Appendix C Horsham Highway Model Local Model Validation Report

Horsham Transport Study

Horsham Highway Model
Local Model Validation Report

On behalf of **Horsham District Council**

Project Ref: 45539| Rev: A | Date: June 2020

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For and on behalf of Stantec UK Limited				

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Glossary

ATC: Automatic Traffic Count
Buffer: Buffer network is a simplified version of the simulation network for away from our area of interest
Convergence: The seek for network stability (Wardrop's First Principle of Traffic Equilibrium or User Equilibrium)
Delta statistic or % gap: The difference between the costs along the chosen routes and those along the minimum cost routes, summed across the whole network, and expressed as a percentage of the minimum costs, usually known as 'Delta' or the '%GAP.
GEH: Geoffrey E. Havers statistic formula
HGV: Heavy Goods Vehicle
LGV: Light Goods Vehicle,
Link Flow: Number of PCU/hr
Matrix estimation: Refine estimates of movements which have been synthesised
MCC: Manual Classified Count
MCTC: Manual Classified Turning Count
ME: Matrix Estimation
OD: Origin / Destination,
PCU: Passenger Car Unit
PPK: Price per Kilometre
PPM: Price per Minute
SATURN: Strategic Modelling Software (Simulation and Assignment of Traffic in Urban Road Networks)
TAG: Transport Analysis Guidance
WebTAG: Web Based Transport Analysis Guidance
WSCC: West Sussex County Council

1 Introduction

1.1 Background

1.1.1 Peter Brett Associates (PBA) now part of Stantec was commissioned by Horsham District Council (HDC) to undertake a transport study to inform the emerging Horsham Local Plan.

1.1.2 The study is to be undertaken in two stages, with Stage 1 being to produce a highway modelling tool covering the District, This will then be used to underpin Stage 2 of the study, to evaluate the highway impact of development within Horsham District up to 2036 and to support the delivery of the Horsham Local Plan.

1.1.3 The modelling tool will take the form of a highway assignment model, known going forward as the Horsham Highway Model (HHM). This report summarises the methodology which has been adopted in order to build and validate the base year model.

1.1.4 The purpose of the model is to test the impact of proposed Local Plan development on the highway network and to inform the transport evidence base for the Local Plan Regulation 18 and 19 stages.

1.1.5 The HHM has been designed to adequately replicate traffic condition in order to provide a basis for forecasting future impacts of the local plan. This report intends to summarise all aspects of model development in order to replicate the following conditions:

- Strategic route choice between key settlements within the Horsham District
- Strategic route choice to external points outside of the Horsham District
- Travel times on major routes within Horsham District
- Turning movements at key junctions
- Traffic volumes across “screenlines” within the Horsham District
- Vehicle Type Proportions

1.1.6 The criteria of achieving an adequate replication of these conditions are provided by Department for Transport Appraisal Guidance (TAG) Unit M3.1[1].

1.2 Model Area

1.2.1 The area covered by HHM is shown in Figure 1-1. The includes the urban area of Horsham town and the entire district of Horsham. It will also include some roads outside of the Horsham District, where the Horsham District Local Plan strategic housing allocations may have an impact and would need to be reported. These links include parts of the SRN, as well as links within neighbouring district authorities within West Sussex and Surrey and in particular within Crawley.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment-modelling.pdf

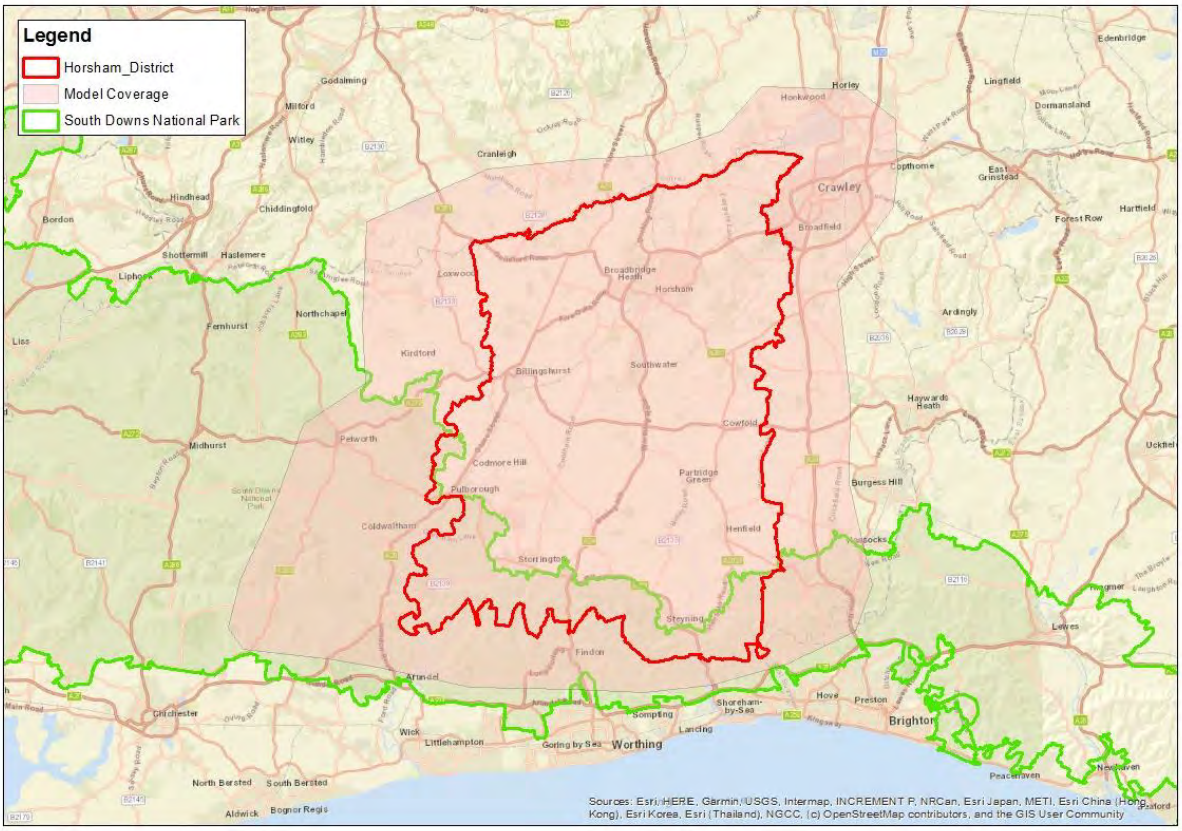


Figure 1-1: Horsham Transport Model - Study Area

1.3 Local Context

1.3.1 Horsham is a local government district in West Sussex, the district borders Crawley, Mid Sussex, Mole Valley (Surrey), Chichester, Arun and Adur. The Office for National Statistics mid-2018 population estimate for the District was just above 142,000.

1.3.2 Horsham District Council sits partially within the South Downs National Park and within this area it is the National Park Authority who are the Local Planning Authority. The National Park boundary is shown in Figure 1-1.

1.3.3 Horsham is the main settlement within the District, Other major areas of population within Horsham District being Billinghurst, Pulborough, Storrington, Henfield & Southwater.

1.3.4 The main routes through the District are the A24 travelling north to south from the M25 to Worthing on the south coast, the A272 running through the centre of the Horsham District East to West and the A264 from the A23 to the south west of Crawley, to the A24 to the north east of Horsham.

1.3.5 To the south of Horsham District is the A27, the main route for east-west traffic along the south coast and to the east of the District is the A23. This is one of the main north-south routes from the south coast to London, starting at Brighton, and forms part of Highways England's Strategic Road Network (SRN).

1.3.6 Within Horsham itself, the A24 and A264 forms an outer ring road to the West and North of the town. With the A264 accommodating traffic movements between Horsham and Crawley and linking Horsham to the SRN at M23 Junction 11.

1.3.7 The Horsham District is situated within the Gatwick Diamond, which is a key area of economic growth within West Sussex. Major areas of employment are located within Horsham Town centre. Outside of Horsham, Gatwick airport is a major employment area.

1.4 Report Structure

1.4.1 This report is presented with the following structure:

- Section 2 provides an overview of the highway assignment model
- Section 3 summarises the traffic data used in the model development
- Section 4 outlines the network development
- Section 5 details the matrix development
- Section 6 outlines the assignment, calibration and validation procedures
- Section 7 Outlines the calibration results
- Section 8 Outlines the model validation results
- Section 9 provides an overall summary

2 Highway Model Overview

2.1 Introduction

2.1.1 The HHM has been developed using a software package known as SATURN[2]. The latest version of SATURN (version 11.3.12) has been used.

2.1.2 SATURN is a widely used software package for highway assignment modelling. At a basic level the model is made up of a highway network (supply) and a matrix of trips (demand). In broad terms the network is made up of a series of junctions (known as nodes) and sections of road between junctions (known as links). The model area is split into a number of zones and a matrix is developed to represent all trips between each of these zones. Zones are connected to the network using a series of connectors, otherwise known as zone centroid connectors, which reflect points where trips from a zone are loaded on to the network. The trip matrix is then assigned to the network.

2.1.3 One of the main benefits of using SATURN for the assignment process is that it is applicable to both urban and rural networks and can model peak hour congestion in sufficient detail. As a combined simulation and assignment model, SATURN also has the advantage that it enables detailed junction modelling.

2.1.4 The model in question is a highway assignment model only and uses a fixed trip matrix approach. This does not include any multimodal (i.e. public transport, cycling or walking) or variable demand modelling (which reflects responses travellers may have within a congested network, such as travelling at a different time or changing destination).The fixed trip matrix approach is seen to be proportionate for the purposes of then Local Plan study. Sustainable travel measures, which may form part of a Local Plan mitigation package will be considered as part of Stage 2 of the study and reflected within the modelling at that stage.

2.1.5 The assignment model predicts routes that drivers will choose and the way that traffic demand interacts with the available road capacity based on perceived costs of travel by competing routes. The underlying principle used in the adopted assignment algorithm is Wardrop's First Principle of Traffic Equilibrium. Wardrop's First Principle states that:

"*Traffic arranges itself on networks such that the cost of travel on all routes used between each OD pair is equal to the minimum cost of travel and all unused routes have equal or greater cost".*

2.1.6 The aim of the assignment model is to reach equilibrium such that costs, and flows are in balance under the assumption that individual users will seek to minimise their costs of travel through the network.

2.2 Existing Models

2.2.1 A review of existing models has been undertaken to determine whether these would be suitable for any part of the HHM development process. Two models have been identified:

- West Sussex County Transport Model (WSCTM) – This model is a SATURN model and was previously used to inform the Horsham District Strategic Transport Study (HDSTS) in 2013.
- Crawley Transport Model (CTM) – A SATURN model with a base year of 2015.

[2] https://saturnsoftware2.co.uk/

2.2.2 Both models were provided by WSCC. On review it was determined that both models would be useful to inform the network development for the HHM.

2.3 Model Year and Time Periods

2.3.1 The model has been developed with a base year of 2019 as the majority of the data used in the model development was collected in May 2019.

2.3.2 Models have been developed to reflect the worst traffic conditions on a typical weekday. This would represent a period during school term time and avoid large scale events or periods within the year, where traffic conditions may not be typical i.e. Christmas. Two time periods have been represented within the model:

- AM Peak hour (0800-0900);
- PM Peak hour (1700-1800).

2.3.3 The peak hours modelled were confirmed using count data.

2.4 Vehicle Types and Travel Purposes

2.4.1 The following vehicle types have been included within the model:

- Car;
- Light Goods Vehicles; and
- Heavy Goods Vehicles.

2.4.2 Car trips are further classified by travel or trip purpose resulting in five user classes in the model:

- Car Commuting (CarCom)
- Car Other (CarOth)
- Car Employer Business (CarEB)
- Light Goods Vehicles (LGV);
- Heavy Goods Vehicles (HGV).

PCU Factors

2.4.3 Passenger Car Units (PCU) is used as the standard unit for demand and capacity within the model. This allows for the impact of large vehicles which take up more road space and take longer to clear junctions to be accounted for. The factors used within the HHM are:

- Car - 1.0
- LGV – 1.0
- HGV – 2.3
- PSV/Bus – 2.5

3 Survey Data

3.1 Overview

3.1.1 This section summarises the data that has been used in the development of the HHM and includes both existing data and new data that has recently been collected. The types of existing and new collected data comprise:

- Automatic Traffic Counts (ATC)
- Manual Classified Turning Counts (MCTC)
- Journey Time data
- Mobile Phone data for matrix building
- Traffic Signal Data

3.1.2 More detail analysis of the data that has been used in developing the HHM is reported in the Horsham Transport Data Report (35981/R1 dated 25th April 2016) which should be read in conjunction with this section. The sections that follow outline the key data that has been used in developing the highway model.

3.2 Data Collection Sources

3.2.1 In line with WebTAG[3] guidance, existing data has been used wherever possible in order to keep data costs to a minimum while not compromising the integrity of the model. The following existing data has been used:

- WSCC Data
- Existing Transport Assessment Data
- Highways England Data

3.2.2 The existing WSCC traffic survey locations are shown in Figure 3-1 and the existing HE permanent count sites are shown in Figure 3-2.

3.2.3 The data predominantly stems from 2018 neutral weeks.

3.2.4 In addition to the existing available count site, new ATC and MCTC data was collected for the purpose of providing complete coverage of model calibration and validation. Gap analysis was undertaken once existing data had been collated to inform requirements for new data collection. The selection of new data points was therefore based on either providing a complete data set for screenline validation and also for turning movement calibration at key junction across the Horsham District. Data was collected within May 2019.

3.2.5 MCTC data was collected on a single day for a 12-hour period from 0700 to 1900. ATC data was collected over a period of two weeks and included the days where MCTC data was collected, to allow for sense checking of data where sites were close and also to allow for any variation in flows to be understood.

[3] See Glossary

3.2.6 The location of the newly collect ATC and MCTC data is shown in Figure 3-3 and summarised in Table 3-3 and Table 3-4. Further detailed information about the data collection process can be found within the Data Collection Report.

Table 3-1: Existing WSCC ATC Locations

ATC Reference	Location
WSCC-1	Henfield A281, Brighton Rd. Just E. of Mill Dr
WSCC -7	A272 Cowfold, Cowfold Rd, Just E. of Fairfield Cot
WSCC -8	A281 Cowfold, Henfield Rd., By Singers Farm
WSCC -10	Pulborough, A283 Stopham Rd., W. of A29
WSCC -11	A24 Shipley, Worthing Road South of A24a272 Jct
WSCC -13	A24 Kingsfold, Layby 12 Mile S. of Surrey Border
WSCC -14	A29 Billingshurst, N. Of Town Just S. of New Rd
WSCC-16	A29 Bognor Road (Just S. of Surrey County Border)
WSCC -17	A281 Rudgwick, Guilford Rd., by House Called Hyes
WSCC -19	B2139 Amberley, New Barn Rd, E. of Railway Station
WSCC -23	A24, Washington, Horsham Rd
WSCC -27	A264 Faygate, Crawley Rd, by Park Road
WSCC -31	A24 Horsham, Broadbridge Heath S. of A281 Roundabout
WSCC -35	A281 Horsham, Brighton Rd S. of St Leonards Rd
WSCC -35	A281 Horsham, Brighton Rd S. of St Leonards Rd
WSCC -36	Horsham, Kings Rd S. of St Georges Gds
WSCC -37	B2237 Horsham, Warnham Rd N. of The Dog & Bacon Public House
WSCC -38	A281 Horsham, Guilford Rd East of Merryfield Drive
WSCC -39	B2237 Horsham, Worthing Rd N. of Tower Hill
WSCC -39	B2237 Horsham, Worthing Rd N. of Tower Hill
WSCC -40	B2195 Horsham, Harwood Rd Just E. of Elgin Close

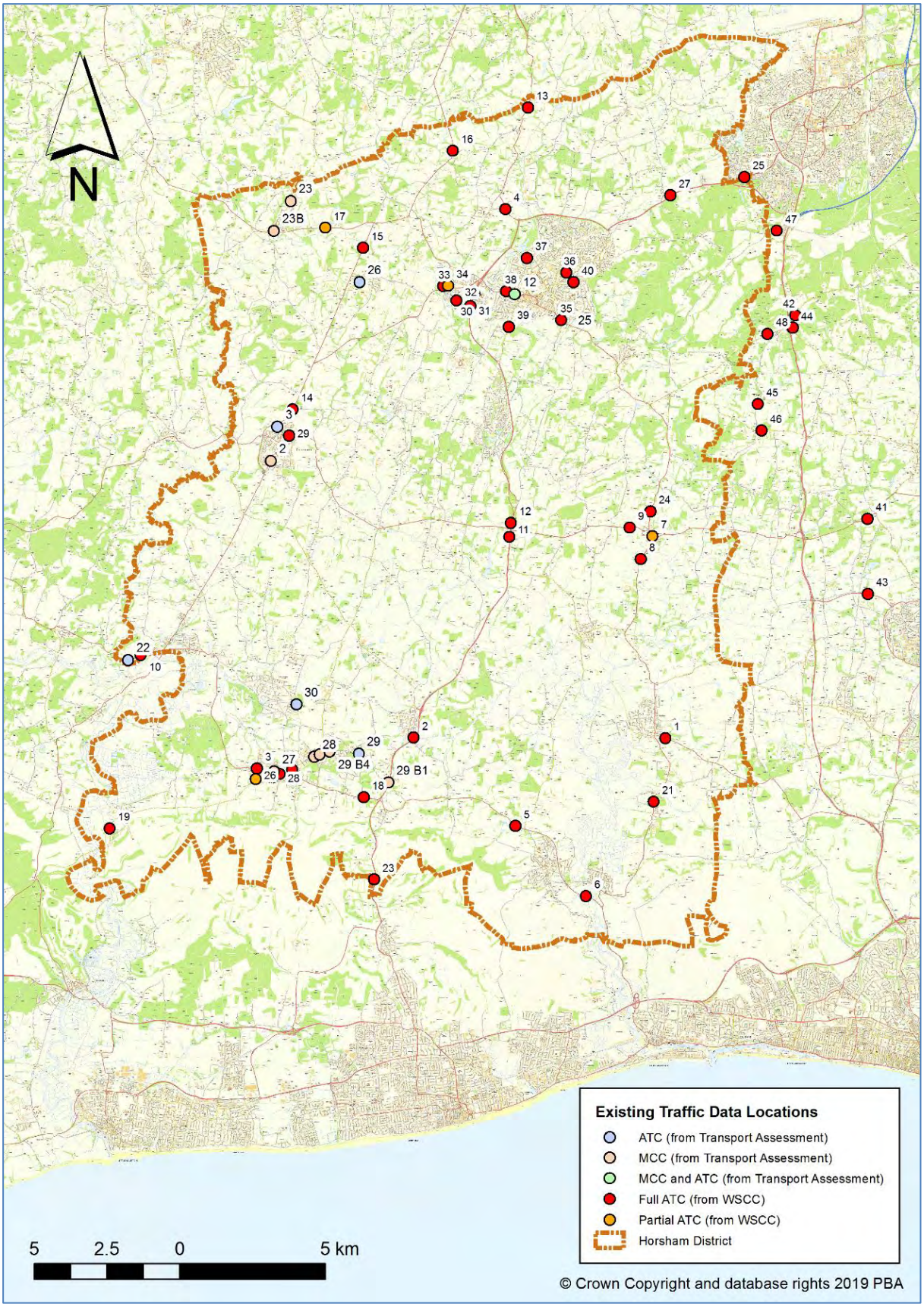


Figure 3-1: WSCC Existing Traffic Count Data

3.2.7 To inform flow calibration and validation on the Highways England network within the Horsham model area, count data was obtained from Highways England's open data source website[4]. The data was downloaded for May 2019 and analysed for weekday (Tuesday to Thursday) AM and PM Peak period flows.

3.2.8 The data covers the M23 and A23 which is part of the SRN managed by Highways England. The locations of the data collected is listed in Table 2-3 and shown in Figure 2-40. The data is classified by vehicle length in metres making it possible to discern vehicle classes into car (<5.2m), LGV (5.21-6.6m), OGV1 (6.61-11.6m) and OGV2 (above 11.6m).

Table 3-2: Highways England Count Location

ATC Reference.	Site Location
HE-1	M23 J10A NB On-slip
HE-2	M23 J10A SB Off-slip
HE-3	M23 between J10A and J11
HE-4	M23 J11 NB On-slip
HE-5	M23 J11 NB
HE-6	M23 J11 SB
HE-7	A23 SB between B2110 and B2114
HE-8	A23 SB B2114 Off-slip
HE-9	A23 NB between B2110 and M23/A264
HE-10	A23 SB between B2110 and B2115
HE-11	A23 NB at B2115 Junction
HE-12	A23 NB at B2115 Off-slip
HE-13	A23 NB at B2115 On-slip
HE-14	A23 NB at A272 Off-slip
HE-15	A23 NB at A272
HE-16	A23 SB at A272 Off-slip
HE-17	A23 SB at A272
HE-18	A23 SB at A2300
HE-19	A23 SB at A2300 Off-slip
HE-20	A23 NB at A2300 Off-slip
HE-21	A23 NB at A2300
HE-22	A23 SB at A281 On-Slip
HE-23	A23 SB at A281
HE-24	A23 NB at A281 Off-slip
HE-25	A23 NB at A281

[4] http://webtris.highwaysengland.co.uk/

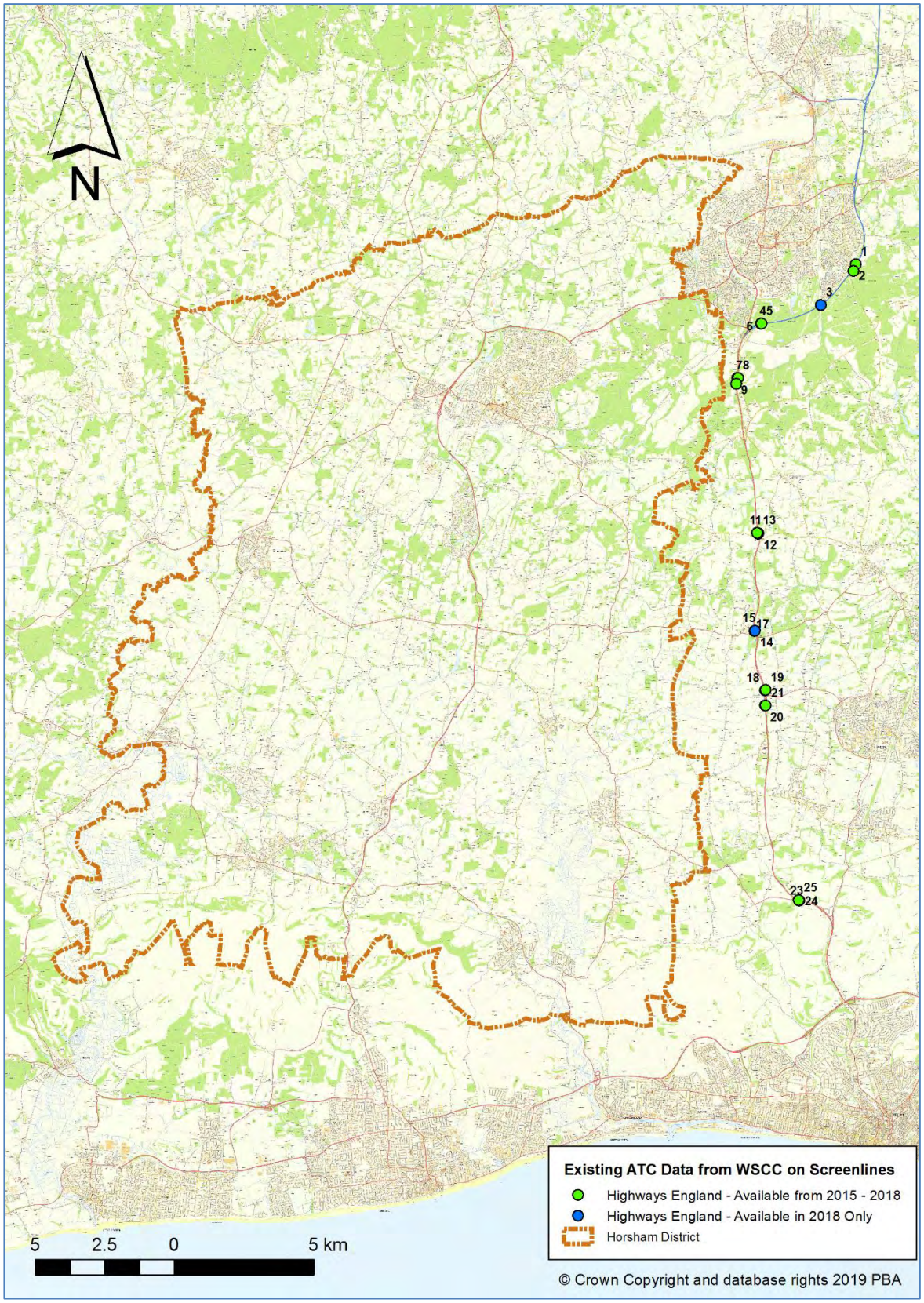


Figure 3-2: Highways England Existing Traffic Count Data

3.2.9 New ATC and MCC surveys were undertaken by Streetwise over a two-week period (14 days) from Friday 10th May 2019 to Thursday 23rd May 2019.

3.2.10 The data survey company was able to discern and classify the ATC and MCC data into cars, LGV, OGV1 and OGV2.

3.2.11 The locations of the new ATC and MCC survey data are set out in Table 3-3 and Table 3-4 respectively. All the new data collection is shown in Figure 3-3.

Table 3-3: New ATC Locations

ATC Reference	Location Description	OSGR
1	Haven Road (Bucks Green)	TQ 08492 31988
2	Rowhook Road (Rowhook)	TQ 12260 34327
3	Muggeridge's Hill (Rusper)	TQ 18119 37815
4	Rusper Road (Rusper)	TQ 20329 39458
5	A29 Stane Street near St Andrews Farm	TQ 07888 24180
6	B2139 Coolham Road (South of A272)	TQ 11897 22482
7	B2133 Lordings Road (Billingshurst)	TQ 07128 24607
8	Marringdean Road (Billingshurst)	TQ 09089 23506
9	West Chiltington Lane (Storrington)	TQ 09984 23088
10	Pound Lane (Green Street)	TQ 14975 22557
11	Littleworth Lane (Cowfold)	TQ 19159 22122
12	A283 Shoreham Road (South of Roundabout with A2037)	TQ 19774 09375
13	Annington Road (Botolphs)	TQ 18612 09568
14	Bostal Road (Steyning)	TQ 16443 09929
15	A281 Guildford Road near Weyhurst Farm	TQ 07451 33268
16	A272 Newbridge Road near River Arun	TQ 06919 25942
17	A29 London Road near Ingrams Farm	TQ 04083 17715
18	Loxwood Road (Bucks Green)	TQ 07426 32655
19	Brook Lane (Coldwaltham)	TQ 03251 16205
20	B2110 Handcross Road near Howards Nursery	TQ 22531 27655
21	B2116 Wheatsheaf Road near Gainsborough	TQ 21977 17539
22	Lambs Green Road (Lambs Green)	TQ 21697 36484

ATC Reference	Location Description	OSGR
23	Tower Road (Faygate)	TQ 22087 33604
24	Forest Road (Colgate)	TQ 22156 32677
25	Grouse Road (Colgate)	TQ 22377 29712
26	Hammerpond Road (Horsham)	TQ 22449 28754
27	Horn Lane (Henfield)	TQ 21931 13870
28	Edburton Road (Henfield)	TQ 21294 11425
29	Blackbridge Lane N (Horsham)	TQ 16434 30152
30	Blackbridge Lane E (Horsham)	TQ 16395 30569
31	Wimblehurst Road (Horsham)	TQ 17672 31903
32	Foundary Lane (Horsham)	TQ 18205 31658
33	Depot Road (Horsham)	TQ 18789 30790
34	St Leonard's Road (Horsham)	TQ 18413 29984
35	Bashurst Hill (Bashurst Hill)	TQ 12227 28650
36	Fulfords Hill (Itchingfield)	TQ 13427 29851
37	Golding Lane (Mannings Heath)	TQ 20904 29279

Table 3-4: New MCC Data Location

MCC Reference	Location
1	A24 Dorking Road / A281 / A24
2	A264 / A264 Crawley Road / B2195
3	A264 / Sullivan Drive / A2220 Horsham Road / A264
4	A281 / Old Guildford Road / A24 NB On-slip / A24 SB Off-slip / A281 Guildford Road / A24 SB On-Slip / A24 NB Off-slip
5	A272 / A24 Worthing Road
6	A24 NB On-slip / A24 SB Off-slip / A24 SB On-slip / East Wolves Farm / A24 NB Off-slip

MCC Reference	Location
7	A283 Storrington Road / A24 A283 The Pike / A24
8	Stane Street / A29
9	A272 / A29 / A272 West Street / A29
10	Albian Way / A281
11	A264 / A23 / M23 NB On-slip / M23 SB Off-slip / B2114 Brighton Road / A23 SB On-slip / A23 NB Off-slip
12	A272 Cowfold Road / London Road / A23 NB On-slip / A23 NB Off-slip
13	A272 Cowfold Road / A23 SB Off-slip / Crossways / A272 / A23 On-slip
14	A283 / A2037
15	Hop Oast Roundabout
16	A29 Stane Street/High Street
17	A281 / A29 Roman Road / A281 Guildford Road
18	Ingfield Manor School / A29 / A264 Horsham Road / A29
19	B2133 / A29
20	A283 Station Road / A29 London Road / A283 Lower Street / A29 Roman Road
21	A283 High Street / B2139 School Hill / A283 Manley's Hill
22	A283 Washington Road / Water Lane / Chanctonbury Ring Road
23	Clays Hill / A283 / Roman Road / The Street / A283 / Maudlin Lane
24	A272 Station Road / A281 Brook Hill / A272 / A281
25	A281 High Street / A2037 High Street / A281 Brighton Road

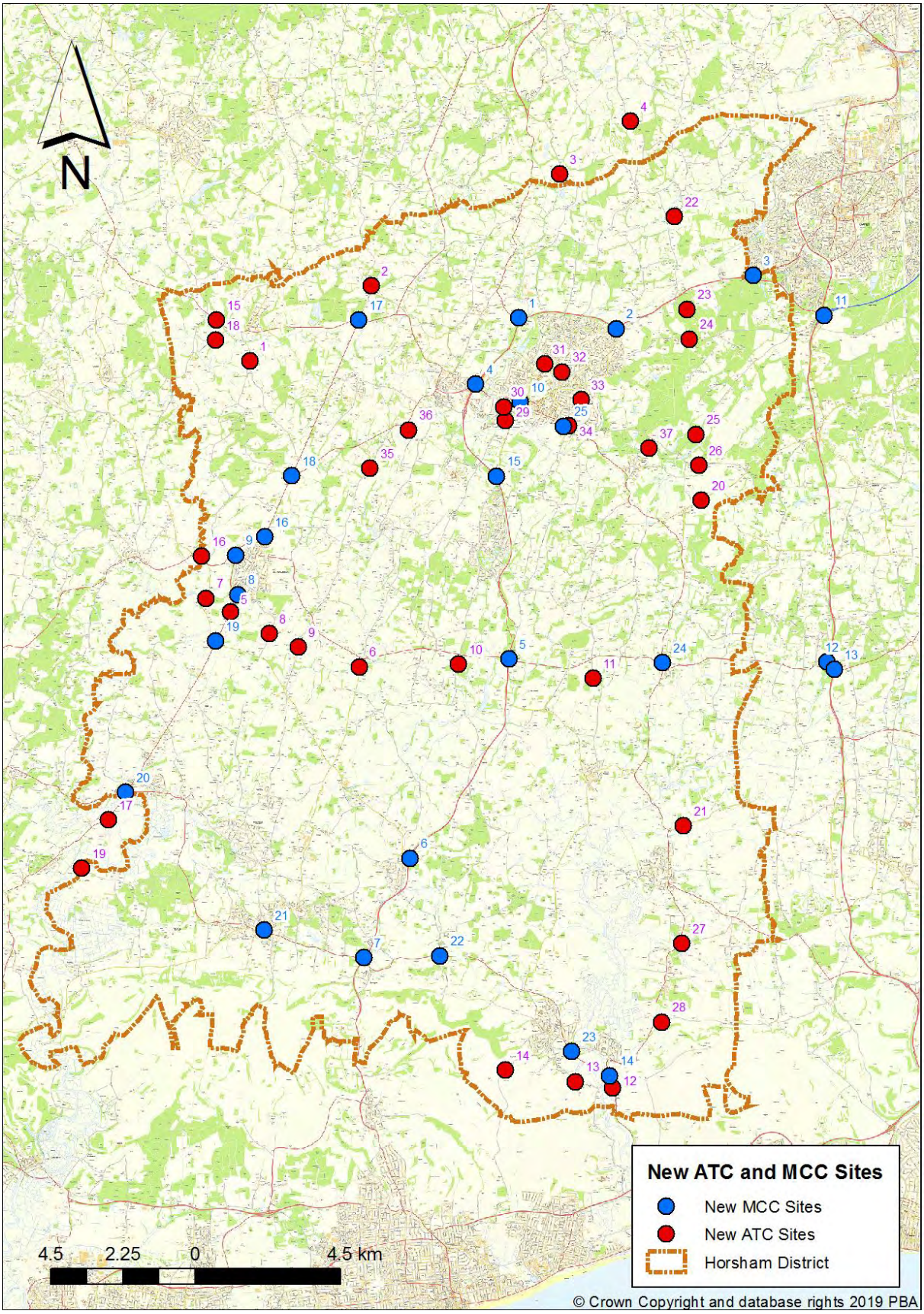


Figure 3-3: New Traffic Count Data

3.3 Journey Time Data

3.3.1 Travel time data is required to enable validation of modelled journey times. Journey time data for model update was sourced from Teletrac Navman (formerly Traffic Master) Data via the Department for Transport (DfT) covering the period May to June 2018.

3.3.2 Journey time routes for validation were defined and the relevant journey time data for the AM peak hour (08:00 to 09:00), and PM peak hour (17:00 to 18:00) extracted from the full data for the study area. The data used was for the neutral weekdays Tuesday to Thursday. Neutral days would avoid school holidays and any other periods where traffic conditions are not seen as the norm such as close to Christmas. Journey time routes can be found in Figure 3-4 below.

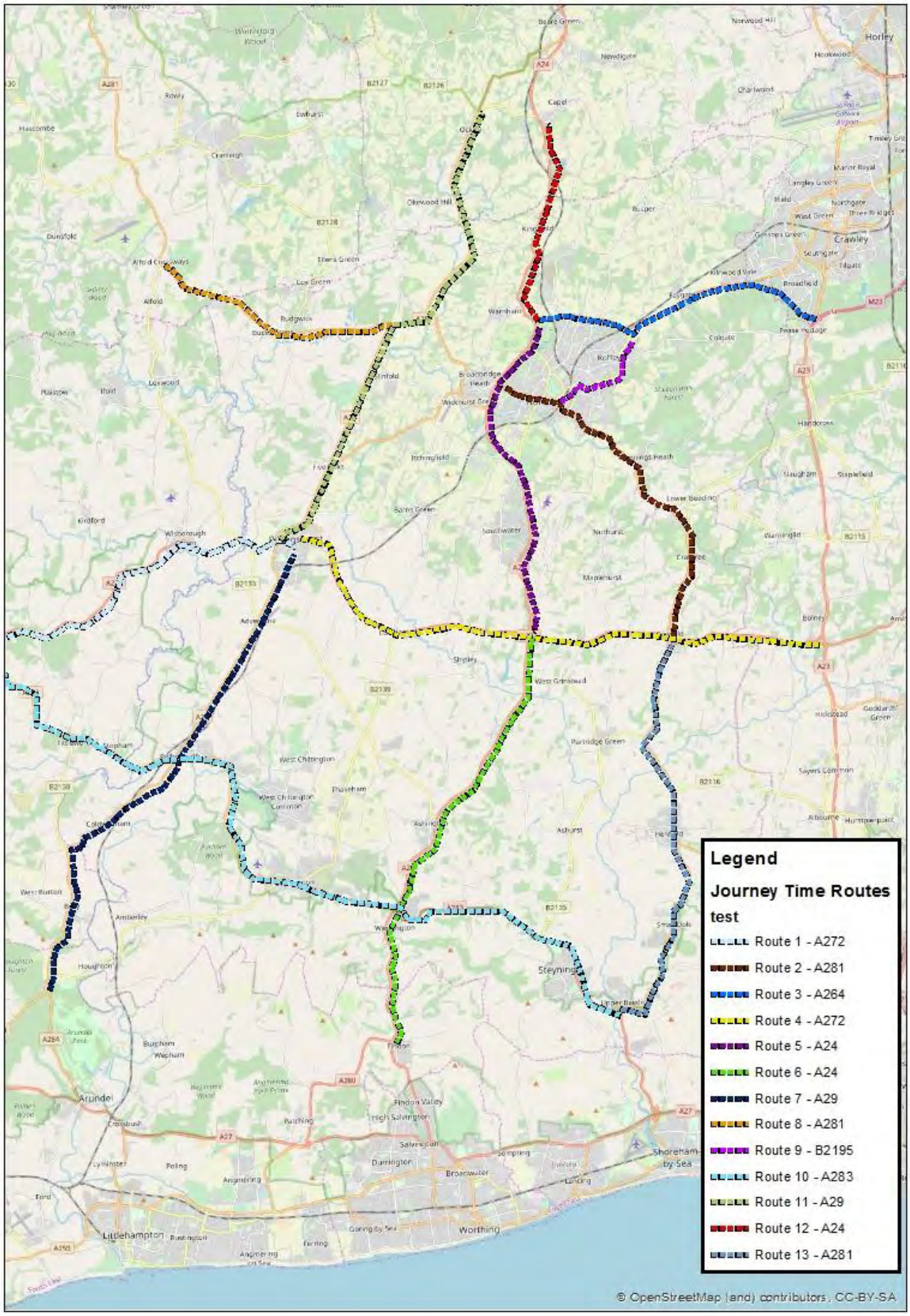


Figure 3-4: Journey Time Routes

3.4 Mobile Network Data

3.4.1 The mobile network data (MND) was used as the main source of data to develop trip origin and destination matrices for the HHM. This was in preference to undertaking Roadside Interview Surveys (RSI) which has been the traditional method of developing matrices for transport models in the UK for a long time. The MND provider in this instance was Telefonica.

3.4.2 RSIs have typically involved directly asking people about their travel patterns through conducting intercept surveys such as roadside interviews or through the use of household surveys. Despite limitations on survey scale and sample biases, these methods have been accepted as the state of practice.

3.4.3 Whilst RSI's traditionally provide a good depth of survey detail (e.g. origin and destination, time of day, travel purpose, mode, vehicle occupancy, frequency, vehicle type, onward journey, journey time). However, they tend to result in low sample rates when compared with overall traffic and travel movements. Furthermore, such surveys:

- Can be intrusive and disruptive to the travelling public (particularly when 1 to 1 interviewers are involved, less so when postcard surveys are involved);
- Require police supervision;
- Can be impacted by diversions (particularly when the public are provided with advanced warnings of the surveys); and
- Can be abandoned should unsafe queuing form at the interview location.

3.4.4 These methods are also becoming increasingly expensive and time consuming to conduct and to authorise.

3.4.5 In recent years, the transport modelling industry in the UK has moved towards making use of MND to assist in the derivation of travel demand matrices. Such data has been used in a range of transport models including Highways England's Regional Transport Models (including the South West Regional Model (SWRTM).

3.4.6 MND provides a large sample of data (the key MND Providers: Telefonica, Vodaphone and EE) tend to have around 30% market share of total mobile phone users across the UK (which will vary regionally). However, it lacks the detail that targeted journey surveys contain (e.g. travel purpose and mode), as the data is essentially mobile phones moving through the transport network.

3.4.7 In order to; increase the value of the data and make it more appropriate for use in transport modelling, while still ensuring mobile user anonymity, MND providers apply a range of algorithms and make a number of assumptions regarding the movement of the phone to infer the mode and travel purpose of the user. While these adjustments are made from the MND providers experience in the use of mobile phone data across the country, there can sometimes be regional variations in the factors that only become apparent when processing the data for model development use. In these situations, further adjustments may be required.

3.4.8 Some key advantages of MND are:

- The high sample of origin and destination (OD) movements. The 'raw' unprocessed data can provide very useful insights into travel patterns and give a 'non modelled' understanding of movements throughout the area of data provided;
- Time of day movements can be extracted;

- MND's store data for a number of years and therefore time series pattern changes can be analysed (e.g. by season (tourists), unique events, year on year);
- Whilst the data and processing of the data can be perceived as expensive, it tends to be less than that of collecting a comprehensive set of observed travel pattern data

3.4.9 Some key challenges in the use of MND:

- While MNDP's process the data using a range of algorithms to provide insight to aspects such; as mode, journey length and travel purpose etc.;
- Journey length is a key challenge. Short distance trips are not well represented within MND and longer trip lengths can be overstated;
- The quality and granularity of data will vary from region to region. This can be dependent upon:
    - the market share (and therefore sample size) of the Mobile Network in the area (which is unlikely to be revealed by the MNDP - instead, they may factor up their own sample to be representative of the total population in the area);
    - the density of the mobile data masts in the area. The larger the area between masts, the larger the resultant zones of origin\destination movements will be.

3.4.10 The use of the MND data in the matrix development in the context of the Horsham model is discussed further in Section 5.

4 Network Development

4.1 Network Extent & Structure

4.1.1 The extent of the detailed highway network is shown in Figure 4-1. The network structure has been designed in accordance to Tag unit M3.1 guidance. The network is coded at two levels with more detail provided within what is known as the detailed simulation area and less detail in the outer area of the model or buffer area.

4.1.2 The detailed simulation area is coded based on the area over which significant impacts of the proposed Local Plan developments are certain and includes the entire Horsham District, Crawley and the A23 corridor to the east and selected relevant links within neighbouring authorities to the south, west and north.

4.1.3 The detailed simulation area is characterised by representation of all trips, with small zones, very detailed network and junction modelling (including flow metering and blocking back). This requires a representation of each junction. Some very short trips may be missing from the model, where these take place within a zone i.e. both the start and the end of the trip fall within the same zone. These trips are known as intrazonal trips. The junction representation needs to include:

- Junction type (e.g. signal controlled, priority etc.);
- Signal timings where appropriate;
- Lane allocations;
- Priorities;
- Movement capacities

4.1.4 The buffer area is the area over which the impacts of the Local Plan are considered to be relatively weak in magnitude.

4.1.5 The extent of the network and the specific roads included was agreed with WSCC.

4.1.6 The buffer area is represented by larger zones and less network detail, with partial representation of demand and simple speed/flow relationships without modelling/simulating junction delays.

4.1.7 The network from the CTM and WSCTM were used as the starting point, with additional detail added within Horsham and a review of coding was undertaken to include any recent changes within the study area.

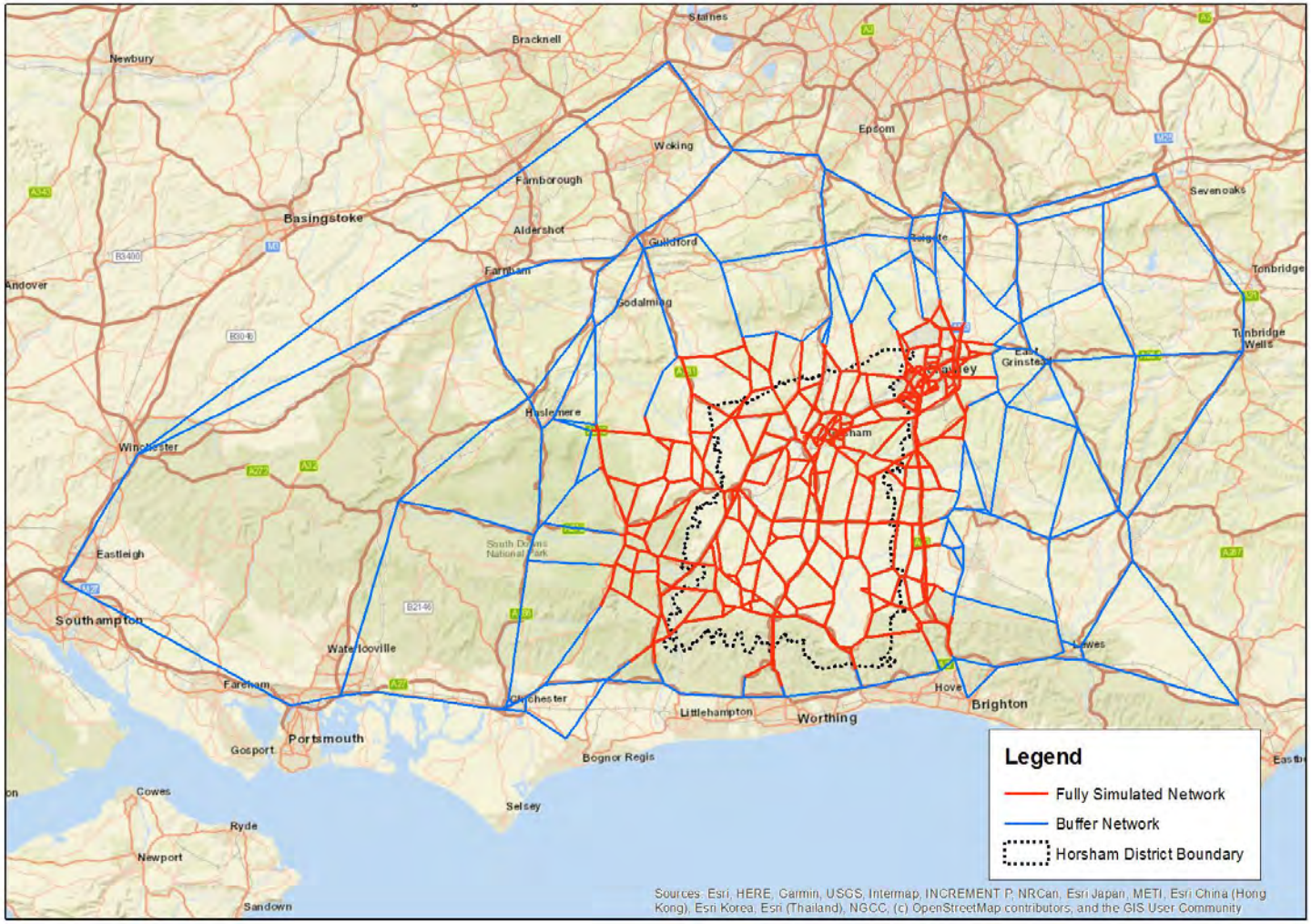


Figure 4-1: Network Extent

Junction Types and Saturation Flows

4.1.8 The HHM consists of various types of junctions including priority junctions, roundabouts and signal-controlled junctions. Within the detailed model area, the main delays to a journey predominantly result from traffic interaction at junctions.

4.1.9 Table 4-1 summarise the default turn saturation flows that have been assumed in the HHM subject to amendment as part of the calibration process for priority and signal junctions. These default values were consistent with Highways England modelling used within development of their Regional Transport Models. Amendments were to better model individual characteristics of the junction such as poor visibility or narrow lanes to help improve calibration. Roundabout saturation flows were considered on a junction by junction basis and vary from a mini roundabout to a 3-lane approach with 4 lanes at the stop line. The range of values are shown in Table 4-2.

Table 4-1: Default Turn Saturation Flows assumed (PCU/hr)

Junction Type	Movement	Saturation Flow
Priority	Major-Straight ahead	1,825
	Major-minor left turn	1,725
	Major-minor right turn	1,650
	Minor-major left turn	1,200
	Minor-major right turn	875
	Minor-major ahead	950
Signals	Left turn	1,750
	Straight ahead	1,900
	Right turn	1,700

Table 4-2: Roundabout coding values

Circulating Time	GAP Value	Entry Capacity	Circulating Capacity
5 – 17 seconds	2.0 – 0.7 seconds	820 – 4760 PCU's	1820 – 5150 PCU's

Speed Flow Curves

4.1.10 Speed/flow curves were used in the rural areas of the model and within the buffer area to model the flow delay relationships. In the buffer area, journey times including delays were determined using speed/flow curves. The speed/flow relationships were derived from DMRB

Volume 13 COBA manual, subject to amendment during the calibration process. The adjustments were made if characteristics of the road meant it did not fit within any of the default curves and to improve calibration. This may include influence of bends, gradients, side accesses etc.

4.1.11 A speed-flow curve defines the key determinants of a link's performance, such as its saturation capacity, the speed that vehicles travel at this level of saturation and the speed that vehicles travel in free-flow conditions. It is appropriate to use speed flow curves within the more rural areas of the model, as these will be better determinants of journey times on rural links, than allowing delays entering upstream junctions and controlled crossings to be the sole variable factor in journey times, as is typically the case in urban networks.

4.2 Zoning System

4.2.1 The zoning system used for the HHM is based on 2011 census output areas. Depending upon the level of detail required within different areas of the model these may have been aggregated. The benefit of using these as the zoning structure is ease of use and comparison with planning data, such as population and employment estimates in both the development of the base model and for model forecasting going forward.

4.2.2 The zoning system comprises 216 zones in total of which 114 are internal zones representing within the Horsham District and immediate surrounding area. 8 zones have been earmarked for future local plan development sites. The rest of the zones are external zones, which represent the entire UK. These are more refined in the areas immediately outside the detailed modelled area and become coarser further out.

4.2.3 For ease of analysis and understanding of the trip making patterns, the zoning system is divided into sectors. As with the zoning system itself, the sectors are more refined within the detailed modelled area, again, becoming coarser further out from the detailed area.

4.2.4 The zoning system is shown in Figures 4-2 and 4-3.

Zone Centroid Connectors

4.2.5 Centroid connectors enable the zones to be linked to the highway network. These are coded as far as possible using specific entry / exit junctions from local access roads onto the main road network from self-contained areas, such as residential, business parks, retail areas and car parks for example.

4.2.6 Judgement is used to determine the number of centroid connectors required from each zone to represent locations where the traffic from the zones was likely to join the main road network in reality.

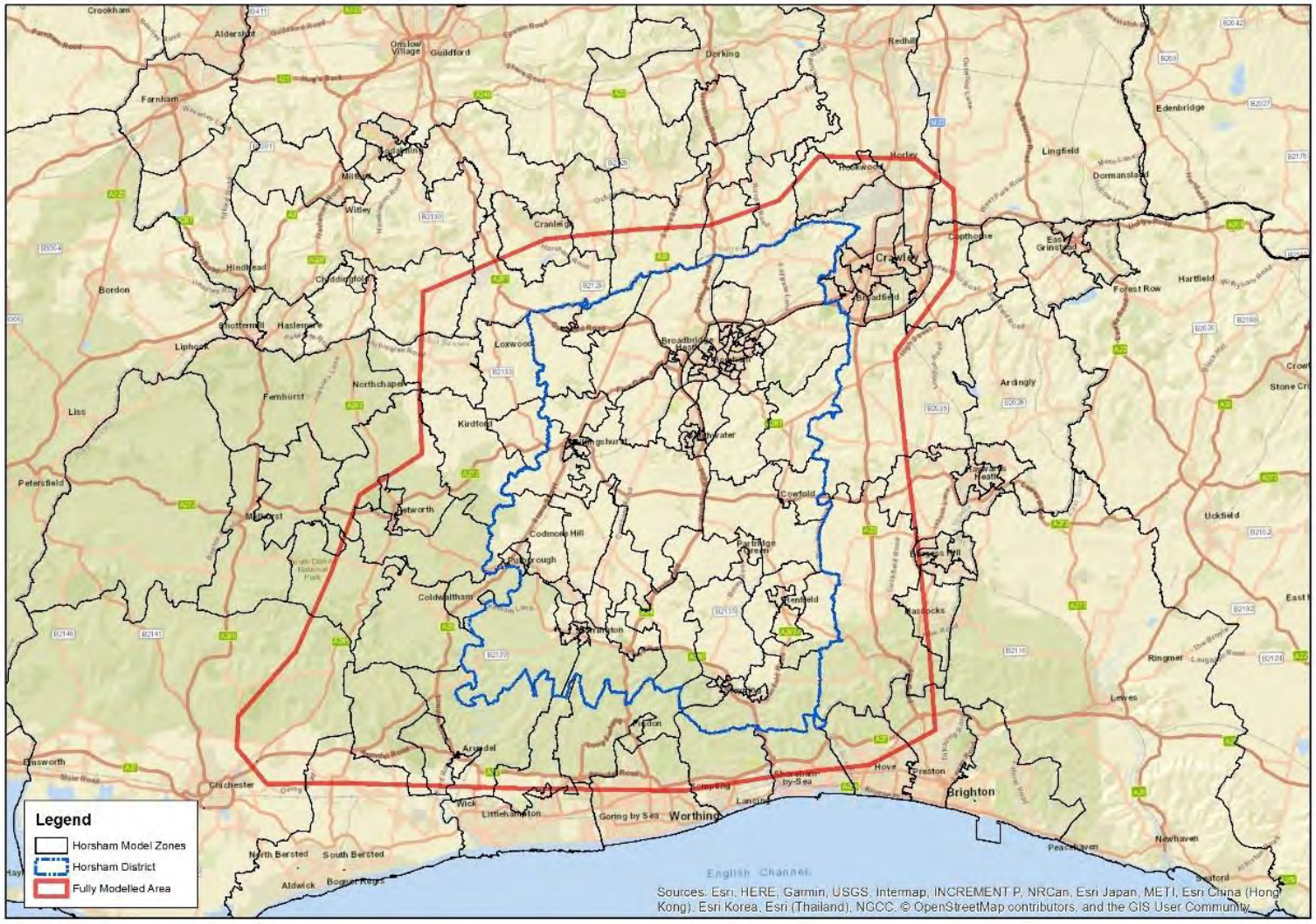


Figure 4-2: Horsham District Zone

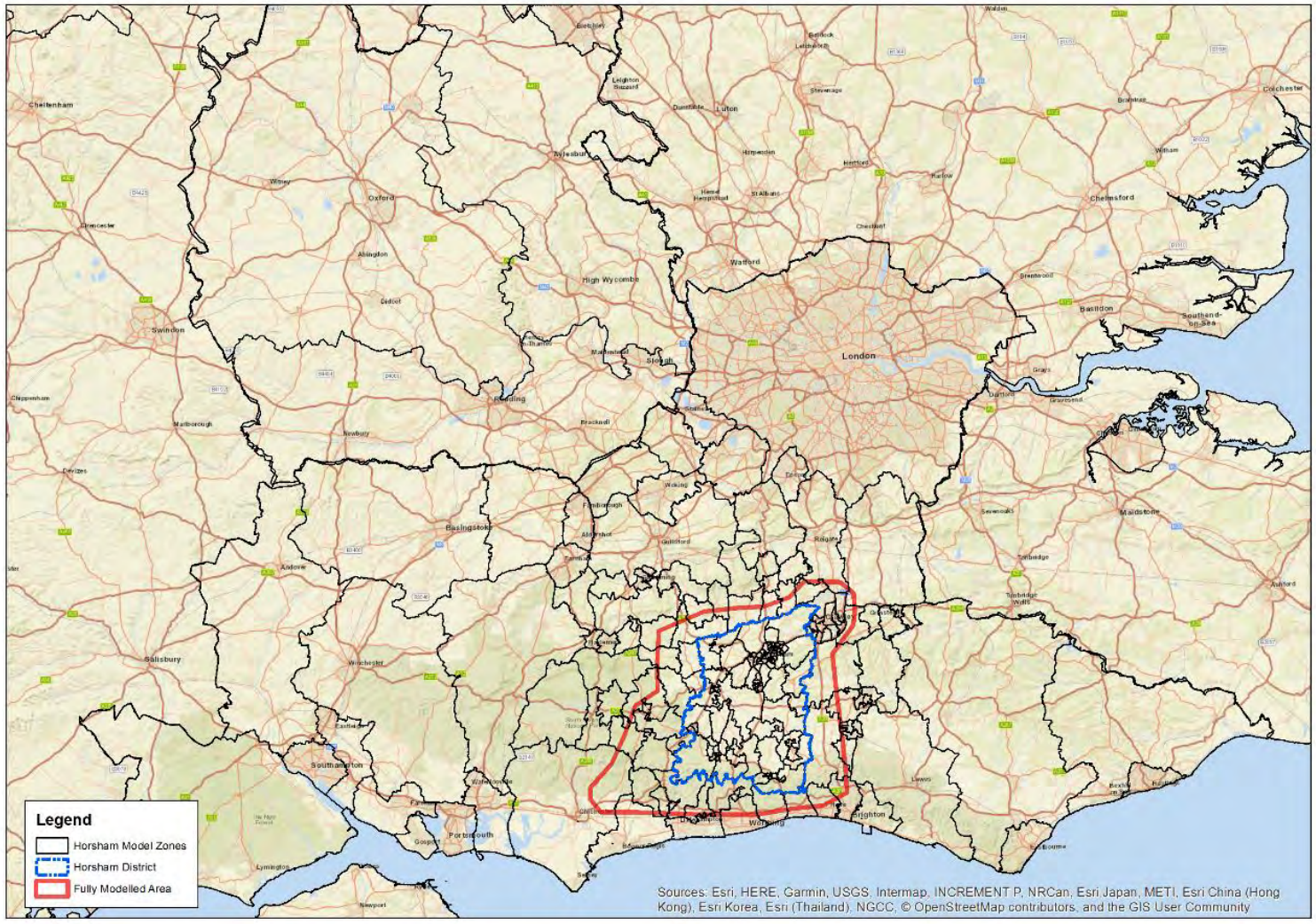


Figure 4-3: Wider Area Model Zones

5 Matrix Development

5.1 Introduction

5.1.1 As explained in Section 3.4, MND was used as the main source of data to develop origin destination matrices for the HTM.

5.1.2 This section explains the methods used to develop the initial origin and destination demand matrices prior to them being assigned to the network. The development of the highway matrices consists of three broad stages:

- Development of 'observed' matrices from mobile network data (MND)
- Development of synthesised matrices to complement MND data for short distance or internal to internal trips
- Merging the synthesised and MND matrices.

5.2 Mobile Network Data Matrices

5.2.1 The MND has been provided by Telefonica (O2 in the UK) for the West Sussex region covering six neutral weeks in April and May 2015. The data as provided was separated into different modes (road, rail and HGV). The data had also been split by purpose into the following categories:

- Non-Home Based (NHB) Trips
- Outbound Home-Based Work (OB_HBW) Trips
- Outbound Home Based Other (OB_HBO) Trips
- Inbound Home-Based Work (IB_HBW) Trips
- Inbound Home Based Other (IB_HBO) Trips

5.2.2 Validation has been carried out to demonstrate that the mobile phone data is consistent with known sources of trip making data such as census journey to work data and National Travel Survey (NTS) data.

5.3 Initial Validation by Telefonica

5.3.1 Telefonica undertook some initial validation of the MND prior to releasing it to WSCC. The initial validation is reported in 'West Sussex OD from Mobile Phone Data, Project Report', issued 25/02/2016.

5.3.2 Telefonica compared a number of different factors in the data to the Census data (including journey to work data) and the National Travel Survey (NTS). These tests included:
Comparison of home-based origins with zone home population

- Comparison of work-based origins with zone work population
- Analysis of trip purpose split
- Comparison of trips starting and ending per zone (trip symmetry)
- Trip length distribution against the census journey to work and NTS data
- Comparison of travel start time with NTS data
- Comparison of rail mode share with the census journey to work data

5.3.3 Telefonica used these tests to verify that there is a strong correlation and good fit between the MND and the census/NTS data and therefore considered suitable for use. Their results also highlighted some known bias in the data such as the under-representation in short trips up to about 5 miles.

5.4 MND Matrix Development

5.4.1 Once the initial MND validation checks had been undertaken, the data was used to develop initial matrices. The data was already split by the required three model time periods. The OD movements were translated as necessary to match HHM zoning system. The MND trip purpose matrices were merged as necessary to create the three model assignment purpose splits of car commute, car other and car employer business.

5.4.2 A key challenge of creating matrices from MND was how to identify those through trips or external to external movements that were relevant to the Horsham model given that MND data covered the whole of West Sussex. A sector system was derived to make it easier to understand the Horsham District and wider trip making patterns. Judgement was applied to decide which sector movements were relevant to the HHM including those sector movements that would form the external to external movements.

5.5 Development of Synthetic Matrices

5.5.1 The MND was used to inform 'observed' trip matrices. While the MND contains external to internal, internal to external and internal to internal movements, the latter being short distance trips, were not well represented in the MND hence the decision to synthesise.

5.5.2 A review of trip lengths within the, showed that short distance trips of up to 5 kilometres were lacking in the data MND when compared against known established sources of trip making data such as NTEM, National Travel Statistics (NTS) and census.

5.5.3 The trip matrices were therefore subject to some adjustment using local traffic count data through the SATURN Matrix Estimation process. Matrix Estimation is a recognised process of updating some part of the trip matrix or synthesising some trips within the matrix and uses traffic counts to inform this process,

5.5.4 The process involved a methodology of checking specific links which fell far short of observed traffic counts and reviewing the model to make sure this was not a result of alternative routing within the model. Once this was established, particular links were fed into the SATURN Matrix Estimation process. Links were selected where it is known that this process would increase shorter distance trips based on nearby count sites and where it appeared that there was a shortfall of these trips.

5.5.5 The modified MND and synthesised OD demand based on the selected traffic counts, formed the initial prior matrices which were then assigned to the network as part of the calibration process.

6 Model Assignment, Calibration and Validation Procedures

6.1 Introduction

6.1.1 Calibration of the network and matrices was undertaken to demonstrate that the model outputs provide a reasonable representation of observed traffic flows and behaviours in the updated model. The calibration process involved the refinement of the network detail to check that link lengths, link speeds and junction behaviour/operation are well represented. Junction parameters reviewed and amended as part of the calibration process include turn saturation flows and signal timings as appropriate.

6.1.2 Generalised cost parameters are used in the model network to determine the minimum cost routes by which traffic is assigned onto the network. Within SATURN, generalised cost coefficients are input by user class. The two parameters required are pence per minute (PPM) and pence per kilometre. The values of time and values of distance for 2010 and 2015 used to calculate the PPM[5] and PPK[6] coefficients were determined using the TAG Data book Autumn 2015 release v1.4b. The coefficients are shown in Table 6-1.

Table 6-1: Generalised Cost Coefficients

User Class	Class Type	AM		IP		PM	
		PPM	PPK	PPM	PPK	PPM	PPK
1	Commute	1.00	0.42	1.00	0.41	1.00	0.42
2	Employer business	1.00	0.17	1.00	0.16	1.00	0.17
3	Other	1.00	0.33	1.00	0.32	1.00	0.33
4	LGV	1.00	0.51	1.00	0.51	1.00	0.51
5	HGV	1.00	1.55	1.00	1.50	1.00	1.55

6.2 Network Calibration

6.2.1 In order to verify that the modelled network correctly represents the existing situation, a number of checks were undertaken as part of the calibration process. These include the following:

- Checks to verify that loading of zone connectors was reasonable;
- Link lengths checks including verifying that directional distances were matched and where different, that the differences were reasonable;
- Routeing checks through the network by using SATURN's 'built trees' facility
- Verifying that lane designations at junctions were correctly coded;
- Verifying of turn saturation flows at key junctions;

[5] See Glossary
[6] See Glossary

- Routeing checks through the network by using SATURN's 'built trees' facility

6.2.2 A thorough examination of the SATURN network has confirmed that each zone centroid has been loaded onto the appropriate link and link length checks confirmed that link lengths had been coded correctly.

6.2.3 The modelled routeing of traffic throughout the network has been checked. Appendices A to C show model output plots of the routeing calibration checks for all three modelled time periods.

6.2.4 The routeings have been checked using the 'forest trees' option within SATURN's P1X module. Routes between a wide range of Origin and Destination pairs across the whole network were checked to verify that route choice in the model was reasonable. This included checks for north to south and south to north key movements; checks for east to west and west to east movements.

6.2.5 The routeing checks indicated that the model was in main replicating the complex route choice in the HTM. Outputs of the route checks can be found within Appendix A.

6.3 Matrix Calibration

6.3.1 The matrix calibration involved assigning the initial or prior matrices onto the network and checking that observed flows were reasonably replicated. The prior matrix was developed from the MND data as described in Section 5.

6.3.2 A manual factoring process has been undertaken where major over- or under-estimated count sites have been analysed in order to understand discrepancies within the MND data. This analysis showed an overestimation of demand from large MSOA zones and Local Authority zones along the South Coast using the A27 to other external zones along the south coast. These external to external movements along the south coast have been removed from the demand matrix.

6.3.3 Further Matrix calibration involved factoring of certain zones in particular the zone encompassing the local authority of Worthing which has a considerably large population in comparison to other zones. Trips from this zone appeared to significantly overestimate demand further north along the A24. Therefore, a manual factoring process was undertaken to reduce the number of trips with an origin or destination of Worthing. This methodology was used instead of individual matrix estimation as it was deemed that the trip distribution was realistic, whereas matrix estimation applies multiplication factors to trips from zones in close proximity to the link where the matrix estimation is being undertaken.

6.3.4 While matrix estimation generally improves flow calibration and validation, it should only be undertaken once network issues have been resolved and only when trip matrices are reasonably close to the expected demands, otherwise the matrix estimation process amplifies the network and demand errors. The results of the flow calibration following the matrix estimation process are reported in the next section.

7 Model Calibration Results

7.1 Introduction

7.1.1 This section reports on the flow calibration. As noted in Section 5, calibration of the network and matrices was undertaken to seek to achieve an accurate representation of observed traffic flows and behaviours in the updated Horsham District model. This section reports on the results of the flow calibration in the HHM for all three time periods.

7.1.2 Flow calibration has been undertaken at key junctions within the Horsham District. Including key HE junctions just to the West of Horsham district along the A23 and M23 J11 South of Crawley as a key access point from the HE network to the Horsham district.

7.2 Turning Flow Calibration Results

7.2.1 The GEH (Geoffrey Edward Havers) statistic has been used to summarise the flow calibration results. This summary is shown in Tables 6-1 and 6-2 for all junction turning movements used within the calibration process.

7.2.2 The GEH Statistic is a formula used in traffic modelling to compare two sets of traffic volumes and assess the fit between the observed and modelled flows. It takes account of the fact that when traffic flows are low, the percentage difference between observed and modelled flows may be high but the significance of this difference is small.

7.2.3 A GEH of less than 5.0 is considered to represent a good match between the modelled and observed hourly flows. A GEH value greater than 10 indicates that the match between observed and modelled flows is poor and closer attention is required. The guideline is to aim for 85% of counts with a GEH below 5.

Table 7-1: GEH Flow Calibration (PCU/hr) by Time Period

Calibration Criteria	AM Peak	PM Peak
No of Observed Turn Counts	275	275
No of Modelled flows with GEH<5	203	192
% of Modelled flows with GEH < 5	**74%**	**70%**
No of Modelled flows with GEH< 10	254	256
% of Modelled flows with GEH < 10	**92%**	**93%**

7.3 Strategic Road Network Calibration

7.3.1 Certain junctions along the A23 under Highways England's authority have also been included with the overall calibration results. Whilst these junctions do not fall within Horsham district, the Local Plan study will be required to show how proposed developments will impact on the A23.

7.3.2 Link count results along the A23 and M23 mainline are shown in the table below:

Table 7-2: HE Link Count Results AM

Location	Count	Model	Diff.	GEH	Pass/Fail	
					GEH	FLOW
M23 J10 - J11 SB	4257	3588	-669	10.68	×	×
NB Within J11	2081	1994	-87	1.92	✓	✓
M23 J11 northbound access	890	1025	135	4.36	✓	×
A23 southbound between B2110 and B2114	3655	3017	-637	11.04	×	×
A23 northbound between B2110 and M23/A264	3045	2719	-326	6.07	×	✓
A23 northbound within the B2115 junction	2786	2575	-211	4.08	✓	✓
A23 northbound within the A272	2598	2745	147	2.85	✓	✓
A23 southbound within the A2300	3118	2947	-171	3.11	✓	✓
A23 northbound within the A2300 junction	2243	2429	186	3.85	✓	✓

Table 7-3: HE Link Count Results PM

Location	Count	Model	Diff.	GEH	Pass/Fail	
					GEH	FLOW
M23 J10 - J11 SB	4257	3588	-669	10.68	×	×
NB Within J11	2081	1994	-87	1.92	✓	✓
M23 J11 northbound access	890	1025	135	4.36	✓	×
A23 southbound between B2110 and B2114	3655	3017	-637	11.04	×	×
A23 northbound between B2110 and M23/A264	3045	2719	-326	6.07	×	✓
A23 northbound within the B2115 junction	2786	2575	-211	4.08	✓	✓
A23 northbound within the A272	2598	2745	147	2.85	✓	✓
A23 southbound within the A2300	3118	2947	-171	3.11	✓	✓
A23 northbound within the A2300 junction	2243	2429	186	3.85	✓	✓

7.3.3 Detailed results of turning counts at junctions along the A23 and M23 can be found within Appendix B & C. These include the following junctions:

- M23 J11 (Pease Pottage)
- A23/B2115 Cuckfield Lane
- A23/ Cowfold Road
- A23/A281 West Road

7.4 Impact of Matrix Estimation on Trip Lengths

7.4.1 This section describes the resulting impact of the matrix estimation process to the prior matrices. The analysis is intended to check there are no significant changes to the prior matrices, as stated with TAG M3.1, it is important that the fidelity of the underlying trip matrices is not compromised in order to meet the validation standards.

7.4.2 Trip length distribution pre and post matrix estimation has been checked. This is to check that the matrix estimation process does not materially alter the trip making patterns in the prior matrices. Matrix estimation can have the tendency to increase short distance trips at the expense of long-distance trips, which needs to be kept to a minimum.

7.4.3 The results of the trip length distribution checks are shown in Figures 7-1 and 7-2 for each of the AM and PM peaks respectively. The results show that the trip length distribution does not change significantly pre and post matrix estimation.

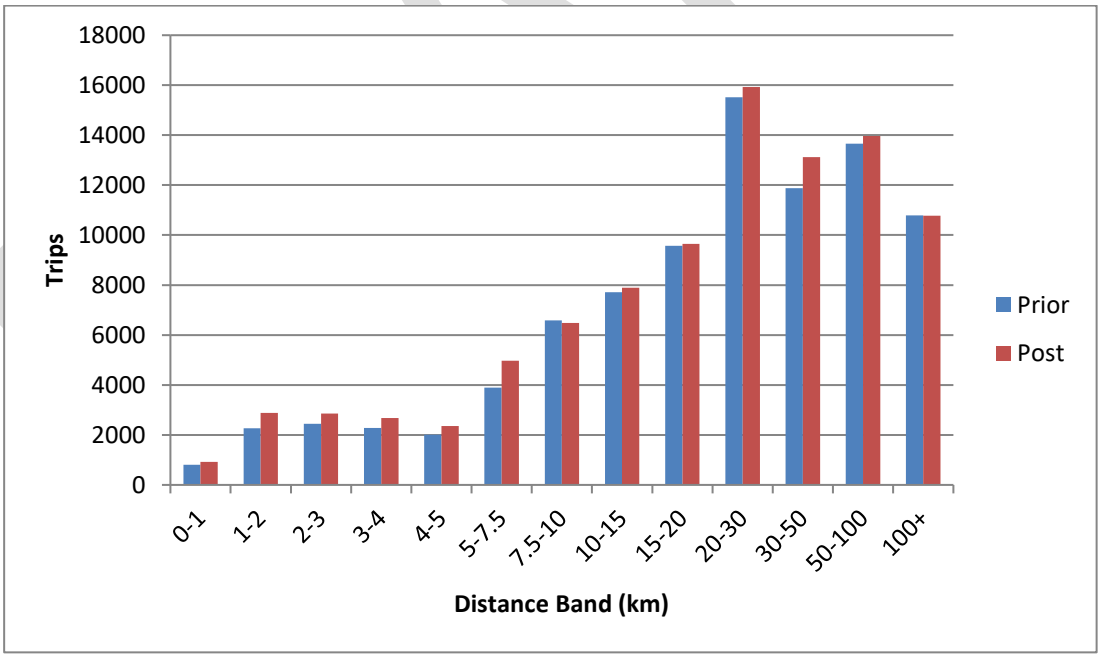


Figure 7-1: AM Peak TLD Comparison

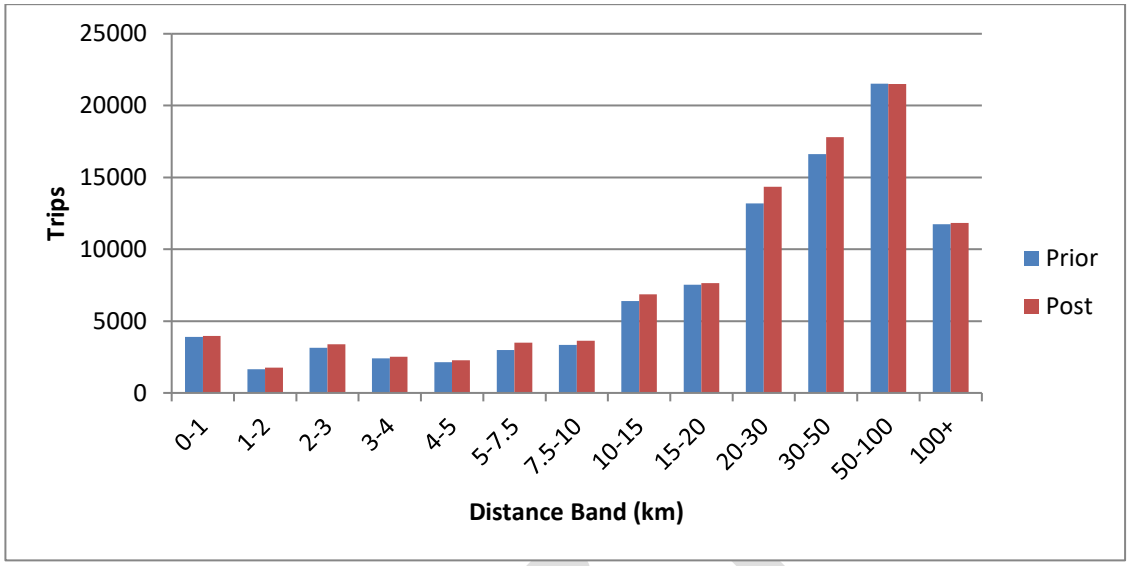


Figure 7-2: PM Peak TLD Comparison

7.5 Matrix Estimation Sector Analysis

7.5.1 As with the trip length distribution, sector to sector level matrices has been created in order to verify the variance of sector to sector trips between the prior and post ME matrices.

7.5.2 For the purpose of sector analysis, the model zoning has been grouped as shown in Figure 7-3. The sector descriptions are as follows:

- Sector 1 – Horsham North, including Horsham Town and Broadbridge Heath
- Sector 2 – Middle Horsham, including Southwater, Bilinghurst and Cowfold
- Sector 3 – Horsham South, including Storrington Steyning and Henfield
- Sector 4 – Mole Value, incorporating the entire District Boundary
- Sector 5 – Waverley, incorporating the entire District Boundary
- Sector 6 - Chichester, incorporating the entire District Boundary
- Sector 7 – South Coast, this includes the districts of Arun, Worthing, Adur and Brighton and Hove
- Sector 8 – Mid Sussex, incorporating the entire District Boundary
- Sector 9 – Crawley, incorporating the entire District Boundary

7.5.3 DfT Unit M3.1 Tag guidance recommends significance of matrix estimation change should not exceed 5%.

The results of the analysis in terms of the percentage difference in vehicle totals across each sector are displayed in Table 7-4 to Table 7-7, highlighting both percentage change between sectors and GEH change between sectors.

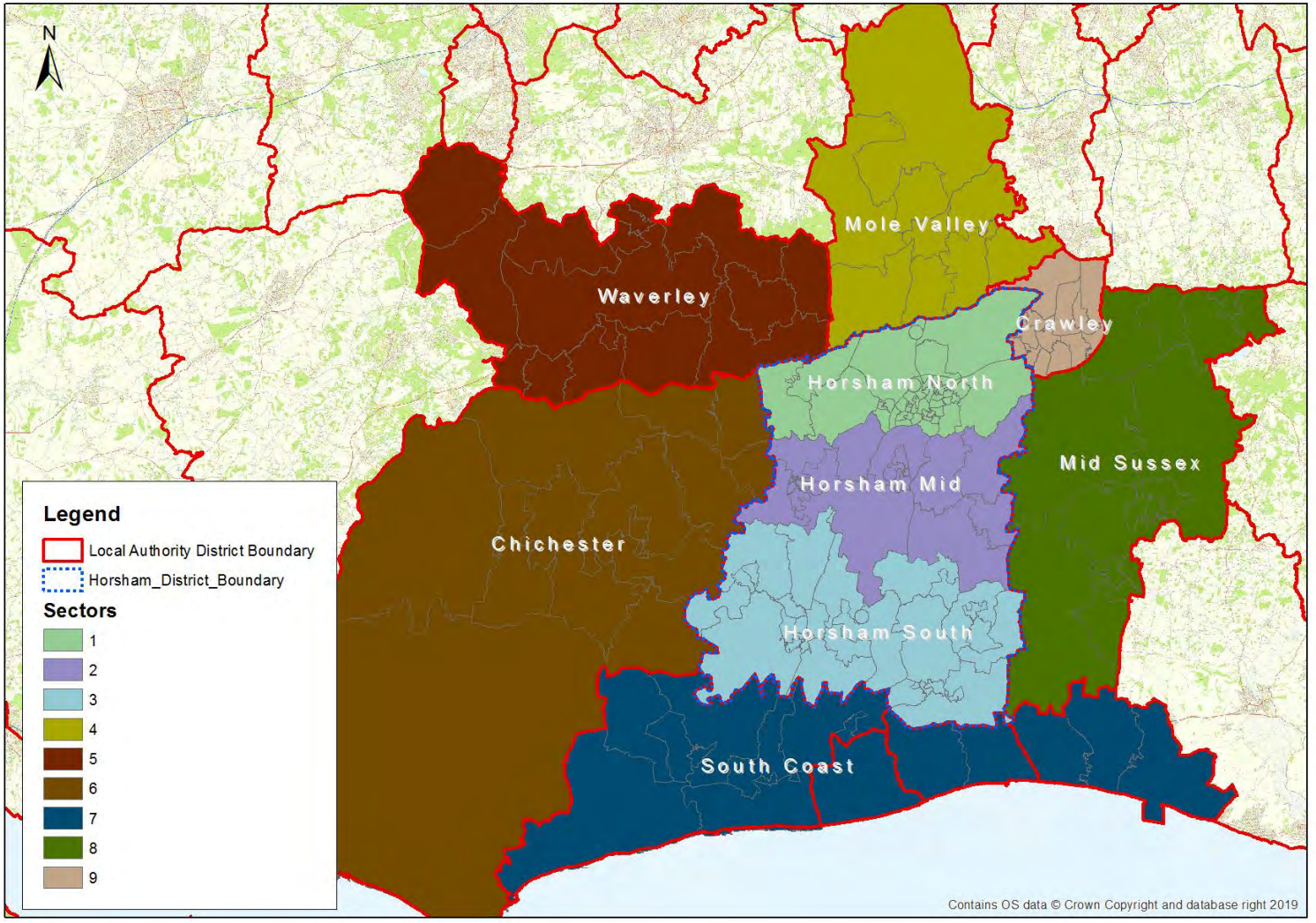


Figure 7-3: Model Validation Results

Table 7-4: AM Peak Pre-ME vs Post-ME Sector Percentage Changes

Sector	1	2	3	4	5	6	7	8	9	Total
1	9%	-32%	-33%	0%	-22%	-19%	4%	3%	-8%	**-5%**
2	-36%	-1%	1%	-9%	-2%	25%	50%	4%	-28%	**-21%**
3	-38%	-1%	2%	-13%	30%	47%	-9%	46%	-37%	**-1%**
4	-8%	-10%	-21%	0%	-8%	-6%	1%	-3%	0%	**-2%**
5	7%	-11%	19%	-4%	0%	0%	-14%	-5%	-16%	**-1%**
6	-11%	22%	30%	-12%	0%	0%	0%	4%	-54%	**-1%**
7	10%	65%	-2%	1%	-2%	1%	0%	4%	-1%	**3%**
8	29%	6%	14%	13%	80%	74%	1%	0%	-1%	**2%**
9	-36%	-31%	-21%	-4%	-52%	-50%	-5%	-11%	-3%	**-7%**
Total	**-11%**	**-11%**	**0%**	**-2%**	**-1%**	**6%**	**-1%**	**1%**	**-4%**	

Table 7-5: PM Peak Pre-ME vs Post-ME Sector Percentage Changes

Sector	1	2	3	4	5	6	7	8	9	Total
1	10%	-15%	-21%	-5%	-43%	-33%	-3%	13%	-19%	**-3%**
2	-17%	-1%	4%	0%	7%	35%	41%	30%	4%	**1%**
3	-24%	0%	22%	-15%	49%	75%	-7%	62%	3%	**10%**
4	21%	8%	-14%	0%	-5%	-8%	23%	4%	-7%	**3%**
5	7%	11%	65%	-8%	0%	0%	-16%	27%	-54%	**-1%**
6	-8%	4%	44%	-8%	0%	0%	0%	155%	16%	**6%**
7	0%	48%	-16%	4%	-14%	-1%	0%	6%	42%	**1%**
8	8%	-3%	14%	0%	4%	28%	1%	0%	-3%	**0%**
9	16%	46%	51%	-1%	-28%	-9%	-3%	-13%	-12%	**-9%**
Total	**6%**	**-4%**	**4%**	**-2%**	**-6%**	**4%**	**0%**	**0%**	**-11%**	

Table 7-6: AM Peak Pre-ME vs Post-ME Sector GEH Changes

Sector	1	2	3	4	5	6	7	8	9	Total
1	6.2	15.5	7.0	0.0	4.2	2.6	0.6	0.6	3.5	**5.0**
2	23.1	0.3	0.1	0.4	0.2	2.1	6.7	0.6	5.4	**16.7**
3	9.7	0.2	0.7	0.4	2.7	7.7	3.9	8.6	7.2	**1.1**
4	0.8	0.3	0.5	0.0	0.6	0.1	0.0	0.1	0.0	**0.6**
5	1.1	0.7	1.4	0.2	0.0	0.0	1.2	0.4	2.6	**0.5**
6	1.7	2.3	4.2	0.5	0.0	0.0	0.1	0.4	7.9	**0.3**
7	2.1	10.1	0.9	0.1	0.2	0.2	0.0	1.5	0.5	**2.9**
8	5.6	0.8	2.4	0.5	8.0	4.0	0.3	0.0	0.8	**2.7**
9	15.0	4.0	1.8	0.5	7.9	2.3	1.0	4.7	4.0	**9.9**
Total	**12.2**	**7.2**	**0.3**	**0.5**	**0.5**	**3.1**	**0.7**	**1.1**	**6.8**	

Table 7-7: PM Peak Pre-ME vs Post-ME Sector GEH Changes

Sector	1	2	3	4	5	6	7	8	9	Total
1	7.4	8.8	4.9	0.6	7.5	5.7	0.7	2.6	7.3	**3.9**
2	6.9	0.2	0.8	0.0	0.5	3.4	7.9	3.7	0.5	**0.7**
3	4.5	0.0	7.9	0.3	2.6	9.5	3.1	9.8	0.2	**6.8**
4	1.9	0.3	0.5	0.0	0.3	0.2	1.2	0.2	0.9	**0.6**
5	1.3	0.9	5.1	0.5	0.0	0.0	2.2	2.7	9.3	**0.6**
6	1.1	0.4	6.8	0.1	0.0	0.0	0.1	8.6	0.9	**3.6**
7	0.1	6.8	7.7	0.2	1.3	0.2	0.0	2.7	8.2	**0.8**
8	1.3	0.5	2.8	0.0	0.3	2.5	0.2	0.1	1.4	**0.5**
9	6.6	7.3	7.0	0.1	4.6	1.1	1.1	8.3	17.7	**15.2**
Total	**5.6**	**3.1**	**3.2**	**0.5**	**3.2**	**2.3**	**0.3**	**0.5**	**17.6**	

7.5.4 In several cases with both the AM and PM modelled time periods the sector to sector trip changes fall outside the recommended 5% change criteria. These changes can be attribute to the limitations of mobile phone data coverage in some of the rural LSOA zones, and the known shortcomings of the mobile phone data capturing short distance trips. These constraints, in combination with some of the coarse zones within Horsham, due to the low population density, have meant that the matrix estimation at certain junctions has had to be used as a tool to infill and refine more localised trip patterns.

7.5.5 Between the 3 sectors within Horsham (Sectors 1-3) changes can be further attributed to alterations in travel patterns post mobile phone data collection, with the closure of the A281 to through traffic within Broadbridge Heath and Billinghurst Road. These changes have meant matrix estimation based on turning counts at Farthings Hill interchange has created significant change to the prior matrix.

7.5.6 Given the recent and ongoing changes to the highway network around Broadbridge Heath, if any detailed assessment in this area is required in the future, a more complete assessment of travel patterns would be advised once all works are complete.

8 Model Validation Results

8.1 Introduction

8.1.1 This section reports on the flow and journey time validation achieved by the HTM. The results have been considered with respect to validation criteria and acceptability guidelines contained in Section 3 of TAG Unit M3.1 (Highway Assignment Modelling). The guidance notes that any adjustments to the model intended to reduce the differences between the modelled and observed data should be regarded as calibration. Validation simply involves comparing modelled and observed data that is independent from that used in the calibration.

8.1.2 The main comparisons required for the validation of a highway assignment model as noted in the guidance are listed below:

- A check on the quality of the trip matrices – this requires a comparison of assigned flows and counts totalled for each screenline.
- A check on the quality of the assignment – this is demonstrated by comparing flows and counts on individual links;
- A check on the quality of the network and assignment – this is demonstrated by comparing modelled and observed journey times along routes.

8.2 Model Convergence

8.2.1 WebTAG guidance notes that before the results of any traffic assignment are used to influence decisions, the stability or degree of convergence of the assignment must be confirmed at the appropriate level (para 3.3 of TAG M3.1).

8.2.2 The importance of achieving convergence at an appropriate level is related to the need to provide stable, consistent and robust model results. This is especially so when model outputs are used to compare 'with' and 'without' scheme scenarios in cost benefit analysis. It is important to be able to distinguish differences due to the scheme from those associated with different degrees of convergence.

8.2.3 Table 8-30 summarises the most appropriate convergence measures of proximity and stability given in WebTAG Unit M3.1 Table 4 for model convergence.

Table 8-1: Summary of Convergence Measures and Base Model Acceptable Values.

Measure of Convergence	Base Model Acceptable Values
Delta and % Gap	Less than 0.1% or at least stable with convergence fully documented and all other criteria met
Percentage of links with flow change (P) < 1%	Four consecutive iterations greater than 98%
Percentage of links with cost change (P2) < 1%	Four consecutive iterations greater than 98%
Percentage change in total user costs (V)	Four consecutive iterations less than 0.1% (SUE only)

8.2.4 The results of convergence statistics achieved for all two periods of the CTM are shown in Table 8-2 and Table 8-3.. This shows that both time period models exceed the convergence criteria required and therefore demonstrate that the models are stable and robust.

Table 8-2: HHM Convergence Statistics AM

AM			
Iteration	% Gap/ Delta	% Flow	% Cost Delays
19	0.011	98.9	99.7
20	0.0089	98.9	99.7
21	0.0088	98.8	99.7
22	0.0068	98.9	99.7

Table 8-3: HHM Convergence Statistics PM

PM			
Iteration	% Gap/ Delta	% Flow	% Cost Delays
20	0.0046	98.6	99.6
21	0.0074	98.9	99.7
22	0.0037	99.0	99.5
23	0.0034	99.1	99.6

8.3 Flow and Journey Time Validation Criteria and Acceptability Guidelines

8.3.1 The screenlines being used within the assessment intend to highlight the level of accuracy the model has in replication of observed travel patterns within Horsham and across the Horsham District boundary. For this reason, the following screenlines shown in Figure 8-1 below have been designed to validate the modelled trips within and across Horsham district. These screenlines are made up of automatic link traffic counter sites, which are independent from the manual turning count sites used for model flow calibration. This is to ensure that the validation performs a genuine check on model performance on links which are located away from those which have been subject to individual calibration against counts.

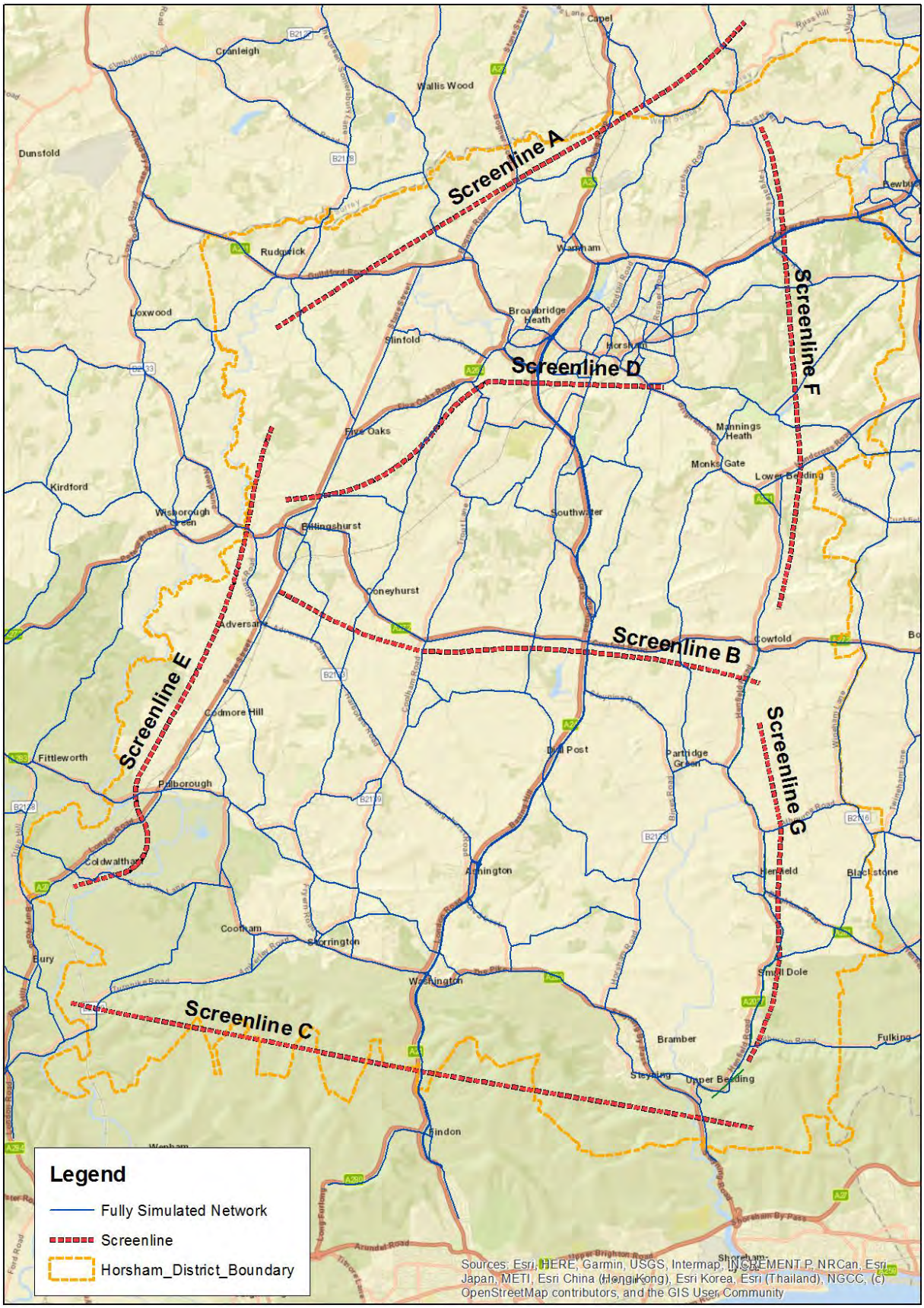


Figure 8-1: Horsham Validation Screenlines

8.3.2 The criteria and guidelines apply to models created both for general purposes and those created to address or assess specific interventions. In respect of the latter, it is expected that greater attention should be paid to validation quality in the vicinity of the interventions.

8.3.3 Table 8-4 provides a summary of WebTAG flow validation criteria and acceptability guidelines. It also includes journey time validation criteria and acceptability guidelines.

8.3.4 Criterion 1 relates directly to the flows, criterion 2 relates to the GEH statistic, which was explained in Section 7.2. Criterion 3 relates to screenlines and cordons and Criterion 4 relates to journey time validation.

Table 8-4: Validation Criteria and Acceptability Guidelines

Criteria	Description of Criteria	Acceptability Guideline
1	Individual flows within 100 vph of counts for flows less than 700 vph	>85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 vph	>85% of cases
	Individual flows within 400 vph of counts for flows more than 2,700 vph	>85% of cases
2	GEH < 5 for individual flows	>85% of cases
3	Screenline Flow Validation and Acceptability Guideline	Acceptability Guideline
	Differences between modelled flows and observed counts should be less than 5% of the observed counts	All or nearly all screenlines
4	Journey Time Validation Criterion and Acceptability Guideline	Acceptability Guideline
	Modelled Times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%)	>85% of routes

AM Peak hour (0800-0900) Screenline Validation

8.3.5 Table 8-5 to Table 8-18 show the AM Peak hour flow validation results for all the screenlines shown within Figure 8-1.

Table 8-5: Screenline A (North Horsham) Northbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Haven Road	160	95	-65	5.76	×	✓
2	A281 Guildford Road	649	872	224	8.11	×	×
3	Rowhook Road	182	195	13	0.92	✓	✓
4	A29 Bognor Road	387	295	-91	4.95	✓	✓
5	A24	914	921	7	0.23	✓	✓
6	Rusper Road	115	121	6	0.55	✓	✓
7	Rusper Road North	254	150	-104	7.33	×	✓
All	**Total**	**2661**	**2649**	**-11**	**0.22**	✓	✓

Table 8-6: Screenline A (North Horsham) Southbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Haven Road	126	31	-95	10.77	×	✓
2	A281 Guildford Road	575	651	76	3.06	✓	✓
3	Rowhook Road	118	103	-15	1.40	✓	✓
4	A29 Bognor Road	157	170	14	1.06	✓	✓
5	A24	502	539	37	1.63	✓	✓
6	Rusper Road	102	123	22	2.05	✓	✓
7	Rusper Road North	68	107	39	4.16	✓	✓
All	**Total**	**1648**	**1725**	**77**	**1.88**	✓	✓

Table 8-7: Screenline B (Central Horsham) Northbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Stane Street	585	525	-61	2.57	✓	✓
2	Coolham Road	329	347	19	1.02	✓	✓
3	Lordings Road	239	246	6	0.39	✓	✓
4	Marningdean Road	146	198	52	3.97	✓	✓
5	Littleworth Lane	35	0	-34	8.17	×	✓
6	Wineham Lane	347	302	-45	2.51	✓	✓
7	A24 Worthing Road	1549	1559	9	0.24	✓	✓
All	**Total**	**3231**	**3177**	**-55**	**0.95**	✓	✓

Table 8-8: Screenline B (Central Horsham) Southbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Stane Street	443	445	2	0.09	✓	✓
2	Coolham Road	184	209	25	1.75	✓	✓
3	Lordings Road	134	125	-9	0.80	✓	✓
4	Marningdean Road	123	103	-20	1.87	✓	✓
5	Littleworth Lane	35	0	-34	8.17	×	✓
6	Wineham Lane	229	143	-86	6.30	×	✓
7	A24 Worthing Road	1202	1304	102	2.88	✓	✓
All	**Total**	**2351**	**2330**	**-22**	**0.44**	✓	✓

Table 8-9: Screenline C (South Horsham) Northbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A283 Shoreham Road	1126	1060	-67	2.02	✓	✓
2	A24 Lond Road	1300	1410	111	3.01	✓	✓
3	A29 Farmhille Bottom	482	419	-63	2.97	✓	✓
All	**Total**	**2908**	**2889**	**-19**	**0.36**	✓	✓

Table 8-10: Screenline C (South Horsham) Southbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A283 Shoreham Road	1197	1248	51	1.46	✓	✓
2	A24 Lond Road	1116	1138	22	0.64	✓	✓
3	A29 Farmhille Bottom	474	502	27	1.24	✓	✓
All	**Total**	**2787**	**2887**	**100**	**1.88**	✓	✓

Table 8-11: Screenline D (South Horsham) Northbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A29 Stane Street	1207	1223	16	0.47	✓	✓
2	Bashurst Hill	26	0	-26	7.19	×	✓
3	Fulfolds Hill	137	103	-34	3.08	✓	✓
4	Weston's Hill	781	951	169	5.76	×	×
5	A24	1684	1585	-98	2.43	✓	✓
6	B22237 Worthing Road	830	968	138	4.59	✓	×
All	**Total**	**4664**	**4830**	**149**	**2.41**	✓	✓

Table 8-12: Screenline D (South of Horsham Town) Southbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A29 Stane Street	717	703	-14	0.52	✓	✓
2	Bashurst Hill	27	0	-27	7.37	×	✓
3	Fulfolds Hill	156	146	-10	0.82	✓	✓
4	Weston's Hill	295	427	133	7.00	×	×
5	A24	1529	1299	-230	6.11	✓	✓
6	B2237 Worthing Road	414	457	43	2.05	✓	✓
All	**Total**	**3138**	**3033**	**-91**	**1.89**	✓	✓

Table 8-13: Screenline E (West of Horsham Town) Westbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A272	728	708	-20	0.74	✓	✓
2	London Road	336	289	-47	2.65	✓	✓
3	A283 (West of Pulborough	40	40	0	0.07	✓	✓
All	**Total**	**1104**	**1037**	**-67**	**2.05**	✓	✓

Table 8-14: Screenline E (West Horsham) Westbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A272	563	624	61	2.52	✓	✓
2	London Road	515	403	-111	5.20	×	×
3	A283 (West of Pulborough	31	29	-2	0.37	✓	✓
All	**Total**	**1109**	**1057**	**-52**	**1.58**	✓	✓

Table 8-15: Screenline F (North East) Westbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Tower Road	265	264	0	0.01	✓	✓
2	Forest Road	214	298	83	5.21	×	✓
3	Hammerpond Road	71	16	-55	8.44	×	✓
4	A264	2169	2066	-103	2.24	✓	✓
5	Handcross Lane	524	324	-199	9.68	×	×
All	**Total**	**3243**	**2968**	**-275**	**4.93**	✓	✓

Table 8-16: Screenline F (North East) Eastbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Tower Road	164	222	58	4.17	✓	✓
2	Forest Road	391	339	-52	**2.74**	✓	✓
3	Hammerpond Road	48	174	126	11.93	×	×
4	A264	1644	1587	-58	1.43	✓	✓
5	Handcross Lane	643	577	-66	2.65	✓	✓
All	**Total**	**2890**	**2899**	**9**	**0.16**	✓	✓

Table 8-17: Screenline G (South East) Westbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Wheatsheaf Road	216	94	-123	9.88	×	×
2	Horn Lane	154	131	-23	1.90	✓	✓
3	A281	178	141	-37	2.95	✓	✓
All	Total	**548**	**365**	**-183**	**8.56**	×	×

Table 8-18: Screenline G (South East) Eastbound AM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Weatheaf Road	284	268	-16	0.98	✓	✓
2	Horn Lane	240	181	-58	4.02	✓	✓
3	A281	259	229	-30	1.92	✓	✓
All	**Total**	**783**	**679**	**-105**	**3.87**	✓	✓

Table 8-19: AM Individual Link Count Validation Summary

Criteria	Description of Criteria	Result
1	Individual flows Criteria	88%
2	GEH < 5 for individual flows	76%

Table 8-20: AM Screenline Totals Validation Summary

Criteria	Description of Criteria	Result
1	Individual flows Criteria	87%
2	GEH < 5 for individual flows	93%

8.3.6 From the above summary of the screenline results, the model is able to replicate observed AM Peak screenline movements to a relatively high level of passing criteria, in particular for screenline flow totals passing the GEH criteria. Individual counts fall to a lower level of passing criteria, this can be expected due to the rural nature of some of parts of the modelled network and the limitation to accurately model all minor road traffic flow and localised short distance trips on such minor roads.

PM Peak hour (1700-1800) Flow Validation

8.3.7 Table 8-21 to Table 8-34 show the PM Peak hour flow validation results for the external cordon in the inbound and outbound directions respectively.

Table 8-21: Screenline A (North Horsham) Northbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Haven Road	90	66	-24	2.72	✓	✓
2	A281 Guildford Road	514	784	270	10.60	×	×

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
3	Rowhook Road	115	52	-64	6.97	×	✓
4	A29 Bognor Road	182	151	-31	2.42	✓	✓
5	A24	492	502	10	0.44	✓	✓
6	Rusper Road	143	196	54	4.12	✓	✓
7	Rusper Road North	79	156	77	7.12	✓	✓
All	**Total**	**1615**	**1907**	**292**	**6.95**	×	×

Table 8-22: Screenline A (North Horsham) Southbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Haven Road	143	90	-54	4.97	✓	✓
2	A281 Guildford Road	653	533	-120	4.93	✓	×
3	Rowhook Road	185	142	-43	3.33	✓	✓
4	A29 Bognor Road	377	294	-82	4.50	✓	✓
5	A24	1030	991	-39	1.22	✓	✓
6	Rusper Road	139	75	-63	6.11	×	✓
7	Rusper Road North	227	137	-89	6.62	×	✓
All	**Total**	**2753**	**2263**	**-490**	**9.78**	×	×

Table 8-23: Screenline B (Central Horsham) Northbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Stane Street	429	486	57	2.69	✓	✓
2	Coolham Road	186	220	34	2.39	✓	✓
3	Lordings Road	136	136	0	0.01	✓	✓
4	Marningdean Road	98	138	40	3.66	✓	✓

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
5	Littleworth Lane	49	2	-47	9.22	×	✓
6	Wineham Lane	296	199	-97	6.17	×	✓
7	A24 Worthing Road	1187	1194	7	0.21	✓	✓
All	**Total**	**2381**	**2376**	**-6**	**0.11**	✓	✓

Table 8-24: Screenline B (Central Horsham) Southbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Stane Street	686	658	-28	1.06	✓	✓
2	Coolham Road	391	440	49	2.39	✓	✓
3	Lordings Road	239	236	-3	0.23	✓	✓
4	Marningdean Road	133	99	-34	3.17	✓	✓
5	Littleworth Lane	49	2	-47	9.22	×	✓
6	Wineham Lane	310	254	-56	3.34	✓	✓
7	A24 Worthing Road	1906	1882	-24	0.56	✓	✓
All	**Total**	**3715**	**3571**	**-145**	**2.38**	✓	✓

Table 8-25: Screenline C (South Horsham) Northbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A283 Shoreham Road	1269	1284	15	0	✓	✓
2	A24 Lond Road	1114	1097	-17	1	✓	✓
3	A29 Farmhille Bottom	470	417	-53	3	✓	✓
All	**Total**	**2852**	**2797**	**-55**	**1.04**	✓	✓

Table 8-26: Screenline C (South Horsham) Southbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A283 Shoreham Road	1115	1195	80	2.35	✓	✓
2	A24 Lond Road	2144	1985	-159	3.50	✓	✓
3	A29 Farmhille Bottom	533	469	-64	2.84	✓	✓
All	**Total**	**3792**	**3649**	**-143**	**2.34**	✓	✓

Table 8-27: Screenline D (South of Horsham Town) Northbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A29 Stane Street	763	912	149	5.16	×	×
2	Bashurst Hill	23	0	-23	6.73	×	✓
3	Fulfolds Hill	92	100	8	0.78	✓	✓
4	Weston's Hill	438	512	73	3.37	✓	✓
5	A24	1361	1131	-230	6.52	×	×
6	B2237 Worthing Road	459	479	20	0.93	✓	✓
All	**Total**	**3135**	**3133**	**-152**	**0.04**	✓	✓

Table 8-28: Screenline D (South of Horsham Town) Southbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A29 Stane Street	1213	1200	-13	0.38	✓	✓
2	Bashurst Hill	25	0	-25	7.07	×	✓
3	Fulfolds Hill	135	132	-3	0.29	✓	✓
4	Weston's Hill	327	205	-122	7.47	×	×
5	A24	1877	2107	230	5.15	×	✓
6	B2237 Worthing Road	801	970	169	5.69	×	×
All	**Total**	**4378**	**4614**	**249**	**3.52**	✓	✓

Table 8-29: Screenline E (West Horsham) Westbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A272	589	572	-17	0.69	✓	✓
2	London Road	603	551	-51	2.14	✓	✓
3	A283 (West of Pulborough	28	35	7	1.27	✓	✓
All	**Total**	**1220**	**1159**	**-61**	**1.76**	✓	✓

Table 8-30: Screenline E (West Horsham) Eastbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	A272	735	793	58	2.10	✓	✓
2	London Road	343	321	-22	1.23	✓	✓
3	A283 (West of Pulborough	34	47	13	2.05	✓	✓
All	**Total**	**1112**	**1160**	**48**	**1.44**	✓	✓

Table 8-31: Screenline F (North East) Westbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Tower Road	174	194	20	1.47	✓	✓
2	Forest Road	361	406	45	2.28	✓	✓
3	Hammerpond Road	35	75	39	5.31	×	✓
4	A264	1980	1973	139	3.12	✓	✓
5	Golding Lane	565	566	2	0.06	✓	✓
All	**Total**	**3115**	**3213**	**245**	**1.75**	✓	✓

Table 8-32: Screenline F (North East) Eastbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Tower Road	131	205	73	5.67	×	✓
2	Forest Road	163	178	16	1.19	✓	✓
3	Hammerpond Road	45	44	-1	0.11	✓	✓
4	A264	1916	2055	139	3.12	✓	✓
5	Golding Lane	585	442	-143	6.32	×	×
All	**Total**	**2839**	**2923**	**84**	**1.56**	✓	✓

Table 8-33: Screenline G (South East) Westbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Weatheaf Road	377	224	-153	8.80	×	×
2	Horn Lane	297	198	-100	6.34	×	✓
3	A281	258	275	17	1.05	✓	✓
All	Total	**932**	**697**	**-235**	**8.23**	×	×

Table 8-34: Screenline G (South East) Eastbound PM

Link No.	Location	Count	Model	Diff.	GEH	Pass/Fail	
						GEH	FLOW
1	Weatheaf Road	170	104	-66	5.66	×	✓
2	Horn Lane	175	143	-33	2.60	✓	✓
3	A281	215	278	63	4.04	✓	✓
All	Total	**560**	**525**	**-36**	**1.53**	✓	✓

Table 8-35: PM Individual Link Count Validation Summary

Criteria	Description of Criteria	Result
1	Individual flows Criteria	91%
2	GEH < 5 for individual flows	66%

Table 8-36: PM Screenline Totals Validation Summary

Criteria	Description of Criteria	Result
1	Individual flows Criteria	80%
2	GEH < 5 for individual flows	86%

8.3.8 From the above summary of the screenline results, the model is able to replicate observed PM Peak screenline movements to a relatively high level of passing criteria, in particular for screenline flow totals passing the GEH criteria. Individual counts fall to a lower level of passing criteria, this can be expected due to the rural nature of some of parts of the modelled network and the limitation to accurately model all minor road traffic flow and localised short distance trips on such minor roads. In some cases within the PM we are seeing a lower level of individual GEH passing criteria in comparison to the flow criteria, this is due again to the limitation of strategic modelling accurately reflecting minor roads and more localised traffic movements.

8.4 Journey Time Validation

8.4.1 Observed journey times were informed by Teletrac Navman Data. Eight journey time routes have been checked for journey time validation. Each route has been checked for validation in both directions. The validation routes were previously shown in Figure 3-5.

8.4.2 Table 8-37 gives a summary of the AM peak and PM peak journey time validation respectively. The routes are shown in Figure 3-4.

Table 8-37: Journey Time AM

AM	Route Description	Distance (km)	Obs (min:sec)	Lower 15%	Upper 15%	Modelled Journey Time (min:sec)	Difference (Seconds)	% Diff.	Pass/ Fail
1	A272 Eastbound	13	12:26	10:34	14:18	**12:07**	-00:19	-2.6%	□
	A272 Westbound	13.2	12:14	10:24	14:04	**11:59**	-00:15	-2.0%	□
2	A281 Northbound	12.7	17:29	14:52	20:06	**16:57**	-00:32	-3.1%	□
	A281 Southbound	12.7	16:39	14:09	19:09	**16:37**	-00:02	-0.2%	□
3	A264 Westbound	10.5	09:12	07:49	10:35	**10:44**	01:32	16.8%	□
	A264 Eastbound	10.4	12:44	10:49	14:39	**10:07**	-02:37	-20.6%	□
4	A272 Eastbound	20	21:33	18:19	24:47	**20:46**	-00:47	-3.6%	□
	A272 Westbound	19.8	20:55	17:47	24:03	**20:47**	-00:08	-0.6%	□
5	A24 Central Southbound	11.8	11:27	09:44	13:10	**09:05**	-02:22	-20.7%	□
	A24 Central Northbound	11.7	08:41	07:23	09:59	**09:12**	00:31	5.9%	□
6	A24 South Southbound	15.6	10:33	08:58	12:08	**09:30**	-01:03	-9.9%	□
	A24 South Northbound	15.6	15:38	13:17	17:59	**13:15**	-02:23	-15.2%	□
7	A29 South Northbound	17.9	21:38	18:23	24:53	**20:49**	-00:48	-3.7%	□
	A29 South Southbound	18	21:08	17:58	24:18	**20:28**	-00:40	-3.1%	□
8	A281 Eastbound	8.6	07:56	06:45	09:07	**08:55**	00:59	12.4%	□
	A281 Westbound	8.6	08:04	06:51	09:17	**08:12**	00:08	1.6%	□
9	B2195 Southbound	4	07:20	06:14	08:26	**09:28**	02:08	29.2%	□
	B2195 Northbound	3.9	05:52	04:59	06:45	**07:52**	02:00	34.2%	□
10	A283 Westbound	29.9	35:58	30:34	41:22	**33:40**	-02:18	-6.4%	□
	A283 Eastbound	29.6	35:14	29:57	40:31	**34:06**	-01:08	-3.2%	□
11	A29 North Northbound	17.2	15:13	12:56	17:30	**16:09**	00:56	6.1%	□
	A29 North Southbound	17.5	15:57	13:33	18:21	**15:53**	-00:04	-0.5%	□
12	A24 North Northbound	7.6	07:12	06:07	08:17	**07:10**	-00:02	-0.4%	□

AM	Route Description	Distance (km)	Obs (min:sec)	Lower 15%	Upper 15%	Modelled Journey Time (min:sec)	Difference (Seconds)	% Diff.	Pass/ Fail
	A24 North Southbound	7.6	07:19	06:13	08:25	**06:41**	-00:38	-8.7%	□
13	A281 Northbound	7.6	16:53	14:21	19:25	**17:28**	00:35	3.5%	□
	A281 Southbound	7.6	16:15	13:49	18:41	**17:34**	01:19	8.1%	□
								Total Passing	75%

Table 8-38: Journey Time PM

PM	Route Description	Distance (km)	Obs (min:sec)	Lower 15%	Upper 15%	Modelled Journey Time (min:sec)	Difference (Seconds)	% Diff.	Pass/ Fail
1	A272 Eastbound	13	11:38	09:53	13:23	12:08	00:30	4.3%	□
	A272 Westbound	13.2	12:27	10:35	14:19	12:03	-00:24	-3.2%	□
2	A281 Northbound	12.7	15:43	13:22	18:04	16:33	00:50	5.3%	□
	A281 Southbound	12.7	17:36	14:58	20:14	16:49	-00:47	-4.5%	□
3	A264 Westbound	10.5	10:52	09:14	12:30	10:21	-00:31	-4.8%	□
	A264 Eastbound	10.4	10:50	09:13	12:27	11:22	00:33	5.0%	□
4	A272 Eastbound	20	19:04	16:12	21:56	20:44	01:40	8.7%	□
	A272 Westbound	19.8	19:41	16:44	22:38	21:13	01:32	7.8%	□
5	A24 Central Southbound	11.8	09:21	07:57	10:45	08:46	-00:35	-6.2%	□
	A24 Central Northbound	11.7	08:25	07:09	09:41	11:33	03:08	37.2%	□
6	A24 South Southbound	15.6	10:15	08:43	11:47	10:08	-00:07	-1.1%	□
	A24 South Northbound	15.6	10:15	08:43	11:47	11:42	01:27	14.2%	□
7	A29 South Northbound	17.9	18:27	15:41	21:13	20:29	02:02	11.0%	□
	A29 South Southbound	18	18:28	15:42	21:14	21:12	02:44	14.8%	□
8	A281 Eastbound	8.6	07:33	06:25	08:41	08:40	01:07	14.9%	□
	A281 Westbound	8.6	07:20	06:14	08:26	08:01	00:41	9.4%	□
9	B2195 Southbound	4	06:29	05:31	07:27	08:13	01:44	26.6%	□
	B2195 Northbound	3.9	10:44	09:07	12:21	08:37	-02:07	-19.7%	□
10	A283 Westbound	29.9	31:43	26:58	36:28	34:50	03:07	9.8%	□
	A283 Eastbound	29.6	30:27	25:53	35:01	34:06	03:39	12.0%	□

PM	Route Description	Distance (km)	Obs (min:sec)	Lower 15%	Upper 15%	Modelled Journey Time (min:sec)	Difference (Seconds)	% Diff.	Pass/ Fail
11	A29 North Northbound	17.2	14:36	12:25	16:47	15:50	01:14	8.5%	
	A29 North Southbound	17.5	14:36	12:25	16:47	16:10	01:34	10.7%	
12	A24 North Northbound	7.6	07:07	06:03	08:11	06:40	-00:27	-6.3%	
	A24 North Southbound	7.6	07:43	06:34	08:52	07:06	-00:37	-8.0%	
13	A281 Northbound	7.6	15:18	13:00	17:36	17:26	02:08	13.9%	
	A281 Southbound	7.6	15:20	13:02	17:38	17:39	02:19	15.1%	
								Total Passing	88%

8.4.3 From the above results it is evident that in most of the routes the model validates based on the WebTAG criteria for the AM, with 75% passing for the AM and 88% PM Peak respectively. B2195 Route 9, which travels the North East of Horsham town, struggles to validate in both peak periods, most likely due to the localised movements within Horsham not being captured in refined detail of the strategic model. Further data collection of turning movements in particular at the Harwood Road/Recklin Way roundabout and the Crawley/ Forest Road intersection would provide better validation and understanding of travel movements on this route, if required. In the AM the A264 Route 3 which travels between Horsham and Crawley fails to meet the validation criteria. In the eastbound direction the model is too slow but westbound it is too fast.

8.5 Summary

8.5.1 This chapter has presented and discussed the flow validation and Journey time validation of the HHM model. It has also presented convergence statistics achieved by the model. It has been concluded that the model achieves adequate validation to be considered a robust tool that can be relied upon for the purposes for which the model was commissioned such as informing the transport infrastructure requirements to support strategic site allocations of housing and employment though the emerging Local Development Plan or business cases to support infrastructure schemes. Considerable effort has been made to improve validation on key links likely to be critical to assessing schemes and development in the vicinity of these links.

9 Summary

9.1 Overview

9.1.1 This report has summarised the methodology which has been adopted in order to build and validate a base year 2015 SATURN model of the Horsham District.

9.1.2 The purpose of this model is to assist in assessing the relative effects of the Horsham Local Plan and the consequent transport impact and Local Plan development mitigation. The model is deemed to be suitable for this purpose.

9.2 Conclusions

9.2.1 The calibration and validation results for the AM& PM modelled peak hours have shown a good and acceptable fit between observed and modelled flows and journey times. The model has been validated against independent counts not used within the calibration process and shows an acceptable fit when measured against the Acceptability Guidelines in WebTAG Unit M3.1 (Highway Assignment Modelling).

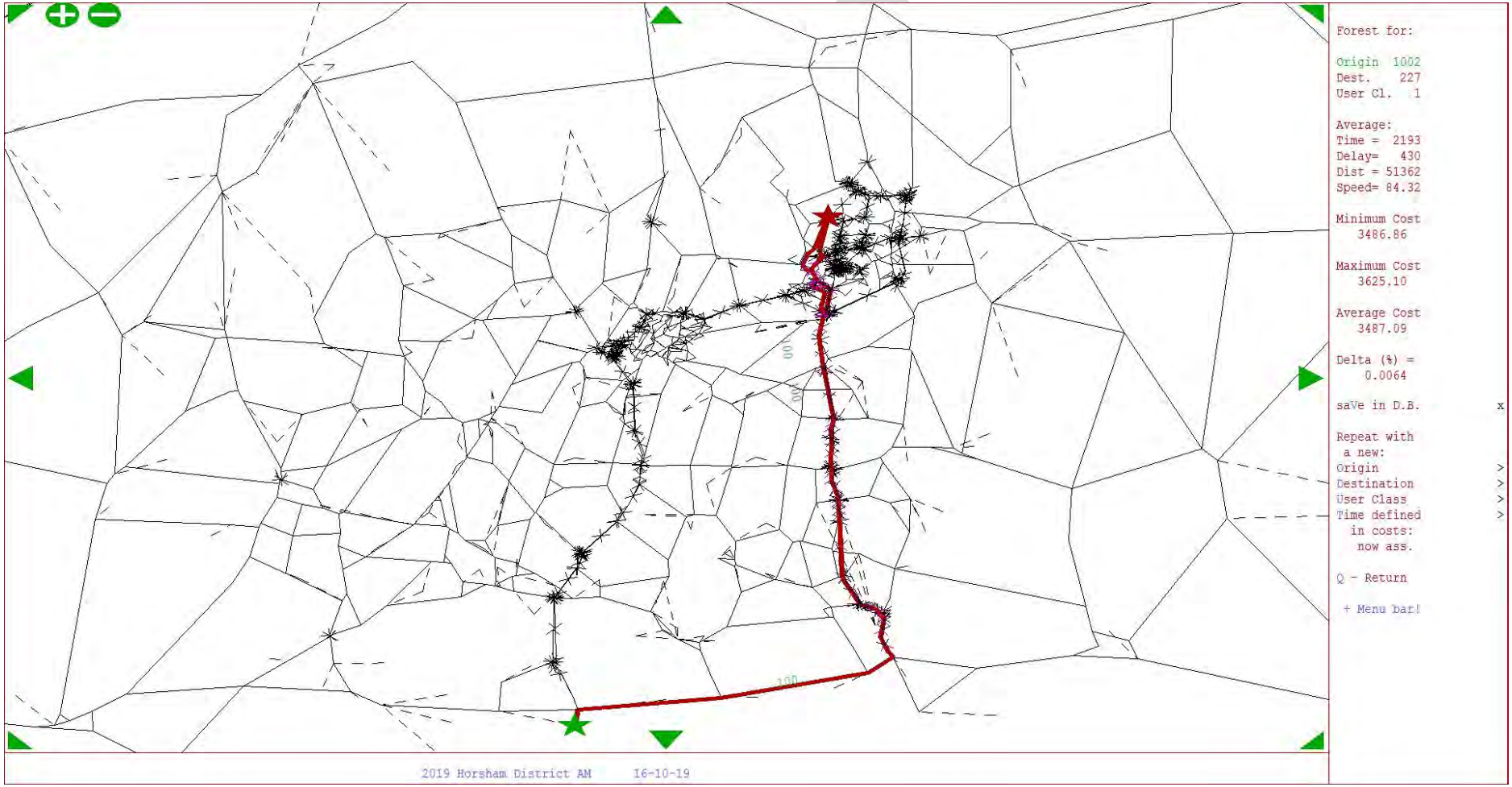
9.2.2 Journey times in the model time periods have been validated against DfT Traffic Master Data. The majority of the modelled routes are an acceptable fit to observed journey times and close or within the WebTAG validation criteria. Of those that do not, the majority are within 20% to 30% of observed journey times.

9.2.3 Crucially, all time period models have been shown to meet convergence criteria guidelines demonstrating the stability and suitability of the models to discern scheme impact differences from flow changes that may have been due to other factors in the model were convergence of the model insufficient to meet applicable standards.

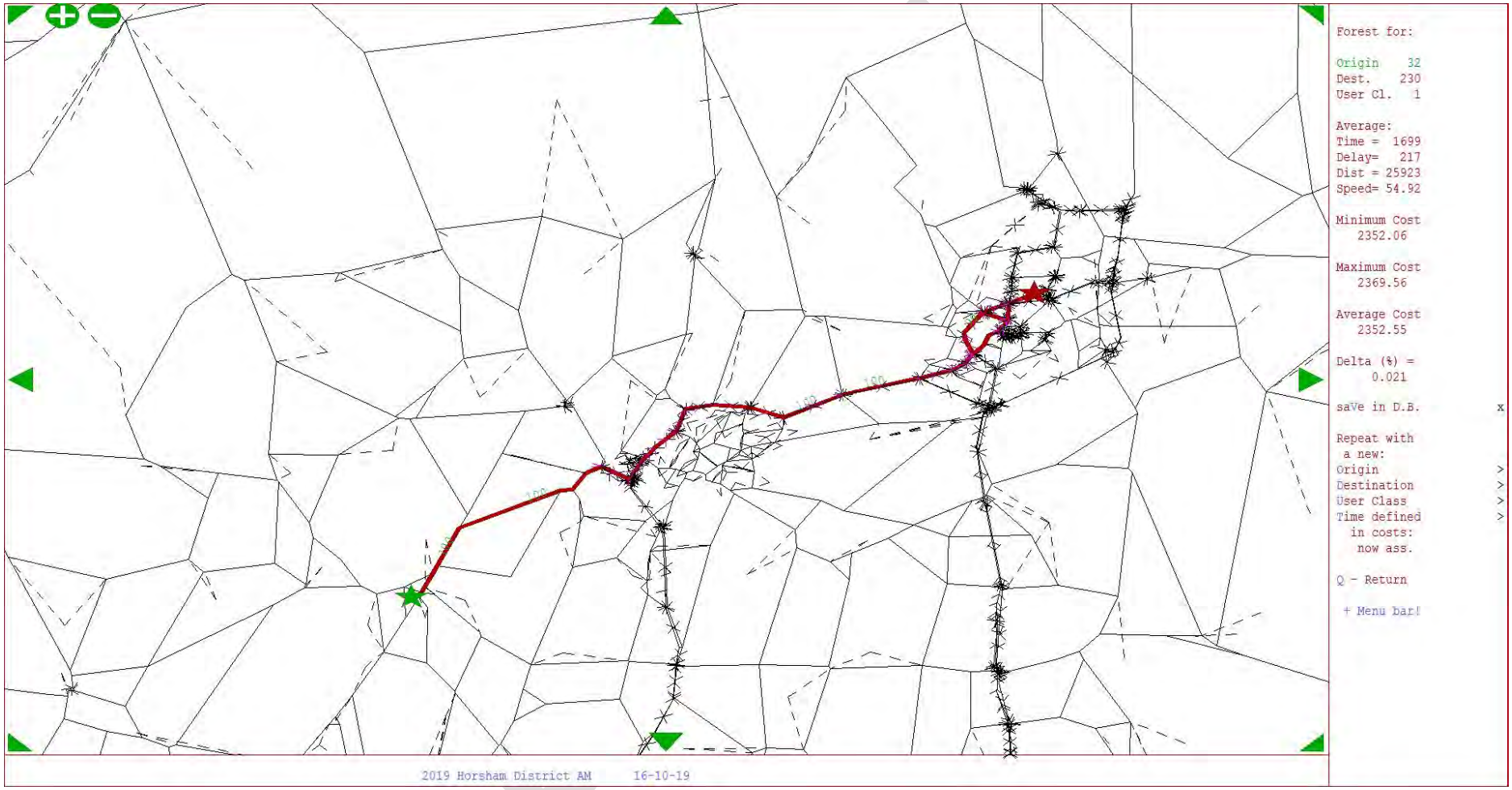
9.2.4 From the analysis of the results presented in this report, it is concluded that the base model is a robust tool for the agreed scope (set out in Section 1) and forms a good and acceptable platform from which to develop future forecasts. The model validation results are considered to be reasonably robust and therefore the model is considered suitable to measure the impacts on the network for the Horsham Local Plan developments as outlined in Section 1.

Appendix A Route Checks

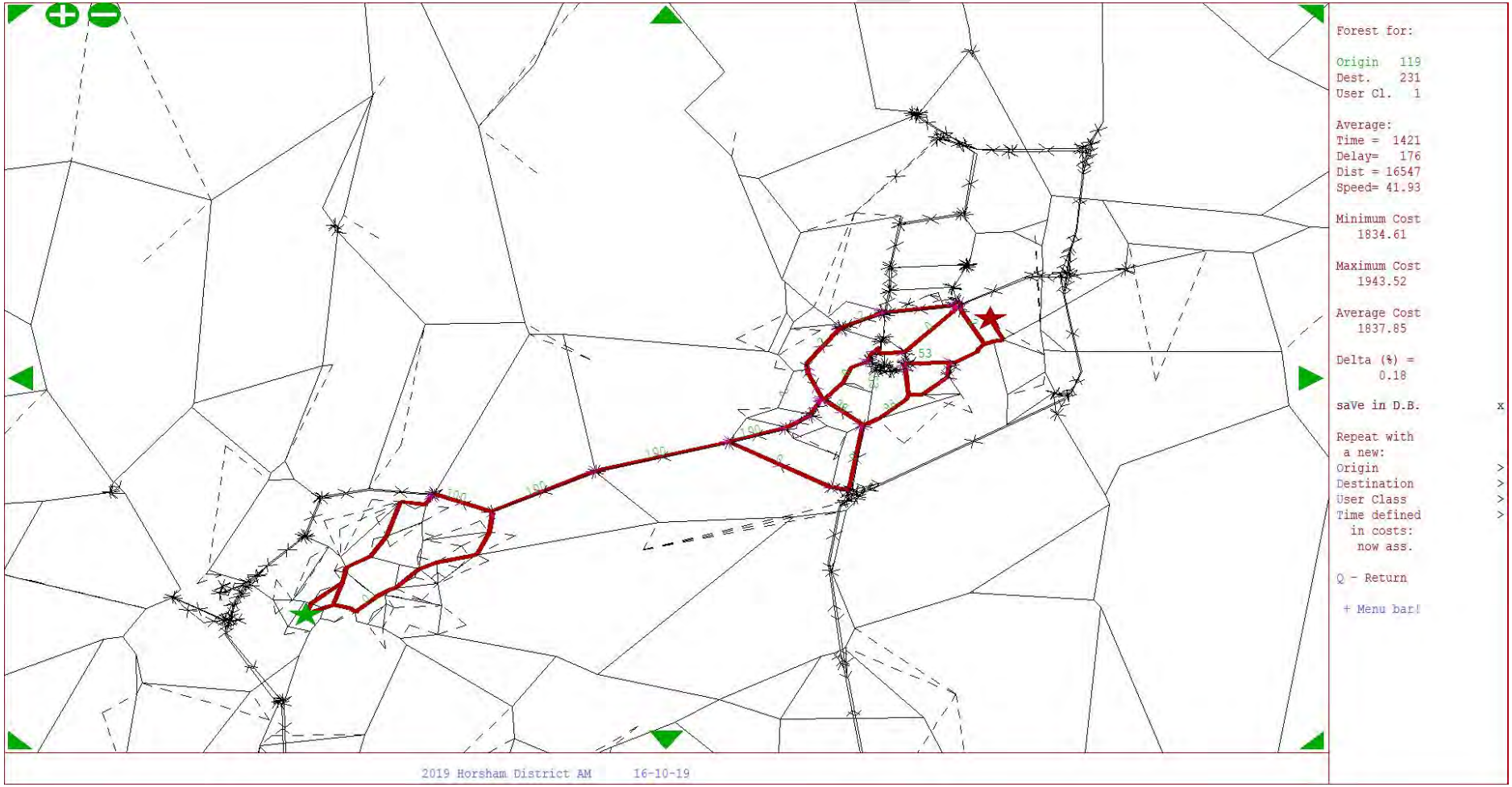
Route 1 – Zone 1002 to 227 (Worthing to Gatwick)



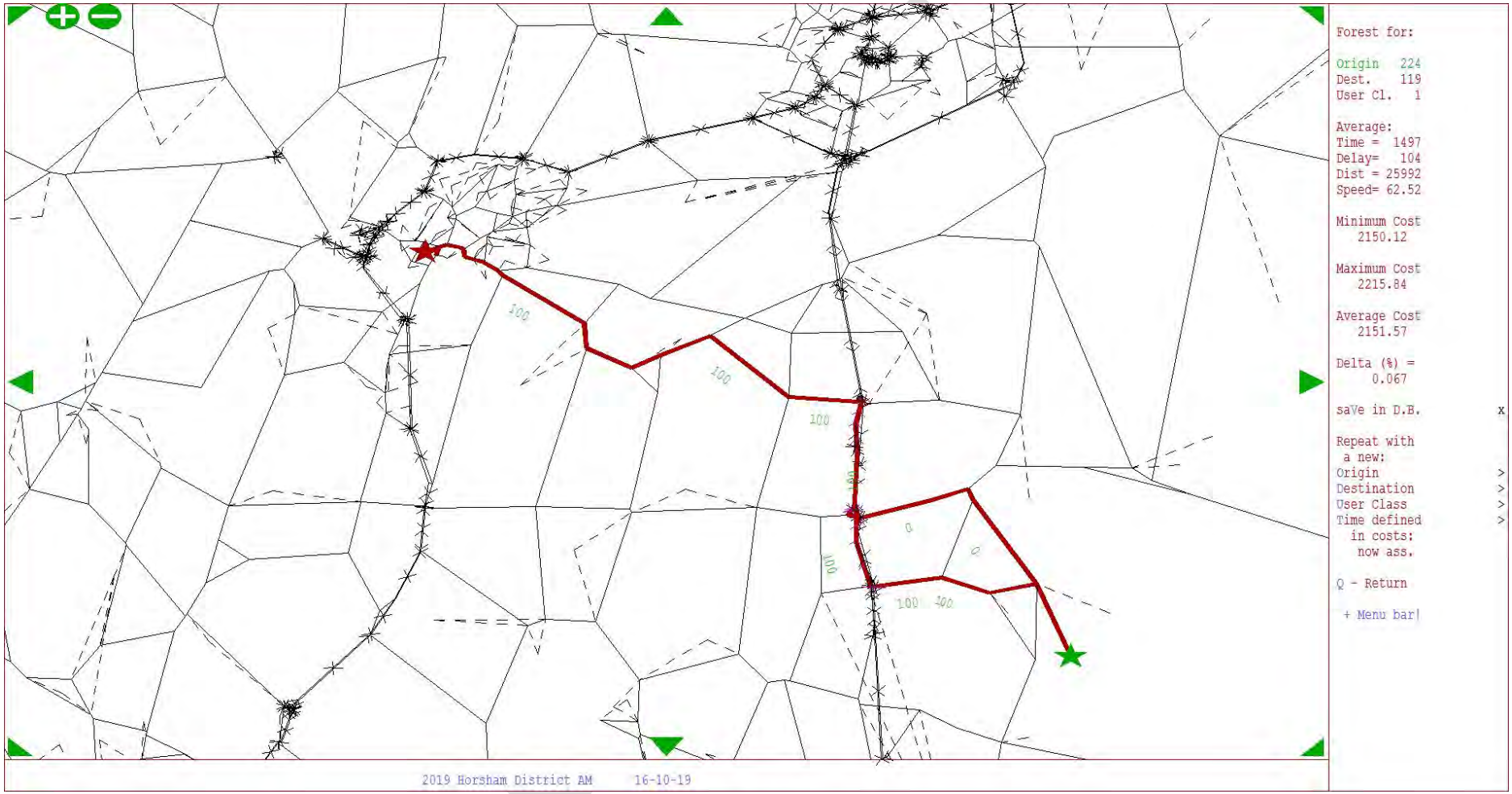
Route 2 – Zone 32 to Zone 230 (Billingshurst to North Crawley)



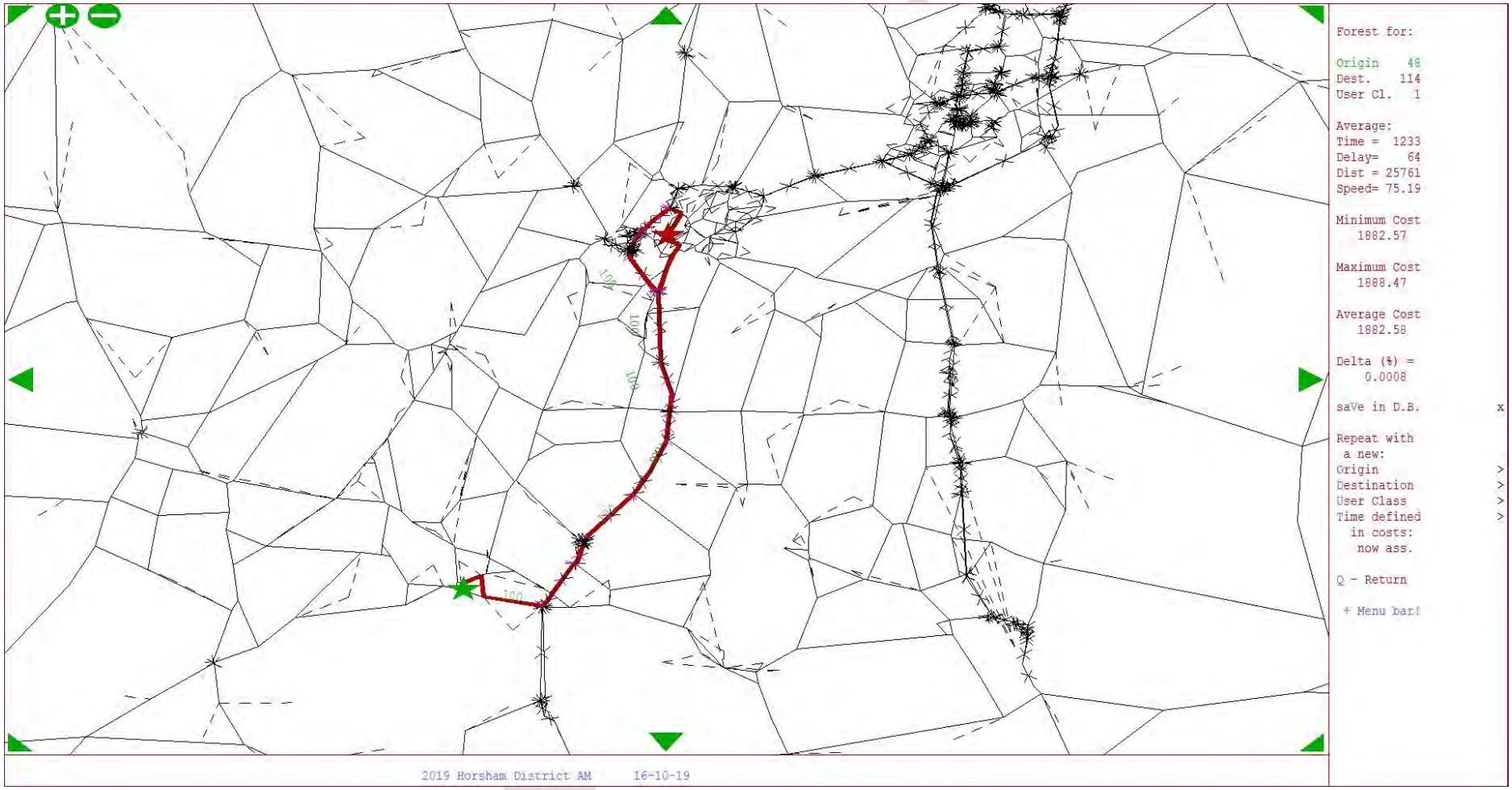
Route 3 – Zone 119 to Zone 231 (Horsham Town Centre to East Crawley)



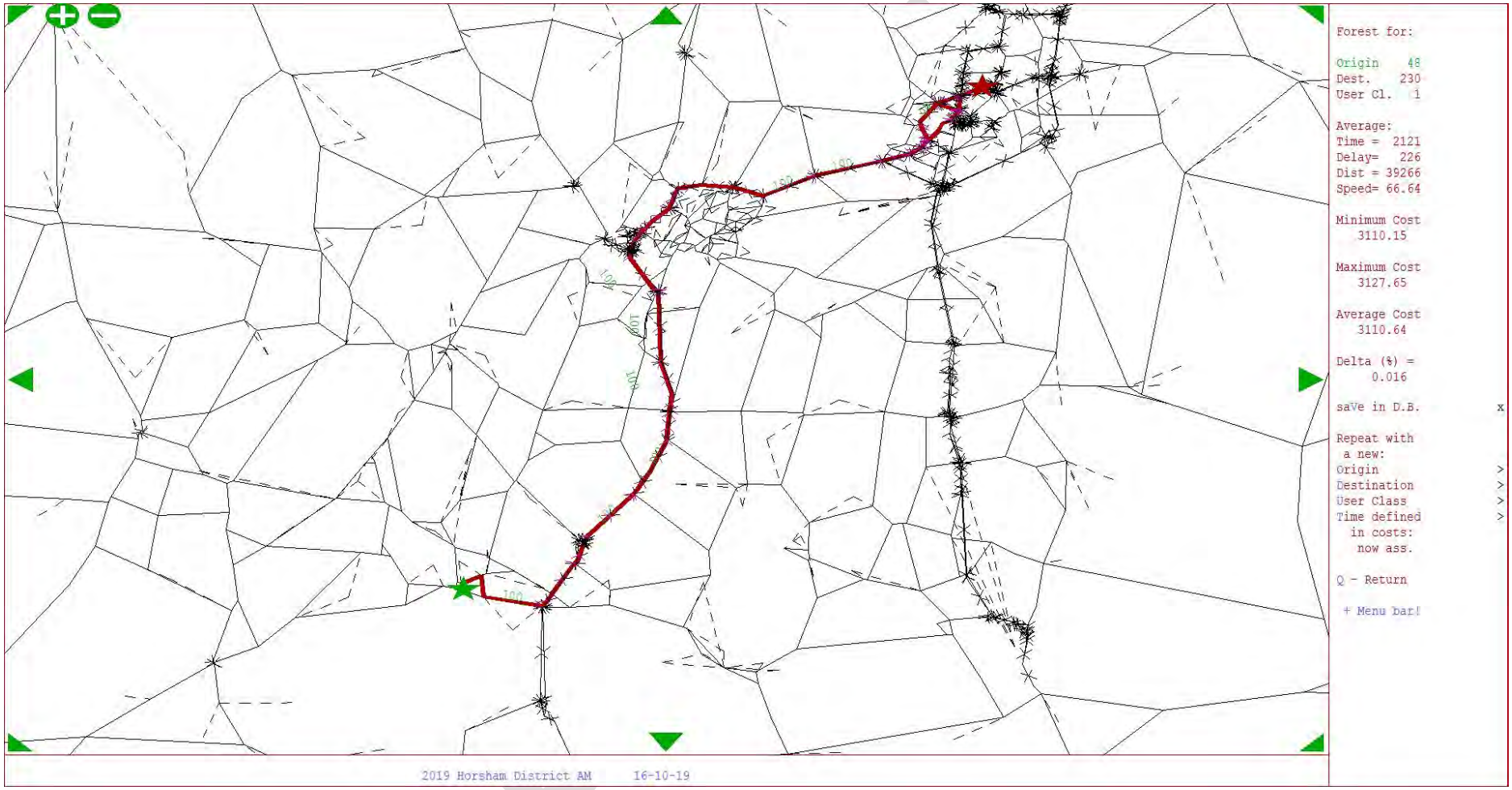
Route 4 – Zone 224 to 119 (Burgess Hill to Horsham Town Centre)



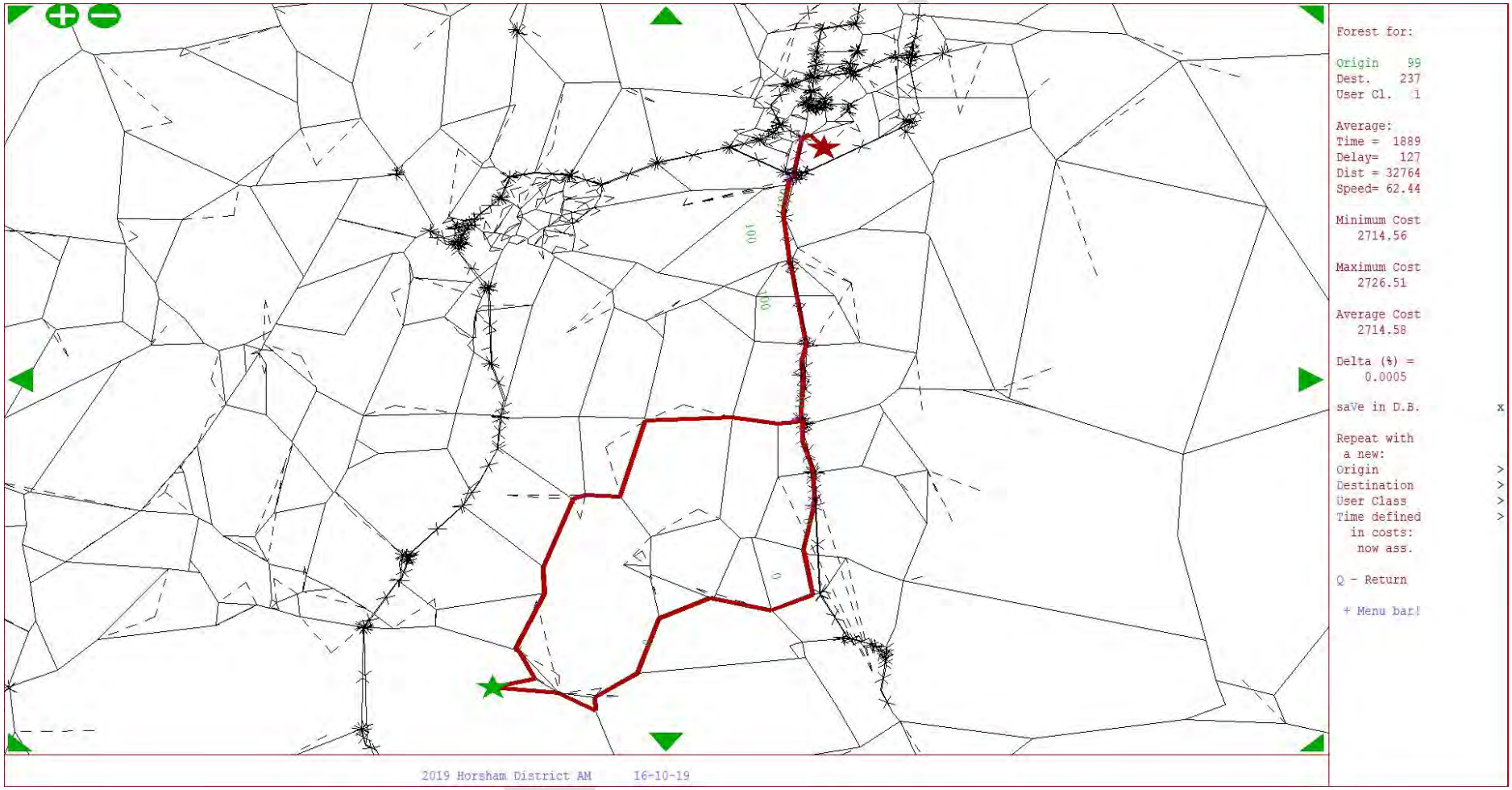
Route 5 – Zone 48 to 114 (Storrington to West of Horsham Town Centre)



Route 6 - Zone 48 to 230 (Storrington to North Crawley)



Route 7 – Zone 99 to 237 (Steyning to South Crawley)



Appendix B Calibration Counts AM

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Great Daux Rbt - A24 / A265	1805	1552	6.16	✓
Great Daux Rbt - A24 / A265	1805	1552	6.16	✓
Great Daux Rbt - A24 / A267	762	717	1.65	✓
Great Daux Rbt - A24 / A268	975	1472	14.20	×
Great Daux Rbt - A24 / A269	1591	797	22.98	×
Great Daux Rbt - A24 / A270	1714	1623	2.22	✓
Great Daux Rbt - A24 / A271	762	717	1.65	✓
Great Daux Rbt - A24 / A272	1591	797	22.98	×
Great Daux Rbt - A24 / A273	801	858	1.96	✓
Great Daux Rbt - A24 / A274	420	608	8.29	×
Great Daux Rbt - A24 / A275	1972	1046	23.83	×
Great Daux Rbt - A24 / A276	420	608	8.29	×
Great Daux Rbt - A24 / A277	2055	1776	6.36	✓
Moorhead Rbt - A264 / B2195	760	711	1.80	✓
Moorhead Rbt - A264 / B2196	450	384	3.23	✓
Moorhead Rbt - A264 / B2197	1898	1873	0.59	✓
Moorhead Rbt - A264 / B2198	450	384	3.23	✓
Moorhead Rbt - A264 / B2199	647	519	5.28	×
Moorhead Rbt - A264 / B2200	1588	1546	1.08	✓
Moorhead Rbt - A264 / B2201	122	120	0.20	✓
Moorhead Rbt - A264 / B2202	1827	1752	1.78	✓
Moorhead Rbt - A264 / B2203	122	120	0.20	✓
Moorhead Rbt - A264 / B2203	1499	1488	0.30	✓
Moorhead Rbt - A264 / B2203	2113	1945	3.73	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1213	1172	1.18	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1652	1587	1.63	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	2033	2066	0.73	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	76	61	1.78	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	67	61	0.76	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	896	955	1.94	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1344	1328	0.46	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	896	955	1.94	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1479	1408	1.88	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	249	240	0.57	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1517	1627	2.77	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1517	1627	2.77	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	356	347	0.46	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	723	656	2.56	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	394	566	7.88	×
Farthings Hill Interchange	732	565	6.55	×
Farthings Hill Interchange	355	356	0.06	✓
Farthings Hill Interchange	772	755	0.62	✓
Farthings Hill Interchange	541	563	0.94	✓
Farthings Hill Interchange	1144	1075	2.05	✓
Farthings Hill Interchange	1144	1075	2.05	✓
Farthings Hill Interchange	772	755	0.62	✓
Farthings Hill Interchange	860	672	6.81	×
Farthings Hill Interchange	1044	1037	0.23	✓
Farthings Hill Interchange	454	394	2.92	✓
Farthings Hill Interchange	953	850	3.42	✓
Farthings Hill Interchange	900	861	1.31	✓
Farthings Hill Interchange	1289	1241	1.37	✓
Farthings Hill Interchange	356	352	0.20	✓
Farthings Hill Interchange	1289	1241	1.37	✓
Farthings Hill Interchange	601	556	1.89	✓
Farthings Hill Interchange	564	471	4.08	✓
Farthings Hill Interchange	913	884	0.98	✓
Worthing Rd / A272 / Cowfold Rd	1346	1363	0.47	✓
Worthing Rd / A272 / Cowfold Rd	294	319	1.44	✓
Worthing Rd / A272 / Cowfold Rd	891	887	0.14	✓
Worthing Rd / A272 / Cowfold Rd	456	368	4.32	✓
Worthing Rd / A272 / Cowfold Rd	1347	1363	0.44	✓
Worthing Rd / A272 / Cowfold Rd	890	887	0.10	✓
Worthing Rd / A272 / Cowfold Rd	446	581	5.94	×
Worthing Rd / A272 / Cowfold Rd	152	126	2.18	✓
Worthing Rd / A272 / Cowfold Rd	890	887	0.10	✓
Worthing Rd / A272 / Cowfold Rd	1346	1363	0.47	✓
Worthing Rd / A272 / Cowfold Rd	446	581	5.94	×
Worthing Rd / A272 / Cowfold Rd	294	319	1.44	✓
Worthing Rd / A272 / Cowfold Rd	1106	1165	1.75	✓
Worthing Rd / A272 / Cowfold Rd	534	517	0.72	✓
Worthing Rd / A272 / Cowfold Rd	411	417	0.29	✓
Worthing Rd / A272 / Cowfold Rd	1044	1121	2.32	✓
Worthing Rd / A272 / Cowfold Rd	152	126	2.18	✓
Worthing Rd / A272 / Cowfold Rd	292	347	3.08	✓
Worthing Rd / A272 / Cowfold Rd	191	107	6.86	✓
Worthing Rd / A272 / Cowfold Rd	534	517	0.72	✓
Worthing Rd / A272 / Cowfold Rd	411	417	0.29	✓
Worthing Rd / A272 / Cowfold Rd	292	347	3.08	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Worthing Rd / A272 / Cowfold Rd	191	107	6.86	✓
North Ashington A24 access	89	88	0.10	✓
North Ashington A24 access	219	265	2.96	✓
North Ashington A24 access	217	230	0.87	✓
North Ashington A24 access	205	209	0.33	✓
North Ashington A24 access	89	88	0.10	✓
North Ashington A24 access	219	265	2.96	✓
North Ashington A24 access	217	230	0.87	✓
North Ashington A24 access	205	209	0.33	✓
North Ashington A24 access	90	88	0.15	✓
North Ashington A24 access	90	88	0.15	✓
North Ashington A24 access	90	88	0.15	✓
North Ashington A24 access	205	209	0.33	✓
North Ashington A24 access	204	209	0.36	✓
Crawley Avenue/London Road	204	209	0.36	✓
Crawley Avenue/London Road	1425	1410	0.40	✓
Crawley Avenue/London Road	757	622	5.14	x
Crawley Avenue/London Road	1053	943	3.48	✓
Crawley Avenue/London Road	1212	1138	2.16	✓
Crawley Avenue/London Road	1053	943	3.48	✓
Crawley Avenue/London Road	1529	1324	5.44	✓
Crawley Avenue/London Road	949	986	1.18	✓
Crawley Avenue/London Road	1529	1324	5.44	✓
Crawley Avenue/London Road	949	986	1.18	✓
Crawley Avenue/London Road	1508	1459	1.27	✓
Crawley Avenue/London Road	673	570	4.10	x
Crawley Avenue/London Road	1508	1459	1.27	✓
Crawley Avenue/London Road	673	570	4.10	x
Crawley Avenue/London Road	776	773	0.13	✓
Crawley Avenue/London Road	1699	1571	3.16	✓
Crawley Avenue/London Road	776	773	0.13	✓
Crawley Avenue/London Road	946	1020	2.36	✓
Crawley Avenue/London Road	1404	1257	4.05	✓
Crawley Avenue/London Road	946	1020	2.36	✓
Crawley Avenue/London Road	757	622	5.14	x
Crawley Avenue/London Road	2	0	0.00	✓
Crawley Avenue/London Road	201	157	3.30	✓
Crawley Avenue/London Road	62	0	0.00	✓
Crawley Avenue/London Road	186	148	2.95	✓
Crawley Avenue/London Road	2	0	0.00	✓
Crawley Avenue/London Road	348	377	1.51	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Crawley Avenue/London Road	32	0	0.00	✓
Crawley Avenue/London Road	247	288	2.54	✓
Crawley Avenue/London Road	0	0	0.00	✓
Crawley Avenue/London Road	0	0	0.00	✓
Crawley Avenue/London Road	28	42	2.39	✓
Crawley Avenue/London Road	218	258	2.59	✓
Crawley Avenue/London Road	173	171	0.13	✓
Crawley Avenue/London Road	53	0	0.00	✓
Crawley Avenue/London Road	0	0	0.00	✓
Platts Rbt	35	31	0.77	✓
Platts Rbt	300	301	0.06	✓
Platts Rbt	336	367	1.68	✓
Platts Rbt	23	10	3.32	✓
Platts Rbt	0	0	0.00	✓
Platts Rbt	52	0	0.00	✓
Platts Rbt	197	270	4.77	✓
Platts Rbt	235	237	0.09	✓
Platts Rbt	28	0	0.00	✓
Platts Rbt	5	0	0.00	✓
A281 / B2237 / Albion Way jct	608	589	0.77	✓
A281 / B2237 / Albion Way jct	373	230	8.22	×
A281 / B2237 / Albion Way jct	714	671	1.66	✓
A281 / B2237 / Albion Way jct	76	307	16.70	×
A281 / B2237 / Albion Way jct	508	354	7.40	×
A281 / B2237 / Albion Way jct	213	124	6.87	✓
Brighton Rd / M23 / A264 Rbt	776	645	4.90	×
Brighton Rd / M23 / A264 Rbt	734	638	3.65	✓
Brighton Rd / M23 / A264 Rbt	400	864	18.46	×
Brighton Rd / M23 / A264 Rbt	776	645	4.90	×
Brighton Rd / M23 / A264 Rbt	791	923	4.50	×
Brighton Rd / M23 / A264 Rbt	1398	1536	3.61	✓
Brighton Rd / M23 / A264 Rbt	1398	1536	3.61	✓
Brighton Rd / M23 / A264 Rbt	671	254	19.38	×
Brighton Rd / M23 / A264 Rbt	1413	1815	10.01	×
Brighton Rd / M23 / A264 Rbt	671	339	14.78	×
Brighton Rd / M23 / A264 Rbt	1413	1815	10.01	×
Brighton Rd / M23 / A264 Rbt	1276	1068	6.10	×
Brighton Rd / M23 / A264 Rbt	855	1106	8.02	×
Brighton Rd / M23 / A264 Rbt	1276	1068	6.10	×
Brighton Rd / M23 / A264 Rbt	855	1107	8.03	×
Brighton Rd / M23 / A264 Rbt	1526	1682	3.90	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Brighton Rd / M23 / A264 Rbt	1490	1719	5.74	×
Brighton Rd / M23 / A264 Rbt	1526	1682	3.90	✓
Brighton Rd / M23 / A264 Rbt	1142	902	7.52	×
Brighton Rd / M23 / A264 Rbt	1142	902	7.52	×
Brighton Rd / M23 / A264 Rbt	1080	1310	6.66	×
Brighton Rd / M23 / A264 Rbt	1739	2340	13.30	×
Brighton Rd / M23 / A264 Rbt	942	1252	9.37	×
Brighton Rd / M23 / A264 Rbt	696	529	6.72	×
Brighton Rd / M23 / A264 Rbt	734	638	3.65	✓
Brighton Rd / M23 / A264 Rbt	400	864	18.46	×
A23 / Cowfold Rd	391	242	8.41	×
A23 / Cowfold Rd	372	329	2.28	✓
A23 / Cowfold Rd	343	329	0.76	✓
A23 / Cowfold Rd	63	0	0.00	✓
A23 / Cowfold Rd	390	243	8.27	×
A23 / Cowfold Rd	34	0	0.00	✓
A23 / Cowfold Rd	33	9	5.18	✓
A23 / Cowfold Rd	346	294	2.91	✓
A23 / Cowfold Rd	33	9	5.18	✓
A23 / Cowfold Rd	346	294	2.91	✓
A23 / Cowfold Rd	36	9	5.61	✓
A23 / Cowfold Rd	391	234	8.90	×
A238 / A2037 Rbt	0	0	0.00	✓
A238 / A2037 Rbt	415	373	2.10	✓
A238 / A2037 Rbt	205	90	9.50	×
A238 / A2037 Rbt	359	323	1.93	✓
A238 / A2037 Rbt	2	0	0.00	✓
A238 / A2037 Rbt	851	723	4.55	×
A238 / A2037 Rbt	216	99	9.36	×
A238 / A2037 Rbt	876	837	1.32	✓
A238 / A2037 Rbt	0	0	0.00	✓
Hop Oast Rbt	1630	1526	2.61	✓
Hop Oast Rbt	250	271	1.26	✓
Hop Oast Rbt	421	493	3.36	✓
Hop Oast Rbt	1616	1542	1.88	✓
Hop Oast Rbt	513	505	0.37	✓
Hop Oast Rbt	775	786	0.41	✓
Hop Oast Rbt	1092	1026	2.01	✓
Hop Oast Rbt	513	505	0.37	✓
Hop Oast Rbt	500	520	0.92	✓
Hop Oast Rbt	775	786	0.41	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Hop Oast Rbt	1092	1026	2.01	✓
Hop Oast Rbt	1049	989	1.90	✓
Hop Oast Rbt	500	520	0.92	✓
Hop Oast Rbt	1210	1126	2.46	✓
Hop Oast Rbt	883	877	0.20	✓
Hop Oast Rbt	1210	1126	2.46	✓
Hop Oast Rbt	883	877	0.20	✓
Hop Oast Rbt	339	383	2.32	✓
Hop Oast Rbt	339	383	2.32	✓
Hop Oast Rbt	1319	1218	2.83	✓
Hop Oast Rbt	250	271	1.26	✓
Hop Oast Rbt	421	493	3.36	✓
A29 / High St Rbt	2	0	0.00	✓
A29 / High St Rbt	317	300	1.01	✓
A29 / High St Rbt	390	357	1.68	✓
A29 / High St Rbt	528	633	4.39	×
A29 / High St Rbt	2	0	0.00	✓
A29 / High St Rbt	23	75	7.42	✓
A29 / High St Rbt	578	541	1.56	✓
A29 / High St Rbt	7	53	8.36	✓
A29 / High St Rbt	0	0	0.00	✓
A281 / Guildford Rd / Stane St	3	0	0.00	✓
A281 / Guildford Rd / Stane St	173	137	2.90	✓
A281 / Guildford Rd / Stane St	587	580	0.28	✓
A281 / Guildford Rd / Stane St	346	241	6.14	×
A281 / Guildford Rd / Stane St	1	0	0.00	✓
A281 / Guildford Rd / Stane St	62	42	2.71	✓
A281 / Guildford Rd / Stane St	501	766	10.54	×
A281 / Guildford Rd / Stane St	74	65	1.13	✓
A281 / Guildford Rd / Stane St	0	0	0.00	✓
A264 / Stane St Rbt	3	0	0.00	✓
A264 / Stane St Rbt	56	0	0.00	✓
A264 / Stane St Rbt	253	230	1.46	✓
A264 / Stane St Rbt	101	12	11.73	✓
A264 / Stane St Rbt	0	0	0.00	✓
A264 / Stane St Rbt	456	427	1.39	✓
A264 / Stane St Rbt	519	509	0.47	✓
A264 / Stane St Rbt	577	666	3.57	✓
A264 / Stane St Rbt	2	0	0.00	✓
A29 / Lordings Rd / Adversane Ln Jct	79	68	1.32	✓
A29 / Lordings Rd / Adversane Ln Jct	607	564	1.79	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
A29 / Lordings Rd / Adversane Ln Jct	97	87	0.98	✓
A29 / Lordings Rd / Adversane Ln Jct	136	178	3.37	✓
A29 / Lordings Rd / Adversane Ln Jct	233	249	1.08	✓
A29 / Lordings Rd / Adversane Ln Jct	510	492	0.80	✓
A29 / Lordings Rd / Adversane Ln Jct	448	425	1.09	✓
A29 / Lordings Rd / Adversane Ln Jct	105	105	0.08	✓
A29 / Lordings Rd / Adversane Ln Jct	111	115	0.42	✓
A29 / Lordings Rd / Adversane Ln Jct	12	0	0.00	✓
A29 / Lordings Rd / Adversane Ln Jct	443	415	1.36	✓
A29 / Lordings Rd / Adversane Ln Jct	5	0	0.00	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	438	434	0.16	✓
A283 / Church Hill / London Rd Rbts	39	22	3.14	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	128	105	2.10	✓
A283 / Church Hill / London Rd Rbts	315	291	1.40	✓
A283 / Church Hill / London Rd Rbts	312	307	0.27	✓
A283 / Church Hill / London Rd Rbts	403	339	3.31	✓
A283 / Church Hill / London Rd Rbts	32	10	4.89	✓
A283 / Church Hill / London Rd Rbts	302	204	6.15	✓
A283 / Church Hill / London Rd Rbts	1	0	0.00	✓
A283 / Church Hill / London Rd Rbts	98	50	5.57	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	399	355	2.28	✓
A283 / Church Hill / London Rd Rbts	207	124	6.41	✓
A283 / Church Hill / London Rd Rbts	533	514	0.82	✓
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / High St / School Hill Rbt	62	0	0.00	✓
A283 / High St / School Hill Rbt	278	255	1.40	✓
A283 / High St / School Hill Rbt	57	0	0.00	✓
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / High St / School Hill Rbt	585	364	10.16	×
A283 / High St / School Hill Rbt	325	298	1.53	✓
A283 / High St / School Hill Rbt	620	362	11.65	×
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / Water Ln / Chanctobury Ring Rd	269	108	11.76	×
A283 / Water Ln / Chanctobury Ring Rd	7	3	1.95	✓
A283 / Water Ln / Chanctobury Ring Rd	177	186	0.70	✓
A283 / Water Ln / Chanctobury Ring Rd	757	345	17.57	×
A283 / Water Ln / Chanctobury Ring Rd	3	46	8.68	✓
A283 / Water Ln / Chanctobury Ring Rd	624	444	7.77	×

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	1	1.10	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	58	59	0.16	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	660	581	3.20	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	19	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	83	64	2.17	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	1	1	0.06	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	15	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	57	9	8.47	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	797	554	9.36	×
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	6	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	250	259	0.55	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	47	4	8.47	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	105	2	14.02	×
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	346	355	0.51	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	0	0.00	✓
A272 / A281 Rbts	1	0	0.00	✓
A272 / A281 Rbts	250	267	1.04	✓
A272 / A281 Rbts	106	156	4.42	✓
A272 / A281 Rbts	762	730	1.16	✓
A272 / A281 Rbts	305	285	1.19	✓
A272 / A281 Rbts	123	134	0.98	✓
A272 / A281 Rbts	795	661	4.93	×
A272 / A281 Rbts	95	102	0.65	✓
A272 / A281 Rbts	817	748	2.46	✓
A272 / A281 Rbts	0	0	0.00	✓
A272 / A281 Rbts	683	643	1.55	✓
A272 / A281 Rbts	229	223	0.42	✓
A272 / A281 Rbts	235	153	5.87	✓
A272 / A281 Rbts	156	133	1.96	✓
A272 / A281 Rbts	0	0	0.00	✓
A281 / St Leonard's Rd Jct	71	96	2.70	✓
A281 / St Leonard's Rd Jct	365	339	1.42	✓
A281 / St Leonard's Rd Jct	66	327	18.64	×
A281 / St Leonard's Rd Jct	107	202	7.62	✓
A281 / St Leonard's Rd Jct	612	617	0.19	✓
A281 / St Leonard's Rd Jct	65	177	10.23	×
Total		**275**	**74%**	**80%**

Appendix C Calibration Counts PM

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Great Daux Rbt - A24 / A265	1706	1656	1.23	✓
Great Daux Rbt - A24 / A265	1706	1656	1.23	✓
Great Daux Rbt - A24 / A267	358	359	0.03	✓
Great Daux Rbt - A24 / A268	772	789	0.61	✓
Great Daux Rbt - A24 / A269	1292	1225	1.88	✓
Great Daux Rbt - A24 / A270	1952	1899	1.23	✓
Great Daux Rbt - A24 / A271	358	359	0.03	✓
Great Daux Rbt - A24 / A272	1292	1225	1.88	✓
Great Daux Rbt - A24 / A273	807	818	0.38	✓
Great Daux Rbt - A24 / A274	395	353	2.16	✓
Great Daux Rbt - A24 / A275	1704	1690	0.34	✓
Great Daux Rbt - A24 / A276	395	353	2.16	✓
Great Daux Rbt - A24 / A277	1915	1904	0.26	✓
Moorhead Rbt - A264 / B2195	669	529	5.69	×
Moorhead Rbt - A264 / B2196	525	393	6.16	×
Moorhead Rbt - A264 / B2197	1746	1822	1.80	✓
Moorhead Rbt - A264 / B2198	525	393	6.16	×
Moorhead Rbt - A264 / B2199	870	786	2.91	✓
Moorhead Rbt - A264 / B2200	1602	1686	2.05	✓
Moorhead Rbt - A264 / B2201	306	328	1.21	✓
Moorhead Rbt - A264 / B2202	2037	1893	3.23	✓
Moorhead Rbt - A264 / B2203	306	328	1.21	✓
Moorhead Rbt - A264 / B2203	1818	1828	0.24	✓
Moorhead Rbt - A264 / B2203	2166	2170	0.09	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1303	647	21.01	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	2084	2055	0.65	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	2040	1973	1.49	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	257	170	5.94	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	257	159	6.74	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	993	1496	14.25	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1265	764	15.72	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	993	1496	14.25	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1925	1688	5.58	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	416	537	5.54	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1403	1253	4.11	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	1403	1253	4.11	✓
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	784	916	4.53	×
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	855	1007	4.97	×

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Bewbush Manor Rbt - A264 / Horsham Rd / Sullivan Dr	262	481	11.38	×
Farthings Hill Interchange	785	793	0.28	✓
Farthings Hill Interchange	676	680	0.14	✓
Farthings Hill Interchange	936	932	0.12	✓
Farthings Hill Interchange	723	721	0.05	✓
Farthings Hill Interchange	1059	1068	0.26	✓
Farthings Hill Interchange	1059	1068	0.26	✓
Farthings Hill Interchange	936	932	0.12	✓
Farthings Hill Interchange	919	930	0.36	✓
Farthings Hill Interchange	1241	1253	0.37	✓
Farthings Hill Interchange	495	494	0.03	✓
Farthings Hill Interchange	838	832	0.20	✓
Farthings Hill Interchange	1070	1069	0.02	✓
Farthings Hill Interchange	1261	1280	0.56	✓
Farthings Hill Interchange	408	404	0.19	✓
Farthings Hill Interchange	1261	1280	0.56	✓
Farthings Hill Interchange	428	431	0.14	✓
Farthings Hill Interchange	647	621	1.04	✓
Farthings Hill Interchange	846	856	0.37	✓
Worthing Rd / A272 / Cowfold Rd	1073	1020	1.62	✓
Worthing Rd / A272 / Cowfold Rd	334	433	5.07	✓
Worthing Rd / A272 / Cowfold Rd	1358	1427	1.87	✓
Worthing Rd / A272 / Cowfold Rd	357	283	4.12	✓
Worthing Rd / A272 / Cowfold Rd	1073	1020	1.62	✓
Worthing Rd / A272 / Cowfold Rd	1358	1427	1.86	✓
Worthing Rd / A272 / Cowfold Rd	581	595	0.58	✓
Worthing Rd / A272 / Cowfold Rd	202	195	0.48	✓
Worthing Rd / A272 / Cowfold Rd	1358	1427	1.86	✓
Worthing Rd / A272 / Cowfold Rd	1073	1020	1.62	✓
Worthing Rd / A272 / Cowfold Rd	581	595	0.58	✓
Worthing Rd / A272 / Cowfold Rd	334	433	5.07	✓
Worthing Rd / A272 / Cowfold Rd	873	892	0.62	✓
Worthing Rd / A272 / Cowfold Rd	534	562	1.21	✓
Worthing Rd / A272 / Cowfold Rd	530	454	3.41	✓
Worthing Rd / A272 / Cowfold Rd	1591	1658	1.66	✓
Worthing Rd / A272 / Cowfold Rd	202	195	0.48	✓
Worthing Rd / A272 / Cowfold Rd	348	365	0.88	✓
Worthing Rd / A272 / Cowfold Rd	117	103	1.36	✓
Worthing Rd / A272 / Cowfold Rd	534	562	1.21	✓
Worthing Rd / A272 / Cowfold Rd	530	491	1.71	✓
Worthing Rd / A272 / Cowfold Rd	348	365	0.88	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Worthing Rd / A272 / Cowfold Rd	117	103	1.36	✓
North Ashington A24 access	189	172	1.28	✓
North Ashington A24 access	147	200	4.03	✓
North Ashington A24 access	198	175	1.69	✓
North Ashington A24 access	230	209	1.38	✓
North Ashington A24 access	189	172	1.28	✓
North Ashington A24 access	147	200	4.03	✓
North Ashington A24 access	198	175	1.69	✓
North Ashington A24 access	230	209	1.38	✓
North Ashington A24 access	194	176	1.28	✓
North Ashington A24 access	194	176	1.28	✓
North Ashington A24 access	194	176	1.28	✓
North Ashington A24 access	230	209	1.38	✓
North Ashington A24 access	225	205	1.37	✓
Crawley Avenue/London Road	225	205	1.37	✓
Crawley Avenue/London Road	1170	1097	2.19	✓
Crawley Avenue/London Road	685	535	6.09	×
Crawley Avenue/London Road	823	817	0.20	✓
Crawley Avenue/London Road	2139	1985	3.41	✓
Crawley Avenue/London Road	823	817	0.20	✓
Crawley Avenue/London Road	1132	923	6.51	×
Crawley Avenue/London Road	862	991	4.24	✓
Crawley Avenue/London Road	1132	923	6.50	×
Crawley Avenue/London Road	862	991	4.24	✓
Crawley Avenue/London Road	2278	2267	0.21	✓
Crawley Avenue/London Road	620	606	0.56	✓
Crawley Avenue/London Road	2278	2267	0.21	✓
Crawley Avenue/London Road	620	606	0.56	✓
Crawley Avenue/London Road	925	924	0.04	✓
Crawley Avenue/London Road	1296	1176	3.39	✓
Crawley Avenue/London Road	925	924	0.04	✓
Crawley Avenue/London Road	1090	1177	2.61	✓
Crawley Avenue/London Road	1972	1949	0.51	✓
Crawley Avenue/London Road	1090	1177	2.61	✓
Crawley Avenue/London Road	685	535	6.09	×
Crawley Avenue/London Road	4	0	0.00	✓
Crawley Avenue/London Road	34	124	10.07	✓
Crawley Avenue/London Road	1	0	0.00	✓
Crawley Avenue/London Road	3	100	13.49	✓
Crawley Avenue/London Road	325	0	0.00	×
Crawley Avenue/London Road	40	387	23.74	×

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Crawley Avenue/London Road	0	0	0.00	✓
Crawley Avenue/London Road	0	534	32.69	×
Crawley Avenue/London Road	0	0	0.00	✓
Crawley Avenue/London Road	0	0	0.00	✓
Crawley Avenue/London Road	63	70	0.92	✓
Crawley Avenue/London Road	454	504	2.28	✓
Crawley Avenue/London Road	214	203	0.81	✓
Crawley Avenue/London Road	42	0	0.00	✓
Crawley Avenue/London Road	2	0	0.00	✓
Platts Rbt	35	30	0.86	✓
Platts Rbt	259	243	1.06	✓
Platts Rbt	296	378	4.48	✓
Platts Rbt	31	8	5.06	✓
Platts Rbt	0	0	0.00	✓
Platts Rbt	27	0	0.00	✓
Platts Rbt	231	254	1.47	✓
Platts Rbt	310	309	0.09	✓
Platts Rbt	48	0	0.00	✓
Platts Rbt	1	0	0.00	✓
A281 / B2237 / Albion Way jct	912	345	22.62	×
A281 / B2237 / Albion Way jct	520	565	1.93	✓
A281 / B2237 / Albion Way jct	673	237	20.41	×
A281 / B2237 / Albion Way jct	80	186	9.19	×
A281 / B2237 / Albion Way jct	354	426	3.63	✓
A281 / B2237 / Albion Way jct	191	135	4.36	✓
Brighton Rd / M23 / A264 Rbt	497	589	3.93	✓
Brighton Rd / M23 / A264 Rbt	450	429	1.00	✓
Brighton Rd / M23 / A264 Rbt	442	296	7.61	×
Brighton Rd / M23 / A264 Rbt	497	589	3.92	✓
Brighton Rd / M23 / A264 Rbt	839	775	2.26	✓
Brighton Rd / M23 / A264 Rbt	1454	1355	2.64	✓
Brighton Rd / M23 / A264 Rbt	1454	1355	2.64	✓
Brighton Rd / M23 / A264 Rbt	893	575	11.71	×
Brighton Rd / M23 / A264 Rbt	1796	1541	6.23	✓
Brighton Rd / M23 / A264 Rbt	893	617	10.01	×
Brighton Rd / M23 / A264 Rbt	1796	1541	6.23	✓
Brighton Rd / M23 / A264 Rbt	755	947	6.58	×
Brighton Rd / M23 / A264 Rbt	1149	837	9.90	×
Brighton Rd / M23 / A264 Rbt	755	947	6.58	×
Brighton Rd / M23 / A264 Rbt	1149	838	9.89	×
Brighton Rd / M23 / A264 Rbt	1337	1310	0.74	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Brighton Rd / M23 / A264 Rbt	923	860	2.12	✓
Brighton Rd / M23 / A264 Rbt	1337	1310	0.74	✓
Brighton Rd / M23 / A264 Rbt	1375	1225	4.17	✓
Brighton Rd / M23 / A264 Rbt	1375	1225	4.17	✓
Brighton Rd / M23 / A264 Rbt	886	1025	4.52	×
Brighton Rd / M23 / A264 Rbt	1505	1223	7.64	×
Brighton Rd / M23 / A264 Rbt	1314	934	11.31	×
Brighton Rd / M23 / A264 Rbt	924	940	0.54	✓
Brighton Rd / M23 / A264 Rbt	450	429	1.00	✓
Brighton Rd / M23 / A264 Rbt	442	296	7.61	×
A23 / Cowfold Rd	365	251	6.48	×
A23 / Cowfold Rd	316	167	9.57	×
A23 / Cowfold Rd	267	167	6.78	✓
A23 / Cowfold Rd	91	0	0.00	✓
A23 / Cowfold Rd	370	248	6.91	×
A23 / Cowfold Rd	42	0	0.00	✓
A23 / Cowfold Rd	47	2	9.01	✓
A23 / Cowfold Rd	268	148	8.36	×
A23 / Cowfold Rd	47	2	9.01	✓
A23 / Cowfold Rd	268	148	8.36	×
A23 / Cowfold Rd	48	2	9.13	✓
A23 / Cowfold Rd	365	246	6.79	×
A238 / A2037 Rbt	4	0	0.00	✓
A238 / A2037 Rbt	390	377	0.64	✓
A238 / A2037 Rbt	245	126	8.68	×
A238 / A2037 Rbt	338	370	1.75	✓
A238 / A2037 Rbt	11	0	0.00	✓
A238 / A2037 Rbt	910	909	0.03	✓
A238 / A2037 Rbt	142	105	3.30	✓
A238 / A2037 Rbt	829	804	0.88	✓
A238 / A2037 Rbt	0	0	0.00	✓
Hop Oast Rbt	1101	1028	2.24	✓
Hop Oast Rbt	237	250	0.81	✓
Hop Oast Rbt	305	303	0.13	✓
Hop Oast Rbt	1173	970	6.21	×
Hop Oast Rbt	677	952	9.65	×
Hop Oast Rbt	471	448	1.09	✓
Hop Oast Rbt	939	771	5.73	×
Hop Oast Rbt	677	952	9.65	×
Hop Oast Rbt	748	892	5.03	×
Hop Oast Rbt	471	448	1.09	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
Hop Oast Rbt	939	771	5.73	×
Hop Oast Rbt	1765	1863	2.32	✓
Hop Oast Rbt	748	892	5.03	×
Hop Oast Rbt	1781	2090	7.01	×
Hop Oast Rbt	504	448	2.56	✓
Hop Oast Rbt	1781	2090	7.01	×
Hop Oast Rbt	504	448	2.56	✓
Hop Oast Rbt	732	704	1.04	✓
Hop Oast Rbt	732	704	1.04	✓
Hop Oast Rbt	1814	2090	6.24	×
Hop Oast Rbt	237	250	0.81	✓
Hop Oast Rbt	305	303	0.13	✓
A29 / High St Rbt	2	0	0.00	✓
A29 / High St Rbt	511	479	1.44	✓
A29 / High St Rbt	718	702	0.58	✓
A29 / High St Rbt	287	339	2.95	✓
A29 / High St Rbt	2	0	0.00	✓
A29 / High St Rbt	15	63	7.71	✓
A29 / High St Rbt	555	554	0.07	✓
A29 / High St Rbt	17	63	7.24	✓
A29 / High St Rbt	0	0	0.00	✓
A281 / Guildford Rd / Stane St	2	0	0.00	✓
A281 / Guildford Rd / Stane St	343	295	2.68	✓
A281 / Guildford Rd / Stane St	458	436	1.00	✓
A281 / Guildford Rd / Stane St	197	101	7.84	✓
A281 / Guildford Rd / Stane St	1	0	0.00	✓
A281 / Guildford Rd / Stane St	56	90	4.03	✓
A281 / Guildford Rd / Stane St	591	725	5.22	×
A281 / Guildford Rd / Stane St	62	53	1.13	✓
A281 / Guildford Rd / Stane St	1	0	0.00	✓
A264 / Stane St Rbt	0	0	0.00	✓
A264 / Stane St Rbt	79	13	9.78	✓
A264 / Stane St Rbt	561	505	2.45	✓
A264 / Stane St Rbt	36	0	0.00	✓
A264 / Stane St Rbt	0	0	0.00	✓
A264 / Stane St Rbt	639	676	1.43	✓
A264 / Stane St Rbt	261	247	0.84	✓
A264 / Stane St Rbt	585	645	2.46	✓
A264 / Stane St Rbt	2	0	0.00	✓
A29 / Lordings Rd / Adversane Ln Jct	102	103	0.05	✓
A29 / Lordings Rd / Adversane Ln Jct	528	499	1.30	✓

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
A29 / Lordings Rd / Adversane Ln Jct	89	85	0.41	✓
A29 / Lordings Rd / Adversane Ln Jct	97	115	1.79	✓
A29 / Lordings Rd / Adversane Ln Jct	148	143	0.43	✓
A29 / Lordings Rd / Adversane Ln Jct	477	471	0.27	✓
A29 / Lordings Rd / Adversane Ln Jct	693	692	0.04	✓
A29 / Lordings Rd / Adversane Ln Jct	203	199	0.31	✓
A29 / Lordings Rd / Adversane Ln Jct	216	242	1.70	✓
A29 / Lordings Rd / Adversane Ln Jct	6	0	0.00	✓
A29 / Lordings Rd / Adversane Ln Jct	680	649	1.21	✓
A29 / Lordings Rd / Adversane Ln Jct	5	0	0.00	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	362	371	0.46	✓
A283 / Church Hill / London Rd Rbts	26	14	2.68	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	125	116	0.88	✓
A283 / Church Hill / London Rd Rbts	250	244	0.33	✓
A283 / Church Hill / London Rd Rbts	560	584	1.00	✓
A283 / Church Hill / London Rd Rbts	344	306	2.08	✓
A283 / Church Hill / London Rd Rbts	41	22	3.47	✓
A283 / Church Hill / London Rd Rbts	468	346	6.08	×
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	155	114	3.53	✓
A283 / Church Hill / London Rd Rbts	0	0	0.00	✓
A283 / Church Hill / London Rd Rbts	654	646	0.33	✓
A283 / Church Hill / London Rd Rbts	315	253	3.67	✓
A283 / Church Hill / London Rd Rbts	515	464	2.34	✓
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / High St / School Hill Rbt	66	0	0.00	✓
A283 / High St / School Hill Rbt	305	304	0.09	✓
A283 / High St / School Hill Rbt	35	0	0.00	✓
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / High St / School Hill Rbt	525	385	6.58	×
A283 / High St / School Hill Rbt	224	221	0.20	✓
A283 / High St / School Hill Rbt	719	365	15.21	×
A283 / High St / School Hill Rbt	0	0	0.00	✓
A283 / Water Ln / Chanctobury Ring Rd	327	205	7.46	×
A283 / Water Ln / Chanctobury Ring Rd	39	11	5.56	✓
A283 / Water Ln / Chanctobury Ring Rd	158	156	0.16	✓
A283 / Water Ln / Chanctobury Ring Rd	923	534	14.39	×
A283 / Water Ln / Chanctobury Ring Rd	6	50	8.29	✓
A283 / Water Ln / Chanctobury Ring Rd	581	464	5.14	×

Junction/Count	All (PCU)			
	Observed	Modelled	GEH	DMRB
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	69	78	1.16	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	736	712	0.91	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	29	5	5.88	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	96	98	0.16	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	2	2.20	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	14	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	64	10	8.76	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	881	782	3.42	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	7	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	1	0	0.00	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	250	253	0.17	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	22	3	5.36	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	74	7	10.46	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	195	197	0.18	✓
A283 / Castle Ln / The St / Maudlin Ln / Clays Hill	0	0	0.00	✓
A272 / A281 Rbts	0	0	0.00	✓
A272 / A281 Rbts	192	172	1.51	✓
A272 / A281 Rbts	107	125	1.75	✓
A272 / A281 Rbts	762	697	2.41	✓
A272 / A281 Rbts	192	189	0.27	✓
A272 / A281 Rbts	190	175	1.06	✓
A272 / A281 Rbts	828	771	2.00	✓
A272 / A281 Rbts	112	183	5.87	✓
A272 / A281 Rbts	762	714	1.78	✓
A272 / A281 Rbts	1	0	0.00	✓
A272 / A281 Rbts	776	745	1.16	✓
A272 / A281 Rbts	168	99	5.94	✓
A272 / A281 Rbts	241	202	2.60	✓
A272 / A281 Rbts	185	318	8.39	×
A272 / A281 Rbts	0	0	0.00	✓
A281 / St Leonard's Rd Jct	96	141	4.12	✓
A281 / St Leonard's Rd Jct	629	767	5.21	×
A281 / St Leonard's Rd Jct	52	99	5.35	✓
A281 / St Leonard's Rd Jct	102	358	16.88	×
A281 / St Leonard's Rd Jct	410	408	0.13	✓
A281 / St Leonard's Rd Jct	56	196	12.49	×
Total			**70%**	**78%**