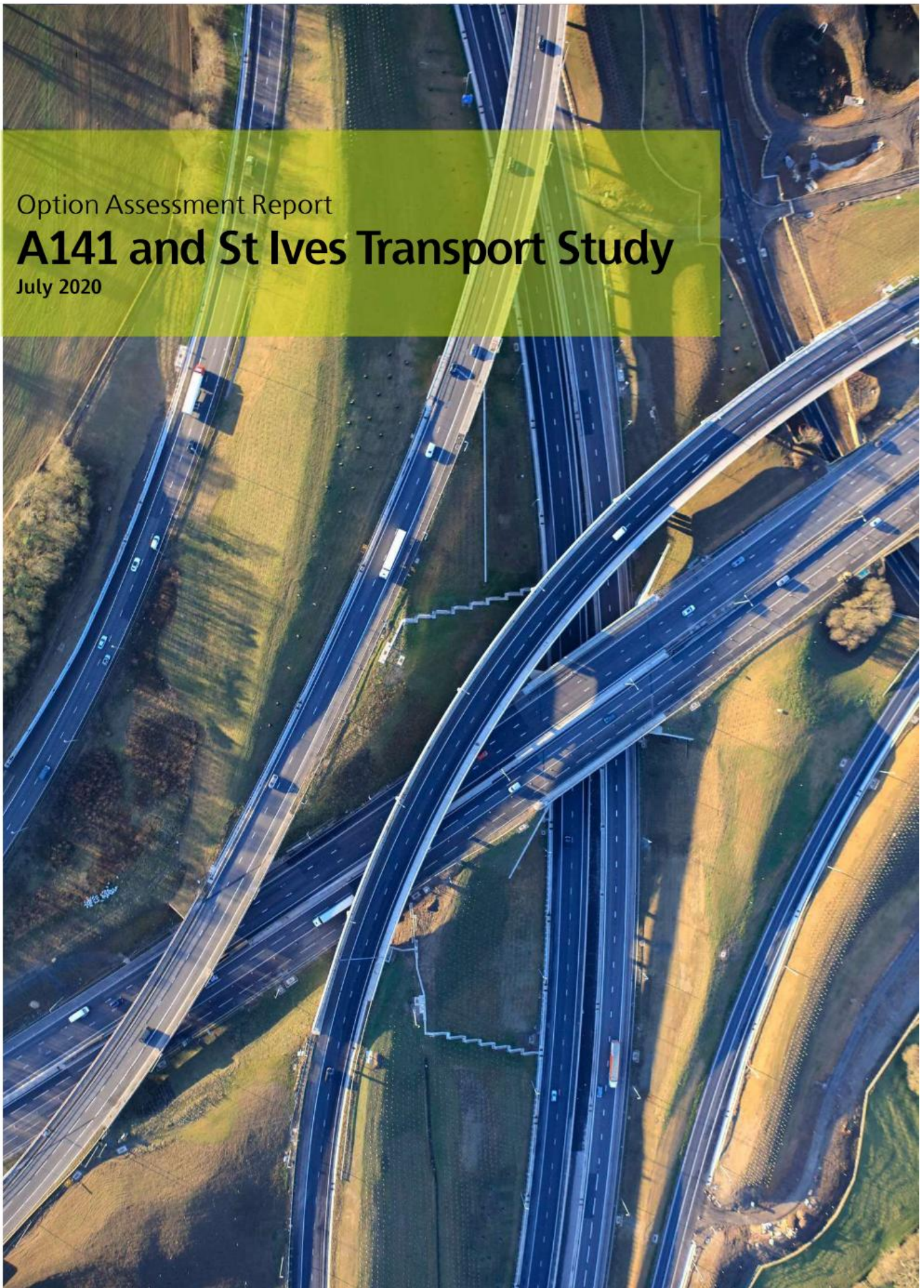


Option Assessment Report

# A141 and St Ives Transport Study

July 2020









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## Glossary

Term	Definition
AADF	Annual Average Daily Flow
ANPR	Automatic Number Plate Recognition
ATC	Automatic Traffic Count
CCC	Cambridgeshire County Council
CPCA	Cambridgeshire and Peterborough Combined Authority
CSRM2	Cambridgeshire Sub Regional Model
DfT	Department for Transport
DM	Do Minimum (Traffic Model)
DS	Do Something (Traffic Model)
HDC	Huntingdonshire District Council
HLP	Huntingdonshire's Local Plan to 2036
IP	Inter Peak
LTP	The Cambridgeshire and Peterborough Local Transport Plan (2020)
MCTC	Manual Classified Turning Count
OAR	Options Assessment Report
PCUs	Passenger Car Units
RFC	Ratio of Flow to Capacity
SIHM	St Ives and Huntingdon Model
SLA	Select Link Analysis
V/C	Volume to Capacity Ratio

# Executive Summary

## Introduction

The A141 and St Ives Transport Studies Options Assessment Report (OAR) documents the work undertaken to develop and assess a range of potential improvement options for the A141 Huntingdon, and St Ives Town Centre.

The OAR is the final report within Stage 1 of the A141 and St Ives Transport Studies, and concludes the technical work undertaken to prepare packages of schemes for this stage of the studies.

Following this OAR, Stage 2 will involve further assessment and design of the best performing options, as identified through the OAR process. Stage 2 of the A141 and St Ives Transport Studies will follow the Department for Transport's (DfT) three-phase decision making approach for major investment decisions, starting with a Strategic Outline Business Case (SOBC).

## Purpose of A141 and St Ives Transport Studies

The purpose of the A141 and the St Ives Transport Studies is to identify transport interventions to:

- Address existing congestion and capacity constraints along the A141, and the St Ives road networks
- Mitigate the traffic impact of additional future growth, beyond the HLP
- Restrict through traffic in St Ives Town Centre
- Improve bus service reliability through St Ives.

The A141 and St Ives Transport Studies areas are shown in Figure 1 below. The A141 portion of the study area includes all A141 junctions and links east of the A141 / A1307 Junction (Spittals Interchange) through to the B1090 Sawtry Way. The St Ives portion of the study area includes the main junctions on the A1123, and A1096 through St Ives, plus the town centre through routes.



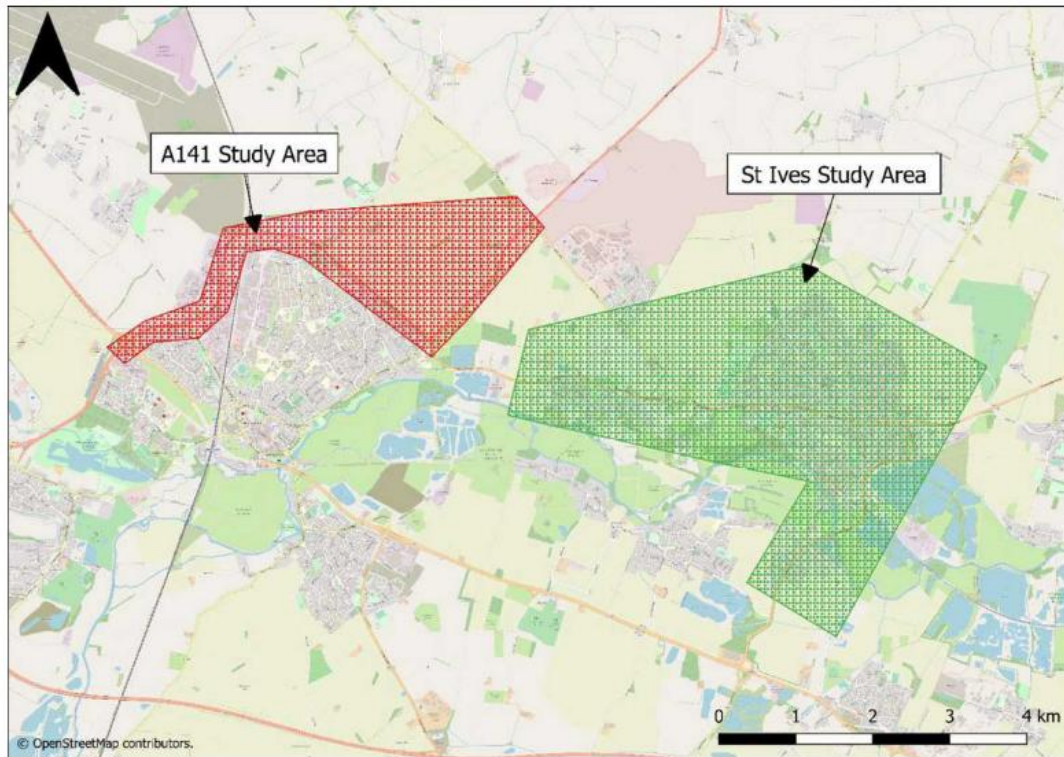


Figure 1: The A141 Huntingdon and St Ives Transport Study Areas

The proximity and interconnectivity of the A141 and the St Ives transport network required the impact of interventions to be considered across both study areas. This approach is reflected by the coordinated project delivery and joint modelling platform used to development and assess highway improvement options for both the A141 and St Ives.

### Existing and Future Conditions

A summary of the existing and future network conditions across the study areas provides an evidence base for why highway improvement schemes for the A141 and St Ives are required.

Existing conditions on the A141 in Huntingdon and St Ives prior to the opening of the Huntingdon Southern Bypass (HSB) in December 2019, and the completion of the A14 scheme in May 2020, reflect pre-COVID-19 travel patterns. The key issues discussed in these sections include traffic growth, congestion and over capacity junctions on the A141 in Huntingdon and congestion, through traffic in St Ives Town Centre, and the detrimental effects of traffic on local bus routes. These issues highlight the present cases for change on the A141 and in St Ives.

Peak period traffic congestion affects the main road network around Huntingdon, with the A141 north of Huntingdon, the A1123 and A1096 in St Ives, experiencing congestion in both the AM and PM peak hours.

Prior to commencement of the SOBC further assessment of the existing conditions in the study area will need to be undertaken to reflect the changing travel demand and traffic conditions as a result of the opening of the HSB, the completion of the A14 scheme in May 2020, and the implications of the Coronavirus pandemic.

### Future Conditions

The increase in travel demand as a result of the planned housing and employment growth within the adopted HLP will place additional pressure on the local road network, particularly around the A141 to the north of Huntingdon.

The CSRM2 strategic transport model was used to forecast traffic conditions in 2036, incorporating housing and employment growth from the HLP, and shows that this is expected to result in:

- A 30% growth in traffic across the Cambridgeshire network
- A 33% increase in vehicles during the AM peak hour on the A141, A1123, A1096 Harrison Way, B1090 Sawtry Way and B1040 Somersham Road
- A 29% increase in vehicles during the PM peak hour on the A141, A1123, A1096, B1090 and Somersham Road, with the biggest increases on B1090 Sawtry Way (southbound) and A1096 Harrison Way (southbound) links
- Five (out of seventeen) (29%) junctions in the study area will be approaching capacity or over capacity in the AM peak hour in 2036.
- Eight (47%) junctions in the study area will be approaching capacity or over capacity in the PM peak hour in 2036
- Journey times during the AM and PM peak hours are forecasted to increase on most sections of the A1096 Harrison Way, Ramsey Road, A1123, B1514 Hartford Road, St Peters Road and A141. Specifically:
  - In the AM peak, journey times will be over 50% higher on the B1514 Hartford Road.
  - In the PM peak, journey times will more than double on the A1096 northbound and the B1514 in both directions, and will be over 50% higher on St Peters Road southbound.

The future forecasts highlight the need for investment in highway infrastructure in order to address existing issues in Huntingdon and St Ives, and to provide further capacity for growth beyond the HLP.

The Huntingdonshire Strategic Transport Study, 2017 (HSTS) identified a package of measures throughout the study area to mitigate the impact of the HLP growth. This study considers mitigation above that already identified within the HSTS to support the HLP growth.

Assessment Process

This OAR forms part of a suite of outputs from the A141 and St Ives Transport Studies, and is the final report within Stage 1 of the studies, as shown in Figure 2 below.

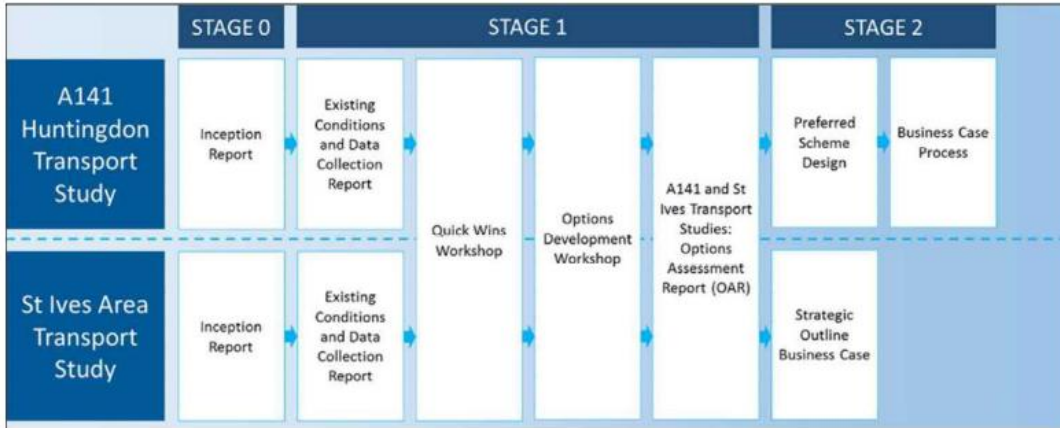


Figure 2: Stages and Key Outputs of the A141 and St Ives Transport Studies

The assessment process used to identify emerging options for the A141, and St Ives Transport Studies, has been delivered in four sequential stages, with each stage informing the next, leading to the identification of a best performing option, or package of options. The four assessment stages are:

- Option Development
- Strategic Assessment
- Operational Assessment
- Assessment of a Third River Crossing (between Huntingdon and St Ives).

Each of these are discussed and summarised in turn below.

Option Development

The Option Development process was informed by data analysis, site visits, and engagement with key stakeholders. Option Development workshops were held and attended by stakeholders from various transport, planning and engineering disciplines, with delegates representing:

- Cambridgeshire County Council
- Huntingdonshire District Council
- Skanska / Capita.

The Cambridgeshire and Peterborough Combined Authority (CPCA) were also invited to the Option Development Workshop, but were unable to attend.



Options for each of the key junctions and links were identified, discussed and developed with delegates sharing knowledge and challenging option development on technical and delivery grounds.

The Option Development process identified a shortlist of five options for the A141, including:

- Option 1: Local Improvements (Two lane junction entry / exits on existing A141)
- Option 2: Signalisation of Existing A141 Junctions
- Option 3: Online Dualling of Existing A141
- Option 4: Offline Single Carriageway Bypass
- Option 5: Offline Dual Carriageway Bypass.

These options were then assessed in the Strategic Assessment, to identify a best performing option.

The process of developing options for the St Ives network ran in conjunction with the assessment and identification of the preferred A141 option. The St Ives options development focussed on identifying measures to ease congestion on the A1123 and the A1096, mitigate the impact of an emerging A141 strategic solution, and reduce through traffic in St Ives Town Centre. The options identified are shown below in Table 1.

Table 1: Options Identified

Options	Description
Mitigate congestion on A1123/A1096	Assess signalisation and two-lane entry / exits at the A1123 / A1096 roundabout.
	Review signal phasing at A1123 junctions with Ramsey Road junction and Hill Rise.
Restricting Through Traffic in St Ives Town Centre	Bus gate on East Street.
	Traffic calming measures on through routes in town centre.
	Restricting through traffic movements in St Ives town centre (except for buses and emergency services)
	Restricting turning movements into Needingworth Road, Pig Lane or Ramsey Road.
Improving Town Centre Accessibility	Change junction priority: Ramsey Road / North Road.
	Change junction priority: Globe Place / West Street / East Street.
	Change junction priority: North Road / Broad Leas / Globe Place.

Three quick wins were identified for St Ives to support the development of schemes to improve town centre access for buses and visitors. These were:

- Town Centre Parking Review – completed in spring 2020
- Bus Service Accessibility Review – completed in spring 2020
- Pedestrian and Cycling Wayfinding Audit – completed in spring 2020.



## Strategic Assessment Summary

The Strategic Assessment has been conducted in four distinct phases, using CSRM2. These phases are:

- Phase 1: To assess the five shortlisted options for the A141 improvements (as discussed in Chapter 3), and to identify the best performing option
- Phase 2: To further consider Option 4 and Option 5, which were identified as the two performing options from Phase 1, to determine which to progress
- Phase 3: To further refine the best performing option, and define its key characteristics
- Phase 4: To consider the ability of the best performing option to support additional growth beyond that identified in the HLP, including a High Growth (HG) and High Growth Plus (HG+) scenario.

### Phase 1: Assessment of Five Shortlisted Options

Phase 1 of the assessment compared the five shortlisted A141 options and identified that Option 4 (offline single carriageway bypass) and Option 5 (offline dual carriageway bypass) offered the greatest level of benefit, and did the most to address congestion and delay along the existing A141. This is because both would provide significant reductions in traffic along the existing A141, improving junction capacity along the route.

### Phase 2: Further Assessment of Option 4 and Option 5

A comparison of Option 4 and Option 5 was then undertaken, and considered performance, construction cost and land requirements. The marginal performance benefits provided by Option 5, were not considered to outweigh the additional costs associated with construction, and the additional land required for the dual carriageway bypass, when compared to a single carriageway bypass. As a result of this, Option 4 was progressed as the best performing option.

### Phase 3: Further Refinement of Option 4

Further refinement of Option 4 identified that the bypass should connect with the Junction A (A141 / A1307, Spittals Interchange) in the west via a roundabout which also provides direct access to Spittals Way. To the east, the assessment determined that the new bypass should connect to the existing A141 via an upgraded roundabout at Junction G (A141 / B1090 Sawtry Way, Wyton Roundabout).

The further refinement of Option 4 concluded that the bypass should have at-grade, rather than grade separated junctions at three intermediate points (Ermine Street, Huntingdon Road and Kings Ripton Road).

Consideration of the impact of the bypass on the wider network identified that mitigation measures would be required at several junctions along the A1123 through St Ives.

#### Phase 4: Additional Growth Assessment

The final phase of the Strategic Assessment considered how the new A141 bypass would perform in the HG, and HG+ scenarios. These growth scenarios consist of:

- **High Growth**, consisting of:
  - 4,500 dwellings at Wyton Airfield (north east of Huntingdon), and
  - 2,200 dwellings at Gifford's Park (to the east of St Ives).
- **High Growth Plus**, consisting of:
  - 4,500 dwellings at Wyton Airfield (north east of Huntingdon)
  - 2,200 dwellings at Gifford's Park (to the east of St Ives), and
  - 4,500 dwellings to the north of Huntingdon.

The assessment concluded that Option 4 could support the additional growth identified in the HG scenario with mitigation measures provided at Junction M (A1123 / B1040 / A1096) and Junction V (B1514 Main Street / Desborough Road).

Assessment of the HG+ scenario indicated that multiple junctions within the model network would be at, or over capacity with the additional growth at Land North of Huntingdon, and that Option 4 would struggle to support this level of growth. Further testing has been undertaken to confirm this, and consider the mitigation needed in detail and to confirm the level of development that could be accommodated by the best performing option.

#### Operational Assessment Summary

The Operational Assessment used the Paramics Discovery based St Ives and Huntingdon Model (SIHM) to undertake a series of sequential tests to determine the effectiveness of interventions to reduce through trips in St Ives Town Centre, and how effectively Option 4, in conjunction with local junction improvement measures, could support the additional growth contained within the HG and HG+ scenarios.

The Operational Assessment was undertaken in the following four phases:

- Phase 1: Consider interventions to improve traffic conditions in St Ives, and reduce through trips from the town centre
- Phase 2: Consider the ability of Option 4, in conjunction with local junction improvements, to support additional growth at Wyton Airfield
- Phase 3: Consider the ability of Option 4, in conjunction with local junction improvements, to support additional growth at Gifford's Park (building upon the previous phase)
- Phase 4: Consider the ability of Option 4, in conjunction with local junction improvements, to support additional growth North of Huntingdon (building upon the previous phase).

**Note:** that all of these assessments assumed that the mitigations identified in the HSTS (to support the HLP growth) were already in place.

#### Phase 1: St Ives Town Centre

The first phase of assessment considered the potential for different interventions to improve traffic conditions in St Ives Town Centre, and reduce through trips. Interventions assessed included a series of speed reduction zones and bus gate features, as well as priority changes and movement restrictions.

The assessment has shown that the introduction of a 20 mph zone was the best performing option as it reduced a moderate number of through trips, without significantly compromising the surrounding road network, and had a positive impact on bus journey times.

Supplementing the 20 mph zone with the signalisation of the western roundabout at Junction M (A1123 / B1040) mitigates the impact of displaced traffic on the surrounding road network, and even offers an improvement at this junction over the base scenario. A right turn ban out of Needingworth Road onto the A1123 should also be incorporated into this package to remove delay from Needingworth Road and further reduce the proportion of through trips using this route.

Signalisation of the junction offers a benefit during both peak hours, and input from a traffic signal specialist would further optimise the performance of the junction.

Both the introduction of two bus gates and a 10 mph zone resulted in the greatest reduction in through trips (as the through route is severed by the bus gates), however the diverted trips cause significant congestion and many of the surrounding junctions are expected to go over capacity, with a large increase in bus journey times in both peak hours to an extent that cannot be mitigated by localised improvements.

The one bus gate intervention had a limited impact on the surrounding network, which was partially offset by traffic signal amendments at Junction L (A1123 Houghton Road / Ramsey Road) and offered a marginal eastbound bus journey time benefit in the AM peak hour, however it was counterproductive and encouraged an increase in through trips in the town centre.



Based on the assessment described above, the following package of measures is considered to offer the most benefit to St Ives Town Centre.

- Reduce town centre speeds to 20 mph, most likely through physical measures such as traffic calming
- Signalisation of the western half of Junction M (A1123 / B1040)
- Ban the right turn movement from Needingworth Road onto the A1123
- Priority Changes at:
  - Ramsey Road / North Road
  - North Road / Globe Place / Broad Leas
  - Globe Place / East Street.

Phase 2: Additional Growth at Wyton Airfield

Phase 2 of the Operational Assessment considered the impact of the additional growth at Wyton Airfield within the context of the new bypass. This assessment demonstrated that it is possible to mitigate the impact of the Wyton Airfield growth on junction performance within the study area to nil detriment, or close to nil detriment, with a series of local junction improvements at the following locations.

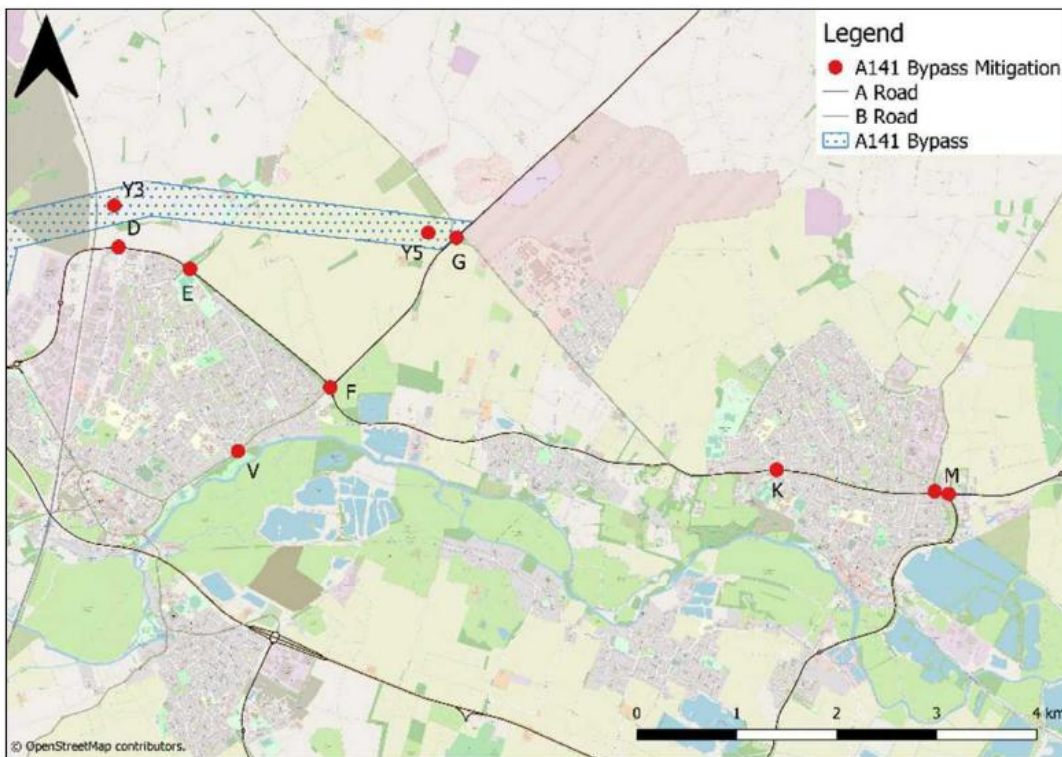


Figure 3: Local Junction Improvements to Support Additional Growth at Wyton Airfield



### Phase 3: Additional growth at Gifford's Park

Phase 3 considered whether additional growth at Gifford's Park could be supported by Option 4.

The analysis shows that, due to the scale of the impact of Gifford's Park on junctions throughout St Ives, and specifically at Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way), it is not considered possible to deliver the additional growth at Giffords Park with localised junction improvements alone. This would instead require a more strategic intervention.

A sensitivity test was undertaken, which applied 10% of the Gifford's Park demand. This test confirmed that the obstacle to delivering this growth was network constraints, and not the scale of growth at Gifford's Park.

The volume of additional traffic attempting to pass through Junction M significantly increases delay at this junction, and a more significant strategic scheme is required to unlock the growth in St Ives, and to provide alternative access routes onto the surrounding road network for development traffic.

### Phase 4 Summary

Phase 4 has assessed the level of additional growth that can be supported at Land North of Huntingdon through a series of incremental tests.

The results show that junction performance begins to deteriorate most notably between scenarios with 40% and 60% growth during the AM peak hour. This suggests that the network could support somewhere in the region of 2,250 additional dwellings to the north of Huntingdon in addition to 4500 dwellings at Wyton Airfield, without the need for further significant improvements. Conditions were generally better in the PM peak hour, however the scale of growth is limited by network capacity in the AM peak hour.

### Scale of Growth Supported by Option 4

The Operational Assessment has identified that Option 4 (offline single carriageway bypass), in conjunction with local junction improvements throughout the study area, could potentially support a total of 6,750 dwellings beyond those identified in the HLP. In this assessment, this consisted of 4,500 dwellings at Wyton Airfield, and approximately 2,250 dwellings additional dwellings to the North of Huntingdon.

Any growth at Gifford's Park would require a new strategic intervention looking at options for St Ives, which should be considered further as part of a Strategic Outline Business Case for St Ives.

## Third River Crossing Summary

In January 2020, the CPCA approved an increased scope for the A141 Huntingdon Transport Study to include the assessment of a Third River Crossing over the River Great Ouse between Huntingdon and St Ives.

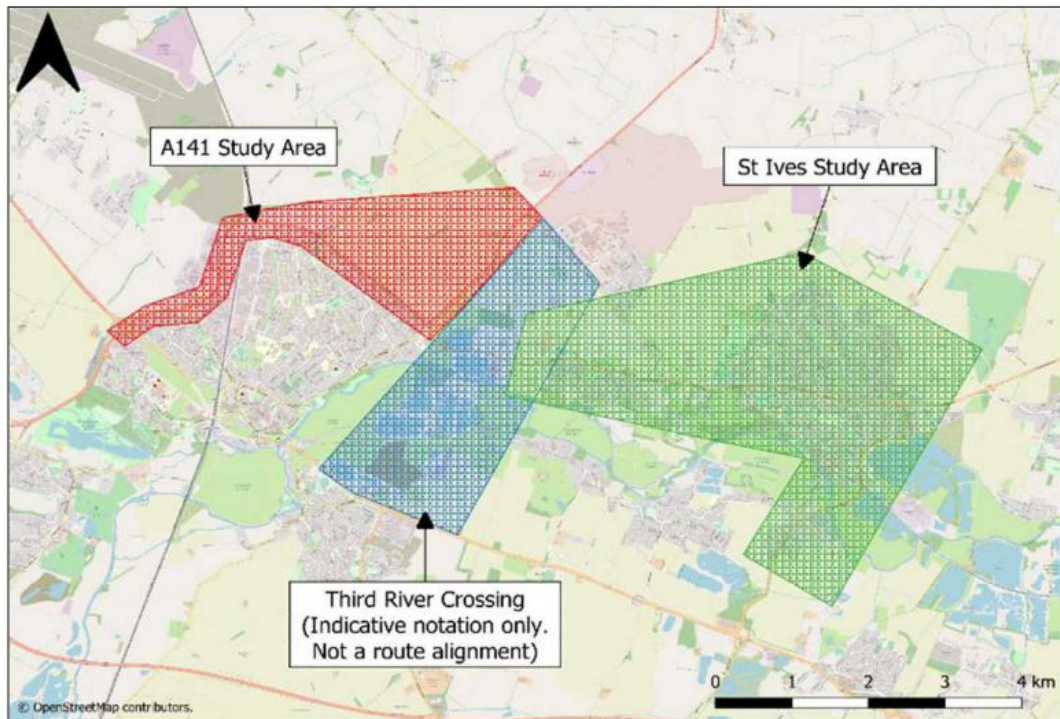


Figure 2: Third River Crossing Study Area Relative to the A141 Huntingdon and St Ives Transport Study Areas

This OAR sets out the transport modelling and environmental assessment that has been undertaken to compare the performance of a Third River Crossing between Huntingdon and St Ives, against the best performing A141 option, in its ability to deliver additional growth.

The comparison of a Third River Crossing with the A141 bypass has been undertaken using Strategic Modelling, and has shown that the A141 bypass offers greater benefit in delivering additional growth beyond that identified within the HLP. The most significant benefit of the A141 bypass over a Third River Crossing is that it addresses the capacity issues along the existing A141 route, which the Third River Crossing does not.

The provision of a Third River Crossing would not facilitate the additional development North of Huntingdon (HG+ scenario), as additional capacity along the A141 would be required which the Third River Crossing would not create. A test to see if providing additional capacity on junctions along the A141 between Junction A (A141 / A1307, Spittals Interchange) and Junction F (A141 / A1123 / B1514, BP Roundabout), showed that it had little impact on junction capacity along the route.



An assessment of the benefit of delivering both a Third River Crossing and an A141 bypass shows that this offers marginal benefit over delivering the A141 bypass on its own, and network wide junction capacity issues still remain in the HG+ scenario.

The Third River Crossing assessment has identified that the A141 bypass is the better performing option in transport terms for enabling additional growth (beyond HLP) and has the least environmental impact. The A141 option (Option 4) should be progressed instead of a Third River Crossing between Huntingdon and St Ives.

### Conclusion and Next Steps

This OAR has identified that the best performing A141 option is Option 4, an offline single carriageway bypass, with at-grade junctions, between Junction A (A141 / A1307, Spittals Interchange), and Junction G (A141 / B1090, Wyton Roundabout).

The assessment has identified that this option, in conjunction with a series of local junction improvements within the study area, has the potential to support an additional 6,750 dwellings beyond those already identified within the HLP. This includes 4,500 dwellings at Wyton Airfield, and 2,250 additional dwellings North of Huntingdon.

This option was compared to a Third River Crossing between Huntingdon and St Ives, to determine which had the most potential to support additional growth beyond that identified in the HLP. The assessment considered transport performance, affordability and existing environmental factors, and confirmed that Option 4 was the better performing of the two options, and should be progressed over a Third River Crossing between Huntingdon and St Ives.

The study has also identified a package of improvement measures for St Ives Town Centre, including the introduction of a 20mph zone, a right turn ban from Needingworth Road onto the A1123, and signalisation of the A1123 / B1040 Junction. This will reduce through trips in the town centre, improve bus journey times and mitigate the impact of displaced traffic from the town centre, on junctions along the A1123.

The assessment identified that it was not possible to support additional growth at Gifford's Park with localised improvements alone, due to network capacity issues, especially at Junction M (A1123 / B1040 / A1096 Junction) and along the A1096 Harrison Way. Consequently further investigation needs to be undertaken to identify a strategic intervention to bring significant improvement to St Ives and enable the delivery of additional growth in St Ives.

The next stage for both the A141 and St Ives Transport Studies, is to produce a Strategic Outline Business Case to further define the design and feasibility of Option 4 for the A141, and a strategic intervention for St Ives.