1101. Upgrades along these roads will be required for this alignment to be feasible.

**Table 4.9: Alignment 1D Summary**

Criteria	Comment
Use of existing infrastructure	Minimal use of existing infrastructure.
Potential Impact on heritage assets	The route bypasses Leverington Conservation Area, and provides adequate buffer for heritage assets located nearby the link road.
Demolition / private land take	Demolition of approx. 2 buildings is required, however large amount of agricultural land is required.
Site constraints and future proofing	Alignment is largely unconstrained and allows for future upgrades
Reduction in town centre traffic	Provides a diversionary benefit of 498 (AM) and 476 (PM) vehicles away from Freedom Bridge Roundabout in 2031

**Table 4.10: Alignment 1E Summary**

Criteria	Comment
Use of existing infrastructure	Minimal use of existing infrastructure.
Potential Impact on heritage assets	The route bypasses Leverington Conservation Area, and provides adequate buffer for heritage assets located nearby the link road.
Demolition / private land take	Demolition of approx. 2 -3 dwellings is required, however large amount of agricultural land is required.
Site constraints and future proofing	Alignment is largely unconstrained and allows for future upgrades
Reduction in town centre traffic	Provides a diversionary benefit of 495 (AM) and 475 (PM) vehicles away from Freedom Bridge Roundabout and Town Bridge in 2031

## Set 1 Alignment Summary

All options within set 1 are shown to have strengths and weaknesses attached, in relation to the criteria set.

The Southern River crossing is shown to be a strong location to facilitate a Western Link Road, with benefits of minimal site constraints and flexibility for the West Wisbech site greatly outweighing weaknesses of junction improvements for the A47 Roundabout.

## Set 2 Alignments

Set 2 alignments are facilitated by the New Bridge Lane River Crossing, as shown in Figure 4.4. The strengths and weaknesses associated with this crossing location are detailed below.

**Table 4.11: Summary of the New Bridge Lane River Crossing**

Strengths	Weaknesses
Narrowest point over the River Nene	Ramp approaches would make access for Tesco Yard and residential properties difficult
Short bridge required, design would allow for a simple unobtrusive bridge design	Site is hampered by being in close proximity to a large commercial development site
River crossing sits on the alignment of Mile Tree Lane and New Bridge Lane, access to wider network	Disruption to nearby properties throughout construction and life of the bridge

**Table 4.12: Alignment 2A Summary**

Criteria	Comment
Use of existing infrastructure	Minimal use of existing infrastructure north of Leverington Common.
Potential Impact on heritage assets	High impact on Leverington Conservation Area due to greater volumes of travelling passing through Leverington Common. Scheduled Ancient Monument Roman Bank severed, with inadequate heritage buffer provided for Cherry Tree Hill.
Demolition / private land take	Demolition of approx. 3 houses along Leverington Common.
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 581(AM) and 433 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact predicted on lower Cromwell Road, with vehicles travelling southbound to the A47 / Cromwell Road Roundabout. Additional pressure at this location in relation to South Wisbech development site. Facilitating the river crossing and associated ramp infrastructure within this location will impact the Tesco / retail site.

**Table 4.13: Alignment 2B Summary**

Criteria	Comment
Use of existing infrastructure	No utilisation of existing infrastructure
Potential Impact on heritage assets	Provides a buffer for the Leverington Conservation area.
Demolition / private land take	Minimal demolition required for a new junction on Leverington Common. Significant agricultural land take required.
Site constraints and future proofing	Alignment is unconstrained and can accommodate future upgrades.
Reduction in town centre traffic	Provides a diversionary benefit of 564(AM) and 398 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact predicted on lower Cromwell Road, with vehicles travelling southbound to the A47 / Cromwell Road Roundabout..
	Facilitating the river crossing and associated ramp infrastructure within this location will impact the Tesco / retail site.

**Table 4.14: Alignment 2C Summary**

Criteria	Comment
Use of existing infrastructure	High use of existing infrastructure, including Gadds Lane, Leverington Common and the A1101 / Sutton Junction.
	Significant upgrades are required for this alignment to be feasible.
Potential Impact on heritage assets	Connecting junction with Leverington Common is outside of the Leverington Conservation Area.
	Greater volumes of traffic will pass through Leverington, over time impacting the setting of heritage assets.
Demolition / private land take	No demolition required within Leverington Conservation Area
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 428 (AM) and 343 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact predicted on lower Cromwell Road, additional pressure at due to South Wisbech development site.
	Sutton Road junction is already heavily used, additional development traffic is predicted to force this junction over capacity. Facilitating the river crossing and associated ramp infrastructure within this location will impact the Tesco / retail site.



**Table 4.15: Alignment 2D Summary**

Criteria	Comment
Use of existing infrastructure	Good use of existing infrastructure, including Leverington Common and the A1101/ Sutton Road Junction
Potential Impact on heritage assets	Greater volumes of traffic will pass through the eastern side of Leverington. Connecting Junction position may impact setting of Scheduled Ancient Monument Rabbit Hill.
Demolition / private land take	Demolition of approx. 2-3 dwellings within Leverington is required for a new junction.
Site constraints and future proofing	Alignment is constrained when passing through Leverington. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 556 (AM) and 430 (PM) vehicles away from Freedom Bridge Roundabout in 2031
	High impact predicted on lower Cromwell Road, with vehicles travelling southbound to the A47 / Cromwell Road Roundabout.
	Sutton Road junction is already heavily used, additional development traffic is predicted to force this junction over capacity. Facilitating the river crossing and associated ramp infrastructure within this location will impact the Tesco / retail site.

### Set 2 Alignment Summary

All four of the alignments within this set are shown to have strengths and weaknesses attached, when compared against the criteria set.

New Bridge Lane is shown to be a weaker location for facilitating a river crossing, with the weaknesses associated with ramp infrastructure and the impact on residential and commercial areas within this area outweighing the benefits of network connectivity.

### Set 3 Alignments

Set 3 alignments are facilitated by the Barton Road River Crossing, as shown in Figure 4.5. The strengths and weaknesses associated with this crossing location are detailed below.

**Table 4.16: Summary of Barton Road River Crossing**

Strengths	Weaknesses
Minimum requirement for providing access to the West Wisbech site	Largest bridge span required of all three sites
Minimises the length, level of infrastructure and cost required for the Western Link Road	Located in the Wisbech Conservation Area,
	Demolition of eight to ten houses (probably listed) is required
	Required ramp infrastructure will make houses closest to the bridge inaccessible

**Table 4.17: Alignment 3A Summary**

Criteria	Comment
Use of existing infrastructure	Use of existing infrastructure is minimal. Where existing network is utilised substantial junction improvements are required.
Potential Impact on heritage assets	Impact on Leverington Conservation Area and Wisbech Conservation Area due to River crossing location. Scheduled Ancient Monument Roman Bank is severed, with inadequate heritage buffer provided for Cherry Tree Hill. River crossing location is located within the Wisbech Conservation area and will impact the setting of nearby Listed Buildings (8-10 dwellings)
Demolition / private land take	Demolition of approx. 3 houses along Leverington Common for new Junction. Significant demolition required on North Brink for river crossing.
Site constraints and future proofing	Junction on Leverington Common is constrained, when mitigating against the scale of demolition required within conservation area. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 998 (AM) and 733 (PM) vehicles away from Freedom Bridge Roundabout in 2031 High volumes of traffic still expected to use lower Cromwell Road, with this river crossing location.

**Table 4.18: Alignment 3B Summary**

Criteria	Comment
Use of existing infrastructure	No utilisation of existing infrastructure.
Potential Impact on heritage assets	Northern section of this alignment provides a buffer for the Leverington Conservation area. River crossing location is located within the Wisbech Conservation area and will impact the setting of nearby Listed Buildings (between 8-10 dwellings)
Demolition / private land take	Significant demolition required on North Brink for river crossing.
Site constraints and future proofing	Alignment is unconstrained and can accommodate future upgrades
Reduction in town centre traffic	Provides a diversionary benefit of 977 (AM) and 989 (PM) vehicles away from Freedom Bridge Roundabout in 2031 Impact on North Brink, and high volumes of traffic still expected to use lower Cromwell Road, with this river crossing location.

**Table 4.19: Alignment 3C Summary**

Criteria	Comment
Use of existing infrastructure	Small use of existing infrastructure, including the Sutton Road Junction and the A1101.
Potential Impact on heritage assets	Impact on Leverington Conservation Area and Wisbech Conservation Area due to River crossing location. The impact on Rabbit Hill needs to be considered within design of the Connecting Junction with Leverington Common. River crossing location is located within the Wisbech Conservation area and will impact the setting of nearby Listed Buildings (between 8-10 dwellings)
Demolition / private land take	Demolition of approx. 3 houses along Leverington Common for new Junction. Significant demolition required on North Brink for river crossing.
Site constraints and future proofing	New junction on Leverington Common as well as Sutton Road / A1101 Junction are constrained, when mitigating against the scale of demolition required within conservation area. Difficult to include passive provision for future upgrade.
Reduction in town centre traffic	Provides a diversionary benefit of 913 (AM) and 969 (PM) vehicles away from Freedom Bridge Roundabout in 2031 High volumes of traffic still expected to use lower Cromwell Road, with this river crossing location.

### Set 3 Alignment Summary

Alignments within this set are shown to have some benefits attached, however perform worse when assessed the criteria compared to alignments within Set 1 and 2.

Barton Road is shown to be a weaker location for facilitating a river crossing, with the weaknesses of ramp infrastructure and impact on heritage assets greatly outweighing the benefits of providing a shorter with lower cost.

### Assessment Summary

All twelve alignments are shown to meet at least one element of the assessment criteria, however it's clear from the assessment above that strengths and weaknesses associated with the river crossing locations strongly influence the feasibility of constructing the Western Link Road.

Based on the strengths and weaknesses of the river crossing locations alone, it is clear that the Southern River crossing is the strongest river crossing location, offering an unconstrained site, minimal impact on the existing network and heritage assets within the vicinity of the crossing site.

In contrast, the ramp infrastructure associated with the river crossing locations of New Bridge Lane (Set 2) and Barton Road (Set 3), are predicted to have a significant impact on heritage assets as well as residential and commercial areas close the crossing location.

On this basis, the Southern River crossing has been identified as the 'preferred' crossing location, with River crossings at New Bridge Lane and Barton Road being dismissed at this stage.

This assessment confirms the structural assessment conclusions stated within the New River Crossing Report, which identifies the Southern Crossing Location as the preferred crossing point for a new bridge carrying the Western Link Road. As stated within the River Crossing Report:

*"It is recommended that the option of constructing a new bridge at the southern crossing is adopted. This option presents the best value structure, the least disruptive construction process and has the minimum impact on existing properties and businesses along the river".*

With the Southern River Crossing progressed, alignments 1A, 1B, 1C, 1D and 1E have been considered in greater detail to identify a preferred option.

### **Alignment Option Comparison**

In order to determine the preferred alignment, each of the Set 1 options (1A, 1B, 1C, 1D and 1E) have been considered again against the same criteria used above, considering reduction in town centre trips, impact on heritage assets, extent of demolition and land take, use of existing infrastructure as well as a new element of length and associated cost of each alignment.

Table 4.20 below, shows the Set 1 alignment comparison. Cells highlighted in green indicate the benefits and red indicate the disbenefits of each alignment.

Table 4.20: Set 1 Alignment Comparison

	Alignment 1A	Alignment 1B	Alignment 1C	Alignment 1D	Alignment 1E
Potential Trip Diversion (from Freedom Bridge)	2031: 447 (AM peak) 448 (PM peak)	2031: 491 (AM peak) 447 (PM peak)	2031: 460 (AM peak) 451 (PM peak)	2031: 498 (AM peak) 476 (PM peak)	2031: 495 (AM peak) 475 (PM peak)
Impact on Conservation / Heritage Assets	Scheduled Ancient Monument (Roman Bank) severed, inadequate heritage buffer. WLR traffic through Leverington conservation area.	Alignment provides a buffer for Leverington Conservation Area, and buffer for heritage assets. Would impact one listed building	WLR traffic through Leverington conservation area.	Alignment provides a buffer for Leverington Conservation Area, and buffer for heritage assets.	Alignment provides a buffer for Leverington Conservation Area, and buffer for heritage assets.
Use of Existing Infrastructure	Little use of existing infrastructure within this option. Where existing junctions are used, substantial improvement are required.	No utilisation of existing infrastructure.	Use of existing A1101 to the north of Leverington Road. Some localised upgrades required through the village.	Minimal use of existing infrastructure.	Minimal use of existing infrastructure.
Length and approximate cost (exc. River Crossing)	6.8 kms £34.6 m	7.5 kms £45.5 m	7.9 kms £28.9 m (including £4m upgrades to existing infrastructure)	8.0 kms £49.3 m	7.8 kms £ 48.5 m
Demolition & Private Land Take	Approx. 3 Houses along Leverington Road (alignment determined by SAM).	No demolition required. Although some land take required from a listed building.	No demolition required. Significant land take from private properties to upgrade Leverington Road.	No demolition required.	Demolition of approx. 2-3 dwellings.
Site Constraints / Future Proofing	Route constrained as it passes through Leverington. May be difficult to include passive provision for potential future upgrade.	Route constrained as it passes through Leverington. May be difficult to include passive provision for potential future upgrade.	Site heavily constrained through Leverington Road with little scope to include passive provision for potential future upgrades.	Route generally unconstrained.	Route generally unconstrained.



Based on the information presented within Table 4.20, Alignment 1D is considered to be the preferred option, with a greater number of benefits attached.

Alignment 1D is expected to provide good trip diversion away from Freedom Bridge Roundabout, whilst avoiding the need for demolition of private property and reducing the impact on heritage / conservation assets within the vicinity of the Western Link Road.

Alignment 1D is facilitated by the Southern river crossing location which is shown to have the greatest number of benefits attached.

The preferred alignment of 1D is considered in greater detail throughout the remainder of this report.

## 5 Junction Assessment

### Introduction

This chapter outlines the modelling assessment, including assumptions and results, used to determine the required forms of junction along the Western Link Road for Alignment 1D.

### Preferred Alignment

Alignment 1D joins with an upgraded A47 / Cromwell Road roundabout in the south, crosses the River Nene via a new river crossing and continues north intersecting Mile Tree Lane, Barton Road and Gadds Lane, before connecting onto the B1169 Leverington Common to the west of Leverington Village. From this point the northern portion of the Western Link Road proceeds to the north east (avoiding Leverington) before connecting to the A1101 Sutton Road in the vicinity of Little Ramper.

### Identified Junctions

The preferred Western Link Road alignment spans approximately 8.5 km's. Junctions have been identified at points where the Western Link Road intersects an existing road, or where it will be required to provide access into a development site.

The form of junction has been determined by its purpose, its location and the volume of traffic expected to use it. Where possible priority junctions have been included with priority given to the Western Link Road, the purpose of this is to reduce delay along the Western Link Road and therefore increase its attractiveness as an alternative route to Wisbech town centre for longer distance strategic trips.

However, roundabouts have been included within the design where:

- The purpose of the junction is to provide access to a development site, to ensure that there is good accessibility into the site;
- The junction intersects with a significant existing road (such as the B1169), which will be frequently used by existing traffic, to ensure that the impact of the Western Link Road on existing local trips is mitigated; and,
- The junction form assessment beneath has identified that a priority junction would have insufficient capacity for the forecast traffic flows.

Table 5.1 on the following page details the junctions identified along the Western Link Road, whilst Figure 5.1 shows the positioning of each junction. The naming convention used takes into consideration the junction purpose, based on the following:

- Connecting Junction – connects the Western Link Road to a significant existing road (typically an A or B class road);
- Local Junction – a junction between the Western Link Road and one of the less significant existing local roads; and,
- Development Junction – provides access into one of the two Wisbech West Development Site.

**Table 5.1: Alignment 1D Junction Summary**

Junction Name	Description
Connecting Junction 1	Connecting the Western Link Road to Little Ramper (A1101)
Local Junction 1	Junction positioned on Gorefield Road
Connecting Junction 2	Junction positioned on Leverington Common, positioned to the west of the Conservation Area
Development Access 1	Northern development access junction, located north of Barton Road
Local Junction 2	Junction positioned along Barton Road, maintaining local access
Development Access 2	Southern development access junction, located at Mile Tree Lane
Connecting Junction 3	Connecting the Western Link Road to the A47/ Cromwell Road Roundabout



**Figure 5.1: Alignment 1D - Junction Location**

## Modelling Assumptions

Assumptions made for the junction assessments of the Western Link Road are detailed below (north – south).

### Treatment of Roman Bank

The Western Link Road severs the northern section of Roman Bank (approximately 0.7 miles south of Little Ramper) between Connecting Junction 1 and Local Junction 1.

No junction has been provided at this location due to the area being primarily agricultural land, with a minimal number of dwellings located within the vicinity of the proposed alignment. This decision was supported by the WATS model (updated May 2017) which indicated dwellings along Roman Bank did not utilise the connection onto the link road, instead either travelled northbound (if north of link road) connecting at Fitton End Road toward Little Ramper, or travelled south along Roman Bank toward Leverington Common if south of the link road sever.

Figure 5.2 below indicates the diversion routes taken, as indicated by the WATS model. The Western Link Road is indicated in red, with the diversions shown in yellow.



**Figure 5.2: Roman Bank Severance Diversion Routes**

### Treatment of May's Lane

The Western Link Road severs May's Lane between Connecting Junction 2 (positioned on Leverington Common) and Local Junction 1 (positioned on Gorefield Road).

The northern section of May's Lane currently provides residential access to approximately 10 dwellings (residential or farm houses). With the existing utilisation of this road being minimal, the decision has been made to sever May's Lane resulting in a reduced number of junctions along the Western Link Road.

Alternative access arrangements for properties affected by this severance have been considered, as shown within Figure 5.3 on the following page. As stated above this is only expected to affect a very small number of trips.





**Figure 5.3: May's Lane Severance Diversion Routes**

Figure 5.3 highlights dwellings located north of the Western Link Road will travel northbound along May's Lane and re-join the network at Gorefield Lane and the new junction. In comparison vehicles from dwellings south of the Western Link Road will travel south along May's Lane re-joining the network at Leverington Common, whereby motorists will have the option to either join the link road to the west or travel toward the A1101 in the east.

#### Treatment of North Brink and South Brink

The Western Link Road severs North Brink as it crosses the River Nene. No junction has been provided at this location due to its proximity to the New River Crossing and the safety issues with visibility over the rise of the bridge. This decision was supported by the WATS model that shows that most of the traffic from the rural areas south of Barton Road would access the Western Link Road via the new 'Access Junction 2' at Mile Tree Lane, which is easily accessible from North Brink on both sides of the Western Link Road.

Similarly South Brink has been severed by the Western Link Road, again because of safety issues with locating a junction in such close proximity to the bridge.

Alternative access arrangements for properties affected by this severance (indicated in red in Figure 5.4) have been considered, and this is only expected to affect a very small number of trips.

Figure 5.4 on the following page highlights the possible diversion routes nearby residents could take as a result of North and South Brink being severed by the Western Link Road. The Western Link Road is indicated in red, with the diversions shown in yellow.



**Figure 5.4: Potential Diversions for Nearby Housing**

Note that access from the properties along South Brink to the south of the Western Link Road is assumed to be via the existing exit only junction onto the A47. This junction would be upgraded to a left in / left out junction. This should not become an all movement junction as vehicles attempting to turn from the A47 westbound onto the access road may block traffic along the A47 and generate queues and delay, this would also create a significant safety concern.

### Development Accesses

Both Development Access junctions have been assumed to be roundabouts to provide adequate access into each of the two sites. As mentioned within Chapter three of this report 'Development Access 2' is the primary Junction where development traffic will join the Western Link Road, therefore traffic flows extracted from the WATS model (updated May 2017) are expected to be higher at this location in comparison to the junction named 'Development Access 1'.

### Connecting Junction 3 (A47 / Cromwell Road / Redmoor Lane / Western Link Road)

Connecting Junction 3 has been assessed within the Cromwell Road element of the Wisbech Access Study. Varying junction forms have been assessed using the Wisbech VISSIM Model. A summary of this junction is provided beneath, and full details can be found within the Cromwell Road Report.

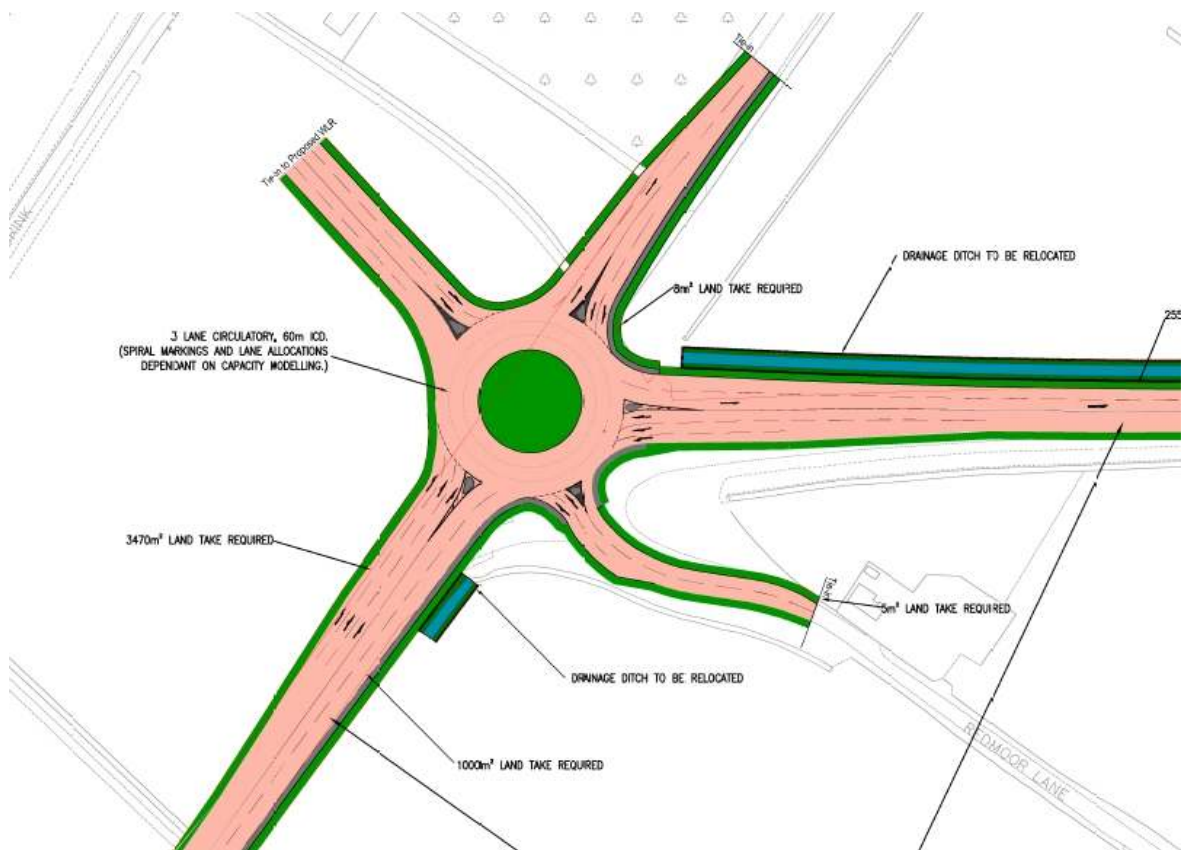
### A47 / Cromwell Road Junction

The design for the A47 / Cromwell Road roundabout is considered within the Cromwell Road element of the study, as an option which enhances capacity as well as enables the Western Link Road to be facilitated within this location. This is Option CR 7c.

The layout of the proposed roundabout is a five arm roundabout with an ICD of 60 m. Network changes required for this option are detailed below;

- 3 lane circulatory (in part);
- Western Link Road positioned between Cromwell Road and the A47 West;
- Western Link Road entry / exit is two lanes;
- Cromwell Road entry / exit is two lanes;
- A47 East / West entry is widened to 3 lanes, with 2 lane exit (merge flares of 50 m);
- Added flare of 30 m on the entry of Redmoor Lane.

Figure 5.5 beneath shows Option CR 7c which forms Connecting Junction 3.



**Figure 5.5: Connecting Junction 3 (Option CR 7c)**



## Junction Form Assessment

The following modelling packages have been used to assess the capacities of the junctions identified along the Western Link Road:

- PICADY modelling software in TRL'S Junction 9 for priority junctions; and,
- ARCADY modelling software in TRL'S Junction 9 for roundabouts.

The following scenarios have been assessed to establish the required junction form:

- AM Peak Hour (08:00 – 09:00) and PM Peak Hour (17:00 – 18:00); and,
- 2031 Future Year Scenario.

The 2031 forecast year has been used as it includes the completed Wisbech West development identified within the WATS model, and therefore the junctions being tested will carry the highest amount of traffic in this forecast year.

## Model Outputs

The following measures have been used to understand the performance of the junctions identified along the Western Link Road in the 2031 forecast year scenario:

**Ratio Flow to Capacity (RFC)** indicates the likely performance of a junction, with a value of 0.85 being a practical capacity threshold (orange). Any value greater than 1.00 implies the demand flow is equal or has exceeded capacity (red).

**Queue Lengths (PCU)** indicates the likely impact of queuing on the approach to the junction and on the surrounding network.

**Delay (seconds)** indicates the likely impact of vehicle delay on journey times as a consequence of the junction.

**LOS (Levels of Service)** indicates the expected level of service that vehicles will experience using the junction, where 'A' represents free flow conditions, and 'F' represents break down as a result of exceeding capacity.

## Junction Modelling Results

The geometric inputs, traffic flows and model results for each of the junctions identified along the Western Link Road are outlined in turn below.

Note, for the purpose of modelling assessments the future year 2031 has been used to provide a worst case scenario. Data regarding traffic flows and results discussed within this chapter all relate to the 2031 scenario.

## Connecting Junction 1

This junction has been assessed as a four arm roundabout, connecting the Western Link to Little Ramper and the A1101 (Sutton Road). This option assumes the same geometry for all four arms, each being modelled as a single lane approach with a flare of 30 m.

The geometry assumed for this junction is shown below. The descriptions of parameters shown in Table 5.3 are consistent for all ARCADY models considered within this chapter.

**Table 5.2: Connecting Junction 1 Geometric Input**

	V (m)	E (m)	L' (m)	R (m)	D (m)	PHI (deg)
All Approaches	3.65	7.3	30	30.0	40.0	30.0

**Table 5.3: Geometry Input Description for proposed Roundabout Options**

Geometric Parameter	Description
V (m)	Road half width
E (m)	Entry width
L' (m)	Effective flare length
R (m)	Entry radius
ICD (m)	Inscribed circle diameter
PHI (deg)	Entry angle

## Connecting Junction 1 Traffic Flows

Traffic flows modelled for this junction are shown in Table 5.4, which is separated into the AM and PM peaks. Please note, traffic flows shown below are representative of the future year 2031.

**Table 5.4: Connecting Junction 1 Modelled Traffic Flows (2031)**

		To			
		AM			
From	A1101 North	A1101 South	WLR	Little Ramper	
A1101 North	0	536	59	28	
A1101 South	254	0	0	44	
WLR	102	0	0	21	
Little Ramper	37	134	25	0	
		PM			
From	A1101 North	A1101 South	WLR	Little Ramper	
A1101 North	0	319	18	31	
A1101 South	370	0	0	108	
WLR	145	0	0	42	
Little Ramper	31	81	11	0	

## Connecting Junction 1 Results

The results for the assessment of this junction are shown beneath.



**Table 5.5: Connecting Junction 1 Modelling Results (2031)**

	RFC	Queue (PCU)	Delay (S)	LOS
<b>AM</b>				
A1101 North	0.4	0.6	3.2	A
A1101 South	0.2	0.2	2.4	A
Western Link Road	0.1	0.1	2.3	A
Little Ramper	0.2	0.3	5.1	A
<b>PM</b>				
A1101 North	0.2	0.3	2.5	A
A1101 South	0.3	0.4	2.6	A
Western Link Road	0.1	0.2	2.7	A
Little Ramper	0.2	0.2	5.2	A

Table 5.5 shows that the roundabout is expected to operate well within capacity by 2031, with all approaches operating under a LOS category 'A', which suggests free flowing traffic.

Delay at this roundabout is considered to be minimal, with a maximum delay shown to be 5.2 seconds.

### Local Junction 1

This junction was initially assessed as a priority junction however upgraded to a roundabout, on the basis that initial results showed a priority junction would provide inadequate residential access for traffic originating from and destined to the village of Gorefield.

For this assessment of a roundabout all approaches are assumed to be single lane approach with a 30 m flare. See Table 5.6 beneath for geometry inputs.

**Table 5.6: Local Junction 1 Geometric Input for a Roundabout**

	V (m)	E (m)	L' (m)	R (m)	D (m)	PHI (deg)
All Approaches	3.65	7.3	30	30.0	40.0	30.0

### Local Junction 1 Traffic Flow

Traffic flows modelled for this junction are shown in Table 5.7, which is separated into the AM and PM peaks.

**Table 5.7: Local Junction 1 Modelled Traffic Flows (2031)**

		To			
		AM			
From	WLR North	Gorefield East	WLR South	Gorefield West	
WLR North	0	0	50	26	
Gorefield Road East	0	0	0	161	
WLR South	60	0	0	89	
Gorefield Road West	21	359	126	0	
		PM			
From	WLR North	Gorefield East	WLR South	Gorefield West	
WLR North	0	0	0	23	
Gorefield Road East	0	0	0	302	
WLR South	60	0	0	186	
Gorefield Road West	25	174	181	0	

## Local Junction 1 Results

The model outputs for this junction are shown within Table 5.8 beneath.

**Table 5.8: Local Junction 1 Modelling Results (2031)**

		RFC	Queue (PCU)	Delay (S)	LOS
		AM			
WLR North	0.3	0.4	2.7	A	
Gorefield Road East	0.1	0.1	2.4	A	
WLR South	0.1	0.1	2.3	A	
Gorefield Road West	0.1	0.1	2.2	A	
		PM			
WLR North	0.3	0.3	2.4	A	
Gorefield Road East	0.1	0.1	2.3	A	
WLR South	0.2	0.2	2.6	A	
Gorefield Road West	0.2	0.2	2.5	A	

Table 5.8 shows that a roundabout in this location is expected to operate well within capacity for the forecast year of 2031. All approaches are shown to operate with minimal delay (Maximum of 3 seconds), which reflects the free flowing nature of LOS category 'A'.

## Connecting Junction 2

This junction has been assessed as a four arm roundabout, connecting the Western Link Road to Leverington Road. This junction aims to provide greater access to the existing residential areas along Leverington Road, whilst minimising the delay along the new link road.

This option assumes the same geometry for all arms, each being modelled as a single lane approach with a flare of 30 m. Junction geometry, traffic flows and model results and discussed on the following pages.

The geometry assumed for this junction is shown below.

**Table 5.9: Connecting Junction 2 Geometric Input**

	V (m)	E (m)	L' (m)	R (m)	D (m)	PHI (deg)
All Approaches	3.65	7.3	30	30.0	40.0	30.0

### Connecting Junction 2 Traffic Flows

Traffic flows modelled for this junction are shown in Table 5.10, which is separated into the AM and PM peaks.

**Table 5.10: Connecting Junction 2 Modelled Traffic Flows (2031)**

		To			
		AM			
From	WLR North	Lev. Rd East	WLR South	Lev. Rd West	
WLR North	0	0	125	2	
Lev. Road East	8	0	220	18	
WLR South	136	13	0	0	
Lev. Road West	186	9	63	0	
		PM			
From	WLR North	Lev. Rd East	WLR South	Lev. Rd West	
WLR North	0	0	81	3	
Lev. Road East	10	0	45	19	
WLR South	367	38	0	0	
Lev. Road West	120	9	90	0	

### Connecting Junction 2 Results

The results for the assessment of this junction are shown beneath.

**Table 5.11: Connecting Junction 2 Modelling Results (2031)**

		RFC	Queue (PCU)	Delay (S)	LOS
		AM			
WLR North		0.1	0.1	2.1	A
Lev. Road East		0.2	0.2	2.4	A
WLR South		0.1	0.1	2.1	A
Lev. Road West		0.3	0.4	4.8	A
		PM			
WLR North		0.1	0.1	2.1	A
Lev. Road East		0.1	0.1	2.1	A
WLR South		0.2	0.3	2.5	A
Lev. Road West		0.3	0.4	5.6	A

Table 5.11 highlights this roundabout is predicted to operate within capacity within the peak hours of 2031, providing adequate access for traffic associated with the Western Link Road and the residential area of Leverington.

Similarly to Connecting Junction 1 and Local Junction 1 assessments, the minimal delay (5 seconds) shown within Table 5.11 for this junction, reflects the free flowing nature of LOS category 'A'.

## Development Access Junction 1

This junction has been modelled as a three arm roundabout connecting the Western Link Road to the West Wisbech Development site. The roundabout is positioned on Gadd's Lane, north of Barton Road. This option assumes a single lane approach for all roundabout arms, with 30 m effective flares.

The geometry used for this junction is detailed in the table beneath.

**Table 5.12: Development Access Junction 1 Geometric Input**

Access Junction 1	V (m)	E (m)	L' (m)	R (m)	D (m)	PHI (deg)
WLR Approaches	3.65	3.65	0	30.0	50.0	30.0
Development Access	3.0	3.0	0	30.0	50.0	30.0

## Traffic Flows

Traffic flows modelled for this junction are shown in Table 5.13, which is separated into the AM and PM peaks. Please note, traffic flows shown below are representative of the future year 2031.

Note: Traffic flow shown for 'arm B' of this roundabout is non-existent and is marked within Table 5.13 as a '-'. This is due to this development junction being included within the WATS model (2015 base) as a future proofing element.

Traffic originating from and destined to the West Wisbech Development site are proposed to utilise Development Access Junction 2, positioned on Mile Tree Lane. For more information see Chapter three of this report. .

**Table 5.13: Development Access Junction 1 Modelled Traffic Flows (2031)**

		To		
		AM		
From	WLR West	Dev. Access	WLR South	
WLR West	0	0	408	
Dev. Access	-	-	-	
WLR South	149	0	0	
		PM		
From	WLR West	Dev. Access	WLR South	
WLR West	0	0	216	
Dev. Access	-	-	-	
WLR South	405	0	0	

## Development Access Junction 1 Results

The results for the assessment of this junction are shown within Table 5.14 below. Note the same ‘-’ marker for the development access applies.

**Table 5.14: Development Access Junction 1 Modelling Results (2031)**

	RFC	Queue (PCU)	Delay (S)	LOS
	AM			
WLR West	0.2	0.3	2.4	A
Dev. Access	-	-	-	-
WLR South	0.1	0.1	2.0	A
	PM			
WLR West	0.1	0.1	2.1	A
Dev. Access	-	-	-	-
WLR South	0.2	0.3	2.4	A

Table 5.14 shows that the roundabout is expected to operate within capacity during both peak hours in 2031, with the highest RFC being 0.2. This RFC is shown to represent the Western Link Road North approach during the AM peak and the Western Link Road South approach during the PM peak hour, reflecting the tidal nature of traffic predicted once the link road is constructed.

Delay generated from the roundabout appears to be minimal, allowing all approaches to be free flowing.

## Local Junction 2

The junction serves to provide a connection between the existing road network, namely Barton Road, and the new Western Link Road. This has been assessed as a priority junction, with priority along the Western Link Road, and the two Barton Road approaches staggered as the minor arms.

This option assumes Barton Road East is a two lane approach (30 m flare), whilst Barton Road West is a single lane approach.

Geometry assumed for this junction is shown within Table 5.15 beneath.

**Table 5.15: Local Junction 2 Geometry Input**

Major Arms	Width of Carriageway	Visibility for right turners
Western Link Road (N)	7.3	250.0

Minor Arms	Road width at give way (m)	Visibility to the left (m)	Visibility to the right (m)
Arm B – Barton Road (E)	6.0	120.0	120.0
Arm D – Barton Road (W)	3.5	120.0	120.0



## Local Junction 2 Traffic Flows

Traffic flows modelled for this junction are shown in Table 5.16 on the following page, which are representative of the future year 2031.

**Table 5.16: Local Junction 2 Modelled Traffic Flows (2031)**

		To			
		AM			
From	WLR North	Barton Rd East	WLR South	Barton Rd West	
WLR North	0	38	370	0	
Barton Rd East	1	0	502	30	
WLR South	147	274	0	0	
Barton Rd West	0	114	0	0	
		PM			
From	WLR North	Barton Rd East	WLR South	Barton Rd West	
WLR North	0	10	206	0	
Barton Rd East	7	0	411	80	
WLR South	395	168	0	0	
Barton Rd West	0	22	0	0	

## Local Junction 2 Results

Model outputs for this junction are shown in Table 5.17 beneath.

**Table 5.17: Local Junction 2 Modelling Results (2031)**

	RFC	Queue (PCU)	Delay (S)	LOS
AM				
Stream B-CD	0.8	4.4	29.0	D
Stream B-AD	0.1	0.1	20.6	C
Stream D-ABC	0.4	0.6	13.2	B
Stream C-B	0.5	0.9	11.1	B
PM				
Stream B-CD	0.7	2.4	17.8	C
Stream B-AD	0.2	0.2	14.0	B
Stream D-ABC	0.1	0.1	9.1	A
Stream C-B	0.3	0.4	7.3	A

Table 5.17 highlights the priority junction is expected to operate within capacity across both peak hours of 2031, with traffic along the Western Link Road remaining free-flowing.

Stream B - CD (Barton Road East to Western Link Road South and Barton Road West) is forecast to be the worst operating approach across both peak hours, with RFC values of 0.8 (AM peak) and 0.7 (PM peak) recorded. Despite this approach remaining within capacity, a delay of 29 seconds is expected in the AM peak hour, resulting in the flow of traffic becoming unstable.

The remaining right and left turn movements from the minor arms of Barton Road East and West are shown to operate within capacity with delay ranging from 9 – 20 seconds.

## Development Access Junction 2

This junction is positioned south of Barton Road and has been modelled as a four arm roundabout. The roundabout aims to provide access between the Western Link Road and the West Wisbech Development site (via Mile Tree Lane), whilst maintaining access to rural areas to the west of Wisbech.

This option assumes flared single lane approaches for all roundabout arms, as detailed within the geometric parameters table below.

**Table 5.18: Development Access Junction 2 Geometric Input**

Access Junction 2	V (m)	E (m)	L' (m)	R (m)	D (m)	PHI (deg)
Western Link Road Approaches	3.65	7.3	0	30.0	50.0	30.0
Development Access Mile Tree Lane	3.0	6.5	30.0	40.0	50.0	30.0

## Development Access Junction 2 Traffic Flows

Traffic flows modelled for this junction are shown in Table 5.19, which is separated into the AM and PM peaks. Please note, traffic flows shown below are representative of the future year 2031.

**Table 5.19: Development Access Junction 2 Modelled Traffic Flows (2031)**

		To			
		AM			
From	WLR North	Dev. Access	WLR South	MLT	
WLR North	0	13	858	0	
Dev. Access	32	0	121	2	
WLR South	389	49	0	104	
Mile Tree Lane	0	2	156	0	
		PM			
From	WLR North	Dev. Access	WLR South	MLT	
WLR North	0	89	528	0	
Dev. Access	18	0	78	2	
WLR South	548	75	0	93	
Mile Tree Lane	0	2	98	0	

## Development Access Junction 2 Results

The results for the assessment of this junction are shown in Table 5.20 beneath.

**Table 5.20: Development Access Junction 2 Modelling Results (2031)**

	RFC	Queue (PCU)	Delay (S)	LOS
<b>AM</b>				
WLR North	0.5	1.2	4.4	A
Dev. Access	0.1	0.2	3.5	A
WLR South	0.3	0.5	2.7	A
Mile Tree Lane	0.1	0.1	2.5	A
<b>PM</b>				
WLR North	0.4	0.8	3.5	A
Dev. Access	0.1	0.1	2.8	A
WLR South	0.4	0.7	3.4	A
Mile Tree Lane	0.1	0.1	2.7	A

Table 5.20 shows that the roundabout is expected to operate within capacity during both peak hours in 2031, with the highest RFC being 0.5 for the Western Link Road North during the AM peak.

Junction delay is minimal with delay on all approaches being lower than 5 seconds. All approaches operate with a LOS of category 'A', suggesting free flowing traffic.

### Connecting Junction 3

Connecting Junction 3 has been assessed within the Cromwell Road element of the Wisbech Access Study. The roundabout design as shown within Figure 5.5 (start of this chapter) is a five arm roundabout with an ICD of 60m. Within this design the Western Link Road is facilitated between Cromwell Road and the A47 West approaches.

For more information regarding this junction form, please refer to the Cromwell Road Report.

### Preferred Junction Types

The junction assessment has shown that the following junction forms are all expected to operate within capacity, resulting in the Western Link Road having a balance between good connectivity to the West Wisbech development area and local road network, whilst minimising delay along the route and therefore encouraging longer distance strategic trips to divert out from Wisbech Town Centre. The preferred junctions are:

- Connecting Junction 1 – 4 arm roundabout connecting the Western Link Road to Little Ramper and the A1101;
- Local Junction 1 – 4 arm roundabout connecting the Western Link Road to Gorefield Road;
- Connecting Junction 2 – 4 arm roundabout connecting the link road to Leverington Road;
- Access Junction 1 – Three arm roundabout on Gadd's Lane;
- Local Junction 2 – Staggered Priority Junction on Barton Road;
- Access Junction 2 – Four arm roundabout on Mile Tree Lane; and,
- Connecting Junction 3 – Enhanced five arm roundabout (see Cromwell Road Report).

## 6 Carriageway Assessment

### Introduction

This chapter discusses the assessment undertaken to determine the form of the Western Link Road, specifically whether it should be a single or dual carriageway road.

### Carriageway Assessment

The requirement for the Western Link Road to be either single carriageway or dual carriageway has been assessed using Ratio of Flow to Capacity (RFC Ratio) by extracting demand flows from the WATS model and comparing these to thresholds contained within TA 46/97. This design guidance gives the design capacity of a single carriageway road as 1,380 equivalent passenger car units (PCU) per hour by direction, the design capacity of a dual carriageway as 4,200 PCU per hour per direction.

### Model Outputs

The measurement of RFC ratio has been used to determine the capacity requirements for the road. The RFC ratio reports the demand flow compared to the available capacity (represented as a percentage), and has been reported based on the definitions outlined below:

- RFC ratio of less than 85% indicates demand is within capacity;
- RFC ratio of 85% - 100% indicates a link is approaching capacity and queues / delay will be commonplace; and,
- RFC ratio of 100% or higher indicates that demand exceeds capacity and that the operation of the link has broken down.

### Carriageway Modelling Results

Table 6.1 on the following page summarises the RFC ratio values extracted from the WATS Models (2015 base), against the design guidance within the TA 46/ 97 Design standards for Highway.

The Western Link Road contained within the WATS model assumes a single carriageway road. It is against this assumption that the RFC ratio assessment has been performed.

Please note as with the junction assessment, the carriageway assessment was undertaken for the forecast year of 2031 for both the AM and PM peak hours.

**Table 6.1: RFC Summary**

		Design Capacity (Veh p/h)	Demand Flow (PCU/h)		Ratio of Flow to Capacity (%) as of 2031	
			AM	PM	AM	PM
Connecting Junction 1 to Local Junction 1	Northbound	1,380	123	188	8	12
	Southbound	1,380	65	29	4	2
Local Junction 1 to Connecting Junction 2	Northbound	1,380	330	500	27	41
	Southbound	1,380	88	80	5	5
Connecting Junction 2 to Dev. Access 1	Northbound	1,380	149	406	9	25
	Southbound	1,380	177	202	9	10
Dev. Access 1 to Local Junction 2	Northbound	1,380	149	406	9	25
	Southbound	1,380	177	202	9	10
Local Junction 2 to Dev. Access 2	Northbound	1,380	458	459	50	43
	Southbound	1,380	495	561	25	28
Dev. Access 2 to River Crossing	Northbound	1,380	535	715	25	36
	Southbound	1,380	664	645	33	33
River Crossing to Connecting Junction 3	Northbound	1,380	535	715	34	33
	Southbound	1,380	664	645	18	18

Table 6.1 shows that the Western Link Road is predicted to operate within capacity in 2031, across both peak hours. RFC ratios indicate a higher traffic flow is present along the southern half of the Western Link Road, especially south of the Development Access Junction 2 to the A47 roundabout. This reflects the location where vehicles originating from or destined to the West Wisbech Development site will connect with the wider network.

Extracted demand flows are shown to be higher during the PM peak hour, with demand shown to be greater whilst travelling northbound.

In contrast, during the AM peak hour demand flow is shown to vary across the length of the link road, being greater when travelling northbound between Connecting Junction 2 and Connecting Junction 1, then southbound when travelling between Connecting Junction 2 and the A47.

With RFC Ratios below 85%, the Western Link Road is predicted to perform within capacity as a single carriageway road by the forecast year of 2031, and therefore a **single carriageway** road (along entire route) will be adequate to maintain free flowing traffic along the sections of the link road detailed above.

### Assessment Summary

A single carriageway Road is adequate for the Western Link Road, however it is recommended that sufficient land take is procured for a dual carriageway in order to enable future improvement.



## 7 Phasing Assessment

### Introduction

This chapter discusses the phasing assessment undertaken to determine the stages of construction required for the Western Link Road, across the forecast years of 2026 and 2031.

The dispersal of development traffic onto the local network as a result of phasing (and the impact of this across Wisbech) is considered within this assessment.

### Phasing Assessment

The phasing requirement for the Western Link Road has been assessed by extracting Ratio of Flow to Capacity (RFC Ratio) data from the WATS model (2015 base).

The following tests have been completed for this phasing assessment:

- Test 1 – Assuming only the southern section of the Western Link Road is built between the A47 / Cromwell Road Roundabout and Mile Tree Lane, with development traffic using Development Access Junction 2;
- Test 2 – Assuming the two thirds of the Western Link Road is built, between the A47 / Cromwell Road Roundabout and Leverington Common; and,
- Test 3 – Which assumes the full Western Link Road is complete, with vehicles being able to travel between the A47 / Cromwell Road Roundabout to the A1101 / Little Ramper in the north.

All three tests were undertaken within the 'Do Something' Model for scenarios of the AM (08:00 – 09:00) and PM peak (17:00 -18:00) hours, as well as forecast years of 2026 and 2031. The use of the 'Do-Something' Model for this assessment was to replicate changes across the town network as well as the implementation of highway schemes that would potentially be completed within these time periods.

Note, the forecast year of 2021 was not used within this assessment due to the development of West Wisbech being proposed from 2023 onwards, see Chapter 3 of this report for more details.

### WATS Model

To undertake the Phasing Assessment the preferred alignment (Option 1D) was coded into the 'Do Something' model, and then a series of movement bans were applied to various parts of the network, preventing their use, to replicate partial or full closure of the Western Link Road.

Link bans made within the model under each test, have been applied to all user classes under the '44444' section of the model code file. The number of bans applied within the model file varied across the three tests completed, however ensured traffic originating from the West Wisbech development had adequate points of entry / exit onto the wider network.

Modelling assumptions (link bans) made for test 1 and 2 are detailed below.

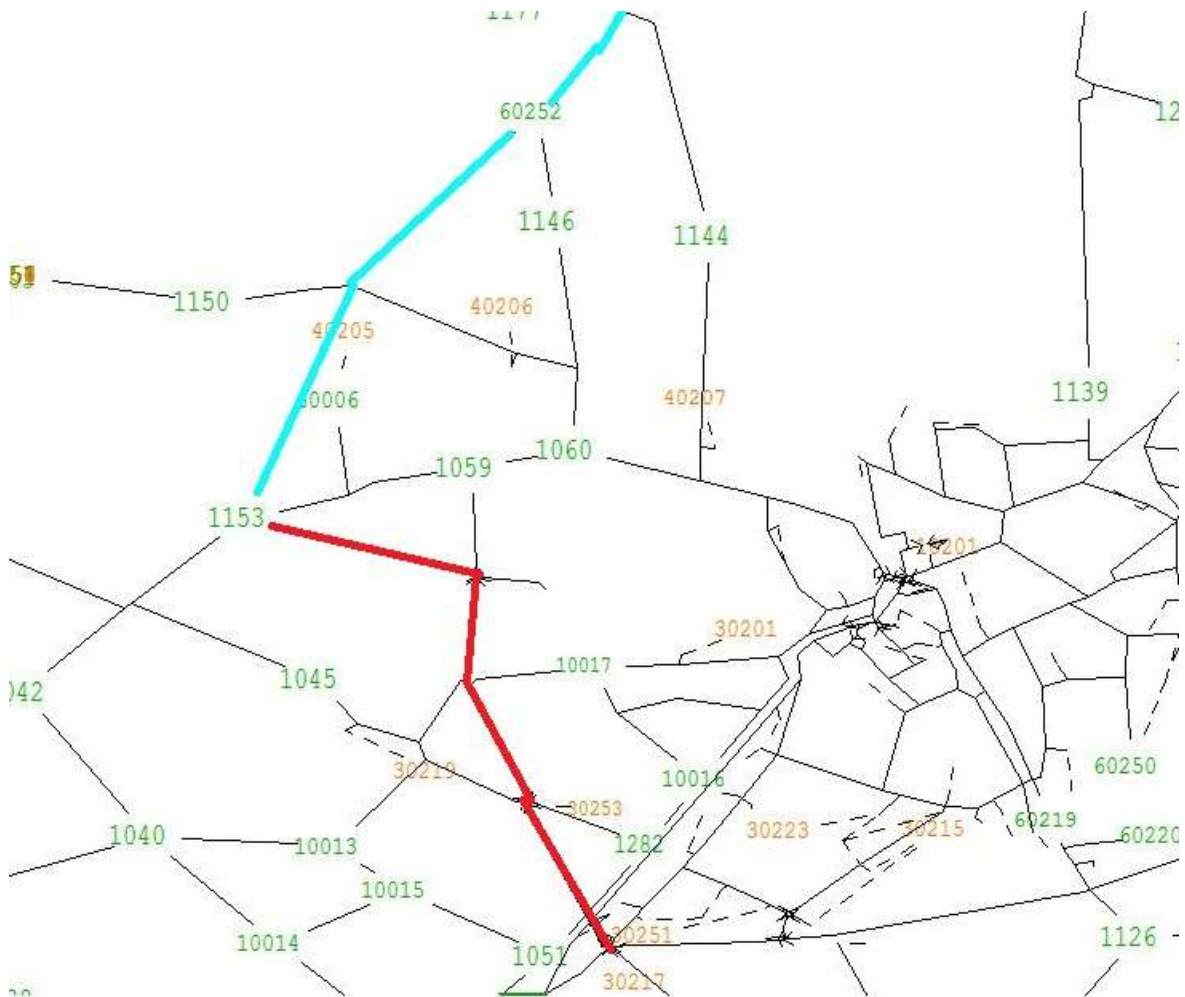
#### Test 1 Model Assumptions

Figure 7.1 highlights the links whereby movement has been banned (highlighted in blue) for this test. This test assumes the link road is constructed up to Mile Tree Lane (red). Link bans coded into the model represent the following node number sets:



**Table 7.2: Test 2 – Banned Link Movements**

Banned Movement Node Sets
1176 – 60253 and 60253 -1176
60251 – 60253 and 60253 – 60251
60252 – 60251 and 60251 – 60252
1149 – 60252 and 60252 – 1149
60257 – 1149 and 60257 – 1149
1153 – 60257 and 60257 – 1153



**Figure 7.2: Test 2 Banned Link Movements**

## Model Outputs

The RFC ratio reports the demand flow compared to the available capacity (represented as a percentage), and has been reported based on the definitions outlined below:

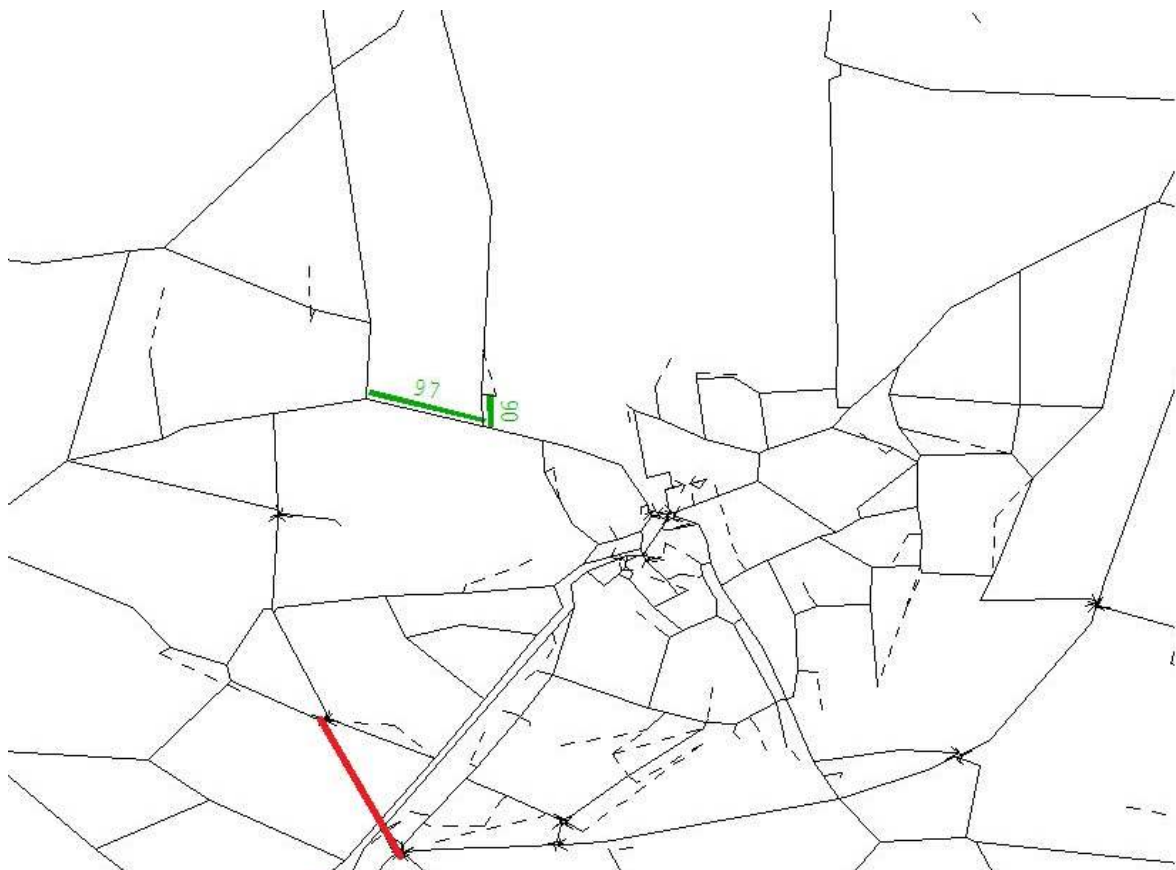
- RFC ratio of less than 85% indicates demand is within capacity;
- RFC ratio of 85% - 100% indicates a link is approaching capacity and queues / delay will be commonplace; and,
- RFC ratio of 100% or higher indicates that demand exceeds capacity and that the operation of the link has broken down.

The results of phasing tests are discussed in turn within the remainder of this chapter. RFC values (greater than 85%) within the WATS model are shown within model screenshots, which highlight the impact of the part or full link road on the wider network.

Note, the section of the Western Link road open to traffic within phasing tests will be highlighted in red within the following screenshots.

## Test 1 – 2026 Results

Figure 7.3 and 7.4 below show the RFC ratios which have been extracted from the WATS model for test 1 under the AM and PM peak hour scenarios.



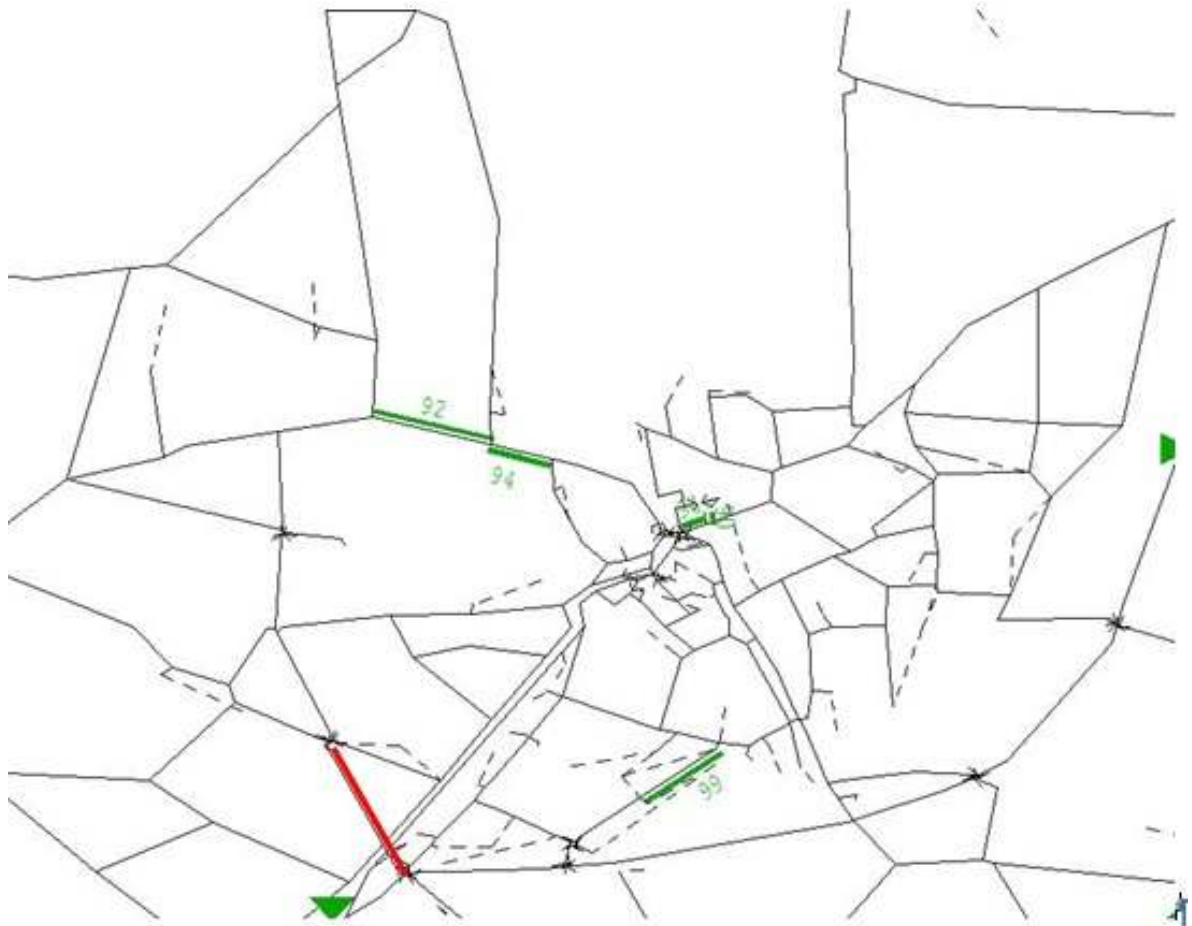
**Figure 7.3: Test 1 – 2026 AM Peak Hour**

The partial construction of the Western Link Road (up to Mile Tree Lane) is shown to have no impact on southernmost link of the proposed alignment. Traffic originating from and destined to this section of the link road is shown to have no adverse impact on the local network, with roads within the vicinity of the development remaining within the capacity of 85%.



Impact is however shown on the Sutton Road / A1101 Junction in the north, whereby RFC values of 90% and 97% are shown. This indicates the junction within this time period is predicted to be nearing capacity. This test highlights what the operation of this junction could potentially be in the future, if no alternative north / south route is implemented.

2026 PM peak results of Test 1 are outlined below.

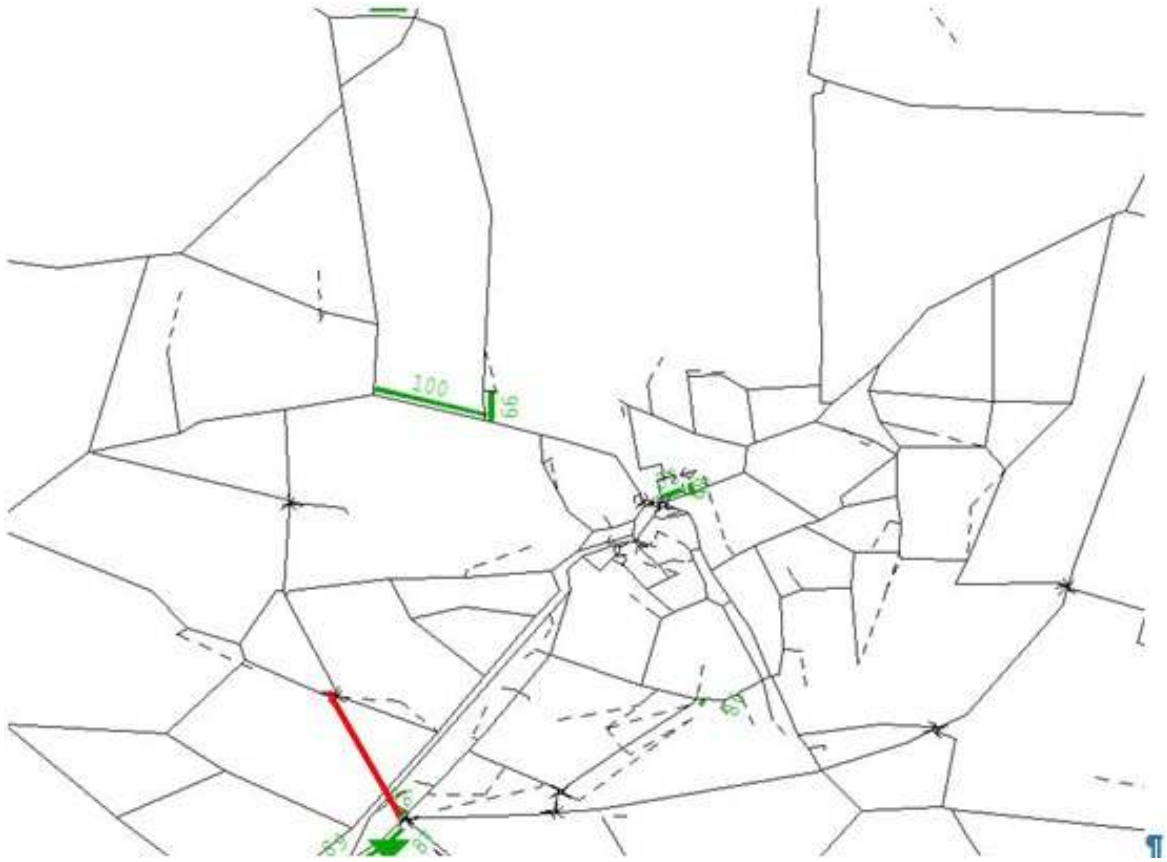


**Figure 7.4: Test 1 – 2026 PM Peak Hour**

Similarly to the AM Peak hour of 2026 under Test 1, the PM peak hour is shown to have no impact on the Western Link Road and area of Development. Sutton Road Junction However, impact on Sutton Road / A1101 Junction remains, being slightly worse with the A1101 approaching capacity with an RFC value of 94 shown.

### **Test 1 – 2031 Results**

Figure 7.5 and 7.6 on the following page show the RFC ratios which have been extracted from the WATS model for test 1 under the AM and PM peak hour scenarios.



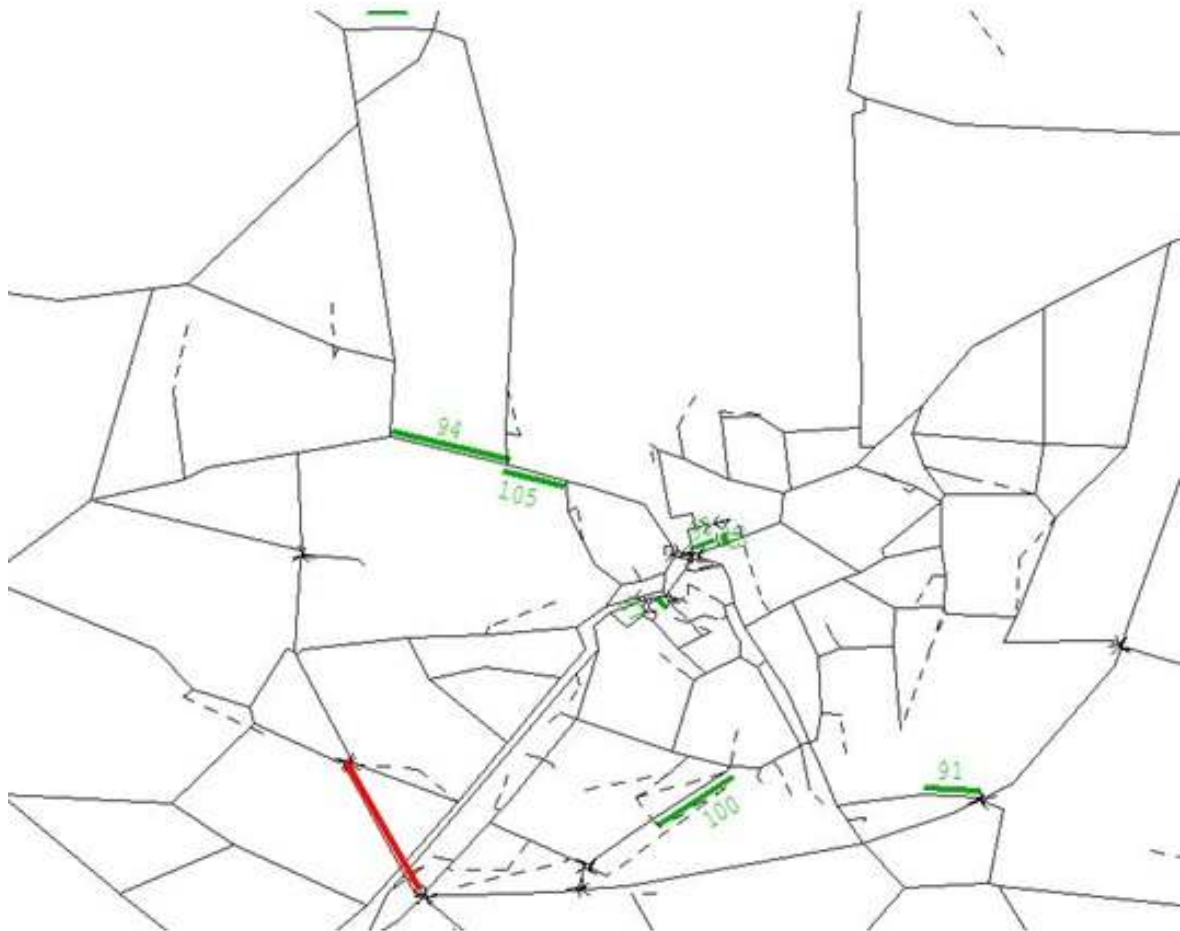
**Figure 7.5: Test 1 – 2031 AM Peak Hour**

The impact of partially constructing the link road to Mile Tree Lane is shown to have minimal impact on the surrounding network within the AM peak of 2031.

Figure 7.5 shows an increase in RFC for the A47 West approach as well as the Western Link Road approach to the A47 roundabout, from an RFC less than 85% in 2026 peak hours to 89% and 96% retrospectively in 2031. Despite these values being over the capacity threshold of 85%, it should be noted that these approaches and the roundabout itself are expected to operate within capacity within this time period.

RFC values for Sutton Road / A1101 Junction are again shown to be high, with the Leverington Road at capacity during 2031 AM peak.

2031 PM peak results for Test 1 are shown on the following page.



**Figure 7.6: Test 1 – 2031 PM Peak Hour**

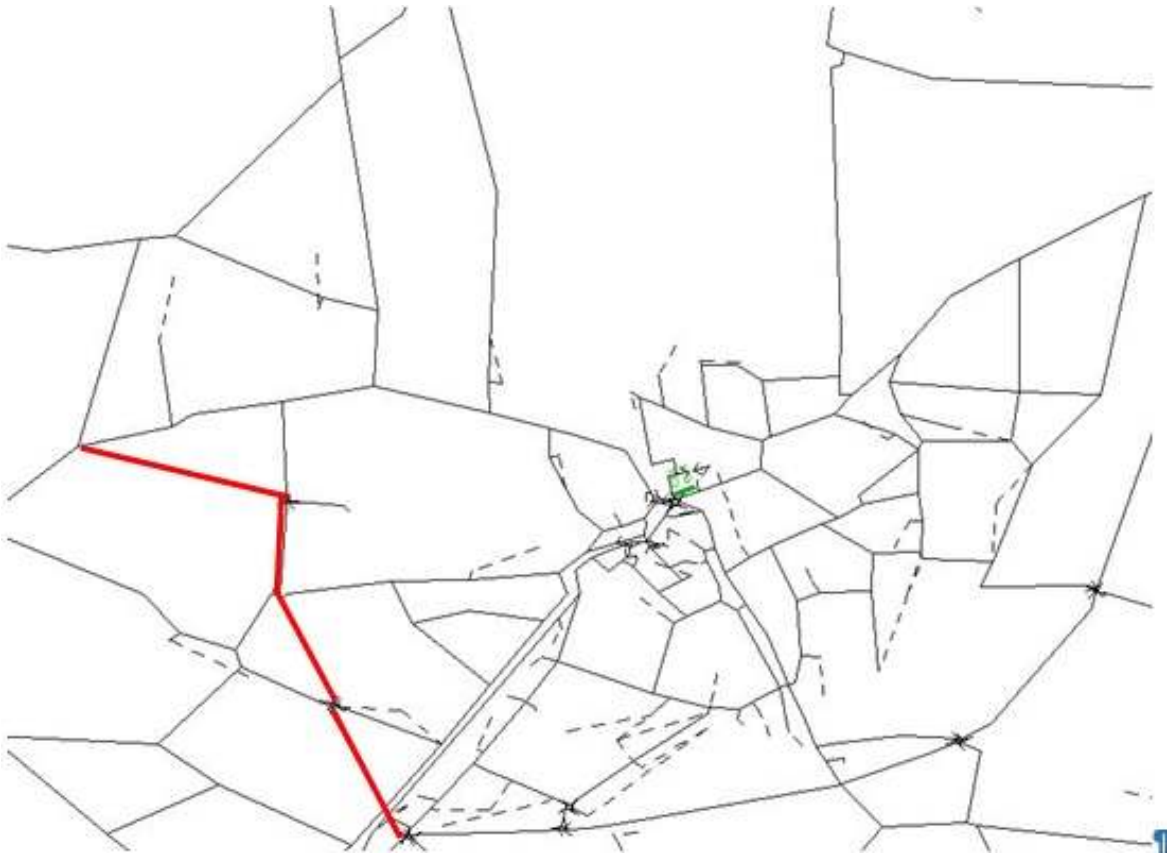
During 2031 PM peak, the impact on the A47 West and Western Link Road approaches to the A47 roundabout are less severe, with RFC's of less than 85%. Issues with Sutton Road / A1101 are still present when only completing one third of the link road in 2031.

### Test 1 Summary

In building part of the Western Link Road, between the A47 roundabout and Mile Tree Lane, the link road itself is predicted to operate within capacity, with development traffic having no adverse impact on the surrounding network within 2026 peak hours. Within 2031 this largely remains the same prediction, however the within the AM peak hour the A47 West and Link road approach to the A47 roundabout are shown to be approaching capacity (however remain under 100%). In addition to this in 2031, the Sutton Road / A1101 junction is expected to be approaching or at capacity.

### Test 2 – 2026 Results

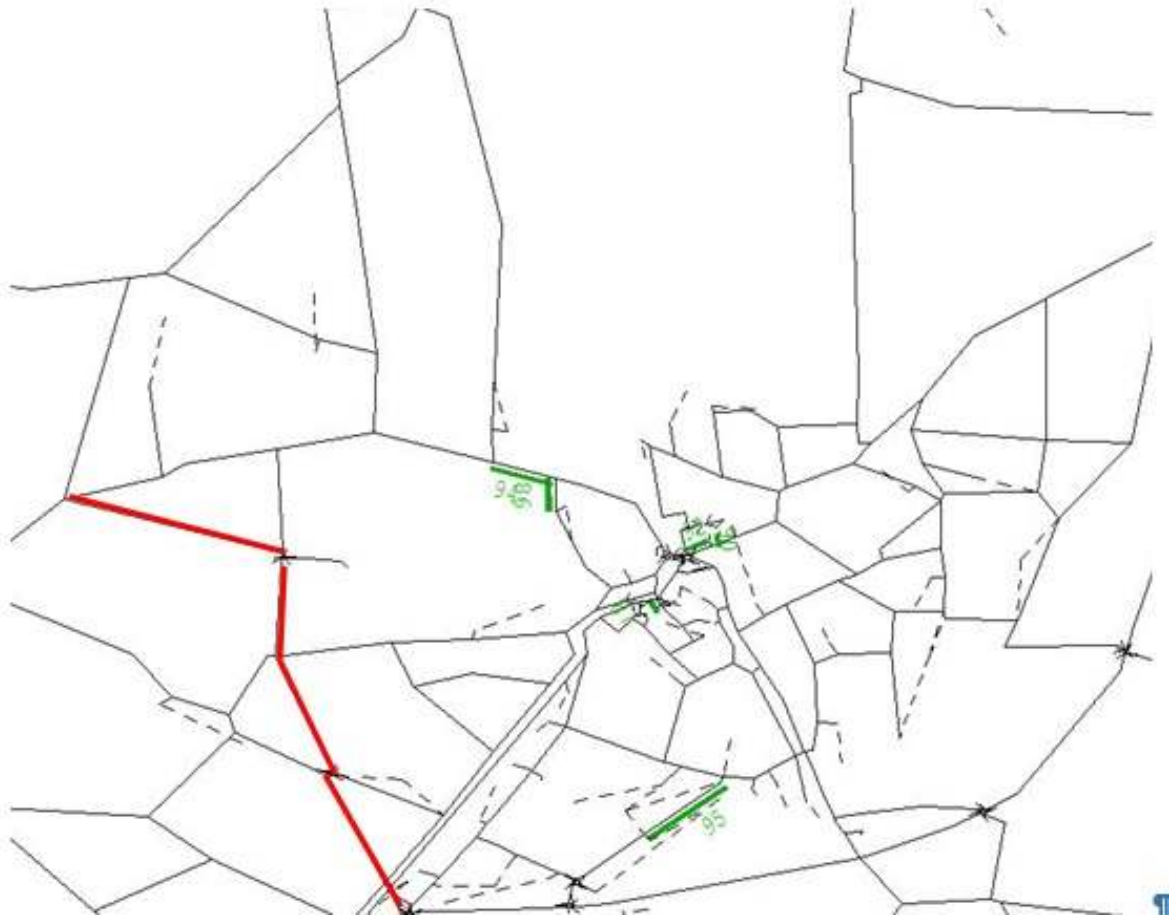
RFC results for this Test, for a link road between the A47 roundabout and Leverington Common, are shown within Figures 7.7 and 7.8 on the following page.



*Figure 7.7: Test 2 – 2026 AM Peak Hour*

The partial build of the Western Link Road to Leverington Common is shown to have no impact on the RFC values of the network. In extending the link road in comparison to Test 1, the impact on the Sutton Road / A1101 Junction is minimised with RFC values being below the threshold of 85% compared to over 90% within Test 1.

2026 PM peak results for Test 2 are shown in Figure 7.8.



**Figure 7.8: Test 2 – 2026 PM Peak Hour**

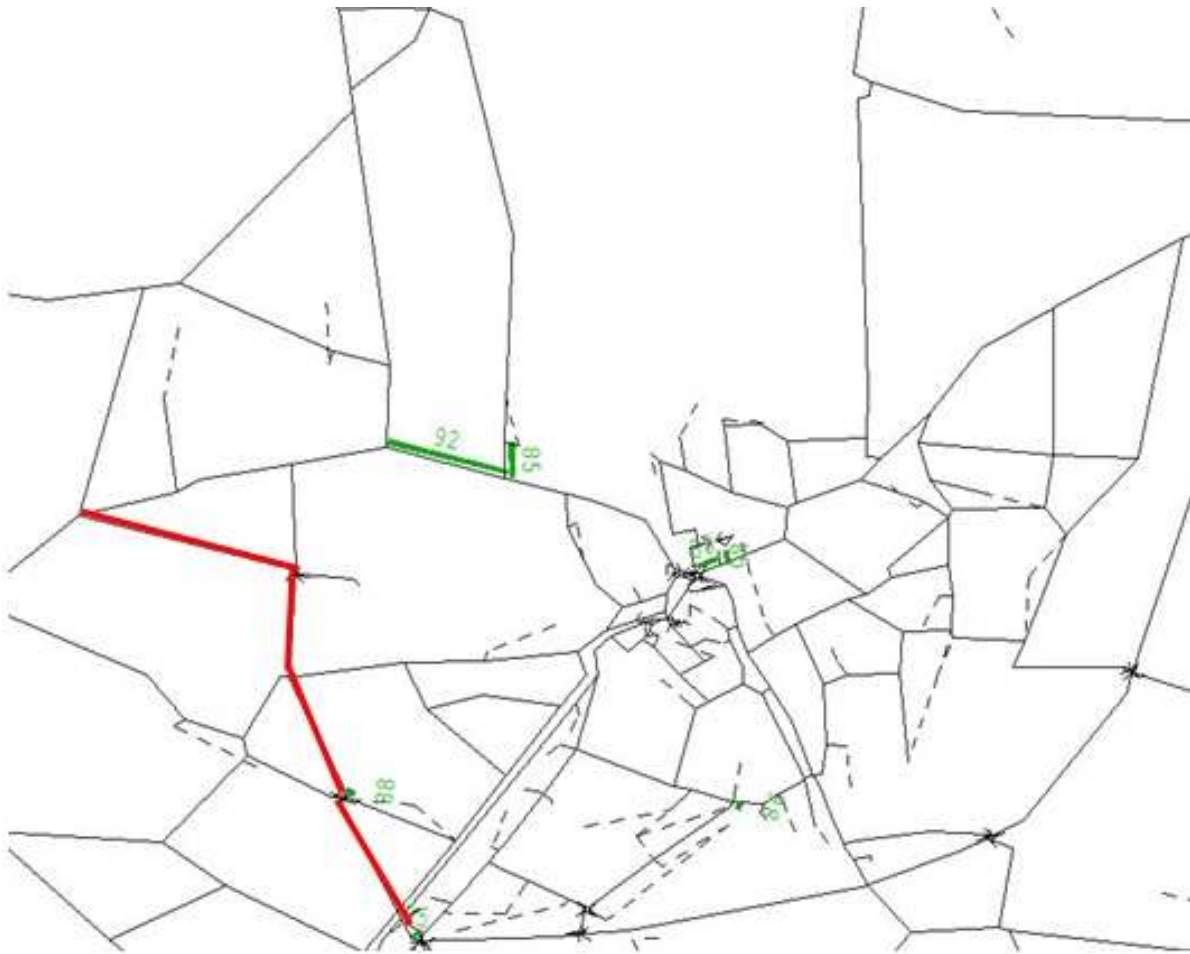
2026 PM peak results highlight the link road is predicted to remain within capacity, with the dispersal of development traffic having no adverse impact on the wider network.

Issues with the A1101 approach to the Sutton Road Junction is shown to exist within the PM peak of 2026 when building the link road to Leverington Road.

### **Test 2 – 2031 Results**

Figure 7.9 and 7.10 on the following page show the RFC ratios which have been extracted from the WATS model for test 2 under the AM and PM peak hour scenarios.





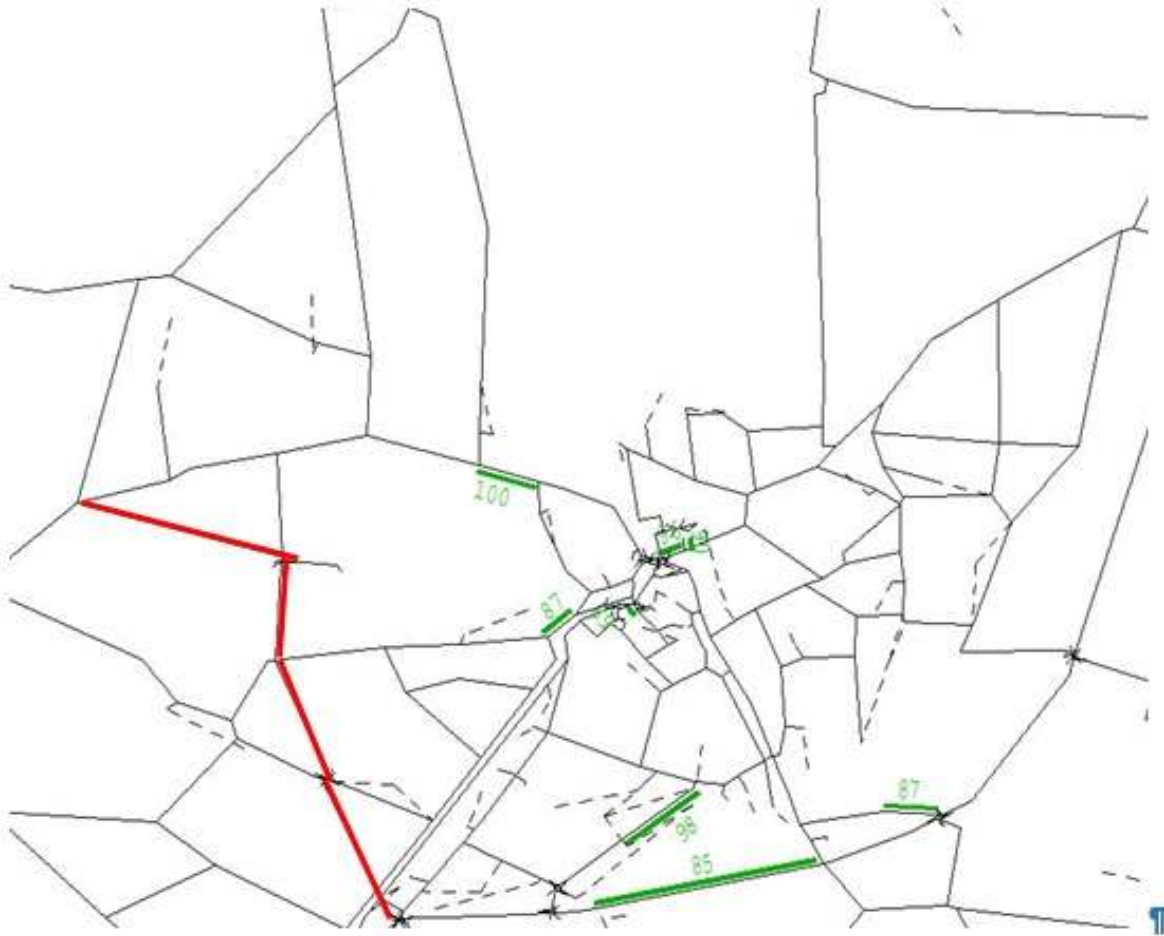
**Figure 7.9: Test 2 – 2031 AM Peak Hour**

Figure 7.9 shows that in 2031 the Western Link Road from Leverington Common is expected to operate within capacity.

In 2031 Leverington Road approach to the Sutton Road / A1101 Junction is shown to be approaching capacity at an RFC of 92. This increase from 2026 is due to greater volumes of traffic passing through Leverington that are either destined for the link road or originating from it.

In addition with the Western Link Road facilitating north – south trips within this test, an increase in RFC (from below 85% to 95%) is shown at the Western Link Road approach to the A47 / Cromwell Road Roundabout. Despite the increase this approach would operate within capacity.

2031 PM peak results for Test 2 are shown on the following page.



**Figure 7.10: Test 2 – 2031 PM Peak Hour**

Figure 7.10 shows that in 2031 the Western Link Road to Leverington Common is expected to operate within capacity.

Like the AM peak, a greater RFC is shown at the Sutton Road / A1101 Junction during the PM peak, however as the Western Link Road is predicted to impact the A1101 approach. This increase could be reflective of the increased traffic flows expected to be travelling toward the Western Link Road.

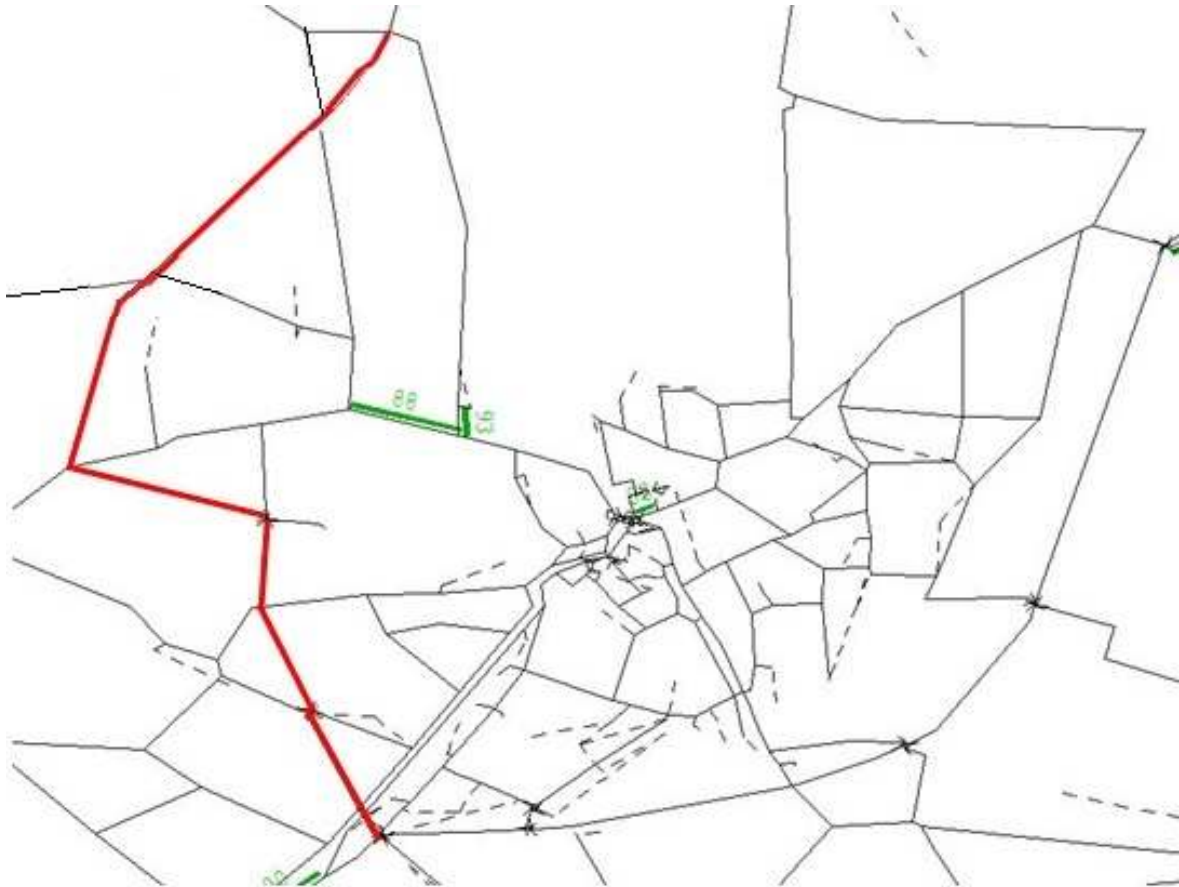
### Test 2 Summary

In building part of the Western Link Road, between the A47 roundabout and Leverington Common, the link road itself is predicted to operate within capacity across both 2026 and 2031 peak hours.

The wider network is predicted to remain within capacity 2026 and the AM peak hour of 2031. However, within 2031 PM peak hour the approaches at the Sutton Road / A1101 approach are shown to be at capacity, due to more vehicles passing through Leverington to reach the Western Link Road due to the northern section of Alignment 1D being inaccessible within this phasing test.

### Test 3 – 2026 Results

RFC results for this Test, for the full alignment of 1D reaching Little Ramper, are shown within Figures 7.11 and 7.12 on the following page.

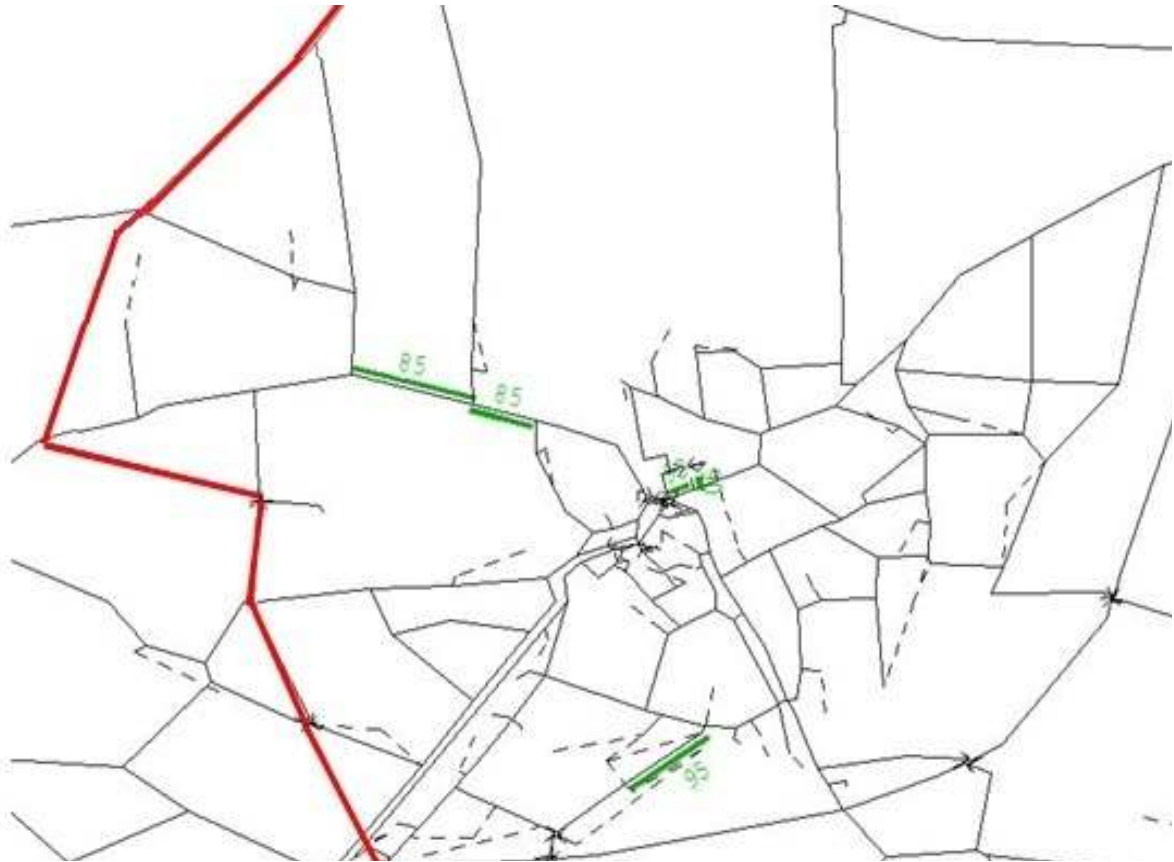


**Figure 7.11: Test 3 – 2026 AM Peak Hour**

Figure 7.11 shows that with the full link (between A47 Roundabout and Little Ramper) road open to traffic, the link road itself operates within capacity, with RFC values lower than 85%.

The majority of the wider network is also shown to operate within the 85% threshold, with the exception of the A1101 Sutton Road / A1101 Junction, which is predicted to be approaching capacity with RFC values of 88% and 93 retrospectively. Despite these RFC values shown, it should be noted this junction is within capacity still.

2026 PM peak results are shown on the following page.

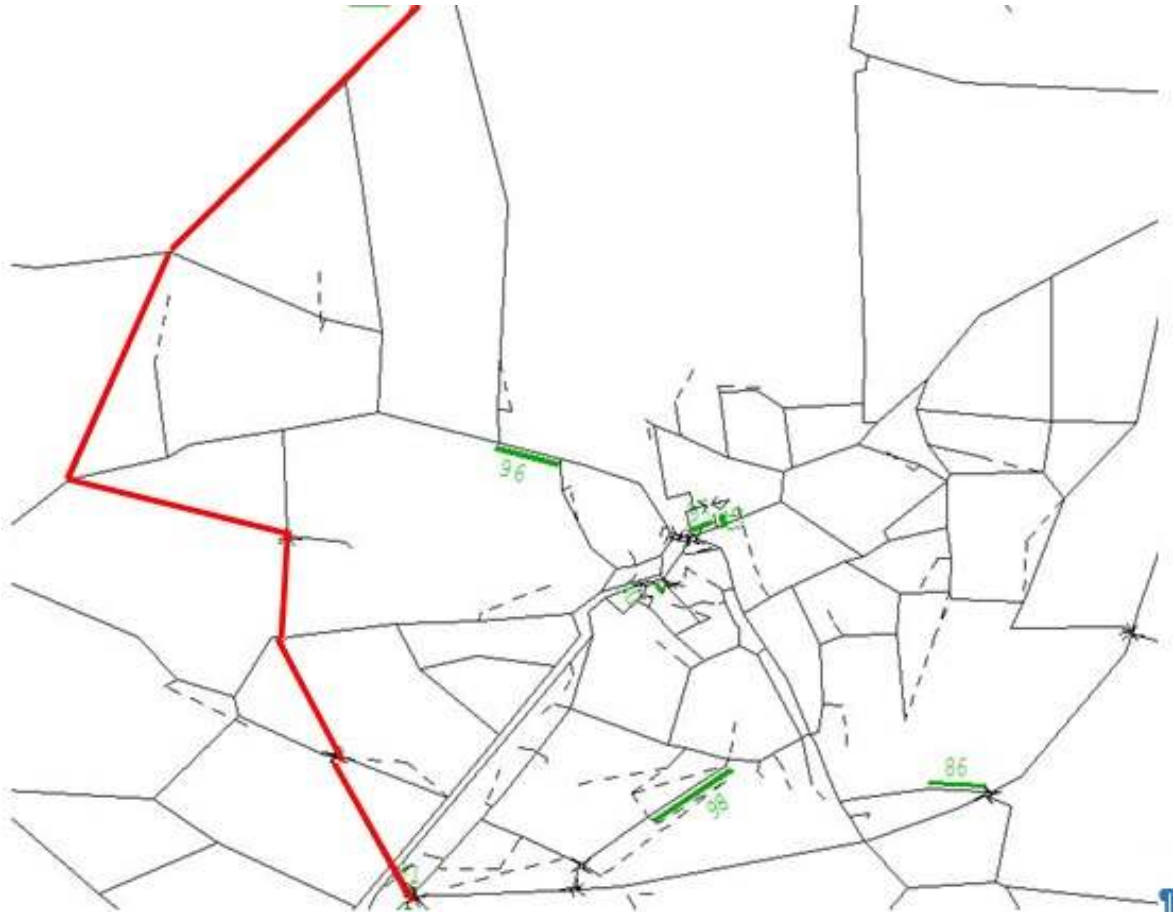


**Figure 7.12: Test 3 – 2026 PM Peak Hour**

Similarly to the 2026 AM peak hour, the impact of the full link road is shown to be on the Sutton Road / A1101 Junction. Within this peak period the RFC on the A1101 approach from the town centre is shown to be on the 85% threshold.

### **Test 3 – 2031 Results**

RFC results for this Test, for the full alignment of 1D reaching Little Ramper, are shown within Figures 7.13 and 7.14 on the following page.



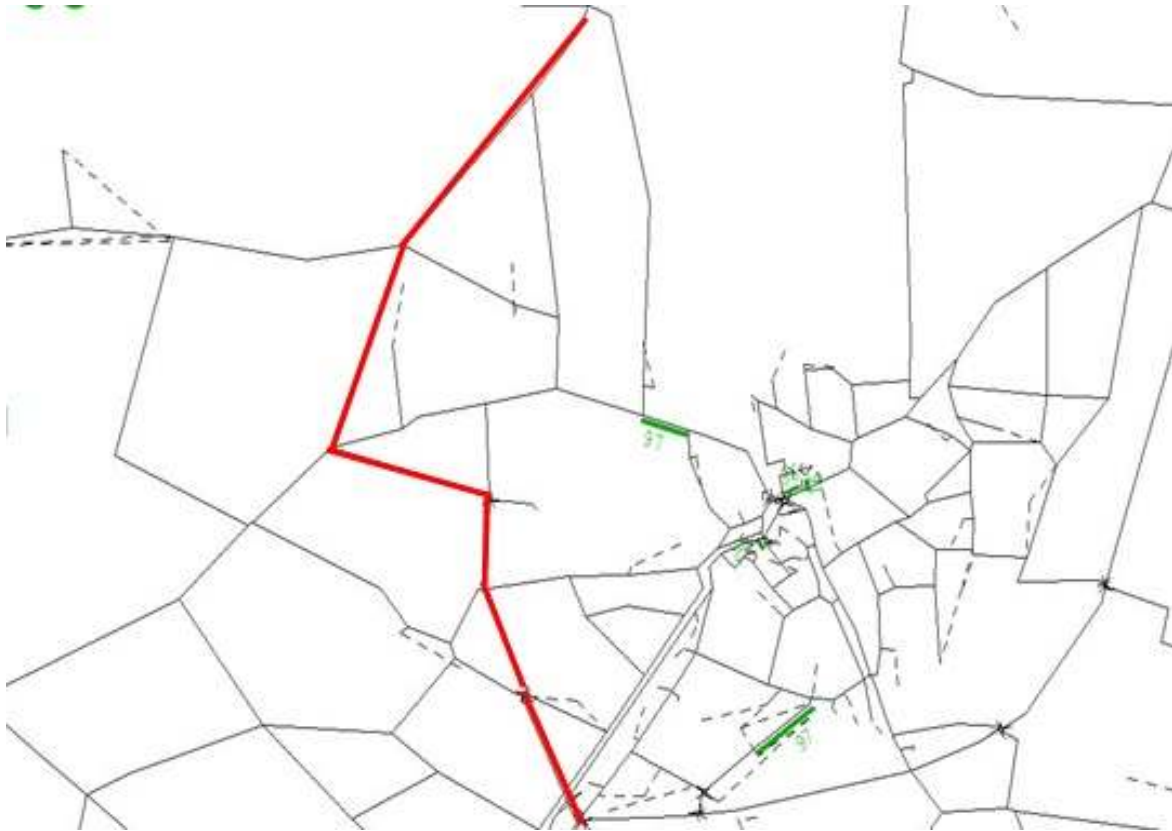
**Figure 7.13: Test 3 – 2031 AM Peak Hour**

By 2031 the Western Link Road and the wider network is expected to operate within capacity.

In comparing this scenario to the 2026 scenarios undertaken for this test, Figure 7.13 suggests the full link road facilitates a greater trip diversion away from the town centre and the Sutton Road / A1101 Junction, as shown by the decrease in RFC values at the junction from 102% to 96% within 2031. Likewise, Leverington Common remains under the threshold of 85%, indicating reduced traffic flows pass through Leverington when the full link road is open to traffic (see 2026 AM of Test 3 for comparison).

2031 PM peak results are shown in Figure 7.14 below.





**Figure 7.14: Test 3 – 2031 PM Peak Hour**

Similarly to the AM peak of 2031, the PM peak hour shows the same impact on the Sutton Road / A1101 Junction. Despite RFC values over the 85% capacity threshold, this junction is predicted to remain within capacity.

### Test 3 Summary

In building the full Western Link Road, between the A47 roundabout and Little Ramper, the link road itself is predicted to operate within capacity across both 2026 and 2031 peak hours.

The benefit of building the full link road is seen within the 2031 scenarios of this Test, with Figures 7.13 and 7.14 highlighting the reduction in RFC values on the Sutton Road / A1101 junction. This RFC decrease compared to within Test 1 and Test 2, is probably reflective of a proportion of traffic now bypassing the A1101 and diverting to the Western Link Road at Little Ramper. RFC values are shown to be higher than the 85% threshold used within this assessment, but the junction is predicted to remain within capacity.

### Phasing Summary

The results from the phasing tests undertaken have highlighted the following points:

- Test 1 – The benefit of building the first third of the Western Link Road to Mile Tree Lane is shown in 2026 only, with 2031 forcing the Sutton Road / A1101 Junction over capacity. This also would impact Freedom Bridge Roundabout as vehicles would continue to use the town centre network as their only viable route;
- Test 2 – The benefit of building the link road to Leverington Common is shown within 2026 only. Building to Leverington Common is found to generate capacity issues along Leverington Common and the A1101 in 2031, due to greater volumes

of traffic passing through this area in order to reach the Western Link Road. In opening the link road to Leverington Common by 2026, the impact on heritage assets will have to be considered, as greater volumes of traffic will utilise this area.

- Test 3 – The benefit of building the full link road to Little Ramper in the north, is highlighted within the 2031 scenarios of this Test. The enabling of an alternative north to south from the A1101 at Little Ramper is shown to alleviate capacity issues at the Sutton Road / A1101 junction, as vehicles are able to bypass this junction and continue to utilise the Western Link Road when destined for the A47.

Based on the points made above (considering the RFC assessment results and wider impact on heritage assets within Leverington), the preference for phasing the Western Link Road is to build the first third of the Western Link road to Mile Tree Lane by 2026, and extend to the full alignment of 1D by 2031. Table 7.3 below highlights this recommended phasing. Cells left blank are those scenarios discarded from the phasing assessment.

With this phasing combination, the development site will be facilitated by 2026 with development traffic having no adverse impact on the wider network, and by 2031 traffic will have an alternative north - south route, mitigating against the impact on Leverington Conservation Area and associated heritage assets, whilst mitigating against capacity issues on the already heavily used junction of the A1101 and Sutton Road.

**Table 7.3: Phasing Summary**

	By 2026	By 2031
Test 1	✓ Enhanced A47 Roundabout, New river crossing and link road to Mile Tree Lane	
Test 2		
Test 3		✓ Link road extended through the West Wisbech site, by passes Leverington Road and reaches Little Ramper

## 8 Development Sensitivity Test

### Introduction

This chapter discusses sensitivity tests undertaken to identify the impact along the Western Link Road and wider network, if more than the 750 homes proposed within the Local Plan (2014) are to be built on the West Wisbech Development site.

### Housing Growth Sensitivity Tests

The impact and required improvements along the Western Link Road and wider network have been assessed by extracting Ratio of Flow to Capacity (RFC Ratio) data from the WATS model (2015 base).

The following levels of housing growth have been assessed as part of these sensitivity tests:

- Test 1 – A total of 1500 dwellings proposed for the West Wisbech Development site. Housing to be equally split across both the north (Access Junction 1) and south (Access Junction 2) of the development site; and,
- Test 2 – A total of 2000 dwellings proposed for the West Wisbech Development site. 1250 dwellings to be positioned to the north (Access Junction 1) of the development site, whilst 750 dwellings are to be positioned in the south (Access Junction 2).

Both tests were undertaken within the ‘Do Something’ model for scenarios of the AM (08:00 – 09:00) and PM peak (17:00 -18:00) hours, as well as forecast years of 2026 and 2031. The use of the ‘Do-Something’ Model for this assessment was to replicate changes across the town network as well as the implementation of highway schemes that would potentially be completed within these time periods.

Note, the forecast year of 2021 was not used within this assessment due to the original housing development of West Wisbech being proposed from 2023 onwards, see Chapter 3 of this report for more details.

### WATS Model

To undertake the sensitivity tests outlined above, matrices included within the ‘55555’ section of the model code file were manipulated. Manipulation of coding was completed using the ‘MX’ program within SATURN, which allowed the ‘UFM’ file to be unstacked into the 5 users classes included within the WATS model (2015 base), the origin and destination data changed and then re-stacked to the original file format.

Table 8.1 below highlights the factors applied within the file coding for both the north and south zones of the West Wisbech Development site, in order to achieve the scale of housing specified within each test. The table includes the Local Plan (2014) housing growth, which is currently proposed for the site for comparison.

**Table 8.1: Factors Applied to Matrices**

	Local Plan Growth (2014)		Test 1 (1500 dwellings)		Test 2 (2000 dwellings)	
	Housing	Factor	Housing	Factor	Housing	Factor
Zone 1 (North)	-	-	750	1.00	1, 250	1.67
Zone 2 (South)	750	1.00	750	1.00	750	1.00

## Model Outputs

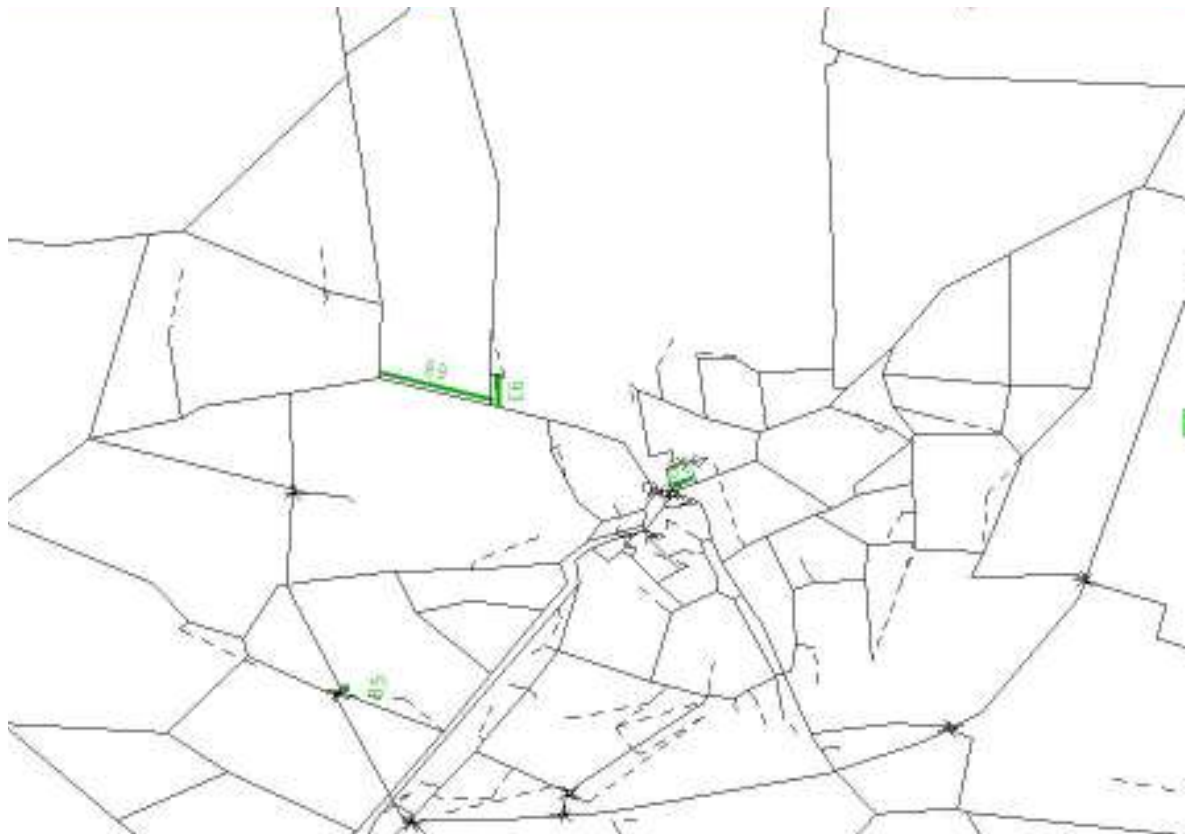
The RFC ratio reports the demand flow compared to the available capacity (represented as a percentage), and has been reported based on the definitions outlined below:

- RFC ratio of less than 85% indicates demand is within capacity;
- RFC ratio of 85% - 100% indicates a link is approaching capacity and queues / delay will be commonplace; and,
- RFC ratio of 100% or higher indicates that demand exceeds capacity and that the operation of the link has broken down.

The results of the sensitivity tests are discussed in turn within the remainder of this chapter. RFC values (greater than 85%) extracted from the WATS model are shown within model screenshots, which highlight areas on the network whereby performance would potentially decrease alongside the additional development traffic generated from the West Wisbech site.

### Test 1 – 2026 Results

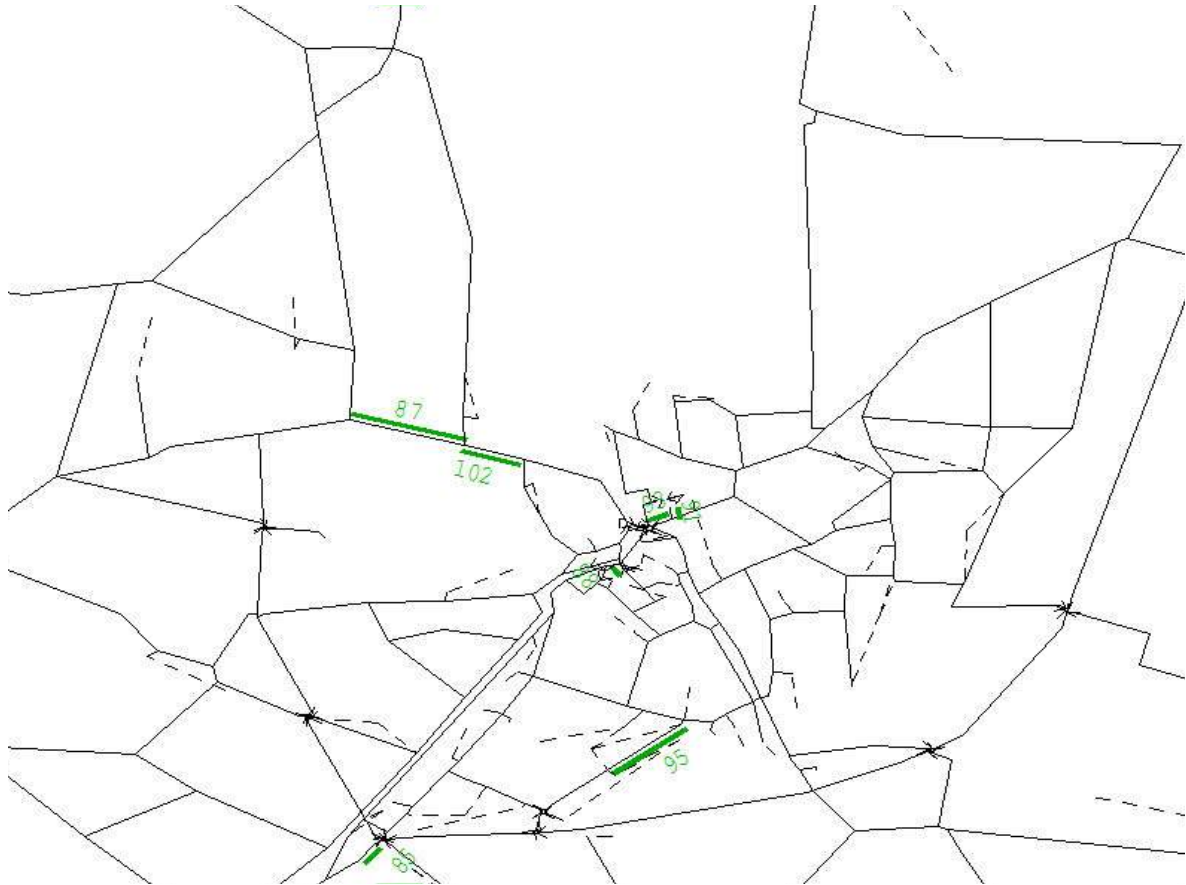
Figure 8.1 and 8.2 below show the RFC ratios which have been extracted from the WATS model for Test 1 under the AM and PM peak hour scenarios.



**Figure 8.1: Test 1 – 2026 AM Peak Hour**

By locating 750 dwellings to both the north and south of the West Wisbech development site, the wider network is shown to remain within capacity in 2026.

Areas affected by the additional development traffic are shown to be the Sutton Road / A1101 Junction (approaching capacity RFC 93%), Leverington Common (RFC 89%) and the Western Link Road north approach to the Development Access Junction 2 (at the 85% threshold).



**Figure 8.2: Test 1 – 2026 PM Peak Hour**

During the PM peak hour of this scenario, the additional 750 dwellings positioned to the north of the West Wisbech Development site is expected to force the Sutton Road / A1101 Junction over capacity (RFC 102).

### **Test 1 – 2031 Results**

Figure 8.3 and 8.4 on the following page show the RFC ratios which have been extracted from the WATS model for Test 1 under the AM and PM peak hour scenarios.





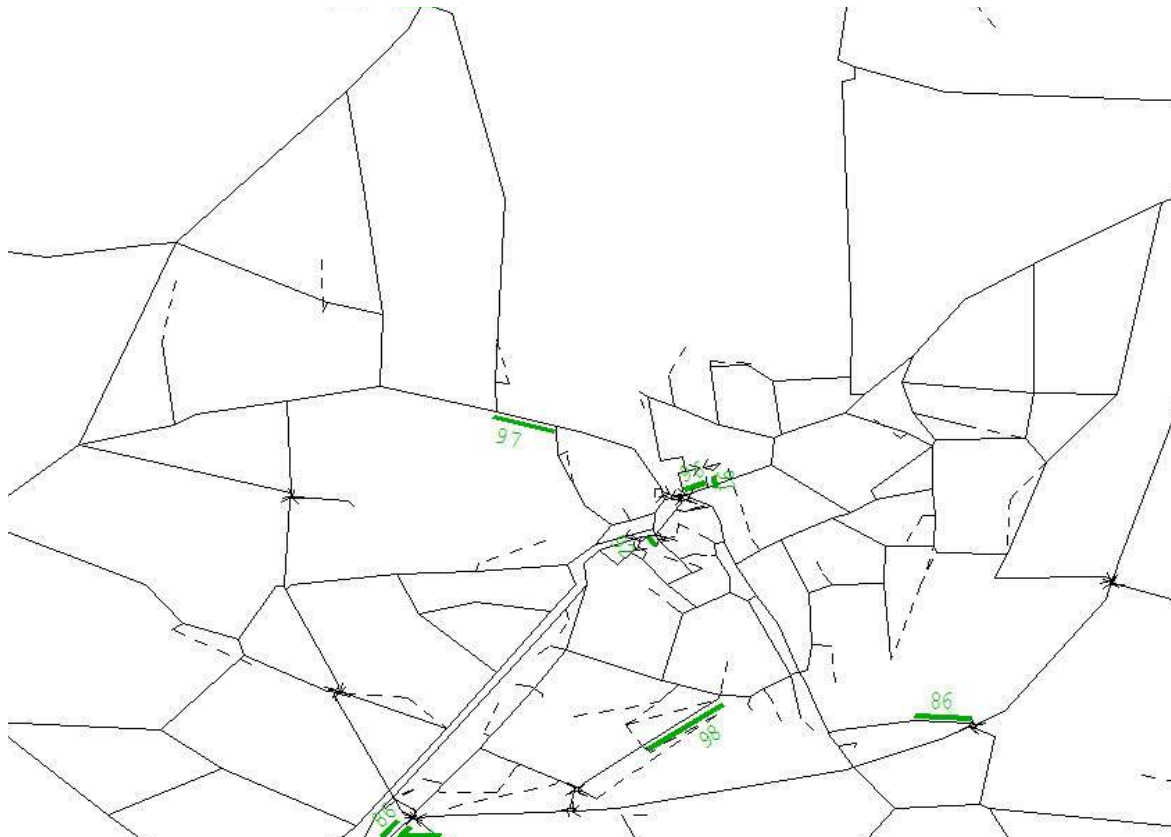
**Figure 8.3: Test 1 – 2031 AM Peak Hour**

Figure 8.3 shows a greater number of junctions on the wider network are impacted by the additional 750 dwellings proposed within this option.

Despite all junctions remaining within capacity, the Sutton Road / A1101, Leverington Common, the development access at Development Access Junction 2, as well as the Western Link Road and A47 West approaches to the A47 roundabout are all shown to be approaching capacity within this scenario. This is indicated by an RFC value greater than 85%.

With such junctions being impacted by heavier traffic flows, additional capacity enhancements will be required, to maintain free flowing traffic, minimise delay on the Western Link Road and to maintain residential access.

Results for the PM peak hour of this 2031 are shown beneath.



**Figure 8.4: Test 1 – 2031 PM Peak Hour**

During the PM peak hour of this scenario, both the Sutton Road / A1101 junction and the A47 West approach are shown to be approaching capacity, with RFC values of 97% and 88% retrospectively.

### Test 1 Summary

In proposing a total of 1500 dwellings on the West Wisbech Development Site, the wider network, with the exception of the Sutton Road / A1101 junction, is expected to operate within (but approaching) capacity across both forecast years of 2026 and 2031.

The Sutton Road / A1101 junction is shown to be either approaching capacity (RFC greater than 85%) or at capacity (RFC greater than 100%) across scenarios assessed. With this junction already heavily trafficked, junction improvements to increase capacity would be required at this location (by 2026), if a total of 1500 homes were to be proposed for the West Wisbech Development site.

### Test 2 – 2026 Results

Within Test 2 a total of 2000 homes are proposed for the West Wisbech Development site.

Figure 8.5 and 8.6 below show the RFC ratios which have been extracted from the WATS model for Test 2 under the AM and PM peak hour scenarios.



**Figure 8.5: Test 2– 2026 AM Peak Hour**

By coding 2000 homes on the West Wisbech Development site, areas on the wider network that are approaching capacity include the Sutton Road / A1101 junction (RFC 94%), Leverington Common (RFC 89%), and the Western Link Road North Approach (RFC 98%) of Development Access Junction 2.

2026 PM peak hour results of Test 2 are shown beneath.



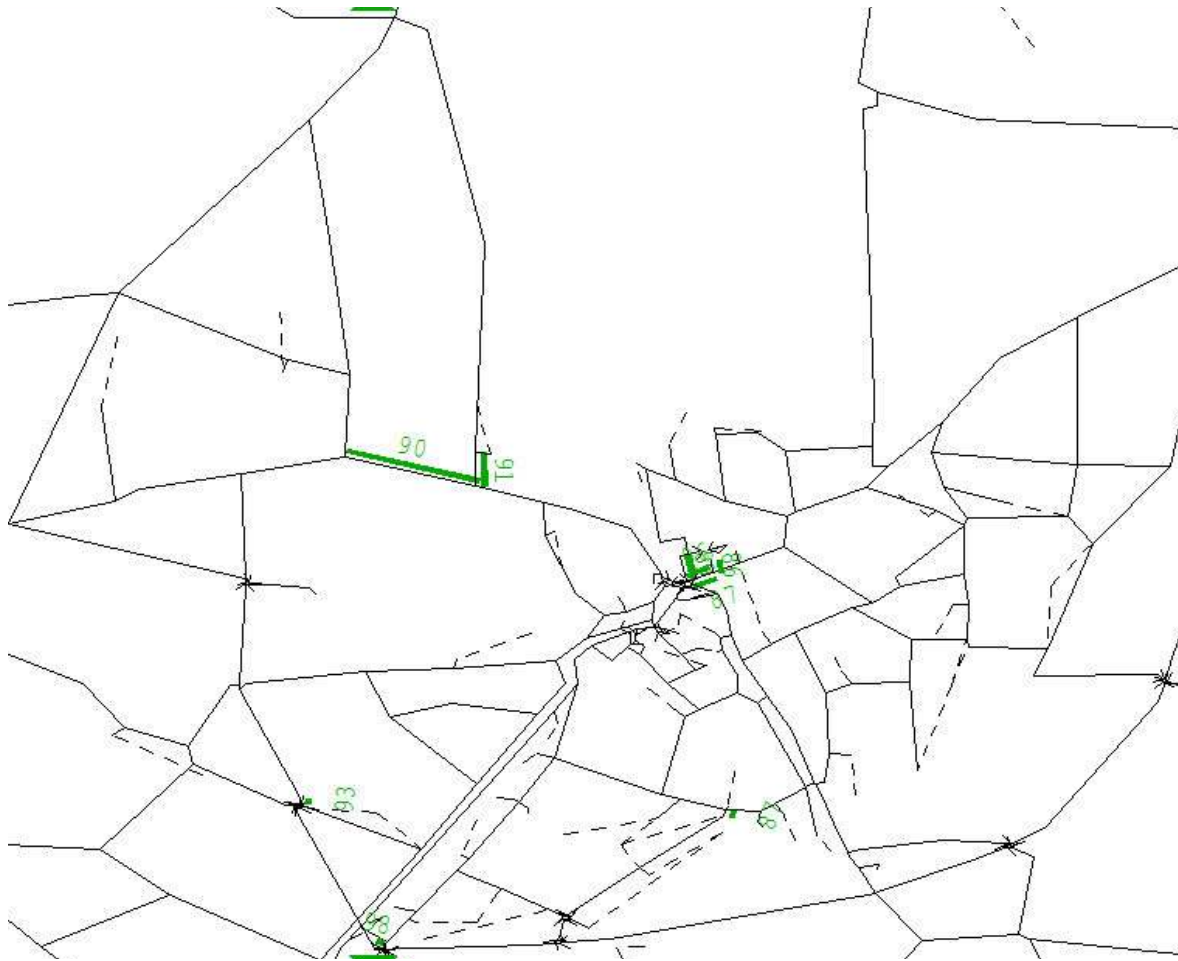
**Figure 8.6: Test 2– 2026 PM Peak Hour**

During the PM peak hour of 2026, the Sutton Road / A1101 junction is forced over capacity following the increased traffic flows, with an RFC of 102% shown. Additionally, the A47 West approach to the roundabout and Leverington Common are shown to be approaching capacity during this period.

Figure 8.6 shows the existing junction with Sutton Road and the A1101, is inadequate if 2000 homes are to be built on the West Wisbech site. Capacity enhancing improvements would be required at this junction to maintain free-flowing traffic, minimise delay and maintain sufficient access for residents of Leverington.

### **Test 2 – 2031 Results**

Figure 8.7 and 8.8 on the following page show the RFC ratios which have been extracted from the WATS model for Test 2 under the AM and PM peak hour scenarios.

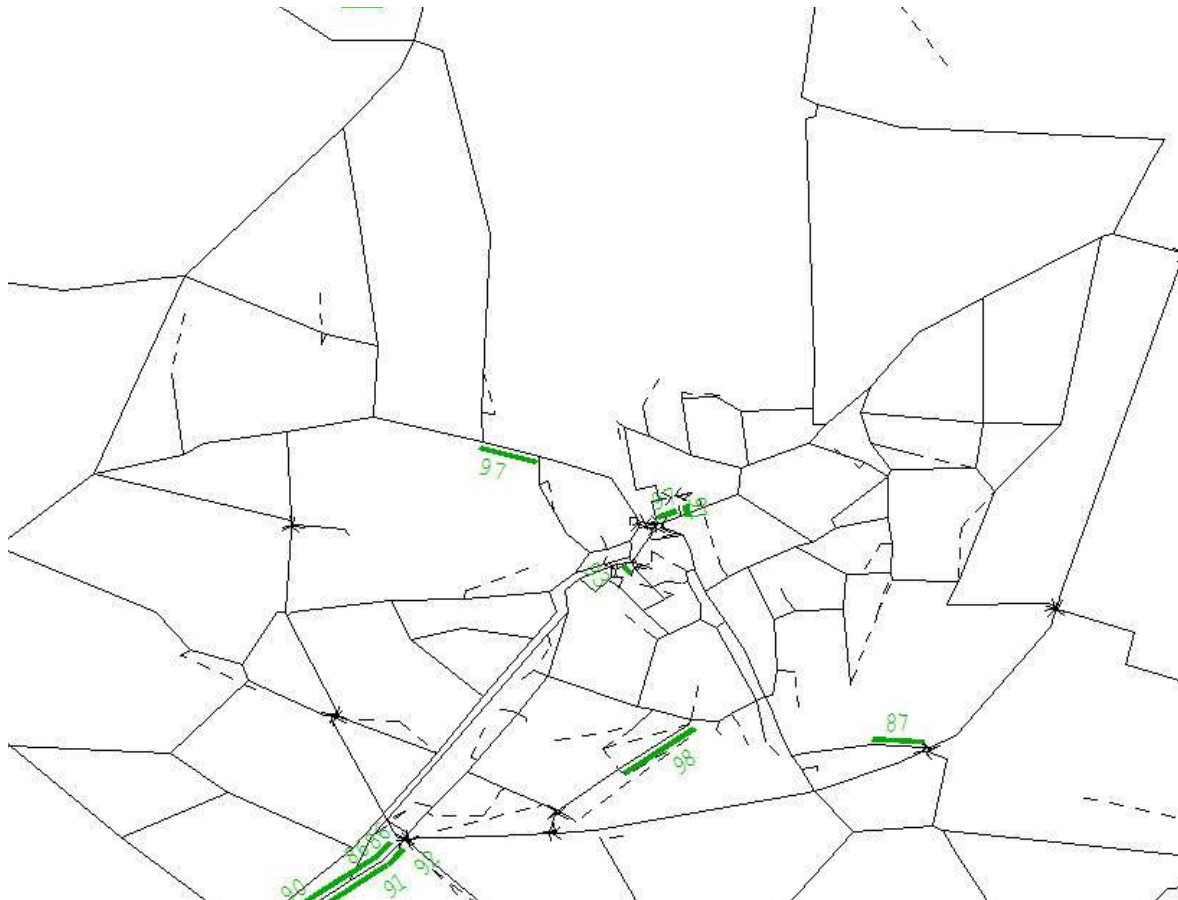


**Figure 8.7: Test 2– 2031 AM Peak Hour**

Figure 8.7 shows the wider network remains within capacity under this scenario of 2000 homes. Despite this, it should be noted that the Sutton Road / A1101 junction (RFC 91%), Leverington Common (90%) and the Western Link Road North approach to both the Development Access 2 Junction (RFC 93%) and the A47 roundabout (RFC 98%).

PM peak results for this scenario are shown beneath.





**Figure 8.8: Test 2– 2031 PM Peak Hour**

Similarly to the AM peak hour of 2031, the Sutton Road / A1101 junction is predicted to be approaching capacity during the PM peak hour, with a RFC of 97% present for the A1101 south approach.

Higher RFC values are shown at the A47 / Cromwell Roundabout during the PM peak hour, particularly for the A47 West approach. RFC values along this approach range between 88% - 92%, which suggests congestion and delay are common place during this period. Improvements enhance capacity and alleviate congestion would be required at this location, if 2000 homes are to be built on the development site.

### Test 2 Summary

In proposing a total of 2000 dwellings on the West Wisbech Development Site, key junctions on the network are shown to be either approaching capacity or at capacity across the forecast years of 2026 and 2031.

Under Test 2, it is recommended that capacity enhancements are made to the Sutton Road / A1101 Junction (by 2026), the Development Access 2 junction (by 2026) , as well on the A47 West and Western Link Road approaches to the A47 / Cromwell Road Roundabout (by 2031).

## Sensitivity Test Summary

Table 8.2 below summarises the results of both sensitivity tests in regards to 1500 and 2000 dwellings for the West Wisbech Development Site.

Note: junctions listed within the table have been extracted from the above screenshots and commentary, and are used as examples of locations on the network which would require improvements in order to meet the demand of increased development traffic.

Cells highlighted in orange shows areas on the network that are approaching capacity, whilst those in red highlight areas over capacity and in need of improvement under each test scenario. Cells left blank indicate areas which remain within capacity (RFC below 85%) under scenarios assessed.

**Table 8.2: Housing Sensitivity Test Results**

	Test 1 – 1500 homes				Test 2 – 2000 homes			
	2026		2031		2026		2031	
	AM	PM	AM	PM	AM	PM	AM	PM
Sutton Road / A1101 Junction	Orange	Red	Orange	Orange	Orange	Red	Orange	Orange
Leverington Road	Orange	Orange	Orange	White	Orange	Orange	Orange	White
Development Access 2	White	White	Orange	White	Orange	White	Orange	White
A47 / CWR Roundabout (A47 West / WLR approaches)	White	Orange	Orange	Orange	White	Orange	Orange	Orange

## 9 Concept Highway Design

### Introduction

This chapter outlines the Concept Highway Design and cost - estimate for the preferred Western Link Road Alignment of 1D identified within this report. The chapter includes:

- Design Assumptions and Input decisions;
- Concept Design Drawings;
- STATS Review; and,
- Road Safety Review.

### Preferred Option

The schemes within the Wisbech Access Study have been designed to concept design level. Designs are based on national and local highway standards, and make clear reference where departures from standards are proposed. Concept designs are adequate to undertake transport assessments, and to inform Outline Business Cases. Any further level of design would require highway surveys, including topographical surveys.

Scheme designs have been informed by an initial STATs search, to identify if any public utilities would be affected by the scheme which may compromise scheme delivery.

As identified within the previous chapter, Alignment 1D was the preferred option progressed to the concept design stage of the Wisbech Access Study. The description below provides a summary of this option:

*A single carriageway road which connects the A47 / Cromwell Road Roundabout in the south to Little Ramper in the north. The alignment crosses the River Nene to follow a central route within the West Wisbech development site, intersecting Gadd's Lane and Leverington Common, before circling west of the Leverington Conservation Area.*

*Six of the seven junctions take the form of a roundabout, whilst the remaining one is a priority junction. A summary of the junctions (and form) are detailed below:*

- Connecting Junction 1; A four arm Roundabout connecting the Western Link Road with the A1101 and Little Ramper;
- Local Junction 1; A four arm roundabout with the Western Link Road intersecting Gorefield Road;
- Connecting Junction 2; A four arm roundabout on Leverington Common, West of the Conservation Area;
- Development Access 1; A three arm roundabout positioned to the north of the West Wisbech Development Site;
- Local Junction 2; A priority junction positioned on Barton Road, with the Western Link Road given priority;
- Development Access 2; A four arm roundabout positioned on Mile Tree Lane, providing development access; and,
- Connecting Junction 3; Enhancement of the existing A47 / Cromwell Road Roundabout, facilitating the Western Link Road between the A47 West and Cromwell Road approaches.

The junctions outlined above are expected to operate within capacity, resulting in the Western Link Road providing a balance between good connectivity to the West Wisbech development area / local road network, alongside minimising delay along the route, encouraging longer distance strategic trips to divert out from Wisbech Town Centre.

## **Design Assumptions and Input Decisions**

Designs are concept designs based on Ordinance Survey mapping. Level information is unknown and therefore embankments/cuttings and footprints should be treated as indicative.

The road width (3.65m) has been designed to the Design Manual for Roads and Bridges (DMRB). Where DMRB does not apply or is irrelevant, the scheme is designed using the Manual for Streets 1 & 2 alongside the Cambridgeshire Estate Road specification.

Where the existing access along North and South Brink is severed by the Western Link Road, access to nearby properties has been diverted onto other local routes.

Junction assumptions concerning geometric parameters of lane length and flare length, alongside capacity decisions, have been informed by the assessment work described earlier within this report.

The costing of the alignment incorporates the land take required for a dual carriageway, ensuring opportunity for future upgrades of this scheme.

Figures 9.1 and 9.2 on the following pages shows the concept design the option described above. Note, junctions displayed within the figures are shown north to south.







## STATS Review

As part of the concept design process, searches have been undertaken to determine whether any STATS exist within the vicinity of the proposed schemes. STATS refers to utilities or services which run beneath the surface of the road, for example:

- Electricity Cables;
- Gas Mains;
- Water Mains and sewers; and,
- Telecommunications Wires.

This information will be necessary for further design stages, including more detailed scheme cost estimates. The presence of STATS may also dictate amendments to a scheme design at a later point.

Figure 9.3 on the following pages shows the STATS present within the vicinity of the scheme location. Note, the WLR stat plan is divided into sections with the first image representing the northern section, whilst the second page represents the southern section of this scheme.

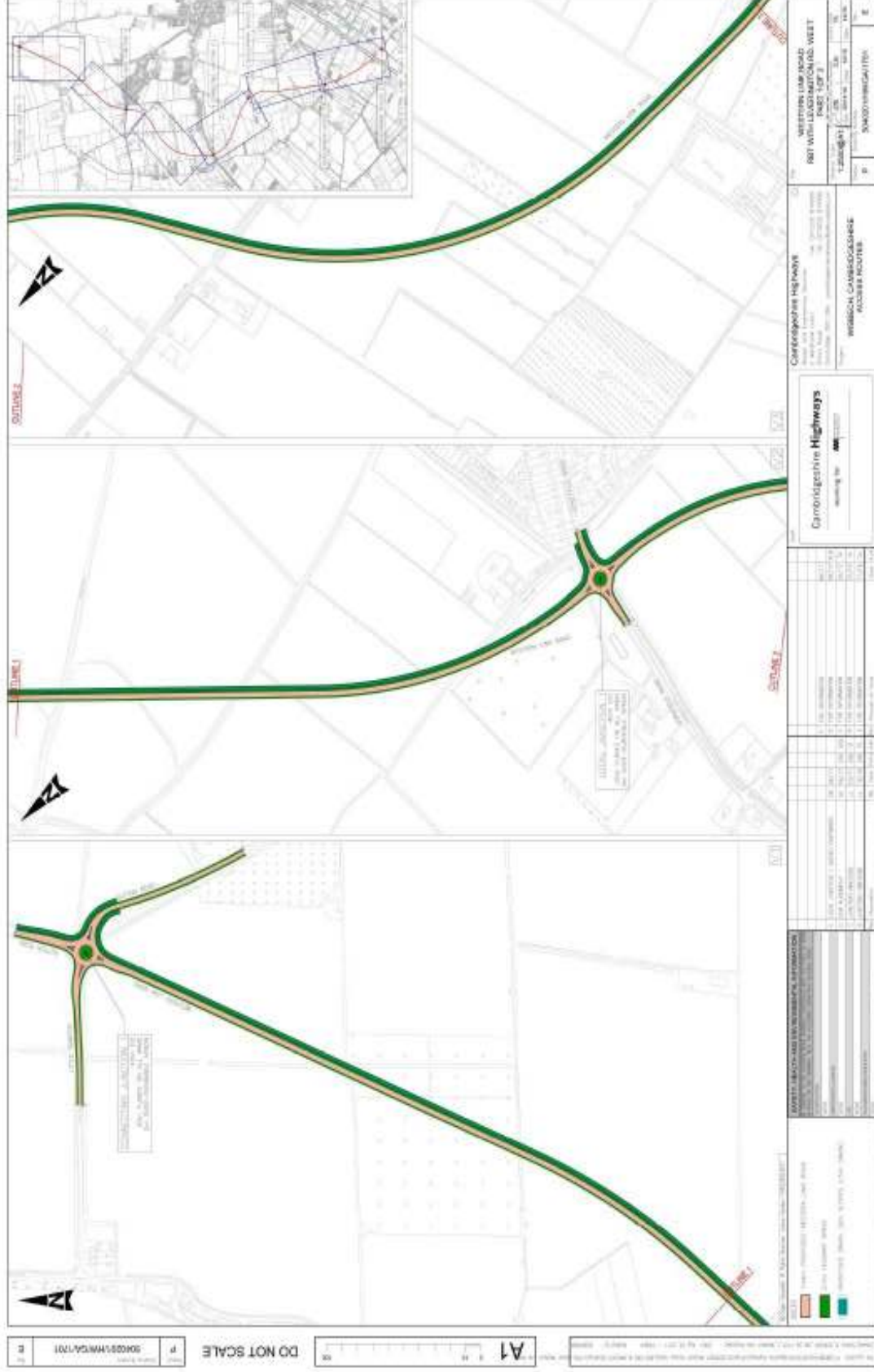


Figure 9.3: Alignment 1D –STAT Review North



## Road Safety Review

The Concept Designs have been subject to an initial Road Safety Review by Cambridgeshire County Council. The purpose of the Road Safety Review is to identify potential safety issues associated with the schemes prior to any further design phase, and in particular any that could compromise scheme deliverability.

Note that this does not constitute a formal Road Safety Audit, and is instead initial feedback based on the Concept Designs. It should also be noted that does it not necessarily reflect the opinions of Norfolk County Council or Highways England. Schemes that fall within the jurisdiction of Norfolk County Council or Highways England will also need to satisfy their Road Safety Requirements as part of the design process.

Comments from the Road Safety Review are documented in Table 9.1 below.

**Table 9.1: Road Safety Review for the Western Link Road**

Road Safety Feedback	Comment
What happens on North and South Brink? What alternative measures are put in place?	Alternative access arrangements for North and South Brink have been considered and are explained within the report
Long Straight alignments can increase speeds	The road is to serve as a high speed road. Careful consideration should be given to minimising the risk of accidents at the detailed design stage
Traffic flows are likely to be high – this may limit over taking opportunities and creates the risk of collisions at speed	Traffic flows are not forecast to be high enough to warrant dual carriageway. Careful consideration should be given to minimising the risk of accidents at the detailed design stage.
Right turn lanes at junctions will need to be designed in accordance with the DMRB. Risks associated with right turn lanes being misused for overtaking purposes, and island strikes at speed are present.	Designs are in line with the relevant standards. Safety enhancements have been made to the staggered priority junctions, including the provision of ghost islands, in light of these comments.
The staggered junction is concern because: <ul style="list-style-type: none"> <li>• A sharp double bend is introduced on the eastern side and in a national speed limit area. Increased likelihood in accidents;</li> <li>• Driver visibility over the junctions will need to be block, encouraging drivers to slow and reduce the likelihood of drivers misjudging the alignment ahead;</li> <li>• Visibility for motorists exiting properties along Barton Road (east) will be extremely substandard. Vehicles approaching the west are likely to be travelling at reasonably high speeds, therefore severity of injury is high;</li> <li>• Right turning vehicles will block the inter –visibility of left turners at the junction</li> </ul>	See above. Careful consideration should be given to minimising the risk of accidents at the detailed design stage.



## Scheme Cost Estimate

A cost estimate has been produced for the Western Link Road (Alignment 1D) which includes the cost of the junctions positioned along the length of the road, as well as additional land take equating to a dual carriageway.

The cost for this scheme is £49,347,393. This cost is produced using 2017 prices and it should be noted that the construction industry inflation is approximately 4 - 5% per annum.

Although the costs below are considered robust, these cost estimates are based on concept level designs, and may alter in the future subject to further information becoming available during later design stages.

The cost estimates include the following items:

- Drainage;
- Carriageway;
- Junctions;
- Footpaths;
- Street Lighting;
- Signing and Lining;
- Preliminaries, including design (10% const. cost) and supervision (20% const. cost);
- Traffic Management;
- Land purchase and compulsory purchase estimates;
- Demolition;
- Land Acquisition, and,
- Optimism Bias @ 45%.

The cost estimates excludes the following items:

- Services Diversions;
- Contaminated Land Treatment; and,
- Local Planning Fees.

## Land Acquisition and Demolition Costs

The following costs have been applied where land acquisition or demolition is required by a scheme. These costs are considered relevant to the location of the schemes and are derived from experience of other similar schemes within the region.

- Land Acquisition – Agricultural £37,500 per hectare;
- Land Acquisition – Urban / Built £125,000 per hectare;
- Compulsory Purchase Order – Dwelling £277,500 per dwelling; and,
- Demolition – £70m<sup>2</sup> or £7,500 per dwelling.

## Optimism Bias

The scheme costs also include 45% optimism bias. This is an uplift that is applied to the final scheme cost in line with DfT guidance on preparing scheme cost estimates. The DfT describes optimism bias in their Web Tag Note 'A1.2 Scheme Costs' (November 2014) as:

*'Optimism bias is the demonstrated systematic tendency for appraisers to be overly optimistic about key parameters. Theorists on cost overrun suggest that optimism bias could be caused by the organisation of the decision-making process and strategic behaviour of stakeholders involved in the planning and decision-making processes.'*

Different levels of optimism bias should be applied to scheme costs depending on the nature of the scheme (road, rail, ITS etc.) and how developed proposals or designs are. The schemes costed as part of the study are road schemes and are all at the first stage of scheme development. As a result of this an optimism bias of 45% is applied to the scheme costs.

The cost estimate for the scheme, including optimism bias are summarised in the table beneath. A more detailed breakdown of the cost is provided in Appendix B. Note that the cost assumes the scheme is delivered in isolation, and do not reflect the potential cost savings that may be associated with delivering adjacent or overlapping schemes at the same time.

**Table 9.2: Western Link Road Scheme Cost Estimate**

Road Safety Feedback	Comment
Carriageway (length of link road)	£14,851,600
Junctions	£3,546,705
Structures	£1,350,000
Earthworks	£2,563,007
<b>Sub Total</b>	<b>£22,311,312</b>
Percentages (Inc. Preliminaries, STAT review, landscaping, supervision and design)	£10,597, 873
Land Acquisition	£1, 123,500
Optimism bias (@45%)	£15,314,708
<b>Total</b>	<b>£49,347,393</b>

The following table shows a breakdown in costs which reflects the costs associated with the phased approach (across 2026 and 2031) to constructing the Western Link Road, as concluded within Chapter seven of this report.

**Table 9.3: Western Link Road Scheme Cost Estimate**

	2026	2031
Phasing Description	Western Link Road constructed between Connecting Junction 3 (A47 Roundabout) and Development Access 2 (Mile Tree Lane).	Extending the Western Link Road to Connecting Junction 1 (Little Ramper) in the north, whilst intersecting Barton Road, Levering Common and Gorefield Road.
Cost	£10, 918,440	£36,235,159

## River Crossing Outline Design

The New River Crossing scheme is directly linked to the provision of a Western link Road. The proposed location of the river crossing is at the 'Southern Crossing point' (discussed in Chapter 4), which will facilitate the connection between the Western Link Road and the A47/ Cromwell Road Roundabout.

The carriageway over the bridge will be single carriageway road with the bridge structure being of a steel tied arch, as indicated in Figure 9.4 on the following page. For more information regarding this outline design, please refer to the Cromwell Road Report 'New River Crossing Scheme Report'.



## 10 Summary

Skanska have been commissioned by Cambridgeshire County Council to undertake an assessment to provide feasible alignments for a link road, which will be positioned to the west of the town centre. This assessment forms the first phase of the Wisbech Access Study.

The purpose of this scheme assessment is to determine the optimum alignment for the Western Link Road, as well as the individual junction forms required to facilitate the growth proposed for the West Wisbech development. For the Western Link Road to be viable it must provide adequate access between the development site and strategic road network, maintain adequate residential access on the wider network, as well as provide a reduction in town centre congestion.

This report has considered the existing conditions within the vicinity of the West Wisbech site boundary, including heritage assets of listed buildings and conservation areas as well as flood risk. Existing town centre traffic flows have also been assessed, identifying the busiest routes through Freedom Bridge Roundabout and Town Bridge, and the routes whereby a reduction in traffic flows would be greatest felt.

The report has also considered the development proposals for the Wisbech West development site, including the proposed location for housing and development access, as well as the anticipated increase in traffic that would use the link road as a result of the local growth.

Sensitivity tests assessing the optimum location of housing provided the conclusion of building the Southern section of the West Wisbech Site first, therefore facilitating the need for a river crossing and access via the A47 / Cromwell Road roundabout.

Chapters four through to seven of this report provide commentary on the options tested for the Western Link Road, focusing on elements of alignment, junction form and phasing in construction required by 2031.

Within chapter four, twelve alignments were initially built into and tested within the WATS model (2015 base). Alignments incorporated all three river crossing locations, as identified within the River Crossing Report, including Set 1 Alignments – Southern River Crossing, Set 2 Alignments – New Bridge Lane Crossing and Set 3 Alignments – Barton Road Crossing. The twelve alignments varied in relation to use of existing infrastructure, length and associated cost, and the potential diversion from the town centre network.

To establish a preferred alignment the twelve alignments were assessed against a criteria considering elements of impact on heritage assets, reduction in town centre traffic, use of existing infrastructure, extent of demolition and land take as well as site constraints and limitations for future proofing. In addition to the above criteria the strengths and weaknesses of each of the river crossing locations were used to sift through the options.

The conclusion of the sifting process was that Set 1 alignments, utilising the Southern River Crossing, were the strongest performing alignments when compared to the remaining alignments sets 1 and 2 / river crossing locations. This conclusion was supported by the conclusions of the River Crossing Report, which recommended the Southern River Crossing, due to minimal site constraints, minimal impact on the wider network (both highway and residential) as well as being located away from the town centre and Conservation Area.

With Set 1 alignments identified as the best performing alignments, 1A, 1B, 1C, 1D, 1E were compared again using the same criteria, with the additional element of length and



cost. The conclusion of this comparison was that Alignment 1D was the preferred alignment, offering the greatest number of benefits in relation to the criteria set.

Alignment 1D is predicted to provide a good town centre diversion, whilst mitigates against the need for demolition, therefore minimises the impact on Leverington Conservation Area and associated heritage assets.

With alignment 1D being the optimum performer, chapter five and six of this report assess the required form of both the carriageway and junctions positioned along the link road.

Using modelling packages of ARCADY and PICADY to extract data of RFC and delay at each junction, the final junction formation consists of:

- Connecting Junction 1; A four arm Roundabout connecting the Western Link Road with the A1101 and Little Ramper;
- Local Junction 1; A four arm roundabout with the Western Link Road intersecting Gorefield Road;
- Connecting Junction 2; A four arm roundabout on Leverington Common, West of the Conservation Area;
- Development Access 1; A three arm roundabout positioned to the north of the West Wisbech Development Site;
- Local Junction 2; A priority junction positioned on Barton Road, with the Western Link Road given priority;
- Development Access 2; A four arm roundabout positioned on Mile Tree Lane, providing development access; and,
- Connecting Junction 3; Enhancement of the existing A47 / Cromwell Road Roundabout, facilitating the Western Link Road between the A47 West and Cromwell Road approaches.

Based on inputted traffic flows and extracted VC Ratios from the WATS model, results highlight a single carriageway road is adequate along the Western Link Road, allowing the traffic to remain free-flowing, whilst having spare capacity for additional growth. Additional land take will be procured for the length of a dual carriageway, enabling the length of the Western link Road to be upgraded in the future if required.

Chapter seven of this report outlines the phasing assessment undertaken to determine the construction stages required for the link road, across the forecast years of 2026 and 2031.

The assessment considered the impact on capacity across the network, under three tests which assumed the construction of either part or the full link road. The three tests are outlined below:

- Test 1 – Assuming only the southern section of the Western Link Road is built between the A47 / Cromwell Road Roundabout and Mile Tree Lane, with development traffic using Development Access Junction 2;
- Test 2 – Assuming the two thirds of the Western Link Road is built, between the A47 / Cromwell Road Roundabout and Leverington Common; and,
- Test 3 – Assuming the full Western Link Road is complete, with vehicles being able to travel between the A47 / Cromwell Road Roundabout to the A1101 / Little Ramper in the north.

In using the process of applying movement bans within the '44444' coding file, the conclusion of this assessment was to build the southern section of the Western Link Road

(and facilitate a river crossing) between the A47 Roundabout and Mile Tree Lane by 2026, then extended the link road to Little Ramper in the north by 2031.

Conclusions for the assessment showed that assuming Test 1 and Test 2 by 2031, forced the Sutton Road / A1101 junction over capacity, with RFC values shown to be greater than 100%. Additionally under Test 2, the potential impact on heritage assets within the Leverington Conservation Area by 2031 was considered to be a significant weakness of the phasing test, which would outweigh any attached benefits of the proposed alignment within the Test.

The assessment highlights that by 2031 a complete alternative north –south route is required to alleviate capacity issues at the existing heavily used Sutton Road / A1101 Junction. With this phasing of the Western Link Road, the link road itself and the wider network are expected to operate within capacity.

Chapter eight of this report discusses sensitivity tests undertaken to determine the impact on the wider network, if a greater number of dwellings were proposed for the West Wisbech Development site. The following tests were completed for this assessment:

- Test 1 – A total of 1500 dwellings, 750 of which located to the south and north of the development site; and,
- Test 2 – A total of 2000 dwellings, 750 of which built to the south of the site, with remaining 1250 homes located to the north of the site.

The conclusion of Test 1 was that with a total 1500 homes proposed for the development site, the Sutton Road / A1101 junction is forced to operate over capacity in both forecast years of 2026 and 2031. Therefore, improvements to enhance capacity is needed if this scale of housing were to be built.

Likewise the Sutton Road / A1101 junction is predicted to operate over capacity in Test 2. However due to increased housing and development traffic improvements at this junction would be required by 2026. Additionally, under Test 2 the Development Access Junction 2 and the A47 West and Western Link Road approaches to the A47 roundabout are shown to be impacted by increased development traffic. Capacity enhancements to the development access junction are shown to be required by 2026 and the A47 roundabout by 2031.

Results from Alignment, Junction Form, and Carriageway Assessments, indicate the preferred option for the Western Link Road is Alignment 1D:

A single carriageway link road which will be phased in two sections, first in 2026 between the A47 and Mile Tree Lane, and second by 2031 to Little Ramper in the north. The Western Link Road will have seven junctions that will facilitate the development of the West Wisbech Development Site as well as intersect the wider local network.

## Appendix A – Heritage Asset Summary

The following tables outline the heritage assets for the parishes of Newton, Leverington and Wisbech. Heritage assets discussed correspond to those positioned within the site boundary for the West Wisbech Development site.

### Newton

Heritage Asset	Grade
Bridge over Drain at Corner of Fendyke Land and High Road	Grade II
Cherrytree House	Grade II
Barn, North West of Park Farmhouse	Grade II
Barn West of Park Farmhouse	Grade II
Park House	Grade II*

### Leverington

Heritage Asset	Grade
Church of St. Leonard	Grade I
Base of Cross, south of porch to St. Leonard Church	Grade II
War memorial in cemetery	Grade II
Leverington Hall	Grade I
Reed Cottage	Grade II
Lance Wood	Grade II
Dovecote, rear of Beachwood	Grade II
Walled garden wall and gate piers, immediately west and south of the Grange	Grade II
The Grange	Grade II
Hall Croft	Grade II
Rabbit Hill Round Barrow	Scheduled Ancient Monument
Cherry Tree Hill Round Barrow	Scheduled Ancient Monument
Roman Bank, ancient sea defence	Scheduled Ancient Monument

### Wisbech

Heritage Asset	Grade
Elgoods Brewery	Grade II
Stable block to north of number 69	Grade II
Sibald Holme	Grade II
4, 6 and 8 Barton Road	Grade II
Numbers 14 to 61 North Brink	Grade II
Barton Lodge	Grade II
Brink House	Grade II
Riverside Tavern	Grade II
Harecroft School	Grade II
Number 7 and 6 North Brink	Grade II*
Red Lion	Grade II
Old Town Hall	Grade II

## Appendix B – 1D Alignment Cost Summary

### Western Link Road, Cromwell Rd, Leverington Road

#### Highways Only

Site Clearance Generally			76650 m2	1.00	76,650.00	
Construction Assumptions:						
Carriageway	s/c	40	15.00	Footpath	25	12.00
	b/c	60	13.00		65	15.00
	rd b	200	40.00			
	sub base	450	37.50		260	25.00
	Capping l:	400	40.00			
		0	3.00			
	terram	1150			350	
		2300			700	
	exc & CA		35.00			30.00
			185.50			82.00

Excavate & construct carriageway areas	40150 m2	185.50	7,447,825.00
Construct Verges	25000 m2	35.00	875,000.00
Excavate & construct footway areas	9125 m2	82.00	748,250.00
Construct roundabout islands, inc approach barriers etc	3 no	120,000.00	360,000.00
Carriageway kerbs	7600 m	33.00	250,800.00
Footway edgings	9650 m	23.00	83,950.00
Alter existing junctions	3 item	35,000.00	105,000.00
Carriageway drainage & alterations	1 allow	340,000.00	340,000.00
Timber post & rail fence	8000 m	22.00	176,000.00
Street lighting & alterations	1 allow	330,000.00	330,000.00
Duct provision	1 allow	100,000.00	100,000.00
Signs & lines	1 allow	101,900.00	101,900.00
Surveys	1 item	75,000.00	75,000.00
Landscaping	1 item	250,000.00	250,000.00
Junction signal alterations/additions/bus priority measures	1 item	45,000.00	45,000.00
Southern Bridge Crossing - Standard Width option	B/Fwd		-
			11,365,375.00

#### Prelims

Land Acquisition	60163 m2	3.75	225,611.25
Demolition	m2		-
Design	10%		1,136,537.50
Staff, supervision, accommodation, temp fences	20%		2,273,075.00
Traffic Management	52 weeks	5,500.00	286,000.00
			15,286,588.75
Add Contingency & Optimism Bias	45%		6,878,369.44
			22,165,568.19

#### Risks/Assumptions

Soil conditions (contamination etc)  
Vandalism

A47 Roundabout works costed separately

