Technical Note H

Project:	Wisbech Area Transport Study	**To:**	FDC
Subject:	Housing Option Tests with development in Kings Lynn and West Norfolk District	**From:**	Atkins
Date:	13 September 2013	**cc:**	CCC

1. Introduction

This Technical Note forms part of a series of documents for the Wisbech Area Transport Study (WATS). This study focuses on assessing the transport impacts of housing and employment growth in and around Wisbech in North Cambridgeshire. The study principally uses a SATURN (Simulation and Assignment of Traffic in Urban Road Networks) model for the purposes of testing different scenarios. This document should be read in conjunction with some of the other technical documents that form part of WATS. These documents can be found on Fenland District Council website at:

http://www.fenland.gov.uk/article/7085/Wisbech-Area-Transport-Study

On the eastern side of town the local authority administrative boundary with the neighbouring district in Norfolk is within the developed area of Wisbech, please see Figure 2.1. Kings Lynn and West Norfolk (KL&WN) have set out in their adopted Core Strategy, 550 new homes within the Wisbech Area. As part of their detailed policies and sites plan KL&WN with Norfolk County Council are seeking to assess the impact of the 550 homes in two different locations on the edge of Wisbech. Please see Figure 2.2.

This Technical Note will therefore provide the results of the SATURN traffic modelling for the KL&WN area. All the options include the housing and employment developments within Fenland District to give an assessment of the overall transport implications for Wisbech. These results will also allow comparison of the respective merits of the site location, giving broad advice on the appropriateness of the potential assess arrangements between the two sites.

The forecast year to be modelled is 2031. This is consistent with the previous traffic modelling that has been undertaken in the Fenland District Council area including the Fenland Communities Development Plan consultation documents from July 2011 and July 2012, along with the Neighbourhood Planning Study Stage 2 Report.

The detailed results of the Fenland District Council traffic modelling to 2031 that take account of developments in their administrative boundary only are contained in Technical Note E.

For the purposes of testing the KL&WN proposed developments, the following options were undertaken, that are a revision to the Fenland District options.

- Do-Minimum scenarios for 2031, to include all committed developments and background growth, controlled to TEMPRO 6.2 growth projections (DM) for areas outside Wisbech;
- Do-Something scenarios for 2031, to include the DM above + growth options controlled to TEMPRO 6.2 growth projections for areas outside Wisbech. The Do-Something scenarios and their growth options are
    - DS0 – FDC Growth Option 1 (East and West opportunity developments)
    - DS1 – FDC Growth Option 1 + KL&WN development with 550 dwellings (north access)
    - DS2 – FDC Growth Option 1 + KL&WN development with 550 dwellings (south access)

2. Forecast Year Scenario Definitions

The forecast year for this study is 2031; and the forecast scenarios for this study are Do Minimum (DM), Do Something 0 (DS0), Do Something 1 (DS1) and Do Something 2 (DS2) scenario. The definitions of these forecast year scenarios are given in the sections below.

All the scenarios include the developments with Fenland District with options DS1 and DS2 also including the 550 homes in KL&WN. DS1 and DS2 show different access arrangements.

Do Minimum

The DM scenario consists of all committed housing and employment developments within Wisbech as outlined in the revised brief. For light vehicles, the total growth level is controlled to the levels as defined by TEMPRO 6.2 (Trip End Model Projections) growth forecasts, for areas outside Wisbech. For heavy vehicles, the total growth level is controlled to the levels as defined by National Transport Model (NTM) 2009 (Revised May 2010). The growth of trips outside Wisbech was controlled to TEMPRO 6.2 levels.

The DS0 scenario includes all the committed developments included in the DM scenario and developments from option 1. The DS1 & DS2 scenario includes all developments included in the DS0 scenario together with two possible configuration/permutations of Kings Lynn/West Norfolk Development. The locations of the development sites are shown in Figure 2.1 within the Fenland District boundaries and Figure 2.2 for the sites beyond the District boundary.

Table 2.1 and Table 2.2 summarises the Housing and Employment development assumptions considered in all forecast scenarios.

Table 2.1 – Housing Growth Figures 2011-2031

Housing Trajectory Element	No of additional dwellings (2011 – 2031)			
	DM	DS0	DS1	DS2
Commitments	860	860	860	860
Windfall	600	600	600	600
Fenland – East Opportunity Zone	-	1000	1000	1000
Fenland – zone	-	750	750	750
Kings Lynn & West Norfolk – new development	-	-	550	550
Total	**1460**	**3210**	**3760**	**3760**

* *Commitments from 2008-2011 is 265 dwelling units as per updated brief*

Table 2.2 –Employment Growth Figures 2011-2031

Employment Element	DM	DS0	DS1	DS2
Total Jobs	551	1304	1304	1304

Figure 2-1 – Development Sites in Fenland District Council Area

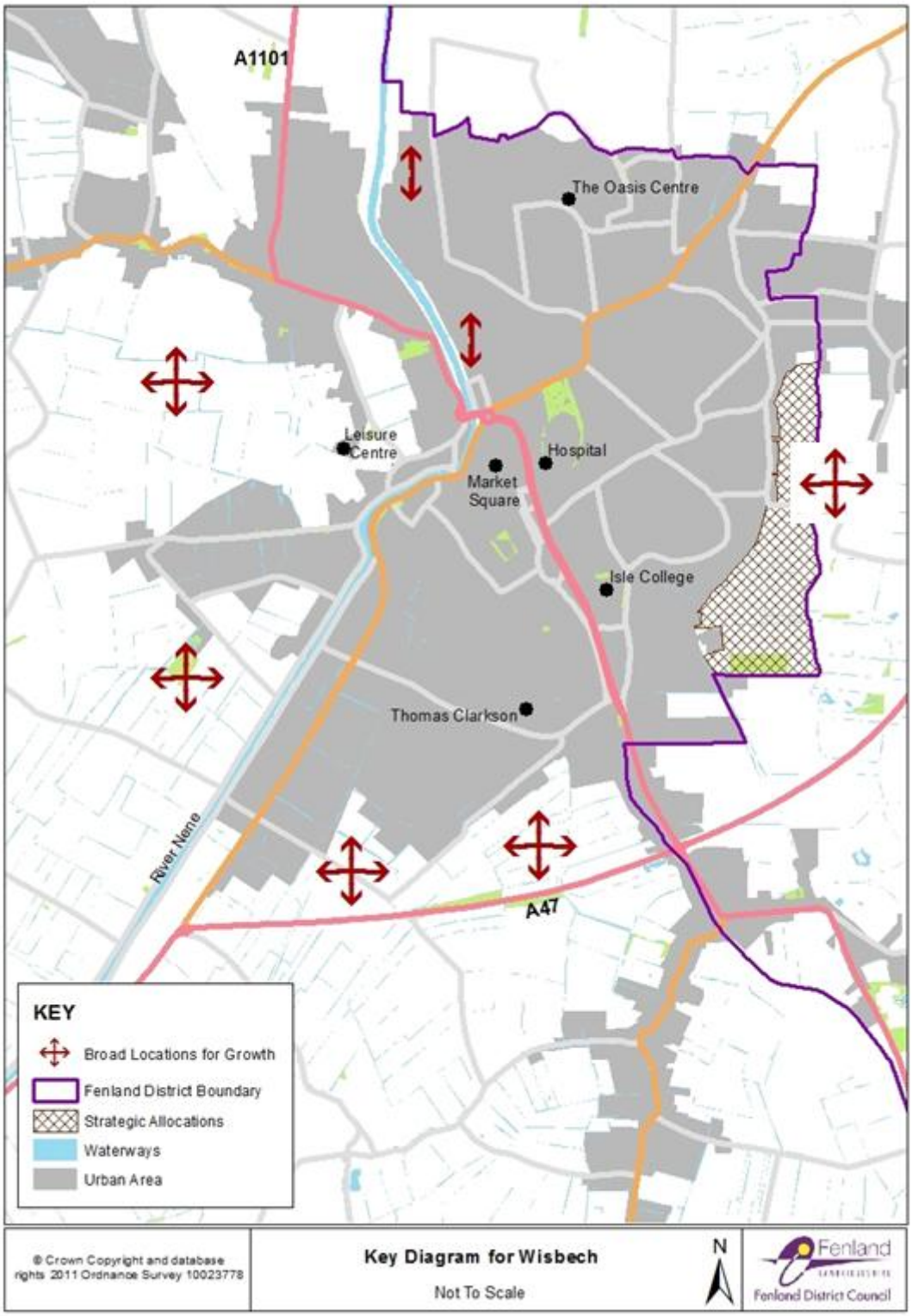
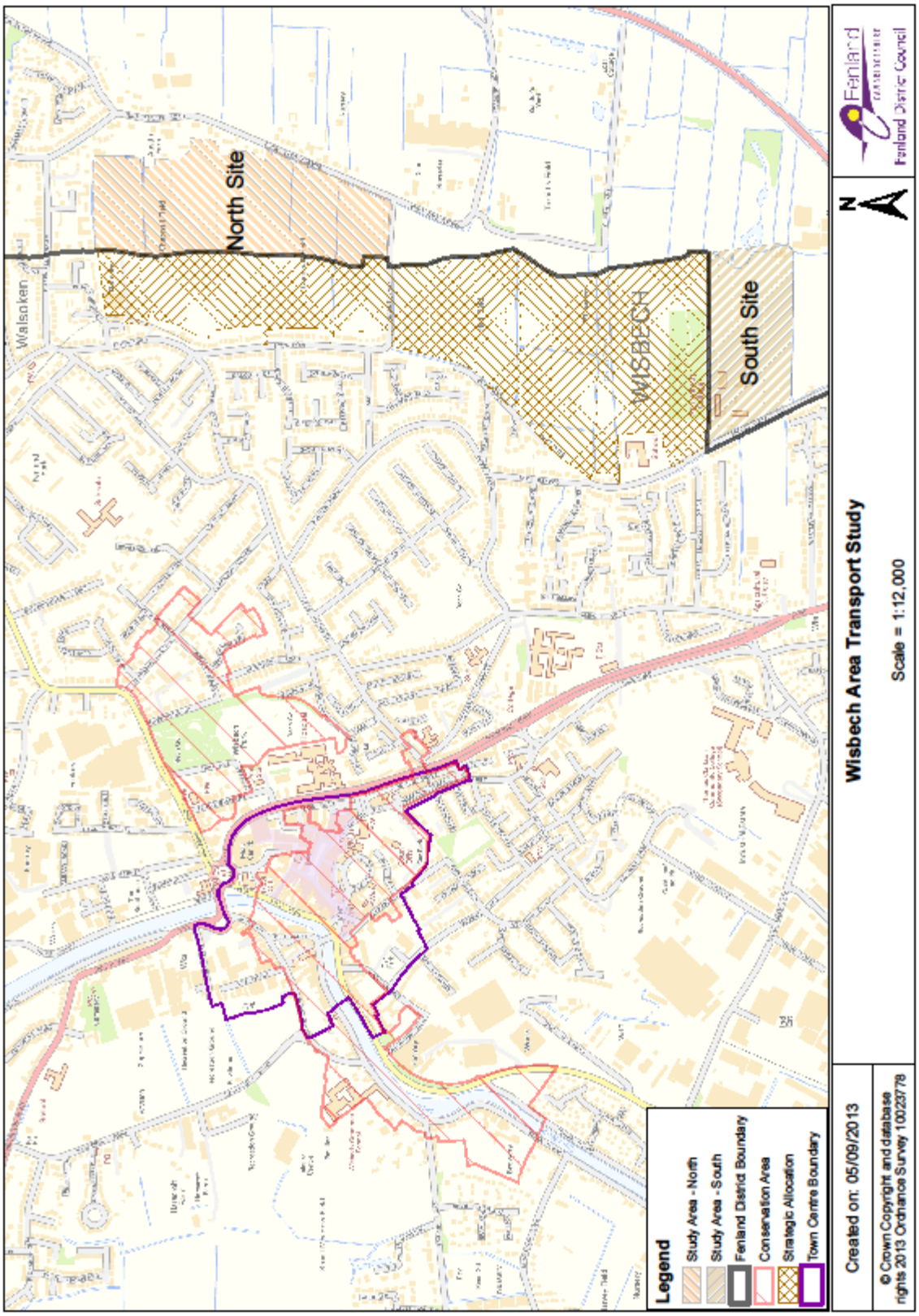


Figure 2-2 East Wisbech Development Sites



Forecast Year Network Changes

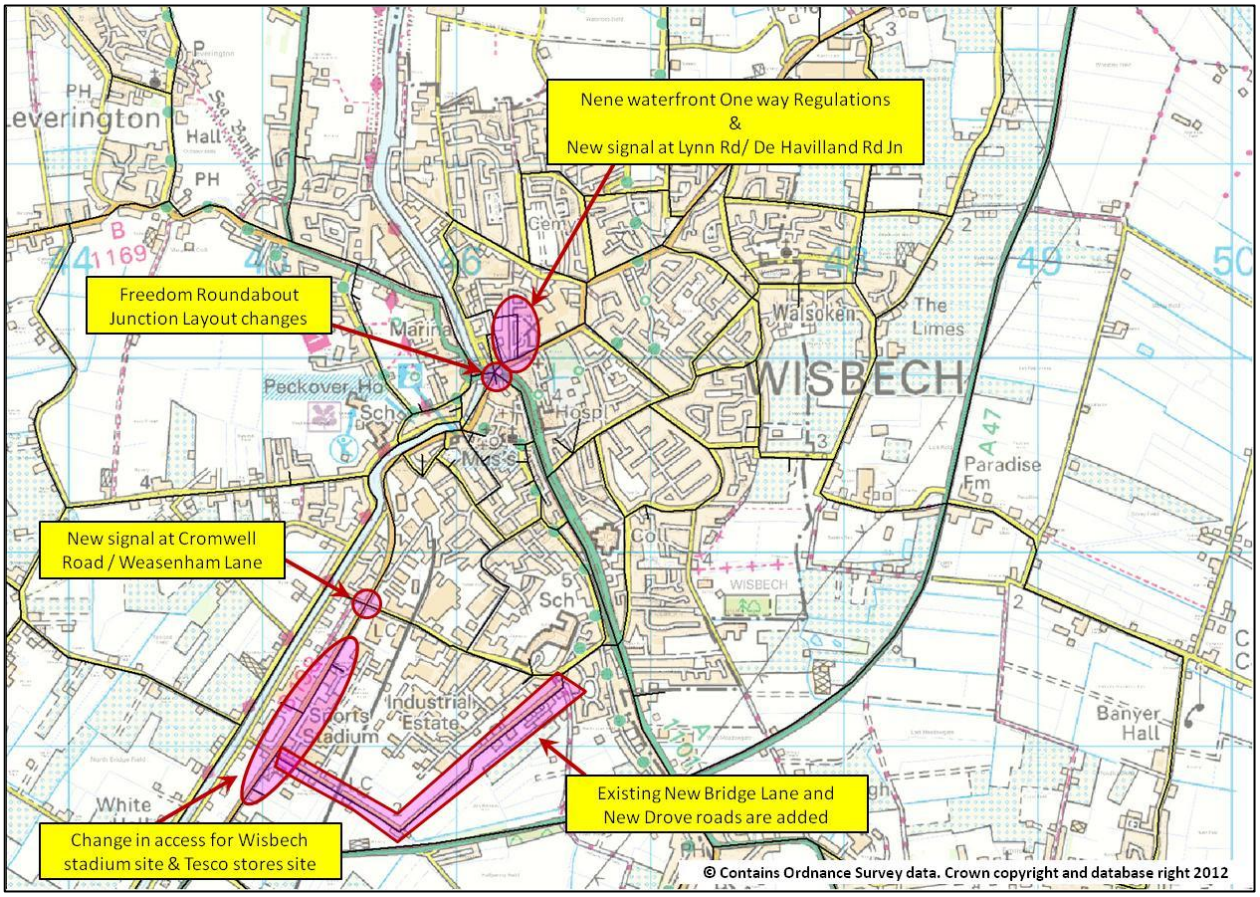
The forecast year networks have been updated to include the latest schemes, changes and mitigation measures considered. The DM forecast networks have been updated to include the following:

- The new junction layout at Freedom Bridge Roundabout.
- One way regulations near Nene Waterfront.
- New traffic signals at Lynn Road / De Havilland Road junction.
- New traffic signals at Cromwell Road / Weasenham Lane.
- Existing New Bridge Lane and New Drove roads are added to the model.
- Change in junction layouts of access junctions to Wisbech stadium site and Tesco stores site.

Figure 2.3 shows the location of above mentioned updates.

In terms of network parameters, detailed information on values of time (PPM) and values of operating cost (PPK) in the updating of the Future Year network is provided in Technical Note D – 'TN D Wisbech SFF Tech Note.docx ' with an update for year 2031 in the coding of infrastructure for the options.

Figure 2-3 – DM Network updates

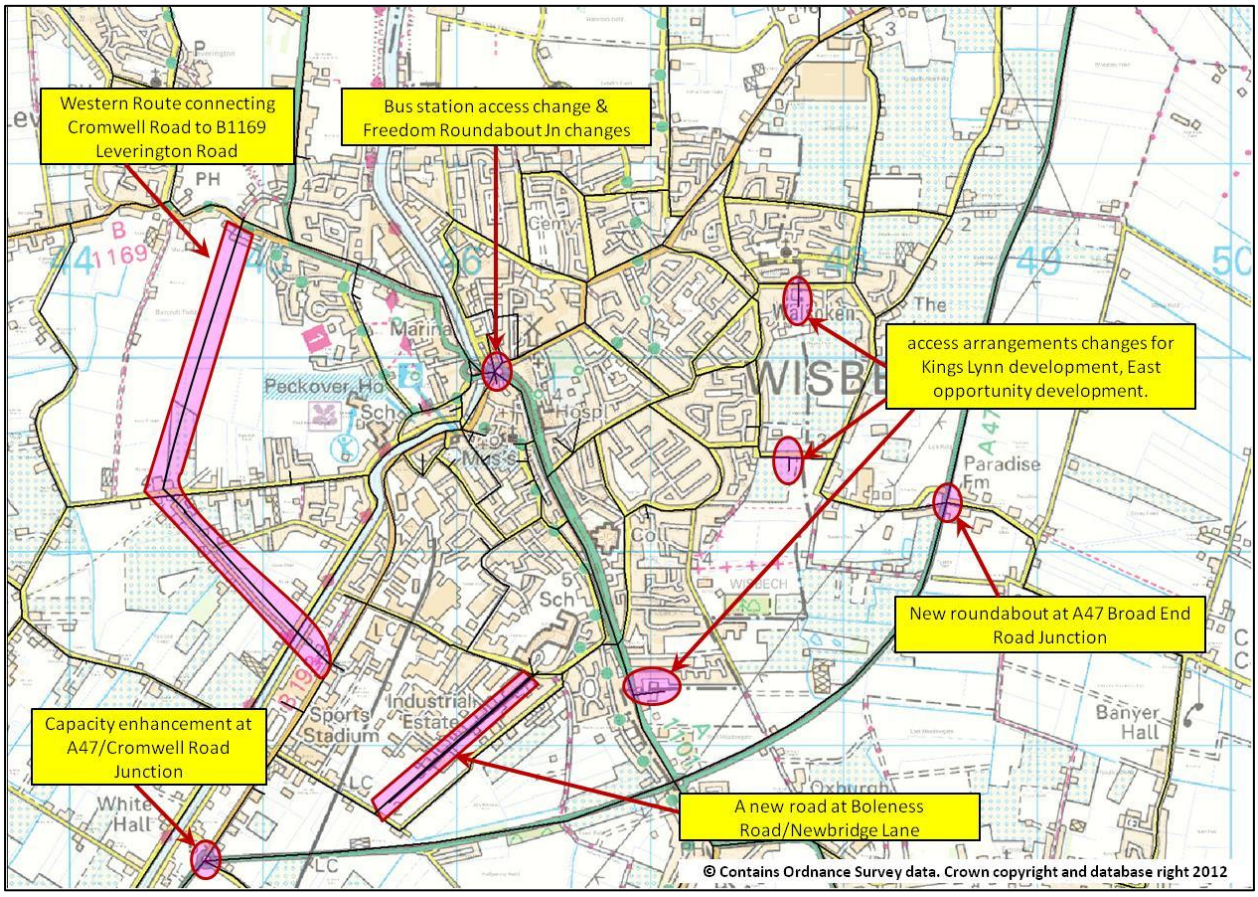


In addition to above mentioned changes in DM network the following schemes and mitigation measures has been considered in the DS scenario:

- A new roundabout at A47 Broad End Road Junction;
- Changes to access arrangements from Kings Lynn development, East opportunity development;
- Changes to the bus station entrance and corresponding changes to Freedom Bridge Roundabout junction layout;
- A new road at Boleness Road/Newbridge Lane linking Weasenham Lane to Cromwell Road;
- New bridge and bypass road connecting B198 Cromwell Road to B1169 Leverington Road following the route of Cox's Lane crossing Barton Road;
- Increased entry and exit capacity for movements along A47 at A141 Guyhirn Roundabout and A47/B198 Cromwell Road Roundabout.

Figure 2.4 shows the updates that were introduced to the DS network in addition to DM network changes. It should be noted that all mitigation measures were added to the network in one step. There has been no sequential testing or scheme optimisation process involved in this stage of traffic modelling. Further information can be found about these changes in Technical Note G – Wisbech Transport Mitigation Strategy.

Figure 2-4 – DS Network updates



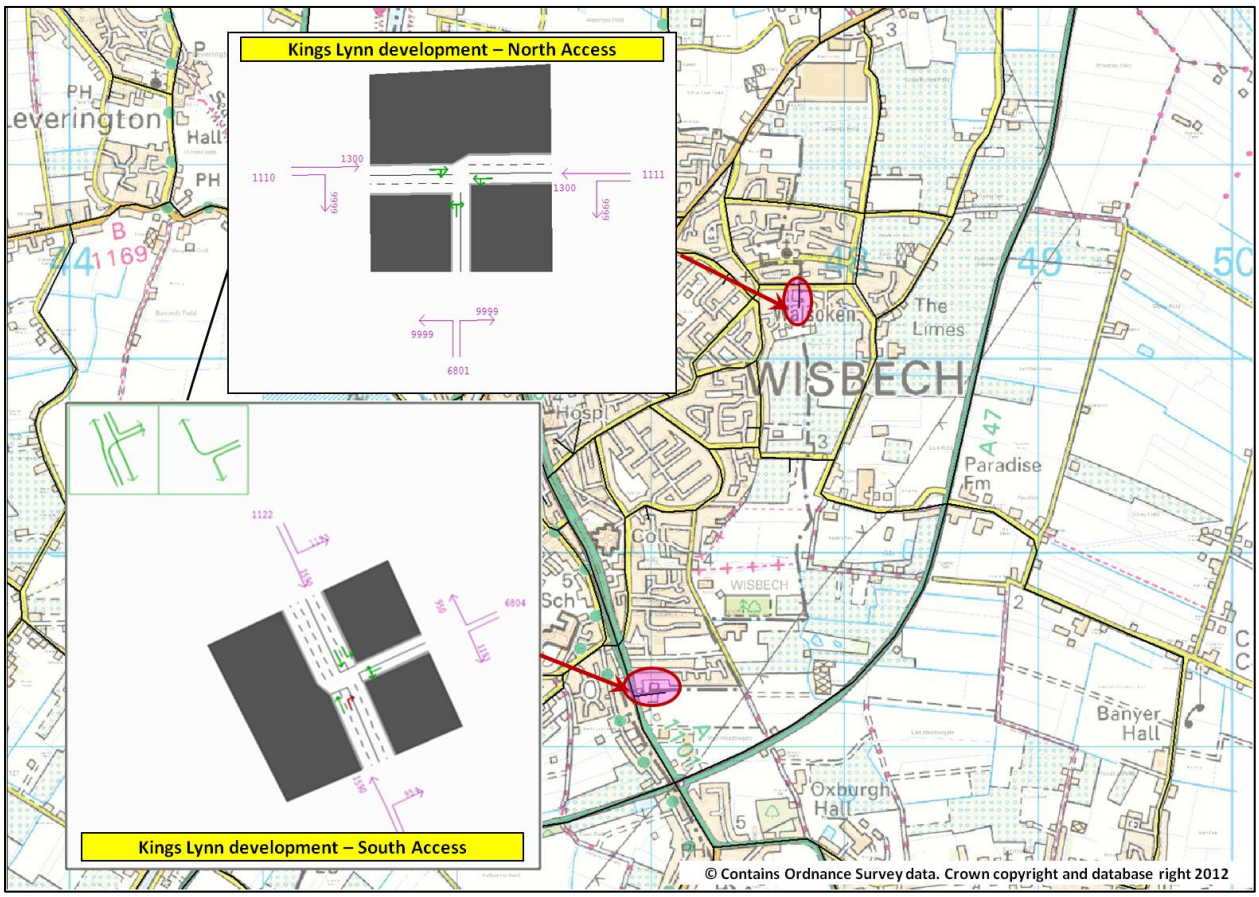
Kings Lynn Development Site – Access arrangements

The differences between DS1 and DS2 scenarios are the physical geographic location and site access arrangements for the potential Kings Lynn/West Norfolk development. DS1 is assumed to lie on the North side of the land and DS2 to the south. The access arrangements assumed in DS1 and DS2 are as below:

- DS1 - The access for the potential site is assumed for the purposes of the traffic modelling to be through Chapnall Road. The precise geometry of the junction has not been considered. In the model it is left as a junction with no capacity constraint imposed.
- DS2 - The access is assumed to be through East of A1101 Elm High Road in between A1101/Ramnoth Rd junction and A1101/A47 junction. The precise details of any potential junction would need further consideration, however, it is presently coded as a signalised junction, with signals optimized based on predicted flow at the junction by time period.

Figure 2.5 shows the location of the above mentioned updates.

Figure 2-5 – Kings Lynn Development Site – Access assumptions



Forecast Year Demand

The methodology to produce the forecast year demands for 2031 demand matrices for the WATS SATURN model are set out below. The process uses several different growth sources:

- TEMPRO 6.2 provides projections of growth over time for use in local and regional transport models. It presents projections of growth in planning data, car ownership, and resultant growth in trip-making by different modes of transport under a constant cost assumption. The information is provided for over 2,500 zones, and can be aggregated into towns, districts or counties. For this study, trip end growth data for Wisbech, Fenland, Cambridgeshire and Rest of Country has been extracted from TEMPRO and is used to provide forecasts of all light vehicle user classes (i.e. UC1 to UC4) for areas outside Wisbech.
- User classes UC1 to UC4 in the model represents lights vehicles which consist of cars and LGVs combined (LV). Generally growth in car traffic is derived from TEMPRO and LGVs from ERTG. Since the Wisbech model does not have separate cars and LGV a combined growth factor has been calculated taking into account the time period of the model and the proportional split between LGV and cars for each of the four user classes. These growth factors have been used to calculate uplifts that have been applied to the TEMPRO car only growth factors. The uplift applied to respective time periods for UC1 to UC4 are shown in Table 2.3.

Table 2.3 – LV uplift factors applied to 2031 TEMPRO car only growth factors

Time Period	Uplift applied
AM	6.00 %
IP	5.02 %
PM	4.37 %

- The growth factor above adds extra LGVs to the car only TEMPRO growth by taking into account the higher growth forecast for LGV's in ERTG as derived from NTM2009
- For the heavy vehicle user classes (i.e. UC5 & UC6), trip end growth factors from NTM 2009 (May 2010 revision) was used. The NTM 2009 published by Department for Transport (DfT) provides forecasts of road traffic growth by region and by vehicle type.
- The FDC SHLAA document, 2007 Employment Land Review document and other planning application data provide information on the committed housing and employment developments in and around Wisbech which are included in all forecast year scenarios (i.e. DM, DS1 & DS2). KL&WN are not considering an employment allocation within their boundary around Wisbech.
- The FDC Neighbourhood Planning study provides housing and employment information to be included in the DS1 scenario supplemented by updated housing and employment growth figures provided by FDC in December 2011.
- TRICS (Trip Rate Information Computer System) is a database of surveys from developments across the county, which can be interrogated to provide an estimate of the number of trips that will be generated by a new development. The information can be tailored to suit the individual development, taking into account trends in that area of the country, and/or location of the development within or outside a town, and/or its size etc.
- The forecast year demand matrices were calculated separately for each user class, time period, forecast year and scenario. Table 2.4 below summarises the growth approach undertaken for forecasting matrices to 2031.

Table 2.4 - Matrix growth factors for light vehicle user classes from 2008 to 2031

Origins /Destinations	Growth Factors
Development sites	TRICS/Fuel/Income
Wisbech Town	Fuel/Income
Rest of Model	TEMPRO/Fuel/Income

Final Forecast Year Matrices

Matrix Totals

The Wisbech SATURN model also includes an assessment of the impact of non car journeys including walking, cycling and public transport. Where possible we have taken account of proposed new infrastructure projects.

As described in the modelling brief, mode choice factors from the Preferred Public Transport Option detailed in PT Tech Note (Technical Note C) dated 6th January 2011 have been taken into account. Thus after creating the demand matrices, a part of the demand which represents the likely ridership due to additional DM Bus Service – Route D has been sieved out from car user classes.

New Cycle ways proposed in Wisbech area along Cromwell Road, Weasenham Lane, Elm Road, Sandy Lane to A1101 through the College of West Anglia Isle campus, old rail line between Wisbech and March, has been considered while building the DS matrices. The potential shift to cycle from car because of the new cycle ways has been calculated through the proportion of highway trip length getting benefited by the cycle way. These trips are then sieved out from the car user classes of the final DS matrices.

Table 2.5 below represents the final demand matrix totals after taking account of the PT ridership abstraction to the proposed new bus service and transfers from car to cycle as a result of new designated cycle ways compared to the 2008 base year demand matrices. Table 2.6 summarises the PT ridership on the new committed bus service – Route D for various modelled scenarios. Table 2.7 summarises the number of potential car trips which will be shifting to cycle because of new proposed cycle ways in DS.

Table 2.5 – Matrix Totals

Scenario		AM	IP	PM
2008 Base		10,459	9,830	11,289
2031 DM		14,238	14,004	15,475
2031 DM – 2008 Base	*Difference*	*3,779*	*4,174*	*4,186*
	% Difference	*36.13%*	*42.46%*	*37.08%*
2031 DS0		14,922	14,585	16,146
2031 DS0 – 2008 Base	*Difference*	*4,463*	*4,755*	*4,857*
	% Difference	*42.67%*	*48.37%*	*43.03%*
2031 DS1		15,030	14,669	16,232
2031 DS1 – 2008 Base	*Difference*	*4,571*	*4,839*	*4,943*
	% Difference	*43.71%*	*49.23%*	*43.78%*
2031 DS2		15,040	14,673	16,240
2031 DS2 – 2008 Base	*Difference*	*4,581*	*4,843*	*4,951*
	% Difference	*43.80%*	*49.26%*	*43.85%*

Table 2.6 – PT Ridership on new bus service

	DM	DS0	DS1	DS2
AM 2031	84	116	124	113
IP 2031	26	41	42	38
PM 2031	84	113	122	111

Table 2.7 – Cycle Ridership on new Cycle Ways

	DM	DS0	DS1	DS2
AM 2031	-	76	78	79
IP 2031	-	77	79	80
PM 2031	-	79	81	82

3. Forecast Results

Network Statistics

The results from each forecast year and time period vary in terms of the level of congestion, delay and overall journey time in and around Wisbech, therefore each value has been taken from the AM, IP and PM time periods, with the worse performing time period highlighted.

For this technical note, in addition to all the sites accessed previously, analysis has been provided for the A47 Broad End Road Junction. This is to assess the impact of this junction becoming a roundabout as a result of potential development proposals.

Table 3.1 below summarises the key SATURN statistics.

- Transient Queues (in PCU hours) – For example, at traffic signals the transient queue corresponds to the queue that develops during the red phase and then dissipates during the subsequent green phase.
- Over-Capacity Queues (in PCU hours) – These occur only for turning movements in excess of capacity where a permanent queue builds up which is unable to clear in a single cycle.
- Link Cruise Time (in PCU hours) – This is the time spent travelling on links within the model, as distinct from time spent in queues at junctions.
- Total Travel Time (in PCU hours) – This is the sum of Transient Queue time, Over-Capacity Queue time and Link Cruise time.
- Total Distance (in km) – This is the total distance travelled by all vehicles in the network.
- Average Speed (in kph) – This is the average speed of vehicles in the network. (It is simply the Total Distance divided by the Total Travel Time).
- Average Trip Time (in PCU hours) – This is the average length of time taken for each trip. (It is calculated as the Total Travel Time divided by the number of trips.)
- Average Trip Distance (in km) – This is the average distance covered by each trip. (It is calculated as the Total Distance divided by the number of trips.)

The SATURN summary statistics from Table 3.1 clearly show that as demand increases on the Do-Minimum network from the 2008 base to the forecast years, the level of congestion and delay increases through time as expected. This is reflected in the increase of the Total Travel Time, Transient and Over-Capacity queues, along with the decrease in Average Speed across the network.

Both options DS1 & DS2 perform in a similar manner and there is no significant difference between the two options, with all DS options performing better than the unmitigated 2031 DM.

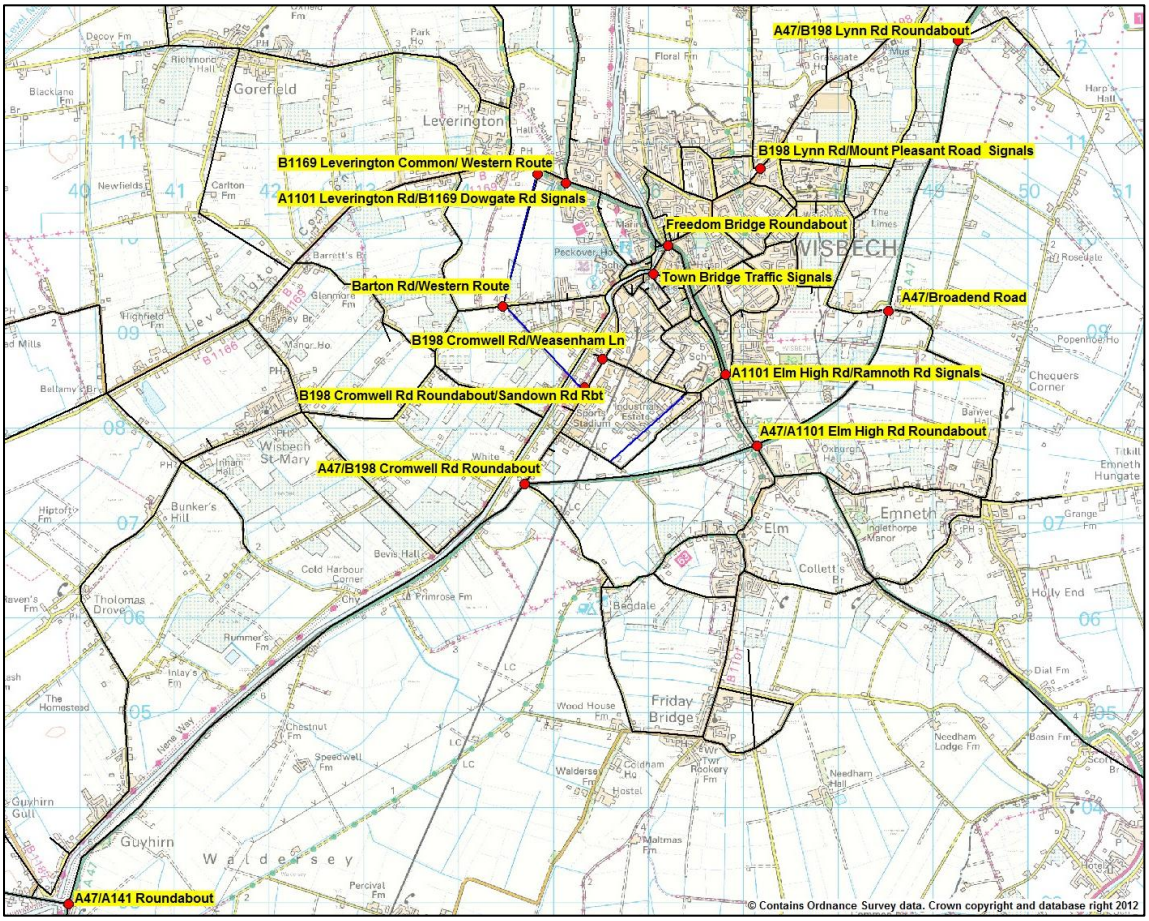
Table 3.1– Summary of SATURN Statistics

Indicator	Time Period	2008	2031 DM	2031 DS0	2031 DS1	2031 DS2
Transient Queues (PCU hrs)	Am	283	661	651	650	661
	IP	232	650	613	609	616
	Pm	318	872	833	829	833
Over-Capacity Queues (PCU hrs)	Am	20	340	172	206	175
	IP	1	297	126	125	124
	Pm	4	664	429	405	401
Link Cruise Time (PCU hrs)	Am	1432	2151	2104	2099	2093
	IP	1342	2104	2051	2044	2043
	Pm	1582	2351	2297	2284	2284
Total Travel Time (PCU hrs)	Am	1735	3152	2927	2955	2929
	IP	1575	3051	2790	2779	2783
	Pm	1904	3887	3559	3518	3518
Total Distance (km)	Am	92224	129770	132988	132494	132312
	IP	87130	128558	130892	130478	130432
	Pm	100980	140815	143792	142901	142936
Average Speed (kph)	Am	53.2	41.2	45.4	44.8	45.2
	IP	55.3	42.1	46.9	47.0	46.9
	Pm	53	36.2	40.4	40.6	40.6
Average Trip Time (PCU hrs)	Am	0.17	0.22	0.20	0.20	0.19
	IP	0.16	0.22	0.19	0.19	0.19
	Pm	0.17	0.25	0.22	0.22	0.22
Average Trip Distance (km)	Am	8.82	9.11	8.91	8.82	8.80
	IP	8.86	9.18	8.97	8.89	8.89
	Pm	8.95	9.10	8.91	8.80	8.80
Trips Loaded	Am	10459	14238	14922	15030	15040
	IP	9830	14004	14585	14670	14673
	Pm	11289	15475	16146	16232	16240

Demand and Delays at Key Junctions

Key junctions within the study area have been identified and have been monitored in terms of delays and flows to provide an indication of the stress at each junction under each scenario. The key junctions set out are shown in Figure 3.1.

Figure 3-1– Key Junctions



Tables 3.2 to 3.4 below summarises the flows and delays at key junctions mentioned above.

It is to be noted that at some of the junctions the actual flow for DS is less than DM. This is because of a shift in routing to the new bypass road between B1169 Leverington Road to Cromwell Road from A1101 and Cromwell Road north of Weasenham Lane junction. The main junctions benefiting from this bypass are Town Bridge Traffic signals and B198 Cromwell Road / Weasenham Lane junction, where we can see decrease in both demand and delays.

In case of Freedom Bridge Roundabout the demand remains almost the same as the trips rerouted to western route have been replaced by trips generated by West Opportunity development zone. The delay at A1101 Leverington Road / B1169 Dowgate Road traffic signals also increased slightly as the demand to and from Dowgate Road is increased because of the new west development zone.

Also increased flow with decrease in delay time has been observed at the junctions along A47 as expected where the capacity of A47 movements has been increased to accommodate more traffic. The mitigation strategy appears to allow the junctions on the Eastern Fringes of Wisbech at the A1101 and Broadend Road junctions to operate in a similar manner to the 2031 Do Minimum. DS1, with the potential Kings Lynn and West Norfolk District development to the north consistently directs more traffic through the A47/Broadend Road junction, however the average

delays experienced remain fairly stable in all time periods and still show an improvement over the existing priority junction configuration.
The A47/A1101 Junction shows a fall relative to the DM scenario which is likely to be a result of the mitigation measures creating capacity on other radial routes, the relief of which is still measurable even with higher levels of local development tested.

The flows and delays observed in DS1 and DS2 are similar and in range to that of DS0. DS2 is performing slightly better as it handles more flows in almost all key junctions with almost same level or even less delay than DS1.

Table 3.2– AM Peak - Summary of Junction Delay and Flow Comparison

Junction		DM	DS0	DS1	DS2
A47 / A141 rbt	Delay	22	17	16	17
	Demand Flow	3398	3497	3347	3352
	Actual Flow	3209	3410	3256	3267
A47 / B198 Cromwell Road rbt	Delay	25	23	25	24
	Demand Flow	3369	3505	3464	3471
	Actual Flow	3175	3413	3360	3377
A47 A1101 Elm High Road rbt	Delay	195	117	126	115
	Demand Flow	3463	3399	3385	3392
	Actual Flow	3412	3377	3357	3371
A47 / B198 Lynn Road rbt	Delay	17	16	16	16
	Demand Flow	2791	2738	2762	2766
	Actual Flow	2736	2717	2740	2746
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	146	176	180	178
	Demand Flow	1912	1892	1917	1913
	Actual Flow	1893	1874	1890	1892
Town Bridge Traffic signals	Delay	75	51	47	54
	Demand Flow	1793	1556	1544	1588
	Actual Flow	1737	1525	1499	1552
Freedom Bridge rbt	Delay	32	44	61	47
	Demand Flow	3597	3533	3542	3593
	Actual Flow	3489	3450	3443	3503
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	22	23	24	24
	Demand Flow	1023	1036	1003	1040
	Actual Flow	1006	1024	989	1027
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	86	74	73	75
	Demand Flow	2475	2342	2353	2391
	Actual Flow	2367	2269	2266	2327
B198 Cromwell Road / Weasenham Lane junction	Delay	170	44	43	45
	Demand Flow	1804	1411	1391	1418
	Actual Flow	1743	1383	1354	1387
B198 Cromwell Rd Roundabout/Sandown Rd Rbt	Delay	38	67	64	65
	Demand Flow	2238	2468	2464	2492
	Actual Flow	2086	2424	2407	2444
Barton Rd/Western Route	Delay	-	107	106	109
	Demand Flow	691	1243	1253	1268
	Actual Flow	682	1231	1239	1255
B1169 Leverington Common/ Western Route	Delay	-	8	7	7
	Demand Flow	678	1075	1047	1059
	Actual Flow	670	1055	1024	1041
A47 / Broadend Road	Delay	26	9	9	9
	Demand Flow	2170	2253	2265	2220
	Actual Flow	2120	2234	2247	2202

Table 3.3– IP Peak - Summary of Junction Delay and Flow Comparison

Junction		DM	DS0	DS1	DS2
A47 / A141 rbt	Delay	25	17	17	17
	Demand Flow	3343	3428	3313	3317
	Actual Flow	3205	3373	3261	3269
A47 / B198 Cromwell Road rbt	Delay	22	21	20	20
	Demand Flow	3383	3568	3510	3520
	Actual Flow	3241	3510	3455	3470
A47 A1101 Elm High Road rbt	Delay	110	63	61	60
	Demand Flow	3545	3417	3436	3429
	Actual Flow	3482	3397	3416	3409
A47 / B198 Lynn Road rbt	Delay	16	16	16	16
	Demand Flow	2432	2402	2421	2431
	Actual Flow	2391	2388	2406	2417
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	141	139	143	143
	Demand Flow	1827	1821	1832	1831
	Actual Flow	1809	1817	1828	1828
Town Bridge Traffic signals	Delay	57	38	37	38
	Demand Flow	2119	1658	1641	1656
	Actual Flow	2043	1651	1634	1650
Freedom Bridge rbt	Delay	41	21	21	21
	Demand Flow	3529	3418	3449	3452
	Actual Flow	3431	3391	3422	3425
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	15	15	15	15
	Demand Flow	869	865	852	853
	Actual Flow	853	861	849	850
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	62	67	68	69
	Demand Flow	1984	1708	1678	1790
	Actual Flow	1913	1683	1656	1768
B198 Cromwell Road / Weasenham Lane junction	Delay	94	54	54	55
	Demand Flow	1997	1535	1525	1530
	Actual Flow	1951	1528	1518	1524
B198 Cromwell Rd Roundabout/Sandown Rd Rbt	Delay	79	79	73	74
	Demand Flow	2535	2759	2743	2750
	Actual Flow	2461	2747	2731	2739
Barton Rd/Western Route	Delay	-	89	88	89
	Demand Flow	722	1186	1197	1195
	Actual Flow	716	1180	1190	1189
B1169 Leverington Common/ Western Route	Delay	-	6	6	6
	Demand Flow	664	1015	1021	1019
	Actual Flow	649	997	1002	1000
A47 / Broadend Road	Delay	20	9	9	9
	Demand Flow	2019	2193	2211	2176
	Actual Flow	1980	2177	2195	2160

Table 3.4– PM Peak - Summary of Junction Delay and Flow Comparison

Junction		DM	DS0	DS1	DS2
A47 / A141 rbt	Delay	24	46	29	30
	Demand Flow	3662	3725	3534	3535
	Actual Flow	3480	3579	3405	3405
A47 / B198 Cromwell Road rbt	Delay	136	99	100	101
	Demand Flow	3430	3773	3675	3659
	Actual Flow	3299	3654	3590	3575
A47 A1101 Elm High Road rbt	Delay	177	105	103	105
	Demand Flow	3963	3839	3827	3826
	Actual Flow	3802	3731	3729	3733
A47 / B198 Lynn Road rbt	Delay	18	17	17	17
	Demand Flow	3031	2875	2901	2910
	Actual Flow	2914	2818	2841	2851
A1101 Leverington Road / B1169 Dowgate Road traffic signals	Delay	150	167	173	174
	Demand Flow	1830	1798	1815	1813
	Actual Flow	1769	1777	1791	1789
Town Bridge Traffic signals	Delay	157	67	69	73
	Demand Flow	1989	1674	1649	1637
	Actual Flow	1904	1648	1622	1610
Freedom Bridge rbt	Delay	51	56	53	53
	Demand Flow	3952	3793	3816	3798
	Actual Flow	3757	3701	3718	3700
B198 Lynn Road / Mount Pleasant Road traffic signals	Delay	23	20	20	20
	Demand Flow	1293	1298	1242	1253
	Actual Flow	1245	1258	1205	1219
A1101 Elm High Road / Ramnoth Road traffic signals	Delay	84	94	94	96
	Demand Flow	2337	1953	1950	2046
	Actual Flow	2182	1862	1855	1951
B198 Cromwell Road / Weasenham Lane junction	Delay	66	37	37	37
	Demand Flow	2101	1488	1482	1488
	Actual Flow	2024	1458	1449	1454
B198 Cromwell Rd Roundabout/Sandown Rd Rbt	Delay	95	77	78	77
	Demand Flow	2451	2720	2704	2709
	Actual Flow	2383	2661	2638	2641
Barton Rd/Western Route	Delay	-	88	90	89
	Demand Flow	862	1229	1250	1252
	Actual Flow	822	1197	1216	1217
B1169 Leverington Common/ Western Route	Delay	-	5	5	5
	Demand Flow	585	1121	1132	1131
	Actual Flow	555	1088	1097	1095
A47 / Broadend Road	Delay	35	9	9	9
	Demand Flow	2438	2595	2633	2589
	Actual Flow	2310	2528	2563	2526

V/C ratio and Delay comparison

Figures 3.2 to 3.9 shows the V/C ratio on links and delay at junctions for all forecast scenarios (DM, DS0, DS1, DS2) and for AM and PM peak respectively.

Kings Lynn Development – Trip Distribution

Figure 3.10 and 3.13 compares the distribution pattern of trips originating from Kings Lynn development site during morning peak in DS1 and DS2 scenario.

Figure 3-2– Node Delay and Link V/C – DM (AM Peak)

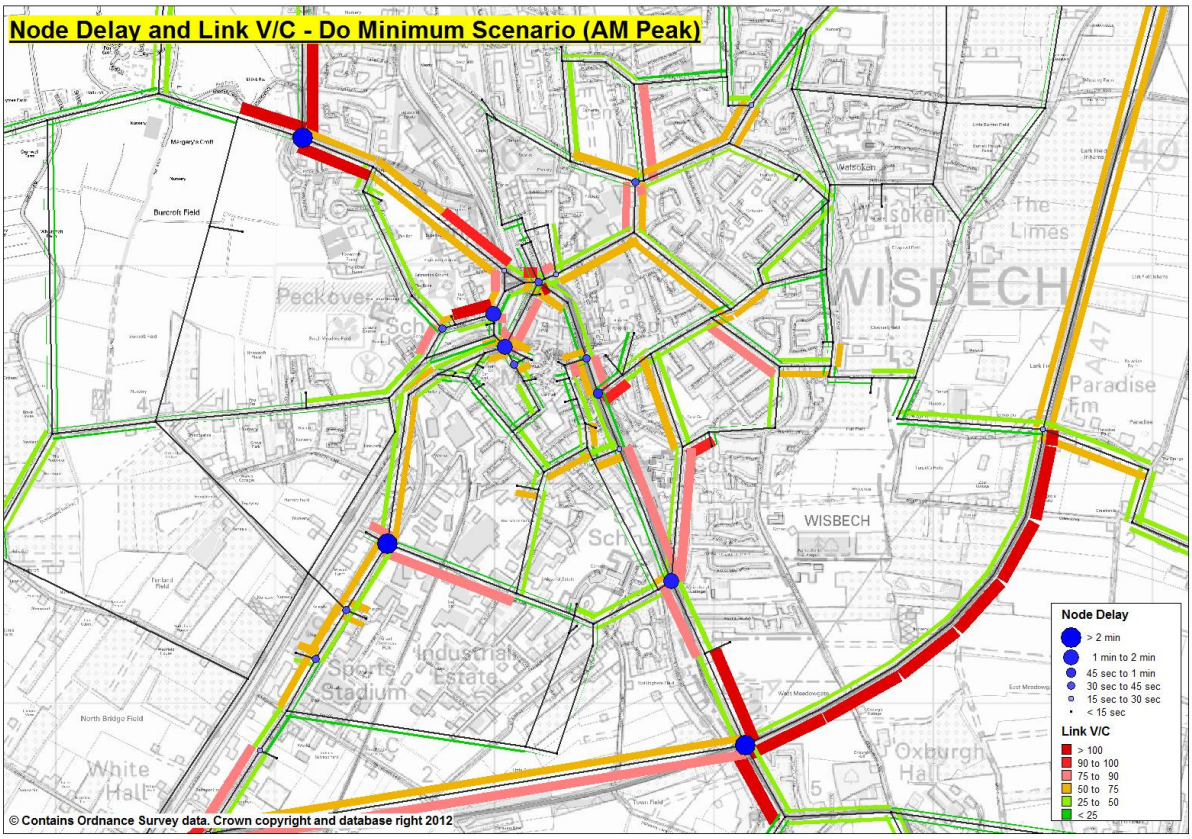


Figure 3-3– Node Delay and Link V/C – DS0 (AM Peak)

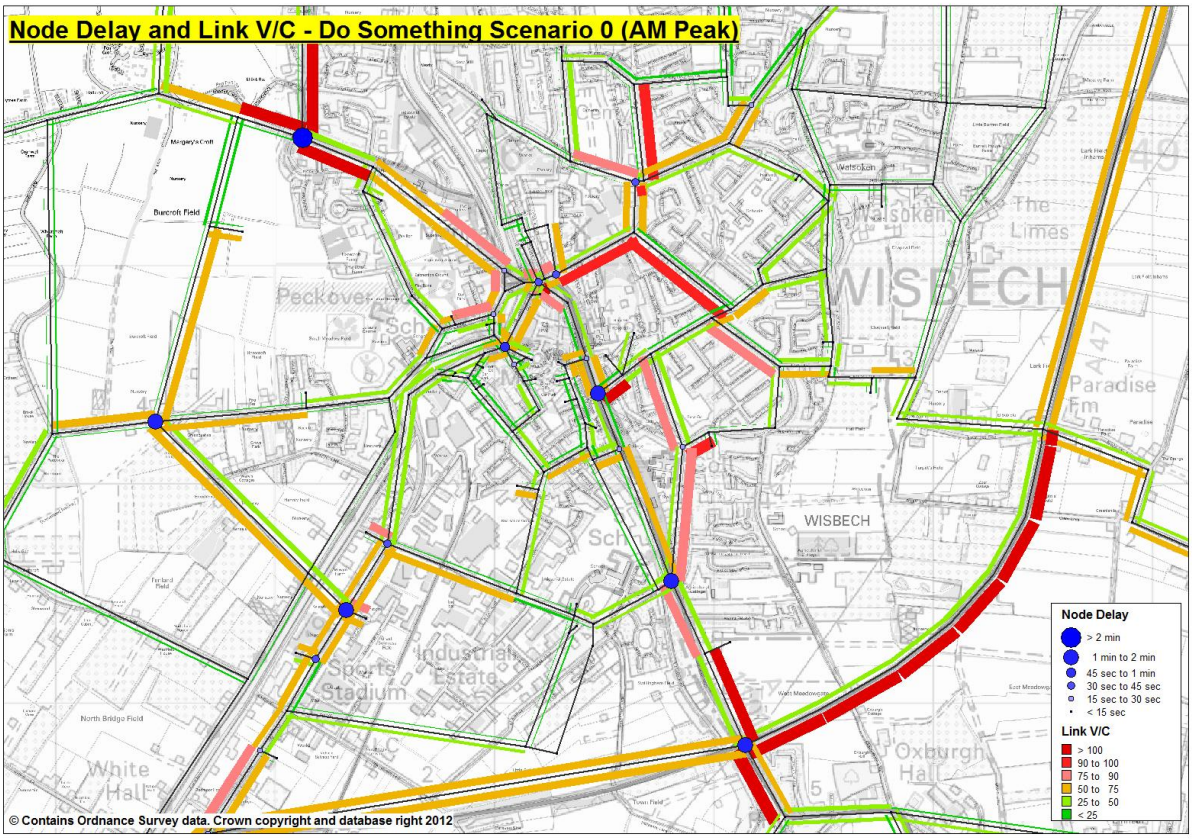


Figure 3-4– Node Delay and Link V/C – DS1 (AM Peak)

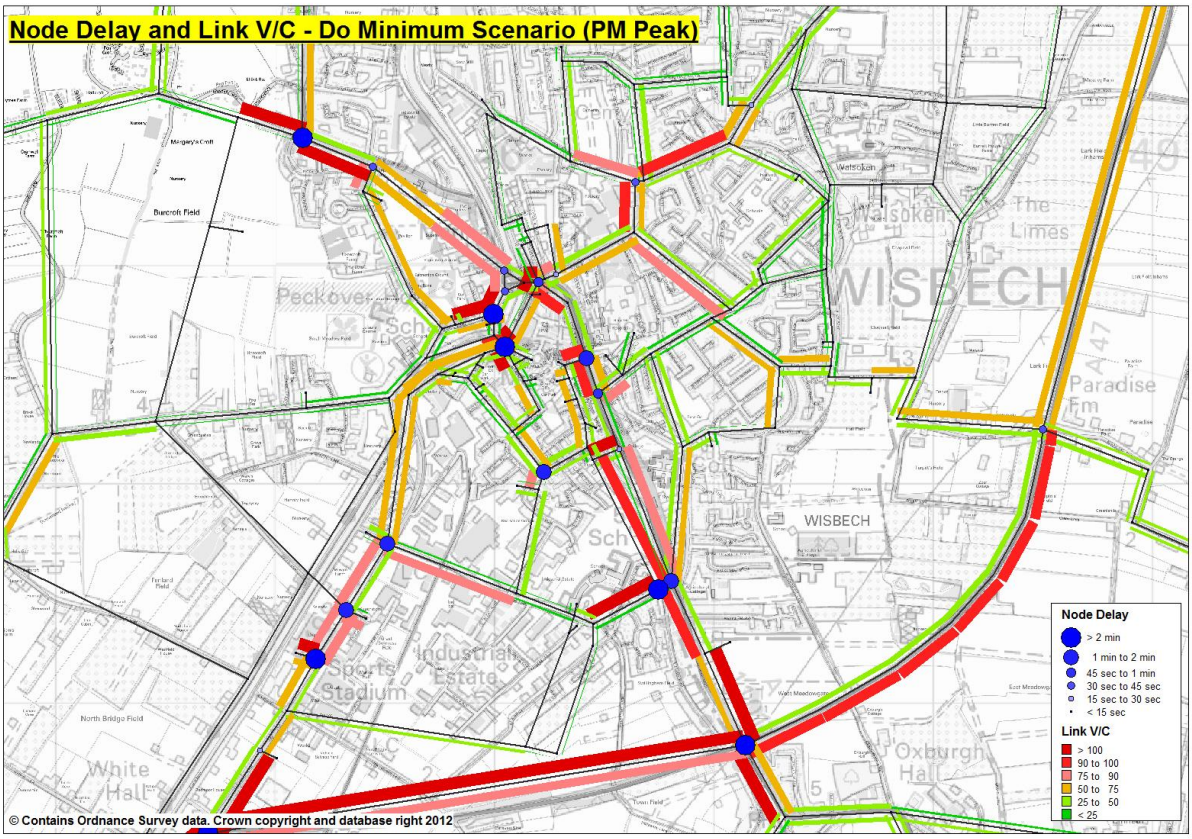


Figure 3-5– Node Delay and Link V/C – DS2 (AM Peak)

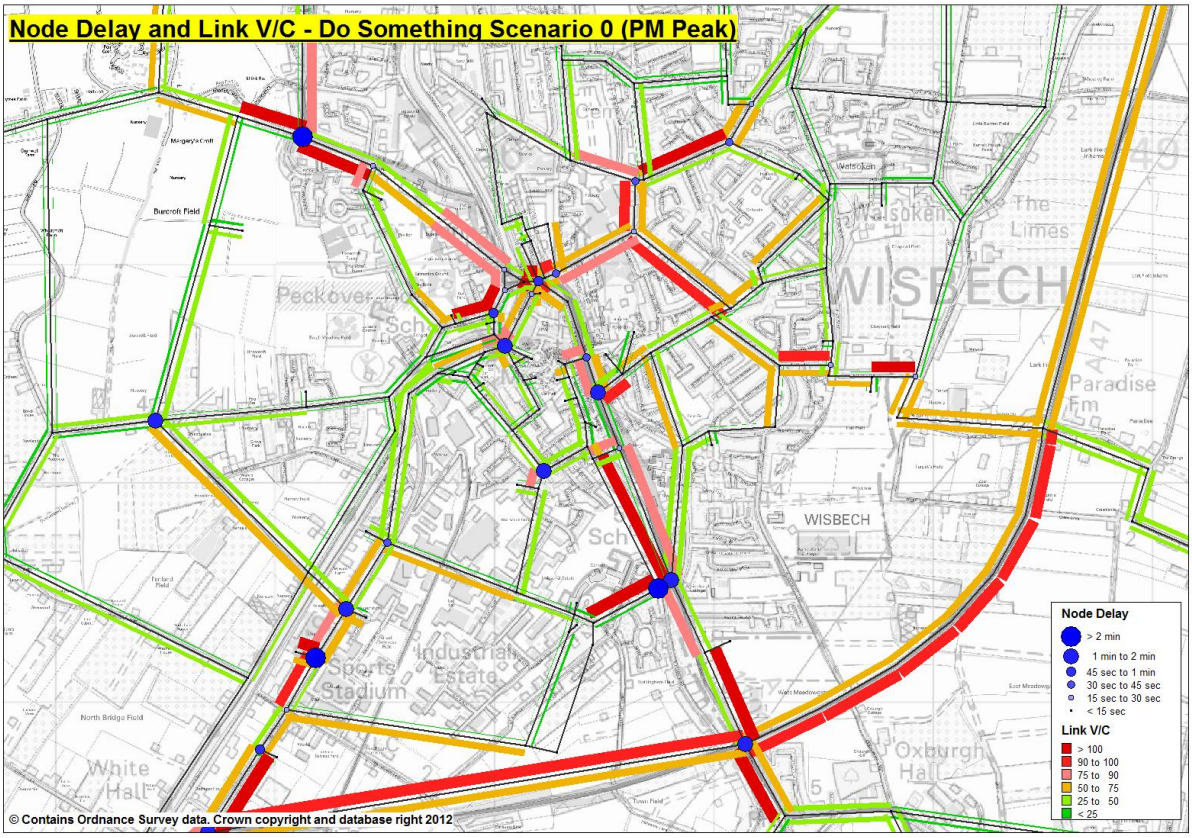


Figure 3-6– Node Delay and Link V/C – DM (PM Peak)

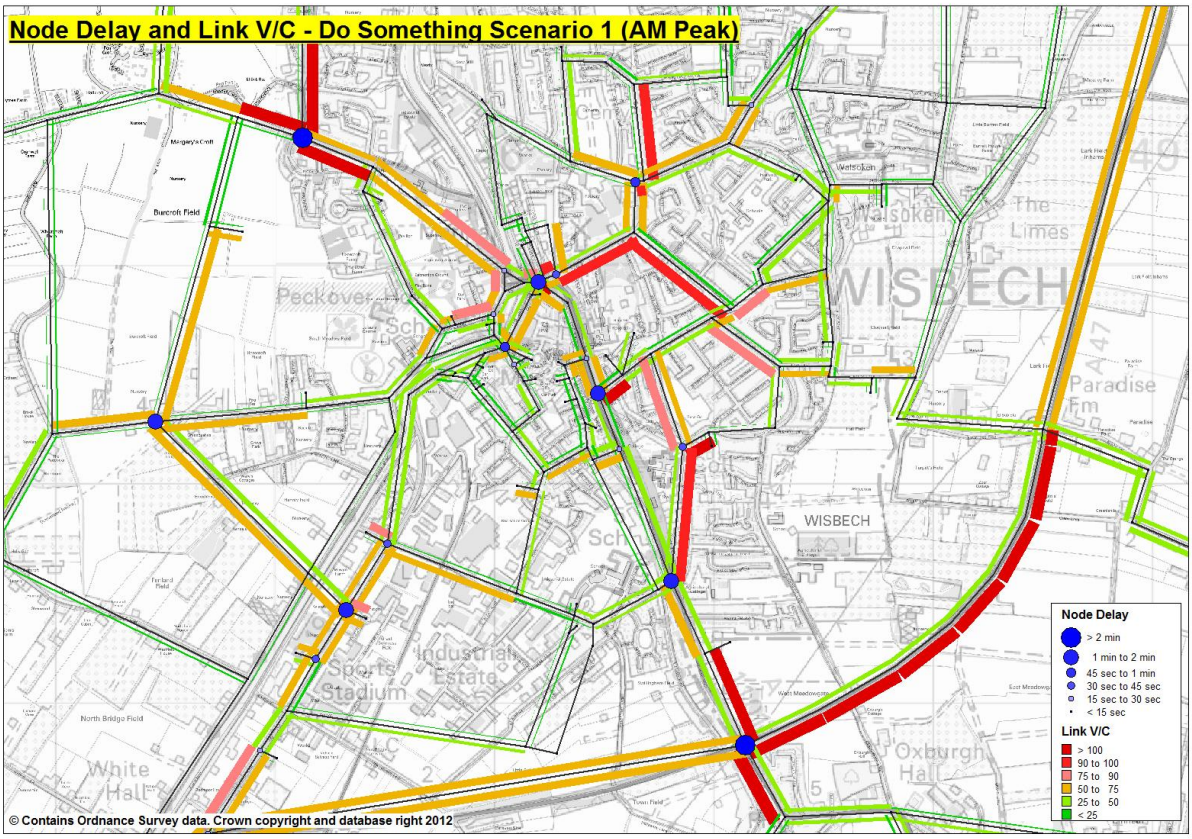


Figure 3-7– Node Delay and Link V/C – DS0 (PM Peak)

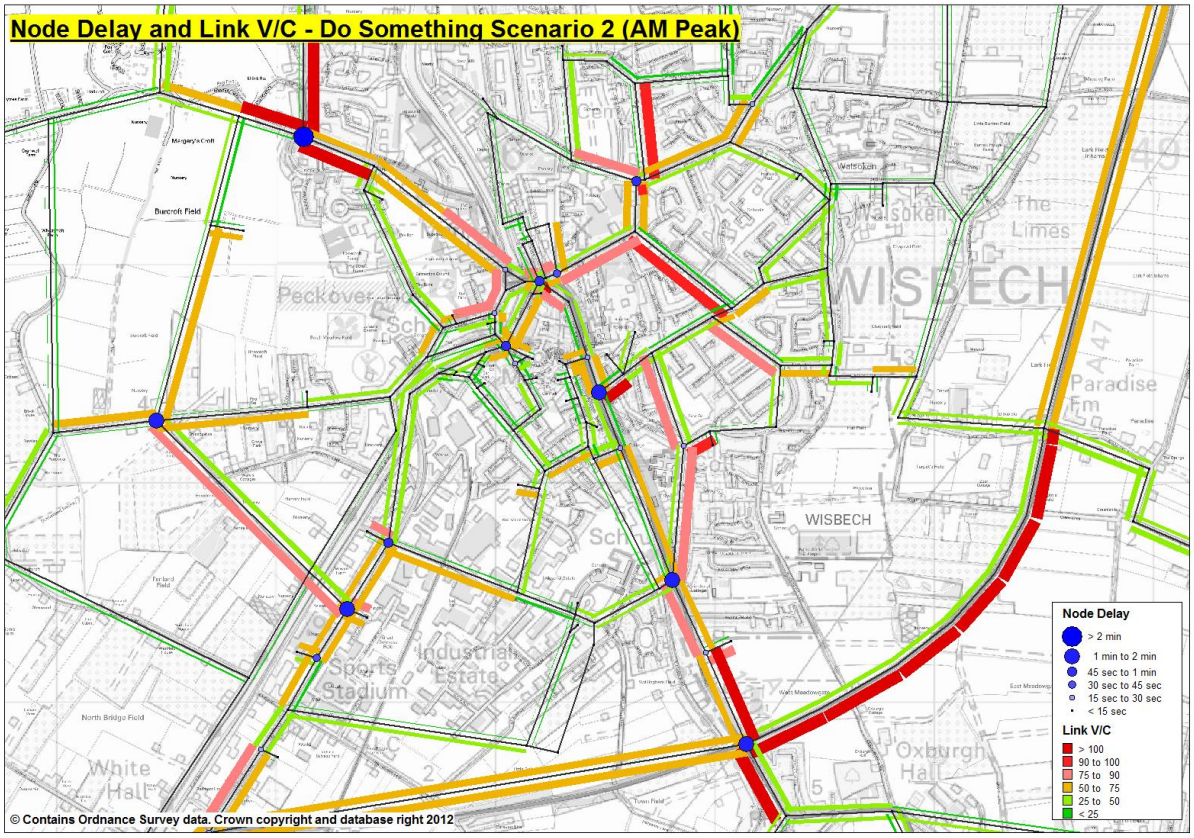


Figure 3-8– Node Delay and Link V/C – DS1 (PM Peak)

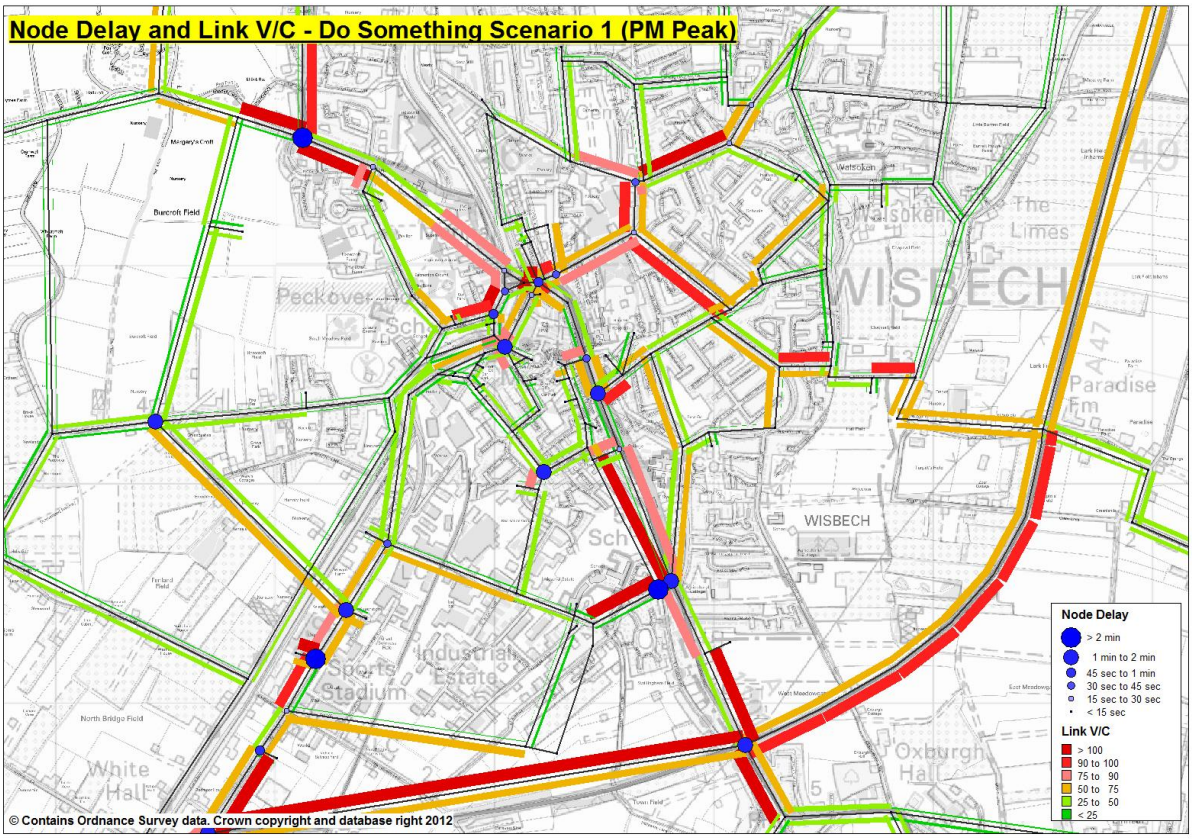


Figure 3-9– Node Delay and Link V/C – DS2 (PM Peak)

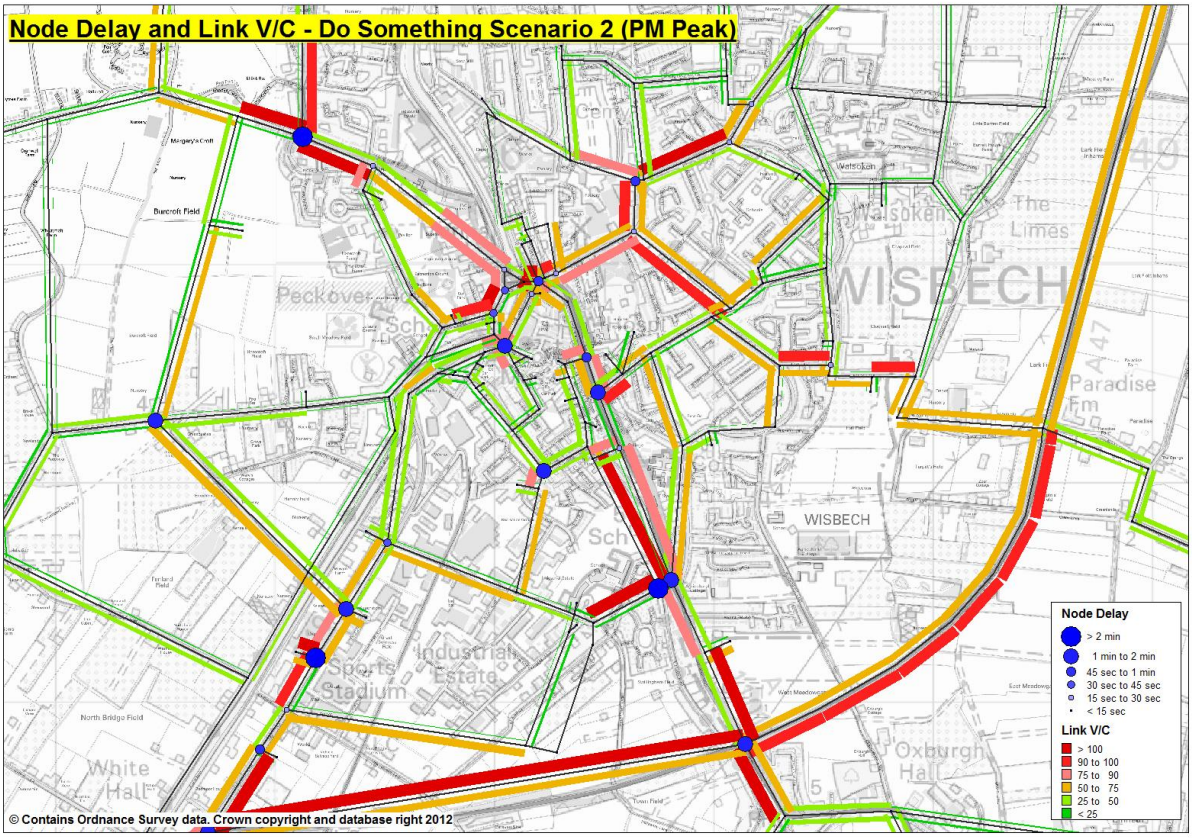


Figure 3-10– KLYN Development (North Access) Origin Trip Distribution – AM Peak

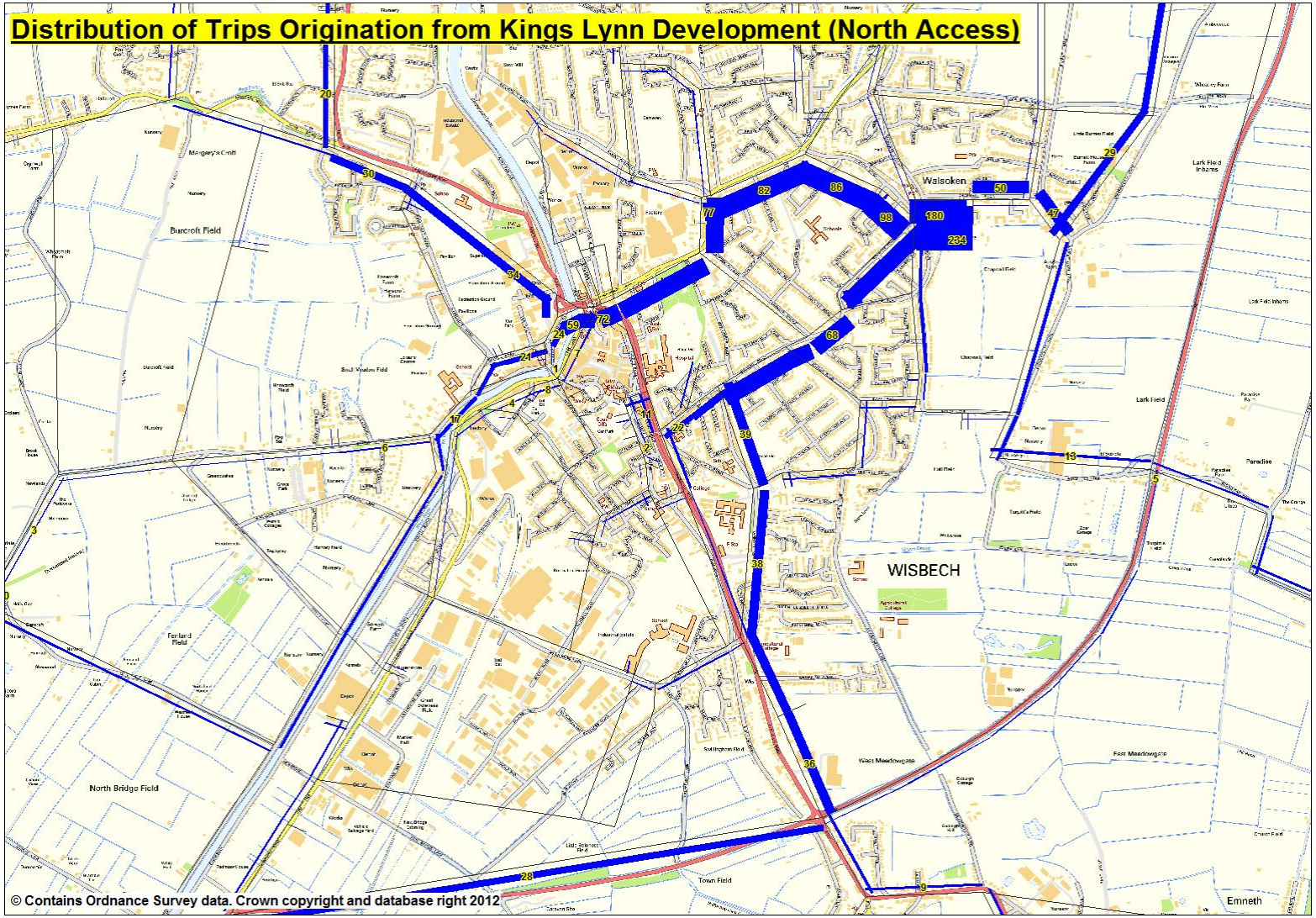


Figure 3-11 – KLYN Development (South Access) Origin Trip Distribution – AM Peak

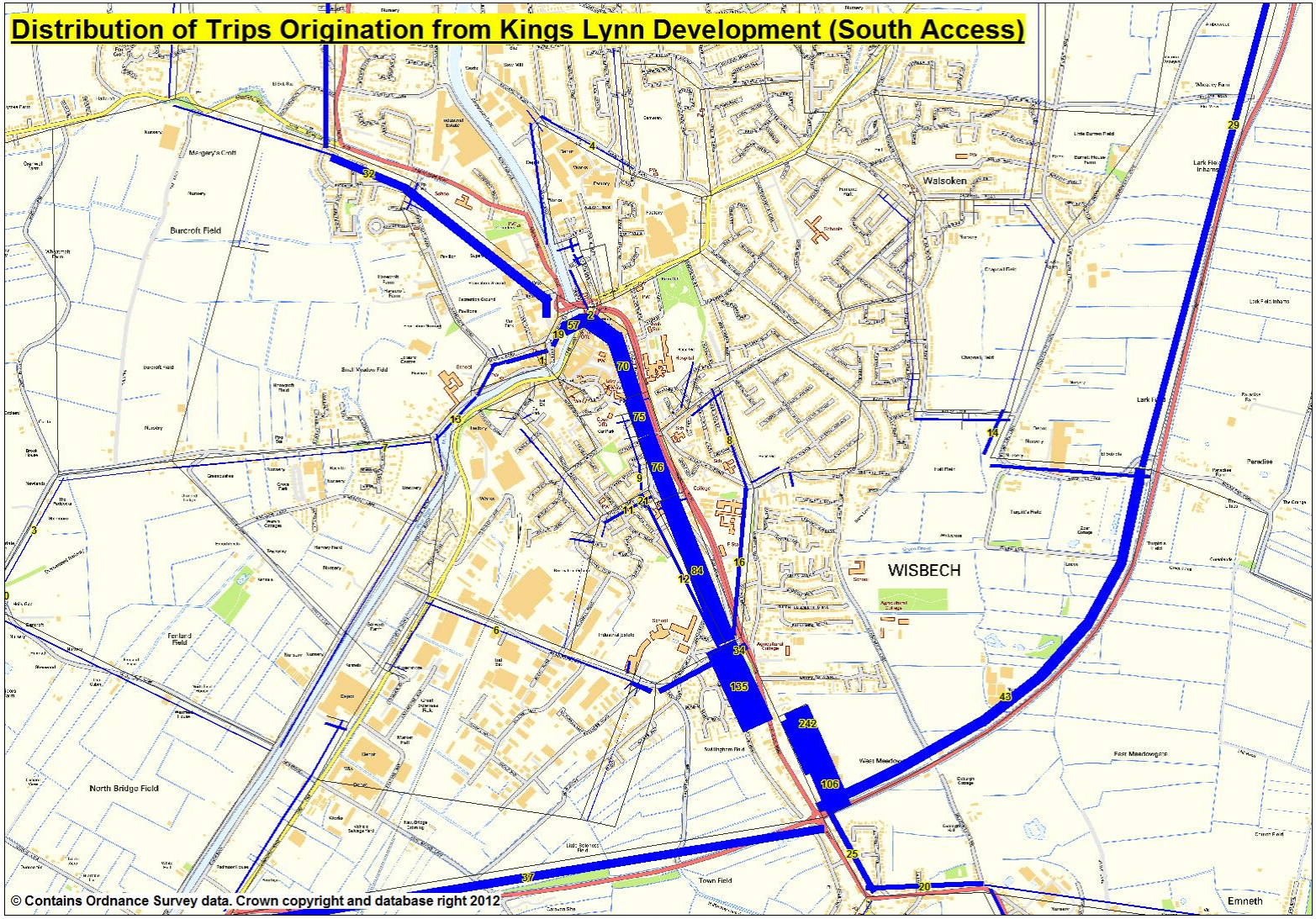


Figure 3-12 – KLYN Development (North Access) Destining Trip Distribution – PM Peak

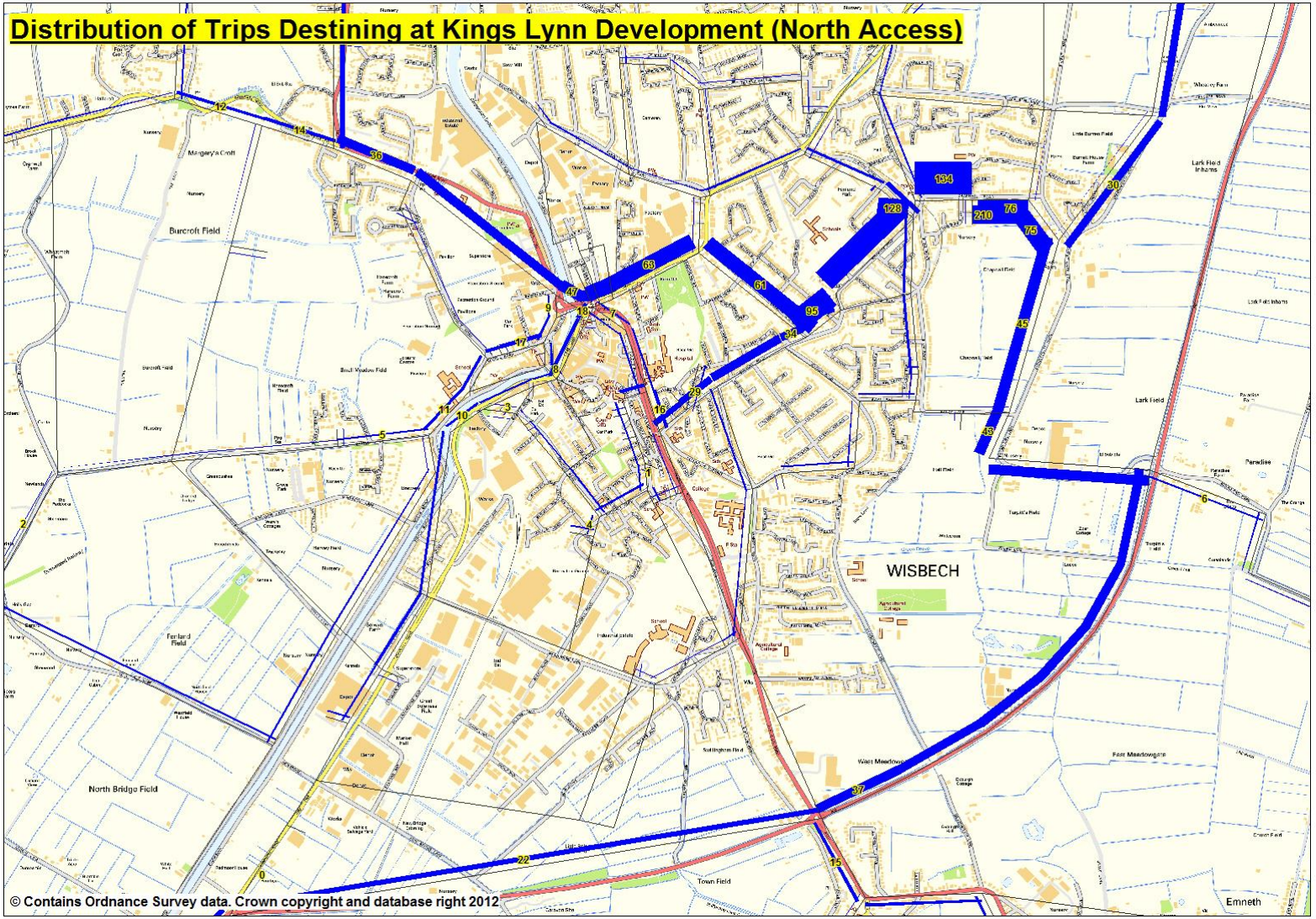
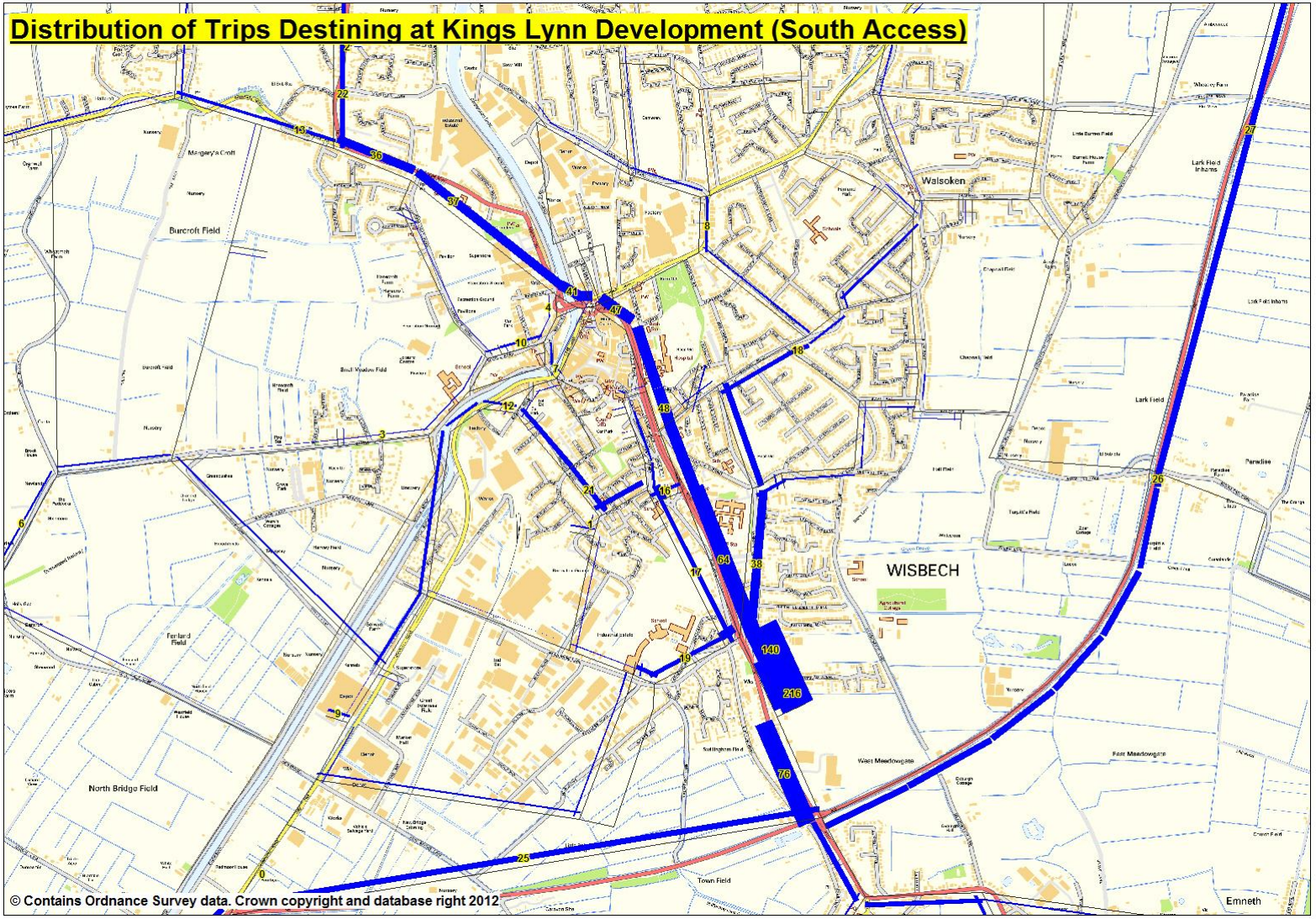


Figure 3-13 – KLYN Development (South Access) Destining Trip Distribution – PM Peak



4. Summary

This piece of work has focused upon:

- The analysis of potential highway impacts of additional large scale housing allocation on the fringes of Wisbech lying in the adjacent Kings Lynn and West Norfolk district. It is assumed the dwelling allocations tested would have reached full build out and occupancy by 2031;
- The assessment follows the identical procedure to the Core tests previously conducted with consistent outputs extracted;

In terms of headline information regarding the transport impacts of the additional testing, and a comparison between the two sites, this is as follows:

- The distribution of routes through from the Northern Site will have a more dispersed pattern through more minor routes into Wisbech. There is no significant scale of difference between the north and south sites; however the impact of the additional housing allocation is likely to have more congestion effects if located at the northern site than the southern site.
- The distribution plots show quite clearly that the impact of the Southern Access on the A1101 focuses activity in that corridor; this corridor is already recognised as suffering from heavy traffic flows;
- Traffic from the Southern Site is likely to have a larger impact on the A47 generally;
- The additional houses are likely to shorten the vehicle KM across the Wisbech network although this does not mean local congestion would improve;
- The impacts of the additional houses do not seem substantial when set in the context of the overall level of housing growth assumed to happen across Wisbech;
- The trip generation for the KLWN sites are likely to have some relief through the take up in the use of existing proposed upgrades to PT and cycle facilities close to the sites.