

Figure 5.19: Signal Staging for Junction M Western Junction

- 5.4.64. Whilst monitoring the performance of the signalisation at Junction M, it became apparent that significant delay was building on the Needingworth Road northbound approach to the A1123. This delay resulted from right turning traffic, unable to turn onto the A1123 due to queuing traffic, blocking the remainder of trips on Needingworth Road.
- 5.4.65. Upon further investigation it became apparent that many of these right turning trips were through trips that were using Needingworth Road to avoid the congested route along the A1096 Harrison Way and through Junction M from the south. To address this issue, the right turn out of Needingworth Road onto the A1123 was banned and incorporated into the signalisation of Junction M.
- 5.4.66. Results from the test comparing the without and with mitigation scenarios for the AM peak hour are provided in Table 5.18 below.

Table 5.18: AM Peak Hour: Junction M Mitigation Test

AM Peak Hour	DS (HLP / with Bypass)		20 mph Zone (Without Mitigation)		20 mph Zone (With Mitigation)		Difference
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	
K - A1123 Houghton Road / Hill Rise	49	D	37	D	39	D	2
L - A1123 Houghton Road / Ramsey Road	28	C	32	C	28	C	-4
M - A1123 / B1040 Somersham Road / A1096 Harrison Way	94	F	102	F	66	E	-36
R - A1096 Harrison Way / The Quadrant / Meadow Lane	37	E	42	E	49	E	7
S - A1096 Harrison Way / Guided Busway crossing	5	A	6	A	6	A	1

- 5.4.67. The results show that the introduction of traffic signals at the A1123 / B1040 (western) junction not only mitigates the impact of the 20 mph zone in the town centre, but provides an improvement during the AM peak hour, reducing average delay per vehicle by 28 seconds and improving the LOS from F to E. The impact at the other junctions being monitored was negligible.
- 5.4.68. Table 5.19 show the results for the PM peak hour.

Table 5.19: PM Peak Hour: Junction M Mitigation Test

PM Peak Hour	DS (HLP / with Bypass)		20 mph Zone (Without Mitigation)		20 mph Zone (With Mitigation)		Difference
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	
K - A1123 Houghton Road / Hill Rise	23	C	21	C	29	C	9
L - A1123 Houghton Road / Ramsey Road	18	B	23	C	25	C	2
M - A1123 / B1040 Somersham Road / A1096 Harrison Way	65	F	70	F	74	E	4
R - A1096 Harrison Way / The Quadrant / Meadow Lane	11	B	14	B	14	B	0
S - A1096 Harrison Way / Guided Busway crossing	3	A	2	A	2	A	0

5.4.69. The results for the PM peak hour show that signalisation of the A1123 / B1040 junction leads to a 4 second increase in delay at Junction M, but that the LOS improves from F to E. This is because the LOS thresholds are different for signalised and non-signalised junctions. A signalised junction naturally experiences higher levels of delay due to the signal control, however this delay is regulated providing more capacity at the junction.

5.4.70. This delay is experienced on the A1096 northbound approach to the junction and an initial review of the signalisation of this junction by a traffic signal engineer suggests that there is scope to further improve the performance during both peak hours. Signalisation also provides a benefit to the eastbound approach, which experiences LOS F (at, or over capacity) without any mitigation, and improves to LOS E (approaching capacity) under signalisation.

5.4.71. Figure 5.20 and 5.21 below show the impact that mitigation has on bus journey times.

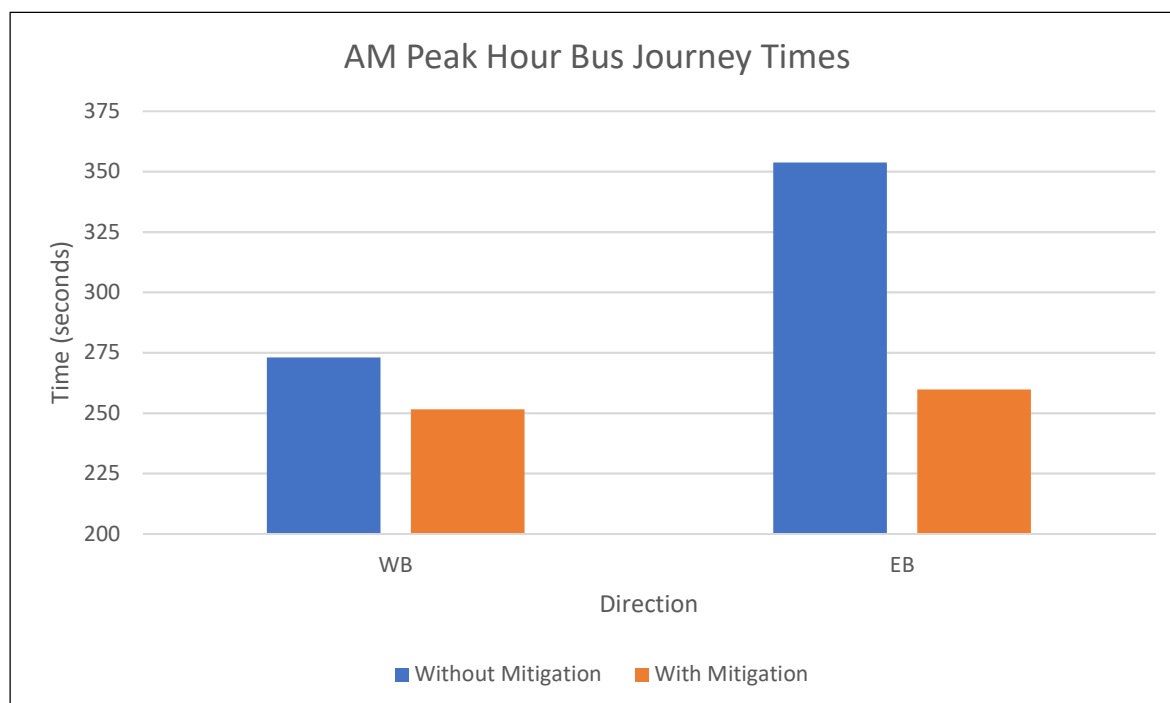


Figure 5.20: AM Peak Hour Bus Journey Times, 20 mph Zone with Mitigation Measures

5.4.72. Figure 5.20 shows the signalisation at Junction M improves bus journey times in both directions during the AM peak hour. There is a small improvements in the westbound direction of approximately 24 seconds and a more significant journey time improvement of approximately 90 seconds in the eastbound direction.

5.4.73. Figure 5.21 below shows the results for the PM peak hour.

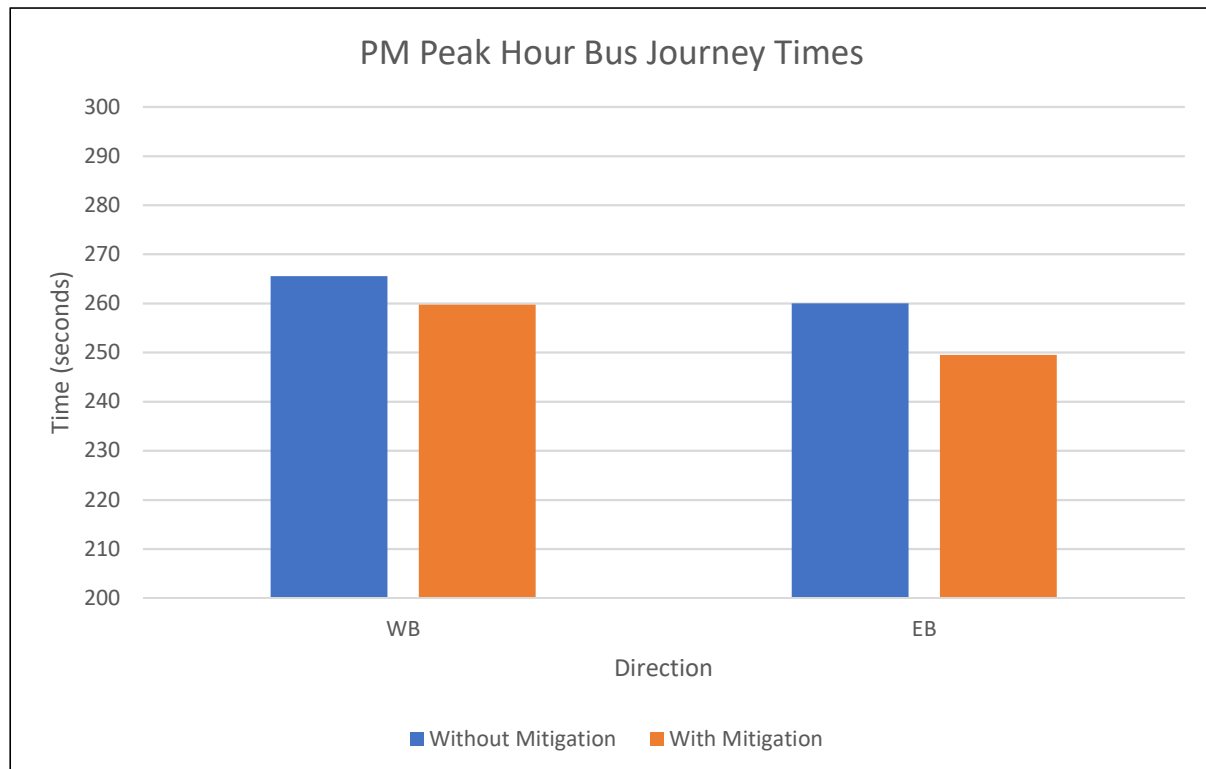


Figure 5.21: PM Peak Hour Bus Journey Times, 20 mph Zone with Mitigation Measures

5.4.74. The results show that the mitigation again offers a benefit in bus journey time in both directions during the PM peak hour. There is a slight improvement of approximately 5 seconds in the westbound direction, and 11 seconds in the eastbound direction.

#### Town Centre Priority Changes

5.4.75. The Option Development process identified priority changes to several junctions within St Ives Town Centre to improve local accessibility and bus passage through the town centre. These included priority changes at the following junctions:

- East Street / West Street / Globe Place
- Globe Place / North Road / Broad Leas
- North Road / Ramsey Road (South) / Ramsey Rd (North)

5.4.76. These changes have been included within the Town Centre Package identified above (20 mph zone, Needingworth Road northbound right turn ban and signalisation of the A1123 / B1040 Somersham Road Junction), and results are presented beneath for junction performance and bus journey times.

- 5.4.77. Results comparing junction performance in the AM and PM peak hours are provided in Table 5.20 and Table 5.21 below.

Table 5.20: AM Peak Hour: 20 mph Zone with Mitigation Measures + Priority Changes

AM Peak Hour	DS (HLP / with Bypass)		20 mph Zone & Mitigations (No Priority Change)		20 mph Zone & Mitigations (With Priority Change)		Difference
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
K - A1123 Houghton Road / Hill Rise	49	D	39	D	46	D	7
L - A1123 Houghton Road / Ramsey Road	28	C	28	C	27	C	-2
M - A1123 / B1040 Somersham Road / A1096 Harrison Way	94	F	66	E	67	E	1
R - A1096 Harrison Way / The Quadrant / Meadow Lane	37	E	49	E	50	E	1
S - A1096 Harrison Way / Guided Busway crossing	5	A	6	A	5	A	-1

- 5.4.78. The priority changes result in little change in junction performance along the A1123 or A1096 in the AM peak hour, and the LOS remains consistent to the scenario without priority changes.

Table 5.21: PM Peak Hour: 20 mph Zone with Mitigation Measures + Priority Changes

PM Peak Hour	DS (HLP / with Bypass)		20 mph Zone & Mitigations (No Priority Change)		20 mph Zone & Mitigations (With Priority Change)		Difference
	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
K - A1123 Houghton Road / Hill Rise	23	C	29	C	33	C	4
L - A1123 Houghton Road / Ramsey Road	18	B	25	C	25	C	0
M - A1123 / B1040 Somersham Road / A1096 Harrison Way	65	F	74	E	69	E	-5
R - A1096 Harrison Way / The Quadrant / Meadow Lane	11	B	14	B	14	B	0
S - A1096 Harrison Way / Guided Busway crossing	3	A	2	A	3	A	1

- 5.4.79. The priority changes have a negligible impact during the PM peak hour, with no change in delay when the all five junctions are considered cumulatively.



5.4.80. Figure 5.22 and 5.23 below show the impact that the priority changes have on bus journey times.

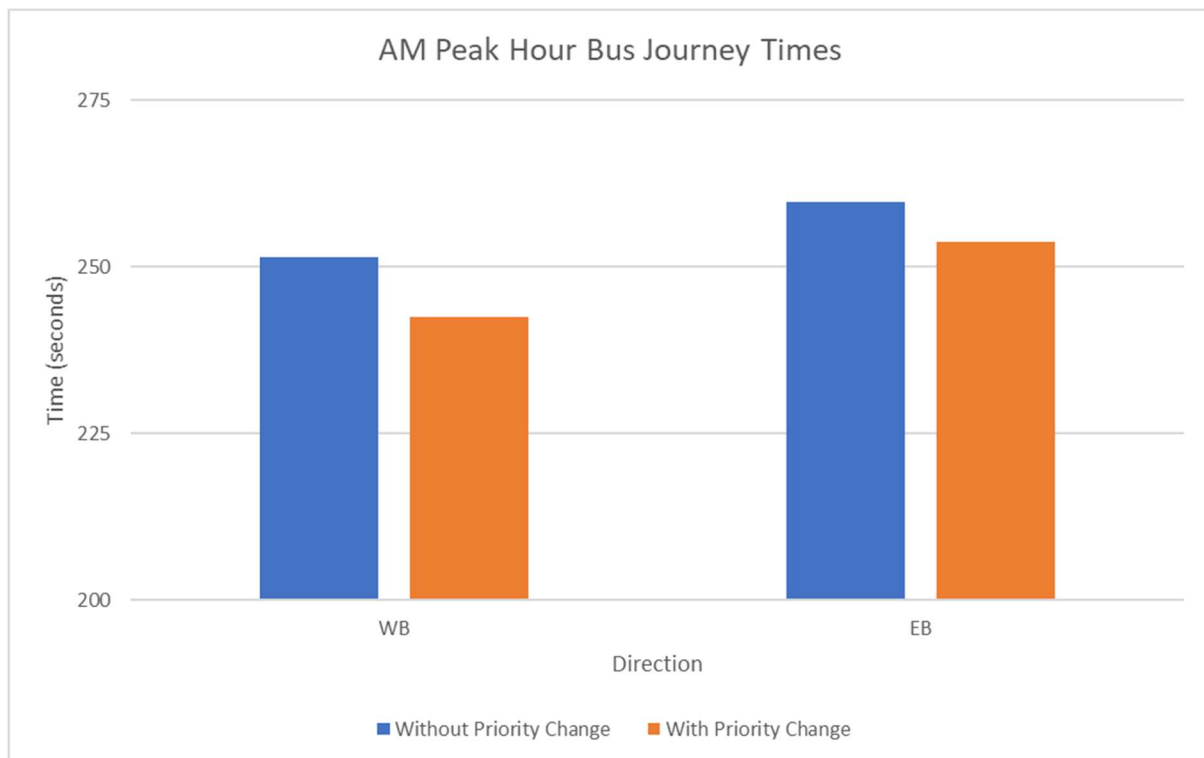


Figure 5.22: AM Peak Hour Bus Journey Times, 20 mph Zone with Mitigation Measures + Priority Changes

5.4.81. The results show that the junction priority changes results in bus journey time benefits in both directions during the AM peak hour. There is an improvement of 9 seconds westbound, and 6 seconds eastbound, as buses are no longer required to pause to give way.

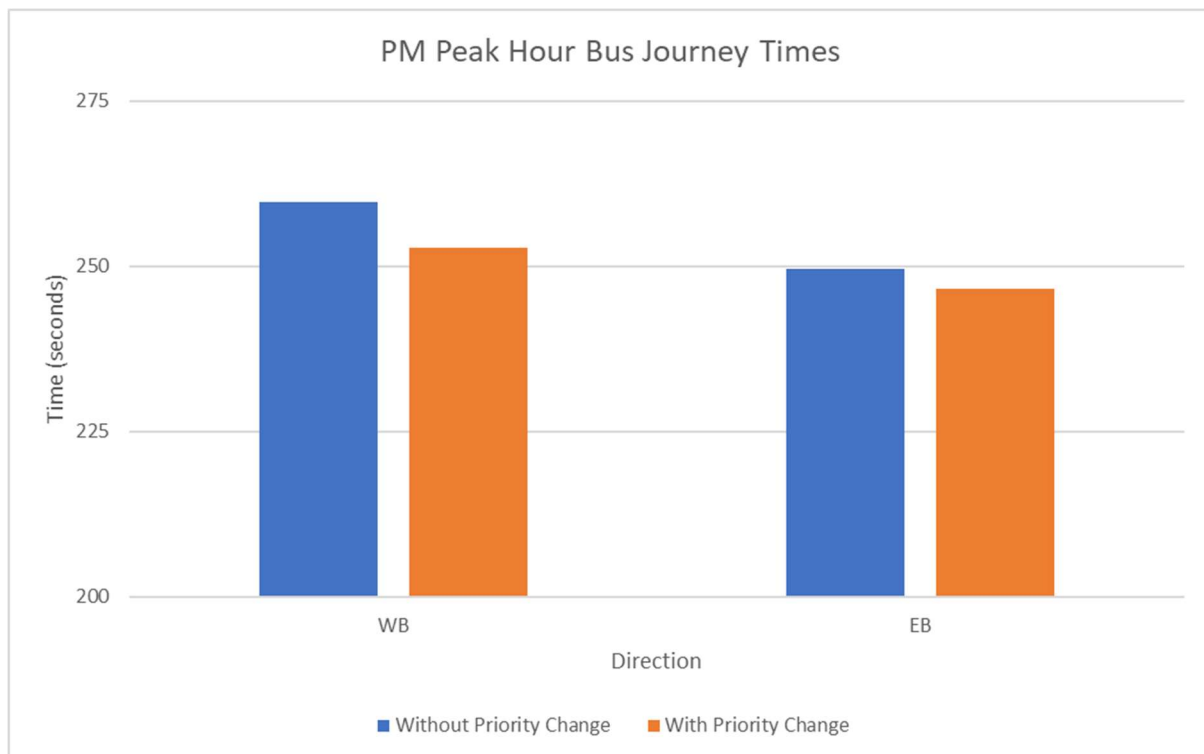


Figure 5.23: PM Peak Hour Bus Journey Times, 20 mph Zone with Mitigation Measures + Priority Changes

- 5.4.82. The PM peak hour results again show bus journey time benefits in both directions, but as with the AM peak hour, these remain modest. There is an improvement of 7 seconds westbound, and 3 seconds eastbound.
- 5.4.83. Analysis of the town centre priority changes have a positive impact on bus journey times without a detrimental impact on junction capacity along adjacent routes. As a result of the bus journey time benefits, the priority changes have been included within the town centre package of measures.

#### St Ives Town Centre Package of Measures

- 5.4.84. 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 (area shown in Figure 5.13), 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 1 Summary

- 5.4.85. The assessment of interventions in St Ives Town Centre 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.
- 5.4.86. Supplementing the 20 mph zone with the signalisation of western roundabout of 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.
- 5.4.87. The performance of Junction M is improved in both peak hours with signalisation, and it is considered that specialist traffic signal input could further optimise the performance of the junction.
- 5.4.88. Both the introduction of two bus gates and a 10 mph zone resulted in the greatest reduction in through trips (completely removing them with two 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.
- 5.4.89. The one bus gate intervention had a limited impact on the surrounding network, which was partially offset by traffic signal amendments at Junction L 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.
- 5.4.90. Testing to consider the impact of priority changes at three locations within the town centre identified that these would result in small bus journey time increases, without having a detrimental impact on junction performance, and these measures have been include within a St Ives Town Centre package of measures.
- 5.4.91. On the basis of the assessment described within this section, the introduction of a 20 mph zone in St Ives Town Centre and associated improvements at Junction M, Needingworth Road, and priority changes within the town centre, have been included in subsequent modelling to consider the impact of additional growth within the study area. In reality this may represent an actual 20 mph zone, or physical measures such as traffic calming and carriageway narrowing that are designed to bring vehicle speeds down to the desired level.

## 5.5. Phase 2: Assess the Impact of Additional Growth at Wyton Airfield

### Purpose

- 5.5.1. The second phase in the Operational Assessment has considered the potential to mitigate the impact of the additional growth at Wyton Airfield with the new A141 bypass implemented.
- 5.5.2. Vehicle delay (taken from the approach with the highest value) has been used to measure the impact of the additional growth on junction performance within the study area.

### Phase 2 Results

- 5.5.3. The results are shown for the AM peak hour and PM peak hour respectively in Table 5.22 and Table 5.23 below, and compare the DS scenario (with the bypass and HLP growth) against the '+ Wyton scenario' which includes the bypass, HLP growth and the additional growth at Wyton Airfield.
- 5.5.4. The tables below include comments on a junction by junction basis identifying where additional mitigation measures have been included beyond those identified in the DM model (HLP mitigation measures). The additional mitigations are explained in further detail below, and are considered as reasonable and realistic measures that can be taken to mitigate the impact of the additional growth at Wyton Airfield.

Table 5.22: Phase 2: 2036 AM Peak Hour Junction Performance (+ Wyton)

Junction	AM Peak Hour						
	(HLP / with Bypass)			(HLP / with Bypass) + 100% Wyton			+ Wyton Comments
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	
A – A1307 / A141 (Spittals Interchange)	30	C	545	27	C	563	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	7	A	243	7	A	260	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
C – A141 Spittals Way / Latham Road / Washingley Road	2	A	44	1	A	45	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	3	A	1047	3	A	1103	Mitigation Applied: Impact reduced to nil detriment.
E – A141 Spittals Way / Kings Ripton Road	1	A	47	34	C	216	Mitigation Applied: Increase in delay reduced to +33 seconds. LOS C operating within capacity.
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	6	A	553	6	A	678	Mitigation Applied: Impact reduced to nil detriment.
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	30	D	1093	41	D	660	Mitigation Applied: LOS remains at D, increase of 11 seconds.
J – A1123 Houghton Road / B1090 Sawtry Way	3	A	308	3	A	313	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
K – A1123 Houghton Road / Hill Rise	46	D	322	27	C	400	Mitigation Applied: Delay reduced by 19 seconds and LOS improved from D to C.
L – A1123 Houghton Road / Ramsey Road	33	C	413	30	C	437	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	109	F	655	129	F	615	Mitigation Applied: LOS remains at F, delay increased by 20 seconds.
N – B1514 Hartford Road / B1514 Nursery Road	18	B	962	26	C	907	Impact considered acceptable. LOS change from B to C represents increase in delay of 8 seconds, and junction still operating within capacity.
O – B1514 Castle Moat Road / B1044	24	C	1158	36	D	1182	Impact considered acceptable. LOS change from C to D represents increase in delay of 12 seconds, and junction still operating within capacity.
R – A1096 Harrison Way / Meadow Lane	44	E	880	44	E	770	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
S – A1096 Harrison Way / Guided Busway	5	A	1330	6	A	1343	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
T – A1096 Harrison Way / Low Road	32	D	208	36	E	219	LOS change from D to E represents increase in delay of 4 seconds. There are limitations to the model at this locaiton which prevent re-routnig and the subsequent reduction in delay.
U – A1096 London Road / A1307 (Galley Hill)	3	A	238	4	A	12	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
V – B1514 Main Street / Desborough Road	14	B	962	32	C	1060	Mitigation Applied: Delay reduced to +18 seconds and junction remains within capacity.
X – B1040 Somersham Road / Marley Road	16	C	350	15	C	369	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Y2 - Bypass / Ermine Street	0	A	592	2	A	677	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Y3 - Bypass / Huntingdon Road	9	A	887	15	C	1058	Mitigation Applied: LOS change from A to C represents increase in delay of 6 seconds.
Y4 - Bypass / Kings Ripton Road	0	A	797	1	A	804	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z1 - Wyton Airfield Dev Access South	0	A	592	2	A	677	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z2 - Wyton Airfield Dev Access North	2	A	1026	6	A	1024	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z3 - Giffords Dev Access	2	A	688	0	A	669	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z4 - Area to N of Huntingdon East Access	0	A	592	2	A	677	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z5 - Area to N of Huntingdon South Access	0	A	46	0	A	111	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.

Table 5.23: Phase 2: 2036 PM Peak Hour Junction Performance (+ Wyton)

Junction	PM Peak Hour						
	(HLP / with Bypass)			(HLP / with Bypass) + 100% Wyton			+ Wyton Comments
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	
A – A1307 / A141 (Spittals Interchange)	18	B	373	18	B	409	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	4	A	339	4	A	334	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	156	1	A	179	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	4	A	958	29	D	92	<b>Mitigation Applied:</b> LOS change from A to D represents increase in delay of 25 seconds.
E – A141 Spittals Way / Kings Ripton Road	0	A	108	33	C	207	<b>Mitigation Applied:</b> LOS change from A to C represents increase in delay of 33 seconds. Further signal optimisation may reduce this.
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	5	A	203	9	A	228	<b>Mitigation Applied:</b> Impact reduced to nil detriment.
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	38	E	1228	15	B	1457	<b>Mitigation Applied:</b> LOS improves from E to B.
J – A1123 Houghton Road / B1090 Sawtry Way	7	A	617	9	A	603	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
K – A1123 Houghton Road / Hill Rise	21	C	305	25	C	1063	<b>Mitigation Applied:</b> LOS change from A to C represents increase in delay of 33 seconds. Further signal optimisation may reduce this.
L – A1123 Houghton Road / Ramsey Road	17	B	159	17	B	144	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	154	F	441	68	F	655	<b>Mitigation Applied:</b> LOS change from A to C represents increase in delay of 33 seconds. Further signal optimisation may reduce this.
N – B1514 Hartford Road / B1514 Nursery Road	10	A	791	12	B	838	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment. LOS change from A to B represents increase in delay of 2 seconds.
O – B1514 Castle Moat Road / B1044	7	A	605	6	A	586	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
R – A1096 Harrison Way / Meadow Lane	14	B	1071	13	B	1072	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
S – A1096 Harrison Way / Guided Busway	2	A	1069	2	A	1069	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
T – A1096 Harrison Way / Low Road	113	F	457	143	F	429	LOS remains at F. Results show increase in delay of 30 sseconds, however there are limitations to the model at this locaiton which prevent re-routnig and the subsequent reduction in delay.
U – A1096 London Road / A1307 (Galley Hill)	5	A	17	4	A	310	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
V – B1514 Main Street / Desborough Road	22	C	233	10	A	851	<b>Mitigation Applied:</b> LOS change from A to C represents increase in delay of 33 seconds. Further signal optimisation may reduce this.
X – B1040 Somersham Road / Marley Road	6	A	605	7	A	615	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Y2 - Bypass / Ermine Street	0	A	415	2	A	577	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Y3 - Bypass / Huntingdon Road	13	B	1294	21	C	1337	<b>Mitigation Applied:</b> LOS change from A to C represents increase in delay of 33 seconds. Further signal optimisation may reduce this.
Y4 - Bypass / Kings Ripton Road	1	A	1124	2	A	1331	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z1 - Wyton Airfield Dev Access South	0	A	415	2	A	577	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z2 - Wyton Airfield Dev Access North	2	A	1185	3	A	549	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z3 - Giffords Dev Access	0	A	688	0	A	505	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z4 - Area to N of Huntingdon East Access	0	A	415	2	A	577	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.
Z5 - Area to N of Huntingdon South Access	0	A	53	0	A	55	Growth at Wyton Airfield considered to cause nil detriment / close to nil detriment.

## Mitigation Measures

- 5.5.5. The location of the mitigation measures that have been applied to reduce the impact of the growth at Wyton, to be at or close to nil detriment, is shown in Figure 5.24 below. The mitigation measures tested include localised junction improvements that are in addition to the HLP mitigation measures included within the DM model.

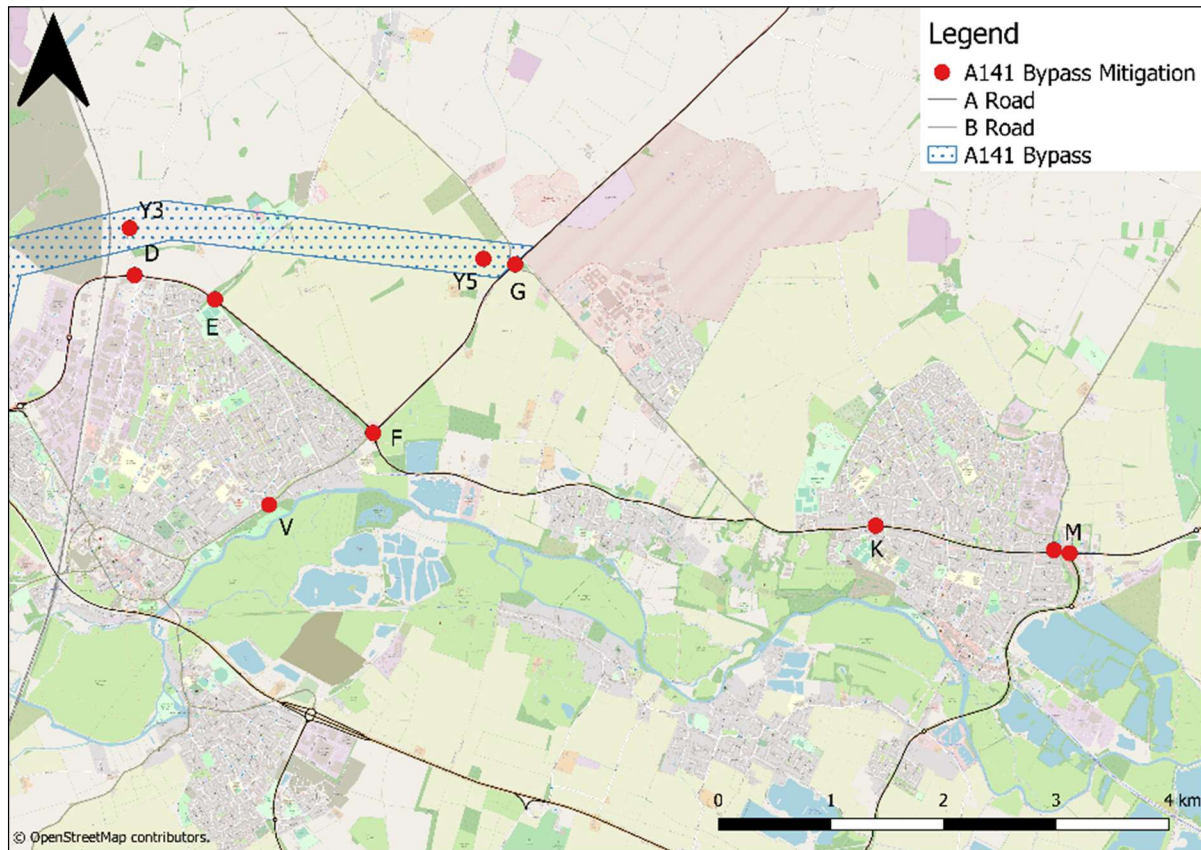


Figure 5.24: Location of Wyton Mitigation Measures

- 5.5.6. The mitigations that have been applied are described beneath.

#### Junction D (A141 / Huntingdon Road / Abbotts Ripton Road) & Y3 (A141 Bypass / Huntingdon Road)

- 5.5.7. Two lanes southbound were provided between Junction Y3 (A141 Bypass / Huntingdon Road) and Junction D (A141 Spittals Way / Huntingdon Road), and shown in Figure 5.25 below. Note that the existing A141 is not dualled, but has two lane approaches and exits to Junction D.

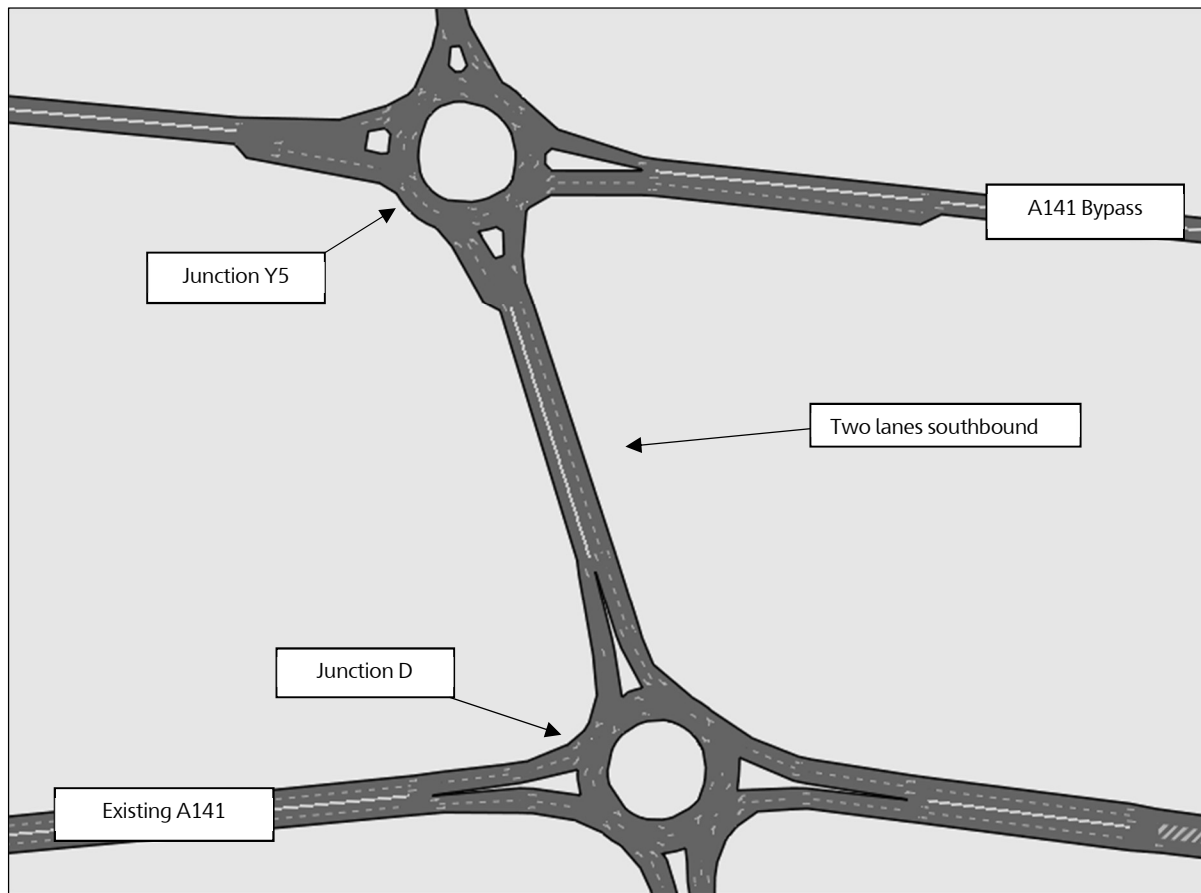


Figure 5.25: A141 / Huntingdon Road / Abbotts Ripton Road Gating

- 5.5.8. In addition to this, the eastbound lane allocation was amended so that ahead traffic used the nearside lane, rather than the offside lane.

#### Junction E (A141 / Kings Ripton Road)

- 5.5.9. Signal timings at Junction E (A141 / Kings Ripton Road) were adjusted to reflect the increase in traffic on the southbound approach coming from the direction of the new bypass. Adjustments to the traffic signal timings included the reallocation of green time to the Kings Ripton approach, and reducing the cycle time to 76 seconds. It is believed that there is further scope to improve upon this with more detailed traffic signal optimisation by a traffic signal engineer if required, although the junction operates within capacity with a LOS C in both peak hours.



#### Junction F (A141 / B1514 / A1123, BP Roundabout)

- 5.5.10. Two mitigation measures were applied to this junction. The first was the provision of a two lane southbound exit onto the B1514 to enable a two lane southbound approach from the north. The two lane exit was maintained as far as Owl Way, at which point the first lane continued ahead along the B1514 and the second lane formed a right turn into Owl Way.
- 5.5.11. In addition to this a gating feature was provided on the southbound A141 approach in the form of traffic signals which operated on a 90 second cycle, of which vehicles were held for 20 seconds. The gating feature was placed approximately 60 metres north of the junction to prevent northbound queues forming back to the roundabout.
- 5.5.12. Please note that the purpose of the signalised gating feature used within the model is to disrupt, or slow, the approach of southbound traffic to the junction. This has been used as a proxy for a scheme at this location that would have a similar impact, such as a pedestrian crossing, which could link the BP Garage with the Marina and Houghton to the east, or speed reduction measures on the southbound approach to the junction. Further design and testing will define an eventual scheme at this location.
- 5.5.13. As at Junction D, the gaps created by gating the southbound traffic increased the opportunities for westbound traffic to join the roundabout, and reduced the level of delay forming on this approach. In reality, this gating feature may take the form of a signalised pedestrian crossing or a signal controlled bus route intersecting Abbotts Ripton Road.
- 5.5.14. The location of the gating feature is shown in Figure 5.26 below.

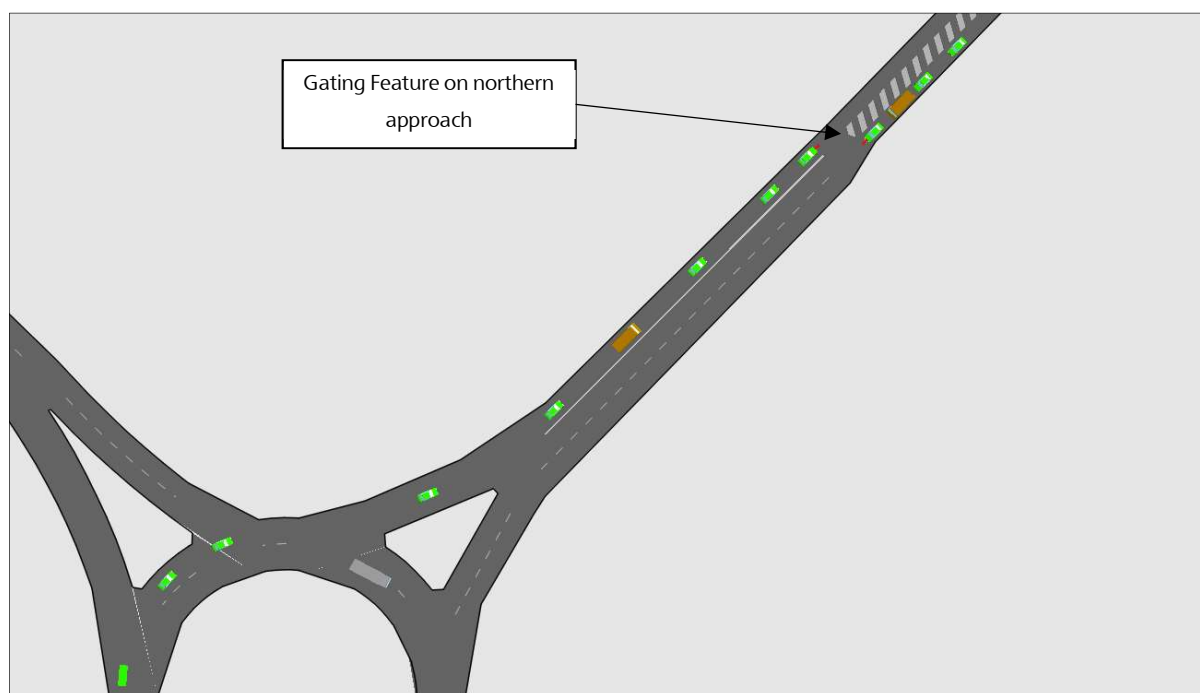


Figure 5.26: A141 / B1514 / A1123 (BP Roundabout) Gating Feature

#### Junction G (A141 New Bypass / B1090 Sawtry Way)

- 5.5.15. Further improvements were required at this junction to mitigate the impact of additional traffic from Wyton Airfield, located immediately to the north of this junction.
- 5.5.16. The mitigation measures included creating a larger, partially signalised roundabout. Signals were provided on the west (new bypass) and east (B1090 Sawtry Way) approaches, and the corresponding roundabout circulatory sections were extended to increase circulatory stacking capacity.
- 5.5.17. Three lane approaches were provided from the north, south and west, along with three lane exits to the north and the south. The A141 to the north of the junction was dualled as far as the first Wyton Airfield development access.
- 5.5.18. This mitigation measure significantly reduced delay at this junction when tested, and it is believed that delay can be further reduced if necessary with more detailed traffic signal optimisation and guidance from a traffic signal engineer.
- 5.5.19. The revised Junction G is shown in Figure 5.27 below.

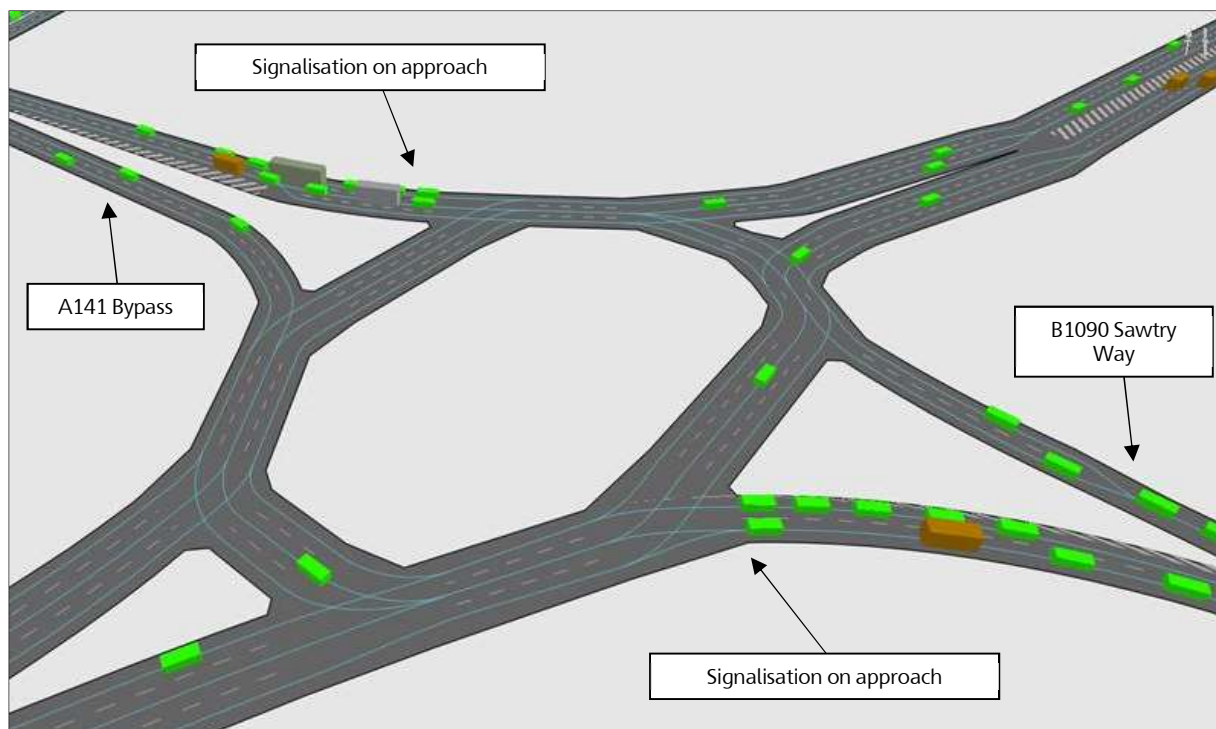


Figure 5.27: A141 / B1090 Sawtry Way Proposed Layout

#### Junction K (A1123 Houghton Hill / Hill Rise)

- 5.5.20. Traffic signal timings at the Junction K (A1123 Houghton Hill / Hill Rise) were adjusted to reallocate green time to both the northbound and southbound movements.
- 5.5.21. In addition to this, the signalised junction to the west was observed to cause significant blocking back towards Junction K, with relatively little demand on the side arms. This was subsequently changed to a priority junction within the model, which resolved the blocking back issue, and reduced delay at Junction K.

#### Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way)

- 5.5.22. The lane allocation on the westbound approach to the A1123 / A1096 Harrison Way roundabout (easternmost of the two) was altered so that the offside lane catered for ahead and right turning traffic only, as illustrated in Figure 5.28, below. Note that this approach was extended as part of the DM HLP mitigations.
- 5.5.23. The lane allocation was altered to designate the nearside lane as left turn only, which prevented ahead trips from using the lane and blocking left turners that would otherwise have been unobstructed.

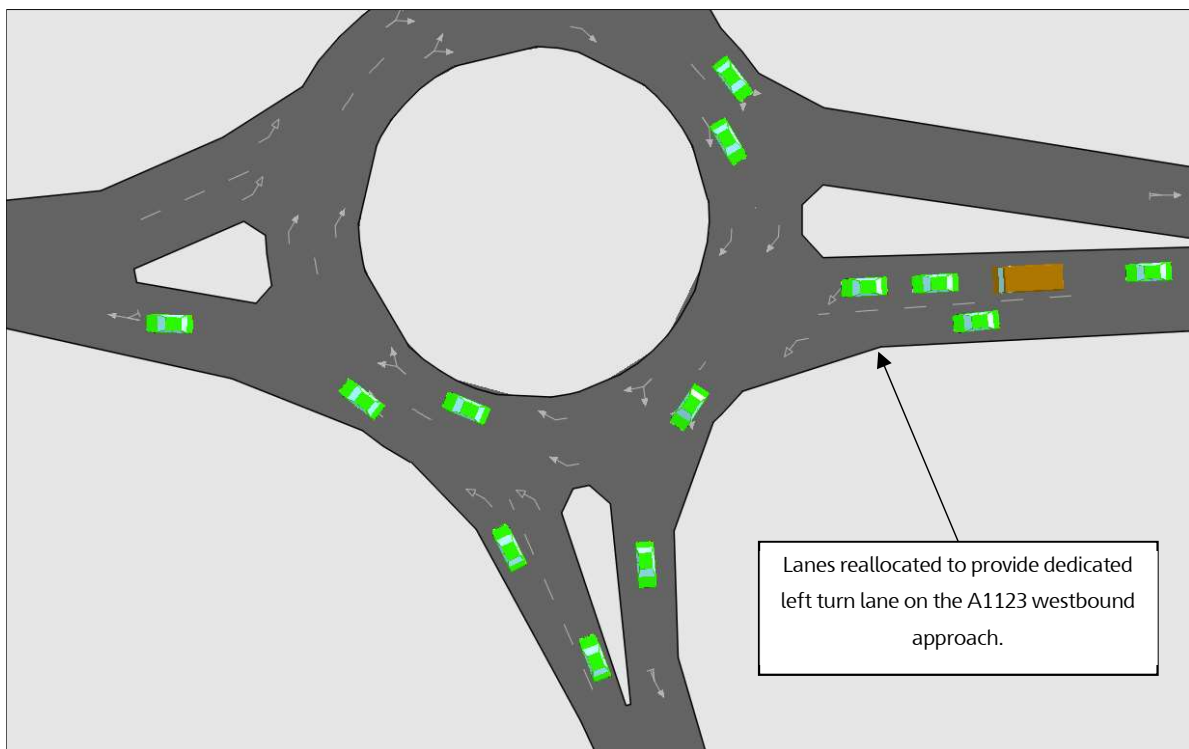


Figure 5.28: Junction M: A1123 / A1096 Harrison Way Roundabout

#### Junction V (B1514 / Desborough Road)

- 5.5.24. Signal timings were adjusted at the junction, most notably to accommodate the increased southbound traffic flow resulting from the Wyton Airfield development to the north.
- 5.5.25. In addition to this the southbound flare was increased to 40 metres length, and a two lane approach was provided on Desborough Road, extending back for approximately 35 metres.

#### Junction Y5 (A141 Bypass / B1090 Abbotts Ripton Road)

- 5.5.26. The increase in trips along the new bypass resulting from the Wyton Airfield development resulted in an increase in delay at this junction, particularly to eastbound traffic on the bypass that was required to give way to westbound vehicles turning right onto the B1090 Abbotts Ripton Road.
- 5.5.27. Several options were explored to mitigate the impact of this delay, such as increasing the size of the roundabout to increase gap times (with little success), and banning particular movements including the right turn into the B1090 Sawtry Way, and all movements out from this road. However, placing restrictions on movements at this junction simply moved the problem further west to the next junction (Y4, A141 Bypass / Kings Ripton Road).
- 5.5.28. Ultimately the mitigation developed for this junction involved converting the B1090 Sawtry Way into a left in / left out only junction, and facilitating the westbound right turn via an overbridge. The number of vehicles turning right out of the B1090 Sawtry Way is expected to be negligible, and so these trips either u-turned at Junction G to the east, or re-routed to join the bypass further west at the junction with Kings Ripton Road. Figure 5.29 below shows the upgraded junction within the model.

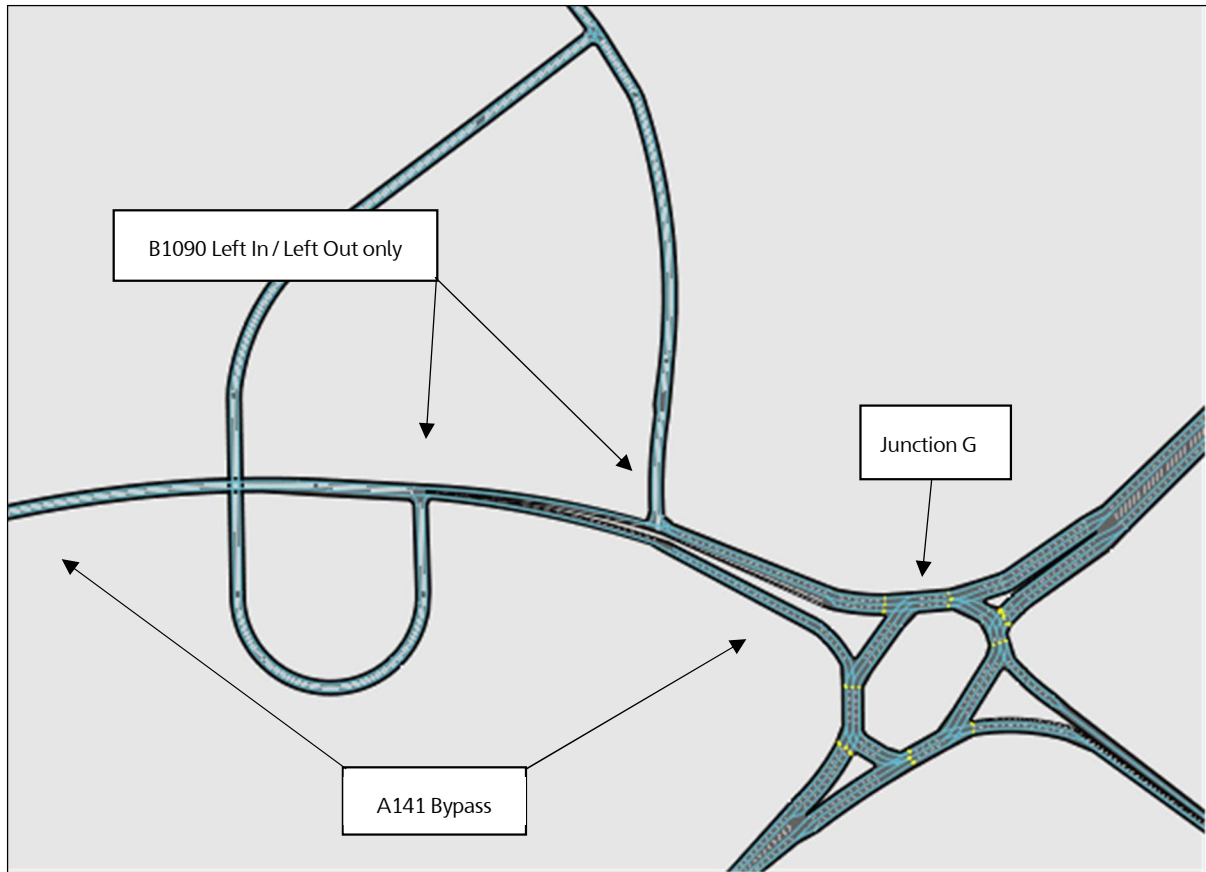


Figure 5.29: Y5 A141 Bypass / B1090 Abbotts Ripton Road Mitigation

#### Phase 2 Summary

- 5.5.29. Phase 2 of the Operational Assessment has considered the impact of the additional growth at Wyton Airfield within the context of the new bypass. This assessment has 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 local junction improvements.

## 5.6. Phase 3: Assess the impact of additional growth at Giffords Park

### Purpose

- 5.6.1. Phase 3 of the Operational Assessment has considered the impact of the Gifford's Park development on the highway network. This assessment builds upon the previous test and includes HLP and Wyton Airfield growth.

### Phase 3 Results

- 5.6.2. The results are shown in Table 5.24 below for the AM peak hour and Table 5.25 for the PM peak hour.
- 5.6.3. Note that it is not considered possible to improve the junctions already identified for mitigation as part of the Wyton Airfield assessment without significant further works. The mitigations developed so far have been developed iteratively, with several different combinations of localised improvements tested to arrive at the mitigation measure presented within this assessment. Further mitigation to reduce delay at these junctions as a result of additional growth is likely to require major junction improvement works that would require further assessment.
- 5.6.4. The increase in delay as a result of the Gifford's Park Development has been compared to the delay experienced in the HLP + 100% Wyton Airfield scenario. Comments are provided to indicate whether the Gifford's Park growth has had a slight impact on delay (typically 10 – 30 seconds) or a significant impact (greater than 30 seconds).

Table 5.24: Phase 3: 2036 AM Peak Hour Junction Performance (+ Giffords)

Junction	AM Peak Hour						
	HLP & 100% Wyton			+ 100% Giffords			+ 100% Giffords Comments
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	
A – A1307 / A141 (Spittals Interchange)	27	C	563	31	C	124	
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	7	A	260	12	B	287	
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	45	1	A	105	
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	3	A	1,103	20	C	1,122	Slight Impact
E – A141 Spittals Way / Kings Ripton Road	34	C	216	75	E	182	Significant Impact
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	6	A	678	7	A	372	
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	41	D	660	29	C	571	
J – A1123 Houghton Road / B1090 Sawtry Way	3	A	313	11	B	484	
K – A1123 Houghton Road / Hill Rise	27	C	400	163	F	327	Significant Impact
L – A1123 Houghton Road / Ramsey Road	30	C	437	126	F	1,270	Significant Impact
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	129	F	615	213	F	634	Significant Impact
N – B1514 Hartford Road / B1514 Nursery Road	26	C	907	23	C	1,093	
O – B1514 Castle Moat Road / B1044	36	D	1,182	32	C	606	
R – A1096 Harrison Way / Meadow Lane	44	E	770	74	F	231	Significant Impact
S – A1096 Harrison Way / Guided Busway	6	A	1,343	8	A	506	
T – A1096 Harrison Way / Low Road	36	E	219	40	E	220	
U – A1096 London Road / A1307 (Galley Hill)	4	A	12	4	A	57	
V – B1514 Main Street / Desborough Road	32	C	1,060	37	D	564	
X – B1040 Somersham Road / Marley Road	15	C	369	31	D	1,148	Slight Impact
Y2 - Bypass / Ermine Street	2	A	1,128	2	A	1,131	
Y3 - Bypass / Huntingdon Road	15	C	1,058	45	E	48	Significant Impact
Y4 - Bypass / Kings Ripton Road	1	A	804	11	B	878	
Z1 - Wyton Airfield Dev Access South	5	A	1,024	6	A	211	
Z2 - Wyton Airfield Dev Access North	6	A	1,024	6	A	211	
Z3 - Giffords Dev Access	0	A	669	65	F	790	Significant Impact
Z4 - Area to N of Huntingdon East Access	2	A	677	2	A	333	
Z5 - Area to N of Huntingdon South Access	0	A	111	0	A	150	

- 5.6.5. Table 5.24 shows that the application of additional growth at Giffords Park will significantly impact on junctions throughout St Ives. Junctions K, L and M all go over capacity and reach an LOS F in the 'with Gifford's Park' scenario, with delay ranging from 126 seconds to 213 seconds at Junction M, which is in close proximity of the Gifford's Park development.
- 5.6.6. The eastbound, northbound and southbound approaches all experience LOS F in the AM peak hour, and the westbound approach experiences LOS E, confirming that the operation of the junction has completely failed. As discussed above, it is not considered possible to make any further localised improvements at this junction, and a more significant, strategic solution would be required to accommodate the additional growth at Gifford's Park.
- 5.6.7. Junction R (A1096 / Meadow Lane) experiences a 30 second increase in delay, reducing it to LOS F. Both Meadow Lane and the A1096 southbound movement experienced LOS F due to the increase in traffic from Gifford's Park travelling via Harrison Way to access the A1307 in the south, as identified by the routing analysis within the Strategic Assessment.
- 5.6.8. Attempts were made to mitigate this increase in delay by providing additional junction capacity at Junction R and the A1096 Harrison Way junction with Parsons Green, however the issue along this route is link capacity which would need to be addressed by dualling, or the provision of an alternative route, again confirming that a more significant, strategic solution is required at this location.
- 5.6.9. Junction Z3 (Gifford's Park Development Access) experiences a significant increase in delay once the additional growth is applied, with the LOS changing from LOS A in 'without Gifford's Park' to LOS F in the 'with Gifford's Park' scenario. This is as a result of vehicles queueing back from Junction M and blocking back across the development access, rather than a lack of capacity at Junction Z3 itself.
- 5.6.10. The results from the PM peak hour are shown below in Table 5.25.



Table 5.25: Phase 3: 2036 PM Peak Hour Junction Performance (+ Giffords)

Junction	PM Peak Hour						
	HLP & 100% Wyton			+ 100% Giffords			+ 100% Giffords Comments
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	
A – A1307 / A141 (Spittals Interchange)	18	B	409	17	B	2,348	
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	4	A	334	4	A	8	
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	179	1	A	71	
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	29	D	92	31	D	449	
E – A141 Spittals Way / Kings Ripton Road	33	C	207	53	D	370	Slight Impact
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	9	A	228	10	A	50	
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	15	B	1,457	16	B	1,780	
J – A1123 Houghton Road / B1090 Sawtry Way	9	A	603	9	A	873	
K – A1123 Houghton Road / Hill Rise	25	C	1,063	59	E	122	Slight Impact
L – A1123 Houghton Road / Ramsey Road	17	B	144	31	C	278	Slight Impact
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	68	F	655	291	F	610	Significant Impact
N – B1514 Hartford Road / B1514 Nursery Road	12	B	838	11	B	907	
O – B1514 Castle Moat Road / B1044	6	A	586	6	A	3	
R – A1096 Harrison Way / Meadow Lane	13	B	1,072	22	C	952	Slight Impact
S – A1096 Harrison Way / Guided Busway	2	A	1,069	57	E	224	Significant Impact
T – A1096 Harrison Way / Low Road	143	F	429	155	F	948	Slight Impact
U – A1096 London Road / A1307 (Galley Hill)	4	A	310	4	A	93	
V – B1514 Main Street / Desborough Road	10	A	851	43	D	39	Significant Impact
X – B1040 Somersham Road / Marley Road	7	A	615	8	A	923	
Y2 - Bypass / Ermine Street	7	A	1,029	7	A	490	
Y3 - Bypass / Huntingdon Road	21	C	1,337	26	D	28	Slight Impact
Y4 - Bypass / Kings Ripton Road	2	A	1,331	3	A	704	
Z1 - Wyton Airfield Dev Access South	3	A	549	2	A	1,081	
Z2 - Wyton Airfield Dev Access North	3	A	549	2	A	1,081	
Z3 - Giffords Dev Access	0	A	505	5	A	0	
Z4 - Area to N of Huntingdon East Access	2	A	577	2	A	878	
Z5 - Area to N of Huntingdon South Access	0	A	55	0	A	74	

- 5.6.11. Table 5.25 shows that the impact of additional development at Giffords Park is generally not as significant in the PM peak hour as in the AM peak hour, however there is still a large increase in delay at Junction M, which increases from 68 seconds without Gifford's Park to 291 seconds with Gifford's Park.
- 5.6.12. Again, the eastbound, northbound and southbound approaches are all over capacity with LOS F, confirming that the additional growth cannot be readily mitigated through local junction improvements.

#### 10% Sensitivity Test

- 5.6.13. A sensitivity test was undertaken to confirm that the significant impact of Gifford's Park is as a result of network constraints, rather than the scale of development proposed. A test was run for the AM peak hour, in which only 10% of the total Gifford's Park development was added (220 dwellings). The results from this test are shown beneath in Table 5.26.

Table 5.26: Phase 3: 2036 AM Peak Hour Junction Performance (+ Giffords 10% Sensitivity Test)

Junction	AM Peak Hour						
	HLP & 100% Wyton			+ 10% Giffords			+ 10% Giffords Comments
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	
A – A1307 / A141 (Spittals Interchange)	27	C	563	30	C	372	
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	7	A	260	10	B	68	
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	45	2	A	52	
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	3	A	1,103	18	C	370	
E – A141 Spittals Way / Kings Ripton Road	34	C	216	70	E	140	Significant Impact
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	6	A	678	7	A	1,072	
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	41	D	660	34	D	1,177	
J – A1123 Houghton Road / B1090 Sawtry Way	3	A	313	4	A	307	
K – A1123 Houghton Road / Hill Rise	27	C	400	106	F	822	Significant Impact
L – A1123 Houghton Road / Ramsey Road	30	C	437	53	D	1,169	Slight Impact
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	129	F	615	142	F	651	
N – B1514 Hartford Road / B1514 Nursery Road	26	C	907	26	C	939	
O – B1514 Castle Moat Road / B1044	36	D	1,182	36	D	2,134	
R – A1096 Harrison Way / Meadow Lane	44	E	770	55	F	299	Significant Impact
S – A1096 Harrison Way / Guided Busway	6	A	1,343	6	A	1,700	
T – A1096 Harrison Way / Low Road	36	E	219	43	E	240	
U – A1096 London Road / A1307 (Galley Hill)	4	A	12	4	A	82	
V – B1514 Main Street / Desborough Road	32	C	1,060	28	C	1,099	
X – B1040 Somersham Road / Marley Road	15	C	369	14	B	373	
Y2 - Bypass / Ermine Street	2	A	1,128	3	A	749	
Y3 - Bypass / Huntingdon Road	15	C	1,058	40	E	860	Significant Impact
Y4 - Bypass / Kings Ripton Road	1	A	804	10	A	737	
Z1 - Wyton Airfield Dev Access South	5	A	1,024	6	A	559	
Z2 - Wyton Airfield Dev Access North	6	A	1,024	6	A	560	
Z3 - Giffords Dev Access	0	A	669	1	A	1,196	
Z4 - Area to N of Huntingdon East Access	2	A	677	2	A	768	
Z5 - Area to N of Huntingdon South Access	0	A	111	0	A	1,296	

- 5.6.14. The results show that Junction K and Junction R are still expected to go over capacity with LOS F when only 10% of the Gifford's Park demand is applied. Junction M remains over capacity with LOS F, and a slight increase in delay. This confirms that the issue is the constraint at Junction M, and along the A1123 and A1096 through St Ives, and not the scale of growth. A more strategic scheme would be needed to address the network constraints at this location, and unlock additional growth at Gifford's Park.

#### Phase 3 Summary

- 5.6.15. Given the scale of the impact of the additional growth from Giffords Park on junctions throughout St Ives, and specifically at Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) during both peak hours, it is not considered possible to deliver the additional growth at Gifford's Park with localised junction improvements alone, and therefore, development of this scale in St Ives would require a more strategic intervention.
- 5.6.16. The volume of additional traffic attempting to pass through Junction M significantly increases delay at this junction. Based on this assessment, it is suggested that a more significant strategic scheme is required at this location to unlock significant growth in St Ives, and to provide alternative access routes onto the surrounding road network for development traffic.
- 5.6.17. A sensitivity test was undertaken which applied 10% of the demand for Gifford's Park. This test confirmed that a strategic intervention was required to overcome the network constraints in St Ives in order to deliver any growth at Gifford's Park.

## 5.7. Phase 4: Assess the impact of additional growth North of Huntingdon

### Purpose

- 5.7.1. Phase 4 of the Operational Assessment has considered the impact of additional growth North of Huntingdon, on the highway network. This assessment builds upon the previous test and includes HLP and Wyton Airfield growth, but does not include the additional growth at Gifford's Park, as Phase 3 demonstrated that it would not be possible to accommodate the additional growth at Gifford's Park without more significant highway improvements, which would require further assessment.
- 5.7.2. Note that the additional growth North of Huntingdon is not a specified site, but has been used as a proxy for growth in this general area for the purpose of this assessment.
- 5.7.3. The Strategic Assessment identified that the highway network would experience significant issues in the High Growth Plus scenario, when the full allocation of additional growth North of Huntingdon was applied. Consequently, this growth has been tested in 20% increments to identify the point at which the impact would become significant. This enables an assessment to be made of how much growth this site could reasonably accommodate without further significant infrastructure improvements.
- 5.7.4. The assessment has considered the following proportion of development, and Table 5.27 below shows what this would equate to in housing.

Table 5.27: Additional Growth Levels North of Huntingdon

Scale of Growth Tested	Equivalent No. Houses
10%	450
20%	900
40%	1,800
60%	2,700
80%	3,600
100%	4,500

### Phase 4 Results

- 5.7.5. The results for the AM peak hour are shown in Table 5.28 below.

Table 5.28: Phase 4: 2036 AM Peak Hour Junction Performance (+ Growth North of Huntingdon)

Junction	AM Peak Hour																				
	HLP & 100% Wyton			HLP & 100% Wyton + 10% LNH			HLP & 100% Wyton + 20% LNH			HLP & 100% Wyton + 40% LNH			HLP & 100% Wyton + 60% LNH			HLP & 100% Wyton + 80% LNH			HLP & 100% Wyton + 100% LNH		
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)
A – A1307 / A141 (Spittals Interchange)	27	C	563	28	C	556	32	C	573	30	C	572	30	C	590	33	C	596	28	C	581
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	7	A	260	9	A	215	21	C	220	13	B	265	18	C	343	39	E	201	53	F	194
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	45	1	A	49	2	A	50	2	A	43	2	A	53	2	A	44	2	A	53
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	3	A	1,103	13	B	236	17	C	243	18	C	270	60	F	291	78	F	337	75	F	321
E – A141 Spittals Way / Kings Ripton Road	34	C	216	41	D	264	37	D	260	37	D	247	45	D	264	56	E	311	56	E	333
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	6	A	678	6	A	693	7	A	640	7	A	659	30	D	593	33	D	581	66	F	574
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	41	D	660	37	E	663	50	D	665	46	D	666	70	F	690	90	F	713	128	F	719
J – A1123 Houghton Road / B1090 Sawtry Way	3	A	313	3	A	304	4	A	308	3	A	300	4	A	331	5	A	343	11	B	379
K – A1123 Houghton Road / Hill Rise	27	C	400	28	C	407	39	D	382	34	C	393	34	C	1,043	56	E	393	42	D	1,061
L – A1123 Houghton Road / Ramsey Road	30	C	437	31	C	432	30	C	426	38	D	434	34	C	442	41	D	441	44	D	443
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	129	F	615	125	F	627	112	F	610	131	F	593	129	F	572	113	F	612	136	F	577
N – B1514 Hartford Road / B1514 Nursery Road	26	C	907	25	C	931	31	C	868	27	C	923	35	D	804	27	C	928	26	C	929
O – B1514 Castle Moat Road / B1044	36	D	1,182	34	C	1,195	40	D	1,176	38	D	1,159	53	D	1,056	38	D	1,215	37	D	1,211
R – A1096 Harrison Way / Meadow Lane	44	E	770	51	F	850	49	E	824	57	F	782	60	F	799	54	F	818	62	F	798
S – A1096 Harrison Way / Guided Busway	6	A	1,343	5	A	1,344	5	A	1,344	6	A	1,348	4	A	1,370	5	A	1,325	5	A	1,343
T – A1096 Harrison Way / Low Road	36	E	219	35	D	204	47	E	220	40	E	211	47	E	220	42	E	230	35	D	227
U – A1096 London Road / A1307 (Galley Hill)	4	A	12	3	A	11	3	A	8	4	A	244	4	A	12	3	A	13	3	A	239
V – B1514 Main Street / Desborough Road	32	C	1,060	49	D	1,072	54	D	1,011	57	E	1,046	77	E	937	93	F	1,034	88	F	1,024
X – B1040 Somersham Road / Marley Road	15	C	369	18	C	374	15	B	369	17	C	359	15	C	365	15	B	377	20	C	347
Y2 - Bypass / Ermine Street	2	A	677	2	A	695	2	A	650	2	A	682	2	A	725	3	A	804	2	A	782
Y3 - Bypass / Huntingdon Road	15	C	1,058	22	C	1,042	19	C	1,082	17	C	1,093	41	E	984	51	F	990	62	F	1,088
Y4 - Bypass / Kings Ripton Road	1	A	804	3	A	830	1	A	810	1	A	805	12	B	753	12	B	771	13	B	821
Z1 - Wyton Airfield Dev Access South	2	A	677	2	A	695	2	A	650	2	A	682	2	A	725	3	A	804	2	A	782
Z2 - Wyton Airfield Dev Access North	6	A	1,024	6	A	1,044	6	A	1,034	6	A	1,042	6	A	1,052	6	A	1,042	6	A	1,060
Z3 - Giffords Dev Access	0	A	669	0	A	664	0	A	674	0	A	670	0	A	657	13	B	673	3	A	682
Z4 - Area to N of Huntingdon East Access	2	A	677	2	A	695	2	A	650	2	A	682	2	A	725	3	A	804	2	A	782
Z5 - Area to N of Huntingdon South Access	0	A	111	0	A	131	0	A	185	0	A	226	0	A	273	0	A	296	1	A	334

- 5.7.6. The results show that the mitigations developed earlier in the assessment are able to accommodate the lower levels of additional growth North of Huntingdon (up to 40%), with only slight changes in junction performance.
- 5.7.7. Junction R (A1096 / Meadow Lane) experiences a LOS F with 10% growth which improves to LOS E in the 20% growth scenario. This is because vehicle routing may alter between different scenarios based on network conditions, causing levels of delay to fluctuate slightly. In some instances it is also because vehicles are held at one junction longer with a higher level of growth, which constrains the traffic flow to other junctions further along, resulting in an improvement at those locations. By the 40% growth scenario, Junction R returns to LOS F and does not return within capacity in subsequent scenarios.
- 5.7.8. At 60% growth, junction performance in several locations begins to deteriorate more rapidly. Junction R remains over capacity, and experiences LOS F on both the Meadow Lane and A1096 southbound approaches. Junction D (A141 / Huntingdon Road, Tesco Roundabout) experiences a steep deterioration in performance, reducing from LOS C in the 40% growth scenario to LOS F in the 60% growth scenario, as delay increases by 42 seconds.
- 5.7.9. Junction G also goes over capacity, and drops to LOS F at 60%. This junction has already been mitigated as part of the Wyton Airfield assessment, and further mitigation here would require substantive improvements. Junction F also reduces dramatically to LOS E in the 60% growth scenario.
- 5.7.10. Further junctions fail, and go over capacity in the 80% and 100% scenarios.
- 5.7.11. The results for the AM peak hour show that junction performance begins to deteriorate most notably between scenarios with 40% and 60% growth at Land North of Huntingdon. This suggests that the network could support somewhere in the region of 2,250 dwellings (50%) without the need for further significant improvements.
- 5.7.12. The results for the PM peak hour are shown in Table 5.29 below.

Table 5.29: Phase 4: 2036 PM Peak Hour Junction Performance (+ Growth North of Huntingdon)

Junction	PM Peak Hour																				
	HLP & 100% Wyton			HLP & 100% Wyton + 10% LNH			HLP & 100% Wyton + 20% LNH			HLP & 100% Wyton + 40% LNH			HLP & 100% Wyton + 60% LNH			HLP & 100% Wyton + 80% LNH			HLP & 100% Wyton + 100% LNH		
	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)	Delay (s)	LOS	Flow (v)
A – A1307 / A141 (Spittals Interchange)	18	B	409	18	B	415	16	B	415	16	B	414	16	B	429	18	B	409	14	B	422
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	4	A	334	4	A	361	5	A	371	4	A	325	4	A	333	4	A	362	5	A	389
C – A141 Spittals Way / Latham Road / Washingley Road	1	A	179	2	A	162	2	A	174	1	A	170	2	A	165	1	A	171	2	A	169
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	29	D	92	20	C	109	8	A	564	20	C	104	24	C	114	14	B	139	45	E	582
E – A141 Spittals Way / Kings Ripton Road	33	C	207	31	C	212	33	C	221	32	C	206	34	C	218	35	C	202	59	E	346
F – A141 / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	9	A	228	9	A	240	9	A	261	9	A	294	9	A	305	8	A	317	11	B	365
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	15	B	1,457	15	C	1,467	15	B	1,447	15	B	1,439	16	C	1,467	15	B	1,468	16	B	1,466
J – A1123 Houghton Road / B1090 Sawtry Way	9	A	603	9	A	568	9	A	580	8	A	592	8	A	587	9	A	597	69	F	559
K – A1123 Houghton Road / Hill Rise	25	C	1,063	23	C	1,040	20	C	1,044	25	C	1,076	32	C	1,086	35	D	1,085	68	E	303
L – A1123 Houghton Road / Ramsey Road	17	B	144	16	B	147	17	B	151	17	B	145	18	B	152	16	B	149	29	C	182
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	68	F	655	65	F	662	64	F	681	65	F	649	60	F	660	66	F	653	66	F	675
N – B1514 Hartford Road / B1514 Nursery Road	12	B	838	12	B	845	11	B	810	12	B	853	13	B	884	12	B	848	12	B	853
O – B1514 Castle Moat Road / B1044	6	A	586	7	A	596	7	A	595	6	A	585	6	A	573	6	A	581	6	A	591
R – A1096 Harrison Way / Meadow Lane	13	B	1,072	12	B	1,065	13	B	1,083	13	B	1,081	13	B	1,075	12	B	1,040	15	C	1,095
S – A1096 Harrison Way / Guided Busway	2	A	1,069	2	A	1,048	3	A	1,075	2	A	1,079	3	A	1,078	2	A	1,036	3	A	1,090
T – A1096 Harrison Way / Low Road	143	F	429	147	F	432	139	F	458	126	F	464	123	F	455	132	F	423	141	F	437
U – A1096 London Road / A1307 (Galley Hill)	4	A	310	4	A	316	4	A	16	4	A	319	4	A	300	4	A	311	4	A	309
V – B1514 Main Street / Desborough Road	10	A	851	11	B	875	11	B	855	12	B	853	11	B	873	11	B	843	56	E	253
X – B1040 Somersham Road / Marley Road	7	A	615	7	A	618	6	A	615	7	A	629	6	A	635	8	A	641	6	A	623
Y2 - Bypass / Ermine Street	2	A	577	2	A	606	2	A	588	2	A	586	2	A	597	3	A	561	3	A	610
Y3 - Bypass / Huntingdon Road	21	C	1,337	23	C	1,357	21	C	1,362	21	C	1,360	27	D	1,386	20	C	1,371	36	E	693
Y4 - Bypass / Kings Ripton Road	2	A	1,331	2	A	1,360	1	A	1,346	2	A	1,357	2	A	1,369	2	A	1,346	3	A	1,401
Z1 - Wyton Airfield Dev Access South	2	A	577	2	A	606	2	A	588	2	A	586	2	A	597	3	A	561	3	A	610
Z2 - Wyton Airfield Dev Access North	3	A	549	3	A	586	2	A	556	3	A	574	3	A	572	2	A	554	3	A	578
Z3 - Giffords Dev Access	0	A	505	0	A	503	0	A	482	0	A	512	0	A	657	0	A	510	0	A	505
Z4 - Area to N of Huntingdon East Access	2	A	577	2	A	606	2	A	588	2	A	586	2	A	597	3	A	561	3	A	610
Z5 - Area to N of Huntingdon South Access	0	A	55	0	A	0	1	A	0	0	A	0	0	A	70	0	A	81	0	A	213



- 5.7.13. The results for the PM peak hour show that the network can reasonably accommodate up to 80% growth without any significant detriment in junction performance.
- 5.7.14. Junction J (A1123 / B1090) goes over capacity in the 100% growth scenario, and several junctions including Junction D (A141 / Huntingdon Road), Junction E (A141 / Kings Ripton Road), Junction K (A1123 / Hill Rise) and Junction V (B1514 / Desborough Road) all deteriorate to LOS E, meant that they are approaching over capacity.
- 5.7.15. The PM peak hour results suggest that the network could accommodate approximately 3,600 dwellings (80%) at Land North of Huntingdon without the need for further significant improvements. However, this level of growth is not realistic, as the AM peak hour results demonstrate that a maximum of 2,250 dwellings can be supported.

#### Phase 4 Summary

- 5.7.16. Phase 4 has assessed the level of additional growth that can be supported at Land North of Huntingdon through a series of sequential tests.
- 5.7.17. The results for the AM peak hour show that junction performance begins to deteriorate most notably between scenarios with 40% and 60% growth North of Huntingdon. This suggests that the network could support somewhere in the region of 2,250 dwellings (50%) without the need for further significant improvements.
- 5.7.18. The results for the PM peak hour show that the network performs much better, with a limited impact on junction performance up to 80% growth (3,600 dwellings), however the AM peak hour results demonstrate that a maximum of 2,250 dwellings can be supported at this location.

#### Scale of Growth Supported by Option 4

- 5.7.19. The incremental assessment of the level of additional growth that can be supported at Land North of Huntingdon has identified that approximately 2,250 dwellings could be reasonably accommodated by the highway network without the need for significant intervention.
- 5.7.20. This is in addition to the 4,500 dwellings at Wyton Airfield, it is believed that Option 4 (offline single carriageway bypass), along with various junction improvements within the study area, could accommodate a total of 6,750 dwellings beyond those identified in the HLP.

## 5.8. Operational Assessment Summary

- 5.8.1. The Operational Assessment used the Paramics Discovery based 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 additional growth sites can be supported by Option 4, along with a series of junction improvement measures.

### Phase 1 Summary

- 5.8.2. The assessment of interventions in St Ives Town Centre 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 having a subsequently negative impact on junction performance and bus journey times.
- 5.8.3. 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.
- 5.8.4. Both the introduction of two bus gates and a 10 mph zone resulted in the greatest reduction in through trips (completely removing them with two 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.
- 5.8.5. The one bus gate intervention had a limited impact on the surrounding network, which was partially offset by traffic signal amendments at Junction L 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.
- 5.8.6. On the basis of the assessment described within this section, the introduction of a 20 mph zone in St Ives Town Centre and associated improvements at Junction M, Needingworth Road, and priority changes within the town centre, have been included in subsequent modelling to consider the impact of additional growth within the study area. In reality this may represent an actual 20 mph zone, or physical measures such as traffic calming and carriageway narrowing that are designed to bring vehicle speeds down to the desired level.

### Phase 2 Summary

- 5.8.7. Phase 2 of the Operational Assessment has considered the impact of the additional growth at Wyton Airfield within the context of the new bypass. This assessment has 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 local junction improvements.

### Phase 3 Summary

- 5.8.8. Given the scale of the impact of the additional growth from Gifford's Park on junctions throughout St Ives, and specifically at Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) during both peak hours, it is not considered possible to deliver the additional growth at Giffords Park with localised junction improvements alone, and this would instead require a more strategic intervention.
- 5.8.9. The volume of additional traffic attempting to pass through Junction M significantly increases delay at this junction. Based on this assessment, it is suggested that a more significant strategic scheme is required at this location to unlock significant growth in St Ives, and to provide alternative access routes onto the surrounding road network for development traffic.
- 5.8.10. A sensitivity test was undertaken which applied 10% of the demand for Gifford's Park. This test confirmed that a strategic intervention was required to overcome the network constraints in St Ives in order to deliver any growth at Gifford's Park.

### Phase 4 Summary

- 5.8.11. Phase 4 has assessed the level of additional growth that can be supported at Land North of Huntingdon through a series of sequential tests.
- 5.8.12. The results for the AM peak hour show that junction performance begins to deteriorate most notably between scenarios with 40% and 60% growth North of Huntingdon. This suggests that the network could support somewhere in the region of 2,250 dwellings (50%) without the need for further significant improvements.
- 5.8.13. The results for the PM peak hour show that the network performs much better, with a limited impact on junction performance up to 80% growth (3,600 dwellings), however the AM peak hour results demonstrate that a maximum of 2,250 dwellings can be supported at this location.

## 6. Assessment of a Third River Crossing

### 6.1. Introduction

- 6.1.1. 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. The purpose of this revised brief was to assess how the provision of a Third River Crossing would compare to the best performing A141 option (Option 4) for delivering additional growth, and considered the impact in transport and environmental terms.
- 6.1.2. The HLP states that improvement to key transport infrastructure is critical to support economic growth and facilitate development beyond that set out in the adopted local plan. The A141 Strategic Assessment has identified an offline single carriageway bypass (Option 4) as the best performing option for the A141, and this assessment considers how a Third River Crossing between Huntingdon and St Ives would compare to that option for delivering additional growth in Huntingdonshire beyond that included within the HLP.
- 6.1.3. The additional growth scenarios against which a Third River Crossing has been assessed are consistent with those used within the A141 Strategic Assessment, and include the High Growth (HG) and High Growth Plus (HG+) scenarios, which are described below.
- 6.1.4. This Strategic Assessment is supported by a consideration of potential costs, and an Environmental Assessment of conditions along the routes of both the A141 bypass and a Third River Crossing between Huntingdon and St Ives.
- 6.1.5. The assumptions used for a Third River Crossing, and detail of the HG and HG+ scenarios, are set out below.

## 6.2. Third River Crossing Assumptions

- 6.2.1. For the purpose of this assessment, a Third River Crossing has been assumed to begin at the B1044 / A1307 / A1198 Junction at Godmanchester in the south (formerly the A14 Junction 24) and to re-join the existing network along the A141 to the north of the A141 / B1514 / A1123 (BP Roundabout) at a new junction. The road assessed takes the form of a single carriageway, which is considered appropriate for the expected demand identified within the modelling, and remains consistent with the A141 bypass option.
- 6.2.2. Figure 6.1 below shows the broad location of a Third River Crossing in relation to the corridor for the A141 bypass. The broad area considered for a Third River Crossing has been informed by the Cambridgeshire & Peterborough Combined Authority (CPCA) Local Transport Plan. Locations between Huntingdon and St Ives that are further east are heavily constrained by existing housing.

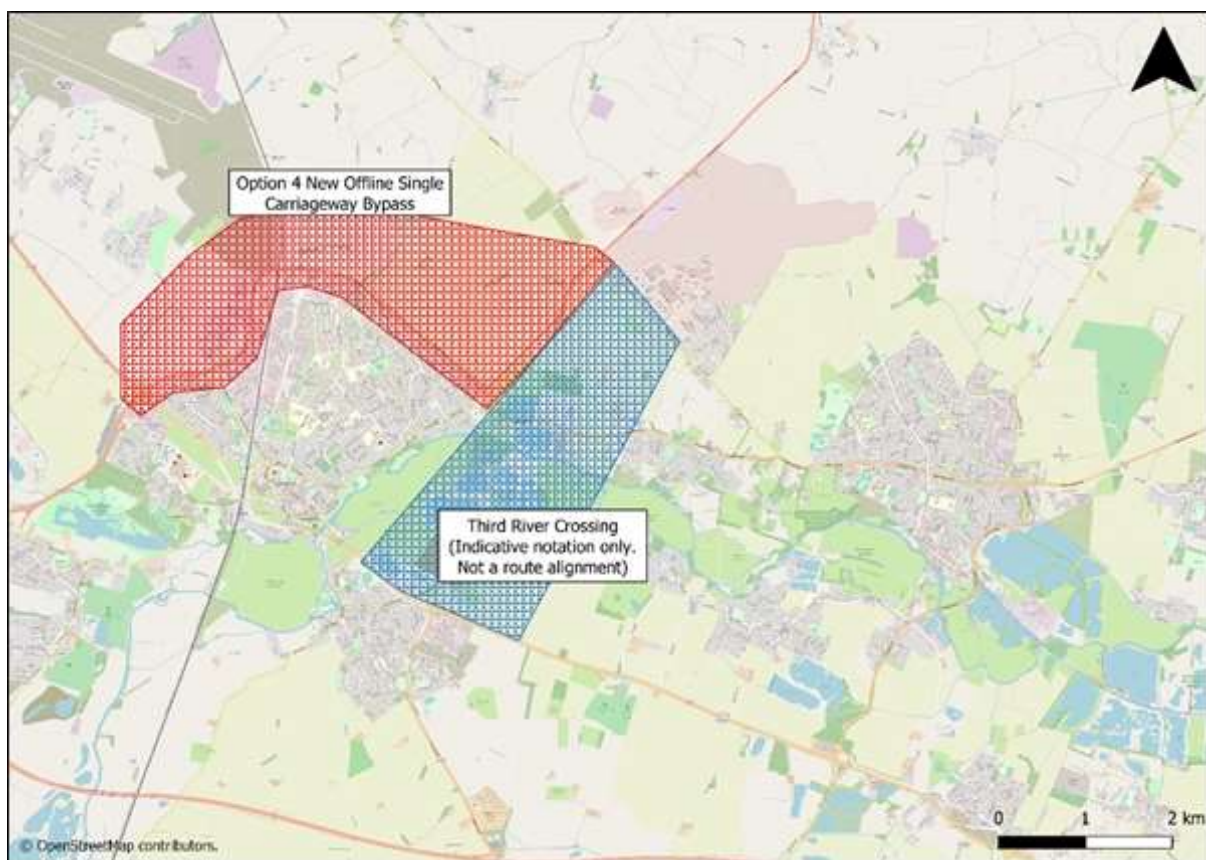


Figure 6.1: Indicative Location of Third River Crossing Relative to Option 4: Offline Single Carriageway Bypass

### 6.3. Additional Growth Scenarios

- 6.3.1. The assessment of a Third River Crossing has been consistent with the Strategic Assessment of the A141 bypass, and used the HG and HG+ growth scenarios.
- 6.3.2. These scenarios represent additional growth beyond that identified within the HLP (which does not require a new bypass or a Third River Crossing), and assume that the additional growth would be realised by 2036, as with the HLP growth.
- 6.3.3. The broad locations for of these growth sites are shown again below in Figure 6.2 for context.

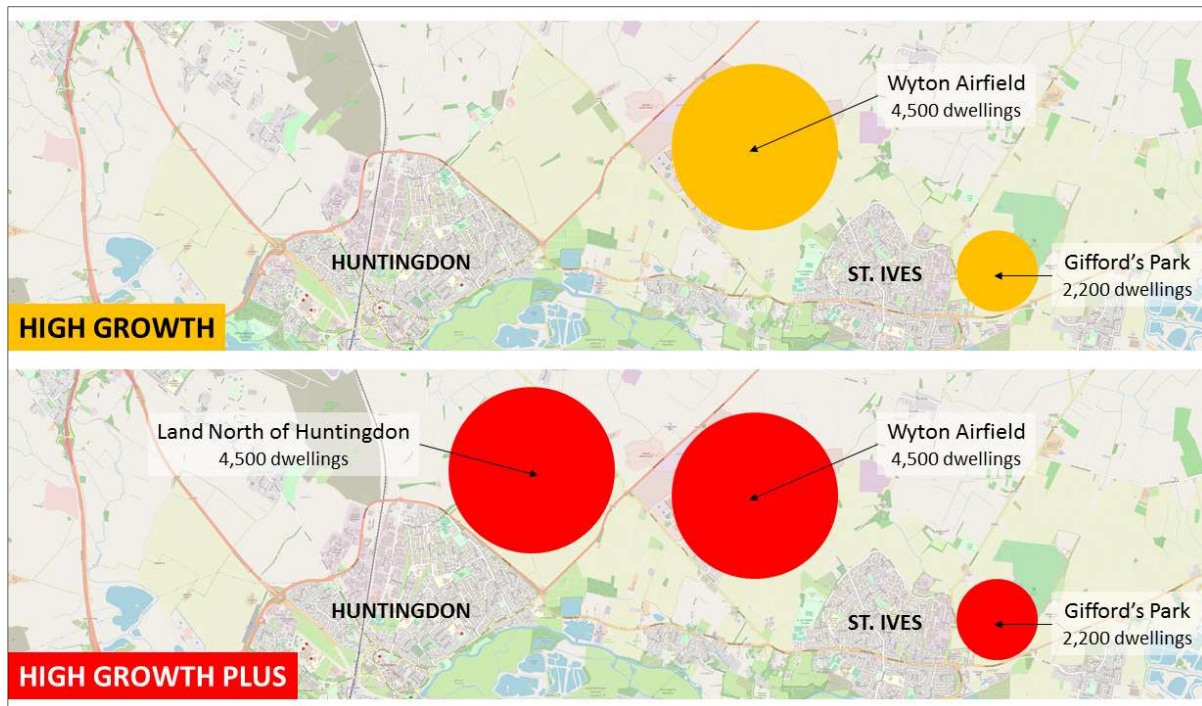


Figure 6.2: Additional Growth Scenarios

- 6.3.4. Note that the Land North of Huntingdon is not a specific site, but is used as a proxy for growth to the north of Huntingdon.



## 6.4. Third River Crossing Strategic Assessment

6.4.1. The Strategic Assessment of a Third River Crossing has been undertaken using the same CSRM2 model as the A141 Strategic Assessment, which is described within Chapter 4. The assessment has sought to determine whether a Third River Crossing would offer greater benefit over an A141 bypass in delivering additional growth in the HG and HG+ scenarios. The assessment has specifically considered the following:

- The transport impacts of a Third River Crossing, to understand how this option would perform in both the HG and HG+ scenarios, when compared to the HLP growth
- A comparison of the performance of a Third River Crossing to an A141 bypass

6.4.2. Two additional sensitivity tests have also been undertaken to determine whether there would be significant benefits in delivering additional growth if a Third River Crossing were supported by additional infrastructure. These sensitivity tests included:

- Sensitivity Test 1: An assessment of a Third River crossing in conjunction with junction capacity improvements along the existing A141
- Sensitivity Test 2: An assessment of a Third River Crossing in conjunction with the A141 bypass.

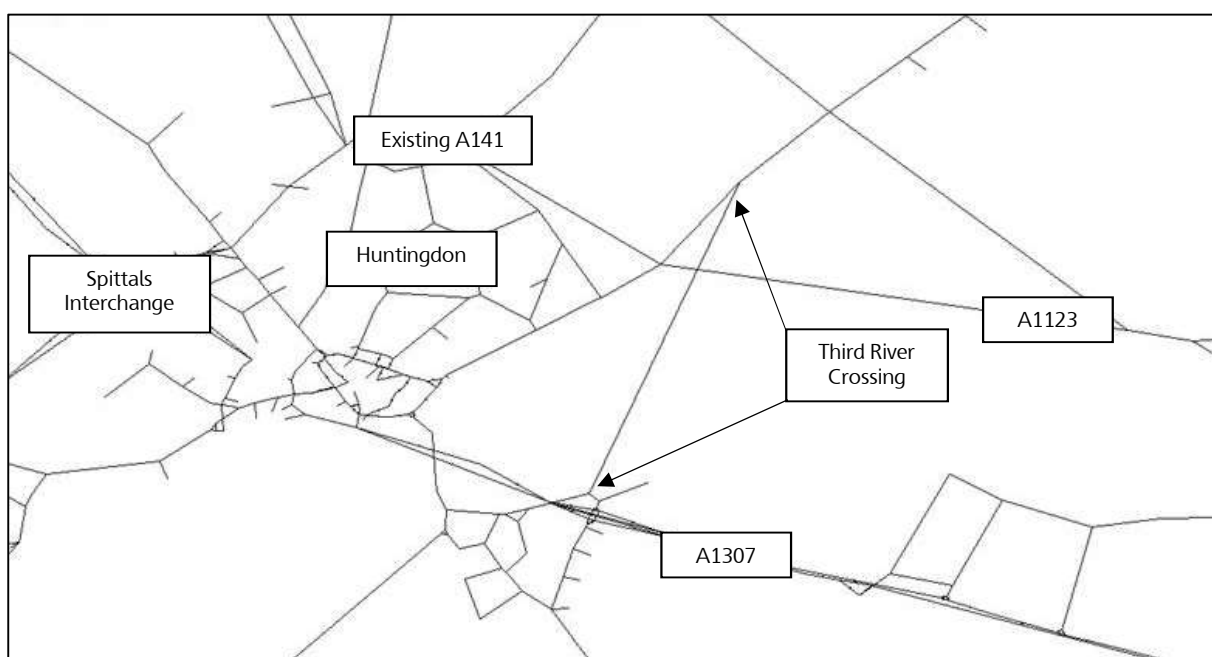


Figure 6.3: Third River Crossing within the CSRM Model Network

### Third River Crossing Traffic Flow Analysis

6.4.3. The series of figures below, show the impact of a Third River Crossing on traffic flows within the Huntingdon and St Ives areas, for both growth scenarios, compared to the DM scenario. The plots are organised by peak hour and by growth scenario, and focus on Huntingdon and St Ives in turn to provide an indication of how the transport network would behave with a Third River Crossing, under the HG and HG+ growth scenarios.

- 6.4.4. The DM scenario against which a Third River Crossing is compared below, includes HLP growth, and does not include a Third River Crossing (or A141 bypass).

#### High Growth (AM Peak Hour)

- 6.4.5. Figure 6.4 shows the impact of a Third River Crossing, compared to the DM scenario, in Huntingdon for the 2036 AM peak hour in the HG scenario. Green bars represent an increase in traffic flow, and blue a decrease.

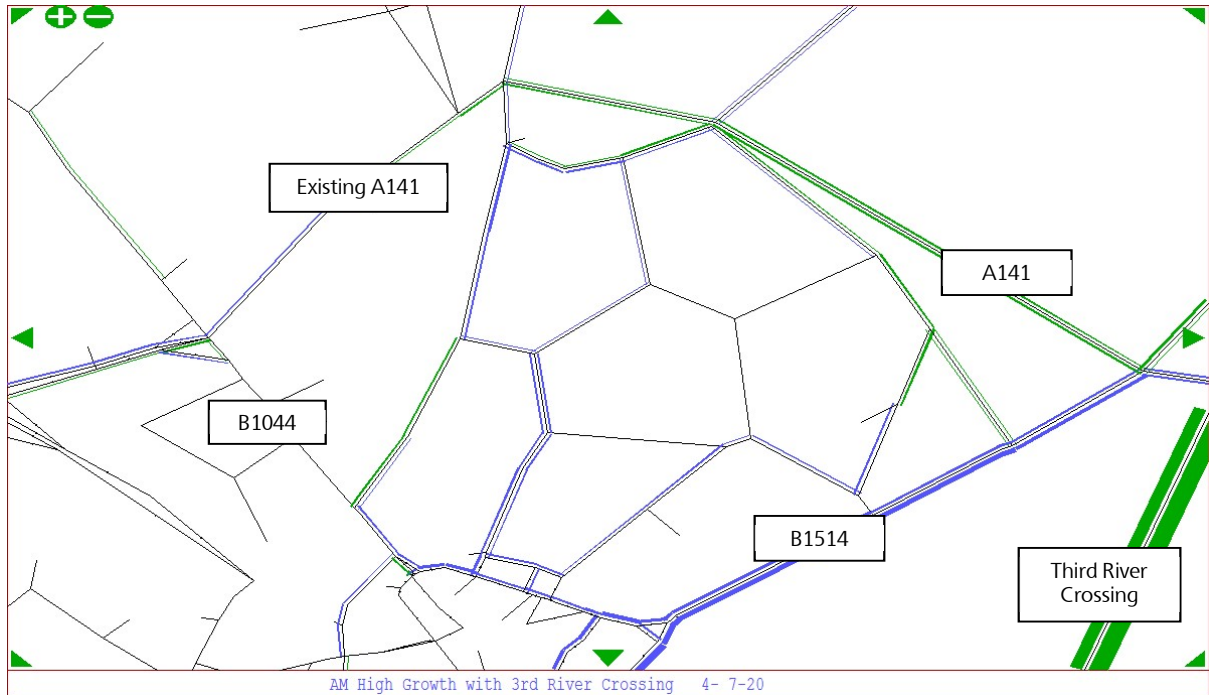


Figure 6.4: 2036 AM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in Huntingdon, High Growth Scenario

- 6.4.6. Figure 6.4 shows that in the HG scenario a Third River Crossing will result in an increase along the existing A141 of approximately 100 trips eastbound, and approximately 140 trips westbound between the Kings Ripton Road junction, and the A141 / A1123 / B1514 Roundabout (BP Roundabout).
- 6.4.7. This is likely to overburden junctions along the route which already struggling with capacity. The junction capacities are explored in the Junction Capacity analysis in the following section.
- 6.4.8. There is a reduction of between 100 – 200 vehicles southbound (depending on the section road) along the B1514, and a reduction of approximately 350 – 430 vehicles northbound. There is also some localised reassignment of trips within Huntingdon itself.



- 6.4.9. Figure 6.5 shows the impact of a Third River Crossing, compared to the DM scenario, in St Ives for the 2036 AM peak hour in the HG scenario.

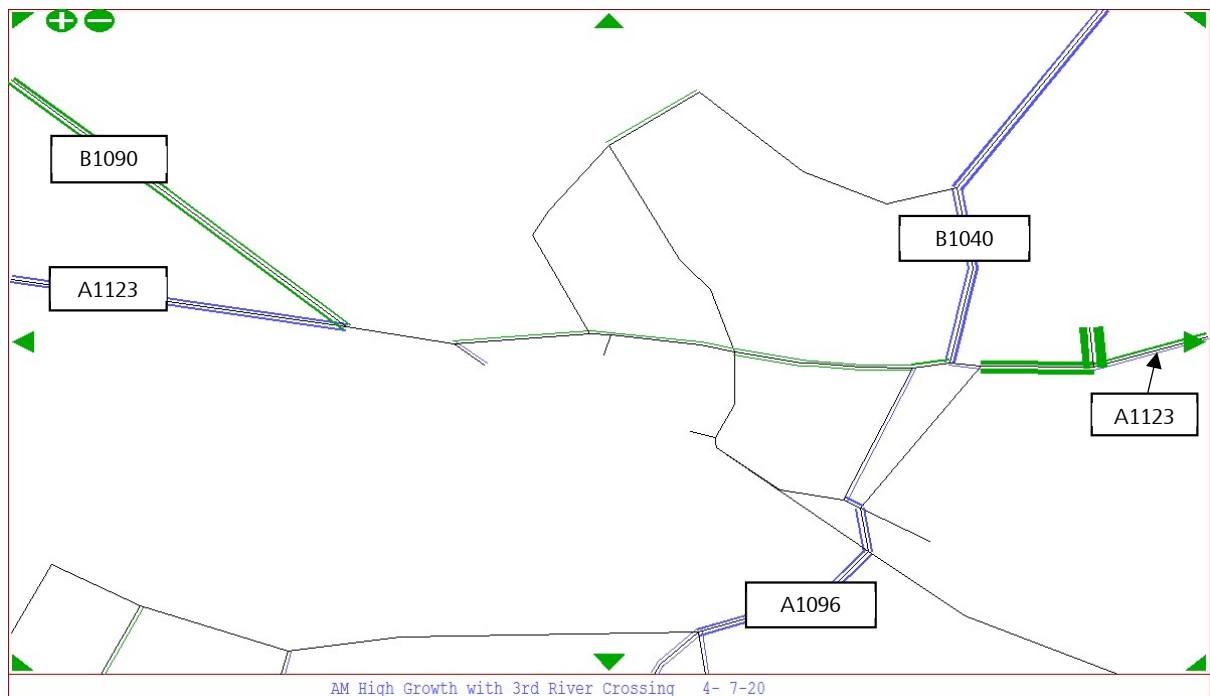


Figure 6.5: 2036 AM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in St Ives, High Growth Scenario

- 6.4.10. Figure 6.5 shows that the Gifford's Park development will lead to an increase of approximately 330 trips eastbound along the A1123 to the east of St Ives, and 375 trips westbound into St Ives during the AM Peak Hour.
- 6.4.11. There is forecast to be a reduction in trips in each direction along the B1040 Somersham Road, and a reduction of approximately 100 vehicles in each direction along the A1123 in the vicinity of Houghton, as a result of trips re-routing along the B1090 Sawtry Way to access a Third River Crossing, further north along the existing A141.
- 6.4.12. The reduction in trips along the B1040 occurs as a result of trips from the A141 Warboys vicinity switching from the B1040 and A1096, onto the A141 and Third River Crossing, to access the A1307.

# High Growth (PM Peak Hour)

- 6.4.13. Figure 6.6 shows the impact of a Third River Crossing, compared to the DM scenario, in Huntingdon for the 2036 PM peak hour in the HG scenario.

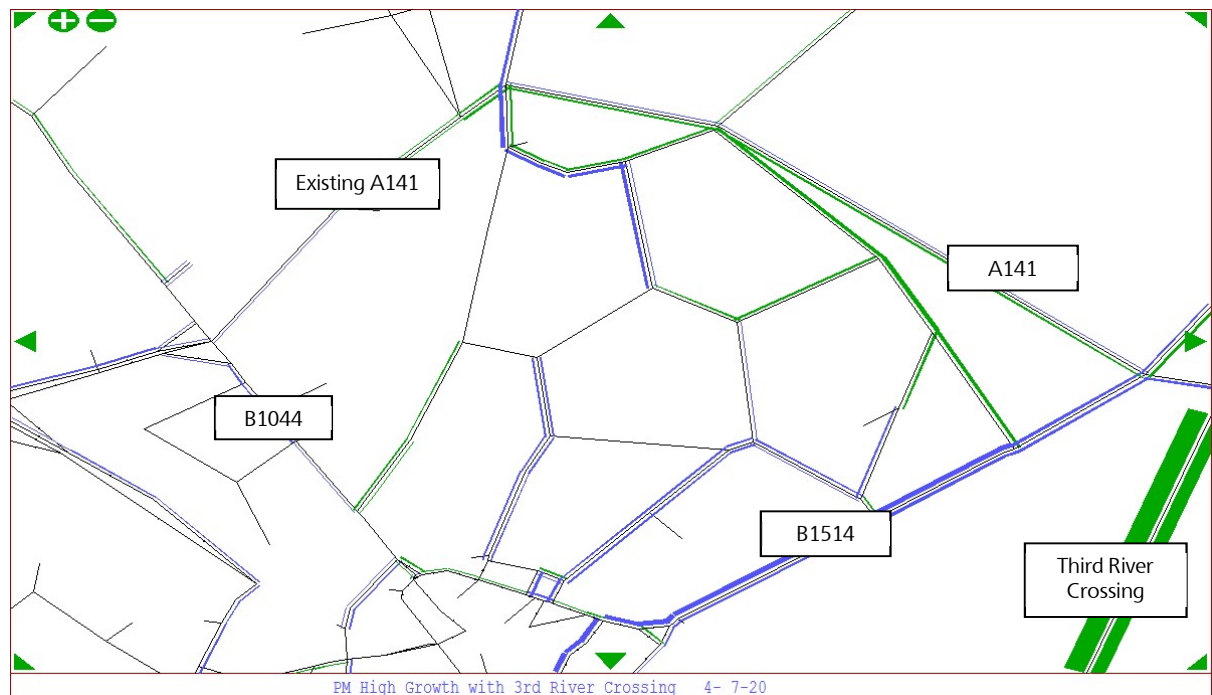


Figure 6.6: 2036 PM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in Huntingdon, High Growth Scenario

- 6.4.14. Figure 6.6 shows a reduction of approximately 100 eastbound trips along the existing A141 between the Kings Ripton Road junction and the A141 / A1123 / B1514 (BP Roundabout), but a parallel increase of approximately 250 eastbound trips along Sapley Road to the south, as trips re-route to avoid congestion and delay along the A141. There is also an increase in westbound trips along the A141.
- 6.4.15. As with the AM peak hour, there is expected to be a reduction of approximately 450 northbound trips, and 150 southbound trips along the B1514 in Huntingdon, as these trips now use the Third River crossing for access to the A1307 and beyond, rather than travelling through Huntingdon. Again, there is some localised rerouting within Huntingdon itself.
- 6.4.16. Figure 6.7 shows the impact of a Third River Crossing, compared to the DM scenario, in St Ives for the 2036 PM peak hour in the HG scenario.

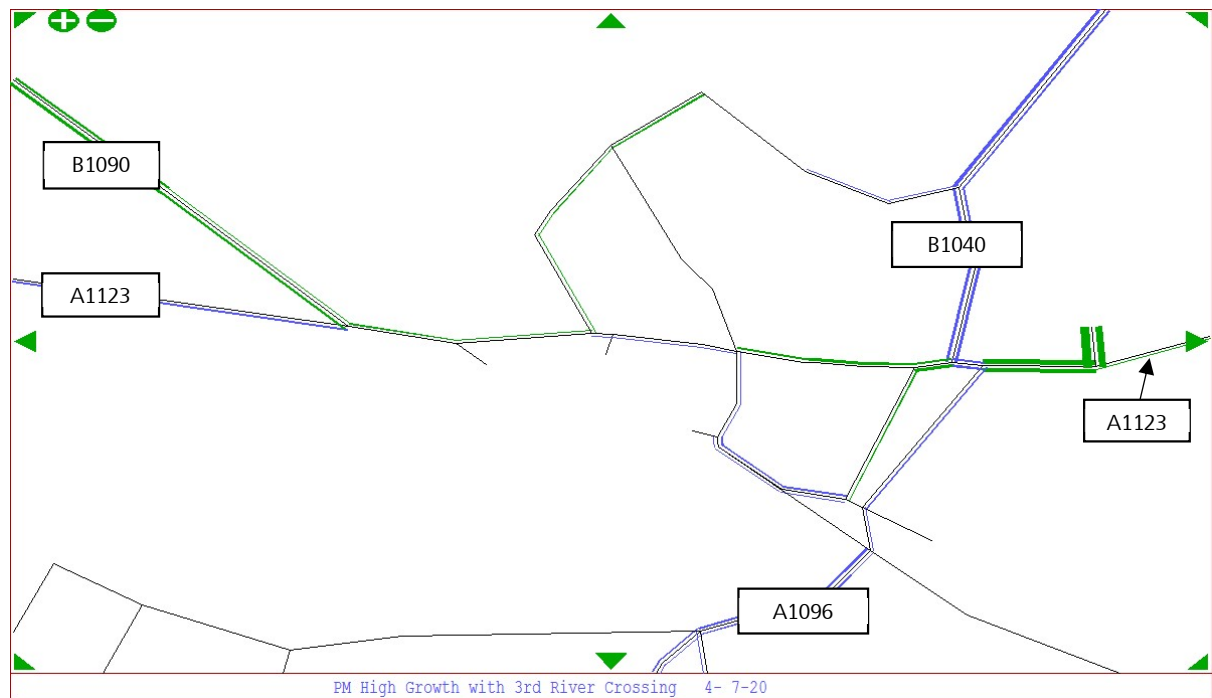


Figure 6.7: 2036 PM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in St Ives, High Growth Scenario

- 6.4.17. Figure 6.7 shows a similar pattern to the AM peak hour within St Ives, with a large increase in trips in both directions along the A1123 to the east of the town as a result of the Gifford's Park development. This traffic passes through Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) which is already at, or over capacity as demonstrated by the junction capacity analysis in the following section.
- 6.4.18. The location of a Third River Crossing to the west of St Ives, in conjunction with growth at Gifford's Park to the east of town, serves to draw trips along the A1123 through St Ives. An increase of approximately 125 eastbound trips is expected during the PM peak hour along the A1123 through the town, which will exacerbate existing capacity issues along the A1123.
- 6.4.19. There is expected to be a reduction in trips along the B1040 Somersham Road, as trips from the northeast re-route via the A141 further to the north to access a new river crossing. Trips from the A1123 Houghton Hill Road also re-route, and divert onto the B1090 Sawtry Way to access to a Third River Crossing, which joins the A141 further to the north.

# High Growth Plus (AM Peak Hour)

- 6.4.20. Figure 6.8 shows the impact of a Third River Crossing, compared to the DM scenario, in Huntingdon for the 2036 AM peak hour in the HG+ scenario.

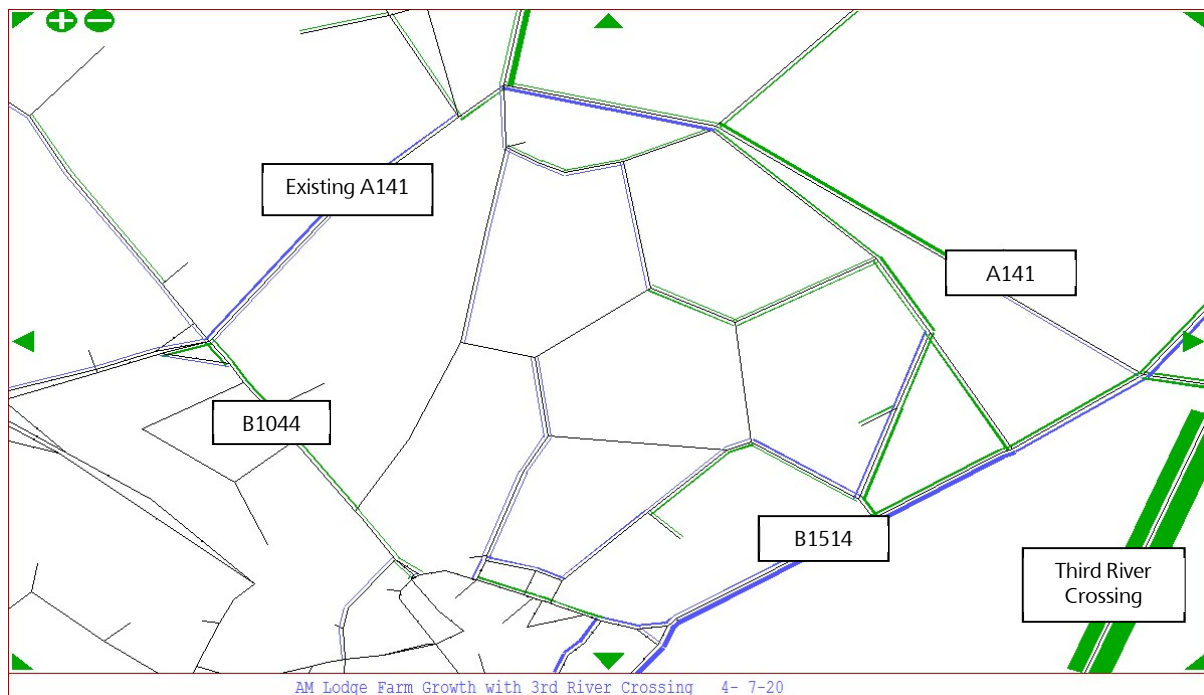


Figure 6.8: 2036 AM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in Huntingdon, High Growth Plus Scenario

- 6.4.21. Figure 6.8 shows that there is expected to be an increase of approximately 375 trips westbound along the A141 towards Junction E (A141 / Kings Ripton Road) with the addition of the Land North of Huntingdon growth in the HG+ scenario. Note that the modelling assumptions include an access from this growth site onto the A141 in this location (and a second access onto the A141, to the northeast, just south of the A141 / B1090 Sawtry Way (Wyton Roundabout)).
- 6.4.22. The benefits provided to the B1514 by a Third River Crossing are diminished compared to the HG scenario, and there is expected to be an increase of approximately 140 northbound trips along the northern end of the road as it approaches Junction F (A141 / A1123 / B1514, BP Roundabout). This increase in trips occurs as more trips re-route via Sapley Road to avoid junction capacity issues along the existing A141, and approach Junction F (A141 / A1123 / B1514, BP Roundabout) from the south, rather than the west.
- 6.4.23. Figure 6.9 shows the impact of a Third River Crossing, compared to the DM scenario, in St Ives for the 2036 AM peak hour in the HG+ scenario.

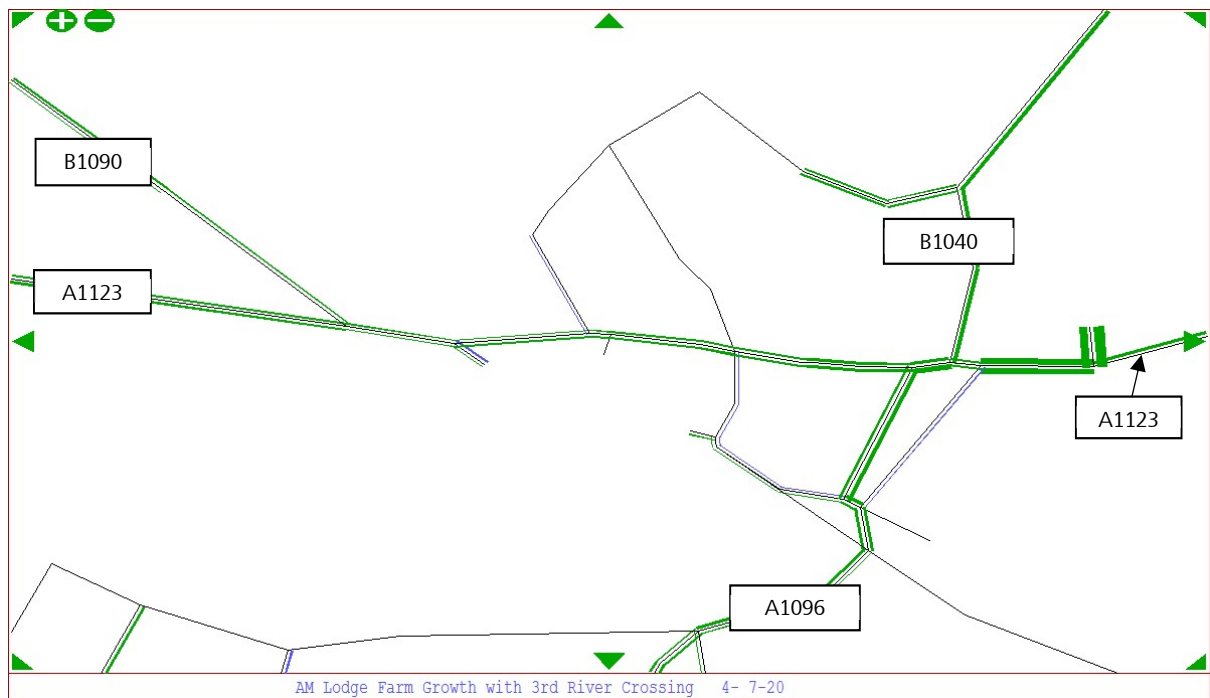


Figure 6.9: 2036 AM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in St Ives, High Growth Plus Scenario

- 6.4.24. The addition of the Land North of Huntingdon Growth in the HG+ scenario leads to an increase in traffic flow throughout St Ives, even with a Third River Crossing provided.
- 6.4.25. As with the HG scenario, the location of a Third River Crossing to the west of St Ives, in conjunction with growth at Gifford's Park to the east of town, serves to draw trips along the A1123 through St Ives. This is exacerbated in the HG+ scenario and an increase of between 200 – 250 trips in both directions is expected during the AM peak hour, an increase that cannot be easily mitigated given the existing constraints along the A1123 in St Ives.

## High Growth Plus (PM Peak Hour)

- 6.4.26. Figure 6.10 shows the impact of a Third River Crossing, compared to the DM scenario, in Huntingdon for the 2036 PM peak hour in the HG+ scenario.

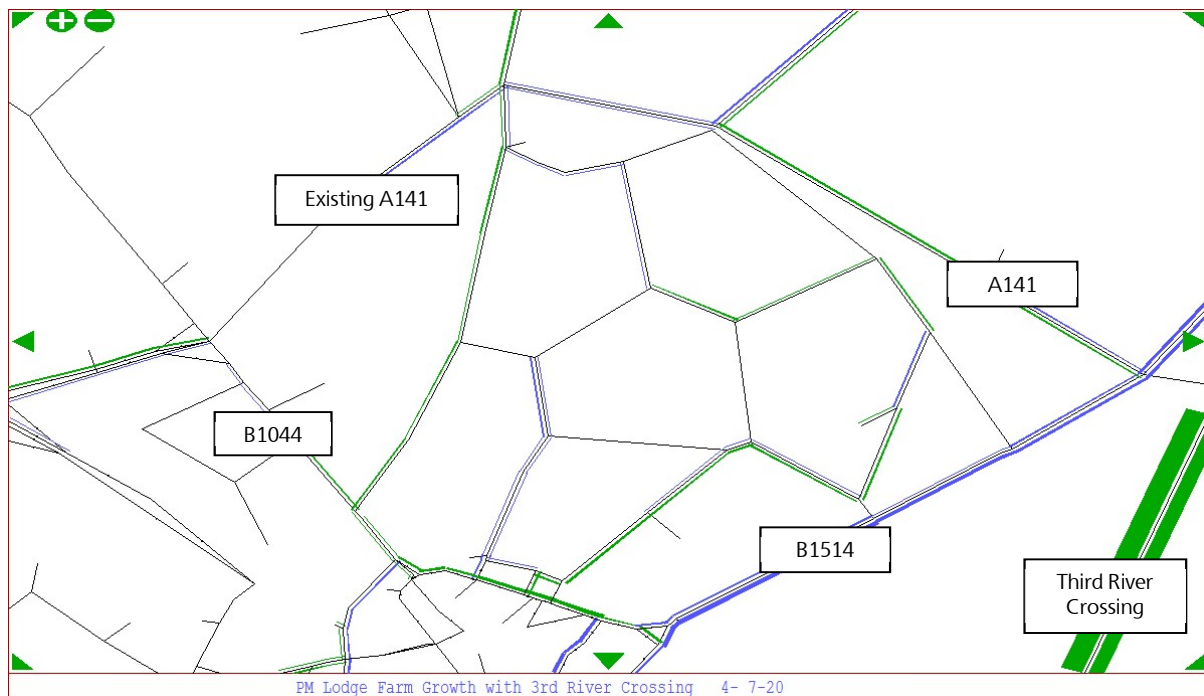


Figure 6.10: 2036 PM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in Huntingdon, High Growth Plus Scenario

- 6.4.27. Figure 6.10 shows that large increases in traffic flow are anticipated along the A141 as trips return to the Land North of Huntingdon growth site during the PM peak hour. There is still a small reduction in trips along the B1514 as a Third River Crossing provides an alternative parallel route. The proximity of the additional growth at Land North of Huntingdon results in a general increase in trips on nearly all roads within Huntingdon, most likely in an attempt to avoid the increasing congestion experienced along the existing A141 (without substantial improvements along that route).
- 6.4.28. Figure 6.11 shows the impact of a Third River Crossing, compared to the DM scenario, in St Ives for the 2036 PM peak hour in the HG+ scenario.

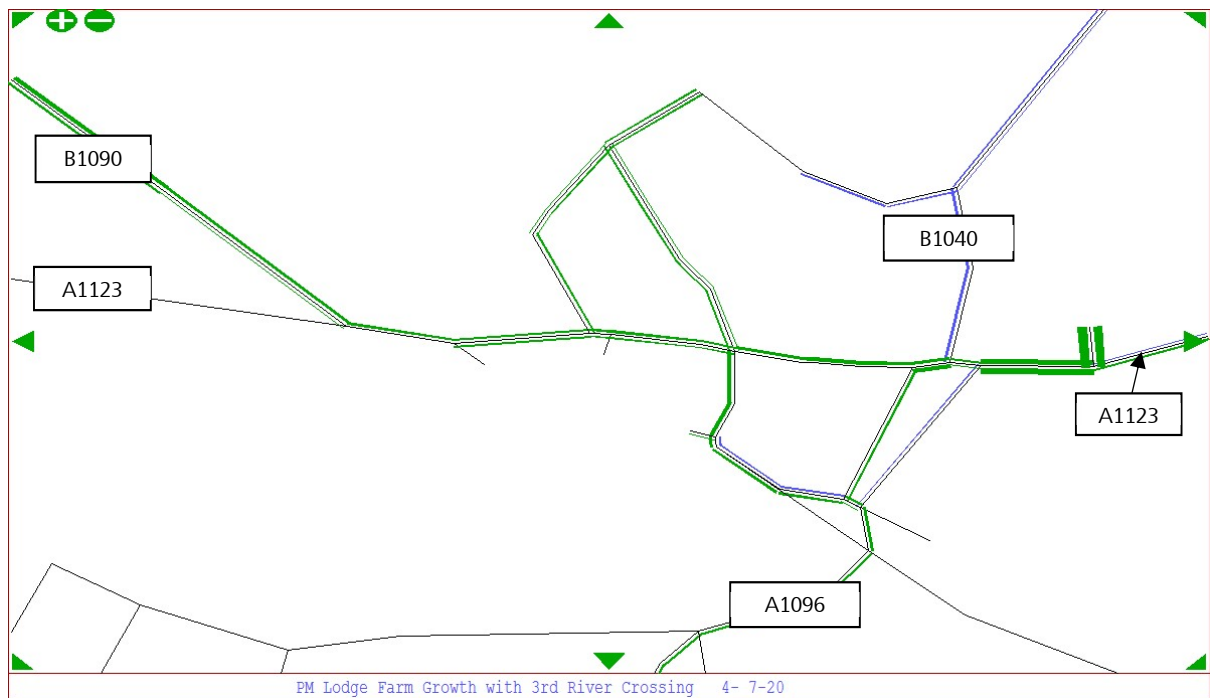


Figure 6.11: 2036 PM Peak Hour, Traffic Flow Differences between Third River Crossing and DM in St Ives, High Growth Plus Scenario

- 6.4.29. Figure 6.11 shows an increase of approximately 340 westbound trips through St Ives, mostly representing trips destined for Gifford's Park during the PM peak hour. As with Huntingdon, many of the trip decreases shown in St Ives in the HG scenario, are either diminished, or become small increases in the HG+ scenario, as a result of the additional growth to the north of Huntingdon. There is also an increase in trips along routes within St Ives including Ramsey Road (north and south of the A1123) as trips re-route in an attempt to avoid congestion along the A1123.
- 6.4.30. The reduction in trips along the B1040 again occurs as a result of trips from the A141 Warboys vicinity switching from the B1040 and A1096, onto the A141 and Third River Crossing, to access the A1307.

## Comparison of Third River Crossing with A141 Bypass

### Junction Capacity Analysis

- 6.4.31. The impact on capacity at each of the key junctions within the study area has been assessed for both a Third River Crossing and A141 bypass, for each of the growth scenarios. The results of this analysis are shown below in Table 6.1.
- 6.4.32. As with the A141 Strategic Assessment, junction performance has been measured as a ratio of volume to capacity ( $v/c$ ) for the busiest approach of each junction, and is colour coded as follows:
- Green –  $V/C$  ratio less than 70% (junction is operating within capacity)
  - Amber –  $V/C$  ratio between 70% - 85% (junction operating close to its operational capacity, with some associated queuing and delay)
  - Red –  $V/C$  ratio greater than 85% (junction operating at or beyond its operational capacity, with associated queuing and delay).
- 6.4.33. It should be noted that strategic models are by nature generalised, as they model average conditions over the course of an hour (or longer depending on the model parameters), rather than capture specific traffic profiles or “peaks” within the modelled time period (this level of detail is considered within the operational modelling).
- 6.4.34. As a result of this, model results may not always reflect acute conditions at particular times during peak hours, as in reality conditions vary within the hour. Some junctions may show as being within capacity over the course of a modelled hour, but in reality experience periods during that hour when they are at or over capacity.
- 6.4.35. Nonetheless, strategic models provide a valuable tool for the appraisal of transport schemes as they enable different scenarios to be measured relative to each other, showing where conditions are expected to improve or deteriorate as a result of different growth scenarios, or highway interventions.
- 6.4.36. The results are discussed below by growth scenario for the AM peak hour, and PM peak hour respectively.
- 6.4.37. Please note that the DM HLP growth scenario is provided as a point of reference for the HG and HG+ scenarios, and that neither the A141 bypass nor a Third River Crossing is required to facilitate the HLP growth.
- 6.4.38. Table 6.1 below shows the results of the comparison of junction performance for the AM peak hour. Note that the A141 bypass (Y series junctions) do not feature in a Third River Crossing scenario, and so there are no results for those junctions in a Third River Crossing scenario.



Table 6.1: Third River Crossing vs A141 Bypass: 2036 AM Peak Hour Junction Capacities (V / C ratios)

Junction	AM Peak Hour (V/C Ratio)				
	DM	High Growth		High Growth Plus	
	HLP	A141 Bypass	Third River Crossing	A141 Bypass	Third River Crossing
A – A1307 / A141 (Spittals Interchange)	62	67	59	68	68
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	99	44	96	53	97
C – A141 Spittals Way / Latham Road / Washingley Road	31	13	30	15	29
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	63	51	64	67	72
E – A141 Spittals Way / Kings Ripton Road	94	44	99	91	96
F – A141 Spittals Way / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	92	54	91	62	88
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	39	68	64	109	81
J – A1123 Houghton Road / B1090 Sawtry Way	56	56	65	66	68
K – A1123 Houghton Road / Hill Rise	65	67	66	71	72
L – A1123 Houghton Road / Ramsey Road	35	42	36	52	44
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	75	88	86	92	91
N – B1514 Hartford Road / B1514 Nursery Road	37	41	26	53	34
O – B1514 Castle Moat Road / B1044	45	44	31	65	36
R – A1096 Harrison Way / Meadow Lane	66	69	61	82	79
S – A1096 Harrison Way / Guided Busway	57	58	53	64	62
T – A1096 Harrison Way / Low Road	67	68	62	75	77
U – A1096 London Road / A1307 (Galley Hill)	53	53	53	62	60
V – B1514 Main Street / Desborough Road	65	75	44	94	63
X – B1040 Somersham Road / Marley Road	52	54	45	62	61
Y1 – A141 Bypass / Spittals Way / Western Connection	N/A	75	N/A	78	N/A
Y2 – A141 Bypass / Ermine Street	N/A	86	N/A	82	N/A
Y3 – A141 Bypass / Huntingdon Road	N/A	72	N/A	76	N/A
Y4 – A141 Bypass / Kings Ripton Road	N/A	62	N/A	63	N/A
Y5 – A141 Bypass / B1090 Sawtry Way	N/A	70	N/A	78	N/A
Z1 – Wyton Airfield – Northern Access	39	50	51	60	62
Z2 – Wyton Airfield – Southern Access	39	60	61	74	85
Z3 – Gifford's Park Development Access	42	64	67	73	73
Z4 – Area to the North of Huntingdon (South Access)	53	21	59	19	23

#### High Growth (AM Peak Hour)

- 6.4.39. The results show that a Third River Crossing does not address the capacity issues along the A141 during the AM peak hour, and Junctions B, E and F operate at or close to capacity, meaning that they will experience significant congestion and delay. The A141 bypass however, brings all of the A141 junctions back within capacity.
- 6.4.40. Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) remains over capacity in the Third River Crossing option, and does not address the capacity issues that also occur there with the A141 bypass.
- 6.4.41. The results indicate that several of the junctions along the A141 bypass will be approaching capacity. The HG assessment has highlighted that further capacity would be needed at these junctions, and this was considered further during Operational Assessment (Chapter 5).

#### High Growth Plus (AM Peak Hour)

- 6.4.42. The results from the HG+ scenario shows that the additional development at Land North of Huntingdon puts additional strain on multiple junctions throughout the model network.
- 6.4.43. The results show that there are still capacity issues along the A141 with a Third River Crossing in the HG+ scenario. Junction G (Wyton Roundabout) performs better than in the A141 bypass scenario as access to a Third River Crossing is located to the south of Wyton Roundabout, and this draws more trips from the additional growth site south away from Wyton Airfield and Junction G, as opposed to the A141 bypass which naturally draws more trips to the north and through Wyton Roundabout itself.
- 6.4.44. Junctions E and G operate at, or over capacity with the A141 bypass, as a direct result of the growth at Land North of Huntingdon, which is located adjacent to these junctions.
- 6.4.45. Several other junctions along the A1123 and A1096 in St Ives also approach capacity in the HG+ scenario, and this is consistent with both options. Junction M again remains over capacity in both options and a Third River Crossing does not offer any improvement over the A141 bypass at this location.

Table 6.2: Third River Crossing vs A141 Bypass: 2036 PM Peak Hour Junction Capacities (V / C ratios)

Junction	PM Peak Hour (V/C Ratio)						
	DM		High Growth			High Growth Plus	
	HLP		A141 Bypass	Third River Crossing		A141 Bypass	Third River Crossing
A – A1307 / A141 (Spittals Interchange)	55		64	52		67	57
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	97		51	94		67	98
C – A141 Spittals Way / Latham Road / Washingley Road	27		15	28		20	26
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	74		59	74		78	74
E – A141 Spittals Way / Kings Ripton Road	100		53	103		86	104
F – A141 Spittals Way / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	95		63	94		71	86
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	43		82	68		105	86
J – A1123 Houghton Road / B1090 Sawtry Way	58		62	67		68	69
K – A1123 Houghton Road / Hill Rise	65		72	68		79	75
L – A1123 Houghton Road / Ramsey Road	39		47	37		56	52
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	85		96	95		100	101
N – B1514 Hartford Road / B1514 Nursery Road	70		73	60		80	72
O – B1514 Castle Moat Road / B1044	58		68	49		78	53
R – A1096 Harrison Way / Meadow Lane	70		72	67		77	75
S – A1096 Harrison Way / Guided Busway	61		62	58		65	64
T – A1096 Harrison Way / Low Road	78		78	71		86	82
U – A1096 London Road / A1307 (Galley Hill)	65		65	61		67	69
V – B1514 Main Street / Desborough Road	99		103	65		109	79
X – B1040 Somersham Road / Marley Road	62		60	51		62	57
Y1 – A141 Bypass / Spittals Way / Western Connection	N/A		72	N/A		75	N/A
Y2 – A141 Bypass / Ermine Street	N/A		80	N/A		80	N/A
Y3 – A141 Bypass / Huntingdon Road	N/A		80	N/A		96	N/A
Y4 – A141 Bypass / Kings Ripton Road	N/A		67	N/A		72	N/A
Y5 – A141 Bypass / B1090 Sawtry Way	N/A		67	N/A		84	N/A
Z1 – Wyton Airfield – Northern Access	45		53	54		63	65
Z2 – Wyton Airfield – Southern Access	45		66	67		82	87
Z3 – Gifford’s Park Development Access	47		66	70		68	74
Z4 – Area to the North of Huntingdon (South Access)	56		31	59		20	23

# High Growth (PM Peak Hour)

- 6.4.46. The results show that in the HG scenario, the A141 bypass improves junction performance along the existing A141 and brings each of the junctions back within capacity. These junctions all remain very close to, or over capacity in a Third River Crossing option.
- 6.4.47. Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) is very close to capacity in the HG scenario in both options with a V / C ratio of 95%. This is an issue that has developed since the DM HLP growth scenario as a result of the additional development at Gifford's Park immediately to the east of this junction.
- 6.4.48. The A141 bypass leads to a deterioration in performance at Junction V (B1514 Main Street / Desborough Road) along the eastern side of Huntingdon, as traffic uses the B1514 to access the A1307 south of Huntingdon from the north / northeast in the absence of a Third River Crossing. Mitigation measures for this junction have been identified in the Operational Assessment of the A141 bypass, and are discussed in Chapter 5.
- 6.4.49. Figure 6.12 below shows how the increase in trips along a Third River Crossing results in a decrease in trips along the parallel B1514 route. Again, green represents an increase in trips, and blue represents a decrease.

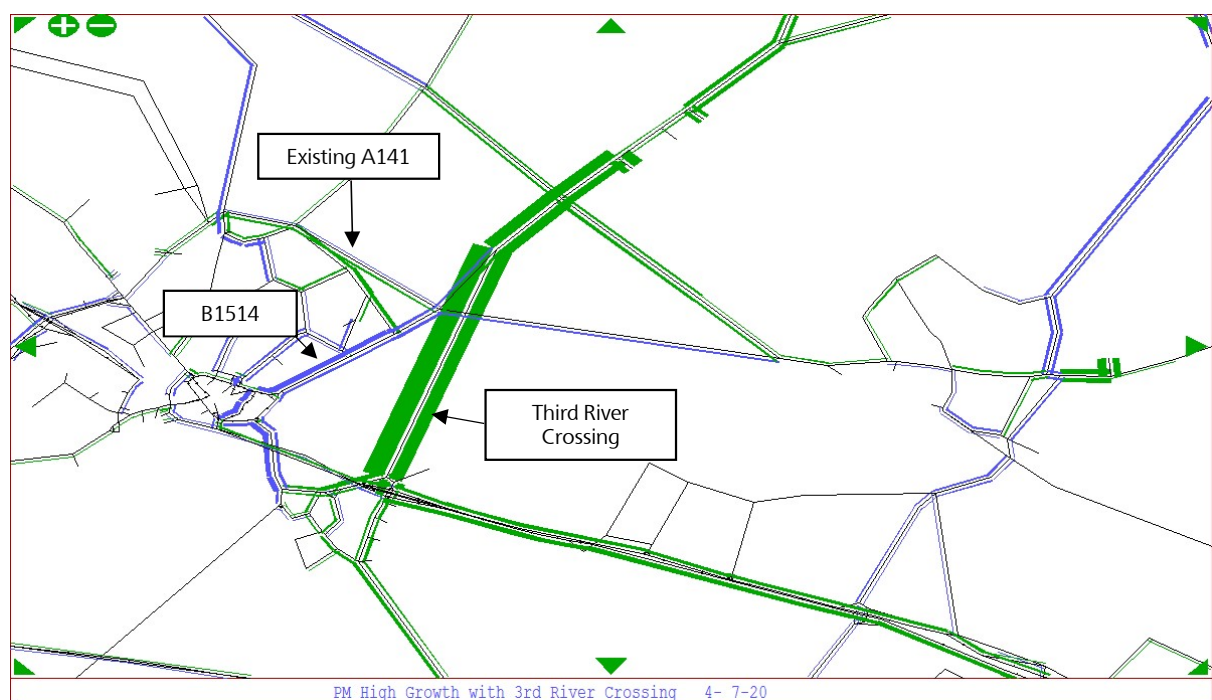


Figure 6.12: PM Peak Hour Impact of Third River Crossing in the High Growth Scenario

- 6.4.50. Figure 6.12 shows that, despite attracting a large number of trips, a Third River Crossing on its own would not lead to a reduction in vehicles along the existing A141, and consequently would not address the capacity issues on that route. This would require further mitigation, and a Third River Crossing also fails to address junction capacity issues at Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) in St Ives. The A141 bypass on its own, however, would provide a significant improvement along the existing A141, and only requires further mitigation at the B1514 Main Street / Desborough Road Junction

#### High Growth Plus (PM Peak Hour)

- 6.4.51. In the HG+ Scenario, junction capacity issues develop at several junctions along the A141 for both options, which is to be expected given the proximity of the additional 4,500 dwellings to the north of the existing A141.
- 6.4.52. The results also identify that Junction G, the A141 / B1090 Sawtry Way (Wyton Roundabout) approaches or exceeds capacity in both options. The A141 bypass option performs slightly worse at this location, which is reasonable given that the bypass channels traffic directly through the junction.
- 6.4.53. Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) is very close to, or over capacity for both options, which is consistent with the HG scenario, and also the DM scenario.
- 6.4.54. The performance of several junctions along the B1514 and A1096 also deteriorates in the HG+ scenario, with several approaching capacity. The performance of junctions along the B1514 is worse in the A141 bypass option, as a Third River Crossing serves as an alternative route B1514 for trips to / from the A1307.

#### Junction Capacity Summary

- 6.4.55. The provision of an A141 bypass in the HG scenario has greater benefit on junction capacities within the study area than the provision of a Third River Crossing, in both peak hours. This is most critical along the existing A141, where junctions remain over capacity with a Third River Crossing, but are brought back within capacity with the A141 Bypass.
- 6.4.56. The junction capacity results confirm that both the HG and HG+ scenarios exacerbate the capacity issues at Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) in St Ives, which remains over capacity in all scenarios as a result of the additional growth at Gifford's Park. This has been explored in much greater detail within the Operational Assessment (Chapter 5), which determined that a more strategic intervention was required to deliver additional growth in St Ives.
- 6.4.57. Both options see a significant deterioration in junction capacities during both peaks in the HG+ scenario. A Third River Crossing provides greater benefit along the adjacent B1514, however these small benefits are offset by the junction capacity issues along the A141, which deteriorate in a Third River Crossing option.

### Traffic Flow and Routing Analysis

- 6.4.58. The strategic model has been used to review the impact of the A141 bypass and a Third River Crossing on traffic flow and vehicle routing. The key points observed are summarised below for each option and growth scenario, and provide further context to the junction capacity analysis provided above.
- 6.4.59. This analysis has been undertaken for the PM peak hour, when the issues identified in the junction capacity analysis were most prevalent.

### Option 4 (A141 Offline Single Carriageway Bypass)

- 6.4.60. The impact of the A141 bypass on PM peak hour traffic flows in the HG scenario is shown in Figure 6.13 below.

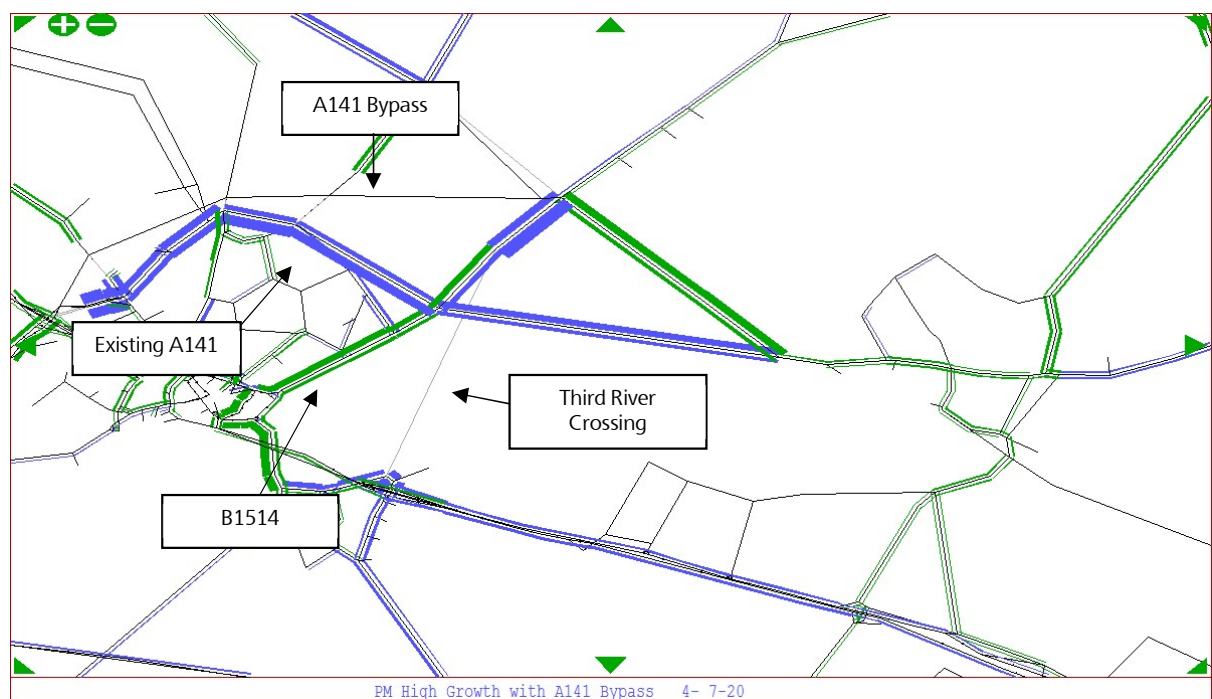


Figure 6.13: 2036 PM Peak Hour Impact of Option 4 in the High Growth Scenario

- 6.4.61. Figure 6.13 shows that the provision of the A141 bypass will lead to significant reductions in traffic along the existing A141 and along the A1123 between Junction F (A141 / B1514 / A1123, BP Roundabout) and Junction J (A1123 Houghton Road / B1090 Sawtry Way) in the HG scenario, which is consistent with the results shown in the junction capacity analysis.
- 6.4.62. These trips have diverted onto the A141 bypass (not visible in this graphic as the infrastructure is not common in both model networks), and then onto the B1090 Sawtry Way, before proceeding towards St Ives, rather than using the existing A141 and the A1123 Houghton Hill Road.
- 6.4.63. The traffic generated by the Gifford's Park development is evident to the east of St Ives, and is a significant factor causing Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) to exceed capacity in the HG and HG+ scenarios.

6.4.64. The impact of the A141 bypass on PM peak hour traffic flows in the HG+ scenario is shown below in Figure 6.14.

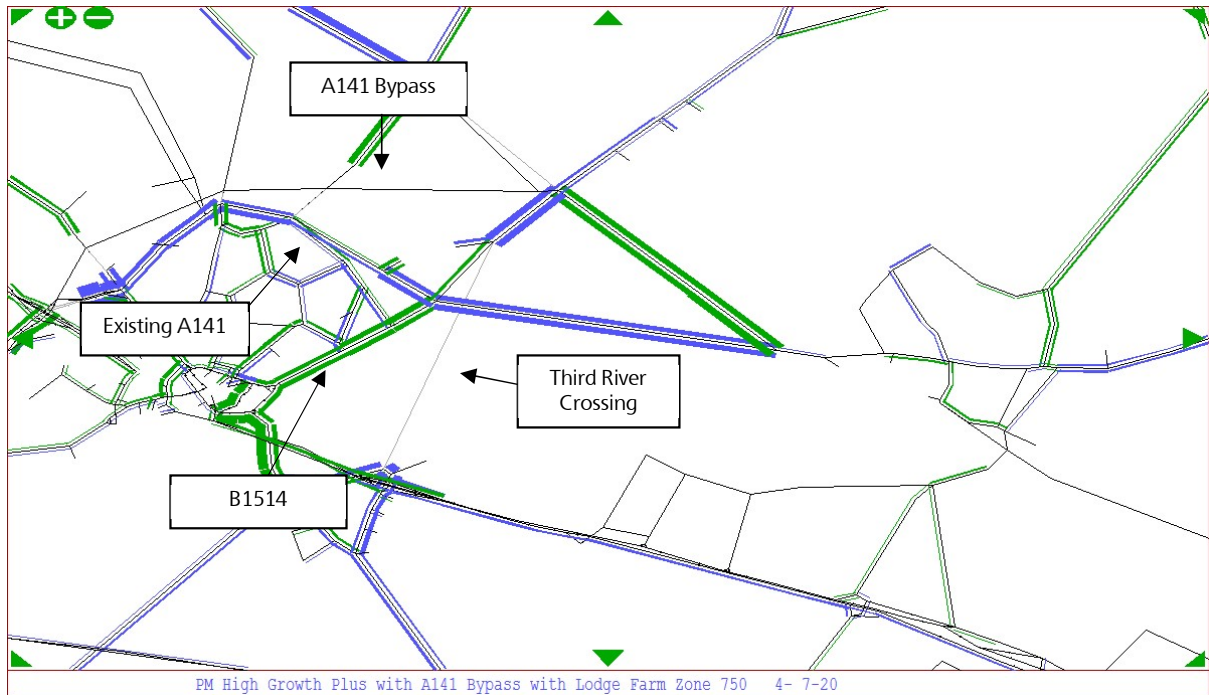


Figure 6.14: 2036 PM Peak Hour Impact of Option 4 in the High Growth Plus Scenario

6.4.65. Many of the impacts identified in the HG scenario (Figure 6.13 above) are consistent in the HG+ scenario. The addition of 4,500 dwellings to the north of Huntingdon further increases pressure on this section of the existing A141 as is evidenced by the failure of several junctions along the existing A141, as identified in the junction capacity analysis.



## Third River Crossing

- 6.4.66. The impact of a Third River Crossing on PM peak hour traffic flows in the HG scenario is shown in Figure 6.15 below.

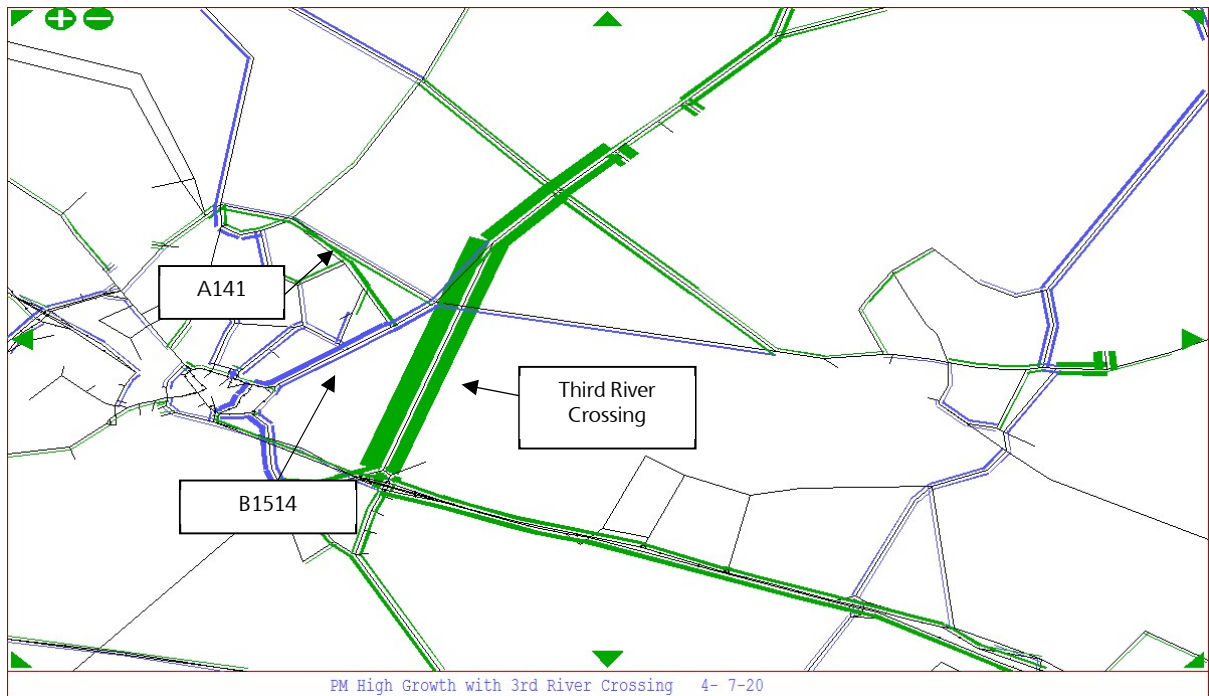


Figure 6.15: 2036 PM Peak Hour Impact of Third River Crossing in the High Growth Scenario

- 6.4.67. Figure 6.15 shows that a Third River Crossing would accommodate a large number of trips between the A1307 in the south to the A141 in the vicinity of the Wyton Airfield development.
- 6.4.68. A Third River Crossing reduces trips along the B1514 along the eastern side of Huntingdon, offering capacity benefits along this route that do not occur with the A141 bypass. However, a Third River Crossing would not result in any significant reductions in traffic along the existing A141, and those junctions remain over capacity with this option.
- 6.4.69. As with the A141 bypass option, the impact of the Gifford's Park development is evident on the eastern side of St Ives.



- 6.4.70. The impact of a Third River Crossing on PM peak hour traffic flows in the HG+ scenario is shown in Figure 6.16 below.

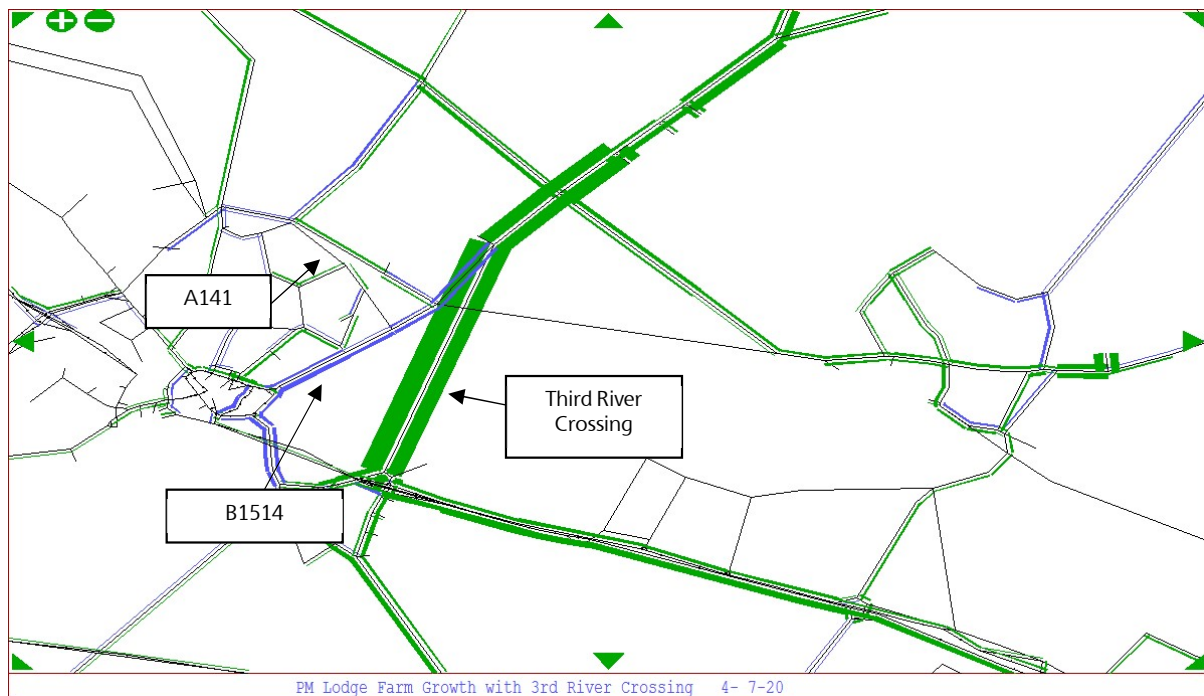


Figure 6.16: 2036 PM Peak Hour Impact of Third River Crossing in the High Growth Plus Scenario

- 6.4.71. Many of the impacts identified in the HG scenario (Figure 6.16 above) are consistent in the HG+ scenario. The benefits that are provided along the B1514 as a result of a Third River Crossing are diminished and there are further increases in traffic flow along the existing A141 as a result of the additional traffic in this growth scenario, which further exacerbates the issues along this route.
- 6.4.72. The analysis of the impact of the two options on traffic flows during the PM peak hour has shown results that are consistent with the junction capacity analysis and confirms the patterns identified in the earlier analysis of the impact of a Third River Crossing on traffic flows in Huntingdon and St Ives, demonstrating that the A141 bypass will offer greater transport benefits, than a Third River Crossing, to deliver additional growth beyond that identified within the HLP.

## Sensitivity Test 1: Third River Crossing with A141 Junction Capacity Improvements

- 6.4.73. The Strategic Assessment of a Third River Crossing has shown that it does not resolve the congestion and delay issues currently identified along the existing A141. Therefore a sensitivity test was undertaken to determine if the provision of capacity improvements along the existing A141, in conjunction with a Third River Crossing, would offer more benefit and result in performance comparable to the A141 bypass.
- 6.4.74. The Strategic Assessment of the A141 considered a series of potential capacity improvements along the existing A141 including local junction improvements, signalisation and dualling. It identified that dualling of the existing A141 is unlikely to resolve the issues along the route, as the congestion and delay are caused by junction capacity issues rather than link capacity issues.
- 6.4.75. Therefore junction capacity improvements were assumed along the route between Junction A (A141 / A1307 - (Spittals Interchange) and Junction F (A141 / A1123 / B1514 Junction - BP Roundabout). This assessment has been undertaken for the PM peak hour only, which is where junction capacity issues along the existing A141 were most prevalent.
- 6.4.76. The results for the PM peak hour are shown below in Table 6.3. This assessment has been undertaken using the HG scenario as earlier analysis has demonstrated that both the A141 and Third River Crossing struggle to accommodate the additional growth within the HG+ scenario.

Table 6.3: A141 Capacity Improvement Sensitivity Test: 2036 PM Peak Hour Junction Capacities (V / C ratios)

Junction	PM Peak Hour (V/C Ratio)	
	High Growth	
	Third River Crossing	Third River Crossing + A141 Capacity Improvements
A – A1307 / A141 (Spittals Interchange)	52	54
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	94	93
C – A141 Spittals Way / Latham Road / Washingley Road	28	31
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	74	72
E – A141 Spittals Way / Kings Ripton Road	103	93
F – A141 Spittals Way / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	94	88
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	68	68
J – A1123 Houghton Road / B1090 Sawtry Way	67	77
K – A1123 Houghton Road / Hill Rise	68	71
L – A1123 Houghton Road / Ramsey Road	37	39
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	95	95
N – B1514 Hartford Road / B1514 Nursery Road	60	59
O – B1514 Castle Moat Road / B1044	49	44
R – A1096 Harrison Way / Meadow Lane	67	67
S – A1096 Harrison Way / Guided Busway	58	57
T – A1096 Harrison Way / Low Road	71	70
U – A1096 London Road / A1307 (Galley Hill)	61	62
V – B1514 Main Street / Desborough Road	65	72
X – B1040 Somersham Road / Marley Road	51	52
Z1 – Wyton Airfield – Northern Access	54	54
Z2 – Wyton Airfield – Southern Access	67	69
Z3 – Gifford's Park Development Access	70	70
Z4 – Area to the North of Huntingdon (South Access)	59	68

- 6.4.77. The results of this assessment show that a Third River Crossing, delivered in conjunction with junction capacity improvements along the existing A141, has minimal impact on junction performance, and many junctions along the A141 remain close to, or at capacity.
- 6.4.78. In addition to this, junction performance at several junctions along the A1123 suffers, and Junction J (A1123 Houghton Road / B1090 Sawtry Way) and Junction K (A1123 Houghton Road / Hill Rise) begin to approach capacity with V / C ratios of 77% and 71% respectively<sup>26</sup>. This occurs as the additional capacity provided along the A141 attracts more trips from St Ives, as explained in the analysis below.
- 6.4.79. Analysis of traffic flows within the model indicates that the junction capacity improvements along the A141 serve to draw traffic away from a Third River Crossing, and back onto the A141 and Huntingdon Town Centre Network, and the additional capacity promotes the use of the A141 over a Third River Crossing as shown in Figure 6.17 below.

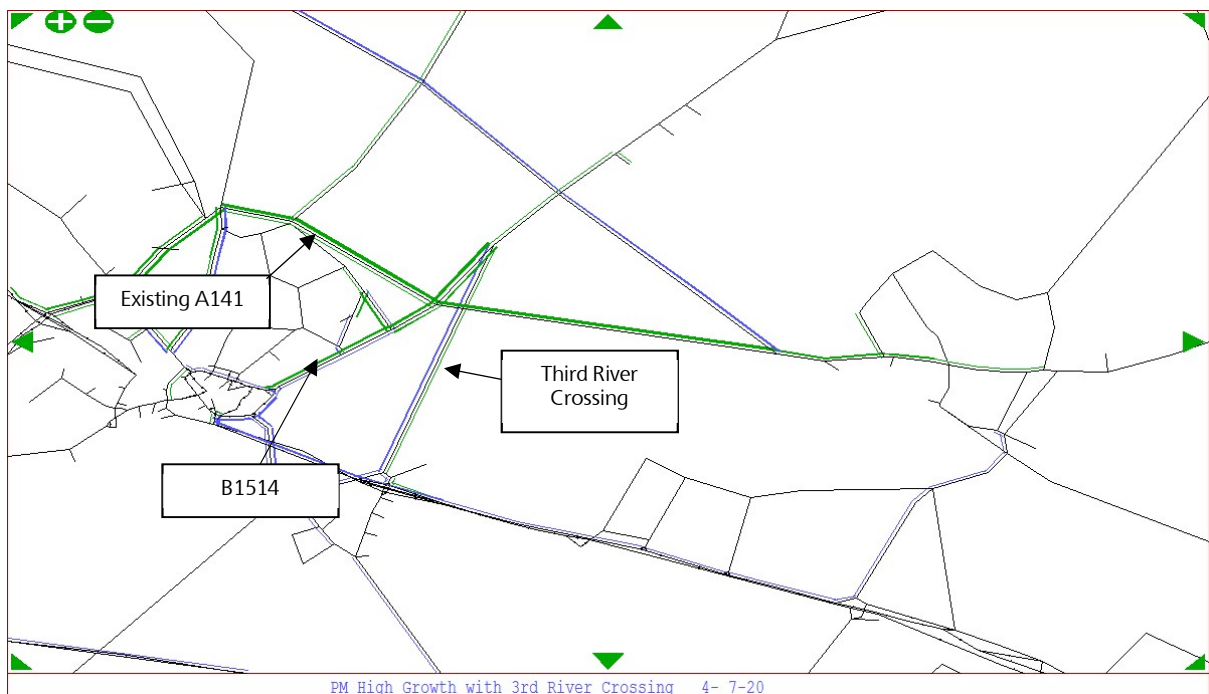


Figure 6.17: 2036 PM Peak Hour Impact of Option 4 in the High Growth Scenario

- 6.4.80. The sensitivity test demonstrates that a Third River Crossing, even with capacity improvements along the existing A141, does not address the congestion and delay issues along the A141. The provision of additional capacity on the A141 makes it a more attractive route, and removes trips from a Third River Crossing.

<sup>26</sup> It should be noted that the strategic modelling considers junction performance over the course of an hour, and that conditions may be worse at certain times within the peak hour, as currently experienced.

#### Sensitivity Test 2: Provision of Both a Third River Crossing and A141 Bypass

- 6.4.81. A final assessment has been undertaken to determine whether delivering both a Third River Crossing and an A141 Bypass together would offer significant benefit, and facilitate the HG+ growth scenario.
- 6.4.82. The assessment again considered junction performance, and the results are presented below for the AM peak hour are shown in Table 6.4, below. Note that the new bypass (Y series junctions) do not feature in a Third River Crossing scenario, and so there are no results for those junctions in the Third River Crossing scenario.

Table 6.4: Third River Crossing & A141 Bypass High Growth Plus Test: 2036 AM Peak Hour Junction Capacities (V / C ratios)

Junction	AM Peak Hour (V/C Ratio)		
	High Growth Plus		
	A141 Bypass	Third River Crossing	Third River Crossing + A141 Bypass
A – A1307 / A141 (Spittals Interchange)	68	68	68
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	53	97	48
C – A141 Spittals Way / Latham Road / Washingley Road	15	29	14
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	67	72	69
E – A141 Spittals Way / Kings Ripton Road	91	96	88
F – A141 Spittals Way / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	62	88	44
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	109	81	106
J – A1123 Houghton Road / B1090 Sawtry Way	66	68	59
K – A1123 Houghton Road / Hill Rise	71	72	80
L – A1123 Houghton Road / Ramsey Road	52	44	48
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	92	91	92
N – B1514 Hartford Road / B1514 Nursery Road	53	34	25
O – B1514 Castle Moat Road / B1044	65	36	36
R – A1096 Harrison Way / Meadow Lane	82	79	76
S – A1096 Harrison Way / Guided Busway	64	62	60
T – A1096 Harrison Way / Low Road	75	77	75
U – A1096 London Road / A1307 (Galley Hill)	62	60	58
V – B1514 Main Street / Desborough Road	94	63	36
X – B1040 Somersham Road / Marley Road	62	61	59
Y1 – A141 Bypass / Spittals Way / Western Connection	78	N/A	73
Y2 – A141 Bypass / Ermine Street	82	N/A	76
Y3 – A141 Bypass / Huntingdon Road	76	N/A	74
Y4 – A141 Bypass / Kings Ripton Road	63	N/A	52
Y5 – A141 Bypass / B1090 Sawtry Way	78	N/A	77
Z1 – Wyton Airfield – Northern Access	60	62	60
Z2 – Wyton Airfield – Southern Access	74	85	77
Z3 – Gifford's Park Development Access	73	73	73
Z4 – Area to the North of Huntingdon (South Access)	19	23	20

- 6.4.83. The results show that combining the A141 bypass and Third River Crossing options offers little benefit over the A141 bypass on its own. There is generally a slight improvement in junction across the network, however junctions such as Junction E (A141 / Kings Ripton), Junction G (Wyton Roundabout) and Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Way) all remain at, or over capacity, as they are in the A141 bypass option.
- 6.4.84. The only significant improvement offered by combining a Third River Crossing with the A141 Bypass is at Junction V (B1514 Main Street / Desborough Road), which comes back within capacity as trips from the B1514 divert onto a Third River Crossing to access the A1307.
- 6.4.85. The results for the AM peak hour indicate that the network struggles with the level of additional growth in the HG+ scenario, even when both a Third River Crossing and A141 bypass are delivered.
- 6.4.86. The results for the PM peak hour are shown in Table 6.5 below.

Table 6.5: Third River Crossing & A141 Bypass High Growth Plus Test: 2036 PM Peak Hour Junction Capacities (V / C ratios)

Junction	PM Peak Hour (V/C Ratio)		
	High Growth Plus		
	A141 Bypass	Third River Crossing	Third River Crossing + A141 Bypass
A – A1307 / A141 (Spittals Interchange)	67	57	65
B – A141 Spittals Way / B1044 Stukeley Road / Ermine Street	67	98	57
C – A141 Spittals Way / Latham Road / Washingley Road	20	26	17
D – A141 Spittals Way / Huntingdon Road (Tesco Roundabout)	78	74	74
E – A141 Spittals Way / Kings Ripton Road	86	104	92
F – A141 Spittals Way / A1123 Houghton Road / B1514 Main Street (BP Roundabout)	71	86	65
G – A141 / B1090 Sawtry Way (Wyton Roundabout)	105	86	108
J – A1123 Houghton Road / B1090 Sawtry Way	68	69	69
K – A1123 Houghton Road / Hill Rise	79	75	73
L – A1123 Houghton Road / Ramsey Road	56	52	48
M – A1123 / B1040 Somersham Road / A1096 Harrison Way	100	101	99
N – B1514 Hartford Road / B1514 Nursery Road	80	72	58
O – B1514 Castle Moat Road / B1044	78	53	46
R – A1096 Harrison Way / Meadow Lane	77	75	70
S – A1096 Harrison Way / Guided Busway	65	64	61
T – A1096 Harrison Way / Low Road	86	82	80
U – A1096 London Road / A1307 (Galley Hill)	67	69	65
V – B1514 Main Street / Desborough Road	109	79	53
X – B1040 Somersham Road / Marley Road	62	57	56
Y1 – A141 Bypass / Spittals Way / Western Connection	75	N/A	70
Y2 – A141 Bypass / Ermine Street	80	N/A	76
Y3 – A141 Bypass / Huntingdon Road	96	N/A	90
Y4 – A141 Bypass / Kings Ripton Road	72	N/A	60
Y5 – A141 Bypass / B1090 Sawtry Way	84	N/A	79
Z1 – Wyton Airfield – Northern Access	63	65	64
Z2 – Wyton Airfield – Southern Access	82	87	85
Z3 – Gifford's Park Development Access	68	74	72
Z4 – Area to the North of Huntingdon (South Access)	20	23	21

- 6.4.87. The results for the PM peak hour are similar to those of the AM peak hour, and demonstrate that both a Third River Crossing and an A141 bypass together offer marginal benefits over the delivery of the A141 bypass on its own.
- 6.4.88. Junction F (A141 / B1514 / A1123, BP Roundabout) approaches capacity in the A141 bypass with a V / C ratio of 71%, and this is reduced to a V / C ratio of 65% in the scenario with both pieces of infrastructure, indicating that it is operating within capacity.
- 6.4.89. There are also improvements along the B1514, at Junction N and Junction O, which are both brought back within capacity, however Junction E (A141 / Kings Ripton Road), Junction G (Wyton Roundabout), Junction M (A1123 / B1040 Somersham Road / A1096 Harrison Road) all remain at or over capacity.
- 6.4.90. The results for both the AM and PM peak hour demonstrate that delivering the A141 bypass plus a Third River Crossing offers marginal benefit to delivering the A141 bypass on its own, and network wide junction capacity issues still remain in the HG+ scenario.

#### Strategic Assessment Summary

- 6.4.91. The comparison of the Third River Crossing with the A141 bypass has shown that the A141 bypass offers greater benefit, than a Third River Crossing, 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 a Third River Crossing does not.
- 6.4.92. Sensitivity testing was undertaken to determine if a Third River Crossing, in conjunction with junction capacity improvements along the A141, would address capacity issues along the A141 and support additional growth. The sensitivity test concluded that significant capacity issues would still remain along the A141, with many junctions being at, or over capacity. The test also demonstrated that any capacity improvement along the A141 would draw more trips away from a Third River Crossing, confirming an A141 bypass would be preferable.
- 6.4.93. A final test considering a Third River Crossing along with an A141 Bypass was undertaken to understand if delivering both options together could support the HG+ scenario. This concluded that the combination of a Third River Crossing and the A141 bypass did not provide any significant improvement beyond delivery of the A141 bypass alone, and network wide junction capacity issues still remained in the HG+ scenario.



## 6.5. Consideration of Costs

- 6.5.1. High level cost estimates have been produced to gauge an appreciation of the magnitude of costs associated with a Third River Crossing and an A141 bypass, enabling a comparison between the two. It should be noted that these costs are not formal cost estimates, and are not based on any design work, but have been produced using generic tools for comparative purposes only, to understand the potential costs of different options relative to each other.
- 6.5.2. Option costs have been calculated using aerial imagery and local mapping to determine the approximate length, size and component parts of each option in order to generate an option cost using 2019 unit rates.
- 6.5.3. The costing tool also includes allowances for design, preliminary works, supervision, land-take, Stats relocation, risk allowance (20%) and Optimism Bias (44% Highways / 66% Structures), but does not make specific allowances for any environmental mitigation or location specific factors that may inflate final scheme costs.
- 6.5.4. The costing exercise has determined that the cost of an A141 bypass, as defined in Option 4, would be in excess of £155m, and would likely be in the region of £200m. The equivalent cost of a Third River Crossing would be in excess of £450m, meaning that the cost is approximately three times greater than an A141 bypass.
- 6.5.5. The primary consideration in the cost difference between the two schemes is the extent and length of highway structures (bridges) that would be required for a Third River Crossing.

## 6.6. Environmental Assessment

6.6.1. A high level Environmental Assessment has been undertaken to identify the key issues associated with delivering a Third River Crossing between Huntingdon and St Ives. The assessment has also considered the broad area through which the A141 bypass, would pass, to enable a comparison of the environmental factors relating to the two options.

6.6.2. The assessment has identified the presence, and significance, of the following environmental factors:

- Air Quality
- Cultural Heritage
- Ecology and Wildlife
- Landscape
- Noise
- Water Environment.

6.6.3. The extent of the search area used in the Environmental Assessment is shown in Figure 6.18 beneath.

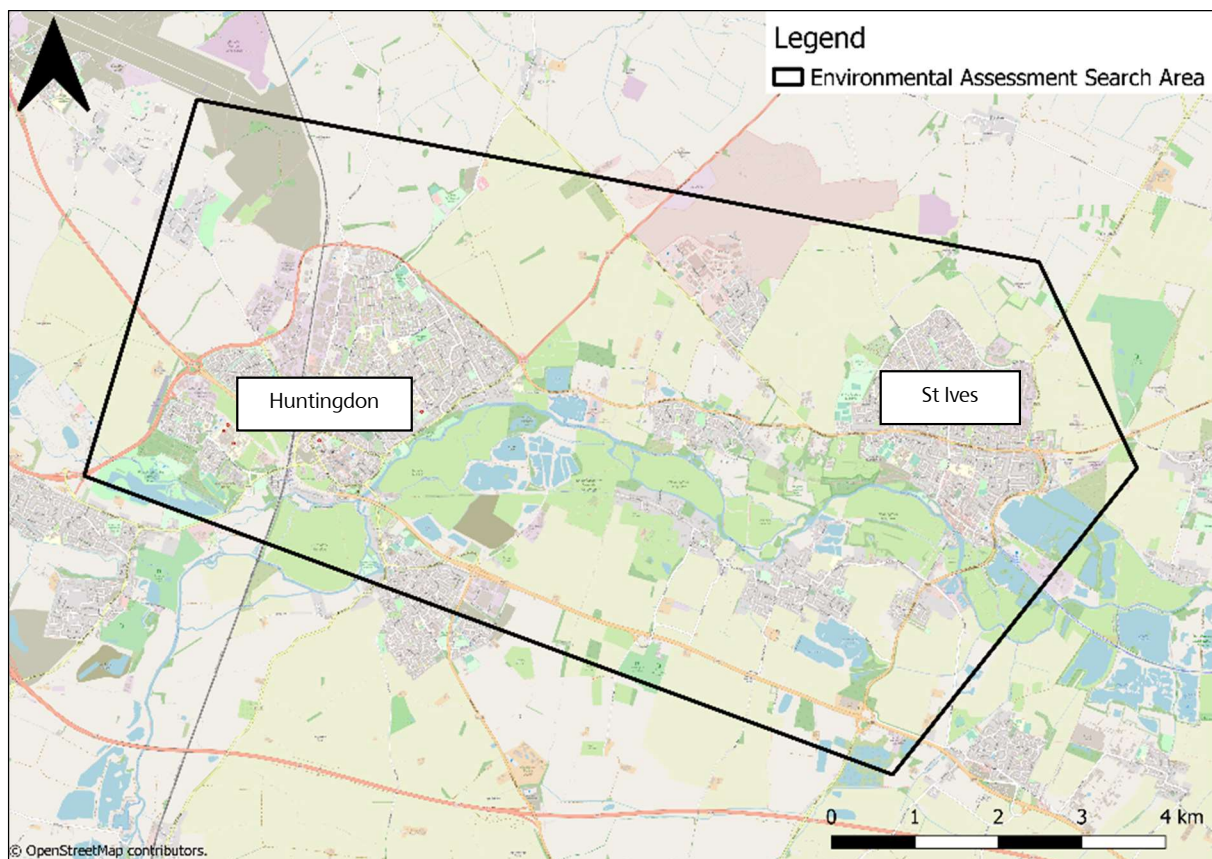


Figure 6.18: Environmental Assessment Search Area

### Overview

- 6.6.4. Figure 6.19 below, provides an overview plan showing the key environmental factors identified within the assessment, with the approximate area of a Third River Crossing and A141 bypass outlined in black.
- 6.6.5. The figure shows that the main environmental issues identified immediately within a Third River Crossing and A141 bypass search areas relate to Flood Risk, Sites of Special Scientific Interest (SSSI) and Air Quality Management Areas (AQMA).
- 6.6.6. Flood risk is far more prevalent within the Third River Crossing area, and much of the land is situated within Flood Risk Zone 2 or 3, which would pose a significant challenge to the viability of a Third River Crossing within this area.
- 6.6.7. Based on the work undertaken during the A141 Strategic Assessment (Chapter 4), the flood risk identified within that search area is not of concern as it is situated to the west of the location of the proposed western connection to the A1307 at Spittals Interchange.
- 6.6.8. There are a total of six SSSI's within the potential alignment area for a Third River Crossing which would potentially affect the alignment of a Third River Crossing.
- 6.6.9. There is a single SSSI within the A141 bypass search area which runs north / south along the embankments of the East Coast Main Line. A bypass in this location would require a highway bridge over the railway line, which would take the road clear of the SSSI within the embankments, although mitigation would still be required as discussed in greater detail below.
- 6.6.10. There are no AQMA's within the Third River Crossing search area. There is a portion of an AQMA situated within the A141 bypass search area which is to the east of the A141 Spittals Way. This is not within the immediate vicinity of an approximate bypass route, air quality within the study area is improving, resulting in the gradual lifting of AQMAs. Transport modelling of the A141 bypass has shown that it will reduce traffic along the A141 Spittals Way, which would further improve air quality at this location.

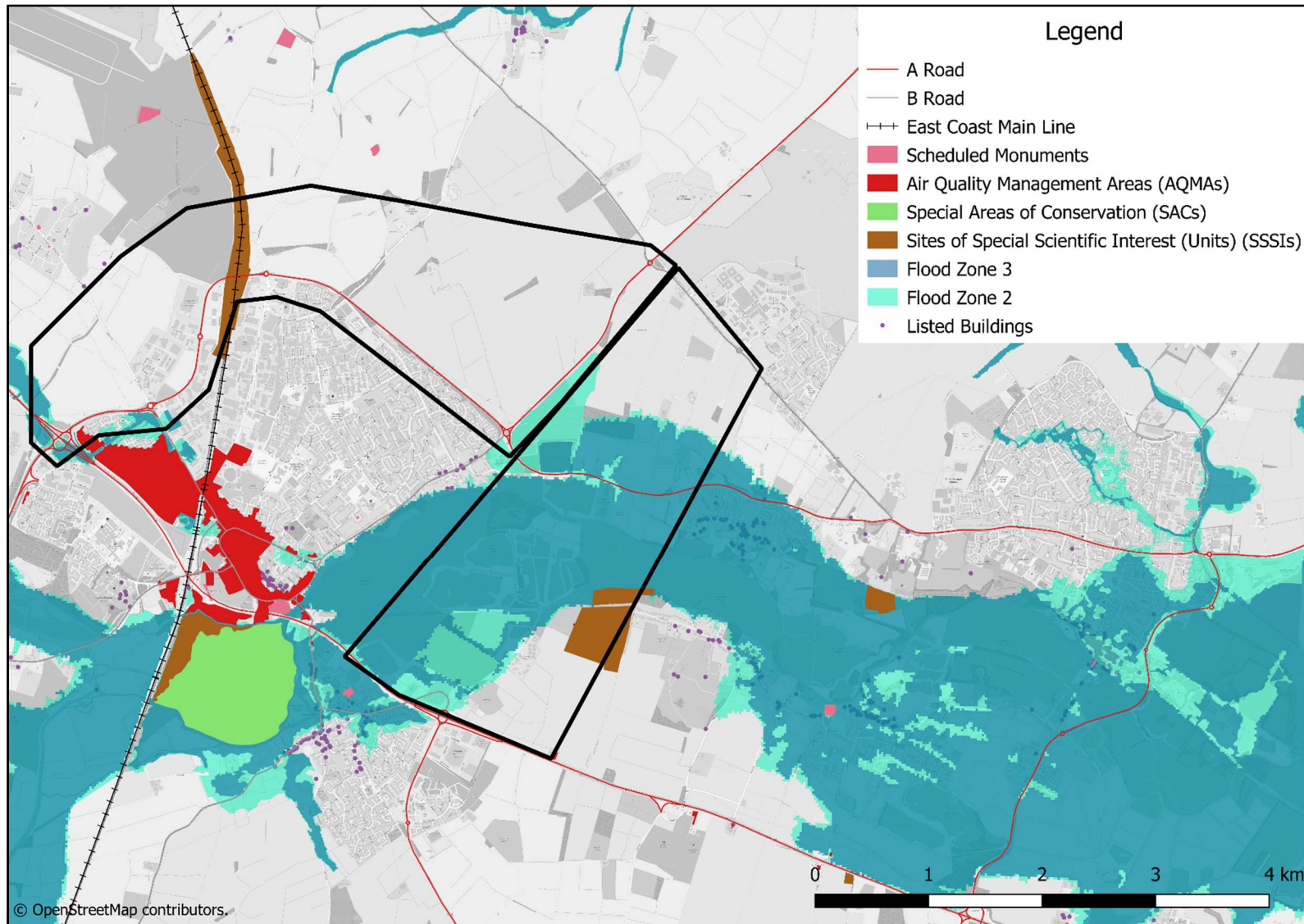


Figure 6.19: Overview Plan of Environmental Assessment



6.6.11. A summary explanation of each of the key factors identified within the broader study area is provided below, and the full reports informing the Environmental Assessment are provided in Appendix C.

#### Air Quality

6.6.12. The biggest air quality risks identified are:

- Air quality trends appear to be improving in the study area and therefore existing AQMAs are being removed. The risk is that the scheme causes a reduction in air quality and the necessity for further AQMAs.
- There is sensitive Ecology in the area, particularly Wetlands habitats. These habitats will need an assessment as to how they might be affected by worsening Air Quality.
- There are numerous sensitive receptors, particularly schools and nurseries in the area.
- There is a general trend in the UK of much more stringent expectations and guidelines around air quality.

6.6.13. There is a Joint Air Quality Action Plan (AQAP) developed by CCC and Huntingdonshire and South Cambridgeshire District Councils. There is a framework for Local Air Quality Management (LAQM) in England and the Air Quality Standards Regulations 2010 are also relevant.

6.6.14. There are 79 Sensitive Human Receptors in the study area: 44 education receptors and 36 medical receptors. Their locations are shown in Figure 6 in Appendix C.

6.6.15. There are three Air Quality Management Areas which have all been declared for Nitrogen Dioxide (NO<sub>2</sub>). The locations of these AQMAs are shown in Figure 6.19 below.



Figure 6.20: AQMAs Relative to the Study Area

- 6.6.16. These are Huntingdon, affecting 2,831 domestic properties; Hemingford to Fenstanton, affecting 62 domestic properties, and Brampton, affecting 82 domestic properties. However, concentrations have reduced over the last 5 years to the extent that revocation of the Hemingford to Fenstanton and Brampton AQMAs is referenced in the most recent Annual Status Report (ASR).
- 6.6.17. In terms of local monitoring locations, there is one automatic monitor and 20 diffusion tubes located across the study area. The monitoring has shown a general downward trend in both NO<sub>2</sub> and PM<sub>10</sub>. The NO<sub>2</sub> annual mean objectives were breached by 3 diffusion tubes in 2018 (all located in Pathfinder House Huntingdon), whilst PM<sub>10</sub> has not exceeded the objective since 2012.

#### Cultural Heritage

- 6.6.18. From a search of MAGIC and Heritage Gateway there are a number of cultural heritage features within the area of search which could potentially be impacted. In summary they are:
- Designated or other cultural heritage resources within the footprint or outside it but still potentially physically affected by it
  - The setting of any designated or other cultural heritage resource in the footprint of the scheme within the zone of visual influence or potentially affected by noise, such as:
    - Historic Milestone Society database: 51 milestones
    - PastScape: 1,253 records of archaeology and buildings of England Monuments and buildings taken from the National Record of the Historic Environment (NRHE)
    - National Trust Historic Buildings, Sites & Monuments Record: 4 records associated with Houghton Mill
    - 44 records in Parks and Gardens UK (web resource dedicated to historic designed landscapes across England, Northern Ireland, Scotland and Wales)
    - National Monuments Record Excavation Index (index to the location of the excavation archives and finds): 421 results
    - Church Heritage Record: 45 church buildings
    - Cambridgeshire Historic Environment Record is the definitive source of information on archaeological sites and finds in the modern county of Cambridgeshire: No records, however, see below.
- 6.6.19. Concentrations of these features are shown in Figure 6.21 below.

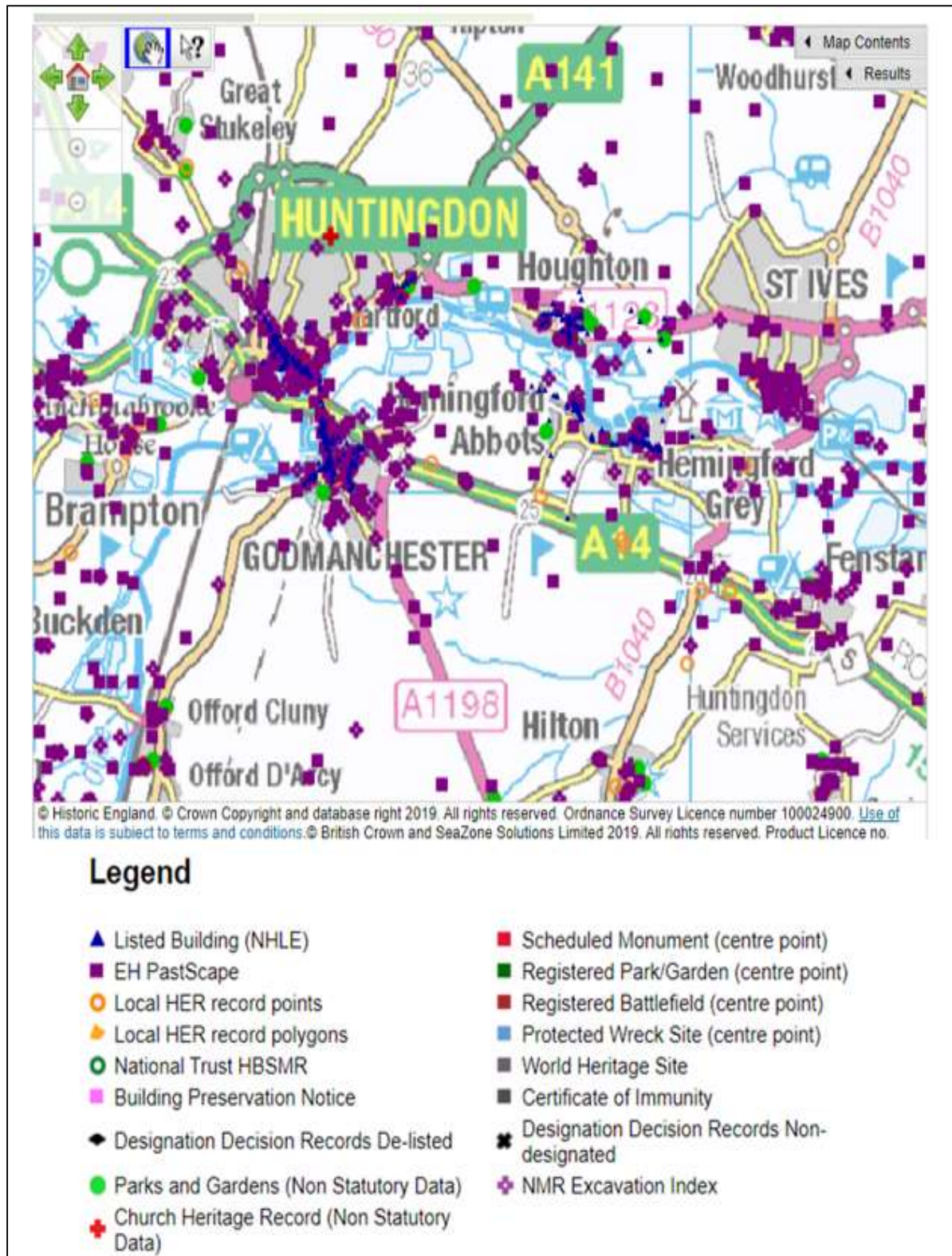


Figure 6.21: Cultural Heritage Features in Huntingdon and St Ives

6.6.20. There is a concentration of listed buildings in the following areas:

- Huntingdon Town Centre, mainly along High Street but also along the B1514
- St Ives Town Centre
- Godmanchester along the B1044 (south of A14)
- The Village of Houghton and Wyton
- The Village of Hemingford Abbots along Common Lane and High Street
- Hemingford Grey along High Street.

6.6.21. There are a number of scheduled monuments, including:

- Huntingdon Castle (Castle Hills): a motte and bailey castle and Civil War fieldwork
- Huntingdon Bridge
- Civil War battery at Clayton's Way, Huntingdon
- The Manor of Hemingford Grey: a medieval moated site
- Moated site 170m east of St Mary's Church, Godmanchester
- Earthwork on Mill Common, Huntingdon
- Roman barrow 450m south west of Stukeley Park, Great Stukeley
- Roman barrow adjacent to Ermine Street, 290m east of St Bartholomew's Church, Great Stukeley
- Moated site in Prestley Wood, 800m north east of Cartwright's Farm
- Moated site in Bellamy's Grove
- 'The Moat': a motte and bailey castle 700m west of Mayfield Heath Farm
- St Ives Bridge
- Obelisk at site of Republic Cottage, Stocks Bridge
- The priory barn: remains of the Benedictine priory at St Ives.

6.6.22. Potential archaeological remains could be concealed. There are 421 records in the National Monuments Record Excavation Index. These include, for instance, findings from excavation works for development.

#### Ecology and Wildlife

6.6.23. Numerous designated sites are present in the Study Area. There are six Sites of Special Scientific Interest (SSSIs) and nine County Wildlife Sites (CWS) between St Ives and Huntingdon. The internationally important Portholme Meadow SAC / SSSI is also present in the Study Area and will require special consideration such as a Habitats Regulations Assessment and an Appropriate Assessment.

6.6.24. The main impacts are likely to affect Portholme Meadow SAC / SSSI, Godmanchester Eastside Common SSSI, Houghton Meadows SSSI and Hemingford Grey Meadow SSSI. In addition, three locally important CWSs could be directly affected; River Great Ouse CWS, Godmanchester Eastside Common CWS and Cow Lane Gravel Pits CWS.



- 6.6.25. In addition, the majority of habitats throughout the Study Area between St Ives and Huntingdon are identified as Priority Habitat and Habitats of Conservation Concern under the Natural Environment and Rural Communities Act, although many have suffered a significant loss of species-richness in the riverside meadows.
- 6.6.26. A key objective for the Ouse Valley area of greenspace enhancement is the restoration of species rich floodplain meadows.
- 6.6.27. Numerous protected and notable species records are known to be present in the Study Area and include, bats, great crested newts, otters, badger, water vole, birds, fish and notable plants.
- 6.6.28. A route involving a river crossing over the Great Ouse would sever key habitats and, without mitigation, would result in significant habitat loss, with negative impacts on protected and notable species and irreversible damage to some designated sites.
- 6.6.29. Significant survey and impact assessment work (EclA) will be required to inform mitigation/compensation for losses or damage to key sites and important habitats and to avoid impacts on protected species. For some sites and species the impacts are likely to be High Magnitude and with sensitive receptors likely to be present, this is likely to result in a Major negative impact, depending on the sensitivity of the receptor.
- 6.6.30. Other plans and projects will also need to be taken into consideration.

#### Landscape

- 6.6.31. Under the DMRB-LA107, the main landscape and visually sensitive landscapes/receptors within the study area classed as moderate or high sensitivity leading to a moderate or major magnitude of effect depending on the scale of the works, are as follows:
- Designated Sites - Portholme Meadow SAC/SSSI; Houghton Meadow SSSI; Hemingford Grey Meadow SSSI; Godmanchester Eastside SSSI-evaluated as High Sensitivity and Moderate/Major magnitude
  - Registered Common Land – Portholme Meadow; Land adjacent to Houghton Grange; Godmanchester Eastside Common; Westside Common – evaluated as Moderate Sensitivity and Moderate magnitude
  - There are two main Character Areas described in the Huntingdonshire Landscape and Townscape Assessment within the Study area, which are Central Claylands and the Ouse Valley
  - Visual receptors are users of Public Rights of Way, Users of Public Open Spaces and Residential areas.
- 6.6.32. The key landscape designations in the study area are shown below in Figure 6.22.

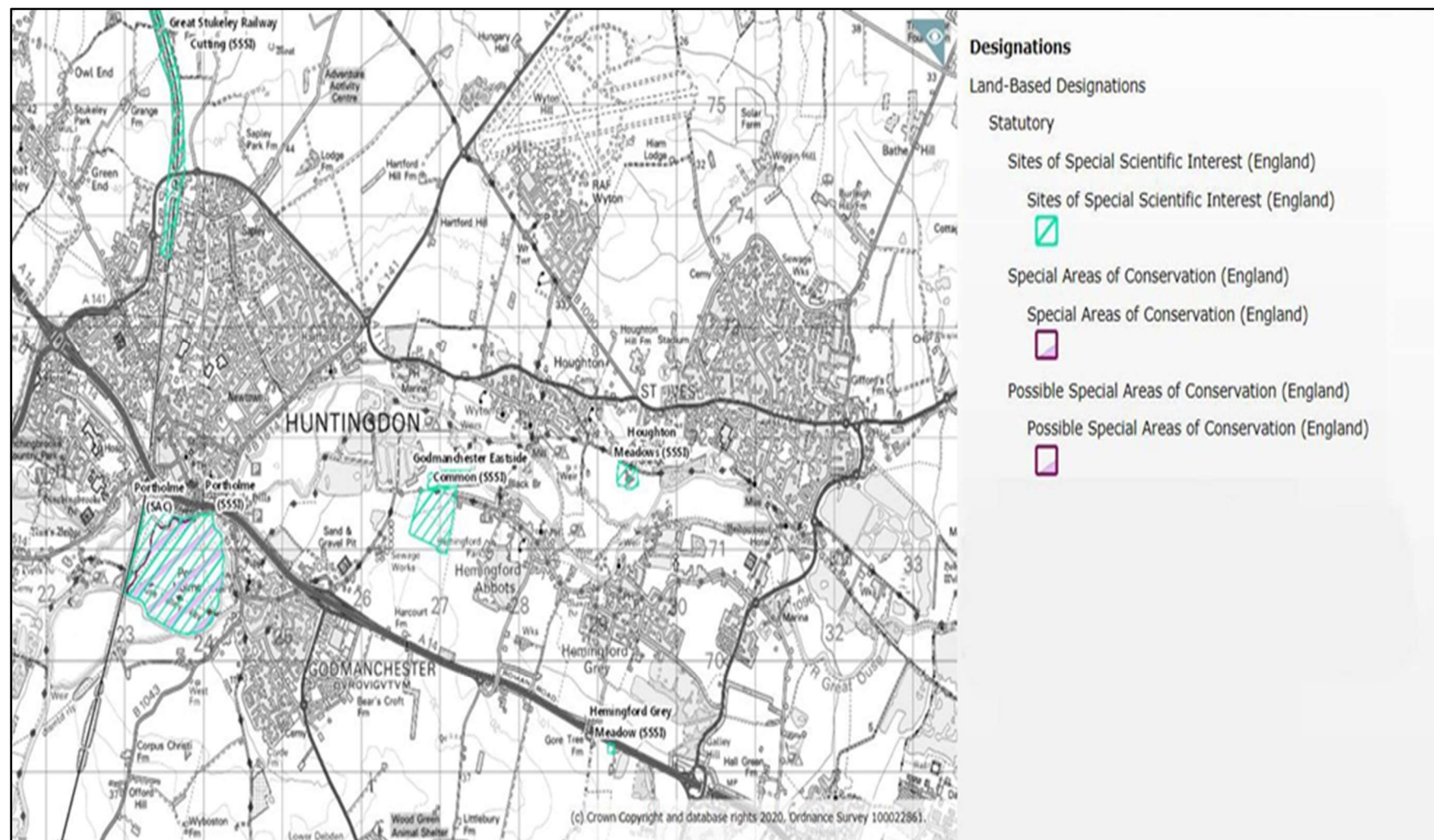


Figure 6.22: Key Landscape Designations in the Study Area

- 6.6.33. The main impacts are from vegetation loss which would potentially reduce screening, making the development more visible in the landscape; the introduction of built form into rural areas of the landscape creating impacts on the tranquillity and isolated feel on the valley floor; and severance from the new linear feature of the proposed road / river crossing in the landscape.
- 6.6.34. Further assessment work will be required to look in detail at the impacts and effects on landscape and visually sensitive receptors, and the level of mitigation required to reduce the significance of the effects.
- 6.6.35. Other plans and projects may affect the current assessment, such as potential designations of Areas of Outstanding Natural Beauty (AONBs).

#### Noise

- 6.6.36. A high level assessment of road noise from the A-roads in the required area has been undertaken and noise maps produced using 3D noise modelling software CadnaA, which calculates road traffic noise using the Calculation of Road Traffic Noise method. A map of noise from A-roads only is shown below in Figure 6.23.



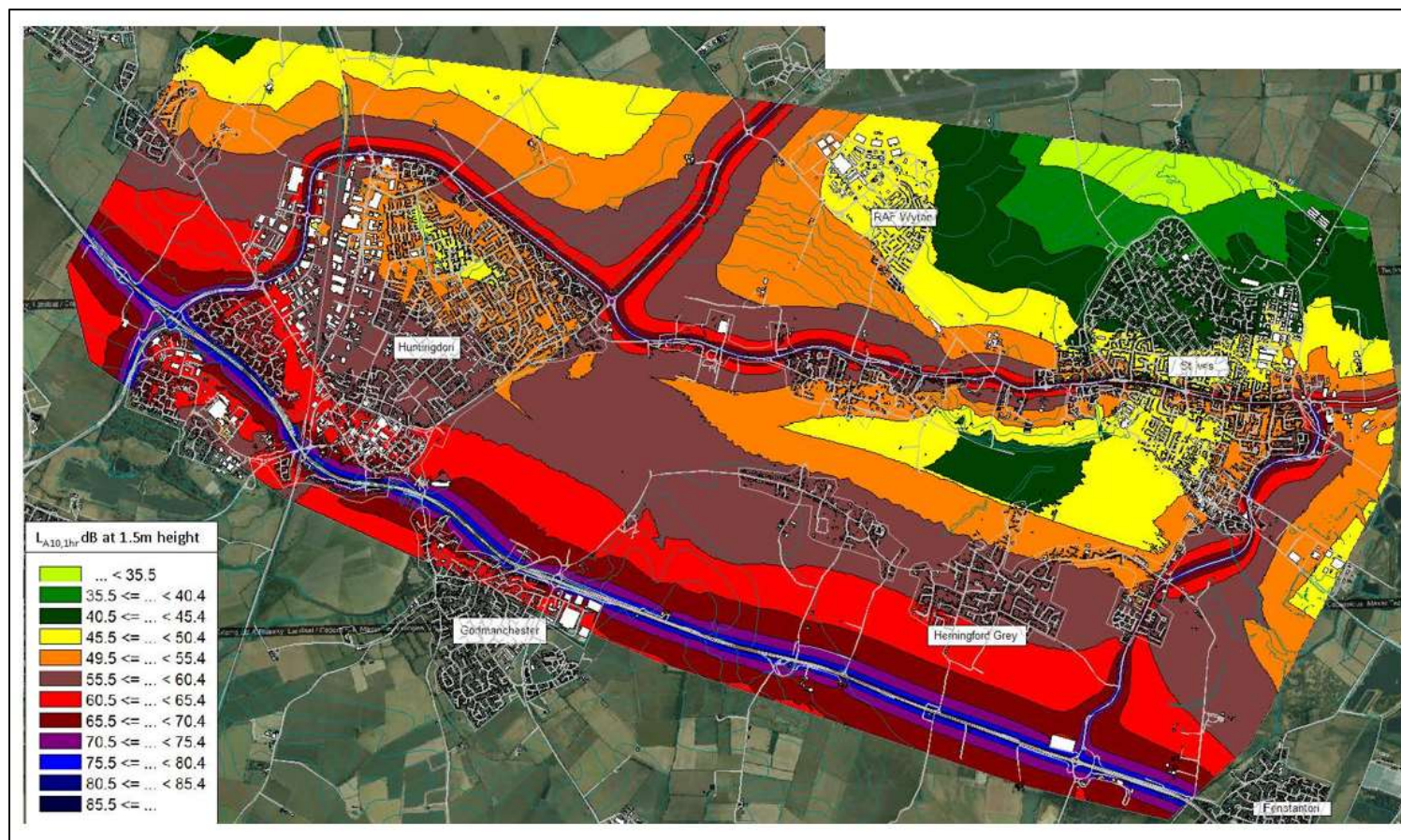


Figure 6.23: Map of Noise From A-Roads Only, At 1.5m High

- 6.6.37. The site visit determined where all critical noise sensitive receptors are, including new residential developments and schools which are not shown on some satellite images. The location of noise sensitive receptors which are highlighted in orange, and include all residential buildings, including care homes and hotels, are provided in Appendix C. All hospitals and schools have been highlighted red.
- 6.6.38. The key legislation to be met in terms of noise is the Noise Insulation Regulations 1975 in relation to the Land Compensation Act 1973.
- 6.6.39. The Noise Insulation Regulations 1975 (as amended 1988) set out the requirements under which buildings may qualify for both statutory and discretionary noise insulation in relation to the Land Compensation Act 1973. Any residential property within 300m of the modified or new highway is eligible for compensation for insulation work if both the following are true:
- The relevant noise level is greater by at least 1dB(A) than the prevailing noise level and at least the specified noise level 68dB(A)
  - Noise caused by traffic using the modified or new highway contributes at least 1dB (A) to the relevant noise level.
- 6.6.40. The Noise Insulation Regulations requires assessed noise levels to be calculated in accordance with Calculation of Road Traffic Noise (1988). The Noise Insulation Regulations also set out which buildings and rooms the regulations are applicable to. Only habitable rooms within residential buildings are eligible. Bathrooms, hallways, utility areas and smaller kitchens that do not include living or dining areas are not eligible.

#### Further Study

- 6.6.41. The next steps could involve a revision to the noise model that considers the re-routing of the A14 to the south of Huntingdon, with the old A14, now the A1307, being used as a local road in the area. There will not be any valid data for this until new traffic counts have been done.
- 6.6.42. Other steps could include considering noise from B roads in all or certain parts of the area. To obtain the most accurate data, noise surveys of certain roads within an area must be done. If a new section of road is proposed at a known location, an assessment under the Noise Insulation Regulations 1975 can also be done.

## Water Environment

- 6.6.43. River flooding is the dominant flood risk in the study area. A route involving a river crossing will require significant investigation, modelling and option development due to the crossing of functional flood plain.
- 6.6.44. Flood zones in the study area are shown below in Figure 6.24.

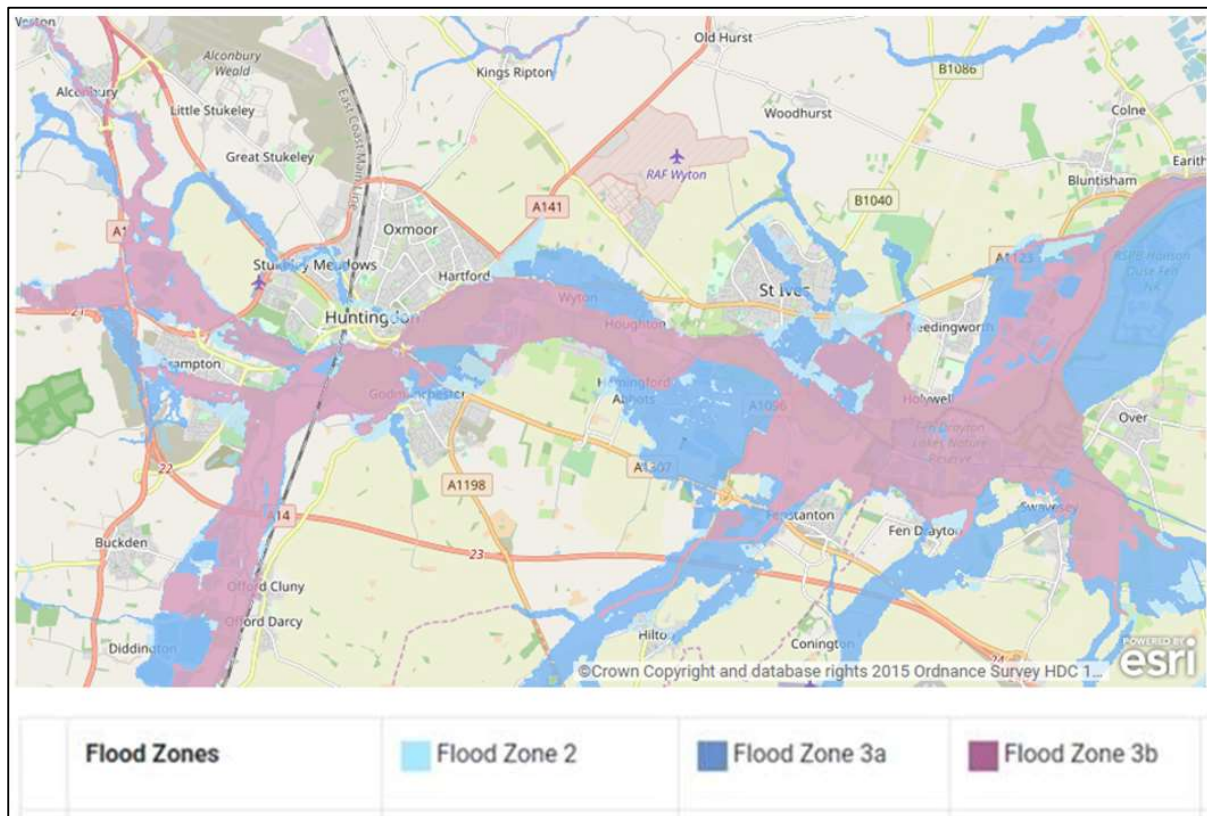


Figure 6.24: Flood Zone Map

- 6.6.45. There is a significant area of functional flood plain (Flood Zone 3b) between Huntingdon and St Ives which can be inundated, fairly regularly, during winter or high flows.
- 6.6.46. The current A141 road is not shown to be at significant risk of flooding from rivers (i.e. it is situated within Flood Zone 1). There is no fluvial flood risk along the northern boundary of the study area.
- 6.6.47. Any development / new road / river crossing within the study area would need to go through the Sequential Test, and a new river crossing is likely to require an Exception Test in accordance with the National Planning Policy Framework.
- 6.6.48. If an Exception Test is required, development must provide wider sustainability benefits to the community that outweigh the flood risk and must be designed and constructed to:
  - Remain operational and safe for users in times of flood
  - Result in no net loss of floodplain storage
  - Not impede water flows and
  - Not increase flood risk elsewhere.



- 6.6.49. Flood risk from Surface Water is generally low, with some pockets of medium or higher risk in dips and hollows and urban areas. Some locations within the study area may be susceptible to ground water flooding.
- 6.6.50. In terms of the Water Framework Directive, the watercourse is classified as a Heavily Modified Waterbody with moderate ecological potential. There are invasive, non-native plant and animal species and there is some diffuse and point source pollution. The exact location of these invasive species is currently unknown and may not be directly within the study area. Further investigation is therefore required.

#### Environmental Assessment Summary

- 6.6.51. The Environmental Assessment has identified that there are significant flood issues associated with a Third River Crossing between Huntingdon and St Ives, as the land would be in functional flood plain. Both the A141 Bypass and a Third River Crossing would require a sequential test in relation to flood risk, and a Third River crossing would also need to meet the requirements of an Exception test.
- 6.6.52. In addition, a route involving a river crossing would sever key habitats and, without mitigation, would result in significant habitat loss, with negative impacts on protected and notable species and irreversible damage to some designated sites.
- 6.6.53. There is a SSSI within the area through which the A141 bypass would pass, however this is localised to a railway embankment, which would need to be bridged by the new bypass.
- 6.6.54. There are significant heritage assets within the study area which would require special consideration depending on the location of the scheme. Care would be needed to ensure that there are no adverse effects from noise and air pollution associated with a proposed scheme.

#### 6.7. Assessment of a Third River Crossing Summary

- 6.7.1. The comparison of a Third River Crossing with the A141 bypass, has shown that the A141 bypass offers greater benefit, than a Third River Crossing, 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.
- 6.7.2. The provision of a Third River Crossing would not facilitate the development of Land 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 Spittals and A141 / A1123 / B1514 Main Street junctions, showed that it had little impact on junction capacity along the route, and a combination of a Third River Crossing and A141 bypass was also insufficient to provide the capacity needed for the HG+ scenario.
- 6.7.3. The Third River Crossing assessment has identified that the A141 bypass is the better performing option for addressing current and future issues, enabling additional growth (beyond HLP) and has the least environmental impact, and should be progressed instead of a Third River Crossing between Huntingdon and St Ives.

## 7. Summary

- 7.1.1. This Option Assessment Report (OAR) sets out the technical work that has been undertaken to develop, test and identify the best performing options for the A141 and St Ives Transport Studies.
- 7.1.2. The OAR has also considered how a Third River Crossing between Huntingdon St Ives compares to the best performing A141 option, to determine whether this would provide greater benefit than an A141 improvement scheme to deliver additional growth beyond that identified in the HLP.
- 7.1.3. The OAR has set out the policy context, and summarised the existing and future conditions within both study areas. This information has been drawn from the A141 Huntingdon, and St Ives Existing and Future Conditions Reports that were prepared earlier in the study. This information refers to the situation prior to the opening of the HSB in December 2019 (and the completion of the A14 scheme in May 2020). The existing conditions also reflect pre-COVID-19 travel patterns.
- 7.1.4. The key issues identified include traffic growth, congestion and junction performance on the A141 in Huntingdon and congestion and through traffic in St Ives, and especially in the town centre, and the subsequent impact this has on bus travel times. These issues highlight the present cases for change on the A141 and in St Ives.
- 7.1.5. The OAR has also considered future conditions on the A141 in Huntingdon, and the St Ives road network, which are generally expected to worsen. Key issues were identified at specific locations, which included traffic growth, junction performance issues and worsening journey times. The future forecasts highlight the need for new highway infrastructure in order to mitigate the effects of housing growth, and the subsequent increase in network demand.
- 7.1.6. The Option Development chapter has set out the process through which different options were identified and defined, which included data analysis, site visits, option development workshops and engagement with the MSG.
- 7.1.7. The Option Development process also identified a series of quick wins, which were separated out from the main project to be progressed independently, and at their own pace.
- 7.1.8. The Option Development process for the A141 identified a shortlist of five options, 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.



- 7.1.9. The option development process also identified a series of potential measures to improve traffic conditions within St Ives Town Centre. These options were developed to ease congestion on the A1123 and the A1096, mitigate the impact of an emerging A141 strategic solution, reduce through traffic in St Ives Town Centre, and improve local access.
- 7.1.10. The assessment process consisted of three stages, each containing different phases of testing. The three stages of assessment were:
- Strategic Assessment
  - Operational Assessment
  - Assessment of a Third River Crossing
- 7.1.11. Each of these stages are summarised below.

## 7.2. Strategic Assessment Summary

- 7.2.1. The Strategic Assessment has been conducted in four distinct phases, using the SATURN based CSRM2 model. 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 to determine which is the best performing option
  - 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 Summary

- 7.2.2. 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 Summary

- 7.2.3. 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, are 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 Summary

- 7.2.4. Further assessment 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).
- 7.2.5. 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).
- 7.2.6. Consideration of the impact of the bypass on the wider network identified that mitigation measures would be required at Junction J (A1123 / B1090 Sawtry Way).

### Phase 4: Additional Growth Assessment Summary

- 7.2.7. 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.
- 7.2.8. 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).
- 7.2.9. 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 whether a reduced growth scenario would be viable, as part of the Operational Assessment.

## 7.3. Operational Assessment Summary

- 7.3.1. The Operational Assessment used the Paramics Discovery based 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.

7.3.2. 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 at Land North of Huntingdon (building upon the previous phase)

7.3.3. 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 Summary

7.3.4. 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.

7.3.5. 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.

7.3.6. 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.

7.3.7. 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.

7.3.8. Both the introduction of two bus gates and a 10 mph zone resulted in the greatest reduction in through trips (completely removing them with two 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.

7.3.9. The one bus gate intervention had a limited impact on the surrounding network, which was partially offset by traffic signal amendments at Junction L 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.

7.3.10. 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 Summary

7.3.11. Phase 2 of the Operational Assessment has considered the impact of the additional growth at Wyton Airfield within the context of the new bypass. This assessment has 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.

#### Phase 3: Additional Growth at Gifford's Park Summary

- 7.3.12. Phase 3 considered whether additional growth at Gifford's Park could be supported by Option 4.
- 7.3.13. 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 Gifford's Park with localised junction improvements alone. This would instead require a more strategic intervention.
- 7.3.14. 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.
- 7.3.15. 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 at this location to unlock the growth in St Ives, and to provide alternative access routes onto the surrounding road network for development traffic.

#### Phase 4: Additional Growth at Land North of Huntingdon Summary

- 7.3.16. Phase 4 has assessed the level of growth that can be supported at Land North of Huntingdon through a series of incremental tests.
- 7.3.17. The results show that junction performance begins to deteriorate most notably between scenarios with 40% and 60% growth (at Land North of Huntingdon) during the AM peak hour. This suggests that the network could support somewhere in the region of 2,250 dwellings (50%) at this location, 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

- 7.3.18. 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 at Land North of Huntingdon.
- 7.3.19. Any growth at Gifford's Park would require a strategic intervention of its own, which should be considered further as part of a Strategic Outline Business Case for St Ives.

#### 7.4. Third River Crossing Summary

- 7.4.1. The comparison of a Third River Crossing with the A141 bypass, 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.
- 7.4.2. The provision of a Third River Crossing would not facilitate the development of Land 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, and a combination of a Third River Crossing and an A141 bypass was also insufficient to provide the capacity needed for the HG+ scenario.
- 7.4.3. The Third River Crossing assessment has identified that the A141 bypass is the better performing option for addressing current and future issues, 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.

#### 7.5. Conclusion and Next Steps

- 7.5.1. 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).
- 7.5.2. The assessment has identified that this options, 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 at Land North of Huntingdon.
- 7.5.3. 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, 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.

- 7.5.4. The study has also identified a package of improvement measures for St Ives, 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 from the town centre, improve bus journey times and mitigate the impact of displaced traffic from the town centre, on junctions along the town's key routes.
- 7.5.5. 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 the A1123 / B1040 / A1096 Junction and along the A1096 Harrison Way. Consequently further investigation needs to be undertaken to identify a strategic intervention to deliver Gifford's Park and bring significant improvement to St Ives.
- 7.5.6. 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.

## Appendices





# Environmental Desk top Studies

## 1. Air Quality

The air quality part of the environmental study covers the following:

- Introduction
- Air Quality Risks of the Scheme
- Relevant Air Quality Legislation
- Local Air Quality Strategies
- Stakeholders
- Sensitive Receptors
- Air Quality Management Areas
- Air Quality Monitoring Locations
- Air Quality Monitoring Data
- Assessment of Potential Further Studies

### Introduction

In February of 2020, Skanska Technology Green (STL Green) - Skanska UK's in-house environmental consultancy - were commissioned to carry out a high-level air quality assessment for Cambridgeshire County Council, a client of Skanska Infrastructure Services.

The focus of the study was to be of the potential Air Quality effects in the Huntingdon area of an unspecified key road network development. STL Green were asked to examine the potential effects within the study area shown in Figure 1. STL's study would be delivered by way of two separate deliverable documents: firstly, a presentation showing high level findings which was delivered to the client on the 18th March 2020; and secondly, a document outlining these findings in more detail and context. This document represents the second of those deliverables.

This document aims to outline the key Air Quality items for the study area and includes:

- A list of Air Quality Risks that may affect the scheme.
- An assessment of relevant legislation and policy.
- Maps showing Air Quality Management Areas (AQMAs), local Stakeholders and potentially sensitive receptors with added descriptions.
- Assessment of current air quality levels in and around the study area.
- Recommendations for further studies to progress the scheme.

In addition, a GIS map will be delivered to the client giving locations for many of the key points described above.

The details and location of the proposed scheme have not been provided although it is understood that the scheme constitutes, or at least partially comprises of, a 3rd crossing of the River Great Ouse, to make way for a highway diversion. In lieu of an exact location the client shared a map of the agreed study area which is shown in Figure 1 – Map of the Study Area.

The entire study area is within the Huntingdonshire District Council (HDC) area, with South Cambridgeshire District Council (SCDC) just to the east and southeast. Huntingdon District Council is the regulatory local authority and fulfils its duty under the Environment Act 1995 by undergoing the Local Air Quality Management (LAQM) Process.





## Air Quality Risks of the Scheme

The following section outlines what have been identified as the most significant risks with regards to air quality which could affect or result from the development of the proposed scheme. It is worth noting that, due to the exact location of the scheme not being provided, some assumptions have been made and this list should be updated when the location is confirmed.

1. Effects on Air Quality Trends and existing AQMAs.

As can be seen later in this document the general air quality trends appear to be improving within the study area and therefore existing AQMAs are currently going through the process of being revoked. There is a risk that any scheme could cause a net increase in the adverse air quality of the area. This in turn could delay the revocation of the AQMAs or in a worst-case scenario could mean that the AQMAs aren't revoked or further AQMAs are required leading additional costs and further limits on development.

2. Effects on Local Ecological Receptors.

There are existing sensitive ecological receptors within the study area. From a high-level desktop study, it understood that these habitats are primarily wetlands, including at least one Site of Special Scientific Interest (SSSI). It is likely that as the scheme progresses an assessment of the air quality impacts on sensitive ecological receptors shall be required within the Environmental Impact Assessment (EIA), which may call for specific mitigation measures. This could result in additional costs to the development and potential delays.

3. Complaints and petitions from stakeholders and special interest groups.

There are numerous potential stakeholders and special interest groups in the area, which may be resistant to the scheme. These comprise of local business which may be affected, and special interest groups related to the environment, wetlands and the River Great Ouse. It is possible that as any schemes may have a perceived effect on local amenities or businesses, the regulatory and planning authority, in this case HDC, may come under significant petition from these groups slowing down the scheme development and adding additional costs to the developer or authority.

4. Human Sensitive Receptors.

As the full scheme location is not known a full assessment of the potential sensitive receptors cannot be carried out here. However, there are a significant number of receptors within the study area and it is highly likely that a number of these shall be affected by any potential scheme. Sensitive receptors have been defined in this case as schools, nurseries and healthcare providers e.g. hospitals, doctors' surgeries and nursing homes. These receptors may require the provision of e.g. Air Quality monitors to determine the effect of the scheme on Air Quality during scheme construction and operation, with the associated costs and Public Relation risks. In addition, further study should be carried out to determine whether there any additional sensitive receptors such as elderly persons or people with special needs which haven't been considered here.

5. UK Air Quality Strategy.

The general trend in the UK over the past few years has been for a significant increase in the stringency of Air Quality expectations and requirements. Going forward this may mean a more critical look and more stringent requirements relating to any new infrastructure projects which may have net negative affect on Air Quality. This could mean additional costs or more stringent legislation to comply with for any scheme. It is also worth considering this point regarding UK Carbon reduction targets.

## Relevant Air Quality Legislation

This section outlined the relevant Air Quality legislation which must be complied with.

The EU Air Quality framework Directive 2008/50/EC was established in English law as part of The Air Quality Standards Regulation 2010 (other UK nations have similar parallel regulations). This consolidated existing legislation, provided a new regulatory framework which excludes natural contributions when assessing compliance and improved clarity on assessment so that public exposure is prioritised. It is enforceable through the judicial system, with legally binding responsibility eventually falling upon the Secretary of State for the Environment. Environmental Impact Assessments (EIAs) must consider the limits established by this framework.

UK Air Quality Objectives are therefore identical, or in some cases more stringent, than the limits established by EU Air Quality framework Directive 2008/50/EC. These are shown in Figure 2 below:

Pollutants	UK Air Quality Objectives	
	Concentration	Measured as
<b>Nitrogen Dioxide (NO<sub>2</sub>)</b>	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year 1-hour mean	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
<b>Particulate Matter (PM<sub>10</sub>)</b>	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
<b>Sulphur Dioxide (SO<sub>2</sub>)</b>	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

Figure 2 - UK Air Quality Objectives

The Environment Act 1995 established a National Air Quality framework which requires local authorities to monitor ambient AQ through the Local Air Quality Management (LAQM) framework and enforce Air Quality management Areas (AQMA) with Air Quality Action Plans (AQAPs) where intervention is required to meet the Objectives outlined in Figure 2.

The short-term Objectives, i.e. those measured hourly or over 24 hours, are specified in terms of the number of times during a year that a concentration measured over the specific period is permitted to exceed a specified value. Exceedances beyond those permitted during a one-year period would represent a breach of the objective. Figure 3 gives examples from the Defra TG (16) guidance on where these Objectives apply.

<b>Averaging Period</b>	<b>Objectives should apply at:</b>	<b>Objectives should generally not apply at:</b>
<b>Annual mean</b>	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
<b>24-hour mean, and 8-hour mean</b>	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
<b>1-hour mean</b>	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
<b>15-min mean</b>	All locations where members of the public might reasonably be exposed for a period of 15	

**Figure 3 - DEFRA TG (16) guidance of the application of UK Air Quality Objectives**



## Local Air Quality Strategies

This section outlines local authority policies to comply with the legislation outlined above.

### **The Joint Air Quality Action Plan (AQAP)**

This action plan was developed by Cambridgeshire County Council, Huntingdonshire and South Cambridgeshire District Council in partnership. It was developed following the framework of Local Air Quality Management (LAQM) in England, Air Quality Strategy (2000), and Air Quality Regulations by DEFRA 2010. The areas covered by the Joint AQAP are mainly the sub-regional centre of Cambridge, the main centre in Huntingdon the villages in the suburbs.

For the further development of the scheme, this and any other relevant AQAPs at that time, should be read and, if required, complied with.

### **Local Plan: LP36- Air Quality**

Local Plan LP36 has been produced for the A141 Huntingdon North Bypass to comply with the AQAP, it is likely that a further Local Plan may be required for the proposed scheme.

Long Term Transport Strategy (LTTs) (2014) proposes the safeguarding of an alignment for the possible future re-routing of the A141 Huntingdon northern bypass to separate the strategic and local functions of the current route and provide capacity for further growth, both locally and further north-east along the A141. Transport impacts will be reassessed once the A14 upgrade scheme is completed. It would only be delivered if conditions on the network required it, or if it were needed to support growth. The LTTs suggests that the route may be sought in the late 2020s / early 2030s.

The Huntingdonshire Strategic Transport Study (2017) tested the provision of a re-routed A141 Huntingdon northern bypass but identified significant funding challenges in delivering this, at least in the short term.

For development of the proposed scheme it is essential that all relevant Local Plans at the time are fully understood and complied with.

## Stakeholders

This section outlines likely key stakeholders within proximity of the study area, categorised below with locations shown on Figure 4 (and in more detail within Huntingdon on Figure 5).

### Governmental Groups:

- Cambridgeshire and Peterborough Combined Authority
- Cambridgeshire County Council
- Huntingdonshire District Council
- Huntingdon Town Council
- Environment Agency, Great Ouse and Fenland Fisheries Team

### Environmental Groups:

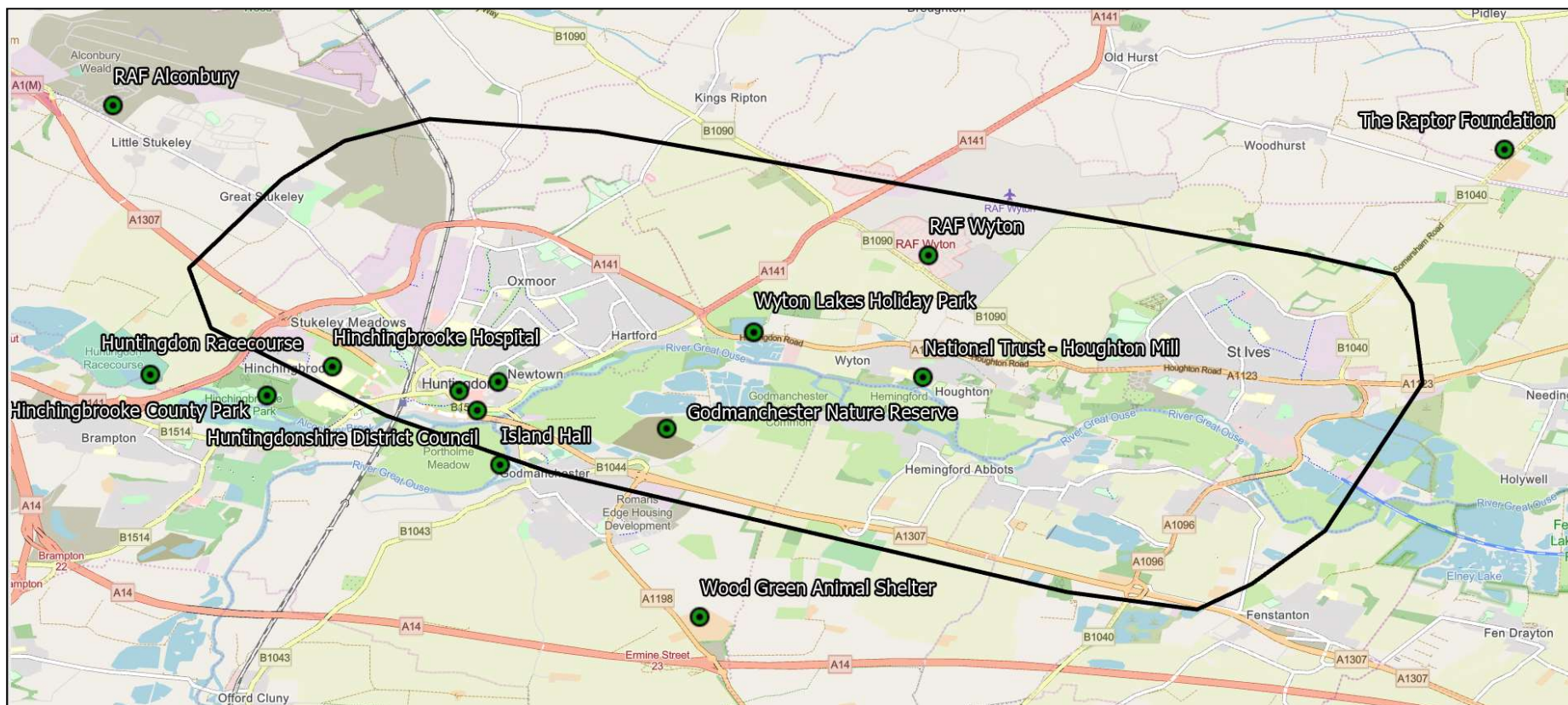
- Great Ouse Valley Trust - New charity formed to conserve and restore the landscape, wildlife and heritage of the Cambridgeshire Great Ouse Valley for the enjoyment of all
- Hinchbrooke County Park -Home to a variety of birds & wildlife, this park features open grassy expanses, wetlands and lakes
- Godmanchester Nature Reserve -Godmanchester Nature Reserve is a 59-hectare nature reserve in Godmanchester in Cambridgeshire. It is managed by the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire. The site has four former gravel pits which are now lakes, together with areas of grassland, willow woodland and reedbed
- The Raptor Foundation - rescue, rehabilitate and return injured birds of prey back to the wild and secondly to protect and preserve them through education and conservation
- Extinction Rebellion Huntingdon -The Huntingdon and Huntingdonshire area branch of Extinction Rebellion

### Tourism Groups:

- National Trust Houghton Mill - Houghton Mill is a water mill located on the Great Ouse in the village of Houghton, Cambridgeshire, England. It is a National Trust property
- Wyton Lakes Holiday Park - Wyton Lakes Holiday Park is a family run Adults only park set in 12 1/2 acres offering 4 well stocked fishing lakes and a delightful pathway down to the frontage on the river Great Ouse
- Island Hall - Tourist attraction of a riverside mansion built in the late 1740s. The house is situated in 3 acres of gardens including an ornamental Saxon island in the river Great Ouse. Island Hall is a family run private home and all tours are given to tourists alongside hosting evening events
- Huntingdon Racecourse- Huntingdon Racecourse is a thoroughbred horse racing venue located in Brampton near Huntingdon, Cambridgeshire, England. It hosts 17 jump race meetings spanning nine months of each calendar year. The site is also a Site of Special Scientific Interest called Brampton Racecourse.

### Others:

- RAF Wyton - Royal Air Force Wyton (RAF Wyton) is a Royal Air Force station near St. Ives, Cambridgeshire, England. In terms of organisation RAF Wyton was part of the combined station RAF Brampton Wyton Henlow, a merger of Wyton with two previously separate bases, RAF Brampton and RAF Henlow
- RAF Alconbury – Royal Air Force Alconbury (RAF Alconbury) is an active Royal Air Force station near Huntingdon, England. It has been used by the United States Air Force since 1942.
- Hinchingsbrooke Hospital - Hinchingsbrooke Hospital is a 304-bed district general hospital located at Hinchingsbrooke Park in Huntingdon. The hospital opened in 1983 and provides a wide range of specialties including general surgery, ear, nose and throat, ophthalmology, orthopaedics, urology, breast surgery, gynaecology and vascular services. The hospital has an emergency department and maternity unit.



**Figure 4 - Map Showing the Locations of Potential Stakeholders, Relative to the Study Area**





**Figure 5 - Map Showing the Location of Potential Stakeholders, Relative to the Study Area (Detailed View of Huntingdon)**

## Sensitive Receptors

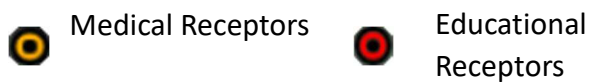
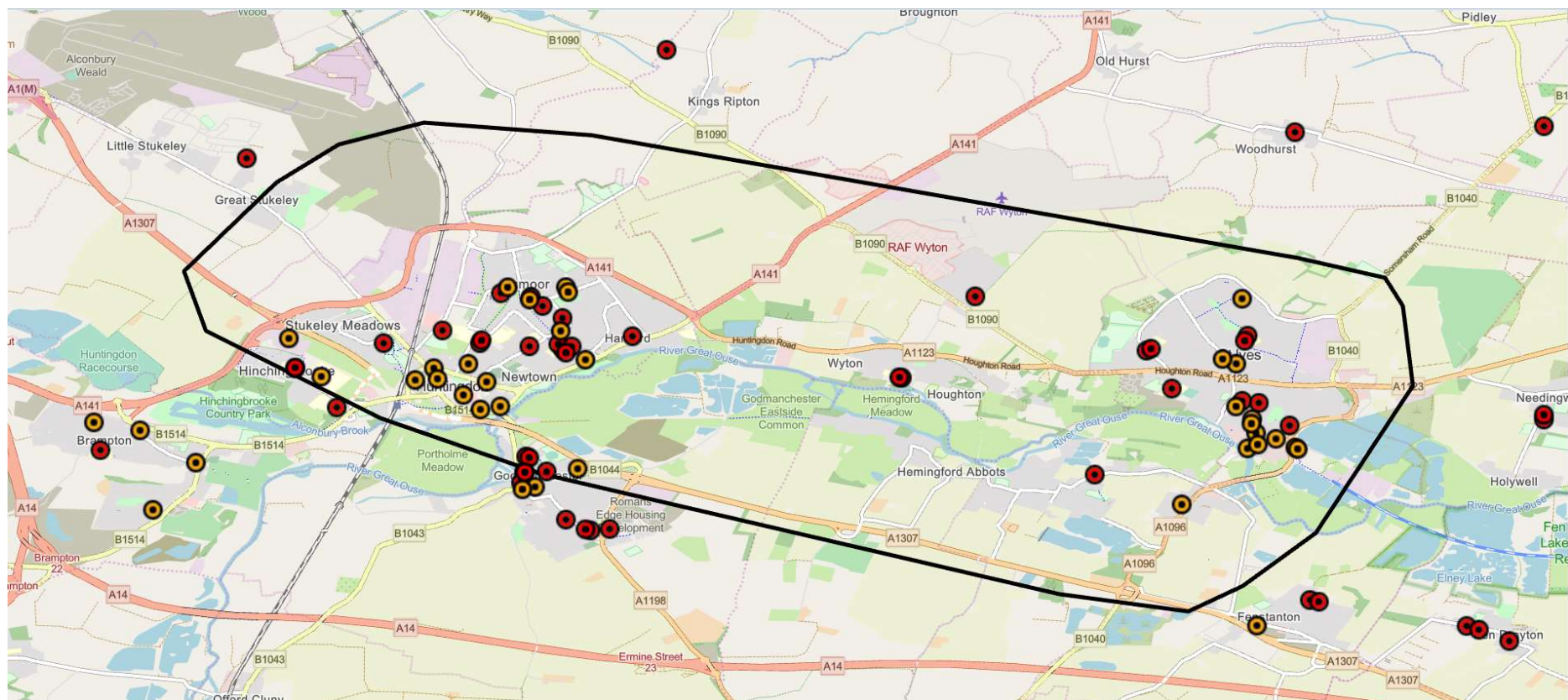
This section gives an overview of potentially sensitive receptors within or close to the study area. These are split into educational and medical categories with numbers of each shown below and these locations represented on the map in Figure 6 - Map Showing the Location of Potential Sensitive Receptors, Relative to the Study Area.

### 51 Educational Receptors

- 18 Nurseries & Pre-Schools
- 20 Primary, Junior, Infant & Elementary Schools
- 8 Secondary Schools & Academies
- 5 Further Education & Other

### 37 Medical Receptors

- 1 Hospital
- 12 Medical Practices
- 5 Sheltered Accommodation facilities
- 19 Care & Nursing Homes



**Figure 6 - Map Showing the Location of Potential Sensitive Receptors, Relative to the Study Area**

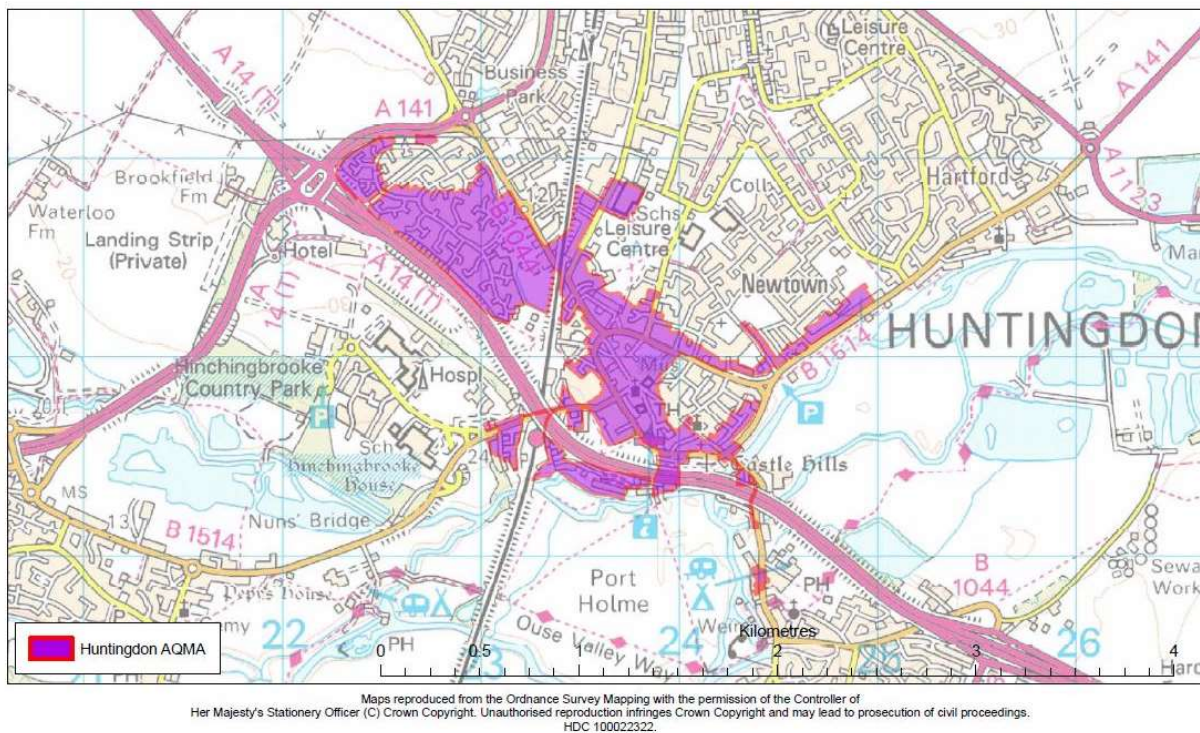


## Air Quality Management Areas

This section outlines the AQMAs within close proximity of the study area.

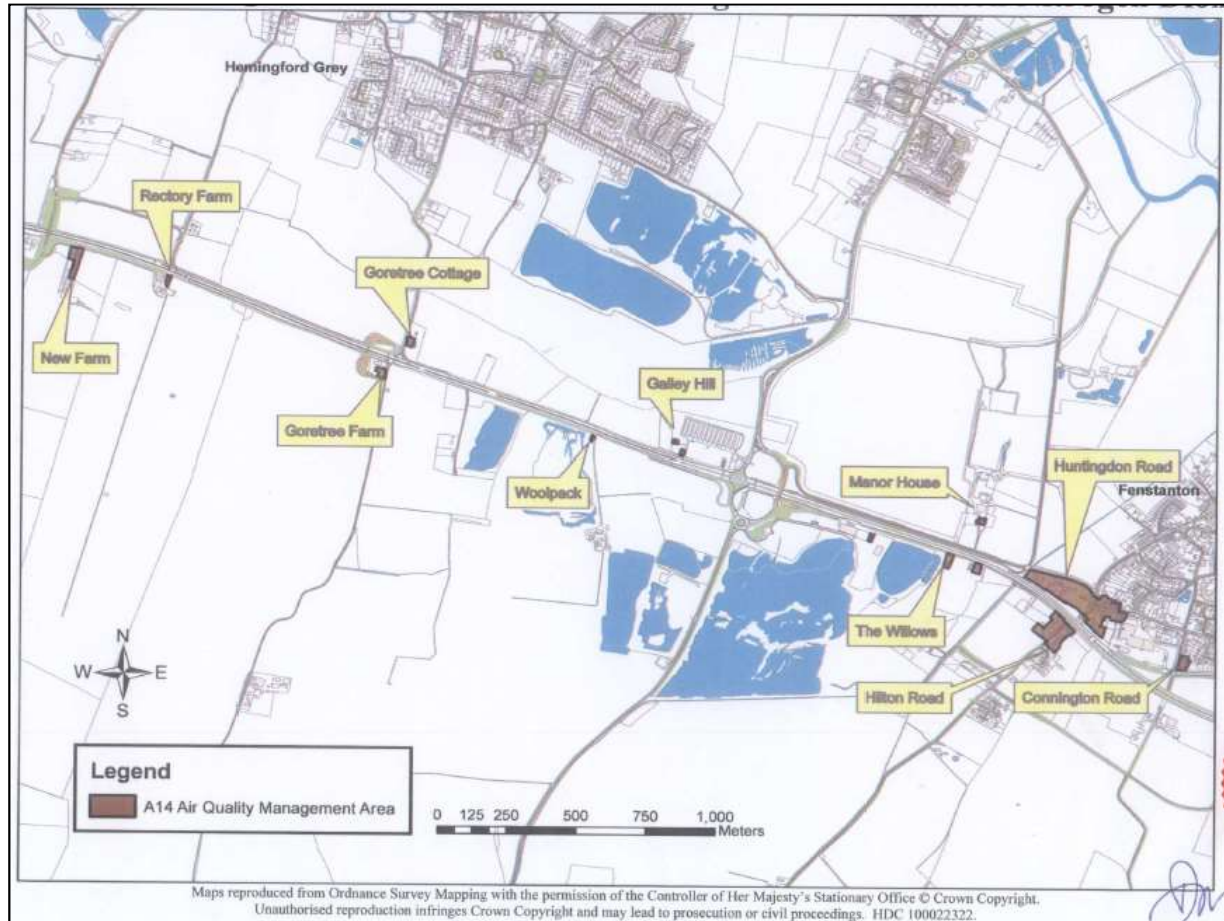
Two of the four current HDC Air Quality Management Areas (AQMAs) – Huntingdon and Hemingford to Fenstanton (A14) – fall within the study area, whilst Brampton AQMA is just outside to the southwest. However, it has been proposed that all but Huntingdon be revoked due to long term compliance, with DEFRA supporting this recommendation (2019 Air Quality Status Report (ASR) for the year 2018, 2.2.).

Huntingdon AQMA (Figure 7) covers “an area encompassing approximately 2831 domestic properties affected by the A14, A141, B1044, B1514 and Huntingdon Inner Ring Road.” Annual mean NO<sub>2</sub> levels have reduced from 50.2 µg m<sup>-3</sup> at declaration to 43.3 µg m<sup>-3</sup> now (2019 Air Quality Status Report (ASR) for the year 2018, 2.1).



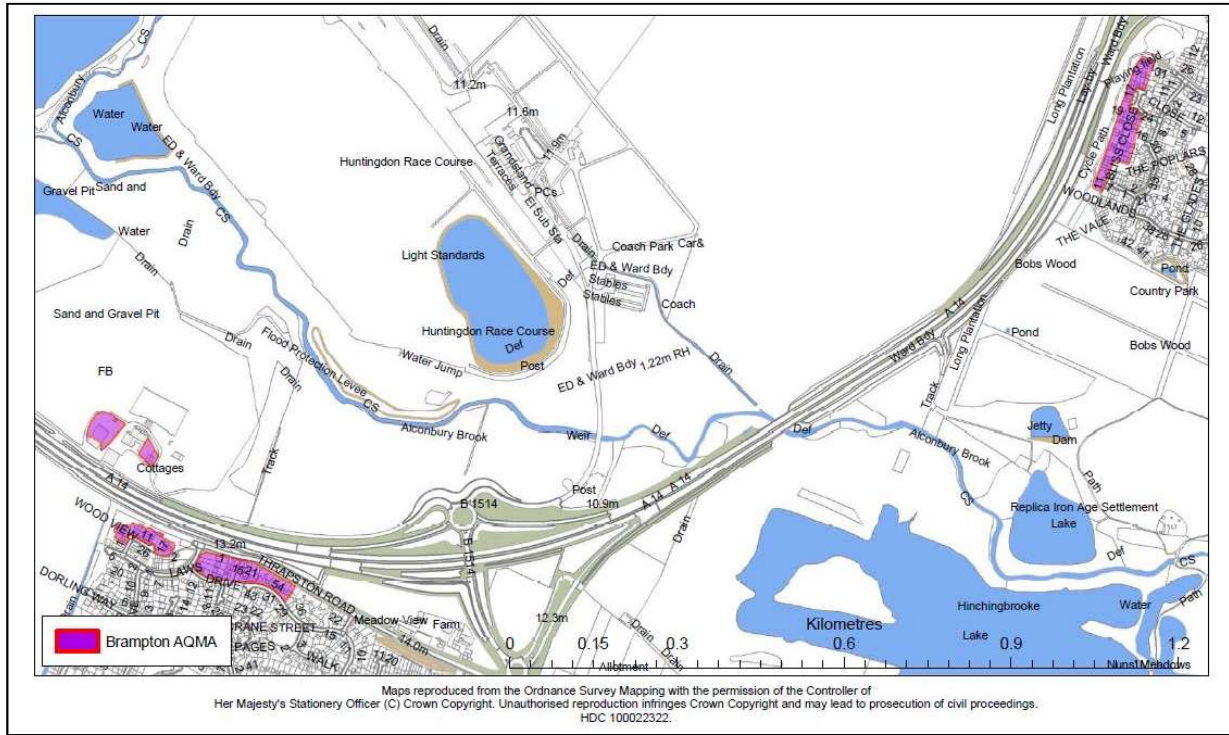
**Figure 7 - Huntingdon AQMA Map**

Hemingford to Fenstanton (A14) AQMA (Figure 8) covers “an area encompassing approximately 62 domestic properties affected by the A14.” Annual mean NO<sub>2</sub> levels have reduced from 46.2 µg m<sup>-3</sup> at declaration to 25.0 µg m<sup>-3</sup> now (2019 Air Quality Status Report (ASR) for the year 2018, 2.1).



**Figure 8 - Hemingford to Fenstanton AQMA Map**

Brampton AQMA (Figure 9) covers “an area encompassing approximately 82 domestic properties affected by the A14”, as shown in Fig. 3. The source is declared as a highways agency road (2019 Air Quality Status Report (ASR) for the year 2018, 2.1).



**Figure 9 - Brampton AQMA Map**

An overview map showing the locations of these three AQMAs relative to the Study Area is shown in Figure 10.



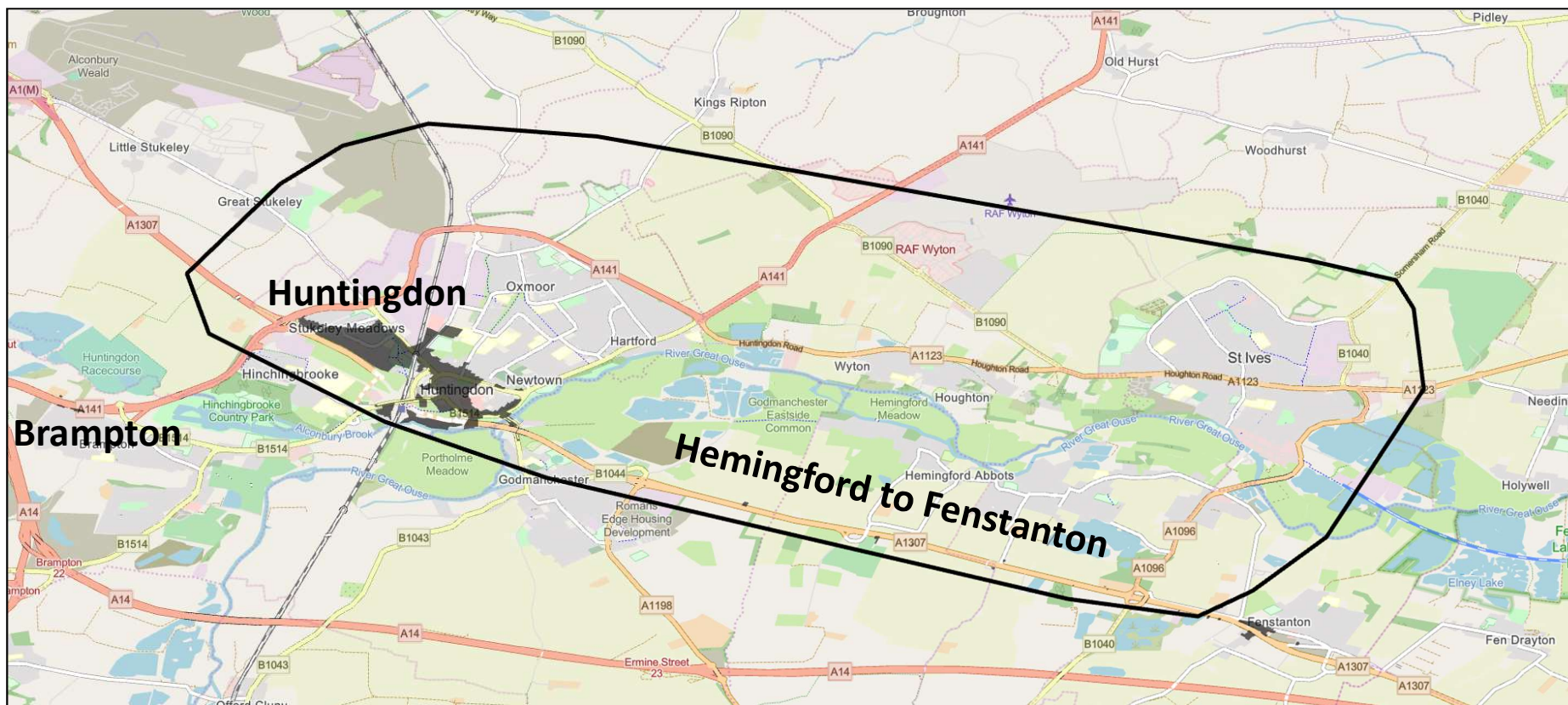


Figure 10 - Map Showing the Location of AQMAs Relative to the Study Area

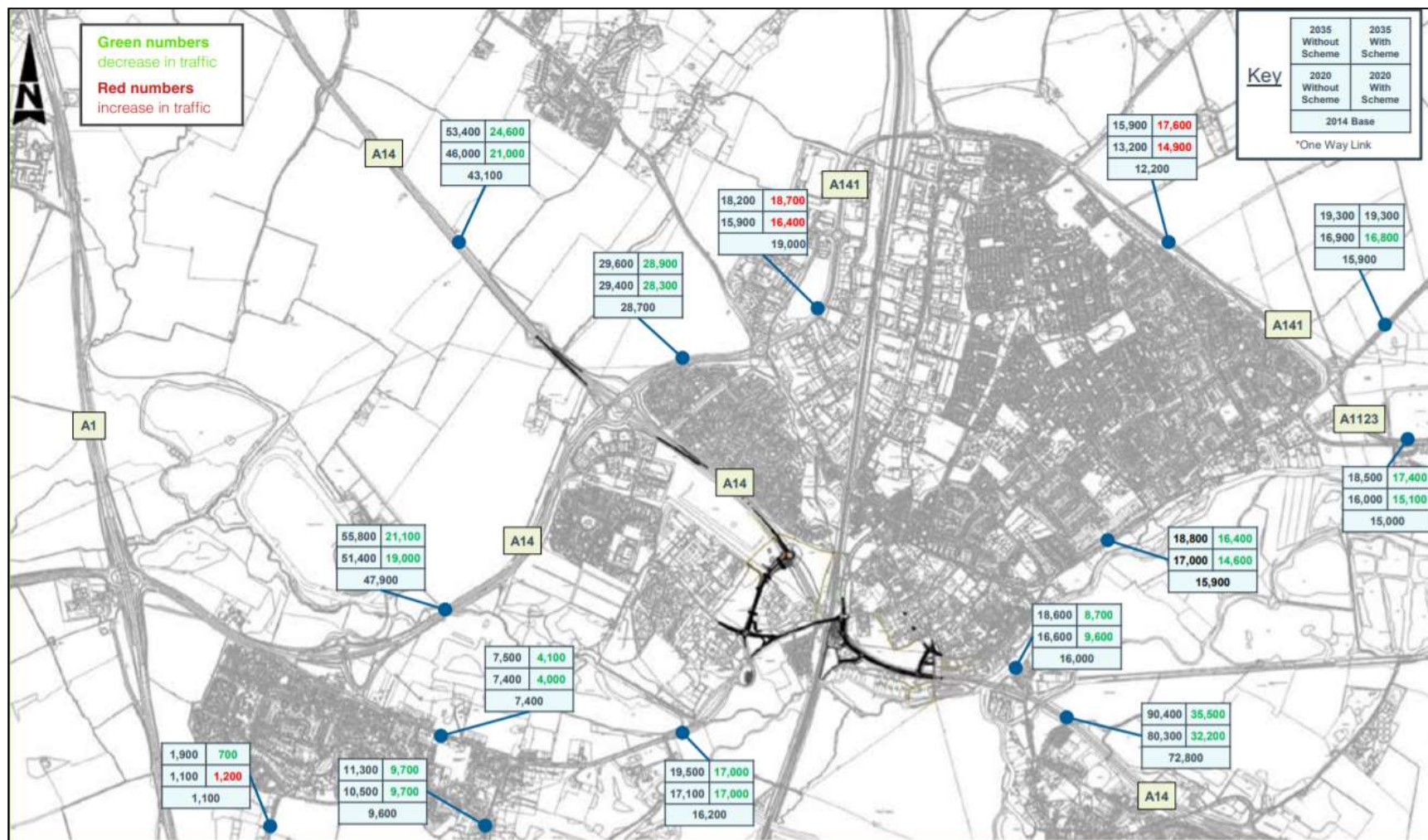


Figure 11 - Traffic Numbers at Various Points Around Huntingdon, Including a 2012 Baseline and Predictions for 2020 and 2035 Under A14 With Scheme and Without Scheme Scenarios (A14 Cambridge to Huntingdon improvement scheme – What’s happening in Huntingdon?)

Further, as part of the A14 Southern Bypass, the old A14 viaduct will be removed in Huntingdon. Traffic will be reduced throughout the majority of the town (Figure 11), however, it is expected that there will be a small increase in traffic on part of the A141 Huntingdon Northern Bypass (A14 Cambridge to Huntingdon improvement scheme – What’s happening in Huntingdon?). Construction of this project was completed in 2019, with the viaduct removal ongoing.

This general reduction in traffic in Huntingdon is likely to lead to the revocation of Huntingdon AQMA (A14 Cambridge to Huntingdon improvement scheme – What’s happening in Huntingdon?), as predictions indicate all current AQMA areas will see significant reductions in NO<sub>2</sub> and PM<sub>10</sub> levels as a result of the A14 scheme (2019 Air Quality Status Report (ASR) for the year 2018, Exec.).

As shown by Fig. 8, traffic numbers on the A141 along the northern edge of Huntingdon are expected to be an exception and increase under a ‘with-scheme’ scenario. These values are expected to be (A14 Cambridge to Huntingdon improvement scheme – What’s happening in Huntingdon?):

- 2020: an increase from 13,200 vehicles per day to 14,900 (12.9% increase)
- 2035: an increase from 15,900 vehicles per day to 17,600 (10.7% increase)

As part of Huntingdonshire’s Local Plan to 2036, 4.53, capacity enhancements to the A141 and a Huntingdon strategic river crossing will be considered. The Cambridgeshire Local Transport Plan 2011-2031 (LTP3): Long Term Transport Strategy (LTTs) (2014) also proposes the safeguarding of an alignment for the possible future re-routing of the A141 Huntingdon northern bypass (Huntingdonshire’s Local Plan to 2036, 9.40).

In addition, plans exist to upgrade the A14, including widening of the existing carriageway and the creation of a new route, to alleviate both existing traffic congestion and provide the infrastructure to accommodate the new housing

## Air Quality Monitoring Locations

This section outlines the AQ monitoring equipment deployed within the proximity of the study area.

HDC used diffusion tubes to monitor NO<sub>2</sub> at 53 locations in 2018. 28 of these diffusion tubes were located within or close to the study area (2019 Air Quality Status Report (ASR) for the year 2018, 3.1.2). There are no Automatic Urban and Rural Network (AURN) monitors in study area (<https://uk-air.defra.gov.uk/interactive-map>).

However, there is one HDC-managed automatic monitor, located in the south-east of the Huntingdon AQMA (<https://www.huntingdonshire.gov.uk/environmental-issues/noise-nuisance-pollution/air-quality/>) at Huntingdon Pathfinder House which monitors NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> (Particulate Matter of less than 2.5 and 10 micrometres in diameter, respectively). The location and exposure details of these various monitors are described in Figure 12 with their locations shown in Figure 13 (Figure 14 and Figure 15 show locations in the Huntingdon and Brampton areas more clearly).

### 1 Automatic Monitor

- PM<sub>2.5</sub>, PM<sub>10</sub> (particulate matter of less than 2.5 and 10 micrometres in diameter, respectively) & NO<sub>2</sub> continuous data

### 28 Diffusion Tubes

- NO<sub>2</sub> annual mean data



Site ID	x (OS)	y (OS)	Lat	Lon	Near. Rec (m)	Near. Kerb (m)	Height (m)
<b>Active Monitoring Sites (Continuous Analyser)</b>							
PFH	524102	271540	52.3279	-0.1803	3.00	7.00	2.50
<b>Passive Monitoring Sites (Diffusion Tubes)</b>							
Brampton 1	520734	269623	52.3115	-0.2304	10.00	0.50	3.00
Brampton 2	520500	269646	52.3117	-0.2338	10.00	1.50	3.00
Brampton 3	520155	271561	52.3290	-0.2382	32.00	2.00	3.00
Brampton 4	519956	271461	52.3282	-0.2411	6.00	1.50	3.00
Brampton 5	519839	271061	52.3246	-0.2430	18.00	0.50	3.00
Brampton 6	521487	270803	52.3219	-0.2189	19.00	1.00	3.00
Brampton 7	519874	270948	52.3236	-0.2425	7.00	1.50	3.00
Fenstanton 1	531427	268397	52.2980	-0.0741	20.00	2.00	3.00
Fenstanton 2	531770	268215	52.2963	-0.0692	14.00	2.00	3.00
Fenstanton 3	531063	268063	52.2951	-0.0796	6.00	1.50	3.00
Fenstanton 4	531729	268370	52.2977	-0.0697	1.50	1.00	3.00
Godmanchester 1	525319	270571	52.3190	-0.1628	3.00	12.00	3.00
Great Stukely 1	522000	274607	52.3560	-0.2100	33.00	1.00	3.00
Huntingdon 1	523177	271627	52.3289	-0.1938	3.00	2.00	3.00
Huntingdon 2	524198	271949	52.3316	-0.1787	0.00	1.00	1.75
Huntingdon 3	523661	271802	52.3304	-0.1867	0.00	1.00	3.00
Huntingdon 4	523435	272464	52.3364	-0.1898	3.00	1.00	3.00
Huntingdon 5	522293	272909	52.3406	-0.2063	3.00	2.00	3.00
Huntingdon 6	524274	271939	52.3315	-0.1776	4.00	2.00	3.00
Huntingdon 7	523432	271760	52.3301	-0.1901	10.00	2.00	3.00
Huntingdon 8	525289	272525	52.3365	-0.1625	27.00	2.00	3.00
PFH 1	524102	271540	52.3279	-0.1803	8.00	6.00	3.60
PFH 2	524102	271540	52.3279	-0.1803	8.00	6.00	3.60
PFH 3	524102	271540	52.3279	-0.1803	8.00	6.00	3.60
St Ives 1	531206	272334	52.3334	-0.0758	5.00	1.00	3.00
St Ives 2	530850	270286	52.3151	-0.0818	6.00	1.50	3.00
St Ives 3	529866	272285	52.3333	-0.0955	11.00	6.00	3.00
Wood Green AS	526250	268264	52.2980	-0.1500	0.00	235.00	3.00

Figure 12 - Location Details for All Monitoring Carried Out Within the Study Area (2019 Air Quality Status Report (ASR) for the year 2018). Colour-coded to match location map.

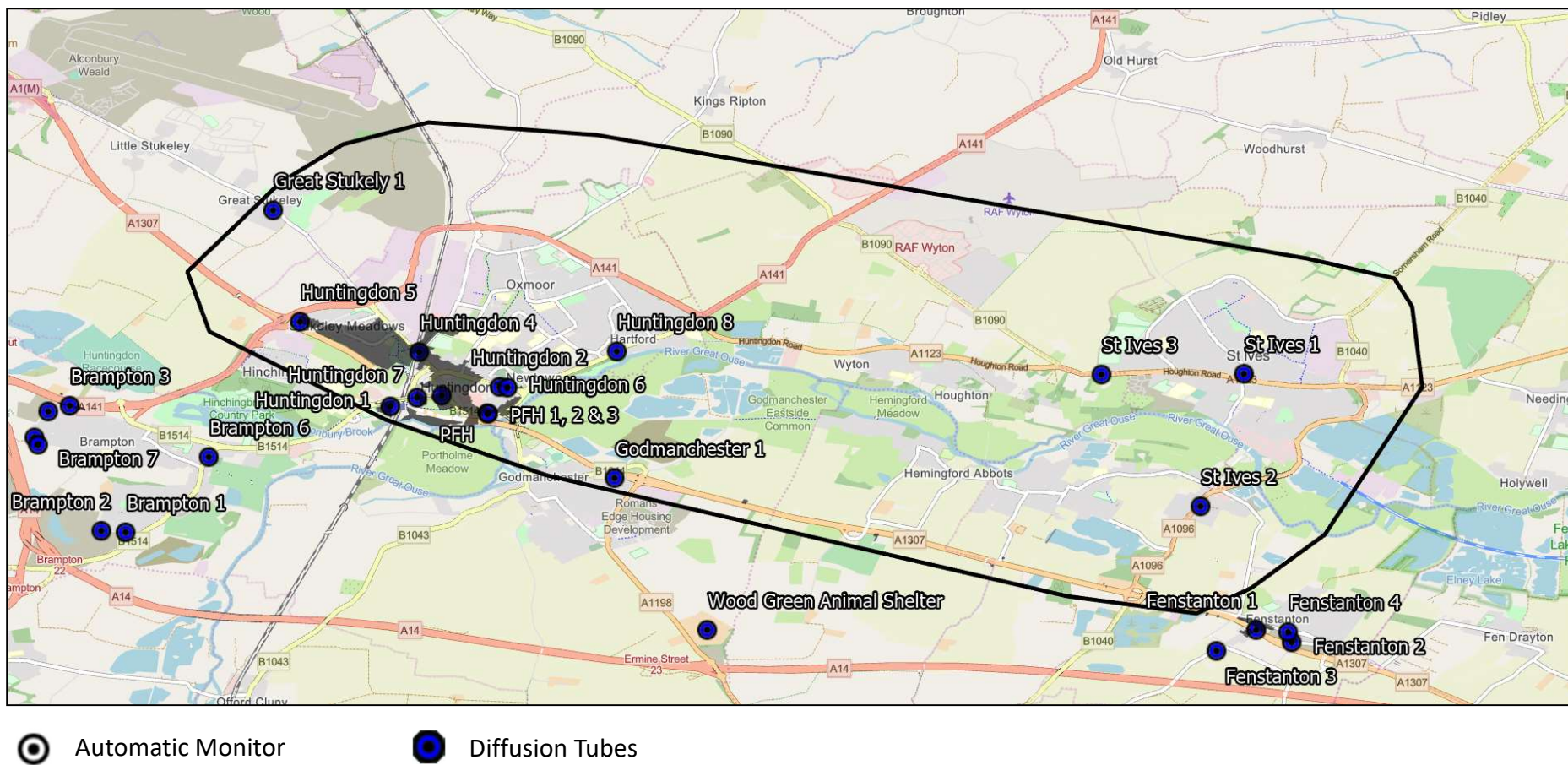


Figure 13 - Map of Locations of All Monitoring Carried Out Within the Study Area (co-ordinates from 2019 Air Quality Status Report (ASR) for the year 2018). Colour-coded to match location details.



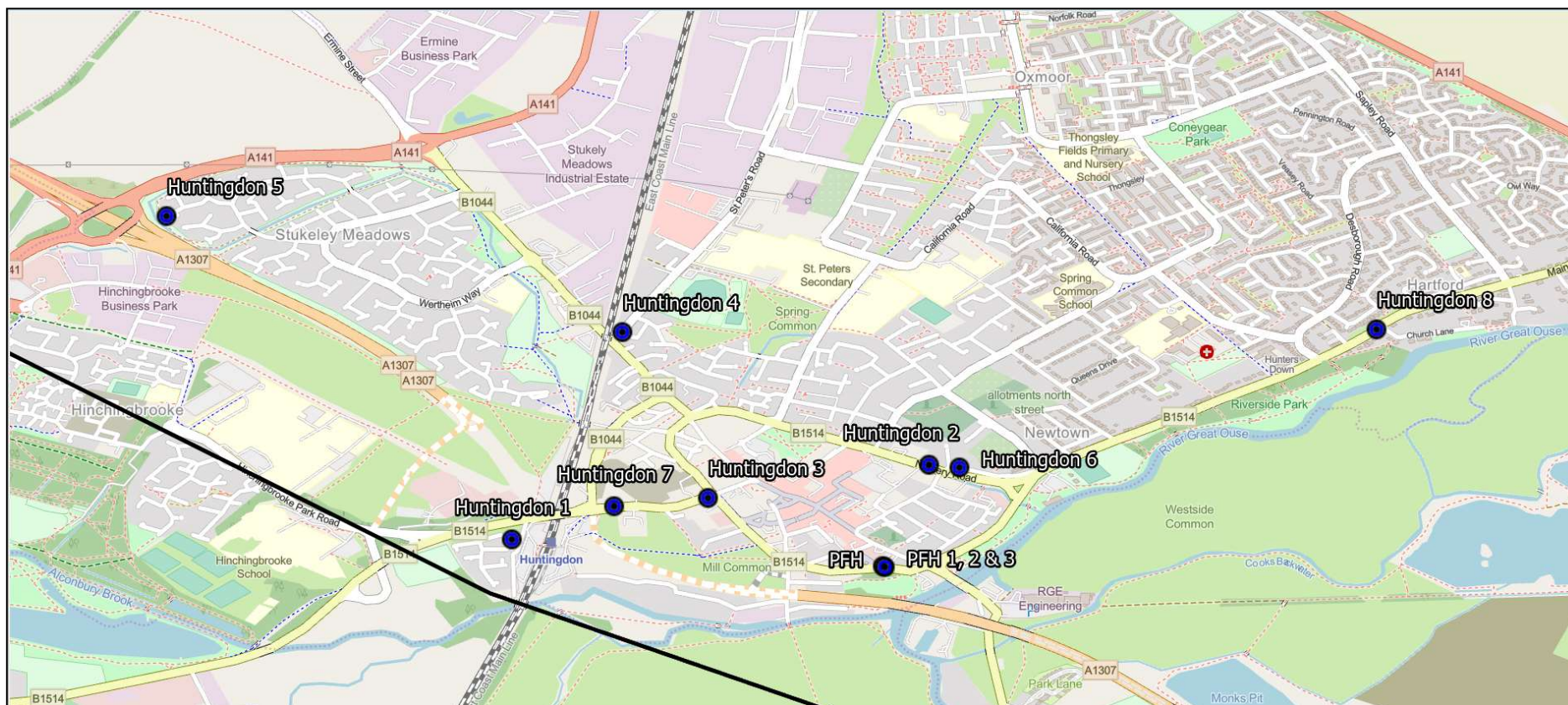
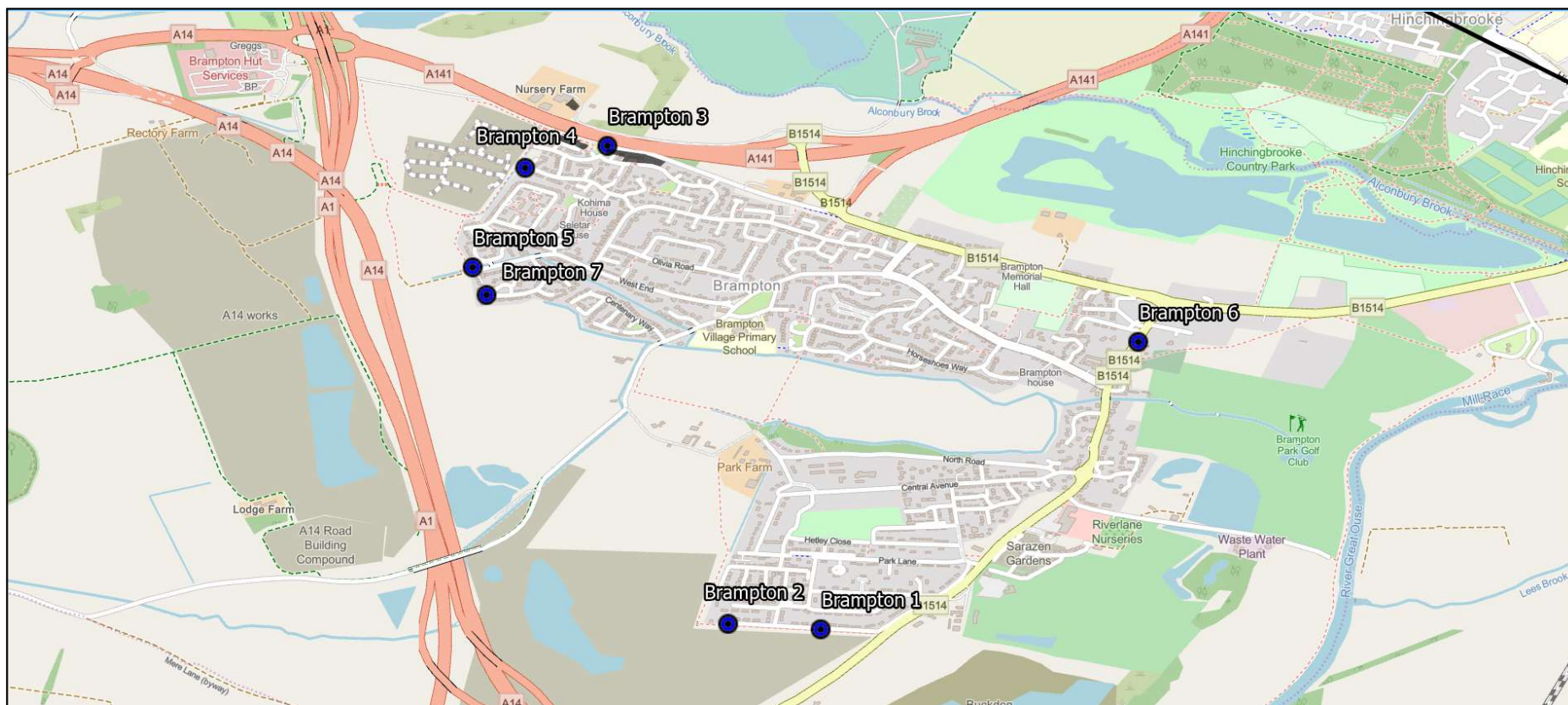


Figure 14 - Map of Locations of All Monitoring Carried Out Within the Study Area (co-ordinates from 2019 Air Quality Status Report (ASR) for the year 2018). Colour-coded to match location details (detailed view of Huntingdon).



**Figure 15 - Map of Locations of All Monitoring Carried Out Within the Study Area (co-ordinates from 2019 Air Quality Status Report (ASR) for the year 2018). Colour-coded to match location details (detailed view of Brampton).**



## Air Quality Monitoring Data

This section examines existing available AQ monitoring data from the proximity of the study area, from the monitoring equipment outlined above.

Figure 16 shows annual mean concentrations for NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> and number of mean exceedances for NO<sub>2</sub> and PM<sub>10</sub>. This monitor was replaced in April 2019 (2019 Air Quality Status Report (ASR) for the year 2018, 2.3). These are the only PM data measured across the study area. The 50 µg m<sup>-3</sup> 24-hour mean objective for PM<sub>10</sub> is not to be exceeded more than 35 times per year, therefore the objective levels are not exceeded at this site.

Site ID	Site Type	Area	Pollutant	Annual mean concentrations (ug m <sup>-3</sup> )							
				2011	2012	2013	2014	2015	2016	2017	2018
PFH	Road-side	AQMA	NO <sub>2</sub>	37.6	55.5	45.0	38.9	32.2	39.4	31.9	28.0
			PM <sub>2.5</sub>	-	-	-	13.9	12.3	11.8	10.6	11.7
			PM <sub>10</sub>	26.3	31.2	30.0	20.5	19.3	20.4	18.4	-

Site ID	Site Type	Area	Pollutant	Number of mean exceedances							
				2011	2012	2013	2014	2015	2016	2017	2018
PFH	Road-side	AQMA	NO <sub>2</sub> (hourly)	0	3	0	0	0	0	0	0
			PM <sub>10</sub> (daily)	0	41	26	6	3	5	7	-

**Figure 16 - NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> Annual Mean Concentrations and NO<sub>2</sub> and PM<sub>10</sub> Number of Exceedances from Automatic Monitoring In or Close to the Study Area (2019 Air Quality Status Report (ASR) for the year 2018; 2014 Air Quality Status Report (ASR) for the year 2013)**

All NO<sub>2</sub> annual mean concentration data from diffusion tubes in or close to the study area (those listed in Figure 12) are shown in Figure 17. Site IDs have been standardised to the format used in the 2019 Air Quality Status Report (ASR) for the year 2018.

Site ID	Site Type	Area	NO <sub>2</sub> annual mean concentration (µg m <sup>-3</sup> )									
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Brampton 1	Roadside	-	17.8	18.8	16.2	14.3	17.1	14.1	14.4	15.4	14.3	13.1
Brampton 2	Roadside	-	-	-	-	-	-	-	16.8	16.3	15.6	15.2
Brampton 3	Roadside	AQMA	33.6	35.6	27.4	26.9	29.4	25.6	22.7	27.0	23.9	21.0
Brampton 4	Roadside	-	-	-	-	-	-	-	18.8	19.8	17.4	16.3
Brampton 5	Roadside	-	19.3	18.1	16.8	16.3	18.4	16.9	15.9	17.5	15.7	13.4
Brampton 6	Roadside	-	-	-	-	-	-	-	-	-	23.6	20.7
Brampton 7	Suburban	-	-	-	-	-	-	-	-	-	14.5	11.6
Fenstanton 1	Roadside	AQMA	41.0	38.2	37.0	35.5	29.5	32.8	31.5	31.2	31.9	25.0
Fenstanton 2	Roadside	AQMA	28.3	29.5	28.6	24.5	22.0	22.5	19.9	20.0	20.7	18.8
Fenstanton 3	Rural	-	-	-	-	-	-	-	13.7	13.8	13.6	12.4
Fenstanton 4	Roadside	-	-	-	-	-	-	-	-	-	23.1	19.2
Godmanchester 1	Roadside	-	24.2	31.1	23.9	24.3	27.9	23.8	22.7	24.8	22.0	22.1
Great Stukely 1	Roadside	-	-	-	-	-	-	-	-	-	18.7	16.4
Huntingdon 1	Suburban	-	21.1	24.7	19.9	20.2	21.3	18.5	17.1	19.3	15.9	17.0
Huntingdon 2	Kerbside	AQMA	-	-	26.1	24.4	23.0	22.7	21.0	22.2	25.4	23.5
Huntingdon 3	Kerbside	AQMA	45.9	44.2	48.8	44.5	42.9	41.1	40.7	39.9	38.8	34.0
Huntingdon 4	Kerbside	AQMA	28.6	35.3	28.1	27.9	27.9	28.9	29.9	28.7	28.3	27.4
Huntingdon 5	Roadside	AQMA	29.3	34.0	32.8	29.1	29.9	27.0	27.6	26.9	26.5	24.6
Huntingdon 6	Roadside	AQMA	26.0	30.6	32.0	26.4	24.6	25.2	23.7	25.2	24.7	21.6
Huntingdon 7	Roadside	AQMA	-	-	-	-	-	-	36.4	34.6	37.4	30.7
Huntingdon 8	Roadside	-	-	-	-	-	-	-	-	-	23.4	20.5
PFH 1	Roadside	AQMA	-	-	51.6	49.3	47.5	49.5	44.2	45.1	42.5	40.8
PFH 2	Roadside	AQMA	-	-	49.0	49.0	48.8	52.0	44.7	46.1	44.4	41.4
PFH 3	Roadside	AQMA	-	-	52.4	48.5	50.2	52.8	46.6	44.8	44.9	43.3
St Ives 1	Urban Background	-	20.2	22.5	20.0	18.9	17.8	18.7	17.6	18.6	19.0	16.3
St Ives 2	Suburban	-	-	-	-	-	-	-	21.3	22.9	23.2	19.3
St Ives 3	Roadside	-	-	-	-	-	-	-	-	-	16.4	15.9
Wood Green AS	Rural	-	-	-	-	-	-	-	12.4	13.7	14.1	12.7

**Figure 17 - NO<sub>2</sub> Annual Mean Concentrations From Diffusion Tubes In or Close to the Study Area (2019 Air Quality Status Report (ASR) for the year 2018; 2014 Air Quality Status Report (ASR) for the year 2013)**

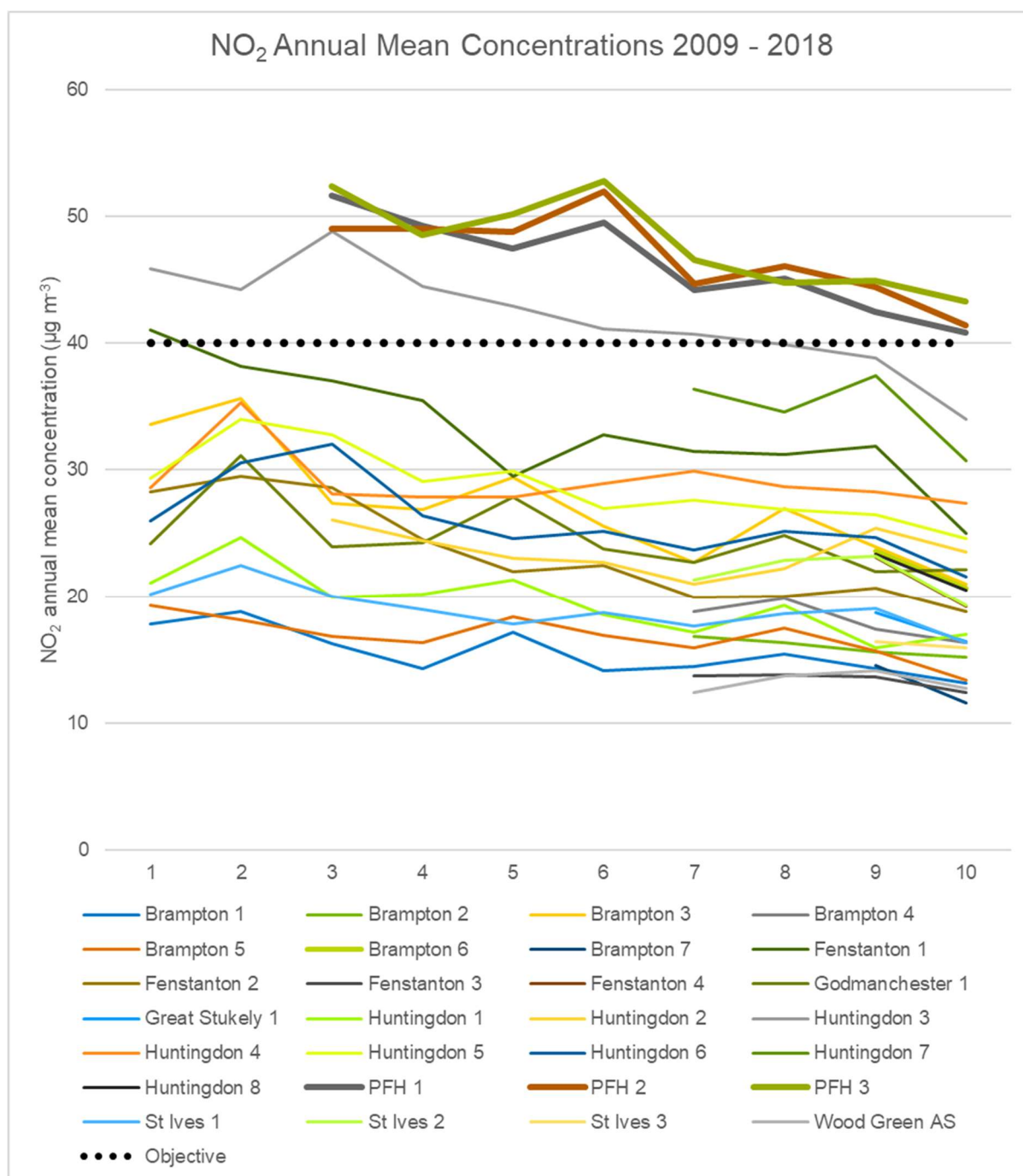
As shown by Figure 17, three diffusion tubes breached NO<sub>2</sub> Air Quality Objectives for 2018 – all located at Pathfinder House in the Huntingdon AQMA (2019 Air Quality Status Report (ASR) for the year 2018, 3.2.1). These are the only diffusion tubes co-located with a continuous analyser (2019 Air Quality Status Report (ASR) for the year 2018, A.2). The average values for annual mean NO<sub>2</sub> concentrations from the three co-located diffusion tubes (PFH 1, 2 and 3) are shown relative to comparable automatic monitoring data for the same site below:

- 2011: + 35.6 %
- 2012: - 11.8 %
- 2013: + 8.5 %
- 2014: + 32.2 %
- 2015: + 40.3 %
- 2016: + 15.1 %
- 2017: + 37.7 %
- 2018: + 49.4 %

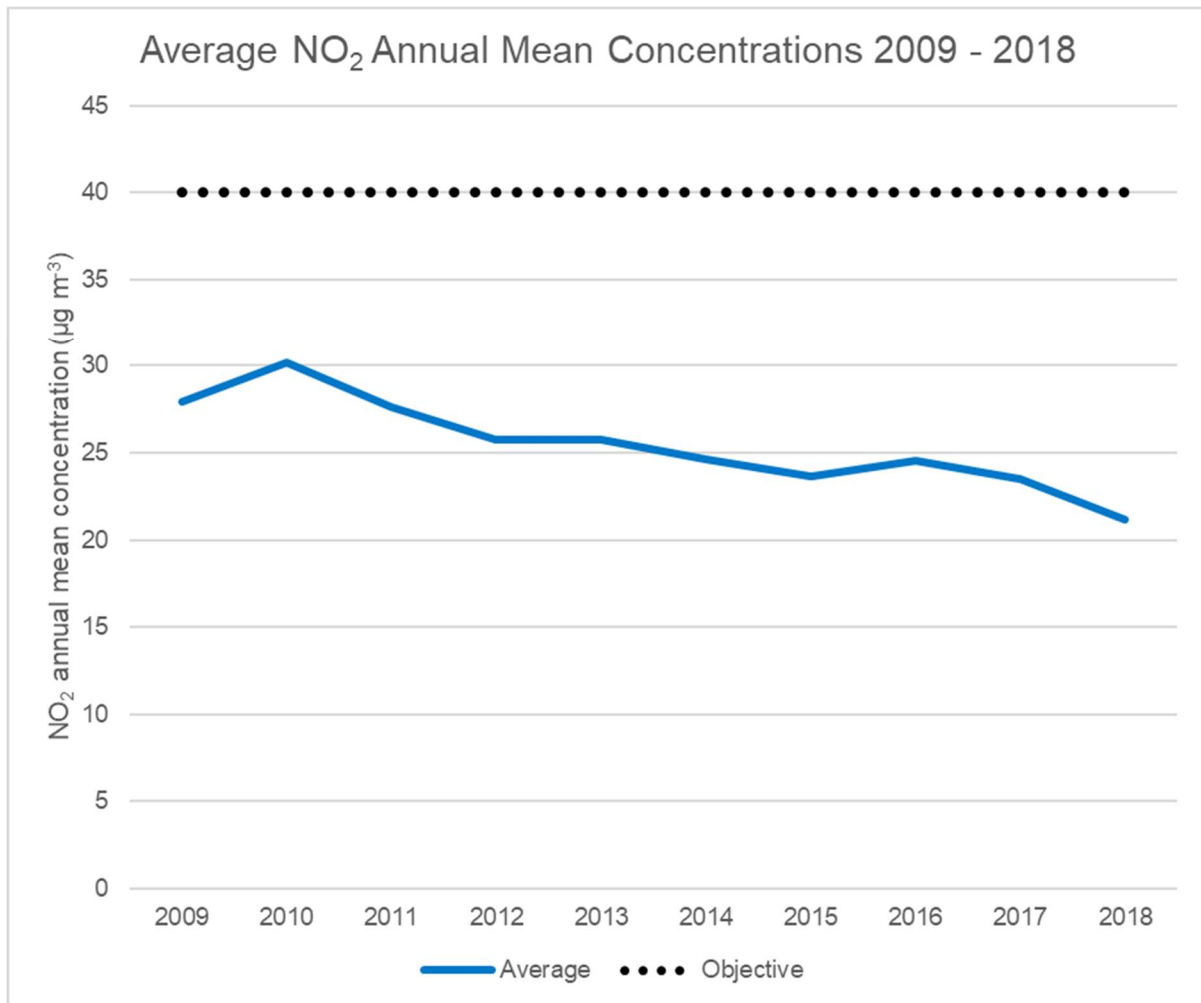
Diffusion tube data for this site are shown to significantly (> 25 %) overestimate annual mean NO<sub>2</sub> concentrations for 5 of the 8 years of operation, including the two most recent years. Figure 16 shows that annual mean NO<sub>2</sub> concentrations recorded by the continuous monitor fall below the objective limit of 40 µg m<sup>-3</sup>. Application of distance calculation to diffusion tube data also takes the average passive value at this site to 39.4 µg m<sup>-3</sup> at the nearest sensitive receptor (2019 Air Quality Status Report (ASR) for the year 2018). The 200 µg m<sup>-3</sup> 1-hour mean objective for NO<sub>2</sub> is not to be exceeded more than 18 times per year, therefore the objective levels are not exceeded at this site as there have been no exceedances since 2012.

Annual mean NO<sub>2</sub> concentrations for all diffusion tubes within the proximity of the study area are shown in Figure 18. A downward trend appears to be apparent, with Objectives breached by 3 diffusion tubes in 2018, all located at Pathfinder House within the Huntingdon AQMA. Examining this trend further, Figure 19 takes the average of all 12 monitors which have provided data for the entire 2009-2018 period for each year, showing a 24% reduction over the 10 year period.





**Figure 18 - NO<sub>2</sub> Annual Mean Concentrations for All Diffusion Tubes From 2009-2018**



**Figure 19 - Average NO<sub>2</sub> Annual Mean Concentrations for All Diffusion Tubes Active for the Entire Period From 2009-2018**

Nitrogen Dioxide (NO<sub>2</sub>) is the only pollutant which exceeds objective levels within HDC boundaries, although levels have fallen over the past 5 years. PM<sub>10</sub> daily exceedances have been trending downwards, with the Objective number not exceeded since 2012 (2019 Air Quality Status Report (ASR) for the year 2018).

## Assessment of Potential Further Studies

This section outlines the key steps that should be followed from an Air Quality perspective to further develop, construct and operate the scheme through to project delivery.

### Low Emission Strategy following the 2015-16 DEFRA LES Planning Guidance:

The LES would set out an integrated, year on year plan for the scheme to improve air quality over the period until 2025 through a reduction in vehicle emissions by accelerating the uptake of cleaner fuels and technologies.

### Air Quality Neutral Assessment:

The air quality neutral assessment compares the energy related emissions against calculated benchmark values based upon floor space, land use and energy demand, in accordance with the Air Quality Neutral Planning Support. It shows whether a scheme will be net negative, net positive or neutral from an Air Quality perspective.

### Traffic Impact Assessment & Travel Plan:

An assessment of the effects upon the surrounding area by traffic as a result of a development, such as increased traffic flows that may require highway improvements etc.

### Habitat Phase 1 & Invasive Species Survey:

A Phase 1 habitat survey is designed to map an area under consideration based on the habitats present. An extended survey might include more detailed information on hedgerows, a botanical species list, and a further appraisal of the areas as habitat for legally protected species.

### Habitats Regulations Assessment (HRA) of air quality impacts:

Habitats Regulations Assessment (HRA) is the process that competent authorities must undertake to consider whether a proposed development plan or programme is likely to have significant effects on a European site designated for its nature conservation interest.

#### Environmental Impact Assessment (EIA):

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

#### Non-Road Mobile Machinery (NRMM):

Currently NRMM on major construction sites within Greater London are required to meet Stage IIIA of EU Directive 97/68/EC as a minimum; and NRMM on all sites within either the Central Activity Zone or Canary Wharf (CAZ/CW) are required to meet Stage IIIB of EU Directive 97/68/EC as a minimum

Onsite Dust Monitoring Onsite Dust Sampling for Respirable, Inhalable Dust, Fibres Analysis, Heavy Metal Analysis. This has been included as even though the local area may not currently be subject to this, going forward it quite foreseeable that these regulations will be extended to include the whole county.

#### Ongoing Air Quality Monitoring:

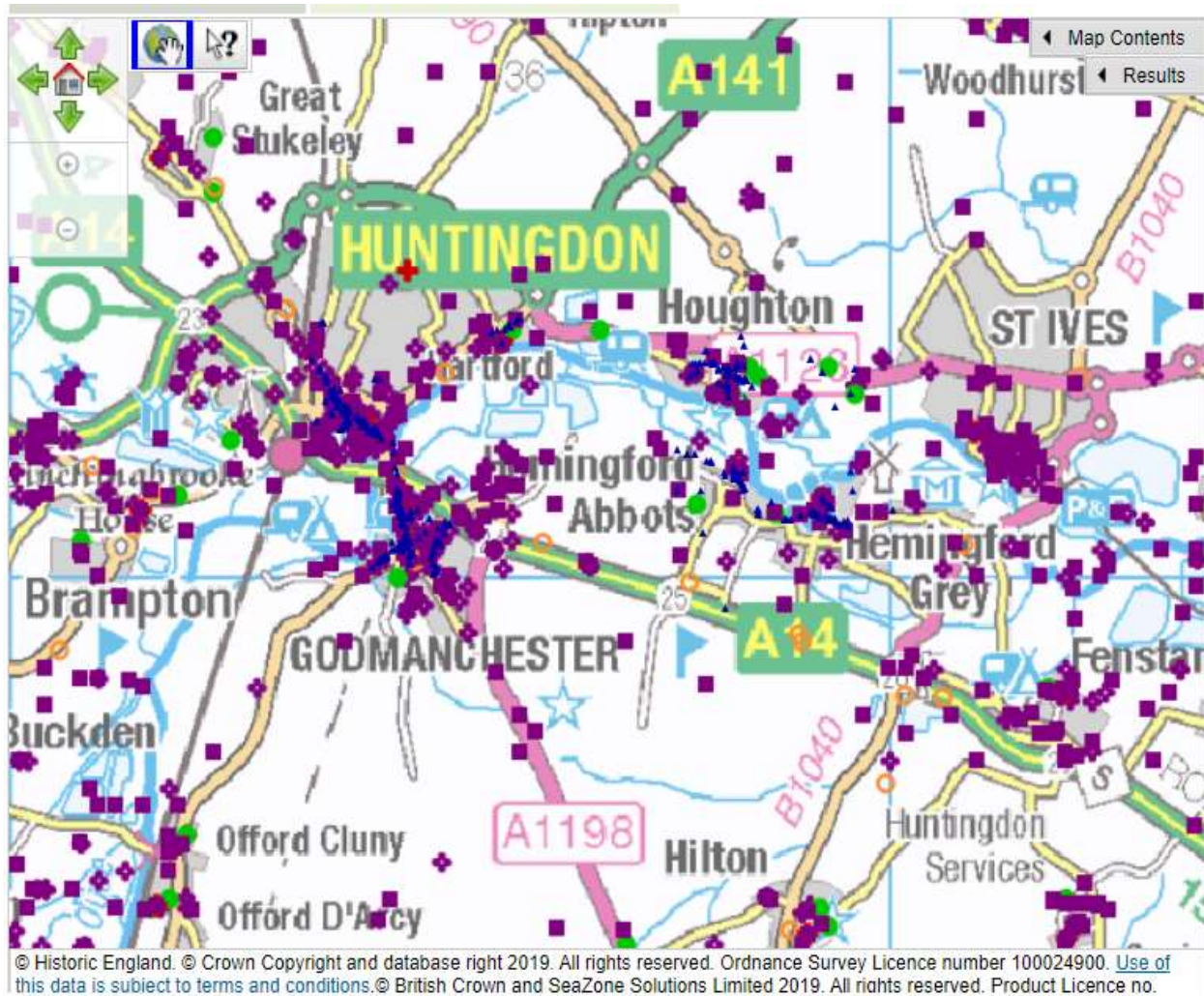
There is likely to be a requirement for dust monitoring of the project during construction of any scheme, there is also likely to be a requirement for additional air quality monitoring of the local area once the scheme is operational.

## 2. Cultural Heritage

The desktop-based study for cultural heritage was restricted to MAGIC and Heritage Gateway databases.

Features potentially impacted upon are as follows:

1. Designated or other cultural heritage resource in the footprint or outside that footprint but still potentially physically affected by it; and
2. Setting of any designated or other cultural heritage resource in the footprint of the scheme within the zone of visual influence or potentially affected by noise:
  - Historic Milestone Society database: 51 milestones
  - PastScape: 1253 records of archaeology and buildings of England Monuments and buildings taken from the National Record of the Historic Environment (NRHE).
  - National Trust Historic Buildings, Sites & Monuments Record: 4 records associated with Houghton Mill
  - 44 records Parks and Gardens UK (web resource dedicated to historic designed landscapes across England, Northern Ireland, Scotland and Wales).
  - National Monuments Record Excavation Index (index to the location of the excavation archives and finds): 421 results
  - Church Heritage Record: 45 church buildings
  - Cambridgeshire Historic Environment Record is the definitive source of information on archaeological sites and finds in the modern county of Cambridgeshire: No records



## Legend

- |   |   |
|---|---|
| ▲ Listed Building (NHLE)                      | ■ Scheduled Monument (centre point)           |
| ■ EH PastScape                                | ■ Registered Park/Garden (centre point)       |
| ○ Local HER record points                     | ■ Registered Battlefield (centre point)       |
| ▲ Local HER record polygons                   | ■ Protected Wreck Site (centre point)         |
| ○ National Trust HBSMR                        | ■ World Heritage Site                         |
| ■ Building Preservation Notice                | ■ Certificate of Immunity                     |
| ◆ Designation Decision Records De-listed      | ★ Designation Decision Records Non-designated |
| ● Parks and Gardens (Non Statutory Data)      | ✦ NMR Excavation Index                        |
| ✦ Church Heritage Record (Non Statutory Data) |   |

Figure 20: Map of Results Heritage Gateway Within 10km from Huntingdon



## Listed Buildings (also included in PastScape. See Figure 21)

Concentration of Listed Buildings as follows:

- Huntingdon town centre, mainly along High Street but also along the B1514
- Godmanchester along the B1044 (south of A14)
- Village of Houghton
- Village of Hemingford Abbots along Common Lane and High Street
- Hemingford Grey along High Street



Figure 21: Map of Listed Buildings Within the Study Area (MAGIC search)



## Scheduled Monuments

- Huntingdon Castle (Castle Hills): a motte and bailey castle and Civil War fieldwork
- Huntingdon Bridge
- Civil War battery at Clayton's Way, Huntingdon
- The Manor of Hemingford Grey: a medieval moated site
- Moated site 170m east of St Mary's Church, Godmanchester
- Earthwork on Mill Common, Huntingdon
- Roman barrow 450m south west of Stukeley Park, Great Stukeley
- Roman barrow adjacent to Ermine Street, 290m east of St Bartholomew's Church, Great Stukeley
- Moated site in Prestley Wood, 800m north east of Cartwright's Farm
- Moated site in Bellamy's Grove
- 'The Moat': a motte and bailey castle 700m west of Mayfield Heath Farm
- St Ives Bridge
- Obelisk at site of Republic Cottage, Stocks Bridge
- The priory barn: remains of the Benedictine priory at Saint Ives



**Figure 22: Map of Scheduled Monuments Within the Study Area (MAGIC search)**

3. Could potential archaeological remains be concealed?
  - Yes, 421 records in the National Monuments Record Excavation Index (index to the location of the excavation archives and finds). These include, for instance, findings from excavation works for development.
  - Refer to Figure 20 above.

## Limitations

The following sources have not been consulted:

1. Historical documents
2. Cartographic and pictorial documents
3. Aerial photographs
4. Geotechnical information
5. Secondary and statutory sources e.g. Regional and period archaeological studies, landscape studies, local knowledge, dissertations, policy statements and research frameworks, legislative documents, European directives, local development plans, unitary development plans, constraints map.

### 3. Ecology

The key headlines from the ecology desk top study are:

- The most likely major impact is loss of habitats supporting protected and notable species and severance of habitats which is likely to be a significant negative adverse impact for some species.
- Other plans and projects will need to be taken into consideration to fully assess the potential impacts of a 3rd River Crossing as well as detailed ecological surveys and impact assessments.

Cambridgeshire and Peterborough Environmental Records Centre CPERC provided data for the desk study. 'Where's the Path' was checked to identify ponds and waterbodies in the study area which could support great crested newt.

#### Designated Sites

There are numerous designated sites within the study area. These include 6 Sites of Special Scientific Interest with two located between St Ives and Huntingdon. In addition, there are 27 County Wildlife Sites within the study area, 9 of which fall within the area between St Ives and Huntingdon as shown in Figure 23 below;

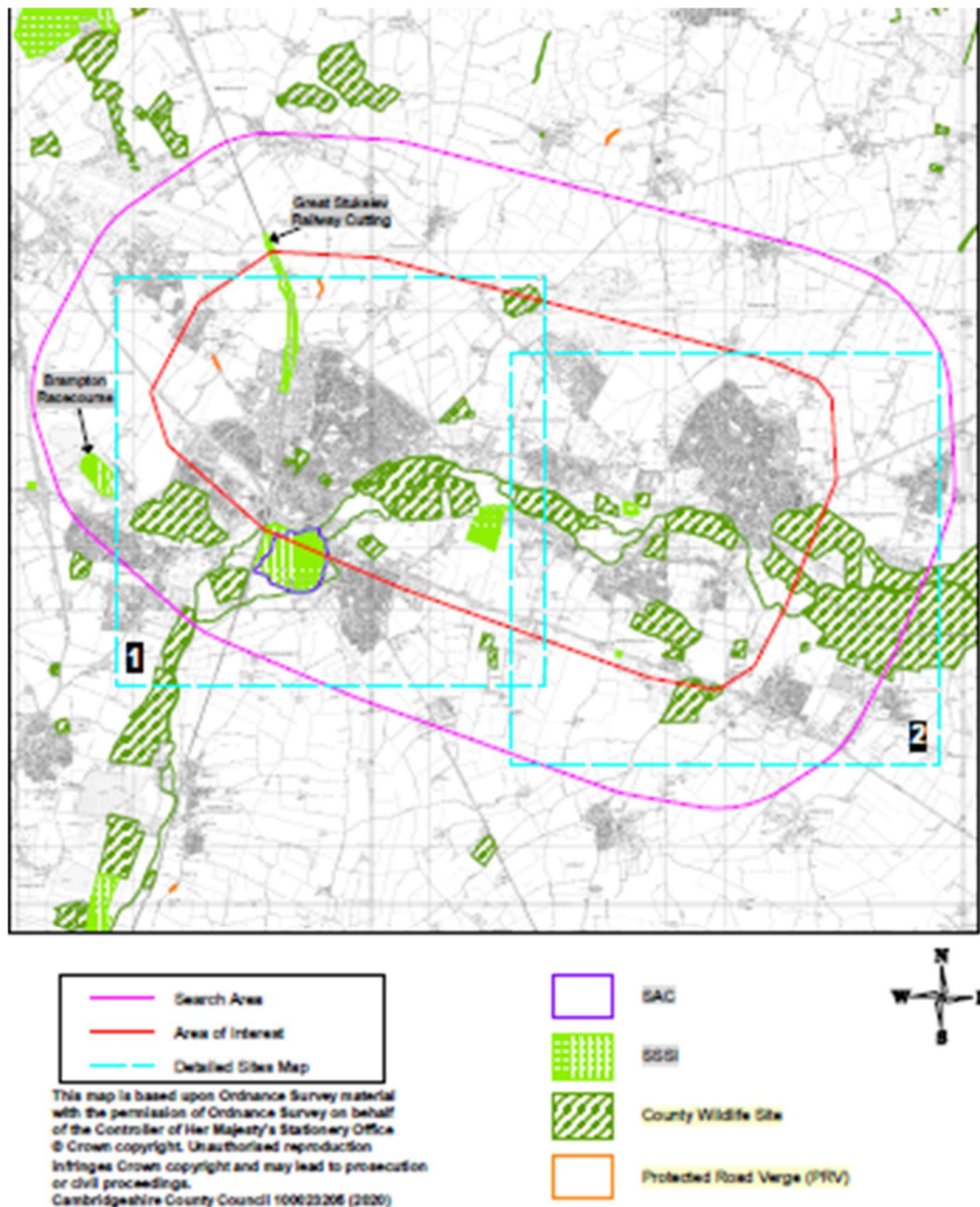


Figure 23: Designated Sites Within the Study Area. Source CPERC

The key designated sites are;

- Portholme Meadows SAC/SSSI -International Importance
- Godmanchester Eastside Common SSSI – National Importance
- Houghton Meadows SSSI – National importance
- Hemingford Grey Meadow SSSI – National importance

The most likely County Wildlife Sites (CWS) that could be directly impacted are as follows;

- River Great Ouse CWS -Local importance
- Godmanchester Eastside Common CWS
- Cow Lane Gravel Pits CWS

Indirect impacts could affect the following CWSs;

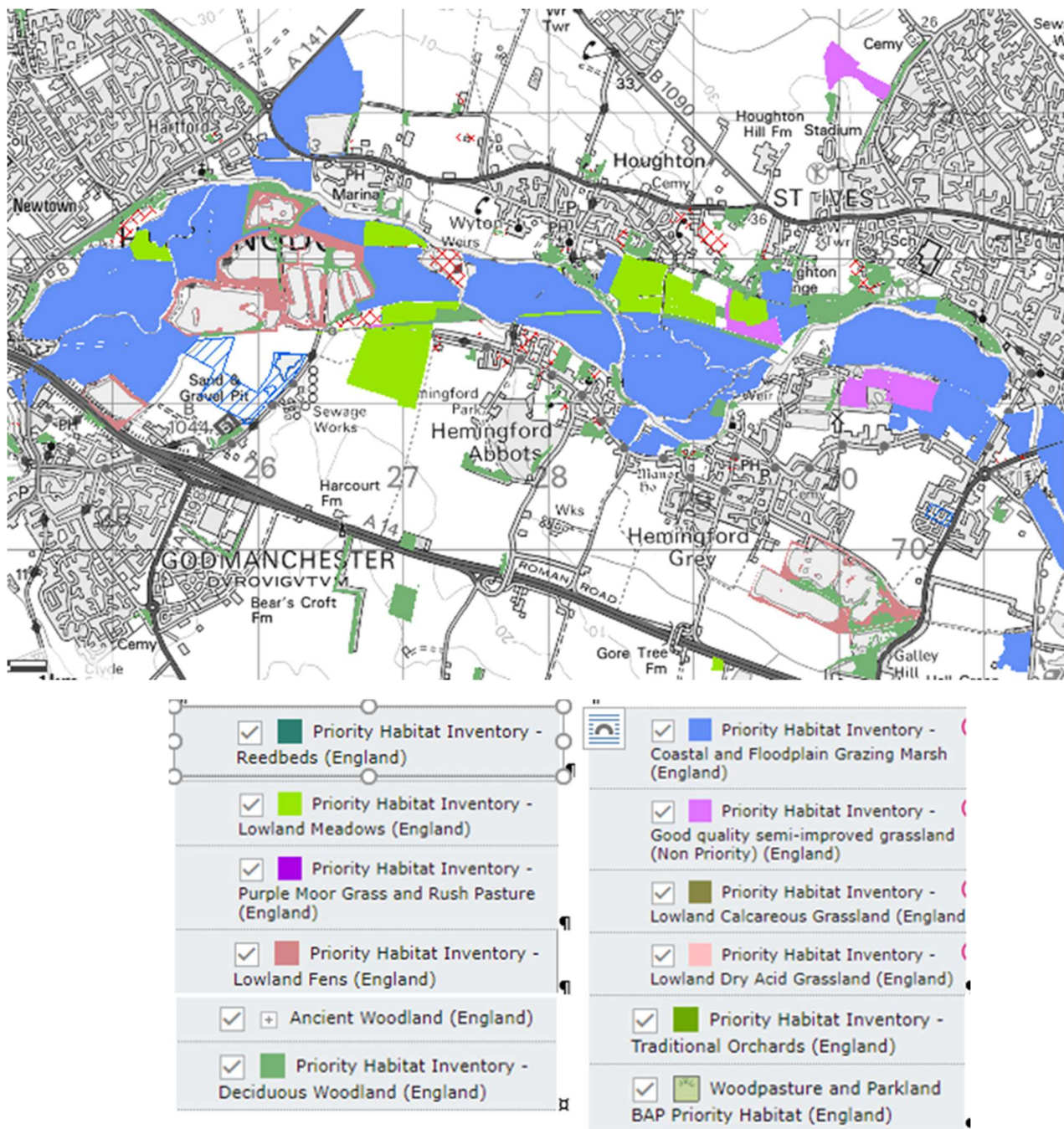
- Houghton Meadow Pollard Willows CWS
- Houghton Grange Grasslands CWS
- Hemingford Abbots Meadow CWS
- Huntingdon Bypass Borrow Pit CWS

## Priority Habitats

The Houghton and Wyton Neighbourhood Plan March 2018, states that Houghton and Wyton contain a large area of floodplain meadows, some of which is designated but the majority of which is impoverished from a biodiversity perspective. There has been a significant loss of species-richness in the riverside meadows. A key objective for the Ouse Valley area of greenspace enhancement is the restoration of species rich floodplain meadows.

Priority habitats are present along the River Ouse corridor as shown in Figure 24 below;





**Figure 24: Priority Habitats in the Study Area.**

All of these habitats are listed as important under the Natural Environment and Rural Communities Act 2006 (NERC) and listed as Habitat of Conservation Concern.



## Protected Species

CPERC returned over 17,500 records of animals, plants and invertebrates.

The lowland hay meadows are characterised by species rich swards including, great burnet, meadowsweet, meadow buttercup, yellow rattle and lady's bedstraw and at Houghton Meadow, down the Thicket, it is recorded that the scarce, green winged orchid is present.

The river Great Ouse is important for eels, spined loach, tommy ruffe, lampreys and otter. Many dragonfly and damselfly species are also present.

The main faunal species that are considered likely to be a major constraint to the works are as follows;

- Otter (International) Conservation of Habitats and Species Regulations 2017
- Great crested newt (International) Conservation of Habitats and Species Regulations 2017
- Bats (International) Conservation of Habitats and Species Regulations 2017
- Breeding birds Wildlife and Countryside Act 1981 (as amended)
- Water vole Wildlife and Countryside Act 1981 (as amended)
- Badger Protection of Badgers Act 1996
- Fish Wildlife and Countryside Act 1981 (as amended)
- Plants Wildlife and Countryside Act 1981 (as amended)

It is estimated that there are around 42 ponds/waterbodies that could support great crested newt between St Ives and Huntingdon. There are very recent records (2009 -2019) of great crested newt throughout the study area, including Houghton Grange.

There are numerous records of species that are listed as UK BAP species and listed under the Natural Environment and Communities Act 2006 as Species of Conservation Concern.

The river appears to support alien invasive species and it is assumed that this means signal crayfish. Therefore White-clawed crayfish are unlikely to be present but this needs to be confirmed.

There are numerous WCA Schedule 1 species of bird present in the study area, the main ones are as follows;

- Bittern
- Kingfisher
- Barn owl

Numerous birds associated with the gravel pits are likely to use the adjacent floodplain meadows for grazing and roosting.

CPERC did not have any records for fish but it is thought that the River Ouse supports lampreys, common eel and spined loach, all of which are UK BAP species.

There are numerous records of UK BAP invertebrates (beetles, moths, butterflies, dragonflies, flies), most of which are also listed under s41 of the NERC Act and some are listed as Cambridgeshire additional species of interest.

There are numerous records of UK BAP plants, most of which are also listed under s41 of the NERC Act and some are listed as Cambridgeshire additional species of interest (Field gromwell, fritillary, water violet, strawberry and sulphur clover and dodder). Grass poly is listed under WCA Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).

The most likely major impact is loss of habitats supporting protected and notable species and severance of habitats which is likely to be a significant negative adverse impact for some species.

## Other plans and projects

Other plans and projects will need to be taken into consideration to fully assess the potential impacts of a 3rd River Crossing as well as detailed ecological surveys and impact assessments.

## 4. Landscape

Key points from the landscape desk top study are that the main impacts are on designated sites which include:

- Portholme Meadows - SAC / SSSI
- Houghton Meadows - SSSI
- Hemingford Grey Meadow - SSSI
- Godmanchester Eastside Common - SSSI

Under the DMRB LA107, Landscape and visual effects, these landscapes would be classed as high sensitivity with a moderate or major magnitude of effect depending on the scale of the works.

There will be significant effects on any SSSI /SAC land intersected by the scheme due to vegetation loss and the additional built form intersecting the landscape.

Godmanchester Eastside Common SSSI in the centre of the study area is home to diverse grass species, such as crested hair-grass and meadow oat grass.

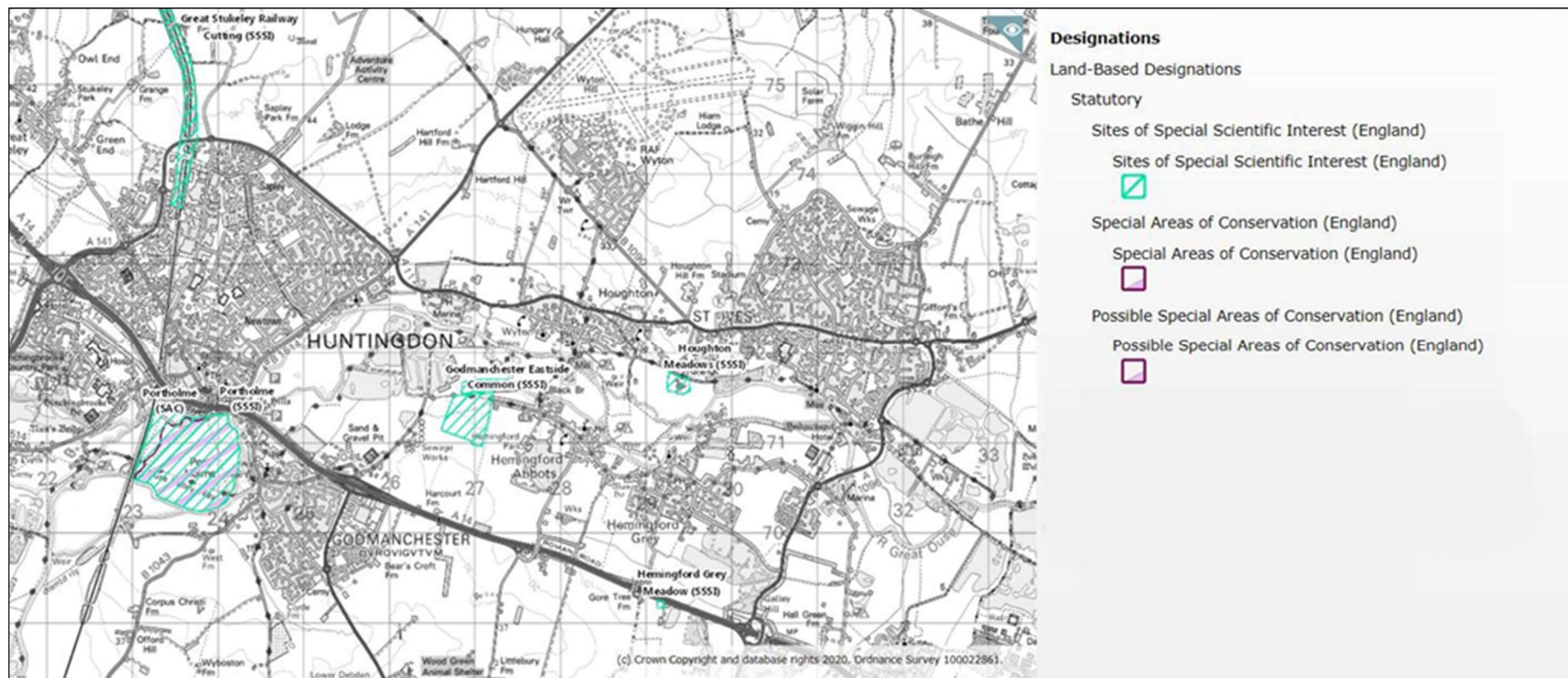
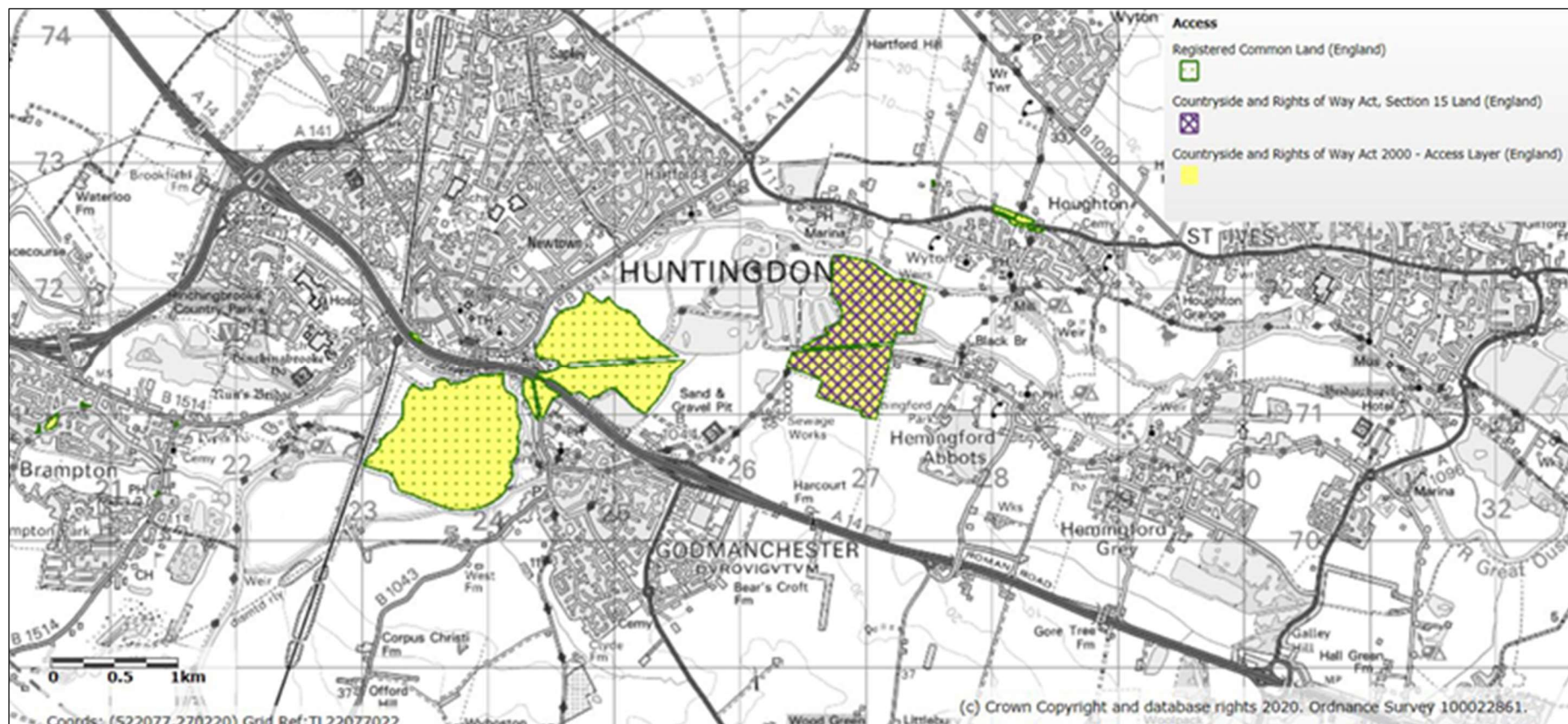


Figure 25: Landscape Designations Map

The impacts on other access land.

- Portholme Meadows Registered - Common Land, Countryside and Rights of Way Act 2000
- Land adjacent to Houghton Recreational Ground - Registered Common Land, Countryside and Rights of Way Act 2000
- Godmanchester Eastside Common - Registered Common Land, Countryside and Rights of Way Act 2015 & 2000
- Westside Common - Registered Common Land, Countryside and Rights of Way Act 2000.

Under the DMRB LA107, Landscape and visual effects, these landscapes would be classed as moderate sensitivity with a moderate magnitude of effect. However, some of these classifications also fall into the designations above so would have a major adverse effect.



### Figure 26: Access Land Map



Within the Huntingdonshire Landscape and Townscape Assessment there are two character areas within the study area, Central Claylands and Ouse Valley.

The main impacts will be on the Ouse Valley. This character area comprises of a mosaic of land uses, united by their topography. Urbanising influences occur at road crossings and where the valley passes through towns. Otherwise, the valley floor feels tranquil and isolated. Any development/new road/river crossing could have a significant adverse impact on the tranquillity and isolated feel of the current landscape and would create an additional linear feature on the valley floor. There is the potential for the loss of Willow and Poplar trees which flourish in the valley, which increase its sense of identity and enclosure.

- Impacts on visual receptors.
- Prow users. There are a number of prows within the study which include 102/4, 121/4, 102/13 as displayed on the Cambridgeshire definitive map
- Residential areas
- Users of public open spaces

Under the DMRB LA107 landscape and visual effects these visual receptors are classed as high sensitivity with a moderate or major magnitude of effect depending on the scale of the works. Any development/new road/river crossing would create additional built form and associated traffic in the views. Vegetation loss would potentially reduce screening, making the development more visible in the landscape



## 5. Noise Impact

The high level assessment of road noise from the A-Roads in the study area around Huntingdon and St Ives, gave the following results.

### Noise Model

Noise maps were produced using 3D noise modelling software CadnaA, which calculates road traffic noise using the Calculation of Road Traffic Noise method. These are shown in Figures 27 to 31. The historical traffic count data for this model was sourced from the DFT Traffic Statistics 2018 data, which is the most current data available. Further information can be found on [www.roadtraffic.dft.gov.uk](http://www.roadtraffic.dft.gov.uk). Typical traffic speeds are determined by the speed limit of each road. Please note this is historical data and the data is limited, therefore the accuracy of this model cannot be guaranteed.

24-hour count data, taken a 1-hour average has been used. This therefore represents an average noise level per hour over a 24-hour period. Periods of the day, particularly such as rush-hour, will have higher noise levels than shown. Similarly, periods of the night will have lower levels than shown.

This model has been updated to the screening of noise by the first row of buildings next to all A roads. Please note that this model does not allow for screening from all buildings within the area. This means that, where there are buildings further away from the A roads, noise propagation behind these buildings will be further mitigated by their screening effect.

Only noise from the A-Roads in this area is used in this model. This includes the A14, A1307 (old A14) A141, A1123 and A1096. Currently, the construction work on A14 is ongoing: sections of the old A14 (now renamed A1307) are currently closed and the new A14 is routed to the south of Huntingdon and Godmanchester. As no traffic data is available for this current situation, the noise model assumes the scenario of these roads before the new routing took place.

## Noise Sensitive Receptors

Our visit to the site determined where all critical noise sensitive receptors are, including new residential developments and schools which are not shown on some satellite images. Figures 32 to 42 show the location of noise sensitive receptors. These are highlighted in orange, and include all residential buildings, including care homes and hotels. All hospitals and schools have been highlighted red.

## Noise Criteria

The key legislation to be met in terms of noise is the Noise Insulation Regulations 1975 in relation to the Land Compensation Act 1973.

The Noise Insulation Regulations 1975 (as amended 1988) set out the requirements under which buildings may qualify for both statutory and discretionary noise insulation in relation to the Land Compensation Act 1973.

The Noise Insulation Regulations set out the following definitions:

- “Relevant noise level” - the level of noise, expressed as a level of LA10 (18-hour), one metre in front of the most exposed of any windows and doors in a facade of a building caused or expected to be caused by traffic using or expected to use any highway.
- “Prevailing noise level” - the level of noise, expressed as a level of LA10 (18-hour), one metre in front of the most exposed of any windows and doors in a facade of a building caused by traffic using any highway immediately before works for the construction of a highway or additional carriageway, or for the alteration of a highway, as the case may be, were begun.
- “Specified level” - a noise level of LA10 (18-hour) of 68dB.
- “Relevant date” - the date on which a highway or additional carriageway was first open to public traffic or, in the case of an altered highway, the date on which it was first open to public traffic after completion of the alteration.

Any residential property within 300m of the modified or new highway is eligible for compensation for insulation work if both the following are true:

- The relevant noise level is greater by at least 1dB(A) than the prevailing noise level and at least the specified noise level 68dB(A)
- Noise caused by traffic using the modified or new highway contributes at least 1dB(A) to the relevant noise level.

The Noise Insulation Regulations requires assessed noise levels to be calculated in accordance with Calculation of Road Traffic Noise (1988).

The Noise Insulation Regulations also set out which buildings and rooms the regulations are applicable to. Only habitable rooms within residential buildings are eligible. Bathrooms, hallways, utility areas and smaller kitchens that do not include living or dining areas are not eligible.

## Further Study

The next step of this study could involve a revision to the noise model that considers the re-routing of the A14 to the south of Huntingdon, with the old A14, now the A1307 being used as a local road in the area. As sections of the A1307 are currently closed for the ongoing roadworks, which are due to finish in December 2020, there will not be any valid data for this until the road is opened and new traffic counts have been done.<sup>1</sup>

Other steps could be made by considering noise from B roads in all or certain parts of the area. To obtain the most accurate data, noise surveys of certain roads within an area must be done. If a new section of road is proposed at a known location, an assessment to the Noise Insulation Regulations 1975 can also be done.

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<sup>1</sup> Note that the A14 scheme opened for traffic on Tuesday 5<sup>th</sup> May 2020.



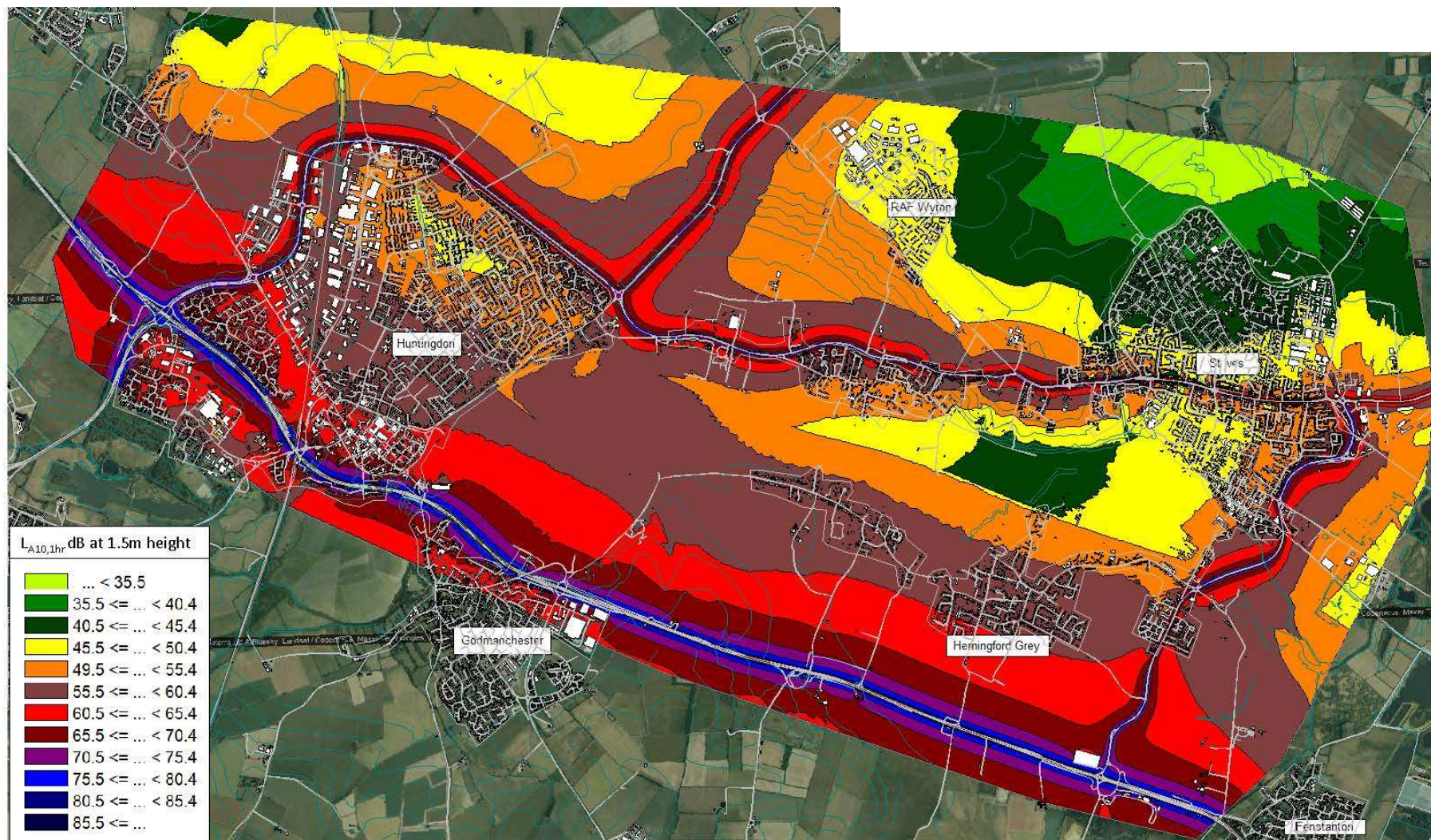


Figure 27: Map of Noise from A-roads only, at 1.5m high



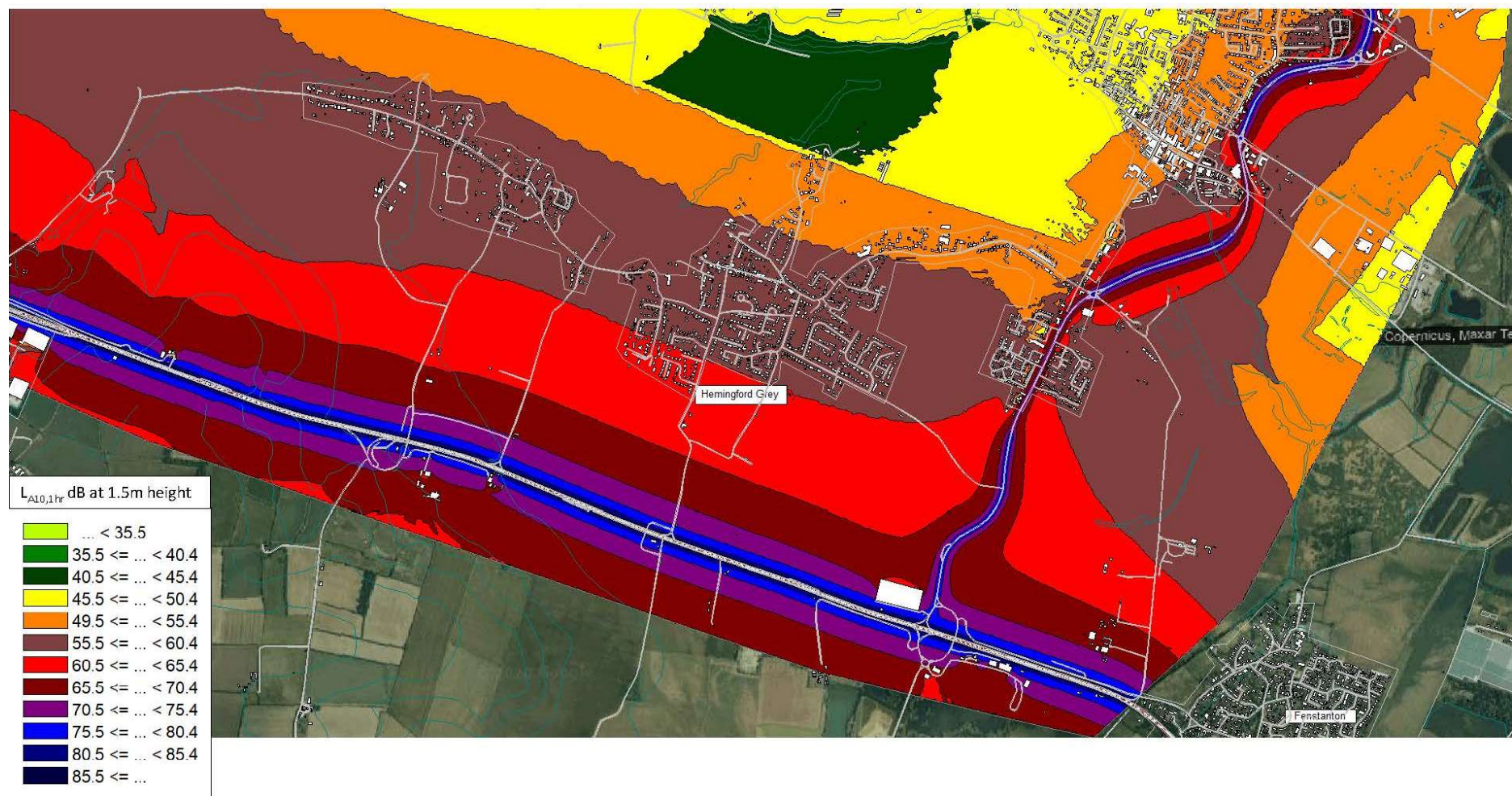


Figure 28: Map of Noise from A-roads only, at 1.5m high – NE Section of Assessment Area



Figure 4: Map of noise from A-Roads only, at 1.5m high – NE section of assessment area

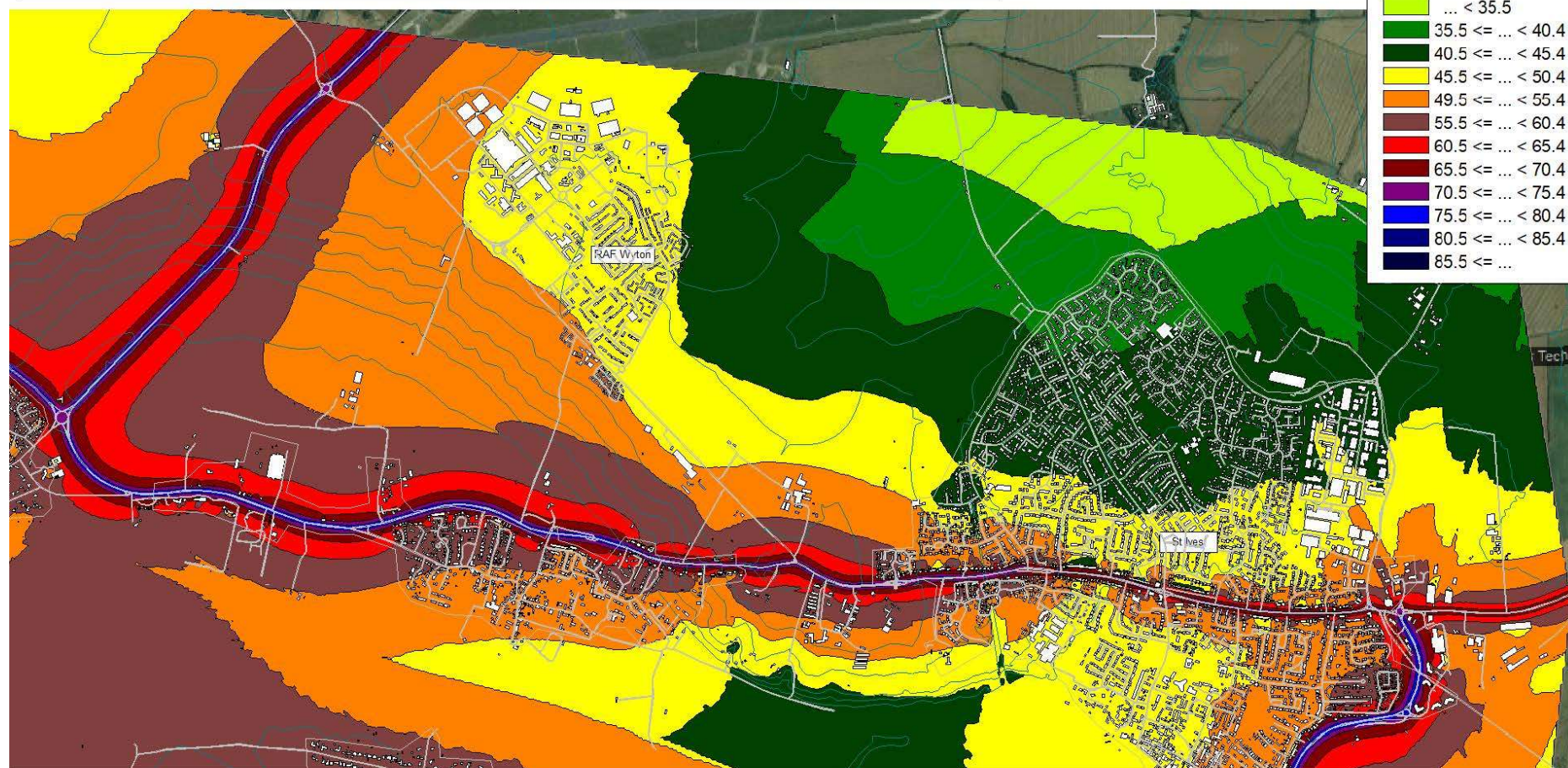


Figure 29: Map of Noise from A-Roads Only, at 1.5m High – North east section of Assessment Area



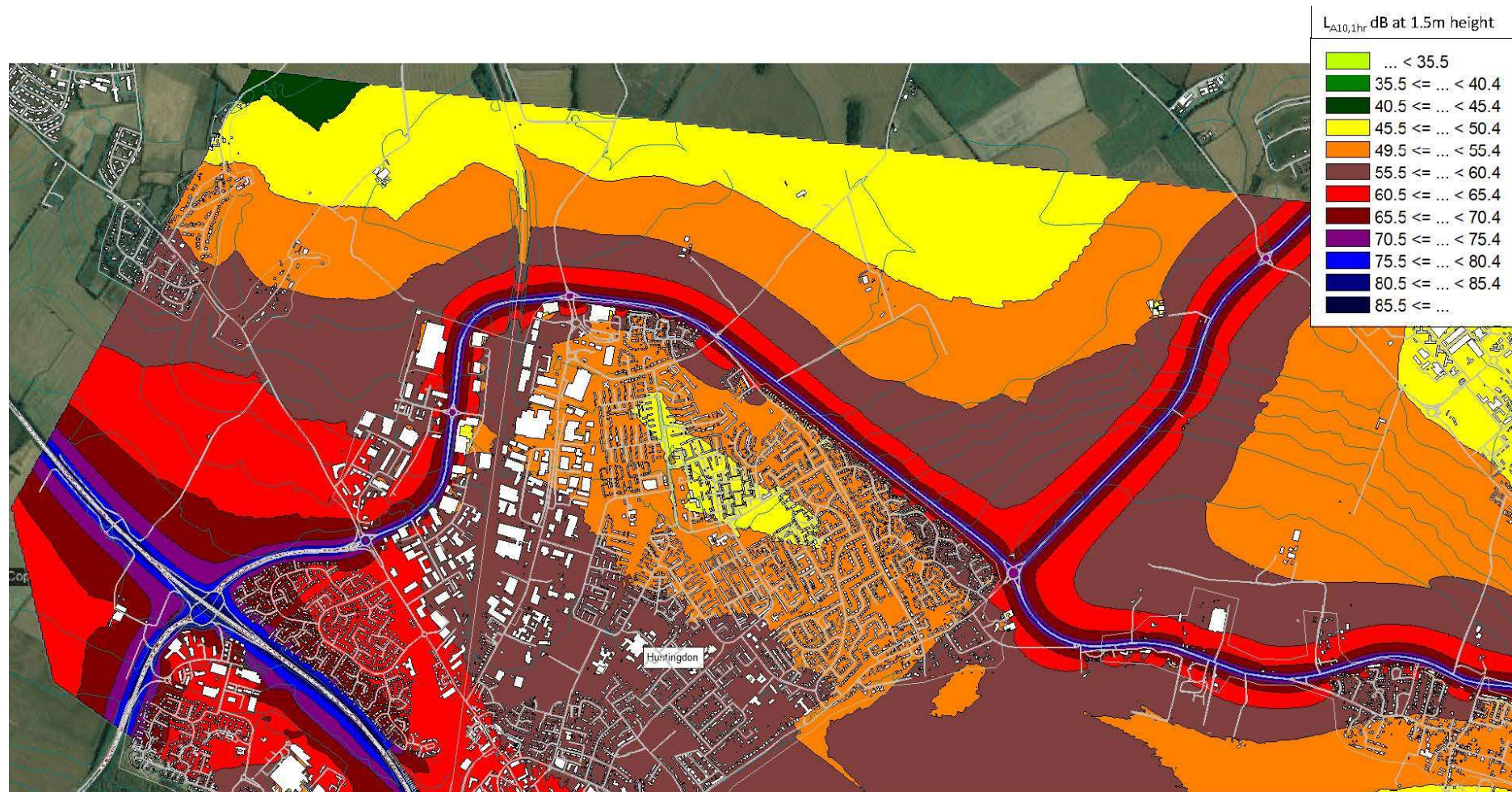


Figure 30: Map of Noise from A-Roads Only at 1.5m high – North West section of assessment Area



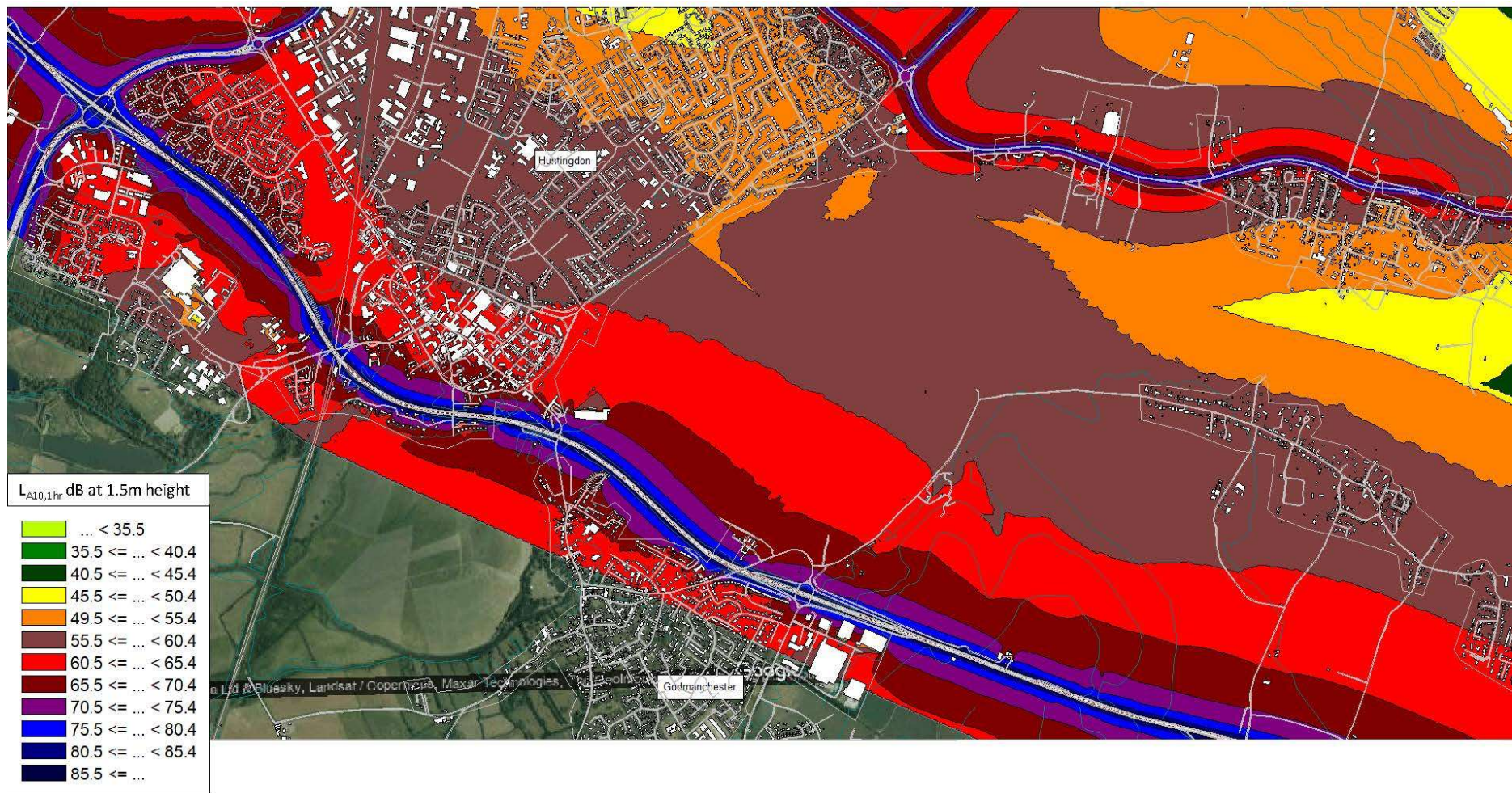


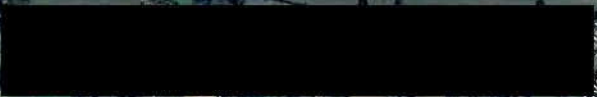
Figure 31: Map of Noise from A-Roads Only at 1.5m High – South West Section of Assessment Area





Figure 32: Satellite Image With Noise Sensitive Receptors Highlighted – A14 to St Ives





**Figure 33: Satellite Image With Noise Sensitive Receptors Highlighted – St Ives**



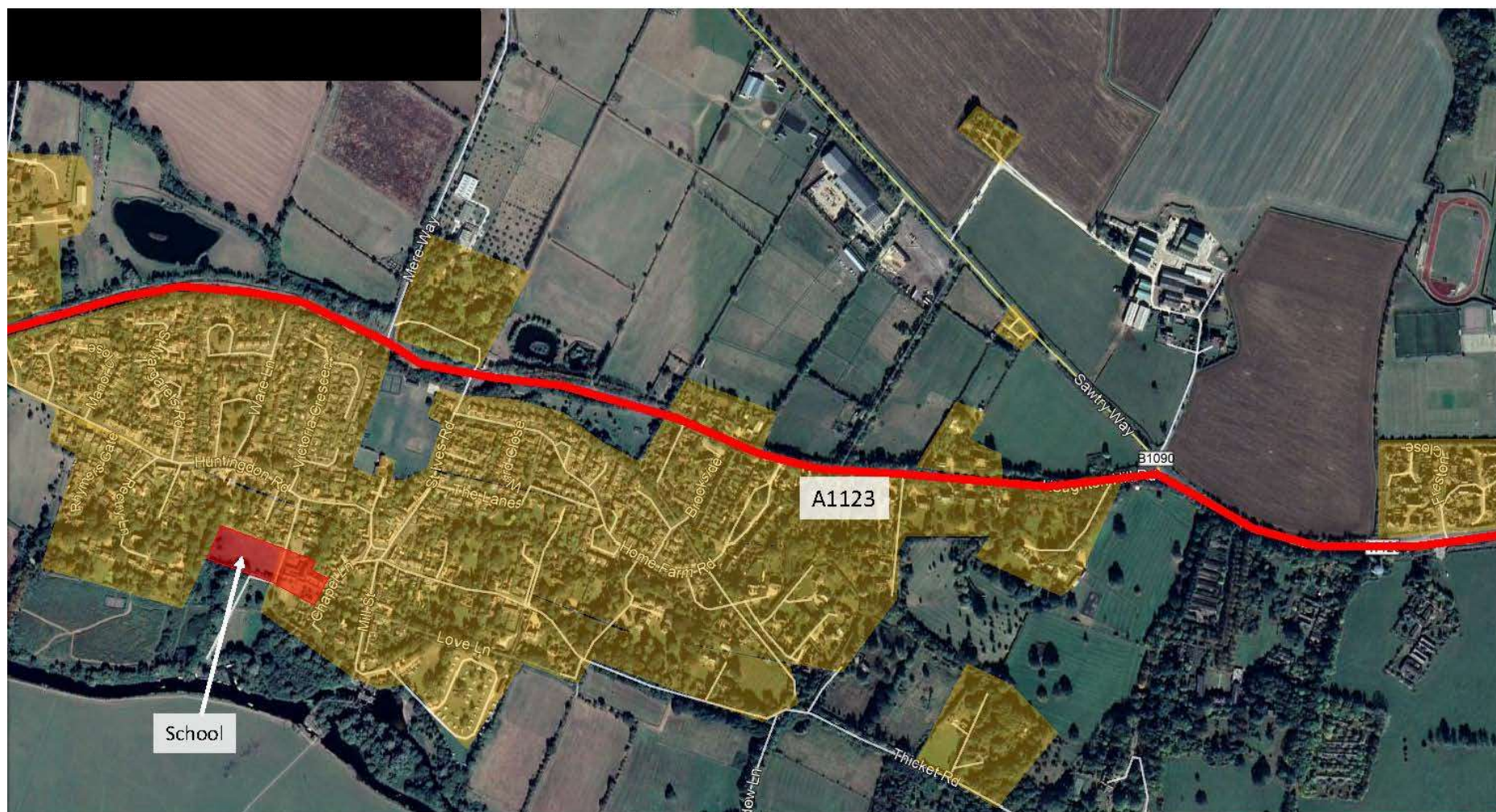


Figure 34: Satellite Image With Noise Sensitive Receptors Highlighted – Houghton





Figure 35: Satellite Image With Noise Sensitive Receptors Highlighted – Hartford Marina



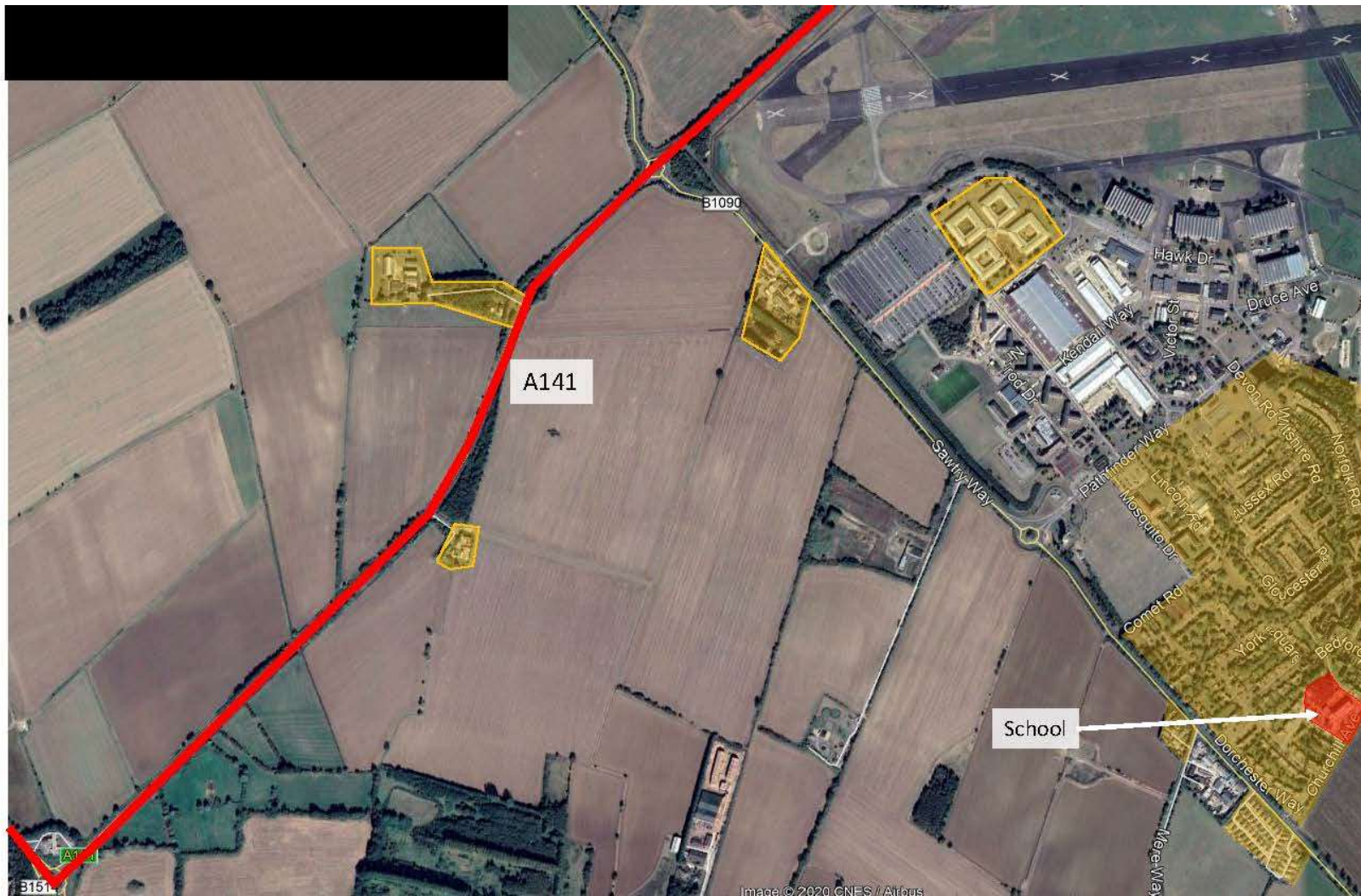
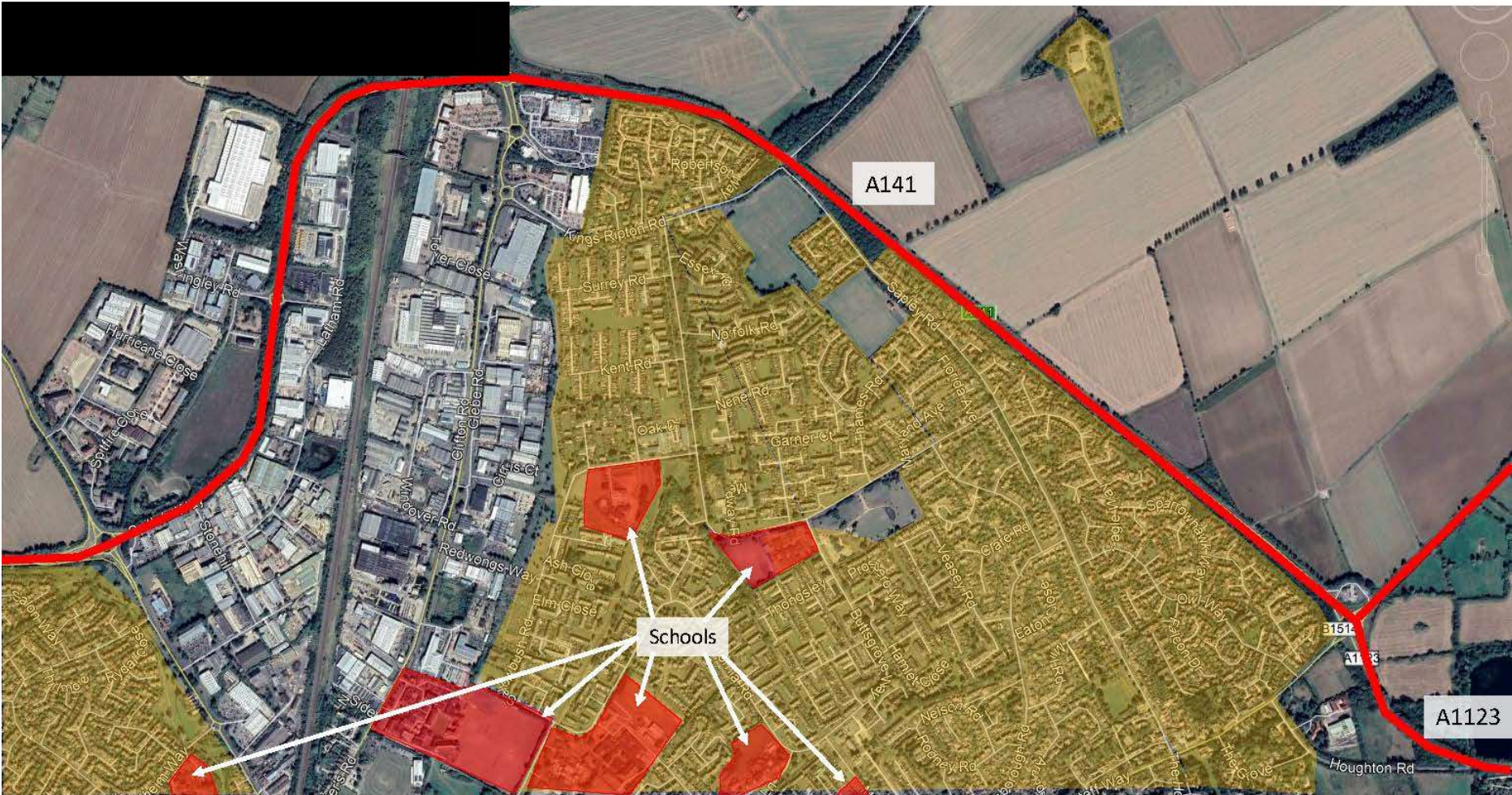


Figure 36: Satellite Image With Noise Sensitive Receptors Highlighted – RAF Wyton





**Figure 37: Satellite Image With Noise Sensitive Receptors Highlighted – Huntingdon North**





Figure 38: Satellite Image With Noise Sensitive Receptors Highlighted – Huntingdon West and Brampton



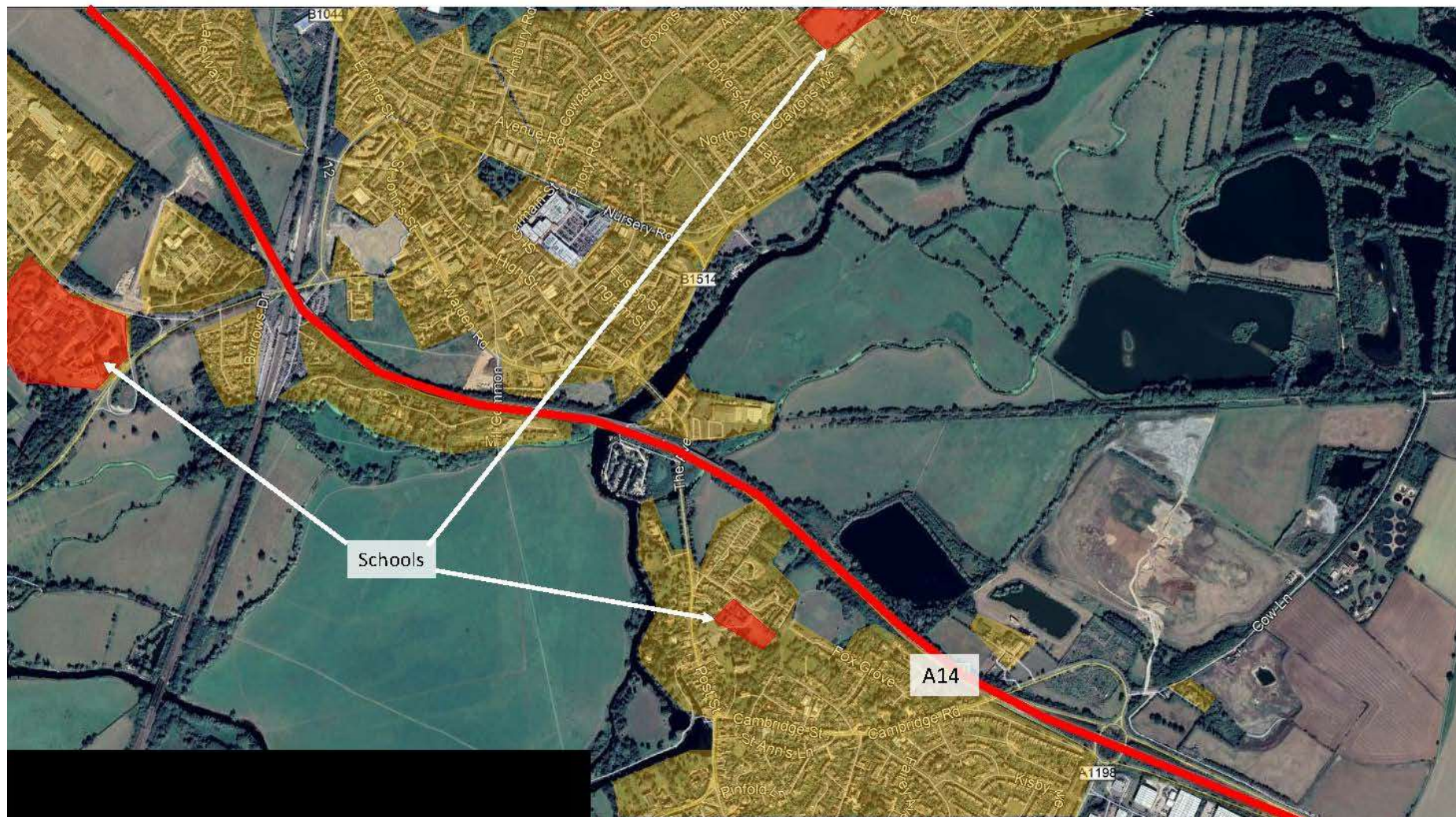


Figure 39: Satellite Image With Noise Sensitive Receptors Highlighted – Huntingdon South and Godmanchester



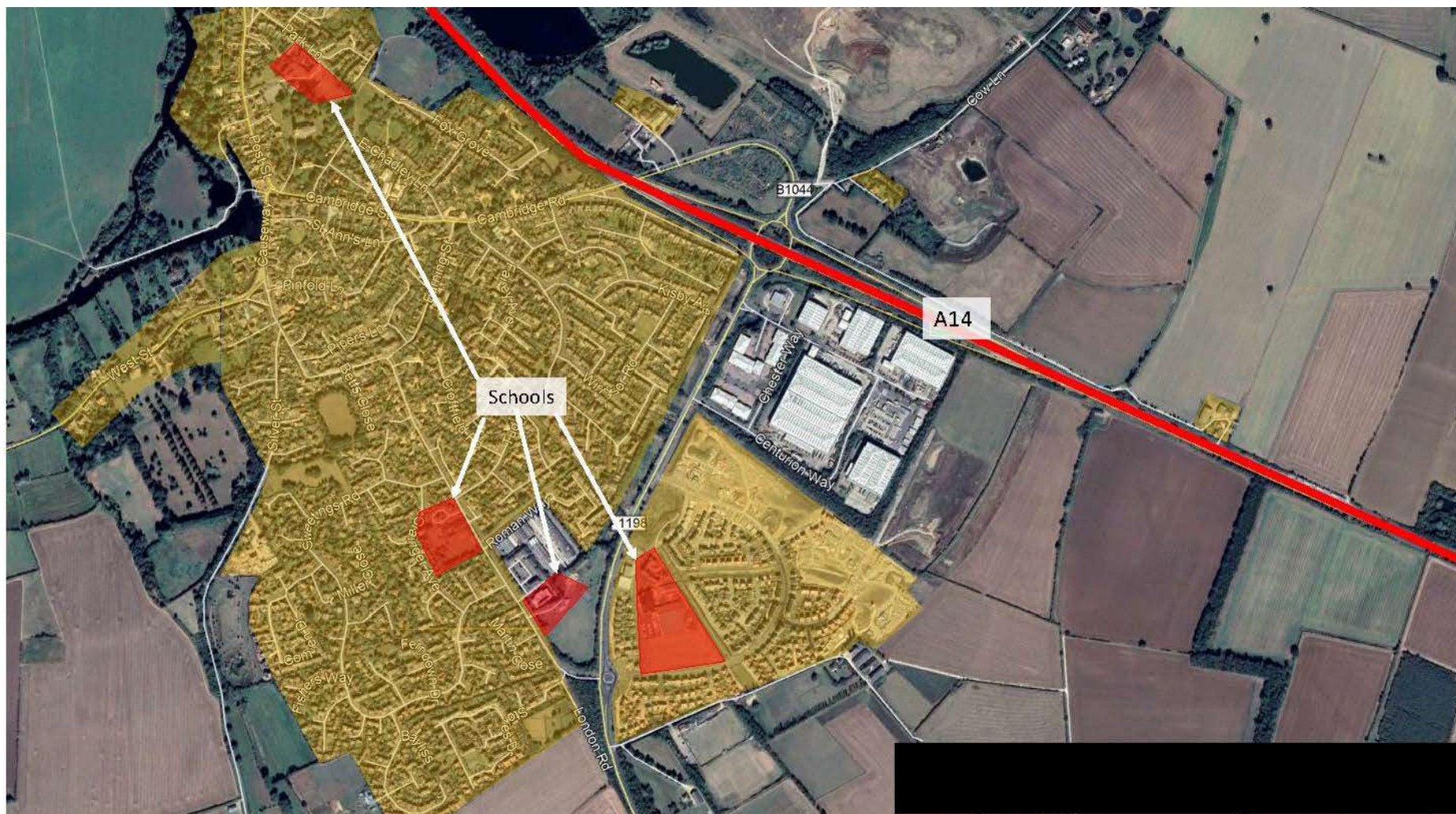


Figure 40: Satellite Image With Noise Sensitive Receptors Highlighted – Huntingdon South and Godmanchester





Figure 41: Satellite Image With Noise Sensitive Receptors Highlighted – Hemingford Grey





Figure 42: Satellite Image With Noise Sensitive Receptors Highlighted – Houghton, Hemingford Abbots and Hemingford Grey

## 6. Water Environment

The key points from the high level assessment of the Water Environment are as follows:

- A route involving a river crossing will require significant investigation, modelling and optioneering due to the crossing of functional flood plain.
- River flooding is the dominant flood risk in the study area.
- There is a significant area of functional flood plain (Flood Zone 3b) between Huntingdon and St Ives which can be inundated fairly regularly during winter or high flows (locations include Westside Common, Godmanchester East Side Common, Battocks Meadow, Houghton Meadow and Hemingford Meadow). The functional flood plain outline is derived from the 5% Annual Exceedance Probability (AEP) or 1 in 20-year probability modelled outline.

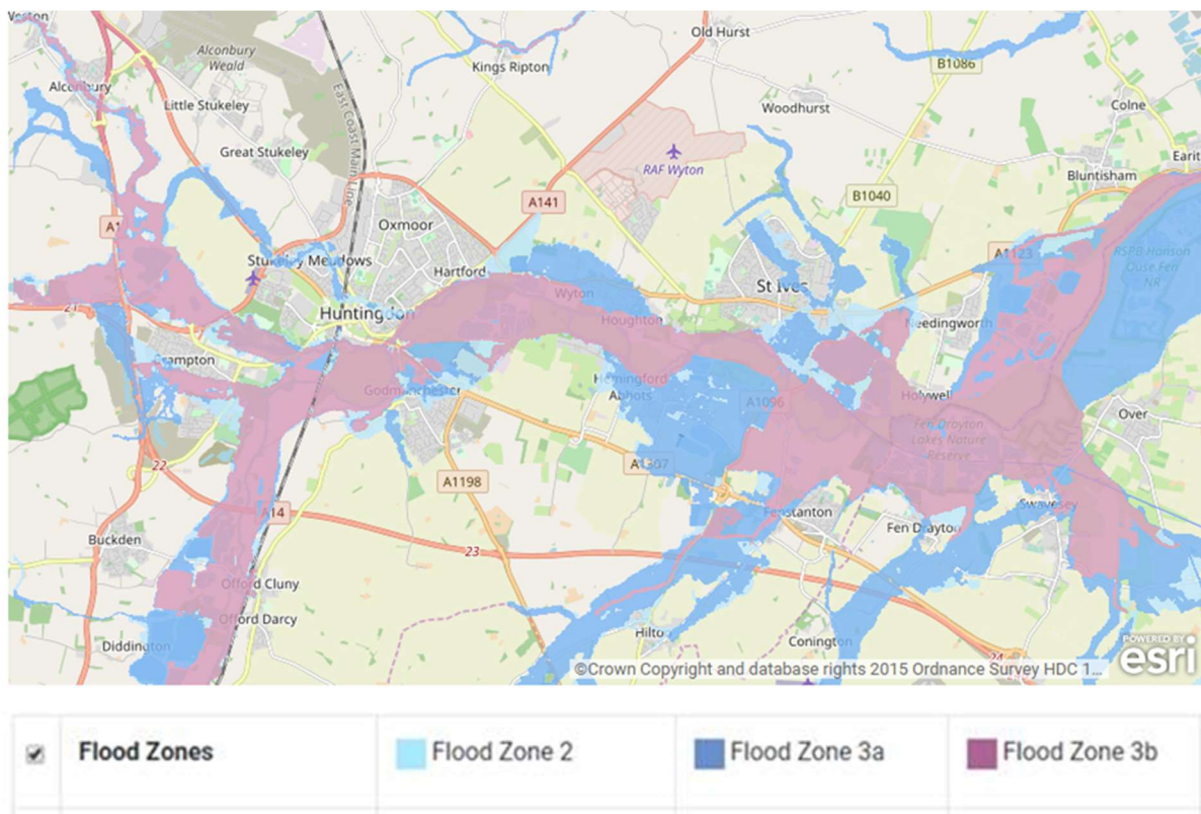


Figure 43: Flood Zone Map

<https://www.huntingdonshire.gov.uk/environmental-issues/flooding/strategic-flood-risk-assessment/#map>

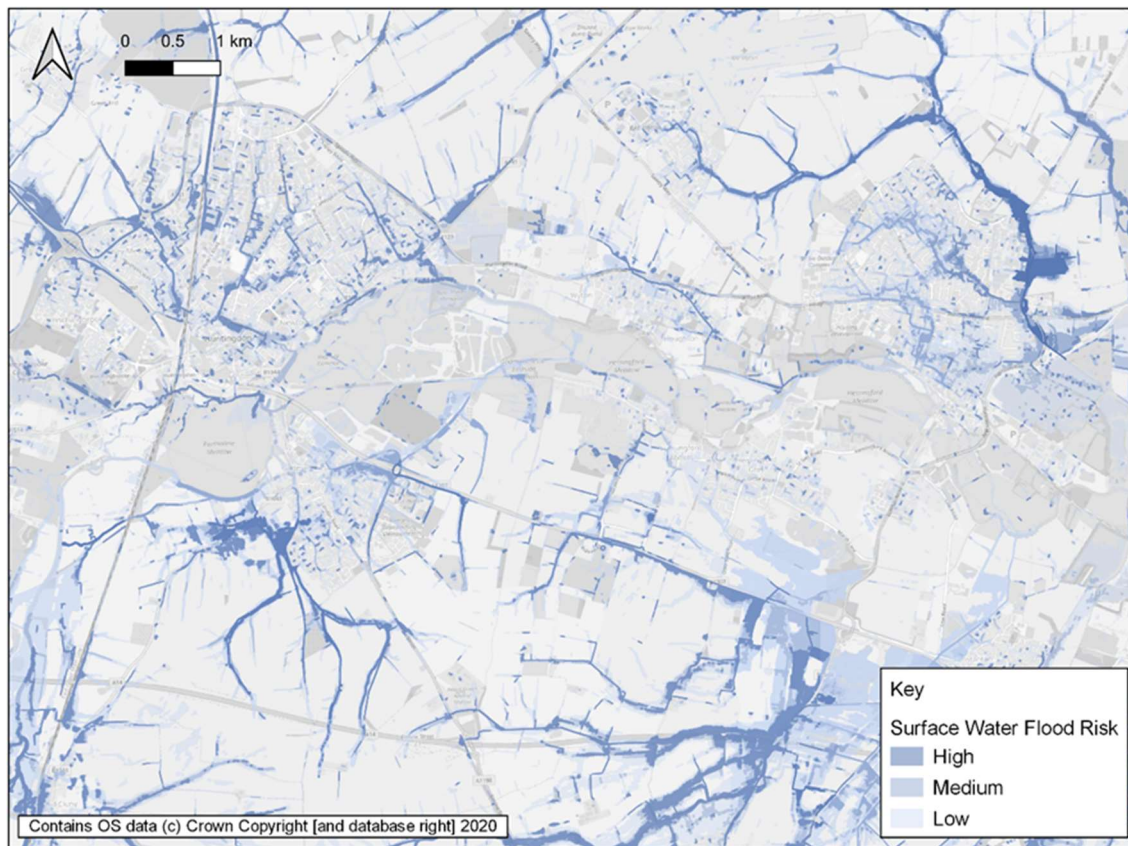


- The current A141 road is not shown to be at significant risk of flooding from rivers (i.e. it is situated within Flood Zone 1). There is no fluvial flood risk along the northern boundary of the study area.
- Any development/new road/river crossing within the study area will need to go through a Sequential Test and a river crossing is likely to require an Exception Test in accordance with the National Planning Policy Framework.
- If an Exception Test is required, development must provide wider sustainability benefits to the community that outweigh the flood risk and must be designed and constructed to:
  - remain operational and safe for users in times of flood;
  - result in no net loss of floodplain storage;
  - not impede water flows; and
  - not increase flood risk elsewhere.

Flood risk vulnerability classification	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	×	Exception Test required	✓
Zone 3b 'functional flood plain'	Exception Test required	✓	×	×	×
Key:	✓ : Development may be appropriate		× : Development should not be permitted		

1. Source: Table 3: Flood risk vulnerability and flood zone 'compatibility', PPG

- Flood risk from Surface Water is generally low in the study area, with some pockets of medium or higher risk in dips and hollows and urban areas.



**Figure 44: Risk of Flooding from Surface Water**

- Some locations within the study are may be susceptible to ground water flooding.
- In terms of the Water Framework Directive, the watercourse is classified as a Heavily Modified Waterbody with moderate ecological potential. There are invasive non-native plant and animal species and there is some diffuse and point source pollution (specific maps for Anglian have a broken link on GOV website). The exact location of these invasive species is currently unknown and may not be directly within the study area. Further investigation is required.
- The River Great Ouse is navigable for leisure craft throughout the study area.

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