South Staffordshire Local Plan – SRN Modelling Technical Note

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Table of contents

Table of Figures

List of Tables

1. Introduction

1.1 Overview

In support of the emerging South Staffordshire Local Plan, Sweco have been appointed by South Staffordshire Council (SSC) to undertake the required transport modelling to assess the high-level cumulative impacts of the proposed local plan development on the Strategic Road Network (SRN). As part of this commission, the development quantum for the local plan has been agreed upon with SSC, and the modelling methodology has been agreed upon with National Highways (NH).

1.2 Background

Regular meetings were held with National Highways (NH) during the course of the project to work collaboratively and agree on the modelling methodology for the accumulative SRN assessment. It was decided that NHs SATURN based Midlands Regional Traffic Model (MRTM) would be the best tool for this assessment. Before using the MRTM, local base validation was conducted around the South Staffordshire area, specifically focusing on the proposed allocations. The results of this validation assessment indicate that a MRTM base year achieves satisfactory results in the vicinity of the larger developments sites.

It has also been agreed to create a cordon model using MRTM around South Staffordshire, based on an area specified in agreement with NH. As the MRTM forecasts are not available for this study, to assess the local plan impact, a pragmatic approach has been agreed upon to develop the forecast models using a fixed demand approach from the base year cordons. A single forecast year of 2042 and two scenarios have been developed as part of this assessment: the Without Local Plan Scenario and the With Local Plan Scenario. In summary, two forecast scenarios have been developed:

- **Without Local Plan Scenario** - Includes committed developments
- **With Local Plan Scenario** - Includes committed developments as well as local plan sites

1.3 Purpose of this Technical Note

This technical note outlines the methodology adopted for the South Staffordshire Local Plan SRN modelling assessment. This note also presents the modelling outcomes around SRN, and highlights areas of additional congestion that may require mitigation. In summary, this technical note describes the principles, assumptions, and methodology employed to develop the future year forecasts and test the local plan scenario.

2. Modelling Methodology

2.1 Overview

As described earlier, a methodology has been agreed upon with NH to assess the impact of local plan development on the SRN as part of the local plan modelling process. This methodology provides a high-level evaluation of how the proposed developments effects on the SRN.

This section describes how the With Local Plan and Without Local Plan matrices have been developed using fixed trip demand forecasting techniques using site specific as well as National Trip End Model (NTEM) version 8 growth (background growth).

2.2 MRTM Models and Cordoning

The MRTM is utilised for this assessment, with its highway network based on SATURN software. A cordon model has been agreed upon with NH for South Staffordshire, following the Local Plan site allocation. The nearest 2022 WebTRIS data were reviewed to calculate the percentage of Local Plan flows at the proposed cordon boundary. NH was satisfied with using WebTRIS for verifying the cordon extent, ensuring it is adequately sized to assess the impact on the Local Plan SRN.

The cordon base model has been enhanced for better resolution around proposed development sites, with validation checks confirming no material changes to the calibration results after adding new links. Figure 1 illustrates the cordon area, while Figure 2 depicts the cordon model, and detailed validation checks are included in Appendix A.

Figure 1: Cordon Area

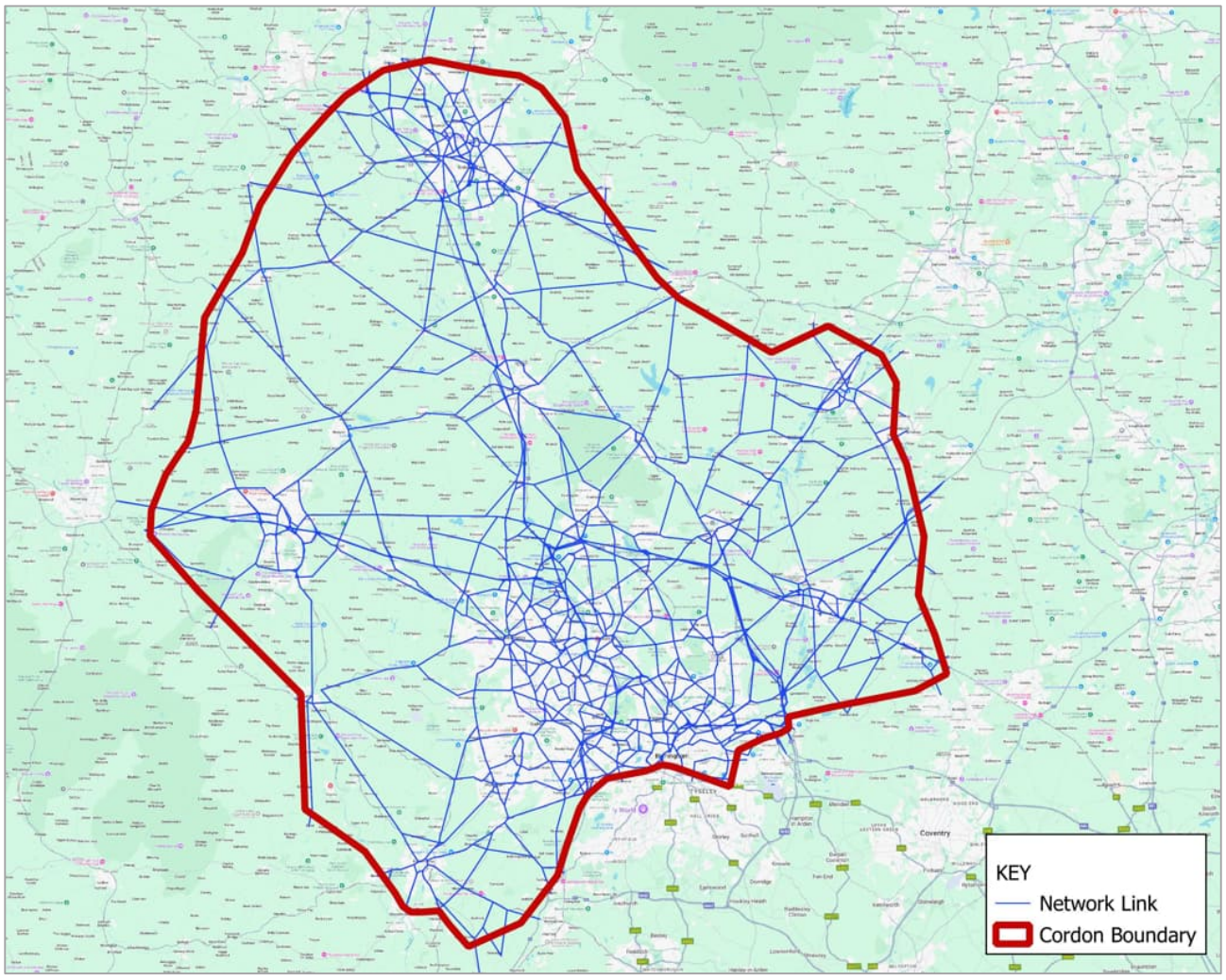
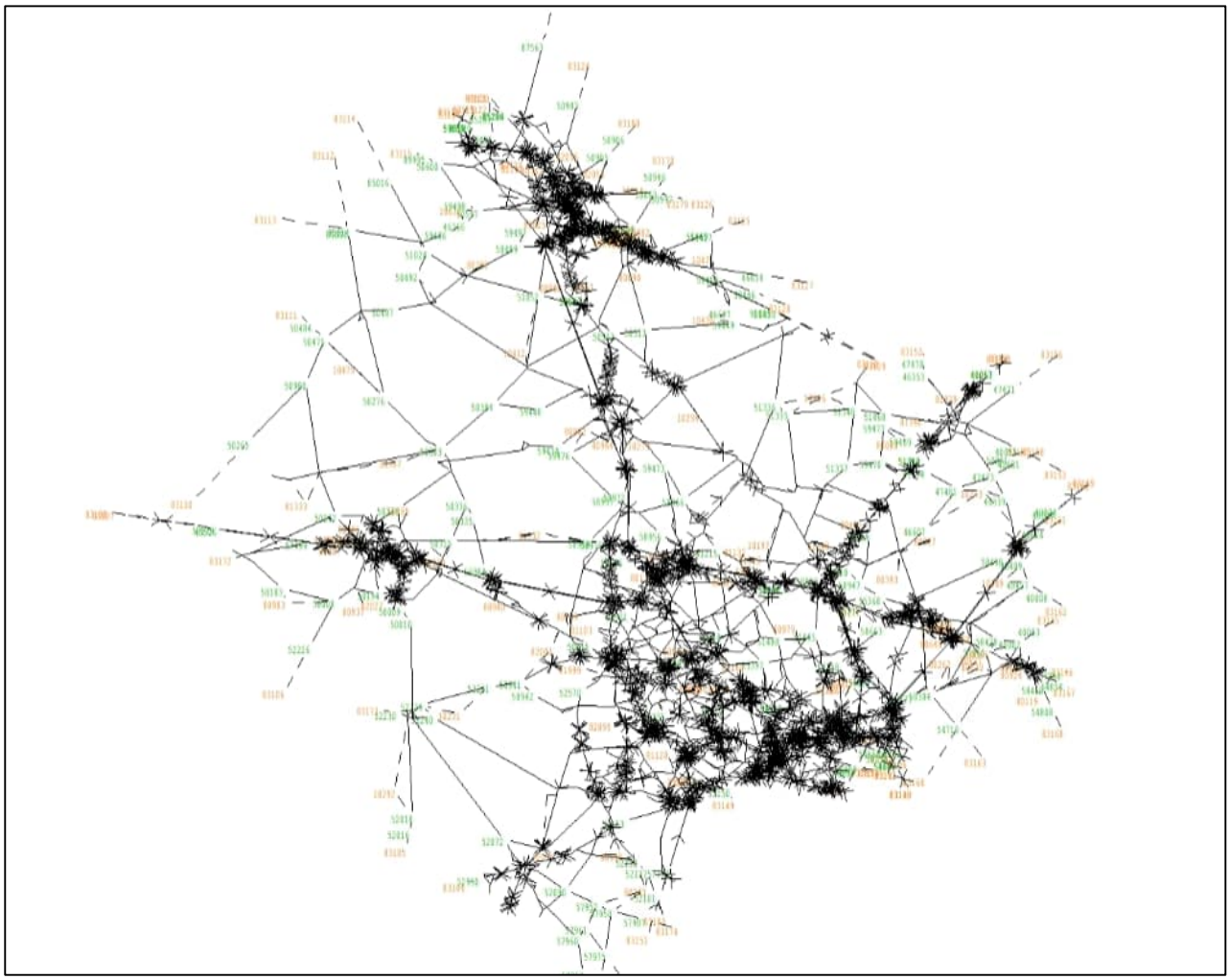


Figure 2: Cordon Model



As shown in the figures above, a sufficiently large cordon area has been established to evaluate the impact on the Local Plan SRN, which includes 634 zones, 3864 nodes and 11998 links. Further cordon network resolution details are included in Appendix B.

2.3 Demand Development

2.3.1 Overview

Two sets of demand have been developed: "With Local Plan Demand" and "Without Local Plan Demand," using the base year cordon demand. The "With Local Plan" scenario includes both committed and local plan developments, while the "Without Local Plan" scenario includes only committed developments. Forecast demand has been developed incrementally, with background growth added to the base matrices before incorporating the demand from the development sites.

Following steps are followed to develop the "Without Local Plan" scenario demand:

- Step 1: Following tasks are undertaken to calculate the 2042 background growth:
    - Extract the Trip End Model Presentation Program (TEMPro) growth factor between 2019 and 2042; An alternative TEMPRO growth factor has been derived without any additional housing and employment in the forecast planning data (Base year planning data = Future Year Planning Data) using the alternative planning data functionality in TEMPRO. Calculate the reduced background matrices by applying the alternative TEMPRO growth factors to the base cordon matrices.
    - LGV and HGV will be grown using National Road Traffic Projections (NRTP 2022) factors.

- A global uplift of 1.19 to the base year demand has been applied, as instructed by NH, as part of the background growth for the 'Fuel and Income uplift factors to estimate the impact of Variable Demand Model (VDM) in the “Without Local Plan” scenario.

- Step 2: Calculate the trip generations for the identified developments for the committed sites by applying TEMPRO trip rates and distribute them using the MRTM ‘Parent zone’
- Step 3: Combine Step 1 and Step 2 matrices to derive the “Without Local Plan” scenario matrices.

Following steps are followed to develop the "Local Plan" scenario demand:

- With Step 1: Calculate the trip generations for the identified developments for the local plan sites by applying TEMPRO trip rates and distribute them using the MRTM ‘Parent zone’
- Step 2: Combine Step 1 and Without Local Plan matrices to derive the With LP matrices.

2.3.3 Uncertainty Log

The uncertainty log for the committed sites and local plan sites has been received from South Staffordshire. The details of the log are included in Appendix C. The development locations are shown in Figure 3 and Figure 4.

Figure 3: Allocated Housing in South Staffordshire

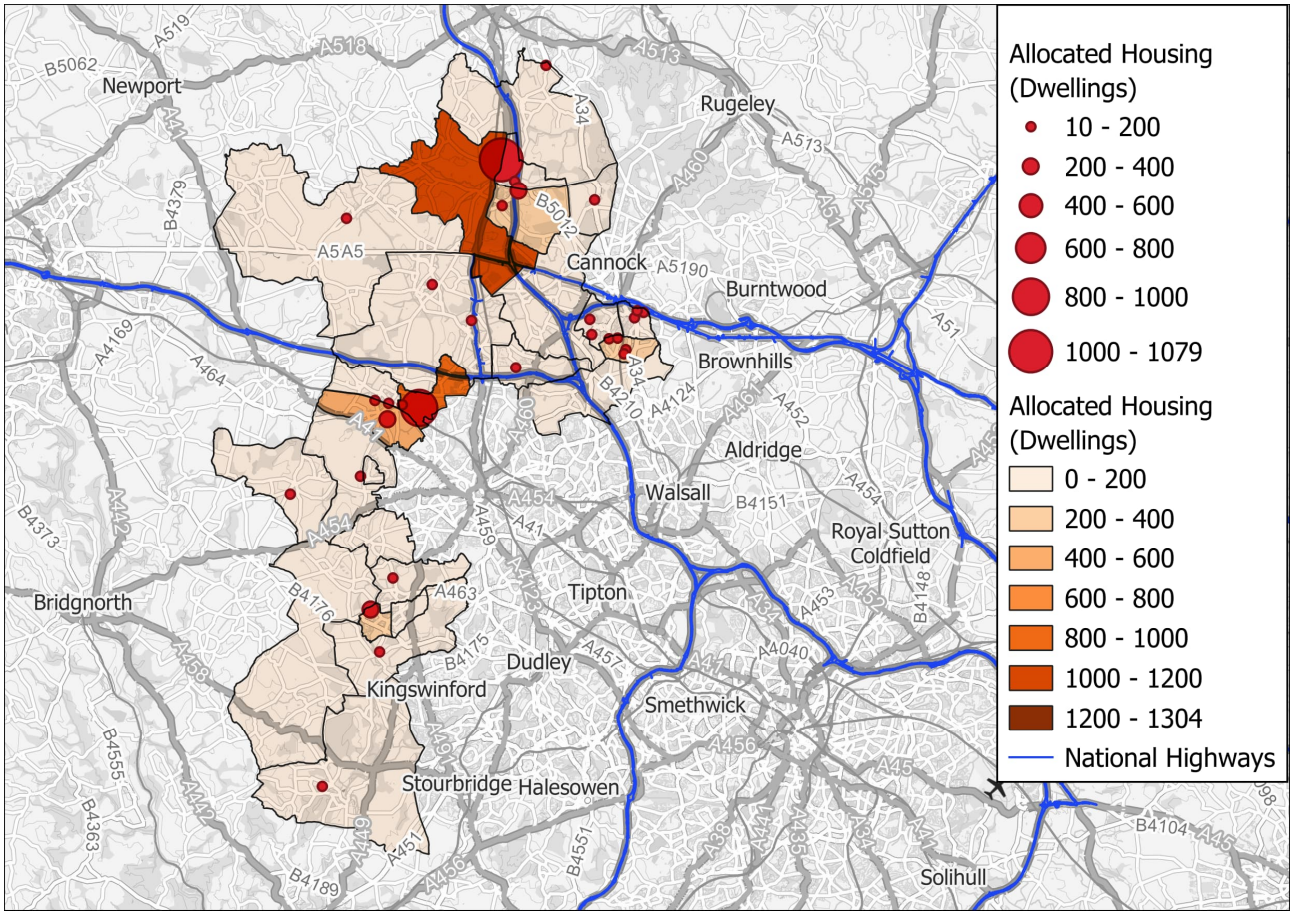
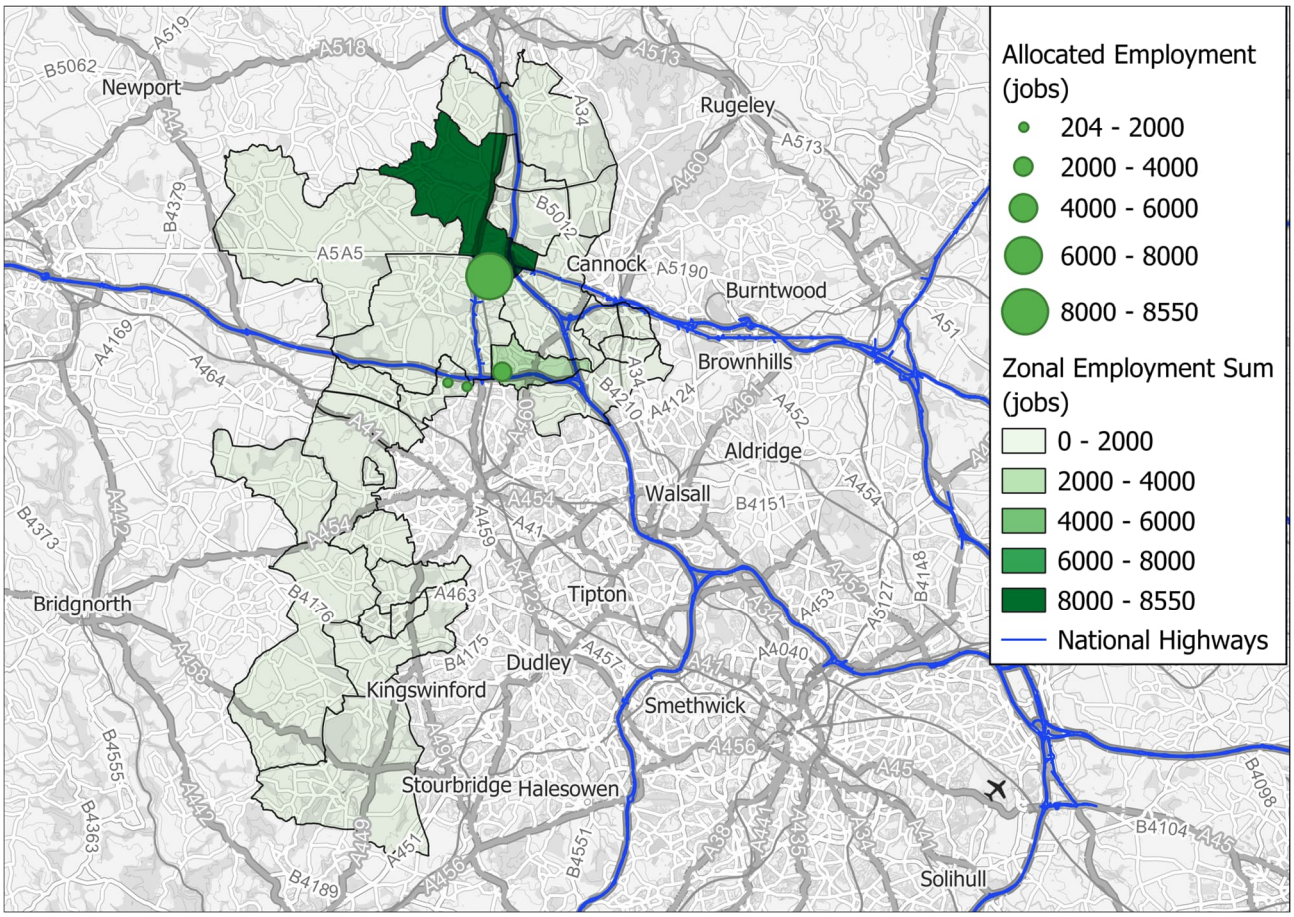


Figure 4: Allocated Employment in South Staffordshire



2.3.4 Local Plan Development Trip Rates

NTEM v8 trip rates are extracted for each purpose, period, and area where the planned developments are located. These trip rates are then applied to the quantum (size of housing and/or jobs) in each development for the forecast year, apart from the M6 J13 development site, for which site-specific trip rates have been used.

Table 1: Trip Rate

TEMPro Trip Rates	**AM Peak**			**PM Peak**		
Land use	Origin	Destination	Total	Origin	Destination	Total
Housing	0.26	0.04	0.30	0.10	0.24	0.34
Employment	0.06	0.25	0.31	0.21	0.09	0.31

Table 2: Trip Rate used for M6 J13 Development Site

TEMPro Trip Rates	**AM Peak**			**PM Peak**		
Land use	Origin	Destination	Total	Origin	Destination	Total
Employment	0.099	0.177	0.276	0.161	0.078	0.239

2.3.5 Local Plan Development Trip Distribution

For the larger sites, separate new zones are used to model both committed and local plan development sites. Trip distributions for each of the larger sites are derived from the corresponding MRTM base model zones. A donor zone from the base year is selected to replicate its trip pattern for the new zones added in the forecast models. Whenever possible, the chosen donor zone shares the same land use as the development zone and is in reasonable proximity to it. However, most of the MRTM zones are mixed-use zones. Figure 5 illustrates the new zones that have been added to the model.

Figure 5: New Development Zone Locations

This process is undertaken to accurately replicate the expected trip distribution of the development zones and to ensure that the future trip distribution has been robustly modelled. The list of donor zones for large sites is shown in Table 3.

Table 3: Land Use Distribution for Local Plan Sites

Zone	Type	No of HHs/Jobs	Sites	MRTM Donor Zones	Zone Type
90001	Housing	1079	Land north of Penkridge (Sites 010, 584 &420)	80918	Mixed use
	Housing	88	Land at Cherrybrook (Site 005)		
90002	Housing	848	Land East of Bilbrook (Site 519)	80437	Mixed use

Zone	Type	No of HHs/Jobs	Sites	MRTM Donor Zones	Zone Type
90003	Housing	317	Land at Wergs Hall Rd (Site 419)	80974	Mixed use
	Housing	85	Land at Station Rd (Site 224)		Mixed use
90004	Employment	3000	ROF Featherstone	80149	Mixed use
90005	Employment	8550	West Midlands Interchange	80381	Mixed use
90006	Employment	1405	i54 Western extension (north)	80437	Mixed use
90007	Employment	606	Land at J13 of the M6	80076	Mixed use

2.3.6 Future Year Target Trip Ends

The final demand trip ends combine the background growth with site specific development trip ends and are converted into matrix format through a furnessing process to obtain a forecast year origin/destination demand matrix for the 2042 forecast year.

The final matrices displayed in Table 4 and Figure 6 illustrate growth categorised by various elements of growth, i.e, Background Growth, Committed development and Local plan development etc.

Table 4: Matrix Growth Comparison

User-Class	AM Peak	% Growth vs Base Year	PM Peak	% Growth vs Base Year
2019 Base Cordon	364,754	0	373,821	0
Background Growth	80,924	22%	86,800	23%
Committed Development	5,021	1.4%	4,772	1.3%
Local Plan Development	1,871	0.50%	1,985	0.50%
Total	452,570	24%	467,379	25%

In summary, the total growth in the 2042 With Local Plan scenario is approximately 25% compared to the base year, with only 0.5% of this growth attributed to local plan developments. The majority of the growth is driven by background growth and committed development sites.

Figure 6: Matrix Growth Comparison – AM Peak

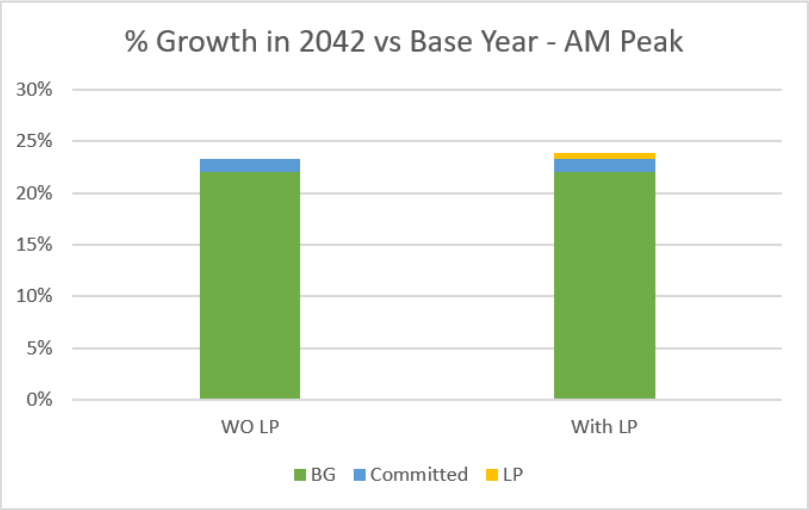
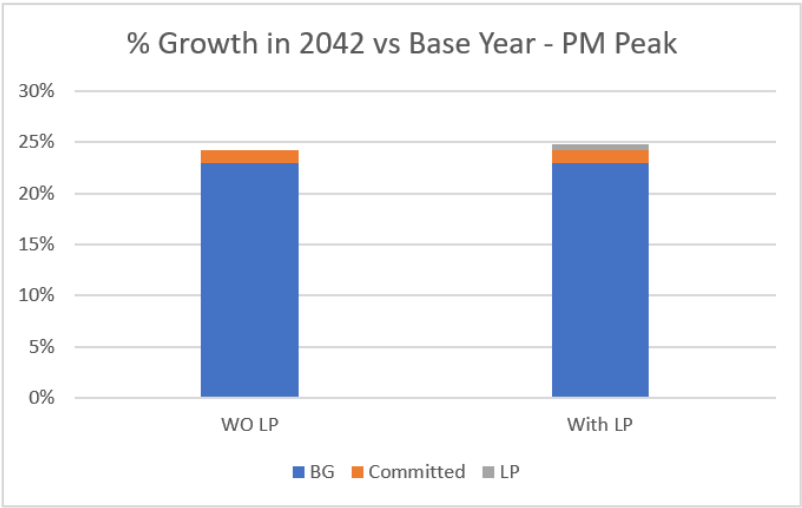


Figure 7: Matrix Growth Comparison – PM Peak



2.5 Development of Forecast Highway Network

Access arrangements for larger sites are coded in detail, based on information received from South Staffordshire Council. Multiple access points are provided to distribute trips across the network effectively. Access points are coded as accurately as possible to ensure that development trips are appropriately allocated to the SRN. A capacity of 99999 on access junctions has been allocated to allow all traffic entering and exiting the network. Detailed access arrangements are included in Appendix D.

The M54-M6 link road has been added in both forecast scenarios. The assumptions for the link road are based on the granted Development Consent Order (DCO) application, which was approved on April 21, 2022, and is currently in the post-decision stage, with an anticipated opening year prior to 2042 (originally projected as 2024 in the DCO). In the absence of additional data, the assessment will rely on the information provided in the DCO Transport Assessment (TA) document[1]. The link road is designed to meet the Dual 2-lane All-Purpose (D2AP) Design Standard, featuring a speed limit of 70 mph, along with a direct free-flow lane to the M54 and the inclusion of entry and exit slip roads at M54 Junction 1.

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010054/TR010054-000727-7.4%20P06%20Transport%20Assessment%20Report%20clean%20(1).pdf

3. Forecast Year Modelling Results

3.1 Overview

This chapter presents the model results for both the Without Local Plan Scenario and With Local Plan Scenario. The comparison between the two scenario highlights the impact of developments around SRN and within South Staffordshire. A set of output plots have been produced to show the flow difference, link Volume over Capacity (V/C) and delay difference. These plots facilitate the analysis of the traffic flows associated with the additional developments.

3.2 Traffic Flow

Link flow difference plots have been produced to show the difference in actual flows between scenarios. The changes in traffic flows are shown as bandwidths, where a green bar indicates a predicted increase in traffic flows and a blue bar for a decrease. The bandwidths have widths proportional to the magnitude of the change. The plots below measure bandwidth at a rate of 100 Passenger Car Units (PCU) per mm. The absolute flow difference under 50 PCUs are not presented in the plots.

Figure 8 and Figure 9 show the comparisons between Without Local Plan Scenario and With Local Plan Scenario modelled actual flow for the AM peak and PM peak in 2042. Overall, the flow difference reflects the difference on travel demand which was derived from the local plan. In PM peak a slight reduction in flows around Gailey Island (A449/Watling St) has been observed, this is attributed to increased delays at the Watling St eastbound approach.

Flow difference plots for both peak periods, along with the numerical values, can be found in Appendix E.

Figure 8: Actual Flows Comparison – AM Peak (With LP minus Without LP)

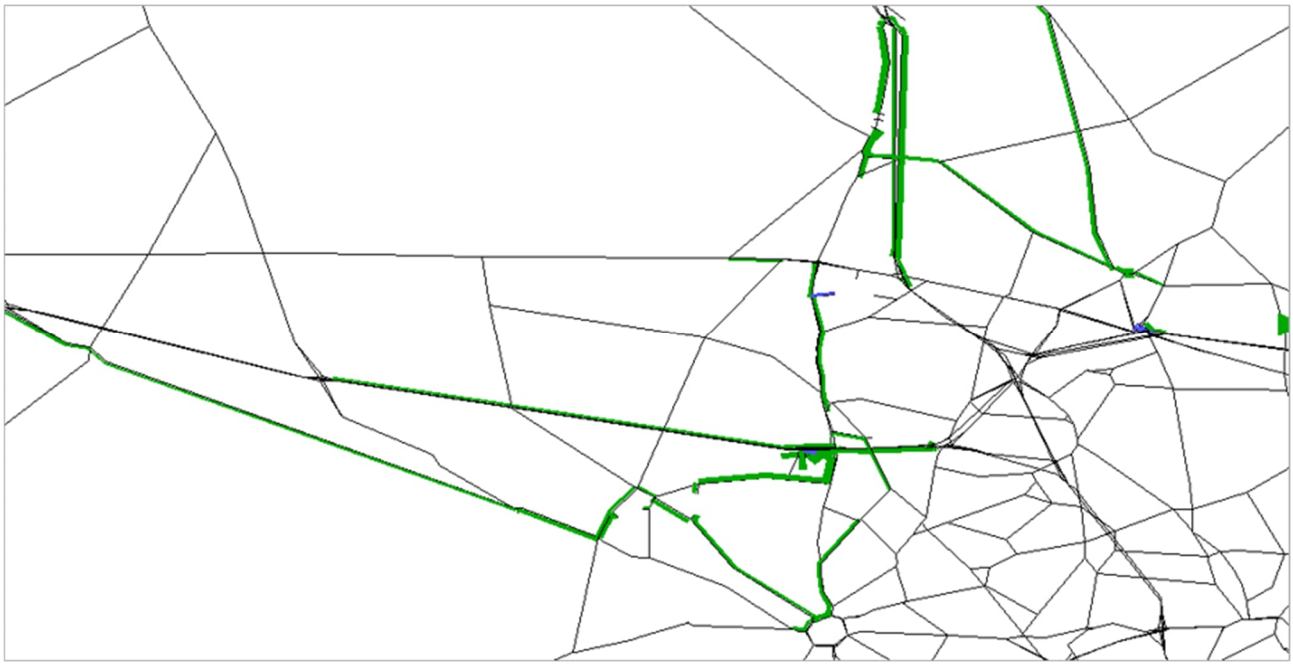
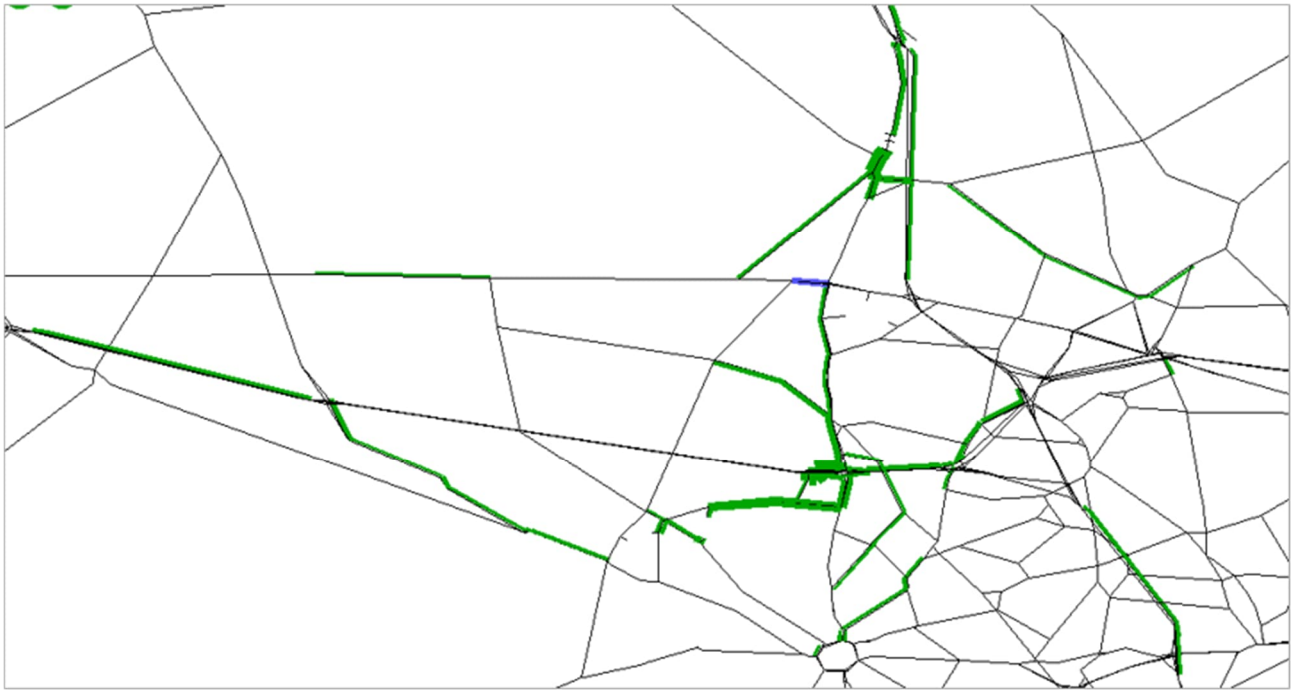


Figure 9: Actual Flows Comparison – PM Peak (With LP minus Without LP)



3.3 Junction Performance

This section demonstrates the performance of junctions around the SRN between Without Local Plan Scenario and With Local Plan Scenario. The analysis focuses on turn delays and turn V/C ratios at each junction during peak periods. Figure 10 shows the location of the SRN junctions.

Figure 10: Location of the SRN Junctions

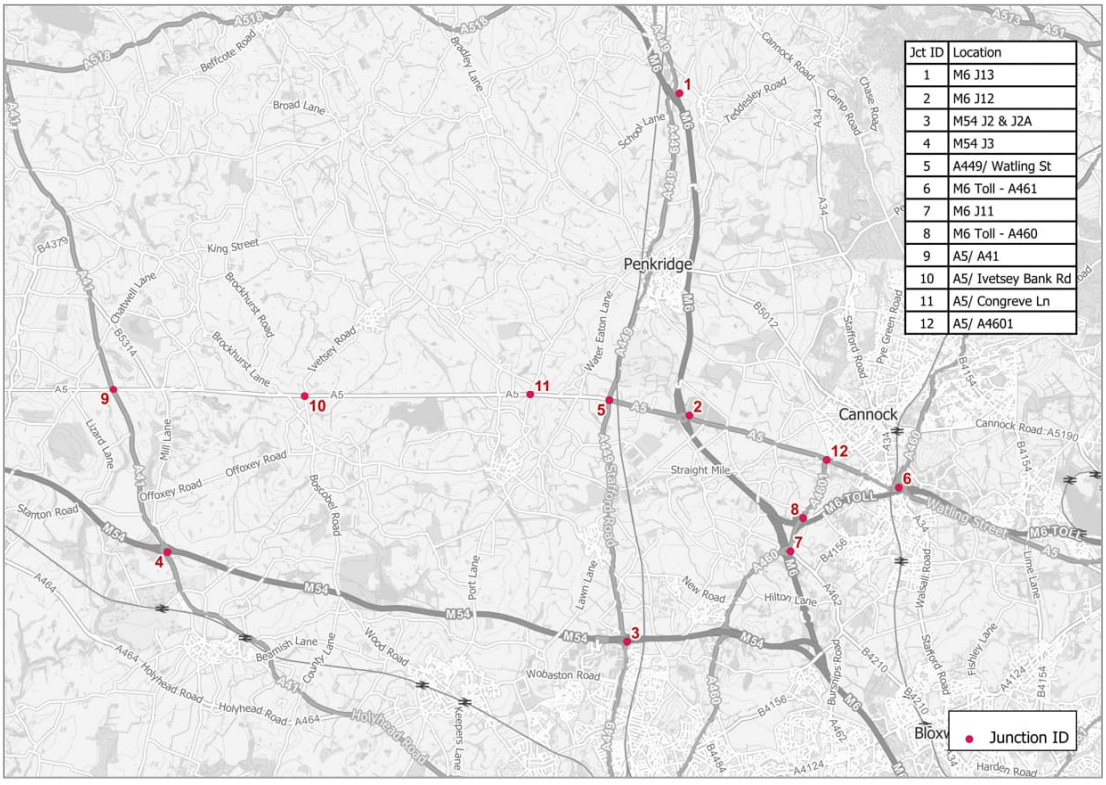


Table 5 shows the turn-based delays in seconds for the SRN junctions at each junction during peak periods.

Table 5: SRN Junction Delays and Delays Difference Between Two Scenarios (second)

Junction Name	Approach	Node Number	AM Peak			PM Peak		
			LP	RC	Diff (LP-RC)	LP	RC	Diff (LP-RC)
M6 J13	A449 WB	50389	40	6	34	6	6	0
	M6 SB	50392	34	26	8	97	51	46
	M6 NB	50390	6	5	0	8	8	1
	A449 EB	50391	7	7	1	7	7	0
M6 J12	M6 NB	50390	111	109	2	7	7	0
	Watling St EB	50371	5	5	0	5	5	0
	M6 SB	50392	26	24	2	5	5	0
	Watling St WB	50373	33	33	0	5	6	0
M54 J2 & J2A	A449 NB	50038	165	37	128	28	27	1
	M54 EB	58501	66	67	-2	43	41	2
	A449 SB	50042	20	19	1	19	19	0
	M54 WB	50041	27	23	4	40	26	13
	J2A Overbridge S	55421	19	19	0	19	19	0
	J2A Overbridge N	55424	21	20	0	42	23	19
M54 J3	Newport Rd NB	50318	6	6	0	6	6	0
	M54 WB	50041	7	6	0	17	12	5
	Newport Rd SB	50319	5	5	0	6	6	0

Junction Name	Approach	Node Number	AM Peak			PM Peak		
			LP	RC	Diff (LP-RC)	LP	RC	Diff (LP-RC)
	M54 EB	58501	7	6	0	9	8	1
A449/Watling St	Watling EB	58586	176	167	8	257	205	51
	Watling WB	58588	12	12	-1	66	73	-7
	A449 SB	58587	20	15	5	5	5	0
	A449 NB	58589	14	11	3	233	210	23
M6Toll - A461	RB W- A460 NB/EB	58599	23	23	0	29	30	-1
	RB W- Watling WB	58504	69	75	-6	152	138	14
	RB W- A460 SB/WB	58503	224	152	71	191	167	24
	RB W- Walsall Rd SB	58502	259	198	61	119	95	24
	RB W- Watling EB	50931	96	92	4	114	105	9
	RB N- A460 NB	58600	5	6	0	5	5	0
	RB N- A460 SB	58602	82	97	-15	8	8	0
	RB N- A460 WB	50929	6	7	0	7	7	0
	Overbridge N - Watling EB	50967	89	87	2	132	133	0
	Overbridge N - A460 SB	50969	275	207	68	269	254	15
	Overbridge S - A34 NB	50928	154	151	3	18	18	0
	Overbridge S - Watling SB	58605	21	21	0	20	20	0
	Overbridge S - M6 Toll WB	50968	39	38	1	13	13	0
	Overbridge S - Watling WB	58606	98	96	2	47	42	5
M6 J11	A460 EB	50350	27	27	0	17	16	1
	M6-M54 Link Rd	50085	53	48	6	119	109	10
	M6 NB	50390	25	25	0	23	23	0
	A462 WB	50349	65	61	4	61	55	6
	A460 WB	50352	114	109	5	172	170	2
	M6 SB	50392	298	281	17	305	276	29
M6Toll - A460	A4601 SB	50965	6	6	0	6	6	0
	A460 WB	50352	4	4	0	4	4	0
	A460 NB	50964	92	89	4	32	21	11
A5/A41	A41 SB	50330	14	13	0	14	13	0
	A5 WB	50330	15	15	1	15	15	0
	A41 NB	50330	15	15	0	15	15	0
	A5 EB	50330	14	13	0	14	14	0
A5/Ivetsey Bank Rd	A5 WB	61806	2	2	0	2	2	0
	Ivetsey Bank Rd	61806	13	12	0	12	12	0
	A5 EB	61806	7	7	0	7	7	0
A5/Congreve Ln	Congreve Ln	58959	223	138	85	15	14	1
	A5 WB	58959	10	9	1	8	7	1
	A5 EB	58959	2	2	0	2	1	0
A5/A4601	A5 EB	58594	22	21	1	30	30	0

Junction Name	Approach	Node Number	AM Peak			PM Peak		
			LP	RC	Diff (LP-RC)	LP	RC	Diff (LP-RC)
	A5 WB	58596	5	5	0	5	5	0
	A4601 SB	58595	5	5	0	5	5	0
	A4601 NB	58597	7	7	0	7	7	0

Table 6 indicates that the delay changes between the With and Without Local Plan scenarios at most of the junctions are below 2 minutes, except for M54 J2A. This issue can be addressed in the models through signal optimisation.

Table 6: Summary of SRN Junction Delay Difference Between Two Scenarios (second)

SRN Junction	AM Peak	PM Peak
M6 J13	34	46
M6 J12	2	0
M54 J2 &J2A	128	19
M54 J3	0	5
A449/ Watling St	8	51
M6 Toll – A461	71	24
M6 J11	17	29
M6 Toll – A460	4	11
A5/A41	1	0
A5/Ivetsey Bank Rd	0	0
A5/Congreve Ln	85	1
A5/A4601	1	0

Table 7 shows the turn-based V/C ratios for the SRN junctions at each junction during peak periods.

Table 7: SRN Junction V/C ratios and V/C ratios Difference Between Two Scenarios

Junction Name	Approach	Node Number	AM Peak			PM Peak		
			LP	RC	Diff (LP-RC)	LP	RC	Diff (LP-RC)
M6 J13	A449 WB	50389	101%	96%	5%	77%	73%	4%
	M6 SB	50392	83%	82%	1%	101%	89%	12%
	M6 NB	50390	51%	48%	3%	76%	72%	4%
	A449 EB	50391	68%	60%	8%	56%	53%	3%
M6 J12	M6 NB	50390	103%	103%	0%	64%	65%	-1%
	Watling St EB	50371	45%	46%	-2%	42%	43%	-1%
	M6 SB	50392	100%	97%	3%	62%	60%	2%
	Watling St WB	50373	98%	98%	0%	48%	50%	-1%
M54 J2 & J2A	A449 NB	50038	107%	93%	14%	73%	64%	9%
	M54 EB	58501	101%	101%	0%	96%	96%	0%
	A449 SB	50042	77%	74%	3%	71%	72%	-1%
	M54 WB	50041	86%	80%	6%	94%	88%	6%
	J2A Overbridge S	55421	24%	17%	7%	11%	8%	3%
	J2A Overbridge N	55424	42%	34%	8%	94%	66%	28%
M54 J3	Newport Rd NB	50318	71%	69%	2%	69%	68%	1%
	M54 WB	50041	56%	54%	1%	78%	74%	4%
	Newport Rd SB	50319	45%	45%	0%	64%	61%	3%
	M54 EB	58501	53%	52%	2%	75%	70%	5%
A449/Watling St	Watling EB	58586	107%	107%	0%	111%	108%	3%
	Watling WB	58588	80%	81%	-1%	102%	100%	2%
	A449 SB	58587	95%	91%	4%	77%	74%	3%
	A449 NB	58589	93%	89%	4%	113%	109%	4%
M6Toll - A461	RB W- A460 NB/EB	58599	89%	89%	-1%	100%	100%	0%
	RB W- Watling WB	58504	99%	100%	-1%	105%	104%	1%
	RB W- A460 SB/WB	58503	109%	106%	4%	108%	107%	1%
	RB W- Walsall Rd SB	58502	113%	109%	3%	105%	104%	1%
	RB W- Watling EB	50931	102%	102%	0%	103%	102%	0%
	RB N- A460 NB	58600	45%	48%	-3%	29%	30%	0%
	RB N- A460 SB	58602	103%	104%	-1%	87%	87%	0%
	RB N- A460 WB	50929	51%	55%	-4%	59%	60%	-1%
	Overbridge N - Watling EB	50967	100%	100%	0%	103%	103%	0%
	Overbridge N - A460 SB	50969	112%	108%	4%	111%	111%	1%
	Overbridge S - A34 NB	50928	106%	106%	0%	90%	90%	0%
	Overbridge S - Watling SB	58605	54%	56%	-2%	57%	57%	0%
	Overbridge S - M6 Toll WB	50968	87%	86%	1%	60%	59%	1%

Junction Name	Approach	Node Number	AM Peak			PM Peak		
			LP	RC	Diff (LP-RC)	LP	RC	Diff (LP-RC)
	Overbridge S - Watling WB	58606	101%	101%	0%	97%	96%	1%
M6 J11	A460 EB	50350	95%	95%	0%	67%	68%	0%
	M6-M54 Link Rd	50085	100%	99%	1%	103%	103%	1%
	M6 NB	50390	84%	82%	2%	93%	92%	2%
	A462 WB	50349	100%	100%	0%	100%	99%	1%
	A460 WB	50352	103%	103%	0%	107%	106%	0%
	M6 SB	50392	110%	109%	1%	111%	109%	2%
M6Toll - A460	A4601 SB	50965	30%	30%	0%	29%	30%	0%
	A460 WB	50352	8%	8%	0%	10%	10%	0%
	A460 NB	50964	105%	104%	0%	101%	101%	1%
A5/A41	A41 SB	50330	45%	44%	1%	41%	40%	1%
	A5 WB	50330	45%	44%	1%	41%	40%	1%
	A41 NB	50330	45%	44%	1%	41%	40%	1%
	A5 EB	50330	45%	44%	1%	41%	40%	1%
A5/Ivetsey Bank Rd	A5 WB	61806	39%	38%	1%	39%	39%	0%
	Ivetsey Bank Rd	61806	39%	38%	1%	39%	39%	0%
	A5 EB	61806	39%	38%	1%	39%	39%	0%
A5/Congreve Ln	Congreve Ln	58959	109%	104%	5%	41%	36%	6%
	A5 WB	58959	109%	104%	5%	41%	40%	1%
	A5 EB	58959	109%	104%	5%	41%	40%	1%
A5/A4601	A5 EB	58594	82%	81%	1%	88%	88%	0%
	A5 WB	58596	36%	36%	0%	24%	25%	-1%
	A4601 SB	58595	30%	30%	0%	35%	35%	0%
	A4601 NB	58597	71%	70%	0%	73%	73%	-1%

The largest changes occurred at M54 J2 and J2A. These performance issues could be mitigated in the model through optimisation of the MRTM signalised junction coding. Additionally, the A5/Congreve Lane operates over capacity in the Without Local Plan scenario, which gets slightly worse in the With Local Plan scenario, primarily due to increased traffic flow during the PM peak. This increase is partly caused by delays at the eastbound approach of the A449/Walting Street junction, as well as the sparse network of the MRTM.

Table 8: Summary of SRN Junction V/C Difference Between Two Scenarios

SRN Junction	AM Peak	PM Peak
M6 J13	8%	12%
M6 J12	3%	2%
M54 J2 &J2A	14%	28%

SRN Junction	AM Peak	PM Peak
M54 J3	2%	5%
A449/ Watling St	4%	4%
M6 Toll – A461	4%	1%
M6 J11	2%	2%
M6 Toll – A460	0%	1%
A5/A41	1%	1%
A5/Ivetsey Bank Rd	1%	0%
A5/Congreve Ln	5%	6%
A5/A4601	1%	0%

The mean delay differences for SRN junctions, which represent the average node delay differences across all approach arms, are detailed in Appendix F. Additionally, the changes in link V/C ratios are presented in Appendix G.

4. Summary

Sweco collaborated with National Highways (NH) to establish the high-level methodology for the accumulative SRN assessment. It has been agreed that the assessment should be proportionate and pragmatic, considering the relevant modelling outcomes and timescales.

The 2019 Midlands Regional Traffic Model (MRTM) was utilised for this assessment. Before using the MRTM, local base validation was conducted around the South Staffordshire area, specifically focusing on the proposed allocations. The results of this validation assessment indicate that a MRTM base year achieves satisfactory results in the vicinity of the larger developments sites. A cordon model was created using MRTM around South Staffordshire, as agreed with NH. Due to the unavailability of the MRTM forecasts for assessing the local plan, a pragmatic approach has been taken to develop forecast models using a fixed demand methodology from the base year cordons. This assessment includes a single forecast year of 2042 and two scenarios: the Without Local Plan Scenario and the With Local Plan Scenario.

Forecast demand has been developed incrementally, with background growth added to the base matrices before incorporating the demand from the development sites. It is to be noted that the total growth in the 2042 With Local Plan scenario is approximately 25% compared to the base year, with only 0.5% of this growth attributed to local plan developments. The majority of the growth is driven by background growth and the committed development sites

Due to the regional nature of the MRTM, the zone sizes are relatively large and the network details in the local area are limited. Since this is a high-level fixed demand study focused on SRN impacts, local effects, such as zone disaggregation for the impact on local roads in South Staffordshire, have not been fully represented. Some local roads have been added in the network to model the development's load robustly; however, the study is principally targeted at strategic highway movements.

As agreed with NH, the trip generation figures used the TEMPro trip rates. These have not been further adjusted to reflect additional opportunities for decrease car demand from mode shift. Furthermore, no internalisation among the developments has been considered. The zone distribution has been derived from the MRTM to model the local plan developments.

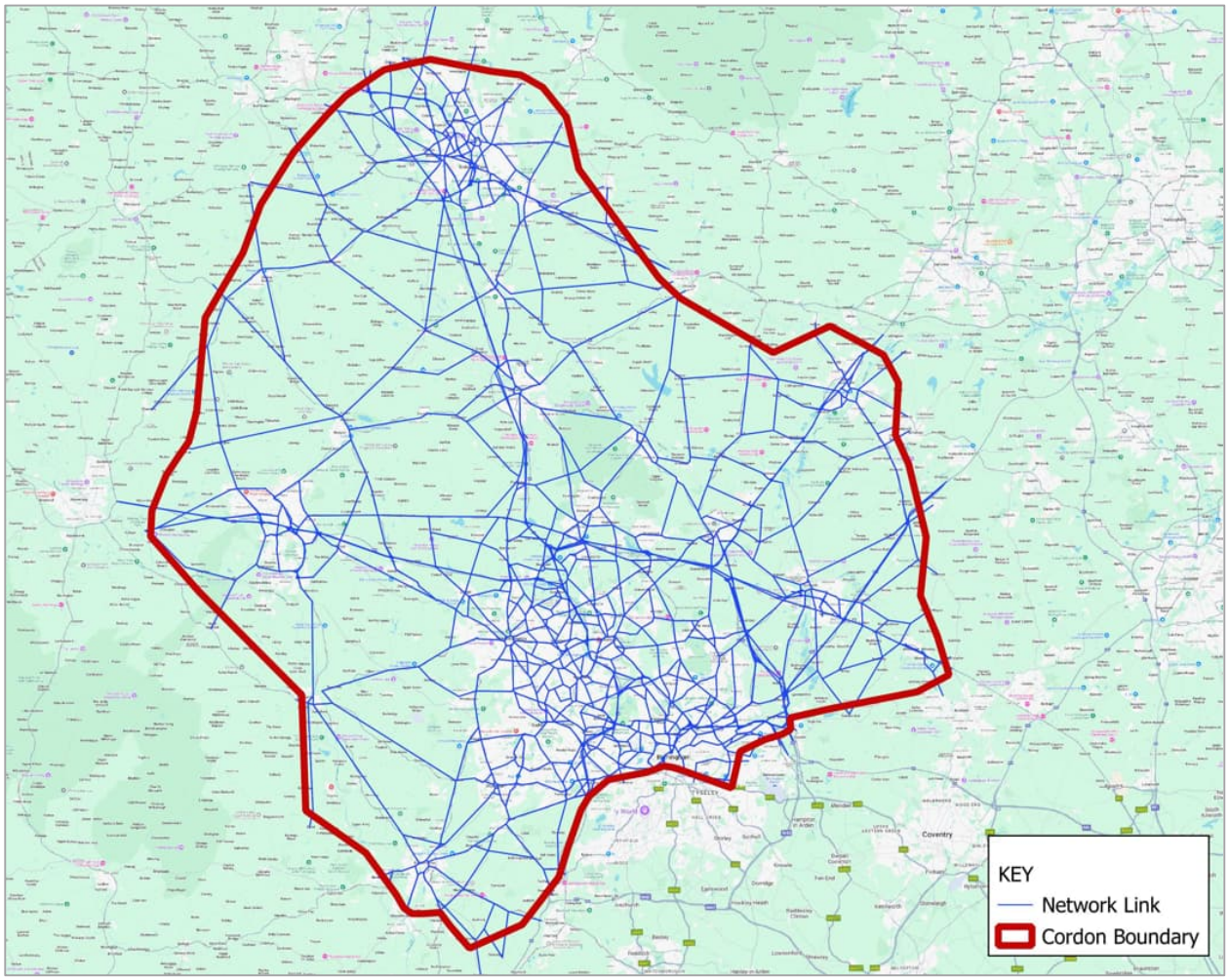
The performance of the SRN junctions is assessed based on turn delays and turn volume-to-capacity (V/C) ratios during the peak periods. The analysis indicates that the changes in delays between the With and Without Local Plan scenarios are below 2 minutes for most junctions, with the exception of M54 J2A. These performance issues could be mitigated in the model through optimsation of the MRTM signalised junction coding

The A5/Congreve Lane already operates above capacity in the Without Local Plan scenario (138 seconds delay in the AM peak). This situation worsens slightly in the With Local Plan scenario, primarily due to increased traffic flow (increase of 85 seconds). This increase in delays is partly attributed to congestion at the eastbound approach of the A449/Walting Street (Gailey) junction, as well as the sparse network of MRTM. It is however important to note that delays at the Gailey junction are already observed in the Without Local Plan scenario, where it operates beyond capacity (V/C up to 107% AM peak and 109% PM peak).

Appendix A

Cordoning and Local Validation Checks before Improving Network Resolution

Cordon Extent covers Stoke-on-Trent to the north, Kidderminster to the south, Tamworth to the east, and Telford to the west.



Summary:

MRTM Base Validations are reviewed for link flows, screenline flows and journey time.

Link Flow validation

TAG	AM	PM
Pass	423	416
Fail	46	53
Total	469	469
%	90%	89%

Screenline Validation

	AM	PM
PASS(Less than 5% change)	13	13
FAIL(more than 5% change)	1	1
Total	14	14
%	93%	93%

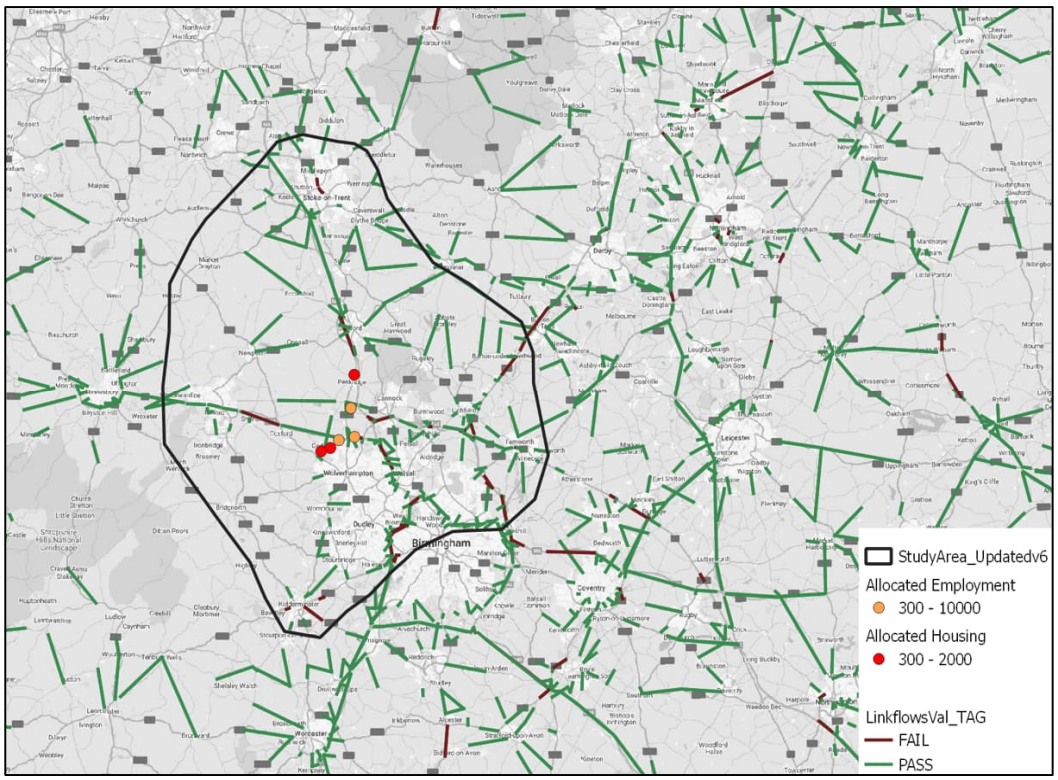
Journey Time Validation (Links)

TAG	AM	PM
PASS	129	125
FAIL	17	21
TOTAL	146	146
%	88%	86%

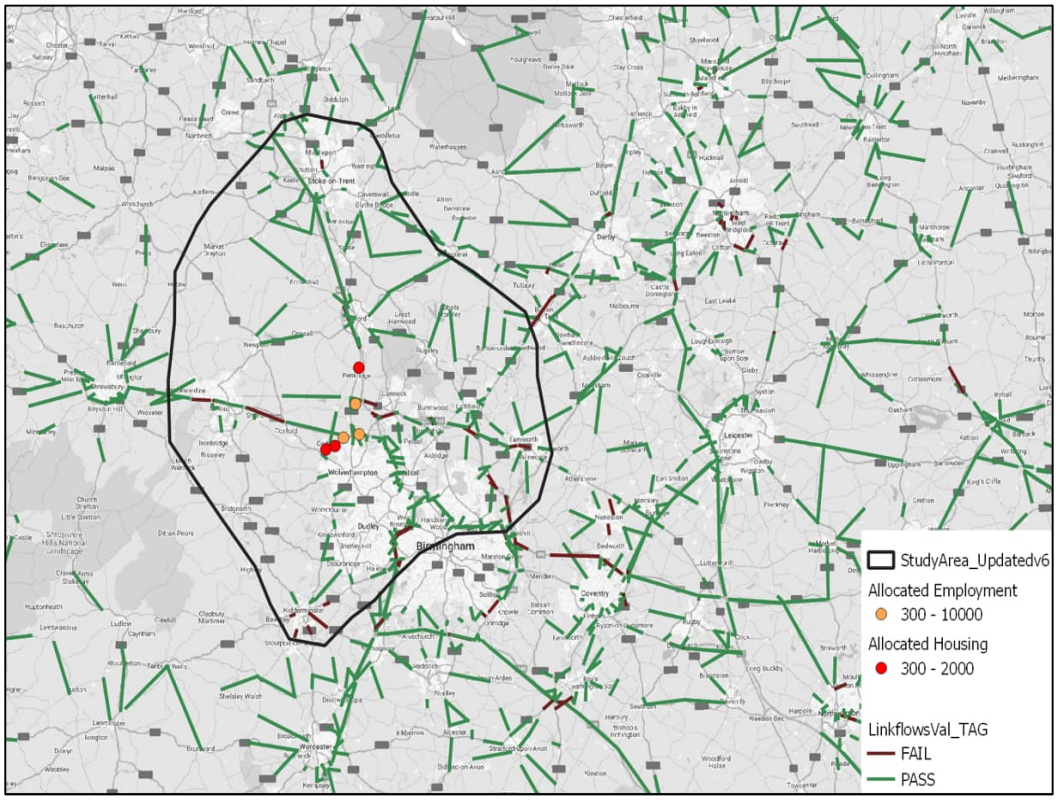
Overall, the validation of the network within the cordon area is satisfactory.

Local Validation Checks

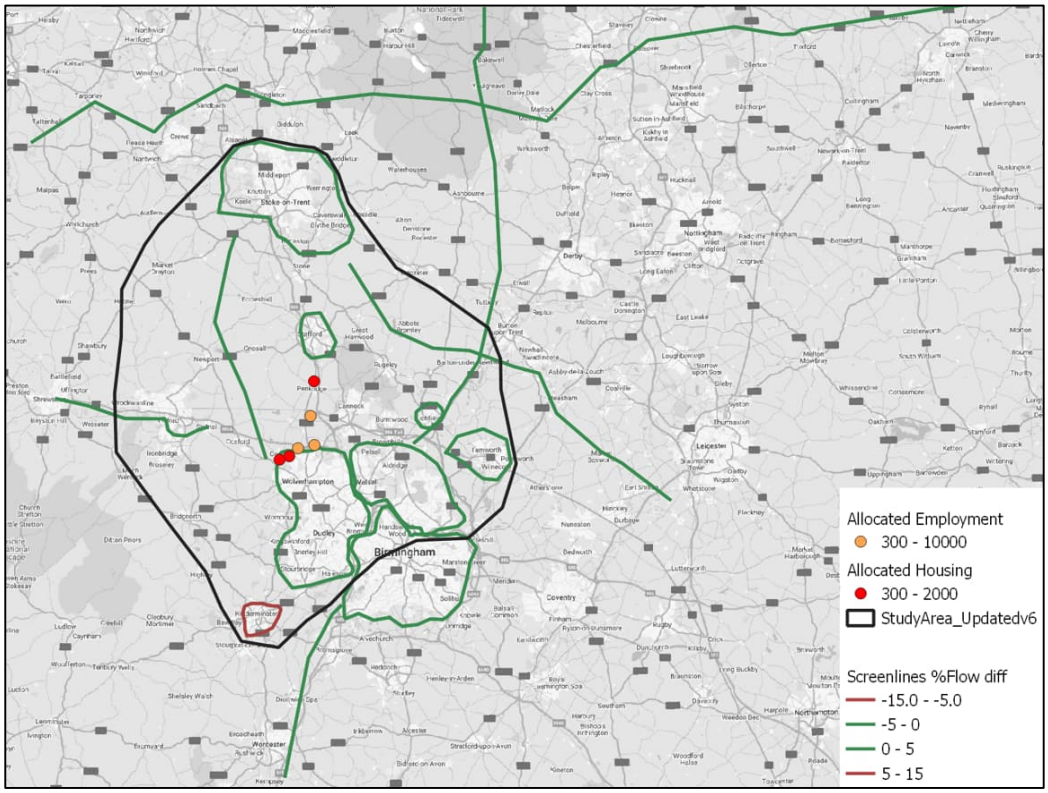
Link Flow Validation – AM Peak



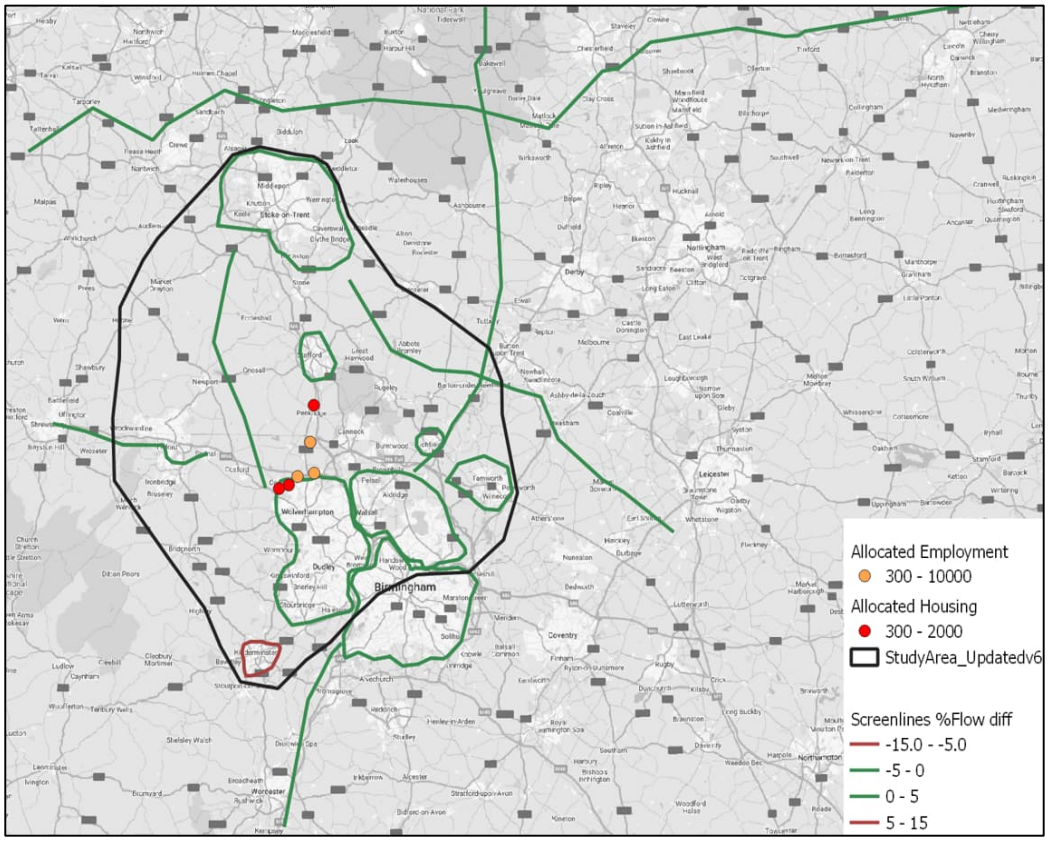
Link Flow Validation – PM Peak



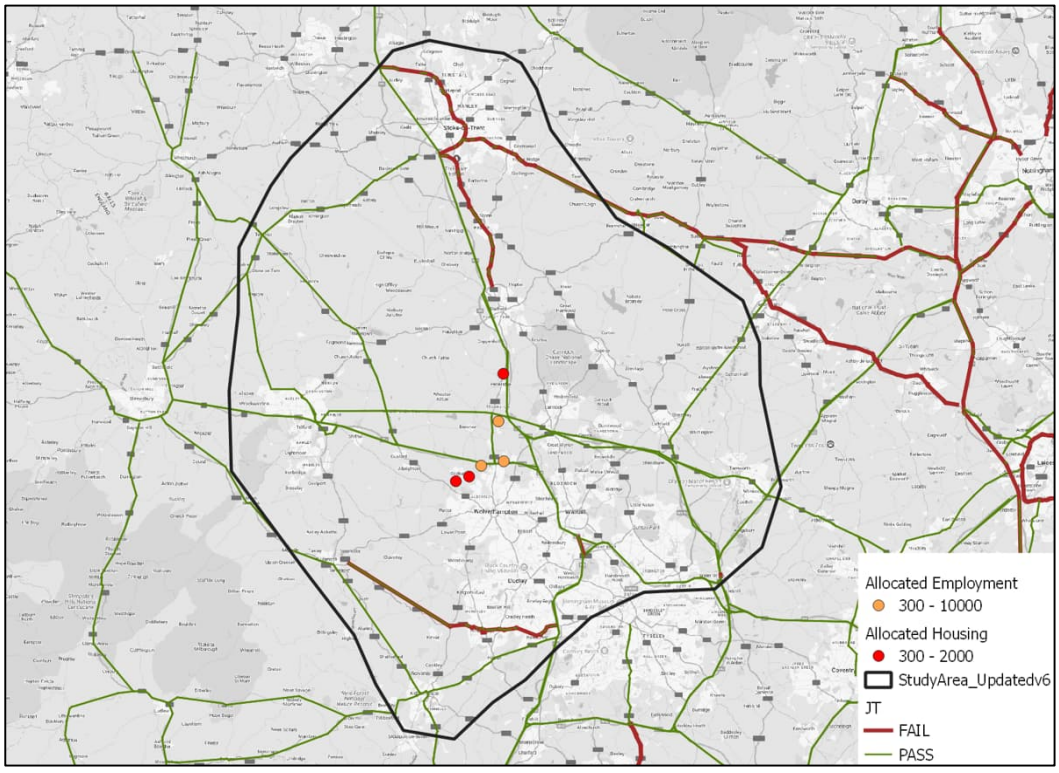
Screenline Flow Validation – AM Peak



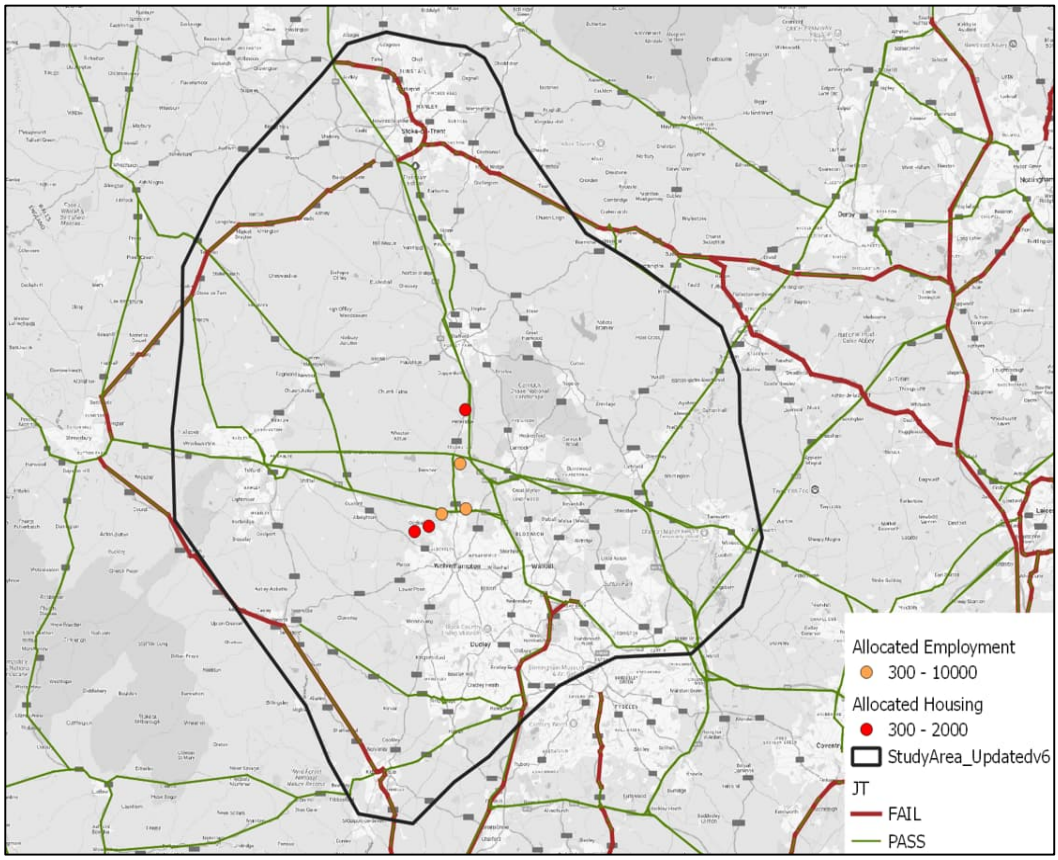
Screenline Flow Validation – PM Peak



Journey Time Validation (Links) – AM Peak

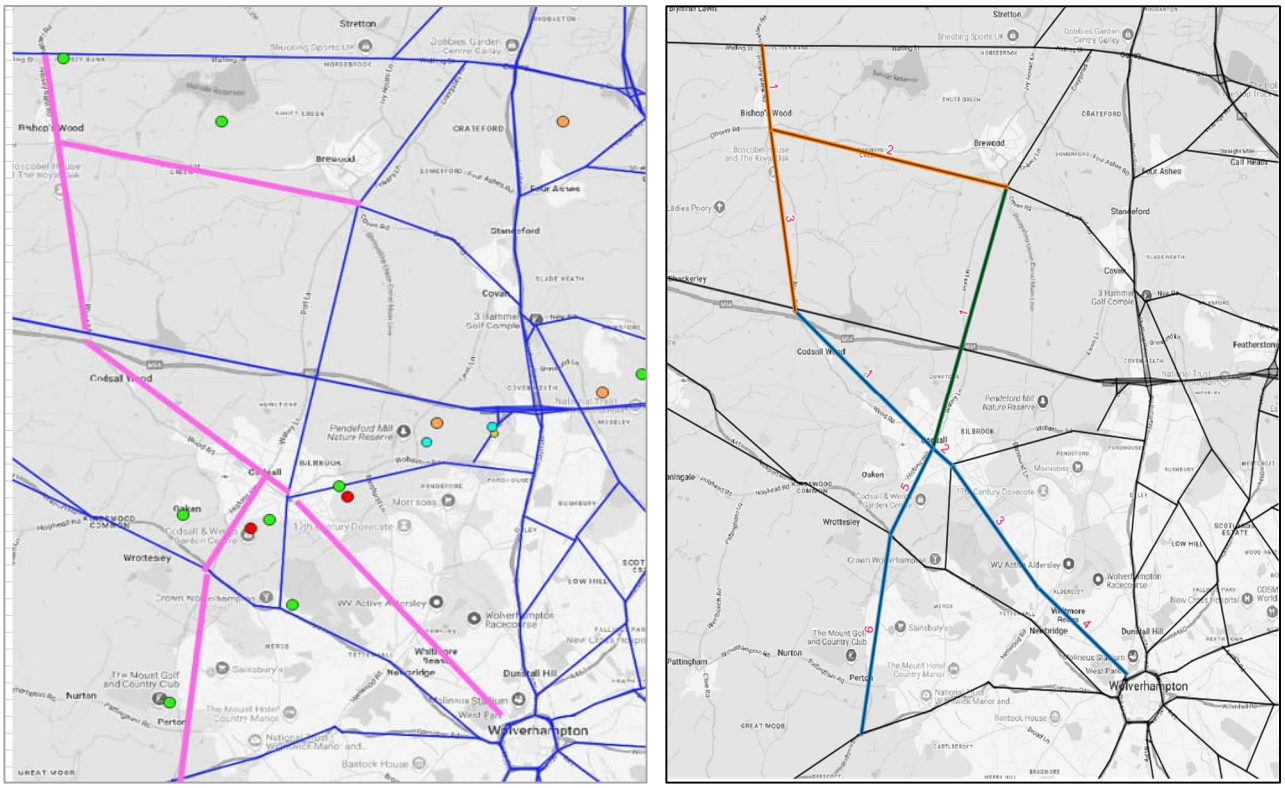


Journey Time Validation (Links) – PM Peak



Appendix B

Network Resolution



Pink links displayed in the left figure have been incorporated into the network to improve areas around committed and local plan development sites. The additional links have been color-coded in the right figures, and the table below provides details on the network coding for these links.

Type	SFC code	Free Flow Speed	Capacity	Link No	Road Name
Green	208	70	1328	1	Port Ln
Orange	220	48	1328	1	Ivetsey Bank Rd
				2	Kiddemore Green Rd
				3	Wood Rd (North of M54)
Blue	328	48	1680	1	Wood Rd (South of M54)
				2	Wolverhampton Rd
				3	Birches Rd

Type	SFC code	Free Flow Speed	Capacity	Link No	Road Name
				4	New Hampton Rd
				5	Histons Hill
				6	Wrotesley Park Rd

Local Validation Checks after Improving Network Resolution

MRTM Base Validations are reviewed for link flows, screenline flows and journey time.

Link Flow validation

TAG	AM	PM
Pass	473	472
Fail	50	51
Total	523	523
%	90%	90%

Screenline Validation

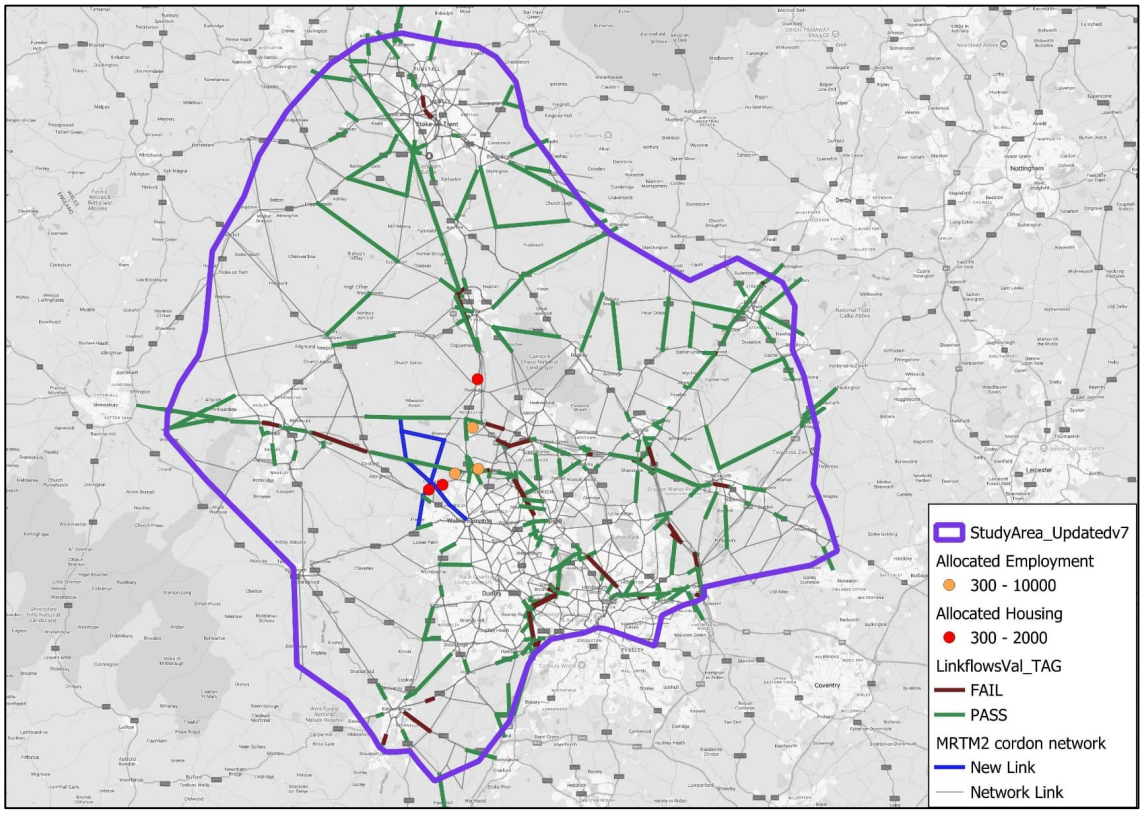
	AM	PM
PASS(Less than 5% change)	13	13
FAIL(more than 5% change)	1	1
Total	14	14
%	93%	93%

Journey Time Validation (Links)

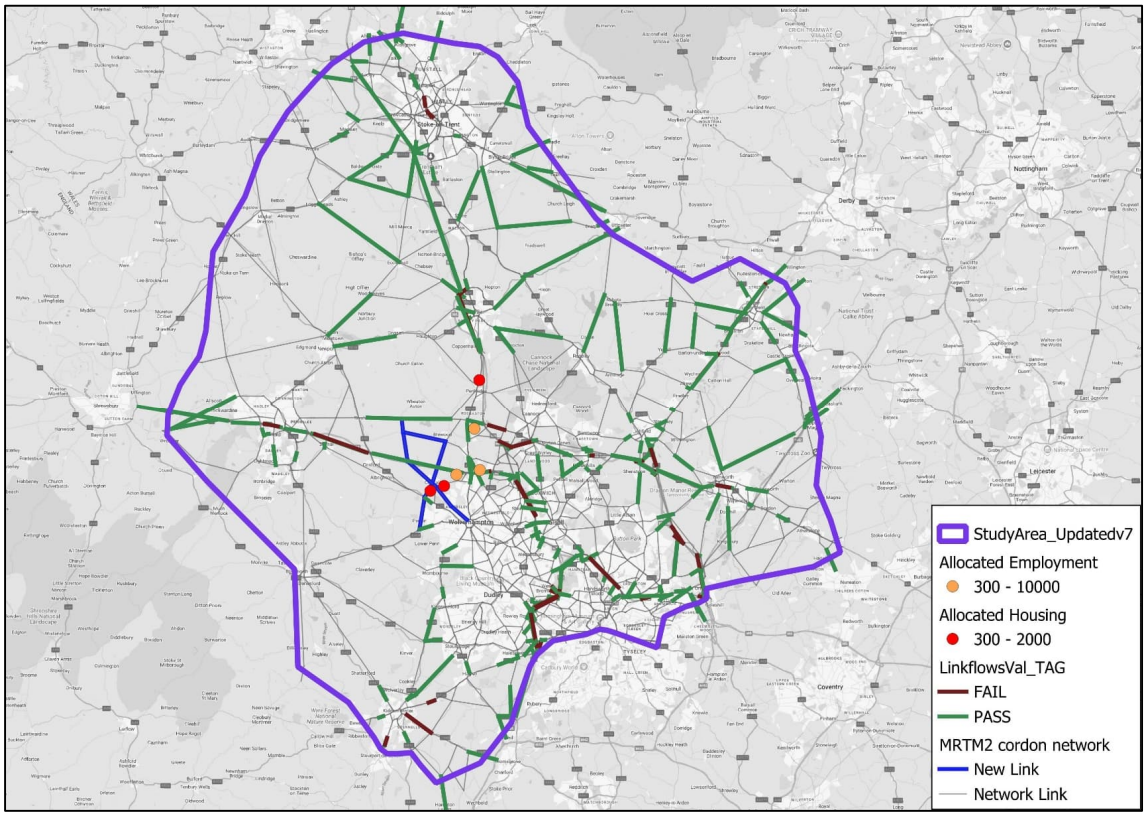
TAG	AM	PM
PASS	128	126
FAIL	18	20
TOTAL	146	146
%	88%	86%

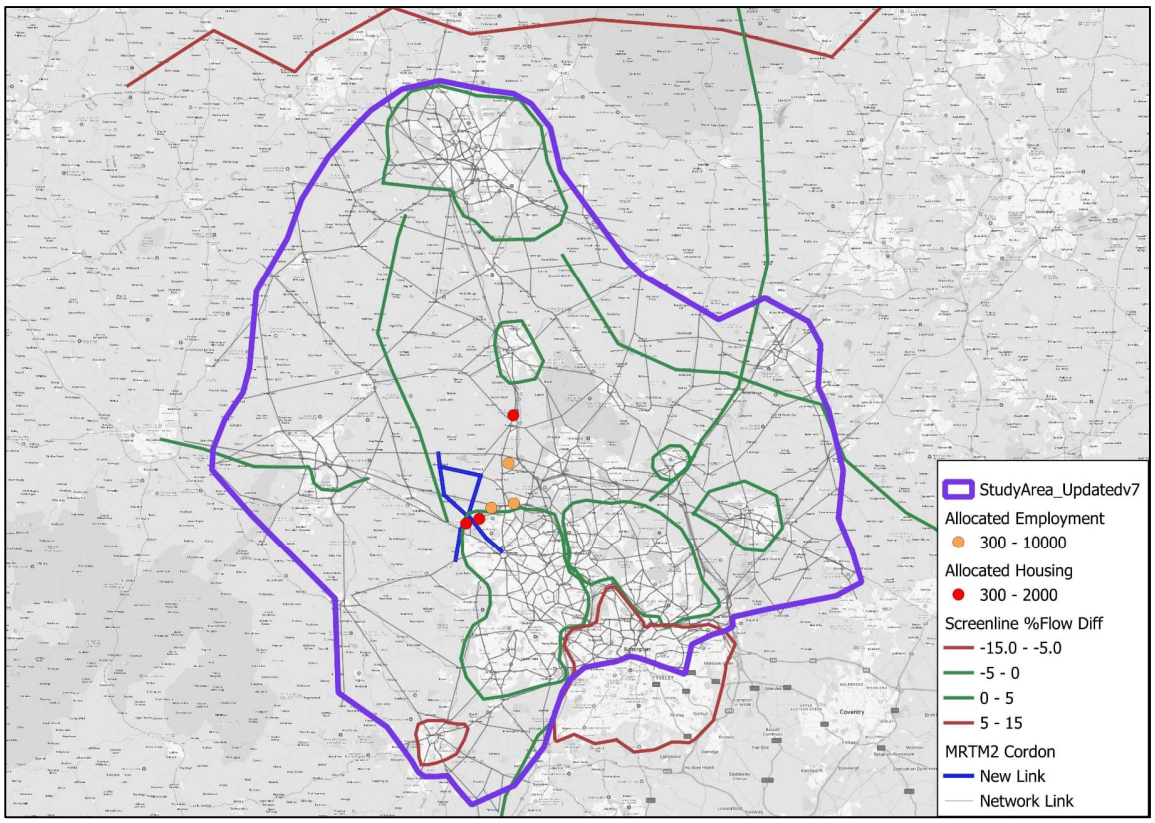
The validation of the network with the additional links is similar to the previous validation and overall NH are content with this.

Link Flow Validation – AM Peak

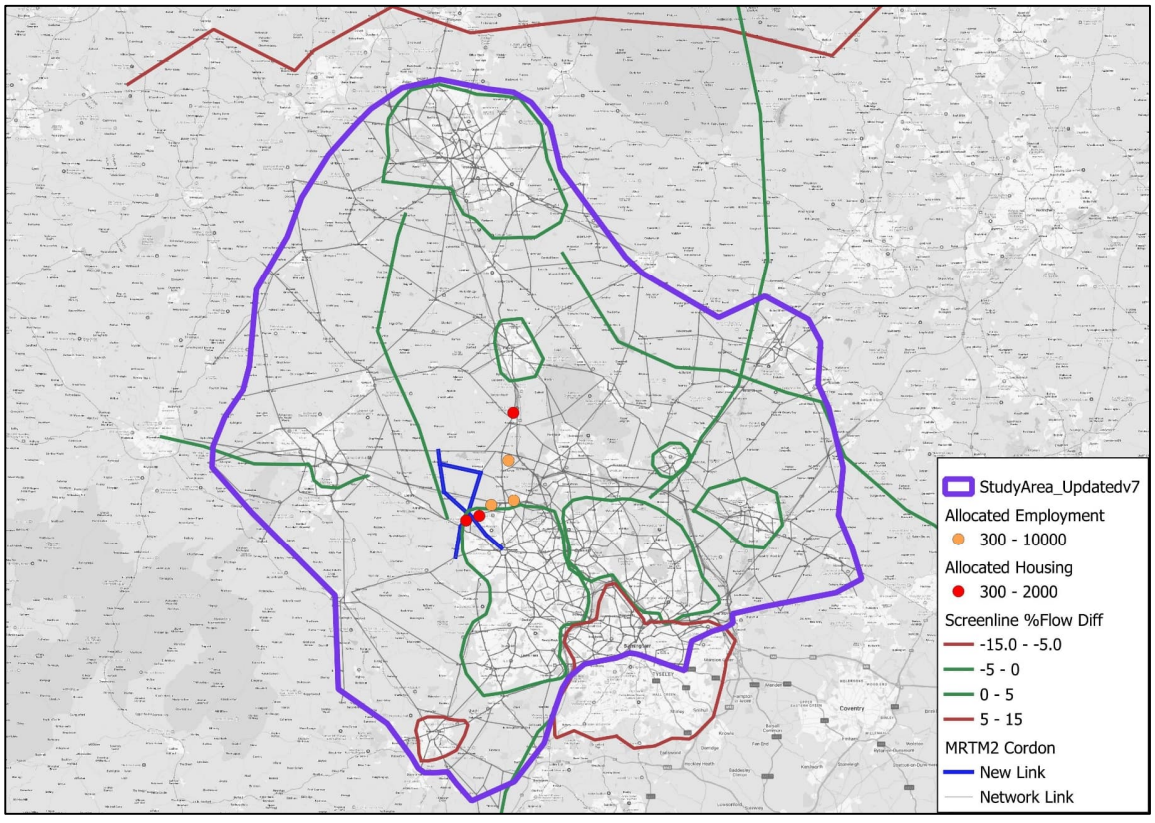


Link Flow Validation – PM Peak

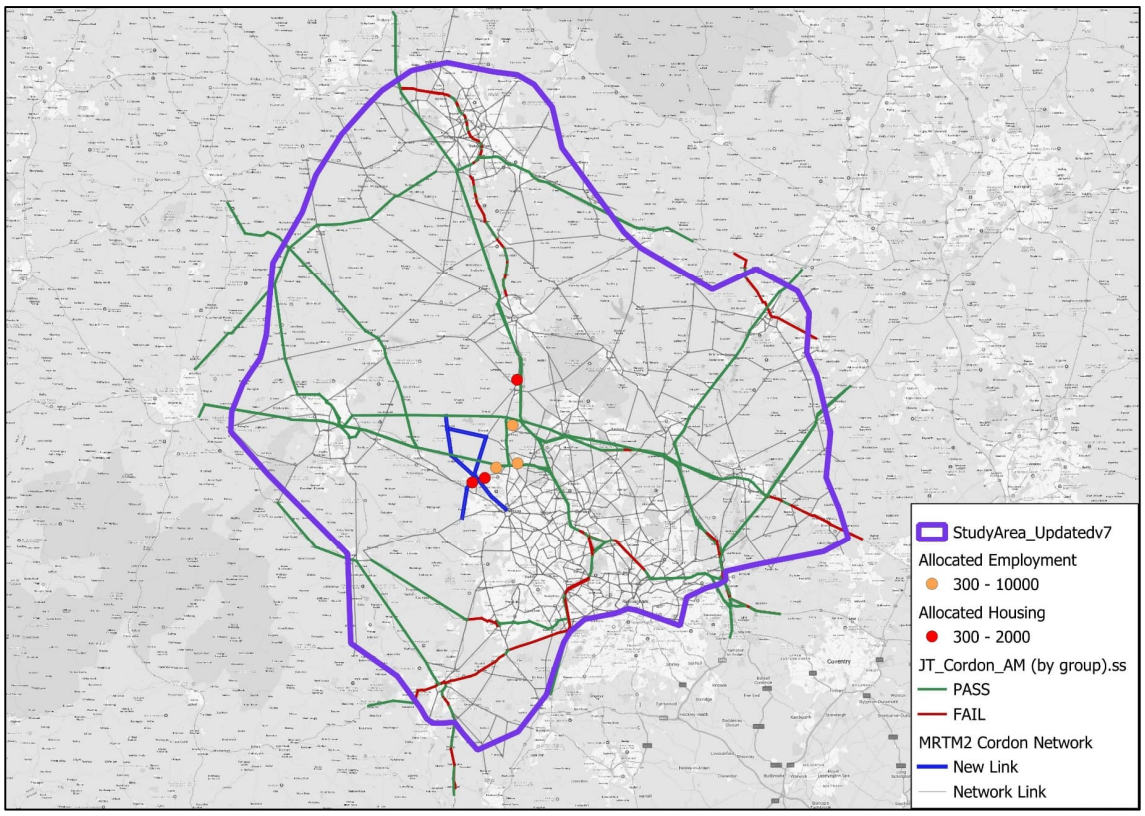




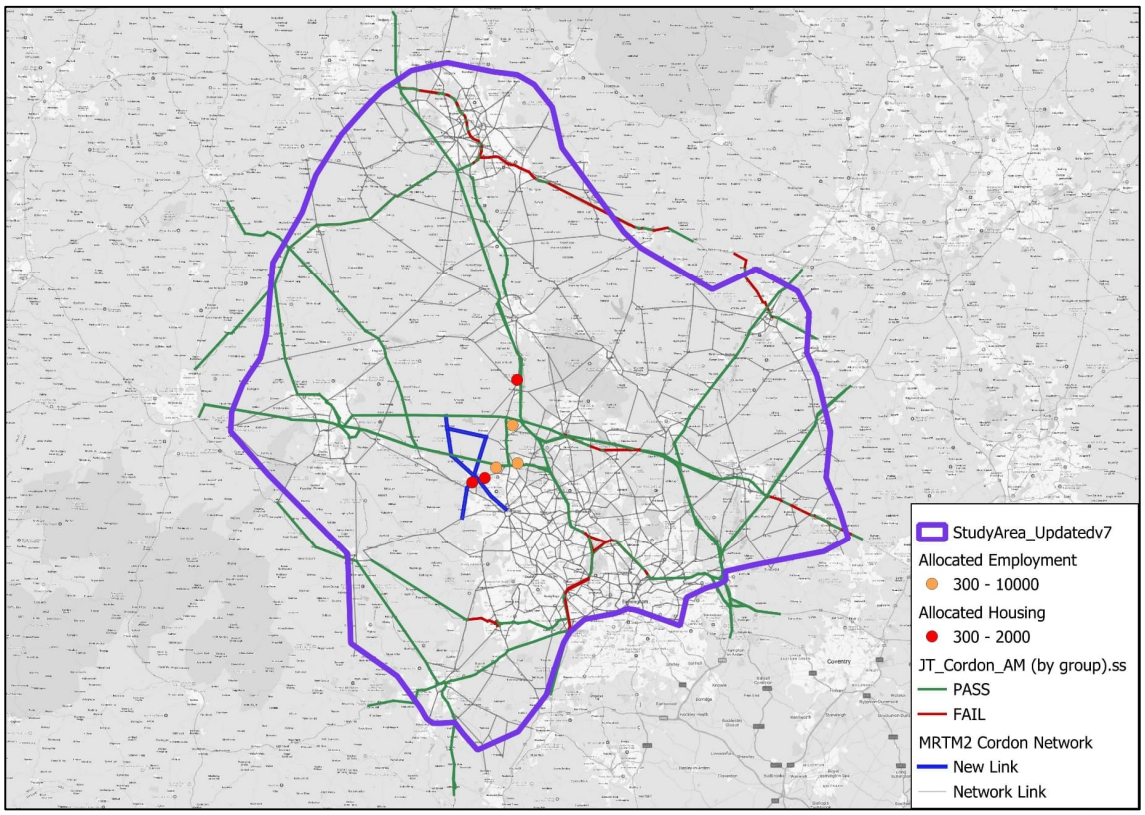
Screenline Flow Validation – PM Peak



Journey Time Validation (JT Group) – AM Peak



Journey Time Validation (JT Group) – PM Peak



Appendix C

Committed Sites in South Staffordshire

Housing Development

District	Application No	Description	No of Houses	Uncertainty
South Staffs	19/00248/FUL	LAND AT SHOP LANE, OAKEN	10	Near Certain
South Staffs	19/00988/REM	LAND ON NORTH WEST SIDE OF STAFFORD ROAD, PENKRIDGE	24	Near Certain
South Staffs	16/01023/REM	(SAD 239) LAND WEST OF WROTTESLEY PARK ROAD, PERTON	220	Near Certain
South Staffs	20/00621/OUT	HAZELBROOK INDUSTRIAL ESTATE HAZEL LANE, GREAT WYRLEY	17	Near Certain
South Staffs	21/00660/FUL	(SAD 272) LAND SOUTH OF WHITE HILL, KINVER	40	Near Certain
South Staffs	21/00631/FUL	Bridge Farm, Long Street, Wheaton Aston	21	Near Certain
South Staffs	22/00004/FUL	Land at Landywood Lane, Chelsyn Hay	50	Near Certain
South Staffs	18/00710/FUL	(SAD 443) LAND SOUTH OF PENDEFORD MILL LANE, BILBROOK	63	Near Certain
South Staffs	21/00068/REM	(SAD 054) LAND AT ENGLETON LANE, BREWOOD	25	Near Certain
South Staffs	19/00407/FUL	(SAD 406) LAND AT KEEPERS LANE, CODSALL	56	Near Certain
South Staffs	18/00450/REM	(SAD 119) SAREDON ROAD, CHESLYN HAY	60	Near Certain
South Staffs	19/00919/FUL	(SAD 153) LAND OFF (SE) HOBNOCK ROAD, ESSINGTON	102	Near Certain
South Staffs	19/00444/REM	(SAD 168) BRINSFORD LODGE, EAST ROAD, FEATHERSTONE	74	Near Certain
South Staffs	18/00392/REM	(SAD 270) LAND EAST OF HYDE LANE, KINVER	13	Near Certain
South Staffs	19/00862/REM	LAND WEST OF IVETSEY ROAD, WHEATON ASTON	19	Near Certain

District	Application No	Description	No of Houses	Uncertainty
South Staffs	19/00043/FUL	LAND NORTH OF PENKRIDGE, STAFFORD ROAD, PENKRIDGE	142	Near Certain
South Staffs	18/00831/FUL	THE PLOUGH INN, SCHOOL ROAD, TRYSULL	9	Near Certain
South Staffs	19/00212/REM	(SAD 281A) LAND OFF GIGGETTY LANE, WOMBOURNE	19	Near Certain
South Staffs	20/01045/FUL	(SAD 302) LAND AT BEGGARS BUSH LANE, WOMBOURNE	11	Near Certain
South Staffs	21/00435/FUL	HIMLEY COUNTRY HOTEL	9	Near Certain
South Staffs	19/00989/FUL	WHEATON ASTON OLD HALL	9	Near Certain
South Staffs	19/00814/FUL	PRIME OAK	9	Near Certain
South Staffs	19/00993/FUL	WAGGON AND HORSES PUBLIC HOUSE	9	Near Certain
South Staffs	19/00760FUL	LAND OFF	8	Near Certain
South Staffs	21/00458/FUL	THE BUNGALOW	8	Near Certain
South Staffs	11/0062/AME	MARY BOND COURT	8	Near Certain
South Staffs	21/00770/FUL	MANOR FARM	7	Near Certain
South Staffs	20/00639/COU	SEDGLEY COURT	6	Near Certain
South Staffs	16/01046/FUL	BEARNETT HOUSE NURSING HOME	6	Near Certain
South Staffs	20/00063/FUL	POPES LANE	6	Near Certain
South Staffs	18/00349/FUL	FIR SREET	7	Near Certain
South Staffs	18/00925/OFFR	SHUTT GREEN LANE	6	Near Certain
South Staffs	19/00937/FUL	FIR STREET	8	Near Certain
South Staffs	19/00937/FUL	HIGH STREET	8	Near Certain

Employment Development

District	Application No	Description	No of Jobs	Uncertainty
South Staffs	Planning app ref 18/00637/OUT	i54 western extension (south)	1500	Near Certain
South Staffs	Planning app ref 05/01311/OUT. Reserved matters (22/00700/REM) subsequently granted October 2023	i54 (plot E)- Barberry	207	Near Certain
South Staffs	Planning app ref 20/01078/FUL. Granted August 2021	Hilton Cross	283	Near Certain
South Staffs	Planning app ref 21/00948/FUL. Granted April 2022	Vernon Park	178	Near Certain
South Staffs	Planning app ref: 21/00021/COU	Range Farm, Watling Street, Four Crosses	30	Near Certain
South Staffs		Lidl	33	Near Certain
South Staffs	Planning app ref 20/01131/OUT subsequently granted October 2022	ROF Featherstone	3000	Near Certain
South Staffs	DCO Granted May 2021	West Midlands Interchange	8550	Near Certain

Local Plan Sites in South Staffordshire

Housing Development

District	Application No	Description	No of Houses	Uncertainty
South Staffs	22/00004/FUL	Former Great Wyrley Community Support Unit, 156 Walsall Road, Great Wyrley	63	More than likely
South Staffs	Emerging Local Plan allocation	Land north of Penkridge (Sites 010, 584 &420)	1079	More than likely
South Staffs	Emerging Local Plan allocation	Land at Boscomoor Lane (Site 006)	80	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Cherrybrook (Site 005)	88	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Station Rd (Site 224)	85	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land East of Bilbrook (Site 519)	848	More than likely
South Staffs	Emerging Local Plan allocation	Bilbrook House (Site 213)	13	More than likely
South Staffs	Existing Local Plan allocation	Land at Histons Hill (SAD Site 228)	29	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Wergs Hall Rd (Site 419)	317	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Loades PLC (Site 638)	29	More than likely
South Staffs	Emerging Local Plan allocation	Land at Norton Lane (Site 704)	31	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Holly Lane (Site 536)	84	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Fishers Farm (Site 730)	10	Reasonably foreseeable
South Staffs	Existing Local Plan allocation	Land at Pool View (SAD Site 139)	46	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Wolverhampton Rd (Site 523)	49	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Saredon Rd (Site 119)	60	Reasonably foreseeable

District	Application No	Description	No of Houses	Uncertainty
South Staffs	Emerging Local Plan allocation	Land at Landywood Lane (safeguarded land), Chelsyn Hay (Site 136)	109	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Orton Lane (Site 416) - safeguarded	57	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Poolhouse Road (Sites 285, 562/415, 459)	223	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Four Ashes Rd (site 617)	63	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land off White Hill safeguarded land (Site 274)	82	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land off Wrottesley Park Rd safeguarded land (Site 239)	150	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Pear Tree Farm (Site 016)	39	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land between School Lane and Stafford Rd (Site 082)	48	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land adjacent Brookhouse Ln (Site 397)	35	Reasonably foreseeable
South Staffs	Existing Local Plan allocation	Land off Ivetsey Rd (Site 379)	18	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Hall End Farm (Site 251)	17	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land off Himley Lane (Site 313)	22	Reasonably foreseeable
South Staffs	Emerging Local Plan allocation	Land at Weeping Cross (Site 036c)	81	Reasonably foreseeable

Employment Development

District	Application No	Description	No of Jobs	Uncertainty
South Staffs	Allocated site with no planning application. Size rervied by 0.4 plot ratio	i54 western extension (north)	1405	Reasonably foreseeable
South Staffs	Planning app ref 05/01311/OUT. This is the remaining plots from the original outline.	i54 (plot D/F)	204	Reasonably foreseeable

District	Application No	Description	No of Jobs	Uncertainty
South Staffs		Land at J13 of the M6	606	Reasonably foreseeable

Omitted Sites in South Staffordshire

Housing Development

District	Description	No of Houses	Uncertainty
South Staffs	Land at Billy Buns Ln (Sites 463 & 284)	223	Hypothetical
South Staffs	Land at Kiddemore Green Rd (Site 079)	43	Hypothetical
South Staffs	Land off Hyde Lane (Site 576)	44	Hypothetical
South Staffs	Land at Cross Green (Site 646a&b)	1200	Hypothetical
South Staffs	Land at Linthouse Lane (Site 486c)	1976	Hypothetical
South Staffs	Land at Langley Rd (Site 582)	390	Hypothetical

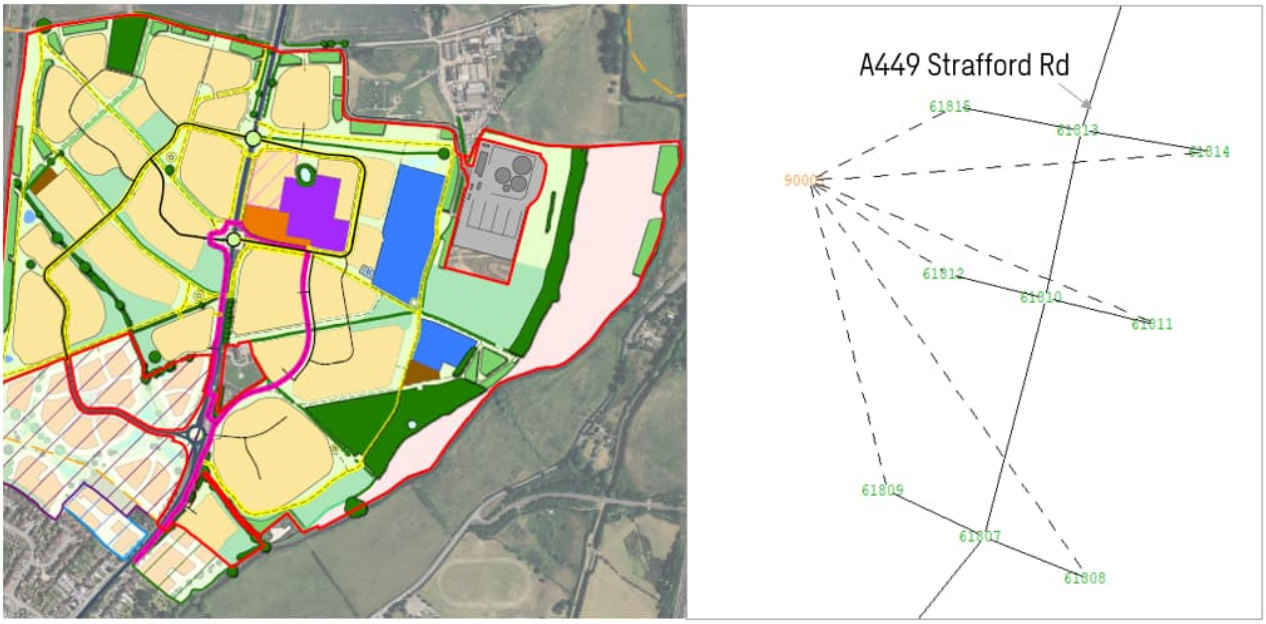
Employment Development

District	Description	No of Houses	Uncertainty
South Staffs	Hobnock Road	867	Hypothetical
South Staffs	Acton Plaza	174	Hypothetical

Appendix D

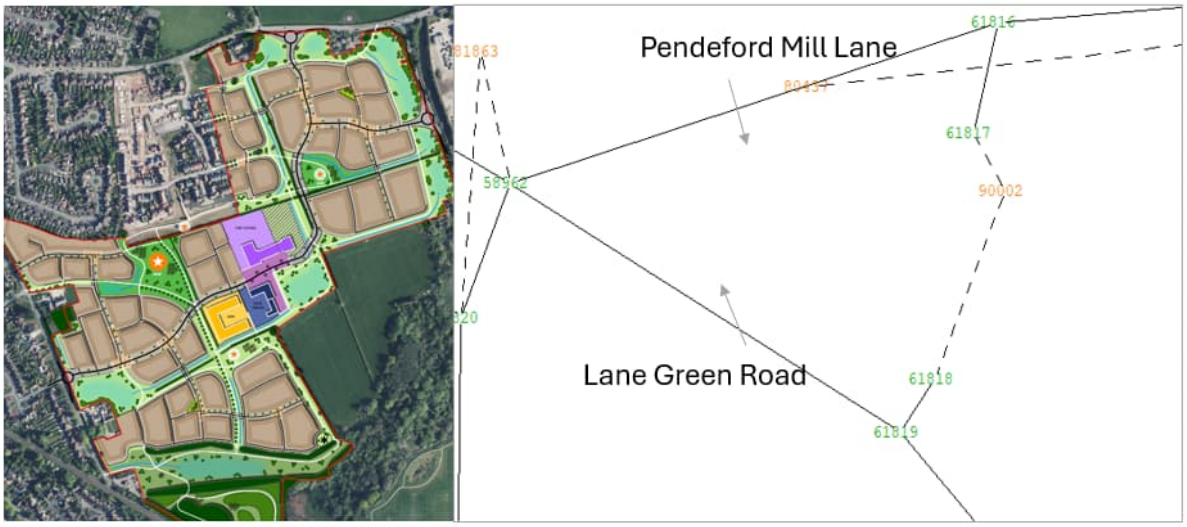
Access Details

1. Land north of Penkridge (Sites 010, 584 &420)



3 accesses (see roundabouts) off Stafford Road (A449)

2. Land East of Bilbrook (Site 519)



3 accesses (see roundabouts) off:

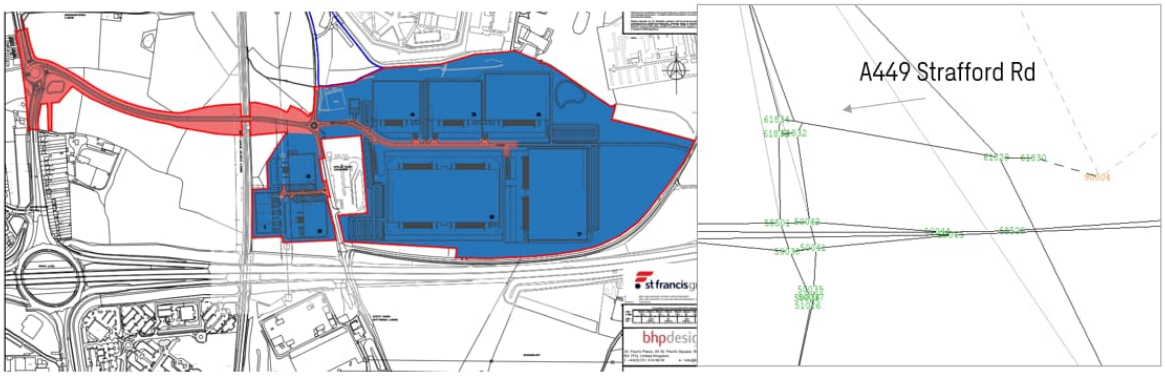
- Pendeford Mill Lane
- Lane Green Road
- Barnhurst Lane (not coded in the network, this access would distribute trips on the two roads mentioned above)

3. Land at Wergs Hall Rd (Site 419)

3 accesses off:

- Wergs Hall Road
- Keepers Lane
- Suckling Green Lane (not coded in the network, this access would distribute trips on the two roads mentioned above)

4. ROF Featherstone



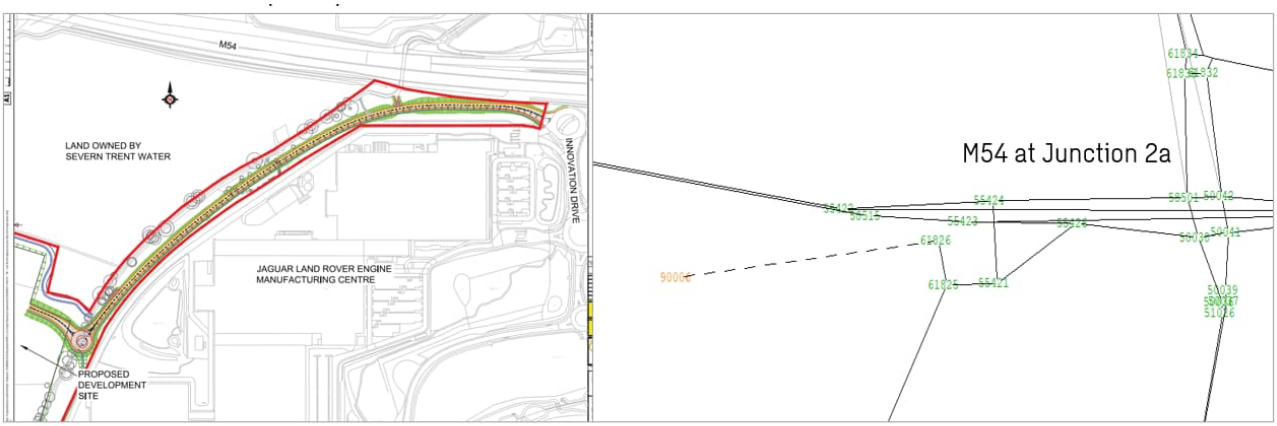
Single access onto the Stafford Road (A449)

5. West Midlands Interchange

Access onto

- Stafford Road (A449)
- A5
- Vicarage Road

6. i54 Western extension (north)



Access links to the junction at Innovation Drive and then onto the M54 at Junction 2a

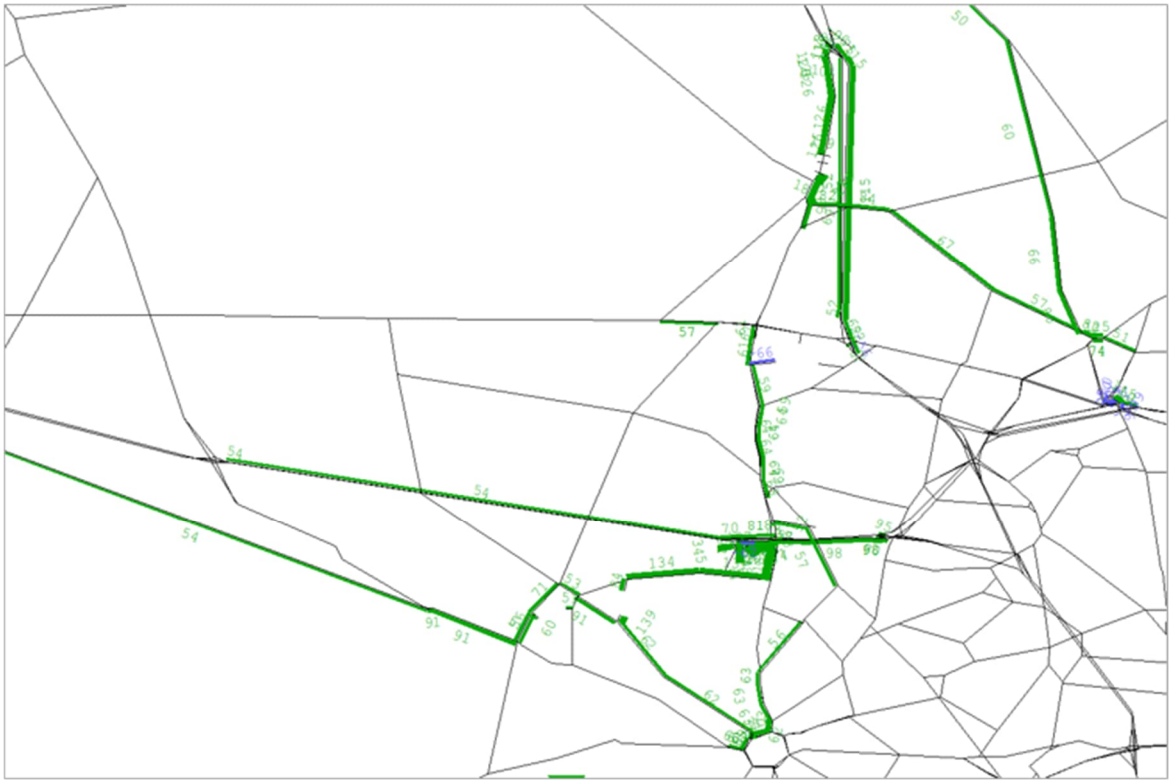
7. Land at J13 of the M6

Single access onto Stafford Road (A449) proposed.

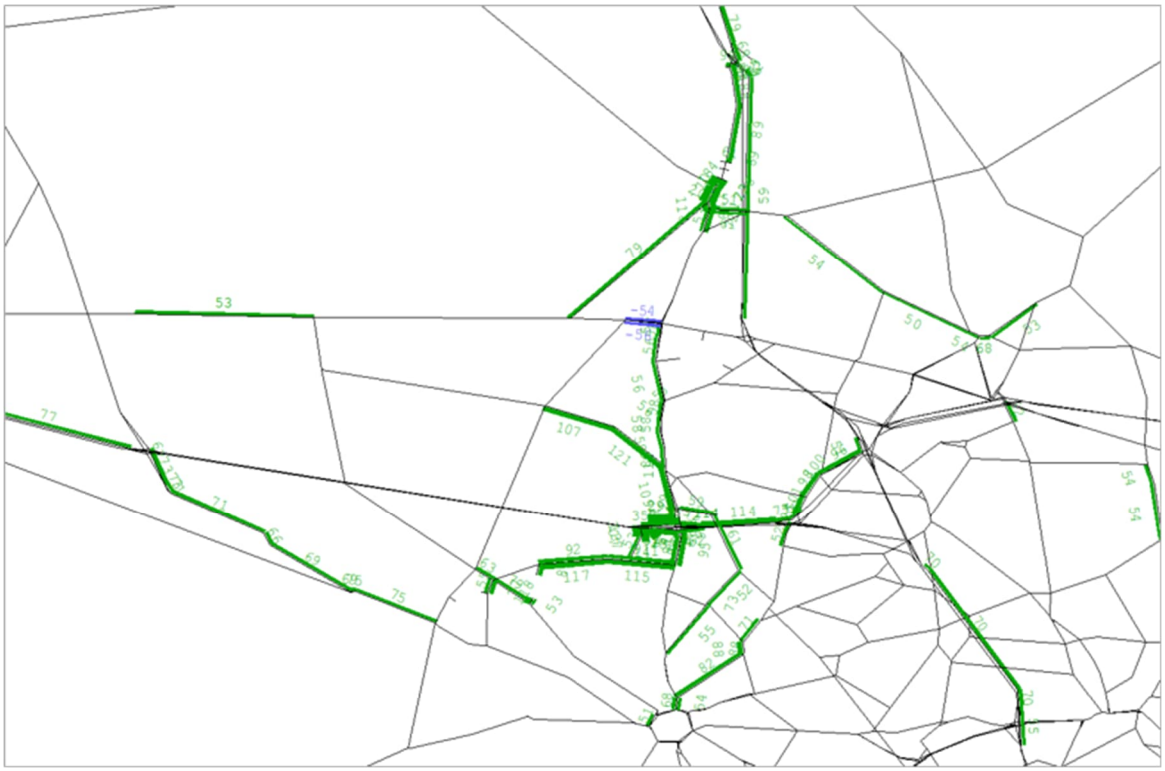
Appendix E

Flow Difference Plots

Actual Flows Comparison – AM Peak (With LP minus Without LP)

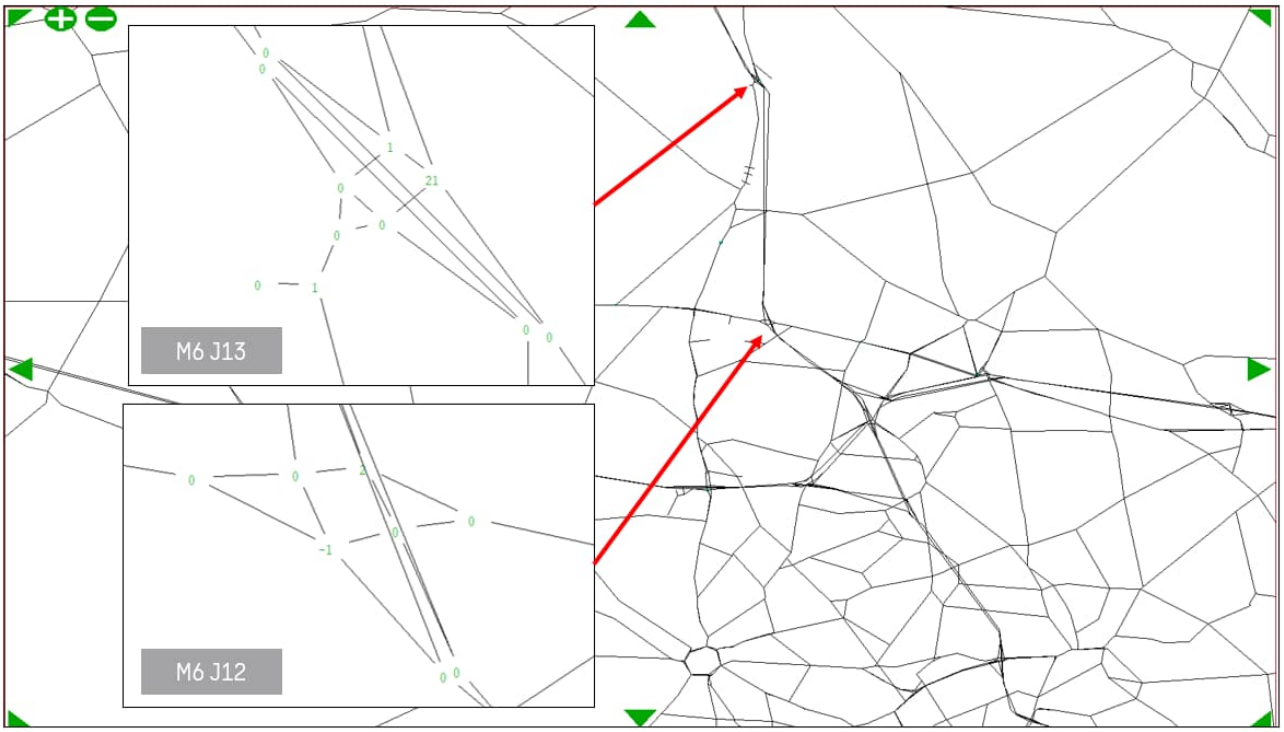


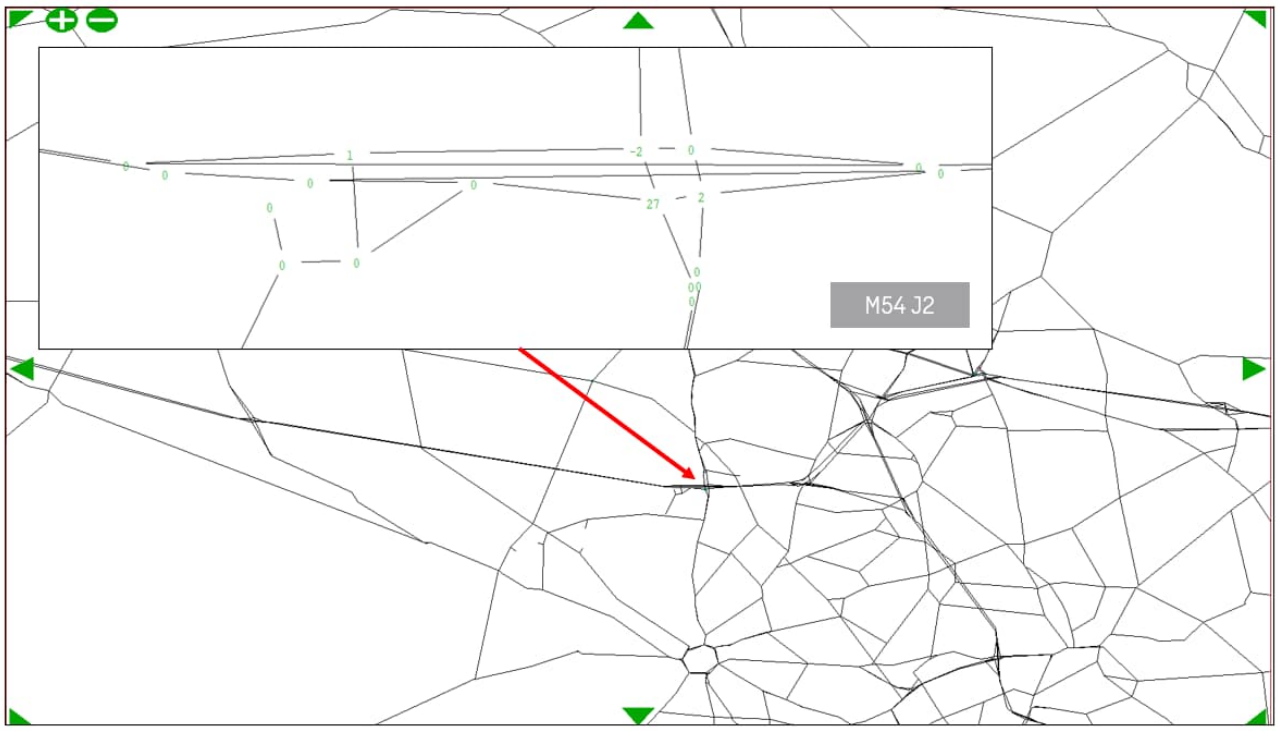
Actual Flows Comparison – PM Peak (With LP minus Without LP)

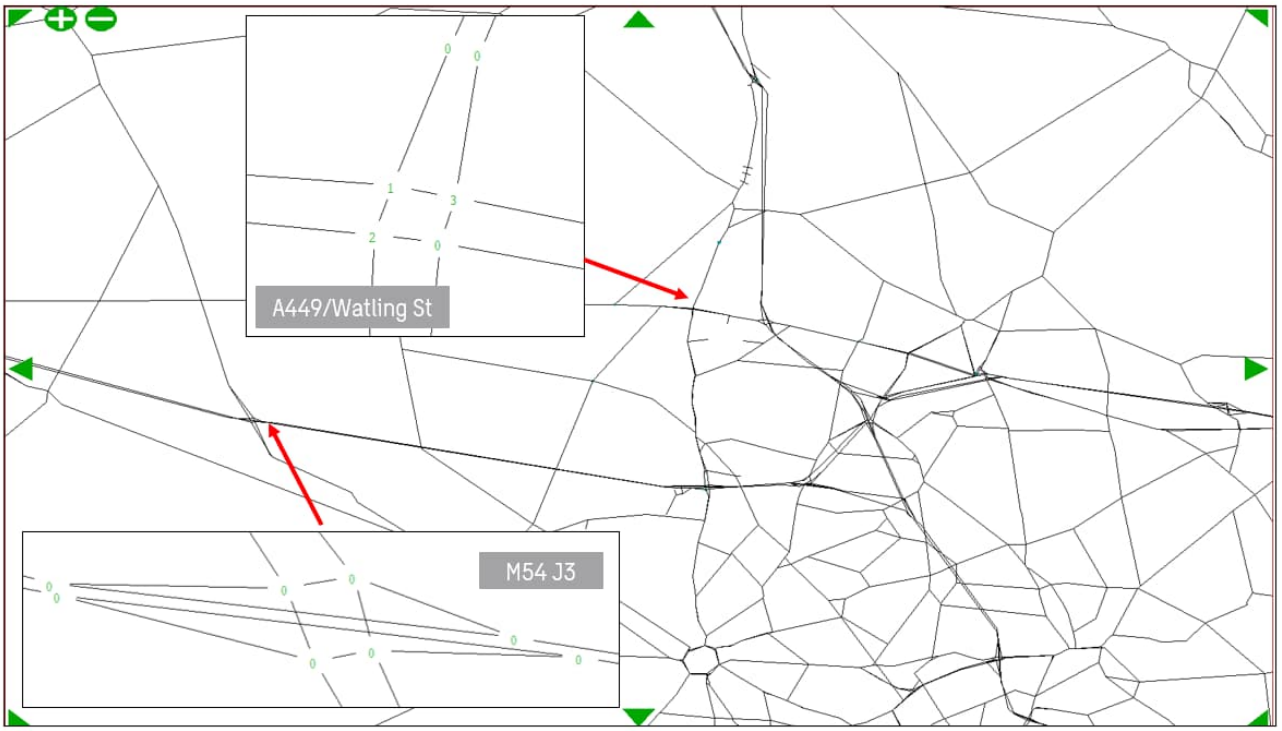


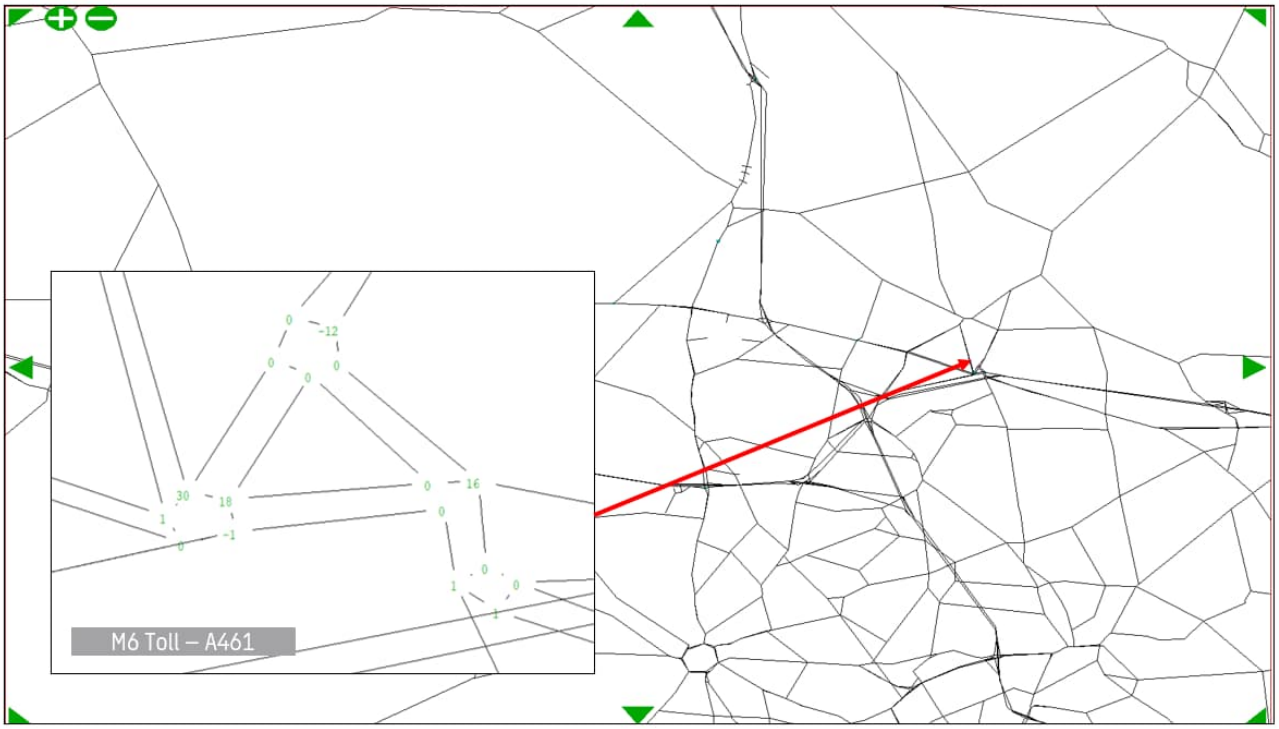
Appendix F

Junction Mean Delay Difference Plots (between With Local Plan and Without Local Plan scenarios) – AM Peak

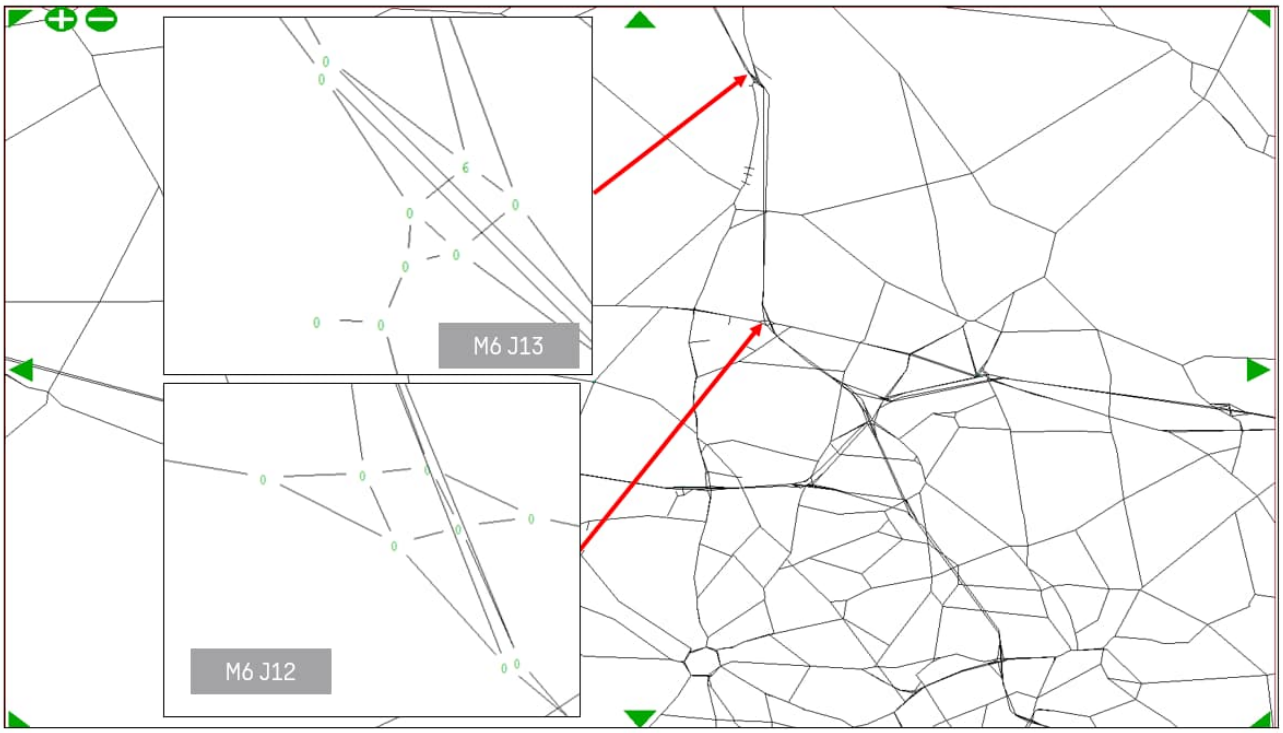


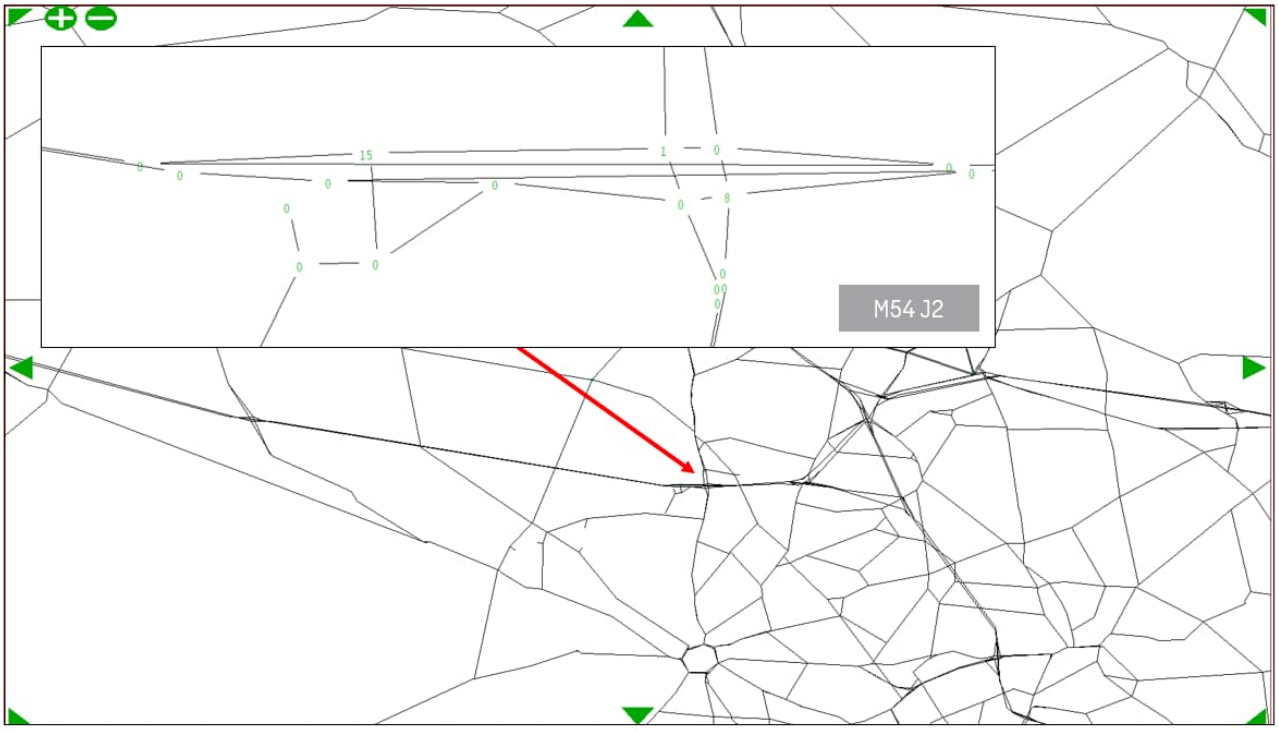



A449/Watling St
M54 J3

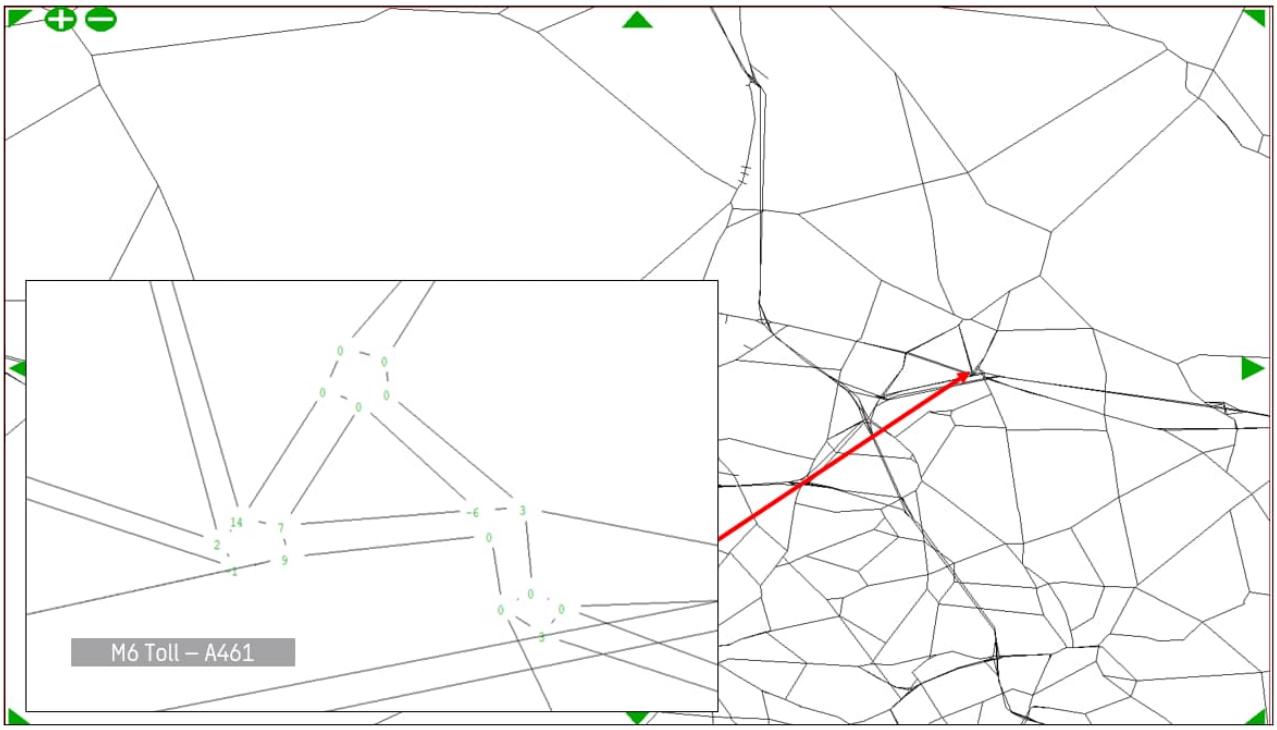

M6 Toll – A461

Junction Mean Delay Difference Plots (between With Local Plan and Without Local Plan scenarios) – PM Peak



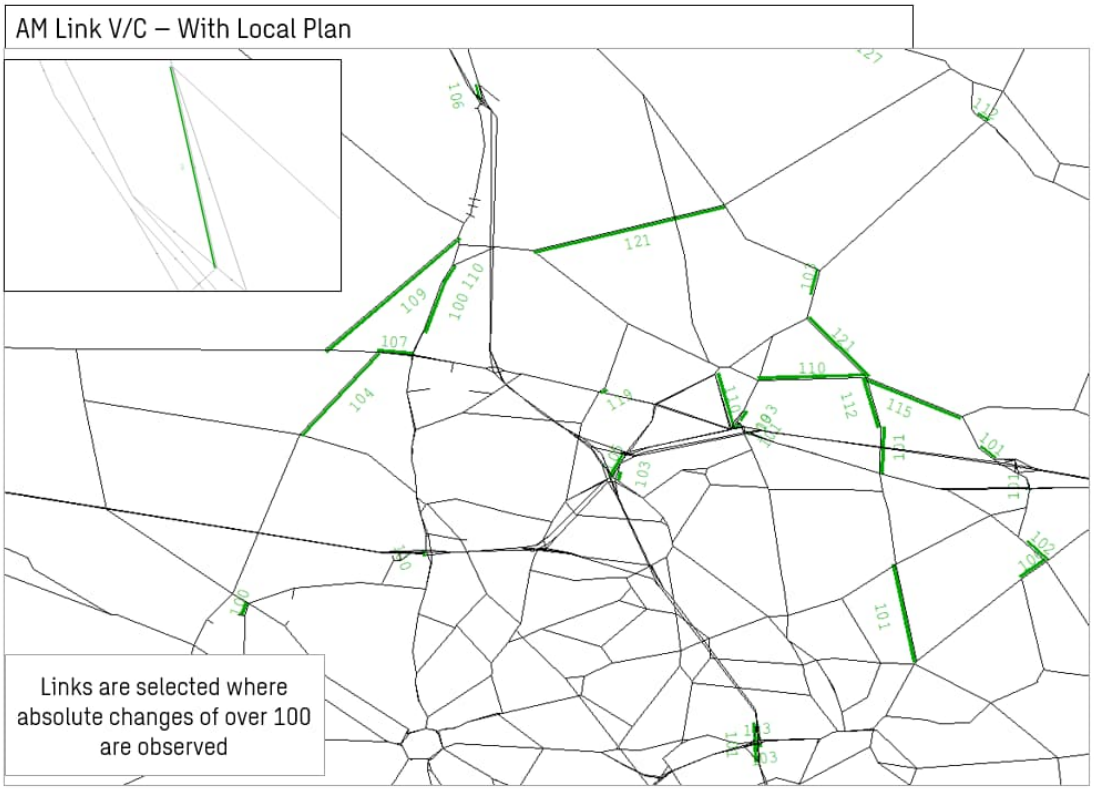


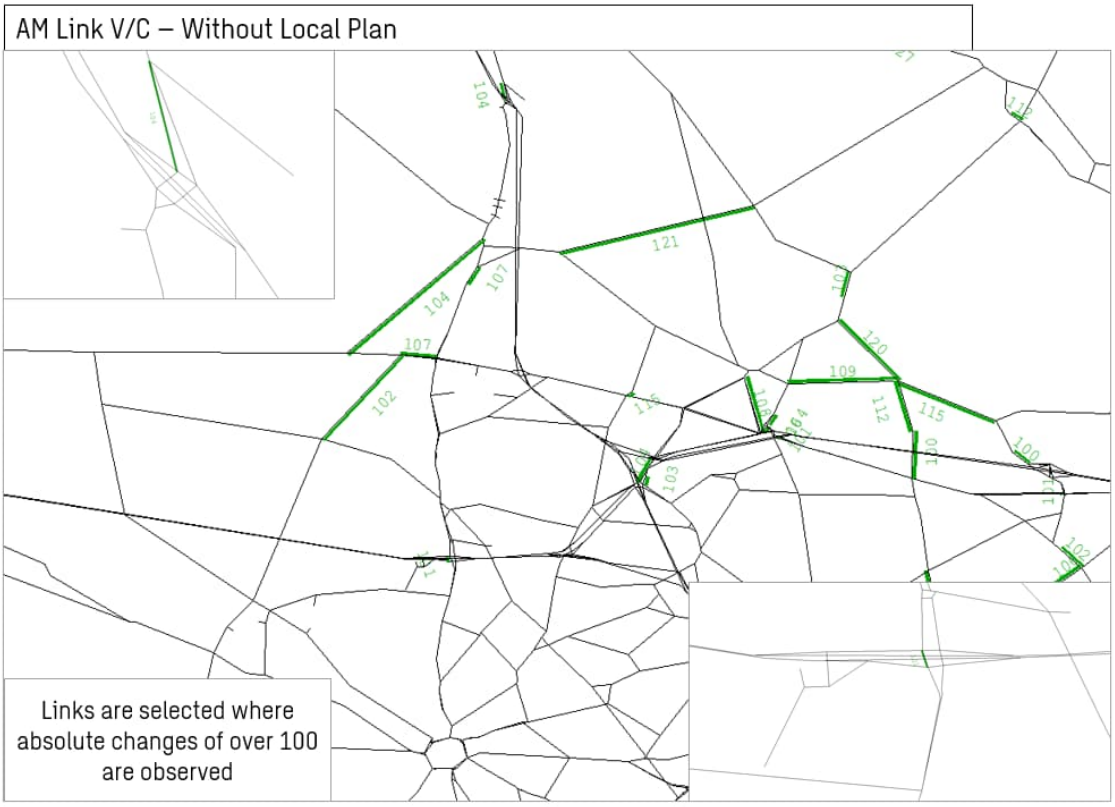

A449/Watling St
M54 J3

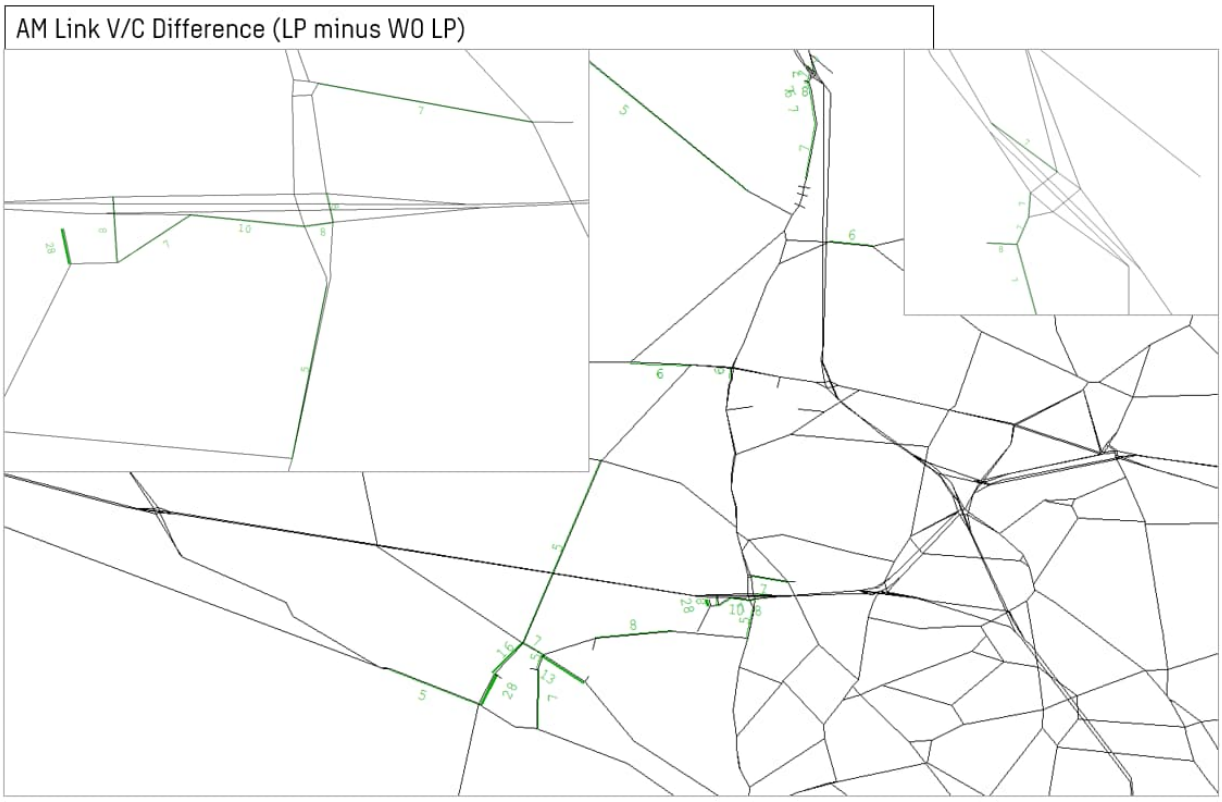

M6 Toll – A461

Appendix G

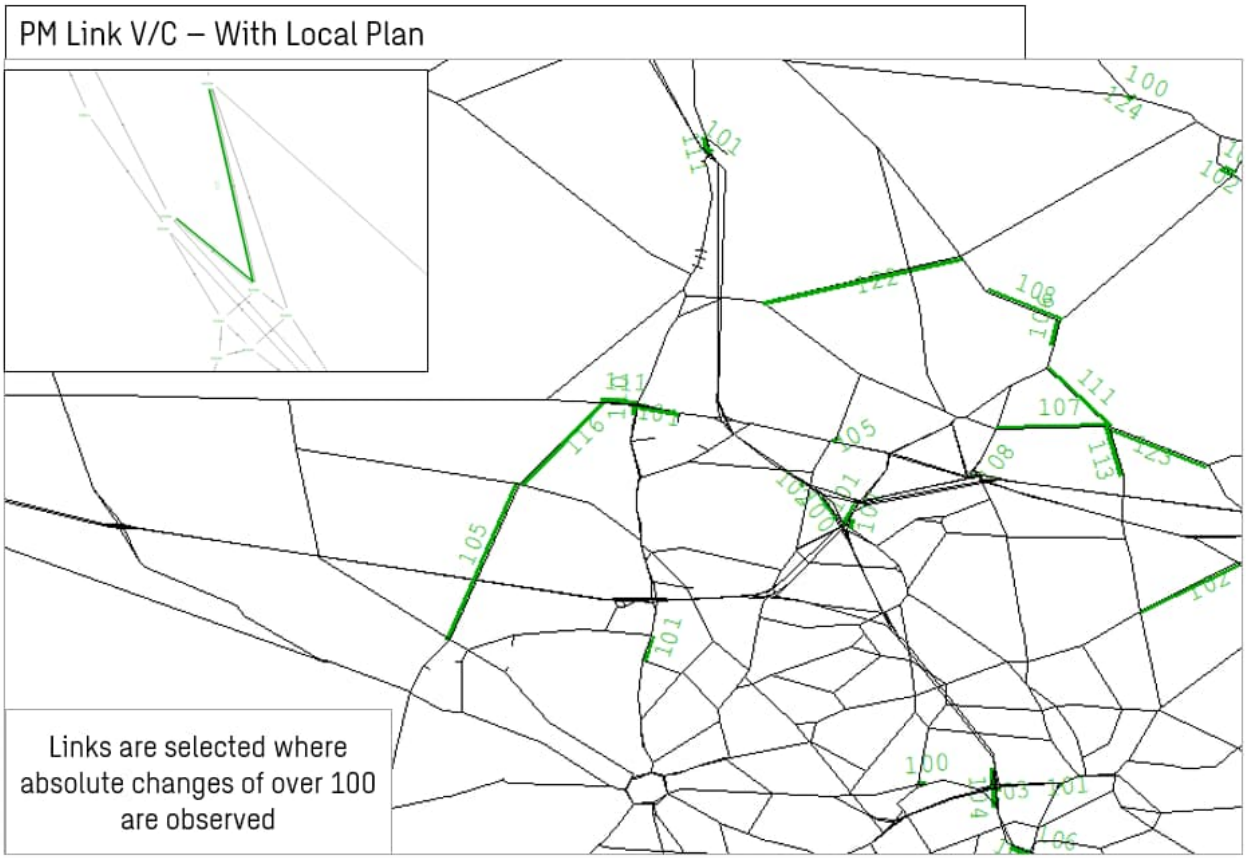
AM Peak Link V/C



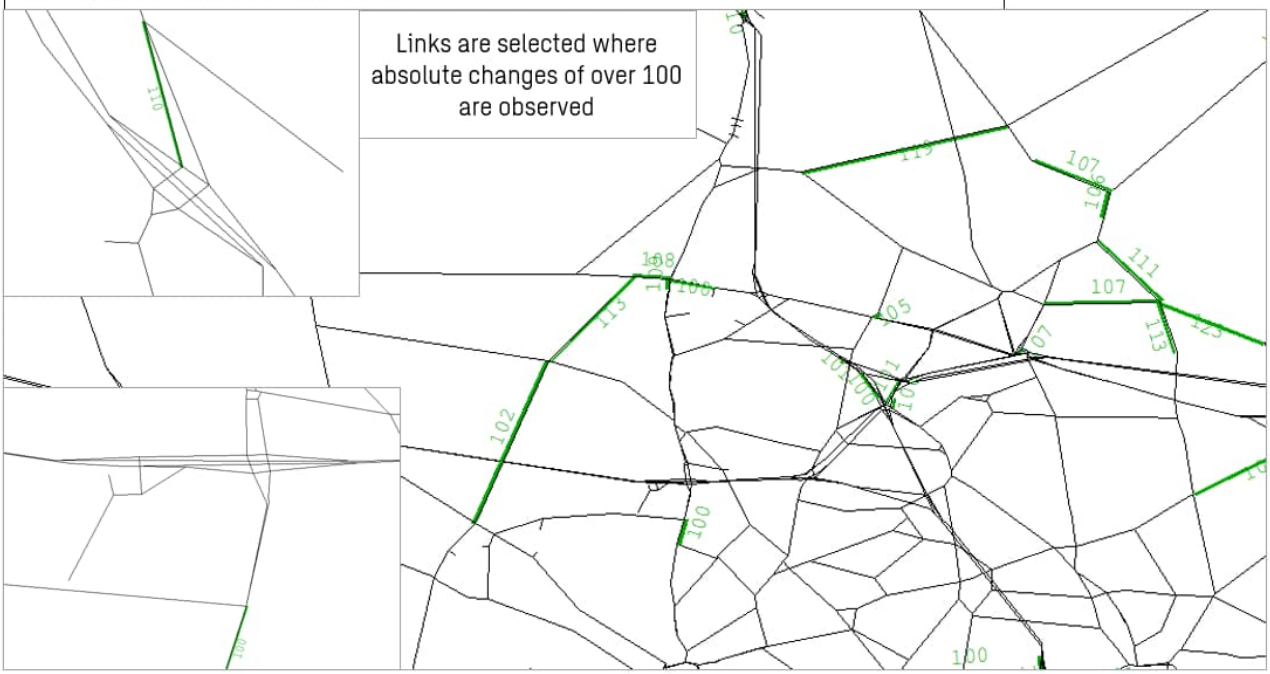




PM Peak Link V/C



PM Link V/C – Without Local Plan



PM Link V/C Difference (LP minus W0 LP)