A12 Chelmsford to A120 widening scheme

TR010060

7.3 Combined Modelling and Appraisal Report

Appendix A: Transport Data 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 A: TRANSPORT DATA PACKAGE REPORT

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1. Introduction

1.1 Purpose of report

The Transport Data 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 Data Package is to report the collection and initial analysis of data upon which the traffic model is built. It will:

- Set out the need for traffic data taking into consideration the current PCF Stage (the Project Control Framework process) and data required for subsequent Stages;
- Collate, summarise and review available existing traffic data;
- Describe data cleaning, expansion and checking up to the point in which it transfers to the model building process; and
- Summarise and discuss the outputs from the data collection and traffic surveys.

1.2 Structure of Report

Following the introduction, the structure of this report is:

- Chapter 2 Need for traffic data
- Chapter 3 March 2020 Traffic Surveys Cancellation and Alternative Approach
- Chapter 4 Summary and review of existing data
- Chapter 5 Use of Available Traffic Models
- Chapter 6 Final Volumetric and Trip Dataset
- Chapter 7 Journey Time Data
- Chapter 8 Selection of Modelled Peak Hours
- Chapter 9 Suitability of Accumulated Database

2. Need for Traffic Data

2.1 Overview of data requirements

An updated base year transport model for the A12 Chelmsford to A120 widening scheme is being developed to support the scheme's Development Consent Order application (DCO). This forms the second part of the previously agreed two-phase traffic modelling strategy for the 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), which was to:

- Produce a 'Stat Con' model with a base year of 2016 to support the scheme through Statutory Consultation.
- Update the model in Spring/Summer 2021, to produce a 'DCO model' with a base year of 2019. This is to support DCO submission.

The Stat Con model used traffic count and journey time data which was almost entirely from 2016. The reason for producing a DCO model is to incorporate more recent traffic data.

The DCO model will be used to predict future traffic conditions with and without the A12 scheme in place. These traffic predictions form a key input to the scheme design process, as well as to its economic and environmental appraisal.

This report discusses the full set of traffic data used within the 2019 base year DCO model. It does not focus only on the new data incorporated into the model since the earlier 2016 base year Stat Con model.

2.2 Use of traffic data

As described above, the scheme's traffic modelling and economic assessment needs several different types of traffic data. The key uses of the different types of traffic data are set out in Table 2-1.

Table 2-1 Use of survey data

Type of Data	Overview of Key Uses
Volumetric data (link)	- To establish baseline link volume conditions including identification of peak hours - To be used in base model calibration and validation
Volumetric data (junction turning)	- To evaluate the performance and calibration of the model around key junctions within the study area
Vehicle classification data	- To inform the mix of vehicle types represented in the traffic model and establish the flows of the modelled vehicle classes for calibration and validation
Journey time data	- To be used for model validation of journey times along selected routes

3. March 2020 Traffic Surveys Cancellation and Alternative Approach

To inform the A12 PCF Stage 3 base model updates, a set of traffic surveys were proposed to be undertaken from 17th March 2020 for the duration of two weeks.

However, due to the Coronavirus outbreak in March 2020 and following the Government guidance to stay at home, these surveys were cancelled to avoid putting survey company staff's health at risk. Traffic levels were also assumed to be non-typical at that time.

As an alternative course of action, better use was made of existing traffic data. Count data from Essex County Council which had previously been discounted in favour of collecting new data was used, as described in Chapter 4. This data is considered to be a good replacement for the cancelled traffic surveys.

4. Summary and Review of Existing Data

4.1 Volumetric data

Summary of available data

Several existing traffic count (volumetric) datasets are available for use in developing the A12 Stage 3 traffic model. These are described in Table 4-1.

Table 4-1 Existing volumetric datasets

Dataset	Available data
A120 model	Traffic data was collected as part of the development of the A120 Braintree to A12 scheme's traffic model (A120 model). This included Automatic Traffic Counts (ATC), Manual Classified Counts on links (MCC), and Manual Classified Turning Counts at junctions (MCTC).
Stage 2 A12 model	Traffic data was collected as part of the development of the existing PCF Stage 2 A12 traffic model (PCF Stage 2 is the stage of National Highways' Project Control Framework where a preferred route is identified). As with the A120 model data, this included ATCs, MCCs and MCTCs.
Essex County Council counts database	A database of traffic count information has been made available by Essex County Council (ECC). The data comprises ATCs, MCCs and MCTCs collected by or on behalf of the Council. ATC counts are available at a number of locations throughout Essex, with data recorded at both permanent inductive loop sites as well as temporary sites recorded on an ad-hoc basis. Temporary counts have typically been carried out for a 7 or 14 day period. The MCCs and MCTCs were typically undertaken for the 12-hour period between 07:00 and 19:00 hours, or in some instances the counts are limited to peak periods. The data is recorded in 15-minute intervals,
National Highways WebTRIS database	National Highways has an extensive set of permanent monitoring sites across the Strategic Road Network (SRN) which is accessed via the WebTRIS site. These measure the volume of traffic on the network and provide continuous output. This enables the derivation of robust seasonality profiles and average hourly volumes at specific sites.

These existing datasets were reviewed to identify which data was suitable for use for the purposes of this project, based on the criteria that:

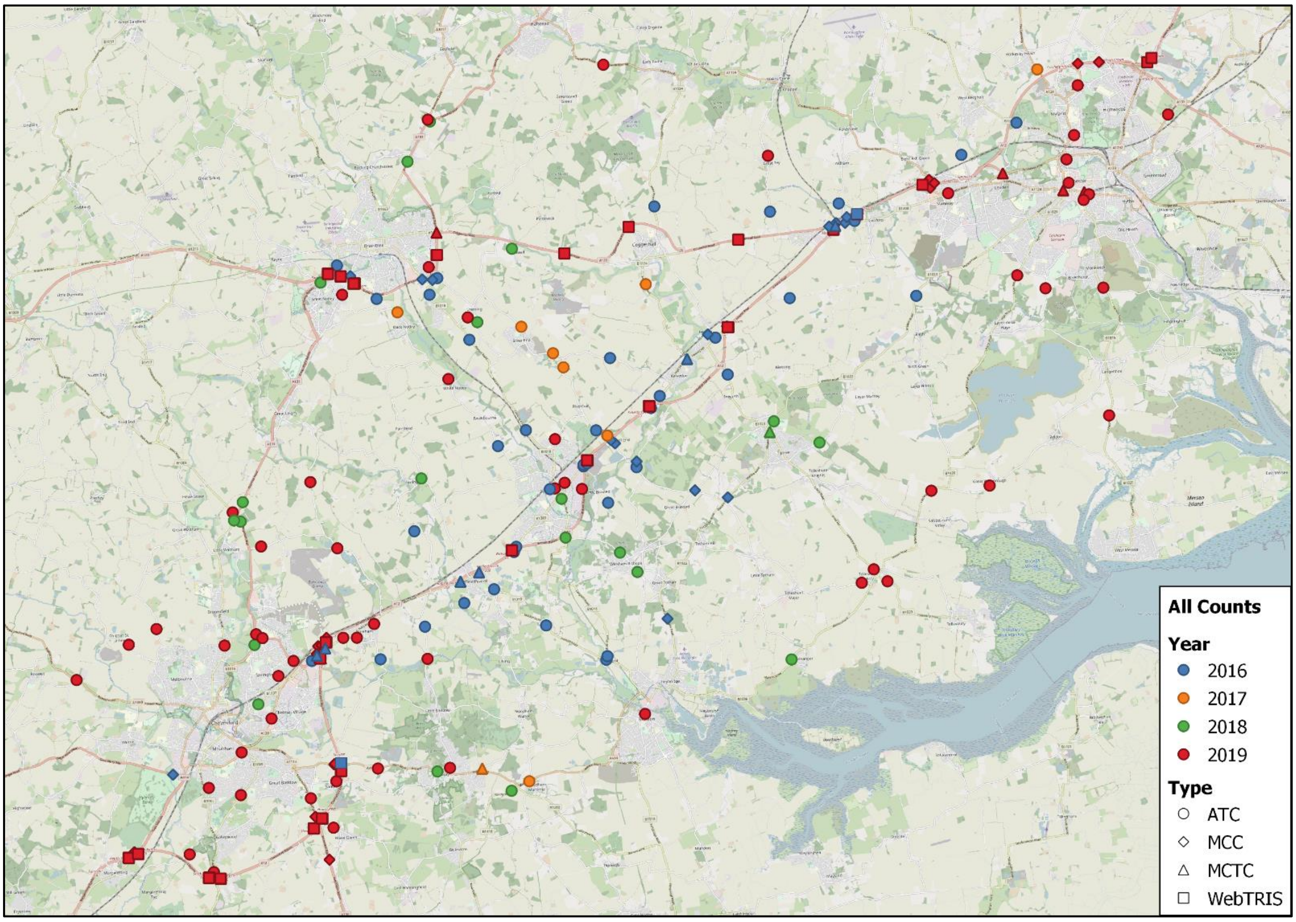
- Data should be from a neutral month in 2016, 2017, 2018 or 2019 to align with data required for model development
- The location of the counts should be relevant to towns, villages or key routes that would be suitable for use in the calibration or validation of the base model

Those counts which match the criteria were selected and processed to:

- Factor counts to 2019 levels (see section 4.1.2)
- Classify counts into the cars, LGVs and HGVs as required in the traffic model (see section 4.1.3)
- Ensure data was checked and logical (see section 4.1.4)
- Extract data for the required model time periods (see chapter 8 for details on how these time periods were selected)

The location of the final set of existing counts that were processed and selected for use in the model is shown in Plate 4-1. Chapter 6 provides a summary of this final volumetric dataset.

Plate 4-1 Locations of volumetric traffic data taken forward for use in the DCO model



Factoring of count data to 2019

The available traffic data originates from the years 2016, 2017, 2018 and 2019. Figure 4-1 shows the location of the counts by year. To obtain the required input to transport model all data was factored up to the year 2019, which is the model base year.

Initially, count sites that had data available for each of the different years were compared to estimate the traffic growth factors between each year. However, the sample size available was not large enough to calculate reliable factors. It was decided that growth factors using the Eastern England RTF18 data for different classes of road would be more appropriate. The calculated factors are presented in Table 4-2.

Table 4-2 Traffic growth factors for conversion to 2019

Year	Road Type	Factor			
		Total	Car	LGV	HGV
2016-2019	Trunk A Road	1.056	1.061	1.060	1.015
2016-2019	Principal A Road	1.033	1.032	1.055	0.996
2016-2019	Minor Road	1.036	1.032	1.069	0.989
2017-2019	Trunk A Road	1.036	1.040	1.039	1.010
2017-2019	Principal A Road	1.022	1.021	1.036	0.997
2017-2019	Minor Road	1.024	1.021	1.045	0.992
2018-2019	Trunk A Road	1.018	1.019	1.019	1.005
2018-2019	Principal A Road	1.011	1.010	1.018	0.999
2018-2019	Minor Road	1.012	1.010	1.022	0.996

The RTF total growth factor has been applied to the ATC and WebTRIS count data if the vehicle classification split is later calculated using a corresponding MCC count, as discussed in Section 4.1.3. This is because the vehicle splits provided by these data sources are considered to be less reliable than the vehicle split provided by the MCC count. Applying the factors by vehicle class prior to adjusting the classification split could result in the wrong factors being applied.

For MCC and ATC counts that use their original vehicle classification, the RTF growth factor has been applied by vehicle class.

Classification of count data into vehicle types

Although the WebTRIS count data and ATC data can provide traffic at an all-vehicle level, it is necessary to estimate how this total traffic is split between vehicle types.

WebTRIS count data was divided into the model vehicle categories by using factors derived from the nearest MCC count on the same road. WebTRIS counts located on the A12 were split based on A12 MCC counts, while WebTRIS counts located on the A120 were split based on A120 MCC counts. This was considered to be more reliable than the classification based on vehicle length which is available within the WebTRIS data itself.

Where possible, estimates of vehicle classification for ATC counts were calculated using the nearest MCC count from the same road. In cases where a corresponding MCC count was unavailable, the ATC vehicle classifications for Car, LGV and HGV vehicles were maintained. Table 4-3 summarises the number of counts which have been adjusted.

Table 4-3 Traffic growth factors for conversion to 2019

Count Type	Vehicle split has been adjusted using a corresponding MCC count	Vehicle split has been maintained
ATC	46	77
WebTRIS	53	0

Data cleaning and checking

This section outlines the data quality checks that were undertaken for the DCO model dataset. Data quality checks were also undertaken both by the survey companies and as part of the development of the previous A12 and A120 traffic models. Similarly, additional ad-hoc sense checks were undertaken on count data during the model calibration and validation process.

All count data was cleaned and processed for neutral periods as follows:

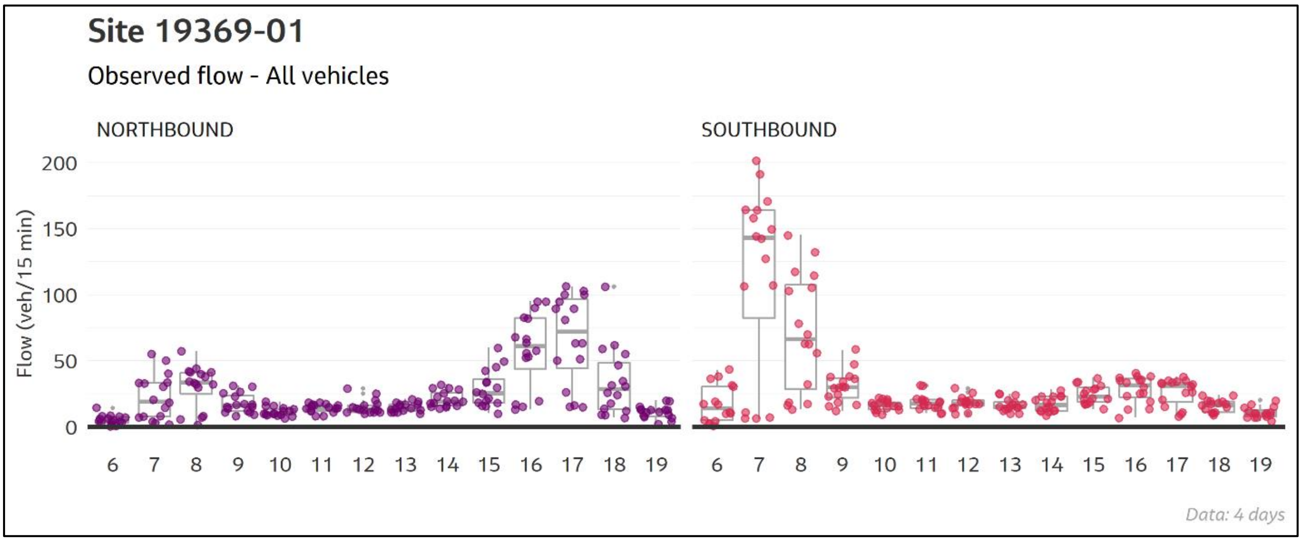
- Removal of non-neutral months (January, February, August, and December).
- Removal of Fridays, weekends, and Bank Holidays.
- Removal of the weeks before/after Easter, the Thursday before and the week of the bank holiday.
- Removal of school holidays.

To account for possible outliers within the dataset, daily traffic flows greater than 2 standard deviations away from the mean were removed. Days with a daily flow equal to zero were also removed from the count dataset.

Visual checks were also undertaken for all count sites used as part of the DCO model dataset. Visual checks of the count data profiled over each day were used to identify any days or part-days for which traffic data looked unusual. These visual checks highlighted counts which did not have a distinctive pattern or showed multiple traffic flow trends. For example, the raw observed traffic flow data for site 19369-01 is shown in Plate 4-2. This site exhibits two traffic flow trends, particularly for the southbound AM traffic.

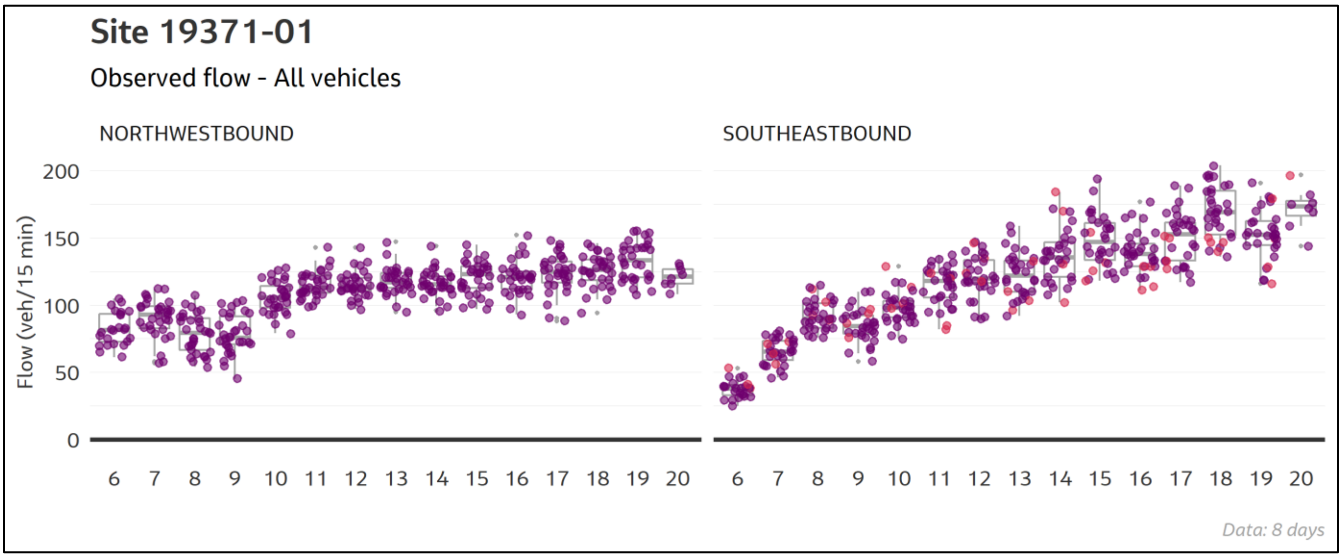
Count sites identified as having an unusual traffic flow profile, such as site 19369-01, were compared against adjacent count sites to allow the correct traffic flow trend to be identified. The outlier could then be removed from the final dataset by removing the day containing the outlier or by removing the count site completely.

Plate 4-2 Traffic flow for site 19369-01



Additionally, traffic profile checks were completed to check consistencies in flow patterns and tidality. For example, Plate 4-3 shows traffic to be increasing unusually throughout the day in the South-East direction. Count sites identified as having a potential issue with tidality were checked against adjacent count data to confirm whether the count should be removed as an outlier. If the flow data was considered to be inconsistent with nearby count sites, the count was removed from the final dataset.

Plate 4-3 Traffic flow for site 19371-01



The full dataset was checked for consistency against adjacent counts where available. This helped to identify additional outliers or directionality issues. Similarly, where multiple counts exist in a similar location, it was checked that the count used is generally representative of most other counts. Visual checks were also conducted to ensure the processed count data seemed generally appropriate for the relevant road type.

Table 4-4 provides an example of a directionality issue that was identified with count site 16326-1314. All counts shown in Table 4-4 are located on the same link and represent 2016 data. While count site 16139-25 and 16326-52 both display higher AM traffic flows in the Northbound direction and higher PM traffic flows in the Southbound direction, the reverse is true for site 16326-1314. In this case, it was concluded that there was an issue with the directionality of site 16326-1314, as provided by the survey company. So, the directions were corrected in line with the adjacent count sites.

Table 4-4 Consistency check example

Site ID	*Direction*	*AM Total Flow (7:30-8:30)*	*IP Total Flow (10:00-16:00)*	*PM Total Flow (17:00-18:00)*
16139-25	*N*	*484*	*316*	*330*
16139-25	*S*	*381*	*344*	*588*
16326-52	*N*	*479*	*332*	*303*
16326-52	*S*	*370*	*344*	*598*
16326-1314	***N***	***346***	***363***	***604***
16326-1314	***S***	***468***	***342***	***333***

After potential outliers or inconsistencies within the dataset had been identified, these counts were adjusted as appropriate or replaced by an alternative count site if available.

Once the total flows had been checked, further checks were completed for the vehicle splits. All counts with an HGV percentage greater than 10% or an LGV percentage greater than 30% of the total traffic flow were investigated. ATC count sites which were considered to have an unrealistic vehicle split were adjusted using an alternative MCC count from the same road where possible. In cases where an MCC count was unavailable, the ATC count retained the original ATC classification or an average vehicle split was applied, calculated from nearby counts of the same road type. MCC or MCTC count sites which were considered to have an unrealistic vehicle split were removed from the dataset.

As a consistency check, vehicle splits were also compared between corresponding ATC and MCC counts where possible.

4.2 Other existing data

Matrix data used

The A12 PCF Stage 3 Analytical Requirements Report proposed that the updated DCO model should incorporate new origin/destination data that was being procured as part of the Regional Traffic Model (RTM) update. This data was due to be available in early 2021. However, due to methodological inconsistencies between how the 2015 and 2021 RTM matrices were developed, this approach was not possible.

It was therefore agreed with National Highways' Transport Planning Group that the DCO model's origin/destination data would still be based on that from the South East Regional Transport Model Design Fix 3 (SERTM DF3) 2015 data. Section 5.4 describes how this data was then manipulated for use as the input matrices for the DCO base model.

Journey time data

Journey time data is used to understand baseline transport conditions and for validating the new base year A12 traffic model. The DfT provided data purchased from Teletrac Navman containing global positioning system (GPS) derived journey times of vehicles. This data was used to calculate observed journey time data along a series of key routes. This is described further in Section 7.

5. Use of Available Traffic Models

5.1 Use of A120 traffic model

The traffic modelling requirements for the project during the current stage (known as PCF Stage 3) specified that a new base year transport model should be developed, which would be a modified version of the 'A120 traffic model'. This A120 model was originally developed by Essex County Council to support the A120 Braintree to Marks Tey scheme appraisal.

The main reasons for using the A120 model as a starting point for a PCF Stage 3 A12 model were that:

- The A120 model had better calibration / validation within the study area than the previous A12 model.
- The A120 is based on National Highways' SERTM regional traffic model. This is key to ensuring future traffic data updates (such as new mobile phone demand data and new freight model data) can be incorporated, as they will be in a SERTM compatible format.
- Interactions between the A12 and A120 schemes can be assessed within a single traffic model.

To produce the PCF Stage 3 A12 model, we have extended the A120 model to provide an area of detailed modelling which is appropriate for the A12 scheme. The A120 model is therefore the primary source of network information for the new A12 model.

Full details of how the A120 model is used in the development of the PCF Stage 3 A12 model are provided in the Transport Model Package report.

We are also utilising some of the traffic survey data used to develop the A120 model, as discussed in Section 4.1.

5.2 Use of the PCF Stage 2 A12 model

Where the A120 traffic model network is being extended to cover the A12 scheme area in detail, some scheme coding information from the previous PCF Stage 2 A12 model is being used to inform this.

We are also utilising some of the traffic survey data used to develop the previous PCF Stage 2 A12 model, as discussed in Section 4.1.

5.3 Use of the PCF Stage 3 'Stat Con' A12 model

As discussed in Section 4.1, an updated A12 base year transport model is being developed at PCF Stage 3 to support the scheme through DCO. The DCO model network has been informed by the previous A12 Stage 3 model (the 'Stat Con model'). While some network changes have been made for the DCO model update, much of the network remains the same.

5.4 Use of the South East Regional Transport Model (SERTM)

Conversion to the A12 zones

The underlying trip matrix data used in the new A12 model are taken from SERTM DF3 (March 2015). The matrices were aggregated and disaggregated to be in line with the A12 zoning system, using Census 2011 output area information on the number of households and jobs in line with the assumptions in Table 5-1 below.

Table 5-1 Assumptions for Use of Demographic Data to Split SERTM Zones

Period	User Class			Origin	Destination
AM	UC1	Car	Employer's Business	Jobs	Jobs
AM	UC2	Car	Commuter	Households	Jobs
AM	UC3	Car	Other	Households	Jobs
AM	UC4	LGV	Light Goods Vehicle	Jobs	Jobs
AM	UC5	HGV	Heavy Goods Vehicle	Jobs	Jobs
IP	UC1	Car	Employer's Business	Jobs	Jobs
IP	UC2	Car	Commuter	Jobs+Households	Jobs+Households
IP	UC3	Car	Other	Jobs+Households	Jobs+Households
IP	UC4	LGV	Light Goods Vehicle	Jobs	Jobs
IP	UC5	HGV	Heavy Goods Vehicle	Jobs	Jobs
PM	UC1	Car	Employer's Business	Jobs	Jobs
PM	UC2	Car	Commuter	Jobs	Households
PM	UC3	Car	Other	Jobs+Households	Jobs+Households
PM	UC4	LGV	Light Goods Vehicle	Jobs	Jobs
PM	UC5	HGV	Heavy Goods Vehicle	Jobs	Jobs

Uplifting of SERTM demand from 2015 to 2019

The SERTM base year demand was uplifted to 2019 from 2015 in the following way:-

- Car – using NTEM data (TEMPro 7.2) at Middle Layer Super Output Area (MSOA) for the Internal Area and at GB level for the External Area

- LGV and HGV trips – DfT Road Traffic Forecasts (RTF 18) using an average factor for all roads in Eastern England for LGV and for HGV.

Conversion from average hour to actual modelled hour

The SERTM matrix data was supplied in average hour format, 0700 – 1000 for AM, 1000 – 1600 for Inter Peak and 1600 – 1900 for PM Peak. The matrices were supplied for all three modelled vehicle types – Car, LGV and HGV.

As described in chapter 8, the new A12 model represents peak hours for AM (0730 – 0830) and PM (1700 – 1800). Factors were therefore required to convert the average hour SERTM information to peak hour. The Stage 3 model IP hour was the same as the SERTM model, i.e. average hour 1000 – 1600 – hence no factoring was required to get to the correct IP hour.

The average hour to peak hour factors were calculated using a model count database of ATC and WebTRIS counts. The factors used are shown in Table 5-2.

Table 5-2 Factors used to convert SERTM Average Hour Matrices to Stage 3 Modelled Hours

Time Period	Car	LGV	HGV
AM	1.128	1.076	1.031
PM	1.089	1.05	1.023

Public Transport Information

Although there is no Public Transport (PT) model used for the A12 model, a representation of PT demand and supply is required for Variable Demand Model (VDM) purposes.

The SERTM PT matrices were matched to the A12 zoning structure. In common with many other models it was deemed that rail travel was the main competitor to car travel and to keep this work proportionate only rail and not bus / coach was represented. The SERTM rail matrices had their origins in PLANET South rail model. Rail fare data was also obtained from SERTM and had previously been used in the M27 model. The PT fares were adjusted to reflect the A12 zoning system and 2019 base year. In this way skimmed PT (i.e. rail) costs and demand were available to be input into the VDM model.

6. Final Volumetric and Trip Dataset

6.1 Summary of counts used in final volumetric dataset

A summary of the total number of counts taken forward for potential use in the development of the new A12 base model is presented in Table 6-1. It should be noted that each count site may represent more than one direction of traffic data. Plate 6-1 presents the locations of this data set.

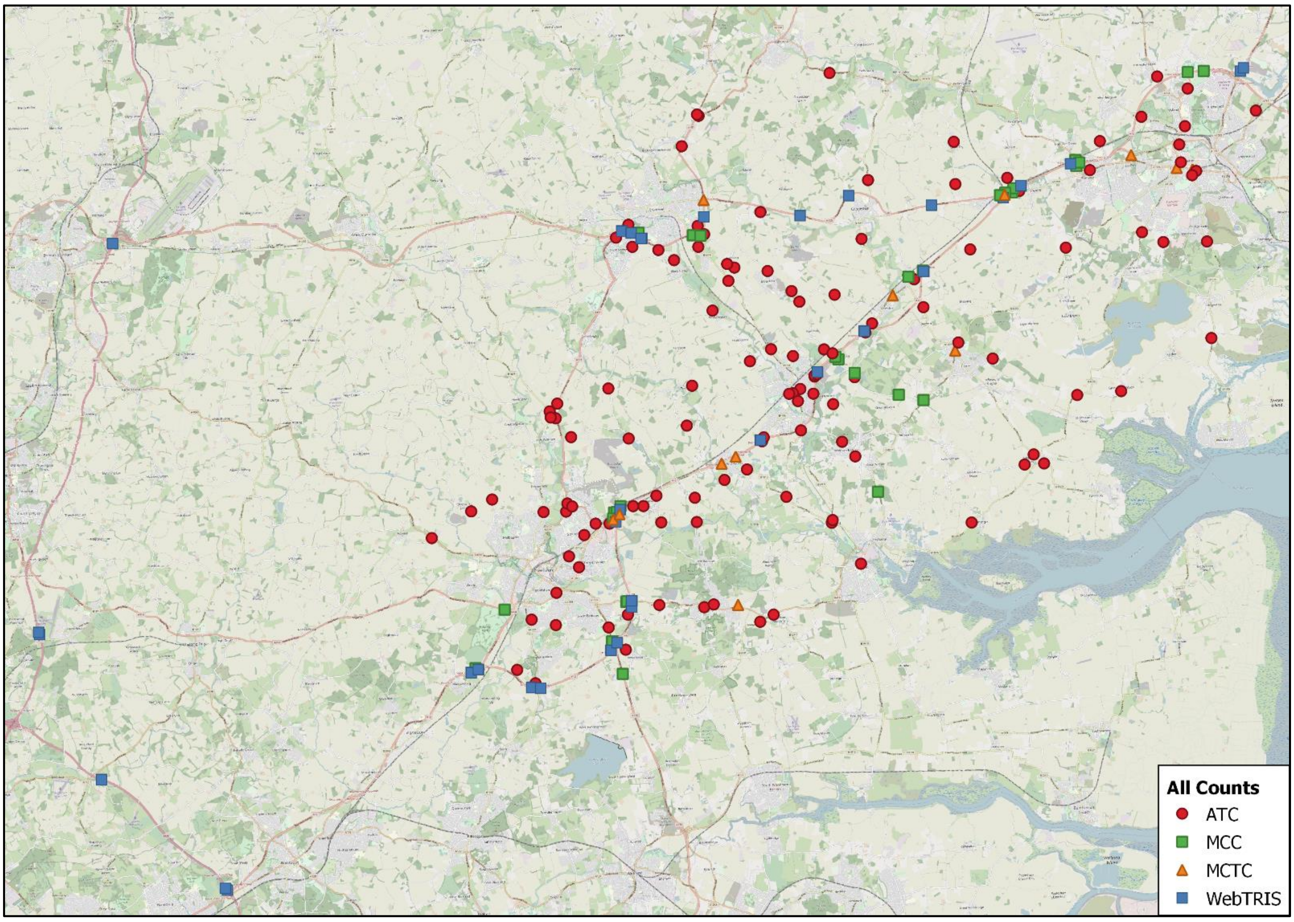
Traffic counts have been extracted for weekday modelled hours (Monday-Thursday), factored to 2019. The MCTC counts mentioned in Table 6-1 are those which were re-processed to form link counts used in model calibration or validation. Additional MCTC counts are available to use in sense-checking the base model outputs.

It should be noted that the counts described below are those that were made available for use in developing the base model. Not every single one of these counts will necessarily be used in the final model calibration and validation process.

Table 6-1 Summary of volumetric dataset

Count source	Count type	No. of surveys by collection year				Total no. of counts
		2016	2017	2018	2019	
A120 Model	ATC	18	0	0	0	18
	MCC	11	0	0	0	11
	MCTC	0	0	0	0	0
A12 Model	ATC	11	0	0	0	11
	MCC	2	0	0	0	2
	MCTC	5	0	0	0	5
Essex Count Database	ATC	9	8	21	56	94
	MCC	4	0	0	14	18
	MCTC	1	1	1	4	7
WebTRIS	TRIS	3	0	1	55	59
Total no. of counts		64	9	23	129	225

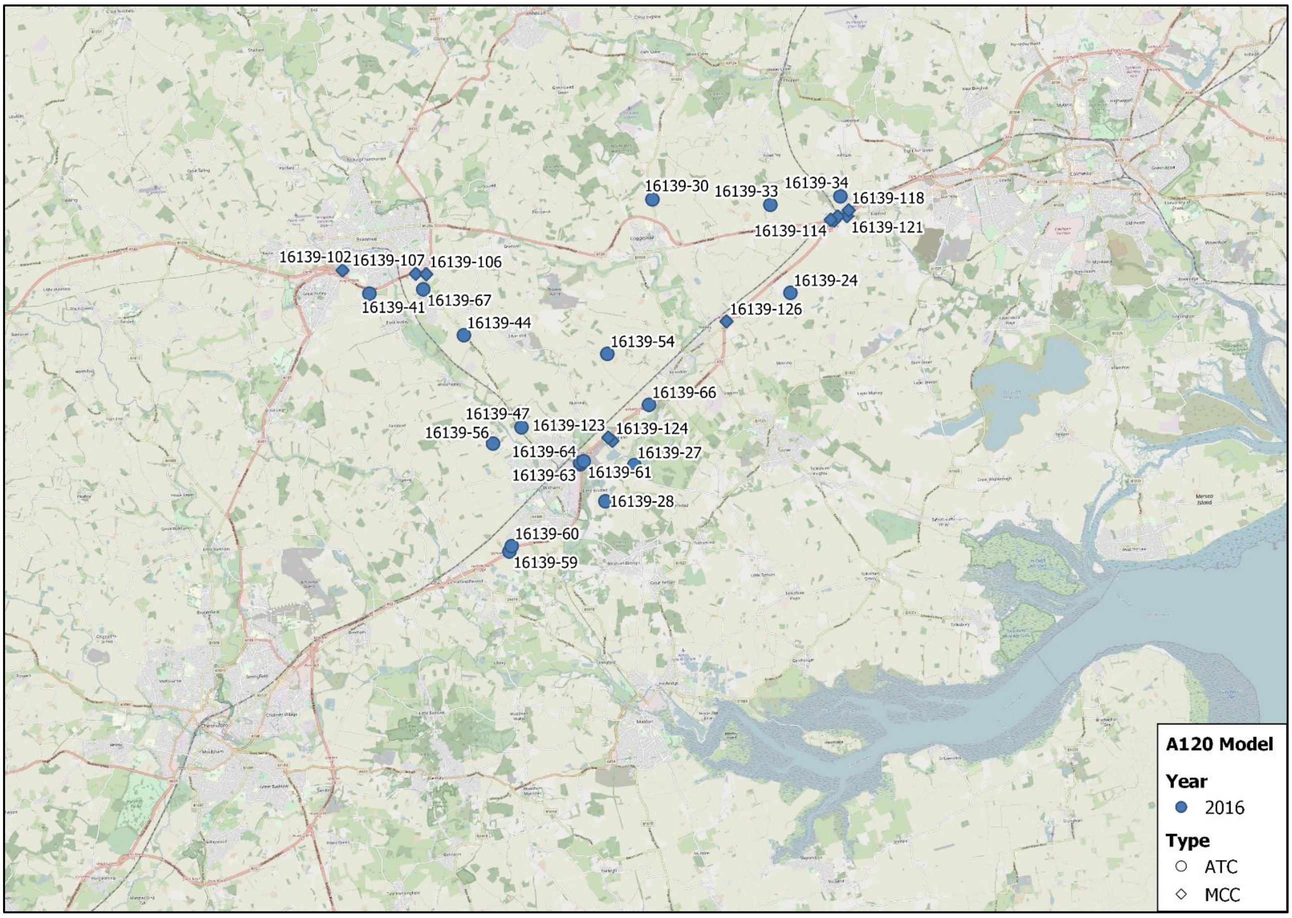
Plate 6-1 Location plan of volumetric dataset



6.2 A120 model Dataset

Plate 6-2 presents the locations of counts taken from the A120 model dataset. All counts from the A120 dataset are from 2016. Each count site shown may represent more than one direction of traffic data.

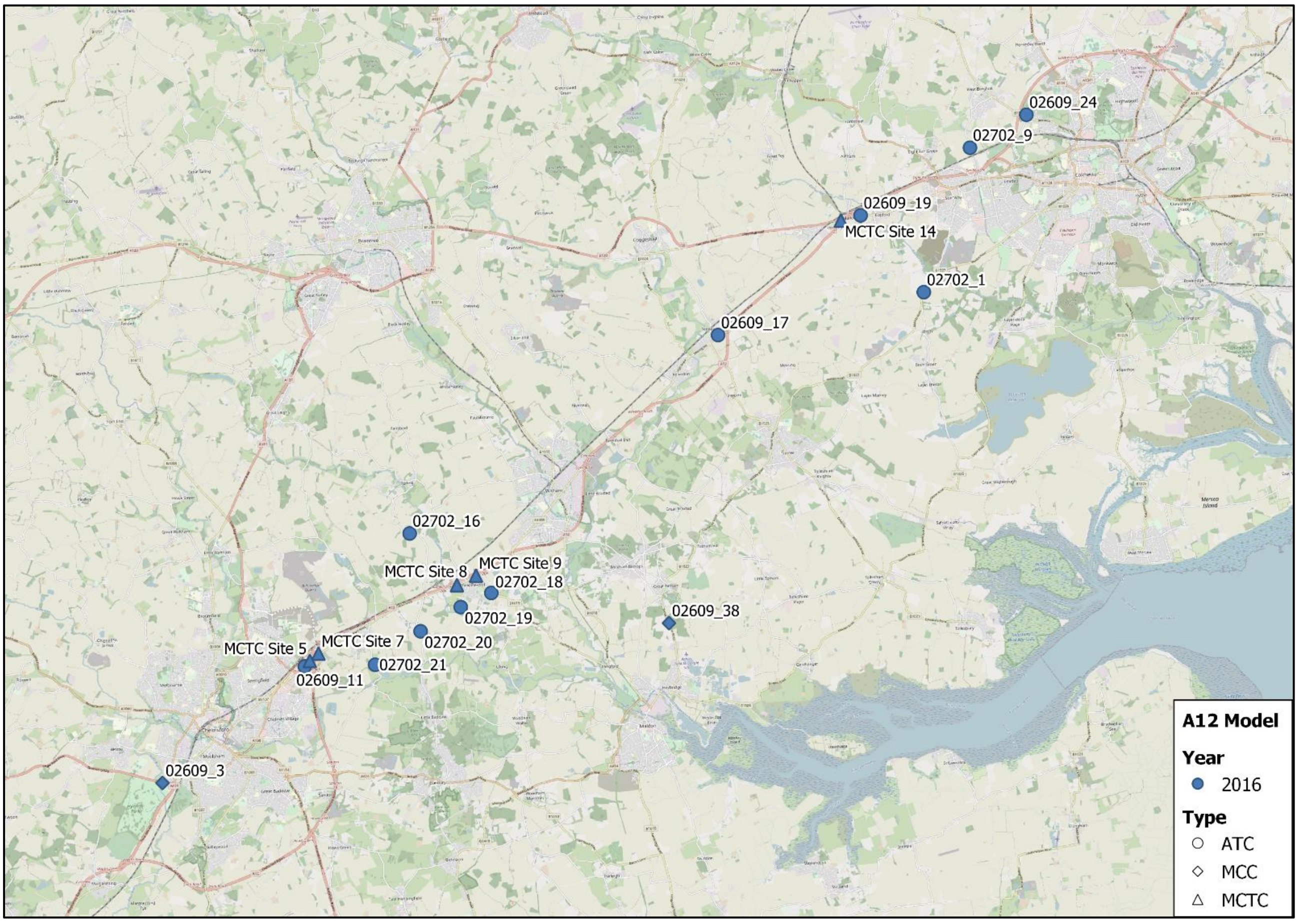
Plate 6-2 Location plan of previous A120 dataset



6.3 PCF Stage 2 A12 model dataset

Plate 6-3 presents the locations of counts taken from the previous Stage 2 A12 model dataset. All counts from the A12 dataset are from 2016. Each count site shown may represent more than one direction of traffic data.

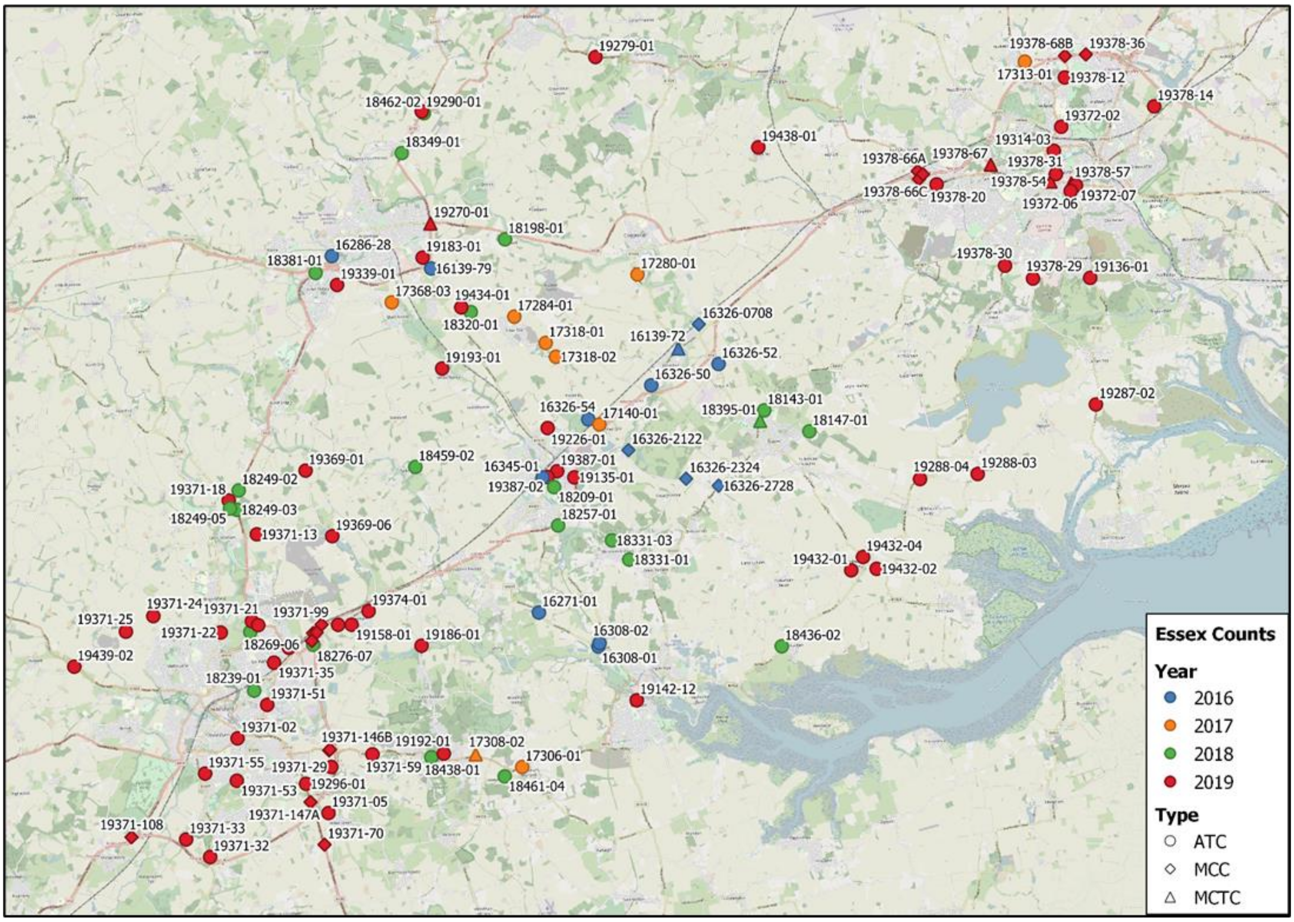
Plate 6-3 Location plan of PCF Stage 2 A12 model dataset



6.4 Essex Count database dataset

Plate 6-4 presents the locations of counts taken from Essex Count Database data set. Each count site shown may represent more than one direction of traffic data.

Plate 6-4 Location plan of Essex counts database



6.5 National Highways WebTRIS dataset

Plate 6-5 and Plate 6-6 present the locations of counts taken from the National Highways WebTRIS data set. While most of the counts in the WebTRIS dataset were from 2019, a small number of 2016 count sites were also included where more recent data was unavailable. Note that *Figure 6-6* represents additional counts that were requested by the environmental team to aid validation in this non-core area as these are on some strategic alternative roads that could potentially be relieved by any traffic switching to the A12 once the scheme is in place.

Plate 6-5 Location plan of National Highways WebTRIS dataset (1)

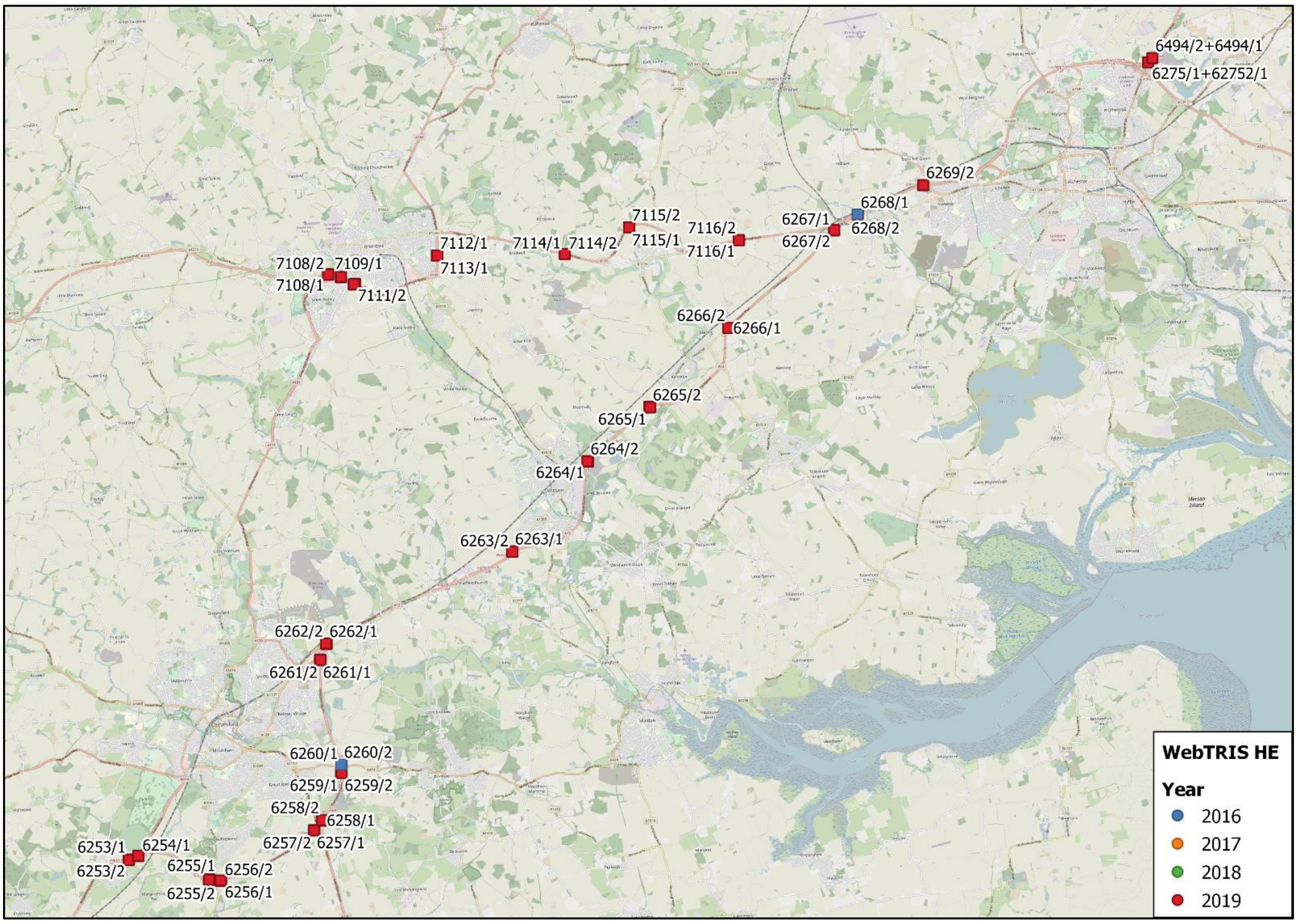
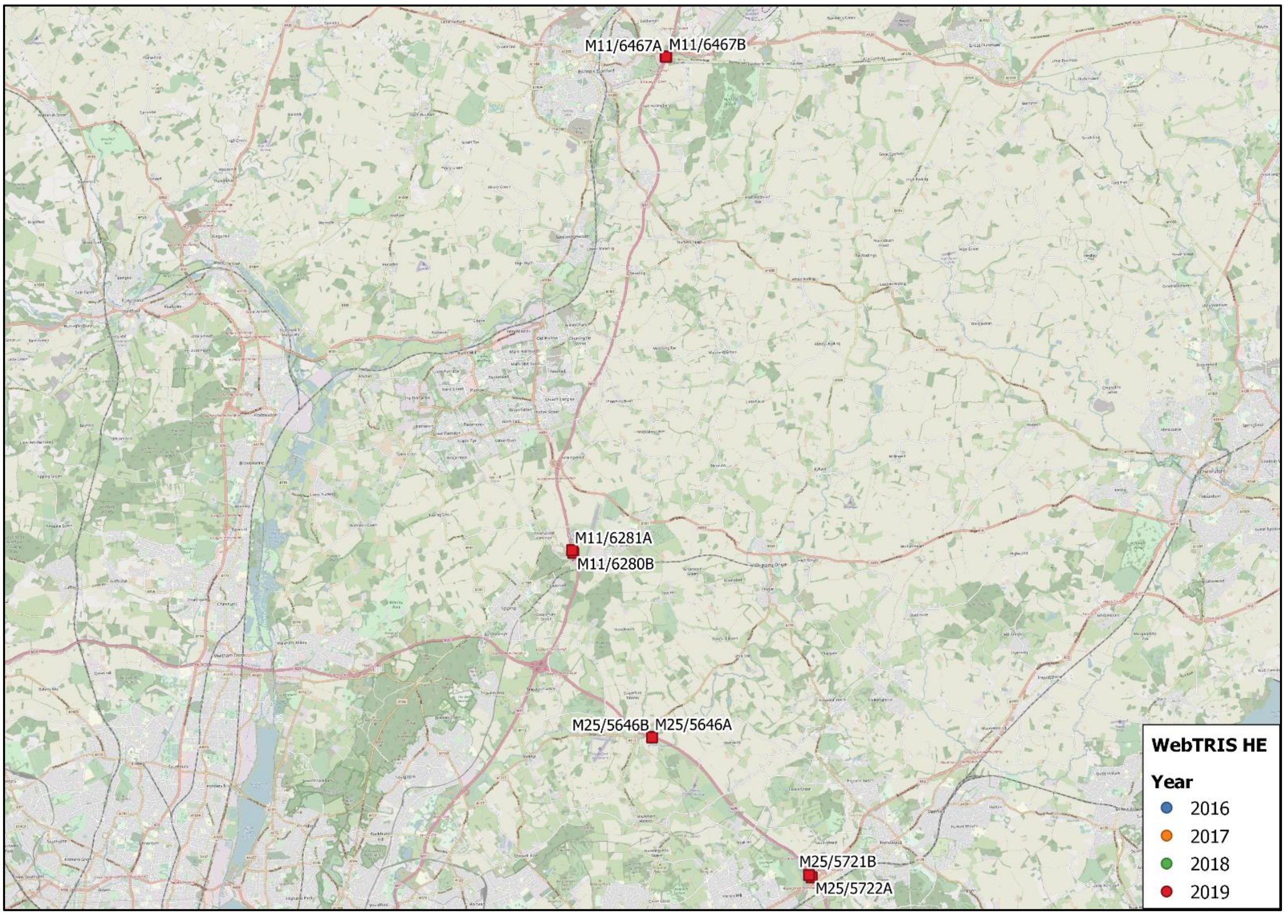


Plate 6-6 Location plan of National Highways WebTRIS dataset (2)



7. Journey Time Data

7.1 Overview

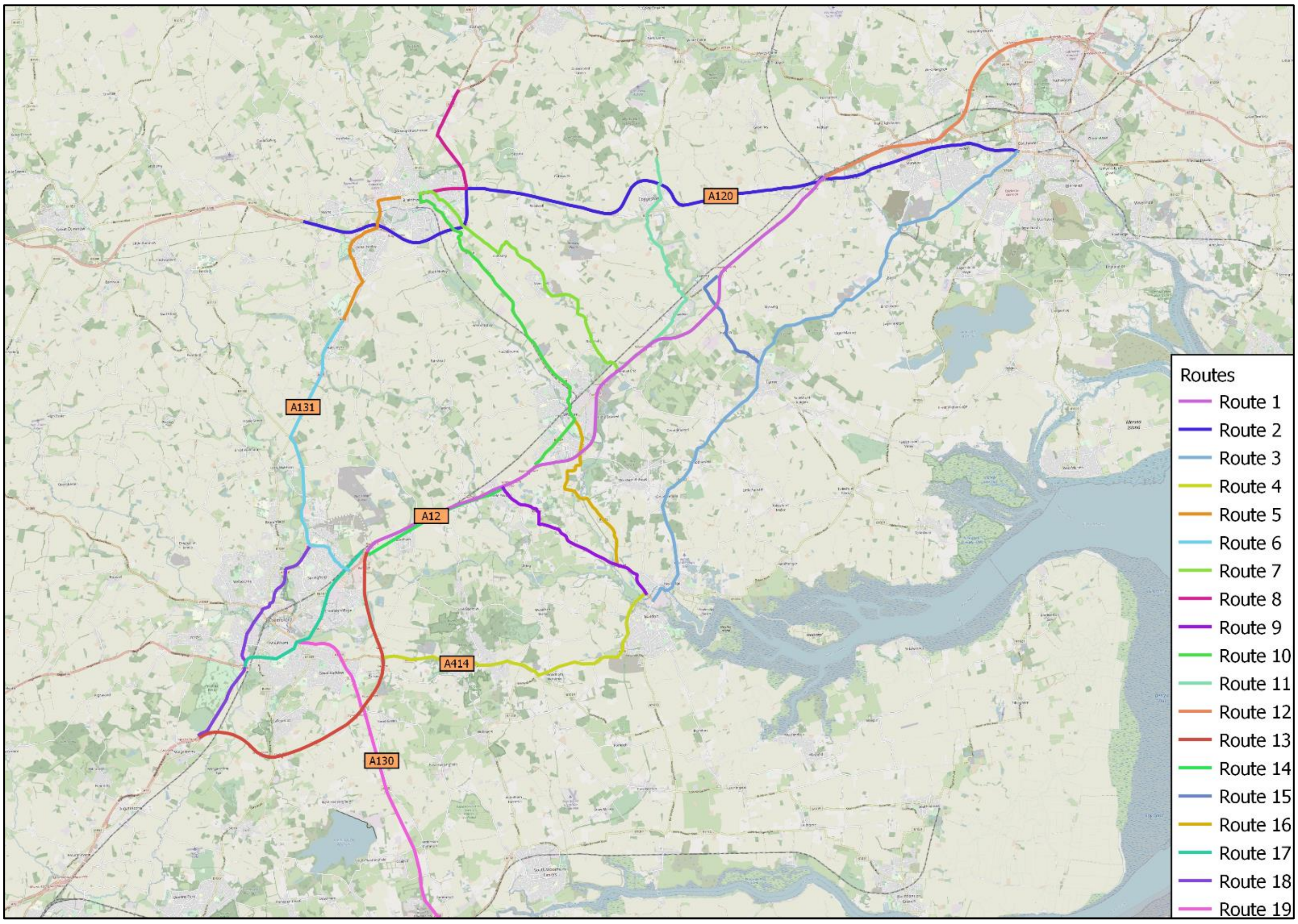
This section describes the locations and journey time routes that have been analysed for the purposes of establishing baseline conditions to inform transport model development. The journey time data is used to check and compare the delays and travel times calculated by the model with observed data as part of a model validation process.

Journey time data along selected routes were obtained from Teletrac Navman. Teletrac Navman is a journey time dataset based on data gathered using satellite navigation devices installed in cars and other vehicles. Travel times are specified for links in the Integrated Transport Network (ITN). Times along a set of routes are collated by aggregating the set of ITN links along the route.

7.2 Journey time routes

A series of 19 key routes was devised as shown in Plate 7-1, in which observed data was compared to modelled flows for validation purposes to ensure that model times closely resembled those experienced on the ground. The routes cover main routes through the A12 traffic model's area of detailed modelling.

Plate 7-1 Journey time routes for model validation



7.3 Observed journey time data

Journey time data was obtained for weekdays (Monday - Thursday) excluding school and bank holidays in neutral months in 2019 (Base Year). Neutral months are defined as March through to November (excluding August). The weeks before/after Easter, the Thursday before and all of the week of a bank holiday were also excluded from the dataset.

Journey time data was processed for the following modelled time periods:

- AM peak (07:30-8:30);
- IP (average hour between 10:00-16:00); and
- PM peak 17:00-18:00

To account for possible outliers within the dataset, journey times greater than 2 standard deviations away from the weighted mean were removed for each time period. This provides a conservative representation of delay as it excludes days with unusually high congestion. The weighted mean was then recalculated from the cleaned dataset.

Additional checks were also completed on the journey time dataset. These included: visually checking the routing in GIS, comparing the route lengths and times to

Google Maps and spot checking the journey time distribution for important links within the network.

Data was processed for all routes shown in the figure above. A summary of journey times on each route is provided in Table 7-1.

Each journey time route was also split into several route sub-sections. This shows the places along each route where traffic moves more slowly, showing for example higher delays on the approaches to busy junctions. This allowed each route's journey time to be sense-checked in more detail than using a full route journey time alone. It will also allow a more detail journey time validation analysis of the base year traffic model.

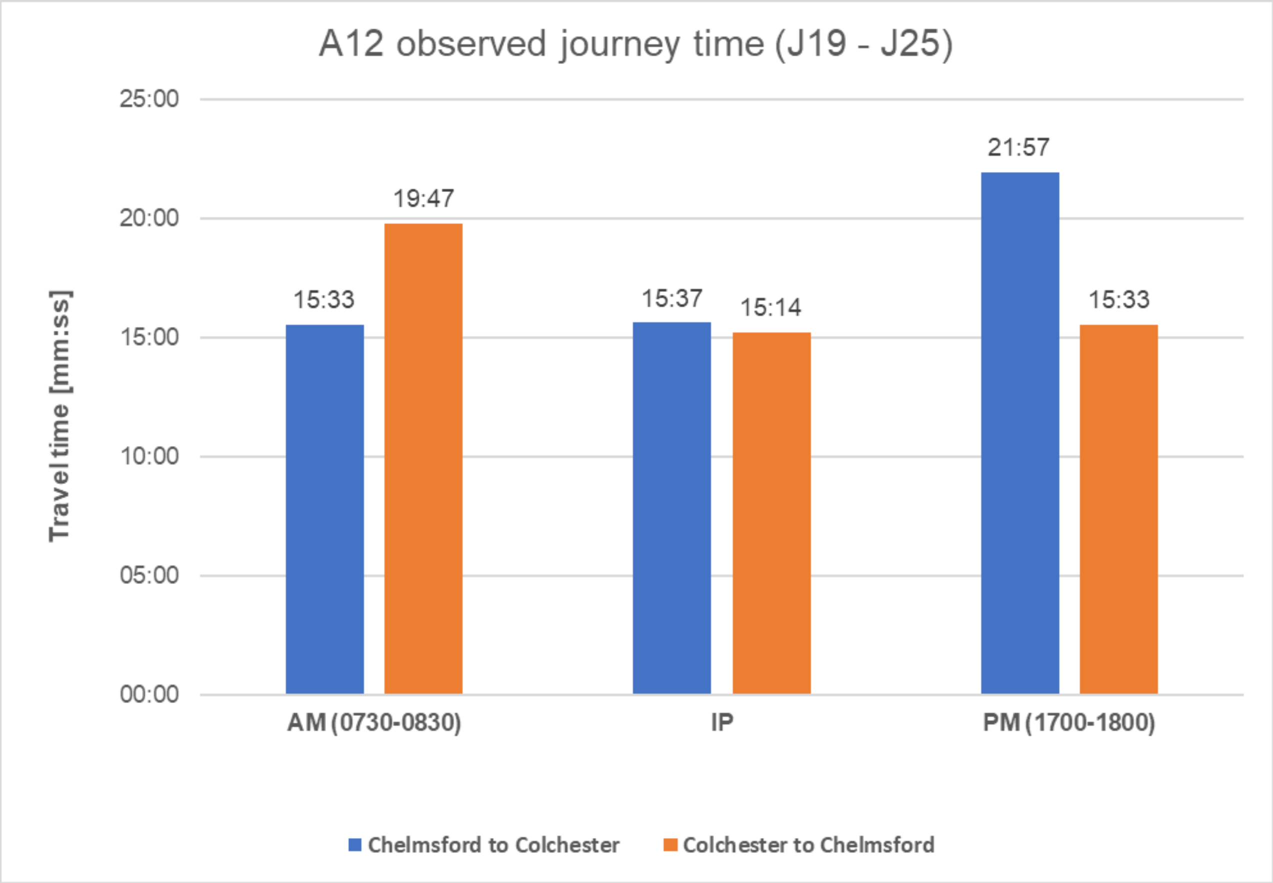
Table 7-1 Teletrac Navman average observed journey times

Route ID	Route Description	Direction	Length [km]	Observed journey time [mm:ss]			Speed [Kph]		
				AM	IP	PM	AM	IP	PM
1	A12 Junction 19 - 25	NB	25.3	15:33	15:37	21:57	98	97	69
		SB	25.3	19:47	15:14	15:33	77	100	98
2	A120 Braintree to A12	EB	30.9	34:58	32:37	46:00	53	57	40
		WB	30.7	38:43	31:44	32:21	48	58	57
3	Maldon Road Colchester to Maldon	NB	25.5	32:13	30:49	32:37	48	50	47
		SB	25.2	31:20	30:14	30:24	48	50	50
4	Maldon Road Maldon to Chelmsford	EB	12.7	14:13	14:12	16:54	54	54	45
		WB	12.9	15:37	14:35	14:42	49	53	53
5	A131 Great Leighs to Braintree	NB	6.5	08:35	07:43	12:17	45	50	32
		SB	6.6	06:54	06:47	07:09	57	58	55
6	A131 Chelmsford to Great Leighs	NB	11.6	13:09	11:26	12:45	53	61	54
		SB	11.5	14:18	11:53	12:46	48	58	54
7	Cressing Road Braintree to Rivenhall	NB	12.0	18:17	15:30	16:34	39	47	44
		SB	12.0	15:56	15:09	17:07	45	48	42
8	A131 Braintree Gosfield Road	NB	5.7	07:25	07:27	09:29	46	46	36
		SB	5.8	10:11	08:17	09:55	34	42	35
9	B1019 Maldon to Hatfield Peverel	NB	7.5	08:58	08:15	08:11	50	55	55
		SB	7.5	08:20	08:09	08:32	54	56	53
10	B1018 Witham to Braintree	NB	14.3	21:11	20:18	23:29	40	42	36
		SB	14.4	22:05	20:33	21:34	39	42	40
11	B1024 Kelvedon to Coggeshall	NB	8.9	12:26	12:10	12:23	43	44	43
		SB	8.9	13:45	12:18	12:52	39	43	41
12	A12 Junction 25 - 29	NB	10.9	06:39	06:32	07:47	99	100	84
		SB	11.0	07:57	06:35	06:46	83	101	98
13	A12 Junction 15 - 19	NB	14.6	09:55	08:58	10:34	88	98	83
		SB	14.3	09:26	08:38	09:21	91	99	92
14	B1137 Boreham to Hatfield Peverel	NB	5.7	06:11	06:06	07:34	55	56	45
		SB	5.7	06:37	05:56	05:57	51	57	57
15	B1023 Feering to Tiptree	NB	4.4	07:03	05:27	07:40	37	48	34
		SB	4.4	05:10	05:16	05:39	51	50	47
16	B1018 Witham to Maldon	NB	7.2	09:29	10:03	10:27	45	43	41
		SB	7.2	08:25	08:22	08:57	51	51	48
17	Chelmsford to A12 Junction 19	EB	6.9	12:27	09:35	13:59	33	43	30
		WB	7.0	11:00	08:53	11:32	38	47	37
18	A12 Junction 15 to Chelmsford	NB	9.1	15:47	12:09	17:32	34	45	31
		SB	9.1	13:34	12:16	17:21	40	45	32
19	A130 to Chelmsford	NB	12.6	13:18	09:09	13:49	57	83	55
		SB	12.9	08:27	08:23	08:39	92	92	89

The journey times along the A12 corridor between junction 19 and 25 (Route 1) are shown graphically in Plate 7-2 below. This illustrates the additional journey time during peak periods relative to the average interpeak period. as a measure of delay experienced during the AM and PM peak hours.

A12 journey times are shown to increase markedly during the AM peak in a southbound direction and during the PM peak in a northbound direction. This is consistent with the tidal pattern of traffic volume along the route. Other routes also fit with the known pattern of commuting within the area, such as travel into Chelmsford from the Braintree area in the morning peak and generally prevalent congestion on the A120 during all peak periods.

Plate 7-2 Journey time on the A12 between Junction 19 and 25

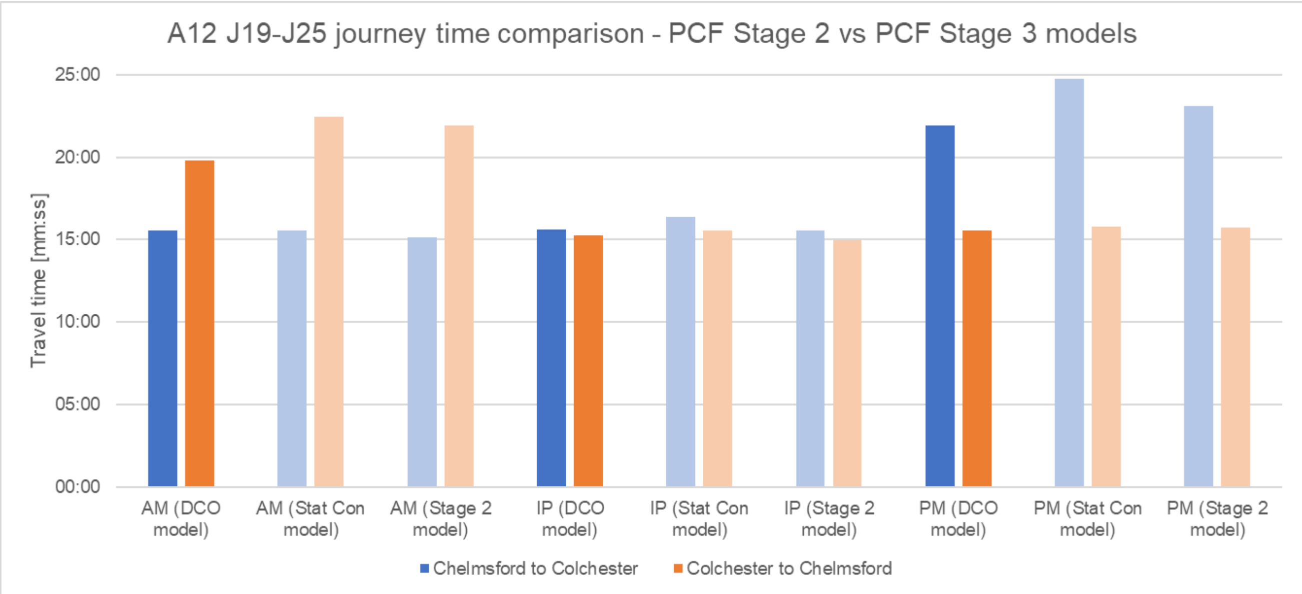


An additional check was undertaken on the journey time data, by comparing against journey time data used in the previous PCF Stage 2 and PCF Stage 3 A12 modelling. Although each set of journey time data was derived from Teletrac Navman data, the data was obtained, processed and extracted independently, potentially using slightly different assumptions. It should also be noted that the data used for the DCO model represents a different base year (2019).

As described in the previous A12 *Traffic Data Collection Report (2016)*[1], that original Teletrac Navman data (referred to then as 'Trafficmaster' data) was compared and found to be sufficiently similar to the independent HATRIS Journey Time Database source of journey time data, and therefore suitable for use in model validation.

Plate 7-3 compares the data used to support the Stage 2 and Stage 3 models for each time period. This shows that the journey time data is extremely similar between the three datasets. This provides evidence that the new dataset is a good representation of existing journey times and is suitable for the purpose of model validation.

Plate 7-3 Journey time on the A12 between Junction 19 and 25 – comparisons between PCF2 and PCF3 data



[1] https://highwaysengland.citizenspace.com/he/a12-chelmsford-to-a120-widening-scheme/supporting_documents/A12%20Chelmsford%20to%20A120%20%20Traffic%20Data%20Collection%20Report%20TDCR.pdf

8. Selection of Modelled Peak Hours

8.1 Traffic count data

To decide the hours to model for the AM and PM peak in the updated A12 base model, we reviewed the traffic count data described in this report. This was to choose the most appropriate hourly period that represents highest demand with particular reference to the A12 itself.

ATC and WebTRIS count sites were used to identify the peak flows within the model simulation area. The counts selected were considered to be representative of all key roads within the study area. Plate 8-1 shows the location of these counts.

Plate 8-1 Observed counts for model peak hour analysis

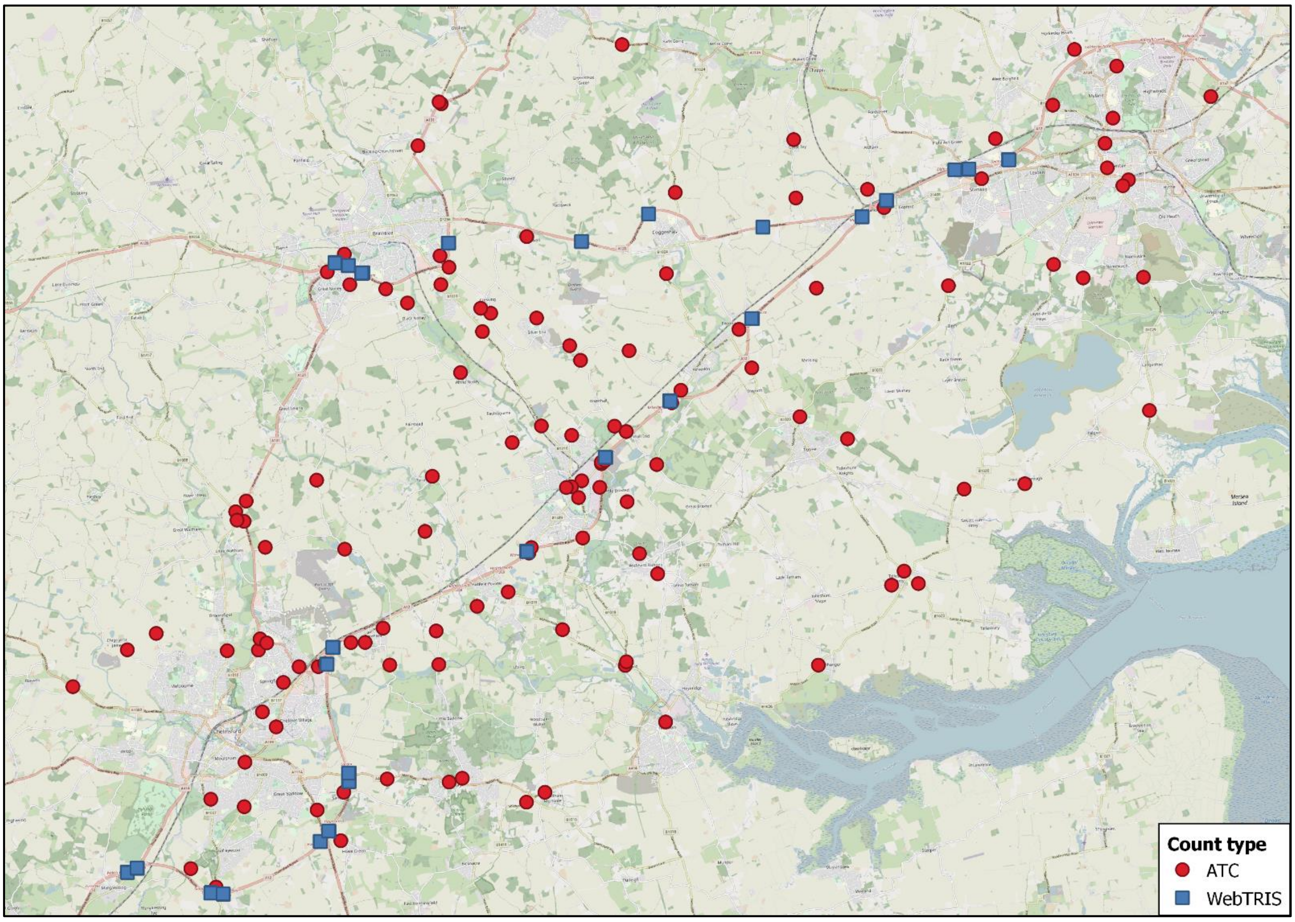
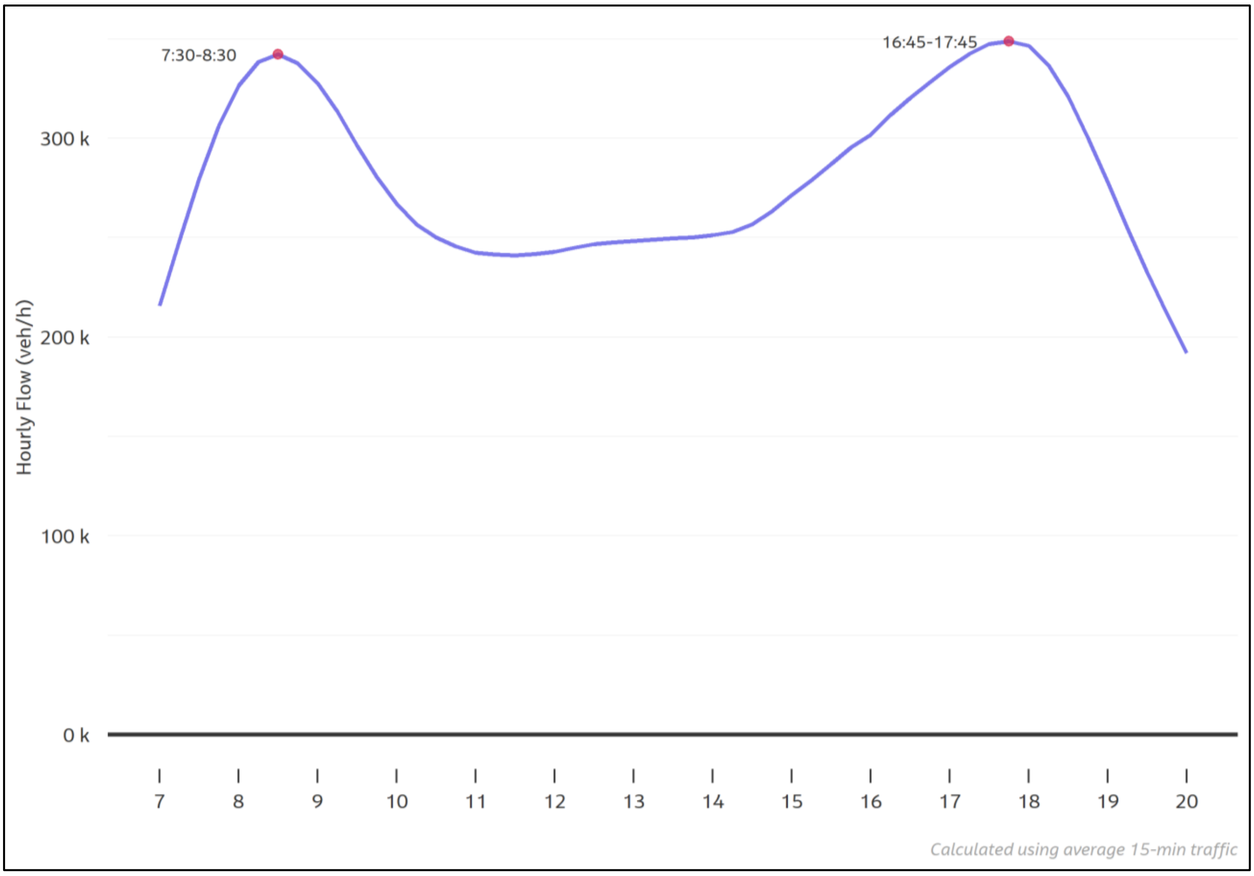


Plate 8-2 shows the AM and PM peak traffic flows for ATC and WebTRIS count sites. The AM peak is 7:30-8:30 and the PM peak is 16:45-17:45. Although, the PM traffic flows are similar between 16:45-18:15.

Plate 8-2 Rolling hourly traffic flows



Traffic flows were also examined for specific WebTRIS sites along the A12. Plate 8-3 to Plate 8-6 show the A12 flows at two sites – Junction 19 and Junction 22. In the AM, the traffic flows follow a similar pattern to *Figure 8-2*,with the AM peak shown to be around 7:30-8:30 in the Northbound direction and between 06:45-7:30 in the Southbound direction. Similarly, the PM peak is shown to be around 16:00-17:00 in the Northbound direction and 16:45-17:45 in the Southbound direction.

Plate 8-3 A12 Junction 19 northbound traffic flow profile

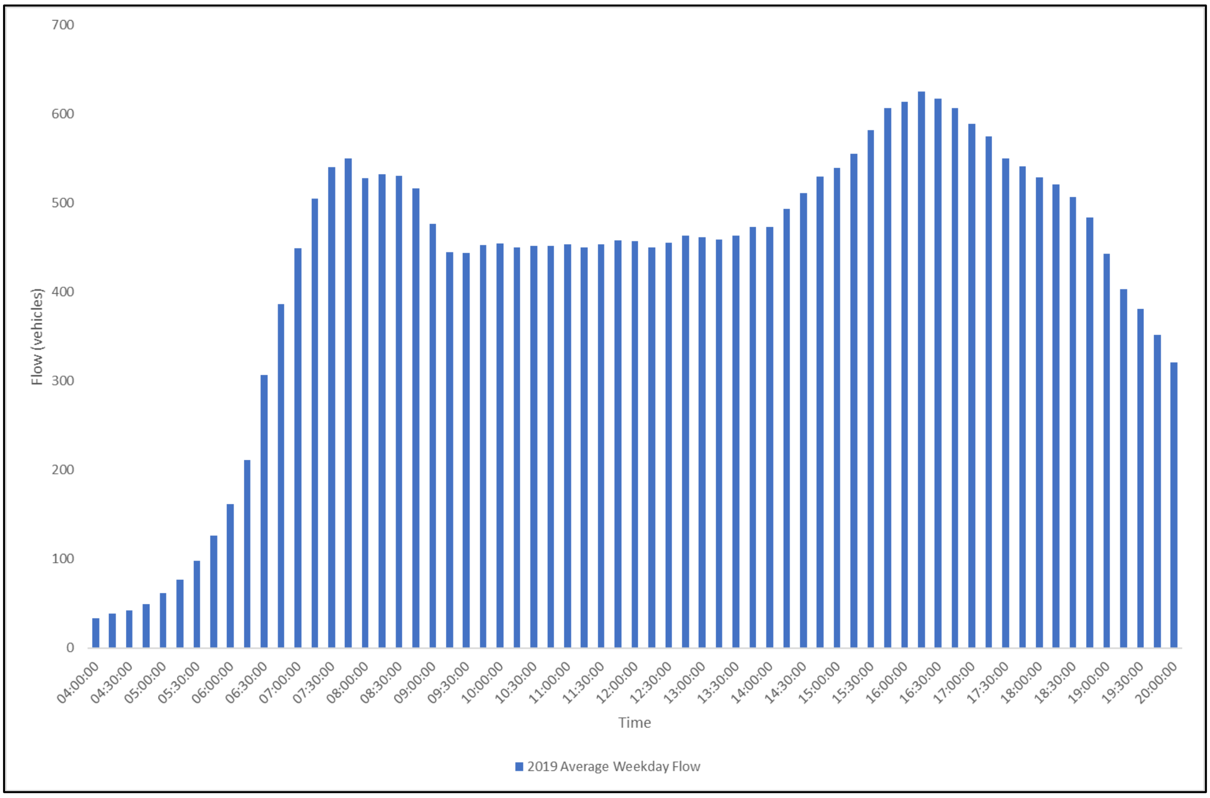


Plate 8-4 A12 Junction 19 southbound traffic flow profile

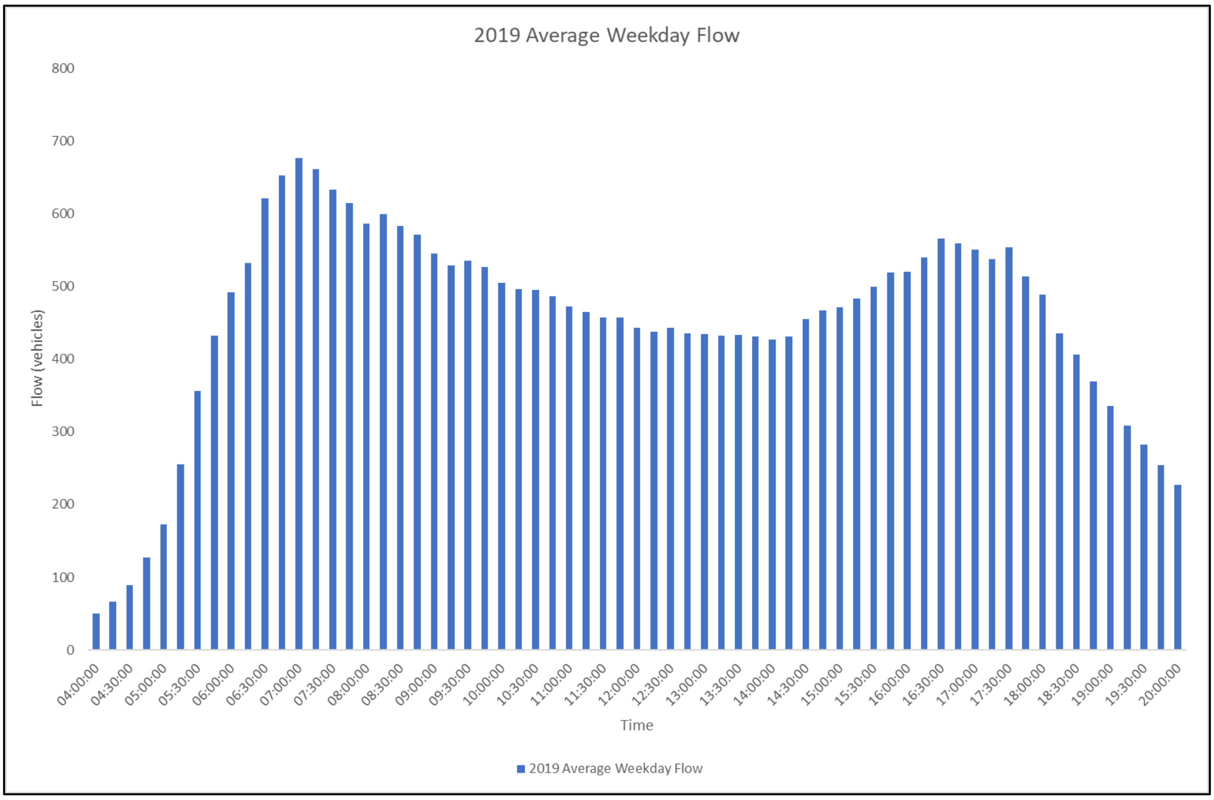


Plate 8-5 A12 Junction 22 northbound traffic flow profile

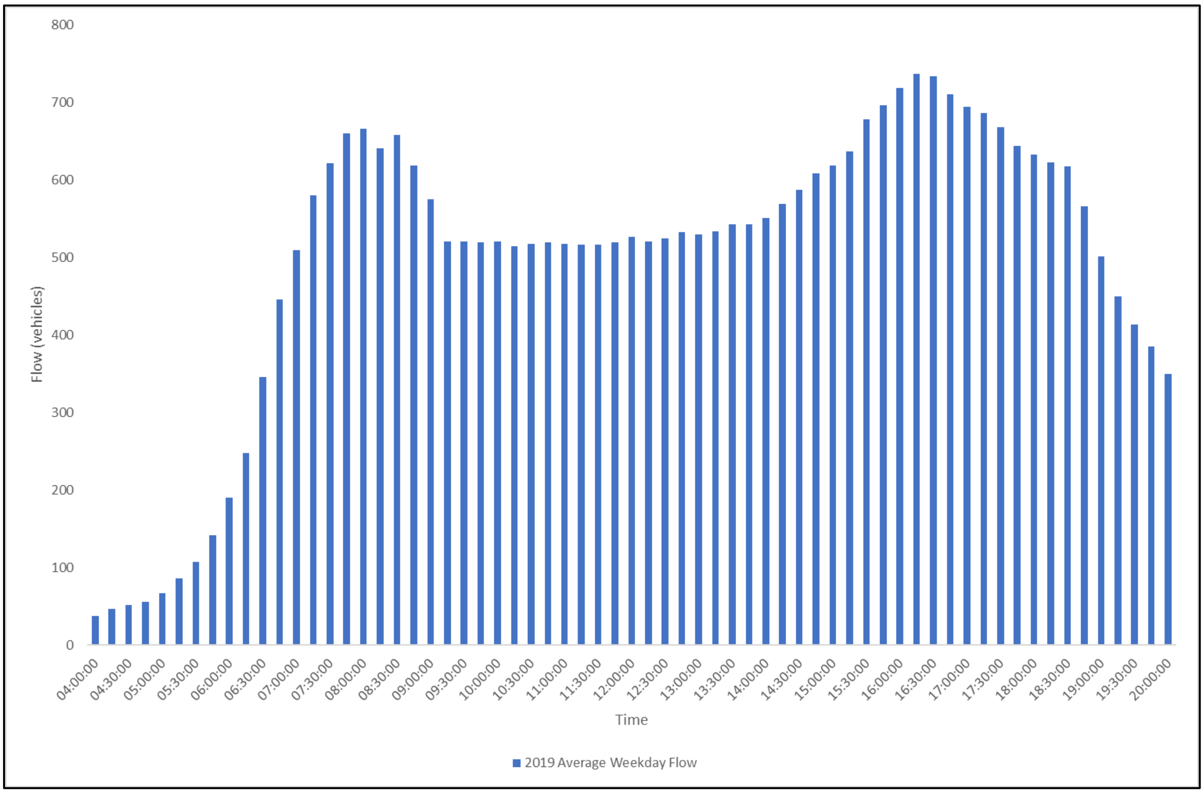
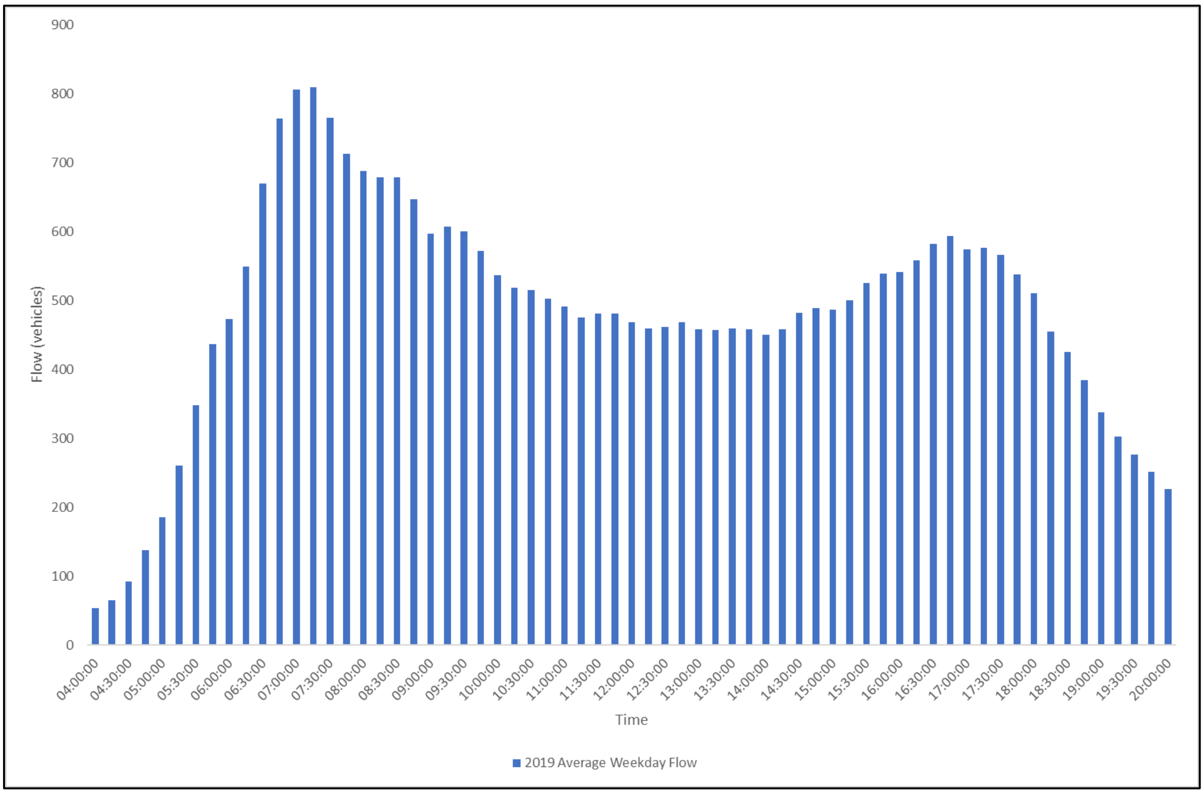


Plate 8-6 A12 Junction 22 southbound traffic flow profile



The speed data at these sites is shown in Table 8-1. This shows the traffic is the slowest – and hence congestion is greatest – between 7:30-8:30 and 17:00-18:00.

Table 8-1 WebTRIS average observed speeds (mph)

	Northbound		Southbound	
	J19	J22	J19	J22
0700-0800	63	63	59	52
0730-0830	61	62	58	51
0800-0900	61	62	58	53
0900-1000	62	63	60	57
1000-1100	63	62	62	60
1100-1200	62	62	63	61
1200-1300	62	62	63	61
1300-1400	62	61	64	61
1400-1500	61	60	64	61
1500-1600	60	59	63	61
1000-1600	62	61	63	61
1600-1700	58	57	59	60
1700-1800	56	53	54	60
1800-1900	61	57	64	63

8.2 Final selection of modelled peak hours

For the AM peak period, there are greater traffic volumes during the 07:30-08:30 time period. 07:30-08:30 was therefore chosen as the peak hour to be modelled.

For the PM peak hour, traffic flows are more spread out, but the speed data shows congestion to be greatest between 17:00-18:00. It was therefore decided to maintain the 17:00-18:00 peak hour, as chosen in the previous stages of the modelling.

For the IP model, an average hour model will be produced using data between 10:00-16:00.

The modelled hours to be used in the DCO model are therefore:

- AM Peak (0730-0830)
- IP (Average hour 1000 – 1600)
- PM Peak (1700 – 1800)

9. Suitability of Accumulated Database

9.1 Data management

A substantial volume of traffic data from various sources has been collated for the purposes of informing scheme development including the development of a transport model.

Where possible all data collection sites are referenced by the originators assigned name. For instance, all Local Authority and the A120 count data retain the same site numbers for ease of comparison.

Quality checks have been applied to the data during the processing stage prior to export to the model building process, as discussed throughout this report. This ensures consistency and accuracy throughout the model building process, and for subsequent use in the processing of model outputs.

9.2 Summary of adequacy of data

Little new survey data could be specifically collected for PCF Stage 3 because of the coronavirus pandemic. This report has identified and described the review of traffic survey data previously collected and collated to assess and quantify baseline conditions and to develop a traffic model for the A12.

The traffic data collated for this study had been obtained from credible sources. A process of data filtering and checking has been implemented to confirm the suitability of traffic data provided for the study purposes.

The Teletrac Navman data is commonly used for transport model development purposes across the UK and is considered the most appropriate source of journey time data.

Further operational data has been collected to support and inform several elements of scheme modelling and appraisal.

Overall, it is considered that the data collected as part of the A12 model development forms a suitable and comprehensive database. It is sufficiently detailed to establish principal traffic movements and characteristics within the area of the A12 Chelmsford to A120 (J19-25) scheme.