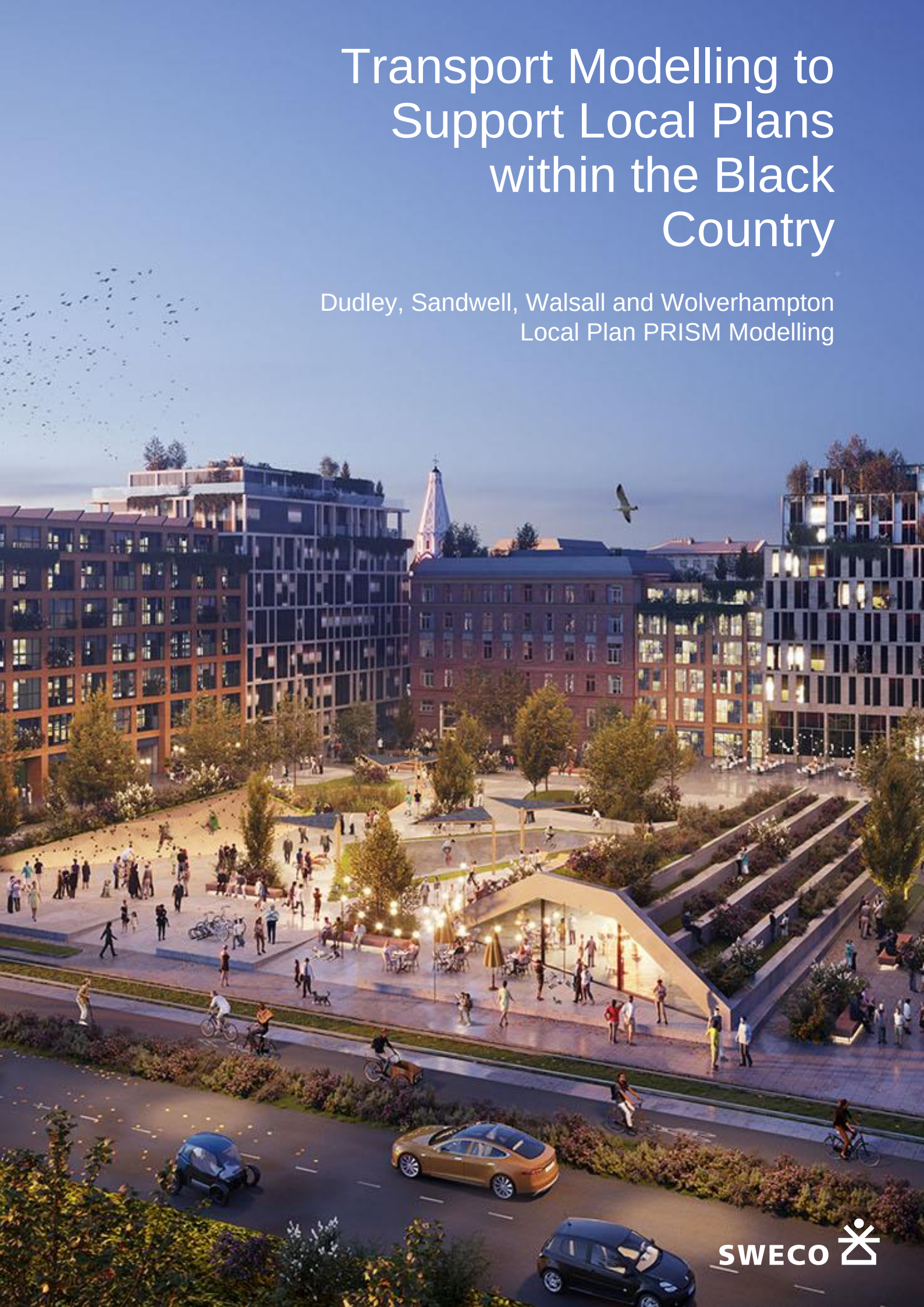
Transport Modelling to Support Local Plans within the Black Country

Dudley, Sandwell, Walsall and Wolverhampton
Local Plan PRISM Modelling



SWECO

Change list

Ver	Date	Description of the change	Reviewed	Approved by
1	16/07/2024	Draft Structure for Review	MP	KJ
2	20/09/2024	Draft Issue for Comments	MP	RW
3	01/10/2024	Draft Issue including DS Results	MP	RW
4	04/10/2024	First Issue	MP	RW
5	07/10/2024	Approved Issue for Release	MP	RW

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1 Introduction

This report presents the results of the transport modelling of the proposed Local Plans of the four Local Authorities that make up the Black Country: Dudley, Sandwell, Walsall and Wolverhampton. Sweco were commissioned by Black Country Transport on behalf of the Local Authorities to prepare updated evidence for Local Plan purposes.

1.1 Necessity of the Work

1.1.1 Policy Context within the Black Country

Sweco, supported by Arcadis, undertook the Black Country Draft Plan Modelling in 2021/2022, using the PRISM 5.4 model. This model had a base year of 2015 and forecast years of 2031 and 2041. The Draft Plan modelled years were 2032 and 2039. Three scenarios were modelled, as summarised in the table below.

Table 1-1: Summary of Demand and Network Differences between Model Scenarios.

Scenario	Demand	Network
Reference Case	Reference Case Demand	Reference Case Network
Draft Plan with DM Transport	Reference Case Demand + Draft Plan Housing and Employment	Reference Case Network
Draft Plan with DS Transport	Reference Case Demand + Draft Plan Housing and Employment	Reference Case Network + Draft Plan Mitigation Schemes

In October 2022, the Draft joint Black Country Plan was abandoned and the following statement was published.

"The four Local Planning authorities in the Black Country have been working together on a joint plan for the area to 2039. It is with regret that we are unable to reach agreement on the approach to planning for future development needs within the framework of the Black Country Plan.

"Local Plans for the four Black Country Councils will now provide the framework for the long-term planning of the Black Country. The Black Country Plan 2039 work programme will end and we will now transition to a process focused on Local Plans. The issues of housing and employment land need will now be addressed through individual Local Plans for each of the authorities. The Councils will co-operate with each other and with other key bodies as they

prepare their Local Plans."
A joint statement of the Leaders of Dudley MBC, Sandwell MBC, Walsall Council, City of Wolverhampton.

1.1.2 Black Country Draft Plan Modelling Review (2024)

To support the proposed individual Local Plan modelling, Sweco were asked to review the modelling work in context of this and determine a proportionate response to ensure that new Local Plans were sufficiently modelled to provide an understanding of traffic levels across the Black Country in the future.

This review was completed at the end of 2023 and presented to Black Country Transport in the report "*BLACK COUNTRY LOCAL PLAN MODELLING: Review of Modelling Plan Work and Future Direction*", attached as Appendix 5.

This review identified six aspects of the previous modelling with a risk rating of red/amber/green regarding its suitability to reflect the Black Country in the future. These are presented in the table below.

Task	Reason	RAG Rating	Justification
1a	New PRISM version imminently available.	Amber	Best practice indicates that the most recent and up-to-date data should be used It is likely that some of the work involved in updating the existing Black Country Draft Plan models has already been undertaken during PRISM v6 development Potential improved model performance in PRISM v6
1b	Updated committed housing and employment developments in baseline.	Red	This informs the creation of the future baseline scenario. This will impact the underlying demand in the model that Local Plan developments are built on top of. The most up-to-date data provides the best indication of traffic levels in the future for comparison.
1c	Additional committed transport schemes included in newer versions of PRISM	Green/Amber	The majority of schemes that have been updated are outside the Black Country, but would impact model flows so should be tested
1d	Updated guidance on modelling post- Covid-19.	Red	The previous Local Plan modelling made no reference to any impacts of Covid-19 on traffic modelling. As guidance has been released, it is important that the modelling methodology reflects and accounts for this.
1e	Delayed implementation of the Local Plan compared to proposed, due to abandonment	Red	Adoption Year delayed Intermittent Year delayed (2032-2035) Horizon Year delayed (2039-2042)
1e	Updated NTEM version	Amber	Best practice indicates that the most recent and up-to-date data should be used. New forecasts account for some impacts of Covid-19 - this is not 100% precise but best estimation from DfT

1.2 Report Structure

This report summarises the requirement for refreshed Local Plan modelling, and provides the results of the transport modelling undertaken for the individual Local Plans for the Local Authorities within the Black Country: Dudley, Sandwell, Walsall and Wolverhampton.

The note structure is as follows:

- Section 2: Provides an overview of the assumptions adopted for the Local Plan Reference Case, Do Minimum and Do Something scenarios.
- Section 3: Presents the Reference Case model network and demand assumptions, and gives an analysis of the model results.
- Section 4: Presents the Do Minimum model network and demand assumptions, and gives an analysis of the model results.
- Section 5: Presents the Do Something model network and demand assumptions, and gives an analysis of the model results.
- Section 6: Draws conclusions on the Local Plan modelling and implications for the Local Authorities of the Black Country.
- Appendices: Present additional analysis and supplementary material to enhance understanding of the model inputs and context.

1.3 Glossary of Key Terminology

Throughout this report, some terminology may be used that is unfamiliar to readers outside of transport planning and modelling. To assist in understanding this report, we have prepared a glossary of acronyms and technical language which can be found in Table 1-2 below.

Table 1-2: Glossary

Term	Description
Demand (Matrices)	The representation of the number and type of vehicles loaded into the network of a transport model. These provide the trips that are analysed, and the most basic format is in “Origin”, “Destination”, “Number of Vehicles”
Reference Case (modelling)	In Local Plan Modelling: The transport model scenario where only committed demand, and committed transport schemes, are included. It is a representation of what can be expected in the future with none of the implementations to be tested included.
Do Minimum (modelling)	In Local Plan Modelling: The transport model scenario where Local Plan housing and employment developments are included. The network remains the same as the Reference Case. This scenario assesses how the existing network will cope with a change in demand.
Do Something (modelling)	In Local Plan Modelling: The transport model scenario where Local Plan housing and employment developments are included, *and* non-committed transport schemes are assessed. This provides an understanding of how future schemes may help or hinder the performance of the network when the Local Plan is adopted.
“the Local Plan model”	This is the one transport model for the combined impacts of the individual Local Plans. It is *not* one Local Plan for the whole of the Black Country.

Term	Description
Link	The representation of all or part of a road. It contains attributes about a roads' characteristics (speed, length, capacity)
Node	The representation of all or part of a junction. These are usually split into different types (signals, roundabouts, give ways etc) with different rates at which vehicles can "pass through" them.
TfWM	Transport for West Midlands
PRISM	Policy Responsive Integrated Strategy Model The multi-modal strategic model of the West Midlands, used for many applications of modelling within the conurbation.
Multi-modal	Comprised of different modes of transport. Usually highway (car, van and lorry) and public transport (bus, rail, tram) and/or active travel (walk, cycle)
Strategic (model)	Strategic models usually cover large areas in less detail than micro- or mesoscopic models. As such, not every road in an area may be represented, but the key corridors will be included.
Uncertainty Log	A record of all committed and speculative changes to be made to the demand (housing, employment, education etc) and the network of a model.
VDM	Variable Demand Model
NTEM	National Trip End Model. The UK Government's tool to forecast long term population growth patterns.
TEMPro	Trip End Model Programme. The tool through which the NTEM databases are interrogated.
Link Flow	The number of vehicles passing along a link.
Link Capacity	The number of vehicles that are able to pass along a link before it becomes fully blocked. The flow rate along links becomes slower as the link becomes more saturated.
SRN	Strategic Road Network. These are typically the larger roads used to traverse an area (motorways, A roads and B roads)
NB / EB / SB / WB	Northbound / Eastbound / Southbound / Westbound

1.4 Disclaimers

For the avoidance of doubt, some key notices are provided below. These should be considered when reading the report.

In some places, reference may be made to the "Local Plan". In most cases, this refers to the combined impacts of the four individual Local Plans prepared by Dudley, Sandwell, Walsall and Wolverhampton. There is no joint or merged Local Plan for the Black Country as there was previously, but the modelling was completed on the combined impacts of the Local Plans to account for interconnectivity within the Black Country.

Walsall did not have a proposed Local Plan at the time of this assessment. As such, the allocations in Walsall from the previous Joint Local Plan were included. As the development of the Walsall Local Plan progresses, the quantum and location of Local Plan developments may be subject to change. As such, the conclusions drawn in this report may not be suitable for longer term planning in Walsall, but should form a sufficient basis for their relationship with other districts.

2 Modelling Assumptions and Limitations

2.1 Agreed Methodology

The outcome of the review discussed in Section 1.1.2 led to Sweco being commissioned in April 2024 to undertake refreshed Local Plan modelling for the Black Country. The commission was to undertake modelling using the recently released PRISM 6 model with the aim of understanding how the changes discussed (NTEM population forecast changes, delayed adoption of Local Plans, baseline network changes) would interact with the demand changes expected due to the individual Local Plans.

There are a number of different transport models in the West Midlands that may have been suitable for modelling the combined impacts of the Local Plans. However, it was decided to use TfWM's PRISM model, the strategic, multi-modal model covering the 7 districts of the West Midlands: Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton. The large, detailed network of the model allows greater understanding of movements within and outside of the Black Country, and the multi-modal VDM allows some impacts of modal shift to be modelled. It also ensures consistency with previous Local Plan modelling undertaken in the Black Country.

2.2 General Modelling Assumptions

2.2.1 Model Time Periods and Years

The proposed intermittent and horizon years of the Local Plans for the four Black Country Local Authorities are understood to be 2035 and 2042. 2035 will be modelled through the existing 2036 PRISM model, whilst a new scenario will be created for 2042.

The time periods will remain consistent with existing adopted PRISM models, being:

- AM: 07:00 – 09:30
- IP: 09:30 – 15:30
- PM: 15:30 – 19:00

The user classes will also remain consistent:

- Car Employers Business
- Car Commute
- Car Other

- Light goods vehicle (LGV)
- Heavy goods vehicle (HGV)

2.3 PRISM Modelling Environments

The models are derived from the PRISM Reference Case models provided to Sweco by Transport for West Midlands in April 2024. We understand that more recently updated models have since been produced for TfWM, but have confirmed that these models remain acceptable for use, specifically for this project as the updates do not occur in the Black Country.

To make the modelling of the intermittent year easier, and because it is close to the pre-existing PRISM Reference Case model of 2036, we have assumed growth to 2036 for the intermittent year. This includes network, demand and model cost parameters.

A new scenario has been created for the 2042 Reference Case and Local Plan models, derived from the existing 2046 PRISM Reference Case model. As above, this has been done to simplify the modelling process. Key modelling inputs such as car demand, freight demand, generalised cost and PT fares have been amended to 2042 to ensure reliable routing and overall levels of traffic, but parameters such as PT speeds and model network will remain at 2046 level. This is appropriate because the majority, if not all transport schemes in 2046 are pre-existing in 2036, indicating that no additional committed schemes are proposed to be added past 2036. Furthermore, a review of the changes in bus speeds between the existing PRISM Reference Case models indicates that the majority of changes to speeds compared to the base year occur before 2036, at over 66% for all time periods.

2.4 Housing and Employment Assumptions

2.4.1 Reference Case Distribution

As previously discussed, the Refence Case development distribution was derived from the v34 adopted Reference Case Uncertainty Log published in April 2024. The More than Likely and Near Certain development sites from this log have been used in the PRISM Population Segmentation Model (PSM) to derive the pre-VDM matrices.

The distribution of these sites has been plotted spatially by PRISM zone to highlight areas of each district that will experience growth. This can be seen in the plots below.

2.4.1.1 Population

The reporting of the population (and employment in later sections of this report) is split by overall Black Country level, to demonstrate the distribution on housing within the whole model, and then by individual districts, to help support and inform Local Authorities in their respective Local Plans.

Overall, there is a roughly even distribution of committed housing development within the Black Country, with no one district experiencing a disproportionately large increase (Figure 2-1). Individual districts can be seen to experience

growth in different areas, with Sandwell experiencing larger growth in the west, whilst Dudley, Walsall and Wolverhampton trending towards developments around centres.

All the information below has come from the PRISM v34 Uncertainty Log as provided by TfWM. The individual district plots show no additional information compared to the Black Country plot; it is simply a closer view to help legibility.

Figure 2-1: 2042 Reference Case Population Growth compared to Base Year (2019)

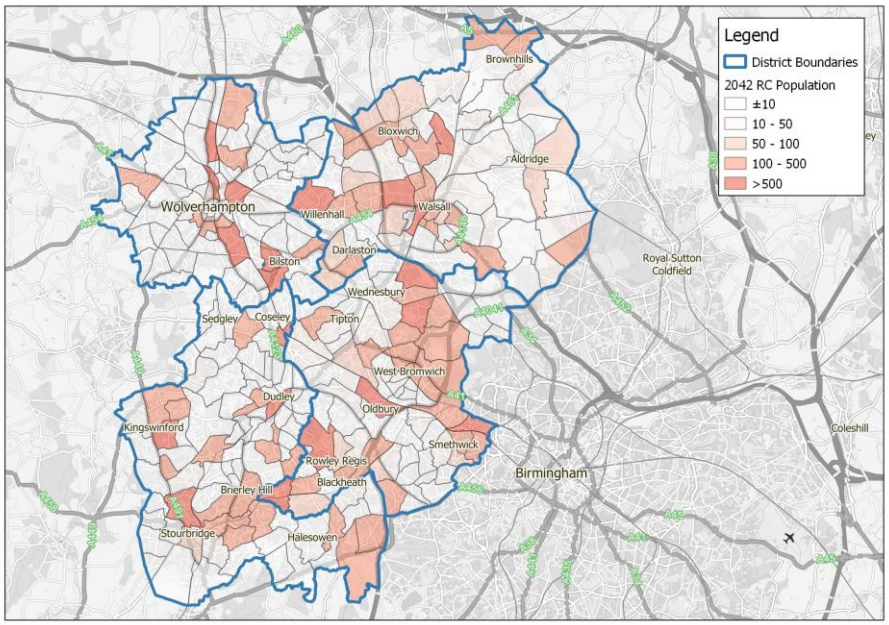
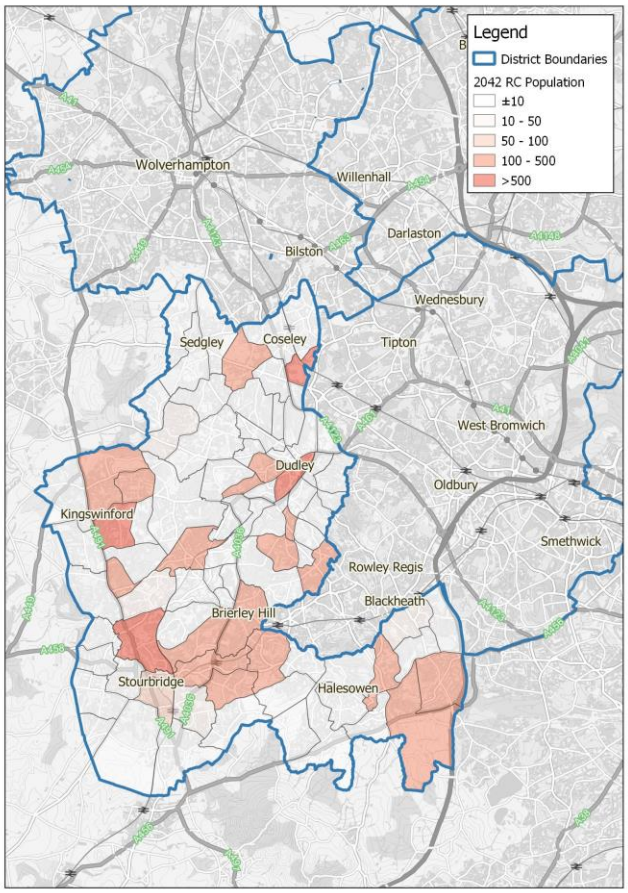


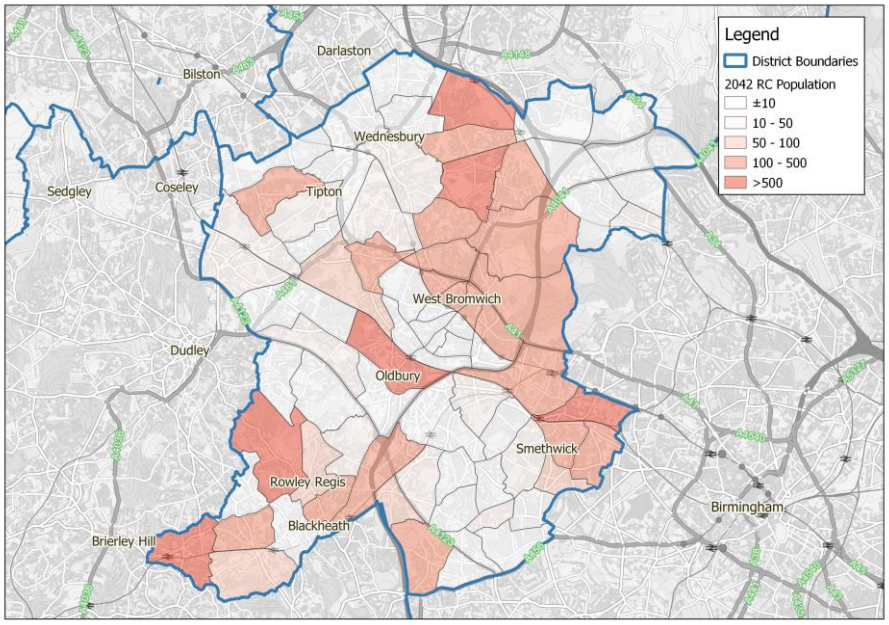
Figure 2-2 below shows that committed housing developments within the district of Dudley trends towards further developing existing towns such as Stourbridge, Kingswinford and Dudley, with developments around Halesowen bordering West Birmingham. With an average housing to population conversion factor of 2.33, development is highly concentrated in a few zones, with those zones experiencing at least an increase of 20 residences.

Figure 2-2: 2042 Reference Case Population Growth compared to Base Year (2019), focused on Dudley.



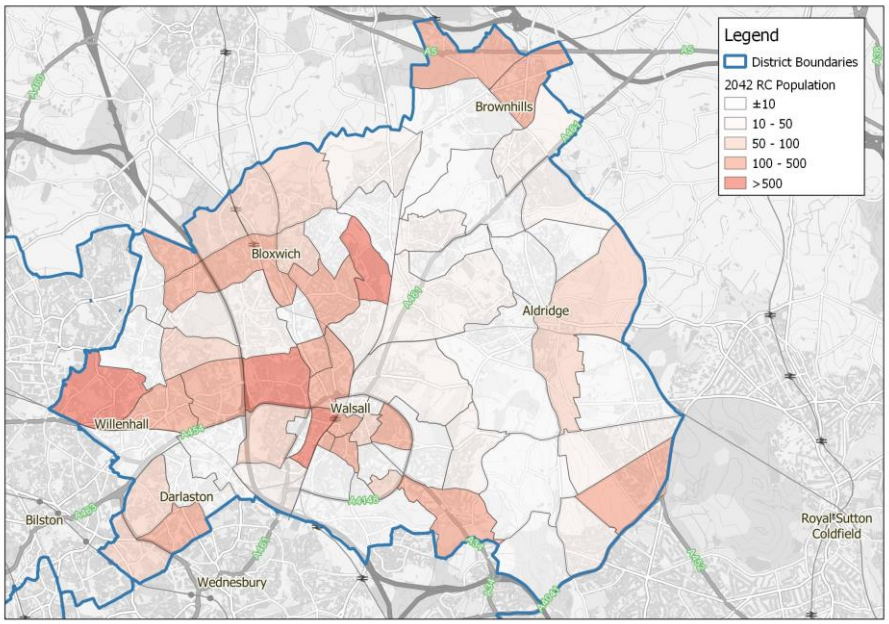
The population changes in Sandwell are provided in Figure 2-3, where it can be seen that a lot of the committed developments are forecast to occur in the east of the district, with growth hotspots found north of Smethwick, north and central Wednesbury and to the southwest, in Cradley Heath.

Figure 2-3: 2042 Reference Case Population Growth compared to Base Year (2019), focused on Sandwell.



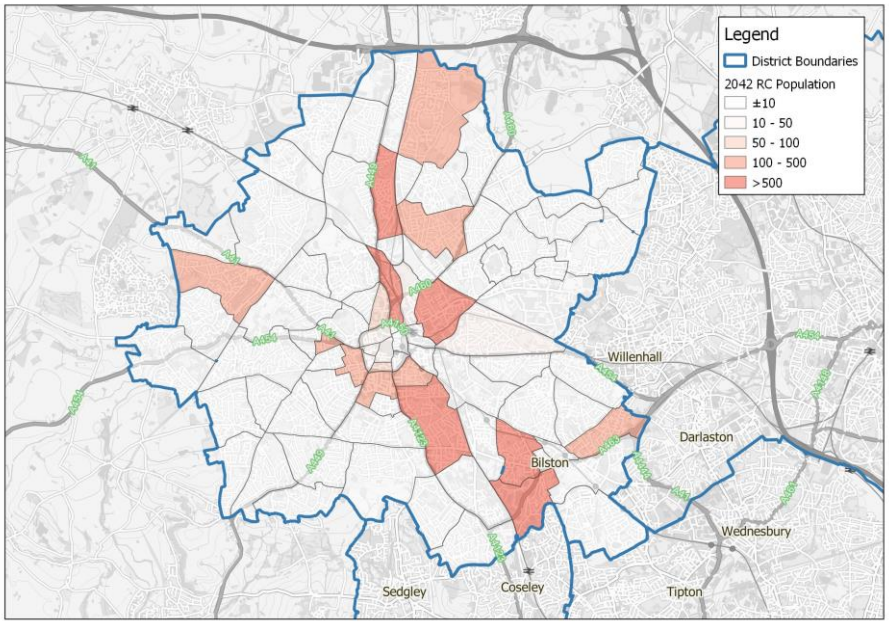
In Figure 2-4, Walsall is seen to experience a lot of growth in central and north-western parts of Walsall town. Committed development is also expected in and around Bloxwich and Brownhills.

Figure 2-4: 2042 Reference Case Population Growth compared to Base Year (2019), focused on Walsall



Wolverhampton experiences growth outside of the A4150 ring road, to the east of the A4123 heading southbound extending to Bilston, with northern developments trending towards the University.

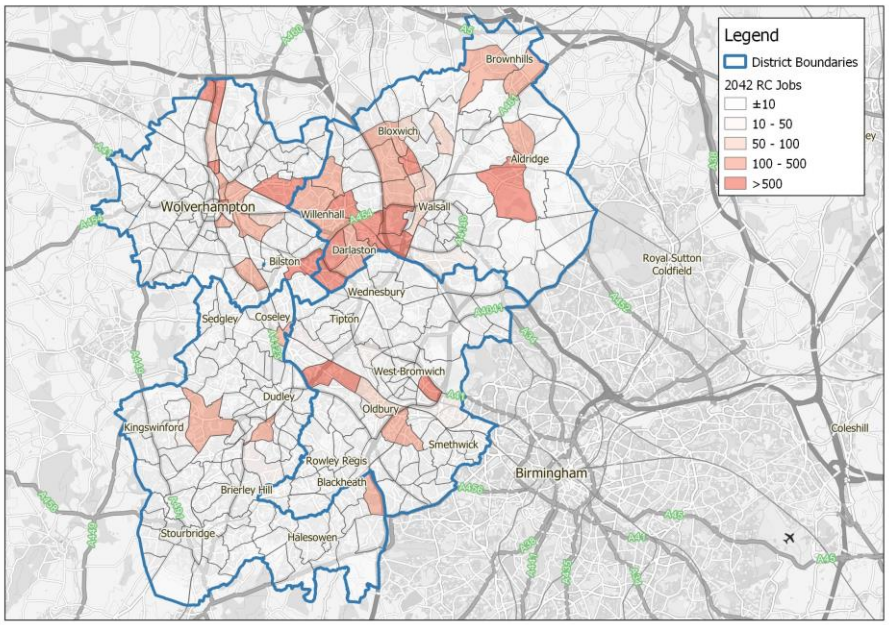
Figure 2-5: 2042 Reference Case Population Growth compared to Base Year (2019), focused on Wolverhampton



2.4.1.2 Jobs

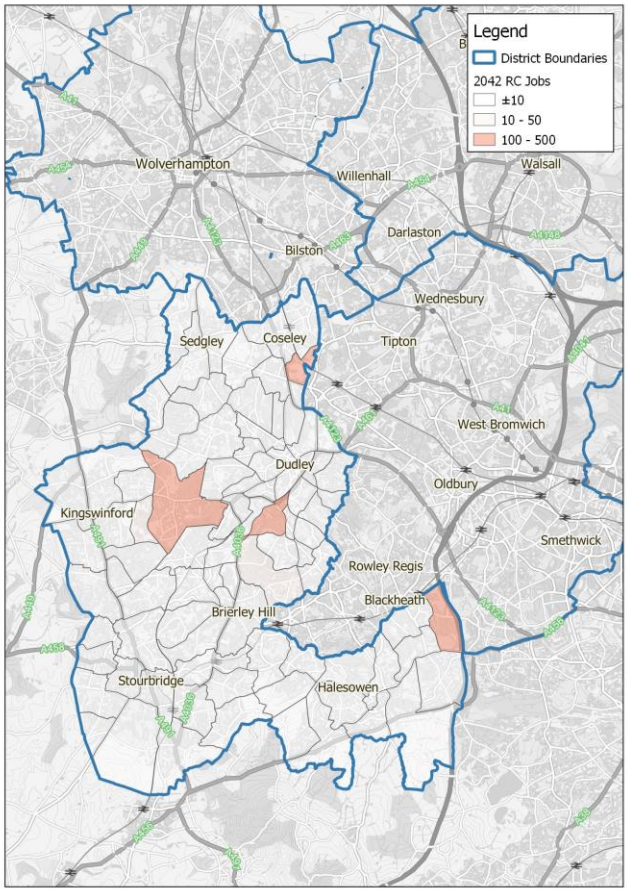
Committed employment changes show a different pattern to housing, with a significant trend towards Walsall, with some smaller increases in and around Wolverhampton and Oldbury.

Figure 2-6: 2042 Reference Case Employment Growth compared to Base Year (2019)



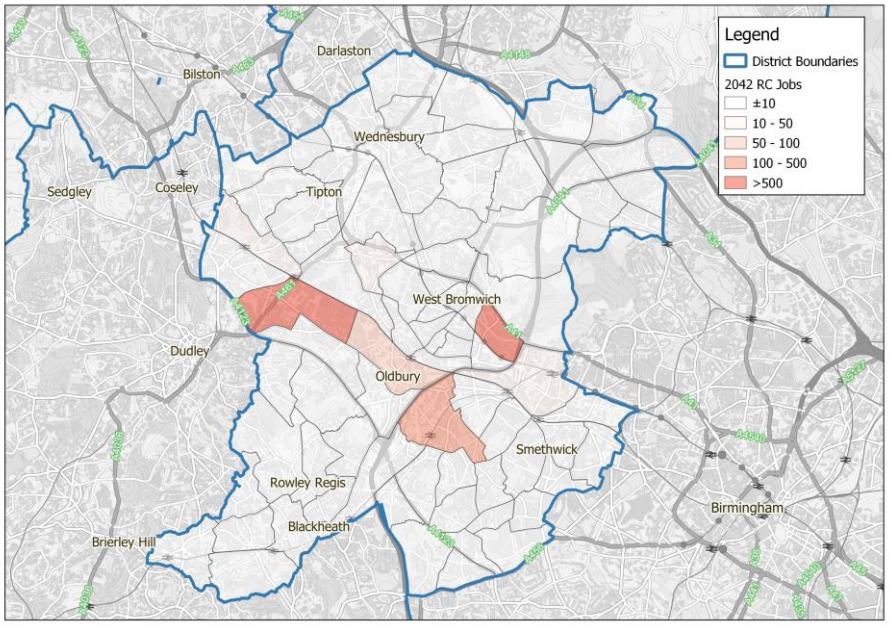
In Dudley, the distribution of committed employment development growth is not located in town centres but slightly outside areas such as Dudley and Coseley. There is an increase of approximately 700 jobs distributed across the four zones highlighted in Figure 2-7.

Figure 2-7: 2042 Reference Case Employment Growth compared to Base Year (2019), focused on Dudley



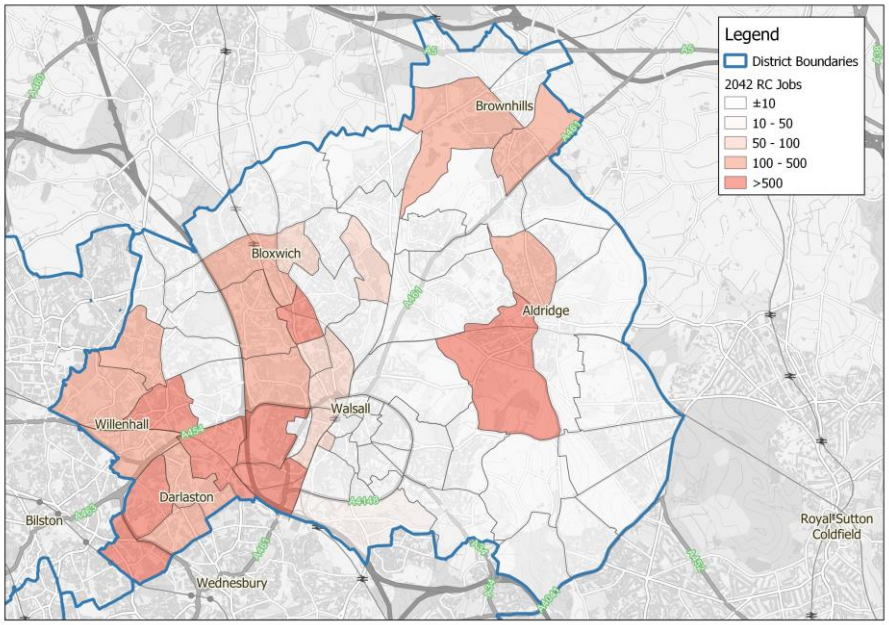
For Sandwell, there is an increase of approximately 1,700 jobs spread over four zones around West Bromwich and Oldbury, with the largest development to the northwest of West Bromwich providing nearly 1,000 jobs. There is likely to be some crossover in employment trips between Sandwell and Dudley, with the proximity of employment sites being seen in Figure 2-7and Figure 2-8.

Figure 2-8: 2042 Reference Case Employment Growth compared to Base Year (2019)



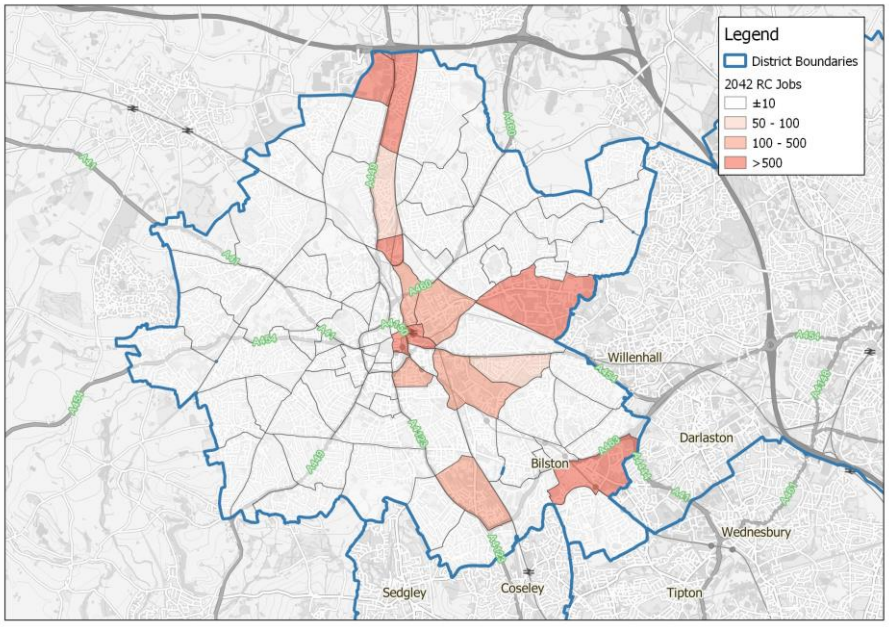
In Figure 2-9 below, Walsall appears to hold a large proportion of employment development within the Black Country, with committed sites around Aldridge, Brownhills, Bloxwich and to the west of Walsall towards Darlaston and Willenhall. Approximately 13,000 jobs are created between 2019 and 2042, with over 8,000 located to the west of the district, bordering Wolverhampton.

Figure 2-9: 2042 Reference Case Employment Growth compared to Base Year (2019), focused on Walsall



In Wolverhampton, there appears to be a main corridor of employment development along the A449 northbound shown in Figure 2-10. Employment sites also appear to be trending towards the boundary with Walsall near Bilston, showing interconnectivity between these two districts. There is also employment development inside the A4123 ring road of Wolverhampton, and around the station. The overall increase in jobs around Wolverhampton is approximately 7,000, with 2,000 of these occurring in zones bordering Walsall. There is also some degree of “sharing” employment provisions with South Staffordshire, with ROF Featherstone and West Midlands Interchange forming part of the job provision in Wolverhampton. This is to account for the close proximity of these sites to Wolverhampton and the high likelihood of employment trips being generated

Figure 2-10: 2042 Reference Case Employment Growth compared to Base Year (2019), focused on Wolverhampton



2.4.2 Local Plan

The Local Plan assumptions were all discussed with officers from the Black Country authorities, demonstrating Sweco’s understanding and proposed modelling of the distribution and quanta of Reference Case and Local Plan developments. After processing for input into the PRISM Population Segmentation Model (PSM), these sites were plotted spatially across PRISM zones to highlight the areas of each district that would experience the most growth. These plots can be found below, with further information found in Appendix 4.

2.4.2.1 Population

For the purposes of the Local Plan modelling, there are two main factors to be aware of:

1. Total Local Plan provision was adjusted to account for changes to committed developments that had not been added to the adopted PRISM Reference Case model. As such, some zones may experience

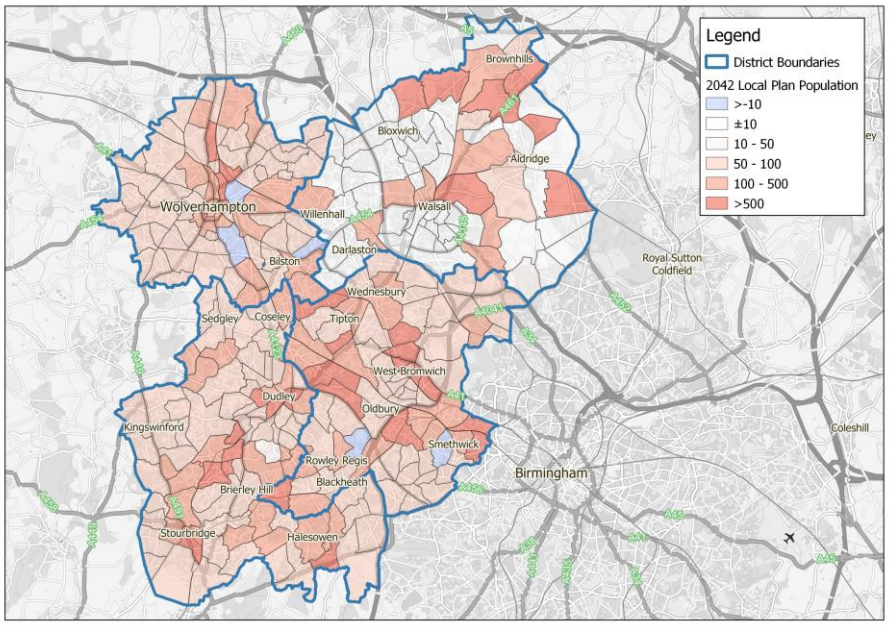
higher or lower growth relative to the Reference Case than would actually occur, but the model now provides a more accurate picture of forecast traffic flows following the adoption and full buildout of the proposed Local Plan.

2. The Local Plans may also account for changes in the provision of housing and employment sites to alternative purposes (e.g. housing to employment and vice versa).

The combination of the above two points explains why there may be a reduction seen in certain zones.

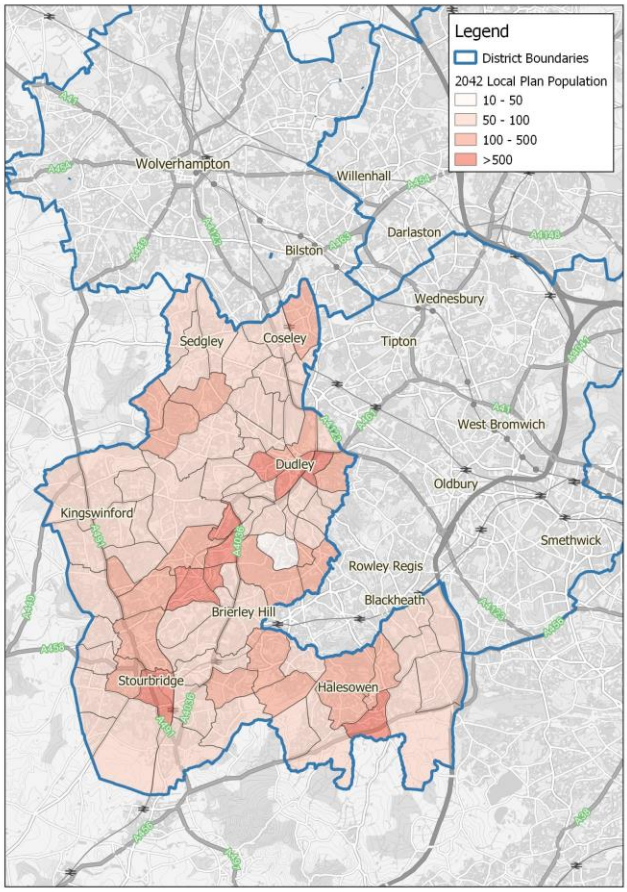
Across the whole of the Black Country, there is an overall large increase of 50+ houses in the Local Plan model compared to the Reference Case model, shown in Figure 2-11. These houses are distributed fairly evenly across Dudley, Sandwell and Wolverhampton. As Walsall did not have any new sites identified, it was decided to retain the larger housing sites from the previous Black Country Joint Local Plan, to account for some level of growth in this district. This also explains why the growth is localised to a few zones rather than spread across the district, as the smaller aggregated housing sites do not appear in this district as they do in the others.

Figure 2-11: 2042 Local Plan Population Change compared to Reference Case



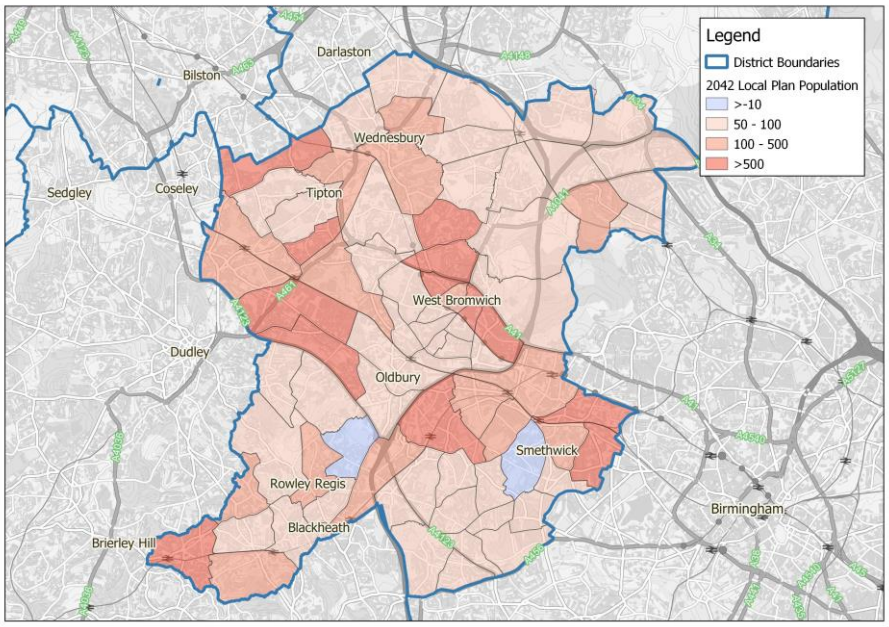
In Figure 2-12, it can be seen that the district of Dudley experiences growth in nearly all zones, with the largest increases in housing seen around centres like Dudley, Coseley, Halesowen and Stourbridge. These areas represent an increase in houses of over 8,000. There are no zones which experience a decrease in housing compared to the Reference Case.

Figure 2-12: 2042 Local Plan Population Change compared to Reference Case



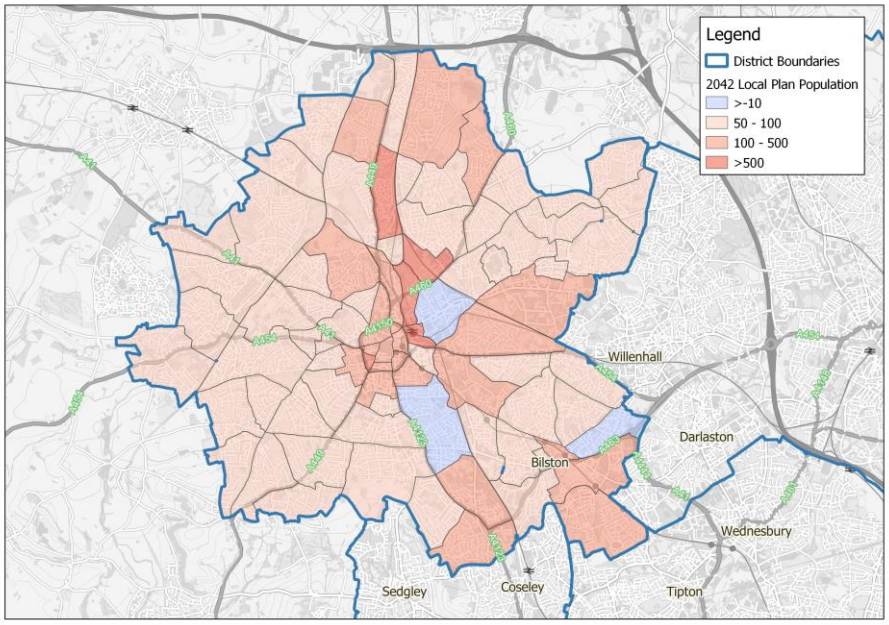
In Sandwell, there are two zones which experience a decrease in housing provision as a result of their Local Plan, shown in Figure 2-13. These are found in Blackheath and Smethwick and represent a decrease of 450. However, Smethwick also experiences an increase in houses further outside the town centre, with zones bordering Birmingham demonstrating an additional 3,000 houses. Other key urban centres such as Oldbury, West Bromwich and Rowley Regis also experience overall growth in housing provision.

Figure 2-13: 2042 Local Plan Population Change compared to Reference Case



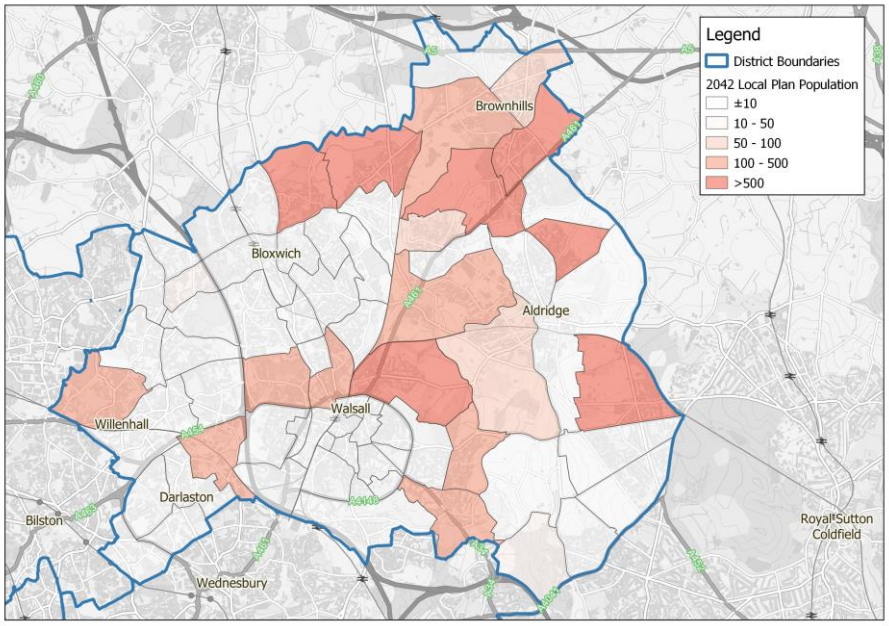
Wolverhampton is the other district within the Black Country that shows areas of negative growth in housing in the Local Plan scenario. Figure 2-14 shows that most of the concentrated growth in housing in Wolverhampton occurs on the east side of the A449, although there is general growth across the whole district. Largest growth zones are seen in Low Hill and St Peters, representing an increase of over 3,500 houses, whilst decreases of approximately 350 houses are seen in wards such as Bilston East, Ettingshall and Heath Town.

Figure 2-14: 2042 Local Plan Population Change compared to Reference Case



In Walsall, there is no pattern of distributed growth seen in other districts. This is because there were no additional Local Plan development sites identified for modelling at the time of this project. However, larger green belt sites identified as part of the previous Joint Black Country Local Plan were included in this modelling, to allow for the impacts of development within Walsall to be reflected. Figure 2-15 shows that most of the development is projected to occur outside the town centre, stretching northeast towards Brownhills and east around Aldridge.

Figure 2-15: 2042 Local Plan Population Change compared to Reference Case



2.4.2.2 Jobs

Employment growth is considerably lower than housing and is more highly concentrated in certain zones, shown in Figure 2-16. This is expected and likely due to larger scale employment sites being created or redeveloped. Walsall and Sandwell show the largest spread of employment sites, with Walsall showing highly concentrated development.

Figure 2-16: 2042 Local Plan Population Change compared to Reference Case

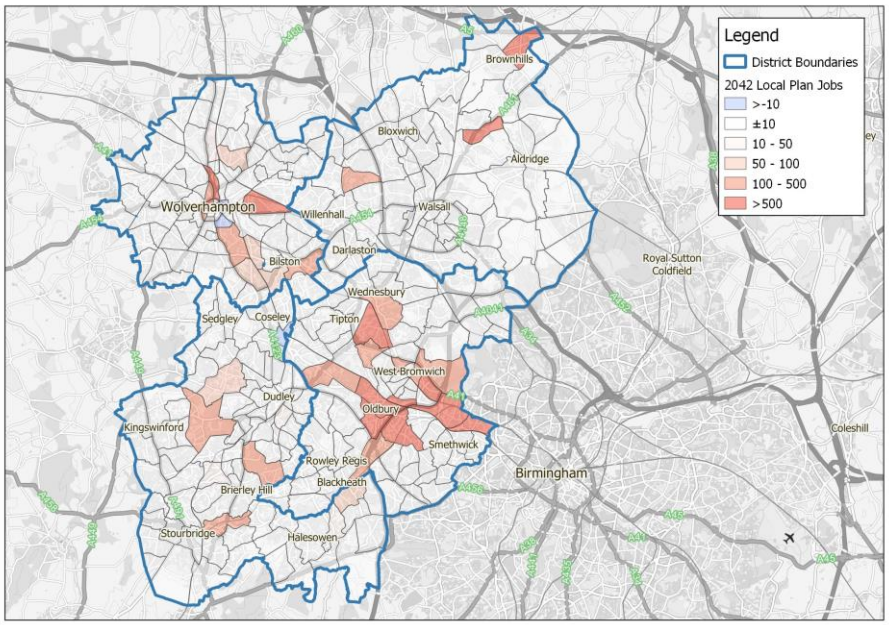
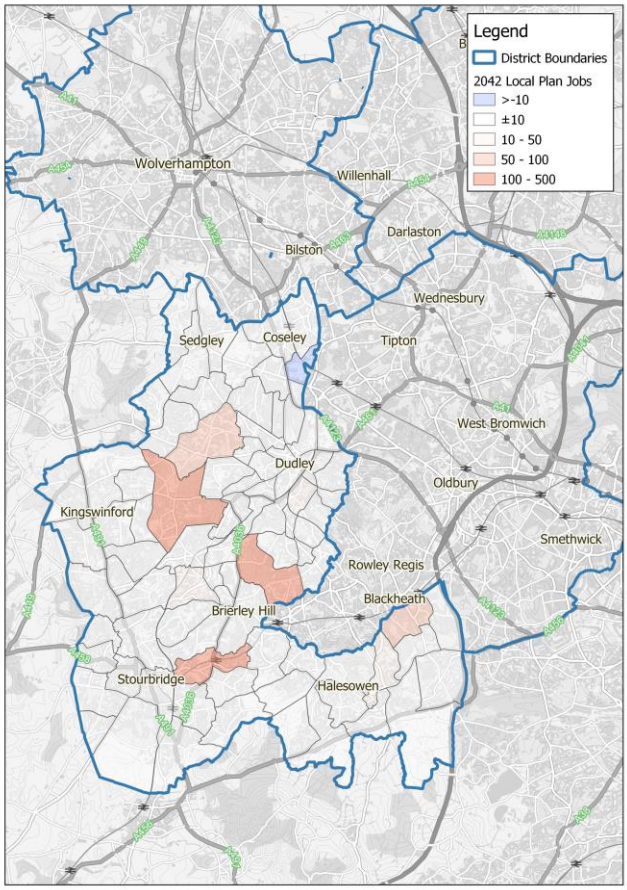


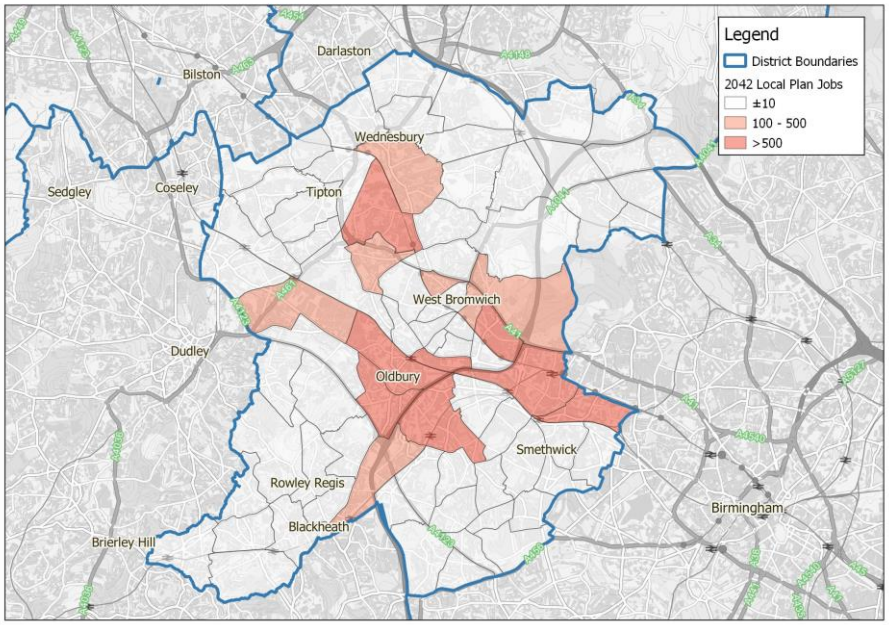
Figure 2-17 shows that in Dudley, there are five zones which experience growth in employment, providing an additional 500 jobs. The largest of these are seen around Stourbridge and Brierley Hill. There is also a zone south of Coseley which has a reduction of jobs of 134, likely due to redevelopment or a change in use from employment to residential.

Figure 2-17: 2042 Local Plan Population Change compared to Reference Case



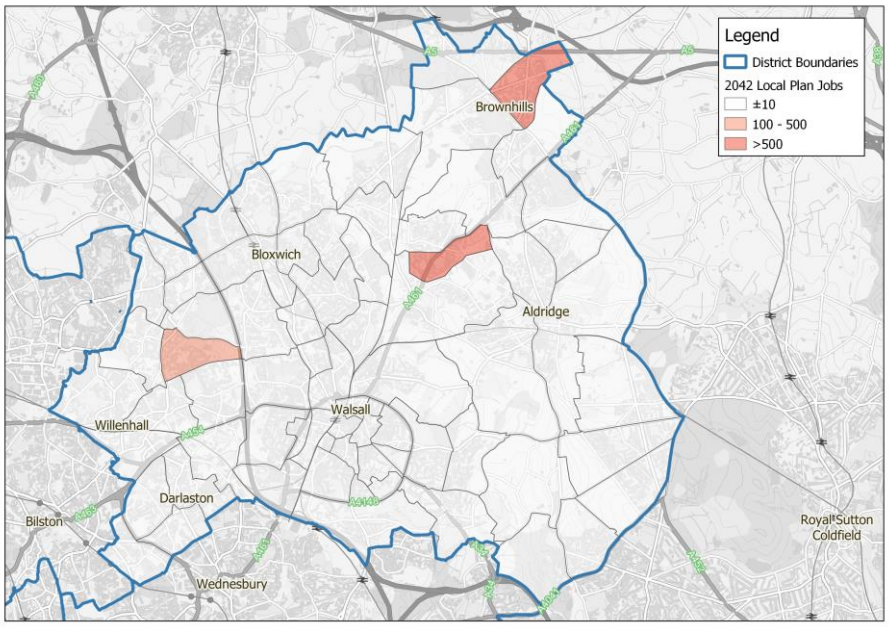
In Figure 2-18, the distribution of additional jobs in Sandwell's Local Plan can be seen. As in the other Black Country districts, employment development sites are more localised than housing developments. Largest increases are seen around Oldbury, south of Wednesbury and to the southeast of West Bromwich, trending towards Birmingham city centre.

Figure 2-18: 2042 Local Plan Population Change compared to Reference Case



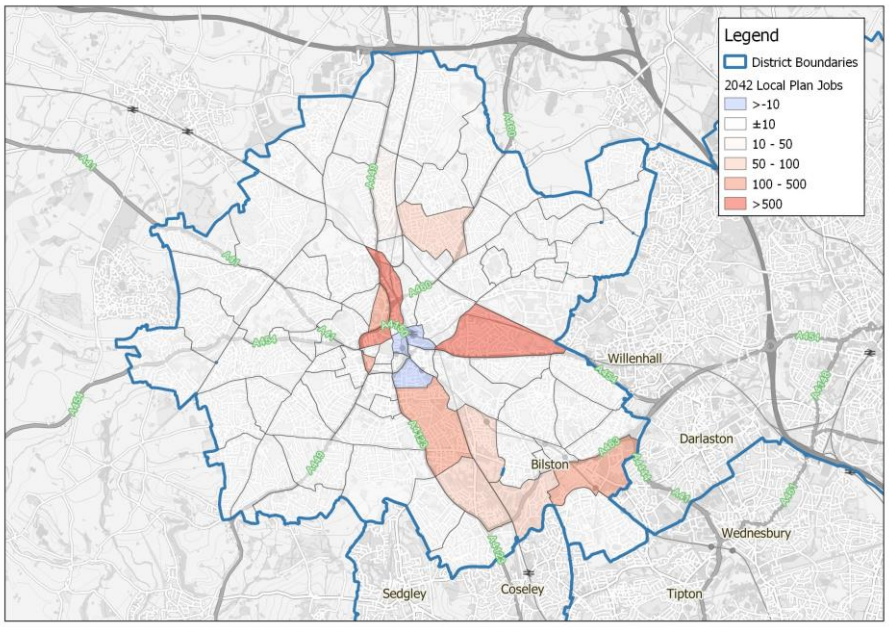
Similarly to the housing development in Walsall's Local Plan, there are no new employment sites identified for this tranche of Local Plan modelling. Figure 2-19 instead shows the distribution of previously identified sites modelled in the Black Country Joint Local Plan. These are localised in three zones, one near Brownhills, one between Bloxwich and Aldridge and one near Willenhall. Overall this represents an increase in employment provision of approximately 2,000 jobs.

Figure 2-19: 2042 Local Plan Population Change compared to Reference Case



The distribution of employment sites in Wolverhampton is shown below in Figure 2-20, showing zones with increases and decreases in employment provisions. The three zones highlighted in blue around the city centre represent a loss of 900 jobs, whilst increases to the east provide an additional 660. Other employment sites spread along the A449, A4123 and around Bilston represent an increase of nearly 4,000 jobs, showing that overall there is an increase in employment provision in Wolverhampton as expected.

Figure 2-20: 2042 Local Plan Population Change compared to Reference Case



3 Reference Case

3.1 Introduction

In Local Plan modelling, the Reference Case scenario is the model against which the Local Plan demand is compared. It contains all committed housing and employment development within the model area, including planning permissions, completions between the base year and the forecast year and any allocation of housing from previous Local Plans that are due to be implemented prior to the adoption of the new Local Plan.

3.2 Network Assumptions

As discussed in Section 2.3, the primary network assumptions to be aware of are that in 2042, the model uses a 2046 network as most transport schemes within the model are consistent between 2036 and 2042, for which all schemes within the study area of the Black Country are identical between model years.

3.3 Housing and Employment Assumptions

Housing and employment assumptions are all detailed in the PRISM Uncertainty Log. To create the Reference Case, the v34 Uncertainty Log was used, which was provided by TfWM in April 2024 and contained the development plan for adopted PRISM Reference Case scenarios.

Note that we have used the adopted TfWM Reference Case Uncertainty Log and not any changes to committed developments within the Black Country. This is to ensure consistency with the adopted PRISM models.

The input tables used to derive the model demand are provided below. Previous methodology required the inclusion of items marked “Reasonably Foreseeable” in the Uncertainty Logs due to significant differences between projected demand and National Trip End Model (NTEM) growth forecasts, against which the model demand is constrained. As NTEM growth factors are significantly reduced in NTEM8 rather than NTEM7, “Reasonably Foreseeable” developments are no longer included in the Reference Case, but will be moved to the Local Plan scenario to ensure their effects are modelled.

Figure 3-1: Uncertainty Log housing development constraint to NTEM - 2019 to 2026

2019 to 2026											
District	NTEM 2019	NTEM 2026	Abs Growth	PRISM 2019	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	1,106,109	1,144,049	-	1,146,600	30,375	36,092	1.00	-	7,565	0.7%	37,940
Coventry	343,403	369,243	25,840	372,009	2,330	22,187	1.00	1.00	1,323	0.4%	25,840
Dudley	320,163	327,843	7,680	321,824	2,347	739	1.00	1.00	4,594	1.4%	7,680
Sandwell	322,278	334,868	12,590	328,683	5,139	2,002	1.00	1.00	5,449	1.7%	12,590
Solihull	212,514	222,255	9,741	216,736	5,193	5,876	1.00	0.77	-	0.0%	9,741
Walsall	276,842	286,561	9,719	285,694	3,524	3,351	1.00	1.00	2,844	1.0%	9,719
Wolverhampton	258,707	267,517	8,810	272,283	6,840	310	1.00	1.00	1,660	0.6%	8,810
WM Met	**2,840,017**	**2,952,336**	**74,380**	**2,943,829**	**55,748**	**70,558**			**23,435**		**112,319**

Figure 3-2: Uncertainty Log housing development constraint to NTEM – 2026 to 2036

2026 to 2036											
District	NTEM 2026	NTEM 2036	Abs Growth	PRISM 2026	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	1,144,049	1,174,093	30,044	1,184,539	410	40,055	1.00	0.74	-	0.0%	30,044
Coventry	369,243	395,992	26,749	397,850	-	8,625	1.00	1.00	18,124	4.6%	26,749
Dudley	327,843	334,643	6,800	329,504	5,104	1,013	1.00	1.00	683	0.2%	6,800
Sandwell	334,868	346,945	12,077	341,273	892	3,141	1.00	1.00	8,044	2.4%	12,077
Solihull	222,255	232,184	9,929	226,476	1,048	17,324	1.00	0.51	-	0.0%	9,929
Walsall	286,561	296,662	10,101	295,413	681	118	1.00	1.00	9,302	3.1%	10,101
Wolverhampton	267,517	275,947	8,430	281,093	333	636	1.00	1.00	7,461	2.7%	8,430
WM Met	**2,952,336**	**3,056,466**	**104,130**	**3,056,149**	**8,468**	**70,913**			**43,613**		**104,130**

Figure 3-3: Uncertainty Log housing development constraint to NTEM – 2036 to 2042

2036 to 2042											
District	NTEM 2036	NTEM 2042	Abs Growth	PRISM 2036	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	1,174,093	1,189,812	15,719	1,214,583	-	10,421	1.00	1.00	5,298	0.4%	15,719
Coventry	395,992	409,893	13,901	424,599	-	-	1.00	-	13,901	3.3%	13,901
Dudley	334,643	339,051	4,408	336,304	106	-	1.00	-	4,302	1.3%	4,408
Sandwell	346,945	353,468	6,523	353,350	42	834	1.00	1.00	5,647	1.6%	6,523
Solihull	232,184	237,212	5,028	236,405	-	8,443	1.00	0.60	-	0.0%	5,028
Walsall	296,662	302,814	6,152	305,514	-	-	1.00	-	6,152	2.0%	6,152
Wolverhampton	275,947	280,677	4,730	289,523	4	-	1.00	-	4,726	1.6%	4,730
WM Met	**3,056,466**	**3,112,927**	**56,461**	**3,160,279**	**152**	**19,699**			**40,025**		**56,461**

Figure 3-4: Uncertainty Log employment development constraint to NTEM - 2019 to 2026

2019 to 2026											
District	NTEM 2019	NTEM 2026	Abs Growth	PRISM 2019	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	544,056	572,106	28,050	514,768	17,175	21,782	1.00	0.50	-	0.0%	28,050
Coventry	163,288	171,809	8,521	163,923	-	22,478	-	0.38	-	0.0%	8,521
Dudley	135,419	140,848	5,429	114,192	516	314	1.00	1.00	4,599	4.0%	5,429
Sandwell	137,330	142,124	4,794	124,531	-	1,460	-	1.00	3,335	2.7%	4,794
Solihull	111,917	117,794	5,877	140,739	12,370	-	0.48	-	-	0.0%	5,877
Walsall	114,628	119,185	4,557	102,536	8,122	5,596	0.56	-	-	0.0%	4,557
Wolverhampton	119,196	124,013	4,817	109,576	9,221	1,820	0.52	-	-	0.0%	4,817
WM Met	1,325,834	1,387,879	62,045	1,270,264	47,403	53,448			7,934	0	62,045

Figure 3-5: Uncertainty Log employment development constraint to NTEM – 2026 to 2036

2026 to 2036											
District	NTEM 2026	NTEM 2036	Abs Growth	PRISM 2026	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	572,106	585,996	13,890	542,817	-	11,643	-	-	13,890	2.6%	13,890
Coventry	171,809	175,982	4,173	172,444	-	17,957	-	0.23	-	0.0%	4,173
Dudley	140,848	144,267	3,419	119,621	-	-	-	-	3,419	2.9%	3,419
Sandwell	142,124	145,575	3,451	129,325	-	390	-	1.00	3,061	2.4%	3,451
Solihull	117,794	120,652	2,858	146,615	17,689	-	0.16	-	-	0.0%	2,858
Walsall	119,185	122,079	2,894	107,093	3,565	5,596	0.81	-	-	0.0%	2,894
Wolverhampton	124,013	127,022	3,009	114,393	9,959	3,855	0.30	-	-	0.0%	3,009
WM Met	1,387,879	1,421,573	33,694	1,332,309	31,213	39,440			20,370	0	33,694

Figure 3-6: Uncertainty Log employment development constraint to NTEM – 2036 to 2042

2036 to 2042											
District	NTEM 2036	NTEM 2042	Abs Growth	PRISM 2036	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth
Birmingham	585,996	588,845	2,849	556,707	-	11,643	-	-	2,849	0.5%	2,849
Coventry	175,982	176,838	856	176,617	-	13,784	-	0.06	-	0.0%	856
Dudley	144,267	144,971	704	123,040	-	-	-	-	704	0.5718%	704
Sandwell	145,575	146,282	707	132,776	-	-	-	-	707	0.5%	707
Solihull	120,652	121,238	586	149,473	17,742	-	0.03	-	-	0.0%	586
Walsall	122,079	122,672	593	109,987	671	5,596	0.88	-	-	0.0%	593
Wolverhampton	127,022	127,641	619	117,402	9,050	3,855	0.07	-	-	0.0%	619
WM Met	1,421,573	1,428,486	6,913	1,366,003	27,463	34,877			4,260		6,913

Full housing and employment distributions can be found in Appendix A and Appendix C for model years 2036 and 2042 respectively.

3.4 Model Results

The Reference Case results are shown below, compared against the base year (2019). This information provides an understanding of the impact of committed developments on traffic within the Black Country. It is not an assessment of traffic in these areas and should not and does not provide evidence for locations and links where additional traffic interventions are required. The Reference Case forms the basis against which the Local Plans are assessed, and it is this model that is used to identify congestion hotspots caused as a direct result of the Local Plan developments.

3.4.1 Horizon Year: 2042

Model results are presented for the whole of the Black Country and arranged to explain logically the impacts of each model result on the reported analysis. For larger plots focused on the individual districts, please refer to the appendices.

Link flow difference is presented for the 2042 Reference Case model against the 2019 Base Year model. These plots show a large change due to 23 years of NTEM growth, and so should be analysed alongside the percentage flow difference plots, which provide context for the proportional change in vehicular flow.

Smaller changes in vehicular flow along links with lower capacity are more likely to cause congestion than those same increases on a larger link on the SRN, which is picked up in the percentage flow difference plots.

Link flow then contributes in part to Link Volume over Capacity, which is a measure of how congested a link is. The capacity within the model provides a maximum number of vehicles that can be using a link, and the ratio of the links volume against its capacity can be used to determine how busy a road is. Typically, a value of above 85% is considered to demonstrate moderate congestion.

As part of the link V/C ratio, we are also reporting on link relative queue length difference. This is a standard VISUM output which shows how much of a link is blocked back by queue as a proportion of its length. This can help to highlight junctions with large delays on one or more arms, as links further back from the junction will show blocking back.

The combined impact of link flow, link V/C and link relative queue is then shown in the link delay difference plots. These are provided in seconds and show the delay experienced by an average vehicle in the time period. Some delays are expected due to signalised junctions and the volume of traffic within PRISM, but delay differences can be used to identify areas within the model that are being severely adversely impacted by vehicular flow increases.

3.4.1.1 AM Model Results

Link Flow

In Figure 3-7, it can be seen that there is a general trend of increases in link flows as expected due to population growth. These increases in flows are along sensible routes along the strategic road network (SRN), with greater increases on A roads and smaller increases on B roads and minor side streets. Some localised rerouting can be seen around Wolverhampton, Coseley, Dudley and on the road approaching Brierley Hill from the west, indicated by links in blue. Figure 3-8 shows a more severe change in percentage link flow difference, with many major and minor links experiencing a change of 20%+. This plot should help to provide context on the growth in traffic flow in the committed Reference Case scenario, but is not fully analysed as part of this work.

Volume over Capacity (VC)

The change in link V/C is seen below in Figure 3-9, showing the impact of the flow difference changes. Similarly to the link percentage change plot, the impact appears severe, although this plot assesses all links, and not just those that are nearing or over the critical threshold of 85%.

When the links are filtered to only show those links which are over capacity in the Reference Case, it becomes clearer to see the main impacts of the growth. Figure 3-10 shows that many of the key corridors within the Black Country can be expected to see increases in link saturation:

- Bloxwich to Walsall
- WB approach into Walsall
- Wolverhampton Ring Road
- Rowley Regis to Oldbury
- A4037 in Bilston
- Cinder Bank Island in Dudley
- M5 and M6
- A456/A459 in Halesowen

Relative Queue

Whilst there are large increases in link V/C seen, the impacts of these changes are relatively minor, suggesting in many areas that the network is able to accommodate additional baseline flow. Figure 3-11 shows that only a few links experience an increase in congestion, mostly on approaches to major intersections such as the A4036 and A491 south of Stourbridge, and the A458/A4034 Long Lane intersection travelling eastbound.

Delay

The link delay plot shown below in Figure 3-12 shows localised hotspots of delay increases, in most cases corresponding with increased queue lengths and V/C differences. Increases in delays seen are in most cases a realistic and expected impact of the growth assumptions made in the modelling.

Reductions in delay can be seen in Coseley and Dudley, likely due to rerouting seen in the link flow difference plots above. Increases in delays can be seen on some arms of multiple SRN intersections, suggesting the need for additional junction redesign in the future outside of the Local Plan mitigations.

Figure 3-7: 2042 Reference Case vs 2019 Base Year Flow Difference for the AM period.

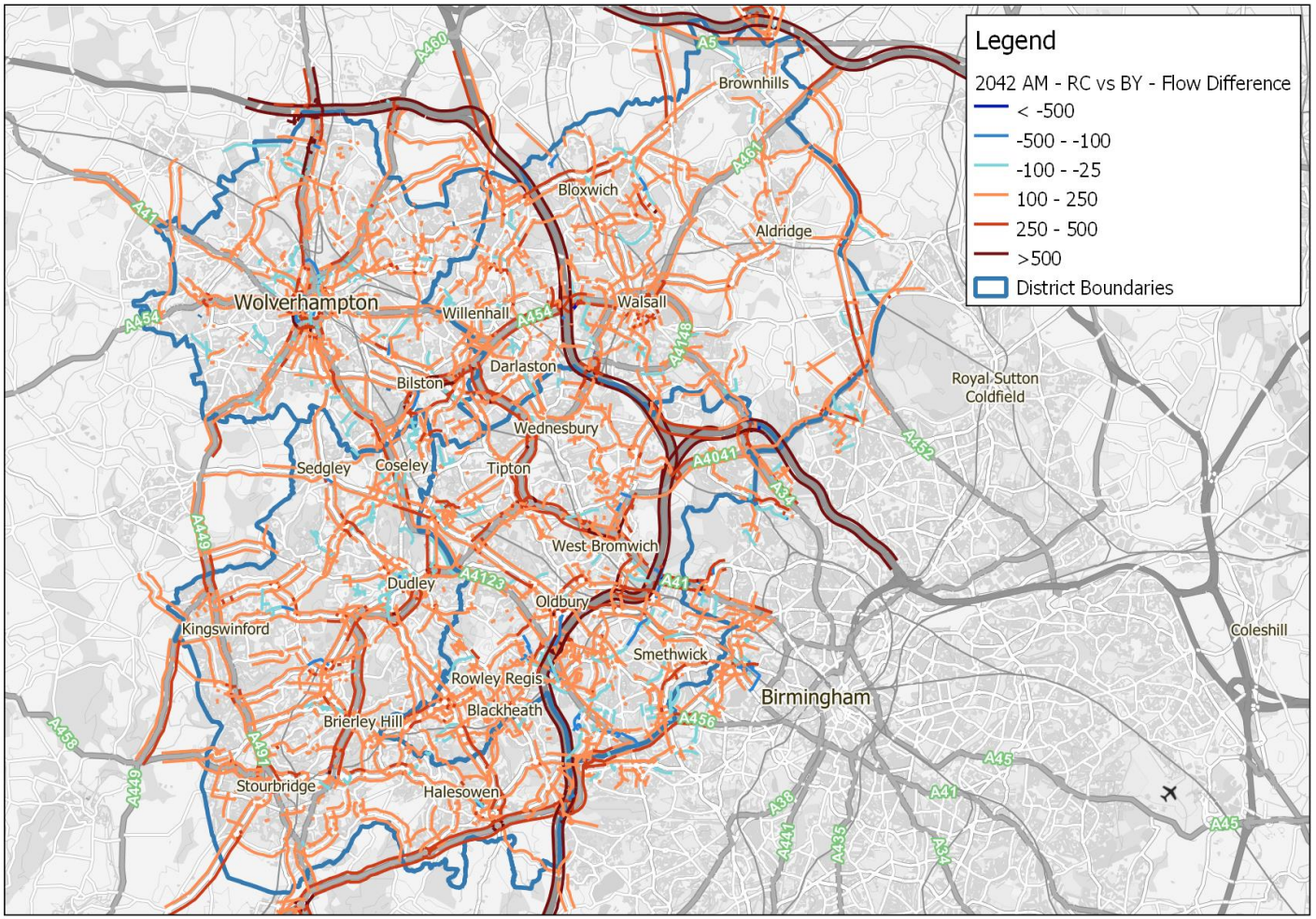


Figure 3-8: 2042 Reference Case vs 2019 Base Year Percentage Flow Difference for the AM period.

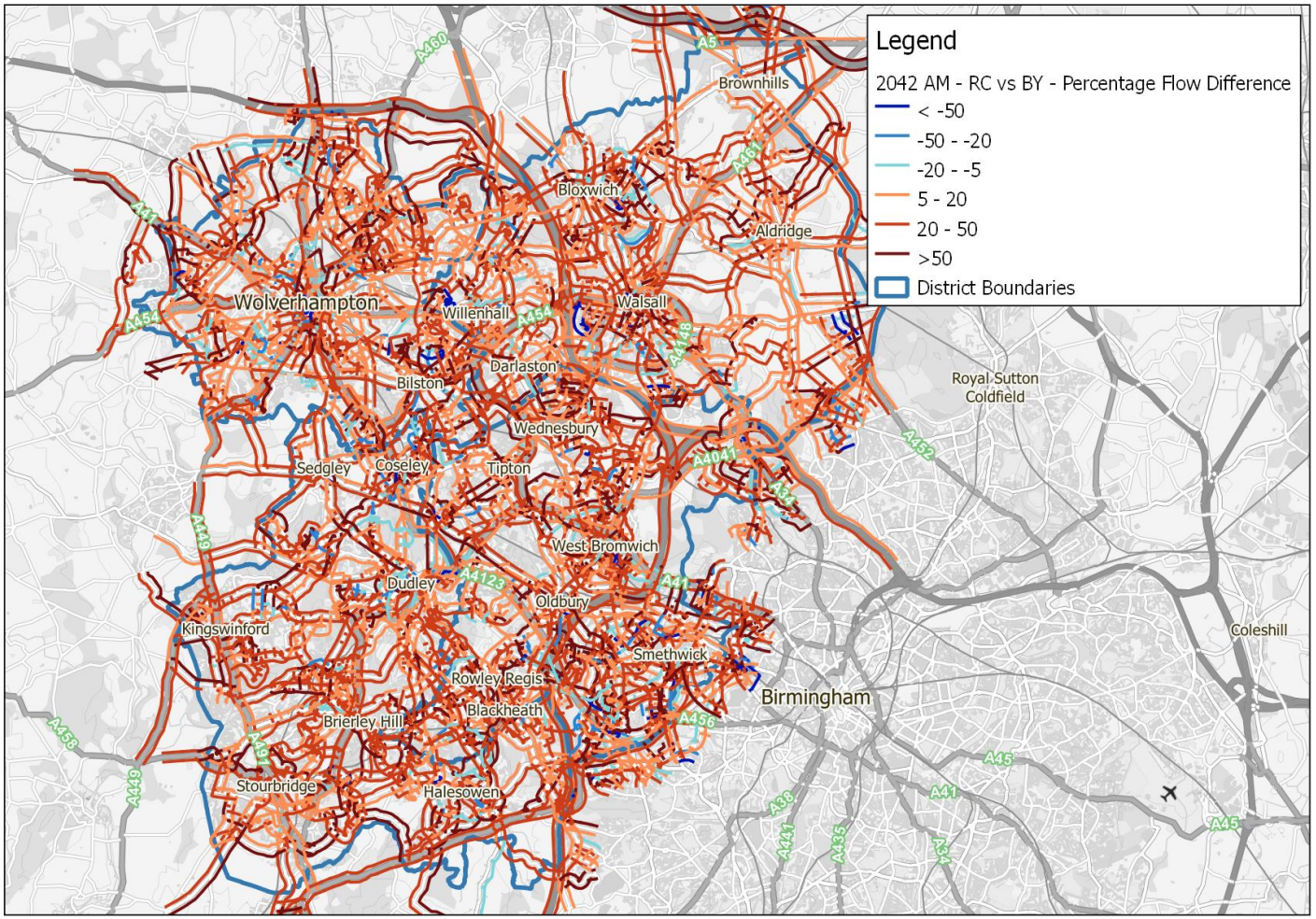


Figure 3-9: 2042 Reference Case vs 2019 Base Year Volume over Capacity Ratio Difference for the AM period. Difference is in % of the Base Year.

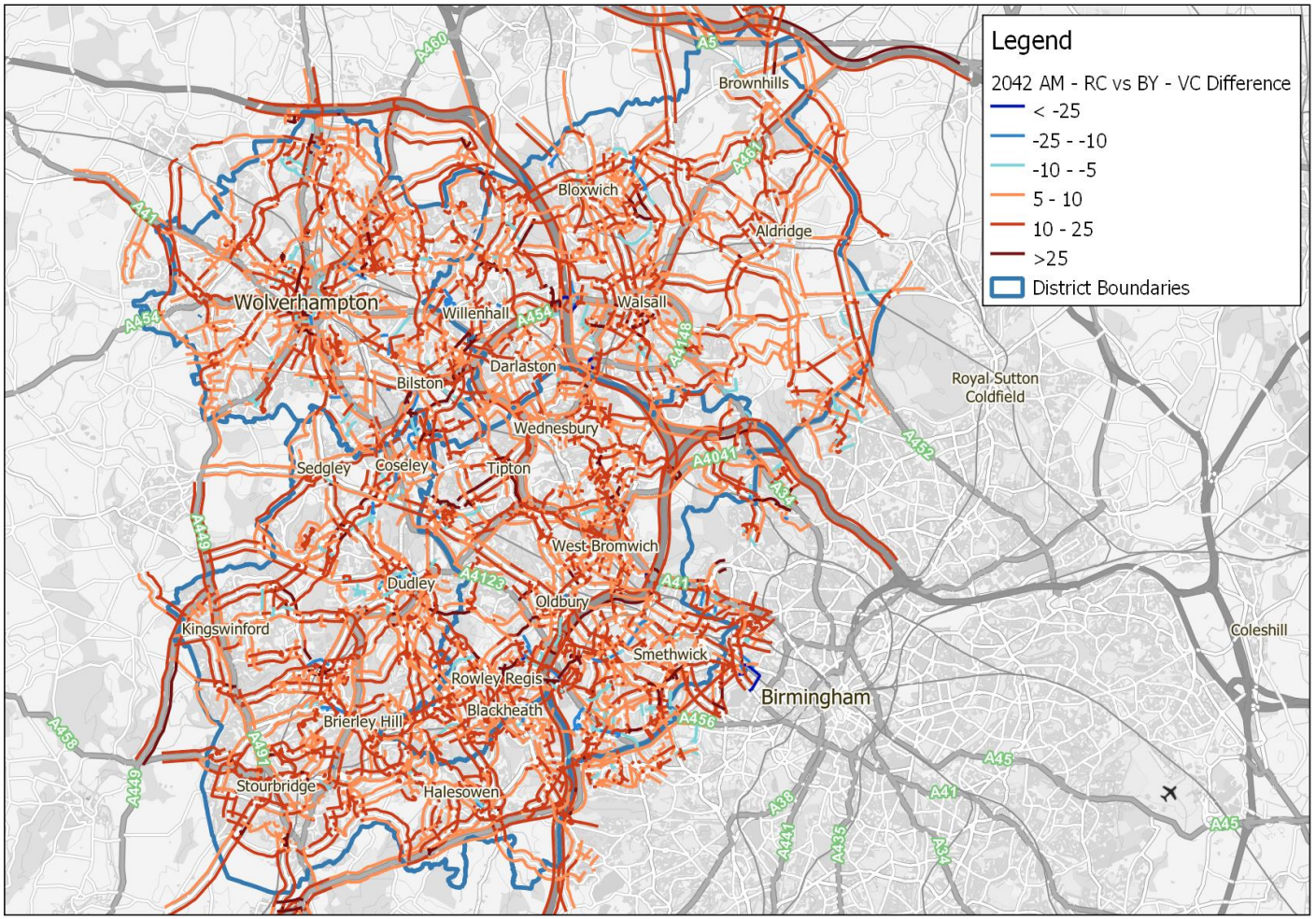


Figure 3-10: 2042 RC vs 2019 BY V/C Ratio Difference for the AM period. Links shown are over 85% V/C in the RC. Difference is in % of the Base Year.

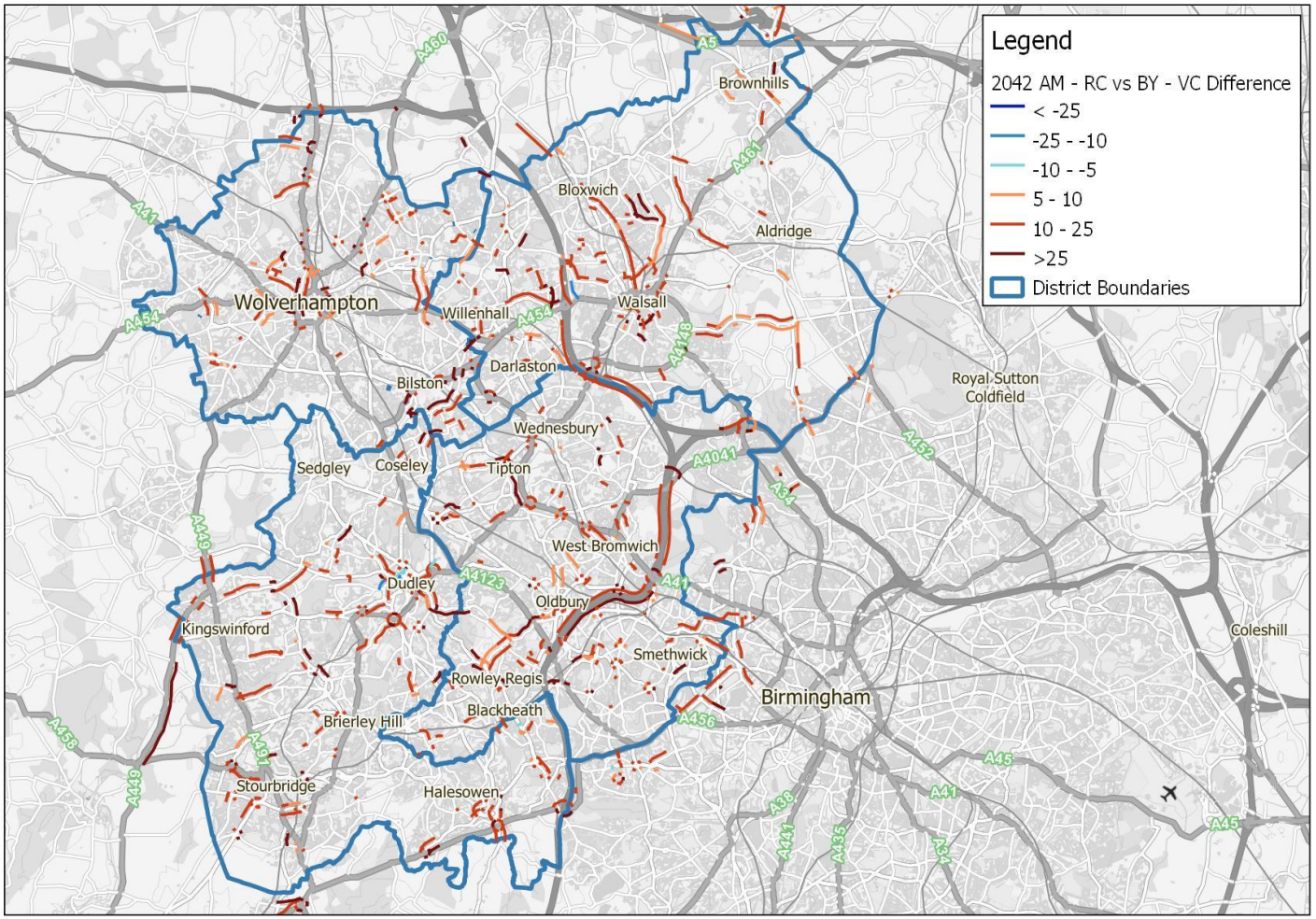


Figure 3-11: 2042 Reference Case vs 2019 Base Year Relative Queue Difference in % Link Saturation for the AM period.

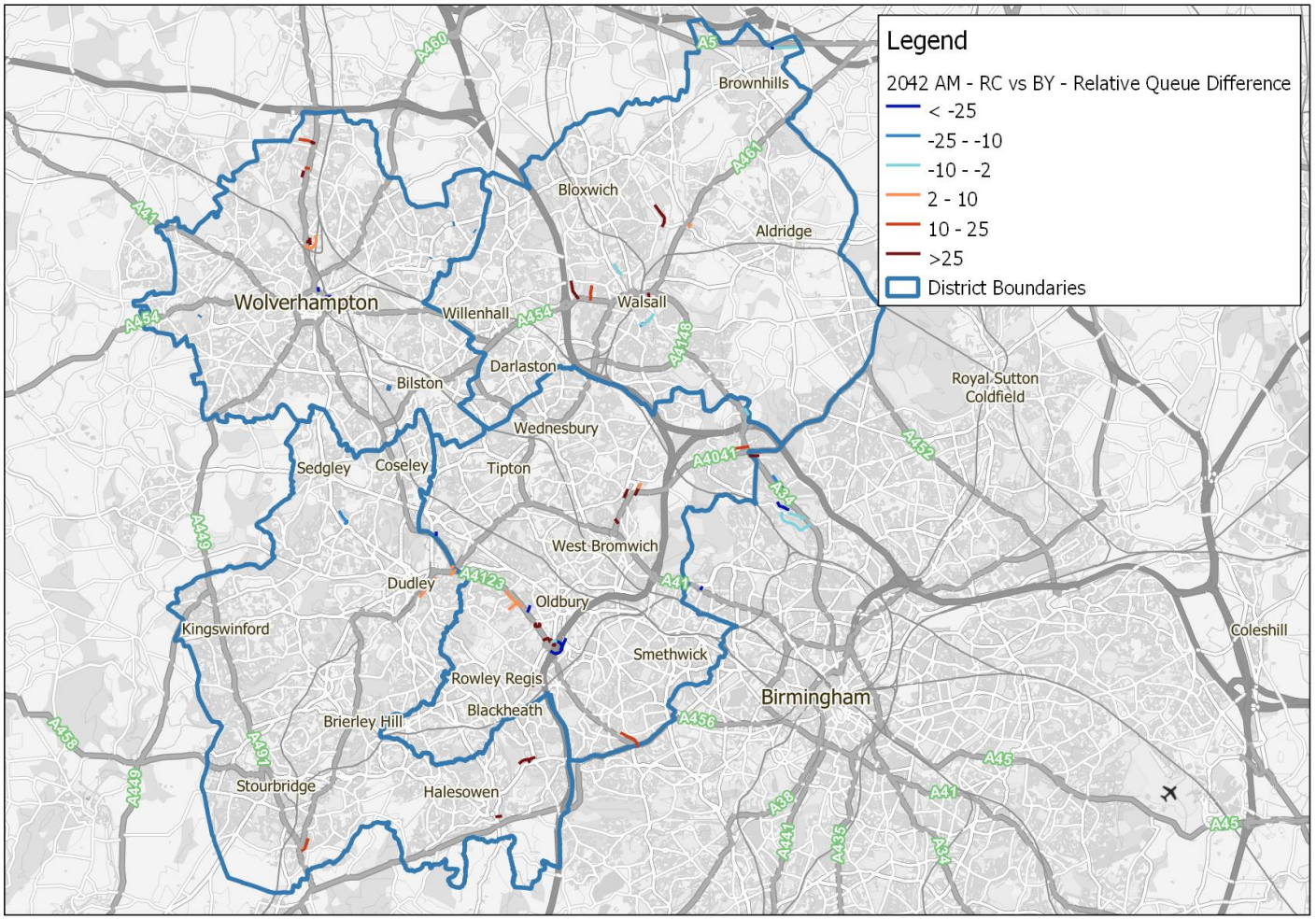
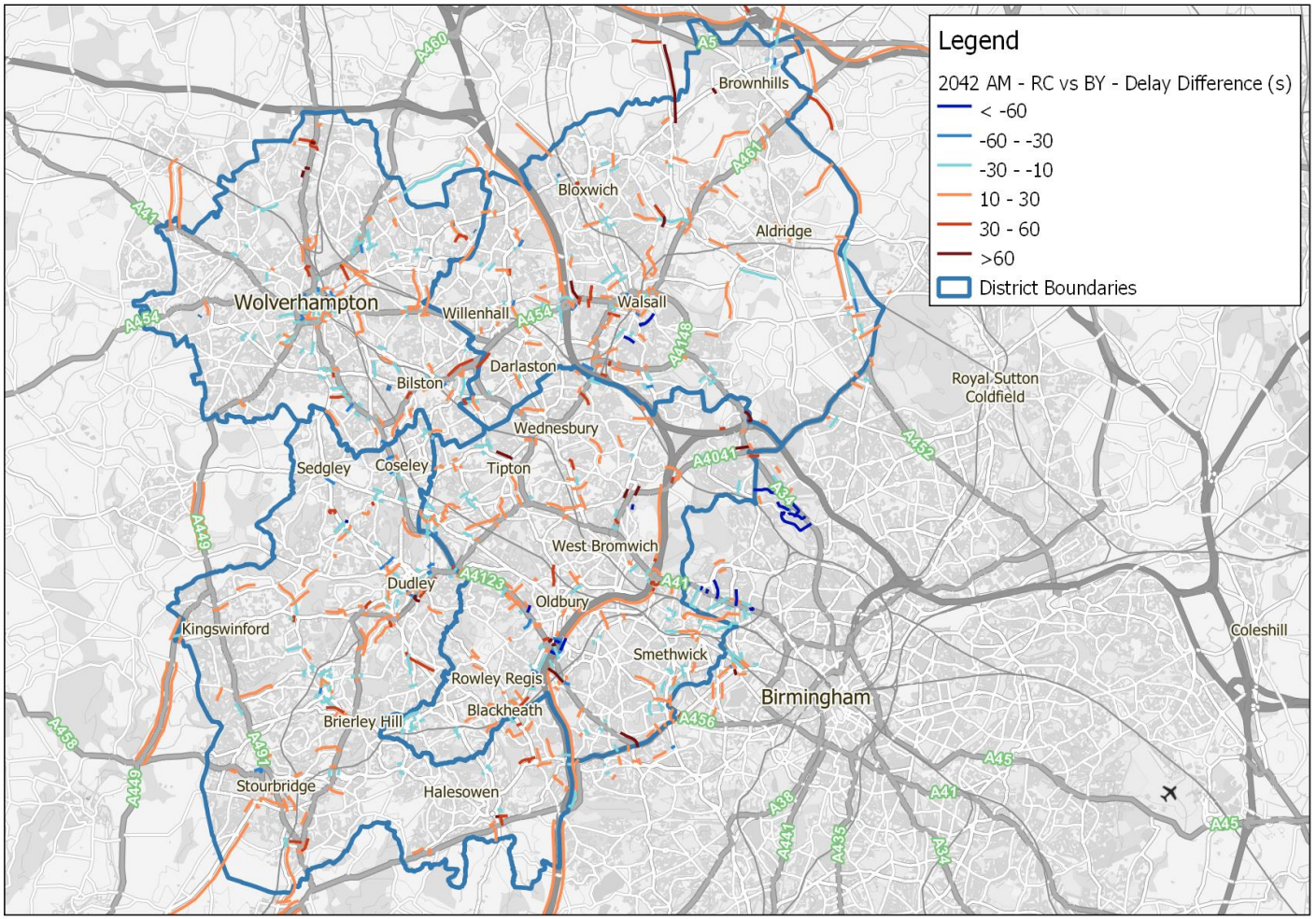


Figure 3-12: 2042 Reference Case vs 2019 Base Year Delay Difference for the AM period.



3.4.1.2 IP Model Results

Link Flow

In Figure 3-13, it can be seen that there is a general trend of increases in link flows as expected due to population growth, similar to AM. These increases in flows are along sensible routes along the SRN, with greater increases on A roads and smaller increases on B roads and minor side streets. Rerouting impacts, highlighted in blue, are less significant in the IP than in the AM, mainly around Wolverhampton and M5 Junction 2. Figure 3-14 shows a severe change in percentage link flow difference, similar to the AM, with many major and minor links experiencing a change of 20%+.

VC

The change in link V/C is seen below in Figure 3-15 , showing the impact of the flow difference changes. The VC changes are less significant than in the AM, but the impact still appears severe.

When the links are filtered to only show those links which are over the critical threshold of 85% in the Reference Case, it becomes clearer to see the main impacts of the growth. Figure 3-16 shows that the same corridors identified in the AM period can be expected to see increases in link saturation:

- Bloxwich to Walsall
- Wolverhampton Ring Road
- Rowley Regis to Oldbury
- A4037 in Bilston
- Cinder Bank Island in Dudley
- M5 and M6
- A456/A459 in Halesowen

The overall impact is likely to be less severe in the IP due to the lower overall demand typically seen in this time period.

Relative Queue

Whilst there are large increases in link V/C seen, the impacts of these changes are relatively minor, suggesting in many areas that the network is able to accommodate additional baseline flow. Figure 3-17 shows that only two major intersections are expected to see a significant change in their queue lengths: M5 J2 (decrease) and Bushbury Roundabout (increase).

Delay

The link delay plot shown below in Figure 3-18 shows localised hotspots of delay increases, in most cases corresponding with increased queue lengths and V/C differences. Increases in delays seen are in most cases a realistic and expected impact of the growth assumptions made in the modelling.

Notable reductions in delay can be seen around Wolverhampton and Walsall, although increases seen on the M5 approaching Walsall and between M5J1 and M6J8 are notable, as are increases seen on traffic entering the Black Country via A449 near Kingswinford and the A45 around Burnt Tree.

Figure 3-13: 2042 Reference Case vs 2019 Base Year Flow Difference for the IP period.

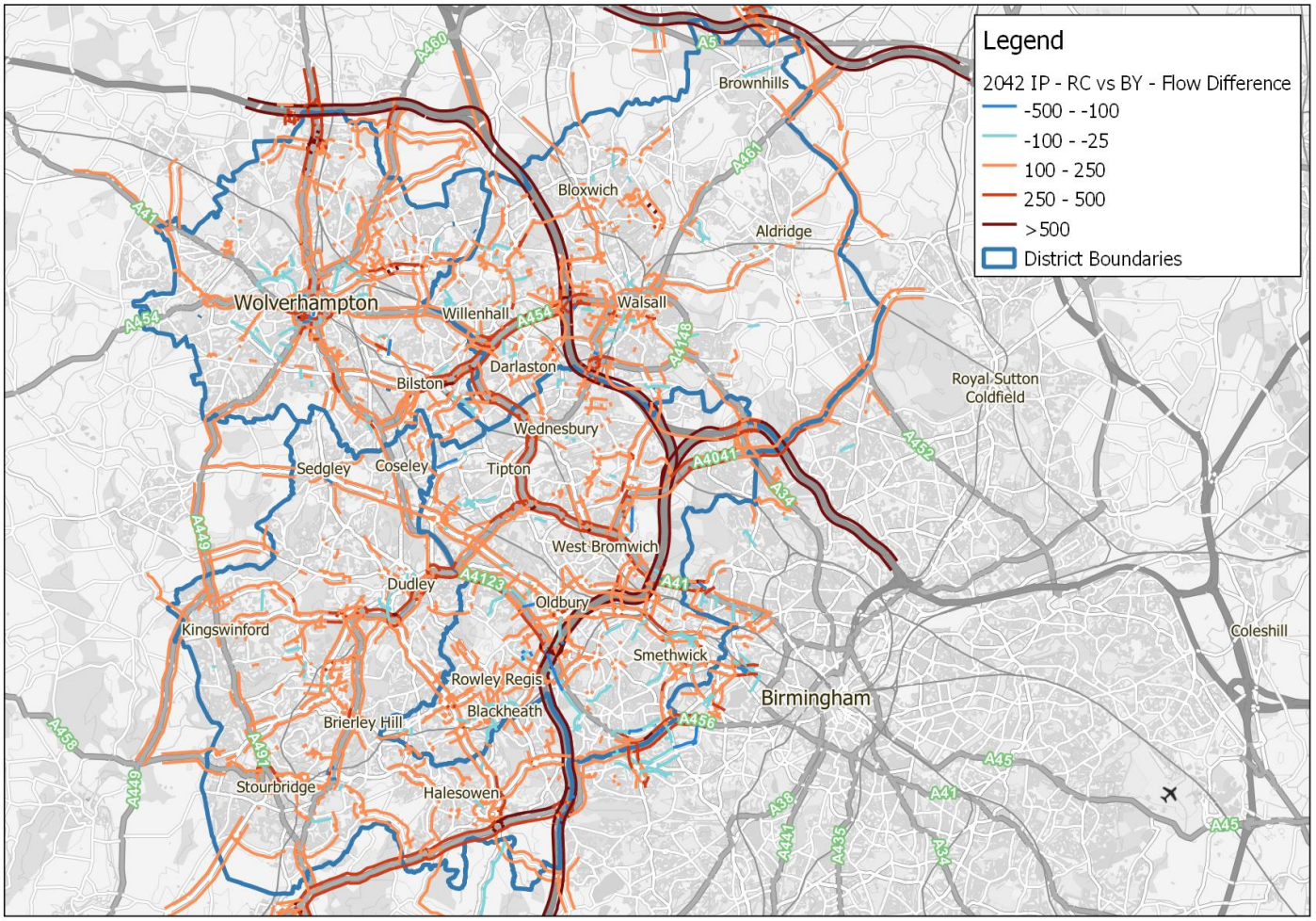


Figure 3-14: 2042 Reference Case vs 2019 Base Year Percentage Flow Difference for the IP period.

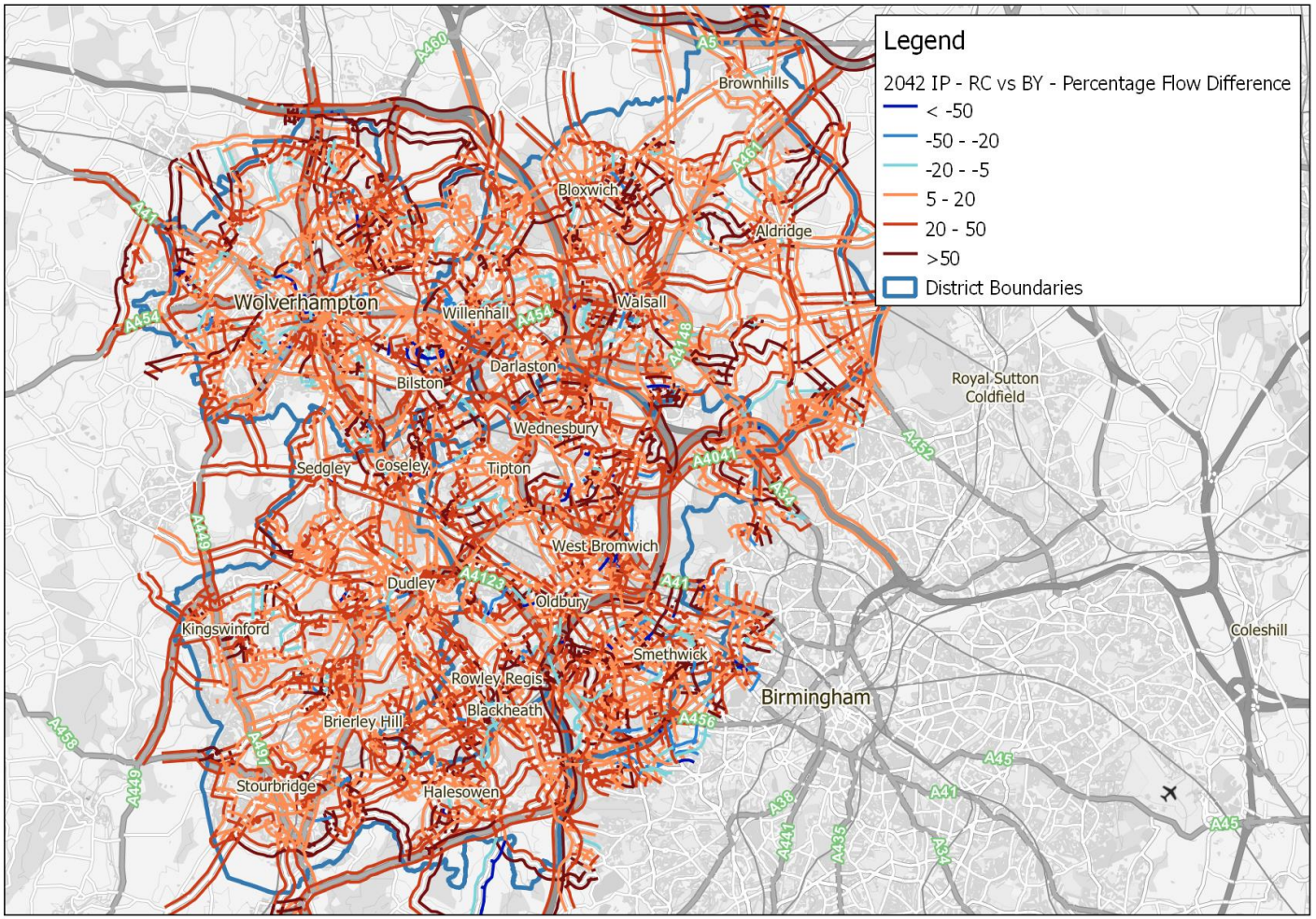


Figure 3-15: 2042 Reference Case vs 2019 Base Year Volume over Capacity Ratio Difference for the IP period.

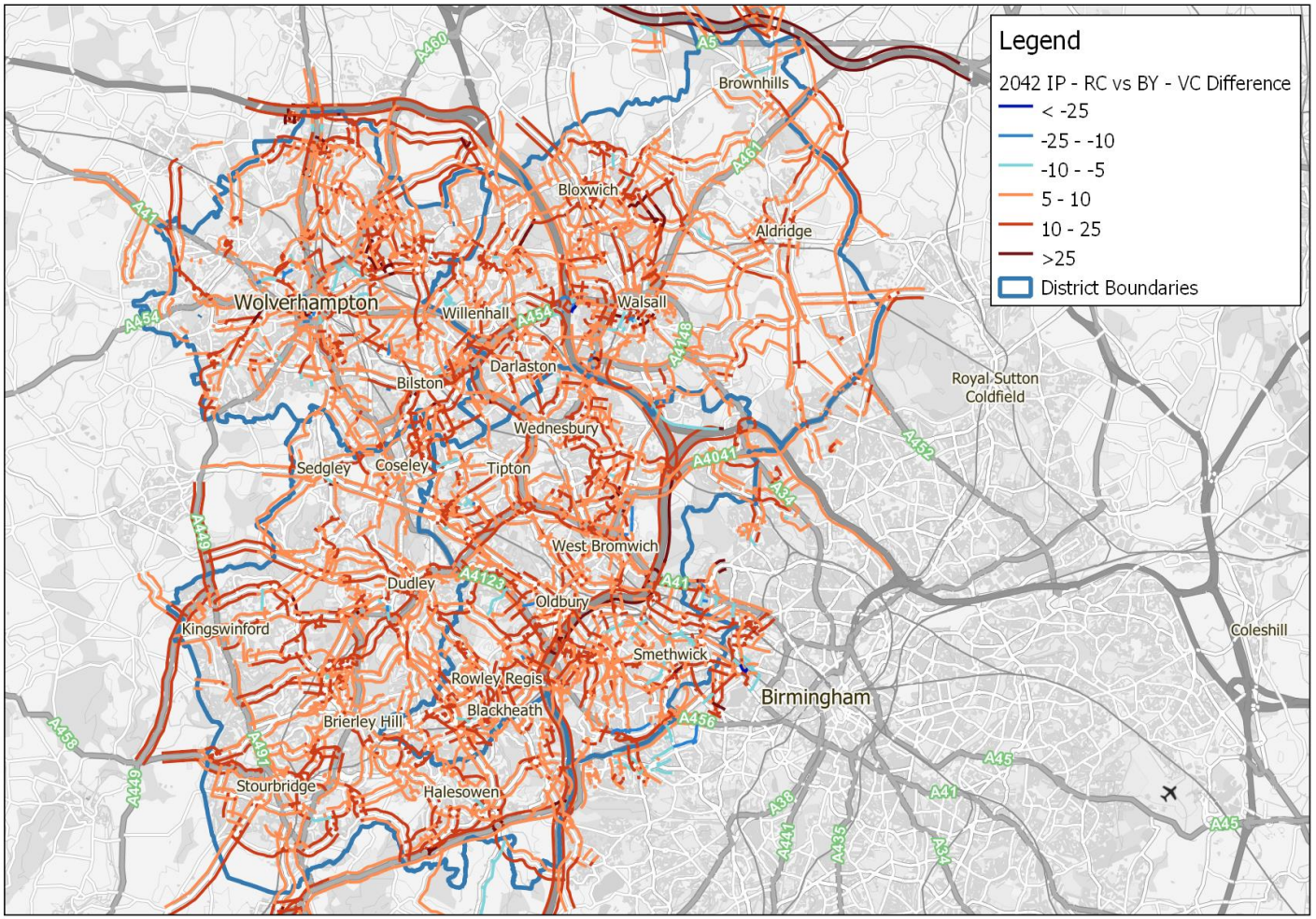


Figure 3-16: 2042 RC vs 2019 BY V/C Ratio Difference for the IP period. Links shown are over 85% V/C in the RC. Difference is in % of the Base Year.

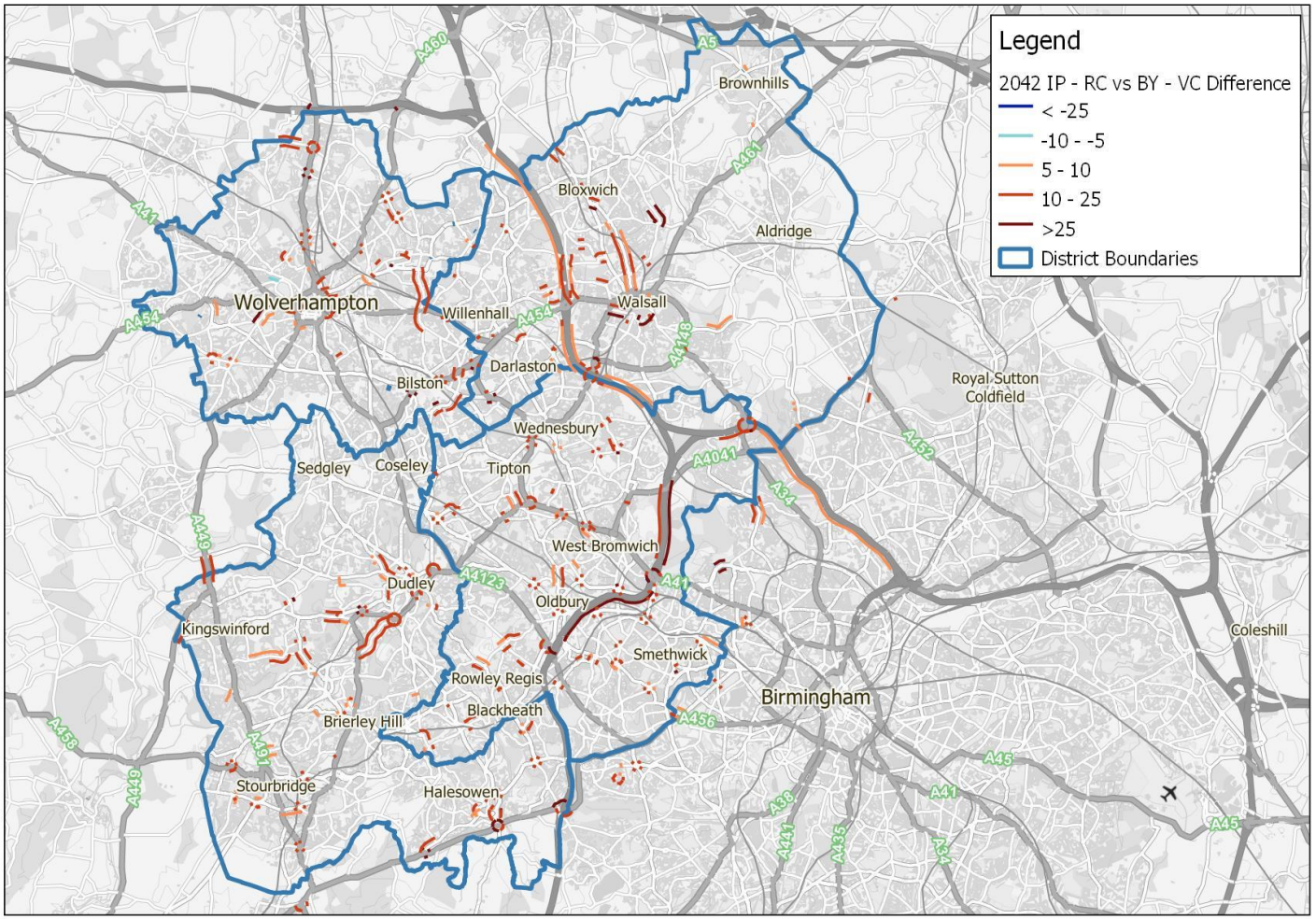


Figure 3-17: 2042 Reference Case vs 2019 Base Year Relative Queue Length Difference in % Link Length for the IP period.

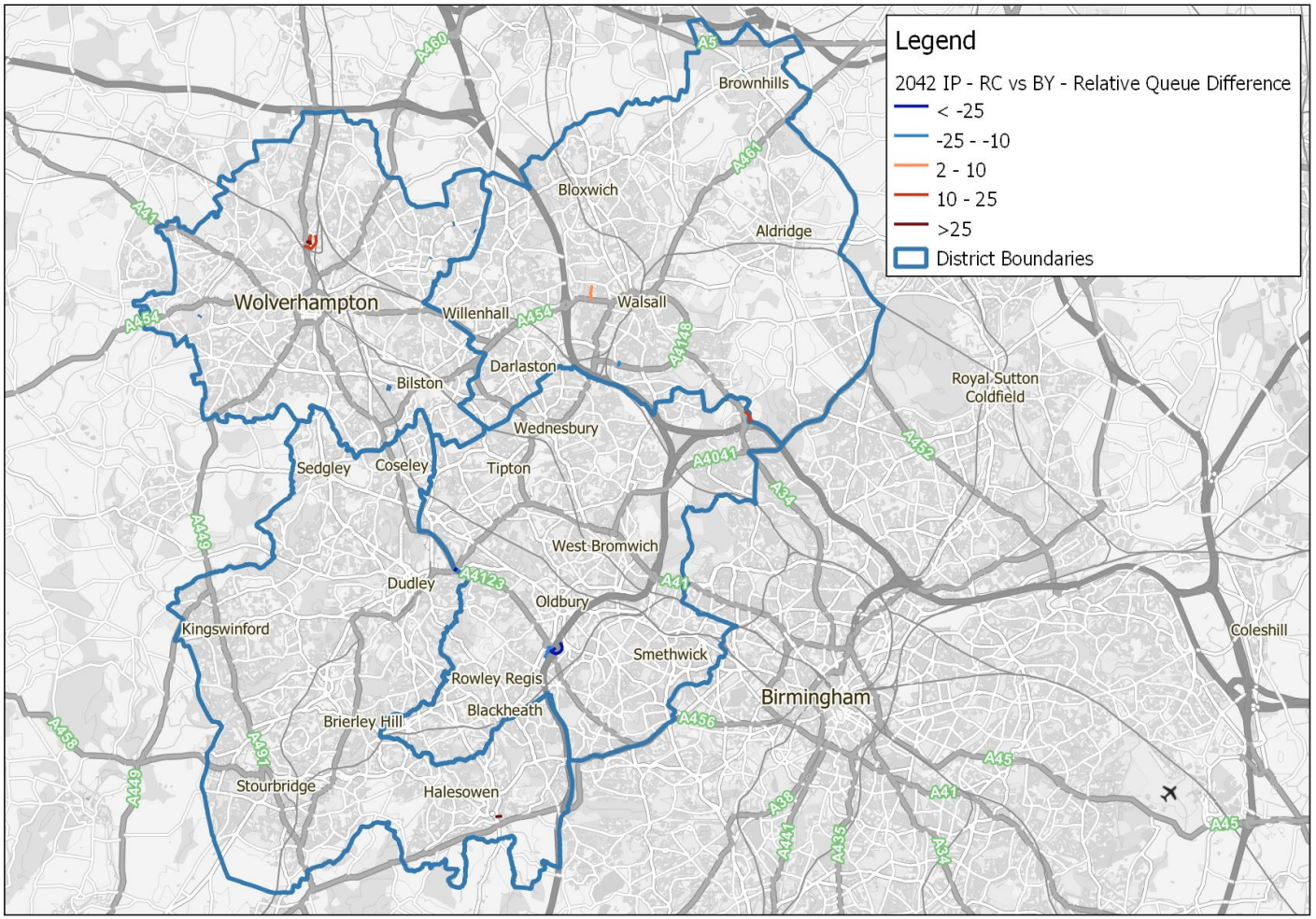
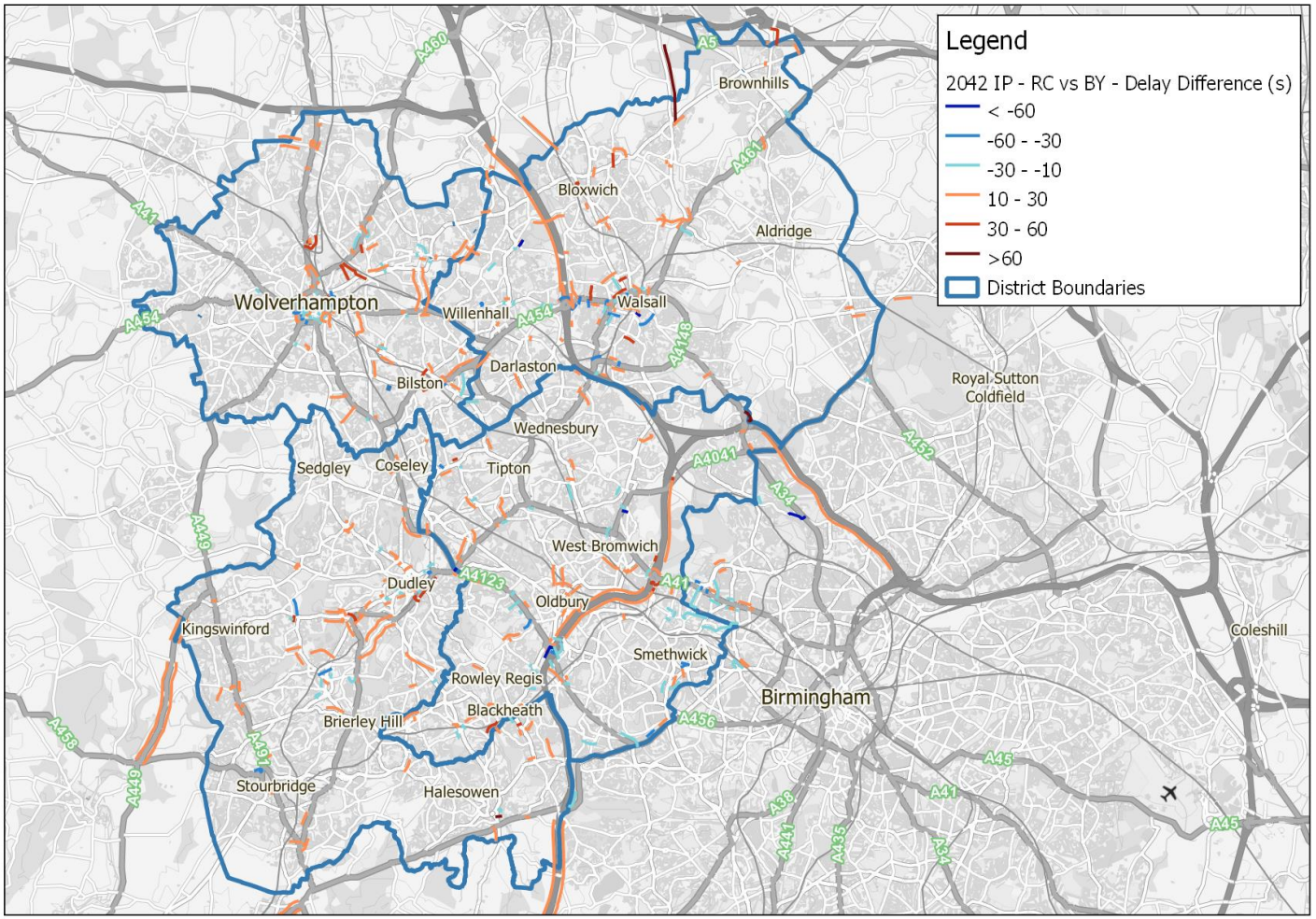


Figure 3-18: 2042 Reference Case vs 2019 Base Year Delay Difference for the IP period.



3.4.1.3 PM Results

Link Flow

In Figure 3-19, it can be seen that there is a general trend of increases in link flows as expected due to population growth, as seen in other time periods. These increases in flows are along sensible routes along the SRN, with most significant flow changes seen on the motorways, and some minor rerouting on local roads seen in some town centres. Figure 3-20 shows a more severe change in percentage link flow difference, with many major and minor links experiencing a change of 20%+. This plot should help to provide context on the growth in traffic flow in the committed Reference Case scenario, but is not fully analysed as part of this work.

VC

The change in link V/C is seen below in Figure 3-21, showing the impact of the flow difference changes. Similarly to the link percentage change plot, the impact appears severe, although this plot assesses all links, and not just those that are nearing or over the critical threshold of 85%.

When the links are filtered to only show those links which are over capacity in the Reference Case, it becomes clearer to see the main impacts of the baseline growth. Figure 3-22 shows that many of the key corridors within the Black Country can be expected to see increases in link saturation:

- Bloxwich to/from Walsall
- WB approach into Walsall
- Wolverhampton Ring Road
- Rowley Regis to Oldbury
- North of Brownhills
- Cinder Bank Island in Dudley
- M5 and M6
- A456 Manor Way

Relative Queue

Whilst there are large increases in link V/C seen, the impact of these changes are relatively minor, suggesting in many areas that the network is able to accommodate additional baseline flow. Figure 3-23 shows a similar reduction in queueing at M5 Junction 2, but increased queues at the A454/M6 junction in Walsall, A41/All Saints Way intersection and to A4041, and at Bushbury roundabout in Wolverhampton.

Delay

The link delay plot shown below in Figure 3-24 shows localised hotspots of delay increases, in most cases corresponding with increased queue lengths and V/C differences. Increases in delays seen are in most cases a realistic and expected impact of the growth assumptions made in the modelling.

Reductions in delay can be seen in Coseley and Dudley, likely due to rerouting seen in the link flow difference plots above. Major increases in delay of over a minute can be seen around A460 in Wolverhampton, Dudley, Brierley Hill and the B4154 entering Walsall from Staffordshire.

Figure 3-19: 2042 Reference Case vs 2019 Base Year Flow Difference for the PM period.

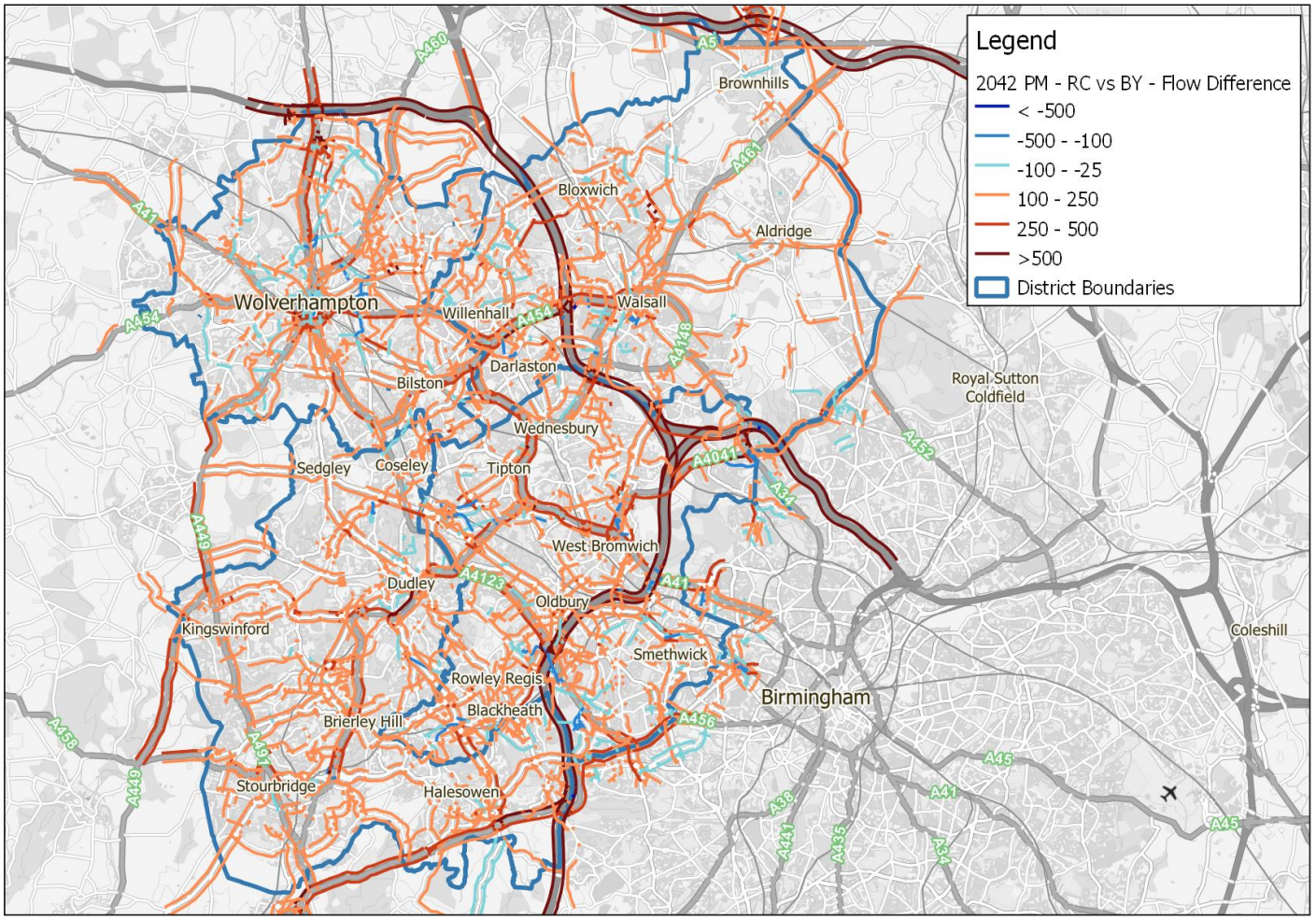


Figure 3-20: 2042 Reference Case vs 2019 Base Year Percentage Flow Difference for the PM period.

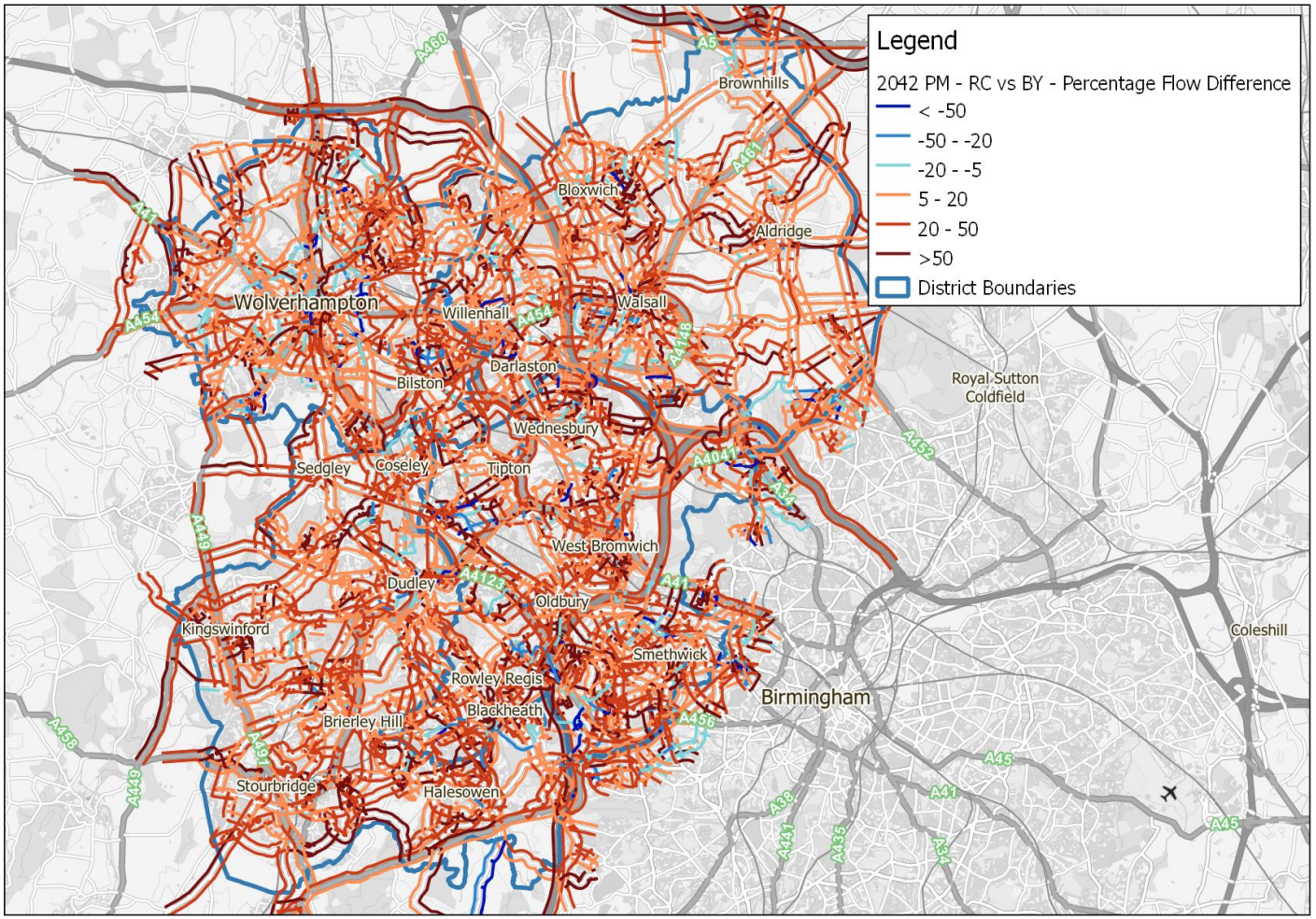


Figure 3-21: 2042 Reference Case vs 2019 Base Year Volume over Capacity Ratio Difference for the PM period.

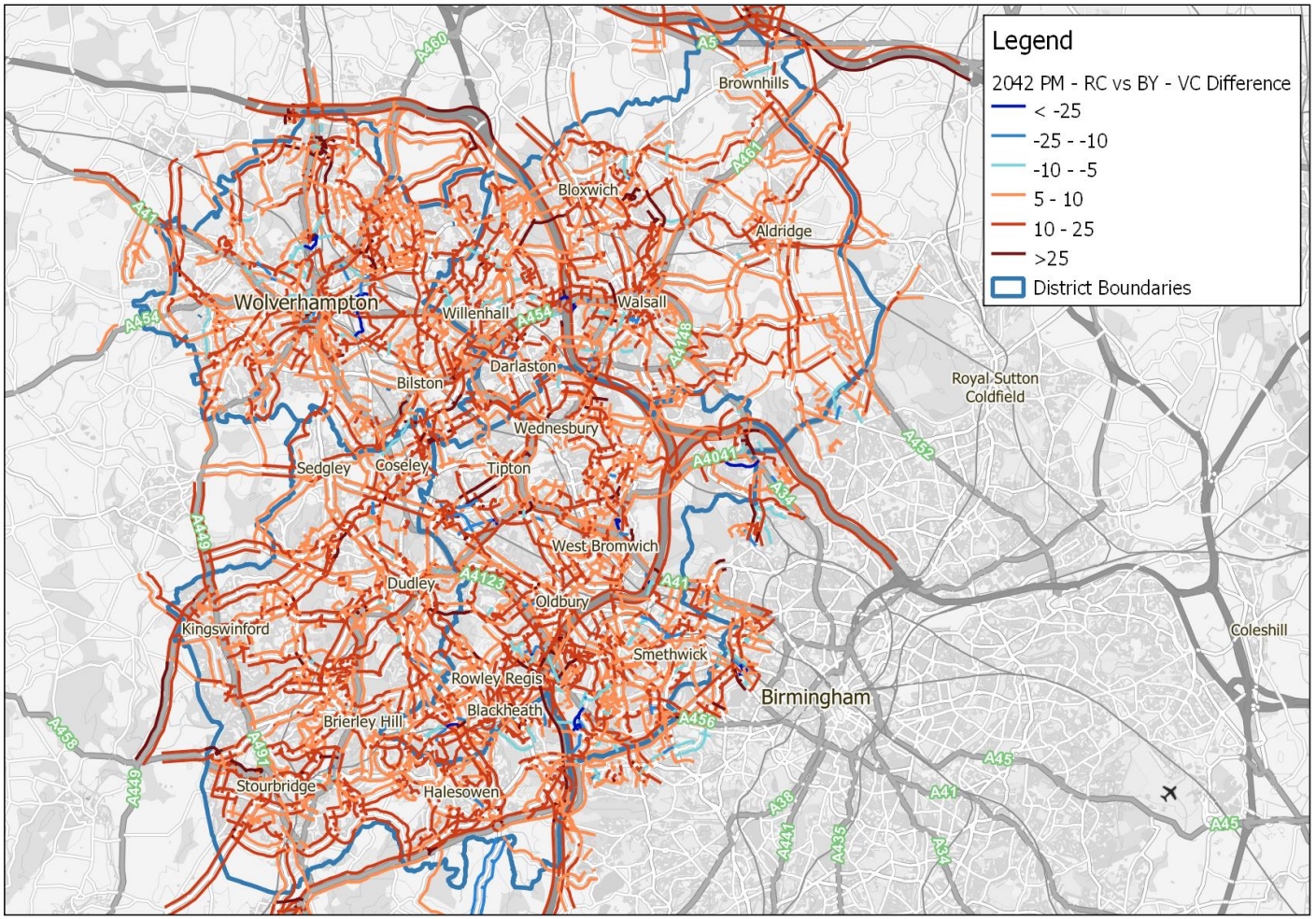


Figure 3-22: 2042 RC vs 2019 BY V/C Ratio Difference for the PM period. Links shown are over 85% V/C in the RC. Difference is in % of the Base Year.

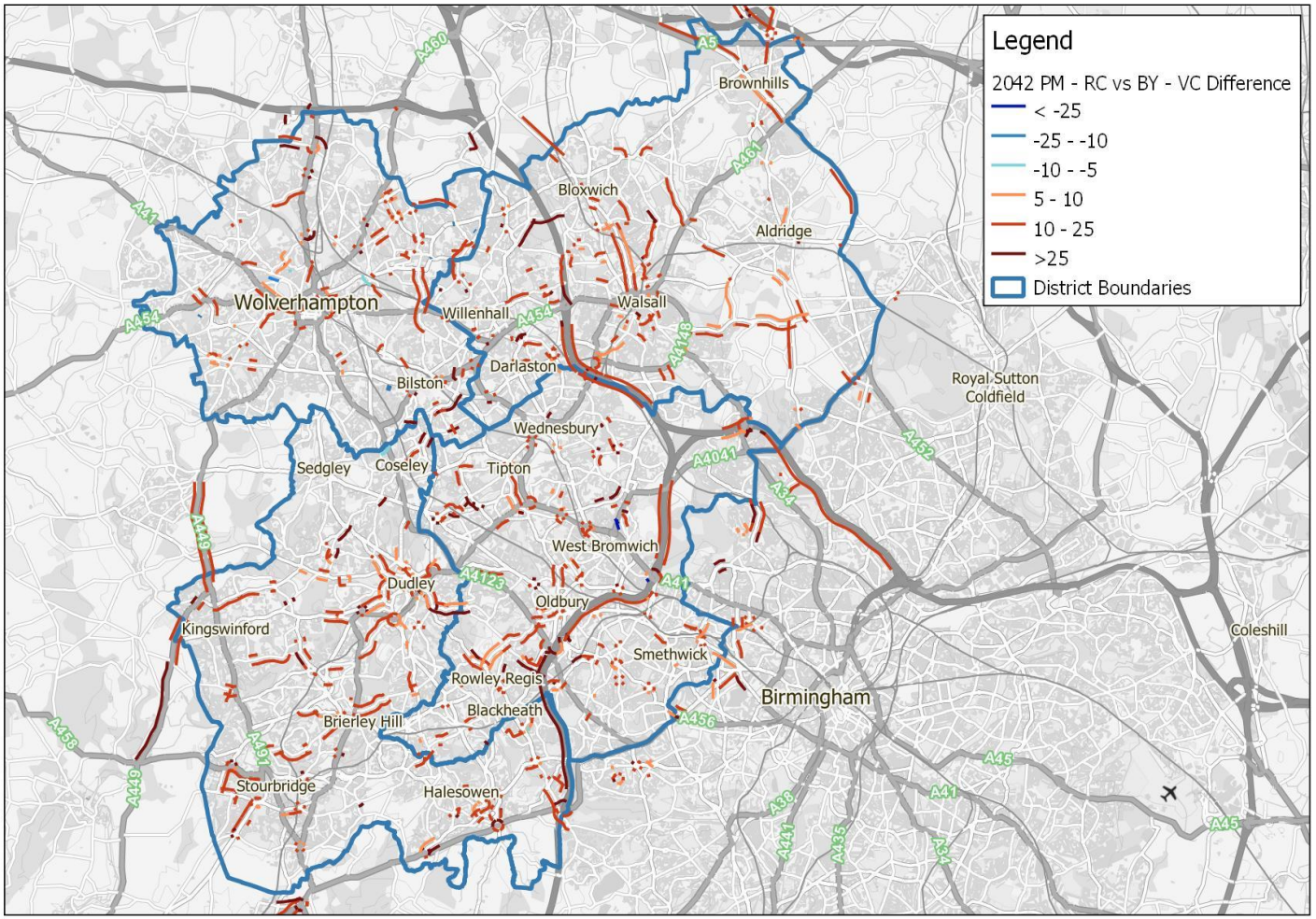


Figure 3-23: 2042 Reference Case vs 2019 Base Year Relative Queue Length Difference in % Link Saturation for the PM period.

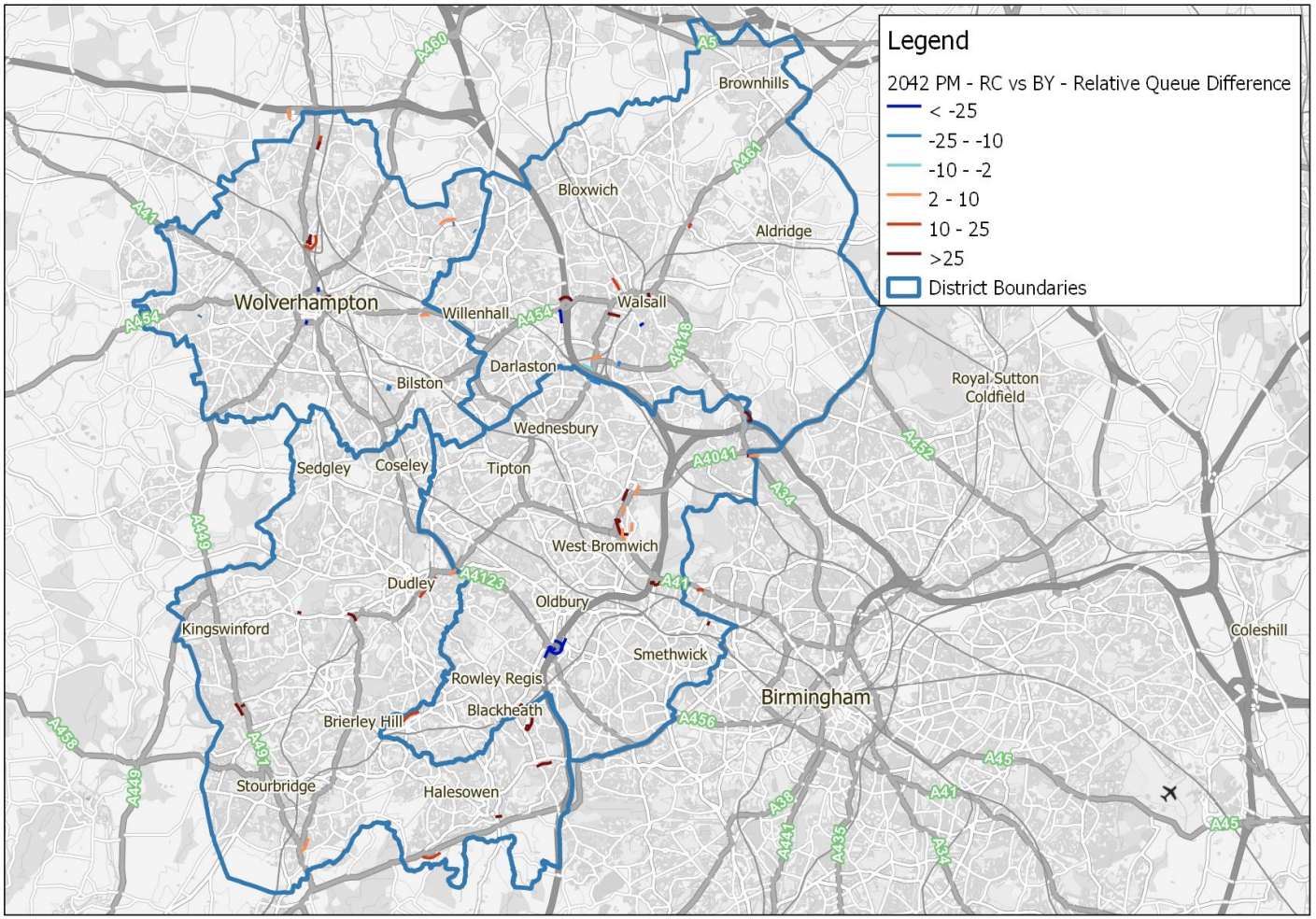
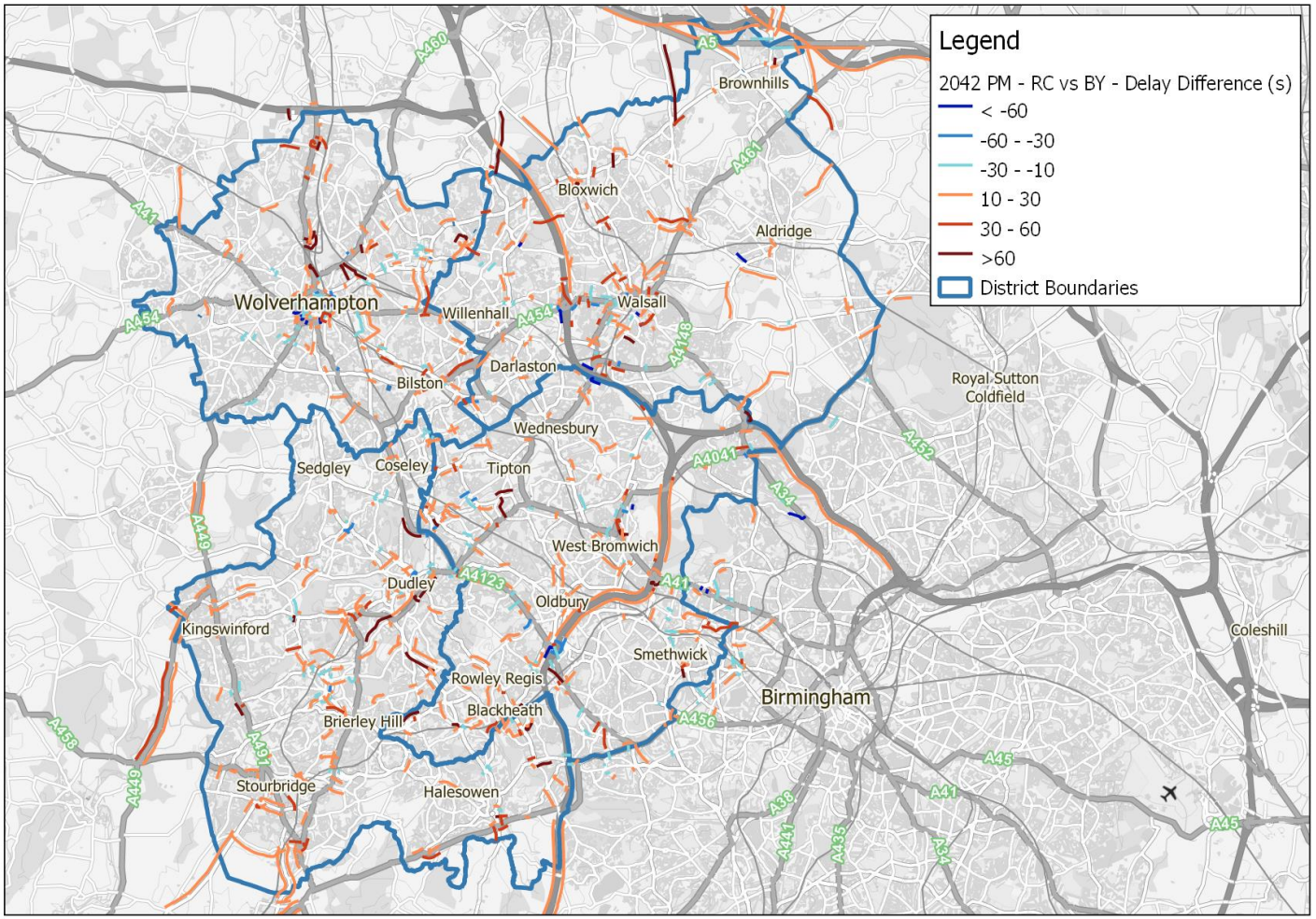


Figure 3-24: 2042 Reference Case vs 2019 Base Year Delay Difference for the PM period.



3.5 Summary

This project was not intended to analyse or mitigate the impacts of committed growth on network performance in PRISM. We have prepared the above plots to provide context for which areas of the Black Country will become more congested as a result of committed transport schemes and developments, and these plots should be reviewed in conjunction with the plots from the Do Minimum modelling.

As expected, 23 years of growth in the West Midlands in line with government projections (NTEM) results in a more congested network in the Reference Case than in the Base Year. Most of the hotspots identified are along the SRN, including the M5 and M6, but also on key transport corridors for Black Country residents including:

- The A4150, A4036 and A4123 in Wolverhampton;
- The A4148, A454 and A461 in Walsall,
- The A41 and A4123 in Sandwell and
- The A491 and A461 in Dudley.

Other major towns and settlements are also projected to experience an increase in flows and delays on key entry roads and thoroughfares, with Dudley, Wolverhampton, Walsall. Brierley Hill and West Bromwich showing increases in delays.

Overall, the network is considerably less congested than it was found in the previous Local Plan Reference Case, but this is primarily due to the level of constraint that is applied to housing growth in newer NTEM forecasts. The impact of this has meant that the overall network has fewer trips forecasted, reducing the projected delays and congestion.

4 Do Minimum

4.1 Introduction

In Local Plan modelling, the Do Minimum scenario is the scenario that contains the increased housing and employment demand set out by the Local Plan, without any transport mitigations.

4.2 Network Assumptions

For Do Minimum modelling for Local Plan, the network remains consistent with the Reference Case scenario, as only the changes in demand are being assessed. As such, the assumptions in Section 3.2 remain applicable.

4.3 Housing and Employment Assumptions

4.3.1 Development Uncertainty Log

To obtain updated housing and employment quanta, copies of the v34 Uncertainty Log were distributed to officers from the four Local Authorities within the Black Country. These logs were updated with new planning probabilities, development type, location and number of houses/jobs.

As the Local Plan demand is added on top of the existing Reference Case models, an exercise was undertaken to compare the two Uncertainty Logs (RC and DM), then adjust any sites that were previously included in the Reference Case to more accurately reflect the difference between Reference Case demand and Do Minimum demand.

Following this, the sites from the Local Plans were extracted and applied to PRISM's Population Segmentation Model to apply the necessary age and sex splits, and constrain to national growth forecasts. The constraint is discussed in Section 4.3.2 below.

The breakdown of demand is shown in Table 4-1 to Table 4-3 for housing, and Table 4-4 to Table 4-6 for employment.

Table 4-1: Local Plan Uncertainty Log housing development constraint to NTEM – 2019 to 2026

2019 to 2026												
District	NTEM 2019	NTEM 2026	Abs Growth	PRISM 2019	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	Local Plan
Birmingham	1,106,109	1,144,049	37,940	1,146,600	30,375	36,092	1.00	-	7,565	0.7%	37,940	-
Coventry	343,403	369,243	25,840	372,009	2,330	22,187	1.00	1.00	1,323	0.4%	25,840	-
Dudley	320,163	327,843	7,680	321,824	2,347	739	1.00	1.00	4,594	1.4%	9,912	2,232
Sandwell	322,278	334,868	12,590	328,683	5,139	2,002	1.00	1.00	5,449	1.7%	18,101	5,511
Solihull	212,514	222,255	9,741	216,736	5,193	5,876	1.00	0.77	-	0.0%	9,741	-
Walsall	276,842	286,561	9,719	285,694	3,524	3,351	1.00	1.00	2,844	1.0%	10,570	851
Wolverhampton	258,707	267,517	8,810	272,283	6,840	310	1.00	1.00	1,660	0.6%	11,394	2,584
WM Met	**2,840,017**	**2,952,336**	**74,380**	**2,943,829**	**55,748**	**70,558**			**23,435**		123,497	**11,178**

Table 4-2: Local Plan Uncertainty Log housing development constraint to NTEM – 2026 to 2036

2026 to 2036												
District	NTEM 2026	NTEM 2036	Abs Growth	PRISM 2026	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	Local Plan
Birmingham	1,144,049	1,174,093	30,044	1,184,539	410	40,055	1.00	0.74	-	0.0%	30,044	-
Coventry	369,243	395,992	26,749	397,850	-	8,625	1.00	1.00	18,124	4.6%	26,749	-
Dudley	327,843	334,643	6,800	331,736	5,104	1,013	1.00	1.00	683	0.2%	15,021	8,221
Sandwell	334,868	346,945	12,077	346,784	892	3,141	1.00	1.00	8,044	2.3%	23,033	10,956
Solihull	222,255	232,184	9,929	226,476	1,048	17,324	1.00	0.51	-	0.0%	9,929	-
Walsall	286,561	296,662	10,101	296,264	681	118	1.00	1.00	9,302	3.1%	25,498	15,397
Wolverhampton	267,517	275,947	8,430	283,676	333	636	1.00	1.00	7,461	2.6%	16,082	7,652
WM Met	**2,952,336**	**3,056,466**	**104,130**	**3,067,327**	**8,468**	**70,913**			**43,613**		146,356	**42,226**

Table 4-3: Local Plan Uncertainty Log housing development constraint to NTEM – 2036 to 2042

2036 to 2042												
District	NTEM 2036	NTEM 2042	Abs Growth	PRISM 2036	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	Local Plan
Birmingham	1,174,093	1,189,812	15,719	1,214,583	-	10,421	1.00	1.00	5,298	0.4%	15,719	-
Coventry	395,992	409,893	13,901	424,599	-	-	1.00	-	13,901	3.3%	13,901	-
Dudley	334,643	339,051	4,408	346,757	106	-	1.00	-	4,302	1.2%	12,271	7,863
Sandwell	346,945	353,468	6,523	369,817	42	834	1.00	1.00	5,647	1.5%	11,398	4,875
Solihull	232,184	237,212	5,028	236,405	-	8,443	1.00	0.60	-	0.0%	5,028	-
Walsall	296,662	302,814	6,152	321,762	-	-	1.00	-	6,152	1.9%	6,152	-
Wolverhampton	275,947	280,677	4,730	299,759	4	-	1.00	-	4,726	1.6%	10,337	5,607
WM Met	**3,056,466**	**3,112,927**	**56,461**	**3,213,683**	**152**	**19,699**			**40,025**		56,461	74,807

Table 4-4: Local Plan Uncertainty Log employment development constraint to NTEM – 2019 to 2026

2019 to 2026												
District	NTEM 2019	NTEM 2026	Abs Growth	PRISM 2019	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	**Local Plan**
Birmingham	544,056	572,106	28,050	514,768	17,175	21,782	1.00	0.50	-	0.0%	28,050	**0**
Coventry	163,288	171,809	8,521	163,923	-	22,478	-	0.38	-	0.0%	8,521	**0**
Dudley	135,419	140,848	5,429	114,192	516	314	1.00	1.00	4,599	4.0%	5,392	**-37**
Sandwell	137,330	142,124	4,794	124,531	-	1,460	-	1.00	3,335	2.7%	17,542	**12748.44**
Solihull	111,917	117,794	5,877	140,739	12,370	-	0.48	-	-	0.0%	5,877	**0**
Walsall	114,628	119,185	4,557	102,536	8,122	5,596	0.56	-	-	0.0%	4,557	**0**
Wolverhampton	119,196	124,013	4,817	109,576	9,221	1,820	0.52	-	-	0.0%	3,245	**-1572.5**
WM Met	1,325,834	1,387,879	62,045	1,270,264	47,403	53,448			7,934	0	73,184	**11138.94**

Table 4-5: Local Plan Uncertainty Log employment development constraint to NTEM – 2026 to 2036

2026 to 2036												
District	NTEM 2026	NTEM 2036	Abs Growth	PRISM 2026	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	**Local Plan**
Birmingham	572,106	585,996	13,890	542,817	-	11,643	-	-	13,890	2.6%	13,890	**0.00**
Coventry	171,809	175,982	4,173	172,444	-	17,957	-	0.23	-	0.0%	4,173	**0.00**
Dudley	140,848	144,267	3,419	119,621	-	-	-	-	3,419	2.9%	3,749	**330.00**
Sandwell	142,124	145,575	3,451	129,325	-	390	-	1.00	3,061	2.4%	6,145	**2694.00**
Solihull	117,794	120,652	2,858	146,615	17,689	-	0.16	-	-	0.0%	2,858	**0.00**
Walsall	119,185	122,079	2,894	107,093	3,565	5,596	0.81	-	-	0.0%	4,944	**2049.78**
Wolverhampton	124,013	127,022	3,009	114,393	9,959	3,855	0.30	-	-	0.0%	8,498	**5488.50**
WM Met	1,387,879	1,421,573	33,694	1,332,309	31,213	39,440			20,370	0	44,256	**10562.28**

Table 4-6: Local Plan Uncertainty Log employment development constraint to NTEM – 2036 to 2042

2036 to 2042												
District	NTEM 2036	NTEM 2042	Abs Growth	PRISM 2036	UL NC Growth	UL MTL Growth	UL NC Factor	UL MtL Factor	Extra for NTEM needed?	Additional Spread	PRISM Revised Growth	**Local Plan**
Birmingham	585,996	588,845	2,849	556,707	-	11,643	-	-	2,849	0.5%	2,849	**-**
Coventry	175,982	176,838	856	176,617	-	13,784	-	0.06	-	0.0%	856	**-**
Dudley	144,267	144,971	704	123,040	-	-	-	-	704	0.5718%	869	**165**
Sandwell	145,575	146,282	707	132,776	-	-	-	-	707	0.5%	707	**-**
Solihull	120,652	121,238	586	149,473	17,742	-	0.03	-	-	0.0%	586	**-**
Walsall	122,079	122,672	593	109,987	671	5,596	0.88	-	-	0.0%	593	**-**
Wolverhampton	127,022	127,641	619	117,402	9,050	3,855	0.07	-	-	0.0%	999	**380**
WM Met	1,421,573	1,428,486	6,913	1,366,003	27,463	34,877			4,260		7,458	**545**

The figures above have been summarised in Table 4-7, showing the growth in population, and Table 4-8, showing the growth in employment.

Table 4-7: Comparison of Reference Case and Do Minimum housing growth for 2036 and 2042

Population Growth from 2019	Reference Case		Do Minimum		Local Plan (DM – RC)	
Local Authority	2036	2042	2036	2042	2036	2042
Birmingham	67,984	83,703	67,984	83,703	0	0
Coventry	52,589	66,490	52,589	66,490	0	0
Dudley	14,480	18,888	24,933	37,204	10,453	18,316
Sandwell	24,667	31,190	41,134	52,532	16,467	21,342
Solihull	19,670	24,698	19,670	24,698	0	0
Walsall	19,820	25,972	36,068	42,220	16,248	16,248
Wolverhampton	17,240	21,970	27,476	37,813	10,236	15,843
West Midlands	178,510	234,971	269,853	326,314	91,343	91,343

Table 4-8: Comparison of Reference Case and Do Minimum employment growth (jobs) for 2036 and 2042

Employment Growth from 2019	Reference Case		Do Minimum		Local Plan (DM – RC)	
Local Authority	2036	2042	2036	2042	2036	2042
Birmingham	41,940	44,789	41,940	44,789	0	0
Coventry	12,694	13,550	12,694	13,550	0	0
Dudley	8,848	9,552	9,141	10,010	293	458
Sandwell	8,245	8,952	23,687	24,394	15,442	15,442
Solihull	8,735	9,321	8,735	9,321	0	0
Walsall	7,451	8,044	9,501	10,094	2,050	2,050
Wolverhampton	7,826	8,445	11,743	12,742	3,917	4,297
West Midlands	95,739	102,652	117,440	124,898	21,701	22,246

4.3.2 Method to Constrain to TEMPro/NTEM

As the Reference Case demand is already constrained to TEMPro, adding the Local Plan demand on top of this would not result in the model assigning increased traffic within the Black Country; instead, there would be the same level of demand redistributed according to where additional developments are found.

To raise the level of constraint within the Black Country, we have suppressed the growth in the “Outer Shires” area of the PRISM model proportionally (according to growth within these shires) by the same amount as the proposed

Local Plan growth, and reallocated this NTEM growth to the Black Country to accommodate the additional developments. It is important to note that the Outer Shires will still experience growth, but at a lower rate than in the Reference Case.

The impact of the adjusted growth on the Outer Shires can be seen in Table 4-9 for housing and Table 4-10 for employment.

Table 4-9: Do Minimum changes in NTEM housing constraint at Outer Shire level to accommodate additional growth in the Black Country

District	NTEM 2019	NTEM 2042	Abs Growth	PRISM 2019	Proportion of total	Apply shortfall	**Reduction in NTEM for Local Plan**	**PRISM Local Growth (adj)**	**Growth Factor (adj)**
Newcastle-under-Lyme	126,624	135,098	8,474	129,483	5.22%	-	957.76	**7,516**	**1.0580**
Stoke-on-Trent	254,107	264,363	10,256	256,203	6.32%	-	1,159.13	**9,096**	**1.0355**
Staffordshire Moorlands	98,536	101,906	3,370	98,691	2.08%	-	380.89	**2,989**	**1.0303**
East Staffordshire	118,888	132,654	13,766	119,471	8.48%	-	1,555.91	**12,210**	**1.1022**
Stratford-on-Avon	129,054	154,756	25,701	130,216	15.83%	-	2,904.85	**22,796**	**1.1751**
Malvern Hills	78,268	89,880	11,611	78,295	7.15%	-	1,312.36	**10,299**	**1.1315**
Wychavon	126,262	149,445	23,184	129,403	14.28%	-	2,620.30	**20,563**	**1.1589**
Shropshire-Telford	320,678	364,179	43,501	324,806	26.80%	-	4,916.65	**38,584**	**1.1188**
Herefordshire, County of	190,424	212,879	22,454	192,879	13.83%	-	2,537.86	**19,916**	**1.1033**
Shire Outer Districts	1,442,842	1,605,160	162,317	1,459,447	100%	-	18,345.71	**143,971**	

Table 4-10: Do Minimum changes in NTEM employment constraint at Outer Shire level to accommodate additional growth in the Black Country

District	NTEM 2019	NTEM 2042	Abs Growth	PRISM 2019	Proportion of total	Apply shortfall	**Reduction in NTEM for Local Plan**	**PRISM Local Growth (adj)**	**Growth Factor (adj)**
Newcastle-under-Lyme	54,122	58,266	4,143	44,790	7.03%	-	38.31	**4,105**	**1.0917**
Stoke-on-Trent	125,756	136,142	10,386	118,181	17.62%	-	96.03	**10,290**	**1.0871**
Staffordshire Moorlands	38,764	42,022	3,258	29,301	5.53%	-	30.12	**3,228**	**1.1102**
East Staffordshire	66,144	71,518	5,374	60,047	9.12%	-	49.69	**5,325**	**1.0887**
Stratford-on-Avon	70,827	76,745	5,917	70,390	10.04%	-	54.71	**5,862**	**1.0833**
Malvern Hills	34,956	37,971	3,015	28,830	5.12%	-	27.88	**2,987**	**1.1036**
Wychavon	60,580	65,787	5,207	51,558	8.83%	-	48.14	**5,159**	**1.1001**
Shropshire-Telford	160,784	174,431	13,648	120,187	23.15%	-	126.18	**13,521**	**1.1125**
Herefordshire, County of	96,081	104,078	7,997	74,996	13.57%	-	73.94	**7,923**	**1.1057**
Shire Outer Districts	708,015	766,960	58,946	598,279	100%	-	545.00	**4,105**	

4.3.3 Notable PSM Adjustments

4.3.3.1 Employment Splits

As the employment type for every Local Plan development was not specified, the Reference Case “Service and Retail” split, which apportions jobs into a number of different categories such as Industrial, Warehouse, Office, Commercial and Mixed was assumed to remain consistent at a zonal level for the Do Minimum scenario.

4.3.3.2 Age/Sex Splits

Where age and sex splits were not available from the base year data (for example, as a zone changes from employment to residential or mixed), a similar zone within the same district was used as a proxy. This only occurs in one zone in the Black Country, and one zone in Solihull.

4.3.3.3 Extreme Growth Zones

In order to prevent unrealistic growth in trips in the demand model process, PRISM includes a set of rules, developed to identify “extreme” growth zones, as follows:

- Population or job growth exceeds 500%
- Population growth > 2500 and base population < 2500
- Job growth > 2500 and base jobs < 2500

In these cases, the pivot in PRISM is forced to use additive growth rather than multiplicative growth.

We present the number of identified zones for Reference Case and Do Minimum below in Table 4-11.

Table 4-11: Extreme Growth Zones

Year	Reference Case Number	Reference Case List	Local Plan Number	Local Plan List (with RC Removed)
2036	15	1191, 1201, 1292, 1512, 1525, 1527, 2081, 2206, 2220, 3153, 3223, 4181, 4307, 5212, 7174	20	3123, 4123, 4301, 7184, 7312
2042	16	1093, 1191, 1201, 1292, 1512, 1525, 1527, 2081, 2206, 2220, 3153, 3223, 4181, 4307, 5212, 7174	26	3123, 3131, 4123, 4301, 7172, 7184, 7307, 7309, 7311, 7312

4.4 Model Results

4.4.1 Horizon Year: 2042

The actual link flow and actual link delay plots are included below to provide context for the expected movement of traffic around the Black Country at the horizon year of the Local Plans. These can be used alongside the flow difference plots presented in Section 4.5/

4.4.1.1 Link Flow

AM

The link flow plot shown in Figure 4-1 helps to visualise the most heavily used roads in the Black Country in the forecast year. As expected, motorways are the busiest links, carrying trips inside the Black Country and accounting for more long-distance trips as well. The A roads that intersect the Black Country are then the next most used links, with those intersecting the motorway such as the A4123, A4041 and A454 also seeing high traffic flows. Routes connecting the major settlements like Wolverhampton, Walsall, Dudley, Wednesbury and Oldbury also show high traffic movements.

IP

Figure 4-3 shows similar patterns to the AM, with the major roads on the SRN showing the highest traffic volumes. The overall demand on the network is lower, explaining why the A roads mentioned earlier are less visible in this plot, but key corridors can still be seen including the A4041, A456, A449 and A34.

PM

As in the AM, PM link flow presented in Figure 4-5 shows a higher volume of traffic flow than the IP, with the M5 and M6 showing high traffic flows. The A461 and A41 between Dudley and West Bromwich show particularly high flows, as does the A454 between Bilston and Walsall, and the A456 at Quinton Interchange.

4.4.1.2 Link Delay

AM

The link delay plot shown in Figure 4-2 shows some pockets of delays, with many links experiencing delays of between 10 and 30 seconds. This is not an inaccurate representation of traffic movement across the Black Country in the AM already, although areas with longer delays should be investigated further. Great Barr Interchange and M6 J10 show high delays, whilst delays in the urban centres of Dudley, Walsall and Wolverhampton are expected due to the high volume of trips these areas will generate in the AM peak.

IP

Figure 4-4 shows that there are areas in the model which are congested in this time period, specifically around urban areas like Brierley Hill, Smethwick and Black Heath. Walsall and Wolverhampton outskirt areas also experience delays of over 60 seconds in places, suggesting some investigation should be done to help alleviate congestion in the future, although at this point it is not yet clear whether these are background growth impacts or caused by the Local Plans.

PM

The PM link delay plot shown in Figure 4-6 highlights many of the same areas as IP and AM. Most of these areas are either intersections of major A roads, like the Wolverhampton Ring Road, A461/A4148 and A4123/A463 but also around towns like Stourbridge, Smethwick, Brierley Hill and Bilston. Delays on some minor arms of junction intersections will be looked at, to investigate whether minor signal changes can help to alleviate congestion. An example of this can be seen on the A4123 west of Oldbury.

Figure 4-1: Modelled traffic flow in the 2042 Do Minimum AM Model.

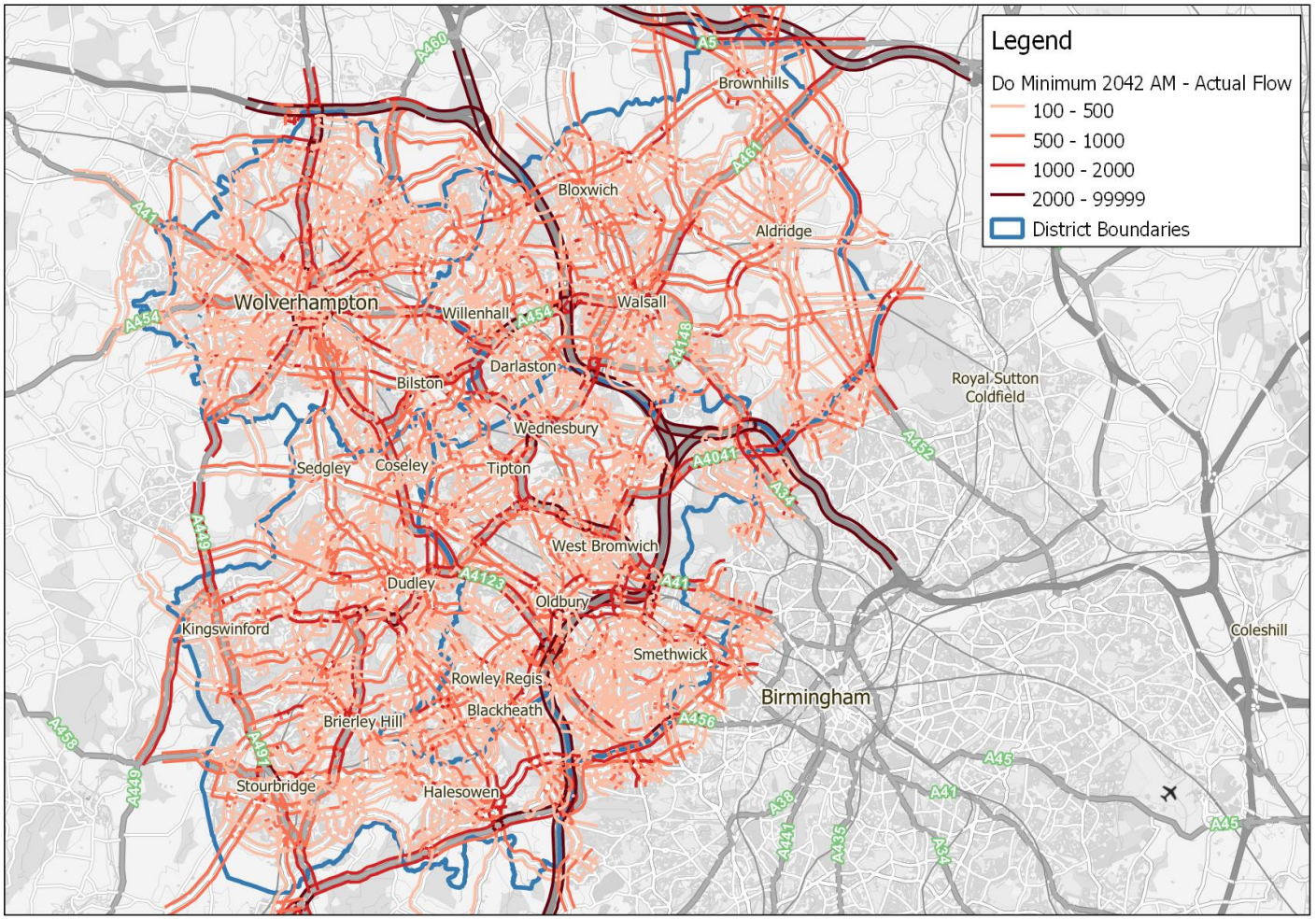


Figure 4-2: Modelled Link Delay in seconds for the 2042 Do Minimum AM Model.

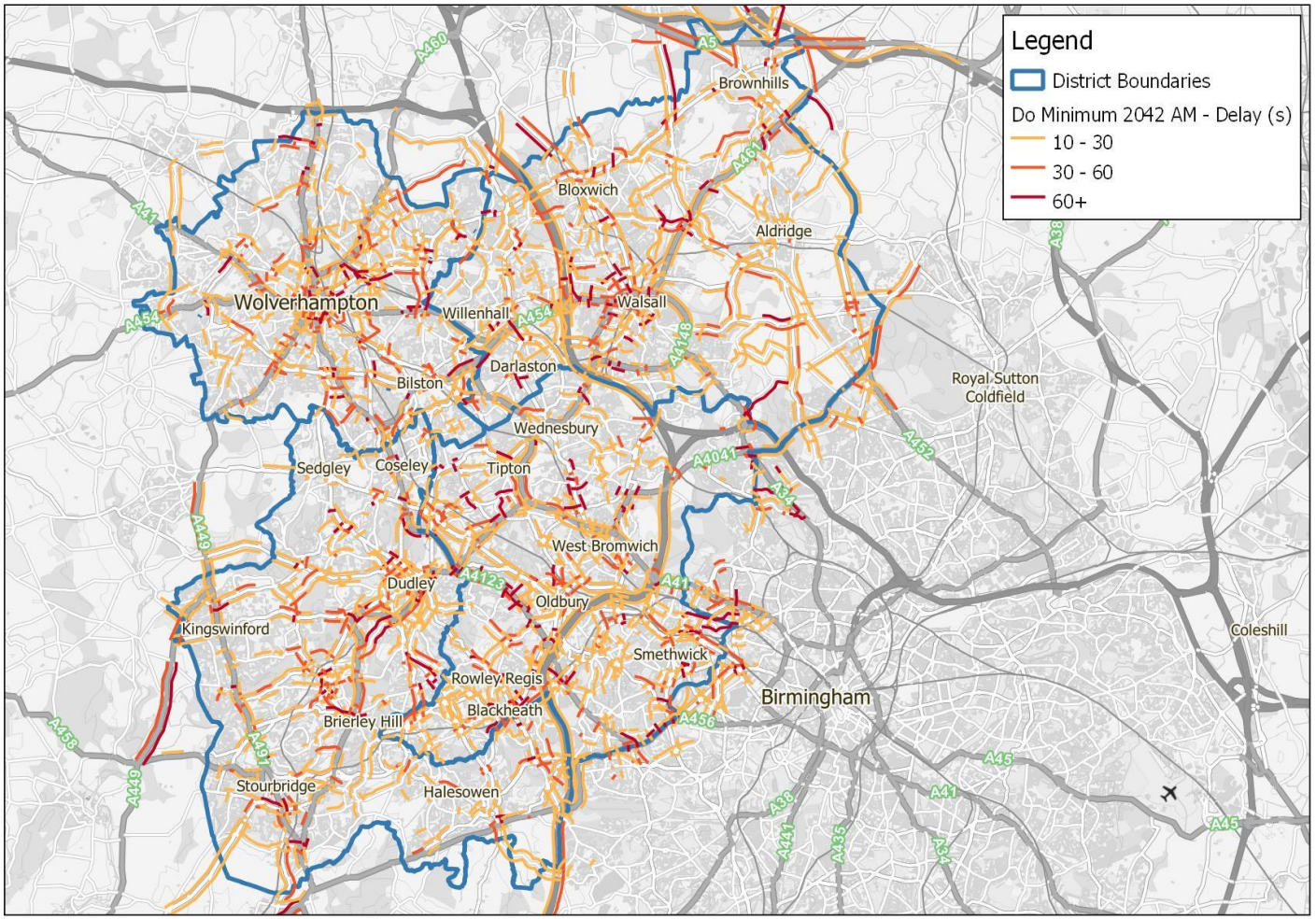


Figure 4-3: Modelled traffic flow in the 2042 Do Minimum IP Model.

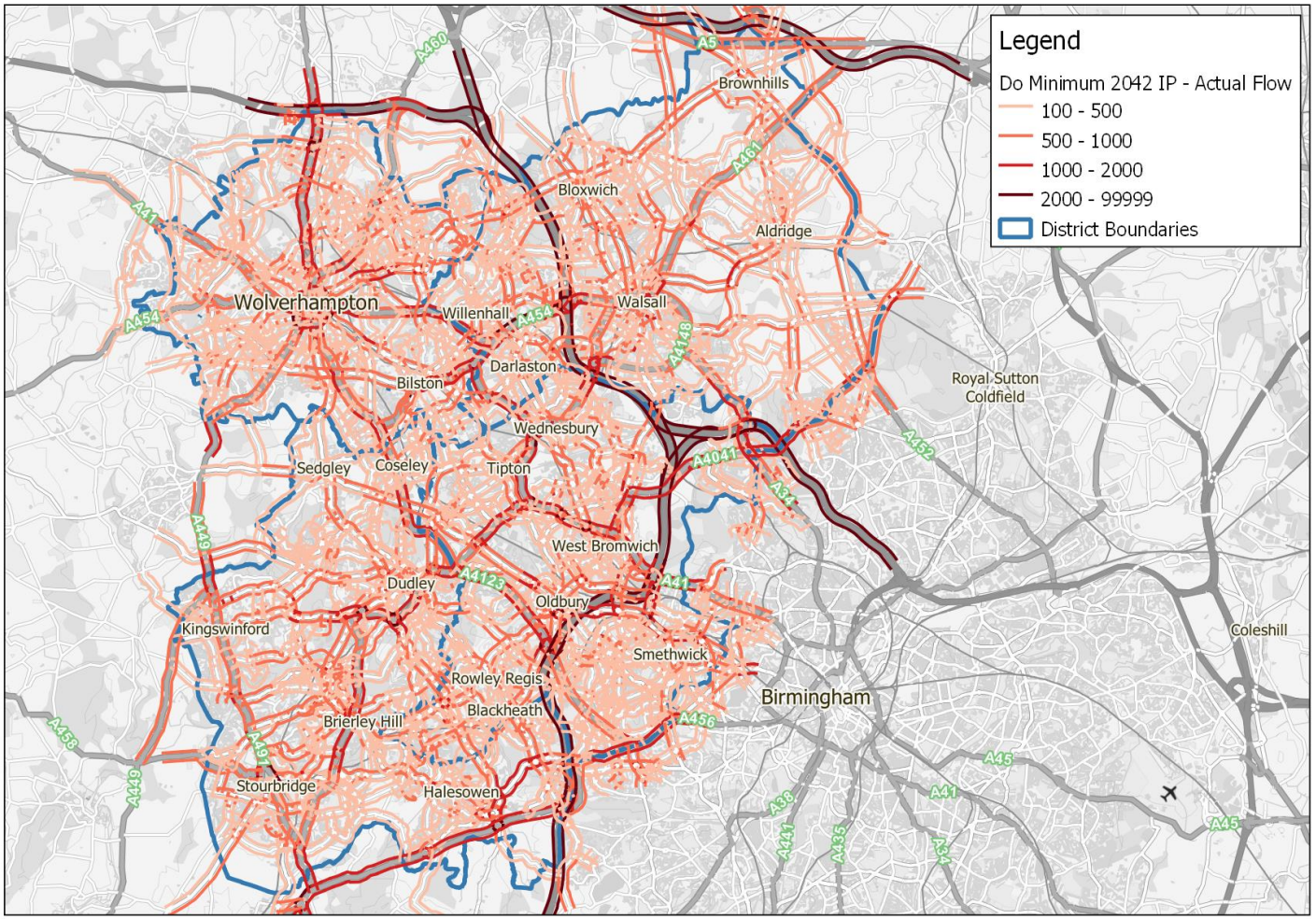


Figure 4-4: Modelled Link Delay in seconds for the 2042 Do Minimum IP Model.

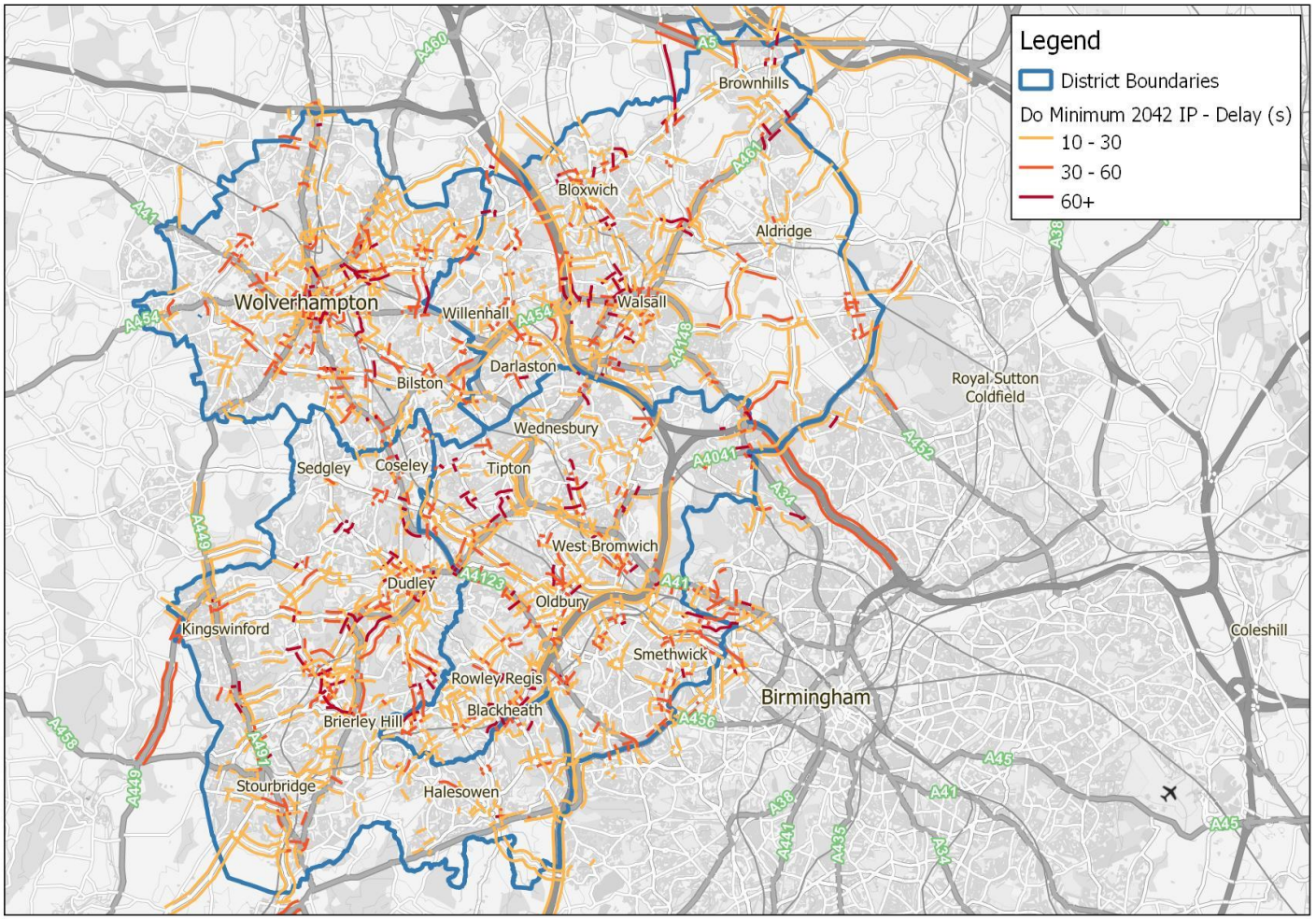


Figure 4-5: Modelled traffic flow in the 2042 Do Minimum PM Model.

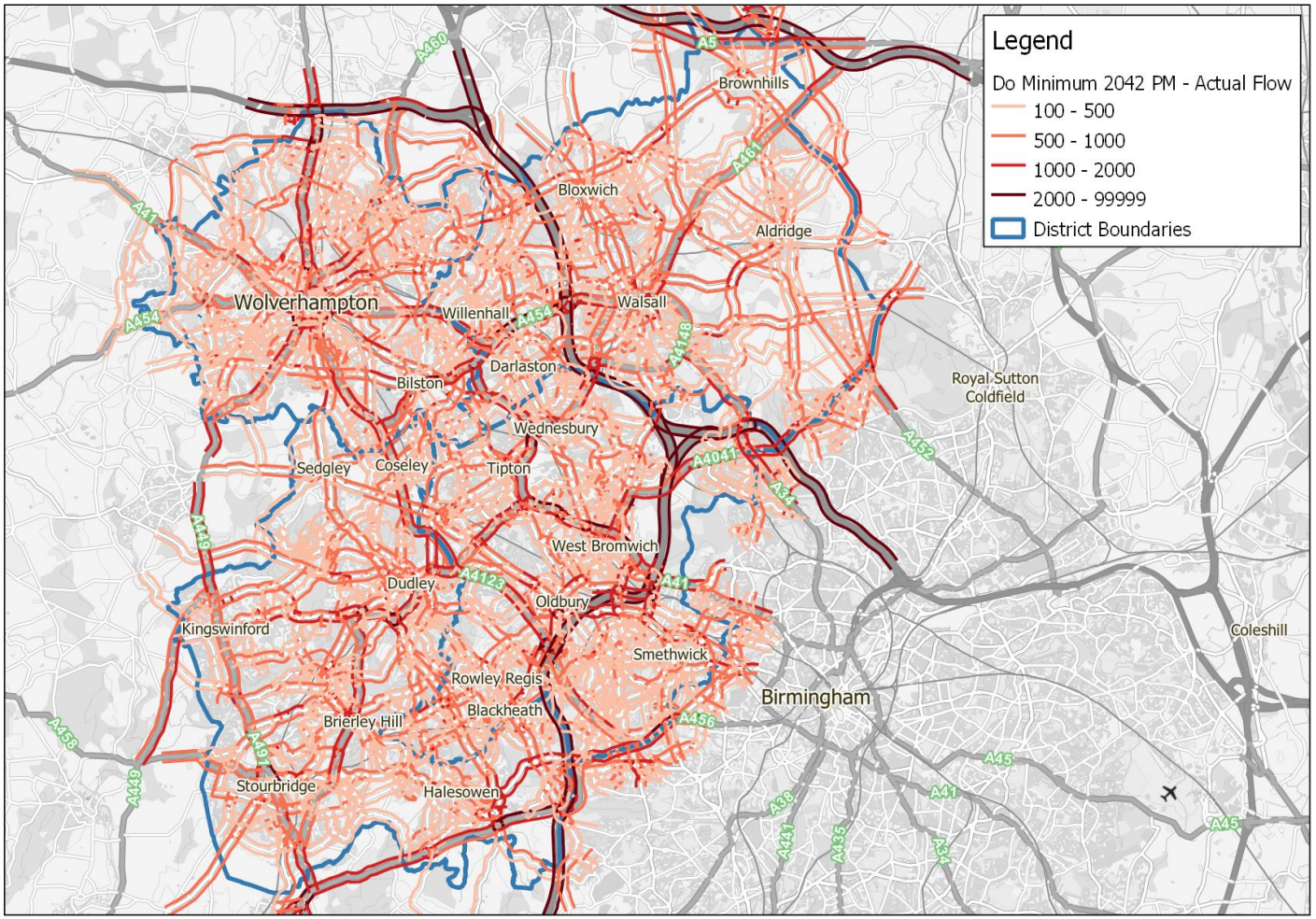
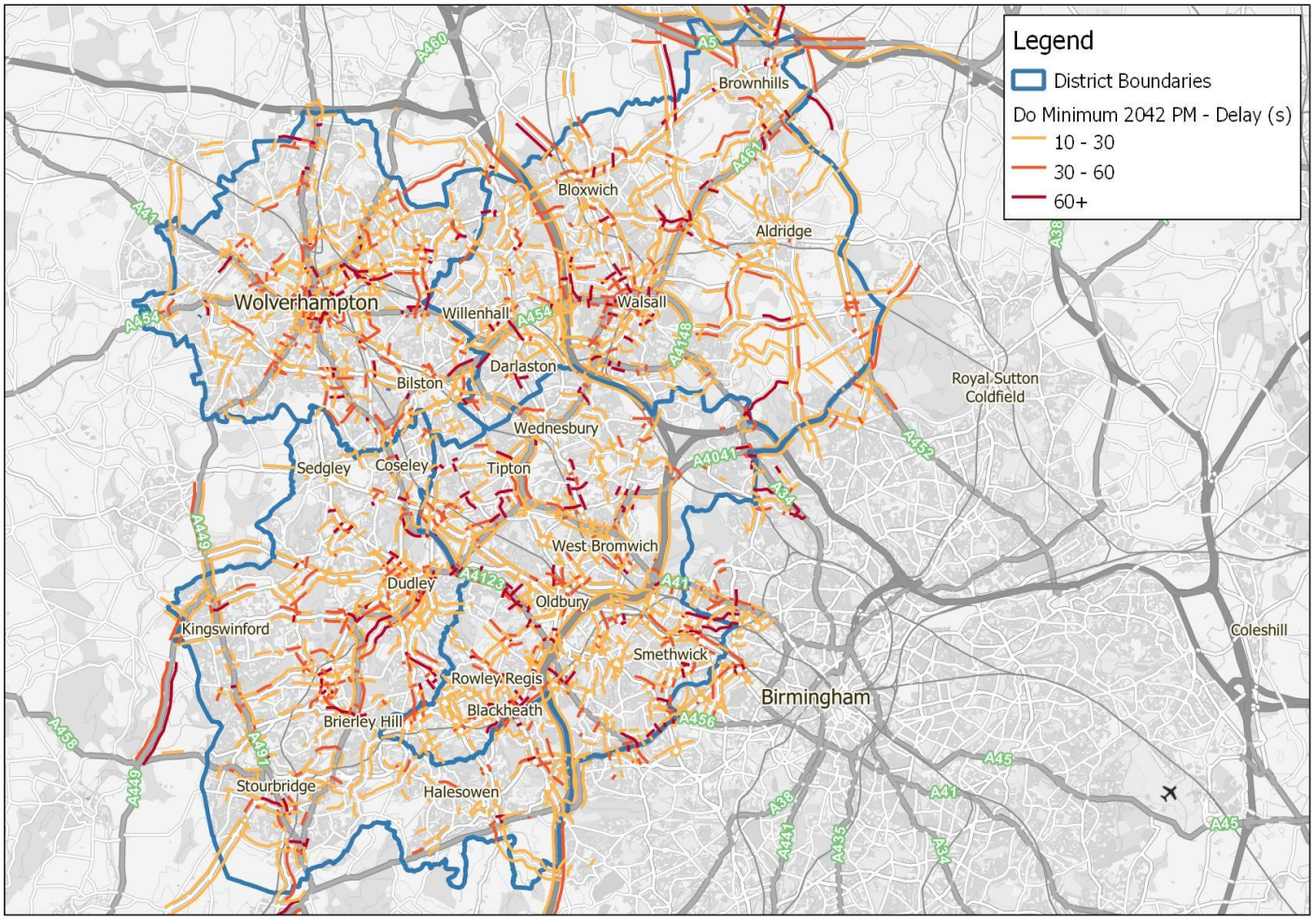


Figure 4-6: Modelled Link Delay in seconds for the 2042 Do Minimum PM Model.



4.5 Comparison against Reference Case

The Do Minimum results are shown below, compared against the Reference Case (both 2042). These plots should help to highlight areas of the model where increases in traffic flow, caused by development sites identified in the Local Plans, require mitigation to improve network performance. As the Do Minimum contains the same network as the Reference Case, but with increased demand, the areas that show increased delay, V/C or queueing can indicate where traffic meets pinch points, and therefore where investment may be required.

4.5.1 Horizon Year: 2042

Model results are presented for the whole of the Black Country and arranged to explain logically the impacts of each model result on the reported analysis. For larger plots focused on the individual districts, please refer to the appendices.

Link flow difference is presented for the 2042 Do Minimum model against the 2042 Reference Case model. They should be analysed alongside the percentage flow difference plots, which provide context for the proportional change in vehicular flow.

Link flow then contributes in part to Link Volume over Capacity, which is a measure of how congested a link is. The capacity within the model provides a maximum number of vehicles that can be using a link, and the ratio of the links volume against its capacity can be used to determine how busy a road is. Typically, a value of above 85% is considered to demonstrate moderate congestion.

As part of the link V/C ratio, we are also reporting on link relative queue length difference. This is a standard VISUM output which shows how much of a link is blocked back by queue as a proportion of its length. This can help to highlight junctions with large delays on one or more arms, as links further back from the junction will show blocking back.

The combined impact of link flow, link V/C and link relative queue is then shown in the link delay difference plots. These are provided in seconds and show the delay experienced by an average vehicle in the time period. Some delays are expected due to signalised junctions and the volume of traffic within PRISM, but delay differences can be used to identify areas within the model that are being severely adversely impacted by vehicular flow increases.

4.5.1.1 AM Model Results

Link Flow

In Figure 4-7, it can be seen that there is a general trend of increases in link flows as expected due to the spread of population change discussed earlier in the housing and employment assumptions. More significant changes in flow can be seen around Oldbury on the M5, around West Bromwich and Around Wolverhampton, particularly on the eastern side. Figure 4-8 shows the percentage change in flows against the Reference Case, with several isolated links showing an increase in flow of 50%+. West Bromwich centre, Wolverhampton centre and northwest, and Bloxwich are all hotspots for flow change in terms of percentage increase.

VC

The change in link V/C is seen below in Figure 4-9, showing the impact of the flow difference changes. When the links are filtered to retain only DM links with a V.C ratio greater than 85%, as in Figure 4-10, key areas with increased congestion can be seen:

- Horseley (Wolverhampton)
- A454
- A460
- A41
- A4037 (Tipton)
- A4123
- A456

Relative Queue

On the whole, there are minimal changes to queue lengths seen in the Black Country. Figure 4-11 shows that only a few links experience an increase in congestion, often coinciding with the V/C issues discussed above: the A4123 in Oldbury, the A449 in Wolverhampton, the A41 near Wednesbury and the A34 on the boarder of Sandwell and Walsall.

Delay

The link delay plot shown below in Figure 4-12 shows, in general, small delay changes across the whole of the Black Country. Where delays are seen, they usually correspond with link V/C or queue length areas identified above. This suggests that some key corridors across the Black Country may struggle to facilitate additional Local Plan demand to the level that has been proposed, at least without minor interventions. Urban areas, and entry routes into the Black Country are most likely to be impacted. It is not expected that large-scale traffic mitigation schemes would be required when public transport and active modes are considered.

Figure 4-7: 2042 Do Minimum vs 2042 Reference Case Flow Difference for the AM period.

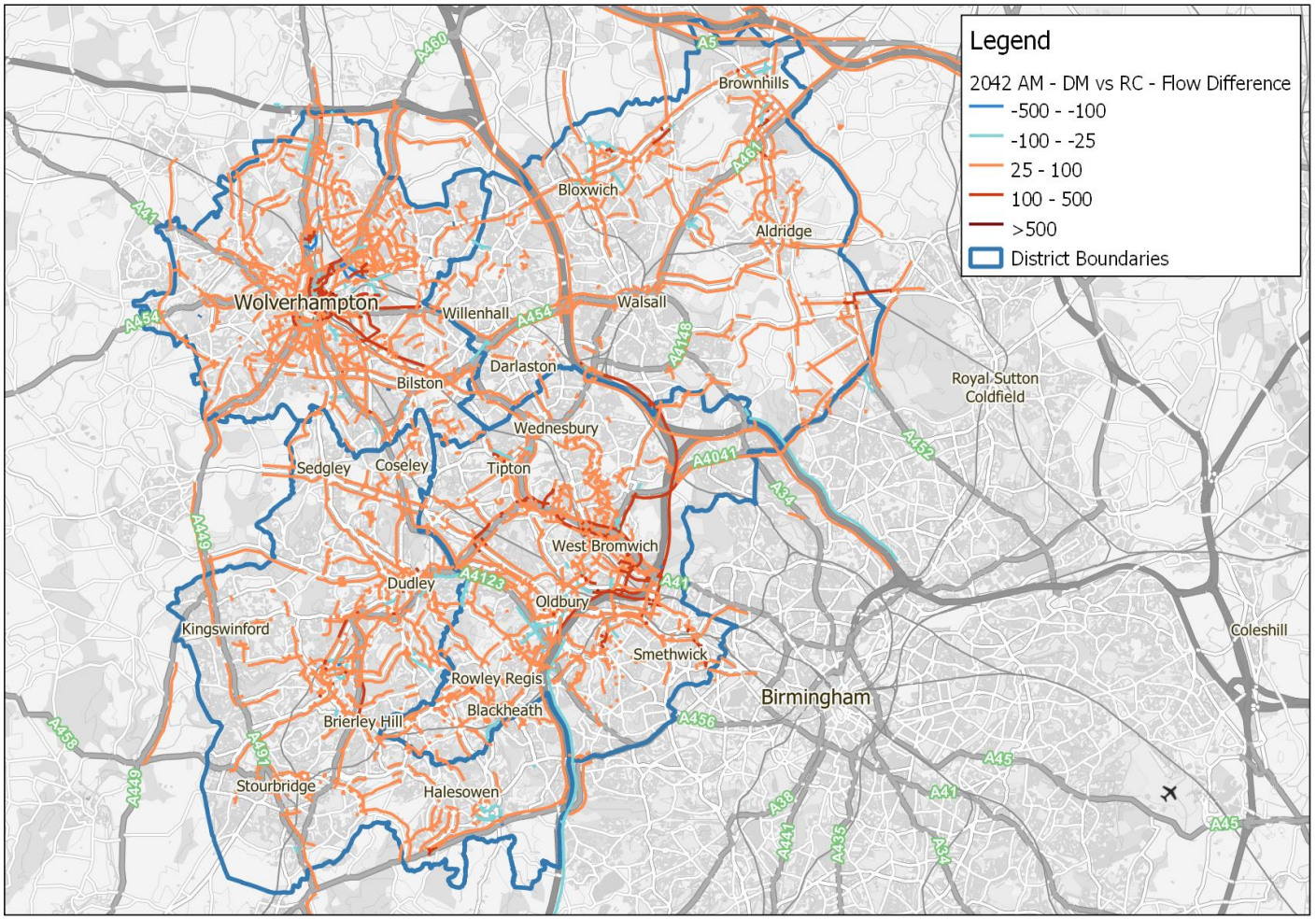


Figure 4-8: 2042 Do Minimum vs 2042 Reference Case Percentage Flow Difference for the AM period.

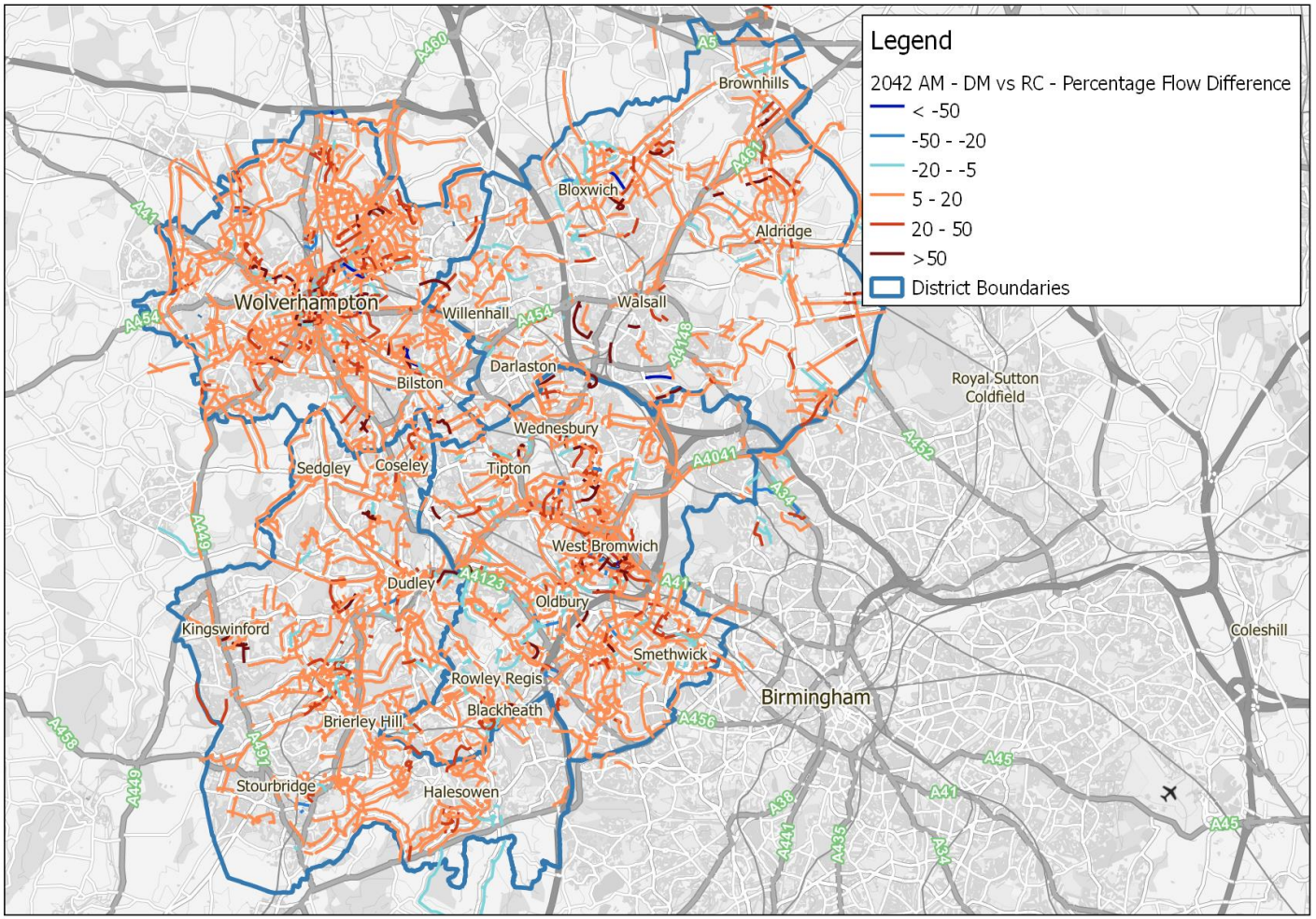


Figure 4-9: 2042 Do Minimum vs 2042 Reference Case Link V/C Difference (%) for the AM period.

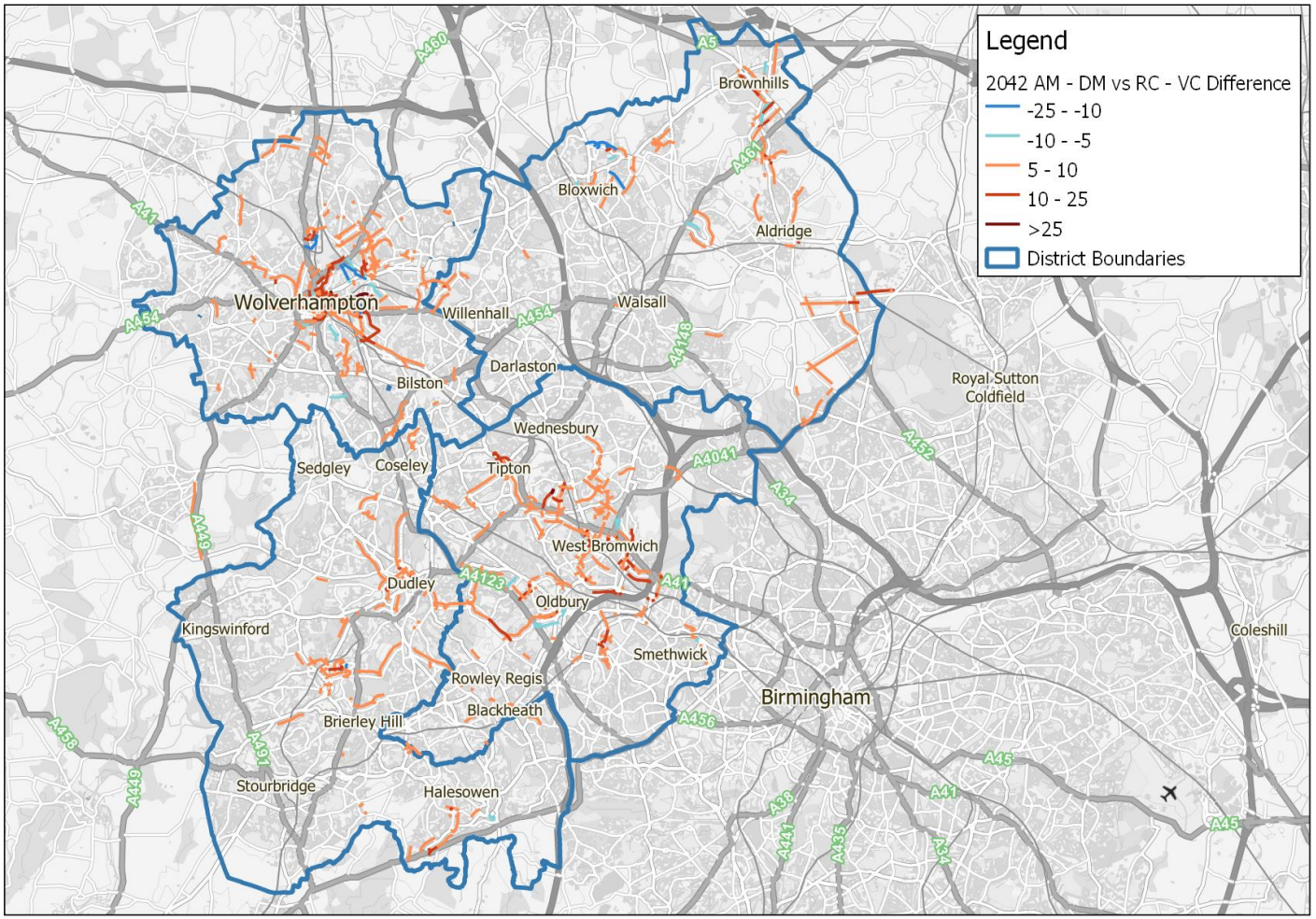


Figure 4-10: 2042 DM vs 2042 RC V/C Ratio Difference for the AM period. Links shown are over 85% V/C in the RC. Difference is in % of the RC.

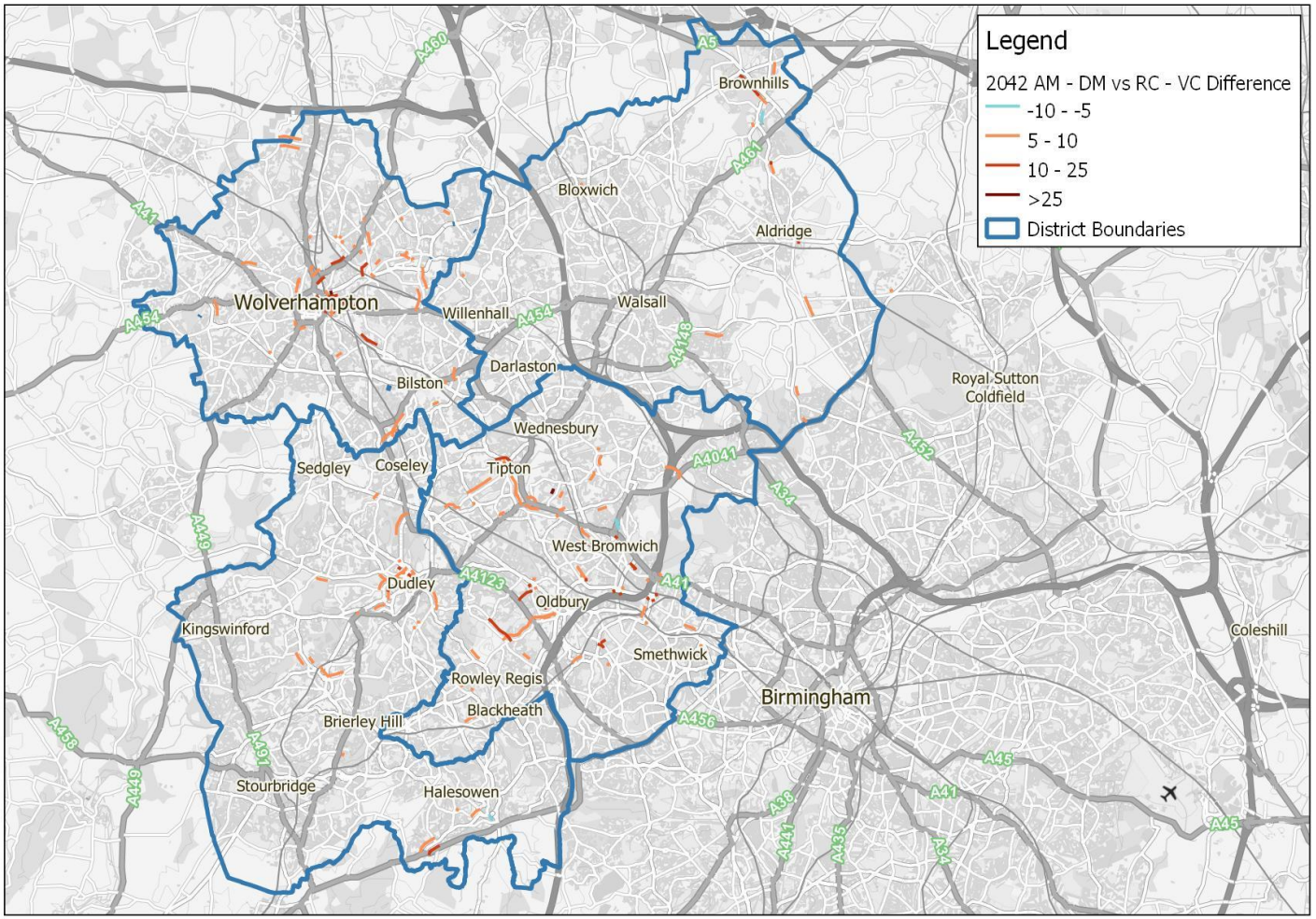


Figure 4-11: 2042 Do Minimum vs 2042 Reference Case Relative Queue Difference in % Link Saturation for the AM period.

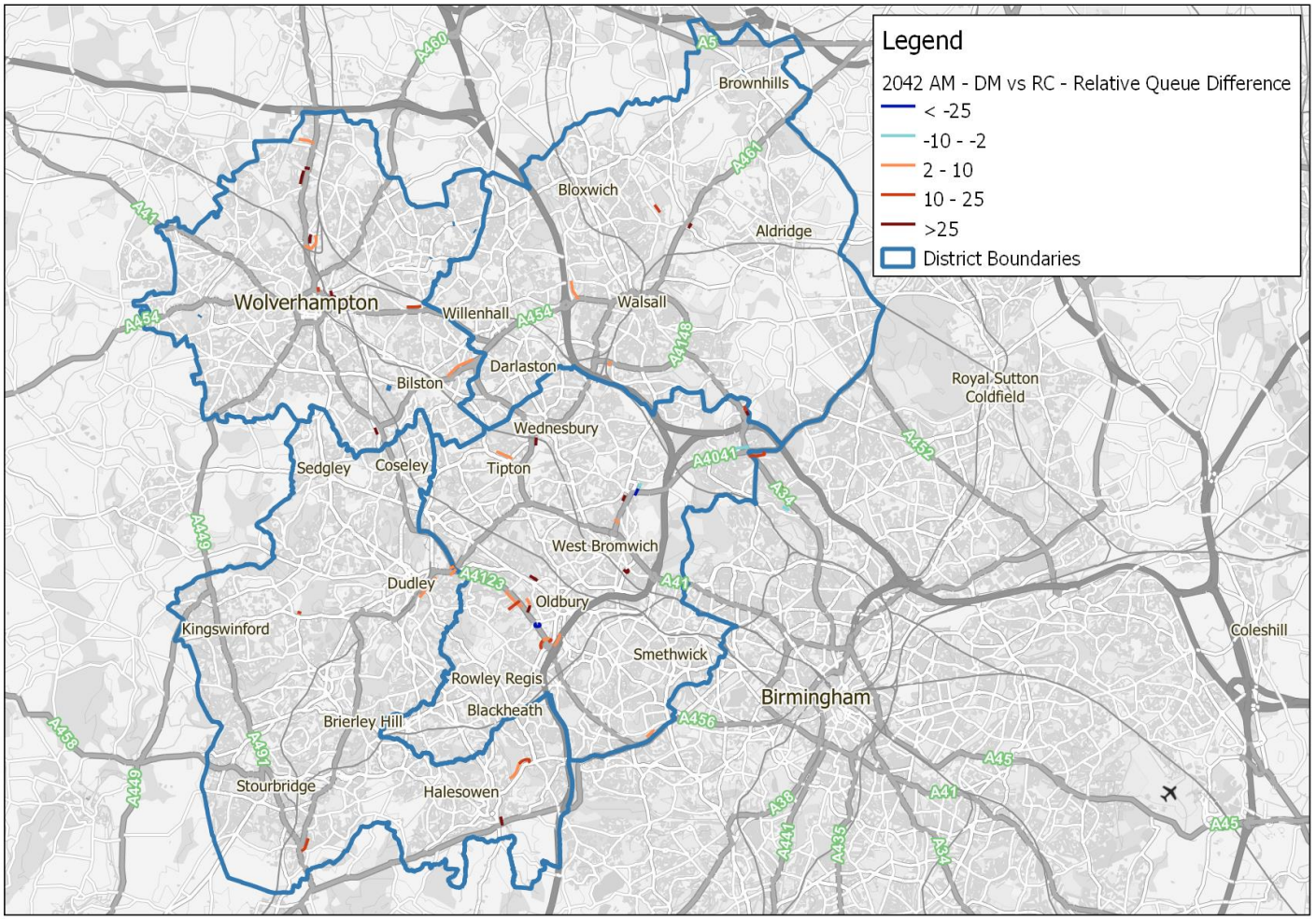
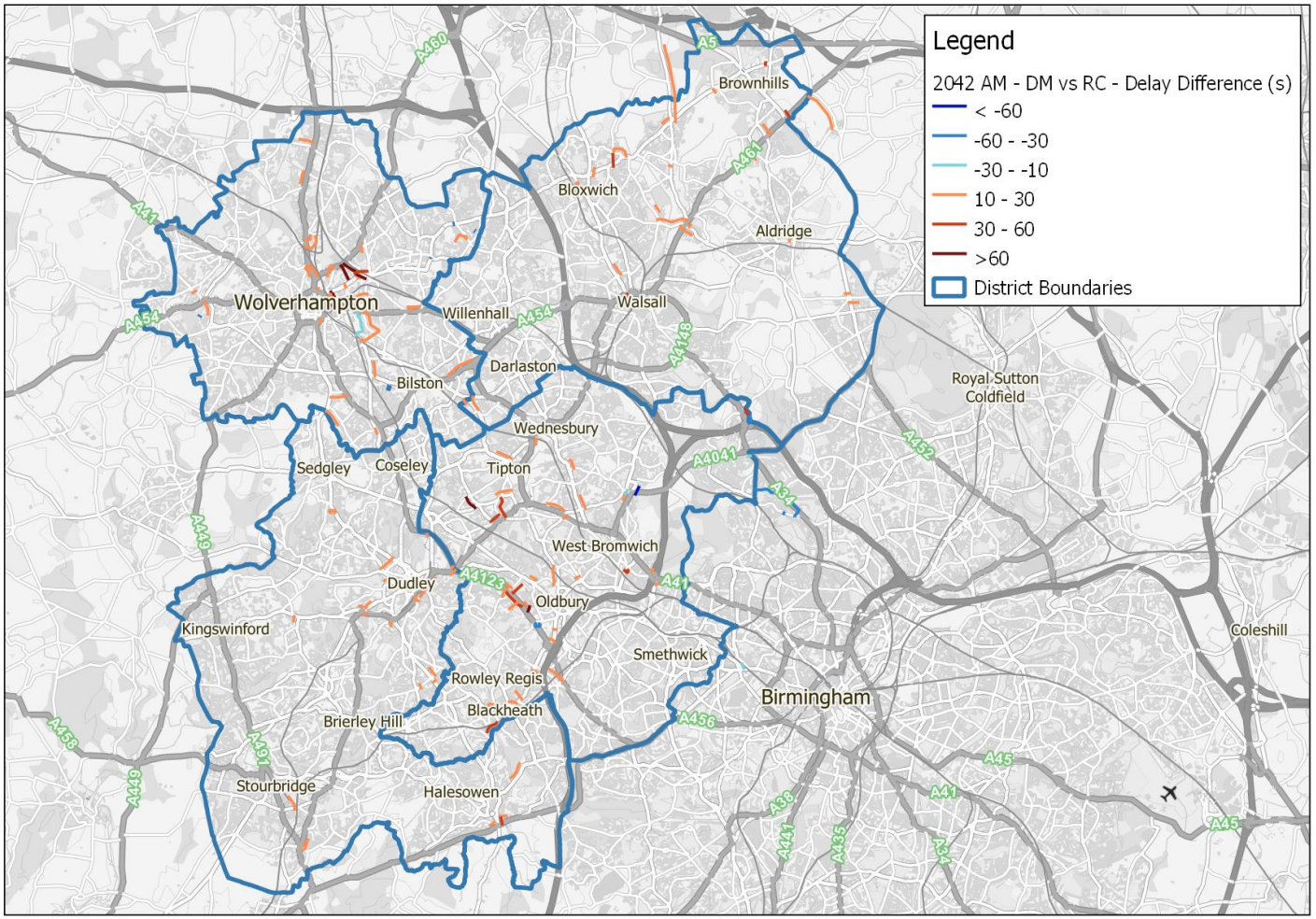


Figure 4-12: 2042 Do Minimum vs 2042 Reference Case Delay Difference for the AM period.



4.5.1.2 IP Model Results

Link Flow

In Figure 4-13, a similar spread of flow increases can be seen across the whole of the Black Country, although this is concentrated more in urban areas than in the AM. Wolverhampton, West Bromwich and Dudley all experience flow increases concentrated on their urban centres, with particularly high flow increases seen on the Wolverhampton Ring Road and A460 northbound, and the A41 between Tipton and West Bromwich. Figure 4-14 shows that much of the wider flow increase is a small proportion of volume already on the link, but darker areas around Halesowen, West Bromwich, Wolverhampton and Bloxwich indicates that either additional trips are being generated in or by this area, or that rerouting (on a fairly local scale) is occurring, likely due to delays being introduced by additional vehicles.

VC

The change in link V/C is seen below in Figure 4-15, showing the impact of the flow difference changes. The impact of these flow changes is not massive, as typically the IP model has a lower demand than the AM or PM peaks and therefore is less congested.

When the links are filtered to only show those links which are over capacity in the Reference Case, it can be seen that in the IP model there are few impacts caused by the Local Plan model. Figure 4-16 shows only a few locations that would increase their V/C above 85%, with most of them on side roads connecting the A roads like the A41 and A4150.

Relative Queue

Figure 4-17 shows that only a few links experience an increase in congestion, mostly on approaches to major corridors like the A41 south of West Bromwich and the A461 in Dudley. These links are typically side roads being opposed by major traffic low, which is realistic but may require some model adjustments to improve performance in these areas.

Delay

The link delay plot shown below in Figure 4-18 shows localised hotspots of delay increases, in most cases corresponding with increased queue lengths and V/C differences. Side roads along the A4124 in Bloxwich, roads connecting the A4124 and the A460 in Wolverhampton and the A41 in Sandwell and A4036 in Dudley are all major points to be aware of.

Figure 4-13: 2042 Do Minimum vs 2042 Reference Case Flow Difference for the IP period.

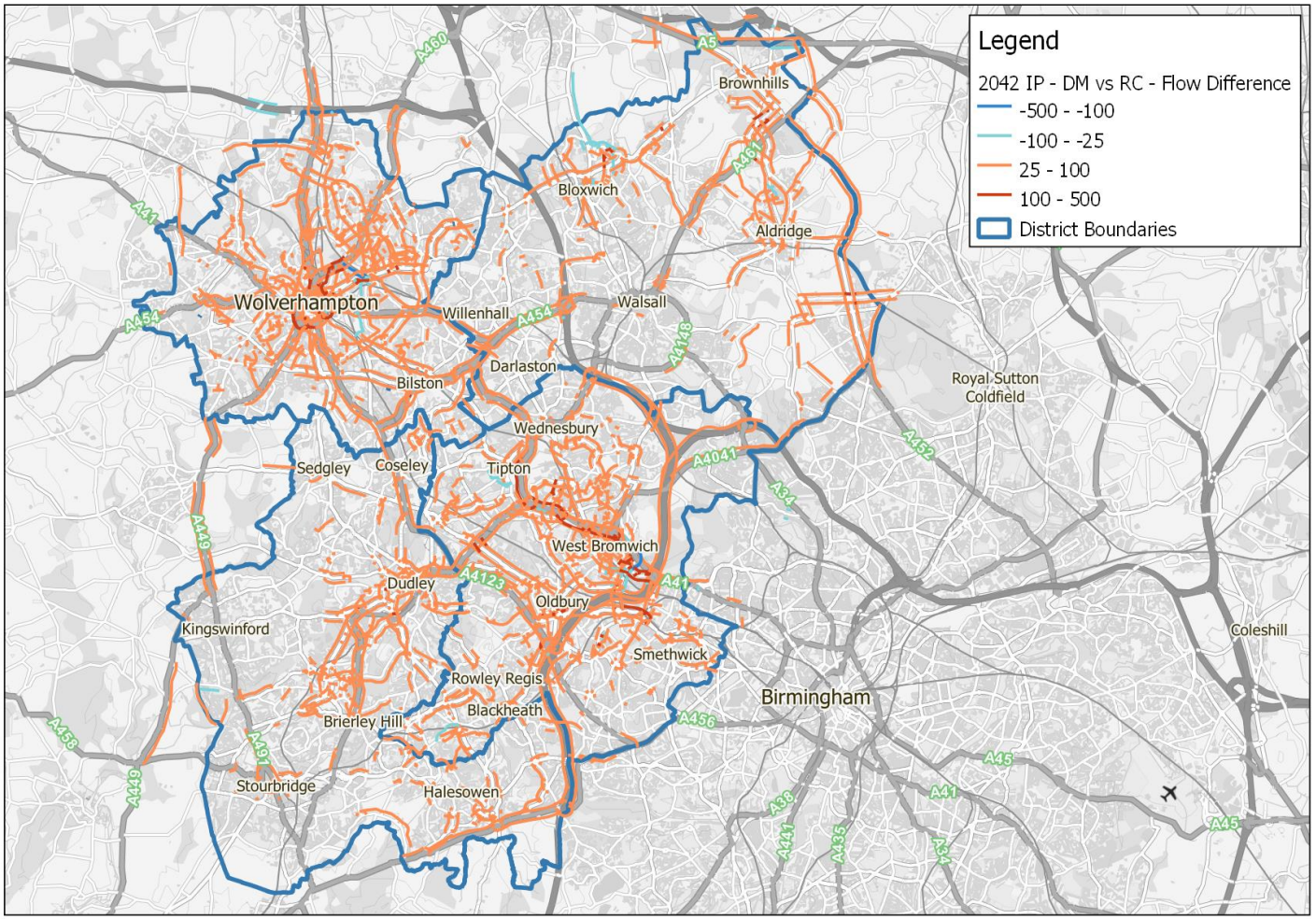


Figure 4-14: 2042 Do Minimum vs 2042 Reference Case Percentage Flow Difference for the IP period.

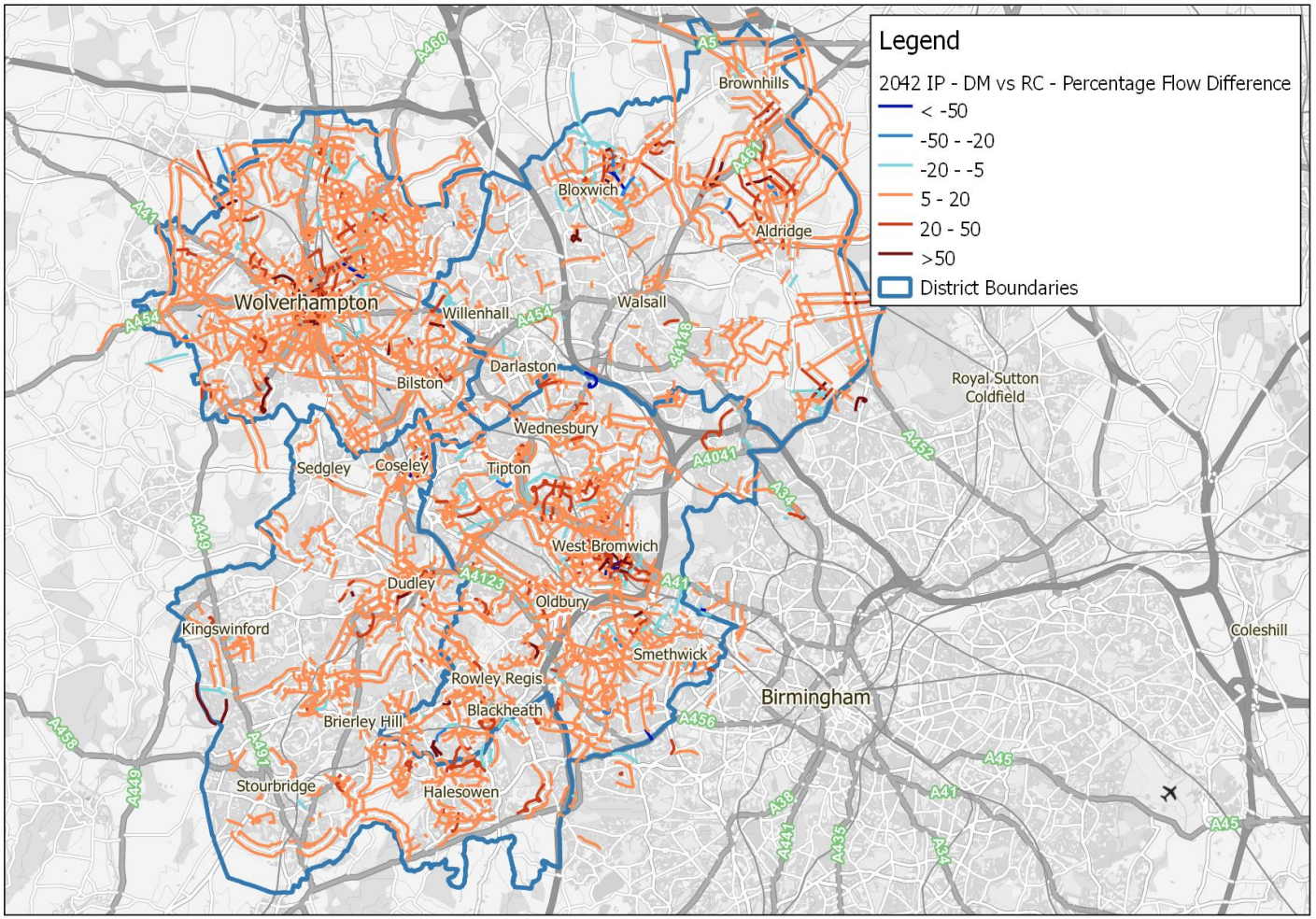


Figure 4-15: 2042 Do Minimum vs 2042 Reference Case Volume over Capacity Ratio Difference for the IP period.

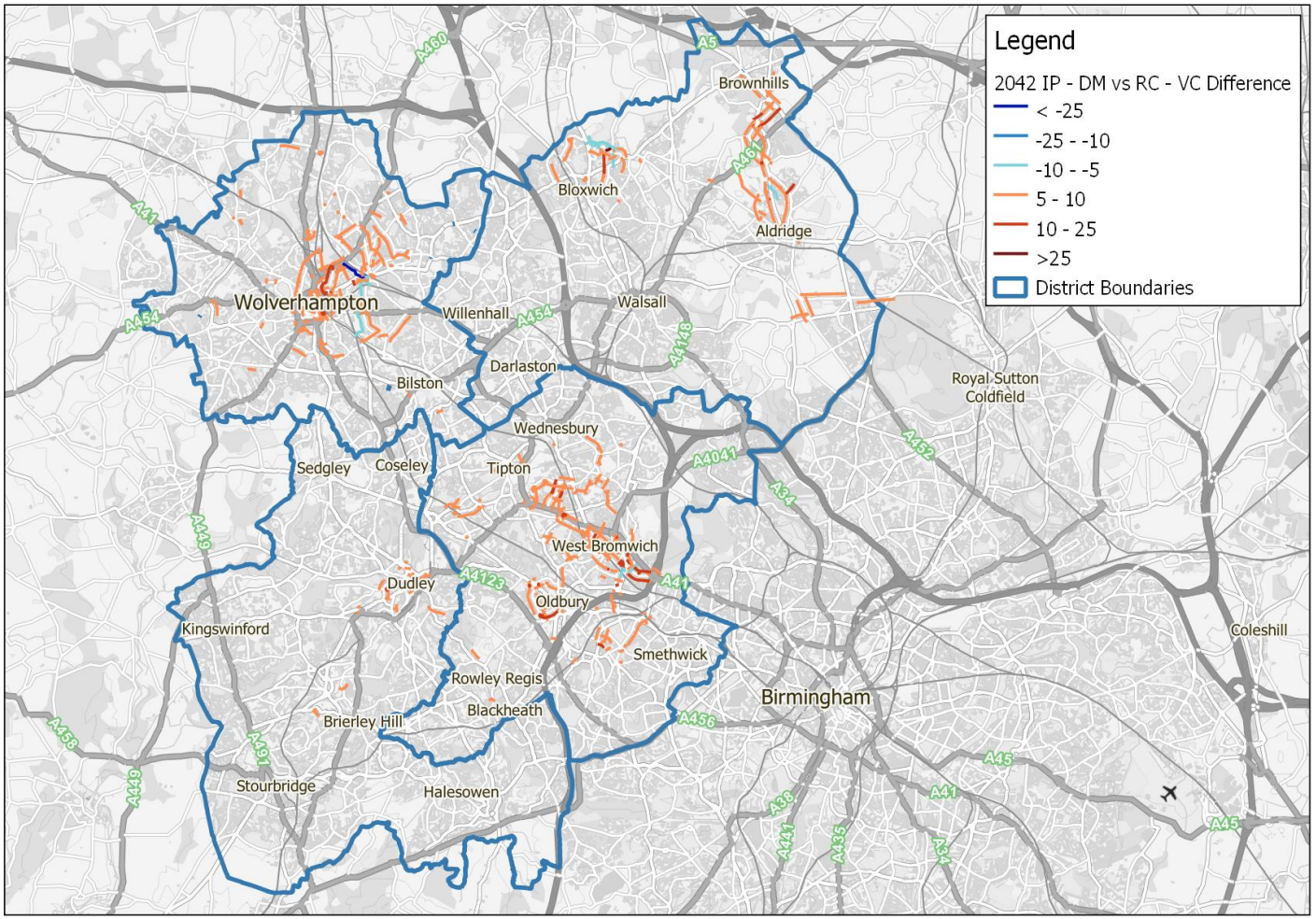


Figure 4-16: 2042 DM vs 2042 RC V/C Ratio Difference for the IP period. Links shown are over 85% V/C in the RC. Difference is in % of the RC.

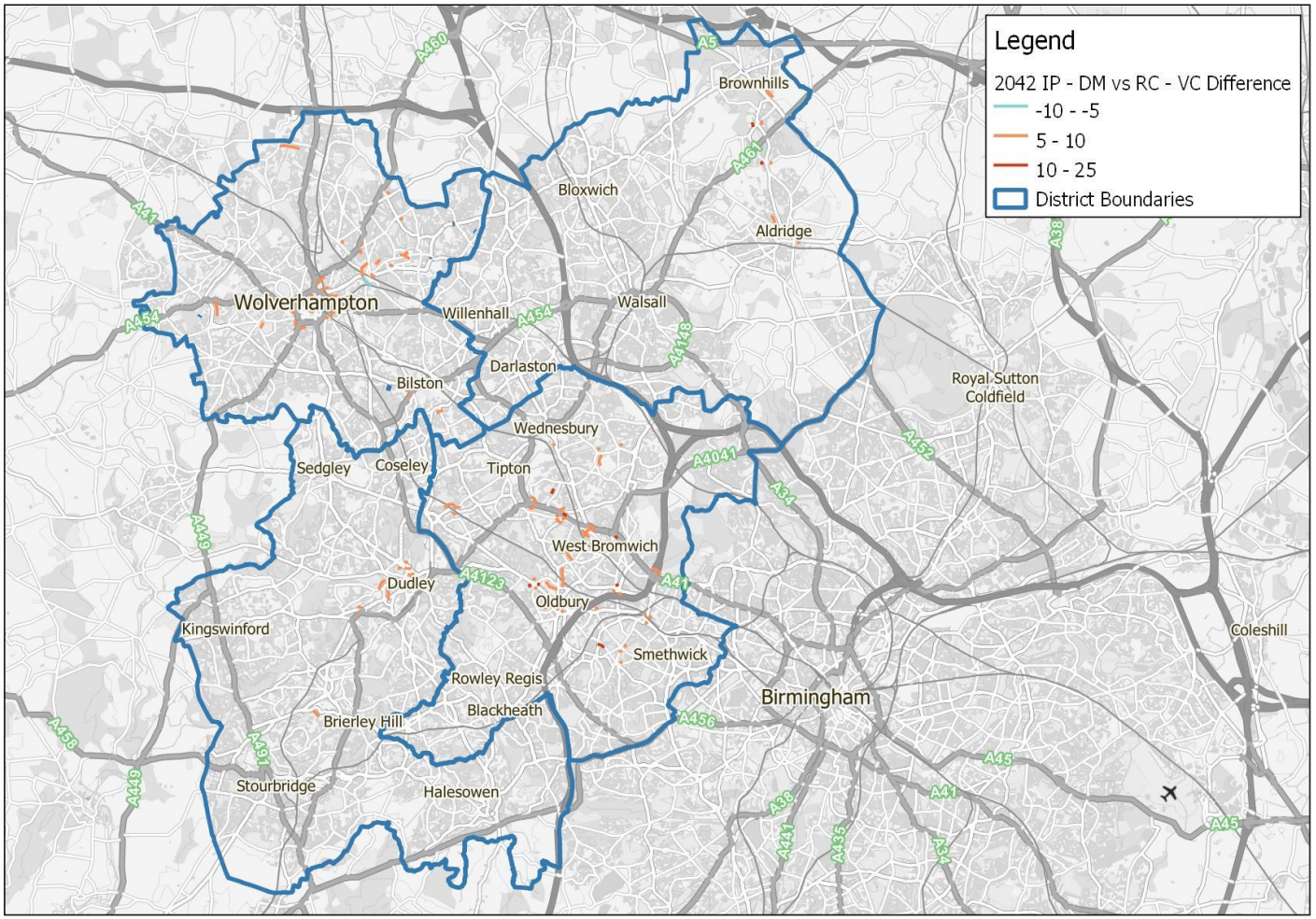


Figure 4-17: 2042 Do Minimum vs 2042 Reference Case Relative Queue Length Difference in % Link Length for the IP period.

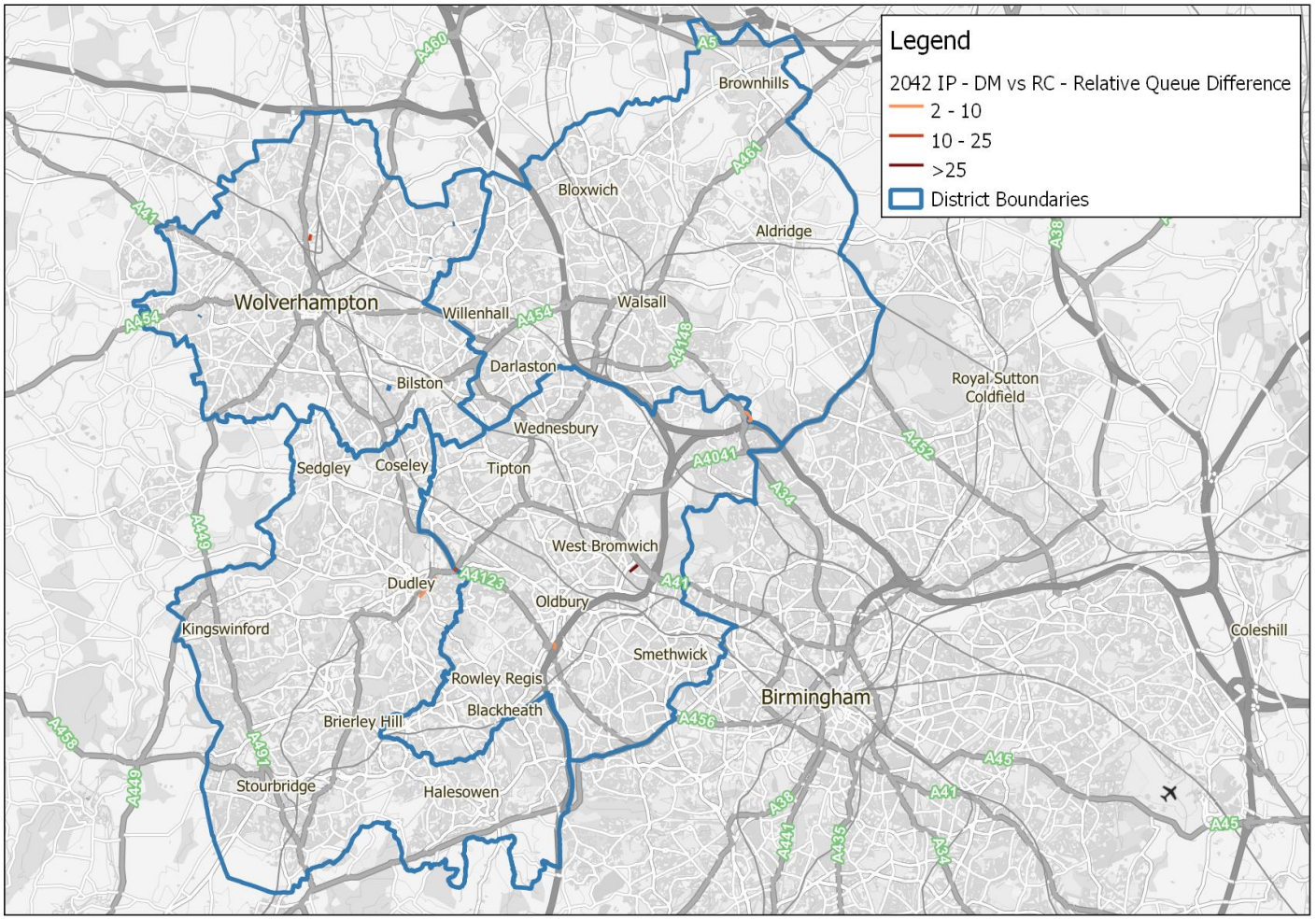
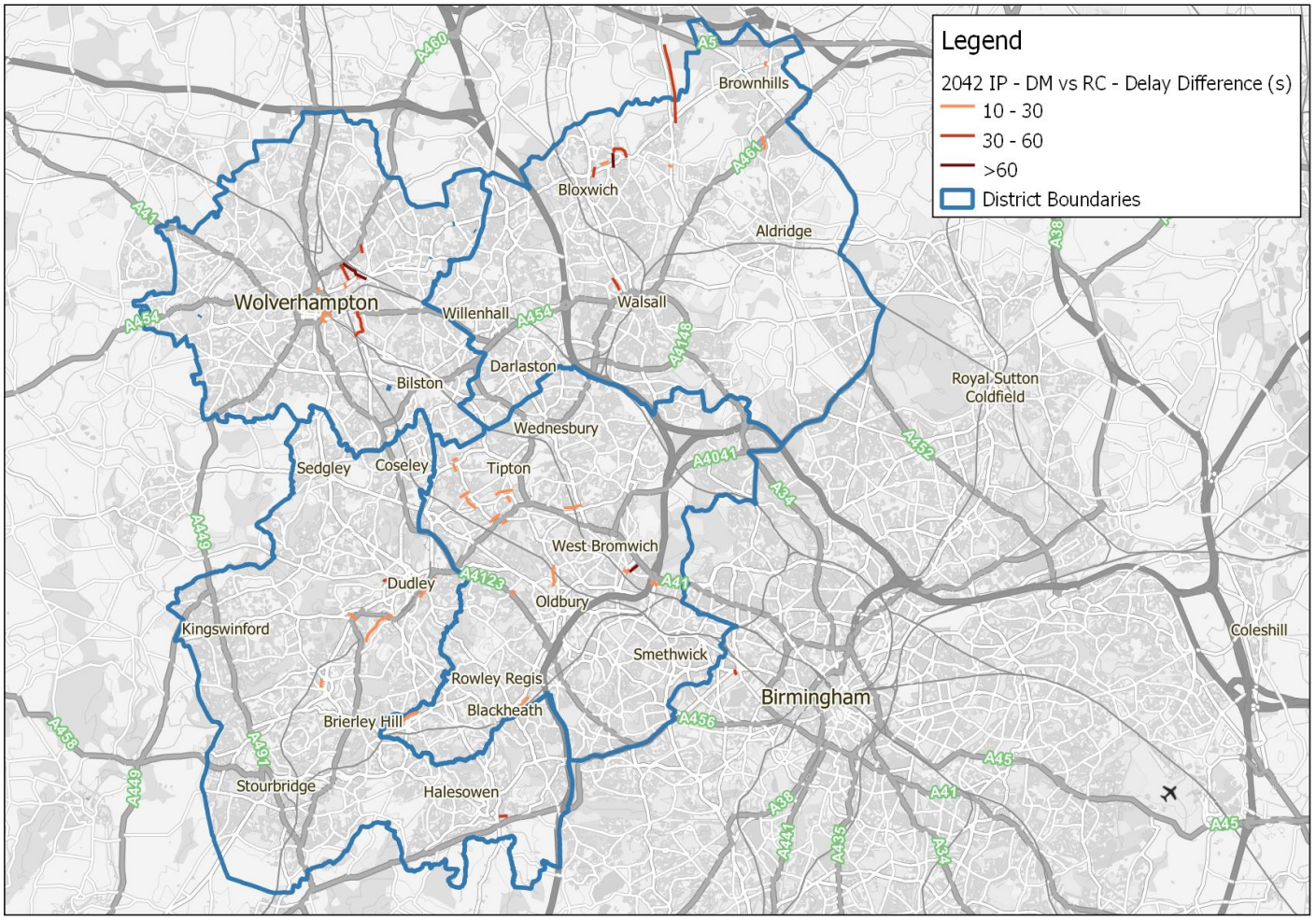


Figure 4-18: 2042 Do Minimum vs 2042 Reference Case Delay Difference for the IP period.



4.5.1.3 PM Results

Link Flow

In Figure 4-19, there is a general trend of increases in link flows as expected due to the spread of population change discussed earlier in the housing and employment assumptions. Greater flow changes relative to the wider area can be seen to the south and northeast of Wolverhampton, around Tipton and West Bromwich and near Oldbury. Figure 4-20 shows a similar pattern to the AM, with several isolated links showing large percentage increases in flow, although if these link flows are small it is unlikely to impact wider traffic flows in a meaningful way. Potential problem areas in the model could include West Bromwich, Bloxwich and Wolverhampton, all of which show percentage changes of ±20%. This indicates rerouting which is often caused by increased congestion on more favourable routes.

VC

The change in link V/C is seen below in Figure 4-21 showing the impact of the flow difference changes. When the links are filtered to only show those links which are over capacity in the Do Minimum, it becomes clearer to see the main impacts of the growth. Figure 4-22 shows that V/C changes mostly occur in on side roads on major Black Country thoroughfares:

- A4100/A4036 (Brierley Hill)
- A4101 (Dudley)
- A457 (West Bromwich)
- A449 (Wolverhampton)
- A460 (Wolverhampton)
- A41

Relative Queue

Similarly to the AM and IP, on the whole there are only a few problem areas identified in the relative queue length plot. Figure 4-23 highlights areas already mentioned in the V/C plot, with longer queues expected on the A449, A4041 and A461, as well as on the A4150 in Wolverhampton.

Delay

The link delay plot shown below in Figure 4-24 shows generally small increases in delay compared to the Reference Case. Where delays are seen, they usually correspond with link V/C or queue length areas identified above, but also are consistent across time periods. This strengthens the rationale behind requiring some level of mitigation against Local Plan traffic. Some of the key corridors mentioned in this section and in the other time periods are likely to struggle to accommodate additional traffic flows, with vehicles travelling to urban centres likely to be particularly impacted.

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Figure 4-19: 2042 Do Minimum vs 2042 Reference Case Flow Difference for the PM period.

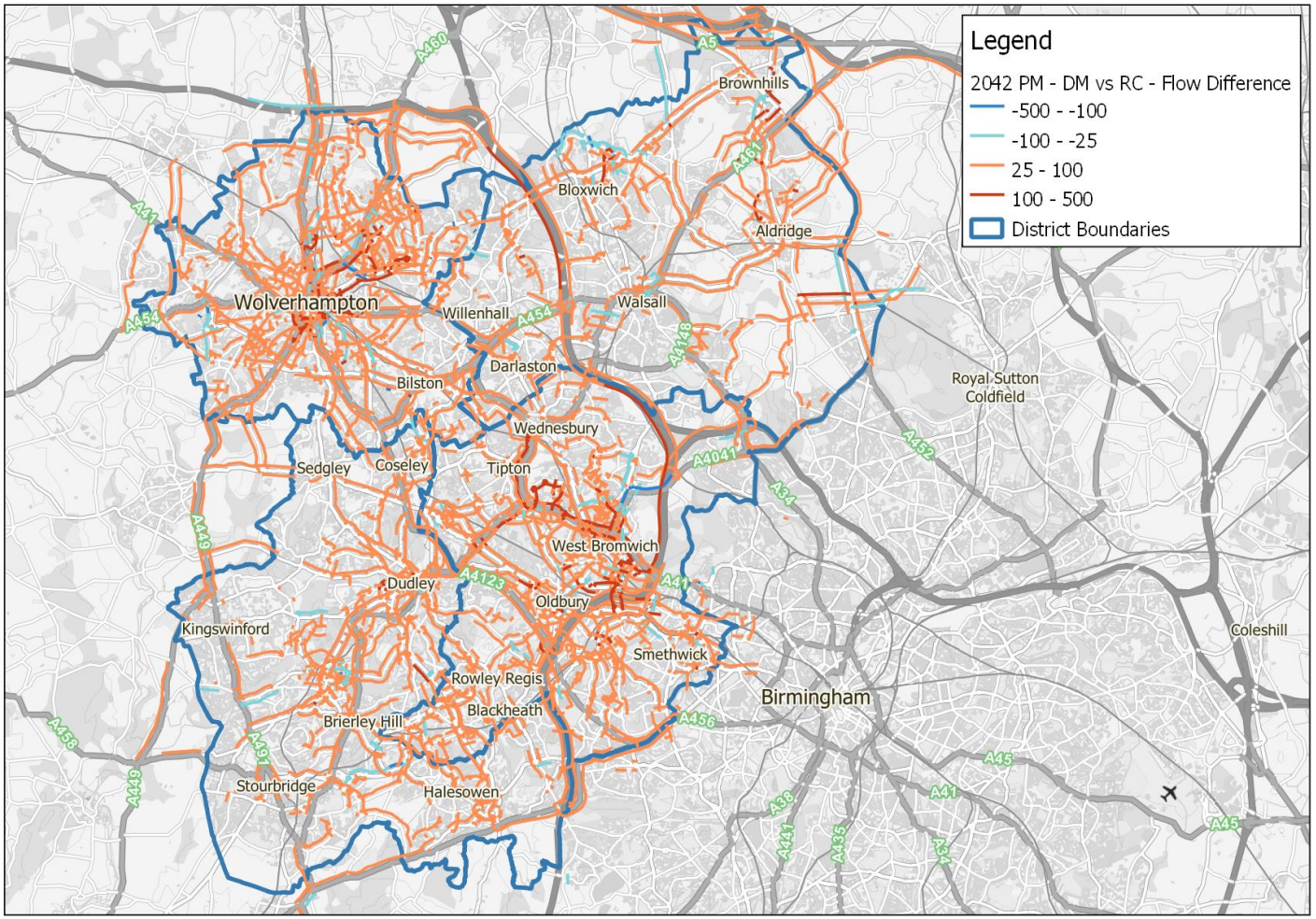


Figure 4-20: 2042 Do Minimum vs 2042 Reference Case Percentage Flow Difference for the PM period.

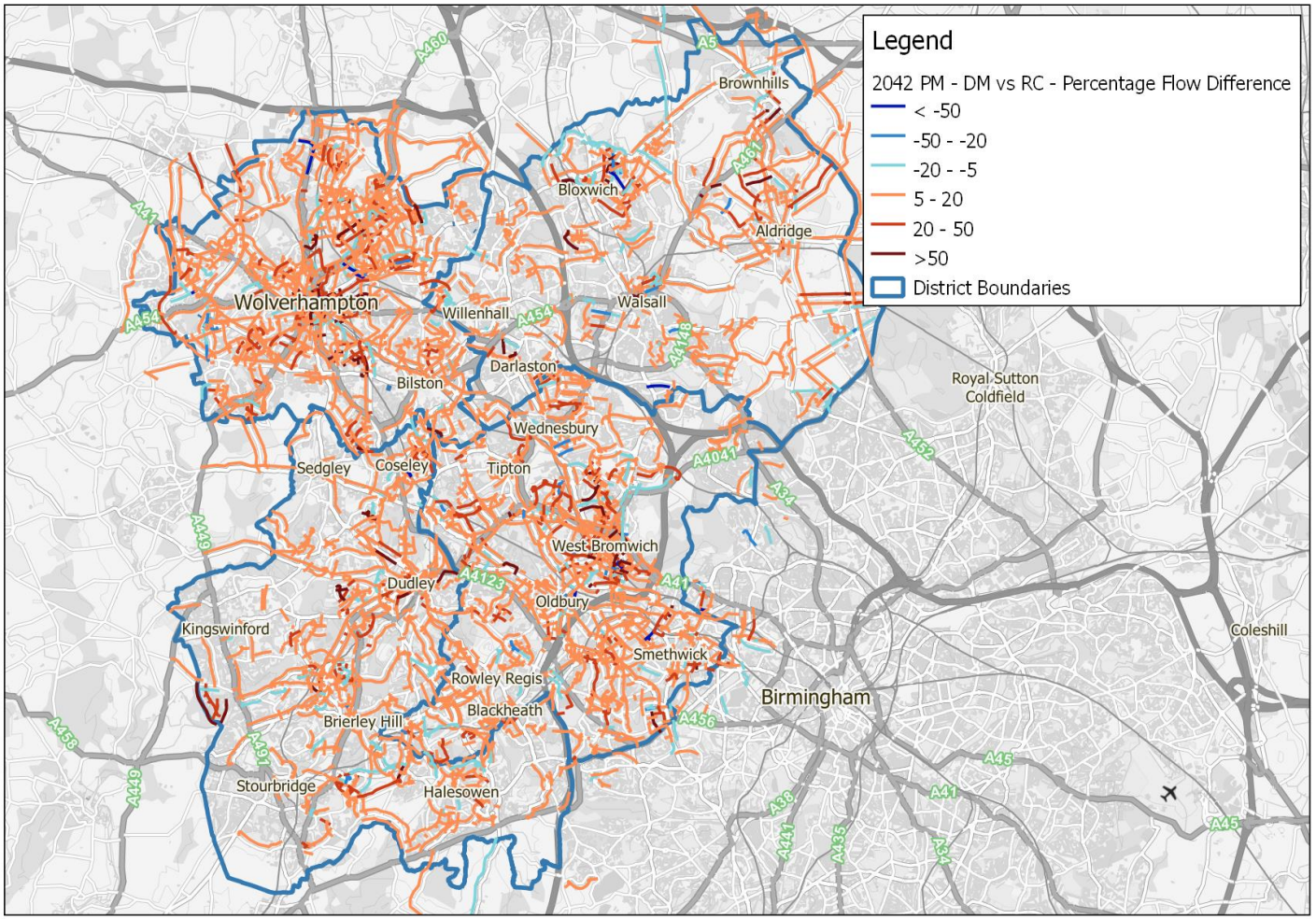


Figure 4-21: 2042 Do Minimum vs 2042 Reference Case Volume over Capacity Ratio Difference for the PM period.

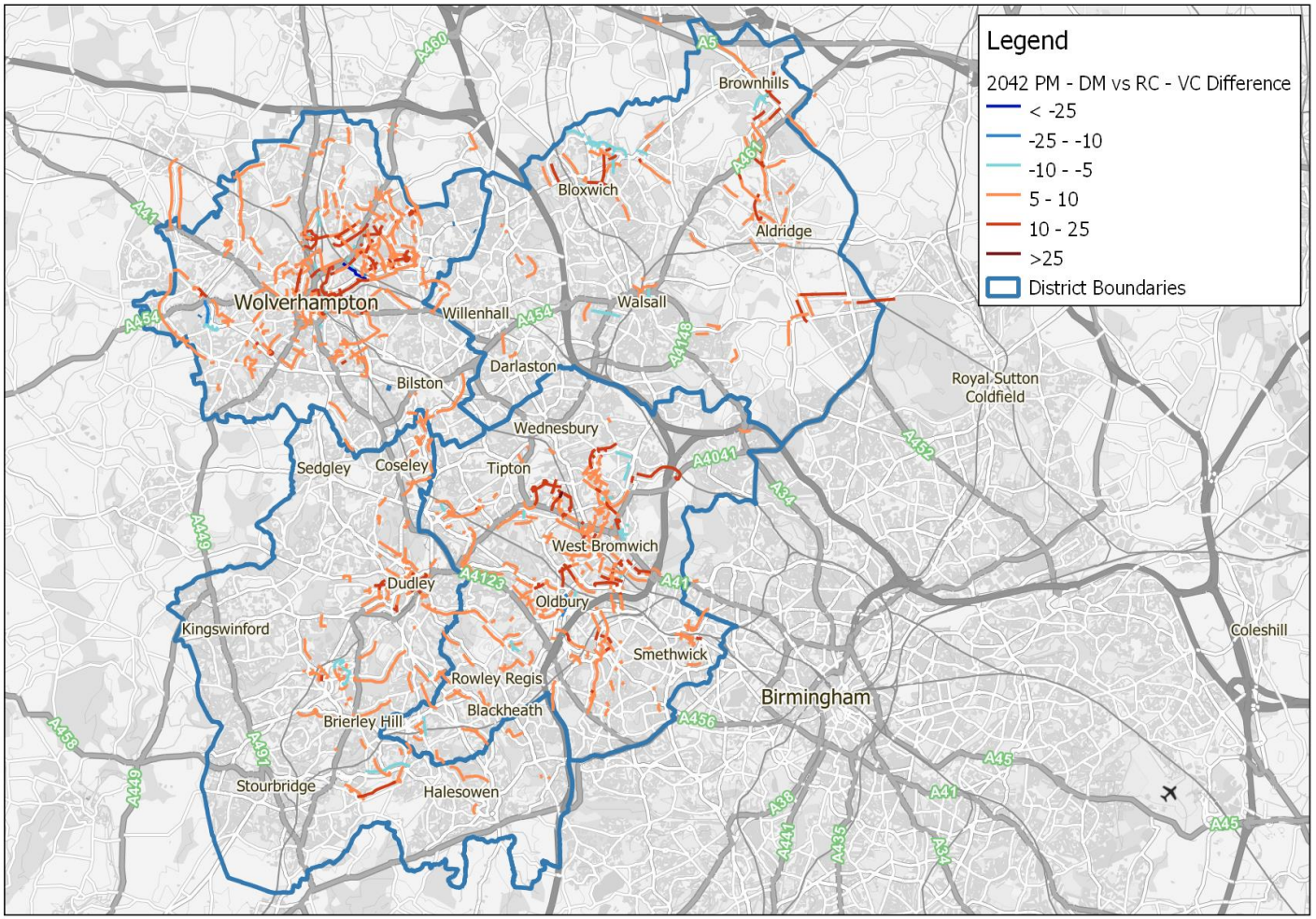


Figure 4-22: 2042 DM vs 2042 RC V/C Ratio Difference for the PM period. Links shown are over 85% V/C in the RC. Difference is in % of the RC.

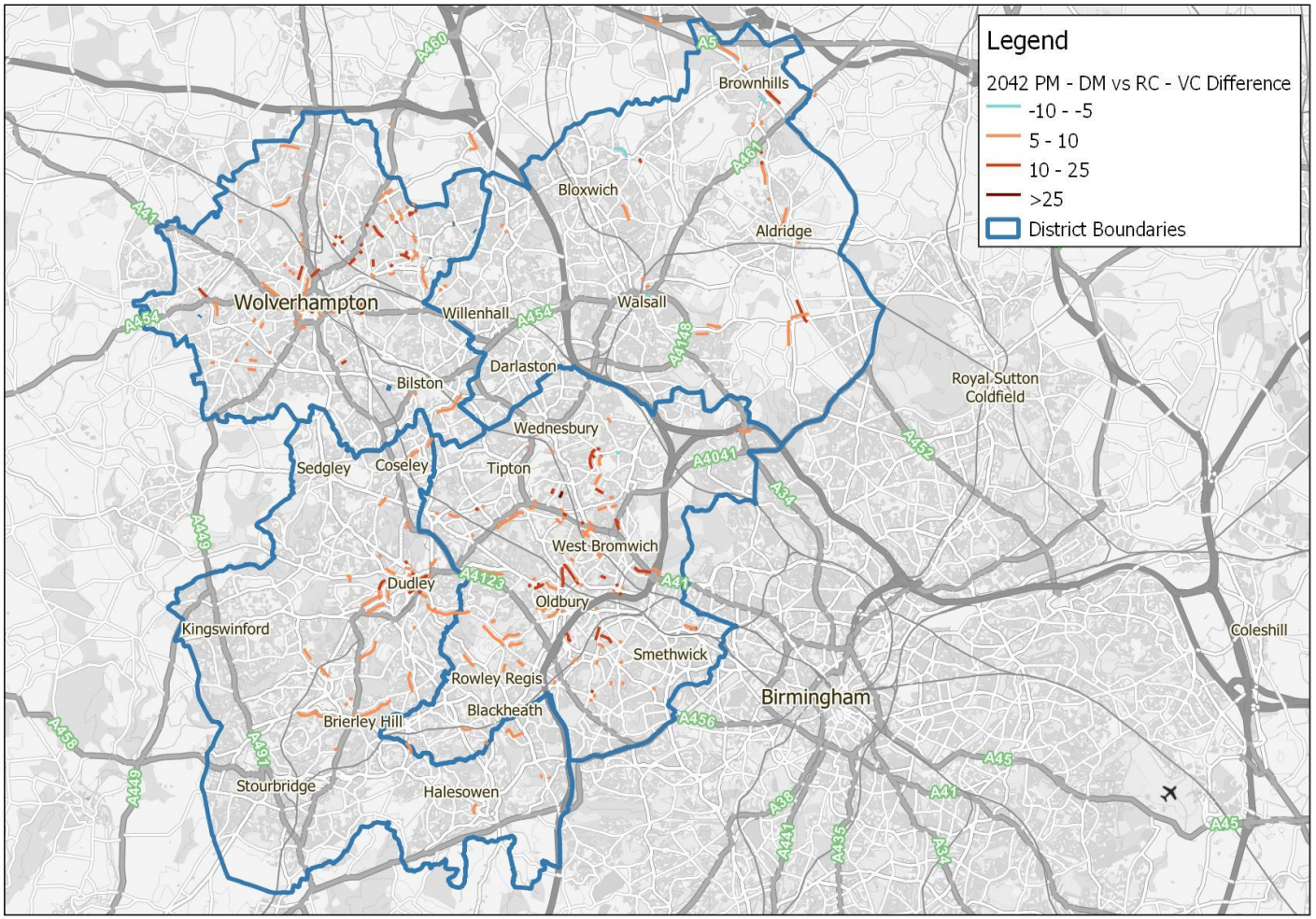


Figure 4-23: 2042 Do Minimum vs 2042 Reference Case Relative Queue Length Difference in % Link Saturation for the PM period.

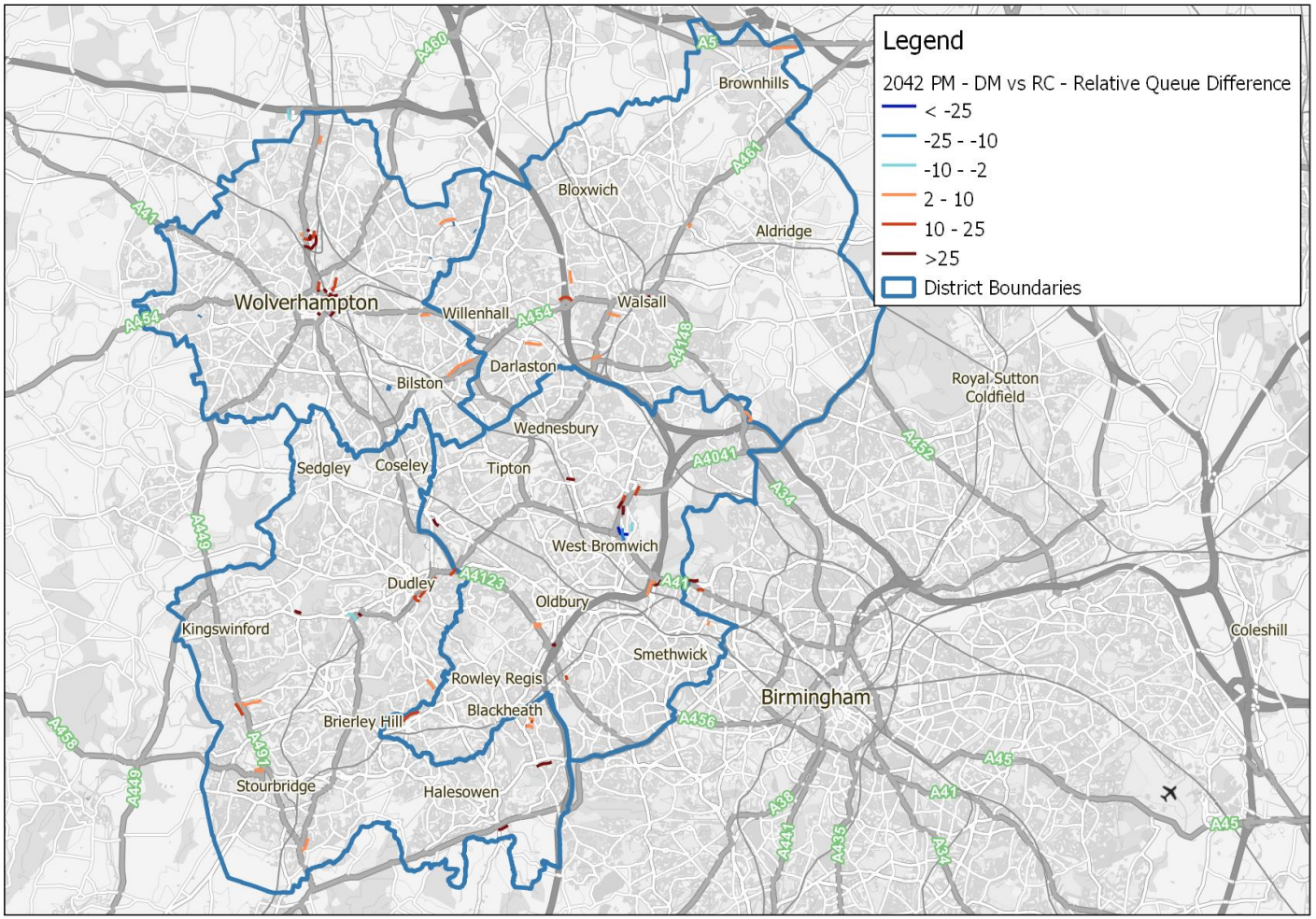
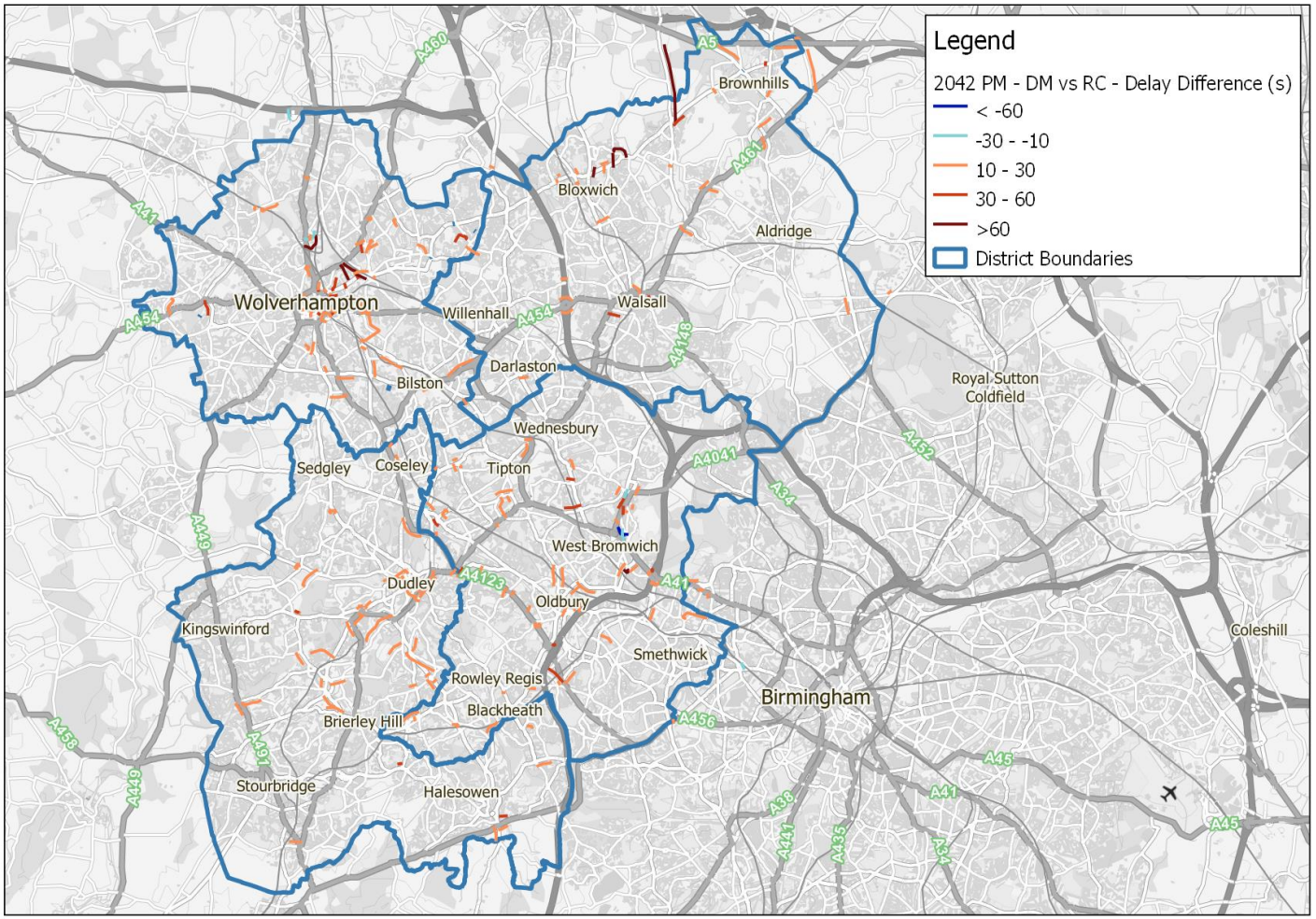


Figure 4-24: 2042 Do Minimum vs 2042 Reference Case Delay Difference for the PM period.



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4.6 Summary

The Do Minimum Local Plan model provides a robust understanding of how the network may perform in the horizon year of the Local Plans, assuming full build out of the employment and housing sites with no mitigations. The model results discussed above indicate that, on the whole, the network is largely able to accommodate the level of traffic that would be generated.

As expected, the Do Minimum model shows increased congestion when compared to the Reference Case, with traffic flow increases corresponding to areas with increased housing and employment provisions. The impacts of these flow increases have identified several potential areas where delays may be expected to increase, and these are primarily on major transport corridors across the Black Country, although typically not on the major flows.

Key areas for consideration in the Do Something model include:

- A4150, A460 and A449 in Wolverhampton, particularly close to the city centre
- A4124 (and B4154), A461 and A4148 in Walsall
- A41, A4031 and A4123 in Sandwell
- A491, A461 and A459 in Dudley.

Overall, the network is considerably less congested than it was found in the previous Local Plan Do Minimum, although similarly to the Reference Case this is primarily due to the level of constraint that is applied to housing growth in newer NTEM forecasts. As the background growth in the whole of the West Midlands is lower than previously forecast, the overall network has fewer trips, reducing the projected delays and congestion.

5 Do Something

5.1 Introduction

In Local Plan modelling, the Do Something scenario includes all committed housing, employment and transport schemes (Reference Case), plus the Local Plan allocation of housing and employment (Do Minimum), with the addition of transport schemes designed to mitigate against the traffic impacts of the increased developments, and any further non-committed schemes that have been selected to be assessed. The mitigation schemes usually only address congestion points in the network that are a result of Local Plan developments and not those resulting from committed growth identified within the Reference Case.

5.2 Network Assumptions

As the Local Plans create additional demand on the transport network, often increased delay at major or minor junctions is seen. To counteract this, mitigation schemes are tested to improve traffic flow within the model. In Section 4.4, the results of the Do Minimum modelling are discussed. The modelling shows minor increases in delay and congestion (via junction v/c) at the several locations.

Where delays occurred at signalised junctions, localised and time period dependent signal optimisation was undertaken to attempt to return junction performance in line with the Reference Case model. These junctions are listed in the appendix.

Other junction types identified were recorded in Table 5-1 and issued to Black Country Transport and officers from the Local Authorities. The following changes were suggested and consequently added to the model.

Table 5-1: Minor node amendments for the Do Something scenario

Node Number	DM Node Type	DS Node Type	Supplementary Information
101298	Two-way yield	Compact Roundabout	Possible conversion to compact roundabout subject to geometry checks.
107141	Two-way yield	No Change	Minor residential road, would suggest no change.
109416	Two-way stop	Signalised Junction	Convert to signalised junction. Without flows it is hard to understand potential impact, but a

Node Number	DM Node Type	DS Node Type	Supplementary Information
			3-stage arrangement with a dedicated ped/cycle stage could minimise delay on the minor arms.
114167	Roundabout	N/A	Already part of pre-identified DS Schemes
114233	Roundabout	N/A	Already part of pre-identified DS Schemes
102377	Two-way yield	Mini-roundabout	Possible conversion to mini-roundabout. However, area looks constrained and deflection may be difficult to achieve. Can test in model as possible mitigation with the understanding that more development work would be required.
102528	Two-way yield	Compact Roundabout	Possible compact roundabout would likely balance flows from Stoney Lane. The difficulty at this junction is turning right from Stoney Lane due to the ghost island. Visibility from the canal bridge would likely be a constraint at this location.
102815	Two-way yield	No Change	Junction used to rat-run through Clayhanger to avoid Brownhills High St. Any junction improvement would likely encourage this. Suggest no change.
114314	Roundabout	As SPRINT phase 2 proposals	No change. SPRINT Phase 2 proposals do not impact this area of the junction.
102288	Two-way yield	Signalised	Updated to match existing status of being signalised.
114805	Roundabout	No Change	Site appears to be constrained so widening is unlikely. Signals could resolve issues, but if flows are balanced then roundabout would offer the best capacity.
113132	Roundabout	No Change	There are no obvious methods of increasing capacity within the highway footprint. Volume at this junction should reduce due to the wider LTP strategy and Stourbridge Sustainable Connectivity Package, promoting a **modal shift** towards sustainable transport
113969	Roundabout	Lane closures	Ednam Road one way from Broadway to Priory Road & making Priory Road one way from Ednam Road to Tower Street.
114039	Roundabout	Lane additions	There is scope for extra lanes at this junction. Model could include the redistribution of the existing highway space to increase the number of lanes and lane storage length on key approaches, particularly where hatching currently exists.

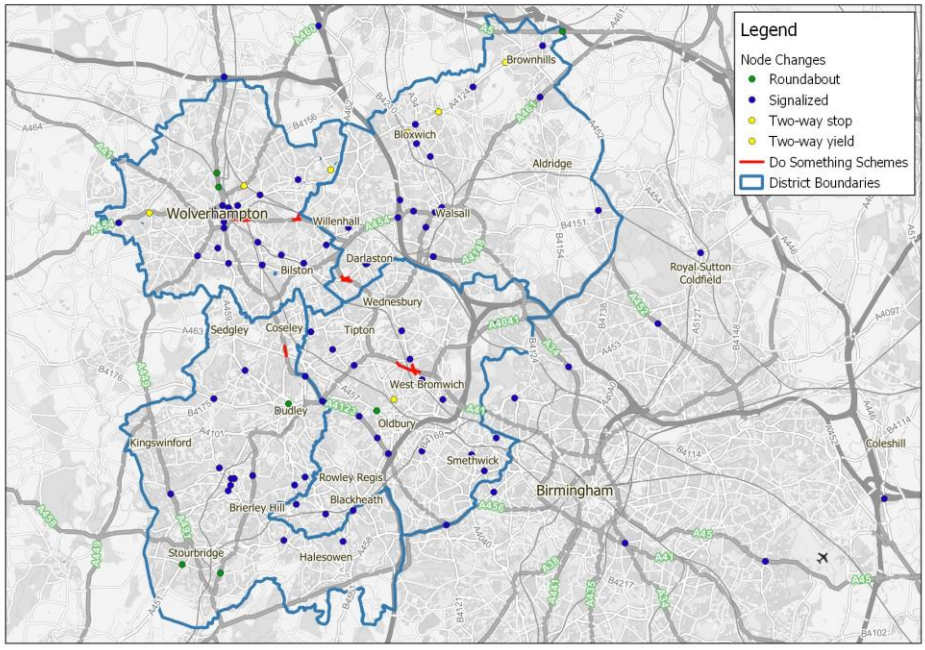
In the scope, it was agreed to retain any schemes from the previous Black Country Draft Plan O1 scenario that had a significant effect on transport impacts. The full list of schemes, detailed in the “Draft Plan O1 Assessment

Technical Note", is provided in Table 5-2 below along with the two additional corridors A449 and A4124, and accompanied by maps in Figure 5-1 below.

Table 5-2: Do Something Major Highway Schemes

Scheme	Type	Year	Source
M5 Junction 1	Highway	2036 and 2042	BCPM O1 Scenarios
Smethwick Birmingham Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A454 Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A4123 Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A461 Corridor (Walsall)	Highway	2036 and 2042	BCPM O1 Scenarios
A41 Moxley Junction Improvement	Highway	2036 and 2042	BCPM O1 Scenarios
A41 Carters Green Junction improvement	Highway	2036 and 2042	BCPM O1 Scenarios
A449 Corridor	Highway	2036 and 2042	Black Country Transport
A4124 Corridor	Highway	2036 and 2042	Black Country Transport

Figure 5-1: Do Something Link and Node Changes from Do Minimum



In the Do Something model, the above schemes were tested alongside the Local Plan demand. However, these schemes may not directly mitigate the impacts of the Local Plan. Instead, they are non-committed schemes that the districts aspire to introduce, with the aim of understanding their impacts on

Local Plan movements. The assessment of network performance that follows should not be used to support or oppose the introduction of these schemes. It is merely a scenario through which potential future highway, public transport and active travel schemes can be viewed in relation to the Local Plan.

5.3 Non-Modelled Qualitative Analysis

To reflect the time and budgetary constraints of this project, it has been agreed with the Black Country Local Plan Steering Group to undertaken proportional modelling within PRISM of the Local Plans, which has resulted in the reduction of quantitative modelling being undertaken. These are explored further in this section.

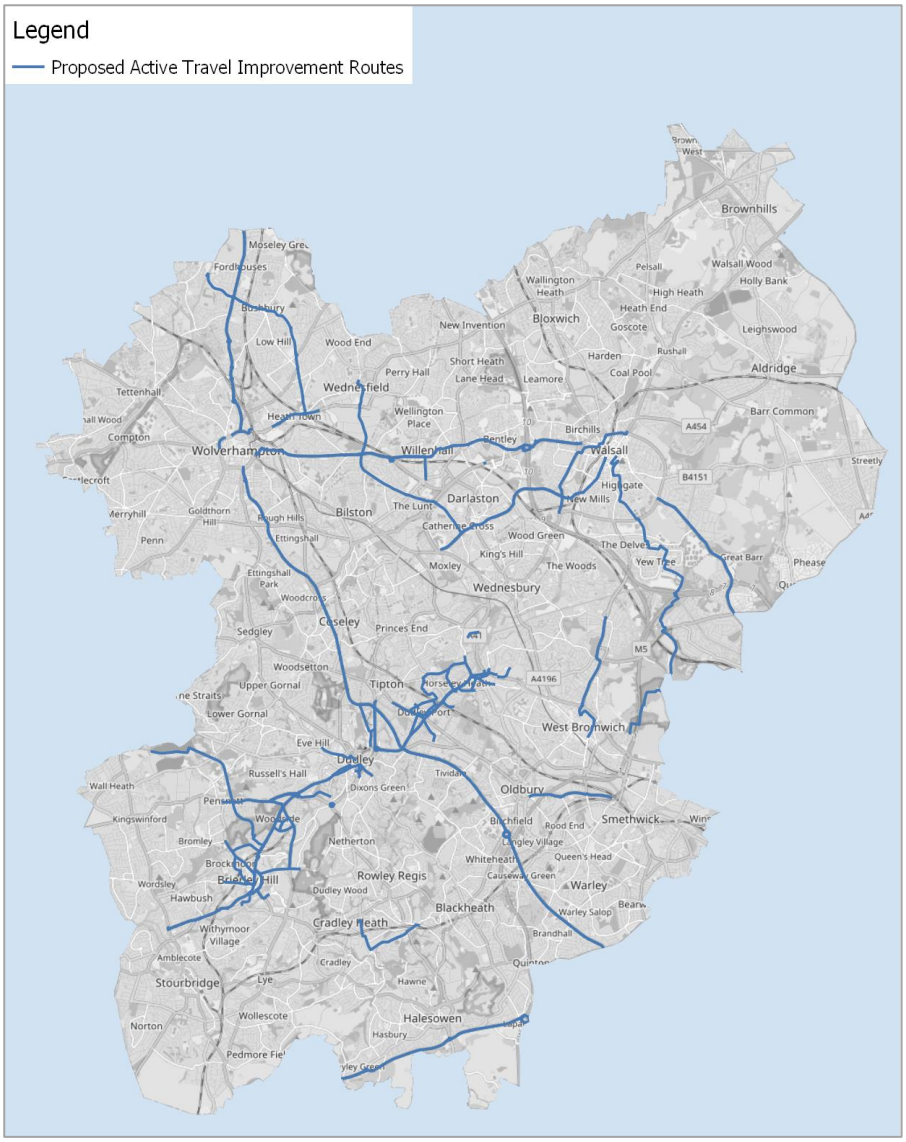
It is unlikely that the outcome of the Local Plans will result in the severity of car traffic seen in the model results, as public transport and active travels schemes will help to alleviate car-based congestion and contribute to more sustainable modes of travel within the Black Country. This modelling is intended to show a worst-case scenario of how the highway network within the Black Country could operate given full adoption of the Local Plans.

5.3.1 Active Travel

From previous experience working with PRISM on a strategic level, we find that modal shift from car to active travel modes is not well represented and does not provide an accurate picture. As such, qualitative analysis has been used to support the model results seen in the Do Something modelling section. Figure 5-2 shows the detail of several proposed cycle and active travel routes in the Black Country, all of which could help to alleviate growth in car demand and therefore improve congestion.

Future work to support the Local Plans in representing modal shift to active travel to reflect walk and cycle schemes could involve undertaking zone-to-zone reductions of car matrices. This would need to be supported by evidence of effective active travels schemes and realistic numbers of trips that schemes are likely to generate, and should be applied only to zones on or within a small buffer around schemes.

Figure 5-2: Map of Proposed Active Travel Routes within the Black Country



5.3.2 Public Transport Modal Shift

Similarly to Active Travel, realistic modal shift from car to public transport has not historically been well represented in PRISM, trending towards lower than expected increases in bus, rail and metro patronage. This was found in the previous Black Country Joint Local Plan and in other PRISM projects undertaken by Sweco.

As such, only a highway post-VDM reassignment has been undertaken, assessing the impact of proposed highway and public transport schemes on delays and congestion of highway vehicles.

It is likely that modal shift will occur from car to public transport, especially with targeted approaches at key corridors to improve transport links and with other interventions such as the £2 bus fare cap. The combined impact of such

measures would help to reduce car congestion, contributing to improved travel across the Black Country and wider West Midlands conurbation, but the quantifiable impact has not been assessed for this Local Plan modelling.

5.4 Housing and Employment Assumptions

As the Do Something scenario is designed to test the effectiveness of transport mitigations and non-committed transport schemes against the allocations in the proposed Local Plans, the housing and employment quanta and distribution are identical to the Do Minimum.

5.5 Model Results

5.5.1 Horizon Year: 2042

The actual link flow and actual link delay plots are included below to provide context for the expected movement of traffic around the Black Country at the horizon year of the Local Plans, taking into account the addition of transport schemes. These can be used alongside the flow difference plots presented in Section 5.6.

5.5.1.1 Link Actual Flow

AM

The link flow plot presented in Figure 5-3 illustrates the traffic patterns in the Black Country under the Do Something scenario. Similar to the Do Minimum scenario, motorways remain the busiest links, facilitating both internal trips within the Black Country and a significant number of long-distance journeys. However, the A4123 shows lower traffic flow in the Do Something scenario compared to the Do Minimum, due to the implementation of pedestrian and cycle routes along the road, as well as the addition of toucan crossings. The A4041 and A454 continue to display high traffic flows. Additionally, routes connecting major settlements such as Wolverhampton, Walsall, Dudley, Wednesbury, and Oldbury exhibit comparable levels of traffic movement. Overall, the trends observed in the Do Something scenario align closely with those identified in the Do Minimum analysis, demonstrating the persistent demand on key transport routes despite the introduction of new transport schemes.

IP

Figure 5-5 shows similar patterns to the AM, with the major roads on the SRN showing the highest traffic volumes. The overall demand on the network is lower, explaining why the A roads mentioned earlier are less visible in this plot, but key corridors can still be seen including the A4041, A456, A449 and A34.

PM

As in the AM, PM link flow presented in Figure 5-7 shows a higher volume of traffic flow than the IP, with the M5 and M6 showing high traffic flows. The A461 and A41 between Dudley and West Bromwich show particularly high flows, as

does the A454 between Bilston and Walsall, and the A456 at Quinton Interchange.

5.5.1.2 Link Actual Delay

AM

The link delay plot presented in Figure 5-4 for the Do Something scenario shows patterns that closely resemble those identified in the Do Minimum analysis. Many links still experience delays ranging from 10 to 30 seconds, reflecting ongoing traffic movement in the Black Country during the AM peak. High delays persist at key locations such as Great Barr Interchange and M6 J10, while urban centres like Dudley, Walsall, and Wolverhampton continue to experience significant delays due to the volume of trips generated.

IP

In the Inter-peak period, Figure 5-6 indicates that congestion remains an issue in similar areas, particularly around urban hotspots like Brierley Hill, Smethwick, and Black Heath. Delays of over 60 seconds can still be observed in the outskirts of Walsall and Wolverhampton, suggesting a need for further investigation to alleviate congestion.

PM

The PM link delay plot shown in Figure 5-8 similarly highlights many of the same congested areas as seen in both the AM and IP analyses. Major A road intersections, including the Wolverhampton Ring Road, A461/A4148, and A4123/A463, continue to exhibit delays. Additionally, towns such as Stourbridge, Smethwick, Brierley Hill, and Bilston still face challenges.

Figure 5-3: Modelled Traffic Flow in the 2042 Do Something AM Model.

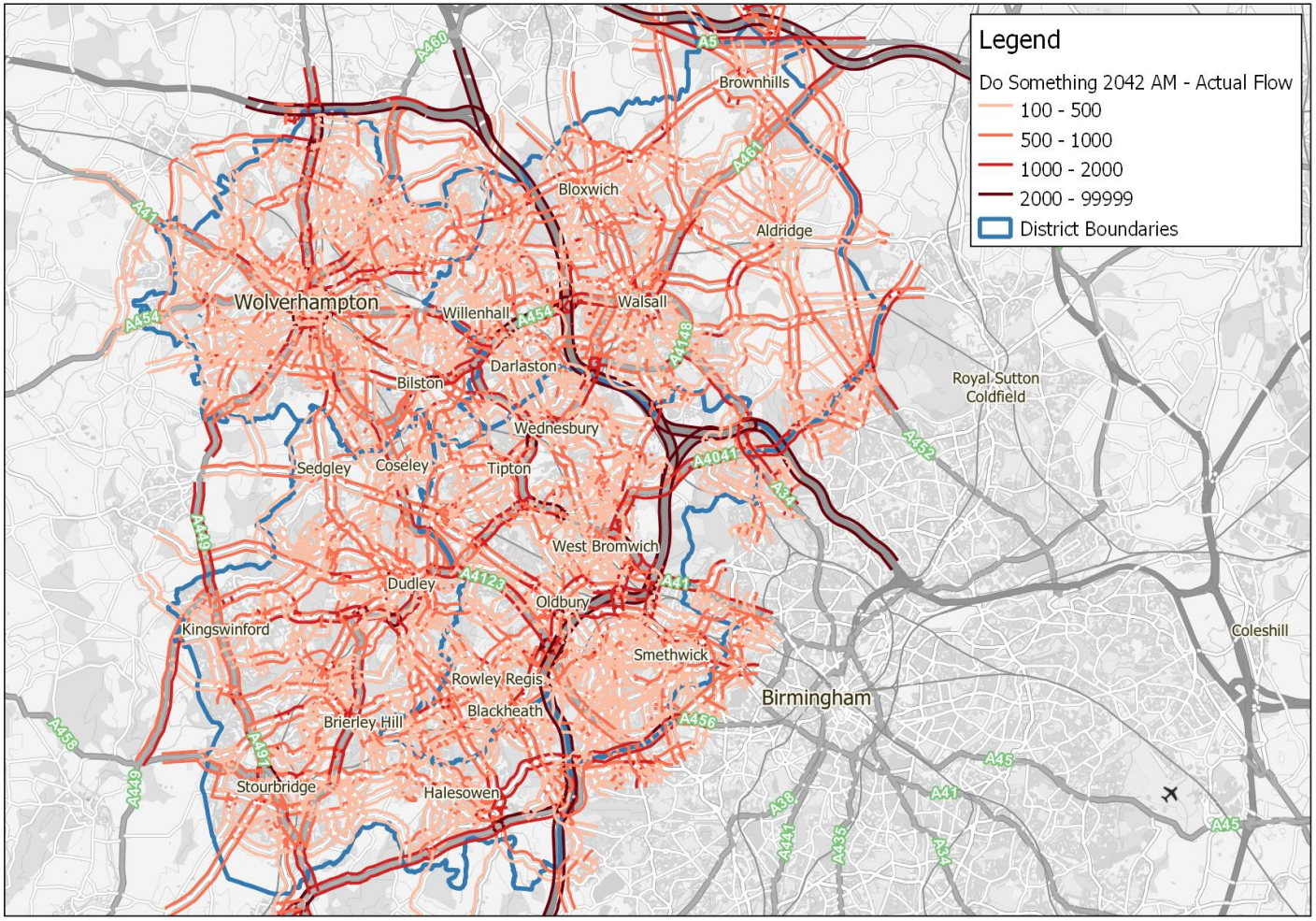


Figure 5-4: Modelled Link Delay in seconds for the 2042 Do Something AM Model.

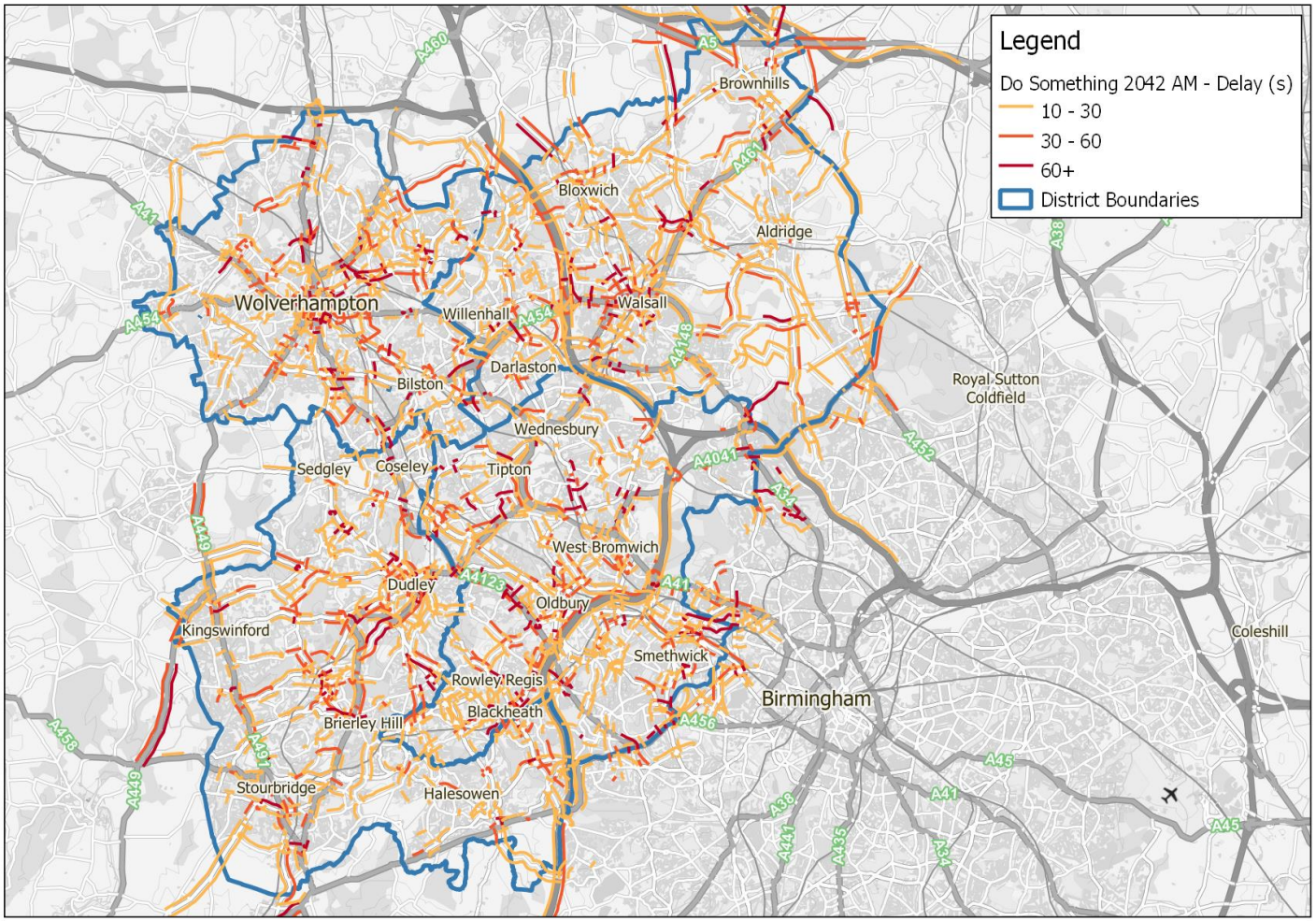


Figure 5-5: Modelled Traffic Flow in the 2042 Do Something IP Model.

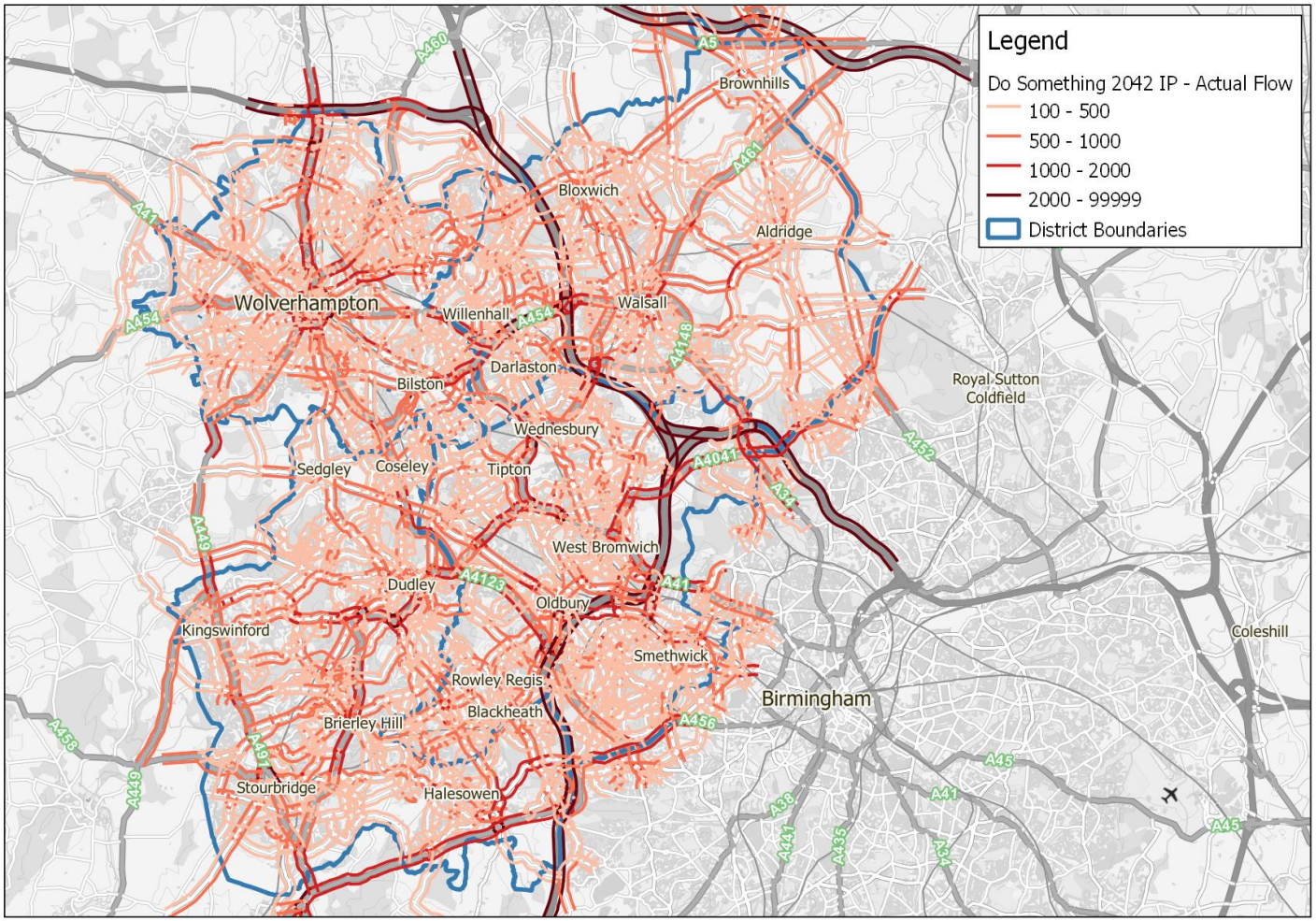


Figure 5-6:Modelled Link Delay in seconds for the 2042 Do Something IP Model.

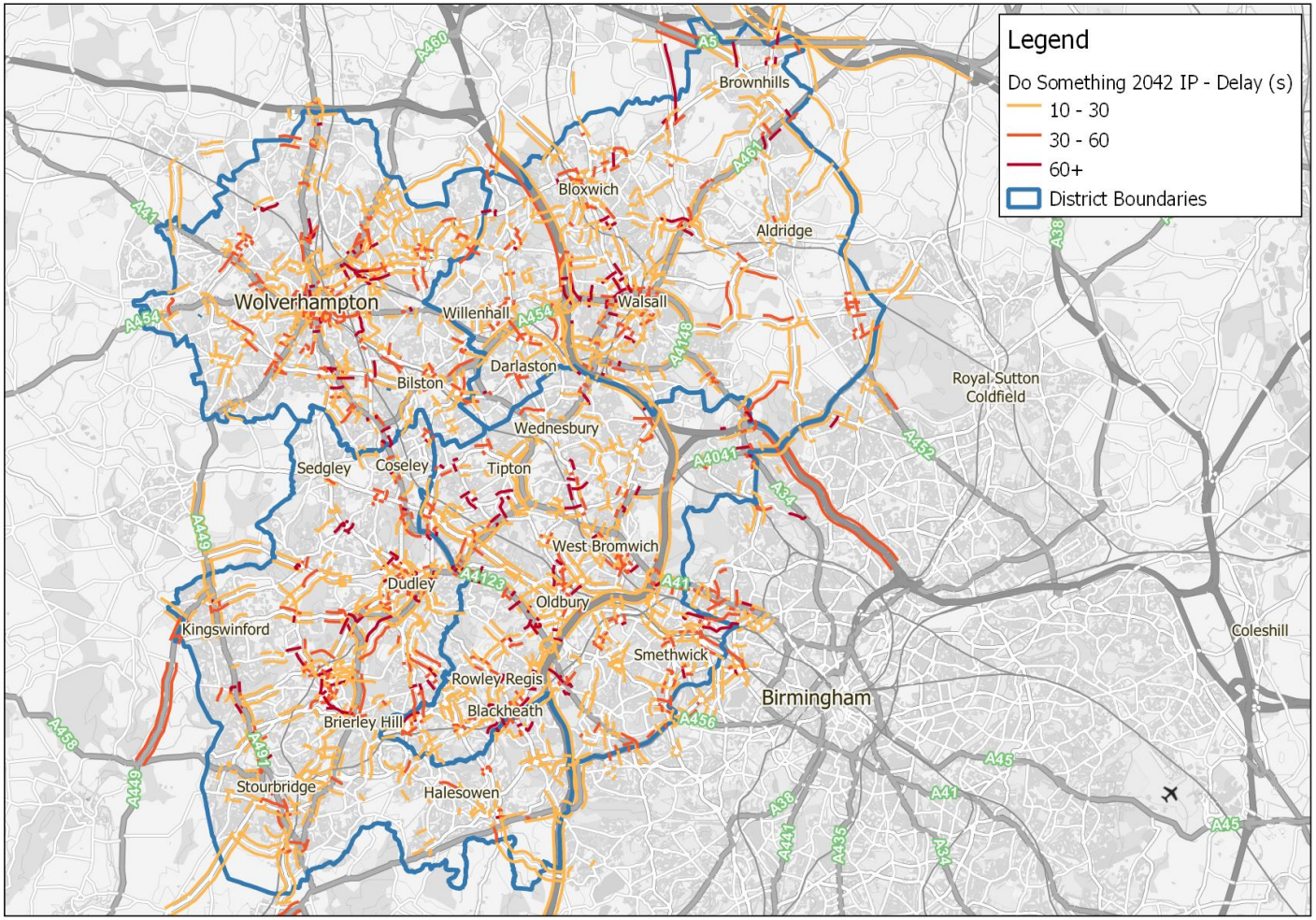


Figure 5-7: Modelled Traffic Flow in the 2042 Do Something PM Model

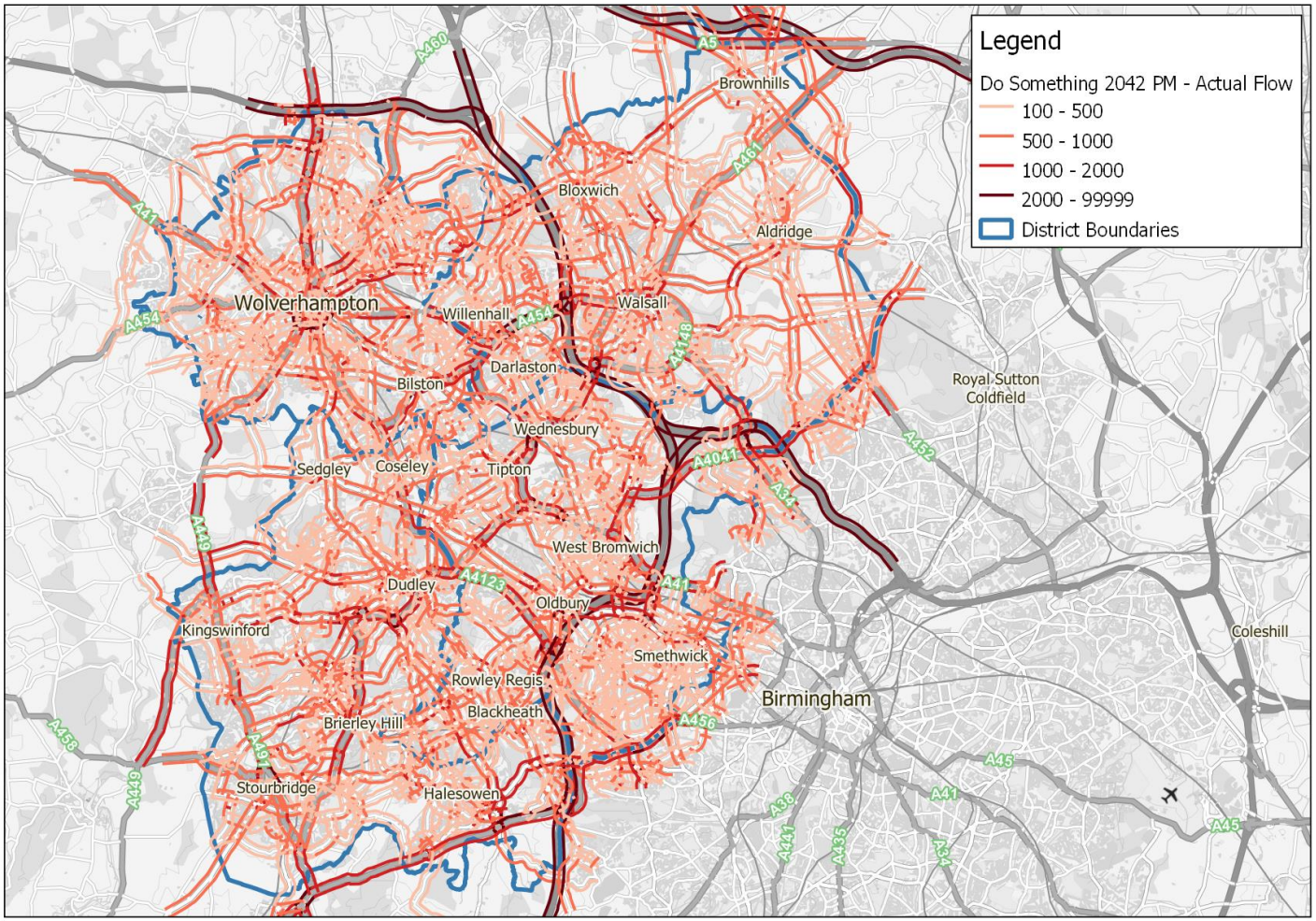
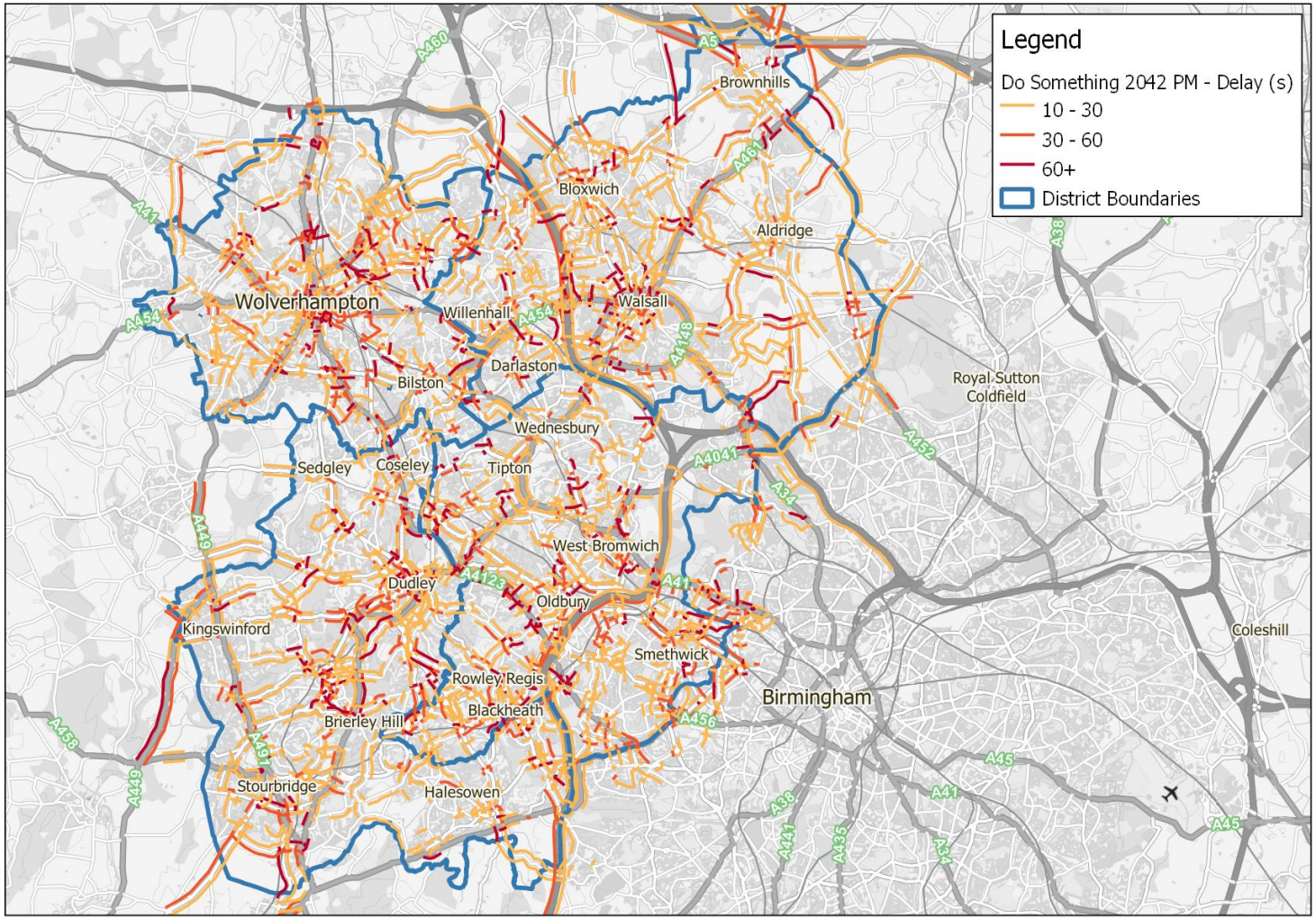


Figure 5-8: Modelled Link Delay in seconds for the 2042 Do Something PM Model.



5.6 Comparison against Do Minimum

The Do Something results are shown below, compared against the Do Minimum (both 2042). These plots highlight areas of the model where transport schemes have been implemented to mitigate the traffic impacts of increased demand from Local Plan development sites. The Do Something scenario includes these schemes, which aim to improve network performance. Areas that show reduced delay, volume/capacity (V/C) ratios, or queueing indicate where the transport schemes effectively address potential pinch points and enhance overall traffic flow.

When reading and understanding this section, it is important to consider the distinction between mitigations schemes and non-committed schemes in the Do Something model. The intended effects of the Do Something schemes are to promote modal shift away from private car use. Their effects are not likely to solely impact Local Plan traffic; instead they would also help to reduce the baseline growth in private car use seen in the Reference Case and the corresponding current and future congestion issues seen in the region. The Reference Case demonstrates high population growth outside of the Local Plans; current modelling assumptions assume a corresponding growth in the use of private cars and therefore congestion.

Minor mitigation measures against the impact of the Local Plans have been implemented in a targeted approach through signal optimisation and minor junction and link changes, discussed in Section 5.2.

By assessing these additional transport schemes, it is hoped to gain a better understanding of the potential state of the transport network in the Black Country when Local Plans are fully built out and additional active travel and public transport infrastructure is established.

5.6.1 Horizon Year: 2042

Model results are presented for the whole of the Black Country and arranged to explain logically the impacts of each model result on the reported analysis. For larger plots focused on the individual districts, please refer to the appendices.

Link flow difference is presented for the 2042 Do Something model against the 2042 Do Minimum model. They should be analysed alongside the percentage flow difference plots, which provide context for the proportional change in vehicular flow.

Link flow then contributes in part to Link Volume over Capacity, which is a measure of how congested a link is. The capacity within the model provides a maximum number of vehicles that can be using a link, and the ratio of the links volume against its capacity can be used to determine how busy a road is. Typically, a value of above 85% is considered to demonstrate moderate congestion.

As part of the link V/C ratio, we are also reporting on link relative queue length difference. This is a standard VISUM output which shows how much of a link is blocked back by queue as a proportion of its length. This can help to highlight junctions with large delays on one or more arms, as links further back from the junction will show blocking back.

The combined impact of link flow, link V/C and link relative queue is then shown in the link delay difference plots. These are provided in seconds and show the delay experienced by an average vehicle in the time period. Some delays are expected due to signalised junctions and the volume of traffic within PRISM, but delay differences can be used to identify areas within the model that are being severely adversely impacted by vehicular flow increases.

5.6.1.1 AM Model Results

Link Flow

In Figure 5-9, there is a general decrease in link flow along the A4123, primarily attributed to the implementation of cycle and pedestrian paths along the corridor. The introduction of toucan crossings has been coded in the model by incorporating pedestrian phases at signalised junctions, which reduces green time for vehicles and affects traffic demand on this route. These changes have led to a decreased capacity and corresponding decrease in demand on the A4123, encouraging drivers to seek alternative routes due to delays caused by the new signals and lane adjustments.

Furthermore, we observe darker link markings in certain areas, such as Moxley Junction, the A41 Carters Green Junction, Lower Walsall street, and the A4123/Bean Road intersection. This is due to the introduction of new links or the splitting of existing links as per the scheme coding, which reflects actual traffic flows rather than flow differences, which might be somewhat misleading.

Overall, we observe a decrease in traffic entering the Carters Green junction because signalising this junction has resulted in minor reductions in demand while improving operational capacity and enhancing traffic circulation. Similarly, the transition of Moxley junction from a roundabout to a signalised junction has also contributed to these improvements. Conversely, there is a shift of traffic from the A454 to Lower Walsall Street due to the road being added to the model, as well as increases on Willenhall Road because of the introduction of scheme changes. Additionally, we see increased demand at Burnt Tree junction and Tividale junction due to changes in lane turning movements and the introduction of new signal phases, which have facilitated traffic flow at these locations.

VC

Figure 5-11 presents the change in link V/C, which is most severely seen in the vicinity of Wolverhampton and its border with Dudley, with the A449 corridor seeing large decreases in link V/C. Increases in link V/C, showing increased link saturation/congestion, are seen on the eastern and southern radial roads from Wolverhampton city centre, suggesting increased traffic flows into these areas and corresponding to patterns seen in the flow difference plots.

Dudley sees the largest increases in link V/C around Coseley, likely due to its proximity to Wolverhampton. This is backed up by increased link saturation on the northern side of the town. In addition, increases in link V/C can be seen on the approach from the north into the town centre of Dudley, and also on the westbound approach.

In Walsall, Bloxwich is expected to see some redistribution of traffic flows, whilst Sandwell sees larger V/C changes around the M5 and West Bromwich.

When the links are filtered to remove those links that are not over capacity in the Do Minimum scenario, and therefore only looking at the most congested links above the 85% threshold, there is a much less significant change. Figure 5-12 indicates that north of Wolverhampton is likely to experience a net decrease in link V/C, potentially caused by the A449 network changes. Some increases further up the A449 can be expected, approaching from Oxley Moor

Road, along with traffic travelling on Wednesfield road and the Finchfield Road approach to the A454 on the west of the city centre.

Filtered links in Walsall do not show any major change to link V/C as expected, with few interventions and low impact of the Local Plan as currently modelled.

In Sandwell, the majority of link V/C changes occur around Oldbury and the M5, with the northbound link between M5 J2 and J1 showing a potential increase in congestion. Some blocking back is suggested around M5 J2, specifically the approach from the A4034.

Of particular note is the increase in V/C at the southern arm of Swan roundabout, but an increase of traffic flows and reduction of link V/C at the southern arm of Carters Green.

Dudley also shows minimum V/C changes when filtered. The most significant changes are seen on the exit from the A457 to Parkes Hall Road, and the roundabout link at Scotts Green Island from Kingswinford Road to the A4101.

The other impact is seen on eastbound traffic on the B4176, approaching from Milking Bank and Salop Street.

Relative Queue

On the whole, there are only a few locations where queues are expected to change in the Local Plan Do Something scenario. Figure 5-13 shows that very minor changes can be expected in Dudley and in Walsall, with decreases in queues seen at the approach to Flood St Island and to Burnt Tree junction travelling north, but with a corresponding increase for traffic from A461 Burnt Tree.

In Sandwell, queue changes mostly occur along the A4123 Wolverhampton Road, with small queue increases at the intersection with Newbury Lane/Portway Road, and from Portway Road itself. However, circulatory traffic flows are improved at Birchley Island near Junction 2 of the M5.

In Wolverhampton, the most significant impacts are seen along the A449, with large increases in queues seen on the approach at all three arms of Bushbury roundabout. These queue increases are expected to travel back further through the smaller roundabout on the eastern side. In addition, flow is likely to become increasingly backed up along the southern part of the A449 down to the roundabout with Dunstall Road and Fox's Lane, with increases in queues along Gorsebrook Road as well.

These queues are a result of amended coding in the model to more accurately reflect the junction geometry and capacity. These combined impacts suggest that further mitigation work may be required along this corridor, although with additional public transport and active travel availability these queues may reduce slightly.

Finally, on the A460 mainline flows ravelling east and west are expected to see an increase in queues at the junction with Woden Street. Signal optimisation may be useful in later modelling to improve these flows, although it has been undertaken for this work more detailed modelling may be useful to improve junction performance.

Delay

The link delay plot shown below in Figure 5-14 shows the impacts of the relative queue lengths and V/C changes on delays seen in the model.

The A449 in Wolverhampton shows increased delays along the A449, likely due to the amended junction coding to reflect geometry as discussed earlier in the relative queue analysis. The A460 at Woden road also shows increased delays on the mainline flows, although with reduced delays on the side roads connecting to it, possibly showing reduced rat-running through minor roads. Some delay increases can also be seen at the A454/B4464 roundabout, with increases seen on traffic from Somerford Place and Willenhall Road.

Walsall shows minor delay changes, but with one location seeing a slight increase at Moxley roundabout. This is due to the rearrangement of the junction to reflect the DS coding (i.e. the addition of new links that do not previously appear) and so traffic flows should not be too severely impacted.

The most significant delay changes seen in Dudley are at the A4123/A4037 junction, with increases in delays seen on the north and south approaches from the A4037. Further along the A4123, the intersection with A457 Sedgley Road also sees increased delays on the side road approaches. These suggest that flows along the A4123 corridor are improved, but at the expense of side roads joining the corridor.

Sandwell shows some pockets of increased delays as expected, but the major impacts are along the A4123 as a continuation of those seen in Dudley. The town centre of Oldbury sees some delay increases on the A4034 and A457 roundabout, specifically on the approaches from the north and west. One junction that is majorly impacted is the intersection between the A4123 and Newbury Lane/Portway Road, with all arms showing an increase in delay with the most significant occurring at Portway Road.

In addition, the A4123/Pound Road intersection shows increased delays at all four arms, with most delays occurring on the mainline flows of the A4123 and the eastbound approach from Pound Road.

Figure 5-9: 2042 Do Something vs Do Minimum Flow Difference for the AM period.

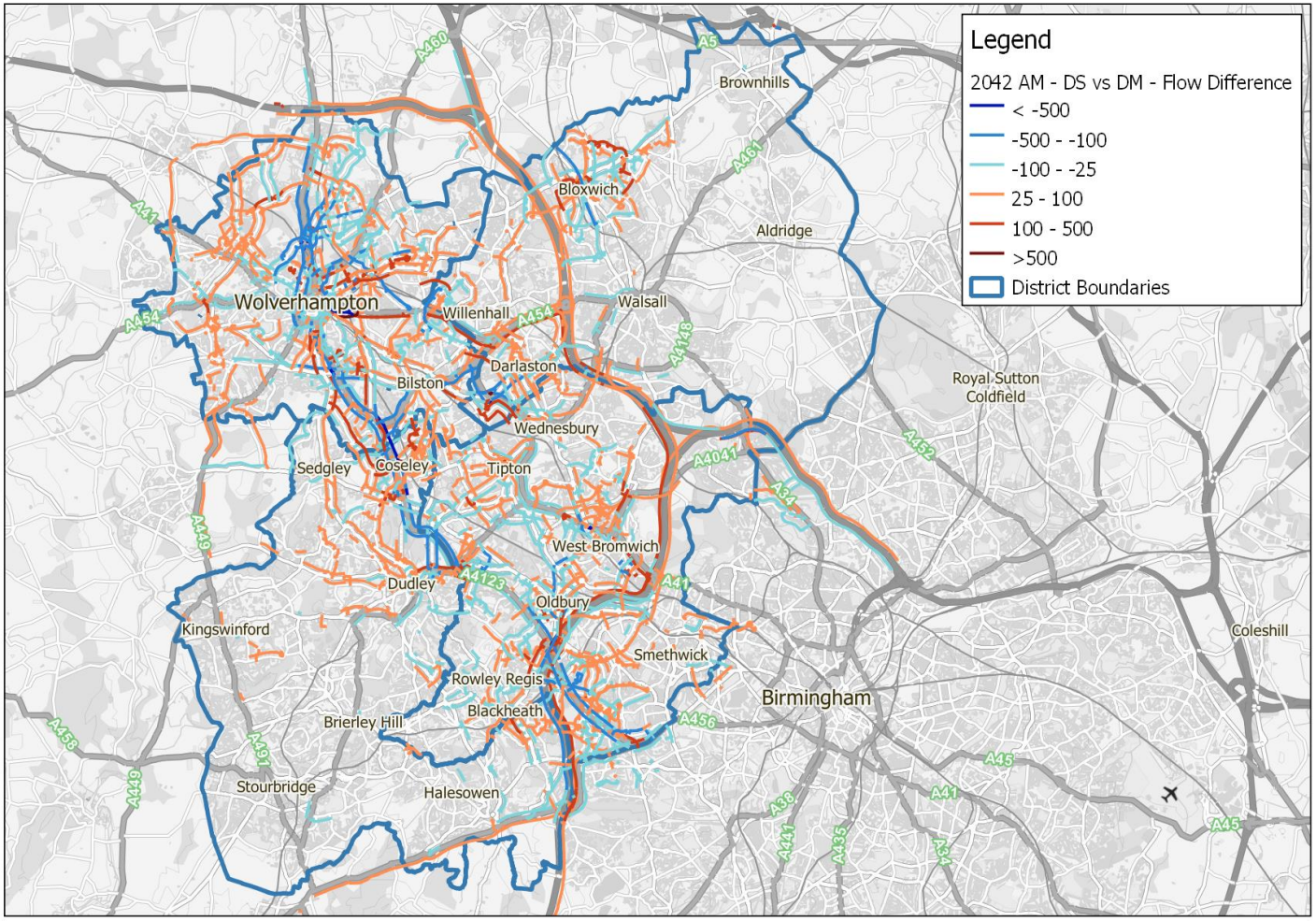


Figure 5-10: 2042 Do Something vs Do Minimum Percentage Flow Difference for the AM period.

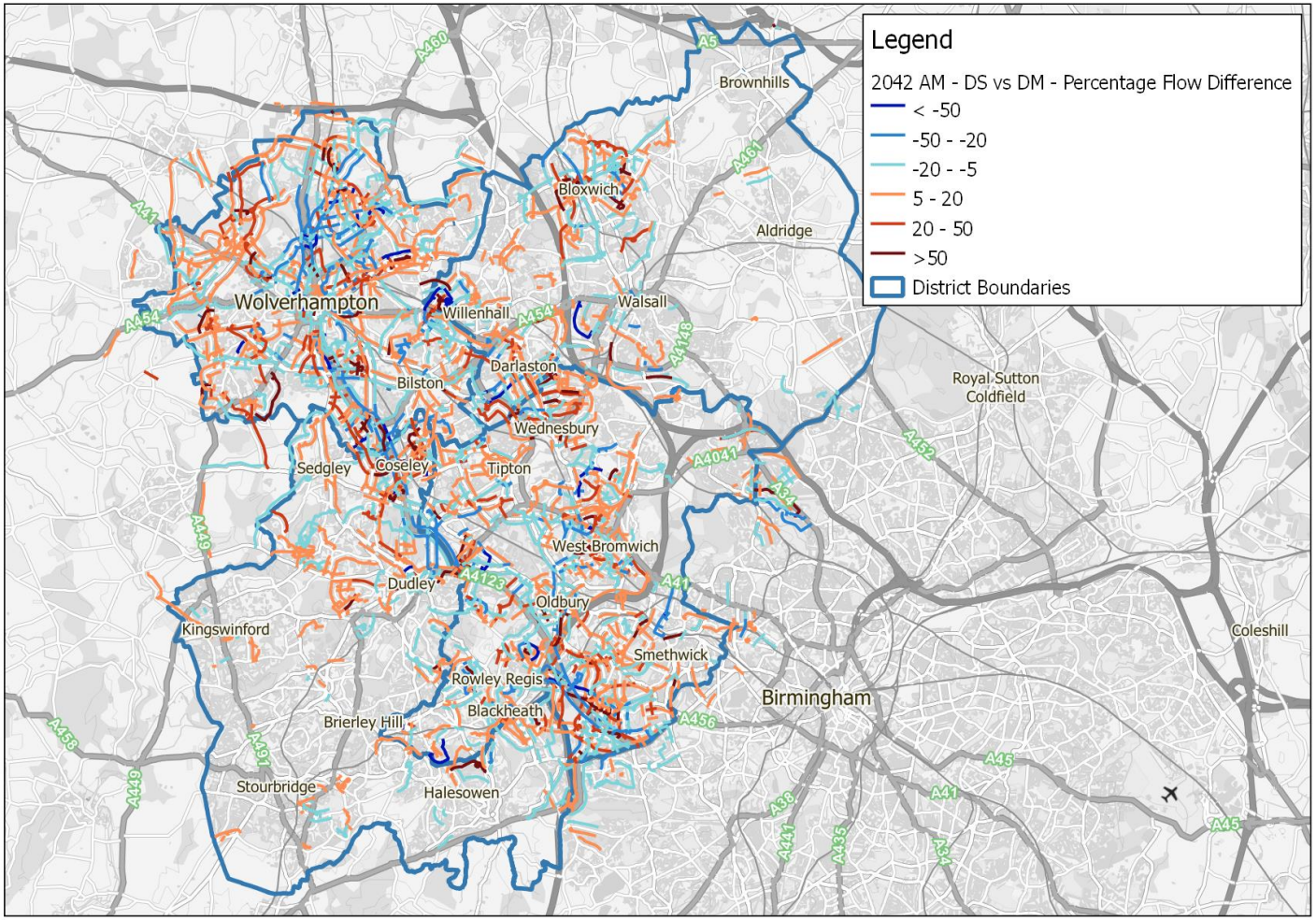


Figure 5-11:2042 Do Something vs Do Minimum Volume over Capacity Ratio Difference for the AM period.

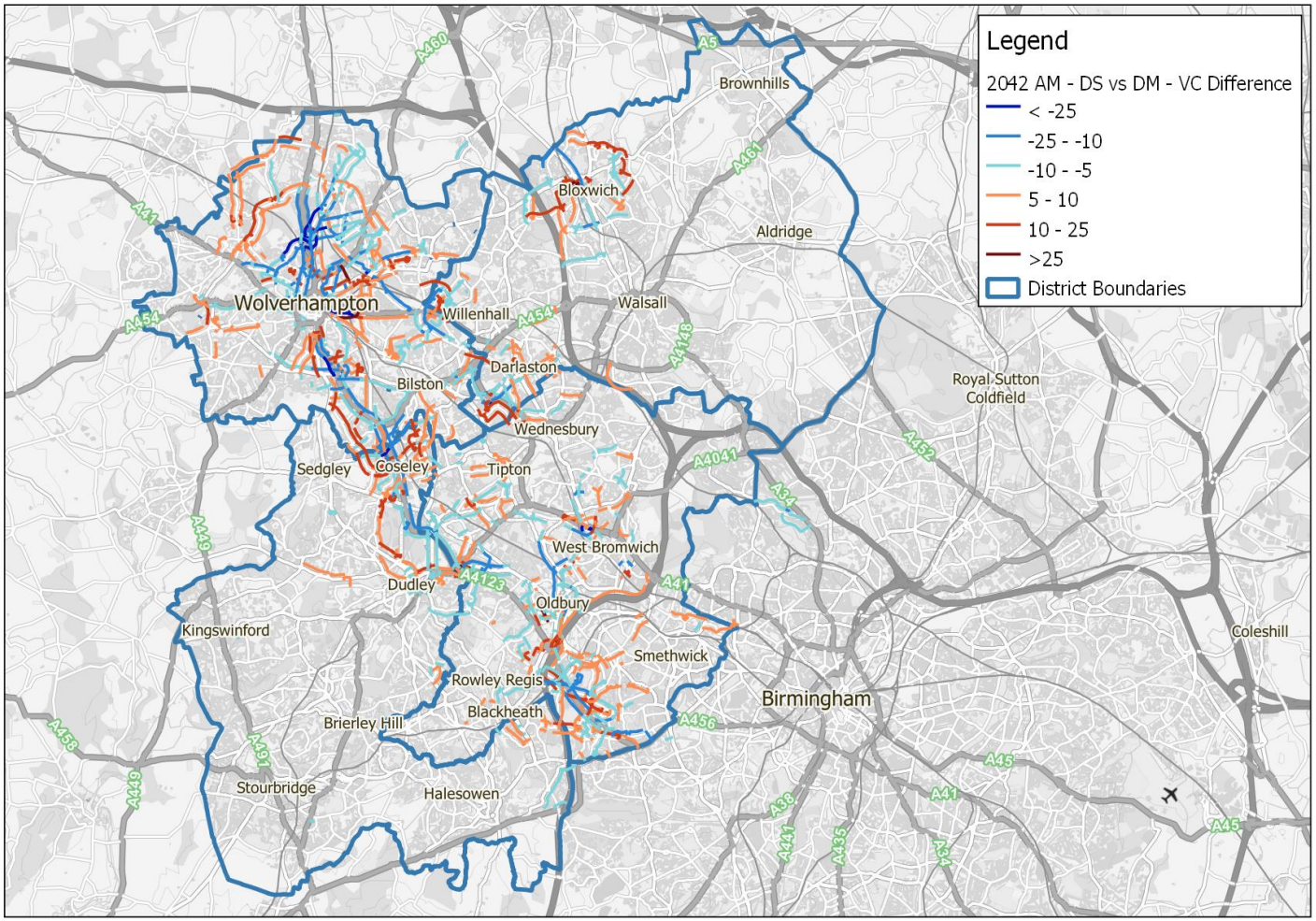


Figure 5-12: 2042 DS vs 2042 DM V/C Ratio Difference for the AM period. Links shown are over 85% V/C in the DM. Difference is in % of DM.

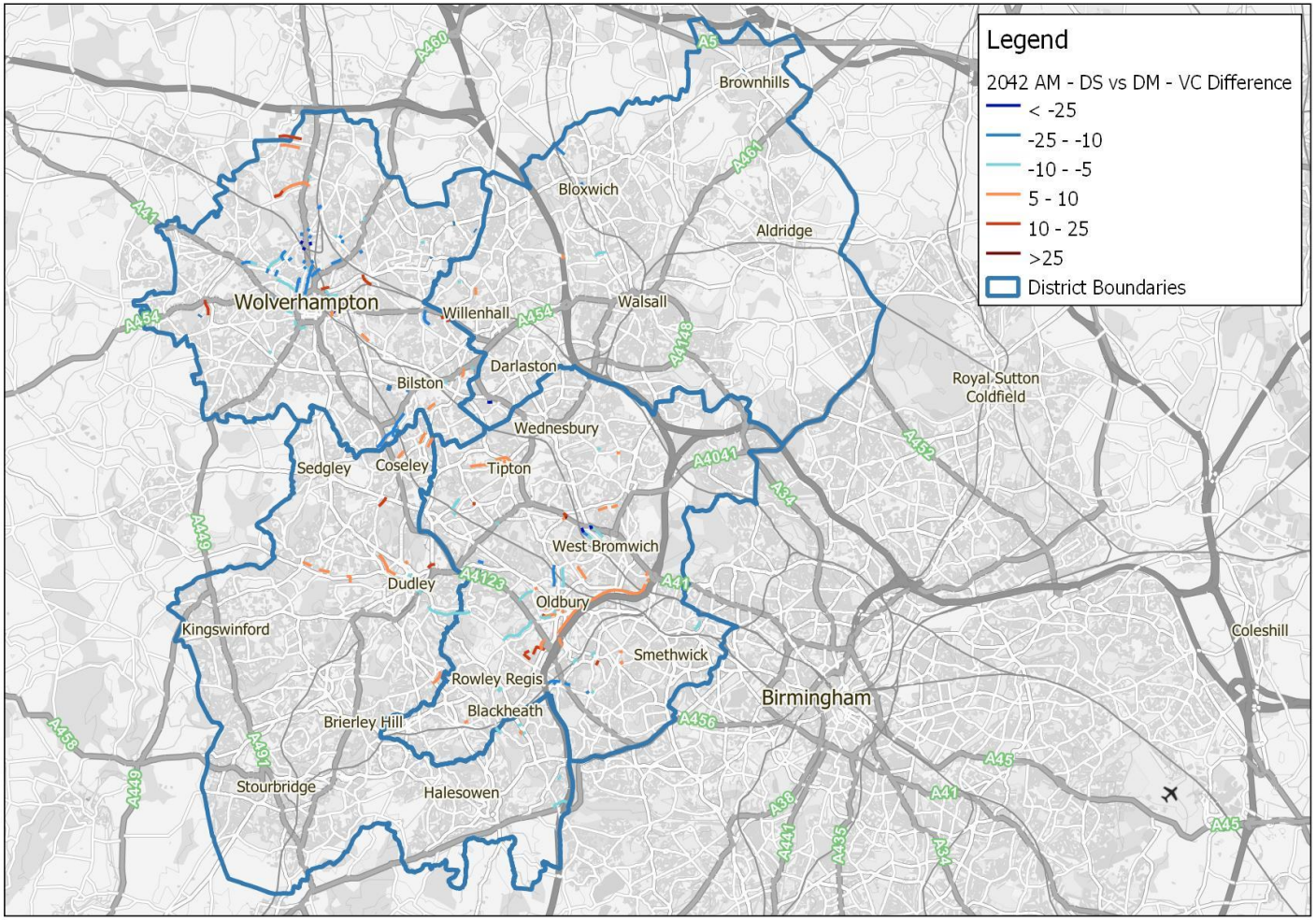


Figure 5-13: 2042 Do Something vs 2042 Do Minimum Relative Queue Length Difference in % Link Saturation for the AM period.

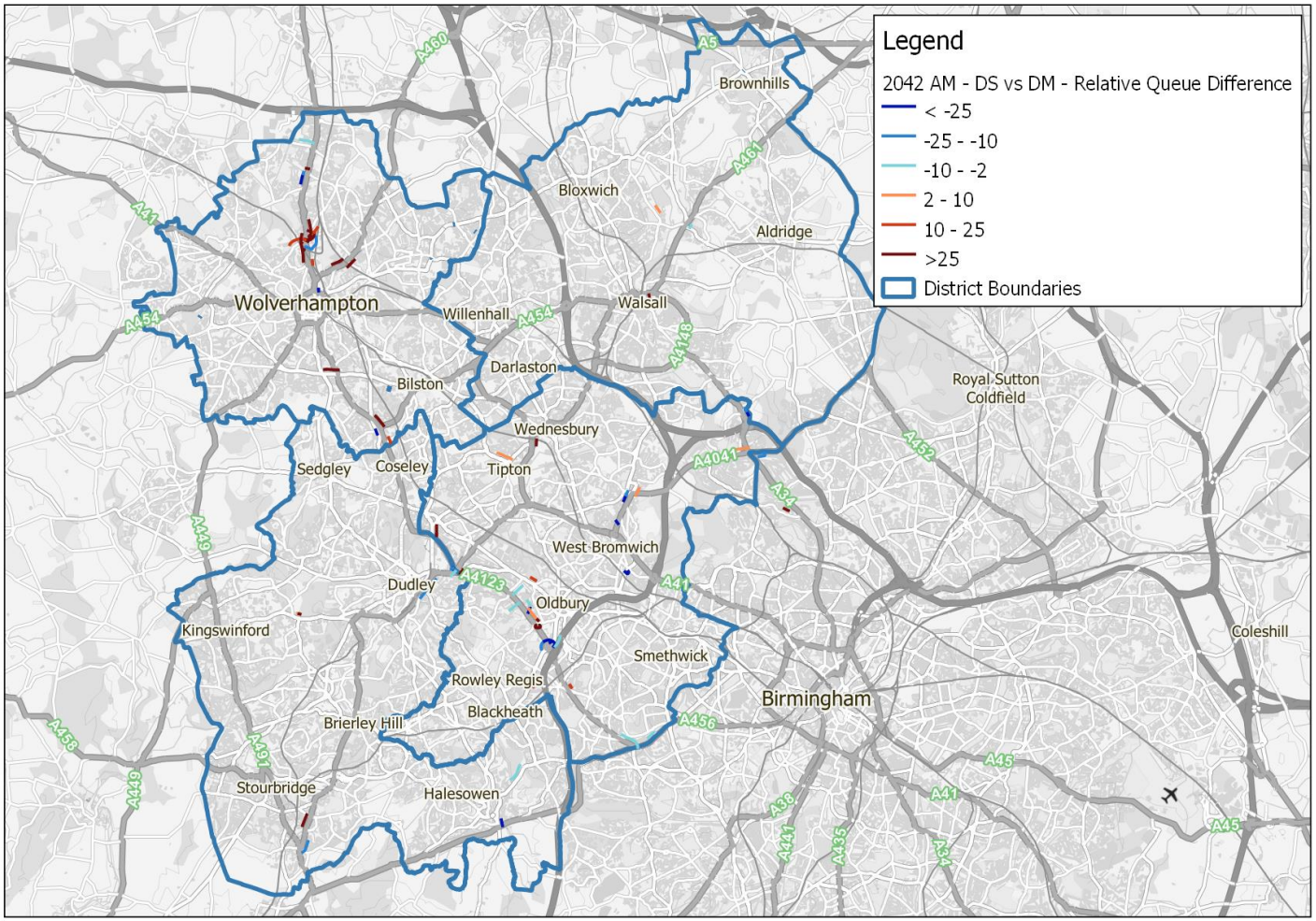
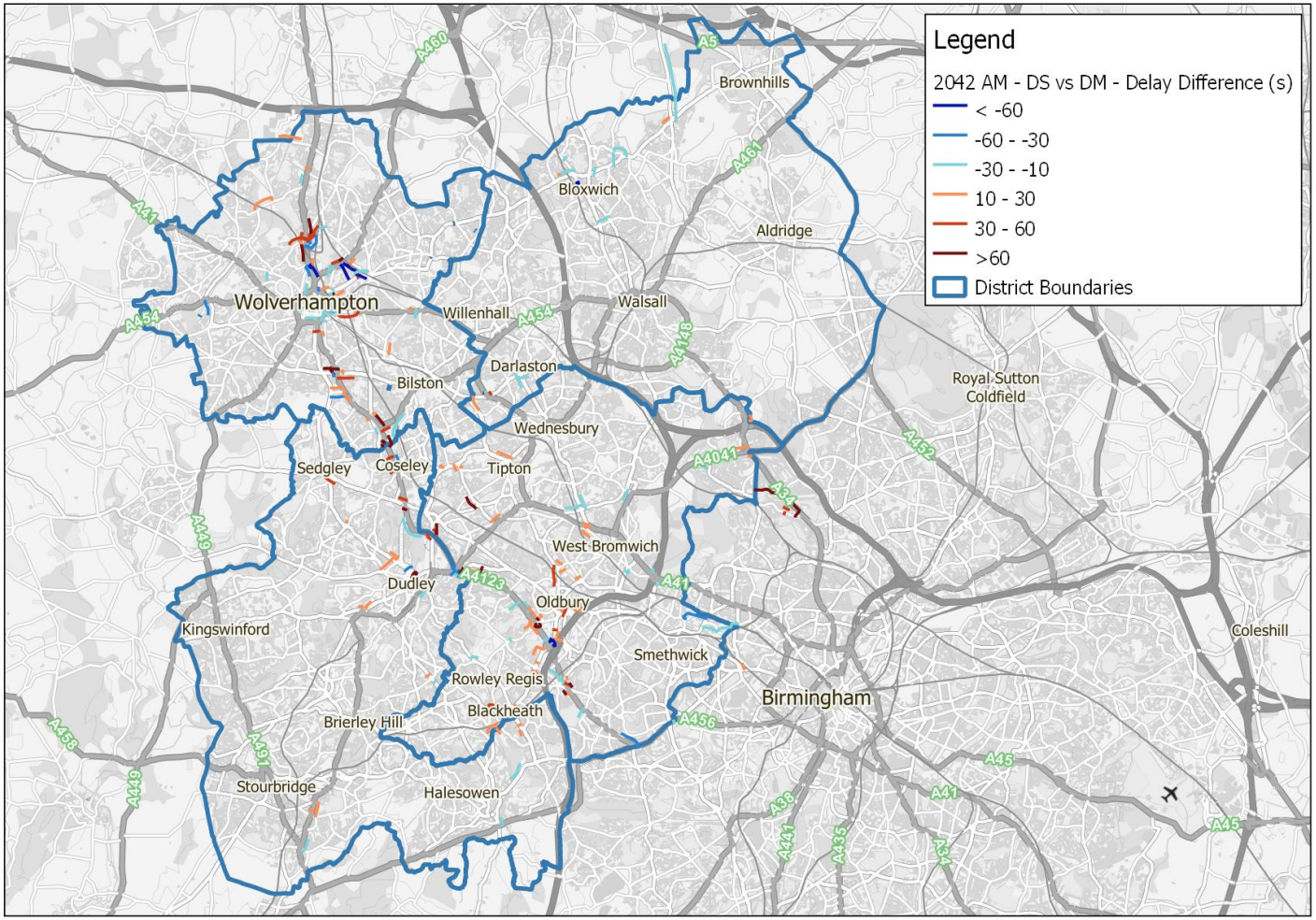


Figure 5-14: 2042 Do Something vs 2042 Do Minimum Delay Difference for the AM period.



5.6.1.2 IP Model Results

Link Flow

Overall, the IP shows a similar trend to the AM period, showing many of the same trends and patterns in flow changes due to the impacts of the DS schemes. In Figure 5-15, there is a general decrease in link flow along the A4123 between Wolverhampton and the M5 J2, primarily attributed to the implementation of cycle and pedestrian paths and crossings along the corridor. As in the AM, the introduction of toucan crossings has been coded in the model by incorporating pedestrian phases at signalised junctions, which reduces green time for vehicles and affects traffic demand on this route. These changes have led to a decreased demand on the A4123, encouraging drivers to seek alternative routes due to delays.

A41 Moxley and A41 Carters Green show the same changes as in the AM, again attributed to the introduction of new or split links which are not corresponded to DM links. We therefore do not expect to see the severe changes in flows that are indicated by this plot, although more minor changes may be seen.

Overall, we observe a decrease in traffic entering the Carters Green junction because signalising this junction has resulted in minor reductions in demand while improving operational capacity and enhancing traffic circulation. Similarly, the transition of Moxley junction from a roundabout to a signalised junction has also contributed to these improvements. Conversely, there is a shift of traffic from the A454 to Lower Walsall Street due to the road being added to the model, as well as increases on Willenhall Road because of the introduction of scheme changes. Additionally, we see increased demand at Burnt Tree junction and Tividale junction due to changes in lane turning movements and the introduction of new signal phases, which have facilitated traffic flow at these locations.

The A449 in Wolverhampton shows reduced flow travelling both northbound and southbound. This is likely due to delay impacts seen and discussed later in this section, with drivers seeking alternative routes to minimise the impact of junction structural changes on their journeys. To the east of Wolverhampton, a large decrease in flow is seen but this is due to the structural changes in the model and not a result of actual rerouting.

The percentage flow change seen in Figure 5-16 shows that many of the larger percentage differences in flows are on the minor roads. This suggests potential increases in rat-running through minor roads to avoid larger delays caused by active travel or PT interventions on more strategic corridors. These impacts can be seen around Bloxwich on the A4124 corridor, Wednesbury, West Bromwich and Coseley on the A4123 corridor.

VC

Figure 5-17 presents the change in link V/C, which is most severely seen in the vicinity of Wolverhampton and its border with Dudley, with the A449 corridor seeing large decreases in link V/C. This pattern is similar to that seen in the AM, with increased link saturation/congestion seen on the eastern and southern radial roads from Wolverhampton city centre, suggesting increased traffic flows into these areas and corresponding to patterns seen in the flow difference plots.

As in the AM, Dudley sees the largest increases in link V/C around Coseley, again with increased link saturation on the northern side of the town towards Wolverhampton. The impacts in Dudley town centre are less severe in this time period.

In Walsall, Bloxwich is expected to see some redistribution of traffic flows similar to the AM, whilst Sandwell sees larger V/C changes around the M5 and West Bromwich. Oldbury also shows some general V/C changes.

When the links are filtered to remove those links that are not over capacity in the Do Minimum scenario, and therefore only looking at the most congested links above the 85% threshold, there is a much less significant change. Figure 5-18 indicates that Wolverhampton and Sandwell will see the greatest impacts, although these are relatively small. Dudley and Walsall are not expected to see any major changes in V/C of links over capacity.

In Wolverhampton, the A449 corridor, specifically the roundabouts up to and including Bushbury Lane, sees minor reductions in link V/C. This suggests that roundabout circulatory movements may be improved in the DS in this time period.

Reductions in link V/C are also seen along the B4166 in Oldbury, and on the approach to the A4123 from High Street in West Bromwich.

Relative Queue

On the whole, there are only a few locations where queues are expected to change in the Local Plan Do Something scenario, and these broadly correspond to the AM period. Figure 5-19 shows that very minor changes can be expected in Dudley and in Walsall, with only the approach to Flood St Island from Castle Gate Island showing a reduction in queue length, although the northern arm of Burnt Tree is expected to see increased queueing.

In Wolverhampton, the changes in queueing are localised to the A449, with large increases in queues seen on the approach at all three arms of Bushbury roundabout. These queue increases are expected to travel back further through the smaller roundabout on the eastern side. In addition, flow is likely to become increasingly backed up along the southern part of the A449 down to the roundabout with Dunstall Road and Fox's Lane. These patterns match those seen in the AM, and are most likely a result of amended coding in the model to more accurately reflect the junction geometry and capacity.

In Sandwell, only minor queue length changes are seen, and mostly along the A4123. Like the AM, the northwest mainline A4123 approach to the intersection with Newbury Lane/Portway Road sees an increase in queues, as does the A4034 approach to Penncricket Lane/Mincing Lane, although this impact is likely to be fairly minor.

Delay

The link delay plot shown below in Figure 5-20 shows the impacts of the relative queue lengths and V/C changes on delays seen in the model. Patterns seen are similar to the AM but less severe and in fewer locations.

The A449 in Wolverhampton shows increased delays along the A449, likely due to the amended junction coding to reflect geometry as discussed earlier in the relative queue analysis. All approach arms can be expected to see an increase

in delay of over 30s. Bushbury Lane sees delays extending further along the link, whilst northbound flows along the A449 experience longer delays along the southern part of the corridor. Delay increases are also seen at the A4039/A4123 intersection on the north, east and west approaches to the intersection.

Walsall shows does not show any delay increases, and delay decreases can be seen around Bloxwich, likely as a result of rerouting to account for the node changes along the A4124.

The most significant delay changes seen in Dudley are at the border with Wolverhampton near Coseley, with increased delays at all arms at the intersection with the A463. These are likely due to increased capacity further down the link encouraging more vehicles to use the corridor on the whole.

The A4123 remains the largest source of delay increases in Sandwell, with multiple arms experiencing delays at the Burnt Tree junction, the intersection with Hill Road and the Portway Road/Newbury Lane/A4123 junction. Further north, the B4166 junction with Oldbury Road and Albion Road also highlight some increased delays.

Figure 5-15: 2042 Do Something vs Do Minimum Flow Difference for the IP period.

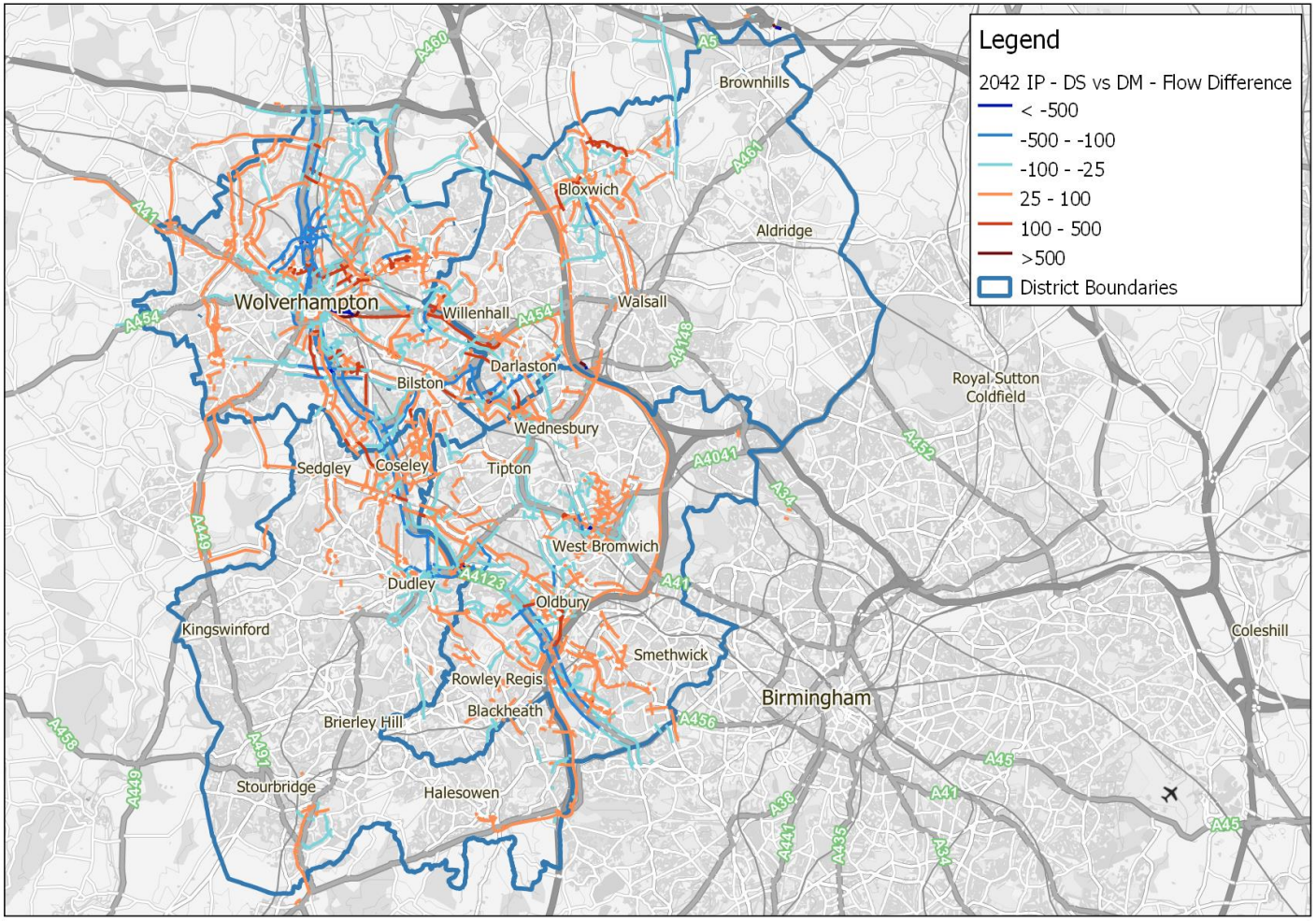


Figure 5-16: 2042 Do Something vs Do Minimum Percentage Flow Difference for the IP period.

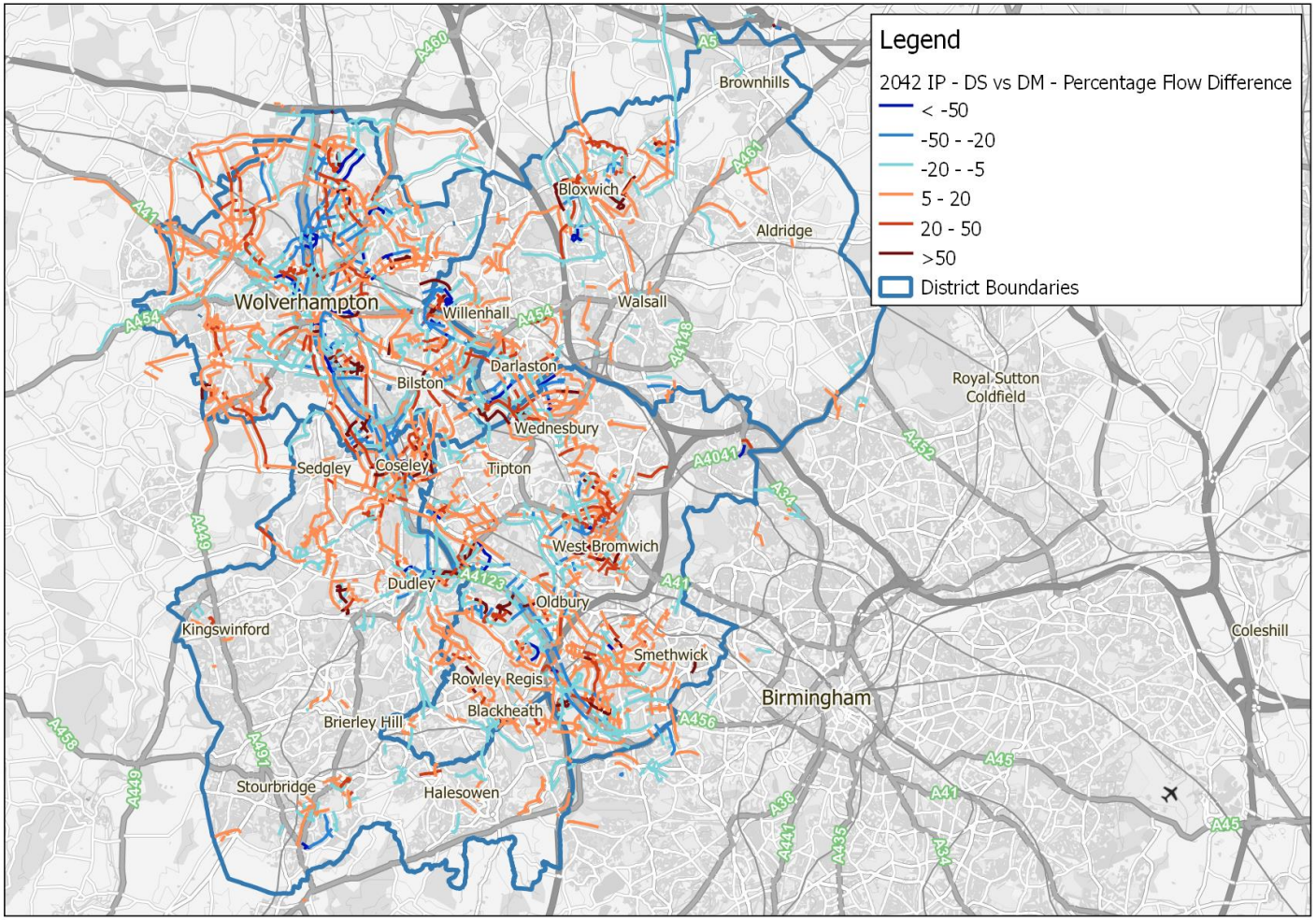


Figure 5-17:2042 Do Something vs Do Minimum Volume over Capacity Ratio Difference for the IP period.

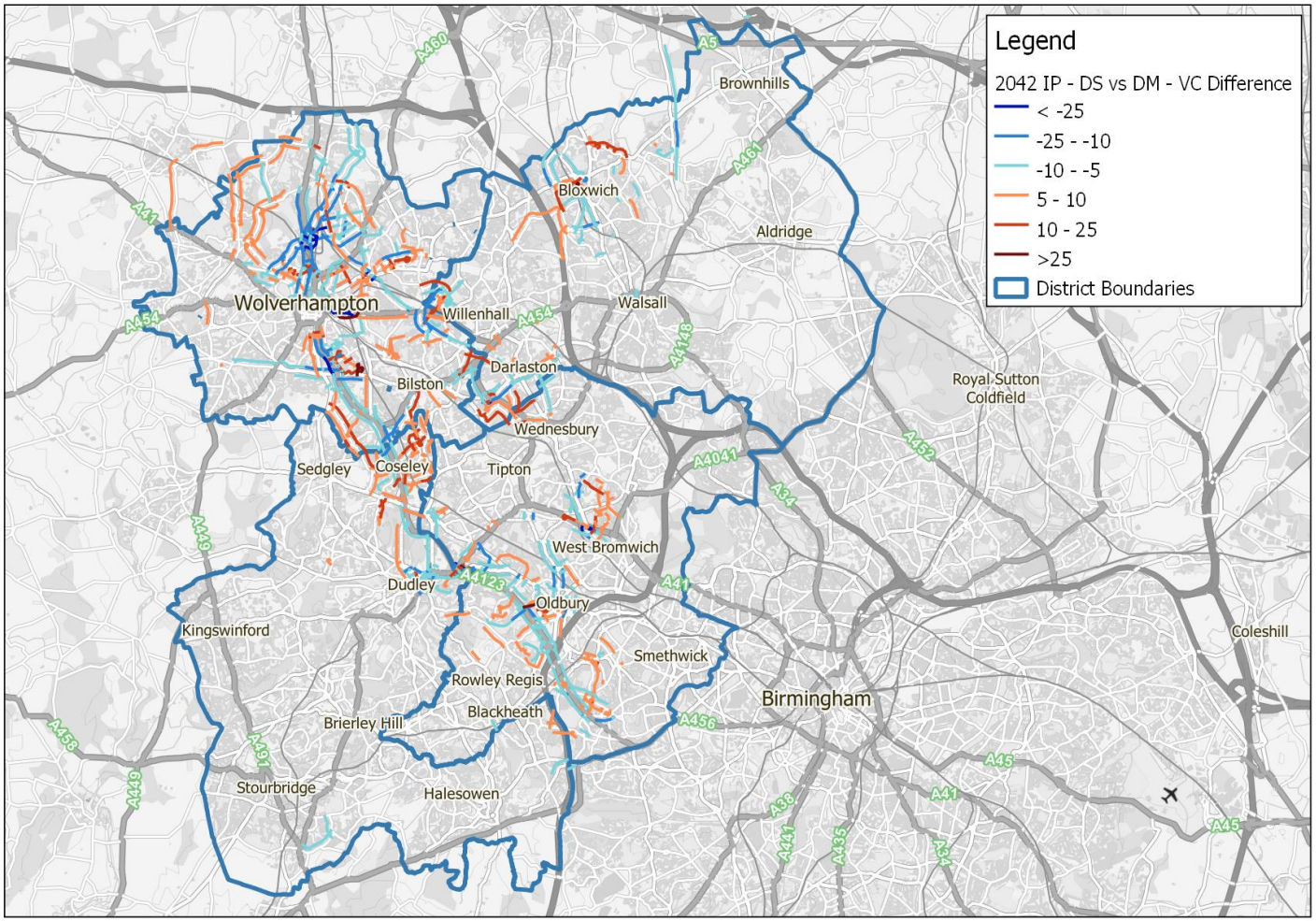


Figure 5-18: 2042 DS vs 2042 DM V/C Ratio Difference for the IP period. Links shown are over 85% V/C in the DM. Difference is in % of DM.

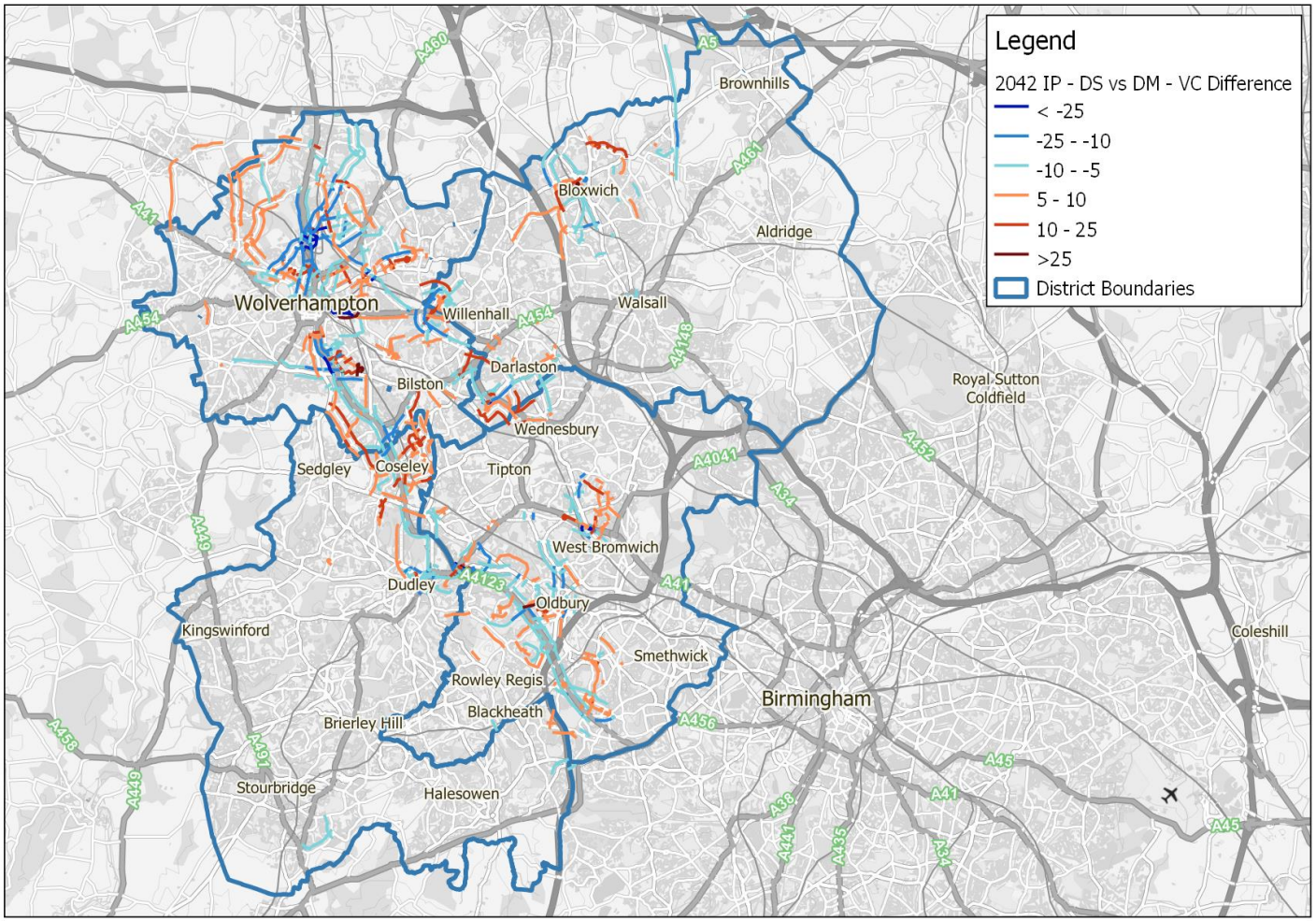


Figure 5-19: 2042 Do Something vs 2042 Do Minimum Relative Queue Length Difference in % Link Saturation for the IP period.

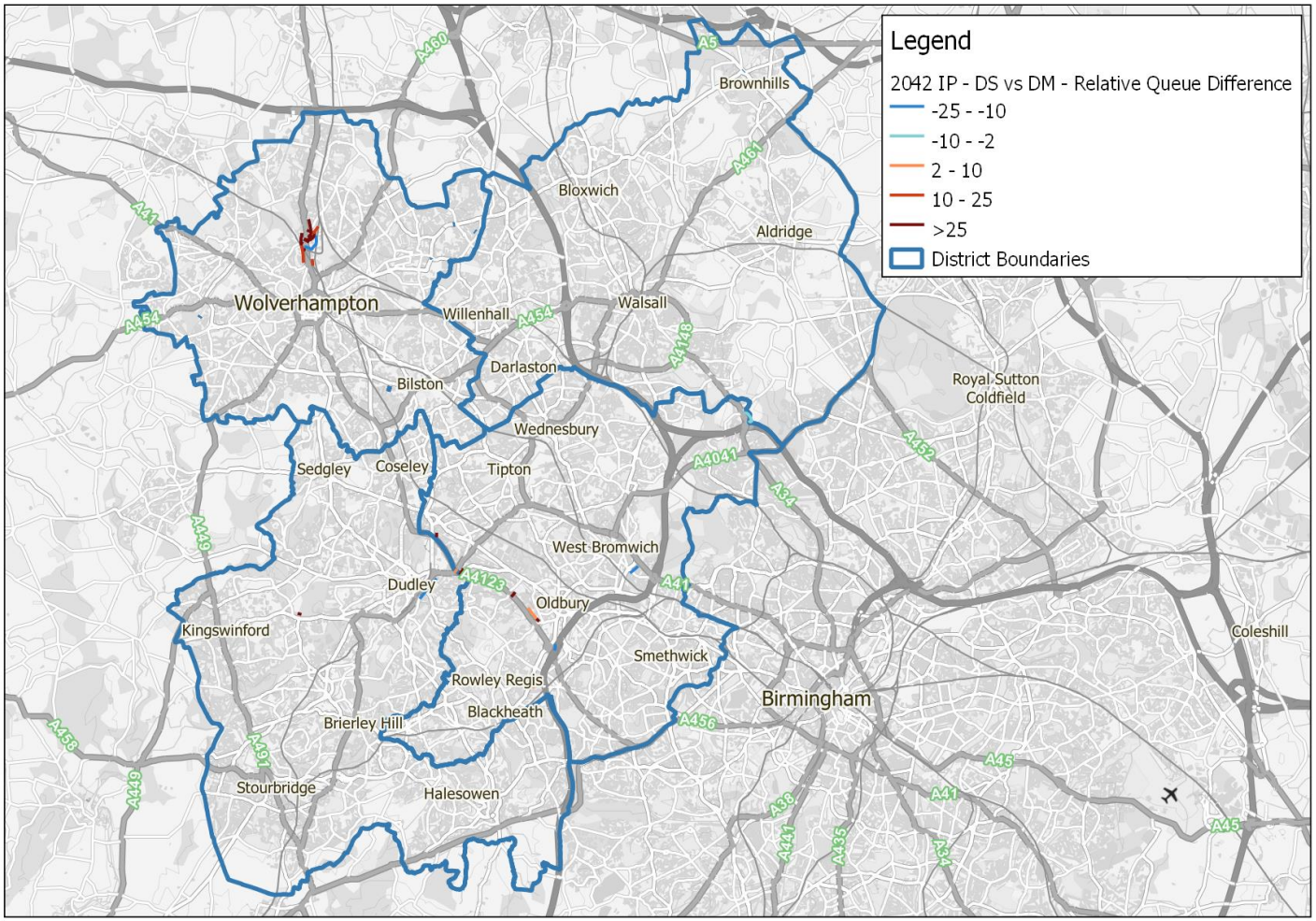
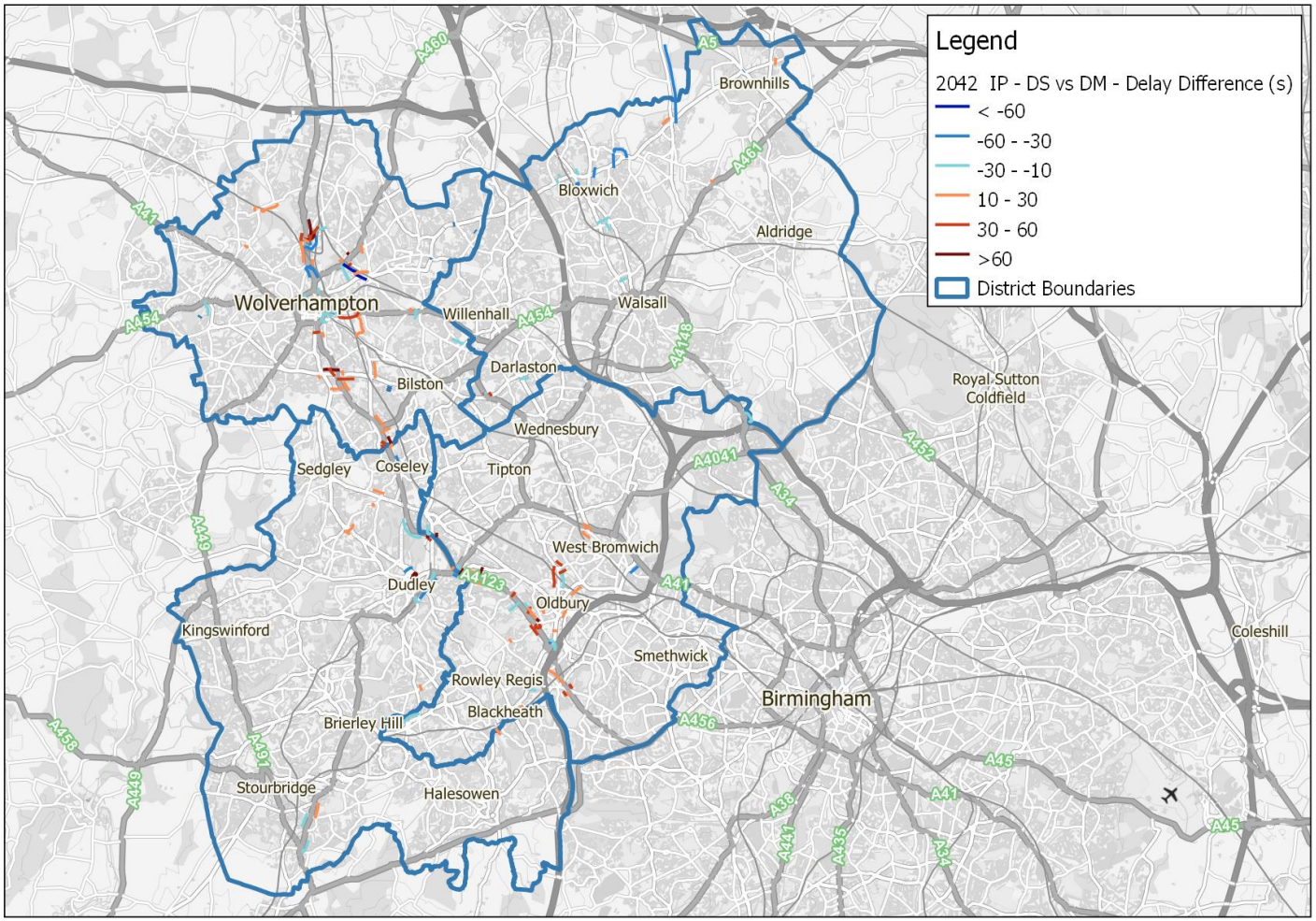


Figure 5-20: 2042 Do Something vs 2042 Do Minimum Delay Difference for the IP period.



5.6.1.3 PM Model Results

Link Flow

In Figure 5-21, the flow difference between the Do Minimum and the Do Something is presented. As in the AM and IP, there is a general decrease in link flow along the A4123 in Wolverhampton, Sandwell and Dudley, primarily attributed to the implementation of cycle and pedestrian paths along the corridor and introduction of toucan crossings. These have been coded in the model by incorporating pedestrian phases at signalised junctions, which reduces green time for vehicles and affects traffic demand on this route. These changes are a result of the promotion of active travel and improve public transport, but do cause drivers to seek alternative routes and therefore change where delays to highway vehicles are experienced.

Other areas in Wolverhampton with major flow changes include the A449, where there is a large reduction in traffic flows caused by corridor scheme changes, where these flow reductions are a result of increased queueing discussed further below. It appears that much of this traffic is rerouting via smaller links to the west (B4161). Westbound traffic along the A460 towards the A4150 is also expected to increase, coming from the A454.

As expected, the M5 expects an increase in flows both northbound and southbound, with accompanying increases in flows at the junctions radiating into the Black Country, specifically the A461 and A4034. The A4041 also shows an increase in traffic leaving the Black Country eastbound.

Urban centres like Coseley, Oldbury, West Bromwich and Darlaston show increased flows, whilst Dudley shows lower traffic flow travelling through the town centre.

Decreases in flow at A41 Carters Green and Moxley, and increases at Burnt Tree and Tividale junctions, are a result of the DS scheme changes providing additional turning flow and junction capacity.

VC

Figure 5-23 presents the change in link V/C, with the hotspots identified in the AM and IP reappearing in the PM model.

V/C changes are most severely seen in the north of Wolverhampton on the A449, impacted by the reduced flows and as a result of the scheme changes implemented in the Do Something. Increases in link V/C, showing increased link saturation/congestion, are seen on the B4161 where traffic is rerouting from the A449.

Dudley sees the largest increases in link V/C around Coseley, likely due to its proximity to Wolverhampton where roads are connecting to the A4123. This is backed up by increased link saturation on the northern side of the town. In addition, increases in link V/C can be seen on the egress from Dudley travelling northbound onto the A4123, and near Sedgley.

In Walsall, Bloxwich is expected to see some redistribution of traffic flows, whilst Sandwell sees larger V/C changes around the M5 and West Bromwich. It is possible that there is some rerouting along Dudley Street to avoid using the A41 at Carters Green, whilst on the A4123 link V/C is likely to reduce. As the A4123

crosses the M5, other connecting roads experience increased congestion at Moat Road and Rame Road.

When the links are filtered to remove those links that are not over capacity in the Do Minimum scenario, and therefore only looking at the most congested links above the 85% threshold, there is a much less significant change. Figure 5-24 indicates that north of Wolverhampton is likely to experience a net decrease in link V/C on the circulatories of the roundabouts at Bushbury. The B4161 does not show any major V/C changes, indicating that there is capacity to handle the rerouting traffic.

Walsall shows some minor V/C increase hotspots, specifically on the A4124 near Bloxwich where DS adjustments have been made at the approach from Buxton Road, but also an increase near the train station.

In Sandwell, the majority of link V/C changes occur on minor roads round Oldbury and Rowley Regis. B4171 Dudley Road experiences a small increase, and a large increase can be seen near the A4034 where traffic is leaving the network and returning to zones.

Dudley also shows minimum V/C changes when filtered, with one impact on the A4123/A4168 intersection where the approach from Priory Road sees a slight increase in link V/C.

Relative Queue

Figure 5-25 shows that relative queue impacts in the PM are generally more severe than in the AM and IP. This corresponds to experience with other projects where we find that the network is more congested on the whole and has less extra capacity for rerouting.

In Wolverhampton, the A449 remains congested at Bushbury, showing large increases in queues along each of the approach arms. On the A460, longer queues are also expected where it meets Woden Road and Powell Street. Network checks suggests that these flows are caused by traffic exiting zones nearby, so impacts may not be as severe as seen as zone loading is done on a more aggregated level rather than by individual roads. It may also be indicative of some rat-running from the A4124.

In Walsall, M6 J10 shows increased queueing on the circulatory and the slip road from M6 northbound. Some signal optimisation may be required to improve these flows.

Like in other time periods, Sandwell sees the main impact along the A4123 at the Newbury Lane/Portway Road junction, with northbound traffic on the A4123 impacted. Burnt Tree junction remains problematic, with increased delays on the approaches from Birmingham Road and Burnt Tree. A4033 Tividale also sees some increased delays when approaching the A4123. Finally, the A4037 approach to the A4123, as well as the northbound flows of the A4123, can be expected to see an increase in congestion.

The major impact in Dudley is at Burnt Tree, with increases in queues expected when travelling westbound towards Sandwell. Other minor impacts include the roundabout on the A4036 with Chawn Hill where northbound traffic may see increased queueing, and in Brierley Hill at the intersection with the A4100, although these are very small and isolated pockets and so may be model noise.

Delay

The link delay plot shown below in Figure 5-26 shows the impacts of the relative queue lengths and V/C changes on delays seen in the model. In general, smaller pockets of delay increases are seen across the whole of the model, to a larger degree than in the other time periods. Many of these are unlikely to impact the travel patterns of residents on the whole.

The A449 in Wolverhampton shows increased delays along the A449 at Bushbury, due to the reasons discussed in other time periods. These delays are not insignificant and should be looked at in further detail to improve journey times in this area. The A460 at Woden road also shows increased delays on the mainline flows, although with reduced delays on the side roads connecting to it, possibly showing reduced rat-running through minor roads.

Delays further south on the A4123 at the A4039 intersection, and at the meeting of the A4123 and A424, suggests some more significant impacts on the SRN that may require further intervention. This is also seen at the intersection with A463 at Shaw Road, where mainline A4123 and side road access is seen to experience delays.

Delays in Walsall are seen at M6 J10, caused by increased queueing on the roundabout discussed earlier. In addition, the link between the A4038 and B4464, Bentley Mill Way, sees an increase in delay. Finally, small delay increases can be seen on the roundabout at the Keyway, with three of four arms seeing an increase in delay for vehicles accessing the roundabout.

Southern Dudley District shows very minor delay changes, with the exception of one junction along the A456. In Dudley town centre, and the connection to Burnt Tree, some delay changes are seen, although these are minor and not indicative of any major issue. Small delay changes around the A459 and A4168 are likely due to localised rerouting.

In Sandwell, the A4123 remains a hotspot of delay. From Burnt Tree to M6 J2, there are six junctions which show large delay increases, with most on both the mainline flow and side roads (Newbury Lane/Portsway Road, Park Road/Lower City Road, Hill Road/Regent Road) and at junctions with DS changes added, such as Tividale Road and Burnt Tree. Further west, similar patterns in the AM and IP are seen, with Pound Road intersection experiencing increased delays.

Figure 5-21: 2042 Do Something vs Do Minimum Flow Difference for the PM period.

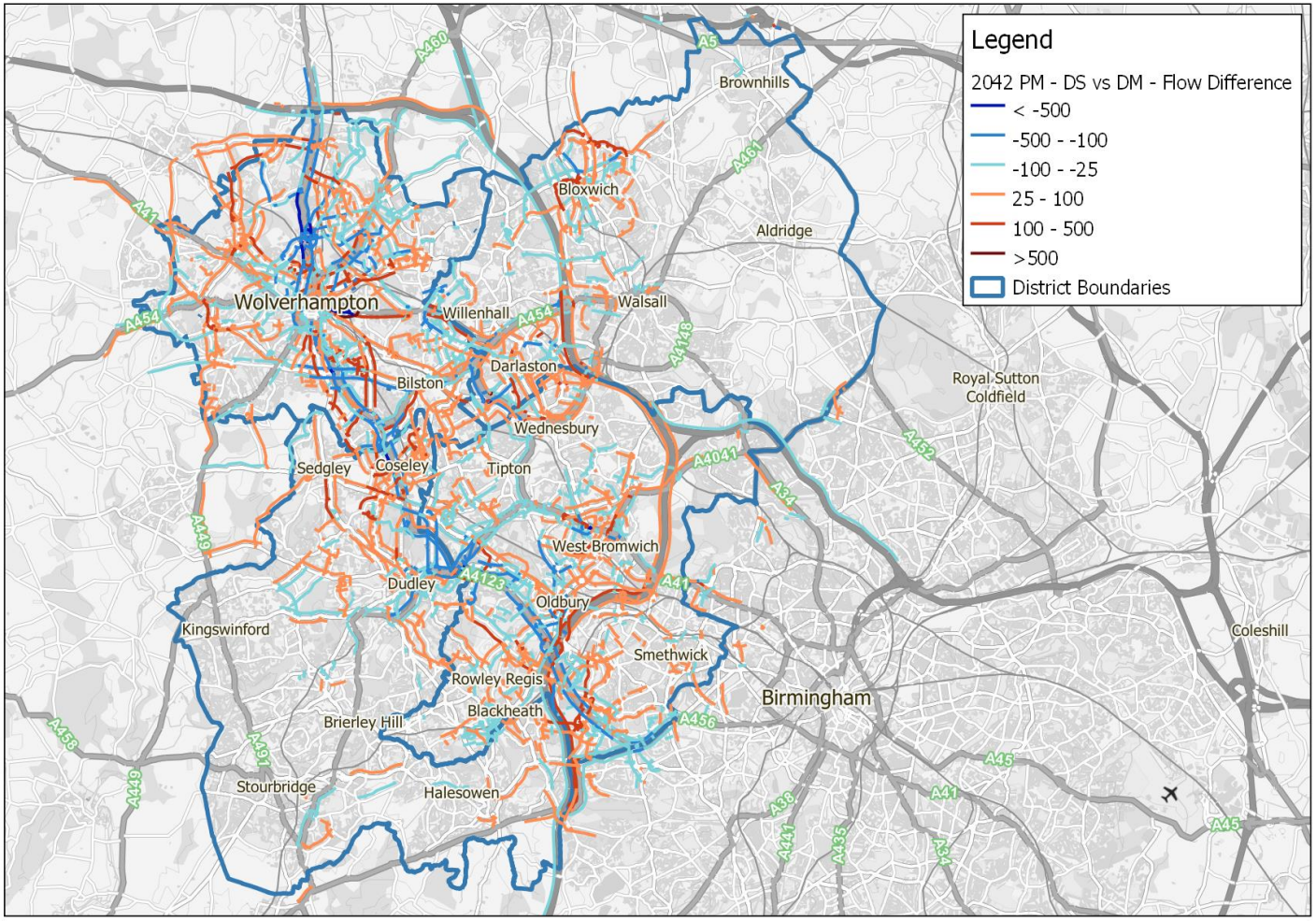


Figure 5-22: 2042 Do Something vs Do Minimum Percentage Flow Difference for the PM period.

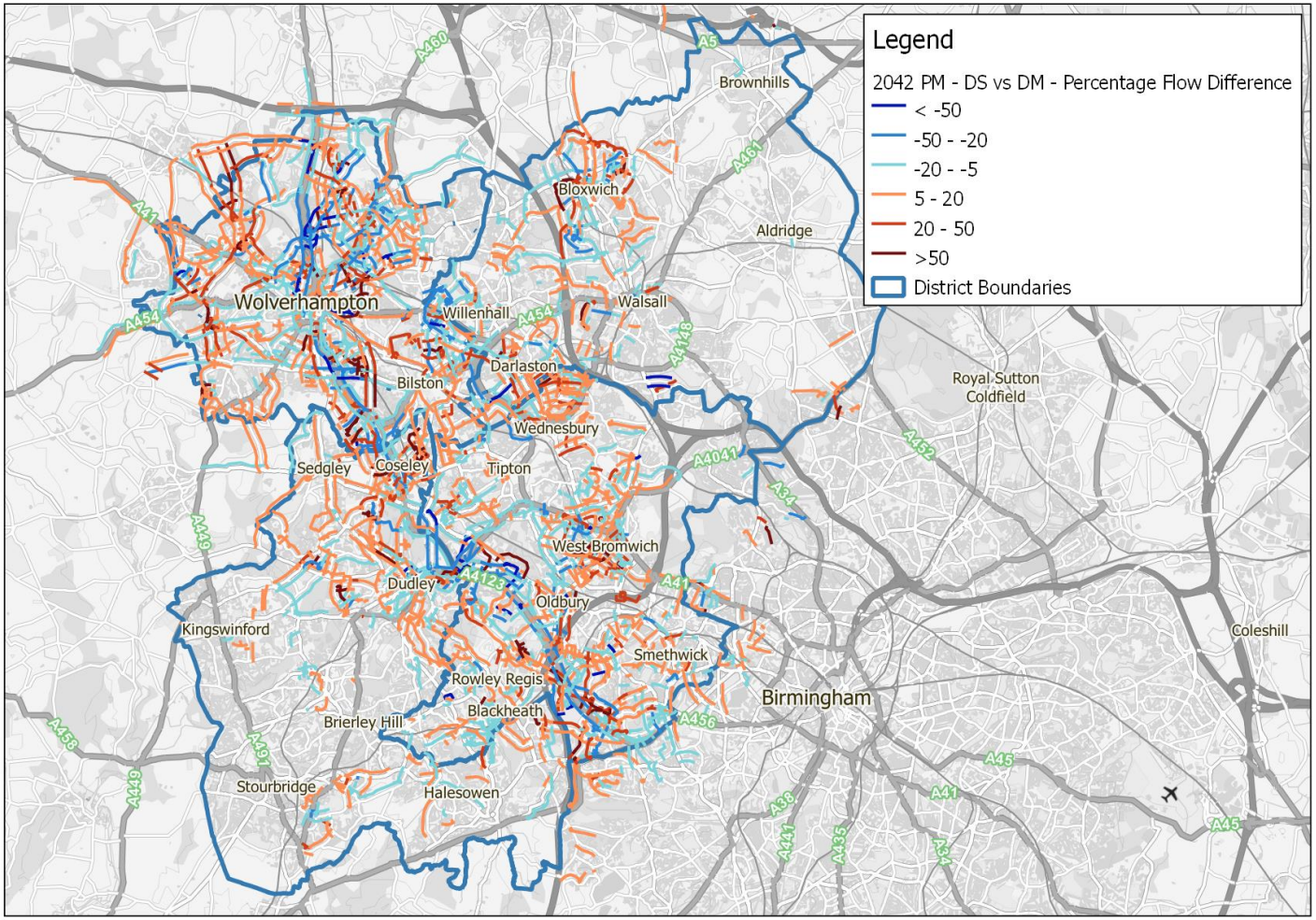


Figure 5-23:2042 Do Something vs Do Minimum Volume over Capacity Ratio Difference for the PM period.

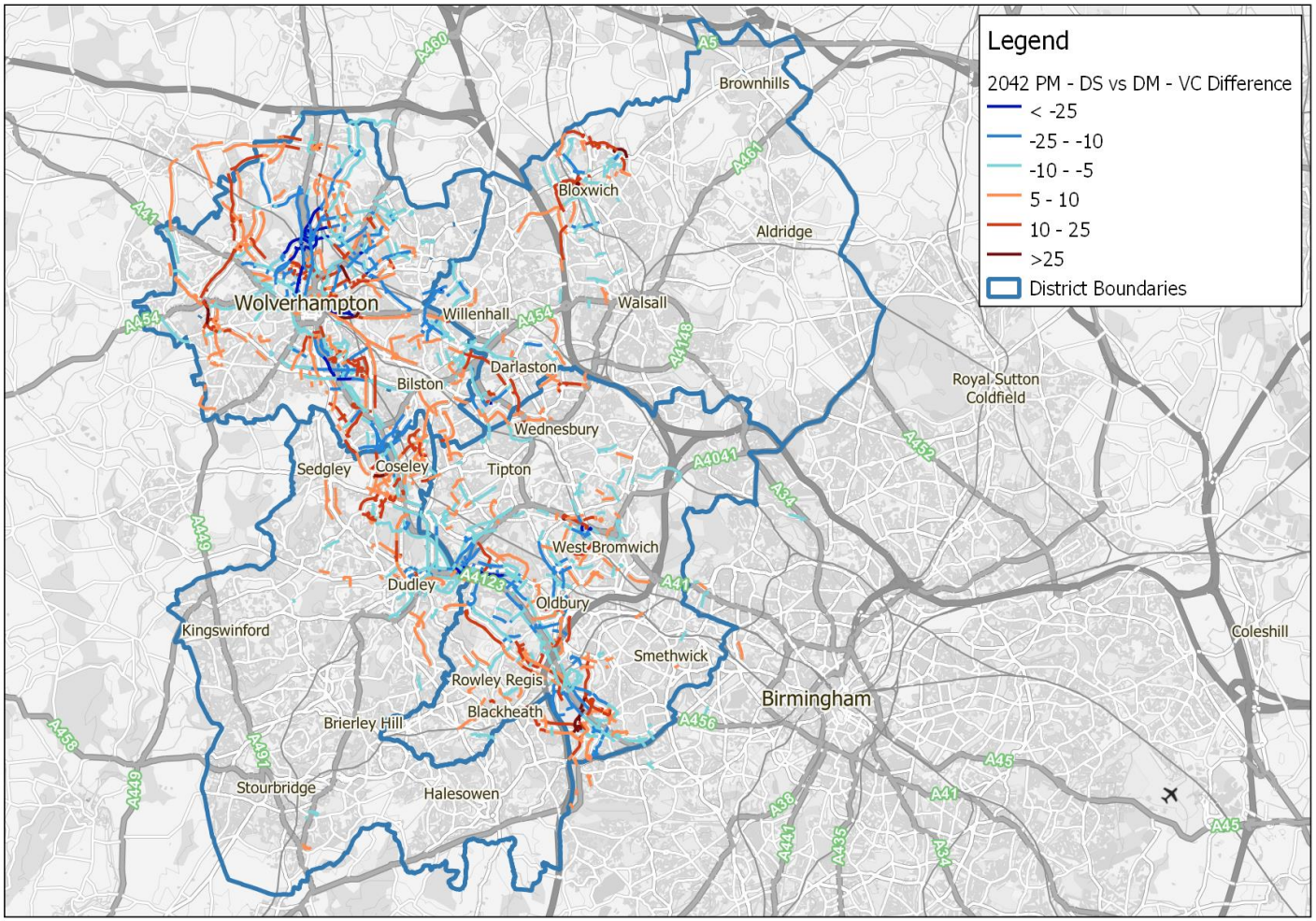


Figure 5-24: 2042 DS vs 2042 DM V/C Ratio Difference for the PM period. Links shown are over 85% V/C in the DM. Difference is in % of DM.

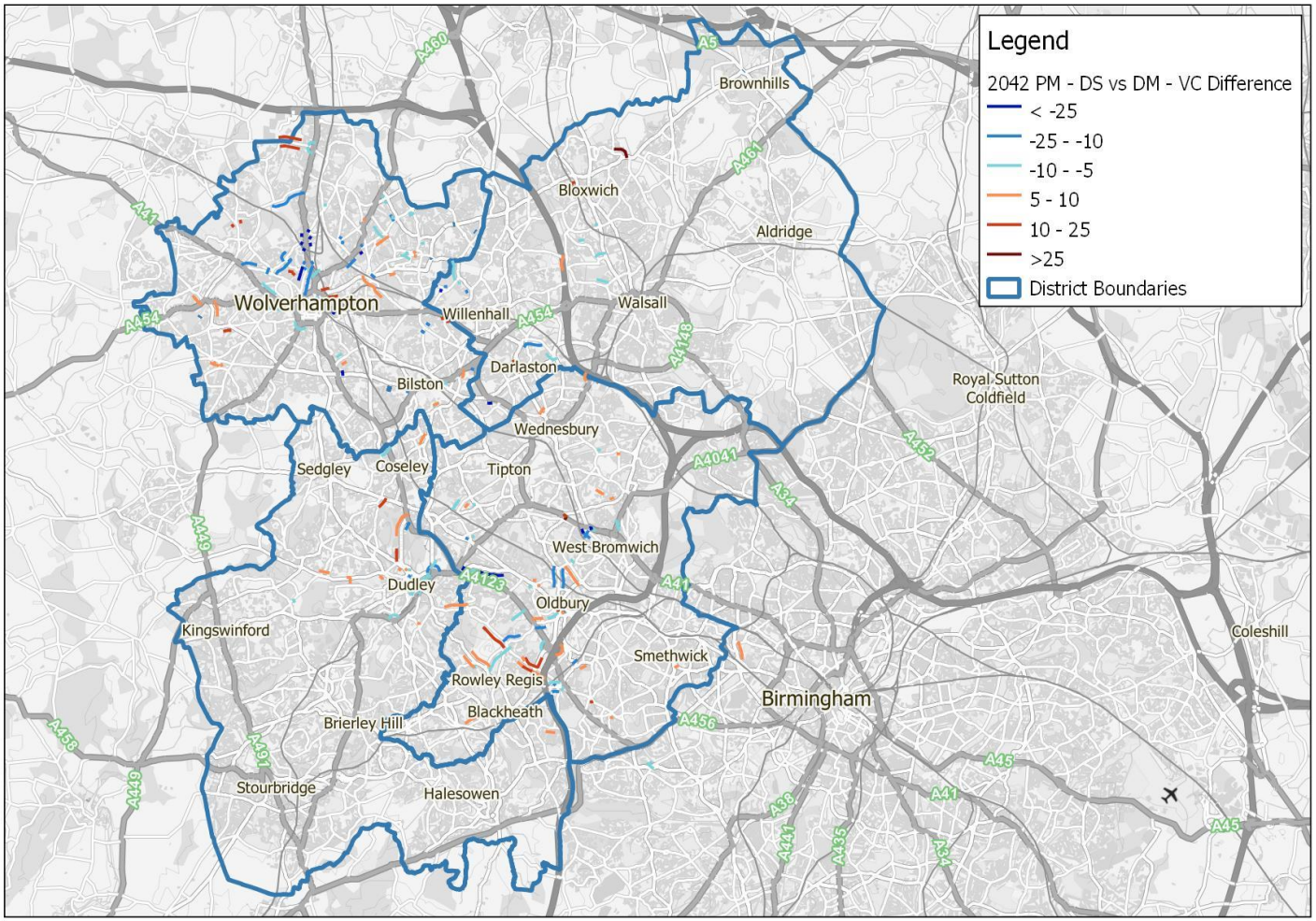


Figure 5-25: 2042 Do Something vs 2042 Do Minimum Relative Queue Length Difference in % Link Saturation for the PM period.

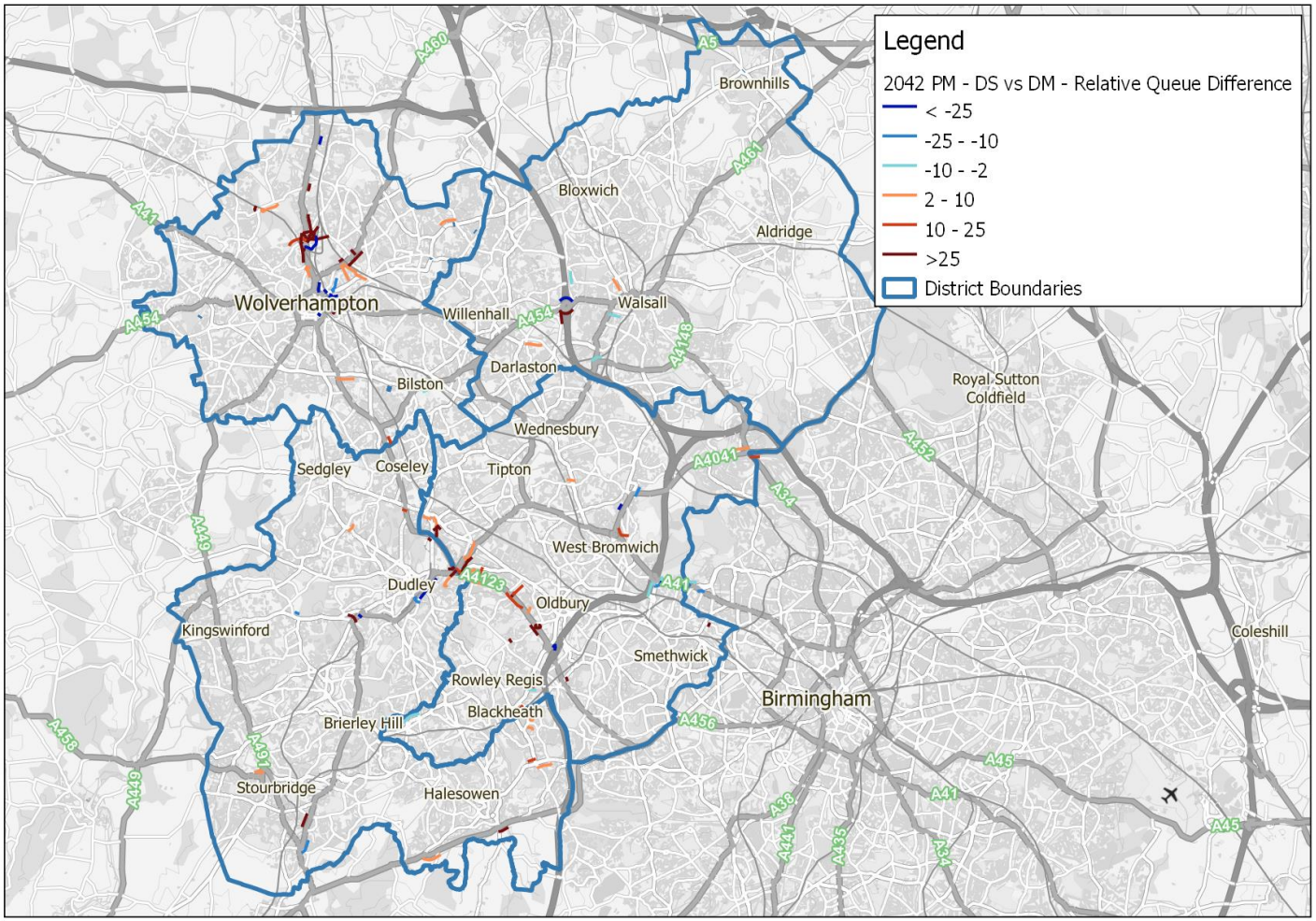
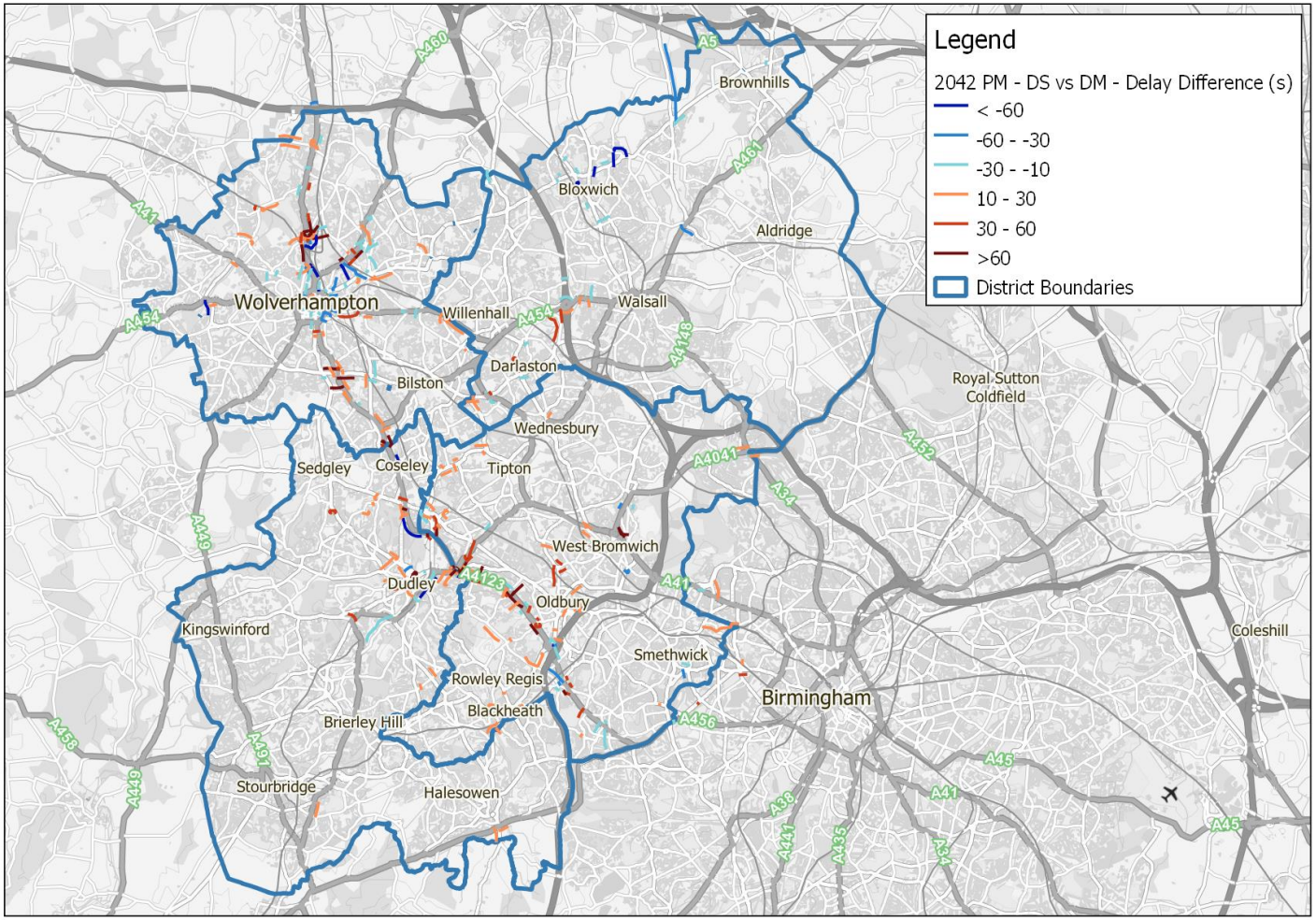


Figure 5-26: 2042 Do Something vs 2042 Do Minimum Delay Difference for the PM period.



5.6.2 Volume over Capacity Table

To demonstrate the performance of key junctions within the four Local Authorities, a table has been prepared showing the banding of the overall junction compared across the Reference Case, Do Minimum and Do Something. These junctions remain the same as in the previous tranche of Local Plan modelling.

Table 5-3: Junction Volume over Capacity Tables for RC, DM and DS Scenarios in 2042

Type	Description	Junction	RC	DM	DS
Corridor	A4150 Wolverhampton ring road, all junctions	A4150 Wolverhampton ring road/A454 Middle Cross			
		A4150 Wolverhampton ring road/Chapel Ash Island			
		A4150/A454/A41			
	A4148 Walsall ring road, all junctions	A4148/A461/Lower Rushall St			
		A4148/Lichfield St			
	A41 Expressway/ Black Country New Road, all junctions	A41/B4149/New Swan Ln			
		A41/Moxley Rd Rbt*			
	A461 Horseley Heath/ Dudley Port, all junctions	A461 Horseley Heath/ New Rd			
		A461/Tame Rd			
	A4123 New Birmingham Road/ Wolverhampton Road, all junctions	A4123/A4168 Priory Rd			
	A4031 All Saints Way, all junctions	-			
	A4041 Newton Road, all junctions	-			
	A457 Dudley Road East/ Oldbury Ringway/ Birmingham Road/ Oldbury Road/ Tollhouse Way/ Soho Way/ Grove Lane/ Dudley Road	A457/Dudley Rd/ City Rd			
		A457/Icknield Port Rd/ Winson Green Rd			
		A457/Rotton Park Rd			
		A457/Soho St			
	A4034 Bromford Road/ Churchbridge/ Birchfield Lane/ Oldbury Road, all junctions	-			
	A454 intersecting with Neachells Lane, B4464, B4484 and Black Country Route	A454/B4464			

Type	Description	Junction	RC	DM	DS
		A454/B4484			
		A454/Moseley Rd/ Neachells Lane*			
	M5 J1 to J4A	M5 J1*			
	M6 J6 to J12	M6 J11			
	M42 J1 to J3A	M42 J1			
		M42 J2			
		M42 J3			
	M54 J 1 to J3	-			
	A491, All primary junctions	A491/B4175 Stallings Ln			
		A491/Heath Lane/ Glasshouse			
		A491/Stallings/ Dudley Rd			
		A491/Vicarage Rd			
	A4101 Lodge Lane/Summerhill/High Street/ Dudley Road/ Kingswinford Road, all intersections with A-roads, B-roads, and Tansey Green Rd	A4101/A449 Wolverhampton Rd			
		A4101/Kidderminster Rd			
		A4101/Pensnett Rd			
		A4101/Tansey Green Rd			
	A449 Penn Road/ Stourbridge Road/Wolverhampton Road/ Kidderminster Road, all intersections wit A-roads, B-Roads, and Warstones Road	A449/Swindon Rd			
	A4036 Dudley Road/ Thorns Road/ Merry Hill/ Pedmore Road/ Highgate Road, All junctions	A4036/Peartree Lane			
		A4036/Coppice Lane			

Type	Description	Junction	RC	DM	DS
	A461 Venture Way, All junctions	-			
	A4100 intersecting with The Boulevard and B4172	B4172/Mount Pleasant/Mill St			
	B4179 intersecting with Bryce Rd, Hickman Road, John St, and High Street	B4179/Bank St/ Dudley Rd/ Level St			
		B4179/Bryce Rd			
		B4179/Hickman Rd			
	B4091intersecting with A-roads and B-roads	-			
Individual Junctions	A41/ Wrottesley Park Road	-			
	A454/Jenny Walkers Lane	-			
	Swindon Rd/ Enville Rd/ Mile Flat	-			
	Himley Rd/ Cinder Rd/ Bull St	Himley Rd/ Cinder Rd/ Bull St			
	A458/ Bagley St	-			
	A458/ A461/ Meriden Ave Rbt (Wollaston Centre)	-			
	A461/A459 Blowers Green Rd/ Peartree Lane (Cinder Bank Rbt)	A461/A459 Blowers Green Rd/ Peartree Lane (Cinder Bank Rbt)			
	A456/A459/ Grange Hill Rbt	A456/A459/ Grange Hill Rbt			
	A459/ Manor Lane	-			
	Level St/ The Embankment/ Waterfront way/ Metro	-			
	Level St/ Central Way	-			
O1 DS Schemes	O1 DS Schemes: A41 Carters Green	A41 Black Country New Road / Carters Green			
	O1 DS Schemes: A454 Corridor	A454 Horseley Fields / Middle Cross			
		A454 Lower Horseley Fields / Lower Walsall St			
		A454 Middle Cross / Lower Walsall St			
Local Plan Schemes	A449 Corridor	A449/Bushbury Lane			
		A449/Fox's Lane/Dunstall Road			

Type	Description	Junction	RC	DM	DS
		A449/Gorsebrook Road			
	A4123 Corridor	A4123 Birmingham New Road/ Burnt Tree			
		A4123 Birmingham New Road/ Tividale Road			
		A4123/Parkfield Road			
		A4123/Manor Road			
		A4123/A463			
		A4123/Shaw Road			
		A4123/Sedgley Road			
		A4123/Priory Road			
		A4123/Dudley Road/ Tipton Road			
		A4123/Portway Road/Newbury Lane			
		A4123 Birchley Island			
		A4123/Pound Road			

5.7 Summary

The Do Something Local Plan model is intended to assess the impacts of non-committed schemes on the demand created by the Local Plans. This helps to provide an understanding of how the network may perform with schemes that are yet to be confirmed, and whether additional mitigation measures beyond those already identified may be required. The model results discussed above indicate that, on the whole, the network is largely able to accommodate the level of traffic that would be generated by the Local Plans, but that some corridors may require additional modelling to better understand and accommodate the changing travel patterns seen when the Local Plans are adopted. However, car travel should not be the focus for transit across the West Midlands, and non-car-based travel is being strongly promoted in the area.

The Do Something model shows, in some areas, worse performance than the Do Minimum model. These are mainly at Burnt Tree junction, on the A449 north of Wolverhampton, and on the A4123 between Wolverhampton and Sandwell. However, these areas are hotspots for active travel and public transport interventions, with many of the schemes being implemented placing greater emphasis on the promotion of sustainable transport infrastructure. The modelling results indicate this may come with additional delays for car users as we have not modelling a quantitative level of modal shift. Delays seen when the Local Plans are fully built out are expected to be less severe.

Testing the Do Something schemes mentioned earlier has highlighted that some further assessment may be required to maximise car journey attractiveness along key corridors within the Black Country, but overall, the network is considerably less congested than it was found in the previous Local Plan. Whilst this is primarily due to the level of constraint that is applied to housing growth in newer NTEM forecasts, there may be scope to “wind back” previous proposals to reassess their need in newer population growth forecast scenarios.

6 Conclusions

6.1 Modelling Conclusions

This report describes the process by which the Black Country Local Plan models, namely the Reference Case, Do Minimum and Do Something models, have been created, providing an overview of the demand development, network changes and model assumptions. Two forecast years were created to represent the Local Plan Horizon Year of 2042 and Intermittent Year of 2035, although the Intermittent Year was modelled as 2036 for ease of model development as a pre-existing 2036 PRISM model already existed. This report presents the results of the Horizon Year modelling only.

Highway model performance is discussed above, providing an overview of link flow, delay and congestion. This is supplemented by qualitative analysis of public transport and active travel impacts and considerations, as it was not deemed to be proportionate to undertake full modelling of these due to limitations of the model used.

Reference Case

The Reference Case modelling highlighted the impacts of baseline growth on the Black Country, following NTEM 8 housing and employment growth forecasts. As expected, 23 years of growth on an already congested base year network shows multiple areas of increase delay all across the Black Country, impacting key roads on the SRN that are used by residents to access employment, retail and leisure opportunities within the area. However, this is expected regardless of the adoption of the Local Plans and so is used as the baseline against which Local Plan growth is assessed.

Local Plan Do Minimum

When the full buildout of the Local Plans as currently proposed is modelled, impacts are less severe than may be expected. Compared to the baseline growth in the Reference Case, additional growth is lower, and fairly evenly distributed across the whole of the districts. However, due to the additional flow, some routes and junctions are found to breach capacity limitations and delays are seen which could be attributed to the Local Plan demand. These areas are:

- A4150, A460 and A449 in Wolverhampton, particularly close to the city centre
- A4124 (and B4154), A461 and A4148 in Walsall
- A41, A4031 and A4123 in Sandwell

- A491, A461 and A459 in Dudley.

Local Plan Do Something

In order to mitigate some of the impacts caused by the Local Plans on the SRN routes identified above, additional transport schemes are required. These can include highway junction redesigns, signal optimisation, public transport or active travel schemes, or redistribution of Local Plan housing or employment sites. This helps to reduce the impact of additional development on the network, improving the accessibility of travel within the Black Country.

For the Do Something, nine potential schemes were assessed. These are provided in Table 6-1 below, but are not all designed to mitigate the highway impacts of the traffic generated by the Local Plans. They are non-committed schemes proposed by the local authorities which have the potential to significantly impact movement across the Black Country, and which have been selected to be tested as part of the Do Something scenario. These schemes are primarily aimed at reducing the dependency of the districts on private cars in favour of more sustainable modes of travel.

Alongside this, any junctions which experienced degraded performance, identified by their Level of Service attribute in PRISM, were investigated and optimised where possible. These junction changes can be considered as minor Local Plan mitigation schemes, whilst the highway schemes detailed in Table 6-1 may not necessarily.

Table 6-1: Do Something Schemes that impact on the Highway Network

Scheme	Type	Year	Source
M5 Junction 1	Highway	2036 and 2042	BCPM O1 Scenarios
Smethwick Birmingham Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A454 Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A4123 Corridor	Highway	2036 and 2042	BCPM O1 Scenarios
A461 Corridor (Walsall)	Highway	2036 and 2042	BCPM O1 Scenarios
A41 Moxley Junction Improvement	Highway	2036 and 2042	BCPM O1 Scenarios
A41 Carters Green Junction improvement	Highway	2036 and 2042	BCPM O1 Scenarios
A449 Corridor	Highway	2036 and 2042	Black Country Transport
A4124 Corridor	Highway	2036 and 2042	Black Country Transport

In addition to this, active travel and public transport impacts were assessed qualitatively alongside the highway measures, to provide context as to how their impacts may affect travel across the Black Country. These were not modelled in PRISM due to historical issues with representing modal shift from private car to

other modes and to allow for a proportionate modelling approach. Their impacts are likely to form a key impact on travel within the Local Plans of the Black Country Authorities, however, and should not be understated as a result of this assessment.

A fixed, post-VDM reassignment was undertaken on the existing Local Plan Do Minimum model to determine the impacts of the proposed scheme changes on vehicle flows. A full VDM run may have shown further rerouting and enhanced network performance, but was not completed in this case due to long model run times.

The results indicate that highway performance may be slightly degraded as a result of the Do Something schemes. This is because many of the schemes include some, or focus entirely on, active travel or bus priority measures. These are often at the expense of highway capacity. As such, they may be highly effective at promoting modal shift and enhancing bus journey times within the region, but in modelling highway vehicles their impacts are often seen as less favourable.

Key areas with slightly degraded performance, when compared to the Do Minimum, include Burnt Tree, the A449 north of Wolverhampton, and on the A4123 between Wolverhampton and Sandwell. The AM and PM periods are expected to experience more delays than the IP, due to the volume of vehicles making commute trips.

Delays are mostly isolated to large junctions on the SRN with high traffic flows, suggesting that individual Local plan sites are not by themselves causing issues, but it is combined movements of multiple vehicles that cause delays. Further investigative work should be undertaken on the following routes, to improve car journey times within the Black Country, but it should be second in priority to improving the access to more sustainable modes of transport:

- A449
- A4123
- A460
- A424

6.2 Implication on Local Plans

6.2.1 General Consideration of Do Something Schemes

As mentioned in earlier sections of the report, not all of the changes applied in the Do Something model are direct mitigation measures against the Local Plans' additional demand.

There is a strong push across the West Midlands to encourage residents to use public transport and active travel to complete their journeys, through providing accessible and attractive transport corridors. It is clear from the Reference Case that private car use is forecast to rise alongside increases in population, causing additional congestion even before the introduction of the Local Plans.

Schemes that have been proposed to help alleviate the existing pressures within the Black Country, such as those assessed in the Do Something scenario, could be used in part to reduce private car dependency of current and future residents. This could have twofold impacts: firstly by reducing the

anticipated growth in private car use and thus congestion in the baseline scenario, and secondly by providing Local Plan traffic an alternative mode of travel. Whilst their positive impacts may not be clearly seen on the traffic in the Local Plan model, any reduction of the number of highway vehicles, whether pre-existing baseline traffic or additional Local Plan traffic, would contribute to a less congested road network.

6.2.2 Dudley

Developments

Dudley primarily experiences committed growth in housing around urban centres like Stourbridge, Brierley Hill and Kingswinford, with employment sites occurring in fewer locations. In their Local Plan, low level growth is experienced in nearly all zones, with the largest growth occurring again in urban centres like Stourbridge, Halesowen and Dudley.

Model Results

The Local Plan Do Minimum shows relatively minor impacts when compared to the Reference Case. Many links experience a small increase in flows, with the V/C plots indicating that there is excess capacity to accommodate these additional flows. Delay changes seen are relatively small and not isolated to a particular corridor or location, although in the PM, Dudley town centre and the A4036 do experience longer “chains” of links with increased delays.

In the Do Something, we see more localised flow differences, with little occurring on minor roads in the south of the district, and more around Dudley and its connections to Wolverhampton via Sedgley and Coseley. V/C difference plots do suggest that links may become more congested, but many are not at capacity as there are very few changes to the relative queue lengths between the DS and the DM. Most delays on the SRN are found at roads intersecting the A4123 corridor, or in Dudley town centre. Burnt Tree remains problematic, with increased delays in the PM period on the approach from Dudley.

More detailed analysis can be found in Section 4.5.1 and 5.6.1.

Next Steps

Providing enhanced access to Dudley town centre by public transport or active travel could help to alleviate congestion in this area. The A456 shows small problems in the AM along the length of the corridor, which has not been looked at in great detail as part of this tranche of DS modelling. In addition, the A4123 is the most significantly impacted link in the Black Country and could impact residents’ movements into and out of the district. Key access points along this link may need to be further investigated.

For all of the plots relating to the discussions above, please refer to Appendix 7.

6.2.3 Sandwell

Developments

Sandwell Reference Case housing developments show high levels of growth on the eastern side of the district near Birmingham, with the majority of housing being developed here. Other committed housing sites are found around Rowley Regis and the border of Dudley near Brierley Hill, and in Oldbury. There are

comparatively few zones showing employment growth, mostly around Oldbury to the east and west. West Bromwich also shows a zone to the east.

Similarly to Dudley, Sandwell shows an even distribution of Local Plan housing growth, although hotspots can be seen in urban areas (West Bromwich, Smethwick) and on key corridors like the A4123 and A41. Employment sites in their Local Plan are primarily focused in the centre of the district around Oldbury, with some north of Smethwick and south of Wednesbury.

Model Results

When comparing the Reference Case committed growth against the 2019 Base Year, we see a large growth on many of the roads in Sandwell. Very high growth is seen on the motorways, mostly passing through and continuing outside the Black Country, but with increases on the roads connecting to the M5 and M6. The A41 also shows high growth in vehicles across the district, in both directions from West Bromwich through Wednesbury and into Walsall and Wolverhampton. The VC plots show that many links experience a high growth in link saturation, across both major and minor thoroughfares, but when this is assessed with the relative queue lengths, we see that only a few major roads are impacted: the A4123 and the A4041. These have a small impact on delays seen in the district, with some small delays on the M5 north and south of Junction 1, longer queueing at the intersection between the A4123 and A456, and some lesser issues arising on the A41, A4123 and the A4034 heading south towards Blackheath. In the PM, there also appears some delays on the B4517 through Tipton.

When Local Plan growth is applied in the Do Minimum scenario, lower growth is seen on most of the major and minor roads, spread evenly across the district with the exception of the A41 near West Bromwich (one of the corridors with high housing growth). V/C differences are less pronounced than in the base year, and show that it is mostly minor roads that show increased link saturation. When this is assessed through queue length differences, we see that it is again mostly the A4123 corridor that shows the biggest impact. The roundabout next to M5 J2 shows increased queueing on the circulatory, whilst more delays are seen further up towards Burnt Tree. These queues are seen to have an impact on delays, causing 30+ seconds of delay for vehicles on the A4123 travelling northbound, but also on the A461 south of Tipton. IP and PM patterns are similar, with greater impacts seen in the PM. In this period, delays are also seen at the approach to M5 J1, on the A41 to the east of M5 J1 and at the A4031/A4041 junction.

Additional schemes applied in the Do Something modelling have some impact in flow patterns, with reduced flows on the A4123 and the A41. This traffic tends to reroute to other roads such as the A4034. The V/C difference shows increased traffic at Birchley Island, arriving from Oldbury. In this scenario, we see increased congestion at Burnt Tree junction, caused by the signal timing and structural changes applied to the junction. Delays are also seen further south on the A4123 where Newbury Lane and Portway Road join, due to the implementation of pedestrian crossings in this area. The A4123/A4037 also sees increased delays, especially on traffic joining the A4123 from the north, and some links within Oldbury show increase delays as well. The AM, IP and PM all highlight issues at Burnt Tree and Tividale junction, and on junctions on the A4123 approaching the M5. The PM in particularly raises serious concerns

about the performance of the A4123 when the active travel crossings are implemented.

These are areas that may require further interventions to ensure smooth travel for highway vehicles across Sandwell. More detailed analysis can be found in Section 4.5.1 and 5.6.1.

Next Steps

As mentioned above, the A4123 is the primary concern for highway vehicles, experiencing large increases in delays in the DS scenario. This is caused by the introduction of less-car-friendly measures such as pedestrian crossings, but which should contribute to improved safety and ambience for other road users which should remain a priority in the district. Further work may be required in the context of their Local Plan to ensure these schemes provide maximal benefits for residents choosing more sustainable modes of transport, whilst minimising the detrimental impact on car trips.

For all of the plots relating to the discussions above, please refer to Appendix 7.

6.2.4 Walsall

As Walsall did not have a proposed Local Plan at the time of producing this report, the assumptions made below cannot be applied to the final Walsall Borough Local Plan but form part of the narrative for the other districts, and could be used as guidance for the location of any new Local Plan sites.

Developments

As in other districts, much of the development within Walsall is expected in urban areas. Walsall, especially to the south and west, Darlaston, Willenhall and Bloxwich all expect to see committed housing growth, supplemented by relatively large increases in employment in many of the same areas. Aldridge and Brownhills also show increased employment developments.

In the Local Plan scenario, housing growth is not expected within Walsall, instead a lot is focused to the north towards Aldridge and Brownhills. Some development is expected directly north of the A4148 in Walsall and further afield.

It is noted again that the Local Plan sites identified in Walsall are subject to change as the final allocations are determined.

Model Results

Local Plan developments in the Do Minimum model show increases in flows along all of the major roads such as the A4148, A461, M6 and A454. The link V/C plots indicate that the network is largely able to accommodate these flows, with some larger increases in Brownhills and on the approach to Aldridge from the north from A461. Increases in delays are seen around Bloxwich on the A4124, specifically on side roads accessing mainline flows. These are likely a result of the development of houses to the north of this route. Within the ring road around Walsall, minor impacts may be seen at the north and west (Green Lane and Bridgeman Street) in the PM period, and on the circulatory at M6 J10.

The Do Something schemes mostly impact around Bloxwich, from DS node optimisation, and around Darlaston and Willenhall. Whilst the node optimisation

in Bloxwich causes rerouting, it also shows that delays for vehicles accessing the A4124 from side roads have less delay, whilst not impacting the mainline flows. Walsall experiences mostly positive impacts from the DS schemes, although some additional delays are predicted for vehicles leaving the M6 and J10, and on vehicles accessing the B4464 via Bentley Mill Way.

More detailed analysis can be found in Section 4.5.1 and 5.6.1.

Next Steps

In the PM, both the circulatory and the northbound off-slip at M6 J10 show increases in delays. Given the M6 J10 junction improvement scheme, there are likely to be limited future opportunities to mitigate these delays, but signal optimisation may help to alleviate some pressure. Connectivity to Wolverhampton near Willenhall may also cause some issues via The Keyway.

For all of the plots relating to the discussions above, please refer to Appendix 7.

6.2.5 Wolverhampton

Developments

In the Reference Case, housing development is expected along the A449 corridor and the A4123 corridor, with some minor growth seen to the west near Codsall/Bilbrook and some around Bilston. Most of the employment is seen to the east of the A449, along the corridor and around Wolverhampton station. There is again more development seen to the east of Bilston, and some on the border of Walsall.

In the Do Minimum, the Local Plan developments are spread across the district but greater growth is seen around Oxley and near the station. Bilston also shows additional growth past the Reference Case. There are three zones showing a loss in housing provisions, one north of the A463 near Bilston, one to the east of the A4123 and one between the A460 and the A454. These reductions are most likely due to a change in use or removal of a site. Loss of employment sites is also seen in the Do Minimum, very near to Wolverhampton city centre, but balanced by a growth in jobs to the north and east, and south along the A4123 corridor.

Model Results

The Do Minimum results, representing full Local Plan growth, show a mostly universal increase in traffic flows across Wolverhampton. High growth is expected on the A4150 and the roads connecting to it from the east, namely the A460, A454 and A41. The A454 and A41 show increased traffic leaving Wolverhampton in the AM, potentially towards new employment sites seen in Bilston and towards Willenhall. These routes also show increased link V/C but with relatively small or no changes in queueing, suggesting an ability to accommodate the flows. The A449 shows increased queueing at Bushbury roundabout and further north, accompanied by small increases in delay. Greater delay increases are seen on side roads connecting to the A460 and A4124, and around the station. There is relatively high development in this area so could be expected. The PM shows particularly high increases in delay at Bushbury roundabout, an area that shows smaller flow increases but larger V/C differences, suggesting it is already very near capacity in the Reference Case.

Side roads on the A454, and mainline A41 traffic, also see increases in delays in the PM.

In the Do Something, the additional schemes do not show improvement on the A449. Lower flow is expected on this corridor due to changes made at the roundabouts, but these changes only increase the delays seen in this location. Changes were made at this junction to more accurately reflect the junction geometry in the model, but this has resulted in increased delays being seen. There are also increased delays seen at the A4039/A4123 intersection and further along the A4123 corridor. The A460 also shows delay increases in the PM. With all arms of the junction showing increases in delays, it suggests that the junction is over capacity and may require additional mitigation.

More detailed analysis can be found in Section 4.5.1 and 5.6.1.

Next Steps

As discussed in other district analyses, the A4123 corridor is a major source of the delays seen in the Local Plan modelling, caused by a number of measures that are detrimental to highway vehicles through capacity restrictions, but which should help to make active travel in the Black Country a more accessible mode of transport.

The A449 may also require further assessment- Bushbury roundabout as now coded in the Local Plan model shows increased delays compared to the Do Minimum which impacts on the volumes of traffic using the A449 to travel north- and southbound.

For all of the plots relating to the discussions above, please refer to Appendix 7.

6.2.6 Burnt Tree Junction and the A4123

The analysis above identifies that Burnt Tree junction and the A4123 are major hotspots for delay increases. The scheme proposed at Burnt Tree junction in particular is designed to increase the capacity of the junction, and the results are initially counterintuitive in this regard. Some text is prepared below to provide context for the results seen in the model.

Burnt Tree Junction

The Do Something scheme drawings indicates that is a proposed change in the number of lanes for some arms of this junction. In conjunction with this, there is a large change to the signal timings in the model, with shorter green times for the north and south arms in favour of increased time for mainline flows. Finally, there is a small change to the allocation of movement within signal stages, with some turns being opposed that previously had their own signal stage. The result of this is that the capacity of the junction is reduced, causing an increase in delays at the north and south arms. Tividale is also updated as part of this junction redesign, and delay increases are seen at this location as vehicles attempt to find a quicker route to access the A4123 from side roads to the north.

A4123 (particularly Sandwell and Dudley)

The Do Something scheme drawings indicate that there is some reallocation of road space from car use to cycle paths. This occurs in the northern section of the route in Wolverhampton, although most of this is from unused road space (on-street parking). Further along the corridor, there are a number of junctions

that have had signal timing changes implemented to account for pedestrian and cycle crossings.

When the active travel measures are implemented, it is not likely that crossings will be called every cycle except in peak hours and in busy locations. In the model, it is difficult to represent this. The approach taken has been to reduce the overall green time of the pedestrian crossing to the minimum seen in the rest of the West Midlands, with the assumption that the overall green time for pedestrians will average out. However, with the potential impact of doubling the inter-green times, it is possible that delays to vehicles for crossing movements may be overestimated.

In this regard, delays caused by pedestrian and cycle crossings are presented as a worst case scenario, and traffic movement is likely to be less severely impacted.

6.2.7 Impacts Outside the Black Country

PRISM is only intended to be used to model policies within the West Midlands. The model network and zoning system becomes less detailed outside of these areas, and so it is not able to predict finer traffic movements and interactions.

This is particularly relevant for authorities that share a boundary with the Black Country. There are likely to be regular trips between the districts of the Black Country and districts outside of this area, such as Staffordshire or Worcestershire. The impacts of the proposed Local Plans on the roads leading out of the study area and into these neighbouring districts, and across the rest of the West Midlands, is expected to be minor. However, no firm conclusions can be drawn on the impacts of the proposed Local Plans outside of the boundaries of the PRISM study area.

Whilst the GIS plots presented above have been trimmed to only present the Black Country, with a 1km buffer around it to capture the routes into the four districts, the full PRISM model covers the rest of the West Midlands conurbation, the wider Midlands region, and the rest of the UK in decreasing detail. Network performance outside the Black Country has been checked to ensure there are no unexpected wider impacts and that routing is generally sensible and proportionate.

Appendix 1 – 2035 Uncertainty Log – Zone Total Growth from Base Year

The additional growth per zone is tabulated below. Note that these values do not correspond exactly to the final zone totals due to the constraint to TEMPro, discussed earlier in the report.

District	PRISM zones	Pop	Jobs
Dudley	3011	0.00	0.00
Dudley	3012	0.00	0.00
Dudley	3013	0.00	0.00
Dudley	3021	60.58	0.00
Dudley	3022	0.00	0.00
Dudley	3023	37.28	0.00
Dudley	3031	234.86	0.00
Dudley	3032	207.37	0.00
Dudley	3033	0.00	0.00
Dudley	3041	0.00	0.00
Dudley	3042	0.00	0.00
Dudley	3043	0.00	0.00
Dudley	3051	782.88	0.00
Dudley	3052	326.20	0.00
Dudley	3053	0.00	0.00
Dudley	3061	428.72	0.00
Dudley	3062	207.37	0.00
Dudley	3063	0.00	0.00
Dudley	3071	0.00	0.00
Dudley	3072	0.00	0.00
Dudley	3073	0.00	0.00
Dudley	3081	0.00	0.00
Dudley	3082	326.20	0.00
Dudley	3083	0.00	0.00
Dudley	3091	0.00	0.00
Dudley	3092	0.00	118.00
Dudley	3093	30.29	0.00
Dudley	3101	0.00	0.00
Dudley	3102	139.80	0.00
Dudley	3103	139.80	0.00
Dudley	3111	205.04	0.00
Dudley	3112	0.00	30.00
Dudley	3113	389.11	0.00
Dudley	3121	39.61	0.00
Dudley	3122	0.00	0.00
Dudley	3123	0.00	0.00
Dudley	3131	0.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3132	382.12	0.00
Dudley	3133	0.00	140.00
Dudley	3141	0.00	0.00
Dudley	3142	1398.00	0.00
Dudley	3143	0.00	28.00
Dudley	3151	0.00	0.00
Dudley	3152	414.74	0.00
Dudley	3153	486.97	0.00
Dudley	3161	0.00	0.00
Dudley	3162	0.00	0.00
Dudley	3163	174.75	0.00
Dudley	3171	20.97	0.00
Dudley	3172	0.00	0.00
Dudley	3173	0.00	0.00
Dudley	3181	0.00	0.00
Dudley	3182	0.00	0.00
Dudley	3183	0.00	0.00
Dudley	3191	0.00	0.00
Dudley	3192	167.76	0.00
Dudley	3193	0.00	0.00
Dudley	3201	0.00	0.00
Dudley	3202	0.00	0.00
Dudley	3203	0.00	0.00
Dudley	3211	0.00	0.00
Dudley	3212	172.42	0.00
Dudley	3213	0.00	0.00
Dudley	3221	0.00	0.00
Dudley	3222	0.00	0.00
Dudley	3223	1099.76	314.00
Dudley	3231	904.04	0.00
Dudley	3232	0.00	0.00
Dudley	3233	0.00	0.00
Dudley	3241	0.00	0.00
Dudley	3242	239.99	0.00
Dudley	3243	0.00	0.00
Dudley	3301	0.00	0.00
Dudley	3302	0.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3303	0.00	0.00
Dudley	3304	0.00	0.00
Dudley	3305	0.00	200.00
Dudley	3306	0.00	0.00
Dudley	3307	0.00	0.00
Dudley	3308	0.00	0.00
Dudley	3309	0.00	0.00
Dudley	3310	0.00	0.00
Dudley	3311	186.40	0.00
Dudley	3312	0.00	0.00
Dudley	3313	0.00	0.00
Dudley	3314	0.00	0.00
Dudley	3315	0.00	0.00
Dudley	3316	0.00	0.00
Sandwell	4011	23.30	37.80
Sandwell	4012	0.00	964.05
Sandwell	4013	32.62	0.00
Sandwell	4021	0.00	219.75
Sandwell	4022	626.55	62.20
Sandwell	4023	32.62	0.00
Sandwell	4024	0.00	0.00
Sandwell	4031	0.00	0.00
Sandwell	4032	0.00	0.00
Sandwell	4041	316.88	24.40
Sandwell	4042	51.26	0.00
Sandwell	4043	0.00	0.00
Sandwell	4044	41.94	0.00
Sandwell	4051	147.00	0.00
Sandwell	4052	0.00	0.00
Sandwell	4061	32.62	0.00
Sandwell	4062	37.00	7.19
Sandwell	4063	0.00	0.00
Sandwell	4071	0.00	0.00
Sandwell	4072	0.00	0.00
Sandwell	4073	0.00	0.00
Sandwell	4081	1605.15	0.00
Sandwell	4082	186.90	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4091	0.00	0.00
Sandwell	4092	0.00	0.00
Sandwell	4093	0.00	0.00
Sandwell	4101	0.00	0.00
Sandwell	4102	0.00	0.00
Sandwell	4103	41.94	0.00
Sandwell	4111	342.51	0.00
Sandwell	4112	121.16	0.00
Sandwell	4113	583.00	0.00
Sandwell	4121	0.00	0.00
Sandwell	4122	0.00	0.00
Sandwell	4123	0.00	0.00
Sandwell	4131	126.00	0.00
Sandwell	4132	27.96	0.00
Sandwell	4133	74.56	0.00
Sandwell	4141	0.00	0.00
Sandwell	4142	0.00	0.00
Sandwell	4143	0.00	0.00
Sandwell	4151	442.70	0.00
Sandwell	4152	0.00	0.00
Sandwell	4153	0.00	0.00
Sandwell	4161	0.00	0.00
Sandwell	4162	0.00	0.00
Sandwell	4163	32.62	0.00
Sandwell	4171	46.60	0.00
Sandwell	4172	76.89	0.00
Sandwell	4181	1425.96	0.00
Sandwell	4182	154.30	0.00
Sandwell	4183	466.00	0.00
Sandwell	4191	298.00	14.39
Sandwell	4192	0.00	0.00
Sandwell	4193	25.63	0.00
Sandwell	4201	291.00	0.00
Sandwell	4202	107.18	0.00
Sandwell	4203	386.29	520.00
Sandwell	4211	0.00	0.00
Sandwell	4212	109.51	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4213	107.18	0.00
Sandwell	4221	54.00	0.00
Sandwell	4222	123.49	0.00
Sandwell	4223	698.82	0.00
Sandwell	4231	0.00	0.00
Sandwell	4232	910.34	0.00
Sandwell	4233	62.91	0.00
Sandwell	4241	46.60	0.00
Sandwell	4242	121.16	0.00
Sandwell	4243	0.00	0.00
Sandwell	4301	0.00	0.00
Sandwell	4302	0.00	0.00
Sandwell	4303	0.00	0.00
Sandwell	4304	0.00	0.00
Sandwell	4305	0.00	0.00
Sandwell	4306	433.37	0.00
Sandwell	4307	302.80	0.00
Sandwell	4308	0.00	0.00
Walsall	6011	81.00	638.89
Walsall	6012	198.00	186.67
Walsall	6013	53.00	1153.33
Walsall	6021	7.00	290.00
Walsall	6022	524.00	433.33
Walsall	6023	154.00	988.89
Walsall	6031	7.00	337.78
Walsall	6032	87.00	0.00
Walsall	6033	33.00	0.00
Walsall	6041	112.00	0.00
Walsall	6042	105.00	0.00
Walsall	6043	5.00	0.00
Walsall	6051	5.00	134.44
Walsall	6052	0.00	760.00
Walsall	6053	190.00	0.00
Walsall	6061	37.00	913.33
Walsall	6062	0.00	0.00
Walsall	6063	61.00	2563.33
Walsall	6071	1087.00	446.67

District	PRISM zones	Pop	Jobs
Walsall	6072	23.00	485.56
Walsall	6073	9.00	1555.56
Walsall	6081	6.00	47.78
Walsall	6082	7.00	0.00
Walsall	6091	118.00	57.78
Walsall	6092	39.00	0.00
Walsall	6093	168.00	56.67
Walsall	6094	9.00	0.00
Walsall	6101	44.00	0.00
Walsall	6102	107.00	0.00
Walsall	6103	1596.00	95.56
Walsall	6111	33.00	0.00
Walsall	6112	9.00	0.00
Walsall	6113	5.00	0.00
Walsall	6121	129.00	0.00
Walsall	6122	11.00	0.00
Walsall	6123	2.00	0.00
Walsall	6131	0.00	302.22
Walsall	6132	5.00	1152.22
Walsall	6133	57.00	0.00
Walsall	6141	0.00	0.00
Walsall	6142	19.00	278.89
Walsall	6143	2.00	0.00
Walsall	6144	14.00	0.00
Walsall	6151	105.00	0.00
Walsall	6152	104.00	0.00
Walsall	6153	18.00	0.00
Walsall	6161	11.00	0.00
Walsall	6162	18.00	0.00
Walsall	6163	2.00	0.00
Walsall	6171	14.00	0.00
Walsall	6172	21.00	0.00
Walsall	6173	2.00	0.00
Walsall	6181	98.00	0.00
Walsall	6182	0.00	0.00
Walsall	6183	66.00	93.33
Walsall	6191	217.00	388.89

District	PRISM zones	Pop	Jobs
Walsall	6192	58.00	0.00
Walsall	6193	87.00	0.00
Walsall	6201	156.00	0.00
Walsall	6202	181.00	0.00
Walsall	6203	0.00	167.78
Walsall	6301	568.00	87.78
Walsall	6302	9.00	0.00
Walsall	6303	141.00	0.00
Walsall	6304	2.00	0.00
Walsall	6305	58.00	0.00
Walsall	6306	162.00	0.00
Walsall	6307	65.00	3.33
Walsall	6308	0.00	0.00
Walsall	6309	8.00	0.00
Walsall	6310	345.00	97.78
Wolverhampton	7011	0.00	0.00
Wolverhampton	7012	0.00	0.00
Wolverhampton	7013	0.00	0.00
Wolverhampton	7021	0.00	0.00
Wolverhampton	7022	0.00	0.00
Wolverhampton	7023	0.00	0.00
Wolverhampton	7031	0.00	0.00
Wolverhampton	7032	0.00	0.00
Wolverhampton	7033	0.00	0.00
Wolverhampton	7041	0.00	0.00
Wolverhampton	7042	0.00	0.00
Wolverhampton	7043	425.00	0.00
Wolverhampton	7051	0.00	0.00
Wolverhampton	7052	0.00	236.00
Wolverhampton	7053	0.00	0.00
Wolverhampton	7061	1113.00	0.00
Wolverhampton	7062	850.00	0.00
Wolverhampton	7063	774.00	0.00
Wolverhampton	7064	0.00	0.00
Wolverhampton	7065	0.00	0.00
Wolverhampton	7071	0.00	0.00
Wolverhampton	7072	0.00	873.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7073	310.00	0.00
Wolverhampton	7074	0.00	0.00
Wolverhampton	7081	0.00	0.00
Wolverhampton	7082	0.00	0.00
Wolverhampton	7083	0.00	0.00
Wolverhampton	7091	19.50	0.00
Wolverhampton	7092	0.00	339.00
Wolverhampton	7093	0.00	62.00
Wolverhampton	7101	0.00	1291.00
Wolverhampton	7102	0.00	0.00
Wolverhampton	7103	0.00	0.00
Wolverhampton	7104	0.00	0.00
Wolverhampton	7111	0.00	0.00
Wolverhampton	7112	0.00	0.00
Wolverhampton	7113	0.00	0.00
Wolverhampton	7121	0.00	0.00
Wolverhampton	7122	0.00	0.00
Wolverhampton	7123	0.00	0.00
Wolverhampton	7131	0.00	0.00
Wolverhampton	7132	408.00	0.00
Wolverhampton	7133	0.00	0.00
Wolverhampton	7141	0.00	0.00
Wolverhampton	7142	0.00	0.00
Wolverhampton	7143	0.00	0.00
Wolverhampton	7151	0.00	0.00
Wolverhampton	7152	135.00	0.00
Wolverhampton	7153	0.00	0.00
Wolverhampton	7161	0.00	0.00
Wolverhampton	7162	0.00	0.00
Wolverhampton	7163	0.00	0.00
Wolverhampton	7171	0.00	0.00
Wolverhampton	7172	27.00	0.00
Wolverhampton	7173	0.00	867.00
Wolverhampton	7174	600.00	0.00
Wolverhampton	7175	0.00	0.00
Wolverhampton	7181	0.00	0.00
Wolverhampton	7182	0.00	0.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7183	0.00	0.00
Wolverhampton	7184	0.00	1274.00
Wolverhampton	7191	733.00	82.00
Wolverhampton	7192	405.00	0.00
Wolverhampton	7193	0.00	576.00
Wolverhampton	7194	0.00	0.00
Wolverhampton	7201	1398.00	134.00
Wolverhampton	7202	0.00	0.00
Wolverhampton	7203	0.00	0.00
Wolverhampton	7204	0.00	0.00
Wolverhampton	7301	165.00	0.00
Wolverhampton	7302	0.00	0.00
Wolverhampton	7303	163.00	0.00
Wolverhampton	7304	0.00	0.00
Wolverhampton	7305	0.00	0.00
Wolverhampton	7306	62.00	0.00
Wolverhampton	7307	44.00	0.00
Wolverhampton	7308	0.00	0.00
Wolverhampton	7309	48.00	0.00
Wolverhampton	7310	0.00	1161.00
Wolverhampton	7311	0.00	0.00
Wolverhampton	7312	62.00	0.00
Wolverhampton	7313	0.00	0.00
Wolverhampton	7314	0.00	0.00
Wolverhampton	7315	350.00	431.00
Wolverhampton	7316	0.00	503.00
Wolverhampton	7317	27.00	288.00
Wolverhampton	8344	0.00	4214.00
Wolverhampton	8351	0.00	2800.00
Wolverhampton	8360	0.00	3500.00

Appendix 2 – 2035 Uncertainty Log – Zonal Total Growth from Reference Case

The additional growth per zone is tabulated below. This provides the breakdown of Local Plan demand by zones, whilst the total demand being loaded into the Local Plan scenario is the sum by zone of this table, and Appendix 1 post-NTEM-constraint.

District	PRISM zones	Pop	Jobs
Dudley	3011	56.00	0.00
Dudley	3012	56.00	0.00
Dudley	3013	56.00	0.00
Dudley	3021	421.12	0.00
Dudley	3022	56.00	0.00
Dudley	3023	56.00	0.00
Dudley	3031	3.99	90.00
Dudley	3032	96.78	0.00
Dudley	3033	56.00	0.00
Dudley	3041	56.00	0.00
Dudley	3042	56.00	0.00
Dudley	3043	340.74	0.00
Dudley	3051	61.14	0.00
Dudley	3052	56.00	0.00
Dudley	3053	56.00	0.00
Dudley	3061	-256.22	0.00
Dudley	3062	149.20	0.00
Dudley	3063	56.00	0.00
Dudley	3071	111.92	0.00
Dudley	3072	56.00	0.00
Dudley	3073	56.00	0.00
Dudley	3081	120.94	0.00
Dudley	3082	113.95	27.00
Dudley	3083	90.95	0.00
Dudley	3091	56.00	0.00
Dudley	3092	56.00	0.00
Dudley	3093	56.00	40.50
Dudley	3101	419.18	0.00
Dudley	3102	56.00	0.00
Dudley	3103	56.00	0.00
Dudley	3111	-67.49	0.00
Dudley	3112	118.91	107.00
Dudley	3113	172.50	0.00
Dudley	3121	125.90	0.00
Dudley	3122	928.50	25.50
Dudley	3123	872.67	0.00
Dudley	3131	798.55	0.00

District	PRISM zones	Pop	Jobs
Dudley	3132	109.59	0.00
Dudley	3133	56.00	99.00
Dudley	3141	58.82	0.00
Dudley	3142	-306.81	0.00
Dudley	3143	56.00	0.00
Dudley	3151	58.82	0.00
Dudley	3152	58.82	0.00
Dudley	3153	56.00	0.00
Dudley	3161	342.59	0.00
Dudley	3162	56.00	0.00
Dudley	3163	56.00	0.00
Dudley	3171	100.27	0.00
Dudley	3172	56.00	39.00
Dudley	3173	111.92	0.00
Dudley	3181	109.59	0.00
Dudley	3182	57.88	0.00
Dudley	3183	56.00	0.00
Dudley	3191	57.88	0.00
Dudley	3192	56.00	0.00
Dudley	3193	56.00	0.00
Dudley	3201	56.00	0.00
Dudley	3202	56.00	0.00
Dudley	3203	109.32	0.00
Dudley	3211	56.00	0.00
Dudley	3212	622.19	0.00
Dudley	3213	56.00	0.00
Dudley	3221	62.27	0.00
Dudley	3222	319.29	0.00
Dudley	3223	56.00	-159.00
Dudley	3231	103.50	0.00
Dudley	3232	501.93	0.00
Dudley	3233	56.00	24.00
Dudley	3241	56.00	0.00
Dudley	3242	132.17	0.00
Dudley	3243	56.00	0.00
Dudley	3301	56.00	0.00
Dudley	3302	56.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3303	56.00	0.00
Dudley	3304	56.00	0.00
Dudley	3305	56.00	0.00
Dudley	3306	62.27	0.00
Dudley	3307	300.65	0.00
Dudley	3308	56.00	0.00
Dudley	3309	56.00	0.00
Dudley	3310	56.00	0.00
Dudley	3311	56.00	0.00
Dudley	3312	157.09	0.00
Dudley	3313	56.00	0.00
Dudley	3314	67.65	0.00
Dudley	3315	56.00	0.00
Dudley	3316	56.00	0.00
Sandwell	4011	197.55	0.00
Sandwell	4012	1329.19	320.00
Sandwell	4013	272.11	0.00
Sandwell	4021	379.29	718.14
Sandwell	4022	53.48	736.89
Sandwell	4023	821.87	0.00
Sandwell	4024	41.44	963.46
Sandwell	4031	36.78	0.00
Sandwell	4032	36.78	0.00
Sandwell	4041	52.16	426.93
Sandwell	4042	141.00	0.00
Sandwell	4043	513.58	0.00
Sandwell	4044	36.78	0.00
Sandwell	4051	36.78	0.00
Sandwell	4052	572.78	0.00
Sandwell	4061	158.09	220.00
Sandwell	4062	36.78	2371.91
Sandwell	4063	171.92	0.00
Sandwell	4071	36.78	0.00
Sandwell	4072	97.09	0.00
Sandwell	4073	59.78	0.00
Sandwell	4081	36.78	0.00
Sandwell	4082	36.78	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4091	36.78	0.00
Sandwell	4092	36.78	0.00
Sandwell	4093	36.78	0.00
Sandwell	4101	36.78	0.00
Sandwell	4102	143.78	0.00
Sandwell	4103	55.84	0.00
Sandwell	4111	1201.78	0.00
Sandwell	4112	576.58	0.00
Sandwell	4113	36.78	0.00
Sandwell	4121	52.78	0.00
Sandwell	4122	36.78	0.00
Sandwell	4123	36.78	0.00
Sandwell	4131	162.70	177.84
Sandwell	4132	36.78	0.00
Sandwell	4133	36.78	0.00
Sandwell	4141	36.78	0.00
Sandwell	4142	36.78	0.00
Sandwell	4143	36.78	0.00
Sandwell	4151	36.78	0.00
Sandwell	4152	36.78	0.00
Sandwell	4153	36.78	0.00
Sandwell	4161	66.30	0.00
Sandwell	4162	36.78	0.00
Sandwell	4163	36.78	0.00
Sandwell	4171	-453.92	0.00
Sandwell	4172	36.78	0.00
Sandwell	4181	473.42	956.50
Sandwell	4182	126.25	0.00
Sandwell	4183	2819.12	0.00
Sandwell	4191	126.25	1518.76
Sandwell	4192	126.25	0.00
Sandwell	4193	274.44	0.00
Sandwell	4201	36.78	167.01
Sandwell	4202	1021.38	130.00
Sandwell	4203	1279.05	2985.00
Sandwell	4211	36.78	0.00
Sandwell	4212	36.78	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4213	36.78	0.00
Sandwell	4221	105.78	0.00
Sandwell	4222	36.78	0.00
Sandwell	4223	914.38	0.00
Sandwell	4231	92.70	0.00
Sandwell	4232	36.78	0.00
Sandwell	4233	386.28	0.00
Sandwell	4241	-543.39	0.00
Sandwell	4242	52.32	0.00
Sandwell	4243	36.78	0.00
Sandwell	4301	36.78	3400.00
Sandwell	4302	36.78	0.00
Sandwell	4303	41.75	0.00
Sandwell	4304	41.75	0.00
Sandwell	4305	41.75	0.00
Sandwell	4306	255.75	0.00
Sandwell	4307	840.75	350.00
Sandwell	4308	36.78	0.00
Walsall	6011	0.00	0.00
Walsall	6012	0.00	0.00
Walsall	6013	0.00	0.00
Walsall	6021	0.00	0.00
Walsall	6022	135.59	0.00
Walsall	6023	0.00	0.00
Walsall	6031	0.00	0.00
Walsall	6032	0.00	500.00
Walsall	6033	0.00	0.00
Walsall	6041	49.00	0.00
Walsall	6042	0.00	0.00
Walsall	6043	0.00	0.00
Walsall	6051	0.00	0.00
Walsall	6052	336.00	0.00
Walsall	6053	0.00	0.00
Walsall	6061	0.00	0.00
Walsall	6062	0.00	0.00
Walsall	6063	0.00	0.00
Walsall	6071	219.02	0.00

District	PRISM zones	Pop	Jobs
Walsall	6072	0.00	0.00
Walsall	6073	0.00	0.00
Walsall	6081	0.00	0.00
Walsall	6082	0.00	0.00
Walsall	6091	0.00	0.00
Walsall	6092	0.00	0.00
Walsall	6093	0.00	0.00
Walsall	6094	0.00	0.00
Walsall	6101	7.00	0.00
Walsall	6102	0.00	0.00
Walsall	6103	0.00	0.00
Walsall	6111	0.00	0.00
Walsall	6112	0.00	0.00
Walsall	6113	27.96	0.00
Walsall	6121	0.00	0.00
Walsall	6122	0.00	0.00
Walsall	6123	2607.27	0.00
Walsall	6131	0.00	0.00
Walsall	6132	81.55	0.00
Walsall	6133	0.00	0.00
Walsall	6141	934.33	0.00
Walsall	6142	3343.55	0.00
Walsall	6143	1817.29	0.00
Walsall	6144	0.00	0.00
Walsall	6151	314.55	0.00
Walsall	6152	0.00	0.00
Walsall	6153	470.66	0.00
Walsall	6161	1521.49	0.00
Walsall	6162	260.96	0.00
Walsall	6163	0.00	911.11
Walsall	6171	86.21	0.00
Walsall	6172	1351.40	0.00
Walsall	6173	0.00	0.00
Walsall	6181	2278.74	0.00
Walsall	6182	0.00	0.00
Walsall	6183	0.00	0.00
Walsall	6191	0.00	0.00

District	PRISM zones	Pop	Jobs
Walsall	6192	0.00	0.00
Walsall	6193	0.00	0.00
Walsall	6201	76.89	638.67
Walsall	6202	0.00	0.00
Walsall	6203	107.18	0.00
Walsall	6301	0.00	0.00
Walsall	6302	0.00	0.00
Walsall	6303	0.00	0.00
Walsall	6304	0.00	0.00
Walsall	6305	0.00	0.00
Walsall	6306	0.00	0.00
Walsall	6307	0.00	0.00
Walsall	6308	0.00	0.00
Walsall	6309	0.00	0.00
Walsall	6310	221.00	0.00
Wolverhampton	7011	57.00	0.00
Wolverhampton	7012	57.00	0.00
Wolverhampton	7013	57.00	0.00
Wolverhampton	7021	57.00	0.00
Wolverhampton	7022	57.00	0.00
Wolverhampton	7023	57.00	0.00
Wolverhampton	7031	79.50	0.00
Wolverhampton	7032	57.00	0.00
Wolverhampton	7033	57.00	0.00
Wolverhampton	7041	57.00	0.00
Wolverhampton	7042	57.00	0.00
Wolverhampton	7043	202.50	0.00
Wolverhampton	7051	137.00	0.00
Wolverhampton	7052	93.00	92.00
Wolverhampton	7053	57.00	0.00
Wolverhampton	7061	57.00	0.00
Wolverhampton	7062	57.00	250.00
Wolverhampton	7063	57.00	0.00
Wolverhampton	7064	57.00	80.00
Wolverhampton	7065	57.00	0.00
Wolverhampton	7071	317.80	0.00
Wolverhampton	7072	207.00	-198.00
Wolverhampton	7073	-244.00	0.00
Wolverhampton	7074	114.00	0.00
Wolverhampton	7081	57.00	0.00
Wolverhampton	7082	57.00	0.00
Wolverhampton	7083	57.00	0.00
Wolverhampton	7091	222.00	660.00
Wolverhampton	7092	261.50	0.00
Wolverhampton	7093	57.00	0.00
Wolverhampton	7101	82.50	0.00
Wolverhampton	7102	57.00	0.00
Wolverhampton	7103	57.00	0.00
Wolverhampton	7104	57.00	0.00
Wolverhampton	7111	57.00	0.00
Wolverhampton	7112	57.00	0.00
Wolverhampton	7113	57.00	0.00
Wolverhampton	7121	57.00	0.00
Wolverhampton	7122	57.00	0.00
Wolverhampton	7123	84.00	0.00
Wolverhampton	7131	57.00	0.00
Wolverhampton	7132	449.25	82.00
Wolverhampton	7133	57.00	0.00
Wolverhampton	7141	57.00	0.00
Wolverhampton	7142	57.00	0.00
Wolverhampton	7143	57.00	0.00
Wolverhampton	7151	57.00	0.00
Wolverhampton	7152	57.00	0.00
Wolverhampton	7153	57.00	0.00
Wolverhampton	7161	57.00	0.00
Wolverhampton	7162	57.00	0.00
Wolverhampton	7163	57.00	0.00
Wolverhampton	7171	168.84	0.00
Wolverhampton	7172	285.80	0.00
Wolverhampton	7173	839.80	-167.00
Wolverhampton	7174	57.00	1919.00
Wolverhampton	7175	57.00	0.00
Wolverhampton	7181	57.00	0.00
Wolverhampton	7182	57.00	0.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7183	173.05	0.00
Wolverhampton	7184	57.00	0.00
Wolverhampton	7191	-75.04	40.00
Wolverhampton	7192	-50.00	0.00
Wolverhampton	7193	57.00	0.00
Wolverhampton	7194	57.00	0.00
Wolverhampton	7201	718.00	0.00
Wolverhampton	7202	57.00	0.00
Wolverhampton	7203	57.00	0.00
Wolverhampton	7204	57.00	0.00
Wolverhampton	7301	35.00	0.00
Wolverhampton	7302	57.00	0.00
Wolverhampton	7303	57.00	0.00
Wolverhampton	7304	57.00	0.00
Wolverhampton	7305	57.00	0.00
Wolverhampton	7306	188.80	431.00
Wolverhampton	7307	164.80	1034.00
Wolverhampton	7308	128.80	0.00
Wolverhampton	7309	80.80	0.00
Wolverhampton	7310	128.80	-353.00
Wolverhampton	7311	594.40	428.00
Wolverhampton	7312	413.80	0.00
Wolverhampton	7313	128.80	0.00
Wolverhampton	7314	57.00	0.00
Wolverhampton	7315	24.00	-382.00
Wolverhampton	7316	57.00	0.00
Wolverhampton	7317	1146.59	0.00
Wolverhampton	8344	0.00	0.00
Wolverhampton	8351	0.00	0.00
Wolverhampton	8360	0.00	0.00

Appendix 3 – 2042 Uncertainty Log – Zone Total Growth from Base Year

The additional growth per zone is tabulated below. Note that these values do not correspond exactly to the final zone totals discussed earlier in the report. This is a result of the constraint to TEMPro,

District	PRISM zones	Pop	Jobs
Dudley	3011	0.00	0.00
Dudley	3012	0.00	0.00
Dudley	3013	0.00	0.00
Dudley	3021	60.58	0.00
Dudley	3022	0.00	0.00
Dudley	3023	37.28	0.00
Dudley	3031	341.02	0.00
Dudley	3032	207.37	0.00
Dudley	3033	0.00	0.00
Dudley	3041	0.00	0.00
Dudley	3042	0.00	0.00
Dudley	3043	0.00	0.00
Dudley	3051	782.88	0.00
Dudley	3052	326.20	0.00
Dudley	3053	0.00	0.00
Dudley	3061	428.72	0.00
Dudley	3062	207.37	0.00
Dudley	3063	0.00	0.00
Dudley	3071	0.00	0.00
Dudley	3072	0.00	0.00
Dudley	3073	0.00	0.00
Dudley	3081	0.00	0.00
Dudley	3082	326.20	0.00
Dudley	3083	0.00	0.00
Dudley	3091	0.00	0.00
Dudley	3092	0.00	118.00
Dudley	3093	30.29	0.00
Dudley	3101	0.00	0.00
Dudley	3102	139.80	0.00
Dudley	3103	139.80	0.00
Dudley	3111	205.04	0.00
Dudley	3112	0.00	30.00
Dudley	3113	389.11	0.00
Dudley	3121	39.61	0.00
Dudley	3122	0.00	0.00
Dudley	3123	0.00	0.00
Dudley	3131	0.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3132	382.12	0.00
Dudley	3133	0.00	140.00
Dudley	3141	0.00	0.00
Dudley	3142	1398.00	0.00
Dudley	3143	0.00	28.00
Dudley	3151	0.00	0.00
Dudley	3152	414.74	0.00
Dudley	3153	486.97	0.00
Dudley	3161	0.00	0.00
Dudley	3162	0.00	0.00
Dudley	3163	174.75	0.00
Dudley	3171	20.97	0.00
Dudley	3172	0.00	0.00
Dudley	3173	0.00	0.00
Dudley	3181	0.00	0.00
Dudley	3182	0.00	0.00
Dudley	3183	0.00	0.00
Dudley	3191	0.00	0.00
Dudley	3192	167.76	0.00
Dudley	3193	0.00	0.00
Dudley	3201	0.00	0.00
Dudley	3202	0.00	0.00
Dudley	3203	0.00	0.00
Dudley	3211	0.00	0.00
Dudley	3212	172.42	0.00
Dudley	3213	0.00	0.00
Dudley	3221	0.00	0.00
Dudley	3222	0.00	0.00
Dudley	3223	1099.76	314.00
Dudley	3231	904.04	0.00
Dudley	3232	0.00	0.00
Dudley	3233	0.00	0.00
Dudley	3241	0.00	0.00
Dudley	3242	239.99	0.00
Dudley	3243	0.00	0.00
Dudley	3301	0.00	0.00
Dudley	3302	0.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3303	0.00	0.00
Dudley	3304	0.00	0.00
Dudley	3305	0.00	200.00
Dudley	3306	0.00	0.00
Dudley	3307	0.00	0.00
Dudley	3308	0.00	0.00
Dudley	3309	0.00	0.00
Dudley	3310	0.00	0.00
Dudley	3311	186.40	0.00
Dudley	3312	0.00	0.00
Dudley	3313	0.00	0.00
Dudley	3314	0.00	0.00
Dudley	3315	0.00	0.00
Dudley	3316	0.00	0.00
Sandwell	4011	23.30	37.80
Sandwell	4012	0.00	964.05
Sandwell	4013	32.62	0.00
Sandwell	4021	0.00	219.75
Sandwell	4022	626.55	62.20
Sandwell	4023	32.62	0.00
Sandwell	4024	0.00	0.00
Sandwell	4031	0.00	0.00
Sandwell	4032	0.00	0.00
Sandwell	4041	316.88	24.40
Sandwell	4042	93.20	0.00
Sandwell	4043	0.00	0.00
Sandwell	4044	41.94	0.00
Sandwell	4051	147.00	0.00
Sandwell	4052	0.00	0.00
Sandwell	4061	32.62	0.00
Sandwell	4062	37.00	7.19
Sandwell	4063	0.00	0.00
Sandwell	4071	0.00	0.00
Sandwell	4072	0.00	0.00
Sandwell	4073	0.00	0.00
Sandwell	4081	1973.90	0.00
Sandwell	4082	186.90	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4091	0.00	0.00
Sandwell	4092	0.00	0.00
Sandwell	4093	0.00	0.00
Sandwell	4101	0.00	0.00
Sandwell	4102	0.00	0.00
Sandwell	4103	41.94	0.00
Sandwell	4111	342.51	0.00
Sandwell	4112	121.16	0.00
Sandwell	4113	583.00	0.00
Sandwell	4121	0.00	0.00
Sandwell	4122	0.00	0.00
Sandwell	4123	0.00	0.00
Sandwell	4131	126.00	0.00
Sandwell	4132	27.96	0.00
Sandwell	4133	74.56	0.00
Sandwell	4141	0.00	0.00
Sandwell	4142	0.00	0.00
Sandwell	4143	0.00	0.00
Sandwell	4151	442.70	0.00
Sandwell	4152	0.00	0.00
Sandwell	4153	0.00	0.00
Sandwell	4161	0.00	0.00
Sandwell	4162	0.00	0.00
Sandwell	4163	32.62	0.00
Sandwell	4171	46.60	0.00
Sandwell	4172	76.89	0.00
Sandwell	4181	1425.96	0.00
Sandwell	4182	154.30	0.00
Sandwell	4183	466.00	0.00
Sandwell	4191	298.00	14.39
Sandwell	4192	0.00	0.00
Sandwell	4193	25.63	0.00
Sandwell	4201	291.00	0.00
Sandwell	4202	107.18	0.00
Sandwell	4203	386.29	520.00
Sandwell	4211	0.00	0.00
Sandwell	4212	109.51	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4213	107.18	0.00
Sandwell	4221	54.00	0.00
Sandwell	4222	123.49	0.00
Sandwell	4223	698.82	0.00
Sandwell	4231	0.00	0.00
Sandwell	4232	1375.62	0.00
Sandwell	4233	62.91	0.00
Sandwell	4241	46.60	0.00
Sandwell	4242	121.16	0.00
Sandwell	4243	0.00	0.00
Sandwell	4301	0.00	0.00
Sandwell	4302	0.00	0.00
Sandwell	4303	0.00	0.00
Sandwell	4304	0.00	0.00
Sandwell	4305	0.00	0.00
Sandwell	4306	433.37	0.00
Sandwell	4307	302.80	0.00
Sandwell	4308	0.00	0.00
Walsall	6011	81.00	638.89
Walsall	6012	198.00	186.67
Walsall	6013	53.00	1153.33
Walsall	6021	7.00	290.00
Walsall	6022	524.00	433.33
Walsall	6023	154.00	988.89
Walsall	6031	7.00	337.78
Walsall	6032	87.00	0.00
Walsall	6033	33.00	0.00
Walsall	6041	112.00	0.00
Walsall	6042	105.00	0.00
Walsall	6043	5.00	0.00
Walsall	6051	5.00	134.44
Walsall	6052	0.00	760.00
Walsall	6053	190.00	0.00
Walsall	6061	37.00	913.33
Walsall	6062	0.00	0.00
Walsall	6063	61.00	2563.33
Walsall	6071	1087.00	446.67

District	PRISM zones	Pop	Jobs
Walsall	6072	23.00	485.56
Walsall	6073	9.00	1555.56
Walsall	6081	6.00	47.78
Walsall	6082	7.00	0.00
Walsall	6091	118.00	57.78
Walsall	6092	39.00	0.00
Walsall	6093	168.00	56.67
Walsall	6094	9.00	0.00
Walsall	6101	44.00	0.00
Walsall	6102	107.00	0.00
Walsall	6103	1596.00	95.56
Walsall	6111	33.00	0.00
Walsall	6112	9.00	0.00
Walsall	6113	5.00	0.00
Walsall	6121	129.00	0.00
Walsall	6122	11.00	0.00
Walsall	6123	2.00	0.00
Walsall	6131	0.00	302.22
Walsall	6132	5.00	1152.22
Walsall	6133	57.00	0.00
Walsall	6141	0.00	0.00
Walsall	6142	19.00	278.89
Walsall	6143	2.00	0.00
Walsall	6144	14.00	0.00
Walsall	6151	105.00	0.00
Walsall	6152	104.00	0.00
Walsall	6153	18.00	0.00
Walsall	6161	11.00	0.00
Walsall	6162	18.00	0.00
Walsall	6163	2.00	0.00
Walsall	6171	14.00	0.00
Walsall	6172	21.00	0.00
Walsall	6173	2.00	0.00
Walsall	6181	98.00	0.00
Walsall	6182	0.00	0.00
Walsall	6183	66.00	93.33
Walsall	6191	217.00	388.89

District	PRISM zones	Pop	Jobs
Walsall	6192	58.00	0.00
Walsall	6193	87.00	0.00
Walsall	6201	156.00	0.00
Walsall	6202	181.00	0.00
Walsall	6203	0.00	167.78
Walsall	6301	568.00	87.78
Walsall	6302	9.00	0.00
Walsall	6303	141.00	0.00
Walsall	6304	2.00	0.00
Walsall	6305	58.00	0.00
Walsall	6306	162.00	0.00
Walsall	6307	65.00	3.33
Walsall	6308	0.00	0.00
Walsall	6309	8.00	0.00
Walsall	6310	345.00	97.78
Wolverhampton	7011	0.00	0.00
Wolverhampton	7012	0.00	0.00
Wolverhampton	7013	0.00	0.00
Wolverhampton	7021	0.00	0.00
Wolverhampton	7022	0.00	0.00
Wolverhampton	7023	0.00	0.00
Wolverhampton	7031	0.00	0.00
Wolverhampton	7032	0.00	0.00
Wolverhampton	7033	0.00	0.00
Wolverhampton	7041	0.00	0.00
Wolverhampton	7042	0.00	0.00
Wolverhampton	7043	425.00	0.00
Wolverhampton	7051	0.00	0.00
Wolverhampton	7052	0.00	236.00
Wolverhampton	7053	0.00	0.00
Wolverhampton	7061	1113.00	0.00
Wolverhampton	7062	850.00	0.00
Wolverhampton	7063	774.00	0.00
Wolverhampton	7064	0.00	0.00
Wolverhampton	7065	0.00	0.00
Wolverhampton	7071	0.00	0.00
Wolverhampton	7072	0.00	873.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7073	310.00	0.00
Wolverhampton	7074	0.00	0.00
Wolverhampton	7081	0.00	0.00
Wolverhampton	7082	0.00	0.00
Wolverhampton	7083	0.00	0.00
Wolverhampton	7091	23.40	0.00
Wolverhampton	7092	0.00	339.00
Wolverhampton	7093	0.00	62.00
Wolverhampton	7101	0.00	1291.00
Wolverhampton	7102	0.00	0.00
Wolverhampton	7103	0.00	0.00
Wolverhampton	7104	0.00	0.00
Wolverhampton	7111	0.00	0.00
Wolverhampton	7112	0.00	0.00
Wolverhampton	7113	0.00	0.00
Wolverhampton	7121	0.00	0.00
Wolverhampton	7122	0.00	0.00
Wolverhampton	7123	0.00	0.00
Wolverhampton	7131	0.00	0.00
Wolverhampton	7132	408.00	0.00
Wolverhampton	7133	0.00	0.00
Wolverhampton	7141	0.00	0.00
Wolverhampton	7142	0.00	0.00
Wolverhampton	7143	0.00	0.00
Wolverhampton	7151	0.00	0.00
Wolverhampton	7152	135.00	0.00
Wolverhampton	7153	0.00	0.00
Wolverhampton	7161	0.00	0.00
Wolverhampton	7162	0.00	0.00
Wolverhampton	7163	0.00	0.00
Wolverhampton	7171	0.00	0.00
Wolverhampton	7172	27.00	0.00
Wolverhampton	7173	0.00	867.00
Wolverhampton	7174	600.00	0.00
Wolverhampton	7175	0.00	0.00
Wolverhampton	7181	0.00	0.00
Wolverhampton	7182	0.00	0.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7183	0.00	0.00
Wolverhampton	7184	0.00	1274.00
Wolverhampton	7191	733.00	82.00
Wolverhampton	7192	405.00	0.00
Wolverhampton	7193	0.00	576.00
Wolverhampton	7194	0.00	0.00
Wolverhampton	7201	1398.00	134.00
Wolverhampton	7202	0.00	0.00
Wolverhampton	7203	0.00	0.00
Wolverhampton	7204	0.00	0.00
Wolverhampton	7301	165.00	0.00
Wolverhampton	7302	0.00	0.00
Wolverhampton	7303	163.00	0.00
Wolverhampton	7304	0.00	0.00
Wolverhampton	7305	0.00	0.00
Wolverhampton	7306	62.00	0.00
Wolverhampton	7307	44.00	0.00
Wolverhampton	7308	0.00	0.00
Wolverhampton	7309	48.00	0.00
Wolverhampton	7310	0.00	1161.00
Wolverhampton	7311	0.00	0.00
Wolverhampton	7312	62.00	0.00
Wolverhampton	7313	0.00	0.00
Wolverhampton	7314	0.00	0.00
Wolverhampton	7315	350.00	431.00
Wolverhampton	7316	0.00	503.00
Wolverhampton	7317	27.00	288.00
Wolverhampton	8344	0.00	4214.00
Wolverhampton	8351	0.00	2800.00
Wolverhampton	8360	0.00	5600.00

Appendix 4 – 2042 Uncertainty Log – Zone Total Growth from Reference Case

The additional growth per zone is tabulated below. This provides the breakdown of Local Plan demand by zones, whilst the total demand being loaded into the Local Plan scenario is the sum by zone of this table, and Appendix 1 post-NTEM-constraint.

District	PRISM zones	Pop	Jobs
Dudley	3011	84.00	0.00
Dudley	3012	84.00	0.00
Dudley	3013	84.00	0.00
Dudley	3021	500.29	0.00
Dudley	3022	84.00	0.00
Dudley	3023	84.00	0.00
Dudley	3031	75.72	120.00
Dudley	3032	139.92	0.00
Dudley	3033	84.00	0.00
Dudley	3041	84.00	0.00
Dudley	3042	84.00	0.00
Dudley	3043	379.13	0.00
Dudley	3051	183.41	0.00
Dudley	3052	84.00	0.00
Dudley	3053	84.00	0.00
Dudley	3061	84.00	0.00
Dudley	3062	177.20	0.00
Dudley	3063	84.00	0.00
Dudley	3071	139.92	0.00
Dudley	3072	84.00	0.00
Dudley	3073	84.00	0.00
Dudley	3081	154.68	0.00
Dudley	3082	194.29	36.00
Dudley	3083	118.95	0.00
Dudley	3091	84.00	0.00
Dudley	3092	84.00	0.00
Dudley	3093	84.00	54.00
Dudley	3101	522.82	0.00
Dudley	3102	84.00	0.00
Dudley	3103	84.00	0.00
Dudley	3111	42.06	0.00
Dudley	3112	146.91	132.00
Dudley	3113	226.13	0.00
Dudley	3121	351.95	0.00
Dudley	3122	1339.87	34.00
Dudley	3123	1652.09	0.00
Dudley	3131	2090.13	0.00

District	PRISM zones	Pop	Jobs
Dudley	3132	323.99	0.00
Dudley	3133	84.00	132.00
Dudley	3141	89.24	0.00
Dudley	3142	89.24	0.00
Dudley	3143	84.00	0.00
Dudley	3151	89.24	0.00
Dudley	3152	89.24	0.00
Dudley	3153	84.00	0.00
Dudley	3161	806.30	0.00
Dudley	3162	84.00	0.00
Dudley	3163	84.00	0.00
Dudley	3171	128.27	0.00
Dudley	3172	84.00	52.00
Dudley	3173	139.92	0.00
Dudley	3181	137.59	0.00
Dudley	3182	87.50	0.00
Dudley	3183	84.00	0.00
Dudley	3191	87.50	0.00
Dudley	3192	84.00	0.00
Dudley	3193	84.00	0.00
Dudley	3201	84.00	0.00
Dudley	3202	84.00	0.00
Dudley	3203	188.85	0.00
Dudley	3211	84.00	0.00
Dudley	3212	829.60	0.00
Dudley	3213	84.00	0.00
Dudley	3221	95.65	0.00
Dudley	3222	391.56	0.00
Dudley	3223	84.00	-134.00
Dudley	3231	570.97	0.00
Dudley	3232	540.68	0.00
Dudley	3233	84.00	32.00
Dudley	3241	84.00	0.00
Dudley	3242	265.74	0.00
Dudley	3243	84.00	0.00
Dudley	3301	84.00	0.00
Dudley	3302	84.00	0.00

District	PRISM zones	Pop	Jobs
Dudley	3303	84.00	0.00
Dudley	3304	84.00	0.00
Dudley	3305	84.00	0.00
Dudley	3306	95.65	0.00
Dudley	3307	328.65	0.00
Dudley	3308	84.00	0.00
Dudley	3309	84.00	0.00
Dudley	3310	84.00	0.00
Dudley	3311	84.00	0.00
Dudley	3312	365.93	0.00
Dudley	3313	84.00	0.00
Dudley	3314	107.30	0.00
Dudley	3315	84.00	0.00
Dudley	3316	84.00	0.00
Sandwell	4011	262.94	0.00
Sandwell	4012	2070.68	320.00
Sandwell	4013	411.66	0.00
Sandwell	4021	712.23	718.14
Sandwell	4022	74.20	736.89
Sandwell	4023	840.26	0.00
Sandwell	4024	62.16	963.46
Sandwell	4031	55.17	0.00
Sandwell	4032	55.17	0.00
Sandwell	4041	73.65	426.93
Sandwell	4042	162.49	0.00
Sandwell	4043	531.97	0.00
Sandwell	4044	55.17	0.00
Sandwell	4051	55.17	0.00
Sandwell	4052	591.17	0.00
Sandwell	4061	184.64	220.00
Sandwell	4062	55.17	2371.91
Sandwell	4063	190.31	0.00
Sandwell	4071	55.17	0.00
Sandwell	4072	212.18	0.00
Sandwell	4073	78.17	0.00
Sandwell	4081	55.17	0.00
Sandwell	4082	55.17	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4091	55.17	0.00
Sandwell	4092	55.17	0.00
Sandwell	4093	55.17	0.00
Sandwell	4101	55.17	0.00
Sandwell	4102	162.17	0.00
Sandwell	4103	74.23	0.00
Sandwell	4111	1220.17	0.00
Sandwell	4112	594.97	0.00
Sandwell	4113	55.17	0.00
Sandwell	4121	71.17	0.00
Sandwell	4122	55.17	0.00
Sandwell	4123	55.17	0.00
Sandwell	4131	209.05	177.84
Sandwell	4132	55.17	0.00
Sandwell	4133	55.17	0.00
Sandwell	4141	55.17	0.00
Sandwell	4142	55.17	0.00
Sandwell	4143	55.17	0.00
Sandwell	4151	55.17	0.00
Sandwell	4152	55.17	0.00
Sandwell	4153	55.17	0.00
Sandwell	4161	99.44	0.00
Sandwell	4162	55.17	0.00
Sandwell	4163	55.17	0.00
Sandwell	4171	-390.79	0.00
Sandwell	4172	55.17	0.00
Sandwell	4181	536.55	956.50
Sandwell	4182	189.38	0.00
Sandwell	4183	2843.72	0.00
Sandwell	4191	189.38	1518.76
Sandwell	4192	189.38	0.00
Sandwell	4193	292.83	0.00
Sandwell	4201	55.17	167.01
Sandwell	4202	1116.77	130.00
Sandwell	4203	1612.94	2985.00
Sandwell	4211	55.17	0.00
Sandwell	4212	55.17	0.00

District	PRISM zones	Pop	Jobs
Sandwell	4213	55.17	0.00
Sandwell	4221	124.17	0.00
Sandwell	4222	55.17	0.00
Sandwell	4223	950.63	0.00
Sandwell	4231	139.05	0.00
Sandwell	4232	55.17	0.00
Sandwell	4233	404.67	0.00
Sandwell	4241	-59.00	0.00
Sandwell	4242	78.47	0.00
Sandwell	4243	55.17	0.00
Sandwell	4301	55.17	3400.00
Sandwell	4302	55.17	0.00
Sandwell	4303	62.63	0.00
Sandwell	4304	62.63	0.00
Sandwell	4305	62.63	0.00
Sandwell	4306	276.63	0.00
Sandwell	4307	1783.63	350.00
Sandwell	4308	55.17	0.00
Walsall	6011	0.00	0.00
Walsall	6012	0.00	0.00
Walsall	6013	0.00	0.00
Walsall	6021	0.00	0.00
Walsall	6022	135.59	0.00
Walsall	6023	0.00	0.00
Walsall	6031	0.00	0.00
Walsall	6032	0.00	500.00
Walsall	6033	0.00	0.00
Walsall	6041	49.00	0.00
Walsall	6042	0.00	0.00
Walsall	6043	0.00	0.00
Walsall	6051	0.00	0.00
Walsall	6052	336.00	0.00
Walsall	6053	0.00	0.00
Walsall	6061	0.00	0.00
Walsall	6062	0.00	0.00
Walsall	6063	0.00	0.00
Walsall	6071	219.02	0.00

District	PRISM zones	Pop	Jobs
Walsall	6072	0.00	0.00
Walsall	6073	0.00	0.00
Walsall	6081	0.00	0.00
Walsall	6082	0.00	0.00
Walsall	6091	0.00	0.00
Walsall	6092	0.00	0.00
Walsall	6093	0.00	0.00
Walsall	6094	0.00	0.00
Walsall	6101	7.00	0.00
Walsall	6102	0.00	0.00
Walsall	6103	0.00	0.00
Walsall	6111	0.00	0.00
Walsall	6112	0.00	0.00
Walsall	6113	27.96	0.00
Walsall	6121	0.00	0.00
Walsall	6122	0.00	0.00
Walsall	6123	2607.27	0.00
Walsall	6131	0.00	0.00
Walsall	6132	81.55	0.00
Walsall	6133	0.00	0.00
Walsall	6141	934.33	0.00
Walsall	6142	3343.55	0.00
Walsall	6143	1817.29	0.00
Walsall	6144	0.00	0.00
Walsall	6151	314.55	0.00
Walsall	6152	0.00	0.00
Walsall	6153	470.66	0.00
Walsall	6161	1521.49	0.00
Walsall	6162	260.96	0.00
Walsall	6163	0.00	911.11
Walsall	6171	86.21	0.00
Walsall	6172	1351.40	0.00
Walsall	6173	0.00	0.00
Walsall	6181	2278.74	0.00
Walsall	6182	0.00	0.00
Walsall	6183	0.00	0.00
Walsall	6191	0.00	0.00

District	PRISM zones	Pop	Jobs
Walsall	6192	0.00	0.00
Walsall	6193	0.00	0.00
Walsall	6201	76.89	638.67
Walsall	6202	0.00	0.00
Walsall	6203	107.18	0.00
Walsall	6301	0.00	0.00
Walsall	6302	0.00	0.00
Walsall	6303	0.00	0.00
Walsall	6304	0.00	0.00
Walsall	6305	0.00	0.00
Walsall	6306	0.00	0.00
Walsall	6307	0.00	0.00
Walsall	6308	0.00	0.00
Walsall	6309	0.00	0.00
Walsall	6310	221.00	0.00
Wolverhampton	7011	77.00	0.00
Wolverhampton	7012	77.00	0.00
Wolverhampton	7013	77.00	0.00
Wolverhampton	7021	77.00	0.00
Wolverhampton	7022	77.00	0.00
Wolverhampton	7023	77.00	0.00
Wolverhampton	7031	99.50	0.00
Wolverhampton	7032	77.00	0.00
Wolverhampton	7033	77.00	0.00
Wolverhampton	7041	77.00	0.00
Wolverhampton	7042	77.00	0.00
Wolverhampton	7043	309.00	0.00
Wolverhampton	7051	185.00	0.00
Wolverhampton	7052	113.00	92.00
Wolverhampton	7053	77.00	0.00
Wolverhampton	7061	77.00	72.00
Wolverhampton	7062	-198.00	250.00
Wolverhampton	7063	77.00	0.00
Wolverhampton	7064	77.00	80.00
Wolverhampton	7065	77.00	0.00
Wolverhampton	7071	403.00	0.00
Wolverhampton	7072	273.60	110.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7073	-137.00	0.00
Wolverhampton	7074	165.50	0.00
Wolverhampton	7081	77.00	0.00
Wolverhampton	7082	77.00	0.00
Wolverhampton	7083	77.00	0.00
Wolverhampton	7091	175.10	660.00
Wolverhampton	7092	363.00	0.00
Wolverhampton	7093	77.00	0.00
Wolverhampton	7101	102.50	0.00
Wolverhampton	7102	77.00	0.00
Wolverhampton	7103	77.00	0.00
Wolverhampton	7104	77.00	0.00
Wolverhampton	7111	77.00	0.00
Wolverhampton	7112	77.00	0.00
Wolverhampton	7113	77.00	0.00
Wolverhampton	7121	77.00	0.00
Wolverhampton	7122	77.00	0.00
Wolverhampton	7123	104.00	0.00
Wolverhampton	7131	77.00	0.00
Wolverhampton	7132	77.25	82.00
Wolverhampton	7133	683.00	0.00
Wolverhampton	7141	77.00	0.00
Wolverhampton	7142	77.00	0.00
Wolverhampton	7143	77.00	0.00
Wolverhampton	7151	77.00	0.00
Wolverhampton	7152	77.00	0.00
Wolverhampton	7153	77.00	0.00
Wolverhampton	7161	77.00	0.00
Wolverhampton	7162	77.00	0.00
Wolverhampton	7163	77.00	0.00
Wolverhampton	7171	188.84	0.00
Wolverhampton	7172	489.50	0.00
Wolverhampton	7173	1249.50	-167.00
Wolverhampton	7174	392.00	1919.00
Wolverhampton	7175	77.00	0.00
Wolverhampton	7181	77.00	0.00
Wolverhampton	7182	77.00	0.00

District	PRISM zones	Pop	Jobs
Wolverhampton	7183	193.05	0.00
Wolverhampton	7184	77.00	0.00
Wolverhampton	7191	715.96	40.00
Wolverhampton	7192	255.00	0.00
Wolverhampton	7193	77.00	0.00
Wolverhampton	7194	77.00	0.00
Wolverhampton	7201	-34.00	0.00
Wolverhampton	7202	77.00	0.00
Wolverhampton	7203	77.00	0.00
Wolverhampton	7204	77.00	0.00
Wolverhampton	7301	116.00	0.00
Wolverhampton	7302	77.00	0.00
Wolverhampton	7303	77.00	0.00
Wolverhampton	7304	77.00	0.00
Wolverhampton	7305	77.00	0.00
Wolverhampton	7306	479.00	431.00
Wolverhampton	7307	424.00	1034.00
Wolverhampton	7308	324.00	0.00
Wolverhampton	7309	276.00	0.00
Wolverhampton	7310	324.00	-353.00
Wolverhampton	7311	906.00	428.00
Wolverhampton	7312	481.00	0.00
Wolverhampton	7313	324.00	0.00
Wolverhampton	7314	77.00	0.00
Wolverhampton	7315	411.00	-382.00
Wolverhampton	7316	77.00	0.00
Wolverhampton	7317	1606.19	0.00
Wolverhampton	8344	0.00	0.00
Wolverhampton	8351	0.00	0.00
Wolverhampton	8360	0.00	0.00

Appendix 5 – v34 Uncertainty Log Scheme Log

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
Birmingham Cycle Revolution (A34)	Cycle	A segregated bi-directional cycle track along the A34 corridor from Lancaster Circus to Perry Barr	Near certain	2017	2018	No	No	No
Birmingham Cycle Revolution Phase 4 (A45 Corridor Off-Road 'Green' Routes)	Cycle	Hatchford Brook from Marston Green Station to Cov Rd / Elmdon Park, Lyndon Playing Fields between Clay Lane and Wagon Lane, Access Track from Yardley Rd, adj. to Grand Union Canal	Reasonably foreseeable	2018	2019	No	No	No
A38 Cycling Corridor - Phase 2	Cycle	Build on Birmingham Cycle revolution scheme, enhance where possible (particularly south of Selly Oak) and link central A38 cycle route with trip attractors in wider area	Reasonably foreseeable	2018	2021	No	No	No
Birmingham Cycle Revolution (A38)	Cycle	A segregated bi-directional cycle track along the A38 corridor running from 'China Town' to Selly Oak	Near certain	2017	2018	No	No	No
A457 Dudley Road	Highway	This section of the Dudley Road corridor is subject to significant delays for road users and unreliable journey times. This project will deliver improvements in capacity, accessibility, safety and reduce congestion through a comprehensive package of junction improvement, road widening to a dual carriageway and making enhancements to pedestrian and cycling facilities.	Near certain	2021	2025	Yes	Yes	Yes

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
Perry Barr Interchange and major regeneration project	Highway	Re-modelling of highway layout to allow greater permeability and open up development sites. Redesign of Transport interchange (WSP commissioned to review options in autumn 16)	Reasonably foreseeable	2020	2024	No	No	No
Birmingham Ring Road improvements	Highway	Capacity, reliability and air quality improvements to ring road	Reasonably foreseeable	2021	2026	No	No	No
Clean Air Zone Measures	Highway	Measures may include; improved signage and rerouting, demand management, encouraging modal shift, road improvements, support for Cycling & Walking and infrastructure for alternative fuels.	Reasonably foreseeable	2018	2020	No	No	No
Ashted Circus	Highway	Conversion to signalised junction to improve traffic capacity and flow and introduce ped/cycling improvements	Completed-by-2019	2017	2018	Yes	Yes	Yes
20mph zones Phase A	Highway	Implementation of 20mph limits	Near certain	2016	2016	Yes	Yes	Yes
20mph zones Phase B	Highway	Implementation of 20mph limits	Near certain	2017	2018	Yes	Yes	Yes
20mph zones Phase C	Highway	Implementation of 20mph limits	Near certain	2019	2021	No	No	No
20mph zones Phase D	Highway	Implementation of 20mph limits	Near certain	2021	2023	No	No	No
20mph zones Phase E	Highway	Implementation of 20mph limits	Near certain	2023	2025	No	No	No
Moor Street Queensway Enabling Works and Urban Realm "One Station"	Highway	Moor Street Queensway closed to private vehicles. “Station Square” created within existing space of Moor Street Queensway and land up to Curzon HS2 new station	More than likely	2019	2024	No	No	No

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
Bromford Gyratory Phase 1	Highway	Improvements to traffic signals, signing and lining	Near certain	2017	2018	Yes	Yes	Yes
Bromford Gyratory Phase 2	Highway	Increased capacity for all modes (one large roundabout instead of an elongated gyratory) plus retaining existing pedestrian facilities at the junction and allowing for cycling movements across the junction	More than likely	2021	2023	Yes	Yes	Yes
A38 Peddimore/Langley Access Junction	Highway	New junction to provide dedicated access to the SUE delivering 6000 dwellings and 7500 jobs	Near Certain	2018	2024	Yes	Yes	Yes
Junction 9 M42 - Access Improvements	Highway	Mitigation works at M42 J9 to accommodate Langley and Peddimore	More than likely		2036	No	yes	Yes
Sutton Coldfield Relief Road and Public Transport Package	Highway	Sutton Coldfield relief road and comprehensive transport improvement package	Hypothetical	2020	2022	No	No	No
Journey Time Reliability Improvements to Growth - BCC/Solihull	Highway	Minor junction improvement schemes	Near certain	2020	2021	No	No	No

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
Iron Lane	Highway	It is a major junction on a key section of the A4040 Outer Ring Road, effectively connecting east Birmingham with the M6 and major employment sites. This project will see the implementation of two new gyratory arrangements to increase junction capacity and reduce congestion. Dedicated pedestrian/cycle-crossing facilities will be provided to enhance 'active travel' and new street lighting.	Near certain	2018	2021	Yes	Yes	Yes
Tyseley Energy Park – Road Access	Highway	Construct an access road and surface infrastructure route off the A45 through the Tyseley Energy Park (TEP)	Near certain	2017	2018	No	No	No
Tyseley Station Bridge	Highway	Widen the Tyseley Station Bridge	Near certain	2017	2019	No	No	No
Battery Way Extension	Highway	This project will see the creation of a new 700m long, 7.3m wide single carriageway road between the existing Battery Way and Reddings Lane with the ultimate effect of unlock a redundant industrial estate. -	Near certain	2017	2018	No	No	No
Selly Oak Phase 1B	Highway	Junction improvements at the Sainsburys end of the Selly Oak bypass	More than likely	2019	2020/2021	Yes	Yes	Yes
Harborne Park Road	Highway	Road safety measures including reducing through traffic to one lane in each direction; parking measures related to proximity of QE; marked cycle facilities; bus stop facilities.	More than likely	2019	2021	Yes	Yes	Yes

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
A38 Growth Corridor – Selly Oak/South Edgbaston/Longbridge - Junction and Signal Upgrades	Highway	Signals along the route to be upgraded where necessary alongside targeted junction improvements (to facilitate development such as any which come out of the Uni/Hospitals Masterplan).	Reasonably foreseeable	2018	2022	No	No	No
Selly Oak New Road Capacity Enhancements	Highway	Increased capacity and traffic management to support further development on University/Hospitals and Life Sciences Campus. Additional to Phase 1a and Phase 2 (2010 and 2011) and Phase 1b (soon - funded from LGF1)	Reasonably foreseeable	2019	2021	No	No	No
Selly Oak/Edgbaston and Uni/Hospitals area wide parking Scheme	Highway	Develop and implement a comprehensive parking strategy	Reasonably foreseeable	2018	2019	No	No	No
Kings Heath – A435 Enhancement Pilot	Highway	Safety measures; public realm enhancements and car parking rationalisation	Reasonably foreseeable	2018	2019	No	No	No
Paradise Circus	Highway	Realigned Highway layout	Completed-by-2019		2017	Yes	Yes	Yes
Curzon Circle - Pinch Point Scheme	Highway		Hypothetical			No	No	No
Tame Valley Viaduct	Maintenance	The A38 (M) Thame Valley Viaduct provides a critical link between the city centre and the M6 via Spaghetti Junction. The load carrying capacity of the viaduct has become tested and requires intervention to maintain the connectivity to external markets.		2019	2023	No	No	No

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
A41 Handsworth to Birmingham	PT	Bus Transit scheme to deliver bus priority enhancements including a package of bus priority measures including bus lanes	Reasonably foreseeable	2018	2019	No	No	No
Snow Hill Station Regeneration	PT	This project will see the delivery of an efficient transport interchange, increased public transport usage and major opportunities for public realm improvements at one of the city's key railway stations. The project will also deliver economic benefits to the wider Snow Hill district.		2022	2026	No	No	No
Snow Hill Station Capacity Enhancement	PT	Station passenger capacity improvements.	More than likely	2021	2026	No	No	No
Green Travel Districts Phase 1	PT	Package of capital measures to support walking, cycling and public transport	Near certain	2016	2019	No	No	No
Green Travel Districts Phase 2	PT	Package of capital measures to support walking, cycling and public transport	Reasonably foreseeable	2019	2023	No	No	No
Hydrogen 22 Bus Project	PT	First zero emission bus route in region (route number 37 and 16 between Birmingham and Solihull). The project will deploy 22 hydrogen fuel cell buses and associated refuelling infrastructure	Near certain	2018	2024	No	No	No
A435 Druids Heath to Birmingham Journey Time Reliability	PT	Bus Transit scheme to optimise existing bus priority measures with additional bus priority to improve journey time reliability **ONLY IF SPRINT DETERMINED UNFEASIBLE**	Reasonably foreseeable	2018	2019	No	No	No

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
A4040 Outer circle - Selly Oak to Bearwood	PT	Bus Transit scheme to deliver bus priority enhancements including a package of bus priority measures including bus lanes	Reasonably foreseeable	2018	2019	No	No	No
SPRINT: Longbridge to Birmingham (A38)	PT - SPRINT	Bus Rapid Transit Scheme from Frankley and Longbridge to Birmingham City Centre	Reasonably foreseeable	2020	2023	No	No	No
One Campus (University, Hospitals and Life Sciences) Connectivity Package	PT	Improvements to bus interchange at hospital; real time bus information at key locations; walking and cycling routes; mapping and wayfinding totems; 20 electric vehicle charging points.		2018	2019	No	No	No
University Station Interchange	PT	increased station capacity and public transport interchange providing significantly improved passenger experience over the current facilities and a new gateway to the campus		2019	2021	No	No	No
A441 Cotteridge to Birmingham	PT	Bus Transit scheme to deliver bus priority enhancements including a package of bus priority measures including bus lanes	Reasonably foreseeable	2018	2019	No	No	No
Hard Shoulder Running M5 Junction 4a-6	Highway		Completed-by-2019		2017	Yes	Yes	Yes

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
20mph zones Area B3	Highway	20mph limits in Area B3. It includes 20mph in local centres on Lozells Road, Soho Road and Dudley Road but other than that it is all on minor roads. Comment frm LL "Not sure what is Area 3B, but all residential roads should be 20mph"	Near certain			Yes	Yes	Yes
Perry Barr Interchange	Highway	Redesign of Transport interchange (WSP commissioned to review options in autumn 16)	Completed-by-2019	2018	2019	yes	yes	yes
Clean Air Zone Additional Measures	Highway	Other areas - Additional measures may include; improved signage and rerouting, demand management, encouraging modal shift, road improvements, support for Cycling & Walking and infrastructure for alternative fuels.	Reasonably foreseeable	2018	2020	No	No	No
Curzon Circus and Garrison Circus	Highway - HS2	Junction improvement work currently being designed by WSP on behalf of HS2	Hypothetical	2018	2019	No	No	No
Snow Hill Station Phase 1	Highway	Package of Urban Realm and Traffic Management small-scale improvements - Colmore Row/Livery Stret	More than likely	2018	2019	No	No	No
Southside Link - Ladywell Walk closure and Thorp Street One way direction	Highway	road closure and one way road in city centre	Completed-by-2019		2018	yes	yes	yes
Minworth Island roundabout	Highway	updates to roundabout layout and signals	Completed-by-2019		2018	yes	yes	yes

Scheme Name	PT or Highway	Scheme Description	Probability	Construction start	Opening year	P6 26	P6 36	P6 46
Cross City bus Package 1 - city centre	Highway	Bus package measures in city centre	Near certain		pre-2026	Yes	Yes	Yes
Cross-city Bus Package 3 - Alcester Road	Highway	Bus package measures on Alcester rd	Near certain			Yes	Yes	Yes
Selly Oak Triangle	Highway	New junction layouts at Selly Oak triangle	Near certain		2021	Yes	Yes	Yes
Perry Barr	Highway	Junction layout updates for junctions along the A34	Near certain		2022	Yes	Yes	Yes
City Centre Cells	Highway	Measures to reduce traffic within the city centre	Near certain		2022	Yes	Yes	Yes

Appendix 6 – Do Something Signalised Junction Optimisation Record

Table 6-2: Record of nodes which have been optimised to improve junction performance in the Do Something modelling.

Node Number	Affected Time Period	RC LOS	DM LOS	Signal Optimisation Status Y – LOS returned to RC level.
101661	AM	4	5	Y
101754	AM	3	4	Y
101761	AM	4	5	Y
101964	AM	5	6	Y
101968	AM	5	6	Y
102003	AM	4	5	Y
102094	AM	4	5	Y
102147	AM	4	5	Y
102163	AM	4	5	Y
102210	AM	3	4	Y
102211	AM	3	4	Y
102385	AM	4	5	Y
102417	AM	3	4	Y
102464	AM	3	4	Y
102500	AM	4	5	Y
102543	AM	4	5	Y
102704	AM	5	6	Y
102786	AM	4	5	Y
102980	AM	4	5	N
102989	AM	5	6	Y
105319	AM	3	4	Y
106913	AM	5	6	N
107180	AM	3	5	N
107427	AM	3	4	N
107736	AM	5	6	N

Node Number	Affected Time Period	RC LOS	DM LOS	Signal Optimisation Status Y – LOS returned to RC level.
109567	AM	3	4	Y
101544	IP	3	4	N – Improved delays to 36s average
101574	IP	4	5	Y
101594	IP	3	4	Y
101612	IP	4	5	Y
101818	IP	4	5	Y
101835	IP	3	4	N - Improved delays to 35s average
102121	IP	4	5	Y
102158	IP	4	5	Y
102336	IP	3	4	Y
102450	IP	3	4	Y
102704	IP	5	6	Y
102980	IP	4	5	Y
103078	IP	3	4	Y
103219	IP	3	4	Y
103340	IP	3	4	N – Improved but not fixed
103584	IP	4	5	Y
103758	IP	3	4	N – Improved but not fixed
105343	IP	3	4	N – Improved but not fixed
106246	IP	5	6	Y
109321	IP	3	4	Y
101221	PM	3	4	Y
101461	PM	3	4	N - Not able to get it below D, although improved the major flow turn to an extent.
101520	PM	5	6	Y
101523	PM	4	5	Y
101526	PM	3	4	Y
101548	PM	4	5	Y
101558	PM	5	6	Y
101568	PM	3	4	N - Not able to get it below D, although improved the worst performing turn significantly.
101594	PM	3	4	Y
101606	PM	4	5	Y

Node Number	Affected Time Period	RC LOS	DM LOS	Signal Optimisation Status Y – LOS returned to RC level.
101617	PM	3	4	Y - Not able to get it below D, although improved the major flow turn to an extent.
101648	PM	3	4	N
101702	PM	5	6	N - Long cycle time, needs remodelling to achieve better performance
101767	PM	4	5	Y
101841	PM	3	4	N - Counteracting flows with poor LOS. Cannot extend green time without impacting major turn LOS
101897	PM	5	6	N - Counteracting flows with poor LOS. Cannot extend green time without impacting major turn LOS
101922	PM	3	4	N - Counteracting flows with poor LOS. Cannot extend green time without impacting major turn LOS
101957	PM	3	4	N - Counteracting flows with poor LOS. Cannot extend green time without impacting major turn LOS
102063	PM	5	6	Y - Reduce EB green time for NB and SB
102066	PM	3	4	N - Cannot drop level but reduce delay at most impacted arms
102191	PM	3	4	N - Counteracting flow means improvement on minor arm causes delay at major arm so no benefit
102210	PM	3	4	Y - Removing unused gap between S1 and S5 allows more green time for both movements. An all red already exists in the model so not impacting ped movement majorly. 24s between stages remaining
102247	PM	3	4	Y
102336	PM	4	5	Y - Rebalanced delay
102351	PM	4	5	N - Minimal scope to improve signals
102385	PM	4	5	Y
102417	PM	3	4	N - Delays minimised at this arm.
102424	PM	3	4	N - Small reduction in average delay achieved
102464	PM	3	4	N - South and East arms cannot be optimised as they are both worst performing and in different stages
102487	PM	5	6	N - Signal timing changes are ineffective as delays switch from E/W to N/S

Node Number	Affected Time Period	RC LOS	DM LOS	Signal Optimisation Status Y – LOS returned to RC level.
102552	PM	4	6	N - 7mins delay on one arm. Cannot rebalance, hopefully mitigated in part by Carters Green
102692	PM	3	4	N - Signal timing changes ineffective
102752	PM	5	6	Y - Balanced delays, all now under 1m40
103219	PM	4	5	Y
103463	PM	3	4	N - No drop achieved but better balanced delays
105594	PM	4	5	N - Slight improvements but insufficient to change LOS
105857	PM	3	4	Y
107830	PM	3	4	Y - Delays balanced
107863	PM	4	5	Y - Delays balanced
109943	PM	5	6	N - Signal timing changes ineffective
110059	PM	4	5	Y - Rebalanced delays
110838	PM	5	6	Y - Rebalanced delays, all under 2m
110891	PM	3	4	Y

Appendix 7 – District Model Results

The model result plots for the individual districts are included below.

Appendix 8 – "*BLACK COUNTRY LOCAL PLAN MODELLING: Review of Modelling Plan Work and Future Direction*"

The report produced by Sweco for Black Country Transport, detailing the justification for refreshed Local Plan modelling, is included below.

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