A12 Chelmsford to A120 widening scheme

TR010060

7.3 Combined Modelling and Appraisal Report

Appendix C: Transport Forecasting Package Report

APFP Regulation 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Volume 7

August 2022

Infrastructure Planning

Planning Act 2008

A12 Chelmsford to A120 widening scheme

Development Consent Order 202[ ]

7.3 COMBINED MODELLING AND APPRAISAL REPORT
APPENDIX C: TRANSPORT FORECASTING PACKAGE REPORT

Regulation Reference	Regulation 5(2)(q)
Planning Inspectorate Scheme Reference	TR010060
Application Document Reference	TR010060/APP/7.3
Author	A12 Project Team, National Highways

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1. Introduction

1.1 Purpose of the report

The Transport Forecasting Package Report is one of a series of documents that set out the scheme's traffic modelling and economic assessment. These include:

- Transport Data Package Report
- Transport Model Package Report
- Transport Forecasting Package Report
- Economic Appraisal Package Report
- Appraisal Summary Table and Worksheets
- Distributional Impacts Report

Each of these documents are provided as appendices to the overall Combined Modelling and Appraisal (ComMA) Report.

The purpose of the Transport Forecasting Package is to describe the forecasting procedure for the future year traffic forecasts produced using the new DCO base model. It describes both the SATURN highway and DIADEM Variable Demand Model.

This report describes the process undertaken in preparing the model for use in the forecasting of future traffic conditions, both with and without the proposed scheme. The model forecasts will provide the data required for economic and environmental appraisal of the scheme at its current stage (known as PCF Stage 3, the stage of National Highways' Project Control Framework where a single scheme option is developed following a Preferred Route Announcement).

1.2 Report structure

The remainder of this document is set out as follows:

- Chapter 2 – Overview of Base Year Model (2019)
- Chapter 3 – Forecast Methodology;
- Chapter 4 – Forecast Networks and Coding;
- Chapter 5 – Forecast Demand;
- Chapter 6 – Forecast Model Results and Checks;
- Chapter 7 – High and Low growth Models;
- Chapter 8 – Summary and Conclusions.

2. Overview of Base Year Model (2019)

2.1 Overview

This section gives a brief overview of the 2019 Base Year model and includes a commentary covering the modelled network structure, time periods, User Classes (vehicle types and journey purposes), generalised cost parameters and the software used.

Full details about the base year model are provided in Appendix B 'Transport Model Package of the ComMA report.

2.2 Study area

The study area for the PCF Stage 3 traffic model was defined and agreed with National Highways Transport Planning Group (TPG). It was designed to cover the area directly affected by the proposed scheme being tested, with the potential to assess some peripheral impacts on strategic routes in the vicinity of the affected area.

The detailed simulation area covers the main scheme area, where the greatest impacts from the scheme will occur. It therefore has the greatest level of accuracy and detail in the model. It covers the area along the A12, Chelmsford, Colchester, Maldon, Witham and Braintree. The 'Rest of the Fully Modelled Area' (ROFMA), also known as the buffer area, roughly corresponds to the rest of Essex outside the simulation area as well as some key strategic links that provide access into or through Essex such as the A14 and M11. The external area network is increasingly coarse the further away from the simulation area. The main purpose of this area is to link trips from other regions of the UK into the Fully Modelled Area.

The simulation area, buffer area and external area are illustrated in Plate 2-1. A more detailed map showing the buffer and simulations areas is provided in Plate 2-2.

Plate 2-1 Local model network by area type

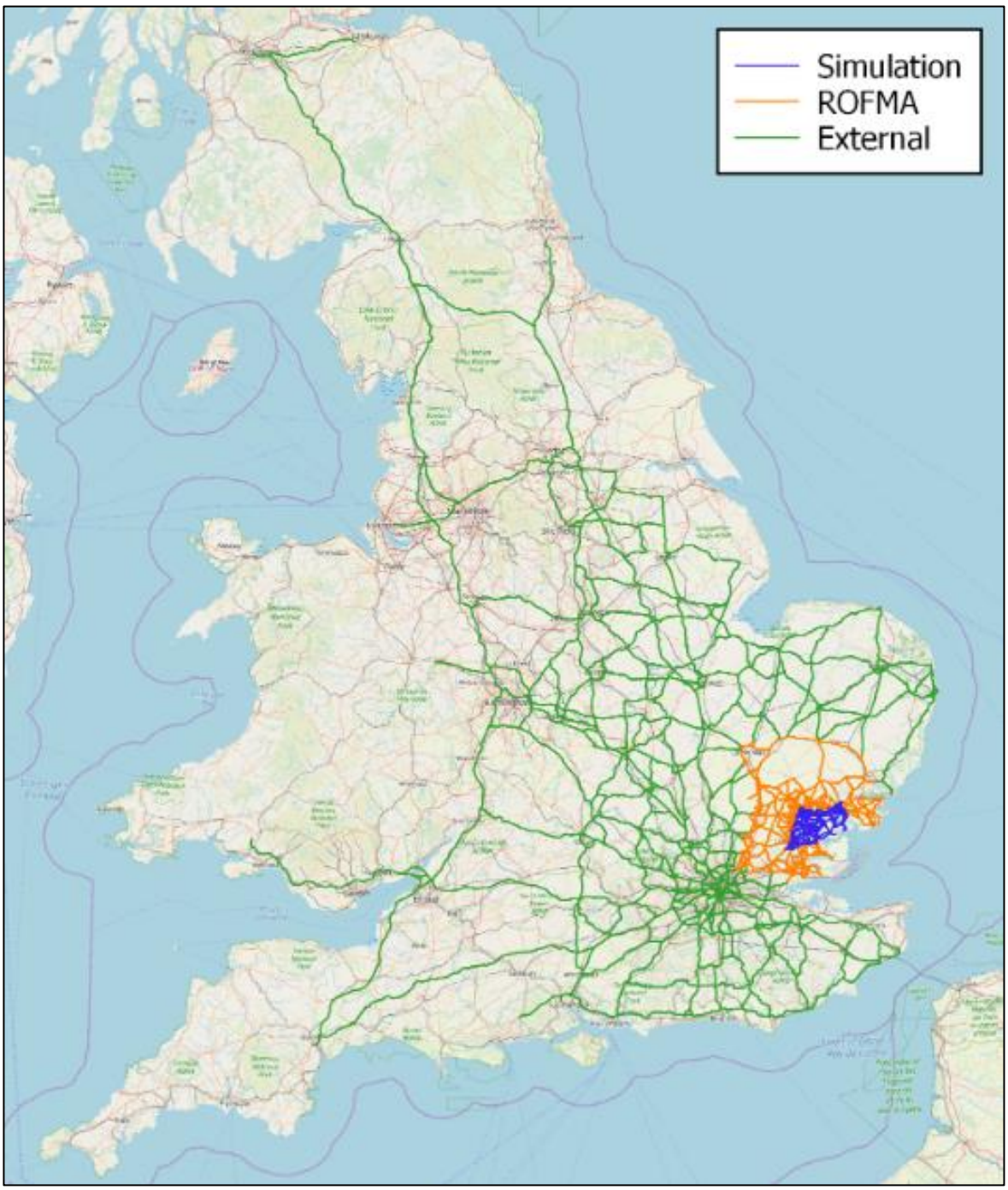
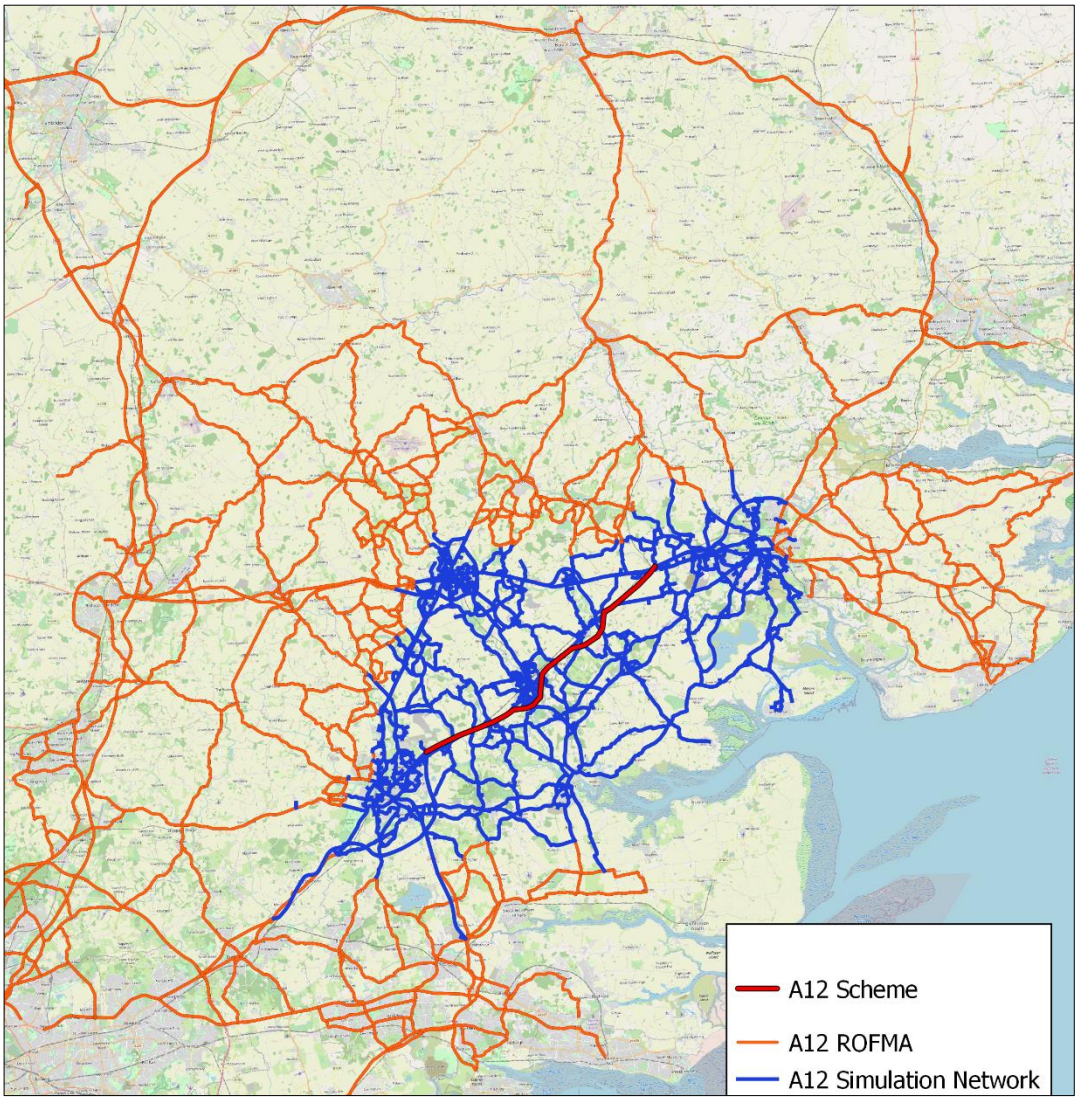


Plate 2-2 Local model network – buffer and simulation area



2.3 User classes

The model segregates trips by vehicle type and trip purpose, as summarised in Table 2-1.

Table 2-1 Purpose/user class/ vehicle class correspondence

Purpose	User class (UC)	Vehicle Class (VC)
Car Employer's Business	UC1	VC1
Car Commute	UC2	
Car Other	UC3	
LGV	UC4	VC2
HGV	UC5	VC3

PCU factors were derived as part of the base year model development. A factor of 2.5 has been applied to the HGV user class.

2.4 Time periods

The A12 Stage 3 model represents peak hours, the times of which came from an analysis of traffic count data. The three modelled hours are:

- AM peak hour (07:30-08:30)
- Average weekday inter-peak hour (10:00-16:00)
- PM peak hour (17:00-18:00)

2.5 Generalised cost parameters

Both the Value of Time (VOT) and Vehicle Operating Costs (VOC) used in the A12 model have been based on the same version of the TAG Data Book (v1.15, May 2021) used for the Base Year modelling exercise. These are presented in Table 2-2.

The value of time given in TAG Unit A1.3 for HGVs relates to the driver's time and does not take account of the influence of owners on the routeing of these vehicles. Therefore, in line with TAG unit M3.1 (Section 2.8.8), the HGV VOTs were doubled to better take into account the driver's and employer's VOT.

Table 2-2 Generalised cost parameters for 2019 (2010 prices in pence)

User Class	Period					
	AM		Inter peak		PM	
	PPM	PPK	PPM	PPK	PPM	PPK
Car Employer Business	30.92	12.27	31.68	12.27	31.36	12.27
Car Commute	20.73	6.01	21.07	6.01	20.81	6.01
Car Other	14.31	6.01	15.24	6.01	14.98	6.01
LGV	22.41	13.60	22.41	13.60	22.41	13.60
HGV	44.63	37.44	44.63	37.44	44.63	37.44

PPM = Pence per Minute (VOT coefficient), PPK = Pence per Kilometre (VOC coefficient)

2.6 Software used

The following software packages and versions were used:

- The highways model was developed in SATURN V11.4.07H
- The variable demand model was developed in DIADEM v7.0.2

2.7 Variable Demand Modelling

Variable Demand Modelling (VDM) captures the principle set out in TAG that "*any change to transport conditions will, in principle, cause a change in demand*". The purpose of variable demand modelling is to predict and quantify these changes.

TAG unit M2 specifies that variable demand assessment should be applied if:

- the scheme is not spatially or financially modest or not modest in terms of its effect on travel costs.
- there is congestion on the forecast year network in the absence of the scheme or
- the scheme will have significant effect on travel choices along corridors containing the scheme.

Given the strategic location of the scheme and the scale of improvement, Variable Demand Modelling has been undertaken.

The demand model for the A12 scheme has been implemented using DIADEM (Dynamic Integrated Assignment and Demand Modelling). DIADEM is a computer software package that was developed to assess variable demand for traffic models.

The Variable Demand model is an incremental Origin-Destination based model using the same purpose definitions as the SATURN assignment model. The distribution (destination choice) and mode choice responses are included in the Variable Demand Model, together with a frequency response for optional (other purpose) trips. The spatial coverage of the Variable Demand model is the same as for the

assignment model and they use the same zone system and generalised cost parameters.

The demand model has been calibrated in accordance with the methodology laid out in TAG Unit M2. This process involved adjusting the model parameters until plausible results were produced from the realism testing. Additional details on the VDM parameters and elasticity tests are included within Appendix B 'Transport Model Package' of the ComMA report.

Table 2-3 below indicates the DIADEM responses which have been modelled for the A12 scheme.

Table 2-3 Scope of VDM for A12

Modelled	Not Modelled
Mode choice	Time of day choice
Trip Frequency (Applied to UC3 only)	Micro time choice
Trip Distribution	
Cost damping (Applied to UC3 only)	

2.8 Model calibration and validation

The Transport Model Package summarises all aspects of the development and validation of the base year model. It demonstrates that the model has been calibrated and validated to a level compliant with its intended use for future year demand forecasting and demonstrates it is fit for purpose.

3. Forecast Methodology

3.1 Introduction

The approach to forecasting has been developed to be consistent with TAG guidance, specifically TAG Unit M4. This chapter describes the overall forecasting methodology adopted.

3.2 Forecast year

In order to demonstrate the long-term benefits of the proposed scheme, three forecast years have been modelled.

- The first forecast year is 2027: the opening year of the scheme.
- The second forecast year is 2042: fifteen years after scheme opening.
- A third forecast year of 2051: the final year for which NTEM traffic growth forecasts are available.

3.3 Traffic forecasting guidance

Key TAG Unit references used are listed below:

- TAG Unit M4: Forecasting and Uncertainty
- TAG Unit M2: Variable Demand Modelling
- TAG data book, Version 1.15 May 2021

3.4 Forecast network

As well as the proposed A12 scheme itself, other transport schemes are likely to be constructed by the time of the A12 model's forecast years. For each forecast year, a list of committed highway schemes was drawn up in conjunction with the relevant local highway authorities.

In line with TAG Unit M4, only schemes that have a sufficient certainty of being realised should be included in the forecast networks. A list of potential future transport schemes was collated into an 'Uncertainty Log', categorised by how likely they are to be built. Relevant schemes were then coded into the transport model.

Full details of the development of the Uncertainty Log and the coding of transport schemes into the model are provided in Chapter 4.

3.5 Forecast demand

Forecast demand for travel was generated using national, regional, and local data sets to inform the amount of travel growth that could be expected from the base year.

Local planning authorities were consulted to identify the locations, size and type of proposed housing and employment developments. The likelihood of each development being realised was also assessed, allowing an Uncertainty Log for developments to be compiled. Based on this, demand matrices for each forecast year have been produced.

This information on local land use was combined with national data from the National Trip End Model (NTEM) to predict changes in car trip generation for the modelled forecast years.

These changes in car trip generation were applied to trip ends from the final set of matrices in the validated base year model to give target trip ends to use in a Furness process. The base year matrices were furnessed to match the target trip ends. This process ensures that the trip distribution from the base year model is preserved.

The process for factoring up LGV and HGV trips for future years was different. In those cases, Road Traffic Forecasts (RTF18) based on the National Transport Model were used in place of NTEM.

Full details of the development of forecast demand, including a methodology flow diagram, are provided in chapter 5.

3.6 Forecast assignment

The forecast demand matrices were assigned to the forecast networks. This was done using the same method and general parameters as used in the base year assignment.

However, generalised cost parameters were updated to reflect the changes in value of time and vehicle operating costs provided in the TAG data book. The version of the TAG data book used (v1.15 May 2021) was the same as in the base model.

Further detail on the assignment methodology is provided in chapter 4 of this report. Chapter 6 discusses the assignment outputs.

4. Forecast Networks and Coding

4.1 Introduction

This chapter describes the supply side and network elements of the traffic model that have been developed for the future years, including the proposed A12 scheme and other highway improvement schemes.

Forecasting requires the development of the following scenarios:

- assignment of the future year trip matrices to the future year network without the scheme, to produce the future year traffic flows without the scheme (Do Minimum scenario).
- assignment of the future year trip matrices to the future year network with the scheme, to produce the future year traffic flows with the scheme (Do Something scenario).

The validated base year network provided the starting point for the development of both of these scenarios.

For each future year (2027, 2042 and 2051), networks have been produced for the AM peak, Inter peak and PM peak.

4.2 Do Minimum scenario

Data on proposed future highway schemes was provided by five Local Planning Authorities: Chelmsford City Council, Maldon District Council, Colchester Borough Council, Tendring District Council, Braintree District Council. They provided information on all potential, likely or committed transport schemes. In addition, National Highways' spatial planning teams were consulted on any schemes on the surrounding strategic road network which would have an impact on trips through the study area.

This list of schemes was developed into an Uncertainty Log. The Uncertainty Log lists the transport scheme developments, their expected opening year and their perceived likelihood of happening.

Only schemes that have a sufficient level of certainty of being realised have been coded into the forecast networks. Of the schemes identified, only those currently under construction or with a likelihood of either 'near certain' or 'more than likely' are included in the modelled Core Scenario.

A list of all schemes included in the model is given below in Table 4-1 and shown in Plate 4-1. This does not include schemes that are considered as only 'reasonably foreseeable' or 'hypothetical'. Some schemes which have been excluded from the model for being too far away from the scheme as they have minimal impact, such as:

- Lower Thames Crossing (LTC) is not included for the following reasons:
    - The A12 is a radial route out of London to/from Essex, Harwich and Felixstowe, whereas LTC is an orbital scheme providing relief to Dartford Crossing, primarily for traffic to/from the A2 and Kent. As

such, the A12 is unlikely to carry significant volumes of traffic that is expected to use LTC.

- LTC is also unlikely to have a significant impact on the A12 scheme due to the location of its proposed connections / junctions and is therefore outside the area of detailed modelling within the A12 scheme model. This is seen as acceptable for the appraisal of the A12 scheme and the area of detailed modelling has been agreed with the DfT.

- The proposed A120 Braintree to A12 improvement, which depends on the A12 scheme being built first, and as such is considered too uncertain.

Table 4-1 List of future transport schemes

No	Location	Scheme	Likelihood	Opening Year
1	Chelmsford	A131 Chelmsford to Braintree Route Improvements	Near certain	Pre 2027
2	Chelmsford	Chelmsford North East Bypass Phase 1	More than likely	Pre 2027
3	Chelmsford	Beaulieu Rail Station	More than likely	Pre 2027
4	Braintree	B1053 Deanery Hill, Braintree	Near certain	Pre 2027
5	Braintree	Junction Improvements to High Street/ Station Road junction, Kelvedon	Near certain	Pre 2027
6	Maldon	South Maldon Garden Suburb relief road	More than likely	Pre 2027
7	Maldon	North Heybridge Garden Suburb relief road	More than likely	Pre 2027
8	Chelmsford	Beaulieu Park, Radial Distributor Road 1	Near certain	Pre 2027
9	Chelmsford	Beaulieu Park, Radial Distributor Road 2 (Connects to Chelmsford North East Bypass)	More than Likely	Pre 2027
10	Chelmsford	Beaulieu Park, Boreham Interchange (Section 106 scheme)	Near certain	Pre 2027
11	Braintree	Millennium Way Slips (A120)	Near certain	Pre 2027

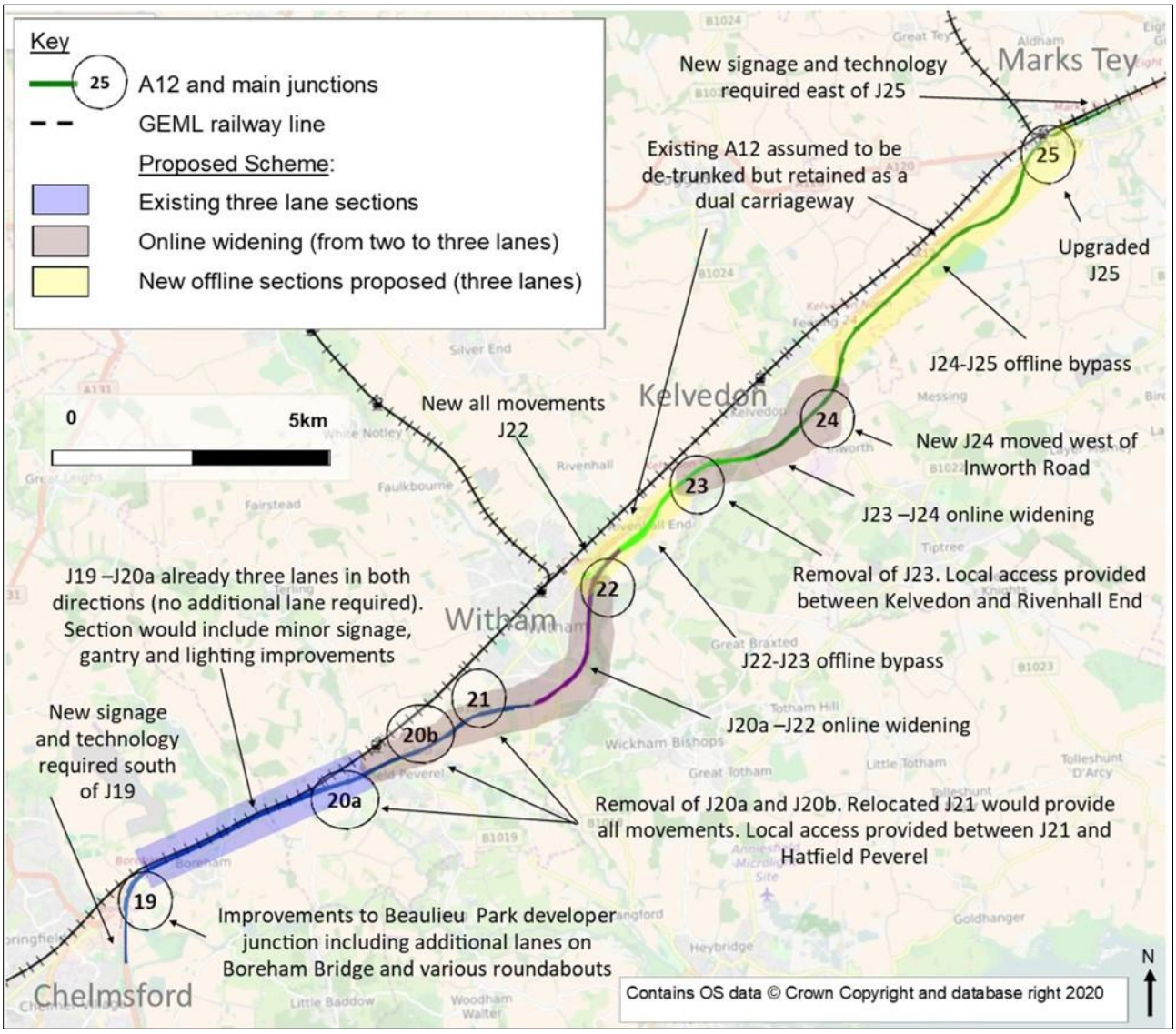
Plate 4-1 Transport scheme location map

The schemes were added to the network in a manner consistent with the network coding employed in the base year, as defined in the base model's Coding Manual.

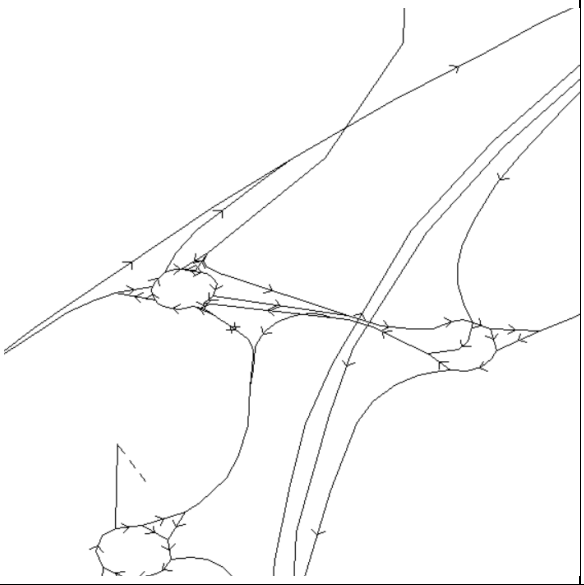
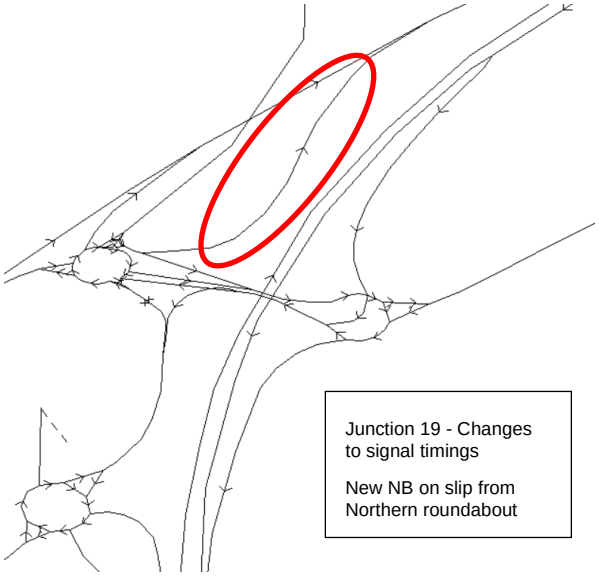
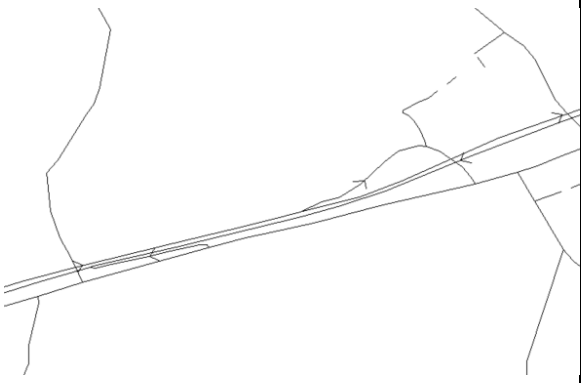
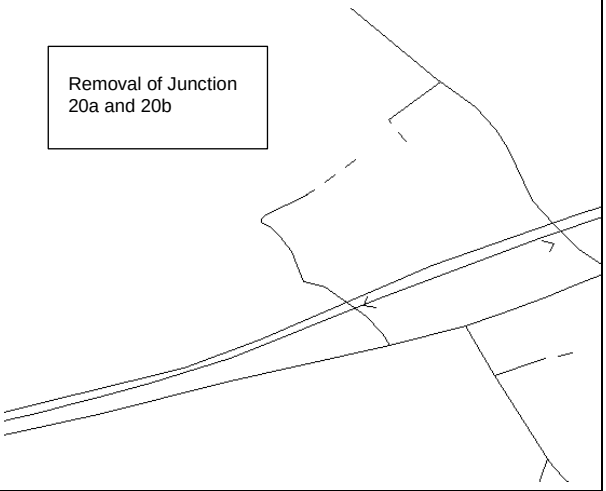
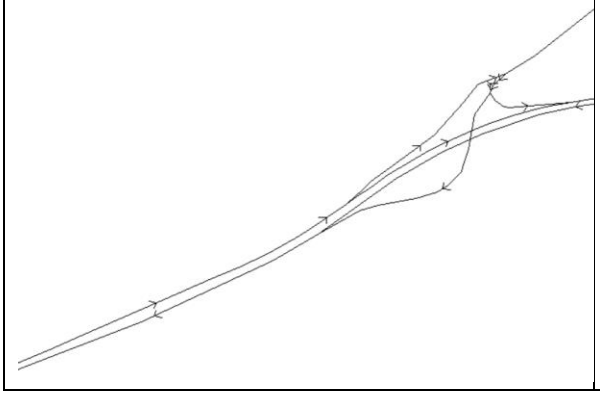
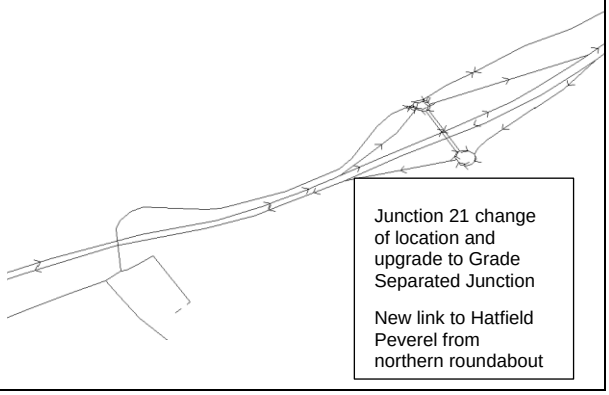
4.3 Do Something scenario

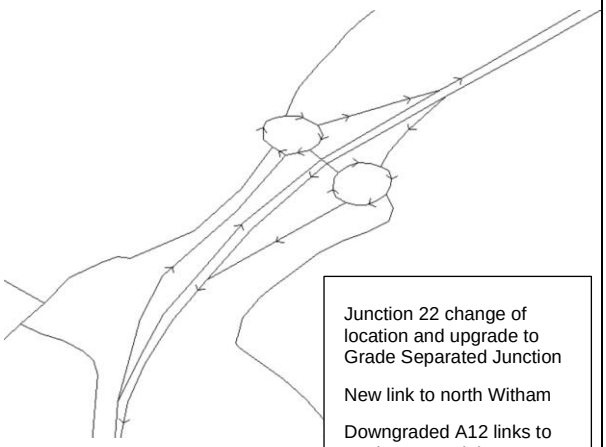
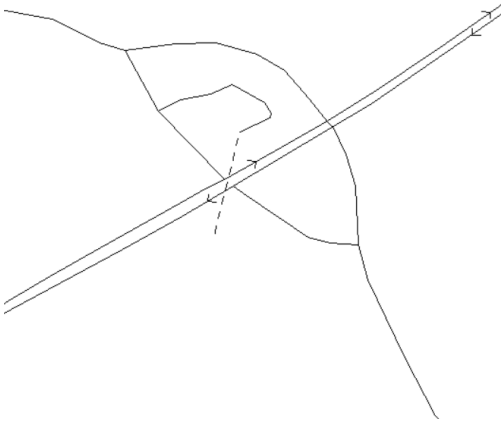
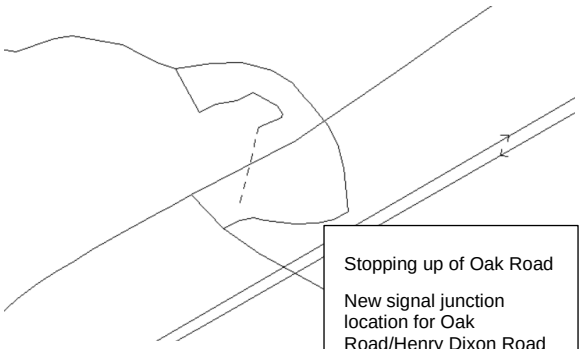
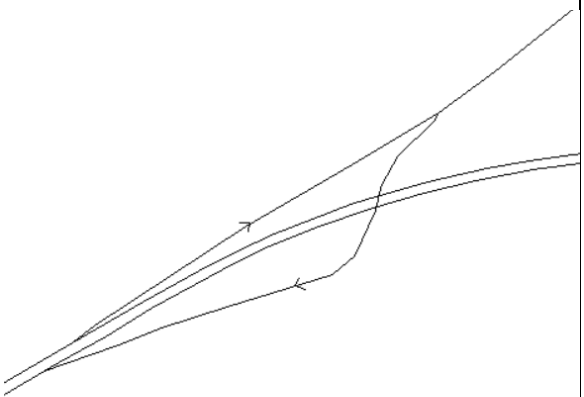
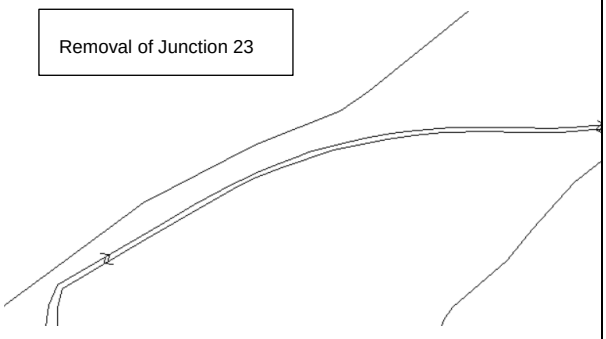
Do Something networks which include the proposed scheme have been prepared for each of the future years. For reference, a summary of the proposed scheme is shown in Plate 4-2 below.

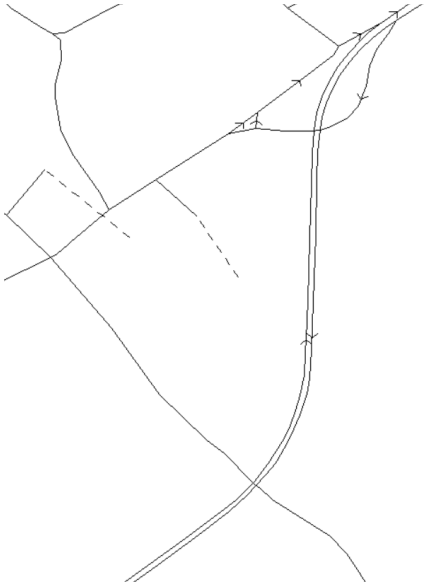
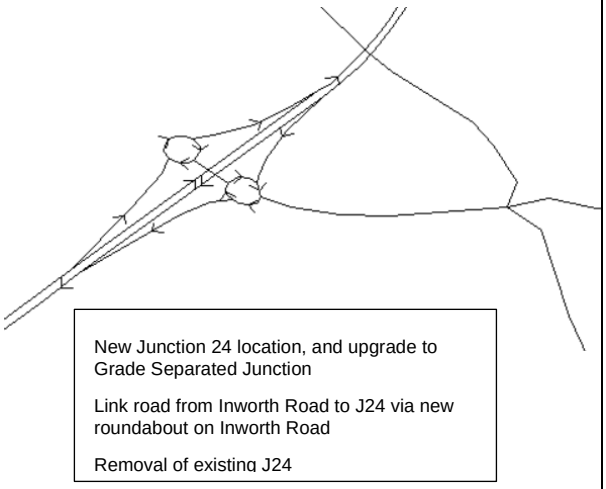
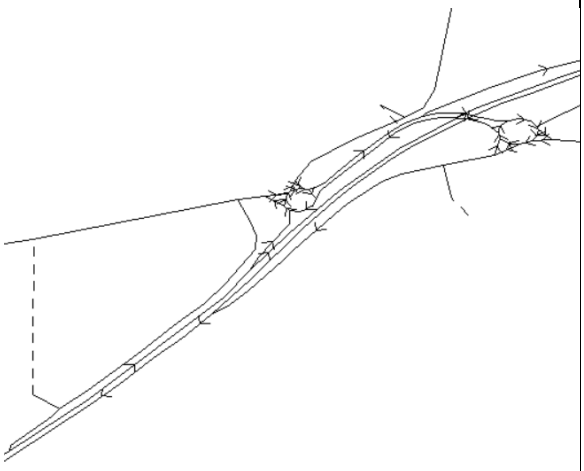
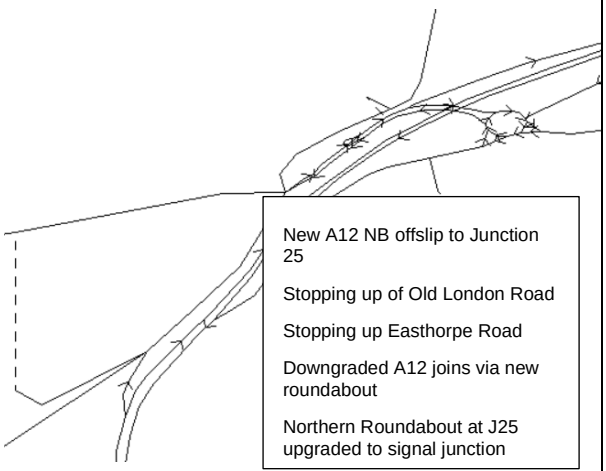
Plate 4-2 Proposed scheme layout



As an example of the coding changes in the model, please see comparisons below for each junction with relevant commentary.

Do Minimum	Do Something
	
	
	

Do Minimum	Do Something
	 Junction 22 change of location and upgrade to Grade Separated Junction New link to north Witham Downgraded A12 links to northern roundabout
	 Stopping up of Oak Road New signal junction location for Oak Road/Henry Dixon Road New roundabout junction on to old A12 to access scheme
	Removal of Junction 23 

Do Minimum	Do Something
	
	

The DCO model reflects the scheme design as it is being submitted at DCO, known as Design Fix 4. Key changes in the Do Something models between this and the previous Stat Con version of the model include:

- Removal of southern link from Hatfield Peverel to junction 21, replacement with a link road via Wellington Bridge to the north of junction 21
- Change from priority junction to signals at Henry Dixon Road/Braxted road junction
- Removal of U-turn on the flyover at Junction 25
- Stopping up of Easthorpe Road access on to the de-trunked A12.

4.4 Generalised cost changes

The values of time (VOT) in pence per minute (PPM) and vehicle operating costs (VOC) in pence per kilometre (PPK) were updated for each forecast year to represent changes in the perceived VOT and VOC in line with TAG (v1.15 May 2021). The updated values are presented in Table 4-2 below.

Consistent with the base year VOC calculation, the vehicle operating cost (VOC) for future years is calculated based on the average speed taken from the base year models. Due to lack of adequate information about OGV splits from the traffic counts, the splits were taken from COBA manual (Table 8/1: Annual Average Category Proportions by Class of Road (2002)).

The value of time given in TAG Unit A1.3 for HGVs relates to the driver's time and does not take account of the influence of owners on the routeing of these vehicles. Therefore, in line with TAG unit M3.1 (Section 2.8.8), the HGV VOTs were doubled to better take into account the driver's and employer's VOT.

Table 4-2 Generalised costs used in future year networks

Year	Time Period	Vehicle Type	Trip Purpose	TAG - May 2021	
				Value of Time (p/min)	Vehicle Operating Cost (p/km)
2027	AM	Car	Business	33.00	11.14
			Commute	22.13	5.38
			Other	15.27	5.38
		LGV	Business	23.91	13.19
		HGV	Business	47.63	37.25
	IP	Car	Business	33.81	11.14
			Commute	22.49	5.38
			Other	16.26	5.38
		LGV	Business	23.91	13.19
		HGV	Business	47.63	37.25
	PM	Car	Business	33.47	11.14
			Commute	22.21	5.38
			Other	15.99	5.38
		LGV	Business	23.91	13.19
		HGV	Business	47.63	37.25
2042	AM	Car	Business	40.78	8.50
			Commute	27.35	3.98
			Other	18.87	3.98
		LGV	Business	29.56	11.53
		HGV	Business	58.87	34.25
	IP	Car	Business	41.79	8.50
			Commute	27.80	3.98
			Other	20.10	3.98
		LGV	Business	29.56	11.53
		HGV	Business	58.87	34.25
	PM	Car	Business	41.37	8.50
			Commute	27.45	3.98
			Other	19.76	3.98
		LGV	Business	29.56	11.53
		HGV	Business	58.87	34.25

Year	Time Period	Vehicle Type	Trip Purpose	TAG - May 2021	
				Value of Time (p/min)	Vehicle Operating Cost (p/km)
2051	AM	Car	Business	45.84	8.06
			Commute	30.74	3.76
			Other	21.21	3.76
		LGV	Business	33.22	11.10
		HGV	Business	66.17	34.48
	IP	Car	Business	46.98	8.06
			Commute	31.24	3.76
			Other	22.59	3.76
		LGV	Business	33.22	11.10
		HGV	Business	66.17	34.48
	PM	Car	Business	46.50	8.06
			Commute	30.85	3.76
			Other	22.21	3.76
		LGV	Business	33.22	11.10
		HGV	Business	66.17	34.48

4.5 Forecast network calibration

The coded networks were first graphically reviewed to check if there were any links missing in the modelled network. Curved lines were adopted in SATURN using GIS input files, to better align the model to scheme drawings and allow easier identification of errors.

Link lengths of the new links introduced in the scheme were checked against the scheme drawings.

The networks were checked for junction type, number of lanes, any turning restrictions, speed limits, etc. The networks were then checked for logical routes and calibrated to avoid any illogical delays.

Interactive network check meetings between the modelling team and highway design team further ensured the robustness of the network coding.

Turn saturation flows are consistent with the base year coding and standard speed flow curves have been used for future network development.

Initial TUBA runs were undertaken and thoroughly checked to identify any anomalies in the Do Minimum and Do Something models. This was done by undertaking sector to sector benefit analysis and by reviewing the TUBA warnings.

DIADEM runs were also monitored to ensure that the network coding was not producing any illogical results in terms of delays, convergence, and flow patterns.

5. Forecast Demand

5.1 Introduction

This section details how the forecast demand matrices have been developed using reference case demand forecasting techniques, including traffic growth from future developments, and how variable demand was then incorporated.

5.2 Data

The data that was used to calculate traffic growth includes:

- TEMPro planning assumptions and growth factors – NTEM v7.2 dataset
- RTF18 growth factors
- Data from five Local Planning Authorities on employment and housing developments
- Transport Assessments and Development Site Masterplans.

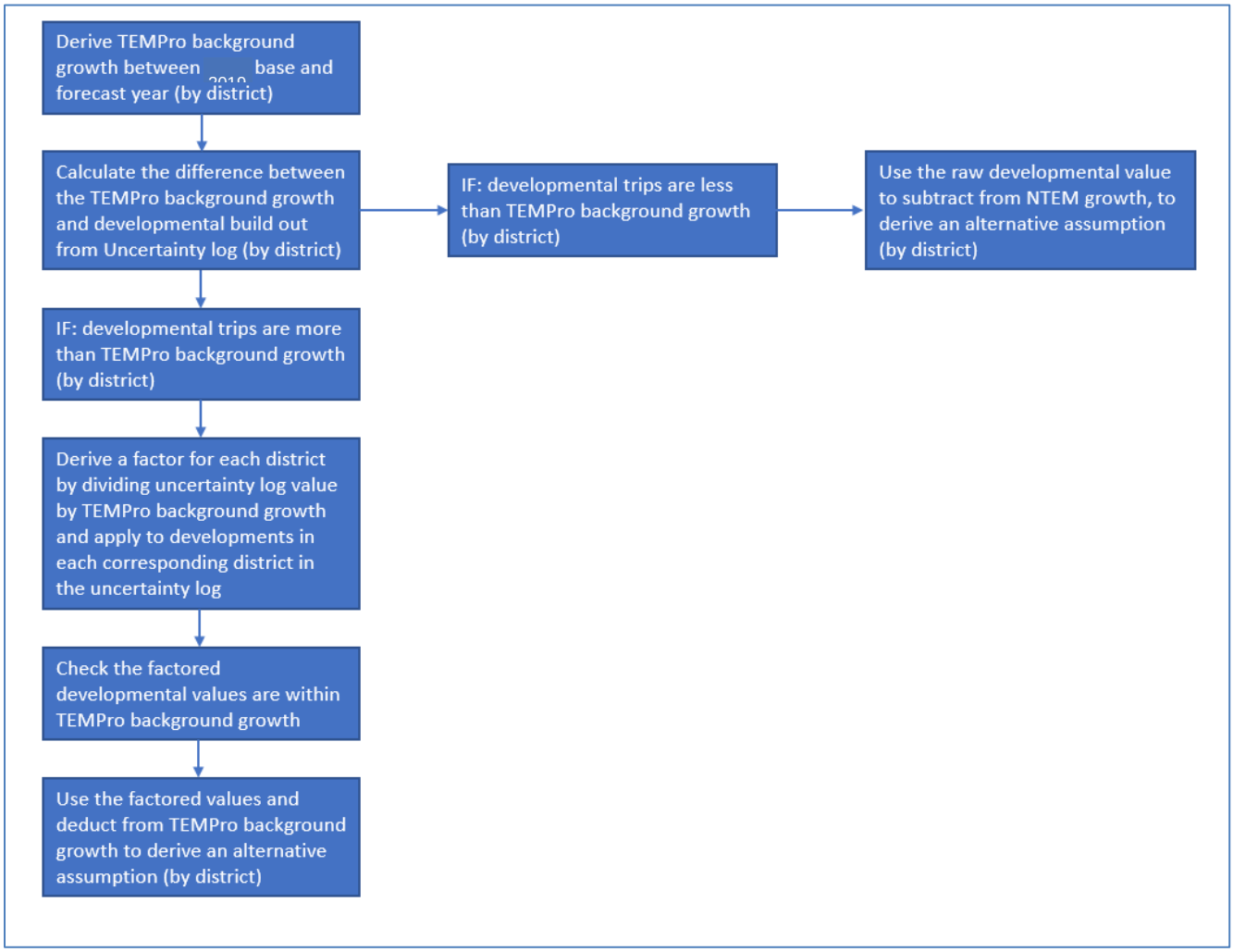
5.3 Growth scenarios

Three standard growth scenarios have been modelled: a core scenario, high growth scenario and low growth scenario. The majority of this chapter discusses the core scenario. Information on the high and low growth scenarios is provided in section 5.14.

5.4 Methodology overview

The methodology for creating reference forecast matrices (i.e. fixed demand) for cars is shown in the flow chart in Plate 5-1. Forecast matrices for LGVs and HGVs are explained separately in Section 5.11.

Plate 5-1 Forecast matrix build methodology for cars



In summary, the development details obtained from the local authorities along with local authority trip rates and trips extracted from Transport Assessments were used to generate development trip numbers.

These trips were distributed using parental zones in the base year to create a development matrix for each trip purpose and time period.

Jobs and households associated with future developments were aggregated by TEMPro area and subtracted from NTEM forecast jobs and houses. This was done using the TEMPro software's Alternative Assumptions tool, to derived adjusted TEMPro growth factors.

The adjusted factors were applied to the base year trips to produce the background growth matrix. The development matrix was then added to the background matrix to create a final core matrix.

The background growth trip ends were further adjusted to ensure that the total of the background growth trip ends and development matrix trip ends match the TEMPro forecast growth at a district and overall model scale.

5.5 Development Trips

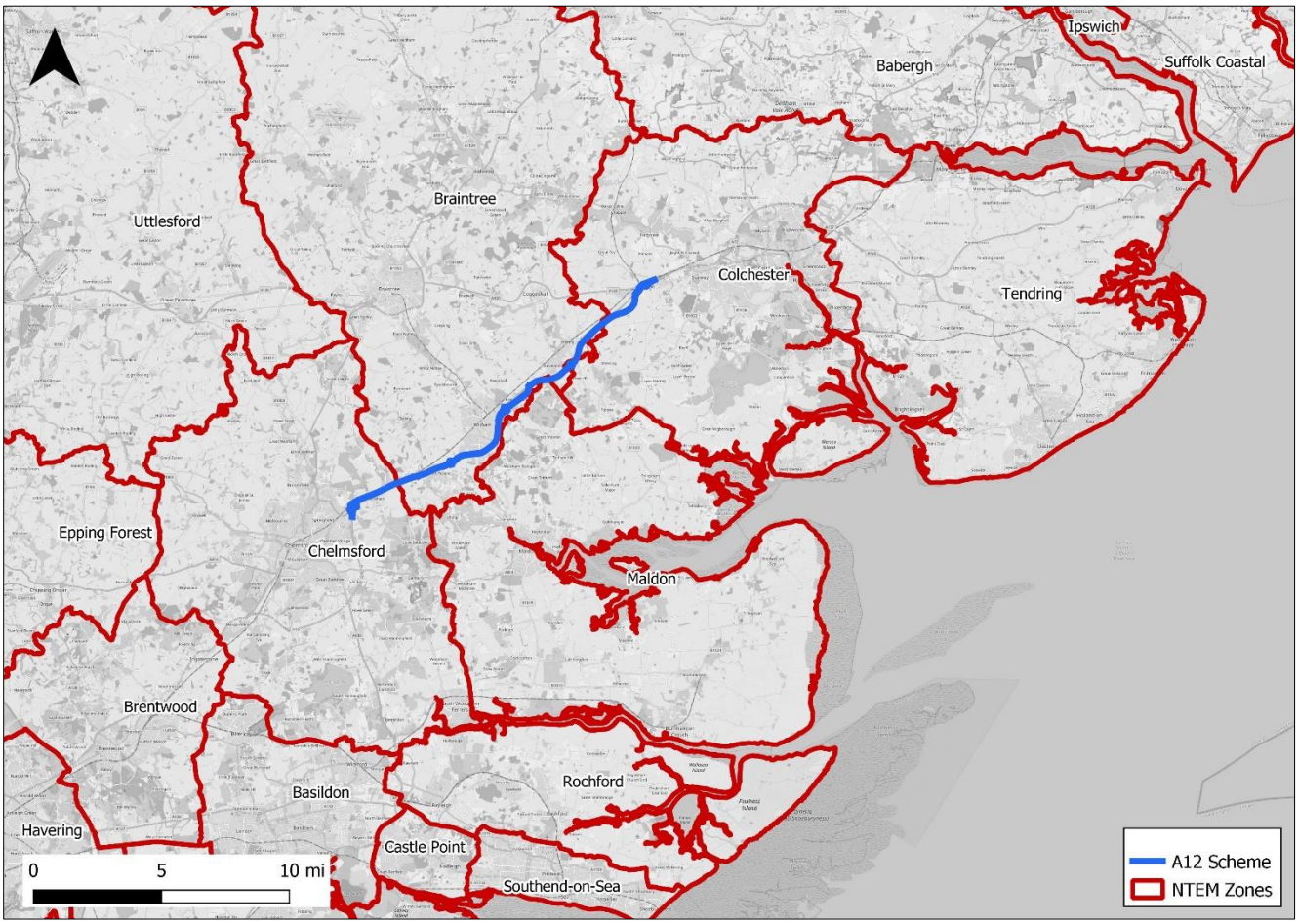
TAG Unit M4 states that future developments in the vicinity of the scheme should be modelled explicitly rather than as part of growth factors extracted from NTEM. For improvement schemes such as the A12, this local area should include:

- All district/unitary council areas through which the scheme passes, either in whole or in part;
- Any adjacent district/unitary council areas where the results of the appraisal and design are likely to be sensitive to different development scenarios in those areas.

The Local Area for the A12 scheme is shown in Plate 5-2. It is represented by five TEMPro district areas in the vicinity of the proposed A12 scheme which satisfy the above criteria: Braintree, Chelmsford, Colchester, Maldon and Tendring. The area generally matches with the simulation network of the A12 model and therefore the appraisal results could be sensitive to developments in that area.

For each of these local developments the modelling process involves estimating the trip generation and trip distribution of the development for each time period. This provides a development trip matrix which is then added to the forecast matrix that had been derived from applying TEMPro growth to the base year matrix.

Plate 5-2 Local authority boundaries



5.6 Uncertainty Log

As described in chapter 3, an Uncertainty Log has been developed to summarise the local planning assumptions in relation to the nature, timing, size and other details of the future developments.

This Uncertainty Log was developed in conjunction with the above-mentioned Local Planning Authorities in early 2020, during the development of the Stat Con model forecasts. The Uncertainty Log was then refreshed in May 2021 based on information for planning applications that have come forward since the previous Uncertainty Log was finalised. It contains information relating to both housing and employment development sites and includes sites which are already completed but did not exist in 2019.

As it is not practical to consider every potential development within the defined Local Area, minor developments which are not expected to have any impact on the forecasts have been removed from the Uncertainty Log. The criteria for removing a development from the Uncertainty Log have been defined as follows:

- For housing development – <200 dwellings

- For employment development – B1 <1000sqm, B2 <1500sqm and B8 < 5000sqm.

In some instances, developments very close to the scheme were included even when below the size thresholds, or several smaller developments were grouped together and included in theChelmsford North East Bypass. model.

Information on the certainty of each development was required, split into four categories based on how well advanced the development is in the planning process. The criteria for each category is summarised in Table 5-1 below. Note that Local Authorities were requested to project which developments they expected would be submitting planning applications over the following 12 months. Where planning applications were not yet submitted but assumed to be imminent (i.e. before traffic modelling is completed prior to the submission of the DCO application), these developments could potentially be included in the 'More than Likely' category.

Table 5-1 Uncertainty categories assigned to developments

Category	Development Status
Near Certain	Planning Application and with Consent
More than Likely	Planning Application and without Consent
Reasonably Foreseeable	In Local Plan. The outcome may happen, but there is significant uncertainty
Hypothetical	There is considerable uncertainty whether the outcome will ever happen

Only those development sites which can be categorised as 'Near Certain' or 'More than Likely' have been included in the Core Scenario.

The summary Uncertainty Log of sites within the Core and High Growth models is included as Appendix A to this report. A summary of how the sites were treated in the traffic model is provided below.

Residential sites and trip rates used

There are multiple residential development sites categorised as 'Near Certain' or 'More than Likely' within the Uncertainty Log. The largest sites (housing units greater than 450) in each district meeting these criteria are shown in Plate 5-3 with the level of housing supply listed below:

Chelmsford

- Greater Beaulieu Park – 3600 dwellings
- North East Chelmsford – 3000 dwellings
- Channels (Land North, South and East of Belsteads Farm Lane, Broomfield) – 750 dwellings

- Runwell Hospital – 575 dwellings
- Strategic Growth Site North Of Woodhouse Lane Broomfield Chelmsford Essex – 450 dwellings

Braintree

- Land Adjacent To Lodge Farm Hatfield Road Witham Essex – 750 dwellings
- Land West of Panfield Lane – 636 dwellings
- Towerlands Park – 575 dwellings

Colchester

- Chesterwell – 1461 dwellings
- Land North of London Road, Stanway – 636 dwellings
- Land off Dyers Road including Fiveways Fruit Farm – 605 dwellings

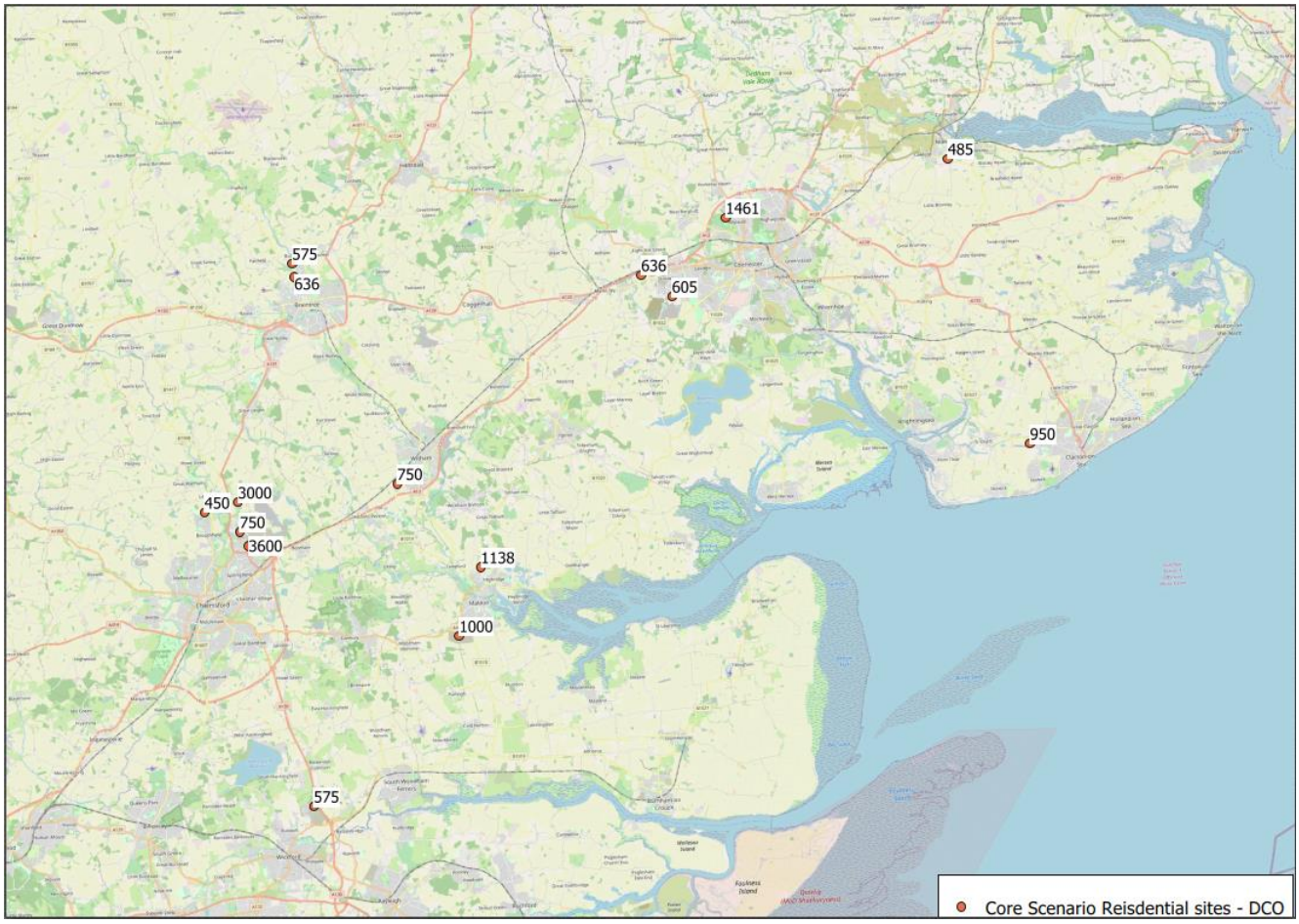
Maldon

- Land at Broad Street Green and Langford road – 1138 dwellings
- South of Limebrook Way – 1000 dwellings

Tendring

- Rouses Farm – 950 dwellings
- Long Road, Mistley – 485 dwellings

Plate 5-3 Major housing development sites – core scenario (number of dwellings shown)



TAG recommends that trip generation for the developments should be consistent with available Transport Assessments (TAs). However, this was not available for all sites. Where TAs have been available the trip rate for that specific development has been used. Where there was no suitable information available in the TA, a standard residential trip rate was produced based on information in the relevant Local Plan.

Table 5-2 shows the Local Plan Trip Rates used from each of the Local Planning authorities that have a Local Plan available. These are hourly trip rates for the car user class only.

Table 5-2 Residential trip rates

Residential Trip Rate (per dwelling)	AM Peak (0700-0800)		Interpeak (1000-1600)		PM Peak (1700-1800)	
	Arrival	Departure	Arrival	Departure	Arrival	Departure
Chelmsford	0.11	0.25	0.17	0.17	0.28	0.18
Braintree	0.09	0.25	0.17	0.17	0.25	0.13
Colchester	0.09	0.25	0.17	0.17	0.25	0.14
Combined	0.09	0.25	0.17	0.17	0.26	0.15

To ensure the rates are reasonable they have been benchmarked against the residential trip rates used in previous A12 models and the TRICS trip rates and were found to be appropriate.

Full details of all the trip rates used are detailed in Appendix B, this also contains the benchmarking exercise of comparing and verifying the trip rates to TRICS and to those used in Essex County Council modelling.

Employment sites and trip rates used

Employment development sites planned within Chelmsford, Colchester, Maldon, Braintree and Tendring were identified. 'Near Certain' and 'More than Likely' employment sites have been included into the Core Scenario.

Transport Assessments and other relevant documents containing estimated trip generation rates have been reviewed and, where appropriate, were used to derive trip ends for the employment sites.

For the sites which do not have TAs or the information is limited it was agreed to use Local Plan trip rates to estimate the trip generation. The Local Plan trip rates for employment sites are expressed in vehicle trips per 100sqm of GFA and are presented in Table 5-3 below.

Table 5-3 Local Plan employment trip rates

Trip Rate per 100sqm of GFA	AM Peak (0700-0800)		Interpeak (1000-1600)		PM Peak (1700-1800)	
	Arrival	Departure	Arrival	Departure	Arrival	Departure
B1	1.30	0.18	0.27	0.29	0.14	1.16
B2	0.48	0.14	0.23	0.24	0.12	0.44
B8	0.09	0.06	0.04	0.04	0.04	0.12

In some cases, an employment site did not have any reliable information available on its estimated number of jobs. In this case, standard employment density factors were used to convert the GFA by use class extracted from the TAs into the number of jobs for each site.

The GFA to Jobs factors were derived from the Table of Employment Densities contained within the Employment Density Guide 2015 3rd edition and shown in Plate 5-4.

The total number of jobs was then used within TEMPro's Alternative Assumptions tool to define background growth rates, as described in section 0.

Plate 5-4 Extract from employment density guide 2015 3rd edition

Use Class	Sub-Category	Sub-Sector	Density (sqm)	Notes
B1a Offices	General Office	Corporate	13	NIA
		Professional Services	12	NIA
		Public Sector	12	NIA
		TMT	11	NIA
		Finance & Insurance	10	NIA
	Call Centres		8	NIA
B1b	R&D Space		40-60	NIA lower densities will be achieved in units with higher provision of shared or communal spaces
B1c	Light Industrial		47	NIA
B2	Industrial & Manufacturing		36	GIA
B8	Storage & Distribution	National Distribution Centre	95	GEA
		Regional Distribution Centre	77	GEA
		'Final Mile' Distribution Centre	70	GEA
Mixed B Class	Small Business Workspace	Incubator	30-60	B1a, B1b – the density will relate to balance between spaces, as the share of B1a increases so too will employment densities.
		Maker Spaces	15-40	B1c, B2, B8 - Difference between 'planned space' density and utilisation due to membership model
		Studio	20-40	B1c, B8
		Co-Working	10-15	B1a - Difference between 'planned space' density and utilisation due to membership model
		Managed Workspace	12-47	B1a, b, c
B8 / Sui Generis	Data Centres	Wholesale	200-950	
		Wholesale Dark Site	440-1,400	
		Co-location Facility	180-540	
A1	Retail	High Street	15-20	NIA
		Foodstore	15-20	NIA
		Retail Warehouse	90	NIA
A2	Finance & Professional Services		16	NIA
A3	Restaurants & Cafes		15-20	NIA
C1	Hotels	Limited Service / Budget	1 per 5 beds	FTE per bed
		Mid-scale	1 per 3 beds	FTE per bed
		Upscale	1 per 2 beds	FTE per bed
		Luxury	1 per 1 bed	FTE per bed
D2	Fitness Centres	Budget	100	GIA
		Mid Market	65	GIA – both types tend to generate between 40-50 jobs per gym
		Family		
	Cinema		200	GIA
	Visitor & Cultural Attractions		30-300	The diversity of the cultural attraction sector means a very wide range exists
	Amusement & Entertainment Centres		70	Potential range of 20-100sqm

Journey purpose split

Car trips within the A12 base model were broken down into user classes representing three journey purposes: Commute, Business and Others.

Trip ends generated by future developments therefore needed to be disaggregated further to those three purposes. This was achieved by applying base year journey purpose proportions from the corresponding model zone.

However, where a land use is expected to significantly change from the base year, the journey purpose split from a zone with the similar land use has been applied.

Trip distribution

Given that the majority of the developments are large sites allocated to 'greenfield zones', a parental zone distribution approach was used to distribute the development trips. Parental zones were selected which represent the same area and similar land use as the development zones.

The distributed trips to and from each development site formed a final development matrix so that trip ends could be calculated and summed up for each TEMPro area.

Zone changes from the base model

In addition to the network changes, the 'spare' zones that were added to the base model have been used in the future network to accommodate large development sites that couldn't be aligned to existing zones' land uses. Where developments are not modelled in the Core Scenario due to their uncertainty, provision has been made for them to be included within the High Growth models. A separate zone was also used for Beaulieu Rail Station Car Park.

5.7 Background growth

Introduction

Background traffic is defined as the amount that traffic would grow naturally over the years, outside of the specific developments included in the Uncertainty Log. The total level of growth is defined in the National Trip End Model (NTEM 7.2).

TEMPro areas and alternative assumptions

As described in Section 5.4 the total number of jobs and households associated with future developments were estimated and aggregated by NTEM zone.

Within the TEMPro software are a set of adjustable planning assumptions which predict the number of households and jobs per NTEM zone for each year between 2011 and 2051.

Given that the development matrix accounts for some of the trips associated with the increase in numbers of jobs and houses within the local area, the planning assumptions within TEMPro need to be adjusted accordingly to avoid double counting.

This has been achieved by deducting the number of households or jobs associated with the Uncertainty Log developments from the number in the NTEM zone that the developments are located in.

TEMPro then generates growth factors based on adjusted assumptions which exclude the explicitly modelled developments. These TEMPro factors are then applied to the base year matrix to calculate the background growth.

The background growth trip ends are further adjusted to ensure that the total of the background growth trip ends and development matrix trip ends match the TEMPro forecast growth at a district and overall model scale. Table 5-4 and Table 5-5

demonstrate the Uncertainty Log assumptions and TEMPro default planning assumptions for the five districts within the Local Area.

Table 5-4 Jobs and households assumptions 2027 (NTEM7.2 vs Local Planning Data)

Local Planning Authority	2027					
	Uncertainty Log		TEMPro Development Growth		Difference (TEMPRO – Uncertainty Log)	
	HH	Jobs	HH	Jobs	HH	Jobs
Braintree	4,235	1,614	5,427	1,817	1,192	203
Chelmsford	5,555	1,681	9,043	2,629	3,489	948
Colchester	4,648	339	5,051	2,697	403	2,358
Maldon	2,517	378	2,526	722	9	344
Tendring	3,375	440	9,486	1,440	6,111	1,000

Table 5-5 Jobs and households assumptions 2042 (NTEM7.2 vs Local Planning Data)

Local Planning Authority	2042					
	Uncertainty Log		TEMPro Development Growth		Difference (TEMPRO – Uncertainty Log)	
	HH	Jobs	HH	Jobs	HH	Jobs
Braintree	5,549	1,937	14,633	4,774	9,084	2,837
Chelmsford	10,260	3,092	24,855	6,862	14,595	3,770
Colchester	6,007	339	12,533	7,022	6,526	6,683
Maldon	3,788	755	6,601	1,906	2,813	1,151
Tendring	5,451	786	25,879	3,734	20,428	2,948

Background growth calculation and constraining to TEMPro

After applying the alternative assumptions on number of jobs and households the adjusted growth factors for the five districts by journey purpose and time period were calculated in TEMPro.

The forecast demand growth then needed to be constrained to TEMPro forecast growth.

The adjusted factors for the five district areas and unadjusted factors for other zones were applied to the base year demand of the corresponding model zones. The growth due to TEMPro in each TEMPro area was then further adjusted based on the following factor:

$$F = \frac{Default\ TEMPRO\ Growth - Development\ Trips}{Adjusted\ TEMPRO\ Growth}$$

This creates a revised growth for each TEMPro area which represents final background growth, i.e. growth not including development.

Appendix C provides the default and adjusted TEMPRO factors used in this assessment.

Trip distribution and reference forecast matrix

The base matrix was furnessed to the background growth trip ends to create a background growth trip matrix, using the furnessing process (doubly constrained) in SATURN.

The development matrix was then added to the background growth matrix to create a final Core reference forecast matrix constrained to TEMPro. Subsequently, these matrices were used in the variable demand model, to capture the changes in demand pattern as a result of the travel cost changes. The impacts of VDM on demand are discussed in section 6.2.

2051 Car matrices

Given there is no data on local developments between 2042 and 2051, a simplified approach was used to create the 2051 matrices.

The 2042 to 2051 default TEMPro growth factors by journey purpose and time period were extracted and applied to the 2042 background growth trip ends to arrive at 2051 background trips.

The furnessing process was then used to distribute the trips using the base matrices as a basis for applying growth.

5.8 Airport demand

Airport growth for future years was obtained from the SERTM models, which is based on DfT's NAPALM (National Air Passenger Allocation Model) forecasts and Civil Aviation Authority (CAA) 2014 passenger statistics.

Whilst it is recognised that NTEM7.2 captures the employee demand at the airports, it does not consider the passengers travelling to/from the airports. Hence, the airport passenger demand was considered as an additional element for the model forecasting. SERTM airport demand forecasts were therefore used for employer business and other trip purpose only and NTEM growth factors were used for forecasting commute trip purpose.

The growth factors were applied to the base year model demand corresponding to each of the identified airport zones. The base year A12 demand is developed from SERTM base year models and therefore includes the base year demand assumptions for airport and ports.

Assumptions

- SERTM airport demand relates to flight passenger (ie, purpose employers' business and other) trips by car.
- It is assumed that the NTEM includes commuter and employers business trips only, ie, NTEM does not include additional "other" trips on top of passengers trips.
- SERTM data for Heathrow and Gatwick airport is not disaggregated by terminal. It has been assumed that the total trip ends are divided equally between each terminal.
- Commuter trips will come directly from NTEM (TEMPro v7.2).
- It is considered that the number of passenger trips is very small compared to the trip end totals in the internal airport zones (Southampton Airport in all of Hampshire and London City in Newham) and as such TEMPro factors will be used directly for these.
- No purpose split data is available for Southampton Airport, so Stansted was used.
- Purpose splits are assumed to not change in future years.
- 2042 Trips are assumed to be the same as 2041 based on the assumption that the expansion to the current planning permission level of 35Mppa will be complete by 2025.
- 2027 Trip Ends for Stansted use 2031 estimates as it will reach its planning permission capacity of 35Mppa in 2025.

Growth factors for the airport zones is summarised in Table 5-6 to Table 5-8.

Table 5-6 Airport zones growth factor –2019 to 2027

Airport	AM						IP						PM					
	Commuter		Emp Bus		Other		Commuter		Emp Bus		Other		Commuter		Emp Bus		Other	
	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest
Stansted	1.012	1.052	2.193	1.959	1.219	0.982	1.040	1.033	2.384	2.176	1.377	1.180	1.049	1.013	1.966	2.507	0.893	1.341
London Luton	1.021	1.050	1.970	3.146	1.111	2.490	1.038	1.034	2.884	2.486	2.233	1.752	1.047	1.020	1.708	4.245	0.753	3.493
Heathrow - Terminal 1	1.047	1.058	1.731	1.968	0.846	1.148	1.053	1.046	1.900	1.886	1.077	1.061	1.056	1.036	1.778	1.755	0.868	0.833
Heathrow - Terminal 2	1.047	1.058	3.340	4.133	2.703	3.655	1.053	1.046	3.907	3.855	3.428	3.379	1.056	1.036	3.491	3.420	2.759	2.657
Heathrow - Terminal 3	1.047	1.058	1.747	1.989	0.866	1.175	1.053	1.046	1.919	1.905	1.102	1.085	1.056	1.036	1.794	1.771	0.888	0.862
Gatwick - North Term	1.066	1.054	3.053	1.825	2.381	0.923	1.049	1.047	2.585	2.340	1.862	1.571	1.051	1.053	1.715	3.090	0.757	2.309
Gatwick - South Term	1.066	1.054	2.278	1.527	1.459	0.574	1.049	1.047	1.992	1.842	1.141	0.978	1.051	1.053	1.459	2.298	0.472	1.424

Table 5-7 Airport zones growth factor – 2019 to 2042

Airport	AM						IP						PM					
	Commuter		Emp Bus		Other		Commuter		Emp Bus		Other		Commuter		Emp Bus		Other	
	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest
Stansted	1.042	1.132	2.240	2.037	1.202	0.968	1.103	1.090	2.447	2.245	1.357	1.165	1.125	1.043	2.039	2.553	0.881	1.323
London Luton	1.045	1.130	1.953	3.061	1.018	2.280	1.096	1.086	2.810	2.448	2.046	1.603	1.121	1.043	1.738	4.040	0.690	3.202
Heathrow - Terminal 1	1.115	1.141	1.859	2.123	0.909	1.233	1.126	1.114	2.044	2.032	1.157	1.139	1.134	1.085	1.916	1.889	0.932	0.894
Heathrow - Terminal 2	1.115	1.141	3.586	4.447	2.902	3.924	1.126	1.114	4.200	4.146	3.681	3.628	1.134	1.085	3.755	3.678	2.963	2.853
Heathrow - Terminal 3	1.115	1.141	1.875	2.146	0.930	1.261	1.126	1.114	2.065	2.053	1.184	1.166	1.134	1.085	1.934	1.907	0.953	0.925
Gatwick - North Term	1.183	1.143	3.309	1.981	2.565	0.995	1.131	1.128	2.794	2.533	2.008	1.694	1.135	1.142	1.859	3.345	0.817	2.489
Gatwick - South Term	1.183	1.143	2.474	1.660	1.572	0.619	1.131	1.128	2.155	1.996	1.231	1.055	1.135	1.142	1.583	2.492	0.509	1.535

Table 5-8 Airport zones growth factor – 2019 to 2051

Airport	AM						IP						PM					
	Commuter		Emp Bus		Other		Commuter		Emp Bus		Other		Commuter		Emp Bus		Other	
	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest	origin	dest
Stansted	1.074	1.192	2.300	2.113	1.213	0.977	1.150	1.135	2.518	2.316	1.369	1.175	1.181	1.072	2.113	2.618	0.888	1.335
London Luton	1.068	1.190	1.999	3.130	1.020	2.283	1.139	1.124	2.871	2.509	2.049	1.605	1.176	1.063	1.803	4.090	0.691	3.206
Heathrow - Terminal 1	1.159	1.197	1.938	2.220	0.943	1.279	1.174	1.156	2.133	2.121	1.200	1.182	1.187	1.114	2.003	1.972	0.967	0.928
Heathrow - Terminal 2	1.159	1.197	3.731	4.631	3.011	4.071	1.174	1.156	4.370	4.314	3.819	3.765	1.187	1.114	3.911	3.827	3.074	2.960
Heathrow - Terminal 3	1.159	1.197	1.956	2.243	0.965	1.309	1.174	1.156	2.155	2.143	1.228	1.209	1.187	1.114	2.022	1.990	0.989	0.960
Gatwick - North Term	1.243	1.205	3.420	2.066	2.625	1.018	1.182	1.174	2.891	2.624	2.055	1.733	1.191	1.184	1.939	3.455	0.836	2.546
Gatwick - South Term	1.243	1.205	2.566	1.737	1.609	0.634	1.182	1.174	2.237	2.074	1.259	1.079	1.191	1.184	1.656	2.582	0.521	1.570

5.9 Port demand

The annual seaport growth rates used in the SERTM models were used for forecasting the Port demand. The DfT's Base Year Freight Model (BYFM) built in 2006 was used in the RTMs (Regional Transport Model) to develop seaport matrices. The seaport growth factors were applied to the seaport freight demand of 2019 to derive the 2027, 2042 and 2051 seaport freight demand matrices, for all three modelled peak hours.

Table 5-9 below presents a list of seaports identified in SERTM model with their representative SERTM zones and their respective growth rates.

Table 5-9 Seaport Annual Growth Rates

Sea Port	Zone	Growth Rates Per annum
Felixstowe	69994	2.80%
London	69995	1.70%
Tilbury	69996	1.70%
Thurrock	69997	1.70%
Purfleet	69998	1.70%
Southampton	89994	2.48%
Channel Tunnel	89995	2.78%
Dover	89996	2.78%

Source: National Highways, March 2020: SERTM TFR, Table 4-15

Growth rates were not available for the seaports of Tilbury, Purfleet, Thurrock and Channel Tunnel. The growth rates of the nearest available seaport were applied to these ports. For instance, the London port growth rate was applied to Tilbury, Thurrock and Purfleet; while the Dover port growth rate was applied to the Channel Tunnel port.

It should be noted that seaport zones except Southampton, Channel Tunnel and Dover have only freight (HGV and LGV) trips in the prior matrices. And therefore, NTEM growth factors for cars were estimated only for these 3 zones with rest of the port zones only generating freight traffic.

5.10 Beaulieu Park station car demand

The new Beaulieu Park rail station is proposed to provide access to the Great Eastern Main Line (GEML). It is anticipated that the new station will relieve crowding at Chelmsford railway station and act as a transport interchange to encourage sustainable travel by bus, cycle, electric vehicles and on foot. This is expected to be built by 2027.

Highway trips (arrivals and departures) generated by Beaulieu Park station were estimated from the Essex rail demand model. The difference in car demand with and without Beaulieu Park station was extracted from that model. This accounted for the abstraction of trips from other rail stations. These flows were incorporated into the A12 future year models by mapping the Essex and A12 model zones representing the various rail stations.

The Beaulieu Park station trips were split into long-term parking and short-term parking as they are in different model zones with different access points.

The Essex models provided highway outputs for 2027 only. Based on the assumed approach of using car parking prices to manage demand, it was assumed that car arrivals/departures to Beaulieu Park station will not increase in future years. 2027 highway outputs were therefore used for all future years.

Table 5-10 to Table 5-15 show the Essex model's rail trips for Beaulieu Park station, with trips extracted from other stations in the county.

Table 5-10 Rail station arrivals – 2027 AM

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	470	460	-10
25068	BRAINTREE RAIL	105	97	-8
25034	BRAINTREE FREEPORT RAIL	7	6	-1
25078	CRESSING RAIL	6	5	-1
23028	KELVEDON RAIL	216	201	-15
23027	WITHAM RAIL	503	471	-31
23026	HATFIELD PEVEREL RAIL	109	83	-26
60627	INGATESTONE RAIL	116	121	5
60628	SHENFIELD RAIL	485	479	-7
60726	BRENTWOOD RAIL	40	41	0
24011	**BEAULIEU PARK RAIL**	**0**	**288**	**288**
23004	CHELMSFORD RAIL	1427	1311	-116

Table 5-11 Rail station departures – 2027 AM

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	254	248	-6
25068	BRAINTREE RAIL	56	52	-4
25034	BRAINTREE FREEPORT RAIL	4	3	0
25078	CRESSING RAIL	2	2	0
23028	KELVEDON RAIL	69	65	-5
23027	WITHAM RAIL	160	150	-10
23026	HATFIELD PEVEREL RAIL	42	32	-10
60627	INGATESTONE RAIL	33	35	1
60628	SHENFIELD RAIL	306	302	-4
60726	BRENTWOOD RAIL	22	22	0
24011	**BEAULIEU PARK RAIL**	**0**	**93**	**93**
23004	CHELMSFORD RAIL	604	555	-49

Table 5-12 Rail station arrivals – 2027 IP

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	58	62	4
25068	BRAINTREE RAIL	13	13	0
25034	BRAINTREE FREEPORT RAIL	1	1	0
25078	CRESSING RAIL	1	1	0
23028	KELVEDON RAIL	24	24	0
23027	WITHAM RAIL	55	56	1
23026	HATFIELD PEVEREL RAIL	12	10	-2
60627	INGATESTONE RAIL	12	14	1
60628	SHENFIELD RAIL	63	66	3
60726	BRENTWOOD RAIL	5	5	0
24011	**BEAULIEU PARK RAIL**	**0**	**34**	**34**
23004	CHELMSFORD RAIL	165	162	-2

Table 5-13 Rail station departures – 2027 IP

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	53	52	-1
25068	BRAINTREE RAIL	12	11	-1
25034	BRAINTREE FREEPORT RAIL	1	1	0
25078	CRESSING RAIL	1	0	0
23028	KELVEDON RAIL	20	19	-1
23027	WITHAM RAIL	47	44	-3
23026	HATFIELD PEVEREL RAIL	11	8	-3
60627	INGATESTONE RAIL	11	11	0
60628	SHENFIELD RAIL	59	58	-1
60726	BRENTWOOD RAIL	5	5	0
24011	**BEAULIEU PARK RAIL**	**0**	**27**	**27**
23004	CHELMSFORD RAIL	147	135	-12

Table 5-14 Rail station arrivals – 2027 PM

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	202	198	-4
25068	BRAINTREE RAIL	45	42	-3
25034	BRAINTREE FREEPORT RAIL	3	3	0
25078	CRESSING RAIL	2	2	0
23028	KELVEDON RAIL	68	63	-5
23027	WITHAM RAIL	157	147	-10
23026	HATFIELD PEVEREL RAIL	38	29	-9
60627	INGATESTONE RAIL	34	36	1
60628	SHENFIELD RAIL	232	229	-3
60726	BRENTWOOD RAIL	18	18	0
24011	**BEAULIEU PARK RAIL**	**0**	**90**	**90**
23004	CHELMSFORD RAIL	525	483	-43

Table 5-15 Rail station departures – 2027 PM

Zone	Station	Essex Rail Model		
		Without Beaulieu station	With Beaulieu station	Net Traffic (With - Without)
60610	BILLERICAY RAIL	285	279	-6
25068	BRAINTREE RAIL	64	59	-5
25034	BRAINTREE FREEPORT RAIL	4	4	0
25078	CRESSING RAIL	3	3	0
23028	KELVEDON RAIL	124	116	-9
23027	WITHAM RAIL	289	271	-18
23026	HATFIELD PEVEREL RAIL	64	49	-15
60627	INGATESTONE RAIL	66	69	3
60628	SHENFIELD RAIL	301	297	-4
60726	BRENTWOOD RAIL	25	25	0
24011	**BEAULIEU PARK RAIL**	**0**	**165**	**165**
23004	CHELMSFORD RAIL	841	773	-68

5.11 LGV and HGV growth

LGV and HGV growth were based on growth factors calculated for principal roads in England using RTF 2018.

These growth factors were applied to the 2019 base year matrices.

This approach is consistent with TAG Unit M4 guidance on forecasting changes in freight traffic which recommends applying a single growth factor for the whole matrix based on NTM forecast growth. The factors are presented in Table 5-16 below.

There are no site-specific major HGV trip generators in the future year models. The planned Integrated Waste Management Facility (IWMF) at Rivenhall was considered for inclusion in the model, but the predicted flows were not considered significant enough (approximately 20 HGVs in and out per hour). Because no new specific HGV generators were included a simple factoring process was adopted instead for the HGV growth. As discussed in the previous section, the GV growth for ports were estimated using SERTM forecasts.

Table 5-16 RTF growth factors

Year	Vehicle Type	Growth Factor from 2019
2027	LGV	1.076
	HGV	1.038
2042	LGV	1.284
	HGV	1.149
2051	LGV	1.382
	HGV	1.218

5.12 Forecast rail demand for mode choice model

No forecast year changes were made to rail journey times as Greater Anglia demand has remained stable since 2019, and we have assumed no significant upgrades to existing line infrastructure enabling reduced journey times.

The existing 2021 forecast rail demand from the SERTM model was factored up to 2027 by applying a uniformed NTEM growth factor for the South East of England. For both 2042 and 2051, the existing 2041 rail demand from the SERTM model was used.

Fares were increased for forecast years using the following methodology below:

- 2027: 2021 fares from SERTM models were adjusted to 2027 FY by applying a uniform factor derived as (2021-2027 RPI Inflation + 1%)/(2021-2027 GDP Deflator) with 2010 base prices.
- 2042: Existing 2041 PT fares from SERTM models were used for 2042 FY scenario,
- 2051: 2041 fares from SERTM models were adjusted to 2051 FY by applying a uniform factor derived as (2041-2051 RPI Inflation +1%)/(2041-2051 GDP Deflator) with 2010 base prices.

5.13 Matrix checks

Checks have been undertaken to compare the trip end totals between the 2019 base year and the future years for all time periods to ensure the overall growth between the base year and the future years are logical. Matrix totals for each forecast year and growth percentage compared to base year are shown in Table 5-17.

The table gives a summary of matrix trip end totals for each trip purpose, time period and future modelled year. In the 2027 opening year there is forecast to be an average 7% overall highway demand growth over and above the 2019 base. The corresponding figure by the 2042 forecast year is predicted to be 19%, then 26% by 2051.

The growth was also checked by journey purpose. In 2027 the increase is on average 6% for business and commute with 9% for other trips. By 2042 the increase is on average 15% for business and commute with 23% for other trips. In 2051 this has increased to an average of 21% for business and commute and 30% for other. The increase in demand between each forecast year also demonstrates logical trends with larger levels of growth between 2027 and 2042 than 2042 to 2051, reflecting the shorter duration between these forecast years.

Given the above, the matrix totals are considered robust and suitable for scheme assessment.

Table 5-17 Fixed trip matrix totals and growth

User Class	2019	2027	2042	2051	%growth by 2027	%growth by 2042	%growth by 2051
AM							
Car Business (UC1)	542,521	575,636	627,443	662,645	6%	16%	22%
Car Commute (UC2)	2,368,533	2,499,984	2,710,755	2,856,944	6%	14%	21%
Car Other (UC3)	2,311,445	2,517,219	2,835,469	3,019,532	9%	23%	31%
LGV (UC4)	622,392	672,572	802,516	864,666	8%	29%	39%
HGV (UC5)	298,858	303,585	325,368	339,810	2%	9%	14%
Total Car	5,222,499	5,592,840	6,173,667	6,539,121	**7%**	**18%**	**25%**
Total	**6,143,750**	**6,568,997**	**7,301,551**	**7,743,596**	**7%**	**19%**	**26%**
IP							
Car Business (UC1)	417,094	441,777	479,806	504,956	6%	15%	21%
Car Commute (UC2)	721,021	756,382	812,812	850,681	5%	13%	18%
Car Other (UC3)	2,913,757	3,189,855	3,603,382	3,828,448	9%	24%	31%
LGV (UC4)	560,427	605,656	722,693	778,681	8%	29%	39%
HGV (UC5)	282,358	286,735	307,149	320,689	2%	9%	14%
Total Car	4,051,872	4,388,014	4,896,000	5,184,084	**8%**	**21%**	**28%**
Total	**4,894,657**	**5,280,405**	**5,925,842**	**6,283,454**	**8%**	**21%**	**28%**
PM							
Car Business (UC1)	549,229	581,852	632,875	667,373	6%	15%	22%
Car Commute (UC2)	2,131,589	2,242,054	2,417,567	2,535,740	5%	13%	19%
Car Other (UC3)	3,202,862	3,469,711	3,882,814	4,118,862	8%	21%	29%
LGV (UC4)	488,590	528,016	630,100	678,969	8%	29%	39%
HGV (UC5)	187,489	190,581	204,507	213,790	2%	9%	14%
Total Car	5,883,681	6,293,617	6,933,256	7,321,976	**7%**	**18%**	**24%**
Total	**6,559,760**	**7,012,213**	**7,767,862**	**8,214,735**	**7%**	**18%**	**25%**

5.14 High and low growth scenario

The guidance in TAG Unit M4 recommends that, in addition to the Core Scenario, at least two sensitivity tests must be considered to investigate the impact of alternative predictions on the value for money of the scheme. Low Growth and High Growth scenarios have therefore been developed. The methodology to develop these two scenarios is summarised below.

High and Low Growth Scenarios include different predictions surrounding the national factors of demographic change (population and employment), GDP growth, fuel price trends and vehicle efficiency changes. TAG specifies that these factors can be allowed for by adding (for High Growth) and subtracting (for Low Growth) a variable proportion of the base year matrix from the forecast year matrix. In terms of local factors, TAG also recommends changing the local demand related factors assumed in the Core Scenario, but not the supply factors unless they related to those demand factors.

To produce the matrices for the High Growth Scenario, the uncertainty threshold was lowered so that all the 'Reasonably Foreseeable' developments from the Uncertainty Log were included in the growth forecasts, in addition to the 'Near Certain' and 'More Than Likely' developments already present in the Core scenario. Secondly, following the principles set out in TAG a proportion of base year demand was added to the core. The proportion for each modelled year was calculated using the following formula:

- High Growth Scenario, 2019 to 2027 = +2.5% x √(2027-2019) = +7.07%
- High Growth Scenario, 2019 to 2042 = +2.5% x √(2042-2019) = +11.99%
- High Growth Scenario, 2019 to 2051 = +2.5% x √(2051-2019) = +14.14%

The matrices were then assigned to the network following the same process as that for the Core Scenario, including Variable Demand.

The Low Growth Scenario was developed in a similar way. For the matrices, the uncertainty threshold remained the same so that both 'Near Certain' and 'More than Likely' developments from the Uncertainty Log were included. The national uncertainty has been assessed in the same way to the Core Scenario, to factor the base year matrices as follows:

- Low Growth Scenario, 2019 to 2027 = -2.5% x √(2027-2019)= -7.07%
- Low Growth Scenario, 2019 to 2042 = -2.5% x √(2042-2019) = -11.99%
- Low Growth Scenario, 2019 to 2051 = -2.5% x √(2051-2019) = -14.14%

For the Low Growth scenario, the network was unchanged. The matrices were then assigned to the network following the same process as that for the Core Scenario, including Variable Demand.

Table 5-18 below summarises the Low and High Growth scenarios in relation to the Core Scenario.

Table 5-18 Summary of low and high growth in relation to Core Scenario

Certainty	Developments Included/Excluded		
	Low Growth	Core Scenario	High Growth
Near Certain	✓	✓	✓
More Than Likely	✓	✓	✓
Reasonably Foreseeable	×	×	✓
Hypothetical	×	×	×
National Uncertainty	Lower	Standard	Higher

5.15 Calculation of AADT and AAWT flows

A number of processes require traffic data for time periods other than those represented directly by the traffic model. Annual Average Daily Traffic (AADT) flows are used for air quality assessment purposes as well as within the economic assessment. The noise assessment requires 18hr Annual Average Weekday Traffic (AAWT) and also evening and night-time volumes.

In order to obtain flows for non-modelled time periods conversion factors are applied to the modelled AM, IP and PM flows. The conversion factors were calculated separately for each time period and road type using data from observed traffic counts. Separate factors were derived for HGV's as their daily profile can be quite different to light vehicles and HGV volumes are of particular importance for the noise and air quality assessments.

The three road types defined were:

- A12;
- A Road excluding A12;
- Other roads.

The 'A12' category factors were based on long-term traffic count data collected on the A12 between J18-J25. 'A-road excl. A12' factors were based on long-term traffic count data from A120 sites. 'Other roads' factors were based on several ATC count sites, primarily on B roads within the study area.

Conversion factors were calculated to expand the AM and PM peak hour model flows to AM and PM period flows, these are show below.

- AM peak hour 07:30 – 08:30 to AM peak period 07:00 – 10:00
- PM peak hour 17:00 – 18:00 to PM peak period 16:00 – 19:00

The IP hour model represented an average hour between 10:00 – 16:00. The 12hr Annual Average Weekday Traffic (AAWT) represents 07:00 – 19:00 and is generated by combining the AM, IP and PM period flows. Conversion factors were then applied to create Night AAWT, 18hr AAWT, 24hr AAWT and 24hr Annual Average Daily Traffic (AADT). These conversion factors are shown in Table 5-19 and Table 5-20 for light and heavy vehicles respectively.

Table 5-19 Factors to convert total traffic flows

Road Type	AM Hr to AM Period	IP Hr to IP Period	PM Hr to PM Period	12hr AAWT to Night AAWT	12hr AAWT to 18hr AAWT	12hr AAWT to 24hr AAWT	24hr AAWT to 24hr AADT
A12	2.76	6.00	2.81	0.16	1.22	1.28	0.97
A Road excl. A12	2.85	6.00	2.86	0.17	1.24	1.32	0.96
Other	2.60	6.00	2.62	0.09	1.18	1.21	0.93

Table 5-20 Factors to HGV flows

Road Type	AM Hr to AM Period	IP Hr to IP Period	PM Hr to PM Period	12hr AAWT to Night AAWT	12hr AAWT to 18hr AAWT	12hr AAWT to 24hr AAWT	24hr AAWT to 24hr AADT
A12	3.12	6.00	3.10	0.24	1.18	1.32	0.78
A Road excl. A12	3.06	6.00	3.20	0.22	1.18	1.30	0.78
Other	3.17	6.00	3.60	0.14	1.14	1.21	0.79

6. Forecast Model Results and Checks

6.1 Introduction

The main forecast model results and findings are discussed in this section.

6.2 Variable Demand Modelling

For each core forecast year, VDM runs are undertaken pivoting from the base year costs for each of the three time periods in each scenario:

- Do Minimum: this takes as its input the reference case matrices and the Do Minimum networks and outputs a set of post-VDM Do Minimum matrices.
- Do Something takes as its input the reference case matrices and the Do Something networks discussed and outputs a set of post-VDM Do Something matrices.

Impact of Variable Demand – matrix comparison

Matrix comparisons for each user class (for each time period forecast year) were done to understand the impacts of VDM and if they were in line with the responses included in the VDM set up. The results show that in the Do Minimum, VDM has only slight impact on the total number of trips.

Similar impacts were observed for the Do Something scenario. The impact on overall numbers is not significant. This is because the most significant changes are noted for the zones that are closer to the scheme area, while the larger external to external zone movements were masked in the VDM process.

Detailed comparison for the Do Minimum scenario is presented in Table 6-1 to Table 6-3.

Table 6-1 Pre and Post VDM matrix comparison - Do Minimum scenario – 2027

Time Period	UC	Pre VDM 2027			Post VDM 2027			Difference			% Difference		
		Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total
AM	1	395,268	180,369	575,636	395,268	180,375	575,643	0	6	6	0.0000%	0.0034%	0.0011%
	2	2,008,834	491,151	2,499,984	2,008,834	491,173	2,500,007	0	23	23	0.0000%	0.0046%	0.0009%
	3	2,051,305	465,914	2,517,219	2,051,305	465,928	2,517,233	0	14	14	0.0000%	0.0029%	0.0006%
	Total	**4,455,406**	**1,137,434**	**5,592,840**	**4,455,407**	**1,137,476**	**5,592,883**	**1**	**42**	**43**	**0.0001%**	**0.0109%**	**0.0025%**
IP	1	327,702	114,075	441,777	327,702	114,077	441,779	0	2	2	0.0000%	0.0020%	0.0005%
	2	565,548	190,834	756,382	565,549	190,852	756,401	0	19	19	0.0000%	0.0098%	0.0025%
	3	2,667,564	522,291	3,189,855	2,667,563	522,348	3,189,911	-1	57	56	0.0000%	0.0110%	0.0018%
	Total	**3,560,814**	**827,199**	**4,388,014**	**3,560,813**	**827,278**	**4,388,091**	**-1**	**78**	**77**	**0.0000%**	**0.0228%**	**0.0048%**
PM	1	427,049	154,803	581,852	427,050	154,805	581,855	0	2	2	0.0000%	0.0015%	0.0004%
	2	1,729,534	512,520	2,242,054	1,729,534	512,557	2,242,091	0	37	37	0.0000%	0.0072%	0.0017%
	3	2,847,863	621,848	3,469,711	2,847,862	621,882	3,469,744	0	34	34	0.0000%	0.0054%	0.0010%
	Total	**5,004,445**	**1,289,171**	**6,293,617**	**5,004,445**	**1,289,244**	**6,293,690**	**0**	**73**	**73**	**0.0000%**	**0.0141%**	**0.0030%**

Table 6-2 Pre and Post VDM matrix comparison - Do Minimum scenario – 2042

Time Period	UC	Pre VDM 2042			Post VDM 2042			Difference			% Difference		
		Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total
AM	1	430,945	196,498	627,443	430,944	196,534	627,479	-1	36	35	-0.0001%	0.0183%	0.0056%
	2	2,178,820	531,936	2,710,755	2,178,820	531,904	2,710,723	0	-32	-32	0.0000%	-0.0060%	-0.0012%
	3	2,305,867	529,602	2,835,469	2,305,866	529,671	2,835,536	-2	69	67	-0.0001%	0.0130%	0.0024%
	Total	**4,915,632**	**1,258,036**	**6,173,667**	**4,915,630**	**1,258,108**	**6,173,738**	**-2**	**73**	**71**	**-0.0002%**	**0.0253%**	**0.0069%**
IP	1	355,902	123,904	479,806	355,901	123,908	479,810	0	4	4	-0.0001%	0.0034%	0.0008%
	2	607,519	205,293	812,812	607,519	205,325	812,843	0	31	31	0.0000%	0.0152%	0.0038%
	3	3,006,991	596,391	3,603,382	3,006,984	596,611	3,603,595	-6	220	213	-0.0002%	0.0368%	0.0059%
	Total	**3,970,411**	**925,589**	**4,896,000**	**3,970,404**	**925,844**	**4,896,248**	**-7**	**255**	**248**	**-0.0003%**	**0.0553%**	**0.0105%**
PM	1	464,500	168,375	632,875	464,500	168,378	632,879	0	4	3	0.0000%	0.0021%	0.0005%
	2	1,864,956	552,611	2,417,567	1,864,956	552,608	2,417,564	0	-3	-2	0.0000%	-0.0005%	-0.0001%
	3	3,180,167	702,647	3,882,814	3,180,162	702,768	3,882,930	-5	121	116	-0.0001%	0.0172%	0.0030%
	Total	**5,509,623**	**1,423,633**	**6,933,256**	**5,509,618**	**1,423,755**	**6,933,373**	**-5**	**122**	**117**	**-0.0002%**	**0.0188%**	**0.0034%**

Table 6-3 Pre and Post VDM matrix comparison – Do Minimum scenario – 2051

Time Period	UC	Pre VDM 2051			Post VDM 2051			Difference			% Difference		
		Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total	Intrazonal	Inter Zonal	Grand Total
AM	1	455,829	206,817	662,645	455,829	206,824	662,653	0	7	7	0.0000%	0.0036%	0.0011%
	2	2,295,540	561,404	2,856,944	2,295,540	561,317	2,856,857	1	-88	-87	0.0000%	-0.0156%	-0.0030%
	3	2,455,619	563,913	3,019,532	2,455,618	563,929	3,019,547	-1	16	15	0.0000%	0.0028%	0.0005%
	Total	**5,206,987**	**1,332,133**	**6,539,121**	**5,206,987**	**1,332,069**	**6,539,056**	**0**	**-64**	**-64**	**0.0000%**	**-0.0092%**	**-0.0014%**
IP	1	375,355	129,602	504,956	375,354	129,606	504,961	0	5	4	-0.0001%	0.0036%	0.0009%
	2	635,577	215,103	850,681	635,577	215,133	850,711	0	30	30	0.0000%	0.0140%	0.0035%
	3	3,195,208	633,240	3,828,448	3,195,202	633,472	3,828,674	-6	232	226	-0.0002%	0.0366%	0.0059%
	Total	**4,206,140**	**977,945**	**5,184,084**	**4,206,133**	**978,212**	**5,184,345**	**-7**	**267**	**260**	**-0.0003%**	**0.0542%**	**0.0103%**
PM	1	490,148	177,225	667,373	490,148	177,231	667,379	0	6	6	0.0000%	0.0033%	0.0009%
	2	1,955,643	580,097	2,535,740	1,955,643	580,056	2,535,699	0	-41	-41	0.0000%	-0.0071%	-0.0016%
	3	3,372,706	746,156	4,118,862	3,372,702	746,243	4,118,944	-5	87	82	-0.0001%	0.0116%	0.0020%
	Total	**5,818,497**	**1,503,479**	**7,321,976**	**5,818,493**	**1,503,530**	**7,322,022**	**-4**	**51**	**47**	**-0.0001%**	**0.0077%**	**0.0012%**

Impact of Variable Demand Modelling – sector analysis

In order to further understand the effect of VDM, the fixed demand forecast matrices have been compared against the post VDM matrices at a sector level for all modelled time periods and years.

For this comparison, only the car user classes have been assessed as the LGV and HGV user classes are excluded from the VDM process.

For ease of analysis and understanding of the trip making patterns, the zoning system is grouped together into sectors. The 18 sectors were developed to take into account model screenlines and sector-to-sector movements to, from and within the A12 scheme impact area. Table 6-4 lists the sector names and these are geographically shown in Plate 6-1 and Plate 6-2.

Table 6-4 Sector names

No.	Sector Name	Sector Type
1	South Colchester	Internal
2	North Chelmsford	Internal
3	Maldon	Internal
4	North Essex	External
5	Tendring	Internal
6	South Essex	External
7	West Essex	External
8	Greater London	External
9	South East	External
10	Norfolk	External
11	Hertford, Bedford & Cambridge	External
12	Rest of UK	External
13	Suffolk	External
14	South Chelmsford	Internal
15	South East Essex	External
16	Braintree	Internal
17	North Colchester	Internal
18	Epping Forest & Harlow	External

Plate 6-1 A12 UK sector system

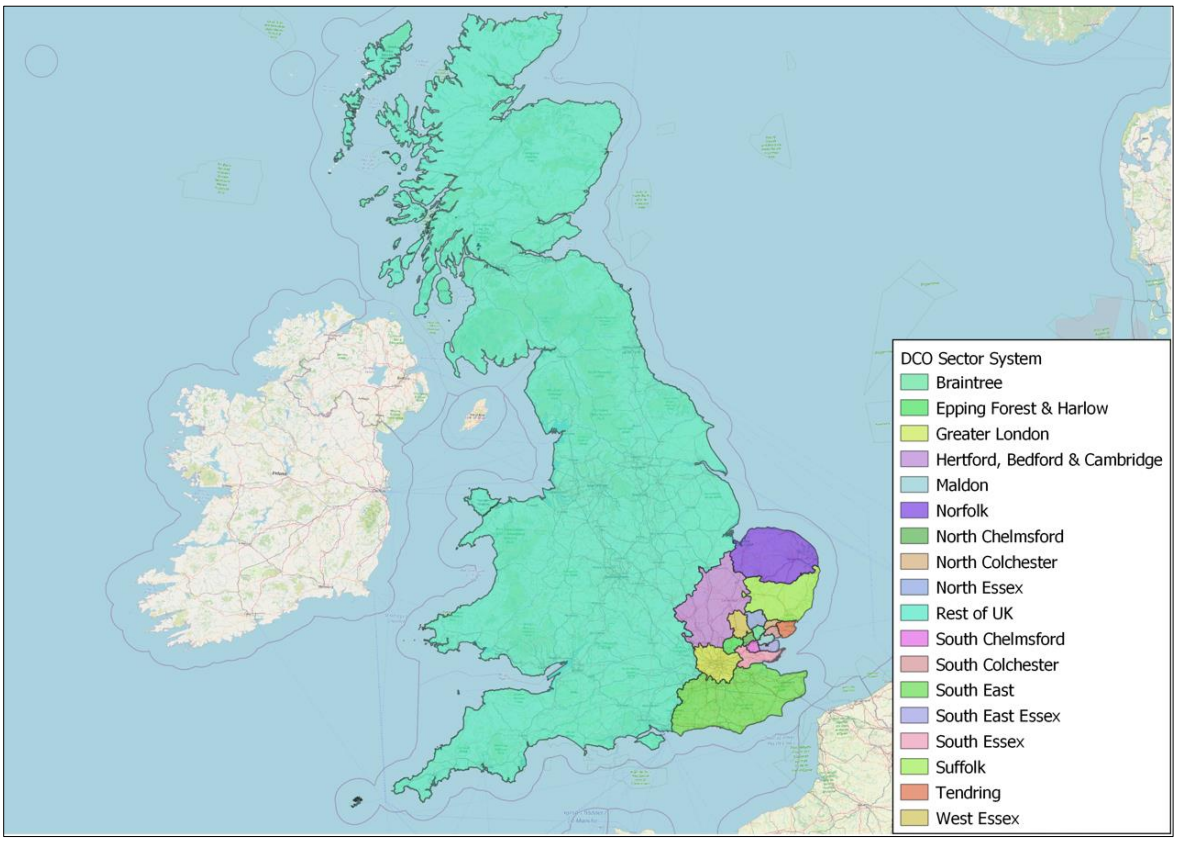
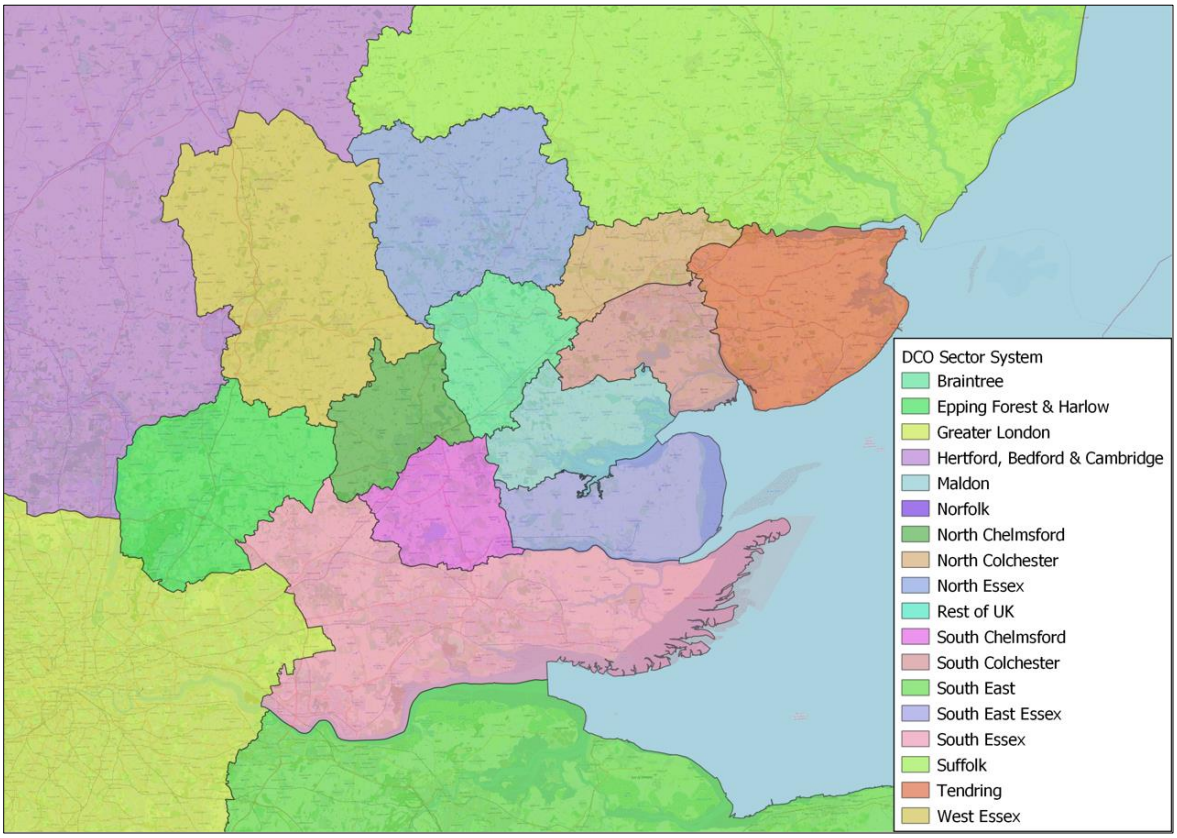


Plate 6-2 A12 sector system – simulation area



Sector demand comparisons for all future years and time periods is included in Appendix E.

In the Do Minimum models the biggest reduction in internal trips was observed in South Chelmsford (Sector 14) and Braintree (Sector 16), while there was an increase in trips between South Essex and Chelmsford. This shows that over time, in response to VDM, there is a switch from shorter distance to longer distance trips due to the distance-based element of travel cost (vehicle operating cost) decreasing while the time base element (value of time) is increasing. As a result, longer distance but faster trips become more attractive. This is a common response in forecast year VDMs.

There is a further increase in trip length between the Do Minimum and Do Something scenarios due to the scheme increasing speeds through the network and therefore meaning that for a similar overall travel cost, driver can reach destinations that are further away.

As expected, the bigger changes occur within, or to and from, the sectors around the scheme or for sector-to-sector movements that pass through the scheme area. For example, a reduction in trips is observed between South Colchester (sector 1) and North Colchester (sector 17) and between North Chelmsford (sector 2) and South Chelmsford (sector 14). An increase in trips is seen between Chelmsford and Colchester. Intra-sector trips for these sectors decrease when compared to the post-VDM Do Minimum trips.

Table 6-5 to Table 6-13 show the sector comparison between post-VDM and pre-VDM for Do Minimum and Do Something scenarios for 2027 for all three peaks. The red highlight indicates a reduction of trips post-VDM and yellow highlights the sectors where the VDM process has increased the trips.

Table 6-5 Sector Comparison – 2027 AM Do Minimum (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford &	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest &
South Colchester	0.21%	-0.44%	2.63%	1.58%	2.98%	-2.10%	1.16%	6.79%	13.10%	14.79%	6.57%	29.73%	2.18%	-3.97%	-1.18%	-0.82%	-1.58%	0.32%
North Chelmsford	-4.20%	-1.06%	1.80%	7.99%	-4.42%	-0.35%	2.22%	6.30%	14.16%	18.92%	6.05%	30.19%	3.61%	-1.83%	2.23%	2.91%	-4.33%	1.18%
Maldon	1.32%	2.52%	-1.08%	-0.04%	-3.25%	0.71%	2.91%	4.55%	15.24%	11.56%	7.19%	26.38%	-1.08%	-1.44%	-0.55%	-0.54%	-4.09%	-5.18%
North Essex	0.57%	1.81%	1.73%	0.15%	-0.98%	3.45%	-0.83%	1.96%	3.89%	1.60%	0.15%	6.28%	0.23%	2.68%	-4.80%	-1.01%	1.35%	0.54%
Tendring	0.40%	-2.51%	-2.73%	-1.39%	0.00%	-0.21%	-0.25%	0.33%	0.81%	1.00%	0.34%	2.81%	0.11%	-6.20%	-11.84%	-5.82%	1.32%	-0.09%
South Essex	-11.26%	-0.44%	1.67%	10.69%	-0.23%	0.00%	0.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.09%	6.13%	-4.46%	-10.55%	0.00%
West Essex	-2.36%	-0.79%	0.75%	-0.77%	-0.13%	0.33%	-0.10%	0.11%	0.17%	0.07%	-0.01%	0.15%	0.01%	2.79%	9.93%	0.40%	-1.61%	0.03%
Greater London	-11.84%	3.66%	-3.17%	3.20%	-0.19%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.48%	5.75%	3.53%	-9.13%	0.00%
South East	-7.09%	4.89%	-0.62%	3.59%	-0.14%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.82%	6.70%	-0.29%	-6.92%	0.00%
Norfolk	-1.46%	-0.46%	0.31%	1.59%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.19%	-3.01%	4.00%	-0.33%	0.00%
Hertford, Bedford & Cambridge	-4.62%	0.92%	-0.25%	-0.06%	-0.12%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.12%	4.65%	1.05%	-2.84%	0.00%
Rest of UK	-5.21%	3.55%	0.33%	1.44%	-0.09%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.23%	5.92%	3.80%	-3.60%	0.00%
Suffolk	-1.80%	-1.33%	0.74%	0.13%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.23%	-3.77%	-1.10%	1.38%	0.00%
South Chelmsford	-8.19%	-1.52%	-2.20%	15.32%	-5.89%	1.20%	6.19%	6.03%	13.38%	10.83%	7.49%	22.28%	1.53%	-1.40%	2.20%	3.31%	-9.88%	1.70%
South East Essex	-4.13%	-0.97%	-3.60%	-0.28%	-12.89%	2.30%	6.19%	7.16%	15.94%	4.34%	8.85%	29.83%	-8.19%	0.42%	-1.14%	-5.46%	-14.14%	-2.55%
Braintree	-1.99%	0.72%	0.66%	-0.24%	-4.42%	2.28%	1.70%	9.73%	16.92%	15.50%	5.29%	30.10%	1.65%	0.43%	-1.86%	-1.07%	-3.35%	5.81%
North Colchester	-1.31%	-1.47%	-0.75%	3.06%	2.37%	-2.18%	1.26%	6.48%	11.60%	11.48%	5.49%	21.35%	3.03%	-5.62%	-8.62%	-2.33%	0.74%	3.78%
Epping Forest & Harlow	-2.35%	-0.50%	-2.82%	1.15%	-0.08%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.65%	-0.53%	4.27%	-1.50%	0.00%

Table 6-6 Sector Comparison – 2027 AM Do Something (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	-1.25%	37.04%	5.21%	-2.21%	1.18%	23.24%	0.10%	28.16%	34.22%	13.13%	9.56%	39.21%	0.81%	25.20%	0.37%	0.10%	-3.53%	17.04%
North Chelmsford	42.49%	-2.30%	1.78%	8.42%	31.07%	-2.69%	1.55%	4.05%	10.82%	26.40%	4.68%	28.17%	29.11%	-3.50%	-0.54%	2.60%	40.10%	-0.20%
Maldon	4.37%	0.43%	-0.68%	-0.37%	3.54%	0.95%	3.98%	2.47%	12.39%	14.34%	7.44%	24.53%	5.16%	-2.96%	0.01%	-1.32%	1.52%	-5.74%
North Essex	-4.11%	4.97%	-1.48%	-0.02%	-1.33%	2.95%	-0.64%	2.19%	3.44%	1.52%	0.35%	6.22%	0.22%	8.24%	-1.95%	-0.55%	-1.87%	1.00%
Tendring	-1.47%	29.21%	2.35%	-1.93%	-0.05%	1.47%	-0.24%	2.51%	2.35%	0.78%	0.66%	4.00%	-0.08%	29.87%	-7.73%	-1.98%	-1.22%	0.71%
South Essex	15.26%	-3.46%	1.24%	8.60%	0.27%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.16%	5.54%	-7.10%	10.84%	0.00%
West Essex	-3.15%	-0.61%	-1.69%	-0.39%	-0.13%	0.28%	-0.09%	0.11%	0.13%	0.07%	-0.01%	0.15%	0.01%	1.56%	7.72%	1.12%	-1.21%	0.04%
Greater London	13.14%	-1.01%	-5.54%	2.74%	0.21%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.00%	2.73%	1.47%	8.21%	0.00%
South East	8.97%	-1.03%	-4.47%	2.23%	0.18%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.16%	2.66%	-4.77%	6.15%	0.00%
Norfolk	-5.12%	13.05%	0.93%	1.42%	-0.06%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	12.89%	1.09%	3.00%	-3.38%	0.00%
Hertford, Bedford & Cambridge	1.27%	0.07%	-2.82%	0.04%	-0.02%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.39%	2.41%	1.60%	-0.21%	0.00%
Rest of UK	5.16%	-0.14%	-2.21%	1.03%	0.06%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.78%	2.75%	1.87%	3.19%	0.00%
Suffolk	-4.79%	21.19%	3.04%	0.11%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.45%	-2.22%	0.58%	-1.67%	0.00%
South Chelmsford	31.83%	-3.15%	-1.36%	14.47%	24.08%	0.85%	4.86%	4.94%	11.56%	23.22%	6.28%	21.31%	26.55%	-2.46%	2.21%	1.72%	30.23%	0.73%
South East Essex	1.31%	-3.38%	-3.71%	1.40%	4.91%	2.36%	3.75%	5.52%	14.29%	13.45%	6.42%	28.20%	7.20%	-0.24%	-1.22%	-6.41%	6.69%	-3.70%
Braintree	-1.60%	1.64%	0.74%	-0.08%	-1.38%	-0.41%	2.12%	8.53%	13.60%	15.71%	5.90%	29.26%	2.37%	-0.37%	-0.15%	-1.18%	-1.41%	6.77%
North Colchester	-3.28%	38.43%	3.06%	1.54%	0.20%	22.90%	1.88%	23.26%	26.92%	9.76%	8.05%	26.64%	1.17%	32.36%	-5.39%	3.07%	-1.72%	14.06%
Epping Forest & Harlow	8.56%	-1.11%	-3.30%	1.54%	0.17%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.85%	-1.21%	5.29%	5.28%	0.00%

Table 6-7 Sector Comparison – 2027 AM (Do Something post-VDM vs Do Minimum post-VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	-1.45%	37.64%	2.51%	-3.74%	-1.75%	25.87%	-1.05%	20.01%	18.67%	-1.44%	2.81%	7.31%	-1.35%	30.38%	1.58%	0.92%	-1.98%	16.66%
North Chelmsford	48.74%	-1.25%	-0.02%	0.41%	37.12%	-2.34%	-0.66%	-2.12%	-2.93%	6.30%	-1.29%	-1.55%	24.61%	-1.71%	-2.71%	-0.30%	46.43%	-1.37%
Maldon	3.02%	-2.04%	0.40%	-0.33%	7.01%	0.23%	1.04%	-1.99%	-2.47%	2.50%	0.23%	-1.46%	6.31%	-1.54%	0.56%	-0.78%	5.85%	-0.60%
North Essex	-4.65%	3.10%	-3.15%	-0.17%	-0.35%	-0.48%	0.20%	0.22%	-0.44%	-0.08%	0.20%	-0.06%	-0.01%	5.41%	2.99%	0.46%	-3.18%	0.47%
Tendring	-1.86%	32.54%	5.21%	-0.54%	-0.05%	1.69%	0.01%	2.17%	1.52%	-0.23%	0.31%	1.16%	-0.18%	38.45%	4.66%	4.07%	-2.50%	0.80%
South Essex	29.88%	-3.03%	-0.42%	-1.88%	0.50%	0.00%	-0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.24%	-0.56%	-2.76%	23.91%	0.00%
West Essex	-0.81%	0.19%	-2.42%	0.38%	0.00%	-0.05%	0.01%	0.00%	-0.03%	0.00%	0.00%	0.00%	0.00%	-1.20%	-2.01%	0.72%	0.41%	0.02%
Greater London	28.33%	-4.50%	-2.45%	-0.45%	0.39%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.43%	-2.85%	-1.99%	19.09%	0.00%
South East	17.29%	-5.65%	-3.88%	-1.32%	0.33%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.87%	-3.79%	-4.50%	14.04%	0.00%
Norfolk	-3.72%	13.57%	0.61%	-0.17%	-0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	16.61%	4.23%	-0.96%	-3.06%	0.00%
Hertford, Bedford & Cambridge	6.17%	-0.85%	-2.58%	0.11%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.49%	-2.14%	0.54%	2.71%	0.00%
Rest of UK	10.94%	-3.57%	-2.54%	-0.40%	0.15%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.94%	-3.00%	-1.85%	7.05%	0.00%
Suffolk	-3.05%	22.83%	2.29%	-0.02%	-0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	23.19%	1.61%	1.70%	-3.01%	0.00%
South Chelmsford	43.59%	-1.65%	0.85%	-0.74%	31.84%	-0.34%	-1.25%	-1.03%	-1.60%	11.18%	-1.12%	-0.80%	24.65%	-1.07%	0.01%	-1.54%	44.51%	-0.95%
South East Essex	5.68%	-2.43%	-0.12%	1.69%	20.43%	0.06%	-2.30%	-1.53%	-1.42%	8.73%	-2.24%	-1.26%	16.76%	-0.66%	-0.08%	-1.01%	24.26%	-1.19%
Braintree	0.39%	0.92%	0.07%	0.16%	3.19%	-2.63%	0.42%	-1.09%	-2.84%	0.18%	0.59%	-0.64%	0.71%	-0.80%	1.74%	-0.12%	2.01%	0.91%
North Colchester	-1.99%	40.49%	3.83%	-1.47%	-2.12%	25.64%	0.61%	15.75%	13.73%	-1.54%	2.42%	4.35%	-1.81%	40.25%	3.54%	5.54%	-2.43%	9.90%
Epping Forest & Harlow	11.17%	-0.61%	-0.50%	0.39%	0.25%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.20%	-0.69%	0.98%	6.89%	0.00%

Table 6-8 Sector Comparison – 2027 IP Do Minimum (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	0.00%	7.84%	3.79%	3.45%	1.86%	5.95%	6.43%	9.65%	17.66%	11.87%	10.73%	30.09%	2.52%	1.85%	1.05%	-0.66%	-3.12%	7.44%
North Chelmsford	1.91%	-2.11%	2.22%	5.82%	3.26%	2.57%	1.44%	5.28%	15.00%	14.18%	6.69%	26.26%	7.12%	-1.12%	6.58%	1.20%	1.14%	2.58%
Maldon	1.80%	4.63%	-2.96%	2.64%	1.40%	2.13%	7.96%	6.54%	16.13%	12.95%	12.37%	28.86%	4.54%	-1.14%	-2.59%	-1.11%	-1.59%	3.71%
North Essex	2.47%	5.13%	1.99%	0.38%	-0.08%	5.95%	-0.61%	3.52%	9.04%	1.54%	0.80%	7.50%	0.17%	11.45%	2.33%	-1.83%	2.64%	1.51%
Tendring	0.77%	6.77%	2.94%	0.38%	-0.14%	0.19%	0.38%	0.35%	0.57%	0.42%	0.39%	1.17%	0.24%	2.49%	-3.18%	1.10%	0.54%	0.22%
South Essex	-3.43%	0.58%	-2.20%	9.64%	-0.01%	0.00%	0.73%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.77%	-1.07%	7.63%	-3.31%	0.00%
West Essex	1.04%	-1.61%	0.58%	-0.94%	0.12%	0.52%	-0.07%	0.07%	0.14%	0.05%	0.01%	0.12%	0.02%	2.32%	17.46%	0.93%	0.36%	0.03%
Greater London	-1.05%	1.69%	-1.14%	1.65%	0.04%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.83%	4.62%	4.70%	-1.15%	0.00%
South East	-1.02%	1.54%	-0.75%	1.47%	0.01%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.03%	2.63%	1.63%	-1.38%	0.00%
Norfolk	0.52%	2.73%	1.37%	0.28%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.89%	-2.29%	0.23%	0.42%	0.00%
Hertford, Bedford & Cambridge	-0.29%	-0.54%	-0.49%	-0.35%	0.00%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.74%	5.14%	1.54%	-0.73%	0.00%
Rest of UK	-0.55%	1.26%	0.07%	0.56%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.90%	3.02%	2.70%	-0.61%	0.00%
Suffolk	-0.12%	3.84%	2.14%	0.13%	0.13%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.43%	-3.38%	0.14%	-0.44%	0.00%
South Chelmsford	-0.66%	-1.00%	-1.67%	15.92%	1.63%	0.82%	7.17%	4.62%	12.82%	12.45%	8.54%	24.63%	7.10%	-1.74%	-0.57%	4.19%	-0.75%	2.92%
South East Essex	-1.14%	5.25%	-4.08%	-0.06%	-5.29%	1.19%	17.39%	9.98%	16.29%	9.32%	17.36%	30.74%	3.99%	-0.83%	-3.02%	-3.40%	-8.02%	5.80%
Braintree	-1.70%	3.33%	-0.94%	-0.83%	0.47%	10.15%	3.01%	11.22%	21.93%	12.82%	10.12%	30.72%	4.00%	3.90%	-0.37%	-2.13%	-2.13%	8.05%
North Colchester	-1.65%	9.14%	3.08%	3.05%	2.06%	5.31%	5.80%	9.22%	15.87%	8.18%	8.60%	21.06%	3.15%	3.39%	-3.36%	0.14%	-0.12%	7.89%
Epping Forest & Harlow	-0.28%	-0.89%	-1.79%	0.76%	0.05%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.65%	-0.05%	4.45%	-0.66%	0.00%

Table 6-9 Sector Comparison – 2027 IP Do Something (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	-0.37%	27.09%	3.57%	3.09%	1.37%	20.63%	7.21%	21.82%	28.21%	11.37%	14.30%	37.05%	2.13%	13.04%	0.70%	-2.16%	-3.32%	16.74%
North Chelmsford	28.84%	-2.19%	1.17%	6.33%	25.90%	1.72%	1.36%	4.25%	14.45%	20.28%	6.35%	26.04%	22.46%	-1.75%	4.62%	0.29%	24.19%	1.98%
Maldon	3.64%	-0.06%	-2.54%	2.03%	8.43%	0.77%	7.13%	4.20%	14.49%	15.77%	11.33%	27.97%	8.72%	-3.25%	-2.21%	-0.23%	3.04%	1.16%
North Essex	0.32%	6.21%	0.13%	0.32%	-0.41%	5.70%	-0.55%	3.39%	8.58%	1.55%	0.84%	7.54%	0.17%	12.53%	2.18%	-1.42%	1.42%	1.70%
Tendring	0.18%	24.44%	4.10%	0.34%	-0.17%	0.59%	0.38%	0.81%	0.92%	0.40%	0.52%	1.44%	0.20%	15.68%	-7.36%	1.12%	-0.36%	0.46%
South Essex	14.02%	-0.72%	-2.13%	8.18%	0.43%	0.00%	0.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.24%	-1.69%	5.18%	10.49%	0.00%
West Essex	0.16%	-1.61%	-0.94%	-0.88%	0.03%	0.49%	-0.07%	0.06%	0.13%	0.05%	0.01%	0.12%	0.02%	1.84%	15.80%	1.25%	-0.09%	0.03%
Greater London	15.42%	-1.47%	-3.08%	1.04%	0.44%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.06%	1.71%	2.00%	9.90%	0.00%
South East	10.22%	-1.96%	-3.30%	0.47%	0.25%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.37%	-0.67%	-1.98%	6.55%	0.00%
Norfolk	-1.66%	8.07%	-0.20%	0.13%	-0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.48%	-7.07%	-1.08%	-1.14%	0.00%
Hertford, Bedford & Cambridge	2.66%	-1.14%	-1.84%	-0.34%	0.06%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.30%	3.30%	1.54%	0.64%	0.00%
Rest of UK	6.76%	-1.04%	-2.01%	0.23%	0.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.84%	0.14%	0.76%	3.65%	0.00%
Suffolk	-1.45%	14.76%	1.45%	0.12%	0.02%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	11.25%	-7.88%	0.80%	-1.52%	0.00%
South Chelmsford	17.71%	-1.57%	-1.82%	15.76%	20.28%	0.60%	6.20%	3.91%	12.37%	21.55%	7.74%	24.46%	19.85%	-2.07%	-0.79%	2.33%	19.38%	2.29%
South East Essex	-0.16%	3.60%	-3.83%	-0.11%	0.89%	1.27%	14.27%	9.75%	16.31%	11.40%	15.68%	30.73%	6.66%	-0.99%	-2.91%	-3.14%	-2.68%	5.48%
Braintree	-1.75%	1.85%	0.61%	-0.25%	0.64%	7.42%	3.54%	10.03%	20.45%	14.12%	10.72%	31.57%	5.09%	1.10%	0.66%	-1.98%	-1.78%	8.17%
North Colchester	-2.12%	29.29%	4.85%	3.28%	1.03%	18.34%	6.25%	19.67%	24.49%	7.73%	10.94%	26.20%	2.46%	21.71%	-7.63%	0.75%	-1.05%	15.54%
Epping Forest & Harlow	16.26%	-1.64%	-2.03%	0.78%	0.40%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.51%	-1.43%	4.20%	10.14%	0.00%

Table 6-10 Sector Comparison – 2027 IP (Do Something post-VDM vs Do Minimum post-VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	-0.37%	17.85%	-0.21%	-0.35%	-0.48%	13.85%	0.73%	11.09%	8.97%	-0.44%	3.22%	5.35%	-0.38%	10.99%	-0.35%	-1.52%	-0.21%	8.66%
North Chelmsford	26.43%	-0.08%	-1.03%	0.48%	21.92%	-0.82%	-0.08%	-0.98%	-0.48%	5.34%	-0.31%	-0.18%	14.32%	-0.64%	-1.84%	-0.89%	22.79%	-0.58%
Maldon	1.81%	-4.48%	0.43%	-0.60%	6.93%	-1.33%	-0.77%	-2.20%	-1.41%	2.50%	-0.93%	-0.70%	4.00%	-2.13%	0.39%	0.89%	4.70%	-2.46%
North Essex	-2.10%	1.03%	-1.83%	-0.06%	-0.33%	-0.23%	0.06%	-0.13%	-0.43%	0.01%	0.04%	0.04%	0.00%	0.97%	-0.15%	0.41%	-1.19%	0.19%
Tendring	-0.58%	16.54%	1.13%	-0.04%	-0.03%	0.40%	0.00%	0.46%	0.35%	-0.02%	0.13%	0.28%	-0.05%	12.87%	-4.32%	0.03%	-0.89%	0.24%
South Essex	18.07%	-1.29%	0.07%	-1.33%	0.44%	0.00%	-0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.48%	-0.63%	-2.27%	14.27%	0.00%
West Essex	-0.87%	0.00%	-1.52%	0.06%	-0.08%	-0.03%	0.00%	-0.01%	-0.01%	0.00%	0.00%	0.00%	0.00%	-0.47%	-1.41%	0.31%	-0.45%	0.00%
Greater London	16.65%	-3.11%	-1.96%	-0.61%	0.41%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.87%	-2.78%	-2.58%	11.18%	0.00%
South East	11.35%	-3.44%	-2.57%	-0.98%	0.24%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.38%	-3.21%	-3.56%	8.03%	0.00%
Norfolk	-2.17%	5.20%	-1.54%	-0.14%	-0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.55%	-4.89%	-1.30%	-1.55%	0.00%
Hertford, Bedford & Cambridge	2.96%	-0.61%	-1.36%	0.01%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.03%	-1.76%	0.00%	1.38%	0.00%
Rest of UK	7.35%	-2.27%	-2.08%	-0.33%	0.23%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.72%	-2.80%	-1.89%	4.29%	0.00%
Suffolk	-1.33%	10.52%	-0.67%	-0.01%	-0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	9.68%	-4.65%	0.66%	-1.08%	0.00%
South Chelmsford	18.49%	-0.57%	-0.15%	-0.14%	18.35%	-0.21%	-0.91%	-0.68%	-0.40%	8.10%	-0.74%	-0.14%	11.91%	-0.34%	-0.22%	-1.79%	20.28%	-0.61%
South East Essex	0.99%	-1.57%	0.26%	-0.05%	6.52%	0.08%	-2.66%	-0.21%	0.02%	1.91%	-1.43%	-0.01%	2.56%	-0.17%	0.12%	0.27%	5.80%	-0.30%
Braintree	-0.06%	-1.44%	1.56%	0.58%	0.17%	-2.48%	0.52%	-1.07%	-1.22%	1.15%	0.54%	0.65%	1.05%	-2.69%	1.03%	0.16%	0.37%	0.11%
North Colchester	-0.48%	18.46%	1.72%	0.23%	-1.01%	12.37%	0.43%	9.57%	7.43%	-0.41%	2.15%	4.25%	-0.67%	17.72%	-4.42%	0.62%	-0.93%	7.10%
Epping Forest & Harlow	16.58%	-0.76%	-0.24%	0.01%	0.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.87%	-1.38%	-0.24%	10.88%	0.00%

Table 6-11 Sector Comparison – 2027 PM Do Minimum (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	0.90%	4.61%	2.75%	2.13%	1.39%	-3.57%	2.09%	-0.26%	10.68%	5.30%	6.33%	27.97%	-0.39%	-3.61%	-1.59%	-1.21%	-3.66%	-0.03%
North Chelmsford	-4.45%	-0.06%	-0.50%	3.19%	-6.50%	0.46%	5.07%	4.00%	12.34%	19.09%	8.29%	26.68%	0.51%	-1.28%	-0.70%	-0.11%	-6.11%	2.69%
Maldon	0.82%	4.37%	-1.53%	1.17%	-3.79%	0.14%	4.94%	-0.51%	8.06%	7.15%	7.19%	27.51%	1.11%	-2.43%	-2.01%	0.24%	-3.11%	-1.29%
North Essex	0.91%	5.37%	-1.33%	0.39%	-1.49%	3.39%	-0.67%	1.99%	7.36%	2.34%	-0.02%	6.80%	0.03%	7.92%	-5.62%	-1.40%	2.94%	1.31%
Tendring	1.45%	2.06%	-0.92%	-0.65%	-0.06%	-0.13%	0.00%	0.02%	0.39%	0.24%	0.24%	0.96%	0.03%	-2.46%	-10.14%	-3.45%	0.42%	0.05%
South Essex	-6.57%	0.88%	-0.11%	3.12%	-0.49%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.52%	1.58%	-1.27%	-9.11%	0.00%
West Essex	-2.79%	-1.27%	-2.45%	-0.70%	-0.30%	0.09%	-0.09%	0.03%	0.04%	0.04%	-0.01%	0.06%	0.01%	1.65%	1.38%	1.45%	-2.86%	0.02%
Greater London	-5.82%	3.17%	-2.03%	0.99%	-0.46%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.72%	7.03%	3.26%	-4.91%	0.00%
South East	-5.32%	3.12%	-1.28%	0.92%	-0.47%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.26%	5.36%	-1.97%	-5.42%	0.00%
Norfolk	1.81%	3.84%	0.73%	0.99%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.68%	-5.40%	0.45%	1.83%	0.00%
Hertford, Bedford & Cambridge	-3.98%	-0.63%	-1.49%	-0.45%	-0.39%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.15%	0.18%	2.14%	-3.67%	0.00%
Rest of UK	-3.48%	2.68%	-0.67%	0.50%	-0.45%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.03%	2.38%	2.40%	-2.67%	0.00%
Suffolk	0.36%	3.84%	-1.29%	0.14%	-0.03%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.81%	-9.50%	-2.16%	1.23%	0.00%
South Chelmsford	-5.28%	-0.22%	-1.97%	4.22%	-6.62%	0.75%	6.09%	3.27%	12.46%	8.06%	6.15%	24.12%	0.74%	-1.37%	0.07%	0.23%	-6.71%	2.11%
South East Essex	-4.36%	2.32%	-2.70%	-5.52%	-10.24%	2.58%	11.52%	5.11%	16.57%	0.32%	9.32%	26.22%	-7.80%	-0.56%	-1.80%	-2.70%	-10.20%	-0.23%
Braintree	-1.48%	4.38%	-0.62%	-0.13%	-5.50%	-1.04%	1.80%	5.23%	14.12%	6.92%	4.86%	25.52%	0.16%	1.71%	-4.00%	-0.94%	-3.10%	5.23%
North Colchester	0.21%	2.51%	-0.35%	2.32%	0.25%	-3.50%	1.51%	0.40%	7.01%	5.87%	4.08%	27.69%	0.72%	-5.30%	-10.61%	-2.64%	-1.67%	0.17%
Epping Forest & Harlow	-3.99%	-1.54%	-4.87%	-0.06%	-0.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.32%	-2.55%	3.98%	-3.85%	0.00%

Table 6-12 Sector Comparison – 2027 PM Do Something (Post VDM vs Pre VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	0.36%	43.61%	5.45%	0.88%	-0.44%	28.69%	0.71%	24.05%	30.59%	3.19%	10.84%	39.22%	-2.57%	28.04%	4.31%	-2.64%	-5.79%	23.93%
North Chelmsford	54.58%	-4.02%	3.16%	3.76%	44.07%	-2.95%	2.24%	-1.02%	7.31%	25.30%	4.38%	22.22%	28.54%	-4.80%	-3.81%	3.85%	51.79%	0.13%
Maldon	2.52%	-0.15%	-1.62%	-0.87%	4.13%	2.08%	3.82%	-2.12%	5.12%	9.16%	6.35%	25.82%	6.22%	-3.84%	-0.93%	-1.66%	1.94%	-1.34%
North Essex	-6.08%	9.89%	-2.65%	0.11%	-2.90%	4.08%	-0.21%	2.14%	6.91%	2.19%	0.43%	6.63%	-0.02%	12.95%	-0.34%	-0.59%	-1.57%	2.53%
Tendring	0.65%	31.15%	-1.51%	-1.03%	-0.09%	0.85%	-0.16%	0.72%	1.01%	0.18%	0.40%	1.28%	-0.08%	18.60%	-8.83%	-3.73%	-2.08%	0.40%
South Essex	25.41%	-4.19%	-0.17%	2.19%	1.49%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.18%	0.31%	1.72%	31.38%	0.00%
West Essex	-4.84%	-1.59%	-1.80%	-0.66%	-0.56%	0.10%	-0.10%	0.02%	0.04%	0.03%	0.00%	0.06%	0.00%	0.96%	1.62%	1.95%	-4.20%	0.03%
Greater London	29.49%	-3.80%	-2.15%	0.68%	1.54%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.41%	3.25%	2.99%	20.93%	0.00%
South East	24.12%	-5.80%	-4.57%	-1.32%	1.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.43%	-0.84%	-2.64%	17.82%	0.00%
Norfolk	-0.81%	12.50%	-1.11%	0.82%	-0.28%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.00%	-7.68%	-0.92%	-1.17%	0.00%
Hertford, Bedford & Cambridge	3.04%	-1.86%	-2.42%	-0.45%	-0.17%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.22%	-2.30%	2.72%	1.97%	0.00%
Rest of UK	15.13%	-2.23%	-3.11%	-0.15%	0.94%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.44%	-2.47%	0.15%	9.58%	0.00%
Suffolk	-1.92%	27.29%	-0.10%	0.18%	-0.29%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	18.56%	-3.93%	-1.57%	-1.81%	0.00%
South Chelmsford	39.12%	-4.04%	0.76%	4.69%	34.70%	-1.37%	2.20%	-0.79%	8.67%	23.92%	1.28%	21.09%	23.58%	-4.32%	-1.10%	2.60%	44.10%	-0.97%
South East Essex	-3.38%	0.37%	-2.69%	-3.23%	-6.80%	3.58%	9.96%	4.50%	15.29%	5.02%	8.67%	25.60%	-1.50%	-1.34%	-2.16%	-4.12%	-3.75%	0.45%
Braintree	-0.19%	3.48%	-1.52%	0.93%	-5.51%	-1.72%	2.89%	4.23%	11.92%	10.65%	7.28%	24.47%	1.76%	-0.86%	-3.55%	-1.10%	0.80%	8.23%
North Colchester	-0.61%	37.92%	1.33%	2.09%	-2.36%	21.87%	1.83%	19.75%	25.08%	4.36%	8.28%	29.57%	-1.03%	30.32%	-6.45%	-0.43%	-4.11%	17.66%
Epping Forest & Harlow	23.32%	-4.11%	-0.74%	0.12%	0.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.51%	-4.74%	5.43%	12.41%	0.00%

Table 6-13 Sector Comparison – 2027 PM (Do Something post-VDM vs Do Minimum post-VDM)

Sector	South Colchester	North Chelmsford	Maldon	North Essex	Tendring	South Essex	West Essex	Greater London	South East	Norfolk	Hertford, Bedford & Cambridge	Rest of UK	Suffolk	South Chelmsford	South East Essex	Braintree	North Colchester	Epping Forest & Harlow
South Colchester	-0.53%	37.28%	2.63%	-1.21%	-1.81%	33.46%	-1.35%	24.37%	17.99%	-2.01%	4.24%	8.79%	-2.19%	32.84%	6.00%	-1.45%	-2.21%	23.96%
North Chelmsford	61.78%	-3.96%	3.68%	0.55%	54.09%	-3.39%	-2.70%	-4.83%	-4.47%	5.22%	-3.62%	-3.52%	27.88%	-3.56%	-3.13%	3.96%	61.66%	-2.49%
Maldon	1.68%	-4.33%	-0.09%	-2.02%	8.23%	1.94%	-1.07%	-1.61%	-2.72%	1.88%	-0.78%	-1.32%	5.05%	-1.44%	1.10%	-1.90%	5.21%	-0.05%
North Essex	-6.93%	4.29%	-1.34%	-0.28%	-1.43%	0.67%	0.46%	0.14%	-0.42%	-0.15%	0.44%	-0.16%	-0.05%	4.66%	5.59%	0.82%	-4.38%	1.21%
Tendring	-0.78%	28.51%	-0.60%	-0.38%	-0.03%	0.98%	-0.16%	0.71%	0.61%	-0.06%	0.17%	0.31%	-0.10%	21.59%	1.45%	-0.29%	-2.49%	0.35%
South Essex	34.23%	-5.03%	-0.06%	-0.90%	1.99%	0.00%	-0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-1.70%	-1.26%	3.03%	44.55%	0.00%
West Essex	-2.10%	-0.32%	0.66%	0.05%	-0.26%	0.01%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-0.68%	0.24%	0.50%	-1.37%	0.02%
Greater London	37.48%	-6.75%	-0.12%	-0.31%	2.01%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-4.02%	-3.53%	-0.26%	27.18%	0.00%
South East	31.10%	-8.65%	-3.33%	-2.22%	1.86%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-4.59%	-5.88%	-0.69%	24.56%	0.00%
Norfolk	-2.57%	8.34%	-1.82%	-0.16%	-0.32%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.74%	-2.41%	-1.36%	-2.95%	0.00%
Hertford, Bedford & Cambridge	7.32%	-1.23%	-0.94%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-2.34%	-2.48%	0.57%	5.86%	0.00%
Rest of UK	19.28%	-4.78%	-2.46%	-0.65%	1.41%	0.00%	-0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.40%	-4.73%	-2.20%	12.58%	0.00%
Suffolk	-2.28%	22.59%	1.21%	0.04%	-0.25%	0.00%	-0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	21.98%	6.15%	0.61%	-3.00%	0.00%
South Chelmsford	46.87%	-3.83%	2.78%	0.45%	44.25%	-2.10%	-3.67%	-3.93%	-3.37%	14.68%	-4.59%	-2.44%	22.67%	-2.99%	-1.17%	2.36%	54.46%	-3.02%
South East Essex	1.03%	-1.91%	0.01%	2.42%	3.83%	0.98%	-1.40%	-0.59%	-1.10%	4.69%	-0.59%	-0.49%	6.84%	-0.79%	-0.37%	-1.47%	7.19%	0.68%
Braintree	1.32%	-0.87%	-0.91%	1.06%	-0.01%	-0.69%	1.07%	-0.95%	-1.92%	3.49%	2.30%	-0.83%	1.60%	-2.53%	0.47%	-0.16%	4.03%	2.86%
North Colchester	-0.82%	34.55%	1.69%	-0.22%	-2.60%	26.29%	0.32%	19.27%	16.89%	-1.42%	4.04%	1.47%	-1.74%	37.62%	4.65%	2.27%	-2.49%	17.46%
Epping Forest & Harlow	28.44%	-2.61%	4.34%	0.18%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.20%	-2.25%	1.40%	16.91%	0.00%

Impact of Variable Demand – trip length distribution

Trip length distribution analysis has been produced across all zones which are impacted by the VDM process, excluding intra-zonal movements. Charts showing the comparison of the fixed, post-VDM Do Minimum and post-VDM Do Something trip length distributions for 2027 and 2042 AM and PM are shown in Plate 6-3 to Plate 6-6. This highlights that the VDM doesn't significantly alter the trip length distribution patterns on an overall matrix level.

Detailed trip length comparisons are included in Appendix F.

Plate 6-3 Trip length distribution 2027 AM

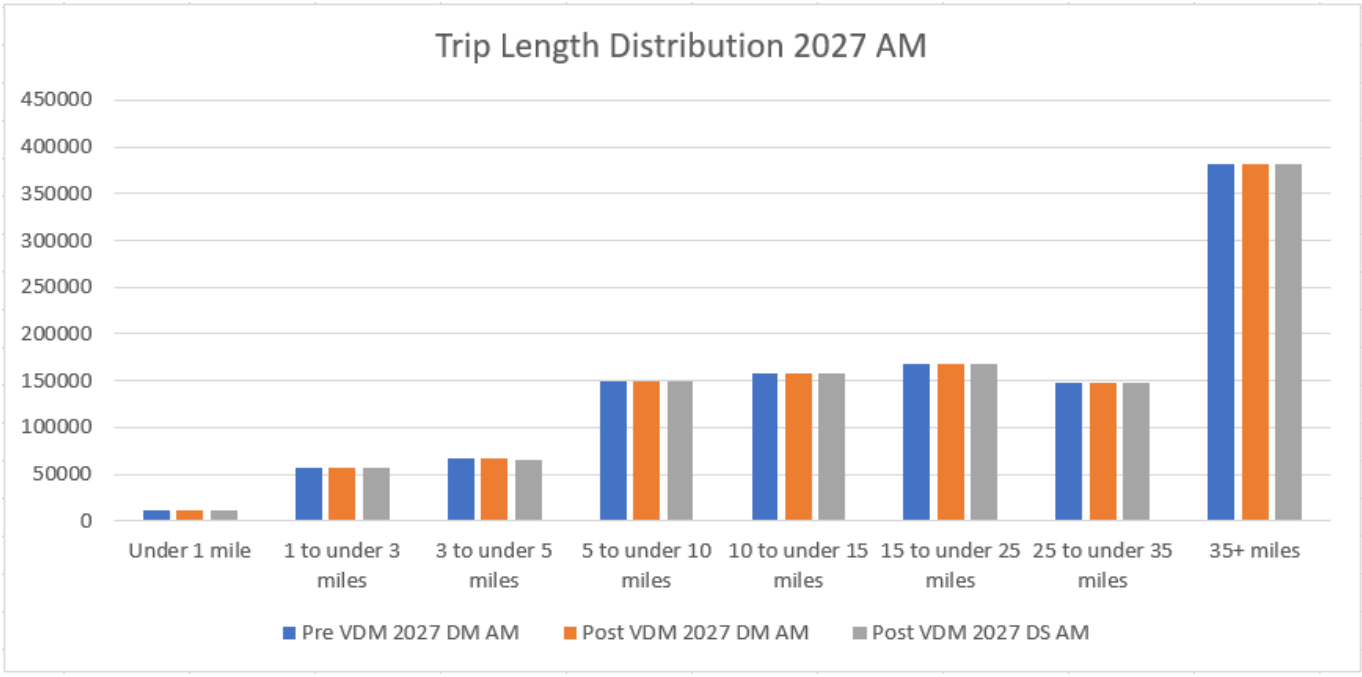


Plate 6-4 Trip length distribution 2027 PM

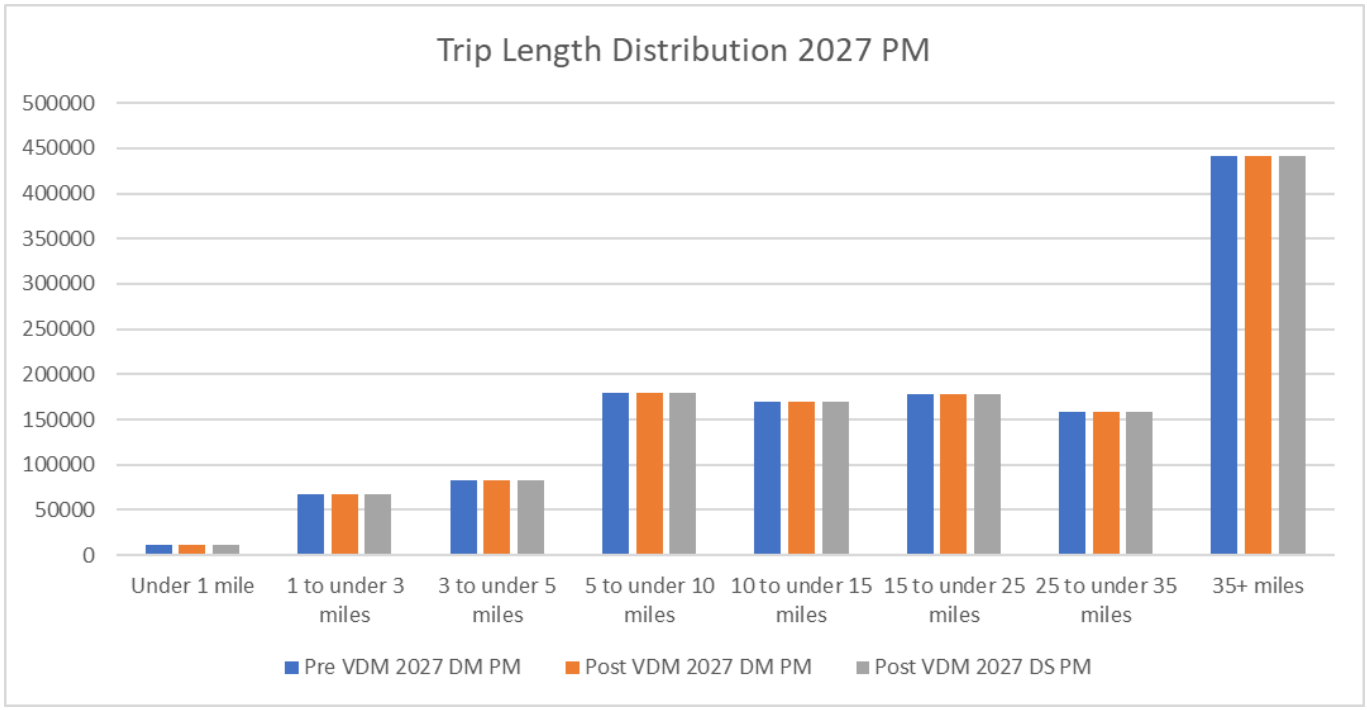


Plate 6-5 Trip length distribution 202 AM

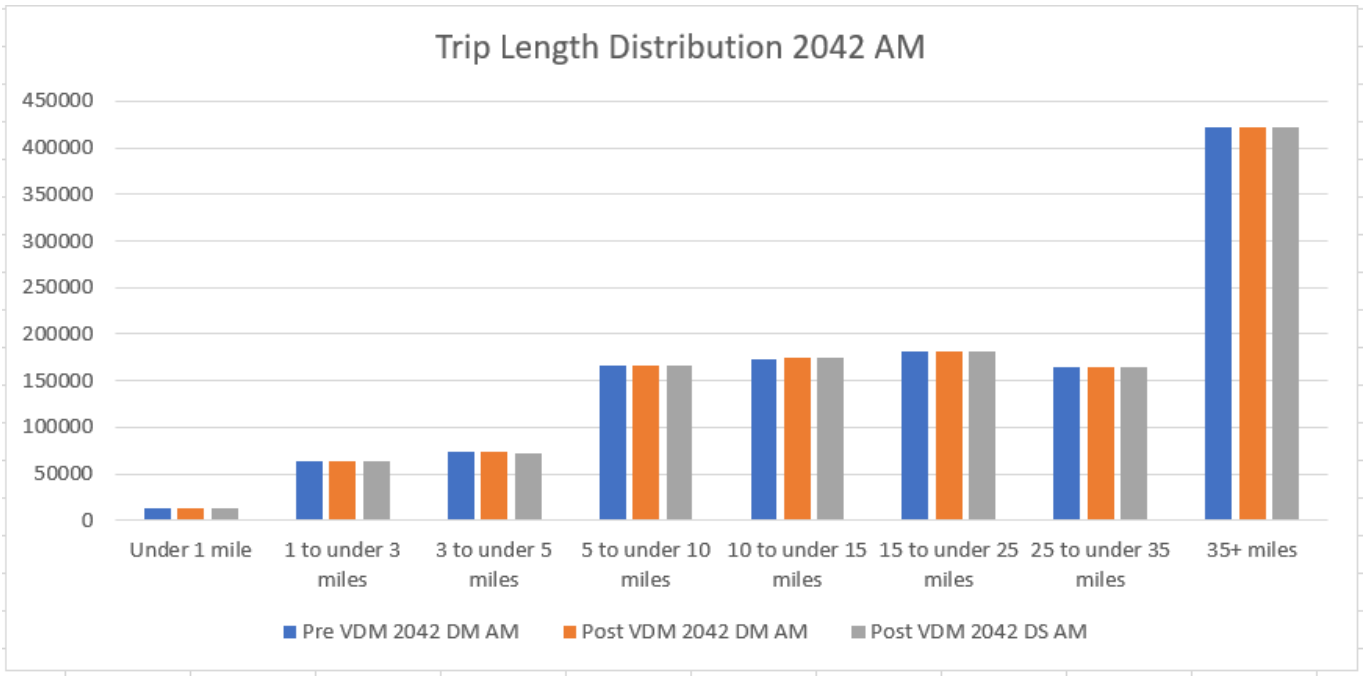
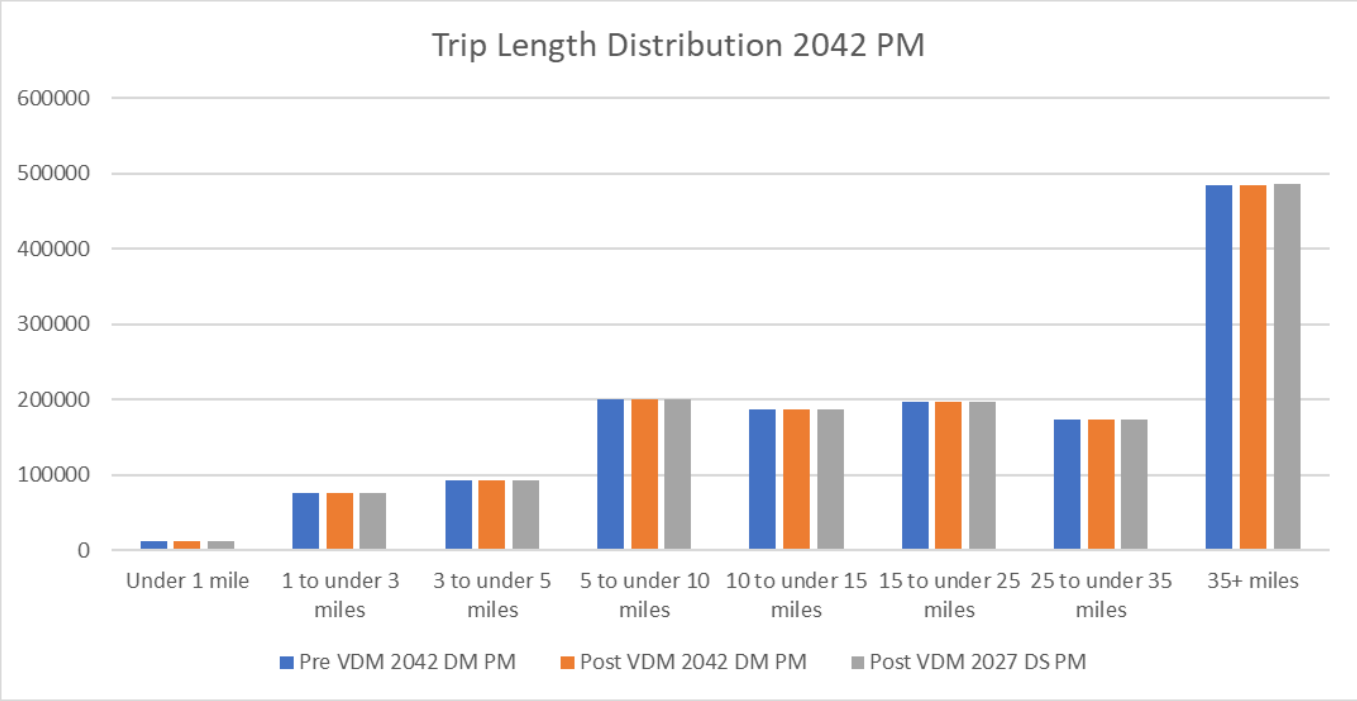


Plate 6-6 Trip length distribution 2042 PM



As can be seen in the above tables, the trip length distribution is very close between the pre-VDM, Do Minimum and Do Something forecasts, highlighting that the VDM process has not significantly disrupted the overall travels patterns in the original demand. It should be noted that the trip length distributions shown in figures above accounts for all trips and hence the trip length changes around the scheme area are not very evident in these. The remainder of the plots are shown in Appendix F.

Pre and post VDM traffic flow impact

The pre- and post-VDM traffic flows are shown in this section. The 2027 Do Minimum plots show that there is a slight reduction in post-VDM trips along the scheme in the AM and PM peaks northbound as the A12 becomes more congested. However, an increase in trips is observed along A12 between J22 and J19 southbound direction in Interpeak (IP).

In 2042, traffic post-VDM increases along the A12 southbound especially between J21 and J19. A slight reduction in traffic is observed northbound from J22 onwards. In the PM peak, a slight reduction is seen along A12 northbound and along Main Road (B1137) near J19.

In all scenarios a traffic flow increase is seen on CNEB (Chelmsford North East Bypass Phase 1) and along the A131 in Braintree.

Plate 6-7 to Plate 6-12 show the 2027 and 2042 Do Minimum traffic flows. The remainder of the figures are shown in Appendix F.

Plate 6-7 2027 AM Do Minimum post vs pre VDM traffic flows

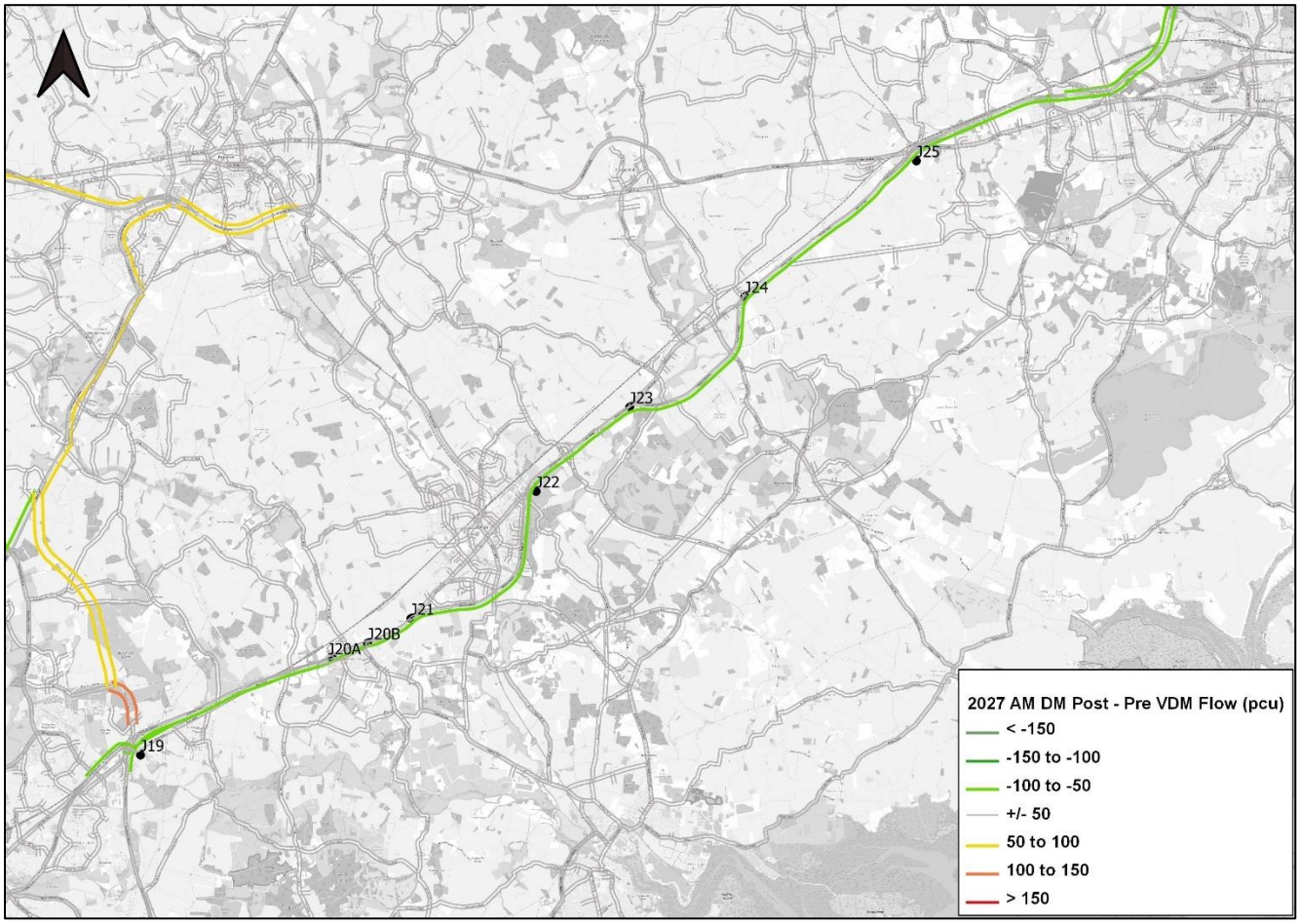


Plate 6-8 2027 IP Do Minimum post vs pre VDM traffic flows

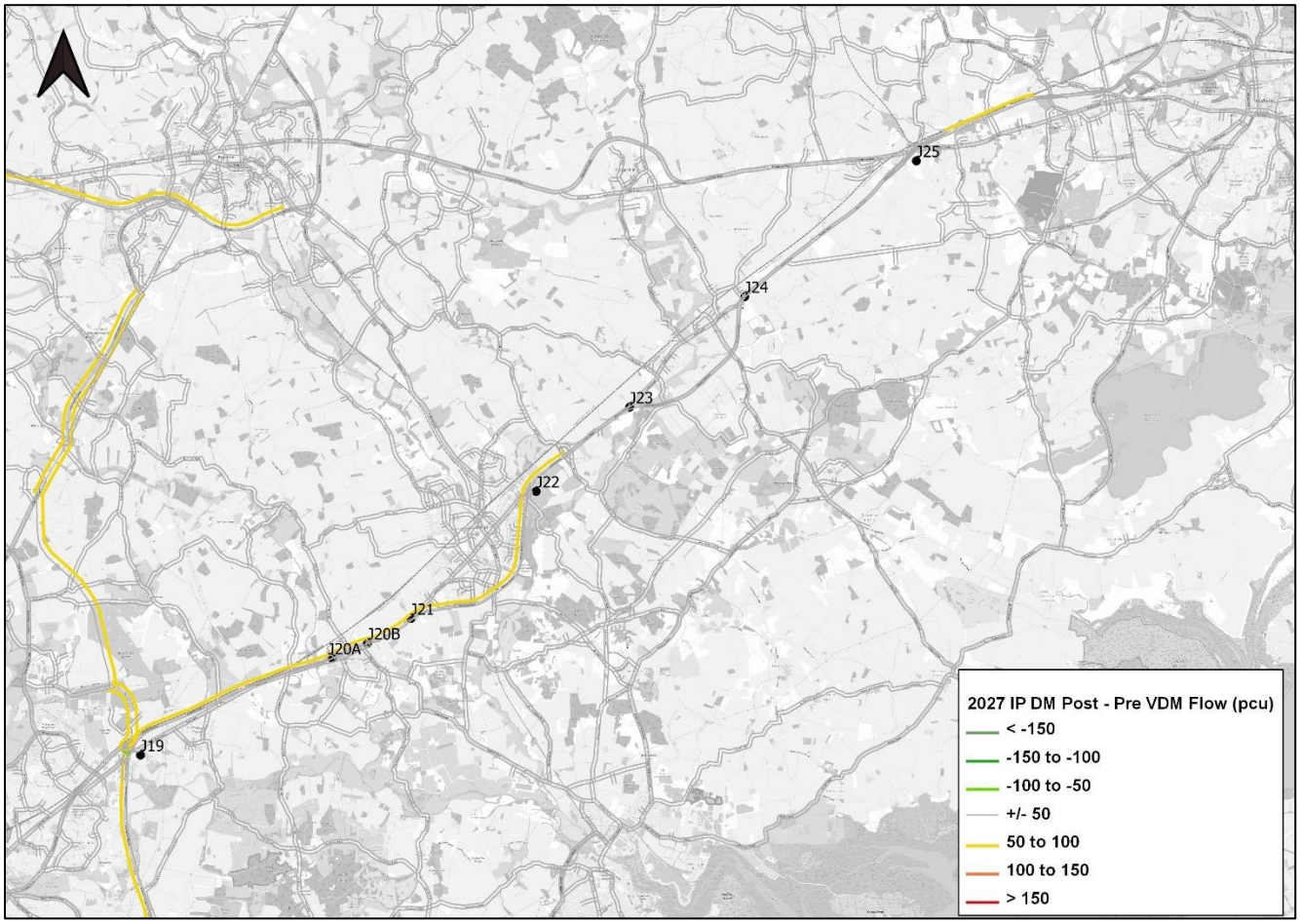


Plate 6-9 2027 PM Do Minimum post vs pre VDM traffic flows

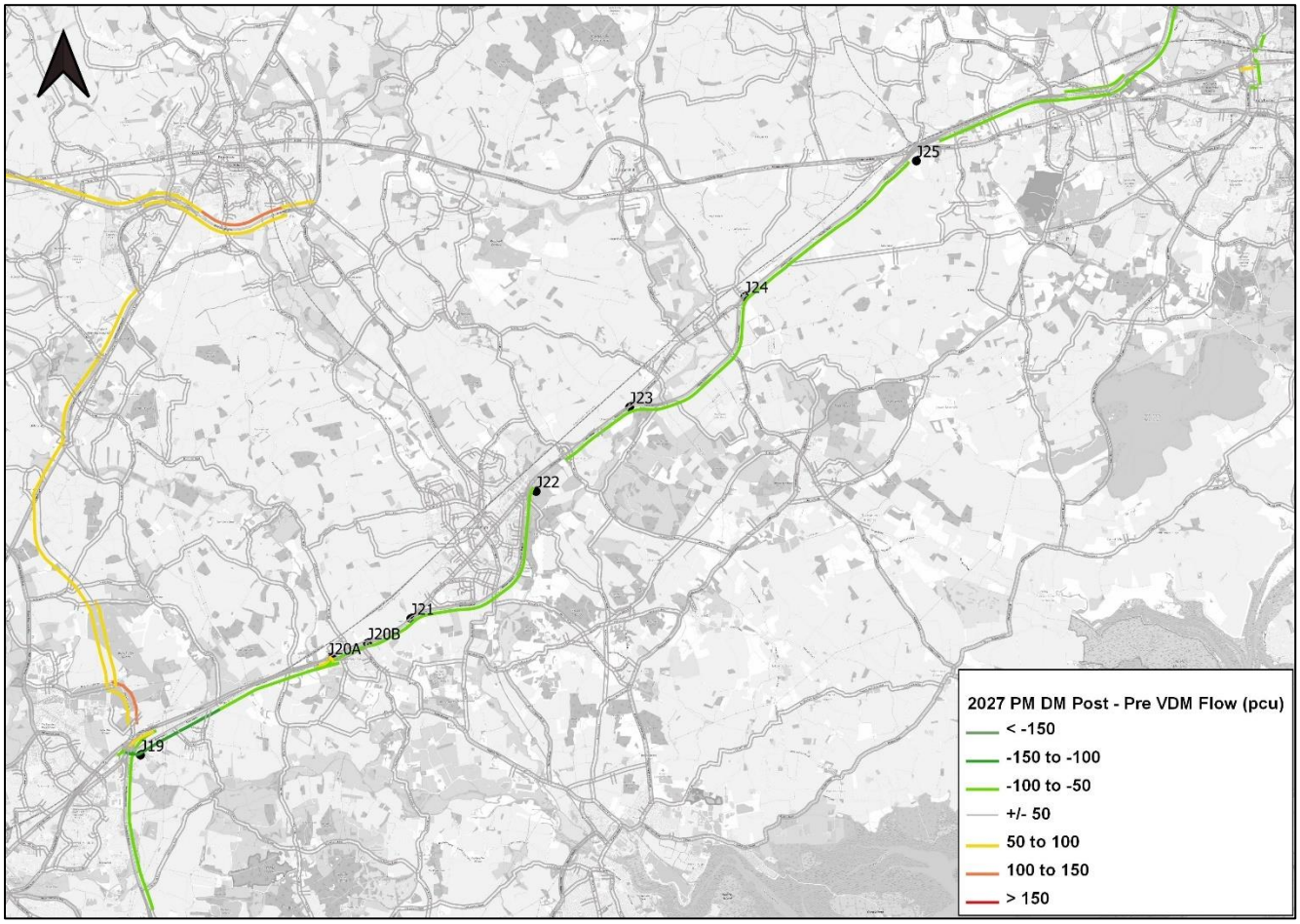


Plate 6-10 2042 AM Do Minimum post vs pre VDM traffic flows

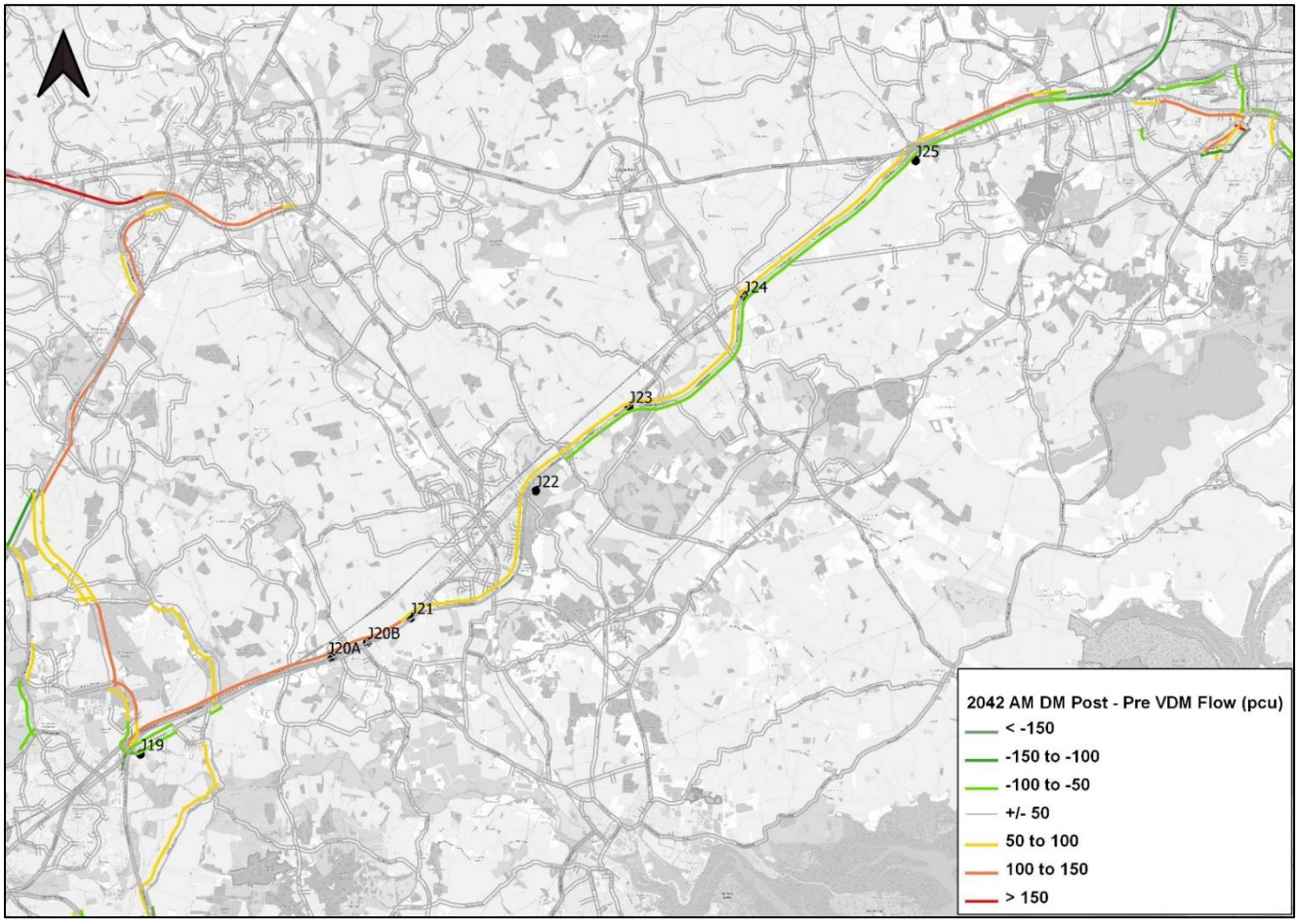


Plate 6-11 2042 IP Do Minimum post vs pre VDM traffic flows

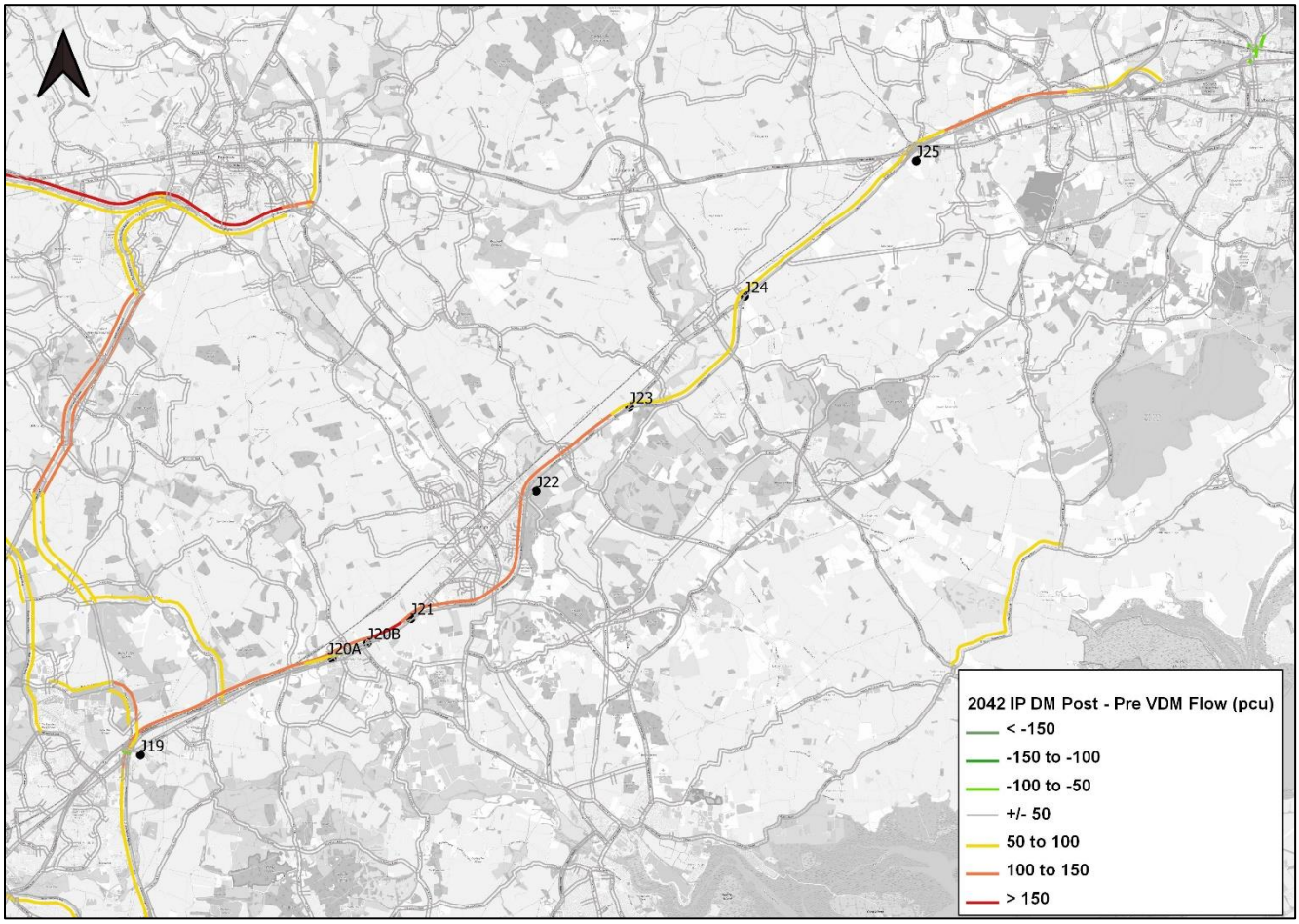
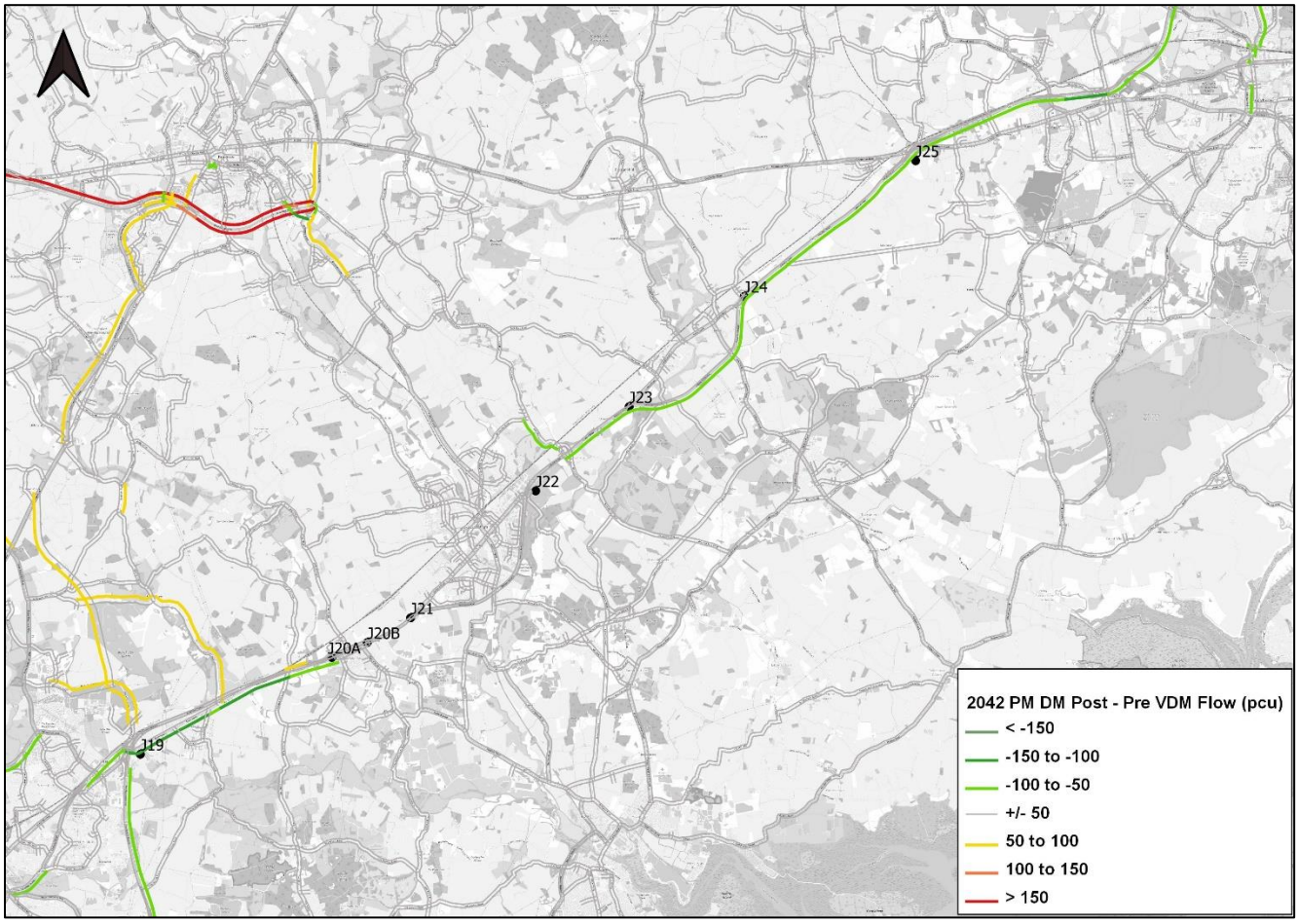


Plate 6-12 2042 PM Do Minimum post vs pre VDM traffic flows



The Do Something impact of VDM shows an increase in longer distance trips, specifically around the Chelmsford to Colchester movements as seen in the sector matrix comparison previously. Short distance trips (intra-sector trips) within Chelmsford and Colchester have switched to long distance trips to use the scheme indicating change in distribution patterns due to VDM. In all future year scenarios, significant increase in traffic is seen along the A12, with traffic increase greater than 150 PCUs/hr along the A12 as shown in the plots.

Plate 6-13 to Plate 6-18 show the 2027 and 2042 Do Something traffic flows. The remainder of the figures are shown in Appendix F.

Plate 6-13 2027 AM Do Something post vs pre VDM traffic flows

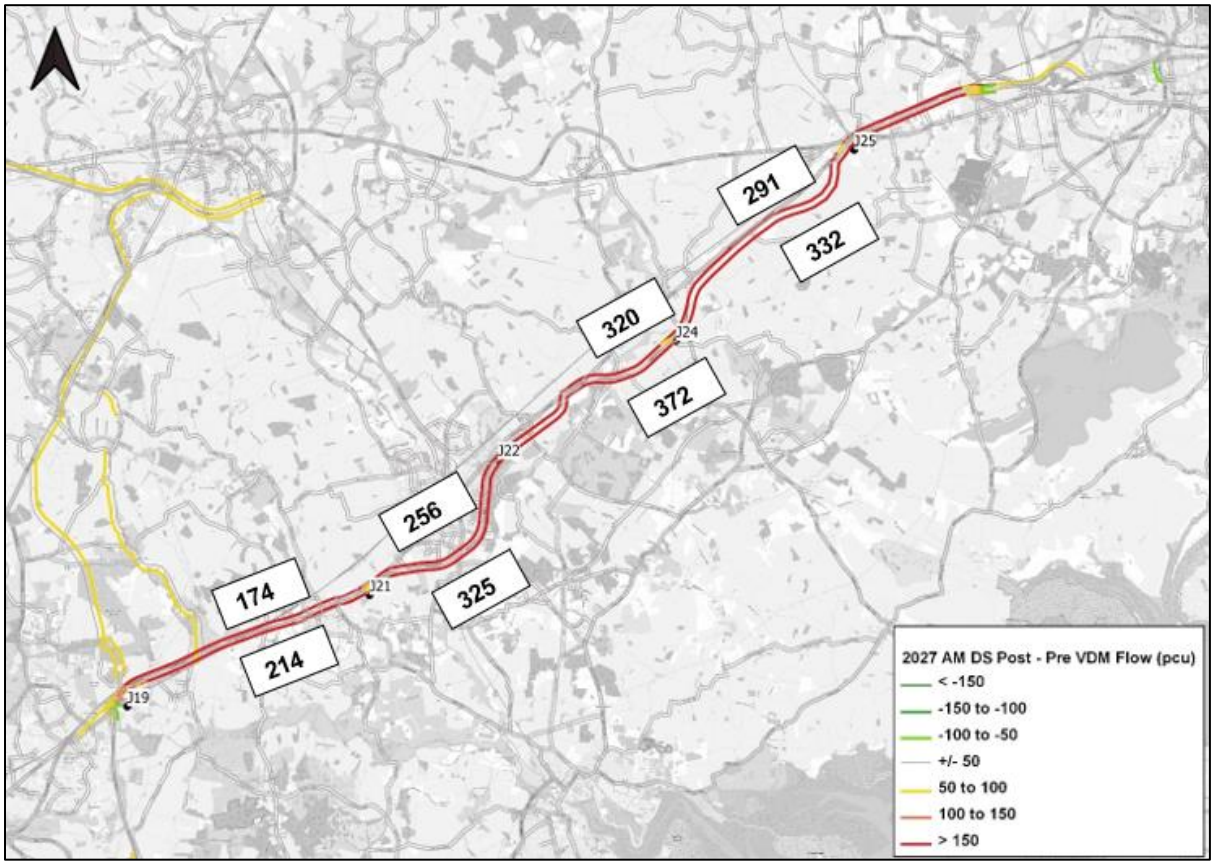


Plate 6-14 2027 IP Do Something post vs pre VDM traffic flows

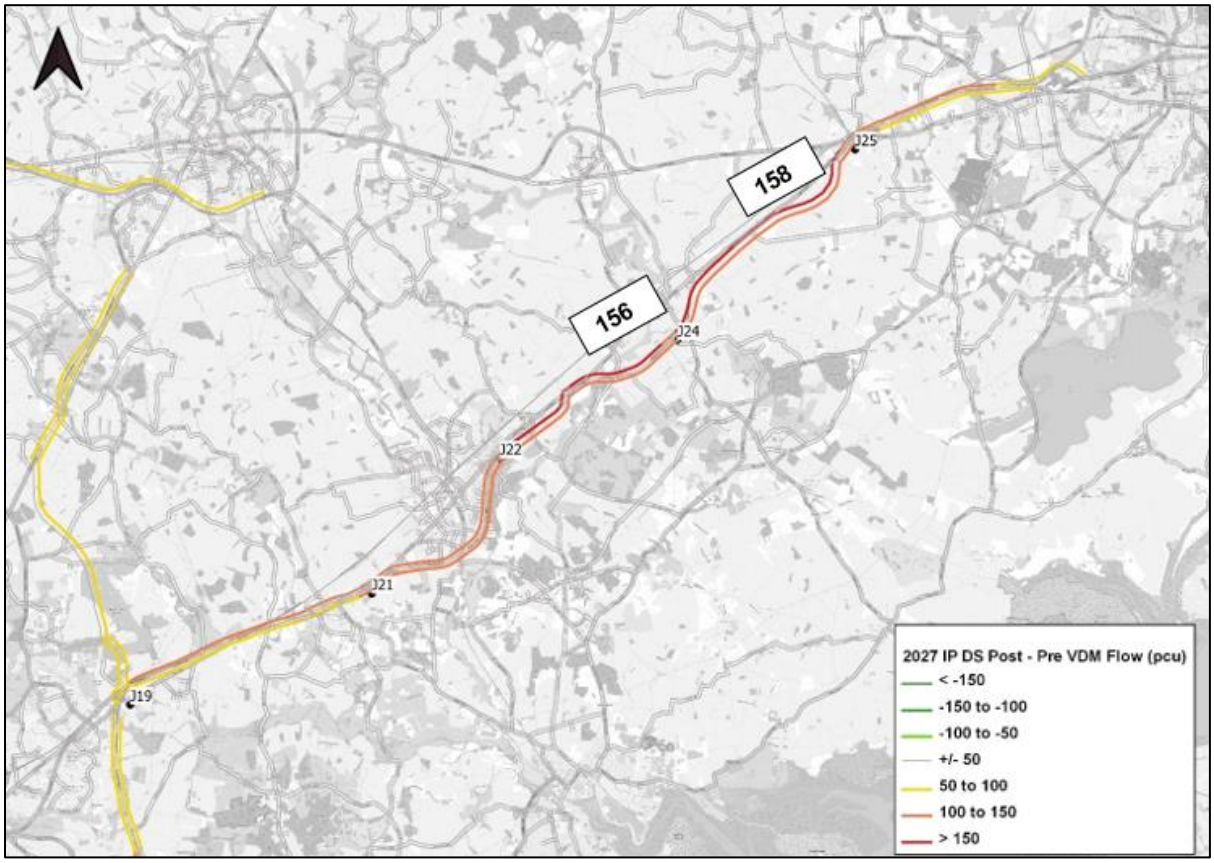


Plate 6-15 2027 PM Do Something post vs pre VDM traffic flows

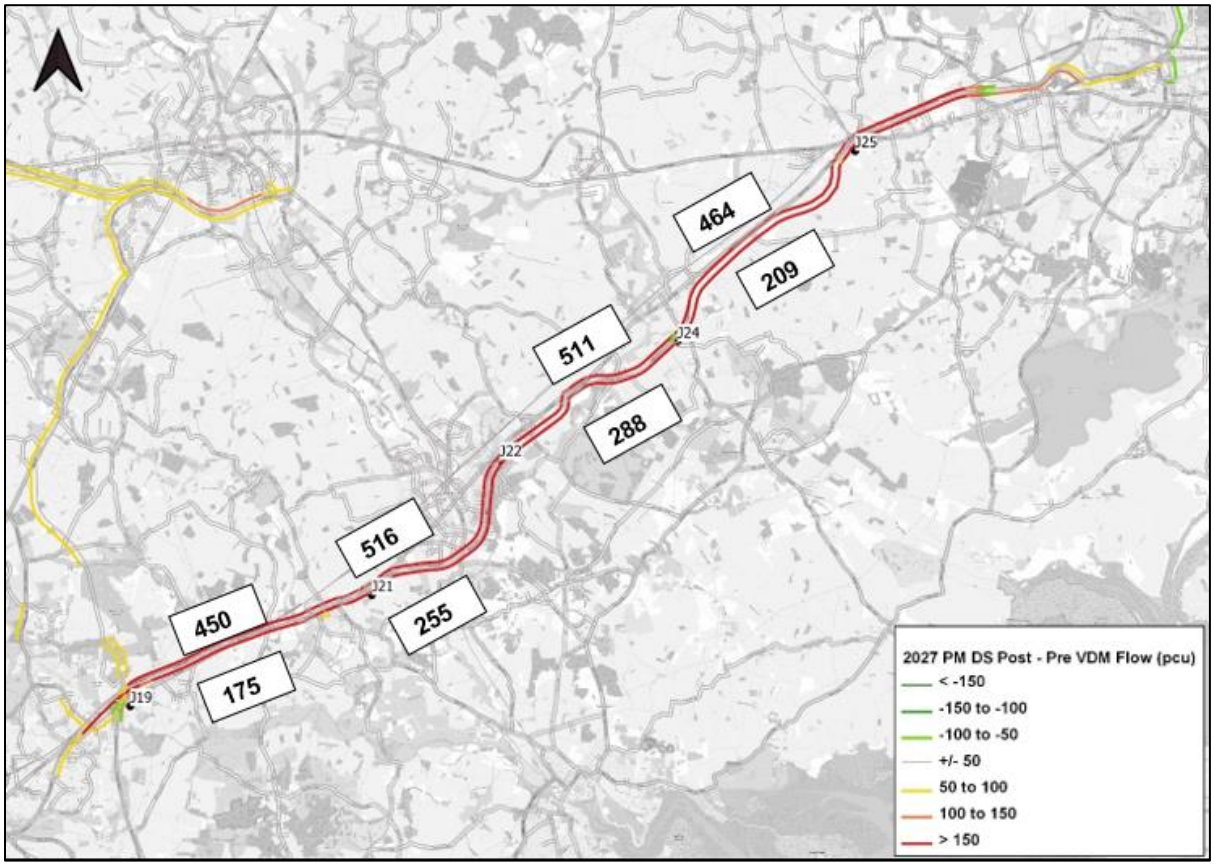


Plate 6-16 2042 AM Do Something post vs pre VDM traffic flows

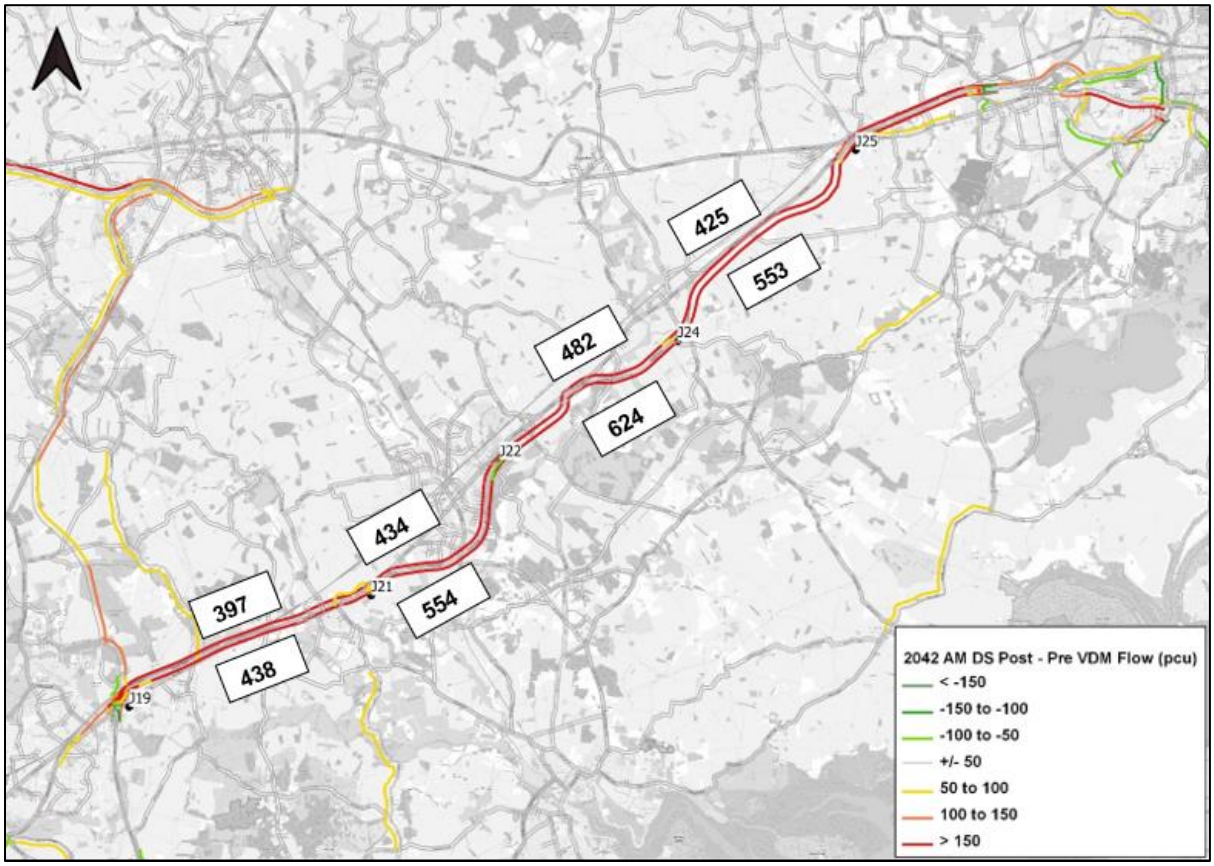


Plate 6-17 2042 IP Do Something post vs pre VDM traffic flows

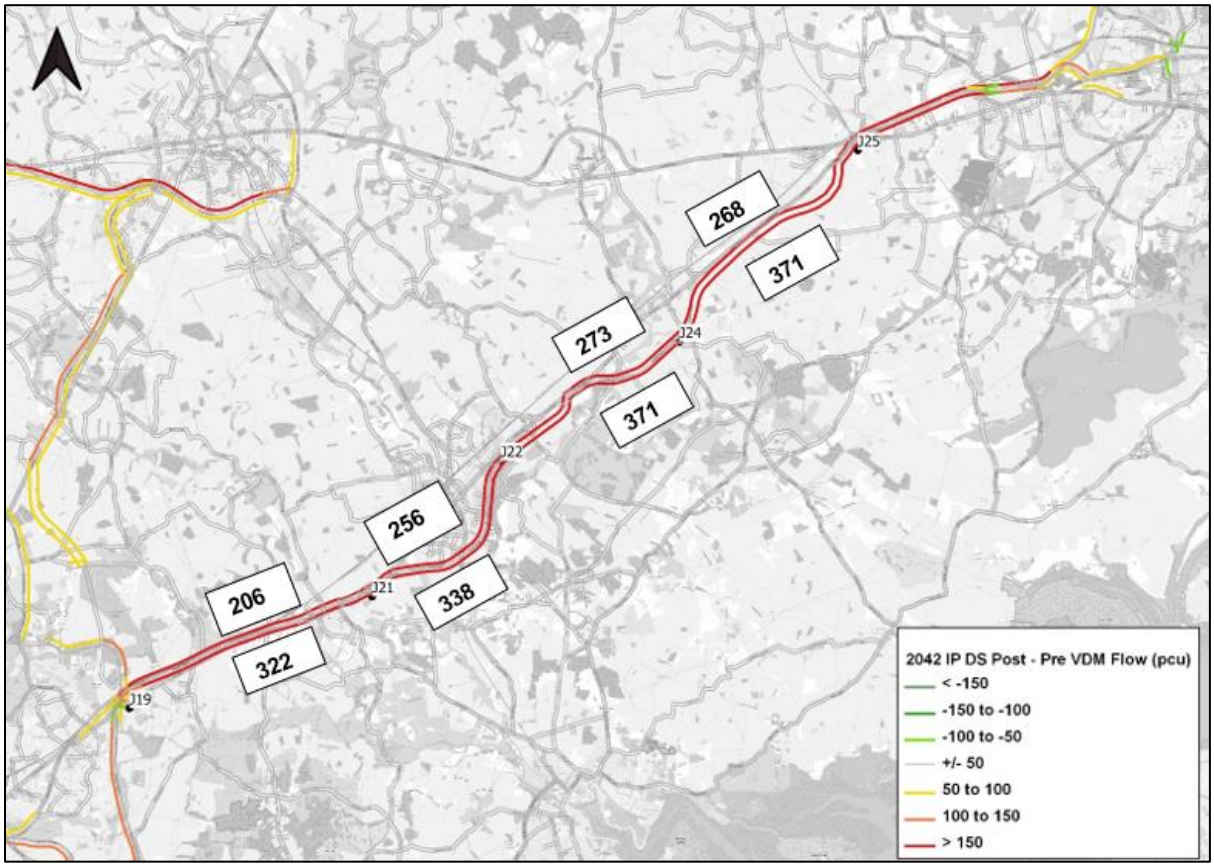
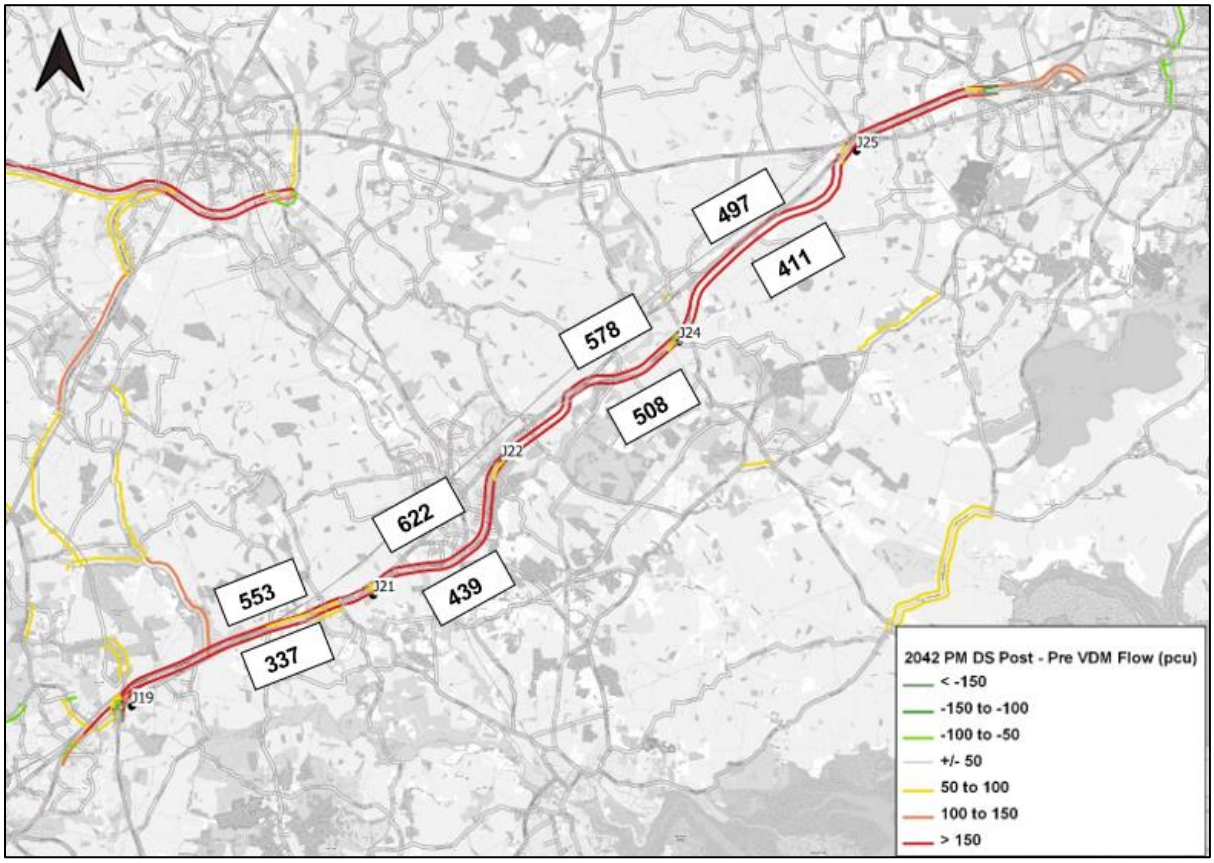


Plate 6-18 2042 PM Do Something post vs pre VDM traffic flows



Conclusion

The comparison exercise concludes that there are some minor changes between the pre- and post-VDM runs for the Do Minimum scenario at an overall level and that the model provides good stability and robustness for assessing the scheme in future years.

The Do Something scenario shows that there are a greater number of longer distance trips in the post-VDM models, which means that even though the overall totals of trips are similar the distribution of those trips changes due to the scheme.

In conclusion, the variable demand model has an impact on travel patterns in the simulation area, mostly as increases in trip length in the Do Something models in the scheme area but has a relatively small impact on overall demand volumes. As shown in the above figures, there is a significant increase in trips on the A12 scheme in the Do Something post-VDM scenario.

6.3 Convergence statistics

Post VDM SATURN convergence

Convergence is the measurement of the stability of the traffic model, whereby the spread (or “distribution”) of trips does not vary significantly between iterations and so the model is said to be in equilibrium. A converged model is therefore stable and produces results that are consistent and robust.

Achieving convergence in the future year forecasts is just as critical as the base year and is particularly important for economic appraisal purposes.

The acceptability values for convergence (TAG Unit M3.1) are less than 0.1% for %GAP and 4 consecutive iterations where the percentage of links with flow changes less than <1% is greater than 98%.

As demonstrated in Table 6-14 and Table 6-15 all the forecast models converge to an acceptable level.

Table 6-14 SATURN assignment convergence statistics for Do Minimum scenarios

Year	Time Period	Iteration	%GAP	% Flow (Link Flows Differing by < 1% Between Assignment & Simulation)	% Delays (Turn Delays Differing by < 1% Between Assignment & Simulation)
2027	AM	15	0.0021	99.0	99.3
		16	0.0015	99.3	99.5
		17	0.0018	99.2	99.5
		18	0.0012	99.4	99.5
	IP	12	0.00045	99.3	99.9
		13	0.00036	99.7	99.9
		14	0.00017	99.5	99.9
		15	0.00023	99.7	100.0
	PM	14	0.00061	99.2	99.7
		15	0.00076	99.7	99.9
		16	0.00059	99.5	99.8
		17	0.00059	99.8	99.9
2042	AM	25	0.0024	99.7	99.7
		26	0.0015	99.4	99.4
		27	0.0014	99.6	99.6
		28	0.0012	99.7	99.7
	IP	23	0.00028	99.2	99.8
		24	0.00046	99.4	99.8
		25	0.00022	99.2	99.9
		26	0.00024	99.9	99.8
	PM	23	0.0011	99.8	99.5
		24	0.00084	99.5	99.6
		25	0.00079	99.5	99.6
		26	0.00085	99.6	99.6
2051	AM	23	0.0023	99.1	99.0
		24	0.0028	99.1	98.9
		25	0.0020	99.3	99.1
		26	0.0024	99.3	99.2
	IP	23	0.00051	99.9	99.8
		24	0.00048	99.8	99.8
		25	0.00072	99.5	99.8
		26	0.00047	99.2	99.7
	PM	27	0.0011	99.2	99.2
		28	0.0013	99.1	99.0
		29	0.0012	99.5	99.1
		30	0.0012	99.5	99.3

Table 6-15 SATURN assignment convergence statistics for Do Something scenarios

Year	Time Period	Iteration	%GAP	% Flow (Link Flows Differing by < 1% Between Assignment & Simulation)	% Delays (Turn Delays Differing by < 1% Between Assignment & Simulation)
2027	AM	15	0.0017	99.1	99.5
		16	0.0016	99.1	99.6
		17	0.0012	99.3	99.6
		18	0.0016	99.3	99.6
	IP	10	0.00034	99.3	99.9
		11	0.00025	99.3	99.8
		12	0.00017	99.7	99.9
		13	0.00016	99.8	100.0
	PM	18	0.00069	99.4	99.8
		19	0.00044	99.5	99.8
		20	0.00081	99.7	99.8
		21	0.00051	99.9	99.8
2042	AM	34	0.0012	99.6	99.4
		35	0.0017	99.7	99.3
		36	0.0017	99.6	99.4
		37	0.0014	99.5	99.5
	IP	19	0.00039	99.5	99.9
		20	0.00046	99.1	99.8
		21	0.00029	99.0	99.9
		22	0.00044	99.7	99.9
	PM	25	0.00095	99.3	99.4
		26	0.0011	99.6	99.3
		27	0.00086	99.5	99.5
		28	0.00090	99.3	99.3
2051	AM	23	0.0022	99.1	99.1
		24	0.0028	99.0	98.9
		25	0.0019	99.3	99.0
		26	0.0026	99.2	99.2
	IP	22	0.00059	99.5	99.8
		23	0.00043	99.0	99.8
		24	0.00048	99.9	99.8
		25	0.00043	99.9	99.9
	PM	26	0.0013	99.2	99.1
		27	0.0014	99.3	99.3
		28	0.0012	99.4	99.5
		29	0.00098	99.3	99.3

DIADEM convergence

Based on the lambda and theta parameters derived in the realism tests, the forecast models have been run through DIADEM. In assessing the outputs of the model runs, the main parameter of importance is the 'relative gap', which is the measure of convergence between demand and supply. Current TAG guidance recommends a relative gap of at least 0.2%.

The DIADEM models achieved a relative gap convergence level of 0.2% or less in all cases, which suggests the demand-supply convergence of the variable demand traffic model is acceptable. It has therefore been shown that the demand model is stable and has converged to an acceptable standard.

Table 6-16 DIADEM convergence statistics

Model Scenario	Measurement	2027 DM	2042 DM	2051 DM	2027 DS	2042 DS	2051 DS
AM	Final Iteration	11	15	10	9	11	9
	%GAP	0.14%	0.16%	0.16%	0.18%	0.17%	0.20%
IP	Final Iteration	7	9	9	8	9	9
	%GAP	0.19%	0.16%	0.19%	0.14%	0.19%	0.19%
PM	Final Iteration	7	11	14	8	11	10
	%GAP	0.18%	0.14%	0.18%	0.16%	0.20%	0.20%

6.4 Highway traffic model performance

Table 6-17 presents high level assignment statistics for forecast years 2027, 2042 and 2051. The statistics have been extracted for the simulation area only of the SATURN model. The results presented are for all vehicle types and journey purposes combined.

Table 6-17 Simulation area assignment statistics

Model Scenario	Measurement	Base	2027 DM	2042 DM	2051 DM	2027 DS	2042 DS	2051 DS
AM	Distance Travelled (PCU km)	1,011,09	1,112,268	1,235,056	1,277,624	1,147,027	1,281,892	1,327,261
	Travel Time (PCU Hrs)	20,295	23,478	28,999	31,285	23,653	28,768	31,066
	Average Speed (Km/Hr)	49.8	46.8	42.6	40.8	48.5	44.6	42.7
IP	Distance Travelled (PCU km)	746,429	852,224	989,355	1,040,888	865,283	1,014,664	1,072,347
	Travel Time (PCU Hrs)	12,888	15,171	18,717	20,343	15,063	18,543	20,141
	Average Speed (Km/Hr)	57.9	56.2	52.9	51.2	57.4	54.7	53.2
PM	Distance Travelled (PCU km)	952,872	1,067,426	1,193,029	1,236,043	1,116,365	1,258,220	1,306,595
	Travel Time (PCU Hrs)	18,405	21,645	26,486	28,557	21,706	26,664	28,847
	Average Speed (Km/Hr)	51.8	49.3	45.0	43.3	51.4	47.2	45.3

The total travel time is a summation of cruise time, transient queued time (e.g. waiting at a red light at signals) and overcapacity queued time. The total travel distance is

summed over full journey lengths for all modelled trips. The average speed is determined based upon the total travel time and total travel distance.

The Do Minimum and Do Something results show a general deterioration in highway conditions over time. Additionally, total travel time is increasing faster than travel distance indicating increasing levels of congestion in all time periods. Reductions in speed are greatest in the AM and PM peak periods. The Do Something scenario which includes the proposed scheme improves the highway conditions. It has the impact of reducing travel times through the area and increasing the distance travelled, resulting in an increase of average vehicle speeds in all time periods in each forecast year.

6.5 Flow changes from base year

Plate 6-19 to Plate 6-21 below show the predicted traffic flow changes between the base year and 2027 Do Minimum (only changes over 50 PCUs/hr shown). Traffic flow comparisons for 2042 and 2051 are included in Appendix G. Green bars represent decreases in traffic while red bars represent increases.

Plate 6-19 Traffic flow changes 2027 Do Minimum vs base year (AM)

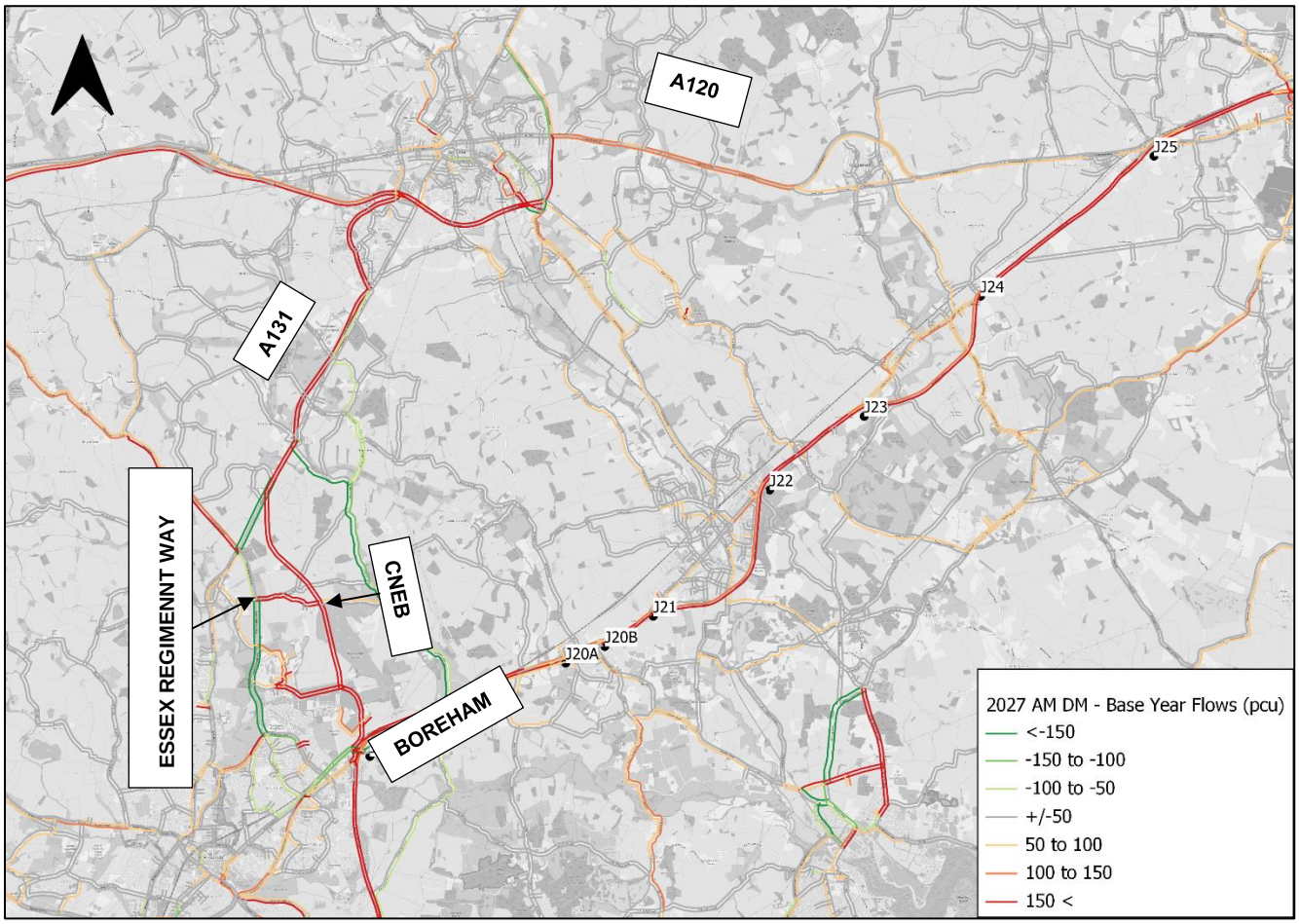


Plate 6-20 Traffic flow changes 2027 Do Minimum vs base year (IP)

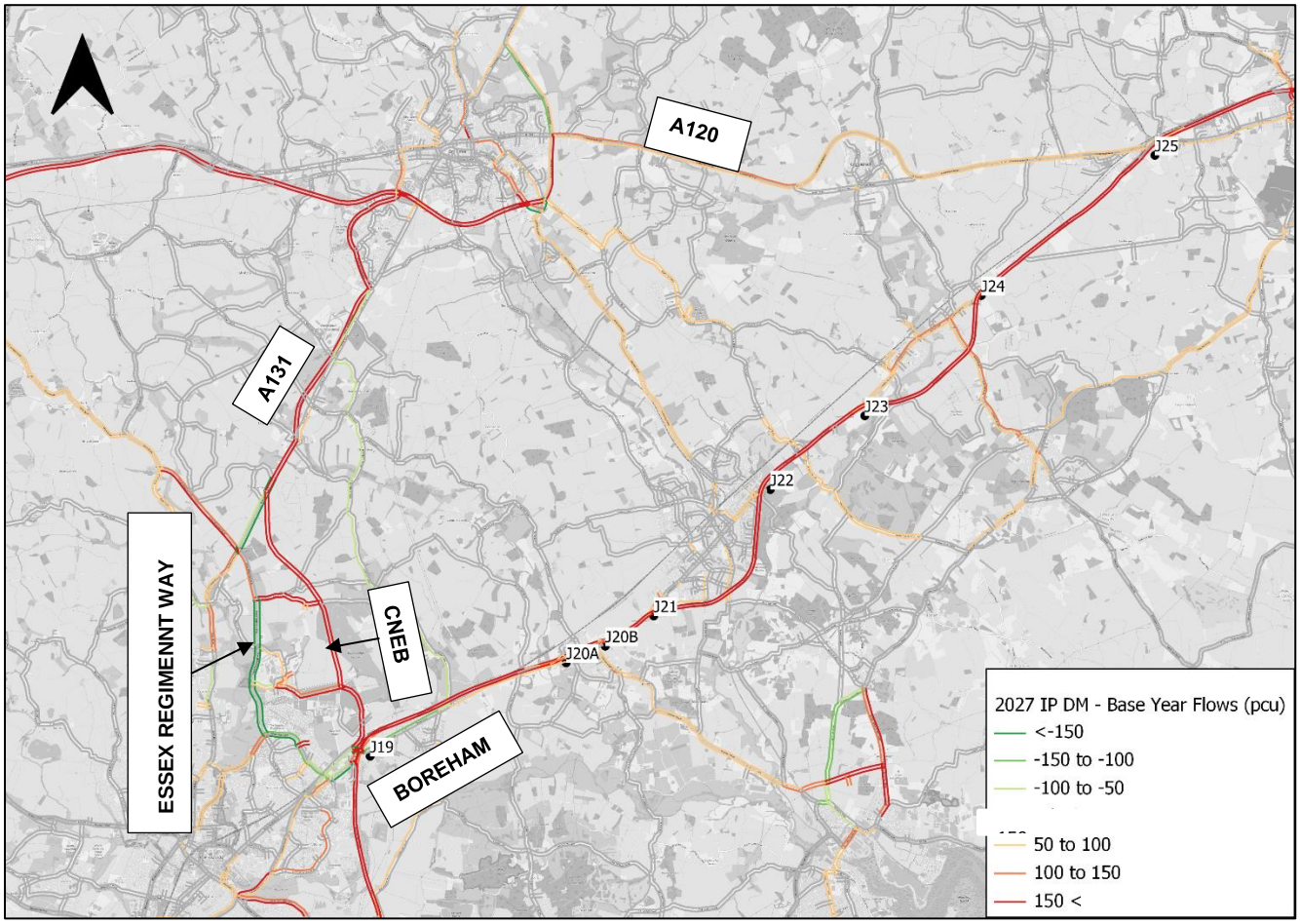
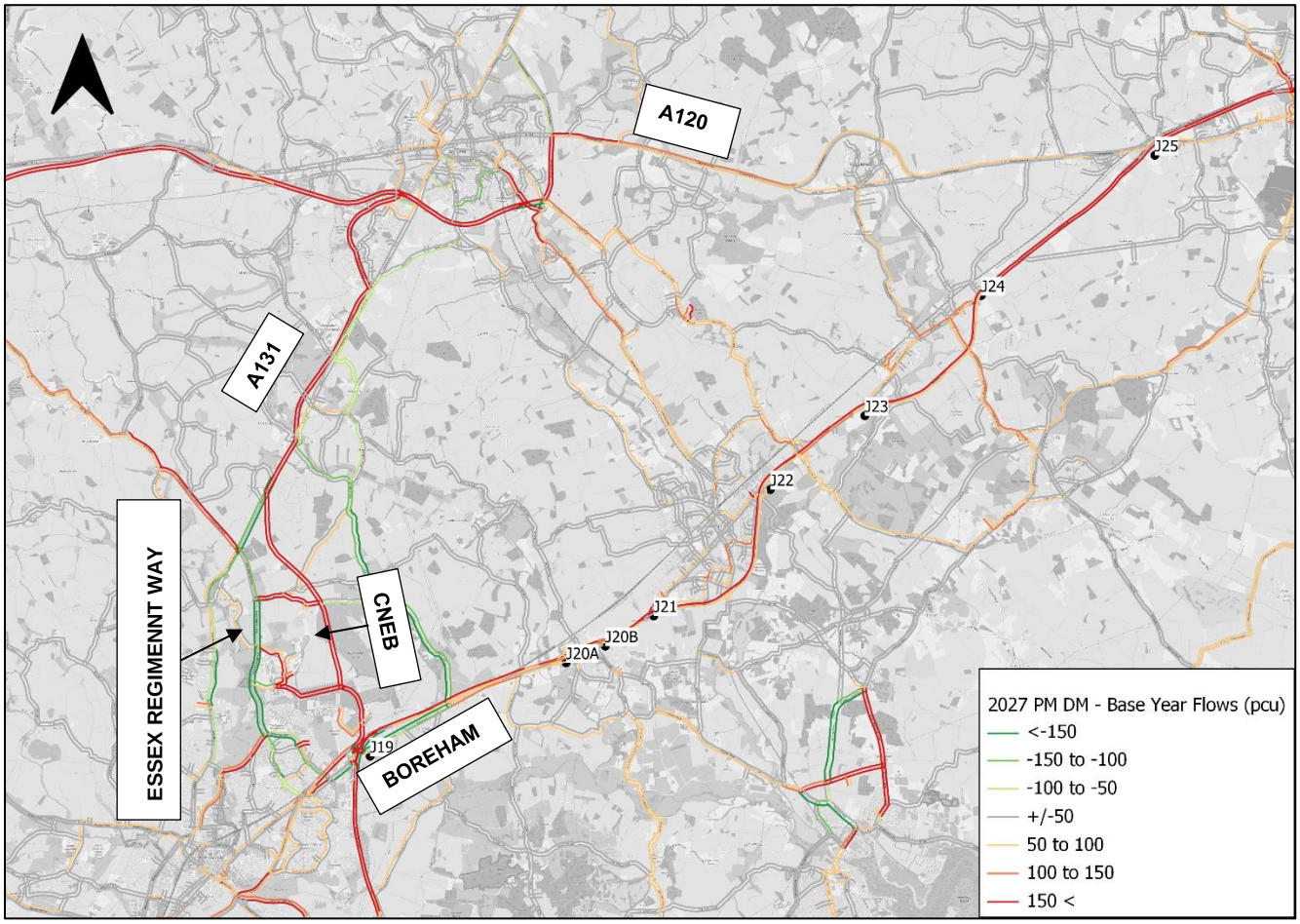


Plate 6-21 Traffic flow changes 2027 Do Minimum vs base year (PM)



The main point to note across the three peak periods is that traffic flows increase across the whole of the area due to growth in levels of demand, apart from:

- Essex Regiment Way, Chelmsford – traffic reduction is seen for this road as traffic switches to the future Chelmsford North East Bypass Phase 1 (CNEB) link road. CNEB is a new link in the future year models and therefore shows an increase when compared to the base year flows.
- Main Road, Boreham – reduction due to CNEB future scheme
- Baddow, Chelmsford – a reduction due to an increase on Essex Yeomanry Way approaching Army & Navy roundabout junction
- Cressing Road, Braintree – Increase on B1018 due to Millennium way slip roads scheme

6.6 Delay and journey time changes from base

Changes in predicted future traffic delays are illustrated in Plate 6-22 to Plate 6-24. These show forecast delay changes between the base year and 2027. Plots for 2042 and 2051 are included in Appendix H.

Plate 6-22 Traffic delay changes 2027 Do Minimum vs base year (AM)

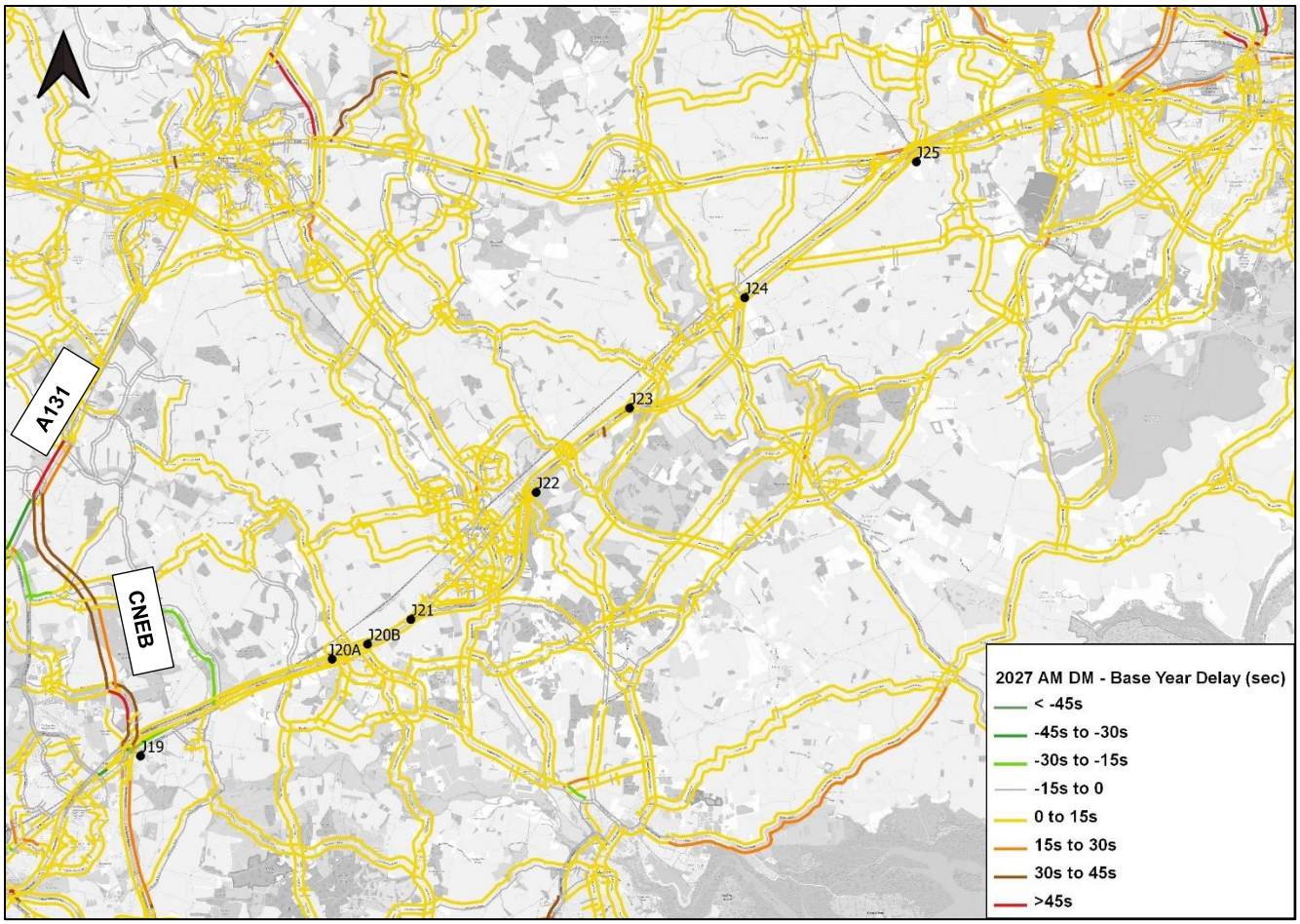


Plate 6-23 Traffic delay changes 2027 Do Minimum vs base year (IP)

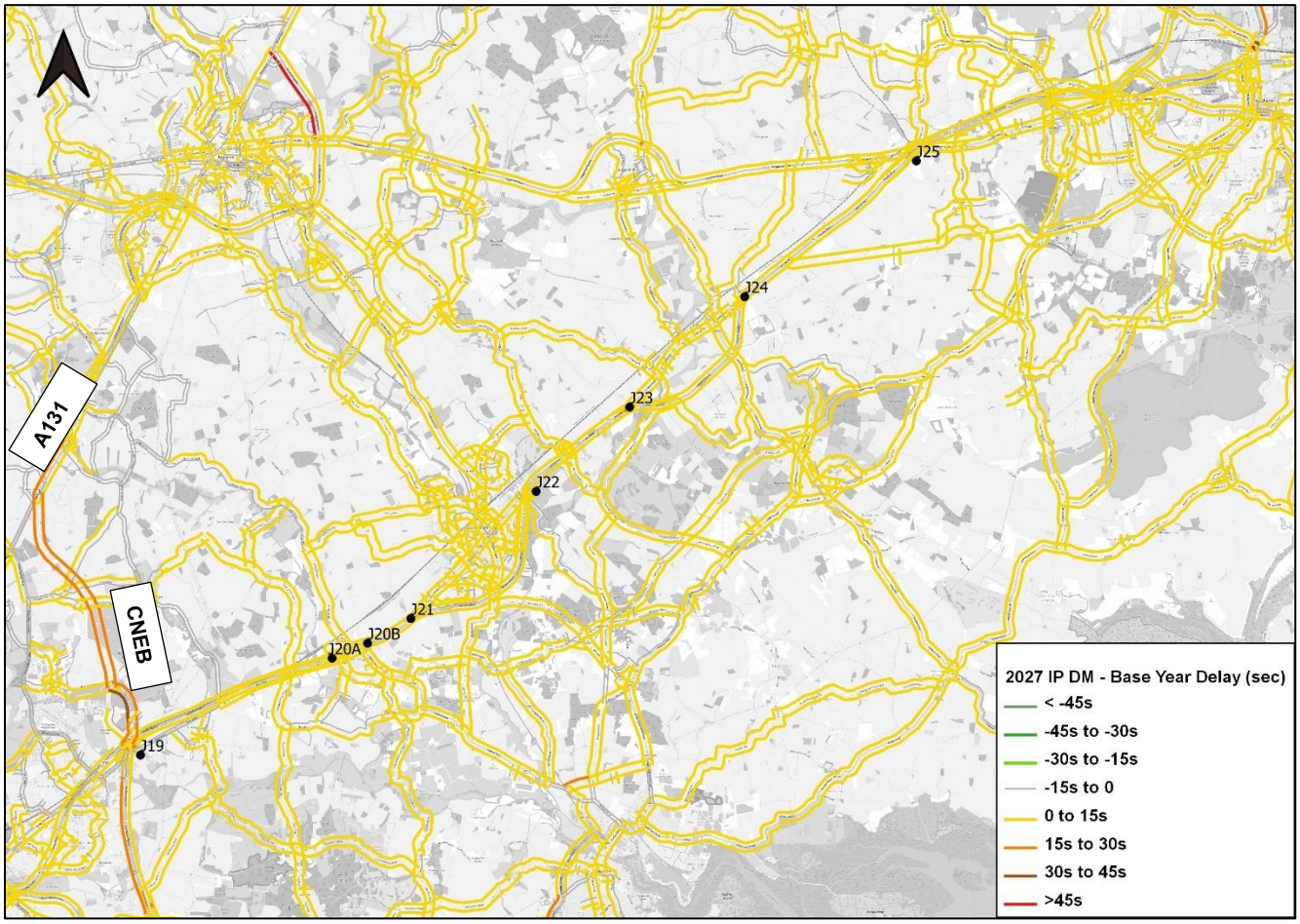
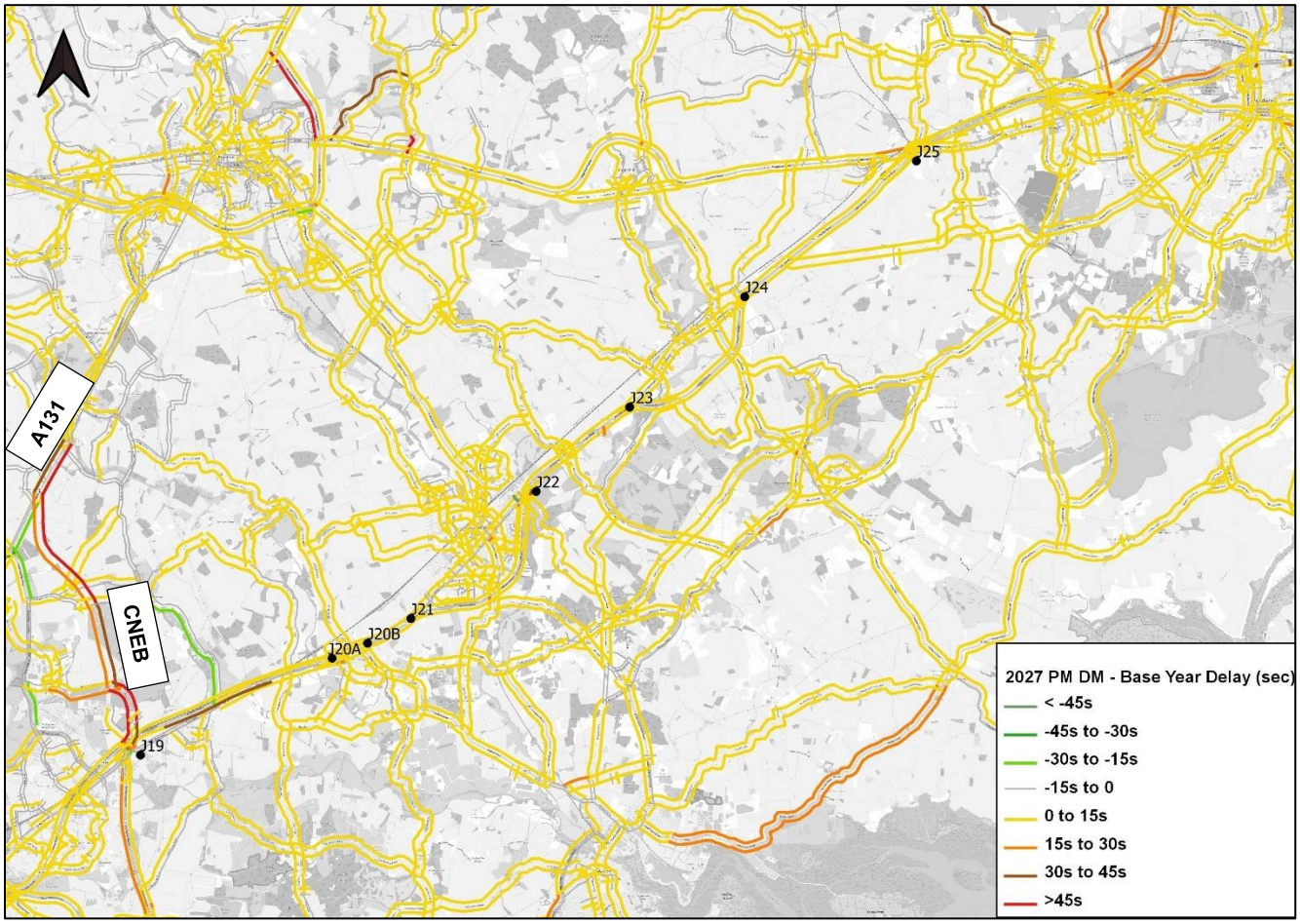


Plate 6-24 Traffic delay changes 2027 Do Minimum vs base year (PM)



The figures above show that most changes in delays in 2027 are increases in comparison to the base year model. These are due to a combination of traffic growth and introduction of new schemes. By 2042 and 2051, the growth in delays is even higher. The main points to note are that:

- The A12 shows an increase in delays due to the extra demand, especially around Junction 19 and Junction 22 in both northbound and southbound directions.
- Future committed schemes such as CNEB are new links in the future year model networks, so are shown as having increases in delay in these diagrams.
- Routes around A131/A120 roundabout in Braintree are also highlighted in these plots to show that there is an increase in delay.

Journey Time information along the A12 is shown below in *Table 6-18* for both 2027 and 2042 and reflects the increase in delays experienced with the increase in traffic demand.

The journey times are measured from the following locations:

- Northbound – Junction 19 offslip to Junction 25 onslip

- Southbound – Junction 25 offslip to Junction 19 onslip

Table 6-18 Journey time changes Do Minimum vs base year

Timing Point	2019 Base NB AM (mm:ss)	2019 Base NB IP (mm:ss)	2019 Base NB PM (mm:ss)	2027 DM NB AM (mm:ss)	2027 DM NB IP (mm:ss)	2027 DM NB PM (mm:ss)	2042 DM NB AM (mm:ss)	2042 DM NB IP (mm:ss)	2042 DM NB PM (mm:ss)
J19	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J21	05:29	04:57	08:24	06:02	05:20	08:45	06:51	06:11	09:50
J22	08:28	07:45	11:22	09:10	08:14	11:50	10:23	09:17	13:29
J24	13:33	12:31	18:45	14:50	13:17	20:14	17:27	15:08	23:04
J25	17:14	15:44	23:06	18:40	16:29	24:44	21:36	18:21	27:44

Timing Point	2019 Base SB AM (mm:ss)	2019 Base SB IP (mm:ss)	2019 Base SB PM (mm:ss)	2027 DM SB AM (mm:ss)	2027 DM SB IP (mm:ss)	2027 DM SB PM (mm:ss)	2042 DM SB AM (mm:ss)	2042 DM SB IP (mm:ss)	2042 DM SB PM (mm:ss)
J25	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J24	03:53	02:57	03:15	04:26	03:15	03:45	05:24	04:03	05:00
J22	09:46	07:19	07:46	10:55	07:56	08:39	12:37	09:39	10:47
J21	13:07	10:15	10:53	14:24	11:01	11:57	16:24	13:02	14:37
J19	18:28	14:40	15:31	19:59	15:35	16:53	22:22	17:58	19:58

Whole A12 Route	2019 base (mm:ss)	2027 DM (mm:ss)	2027 Difference (mm:ss)	2042 DM (mm:ss)	2042 Difference (mm:ss)
NB AM	17:14	18:40	01:27	21:36	04:22
NB IP	15:44	16:29	00:46	18:21	02:38
NB PM	23:06	24:44	01:38	27:44	04:39
SB AM	18:28	19:59	01:31	22:22	03:54
SB IP	14:40	15:35	00:56	17:58	03:18
SB PM	15:31	16:53	01:22	19:58	04:28

6.7 Volume to capacity ratios

Plate 6-25 and Plate 6-26 present the volume to capacity ratio (V/C) for the AM and PM peak hours for forecast year 2027. The V/C value represents the amount of traffic in comparison to the capacity of the road that the traffic is travelling on. The values of greater than 100% are highlighted in red and those below 85% are in green. The V/C ratio of above 100% are in most cases observed on approaches to junctions and are consistent with the delay plots shown in Section 6.6.

Plate 6-25 Volume to capacity ratio – 2027 Do Minimum AM

Plate 6-26 Volume to capacity ratio – 2027 Do Minimum PM

In both the AM and PM peak, the increase in traffic demand brings the A12 almost to capacity, and in some places beyond its capacity. This is reflected in the delays predicted. There are also other areas that experience an increase in the V/C due to the change in delays and traffic routing across the model. These areas are:

- North Chelmsford;
- Braintree;
- Kelvedon; and
- Colchester Town Centre.

Appendix I shows V/C for the Do Minimum scenario and Do Something scenario for year 2042 and 2051.

6.8 Flow changes due to the scheme

The predicted flow changes that occur due to the proposed A12 scheme are presented in this section. Plate 6-27 and Plate 6-31 show any increases and decreases in traffic flow of over 50 PCUs. For the AM hour, more detailed flow change plots with annotations are provided. The changes in flow are only shown on

the links which are consistent between the Do Minimum and Do Something scenarios, therefore flow differences on the A12 itself where the scheme changes from the Do Minimum are not always shown. Increases in traffic greater than 150 PCUs along A12 scheme are labelled in the following plots.

Plate 6-27 Traffic flow changes Do Something vs Do Minimum (2027 AM)

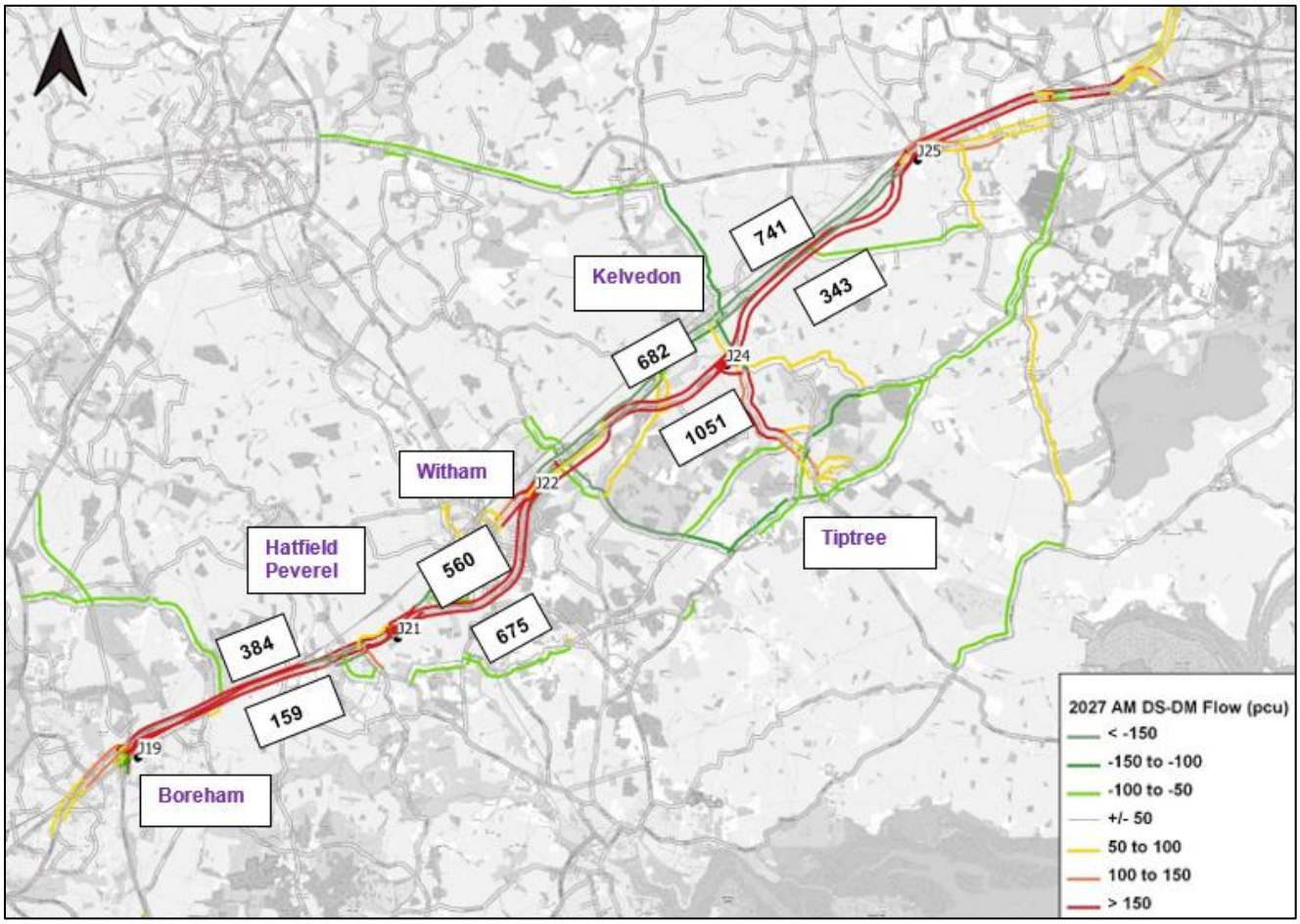
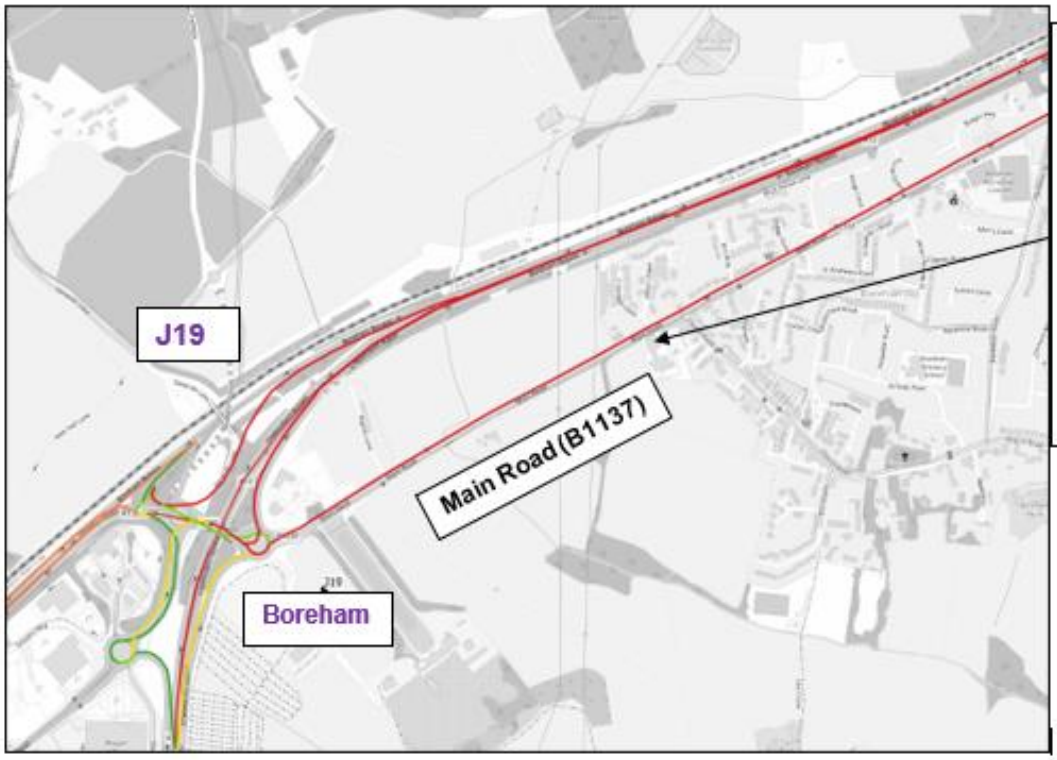
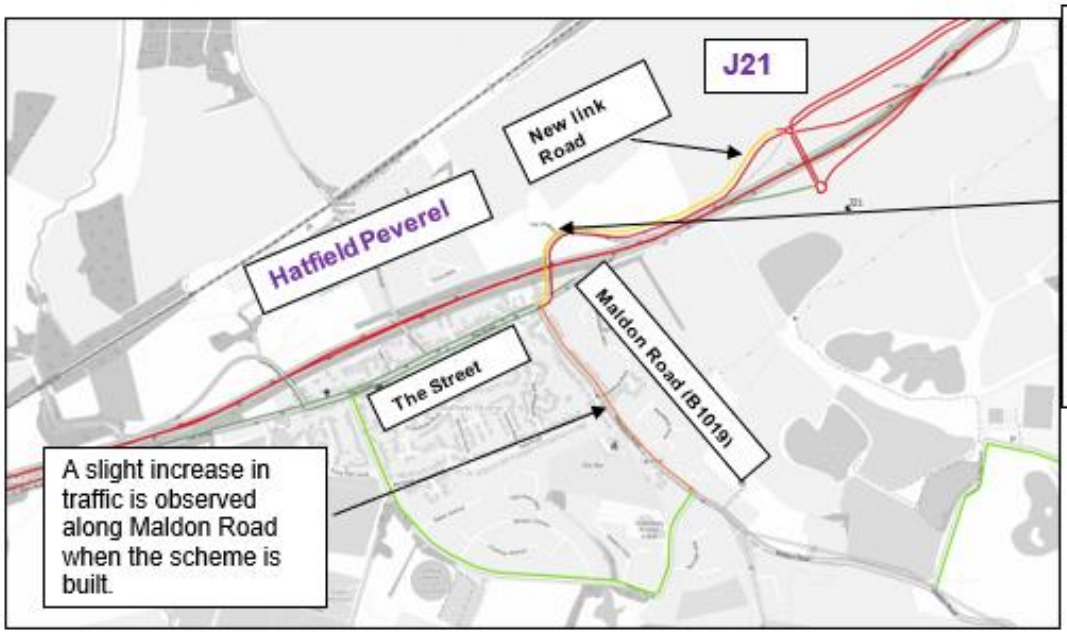


Plate 6-28 Detailed flow change Do Something vs Do Minimum (2027 AM) – junctions 19 to 25



Following the closure of the junction 20a access, most traffic which previously used this access would instead join the A12 at the new J21. However, some traffic is predicted to travel instead along Main Road and use A12 J19, leading to a traffic increase on this road.



Junctions 20a and 20b would be closed as part of the proposed scheme. Traffic going to southbound on the A12 from Maldon Road would use the new J21 rather than using The Street and junction 20a. An increase in traffic is seen on Wellington bridge, which joins the new link road to J21.

Plate 6-29 Detailed flow changes Do Something vs Do Minimum (2027 AM) – junctions 22 to 25

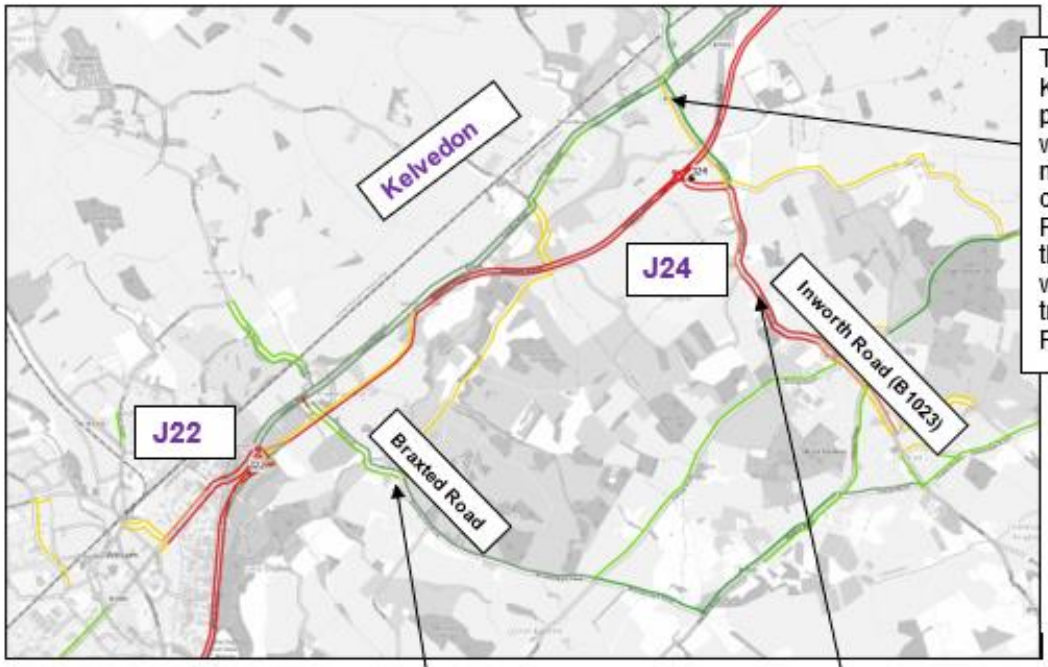


Plate 6-30 Traffic flow change Do Something vs Do Minimum (2027 IP)

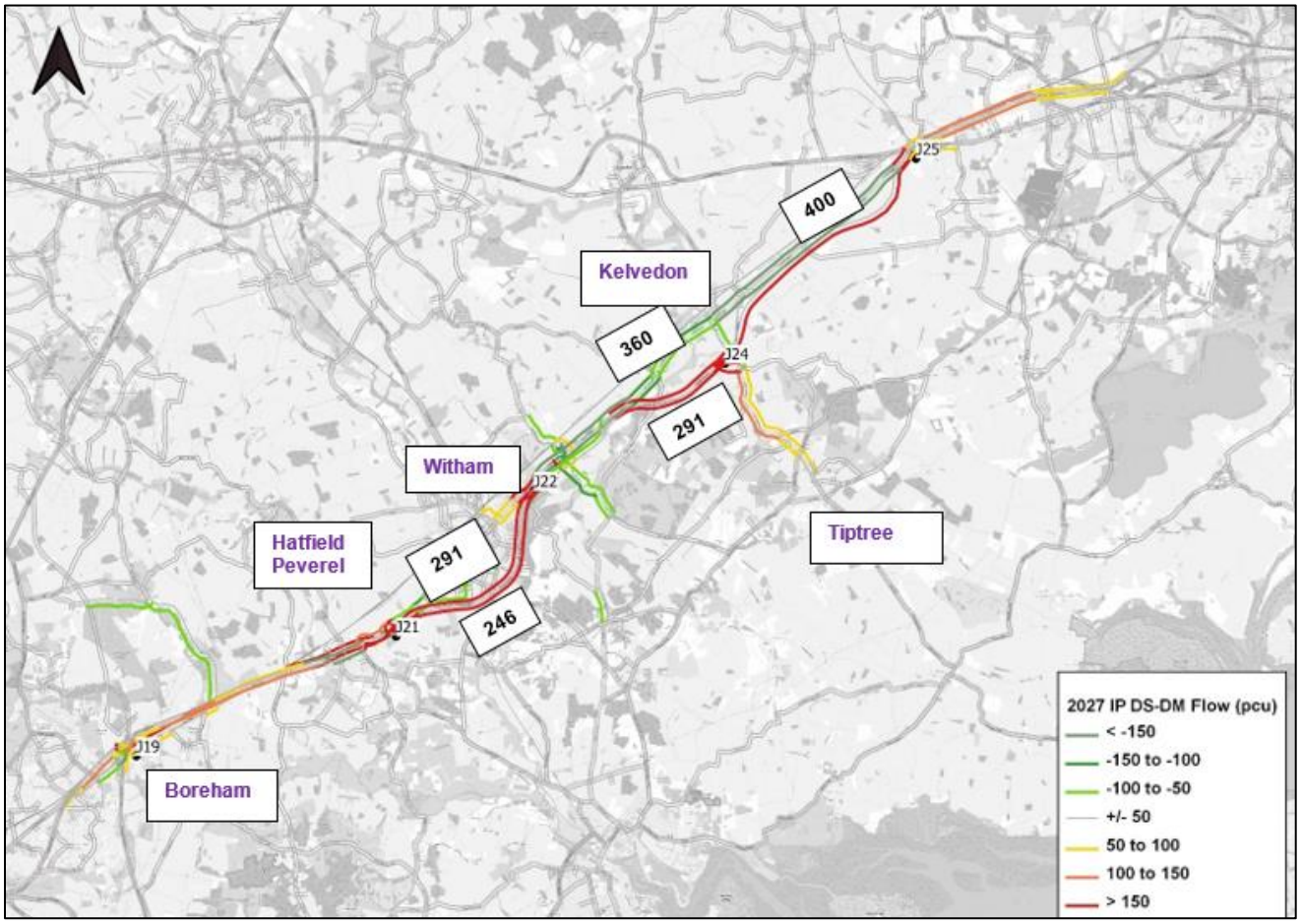
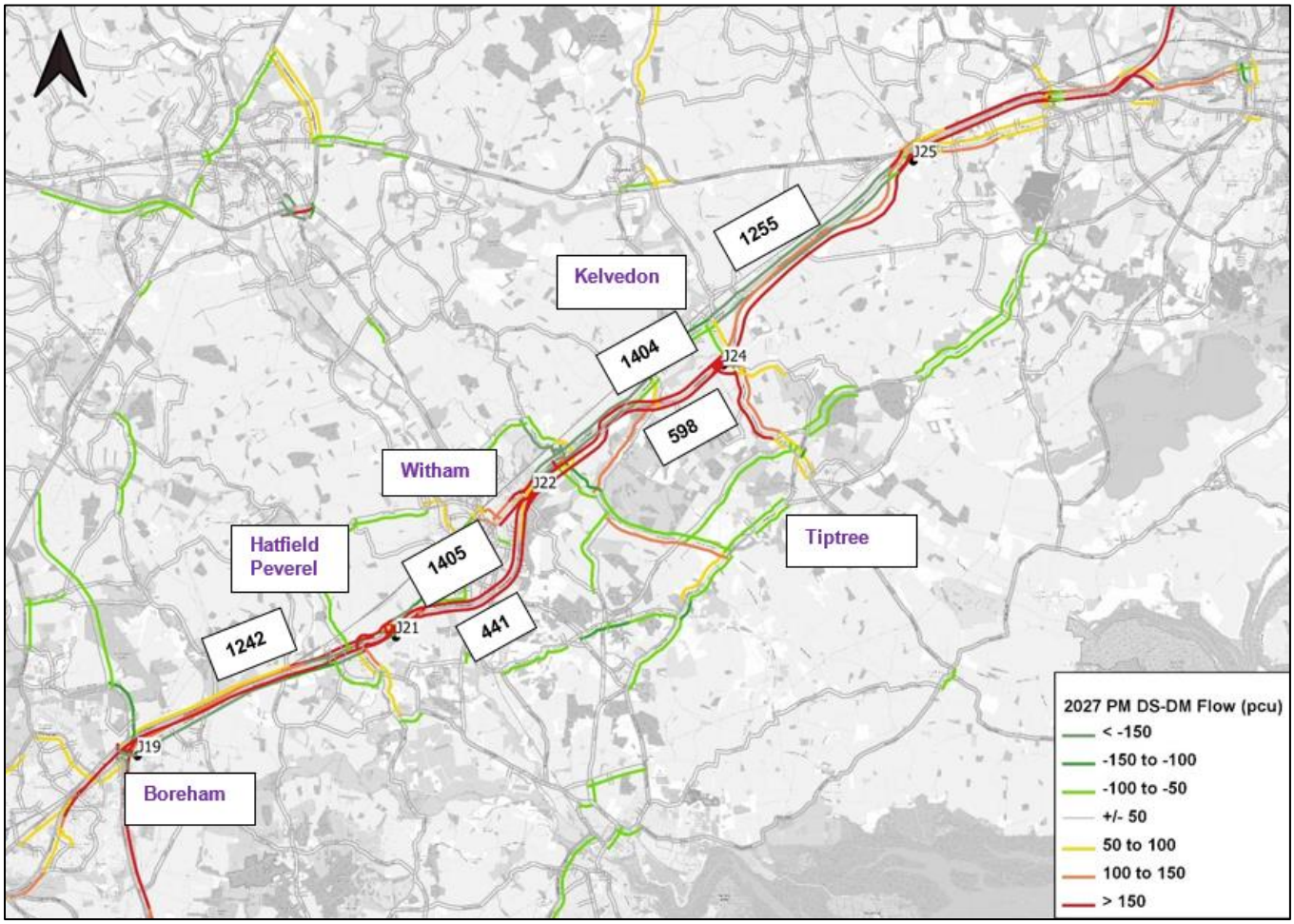


Plate 6-31 Traffic flow change Do Something vs Do Minimum (2027 PM)



The impact that the scheme has on local junction is discussed in detail in the Transport Assessment report. On the A12 itself, the following impacts are expected:

- Traffic would reduce significantly on the two sections of the existing A12 that are bypassed as part of the proposed scheme (Rivenhall End and between junctions 24 and 25).
- Traffic levels would increase on the A12 between junctions 19 and 25, as well as on the sections of the A12 on either side of the scheme. Because the A12 would see such an improvement in journey times and reliability, traffic would re-route onto the A12 away from other less suitable routes.

Similar patterns can be observed in the 2042 and 2051 peak models in Appendix J

6.9 Journey time changes due to the scheme

Table 6-19 shows the impact of the scheme on journey times along the scheme route.

As expected, there is a decrease in journey time along the A12 due to the scheme. This is due to the increase in capacity along the A12 which reduces delay.

The northbound PM and southbound AM have the biggest journey time savings due to the scheme, as these are where the largest delays are in the Do Minimum scenario.

Similar to the base year vs Do Minimum comparison, journey times are measured from the following locations:

- Northbound – Junction 19 offslip to junction 25 onslip
- Southbound – Junction 25 onslip to Junction 19 onslip

Table 6-19 Journey time changes Do Something vs Do Minimum

Timing Point	2027 DM NB AM (mm:ss)	2027 DM NB IP (mm:ss)	2027 DM NB PM (mm:ss)	2027 DS NB AM (mm:ss)	2027 DS NB IP (mm:ss)	2027 DS NB PM (mm:ss)	2042 DM NB AM (mm:ss)	2042 DM NB IP (mm:ss)	2042 DM NB PM (mm:ss)	2042 DS NB AM (mm:ss)	2042 DS NB IP (mm:ss)	2042 DS NB PM (mm:ss)
J19	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J21	06:02	05:20	08:45	04:11	03:59	05:06	06:51	06:11	09:50	04:27	04:15	05:33
J22	09:10	08:14	11:50	07:13	06:51	08:23	10:23	09:17	13:29	07:45	07:17	09:09
J24	14:50	13:17	20:14	10:13	09:42	11:43	17:27	15:08	23:04	10:59	10:15	12:48
J25	18:40	16:29	24:44	14:48	14:01	16:41	21:36	18:21	27:44	15:55	14:46	18:07

Timing Point	2027 DM SB AM (mm:ss)	2027 DM SB IP (mm:ss)	2027 DM SB PM (mm:ss)	2027 DS SB AM (mm:ss)	2027 DS SB IP (mm:ss)	2027 DS SB PM (mm:ss)	2042 DM SB AM (mm:ss)	2042 DM SB IP (mm:ss)	2042 DM SB PM (mm:ss)	2042 DS SB AM (mm:ss)	2042 DS SB IP (mm:ss)	2042 DS SB PM (mm:ss)
J25	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J24	04:26	03:15	03:45	03:24	03:08	03:14	05:24	04:03	05:00	03:35	03:19	03:29
J22	10:55	07:56	08:39	06:29	05:54	06:06	12:37	09:39	10:47	06:52	06:15	06:33
J21	14:24	11:01	11:57	09:33	08:42	09:01	16:24	13:02	14:37	10:06	09:12	09:43
J19	19:59	15:35	16:53	14:43	13:04	13:39	22:22	17:58	19:58	15:36	13:54	14:50

Whole A12 Route	2027 DM (mm:ss)	2027 DS (mm:ss)	2027 Diff (mm:ss)	2042 DM (mm:ss)	2042 DS (mm:ss)	2042 Diff (mm:ss)
NB AM	18:40	14:48	-03:53	21:36	15:55	-05:41
NB IP	16:29	14:01	-02:28	18:21	14:46	-03:36
NB PM	24:44	16:41	-08:02	27:44	18:07	-09:37
SB AM	19:59	14:43	-05:16	22:22	15:36	-06:46
SB IP	15:35	13:04	-02:31	17:58	13:54	-04:04
SB PM	16:53	13:39	-03:13	19:58	14:50	-05:08

6.10 V/C changes due to the scheme

Overall, there is a reduction in the V/C with the scheme in place, as an impact of the scheme and the impact from VDM.

There is an increase in V/C on some routes, generally on the approach to new or improved junctions such as along Inworth Road (south of junction 24) and in Boreham (east of junction 19), as described earlier in this report.

The impact is shown in Plate 6-32 to Plate 6-34. Appendix L shows the V/C plots for the remainder years.

Plate 6-32 2027 AM DS – DM volume to capacity ratio difference

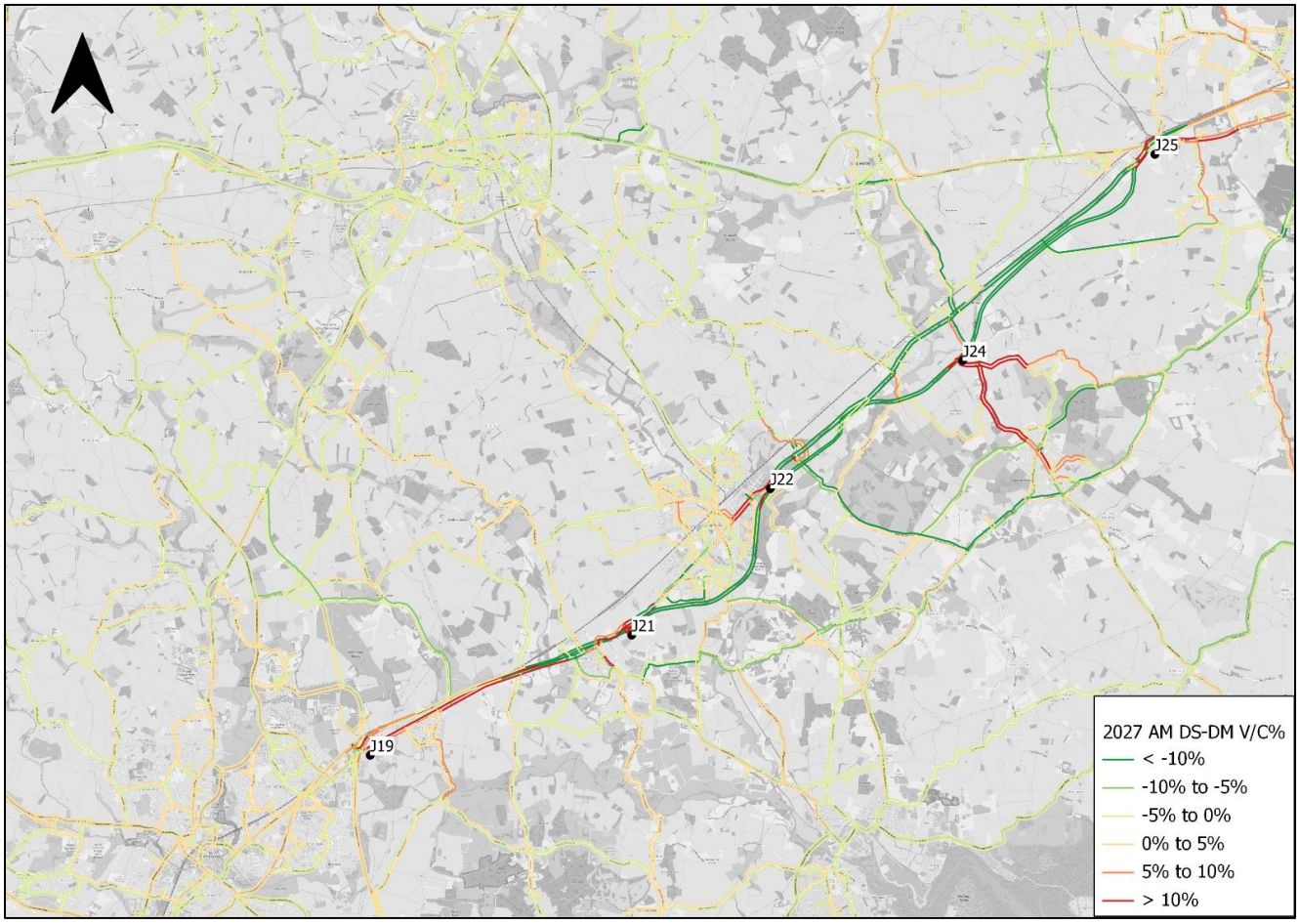


Plate 6-33 2027 IP DS – DM volume to capacity ratio difference

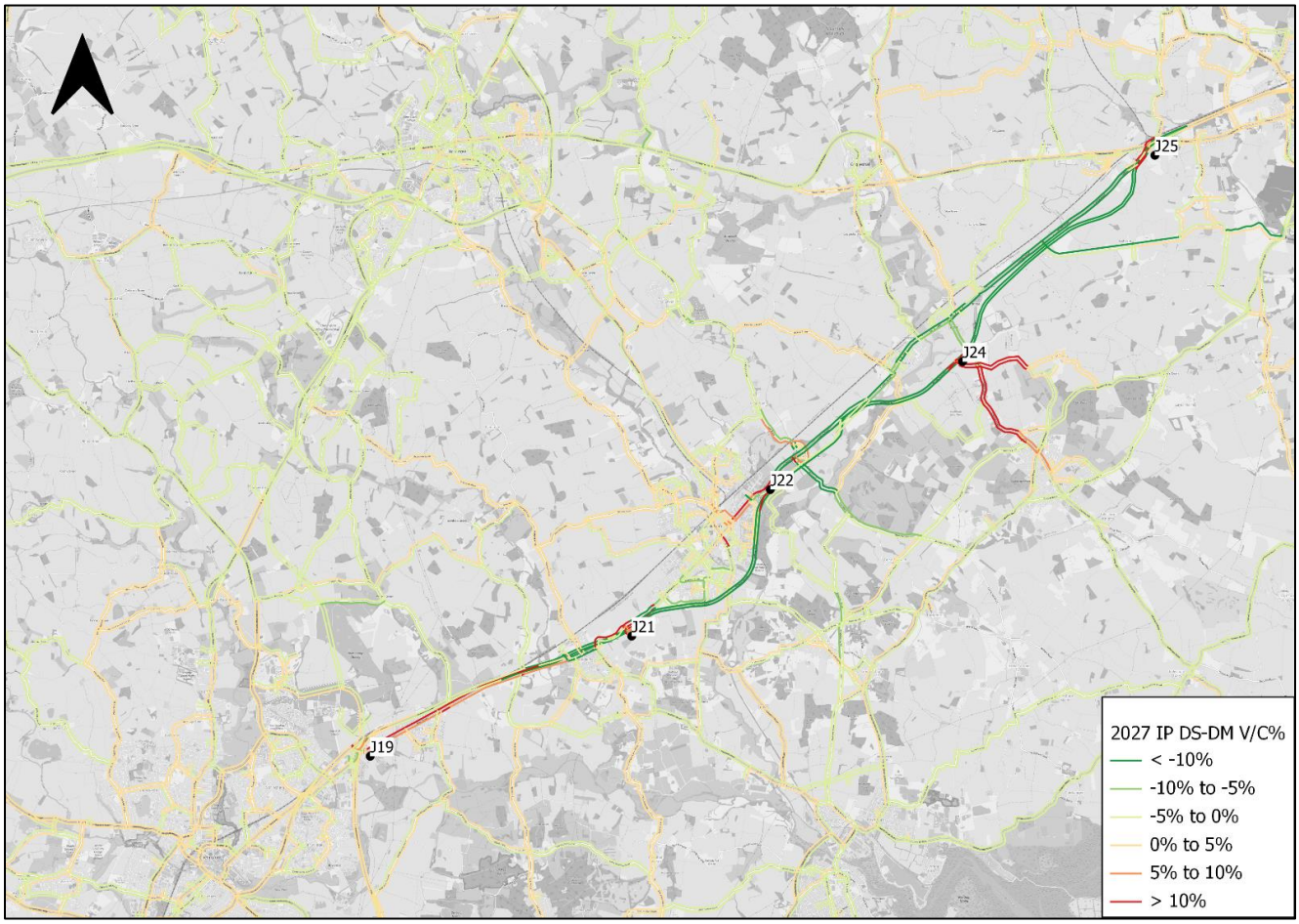
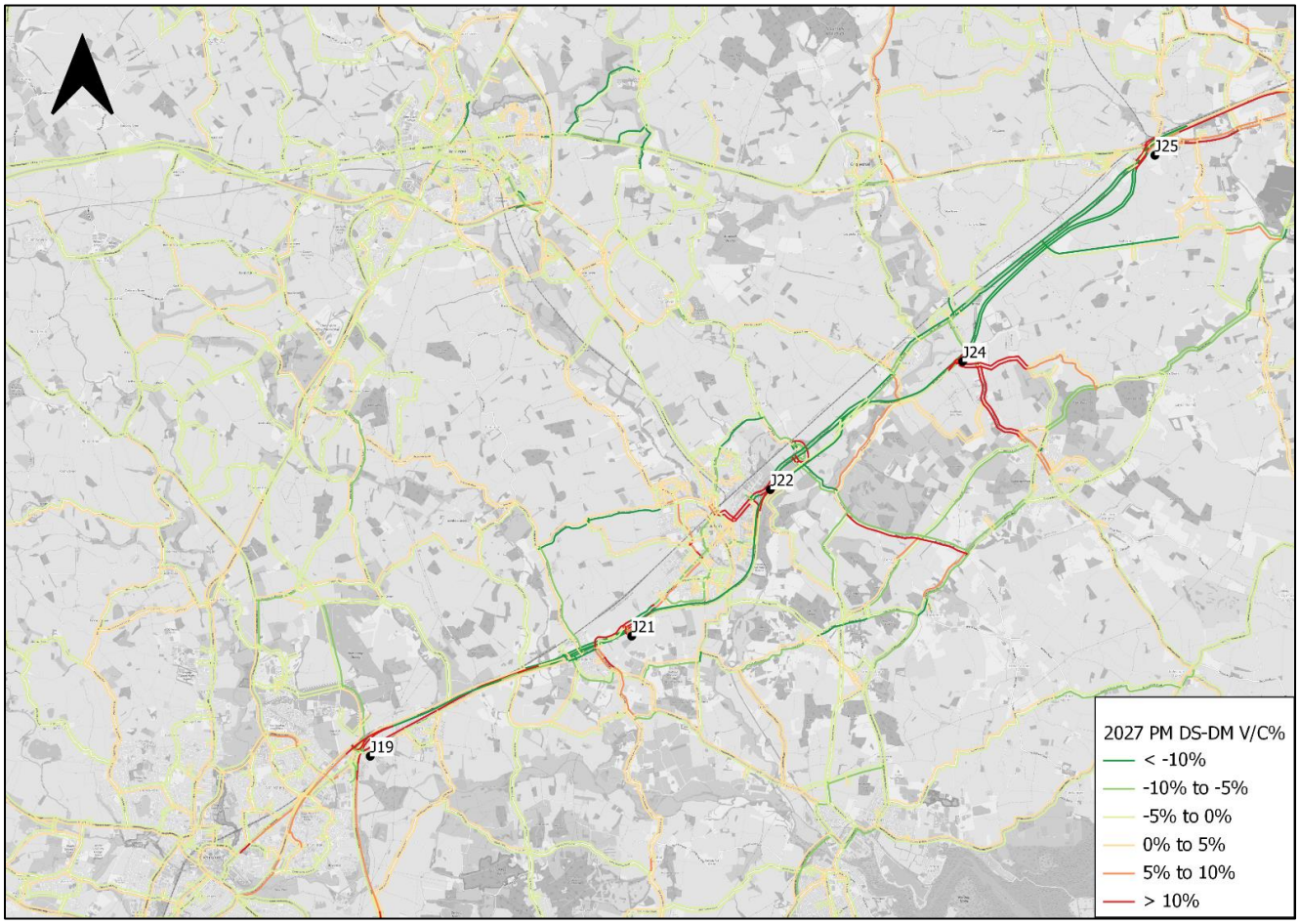


Plate 6-34 2027 PM DS – DM volume to capacity ratio difference



6.11 Operational modelling

Operational modelling of key junctions has been undertaken. This includes junctions constructed or improved as part of the scheme, as well as other junctions identified as being affected by changes in traffic flows. The modelling has been undertaken in either Vissim or Junctions 10 software, depending on the junction type. The results of this assessment are presented in the Transport Assessment.

7. High and Low Growth Models

Introduction

High and low growth models are used as part of the economic appraisal process, to determine how the scheme performs under more optimistic and pessimistic growth assumptions. This section outlines the traffic flow impact of both these growth scenarios.

The results here are shown for 2027 only, with the remaining high growth and low growth plots included in Appendix M.

High growth

The high growth scenario includes extra traffic on top of the core scenario traffic, based on the guidance outlined in TAG.

The traffic flow plots show that in all peaks, traffic increases on the A12 compared to the core scenario, especially in the Interpeak (IP). This is because IP has less demand and delay on the A12 and therefore is able to accommodate more traffic when demand is higher in the high growth scenario. Some of the local roads around the A12 also show increases due to the A12 traffic increase.

Plate 7-1 and Plate 7-2 show the flow difference plots between the core and high growth models for the Do Minimum scenario.

Plate 7-1Traffic flow change – 2027 Do Minimum Core vs high growth (AM)

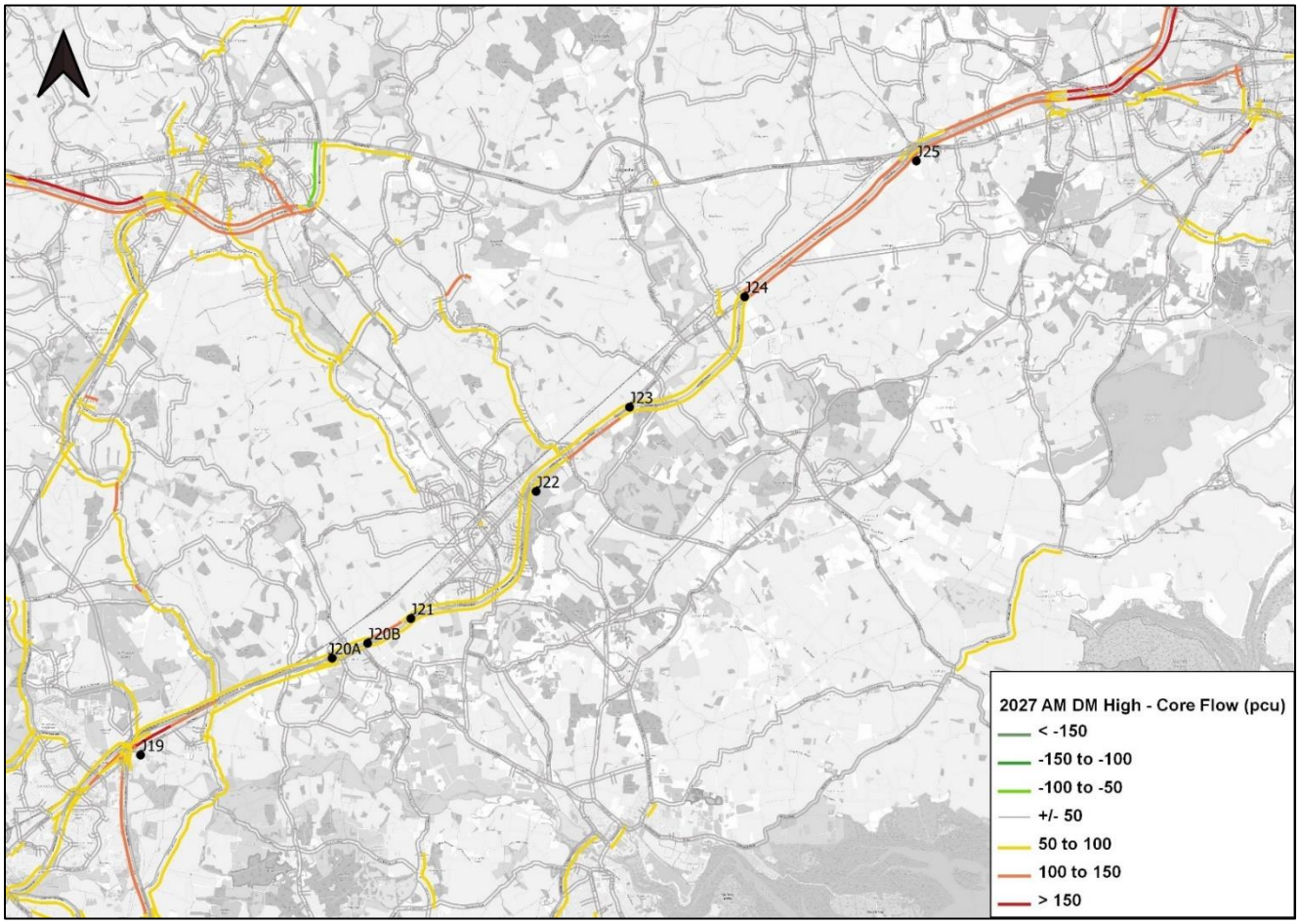
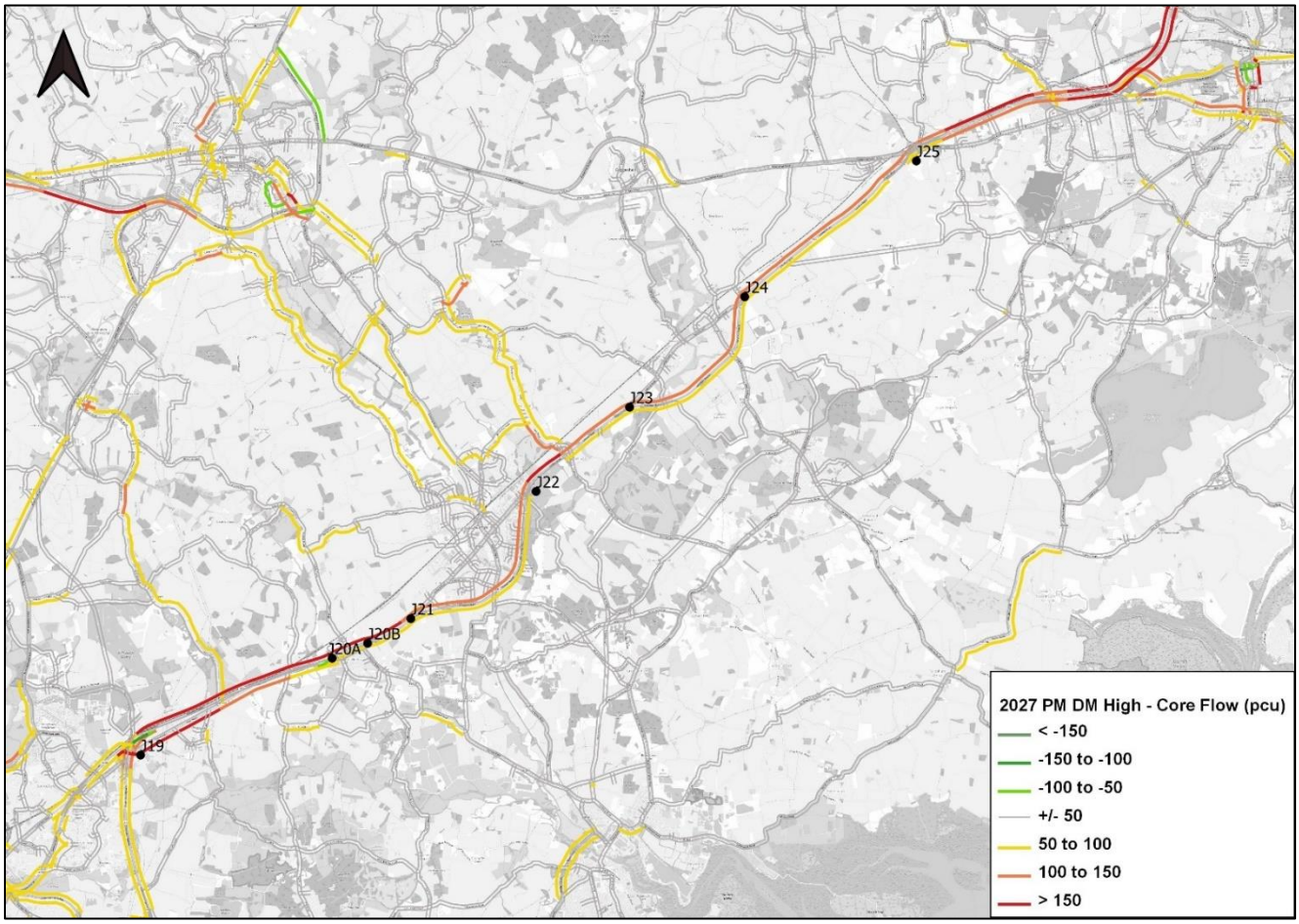


Plate 7-2 Traffic flow change – 2027 Do Minimum core vs high growth (PM)



The Do Something models follow a similar trend to the Do Minimum models. The majority of the flow change is on the A12 in the scheme area. Plate 7-3 and Plate 7-5 show the flow difference plots between the core and high growth models for the Do Something scenario.

Plate 7-3 Traffic flow change – 2027 Do Something core vs high growth (AM)

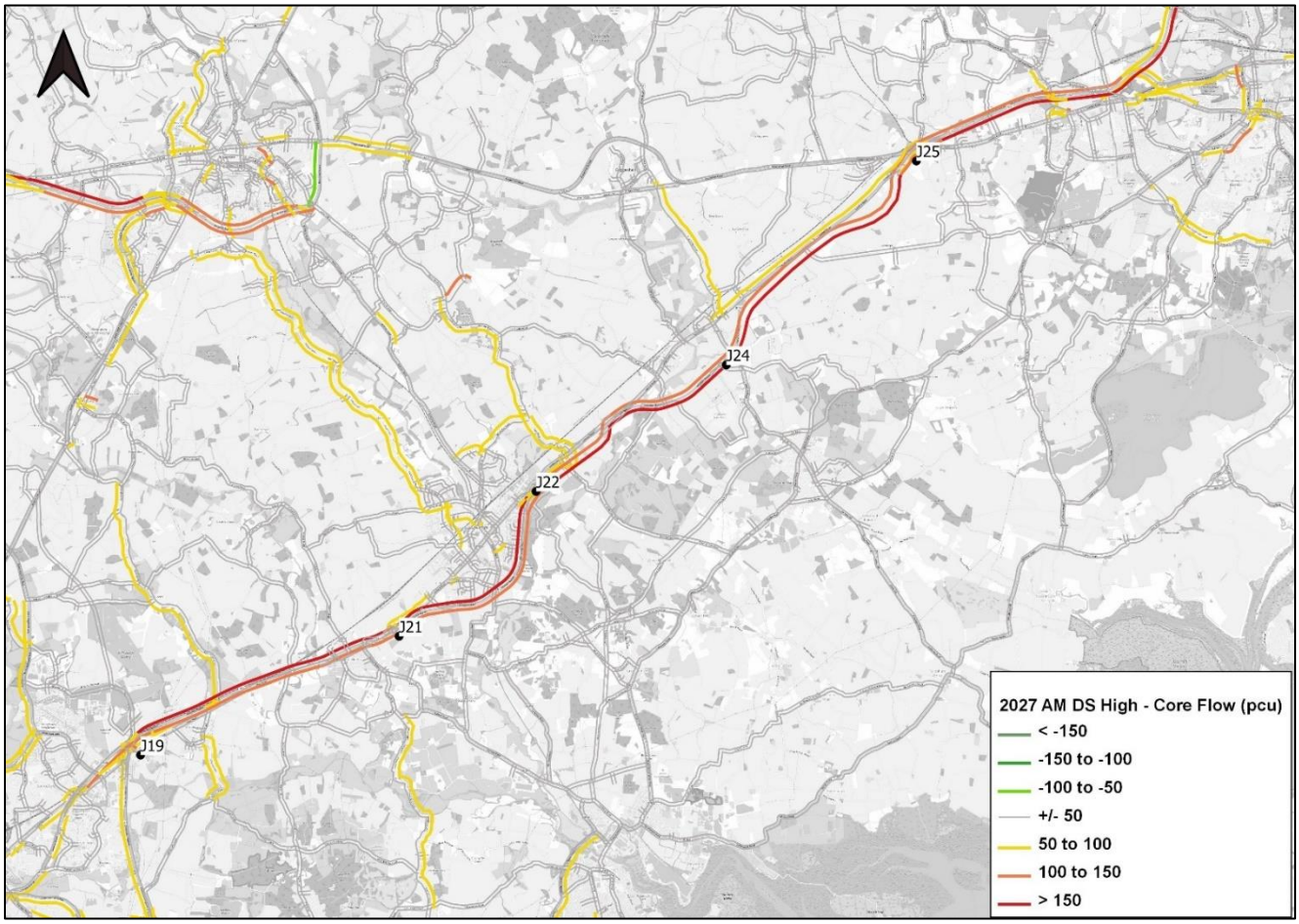


Plate 7-4 Traffic flow change – 2027 Do Something core vs high growth (IP)

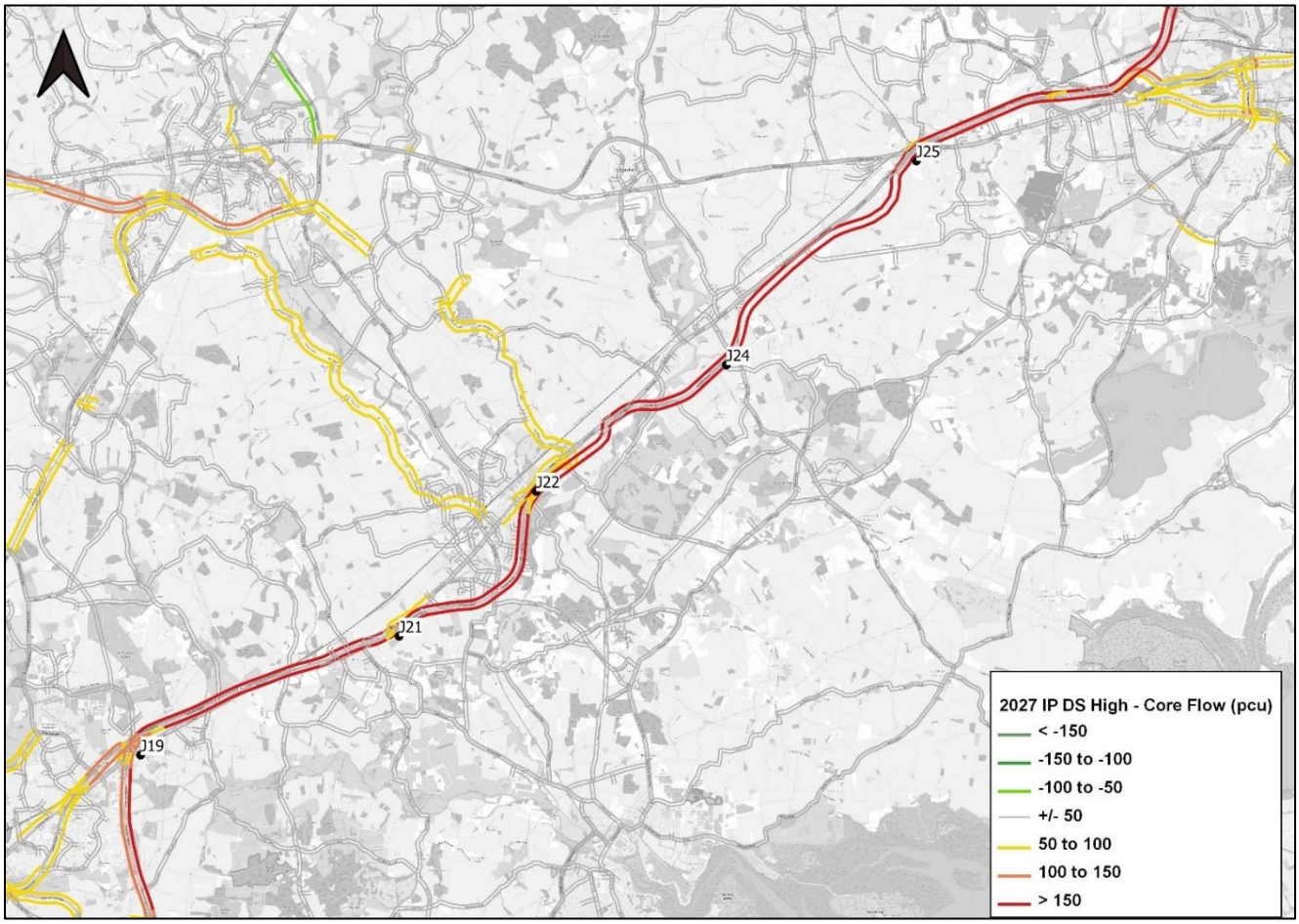
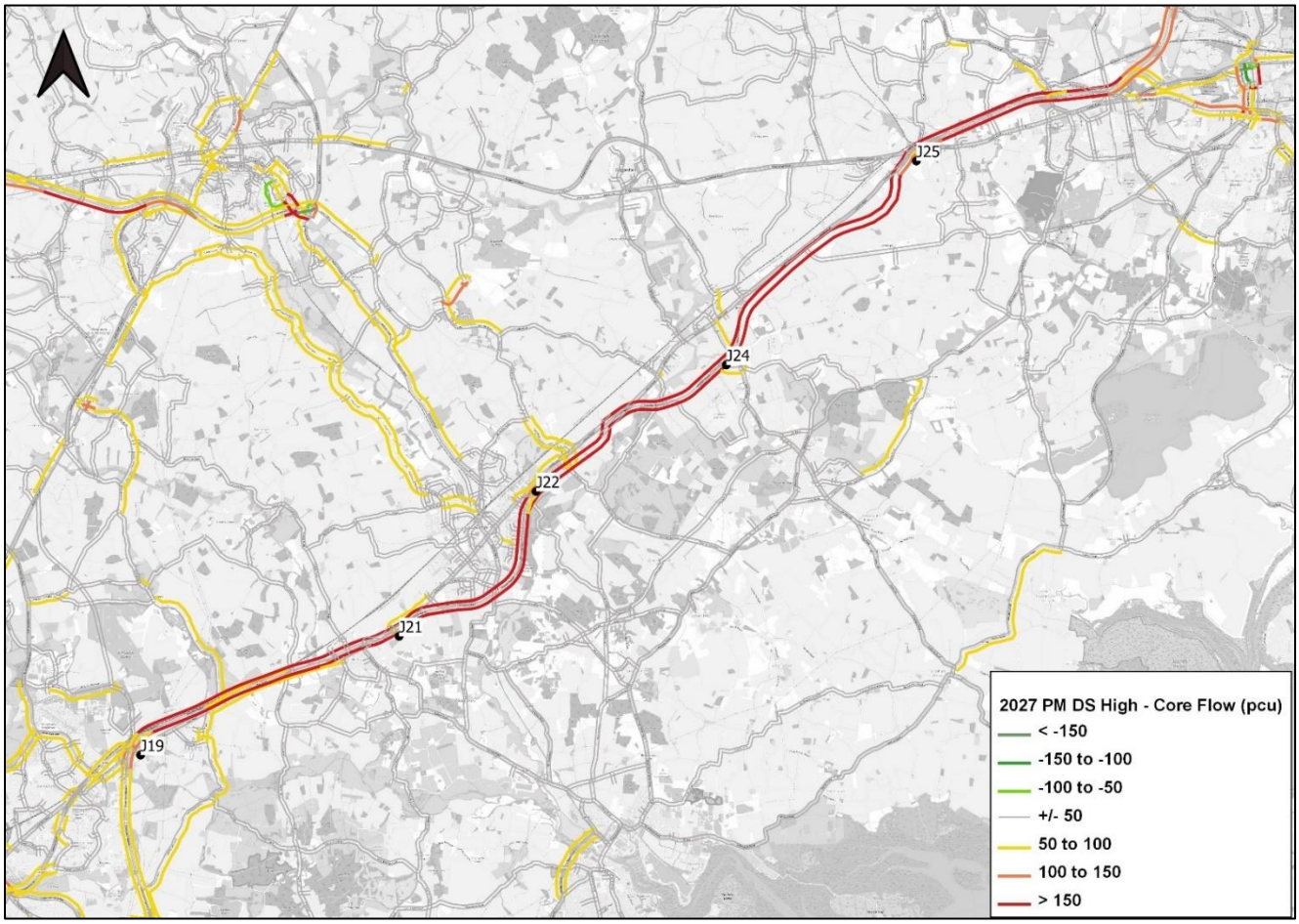


Plate 7-5 Traffic flow change – 2027 Do Something core vs high growth (PM)



High growth - journey time changes due to the scheme

Table 7-1 shows the impact of the scheme on journey times along the scheme route.

As in the core scenario, there is a decrease in journey time along the A12 due to the scheme. This is due to the increase in capacity along the A12 which reduces delay.

A comparison of journey time savings between the core and high growth scenario is summarised in Table 7-2. It shows the total journey time saving between junctions 19 and 25 of the A12 in each direction. As expected, the journey time savings are higher in the high growth scenario. This is because the predicted congestion if the scheme is not built is even higher than in the core scenario.

Table 7-1 High growth - journey time changes Do Something vs Do Minimum

Timing Point	2027 DM NB AM (mm:ss)	2027 DM NB IP (mm:ss)	2027 DM NB PM (mm:ss)	2027 DS NB AM (mm:ss)	2027 DS NB IP (mm:ss)	2027 DS NB PM (mm:ss)	2042 DM NB AM (mm:ss)	2042 DM NB IP (mm:ss)	2042 DM NB PM (mm:ss)	2042 DS NB AM (mm:ss)	2042 DS NB IP (mm:ss)	2042 DS NB PM (mm:ss)
J19	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J21	06:20	05:45	09:25	04:15	04:06	05:21	07:25	07:13	11:26	04:38	04:34	06:18
J22	09:34	08:44	12:43	07:21	07:01	08:45	10:58	10:26	16:09	08:05	07:49	10:11
J24	15:39	14:06	21:48	10:24	09:55	12:13	19:21	18:16	26:07	11:30	11:00	14:11
J25	19:36	17:19	26:21	15:03	14:18	17:19	23:41	21:46	30:55	16:40	15:51	19:52

Timing Point	2027 DM SB AM (mm:ss)	2027 DM SB IP (mm:ss)	2027 DM SB PM (mm:ss)	2027 DS SB AM (mm:ss)	2027 DS SB IP (mm:ss)	2027 DS SB PM (mm:ss)	2042 DM SB AM (mm:ss)	2042 DM SB IP (mm:ss)	2042 DM SB PM (mm:ss)	2042 DS SB AM (mm:ss)	2042 DS SB IP (mm:ss)	2042 DS SB PM (mm:ss)
J25	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J24	04:51	03:25	04:05	03:27	03:11	03:18	05:57	05:07	06:00	03:41	03:33	03:46
J22	11:38	08:18	09:11	06:36	06:00	06:12	13:52	11:57	12:42	07:08	06:42	07:01
J21	15:15	11:27	12:35	09:44	08:49	09:10	17:58	15:46	16:43	10:34	09:50	10:21
J19	21:06	16:09	17:40	15:04	13:17	13:56	24:27	21:03	22:18	16:27	14:51	15:47

Whole A12 Route	2027 DM (mm:ss)	2027 DS (mm:ss)	2027 Diff (mm:ss)	2042 DM (mm:ss)	2042 DS (mm:ss)	2042 Diff (mm:ss)
NB AM	19:36	15:03	-04:33	23:41	16:40	-07:01
NB IP	17:19	14:18	-03:01	21:46	15:51	-05:56
NB PM	26:21	17:19	-09:02	30:55	19:52	-11:03
SB AM	21:06	15:04	-06:02	24:27	16:27	-08:00
SB IP	16:09	13:17	-02:52	21:03	14:51	-06:12
SB PM	17:40	13:56	-03:44	22:18	15:47	-06:31

Table 7-2 Journey time savings (Do Something vs Do Minimum) core vs high growth scenario

Whole A12 Route	2027 Core Scenario (mm:ss)	2027 High Growth Scenario (mm:ss)	2042 Core Scenario (mm:ss)	2042 High Growth Scenario (mm:ss)
NB AM	03:53	04:33	05:41	07:01
NB IP	02:28	03:01	03:36	05:56
NB PM	08:02	09:02	09:37	11:03
SB AM	05:16	06:02	06:46	08:00
SB IP	02:31	02:52	04:04	06:12
SB PM	03:13	03:44	05:08	06:31

Low growth

The low growth scenario shows a traffic reduction as the amount of demand is lower in the low growth than it is in the core scenario. This means that there are generally fewer trips making the same movements across all origin/destinations and is shown in the figures below highlighted with green/yellow bands.

The greatest reductions shown are on key strategic movements such as the A12/A120, as well as some minor reductions around Chelmsford City Centre.

Plate 7-6 to Plate 7-8 show the flow difference plots between the core and low growth models for the Do Minimum scenario.

Plate 7-6 Traffic flow change – 2027 Do Minimum core vs low growth (AM)

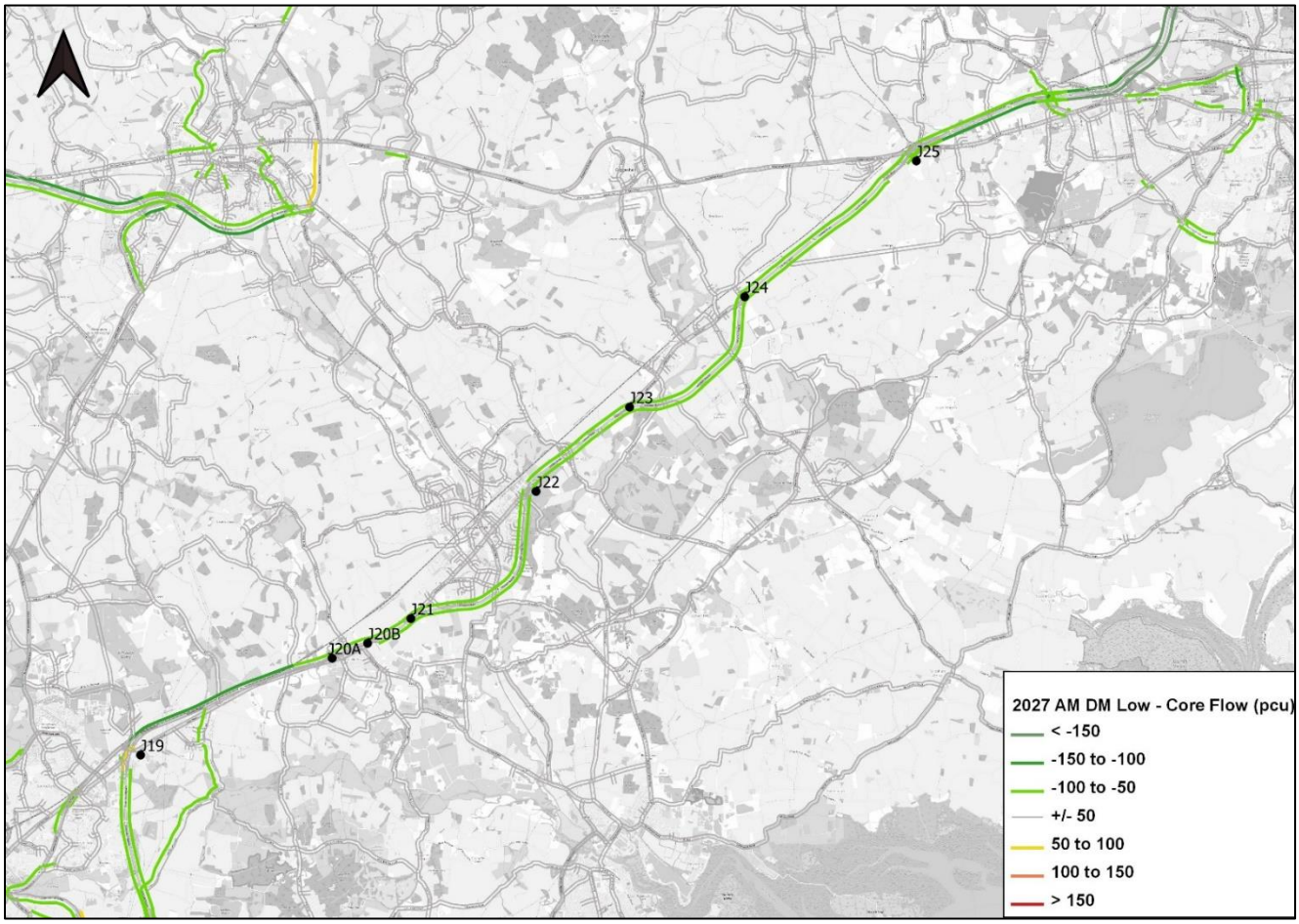


Plate 7-7 Traffic flow change – 2027 Do Minimum core vs low growth (IP)

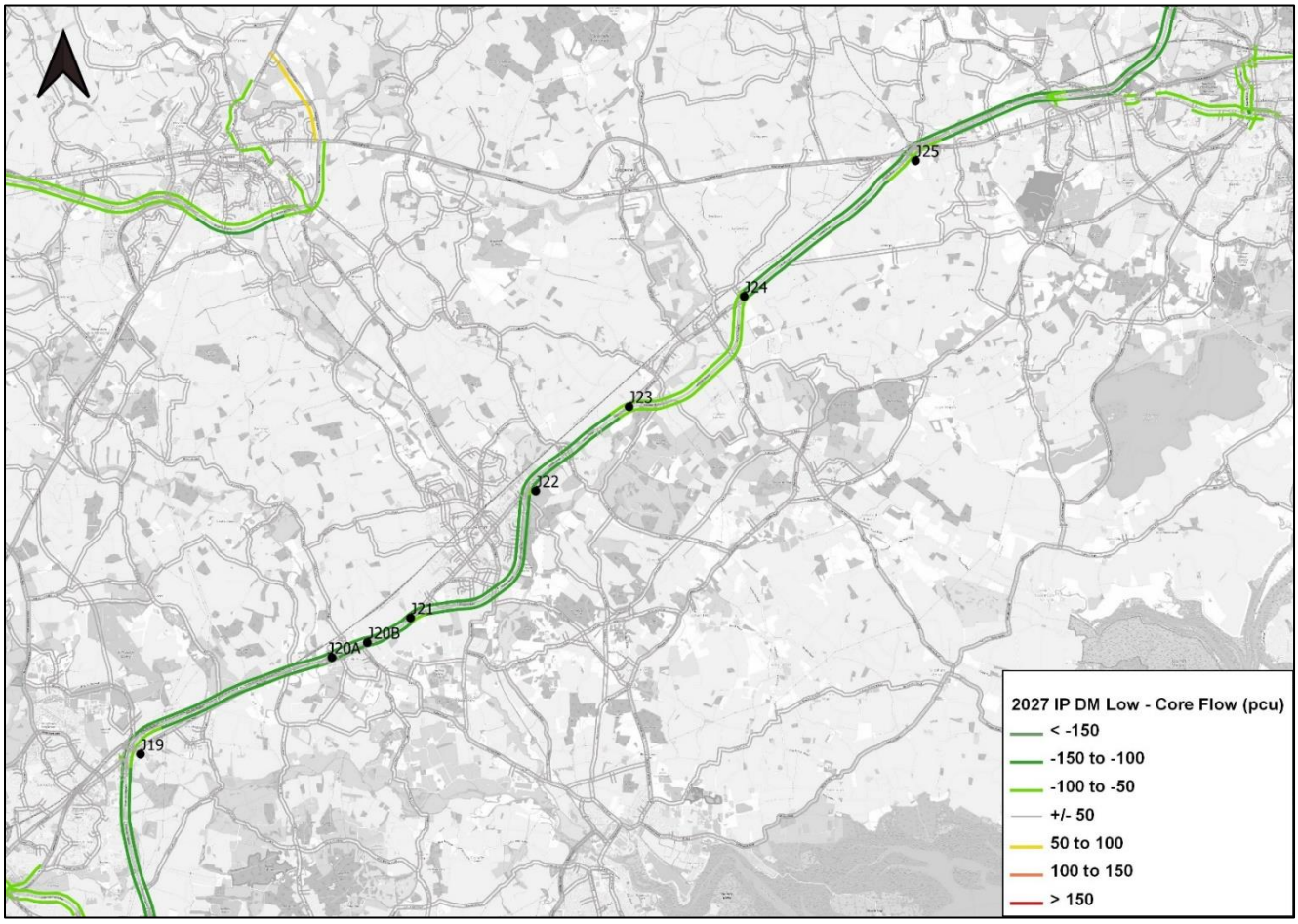


Plate 7-8 Traffic flow change – 2027 Do Minimum core vs low growth (PM)

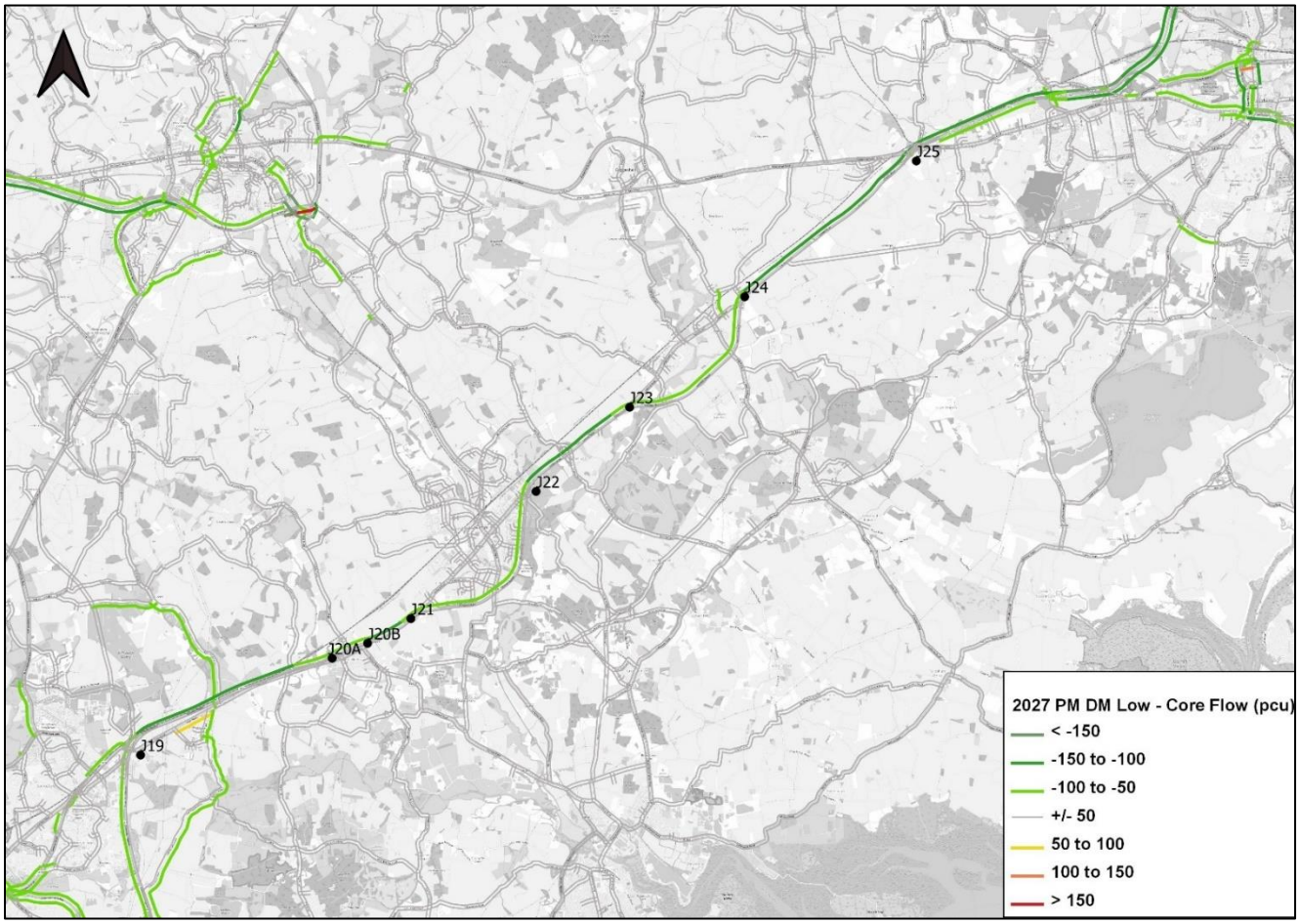


Plate 7-9 to Plate 7-11 show the flow difference plots between the core and low growth models for the Do Something scenario. These plots show that generally there are fewer long-distance trips within the low growth models, and the flow change compared to the core is a mirror image of the high growth scenarios.

Plate 7-9 Traffic flow change – 2027 Do Something core vs low growth (AM)

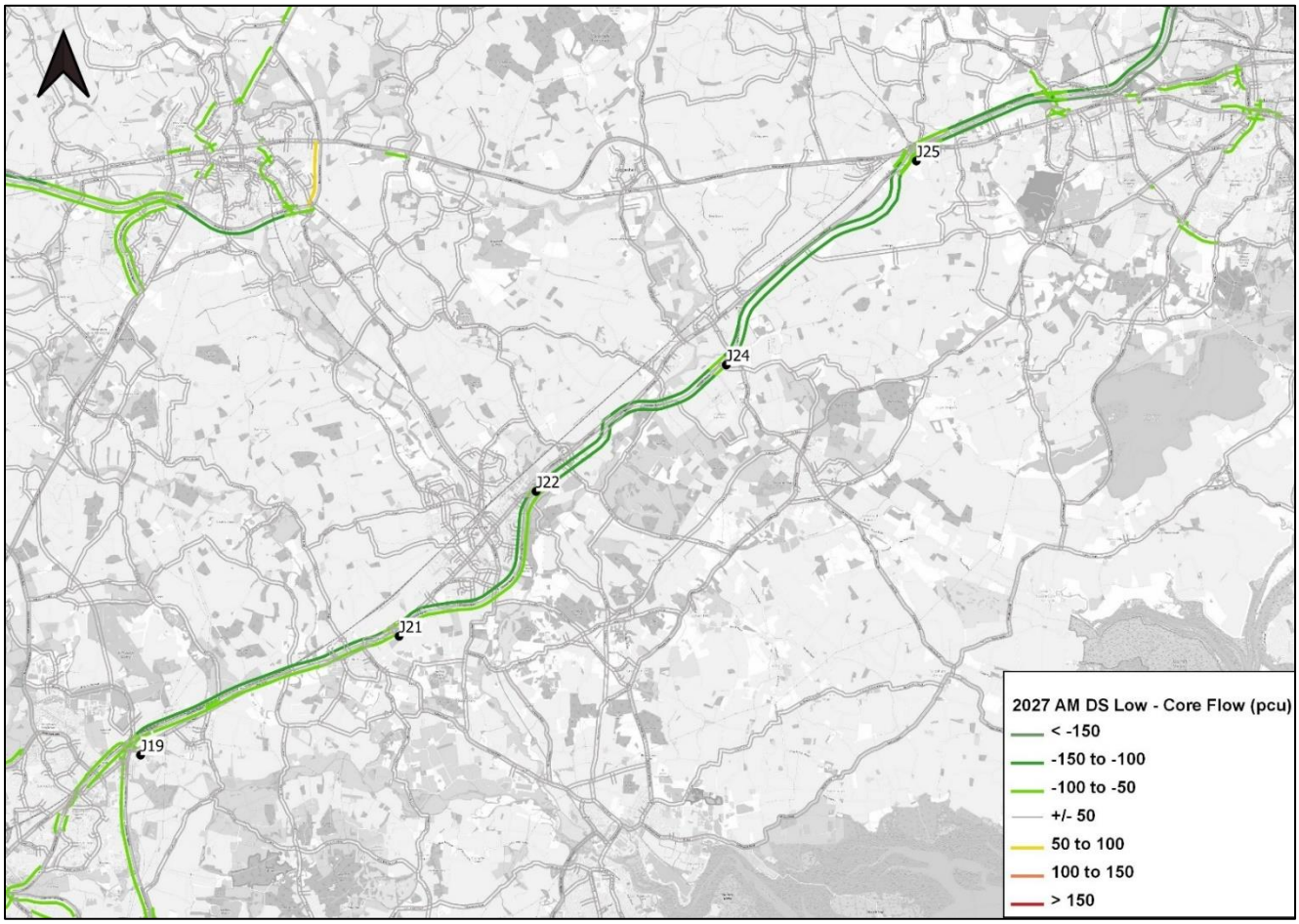


Plate 7-10 Traffic flow change – 2027 Do Something core vs low growth (IP)

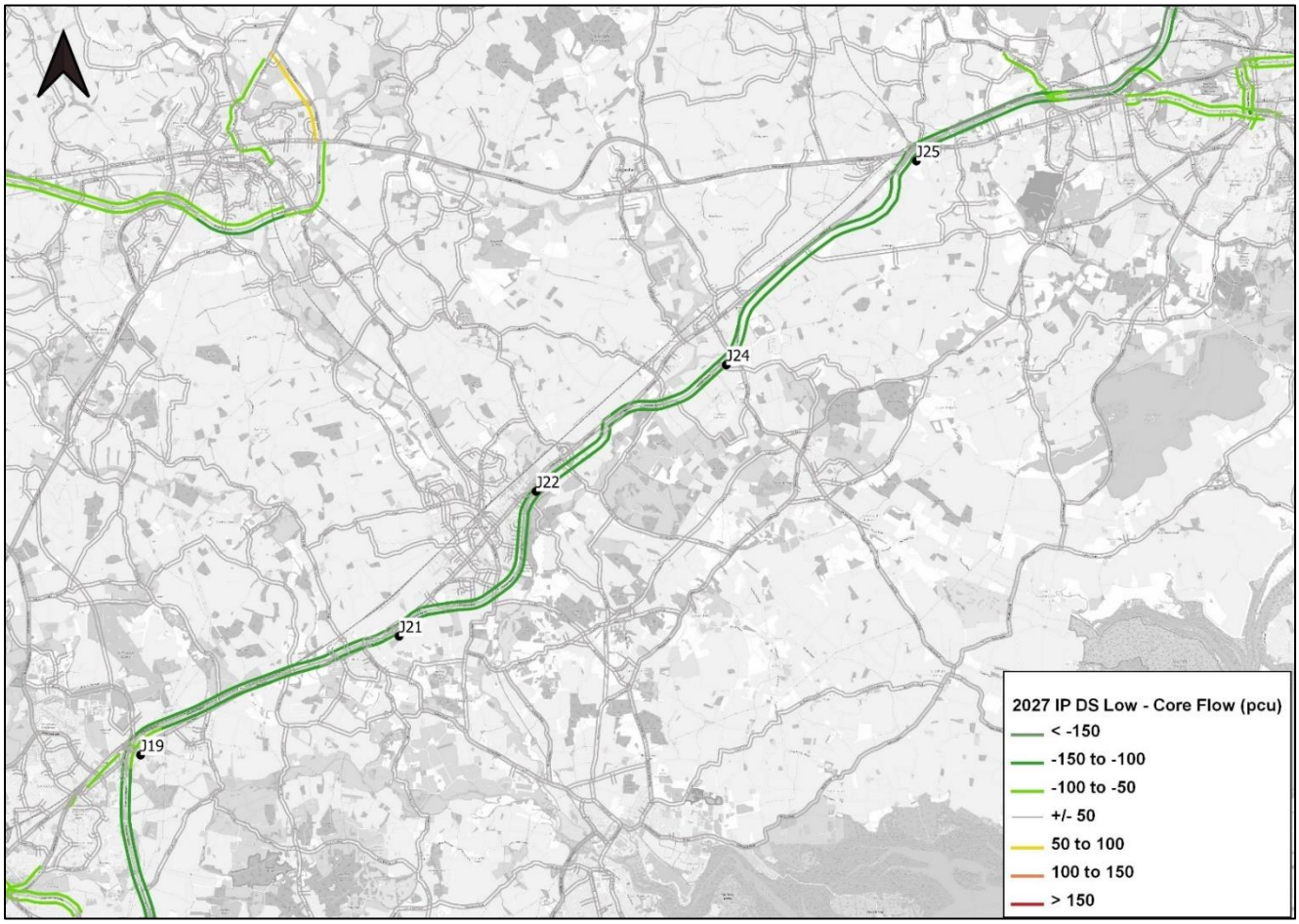
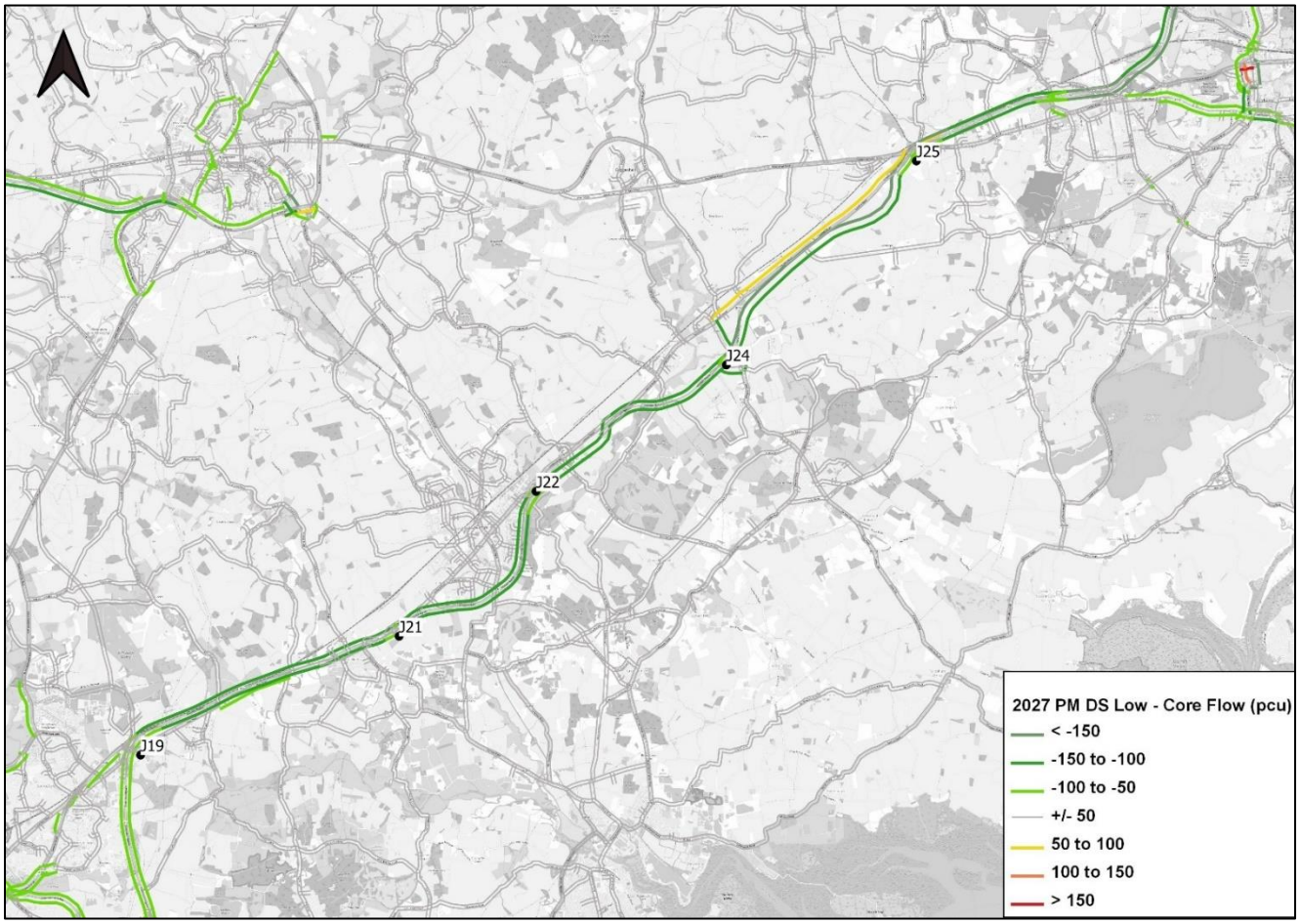


Plate 7-11 Traffic flow change – 2027 Do Something core vs low growth (PM)



Low growth - journey time changes due to the scheme

Table 7-1 shows the impact of the scheme on journey times along the scheme route.

As in the core scenario, there is a decrease in journey time along the A12 due to the scheme. This is due to the increase in capacity along the A12 which reduces delay.

A comparison of journey time savings between the core and low growth scenario is summarised in Table 7-4. As expected, the journey time savings are lower in the low growth scenario. This is because delays if the scheme is not built are not as high as in the core scenario.

Table 7-3 Low growth - journey time changes Do Something vs Do Minimum

Timing Point	2027 DM NB AM (mm:ss)	2027 DM NB IP (mm:ss)	2027 DM NB PM (mm:ss)	2027 DS NB AM (mm:ss)	2027 DS NB IP (mm:ss)	2027 DS NB PM (mm:ss)	2042 DM NB AM (mm:ss)	2042 DM NB IP (mm:ss)	2042 DM NB PM (mm:ss)	2042 DS NB AM (mm:ss)	2042 DS NB IP (mm:ss)	2042 DS NB PM (mm:ss)
J19	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J21	05:54	05:04	08:24	04:08	03:56	04:57	06:37	05:43	09:12	04:22	04:07	05:15
J22	09:00	07:55	11:23	07:09	06:46	08:10	10:04	08:44	12:27	07:35	07:04	08:42
J24	14:27	12:48	19:24	10:07	09:36	11:27	16:38	14:04	21:31	10:44	09:59	12:13
J25	18:13	16:01	23:51	14:38	13:53	16:20	20:39	17:17	26:06	15:33	14:24	17:24

Timing Point	2027 DM SB AM (mm:ss)	2027 DM SB IP (mm:ss)	2027 DM SB PM (mm:ss)	2027 DS SB AM (mm:ss)	2027 DS SB IP (mm:ss)	2027 DS SB PM (mm:ss)	2042 DM SB AM (mm:ss)	2042 DM SB IP (mm:ss)	2042 DM SB PM (mm:ss)	2042 DS SB AM (mm:ss)	2042 DS SB IP (mm:ss)	2042 DS SB PM (mm:ss)
J25	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
J24	04:08	03:08	03:34	03:21	03:07	03:11	05:05	03:42	04:35	03:32	03:15	03:27
J22	10:20	07:41	08:21	06:23	05:52	06:01	12:06	08:53	10:05	06:46	06:07	06:28
J21	13:44	10:42	11:36	09:24	08:38	08:54	15:47	12:10	13:48	09:57	09:01	09:35
J19	19:10	15:13	16:26	14:28	12:57	13:29	21:32	16:59	19:03	15:17	13:35	14:34

Whole A12 Route	2027 DM (mm:ss)	2027 DS (mm:ss)	2027 Diff (mm:ss)	2042 DM (mm:ss)	2042 DS (mm:ss)	2042 Diff (mm:ss)
NB AM	18:13	14:38	03:35	20:39	15:33	05:07
NB IP	16:01	13:53	02:08	17:17	14:24	02:53
NB PM	23:51	16:20	07:31	26:06	17:24	08:42
SB AM	19:10	14:28	04:42	21:32	15:17	06:15
SB IP	15:13	12:57	02:16	16:59	13:35	03:24
SB PM	16:26	13:29	02:57	19:03	14:34	04:29

Table 7-4 Journey time savings (Do Something vs Do Minimum) core vs low growth scenario

Whole A12 Route	2027 Core Scenario (mm:ss)	2027 Low Growth Scenario (mm:ss)	2042 Core Scenario (mm:ss)	2042 Low Growth Scenario (mm:ss)
NB AM	03:53	03:35	05:41	05:07
NB IP	02:28	02:08	03:36	02:53
NB PM	08:02	07:31	09:37	08:42
SB AM	05:16	04:42	06:46	06:15
SB IP	02:31	02:16	04:04	03:24
SB PM	03:13	02:57	05:08	04:29

8. Summary and Conclusion

8.1 Summary

The PCF Stage 3 Transport Model Package demonstrated that the traffic model is robust enough to satisfactorily replicate existing flows and journey times for the existing situation and can therefore be used to provide the future traffic flows needed for the development of the scheme. These future traffic flows can in turn therefore be used to allow environmental and economic assessments to be undertaken.

The purpose of this report has been to derive future traffic flows for A12 and on the surrounding network with and without the proposed improvement scheme. The following future years have been assessed:

- Opening Year 2027
- Design Year 2042
- Final Forecast Year 2051

The methodology used for developing the forecast networks and forecast matrices is summarised below.

Development of the networks in the future years:

- Do Minimum networks have been prepared for each of the future years. They contain the current highway network from the 2019 base year traffic model together with any other significant highway changes identified in the Uncertainty Log that are expected to be in place by each forecast year.
- Do Something networks have been prepared for all forecast years. They contain the Do Minimum network together with the proposed scheme coded in.
- Outside the immediate area of the proposed scheme the Do Minimum and Do Something networks are identical in all other respects.
- Generalised cost parameters (values of time and vehicle operating costs) have been calculated for each of future years/time periods.
- Network Checking - the Do Minimum and Do Something networks have been independently checked in terms of link lengths, link classifications and junction coding.

Development of the matrices in future years:

- Future demand matrices have been developed through liaison with the relevant planning authorities and have been constrained to national targets (NTEM).
- Specific local developments (office, industry, warehouse and residential development types) have been included in the traffic model where they are considered certain enough to happen. This is because employment and residential developments are the main generators of traffic.
- Background traffic growth based on NTEM and NTM growth has also been applied.

- Total trips have been constrained to NTEM and NTM growth. This provides the 'reference case' traffic demand matrices.
- Variable Demand Modelling was then applied. The approach adopted includes distribution (destination choice) and mode choice effects, together with a frequency response for optional (other purpose) trips. The spatial coverage of the Variable Demand model is the same as for the assignment model and they use the same zone system and generalised cost parameters. A review of the gap convergence criteria showed that the variable demand traffic model converged to acceptable levels.

Outputs from the model show that the modelled effects of the A12 scheme are sensible, and the scheme attracts traffic as a result of change in distribution patterns due to delay and journey time reductions along the scheme.

Changes in delays and journey times are also logical and generally consistent with the traffic flow changes.

Future year flow changes with and without the scheme have been checked and confirmed as suitable based on local knowledge of the network.

As well as the hourly traffic flows output from the model, daily traffic flows have also been estimated. These were derived from the hourly period models (AM, IP and PM) using uplift factors based on an analysis of automatic traffic count (ATC) data.

8.2 Conclusion

The future year traffic flows presented in this report provide a robust estimate of the traffic flows likely to occur at A12 and on the surrounding network. These future traffic flows can therefore be used to allow environmental and economic assessments to be undertaken for appraising the A12 scheme.

Appendix A. Uncertainty Log

Employment Sites

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Total GFA (m2)	Estimated number of jobs	% of GFA/Jobs by 2027	% of GFA Jobs by 2042
3	Near Certain	Braintree	Land adjoining Burghey Brook Poultry Farm	583099	216056	16365	355	100%	100%
8	Near Certain	Braintree	Waterside Business Park, Witham	583099	216056	4181	106	100%	100%
10	Near Certain	Braintree	PFE Express, Eastways	583099	216056	15470	392	100%	100%
120	Near Certain	Chelmsford	Rosehart Properties Ltd Blocks B and C Chelmsford Office and Technology Park West Hanningfield Road	572921	204002	-4472	-113	100%	100%
121	Near Certain	Chelmsford	Site at The Warehouse, Hawk Lane	577555	194434	-620	-16	100%	100%
122	Near Certain	Chelmsford	Rivermead Industrial Estate Bishop Hall Lane Chelmsford	570884	207829	780	20	100%	100%
123	Near Certain	Chelmsford	Hanningfield Gate, South Hanningfield Road, South Hanningfield, Chelmsford	574923	197739	245	6	100%	100%
124	Near Certain	Chelmsford	Land At 19 To 21 Woodham Halt, South Woodham Ferrers	580428	197672	-60	-2	100%	100%
125	Near Certain	Chelmsford	Site At Pond View, Banters Lane, Great Leighs, Chelmsford	573651	218133	-109	-3	100%	100%
126	Near Certain	Chelmsford	189 Moulsham Street And Land To The Rear Chelmsford	570793	206311	-114	-3	100%	100%
74	Near Certain	Maldon District Council	Wycke Hill South Maldon	583563	205344	16200	410	50%	100%
161	More than likely	Braintree	Josephs Barn Hatfield Road Witham Essex	580270	213031	1380	106	80%	100%
183	More than likely	Braintree	14 Freebournes Road Witham Essex CM8 3DG	582847	214524	10080	212	80%	100%
197	More than likely	Braintree	12 Freebournes Road Witham Essex CM8 3AH	582886	214690	25300	361	80%	100%
203	More than likely	Braintree	7A - 7B Perry Road Witham Essex CM8 3YZ	582627	213996	675	10	80%	100%
168	More than likely	Colchester	228 Old London Road, Marks Tey CO6 1HD	590834	223208	12517	263	100%	100%
172	More than likely	Colchester	AGM House, 83A London Road, Copford Colchester CO6 1GT	592995	223785	3000	76	100%	100%
4	Reasonably Foreseeable	Braintree	Essex County Fire and Rescue Service Headquarters	584637	216937	21540	546	0%	100%
38	Reasonably Foreseeable	Chelmsford	NE Chelmsford	572140	212363	45000	1140	12%	100%
117	Reasonably Foreseeable	Chelmsford	Remainder of Rivermead Industrial Estate, Bishop Hall Lane, Chelmsford	570884	207829	6220	158	100%	100%
118	Reasonably Foreseeable	Chelmsford	Railway Sidings, Brook Street	571075	207438	7000	177	100%	100%
119	Reasonably Foreseeable	Chelmsford	East of Chelmsford - Land North of Maldon Road	574315	205599	5000	127	100%	100%

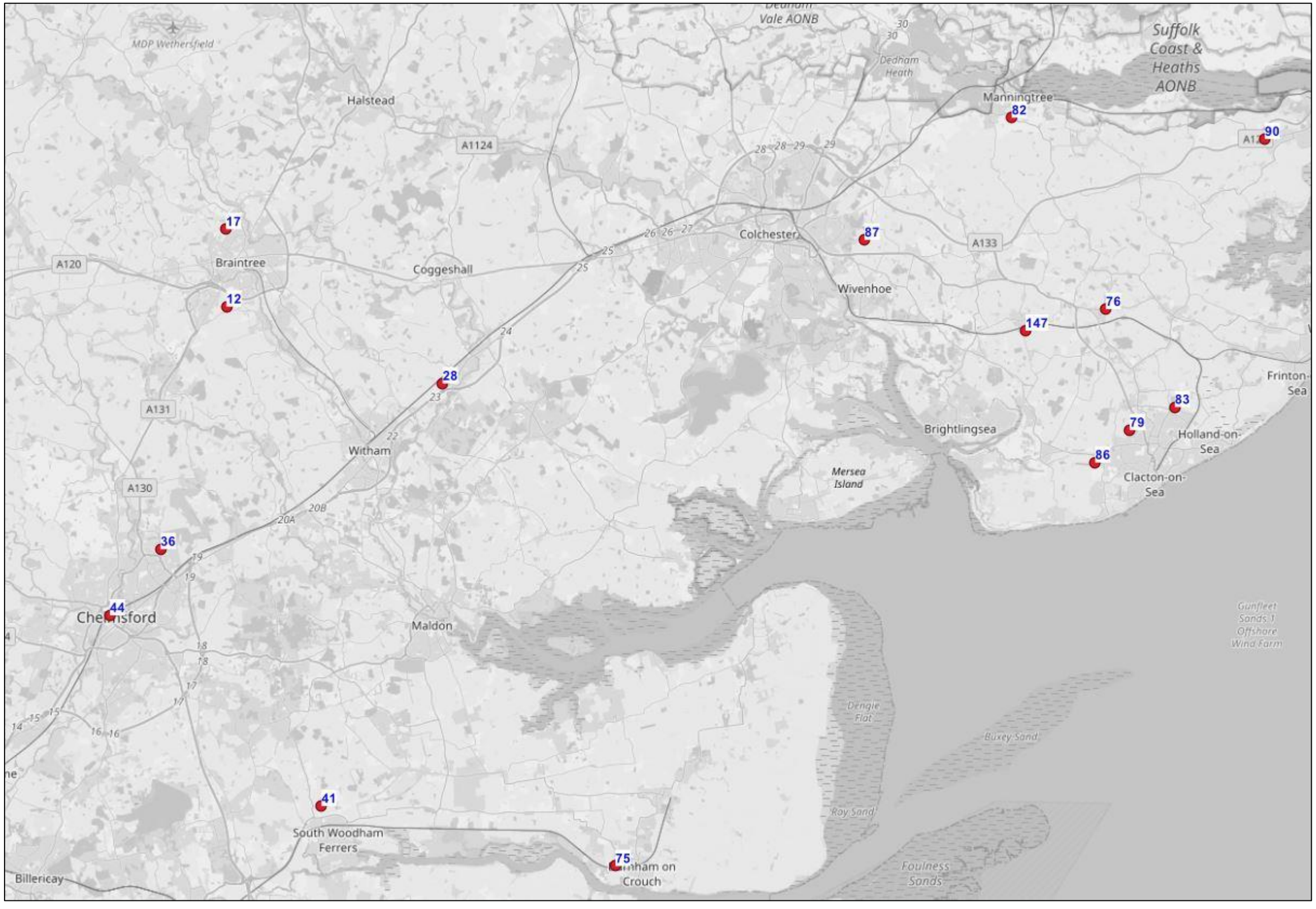
Note: The negative job numbers indicate demolitions or change in land use.

Employment Sites

Mixed Use Sites

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Estimated number of jobs	Total number of dwellings	% of dwellings built by 2027	% of dwellings built by 2042	% of GFA/Jobs by 2027	% of GFA Jobs by 2042
17	Near Certain	Braintree	Land West of Panfield Lane	575171	224503	241	636	23%	100%	23%	100%
28	Near Certain	Braintree	Land off Cranes Lane Kelvedon Essex	585196	217921	154	125	100%	100%	100%	100%
36	Near Certain	Chelmsford	Greater Beaulieu Park, White Hart Lane, Springfield	572714	210006	3067	3600	54%	100%	54%	100%
44	Near Certain	Chelmsford	University Campus Phase 2 part of Central Park and land at Park Road Chelmsford	570528	206940	135	426	100%	100%	100%	100%
75	Near Certain	Maldon District Council	Corinthian Place, Maldon Road, Burnham-on-Crouch	593828	196445	345	180	100%	100%	50%	100%
76	Near Certain	Tendring District Council	Barleyfields, Weeley	614989	222456	231	280	43%	100%	43%	100%
83	Near Certain	Tendring District Council	Oakwood Park (Phase 1), Clacton on Sea	618291	218185	175	250	100%	100%	100%	100%
90	Near Certain	Tendring District Council	Harwich Valley, Harwich	621818	230414	189	297	27%	100%	27%	100%
147	Near Certain	Tendring District Council	Land at Station Field, Plough Road, Great Bentley	611403	221331	72	150	100%	100%	100%	100%
82	More than likely	Tendring District Council	Long Road, Mistley	610381	230877	101	485	25%	100%	25%	100%
86	More than likely	Tendring District Council	Rouses Farm	614803	215534	18	950	13%	100%	100%	100%
12	Reasonably Foreseeable	Braintree	Land east of Great Notley, Strategic Growth Location	575312	221026	38	2000	16%	100%	37%	100%
41	Reasonably Foreseeable	Chelmsford	North of South Woodham Ferrers	580407	198662	25	1000	41%	100%	41%	100%
79	Reasonably Foreseeable	Tendring District Council	Hartley Gardens, Clacton on Sea	616298	217060	177	1700	0%	44%	0%	100%
87	Reasonably Foreseeable	Tendring District Council	Tendring Colchester Borders Garden Community	603976	225113	608	8000	4%	30%	4%	30%

Mixed Use Sites



Residential Sites

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Total number of dwellings	% of dwellings built by 2027	% of dwellings built by 2042
5	Near Certain	Braintree	Former Arla Dairy Site (Hatfield Grove)	578768	212021	145	100%	100%
6	Near Certain	Braintree	Land north east of Inworth Road (Part of Strategic Growth Location Land south of Feering/west of A12)	587407	219587	162	100%	100%
7	Near Certain	Braintree	Land adjacent to Braintree Road	578365	220410	225	100%	100%
14	Near Certain	Braintree	Land north of Colchester Road	585839	223041	300	100%	100%
15	Near Certain	Braintree	Land off Western Road	581440	219370	350	100%	100%
16	Near Certain	Braintree	Land south of Stonepath Drive	578791	211399	120	100%	100%
25	Near Certain	Braintree	Sorrells Field Bury Lane ("Mulberry Green")	578776	211835	50	100%	100%
27	Near Certain	Braintree	Land between London Road, Pods Brook and A120	574812	222182	215	100%	100%
29	Near Certain	Braintree	Land at Flemming Way	582749	216213	222	100%	100%
93	Near certain	Braintree	Willowmead Nursing Home Wickham Bishops Road	580932	211520	25	100%	100%
96	Near certain	Braintree	Land adjacent Watering Farm Coggeshall Road	586242	219574	35	100%	100%
97	Near certain	Braintree	Land South of The Garden Field Western Road	581541	219238	45	100%	100%
99	Near certain	Braintree	Car park at Sheepcotes Lane	581054	219905	15	100%	100%
100	Near certain	Braintree	Land south of Rickstones Road	582168	216656	58	100%	100%
101	Near certain	Braintree	Avondale, Land east of Mill Lane	578089	220371	99	100%	100%
102	Near certain	Braintree	Land at Appletree Farm Polecat Road	578906	220393	78	100%	100%
37	Near Certain	Chelmsford	Land north, south and east of Belsteads Farm Lane, Broomfield (Channels)	572237	210769	750	100%	100%
43	Near Certain	Chelmsford	Runwell Hospital, Runwell Chase, Runwell	576223	195983	575	100%	100%
46	Near Certain	Chelmsford	Great Leighs - Land East of Main Road	573181	217762	100	100%	100%
48	Near Certain	Chelmsford	Land east of Patching Hall Lane, Broomfield	570071	209545	135	100%	100%
49	Near Certain	Chelmsford	St Johns Hospital, Wood Street (North), Chelmsford - Linden Homes	570020	205022	127	100%	100%
50	Near Certain	Chelmsford	St Johns Hospital, Wood Street (South), Chelmsford - Inland Homes	569970	204958	101	100%	100%
51	Near Certain	Chelmsford	Land north of Copperfield Road (East portion) Chelmsford	569222	209373	198	100%	100%
52	Near Certain	Colchester	Chesterwell	598411	227696	1461	100%	100%
53	Near Certain	Colchester	Cowdray Centre	599935	226243	262	100%	100%
54	Near Certain	Colchester	Fiddlers Field, Eight Ash Green	594068	225948	150	100%	100%
56	Near Certain	Colchester	Gosbecks Phase 2	597433	226630	144	96%	100%
58	Near Certain	Colchester	Land adjoining Gables, Kelvedon Road, Tiptree	588629	216942	130	100%	100%
59	Near Certain	Colchester	Land at Grange Farm, Tiptree	588817	216682	103	100%	100%
60	Near Certain	Colchester	Land at Maldon Road, Rear of Peakes Close, Tiptree	588779	215695	255	100%	100%
61	Near Certain	Colchester	Land off Barbrook Lane, Tiptree	589907	216814	200	100%	100%
63	Near Certain	Colchester	Land to the North of London Road, Stanway	593855	224607	636	33%	100%
66	Near Certain	Colchester	Rugby Club (including 260 Extra Care Accomdation)	600148	228845	350	19%	100%
68	Near Certain	Colchester	Tiptree Neighbourhood Plan	589417	216556	150	13%	100%
69	Near Certain	Colchester	Wilkin and Sons Ltd, Factory Hill, Tiptree	590355	215746	126	100%	100%
127	Near Certain	Colchester	Brierley Paddocks, West Mersea	602422	213107	100	100%	100%

Residential Sites (Contd.)

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Total number of dwellings	% of dwellings built by 2027	% of dwellings built by 2042
128	Near Certain	Colchester	Dawes Lane, West Mersea	602206	213634	100	70%	100%
174	Near Certain	Colchester	Land Off, Halstead Road, Eight Ash Green	593259	226436	150	100%	100%
70	Near Certain	Maldon District Council	[South of Limebrook Way, Maldon] eastern parcel = Handley Gardens, Maldon; western parcel = Wycke Place	584060	205164	1000	50%	100%
71	Near Certain	Maldon District Council	Completed LDP allocations, Maldon and Heybridge	585231	208406	320	100%	100%
72	Near Certain	Maldon District Council	Land At Broad Street Green Road And Langford Road And Maypole Road Great Totham Essex [North of Heybridge]	585221	208865	1138	50%	100%
132	Near Certain	Maldon District Council	Grangewood Park, Southminster Rd, Burnham-on-Crouch [North of Burnham-on-Crouch West]	594600	197114	180	100%	100%
133	Near Certain	Maldon District Council	North of Burnham-on-Crouch (East)	595192	197044	90	100%	100%
134	Near Certain	Maldon District Council	Blackwater Reach, Southminster [Theedhams Farm, Southminster]	594809	199939	94	100%	100%
135	Near Certain	Maldon District Council	Barley Fields , Burnham -on-Crouch Land [Land to the east of Pippins Rd Burnham-on-Crouch]	595393	196557	75	100%	100%
136	Near Certain	Maldon District Council	Land west of cemetery chapel, Southminster Road, Burnham-on-Crouch	594627	197773	80	100%	100%
77	Near Certain	Tendring District Council	Finches Park, Frinton on Sea	622300	221220	266	91%	100%
78	Near Certain	Tendring District Council	Hamford Park, Walton on the Naze	625045	221948	216	100%	100%
80	Near Certain	Tendring District Council	Land West of Low Road, Dovercourt	623253	230175	300	57%	100%
81	Near Certain	Tendring District Council	Lawford Green, Lawford	609826	230704	360	57%	100%
85	Near Certain	Tendring District Council	River Reach, Mistley	612633	231365	235	100%	100%
88	Near Certain	Tendring District Council	Turpins Farm, Kirby Le Soken	623590	221594	210	86%	100%
89	Near Certain	Tendring District Council	Brook Park West, Clacton on Sea	616639	217076	200	85%	100%
143	Near Certain	Tendring District Council	‘Colne Gardens Phase 2’, Brightlingsea	609342	217087	115	100%	100%
145	Near Certain	Tendring District Council	Staunton Gate', Alresford	606329	221655	144	100%	100%
146	Near Certain	Tendring District Council	Land North of Cockaynes Lane, Alresford	606395	221890	84	100%	100%
150	Near Certain	Tendring District Council	‘Wellwick Field’, The Priory Estate, St Osyth	612142	215737	190	72%	100%
151	Near Certain	Tendring District Council	Henderson Park, Thorpe le Soken	618572	222616	98	100%	100%

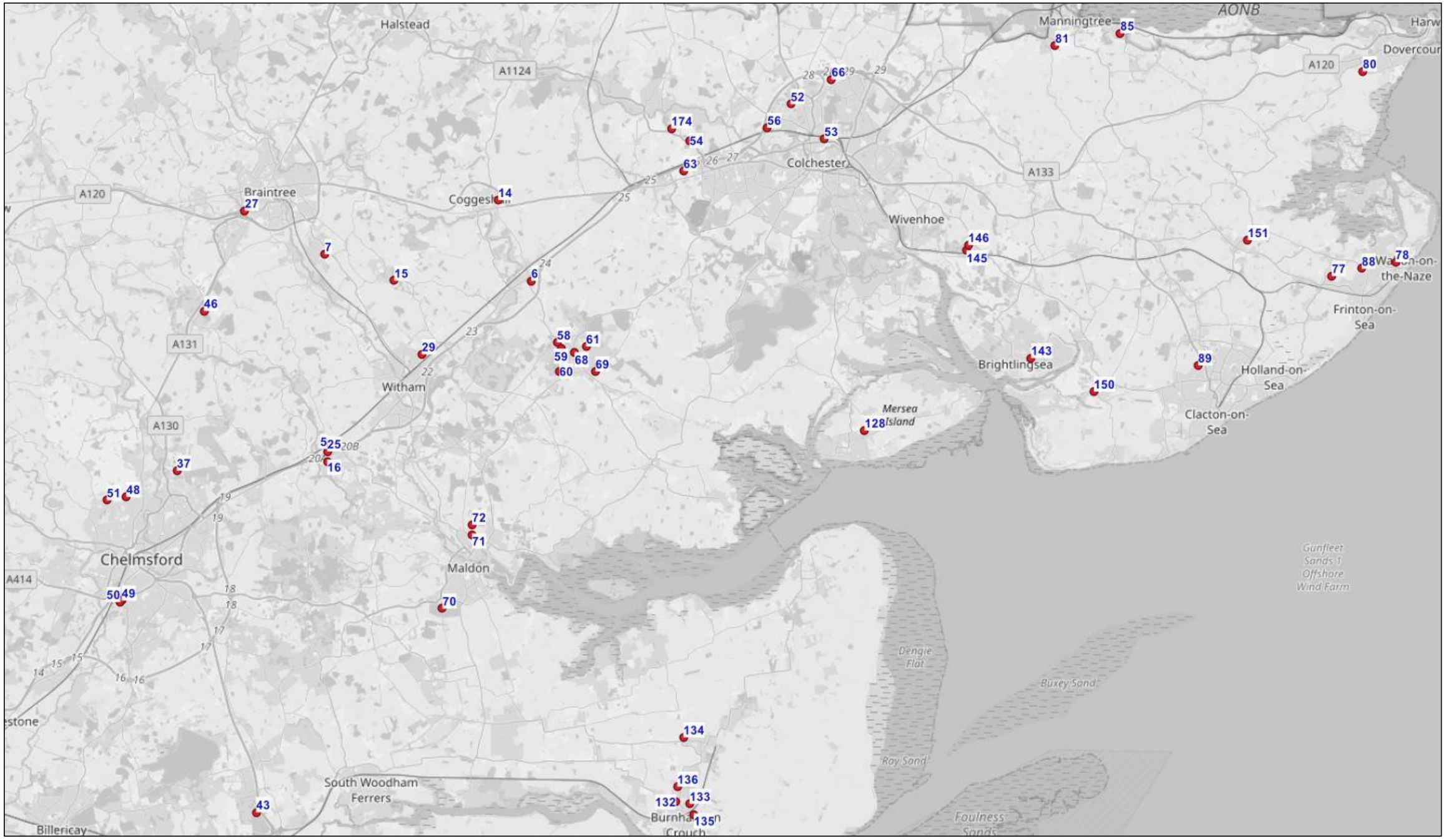
Residential Sites (Contd.)

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Total number of dwellings	% of dwellings built by 2027	% of dwellings built by 2042
2	More than likely	Braintree	Bury Farm, Bury Lane, Hatfield Peverel	578598	211865	46	100%	100%
11	More than likely	Braintree	Land Between Long Green And Braintree Road	578010	221555	250	50%	100%
18	More than likely	Braintree	Land Adjacent To Lodge Farm Hatfield Road Witham Essex	580719	213366	750	53%	100%
22	More than likely	Braintree	Station Field, Land west of Kelvedon Station Station Road (Monks Farm)	586051	219364	250	84%	100%
24	More than likely	Braintree	Towerlands Park	575054	225227	575	65%	100%
92	More than likely	Braintree	St Andrews Road Hatfield Peverel	579078	211538	25	100%	100%
94	More than likely	Braintree	Land at Wood End Farm	580400	213072	300	65%	100%
103	More than likely	Braintree	Land North Of London Road Kelvedon Essex	585412	218136	250	100%	100%
107	More than likely	Braintree	Land at 14-18 Thorne Road and 1-15 Croft Road Kelvedon	585867	218724	15	100%	100%
164	More than likely	Braintree	Land West Of St Dominics Residential Home & The Cloisters Kelvedon Essex	585823	218348	25	100%	100%
199	More than likely	Braintree	Former Bramston Sports Centre, Bridgestreet, CM8 1BT Witham	581739	214219	58	100%	100%
202	More than likely	Braintree	Land North East Of Gleneagles Way Hatfield Peverel Essex	579714	211906	100	100%	100%
159	More than likely	Braintree	Land off Maldon Road, Hatfield Peverel	579714	211906	130	100%	100%
39	More than likely	Chelmsford	North East Chelmsford	572140	212363	3000	12%	100%
40	More than likely	Chelmsford	Strategic Growth Site North Of Woodhouse Lane Broomfield Chelmsford Essex	570332	211817	450	9%	100%
42	More than likely	Chelmsford	Peninsula Site Chelmer Waterside Development Wharf Road Chelmsford	571628	206292	448	100%	100%
114	More than likely	Chelmsford	Rivermead Bishop Hall Lane Chelmsford	570884	207829	136	100%	100%
154	More than likely	Chelmsford	Site At North Bungalow Elm Way Boreham Chelmsford Essex, CM3 3HB	575141	210078	9	100%	100%
155	More than likely	Chelmsford	Strategic Growth Site 3B West Of Park & Ride Terminus, Maldon Road Strategic Growth Site 3c, East Of Molrams Lane & Strategic Growth Site 3d, East Of Sandford Mill Lane Sandon Chelmsford Essex	573778	207272	205	100%	100%
55	More than likely	Colchester	Former Severalls Hospital	599312	228474	392	100%	100%
57	More than likely	Colchester	Lakelands	594925	224060	254	100%	100%
62	More than likely	Colchester	Land off Dyers Road including Fiveways Fruit Farm	595518	223455	605	20%	100%
64	More than likely	Colchester	Land to the West of Lakelands	594546	224041	150	100%	100%
170	More than likely	Colchester	14 Copford Place, London Road, Copford Colchester CO6 1BG	593334	224138	37	100%	100%
173	More than likely	Colchester	Land to the rear of 306 to, 314 London Road, Stanway Colchester CO3 8LT	593938	224406	31	100%	100%
204	More than likely	Colchester	Land at, Brook Meadows, Tiptree Colchester CO5 0QF	589052	216065	221	100%	100%
73	More than likely	Maldon District Council	Wycke Hill North, Maldon	583823	205815	320	100%	100%
130	More than likely	Maldon District Council	Sharpes Meadow, Heybridge [West of Broad Street Green Road]	586005	209294	145	75%	100%
137	More than likely	Maldon District Council	Land North West Of 2 Maldon Road Burnham-On-Crouch Essex [sometimes referred to as 'Tinkers Hole', from name of adjacent lane]	593294	197824	166	0%	100%
141	More than likely	Tendring District Council	Land North of Sladburys Lane, Clacton on Sea	618940	216638	132	45%	100%
142	More than likely	Tendring District Council	Thorpe Road/Chapel Lane, Frinton on Sea	620776	221065	110	100%	100%
144	More than likely	Tendring District Council	Land to the south of Bromley Road, Ardleigh	603135	226075	145	100%	100%
148	More than likely	Tendring District Council	Land south Weeley Road, Great Bentley	611907	222762	136	88%	100%
149	More than likely	Tendring District Council	Land at The Street, Little Clacton	616305	219465	98	100%	100%

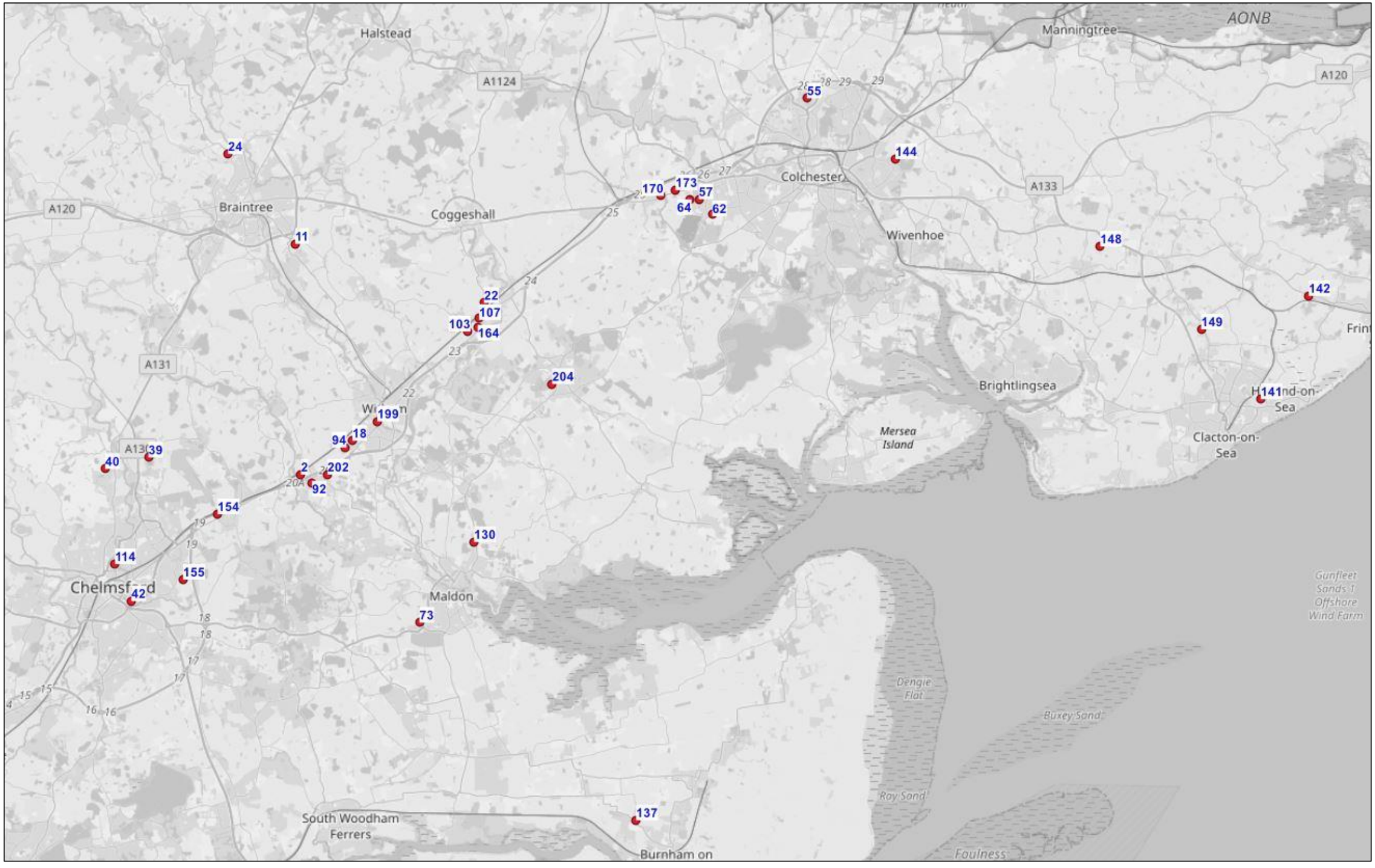
Residential Sites (Contd.)

ID	Uncertainty Assigned	Local Authority	Name	X coordinate	Y coordinate	Total number of dwellings	% of dwellings built by 2027	% of dwellings built by 2042
9	Reasonably Foreseeable	Braintree	Land at Egypts Farm, Silver End	580220	219700	365	40%	100%
13	Reasonably Foreseeable	Braintree	Land east of Silver End	581466	220293	1800	25%	100%
23	Reasonably Foreseeable	Braintree	Strategic Growth Location, Land south of Feering/west of A12	587407	219587	795	8%	100%
26	Reasonably Foreseeable	Braintree	Strategic Growth Location, Land south of Feering/west of A12	587407	219587	40	15%	100%
95	Reasonably Foreseeable	Braintree	Land south of Maltings Lane	581249	213244	63	65%	100%
98	Reasonably Foreseeable	Braintree	Crittall Works site	580083	219575	65	100%	100%
108	Reasonably Foreseeable	Braintree	Land at Newlands Centre Newland Street	582040	214542	15	0%	100%
30	Reasonably Foreseeable	Chelmsford	East Chelmsford - Manor Farm	573578	205591	250	100%	100%
31	Reasonably Foreseeable	Chelmsford	Eastwood House Car Park Glebe Road Chelmsford	570648	207330	231	100%	100%
32	Reasonably Foreseeable	Chelmsford	Former Gas Works Wharf Road Chelmsford	571312	206518	250	0%	100%
33	Reasonably Foreseeable	Chelmsford	Former Royal Mail Premises Victoria Road Chelmsford	571034	207180	203	100%	100%
34	Reasonably Foreseeable	Chelmsford	Great Leighs - Land at Moulsham Hall	573091	218377	750	12%	100%
35	Reasonably Foreseeable	Chelmsford	Great Leighs - Land East of London Road	573496	218450	250	100%	100%
45	Reasonably Foreseeable	Chelmsford	West Chelmsford	568061	207735	800	75%	100%
47	Reasonably Foreseeable	Chelmsford	Great Leighs - Land North and South of Banters Lane	573476	218174	100	100%	100%
110	Reasonably Foreseeable	Chelmsford	Lockside Navigation Road Chelmsford	571590	206486	130	38%	100%
111	Reasonably Foreseeable	Chelmsford	Baddow Road Car Park and Land to the East	571277	206335	190	0%	100%
112	Reasonably Foreseeable	Chelmsford	Riverside Ice and Leisure Land Victoria Road Chelmsford	571133	207016	125	100%	100%
113	Reasonably Foreseeable	Chelmsford	Civic Centre Land Fairfield Road Chelmsford	570340	206938	100	0%	100%
115	Reasonably Foreseeable	Chelmsford	East Chelmsford - Land South of Maldon Road	574067	205323	100	100%	100%
116	Reasonably Foreseeable	Chelmsford	Danbury	580407	198662	100	0%	100%
65	Reasonably Foreseeable	Colchester	Middlewick Ranges	600939	222852	1000	10%	100%
67	Reasonably Foreseeable	Colchester	Tendring/Colchester Borders GC	604151	225678	1250	20%	100%
131	Reasonably Foreseeable	Maldon District Council	Heybridge Swifts, Heybridge	586539	208421	100	0%	100%
138	Reasonably Foreseeable	Maldon District Council	Petticrows Boat Yard, Burnham-on-Crouch	595636	195439	75	10%	100%
84	Reasonably Foreseeable	Tendring District Council	Oakwood Park, Little Clacton	618548	218698	918	4%	100%

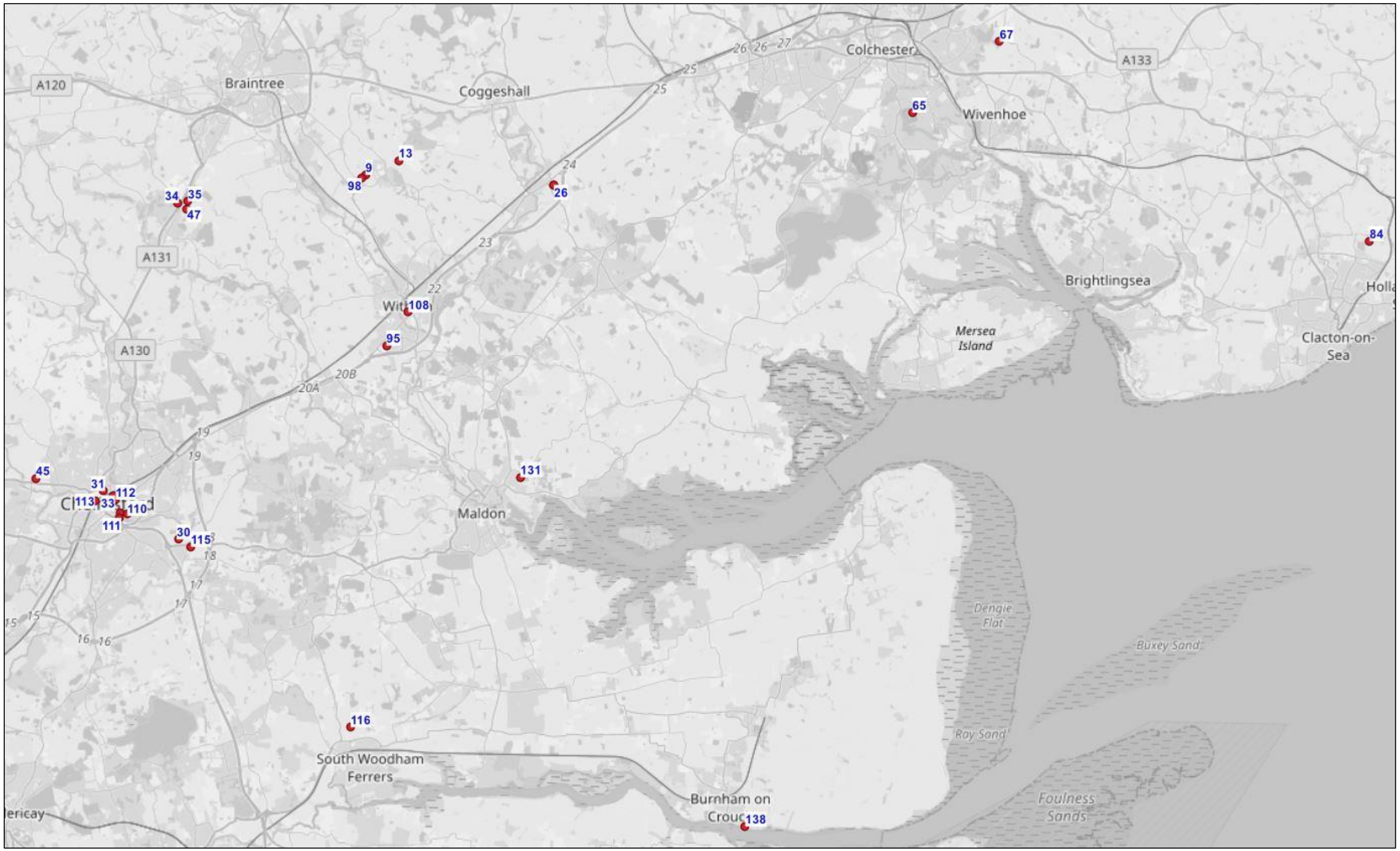
Residential Sites – Near Certain



Residential Sites – More than Likely



Residential Sites – Reasonably Foreseeable



Appendix B. Trip Rate Comparison

Trip rate benchmarking exercise of comparing and verifying the Local authority trip rates (average trip rate for the LPA) to TRICS and to those used in Essex County Council modelling (CNEB) was undertaken to ensure the trip rates were logical. The comparison showed that the residential trip rate is similar across the 3 sources, however employment B1 trip rate from Local authority source was found to be higher than the other two. Given that the local authority trip rates would represent a more suitable local trip rate, it was decided to use these trip rates for this study.

CNEB

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential per dwelling	0.09	0.13	0.26	0.25	0.12	0.14
Employment B1	0.73	0.15	0.08	0.11	0.18	0.63
Employment B2	0.50	0.20	0.20	0.11	0.20	0.52
Employment B8	0.22	0.19	0.10	0.11	0.19	0.20

TRICS

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential per dwelling	0.05	0.12	0.23	0.19	0.12	0.14
Employment B1	0.62	0.21	0.11	0.07	0.25	0.94
Employment B2	0.18	0.10	0.05	0.03	0.11	0.21
Employment B8	0.11	0.12	0.06	0.05	0.13	0.15

Local Authority

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential per dwelling	0.09	0.17	0.26	0.25	0.17	0.15
Employment B1	1.30	0.27	0.14	0.18	0.29	1.16
Employment B2	0.48	0.23	0.12	0.14	0.24	0.44
Employment B8	0.09	0.04	0.04	0.06	0.04	0.12

Local Authority Vs TRICS

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential	0.04	0.05	0.03	0.06	0.05	0.02
Employment B1	0.68	0.06	0.03	0.11	0.04	0.22
Employment B2	0.30	0.12	0.07	0.11	0.13	0.23
Employment B8	-0.01	-0.08	-0.02	0.02	-0.09	-0.03

CNEB Vs TRICS

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential	0.04	0.00	0.03	0.05	0.00	0.00
Employment B1	0.11	-0.06	-0.02	0.04	-0.08	-0.32
Employment B2	0.32	0.09	0.15	0.08	0.09	0.30
Employment B8	0.12	0.07	0.04	0.06	0.06	0.06

Local Authority Vs CNEB

Avg Trip Rate	Arrivals			Departures		
Development type	**AM**	**IP**	**PM**	**AM**	**IP**	**PM**
Residential	0.00	0.04	0.00	0.00	0.05	0.01
Employment B1	0.58	0.12	0.05	0.07	0.11	0.53
Employment B2	-0.02	0.03	-0.08	0.03	0.04	-0.08
Employment B8	-0.13	-0.15	-0.05	-0.05	-0.15	-0.08

Appendix C. TEMPro Factors

These are TEMPro growth factors that are based on NTEM growth forecasts, which were used to estimate each of the future year scenarios by applying the respective growth factors to the validated base year demand. Further adjustments were done on this this to accommodate the exclusively modelled future year developments and to constraint the whole demand to the NTEM forecasts. It should be noted that for horizon year 2051, the growth factors were estimated from 2042 demand as the future year development information is only available upto 2042.

AM (0730-0830)

2027 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.0586	1.0586	1.0555	1.0555	1.0837	1.0837
EAST	1.05	1.0551	1.0419	1.0489	1.1069	1.1087
Essex	1.0421	1.0532	1.0324	1.0475	1.0971	1.101
Braintree	0.9795	1.0234	0.9534	1.0164	1.0376	1.0634
Chelmsford	1.0508	1.0344	1.0511	1.0286	1.1002	1.086
Colchester	0.9947	1.0455	0.9648	1.0378	1.0456	1.0844
Maldon	0.9547	1.0316	0.924	1.024	1.0135	1.0631
Tendring	1.0585	1.044	1.0569	1.0382	1.0982	1.0957
Uttlesford	1.0254	1.0554	1.0075	1.049	1.0979	1.1085
LON	1.0689	1.058	1.0699	1.0535	1.1095	1.1063

2042 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.154	1.154	1.145	1.145	1.215	1.215
EAST	1.1339	1.1491	1.112	1.1315	1.2681	1.2747
Essex	1.1188	1.1455	1.0942	1.1287	1.2505	1.2602
Braintree	1.0323	1.11	0.992	1.0922	1.1665	1.2089
Chelmsford	1.0704	1.1094	1.0378	1.092	1.1816	1.211
Colchester	1.0494	1.1384	0.9933	1.1193	1.1675	1.2354
Maldon	0.9734	1.107	0.9168	1.0884	1.0979	1.1885
Tendring	1.1959	1.1339	1.2016	1.1193	1.2956	1.2629
Uttlesford	1.0814	1.1479	1.0427	1.1299	1.2435	1.2704
LON	1.1803	1.15	1.1806	1.1365	1.2831	1.2697

2042 to 2051 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.0573	1.0573	1.0537	1.0537	1.0641	1.0641
EAST	1.0541	1.0575	1.0476	1.0516	1.0684	1.0707
Essex	1.0535	1.0576	1.047	1.0517	1.0667	1.0691
Braintree	1.0447	1.055	1.0357	1.0494	1.0627	1.0683
Chelmsford	1.0583	1.0557	1.0544	1.0504	1.0755	1.072
Colchester	1.0418	1.0549	1.0295	1.0492	1.0599	1.0677
Maldon	1.0332	1.0544	1.0214	1.0488	1.0519	1.0656
Tendring	1.0843	1.0571	1.0887	1.0526	1.0925	1.0774
Uttlesford	1.0429	1.058	1.0319	1.0517	1.0555	1.0678
LON	1.0639	1.0581	1.0601	1.0529	1.0744	1.0688

IP (1000-1600)

2027 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.0561	1.0561	1.048	1.048	1.0891	1.0891
EAST	1.0528	1.0529	1.0404	1.0397	1.1178	1.1174
Essex	1.0495	1.0493	1.0351	1.0333	1.109	1.108
Braintree	1.0096	1.0105	0.9865	0.9774	1.0587	1.057
Chelmsford	1.0378	1.0378	1.032	1.036	1.104	1.1051
Colchester	1.0318	1.0312	1.0009	0.9884	1.0718	1.0705
Maldon	1.0074	1.0087	0.9746	0.9587	1.0426	1.0412
Tendring	1.0482	1.0467	1.0402	1.044	1.1029	1.1032
Uttlesford	1.0464	1.0463	1.0277	1.0214	1.1153	1.1145
LON	1.0609	1.0598	1.0581	1.0596	1.1149	1.1159

2042 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.1469	1.1469	1.1257	1.1257	1.2242	1.2242
EAST	1.1411	1.1418	1.1081	1.1063	1.2908	1.2896
Essex	1.135	1.1352	1.0984	1.0948	1.2752	1.2727
Braintree	1.0831	1.0851	1.0339	1.0181	1.2043	1.201
Chelmsford	1.0951	1.0949	1.0517	1.043	1.2115	1.2117
Colchester	1.1117	1.111	1.0506	1.0283	1.2146	1.2118
Maldon	1.0628	1.0652	0.9985	0.9712	1.1512	1.1491
Tendring	1.1491	1.146	1.1383	1.1534	1.2932	1.2937
Uttlesford	1.1259	1.1264	1.0838	1.0708	1.2804	1.2792
LON	1.157	1.1543	1.1495	1.1534	1.2898	1.2925

2042 to 2051 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.054	1.054	1.0461	1.0461	1.0618	1.0618
EAST	1.0534	1.0535	1.0421	1.0422	1.0678	1.0677
Essex	1.0535	1.0535	1.0418	1.0422	1.0657	1.0655
Braintree	1.0489	1.0491	1.0358	1.0337	1.0648	1.0646
Chelmsford	1.0532	1.0533	1.0433	1.0445	1.074	1.0741
Colchester	1.0481	1.0482	1.0332	1.0297	1.0627	1.0622
Maldon	1.0454	1.0456	1.031	1.0261	1.0582	1.0578
Tendring	1.0622	1.0616	1.0612	1.0675	1.0845	1.0849
Uttlesford	1.051	1.0507	1.0381	1.0352	1.0595	1.0592
LON	1.0573	1.0568	1.0529	1.0522	1.0674	1.0677

PM (1700-1800)

2027 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.057	1.057	1.0511	1.0511	1.0786	1.0786
EAST	1.054	1.0499	1.0461	1.0401	1.0972	1.0977
Essex	1.0515	1.0427	1.0438	1.0308	1.0887	1.0893
Braintree	1.0181	0.9857	1.011	0.961	1.0417	1.0323
Chelmsford	1.0359	1.0484	1.0273	1.0472	1.0848	1.0921
Colchester	1.0395	1.0001	1.0307	0.9651	1.0577	1.04
Maldon	1.0227	0.9651	1.0171	0.9277	1.032	1.0135
Tendring	1.0457	1.0555	1.037	1.0533	1.0892	1.0896
Uttlesford	1.052	1.0288	1.045	1.0087	1.0903	1.0838
LON	1.0585	1.0654	1.0536	1.0679	1.1029	1.1012

2042 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.1496	1.1496	1.1332	1.1332	1.2018	1.2018
EAST	1.1449	1.1334	1.1231	1.1062	1.2455	1.2457
Essex	1.1402	1.1197	1.1187	1.0893	1.2299	1.2304
Braintree	1.0991	1.0423	1.0789	0.9919	1.166	1.1507
Chelmsford	1.1032	1.0728	1.0803	1.031	1.1791	1.1665
Colchester	1.1261	1.0576	1.1038	0.9908	1.1822	1.1506
Maldon	1.0905	0.9908	1.0729	0.9203	1.1292	1.0954
Tendring	1.1399	1.1844	1.1163	1.1898	1.2591	1.2722
Uttlesford	1.1392	1.0887	1.1205	1.0445	1.228	1.2252
LON	1.151	1.1701	1.1364	1.175	1.2613	1.2597

2042 to 2051 NTEM Growth Factor	Business		Commute		Other	
	Origin	Destination	Origin	Destination	Origin	Destination
GB	1.0552	1.0552	1.0487	1.0487	1.06	1.06
EAST	1.0553	1.0525	1.0466	1.043	1.0641	1.0634
Essex	1.0552	1.0519	1.0465	1.0426	1.0623	1.0615
Braintree	1.052	1.0445	1.0436	1.0318	1.0608	1.0586
Chelmsford	1.0542	1.0563	1.0453	1.0489	1.0691	1.0707
Colchester	1.0512	1.0412	1.0434	1.0253	1.0584	1.0543
Maldon	1.0508	1.035	1.0433	1.0191	1.056	1.0509
Tendring	1.0586	1.0788	1.0494	1.0822	1.0804	1.0867
Uttlesford	1.0549	1.0428	1.0472	1.0292	1.0571	1.0524
LON	1.0567	1.0607	1.0503	1.0568	1.0656	1.0673

The following tables shows the checks undertaken to ensure that the future year demand is constrained to the NTEM forecasts.

NTEM Future Trips (Default Growth Factors*Base Year Trip Ends)

NTEM Authority	2027 AM UC1 O	2027 AM UC1 D	2027 AM UC2 O	2027 AM UC2 D	2027 AM UC3 O	2027 AM UC3 D	2027 IP UC1 O	2027 IP UC1 D	2027 IP UC2 O	2027 IP UC2 D	2027 IP UC3 O	2027 IP UC3 D	2027 PM UC1 O	2027 PM UC1 D	2027 PM UC2 O	2027 PM UC2 D	2027 PM UC3 O	2027 PM UC3 D
Braintree	1,087	890	5,992	4,630	8,067	7,309	628	598	1,601	1,768	8,301	8,244	739	858	4,237	5,236	8,790	9,063
Colchester	1,548	1,536	8,028	8,802	9,800	9,959	1,078	1,079	3,105	2,837	11,576	11,344	1,051	1,126	7,069	6,250	10,942	11,022
Chelmsford	1,568	1,713	7,103	8,542	9,744	10,262	1,041	1,045	2,542	2,406	9,888	9,670	1,339	1,124	6,657	5,632	9,760	9,504
Tendring	1,075	1,066	5,305	4,182	6,960	6,683	669	718	1,441	1,717	7,375	7,565	763	877	2,655	4,305	7,403	7,707
Maldon	501	375	2,513	1,606	1,843	1,729	242	241	660	724	1,998	2,089	281	376	1,542	2,200	2,024	2,280
Uttlesford	535	540	3,058	2,712	3,305	3,544	374	382	1,089	1,005	3,684	3,871	395	426	2,328	2,558	3,908	4,087

NTEM Authority	2042 AM UC1 O	2042 AM UC1 D	2042 AM UC2 O	2042 AM UC2 D	2042 AM UC3 O	2042 AM UC3 D	2042 IP UC1 O	2042 IP UC1 D	2042 IP UC2 O	2042 IP UC2 D	2042 IP UC3 O	2042 IP UC3 D	2042 PM UC1 O	2042 PM UC1 D	2042 PM UC2 O	2042 PM UC2 D	2042 PM UC3 O	2042 PM UC3 D
Braintree	1,151	964	6,243	4,974	9,101	8,306	674	643	1,684	1,852	9,453	9,377	796	910	4,520	5,446	9,866	10,145
Colchester	1,639	1,668	8,333	9,475	10,943	11,305	1,159	1,160	3,264	2,962	13,088	12,807	1,136	1,195	7,559	6,470	12,214	12,215
Chelmsford	1,702	1,842	7,730	9,113	11,165	11,611	1,121	1,126	2,710	2,573	11,299	11,063	1,438	1,218	7,066	6,095	11,017	10,752
Tendring	1,231	1,166	6,123	4,540	8,320	7,769	740	793	1,595	1,921	8,745	8,973	838	997	2,879	4,935	8,649	9,113
Maldon	523	408	2,566	1,730	2,045	1,964	260	259	689	750	2,253	2,354	304	395	1,649	2,245	2,258	2,522
Uttlesford	564	587	3,165	2,921	3,744	4,061	403	412	1,149	1,053	4,230	4,443	427	451	2,496	2,649	4,402	4,595

NTEM Growth Factors Adjusted Alternative Assumptions

NTEM Authority	2027 AM UC1 O	2027 AM UC1 D	2027 AM UC2 O	2027 AM UC2 D	2027 AM UC3 O	2027 AM UC3 D	2027 IP UC1 O	2027 IP UC1 D	2027 IP UC2 O	2027 IP UC2 D	2027 IP UC3 O	2027 IP UC3 D	2027 PM UC1 O	2027 PM UC1 D	2027 PM UC2 O	2027 PM UC2 D	2027 PM UC3 O	2027 PM UC3 D
Braintree	0.928	0.982	0.919	0.974	0.990	1.039	0.962	0.964	0.934	0.935	1.015	1.016	0.977	0.955	0.969	0.916	1.006	0.996
Colchester	0.929	1.015	0.941	1.012	1.010	1.064	0.994	0.991	0.969	0.962	1.037	1.035	0.998	0.966	0.992	0.935	1.024	1.003
Chelmsford	0.981	1.007	0.961	0.998	0.998	1.039	0.993	0.992	0.961	0.965	1.023	1.021	0.994	0.978	0.983	0.929	0.998	0.982
Tendring	0.987	1.005	0.989	1.001	1.028	1.064	0.999	1.000	0.995	1.007	1.062	1.066	0.985	0.984	0.975	0.986	1.040	1.022
Maldon	0.828	0.951	0.857	0.966	0.939	1.000	0.852	0.869	0.864	0.861	0.932	0.941	0.896	0.840	0.934	0.861	0.946	0.926
Uttlesford	1.025	1.055	1.008	1.049	1.098	1.109	1.046	1.046	1.028	1.021	1.115	1.115	1.052	1.029	1.045	1.009	1.090	1.090

NTEM Authority	2042 AM UC1 O	2042 AM UC1 D	2042 AM UC2 O	2042 AM UC2 D	2042 AM UC3 O	2042 AM UC3 D	2042 IP UC1 O	2042 IP UC1 D	2042 IP UC2 O	2042 IP UC2 D	2042 IP UC3 O	2042 IP UC3 D	2042 PM UC1 O	2042 PM UC1 D	2042 PM UC2 O	2042 PM UC2 D	2042 PM UC3 O	2042 PM UC3 D
Braintree	0.968	1.051	0.928	1.032	1.097	1.174	1.020	1.023	0.959	0.956	1.144	1.143	1.041	1.000	1.020	0.919	1.114	1.099
Colchester	0.915	1.094	0.954	1.083	1.107	1.202	1.054	1.050	1.007	0.992	1.164	1.160	1.062	0.993	1.049	0.951	1.133	1.085
Chelmsford	1.009	1.058	0.984	1.037	1.086	1.142	1.027	1.027	0.961	0.969	1.109	1.106	1.031	1.007	1.005	0.914	1.063	1.041
Tendring	1.059	1.064	1.070	1.052	1.165	1.206	1.070	1.072	1.063	1.093	1.230	1.236	1.030	1.055	1.005	1.064	1.168	1.152
Maldon	0.792	0.989	0.806	1.002	0.992	1.096	0.837	0.862	0.827	0.819	0.984	0.998	0.908	0.812	0.952	0.811	0.999	0.972
Uttlesford	1.081	1.148	1.043	1.130	1.244	1.270	1.126	1.126	1.084	1.071	1.280	1.279	1.139	1.089	1.121	1.045	1.228	1.225

NTEM Adjusted Background Future Trips (Adjusted NTEM Factors *Base Trip Ends)

NTEM Authority	2027 AM UC1 O	2027 AM UC1 D	2027 AM UC2 O	2027 AM UC2 D	2027 AM UC3 O	2027 AM UC3 D	2027 IP UC1 O	2027 IP UC1 D	2027 IP UC2 O	2027 IP UC2 D	2027 IP UC3 O	2027 IP UC3 D	2027 PM UC1 O	2027 PM UC1 D	2027 PM UC2 O	2027 PM UC2 D	2027 PM UC3 O	2027 PM UC3 D
Braintree	980	835	5,409	4,332	7,342	6,946	580	554	1,456	1,614	7,659	7,622	691	794	3,959	4,706	8,167	8,346
Colchester	1,395	1,486	7,432	8,540	9,179	9,699	1,027	1,026	2,933	2,672	10,990	10,756	1,002	1,054	6,750	5,760	10,399	10,308
Chelmsford	1,466	1,653	6,504	8,218	8,827	9,786	990	992	2,355	2,234	9,169	8,944	1,276	1,048	6,322	4,995	8,962	8,565
Tendring	969	1,016	4,753	3,988	6,299	6,388	627	675	1,344	1,606	6,917	7,118	709	793	2,464	3,862	6,899	7,001
Maldon	407	340	2,148	1,487	1,601	1,579	199	201	559	615	1,697	1,794	240	309	1,386	1,888	1,773	1,963
Uttlesford	535	540	3,058	2,712	3,305	3,544	374	382	1,090	1,005	3,684	3,871	395	426	2,328	2,558	3,908	4,088

NTEM Authority	2042 AM UC1 O	2042 AM UC1 D	2042 AM UC2 O	2042 AM UC2 D	2042 AM UC3 O	2042 AM UC3 D	2042 IP UC1 O	2042 IP UC1 D	2042 IP UC2 O	2042 IP UC2 D	2042 IP UC3 O	2042 IP UC3 D	2042 PM UC1 O	2042 PM UC1 D	2042 PM UC2 O	2042 PM UC2 D	2042 PM UC3 O	2042 PM UC3 D
Braintree	1,022	893	5,458	4,590	8,137	7,843	615	588	1,495	1,651	8,628	8,575	736	832	4,165	4,722	9,046	9,213
Colchester	1,373	1,602	7,532	9,143	10,061	10,956	1,089	1,087	3,048	2,756	12,334	12,051	1,067	1,083	7,138	5,859	11,502	11,158
Chelmsford	1,508	1,737	6,656	8,538	9,607	10,755	1,023	1,027	2,354	2,244	9,942	9,691	1,323	1,079	6,465	4,915	9,546	9,077
Tendring	1,040	1,076	5,141	4,193	7,140	7,238	671	724	1,436	1,743	8,009	8,255	741	850	2,540	4,169	7,753	7,894
Maldon	390	354	2,021	1,543	1,692	1,730	195	200	535	584	1,793	1,902	244	299	1,413	1,779	1,872	2,060
Uttlesford	564	587	3,165	2,921	3,744	4,061	403	412	1,149	1,053	4,230	4,443	427	451	2,496	2,649	4,402	4,595

NTEM Authority	NTEM Adjusted Background Future Trips (Forecast)+Development Trips																															
	2027																		2042													
	AM						IP						PM						AM						IP						PM			
	UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
Braintree	1,087	889.8	5,992	4,630	8,067	7,309	628	598	1,601	1,768	8,301	8,244	739	858	4,237	5,236	8,790	9,063	1,151	964	6,243	4,974	9,101	8,306	674	643	1,684	1,852	9,453	9,377	796	910	4,520	5,446	9,866	10,145
Colchester	1,548	1,536	8,028	8,802	9,800	9,959	1,078	1,079	3,105	2,837	11,576	11,344	1,051	1,126	7,069	6,250	10,942	11,022	1,639	1,668	8,333	9,475	10,943	11,305	1,159	1,160	3,264	2,962	13,088	12,807	1,136	1,195	7,559	6,470	12,214	12,215
Chelmsford	1,568	1,713	7,103	8,542	9,744	10,262	1,041	1,045	2,542	2,406	9,888	9,670	1,339	1,124	6,657	5,632	9,760	9,504	1,702	1,842	7,730	9,113	11,165	11,611	1,121	1,126	2,710	2,573	11,299	11,063	1,438	1,218	7,066	6,095	11,017	10,752
Tendring	1,075	1,066	5,305	4,182	6,960	6,683	669	718	1,441	1,717	7,375	7,565	763	877	2,655	4,305	7,403	7,707	1,231	1,166	6,123	4,540	8,320	7,769	740	793	1,595	1,921	8,745	8,973	838	997	2,879	4,935	8,649	9,113
Maldon	501	375	2,513	1,606	1,843	1,729	242	241	660	724	1,998	2,089	281	376	1,542	2,200	2,024	2,280	523	408	2,566	1,730	2,045	1,964	260	259	689	750	2,253	2,354	304	395	1,649	2,245	2,258	2,522
Uttlesford	535	540	3,058	2,712	3,305	3,544	374	382	1,090	1,005	3,684	3,871	395	426	2,328	2,558	3,908	4,088	564	587	3,165	2,921	3,744	4,061	403	412	1,149	1,053	4,230	4,443	427	451	2,496	2,649	4,402	4,595

NTEM Authority	Variance (NTEM Default Future Trips - Adjusted Future Trips)																															
	2027																		2042													
	AM						IP						PM						AM						IP						PM			
	UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3		UC1		UC2		UC3	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
Braintree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colchester	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chelmsford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tendring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maldon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uttlesford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix D. Comparison of Pre and Post VDM Totals

2027 Matrix Comparison

	Base		
	AM	IP	PM
Total of all User Classes	6143750	4894656	6559760
CarCommute	2368533	721021	2131589
CarWork	542521	417094	549229
CarOther	2311445	2913757	3202862
LGV	622392	560427	488590
HGV	298858	282358	187489

	2042 PreVDM DM		
	AM	IP	PM
Total of all User Classes	7301550	5925842	7767862
CarCommute	2710755	812812	2417567
CarWork	627443	479806	632875
CarOther	2835469	3603382	3882814
LGV	802516	722693	630100
HGV	325368	307149	204507

	2042 Post VDM DM		
	AM	IP	PM
Total of all User Classes	7301621	5926090	7767980
CarCommute	2710723	812843	2417564
CarWork	627479	479810	632879
CarOther	2835536	3603595	3882930
LGV	802516	722693	630100
HGV	325368	307149	204507

	2042 Post VDM DS		
	AM	IP	PM
Total of all User Classes	7301649	5926103	7768057
CarCommute	2710755	812847	2417621
CarWork	627456	479811	632880
CarOther	2835555	3603604	3882949
LGV	802516	722693	630100
HGV	325368	307149	204507

Growth

	2042 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	1.188	1.211	1.184
CarCommute	1.144	1.127	1.134
CarWork	1.157	1.150	1.152
CarOther	1.227	1.237	1.212
LGV	1.289	1.290	1.290
HGV	1.089	1.088	1.091

	2042 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

	2042 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

Abs Change

	2042 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	1157801	1031186	1208102
CarCommute	342222	91791	285978
CarWork	84922	62712	83646
CarOther	524024	689625	679951
LGV	180124	162267	141510
HGV	26509	24791	17017

	2042 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	71	248	117
CarCommute	-32	31	-2
CarWork	35	4	3
CarOther	67	213	116
LGV	0	0	0
HGV	0	0	0

	2042 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	99	261	194
CarCommute	0	35	54
CarWork	12	5	4
CarOther	86	222	136
LGV	0	0	0
HGV	0	0	0

% Change

	2042 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	19%	21%	18%
CarCommute	14%	13%	13%
CarWork	16%	15%	15%
CarOther	23%	24%	21%
LGV	29%	29%	29%
HGV	9%	9%	9%

	2042 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

	2042 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

2042 Matrix comparison

	Base		
	AM	IP	PM
Total of all User Classes	6143750	4894656	6559760
CarCommute	2368533	721021	2131589
CarWork	542521	417094	549229
CarOther	2311445	2913757	3202862
LGV	622392	560427	488590
HGV	298858	282358	187489

	2027 PreVDM DM		
	AM	IP	PM
Total of all User Classes	6568997	5280404	7012213
CarCommute	2499984	756382	2242054
CarWork	575636	441777	581852
CarOther	2517219	3189855	3469711
LGV	672572	605656	528016
HGV	303585	286735	190581

	2027 Post VDM DM		
	AM	IP	PM
Total of all User Classes	6569040	5280482	7012286
CarCommute	2500007	756401	2242090
CarWork	575643	441779	581855
CarOther	2517233	3189911	3469744
LGV	672572	605656	528016
HGV	303585	286735	190581

	2027 Post VDM DS		
	AM	IP	PM
Total of all User Classes	6569064	5280483	7012358
CarCommute	2500026	756400	2242147
CarWork	575644	441779	581856
CarOther	2517238	3189913	3469758
LGV	672572	605656	528016
HGV	303585	286735	190581

Growth

	2027 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	1.069	1.079	1.069
CarCommute	1.055	1.049	1.052
CarWork	1.061	1.059	1.059
CarOther	1.089	1.095	1.083
LGV	1.081	1.081	1.081
HGV	1.016	1.016	1.016

	2027 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

	2027 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

Abs Change

	2027 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	425247	385748	452453
CarCommute	131451	35361	110464
CarWork	33115	24682	32623
CarOther	205774	276098	266848
LGV	50180	45229	39426
HGV	4727	4377	3091

	2027 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	43	77	73
CarCommute	23	19	37
CarWork	6	2	2
CarOther	14	56	34
LGV	0	0	0
HGV	0	0	0

	2027 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	68	79	145
CarCommute	41	18	94
CarWork	8	3	3
CarOther	19	58	48
LGV	0	0	0
HGV	0	0	0

% Change

	2027 PreVDM DM Vs Base		
	AM	IP	PM
Total of all User Classes	7%	8%	7%
CarCommute	6%	5%	5%
CarWork	6%	6%	6%
CarOther	9%	9%	8%
LGV	8%	8%	8%
HGV	2%	2%	2%

	2027 Post VDM Vs Pre VDM DM		
	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

	2027 Post VDM Vs Pre VDM DS		
	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

2051 Matrix Comparison

Base	AM	IP	PM
Total of all User Classes	6143750	4894656	6559760
CarCommute	2368533	721021	2131589
CarWork	542521	417094	549229
CarOther	2311445	2913757	3202862
LGV	622392	560427	488590
HGV	298858	282358	187489

2051 PreVDM DM	AM	IP	PM
Total of all User Classes	7743596	6283454	8214735
CarCommute	2856944	850681	2535740
CarWork	662645	504956	667373
CarOther	3019531	3828448	4118862
LGV	864666	778681	678969
HGV	339810	320689	213790

2051 Post VDM DM	AM	IP	PM
Total of all User Classes	7743532	6283714	8214782
CarCommute	2856857	850711	2535699
CarWork	662653	504961	667379
CarOther	3019547	3828673	4118944
LGV	864666	778681	678969
HGV	339810	320689	213790

2051 Post VDM DS	AM	IP	PM
Total of all User Classes	7743562	6283732	8214831
CarCommute	2856865	850715	2535731
CarWork	662655	504961	667377
CarOther	3019566	3828685	4118964
LGV	864666	778681	678969
HGV	339810	320689	213790

Growth

2051 PreVDM DM Vs Base	AM	IP	PM
Total of all User Classes	1.260	1.284	1.252
CarCommute	1.206	1.180	1.190
CarWork	1.221	1.211	1.215
CarOther	1.306	1.314	1.286
LGV	1.389	1.389	1.390
HGV	1.137	1.136	1.140

2051 Post VDM Vs Pre VDM DM	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

2051 Post VDM Vs Pre VDM DS	AM	IP	PM
Total of all User Classes	1.000	1.000	1.000
CarCommute	1.000	1.000	1.000
CarWork	1.000	1.000	1.000
CarOther	1.000	1.000	1.000
LGV	1.000	1.000	1.000
HGV	1.000	1.000	1.000

Abs Change

2051 PreVDM DM Vs Base	AM	IP	PM
Total of all User Classes	1599846	1388798	1654975
CarCommute	488410	129660	404151
CarWork	120124	87862	118144
CarOther	708086	914691	916000
LGV	242274	218254	190379
HGV	40952	38331	26301

2051 Post VDM Vs Pre VDM DM	AM	IP	PM
Total of all User Classes	-64	260	47
CarCommute	-87	30	-41
CarWork	7	4	6
CarOther	15	226	82
LGV	0	0	0
HGV	0	0	0

2051 Post VDM Vs Pre VDM DS	AM	IP	PM
Total of all User Classes	-34	277	96
CarCommute	-79	35	-9
CarWork	10	5	4
CarOther	35	238	102
LGV	0	0	0
HGV	0	0	0

% Change

2051 PreVDM DM Vs Base	AM	IP	PM
Total of all User Classes	26%	28%	25%
CarCommute	21%	18%	19%
CarWork	22%	21%	22%
CarOther	31%	31%	29%
LGV	39%	39%	39%
HGV	14%	14%	14%

2051 Post VDM Vs Pre VDM DM	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

2051 Post VDM Vs Pre VDM DS	AM	IP	PM
Total of all User Classes	0%	0%	0%
CarCommute	0%	0%	0%
CarWork	0%	0%	0%
CarOther	0%	0%	0%
LGV	0%	0%	0%
HGV	0%	0%	0%

Appendix E. VDM Sector Comparison

2027 AM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7501	112	457	80	726	140	74	58	37	21	37	23	632	251	59	767	2716	16
2	99	1588	130	57	37	1068	279	252	84	4	112	31	46	2643	28	752	68	216
3	362	267	459	11	21	388	36	39	23	1	20	15	22	664	144	761	91	9
4	164	116	40	604	37	46	217	76	16	5	103	13	601	107	2	1013	133	50
5	1410	65	30	23	8694	57	36	31	23	12	30	16	639	59	1	155	626	8
6	158	892	207	11	81	67887	114	6982	2022	14	279	380	111	2558	214	331	107	384
7	45	386	35	106	18	116	2342	469	56	36	2078	118	169	240	2	372	25	507
8	90	240	54	34	76	5785	476	317240	18432	67	10272	18041	137	384	35	183	45	3180
9	20	26	10	3	17	1700	85	23237	306042	46	738	17798	72	55	11	20	13	77
10	22	5	5	7	42	15	53	52	34	56757	1733	711	4401	9	0	18	25	3
11	21	74	14	61	23	385	1865	14682	676	1145	173574	12608	3029	116	2	108	23	2982
12	27	19	18	14	29	347	214	23062	17176	702	15055	3941168	288	57	7	46	15	117
13	457	57	40	494	688	118	319	154	107	3846	4268	415	39105	71	2	243	558	25
14	120	2713	214	32	31	2376	122	266	102	3	74	51	34	2859	217	510	67	116
15	47	66	263	2	4	430	4	31	19	0	5	12	3	439	17	53	7	5
16	678	984	638	905	90	426	725	281	61	6	208	38	170	1039	39	4441	301	119
17	2512	47	84	89	377	65	37	36	23	15	31	19	492	84	2	288	742	7
18	10	151	8	10	7	464	372	5384	108	5	3179	123	17	133	2	60	6	6046

2027 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7928	128	464	84	755	139	73	56	33	19	38	23	584	263	62	928	2916	16
2	123	2025	164	73	44	1169	319	255	83	5	121	35	51	3042	33	955	90	228
3	394	308	549	14	23	405	35	37	21	1	19	15	21	688	151	837	92	9
4	177	143	45	620	39	47	216	70	14	5	94	12	568	111	2	1116	144	46
5	1637	72	32	26	9916	59	39	32	22	13	31	17	720	65	1	175	734	8
6	197	1040	244	15	98	72771	127	7121	2028	15	289	394	121	2823	253	399	131	397
7	64	464	46	121	26	129	2567	529	70	44	2180	164	190	270	3	444	36	528
8	125	306	71	44	105	6591	571	345278	20115	79	11404	19952	162	465	46	241	62	3502
9	31	35	14	4	24	1954	101	25033	327762	53	845	19311	85	69	15	28	19	88
10	29	5	6	8	54	17	61	57	35	61060	1845	741	4750	11	0	23	32	3
11	29	89	18	72	31	433	2083	15433	715	1239	186779	13323	3319	137	3	137	30	3213
12	37	26	23	17	39	393	254	24971	18218	775	16370	4208016	328	68	9	60	20	129
13	541	65	46	539	807	127	346	161	108	4049	4463	426	42002	79	2	281	639	26
14	139	3123	235	37	37	2368	136	259	96	3	74	51	35	3069	240	578	79	121
15	58	73	303	2	4	459	4	32	20	0	6	12	4	462	19	64	8	5
16	875	1251	750	993	109	432	745	272	58	6	200	39	179	1060	45	5049	374	116
17	2995	52	91	94	421	65	40	36	21	14	34	20	491	87	2	312	875	7
18	13	177	10	12	9	511	416	5654	111	6	3383	131	19	152	3	74	8	6507

2027 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7944	127	476	85	778	136	74	60	38	22	40	30	596	253	61	921	2870	16
2	117	2004	167	79	42	1165	326	271	95	6	128	45	53	2987	34	982	86	230
3	399	315	543	14	22	408	36	39	25	1	20	19	21	679	150	833	88	8
4	178	145	45	621	39	49	214	72	15	5	94	13	569	114	2	1104	146	46
5	1644	70	31	25	9916	59	39	32	22	13	31	18	720	61	1	164	744	8
6	175	1036	248	16	98	72771	127	7121	2028	15	289	394	121	2854	269	381	117	397
7	63	460	47	120	26	129	2565	530	70	44	2180	164	190	278	3	446	35	528
8	110	318	69	45	105	6591	571	345278	20115	79	11404	19952	162	472	49	250	56	3502
9	29	37	14	4	24	1954	101	25033	327762	53	845	19311	85	71	16	28	18	88
10	29	5	6	9	54	17	61	57	35	61060	1845	741	4750	11	0	24	32	3
11	27	90	18	72	31	433	2083	15433	715	1239	186779	13323	3319	138	3	138	29	3213
12	35	27	23	17	39	393	254	24971	18218	775	16370	4208016	328	69	9	62	20	129
13	532	64	46	540	809	127	346	161	108	4049	4463	426	42002	77	2	278	648	26
14	127	3075	230	43	35	2397	144	274	109	3	79	62	36	3026	245	597	71	123
15	56	72	293	2	4	469	5	34	23	0	6	16	3	464	19	61	7	5
16	858	1260	755	991	105	442	758	299	68	7	210	51	182	1065	44	4995	361	123
17	2956	51	91	96	431	64	40	38	23	16	36	25	505	82	2	305	881	7
18	13	176	9	12	9	511	417	5654	111	6	3383	131	19	151	3	77	8	6507

2027 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7829	175	488	82	764	171	73	72	45	22	41	32	588	330	62	929	2813	18
2	175	1979	167	79	58	1138	324	265	92	6	126	44	66	2936	33	979	126	227
3	411	309	546	14	23	409	37	38	24	1	20	19	22	668	151	826	94	8
4	170	150	44	620	39	48	214	72	15	5	94	13	569	120	2	1109	141	46
5	1613	93	33	25	9911	60	39	33	22	13	31	18	719	84	1	171	726	8
6	227	1004	247	16	98	72771	127	7121	2028	15	289	394	121	2818	267	371	145	397
7	62	461	46	120	26	129	2565	530	70	44	2180	164	190	274	3	449	35	528
8	141	303	67	45	105	6591	571	345278	20115	79	11404	19952	162	456	47	245	67	3502
9	34	35	13	4	24	1954	101	25033	327762	53	845	19311	85	69	16	27	20	88
10	28	6	6	8	54	17	61	57	35	61060	1845	741	4750	12	0	24	31	3
11	29	89	17	72	31	433	2083	15433	715	1239	186779	13323	3319	136	3	139	30	3213
12	39	26	23	17	40	393	254	24971	18218	775	16370	4208016	328	67	9	61	21	129
13	515	79	47	540	808	127	346	161	108	4049	4463	426	42002	95	2	283	628	26
14	183	3024	232	43	46	2388	142	271	107	4	78	62	45	2994	245	588	103	122
15	59	71	292	2	5	470	5	33	22	0	6	16	4	461	19	60	9	5
16	861	1272	756	993	108	430	761	295	66	7	212	50	183	1056	45	4989	368	124
17	2897	72	94	95	422	80	41	44	26	16	37	26	496	116	2	321	860	8
18	15	175	9	12	9	511	417	5654	111	6	3383	131	19	149	3	78	9	6507

2027 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	16	-1	12	1	22	-3	1	4	4	3	2	7	13	-10	-1	-8	-46	0
2	-5	-22	3	6	-2	-4	7	16	12	1	7	10	2	-56	1	28	-4	3
3	5	8	-6	0	-1	3	1	2	3	0	1	4	0	-10	-1	-5	-4	0
4	1	3	1	1	0	2	-2	1	1	0	0	1	1	3	0	-11	2	0
5	7	-2	-1	0	0	0	0	0	0	0	0	0	1	-4	0	-10	10	0
6	-22	-5	4	2	0	0	0	0	0	0	0	0	0	31	16	-18	-14	0
7	-2	-4	0	-1	0	0	-3	1	0	0	0	0	0	8	0	2	-1	0
8	-15	11	-2	1	0	0	0	0	0	0	0	0	0	7	3	9	-6	0
9	-2	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0	-1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
11	-1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	1	-1	0
12	-2	1	0	0	0	0	0	0	0	0	0	0	0	2	1	2	-1	0
13	-10	-1	0	1	1	0	0	0	0	0	0	0	0	-2	0	-3	9	0
14	-11	-48	-5	6	-2	28	8	16	13	0	6	11	1	-43	5	19	-8	2
15	-2	-1	-11	0	-1	11	0	2	3	0	1	4	0	2	0	-4	-1	0
16	-17	9	5	-2	-5	10	13	26	10	1	11	12	3	5	-1	-54	-13	7
17	-39	-1	-1	3	10	-1	0	2	2	2	2	4	15	-5	0	-7	6	0
18	0	-1	0	0	0	0	0	0	0	0	0	0	0	-1	0	3	0	0

2027 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-99	47	24	-2	9	32	0	16	11	3	4	9	5	66	0	1	-103	3
2	52	-47	3	6	14	-31	5	10	9	1	6	10	15	-106	0	25	36	0
3	17	1	-4	0	1	4	1	1	3	0	1	4	1	-20	0	-11	1	0
4	-7	7	-1	0	-1	1	-1	2	0	0	0	1	1	9	0	-6	-3	0
5	-24	21	1	0	-5	1	0	1	1	0	0	1	-1	19	0	-3	-9	0
6	30	-36	3	1	0	0	0	0	0	0	0	0	0	-5	14	-28	14	0
7	-2	-3	-1	0	0	0	-2	1	0	0	0	0	0	4	0	5	0	0
8	16	-3	-4	1	0	0	0	0	0	0	0	0	0	-9	1	4	5	0
9	3	0	-1	0	0	0	0	0	0	0	0	0	0	-1	0	-1	1	0
10	-1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-1	0
11	0	0	-1	0	0	0	0	0	0	0	0	0	0	-1	0	2	0	0
12	2	0	-1	0	0	0	0	0	0	0	0	0	0	-1	0	1	1	0
13	-26	14	1	1	1	0	0	0	0	0	0	0	0	16	0	2	-11	0
14	44	-98	-3	5	9	20	7	13	11	1	5	11	9	-76	5	10	24	1
15	1	-2	-11	0	0	11	0	2	3	0	0	4	0	-1	0	-4	1	0
16	-14	21	6	-1	-2	-2	16	23	8	1	12	11	4	-4	0	-60	-5	8
17	-98	20	3	1	1	15	1	8	6	1	3	5	6	28	0	10	-15	1
18	1	-2	0	0	0	0	0	0	0	0	0	0	0	-3	0	4	0	0

2027 Inter Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6541	45	251	133	849	70	40	67	24	11	23	27	353	79	39	514	2010	11
2	44	1233	152	51	30	556	229	120	33	4	33	24	22	1970	59	552	25	104
3	270	137	444	10	25	158	16	33	17	2	10	14	21	243	142	368	54	8
4	97	39	7	483	17	17	112	25	7	4	46	11	484	20	1	742	82	13
5	609	22	26	19	6756	60	14	64	25	9	20	26	450	25	2	68	268	13
6	76	449	139	21	77	44844	85	3779	952	17	183	339	87	1315	186	219	42	249
7	38	198	20	105	27	68	1926	292	64	44	1464	134	171	74	2	398	19	277
8	64	108	41	29	80	4174	344	292405	15588	89	7371	14418	173	185	45	149	35	3686
9	27	29	19	6	27	954	61	13829	247278	49	644	12470	87	44	10	35	16	76
10	9	4	2	3	11	24	50	114	69	50429	1089	817	2939	6	0	6	7	8
11	19	36	11	43	29	220	1468	7074	622	1172	129344	7919	3005	34	3	87	16	2260
12	37	27	19	18	35	382	175	13138	12310	614	7861	3032062	349	46	8	63	21	159
13	217	22	21	442	481	90	157	167	95	3004	2519	336	34405	27	2	131	218	23
14	86	2262	249	23	39	1279	75	207	61	4	37	47	33	2037	251	412	37	83
15	51	48	151	1	2	152	5	25	8	0	4	6	2	236	26	29	2	3
16	479	549	464	724	87	159	407	118	32	6	88	45	138	369	24	3647	174	55
17	2068	18	43	103	292	32	16	26	11	8	14	16	232	21	2	175	564	5
18	6	100	6	14	8	340	292	3252	77	10	2359	115	22	48	2	40	3	5353

2027 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7041	58	279	147	973	80	48	76	28	12	27	30	385	89	47	670	2401	13
2	52	1606	186	63	36	644	270	136	37	4	38	28	26	2303	77	692	31	113
3	294	172	562	11	26	175	20	36	18	2	12	16	21	273	159	457	57	9
4	108	51	10	504	19	18	120	28	7	4	48	11	496	23	1	844	89	14
5	663	26	26	20	7782	66	17	72	28	10	23	29	512	28	2	80	313	14
6	85	529	156	24	89	49042	100	4130	1041	18	201	372	95	1414	217	247	47	269
7	47	241	27	115	34	83	2180	399	91	55	1653	194	200	89	2	451	25	314
8	72	129	47	32	95	4556	423	322434	17140	102	8111	16086	196	201	54	172	41	4024
9	31	34	22	7	32	1041	75	15199	267061	55	715	13537	98	48	12	41	19	84
10	10	5	2	4	13	27	60	130	77	55494	1190	890	3220	7	0	7	9	9
11	23	44	14	46	35	245	1634	7846	701	1280	141893	8696	3303	38	3	100	20	2465
12	41	35	23	19	42	415	221	14582	13307	662	8549	3268484	380	51	9	74	25	171
13	232	28	21	456	561	98	179	188	106	3265	2762	367	37869	29	2	146	245	25
14	92	2610	275	27	45	1359	86	222	66	5	41	51	35	2227	284	473	42	89
15	60	59	171	1	3	178	7	30	9	0	5	8	3	269	30	38	3	3
16	616	704	588	822	105	181	450	134	37	6	98	53	152	426	30	4290	211	61
17	2398	26	47	112	351	37	22	31	13	10	16	19	262	25	3	213	700	6
18	6	113	7	15	9	371	323	3561	85	11	2568	127	24	53	3	45	4	5849

2027 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7041	63	290	152	991	85	51	84	32	14	29	40	394	91	48	666	2326	14
2	53	1572	191	66	37	661	274	143	43	5	41	36	27	2277	82	701	32	116
3	299	180	546	12	27	179	21	38	21	3	13	21	22	270	155	452	56	9
4	111	54	10	506	19	19	119	29	8	4	48	12	497	26	1	828	92	14
5	668	28	27	20	7771	66	17	72	28	10	23	29	513	29	2	81	315	14
6	82	532	152	27	89	49042	100	4130	1041	18	201	372	95	1404	215	266	46	269
7	48	237	27	114	34	84	2178	399	92	55	1653	195	200	91	3	455	25	314
8	71	131	47	33	95	4556	423	322434	17140	102	8111	16086	196	203	56	180	41	4024
9	31	35	21	7	32	1041	75	15199	267061	55	715	13537	98	49	13	41	18	84
10	10	5	2	4	13	27	60	130	77	55494	1190	890	3220	7	0	7	9	9
11	23	44	14	46	35	245	1634	7846	701	1280	141893	8696	3303	38	3	102	20	2465
12	41	36	23	19	42	415	221	14582	13307	662	8549	3268484	380	51	10	75	24	171
13	231	29	22	457	561	98	179	188	106	3265	2762	367	37869	29	2	146	244	25
14	92	2584	270	31	45	1370	93	232	75	5	44	63	37	2188	282	493	42	92
15	59	62	164	1	3	180	8	33	10	0	5	10	3	267	29	37	3	3
16	605	727	583	815	106	200	464	149	45	7	108	69	158	443	30	4198	206	65
17	2358	28	48	116	358	39	23	34	15	10	18	23	270	26	2	213	699	7
18	6	112	6	15	9	371	323	3561	85	11	2568	127	24	53	3	47	4	5849

2027 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7015	74	289	152	987	97	52	93	35	14	30	42	393	101	47	656	2321	15
2	67	1571	189	67	45	655	274	141	43	5	41	36	31	2263	80	695	39	115
3	304	172	548	12	28	177	21	37	21	3	13	21	23	264	155	456	59	9
4	109	54	10	506	19	19	119	29	8	4	48	12	497	26	1	832	90	14
5	665	33	27	20	7769	66	17	73	28	10	23	29	513	32	2	81	312	14
6	97	525	152	26	89	49042	100	4130	1041	18	201	372	95	1397	213	260	52	269
7	47	237	26	114	34	84	2178	399	92	55	1653	195	200	90	3	456	25	314
8	83	127	46	32	95	4556	423	322434	17140	102	8111	16086	196	199	55	175	45	4024
9	34	34	21	7	32	1041	75	15199	267061	55	715	13537	98	48	12	40	20	84
10	10	5	2	4	13	27	60	130	77	55494	1190	890	3220	7	0	7	9	9
11	23	44	14	46	35	245	1634	7846	701	1280	141893	8696	3303	38	3	102	20	2465
12	44	35	22	19	42	415	221	14582	13307	662	8549	3268484	380	50	9	74	26	171
13	228	32	22	457	561	98	179	188	106	3265	2762	367	37869	32	2	147	242	25
14	109	2570	270	31	54	1367	92	230	74	5	44	63	42	2181	282	484	50	91
15	60	61	165	1	3	180	8	33	10	0	5	10	3	267	29	37	3	3
16	605	717	592	820	106	195	466	147	44	7	108	70	159	431	30	4205	207	65
17	2347	34	49	116	355	44	23	37	16	10	18	24	268	30	2	215	693	7
18	7	111	6	15	9	371	323	3561	85	11	2568	127	24	52	3	47	4	5849

2027 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	5	11	5	18	5	3	7	5	1	3	9	10	2	0	-4	-75	1
2	1	-34	4	4	1	17	4	7	6	1	3	7	2	-26	5	8	0	3
3	5	8	-17	0	0	4	2	2	3	0	1	5	1	-3	-4	-5	-1	0
4	3	3	0	2	0	1	-1	1	1	0	0	1	1	3	0	-15	2	0
5	5	2	1	0	-11	0	0	0	0	0	0	0	1	1	0	1	2	0
6	-3	3	-3	2	0	0	1	0	0	0	0	0	0	-11	-2	19	-2	0
7	0	-4	0	-1	0	0	-2	0	0	0	0	0	0	2	0	4	0	0
8	-1	2	-1	1	0	0	0	0	0	0	0	0	0	2	2	8	0	0
9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
13	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-1	0
14	-1	-26	-5	4	1	11	6	10	8	1	3	13	2	-39	-2	20	0	3
15	-1	3	-7	0	0	2	1	3	1	0	1	2	0	-2	-1	-1	0	0
16	-10	23	-6	-7	0	18	14	15	8	1	10	16	6	17	0	-92	-5	5
17	-40	2	1	3	7	2	1	3	2	1	1	4	8	1	0	0	-1	0
18	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0

2027 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-26	16	10	5	13	17	3	17	8	1	4	11	8	12	0	-15	-80	2
2	15	-35	2	4	9	11	4	6	5	1	2	7	6	-40	4	2	8	2
3	11	0	-14	0	2	1	1	2	3	0	1	5	2	-9	-4	-1	2	0
4	0	3	0	2	0	1	-1	1	1	0	0	1	1	3	0	-12	1	0
5	1	6	1	0	-13	0	0	1	0	0	0	0	1	4	0	1	-1	0
6	12	-4	-3	2	0	0	1	0	0	0	0	0	0	-18	-4	13	5	0
7	0	-4	0	-1	0	0	-2	0	0	0	0	0	0	2	0	6	0	0
8	11	-2	-1	0	0	0	0	0	0	0	0	0	0	-2	1	3	4	0
9	3	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	-1	1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
13	-3	4	0	1	0	0	0	0	0	0	0	0	0	3	0	1	-4	0
14	16	-41	-5	4	9	8	5	9	8	1	3	12	7	-46	-2	11	8	2
15	0	2	-7	0	0	2	1	3	1	0	1	2	0	-3	-1	-1	0	0
16	-11	13	4	-2	1	13	16	13	8	1	10	17	8	5	0	-85	-4	5
17	-51	8	2	4	4	7	1	6	3	1	2	5	6	5	0	2	-7	1
18	1	-2	0	0	0	0	0	0	0	0	0	0	0	-1	0	2	0	0

2027 PM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6749	61	314	176	1516	94	50	82	27	20	30	20	610	108	42	735	2322	7
2	115	1192	318	82	63	1114	188	240	47	5	73	24	69	2121	65	952	75	144
3	492	172	472	40	68	226	39	49	22	5	23	16	62	275	215	559	104	4
4	92	55	21	537	36	21	115	43	11	7	54	7	575	40	2	920	86	7
5	708	32	27	32	7631	55	17	68	28	17	21	14	696	36	4	109	383	5
6	142	720	371	44	82	60400	163	6055	1600	20	269	297	108	2284	412	421	74	371
7	58	230	49	216	47	133	2320	424	72	52	1916	164	309	137	8	696	32	324
8	99	229	89	97	110	7577	638	426853	28082	99	14527	26487	235	421	72	424	70	5928
9	14	20	13	5	11	1622	62	23215	333128	31	489	18799	45	51	22	29	10	67
10	8	4	3	4	12	20	43	115	87	60072	1446	984	4090	6	0	9	8	6
11	33	103	51	108	38	381	2161	12003	623	1885	178287	15858	5356	104	10	249	21	3047
12	26	32	26	25	31	485	204	19704	18305	713	13907	4438814	355	65	7	89	19	146
13	394	48	36	574	867	108	207	212	119	4752	3376	306	42683	57	3	212	467	20
14	207	2206	559	85	99	2148	175	357	86	13	101	40	103	2219	371	1125	126	111
15	50	34	150	2	7	201	4	36	10	1	2	5	5	209	26	51	7	1
16	936	868	788	922	280	347	390	205	55	14	134	45	263	720	61	4260	380	42
17	2571	41	76	130	657	42	20	33	16	12	22	22	595	47	3	290	750	2
18	17	200	16	71	20	457	537	4694	117	12	3568	147	58	116	4	168	10	5970

2027 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7227	82	342	191	1746	108	64	101	34	23	38	24	682	122	51	927	2775	8
2	136	1588	377	104	76	1305	213	290	57	6	84	29	81	2507	84	1207	89	161
3	508	220	587	44	75	261	49	60	25	5	27	19	66	299	247	659	111	5
4	105	79	24	552	42	24	125	49	13	7	59	8	600	45	3	1024	95	7
5	765	39	29	36	8840	63	23	83	34	19	27	17	806	41	4	125	440	6
6	148	858	393	46	90	64886	184	6707	1780	22	297	326	114	2327	459	447	79	401
7	64	271	58	225	55	154	2562	529	90	61	2165	213	342	154	9	759	36	373
8	105	265	89	93	119	7916	727	464972	30250	109	15458	28650	252	418	79	439	75	6301
9	15	24	13	5	12	1671	75	25061	356092	33	523	19922	46	50	24	33	10	69
10	9	5	3	4	14	21	53	128	98	64848	1559	1069	4354	6	0	10	9	6
11	33	119	52	104	41	398	2305	13066	687	2001	191759	16986	5657	105	10	253	23	3240
12	27	39	27	25	34	509	262	21507	19663	749	14831	4731289	373	67	8	94	21	154
13	402	58	35	564	992	117	233	236	134	5115	3668	335	46001	60	3	228	499	22
14	217	2566	588	95	111	2329	194	407	98	15	119	44	111	2385	399	1190	135	123
15	57	44	167	3	9	241	5	45	13	2	2	6	6	237	30	63	8	2
16	1137	1120	903	1023	330	405	443	249	69	17	161	56	300	797	73	4912	441	49
17	2832	56	77	142	779	50	28	41	20	14	28	27	665	55	4	350	908	3
18	17	221	16	67	22	481	565	5103	129	13	3836	159	60	123	5	169	10	6424

2027 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7292	85	352	195	1770	104	65	101	38	25	41	31	679	117	50	916	2673	8
2	130	1587	375	108	71	1311	223	301	65	7	91	36	81	2475	83	1205	84	166
3	512	229	578	45	72	261	51	60	27	6	29	24	67	292	242	660	108	5
4	106	83	23	554	42	25	125	50	14	7	59	8	600	49	3	1010	97	7
5	776	39	28	36	8835	63	23	83	34	19	27	18	806	40	4	121	442	6
6	139	865	393	48	89	64886	184	6707	1780	22	297	326	114	2340	467	442	72	401
7	63	268	56	224	55	154	2560	529	90	61	2165	213	342	156	9	770	35	373
8	99	273	87	94	118	7916	728	464972	30250	109	15458	28650	252	430	85	453	71	6301
9	14	24	13	5	12	1671	75	25061	356092	33	523	19922	46	51	25	33	10	69
10	9	5	3	4	14	21	53	128	98	64848	1559	1069	4354	6	0	10	9	6
11	32	118	51	104	41	398	2304	13066	687	2001	191759	16986	5657	107	10	258	22	3240
12	26	40	27	25	34	509	262	21507	19663	749	14831	4731289	373	68	8	96	20	154
13	403	60	35	565	992	117	233	236	134	5115	3668	335	46001	58	3	223	505	22
14	206	2560	577	99	104	2346	205	421	111	16	126	55	112	2353	399	1193	126	126
15	54	45	163	3	8	248	6	48	16	2	3	8	6	236	30	62	8	2
16	1120	1170	898	1021	312	401	451	262	78	18	168	70	300	811	70	4866	428	51
17	2838	57	77	146	780	48	28	41	22	15	29	34	670	52	3	340	893	3
18	17	218	15	67	22	481	565	5103	129	13	3836	159	60	123	5	176	10	6424

2027 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7254	117	361	193	1738	139	65	125	45	24	42	34	664	156	53	903	2614	10
2	210	1524	389	108	110	1267	217	287	62	8	87	35	104	2387	81	1253	135	162
3	521	219	578	44	78	266	50	59	27	6	28	24	70	287	244	648	113	5
4	99	87	23	553	41	25	125	50	14	7	60	8	600	51	3	1018	93	8
5	770	51	28	36	8833	64	23	83	35	19	27	18	805	49	4	120	431	6
6	186	822	392	47	91	64886	184	6707	1780	22	297	326	114	2300	461	455	104	401
7	61	267	56	224	55	154	2559	529	90	61	2165	213	342	155	9	774	35	373
8	135	255	87	93	120	7916	727	464972	30250	109	15458	28650	252	412	82	452	91	6301
9	18	22	12	5	13	1671	75	25061	356092	33	523	19922	46	49	24	32	12	69
10	9	6	3	4	14	21	53	128	98	64848	1559	1069	4354	6	0	10	8	6
11	34	116	50	104	41	398	2304	13066	687	2001	191759	16986	5657	104	10	260	23	3240
12	31	38	26	25	34	509	262	21507	19663	749	14831	4731289	373	66	8	94	23	154
13	394	73	35	565	989	117	233	236	134	5115	3668	335	46001	71	3	224	490	22
14	302	2462	593	100	150	2297	198	404	107	18	120	54	137	2282	395	1221	195	122
15	55	44	163	3	8	250	6	48	15	2	3	8	6	234	30	61	8	2
16	1135	1159	890	1032	312	398	456	260	77	18	172	70	305	791	71	4858	445	53
17	2815	77	78	145	760	60	29	49	25	15	30	34	658	71	4	348	871	4
18	22	212	16	67	22	481	565	5103	129	13	3836	159	60	119	4	178	11	6424

2027 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	65	4	9	4	24	-4	1	0	4	1	2	7	-3	-4	-1	-11	-102	0
2	-6	-1	-2	3	-5	6	11	12	7	1	7	8	0	-32	-1	-1	-5	4
3	4	10	-9	1	-3	0	2	0	2	0	2	5	1	-7	-5	2	-3	0
4	1	4	0	2	-1	1	-1	1	1	0	0	1	0	4	0	-14	3	0
5	11	1	0	0	-5	0	0	0	0	0	0	0	0	-1	0	-4	2	0
6	-10	8	0	1	0	0	0	0	0	0	0	0	0	12	7	-6	-7	0
7	-2	-3	-1	-2	0	0	-2	0	0	0	0	0	0	3	0	11	-1	0
8	-6	8	-2	1	-1	0	0	0	0	0	0	0	0	11	6	14	-4	0
9	-1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	-1	-1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	1	0	5	-1	0
12	-1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	-1	0
13	1	2	0	1	0	0	0	0	0	0	0	0	0	-2	0	-5	6	0
14	-11	-6	-12	4	-7	17	12	13	12	1	7	11	1	-33	0	3	-9	3
15	-2	1	-5	0	-1	6	1	2	2	0	0	2	0	-1	-1	-2	-1	0
16	-17	49	-6	-1	-18	-4	8	13	10	1	8	14	0	14	-3	-46	-14	3
17	6	1	0	3	2	-2	0	0	1	1	1	7	5	-3	0	-9	-15	0
18	-1	-3	-1	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0

2027 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	26	36	19	2	-8	31	0	24	10	1	4	9	-18	34	2	-24	-161	2
2	74	-64	12	4	34	-38	5	-3	4	2	4	6	23	-120	-3	46	46	0
3	13	0	-10	0	3	5	2	-1	1	0	2	5	4	-11	-2	-11	2	0
4	-6	8	-1	1	-1	1	0	1	1	0	0	1	0	6	0	-6	-1	0
5	5	12	0	0	-8	1	0	1	0	0	0	0	-1	8	0	-5	-9	0
6	38	-36	-1	1	1	0	0	0	0	0	0	0	0	-28	1	8	25	0
7	-3	-4	-1	-1	0	0	-3	0	0	0	0	0	0	1	0	15	-2	0
8	31	-10	-2	1	2	0	0	0	0	0	0	0	0	-6	3	13	16	0
9	4	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	-1	2	0
10	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	-2	-1	0	0	0	-1	0	0	0	0	0	0	-1	0	7	0	0
12	4	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	0	0	2	0
13	-8	16	0	1	-3	0	0	0	0	0	0	0	0	11	0	-4	-9	0
14	85	-104	4	4	39	-32	4	-3	9	4	2	9	26	-103	-4	31	60	-1
15	-2	0	-5	0	-1	9	1	2	2	0	0	2	0	-3	-1	-3	0	0
16	-2	39	-14	9	-18	-7	13	11	8	2	12	14	5	-7	-3	-54	4	4
17	-17	21	1	3	-18	11	1	8	5	1	2	8	-7	17	0	-2	-37	1
18	4	-9	0	0	0	0	0	0	0	0	0	0	0	-4	0	9	1	0

2042 AM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7501	112	457	80	726	140	74	58	37	21	37	23	632	251	59	767	2716	16
2	99	1588	130	57	37	1068	279	252	84	4	112	31	46	2643	28	752	68	216
3	362	267	459	11	21	388	36	39	23	1	20	15	22	664	144	761	91	9
4	164	116	40	604	37	46	217	76	16	5	103	13	601	107	2	1013	133	50
5	1410	65	30	23	8694	57	36	31	23	12	30	16	639	59	1	155	626	8
6	158	892	207	11	81	67887	114	6982	2022	14	279	380	111	2558	214	331	107	384
7	45	386	35	106	18	116	2342	469	56	36	2078	118	169	240	2	372	25	507
8	90	240	54	34	76	5785	476	317240	18432	67	10272	18041	137	384	35	183	45	3180
9	20	26	10	3	17	1700	85	23237	306042	46	738	17798	72	55	11	20	13	77
10	22	5	5	7	42	15	53	52	34	56757	1733	711	4401	9	0	18	25	3
11	21	74	14	61	23	385	1865	14682	676	1145	173574	12608	3029	116	2	108	23	2982
12	27	19	18	14	29	347	214	23062	17176	702	15055	3941168	288	57	7	46	15	117
13	457	57	40	494	688	118	319	154	107	3846	4268	415	39105	71	2	243	558	25
14	120	2713	214	32	31	2376	122	266	102	3	74	51	34	2859	217	510	67	116
15	47	66	263	2	4	430	4	31	19	0	5	12	3	439	17	53	7	5
16	678	984	638	905	90	426	725	281	61	6	208	38	170	1039	39	4441	301	119
17	2512	47	84	89	377	65	37	36	23	15	31	19	492	84	2	288	742	7
18	10	151	8	10	7	464	372	5384	108	5	3179	123	17	133	2	60	6	6046

2042 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8739	137	497	98	798	142	76	56	33	20	41	25	584	271	63	1009	3147	16
2	159	2543	203	104	54	1385	380	280	92	7	144	43	64	3560	40	1183	121	261
3	435	340	633	25	24	432	37	38	22	1	20	16	22	735	158	902	97	9
4	205	176	63	721	44	60	240	77	16	6	100	14	607	131	4	1314	162	48
5	1945	79	37	32	11626	66	43	35	24	15	36	20	868	73	1	202	858	9
6	239	1178	281	22	114	80762	141	7469	2142	17	314	431	139	3076	276	457	155	429
7	74	524	51	141	29	136	2816	531	71	48	2326	166	207	281	3	498	40	553
8	163	376	88	57	132	7781	661	388826	22951	95	13131	22762	197	548	53	302	79	4016
9	39	42	17	5	29	2262	114	27244	362455	63	963	21457	101	79	17	34	23	100
10	35	6	7	10	63	19	65	61	37	67853	2006	785	5224	12	0	27	36	4
11	35	102	21	86	37	490	2340	16445	780	1391	207536	14420	3737	151	3	161	36	3544
12	47	32	28	21	48	452	278	27148	19963	901	18264	4632459	384	76	10	72	25	146
13	614	71	51	603	906	138	370	167	114	4448	4837	453	46545	83	2	308	689	27
14	157	3419	258	45	41	2458	143	259	98	3	75	53	38	3197	258	628	87	123
15	64	77	324	3	5	466	4	31	19	0	6	13	4	473	19	68	9	5
16	978	1371	831	1144	120	443	782	272	59	7	201	41	187	1088	47	5558	412	117
17	3284	54	96	104	441	65	40	35	20	15	34	20	493	86	2	328	924	7
18	17	207	11	15	11	578	470	6118	122	7	3752	146	22	168	3	88	10	7270

2042 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8600	139	541	105	879	142	78	66	49	27	49	54	624	271	70	987	3068	17
2	153	2448	220	119	55	1358	409	307	135	13	170	91	70	3389	45	1269	120	268
3	469	342	598	26	24	436	39	39	32	2	24	32	23	713	157	898	94	8
4	212	182	65	737	44	62	239	81	19	6	101	19	608	136	4	1253	174	49
5	1956	77	36	31	11625	66	43	36	25	16	36	24	876	66	1	173	866	9
6	212	1145	292	25	114	80762	142	7469	2142	17	314	431	139	3133	302	425	137	429
7	69	527	53	139	29	136	2812	532	71	49	2326	167	207	283	4	507	39	554
8	135	392	86	61	131	7781	662	388826	22951	95	13131	22762	197	559	60	329	69	4016
9	36	45	17	5	29	2262	114	27244	362455	63	963	21457	101	83	19	33	21	100
10	34	6	7	10	63	19	65	61	37	67853	2006	785	5224	11	0	30	35	4
11	32	105	21	85	37	490	2340	16445	780	1391	207536	14420	3737	153	4	165	34	3544
12	43	33	28	22	48	452	278	27148	19963	901	18264	4632459	384	78	11	78	24	146
13	594	68	51	605	920	138	370	167	114	4448	4837	453	46545	80	2	289	697	27
14	143	3265	256	55	42	2529	161	283	141	5	91	99	41	3093	272	658	77	127
15	70	76	303	4	5	471	5	33	27	0	7	25	4	471	18	67	9	4
16	936	1408	855	1154	113	447	809	320	90	10	225	88	193	1105	50	5359	392	133
17	3168	53	96	113	483	64	41	40	28	19	39	37	524	82	2	315	917	8
18	16	201	12	15	11	578	471	6118	122	7	3752	146	22	163	4	99	10	7270

2042 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8430	209	564	101	862	186	81	80	59	27	51	58	611	375	70	1019	2969	21
2	254	2392	220	122	78	1311	403	300	131	13	166	90	93	3297	42	1276	195	262
3	486	338	599	25	26	441	39	38	32	2	24	31	25	704	158	878	101	8
4	198	191	64	729	43	62	240	81	18	6	101	18	608	147	4	1270	164	50
5	1915	103	38	31	11623	68	43	37	26	16	36	24	872	95	1	183	840	9
6	281	1101	292	24	115	80762	141	7469	2142	17	314	431	139	3082	303	412	175	429
7	69	525	51	140	29	136	2812	532	71	49	2326	167	207	278	4	512	40	554
8	182	369	83	61	132	7781	662	388826	22951	95	13131	22762	197	530	58	325	85	4016
9	43	42	16	5	29	2262	114	27244	362455	63	963	21457	101	79	18	32	25	100
10	32	7	7	10	62	19	65	61	37	67853	2006	785	5224	13	0	31	34	4
11	35	103	21	86	37	490	2340	16445	780	1391	207536	14420	3737	149	3	167	36	3544
12	48	32	27	22	48	452	278	27148	19963	901	18264	4632459	384	75	11	77	25	146
13	567	87	53	604	917	138	370	167	114	4448	4837	453	46545	103	2	301	672	27
14	224	3185	258	55	56	2520	159	281	140	5	90	99	53	3041	271	650	122	126
15	74	74	303	4	5	474	5	32	27	0	7	25	4	467	18	65	11	4
16	958	1431	843	1153	116	435	811	313	87	10	226	86	196	1101	50	5336	413	134
17	3080	83	103	111	471	85	43	47	33	18	41	39	512	126	3	348	881	9
18	18	200	12	15	11	578	471	6118	122	7	3752	146	22	160	4	100	11	7270

2042 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-139	3	43	8	80	1	3	9	16	7	8	29	40	0	7	-22	-78	1
2	-6	-95	16	15	2	-27	29	27	43	6	26	48	6	-171	4	86	-1	7
3	34	2	-35	1	0	4	2	1	10	0	3	15	1	-22	-1	-4	-3	-1
4	7	6	2	16	-1	2	-1	4	3	0	1	5	1	5	0	-61	12	1
5	10	-3	-2	-1	-1	0	0	0	1	1	0	4	8	-7	0	-29	8	0
6	-27	-33	11	3	0	0	1	0	0	0	0	0	0	57	26	-31	-18	0
7	-5	3	1	-2	0	1	-4	1	0	0	0	1	0	2	0	9	-1	1
8	-28	15	-2	3	-1	0	1	0	0	0	0	0	0	11	7	27	-10	0
9	-4	3	0	0	0	0	0	0	0	0	0	0	0	4	2	0	-2	0
10	-2	0	0	1	0	0	0	0	0	0	0	0	0	-1	0	3	-1	0
11	-3	3	0	0	0	0	0	0	0	0	0	0	0	2	0	5	-2	0
12	-3	1	1	1	0	0	0	0	0	0	0	0	0	2	1	6	-1	0
13	-20	-3	0	2	13	0	0	0	0	0	0	0	0	-2	0	-19	9	0
14	-14	-155	-2	9	1	71	18	24	43	2	16	46	2	-104	15	30	-10	4
15	5	-1	-20	0	0	6	1	2	8	0	1	13	0	-2	-1	-1	-1	0
16	-42	37	24	11	-7	4	28	49	30	3	24	47	6	16	3	-199	-20	16
17	-116	-1	0	9	42	-1	1	6	8	4	5	17	31	-3	0	-13	-7	1
18	-1	-6	0	0	0	0	1	0	0	0	0	0	0	-5	0	11	0	0

2042 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-309	73	67	3	63	44	5	23	26	7	10	32	27	104	7	10	-177	4
2	95	-151	16	18	24	-74	23	20	39	6	22	46	29	-263	2	93	73	2
3	51	-1	-33	0	2	9	2	0	9	1	3	14	2	-30	-1	-23	4	-1
4	-7	16	1	8	-2	2	0	4	2	0	2	5	1	16	0	-44	2	2
5	-30	23	1	-1	-2	2	0	2	2	1	1	4	4	22	0	-18	-18	0
6	43	-78	12	2	1	0	1	0	0	0	0	0	0	6	27	-44	20	0
7	-4	2	0	-1	0	0	-4	1	0	0	0	1	0	-3	0	14	0	1
8	18	-7	-5	3	0	0	1	0	0	0	0	0	0	-18	5	23	6	0
9	4	0	-1	0	0	0	0	0	0	0	0	0	0	0	1	-2	2	0
10	-3	1	0	1	0	0	0	0	0	0	0	0	0	1	0	4	-2	0
11	-1	1	-1	0	0	0	0	0	0	0	0	0	0	-2	0	7	0	0
12	2	0	0	1	0	0	0	0	0	0	0	0	0	-1	1	5	1	0
13	-47	17	2	2	11	0	0	0	0	0	0	0	0	20	0	-7	-17	0
14	66	-234	-1	10	15	62	16	22	41	2	15	45	15	-156	14	22	35	4
15	10	-3	-21	0	1	9	0	2	7	0	1	12	1	-6	-1	-3	2	0
16	-20	61	11	10	-3	-8	29	42	27	3	25	46	9	12	3	-222	1	17
17	-204	29	7	7	30	20	3	12	13	4	7	18	19	40	0	20	-42	2
18	2	-7	0	1	0	0	1	0	0	0	0	0	0	-8	0	12	1	0

2042 Interpeak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6541	45	251	133	849	70	40	67	24	11	23	27	353	79	39	514	2010	11
2	44	1233	152	51	30	556	229	120	33	4	33	24	22	1970	59	552	25	104
3	270	137	444	10	25	158	16	33	17	2	10	14	21	243	142	368	54	8
4	97	39	7	483	17	17	112	25	7	4	46	11	484	20	1	742	82	13
5	609	22	26	19	6756	60	14	64	25	9	20	26	450	25	2	68	268	13
6	76	449	139	21	77	44844	85	3779	952	17	183	339	87	1315	186	219	42	249
7	38	198	20	105	27	68	1926	292	64	44	1464	134	171	74	2	398	19	277
8	64	108	41	29	80	4174	344	292405	15588	89	7371	14418	173	185	45	149	35	3686
9	27	29	19	6	27	954	61	13829	247278	49	644	12470	87	44	10	35	16	76
10	9	4	2	3	11	24	50	114	69	50429	1089	817	2939	6	0	6	7	8
11	19	36	11	43	29	220	1468	7074	622	1172	129344	7919	3005	34	3	87	16	2260
12	37	27	19	18	35	382	175	13138	12310	614	7861	3032062	349	46	8	63	21	159
13	217	22	21	442	481	90	157	167	95	3004	2519	336	34405	27	2	131	218	23
14	86	2262	249	23	39	1279	75	207	61	4	37	47	33	2037	251	412	37	83
15	51	48	151	1	2	152	5	25	8	0	4	6	2	236	26	29	2	3
16	479	549	464	724	87	159	407	118	32	6	88	45	138	369	24	3647	174	55
17	2068	18	43	103	292	32	16	26	11	8	14	16	232	21	2	175	564	5
18	6	100	6	14	8	340	292	3252	77	10	2359	115	22	48	2	40	3	5353

2042 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7877	73	313	171	1104	90	53	85	31	13	30	35	415	95	51	745	2643	14
2	64	2053	239	83	44	817	315	156	42	6	45	34	32	2673	98	827	39	127
3	330	214	668	18	29	197	22	40	20	3	14	19	23	301	169	523	63	10
4	128	77	23	592	23	23	138	33	9	5	54	14	551	29	2	996	102	16
5	742	33	29	23	9157	74	19	83	32	12	26	34	591	31	2	91	346	16
6	94	623	174	31	102	55491	109	4680	1170	21	227	422	107	1525	230	274	52	302
7	51	292	29	132	39	91	2439	427	97	61	1843	205	219	94	3	494	27	347
8	80	154	53	37	110	5113	455	367983	19248	115	9092	18071	221	217	57	192	46	4544
9	34	41	24	8	36	1158	80	17069	297285	61	796	15043	110	52	13	45	20	93
10	12	7	2	4	15	30	67	149	87	63058	1337	1002	3626	7	0	8	10	10
11	26	57	16	52	40	276	1828	8854	789	1435	160625	9700	3733	41	4	111	22	2776
12	46	45	26	23	48	465	233	16336	14775	735	9476	3632463	424	54	10	82	27	191
13	252	37	23	507	657	110	198	214	119	3669	3126	415	42836	31	2	157	261	28
14	99	2965	301	34	49	1461	91	241	71	5	44	55	37	2315	298	510	44	94
15	65	69	183	1	3	189	7	32	9	0	5	8	3	283	31	41	3	3
16	684	907	679	973	120	203	498	151	41	7	108	60	164	459	32	4821	232	68
17	2631	33	50	127	394	41	23	34	15	11	18	21	279	26	3	233	750	7
18	7	131	7	16	11	416	357	4042	96	13	2892	143	27	57	3	50	4	6630

2042 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7726	86	352	188	1191	102	63	103	48	18	40	75	453	103	58	726	2511	18
2	68	1939	256	93	49	860	338	180	65	9	57	70	38	2563	106	852	41	139
3	350	232	601	19	31	212	26	47	32	4	18	40	26	295	160	508	62	11
4	134	86	25	594	23	26	137	37	11	5	56	18	555	34	2	955	107	17
5	773	39	32	23	9092	75	20	84	33	12	27	37	600	33	2	94	358	16
6	93	627	176	35	102	55491	110	4680	1170	21	227	422	107	1514	227	294	50	302
7	52	287	31	129	39	92	2436	428	97	61	1843	206	219	96	3	502	28	348
8	78	156	53	39	110	5113	455	367983	19248	115	9092	18071	221	219	63	211	45	4544
9	34	42	24	8	37	1158	80	17069	297285	61	796	15043	110	53	14	46	20	93
10	12	7	2	4	15	30	67	149	87	63058	1337	1002	3626	7	0	8	10	10
11	25	57	16	52	40	276	1828	8854	789	1435	160625	9700	3733	42	4	114	21	2776
12	45	46	26	23	49	465	233	16336	14775	735	9476	3632463	424	55	11	87	27	191
13	251	40	24	508	662	110	198	214	119	3669	3126	415	42836	31	2	157	255	28
14	103	2837	298	42	52	1524	104	271	105	7	55	111	43	2216	297	531	44	104
15	69	75	166	1	3	194	9	40	15	1	7	18	4	268	26	41	3	4
16	662	972	671	960	125	232	545	194	67	11	143	136	184	478	34	4528	225	86
17	2534	39	54	136	420	46	27	41	22	13	23	38	302	28	3	229	736	9
18	7	128	7	17	11	416	358	4042	96	13	2892	143	27	56	3	55	4	6630

2042 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7669	112	357	184	1175	125	63	120	54	18	42	80	445	123	60	729	2491	20
2	95	1928	256	94	65	844	337	175	64	10	56	70	47	2533	105	856	56	137
3	359	224	602	19	34	210	26	45	31	4	18	39	28	290	161	508	66	11
4	131	87	24	593	23	25	137	36	11	5	56	18	555	34	2	960	106	17
5	763	49	33	23	9086	76	20	86	33	12	27	37	599	40	3	97	352	16
6	116	611	175	34	103	55491	109	4680	1170	21	227	422	107	1502	225	289	61	302
7	52	286	30	129	39	92	2436	428	97	61	1843	206	219	95	3	503	28	348
8	97	149	51	39	112	5113	455	367983	19248	115	9092	18071	221	213	61	205	52	4544
9	40	39	24	8	37	1158	80	17069	297285	61	796	15043	110	51	13	44	22	93
10	11	8	2	4	15	30	67	149	87	63058	1337	1002	3626	8	0	8	9	10
11	27	57	16	52	40	276	1828	8854	789	1435	160625	9700	3733	41	4	114	22	2776
12	50	45	26	23	49	465	233	16336	14775	735	9476	3632463	424	54	10	85	28	191
13	245	47	24	508	660	110	198	214	119	3669	3126	415	42836	37	2	160	249	28
14	131	2806	300	42	67	1513	103	266	104	8	54	110	51	2203	297	531	59	102
15	71	73	166	1	4	193	9	40	15	1	7	18	4	268	26	41	3	4
16	666	962	675	966	127	226	546	191	66	11	143	136	187	467	35	4533	231	86
17	2508	51	56	136	411	55	27	47	24	13	23	40	297	37	3	237	723	9
18	9	126	7	17	11	416	358	4042	96	13	2892	143	27	55	3	55	5	6630

2042 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-150	13	39	16	87	13	11	18	18	5	10	40	38	8	7	-19	-132	4
2	5	-114	17	10	5	44	23	23	23	3	12	37	6	-110	9	25	2	12
3	20	18	-67	2	2	15	4	6	11	1	5	21	3	-6	-9	-15	-1	1
4	6	9	2	2	0	2	-1	3	2	0	2	5	4	5	0	-42	5	1
5	31	6	3	0	-65	1	0	1	1	0	1	3	9	2	0	4	12	0
6	-1	4	2	4	0	0	1	0	0	0	0	0	0	-11	-3	20	-2	0
7	1	-5	1	-3	0	1	-3	1	0	0	1	1	0	2	0	7	1	0
8	-2	2	0	2	0	0	0	0	0	0	0	0	0	2	6	19	-1	0
9	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0
12	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0
13	-1	3	1	2	5	0	0	0	0	0	0	0	0	1	0	1	-6	0
14	4	-128	-3	8	3	63	13	30	34	2	11	56	6	-99	0	22	0	10
15	4	5	-17	0	0	5	2	8	5	0	2	9	1	-14	-4	0	0	1
16	-22	65	-8	-13	5	29	47	43	26	3	35	76	20	19	2	-293	-6	19
17	-97	6	4	9	26	4	4	7	7	3	5	16	23	2	0	-4	-14	2
18	0	-3	0	0	0	0	0	0	0	0	0	0	0	-1	0	5	0	0

2042 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-208	38	44	13	71	35	11	35	24	5	12	45	30	27	9	-16	-152	6
2	31	-125	17	11	21	27	21	19	22	4	11	36	15	-140	7	29	17	10
3	29	10	-66	1	4	13	4	5	11	1	4	20	5	-11	-8	-15	4	1
4	3	10	2	2	0	2	-1	3	2	0	2	5	4	5	0	-37	4	1
5	21	16	4	0	-72	2	0	2	2	0	1	3	8	10	0	6	6	0
6	22	-12	1	3	2	0	1	0	0	0	0	0	0	-23	-5	15	9	0
7	1	-5	1	-2	0	1	-3	1	0	0	1	1	0	1	0	9	0	0
8	17	-6	-2	1	2	0	0	0	0	0	0	0	0	-4	4	13	7	0
9	5	-1	0	0	0	0	0	0	0	0	0	0	0	-1	0	-1	2	0
10	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
12	4	-1	0	0	0	0	0	0	0	0	0	0	0	-1	0	3	1	0
13	-7	10	1	2	3	0	0	0	0	0	0	0	0	6	0	3	-11	0
14	32	-159	-1	8	18	53	11	25	32	3	10	54	14	-112	-1	21	15	8
15	6	4	-17	0	1	5	2	8	5	0	2	9	1	-15	-4	0	0	1
16	-19	55	-4	-8	7	23	48	40	25	3	35	76	23	8	2	-288	-1	18
17	-123	18	7	8	17	14	4	13	10	2	5	19	18	10	0	4	-26	2
18	2	-5	0	0	0	0	0	0	0	0	0	0	0	-1	0	5	1	0

2042 PM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6749	61	314	176	1516	94	50	82	27	20	30	20	610	108	42	735	2322	7
2	115	1192	318	82	63	1114	188	240	47	5	73	24	69	2121	65	952	75	144
3	492	172	472	40	68	226	39	49	22	5	23	16	62	275	215	559	104	4
4	92	55	21	537	36	21	115	43	11	7	54	7	575	40	2	920	86	7
5	708	32	27	32	7631	55	17	68	28	17	21	14	696	36	4	109	383	5
6	142	720	371	44	82	60400	163	6055	1600	20	269	297	108	2284	412	421	74	371
7	58	230	49	216	47	133	2320	424	72	52	1916	164	309	137	8	696	32	324
8	99	229	89	97	110	7577	638	426853	28082	99	14527	26487	235	421	72	424	70	5928
9	14	20	13	5	11	1622	62	23215	333128	31	489	18799	45	51	22	29	10	67
10	8	4	3	4	12	20	43	115	87	60072	1446	984	4090	6	0	9	8	6
11	33	103	51	108	38	381	2161	12003	623	1885	178287	15858	5356	104	10	249	21	3047
12	26	32	26	25	31	485	204	19704	18305	713	13907	4438814	355	65	7	89	19	146
13	394	48	36	574	867	108	207	212	119	4752	3376	306	42683	57	3	212	467	20
14	207	2206	559	85	99	2148	175	357	86	13	101	40	103	2219	371	1125	126	111
15	50	34	150	2	7	201	4	36	10	1	2	5	5	209	26	51	7	1
16	936	868	788	922	280	347	390	205	55	14	134	45	263	720	61	4260	380	42
17	2571	41	76	130	657	42	20	33	16	12	22	22	595	47	3	290	750	2
18	17	200	16	71	20	457	537	4694	117	12	3568	147	58	116	4	168	10	5970

2042 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8019	106	380	226	2042	125	72	122	41	27	45	29	745	132	56	1026	3044	10
2	163	1998	436	138	94	1571	235	345	66	7	93	34	96	2860	104	1393	104	182
3	552	275	683	61	87	296	54	72	29	6	31	22	71	321	263	734	119	6
4	129	123	35	642	56	32	144	60	16	8	70	10	663	57	4	1198	107	9
5	828	48	31	43	10445	73	25	100	41	23	32	21	920	44	5	136	471	7
6	154	1046	421	56	102	71937	195	7694	2015	25	329	369	122	2394	474	468	82	447
7	68	322	63	252	62	170	2812	589	97	66	2414	227	368	159	10	804	37	415
8	109	312	93	99	133	8495	751	523713	33191	120	16688	31436	272	416	80	452	77	6907
9	15	29	14	6	14	1787	77	28112	392255	36	568	21766	49	50	24	35	10	74
10	9	6	3	4	16	24	56	146	111	72276	1728	1209	4799	6	0	11	9	7
11	35	144	56	113	46	433	2489	14770	768	2180	212667	18762	6162	106	10	261	24	3576
12	29	50	29	27	39	553	270	24093	21676	804	16060	5195660	400	68	8	97	21	169
13	421	77	37	605	1186	130	253	271	153	5641	4098	382	51019	62	4	239	511	24
14	223	2997	622	118	124	2499	203	460	109	16	126	49	115	2434	409	1232	137	132
15	60	57	178	4	10	262	6	52	15	2	3	7	7	250	31	67	9	2
16	1228	1435	994	1209	382	455	491	294	79	19	183	64	325	838	78	5412	470	56
17	3055	72	81	163	906	56	31	49	24	16	32	31	713	57	4	380	963	3
18	18	256	16	71	25	523	599	5752	144	14	4234	176	63	123	5	173	10	7162

2042 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8028	111	422	244	2071	117	79	119	57	31	56	62	760	126	63	982	2879	10
2	160	1979	433	146	83	1545	262	375	94	12	112	72	97	2733	103	1423	96	195
3	571	291	633	63	78	311	57	70	38	7	36	46	72	314	255	730	114	6
4	137	132	36	655	53	33	144	64	20	9	71	14	666	61	4	1143	116	10
5	870	49	32	42	10396	73	25	100	42	23	32	23	928	43	4	124	493	7
6	144	1045	423	58	100	71937	195	7694	2015	25	329	369	122	2434	480	455	70	447
7	64	323	60	249	62	170	2809	590	97	66	2414	228	368	164	10	816	35	416
8	100	321	90	101	130	8495	752	523713	33191	120	16688	31436	272	433	90	476	71	6907
9	14	30	14	6	14	1787	77	28112	392255	36	568	21766	49	52	26	34	10	74
10	10	7	3	5	16	24	57	146	111	72276	1728	1209	4799	6	0	11	9	7
11	32	147	54	111	45	433	2488	14770	768	2180	212667	18762	6162	111	10	266	22	3576
12	28	52	29	27	38	553	270	24093	21676	804	16060	5195660	400	71	9	101	20	169
13	427	79	37	608	1187	130	253	271	153	5641	4098	382	51019	58	3	225	523	24
14	212	2915	605	124	108	2535	223	487	156	23	146	98	115	2356	413	1235	122	139
15	60	59	164	4	9	276	6	57	23	2	3	13	6	240	28	66	8	2
16	1205	1536	998	1204	333	429	535	336	112	24	216	131	323	842	80	5219	446	66
17	3028	70	82	175	909	52	33	50	30	19	37	64	736	51	4	350	939	4
18	17	248	15	71	24	523	599	5752	144	14	4234	176	63	123	5	187	9	7162

2042 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7933	173	443	237	2011	170	79	158	71	31	59	69	733	184	68	1014	2762	13
2	276	1883	452	150	134	1481	255	355	89	12	108	69	128	2604	100	1497	167	189
3	586	282	630	62	84	320	57	69	37	7	36	45	74	310	256	710	119	6
4	127	138	36	651	51	33	145	64	19	9	71	14	666	64	5	1158	109	10
5	853	69	32	42	10386	74	25	101	43	23	32	23	926	56	5	129	480	8
6	199	974	425	58	104	71937	195	7694	2015	25	329	369	122	2398	477	471	108	447
7	64	319	61	249	61	170	2809	590	97	66	2414	228	368	162	10	822	35	416
8	140	295	89	101	135	8495	752	523713	33191	120	16688	31436	272	411	86	477	91	6907
9	19	27	13	6	15	1787	77	28112	392255	36	568	21766	49	49	24	34	12	74
10	9	7	3	5	16	24	57	146	111	72276	1728	1209	4799	7	0	11	9	7
11	35	144	54	112	45	433	2488	14770	768	2180	212667	18762	6162	107	10	269	23	3576
12	34	50	28	27	39	553	270	24093	21676	804	16060	5195660	400	68	8	99	23	169
13	408	104	39	608	1178	130	253	271	153	5641	4098	382	51019	75	4	232	501	24
14	329	2775	622	127	163	2486	216	467	150	24	139	95	146	2271	406	1283	204	135
15	61	58	164	4	9	279	6	56	22	2	3	13	7	237	28	65	9	2
16	1219	1539	979	1222	323	429	539	333	109	24	221	129	323	823	79	5219	463	68
17	2970	108	85	174	879	71	34	62	37	19	39	65	716	79	5	381	901	4
18	22	240	16	71	25	523	599	5752	144	14	4234	176	63	119	4	191	11	7162

2042 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	9	5	42	17	29	-9	7	-2	17	4	10	34	16	-5	7	-43	-165	0
2	-4	-18	-3	8	-11	-25	27	30	28	5	19	37	2	-126	-1	30	-8	13
3	19	17	-50	2	-9	15	4	-2	9	1	5	24	1	-7	-8	-5	-5	0
4	8	9	1	12	-3	1	0	4	3	1	1	4	3	4	0	-55	9	1
5	42	1	1	-1	-49	0	0	0	1	0	1	1	8	-2	0	-12	22	0
6	-10	-1	2	2	-2	0	1	0	0	0	0	0	0	39	6	-13	-12	0
7	-3	2	-2	-3	-1	0	-3	1	0	0	0	1	0	6	0	11	-2	0
8	-9	9	-3	2	-2	0	1	0	0	0	0	0	0	17	10	24	-6	0
9	-1	1	0	0	0	0	0	0	0	0	0	0	0	2	2	-1	-1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-3	3	-2	-1	-1	0	-1	0	0	0	0	0	0	5	0	5	-2	0
12	-1	2	0	0	-1	0	0	0	0	0	0	0	0	3	0	4	-1	0
13	6	2	0	2	1	0	0	0	0	0	0	0	0	-4	0	-14	12	0
14	-11	-82	-18	6	-15	36	20	27	47	6	19	49	0	-78	3	3	-15	7
15	0	2	-14	0	-1	13	1	5	8	0	0	7	0	-10	-3	-1	-1	0
16	-23	101	4	-5	-49	-26	44	42	33	5	34	67	-1	4	2	-192	-23	10
17	-27	-2	1	12	3	-4	2	0	6	3	5	33	23	-6	0	-30	-24	0
18	-1	-8	-1	0	0	0	0	0	0	0	0	0	0	0	0	13	-1	0

2042 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-86	67	63	11	-31	44	7	36	30	4	14	40	-12	52	12	-12	-281	3
2	113	-115	16	11	40	-90	20	10	23	5	15	34	32	-255	-4	104	64	8
3	34	8	-52	1	-2	24	4	-3	8	1	5	23	3	-10	-8	-25	1	0
4	-3	16	1	8	-4	1	1	4	3	1	2	4	2	7	0	-40	2	1
5	25	21	1	-1	-59	2	0	2	2	0	1	2	6	12	0	-7	8	0
6	45	-72	4	2	2	0	1	0	0	0	0	0	0	3	4	3	25	0
7	-4	-2	-2	-3	-1	0	-3	1	0	0	0	1	0	3	0	18	-3	0
8	31	-17	-4	2	3	0	1	0	0	0	0	0	0	-4	7	25	15	0
9	4	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0
10	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11	0	0	-2	-1	-1	0	-1	0	0	0	0	0	0	1	0	8	0	0
12	4	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
13	-13	27	2	2	-8	0	0	0	0	0	0	0	0	14	0	-7	-10	0
14	106	-222	0	9	39	-13	14	7	41	7	12	46	31	-162	-3	51	67	2
15	1	1	-14	0	-1	17	1	4	8	0	0	6	0	-12	-3	-3	0	0
16	-9	104	-15	13	-58	-26	48	39	30	6	38	65	-2	-15	1	-192	-7	13
17	-85	36	5	11	-27	14	3	13	13	3	7	33	3	22	0	1	-62	1
18	4	-16	-1	1	0	0	0	0	0	0	0	0	0	-4	0	18	1	0

2051 AM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	7501	112	457	80	726	140	74	58	37	21	37	23	632	251	59	767	2716	16
2	99	1588	130	57	37	1068	279	252	84	4	112	31	46	2643	28	752	68	216
3	362	267	459	11	21	388	36	39	23	1	20	15	22	664	144	761	91	9
4	164	116	40	604	37	46	217	76	16	5	103	13	601	107	2	1013	133	50
5	1410	65	30	23	8694	57	36	31	23	12	30	16	639	59	1	155	626	8
6	158	892	207	11	81	67887	114	6982	2022	14	279	380	111	2558	214	331	107	384
7	45	386	35	106	18	116	2342	469	56	36	2078	118	169	240	2	372	25	507
8	90	240	54	34	76	5785	476	317240	18432	67	10272	18041	137	384	35	183	45	3180
9	20	26	10	3	17	1700	85	23237	306042	46	738	17798	72	55	11	20	13	77
10	22	5	5	7	42	15	53	52	34	56757	1733	711	4401	9	0	18	25	3
11	21	74	14	61	23	385	1865	14682	676	1145	173574	12608	3029	116	2	108	23	2982
12	27	19	18	14	29	347	214	23062	17176	702	15055	3941168	288	57	7	46	15	117
13	457	57	40	494	688	118	319	154	107	3846	4268	415	39105	71	2	243	558	25
14	120	2713	214	32	31	2376	122	266	102	3	74	51	34	2859	217	510	67	116
15	47	66	263	2	4	430	4	31	19	0	5	12	3	439	17	53	7	5
16	678	984	638	905	90	426	725	281	61	6	208	38	170	1039	39	4441	301	119
17	2512	47	84	89	377	65	37	36	23	15	31	19	492	84	2	288	742	7
18	10	151	8	10	7	464	372	5384	108	5	3179	123	17	133	2	60	6	6046

2051 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	9119	139	517	103	792	146	89	56	36	21	42	26	599	278	64	1048	3250	17
2	166	2631	212	109	54	1444	424	291	99	8	153	46	67	3714	41	1240	125	276
3	449	343	652	26	24	441	41	38	23	1	21	17	23	750	160	936	100	9
4	213	178	65	767	45	61	269	79	17	6	105	15	637	133	4	1371	168	50
5	2141	84	41	36	12389	73	53	38	27	17	40	22	953	79	1	222	931	10
6	253	1220	297	23	117	85611	170	7789	2265	18	338	457	148	3229	280	484	163	457
7	70	516	49	145	28	132	3074	503	66	47	2368	151	206	273	3	507	39	560
8	176	398	95	63	134	8374	775	414205	24775	104	14271	24311	214	585	55	328	85	4335
9	39	42	17	5	28	2395	127	28377	384279	67	1011	22549	106	81	17	35	24	105
10	37	6	7	10	62	19	71	61	40	71935	2120	819	5516	12	0	28	37	4
11	37	102	22	91	37	509	2712	16954	834	1475	220317	15042	3950	153	3	167	38	3711
12	50	33	29	23	48	482	309	28527	21219	973	19569	4904564	413	80	10	76	26	156
13	636	72	53	638	912	144	410	169	122	4710	5127	475	49254	85	2	322	699	28
14	167	3572	276	49	42	2617	163	272	107	4	81	57	41	3360	268	670	91	132
15	65	77	330	3	5	468	5	31	20	0	6	13	4	484	19	69	9	5
16	1014	1389	861	1205	120	456	890	279	63	8	211	43	192	1114	47	5841	425	122
17	3409	55	101	111	439	68	46	35	22	16	36	21	509	88	2	344	950	7
18	18	212	12	16	11	607	581	6399	130	8	3980	155	24	172	3	92	11	7701

2051 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8956	139	569	110	891	139	84	61	54	28	48	58	644	272	68	1022	3181	17
2	154	2552	230	126	51	1383	464	307	151	14	184	102	71	3527	44	1348	120	280
3	493	340	622	26	23	440	42	37	34	2	24	34	23	724	160	937	96	7
4	217	185	66	792	43	62	270	81	20	6	106	20	638	137	4	1305	183	51
5	2133	71	38	34	12447	71	52	37	28	17	39	25	959	63	1	169	937	10
6	213	1160	315	26	116	85611	171	7789	2265	18	338	457	148	3305	326	443	137	457
7	62	522	50	143	27	132	3071	504	67	48	2368	152	206	272	3	520	37	561
8	140	412	92	66	134	8374	776	414205	24775	104	14271	24311	214	600	62	354	72	4335
9	34	45	17	5	28	2395	127	28377	384279	67	1011	22549	106	86	19	34	21	105
10	34	6	7	11	62	19	71	61	40	71935	2120	819	5516	11	0	34	35	4
11	32	107	22	90	37	509	2711	16954	834	1475	220317	15042	3950	156	3	171	35	3711
12	45	34	30	24	48	482	309	28527	21219	973	19569	4904564	413	83	11	83	25	156
13	607	66	52	641	929	144	410	169	122	4710	5127	475	49254	79	2	291	710	28
14	147	3367	275	58	39	2700	183	292	161	6	98	115	42	3246	291	707	77	131
15	71	73	311	4	4	472	5	31	27	0	7	26	4	485	18	68	9	4
16	971	1439	900	1231	107	443	915	307	95	11	231	96	193	1131	50	5649	405	136
17	3270	53	99	122	495	64	44	38	31	19	40	40	548	82	2	326	951	8
18	16	207	12	16	11	607	581	6399	130	8	3980	155	24	166	4	104	10	7701

2051 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8750	215	600	106	870	188	91	77	66	27	51	63	628	388	71	1064	3072	20
2	267	2484	231	129	78	1333	455	298	145	14	179	100	96	3425	43	1358	204	274
3	512	339	622	26	25	444	42	36	33	2	24	33	25	717	160	913	104	7
4	205	194	65	788	43	62	270	82	20	6	106	20	638	149	4	1312	174	52
5	2092	103	41	34	12435	73	52	39	29	17	40	26	955	95	1	186	903	10
6	293	1111	315	25	117	85611	171	7789	2265	18	338	457	148	3241	325	432	182	457
7	64	520	49	143	27	132	3070	504	67	48	2368	152	206	267	3	523	38	561
8	190	389	88	66	135	8374	776	414205	24775	104	14271	24311	214	567	60	352	90	4335
9	42	42	16	5	28	2395	127	28377	384279	67	1011	22549	106	81	19	32	25	105
10	32	7	7	11	62	19	71	61	40	71935	2120	819	5516	13	0	34	34	4
11	35	105	21	91	37	509	2711	16954	834	1475	220317	15042	3950	152	3	173	37	3711
12	51	33	29	24	48	482	309	28527	21219	973	19569	4904564	413	79	11	82	27	156
13	578	86	54	641	926	144	410	169	122	4710	5127	475	49254	104	2	305	681	28
14	238	3274	277	59	57	2691	179	289	158	6	97	114	57	3187	290	701	130	130
15	77	71	309	4	5	474	5	30	26	0	6	26	4	481	17	66	11	4
16	995	1464	883	1234	113	435	914	303	93	11	231	95	198	1130	50	5606	431	137
17	3171	85	108	120	481	87	48	46	36	19	43	43	534	130	3	366	908	9
18	19	205	12	16	11	607	581	6399	130	8	3980	155	24	162	3	106	11	7701

2051 Pre VDM vs Post VDM (Do Min)

Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-163	0	51	8	99	-7	-5	4	18	7	5	32	45	-6	4	-26	-69	0
2	-12	-79	18	16	-3	-61	41	16	52	6	31	57	4	-187	3	107	-6	4
3	43	-3	-30	1	-1	-1	1	-2	11	0	3	17	0	-27	0	1	-4	-2
4	4	6	2	24	-2	1	1	2	3	0	1	5	0	4	0	-66	15	1
5	-8	-13	-4	-2	57	-2	-1	-1	1	0	0	3	5	-16	0	-53	6	0
6	-40	-60	18	3	-1	0	1	0	0	0	0	0	0	77	46	-42	-26	0
7	-8	6	1	-2	0	0	-4	0	0	0	0	1	0	-2	0	13	-2	1
8	-36	14	-3	3	-1	0	1	0	0	0	0	0	0	15	7	27	-13	0
9	-5	3	0	0	0	0	0	0	0	0	0	0	0	5	2	0	-3	0
10	-3	0	0	1	0	0	0	0	0	0	0	0	0	-2	0	5	-2	0
11	-5	5	0	0	0	0	0	0	0	0	0	0	0	4	0	4	-3	0
12	-5	2	1	1	0	0	0	0	0	0	0	0	0	3	1	7	-2	0
13	-28	-6	-1	3	17	0	0	0	0	0	0	0	0	-6	0	-31	11	0
14	-20	-205	-1	10	-2	83	20	20	54	2	17	57	1	-113	23	37	-14	-1
15	6	-3	-19	0	-1	4	1	0	7	0	1	13	0	1	-1	0	-1	-1
16	-43	49	39	26	-13	-14	25	28	33	3	20	54	1	17	3	-193	-19	14
17	-139	-2	-2	11	56	-4	-1	3	9	4	4	19	39	-6	0	-18	0	0
18	-1	-5	0	0	0	0	1	0	0	0	0	0	0	-6	0	12	0	0

2051 Pre VDM vs Post VDM (Do Som)

Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-370	77	83	4	78	41	2	20	30	7	8	37	29	110	7	15	-178	3
2	101	-148	18	20	24	-111	31	7	46	6	27	55	29	-289	2	117	79	-2
3	63	-4	-30	0	1	3	1	-2	10	0	3	16	2	-34	1	-24	4	-2
4	-8	15	0	21	-2	1	1	3	2	0	1	5	0	16	0	-58	5	2
5	-49	19	-1	-2	46	1	-1	1	2	0	0	4	2	16	0	-36	-28	0
6	40	-109	18	2	0	0	1	0	0	0	0	0	0	12	44	-53	19	0
7	-6	4	0	-1	0	0	-4	0	0	0	0	1	0	-6	0	17	0	1
8	15	-9	-7	3	0	0	1	0	0	0	0	0	0	-18	5	24	5	0
9	4	0	-1	0	0	0	0	0	0	0	0	0	0	0	1	-2	1	0
10	-5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	6	-3	0
11	-1	3	-1	0	0	0	0	0	0	0	0	0	0	-1	0	6	-1	0
12	1	0	0	1	0	0	0	0	0	0	0	0	0	-1	1	6	0	0
13	-58	14	1	3	14	0	0	0	0	0	0	0	0	18	0	-17	-18	0
14	71	-299	1	11	15	74	17	17	51	2	16	57	15	-173	22	31	38	-2
15	12	-6	-20	0	0	6	0	-1	7	0	1	13	1	-3	-1	-2	2	-1
16	-19	74	21	29	-6	-21	24	24	30	3	20	52	6	15	3	-235	6	15
17	-238	30	7	10	42	18	2	11	14	3	6	21	24	42	0	22	-42	1
18	1	-7	0	1	0	0	1	0	0	0	0	0	0	-10	0	14	1	0

2051 Interpeak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6541	45	251	133	849	70	40	67	24	11	23	27	353	79	39	514	2010	11
2	44	1233	152	51	30	556	229	120	33	4	33	24	22	1970	59	552	25	104
3	270	137	444	10	25	158	16	33	17	2	10	14	21	243	142	368	54	8
4	97	39	7	483	17	17	112	25	7	4	46	11	484	20	1	742	82	13
5	609	22	26	19	6756	60	14	64	25	9	20	26	450	25	2	68	268	13
6	76	449	139	21	77	44844	85	3779	952	17	183	339	87	1315	186	219	42	249
7	38	198	20	105	27	68	1926	292	64	44	1464	134	171	74	2	398	19	277
8	64	108	41	29	80	4174	344	292405	15588	89	7371	14418	173	185	45	149	35	3686
9	27	29	19	6	27	954	61	13829	247278	49	644	12470	87	44	10	35	16	76
10	9	4	2	3	11	24	50	114	69	50429	1089	817	2939	6	0	6	7	8
11	19	36	11	43	29	220	1468	7074	622	1172	129344	7919	3005	34	3	87	16	2260
12	37	27	19	18	35	382	175	13138	12310	614	7861	3032062	349	46	8	63	21	159
13	217	22	21	442	481	90	157	167	95	3004	2519	336	34405	27	2	131	218	23
14	86	2262	249	23	39	1279	75	207	61	4	37	47	33	2037	251	412	37	83
15	51	48	151	1	2	152	5	25	8	0	4	6	2	236	26	29	2	3
16	479	549	464	724	87	159	407	118	32	6	88	45	138	369	24	3647	174	55
17	2068	18	43	103	292	32	16	26	11	8	14	16	232	21	2	175	564	5
18	6	100	6	14	8	340	292	3252	77	10	2359	115	22	48	2	40	3	5353

2051 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8251	76	326	181	1166	94	55	89	30	14	32	37	429	101	52	781	2748	15
2	66	2127	245	86	46	850	330	163	43	6	48	35	33	2791	97	859	40	133
3	343	220	688	18	31	206	22	42	21	3	14	20	24	315	171	545	65	10
4	134	79	23	632	25	24	149	35	9	5	58	14	584	30	2	1050	108	17
5	776	35	31	24	9798	79	19	88	33	13	28	36	623	32	2	95	359	17
6	99	649	181	33	108	58905	108	4973	1230	22	243	450	113	1616	233	289	55	321
7	48	298	29	136	38	90	2539	404	89	60	1896	189	220	95	2	502	27	352
8	83	161	55	40	117	5413	430	391746	20243	121	9683	18953	232	230	58	202	47	4830
9	34	42	25	8	38	1215	73	17989	314467	63	837	15823	114	54	13	47	20	97
10	12	7	2	4	16	32	66	158	90	67054	1420	1062	3848	8	0	9	10	11
11	26	59	16	55	42	287	1956	9290	811	1515	170632	10151	3954	42	3	115	22	2934
12	48	47	27	24	51	493	208	17319	15527	778	10088	3845022	448	58	10	86	28	203
13	261	38	24	536	696	116	204	226	123	3887	3326	440	45457	32	2	163	268	30
14	104	3097	314	36	52	1549	94	256	74	5	47	59	39	2437	306	536	46	100
15	65	70	186	1	3	191	6	33	9	0	5	8	3	291	30	42	3	3
16	713	936	703	1024	126	213	541	159	43	8	115	64	169	480	32	5082	241	71
17	2733	34	52	135	413	43	24	36	15	11	19	22	288	28	3	245	773	7
18	7	137	8	17	11	440	384	4288	99	14	3070	152	29	59	3	52	5	7041

2051 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8103	85	374	201	1270	103	65	100	48	19	43	84	469	107	61	748	2599	19
2	69	2009	265	97	49	893	361	186	70	10	62	80	39	2660	107	890	41	148
3	366	239	612	20	32	223	27	48	34	4	19	45	28	308	163	530	64	12
4	142	89	26	636	24	27	148	39	11	6	60	20	587	35	2	1001	115	18
5	814	38	33	25	9732	79	19	89	34	13	29	39	633	33	2	94	376	17
6	95	652	184	37	108	58905	109	4973	1230	22	243	450	113	1611	231	308	51	321
7	49	295	30	133	38	90	2536	404	90	60	1896	190	220	96	3	511	27	352
8	78	164	55	41	117	5413	431	391746	20243	121	9683	18953	232	234	65	225	45	4830
9	33	43	25	8	38	1215	73	17989	314467	63	837	15823	114	56	14	48	20	97
10	13	7	2	4	16	32	66	158	90	67054	1420	1062	3848	8	0	9	10	11
11	25	59	17	55	42	287	1956	9290	811	1515	170632	10151	3954	43	4	120	22	2934
12	46	48	27	24	51	493	209	17319	15527	778	10088	3845022	448	59	11	93	28	203
13	261	41	25	538	703	116	204	226	123	3887	3326	440	45457	32	2	159	265	30
14	106	2942	311	43	53	1630	109	284	113	7	60	127	45	2330	308	559	45	111
15	71	75	168	1	3	197	8	40	15	1	7	19	4	275	25	42	3	4
16	688	1007	701	1011	128	239	598	203	71	11	156	157	187	498	36	4755	231	94
17	2624	39	57	147	445	46	28	41	22	14	24	42	314	28	3	233	768	9
18	7	133	8	18	11	440	385	4288	99	14	3070	152	29	59	3	58	4	7041

2051 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8025	118	382	195	1250	130	66	120	55	19	45	90	459	131	62	763	2569	21
2	101	1993	265	98	68	875	359	181	68	10	61	79	49	2622	106	896	59	146
3	377	231	613	20	36	220	27	46	33	4	19	44	29	303	163	529	69	11
4	137	91	25	635	24	27	148	38	11	6	60	20	587	36	2	1008	112	18
5	801	51	35	24	9724	81	19	90	35	13	29	39	632	42	3	99	368	17
6	121	633	184	36	110	58905	109	4973	1230	22	243	450	113	1597	229	303	64	321
7	49	294	30	133	38	90	2536	404	90	60	1896	190	220	96	3	513	27	353
8	99	155	53	41	118	5413	431	391746	20243	121	9683	18953	232	226	62	219	53	4830
9	39	40	24	8	39	1215	73	17989	314467	63	837	15823	114	53	13	46	22	97
10	12	8	2	4	16	32	66	158	90	67054	1420	1062	3848	8	0	9	10	11
11	26	59	16	55	42	287	1956	9290	811	1515	170632	10151	3954	42	4	120	22	2934
12	52	46	27	24	52	493	208	17319	15527	778	10088	3845022	448	57	10	90	30	203
13	252	49	26	538	700	116	204	226	123	3887	3326	440	45457	38	2	163	258	30
14	139	2901	314	44	71	1622	107	279	112	8	59	125	54	2312	307	560	62	109
15	73	74	168	2	4	198	8	40	15	1	7	19	4	274	25	42	3	4
16	691	999	702	1018	131	232	600	200	70	11	156	157	192	488	36	4757	239	94
17	2588	54	60	145	435	57	28	48	25	13	25	44	308	38	3	247	751	10
18	9	131	7	18	12	440	385	4288	99	14	3070	152	29	58	3	59	5	7041

2051 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-148	10	48	19	104	9	10	11	18	5	11	47	41	6	9	-33	-149	3
2	3	-118	19	11	3	43	31	22	27	4	14	45	6	-131	10	31	1	15
3	23	18	-75	2	1	17	5	5	13	1	5	25	3	-7	-8	-15	-1	1
4	8	10	3	4	0	2	-1	3	2	0	2	6	4	5	0	-49	7	1
5	38	3	3	0	-66	0	0	1	1	0	0	3	10	1	0	-1	17	0
6	-4	3	3	4	0	0	1	0	0	0	0	0	0	-5	-1	19	-4	0
7	0	-4	2	-3	0	1	-3	1	0	0	1	1	0	2	0	8	0	1
8	-5	3	0	2	0	0	1	0	0	0	0	0	0	4	7	23	-2	0
9	-1	1	1	0	0	0	0	0	0	0	0	0	0	2	1	1	-1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0
12	-1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	7	0	0
13	0	2	1	2	7	0	0	0	0	0	0	0	0	0	0	-4	-3	0
14	3	-154	-3	8	1	81	15	28	40	2	13	68	5	-106	2	23	-1	11
15	6	6	-18	0	0	6	2	7	6	0	2	11	1	-16	-5	0	0	1
16	-25	70	-2	-13	2	26	57	43	29	3	41	94	18	17	3	-327	-10	22
17	-109	4	4	12	32	2	4	5	7	2	5	19	26	0	0	-12	-6	2
18	0	-4	0	1	0	0	0	0	0	0	0	0	0	0	0	6	0	0

2051 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-226	42	56	14	84	35	11	32	25	4	13	54	31	30	11	-17	-179	6
2	35	-135	20	13	22	25	28	18	25	4	14	44	15	-168	8	37	19	12
3	34	10	-75	2	4	15	4	4	12	1	5	24	5	-12	-8	-16	4	1
4	3	12	2	3	0	2	-1	3	2	0	2	6	4	6	0	-43	5	1
5	24	16	4	0	-74	2	0	2	2	0	1	3	9	9	0	4	9	0
6	23	-16	2	3	2	0	1	0	0	0	0	0	0	-19	-3	14	9	0
7	0	-5	1	-3	0	0	-3	1	0	0	1	1	0	1	0	11	0	1
8	17	-6	-2	2	1	0	0	0	0	0	0	0	0	-4	4	17	6	0
9	5	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0
10	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
12	4	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	5	1	0
13	-9	11	2	2	4	0	0	0	0	0	0	0	0	6	0	1	-10	0
14	35	-196	0	8	19	73	13	22	38	3	12	66	15	-125	1	24	16	9
15	8	4	-18	0	1	6	2	7	6	0	2	11	1	-17	-5	0	0	1
16	-22	63	-2	-6	5	20	59	40	27	4	41	93	22	8	3	-325	-2	22
17	-145	19	8	10	22	13	4	12	10	2	6	22	19	11	0	3	-22	3
18	2	-6	0	1	0	0	0	0	0	0	0	0	0	-1	0	7	1	0

2051 PM Peak

Base year																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	6749	61	314	176	1516	94	50	82	27	20	30	20	610	108	42	735	2322	7
2	115	1192	318	82	63	1114	188	240	47	5	73	24	69	2121	65	952	75	144
3	492	172	472	40	68	226	39	49	22	5	23	16	62	275	215	559	104	4
4	92	55	21	537	36	21	115	43	11	7	54	7	575	40	2	920	86	7
5	708	32	27	32	7631	55	17	68	28	17	21	14	696	36	4	109	383	5
6	142	720	371	44	82	60400	163	6055	1600	20	269	297	108	2284	412	421	74	371
7	58	230	49	216	47	133	2320	424	72	52	1916	164	309	137	8	696	32	324
8	99	229	89	97	110	7577	638	426853	28082	99	14527	26487	235	421	72	424	70	5928
9	14	20	13	5	11	1622	62	23215	333128	31	489	18799	45	51	22	29	10	67
10	8	4	3	4	12	20	43	115	87	60072	1446	984	4090	6	0	9	8	6
11	33	103	51	108	38	381	2161	12003	623	1885	178287	15858	5356	104	10	249	21	3047
12	26	32	26	25	31	485	204	19704	18305	713	13907	4438814	355	65	7	89	19	146
13	394	48	36	574	867	108	207	212	119	4752	3376	306	42683	57	3	212	467	20
14	207	2206	559	85	99	2148	175	357	86	13	101	40	103	2219	371	1125	126	111
15	50	34	150	2	7	201	4	36	10	1	2	5	5	209	26	51	7	1
16	936	868	788	922	280	347	390	205	55	14	134	45	263	720	61	4260	380	42
17	2571	41	76	130	657	42	20	33	16	12	22	22	595	47	3	290	750	2
18	17	200	16	71	20	457	537	4694	117	12	3568	147	58	116	4	168	10	5970

2051 Pre VDM DM																		
Car	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8339	110	391	236	2192	132	75	127	42	28	47	31	759	139	57	1066	3145	10
2	166	2064	444	141	99	1624	242	361	68	7	95	36	98	2972	104	1430	106	188
3	573	284	700	63	94	310	54	76	31	7	32	24	74	337	267	763	124	6
4	134	127	35	681	60	34	154	64	17	9	73	10	696	60	4	1257	112	10
5	843	49	32	44	11130	76	25	104	42	23	32	22	946	46	5	140	479	8
6	160	1087	432	58	110	75990	197	8204	2126	26	343	392	127	2537	478	487	85	472
7	73	338	65	264	70	184	2988	675	112	73	2575	268	390	168	10	844	40	447
8	113	324	95	103	143	8909	741	556516	34948	126	17451	33374	284	437	80	470	79	7275
9	17	30	15	6	16	1891	73	29988	414566	38	604	23052	53	54	24	37	11	80
10	10	7	3	5	18	25	55	154	117	76504	1825	1294	5072	6	0	11	9	8
11	37	151	58	119	50	460	2632	15764	817	2295	225042	19955	6494	113	10	273	25	3780
12	30	52	30	29	42	582	247	25397	22833	836	16788	5483368	417	72	8	101	22	178
13	435	80	38	636	1282	138	261	286	161	5940	4330	408	53853	65	4	249	527	26
14	229	3121	640	121	132	2617	209	487	113	17	130	52	119	2557	418	1275	141	138
15	60	57	181	4	10	266	6	53	15	2	3	7	7	257	30	68	9	2
16	1271	1485	1025	1263	409	475	529	312	83	20	190	68	334	879	78	5680	485	58
17	3155	74	83	170	966	59	31	51	25	17	33	33	727	60	4	396	988	4
18	19	268	17	73	27	550	640	6110	152	15	4449	187	65	129	5	180	10	7572

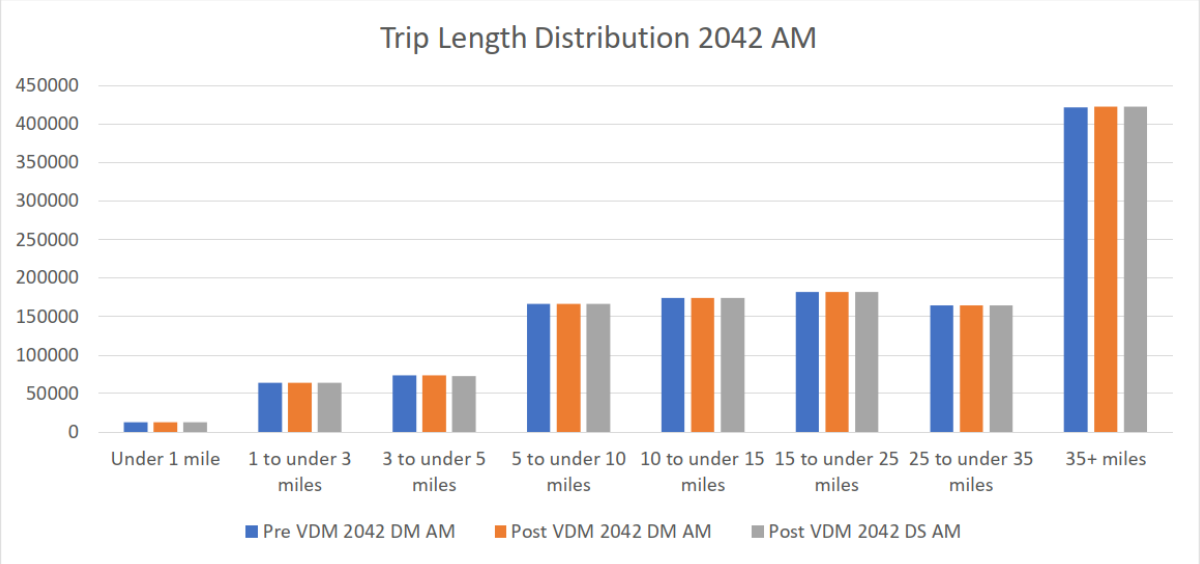
2051 Post VDM DM																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8394	111	444	259	2194	116	81	117	60	30	57	72	773	129	65	1013	2955	10
2	160	2073	439	150	80	1567	278	389	100	13	118	82	94	2827	101	1474	94	202
3	596	300	646	65	79	328	58	72	41	7	37	52	72	331	259	763	116	6
4	143	138	37	700	56	35	155	68	21	10	75	15	699	64	4	1189	123	10
5	888	47	32	43	11090	75	25	103	43	23	33	24	954	41	4	118	508	8
6	147	1076	434	60	108	75990	198	8204	2126	26	343	392	127	2596	486	466	70	472
7	66	347	62	262	68	185	2985	675	112	73	2575	269	390	175	10	852	36	447
8	100	331	90	104	139	8909	741	556516	34948	126	17451	33374	284	452	90	489	71	7275
9	15	32	15	6	15	1891	73	29988	414566	38	604	23052	53	57	26	36	10	80
10	10	7	3	5	17	25	55	154	117	76504	1825	1294	5072	6	0	11	10	8
11	33	159	55	117	49	460	2631	15764	817	2295	225042	19955	6494	120	10	275	22	3780
12	29	55	30	29	41	582	248	25397	22833	836	16788	5483368	417	76	9	106	21	178
13	442	80	38	639	1283	138	262	286	161	5940	4330	408	53853	59	3	226	546	26
14	217	3034	620	127	106	2645	231	512	170	24	151	114	113	2481	423	1282	121	143
15	60	59	166	4	8	282	6	57	24	2	3	14	6	245	27	68	8	2
16	1254	1606	1039	1261	327	436	588	354	120	24	228	149	321	880	81	5475	453	70
17	3129	68	83	186	960	52	33	49	31	20	38	73	754	50	4	358	973	4
18	17	261	15	74	26	550	640	6110	152	15	4449	187	65	129	4	193	9	7572

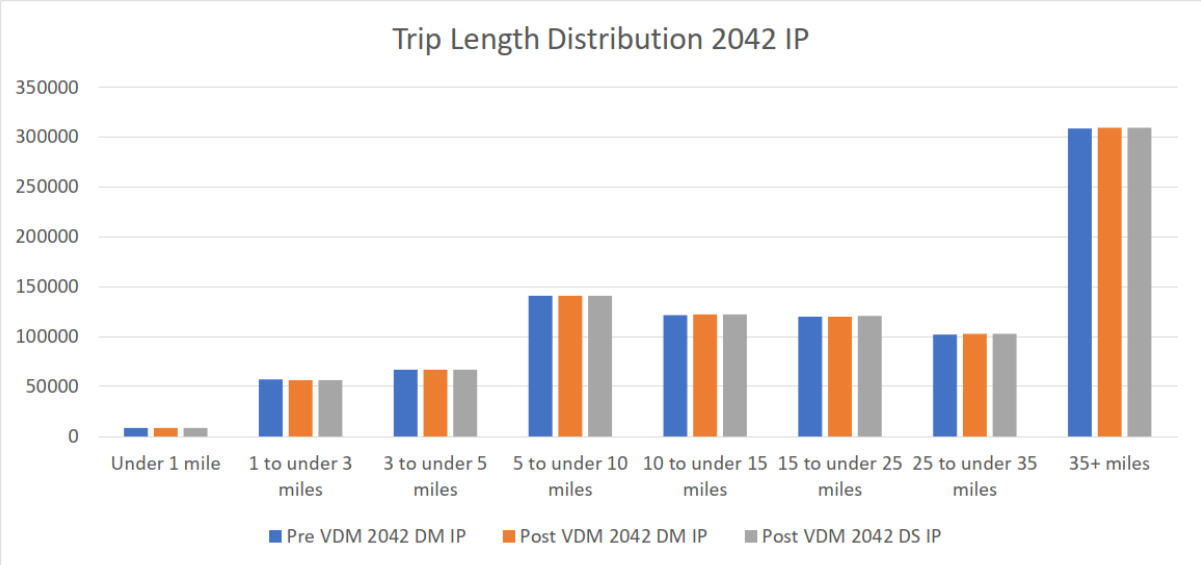
2051 Post VDM DS																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	8293	180	468	247	2120	171	83	155	74	30	61	78	745	191	70	1061	2832	13
2	284	1971	461	153	133	1497	269	367	95	13	113	78	125	2686	98	1552	170	197
3	616	291	644	64	86	338	57	70	40	7	37	51	74	327	259	739	123	6
4	131	143	37	696	54	35	156	68	21	10	75	15	698	67	5	1206	115	10
5	868	68	32	42	11081	77	25	105	44	23	33	24	951	55	5	125	492	8
6	202	998	437	60	112	75990	197	8204	2126	26	343	392	127	2561	486	482	107	472
7	65	340	63	262	68	184	2985	675	112	73	2575	269	390	171	10	863	35	447
8	139	303	89	104	144	8909	741	556516	34948	126	17451	33374	284	428	86	489	90	7275
9	21	29	14	6	16	1891	73	29988	414566	38	604	23052	53	54	25	35	13	80
10	10	8	3	5	17	25	55	154	117	76504	1825	1294	5072	7	0	11	9	8
11	35	155	55	117	49	460	2631	15764	817	2295	225042	19955	6494	115	10	281	23	3780
12	34	52	29	29	41	582	248	25397	22833	836	16788	5483368	417	72	8	105	23	178
13	419	106	40	639	1273	138	262	286	161	5940	4330	408	53853	78	4	235	522	26
14	341	2873	641	130	165	2601	223	492	164	25	143	110	146	2378	418	1336	207	138
15	62	58	166	4	9	285	6	56	24	2	3	14	6	243	27	66	9	2
16	1262	1615	1018	1279	318	433	591	350	116	25	233	146	320	863	80	5483	470	72
17	3057	110	88	184	932	71	35	62	38	19	41	73	733	80	5	397	932	4
18	23	252	16	74	26	550	640	6110	152	15	4449	187	65	124	4	199	11	7572

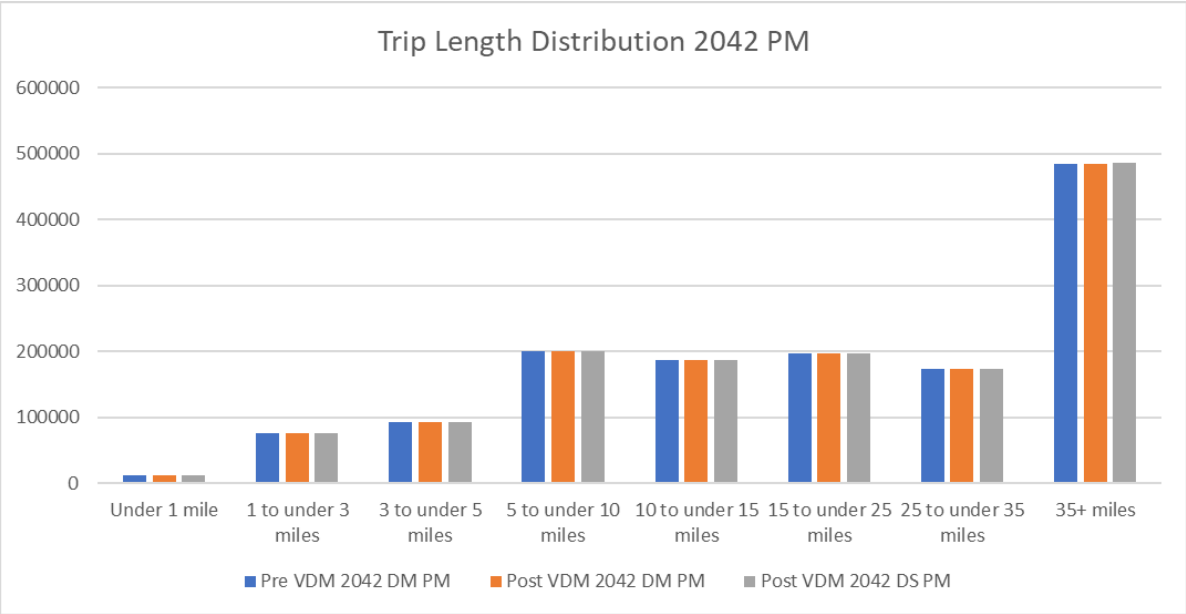
2051 Pre VDM vs Post VDM (Do Min)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	55	1	53	23	2	-15	6	-10	19	2	10	41	13	-10	8	-54	-191	0
2	-6	9	-6	9	-19	-57	35	28	32	6	23	46	-4	-145	-2	44	-12	14
3	24	16	-55	1	-15	18	4	-4	10	1	5	29	-3	-7	-8	1	-7	0
4	9	11	1	19	-4	1	1	4	4	1	1	5	3	4	0	-68	11	1
5	45	-2	0	-2	-41	-1	0	-1	1	0	0	2	8	-4	-1	-22	29	0
6	-12	-11	2	2	-3	0	1	0	0	0	0	0	0	59	8	-20	-16	0
7	-6	9	-3	-3	-2	0	-3	1	0	0	0	1	0	7	0	8	-4	0
8	-13	7	-5	1	-4	0	1	0	0	0	0	0	0	15	10	18	-8	0
9	-1	2	0	0	0	0	0	0	0	0	0	0	0	3	2	-1	-1	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-4	8	-3	-2	-1	0	-1	0	0	0	0	0	0	8	0	2	-3	0
12	-2	3	0	0	-1	0	0	0	0	0	0	0	0	4	0	5	-1	0
13	7	0	0	3	1	0	0	0	0	0	0	0	0	-7	0	-22	19	0
14	-13	-87	-19	6	-26	28	23	25	57	7	21	61	-6	-76	4	7	-20	5
15	0	2	-15	0	-2	16	1	4	9	0	0	8	-1	-12	-4	-1	-1	0
16	-17	120	13	-2	-82	-40	59	42	37	4	39	81	-13	2	3	-204	-31	12
17	-27	-6	0	16	-7	-7	2	-2	7	3	5	40	27	-10	0	-38	-16	0
18	-2	-6	-2	0	-1	0	0	0	0	0	0	0	0	0	0	13	-1	0

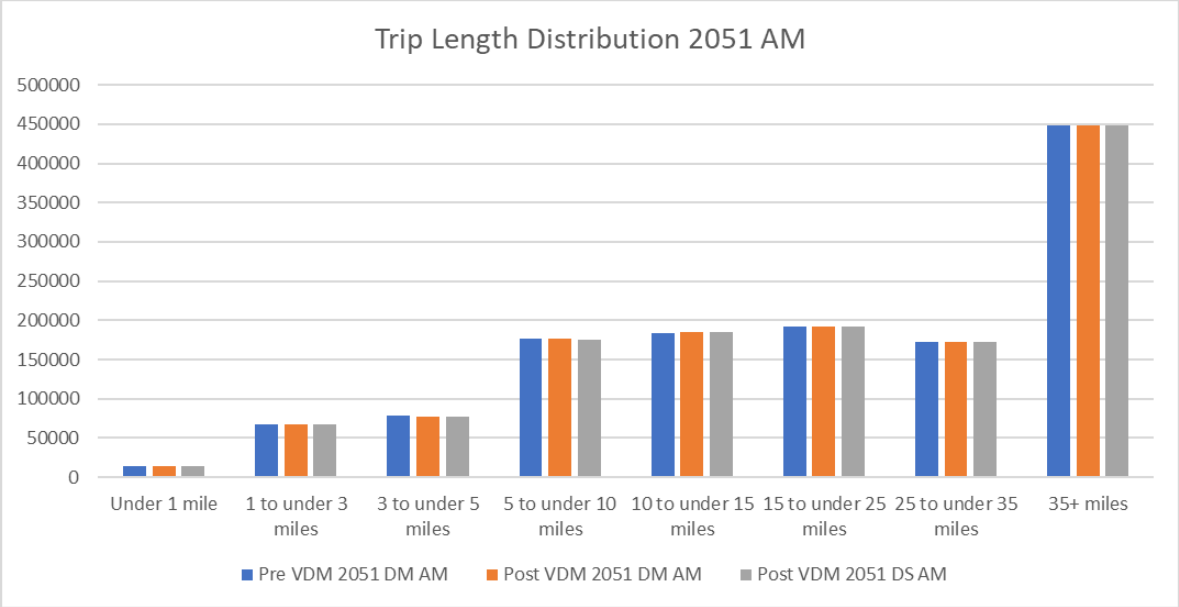
2051 Pre VDM vs Post VDM (Do Som)																		
Business	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-46	70	77	11	-72	40	7	29	32	2	14	48	-15	53	14	-6	-313	3
2	117	-93	17	12	34	-126	26	6	27	6	18	42	27	-286	-6	122	64	8
3	43	6	-56	0	-8	28	4	-5	9	1	4	27	0	-10	-8	-23	-1	0
4	-2	17	1	15	-6	1	1	4	4	1	2	5	2	8	1	-51	3	1
5	25	19	1	-2	-49	1	0	1	2	0	1	2	5	10	0	-15	13	0
6	42	-89	5	2	1	0	1	0	0	0	0	0	0	24	8	-4	22	0
7	-7	2	-2	-2	-2	0	-3	1	0	0	1	1	0	3	0	19	-5	1
8	26	-21	-6	1	1	0	1	0	0	0	0	0	0	-9	6	18	11	0
9	4	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	-1	2	0
10	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-1	4	-3	-2	-1	0	-1	0	0	0	0	0	0	3	0	7	-2	0
12	4	0	-1	0	0	0	0	0	0	0	0	0	0	1	0	3	1	0
13	-17	26	2	3	-8	0	0	0	0	0	0	0	0	12	0	-13	-4	0
14	112	-248	1	9	33	-16	14	5	51	7	13	57	27	-178	-1	61	67	1
15	2	1	-15	0	-2	19	1	3	9	0	0	7	0	-14	-4	-2	0	0
16	-9	129	-8	16	-91	-42	62	38	33	5	43	79	-14	-15	2	-197	-15	14
17	-98	36	5	14	-34	12	3	11	14	2	7	39	7	20	0	1	-56	1
18	4	-15	-1	1	0	0	1	0	0	0	0	0	0	-5	0	19	1	0

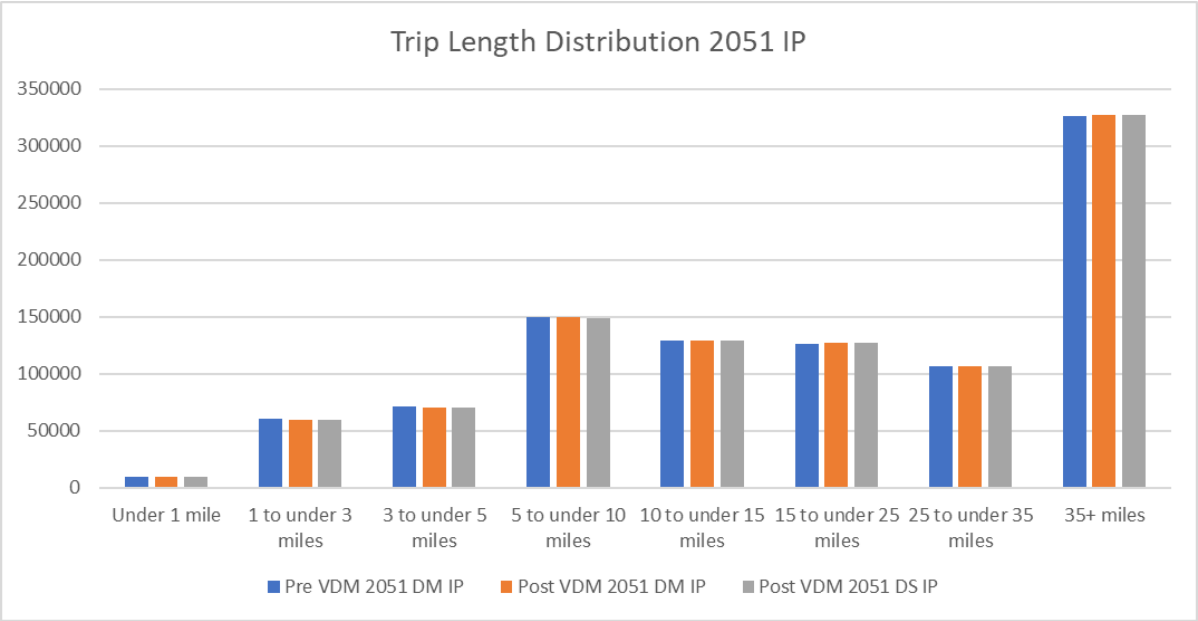
Appendix F. Trip Length Distribution and VDM flow difference plots

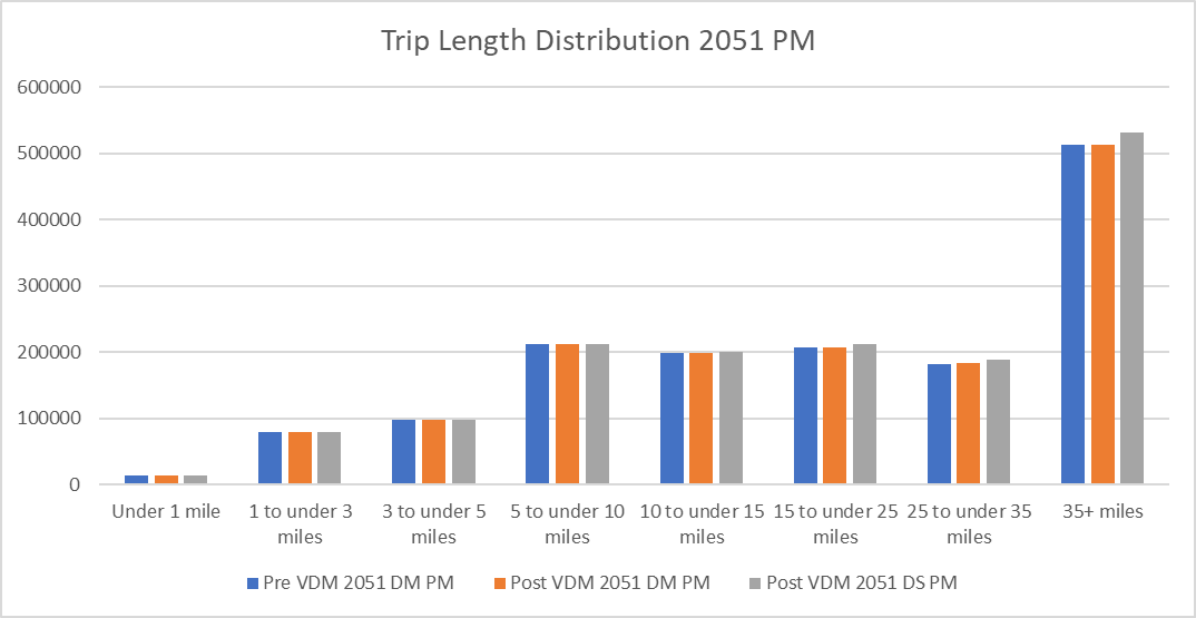




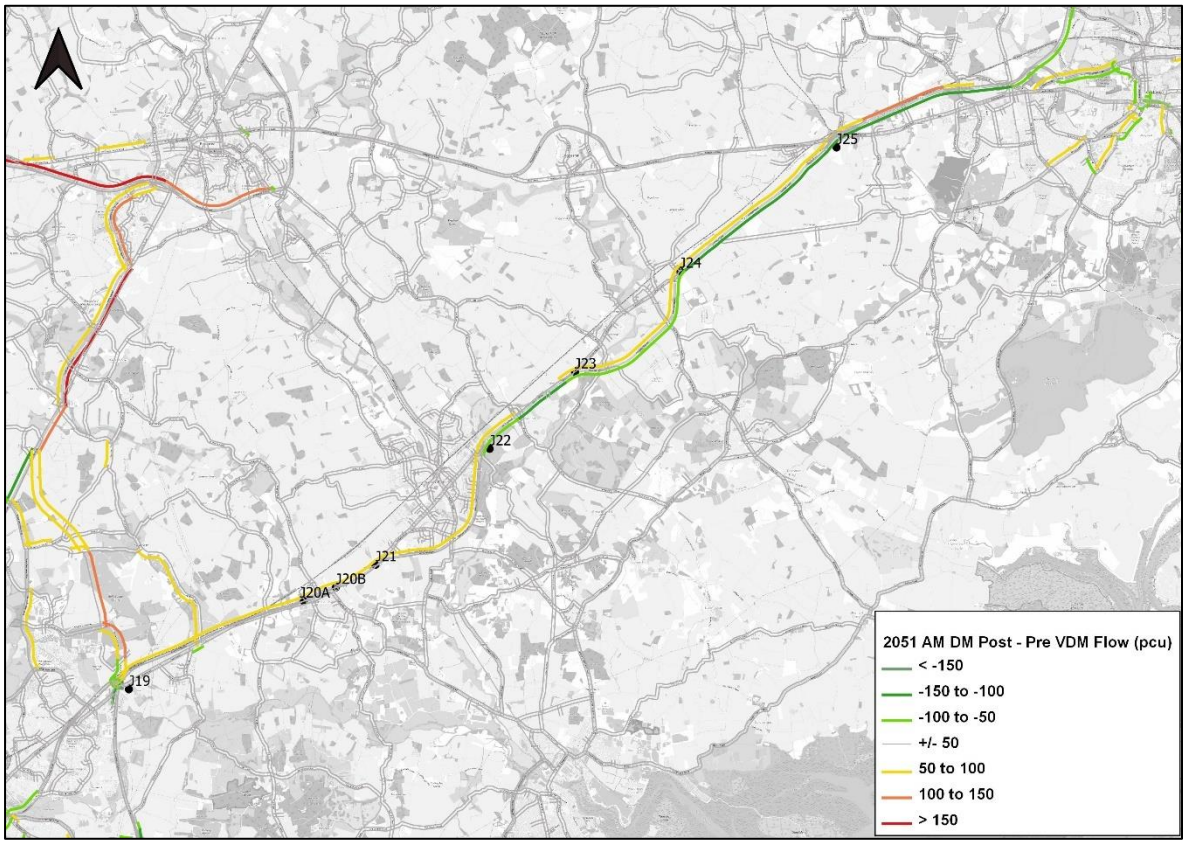

Trip Length Distribution 2042 PM
600000
500000
400000
300000
200000
100000
0
Under 1 mile
1 to under 3 miles
3 to under 5 miles
5 to under 10 miles
10 to under 15 miles
15 to under 25 miles
25 to under 35 miles
35+ miles
Pre VDM 2042 DM PM
Post VDM 2042 DM PM
Post VDM 2042 DS PM

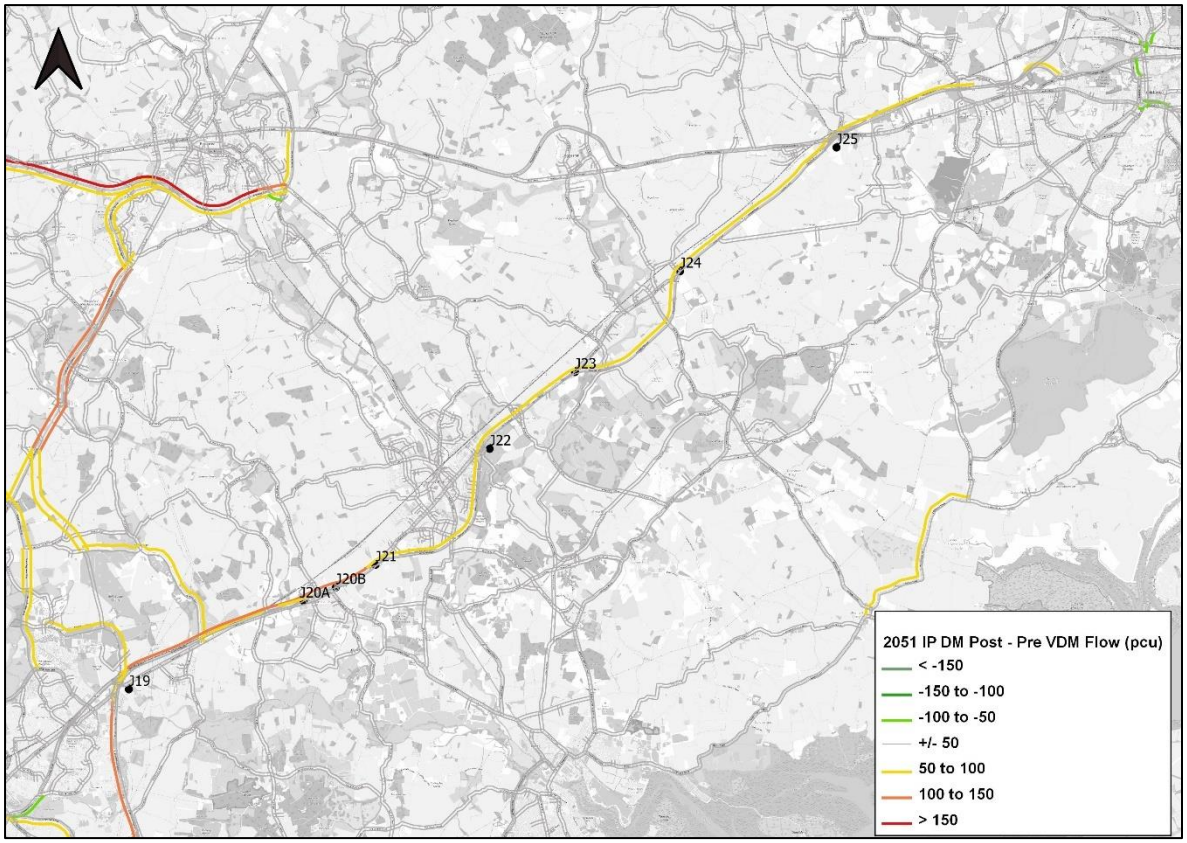

Trip Length Distribution 2051 AM
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
Under 1 mile
1 to under 3 miles
3 to under 5 miles
5 to under 10 miles
10 to under 15 miles
15 to under 25 miles
25 to under 35 miles
35+ miles
Pre VDM 2051 DM AM
Post VDM 2051 DM AM
Post VDM 2051 DS AM

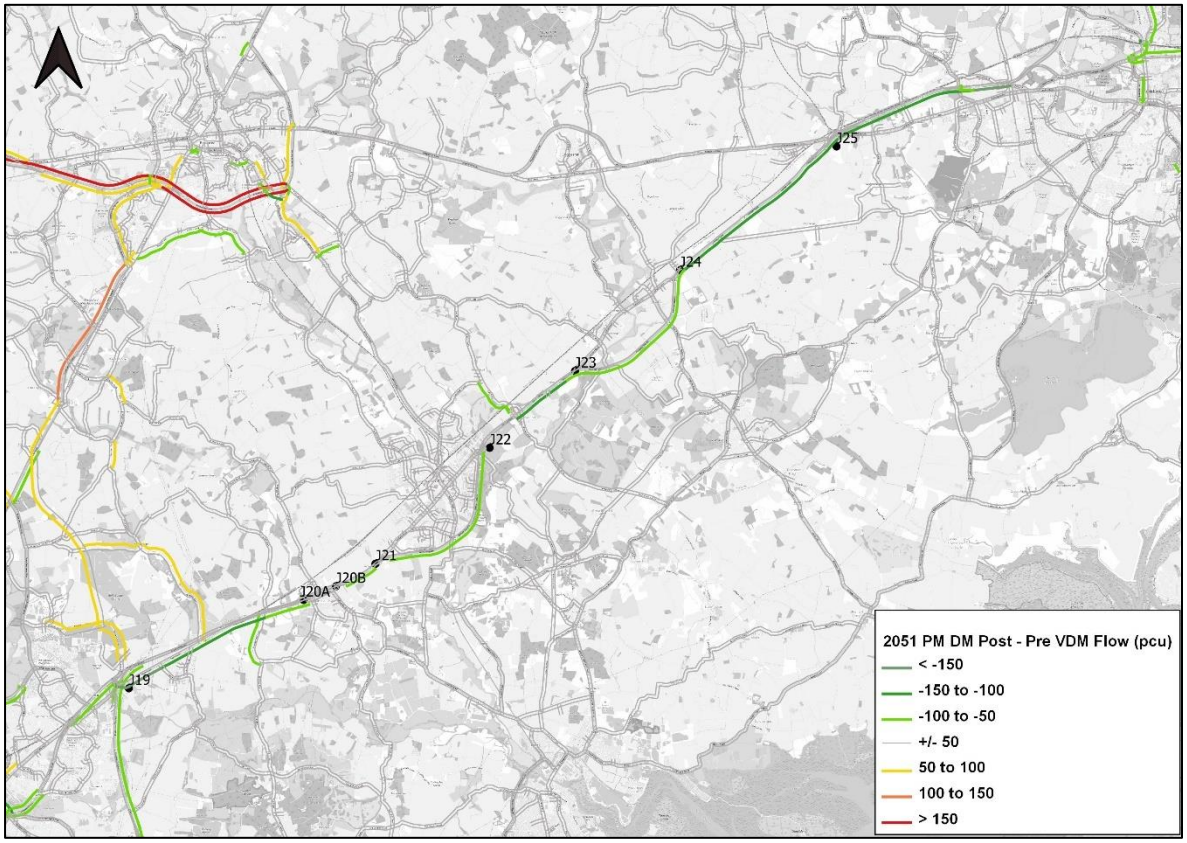

Trip Length Distribution 2051 IP
350000
300000
250000
200000
150000
100000
50000
0
Under 1 mile
1 to under 3 miles
3 to under 5 miles
5 to under 10 miles
10 to under 15 miles
15 to under 25 miles
25 to under 35 miles
35+ miles
Pre VDM 2051 DM IP
Post VDM 2051 DM IP
Post VDM 2051 DS IP


Trip Length Distribution 2051 PM
600000
500000
400000
300000
200000
100000
0
Under 1 mile
1 to under 3 miles
3 to under 5 miles
5 to under 10 miles
10 to under 15 miles
15 to under 25 miles
25 to under 35 miles
35+ miles
Pre VDM 2051 DM PM
Post VDM 2051 DM PM
Post VDM 2051 DS PM

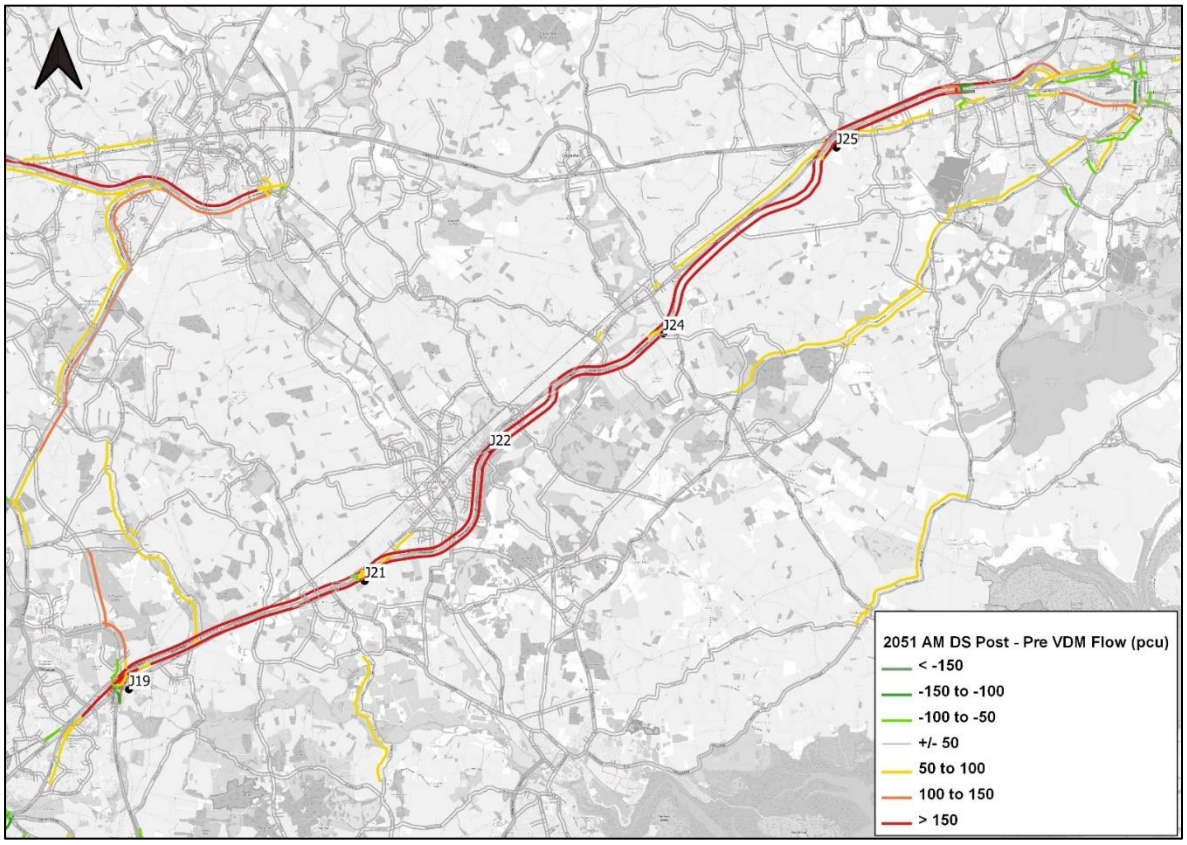
Flow Difference Post vs Pre VDM (Do Minimum)





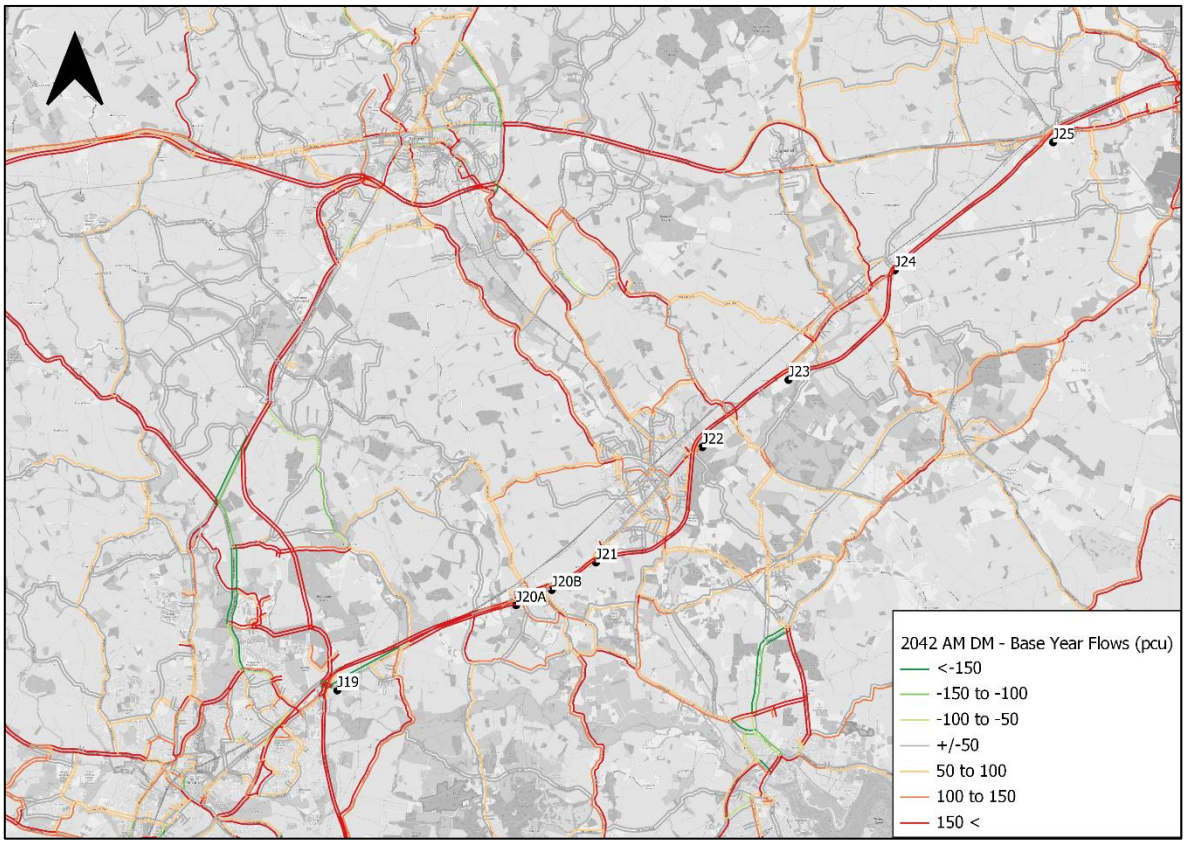

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM Post - Pre VDM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

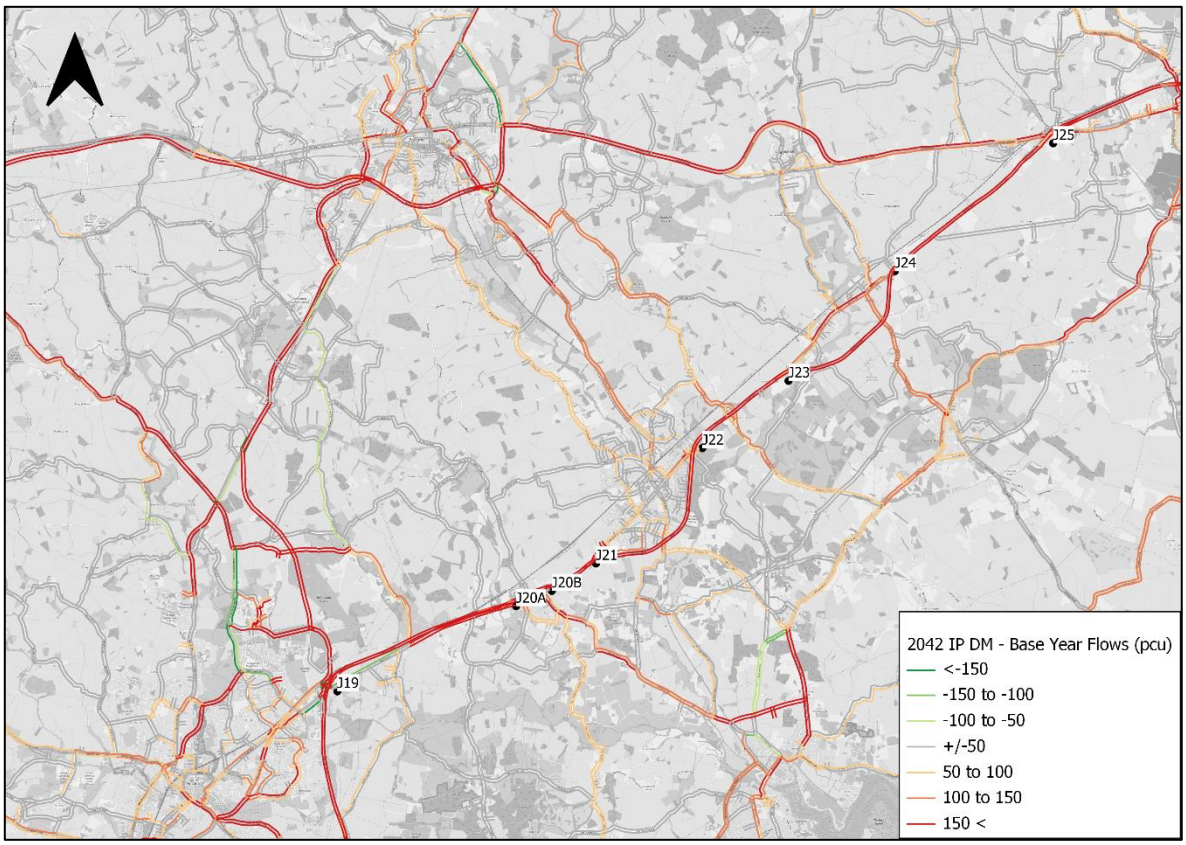
Do Something

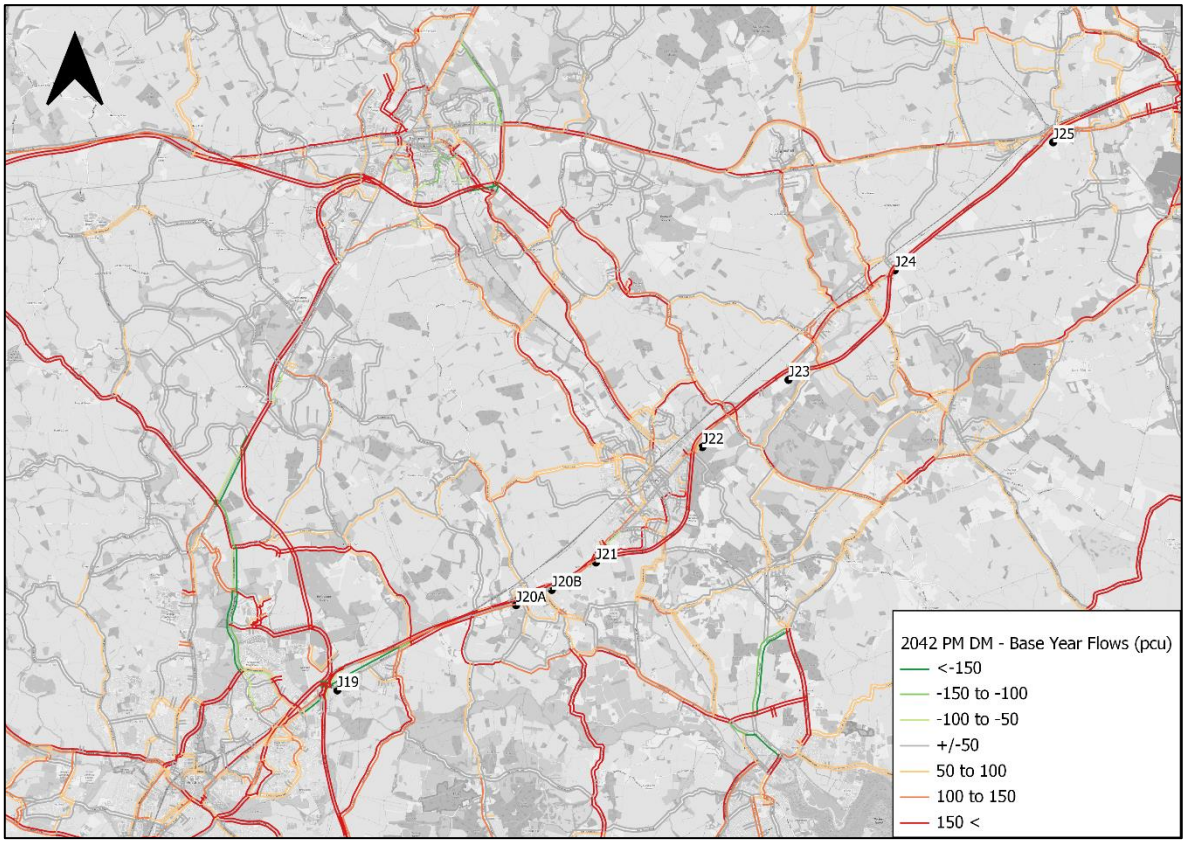


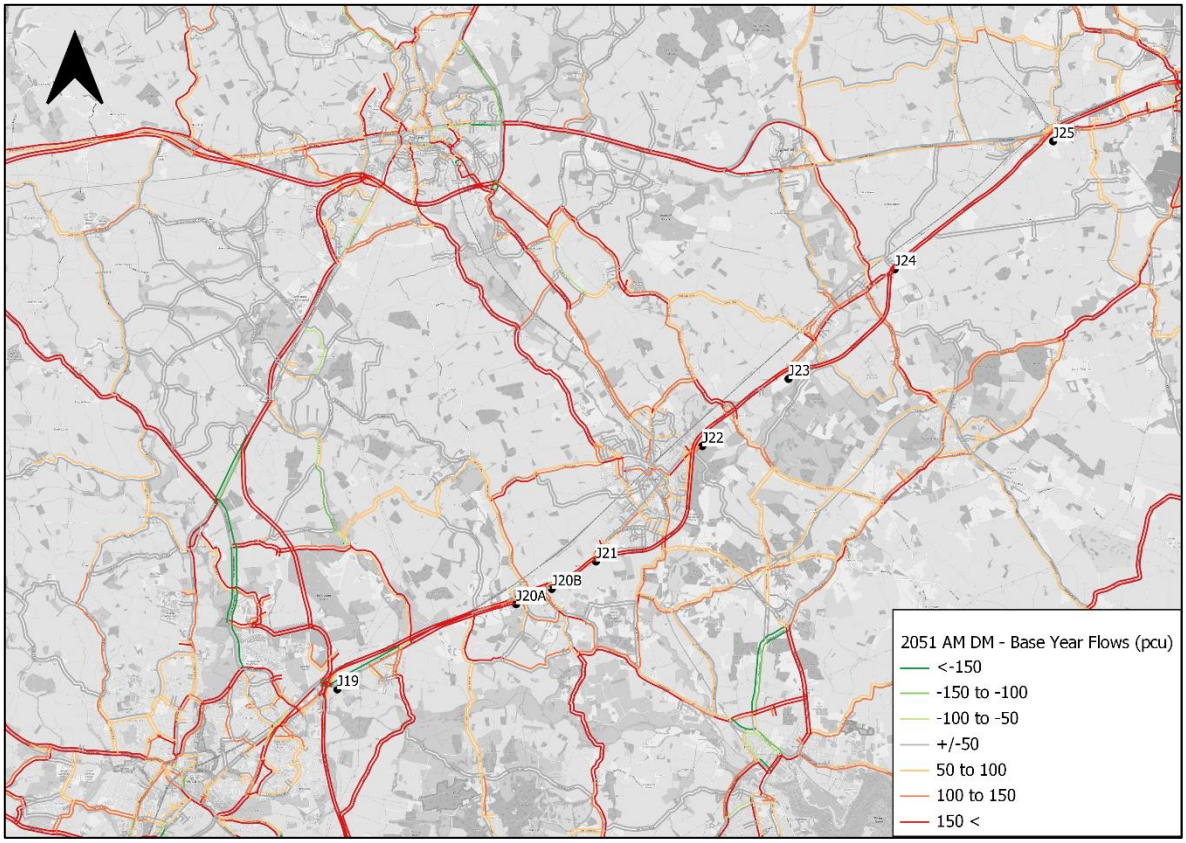

J25
J24
J22
J21
J19
2051 IP DS Post - Pre VDM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150
J25
J24
J22
J21
J19
2051 PM DS Post - Pre VDM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

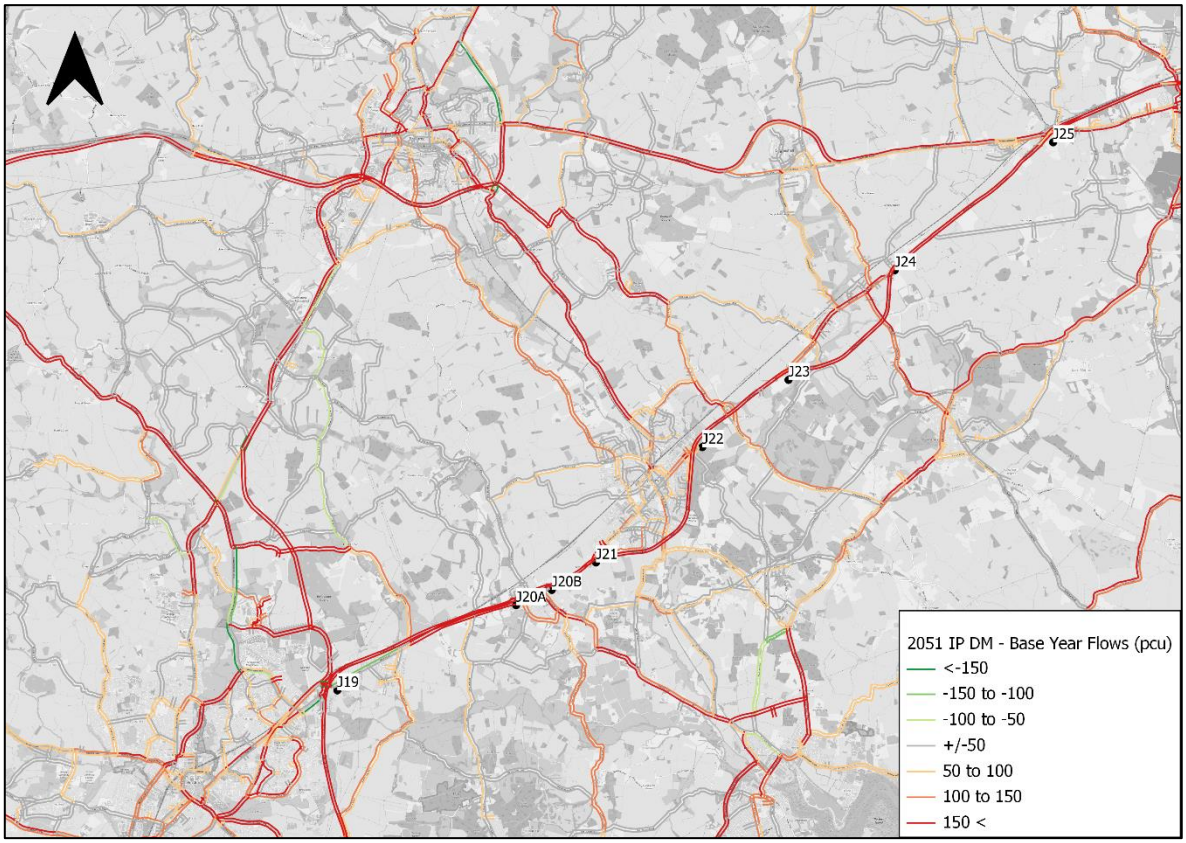
Appendix G. Flow Difference from Base

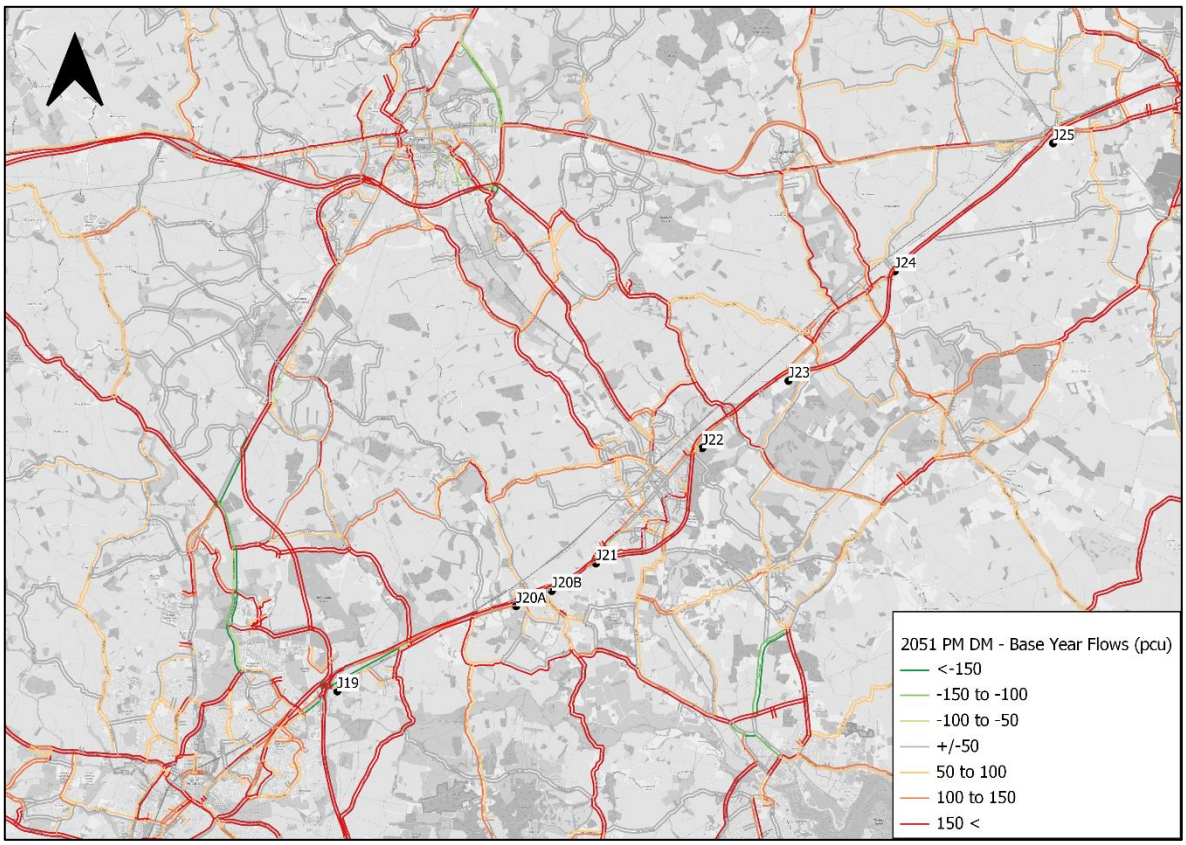



J25
J24
J23
J22
J21
J20B
J20A
J19
2042 IP DM - Base Year Flows (pcu)
<-150
-150 to -100
-100 to -50
+/-50
50 to 100
100 to 150
150 <

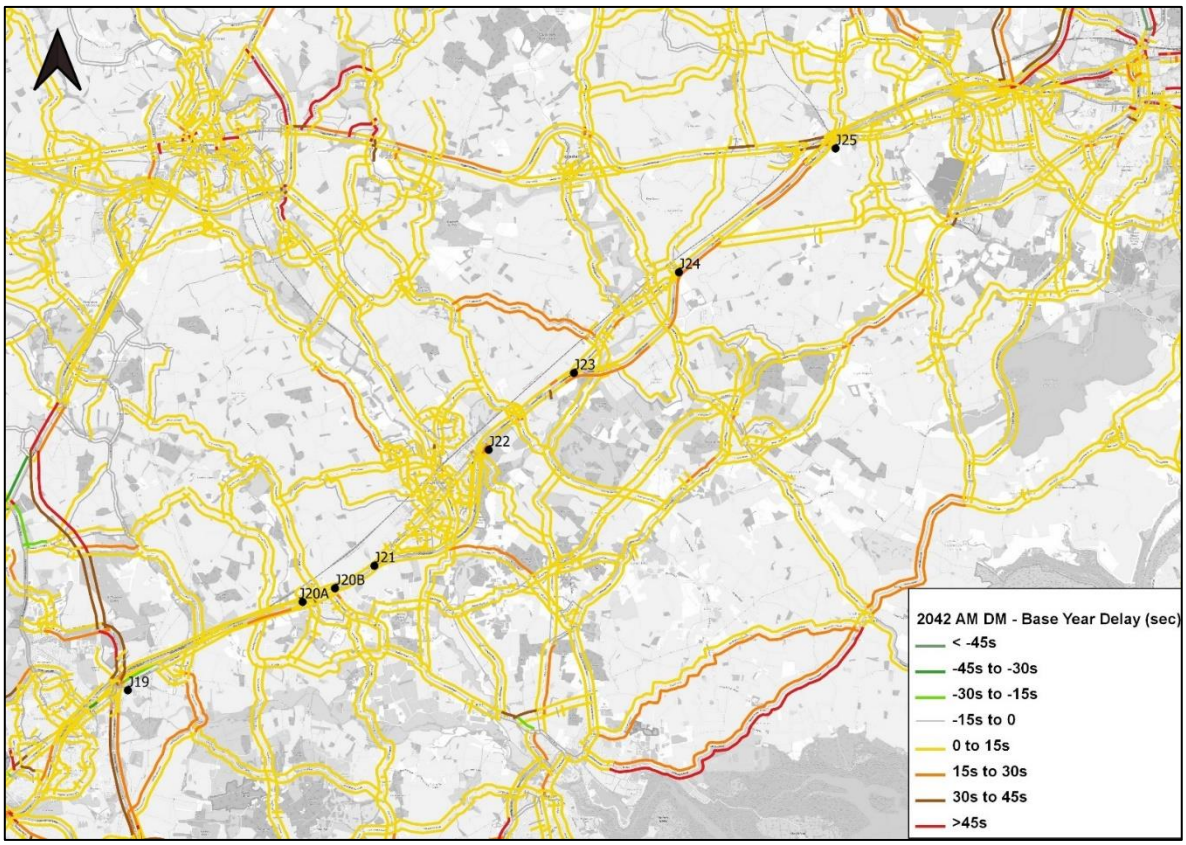

J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM - Base Year Flows (pcu)
<-150
-150 to -100
-100 to -50
+/-50
50 to 100
100 to 150
150 <


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM - Base Year Flows (pcu)
<-150
-150 to -100
-100 to -50
+/-50
50 to 100
100 to 150
150 <

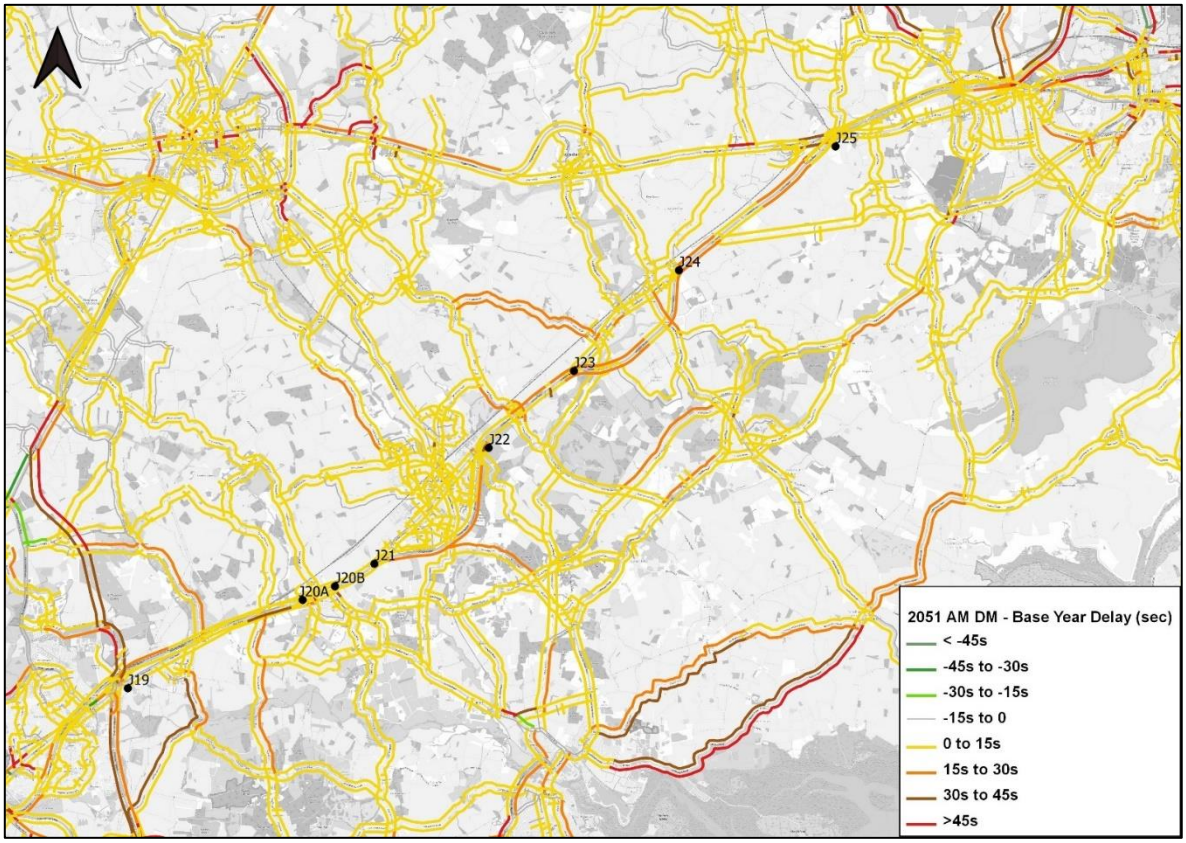

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM - Base Year Flows (pcu)
<-150
-150 to -100
-100 to -50
+/-50
50 to 100
100 to 150
150 <

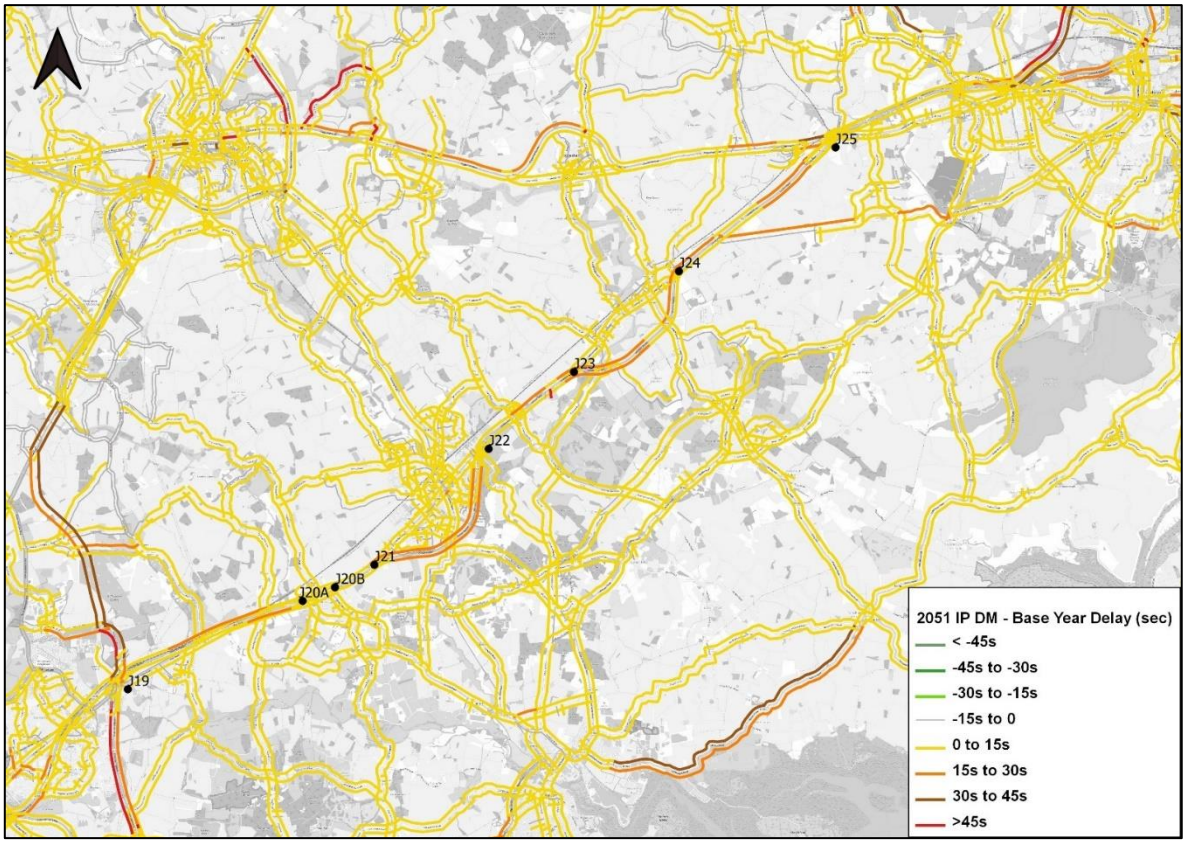

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM - Base Year Flows (pcu)
<-150
-150 to -100
-100 to -50
+/-50
50 to 100
100 to 150
150 <

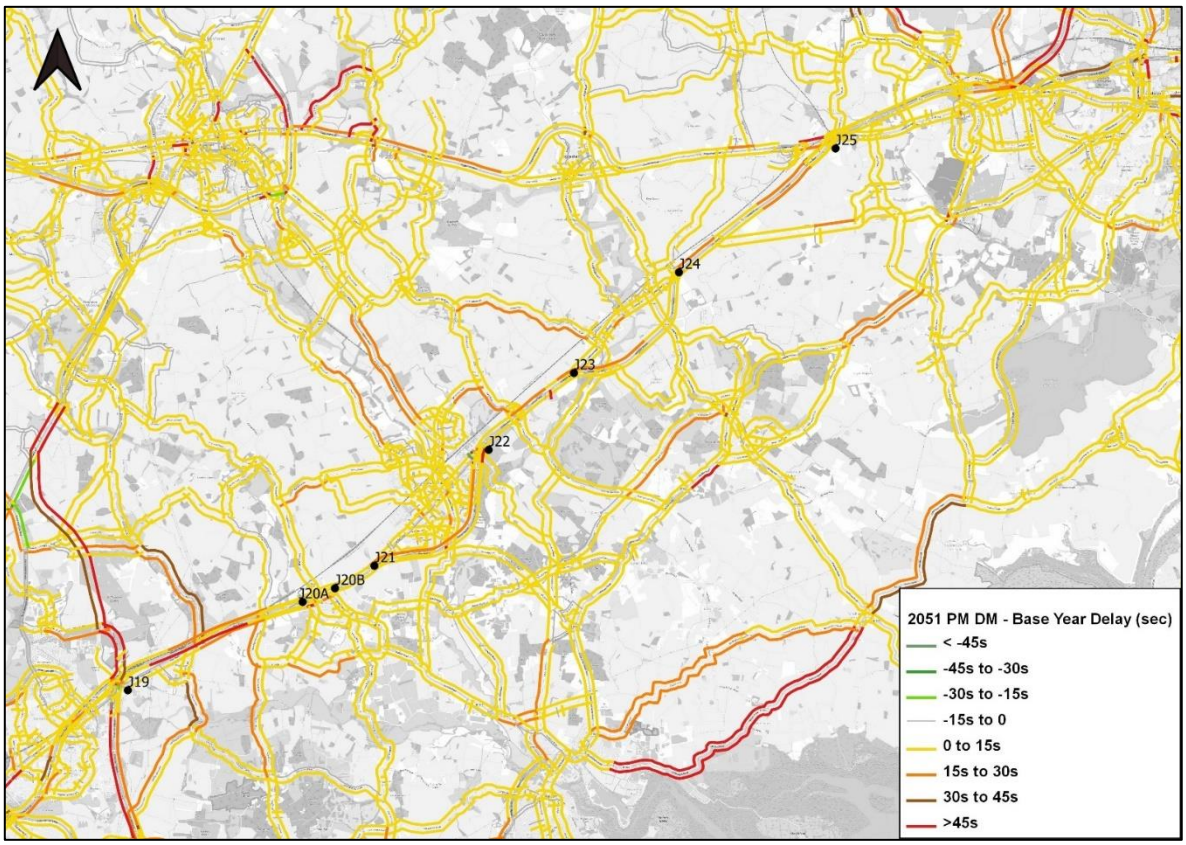
Appendix H. Delay Difference from Base




J25
J24
J23
J22
J21
J20B
J20A
J19
2042 IP DM - Base Year Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s
J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM - Base Year Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM - Base Year Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM - Base Year Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s

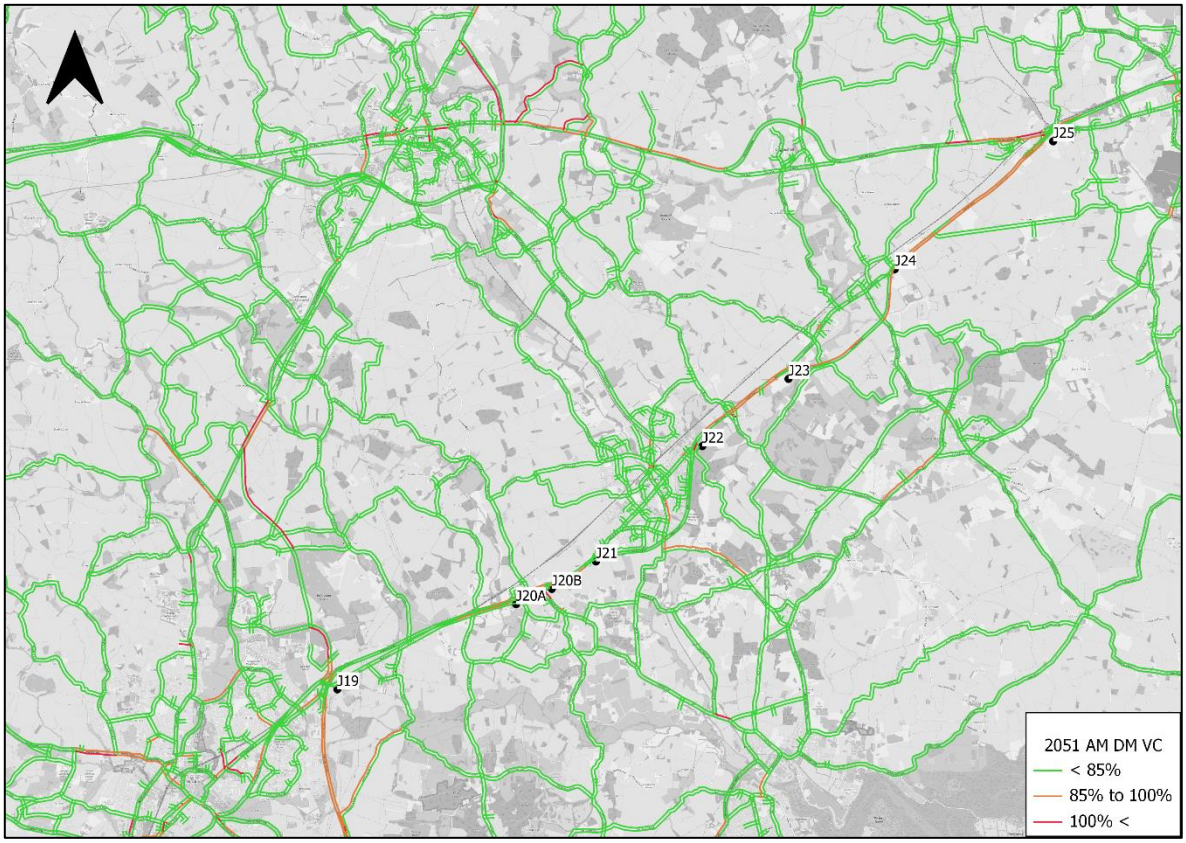

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM - Base Year Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s

Appendix I. Future Year V/C - Do Minimum and Do Something

Do Minimum


J25
J24
J23
J22
J21
J20B
J20A
J19
2042 IP DM VC
< 85%
85% to 100%
100% <

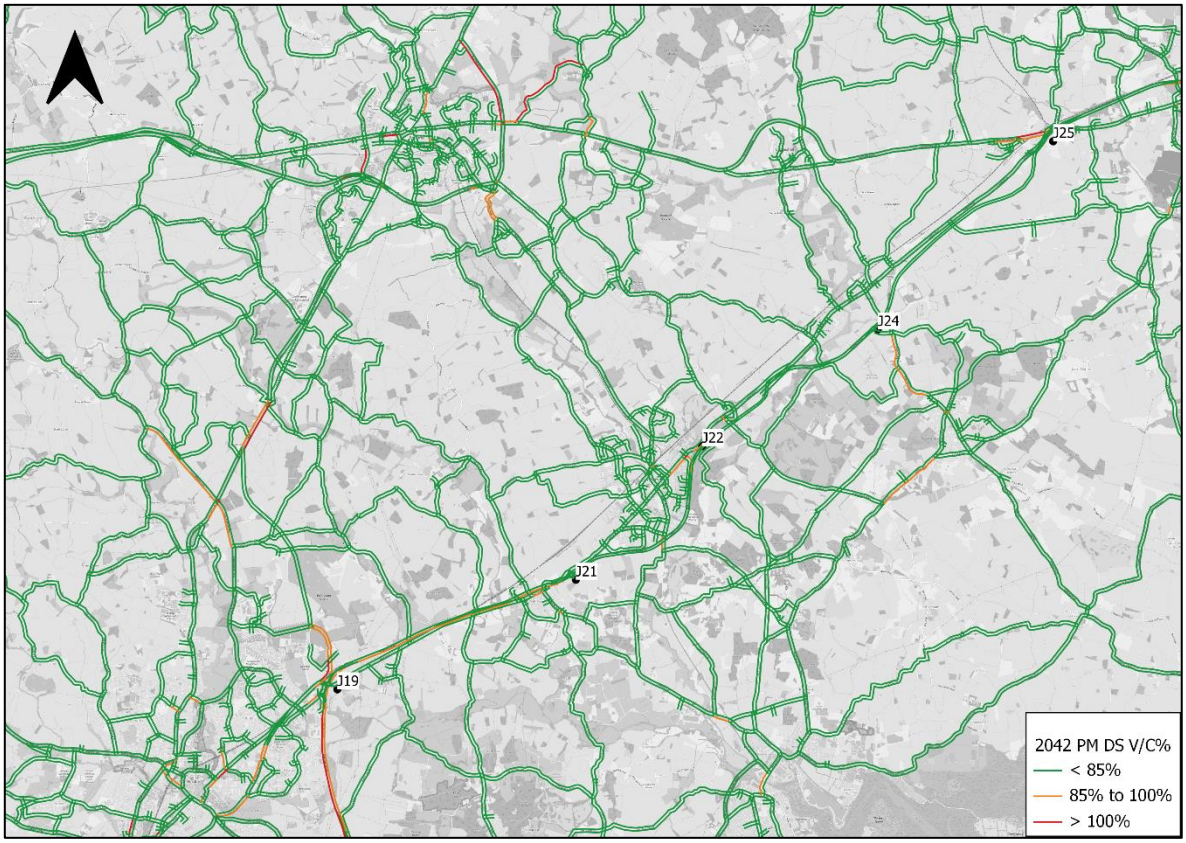

J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM VC
< 85%
85% to 100%
100% <

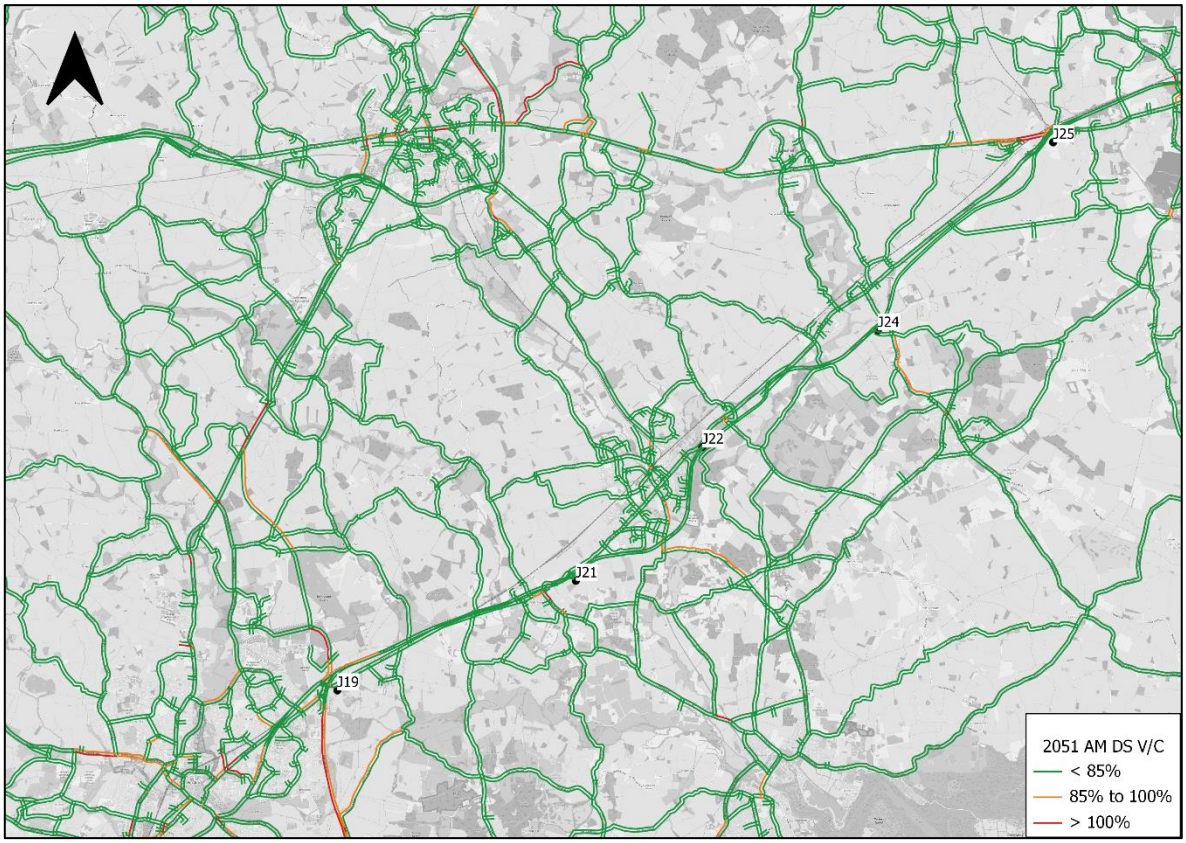

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM VC
< 85%
85% to 100%
100% <


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM VC
< 85%
85% to 100%
100% <

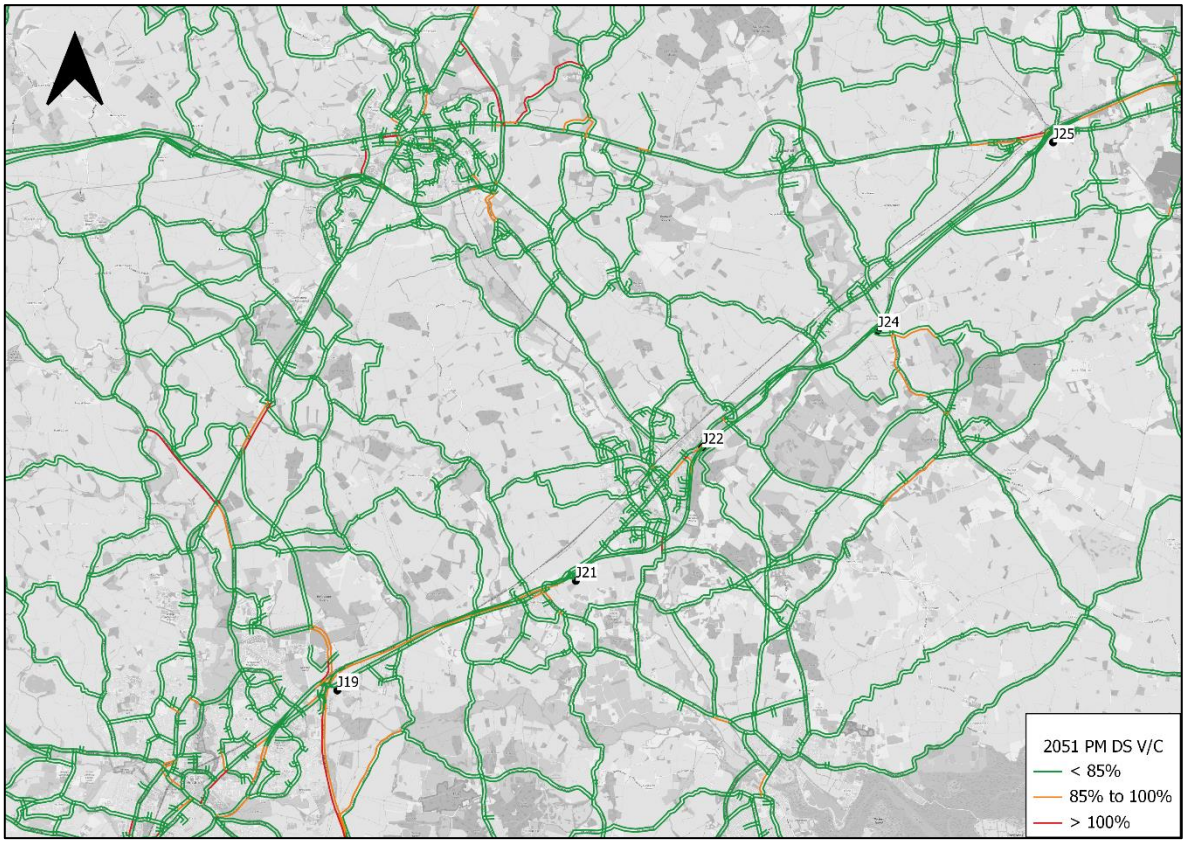

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM VC
< 85%
85% to 100%
100% <

Do Something

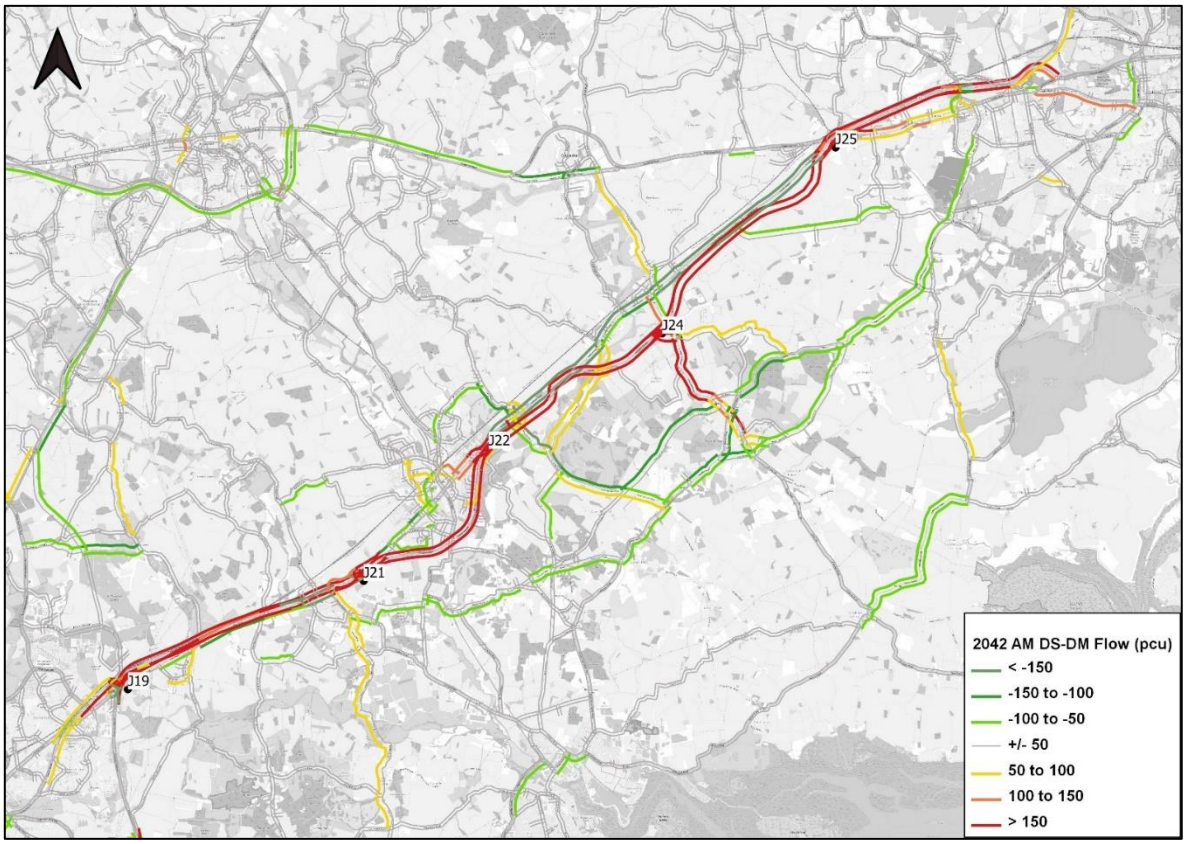

J25
J24
J22
J21
J19
2042 PM DS V/C%
< 85%
85% to 100%
> 100%

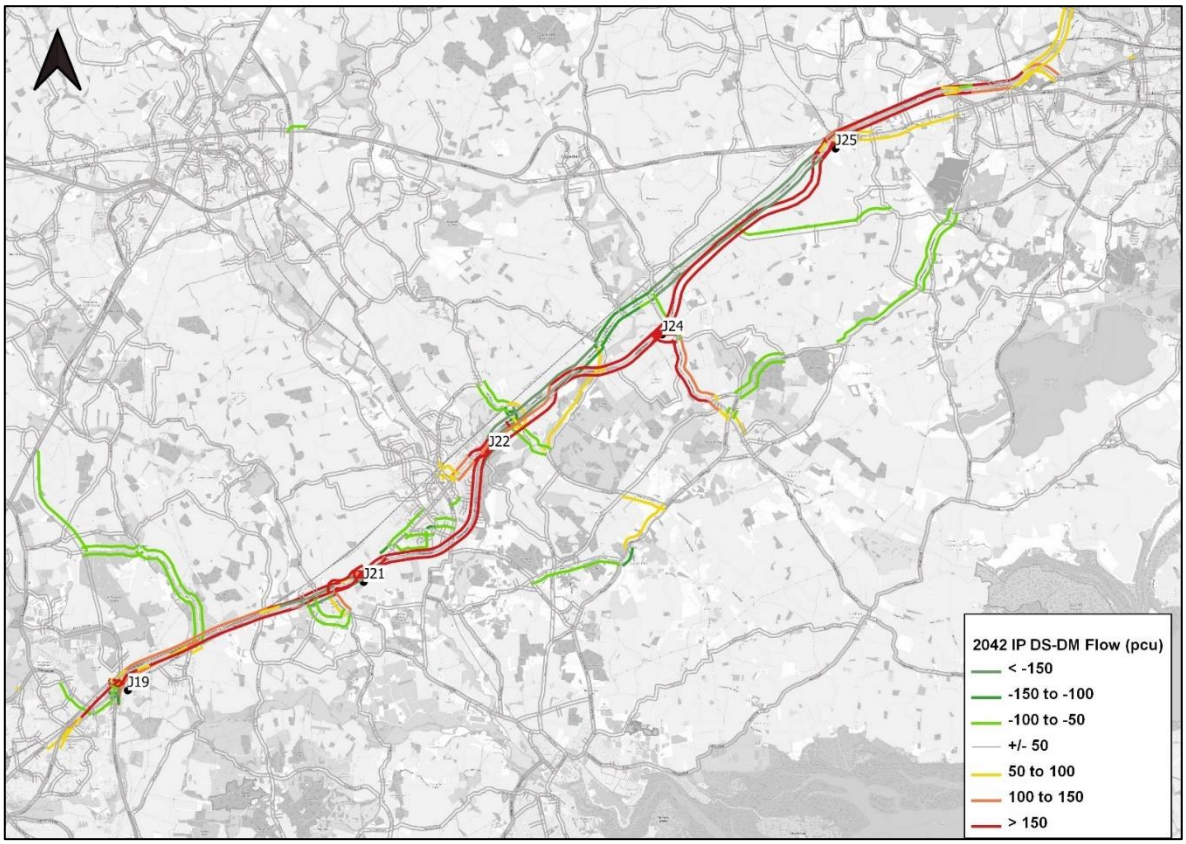

J25
J24
J22
J21
J19
2051 AM DS V/C
< 85%
85% to 100%
> 100%

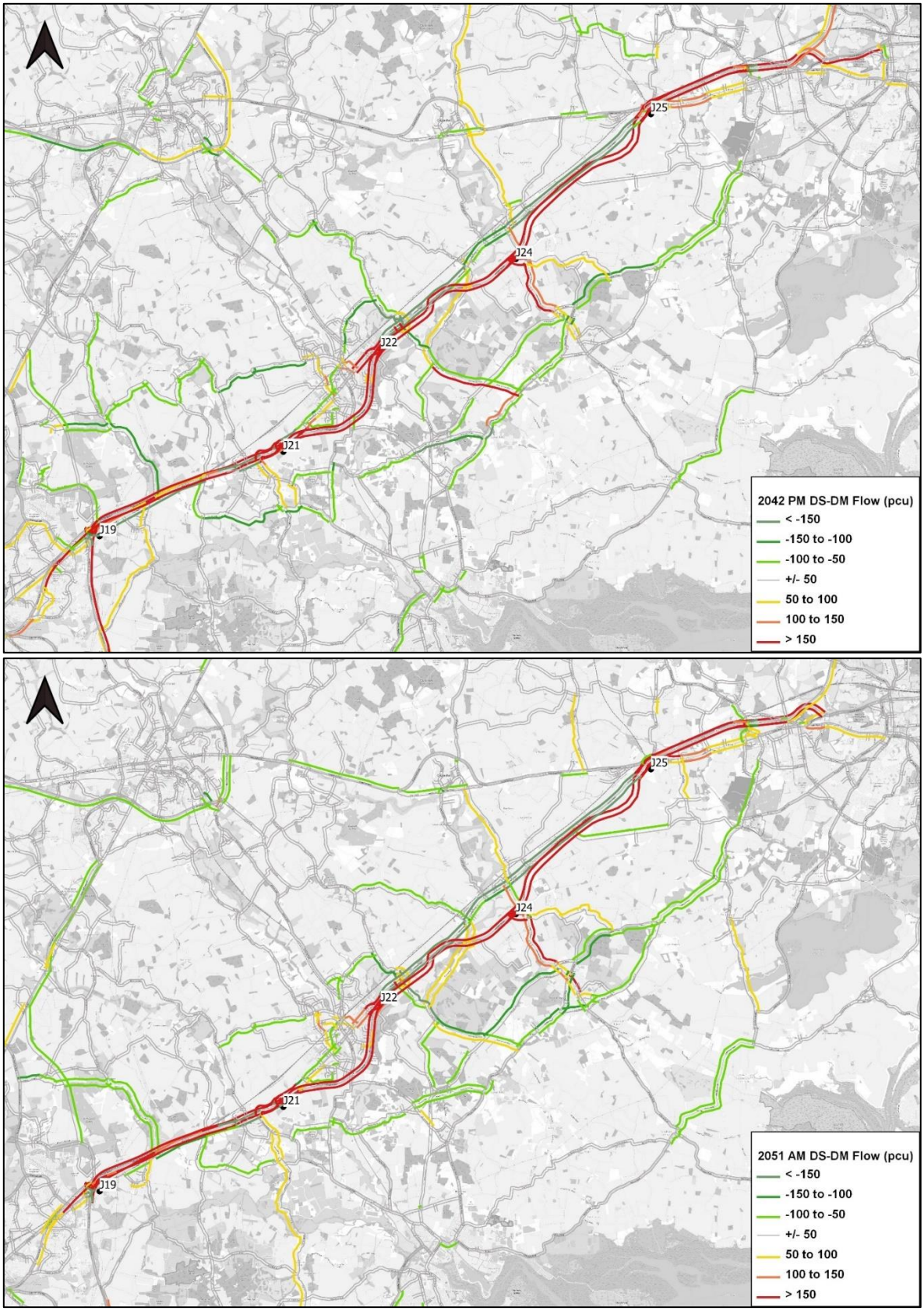

J25
J24
J22
J21
J19
2051 IP DS V/C
< 85%
85% to 100%
> 100%

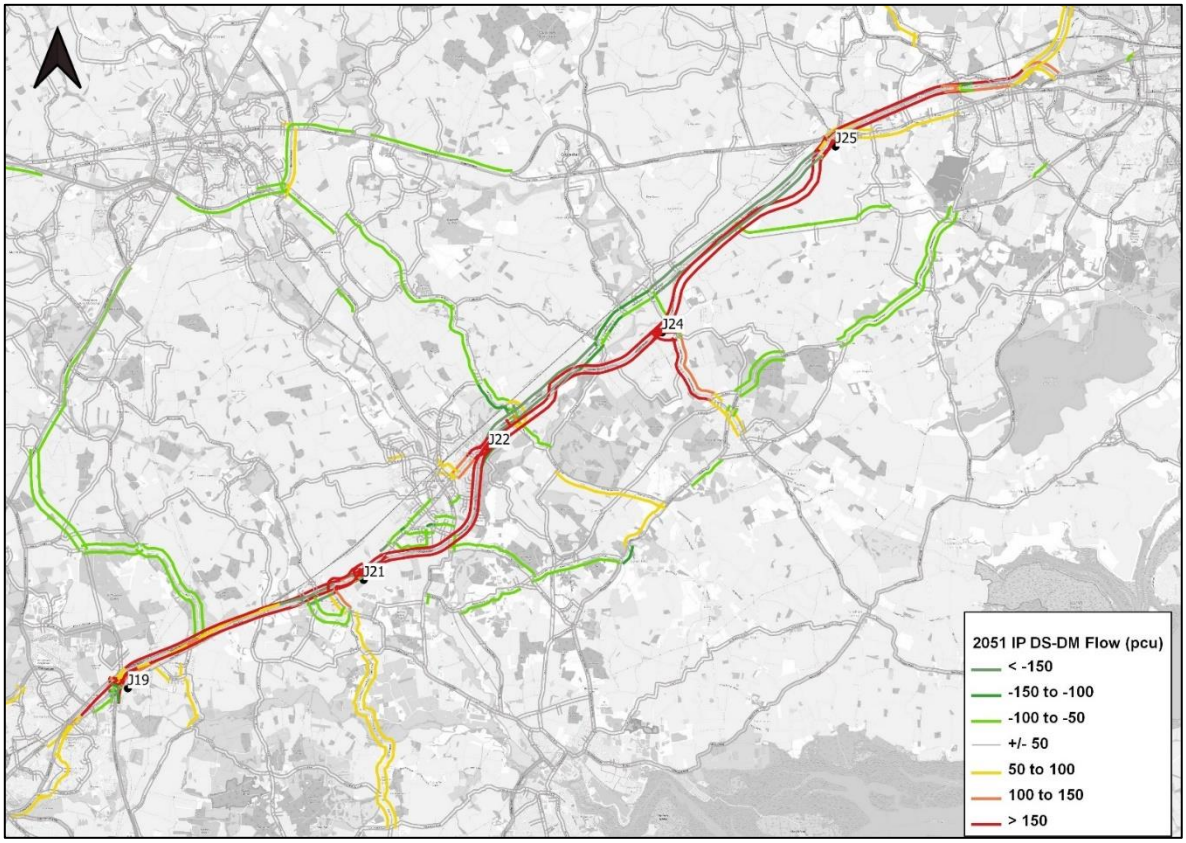

J25
J24
J22
J21
J19
2051 PM DS V/C
< 85%
85% to 100%
> 100%

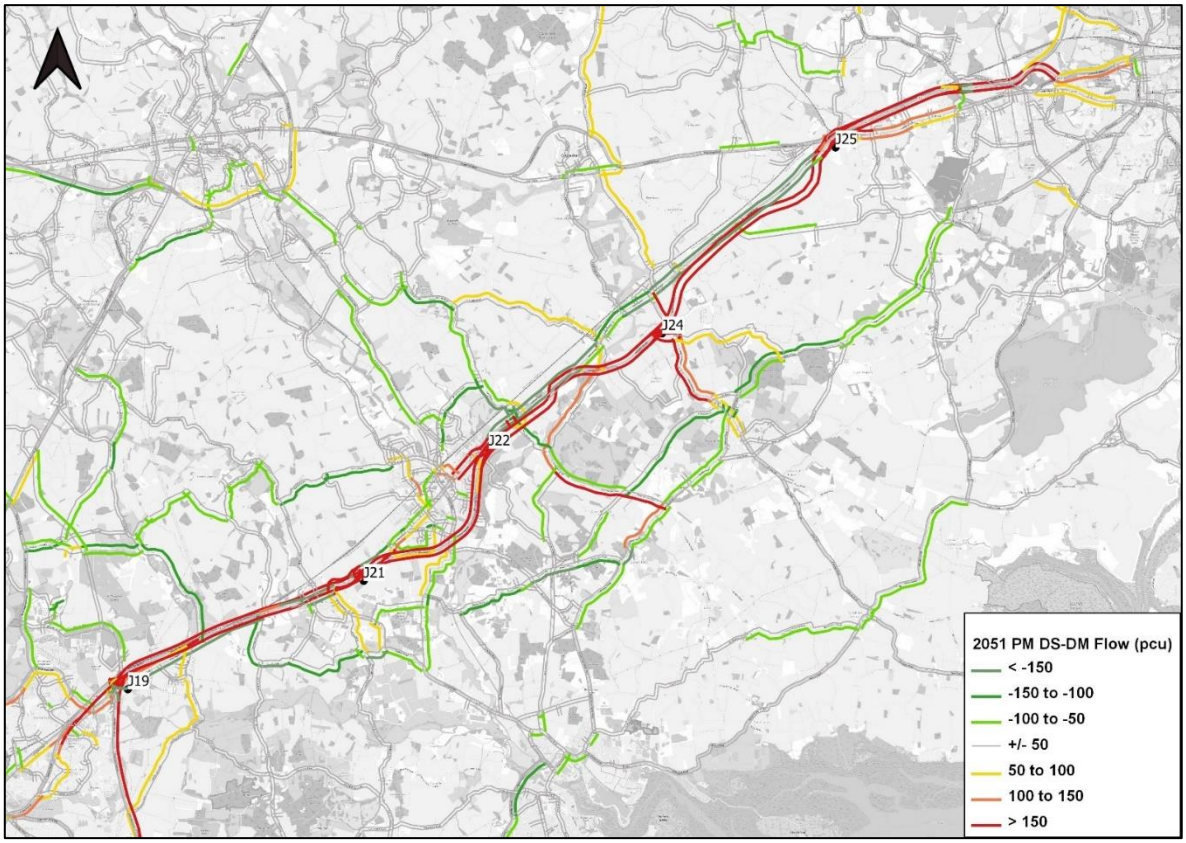
Appendix J. Flow Difference with Scheme



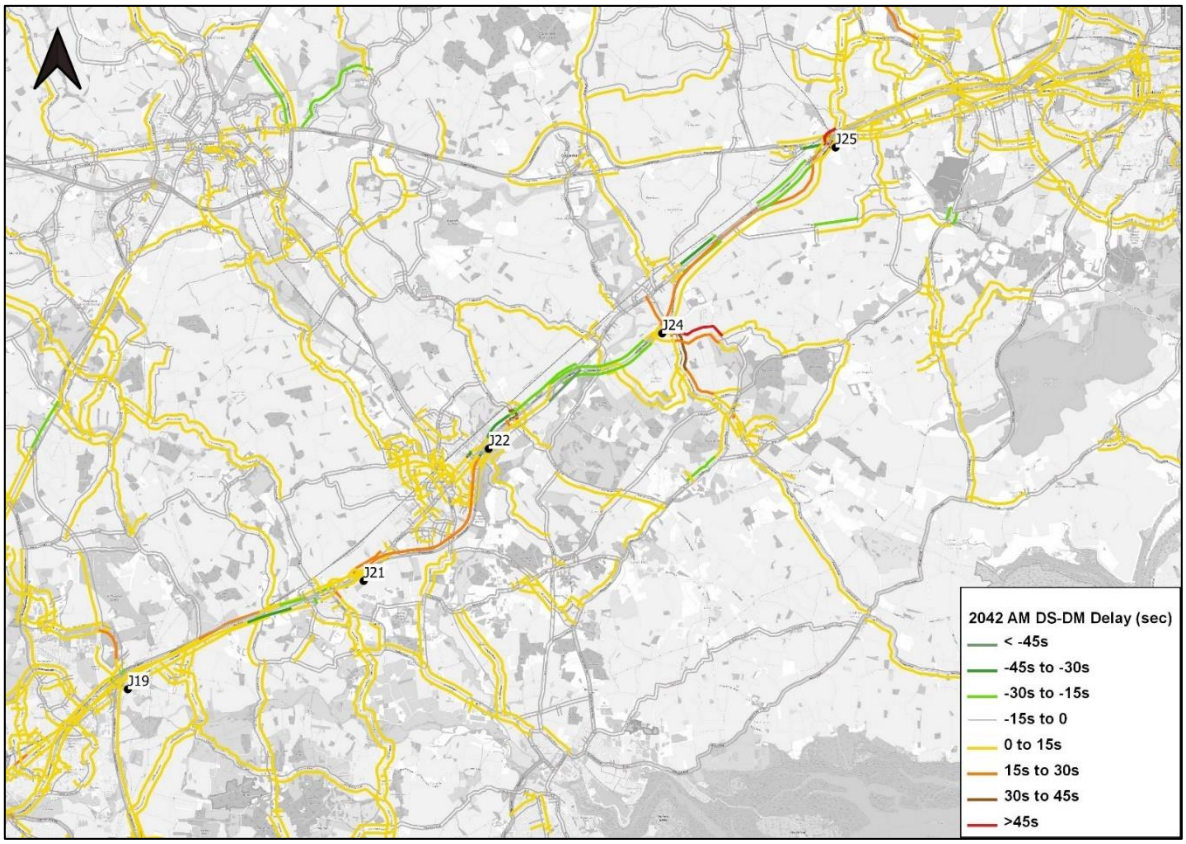


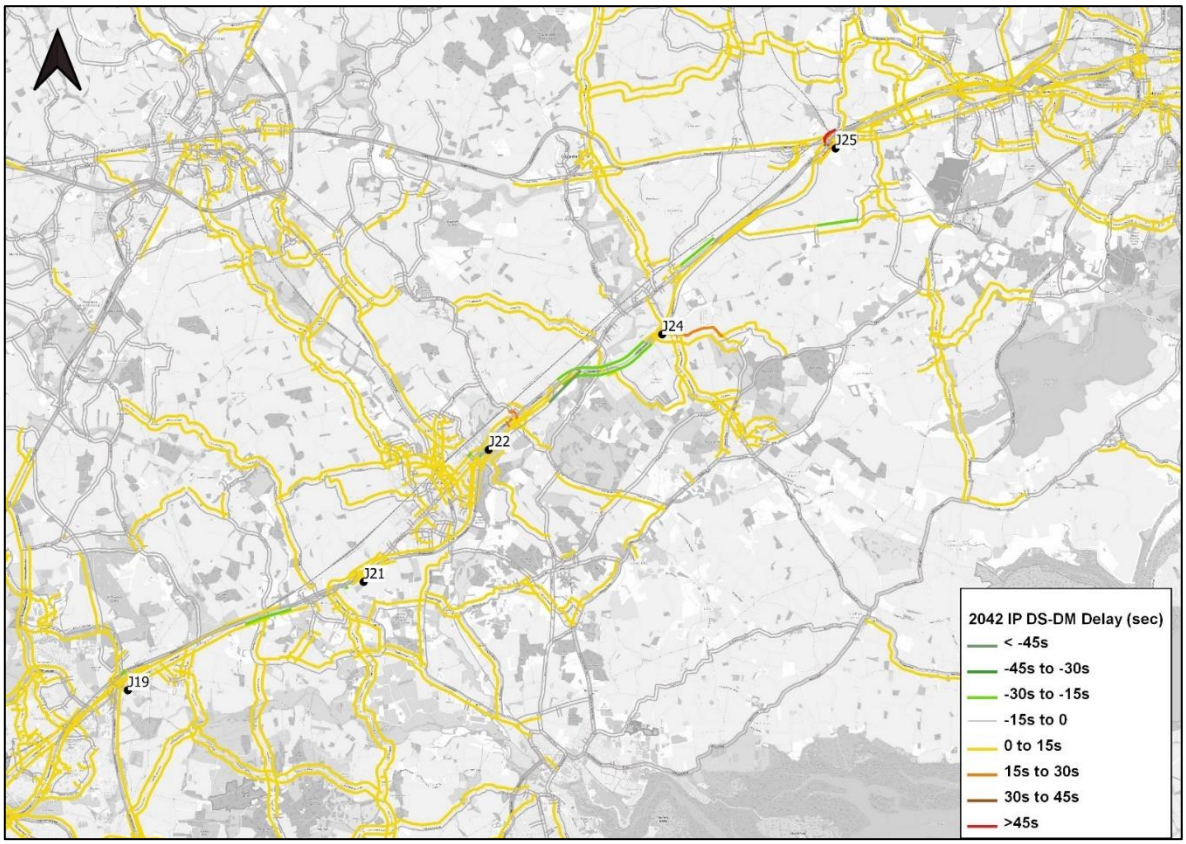

J25
J24
J22
J21
J19
2042 PM DS-DM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150
J25
J24
J22
J21
J19
2051 AM DS-DM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

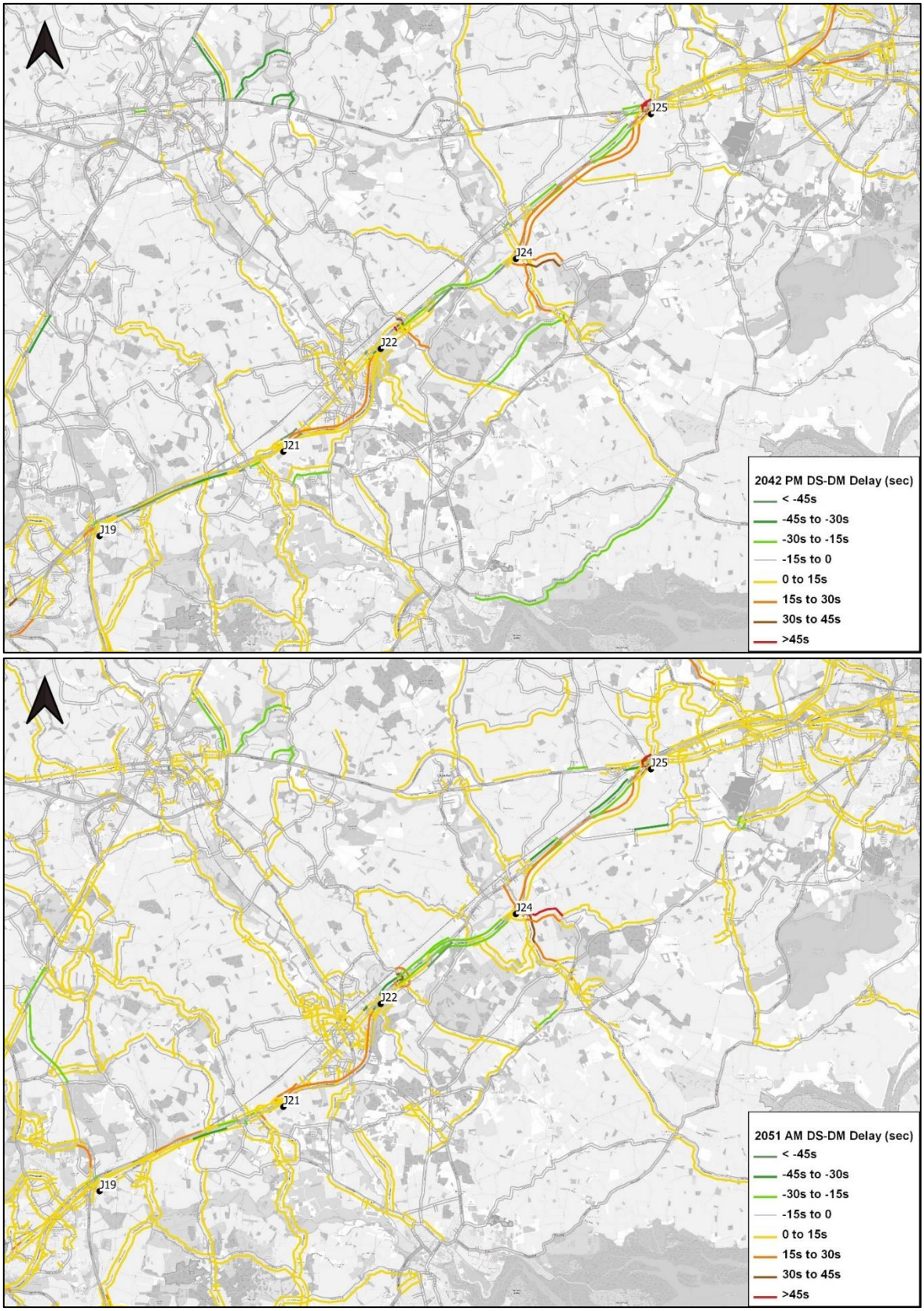

J25
J24
J22
J21
J19
2051 IP DS-DM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

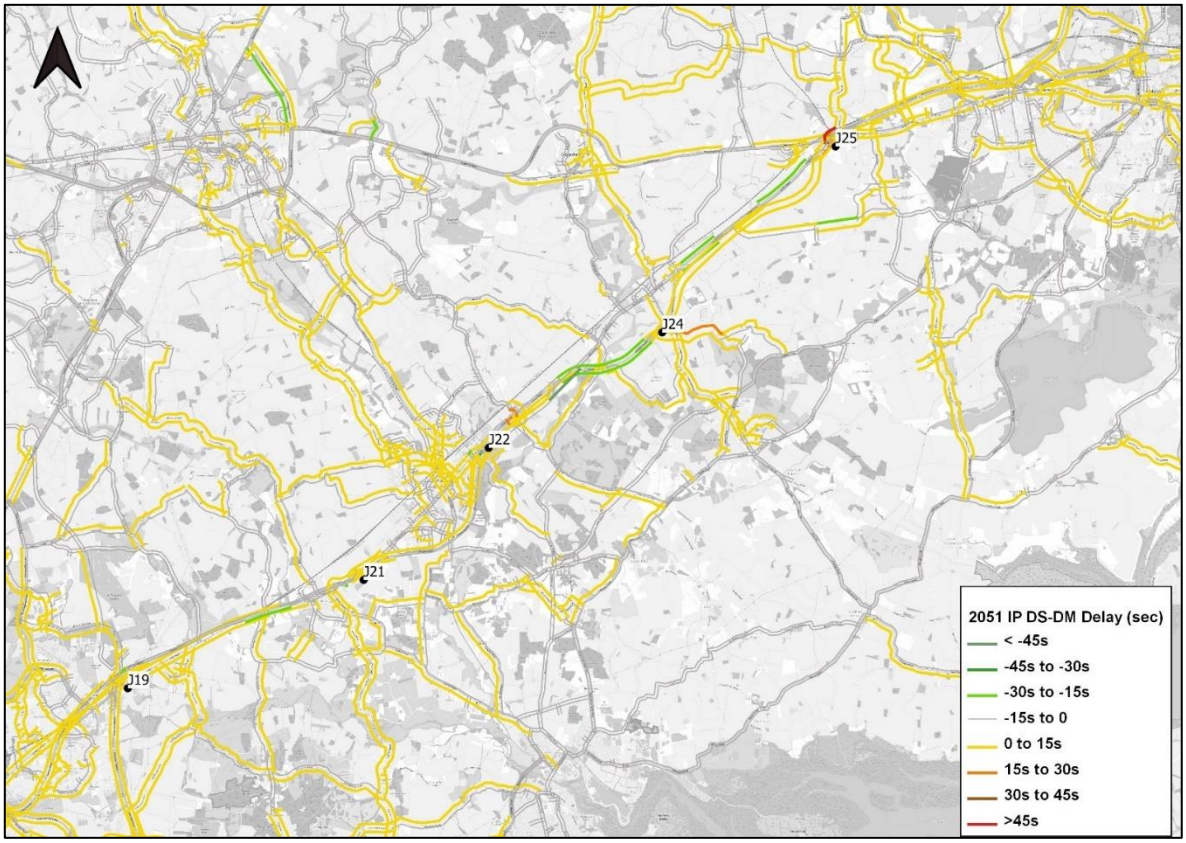

J25
J24
J22
J21
J19
2051 PM DS-DM Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

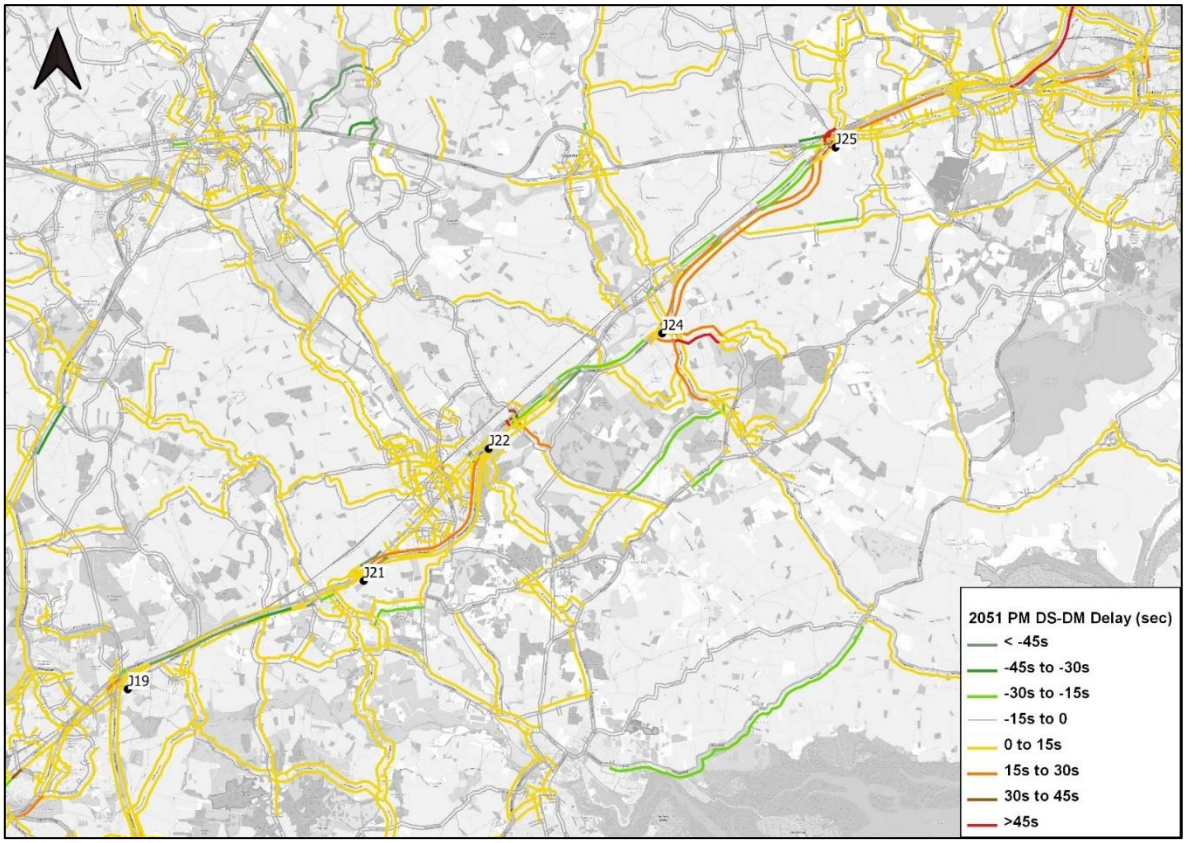
Appendix K. Delay Difference with Scheme



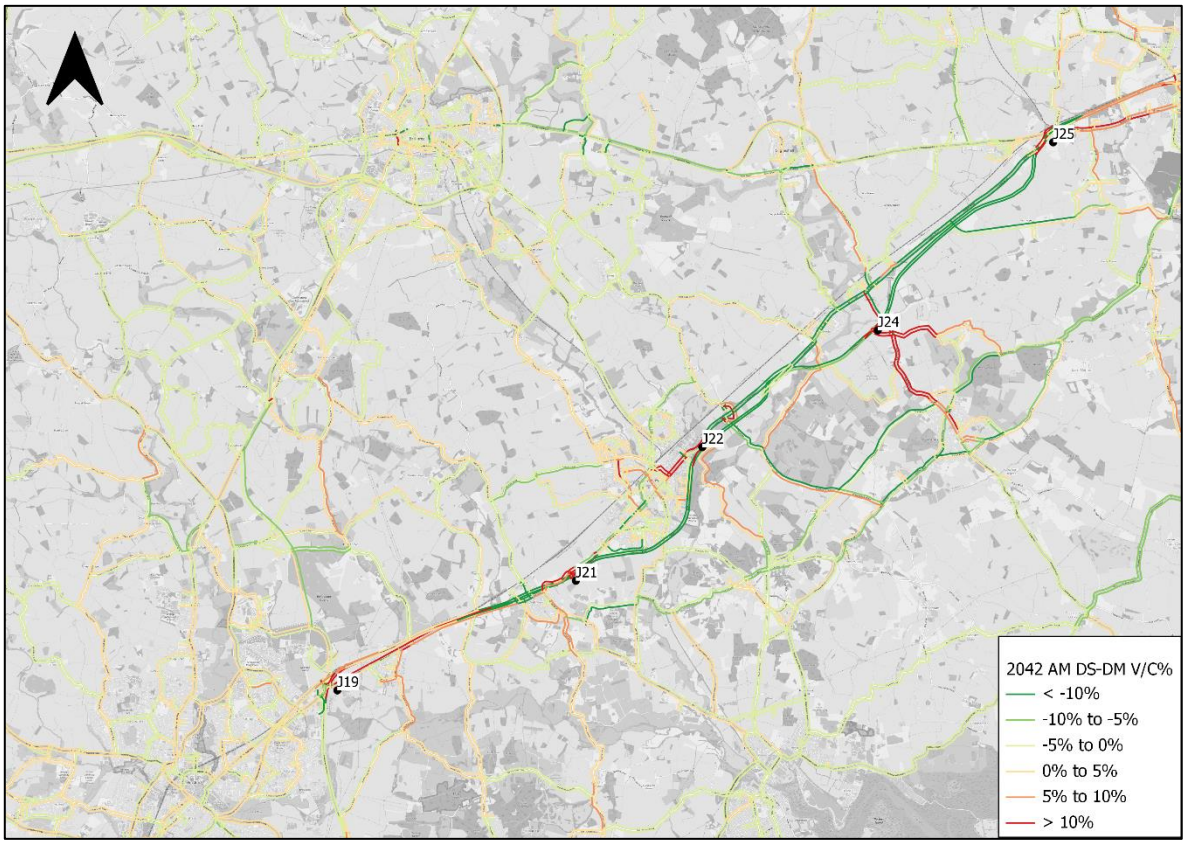


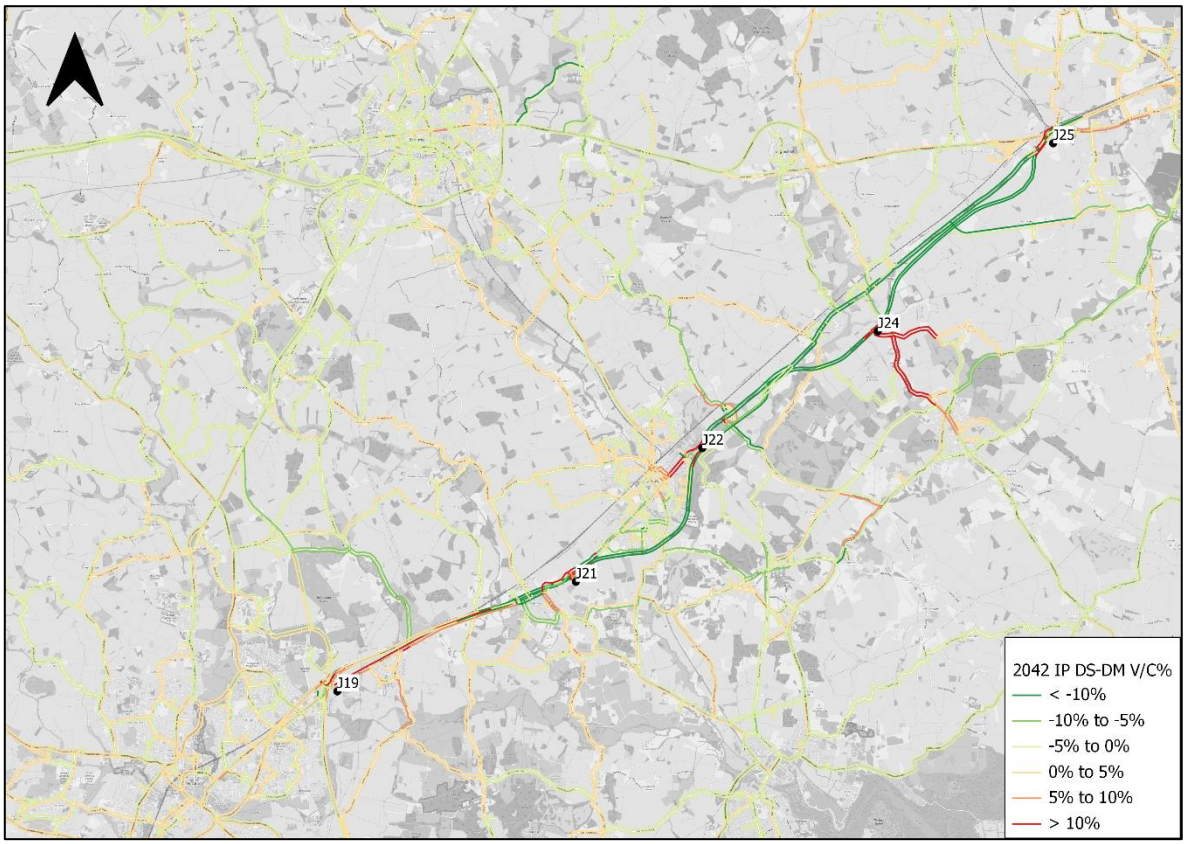

J25
J24
J22
J21
J19
2042 PM DS-DM Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s
J25
J24
J22
J21
J19
2051 AM DS-DM Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s

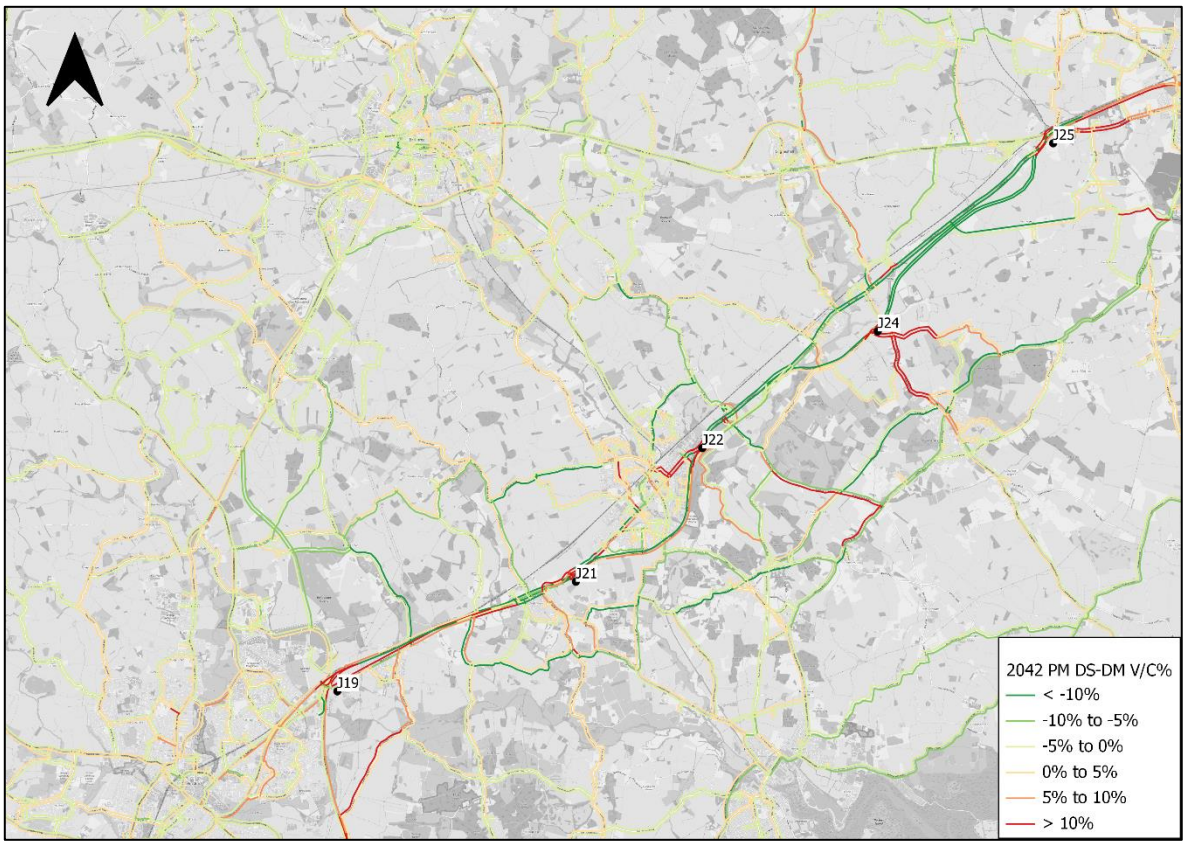

J25
J24
J22
J21
J19
2051 IP DS-DM Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s

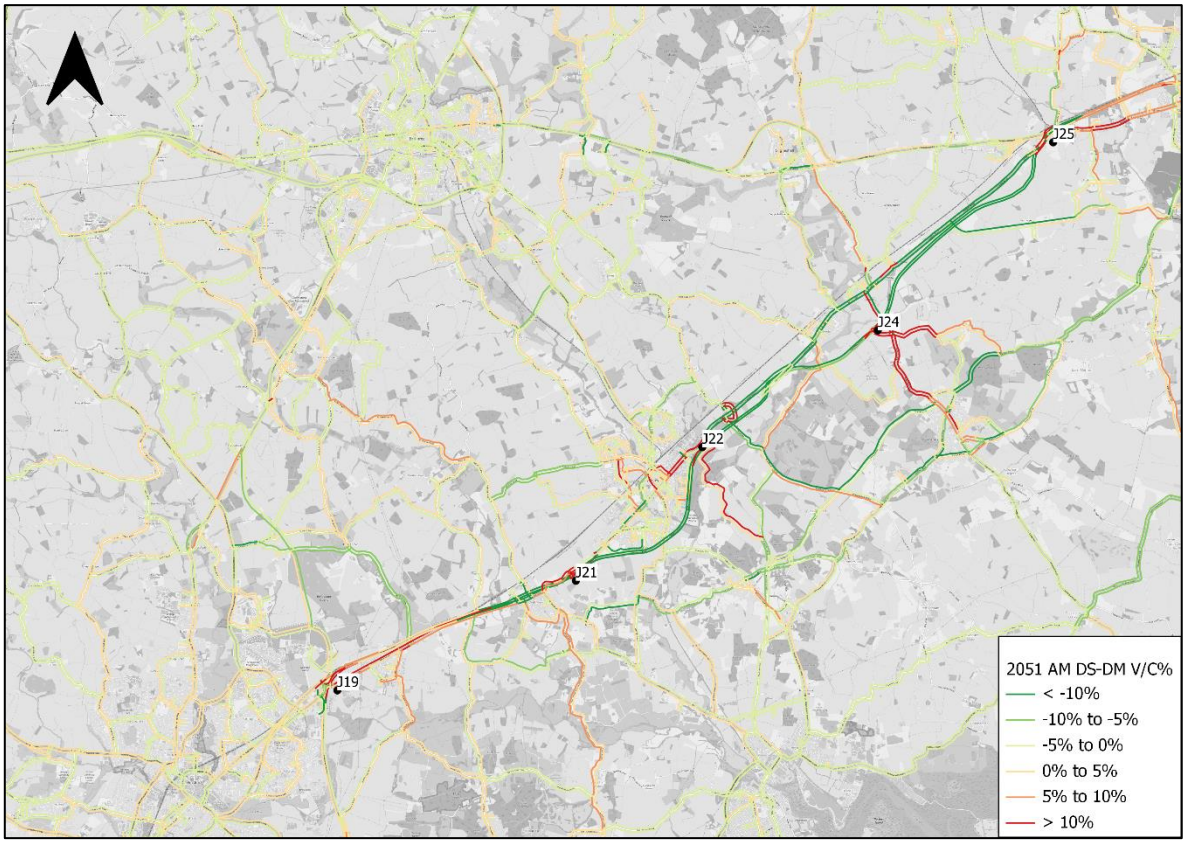

J25
J24
J22
J21
J19
2051 PM DS-DM Delay (sec)
< -45s
-45s to -30s
-30s to -15s
-15s to 0
0 to 15s
15s to 30s
30s to 45s
>45s

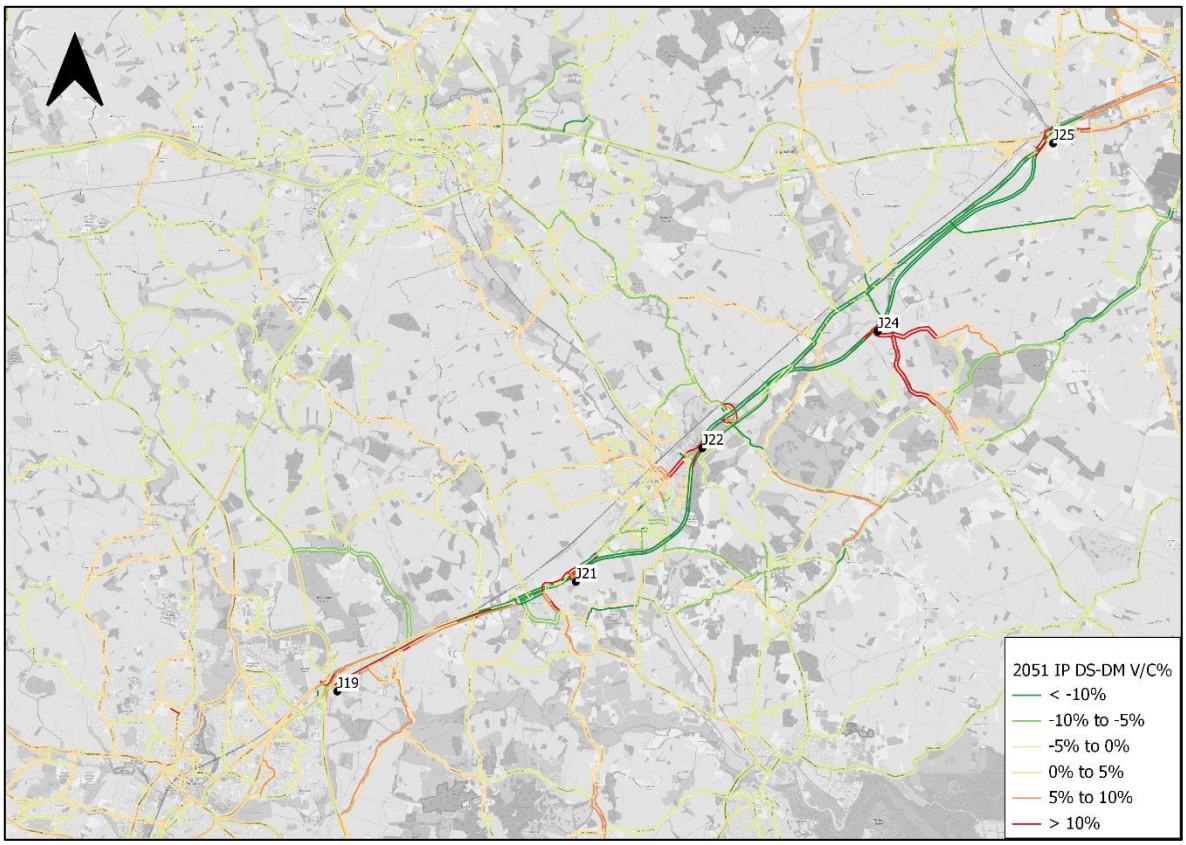
Appendix L. V/C Difference with Scheme

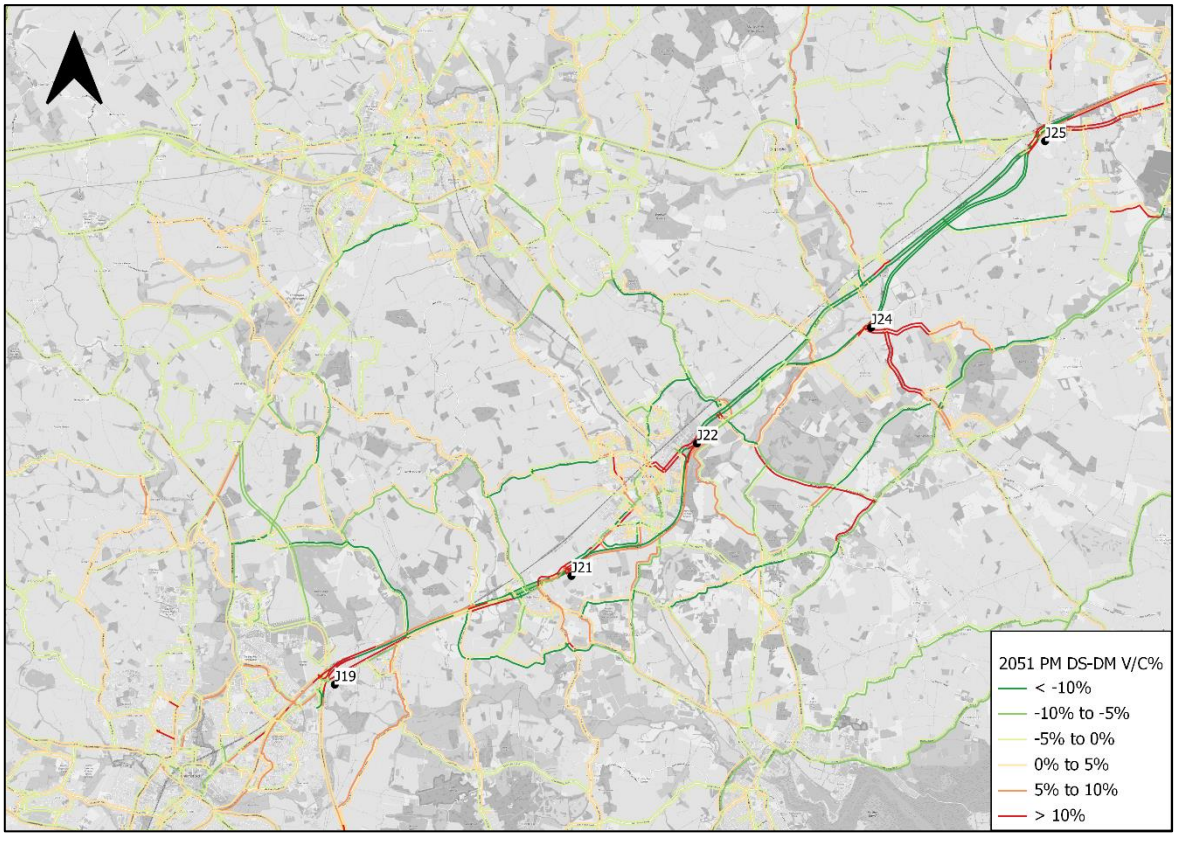





J25
J24
J22
J21
J19
2042 PM DS-DM V/C%
< -10%
-10% to -5%
-5% to 0%
0% to 5%
5% to 10%
> 10%


J25
J24
J22
J21
J19
2051 AM DS-DM V/C%
< -10%
-10% to -5%
-5% to 0%
0% to 5%
5% to 10%
> 10%

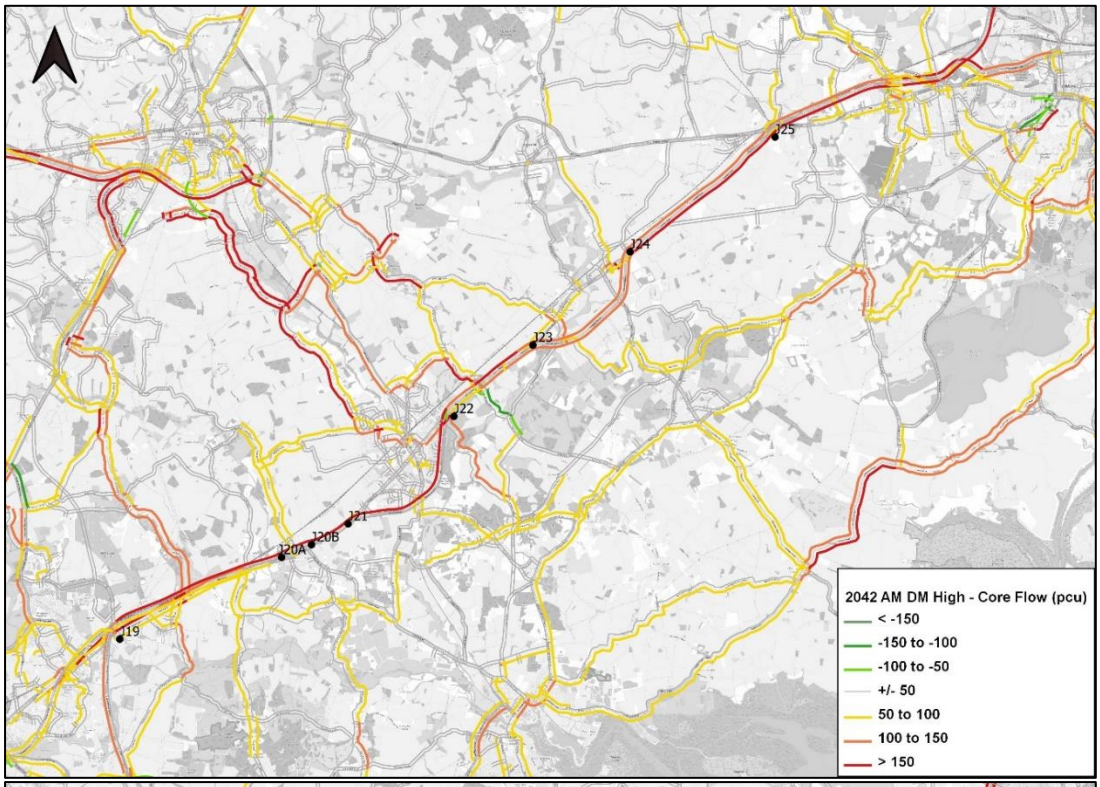

J25
J24
J22
J21
J19
2051 IP DS-DM V/C%
< -10%
-10% to -5%
-5% to 0%
0% to 5%
5% to 10%
> 10%

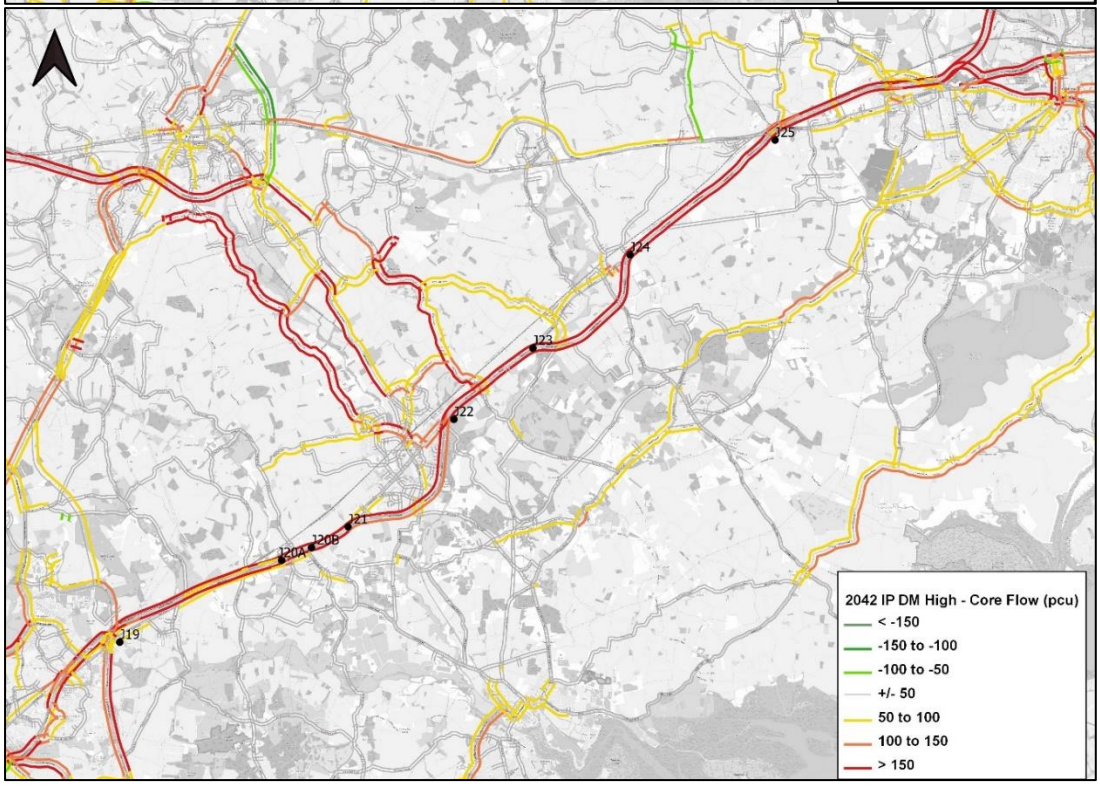

J25
J24
J22
J21
J19
2051 PM DS-DM V/C%
< -10%
-10% to -5%
-5% to 0%
0% to 5%
5% to 10%
> 10%

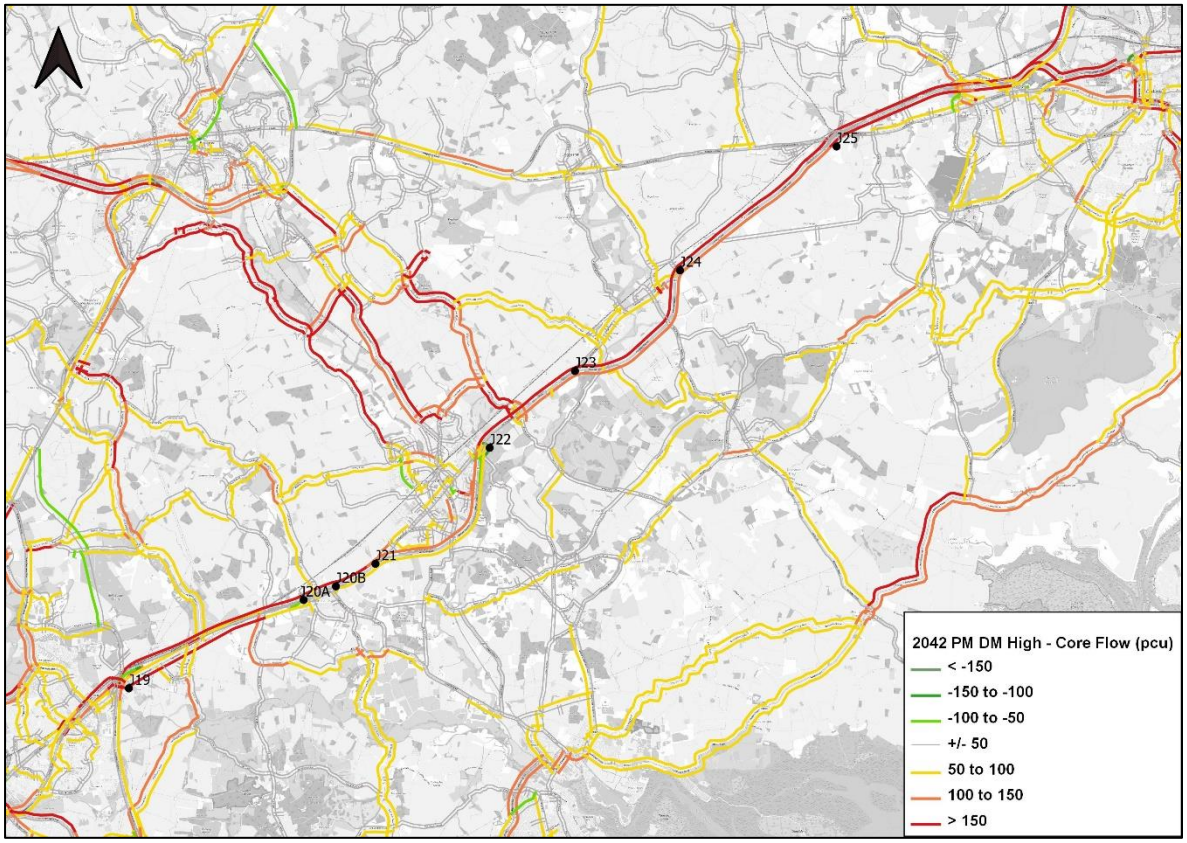
Appendix M. High and Low Growth Difference plots

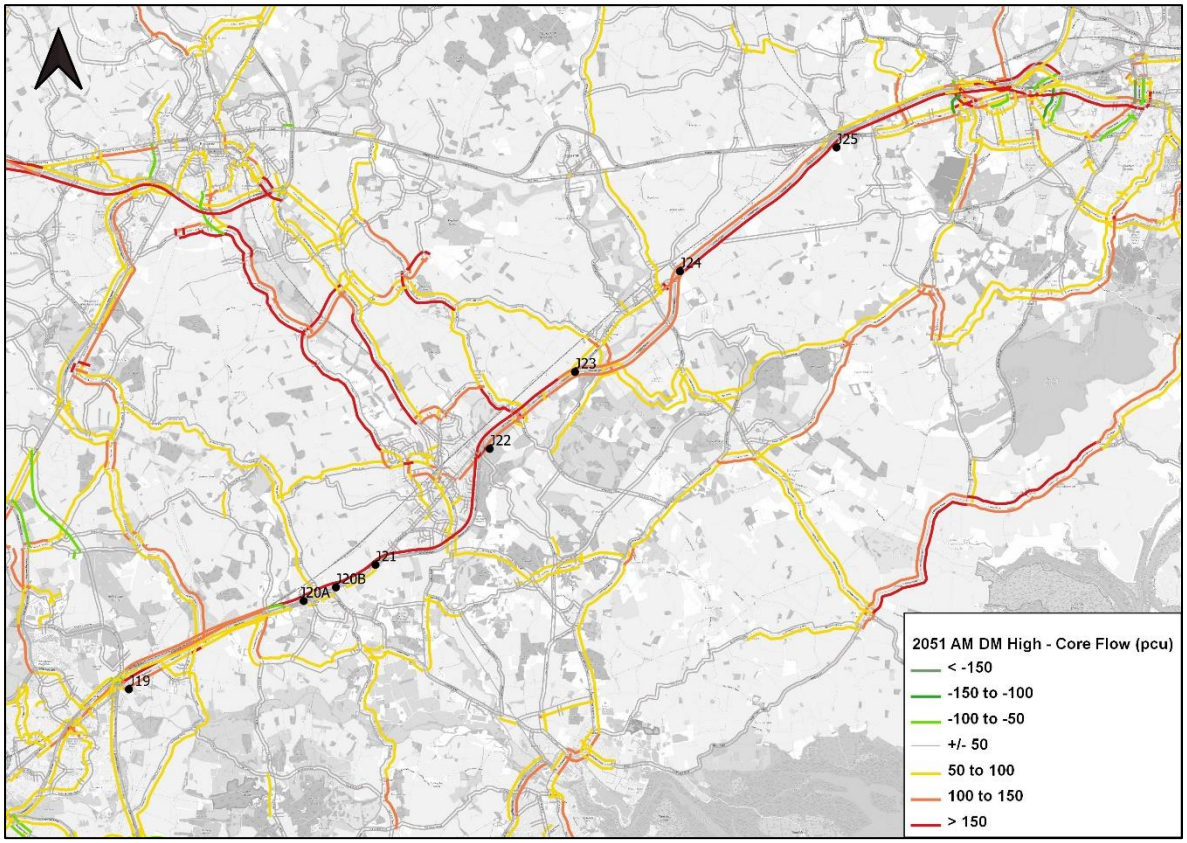
High Growth – Core (flow)

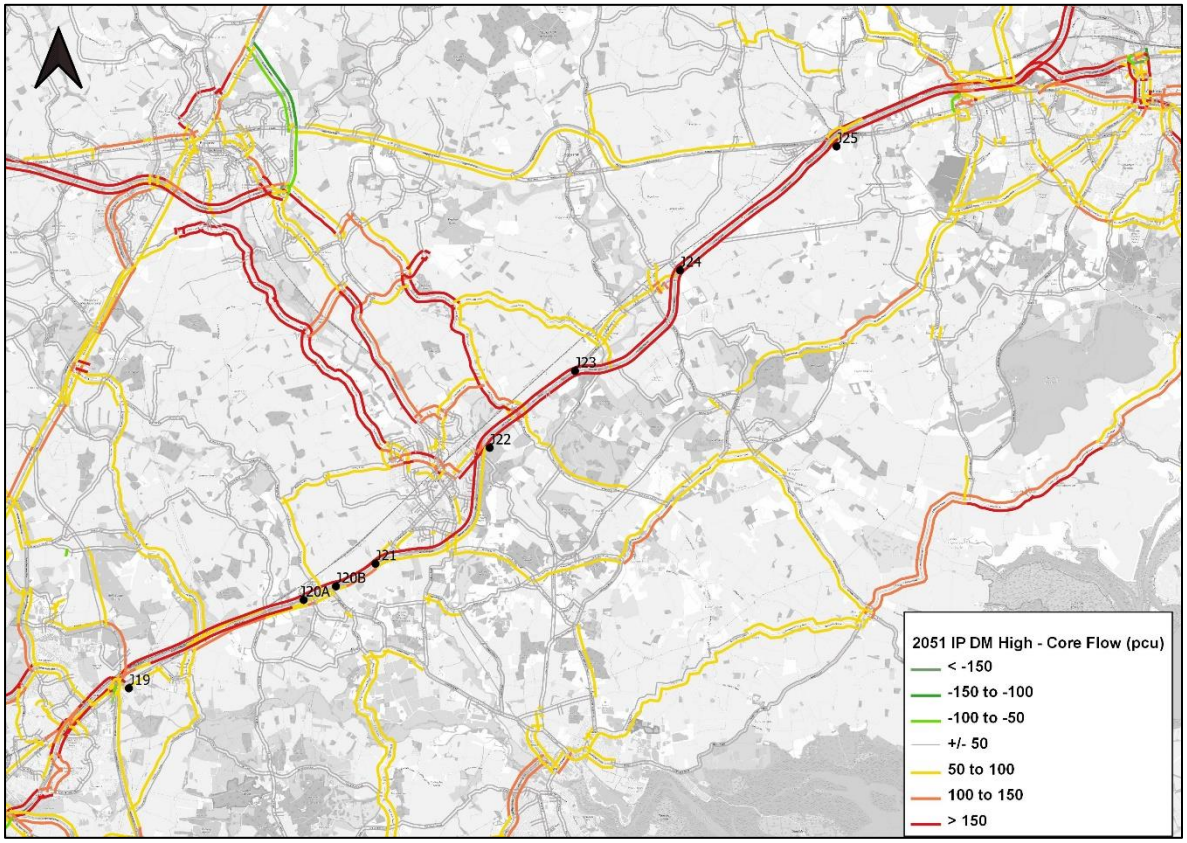
Do Minimum

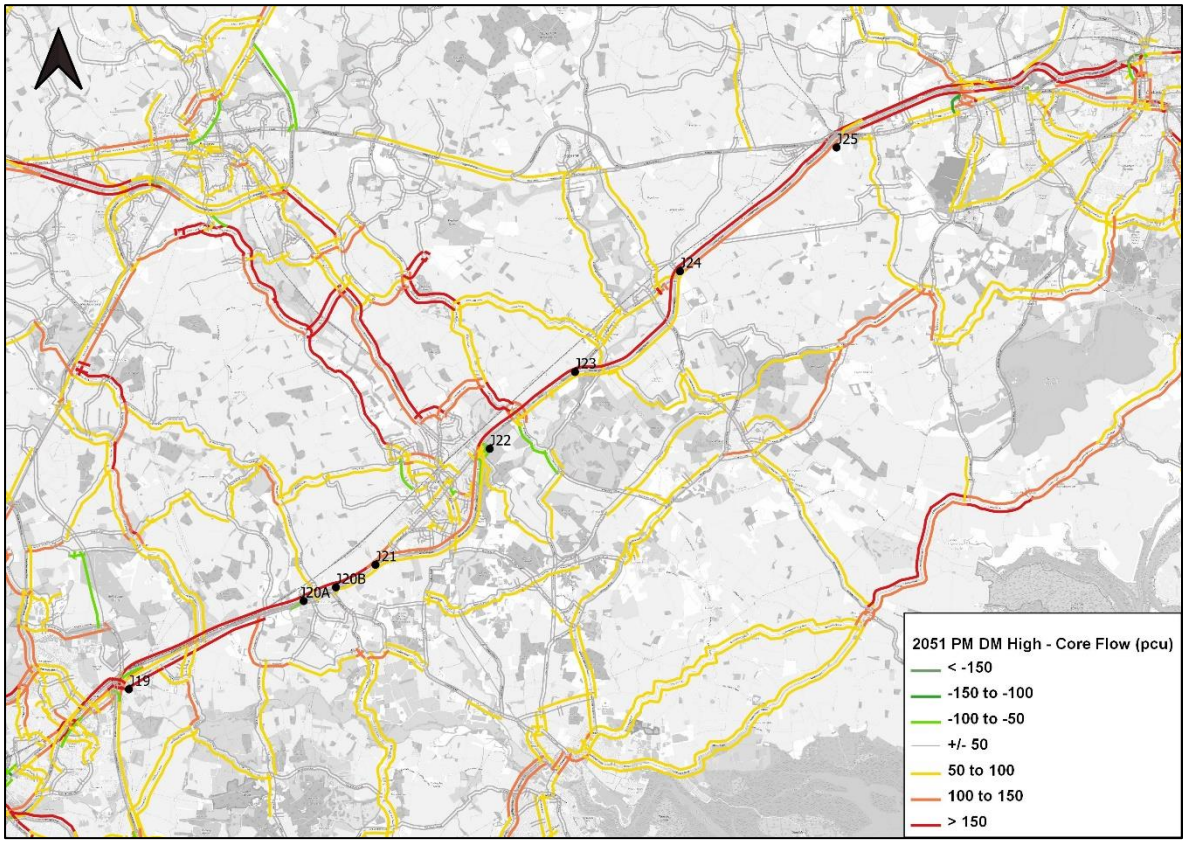




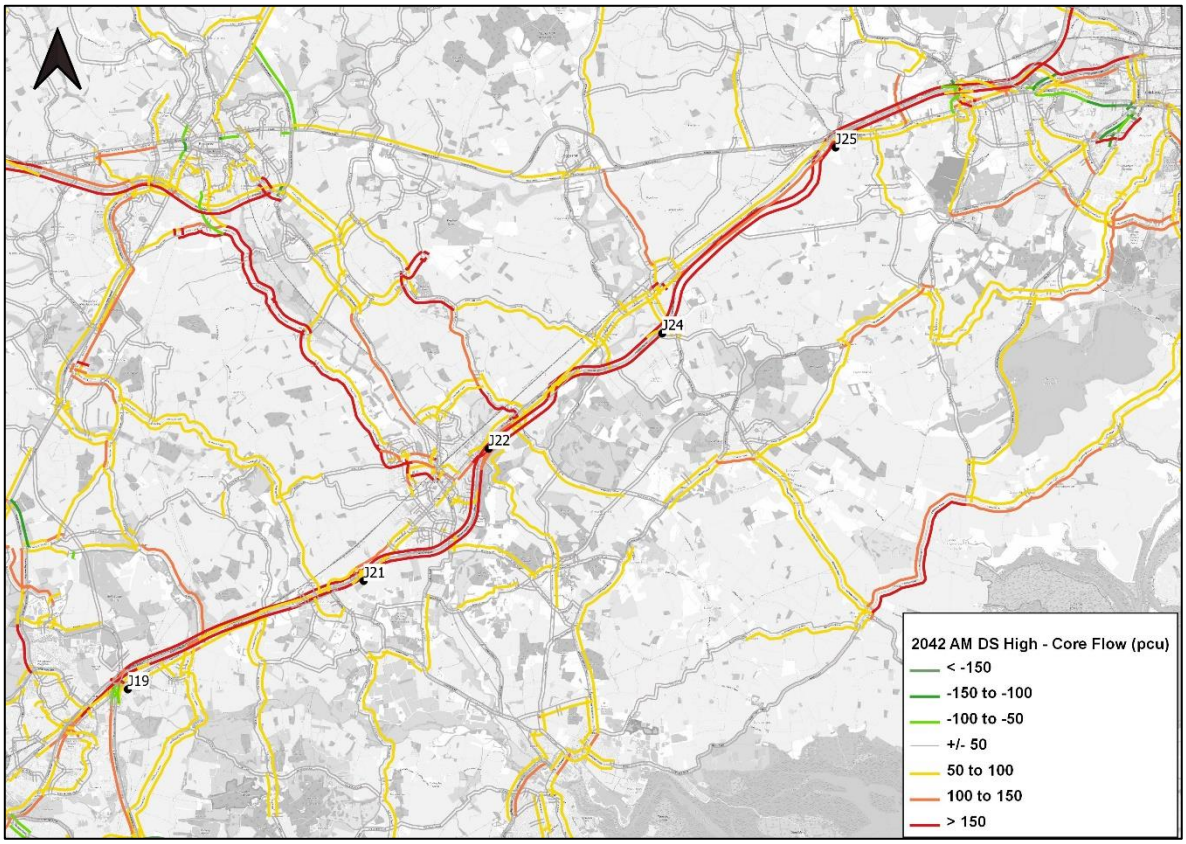

J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

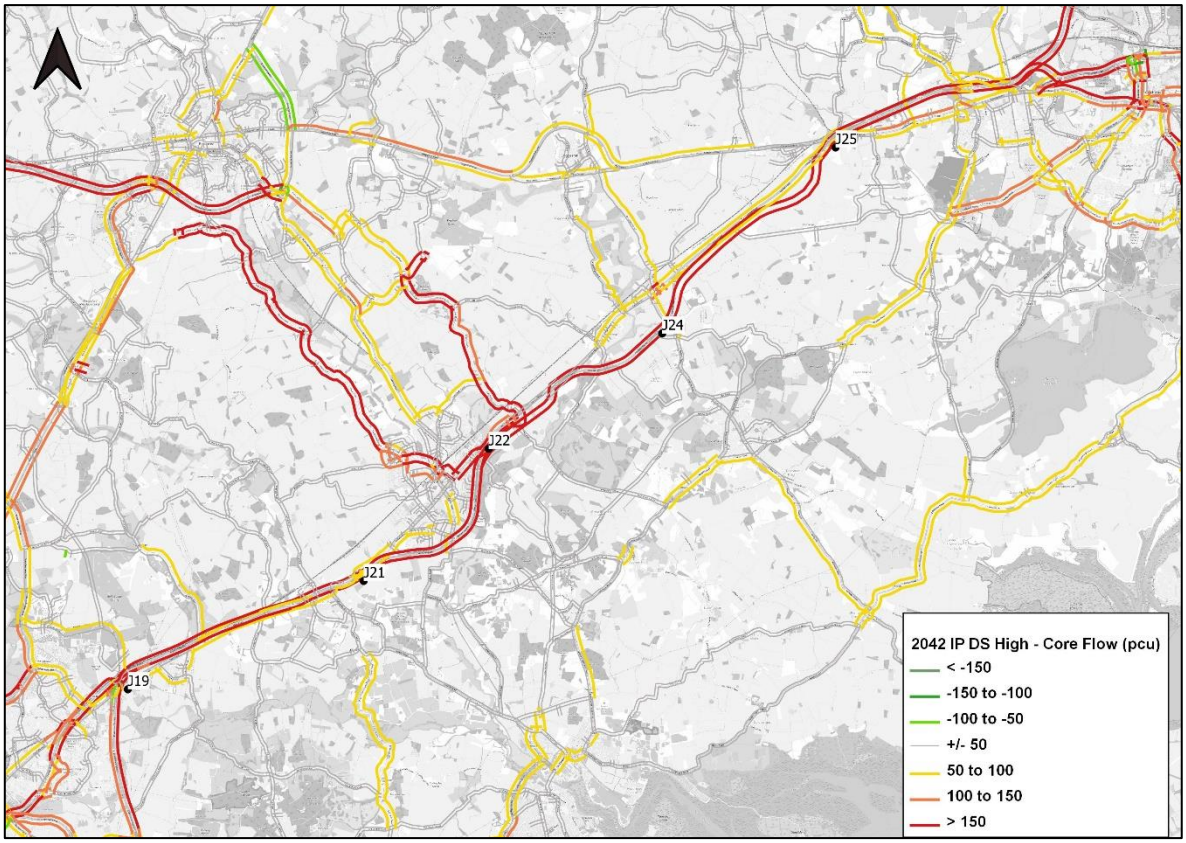

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

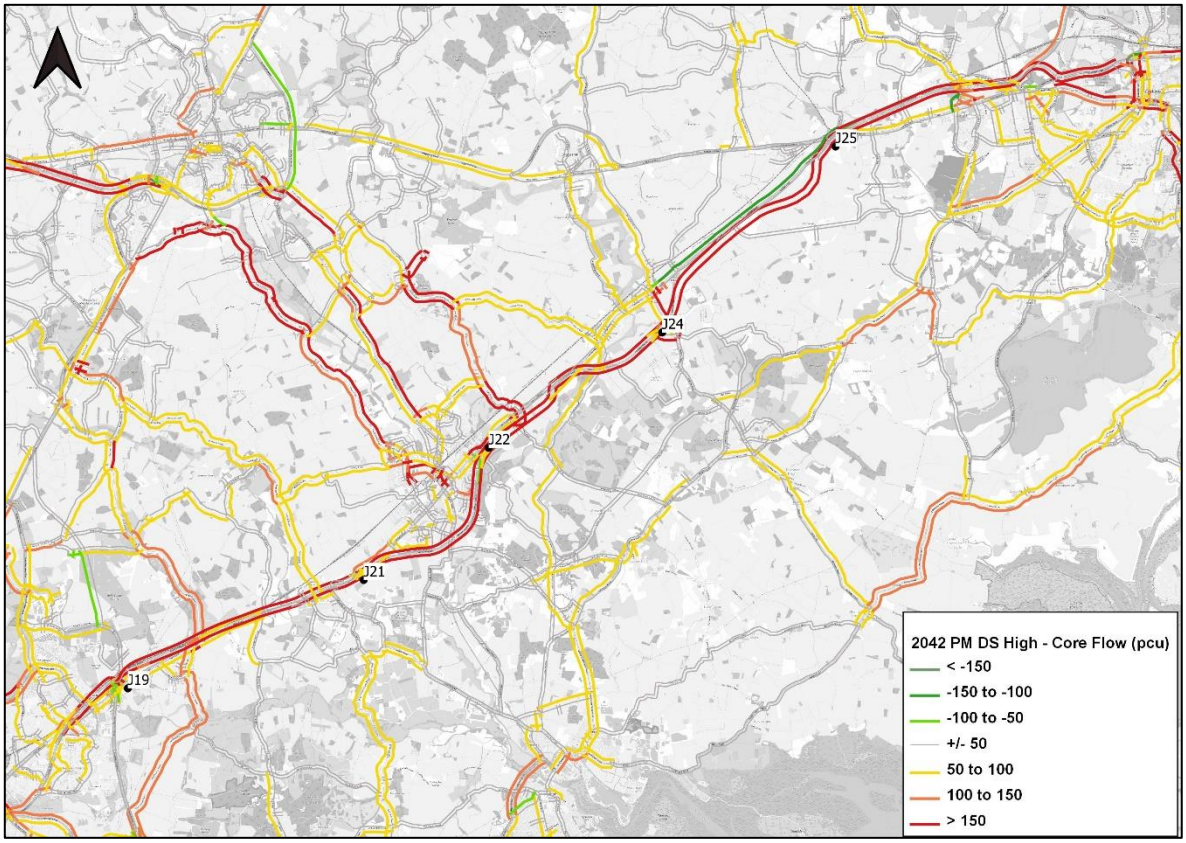

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

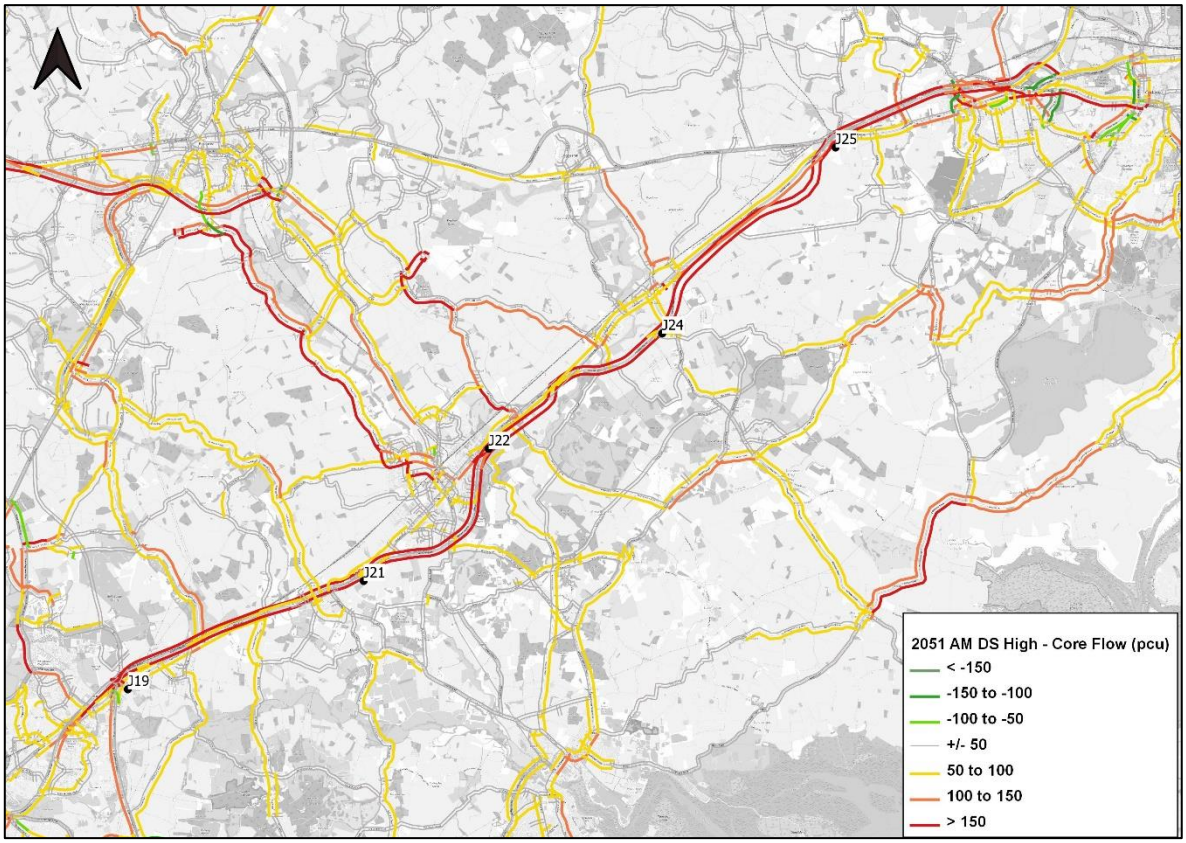

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

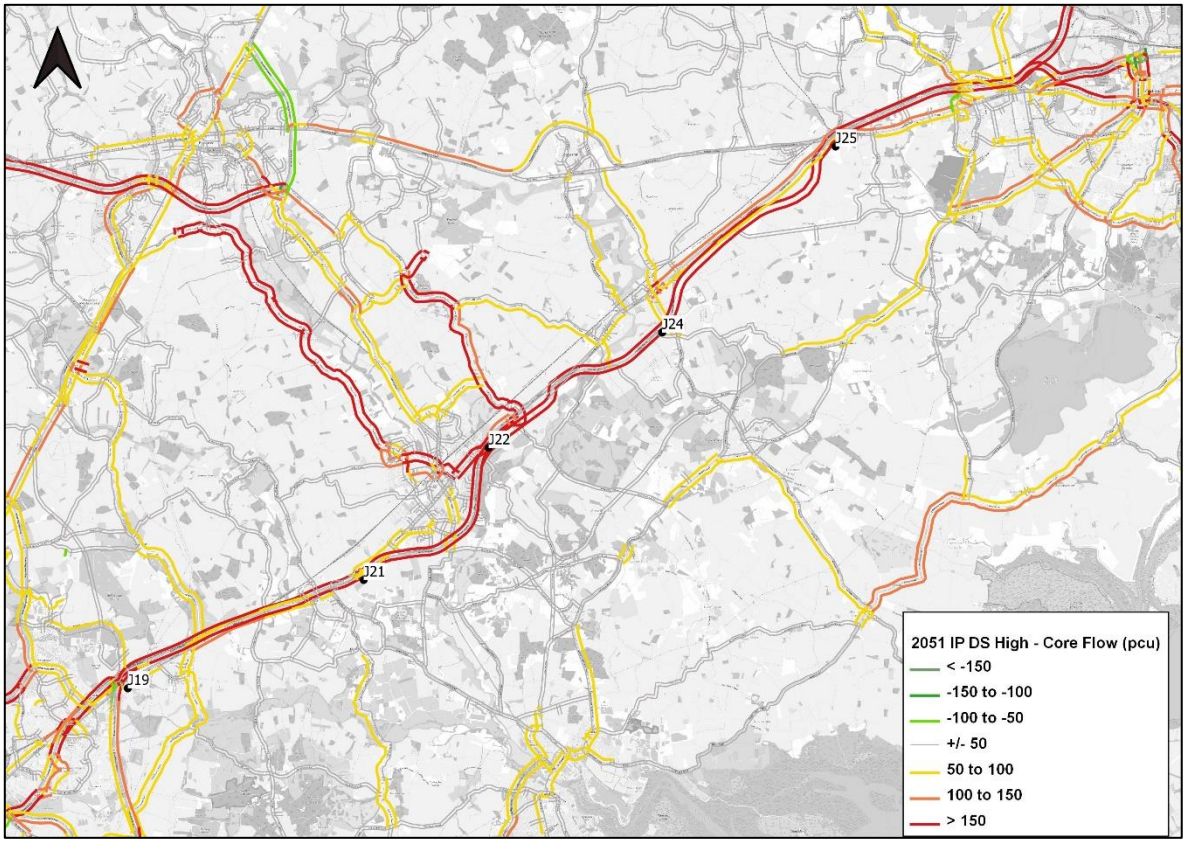
Do Something

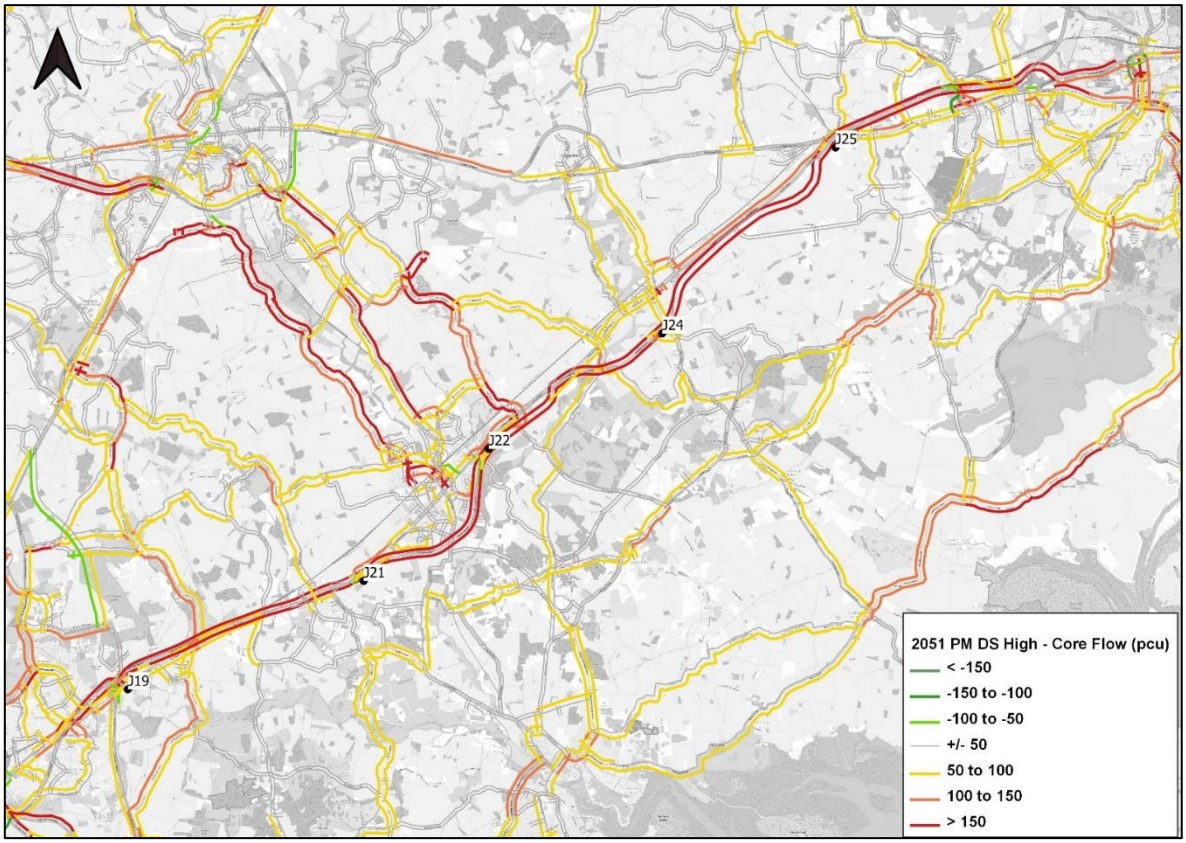




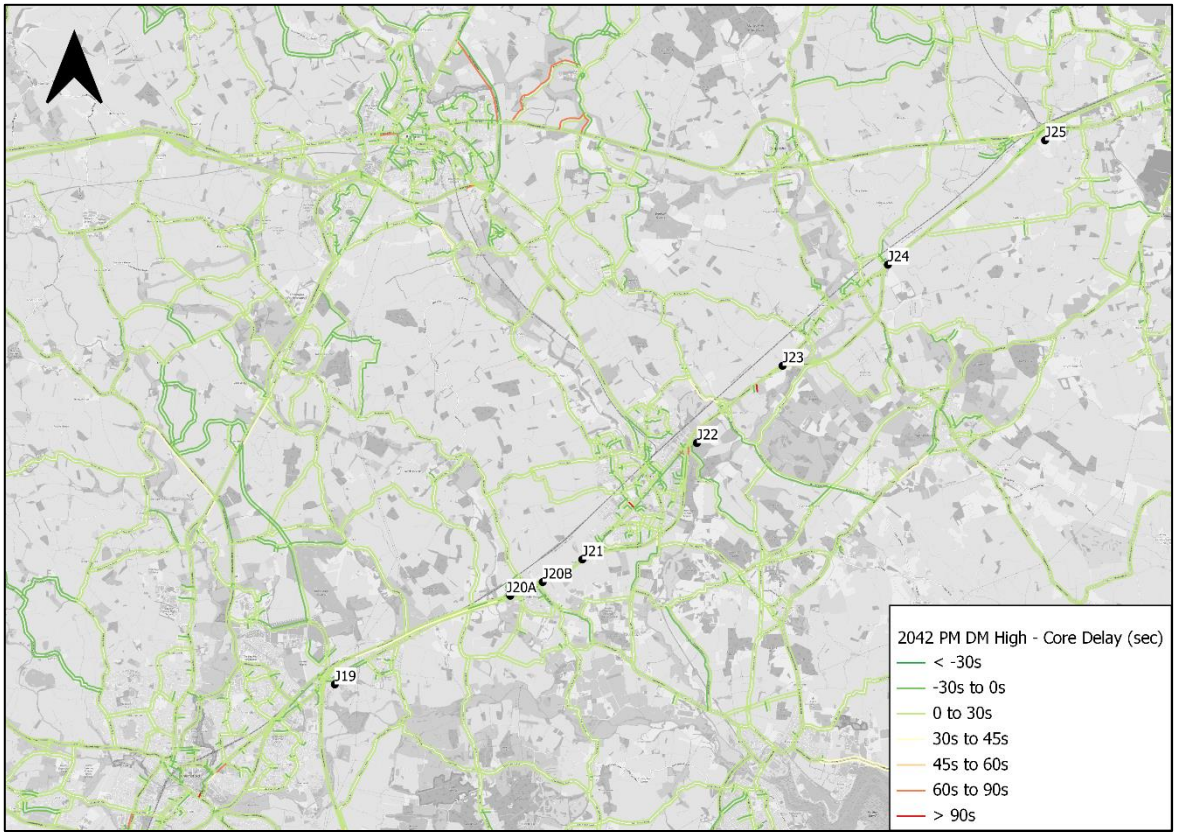

J25
J24
J22
J21
J19
2042 PM DS High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

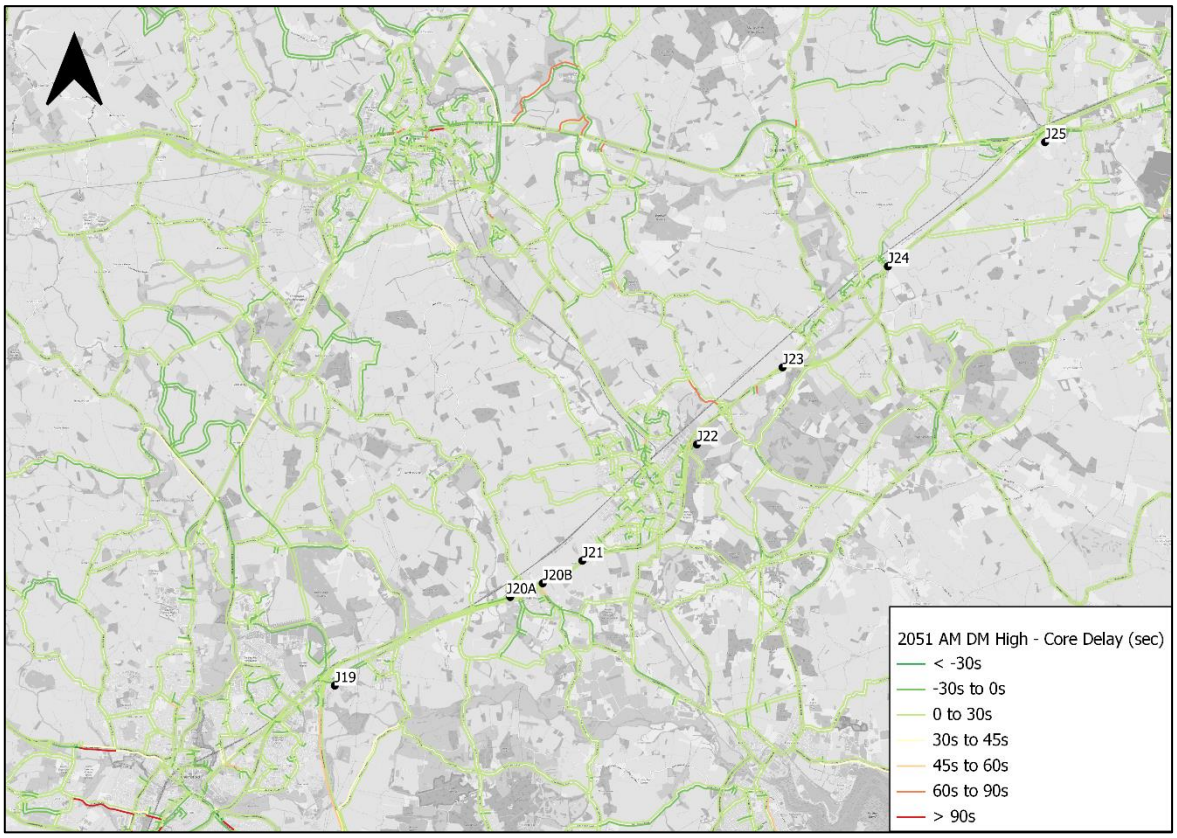

J25
J24
J22
J21
J19
2051 AM DS High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2051 IP DS High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2051 PM DS High - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

High Growth – core (delay)


J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 AM DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 IP DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

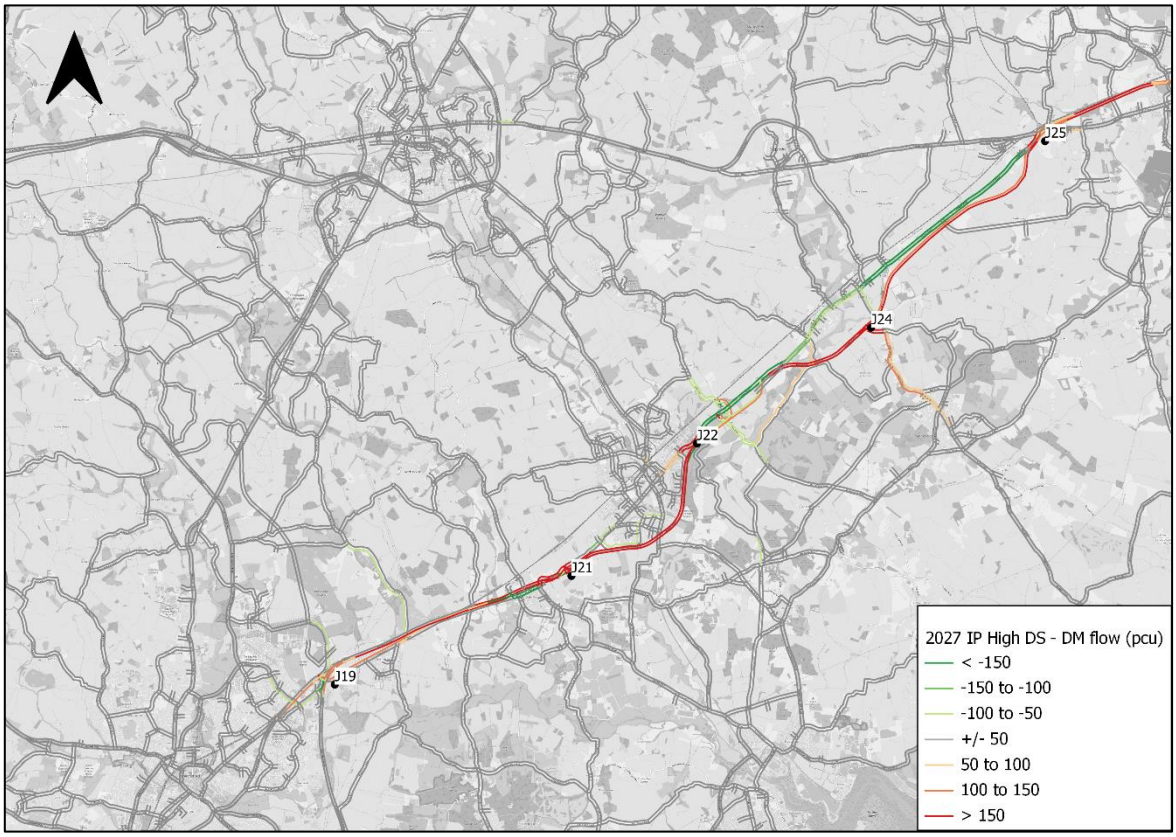

J25
J24
J22
J21
J19
2042 PM DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

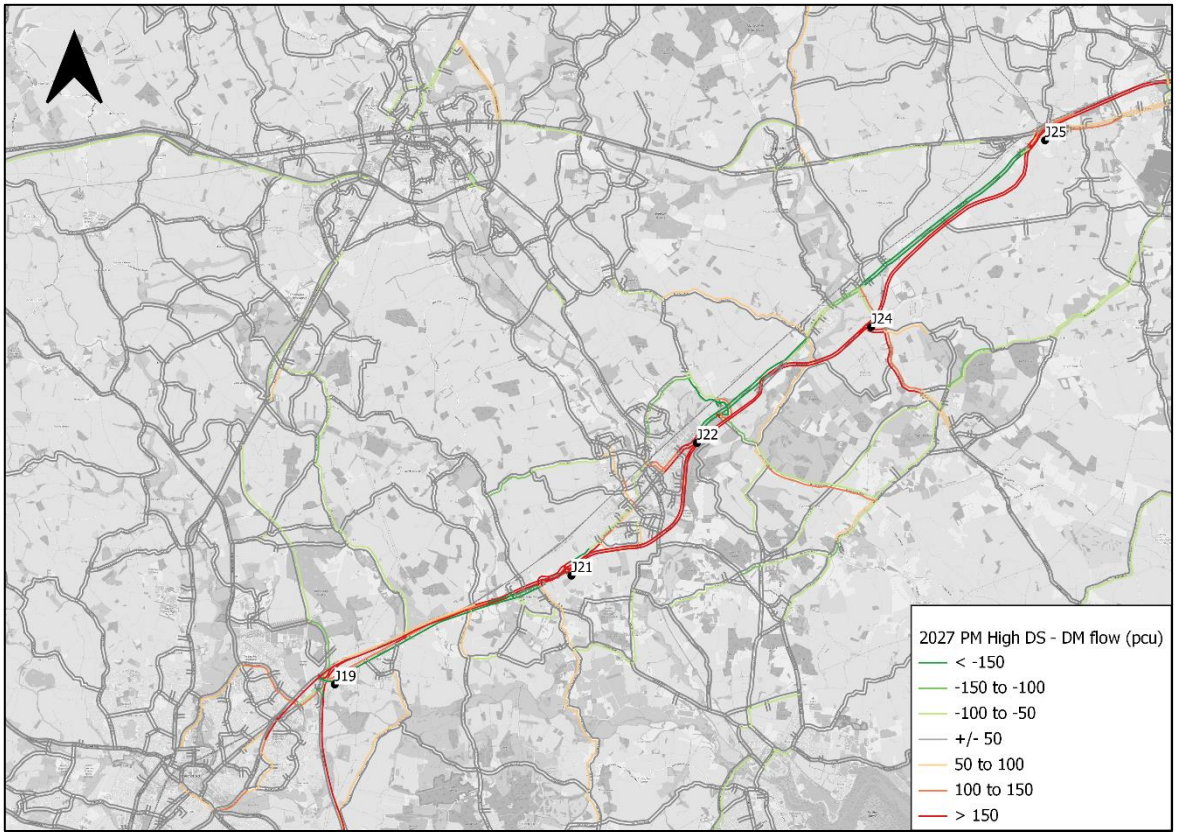

J25
J24
J22
J21
J19
2051 AM DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

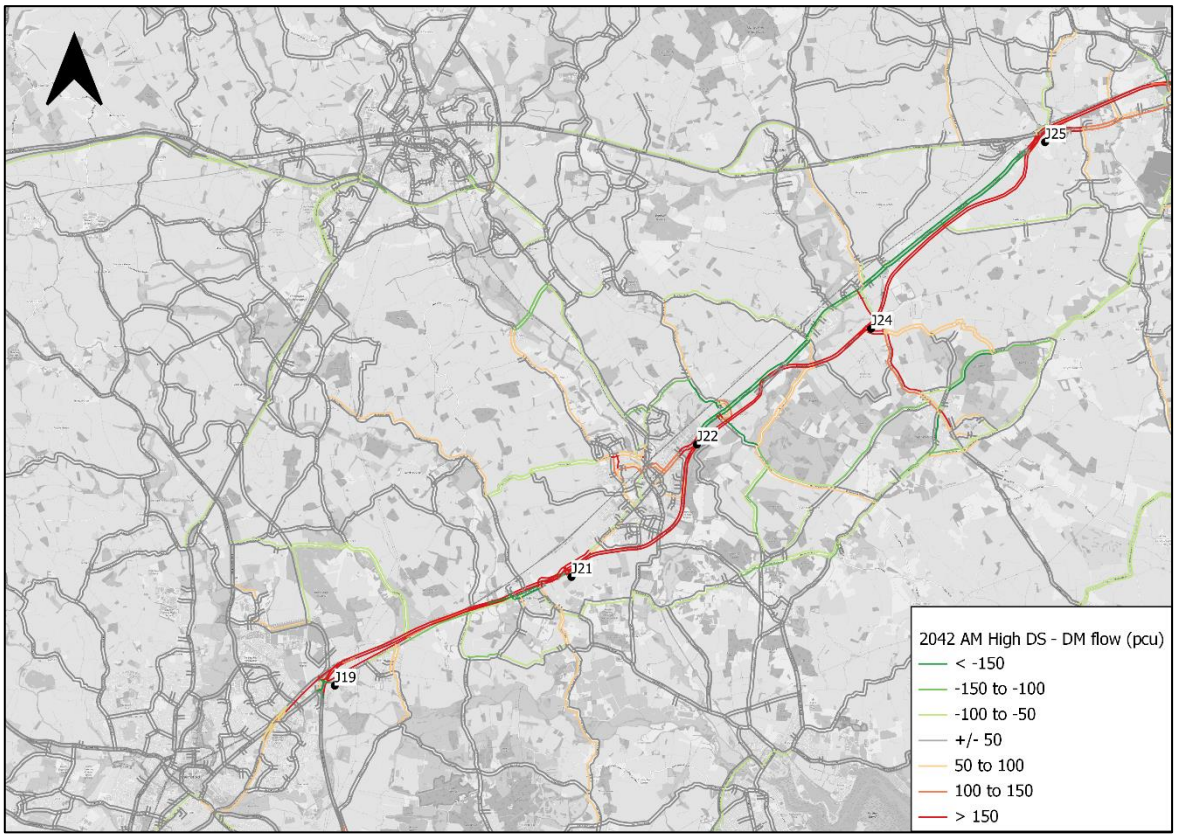

J25
J24
J22
J21
J19
2051 IP DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

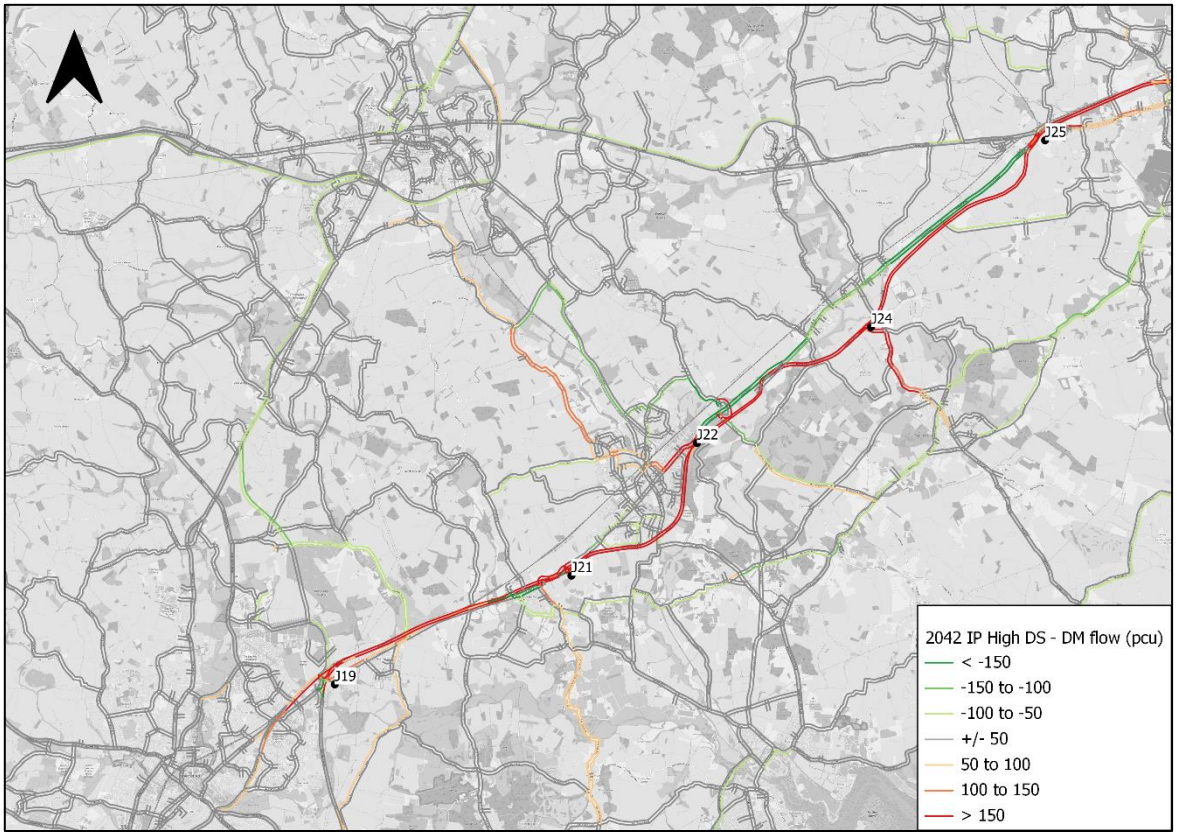

J25
J24
J22
J21
J19
2051 PM DS High - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

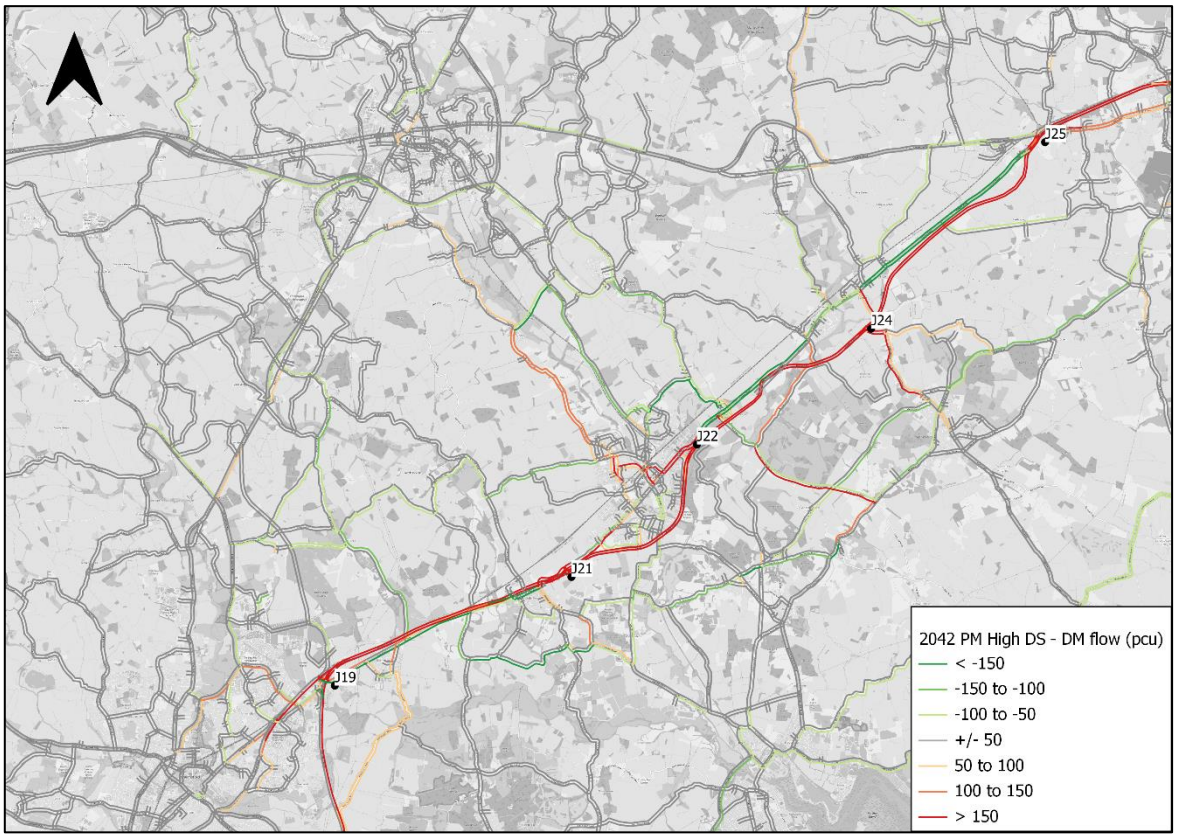
High Growth DS – DM (Flow)

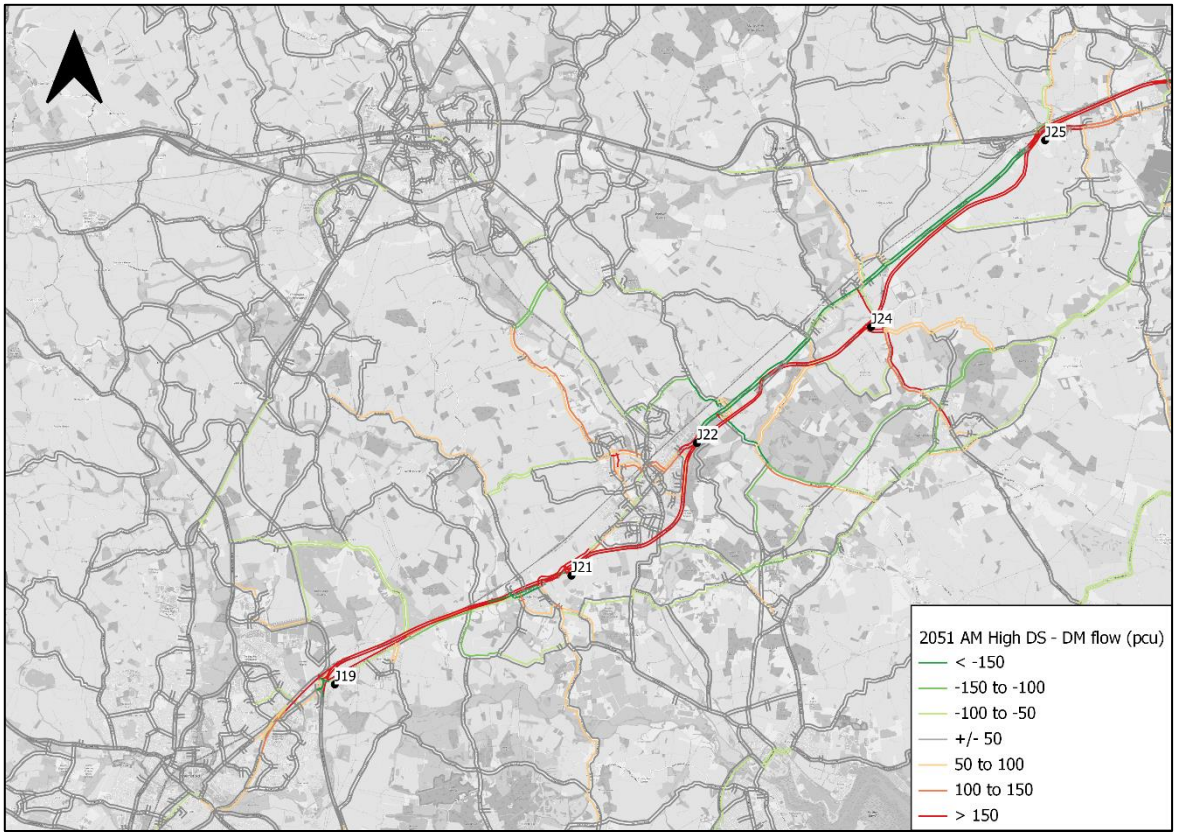



J25
J24
J22
J21
J19
2027 PM High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2042 AM High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2042 IP High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2042 PM High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
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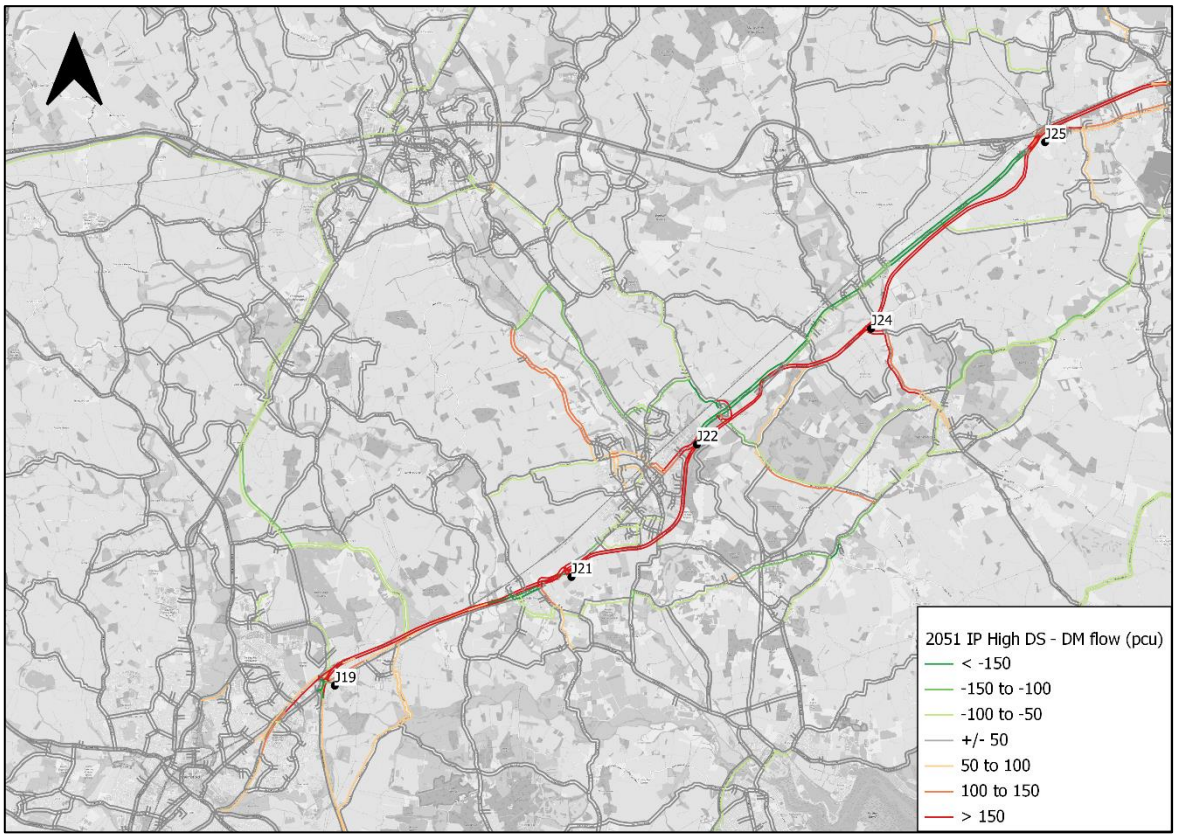
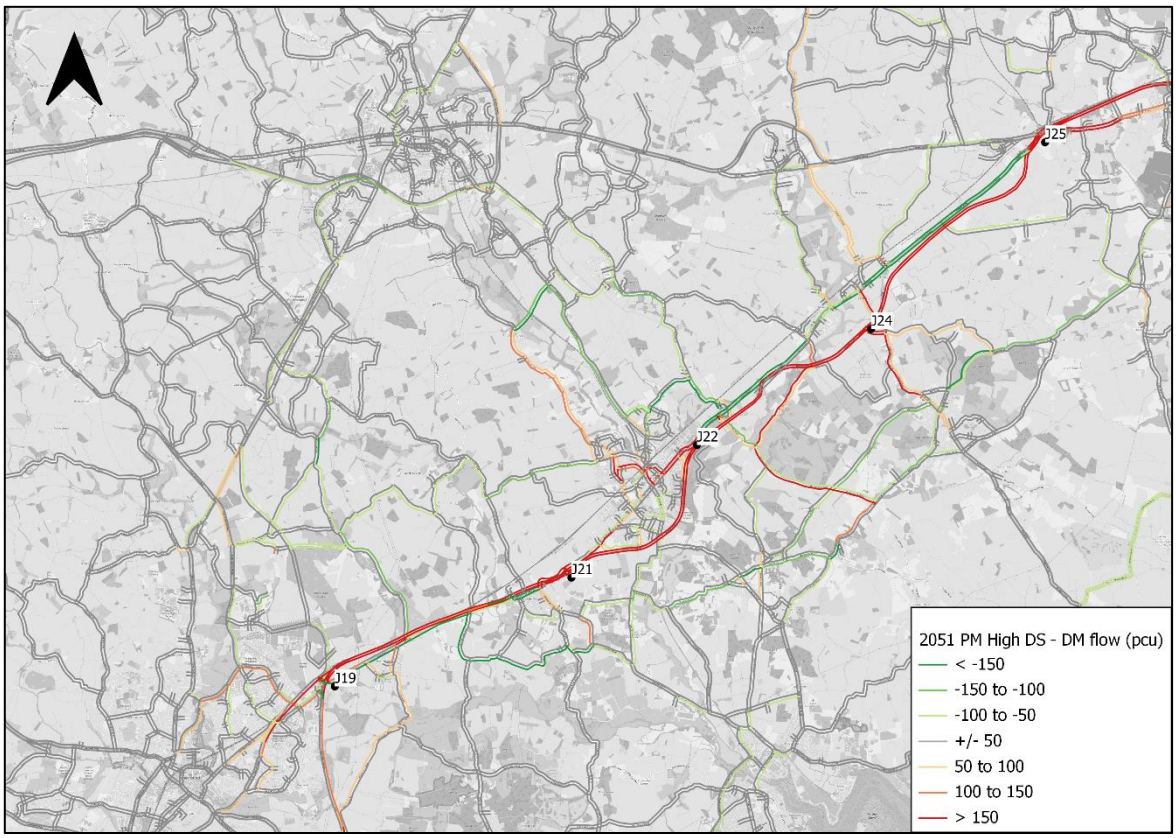
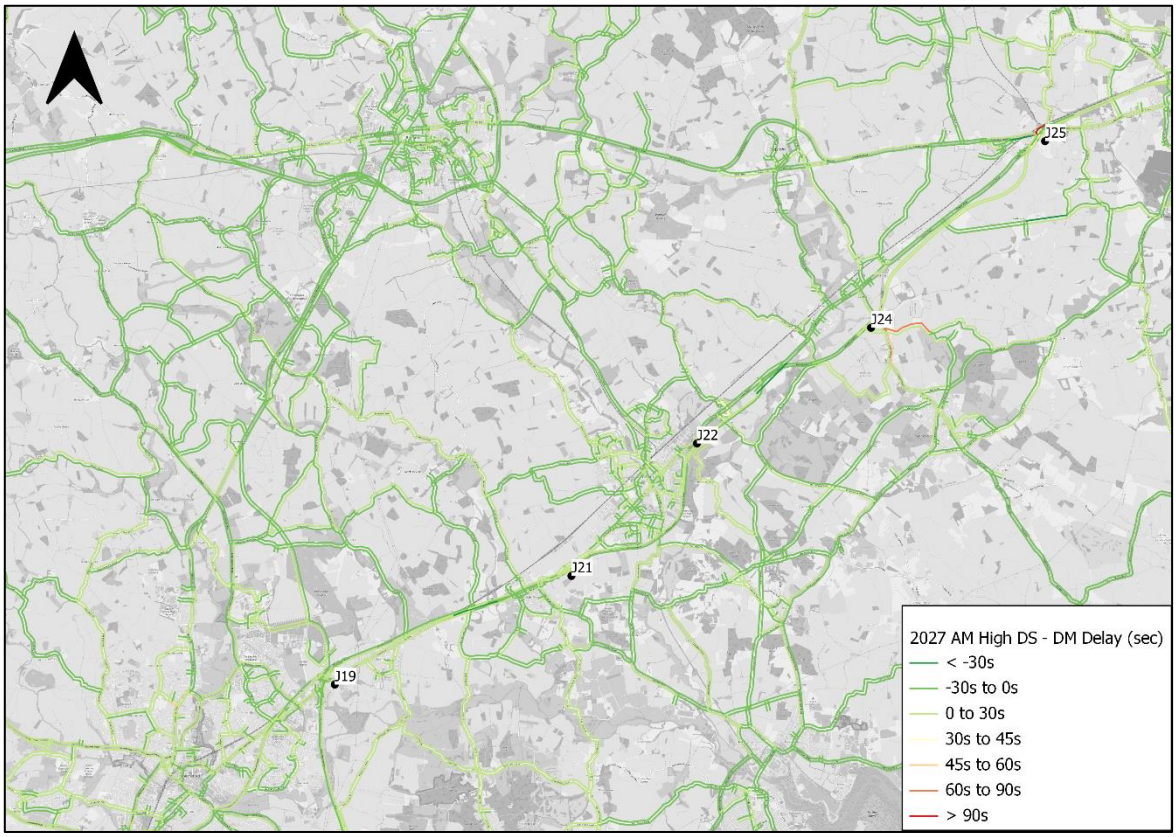
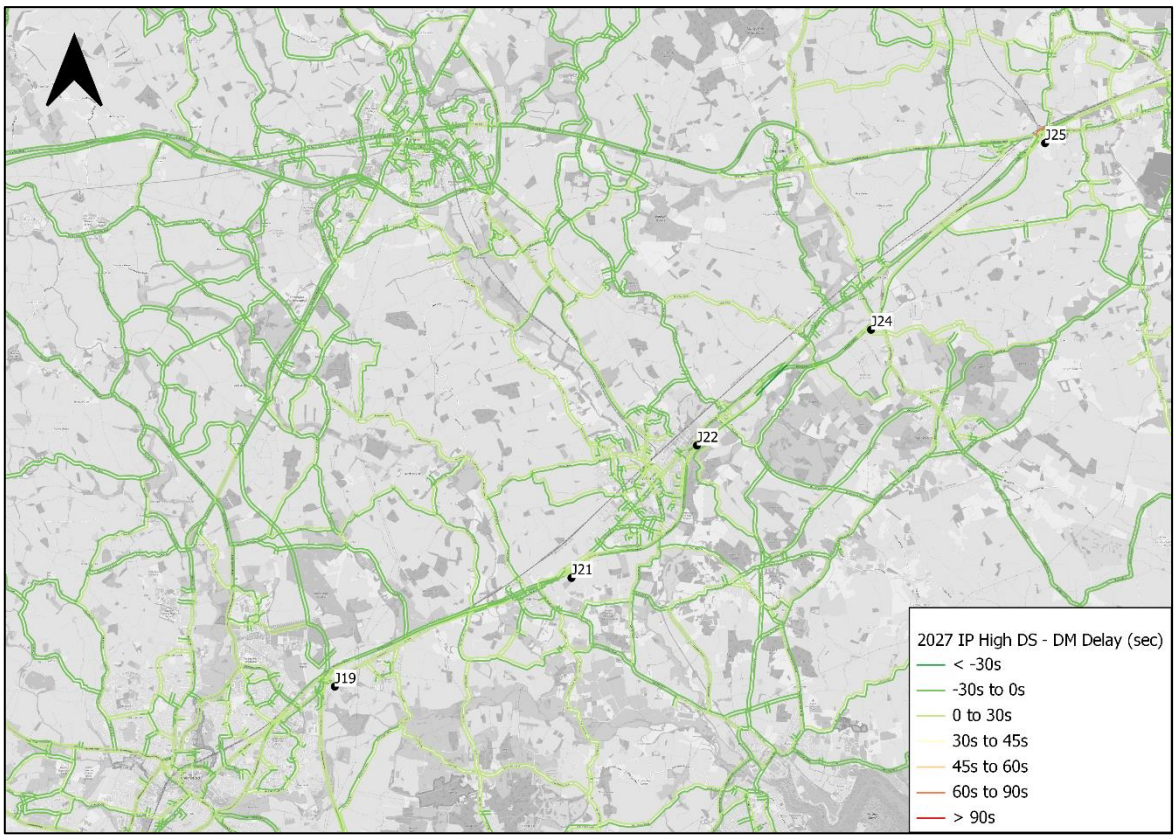
J19
2051 AM High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

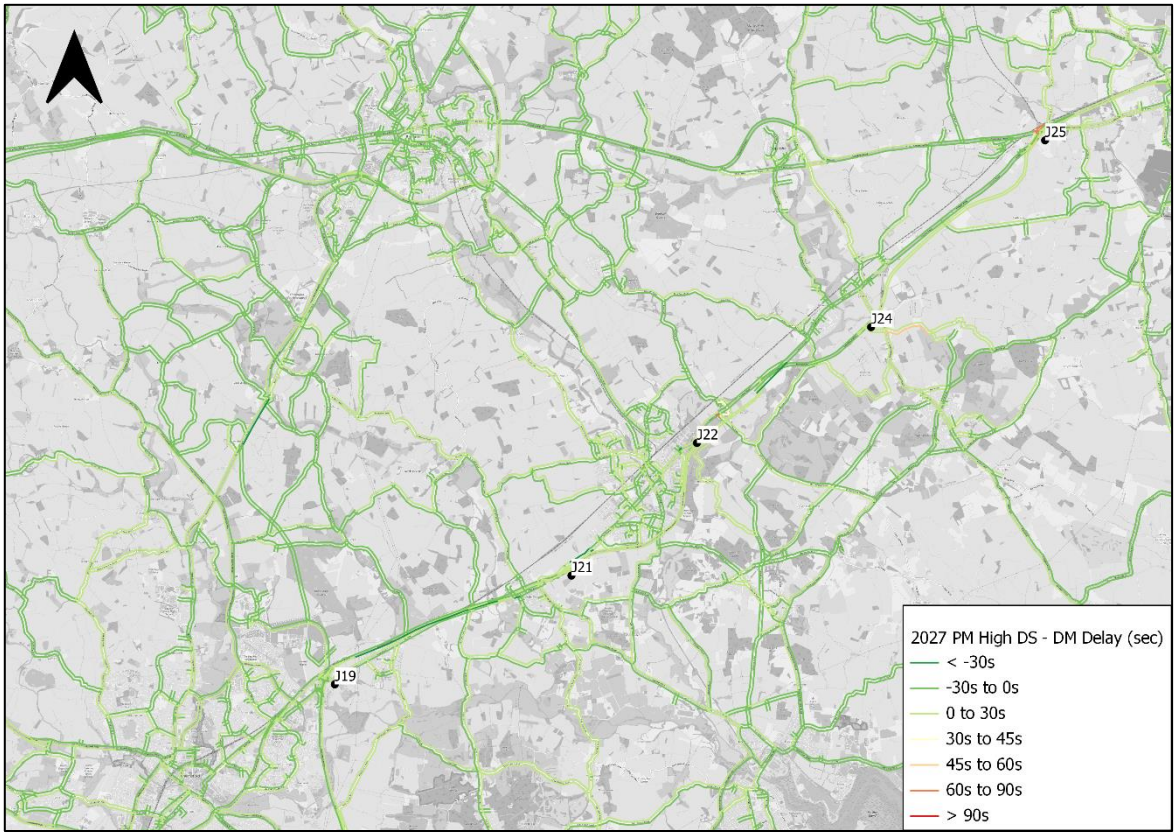

J25
J24
J22
J21
J19
2051 IP High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

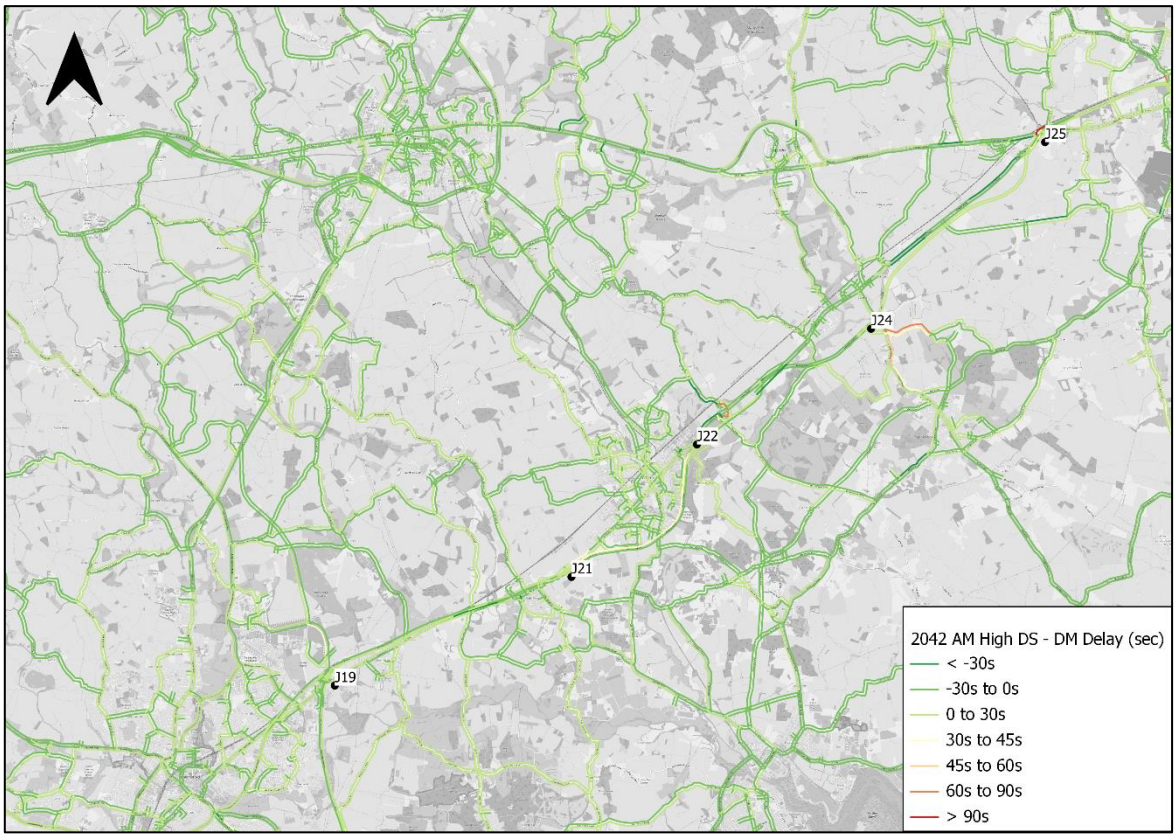

J25
J24
J22
J21
J19
2051 PM High DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

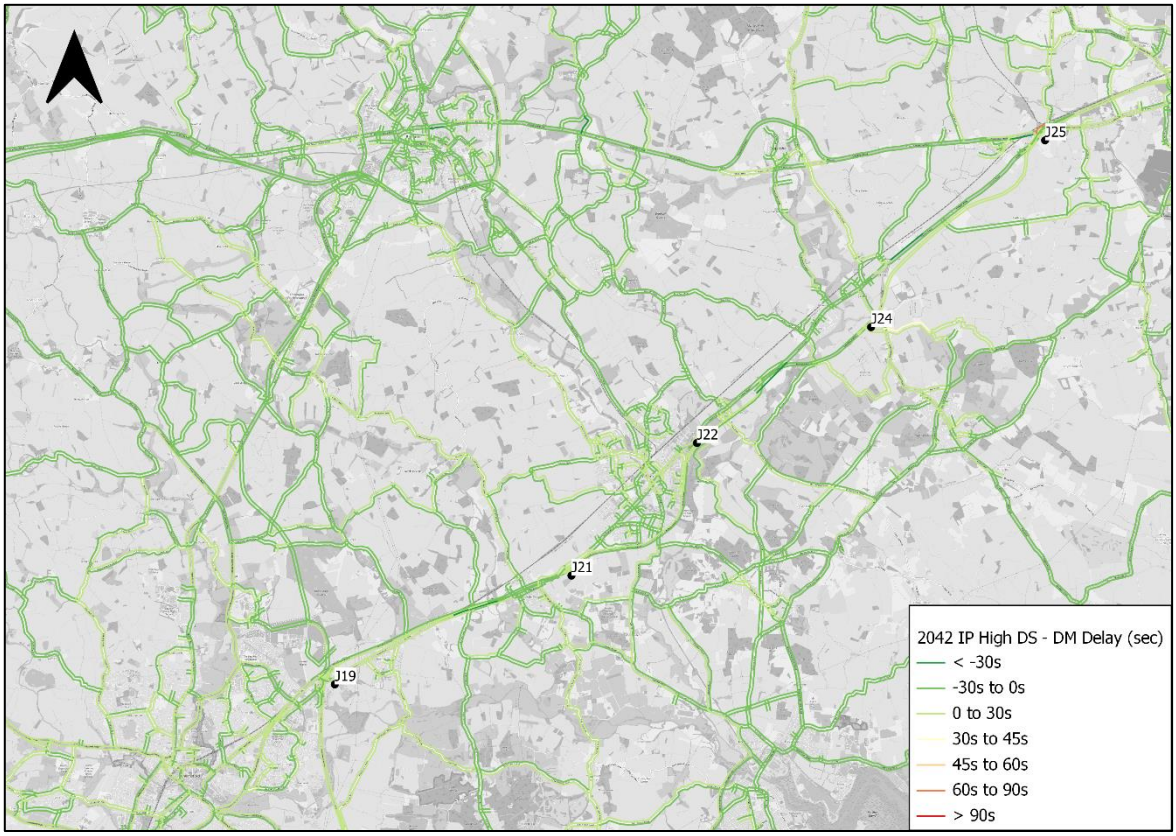
High Growth DS – DM (Delay)

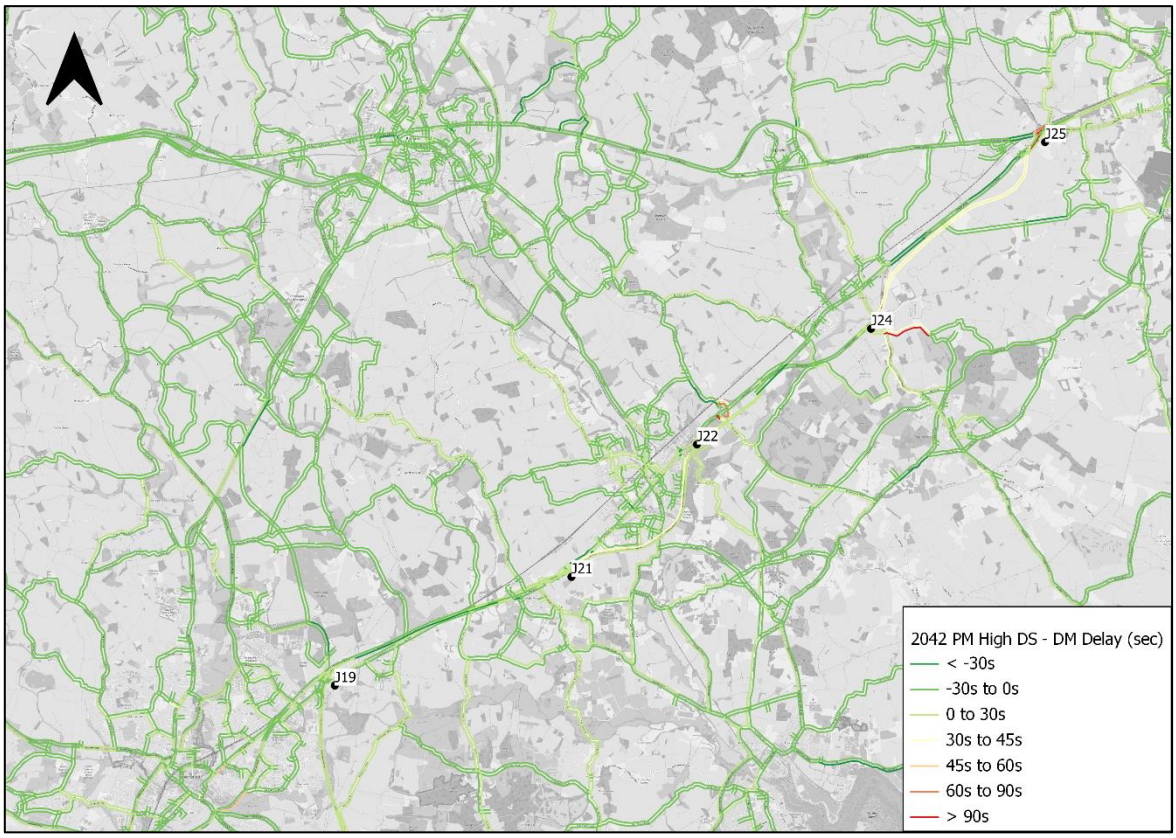





J25
J24
J22
J21
J19
2027 PM High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 AM High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 IP High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
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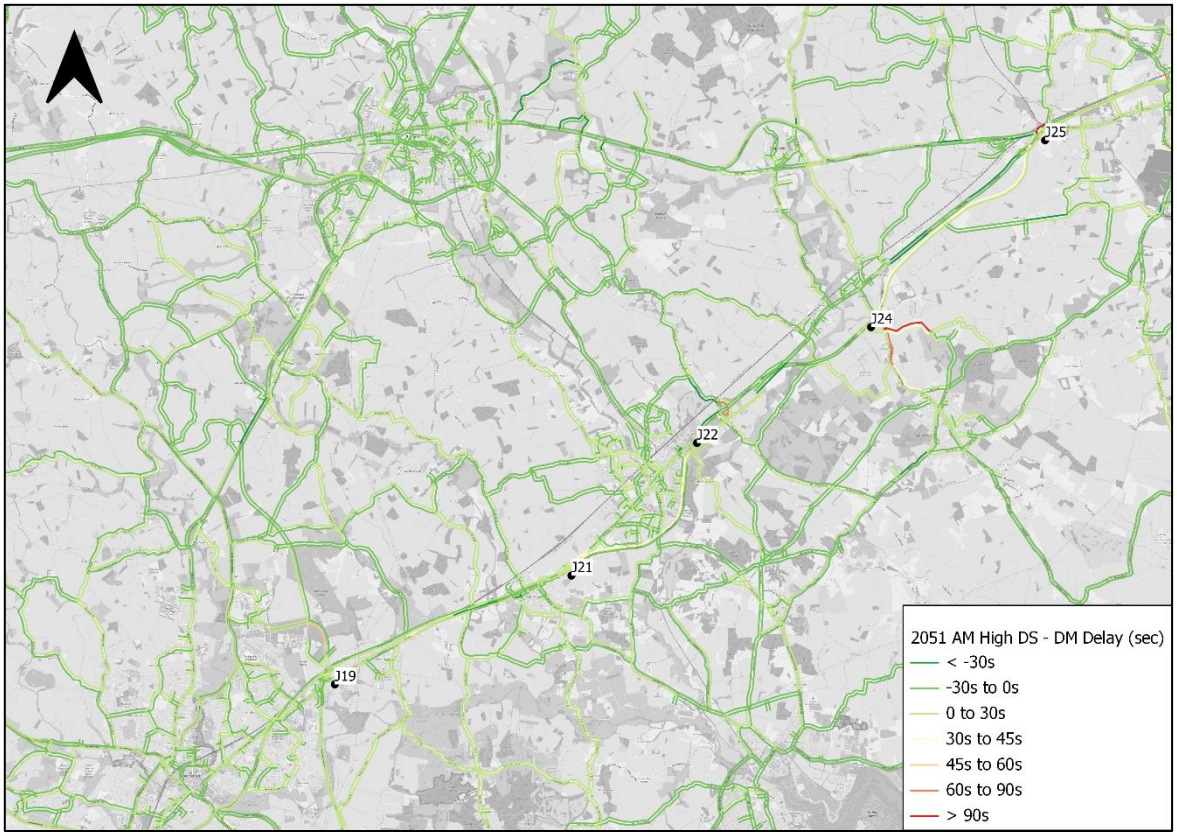
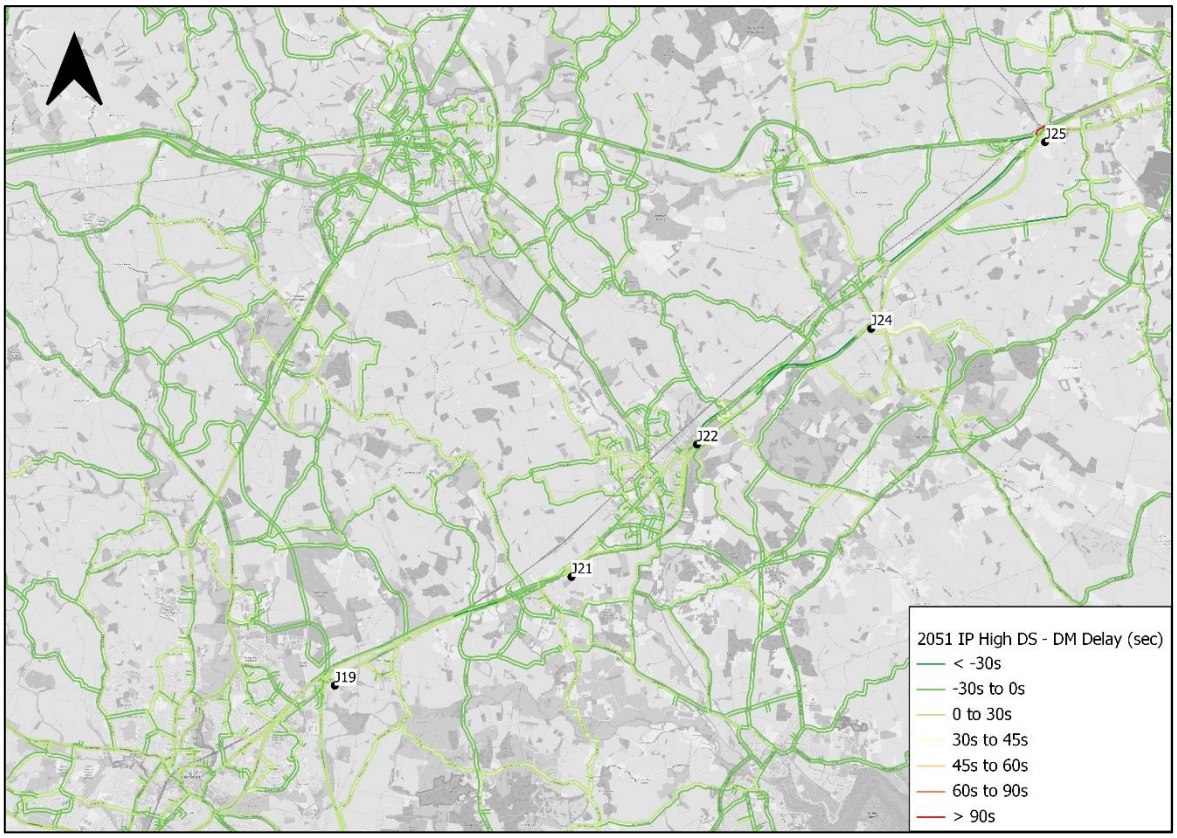
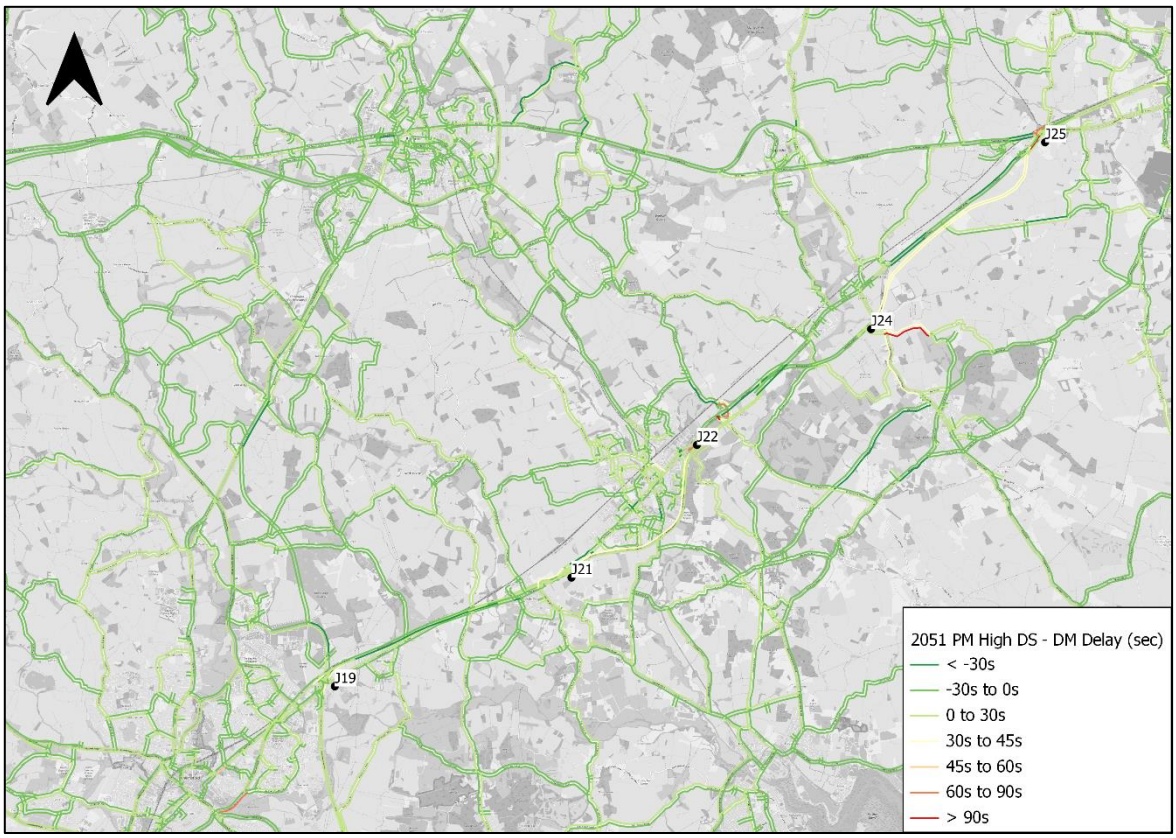
J21
J19
2042 PM High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

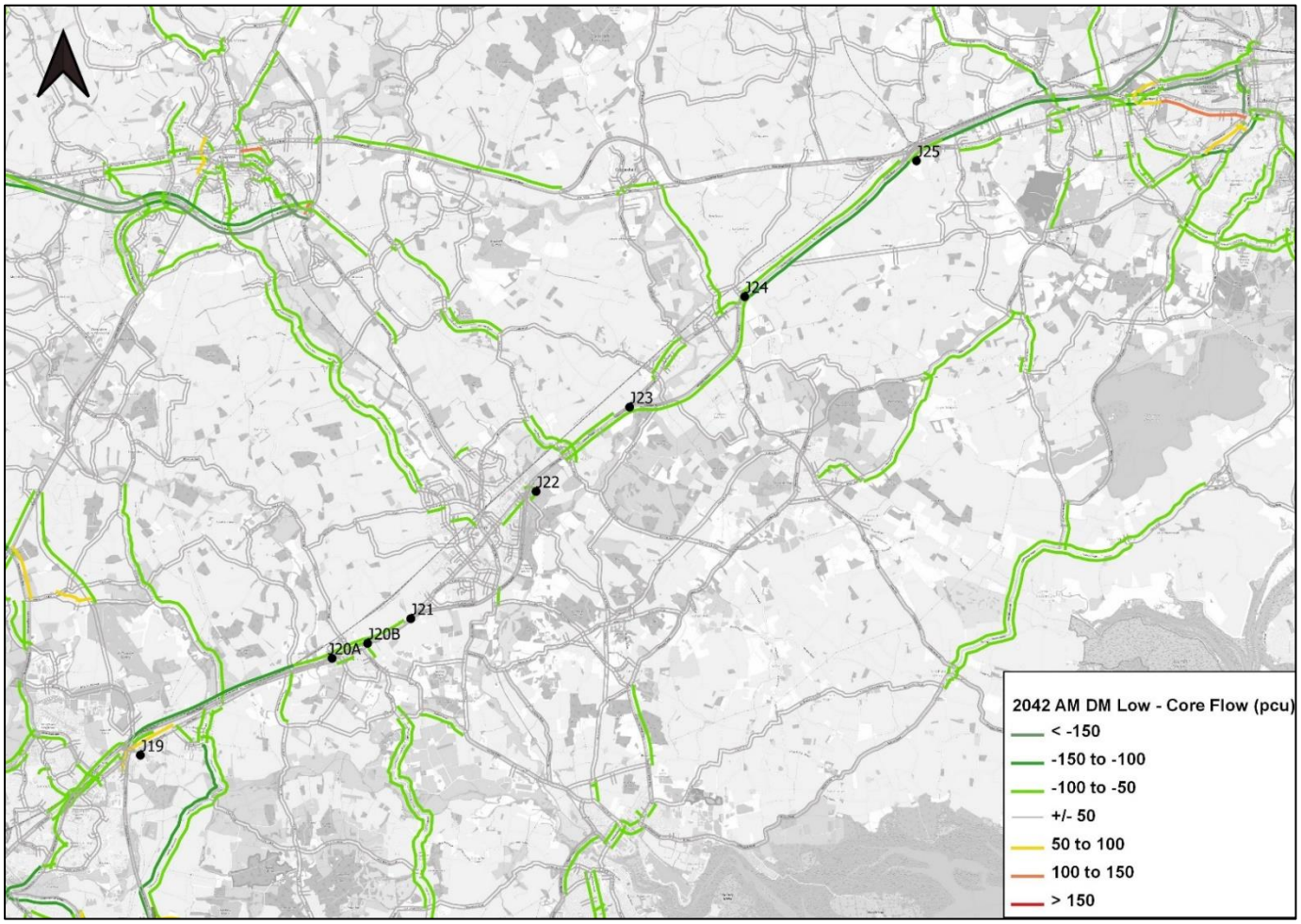

J25
J24
J22
J21
J19
2051 AM High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

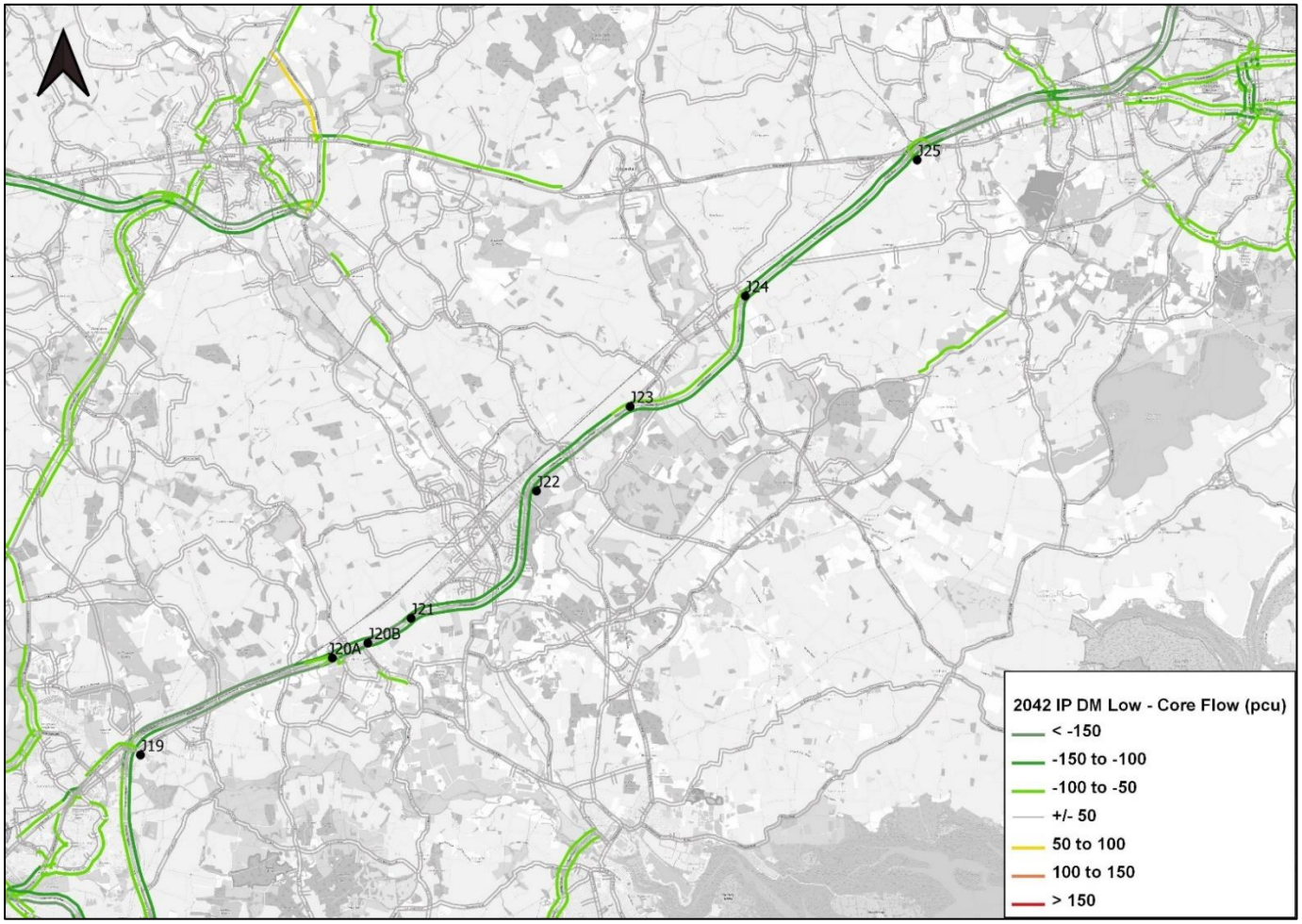

J25
J24
J22
J21
J19
2051 IP High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

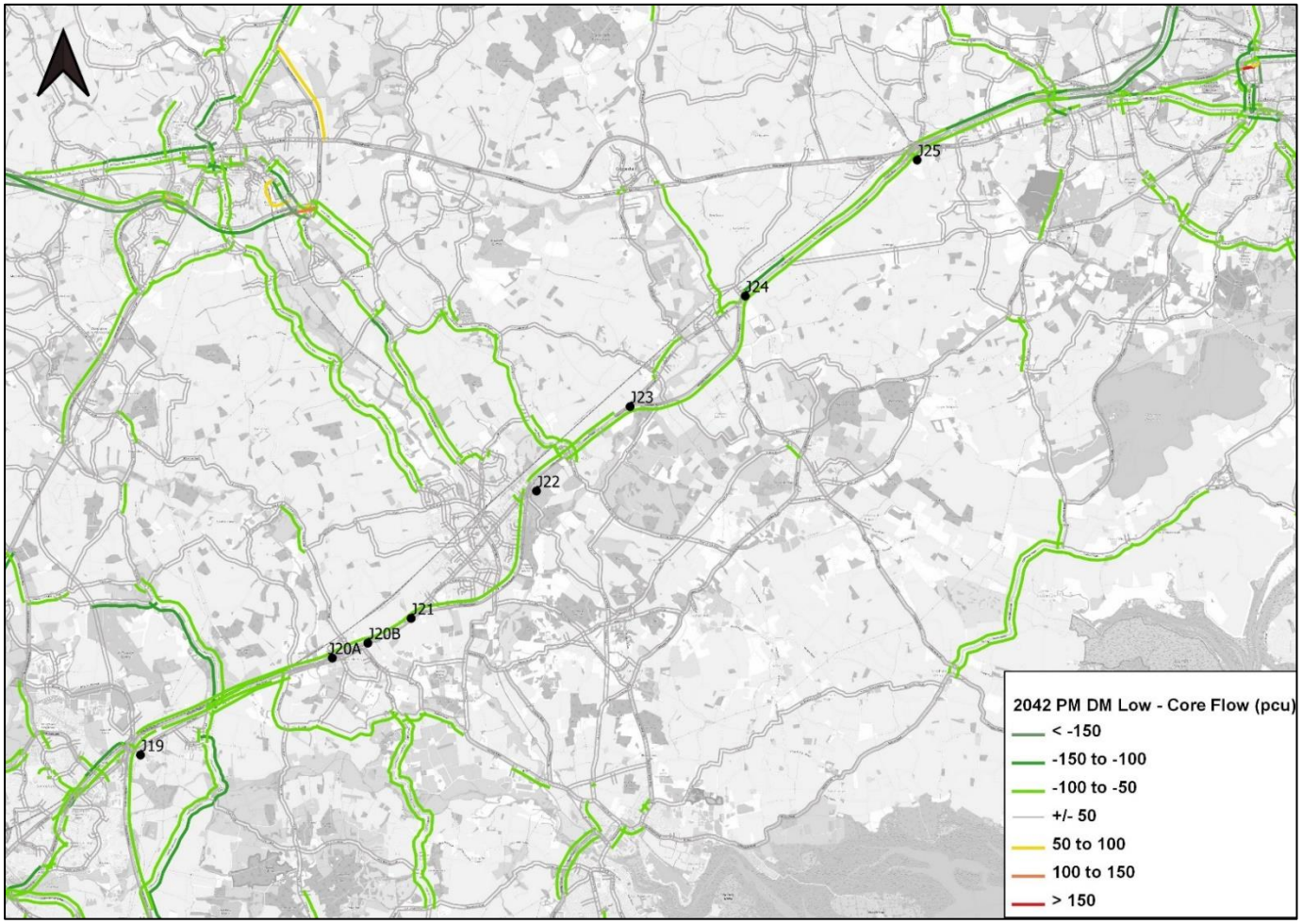

J25
J24
J22
J21
J19
2051 PM High DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

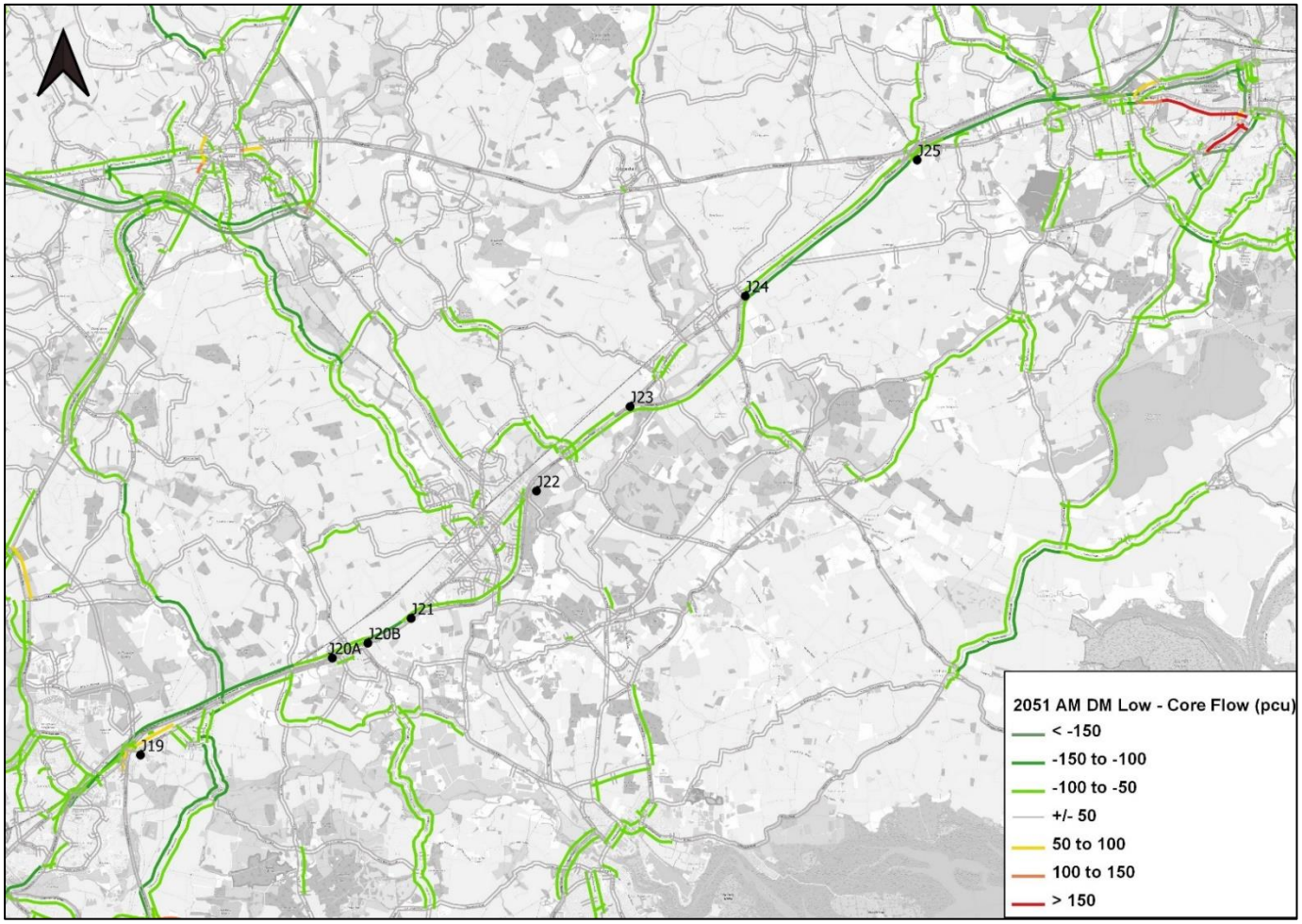
Low Growth – Core (flow)

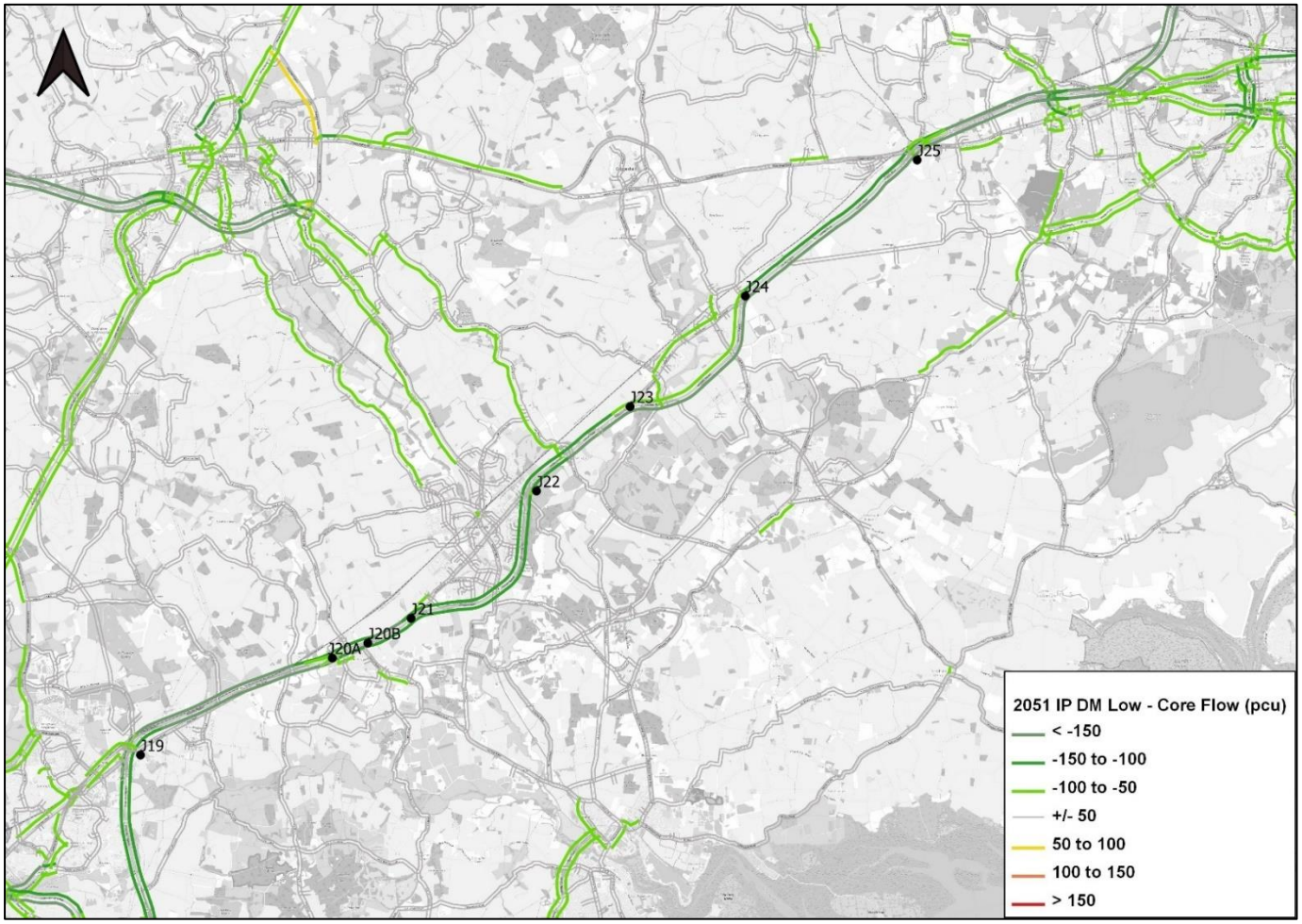
Do Minimum

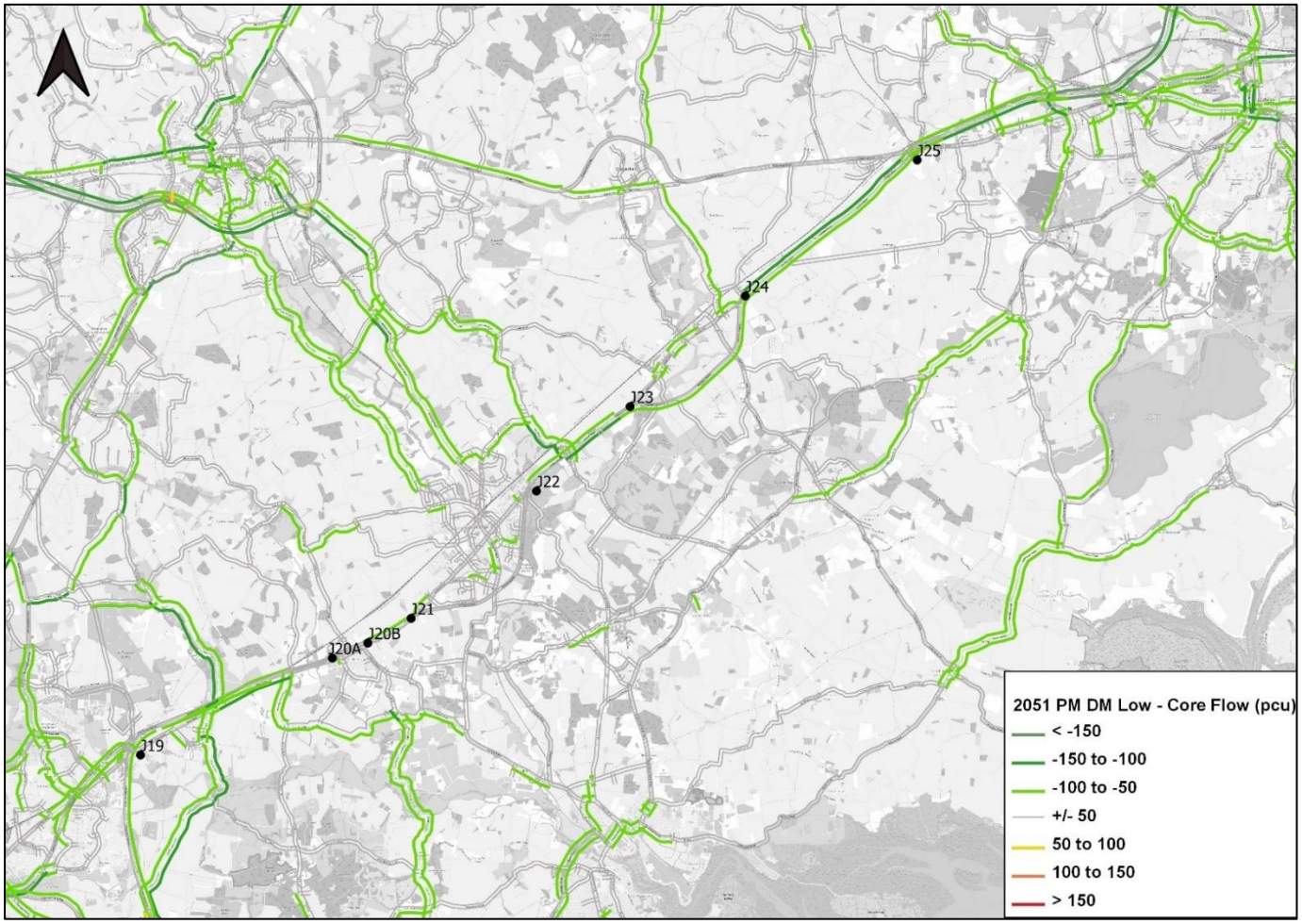



J25
J24
J23
J22
J21
J20B
J20A
J19
2042 IP DM Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

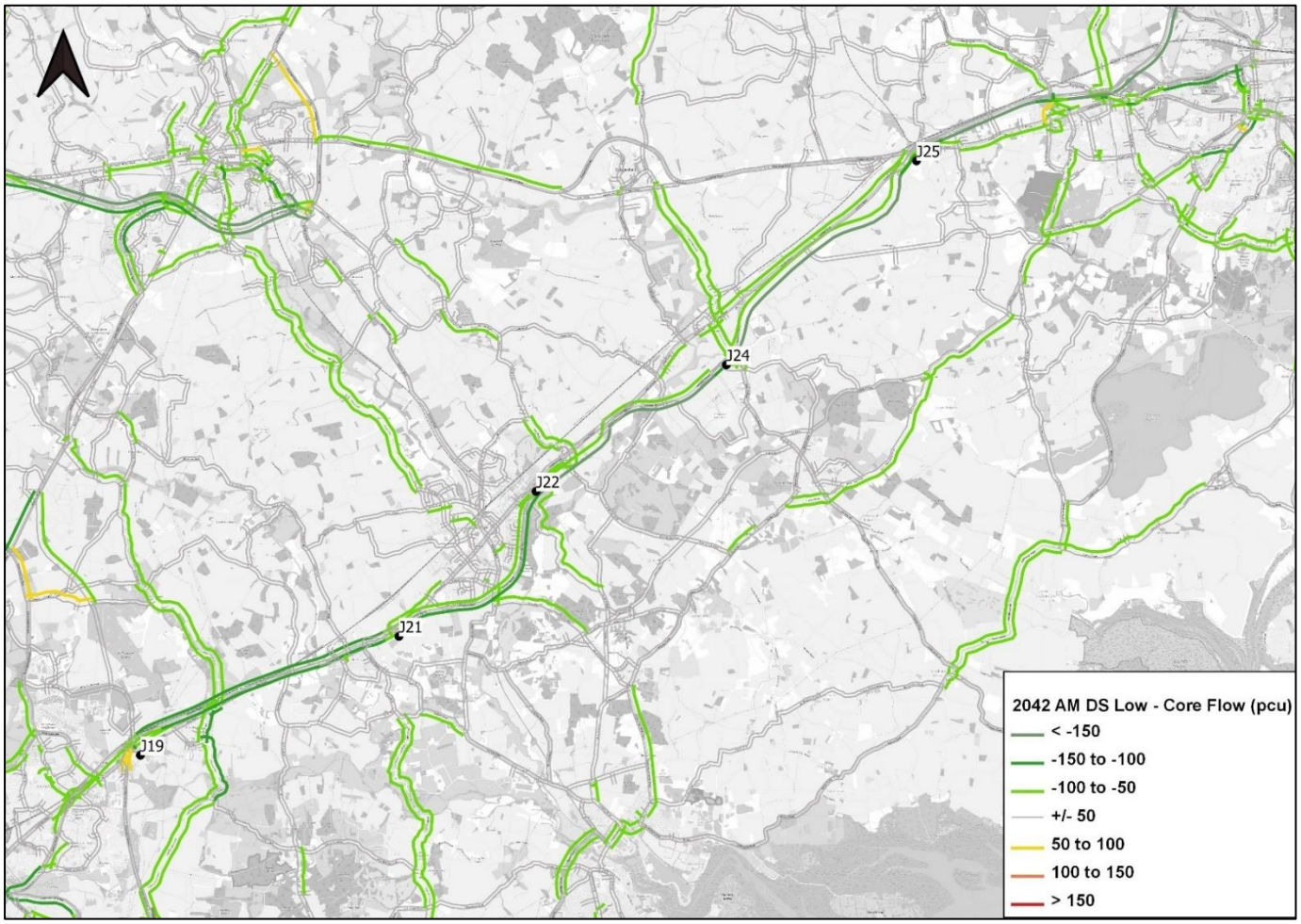

J25
J24
J23
J22
J21
J20B
J20A
J19
2042 PM DM Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

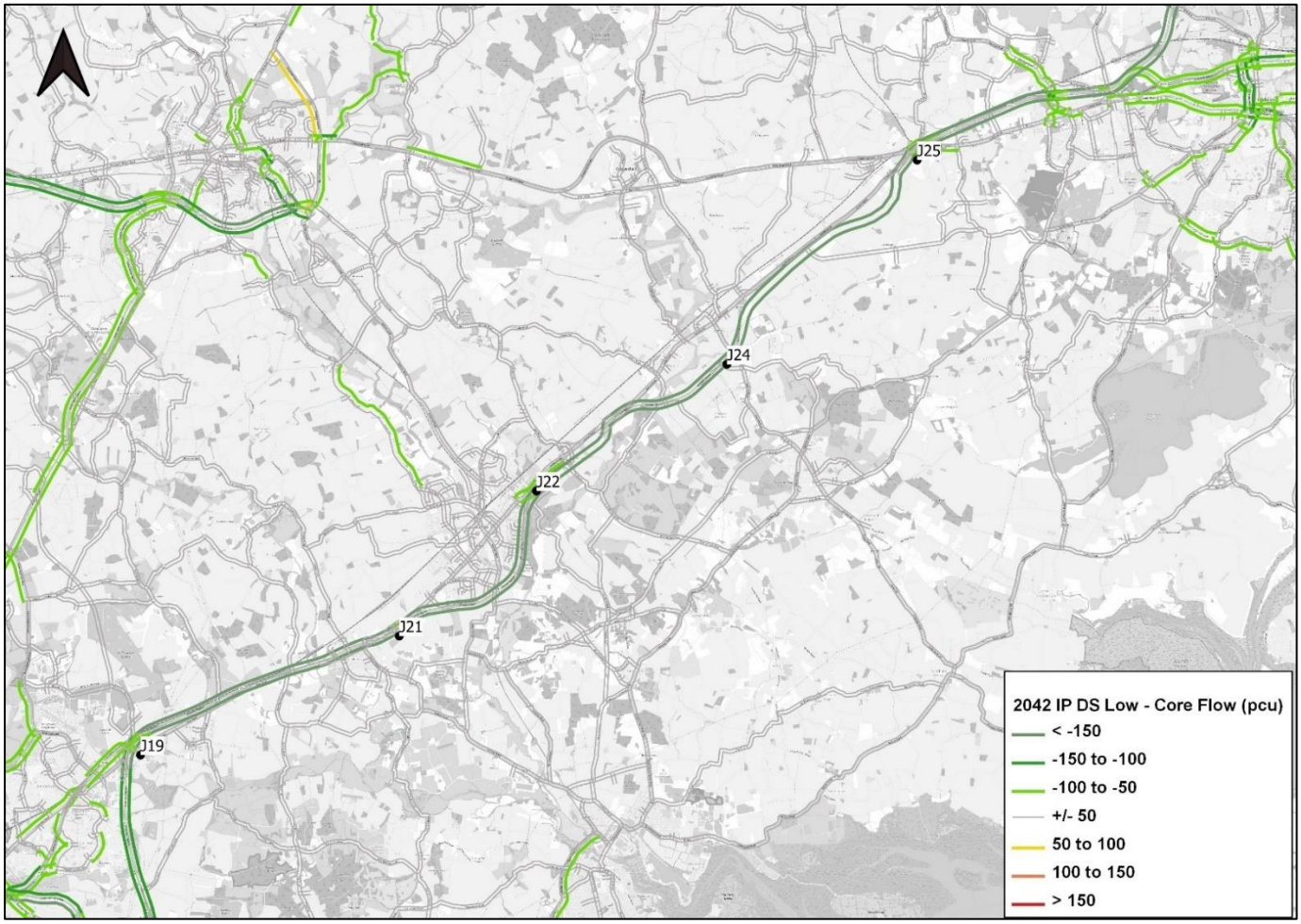

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

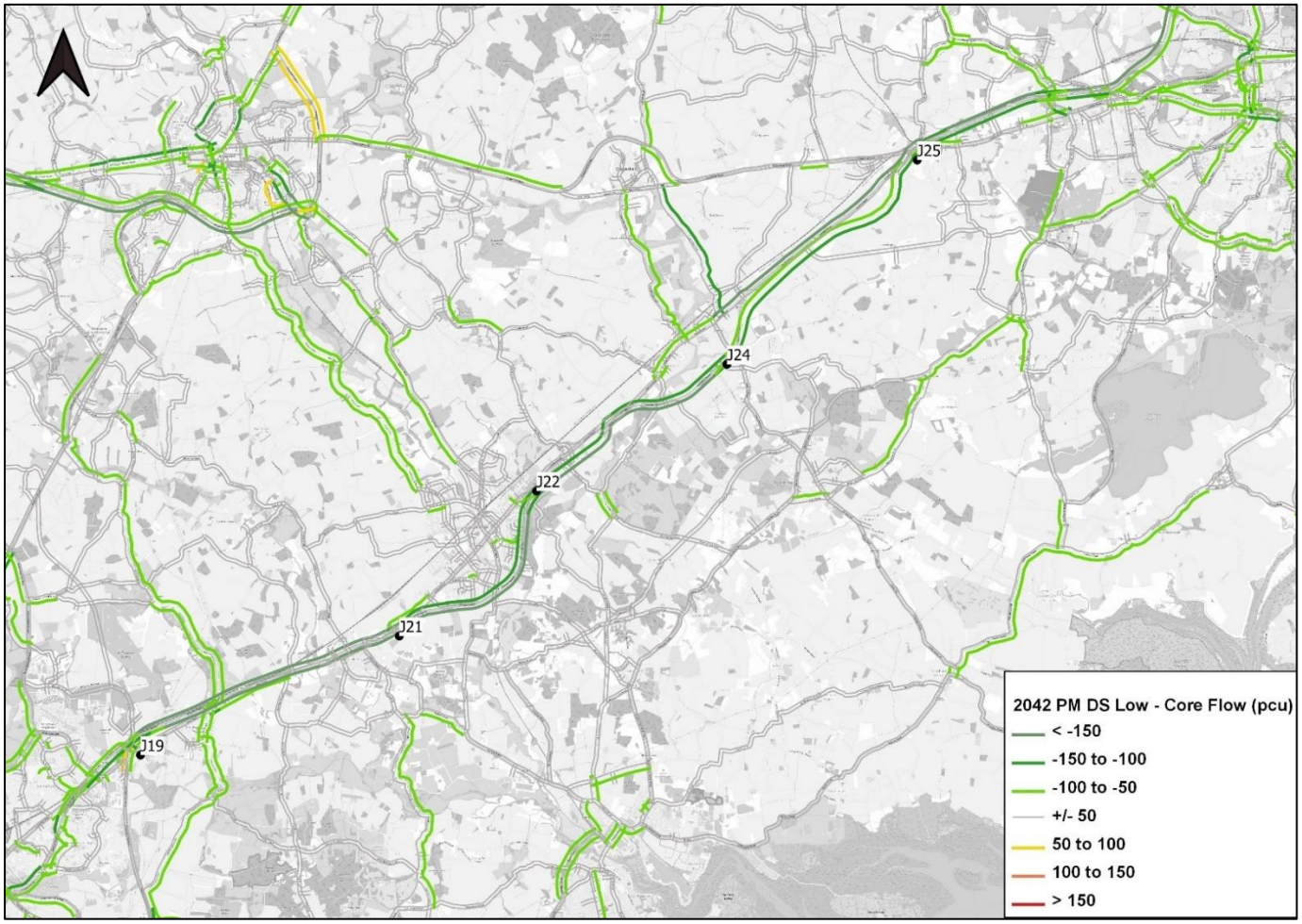

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 IP DM Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

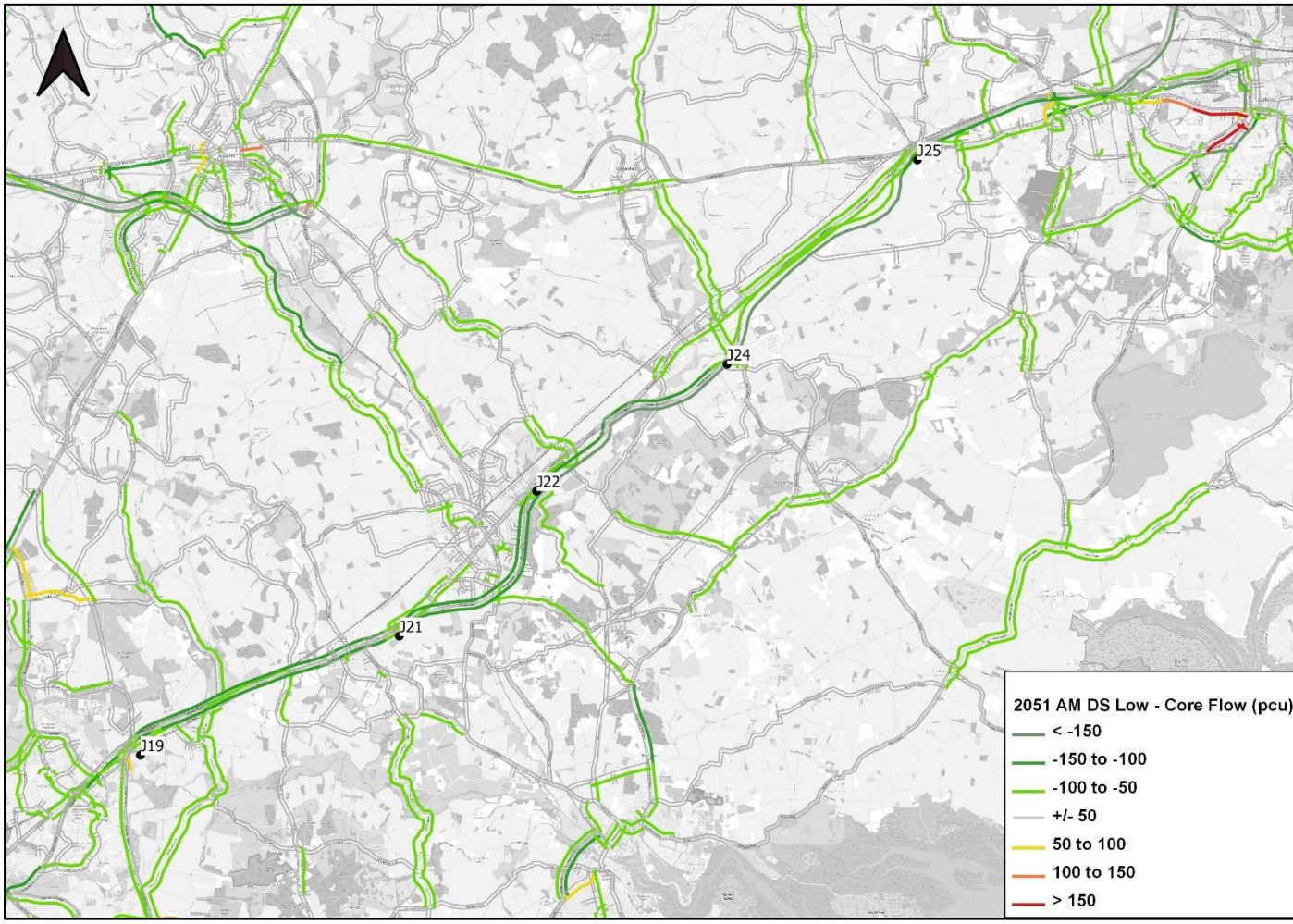

J25
J24
J23
J22
J21
J20B
J20A
J19
2051 PM DM Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

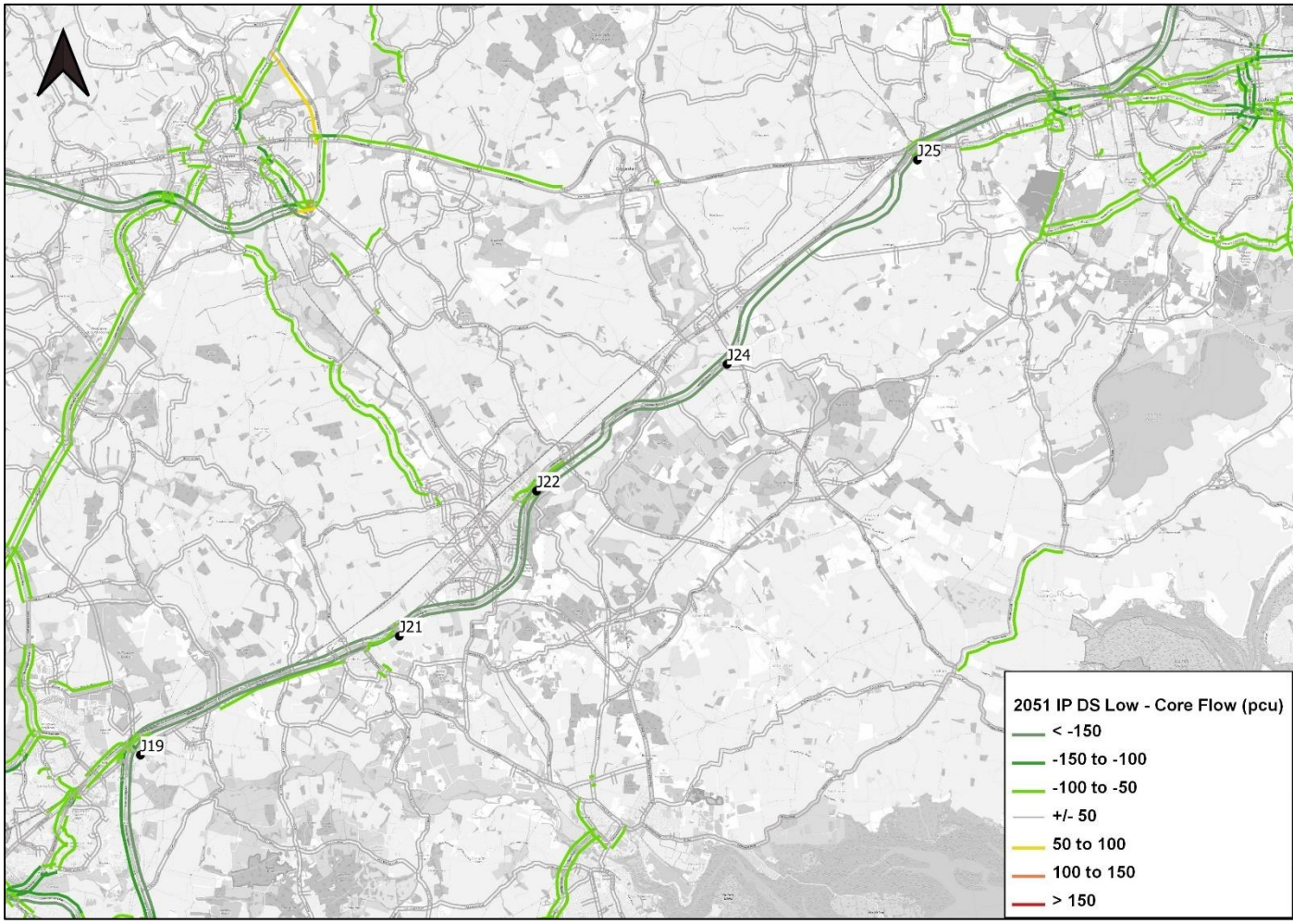
Do Something

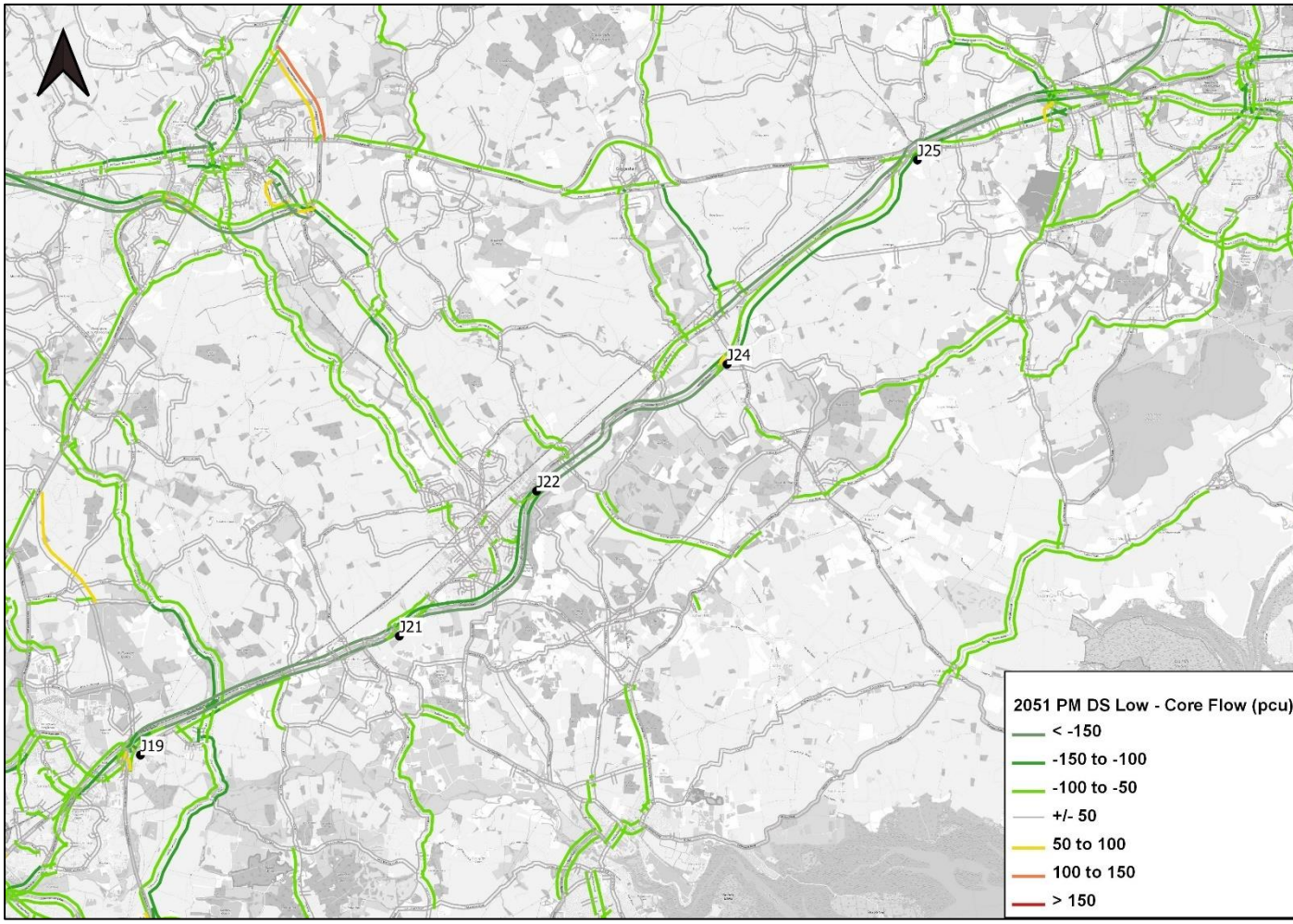



J25
J24
J22
J21
J19
2042 IP DS Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

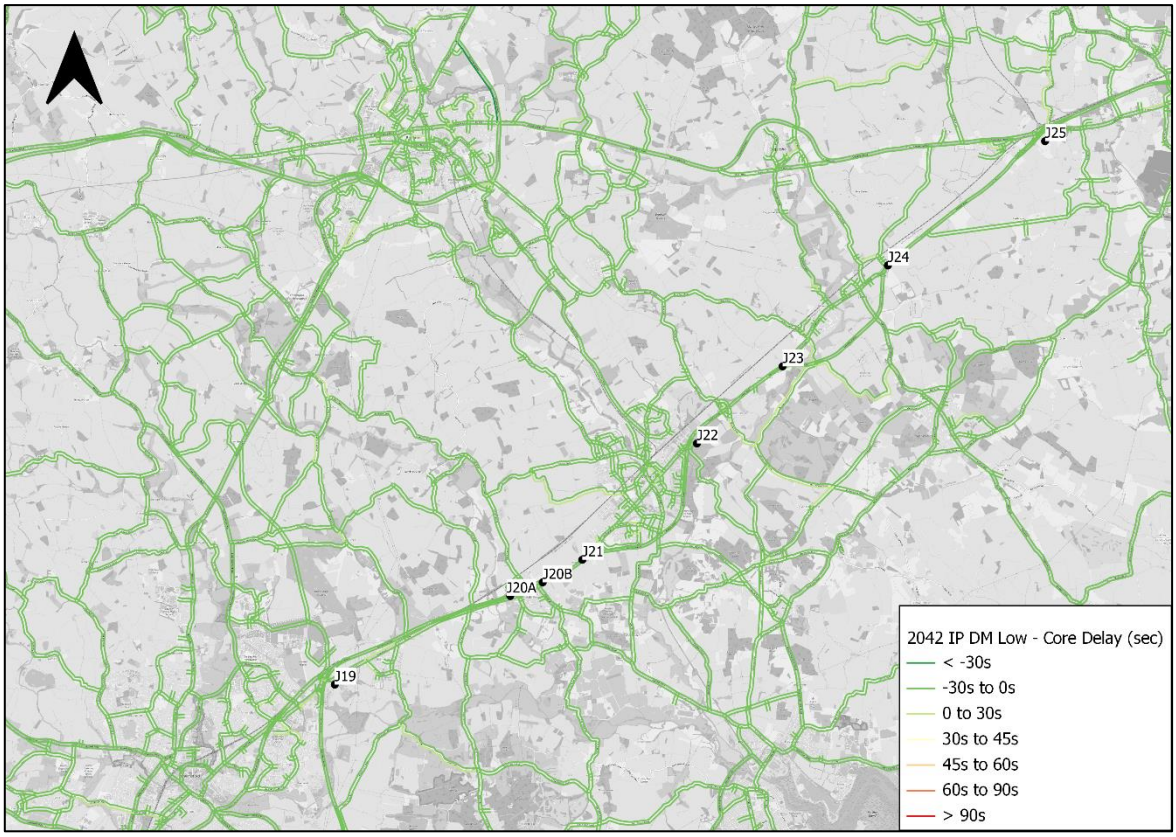

J25
J24
J22
J21
J19
2042 PM DS Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

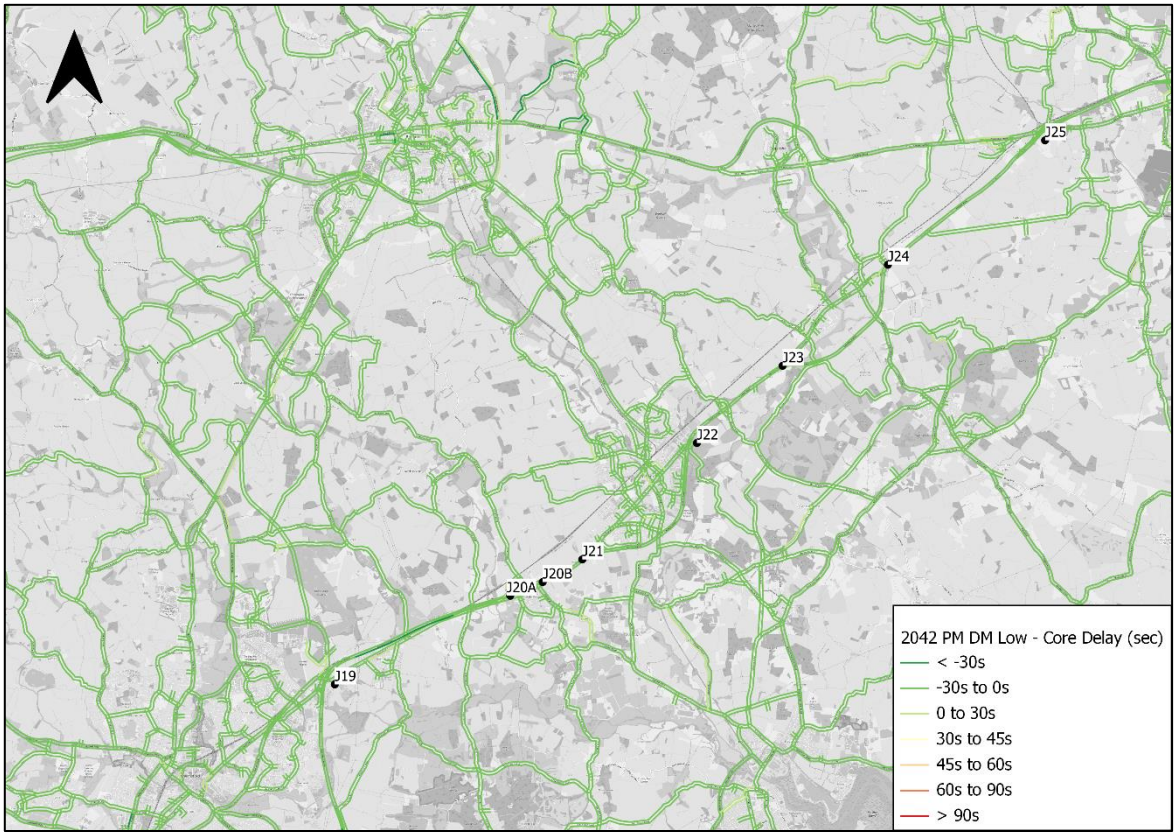

J25
J24
J22
J21
J19
2051 AM DS Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2051 IP DS Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2051 PM DS Low - Core Flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

Low Growth – Core (delay)




J25
J24
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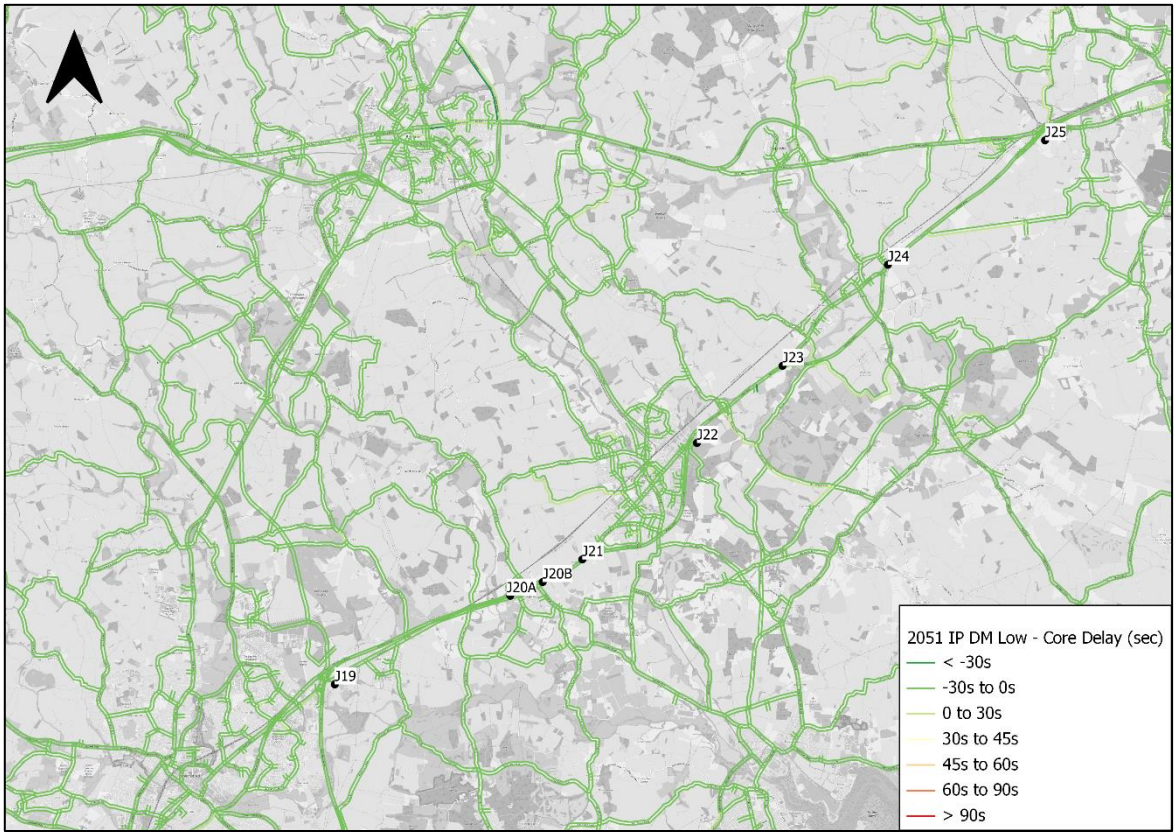
J22
J21
J20B
J20A
J19
2042 PM DM Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J23
J22
J21
J20B
J20A
J19
2051 AM DM Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
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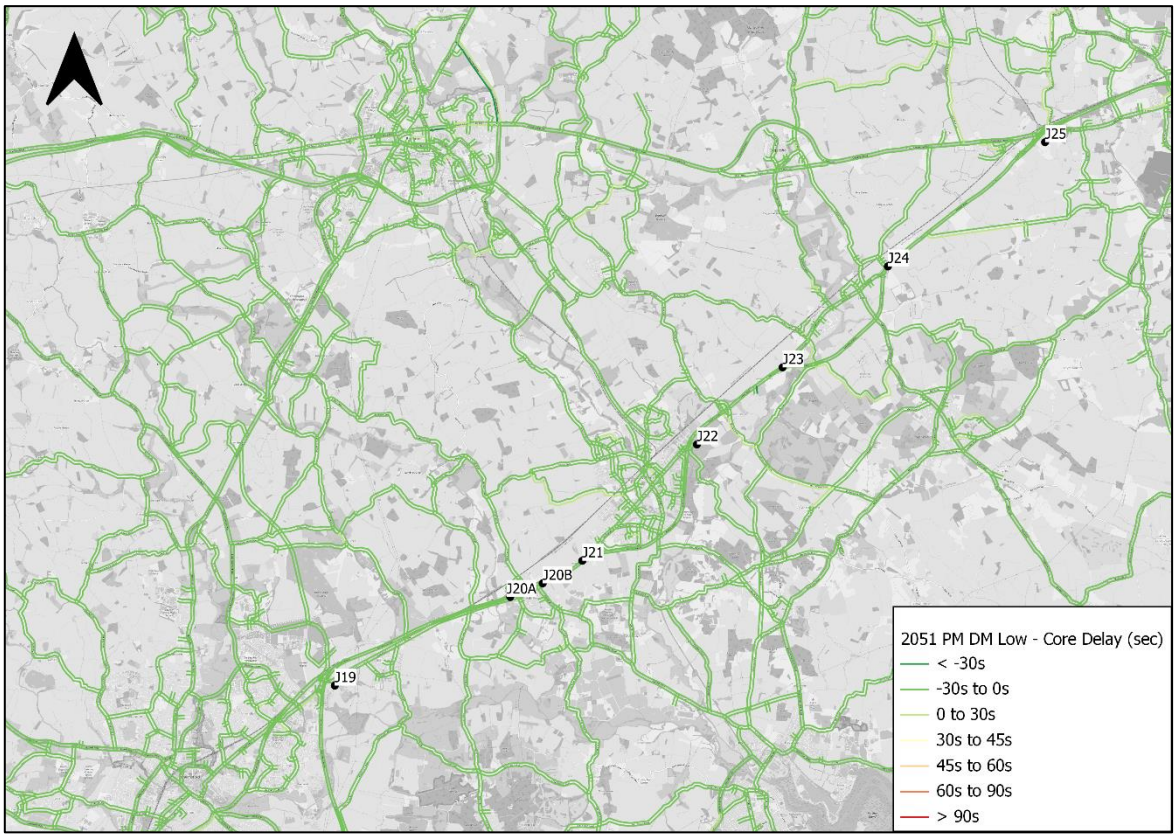
J21
J20B
J20A
J19
2051 IP DM Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
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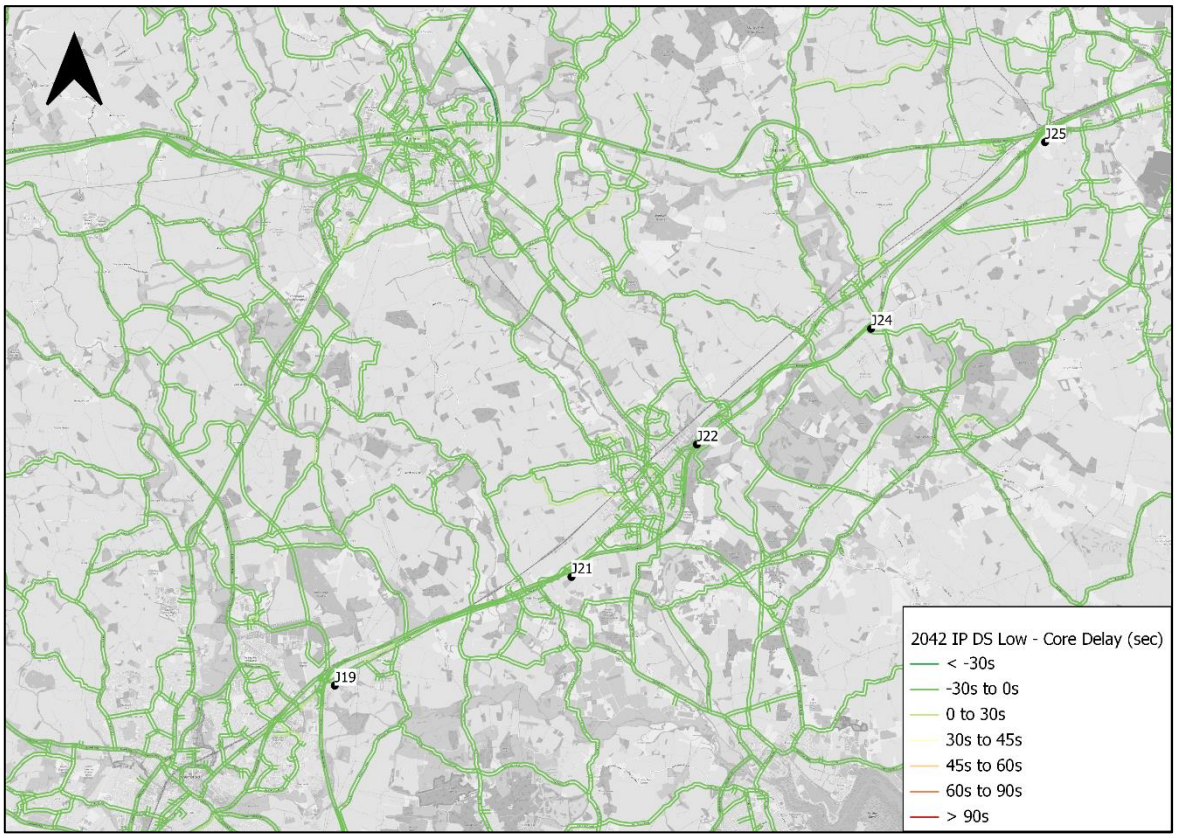
J21
J20B
J20A
J19
2051 PM DM Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 AM DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
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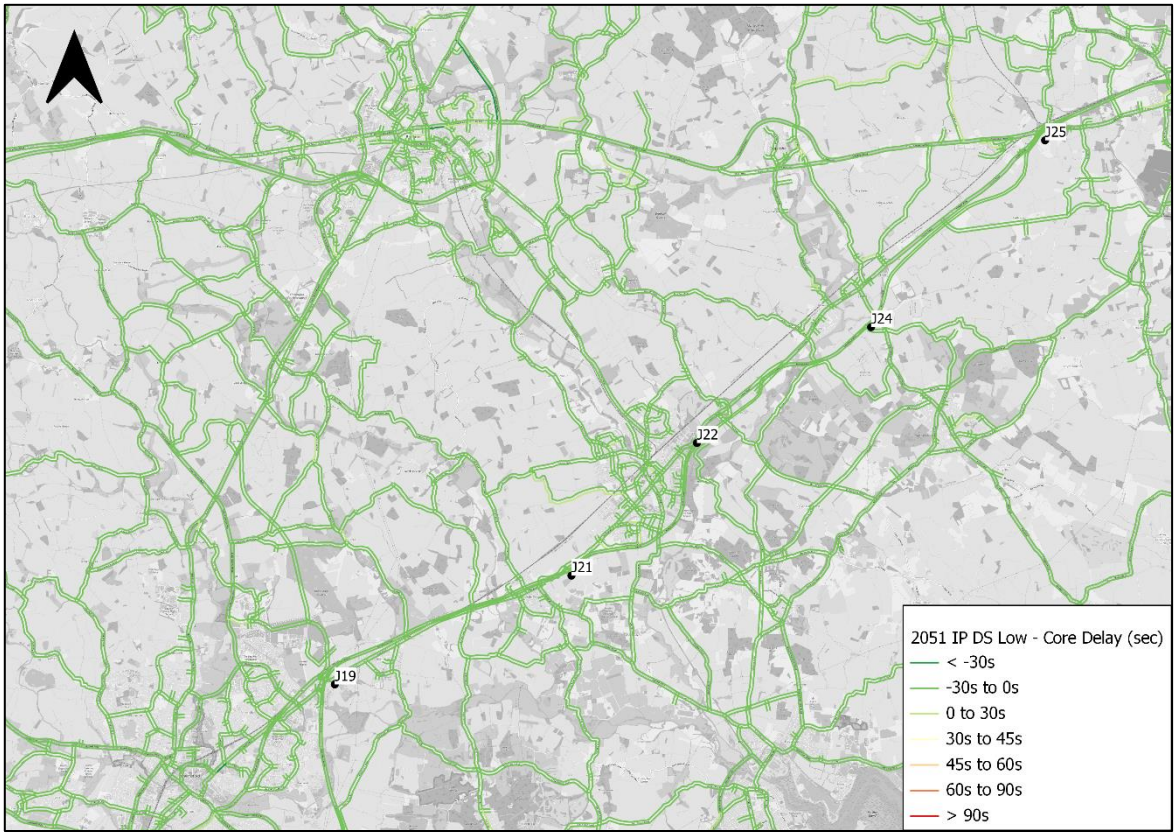
J21
J19
2042 IP DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

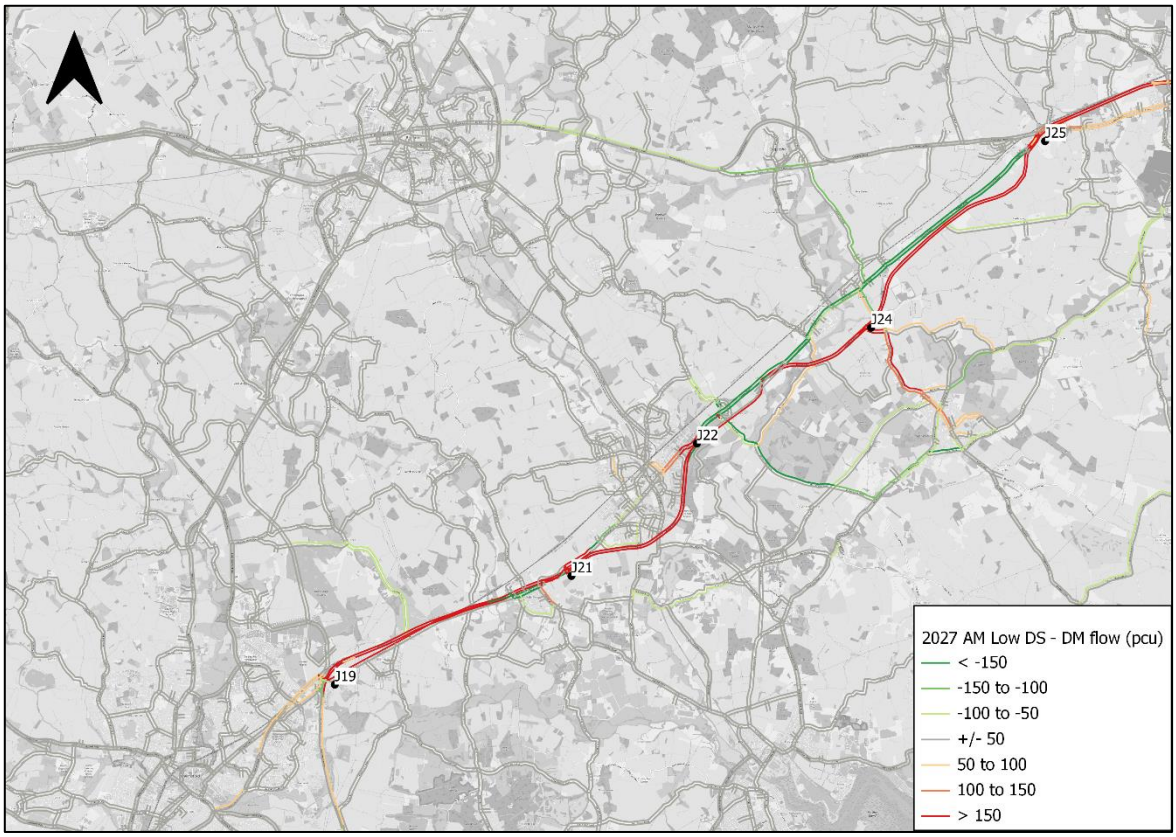

J25
J24
J22
J21
J19
2042 PM DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

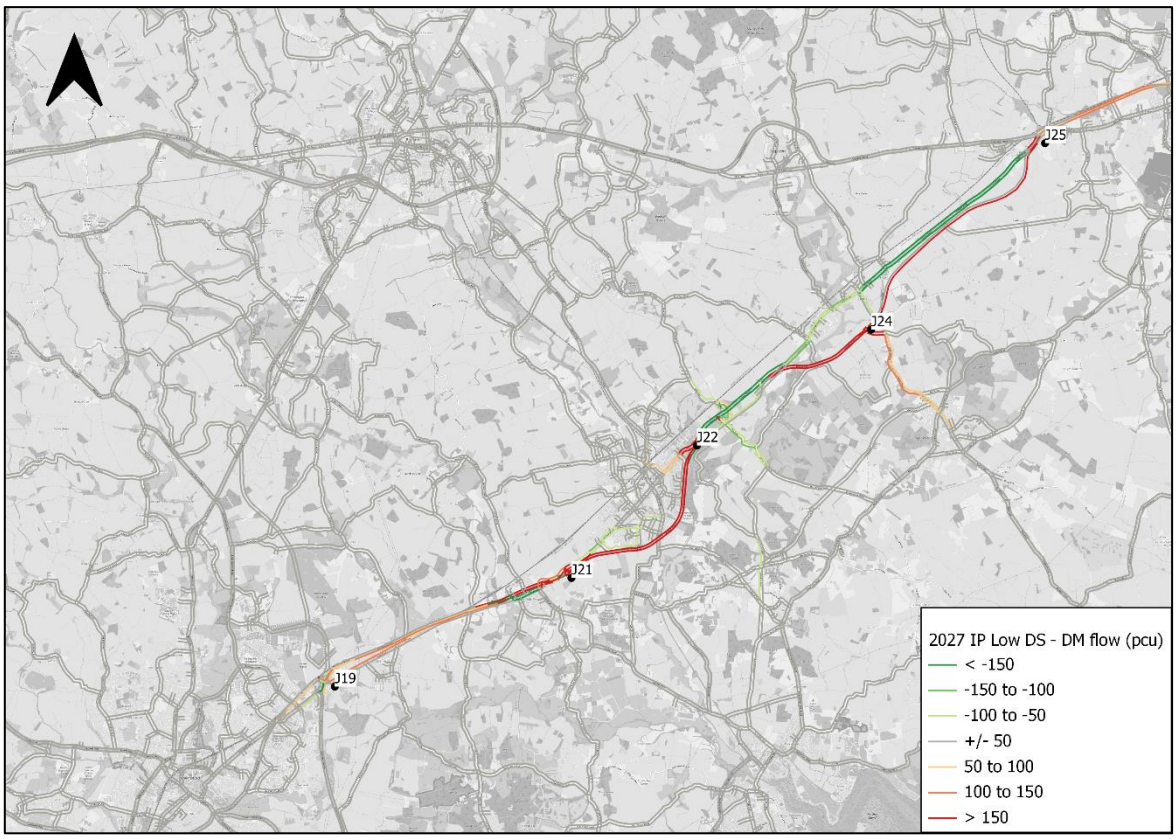

J25
J24
J22
J21
J19
2051 AM DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

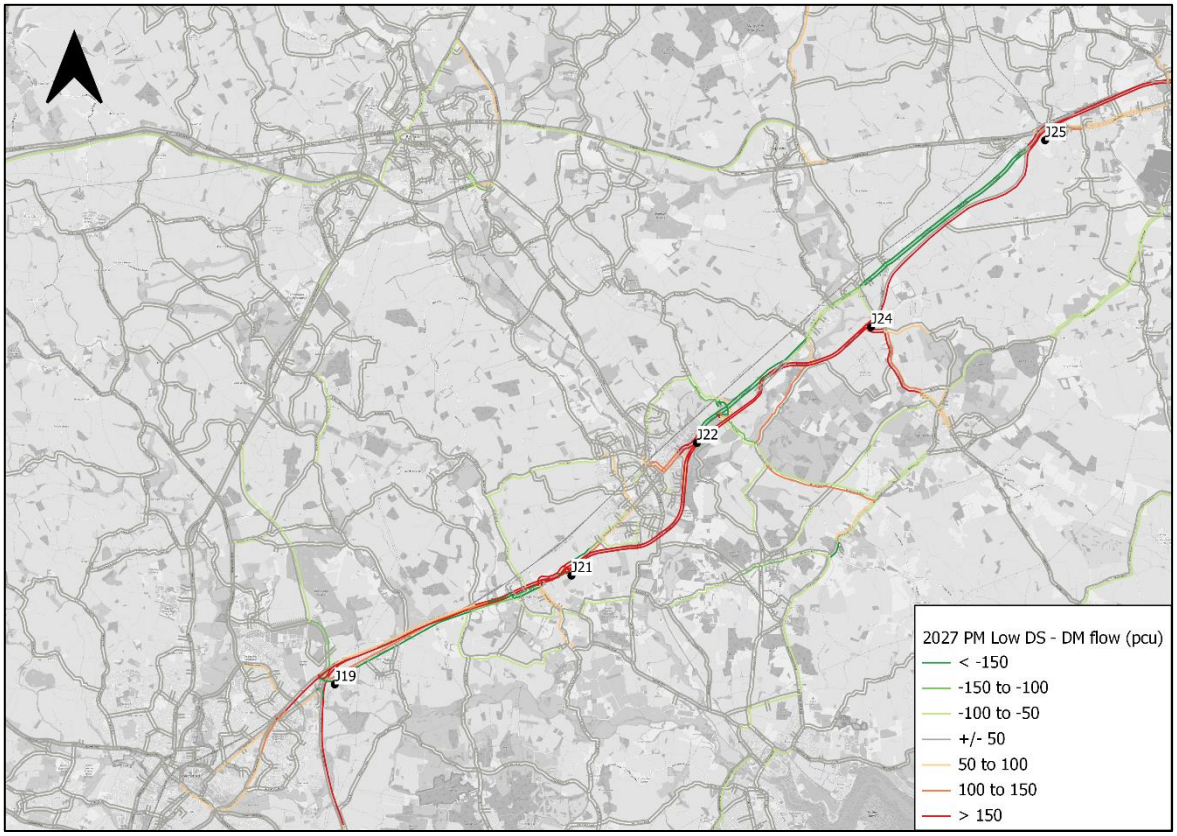

J25
J24
J22
J21
J19
2051 IP DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

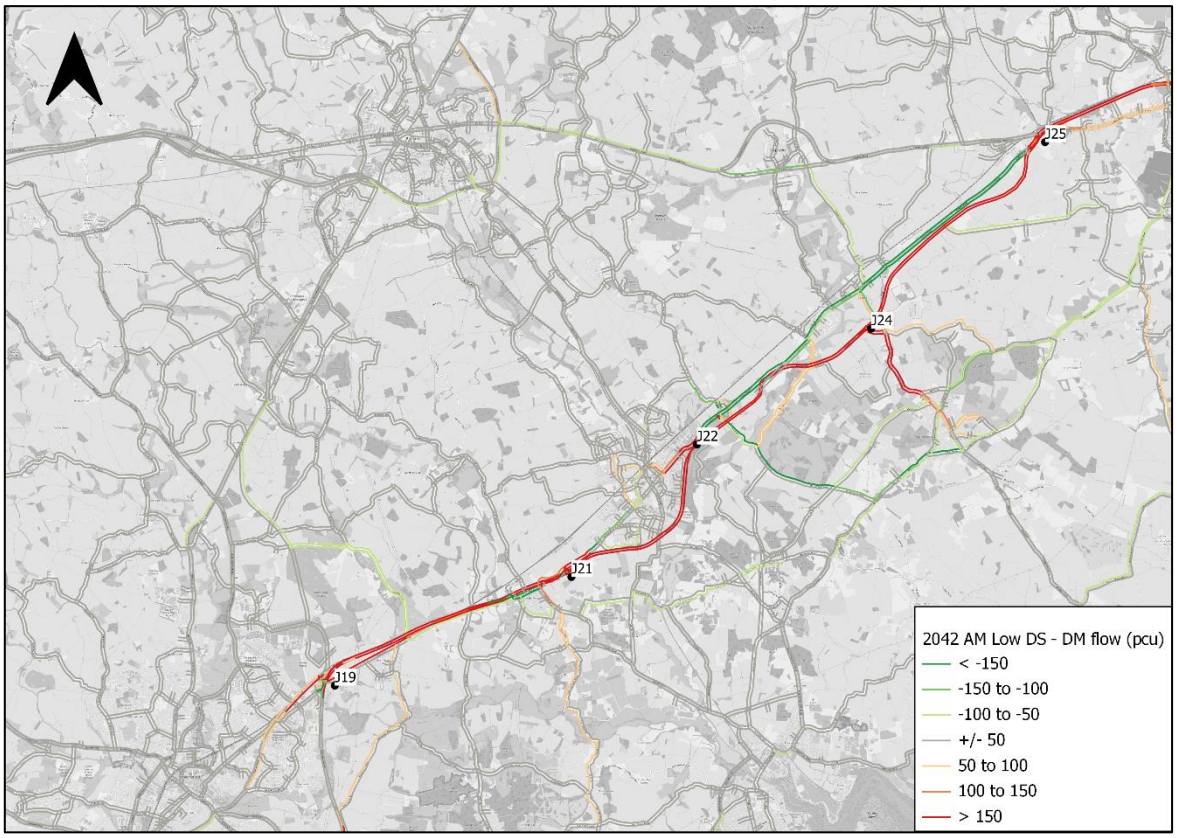

J25
J24
J22
J21
J19
2051 PM DS Low - Core Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

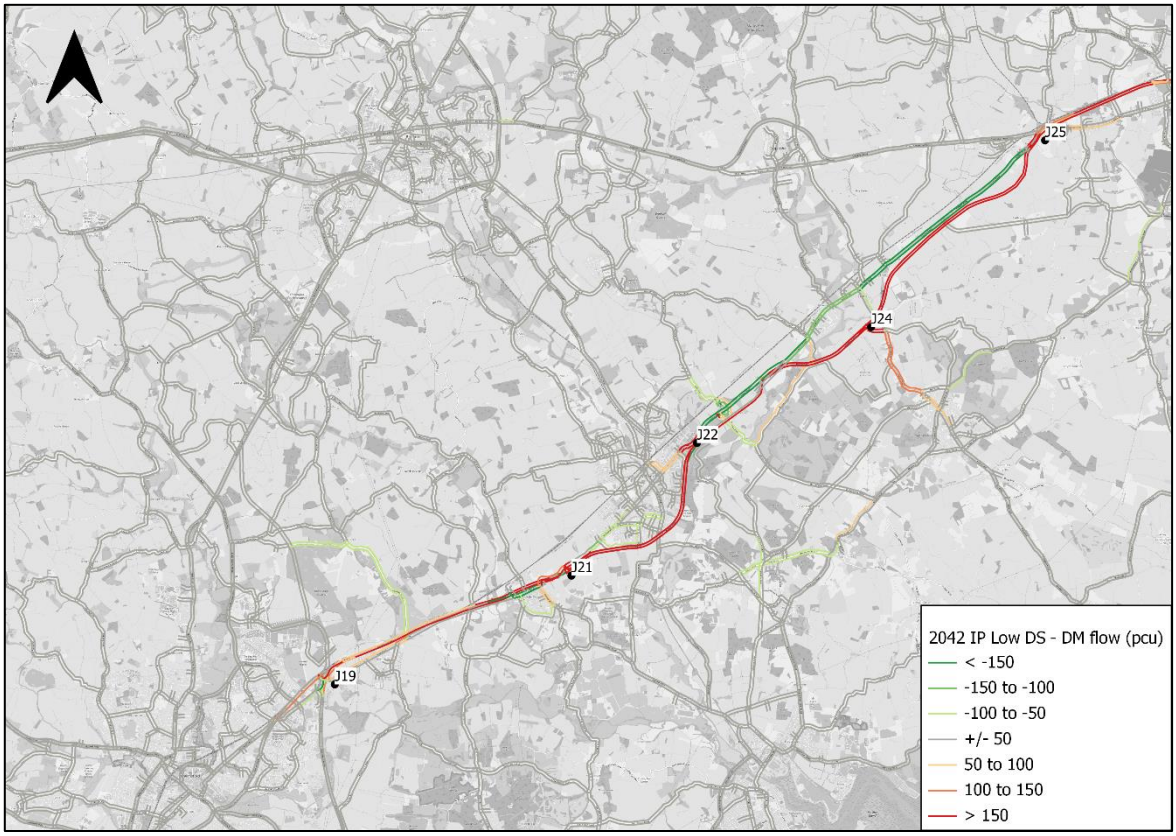
Low Growth DS – DM (flow)

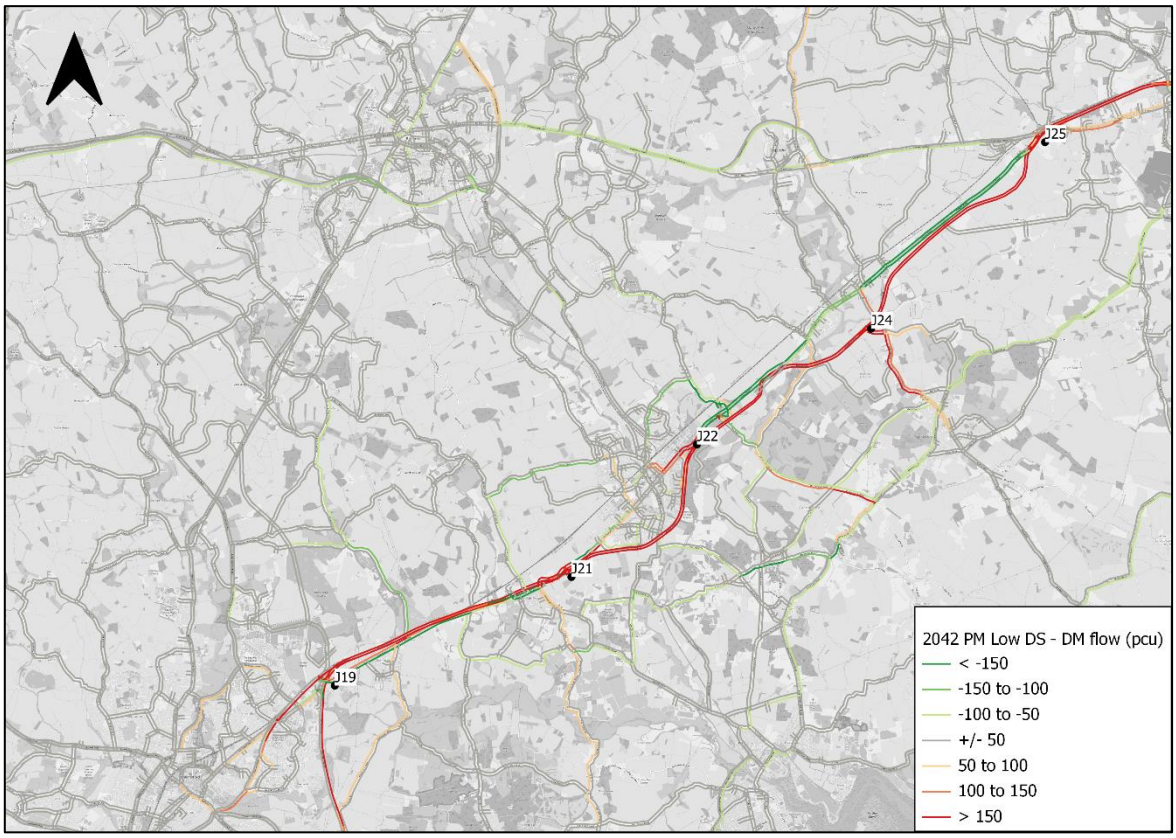


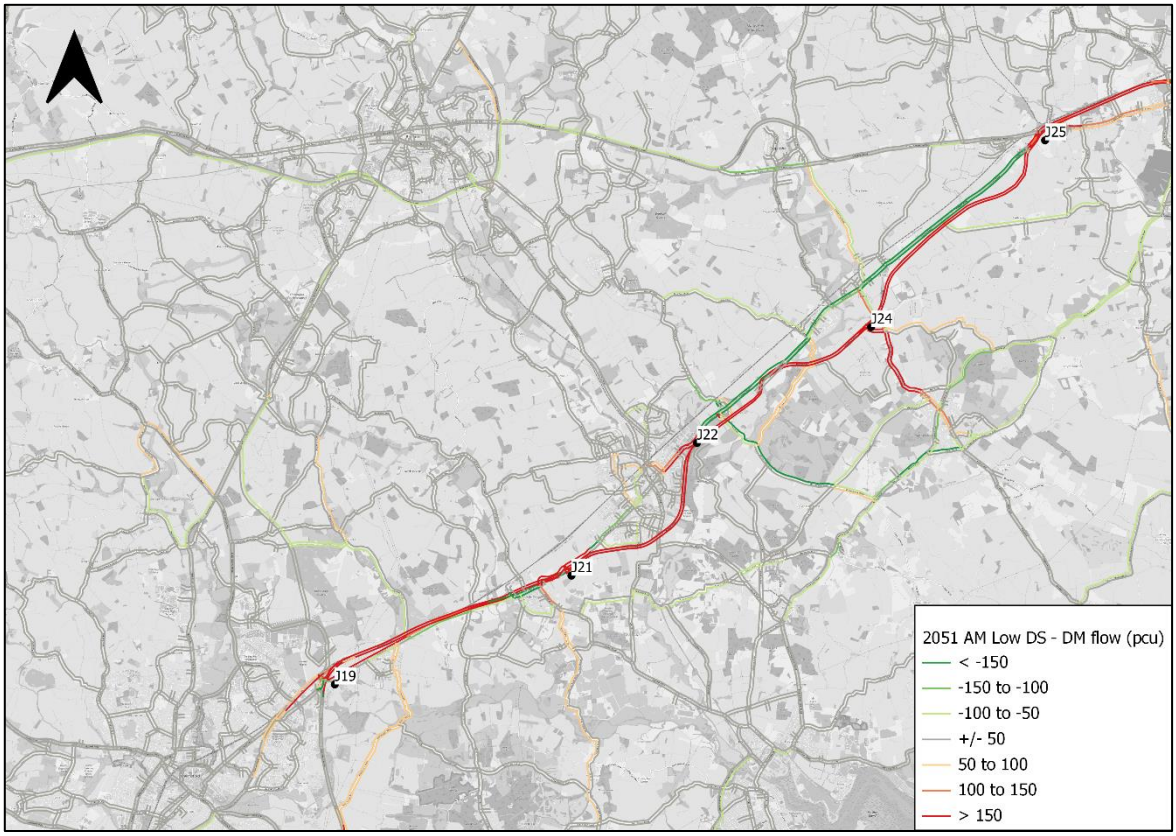


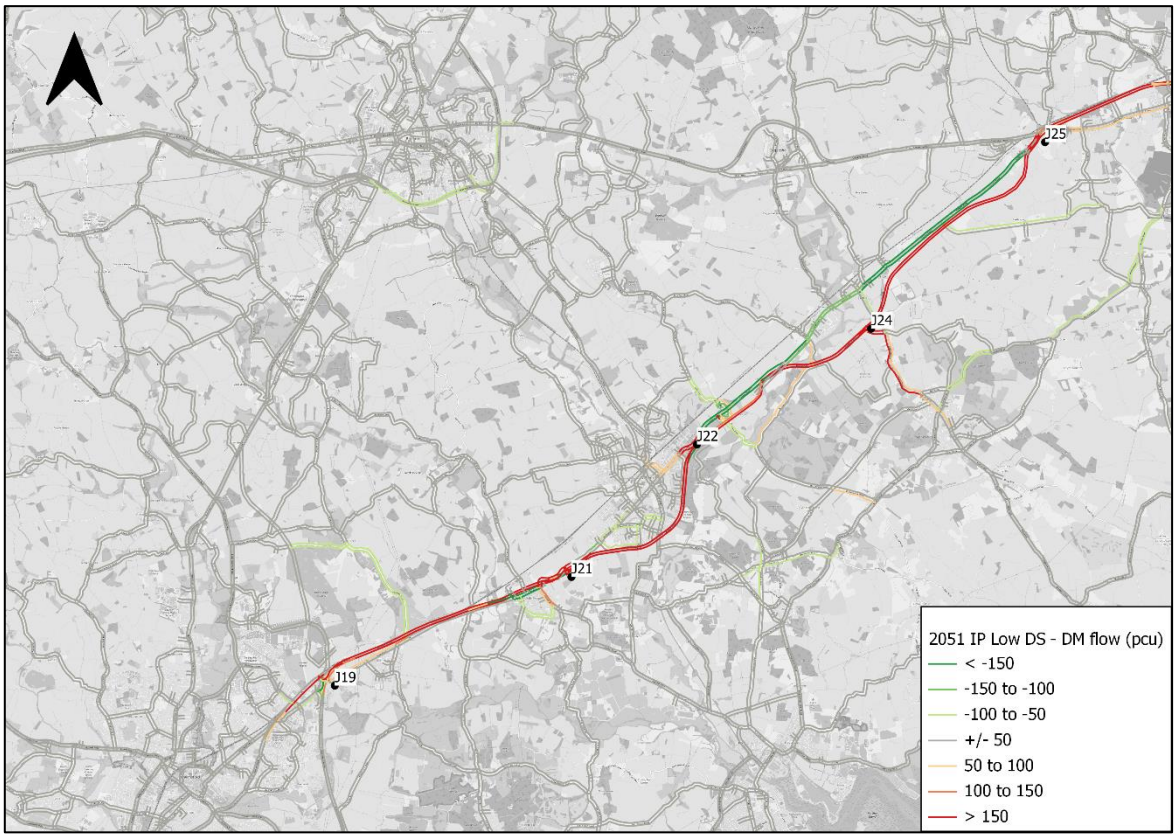

J25
J24
J22
J21
J19
2027 PM Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

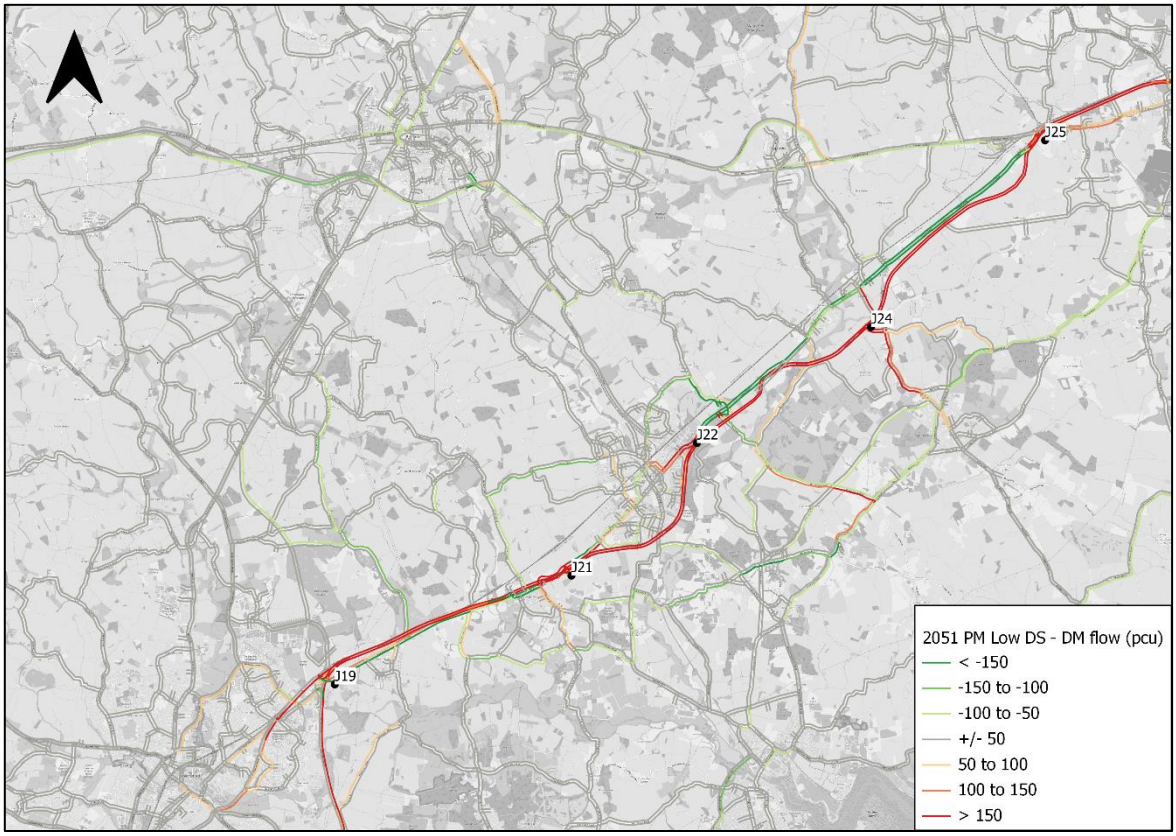

J25
J24
J22
J21
J19
2042 AM Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150


J25
J24
J22
J21
J19
2042 IP Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

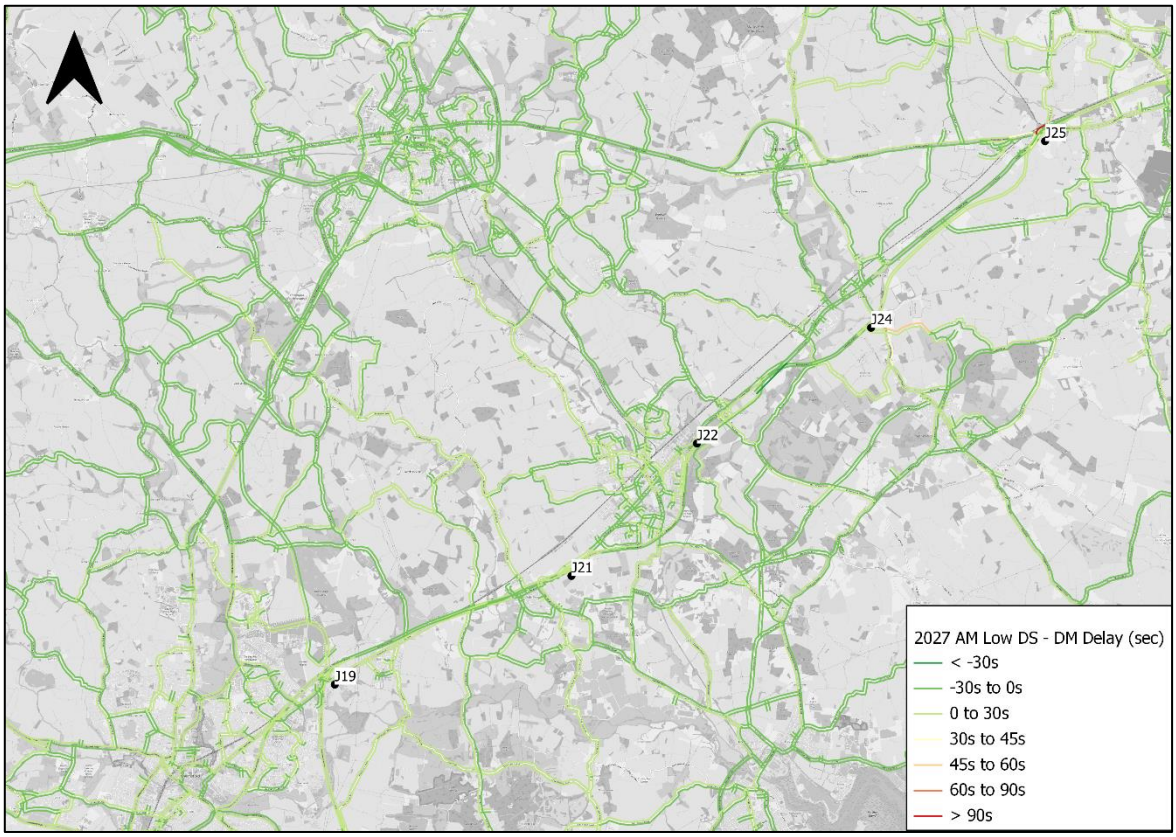

J25
J24
J22
J21
J19
2042 PM Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

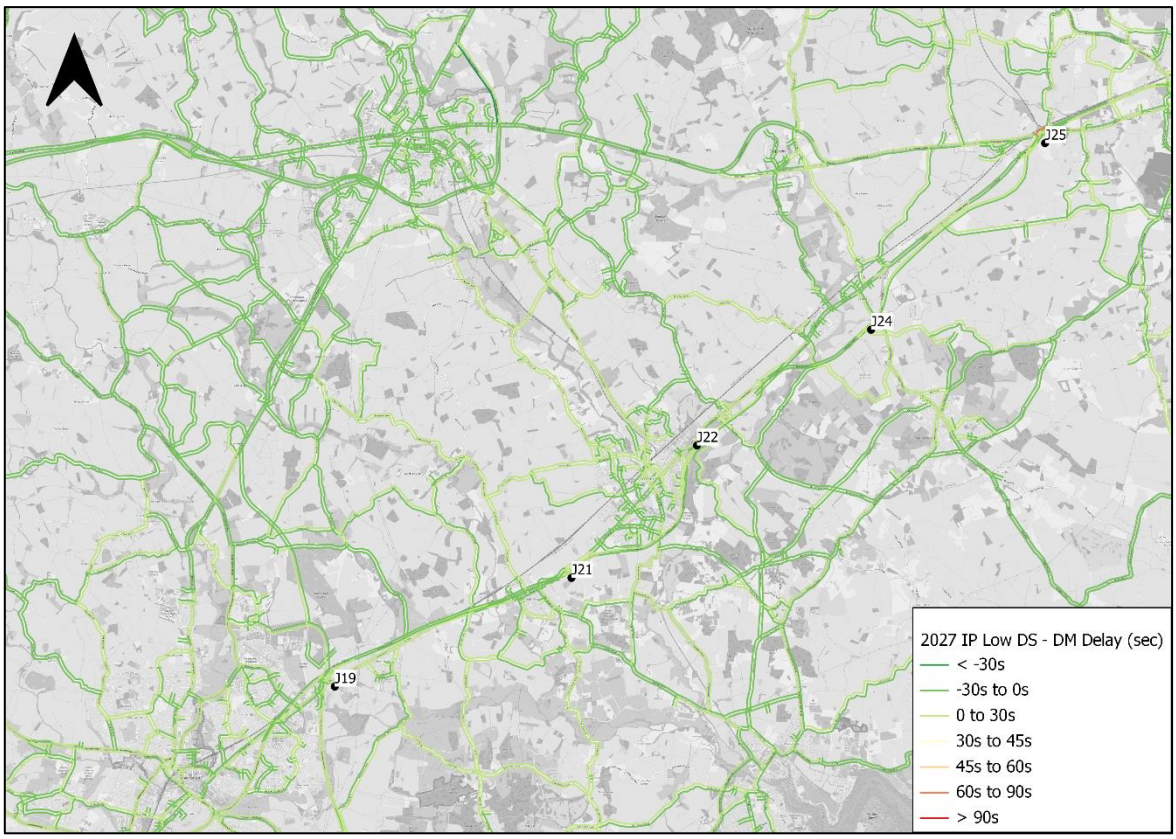

J25
J24
J22
J21
J19
2051 AM Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

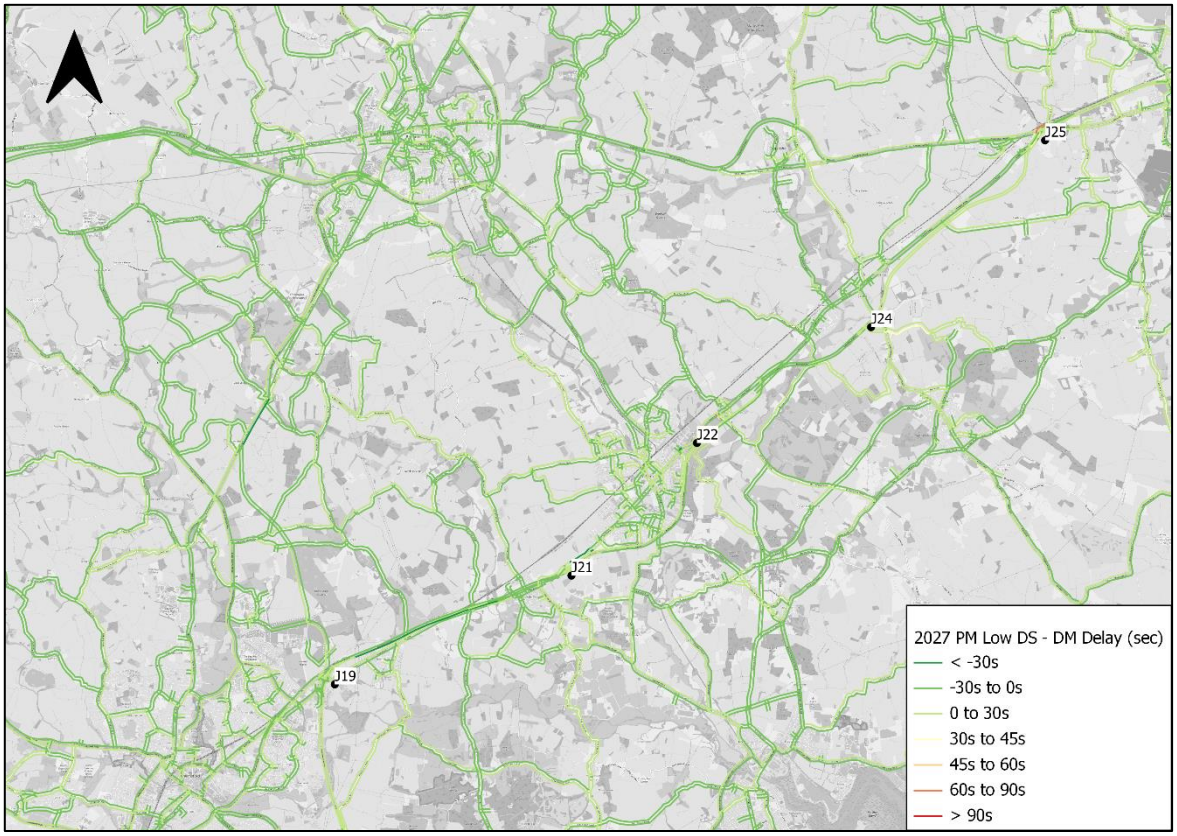

J25
J24
J22
J21
J19
2051 IP Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

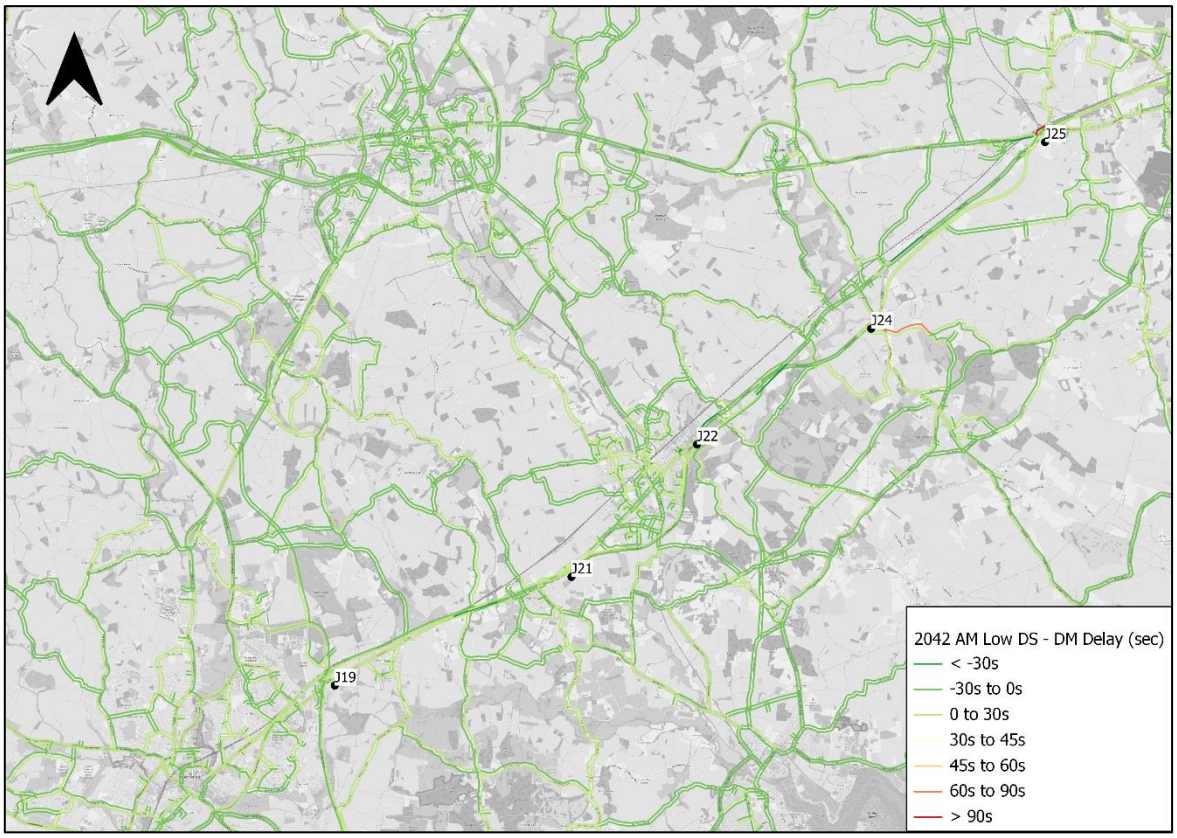

J25
J24
J22
J21
J19
2051 PM Low DS - DM flow (pcu)
< -150
-150 to -100
-100 to -50
+/- 50
50 to 100
100 to 150
> 150

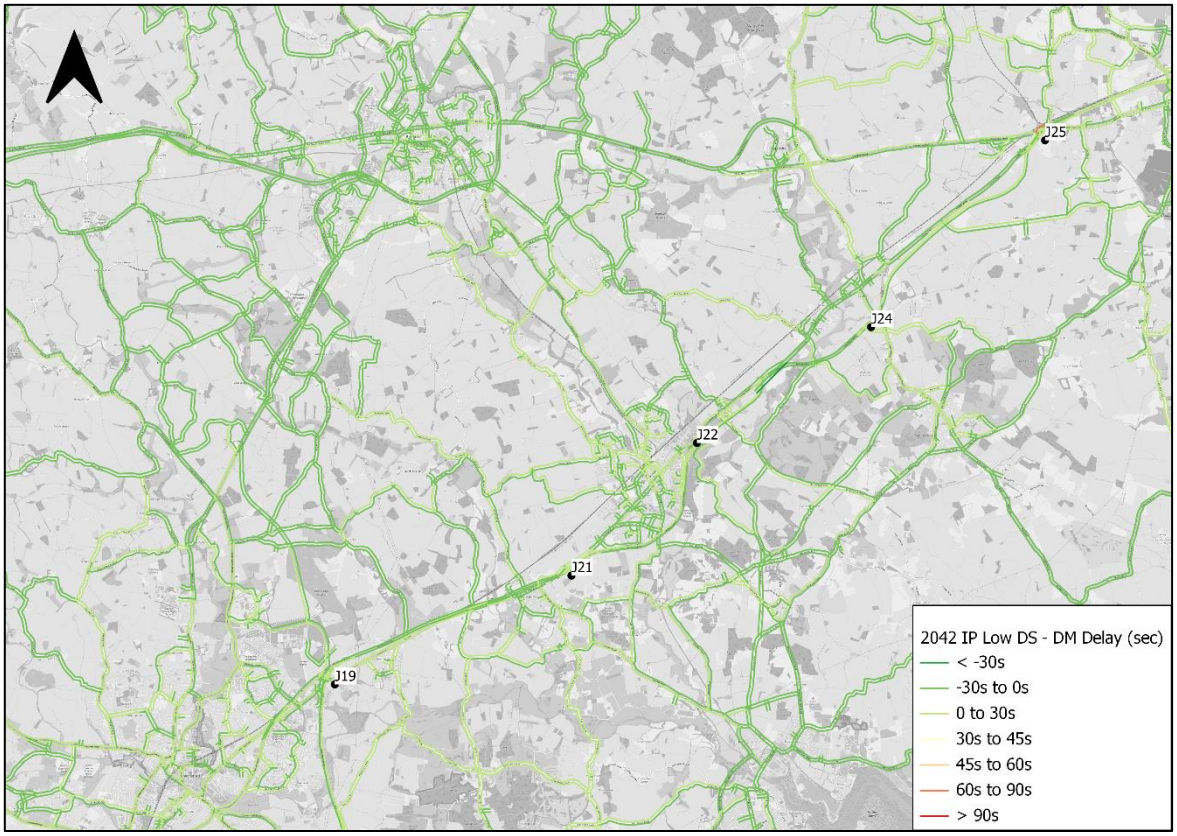
Low Growth DS – DM (Delay)

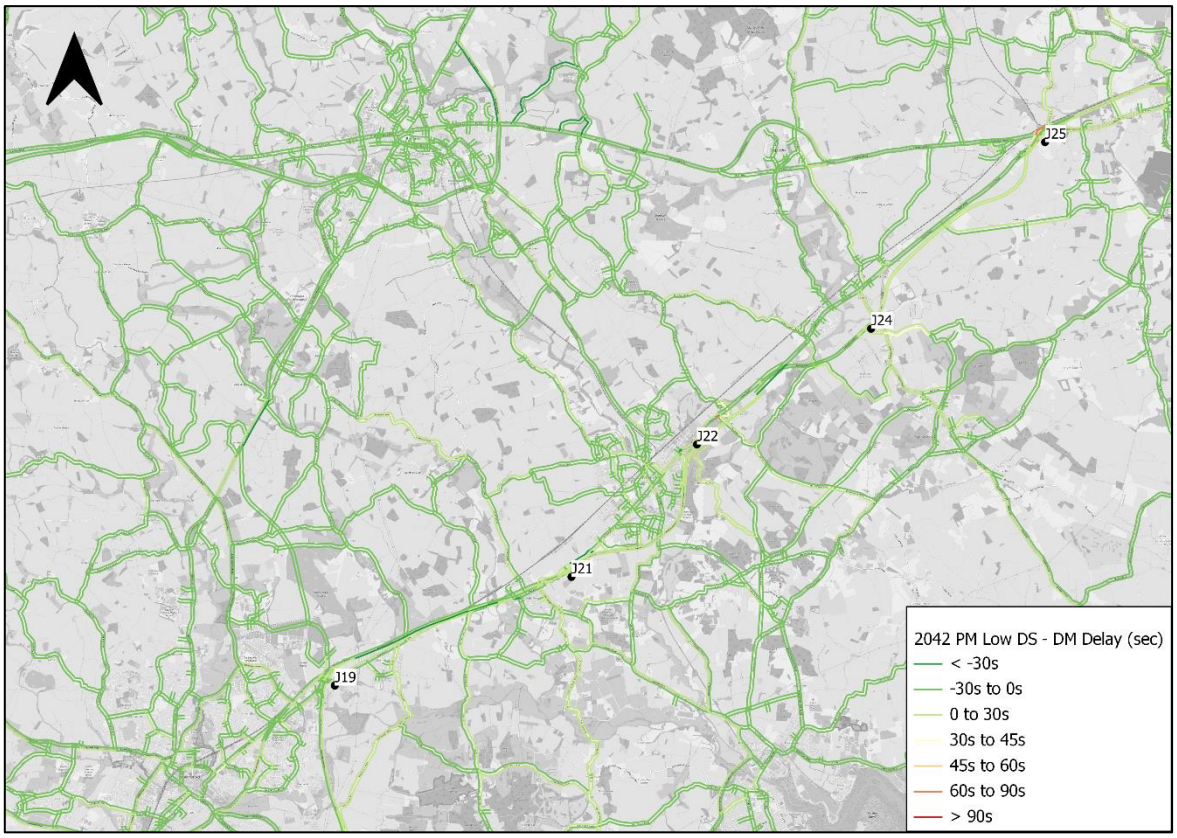


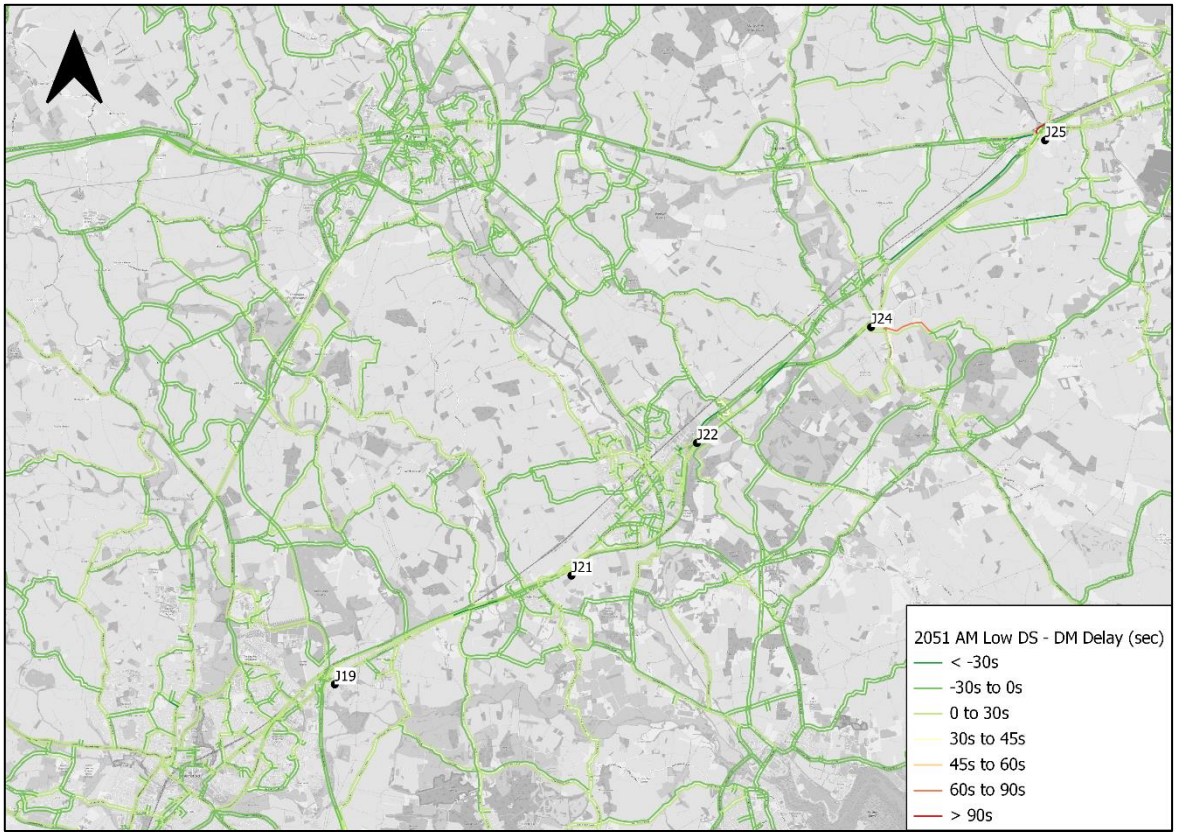


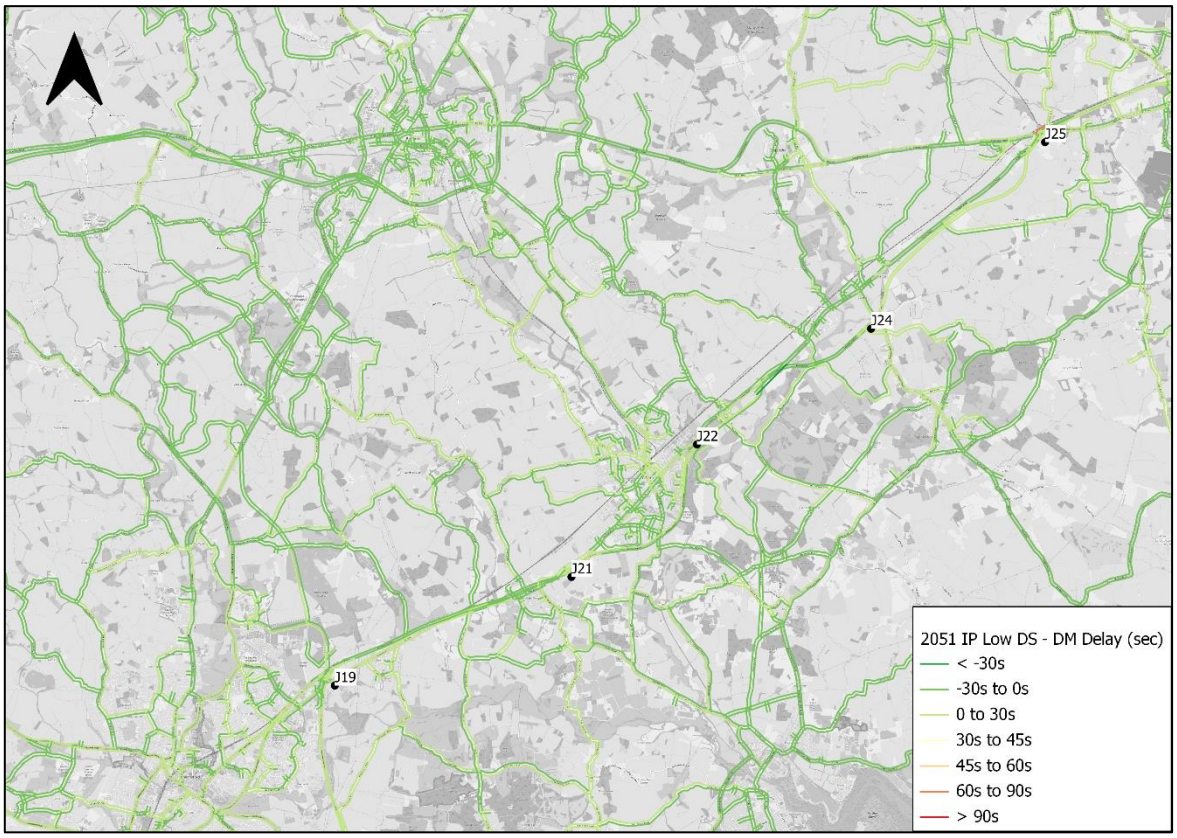

J25
J24
J22
J21
J19
2027 PM Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s

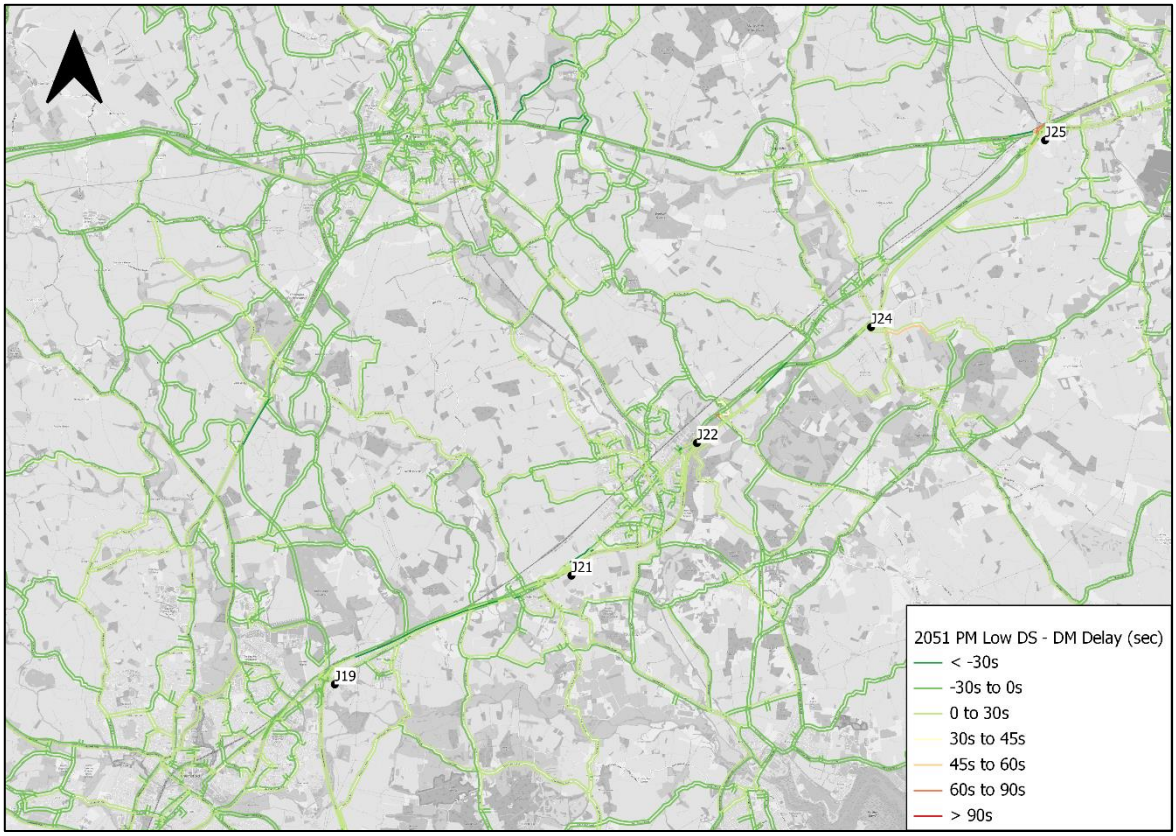

J25
J24
J22
J21
J19
2042 AM Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 IP Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2042 PM Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2051 AM Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2051 IP Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s


J25
J24
J22
J21
J19
2051 PM Low DS - DM Delay (sec)
< -30s
-30s to 0s
0 to 30s
30s to 45s
45s to 60s
60s to 90s
> 90s