North Yorkshire County Council and Selby District Council

SELBY DISTRICT TRAFFIC MODEL

Local Model Validation Report

LMVR (HIGHWAY)
JANUARY 2024

PUBLIC

North Yorkshire County Council and Selby District Council

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Local Model Validation Report

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70081319

OUR REF. NO. LMVR (HIGHWAY)

DATE: JANUARY 2024

WSP

WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft – internal review	Final draft – release		
Date	11/01/2024	15/01/2024		
Prepared by	Sam Callaghan	Sam Callaghan		
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Project number	70081319	70081319		
Report number	LMVR (Highway) V1	LMVR (Highway) V2		

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1 INTRODUCTION

1.1 BACKGROUND

1.1.1. Selby is the southernmost district of North Yorkshire, bound by the unitary authority of City of York to the north, East Riding of Yorkshire to the east, Wakefield council to the south and City of Leeds to the west. Selby District Council (SDC) covers wards including Selby East, Selby West, Tadcaster, Sherburn in Elmet and Eggborough. Selby district has a population of around 84,000 based on 2011 Census information.

1.1.2. The previous Selby Town Traffic model was developed by Mouchel and had a base year of 2016. The model study area covered Selby town centre, extending to Cawood to the northwest of the town and Hemingbrough to the southeast. The model was used to test the transport impacts of potential development sites and infrastructure improvements included in the local plan.

1.1.3. WSP were commissioned by North Yorkshire County Council (NYCC) and SDC to develop the updated Selby District Strategic Transport Model (SDSTM) for a 2019 base year to provide a tool to test the emerging Selby District Local Plan.

1.1.4. When fully developed, the modelling suite will include a SATURN highway assignment model in addition to a variable demand model (VDM) being developed in CUBE Voyager.

1.1.5. It was agreed with NYCC and SDC that the project methodology will be developed incrementally, undertaking the work in two stages, namely:

- Stage 1- Identify network congestion hotspots;
  - Stage 1 makes use of the currently available Selby Town Strategic model to identify congestion hotpots which could influence the development sites included in the Local Plan; and
- Stage 2- Detailed model build;
  - Stage 2 will focus on developing the detailed SATURN model for the areas identified in Stage 1 above to produce a representative robust modelling tool to support and test the proposed Selby District Local Plan.

1.1.6. The analysis and summary of Stage 1 assessment was shared with NYCC and SDC for review, comments and approval in August 2020.

1.1.7. In discussion following submission of the Stage 1 report, it has broadly been accepted that a district wide model update was required to ascertain the strategic highway network impacts of the developments identified within the development log.

1.2 PURPOSE OF THIS REPORT

1.2.1. This Local Model Validation Report (LMVR) has been prepared to document the development and validation of the highway assignment model for SDSTM with reference to DfT's Transport Analysis Guidance (TAG) which defines the best practice for transport modelling, contained within Unit M3.1 Highway Assignment Modelling.

1.2.2. Reference to the forthcoming TAG unit M2.2 (Base Year Demand Matrix Development), previewed under the orderly release process, has also been made when developing travel demands. This report also makes references to the Model Specification Report (MSR) throughout.

1.2.3. This report summarises how well the highway model validates against the observed data in the study area and how it compares against the modelling criteria and principals outlined in TAG.

1.2.4. The base year model will be used to produce the 2040 forecast year model runs which will be used to assess the upcoming Selby District Local Plan.

1.2.5. The content of this report is structured as follows:

- Chapter 1 - Introduction
- Chapter 2 – Base Model Specification,
- Chapter 3 – Summary of Model Data Collection,
- Chapter 4 – Highway Network Development,
- Chapter 5 – Zone System Development,
- Chapter 6 – Highway Matrix Development,
- Chapter 7 – Highway Assignment Process,
- Chapter 8 – Highway Network Checks & Calibration
- Chapter 9 – Matrix Estimation
- Chapter 10 – Model Calibration & Validation, and
- Chapter 11 – Summary and Conclusions.

2 BASE MODEL SPECIFICATION

2.1 OVERALL MODEL STRUCTURE

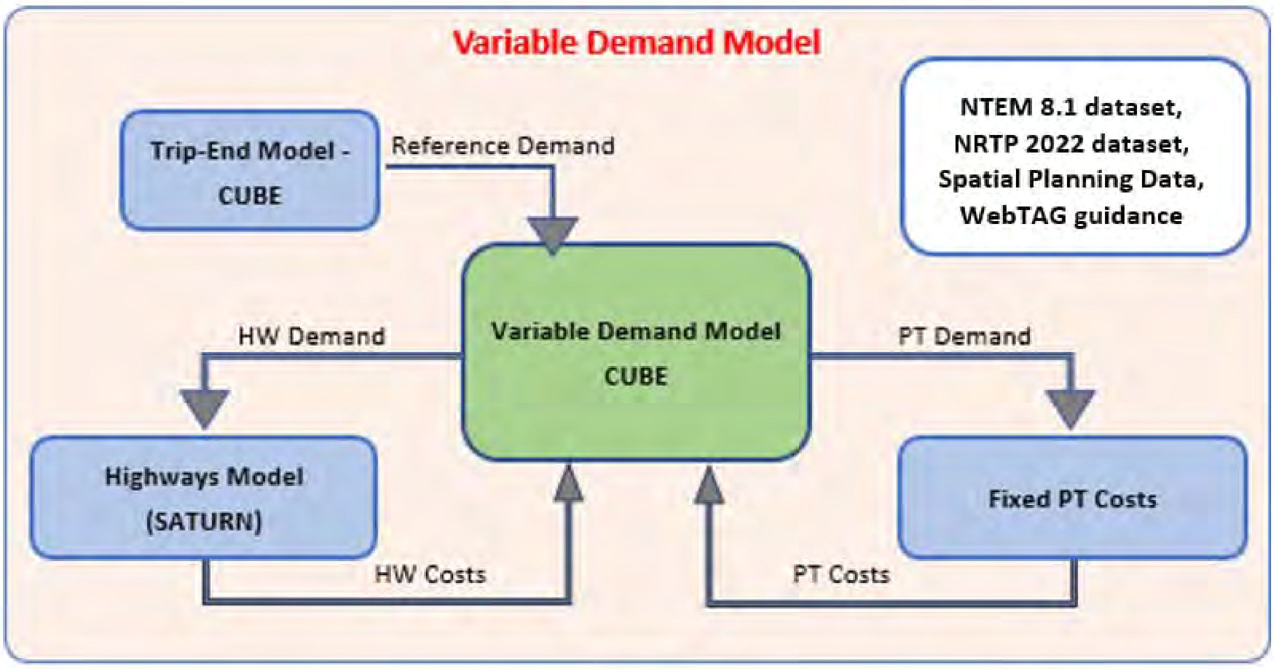
2.1.1. The SDSTM has three key components, illustrated in Figure 2-1 to demonstrate their interaction within the overall model structure:

- Highway assignment model developed in SATURN (SHAM);
- External forecasting model developed in CUBE Voyager (SEFM); and
- Variable demand model developed in CUBE Voyager (SVDM).

This report is focussed on the development of the base year Selby District Strategic Model (SDSM).

2.1.2. The development of the other two components – variable demand model and trip-end model – will be documented in subsequent reporting.

Figure 2-1 - Selby District Transport Model



2.2 MODEL SOFTWARE PLATFORM

2.2.1. The SDSM has been developed in SATURN (Simulation and Assignment of Traffic to Urban Road Networks) which is static equilibrium highway assignment software. SATURN is considered as the market leader in this field due to its enhanced simulation routines for modelling congested assignment, including blocking back and flow metre propagation through the network.

2.2.2. SDSM has been developed using SATURN version 11.5.05H, as set out in the MSR.

2.2.3. The variable demand model is developed in CUBE Voyager. CUBE Voyager can interface with SATURN to run programmes and to extract model data and outputs and those processes will be incorporated within the variable demand model.

2.3 MODEL COVERAGE

2.3.1. The SDSTM model coverage adopts a hierarchical approach to level of detail, in line with TAG. The network coverage and areas of detail, referring to the fully modelled area (FMA), buffer and external area definitions, have been developed as they were defined in the MSR.

- The FMA over which interventions are expected to impact (based on where flow and delay changes are likely to occur given the locations of schemes) includes full trip movements and the network is simulated.
- The extended buffer area over which flow changes will induce speed changes has speed flow curves coded on links.
- The external area over which interventions are not expected to have an impact has only partial representation of trips and a sparse network with fixed speed/flow relationships coded.

2.3.2. The extent of the FMA is illustrated in Figure 2-2 and covers the whole Selby District area and beyond, including Knottingley and major routes into/across the district, such as the M62, A1(M) and A64.

2.3.3. The extent of the fully modelled and buffer area and external area are illustrated in Figure 2-2 and Figure 2-3 respectively.

Figure 2-2 - Fully Modelled Area Network Coverage

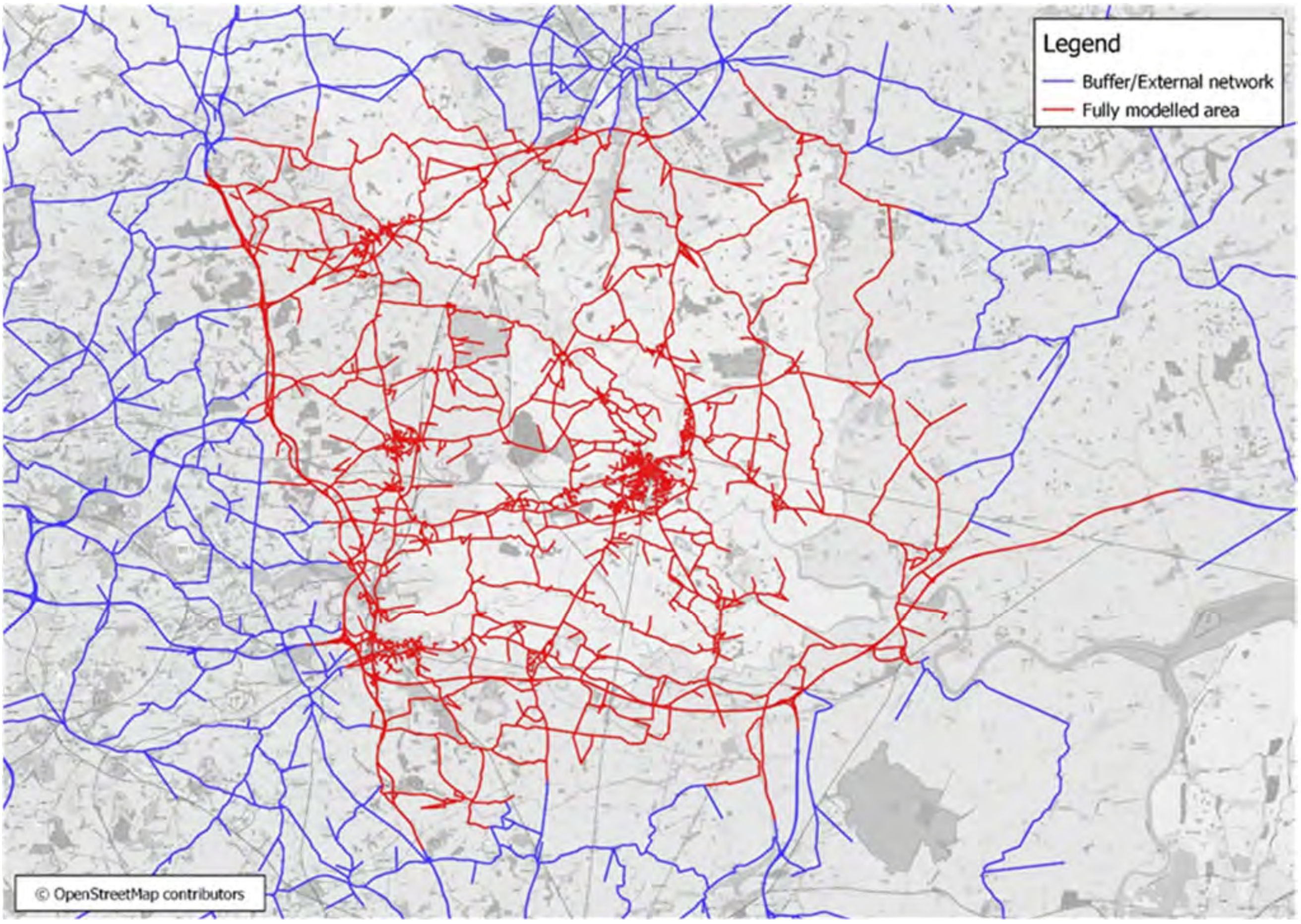
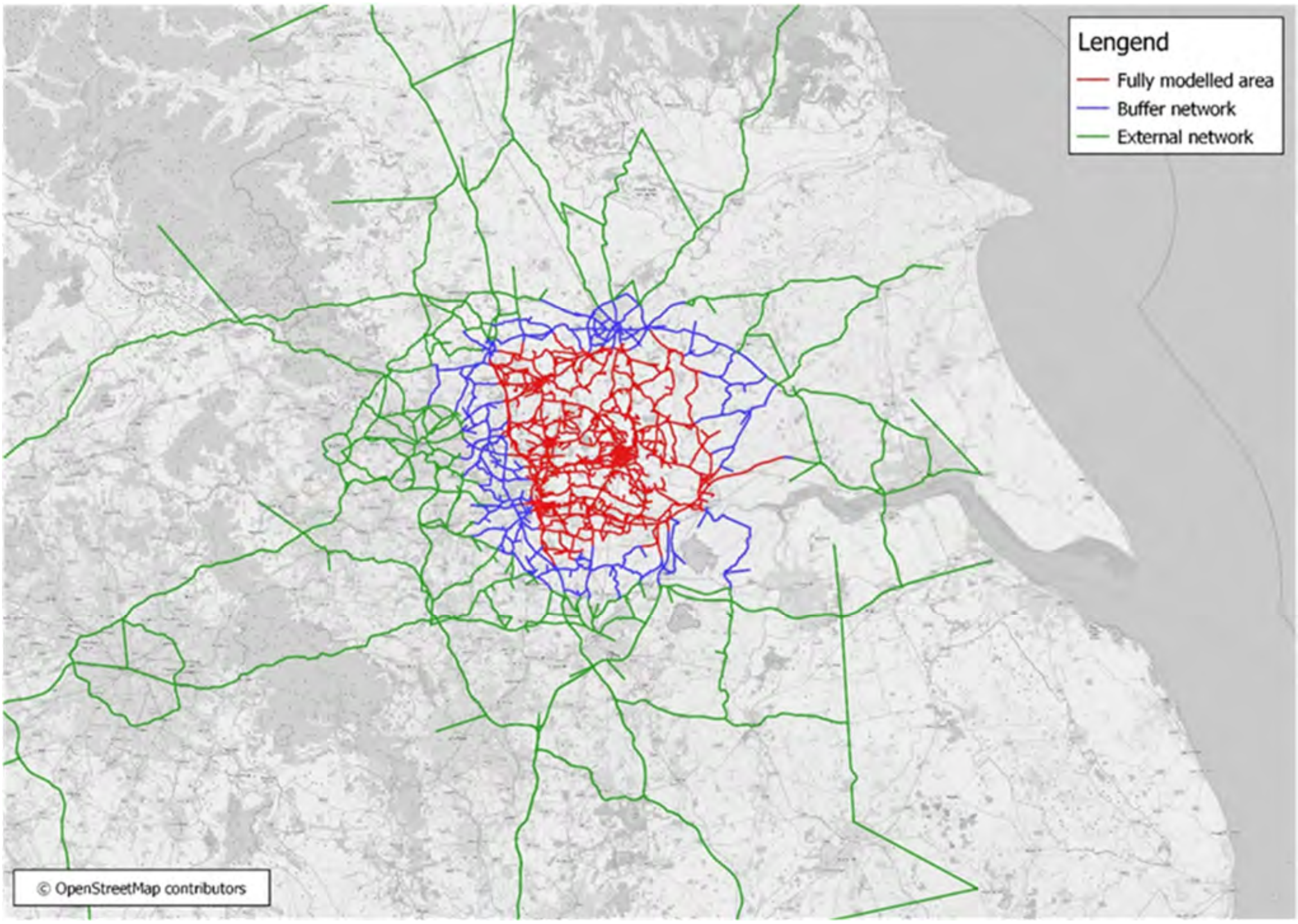


Figure 2-3 - Buffer and External Area Network Coverage



2.4 BASE YEAR

2.4.1. The model has been developed to represent a base year of 2019.

2.4.2. It represents an average neutral weekday in October 2019 based on the primary new demand and traffic count data collection period, as defined in the MSR.

2.5 MODEL TIME PERIODS

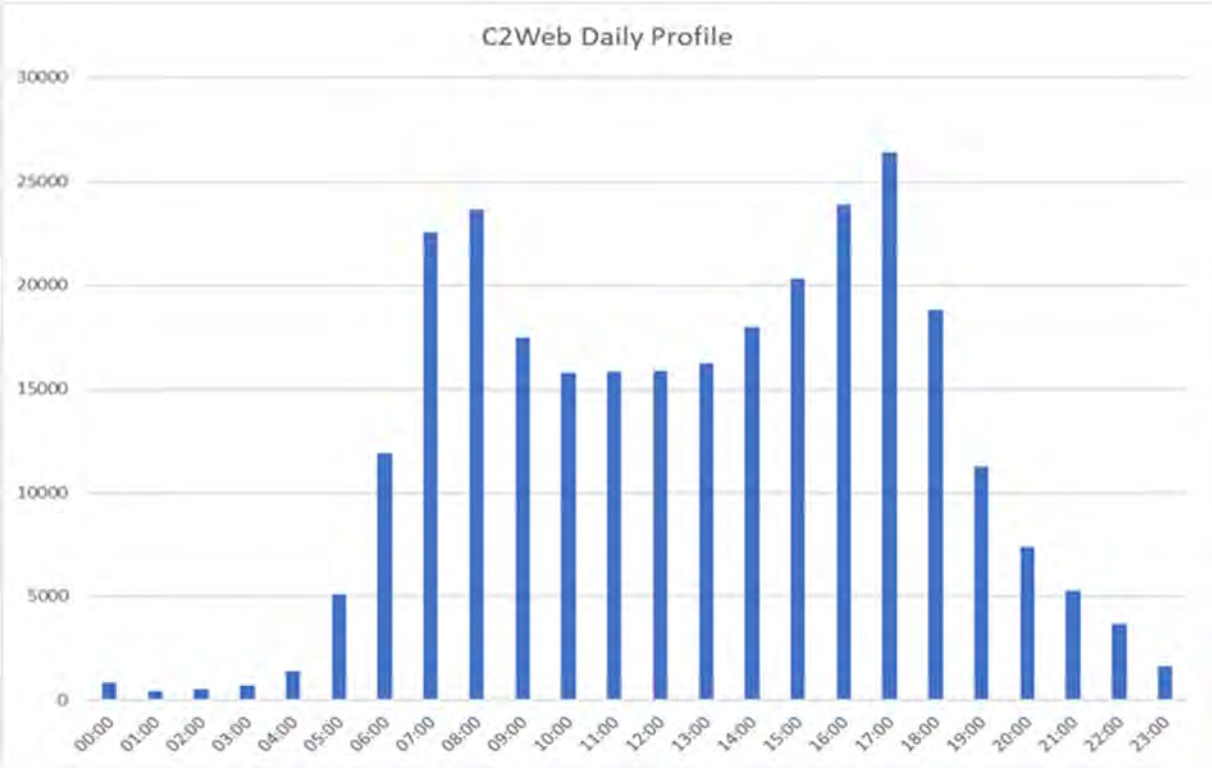
2.5.1. The modelled assignment time periods in SDSM, as set out in the MSR, are:

- AM peak hour 08:00-09:00.
- Inter peak average hour 10:00-16:00; and
- PM peak hour 17:00-18:00.

2.5.2. C2Web count locations cover the radial routes on the local network and, as a subset of the count data, provide a representation of the demand on routes to and from the urban area. The daily flow profile across these locations is illustrated in Figure 2-4.

2.5.3. The outputs from SDSM will be able to be converted to full 24-period for input into variable demand modelling and that process will be documented in the demand model reporting.

Figure 2-4 - C2Web Daily Flow Profile



2.6 MODEL ASSIGNMENT USER CLASSES

2.6.1. The modelled highway assignment user classes in SDSM, as set out in the MSR, are:

- Car employer's business;
- Car commuting;
- Car other;
- Light goods vehicles (LGVs); and
- Heavy goods vehicles (HGVs).

2.7 MODEL VERSION

2.7.1. This report relates to the validated base year SDSM with file version references:

- Network / model: Selby_BY_2019_TS{1,2,3}_nxx.ufs;
- Prior matrix: PriorMatrix_HW_{AM, IP, PM}2019_mbxx.ufm; and
- Calibrated matrix: PriorMatrix_HW_{AM, IP, PM}2019_mbxx_I6.ufm.

3 SUMMARY OF MODEL DATA COLLECTION

3.1 INTRODUCTION

3.1.1. To develop SDSM to a robust level which is compliant with TAG, a variety of data types were required either though existing sources or the commission of new surveys. This chapter summarises the data collected relevant to SDSM including:

- Travel demand data;
- Traffic count data;
- Journey time data;.
- Traffic signal data;
- Bus service and priority data;
- Bus lane data; and
- Additional data sources.

It also details:

- Screenline and cordon definitions; and
- Description of calibration and validation data.

3.1.2. The Transport Data Collection Report (TDCR) contains a more detailed description of these data sources and their verification for use in the model build. This chapter summarises the application of the data sources which were relevant for use in the highway model development.

3.2 TRAVEL DEMAND DATA – MOBILE NETWORK DATA

3.2.1. Building a transport model necessitates the development of base year travel demand matrices for assignment. This required an understanding of the trip making behaviour for Selby district including trip rates, trip length distributions and travel purpose.

3.2.2. The suitability of different demand data sources was considered as part of the model development scoping exercise and documented in the MSR. It was determined that MND would be used as the primary demand data source.

3.2.3. Telefónica were commissioned to derive mobile phone origin-destination (MPOD) matrices from MND using the data from the O2 network. The data collection period covered all weekdays from 01/10/2019 to 31/10/2019, excluding the dates between 28/10/2019 and 31/10/2019 due to school holidays.

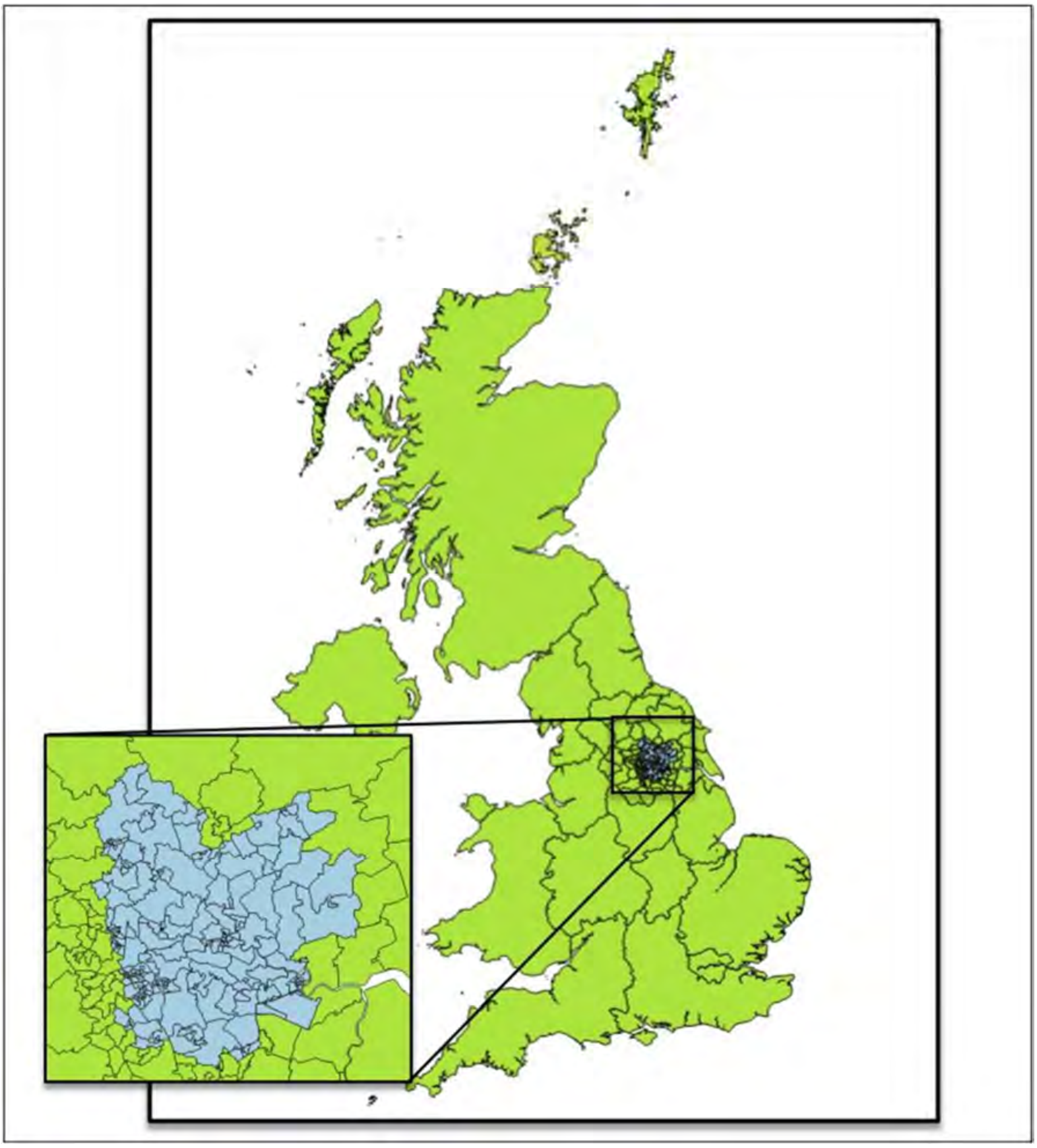
3.2.4. The data specification includes a study area, and an outer area. The study area boundary is shown in Figure 3-1. All trips that interact with the study area are included in the outturn MND matrices.

3.2.5. The mobile phone raw events available for this project were provided for all zones within the Study area. Only the trips relating to the Study area, i.e., trips from, to and traversing the area are included in the matrix. Therefore, trips for external zones within or overlapping the Study area are only included if they interact with the Study area.

3.2.6. Data was supplied in an MND Request Zone system, to make clear the distinction between these zones and the actual assignment model zone system. The MND Request Zone system is less detailed than the assignment zone system since O2 were confident in the spatial accuracy of the MND from LSOA upwards. It comprised 300 zones of which 205 were within the study area. The Request Zone system is illustrated in Figure 3-1.

3.2.7. An MND Verification Report is attached in Appendix B. That document reports on the detailed MND data specification, analysis, and verification. It is summarised in Section 6.3.

Figure 3-1 - MND Zone Area



3.3 TRAVEL DEMAND DATA – TFN NOHAM MODEL

3.3.1. The resultant MND matrices (described in the previous sub-section) included all trips to, from, within and passing through the defined MND study area. Whilst the MND was considered acceptable for the purpose of the car demand matrix development, data required to develop freight demand matrices were insufficient due to the nature of the MND data being collated (i.e., not differentiated by vehicle types).

3.3.2. Light and Heavy Goods Vehicles (GV) prior matrices were therefore required to be supplemented with a secondary data source to infill those trips in the MPOD data matrices. It was agreed with SDC and Transport for the North (TfN) that the North Highway Assignment Model (NoHAM) freight demand matrices would be employed for this purpose. Their application is documented in Chapter 6.

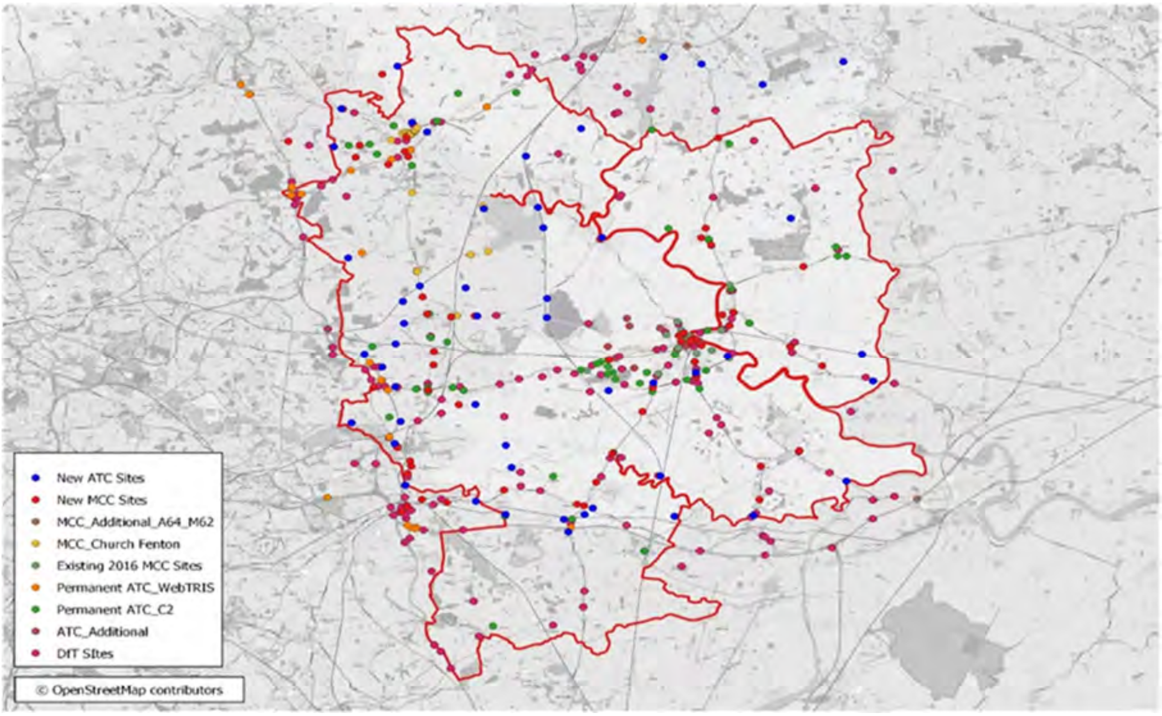
3.4 TRAFFIC COUNT DATA

3.4.1. A gap analysis was undertaken to establish traffic significant links and junctions within the study area which were not covered by the existing data. Areas were also flagged where deficiencies or limitations had been identified in the existing data, such as survey months or consistency with other counts. As a result of this exercise, a large data collection commission was undertaken. The locations of all ATC and MCC data collected are shown in Figure 3-2.

3.4.2. There were 54 ATC surveys undertaken over a 3-week period for October 2020, concluding before the start of half term (28th October 2020). The data obtained was tabulated by survey day with traffic volume reported in fifteen-minute intervals.

3.4.3. The locations were chosen based on proposed screenlines and cordons, watertight coverage of the district boundary and any other key links not covered by those criteria or existing data. The locations are shown in Figure 3-2 below.

Figure 3-2 - ATC and MCC Data Locations



3.4.4. There were 59 MCC surveys undertaken for a twelve-hour period (07:00-19:00) for one day in October 2020. The data was tabulated in fifteen-minute intervals with flow volumes reported by at least six vehicle types:

- Pedal cycle / motorcycle
- Car
- LGV
- OGV1
- OGV2; and
- Buses and Coaches.

3.4.5. The locations corresponded to an ATC survey and the sample was chosen to provide local classified data for Selby and the key towns across the district to supplementing existing data. The locations are shown in Figure 3-2.

3.4.6. The commissioned MCCs for this study were deployed in the modelling to derive classifications for ATCs. In line with the agreed scope the model has not been calibrated or validated to turning movements, which generally have a lower level of assurance than link volumes.

3.4.7. Additionally, permanent and historic counts were available from various sources, including:

- WebTRIS online portal providing access to permanent count site data on Highways England's strategic road network including the M62, A1(M) and A64;
- C2 permanent count site dataset hosted by North Yorkshire County Council providing data for parts of the study area;
- Historic count data available from the DfT count database, covering the study area and parts of the surrounding area; and
- MCC surveys in Church Fenton and Tadcaster.

3.4.8. The number of counts by count type are summarised in Table 3-1. The application of this data for calibration and validation is described in Section 3.11.

Table 3-1- Summary of Counts by Count Type

Count Type	No. of Counts
2020 ATC	54
2020 MCC	59
2016 ATC	12
2016 MCC	25
WebTRIS	38
C2Web	26
DfT	57
MCC Church Fenton/Tadcaster	21
Other	3
Total	**295**

3.5 JOURNEY TIME DATA – TRAFFICMASTER

3.5.1. Observed journey time data are normally used for the purpose of a Base year journey time validation, i.e., to ensure the model can represent accurately level of delays and congestion within the study area.

3.5.2. Trafficmaster journey time data is a dataset owned by the DfT which is sourced via GPS (Global Positioning System) data from devices and trackers fitted to a variety of fleet vehicles (cars, LGVs and HGVs) and buses.

3.5.3. The data is collected by the devices through identifying the location of each device every 1 to 10 seconds on ITN (Integrated Transport Network) links. It is acknowledged that the sample population for Trafficmaster can be skewed, including a bias within cars towards high end vehicles and with a higher than representative proportion of LGVs, however it can be considered as the most comprehensive big dataset readily available for journey times data.

3.5.4. Access to Trafficmaster data for this project was provided by NYCC, covering the North Yorkshire area. The data was processed internally and resulted in a summarised dataset listing link distance and average travel time for ITN links.

3.5.5. The data specification offered was weekday term time for all vehicle types in 2019 for each of the modelled time periods (see 2.5).

3.5.6. The data has been processed internally and is summarised by ITN link. The data was sense checked on a route basis for directionality and tidality. An additional check was undertaken to remove any links with speeds that were unreasonably over the speed limit for that link and any links with less than 5kph speeds.

3.5.7. A total of 35 bi-directional journey time routes have been defined which cover all the key routes within the study area. They will be used for the model validation that is described in more detail in the next chapter.

3.5.8. The journey time routes are also split between two geographical areas, namely

- Selby district (35 bi-directional journey time routes); and
- Selby Urban Area (20 bi-directional journey time routes)

3.5.9. It should be noted that the Selby district journey time routes include the journey time routes within the Selby Urban Area. The coverage of the journey time routes within Selby is shown in the following Figure 3-3 & Figure 3-4 .

Figure 3-3 - Journey Time Data Collection Routes: Selby Urban Area

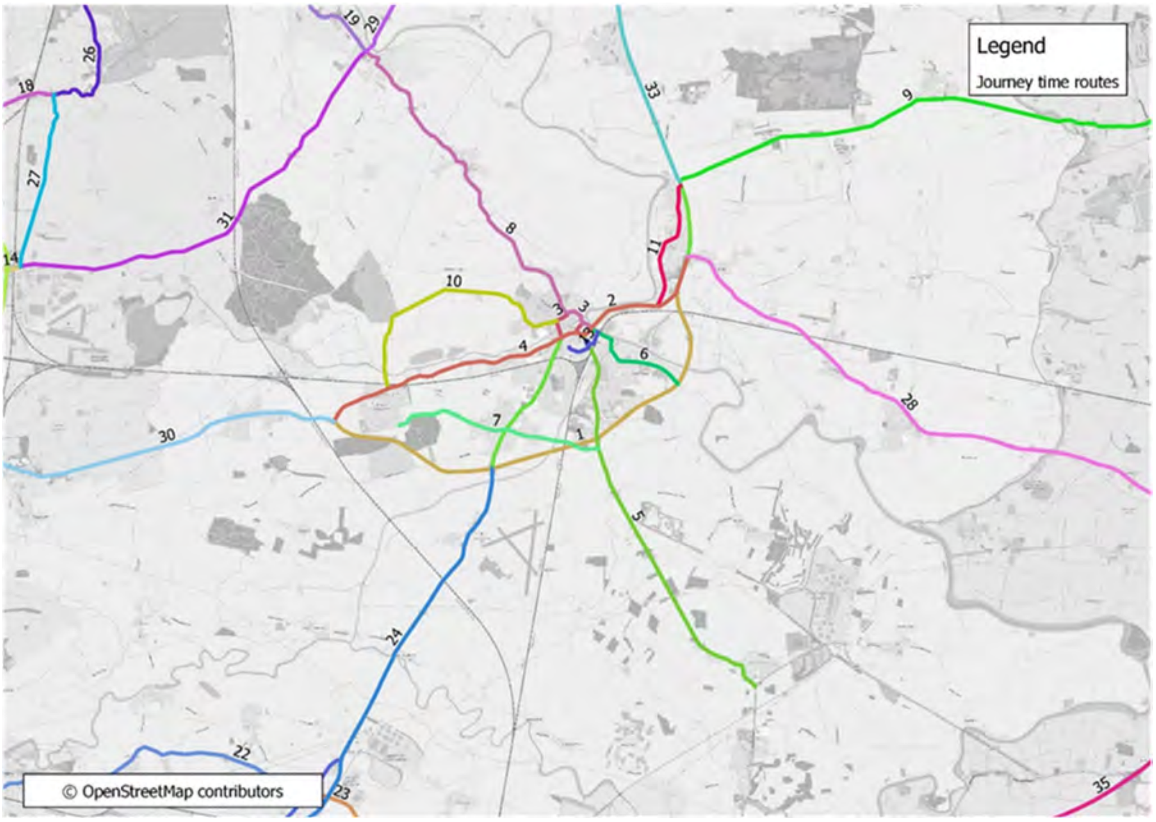
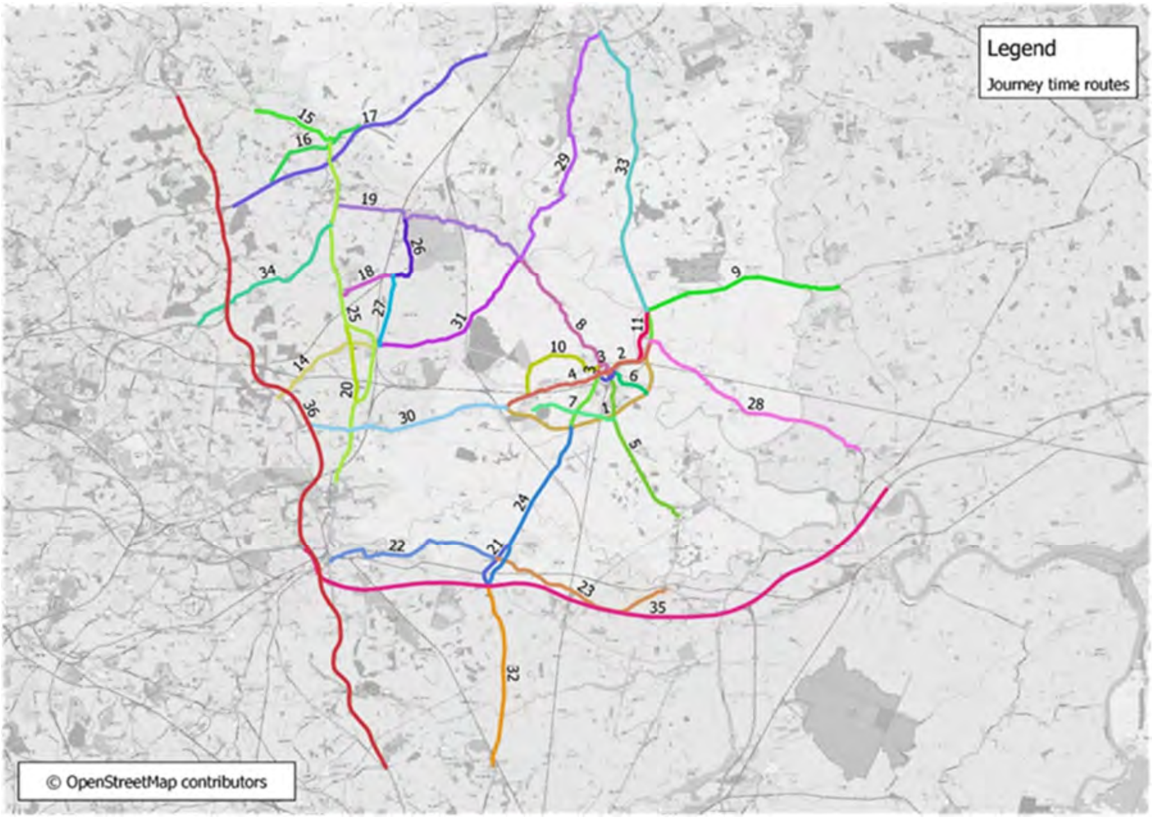


Figure 3-4 - Journey Time Raw Data Routes: Selby District



3.6 TRAFFIC SIGNAL DATA

3.6.1. Traffic signal junctions within the model simulation area require operation data in order for them to be coded within SATURN. Traffic signal specifications were obtained from NYCC for the identified junctions which included data such as:

- Phase and stage diagrams;
- Phase minimum/maximum sets;
- Timetables defining minimum and maximum sets to apply by time-period; and
- Phase intergreen times.

3.6.2. NYCC provided 2019 signal timing data in a template format that is supplied by WSP by for signalised junctions across the network. It included stage and phasing diagrams and, in most cases, observed green times that span multiple years' worth of observed data.

3.6.3. Where observed green time data was not available min/max times were used as the starting point. In a limited number of locations template coding was used to develop most likely timings. The location of all signalised junctions is shown in Figure 4-4.

3.7 BUS SERVICE AND PRIORITY DATA

3.7.1. Bus routing and timetable data was taken from the Routelines Dataset provided by Basemap for 2019. Routelines is a dataset covering the whole of GB which contains a series of road links detailing the shortest journey taken by a bus between stops along a route.

3.7.2. In addition, information on the route operator, number and name was recorded, as well as the service number and direction of travel.

3.7.3. The dataset also contains service frequency information. All data is contained within a shapefile for each route. The bus routes were joined to the highway network by matching each bus stop to the nearest highway node. Figure 3-5 to Figure 3-7 shows the bus routes in each time period and Table 3-2 details the route ID, direction and frequencies for the three time periods.

Figure 3-5 - AM Peak Bus Route Network

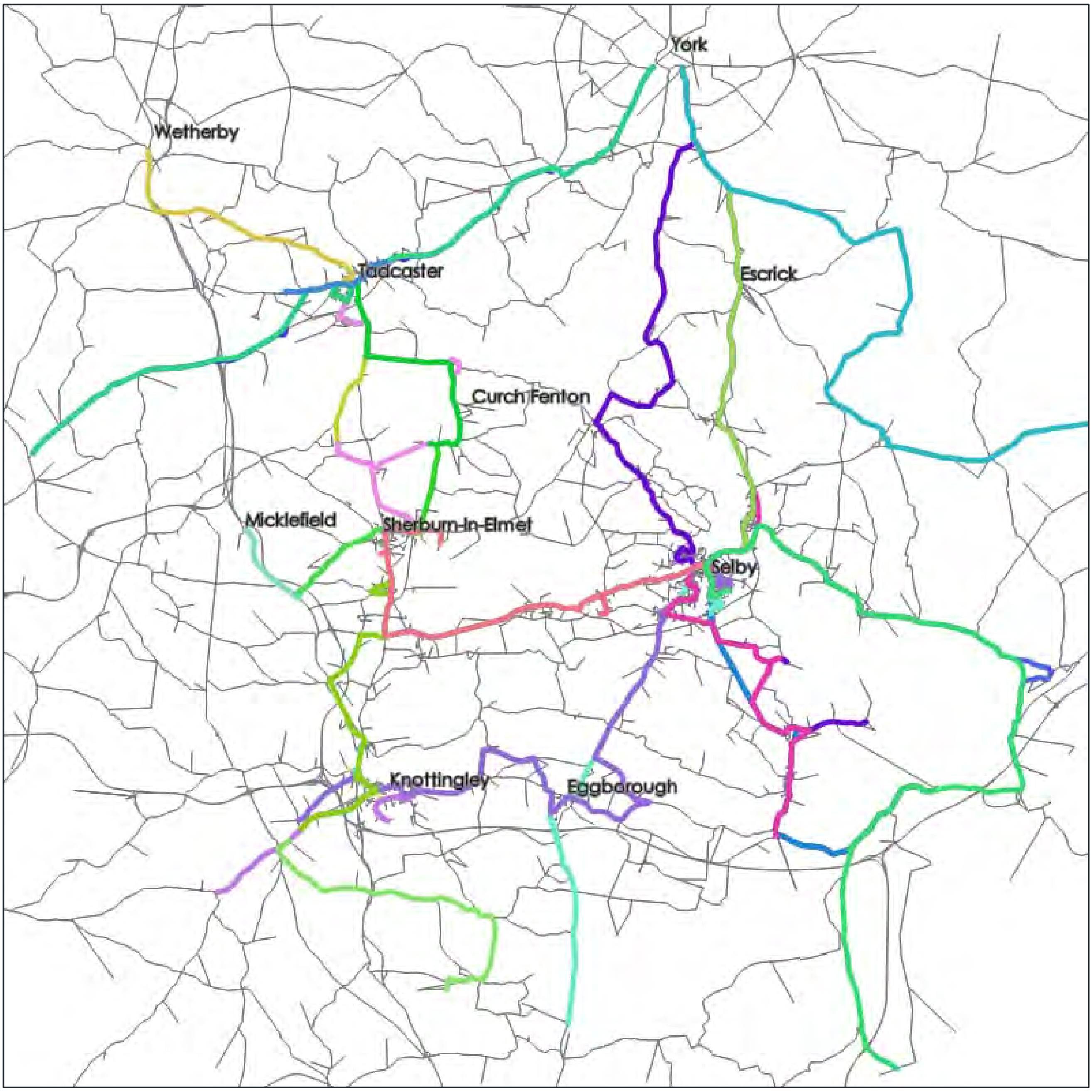


Figure 3-6 - Inter Peak Bus Route Network

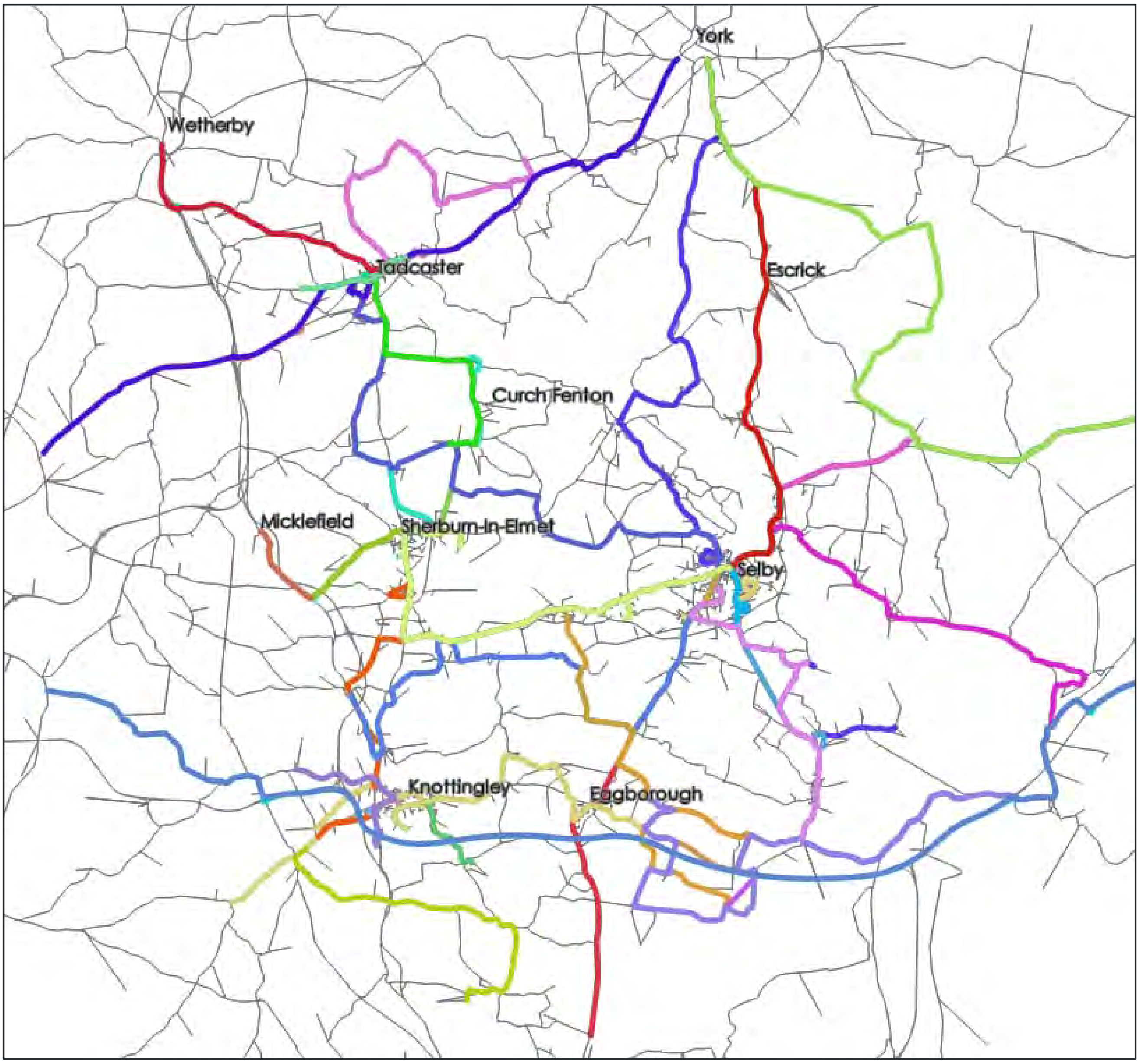


Figure 3-7 - PM Peak Bus Route Network

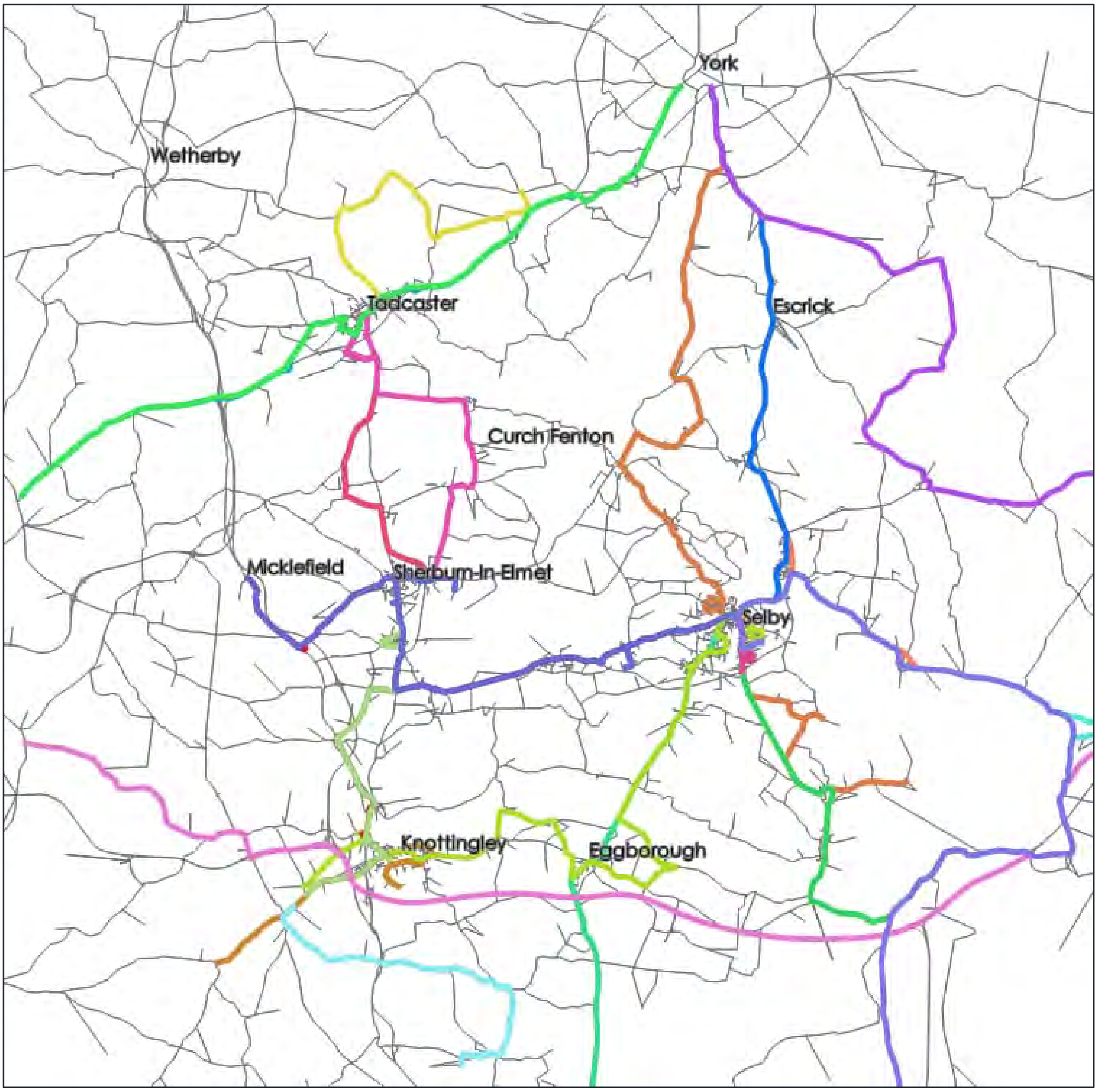


Table 3-2 – Bus Routes with Frequencies

Route ID	Direction	Frequency per hour			Route ID	Direction	Frequency per hour		
		AM Peak	Inter Peak	PM Peak			AM Peak	Inter Peak	PM Peak
1	Outbound	-	1	-	1	Inbound	-	1	-
4	Outbound	-	1	-	4	Inbound	-	1	-
4I	Inbound	-	-	1	4A	Outbound	1	-	-
37	Outbound	-	1	-	37	Inbound	-	1	1
42	Southbound	1	1	1	42	Northbound	1	1	2
77	Outbound	1	1	-	77	Inbound	-	1	-
148	Outbound	2	3	3	148	Inbound	3	3	2
149	Eastbound	3	3	3	149	Westbound	3	3	3
400	Northbound	1	-	-	400	Southbound	2	-	-
401	Southbound	1	2	2	401	Northbound	1	2	2
402	Outbound	-	1	1	402	Inbound	1	-	-
403	Outbound	1	1	1	403	Inbound	1	1	1
405	Outbound	2	1	1	405	Inbound	1	1	1
406	Outbound	-	1	-	406	Inbound	-	1	-
409	Inbound	1	1	1	409	Outbound	-	1	1
415	Inbound	4	4	4	415	Outbound	4	4	4
420	Outbound	-	1	-	420	Inbound	-	1	-
476	Outbound	1	1	1	476	Inbound	1	1	-
486	Inbound	-	1	-	486	Outbound	-	1	-
488	Inbound	-	1	-	488	Outbound	-	1	-
492	Northbound	1	1	1	492	Southbound	-	1	1
493	Southbound	1	1	1	493	Northbound	1	1	-
493 lower	Southbound	1	1	1	493 lower	Northbound	1	1	1
494	Northbound	1	-	-	494	Southbound	-	1	-

Route ID	Direction	Frequency per hour			Route ID	Direction	Frequency per hour		
		AM Peak	Inter Peak	PM Peak			AM Peak	Inter Peak	PM Peak
495	Northbound	-	1	-	495	Southbound	-	1	-
496	Inbound	-	1	-	496	Outbound	-	1	-
616	Southbound	1	-	-	616	Northbound	-	1	-
634	Northbound	-	1	-	634	Southbound	-	-	-
843	Northbound	-	-	-	843	Southbound	-	-	-
T2	Southbound	-	1	-	T2	Northbound	1	-	-
TK2	Northbound	-	1	-	TK2	Southbound	-	1	-
X4	Inbound	1	-	-	X4	Outbound	-	-	1
X45	Northbound	-	-	-	X45	Southbound	-	-	-
X62	Westbound	-	1	1	X62	Eastbound	--	1	-
18	Northbound	1	1	1	18	Southbound	1	1	-
164	Westbound	-	1	1	164	Eastbound	1	1	-
64	Westbound	1	1	-	64	Eastbound	-	1	-
5		-	1	1	3	Outbound	-	-	1
3	Inbound	1	-	-	840	Westbound	1	1	1
840	Eastbound	1	1	1	T1	Eastbound	-	1	-
T1	Westbound	1	-	-					

3.8 ADDITIONAL DATA SOURCES

3.8.1. Further data sources were required to support the base highway matrix development; the National Travel Survey (NTS) and TEMPro 8.1 database including:

- Trip ends;
- Trip purposes;
- Mode share;
- Time of outward and return journeys;
- Trip time and trip length profiles; and
- Vehicle occupancies.

3.8.2. Land-use GIS, census data and education data sets were used to derive splitting factors to disaggregate the TEMPro trip-ends associated with the middle layer super output areas (MSOAs) to trip ends associated with the modelled zones.

3.8.3. Additionally, Experian Mosaic socio-demographic data has been used. As Census Journey to Work (JTW) data was collected eight years prior to the model year and the pandemic placing more reliance on the synthetic matrix, it was decided to use the more up-to-date Experian Mosaic dataset to derive the splitting factors for population figures. The Mosaic dataset is postcode based which allowed for easy aggregation of the statistics to the model zone system and the data was cross checked against census data for validation purposes.

3.8.4. Further details of these data sources applied within the matrix build process are provided in Chapter 5. They are also used in the Mobile Network Data Verification Report (Appendix B).

3.8.5. A large amount of GIS data is available through Ordnance Survey's (OS) OpenData program which can be used freely with copyright acknowledgement. The data obtained from OpenData included:

- Base mapping at various scales for reporting and presentation; and
- Shapefiles for various geographical boundary definitions to define the zone system and other sectors and/or reporting areas which are used throughout this report.

3.8.6. Several of the images used in this report use Open Street Map tiles, which are available under the Open Database License. The cartography is licensed as CC-BY-SA. (https://www.openstreetmap.org/copyright)

3.9 DATA CHECKING AND NORMALISATION

3.9.1. Before count and journey time data was used in the matrix build and calibration/validation, work was undertaken to check the validity of the data. Checks on the count data included:

- Daily and hourly flow profiles. Large variations in day-to-day flows could be indicative of a technical problem with the count or an issue with the local network (such as roadworks or an accident) which has affected the count for one day or more;
- Resolution of conflicting counts on adjacent links - particularly important when running matrix estimation;
- Mapping of observed traffic flows – displaying traffic volume as bandwidth provides a quick visual check of any very large or small flows; and
- Sense checks based on local knowledge.

3.9.2. As part of the Calibration and Validation process, a further cleaning process was undertaken to better validate the model. Details on any of the data cleaning process is documented in the Selby Data Collection Report.

3.10 SCREENLINE AND CORDON DEFINITIONS

3.10.1. Resultant from the data available a set of 13 bi-directional traffic flow screenlines and cordons have been defined, providing comprehensive coverage of the study area. Their locations are illustrated in Figure 3-8 & Figure 3-9 below.

3.10.2. These are split into calibration and validation screenlines/cordons.

Figure 3-8 - Screenline and Cordon Definitions: Selby Urban Area

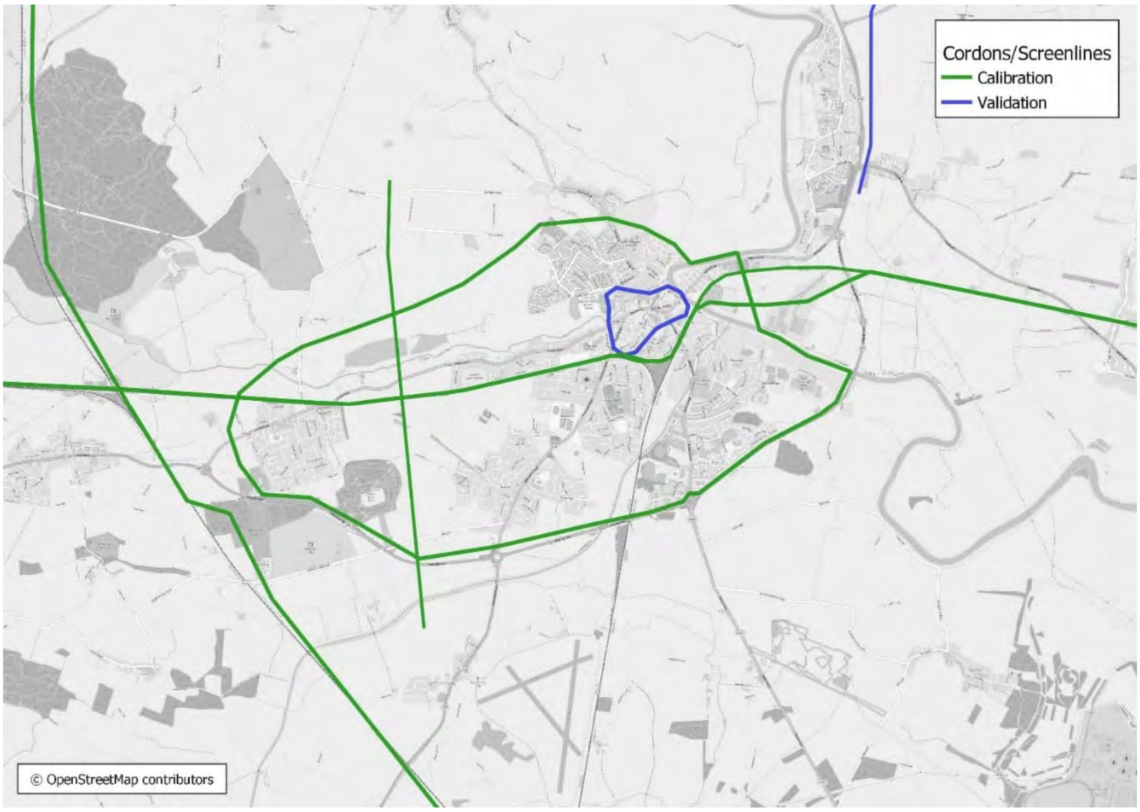
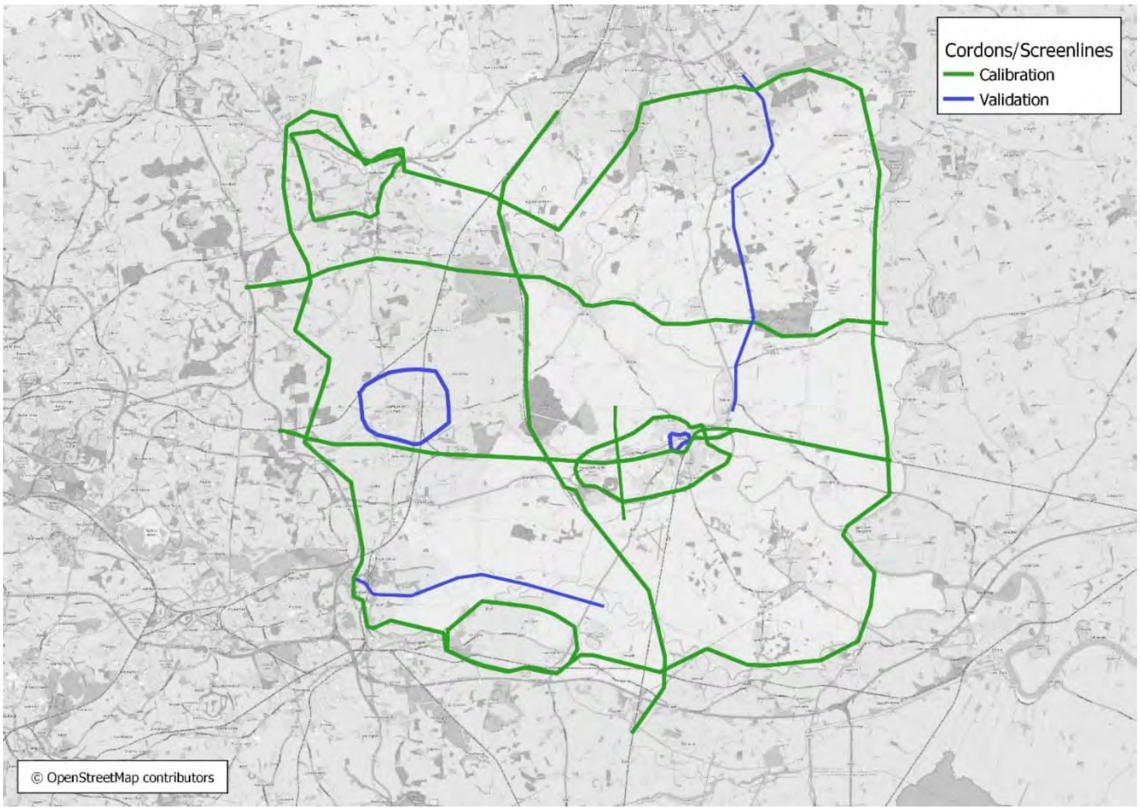


Figure 3-9 - Screenline and Cordon Definitions: Selby District



3.11 DESCRIPTION OF CALIBRATION AND VALIDATION DATA

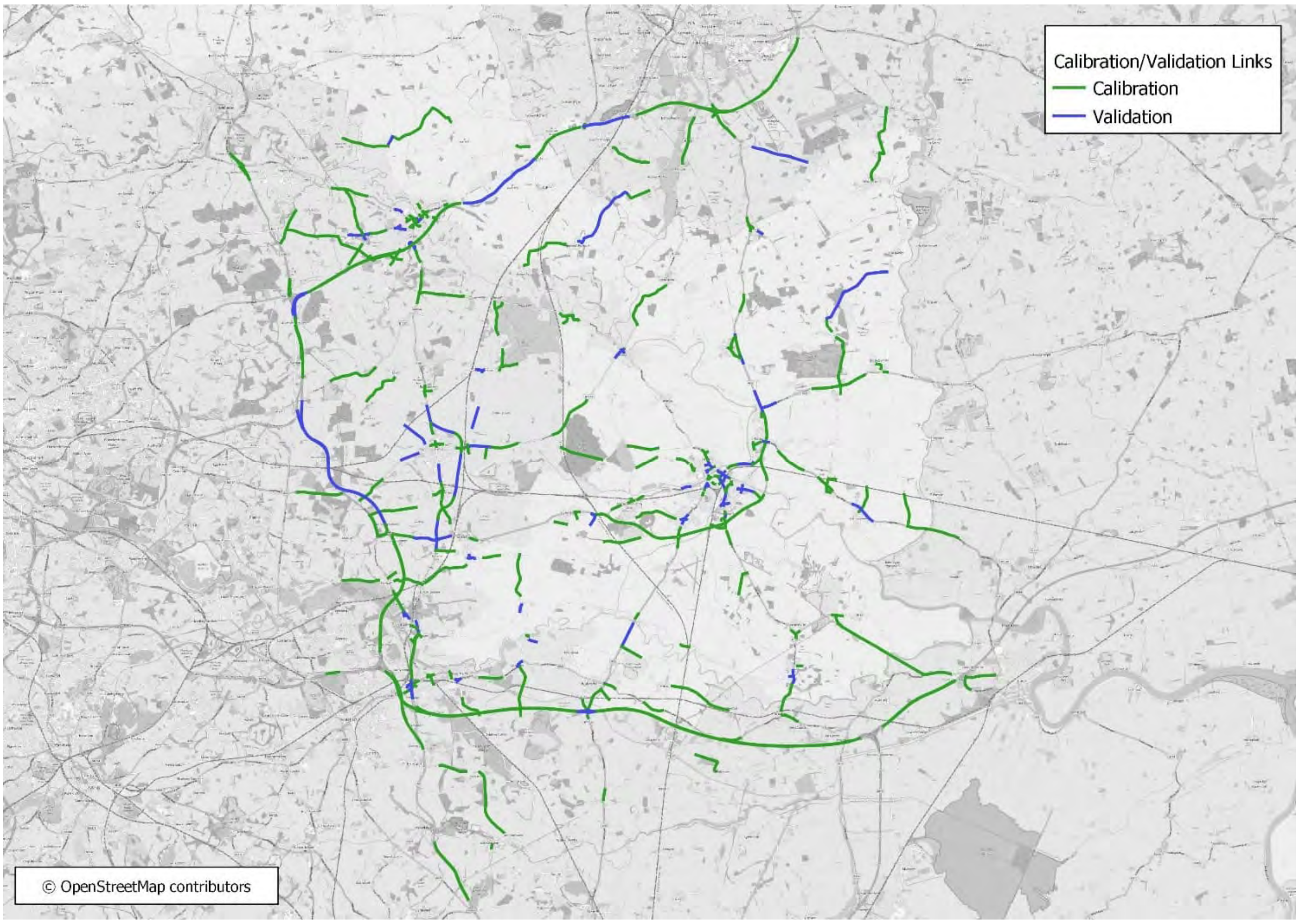
3.11.1. Changes to TAG document (related to the November 2019 release) suggest: *"The extent of data available for model development is often limited and it may be appropriate to use data first for validation through independent testing of other data and model relationships, and then to undertake additional calibration to refine the model. In this case the extent of change from introducing complementary data should be explained."*

3.11.2. Based on this, the traffic count data, as described in Section 1.1, is used:

- For independent validation of the prior matrix assignments at screenline level; and
- For calibration of the matrices in matrix estimation.

3.11.3. The traffic count dataset is also used for reporting model link flow comparisons and statistics. Counts have been divided into calibration and validation counts, as highlighted in Figure 3-10.

Figure 3-10 – Calibration/Validation Count Definitions - Selby District



4 HIGHWAY NETWORK DEVELOPMENT

4.1 INTRODUCTION

4.1.1. Highway assignment models involve representation of networks using a series of nodes and links, where links represent sections of the roads and nodes represent junctions within the networks.

4.1.2. Within the study area, the highway networks are modelled in detail, including all traffic significant routes. Outside the study area, a skeletal network was developed, with key routes for access/egress and through traffic. The model coverage and extent of the network was shown previously in Figure 2-2 & Figure 2-3.

4.1.3. This chapter describes the network development process and coding approach in each of those areas, and is structured as follows:

- Network structure.
- Link coding.
- Junction coding.
- Public transport services and bus priority.
- Generalised cost; and
- PCU conversion factors.

4.1.4. Prior to the start of the network coding, a Coding Manual was produced, reviewed, and agreed with SDC, establishing coding assumptions to be used in developing the SDSM network.

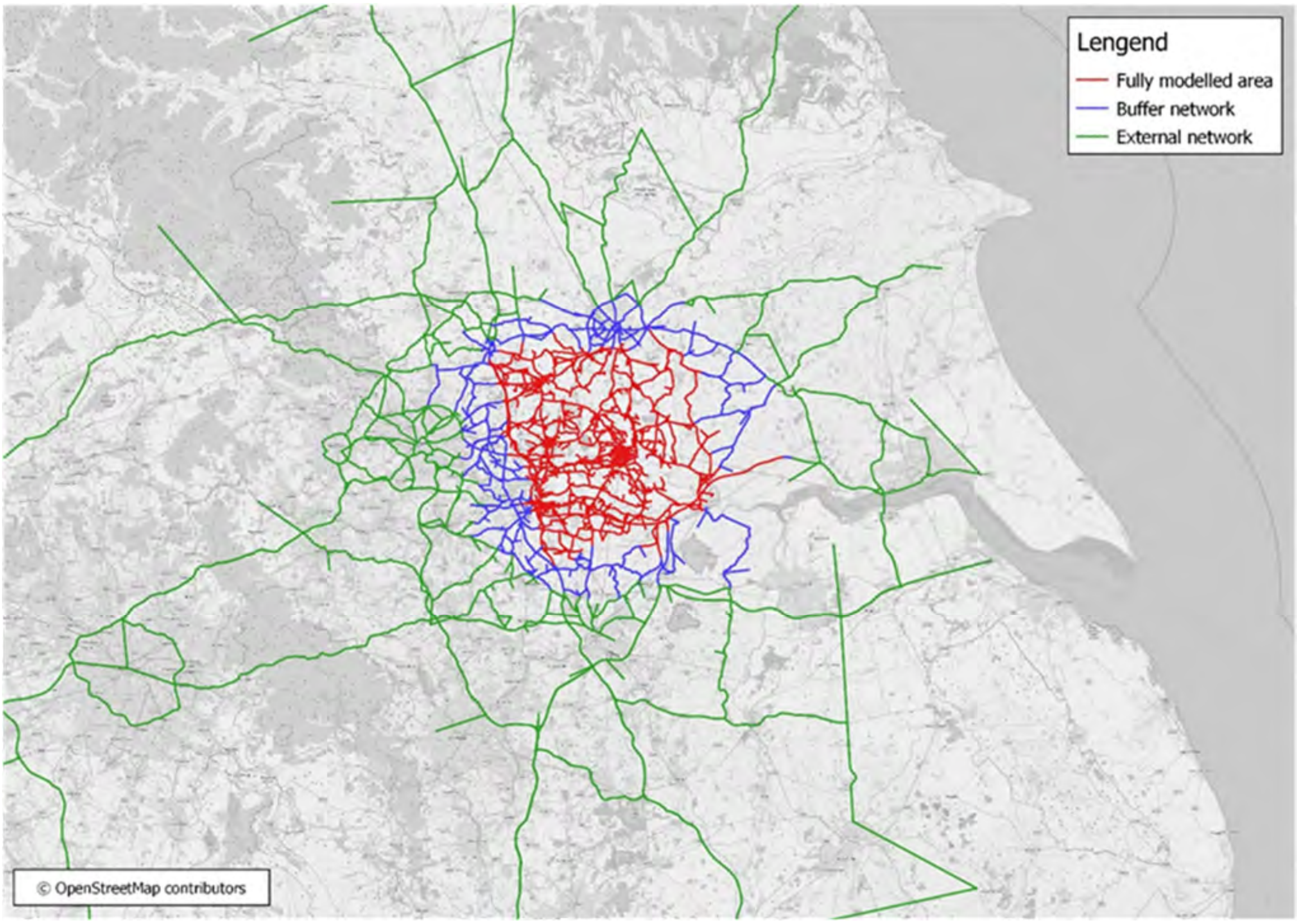
4.2 NETWORK STRUCTURE

4.2.1. The previous Selby town centre model has been improved and additional network details were added to ensure detailed coverage to cover the Selby District full modelled area (represented in red in the Figure 4-1)

4.2.2. For the highway network, a 3-tier level structure was developed as below and shown in the Figure 4-1 below:

- Within Selby district study area: fully simulation with accurate junction coding in combination of speed-flow curve to represent accurately travel costs within the study area.
- Outside study area, a less detailed coding was adopted which travel costs are represented in a form of speed-flow curve; and
- Externally from Selby district (beyond M62 to the south, A64 to the north and A1(M) to the west), fixed speed coding was adopted.

Figure 4-1 - SDSM Network Structure



4.3 LINK CODING

4.3.1. The simulation area network structure was developed from the previous Selby SATURN model within the simulation area. Infill of detail took place where greater density was required including identified growth areas and where schemes are proposed.

4.3.2. Ariel images have provided a valuable source of information on the network to be modelled. Detail such as number of lanes, lane markings and flare lengths have been ascertained from this source.

4.3.3. Links in SATURN have been coded by direction, based on the following information:

- Road class (Motorways, Trunk roads, A road, B road and C/unclassified roads).
- Road type (single or dual carriageway).
- Speed limit.
- Number of lanes; and
- Any other restriction on the roads (e.g., height, weight restriction, etc.).

4.3.4. The model network extent for Selby urban area is mapped in Figure 4-2. A summary by road type is reported in Table 4-1. The values are reported across the whole model, i.e., including “buffer” and external network.

Figure 4-2 - Selby Urban Area and Surrounding Network Extent

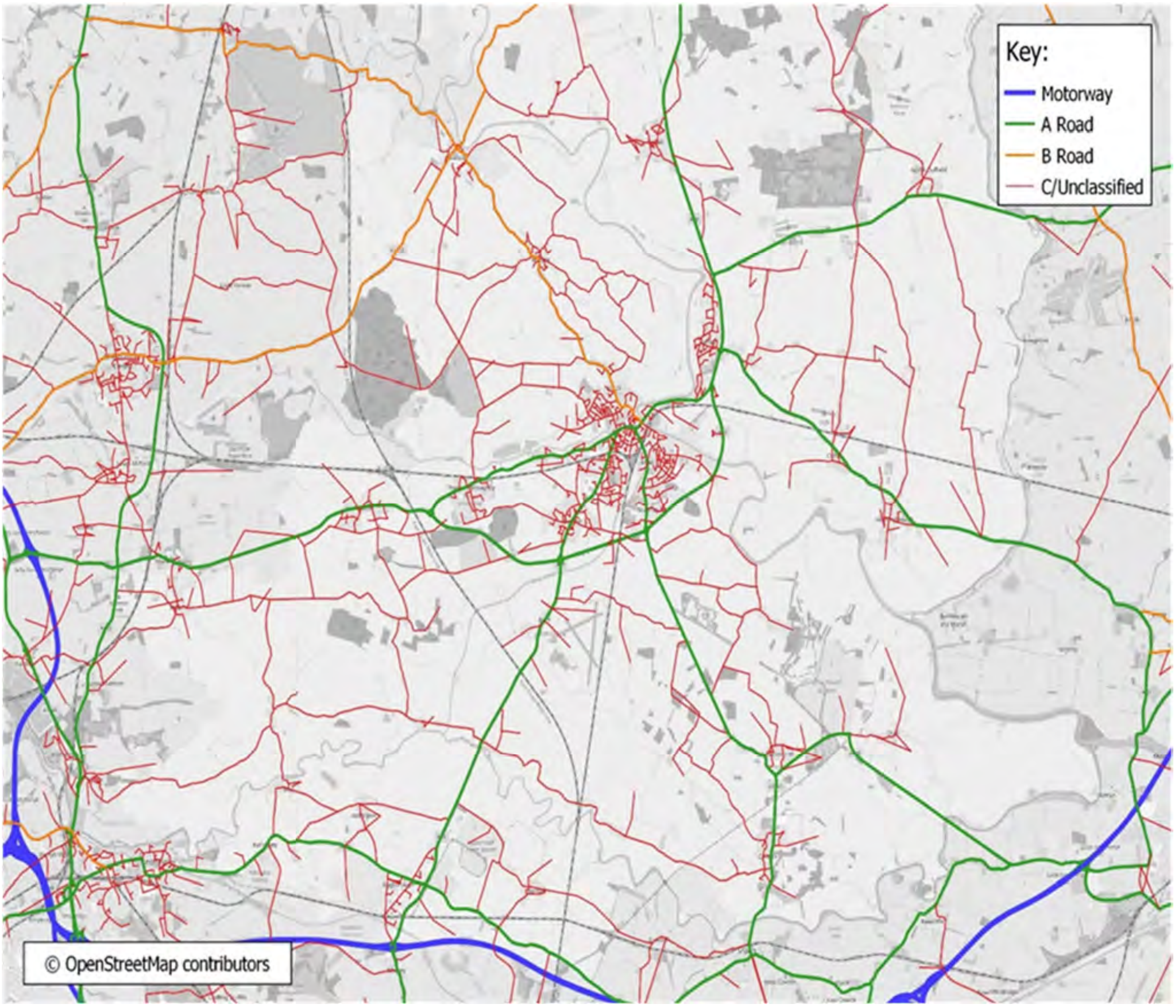


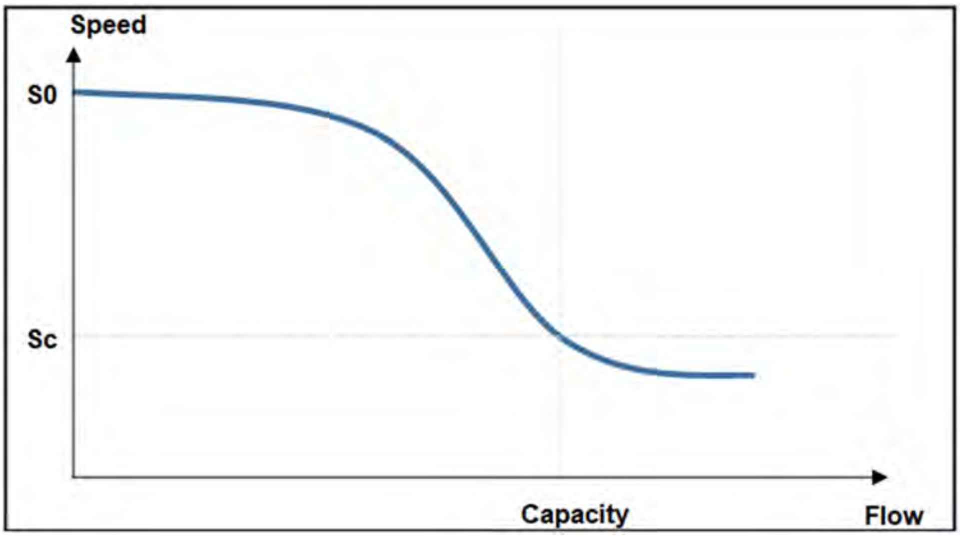
Table 4-1 - Summary of Link Coding by Road Type

Road Type	Number of Modelled Links	Total Modelled Length (km)
Motorway	429	3,061
A Road	2,583	5,368
B Road	376	388
Local Road	3,262	1,691
Total	6,650	10,508

4.4 LINK SPEED-FLOW CURVES

4.4.1. A set of appropriate speed-flow curves was then adopted to reflect a relationship between traffic volume and travel speed on a link. Figure 4-3 illustrates a generic form of a speed-flow curve.

Figure 4-3 - Example of a Speed-Flow Curve



4.4.2. For each speed-flow curve, capacity, free-flow speed (S_0), speed at capacity (S_c) and the rate of speed decline relative to flow increase was determined by various factors including the road class, road type, number of lanes and consideration of street characteristics including on street parking or traffic management which may prohibit the free flow of traffic.

4.4.3. Speed flow curves for the SDSM are derived from COBA 10 guidance and used for links within the buffer area and on links greater than 100m within the simulation area where volume delay is likely to be of importance to the traffic routeing. The list of all the speed-flow curves adopted for the SDSM is provided in Appendix A.

4.4.4. For zones external to the study area, associated network is mainly used to create connectivity from those external zones to the study area. At this level, route choices are limited and therefore a much simpler approach was adopted. In the buffer area (see Figure 4-1) speed flow curves are applied on links. In the external area links are coded as fixed speed network. For external area network links, where data was available, speed data from Trafficmaster was used and all remaining links used speed data from NRTF 2018, based on region, road class and time period.

4.5 JUNCTION CODING

4.5.1. Junctions play a key role within the simulation area as they affect route choice particularly with respect to turning delays. Within the simulation area, the junctions will be modelled in detail to represent the effects of traffic flows on delays and queues. Each junction will be coded using detailed information which will include the:

- Junction type (traffic signal, roundabout, priority);
- Number of approaches;
- Number and width of each approach, flare length and lane discipline;

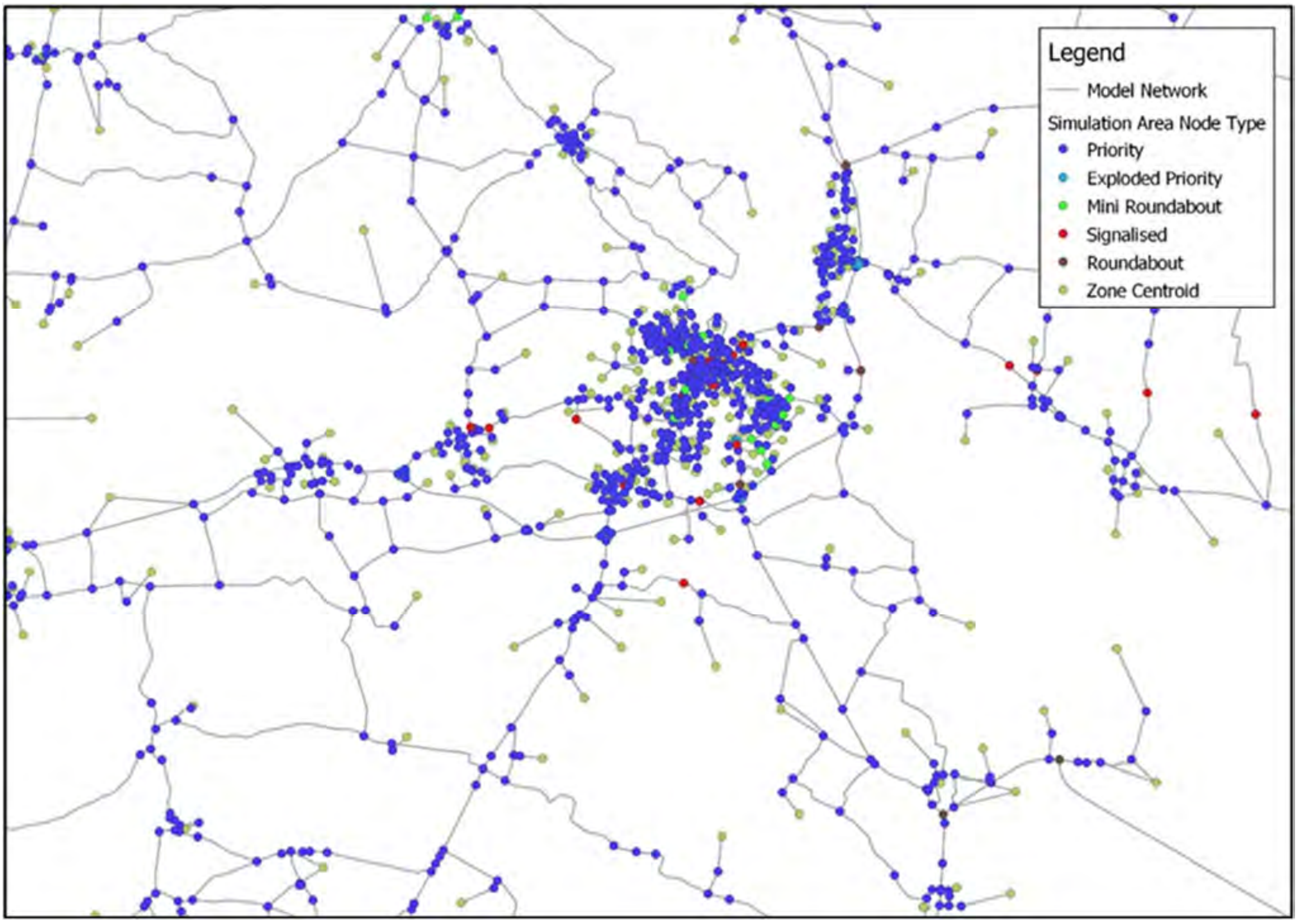
- Permitted and prohibited turns by vehicle type;
- Additional parameters according to junction type (e.g., saturation flows, signal timings and phasing, gap acceptance value); and
- Vehicle circulating capacity and travel time (for roundabouts).

4.5.2. A total of 3,793 nodes, of which 1,586 are simulation junction nodes, were coded within the model as summarised in Table 4-2 and mapped in Figure 4-4.

Table 4-2 - Summary of Junction Coding by Node Type

SATURN Type	Description	Number of Nodes
0	External node	1,564
1	Priority junction	1,320
	Exploded roundabout	101
	Motorway merges/diverges	68
2	Mini-roundabout	23
3	Signalised junction	48
	Exploded signalised roundabout	3
4	Dummy	0
5	Roundabout (with U-turns)	23
n/a	Zone centroids	643
	Total	**3,793**

Figure 4-4 - Selby Urban Area Node Coding Types



Priority Junctions

4.5.3. Default saturation flows for major and minor arms were based on the calculations provided in DMRB Volume 6 Section 2 Part 6 TD42/95. The priority junction saturation flows can be viewed in Table 4-3 to Table 4-6.

4.5.4. These were reviewed and adjusted during the calibration and validation process alongside other junction parameters in order to more accurately represent delays and to reflect local site variation.

Table 4-3 - Saturation Flows (PCUs per hour) of Turns from Major Arms at Priority Junctions

Turn	Radius	Single Lane	Non-Single Lane								
			1 lane	2 lanes		3 lanes		4 lanes		5 lanes	
			Incl N'side	Incl N'side	No N'side	Incl N'side	No N'side	Incl N'side	No N'side	Incl N'side	No N'side
Left	**Tight**	1,530	1,480	3,060		4,640	4,750	6,220	6,330		
	Std	1,730	1,670	3,460		5,240	5,370	7,030	7,150		
	Wide	1,850	1,790	3,700		5,610	5,740	7,520	7,650		
Ahead	**Tight**	1,870	2,010	3,870	4,010	5,880	6,020	7,880	8,020	9,890	10,030
	Std	1,980	2,060	3,970	4,110	6,030	6,170	8,080	8,220	10,140	10,280
	Wide	2,070	2,210	4,270	4,410	6,480	6,620	8,680	8,820	10,890	11,030
Un-opposed Right Turn											
Un-opp. Right	**Tight**	1,530	1,480	3,060	3,430	4,640	4,750	6,220	6,330		
	Std	1,730	1,670	3,460	3,580	5,240	5,370	7,030	7,150		
	Wide	1,850	1,790	3,700	3,920	5,610	5,740	7,520	7,650		

Opposed Right Turn

Turn	Radius	1 lane			2 lanes			3 lanes		
		Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis
Opp. Right	**Tight**	640	690	730	1,280	1,370	1,460	1,920	2,050	2,190
	Std	720	770	820	1,350	1,440	1,540	2,020	2,160	2,300
	Wide	780	830	890	1,550	1,660	1,770	2,320	2,480	2,490

Terminology: N'side = Nearside; Std = Standard; Ave = Average; Vis = Visibility.

Table 4-4 - Saturation Flows of Give Way Turns from Minor Arms at Priority Junctions (with Central Reservation

		Give Way Turns with Central Reservation Present											
		1 lane			2 lane			3 lane			4 lane		
Turn	Radius	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis
Left	**Tight**	640	690	730	1,280	1,370	1,460	1,920	2,050	2,190	2,550	2,730	2,910
	Std	720	770	820	1,350	1,440	1,540	2,020	2,160	2,300	2,690	2,880	3,070
	Wide	780	830	880	1,550	1,660	1,760	2,320	2,480	2,640	3,090	3,310	3,520
Ahead	**Tight**	510	570	630	1,020	1,130	1,250	1,520	1,690	1,870	2,030	2,260	2,490
	Std	570	640	700	1,070	1,190	1,310	1,600	1,780	1,970	2,140	2,380	2,620
	Wide	620	690	760	1,230	1,370	1,510	1,850	2,050	2,260	2,460	2,730	3,020
Right	**Tight**	510	570	630	1,020	1,130	1,250						
	Std	570	640	700	1,070	1,190	1,310						
	Wide	620	690	760	1,230	1,370	1,510						

Table 4-5 - Saturation Flows of Give Way Turns from Minor Arms at Priority Junctions (with no Central Reservation

		Give Way Turns with No Central Reservation Present											
		1 Lane			2 Lanes			3 Lanes			4 Lanes		
Turn	Radius	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis
Left	**Tight**	640	690	730	1,280	1,370	1,460	1,920	2,050	2,190	2,550	2,730	2,910
	Std	720	770	820	1,350	1,440	1,540	2,020	2,160	2,300	2,690	2,880	3,070
	Wide	780	830	880	1,550	1,660	1,760	2,320	2,480	2,640	3,090	3,310	3,520

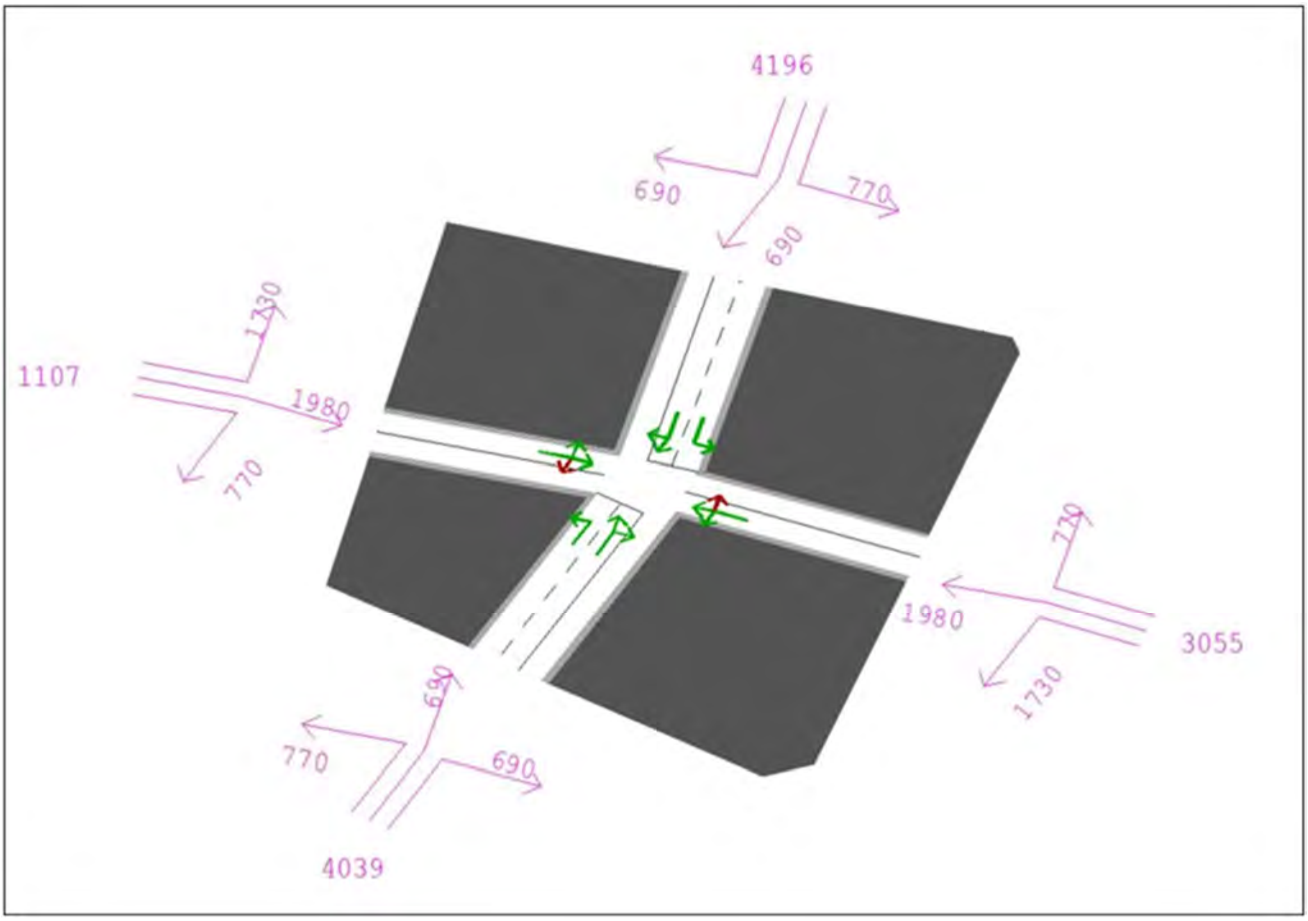
Turn	Radius	Give Way Turns with No Central Reservation Present											
		1 Lane			2 Lanes			3 Lanes			4 Lanes		
		Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis	Poor Vis	Ave Vis	Good Vis
Ahead	Tight	540	600	660	1,070	1,190	1,320	1,610	1,790	1,970	2,140	2,380	2,630
	Std	620	690	760	1,140	1,270	1,400	1,710	1,900	2,100	2,280	2,530	2,800
	Wide	680	760	830	1,360	1,510	1,660	2,030	2,260	2,490	2,710	3,010	3,320
Right	Tight	540	600	660	1,070	1,190	1,320						
	Std	620	690	760	1,140	1,270	1,400						
	Wide	680	760	830	1,360	1,510	1,660						

Table 4-6 – Saturation Flows (PCUs per hour) Of Merges

Turn	Non-Motorway Priority Merge from Minor Arm					
	Single Lane	2 Lanes	3 Lanes		4 Lanes	
			Incl N'side	No N'side	Incl N'side	No N'side
Tight	1,530	1,480	4,640	4,750	6,220	6,330
Std	1,730	1,670	5,240	5,370	7,030	7,150
Wide	1,850	1,790	5,610	5,740	7,520	7,650
Motorway Priority Merge from Minor Arm						
Gradient	1 Lane N'side	1 Lane Not N'side	2 Lane N'side	2 Lane Not N'side		
Uphill	1,910	2,050	3,960	4,100		
Flat	1,930	2,060	3,990	4,140		
Downhill	1,940	2,070	4,010	4,170		

4.5.5. Figure 4-5 shows an example of a priority junction node coded in SATURN. The turn data displayed are saturation flows in PCUs per hour.

Figure 4-5 - Example Coding: Priority Junction



Signalised Junctions

4.5.6. Signalised junctions within the simulation area required additional characteristics to be coded including:

- Staging plans.
- Cycle times.
- Stage green times; and
- Stage intergreen times.

4.5.7. Traffic signal specifications were obtained from NYCC to derive this data (see Section 3.8). It is only possible to code fixed signal timings in SATURN therefore the supplied green times were used as a starting point and further adjusted during the calibration and validation process (see Section 8.3). This reflects the ability to optimise stages for live traffic conditions through dynamic signal operations such as MOVA and SCOOT.

4.5.8. The saturation flows for signalised junctions were based on calculations presented in TRL Report 67 (Kimber, McDonald and Hounsell) by turning movement (left turn, ahead, right turn), lane width and turning radii. The signalised junction saturation flows can be viewed in Table 4-7. These were reviewed and adjusted during the calibration and validation process alongside other junction parameters in order to more accurately represent delays and to reflect local site variation.

Table 4-7 – Saturation Flows at Signalised Junctions

Turn	Radius	Single Lane	Non-Single Lane								
			1 lane	2 lanes		3 lanes		4 lanes		5 lanes	
			Incl N'side	Incl N'side	No N'side	Incl N'side	No N'side	Incl N'side	No N'side	Incl N'side	No N'side
Left	Tight	1,530	1,480	3,060		4,640		6,220			
	Std	1,730	1,670	3,460		5,240		7,030			
	Wide	1,850	1,790	3,700		5,610		7,520			
Ahead	Tight	1,870	2,010	3,870	4,010	5,880	6,020	7,880	8,020	9,890	10,030
	Std	1,980	2,060	3,970	4,110	6,030	6,170	8,080	8,220	10,140	10,280
	Wide	2,070	2,210	4,270	4,410	6,480	6,620	8,680	8,820	10,890	11,030
Right	Tight	1,650	1,600	3,310	3,430	5,030	5,140	6,740	6,850		
	Std	1,800	1,750	3,610	3,740	5,480	5,610	7,350	7,480		
	Wide	1,890	1,830	3,790	3,920	5,740	5,880	7,700	7,830		

Terminology: N'side = Nearside; Std = Standard

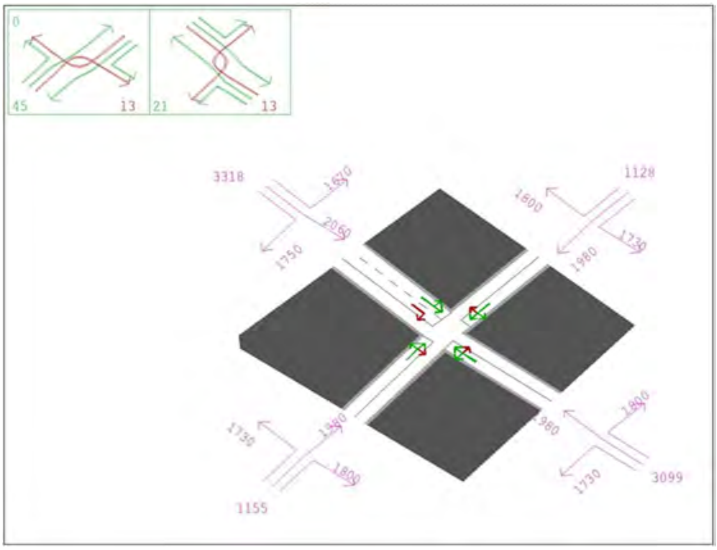
4.5.9. Pedestrian crossings (zebra and pelican/puffin) were also represented as signalised junctions within the model, with the red time determined as intergreen and calculated to represent the average crossing time in each modelled period. The assumed crossing times were estimated based on the location of the crossing and the closeness to retail or education establishments. Where crossings were located very close to a junction, the crossing and adjacent roads have been coded as a single signalised junction with movements during each representative phase designed to replicate the permitted real-world movements when a crossing is in use.

4.5.10. Additionally, railway crossings across the Selby District have been modelled as a single signalised junction located on the railway. These were provided by Network Rail for 2019 and all inputs have been amended to be suitably represented in SATURN. Figure 4-6 shows the location of these railway crossings.

Figure 4-6 - Railway Crossings: Selby District

4.5.11. Figure 4-7 shows an example of a signalised junction node coded in SATURN. The turn data displayed are saturation flows in pcus per hour.

Figure 4-7 - Example Coding: Signalised Junction



Roundabouts

4.5.12. To model roundabouts within the simulation area, the following characteristics are required to be coded:

- Entry capacity at each approach (pcus per hour);
- Circulatory capacity (pcus per hour); and
- Total circulatory time (seconds).

4.5.13. Explicit parameters such as entry width, inscribed diameter (ICD) and flare length were used to derive the saturation flows using the Kimber TRL method used for ARCADY. Table 4-8 shows the saturation flows which are ascribed to a roundabout where no inscribed diameter is specified.

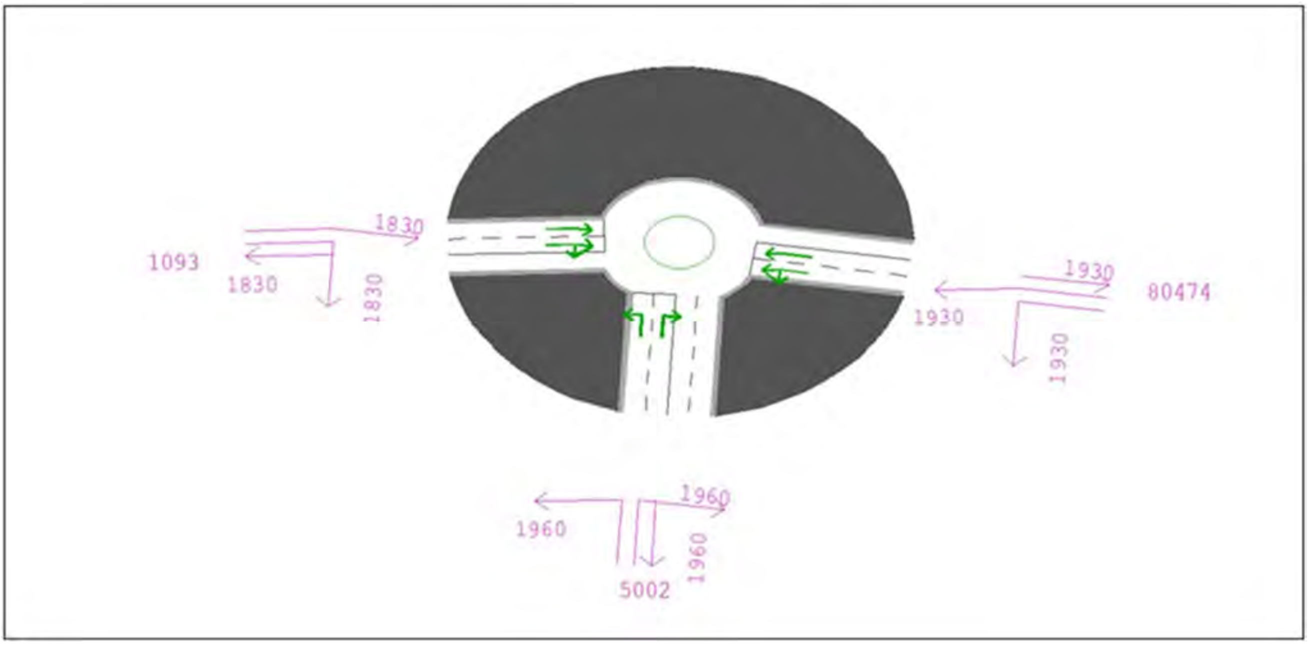
Table 4-8 – Roundabout Parameters Based on Number of Lanes and Turn Radius

	Mid-Link Lanes									
	1				2			3		4
	Stop-line Lanes									
Radius	**1**	**2**	**3**	**4**	**2**	**3**	**4**	**3**	**4**	**4**
Saturation Flow										
Narrow	920	1,370	1,560	2,170	1,810	2,310	2,670	2,730	3,170	3,670
Standard	1,100	1,620	1,800	2,450	2,200	2,760	3,000	3,320	3,750	4,470
Wide	1,380	1,920	2,100	3,250	2,710	3,330	4,010	4,090	4,760	5,510
Circle Time										
Narrow	10	10	10	10	15	15	15	17	17	20
Standard	10	10	10	10	15	15	15	17	17	20
Wide	10	10	10	10	15	15	15	17	17	20
Roundabout Capacity										
Narrow	1,830	2,560	2,730	3,100	3,470	3,850	4,040	4,380	4,590	4,970
Standard	2,250	2,770	2,910	3,200	3,780	4,120	4,400	4,680	5,000	5,250
Wide	2,310	3,000	3,110	3,590	4,090	4,380	4,600	4,970	5,150	5,520
Roundabout Gap Value										
Narrow	20	14	13	12	10	9	9	8	8	8
Standard	16	13	12	11	10	9	8	8	7	7
Wide	16	12	12	10	9	8	8	7	7	7

4.5.14. The values shown in the above table are just indicative and are not actually used as the inscribed diameter for each roundabout will have been specified in every instance. Instead of selecting from a list of values (such as in the case above) the values ascribed to the roundabout are calculated using formulae to which the inputs are the inscribed diameter, the lane width, the number of stop-line and mid-link lanes plus any flare lengths.

4.5.15. Figure 4-8 shows an example of a roundabout node coded in SATURN.

Figure 4-8 - Example Coding: Roundabout



Exploded Roundabouts

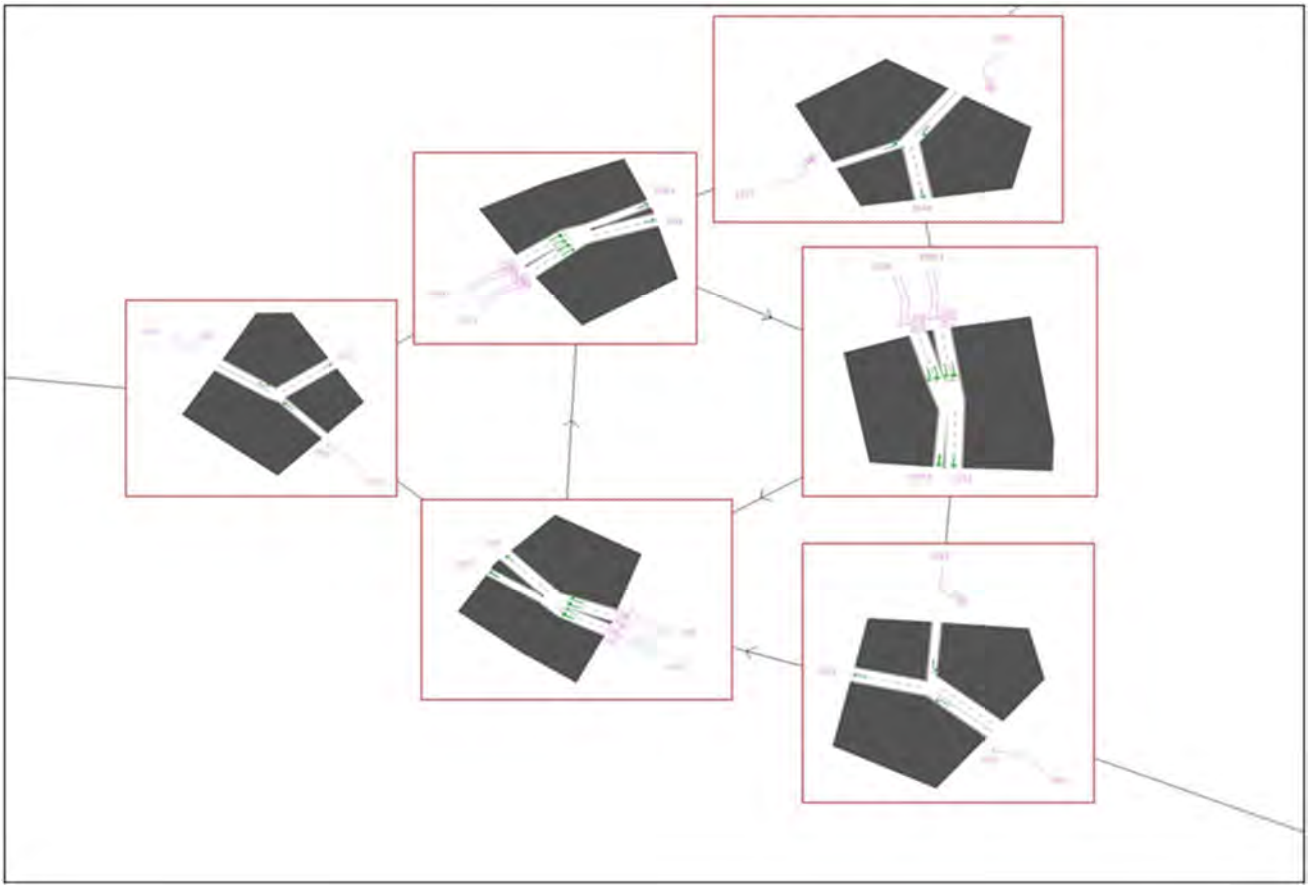
4.5.16. The limitation of traditional roundabout coding is that it only applies for smaller sized roundabouts where traffic flow approaching the roundabout is well within capacity or where there is no clear definition of lane marking for any particular movement (i.e., traffic can utilise all lanes on approaches to exit the roundabout). For larger roundabouts, where traffic flows are more significant and/or where lane markings are clearly defined for particular movements, traditional coding is inappropriate to correctly model delay.

4.5.17. Larger roundabouts were therefore coded as a series of priority junctions with major arms on the circulatory sections and minor arms as on approaches to the roundabouts. This coding approach similarly applies if some or all of the entry arms are signalised (i.e., partial or fully signalised exploded roundabout).

4.5.18. Different saturation flows are applied at these ‘exploded priority nodes’ compared with a typical priority junction since, for example, a left turn off a roundabout generally has a wider turn radius than a left turn into a minor arm, thereby warranting a higher saturation flow.

4.5.19. An example of an exploded roundabout is provided in Figure 4-9. This figure is for illustrative purposes only and does not represent part of the Selby model.

Figure 4-9- Example Coding: Exploded Roundabout



4.6 PUBLIC TRANSPORT SERVICES AND BUS PRIORITY

4.6.1. Bus services are coded into SDSM as pre-loaded demand. This is of particular importance to the peak periods when services will typically have a higher frequency and their impact on traffic flow will be greater in respect of both capacity and network speeds.

4.6.2. In total there were 40 distinct bus services identified across the three modelled periods, however not all services are included in all periods. Services which had a frequency of at least one service per hour were included in the respective period. Section 3.7 details the bus networks and frequencies.

4.6.3. In addition to bus services, bus lanes have also been coded in the model.

4.7 PCU CONVERSION FACTORS

4.7.1. Equivalent trip volumes of different vehicle types will have a varying impact on the network capacity due to the different size of the vehicles. For assignment, the demand is converted into standardised passenger car units (PCUs) which are taken from TAG.

4.7.2. The TAG vehicle-to-PCU factors which will be used for the SDSM are presented in Table 4-9, below. For HGV's, an average PCU factor was calculated using a weighted average based on the respective split between OGV1 and OGV2 from local classified count data.

Table 4-9 - PCU Value by Vehicle Type

Modelled Vehicle Type	TAG Vehicle Type	TAG PCU Factor	Vehicle Split	PCU Values Adopted
Car	Car	1.0	100%	1.0
LGV	LGV	1.0	100%	1.0
HGV	OGV1	1.9	29%	2.61
	OGV2	2.9	71%	
PSV	PSV	2.5	100%	2.5

4.8 GENERALISED COST

4.8.1. Model assignment of trips to the highway network will be undertaken using a standard approach that is based on a ‘Wardrop User Equilibrium’, which seeks to minimise travel costs for each vehicle type in the network. This is implemented in SATURN through the ‘Frank-Wolfe algorithm’ employed as an iterative process based on using successive ‘all or nothing’ iterations which are combined to minimise an ‘objective function’. Travel costs are then recalculated after each iteration and compared to those from the previous iteration. The process is terminated once successive iteration costs do not change significantly. This process enables multi-routing between any origin-destination pair.

4.8.2. Traffic routeing is implemented in SATURN through a function of generalised cost. This normalises time, distance and monetary charges into a standard unit.

4.8.3. The function is defined as:

$$GC = T + \frac{(D \times VOC) + M}{VOT}$$

where:

- GC Generalised cost in minutes.
- T Travel time in units of minutes (including delays and time penalties).
- D Travel distance in kilometres.
- M Monetary charges in pence (e.g., toll fares).
- VOT Value of time in pence per minute (PPM); and
- VOC Vehicle operating costs in pence per kilometre (PPK).

4.8.4. Note: there are no tolls coded in the base year highway model however this principal would apply for any scheme forecasts which may include tolls, such as CAZ.

4.8.5. Parameters have been derived for each user class from TAG Databook November 2021 v1.17[1] and are listed in Table 4-10. This was the latest Databook when the model was created. It should be noted that:

- The average speed assumptions used to derive the PPK values were not based on the average network speeds from a previous assignment, as they were deemed unrealistic due to the A1(M), M62 and A64 influencing the speeds. It was decided that a speed of 52 kph would be applied for all three modelled time periods. This speed was derived using an average of observed speeds over the set of journey time routes.
- A coefficient of 2.3 was applied to the HGV PPM values. This is in line with TAG M3.1 guidance which states that a factor around that order of magnitude is appropriate to be applied to the TAG values to consider the effects of owner choice on routeing.
- The proportion of OGV1 to OGV2 detailed in Table 4-9 was used in the derivation of the PPM PPK values.

Table 4-10 - Generalised Cost Parameters

User Class	AM Peak		Inter Peak		PM Peak	
	PPM	PPK	PPM	PPK	PPM	PPK
Car Business	30.92	12.78	31.68	12.78	31.36	12.78
Car Commute	20.73	6.27	21.07	6.27	20.81	6.26
Car Other	14.31	6.27	15.24	6.27	14.98	6.27
LGV	22.41	13.65	22.41	13.65	22.41	13.65
HGV	51.32	43.99	51.32	44.36	51.32	46.09

[1] https://www.gov.uk/government/publications/tag-data-book

5 ZONE SYSTEM DEVELOPMENT

5.1 INTRODUCTION

5.1.1. The model zone system is an intrinsic element of the highway assignment model and defines the geographical areas between which highway trips are loaded onto the network.

5.1.2. TAG Unit M3.1 gives guidance on the specification of the zone system suggesting that the area of detailed modelling should be split up into small zones; the rest of the fully modelled area should be split up into somewhat larger zones; the external area should be split into larger zones again. The SDSTM's zone system has been constructed in line with this guidance.

5.2 MODEL ZONE SYSTEM

5.2.1. A zone system was developed based on the principles that the level of detail should be fine enough to enable detailed modelling within the areas of interest but not too detailed to compromise development and subsequent model run times.

5.2.2. The starting point for the SDSTM zone system was the MND Request Zone sector system used for the mobile phone data collection, based on LSOA or aggregations thereof – see Section 3.2 for a detailed description. It was necessary to disaggregate the Request Zones, in particular:

- Within and around Selby town centre to complement the detailed network coverage, including identification of transport-specific locations such as car parks and PT stations; and
- Within the more rural parts of the wider district primarily for cases of larger Request Zones which covered multiple conurbations with different access points to the network.

5.2.3. The SDSTM zone system has 643 zones, of which 395 are within Selby district. For comparison there were 300 Request Zones, of which 50 were within Selby district (see Section 3.2). Table 5-1 summarises the number of assignment zones by district, and the zone system is illustrated in Figure 5-1, Figure 5-2 & Figure 5-3.

5.2.4. The locations for development zones will be reviewed prior to forecasting. They will be added into the base year models at that stage to allow pivoting within the variable demand model (VDM).

Table 5-1 - Number of Assignment Zones by District

District	Number of Zones
Selby	395
East Riding of Yorkshire and Hull	29
Doncaster	19
Leeds	42
Wakefield	90
York	24
Rest of GB	44
Total	**643**

Figure 5-1 - Selby Urban Area and Surrounding Zone Definitions

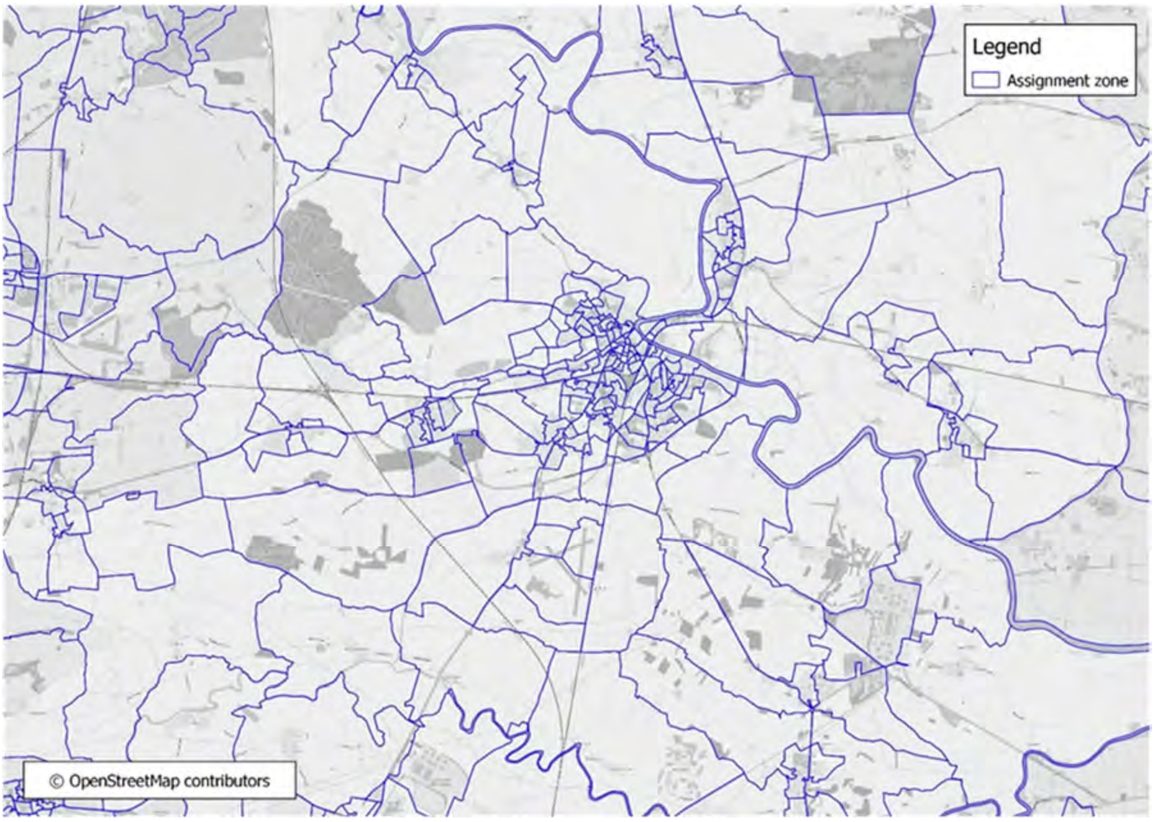


Figure 5-2 - Selby District Model Zone Definitions

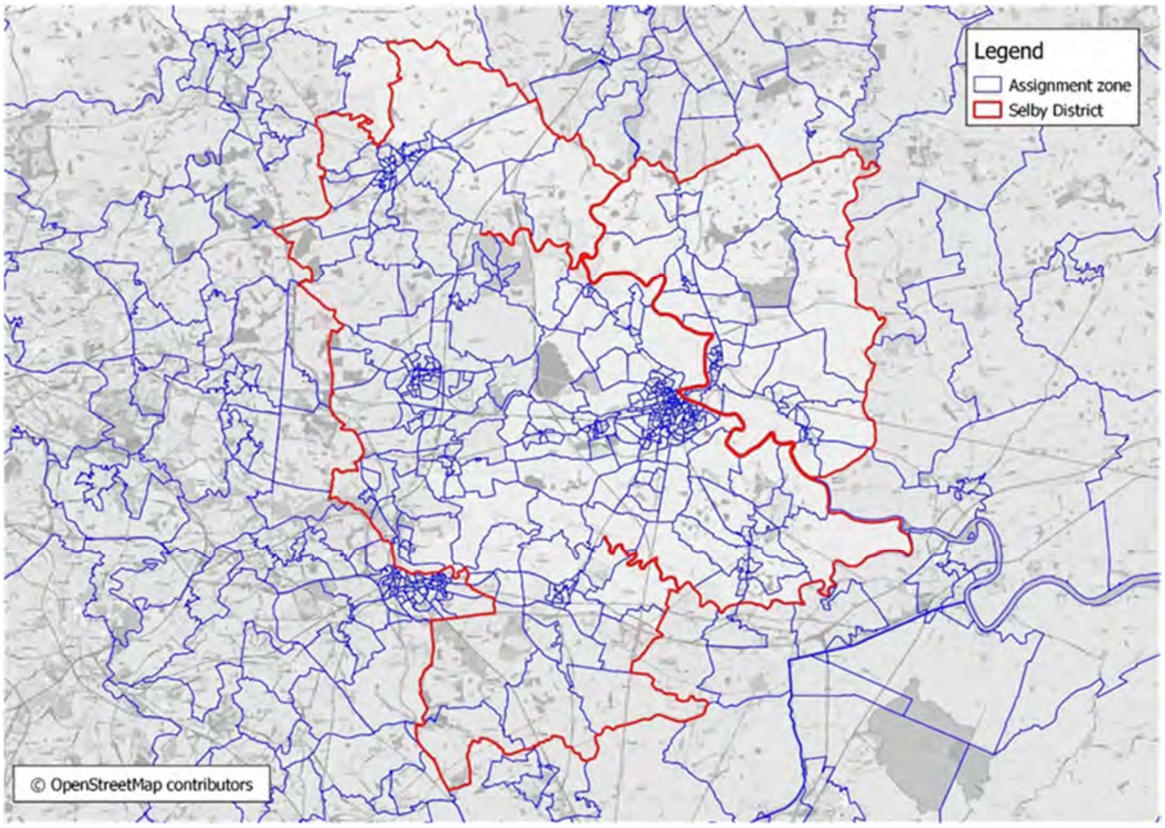
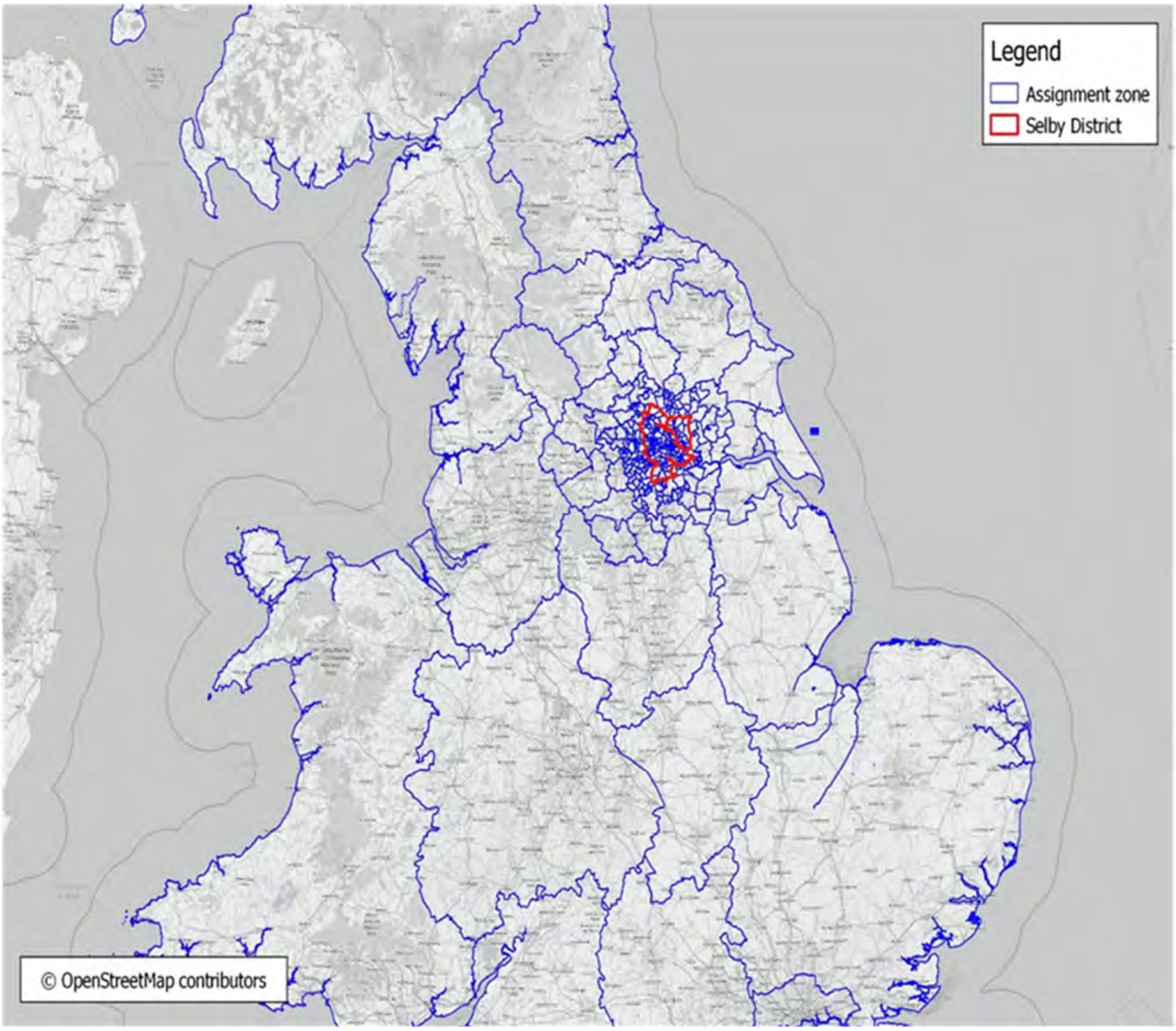


Figure 5-3 - Buffer and External Area Model Zone Definitions



5.3 CENTROID ZONE CONNECTORS

5.3.1. The loading of traffic onto the network from zones was achieved using centroid connectors at appropriate locations. In line with TAG Unit M3.1 guidance, the number of centroid connectors were kept to a minimum (which will also help to avoid/reduce convergence issues).

5.3.2. Zone connectors should represent 'real' junctions within the highway network. The loading points and types of connectors were determined specifically for each zone within the simulation and buffer areas. For the external zones (outside the study area) the loading points were attached to the appropriate locations at the edge of the network.

5.3.3. For the buffer and external network, the appropriate length of the connector in each case was based on the distance to the mid-point of the zone. A speed limit of 40kph was then assigned to the zone connectors.

Speed-flow curves were not assigned to the zone connectors as this is not required in SATURN.

6 HIGHWAY MATRIX DEVELOPMENT

6.1 INTRODUCTION

6.1.1. Highway assignment models require representation of travel demand in the form of trip matrices which are loaded on the network (supply) as model zones.

6.1.2. Zones are defined as areas of similar land use and characteristics which would access and egress the modelled network at a similar location. The area of interest will have the greatest zonal detail, becoming more aggregate further from the simulation area.

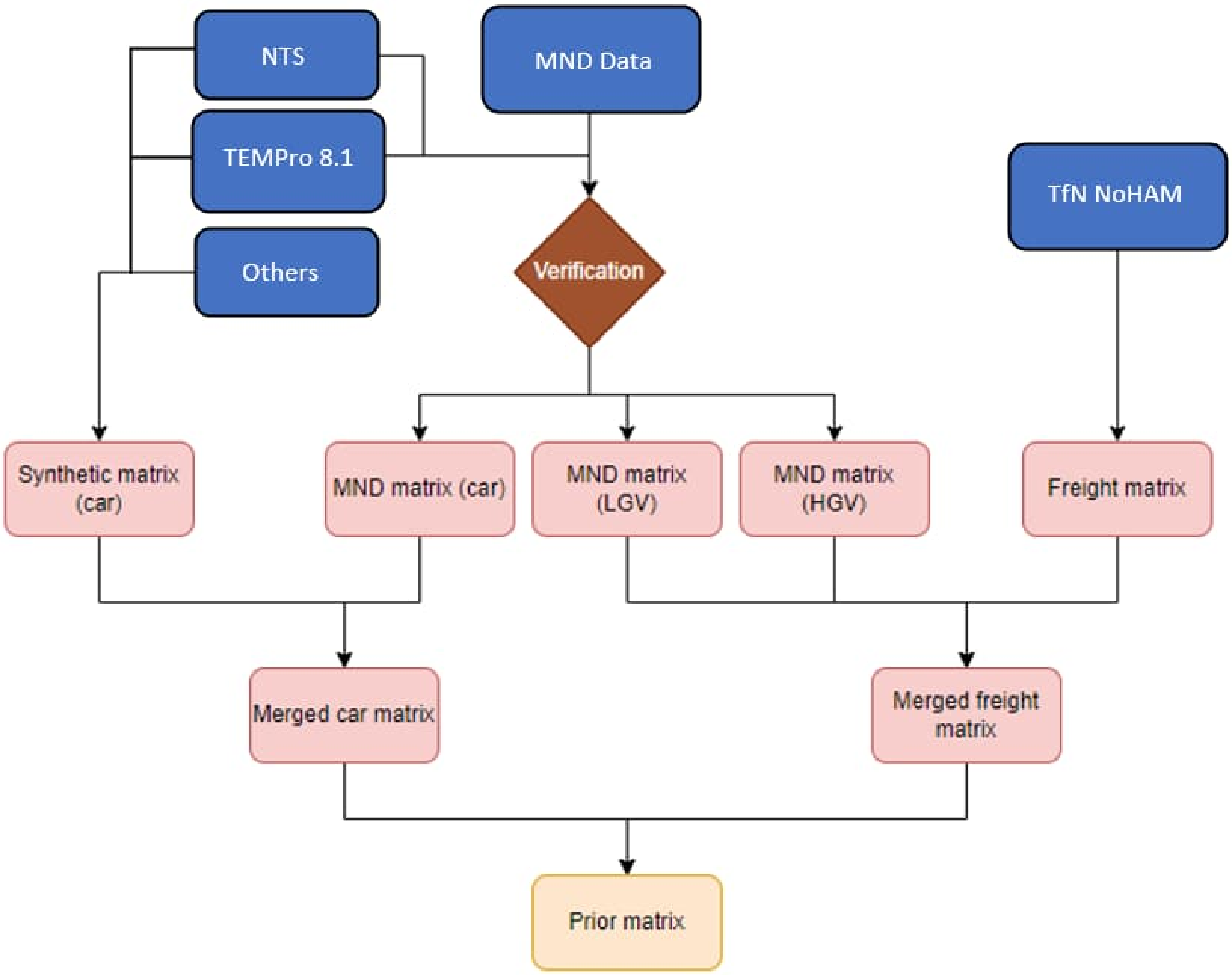
6.1.3. As described in Section 3.2, MND was collected as the primary data source within a bespoke zone system, referred to as the MND Request Zone system. This was the primary data source for development of the SDSTM demand matrices.

6.1.4. The development of the trip matrices from the various data sources is described, including how the data sets were utilised for various sectors of the matrices and combined to form the ‘prior’ matrices.

6.1.5. The current chapter describes the highway matrix development process, including application of the MND and other data sources through to generating the prior matrices for matrix calibration. This process is summarised in Figure 6-1 and is structured as follows:

- Model zone system.
- Overview of MND matrix development.
- Verification of MND collected.
- Development of MND matrices.
- Synthetic matrix development.
- Matrix merging; and
- Prior matrices.

Figure 6-1 – Prior Matrix Development Process



6.2 OVERVIEW OF MND MATRIX DEVELOPMENT

6.2.1. The MND matrix development process is illustrated in Figure 6-2. The flowchart summarises the processing undertaken. Data was received from Telefonica at the most detailed level that can be supported by the MND processing algorithms.

6.2.2. The MND data was supplied by different variables, using the following indexing system.

- Mode:
  - Total Motorised Road (Car, Bus)
  - HGV

- Period:
  - AM peak (07:00-10:00)
  - Inter-peak (10:00-16:00)
  - PM peak (16:00-19:00)

- OP peak (19:00-7:00)

- Purpose:
  - Outbound Home-Based Work
  - Inbound Home-Based Work
  - Outbound Home-Based Other
  - Inbound Home-Based Other
  - Non-Home-Based Work
  - Non-Home Based Other

6.2.3. As highlighted above, HGVs were provided and verified seperately by Telefonica. This is due to the fact that HGVs are not considered to be consistent TEMPro and NTS datasets. Disaggregation related to mode, trip purpose and zoning, is illustrated in Figure 6-3. Other actions and adjustments arose as a result of the verification checks and early matrix calibration respectively. The outcomes of the verification checks are summarised in Section 6.3. Section 6.4 describes each of the processing stages undertaken.

Figure 6-2 - MND Matrix Development Process

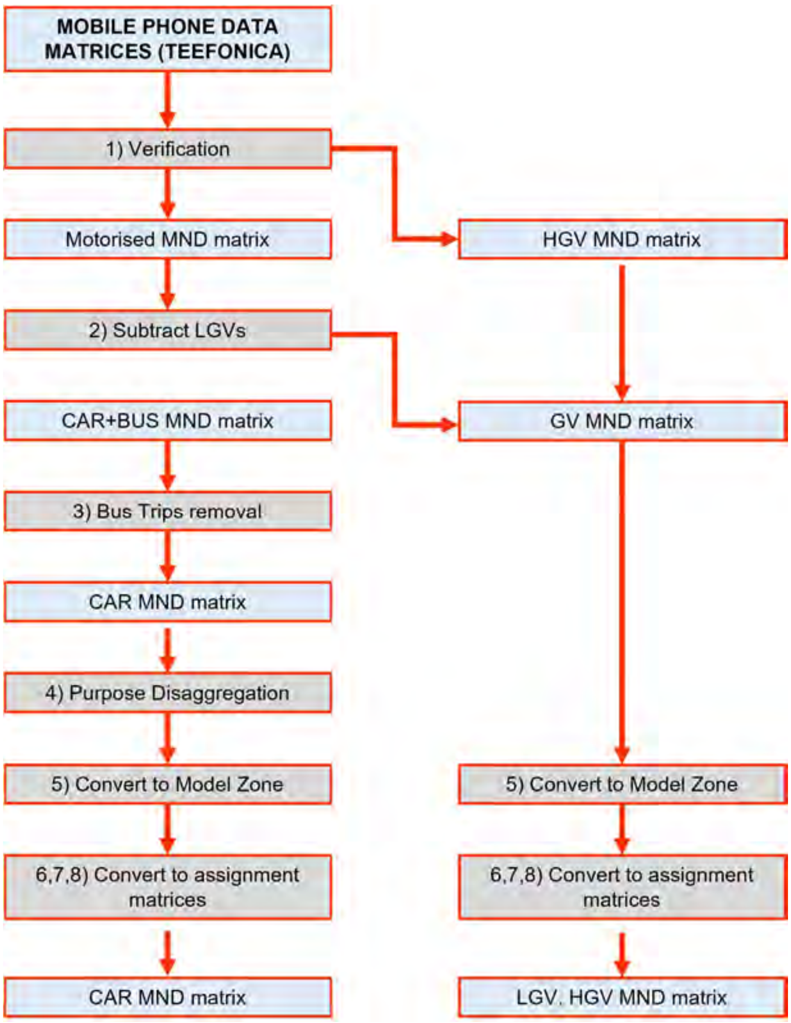
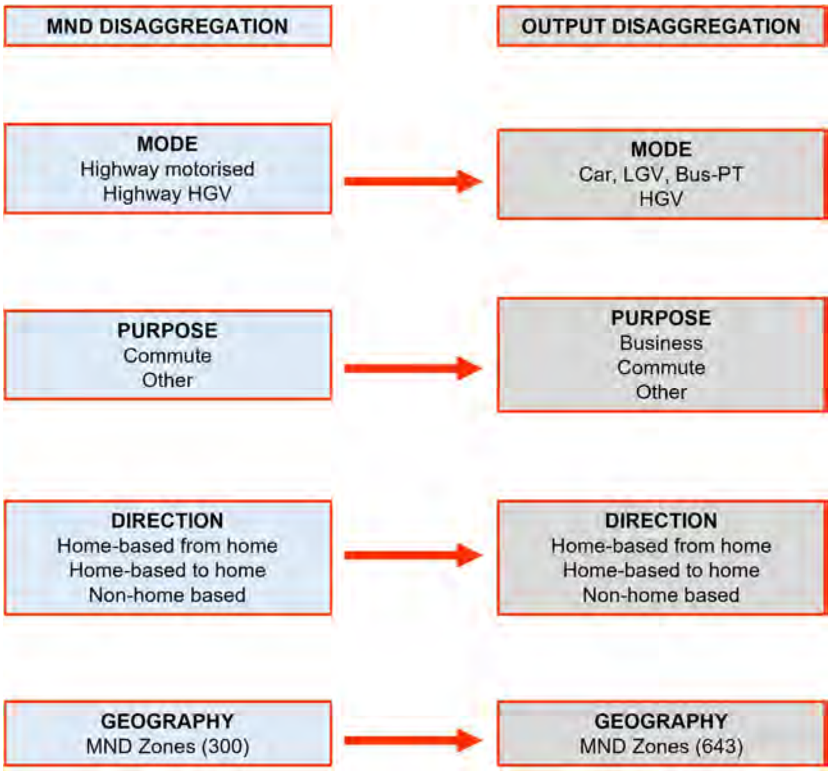


Figure 6-3 - MND Disaggregation Requirements



6.3 VERIFICATION OF MND

6.3.1. Collection of MND was summarised in Section 3.2. The verification checks are extensively detailed in the MND Verification Report, attached as Appendix B.

6.3.2. Key conclusions from that report are summarised as follows:

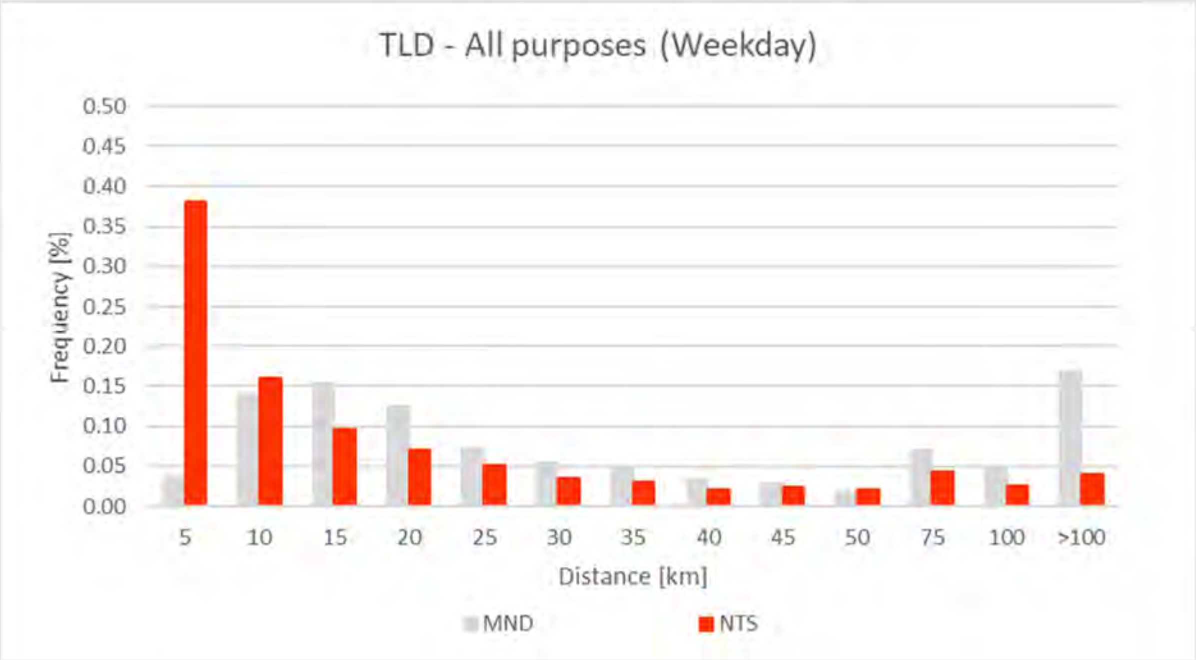
- All the zones within and outside the study area have trips.
- For motorised trips (excluding HGV), most trips in the matrix are the Internal from/to external trips (48%). Long distance trips between the external regions represent a significant 39% whilst the intra-study area trips make up a small proportion (around 14%), of the travel demand from Selby district.
- As regard HGV, most trips in the matrix are the external (around 63%). Intra-study area trips make up around 33%.
- The comparison with TEMPro total trips showed that the MND matrix is significantly underrepresenting the total amount of trips in the study area.

Table 6-1 - MND Verifications: Average Weekday Total Two-Way Trips – All Modes

District	All Modes		
	MND	TEMPro	δ Diff.
Selby District	171,993	287,785	0.60

- The TLD analysis showed that a consistent part of this gap is produced by a shortfall in short distance trips for all purposes combined. These gaps will be infilled using the synthetic matrix;

Figure 6-4 - MND Verifications: TLD Comparison - All purposes and all modes



- The purpose split between 'Work' and 'Other' in the MND dataset closely reflected the purpose split in TEMPro when education and work were defined together in TEMPro. The matrix build will initially assume that the 'Work' category also contains education trips.

Table 6-2 - MND Verifications: Work/Other Split Proportions

Purpose	MND	TEMPro
Work (HB and NHB)	0.33	0.38
Other (HB and NHB)	0.67	0.62

- In the MND the category Other includes "employer business" and 'Other' trips. A method will be required to segment the MND into commute, business and other user classes.
- Other non-car highway trips -LGVs and bus - will need to be subtracted from the motorised component; and
- The analysis of the HGV matrix showed that the MND matrix is underrepresenting the HGV trips in the study area. Therefore, additional data will be required to fill these gaps in the matrix.

6.4 DEVELOPMENT OF MND MATRICES

6.4.1. This section describes the process stages from Figure 6-2 in order.

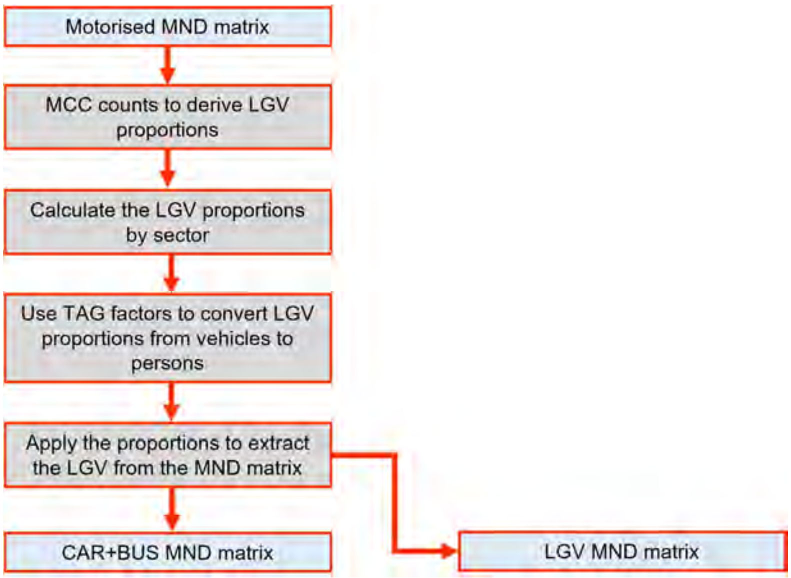
Step 1 – Verification

6.4.2. The verification is detailed above.

Step 2 – Subtract LGVs

6.4.3. This step was a known requirement based on the MND specification. Figure 6-5 summarises the steps followed to extract the LGV trips from the MND matrix.

Figure 6-5 - LGVs extraction process



The MND received from Telefonica does not disaggregate LGVs from the other highway motorised traffic (i.e., cars and buses). As shown in Section 6.2, HGV trips were provided in a separate matrix.

- The MCC data was used to derive the LGV proportions and converted to persons using occupancy factors from TAG.

Table 6-3 - Car/LGV Occupancy Factors

Purpose	Factor
Average Car	1.56
LGV	1.16

- The model area was divided in areas to calculate specific proportions
- The derived splits were applied to the MND to extract the LGV component
- These LGVs matrices in person trips were used to isolate GV from the MND matrix
- The matrices were converted back to vehicle. Table 6-4 below presents the split after GV trips extracted from the MND. At this stage the MND still includes bus trips.

Table 6-4 - Mode split after the extraction of the LGVs (people)

Vehicle Class	AM peak	Inter peak	PM peak
Car+Bus	86%	85%	91%
LGV	14%	15%	9%

Step 3 – Bus Trips Removal

6.4.4. The final remaining mode subtraction was to remove bus demand (persons) from the highway demand (person) trip matrix.

6.4.5. The MND received from Telefonica provides bus passengers and car travellers combined within the motorised mode segment. Therefore, an independent demand data source for bus passengers was required in order to split the motorised MND (post GV removal) into car travellers and bus passengers.

6.4.6. Target overall proportions for bus mode share (against car) were derived from TEMPro 7.2, which was the latest version dataset when building the matrices and Datashine Commute datasets (https://commute.datashine.org.uk) by purpose for the whole study area. These proportions were applied to the MND to extract the bus component of the matrix. It must be noted that TEMPro data was extracted at MSOA level for the base year of 2019 and Datashine Commute data uses 2011 census data. Although the census data is from 2011, 2021 census data had not yet been released when creating the matrices.

6.4.7. Table 6-5 shows mode share resulting from the process.

Table 6-5 - Bus Mode Share (versus Car) by MND purpose

Purpose	AM peak	Inter peak	PM peak
Home Based 'Work'	5.8%	5.9%	5.7%
Home Based 'Other'	5.9%	5.7%	5.8%
Non-Home Based 'Work'	2.0%	2.0%	2.0%
Non-Home Based 'Other'	2.0%	2.0%	2.0%

Step 4 – Produce Car Purpose Matrices for Commute, Business and Other

6.4.8. As stated earlier, the MND purpose split was categorised as 'work' (i.e., commuting) or 'other' (i.e. business and other). However, the verification tests suggested that education trips may be included within the 'work' category. A 'work' location in MND was identified through frequency and time of day analysis. Since an education trip may be undertaken frequently by parents through pick up and drop off, this is not inconsistent with how 'work' trips are inferred. Based on the verification evidence, education trips were assumed to be contained within 'work'. Therefore, two purpose splits were required:

- 'Work' to be segmented into commuting and education (with education that will be added into other for assignment user class); and
- 'Other to be segmented into other and employer business.

Purpose split varies by distance, the disaggregation was undertaken using the NTS dataset for North Yorkshire that was used to develop a specific trip length distribution for commute/education and business/other. The distributions were weighted by their respective volume from TEMPro to develop a final purpose split varying by distance and then applied to the MND. **Figure 6-6** to Figure 6-8 show the Trip Length Distribution of the MND after the purpose split for each time period.

Figure 6-6 - Trip Length Distribution (5km bands) - AM

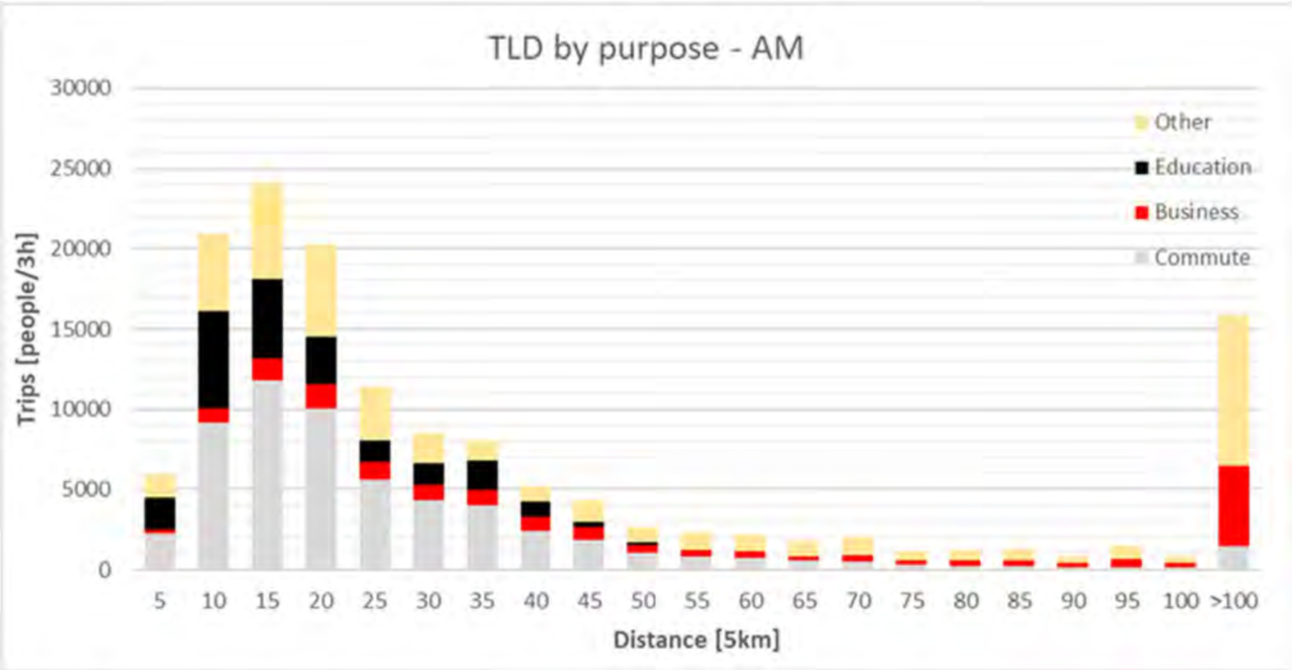


Figure 6-7 - Trip Length Distribution (5km bands) – IP

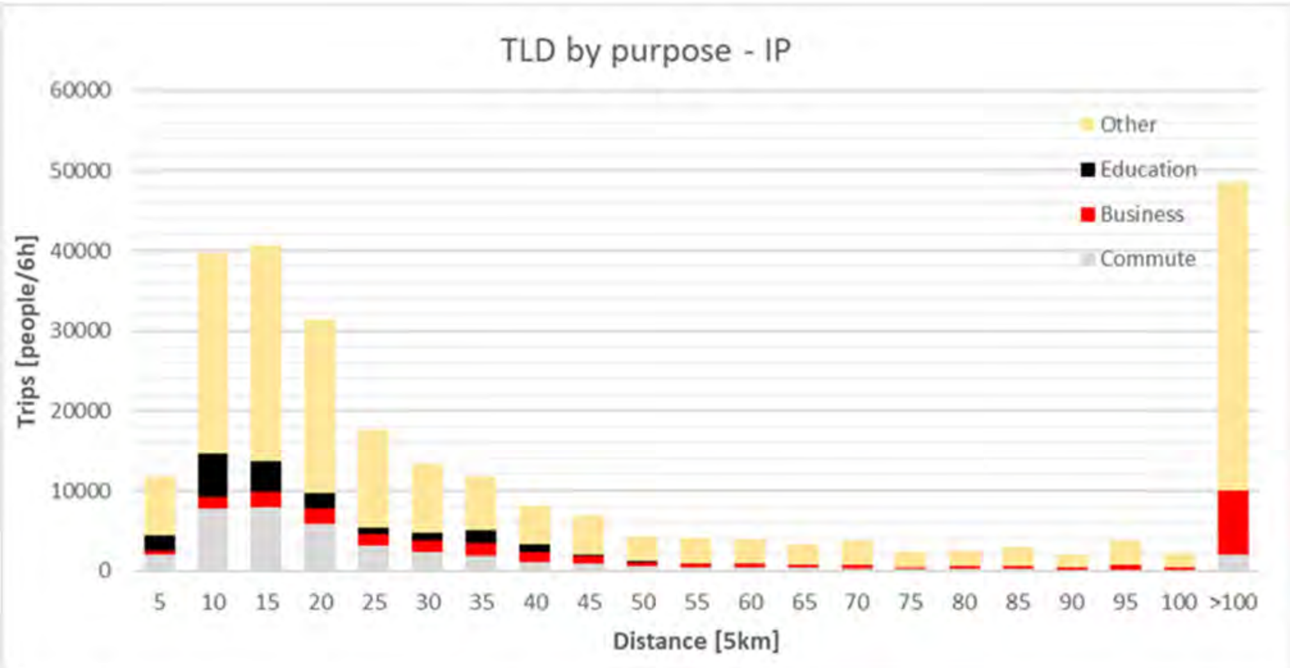
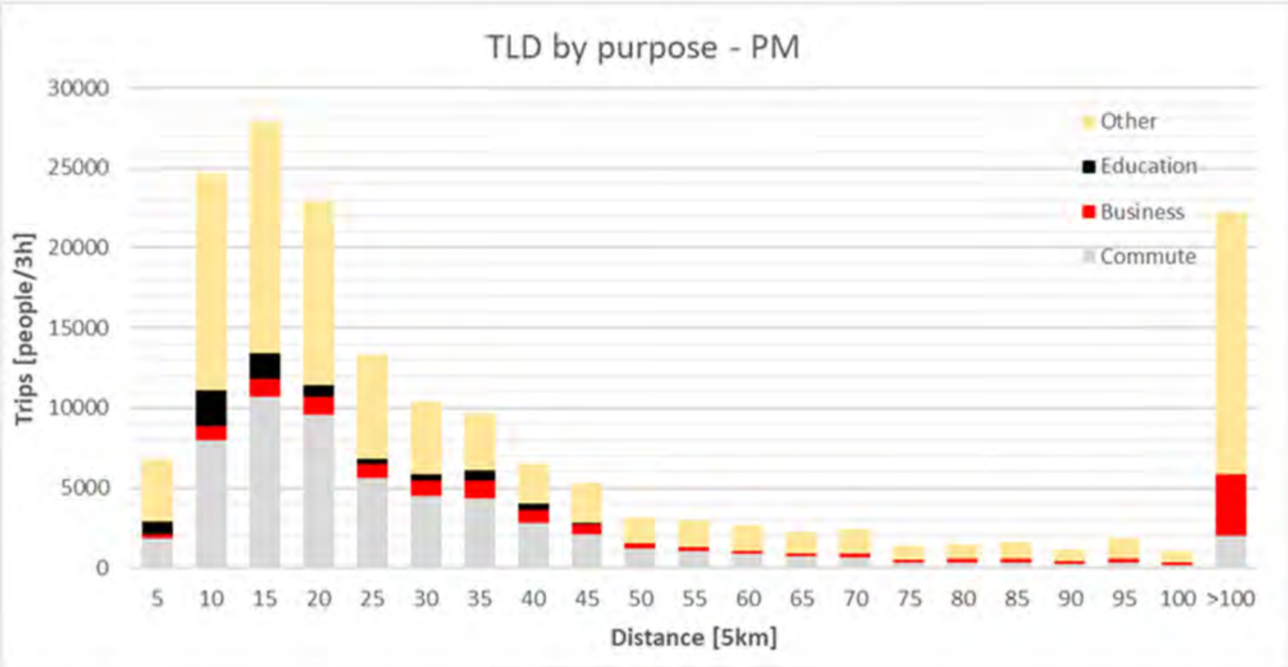


Figure 6-8 - Trip Length Distribution (5km bands) - PM



Step 5 – Convert to model zone

6.4.9. The model zone system consisted of 643 zones compared to 300 MND Request Zones. The Request Zones were LSOA (or aggregations thereof) as the lowest spatial level at which Telefonica were confident to provide the MND data, whereas the model zone system is more detailed than LSOA, particularly in the urban area.

6.4.10. MND demand at the request zone system was therefore disaggregated to the model zone system using the land-use data (i.e. population and employment) produced from CTripEnd. CTripEnd was used to generate the trip ends at model zone level as part of the synthetic matrix development.

6.4.11. As an input, CTripEnd takes a database of socio-demographic data at MSOA level. Population and employment datasets were downloaded from the census. Production and attraction weightings were derived for all zones within the MND sectors using census datasets for population and employment. These are summarised in Table 6-6.

Table 6-6 - Zones Disaggregation Weightings

Purpose	Direction	Production Weight	Attraction Weight
Business / Commute	From Home	Population (16-74)	Workday Population
	To Home	Workday Population	Population (16-74)
	Non-Home Based	Workday Population	Workday Population
Education/ Other	From Home	Population (16-74)	Workday Population
	To Home	Workday Population	Population (16-74)
	Non-Home Based	Workday Population	Workday Population

6.4.12. The splitting factors were derived by using the census data for smaller census geographies where available. However, in some cases the zone splits could not be implemented using output area (or other smaller) boundaries. In particular, within the urban area where the zoning is most dense and some zones correspond to specific attractors, e.g., car parks, shopping centre, PT stations. In those cases, the same principals were applied but this relied on inspection.

6.4.13. The zonal trip ends generated by CTripEnd, by time period and trip purpose, were used to derive splitting factors to convert the MND Request Zone data to model zone.

Step 6 – Period to Peak Hour

6.4.14. As per Section 2.5 the highway assignment modelled hours are:

- AM peak hour 08:00-09:00.
- Inter peak average hour 10:00-16:00; and
- PM peak hour 17:00-18:00.

6.4.15. The peak-to-period factors were derived from the observed ATC counts. The ‘inter peak period to average hour’ divisor was 6. The global peak period to modelled hours divisors were:

- AM peak: 2.71
- PM peak: 2.65

Step 7 – Convert from Person Trips to Car Trips by Purpose

6.4.16. Conversion from person trips into vehicle trips was undertaken through dividing by occupancy factors. The factors applied are listed in Table 6-7 and were derived from TAG.

Table 6-7 - Occupancy Factor by Car Purpose

Purpose	Factor
Business	1.14
Commuting	1.15
Other	1.79

Step 8 – Convert GVs from Vehicles to PCUs

6.4.17. The PCU factors, shown in Table 6-8, were applied to goods vehicle matrices to convert vehicles/h into pcu/h. Derivation of the PCU conversion factors was detailed in Section 4.7.

Table 6-8 - PCU Factors

UC	Factor
LGV	1.00
HGV	2.61

6.4.18. Table 6-9 summarizes the totals of the MND matrix by purpose and period.

Table 6-9 - MND Matrix summary by Purpose and Period (pcu/h)

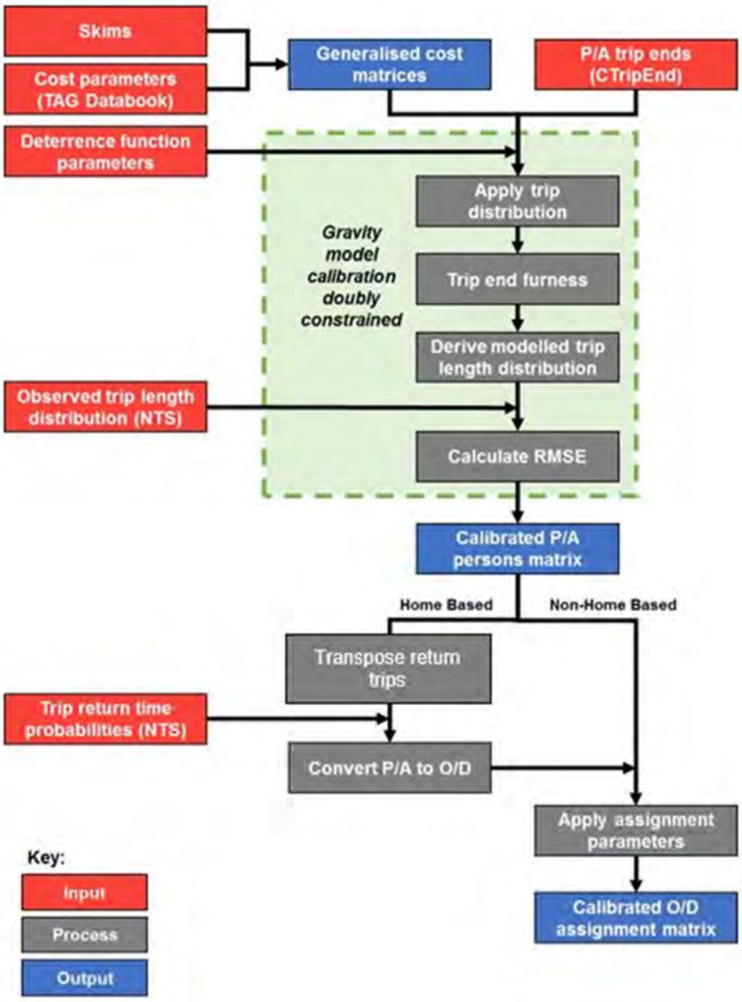
User Class	AM peak	Inter peak	PM peak
Business	7,870	4,658	6,312
Commuting	26,126	7,263	26,819
Other	19,344	24,461	29,531
LGV	10,140	8,598	7,739
HGV	12,664	12,499	7,670
Total	**76,144**	**57,479**	**78,071**

6.5 SYNTHETIC MATRIX DEVELOPMENT

6.5.1. Following from the verification tests, and as expected with MND (see Section 6.3), a set of synthetic matrices were required to be developed and merged with the MND matrix to address the short distance trips within the MND data, for which the verification tests had shown were underrepresented, which is commonly the case in many applications of MND. It is noted that the synthetic demand is developed for car user classes only, not for freights.

The process to construct the synthetic matrices is illustrated in Figure 6-9.

Figure 6-9 - Synthetic Matrix Development Process



Specification

6.5.2. The synthetic matrices were developed through calibrating a trip distribution to observed data. The shape of the observed data will therefore determine the trip distribution in the resultant matrices. Observed data was taken from the National Travel Survey (NTS) which contains travel diary records including origin area, destination area, trip purpose, mode, distance travelled, and time taken.

6.5.3. Trip making characteristics will vary for different localities depending on factors including area type, quality of existing highway network against public transport availability and proximity to other urban centres which may have high levels of inter-connectivity.

6.5.4. It is preferable to take observed data at the most local spatial level defined and available – in this case it was to and within North Yorkshire. Exact locations are not known. Assuming a representative sample, the North Yorkshire data would have the highest number of records in York, however with a lot of interaction between Leeds and York. North Yorkshire is a highly interconnected polycentric area and so will be more representative than expanding the spatial area to, for example, Yorkshire & The Humber as a Government region.

Input Data

6.5.5. The following inputs were prepared for use in the synthetic matrix build:

- Trip ends: 24-hour productions and attractions extracted from TEMPro at model zone level for an average weekday to match the specification, see above, by period, assignment purpose and direction (home-based or non-home based).
- Cost skims: distance, time and toll skims at 24-hour level by assignment purpose from a congested assignment to ensure representation of delays were included in the costs.
- Values of time and vehicle operating costs for each assignment purpose and period from TAG Databook – these were used to combine the cost skims into a single matrix of generalised cost by purpose; and
- Observed daily trip length distribution profiles from NTS for North Yorkshire by purpose and direction (home based, or non-home based).

Gravity Model Application

6.5.6. The distribution of origin productions to destination zones was undertaken using a gravity model approach. A bespoke application was developed with inbuilt matrix, distribution and 'FRATAR' (i.e., furness) applications conducting an iterative search on the parameters for the chosen deterrence function. This optimises the trip length distribution based on the zonal trip ends and generalised costs, producing the closest fit to the observed trip length distribution.

6.5.7. In a trip distribution context, the zonal attraction is proportional to the product of the productions from the origin zone and the attractions to the destination zone. The divisor is taken to be a more sophisticated function of generalised cost rather than simply distance – in this instance the Log-normal and Tanner.

6.5.8. One of two different distribution functions was used to determine the attractiveness from zone i to zone j (F_{ij}) by purpose: the Tanner function or the Log-normal function. The choice between the two functions depended on the shape of the observed distribution, to decide which function fits best in each case.

6.5.9. The log-normal function with some fitted purpose-specific parameters, μ and σ is described as follows:

$$F_{ij} = \frac{1}{x\sigma\sqrt{2\pi}} exp\left[-\frac{(lnx-\mu)^2}{2\sigma^2}\right], x > 0$$

where x is the generalised cost of travel between zone i to zone j.

6.5.10. The Tanner function with some fitted purpose-specific parameters, x_1 and x_2 is described as follows:

$$F_{ij} = c_{ij}^{x_1}\exp\left(c_{ij}^{x_2}\right), c_{ij} > 0$$

6.5.11. Define:

- $P_i$to be the number of productions for zone i; and
- A_i to be the number of attractions for zone j.

The number of trips from zone i to zone j in the gravity model is given by:

$$t_{ij} = P_i \frac{A_j F_{ij}}{\sum_x A_x F_{ix}}.$$

6.5.12. The application was run for seven purposes in one 24-hour time-period, generating seven P/A synthetic matrices. The calibrated parameters are shown in Table 6-10.

Table 6-10 - Gravity Model Calibrated Deterrence Function Parameters

Time Period	Demand Segment	Function	mu (μ) or x_1	sigma (σ) or x_2	R2
24H	Home Based Business	Lognormal	1.1	1.2	0.998
	Home Based Commute	Lognormal	1.1	1.7	0.962
	Home Based Education	Lognormal	0.8	0.3	0.985
	Home Based Other	Lognormal	1.1	1.0	0.998
	NHB Business	Lognormal	1.6	1.3	0.996
	NHB Education	Lognormal	0.2	1.4	0.998
	NHB Other	Lognormal	1.6	1.0	0.995

6.5.13. Appendix C provides supplementary reporting of the gravity model calibration including observed and estimated average trip length and trip length distribution comparisons.

Conversion to O/D

6.5.14. To convert the home-based matrices into O/D format, for each trip purpose, the calibrated P/A (outbound) matrices were converted from 24-hour level into each time-period and then transposed to generate the respective return home A/P (inbound) trips. The inbound matrix for each period was then derived as the sum of a proportion of each of the A/P matrices using time-period trip return probability matrices derived from NTS data for North Yorkshire. The factors are tabulated in Table 6-11 and Table 6-12.

Table 6-11 - Synthetic Matrix 24H to Time Period Factors

Purpose	AM	IP	PM	OP
Home Based Business	0.51	0.23	0.14	0.13
Home Based Commute	0.61	0.17	0.05	0.17
Home Based Education	0.69	0.25	0.05	0.01
Home based Other	0.20	0.50	0.20	0.11
NHB Business	0.21	0.63	0.11	0.05
NHB Education	0.29	0.54	0.17	0.00
NHB Other	0.12	0.59	0.21	0.07

Row totals may not sum to 1 due to rounding in the presented values

Table 6-12 - Synthetic Matrix Trip Return Probabilities

		Inbound			
Business		AM	IP	PM	OP
Out-bound	AM	0.06	0.43	0.42	0.09
	IP	0.00	0.44	0.41	0.15
	PM	0.00	0.00	0.37	0.63
	OP	0.07	0.26	0.12	0.54
Commute					
Out-bound	AM	0.02	0.28	0.63	0.07
	IP	0.00	0.31	0.39	0.30
	PM	0.00	0.00	0.14	0.86
	OP	0.07	0.37	0.42	0.14
Education					
Out-bound	AM	0.36	0.51	0.12	0.00
	IP	0.00	0.98	0.02	0.00
	PM	0.00	0.00	0.87	0.13
	OP	0.00	0.00	0.00	1.00
Other					

Business		Inbound			
		AM	IP	PM	OP
Out-bound	AM	0.24	0.55	0.17	0.05
	IP	0.00	0.70	0.25	0.05
	PM	0.00	0.00	0.52	0.48
	OP	0.04	0.01	0.03	0.92

**Row totals may not sum to 1 due to rounding in the presented values*

Conversion to Assignment Matrices

6.5.15. The peak hours given above, as used for the MND matrices, were used to convert the peak period matrices into peak hour (AM and PM) and average hour (IP) for assignment.

6.5.16. The occupancy factors applied to the synthetic matrices to convert from person trips into vehicle trips are listed in Table 6-13.

Table 6-13 - Synthetic Matrix Occupancy Factors

Occupancy	AM	IP	PM	OP
Business	1.13	1.16	1.15	1.17
Commute	1.13	1.15	1.14	1.15
Other	1.71	1.82	1.79	1.79

(TAG Databook July 2021 Table A1.3.3 'Occupancy per Vehicle Kilometre travelled)

6.5.17. The resultant matrices were specified by assignment purpose, by time-period but disaggregated by direction (from-home, to-home and non-home based) for the matrix merge which required differentiation by direction. The matrix totals by time period and purpose are reported in Table 6-14.

Table 6-14 - Synthetic Matrix Totals

Purpose	AM	IP	PM
Home-Based Business - Inbound	583	2,287	5,899
Home-Based Business - Outbound	7,375	1,449	2,164
Home-Based Commuting - Inbound	1,954	11,212	48,443
Home-Based Commuting - Outbound	52,373	6,545	4,756
Home-Based Education - Inbound	6,381	6,327	3,340
Home-Based Education - Outbound	16,989	2,612	1,380

Purpose	AM	IP	PM
Home-Based Other - Inbound	6,090	22,547	30,704
Home-Based Other - Outbound	22,973	24,252	23,288
Non-Home-Based Business	3,927	5,227	2,221
Non-Home-Based Education	1,238	960	713
Non-Home-Based Other	4,917	10,190	8,772
Total	**124,801**	**93,607**	**131,680**

6.6 GV MATRIX DEVELOPMENT

6.6.1. As referenced in Section 3.2 the MND received from Telefonica does not disaggregate goods vehicles (GVs) from other highway motorised traffic.

6.6.2. Therefore, an independent demand data source for GVs was required in order to develop absolute GV prior matrices which could also be used to subtract GV trips from the highway motorised MND.

6.6.3. The MND data provides the HGV data as a separate matrix however it is presented at a LSOA/ MSOA. When this data is disaggregated at the zone level there is a possibility that it may not reflect the travel patterns at zonal level. Similarly, the LGV data is derived from motorised demand using a global factor which might not reflect the demand accurately.

6.6.4. It was agreed with SDC and NYCC to approach TfN to request copy of the HGV matrices from the North Highway Assignment Model (NoHAM) model. The NoHAM freight demand has been calibrated using data from GBFM. Hence the combination of the two datasets will provide better demand distribution which can be used to infill the Selby model matrices as required.

6.6.5. The following points describe how this data was rebased and rezoned for use in the SDSTM.

6.6.6. The matrices were rebased from 2018 to 2019 (BSTM base year) using appropriate growth factors. This was considered proportionate given the small period between the model base years. The factors were:

- LGV: 1.01; and
- HGV: 1.01.

6.6.7. The matrices were rezoned to the SDSTM zone system. This generally consisted of disaggregating NoHAM zones within Selby District and aggregating NoHAM zones outside of the study area.

6.6.8. The following adjustments were made to the rezoned NoHAM matrices:

- Trips between zone pairs that did not interact with the study area were removed including:
  - external intra-zonal trips.
  - external intra-sector inter-zonal trips.
  - External inter-sector trips. Trips between these adjacent sector pairs would not enter the study area.

- The matrices were adjusted with a 10% uplift following comparison of the NoHAM GV matrices against observed GV count data.
- More specific comparisons resulted in the following adjustment factors being applied: LGV - 1.00, 0.92, 1.10 (AM, IP, PM); HGV - 0.75, 0.68, 0.55. These factors were derived based on validation results on the Selby District cordon.
- The SDSTM prior GV matrices were derived by blending the adjusted NoHAM GV matrices with the MND GV matrices using a 50:50 blending ratio. These were then subtracted from MND.

6.7 MATRIX MERGING

6.7.1. The matrix merge process was to combine the two sources of demand data:

- MND matrices; and
- Synthetic matrices.

6.7.2. The process is summarised in Figure 6-19, starting from the processed MND car matrices.

6.7.3. In line with TAG M2.2 guidance, synthetic matrices were used to blend short distance trips accounting for a shortfall within MND. The implementation and parameters for the blending process were tested throughout the matrix development and calibration process through reviewing the prior matrices against the reporting of the prior matrix validation to screenlines and cordons (Section 9) and the impacts of matrix estimation statistics (Section 9.2).

6.7.4. Analysis of the MND trip length distribution found that this shortfall was occurring for all car user classes, particularly below about 15km. A blending criterion of 100% synthetic trips within the bound 0-15km was adopted, with 100% MND trips adopted for distances larger than 15km. Figure 6-10 to Figure 6-18 shows the trip length distribution comparison between the synthetic and MND matrices and was used to determine the point at which the MND matrix became larger than the Synthetic. Only car user classes have been analysed, as the LGV and HGV matrices are derived from alternative data sources.

Figure 6-10 - MND vs Synthetic Trip Length Distribution: AM Business

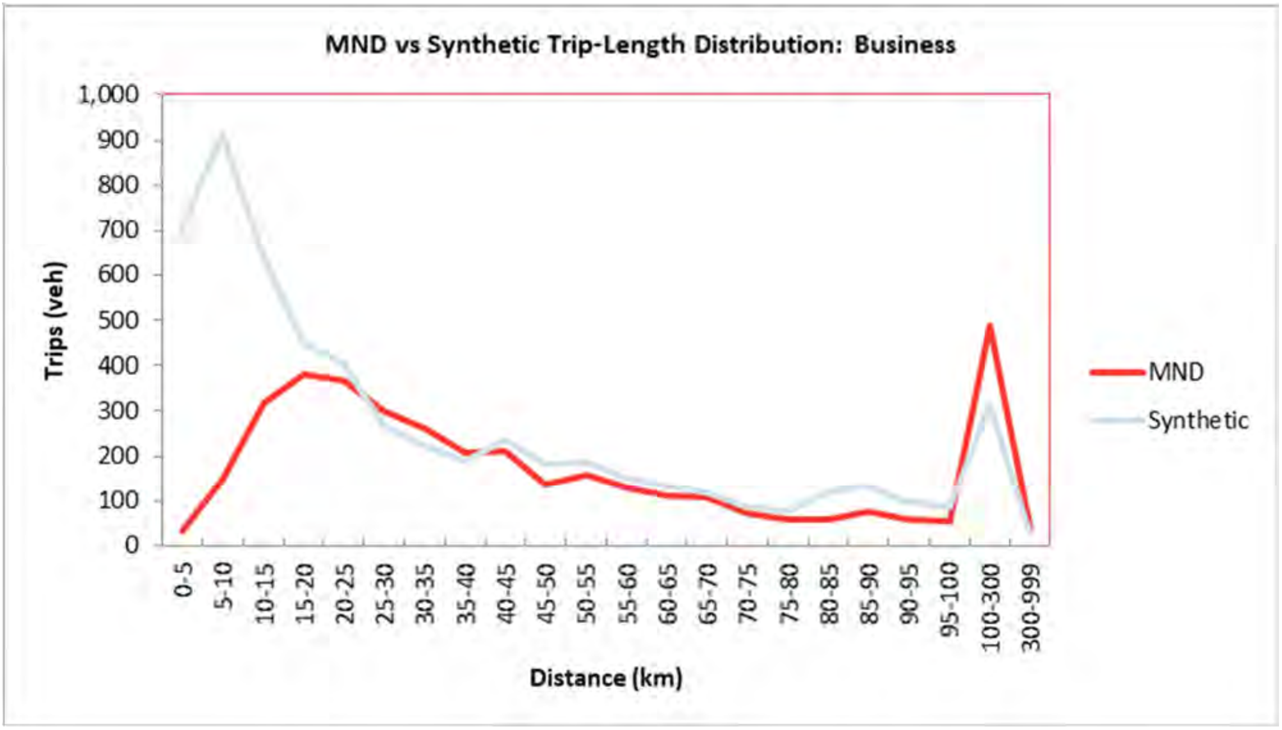


Figure 6-11 - MND vs Synthetic Trip Length Distribution: AM Commute

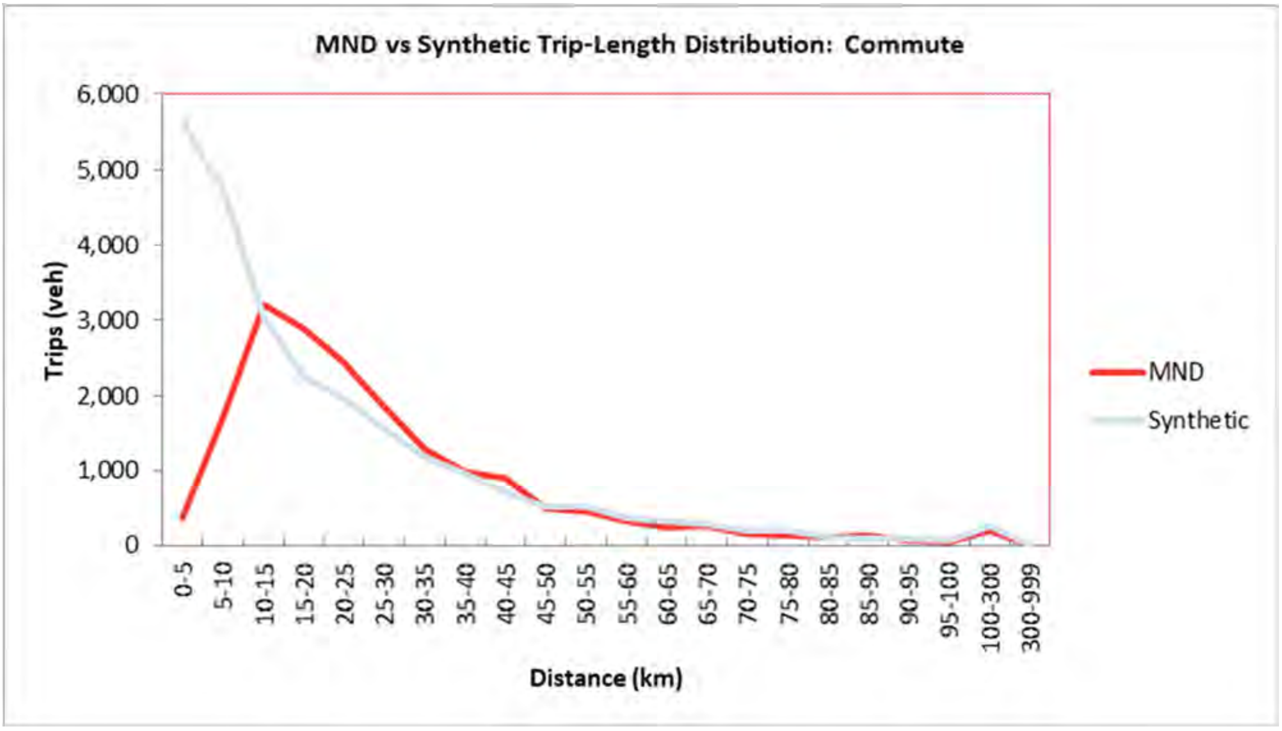


Figure 6-12 - MND vs Synthetic Trip Length Distribution: AM Other

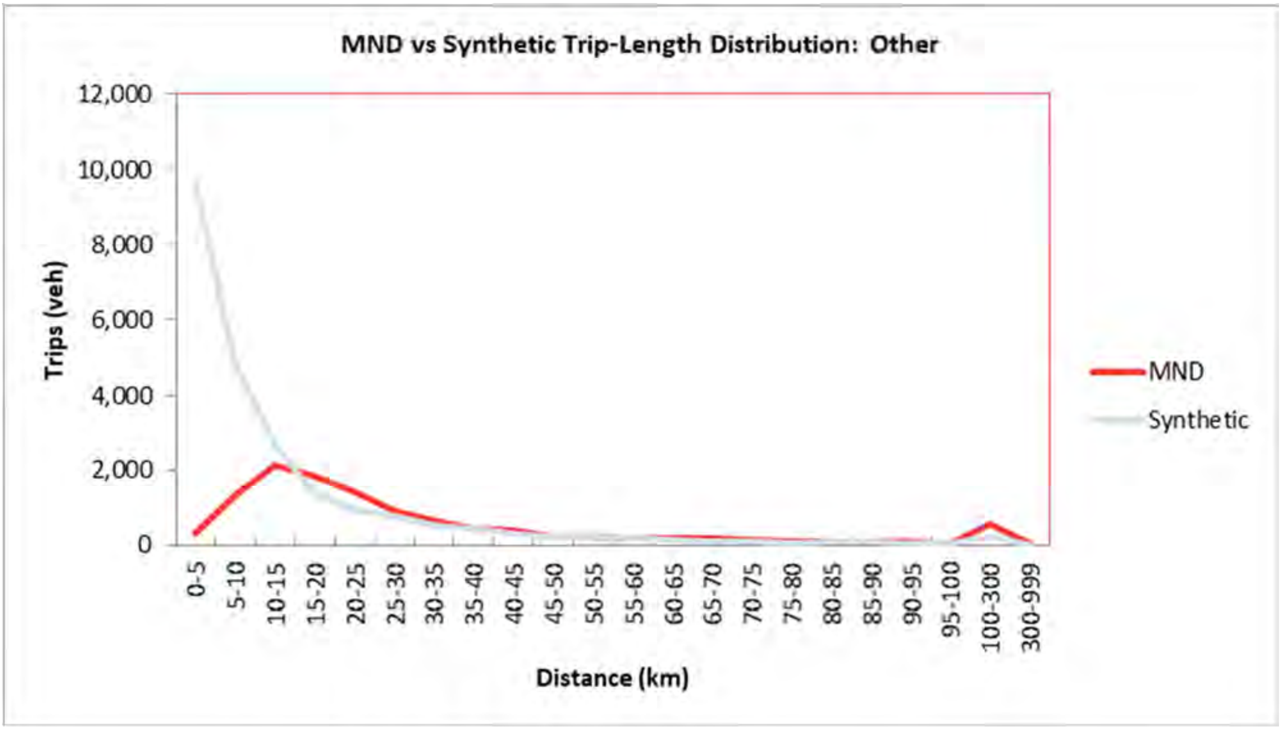


Figure 6-13 - MND vs Synthetic Trip Length Distribution: IP Business

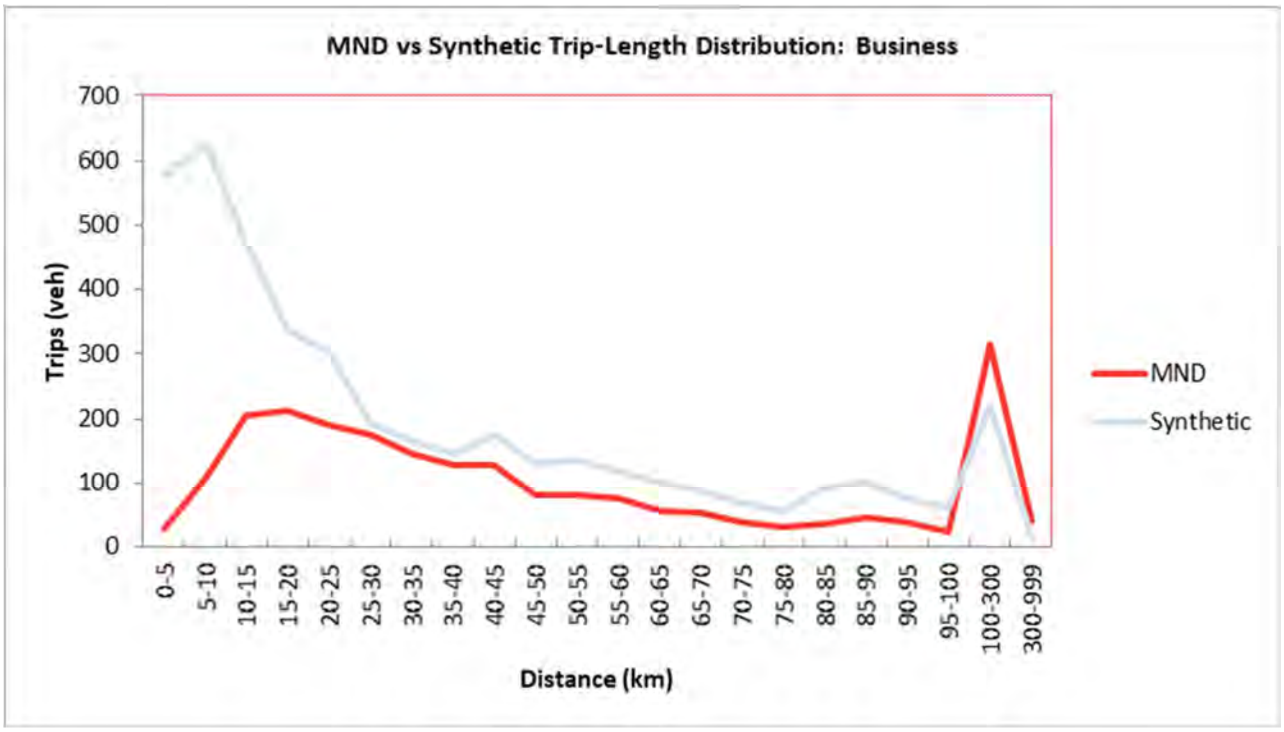


Figure 6-14 - MND vs Synthetic Trip Length Distribution: IP Commute

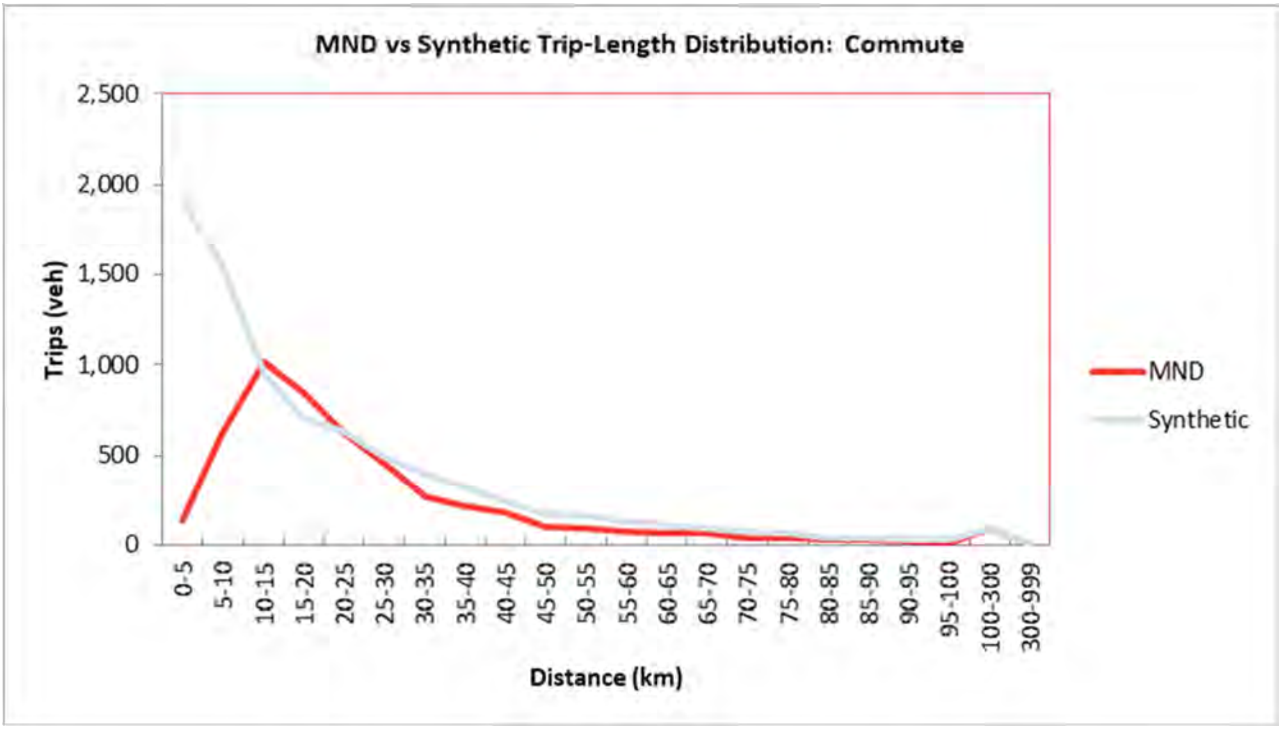


Figure 6-15 - MND vs Synthetic Trip Length Distribution: IP Other

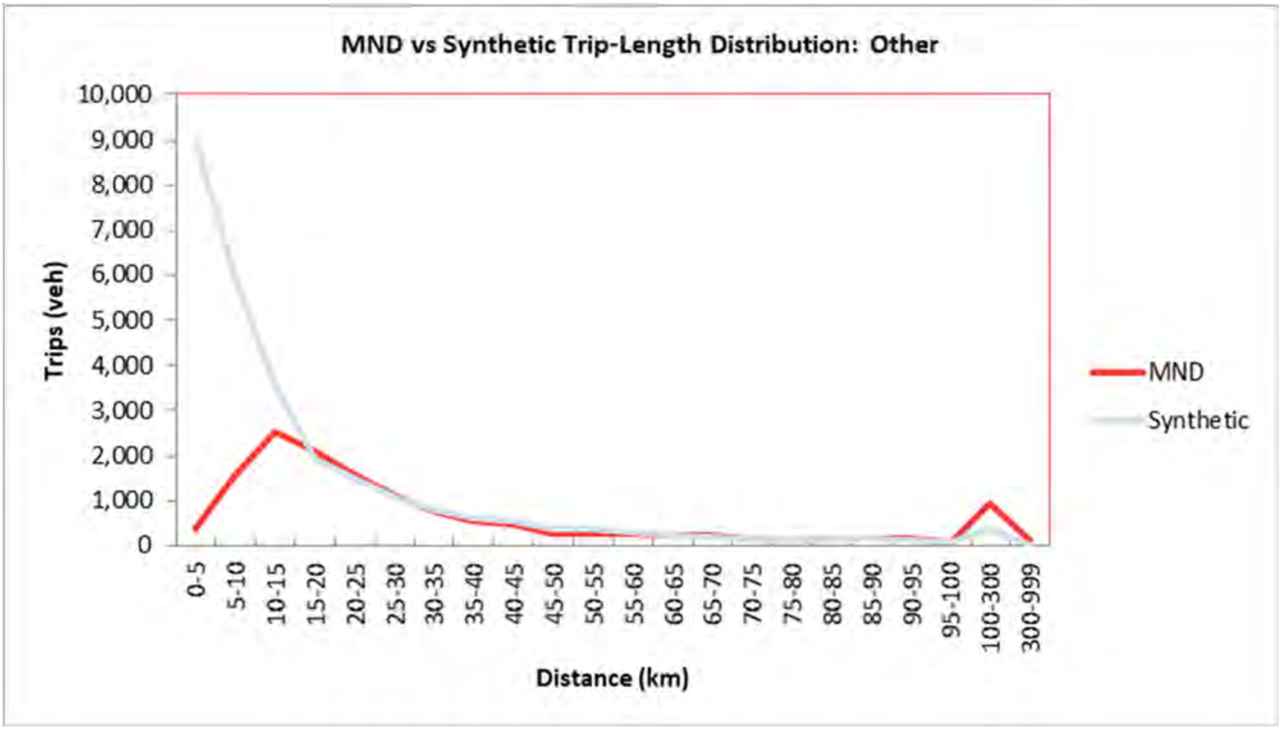


Figure 6-16 - MND vs Synthetic Trip Length Distribution: PM Business

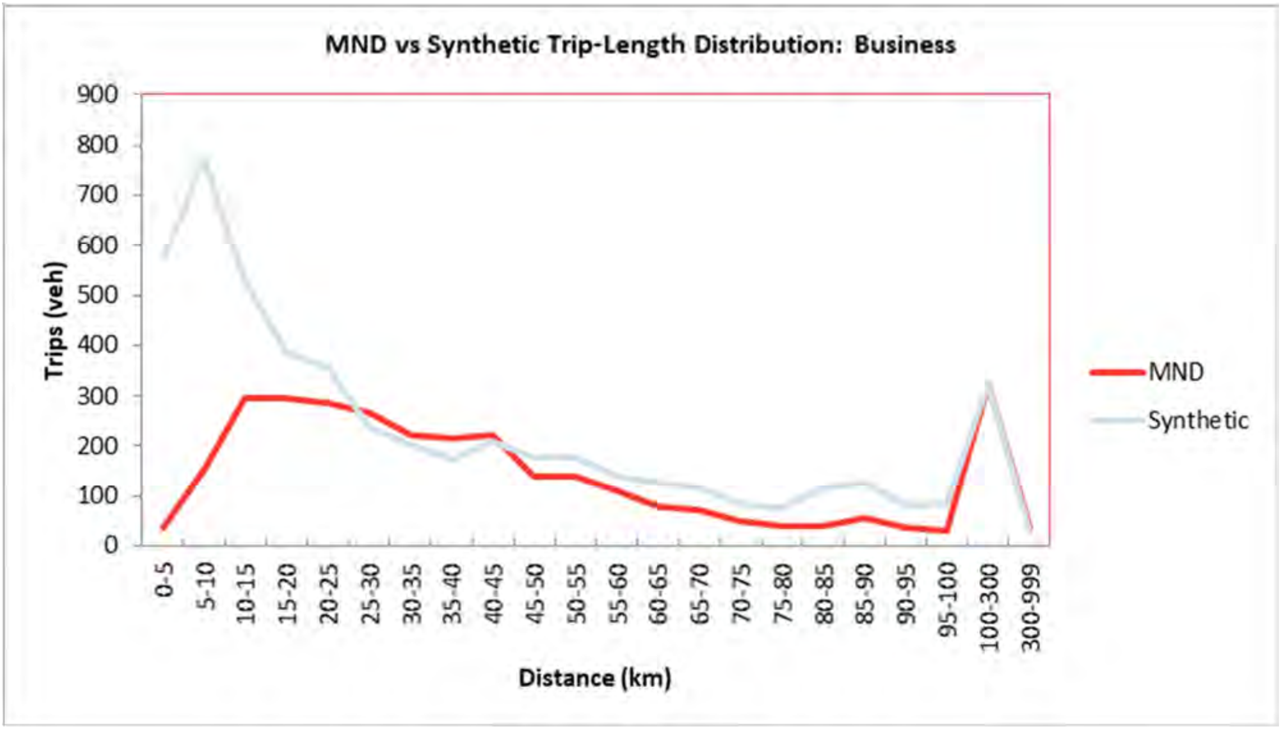


Figure 6-17 - MND vs Synthetic Trip Length Distribution: PM Commute

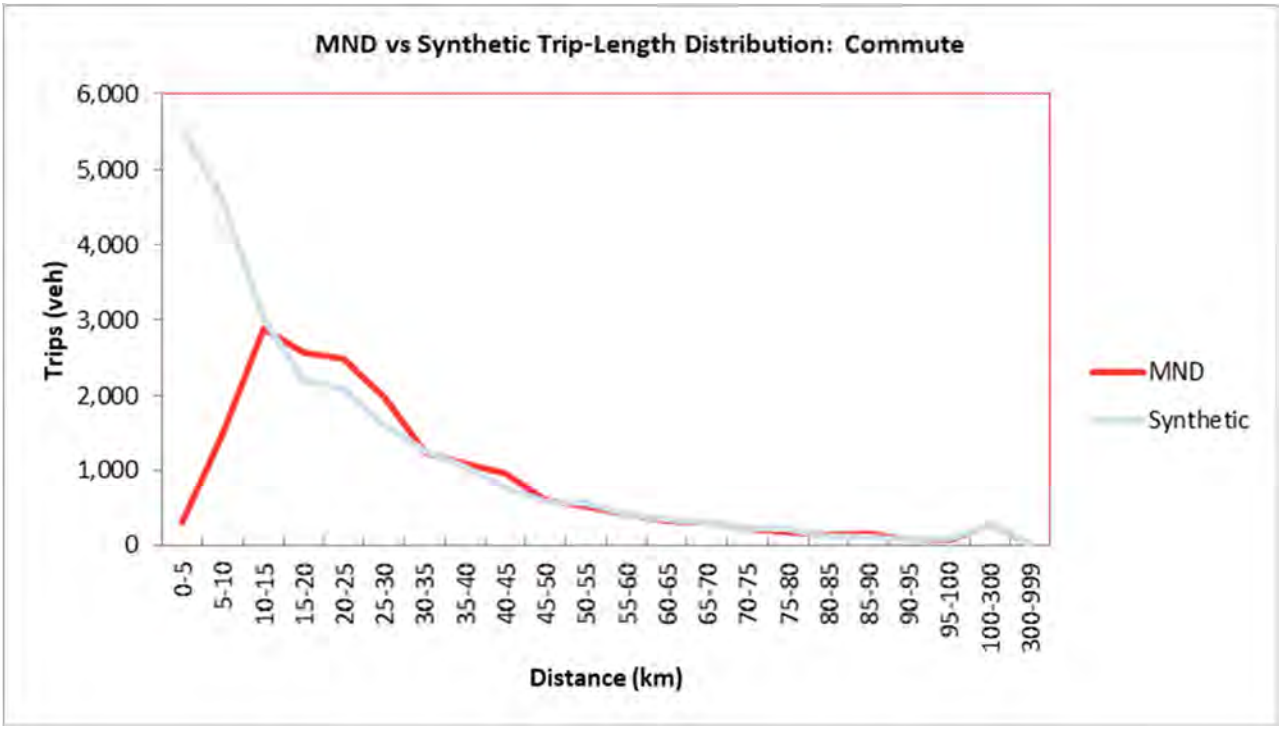


Figure 6-18 - MND vs Synthetic Trip Length Distribution: PM Other

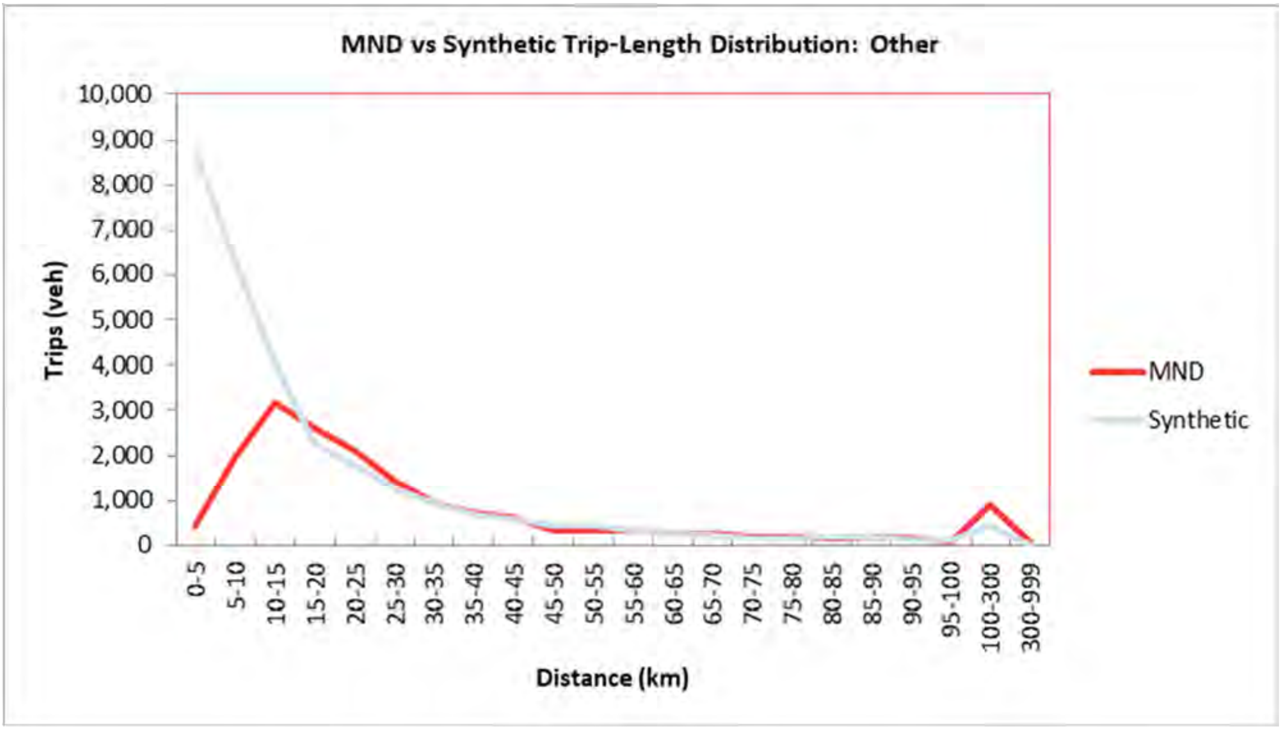
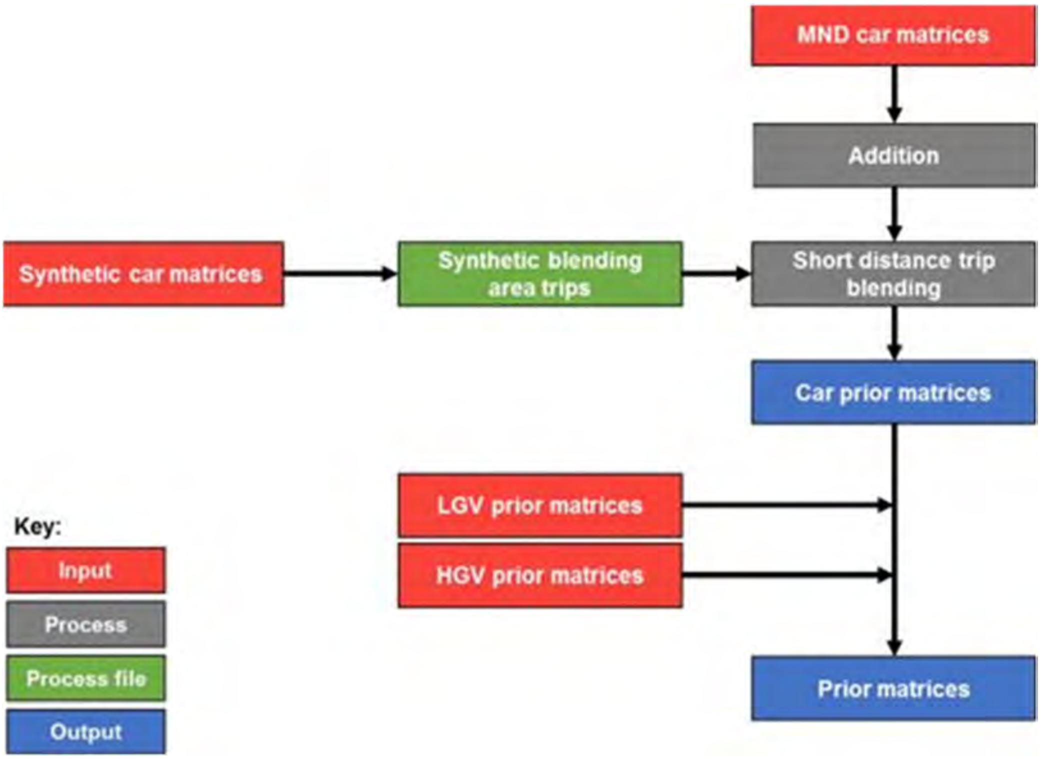


Figure 6-19 - Matrix Merging Process



6.8 PRIOR MATRICES

6.8.1. Section 3.1.2 described the application of count data for calibration and validation, with reference to emerging matrix building guidance which recommends that data may be used firstly as validation, and then incorporated into calibration to refine the model.

6.8.2. The matrix merging process created the initial prior matrices, considering the screenline reporting of the prior matrix validation to screenlines and cordons (Section 9) and the impacts of matrix estimation statistics (Section 9.2).

6.8.3. Prior to undertaking the matrix estimation, localised adjustments, primarily within the urban area, were applied. This was in line with the principal of integrating data into calibration to refine the model, and prior to full use of the data in matrix estimation and forms a part of the matrix calibration.

6.8.4. For cars, the refinements capture uncertainty around the expansion of MND sample data to population. For GVs, this reflected localised uplift of volumes given that the GV matrices are a blend of MND and NoHAM GV matrices.

6.8.5. This generated the prior matrices, with a matrix assignment validation reported in Section 9.2.

Table 6-15 – Merged Prior Matrix Summary by User Class and Period (pcu/hr)

User Class	AM Peak	Inter Peak	PM Peak
Business	11,705	7,632	9,237
Commuting	51,823	15,567	51,544
Other	61,111	66,768	69,858
LGV	18,359	15,080	14,304
HGV	7,978	7,272	4,255
Total	**150,977**	**112,319**	**149,199**

Note: Totals may not sum exactly due to rounding.

6.9 PRIOR MATRIX ASSIGNMENTS

6.9.1. The derived matrices were assigned to networks and reviewed at a screenline level to determine performance against model validation criteria. The high-level statistics for screenline performance and link flow performance are presented below.

6.9.2. The validation prior matrix assignments for all 26 screenlines and cordons (Figure 3-8 and Figure 3-9) are reported in Table 6-16. This shows that modelled flows for well over half of the screen lines in each time period are within 5% or GEH < 4 compared to the observed flow data pre-matrix estimation, and nearly all are either within, or close to that threshold. In all cases, the results are equivalent or stronger for 'all vehicles' than 'cars'.

6.9.3. The performance for the model's all 788 link flow volumes (

6.9.4. Figure 3-10) is reported in Table 6-17. This shows that over 80% of link flows are within criteria pre-matrix estimation. There is a slightly stronger validation for ‘cars’ than ‘all vehicles at a link level. It must be noted that some counts did not have inter-peak data, so the number of links reduces to 728.

6.9.5. The trip matrices have been calibrated against the TAG criteria set out in .

6.9.6. The decision to proceed with these prior matrices into the final run of matrix estimation was based on the prior matrix validation, the calibrated matrix assignment results and the significance of the impacts from matrix estimation in order to achieve the calibrated matrix assignment results. Sections 9 and 9.2 respectively report on the latter two cases.

6.9.7. The reporting of the prior matrix validation at this point is in line with the approach for using data for calibration and validation in this model development that was set out previously in Section 3.11.

Table 6-16 - Prior Matrix Screenline and Cordon Performance

Measure	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Screenlines and Cordons (26)						
Within 5% or GEH < 4	73%	92%	73%	65%	73%	73%
Within 10% or GEH < 7.5	96%	100%	96%	96%	100%	96%

Table 6-17 - Prior Matrix Link Flow Performance

Measure (788 counts)	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	81%	83%	79%	86%	90%	83%
Pass Criteria 2	71%	74%	69%	75%	78%	71%
Pass TAG	**83%**	**84%**	**80%**	**87%**	**90%**	**83%**

6.9.8. Table 6-18 to Table 6-21 shows the comparison between the modelled flows across all screenlines and cordons against the observed flows as a way of assessing the overall matrix fit to the observed data. This is shown at 12 hour level and has been split into all vehicles, cars, LGVs and HGVs.

6.9.9. The results show that at a total level across the whole model, the difference between observed and modelled flows in no greater than 8% across all vehicle types. It must also be noted that at a total vehicle level there very little change at a total screenline level. For the screenlines that have the largest changes, for example Screenline North-South West, the largest GEH value is 7.4 for the Soutbound direction in the AM. This would be considered a ‘near pass’ in the above criteria and has been deemed reasonable for a prior matrix assignment,

6.9.10. Additional reporting of the screenline and cordon verification by time period is provided in Appendix E including verification for cars separately.

Table 6-18 - Prior Matrix Assignment Performance - Screenline/Cordon Total – All Vehicles

	Observed Flow (veh/h)	Modelled Flow (veh/h)	Diff	% Diff
Screenline/ Cordon				
Outer Cordon Inbound	33,858	33,755	-102	-0.3%
Outer Cordon Outbound	33,765	33,915	150	0.4%
Tadcaster Cordon Inbound	17,305	17,690	385	2.2%
Tadcaster Cordon Outbound	17,328	17,772	443	2.6%
Sherburn Cordon Inbound	5,349	5,102	-248	-4.6%
Sherburn Cordon Outbound	5,364	5,249	-115	-2.1%
Eggborough Cordon Inbound	5,967	5,340	-627	-10.5%
Eggborough Cordon Outbound	5,975	5,385	-590	-9.9%
Screenline North-South West NB	3,752	3,923	170	4.5%
Screenline North-South West SB	3,474	4,150	676	19.4%
Screenline North-South North NB	20,409	21,383	974	4.8%
Screenline North-South North SB	20,375	20,803	428	2.1%
Screenline North-South Central NB	18,078	18,479	401	2.2%
Screenline North-South Central SB	17,764	18,313	549	3.1%
Screenline East-West East EB	2,990	2,811	-179	-6.0%
Screenline East-West East WB	3,170	2,859	-311	-9.8%
Screenline East-West Central EB	11,341	10,508	-833	-7.3%
Screenline East-West Central WB	11,028	9,967	-1,060	-9.6%
Selby Outer Cordon Inbound	8,599	8,408	-191	-2.2%

Selby Outer Cordon Outbound	7,856	7,945	89	1.1%
Selby North-South NB	6,794	6,663	-131	-1.9%
Selby North-South SB	6,549	6,525	-24	-0.4%
Selby East-West EB	2,580	2,406	-175	-6.8%
Selby East-West WB	2,370	2,203	-166	-7.0%
Selby Town Centre Cordon Inbound	8,596	8,167	-429	-5.0%
Selby Town Centre Cordon Inbound	8,174	7,966	-208	-2.5%
Total	**288,809**	**287,686**	**-1,124**	**-0.4%**

Table 6-19 - Prior Matrix Assignment Performance - Screenline/Cordon Total – Cars

	Observed Flow (veh/h)	Modelled Flow (veh/h)	Diff	% Diff
Screenline/ Cordon				
Outer Cordon Inbound	27,506	27,285	-221	-0.8%
Outer Cordon Outbound	27,287	27,366	79	0.3%
Tadcaster Cordon Inbound	13,995	14,035	39	0.3%
Tadcaster Cordon Outbound	13,997	14,102	105	0.7%
Sherburn Cordon Inbound	4,346	4,056	-290	-6.7%
Sherburn Cordon Outbound	4,386	4,176	-210	-4.8%
Eggborough Cordon Inbound	4,801	4,286	-515	-10.7%
Eggborough Cordon Outbound	4,808	4,335	-473	-9.8%
Screenline North-South West NB	3,081	3,269	189	6.1%
Screenline North-South West SB	2,817	3,354	537	19.1%

Screenline North-South North NB	14,694	16,286	1,591	10.8%
Screenline North-South North SB	14,605	15,714	1,109	7.6%
Screenline North-South Central NB	13,973	14,675	702	5.0%
Screenline North-South Central SB	13,792	14,477	686	5.0%
Screenline East-West East EB	2,437	2,310	-128	-5.2%
Screenline East-West East WB	2,613	2,402	-212	-8.1%
Screenline East-West Central EB	8,028	7,704	-325	-4.0%
Screenline East-West Central WB	7,775	7,415	-359	-4.6%
Selby Outer Cordon Inbound	7,300	7,519	219	3.0%
Selby Outer Cordon Outbound	6,613	7,035	423	6.4%
Selby North-South NB	5,762	5,819	57	1.0%
Selby North-South SB	5,571	5,568	-3	0.0%
Selby East-West EB	2,240	2,044	-196	-8.7%
Selby East-West WB	2,037	1,885	-152	-7.5%
Selby Town Centre Cordon Inbound	7,699	7,541	-158	-2.1%
Selby Town Centre Cordon Inbound	7,279	7,335	55	0.8%
Total	**229,442**	**231,992**	**2,550**	**1.1%**

Table 6-20 - Prior Matrix Assignment Performance - Screenline/Cordon Total – LGVs

	Observed Flow (veh/h)	Modelled Flow (veh/h)	Diff	% Diff
Screenline/ Cordon				
Outer Cordon Inbound	4,417	4,438	21	0.5%
Outer Cordon Outbound	4,461	4,473	11	0.3%
Tadcaster Cordon Inbound	2,286	2,629	343	15.0%
Tadcaster Cordon Outbound	2,289	2,642	353	15.4%
Sherburn Cordon Inbound	615	629	15	2.4%
Sherburn Cordon Outbound	617	632	14	2.3%
Eggborough Cordon Inbound	793	625	-169	-21.3%
Eggborough Cordon Outbound	787	630	-156	-19.9%
Screenline North-South West NB	511	451	-59	-11.6%
Screenline North-South West SB	495	550	56	11.3%
Screenline North-South North NB	3,045	3,096	52	1.7%
Screenline North-South North SB	3,105	2,953	-153	-4.9%
Screenline North-South Central NB	2,417	2,090	-327	-13.5%
Screenline North-South Central SB	2,346	1,997	-349	-14.9%
Screenline East-West East EB	391	327	-64	-16.3%
Screenline East-West East WB	394	330	-64	-16.3%
Screenline East-West Central EB	1,664	1,404	-260	-15.6%
Screenline East-West Central WB	1,605	1,411	-194	-12.1%
Selby Outer Cordon Inbound	1,049	641	-408	-38.9%

Selby Outer Cordon Outbound	1,001	636	-365	-36.5%
Selby North-South NB	778	568	-209	-26.9%
Selby North-South SB	731	567	-164	-22.4%
Selby East-West EB	265	199	-66	-24.9%
Selby East-West WB	252	195	-57	-22.7%
Selby Town Centre Cordon Inbound	827	428	-399	-48.2%
Selby Town Centre Cordon Inbound	818	422	-396	-48.5%
Total	**37,955**	**34,963**	**-2,992**	**-7.9%**

Table 6-21 - Prior Matrix Assignment Performance - Screenline/Cordon Total – HGVs

	Observed Flow (veh/h)	Modelled Flow (veh/h)	Diff	% Diff
Screenline/ Cordon				
Outer Cordon Inbound	1,935	2,032	97	5.0%
Outer Cordon Outbound	2,017	2,077	60	3.0%
Tadcaster Cordon Inbound	1,023	1,026	3	0.3%
Tadcaster Cordon Outbound	1,043	1,028	-15	-1.4%
Sherburn Cordon Inbound	389	416	28	7.2%
Sherburn Cordon Outbound	360	441	81	22.5%
Eggborough Cordon Inbound	373	429	56	15.0%
Eggborough Cordon Outbound	381	420	39	10.2%
Screenline North-South West NB	161	202	41	25.2%
Screenline North-South West SB	163	246	83	50.7%

Screenline North-South North NB	2,670	2,001	-669	-25.1%
Screenline North-South North SB	2,665	2,136	-529	-19.8%
Screenline North-South Central NB	1,688	1,714	26	1.5%
Screenline North-South Central SB	1,627	1,838	212	13.0%
Screenline East-West East EB	162	175	12	7.7%
Screenline East-West East WB	163	128	-35	-21.6%
Screenline East-West Central EB	1,648	1,400	-249	-15.1%
Screenline East-West Central WB	1,648	1,141	-507	-30.8%
Selby Outer Cordon Inbound	250	247	-3	-1.1%
Selby Outer Cordon Outbound	243	275	32	13.1%
Selby North-South NB	254	275	21	8.4%
Selby North-South SB	247	390	143	58.0%
Selby East-West EB	76	163	87	114.3%
Selby East-West WB	81	124	43	53.9%
Selby Town Centre Cordon Inbound	70	198	128	184.3%
Selby Town Centre Cordon Inbound	77	209	133	173.0%
Total	**21,413**	**20,731**	**-682**	**-3.2%**

7 HIGHWAY ASSIGNMENT PROCESS

7.1 INTRODUCTION

7.1.1. This chapter details the highway assignment process including:

- Generalised costs.
- TAG convergence measures.
- Convergence parameters in SATURN; and
- Assignment convergence.

7.1.2. The SDSM has been constructed in the SATURN modelling suite using an assignment process based upon Wardop's Equilibrium Theory. The principle behind the theory states that traffic arranges itself on a network so that the cost of travel on a route between an origin and destination is equal to or less than all other potential but unused routes. This applies to all trips in the network such that the lowest overall or aggregate cost within the network extents can be achieved.

7.2 TAG CONVERGENCE MEASURES

7.2.1. An assignment model is deemed to be converged if there is no significant change in travel costs across all the routes between successive iterations. Convergence limits "modelled noise", reducing errors and allowing the true impacts of forecast model tests to be established.

7.2.2. TAG recommends several criteria to be applied for all highway assignments to achieve a final solution, i.e., route choice, flows and delays produced from the model are deemed stable. It recommends that the model should continue until, for at least 98% of cases, the percentage of link flow or cost differences changes by no more than 1% on four successive iterations, as replicated in Table 7-1.

Table 7-1 - TAG Convergence Measures

Measure of convergence	Base Model Acceptable Values
Delta and %Gap	Less than 0.1% or at least with convergence fully documented and all other criteria met
Percentage of links with flow change < 1%	Four consecutive iterations greater than 98%
Percentage of links with cost change < 1%	Four consecutive iterations greater than 98%

(Source: TAG M3.1 Table 4)

7.3 CONVERGENCE PARAMETERS IN SATURN

7.3.1. The parameters implemented in SDSM are equivalent or more stringent than those required by TAG to ensure a high level of convergence is achieved in the base year assignments and are listed in Table 7-2.

Table 7-2 - Assignment Parameters

Parameter	Function	SATURN Default Value	SDSM Value
MASL	Maximum number of assignment-simulation loops within SATALL.	15	150
KONSTP	Control of Stopping Criteria: based on selection.	0 (ISTOP)	5*
RSTOP	Used in convergence of assignment/simulation loops.	95% (TAG criteria 98%)	99%
NOMADS	Number of multiple user classes to be assigned separately.	1	5
STPGAP	Critical gap value (%) used to terminate assignment-simulation loops when KONSTP = 1 or 5.	1% (TAG criteria 0.1%)	0.01%
PCNEAR	Percentage change in flows judged to be "near" in successive assignments.	1%	1%
NISTOP	The number of successive loops which must satisfy the "ISTOP" criteria in the test for convergence of the assignment/simulation loops.	4	4

* 5 means that SATURN seeks to terminate the assignment only when proximity (STPGAP) and stability (RSTOP/PCNEAR/NISTOP) measures are both satisfied

7.4 ASSIGNMENT CONVERGENCE

7.4.1. In accordance with the criteria described above, the convergence results are summarised in Table 7-3. The base model assignments achieve the SDSM criteria (equivalent to or exceeding TAG) in all time periods. The final loop was 11, 16 and 13 in the AM peak, inter peak and PM peak model respectively.

Table 7-3 - Calibrated Assignment Convergence Statistics

Time Period	Loop	Proximity indicator: Delta (δ) / (Gap (%)	Stability Indicator: % Flow (Link Flows Differing by < 1% Between Assignment & Simulation)	Stability Indicator: % Delays (Turn Delays Differing by < 1% Between Assignment & Simulation)
AM	8	0.004	99.1	99.9
	9	0.004	99.1	99.9
	10	0.0038	99.2	99.9
	11	0.0037	99.3	99.9
IP	13	0.0007	99.3	100.0
	14	0.0004	99.3	100.0
	15	0.0003	99.6	100.0
	16	0.0005	99.6	100.0
PM	10	0.0041	99.2	100.0
	11	0.0043	99.6	100.0
	12	0.0052	99.4	99.9
	13	0.0059	99.2	100.0

8 HIGHWAY NETWORK CHECKS & CALIBRATION

8.1 INTRODUCTION

8.1.1. This chapter details the calibration process undertaken for the SDSM base year models. Standard techniques, referencing TAG guidance, have been employed to produce the calibrated base year highway models and validate these against independent data sources.

8.1.2. The calibration process involved three sources of information:

- Traffic count ATC/MCC and journey time data collated and processed in accordance with the methodology set out in Chapter 3.
- Initial SATURN networks for each time period (AM peak, inter peak and PM peak) developed in accordance with the methodology set out in Chapter 4; and
- Initial trip matrices for each time period (AM peak, inter peak and PM peak) developed in accordance with the methodology set out in Chapter 5.

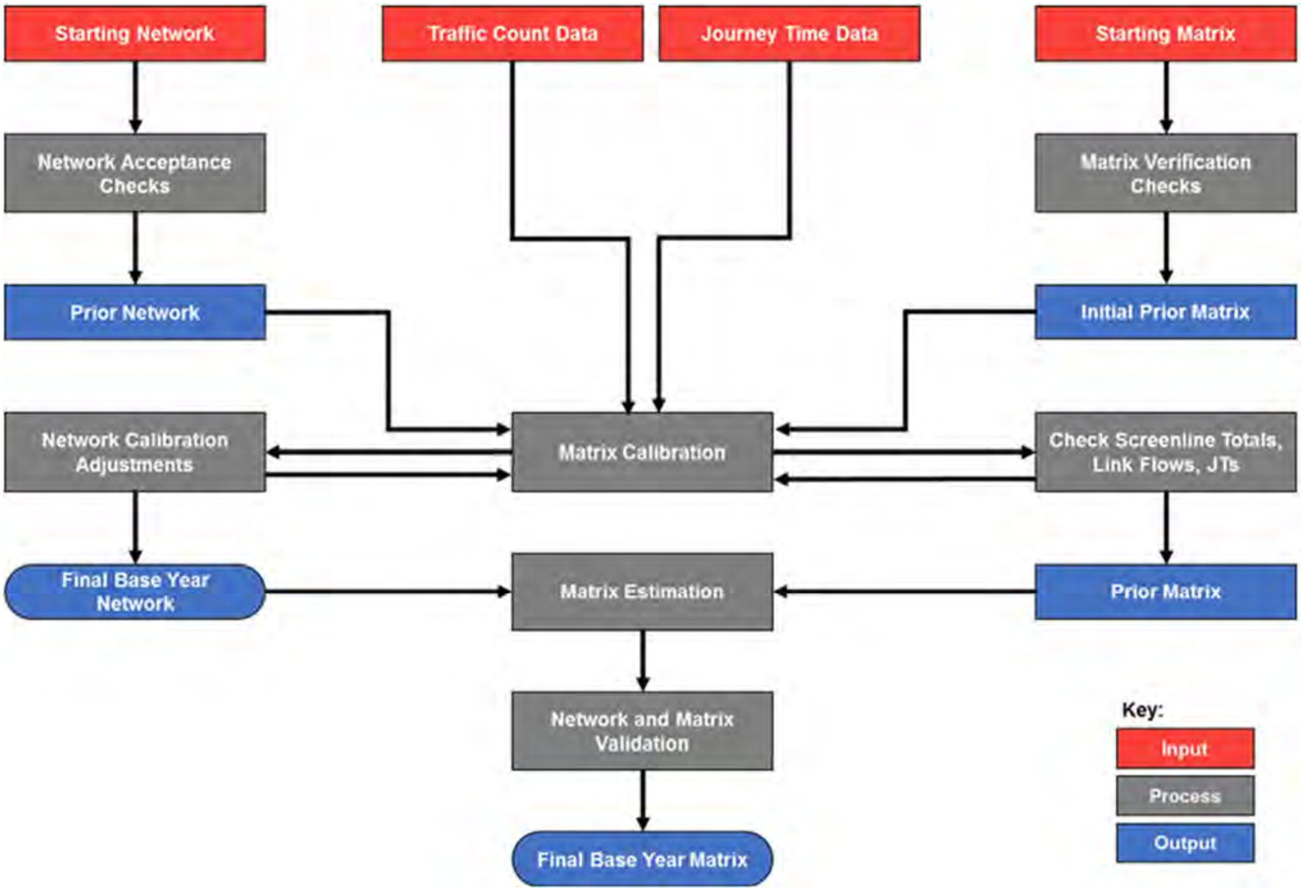
8.1.3. The process for calibrating base year highway models is described in this chapter, including details of:

- Network checking and acceptance tests.
- Network calibration – local adjustments.
- Matrix calibration – prior matrix assignments.
- Matrix calibration – matrix estimation process; and
- Matrix calibration – impacts of matrix estimation.

8.1.4. A summary of the whole calibration and validation process is illustrated in Figure 8-1.

8.1.5. Chapter 8 documents the SDSM validation results which follows on from the model calibration process.

Figure 8-1 - Calibration and Validation Process



8.2 NETWORK CHECKING AND ACCEPTANCE TESTS

8.2.1. Quality and calibration checks were carried out on the networks following the completion of network coding which have been designed to assess the network suitability before moving into full calibration tasks.

8.2.2. Detailed reporting of these checks can be found in Appendix D including tabulations and P1X outputs where relevant. The summary results are presented below.

Test 1 – Network Completeness Check

8.2.3. The network for the study area was developed in accordance with the specification agreed in the MSR. As agreed with SDC, all roads within the study area have been coded in the simulation network and roads outside the study area had been coded as buffer or external network. There was a total of 6,647 modelled links representing 10,508km of modelled network and 3,802 model nodes.

Test 2 – SATURN Compilation Check

8.2.4. The networks were built in SATNET and reviewed and adjusted were necessary throughout the network development.

Test 3 – Inspection of Key Junctions

8.2.5. The following checks were completed across the study area:

- Junctions had the correct definitions.
- Junctions had consistent and appropriate representations based on the available data sources.
- Signalised junctions had correct timings based on the data available;
- Times to circle roundabouts were consistent and appropriate based on the data available; and
- Right turn on major arm definitions for priority junctions were applied consistently.

Test 4 – Range/Logic Checks

8.2.6. The modelled networks were checked to make sure that the characteristics of the coded network (junction type, number of arms and lanes, lane usage) and the properties assigned to the network (road class, speeds, speed-flow curves) were coded correctly. The coded link speeds and HGV restrictions are presented in Figure 8-2, Figure 8-3 and Figure 8-4 respectively.

Test 5 – Network Routeing

Twenty-five paths were tested in line with the TAG recommendation on number of routes to test. Guidance presented in TAG Unit M3.1 proposes the number of routes to be tested is derived from the formula:

- Number of OD Pairs = $(\text{Number of Zones})^{0.25}$ x Number of User Classes

8.2.7. All of the tested paths showed plausible routings in a congested urban network with wide route choice in some cases and validated against Google Maps journey planner; in particular for areas that are unexpectedly avoided or unexpectedly attractive on the unloaded network.

8.2.8. The checks undertaken on the resultant networks are documented and reviewed in Appendix D.

Test 6 – Link Consistency Tests

8.2.9. It was verified against the specified acceptance criteria that:

- There was no change in link type between directions unless there is a specific justification such as a difference in speed limit or number of lanes.
- Dual carriageways had the same link type in both directions except where indicated by a difference such as speed limit or number of lanes; and
- The change in link type was consistent providing changes in speed limit when moving between urban and rural areas.

8.2.10. The percentage difference between the coded links lengths from SATURN and the crow-fly distances were checked for consistency.

Test 7 – Flat Matrix Assignment

8.2.11. A flat matrix is a matrix in which all cells have the same value.

8.2.12. The flat matrix assignment was checked against various measures:

- Routing between OD pairs (using a subset of those pairs from Test 4) appeared plausible with traffic using the major roads and taking the most obvious route in all cases.

- Bandwidths plots for actual flow showed a correct magnitude of difference between traffic on the strategic links and the minor roads; and
- Node delay plots for the urban areas showed delay occurring at expected locations on key links in and around the town centres.

8.3 NETWORK CALIBRATION – LOCAL ADJUSTMENTS

8.3.1. As part of the calibration process, preliminary assignments were carried out using different iterations of the trip matrices to assist with debugging the networks. This undertaking was carried out prior to running matrix estimation to prevent the matrix calibration from causing issues through compensating for network errors.

Delays and Flows

8.3.2. Additional network checks undertaken as part of the calibration included:

- Capacities versus observed counts.
- Modelled delays versus observed delays; and
- Modelled flows versus observed flows.

8.3.3. Where issues with the initial networks were identified, the parameters defining the capacity of movements were reviewed. The loading of zone connectors was reviewed and refined accordingly to represent more accurate loading of the traffic on to the network and to avoid issues with delays at major junctions due to loading directly to junctions.

Signalised Junctions

8.3.4. The initial assignments were reviewed to check that the levels of delay at signalised nodes was reasonable and to find the least converged nodes. For the problem areas, local signal optimisation was used as a proxy to represent varying signal timings under maximum / minimum green times.

8.3.5. However, before being adopted into the networks the signal timings were examined to assure the sensible results on a junction basis, particularly with respect to traffic volume and route hierarchy.

Figure 8-2 - Modelled Link Speeds

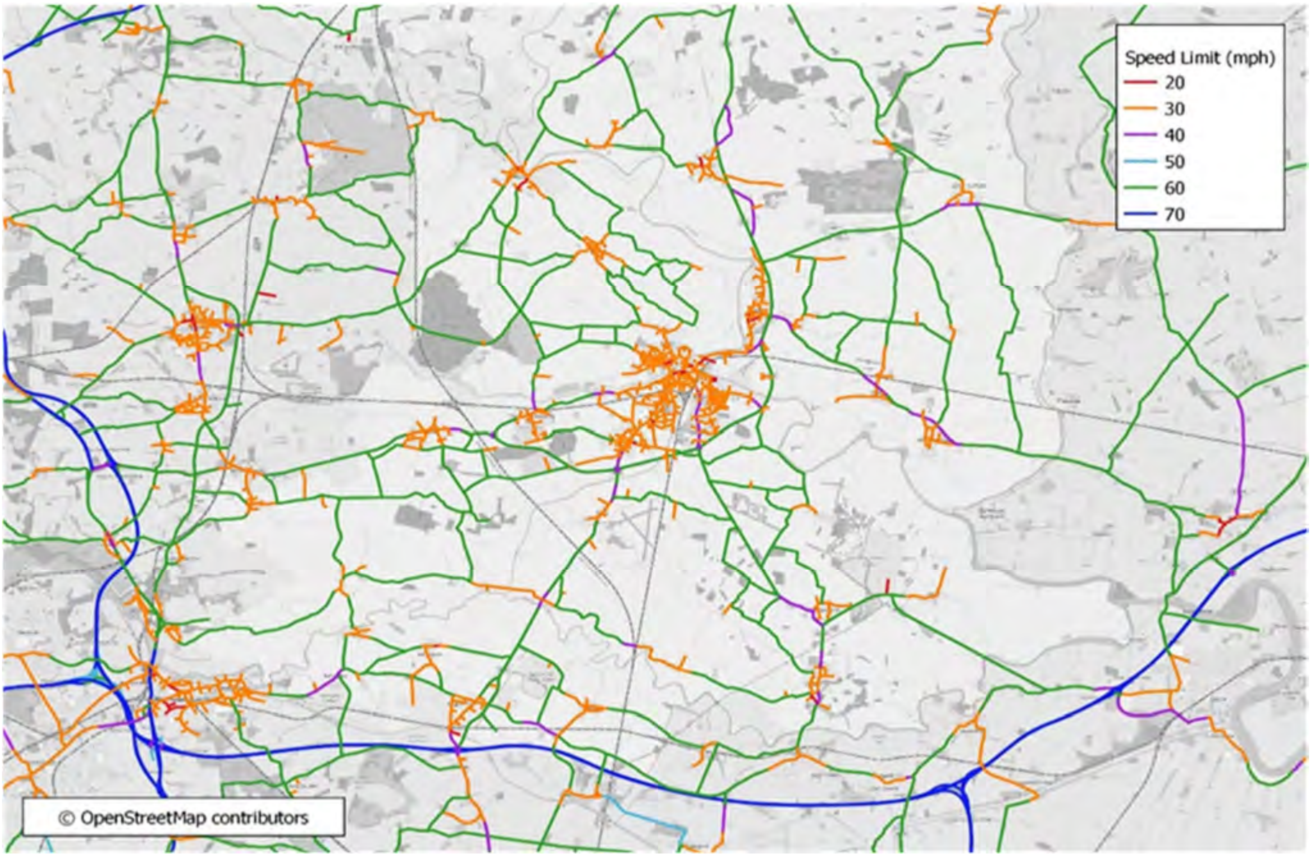


Figure 8-3– Links with HGV Restrictions: Selby Urban Area

Figure 8-4 - Links with HGV Restrictions: Selby District

9 MATRIX ESTIMATION

9.1 MATRIX CALIBRATION – MATRIX ESTIMATION PROCESS

9.1.1. The matrix estimation process used an iterative approach to generate a matrix with improved calibration and validation in the model. Six iterations were used, whereby the PIJA route choice factors were taken from the previous iteration, but the original prior matrix was always used for the demand adjustment. This process is shown in Figure 9-1.

9.1.2. There are several parameters within SATURN that permit the user to control the extent of change that will be caused by the matrix estimation. The SDSM process has adopted the values which have been used successfully on previous studies by WSP, including ones which utilised mobile phone data and similar matrix development techniques. The parameters are listed in Table 9-1.

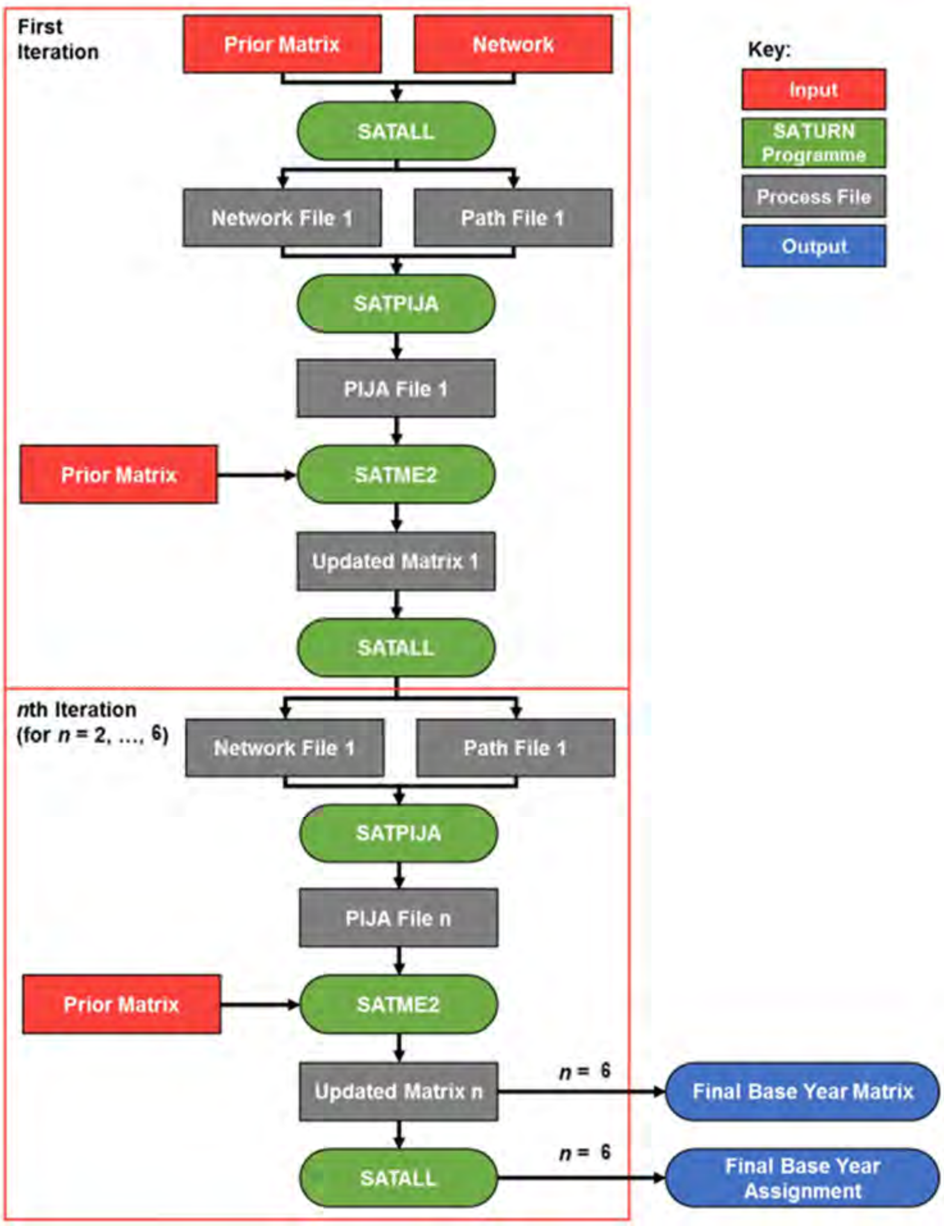
9.1.3. A benefit of using mobile phone data is that it provides complete national coverage of trip making to, from and through the MND study area. Combined with the synthetic matrices infilling short distance trips there is no expectation of unobserved movements in the demand data. Therefore, a SEED value was not used.

9.1.4. The higher XAMAX value for the GV matrices reflects the lower confidence in the demand data used to derive those matrices. The ratio of the XAMAX values was initially based on values which have been used successfully on previous studies, and then reviewed during the model calibration process.

Table 9-1 - SATURN Constraints for Matrix Estimation

Parameter	Description	SDSM Value
XAMAX	The maximum balancing factor to be applied to avoid large changes to the prior matrix. (The minimum balancing factor is taken as the inverse)	Car: 2 LGV/HGV: 5
EPSILN	The convergence criteria for the difference between individual observed counts and their respective model flow.	0.001
ITERMX	The maximum number of iterations that will be run to achieve convergence.	299

Figure 9-1 - Matrix Estimation Process



9.2 MATRIX CALIBRATION – IMPACTS OF MATRIX ESTIMATION

9.2.1. The impacts of matrix estimation are assessed against four measures:

- Trip length distribution.
- Zonal cell values.
- Zonal trip ends; and
- Sector to sector movements.

The performance of the SDSM against each of these is reported in turn throughout this sub-section. Supplementary, and more detailed, report is provided in Appendix F.

Trip Length Distribution

9.2.2. TAG recommends that the trip length distribution statistics for the mean and standard deviation should be analysed with a significance criterion of differences within 5%.

9.2.3. The trip length distribution statistics for SDSM are presented in Table 9-2. The mean and standard deviation is within criteria for all cases. The trip length distributions for the AM peak can be viewed in Figure 9-2 to Figure 9-6 – all such graphs are included in Appendix F.

9.2.4. It should be noted that the average trip lengths reported in Table 9-2 are for the model overall. Specifically, this includes medium and longer distance external traffic on the two motorways and A64 which pass through the study area and skew the average trip lengths reported below to appear longer than may be expected. It is appropriate to include those trips in this analysis because there is calibration data on those roads, but it means these figures should not be considered to be representative of the modelled average trip length for trips to, from and within the local area itself.

Figure 9-2 - AM Peak – Employer's Business Car - Trip Length Distribution (Prior vs Post-ME)

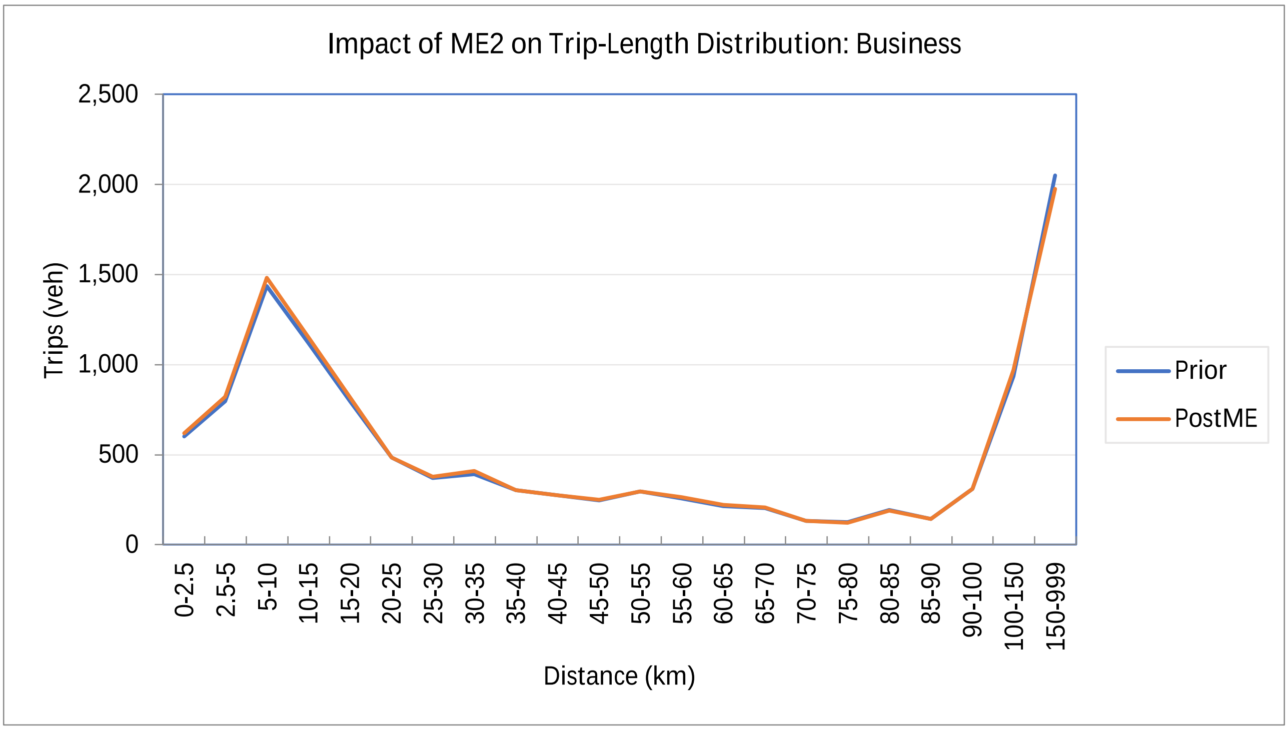


Figure 9-3 - AM Peak – Commuting Car - Trip Length Distribution (Prior vs Post-ME)

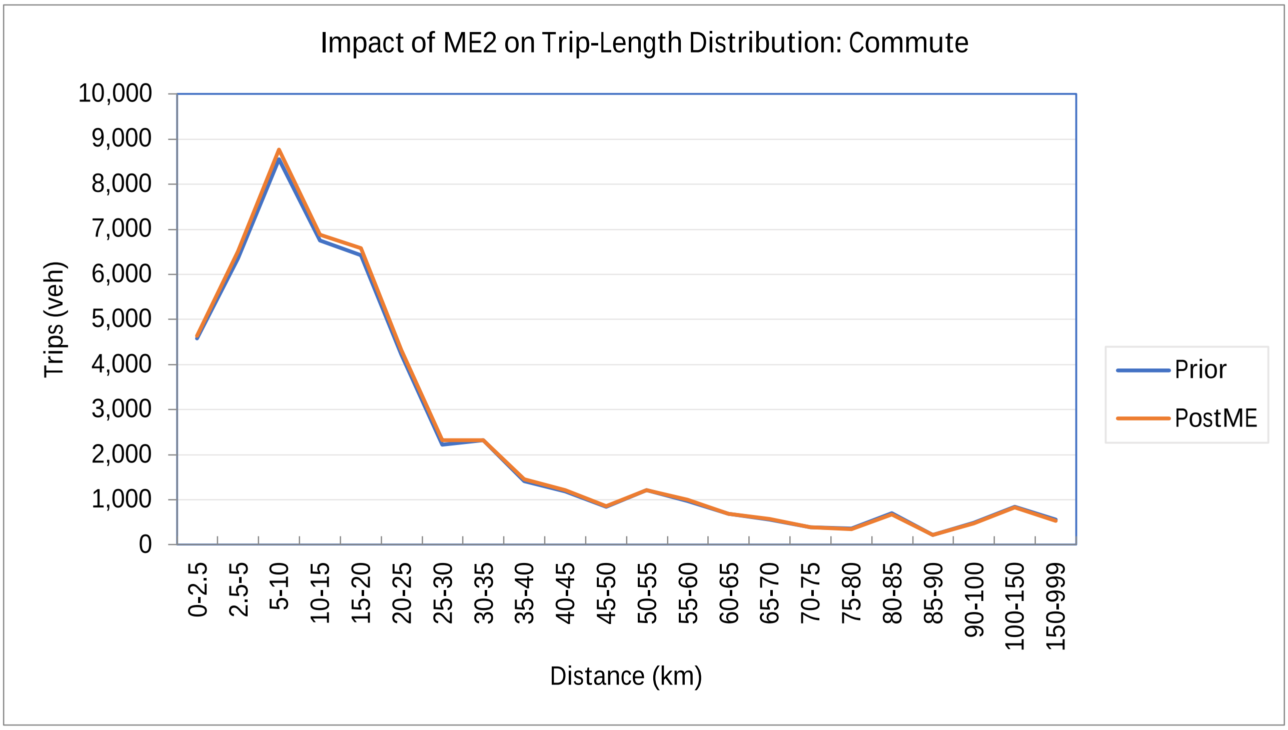


Figure 9-4 - AM Peak – Other Car - Trip Length Distribution (Prior vs Post-ME)

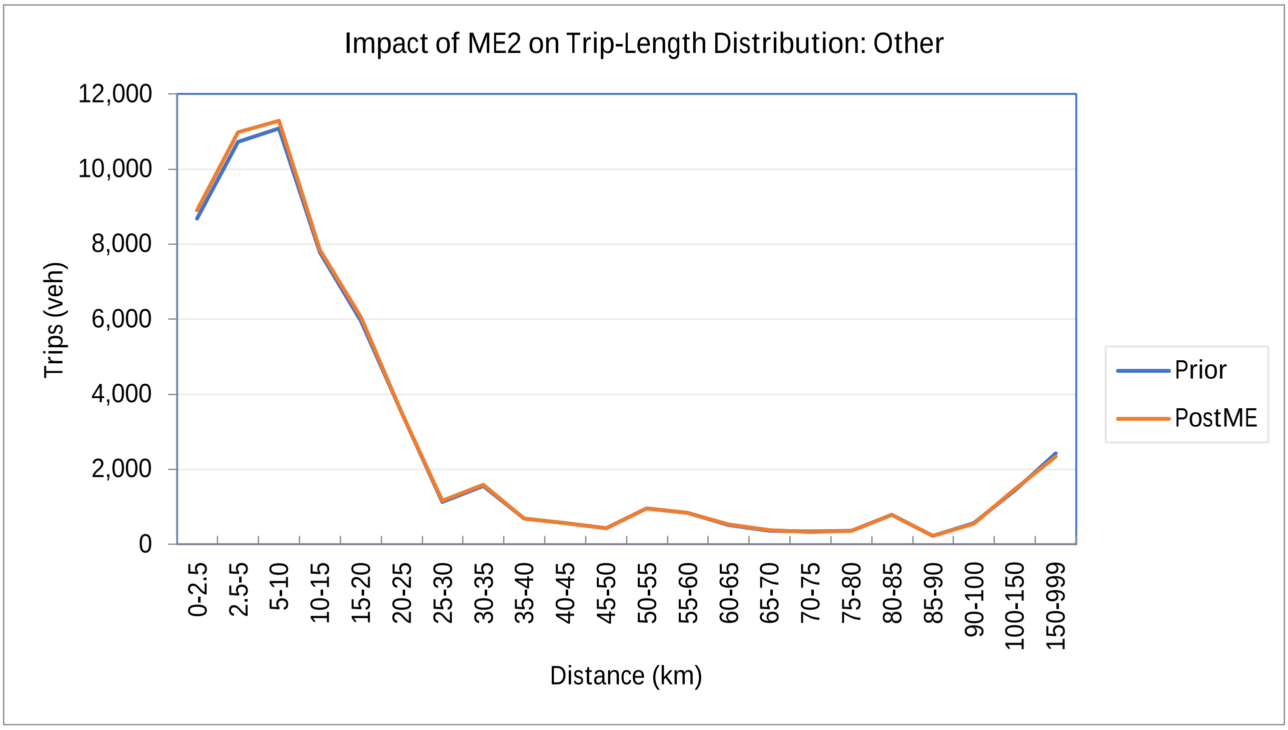


Figure 9-5 - AM Peak – LGV - Trip Length Distribution (Prior vs Post-ME)

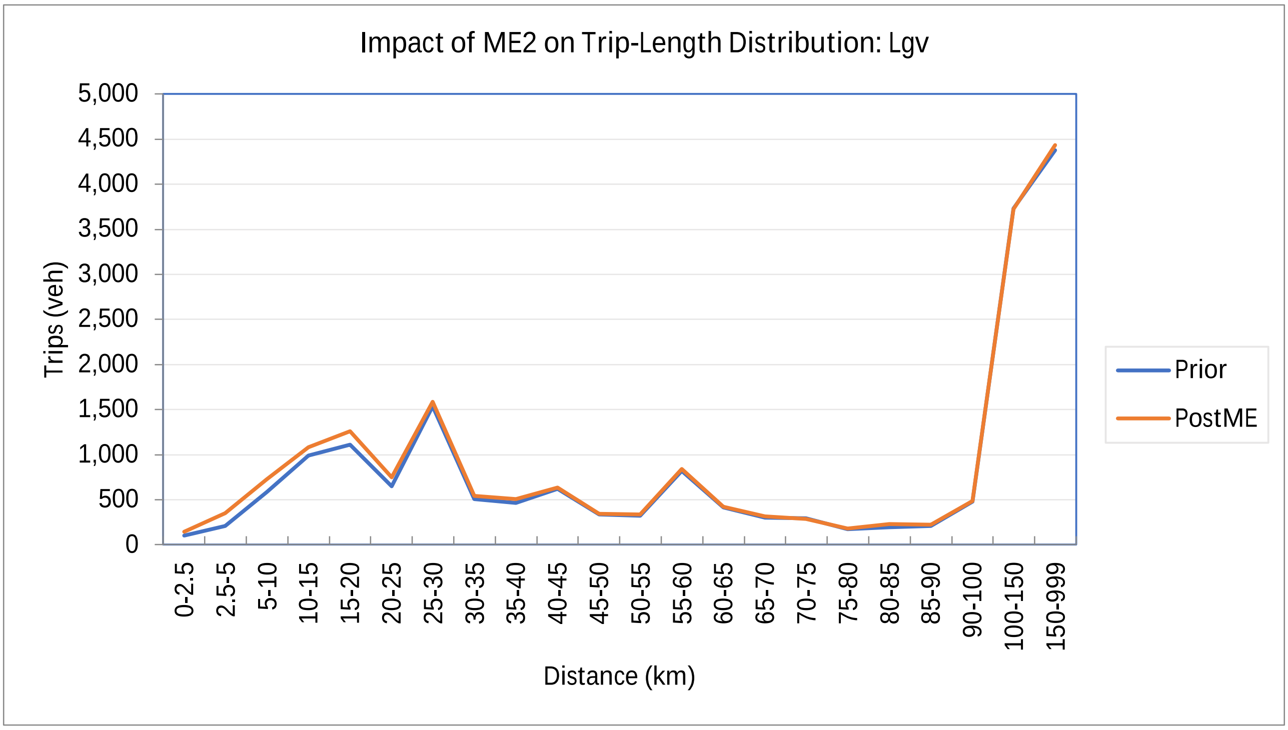


Figure 9-6 - AM Peak – HGV - Trip Length Distribution (Prior vs Post-ME)

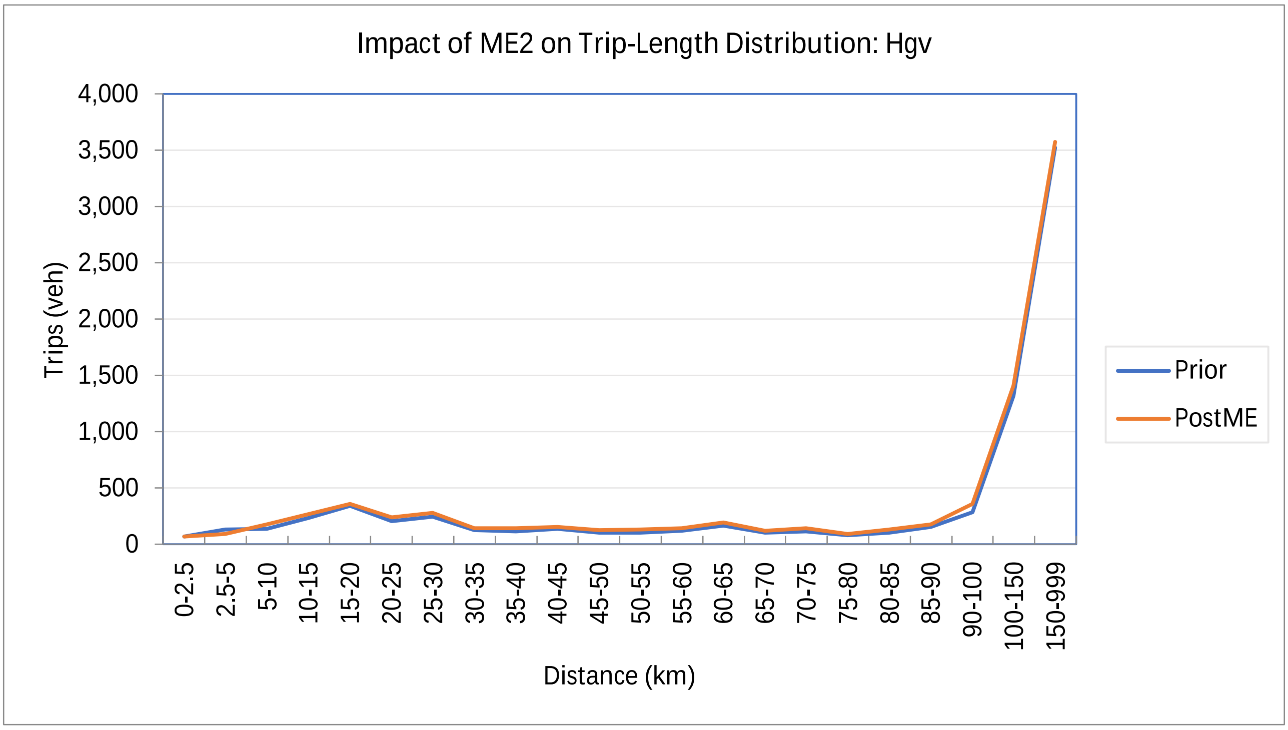


Table 9-2 - Impacts of ME: Trip Length Distribution

Period	User Class	Mean			Standard Deviation		
		Prior	Post ME	Diff.	Prior	Post ME	Diff.
AM	Business	77.4	75.3	-2.7%	103.8	102.3	-1.4%
	Commute	24.4	24.1	-1.5%	32.6	31.9	-2.1%
	Other	28.3	27.7	-2.2%	57.5	56.4	-1.9%
	LGV	102.1	98.9	-3.1%	94.0	94.6	0.6%
	HGV	152.9	146.1	-4.4%	118.8	115.2	-3.1%
IP	Business	75.3	73.0	-3.1%	107.4	104.5	-2.7%
	Commute	26.1	25.8	-1.0%	45.7	44.7	-2.1%
	Other	36.4	35.7	-1.9%	72.2	70.3	-2.6%
	LGV	106.7	103.6	-2.9%	96.9	96.2	-0.7%
	HGV	159.2	153.4	-3.7%	122.0	117.6	-3.7%
PM	Business	77.0	74.8	-2.9%	108.7	105.8	-2.7%
	Commute	27.3	27.1	-0.9%	38.1	37.5	-1.7%
	Other	37.8	37.0	-2.1%	73.3	71.5	-2.6%
	LGV	102.1	98.3	-3.7%	95.7	94.6	-1.2%
	HGV	164.8	156.7	-4.9%	125.0	121.3	-2.9%

Zonal Cell Values

9.2.5. TAG recommends that the zonal cell change statistics should be analysed against the significance criteria:

- R^2 more than 0.95.
- Slope within 0.98 and 1.02; and
- Intercept near zero.

9.2.6. The criteria are achieved for all car purposes and LGVs in all periods, as reported in Table 9-3 & Table 9-4. As noted above there are greater changes for HGVs. The correlation plots for the AM peak are shown in Figure 9-7 by user class. The graphs for all three time periods are included in Appendix F.

Figure 9-7 - Correlation of Prior and Post-ME Zonal Cell Values By User Class - AM Peak

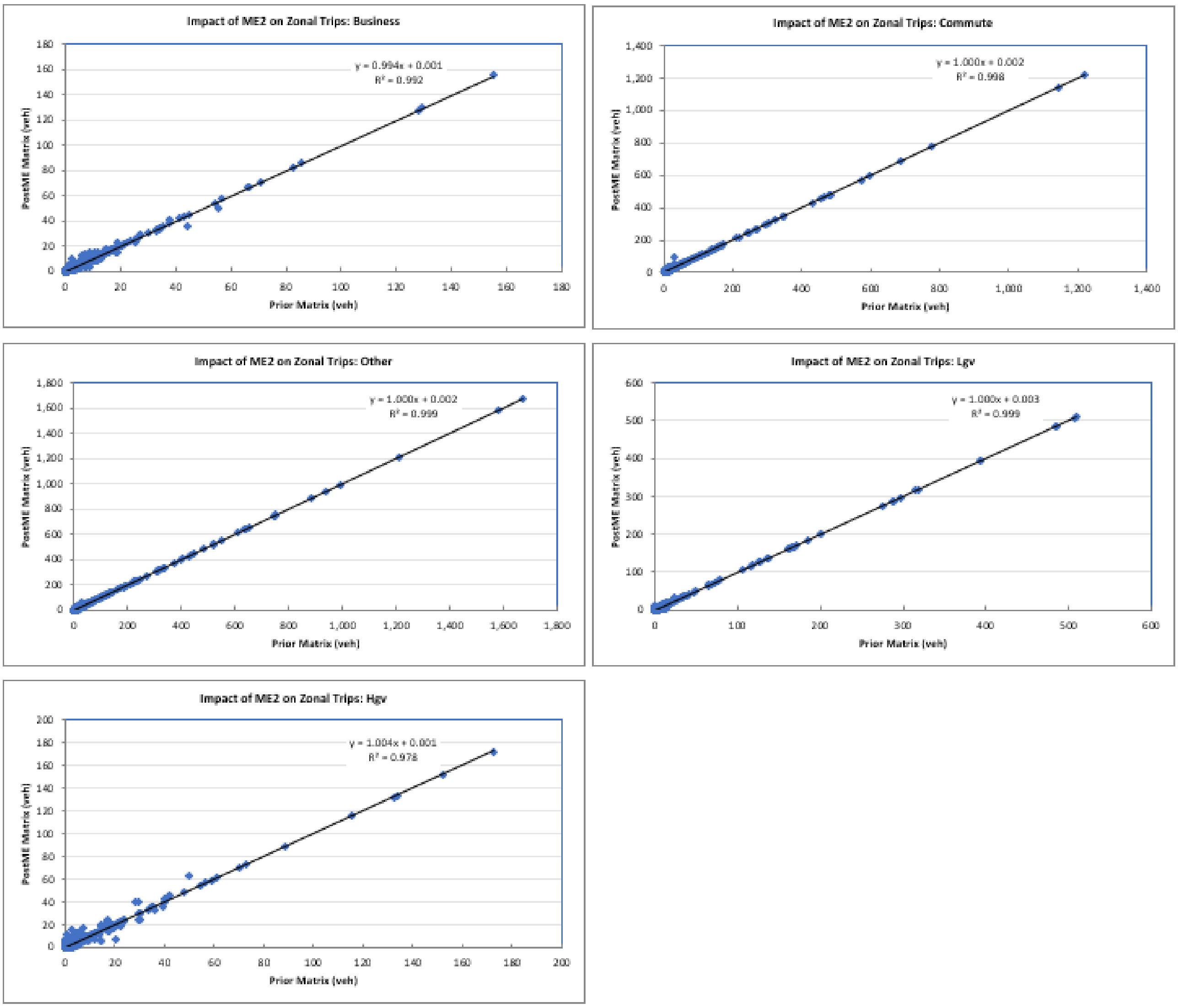


Table 9-3 - Impacts of ME: Zonal Cell Values

Period	User Class	Zonal Cells		
		R^2	Slope	Intercept
AM	Business	0.99	0.99	0.00
	Commute	1.00	1.00	0.00
	Other	1.00	1.00	0.00
	LGV	1.00	1.00	0.00
	HGV	0.98	1.00	0.00

Period	User Class	Zonal Cells		
		R^2	Slope	Intercept
IP	Business	0.99	1.00	0.00
	Commute	1.00	1.00	0.00
	Other	1.00	1.00	0.00
	LGV	1.00	1.00	0.00
	HGV	0.95	1.01	0.00
PM	Business	0.99	1.00	0.00
	Commute	1.00	1.00	0.00
	Other	1.00	1.00	0.01
	LGV	1.00	1.00	0.00
	HGV	0.93	1.01	0.00

Zonal Trip Ends

9.2.7. TAG recommends that the zonal cell change statistics should be analysed against the significance criteria:

- R^2 more than 0.98.
- Slope within 0.99 and 1.01; and
- Intercept near zero.

9.2.8. The criteria are achieved, or close to achieved for car purposes and LGVs across time periods. As noted above there are greater changes for HGVs. The intercept values are to be read in relation to trip end totals and the slightly larger values generally occur in more prevalent demand segments where that change is less significant.

Figure 9-8 - Correlation of Prior and Post-ME Zonal Trip Ends By Car User Class - AM Peak

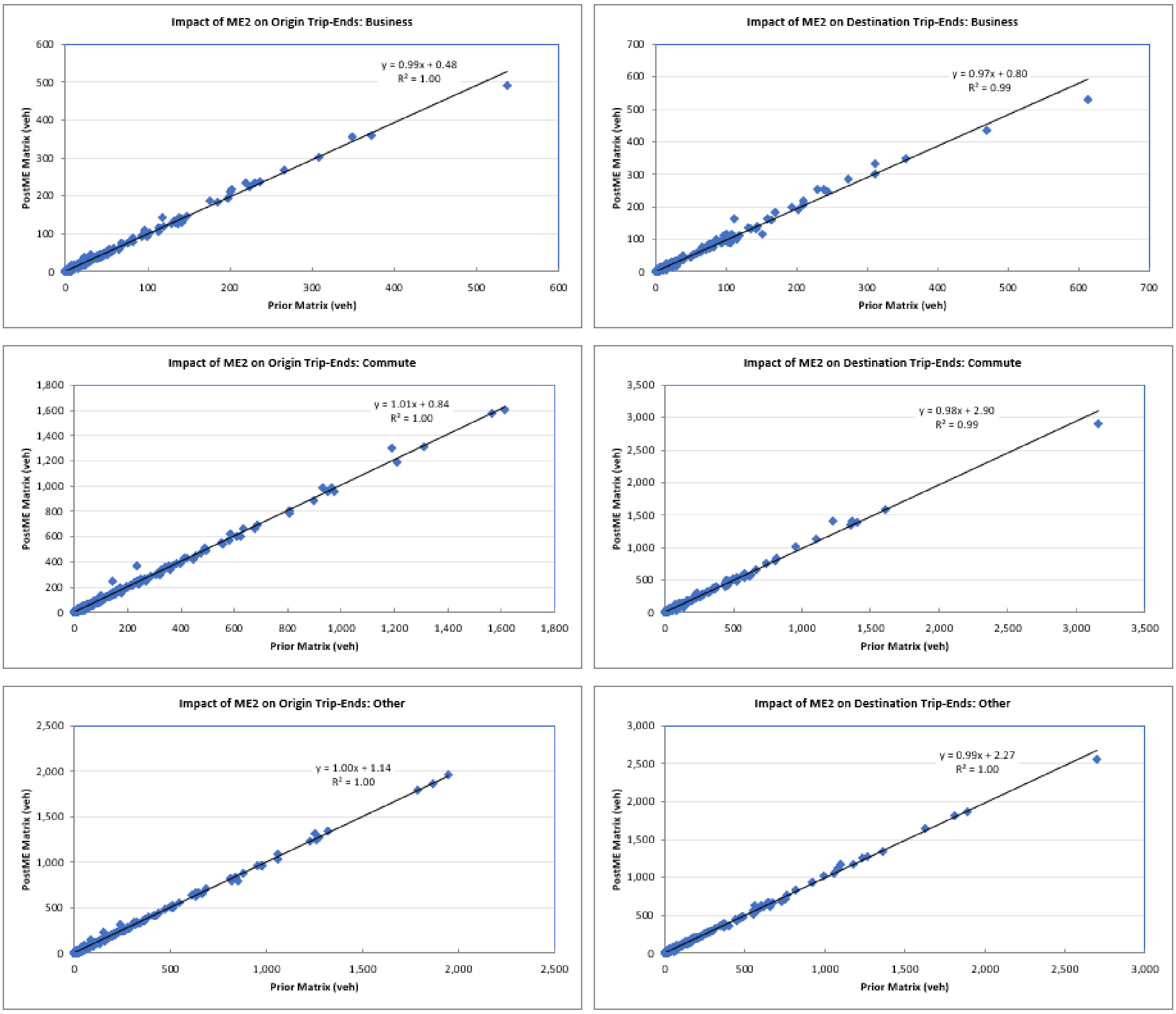


Figure 9-9 - Correlation of Prior and Post-ME Zonal Trip Ends By Goods Vehs - AM Peak

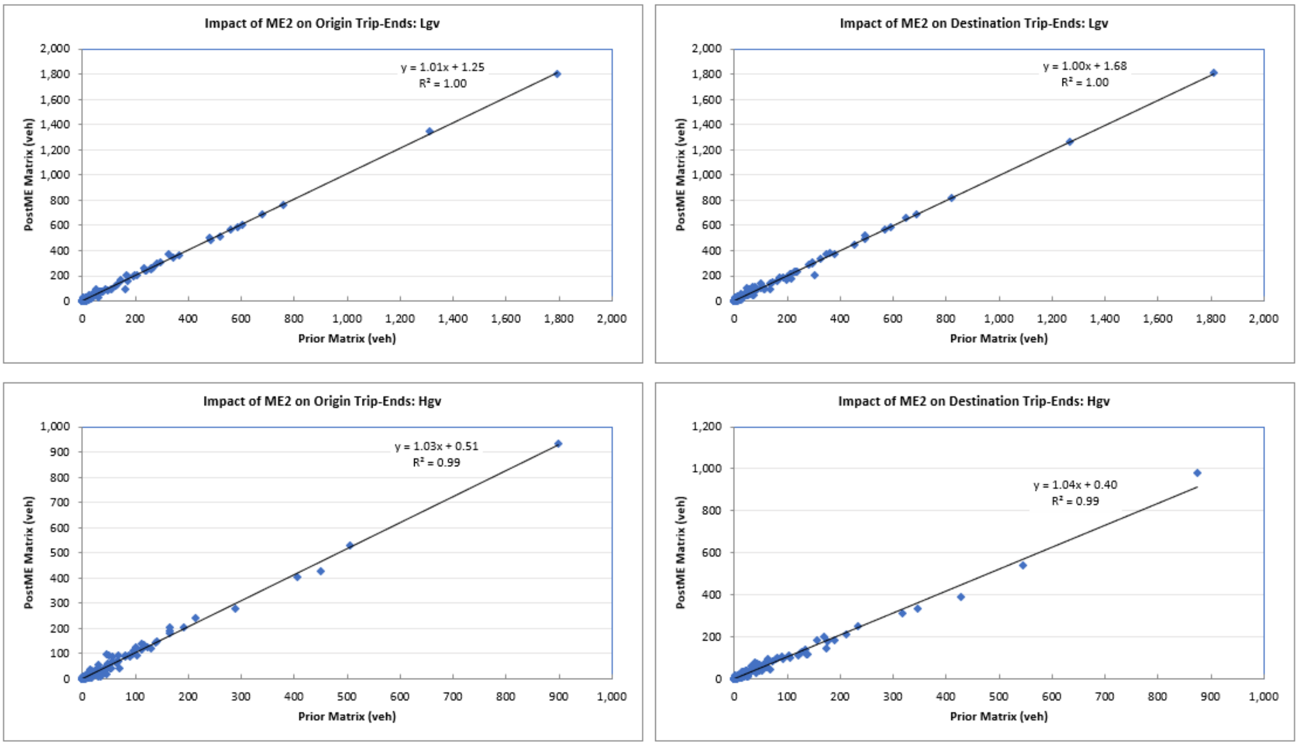


Table 9-4 - Impacts of ME: Zonal Trip Ends

Period	User Class	Origins			Destinations		
		R^2	Slope	Intercept	R^2	Slope	Intercept
AM	Business	1.00	0.99	0.48	0.99	0.97	0.80
	Commute	1.00	1.01	0.84	0.99	0.98	2.90
	Other	1.00	1.00	1.14	1.00	0.99	2.27
	LGV	1.00	1.01	1.25	1.00	1.00	1.68
	HGV	0.99	1.03	0.51	0.99	1.04	0.40
IP	Business	0.99	0.99	0.39	0.99	0.99	0.47
	Commute	1.00	1.00	0.71	1.00	1.00	0.62
	Other	1.00	1.00	1.99	1.00	1.00	2.38
	LGV	1.00	1.01	1.23	1.00	1.01	1.29
	HGV	0.99	1.08	0.42	0.99	1.06	0.63
PM	Business	0.99	0.98	0.69	0.99	1.00	0.47

Period	User Class	Origins			Destinations		
		R^2	Slope	Intercept	R^2	Slope	Intercept
PM contd.	Commute	0.99	0.99	3.28	1.00	1.01	1.18
	Other	1.00	1.00	3.40	1.00	1.00	2.71
	LGV	1.00	1.01	1.10	1.00	1.00	1.27
	HGV	0.99	1.09	0.23	0.98	1.03	0.57

Sector to Sector Matrices

9.2.9. TAG recommends that sector to sector matrices should be analysed with a significance criterion of differences within 5%.

9.2.10. However, there are some sector pairs with relatively low observed flow. Further aggregation of sectors would necessarily be at the expense of detail between other areas. On that basis the sector changes are reviewed against the criteria 'Within 5% or GEH <4'. This is a stricter GEH criterion than TAG applies to individual link flows (see Section 8.3) and has been similarly applied on other models of this type for similar reasons.

9.2.11. There were nine sectors used for the matrix calibration, which considered the district boundary and the locations of screenlines and cordons. Table 9-5 summarises the percentage of sector pairs which achieve the criteria, and this is comfortably in excess of 85% for all time periods and user classes.

9.2.12. The sectors are illustrated in Figure 9-10, with supplementary reporting included in Appendix F.

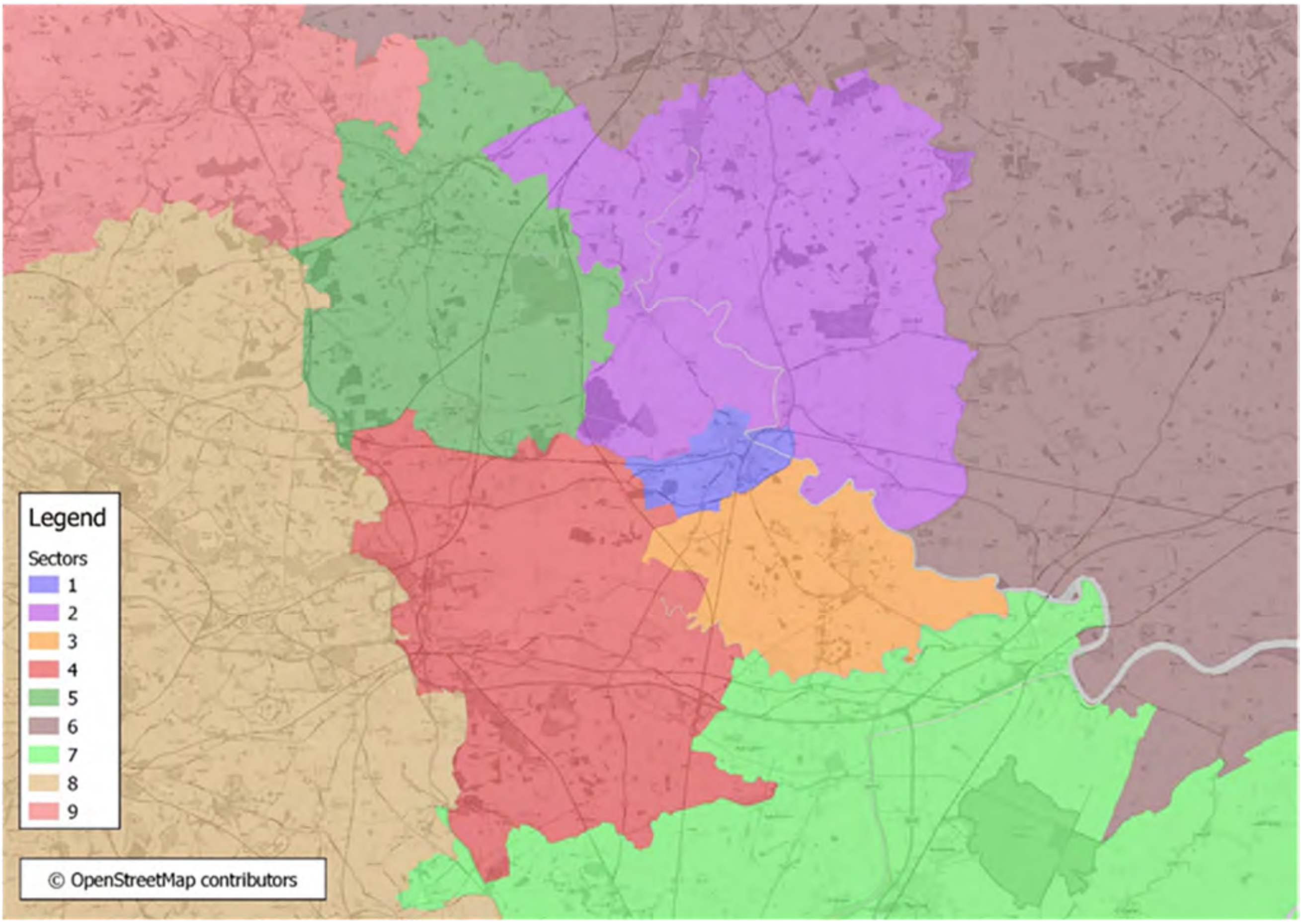
9.2.13. The cells which do not meet the criteria are, in some cases, isolated cells in a certain time period or segment. Specific to the core area for modelling, there are some segments where the change in trips for intra-sectors 1, 2 or 3 does not meet the criteria. The trip length distribution analysis showed that, generally, the changes in mean trip length were not significant and so whilst matrix estimation is increasing short distance trips and reports a higher flow change at a sector cell level, the overall impact of this on the matrix integrity is small considering the other metrics.

9.2.14. This also shows matrix estimation is impacting on the shorter distance inter-urban trips which include the synthetic-blended trips, more than strategic movements. It is a common facet of matrix estimation to increase short distance trips given they are likely to have fewer PIJA factors which can vary along a trip's path. The synthetic distribution is calibrated to the observed data however the zoning is very detailed in the urban area and the estimation appears to be refining this in areas to reflect the observed count data. There is not a calibration count on every urban link and so the calibrated assignments represent an overall model equilibrium balancing the supply (including zoning), demand and observed data.

Table 9-5 - Impacts of ME: Sector to Sector Matrices

Period	User Class	Sector Pairs Within 5% or GEH < 4 Slope Intercept
AM	Business	100%
	Commute	96%
	Other	95%
	LGV	89%
	HGV	98%
IP	Business	100%
	Commute	100%
	Other	95%
	LGV	96%
	HGV	90%
PM	Business	100%
	Commute	95%
	Other	93%
	LGV	89%
	HGV	95%

Figure 9-10 - Calibration Sectors



10 MODEL CALIBRATION & VALIDATION

10.1 INTRODUCTION

10.1.1. This chapter reports the SDSM base year model performance and validation summary with respect to three measures:

- Trip matrix calibration.
- Link flow calibration and validation; and
- Journey time validation.

10.1.2. The calibration and validation of the base year models utilised two sources of data:

- Traffic count data – grouped for.
  - Calibration of screenline and cordon totals.
  - Calibration and validation of link flow volumes.
- Journey time data – for validation of the highway network.

10.1.3. The model results for link flows and journey times are reported globally based on the cordons/screenlines presented in Figure 3-8 and Figure 3-9. Links flows have been split into calibration and validation links based on these cordons/screenlines and is presented in

10.1.4. Figure 3-10.

10.1.5. The reporting of calibration and validation results is based on TAG acceptability guidelines, and with additional 'near' criteria defined for each metric, which are detailed in their respective sections. This approach is consistent with reporting used on other large urban models to provide additional context than only pass/fail and could be considered a style Red/Amber/Green (RAG) system of validation.

10.2 TAG CRITERIA

10.2.1. The trip matrices have been calibrated against the criteria set out in Table 10-1, that is reproduced from TAG M3.1, and advises that modelled flow should be within 5% of the observed counts for "all or nearly all" cordons/screenlines.

Table 10-1 - Trip Matrix Verification Criteria

Criteria	Acceptability Guideline
Differences between modelled flows and counts should be less than 5% of the counts	All or nearly all cordons/screenlines

10.2.2. The measures used for link flow verification are:

- The absolute and percentage differences between modelled flows and counts; and
- The GEH statistic which is a hybrid of the Chi-squared statistic to incorporate both relative and absolute errors. It is defined by

$$GEH = \sqrt{\frac{(M-C)^2}{(M+2)/2}}$$

where M is the modelled flow and C is the observed flow.

10.2.3. Both measures are considered broadly consistent and meeting either is considered satisfactory by TAG M3.1.

10.2.4. The acceptability criteria are given in Table 10-2 reproduced from TAG M3.1.

Table 10-2 - Link Flow Verification Criteria

Criteria	Description	Acceptability Guideline
1	Individual flows within 100 veh/hr of counts for flows less than 700 veh/hr	> 85% of cases
	Individual flows within 15% of counts for flows from 700 veh/hr to 2,700 veh/hr	> 85% of cases
	Individual flows within 400 veh/hr of counts for flows more than 2,700 veh/hr	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

10.2.5. Journey time routes have been validated against the criteria set out in Table 10-3 that is reproduced from TAG M3.1.

Table 10-3 - Journey Time Routes Validation Criteria

Criteria	Acceptability Guideline
Modelled times along routes should within 15% of surveyed times (or 1 minute if higher than 15%)	> 85% of routes

10.3 TRIP MATRIX CALIBRATION

10.3.1. Trip matrix calibration for the calibrated models is reported for nine bi-directional calibration cordons/screenlines which were mapped in Figure 3-8 and Figure 3-9.

10.3.2. The trip matrices have been calibrated against the TAG criteria set out in Table 10-1.

10.3.3. TAG also advises that cordons/screenlines should be “made up of 5 links or more”. For some cordons/screenlines, particularly within the rural areas, it was not possible to do this given the routes actually ‘on the ground’ and without extending them in a way that would compromise the purpose for which those cordons/screenlines had been defined.

10.3.4. There are also some cordons/screenlines with relatively low observed flow. On that basis, the cordon/screenline verification is reported based on differences between modelled and observed flows ‘within 5% or GEH < 4’. The latter condition is accounting for cordons/screenlines with lower cumulative flow and/or lower number of counts and has similarly been applied in other models for those reasons mentioned. A secondary, 'near pass', criteria has been defined as 'within 7.5% or GEH <5'.

10.3.5. The results are presented in Table 10-4 and show, overall, a strong level of calibration for screenlines and cordons. In all cases the screenlines and cordons the primary criteria based on TAG guidance ('Within 5% or GEH < 4') is 100% for all screenlines and cordons.

10.3.6. The screenline and cordon calibration for 'all vehicles' and 'cars' is also very similar across all of the reporting measures.

10.3.7. The breakdown by individual screenlines and cordons has been summarised in Table 10-5 to Table 10-8.

Table 10-4 - Trip Matrix Calibration Screenline and Cordons

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Outer Cordon	Inbound	14,131	14,242	111	1%	0.9	G
	Outbound	12,693	12,627	-66	-1%	0.6	G
Tadcaster Cordon	Inbound	6,615	6,658	43	1%	0.5	G
	Outbound	6,633	6,547	-87	-1%	1.1	G
Eggborough Cordon	Inbound	2,380	2,369	-11	0%	0.2	G
	Outbound	2,291	2,362	71	3%	1.5	G
Screenline North-South North	Northbound	7,519	7,483	-36	0%	0.4	G
	Southbound	8,048	7,967	-81	-1%	0.9	G
Screenline North-South Central	Northbound	6,406	6,506	100	2%	1.2	G
	Southbound	7,352	7,484	133	2%	1.5	G
Screenline East-West Central	Eastbound	4,715	4,713	-2	0%	0.0	G
	Westbound	3,957	3,749	-208	-5%	3.4	G
Selby Outer Cordon	Inbound	3,431	3,460	29	1%	0.5	G
	Outbound	3,042	3,115	73	2%	1.3	G
Selby North-South	Northbound	2,510	2,520	9	0%	0.2	G
	Southbound	2,699	2,739	41	2%	0.8	G

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Selby East-West	Eastbound	1,032	1,030	-2	0%	0.1	G
	Westbound	928	983	55	6%	1.8	G

10.3.8. Table 10-8 for ‘all vehicles’, including the validation ratings. The ratings are using the two criteria described above and therefore, an absolute percentage difference exceeding 5% can have a green rating if the GEH is less than 4.

10.3.9. Additional reporting of the screenline and cordon calibration is provided in Appendix G including verification for cars separately.

Table 10-5 - Calibrated Trip Matrix Calibration

Measure	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Calibration Screenlines and Cordons (18)						
Within 5% or GEH < 4 (‘Green’ validation)	100%	100%	100%	100%	100%	100%
Within 7.5% or GEH < 5 (‘Amber’ validation)	100%	100%	100%	100%	100%	100%

Table 10-6 - Calibrated Trip Matrix Screenline and Cordons: AM Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Outer Cordon	Inbound	11,261	11,275	14	0%	0.1	G
	Outbound	12,558	12,698	140	1%	1.2	G
Tadcaster Cordon	Inbound	6,128	6,119	-9	0%	0.1	G
	Outbound	6,148	6,135	-13	0%	0.2	G
Eggborough Cordon	Inbound	2,099	2,082	-17	-1%	0.4	G
	Outbound	2,159	2,192	34	2%	0.7	G
Screenline North-South North	Northbound	7,558	7,384	-174	-2%	2.0	G
	Southbound	6,583	6,407	-176	-3%	2.2	G
	Northbound	6,725	7,000	274	4%	3.3	G

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Screenline North-South Central	Southbound	5,211	5,253	42	1%	0.6	G
Screenline East-West Central	Eastbound	3,924	3,782	-143	-4%	2.3	G
	Westbound	4,174	4,113	-60	-1%	0.9	G
Selby Outer Cordon	Inbound	3,015	3,089	74	2%	1.3	G
	Outbound	2,651	2,668	17	1%	0.3	G
Selby North-South	Northbound	2,487	2,510	24	1%	0.5	G
	Southbound	1,992	2,010	18	1%	0.4	G
Selby East-West	Eastbound	914	955	41	5%	1.3	G
	Westbound	815	813	-2	0%	0.1	G

Table 10-7 - Calibrated Trip Matrix Screenline and Cordons: Inter Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Outer Cordon	Inbound	8,466	8,452	-14	0%	0.2	G
	Outbound	8,514	8,503	-11	0%	0.1	G
Tadcaster Cordon	Inbound	4,561	4,484	-77	-2%	1.1	G
	Outbound	4,547	4,471	-76	-2%	1.1	G
Eggborough Cordon	Inbound	1,488	1,457	-32	-2%	0.8	G
	Outbound	1,525	1,420	-105	-7%	2.7	G
Screenline North-South North	Northbound	5,331	5,234	-97	-2%	1.3	G
	Southbound	5,744	5,657	-87	-2%	1.2	G
Screenline North-South Central	Northbound	4,947	4,996	49	1%	0.7	G
	Southbound	5,201	5,242	41	1%	0.6	G
Screenline East-West Central	Eastbound	2,701	2,820	119	4%	2.3	G
	Westbound	2,897	2,863	-34	-1%	0.6	G
Selby Outer Cordon	Inbound	2,152	2,183	31	1%	0.7	G

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
	Outbound	2,163	2,167	4	0%	0.1	G
Selby North-South	Northbound	1,797	1,830	33	2%	0.8	G
	Southbound	1,858	1,857	-1	0%	0.0	G
Selby East-West	Eastbound	635	635	0	0%	0.0	G
	Westbound	627	634	6	1%	0.2	G

Table 10-8 - Calibrated Trip Matrix Screenline and Cordons: PM Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Outer Cordon	Inbound	14,131	14,242	111	1%	0.9	G
	Outbound	12,693	12,627	-66	-1%	0.6	G
Tadcaster Cordon	Inbound	6,615	6,658	43	1%	0.5	G
	Outbound	6,633	6,547	-87	-1%	1.1	G
Eggborough Cordon	Inbound	2,380	2,369	-11	0%	0.2	G
	Outbound	2,291	2,362	71	3%	1.5	G
Screenline North-South North	Northbound	7,519	7,483	-36	0%	0.4	G
	Southbound	8,048	7,967	-81	-1%	0.9	G
Screenline North-South Central	Northbound	6,406	6,506	100	2%	1.2	G
	Southbound	7,352	7,484	133	2%	1.5	G
Screenline East-West Central	Eastbound	4,715	4,713	-2	0%	0.0	G
	Westbound	3,957	3,749	-208	-5%	3.4	G
Selby Outer Cordon	Inbound	3,431	3,460	29	1%	0.5	G
	Outbound	3,042	3,115	73	2%	1.3	G
Selby North-South	Northbound	2,510	2,520	9	0%	0.2	G
	Southbound	2,699	2,739	41	2%	0.8	G
Selby East-West	Eastbound	1,032	1,030	-2	0%	0.1	G
	Westbound	928	983	55	6%	1.8	G

10.4 LINK FLOW CALIBRATION

10.4.1. The summary statistics for the link flow calibration in the calibrated models is reported in Table 10-9 for all counts across the study area. The TAG criteria shown in Table 10-2 is achieved for both 'all vehicles' and 'cars' in each time period. The results are also very similar for 'all vehicles' and 'cars'.

10.4.2. The results for turn flow counts are presented in Table 10-9 and Table 10-10. The results show that the turn flows exceed the TAG requirement of 85% for both flow and GEH for both 'all vehicles' and 'cars' in each time period. In addition, the TAG criteria is close to 100% for all time periods. More detailed reporting of the link flow calibration is provided in Appendix H. Figure 10-1 to Figure 10-3 show the GEH statistic for the modelled link flows versus the observed link flows for all vehicles across the three time periods.

Table 10-9 - Link Flow Calibration: All Counts

Measure (572 counts)	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	99%	99%	98%	100%	99%	98%
Pass Criteria 2	96%	97%	96%	97%	98%	97%
Pass TAG	**99%**	**99%**	**99%**	**100%**	**99%**	**99%**

Table 10-10 - Turn Flow Verification: All Counts

Measure (672 turn counts)	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	99%	98%	98%	99%	99%	99%
Pass Criteria 2	88%	90%	88%	91%	93%	89%
Pass TAG	**99%**	**99%**	**99%**	**99%**	**99%**	**99%**

Figure 10-1 – GEH Statistic of Modelled Flow vs Observed Count by Direction - AM Peak

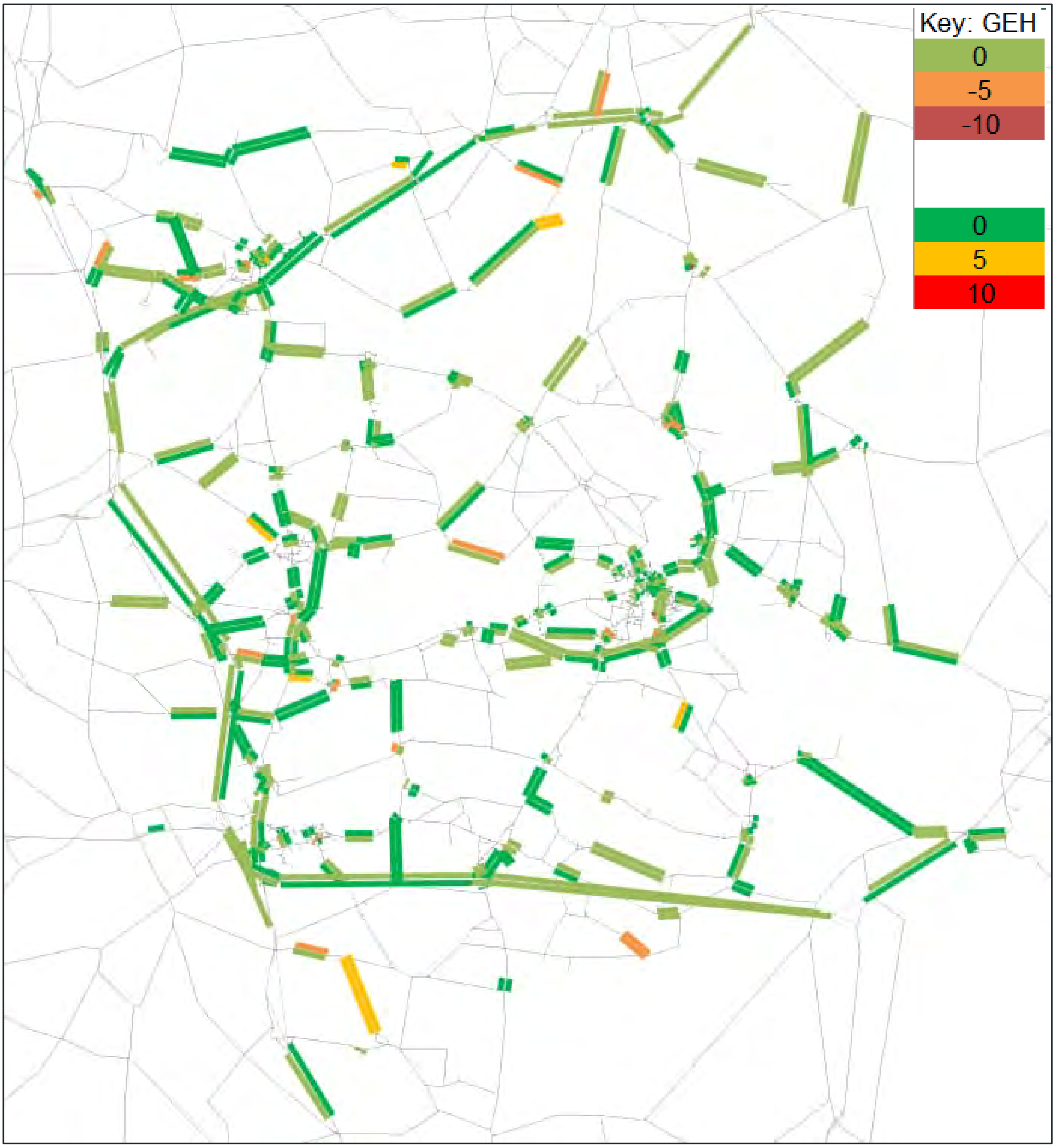


Figure 10-2 - GEH Statistic of Modelled Flow vs Observed Count by Direction - Inter Peak

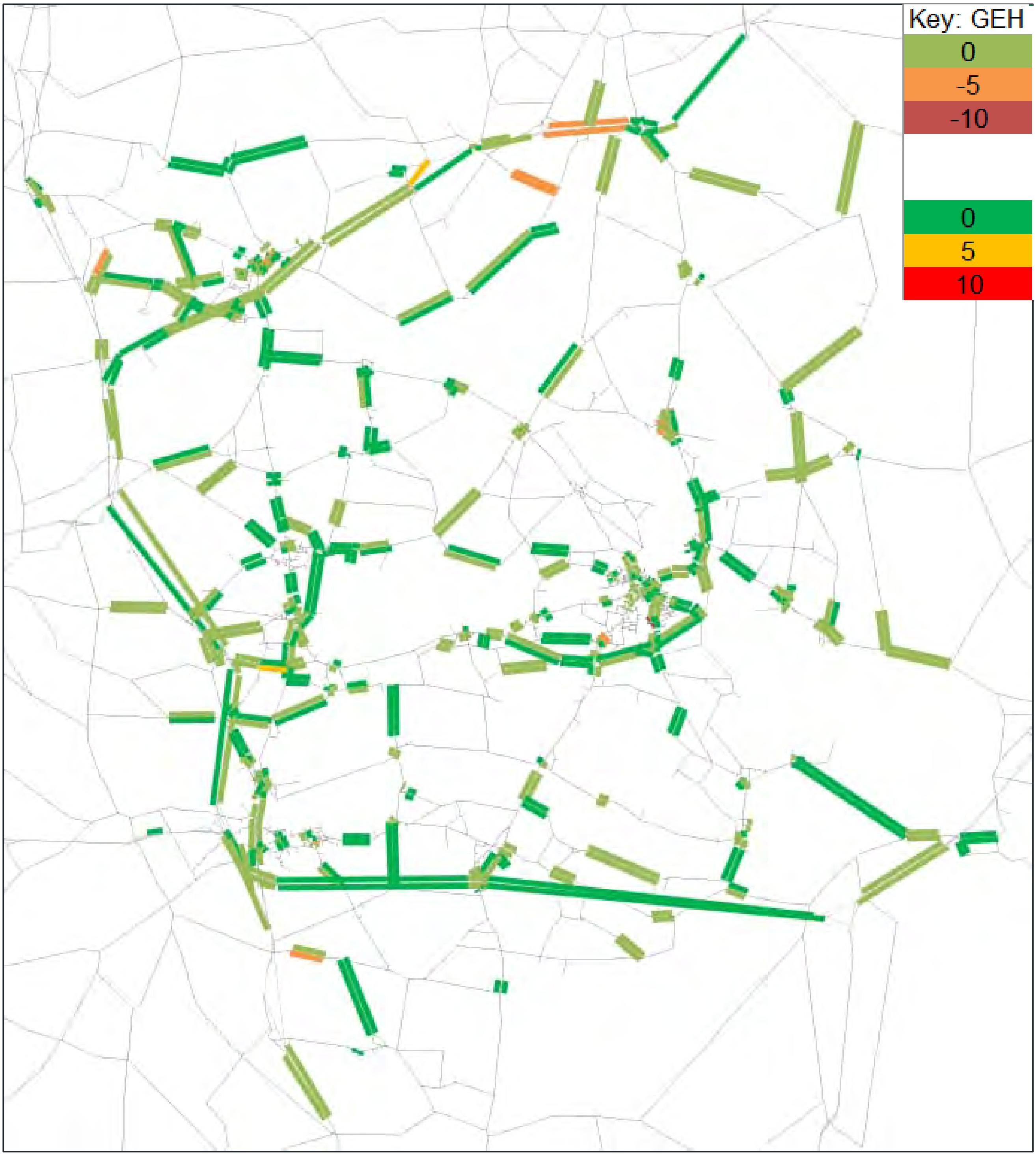
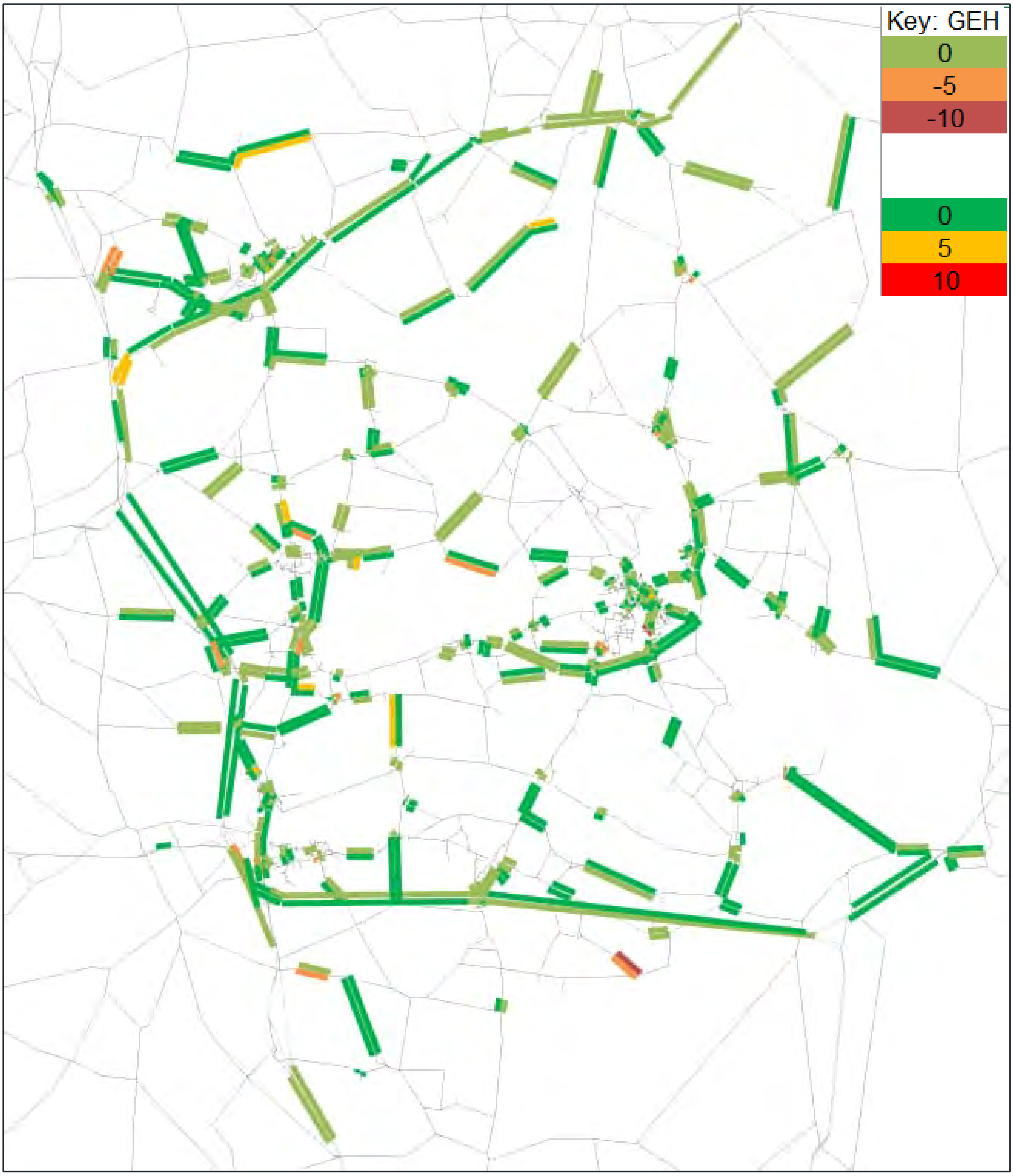


Figure 10-3 - GEH Statistic of Modelled Flow vs Observed Count by Direction - PM Peak



10.5 LINK FLOW VALIDATION

10.5.1. Trip matrix validation for the calibrated models is reported for four bi-directional validation cordons/screenlines which were mapped in Figure 3-8 and Figure 3-9.

10.5.2. The trip matrices have been calibrated against the TAG criteria set out in Table 10-1.

10.5.3. There some cordons/screenlines with relatively low observed flow. On that basis, the cordon/screenline verification is reported based on differences between modelled and observed flows 'within 5% or GEH < 4'. The latter condition is accounting for cordons/screenlines with lower cumulative flow and/or lower number of counts and has similarly been applied in other models for those reasons mentioned. A secondary, 'near pass', criteria has been defined as 'within 7.5% or GEH <5'.

10.5.4. The results are presented in Table 10-11 and show, overall, a strong level of validation for screenlines and cordons. In all cases the screenlines and cordons the primary criteria based on TAG guidance ('Within 5% or GEH < 4') is above 85% for all screenlines and cordons.

10.5.5. The screenline and cordon validation for 'all vehicles' and 'cars' is also very similar across all the reporting measures. The breakdown by individual screenlines and cordons has been summarised in Table 10-11 to Table 10-14 for 'all vehicles', including the validation ratings. The ratings are using the two criteria described above and therefore, an absolute percentage difference exceeding 5% can have a green rating if the GEH is less than 4.

10.5.6. Additional reporting of the screenline and cordon validation is provided in Appendix G including verification for cars separately.

Table 10-11 - Calibrated Trip Matrix Validation

Measure	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Calibration Screenlines and Cordons (18)						
Within 5% or GEH < 4 ('Green' validation)	88%	100%	88%	88%	88%	88%
Within 7.5% or GEH < 5 ('Amber' validation)	100%	100%	100%	100%	100%	100%

Table 10-12 - Calibrated Trip Matrix Screenline and Cordons: AM Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Sherburn Cordon	Inbound	1989	2164	175	9%	3.9	G
	Outbound	1829	2041	212	12%	4.8	A
Screenline North-South	Northbound	1352	1371	19	1%	0.5	G
	Southbound	1125	1141	16	1%	0.5	G
Screenline East-West	Eastbound	894	914	20	2%	0.7	G
	Westbound	1376	1331	-45	-3%	1.2	G
Selby Town Centre Cordon	Inbound	3123	2994	-129	-4%	2.3	G
	Outbound	2340	2368	28	1%	0.6	G

Table 10-13 - Calibrated Trip Matrix Screenline and Cordons: Inter Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Sherburn Cordon	Inbound	1257	1356	98	8%	2.7	G
	Outbound	1289	1395	106	8%	2.9	G
Screenline North-South	Northbound	935	850	-85	-9%	2.9	G
	Southbound	938	915	-23	-2%	0.8	G
Screenline East-West	Eastbound	748	764	16	2%	0.6	G
	Westbound	754	722	-31	-4%	1.2	G
Selby Town Centre Cordon	Inbound	2524	2446	-78	-3%	1.6	G
	Outbound	2530	2517	-13	-1%	0.3	G

Table 10-14 - Calibrated Trip Matrix Screenline and Cordons: PM Peak

All Vehicles	Direction	Obs.	Mod.	Diff.	%Diff.	GEH	RAG Rating
Strategic Screenlines and Cordons Screenlines							
Sherburn Cordon	Inbound	2103	2383	280	13%	5.9	A
	Outbound	2246	2220	-26	-1%	0.6	G
Screenline North-South	Northbound	1466	1481	15	1%	0.4	G
	Southbound	1411	1425	14	1%	0.4	G
Screenline East-West	Eastbound	1349	1421	72	5%	1.9	G
	Westbound	1040	1003	-38	-4%	1.2	G
Selby Town Centre Cordon	Inbound	2948	2828	-120	-4%	2.2	G
	Outbound	3303	3351	48	1%	0.8	G

10.5.7. The summary statistics for the link flow validation in the calibrated models is reported in Table 10-15 for all counts across the study area. The TAG criteria shown in Table 10-2 is achieved for both 'all vehicles' and 'cars' in each time period. The results are also very similar for 'all vehicles' and 'cars'.

10.5.8. More detailed reporting of the link flow validation is provided in Appendix H.

Table 10-15 - Link Flow Validation: All Counts

Measure (216 counts)	All Vehicles			Cars		
	AM Peak	Inter Peak	PM Peak	AM Peak	Inter Peak	PM Peak
Pass Criteria 1	94%	97%	92%	97%	98%	95%
Pass Criteria 2	92%	96%	90%	90%	95%	89%
Pass TAG	**95%**	**98%**	**94%**	**97%**	**98%**	**95%**

10.6 JOURNEY TIME VALIDATION

10.6.1. A total of 35 bi-directional journey time routes have been assessed which cover all the key routes within the study area.

10.6.2. Table 10-16 and Table 10-17 summarises the performance of all the journey time routes and journey time routes in the core areas against WebTAG guidance.

Table 10-16 - Journey Time Validation: All Routes

Performance Measure (70 routes)	AM Peak	Inter Peak	PM Peak
Routes within 15% or 1 min of Observed Times ('Green' validation)	96%	99%	97%
Within 20% - Near Pass ('Amber' validation)	100%	100%	100%

Table 10-17 - Journey Time Validation: Core Area Routes

Performance Measure (40 routes)	AM Peak	Inter Peak	PM Peak
Routes within 15% or 1 min of Observed Times ('Green' validation)	98%	100%	98%
Within 20% - Near Pass ('Amber' validation)	100%	100%	100%

10.6.3. The results show that the journey time routes in both the global and core areas achieve a significantly higher level of validation compared to the 85% threshold required by WebTAG.

10.6.4. The results shows that a higher level of validation has been achieved in the core areas compared to the global results and all periods surpass the 85% threshold defined by WebTAG.

10.6.5. The above tables also show that if a slightly relaxed criteria of 20% (instead of 85%, i.e 15% as per WebTAG) was applied then a 100% validation across all journey time routes and times periods is achieved.

10.6.6. These results demonstrate that most routes pass the criteria with the remaining routes being considered 'near passes', showing a very strong level of validation.

10.6.7. More detailed reporting of the journey time validation is provided in Appendix I.

10.6.8. The journey time validation results are summarised by route, direction, time period and geographical area in Table 10-18 to Table 10-20. Additionally, a map of each route by direction and by time period are detailed in Figure 10-4 to Figure 10-6.

10.6.9. It should also be noted that Route 12 has been removed from the results. This was because this route is a rat-run in Selby, in addition to being a very short route (less than 1km, as per WebTAG guidelines) with potentially unreliable observed data.

Table 10-18- Journey Time Validation Summary by Route: AM Peak

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Selby						
Route 2 NB	826	883	56	7%	Yes	G
Route 2 SB	860	907	47	5%	Yes	G
Route 3 ACW	349	357	8	2%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 3 CW	413	392	-21	-5%	Yes	G
Route 4 EB	786	800	14	2%	Yes	G
Route 4 WB	826	837	11	1%	Yes	G
Route 5 NB	537	628	91	17%	No	A
Route 5 SB	515	535	19	4%	Yes	G
Route 6 EB	259	259	0	0%	Yes	G
Route 6 WB	269	284	16	6%	Yes	G
Route 7 WB	342	316	-25	-7%	Yes	G
Route 7 EB	363	329	-34	-9%	Yes	G
Route 8 NB	631	580	-51	-8%	Yes	G
Route 8 SB	709	632	-76	-11%	Yes	G
Route 10 EB	389	395	6	2%	Yes	G
Route 10 WB	381	383	2	1%	Yes	G
Route 13 EB	140	150	10	7%	Yes	G
Route 13 WB	139	163	24	17%	Yes	G
Tadcaster						
Route 15 EB	444	449	6	1%	Yes	G
Route 15 WB	424	454	30	7%	Yes	G
Route 16 WB	437	428	-10	-2%	Yes	G
Route 16 EB	459	450	-9	-2%	Yes	G
Sherburn						
Route 14 EB	485	467	-18	-4%	Yes	G
Route 14 WB	464	471	7	1%	Yes	G
Route 20 SB	371	345	-25	-7%	Yes	G
Route 20 NB	385	361	-24	-6%	Yes	G
Route 25 NB	1020	992	-28	-3%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 25 SB	968	899	-69	-7%	Yes	G
Route 27 NB	199	209	11	5%	Yes	G
Route 27 SB	194	207	13	7%	Yes	G
Route 31 EB	500	460	-41	-8%	Yes	G
Route 31 WB	474	449	-25	-5%	Yes	G
Eggborough						
Route 21 NB	203	245	43	21%	Yes	G
Route 21 SB	229	249	20	9%	Yes	G
Route 22 EB	619	612	-7	-1%	Yes	G
Route 22 WB	627	611	-15	-2%	Yes	G
Route 23 EB	574	515	-58	-10%	Yes	G
Route 23 WB	532	518	-14	-3%	Yes	G
Route 24 NB	507	468	-39	-8%	Yes	G
Route 24 SB	494	464	-30	-6%	Yes	G
Other Routes						
Route 1 EB	551	481	-71	-13%	Yes	G
Route 1 WB	549	474	-75	-14%	Yes	G
Route 9 WB	556	492	-63	-11%	Yes	G
Route 9 EB	573	480	-94	-16%	No	A
Route 11 SB	244	244	0	0%	Yes	G
Route 11 NB	291	246	-45	-16%	Yes	G
Route 17 EB	555	565	11	2%	Yes	G
Route 17 WB	536	537	1	0%	Yes	G
Route 18 EB	247	206	-41	-17%	Yes	G
Route 18 WB	261	210	-51	-19%	Yes	G
Route 19 EB	771	633	-138	-18%	No	A

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 19 WB	712	654	-58	-8%	Yes	G
Route 26 NB	255	236	-19	-8%	Yes	G
Route 26 SB	246	243	-3	-1%	Yes	G
Route 28 EB	601	565	-36	-6%	Yes	G
Route 28 WB	619	595	-24	-4%	Yes	G
Route 29 NB	821	795	-26	-3%	Yes	G
Route 29 SB	819	783	-36	-4%	Yes	G
Route 30 WB	618	585	-33	-5%	Yes	G
Route 30 EB	584	537	-47	-8%	Yes	G
Route 32 SB	491	459	-32	-6%	Yes	G
Route 32 NB	502	480	-22	-4%	Yes	G
Route 33 NB	954	892	-62	-6%	Yes	G
Route 33 SB	701	740	39	6%	Yes	G
Route 34 EB	460	471	11	2%	Yes	G
Route 34 WB	457	466	9	2%	Yes	G
Route 35 EB	1099	1036	-63	-6%	Yes	G
Route 35 WB	1163	1048	-115	-10%	Yes	G
Route 36 NB	1357	1384	27	2%	Yes	G
Route 36 SB	1278	1280	2	0%	Yes	G

Table 10-19- Journey Time Validation Summary by Route: Inter Peak

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Selby						
Route 2 NB	790	849	59	8%	Yes	G
Route 2 SB	826	848	21	3%	Yes	G
Route 3 ACW	362	363	1	0%	Yes	G
Route 3 CW	402	375	-26	-6%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 4 EB	768	778	9	1%	Yes	G
Route 4 WB	803	780	-24	-3%	Yes	G
Route 5 NB	527	530	3	1%	Yes	G
Route 5 SB	502	500	-3	0%	Yes	G
Route 6 EB	228	252	24	10%	Yes	G
Route 6 WB	281	278	-2	-1%	Yes	G
Route 7 WB	332	309	-23	-7%	Yes	G
Route 7 EB	348	313	-35	-10%	Yes	G
Route 8 NB	619	578	-42	-7%	Yes	G
Route 8 SB	675	625	-50	-7%	Yes	G
Route 10 EB	367	387	19	5%	Yes	G
Route 10 WB	368	381	13	4%	Yes	G
Route 13 EB	167	162	-5	-3%	Yes	G
Route 13 WB	147	161	14	9%	Yes	G
Tadcaster						
Route 15 EB	428	434	6	2%	Yes	G
Route 15 WB	411	431	20	5%	Yes	G
Route 16 WB	399	406	7	2%	Yes	G
Route 16 EB	407	420	13	3%	Yes	G
Sherburn						
Route 14 EB	455	443	-11	-2%	Yes	G
Route 14 WB	446	454	8	2%	Yes	G
Route 20 SB	348	341	-8	-2%	Yes	G
Route 20 NB	363	345	-18	-5%	Yes	G
Route 25 NB	982	921	-61	-6%	Yes	G
Route 25 SB	950	897	-53	-6%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 27 NB	186	209	23	12%	Yes	G
Route 27 SB	191	204	13	7%	Yes	G
Route 31 EB	482	453	-28	-6%	Yes	G
Route 31 WB	471	443	-28	-6%	Yes	G
Eggborough						
Route 21 NB	203	215	12	6%	Yes	G
Route 21 SB	210	216	6	3%	Yes	G
Route 22 EB	633	607	-26	-4%	Yes	G
Route 22 WB	635	596	-39	-6%	Yes	G
Route 23 EB	535	501	-34	-6%	Yes	G
Route 23 WB	523	504	-19	-4%	Yes	G
Route 24 NB	488	438	-50	-10%	Yes	G
Route 24 SB	493	443	-51	-10%	Yes	G
Other Routes						
Route 1 EB	529	451	-79	-15%	Yes	G
Route 1 WB	533	448	-85	-16%	No	A
Route 9 WB	550	485	-65	-12%	Yes	G
Route 9 EB	547	476	-71	-13%	Yes	G
Route 11 SB	239	241	2	1%	Yes	G
Route 11 NB	233	239	6	3%	Yes	G
Route 17 EB	517	519	2	0%	Yes	G
Route 17 WB	533	525	-9	-2%	Yes	G
Route 18 EB	218	205	-13	-6%	Yes	G
Route 18 WB	211	205	-5	-3%	Yes	G
Route 19 EB	675	633	-42	-6%	Yes	G
Route 19 WB	697	643	-54	-8%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 26 NB	246	235	-11	-5%	Yes	G
Route 26 SB	246	242	-4	-2%	Yes	G
Route 28 EB	591	557	-34	-6%	Yes	G
Route 28 WB	597	561	-37	-6%	Yes	G
Route 29 NB	784	756	-28	-4%	Yes	G
Route 29 SB	778	774	-4	-1%	Yes	G
Route 30 WB	590	528	-62	-11%	Yes	G
Route 30 EB	562	522	-40	-7%	Yes	G
Route 32 SB	494	458	-36	-7%	Yes	G
Route 32 NB	487	461	-26	-5%	Yes	G
Route 33 NB	702	681	-20	-3%	Yes	G
Route 33 SB	696	715	19	3%	Yes	G
Route 34 EB	453	466	13	3%	Yes	G
Route 34 WB	453	457	4	1%	Yes	G
Route 35 EB	1127	1033	-95	-8%	Yes	G
Route 35 WB	1125	1029	-96	-9%	Yes	G
Route 36 NB	1277	1302	25	2%	Yes	G
Route 36 SB	1306	1300	-6	0%	Yes	G

Table 10-20 - Journey Time Validation Summary by Route: PM Peak

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Selby						
Route 2 NB	821	908	87	11%	Yes	G
Route 2 SB	954	887	-67	-7%	Yes	G
Route 3 ACW	381	432	50	13%	Yes	G
Route 3 CW	496	446	-50	-10%	Yes	G
Route 4 EB	763	834	71	9%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 4 WB	911	812	-99	-11%	Yes	G
Route 5 NB	544	601	56	10%	Yes	G
Route 5 SB	532	550	18	3%	Yes	G
Route 6 EB	263	279	16	6%	Yes	G
Route 6 WB	313	296	-17	-5%	Yes	G
Route 7 WB	318	318	0	0%	Yes	G
Route 7 EB	334	317	-17	-5%	Yes	G
Route 8 NB	636	588	-48	-8%	Yes	G
Route 8 SB	723	685	-39	-5%	Yes	G
Route 10 EB	362	383	22	6%	Yes	G
Route 10 WB	406	385	-21	-5%	Yes	G
Route 13 EB	185	185	0	0%	Yes	G
Route 13 WB	175	167	-8	-5%	Yes	G
Tadcaster						
Route 15 EB	435	457	22	5%	Yes	G
Route 15 WB	420	457	37	9%	Yes	G
Route 16 WB	418	428	10	2%	Yes	G
Route 16 EB	422	447	25	6%	Yes	G
Sherburn						
Route 14 EB	581	471	-109	-19%	No	A
Route 14 WB	461	477	16	4%	Yes	G
Route 20 SB	392	363	-29	-7%	Yes	G
Route 20 NB	378	361	-17	-5%	Yes	G
Route 25 NB	963	929	-34	-4%	Yes	G
Route 25 SB	1046	956	-90	-9%	Yes	G
Route 27 NB	183	210	27	15%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 27 SB	200	205	5	2%	Yes	G
Route 31 EB	482	463	-18	-4%	Yes	G
Route 31 WB	460	447	-13	-3%	Yes	G
Eggborough						
Route 21 NB	191	220	29	15%	Yes	G
Route 21 SB	194	222	28	14%	Yes	G
Route 22 EB	652	657	5	1%	Yes	G
Route 22 WB	639	634	-6	-1%	Yes	G
Route 23 EB	547	519	-29	-5%	Yes	G
Route 23 WB	515	515	1	0%	Yes	G
Route 24 NB	483	472	-10	-2%	Yes	G
Route 24 SB	497	468	-29	-6%	Yes	G
Other Routes						
Route 1 EB	532	482	-51	-10%	Yes	G
Route 1 WB	545	476	-69	-13%	Yes	G
Route 9 WB	563	492	-70	-13%	Yes	G
Route 9 EB	545	481	-64	-12%	Yes	G
Route 11 SB	262	242	-20	-8%	Yes	G
Route 11 NB	238	242	4	2%	Yes	G
Route 17 EB	522	566	44	8%	Yes	G
Route 17 WB	540	556	16	3%	Yes	G
Route 18 EB	207	208	0	0%	Yes	G
Route 18 WB	200	208	7	4%	Yes	G
Route 19 EB	648	637	-12	-2%	Yes	G
Route 19 WB	749	644	-105	-14%	Yes	G
Route 26 NB	237	236	-2	-1%	Yes	G

Route ID	Obs.	Mod.	Diff.	%Diff	Pass TAG	RAG Rating
Route 26 SB	231	242	12	5%	Yes	G
Route 28 EB	586	602	17	3%	Yes	G
Route 28 WB	599	584	-15	-2%	Yes	G
Route 29 NB	770	773	3	0%	Yes	G
Route 29 SB	755	858	103	14%	Yes	G
Route 30 WB	608	550	-58	-10%	Yes	G
Route 30 EB	602	604	2	0%	Yes	G
Route 32 SB	526	481	-45	-9%	Yes	G
Route 32 NB	482	466	-16	-3%	Yes	G
Route 33 NB	697	726	29	4%	Yes	G
Route 33 SB	808	949	142	18%	No	A
Route 34 EB	442	485	44	10%	Yes	G
Route 34 WB	451	460	10	2%	Yes	G
Route 35 EB	1101	1055	-46	-4%	Yes	G
Route 35 WB	1103	1026	-77	-7%	Yes	G
Route 36 NB	1261	1334	72	6%	Yes	G
Route 36 SB	1455	1329	-126	-9%	Yes	G

Figure 10-4 - Journey Time Route Validation Summary Map: AM Peak

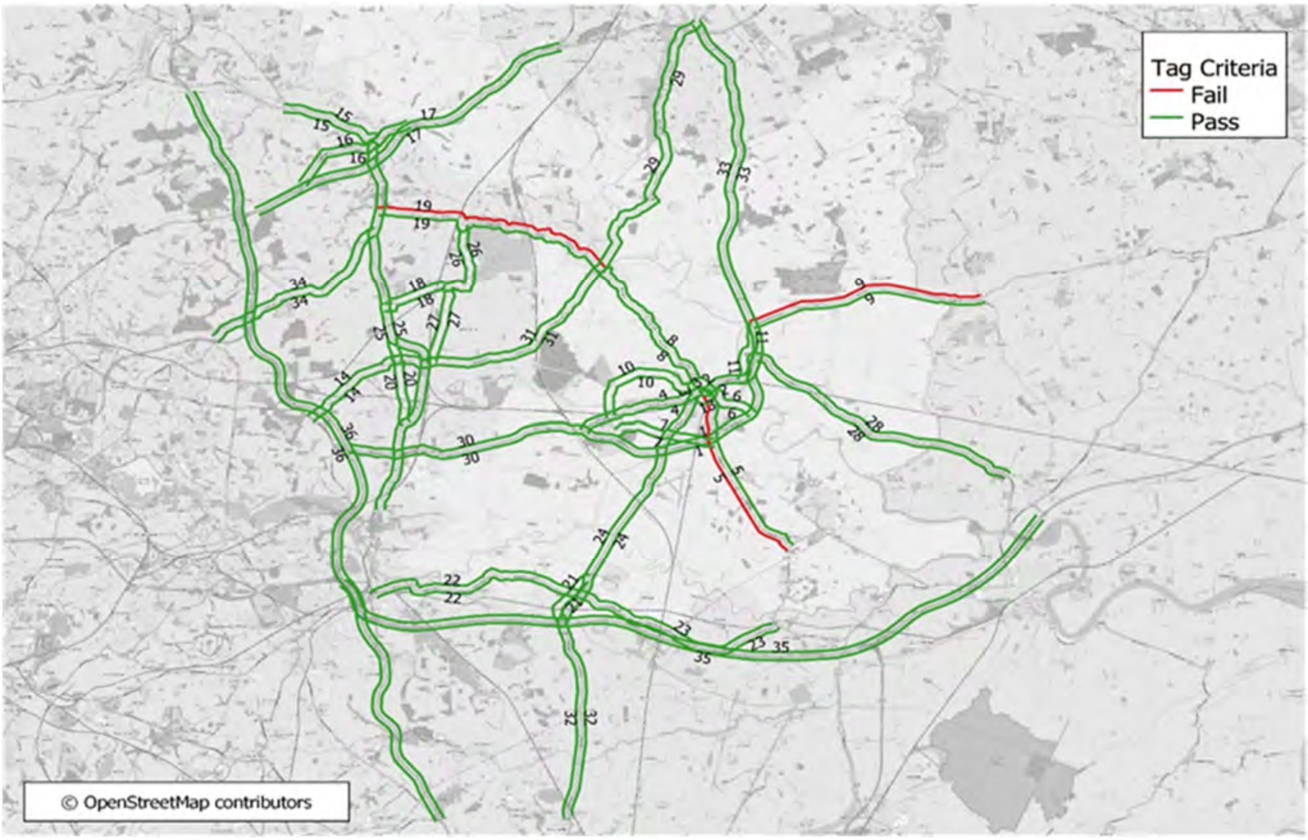


Figure 10-5 - Journey Time Route Validation Summary Map: Inter Peak

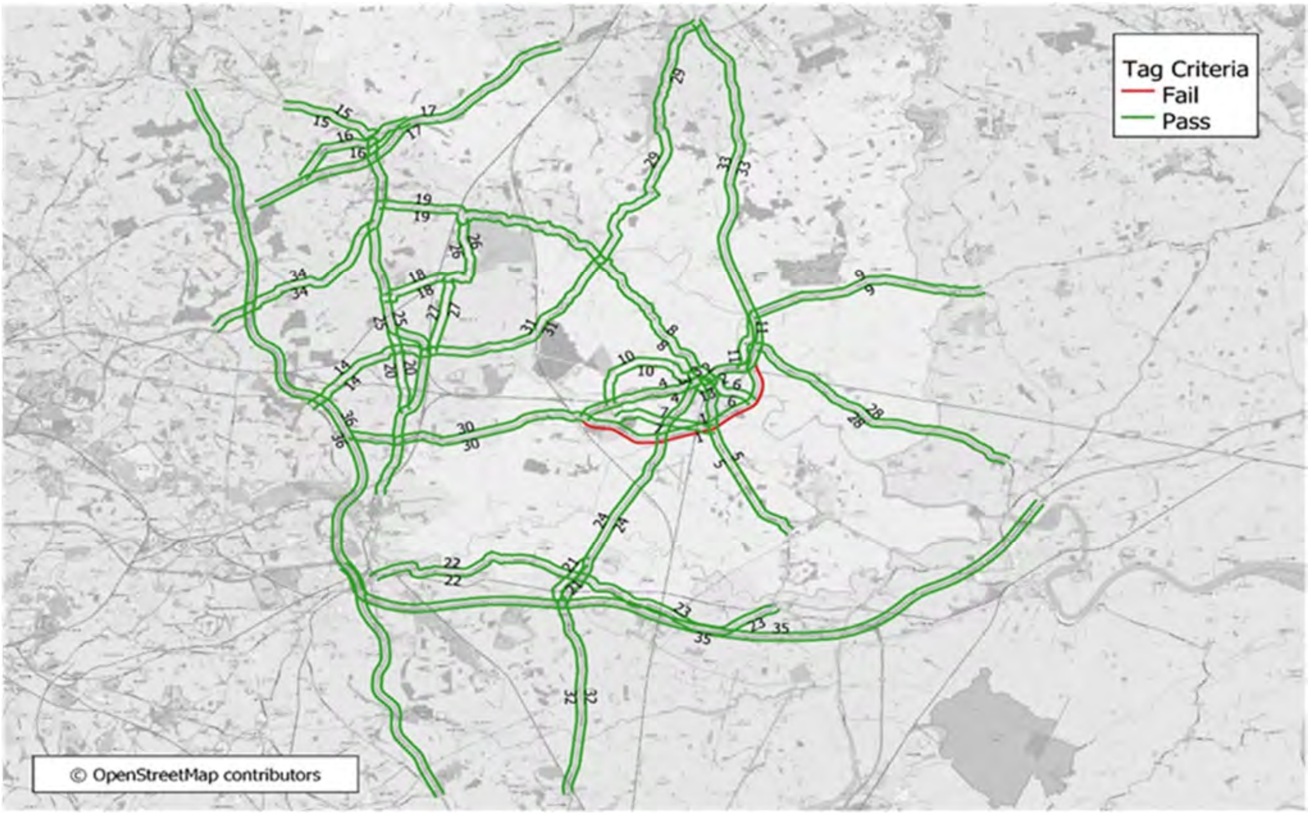
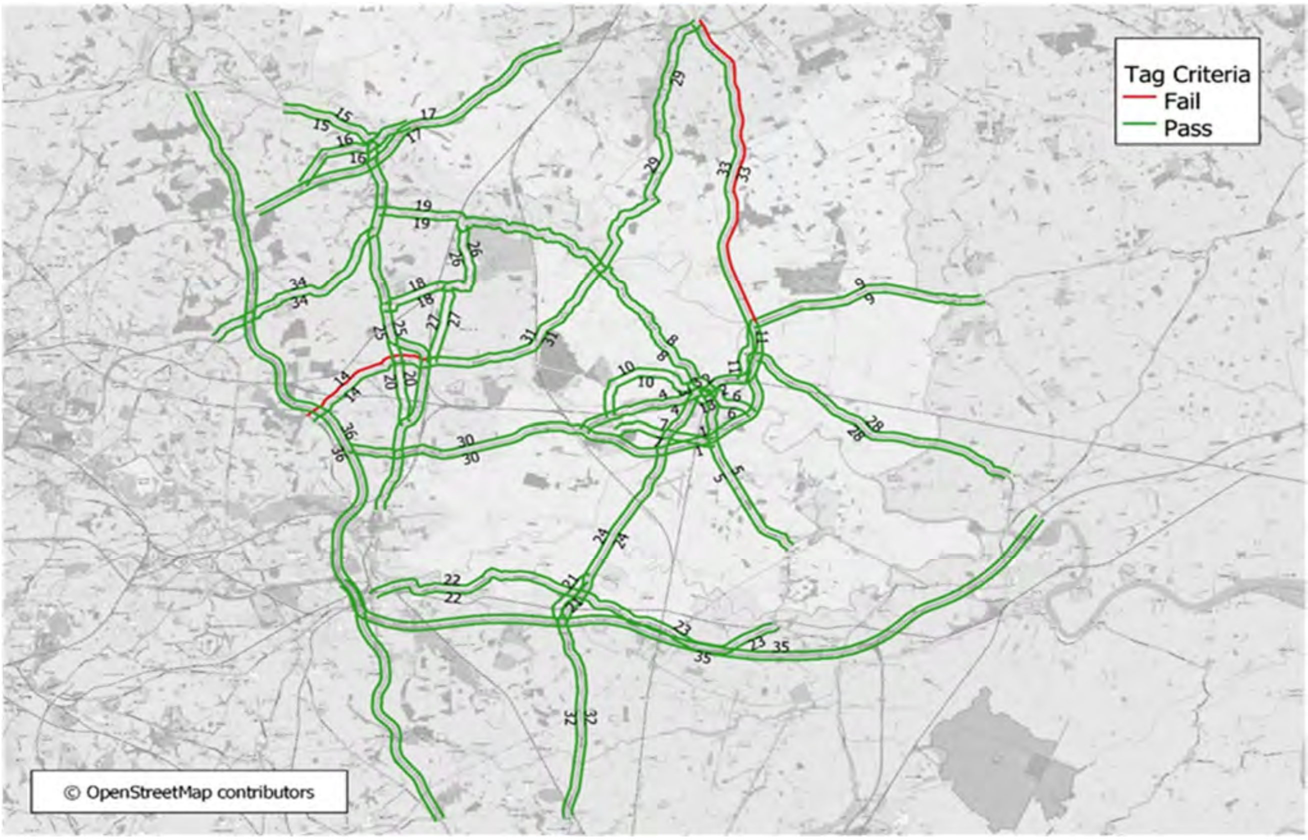


Figure 10-6 - Journey Time Route Validation Summary Map: PM Peak



11 SUMMARY AND CONCLUSIONS

11.1 SUMMARY OF DEVELOPMENT

11.1.1. The Selby District Strategic Transport Model has been developed for a base year of 2019 in SATURN software, with the modelling assisted by a comprehensive data collection program.

11.1.2. An observed prior matrix was derived from mobile phone origin-destination data which provided fully observed movements sampled over a month-long period for all modes within the mobile phone data collection study area.

11.1.3. The data was processed by Telefonica through cell tracking of O2 mobile devices and developed into travel demand matrices using tested processes and algorithms.

11.1.4. The consultants have employed a diligent method of verifying travel demand and developing the assignment matrix, aligned to guidance in emerging TAG Unit M2.2, Base Year Matrix Development.

11.2 SUMMARY OF STANDARDS

11.2.1. The base year model calibration and validation was developed closely to the guidance in TAG Unit M3.1 Highway Assignment Modelling.

11.2.2. Across the fully modelled area, for link flows the model achieves a pass percentage of more than 94% across all time periods which is significantly higher than the WebTAG threshold of 85%.

11.2.3. Across the fully modelled area, for turn flows the model achieves a pass percentage of more than 87% across all time periods which is higher than the WebTAG threshold of 85%.

11.2.4. Across the fully modelled area, for journey time routes the model achieves a pass percentage of more than 97% across all time periods which is significantly higher than the WebTAG threshold of 85%.

11.2.5. Hence for all three periods exceeded the thresholds set by WebTAG for link flows, turn flows and journey times journey time criteria, both globally and in the key model areas.

11.2.6. A greater quantity of data, relative to the amount of modelled network, used in calibration and validation was collected in the core areas meaning that a higher proportion of modelled network in these areas either had a count to calibrate flows or a link that was part of a journey time route.

11.2.7. The results in core areas showed that the model achieved higher levels of validation compared to the remainder of the modelled area.

11.3 SUMMARY

11.3.1. The appropriateness of the Selby District Strategic Transport Model has been judged on whether the model will produce a realistic response for the proposed schemes to be tested. A key consideration is the demonstration of base year calibration/validation results in line with TAG guideline criteria.

11.3.2. The model meets these criteria in most cases, at both the strategic level, and for key areas identified in the brief, subsequently refined through the Model Specification Report.

11.3.3. Results have also been presented globally - in line with TAG guidance, for the full modelled area and in the key areas of interest for future model applications.

11.3.4. TAG guidance makes clear that determining appropriateness of the model is based on the model providing a realistic response to forecast scenarios. Whilst model validation provides one indication of this, adherence to benchmark criteria does not guarantee fitness for purpose. Equally, narrowly missing target criteria does not mean that a model cannot be considered appropriate.

11.3.5. Whilst every effort has been put in to ensure the model is representative of the base scenario, for future applications of the Selby District Strategic Transport Model, it would be expected that each application undertakes a review of the local base year validation and, if necessary, proportional refinement undertaken for the local area as appropriate. This should be documented in the Appraisal Specification Report associated with the relevant scheme being tested.

11.3.6. The document "TAG: Guidance for the Technical Project Manager" references this process, which is generally considered as best practice when using a generic model for specific scheme forecasting and appraisal. Such analysis would also form part of assessing "realistic results" for specific interventions being tested.

11.3.7. Application of the whole SDSTM in forecasting models, and the local modelled responses in the forecast models, must also be considered in order to determine the appropriateness of the SDSTM overall for each scheme assessment.

Appendix A

SPEED FLOW CURVES

Speed-Flow Curve (RTMs)

Index	Description	S0	S2	Capacity	N	HGV	Lane
Motorways: Rural							
1	Motorway D4 Carriageways (70mph)	112.0	82.0	9320	2.78	96.0	4
2	Motorway D4 Carriageways (70mph)	111.0	81.0	9320	2.78	96.0	4
3	Motorway D4 Carriageways (70mph)	110.0	80.0	9320	2.78	96.0	4
4	Motorway D3 Carriageways (70mph)	111.0	81.0	6990	2.78	96.0	3
5	Motorway D3 Carriageways (70mph)	110.0	80.0	6990	2.78	96.0	3
6	Motorway D3 Carriageways (70mph)	109.0	78.0	6990	2.79	96.0	3
7	Motorway D2 Carriageways (70mph)	105.0	74.0	4660	2.88	96.0	2
8	Motorway D2 Carriageways (70mph)	104.0	73.0	4660	2.88	96.0	2
9	Motorway D2 Carriageways (70mph)	102.0	71.0	4660	2.89	96.0	2
10	Motorway D2 Carriageways (70mph)	101.0	70.0	4660	2.89	96.0	2
Dual Carriageway: Rural							
11	All-Purpose D3 Carriageways (70mph)	109.0	82.0	6300	2.70	96.0	3
12	All-Purpose D3 Carriageways (70mph)	108.0	81.0	6300	2.70	96.0	3
13	All-Purpose D2 Carriageways (70mph)	105.0	78.0	4200	2.71	96.0	2
14	All-Purpose D2 Carriageways (70mph)	101.0	74.0	4200	2.79	96.0	2
15	All-Purpose D3 Carriageways (60mph)	98.0	72.0	6300	2.71	96.0	3
16	All-Purpose D3 Carriageways (60mph)	95.0	71.0	6300	2.71		3
17	All-Purpose D2 Carriageways (60mph)	96.0	70.0	4200	2.71		2
18	All-Purpose D2 Carriageways (60mph)	93.0	69.0	4200	2.79		2
19	All-Purpose D3 Carriageways (50mph)	80.0	56.0	5580	2.82		3
20	All-Purpose D3 Carriageways (50mph)	79.0	55.0	5580	2.83		3
21	All-Purpose D2 Carriageways (50mph)	80.0	56.0	3720	2.82		2
22	All-Purpose D2 Carriageways (50mph)	78.0	55.0	3720	2.83		2
Dual Carriageway: Suburban/Urban							
31	D3 Carriageways (40mph)	64.0	35.0	4710	2.42		3
32	D3 Carriageways (40mph)	64.0	35.0	4380	2.10		3
33	D3 Carriageways (40mph)	64.0	35.0	4110	1.79		3
34	D2 Carriageways (40mph)	64.0	35.0	3280	2.79		2
35	D2 Carriageways (40mph)	64.0	35.0	3100	2.35		2
36	D2 Carriageways (40mph)	64.0	35.0	2900	2.01		2
37	D3 Carriageways (30mph)	48.0	25.0	4290	2.61		3
38	D3 Carriageways (30mph)	45.0	25.0	4020	2.09		3
39	D3 Carriageways (30mph)	43.0	25.0	3720	1.59		3
40	D2 Carriageways (30mph)	48.0	25.0	2760	2.37		2
41	D2 Carriageways (30mph)	45.0	25.0	2580	1.84		2
42	D2 Carriageways (30mph)	43.0	25.0	2380	1.41		2
Single Carrigeway: Rural (60mph)							
51	Single Carriageways: SW2-9.0m A Road 60mph	92.0	60.0	1720	2.25		1
52	Single Carriageways: S2-7.3m A Road 60mph	92.0	60.0	1420	2.08		1
53	Single Carriageways: S2-7.0m A Road 60mph	87.0	57.0	1330	2.07		1
54	Single Carriageways: S2-6.6m A Road 60mph	83.0	56.0	1240	2.06		1
55	Single Carriageways: S2-6.3m B Road 60mph	81.0	54.0	1170	2.02		1
56	Single Carriageways: S2-6.0m B Road 60mph	76.0	54.0	1090	2.00		1
57	Single Carriageways: S2-5.6m B Road 60mph	73.0	53.0	970	1.94		1
58	Single Carriageways: S2-5.2m Other Road 60mph	76.0	54.0	830	1.88		1
59	Single Carriageways: S2-5.0m Other Road 60mph	66.0	51.0	750	1.88		1
60	Single Carriageways: S2-4.6m Other Road 60mph	57.0	40.0	570	1.84		1
61	Single Carriageways: S2-4.4m Other Road 60mph	54.0	35.0	440	1.58		1
62	Single Carriageways: S2-7.3m A Road 50mph	80.0	50.0	1590	2.25		1
63	Single Carriageways: S2-7.3m A Road 50mph	80.0	50.0	1390	2.08		1
64	Single Carriageways: S2-7.0m A Road 50mph	76.0	47.0	1330	2.07		1
65	Single Carriageways: S2-6.6m A Road 50mph	73.0	46.0	1240	2.06		1
66	Single Carriageways: S2-6.3m B Road 50mph	70.0	45.0	1170	2.02		1
67	Single Carriageways: S2-6.0m B Road 50mph	66.0	45.0	1090	2.00		1
68	Single Carriageways: S2-5.6m B Road 50mph	63.0	45.0	970	1.94		1
69	Single Carriageways: S2-5.2m Other Road 50mph	61.0	40.0	830	1.88		1
70	Single Carriageways: S2-5.0m Other Road 50mph	56.0	35.0	750	1.88		1
Single Carrigeway: Suburban							
71	Suburban Roads - Single 40mph (Good)	63.0	28.0	1380	2.51		1
72	Suburban Roads - Single 40mph (Good)	60.0	25.0	1240	2.16		1
73	Suburban Roads - Single 40mph (Average)	57.0	25.0	1200	1.94		1
74	Suburban Roads - Single 40mph (Average)	54.0	25.0	1060	1.72		1
75	Suburban Roads - Single 40mph (Poor)	51.0	25.0	980	1.53		1
76	Suburban Roads - Single 30mph (Good)	48.0	25.0	1300	3.91		1
77	Suburban Roads - Single 30mph (Good)	46.0	25.0	1210	2.61		1
78	Suburban Roads - Single 30mph (Average)	44.0	25.0	1170	2.40		1
79	Suburban Roads - Single 30mph (Average)	42.0	25.0	950	1.37		1
80	Suburban Roads - Single 30mph (Poor)	38.0	25.0	860	1.32		1
Single Carrigeway: Urban							
81	Urban Non-central 50% development	48.0	25.0	930	1.97		1
82	Urban Non-central 80% development	48.0	25.0	930	1.65		1

83	Urban Non central 90% development	47.0	25.0	840	1.52	1
84	Urban Central INT = 2	38.0	15.0	910	1.87	1
85	Urban Central INT = 4.5	33.0	15.0	710	1.72	1
86	Urban Central INT = 9	30.0	15.0	560	1.61	1
87	Urban Central INT = 15	20.0	10.0	560	1.61	1
88	Special cobble street	10.0	5.0	250	1.61	1
Small Town						
91	Small Town 10% development	64.0	30.0	1400	2.95	1
92	Small Town 25% development	60.0	30.0	1370	2.96	1
93	Small Town 40% development	58.0	30.0	1300	2.94	1
94	Small Town 60% development	48.0	25.0	1370	3.91	1
95	Small Town 80% development	48.0	25.0	1240	3.35	1
96	Small Town 95% development	45.0	25.0	1120	2.81	1
97	Small Town 95% development - 20mph	32.0	15.0	950	1.72	1

Appendix B

MND VERIFICATION REPORT

North Yorkshire County Council and Selby District Council

BASE MATRIX DEVELOPMENT

Mobile Network Data Verification

MARCH 2022

CONFIDENTIAL

North Yorkshire County Council and Selby District Council

BASE MATRIX DEVELOPMENT

Mobile Network Data Verification

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70081319

DATE: MARCH 2022

North Yorkshire County Council and Selby District Council

BASE MATRIX DEVELOPMENT

Mobile Network Data Verification

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Issued			
Date	04 / 03 / 2022			
Prepared by	Nicola Tedoldi, Sam Callaghan			
Signature				
Checked by	Narendra Sadhale			
Signature				
Authorised by	Paul Smith			
Signature				
Project number	70081319			
Report number	MND Verification			

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. Telefónica has provided WSP with Mobile Network Data (MND) to develop the Selby District Strategic Transport Model (SDSTM).

1.1.2. Telefónica is a mobile network operator (O2 in the UK) providing services to over 22 million UK customers in both the public and private sectors.

1.1.3. This technical note summarises the outcomes of the verification checks undertaken by WSP on the MND, including:

- Range and Logic Check,
- Trip Rate Checks,
- Trip Purpose and Direction Checks,
- Trip Length Distribution Checks, and
- Mode of Travel Checks.

1.1.4. As part of these verification checks TEMPRO (v7.2) was used as a comparison.

1.2 MND DATA DEFINITIONS

1.2.1. The following definitions are used in this note:

- O2 customers communicate their positions with the networks of Telefónica cells.
- Each of these communications is referred to as an event. The events can be divided in:
  - Connection events occur when a user turns the phone on or off, loses or regains connection
  - Call events occur when a user makes or receives a phone call, or moves between cells when on a call
  - Text events occur when a user makes or receives a text message
  - Movement events occur when a user moves from one cell to another
  - Time-based events occur whenever a user does not create an event for a sustained period of 3 hours
- Telefónica replaces the customer details recorded in the event with an encrypted ID, known as the device ID. This allows movements of mobile devices to be tracked in a way that is not compromised.
- The time between consecutive events being registered for a particular device are registered by the same cell is called the dwell time.
- A trip for a mobile device user is defined from the time of the last event registered in the starting dwell cell until the time of the first event registered in the finishing dwell cell.
- A filter is applied to ensure that only mobile devices are included. Machine to machine devices, tablets and GPS units are excluded as they are less likely to be carried by users all times. Large business contracts are also removed from the sample to reduce the risk of double counting users who carry two phones.

- If a dwell exceeds a 30-minute threshold, the device is deemed to be static. Therefore, a static trip is recorded by a mobile device not moving for over 30 minutes within the coverage area of a single cell.

1.3 MND DATA DEFINITIONS

1.3.1. The mobile phone data was collated over a three-month period, from 01/10/2019 and 31/10/2019. The dates between from 28/10/2019 and 31/10/2019 have been excluded due to school holidays. Overall, a total of 19 days were used to build the OD matrix.

1.4 MND ZONE TYPES

1.4.1. The study area was defined by a total of 300 MND zones disaggregated in the following way:

- Cordon area zoning system corresponding to the MSOA (205 zones)
- Outer zones (95 zones)

1.4.2. The study area was further divided into 643 separate zones consisting of the following geographical specifications:

- LSOA and OA within Selby district area, plus the towns within the study area
- District and aggregations thereof outside of the study area based on route choice and proximity to the Cordon area.

1.4.3. The mobile phone raw events available for this project were available for all zones within the Cordon area. Only the trips relating to the Cordon area, i.e., trips from, to and traversing the area are included in the matrix. Therefore:

- Trips for external zones within or overlapping the Cordon area are only included if they interact with the Cordon area

1.4.4. For this reason, the analysis presented in this note is based only trips which start and/or end within the Cordon area. The Outer zones only have partial coverage therefore including them in comparisons with independent datasets such as TEMPRO would not be direct comparison, especially for magnitudes and trip rates.

1.4.5. The zone system definitions are presented in Figure 1-1 and Figure 1-2 below.

Figure 1-1 - MND Extension of the Cordon Area - MND Extension of the Cordon Area

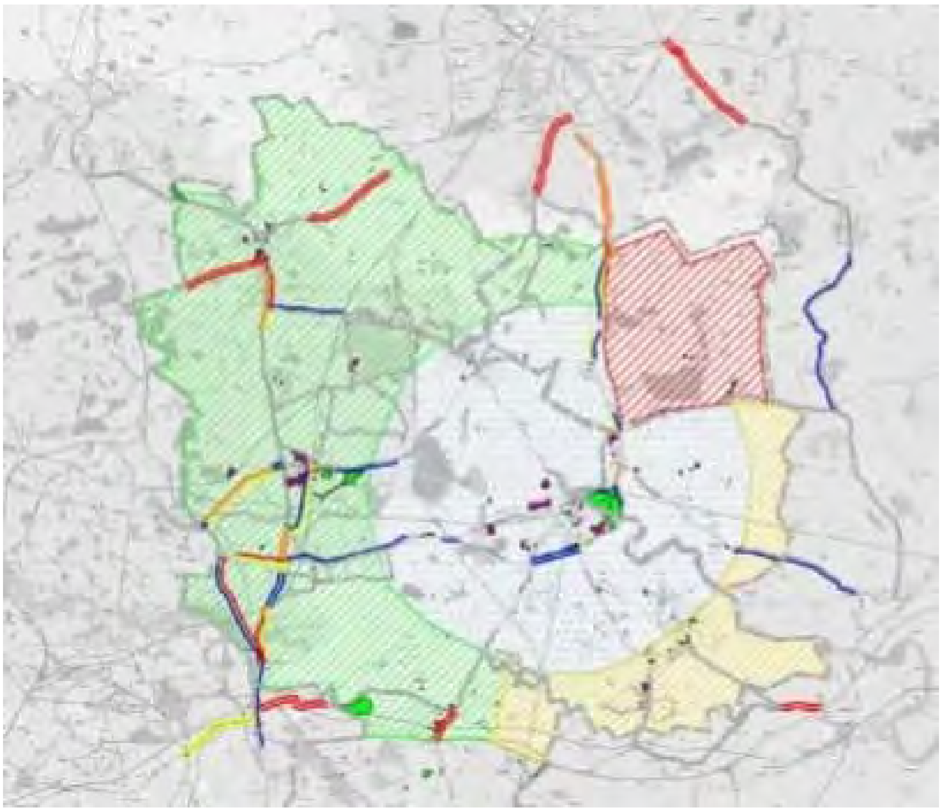
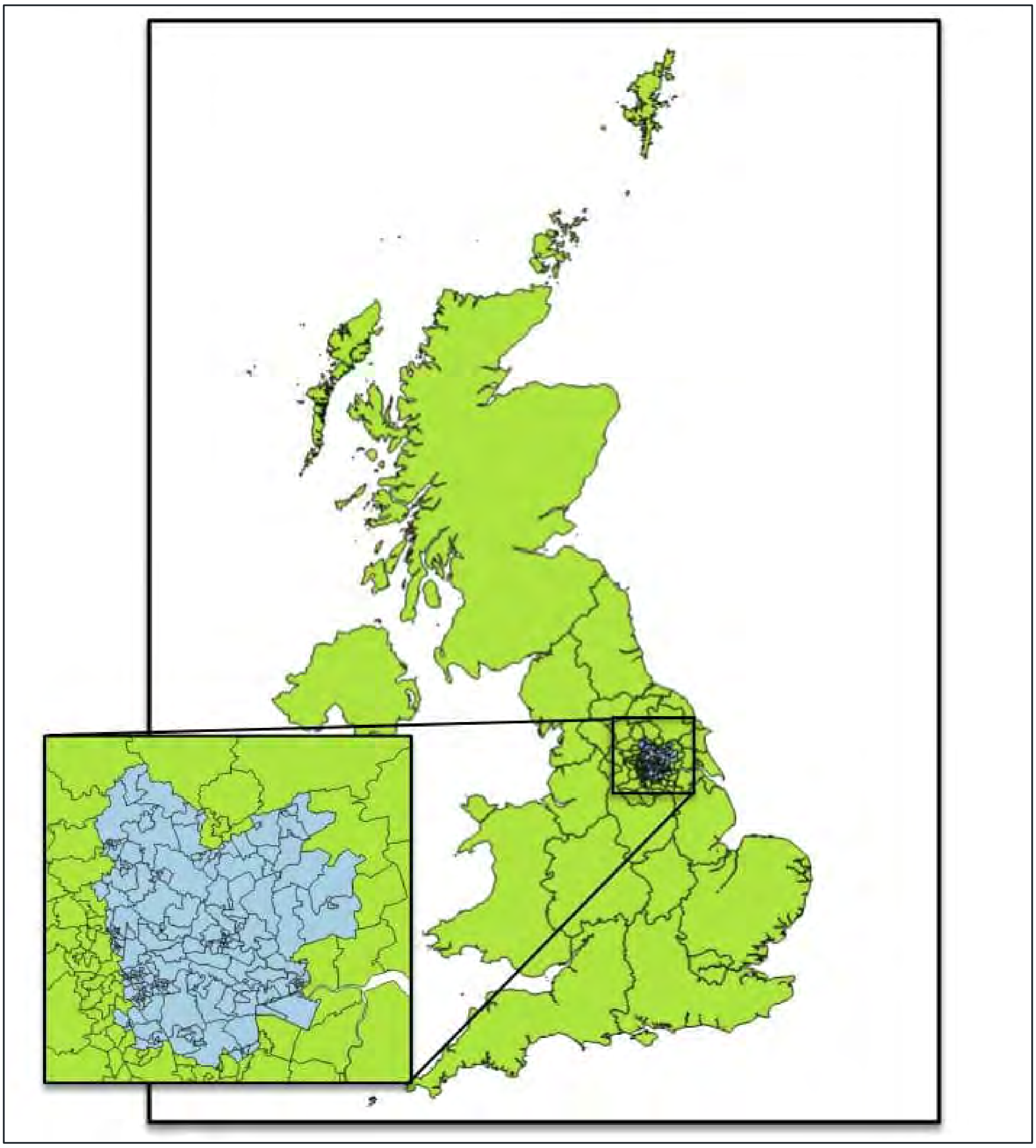


Figure 1-2 – MND Zoning System



1.5 MND DEVICES AND EXPANSION

1.5.1. The sample collected will only cover the subset of the population who use O2 devices. This is estimated at around a 30% share of the UK mobile market. A filter is applied to ensure that only mobile devices are included. Machine to machine devices, tablets and GPS units are excluded as they are less likely to be carried by users all times. Large business contracts are also removed from the sample to reduce the risk of double counting users who carry two phones.

1.5.2. The sample is expanded by Telefónica to the population at the zone level, in a process which takes into account mobile phone penetration and local market share.

These sections summarise key information.

1.6 REPORT KEYS

1.6.1. The MND data was supplied by different variables, using the following indexing system.

- Mode:
  - Total Motorised Road
  - HGV

- Period:
  - AM peak (07:00-10:00)
  - Inter-peak (10:00-16:00)
  - PM peak (16:00-19:00)
  - OP peak (19:00-7:00)

- Purpose:
  - Outbound Home-Based Work
  - Inbound Home-Based Work
  - Outbound Home-Based Other
  - Inbound Home-Based Other
  - Non-Home-Based Work
  - Non-Home-Based Other

2 TELEFONICA VERIFICATION CHECKS

2.1 SUMMARY

2.1.1. The first verifications of the MND data were carried out by Telefónica. These verifications are to demonstrate that the processes implemented by Telefónica have been applied correctly and to flag any deficiencies, should they occur, owing to limitations in the algorithms, so that WSP can address these as part of the transport model prior matrix development.

2.1.2. After Telefónica had completed their verification process they stated:

"The mobile phone travel demand data provided is internally consistent and compares well to the secondary datasets."

2.1.3. The verification tests were carried out for the zones within the cordon only, since trips for outer zones are only partially observed where they interact with the other zones. The main checks which were carried out were:

- Comparisons of the device trip rates against NTS. The device trip rate is 1.16 trips per working day compared to NTS national reporting of 2.75 trips per average day. Several factors contribute to this difference:
  - The lack of short trips observed in the mobile network data
  - The MND are only considering trips made by users with a home located inside the cordon that start/end or pass through the cordon area, not all trips a user makes. The relative size of the area will have an impact on this metric as many journeys will not be captured
- Symmetry checks for origins vs destinations and 'from home' vs 'to home' for different subsets of mode, which showed strong correlation for each,
- Logic checks on the proportion of daily flow by time period for different combinations of direction and purpose to confirm the flow patterns by time period are in line with expected patterns,
- Correlation plots against population for different subsets of the trip matrix, and
- TLD comparison between the Mobile Network Data and NTS

2.1.4. The limitations reported by Telefónica are as follows:

- The trips in the database only represent trips made by those over 12 years old.
- Comparison with trip length distributions from NTS indicate that trips below five miles are likely to be under-represented in the mobile phone data. However, this will depend on the cell resolution.

WSP has proceeded to carry out further verification checks on the data. These are documented in the following chapters.

3 RANGE AND LOGIC CHECKS

3.1 LOGIC CHECKS

3.1.1. The permutations of purpose, direction and mode were checked to assure that the outcomes were logical, and to understand the relationships between the less descriptive elements.

3.1.2. The numbers in the tables below refer to those listed in the report keys in Section 1.6.

3.2 PURPOSE AND DIRECTION COMBINATIONS

3.2.1. As expected, the home-based and non-home-based components of purpose and direction match.

Table 3-1 - Purpose and Direction Combinations

Purpose	Direction
Home-Based Work	Inbound
Home-Based Work	Outbound
Home-Based Other	Inbound
Home-Based Other	Outbound
Non-Home-Based Work	NA
Non-Home-Based Other	NA

3.3 MODE AND PURPOSE COMBINATIONS

3.3.1. As expected, all the purposes and directions are represented in motorised and HGV mode.

Table 3-2 - Mode and Purpose Combinations within the MND Dataset

Mode	Purpose	Mode	Purpose
Motorised	Home-Based Work Inbound	Motorised	Home-Based Other Inbound
Motorised	Home-Based Work Outbound	Motorised	Home-Based Other Outbound
Motorised	Non-Home-Based Work	HGV	Non-Home-Based Work
Motorised	Non-Home Based Other	HGV	Non-Home-Based Other

3.4 RANGE CHECKS

3.4.1. In the zone system supplied to Telefónica, the 300 zones are classified as follows:

- 205 study area zones; and
- 95 external zones.

3.4.2. The potential matrix size is 90,000 cells.

3.4.3. When all modes, time periods and purposes are included, the number of OD pairs with non-zero trips for an average weekday are 55,769 (62%).

3.4.4. The results broken down by time period are summarised in Table 3-3 below.

Table 3-3 - Proportion of MND Matrix with Non-Zero Entries - Weekdays Only

Time Period	AM	IP	PM
OD Pairs with Trips	34,232	45,187	37,096
% of Matrix Non-Zero	38%	50%	41%

3.5 AREA COMPRESSION

3.5.1. The proportions of the total matrix by high level areas are presented in Table 3-4 and Table 3-5. This gives a high-level indication of the magnitude of interaction between the Cordon area, and the rest. The zone definitions were presented in Figure 1-2. From the table we can see different results between motorised and HGV trips. In particular:

3.5.2. As regard motorised trips, we see that within the MND matrix:

- 13.6% of the trips are intra- cordon area,
- 47.6% of the trips are between the cordon area and the external region, and
- 38.8% of the trips are 'through' trips between two external zones.

3.5.3. For HGV trips we see that:

- 3.9% of the trips are intra-cordon area,
- 33.2% of the trips are between the cordon area and the external region; and
- 62.9% of the trips are 'through' trips between two external zones.

3.5.4. In summary, for motorised trips the mid-long-distance trips that interact with the cordon area represent a significative 47.6% whilst internal trips only make up a small proportion (13.6%). For HGV intra-cordon trips are only 3.9% of the total whilst the trips that interact with the external zones represent the 96.1%.

Table 3-4 - Area to Area Proportions of the Overall MND Matrix - Weekdays Only (Motorised)

Proportion of the overall MND matrix	Cordon Area	Rest of Study Area
Cordon Area	13.6%	23.8%
Rest of Study Area	23.8%	38.8%

Table 3-5 - Area to Area Proportions of the Overall MND Matrix - Weekdays Only (HGV)

Proportion of the overall MND matrix	Cordon Area	Rest of Study Area
Cordon Area	3.9%	17.1%
Rest of Study Area	16.1%	62.9%

3.6 MODE SPLIT

3.6.1. The mode split in the MND matrix is presented in the Table 3-6.

Table 3-6 - Mode split comparison

Purpose	MND
Motorised	97.5%
Rail	2.5%

3.7 TIME OF DAY

3.7.1. The following graphs show the time-of-day breakdown within the MND matrix:

- Figure 3-1 shows the percentage of average weekday flow by time period for peak period, for motorised and HGV. Over the full period, the inter-peak has the highest volume of trips. However, for peak hours, the PM has the highest volume of trips, with the AM very close.
- Figure 3-2 shows the same data but disaggregated by purpose; specifically, the percentage of average weekday flow by peak period by purpose. In AM 'Work' and 'Other' are very close while in the other time periods, 'Other' has a greater share (noting that 'Work' in this context, is referring to commuting).

Figure 3-1 - Percentage of Average Weekday Flow by Time Period - Percentage of Average Weekday Flow by Time Period

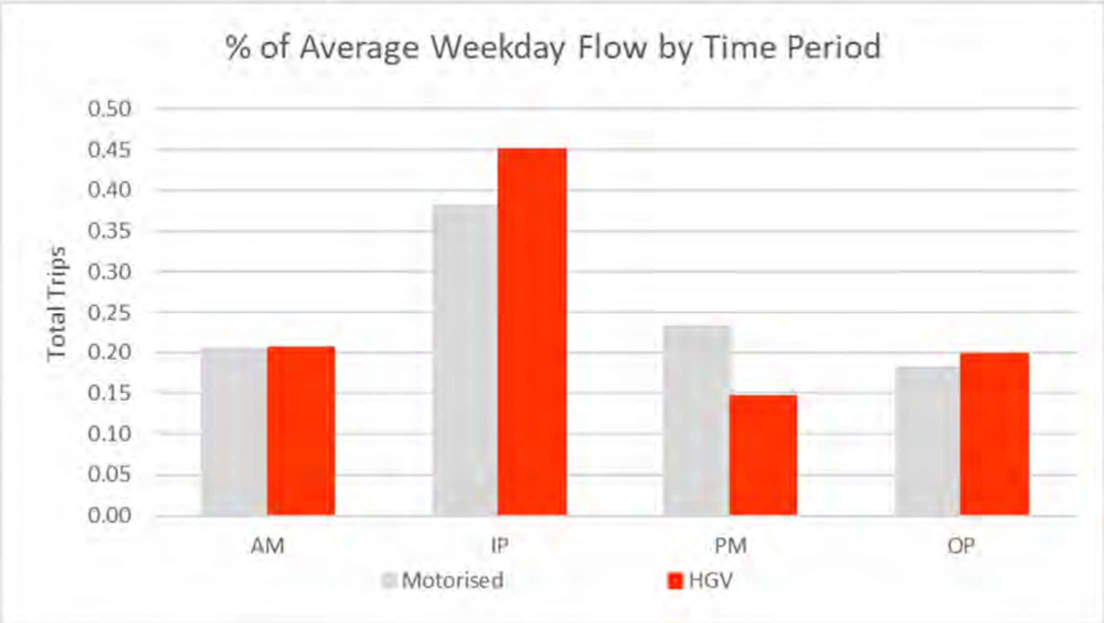
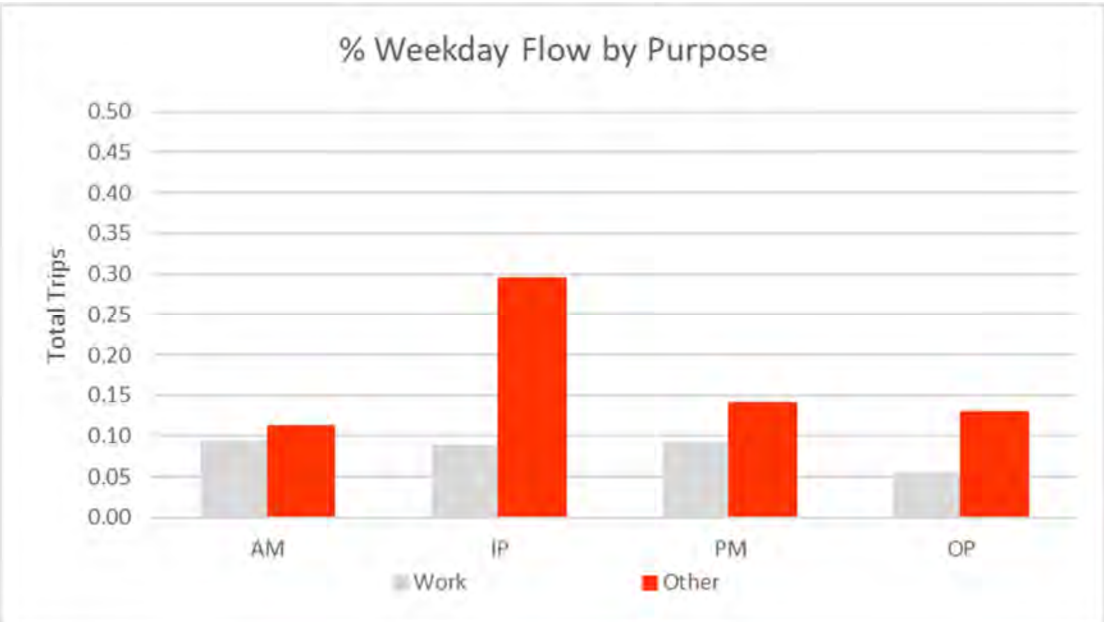


Figure 3-2 - Percentage of Average Weekday Flow by Time Period and Purpose



3.8 FURTHER SYMMETRY CONSIDERATIONS

3.8.1. The symmetry within the dataset is demonstrated in and Figure 3-3. It compares the daily trip end at origin and destination. The graph has an R2 value greater than 0.999 and low intercept values which indicate a strong relationship in each plot between their respective variables. It shows that the dataset has the appropriate balance for each zone of origin trips against destination trips with no outliers. It gives confidence that trips for a traveller within the matrix start from the same zone where their last recorded trip ended.

3.8.2. Table 3-7 compares the total daily outbound and inbound Home Based trips. The Outbound Inbound ratio is higher than 0.95 for HBW and HBO. It shows that within the dataset, each time a traveller leaves home it will make a corresponding return trip home at some point during the course of the day.

Figure 3-3 – 'Total Origins' vs 'Total Destinations' Symmetry

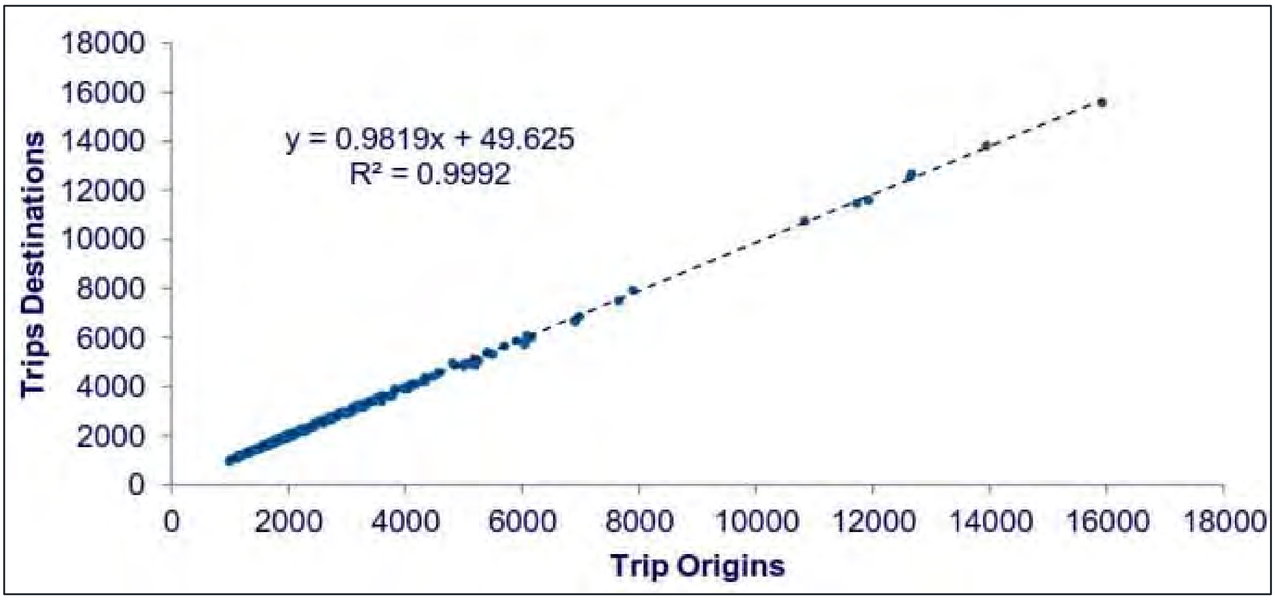


Table 3-7 - Average Weekday Home Based Outbound/Inbound Trips

Purpose	Outbound	Inbound	Symmetry
Home Based Work	99,967	102,903	0.97
Home Based Other	223,400	217,727	1.02

4 TRIP RATES CHECKS

4.1 ORIGIN TRIP RATES

4.1.1. The first comparison was to check the correlation between total trips and population. The average weekday origin trip rates – i.e., total distinct trips – were calculated by district, based on population data from the 2011.

4.1.2. The origin trip rates range from 0.70 to 2.20. Aggregated for Selby District, this gives a weekday average value of 1.39 distinct trips per person as presented in Table 4-1.

Table 4-1 - Average Weekday Origin Person Trip Rates by District – All Purposes

District	All Modes	
	Total Origins	Origin Trip Rate
Selby	86,102	1.39

4.2 COMPARISON WITH TEMPRO - TOTAL TRIP

4.2.1. To investigate the total trip generation from MND, the total trips in the MND dataset were compared against the total trips in TEMPRO by MSOA for Selby District. This analysis is presented in Table 4-2**Error! Reference source not found.**.

4.2.2. We see that at the delta-difference for MPOD / TEMPRO ranges from 0.44 to 0.74. Note that, at this stage, the MND data still includes the Light Goods Vehicles (LGVs) therefore it would be expected that the MND matrix should be higher to a reasonable extent in this comparison.

4.2.3. The delta-differences presented here demonstrate that, in general, the total trips from MND for an average weekday is significantly low when compared with TEMPRO.

Table 4-2 - Average Weekday Total Two-Way Trips – All Modes

District	All Modes		
	MND	TEMPRO	δ Diff.
E02005809	18025	24998	0.72
E02005810	14152	26147	0.54
E02005811	17682	30035	0.59
E02005812	25643	34536	0.74
E02005813	28681	51621	0.56

E02005814	8067	18101	0.45
E02005815	11310	25693	0.44
E02005816	15714	26848	0.59
E02005817	11569	20267	0.57
E02005818	21150	29539	0.72
TOTAL	171993	287785	0.60

4.3 COMPARISON WITH TEMPRO - HOME BASE PRODUCTIONS

4.3.1. In addition to the previous analysis, the average weekday home based production trip rates were calculated as a sense check and compared against TEMPRO. This analysis is presented in Table 4-3 below for Motorised versus all TEMPRO modes. In general, the analysis follows the same trend of the previous paragraph highlighting a shortfall in total home-based trips compared to TEMPRO.

Table 4-3 - Average Weekday Home Based Production Person Trip Rates

District	All Modes		
	MND	TEMPRO	Diff.
E02005809	0.68	1.24	-45%
E02005810	0.59	1.30	-55%
E02005811	0.70	1.30	-46%
E02005812	0.64	1.24	-48%
E02005813	0.48	1.04	-53%
E02005814	0.44	1.16	-62%
E02005815	0.51	1.25	-59%
E02005816	0.56	1.26	-55%
E02005817	0.65	1.26	-48%
E02005818	0.69	1.26	-45%
TOTAL	0.60	1.23	-51%

5 TRIP PURPOSE AND HOME BASED / NON HOME-BASED CHECKS

5.1 COMPARISON WITH TEMPRO – PURPOSE SPLITS

5.1.1. In the previous chapter it was observed that there is a shortfall in trips in the MND. A trip will only be classified as 'Work' within the MND matrix if the data processing algorithms were able to infer a regular work location for the device over the data capture period. It is acknowledged that the assignment of devices to work locations can be difficult where people do not have a regular work location.

5.1.2. The Work/Other purpose split within the MND matrix has been compared against TEMPRO purpose split. The analysis is presented for all the modes for an average weekday.

5.1.3. Note that, 'Work', taken from the MND definitions, is referring to commute trips and not to employer business, that are categorised as 'Other' in the MND data.

5.1.4. Initially, when aggregating the TEMPRO purposes into two categories of Work and Other, education was assigned into other grouping. These results are presented in Table 5-1, and demonstrate a 12% difference in the purpose split between the two datasets.

5.1.5. A second comparison was carried out with the TEMPRO definitions redefined whereby education was moved into the Work grouping, rather than Other. These results are presented in Table 5-2 and show the Work/Other purpose split between the MND matrix and TEMPRO to be very close.

Table 5-1 - Work/Other Split Proportions – Education aggregated with 'Other'

Purpose	MND	TEMPRO
Work (HB and NHB)	0.33	0.25
Other (HB and NHB)	0.67	0.75

Table 5-2 - Work/Other Split Proportions – Education aggregated with 'Work'

Purpose	MND	TEMPRO
Work (HB and NHB)	0.33	0.38
Other (HB and NHB)	0.67	0.62

5.2 COMPARISON WITH TEMPRO – HOME BASED / NON-HOME-BASED SPLITS

5.2.1. The home based / non-home-based proportions have been compared against TEMPRO, as per the purpose split, for all modes for an average weekday. Education trips in TEMPRO have been aggregated into Work for the data presented in the Table 5-3.

5.2.2. The results demonstrate that the home-based trips are slightly underrepresented in the MND. However, as mentioned earlier, at this stage the MND data still includes the Light Goods Vehicles (LGVs).

Table 5-3 - HB/NHB Split Proportions

Purpose	MND	TEMPRO	Difference
HB Work	0.24	0.36	-0.12
HB Other	0.51	0.53	-0.02
NHB Work	0.09	0.02	0.07
NHB Other	0.16	0.09	0.07

6 TRIP LENGTH DISTRIBUTION CHECKS

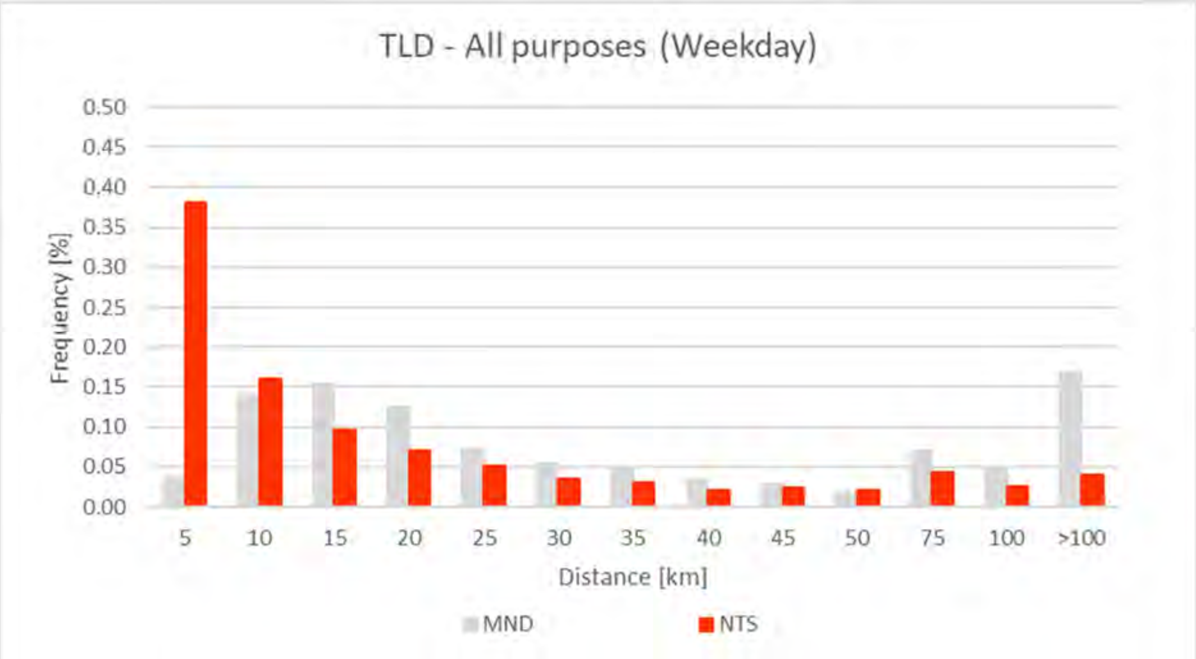
6.1 COMPARISON WITH NTS

6.1.1. A prior expected weakness of mobile phone data is that there will be a shortfall in short distance trips. This can be caused by trips not moving outside of the coverage age of a single cell.

6.1.2. The trip length distributions for the MND data have been compared to those from National Travel Survey (NTS) data for North Yorkshire, to assure a statistically significant sample.

6.1.3. Figure 6-1 below confirms that there is a significant shortfall in short distance trips compared to NTS.

Figure 6-1 - TLD Comparison: All purposes and all modes



6.1.4. Highlighted the gap in the short distance trips, if we represent only the trips above 5km we can see that the TLD is well represented with still a gap in trips below 5-10 km and an overrepresentation of long-distance trips (>100km).

Figure 6-2 - TLD Comparison: All purposes and all modes (>5 kilometers)

7 CONCLUSIONS

7.1.1. The all-day weekday MND matrix has 62% of cells with non-zero trips. By time period, this ranges from 38% - 50%.

7.1.2. The vehicle split showed that the HGV component represents only around the 3% of the total trips.

7.1.3. For motorised trips (excluding HGV), most trips in the matrix are the Internal from/to external trips (48%). Long distance trips between the external regions represent a significant 39% whilst the intra-study area trips make up a small proportion (around 14%), of the travel demand from Selby district.

7.1.4. As regard HGV, most trips in the matrix are the external (around 63%). Intra-study area trips make up around 33%.

7.1.5. The comparison with TEMPRO total trips showed that the MND matrix is significantly underrepresenting the total amount of trips in the study area.

7.1.6. The TLD analysis showed that a consistent part of this gap is produced by a shortfall in short distance trips for all purposes combined. These gaps will be infilled using the synthetic matrix.

7.1.7. The purpose split between ‘Work’ and ‘Other’ in the MND dataset closely reflected the purpose split in TEMPRO when education and work where defined together in TEMPRO. The matrix build will initially assume that the ‘Work’ category also contains education trips.

7.1.8. In the MND the category Other includes “employer business” and ‘Other’ trips. A method will be required to segment the MND into commute, business, and other user classes.

7.1.9. Other non-car highway trips -LGVs and bus - will need to be subtracted from the motorised component.

7.1.10. The analysis of the HGV matrix showed that the MND matrix is underrepresenting the HGV trips in the study area. Therefore, additional data will be required to fill these gaps in the matrix.

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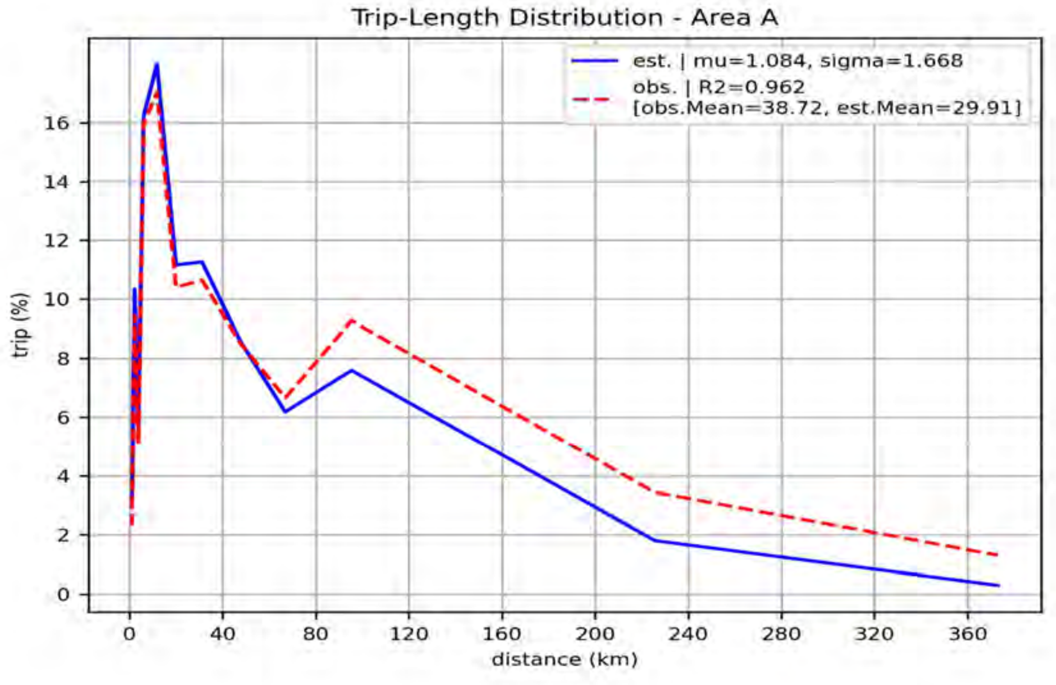
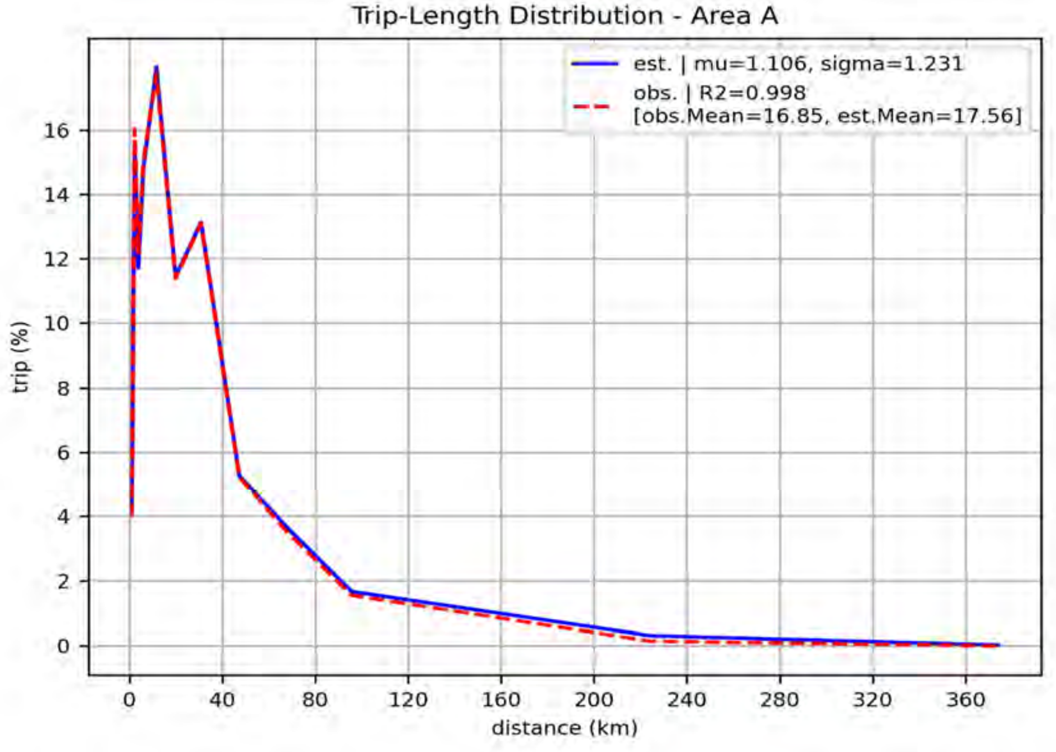
Appendix C

SYNTHETIC MATRIX CALIBRATION

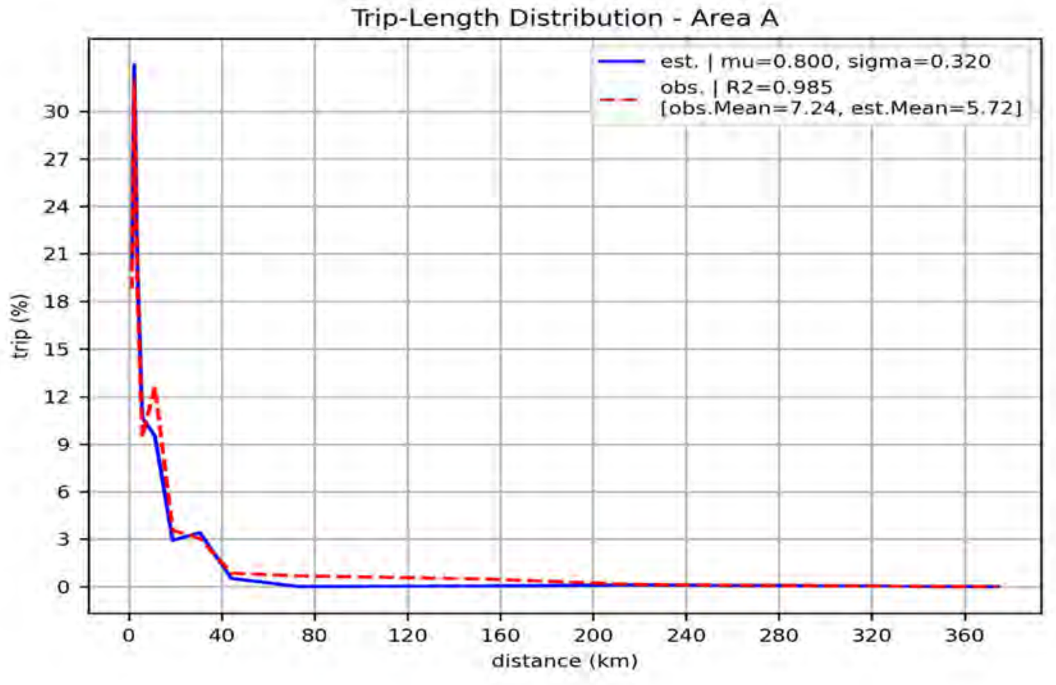
24H_Home-Based Business



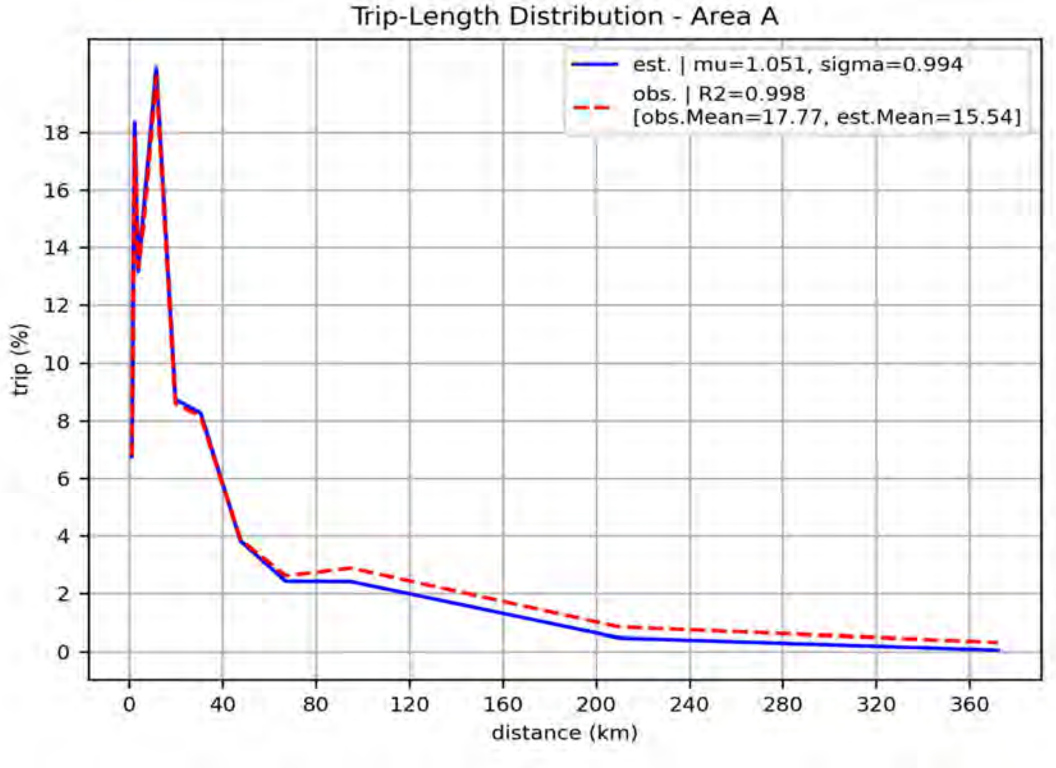
24H_Home-Based Commute



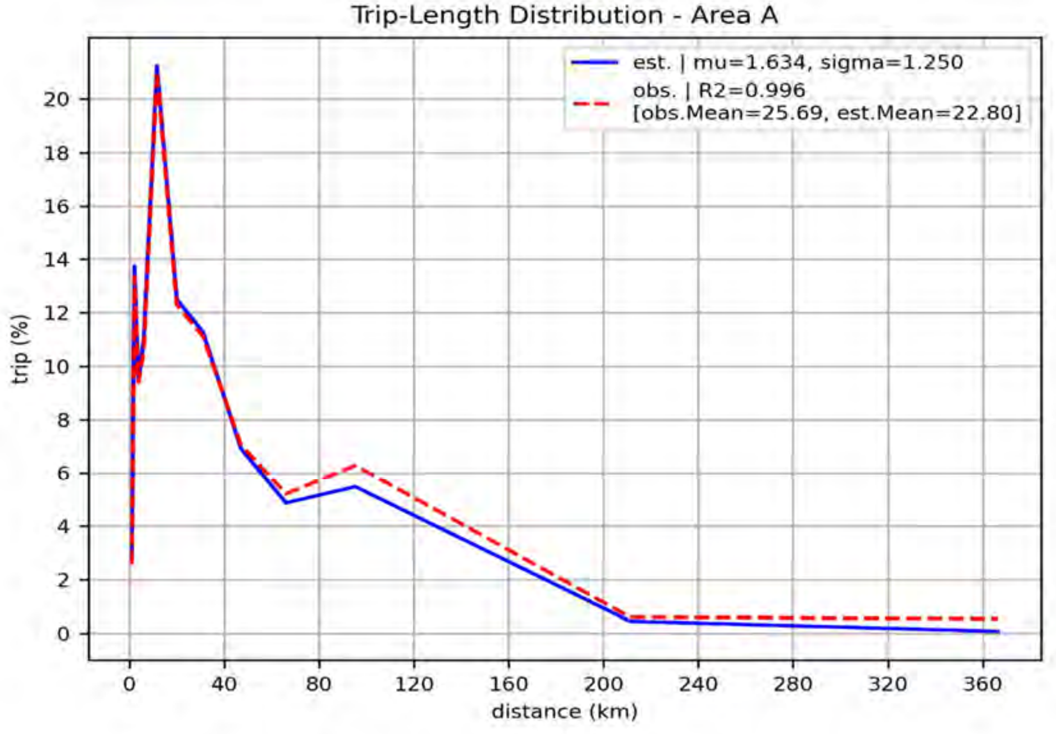
24H_Home-Based Education



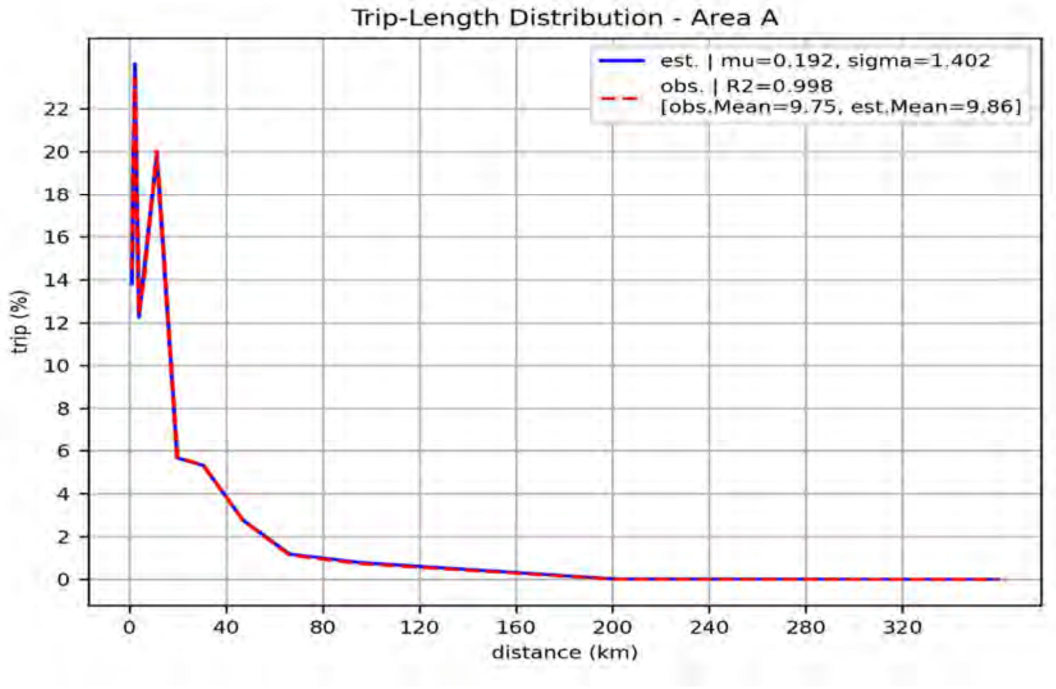
24H_Home-Based Other



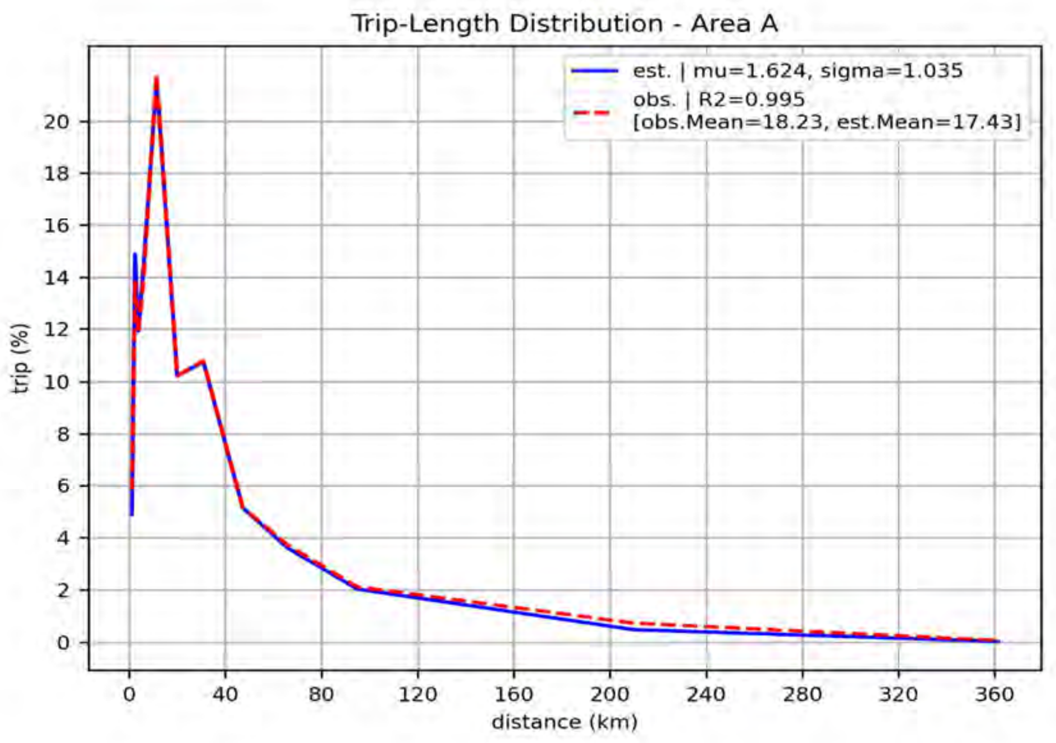
24H Non_Home-Based Business



24H_Non Home-Based Education



24H Non_Home-Based Other



Appendix D

NETWORK ACCEPTANCE CHECKS

TECHNICAL NOTE

DATE:	23 March 2023	**CONFIDENTIALITY:**	Confidential
SUBJECT:	Highway Network Acceptance Checks		
PROJECT:	Selby District Strategic Transport Model	**AUTHOR:**	Sam Callaghan
CHECKED:	Narendra Sadhale	**APPROVED:**	Paul Smith

HIGHWAY NETWORK ACCEPTANCE CHECKS

Introduction

WSP has been commissioned by North Yorkshire County Council (NYCC) and Selby District Council (SDC) to develop the Selby District Strategic Transport Model (SDSTM). A key component of this is the development of a SATURN highway assignment model.

This technical note describes the highway network tests and checking which were undertaken prior to, and further reviewed during, the calibration and validation process. It will be attached as an Appendix to the Local Model Validation Report (LMVR) which includes sections detailing network data and development, including the coding approaches, in more detail.

Purpose of the Tests

This note sets out the requirements for a series of tests to provide evidence that:

- The network building is complete to the agreed standard;
- The network and inputs have been appropriately checked, the SATURN warnings have been reviewed and formal testing has been carried out against a list of potential errors; and
- The network coding is satisfactory, as far as can be determined, before commencement of the calibration/validation stage.

The overall objective of the process is to ensure, as far as practically possible, that coding errors arising from human error in the network building are eliminated before calibration/validation process starts. The initial network should be coded in accordance with the agreed principles defined in the Model Specification Report (MSR).

However, it is recognised that there may be subsequent amendments to the network following feedback from the network calibration/validation process. Further detailed review and updates to network coding were undertaken a later stage based on feedback from NYCC and SDC.

For each test, background information on the purpose is provided along with a list of information that will be reviewed. Furthermore, the acceptance criteria will also be used as the basis for assessing whether the network meets the requirements of the study for this stage of the model development.

Description of Tests Undertaken

The following tests are to be carried out to ensure the network coding is in a satisfactory state before commencement of the calibration/validation stage. There were six types of test carried out, as described below:

- Test 1 – Completeness Check

  This is to ensure that the network produced is complete according to the Model Specification Report.

- Test 2 – SATURN Compilation Check

  This is to ensure that all the errors/warnings produced by SATNET has been reviewed and checked.

- Test 3 – Inspection of Key Junctions

  This is to ensure that all the key junctions within the study area have been coded correctly.

- Test 4 – Network Routeing

  This is to ensure that routeing check on the unloaded network is plausible and realistic.

- Test 5 – Link Consistency Tests

  This is to ensure that link type, distance, speed limit, etc. are consistent between directions and along a road.

- Test 6 – Flat Matrix Assignment Test

  This is to ensure that model assignment with a flat matrix produce plausible results of routeing and also to investigate whether or not locations with excessively high delays are as a result of significant flows or due to coding error.

The test definitions are based on the approach defined by the Network Technical Consistency Group on the Highways England Regional Model project.

The following chapters describe in detail the steps and findings of each of the tests for the Selby District highway assignment model.

TEST 1 – COMPLETENESS CHECK

Background

The purpose of this test is to prove that the network produced is complete, including simulation and buffer network. Upon the completion of this test, it can be confirmed that the initial network development process has been concluded in accordance with the model specification.

Information Required

The information with regard to this test will be provided, as below:

- Map of the simulation and buffer network, as agreed with NYCC and SDC;
- Source of signal timing for signalised junctions: e.g. from NYCC and SDC, from donor models, or using template signal junction coding;
- A map showing locations of signalised junctions by different sources;
- A spreadsheet providing signal timings for signalised junctions, with a technical note detailing signal data collection and assumption; and
- The full network in both GIS and SATURN network DAT formats.

Acceptance Criteria

The acceptance checks for this test would ensure:

- Coding of the network is complete, except for omissions previously agreed by the project team;
- Network coverage is as specified in the Model Specification Report (MSR) for both simulation and buffer networks;
- Reporting total number of nodes coded and checked; and
- The density of the network is as specified in the MSR.

Summary

Figure 1 shows the network that has been coded for the study region and Figure 2 shows the network coverage for the external area. As agreed with NYCC and SDC and specified in the MSR, all the roads within the study area boundary have been coded in the simulation network and roads outside the study area boundary have been coded as buffer network.

A total of 8,258 links have been coded in the SDSTM highway network covering a combined modelled distance of 12,967km, as summarised in Table 1.

A total of 3,793 nodes have been coded in the SDSTM highway network as summarised in Table 2.

Link and node checking is covered in the subsequent tests.

Inspection of key junction coding is covered in Test 3.

Table 1 Summary of Link Coding by Road Type

Road Type	Number of Modelled Links	Total Modelled Length (km)
Motorway	429	3,061
A Road	2,583	5,368
B Road	376	388
Local Road	3,262	1,691
Total	**6,650**	**10,508**

Table 2 Summary of Junction Coding by Node Type

SATURN Type	Description	Number of Nodes
0	External node	1,564
1	Priority junction	1,320
	Exploded roundabout	101
	Motorway merges/diverges	68
2	Mini-roundabout	23
3	Signalised junction	48
	Exploded signalised roundabout	3
4	Dummy	0
5	Roundabout (with U-turns)	23
n/a	Zone centroids	643
	Total	**3,793**

Figure 1 Model Network: Fully Modelled Area

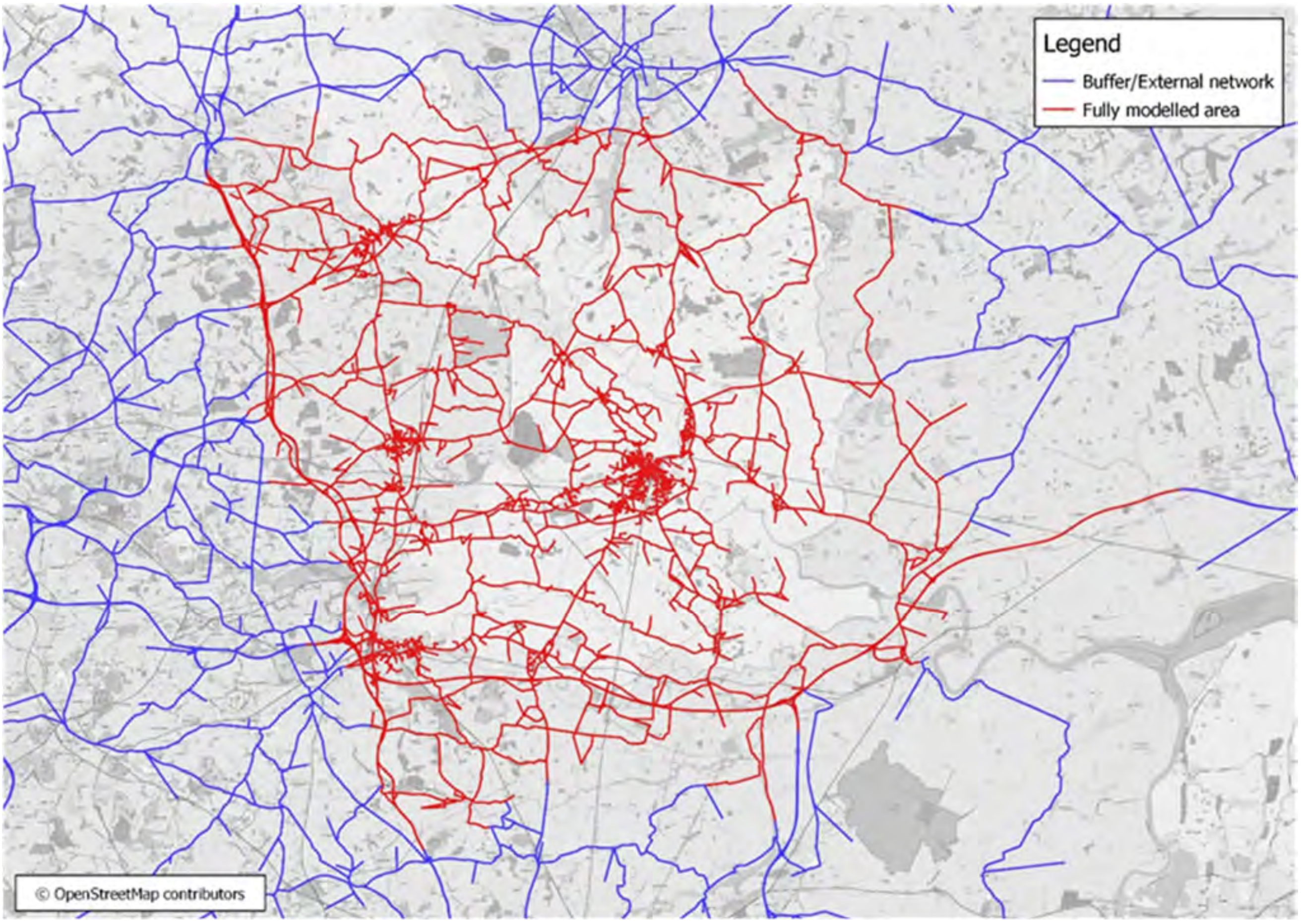
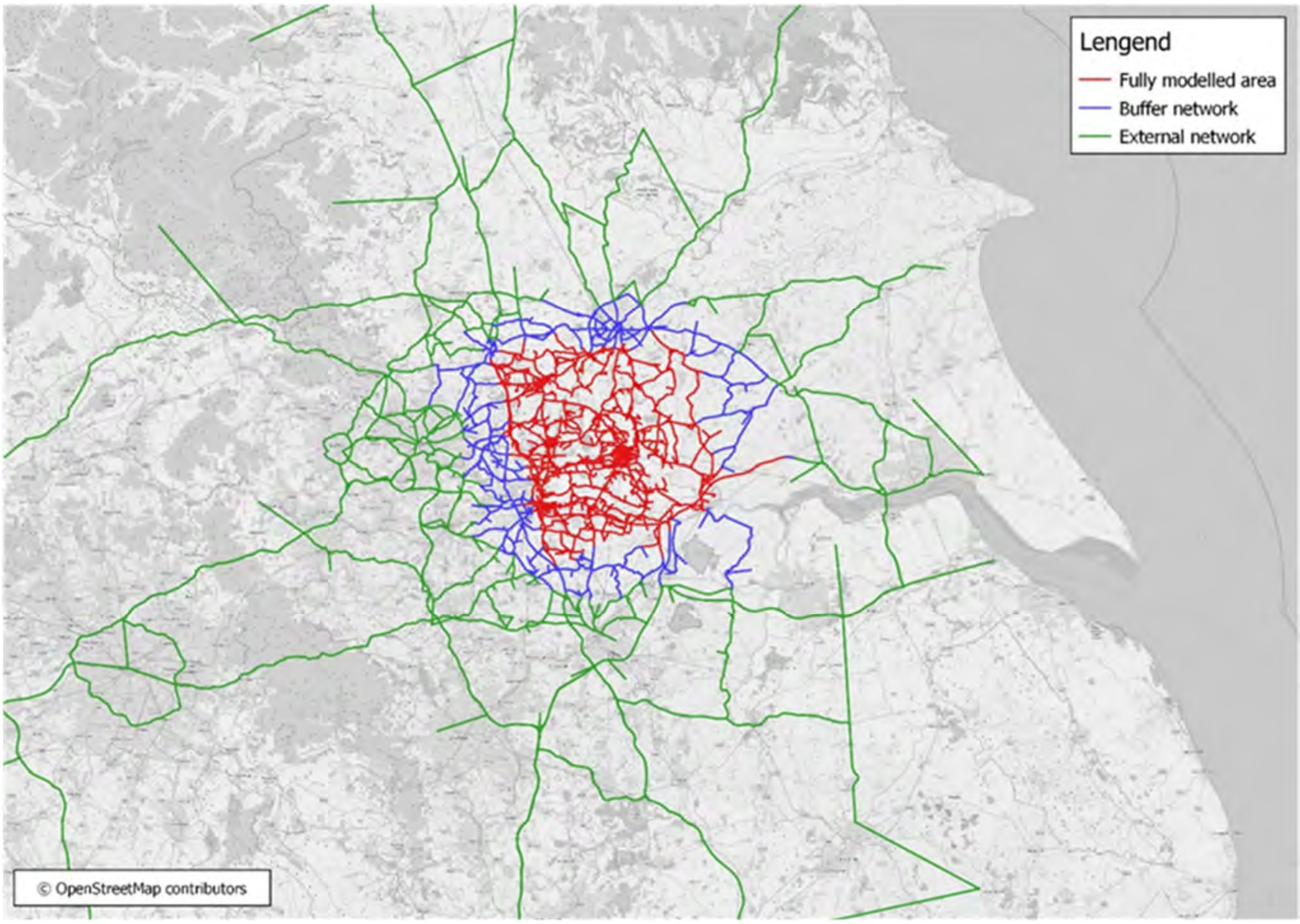


Figure 2 Model Network: Buffer and External Areas



TEST 2 – SATURN COMPILATION TEST

Background

The purpose of this test is to prove that the network, including the buffer network, may be compiled in SATURN with the option "Set WRIGHT = TRUE" without raising unacceptable errors. The test should confirm that the initial network development has been successfully built using SATNET.

Information Required

The following information will be reviewed:

- A list of SATURN warnings, with annotation or accompanying documentation explaining the serious warnings and why they can be safely ignored. Specifically, this will include a table summarising the "SATNET Network Building Report" with the total number of serious warnings and Non-Fatal errors and comments stating that why these are acceptable.

Acceptance Criteria

The acceptance checks should ensure that:

- There should be no Fatal or Semi-Fatal errors as specified by SATURN; and
- For other SATURN serious warnings or warning, a satisfactory explanation for each warning should be provided for the coding with the core modelled area.

Summary

Tables 3 and 4 provides the quantity of warnings by type and a list of all the warnings produced from SATNET respectively.

Table 3 Summary of Total Warnings / Errors from SATNET

SEGMENT	WARNING	SERIOUS	NON-FATAL	NAFF	FATAL	Total
&OPTION	0	0	0	0	0	**0**
NETWORK TITLE	0	0	0	0	0	**0**
&PARAM	0	0	0	0	0	**0**
11111 SIMULATION	706	2,013	0	0	0	**2,719**
22222 SIM CCs	2	1	0	0	0	**3**
33333 BUFFER	8	0	0	0	0	**8**
44444 RESTRICTs	2	0	1	0	0	**3**
55555 CO-ORDS	1	0	0	0	0	**1**
66666 ROUTES	552	0	10	0	0	**562**
77777 COUNTS	6	0	0	0	0	**6**
88888 GEN COSTS	0	0	0	0	0	**0**
Total	**1,277**	**2,014**	**11**	**0**	**0**	**3,302**

Table 4 Detailed List of Warnings from SATNET

WARNING NUMBER	TEXT	COUNT	COMMENTS
2	Turn saturation flow less than the minimum	20	Reviewed – Sat flows represent nature of the road/turns
6	A priority junction has no minor but multiple major arms	1	Reviewed – Represents 2019 arrangement
12	More than one give-way turn sharing a single lane; Priority	531	Coding reviewed - lane allocations are replicating observed junction layout.
16	Rather long intergreen time for a stage (> 20 seconds)	24	Long intergreen times are incorporating pedestrian phase into the overall cycle time.
19	Total stage plus intergreen times not equal input cycle time	2	Green time the same between both stages - ignore.
23	Total upstream sat flow inconsistent with lanes downstream	6	Ignore.
28	A zone CC goes to an external sim link joint with buffer	2	Zone connector coding around boundary of simulation/buffer areas - no action required.
30	The calculated speed is outside the expected range	8	Ignore.
32	Simulation link distances and/or times differ in reverse	2	Reviewed - Updated
33	Suspicious link distance - Input values differ markedly	6	Ignore.
42	A link with a count given is bridged by centroid connectors	6	Reviewed - Updated
43	A turn is coded as an X turn but is not the last	1	Reviewed – coding represents highway arrangement
46	A centroid connector to an external link has been included twice	2	Ignore
50	The saturation flow per lane is low	6	Reviewed – Sat flows represent nature of the road/turns (see warning 2)
52	External simulation node with 2 arms - unusual	3	Two simulation links connect to one external node.
53	Two priority turns share the same exit; should one give way?	12	Reviewed – Updated at some locations as appropriate
66	Link exists but only in the opposite direction	10	Ignore.
68	A priority marker G looks suspiciously like a merge! (M)	17	Typically represent left turn give way onto dual carriageways.

WARNING NUMBER	TEXT	COUNT	COMMENTS
73	Bus route with U-turns at non-simulation nodes	37	Ignore.
76	Possible underestimated stack capacity >5 at XY nodes	1	Ignore.
79	An X-turn at signals is only in unopposed stages - no TAX	2	Observed signal data coded.
82	Cycle time is very high > 999s	5	Nodes at these location represent railway crossings with high cycle times
85	Column 6 on a bus route must be blank	39	Ignore.
92	A zone connected under 33333 might be better coded under 22222	465	This is due to the high volume of spigots that have been used to code zone connectors. No further action required.
96	Give-ways have both shared and unshared lanes	38	Coding reviewed - shared lanes on roundabouts.
98	Possible opportunity for a Clear Exit Priority Modifier?	30	Ignore.
109	Some of your in-links may not have been defined in strict clockwise order	147	Ignore.
111	No opposing turns found for a turn with a Priority Marker	5	Coding of turns and staging based on observed junction layout and signal data respectively.
112	A zone has one or more centroid connectors connected to external simulation nodes	1	Ignore.
135	2+ give-way turns in a single lane: Major arm priority jcn.	843	Multiple movements from minor arms are sharing a single lane or a single lane with flare.
137	Turn saturation flows per lane differ widely. See 6.4.6.3	865	Coded saturation flows based on observed junction layout.
138	Saturation flows differ widely between roundabout arms	2	Coded saturation flows based on observed junction layout.
150	A nearside merge into a turn not in its inside lane	1	Ignore.
152	A single lane arm at signals which includes an X-marked turn	21	Coding reviewed - lane allocations are replicating observed junction layout.
154	X-turn shares identical lanes with the turn inside it, but that turn could use lanes further inside to avoid being blocked by the X-turn	1	Multiple movements from minor arms are sharing a single lane.

WARNING NUMBER	TEXT	COUNT	COMMENTS
156	The exit link for a merge has GE lanes than the 2 entries	1	Coding reviewed - edge of simulation area impact on assignment negligible.
157	The mid-link capacity is either >> or << stop-line sat flow	80	Coding reviewed, particularly in key corridors, during calibration.
160	Merge turns enter a link which has significantly fewer lanes	7	Reviewed – No change
168	A turn has been banned but other turns at the roundabout use the same exit arm	5	Banned U-turns at roundabouts. No further action needed
178	Strange stage sequencing for an X-turn at signals	1	Signal coding based on observed data received
183	LCY for a node differs from its neighbours	34	Ignore.
222	A bus route “Stutters”, i.e it goes twice through link A-B-A-B	8	Ignore.
237	Unidentified node in a bus route	2	Ignore.
253	The number of possible U-turns at external simulation nodes exceeds the number allowed for checking in SATALL	1	Ignore.

TEST 3 – INSPECTION OF KEY JUNCTIONS

Background

The purpose of this test is to demonstrate that the key junctions and intersections, that by definition have the greatest influence in the model calibration and validation, are coded appropriately. The test will focus on the subjective aspects of the junction coding process.

The test should therefore confirm that:

- The characteristics of the selected key junctions/intersections have been appropriately characterised in a consistent manner; and
- For each selected key junctions/intersections, the junctions have been correctly coded as agreed in the MSR.

Information Required

Identify all the key junctions/intersections within the core modelled area. For SDSTM, this will primarily focus on the key corridors and major intersections on routes around the Selby District area.

Acceptance Criteria

To ensure that the process uses an evidence-based approach, a detailed check of the coded network with available source of information including OS ITN, aerial photography and signal timing sheets, using the pro-forma in Table 5.

Table 5 Junction Coding Checking Pro-Forma

Junction Type	Items to be tested	Acceptance
All Junctions		
All	Junction type	Correct definition
	Number of lanes at stop-line	Consistent and appropriate representations based on the available data sources
	Number of lanes on the main (mid-) link approach	
	Main Link type classification (and resulting cruise speed)	
	Representation of flares and the coded length(s)	
	Selected GAP values within pre-determined range	
	Lane definitions for each turn	
	Representation of Bus Lanes	
	Turn Priority Markers	
	Saturation Flow	

	Stacking capacity	
Specific Checks by Junction Type		
Signalised	Coding of Filters	Correct based on signal timings data
	Definition of Stages	
	Cycle time and Offset	
	Green times	
	Inter-green times	
Roundabout	Time to circle roundabout	Consistent and appropriate representations based on the available data sources
Priority	Right turn on major arm definition	Consistent and appropriate representations based on the available data sources

The quality of the model will then be established to determine if there are any serious deficiencies or differences in approach that may have a detrimental impact on the model calibration and validation process. If required, a suitable mitigation process will be determined.

Summary

All the major junctions/intersections in network have been coded. The network has been then reviewed and amended where appropriate to accommodate the detailed zones plan for the study area. The junction coding was based on Google Maps with the following information:

- Junction type: priority, signalised junction, normal roundabout, large roundabout, and signalised roundabout;
- Junction layout: number of approaches, number of lanes on approach, flare lane, roundabout diameters for roundabouts.

Signal timing templates were obtained for the majority of study area signalised junctions from NYCC and SDC.

TEST 4 – NETWORK ROUTEING

Background

The purpose of this test is to prove that the network routeing for all vehicle types, are sensible, particularly for longer distance trips.

The test should then confirm that the route choice through the coded network, based on unloaded conditions, are realistic and appropriately differentiates between the principle vehicle groups.

Information Required

A series of key strategic routes in the core modelled area will be identified and used as the basis of the test. Plots of paths for each identified pairs of places will then be presented showing how vehicles route through the network.

Acceptance Criteria

Paths should show plausible routeings, in particular for areas that are unexpectedly avoided or unexpectedly attractive on the unloaded network.

Differences in routeings between the principle vehicle groups (arising from banned links and turns) should be justified through reference to the source data.

Summary

Guidance presented in TAG Unit M3.1 proposes the number of routes to be tested is derived from the formula:

- Number of OD Pairs = (Number of Zones)$^{0.25}$ x Number of User Classes

Based on the final zone system for the base year with 643 zones, this amounts to 25 routes.

Figures 3 to 27 provide checks on routeing between different OD pairs. The routes all appear plausible with traffic following suggested routes validated against Google Maps route planner.

Figure 3 Routeing Check: Manchester to Hull

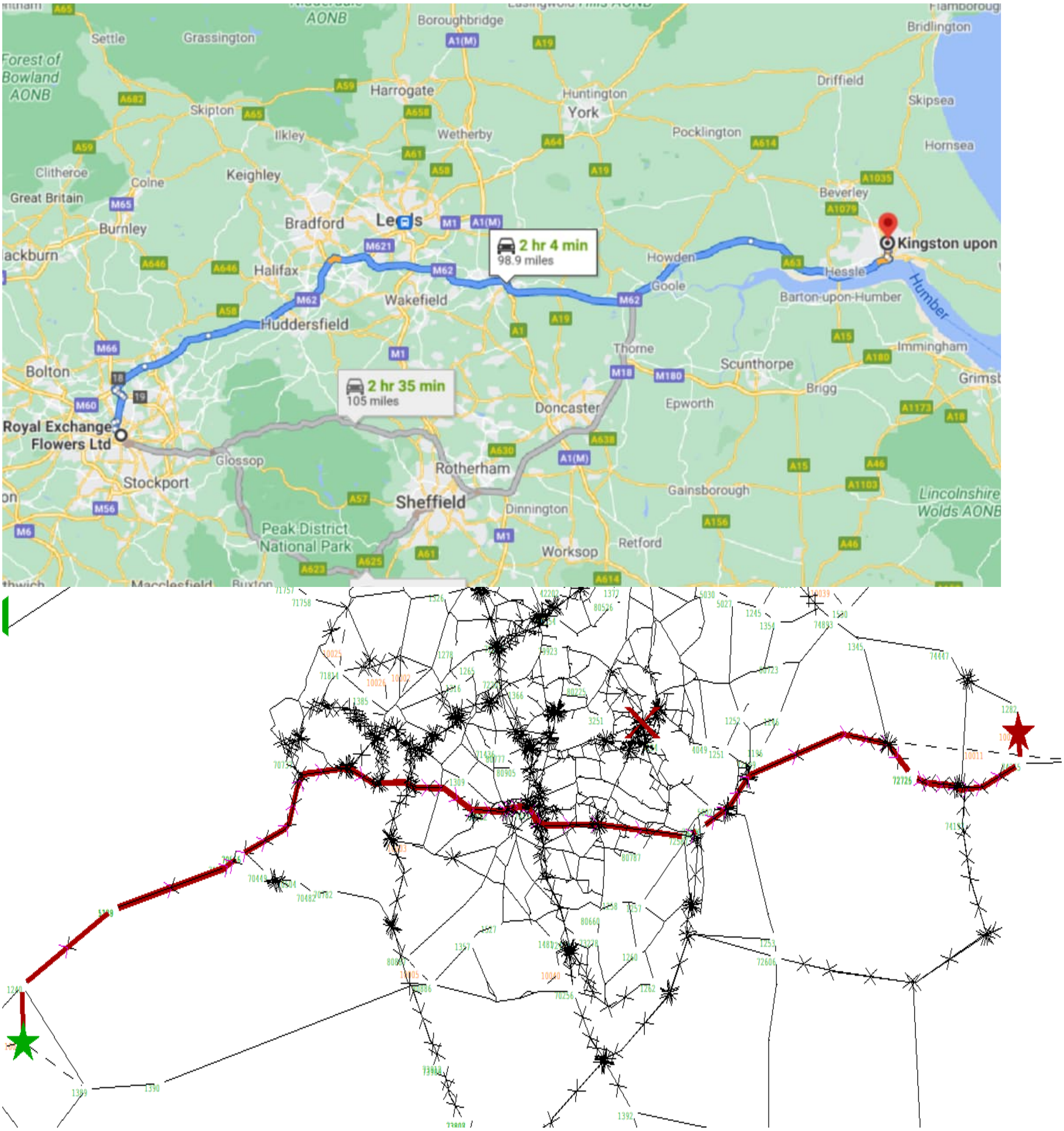
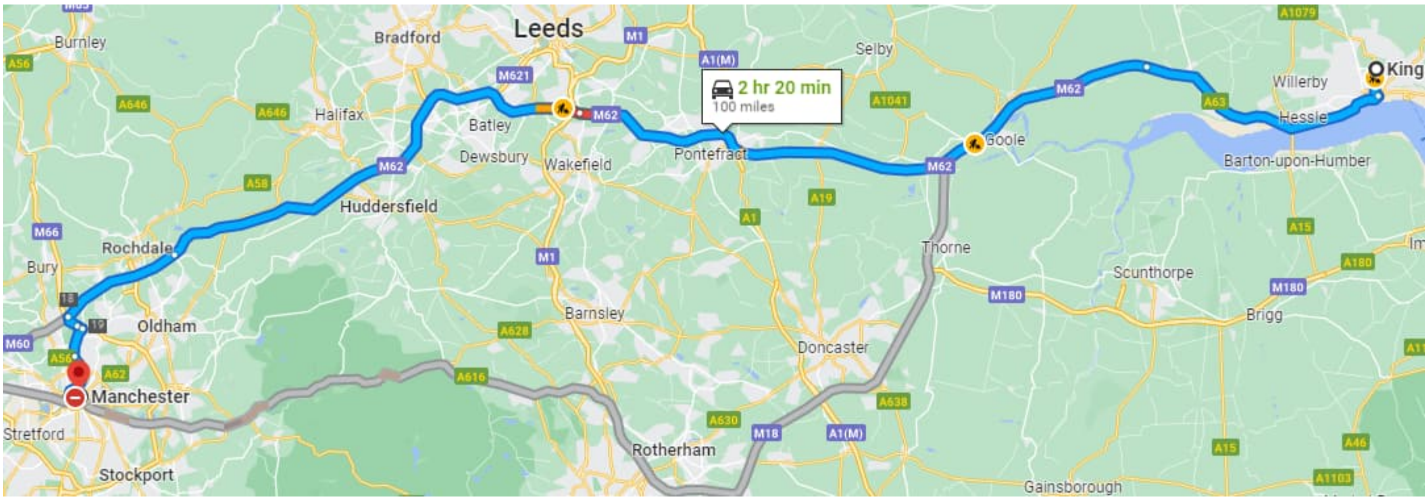


Figure 4 Routeing Check: Hull to Manchester



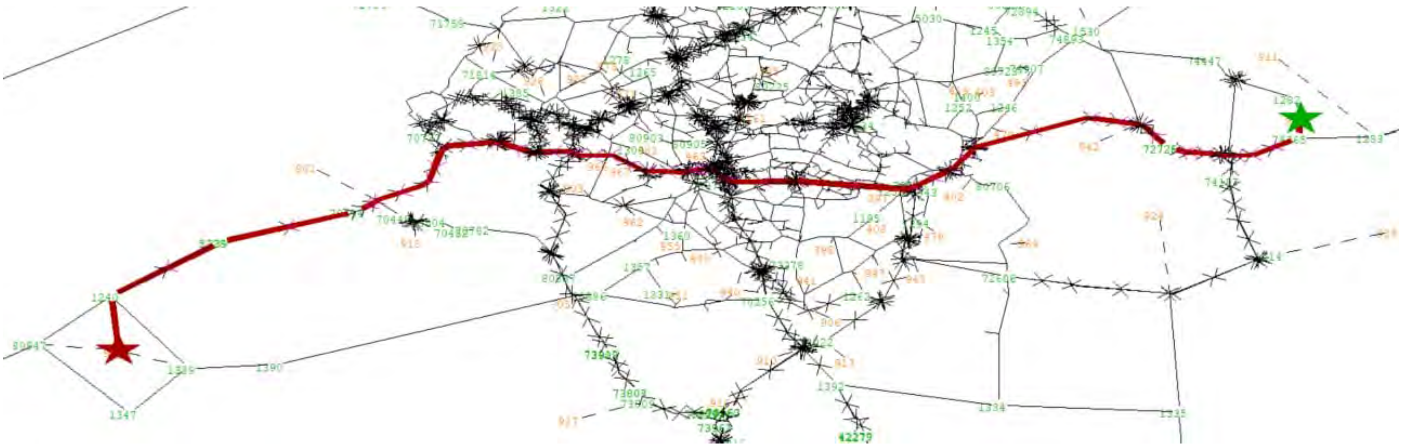


Figure 5 Routeing Check: Birmingham to York

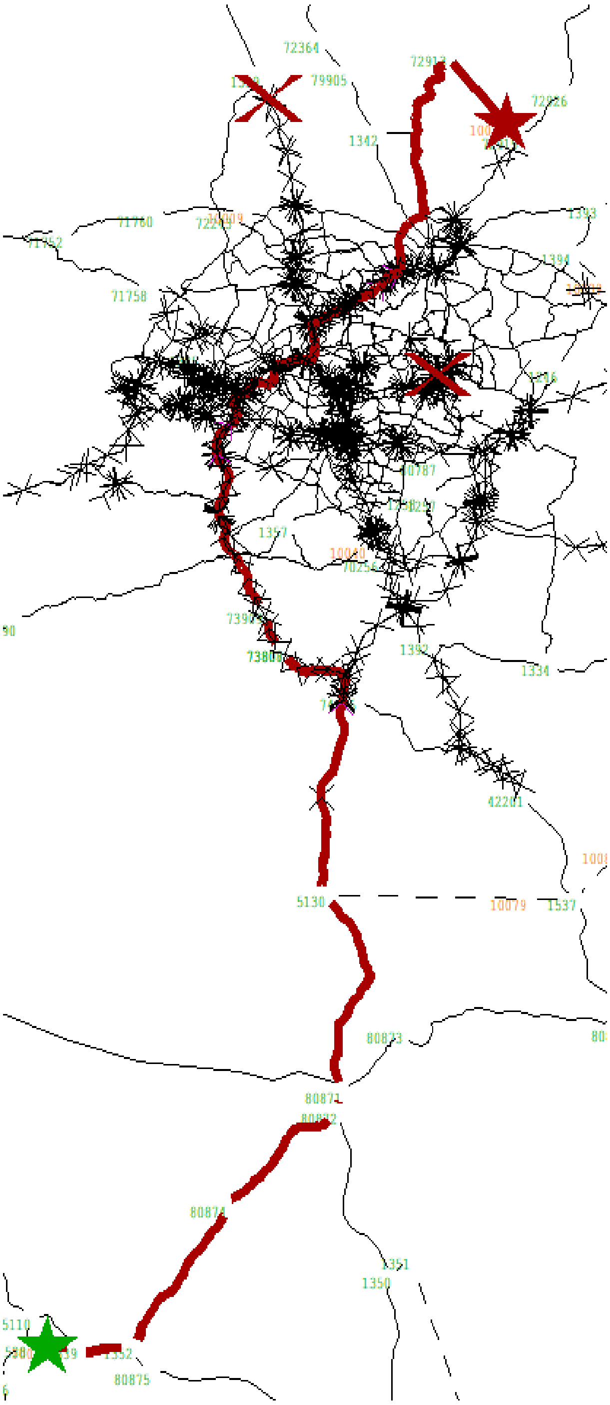


Figure 6 Routeing Check: York to Birmingham

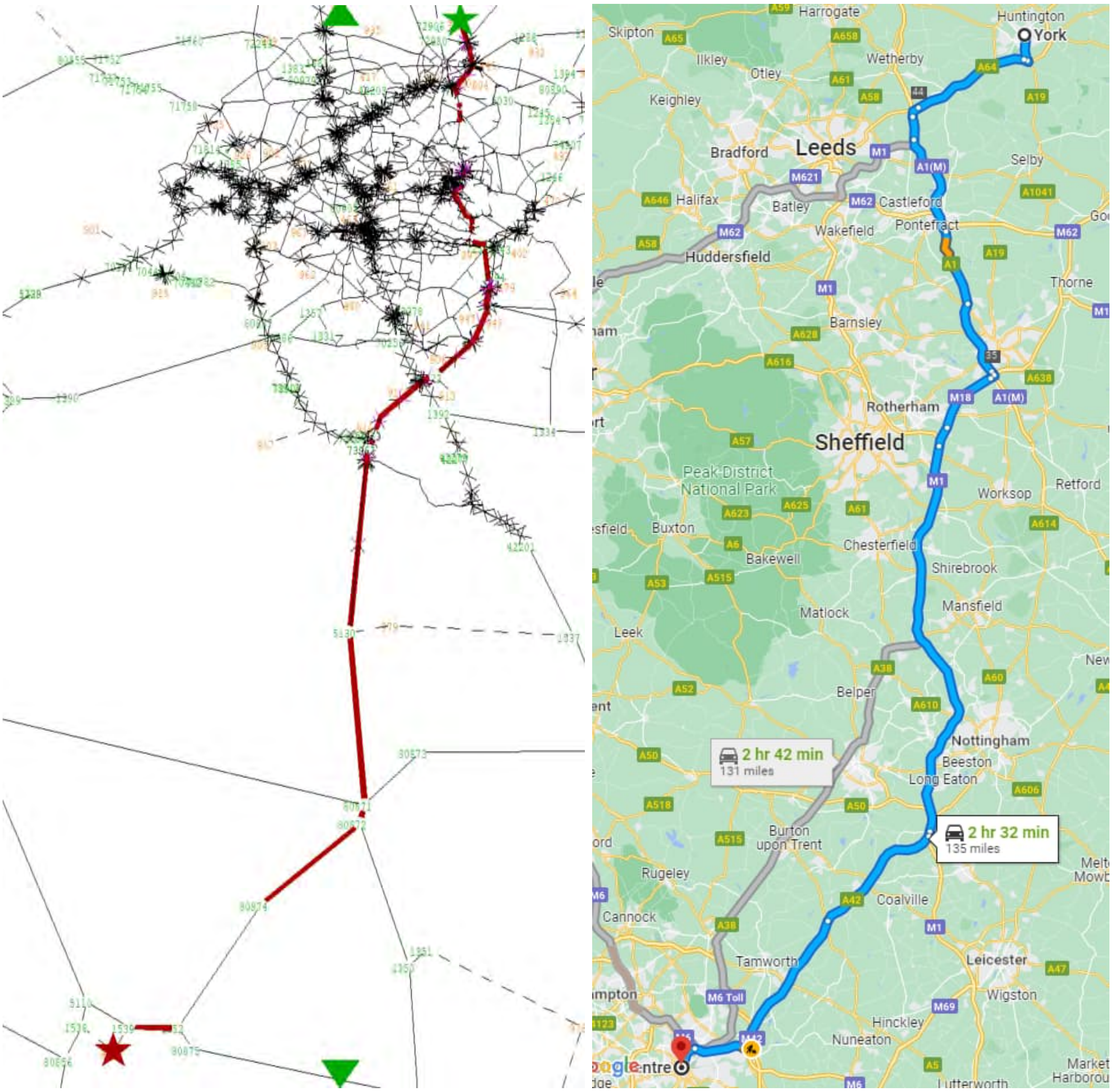


Figure 7 Routeing Check: Leicester to Newcastle

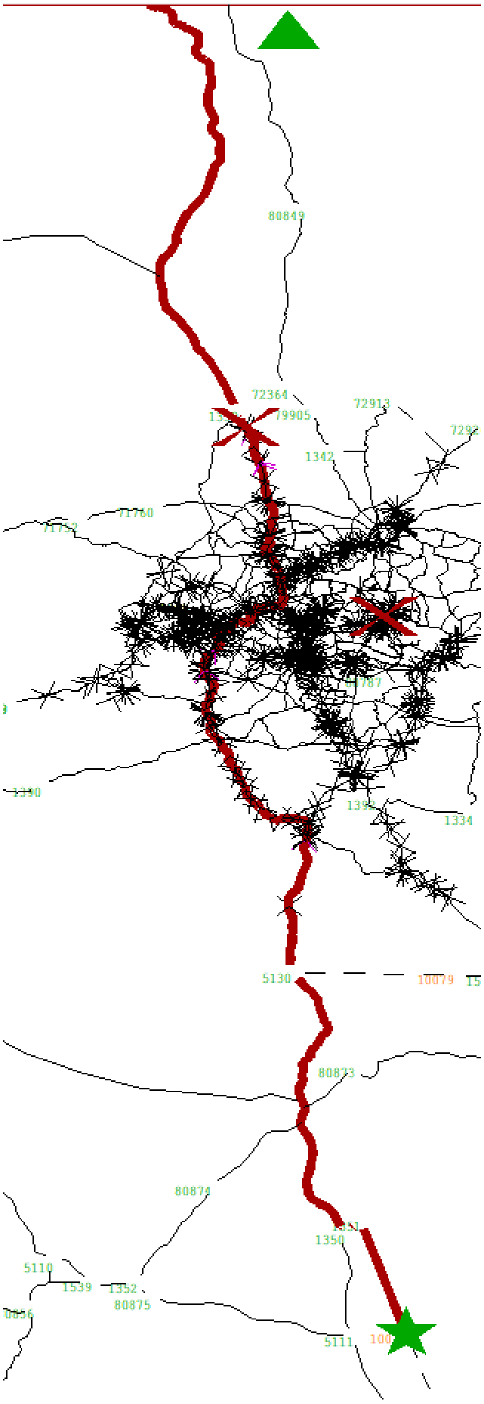
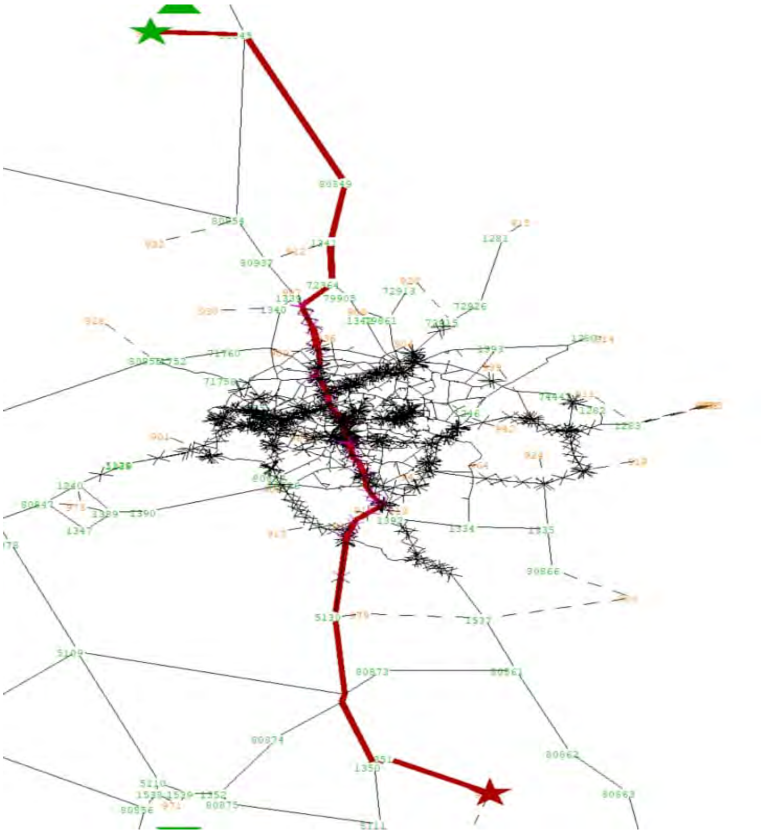


Figure 8 Routeing Check: Newcastle to Leicester



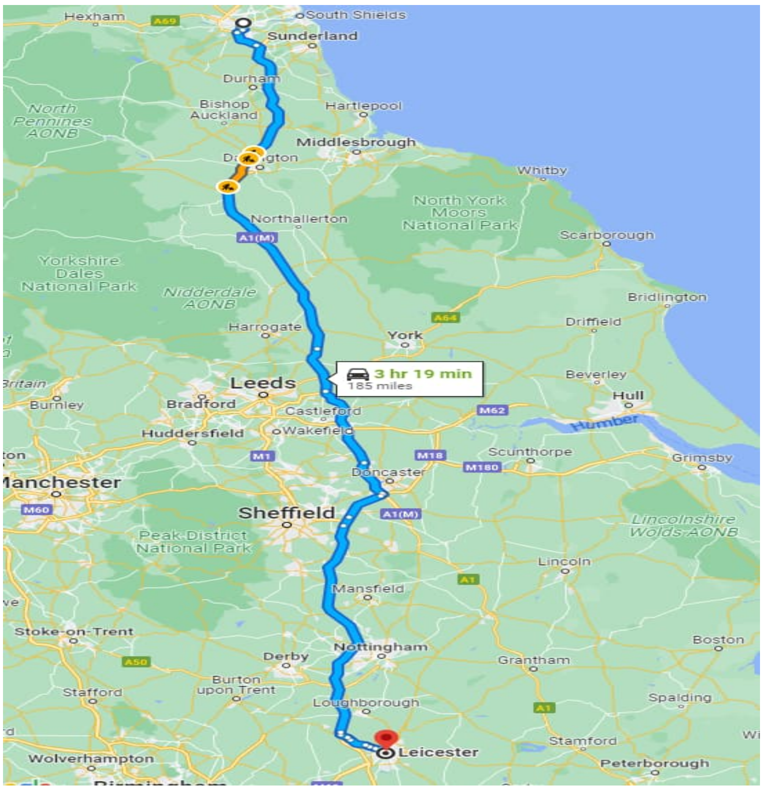
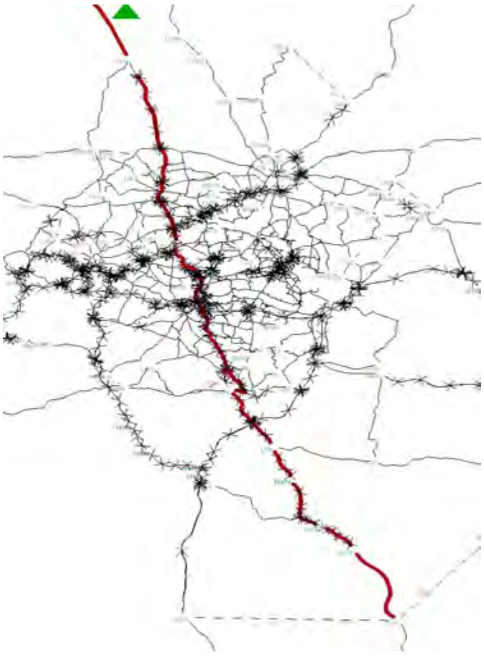


Figure 9 Routeing Check: Cambridge to Middleton



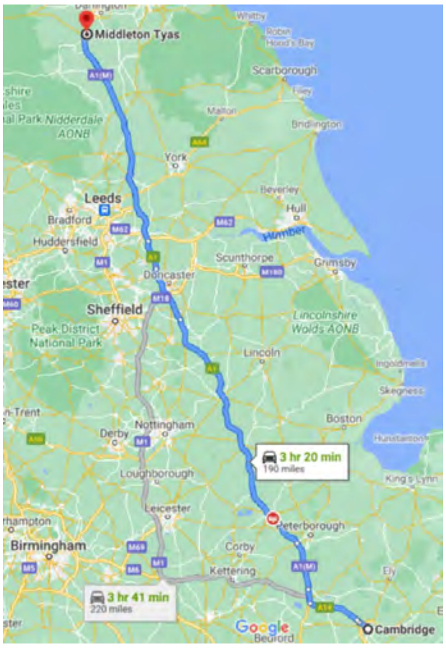
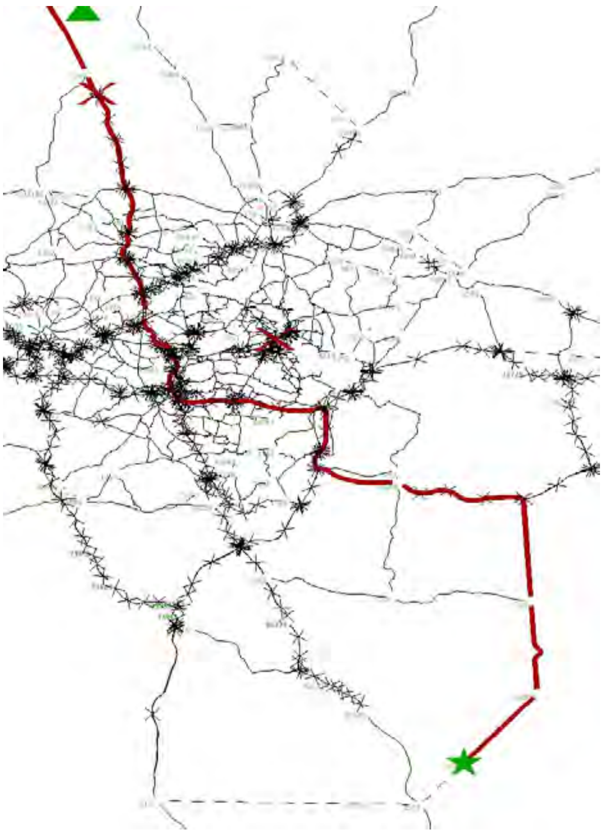


Figure 10 Routeing Check: Lincoln to Penrith



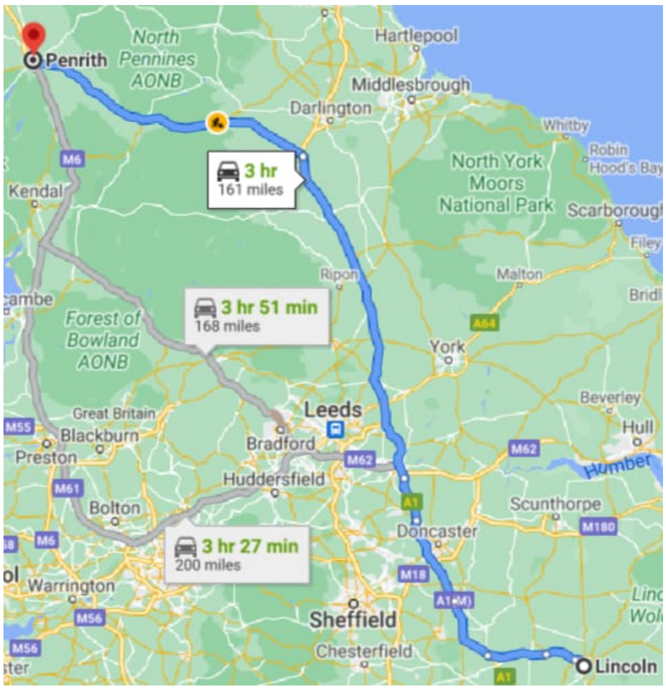
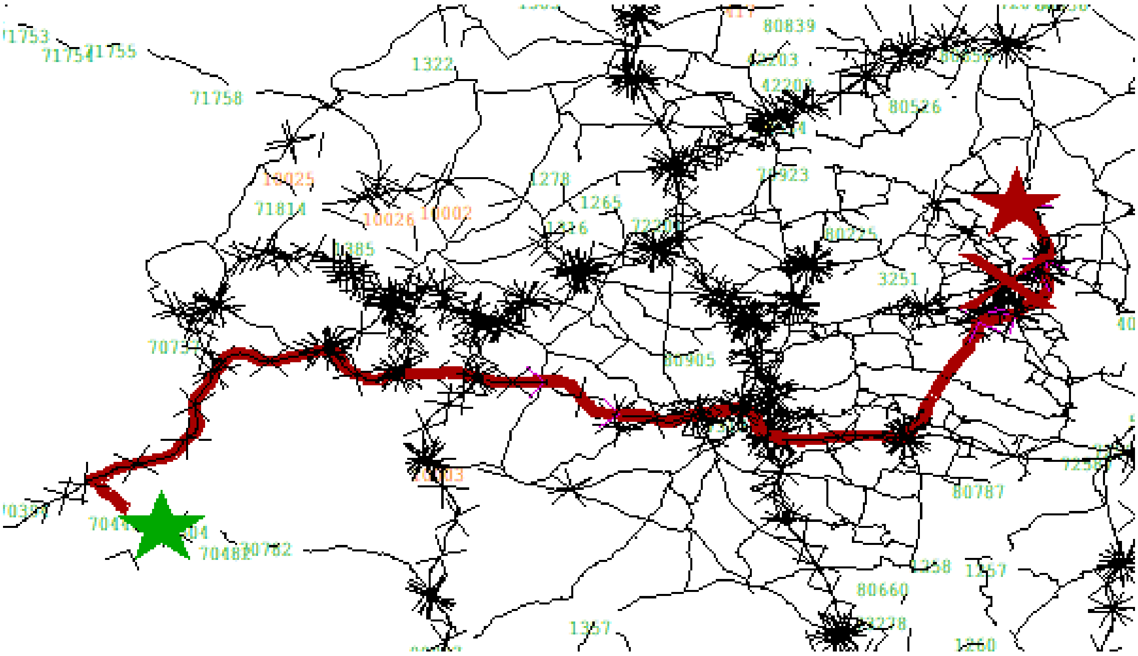


Figure 11 Routeing Check: Huddersfield to Riccall



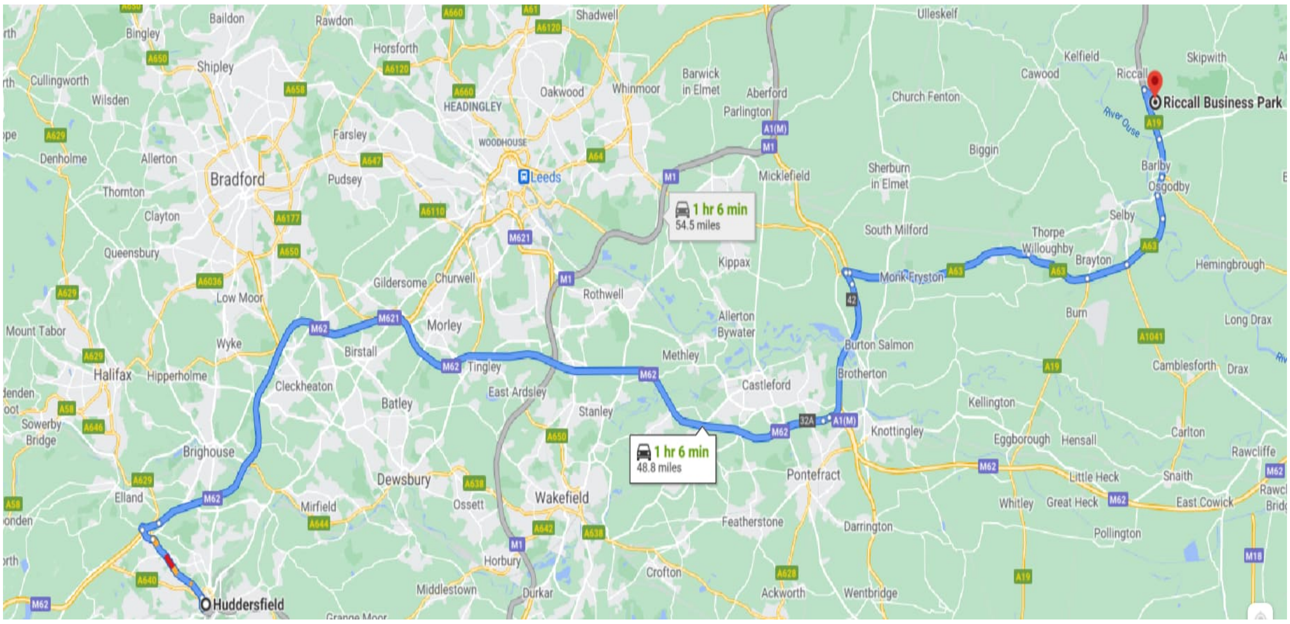
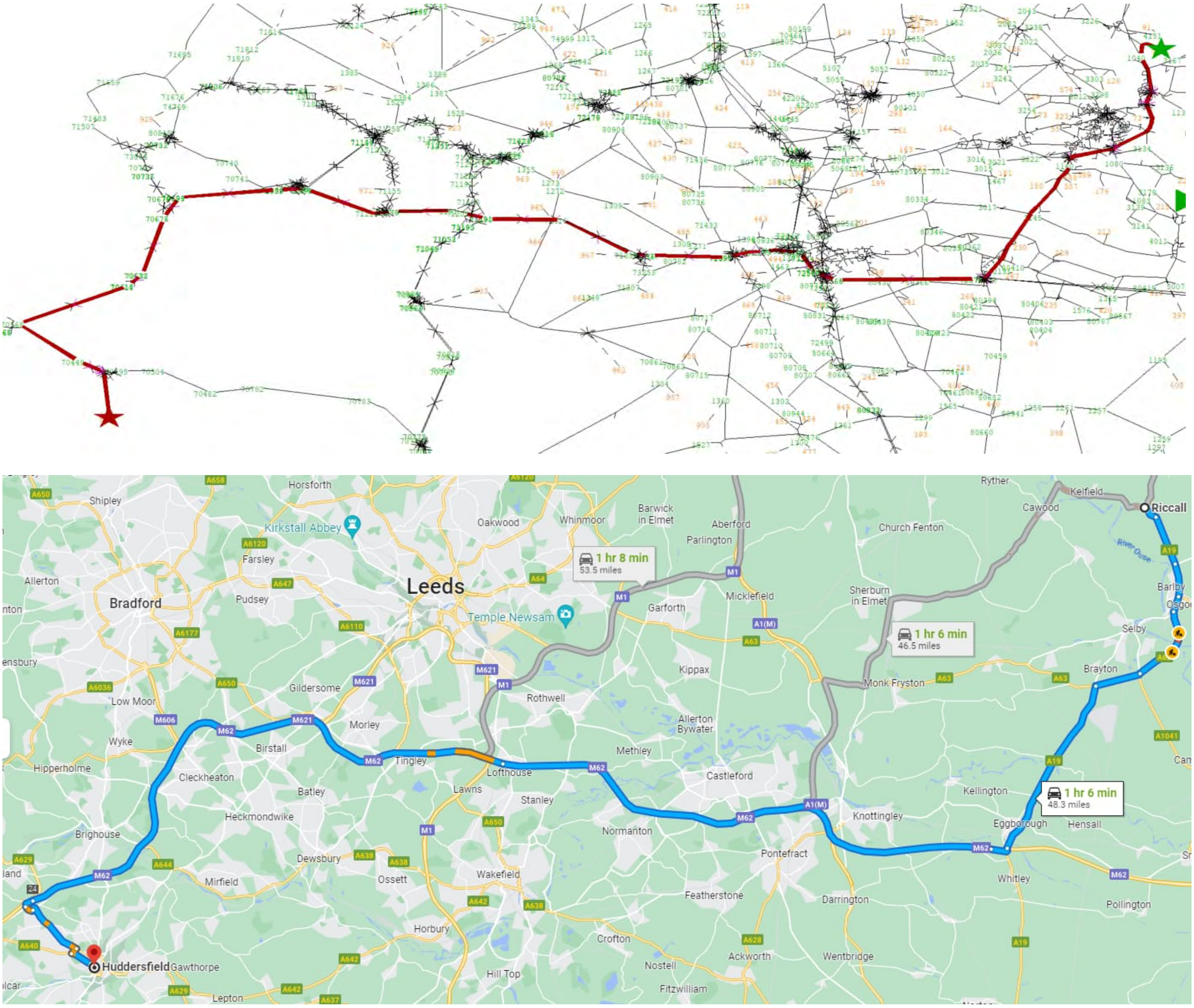


Figure 12 Routeing Check: Riccall to Huddersfield



wsp

Figure 13 Routeing Check: Doncaster to Appleton

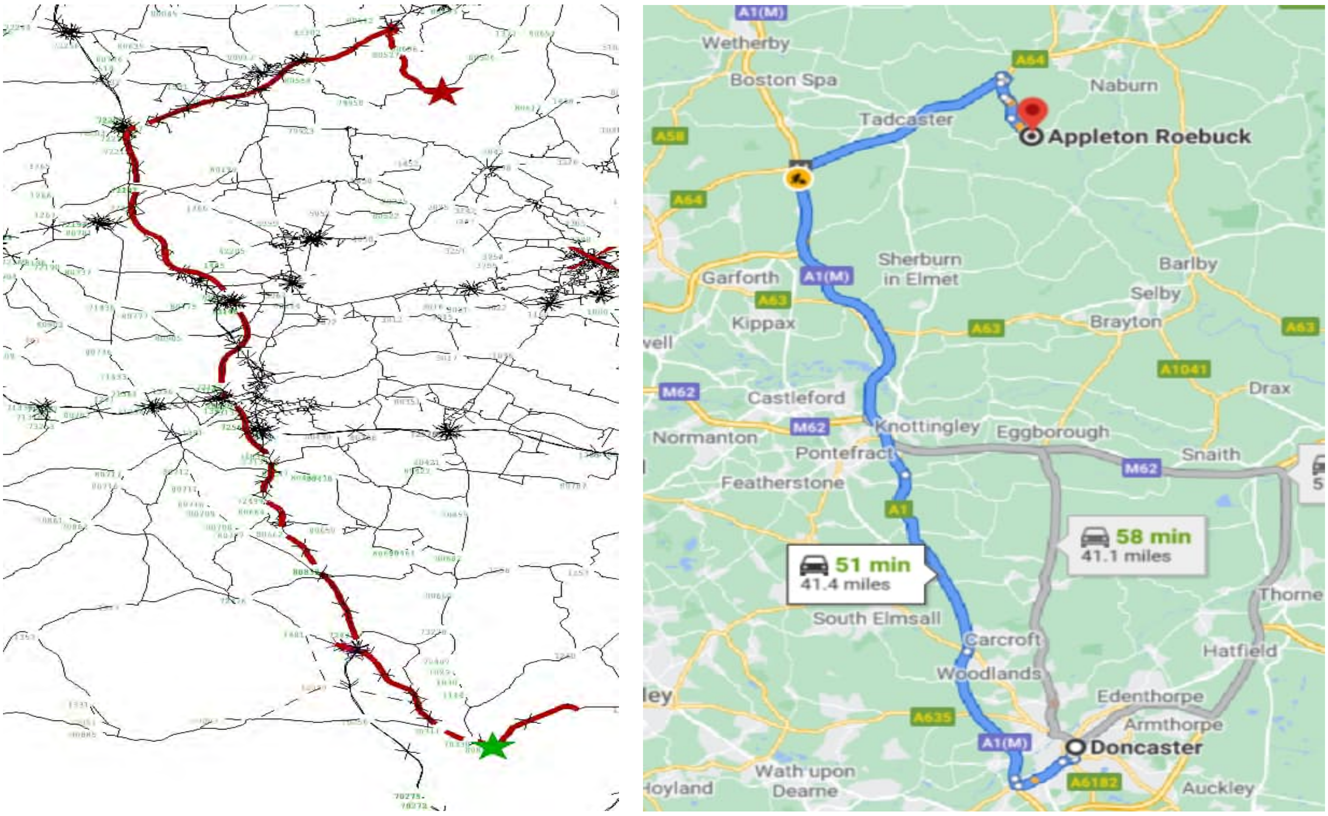


Figure 14 Routeing Check: Appleton to Doncaster

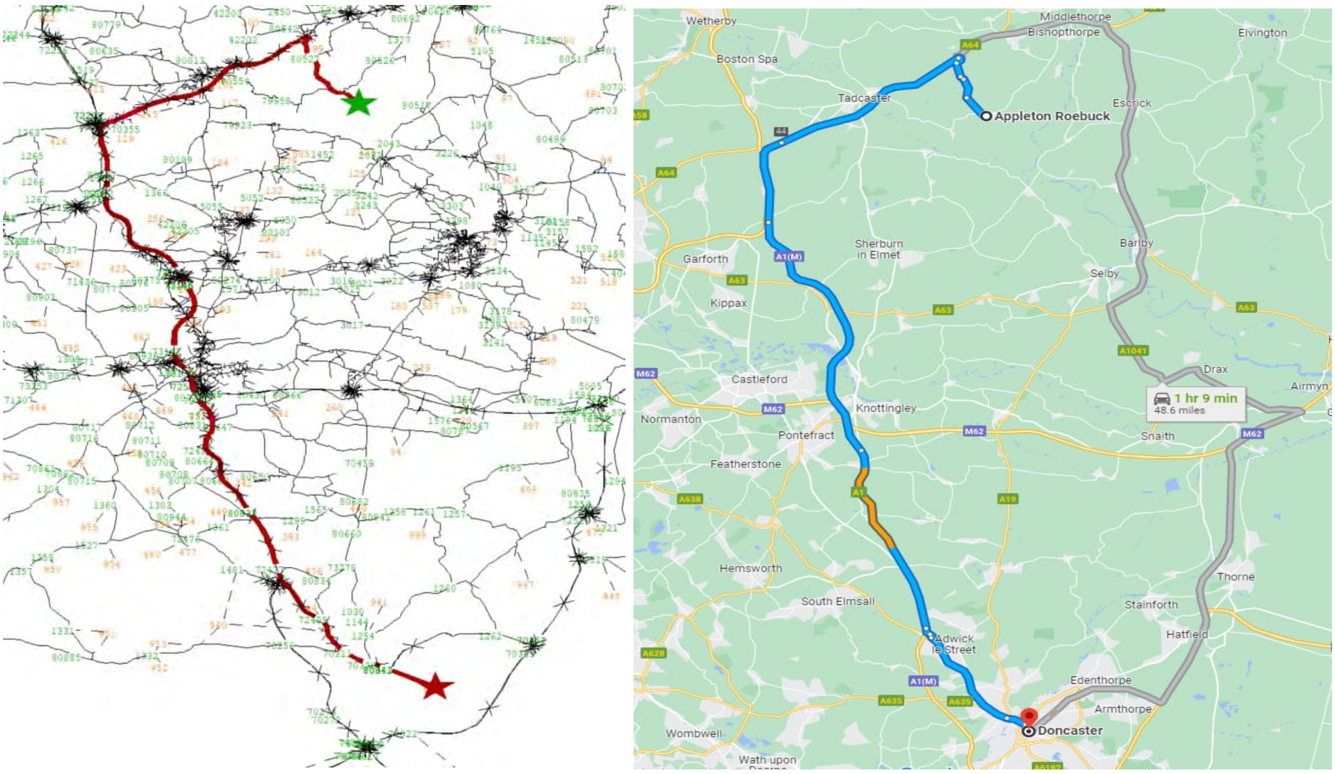


Figure 15 Routeing Check: Crowle to Tadcaster

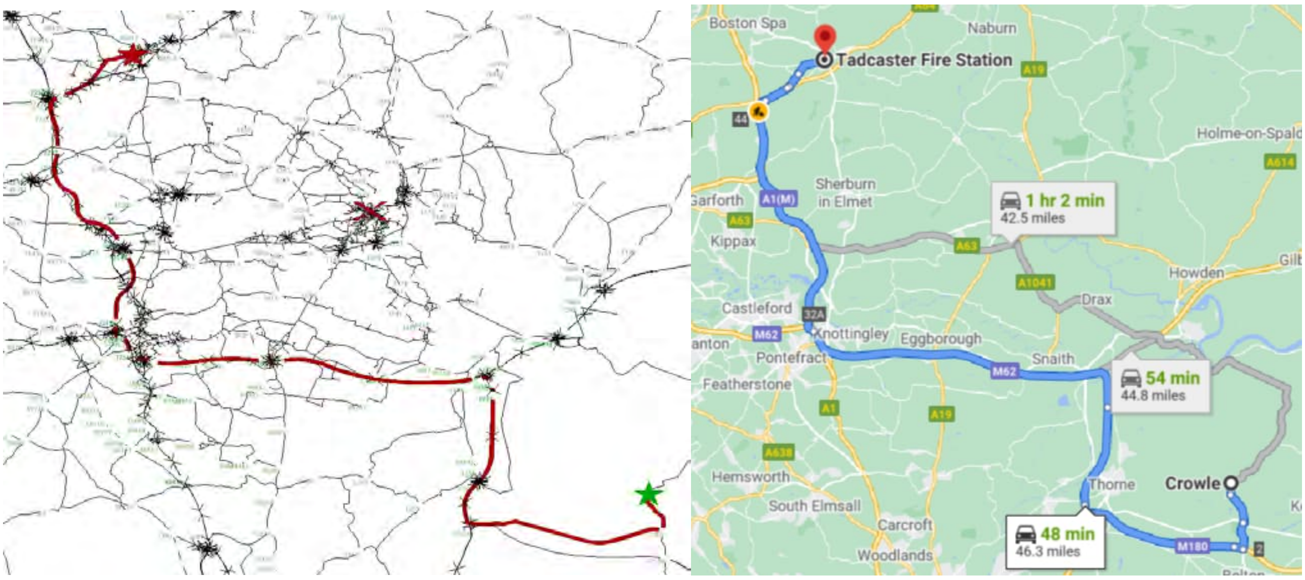


Figure 16 Routeing Check: Tadcaster to Crowle

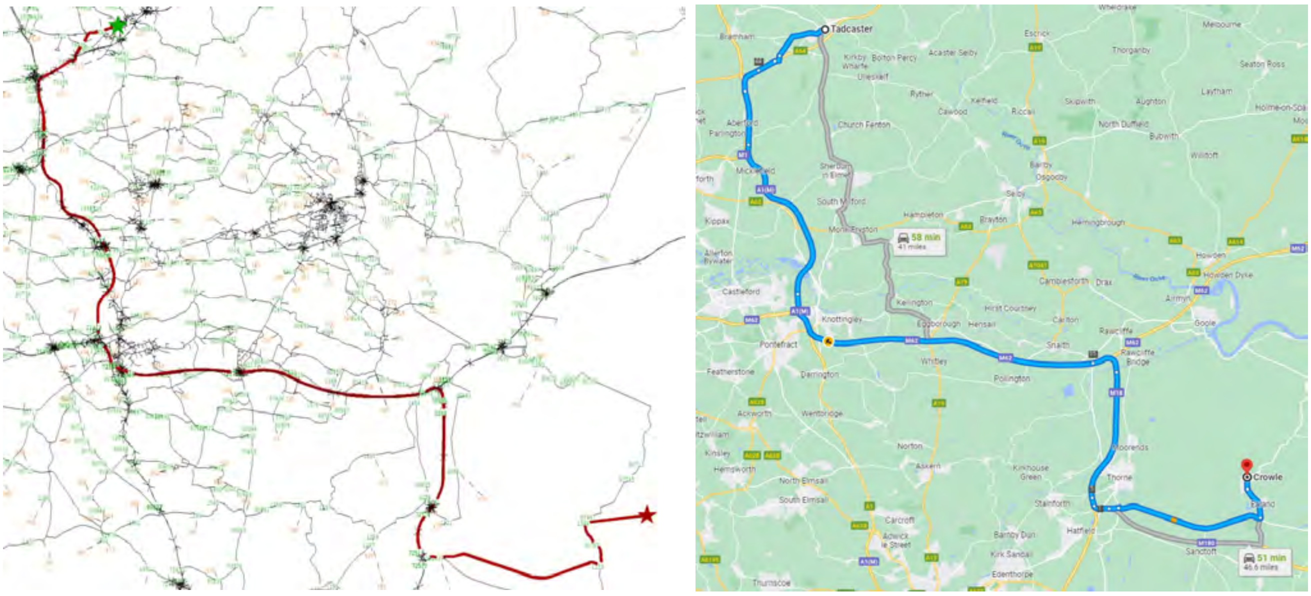


Figure 17 Routeing Check: Millington to Sherburn in Elmet

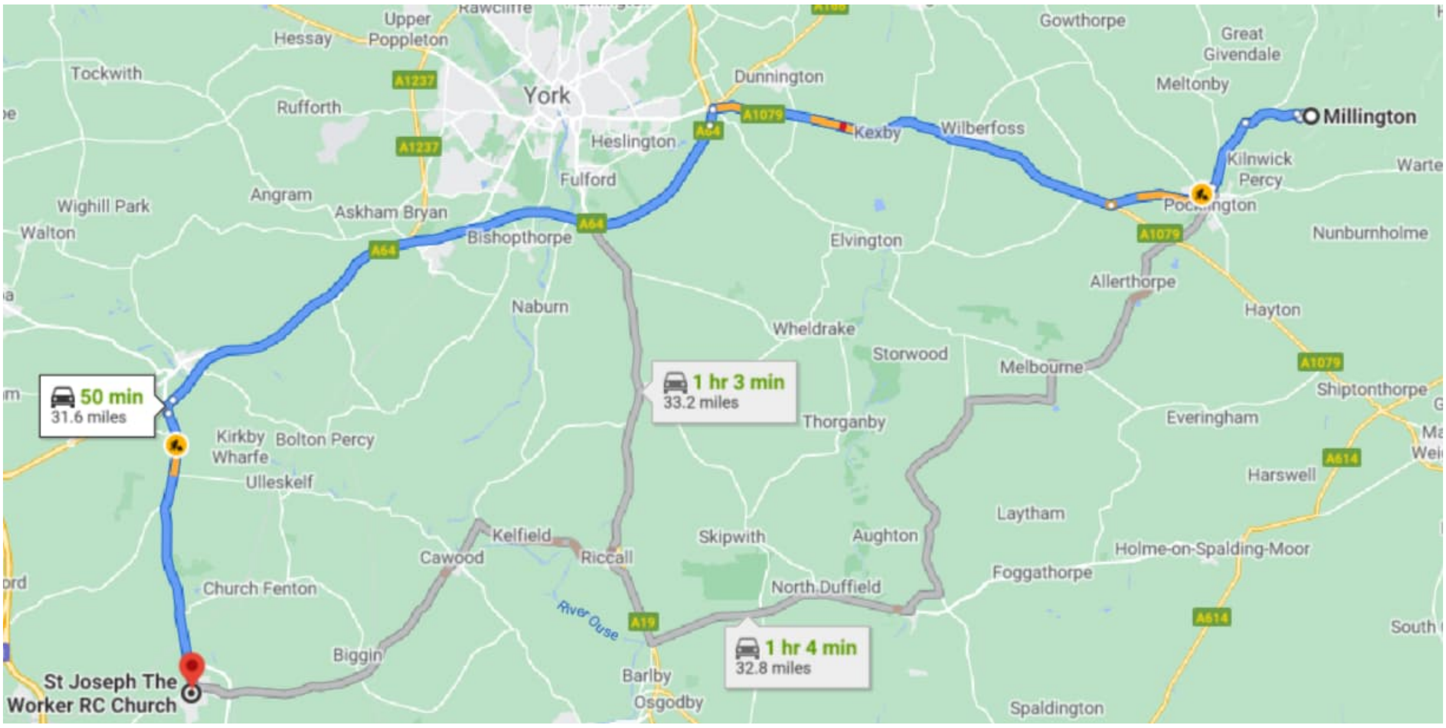


Figure 18 Routeing Check: Knottingley to York

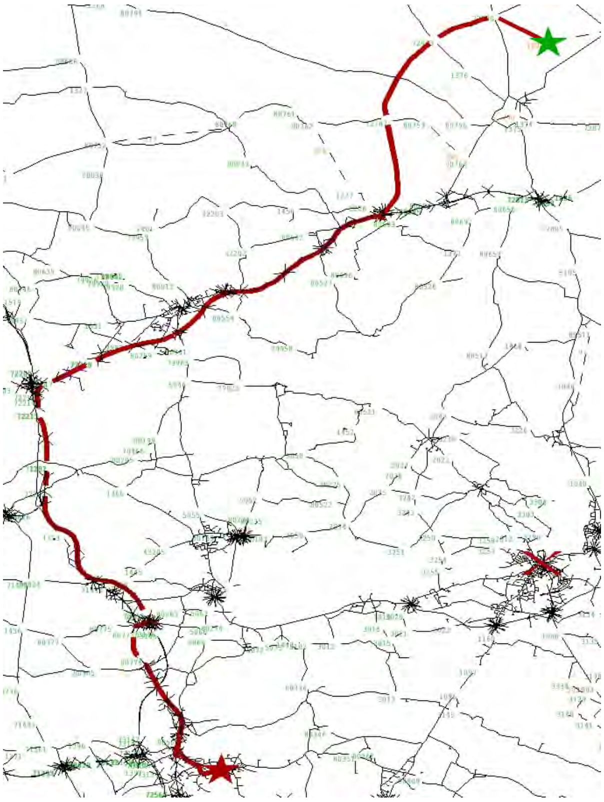
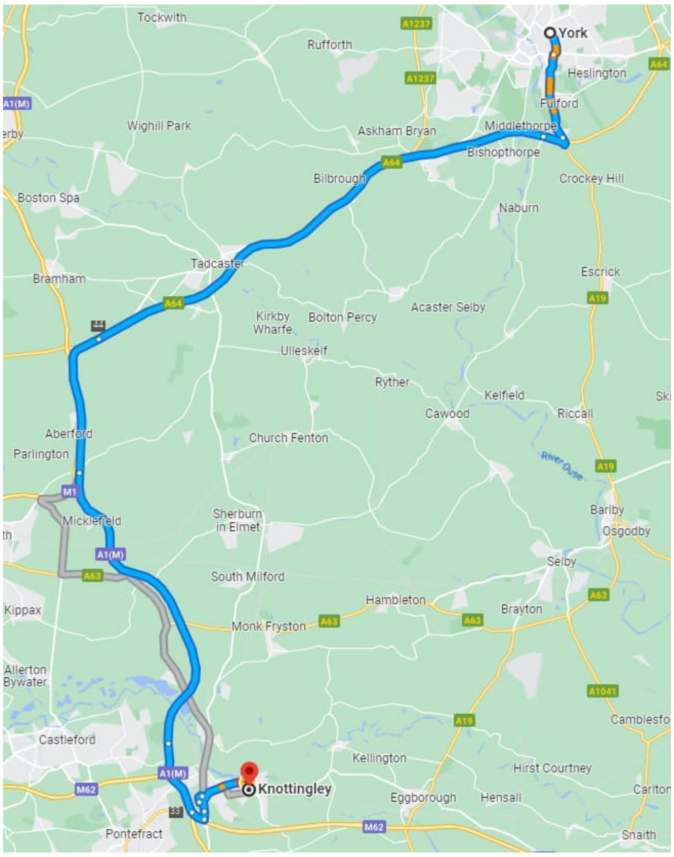


Figure 19 Routeing Check: York to Knottingley



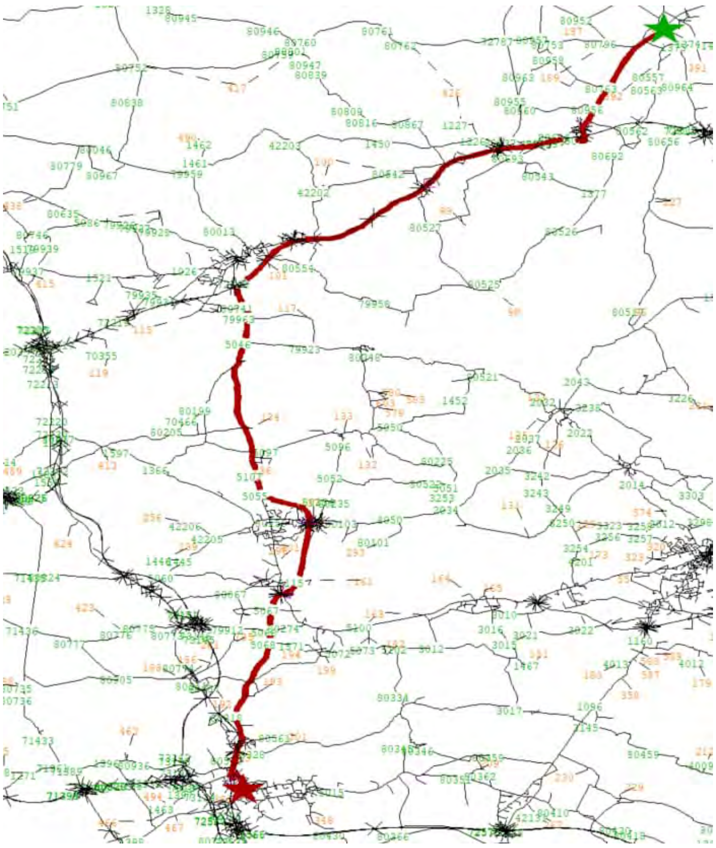


Figure 20 Routeing Check: Eggborough to Tadcaster

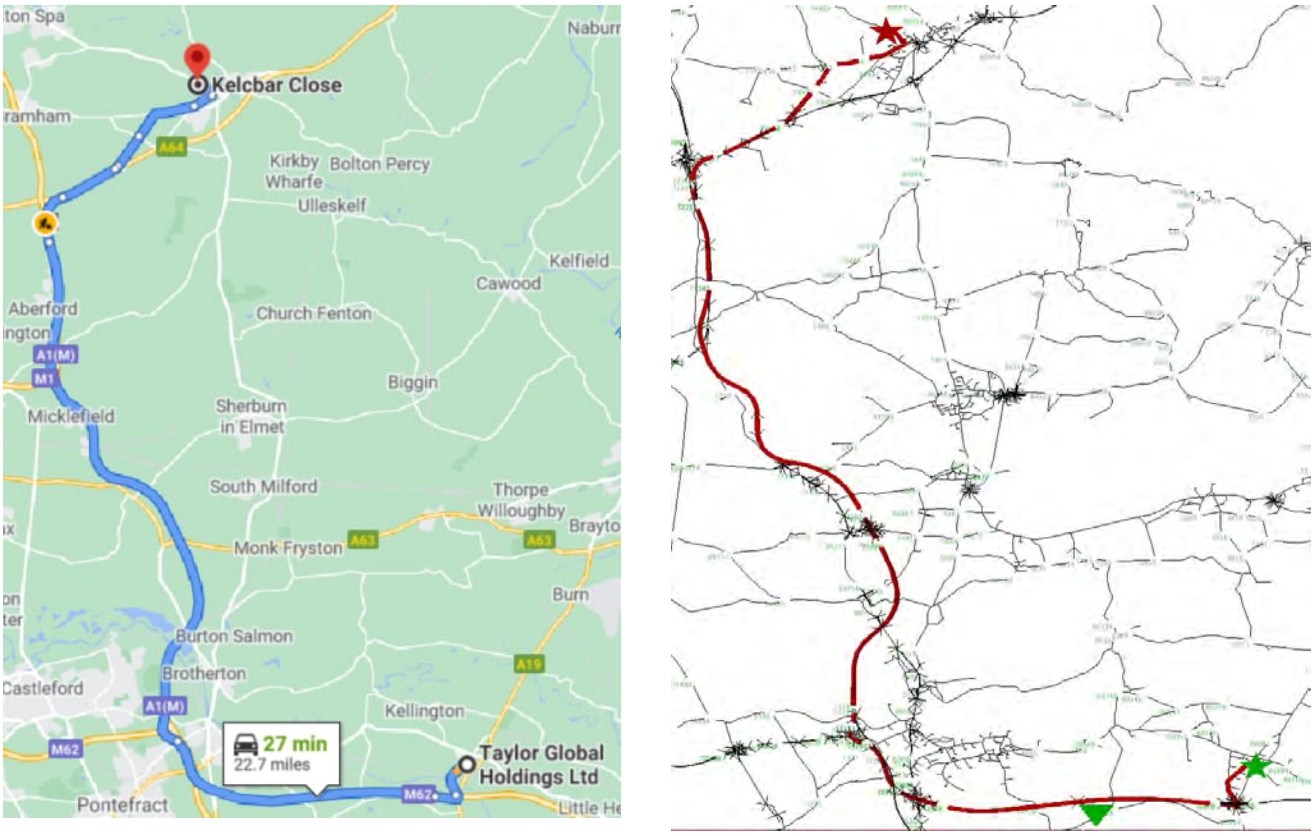


Figure 21 Routeing Check: Tadcaster to Eggborough

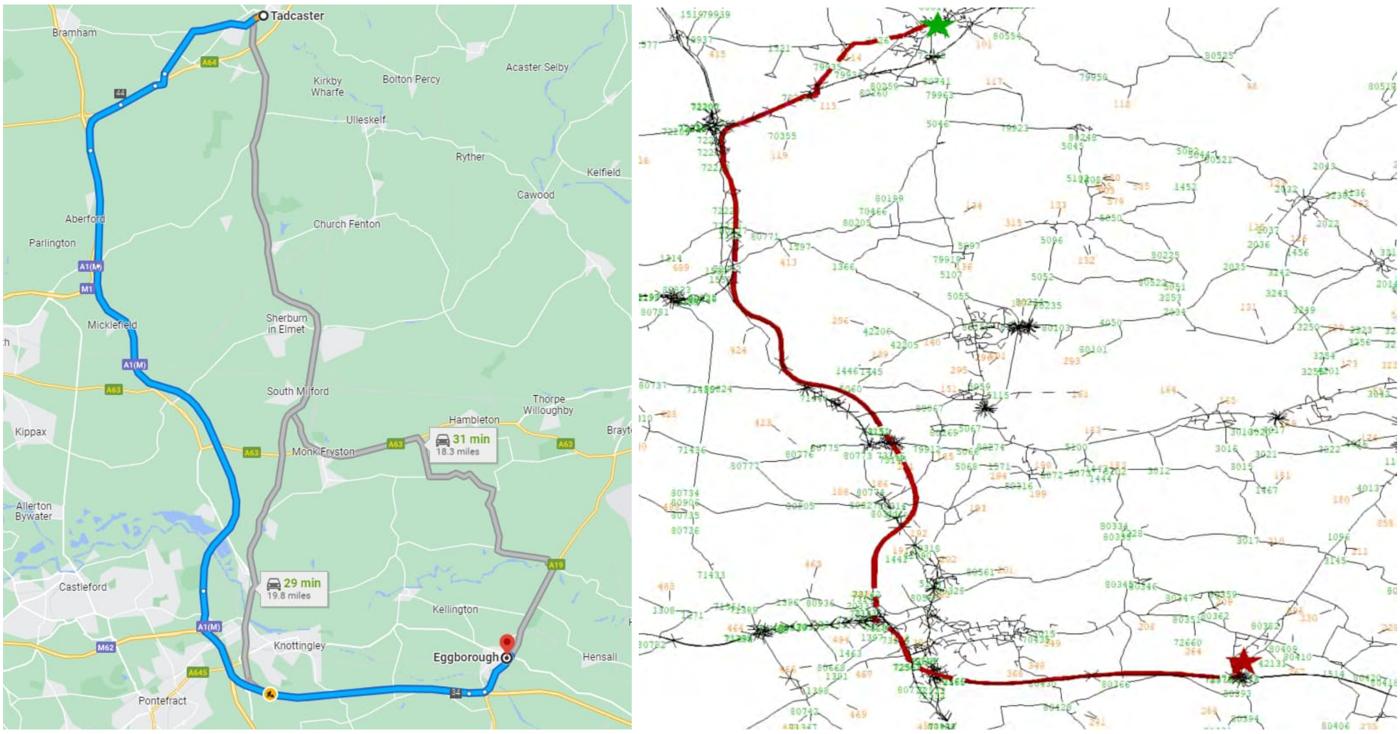


Figure 22 Routeing Check: Knottingley to Selby

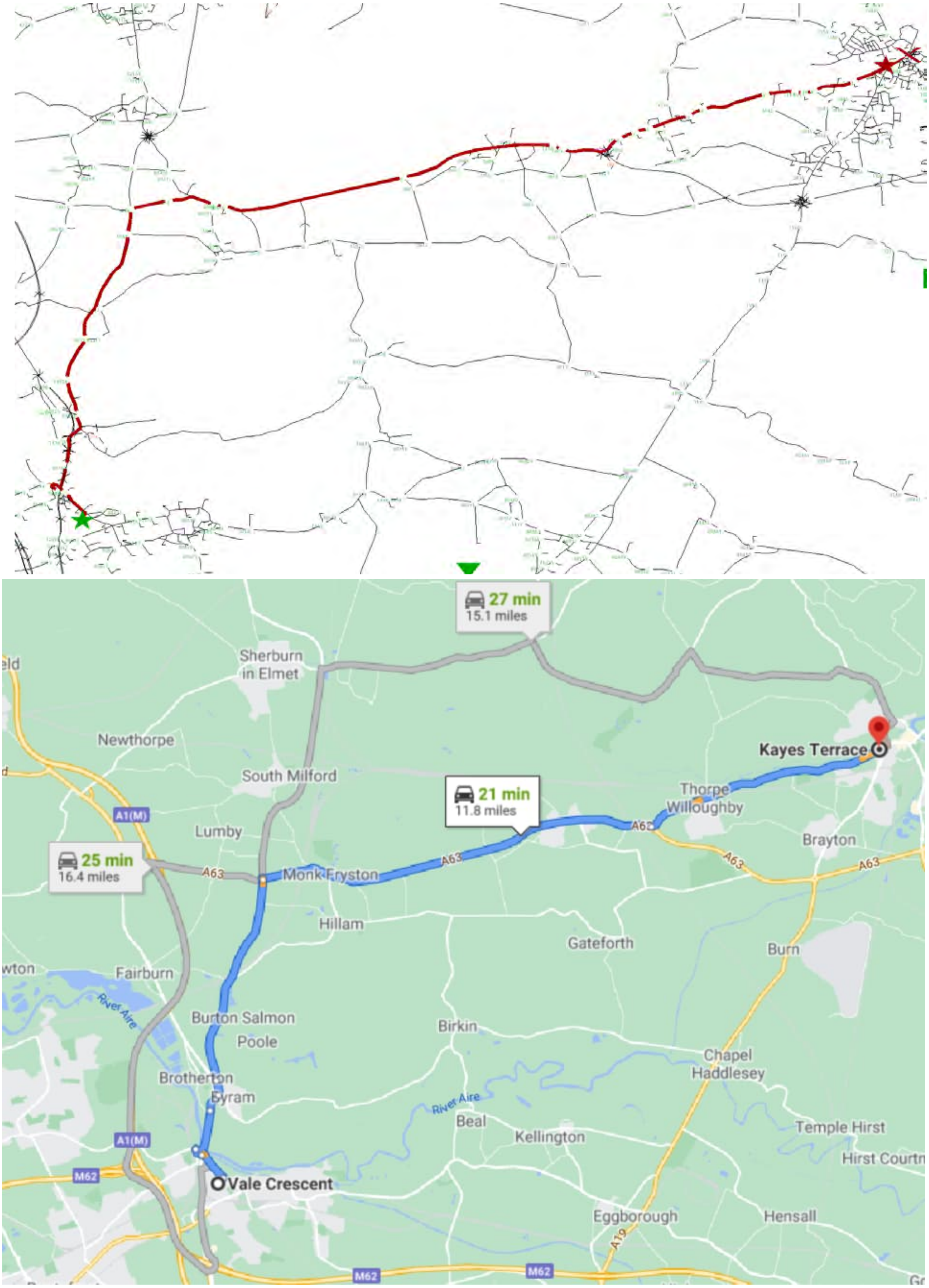


Figure 23 Routeing Check: Selby to Knottingley

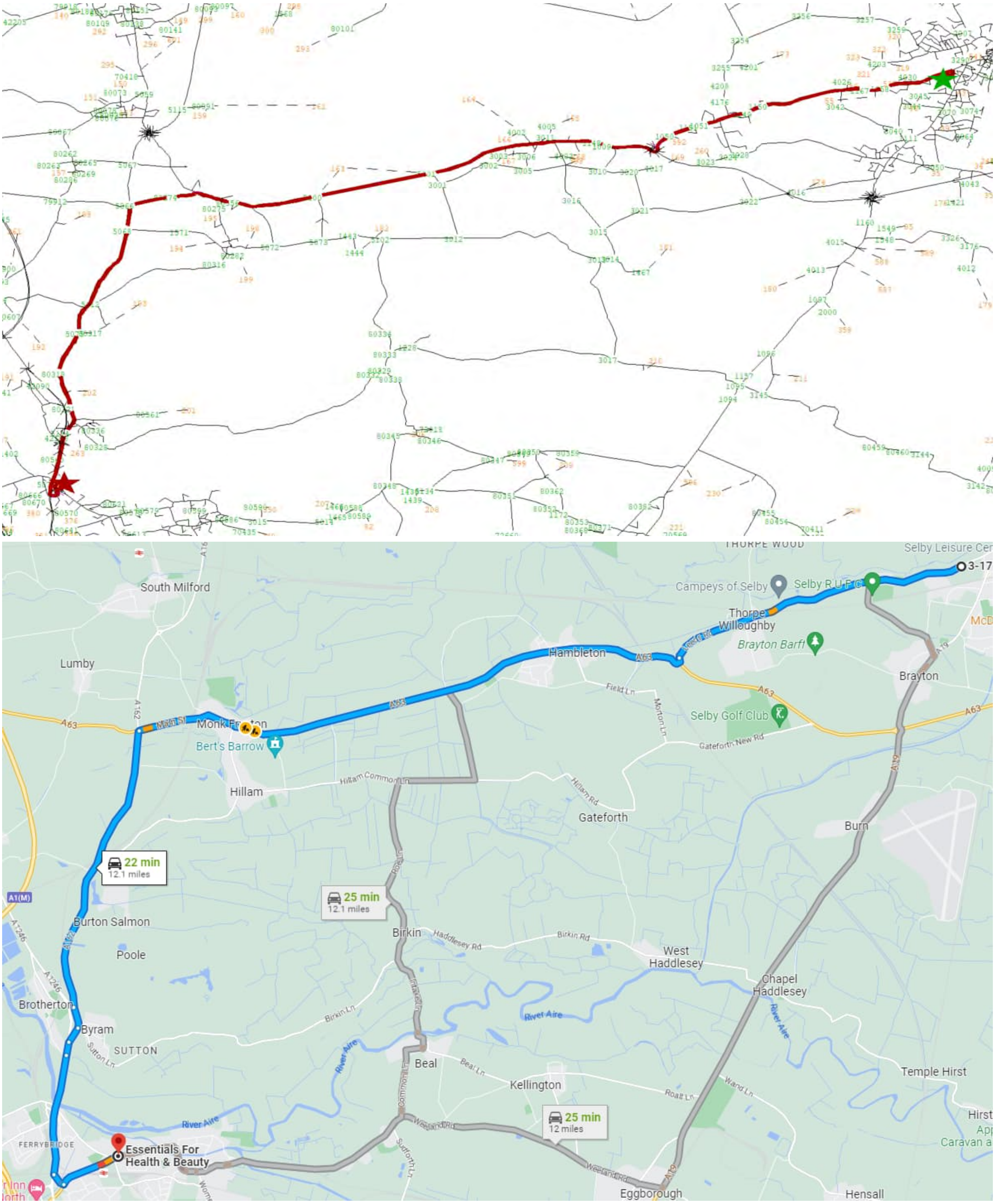


Figure 24 Routeing Check: Barlby to Sherburn in Elmet

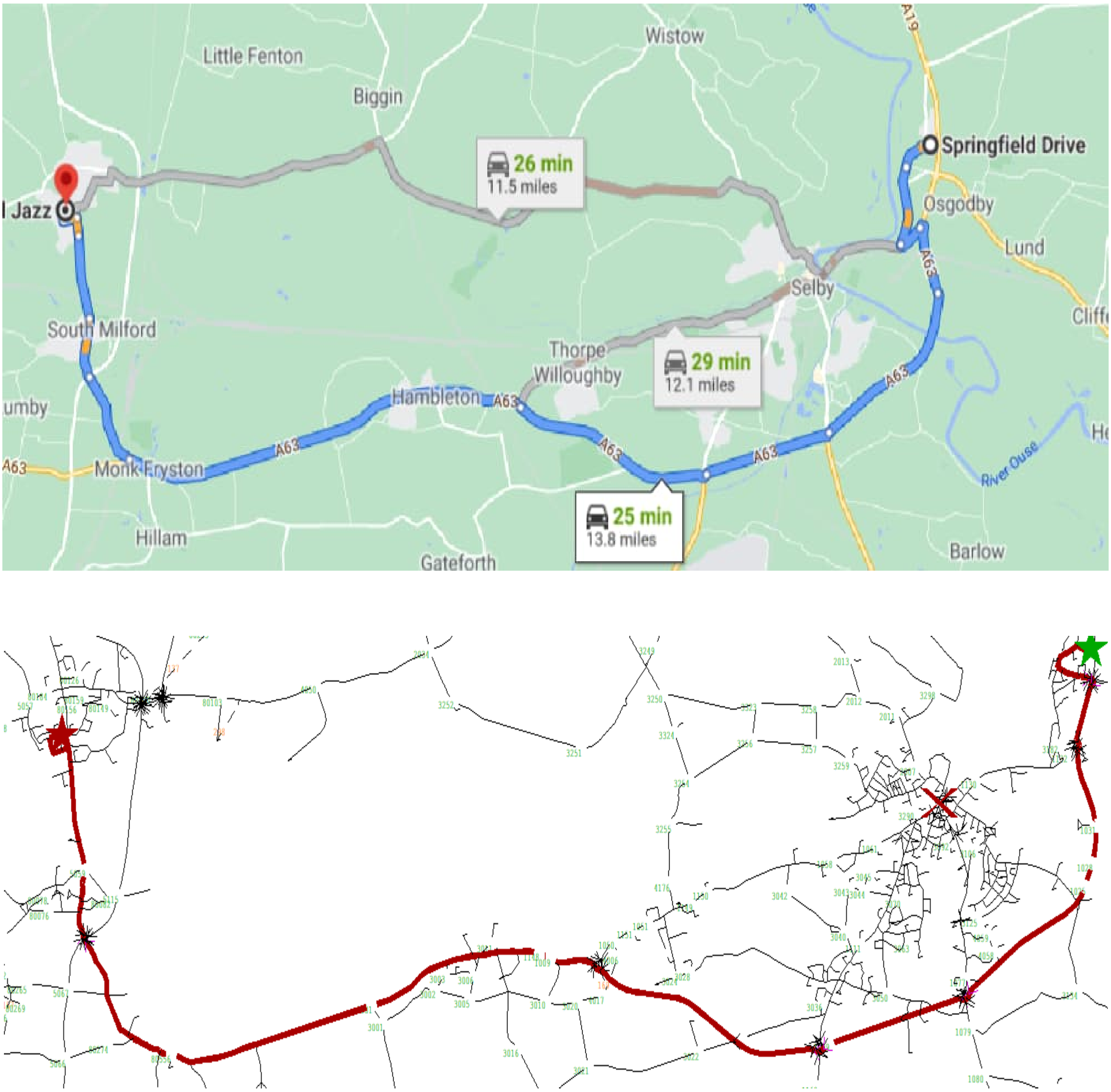


Figure 25 Routeing Check: Barlby to Sherburn in Elmet

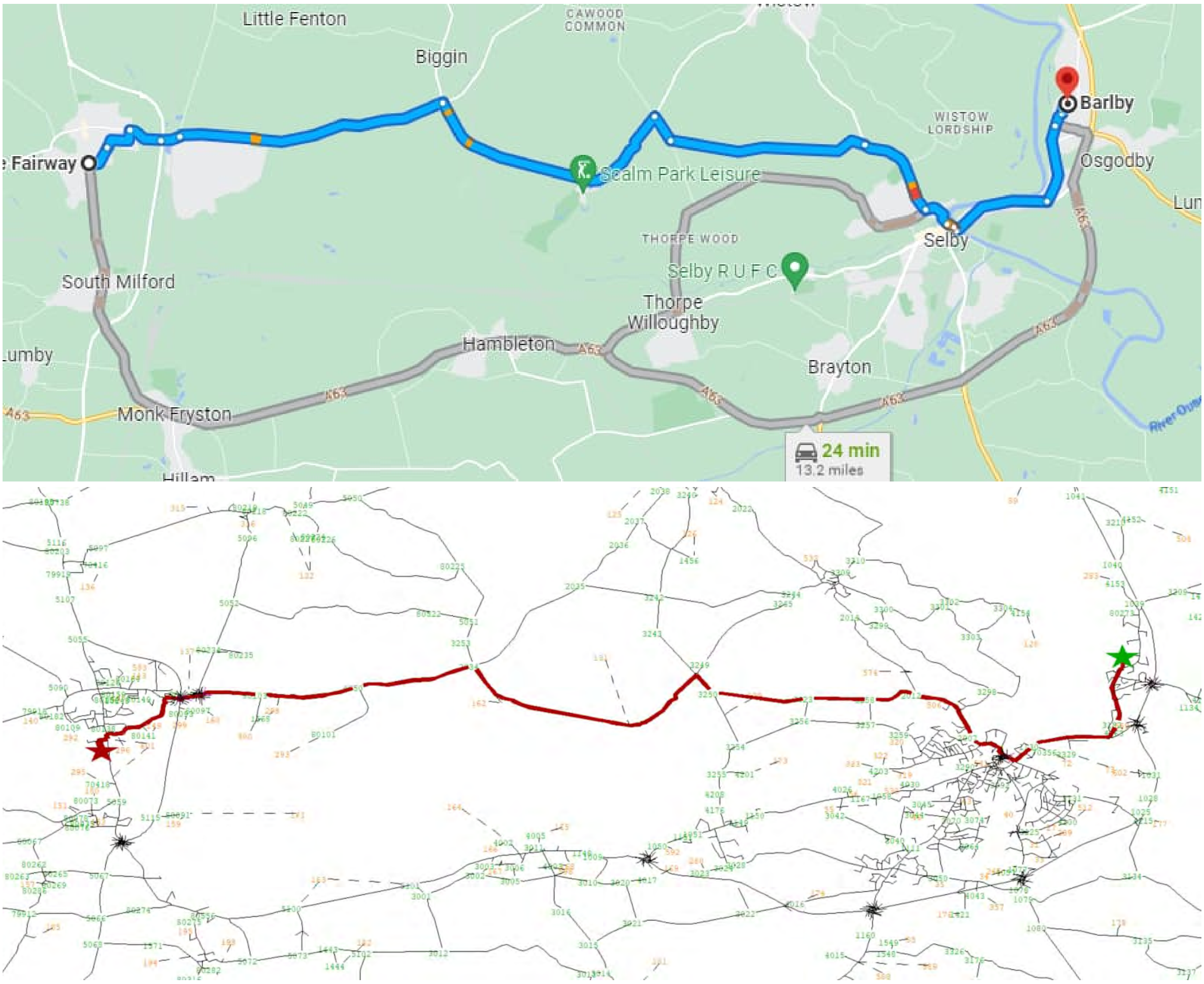


Figure 26 Routeing Check: Norton to Escrick

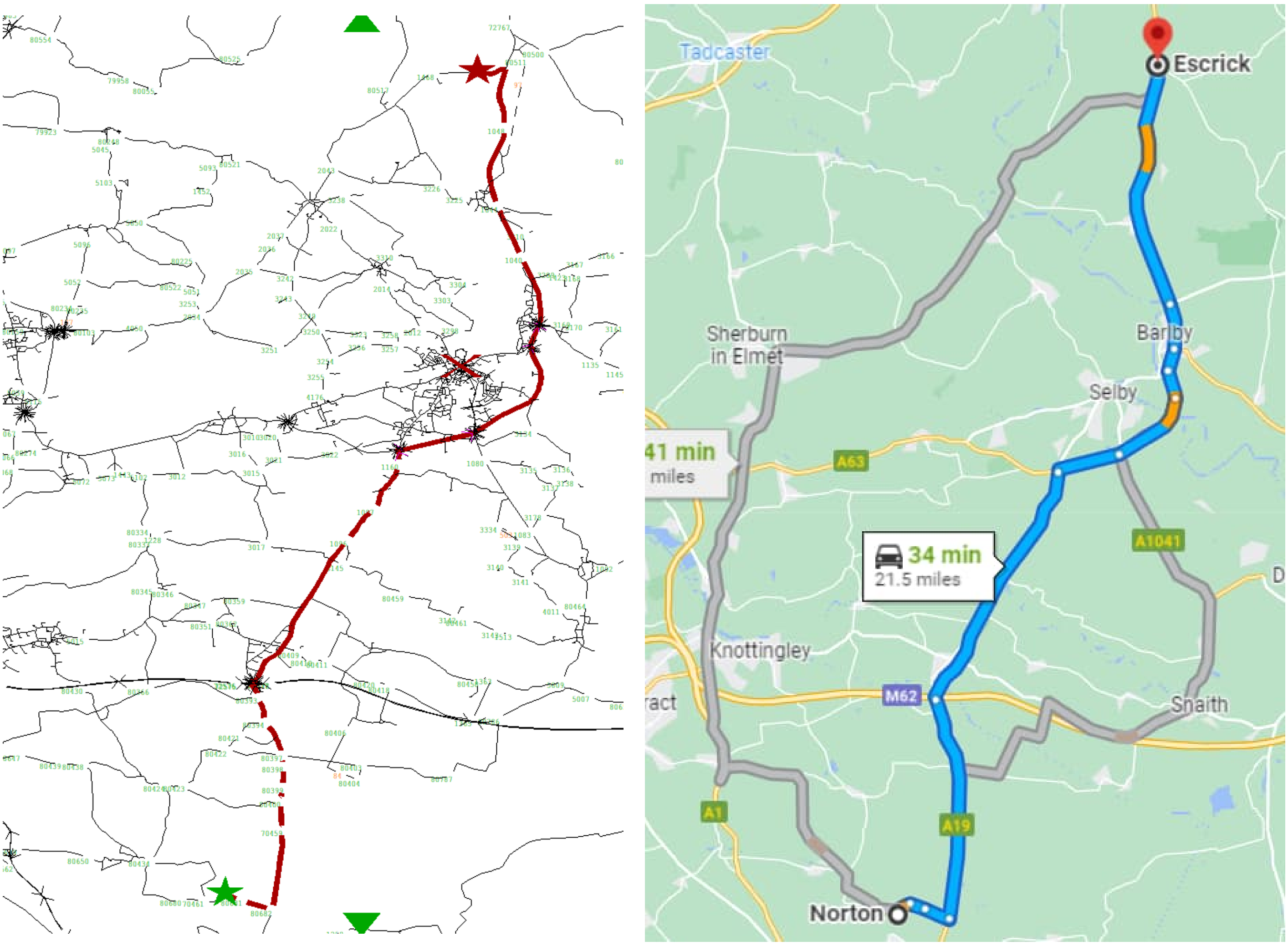
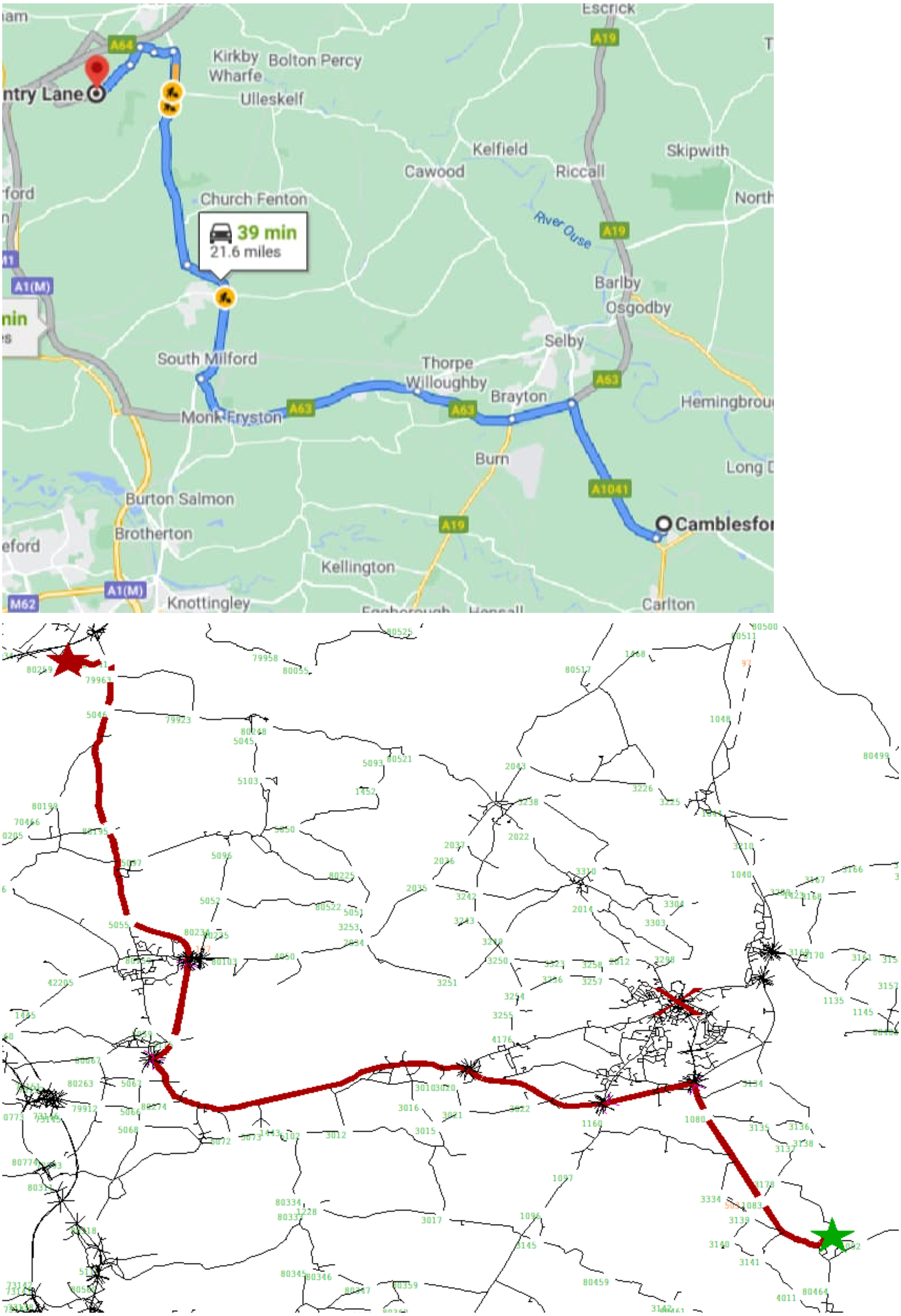


Figure 27 Routeing Check: Camblesforth to Tadcaster



TEST 5 – LINK CONSISTENCY TESTS

Background

The purpose of this test is to check that the network link types are consistent along a road and in both directions, to confirm that network lengths and coded link capacities are appropriately coded. The test should confirm that the network structure has been constructed in accordance with the model specification report.

Information Required

The following information should be required for the purpose of the tests:

- Map showing link types for each direction of a link. Changes in link types along the same stretch of road should be compared with source data. Map of cruise speed as derived from Trafficmaster Journey time data will be used to determine the appropriate link type (i.e. speed-flow curve).
- Maps showing the extent of the types of speed-flow curves and capacities used in the simulation area. For buffer network, the assumption of unlimited capacity with speed taken from the Trafficmaster JT data will be used.
- Tables showing the SATURN link lengths compared with crow-fly distance; and tables showing SATURN link lengths compared with GIS data.

Acceptance Criteria

For the core modelled area:

- There should be no change in link type between directions, unless this can be justified by difference in number of lanes, speed limit;
- Dual carriageway should have the same link type link both directions, except where indicated by difference in speed limit, number of lanes, etc. from source data; and
- Change in link type should be consistent providing changes in speed limit when moving toward town centre from rural area.

For the non-core modelled area:

- If any significant findings arise from the checks, a series of mitigation measures will be implemented either at this stage or during calibration/validation stage.

Summary

Table 6 provides a summary of the difference between coded link lengths from SATURN compared to crow-fly distance.

It is noted from a sample of checks that the –ve (i.e. coded length < crow-fly distance) are due to the coded length being input as an integer, whereas the crow-fly distance is calculated based on XY coordinates of the nodes, i.e. not rounded to an integer.

Table 6 Coded Link Length vs. Crow-Fly Distance Summary

Distance	Percentage Difference (-ve for crow-fly greater)									
	< -20	-20 to -15	-15 to -10	-10 to -5	-5 to 0	0 to 5	5 to 10	10 to 15	15 to 20	> 20
0-500m	0	0	0	0	1241	3350	268	98	63	121
500- 1000m	0	0	0	0	165	831	103	46	23	19
1000- 2000m	0	0	0	0	99	588	111	58	20	25
2000- 5000m	0	0	0	0	46	358	151	35	28	8
5000-10000m	0	0	0	0	22	89	43	12	16	4
10000-20000m	0	0	0	0	4	57	12	12	2	6
Over 20000m	0	0	0	0	18	34	44	22	4	2
All	**0**	**0**	**0**	**0**	**1595**	**5307**	**732**	**283**	**156**	**185**

TEST 6 – FLAT MATRIX ASSIGNMENT TEST

Background

The purpose of this test is to ensure that the model assignment with a flat matrix produce plausible results in terms of routeing and also to investigate whether or not locations with excessively high delays are as a result of significant flows or due to coding error.

Information Required

Plots identifying key strategic places in the core modelled area used to check routeing with additional bandwidth plots showing the magnitude of traffic flow on links in the core modelled area and links where high delays occur.

Acceptance Criteria

Paths should show plausible routeings, in particular for areas that are unexpectedly avoided or unexpectedly attractive on the unloaded network.

Differences in routeings between the principle vehicle groups (arising from banned links and turns) should be justified through reference to the source data.

Traffic flow bandwidth plots should show key routes in the network carrying more traffic than other routes.

Delay plots should show congestion occurring on key routes with significant traffic flows particularly in urban areas.

Summary

Figures 28, 30 and 32 are bandwidth plots which show the magnitude of traffic flow on links across the SDSTM study area. The plots suggest the magnitude between the key strategic links and more minor links is correct with routes such as the A19, A63 and M62 carrying more traffic than the B- and C- rural roads.

Figures 29, 31 and 33 are bandwidth plots which show the magnitude of delay on links across the SDSTM stud area. The plots suggest the magnitude of delay across the network is fairly insignificant, even in the more rural areas and Selby town.

Figure 28 Flat Matrix Flow Plot: AM Peak

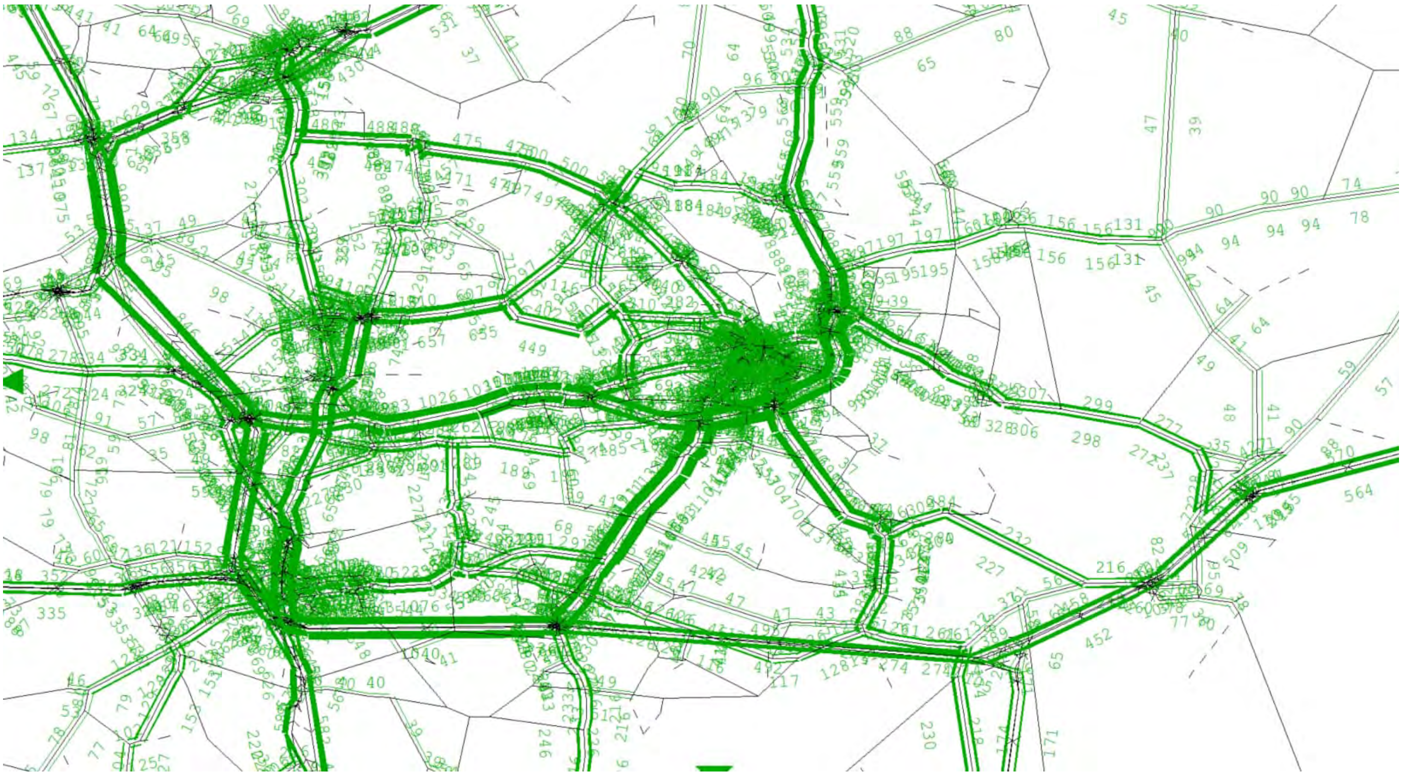


Figure 29 Flat Matrix Delay Flow Plot: AM Peak

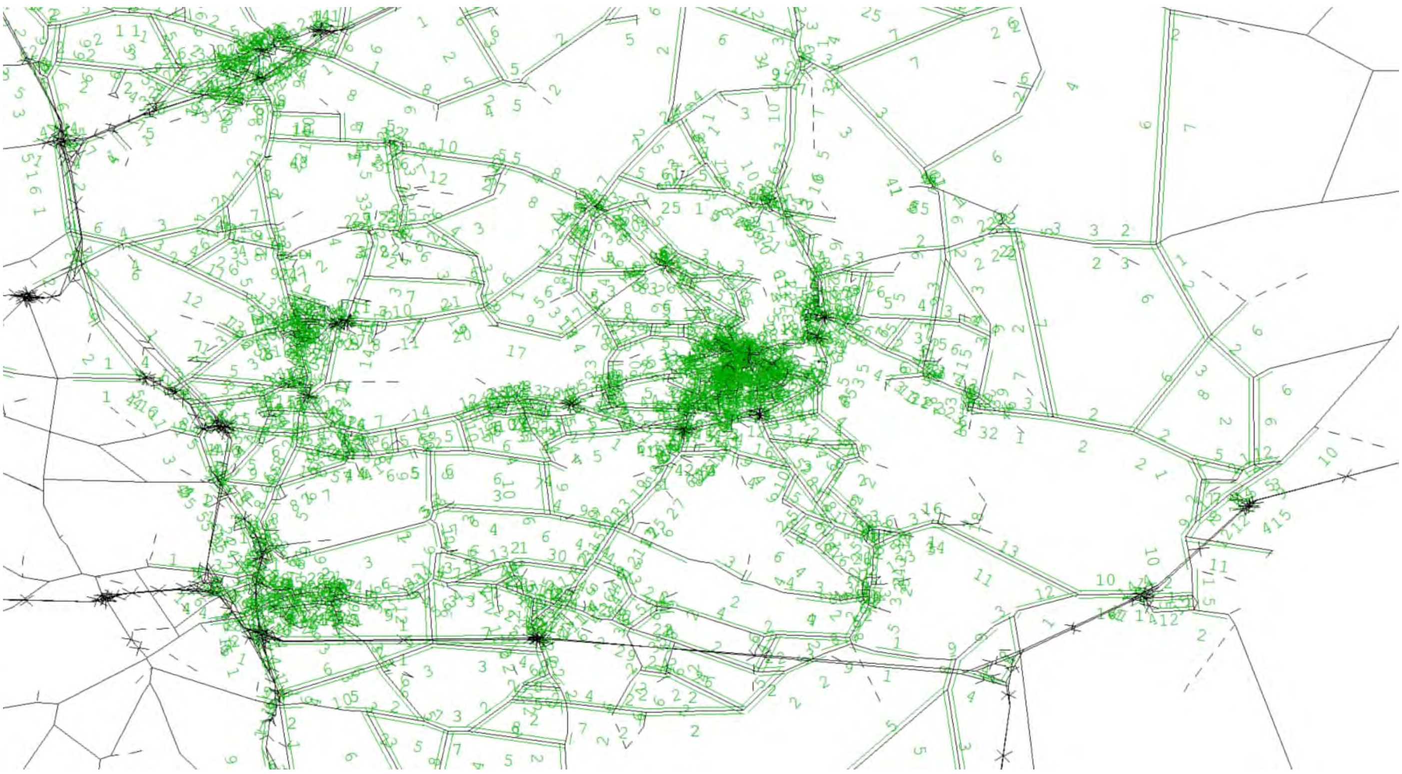


Figure 30 Flat Matrix Flow Plot: Inter Peak

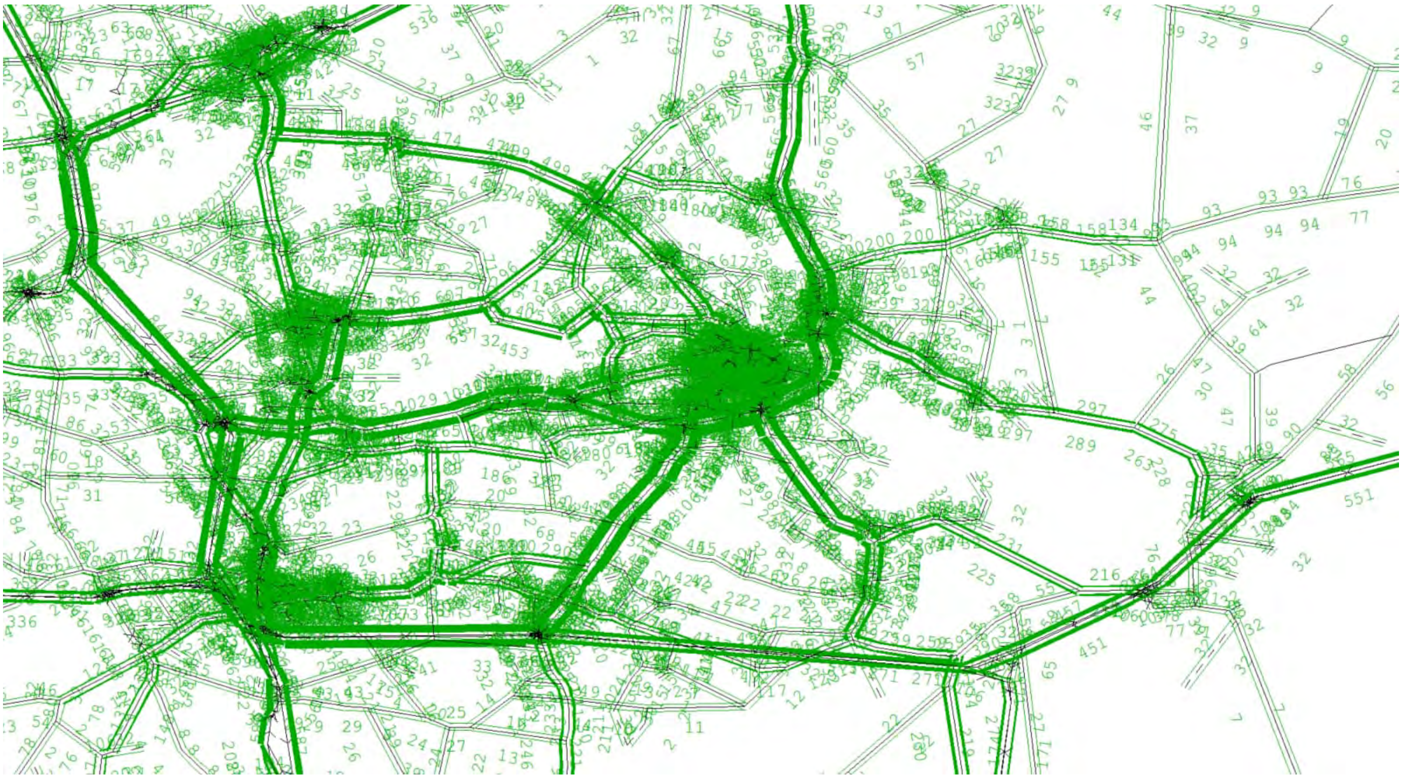


Figure 31 Flat Matrix Junction Flow Plot: Inter Peak

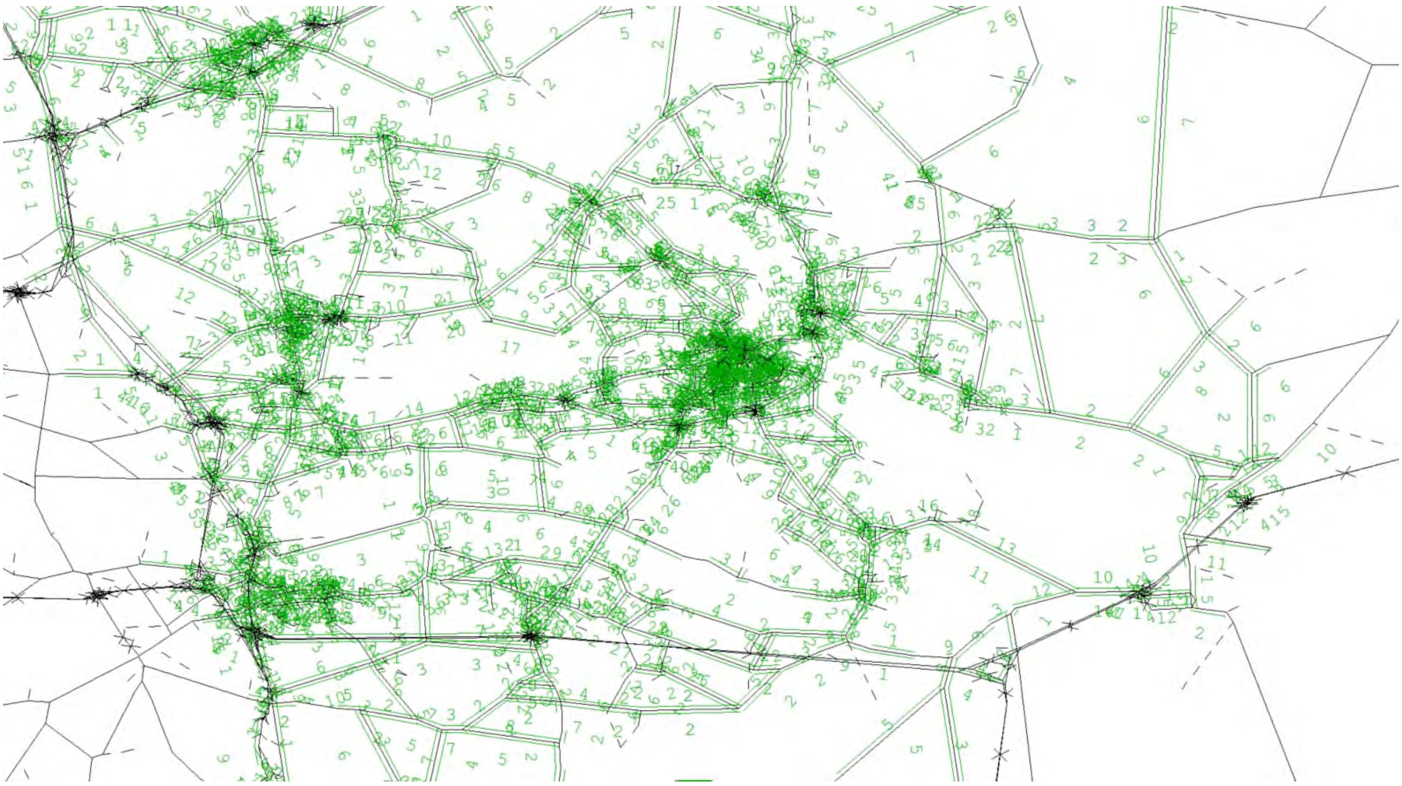


Figure 32 Flat Matrix Flow Plot: PM Peak

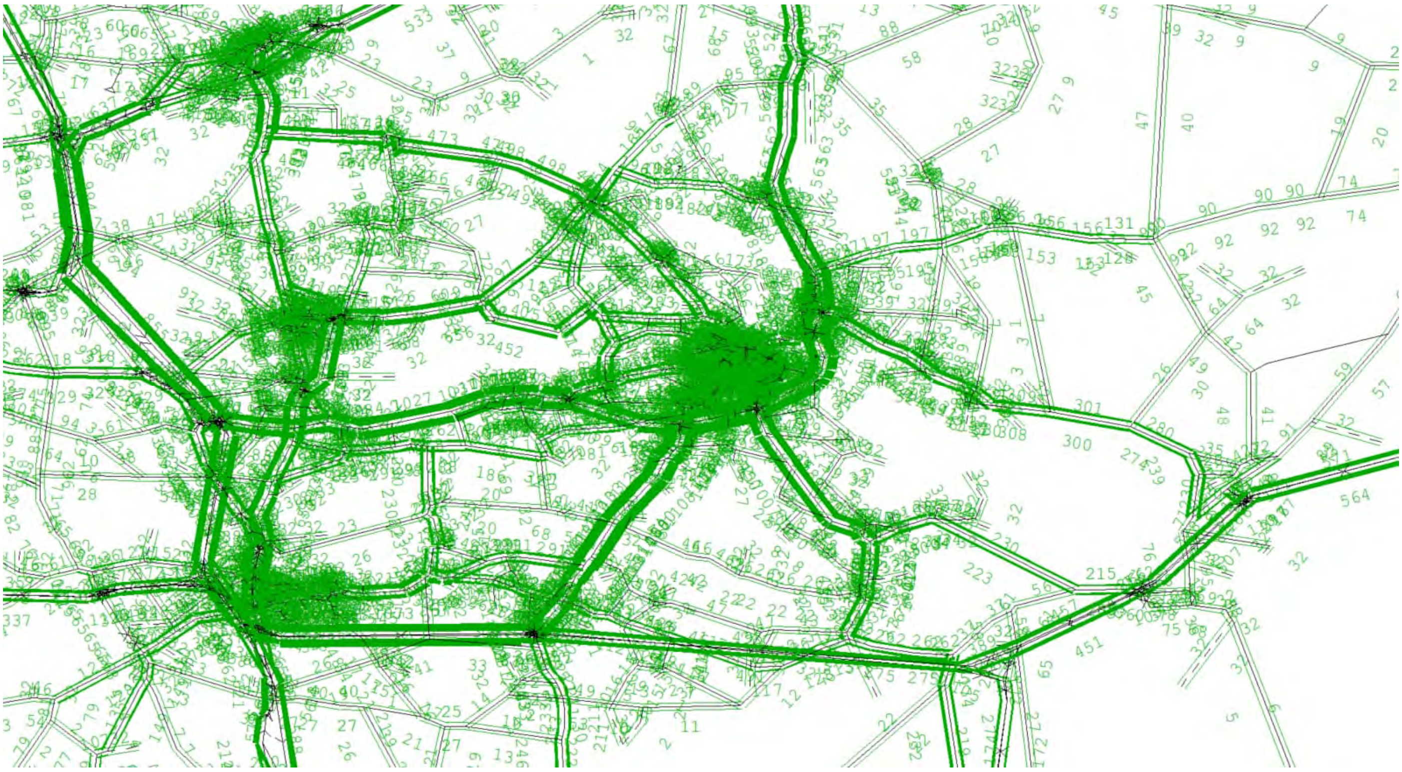
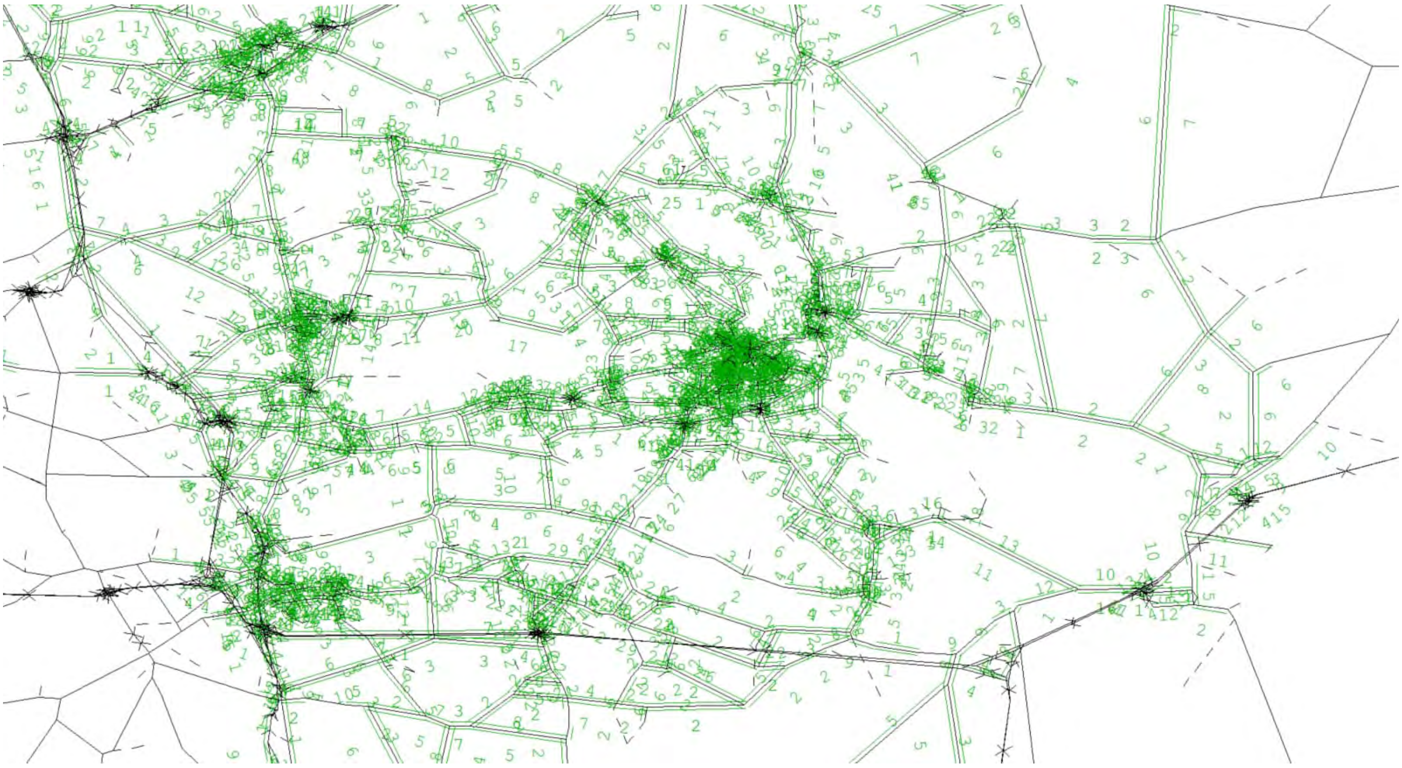


Figure 33 Flat Matrix Junction Flow Plot: PM Peak



Appendix E

PRIOR MATRIX SCREENLINE VERIFICATION

SDSTM Prior Matrix Screenline and Cordon Verification

ID	Calibrated Matrix - Strategic Screenlines and Cordons	AM All Vehicles					AM Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	11,261	11,323	63	1%	0.6	8,695	8,863	168	2%	1.8
2	Outer Cordon Outbound	12,558	12,739	181	1%	1.6	10,043	10,145	102	1%	1.0
3	Tadcaster Cordon Inbound	6,128	6,078	-50	-1%	0.6	4,660	4,677	17	0%	0.3
4	Tadcaster Cordon Outbound	6,148	6,343	196	3%	2.5	4,979	4,896	-83	-2%	1.2
5	Sherburn Cordon Inbound	1,989	1,880	-109	-5%	2.5	1,598	1,470	-128	-8%	3.3
6	Sherburn Cordon Outbound	1,829	1,808	-21	-1%	0.5	1,453	1,383	-69	-5%	1.8
7	Eggborough Cordon Inbound	2,099	1,944	-155	-7%	3.4	1,646	1,529	-116	-7%	2.9
8	Eggborough Cordon Outbound	2,159	1,939	-219	-10%	4.8	1,683	1,522	-161	-10%	4.0
9	Screenline North-South West NB	1,352	1,529	177	13%	4.7	1,086	1,256	170	16%	5.0
10	Screenline North-South West SB	1,125	1,387	262	23%	7.4	905	1,092	187	21%	5.9
11	Screenline North-South North NB	7,558	7,963	404	5%	4.6	5,276	6,010	734	14%	9.8
12	Screenline North-South North SB	6,583	6,840	257	4%	3.1	4,448	4,791	343	8%	5.0
13	Screenline North-South Central NB	6,725	6,890	165	2%	2.0	5,057	5,438	381	8%	5.3
14	Screenline North-South Central SB	5,211	5,569	358	7%	4.9	3,898	4,111	213	5%	3.4
15	Screenline East-West East EB	894	836	-58	-6%	2.0	686	642	-44	-6%	1.7
16	Screenline East-West East WB	1,376	1,298	-78	-6%	2.1	1,131	1,119	-12	-1%	0.4
17	Screenline East-West Central EB	3,924	3,707	-218	-6%	3.5	2,622	2,562	-60	-2%	1.2
18	Screenline East-West Central WB	4,174	3,602	-572	-14%	9.2	2,947	2,581	-366	-12%	7.0
19	Selby Outer Cordon Inbound	3,015	3,072	57	2%	1.0	2,497	2,726	228	9%	4.5
20	Selby Outer Cordon Outbound	2,651	2,680	29	1%	0.6	2,149	2,335	186	9%	3.9
21	Selby North-South NB	2,487	2,525	38	2%	0.8	2,064	2,205	141	7%	3.1
22	Selby North-South SB	1,992	2,028	35	2%	0.8	1,653	1,662	9	1%	0.2
23	Selby East-West EB	914	973	59	6%	1.9	789	828	39	5%	1.4
24	Selby East-West WB	815	678	-137	-17%	5.0	676	552	-124	-18%	5.0
25	Selby Town Centre Cordon Inbound	3,123	3,077	-46	-1%	0.8	2,782	2,835	53	2%	1.0
26	Selby Town Centre Cordon Inbound	2,340	2,333	-7	0%	0.1	2,002	2,095	94	5%	2.1

ID	Calibrated Matrix - Strategic Screenlines and Cordons	IP All Vehicles					IP Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	8,466	8,695	228	3%	2.5	1,314	1,409	94	7%	2.6
2	Outer Cordon Outbound	8,514	8,774	260	3%	2.8	1,404	1,410	6	0%	0.2
3	Tadcaster Cordon Inbound	4,561	4,778	217	5%	3.2	692	829	137	20%	5.0
4	Tadcaster Cordon Outbound	4,547	4,754	206	5%	3.0	766	826	60	8%	2.1
5	Sherburn Cordon Inbound	1,257	1,216	-41	-3%	1.2	192	201	9	5%	0.6
6	Sherburn Cordon Outbound	1,289	1,324	36	3%	1.0	201	201	0	0%	0.0
7	Eggborough Cordon Inbound	1,488	1,353	-136	-9%	3.6	249	199	-50	-20%	3.3
8	Eggborough Cordon Outbound	1,525	1,339	-186	-12%	4.9	240	200	-40	-17%	2.7
9	Screenline North-South West NB	935	947	12	1%	0.4	150	140	-10	-7%	0.8
10	Screenline North-South West SB	938	1,084	146	16%	4.6	168	177	9	5%	0.7
11	Screenline North-South North NB	5,331	5,565	234	4%	3.2	912	925	13	1%	0.4
12	Screenline North-South North SB	5,744	5,811	67	1%	0.9	986	952	-34	-3%	1.1
13	Screenline North-South Central NB	4,947	5,229	282	6%	4.0	766	692	-74	-10%	2.8
14	Screenline North-South Central SB	5,201	5,476	275	5%	3.8	823	699	-125	-15%	4.5
15	Screenline East-West East EB	748	732	-16	-2%	0.6	114	108	-7	-6%	0.6
16	Screenline East-West East WB	754	675	-78	-10%	2.9	120	109	-11	-9%	1.1
17	Screenline East-West Central EB	2,701	2,779	78	3%	1.5	457	429	-28	-6%	1.3
18	Screenline East-West Central WB	2,897	2,784	-113	-4%	2.1	513	457	-56	-11%	2.5
19	Selby Outer Cordon Inbound	2,152	2,139	-14	-1%	0.3	315	211	-104	-33%	6.4
20	Selby Outer Cordon Outbound	2,163	2,165	2	0%	0.0	324	213	-111	-34%	6.8
21	Selby North-South NB	1,797	1,805	8	0%	0.2	238	187	-52	-22%	3.5
22	Selby North-South SB	1,858	1,864	6	0%	0.1	256	192	-64	-25%	4.3
23	Selby East-West EB	635	590	-45	-7%	1.8	88	64	-24	-27%	2.8
24	Selby East-West WB	627	586	-41	-7%	1.7	85	64	-21	-24%	2.4
25	Selby Town Centre Cordon Inbound	2,524	2,342	-182	-7%	3.7	284	148	-136	-48%	9.3
26	Selby Town Centre Cordon Inbound	2,530	2,388	-142	-6%	2.9	280	147	-133	-47%	9.1

ID	Calibrated Matrix - Strategic Screenlines and Cordons	PM All Vehicles					PM Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	14,131	13,737	-394	-3%	3.3	12,400	11,931	-470	-4%	4.3
2	Outer Cordon Outbound	12,693	12,403	-290	-2%	2.6	10,901	10,674	-227	-2%	2.2
3	Tadcaster Cordon Inbound	6,615	6,834	219	3%	2.7	5,857	5,794	-63	-1%	0.8
4	Tadcaster Cordon Outbound	6,633	6,675	41	1%	0.5	5,653	5,663	10	0%	0.1
5	Sherburn Cordon Inbound	2,103	2,005	-98	-5%	2.2	1,838	1,729	-108	-6%	2.6
6	Sherburn Cordon Outbound	2,246	2,117	-129	-6%	2.8	1,996	1,841	-155	-8%	3.5
7	Eggborough Cordon Inbound	2,380	2,043	-337	-14%	7.2	2,061	1,766	-295	-14%	6.7
8	Eggborough Cordon Outbound	2,291	2,107	-184	-8%	3.9	1,986	1,833	-152	-8%	3.5
9	Screenline North-South West NB	1,466	1,446	-19	-1%	0.5	1,282	1,283	1	0%	0.0
10	Screenline North-South West SB	1,411	1,679	268	19%	6.8	1,209	1,448	239	20%	6.6
11	Screenline North-South North NB	7,519	7,854	335	4%	3.8	5,923	6,363	440	7%	5.6
12	Screenline North-South North SB	8,048	8,152	104	1%	1.2	6,392	6,806	415	6%	5.1
13	Screenline North-South Central NB	6,406	6,360	-46	-1%	0.6	5,381	5,349	-31	-1%	0.4
14	Screenline North-South Central SB	7,352	7,268	-84	-1%	1.0	6,194	6,271	77	1%	1.0
15	Screenline East-West East EB	1,349	1,243	-105	-8%	2.9	1,184	1,110	-73	-6%	2.2
16	Screenline East-West East WB	1,040	886	-155	-15%	5.0	913	765	-148	-16%	5.1
17	Screenline East-West Central EB	4,715	4,022	-693	-15%	10.5	3,799	3,298	-500	-13%	8.4
18	Screenline East-West Central WB	3,957	3,581	-376	-9%	6.1	3,047	2,938	-109	-4%	2.0
19	Selby Outer Cordon Inbound	3,431	3,197	-234	-7%	4.1	3,067	2,957	-110	-4%	2.0
20	Selby Outer Cordon Outbound	3,042	3,100	58	2%	1.1	2,725	2,856	132	5%	2.5
21	Selby North-South NB	2,510	2,333	-177	-7%	3.6	2,246	2,108	-138	-6%	3.0
22	Selby North-South SB	2,699	2,633	-65	-2%	1.3	2,431	2,401	-30	-1%	0.6
23	Selby East-West EB	1,032	843	-189	-18%	6.2	939	751	-188	-20%	6.5
24	Selby East-West WB	928	939	12	1%	0.4	849	857	8	1%	0.3
25	Selby Town Centre Cordon Inbound	2,948	2,748	-200	-7%	3.8	2,702	2,589	-113	-4%	2.2
26	Selby Town Centre Cordon Inbound	3,303	3,244	-60	-2%	1.0	3,052	3,082	30	1%	0.5

Appendix F

IMPACTS OF MATRIX ESTIMATION

Public

SDTM LMVR APPENDIX

Impacts of Matrix Estimation

This appendix provides supplementary tables and graphs to the reporting of the impacts from matrix estimation that are documented in the main Local Model Validation Report.

TRIP LENGTH DISTRIBUTION

The impacts of matrix estimation on the mean trip length distribution and standard deviation are reported in the main report. Supplementary images are provided below.

ZONAL CELL VALUES

The regression statistics for the impacts of matrix estimation on zonal cell values are reported in the main report. Supplementary images are provided below.

ZONAL TRIP ENDS

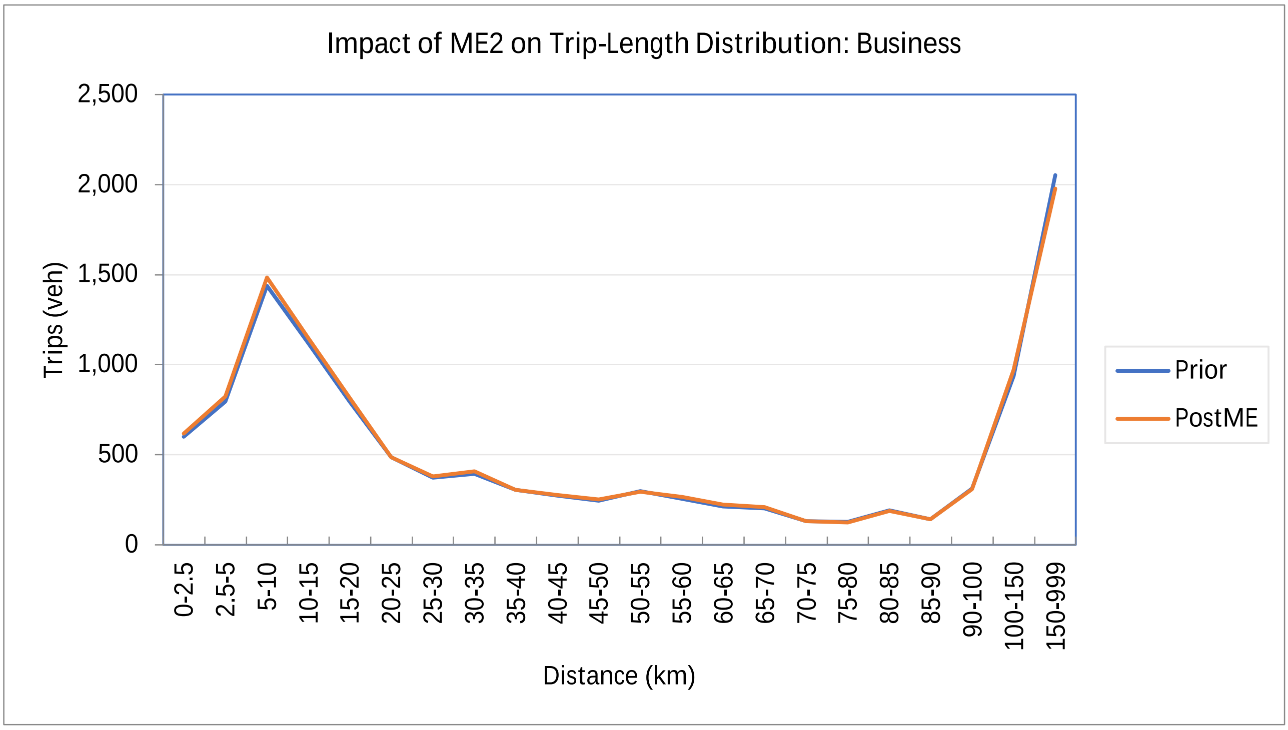
The regression statistics for the impacts of matrix estimation on zonal trip ends are reported in the main report. Supplementary images are provided below.

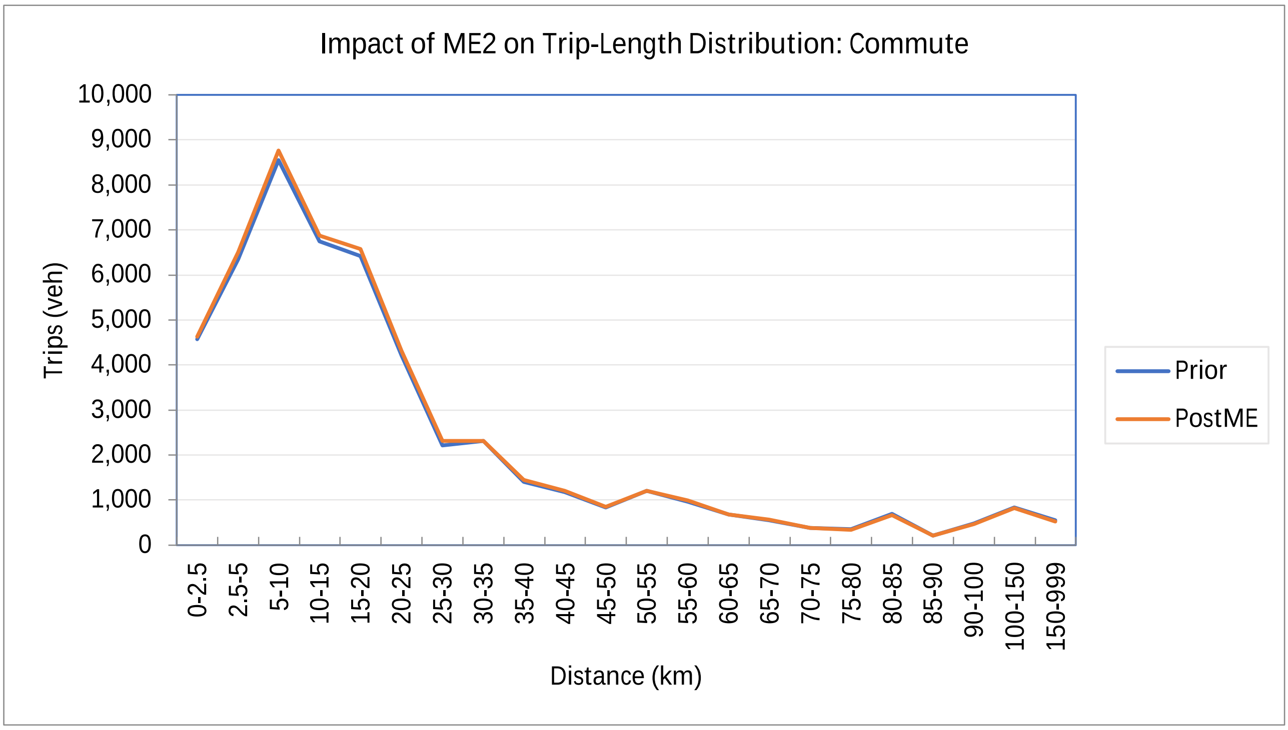
SECTOR TO SECTOR MATRICES

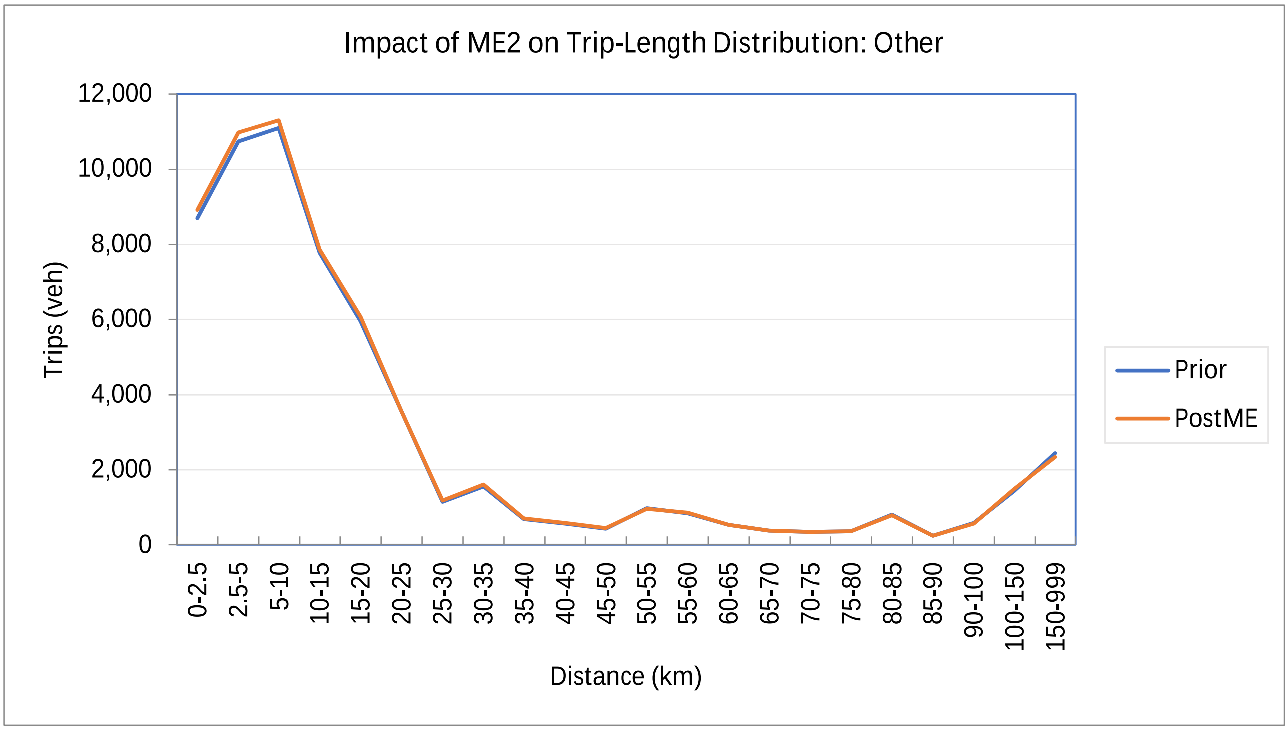
The summary statistics for the impacts of matrix estimation on sector-to-sector movements are reported in the main report. Supplementary tables are provided below.

TRIP LENGTH DISTRIBUTION

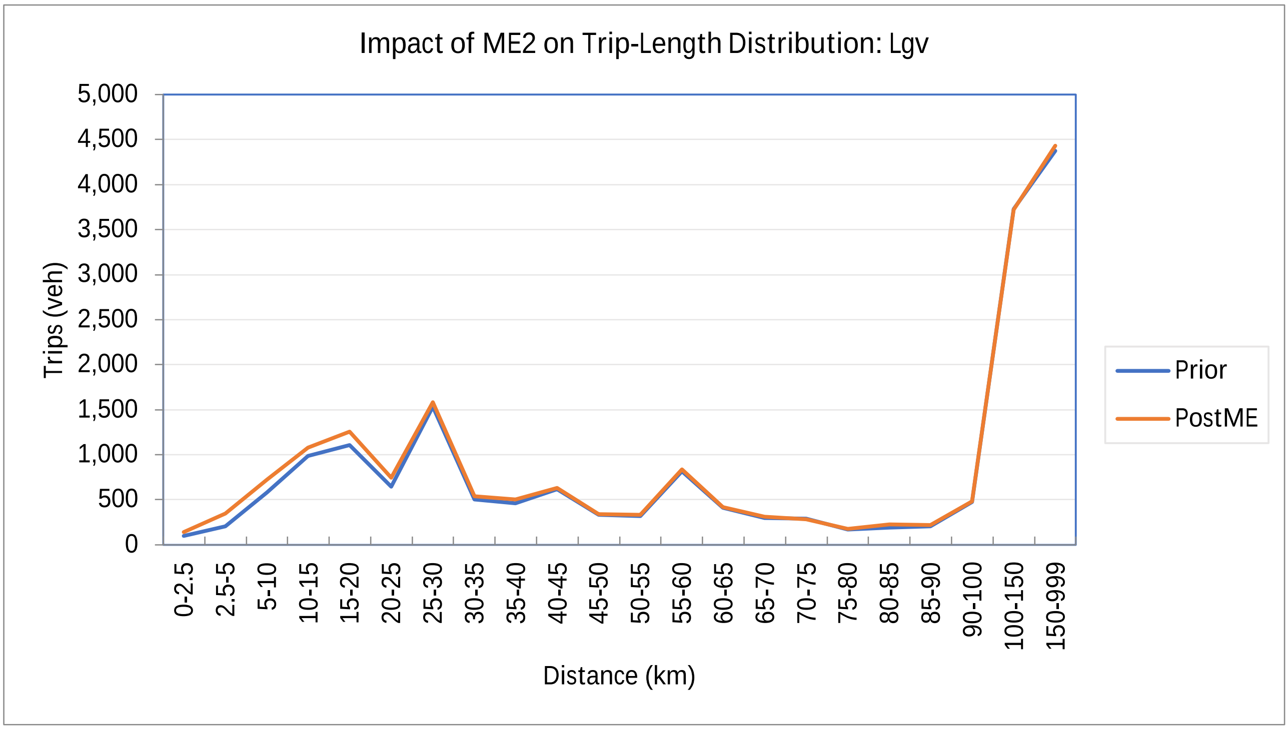
AM Peak



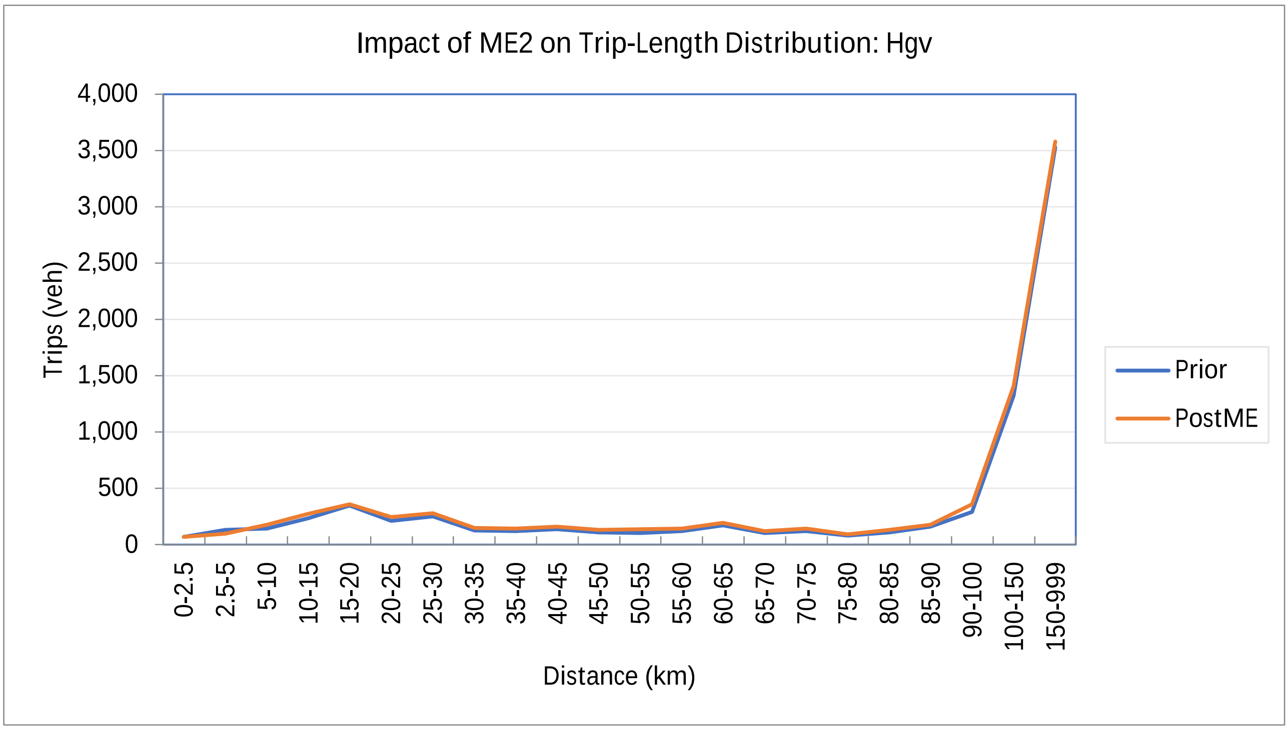




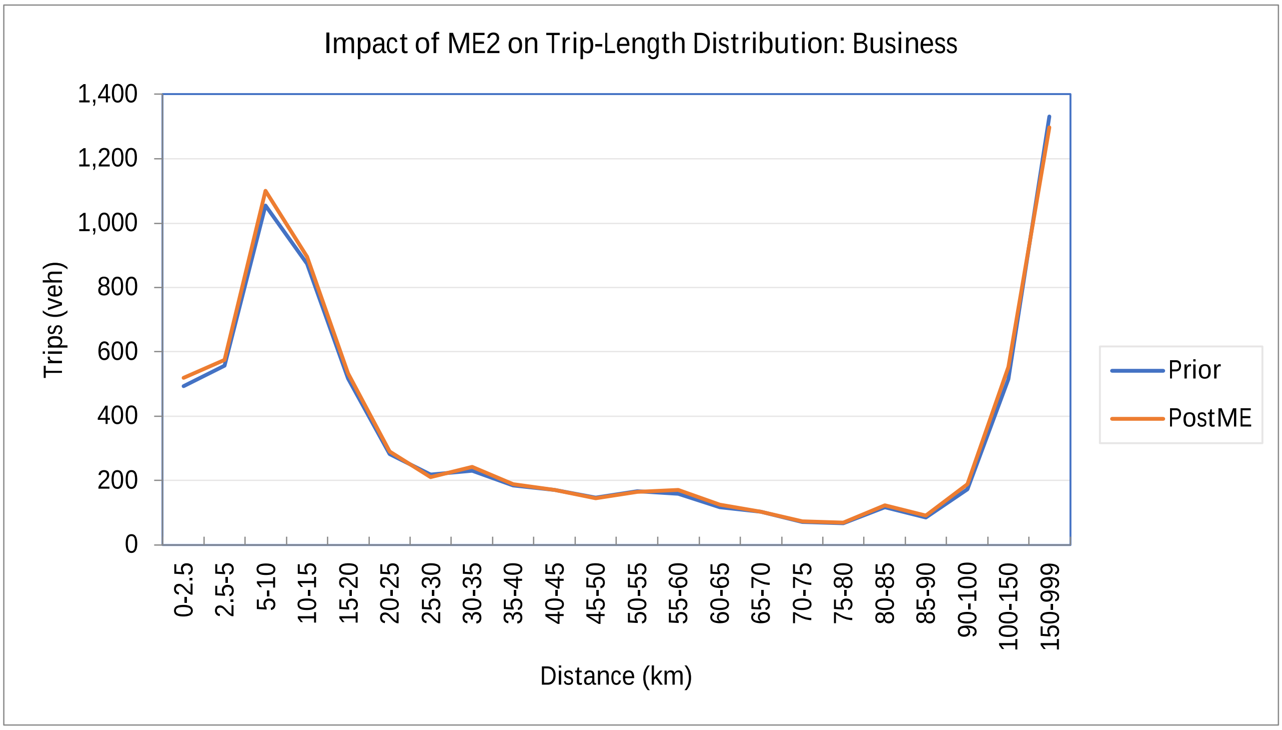
Impact of ME2 on Trip-Length Distribution: Other
12,000
10,000
8,000
6,000
4,000
2,000
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

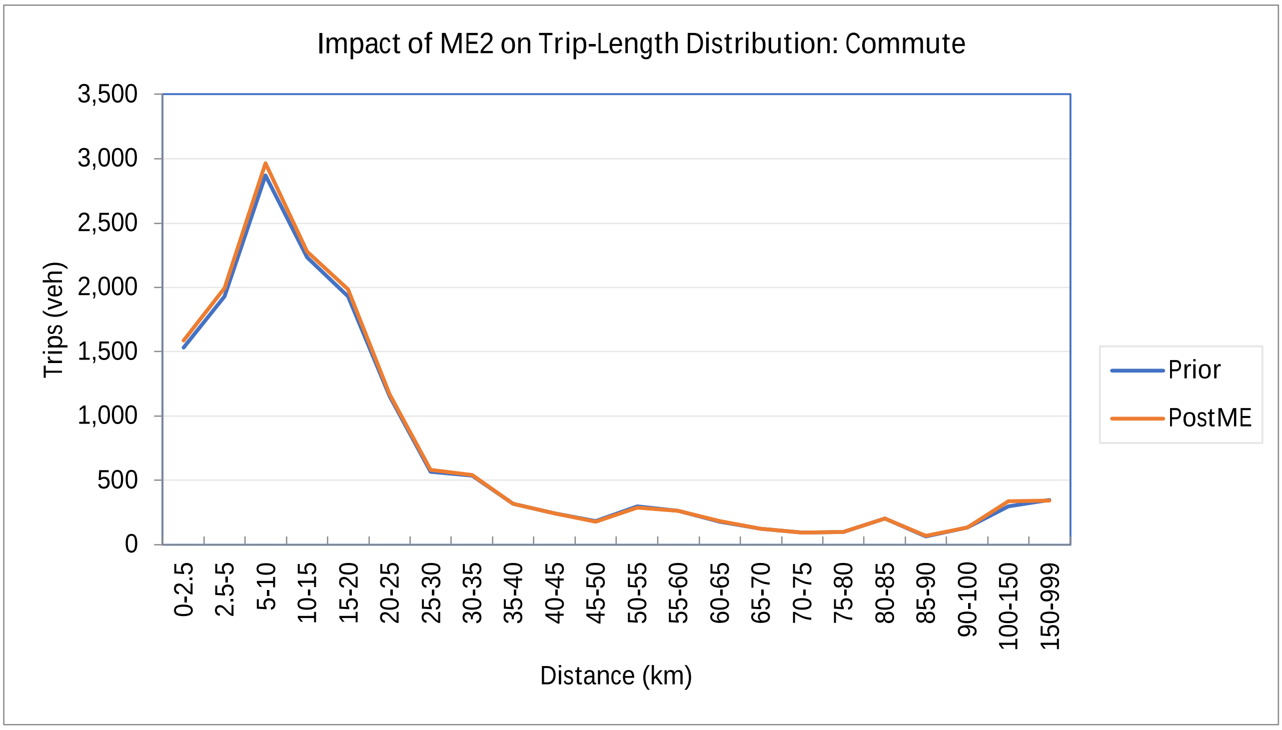


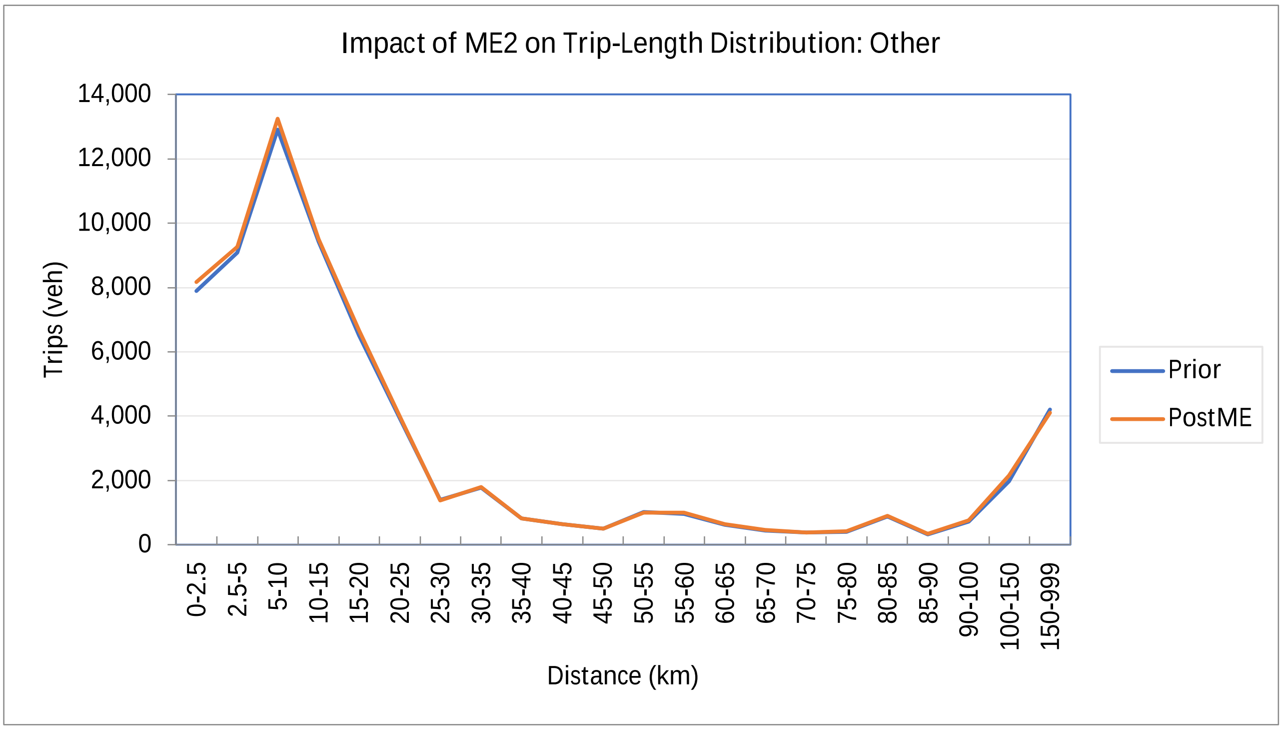
Impact of ME2 on Trip-Length Distribution: Lgv
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

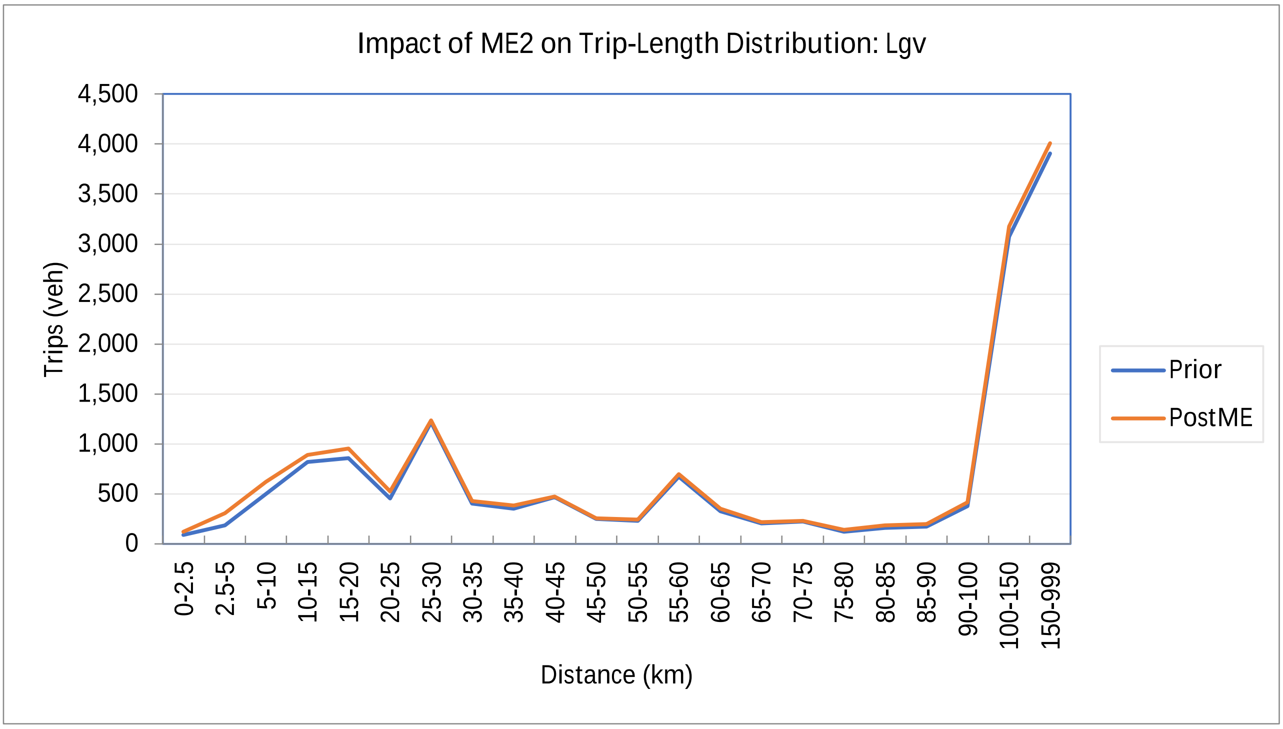

Impact of ME2 on Trip-Length Distribution: Hgv
Trips (veh)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

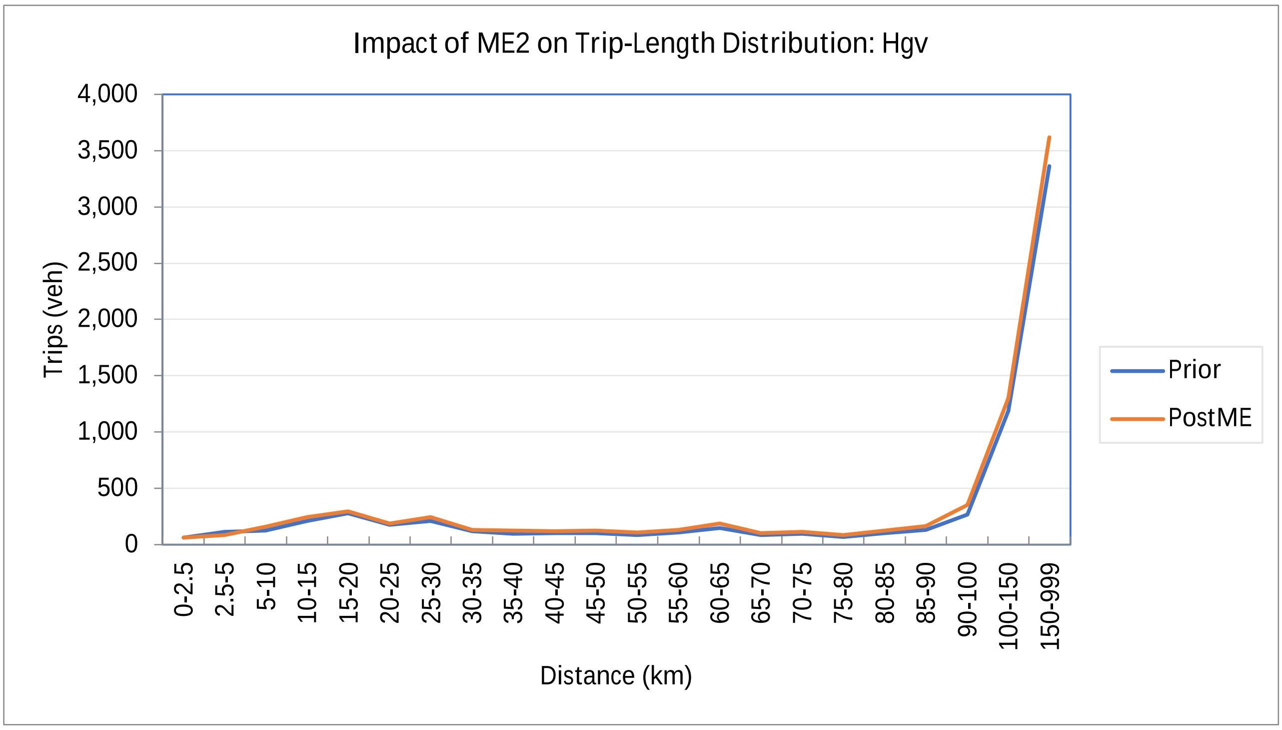
Inter Peak


Impact of ME2 on Trip-Length Distribution: Business
1,400
1,200
1,000
800
600
400
200
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

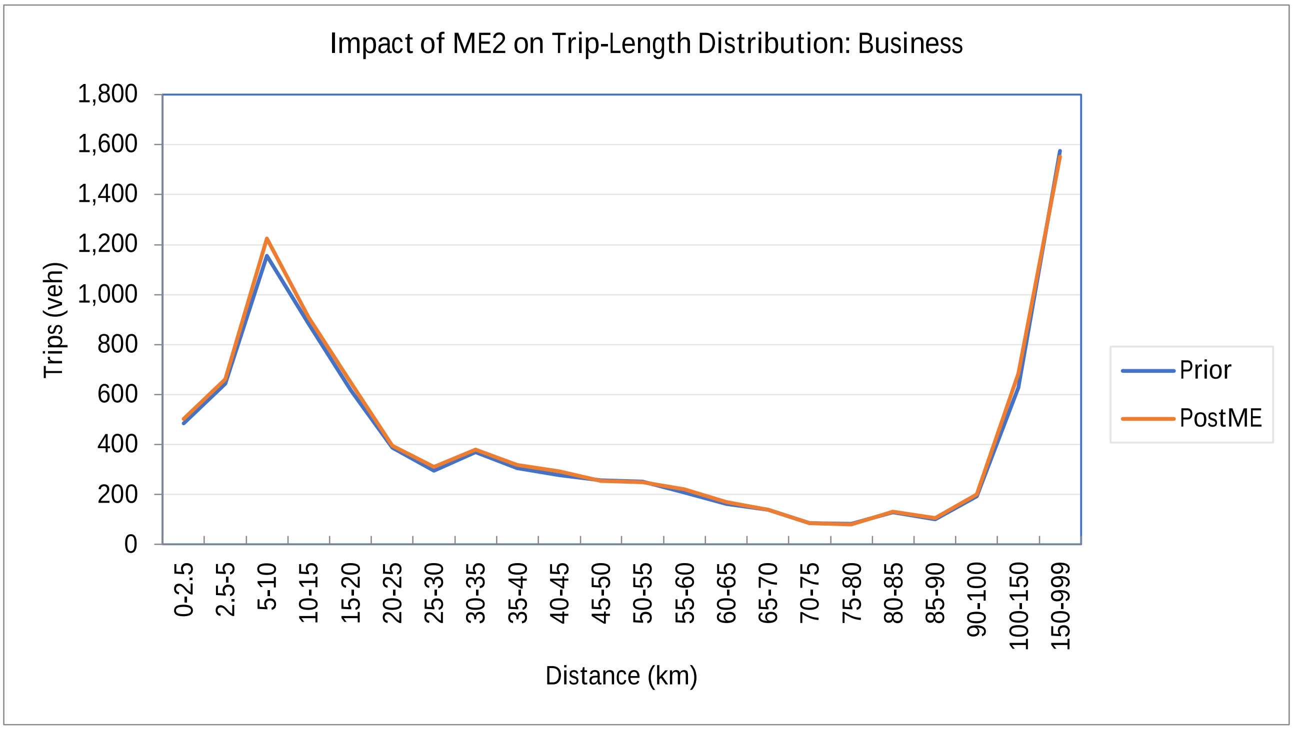

Impact of ME2 on Trip-Length Distribution: Commute
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

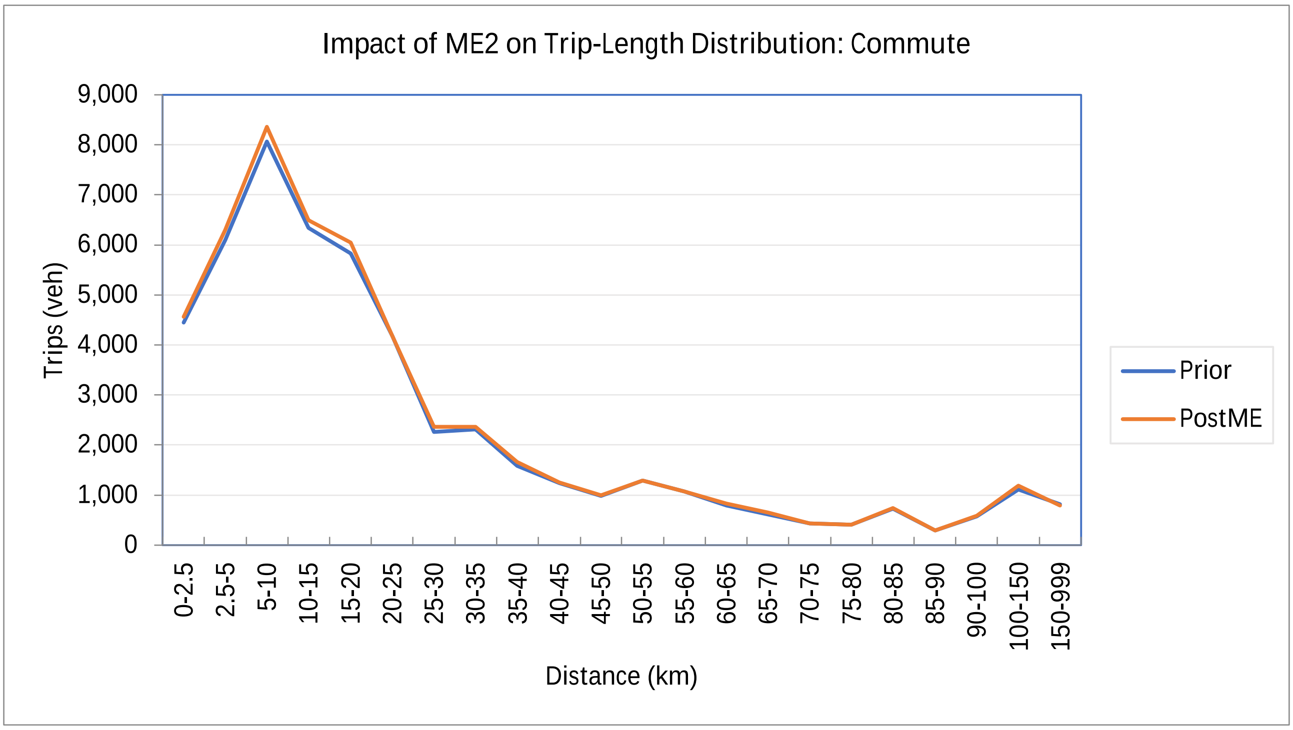

Impact of ME2 on Trip-Length Distribution: Other
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

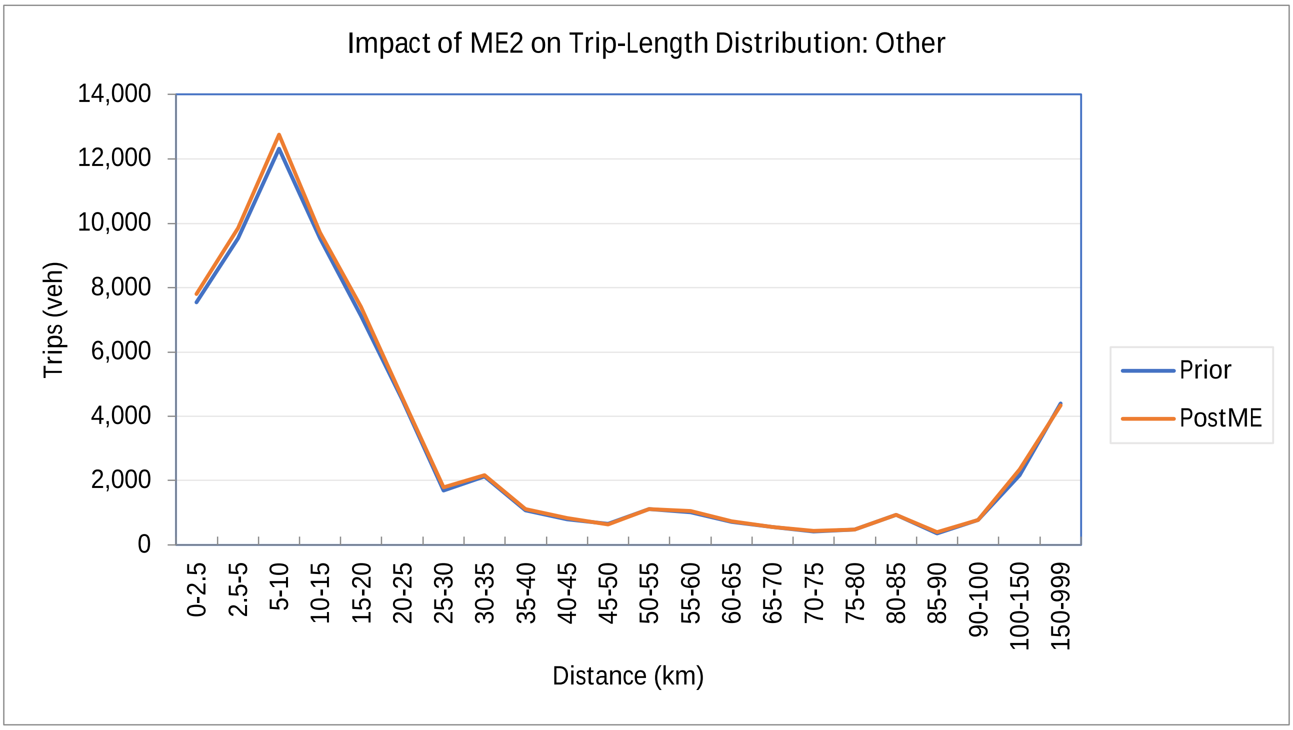

Impact of ME2 on Trip-Length Distribution: Lgv
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

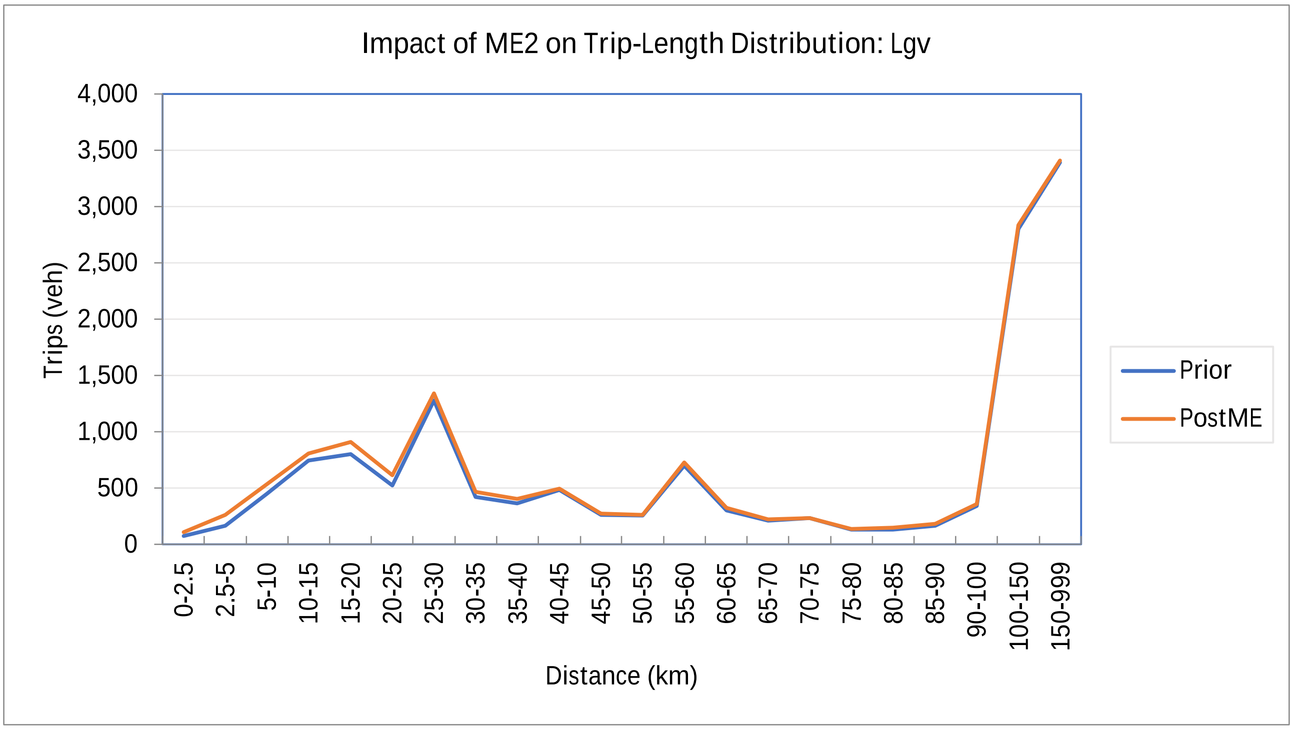

Impact of ME2 on Trip-Length Distribution: Hgv
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Trips (veh)
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

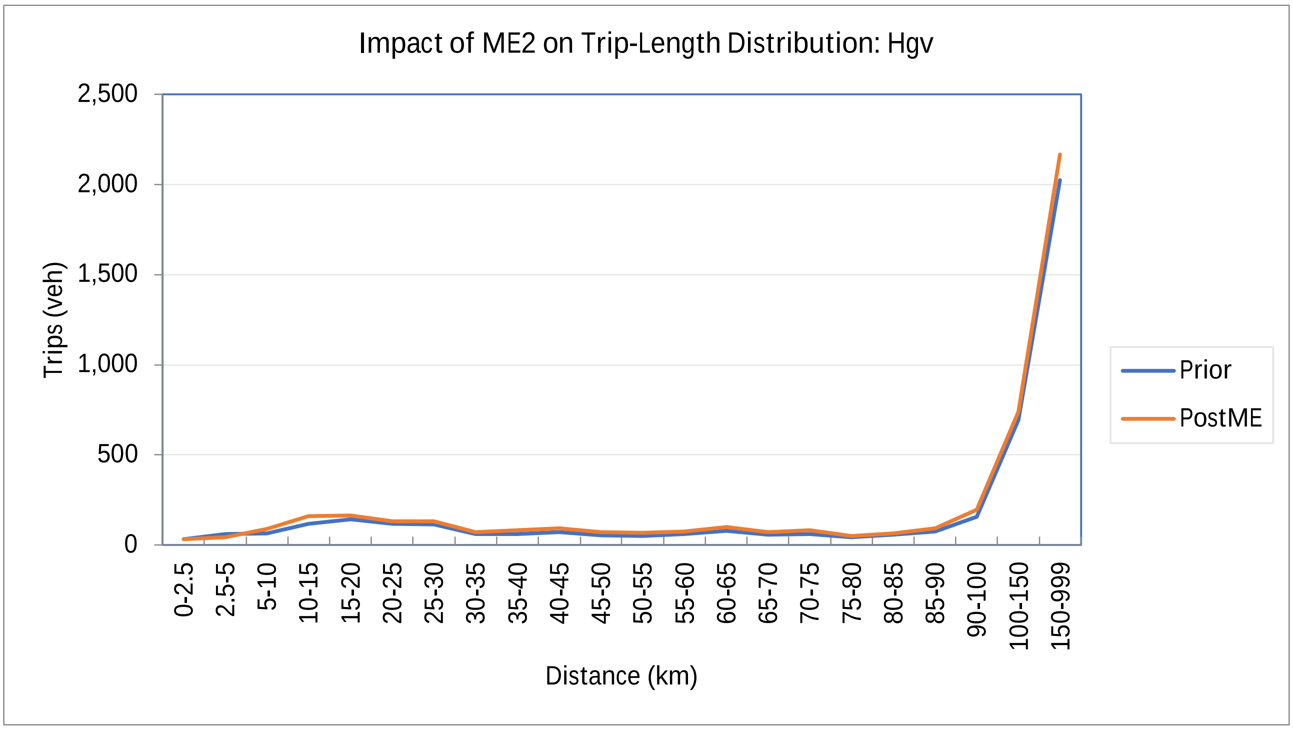
PM Peak


Impact of ME2 on Trip-Length Distribution: Business
Trips (veh)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME


Impact of ME2 on Trip-Length Distribution: Commute
Trips (veh)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

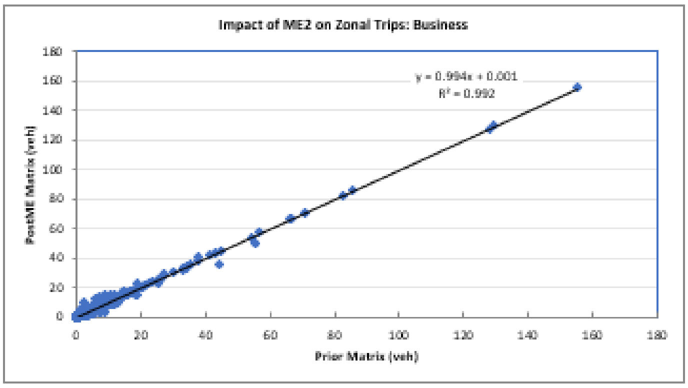

Impact of ME2 on Trip-Length Distribution: Other
Trips (veh)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

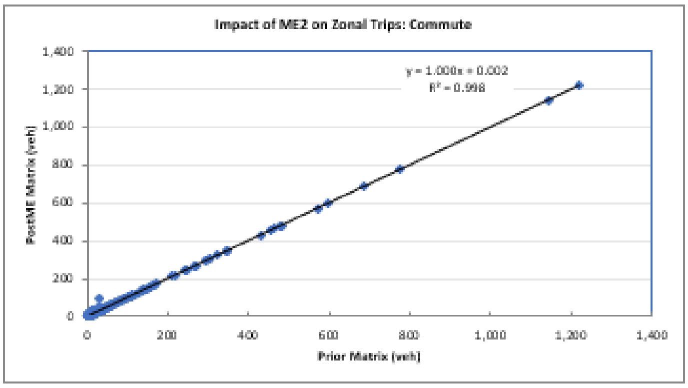

Impact of ME2 on Trip-Length Distribution: Lgv
Trips (veh)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

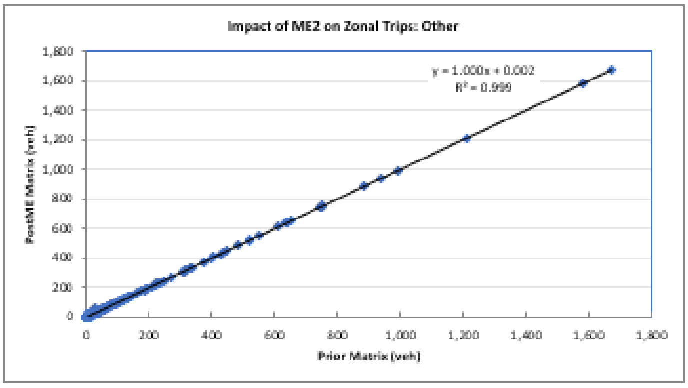

Impact of ME2 on Trip-Length Distribution: Hgv
Trips (veh)
2,500
2,000
1,500
1,000
500
0
0-2.5
2.5-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50
50-55
55-60
60-65
65-70
70-75
75-80
80-85
85-90
90-100
100-150
150-999
Distance (km)
Prior
PostME

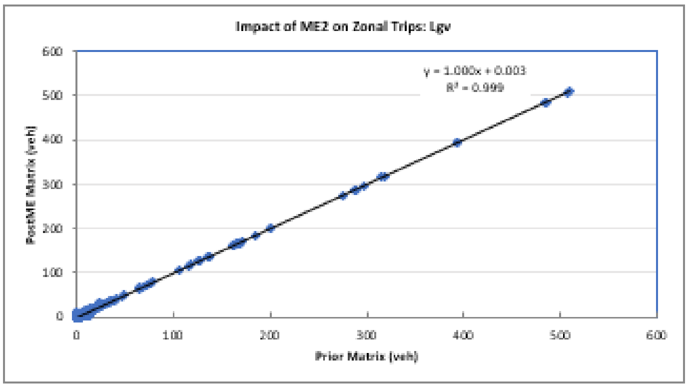
ZONAL CELL VALUES

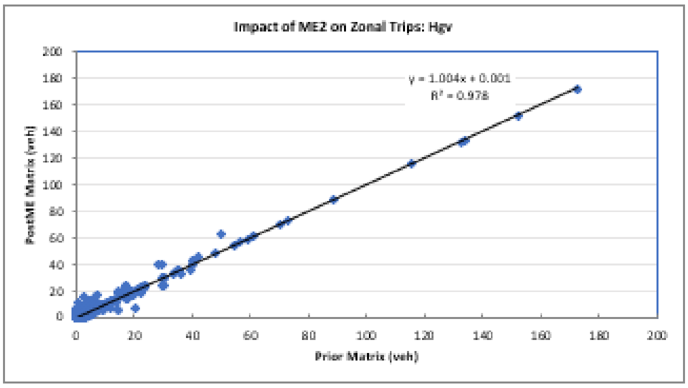
AM Peak



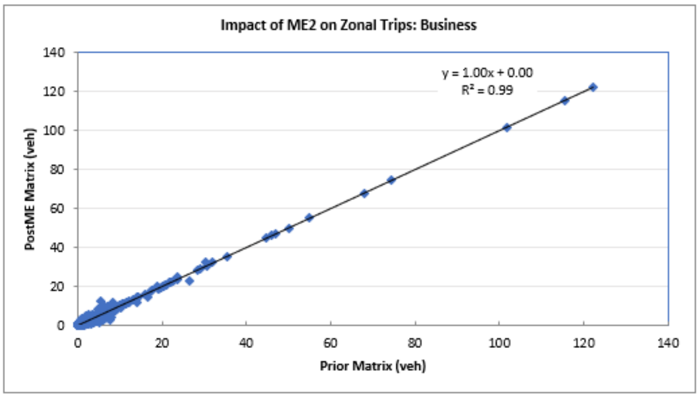


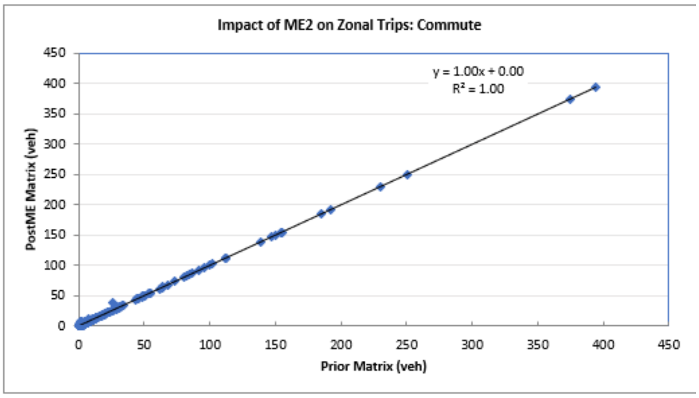


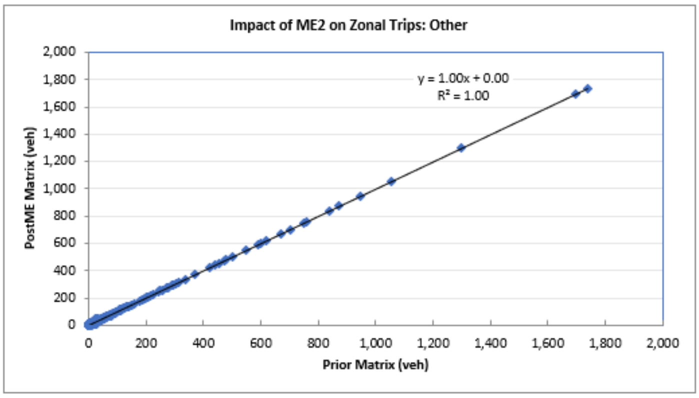


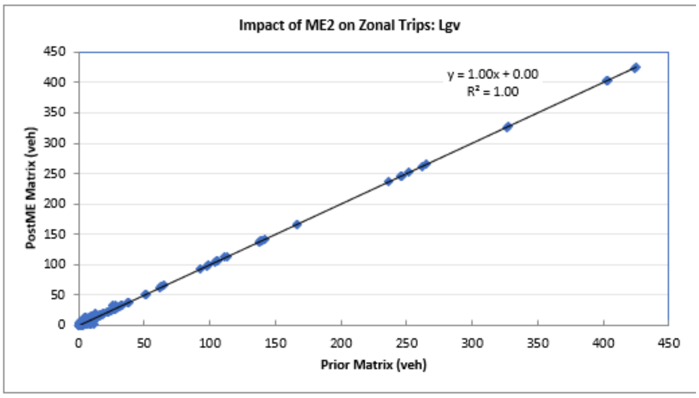


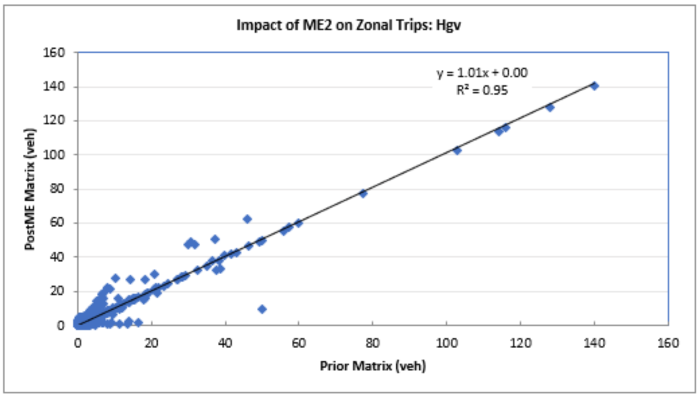
Inter Peak


Impact of ME2 on Zonal Trips: Business
y = 1.00x + 0.00
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)

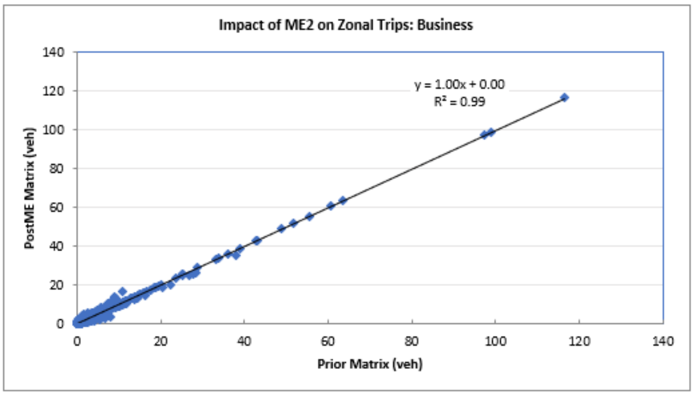

Impact of ME2 on Zonal Trips: Commute
y = 1.00x + 0.00
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

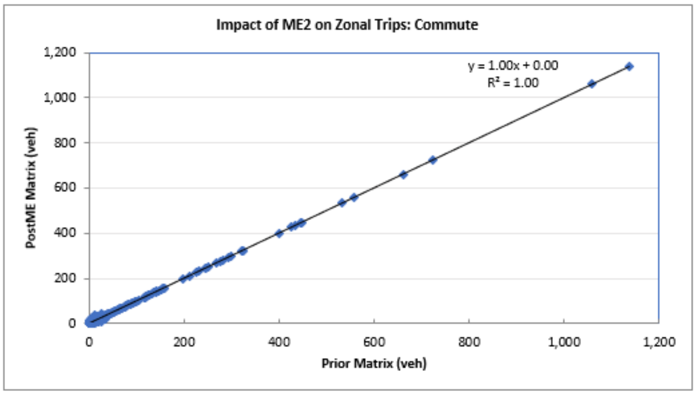

Impact of ME2 on Zonal Trips: Other
y = 1.00x + 0.00
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

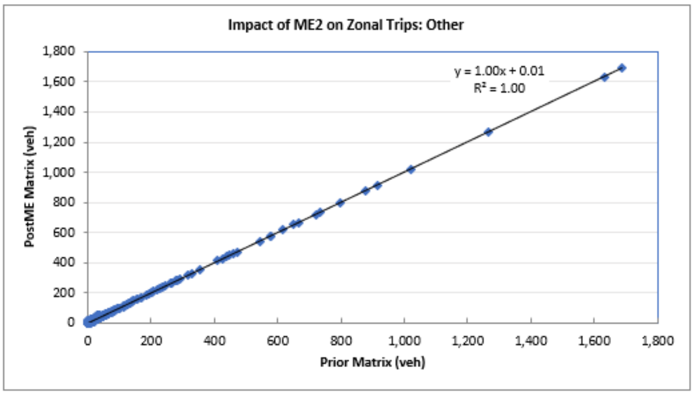

Impact of ME2 on Zonal Trips: Lgv
y = 1.00x + 0.00
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

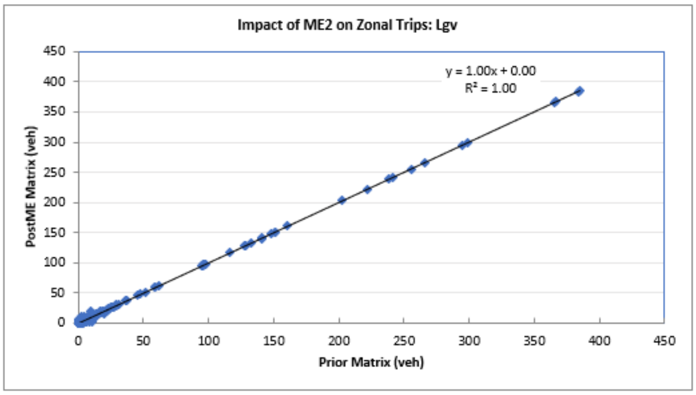

Impact of ME2 on Zonal Trips: Hgv
y = 1.01x + 0.00
R² = 0.95
PostME Matrix (veh)
Prior Matrix (veh)

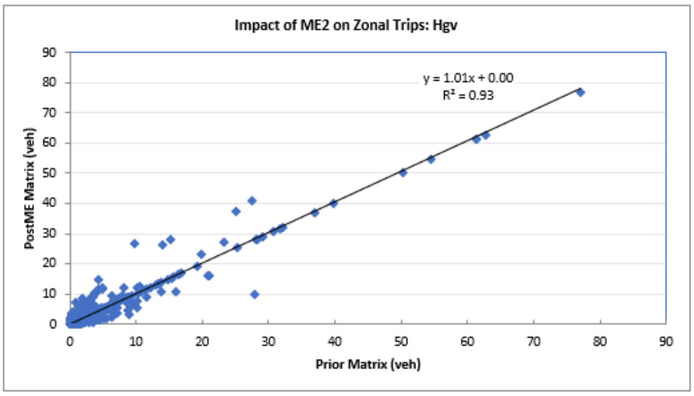
PM Peak


Impact of ME2 on Zonal Trips: Business
y = 1.00x + 0.00
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)


Impact of ME2 on Zonal Trips: Commute
y = 1.00x + 0.00
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

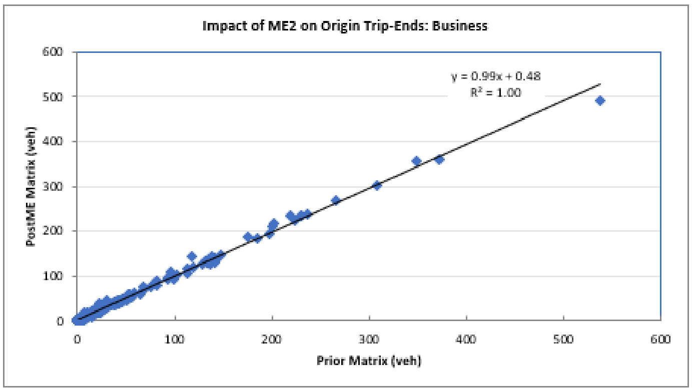

Impact of ME2 on Zonal Trips: Other
y = 1.00x + 0.01
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

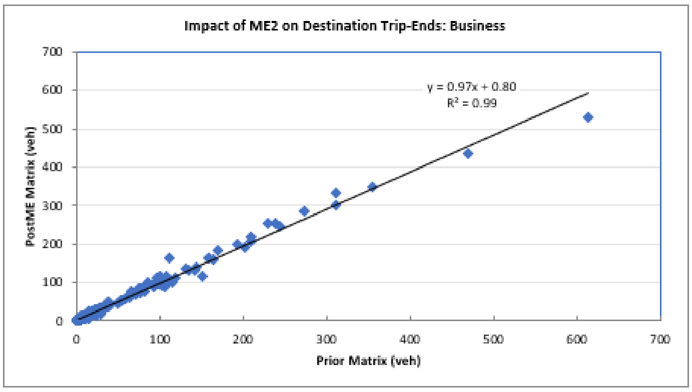

Impact of ME2 on Zonal Trips: Lgv
y = 1.00x + 0.00
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

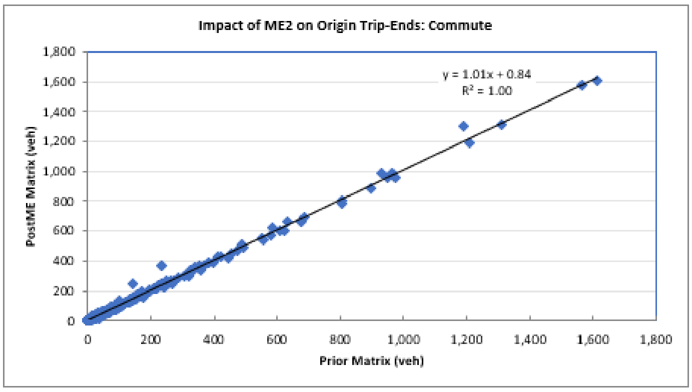

Impact of ME2 on Zonal Trips: Hgv
y = 1.01x + 0.00
R² = 0.93
PostME Matrix (veh)
Prior Matrix (veh)

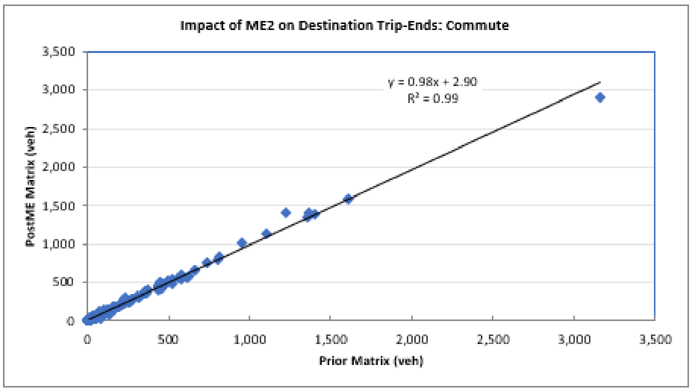
ZONAL TRIP ENDS

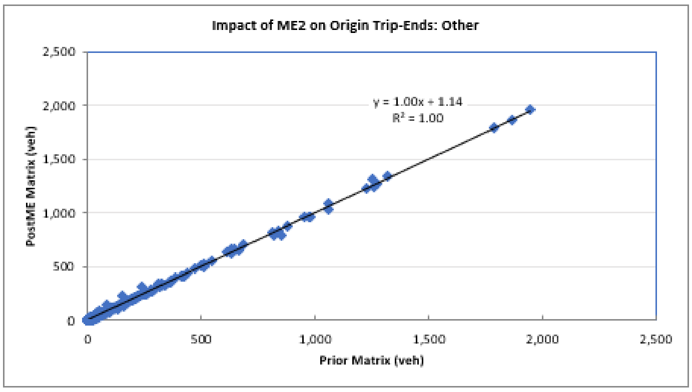
AM Peak: Origins (left) and Destinations (right)

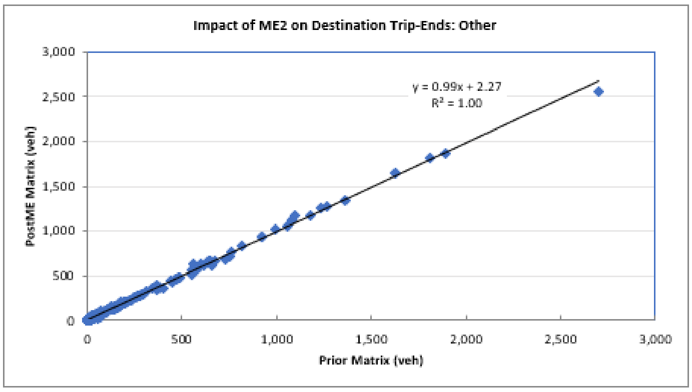


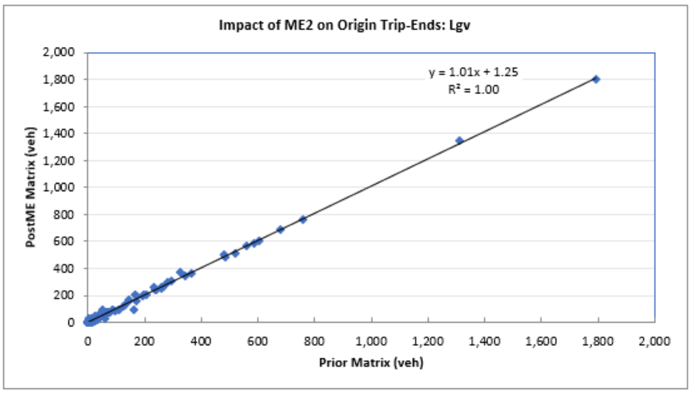


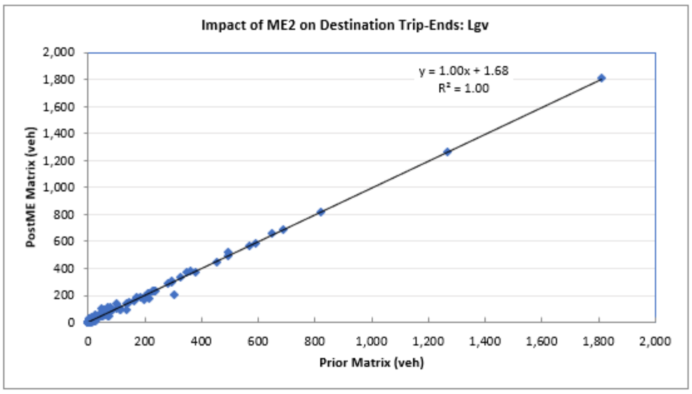


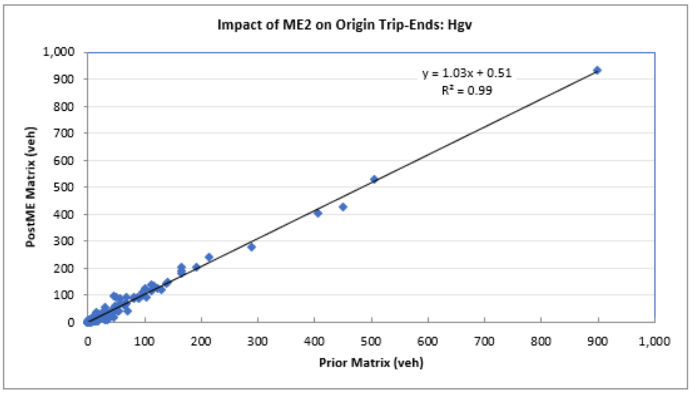


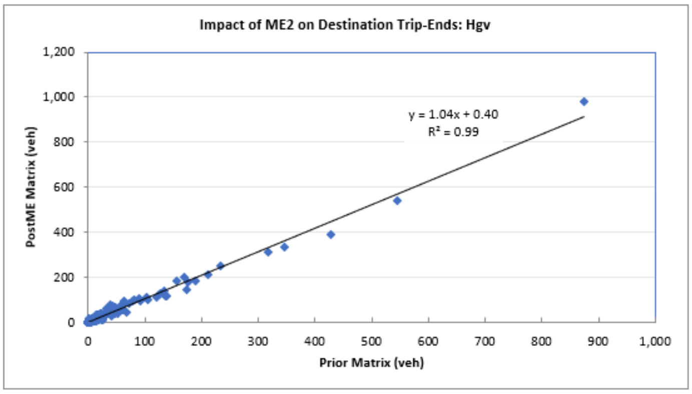




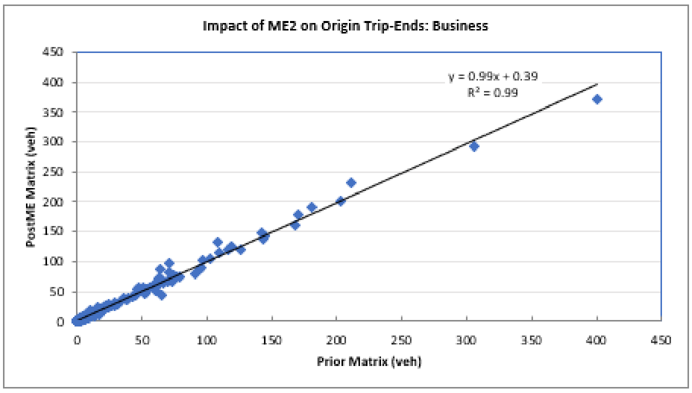

Impact of ME2 on Origin Trip-Ends: Lgv
y = 1.01x + 1.25
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

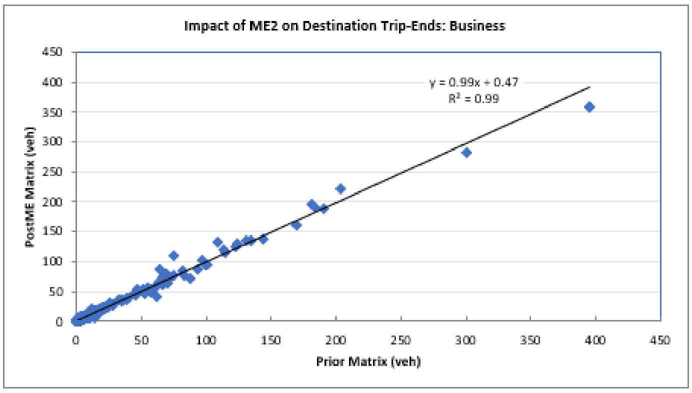

Impact of ME2 on Destination Trip-Ends: Lgv
y = 1.00x + 1.68
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

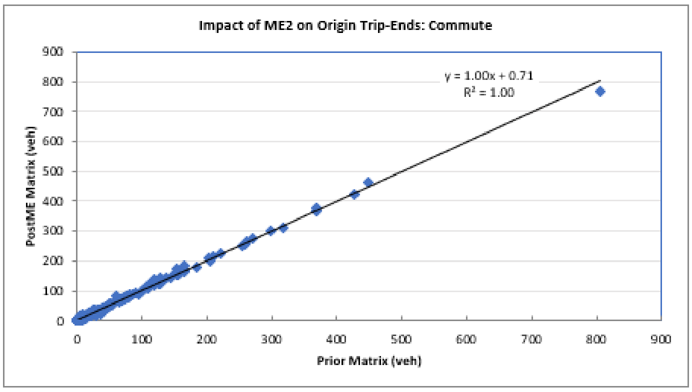

Impact of ME2 on Origin Trip-Ends: Hgv
y = 1.03x + 0.51
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)

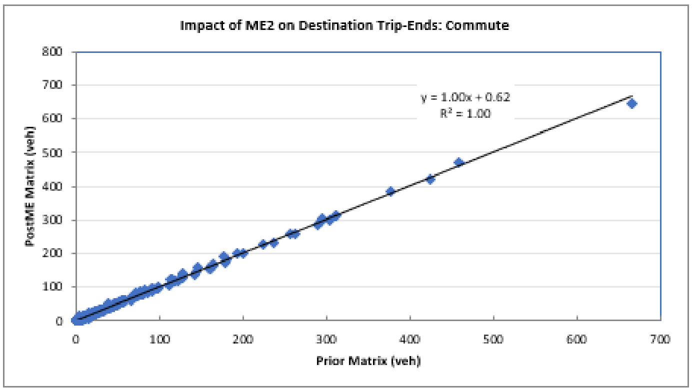

Impact of ME2 on Destination Trip-Ends: Hgv
y = 1.04x + 0.40
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)

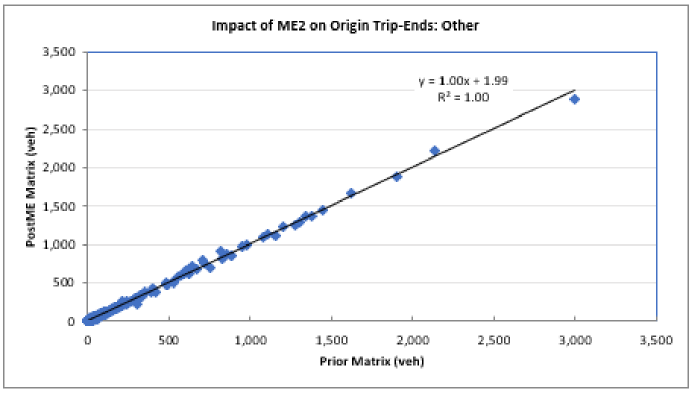
Inter Peak: Origins (left) and Destinations (right)

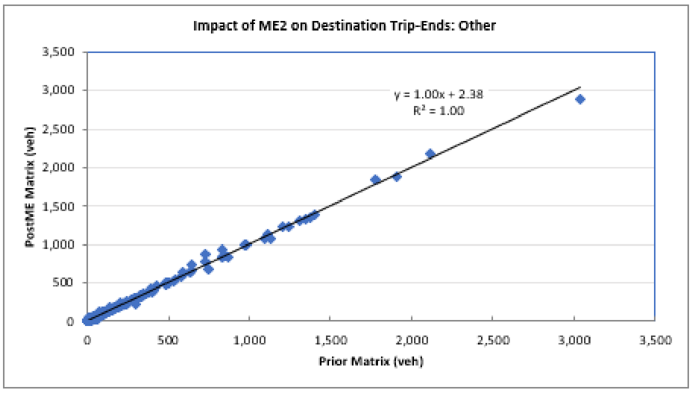


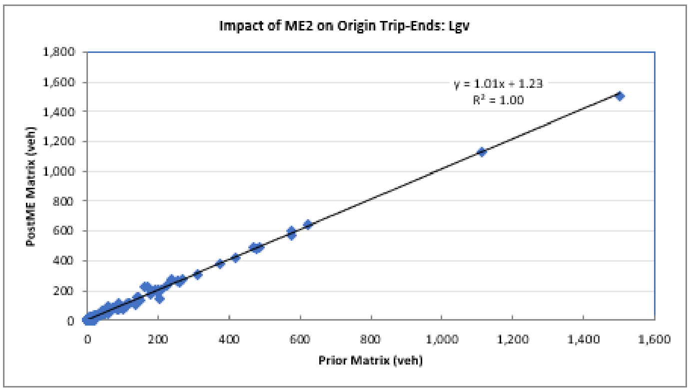


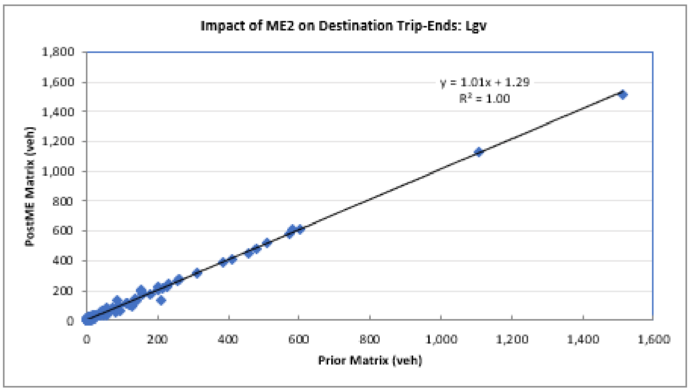


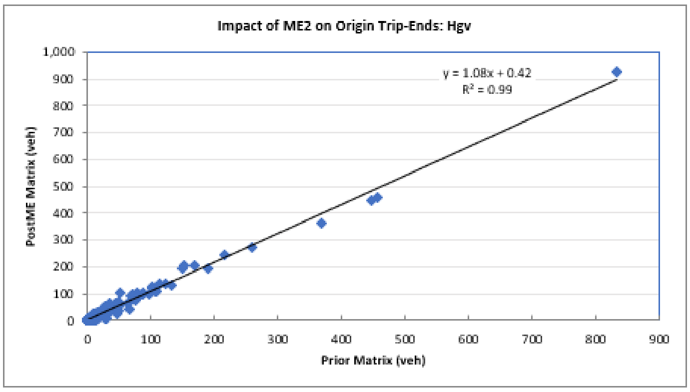


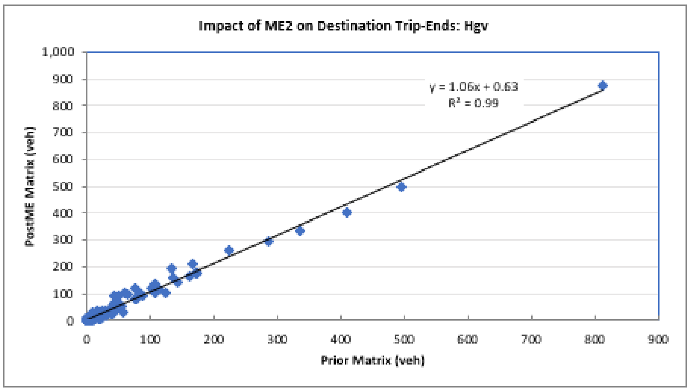




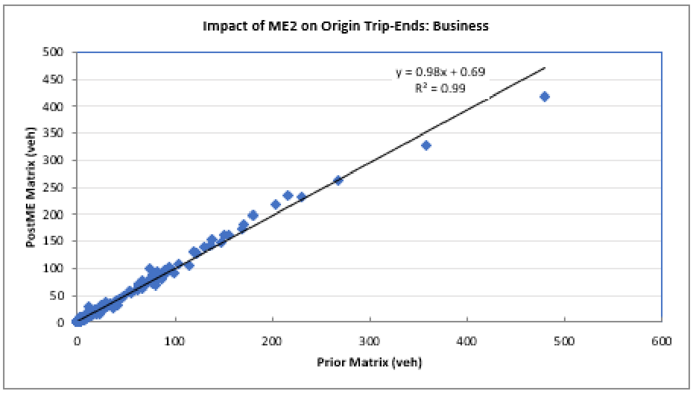

Impact of ME2 on Origin Trip-Ends: Lgv
y = 1.01x + 1.23
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

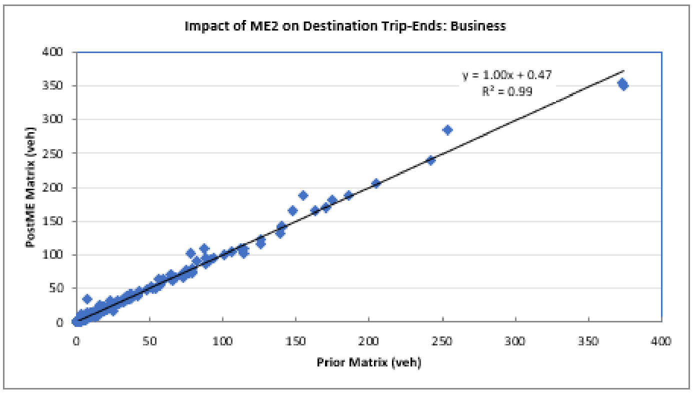

Impact of ME2 on Destination Trip-Ends: Lgv
y = 1.01x + 1.29
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)

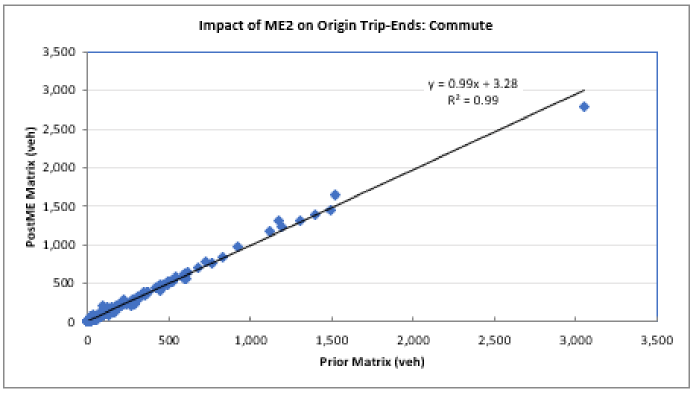

Impact of ME2 on Origin Trip-Ends: Hgv
y = 1.08x + 0.42
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)

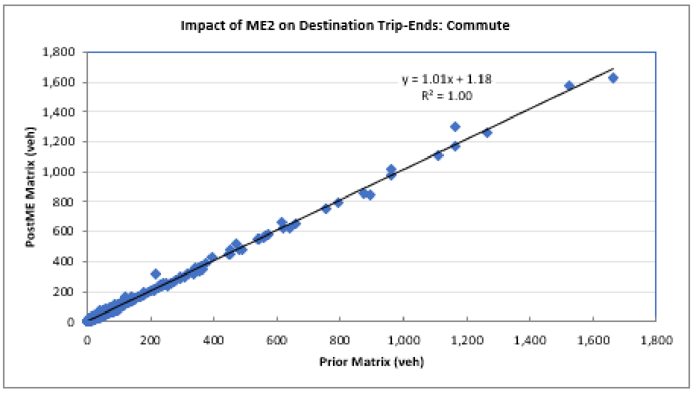

Impact of ME2 on Destination Trip-Ends: Hgv
y = 1.06x + 0.63
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)

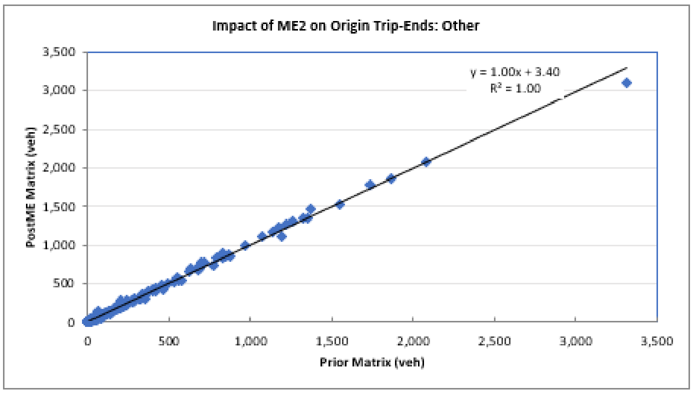
PM Peak: Origins (left) and Destinations (right)

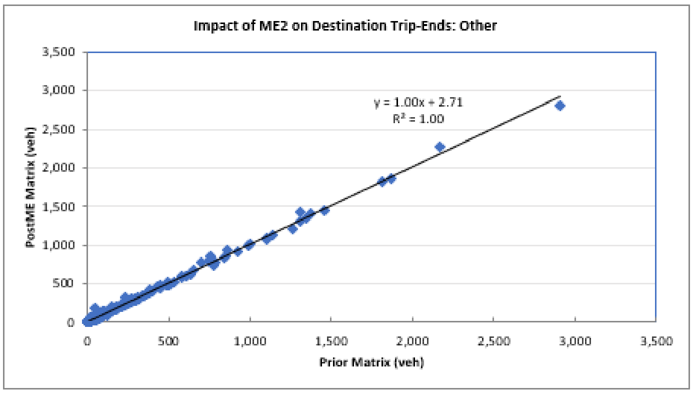


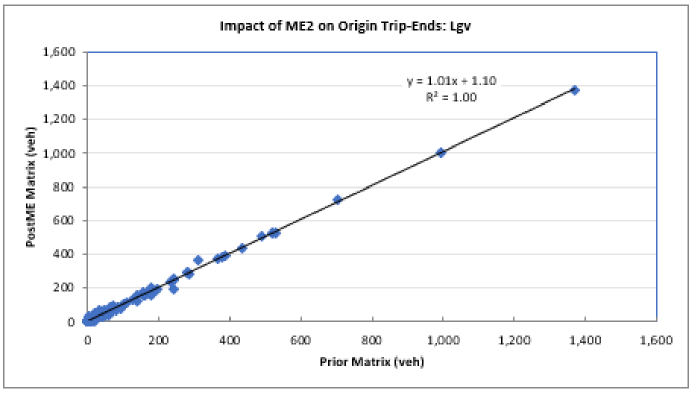




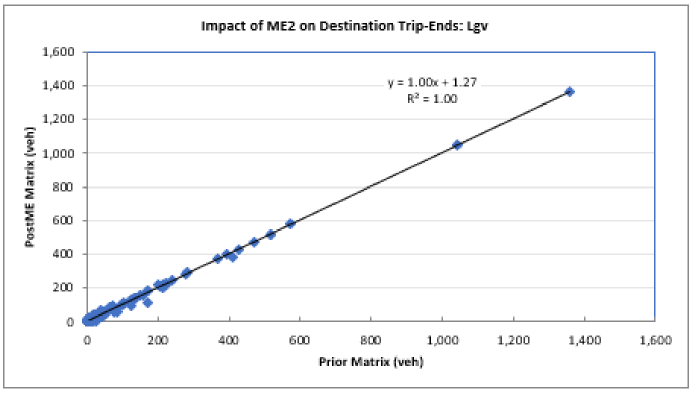




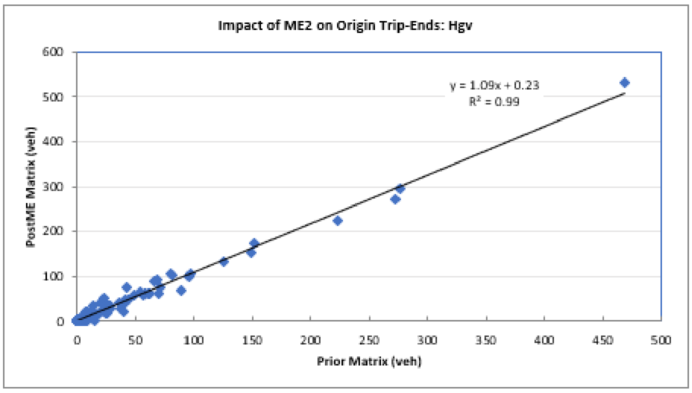




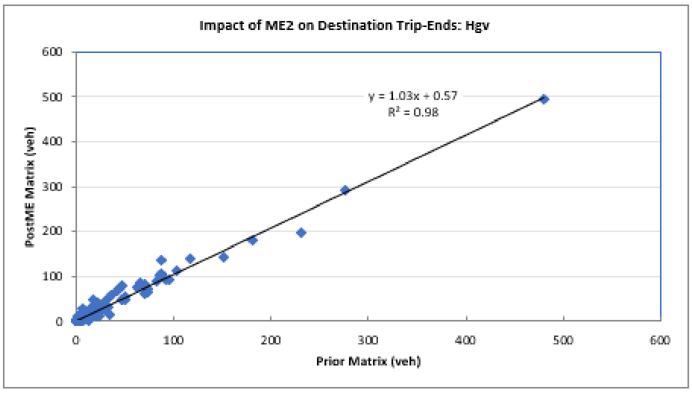
Impact of ME2 on Origin Trip-Ends: Lgv
y = 1.01x + 1.10
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)



Impact of ME2 on Destination Trip-Ends: Lgv
y = 1.00x + 1.27
R² = 1.00
PostME Matrix (veh)
Prior Matrix (veh)



Impact of ME2 on Origin Trip-Ends: Hgv
y = 1.09x + 0.23
R² = 0.99
PostME Matrix (veh)
Prior Matrix (veh)



Impact of ME2 on Destination Trip-Ends: Hgv
y = 1.03x + 0.57
R² = 0.98
PostME Matrix (veh)
Prior Matrix (veh)

SECTOR TO SECTOR MATRICES

AM Peak

Prior Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	170	26	11	19	9	48	29	31	13
2	60	57	6	5	7	82	22	23	15
3	19	5	16	4	1	15	25	10	3
4	24	6	5	104	28	30	49	143	25
5	8	5	1	19	98	59	16	84	48
6	36	55	12	16	35	1,772	298	437	319
7	37	17	29	55	18	317	907	385	328
8	28	15	8	138	80	492	367	1,604	490
9	11	9	3	18	42	352	335	489	669

Commute

OD	1	2	3	4	5	6	7	8	9
1	1,001	134	53	92	44	279	95	108	30
2	312	402	40	25	49	556	85	103	43
3	60	12	94	17	7	67	78	29	5
4	123	39	35	734	184	117	124	694	53
5	40	26	7	81	648	245	18	356	232
6	172	254	67	60	184	11,027	543	702	838
7	175	53	134	203	30	523	6,853	830	119
8	80	56	29	734	372	714	540	11,716	1,149
9	20	12	15	33	151	907	114	1,121	3,716

Other

OD	1	2	3	4	5	6	7	8	9
1	1,667	177	31	115	26	133	75	73	20
2	258	812	26	21	30	406	58	48	27
3	83	16	228	12	3	36	123	19	4
4	233	23	16	968	128	61	152	530	37
5	32	35	3	95	1,010	206	22	269	217
6	101	248	30	30	125	13,364	532	655	608
7	96	40	136	138	25	547	10,045	753	397
8	68	31	17	445	231	740	718	14,322	947
9	19	17	4	26	89	678	411	921	4,992

Lgv

OD	1	2	3	4	5	6	7	8	9
1	52	26	26	18	5	47	25	23	7
2	31	67	23	17	17	148	22	21	10
3	24	22	26	12	2	19	23	12	3
4	23	18	15	163	33	44	62	131	31
5	7	16	2	29	93	105	14	100	45
6	38	114	18	37	58	651	408	483	556
7	31	23	24	60	15	399	179	3,900	296
8	25	21	11	107	84	521	3,856	597	1,507
9	7	9	4	23	31	606	262	1,451	288

Hgv

OD	1	2	3	4	5	6	7	8	9
1	11	7	6	21	9	9	9	10	5
2	7	8	6	8	7	26	11	11	4
3	5	6	6	11	5	6	7	6	1
4	13	12	14	206	33	21	39	159	18
5	9	10	10	41	35	19	20	36	16
6	9	28	6	17	13	148	267	323	205
7	8	7	7	33	18	290	80	1,119	365
8	12	12	8	128	28	319	1,287	124	732
9	3	6	2	21	15	192	375	746	88

PostME Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	189	23	10	22	7	43	27	37	12
2	57	62	5	4	6	82	18	23	17
3	22	7	20	6	1	18	25	11	3
4	24	5	6	116	38	29	51	176	23
5	6	5	1	20	108	53	10	92	45
6	35	63	14	20	38	1,830	266	491	334
7	36	15	27	68	17	270	892	441	346
8	26	14	9	153	77	428	418	1,611	448
9	10	10	3	14	51	367	328	450	656

Commute

OD	1	2	3	4	5	6	7	8	9
1	1,041	115	48	105	40	210	96	130	25
2	304	438	33	21	52	514	69	102	46
3	61	17	114	22	13	77	80	34	7
4	120	33	37	822	251	103	132	831	56
5	31	21	7	104	716	231	13	418	226
6	170	302	76	72	242	11,401	532	831	867
7	205	48	118	251	32	452	6,821	911	130
8	70	47	33	761	362	545	559	11,748	1,145
9	16	18	11	34	188	912	116	1,066	3,695

Other

OD	1	2	3	4	5	6	7	8	9
1	1,711	155	25	138	28	106	75	84	19
2	235	902	21	19	34	326	50	48	28
3	74	21	319	18	4	40	108	21	4
4	249	22	17	1,084	183	58	163	640	38
5	26	36	2	134	1,163	175	14	329	206
6	92	266	34	37	162	13,661	490	748	630
7	100	36	92	173	26	471	10,020	840	425
8	60	28	18	473	197	623	782	14,336	896
9	18	21	4	23	121	691	407	869	4,970

Lgv

OD	1	2	3	4	5	6	7	8	9
1	163	58	34	35	8	57	48	54	22
2	53	122	9	10	17	155	15	14	19
3	48	19	25	10	2	18	28	14	5
4	40	10	9	191	55	27	68	173	34
5	8	13	1	37	112	89	12	111	55
6	55	107	18	30	58	775	366	395	580
7	65	18	23	91	22	344	211	3,920	394
8	55	18	9	186	121	506	3,912	599	1,568
9	12	12	2	25	43	650	290	1,481	282

Hgv

OD	1	2	3	4	5	6	7	8	9
1	18	10	12	20	3	15	8	9	6
2	8	16	4	5	5	36	7	7	6
3	7	4	11	12	3	11	8	9	2
4	21	10	15	129	49	21	41	183	18
5	3	4	7	27	46	25	22	42	18
6	11	34	9	14	12	159	205	390	218
7	15	10	14	27	31	275	93	1,299	383
8	10	7	5	151	49	333	1,416	128	795
9	2	11	1	7	16	208	329	877	91

Difference

Business

OD	1	2	3	4	5	6	7	8	9
1	18	-2	-1	3	-1	-6	-1	7	-1
2	-3	6	-1	-1	-1	0	-4	0	2
3	3	2	4	2	1	3	0	1	0
4	0	0	1	12	10	-1	3	34	-2
5	-2	0	0	1	10	-6	-6	8	-3
6	-1	9	1	4	3	58	-32	54	14
7	0	-2	-3	13	-1	-47	-15	57	19
8	-2	-1	0	15	-4	-64	50	7	-42
9	-1	1	0	-3	9	15	-7	-40	-12

Commute

OD	1	2	3	4	5	6	7	8	9
1	40	-19	-5	13	-4	-69	1	21	-5
2	-8	36	-7	-4	3	-42	-16	-2	3
3	0	4	20	5	6	10	1	5	2
4	-3	-6	2	89	67	-14	7	136	3
5	-9	-5	-1	22	68	-15	-5	62	-6
6	-2	48	9	12	57	374	-11	129	29
7	30	-5	-16	48	2	-71	-32	81	11
8	-10	-10	4	27	-10	-169	19	32	-5
9	-4	6	-4	1	37	5	2	-54	-21

Other

OD	1	2	3	4	5	6	7	8	9
1	44	-22	-7	23	2	-27	0	11	-1
2	-24	90	-5	-2	4	-80	-8	0	1
3	-9	5	91	6	2	5	-15	2	0
4	16	-2	1	116	55	-4	11	110	1
5	-6	1	-1	40	152	-31	-7	60	-10
6	-10	18	4	7	37	297	-42	93	22
7	4	-4	-43	36	1	-76	-25	87	27
8	-8	-4	1	28	-33	-117	64	13	-51
9	-1	4	0	-3	33	13	-4	-52	-22

Lgv

OD	1	2	3	4	5	6	7	8	9
1	111	32	8	17	3	9	23	31	15
2	22	56	-13	-7	0	7	-6	-7	9
3	24	-3	-2	-2	0	-1	5	3	1
4	17	-8	-6	28	22	-17	6	42	4
5	1	-4	-1	8	19	-16	-2	11	10
6	18	-7	0	-7	-1	124	-43	-87	24
7	34	-5	-1	30	7	-55	32	19	99
8	30	-3	-2	79	37	-15	56	2	62
9	5	3	-2	3	12	43	28	30	-6

Hgv

OD	1	2	3	4	5	6	7	8	9
1	8	3	5	-1	-6	6	-1	-1	1
2	1	9	-2	-2	-2	10	-4	-3	2
3	2	-3	5	2	-2	5	2	3	1
4	8	-2	0	-77	16	0	1	24	-1
5	-6	-6	-3	-14	10	7	1	6	2
6	2	6	3	-3	0	12	-62	67	14
7	7	3	8	-5	13	-15	14	181	18
8	-1	-5	-4	23	21	14	128	5	63
9	-2	4	-1	-13	1	16	-46	131	3

Difference <5% or GEH<4

Business 81 81 100%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Commute 78 81 96%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	×	✓	✓	×	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	×	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Other 77 81 95%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	×	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	×	✓	✓	×	✓
5	✓	✓	✓	✓	×	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Lgv 72 81 89%

OD	1	2	3	4	5	6	7	8	9
1	×	×	✓	✓	✓	✓	✓	×	✓
2	✓	×	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	×	✓	✓	✓
7	×	✓	✓	✓	✓	✓	✓	✓	×
8	×	✓	✓	×	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Hgv 79 81 98%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	×	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	×	✓

Inter Peak

Prior Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	175	31	12	18	8	25	19	18	5
2	28	28	3	2	3	39	10	10	6
3	12	3	8	3	1	7	16	5	1
4	15	2	2	67	15	12	31	92	11
5	9	3	1	16	73	26	8	45	24
6	24	41	7	12	25	1,282	187	270	195
7	19	10	15	31	9	191	685	223	237
8	17	9	5	86	43	258	223	1,098	272
9	6	5	1	12	25	200	225	292	445

Commute

OD	1	2	3	4	5	6	7	8	9
1	414	89	19	37	12	52	45	23	3
2	69	103	4	10	8	91	16	20	5
3	19	7	22	7	1	13	31	10	2
4	35	10	5	228	40	24	68	233	13
5	15	13	1	54	222	57	18	117	42
6	58	104	11	19	49	3,369	176	207	178
7	32	17	20	49	6	158	2,230	200	55
8	27	21	6	205	87	148	239	3,579	255
9	8	8	1	10	45	189	68	335	1,075

Other

OD	1	2	3	4	5	6	7	8	9
1	2,108	287	69	156	39	151	111	89	20
2	311	532	20	19	29	345	58	46	25
3	77	21	93	14	4	34	106	25	4
4	132	20	13	791	121	54	166	665	36
5	45	27	5	126	782	175	29	267	149
6	154	355	34	56	180	14,695	771	985	810
7	112	58	82	160	27	766	10,516	919	732
8	87	45	23	629	256	970	973	14,522	1,186
9	22	24	4	38	143	819	728	1,256	5,240

Lgv

OD	1	2	3	4	5	6	7	8	9
1	44	23	21	18	8	38	25	23	6
2	23	57	18	14	14	108	19	17	8
3	21	18	22	11	2	14	20	9	2
4	17	14	10	135	24	31	50	90	21
5	8	14	2	24	80	56	11	67	29
6	38	105	14	32	59	537	316	395	466
7	25	19	19	50	13	289	146	3,244	279
8	21	16	9	92	66	377	3,238	484	1,178
9	7	8	2	22	31	476	273	1,212	231

Hgv

OD	1	2	3	4	5	6	7	8	9
1	9	6	6	19	9	13	9	11	4
2	5	8	5	7	5	22	8	9	3
3	4	5	5	10	4	4	5	6	2
4	12	10	12	178	29	17	43	141	16
5	8	10	9	37	31	16	19	28	14
6	8	25	4	16	12	117	243	296	182
7	9	10	7	32	16	254	72	1,014	369
8	7	13	8	106	27	288	1,137	122	678
9	4	5	3	20	14	182	377	677	83

PostME Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	211	29	11	19	8	22	16	20	6
2	25	32	1	2	3	44	7	9	7
3	12	2	9	2	0	7	17	4	1
4	17	1	2	78	16	10	24	108	11
5	9	3	0	17	82	22	5	49	26
6	22	47	7	12	22	1,327	186	296	203
7	18	8	18	32	7	195	704	219	197
8	20	8	4	110	47	281	237	1,102	281
9	7	6	1	11	28	209	210	289	438

Commute

OD	1	2	3	4	5	6	7	8	9
1	467	85	17	39	13	45	41	26	4
2	58	120	2	7	9	102	16	21	5
3	18	5	25	5	1	16	31	7	1
4	39	7	4	266	47	20	60	271	12
5	14	12	1	59	259	52	10	124	48
6	46	114	12	16	52	3,466	187	198	179
7	34	15	20	51	6	174	2,265	201	46
8	33	19	6	252	99	159	237	3,580	261
9	9	7	1	10	54	193	66	338	1,068

Other

OD	1	2	3	4	5	6	7	8	9
1	2,322	269	62	170	41	129	96	97	21
2	270	608	11	13	32	361	44	44	30
3	80	15	112	11	3	36	95	21	3
4	153	14	10	920	149	41	139	763	36
5	47	27	2	150	913	150	18	278	161
6	129	373	35	50	157	14,991	772	1,087	838
7	110	48	80	166	20	798	10,634	904	608
8	102	40	21	783	284	1,064	1,017	14,538	1,226
9	25	28	3	39	158	851	688	1,251	5,210

Lgv

OD	1	2	3	4	5	6	7	8	9
1	168	45	31	34	10	41	35	37	8
2	43	90	15	8	11	95	16	14	12
3	32	13	32	9	1	19	22	10	1
4	30	8	6	163	28	21	40	176	28
5	10	13	1	29	78	40	8	96	48
6	46	101	13	27	65	614	335	453	494
7	34	15	23	79	15	307	175	3,257	272
8	40	14	9	181	84	372	3,288	494	1,216
9	12	11	1	36	49	481	313	1,250	229

Hgv

OD	1	2	3	4	5	6	7	8	9
1	18	6	13	17	2	15	7	11	4
2	8	16	6	6	2	29	6	11	9
3	14	5	10	13	5	10	6	6	3
4	14	8	10	116	31	19	40	169	18
5	3	3	6	25	33	11	17	56	8
6	16	28	8	19	10	132	181	388	198
7	10	6	5	29	13	210	68	1,198	370
8	8	11	6	157	54	359	1,308	128	803
9	4	9	2	27	22	197	379	801	81

Difference

Business

OD	1	2	3	4	5	6	7	8	9
1	36	-2	-1	1	0	-3	-3	2	0
2	-3	5	-1	-1	0	5	-3	0	1
3	1	-1	1	0	0	1	1	-1	0
4	2	-1	0	11	1	-2	-7	16	-1
5	0	0	0	1	9	-3	-3	4	2
6	-2	6	0	-1	-3	44	-2	26	8
7	-1	-2	3	1	-2	4	20	-4	-40
8	4	-1	-1	24	5	24	14	4	9
9	1	1	0	-1	2	9	-14	-3	-7

Commute

OD	1	2	3	4	5	6	7	8	9
1	53	-3	-1	2	1	-7	-4	3	0
2	-11	17	-2	-3	1	10	0	1	0
3	-1	-2	3	-2	0	3	0	-3	-1
4	4	-4	-1	38	8	-4	-8	37	-1
5	0	-1	-1	6	37	-5	-8	6	6
6	-12	10	1	-3	3	97	11	-9	1
7	1	-3	0	2	0	16	34	1	-9
8	6	-1	0	47	12	11	-2	2	6
9	1	-2	-1	0	9	4	-2	4	-7

Other

OD	1	2	3	4	5	6	7	8	9
1	213	-19	-6	14	3	-22	-15	8	1
2	-41	77	-9	-6	3	15	-14	-2	5
3	3	-6	19	-3	-1	2	-11	-4	-1
4	22	-6	-3	129	28	-13	-27	98	0
5	2	0	-3	23	132	-24	-11	10	12
6	-24	18	1	-6	-23	296	1	102	28
7	-2	-10	-3	6	-6	32	118	-15	-124
8	15	-5	-3	154	27	94	45	16	40
9	3	4	-2	1	15	31	-40	-5	-30

Lgv

OD	1	2	3	4	5	6	7	8	9
1	124	23	10	16	2	3	9	14	3
2	20	32	-4	-6	-3	-12	-3	-3	4
3	11	-6	11	-2	0	5	2	0	-1
4	12	-6	-5	28	4	-10	-10	86	7
5	2	-2	-1	5	-2	-16	-4	29	19
6	8	-4	-1	-5	6	76	19	58	28
7	9	-4	4	29	2	18	29	12	-7
8	19	-2	0	89	18	-5	50	10	37
9	5	3	-1	13	18	5	40	38	-2

Hgv

OD	1	2	3	4	5	6	7	8	9
1	9	0	7	-3	-7	2	-2	0	0
2	3	8	1	-1	-3	6	-2	1	5
3	9	0	4	3	1	6	1	0	1
4	2	-2	-3	-62	2	2	-3	28	3
5	-4	-7	-3	-12	2	-5	-1	28	-6
6	8	4	4	3	-3	15	-62	92	16
7	1	-4	-2	-2	-3	-44	-3	184	1
8	1	-1	-3	51	27	71	171	6	125
9	0	3	-1	7	8	16	1	124	-1

Difference <5% or GEH<4

Business 81 81 100%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Commute 81 81 100%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Other 77 81 95%

OD	1	2	3	4	5	6	7	8	9
1	×	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	×	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	×	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	×	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Lgv 78 81 96%

OD	1	2	3	4	5	6	7	8	9
1	×	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	×	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	×	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Hgv 73 81 90%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	×	✓
6	✓	✓	✓	✓	✓	✓	✓	×	✓
7	✓	✓	✓	✓	✓	✓	✓	×	✓
8	✓	✓	✓	×	×	✓	×	✓	×
9	✓	✓	✓	✓	✓	✓	✓	×	✓

PM Peak

Prior Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	143	37	13	21	6	31	29	25	6
2	32	40	4	4	4	47	15	15	5
3	11	4	8	4	1	12	20	7	2
4	22	3	4	88	21	16	41	107	10
5	7	6	1	29	96	32	10	57	27
6	34	63	12	20	41	1,447	230	344	258
7	28	19	19	35	10	248	700	297	282
8	28	19	9	130	68	371	307	1,271	363
9	9	9	2	16	37	273	268	369	488

Commute

OD	1	2	3	4	5	6	7	8	9
1	1,098	288	60	133	38	171	157	89	23
2	162	354	15	38	25	243	67	65	14
3	52	31	64	31	5	67	134	43	16
4	122	26	19	718	98	65	234	704	29
5	40	48	6	236	749	166	50	406	138
6	314	531	67	134	238	10,579	676	875	900
7	111	88	73	157	27	550	6,441	636	150
8	144	122	35	803	365	913	1,049	11,157	1,144
9	38	45	4	69	226	858	175	1,082	3,432

Other

OD	1	2	3	4	5	6	7	8	9
1	2,058	304	85	186	43	159	145	107	20
2	328	556	31	31	40	377	69	62	20
3	76	26	75	23	6	46	117	29	5
4	178	27	23	883	159	59	202	692	35
5	40	42	5	169	888	208	30	312	155
6	179	458	46	76	247	14,765	823	1,092	929
7	146	81	110	183	31	868	10,358	1,092	784
8	111	72	35	864	384	1,161	1,142	14,625	1,391
9	30	32	6	47	214	986	745	1,387	5,238

Lgv

OD	1	2	3	4	5	6	7	8	9
1	40	23	19	17	5	30	26	21	4
2	19	51	16	13	13	90	20	16	6
3	19	17	20	12	1	14	19	9	2
4	14	12	10	125	21	27	46	85	16
5	5	14	1	24	72	46	11	64	25
6	38	110	15	32	77	499	312	351	443
7	23	20	17	42	11	315	126	2,979	237
8	22	18	10	102	78	391	3,079	466	1,164
9	5	7	3	22	32	442	232	1,220	199

Hgv

OD	1	2	3	4	5	6	7	8	9
1	5	3	3	10	5	4	7	7	2
2	4	3	4	3	3	12	6	4	2
3	2	2	3	5	2	1	3	3	1
4	6	5	6	93	16	8	20	78	9
5	4	5	5	19	16	7	11	14	6
6	5	13	2	10	7	86	149	169	97
7	7	6	5	21	10	153	37	665	240
8	6	6	5	53	16	163	635	72	378
9	2	2	2	12	7	96	235	396	52

PostME Matrix

Business

OD	1	2	3	4	5	6	7	8	9
1	163	37	13	23	5	29	27	26	6
2	31	44	5	4	4	53	13	13	8
3	12	4	9	4	1	13	22	8	1
4	27	3	5	103	24	15	51	128	11
5	7	6	1	34	111	32	9	58	25
6	33	67	12	17	40	1,531	207	311	266
7	32	16	21	40	9	260	707	315	272
8	41	20	11	155	76	448	312	1,271	370
9	11	9	2	15	36	294	242	341	482

Commute

OD	1	2	3	4	5	6	7	8	9
1	1,201	284	59	138	33	181	171	89	24
2	136	401	20	31	23	290	66	57	20
3	49	28	72	36	3	80	147	49	12
4	151	24	20	822	131	73	290	827	35
5	35	51	5	281	871	162	45	411	123
6	270	567	71	106	254	11,071	618	745	925
7	111	83	74	167	24	554	6,460	642	146
8	206	118	38	908	409	1,048	1,041	11,141	1,180
9	51	40	4	71	235	872	166	1,034	3,391

Other

OD	1	2	3	4	5	6	7	8	9
1	2,278	282	82	196	39	144	140	108	21
2	301	643	40	27	38	423	65	43	28
3	88	23	84	26	4	52	121	30	5
4	216	24	24	1,024	202	57	247	821	39
5	44	46	4	220	1,062	223	26	317	150
6	165	465	48	65	236	15,354	749	988	948
7	185	72	112	205	27	903	10,394	1,146	758
8	151	73	38	1,009	434	1,401	1,148	14,619	1,429
9	38	31	6	48	211	1,054	703	1,302	5,206

Lgv

OD	1	2	3	4	5	6	7	8	9
1	109	49	19	23	6	38	44	38	4
2	37	80	9	9	14	81	19	13	11
3	31	11	19	9	1	13	30	7	1
4	30	7	9	156	45	18	68	172	22
5	9	17	1	27	84	44	11	62	33
6	57	101	14	29	63	567	287	348	448
7	49	18	18	79	18	278	149	3,028	228
8	46	13	11	189	89	338	3,128	472	1,217
9	17	10	2	50	47	449	290	1,238	198

Hgv

OD	1	2	3	4	5	6	7	8	9
1	6	4	9	10	2	2	10	4	3
2	3	7	8	1	2	12	4	6	3
3	5	2	5	11	2	3	4	3	1
4	12	4	7	55	27	5	37	89	8
5	1	3	1	13	22	6	18	29	4
6	7	15	4	8	3	88	91	178	98
7	9	5	6	22	21	134	44	804	244
8	3	3	2	96	29	174	784	82	397
9	2	3	2	15	4	102	272	500	52

Difference

Business

OD	1	2	3	4	5	6	7	8	9
1	20	-1	0	1	-1	-2	-2	1	0
2	-1	4	1	-1	0	6	-2	-2	3
3	2	0	1	1	0	2	2	0	0
4	5	0	0	15	4	-1	10	21	1
5	0	0	0	5	15	0	-1	1	-3
6	-1	5	1	-3	-1	84	-23	-32	8
7	4	-3	2	5	-2	11	7	19	-10
8	13	1	1	26	9	78	5	0	6
9	3	0	0	-1	-1	21	-15	-28	-7

Commute

OD	1	2	3	4	5	6	7	8	9
1	103	-4	0	5	-5	10	14	0	1
2	-25	47	5	-7	-2	47	-1	-8	6
3	-3	-3	8	5	-2	13	14	6	-4
4	29	-3	1	104	33	8	57	122	6
5	-5	2	-1	45	122	-4	-5	5	-15
6	-44	35	5	-29	16	492	-58	-130	25
7	0	-5	0	10	-3	5	19	6	-4
8	62	-4	3	105	44	135	-7	-16	36
9	13	-5	0	2	9	14	-9	-48	-41

Other

OD	1	2	3	4	5	6	7	8	9
1	220	-21	-3	10	-4	-16	-5	1	0
2	-26	87	10	-4	-2	46	-3	-9	8
3	12	-2	10	3	-2	6	4	1	-1
4	37	-3	1	141	43	-2	45	129	4
5	4	4	-1	51	175	14	-4	5	-4
6	-14	7	2	-11	-11	589	-74	-104	19
7	40	-9	1	21	-4	35	35	55	-26
8	40	2	2	145	49	240	6	-6	38
9	8	-2	0	1	-3	68	-42	-85	-32

Lgv

OD	1	2	3	4	5	6	7	8	9
1	69	26	0	5	1	8	18	17	0
2	18	29	-7	-5	1	-9	-1	-3	5
3	12	-6	-1	-3	-1	-1	11	-2	-1
4	16	-5	-1	31	24	-9	22	87	5
5	3	3	-1	3	12	-2	0	-2	8
6	19	-10	0	-3	-15	68	-25	-2	5
7	26	-3	1	37	7	-38	22	49	-9
8	24	-5	1	87	11	-54	49	7	52
9	12	3	0	28	15	6	58	18	-1

Hgv

OD	1	2	3	4	5	6	7	8	9
1	1	1	6	0	-3	-1	3	-3	1
2	0	3	-1	-2	-1	0	-2	1	1
3	3	0	3	6	0	2	1	0	0
4	5	-2	1	-39	11	-3	17	12	-1
5	-3	-2	-4	-7	6	-1	6	15	-2
6	2	2	1	-2	-4	3	-58	10	1
7	2	0	1	1	11	-19	7	139	4
8	-1	-3	-3	43	13	11	149	10	20
9	-1	1	0	3	-3	6	36	104	0

Difference <5% or GEH<4

Business 81 81 100%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Commute 77 81 95%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	x	✓
5	✓	✓	✓	✓	x	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	x	✓	✓	✓	✓	x	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Other 75 81 93%

OD	1	2	3	4	5	6	7	8	9
1	x	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	x	✓	✓	✓	x	✓
5	✓	✓	✓	✓	x	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	x	✓	x	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓

Lgv 72 81 89%

OD	1	2	3	4	5	6	7	8	9
1	x	x	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	x	✓	✓	x	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	x	✓	✓	x	✓	✓	✓	✓	✓
8	x	✓	✓	x	✓	✓	✓	✓	✓
9	✓	✓	✓	x	✓	✓	✓	✓	✓

Hgv 77 81 95%

OD	1	2	3	4	5	6	7	8	9
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	x	✓
8	✓	✓	✓	x	✓	✓	x	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	x	✓

Appendix G

SCREENLINE VERIFICATION

Public

SDSTM Screenline and Cordon Calibration

ID	Calibrated Matrix - Strategic Screenlines and Cordons	AM All Vehicles					AM Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	11,261	11,275	14	0%	0.1	8,695	8,826	131	2%	1.4
2	Outer Cordon Outbound	12,558	12,698	140	1%	1.2	10,043	10,164	120	1%	1.2
3	Tadcaster Cordon Inbound	6,128	6,119	-9	0%	0.1	4,660	4,838	178	4%	2.6
4	Tadcaster Cordon Outbound	6,148	6,135	-13	0%	0.2	4,979	4,849	-130	-3%	1.9
7	Eggborough Cordon Inbound	2,099	2,082	-17	-1%	0.4	1,646	1,652	6	0%	0.1
8	Eggborough Cordon Outbound	2,159	2,192	34	2%	0.7	1,683	1,726	43	3%	1.0
11	Screenline North-South North NB	7,558	7,384	-174	-2%	2.0	5,276	5,302	26	0%	0.4
12	Screenline North-South North SB	6,583	6,407	-176	-3%	2.2	4,448	4,430	-18	0%	0.3
13	Screenline North-South Central NB	6,725	7,000	274	4%	3.3	5,057	5,283	226	4%	3.1
14	Screenline North-South Central SB	5,211	5,253	42	1%	0.6	3,898	3,954	56	1%	0.9
17	Screenline East-West Central EB	3,924	3,782	-143	-4%	2.3	2,622	2,567	-54	-2%	1.1
18	Screenline East-West Central WB	4,174	4,113	-60	-1%	0.9	2,947	2,909	-38	-1%	0.7
19	Selby Outer Cordon Inbound	3,015	3,089	74	2%	1.3	2,497	2,583	85	3%	1.7
20	Selby Outer Cordon Oubound	2,651	2,668	17	1%	0.3	2,149	2,184	35	2%	0.7
21	Selby North-South Northbound	2,487	2,510	24	1%	0.5	2,064	2,117	53	3%	1.2
22	Selby North-South Southbound	1,992	2,010	18	1%	0.4	1,653	1,689	37	2%	0.9
23	Selby East-West Eastbound	914	955	41	5%	1.3	789	804	15	2%	0.5
24	Selby East-West Westbound	815	813	-2	0%	0.1	676	658	-18	-3%	0.7

ID	Calibrated Matrix - Strategic Screenlines and Cordons	IP All Vehicles					IP Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	8,466	8,452	-14	0%	0.2	6,411	6,352	-59	-1%	0.7
2	Outer Cordon Outbound	8,514	8,503	-11	0%	0.1	6,343	6,369	26	0%	0.3
3	Tadcaster Cordon Inbound	4,561	4,484	-77	-2%	1.1	3,478	3,398	-80	-2%	1.4
4	Tadcaster Cordon Outbound	4,547	4,471	-76	-2%	1.1	3,364	3,391	27	1%	0.5
7	Eggborough Cordon Inbound	1,488	1,457	-32	-2%	0.8	1,095	1,078	-17	-2%	0.5
8	Eggborough Cordon Outbound	1,525	1,420	-105	-7%	2.7	1,140	1,053	-87	-8%	2.6
11	Screenline North-South North NB	5,331	5,234	-97	-2%	1.3	3,496	3,511	15	0%	0.3
12	Screenline North-South North SB	5,744	5,657	-87	-2%	1.2	3,765	3,769	4	0%	0.1
13	Screenline North-South Central NB	4,947	4,996	49	1%	0.7	3,535	3,616	81	2%	1.4
14	Screenline North-South Central SB	5,201	5,242	41	1%	0.6	3,699	3,796	97	3%	1.6
17	Screenline East-West Central EB	2,701	2,820	119	4%	2.3	1,608	1,748	139	9%	3.4
18	Screenline East-West Central WB	2,897	2,863	-34	-1%	0.6	1,780	1,773	-7	0%	0.2
19	Selby Outer Cordon Inbound	2,152	2,183	31	1%	0.7	1,735	1,780	45	3%	1.1
20	Selby Outer Cordon Oubound	2,163	2,167	4	0%	0.1	1,739	1,770	31	2%	0.7
21	Selby North-South Northbound	1,797	1,830	33	2%	0.8	1,452	1,509	57	4%	1.5
22	Selby North-South Southbound	1,858	1,857	-1	0%	0.0	1,487	1,524	36	2%	0.9
23	Selby East-West Eastbound	635	635	0	0%	0.0	512	509	-4	-1%	0.2
24	Selby East-West Westbound	627	634	6	1%	0.2	512	509	-4	-1%	0.2

ID	Calibrated Matrix - Strategic Screenlines and Cordons	PM All Vehicles					PM Cars				
		Obs	Mod	Diff	%Diff	GEH	Obs	Mod	Diff	%Diff	GEH
1	Outer Cordon Inbound	14,131	14,242	111	1%	0.9	12,400	12,379	-22	0%	0.2
2	Outer Cordon Outbound	12,693	12,627	-66	-1%	0.6	10,901	10,883	-17	0%	0.2
3	Tadcaster Cordon Inbound	6,615	6,658	43	1%	0.5	5,857	5,768	-89	-2%	1.2
4	Tadcaster Cordon Outbound	6,633	6,547	-87	-1%	1.1	5,653	5,659	5	0%	0.1
7	Eggborough Cordon Inbound	2,380	2,369	-11	0%	0.2	2,061	2,055	-5	0%	0.1
8	Eggborough Cordon Outbound	2,291	2,362	71	3%	1.5	1,986	2,052	66	3%	1.5
11	Screenline North-South North NB	7,519	7,483	-36	0%	0.4	5,923	6,089	167	3%	2.2
12	Screenline North-South North SB	8,048	7,967	-81	-1%	0.9	6,392	6,356	-36	-1%	0.4
13	Screenline North-South Central NB	6,406	6,506	100	2%	1.2	5,381	5,478	98	2%	1.3
14	Screenline North-South Central SB	7,352	7,484	133	2%	1.5	6,194	6,312	117	2%	1.5
17	Screenline East-West Central EB	4,715	4,713	-2	0%	0.0	3,799	3,807	9	0%	0.1
18	Screenline East-West Central WB	3,957	3,749	-208	-5%	3.4	3,047	2,954	-93	-3%	1.7
19	Selby Outer Cordon Inbound	3,431	3,460	29	1%	0.5	3,067	3,092	25	1%	0.4
20	Selby Outer Cordon Oubound	3,042	3,115	73	2%	1.3	2,725	2,789	64	2%	1.2
21	Selby North-South Northbound	2,510	2,520	9	0%	0.2	2,246	2,265	19	1%	0.4
22	Selby North-South Southbound	2,699	2,739	41	2%	0.8	2,431	2,483	52	2%	1.1
23	Selby East-West Eastbound	1,032	1,030	-2	0%	0.1	939	911	-28	-3%	0.9
24	Selby East-West Westbound	928	983	55	6%	1.8	849	887	39	5%	1.3

Appendix H

LINK FLOW VERIFICATION

Public

SDSTM Link Flow Verification

AM Peak

ID	Calibration / Validation	Ref	Dir	A-Node	B-Node	ALL VEHICLES Observed	ALL VEHICLES Modelled	ALL VEHICLES GEH	ALL VEHICLES GEH Pass?	ALL VEHICLES Flow Pass?	CAR Observed	CAR Modelled	CAR GEH	CAR GEH Pass?	CAR Flow Pass?	LGV Observed	LGV Modelled	LGV GEH	HGV Observed	HGV Modelled	HGV GEH
1	Calibration	ATC 1	NB	5061	5060	153	147	0.484	Yes	Yes	129.4132	129	0.040	Yes	Yes	17.90572	18	0.020	5.560492	0	3.335
2	Calibration	ATC 1	SB	5060	5061	185	163	1.647	Yes	Yes	156.7698	146	0.882	Yes	Yes	21.6908	18	0.940	6.73592	0	3.670
3	Calibration	ATC 2	EB	80063	80067	12	26	3.296	Yes	Yes	9.973184	23	3.196	Yes	Yes	1.379898	3	1.197	0.428517	0	0.926
4	Calibration	ATC 2	WB	80067	80063	31	42	1.902	Yes	Yes	26.04936	38	2.155	Yes	Yes	3.604211	4	0.203	1.119262	0	1.496
5	Calibration	ATC 3	EB	80674	79912	799	591	7.890	No	No	631.0218	415	9.469	No	No	108.179	108	0.018	60.13378	69	1.078
6	Calibration	ATC 3	WB	79912	80674	914	903	0.377	Yes	Yes	721.8377	686	1.349	Yes	Yes	123.748	124	0.025	68.78815	93	2.685
7	Calibration	ATC 4	EB	80314	80313	16	15	0.100	Yes	Yes	13.35622	13	0.098	Yes	Yes	1.847977	2	0.110	0.573876	0	0.276
8	Calibration	ATC 4	WB	80313	80314	11	16	1.150	Yes	Yes	9.586165	14	1.184	Yes	Yes	1.32635	1	0.303	0.411888	1	0.622
9	Calibration	ATC 7	EB	5015	5014	196	196	0.009	Yes	Yes	154.5457	155	0.036	Yes	Yes	26.49448	26	0.097	14.72756	15	0.021
10	Calibration	ATC 7	WB	5014	5015	242	238	0.239	Yes	Yes	191.1356	191	0.014	Yes	Yes	32.76727	33	0.039	18.21443	14	0.924
11	Calibration	ATC 8	NB	80366	80365	16	26	2.301	Yes	Yes	13.12888	21	1.905	Yes	Yes	1.816522	4	1.129	0.564108	1	0.761
12	Calibration	ATC 8	SB	80365	80366	14	16	0.541	Yes	Yes	11.98271	13	0.235	Yes	Yes	1.657937	2	0.253	0.51486	1	0.948
13	Calibration	ATC 9	NB	80545	80378	219	204	1.077	Yes	Yes	185.7692	186	0.015	Yes	Yes	25.70317	18	1.690	7.981934	0	3.995
14	Calibration	ATC 9	SB	80378	80545	200	200	0.002	Yes	Yes	168.9487	169	0.029	Yes	Yes	23.37588	23	0.078	7.259211	7	0.006
15	Calibration	ATC 10	NB	80392	80391	476	501	1.100	Yes	Yes	375.9412	376	0.004	Yes	Yes	64.44937	80	1.818	35.82565	45	1.388
16	Calibration	ATC 10	SB	80391	80392	436	421	0.720	Yes	Yes	343.8074	344	0.006	Yes	Yes	58.94051	44	2.120	32.76342	33	0.033
17	Calibration	ATC 11	NB	42131	42130	6	6	0.121	Yes	Yes	5.209872	5	0.088	Yes	Yes	0.720842	1	0.301	0.223852	0	0.387
18	Calibration	ATC 11	SB	42130	42131	4	4	0.297	Yes	Yes	3.230121	3	0.130	Yes	Yes	0.446922	1	0.650	0.138788	0	0.529
19	Calibration	ATC 12	NB	80409	72579	430	371	2.955	Yes	Yes	339.8342	281	3.354	Yes	Yes	58.25936	58	0.034	32.3848	33	0.031
20	Calibration	ATC 12	SB	72579	80409	422	385	1.851	Yes	Yes	333.2122	303	1.673	Yes	Yes	57.12413	50	1.009	31.75375	32	0.008
23	Calibration	ATC 13	NB	80341	80340	146	111	3.077	Yes	Yes	123.1845	91	3.112	Yes	Yes	17.04391	14	0.680	5.292864	5	0.031
24	Calibration	ATC 13	SB	80340	80341	115	115	0.009	Yes	Yes	97.55486	98	0.038	Yes	Yes	13.49777	13	0.137	4.191635	4	0.013
25	Validation	ATC 14	NB	80329	80333	167	93	6.442	No	Yes	141.3612	62	7.862	No	Yes	19.55885	24	1.025	6.07386	7	0.380
AMGAP
60	Calibration	ATC 32	SB	80656	80657	98	94	0.422	Yes	Yes	83.04536	83	0.004	Yes	Yes	11.49022	11	0.158	3.568206	0	2.671
61	Calibration	ATC 33	NB	72805	1184	1220	1207	0.360	Yes	Yes	963.0201	966	0.089	Yes	Yes	165.095	165	0.025	91.77184	76	1.704
62	Calibration	ATC 33	SB	1184	72805	738	799	2.215	Yes	Yes	582.6556	625	1.712	Yes	Yes	99.88738	105	0.458	55.52468	70	1.855
63	Validation	ATC 34	EB	80764	1451	79	67	1.333	Yes	Yes	66.68636	54	1.629	Yes	Yes	9.22678	9	0.098	2.86531	4	0.815
64	Validation	ATC 34	WB	1451	80764	120	106	1.331	Yes	Yes	101.7346	64	4.126	Yes	Yes	14.07608	34	4.072	4.371225	8	1.397
65	Calibration	ATC 35	NB	80704	80705	127	125	0.121	Yes	Yes	107.3234	106	0.117	Yes	Yes	14.84935	15	0.034	4.611358	5	0.006
66	Calibration	ATC 35	SB	80705	80704	171	141	2.454	Yes	Yes	145.1186	115	2.673	Yes	Yes	20.07873	20	0.022	6.235305	6	0.042
67	Calibration	ATC 36	SB	80499	80498	129	129	0.028	Yes	Yes	108.8119	109	0.051	Yes	Yes	15.0553	15	0.030	4.675316	5	0.043
68	Calibration	ATC 36	NB	80498	80499	231	232	0.073	Yes	Yes	195.4446	196	0.053	Yes	Yes	27.04188	27	0.061	8.39766	8	0.017
69	Calibration	ATC 37	NB	4049	1581	6	6	0.067	Yes	Yes	5.209872	5	0.097	Yes	Yes	0.720842	1	0.301	0.223852	0	0.669
70	Calibration	ATC 37	SB	1581	4049	5	6	0.373	Yes	Yes	4.357348	5	0.310	Yes	Yes	0.602886	1	0.444	0.187222	0	0.612
71	Calibration	ATC 38	EB	4049	1251	326	326	0.004	Yes	Yes	257.1427	257	0.002	Yes	Yes	44.08318	44	0.007	24.50464	25	0.003
72	Calibration	ATC 38	WB	1251	4049	366	367	0.074	Yes	Yes	288.6131	290	0.104	Yes	Yes	49.4783	49	0.061	27.50364	28	0.016
73	Calibration	ATC 39	EB	5003	5002	352	356	0.242	Yes	Yes	277.6747	278	0.018	Yes	Yes	47.60307	48	0.057	26.46125	30	0.725
74	Calibration	ATC 39	WB	5002	5003	489	525	1.632	Yes	Yes	385.8038	413	1.359	Yes	Yes	66.14014	73	0.773	36.76551	40	0.508
75	Calibration	ATC 40	NB	5009	80651	352	448	4.811	Yes	Yes	277.6747	373	5.300	No	Yes	47.60307	48	0.053	26.46125	27	0.041
76	Calibration	ATC 41	EB	80457	80458	37	35	0.263	Yes	Yes	30.96153	31	0.007	Yes	Yes	4.283862	4	0.139	1.330322	0	1.631
77	Calibration	ATC 41	WB	80458	80457	23	23	0.083	Yes	Yes	19.79751	20	0.043	Yes	Yes	2.7392	3	0.154	0.850639	0	1.304
78	Validation	ATC 44	NB	1077	1076	882	804	2.696	Yes	Yes	696.5403	664	1.258	Yes	Yes	119.4112	115	0.424	66.37742	25	6.033
79	Validation	ATC 44	SB	1076	1077	724	659	2.445	Yes	Yes	571.2863	534	1.583	Yes	Yes	97.93829	104	0.582	54.44123	22	5.340
80	Calibration	ATC 46	EB	80905	80827	102	102	0.020	Yes	Yes	86.3681	86	0.040	Yes	Yes	11.94996	12	0.014	3.710974	4	0.062
81	Calibration	ATC 46	WB	80827	80905	61	61	0.008	Yes	Yes	51.7514	52	0.021	Yes	Yes	7.160366	7	0.060	2.2236	2	0.050
84	Validation	ATC 48	NB	5055	5107	532	551	0.819	Yes	Yes	420.02	486	3.102	Yes	Yes	72.00599	44	3.660	40.02617	21	3.454
85	Validation	ATC 48	SB	5107	5055	382	402	1.017	Yes	Yes	301.2451	339	2.122	Yes	Yes	51.64386	50	0.204	28.70742	12	3.619
86	Calibration	ATC 49	NB	5103	5045	108	104	0.411	Yes	Yes	91.58955	88	0.342	Yes	Yes	12.67241	13	0.053	3.935324	3	0.648
87	Calibration	ATC 49	SB	5045	5103	97	57	4.556	Yes	Yes	81.74763	42	5.021	No	Yes	11.31067	11	0.087	3.512446	3	0.036
88	Calibration	ATC 50	EB	80459	80460	45	39	0.873	Yes	Yes	37.8584	34	0.632	Yes	Yes	5.23812	5	0.105	1.62666	0	1.804
89	Calibration	ATC 50	WB	80460	80459	36	35	0.203	Yes	Yes	30.65141	31	0.063	Yes	Yes	4.240955	4	0.119	1.316998	0	1.623
90	Calibration	ATC 51	EB	1461	42203	25	36	2.086	Yes	Yes	20.74476	28	1.468	Yes	Yes	2.870262	7	1.937	0.891339	1	0.137
91	Calibration	ATC 51	WB	42203	1461	21	44	4.140	Yes	Yes	17.52412	36	3.530	Yes	Yes	2.424651	8	2.371	0.752958	1	0.033
92	Calibration	ATC 52	NB	1366	80201	11	4	2.464	Yes	Yes	9.030445	2	2.949	Yes	Yes	1.24946	1	0.235	0.388011	1	0.654
93	Calibration	ATC 52	SB	80201	1366	11	4	2.589	Yes	Yes	9.169375	2	2.793	Yes	Yes	1.268682	1	0.252	0.39398	0	0.017
94	Calibration	ATC 53	NB	80430	70505	60	60	0.078	Yes	Yes	50.53576	51	0.067	Yes	Yes	6.992169	7	0.001	2.171367	2	0.090
95	Calibration	ATC 53	SB	70505	80430	37	36	0.094	Yes	Yes	31.12899	31	0.020	Yes	Yes	4.307032	4	0.151	1.337518	1	0.137
96	Calibration	Error 2042	NB	5077	80560	754	715	1.426	Yes	Yes	579.9315	580	0.002	Yes	Yes	116.8803	117	0.012	56.72345	18	6.355
97	Calibration	Site1	EB	1007	1407	460	483	1.063	Yes	Yes	380.4039	379	0.056	Yes	Yes	59.11861	68	1.167	20.34562	35	2.817
98	Calibration	Site1	WB	1407	1007	534	558	1.033	Yes	Yes	442.013	442	0.014	Yes	Yes	68.69329	80	1.334	23.64074	37	2.357
99	Calibration	Site2	EB	1149	1150	190	236	3.148	Yes	Yes	164.83	211	3.380	Yes	Yes	22.23254	20	0.519	3.270236	5	0.977
100	Calibration	Site2	WB	1150	1149	143	160	1.395	Yes	Yes	123.4131	136	1.073	Yes	Yes	16.64616	20	0.879	2.448522	4	0.665
101	Calibration	Site3	EB	3028	3321	151	151	0.002	Yes	Yes	130.7235	131	0.019	Yes	Yes	17.63219	18	0.085	2.59356	2	0.397
102	Calibration	Site3	WB	3321	3028	97	97	0.060	Yes	Yes	84.103	84	0.010	Yes	Yes	11.34395	11	0.106	1.668608	2	0.111
103	Calibration	Site4	NB	1119	1120	595	579	0.662	Yes	Yes	492.2666	492	0.002	Yes	Yes	76.50321	76	0.045	26.32851	11	3.623
104	Calibration	Site4	SB	1120	1119	446	436	0.467	Yes	Yes	368.7317	369	0.006	Yes	Yes	57.30464	57	0.046	19.72134	10	2.478
105	Calibration	Site5	EB	3086	3089	241	244	0.209	Yes	Yes	208.3773	208	0.003	Yes	Yes	28.10625	28	0.020	4.134215	8	1.410
106	Calibration	Site5	WB	3089	3086	222	222	0.021	Yes	Yes	191.8312	192	0.013	Yes	Yes	25.87449	26	0.023	3.80594	4	0.013
107	Calibration	Site7	EB	3101	3104	131	130	0.035	Yes	Yes	113.2373	113	0.017	Yes	Yes	15.27362	15	0.070	2.246633	2	0.032
108	Calibration	Site7	WB	3104	3101	142	143	0.093	Yes	Yes	123.0098	124	0.077	Yes	Yes	16.59176	17	0.100	2.440521	2	0.095
109	Calibration	Site8	NB	3207	80272	149	149	0.069	Yes	Yes	129.3697	129	0.045	Yes	Yes	17.44959	17	0.108	2.566701	3	0.069
110	Calibration	Site8	SB	80272	3207	130	107	2.113	Yes	Yes	112.786	93	1.911	Yes	Yes	15.21276	12	0.914	2.23768	2	0.174
111	Calibration	Site9	EB	3257	3259	97	98	0.118	Yes	Yes	84.0748	87	0.291	Yes	Yes	11.34014	10	0.426	1.668048	2	0.104
112	Calibration	Site9	WB	3259	3257	91	91	0.008	Yes	Yes	78.4905	78	0.014	Yes	Yes	10.58692	11	0.126	1.557255	1	0.312
113	Calibration	Site10	EB	3254	3256	82	83	0.020	Yes	Yes	71.32679	71	0.038	Yes	Yes	9.62067	10	0.121	1.415127	2	0.097
114	Calibration	Site10	WB	3256	3254	95	65	3.330	Yes	Yes	82.32618	53	3.603	Yes	Yes	11.10428	11	0.031	1.633355	2	0.083
115	Calibration	Site11	EB	3250	3323	43	51	1.155	Yes	Yes	36.94948	43	0.902	Yes	Yes	4.983804	7	0.876	0.733079	1	0.043
116	Calibration	Site11	WB	3323	3250	57	57	0.076	Yes	Yes	49.01778	49	0.002	Yes	Yes	6.611595	7	0.145	0.972515	1	0.175
119	Validation	20206	1: N/W Bound	79929	1234	206	249	2.858	Yes	Yes	158.3725	211	3.896	Yes	Yes	30.21289	31	0.139	17.36845	7	3.064
120	Validation	20206	2: S/E Bound	1234	79929	203	230	1.888	Yes	Yes	155.8432	208	3.874	Yes	Yes	29.73038	18	2.312	17.09108	4	4.045
121	Calibration	140200	1: East Bound	80288	72893	17	38	3.947	Yes	Yes	14.38633	25	2.296	Yes	Yes	2.176173	9	2.836	0.525283	4	2.476
122	Calibration	140200	2: West Bound	72893	80288	25	32	1.391	Yes	Yes	20.91785	28	1.453	Yes	Yes	3.164176	3	0.094	0.763767	1	0.412
123	Calibration	5060124	1: North Bound	80546	42130	616	617	0.004	Yes	Yes	474.0017	474	0.022	Yes	Yes	90.42582	90	0.043	51.98301	52	0.002
124	Calibration	5060124	2: South Bound	42130	80546	645	651	0.245	Yes	Yes	495.7697	495	0.047	Yes	Yes	94.57852	102	0.733	54.37027	54	0.000
125	Calibration	5060272	1: East Bound	80556	5065	403	447	2.133	Yes	Yes	309.6453	328	1.016	Yes	Yes	59.07137	78	2.267	33.9583	41	1.152
126	Calibration	5060272	2: West Bound	5065	80556	670	658	0.452	Yes	Yes	515.1194	515	0.021	Yes	Yes	98.26988	98	0.032	56.49232	46	1.518
127	Calibration	6080125	1: North Bound	5068	5066	286	350	3.600	Yes	Yes	220.0885	303	5.143	No	Yes	41.98653	46	0.643	24.13676	1	6.564
128	Calibration	6080125	2: South Bound	5066	5068	217	199	1.190	Yes	Yes	166.537	167	0.032	Yes	Yes	31.77045	32	0.042	18.26385	0	5.821
129	Calibration	6080130	1: East Bound	80901	80484	183	183	0.012	Yes	Yes	140.8262	141	0.015	Yes	Yes	26.86557	27	0.018	15.44419	15	0.025
130	Calibration	6080130	2: West Bound	80484	80901	230	229	0.078	Yes	Yes	177.0946	177	0.024	Yes	Yes	33.78452	34	0.049	19.42168	18	0.264
131	Calibration	6080223	2: East Bound	5058	80123	183	196	1.001	Yes	Yes	153.703	154	0.035	Yes	Yes	23.25015	36	2.416	5.612106	6	0.057
132	Calibration	6080223	4: West Bound	80123	5058	246	223	1.463	Yes	Yes	206.8374	185	1.588	Yes	Yes	31.28762	31	0.053	7.552184	8	0.039
133	Calibration	7080276	1: West Bound	80913	1009	595	576	0.761	Yes	Yes	457.2198	451	0.280	Yes	Yes	87.22431	87	0.030	50.14256	38	1.834
134	Calibration	7080276	2: East Bound	1009	80913	501	511	0.437	Yes	Yes	385.4243	401	0.788	Yes	Yes	73.52782	73	0.038	42.26887	37	0.872
135	Calibration	8100167	1: West Bound	1151	1050	305	305	0.030	Yes	Yes	256.5109	257	0.032	Yes	Yes	38.80158	39	0.030	9.365898	9	0.058
136	Calibration	8100167	2: East Bound	1050	1151	262	262	0.007	Yes	Yes	220.4772	220	0.032	Yes	Yes	33.35088	33	0.061	8.050212	9	0.244
137	Validation	1.2E+07	1: South Bound	80092	5115	350	403	2.729	Yes	Yes	232.3433	262	1.905	Yes	Yes	52.15871	61	1.141	65.43547	80	1.691
138	Validation	1.2E+07	2: North Bound	5115	80092	702	755	1.966	Yes	Yes	531.6553	573	1.767	Yes	Yes	76.54998	81	0.466	93.32805	101	0.749
139	Calibration	1.2E+07	1: West Bound	1012	80915	406	405	0.038	Yes	Yes	312.3996	312	0.032	Yes	Yes	59.5968	60	0.046	34.26036	34	0.095
140	Calibration	1.2E+07	2: East Bound	80915	1012	389	384	0.273	Yes	Yes	299.2779	299	0.036	Yes	Yes	57.09357	52	0.661	32.82133	33	0.024
141	Calibration	1.2E+07	1: South Bound	80917	1160	455	458	0.116	Yes	Yes	350.1005	349	0.060	Yes	Yes	66.78905	71	0.451	38.39496	38	0.022
142	Calibration	1.2E+07	2: North Bound	1160	80917	550	551	0.035	Yes	Yes	422.8844	423	0.023	Yes	Yes	80.67411	81	0.042	46.37706	46	0.004
143	Calibration	1.2E+07	1: South Bound	1079	1080	615	652	1.472	Yes	Yes	472.5818	510	1.683	Yes	Yes	90.15494	90	0.018	51.82729	52	0.012
144	Calibration	1.2E+07	2: North Bound	1080	1079	763	819	1.988	Yes	Yes	586.6323	656	2.771	Yes	Yes	111.9125	112	0.002	64.33503	51	1.729
145	Validation	1.2E+07	2: South Bound	80114	42139	269	290	1.290	Yes	Yes	226.3811	265	2.479	Yes	Yes	34.24393	25	1.653	8.265777	0	4.066
146	Validation	1.2E+07	4: North Bound	42139	80114	262	315	3.150	Yes	Yes	220.4094	280	3.751	Yes	Yes	33.34061	36	0.381	8.047735	0	4.012
147	Calibration	1.4E+07	1: East Bound	80920	1023	635	667	1.260	Yes	Yes	488.3024	519	1.387	Yes	Yes	93.15398	93	0.026	53.55134	55	0.174
148	Calibration	1.4E+07	2: West Bound	1023	80920	627	626	0.043	Yes	Yes	481.9128	481	0.037	Yes	Yes	91.93501	92	0.027	52.8506	53	0.002
149	Calibration	1.6E+07	1: North Bound	1116	1117	439	413	1.281	Yes	Yes	337.7396	338	0.012	Yes	Yes	64.43094	64	0.025	37.03936	11	5.421
150	Calibration	1.6E+07	2: South Bound	1117	1116	336	317	1.044	Yes	Yes	258.3251	258	0.030	Yes	Yes	49.28096	49	0.040	28.3301	10	4.125
151	Calibration	1.6E+07	1: East Bound	79932	1026	374	377	0.186	Yes	Yes	287.3829	291	0.199	Yes	Yes	54.82434	55	0.049	31.51682	31	0.026
152	Calibration	1.6E+07	2: West Bound	1026	79932	446	401	2.186	Yes	Yes	342.9121	343	0.007	Yes	Yes	65.41772	42	3.207	37.60663	16	4.173
155	Calibration	1.9E+07	1: East Bound	1066	1155	342	350	0.414	Yes	Yes	287.8623	291	0.199	Yes	Yes	43.54399	58	2.078	10.51062	0	4.585
156	Calibration	1.9E+07	2: West Bound	1155	1066	427	451	1.188	Yes	Yes	359.1153	397	1.970	Yes	Yes	54.32221	54	0.042	13.11226	0	5.121
157	Calibration	2E+07	1: West Bound	1156	1130	498	538	1.763	Yes	Yes	382.7715	439	2.775	Yes	Yes	73.02173	73	0.005	41.97794	26	2.763

Interpeak

ID	ALL VEHICLES Observed	ALL VEHICLES Modelled	ALL VEHICLES GEH	ALL VEHICLES GEH Pass?	ALL VEHICLES Flow Pass?	CAR Observed	CAR Modelled	CAR GEH	CAR GEH Pass?	CAR Flow Pass?	LGV Observed	LGV Modelled	LGV GEH	HGV Observed	HGV Modelled	HGV GEH
1	120	114	0.518	Yes	Yes	96.43648	96	0.041	Yes	Yes	17.70647	18	0.069	5.486851	0	3.313
2	140	134	0.513	Yes	Yes	112.8577	113	0.013	Yes	Yes	20.72153	21	0.061	6.421153	0	3.584
3	15	15	0.089	Yes	Yes	12.16051	13	0.164	Yes	Yes	2.232761	2	0.160	0.691884	0	1.176
4	11	11	0.078	Yes	Yes	9.068518	9	0.026	Yes	Yes	1.665049	2	0.247	0.515963	0	1.016
5	576	505	3.074	Yes	Yes	428.7167	341	4.449	Yes	Yes	91.17697	91	0.020	56.5352	73	1.994
6	577	565	0.527	Yes	Yes	429.3249	385	2.196	Yes	Yes	91.30631	91	0.034	56.61541	89	3.759
7	10	10	0.041	Yes	Yes	7.663068	8	0.120	Yes	Yes	1.406997	1	0.371	0.435998	1	0.268
8	10	9	0.068	Yes	Yes	7.732218	8	0.095	Yes	Yes	1.419694	1	0.382	0.439932	0	0.089
9	201	202	0.042	Yes	Yes	149.7055	150	0.023	Yes	Yes	31.8385	32	0.029	19.74178	20	0.033
10	193	194	0.046	Yes	Yes	143.8279	144	0.007	Yes	Yes	30.58847	31	0.072	18.96669	19	0.037
11	16	17	0.194	Yes	Yes	12.67455	13	0.094	Yes	Yes	2.327144	2	0.092	0.721131	1	0.323
12	13	14	0.211	Yes	Yes	10.81505	11	0.056	Yes	Yes	1.985725	2	0.010	0.615333	1	0.613
13	132	127	0.467	Yes	Yes	106.6687	107	0.032	Yes	Yes	19.58518	20	0.093	6.069023	0	3.484
14	118	115	0.261	Yes	Yes	94.94942	95	0.005	Yes	Yes	17.43343	15	0.571	5.402244	5	0.249
15	232	233	0.015	Yes	Yes	172.8266	173	0.012	Yes	Yes	36.75576	37	0.040	22.79078	23	0.039
16	241	252	0.695	Yes	Yes	179.2716	179	0.020	Yes	Yes	38.12644	43	0.745	23.64069	30	1.242
17	5	5	0.228	Yes	Yes	3.915143	4	0.038	Yes	Yes	0.71885	1	0.303	0.222756	0	0.291
18	5	5	0.300	Yes	Yes	3.788158	4	0.102	Yes	Yes	0.695535	1	0.331	0.215531	0	0.306
19	261	245	1.014	Yes	Yes	194.0188	178	1.169	Yes	Yes	41.26278	41	0.041	25.58541	26	0.015
20	247	224	1.527	Yes	Yes	183.9892	161	1.766	Yes	Yes	39.12974	39	0.021	24.2628	24	0.025
23	76	74	0.251	Yes	Yes	61.52806	60	0.235	Yes	Yes	11.29702	11	0.089	3.500701	3	0.028
24	76	67	1.136	Yes	Yes	61.54727	52	1.226	Yes	Yes	11.30054	11	0.090	3.501794	3	0.031
25	87	66	2.349	Yes	Yes	69.81837	47	3.037	Yes	Yes	12.81918	15	0.605	3.972387	4	0.194
26	91	75	1.814	Yes	Yes	73.39111	50	2.999	Yes	Yes	13.47516	20	1.540	4.175662	5	0.357
27	48	49	0.124	Yes	Yes	39.05462	39	0.009	Yes	Yes	7.170723	7	0.064	2.222052	3	0.656
28	48	48	0.003	Yes	Yes	38.46999	38	0.074	Yes	Yes	7.063381	7	0.024	2.188789	3	0.323
29	96	121	2.448	Yes	Yes	77.11599	92	1.631	Yes	Yes	14.15908	22	1.911	4.387592	7	0.987
30	115	152	3.226	Yes	Yes	92.7313	116	2.261	Yes	Yes	17.02617	30	2.645	5.276041	7	0.574
31	77	77	0.008	Yes	Yes	61.78161	51	1.402	Yes	Yes	11.34357	25	3.293	3.515127	0	2.651
32	86	131	4.338	Yes	Yes	68.99932	105	3.873	Yes	Yes	12.6688	26	2.950	3.925786	0	2.802
33	55	47	1.185	Yes	Yes	44.61804	41	0.533	Yes	Yes	8.19221	3	2.337	2.538589	3	0.286
34	56	45	1.588	Yes	Yes	45.26051	39	0.910	Yes	Yes	8.310172	3	2.054	2.575142	2	0.264
35	188	195	0.461	Yes	Yes	151.8318	158	0.518	Yes	Yes	27.87748	29	0.212	8.638627	7	0.421
36	209	200	0.602	Yes	Yes	168.4995	163	0.458	Yes	Yes	30.93778	30	0.084	9.586949	7	0.773
37	85	75	1.210	Yes	Yes	68.89721	58	1.394	Yes	Yes	12.65005	13	0.100	3.919976	4	0.043
38	80	80	0.035	Yes	Yes	64.11203	64	0.011	Yes	Yes	11.77145	12	0.063	3.647719	4	0.097
39	70	69	0.095	Yes	Yes	56.3034	56	0.042	Yes	Yes	10.33773	10	0.106	3.203439	3	0.078
40	77	76	0.071	Yes	Yes	62.13504	62	0.017	Yes	Yes	11.40846	11	0.119	3.535236	3	0.047
IPGAP

PM Peak

ID	ALL VEHICLES Observed	ALL VEHICLES Modelled	ALL VEHICLES GEH	ALL VEHICLES GEH Pass?	ALL VEHICLES Flow Pass?	CAR Observed	CAR Modelled	CAR GEH	CAR GEH Pass?	CAR Flow Pass?	LGV Observed	LGV Modelled	LGV GEH	HGV Observed	HGV Modelled	HGV GEH
1	228	165	4.473	Yes	Yes	204.5294	145	4.481	Yes	Yes	20.30264	20	0.079	3.108117	0	2.493
2	232	221	0.744	Yes	Yes	208.5592	208	0.062	Yes	Yes	20.70266	14	1.726	3.169355	0	2.518
3	33	46	2.087	Yes	Yes	29.36132	42	2.187	Yes	Yes	2.914556	3	0.235	0.446187	0	0.945
4	18	29	2.193	Yes	Yes	16.50582	27	2.271	Yes	Yes	1.638453	2	0.247	0.25083	0	0.708
5	1055	1002	1.646	Yes	Yes	914.8918	848	2.238	Yes	Yes	106.2827	103	0.358	33.54583	51	2.666
6	793	713	2.923	Yes	Yes	688.2856	576	4.452	Yes	No	79.95792	80	0.006	25.23698	57	4.944
7	14	16	0.497	Yes	Yes	12.33176	14	0.465	Yes	Yes	1.224114	1	0.253	0.187399	1	0.733
8	24	19	1.145	Yes	Yes	21.77499	17	1.191	Yes	Yes	2.161498	2	0.112	0.330902	0	0.087
9	313	314	0.034	Yes	Yes	271.8798	272	0.012	Yes	Yes	31.58418	32	0.077	9.968864	10	0.012
10	276	276	0.015	Yes	Yes	239.6195	240	0.008	Yes	Yes	27.83652	28	0.020	8.785994	9	0.002
11	15	23	1.812	Yes	Yes	13.83661	21	1.621	Yes	Yes	1.373494	2	0.632	0.210267	1	0.641
12	18	26	1.831	Yes	Yes	15.99795	22	1.474	Yes	Yes	1.588039	2	0.308	0.243112	2	1.650
13	283	218	4.066	Yes	Yes	253.7771	193	4.035	Yes	Yes	25.19122	25	0.036	3.856506	0	2.777
14	211	211	0.007	Yes	Yes	189.4996	189	0.035	Yes	Yes	18.8107	19	0.044	2.879717	3	0.108
15	431	431	0.026	Yes	Yes	374.2193	374	0.009	Yes	Yes	43.47294	43	0.072	13.72129	14	0.028
16	489	496	0.319	Yes	Yes	423.9498	424	0.003	Yes	Yes	49.25011	56	0.944	15.54473	16	0.041
17	4	5	0.503	Yes	Yes	3.837893	4	0.082	Yes	Yes	0.380969	1	0.745	0.058322	0	0.691
18	5	5	0.189	Yes	Yes	4.443876	4	0.216	Yes	Yes	0.441122	1	0.658	6.75E-02	0	0.665
19	428	406	1.071	Yes	Yes	370.9295	358	0.681	Yes	Yes	43.09076	34	1.391	13.60066	13	0.053
20	404	402	0.065	Yes	Yes	350.1836	348	0.097	Yes	Yes	40.68072	41	0.050	12.83999	13	0.052
23	140	141	0.086	Yes	Yes	125.6629	126	0.027	Yes	Yes	12.47395	12	0.121	1.909628	3	0.720
24	145	119	2.248	Yes	Yes	130.2303	104	2.392	Yes	Yes	12.92733	13	0.028	1.979035	2	0.040
25	167	119	3.985	Yes	Yes	149.7957	97	4.799	Yes	Yes	14.86949	19	1.036	2.276359	4	0.767
26	143	95	4.433	Yes	Yes	128.1318	74	5.378	No	Yes	12.71902	17	1.111	1.947146	3	0.916
27	83	85	0.135	Yes	Yes	74.73791	76	0.164	Yes	Yes	7.418871	7	0.156	1.13575	1	0.207
28	119	117	0.139	Yes	Yes	106.552	101	0.554	Yes	Yes	10.5769	11	0.129	1.619211	5	1.991
29	174	174	0.030	Yes	Yes	156.4244	151	0.446	Yes	Yes	15.5275	21	1.373	2.377093	2	0.550
30	204	240	2.365	Yes	Yes	183.4109	210	1.874	Yes	Yes	18.20631	28	2.114	2.787191	2	0.842
31	124	108	1.441	Yes	Yes	110.8747	87	2.383	Yes	Yes	11.00599	21	2.477	1.6849	0	1.836
32	257	341	4.867	Yes	Yes	230.7483	319	5.323	No	Yes	22.90526	22	0.115	3.50655	0	2.648
33	106	91	1.511	Yes	Yes	94.83635	87	0.816	Yes	Yes	9.413945	2	3.324	1.441174	2	0.463
34	96	72	2.641	Yes	Yes	85.8476	65	2.383	Yes	Yes	8.521676	5	1.446	1.304577	2	0.240
35	408	346	3.174	Yes	Yes	365.8421	316	2.726	Yes	Yes	36.31537	25	2.012	5.559494	5	0.067
36	300	304	0.212	Yes	Yes	269.3595	290	1.241	Yes	Yes	26.73801	12	3.354	4.093303	2	1.341
37	208	96	9.074	No	No	186.1984	83	8.891	No	No	18.48301	10	2.239	2.829551	3	0.077
38	126	126	0.019	Yes	Yes	112.6119	113	0.051	Yes	Yes	11.17843	11	0.054	1.711298	2	0.119
39	173	172	0.051	Yes	Yes	154.9185	156	0.048	Yes	Yes	15.378	14	0.317	2.354208	2	0.036
40	104	103	0.125	Yes	Yes	93.19795	93	0.001	Yes	Yes	9.251309	9	0.057	1.416276	0	1.174
PMGAP

158	Calibration	2E+07	2: East Bound	1130	1156	345	380	1.808	Yes	Yes	265.3804	303	2.242	Yes	Yes	50.6269	51	0.055	29.10384	25	0.727	390	397	0.341	Yes	Yes	284.0089	306	1.269	Yes	Yes	63.27873	63	0.031	43.18954	28	2.468	522	541	0.795	Yes	Yes	449.949	470	0.952	Yes	Yes	54.10195	54	0.022	18.19987	16	0.464
159	Calibration	2E+07	1: East Bound	1134	1135	321	340	1.053	Yes	Yes	246.7438	247	0.000	Yes	Yes	47.07159	64	2.270	27.06	29	0.419	291	313	1.302	Yes	Yes	211.5322	228	1.112	Yes	Yes	47.13053	54	0.992	32.16793	31	0.164	544	593	2.041	Yes	Yes	469.1037	510	1.840	Yes	Yes	56.40511	64	1.030	18.97465	19	0.004
160	Calibration	2E+07	2: West Bound	1135	1134	490	502	0.559	Yes	Yes	376.629	403	1.354	Yes	Yes	71.84993	72	0.024	41.3043	27	2.482	278	304	1.518	Yes	Yes	202.0912	221	1.300	Yes	Yes	45.02702	55	1.409	30.73223	28	0.553	383	434	2.555	Yes	Yes	329.6796	380	2.667	Yes	Yes	39.64073	42	0.317	13.33512	13	0.172
161	Calibration	2.2E+07	1: South Bound	5120	80741	274	299	1.468	Yes	Yes	211.0112	211	0.006	Yes	Yes	40.25482	65	3.423	23.14126	23	0.014	314	337	1.253	Yes	Yes	228.4505	262	2.155	Yes	Yes	50.90003	51	0.011	34.74073	24	2.082	681	670	0.418	Yes	Yes	586.4053	586	0.018	Yes	Yes	70.50947	71	0.052	23.71935	13	2.547
162	Calibration	2.2E+07	2: North Bound	80741	5120	733	661	2.711	Yes	Yes	563.3557	563	0.013	Yes	Yes	107.472	72	3.801	61.78231	26	5.312	284	319	2.049	Yes	Yes	206.4103	243	2.430	Yes	Yes	45.98934	49	0.463	31.38904	27	0.744	402	356	2.335	Yes	Yes	346.2627	307	2.175	Yes	Yes	41.63468	42	0.055	14.00588	7	1.985
163	Calibration	2.2E+07	1: South Bound	1038	1037	790	789	0.026	Yes	Yes	607.5255	607	0.031	Yes	Yes	115.8983	116	0.002	66.62635	67	0.000	610	629	0.774	Yes	Yes	443.435	462	0.895	Yes	Yes	98.79974	99	0.021	67.43365	67	0.000	1060	1060	0.009	Yes	Yes	913.3601	918	0.167	Yes	Yes	109.8226	110	0.012	36.94426	32	0.834
164	Calibration	2.2E+07	2: North Bound	1037	1038	915	942	0.896	Yes	Yes	703.2913	735	1.185	Yes	Yes	134.1676	134	0.014	77.12883	73	0.500	605	604	0.046	Yes	Yes	439.9763	443	0.155	Yes	Yes	98.02913	98	0.003	66.90768	63	0.543	874	876	0.052	Yes	Yes	753.1411	752	0.027	Yes	Yes	90.55781	93	0.219	30.4636	31	0.033
165	Calibration	2.4E+07	1: West Bound	72754	5083	248	280	1.960	Yes	Yes	190.8786	237	3.158	Yes	Yes	36.41412	36	0.069	20.93335	7	3.722	198	186	0.818	Yes	Yes	143.8276	144	0.032	Yes	Yes	32.04557	35	0.517	21.87202	7	3.860	327	317	0.553	Yes	Yes	281.7983	283	0.042	Yes	Yes	33.88347	33	0.089	11.39838	1	4.025
166	Calibration	2.4E+07	2: East Bound	5083	72754	301	296	0.307	Yes	Yes	231.4479	230	0.066	Yes	Yes	44.15357	49	0.666	25.38253	17	1.930	203	189	1.038	Yes	Yes	147.9337	148	0.005	Yes	Yes	32.96045	33	0.007	22.49645	8	3.760	316	308	0.444	Yes	Yes	271.8265	272	0.010	Yes	Yes	32.68447	33	0.067	10.99504	3	3.049
169	Calibration	2E+07	1: Northeast	1095	1157	514	515	0.014	Yes	Yes	395.5508	396	0.043	Yes	Yes	75.45966	75	0.052	43.37943	43	0.015	319	319	0.017	Yes	Yes	232.3822	232	0.026	Yes	Yes	51.77603	52	0.031	35.33862	35	0.022	573	573	0.021	Yes	Yes	494.095	494	0.002	Yes	Yes	59.41006	59	0.056	19.98551	20	0.022
170	Calibration	2E+07	2: Southwest	1157	1095	448	448	0.034	Yes	Yes	344.7758	344	0.052	Yes	Yes	65.77325	66	0.023	37.81101	38	0.010	340	339	0.021	Yes	Yes	247.16	247	0.014	Yes	Yes	55.06861	55	0.011	37.5859	37	0.014	518	518	0.022	Yes	Yes	446.5532	446	0.024	Yes	Yes	53.69363	54	0.012	18.06251	18	0.019
171	Calibration	J1-A-Entry	0	3325	1054	88	108	1.987	Yes	Yes	69.56186	89	2.176	Yes	Yes	11.77783	12	0.064	6.802879	7	0.031	96	100	0.370	Yes	Yes	75.18873	79	0.427	Yes	Yes	16.08317	16	0.008	4.654143	5	0.028	232	233	0.050	Yes	Yes	204.9463	205	0.035	Yes	Yes	24.95836	25	0.024	2.164946	2	0.090
172	Calibration	J1-B-Entry	0	1219	1054	257	217	2.550	Yes	Yes	221.5674	189	2.241	Yes	Yes	24.73345	24	0.116	10.34928	4	2.469	163	156	0.531	Yes	Yes	135.0938	132	0.309	Yes	Yes	24.02548	21	0.629	4.008822	4	0.084	260	253	0.417	Yes	Yes	230.7257	231	0.003	Yes	Yes	21.39288	20	0.412	7.398377	3	2.181
173	Calibration	J1-D-Entry	0	1053	1054	408	408	0.016	Yes	Yes	367.132	367	0.003	Yes	Yes	29.44458	31	0.245	10.94259	10	0.295	230	226	0.264	Yes	Yes	184.2826	184	0.022	Yes	Yes	35.34327	35	0.065	10.14264	7	1.135	385	384	0.018	Yes	Yes	342.8661	343	0.014	Yes	Yes	36.8433	37	0.021	5.007547	5	0.102
178	Calibration	J5-D-Entry	0	4057	1077	198	133	5.006	No	Yes	112.0719	89	2.279	Yes	Yes	65.95585	38	3.848	19.67037	6	3.852	198	153	3.459	Yes	Yes	131.9316	132	0.005	Yes	Yes	52.02211	15	6.318	14.39264	5	2.940	295	282	0.794	Yes	Yes	241.0374	241	0.002	Yes	Yes	47.53974	40	1.105	6.720724	1	3.212
179	Calibration	J14-A-Entry	0	1583	1136	140	136	0.303	Yes	Yes	121.0892	121	0.009	Yes	Yes	15.31118	12	0.954	3.40144	3	0.025	79	79	0.038	Yes	Yes	63.06718	63	0.008	Yes	Yes	13.30337	13	0.084	3.029758	3	0.020	128	128	0.030	Yes	Yes	116.0073	116	0.015	Yes	Yes	11.88494	12	0.033	0	0	0.875
180	Calibration	J14-B-Entry	0	80480	1136	497	484	0.580	Yes	Yes	391.6075	387	0.245	Yes	Yes	81.26704	72	1.005	23.66512	24	0.164	297	297	0.005	Yes	Yes	219.5932	220	0.027	Yes	Yes	51.42644	51	0.061	25.54823	26	0.024	441	442	0.064	Yes	Yes	387.98	388	0.004	Yes	Yes	40.40878	42	0.197	12.63181	13	0.003
181	Calibration	J14-C-Entry	0	3153	1136	62	52	1.335	Yes	Yes	54.10367	44	1.479	Yes	Yes	7.066699	7	0.025	1.034928	1	0.291	26	26	0.009	Yes	Yes	19.32421	19	0.074	Yes	Yes	5.559615	6	0.183	1.312807	1	0.147	23	24	0.263	Yes	Yes	21.91249	22	0.019	Yes	Yes	1.188494	2	0.643	0	0	0.875
182	Calibration	J14-D-Entry	0	1145	1136	341	340	0.077	Yes	Yes	242.1783	247	0.292	Yes	Yes	63.60029	64	0.049	35.64938	29	1.117	316	313	0.140	Yes	Yes	227.6743	228	0.023	Yes	Yes	59.36875	54	0.687	28.89347	31	0.429	617	593	0.985	Yes	Yes	507.8542	510	0.086	Yes	Yes	91.514	64	3.070	18.04417	19	0.212
183	Calibration	J15-A-Entry	0	1582	1141	16	28	2.455	Yes	Yes	11.59364	23	2.708	Yes	Yes	3.533349	4	0.270	1.331585	1	0.164	19	25	1.209	Yes	Yes	12.99992	19	1.511	Yes	Yes	4.368269	4	0.180	1.909893	2	0.004	26	43	3.045	Yes	Yes	23.20146	41	3.155	Yes	Yes	2.376987	2	0.255	0	0	0.875
184	Validation	J15-B-Entry	0	1142	1141	349	351	0.114	Yes	Yes	251.1956	260	0.523	Yes	Yes	73.02255	65	1.003	24.40339	26	0.415	245	229	1.046	Yes	Yes	168.1206	158	0.820	Yes	Yes	46.4625	46	0.090	30.80727	26	0.947	393	360	1.729	Yes	Yes	340.2881	305	1.966	Yes	Yes	38.03179	41	0.538	14.79675	13	0.432
185	Calibration	J15-C-Entry	0	3314	1141	74	67	0.790	Yes	Yes	64.40913	65	0.046	Yes	Yes	9.422265	2	2.985	0	0	0.631	36	32	0.848	Yes	Yes	28.81063	29	0.096	Yes	Yes	7.148077	2	2.486	0.500615	0	0.285	34	35	0.268	Yes	Yes	33.51322	34	0.106	Yes	Yes	0	1	1.356	0	0	0.263
186	Validation	J15-D-Entry	0	1140	1141	324	260	3.740	Yes	Yes	225.4319	181	3.154	Yes	Yes	51.82246	52	0.009	46.30206	27	3.133	265	223	2.684	Yes	Yes	182.5259	149	2.628	Yes	Yes	45.66827	46	0.099	36.54086	28	1.544	502	425	3.559	Yes	Yes	409.8925	355	2.827	Yes	Yes	73.6866	54	2.464	18.27006	17	0.400
187	Calibration	J16-A-Entry	0	80494	3163	72	73	0.097	Yes	Yes	52.81548	53	0.065	Yes	Yes	11.77783	12	0.059	7.099537	7	0.056	79	74	0.567	Yes	Yes	58.67531	54	0.592	Yes	Yes	15.4875	15	0.125	5.013957	5	0.015	124	123	0.037	Yes	Yes	106.9845	107	0.037	Yes	Yes	15.45042	15	0.115	1.082473	2	0.369
188	Calibration	J16-B-Entry	0	3164	3163	308	305	0.166	Yes	Yes	243.4665	241	0.143	Yes	Yes	48.28911	48	0.082	16.56559	16	0.026	180	180	0.015	Yes	Yes	126.4857	126	0.043	Yes	Yes	32.76202	33	0.042	21.03489	21	0.010	277	280	0.130	Yes	Yes	232.0146	234	0.107	Yes	Yes	35.65481	36	0.058	9.789208	10	0.059
189	Calibration	J16-C-Entry	0	3162	3163	118	88	2.959	Yes	Yes	91.46096	72	2.174	Yes	Yes	18.84453	16	0.767	7.396194	0	3.664	68	46	2.953	Yes	Yes	47.43214	37	1.589	Yes	Yes	11.91346	8	1.240	8.996709	1	3.632	79	45	4.271	Yes	Yes	68.31542	37	4.282	Yes	Yes	9.507948	8	0.506	1.308358	0	1.265
190	Calibration	J16-D-Entry	0	3166	3163	311	281	1.722	Yes	Yes	208.6856	189	1.405	Yes	Yes	65.95585	62	0.451	36.23595	30	1.076	194	195	0.036	Yes	Yes	135.9721	136	0.005	Yes	Yes	35.54183	36	0.077	22.51066	23	0.022	292	287	0.319	Yes	Yes	235.8815	233	0.193	Yes	Yes	41.59727	42	0.068	14.79675	12	0.797
191	Validation	J17-A-Entry	0	1044	1043	576	618	1.710	Yes	Yes	426.3884	470	2.070	Yes	Yes	87.15595	89	0.152	62.86765	59	0.443	538	532	0.261	Yes	Yes	401.0651	396	0.238	Yes	Yes	84.98269	85	0.004	51.97515	51	0.175	976	910	2.128	Yes	Yes	840.4085	789	1.786	Yes	Yes	108.1529	98	1.024	27.20268	23	0.795
192	Validation	J17-B-Entry	0	1041	1042	1046	1055	0.282	Yes	Yes	842.4714	861	0.645	Yes	Yes	141.334	133	0.676	62.26759	60	0.226	576	595	0.804	Yes	Yes	433.7406	446	0.603	Yes	Yes	93.52067	97	0.373	48.40826	52	0.449	808	820	0.413	Yes	Yes	702.4887	712	0.345	Yes	Yes	78.44057	86	0.789	27.20268	23	0.911
193	Calibration	J17-C-Entry	0	3211	3320	168	102	5.644	No	Yes	141.7001	76	6.245	No	Yes	21.2001	21	0.100	4.733024	5	0.066	104	103	0.043	Yes	Yes	78.17519	78	0.025	Yes	Yes	20.65	21	0.024	5.084357	5	0.044	138	119	1.693	Yes	Yes	127.608	107	1.857	Yes	Yes	10.69644	11	0.164	0	0	0.880
194	Calibration	J18-A-Entry	0	3221	3217	79	53	3.262	Yes	Yes	68.27367	46	2.895	Yes	Yes	7.066699	5	0.815	3.698097	1	1.634	80	41	5.026	No	Yes	63.41853	34	4.214	Yes	Yes	14.49471	6	2.646	1.980293	1	0.988	134	94	3.804	Yes	Yes	119.8742	85	3.429	Yes	Yes	14.26192	8	1.873	0	0	0.875
195	Calibration	J18-D-Entry	0	3211	3216	145	76	6.553	No	Yes	118.5128	63	5.870	No	Yes	22.37788	9	3.350	4.436367	5	0.076	91	48	5.226	No	Yes	70.62119	35	4.898	Yes	Yes	17.07596	9	2.237	3.77155	4	0.029	130	78	5.088	No	Yes	116.0073	70	4.771	Yes	Yes	10.69644	5	2.033	3.24742	3	0.103
196	Calibration	J18-E-Entry	0	3322	3216	62	53	1.202	Yes	Yes	45.08639	31	2.254	Yes	Yes	12.95561	17	0.950	3.698097	5	0.566	50	59	1.186	Yes	Yes	38.47274	38	0.068	Yes	Yes	7.74375	16	2.360	3.868021	5	0.510	63	66	0.462	Yes	Yes	56.71469	56	0.114	Yes	Yes	5.942468	10	1.474	0	0	0.880
197	Calibration	J18-F-Entry	0	3322	3217	93	104	1.106	Yes	Yes	81.1555	92	1.180	Yes	Yes	8.244482	9	0.217	3.40144	3	0.375	38	40	0.340	Yes	Yes	30.21603	32	0.392	Yes	Yes	6.949519	7	0.019	0.882593	1	0.128	61	69	0.905	Yes	Yes	55.42572	63	1.038	Yes	Yes	4.753974	5	0.039	1.082473	0	0.961
198	Validation	J19-A-Entry	0	1046	1045	600	603	0.096	Yes	Yes	437.9821	453	0.721	Yes	Yes	95.40043	89	0.622	67.00736	60	0.865	582	562	0.828	Yes	Yes	437.2541	425	0.577	Yes	Yes	91.93221	87	0.568	52.524	50	0.343	1067	1053	0.430	Yes	Yes	916.4578	926	0.319	Yes	Yes	123.6033	104	1.847	27.20268	23	0.791
199	Calibration	J19-C-Entry	0	3221	1045	160	158	0.201	Yes	Yes	140.4119	138	0.175	Yes	Yes	16.48896	16	0.054	3.40144	3	0.133	75	75	0.072	Yes	Yes	57.97262	58	0.004	Yes	Yes	14.0976	14	0.026	3.077994	3	0.328	83	74	1.043	Yes	Yes	74.76027	66	1.092	Yes	Yes	8.319455	8	0.165	0	0	0.871
200	Calibration	J20-A-Entry	0	72767	80507	771	748	0.868	Yes	Yes	597.7167	576	0.913	Yes	Yes	103.6449	104	0.037	70.11214	68	0.263	706	668	1.463	Yes	Yes	547.402	509	1.657	Yes	Yes	105.2356	105	0.023	53.29841	53	0.005	1271	1257	0.380	Yes	Yes	1130.427	1117	0.413	Yes	Yes	117.6609	118	0.021	22.59995	23	0.020
201	Calibration	J20-B-Entry	0	80509	80507	178	124	4.391	Yes	Yes	159.7346	108	4.435	Yes	Yes	11.77783	12	0.128	6.064609	3	1.396	110	111	0.096	Yes	Yes	87.31027	93	0.575	Yes	Yes	14.49471	14	0.131	8.184516	4	1.587	146	118	2.467	Yes	Yes	123.7411	97	2.568	Yes	Yes	19.0159	20	0.200	3.699189	1	1.441
202	Calibration	J20-C-Entry	0	80506	80507	1032	1033	0.044	Yes	Yes	859.2178	862	0.082	Yes	Yes	111.8894	111	0.109	60.936	61	0.023	574	518	2.399	Yes	Yes	436.2	386	2.474	Yes	Yes	87.96106	82	0.648	50.12912	50	0.010	757	734	0.821	Yes	Yes	652.2189	644	0.312	Yes	Yes	84.38304	70	1.635	20.03019	20	0.021
203	Validation	J21-A-Entry	0	2040	2028	137	129	0.706	Yes	Yes	115.9364	113	0.277	Yes	Yes	21.2001	16	1.201	0	0	0.000	117	95	2.113	Yes	Yes	94.33726	80	1.531	Yes	Yes	20.05433	15	1.210	2.384437	0	2.184	203	225	1.467	Yes	Yes	185.6117	206	1.447	Yes	Yes	16.63891	19	0.543	1.082473	0	1.471
204	Validation	J21-B-Entry	0	2027	2028	174	198	1.715	Yes	Yes	155.8701	177	1.651	Yes	Yes	16.48896	18	0.458	2.069855	2	0.119	89	82	0.818	Yes	Yes	74.6617	70	0.530	Yes	Yes	13.50192	10	1.047	1.312807	2	0.414	117	102	1.351	Yes	Yes	108.2735	96	1.180	Yes	Yes	8.319455	6	1.035	0	1	1.021
205	Validation	J21-C-Entry	0	2039	2028	83	52	3.860	Yes	Yes	68.27367	43	3.345	Yes	Yes	10.60005	8	1.023	4.436367	1	2.250	62	42	2.778	Yes	Yes	49.36456	34	2.419	Yes	Yes	9.133654	7	0.658	3.218795	1	1.784	128	87	3.903	Yes	Yes	116.0073	78	3.818	Yes	Yes	10.69644	9	0.544	1.308358	0	1.376
206	Validation	J21-D-Entry	0	2029	2028	101	78	2.393	Yes	Yes	81.1555	69	1.432	Yes	Yes	15.31118	8	2.034	4.436367	1	1.949	48	50	0.252	Yes	Yes	38.64841	41	0.299	Yes	Yes	7.74375	8	0.020	1.716951	2	0.138	89	81	0.879	Yes	Yes	81.20512	74	0.762	Yes	Yes	7.130961	6	0.393	1.082473	1	0.404
207	Calibration	J22-B-Entry	0	80104	80103	49	64	2.087	Yes	Yes	16.74637	32	3.040	Yes	Yes	4.711132	5	0.328	27.21826	27	0.003	80	112	3.333	Yes	Yes	28.98631	61	4.816	Yes	Yes	14.89183	15	0.028	35.82904	36	0.031	226	221	0.315	Yes	Yes	186.9007	187	0.007	Yes	Yes	15.45042	15	0.115	23.32456	19	0.946
213	Calibration	J24-A-Entry	0	80125	5058	208	208	0.038	Yes	Yes	179.0574	179	0.002	Yes	Yes	24.73345	25	0.049	4.13971	4	0.156	222	222	0.030	Yes	Yes	193.5934	194	0.029	Yes	Yes	24.4226	24	0.088	3.719409	4	0.239	403	407	0.216	Yes	Yes	381.5352	382	0.028	Yes	Yes	21.39288	24	0.608	0	1	1.330
214	Calibration	J24-C-Entry	0	80119	5058	373	347	1.401	Yes	Yes	325.9102	328	0.112	Yes	Yes	27.08901	15	2.516	20.40864	3	4.923	246	199	3.146	Yes	Yes	209.9311	174	2.621	Yes	Yes	29.78365	22	1.437	6.374999	3	1.515	348	284	3.614	Yes	Yes	326.1094	269	3.333	Yes	Yes	17.8274	13	1.252	3.925073	2	1.059
215	Calibration	J24-D-Entry	0	80184	5058	289	289	0.007	Yes	Yes	225.4319	225	0.037	Yes	Yes	50.64467	51	0.050	12.57083	13	0.025	210	210	0.031	Yes	Yes	168.1206	168	0.009	Yes	Yes	35.14471	35	0.024	6.704837	7	0.073	425	336	4.601	Yes	Yes	397.0028	308	4.753	Yes	Yes	27.33535	27	0.118	1.082473	1	0.078
216	Validation	J25-B-Entry	0	1477	5055	348	324	1.325	Yes	Yes	275.6711	279	0.198	Yes	Yes	38.86684	24	2.596	33.28287	20	2.508	168	151	1.323	Yes	Yes	115.4182	101	1.360	Yes	Yes	27.99663	21	1.401	24.09463	29	0.859	277	160	7.910	No	No	243.6154	146	7.024	No	Yes	23.76987	10	3.445	9.158504	4	1.821
217	Calibration	J25-C-Entry	0	5098	5055	240	242	0.141	Yes	Yes	212.5501	214	0.088	Yes	Yes	20.02231	20	0.007	7.099537	8	0.344	129	130	0.103	Yes	Yes	112.6074	113	0.038	Yes	Yes	10.72212	11	0.084	5.607137	6	0.202	217	239	1.470	Yes	Yes	202.3683	224	1.514	Yes	Yes	11.88494	12	0.036	2.390831	2	0.032
218	Calibration	J26-A-Entry	0	70417	5059	317	318	0.010	Yes	Yes	287.2647	287	0.016	Yes	Yes	23.55566	24	0.089	6.506222	7	0.003	228	228	0.007	Yes	Yes	190.7826	191	0.017	Yes	Yes	30.975	31	0.003	5.892645	6	0.060	324	324	0.031	Yes	Yes	293.8852	294	0.005	Yes	Yes	29.71234	30	0.049	0	0	0.875
220	Calibration	J26-C-Entry	0	80086	5059	285	237	3.004	Yes	Yes	239.602	203	2.440	Yes	Yes	38.86684	33	0.961	6.802879	0	3.410	198	147	3.824	Yes	Yes	166.1882	128	3.189	Yes	Yes	26.20961	20	1.374	5.321629	0	2.986	363	279	4.675	Yes	Yes	314.5087	238	4.595	Yes	Yes	47.53974	41	0.975	1.082473	0	1.162
221	Calibration	J26-D-Entry	0	80060	5059	70	70	0.013	Yes	Yes	63.12094	63	0.014	Yes	Yes	4.711132	5	0.131	2.366512	2	0.044	58	58	0.040	Yes	Yes	47.95916	48	0.006	Yes	Yes	7.942308	8	0.159	2.340107	2	0.060	101	100	0.151	Yes	Yes	94.09482	92	0.216	Yes	Yes	3.565481	4	0.223	3.699189	4	0.068
222	Validation	J27-A-Entry	0	5115	1499	399	415	0.783	Yes	Yes	234.4492	258	1.475	Yes	Yes	60.06694	64	0.454	104.885	94	1.093	451	454	0.138	Yes	Yes	255.4309	301	2.713	Yes	Yes	78.23173	60	2.160	117.8305	94	2.366	790	728	2.269	Yes	Yes	639.3292	635	0.161	Yes	Yes	82.00606	46	4.511	68.84424	46	2.945
223	Validation	J27-B-Entry	0	80270	1498	232	270	2.381	Yes	Yes	198.3801	238	2.697	Yes	Yes	31.80014	21	2.023	2.069855	10	3.332	135	112	2.028	Yes	Yes	112.2561	93	1.927	Yes	Yes	19.85577	11	2.381	2.551309	9	2.629	205	171	2.434	Yes	Yes	185.6117	154	2.462	Yes	Yes	17.8274	14	0.875	1.082473	3	1.496
224	Validation	J27-C-Entry	0	5067	5062	687	586	4.002	Yes	No	425.1002	390	1.715	Yes	Yes	114.245	84	3.024	147.3373	111	3.184	433	415	0.861	Yes	Yes	236.458	248	0.747	Yes	Yes	67.50961	57	1.384	128.8114	110	1.689	665	554	4.489	Yes	No	518.166	460	2.646	Yes	Yes	80.81756	42	4.958	65.54987	52	1.752
225	Validation	J27-D-Entry	0	80075	1500	431	374	2.861	Yes	Yes	382.5902	357	1.339	Yes	Yes	38.86684	17	4.176	9.611005	0	4.384	271	199	4.694	Yes	Yes	218.1878	174	3.146	Yes	Yes	42.09423	25	2.965	10.73582	0	4.634	382	274	5.958	No	No	338.9991	251	5.117	No	Yes	41.59727	23	3.333	1.082473	0	1.471
226	Calibration	J28-B-Entry	0	80274	5066	572	586	0.583	Yes	Yes	425.1002	457	1.508	Yes	Yes	102.4671	85	1.808	44.52212	44	0.021	353	316	1.990	Yes	Yes	225.5662	226	0.032	Yes	Yes	66.91394	50	2.174	60.36823	40	2.857	525	508	0.746	Yes	Yes	422.7822	410	0.640	Yes	Yes	71.30961	71	0.033	31.30669	28	0.668
227	Validation	J29-A-Entry	0	80278	5071	66	85	2.234	Yes	Yes	54.10367	77	2.855	Yes	Yes	9.422265	6	1.273	2.069855	2	0.168	42	63	2.958	Yes	Yes	34.25655	55	3.048	Yes	Yes	6.750961	8	0.392	0.834358	1	0.075	68	56	1.585	Yes	Yes	65.73748	53	1.650	Yes	Yes	2.376987	2	0.535	0	1	1.417
228	Validation	J29-B-Entry	0	5079	79913	98	38	7.304	No	Yes	87.59641	35	6.738	No	Yes	10.60005	3	3.038	0	0	0.793	50	26	3.911	Yes	Yes	36.54032	20	3.204	Yes	Yes	11.7149	6	2.007	1.383208	0	1.193	87	47	4.902	Yes	Yes	78.62718	42	4.673	Yes	Yes	8.319455	4	1.596	0	0	0.711
229	Validation	J29-C-Entry	0	5070	80283	104	74	3.135	Yes	Yes	87.59641	62	3.020	Yes	Yes	14.1334	12	0.665	2.069855	1	0.900	53	55	0.362	Yes	Yes	42.51325	47	0.601	Yes	Yes	8.736538	8	0.108	1.550079	1	1.006	121	87	3.373	Yes	Yes	108.2735	72	3.781	Yes	Yes	11.88494	13	0.396	1.308358	1	0.074
230	Validation	J30-B-Entry	0	42090	80324	252	243	0.544	Yes	Yes	213.8383	194	1.376	Yes	Yes	34.15571	38	0.609	3.698097	11	2.732	147	141	0.492	Yes	Yes	111.9047	108	0.362	Yes	Yes	26.20961	21	1.031	8.715106	12	0.913	230	233	0.177	Yes	Yes	195.9235	200	0.283	Yes	Yes	29.71234	27	0.492	4.781662	6	0.571
231	Validation	J30-C-Entry	0	80323	80322	67	95	3.064	Yes	Yes	55.39185	84	3.419	Yes	Yes	11.77783	10	0.470	0	1	1.083	38	36	0.259	Yes	Yes	29.51333	26	0.581	Yes	Yes	7.545192	8	0.099	0.882593	2	0.997	51	35	2.431	Yes	Yes	47.6919	31	2.716	Yes	Yes	3.565481	4	0.183	0	1	1.148
232	Validation	J31-A-Entry	0	80319	80321	335	293	2.354	Yes	Yes	287.339	249	2.338	Yes	Yes	37.18777	39	0.236	10.39339	6	1.734	282	289	0.427	Yes	Yes	220.978	232	0.751	Yes	Yes	50.35692	53	0.337	10.92012	4	2.350	456	427	1.368	Yes	Yes	393.8558	374	1.009	Yes	Yes	55.68366	49	0.975	5.972788	4	0.857
233	Validation	J31-B-Entry	0	80330	80321	437	439	0.104	Yes	Yes	369.9982	373	0.140	Yes	Yes	63.57909	63	0.012	3.464463	3	0.234	275	278	0.188	Yes	Yes	215.0733	221	0.407	Yes	Yes	47.52561	50	0.309	12.71801	8	1.578	475	480	0.245	Yes	Yes	425.3642	428	0.124	Yes	Yes	44.78903	51	0.864	4.870258	2	1.756
234	Calibration	J31-C-Entry	0	80325	80321	81	56	3.033	Yes	Yes	69.53867	47	2.911	Yes	Yes	10.79645	9	0.733	1.054103	0	0.737	62	45	2.320	Yes	Yes	48.13205	36	1.826	Yes	Yes	12.74091	8	1.542	0.898946	1	0.145	106	101	0.480	Yes	Yes	90.58683	85	0.592	Yes	Yes	15.73669	16	0.069	0	0	0.875
235	Calibration	J32-A-Entry	0	80330	5076	373	370	0.158	Yes	Yes	317.5162	318	0.029	Yes	Yes	43.1858	43	0.027	12.19944	9	1.046	316	316	0.016	Yes	Yes	249.7856	250	0.013	Yes	Yes	56.82849	57	0.021	9.288214	9	0.024	523	523	0.029	Yes	Yes	447.6827	447	0.012	Yes	Yes	67.7888	68	0.034	7.947777	7	0.251
236	Calibration	J32-B-Entry	0	80327	5076	158	142	1.250	Yes	Yes	135.1412	120	1.338	Yes	Yes	20.39329	20	0.088	2.108206	2	0.128	109	102	0.731	Yes	Yes	85.88618	79	0.810	Yes	Yes	21.03261	21	0.007	2.428617	2	0.084	113	113	0.017	Yes	Yes	91.89968	92	0.003	Yes	Yes	19.36823	19	0.070	2.205059	2	0.063
237	Calibration	J32-C-Entry	0	42100	5076	431	431	0.001	Yes	Yes	347.6933	348	0.001	Yes	Yes	76.77475	77	0.007	6.626771	7	0.043	319	324	0.262	Yes	Yes	252.1117	257	0.300	Yes	Yes	55.2106	55	0.030	11.74338	12	0.041	605	606	0.032	Yes	Yes	533.0181	533	0.006	Yes	Yes	70.20983	70	0.029	2.205059	3	0.547
238	Calibration	J33-A-Entry	0	5114	42099	605	617	0.517	Yes	Yes	524.2903	518	0.283	Yes	Yes	73.02255	74	0.126	7.396194	26	4.474	483	504	0.939	Yes	Yes	376.1193	376	0.004	Yes	Yes	87.96106	88	0.021	19.04679	40	3.799	807	813	0.214	Yes	Yes	680.5762	679	0.044	Yes	Yes	111.7184	112	0.007	14.34499	22	1.691
239	Calibration	J33-C-Entry	0	1426	1505	112	111	0.100	Yes	Yes	100.4782	100	0.048	Yes	Yes	9.422265	9	0.139	2.069855	2	0.109	43	43	0.067	Yes	Yes	37.41869	37	0.067	Yes	Yes	4.963942	5	0.016	0.834358	1	0.076	68	68	0.069	Yes	Yes	61.87057	62	0.016	Yes	Yes	5.942468	6	0.024	0	0	0.875
240	Validation	J34-A-Entry	0	5113	1593	479	537	2.588	Yes	Yes	333.6393	358	1.335	Yes	Yes	78.91147	100	2.185	66.12413	79	1.508	328	388	3.195	Yes	Yes	205.0123	231	1.746	Yes	Yes	58.57452	79	2.423	64.13324	79	1.728	667	669	0.085	Yes	Yes	556.8351	534	0.983	Yes	Yes	70.12112	94	2.599	40.23931	42	0.256
241	Validation	J34-B-Entry	0	1574	5019	620	516	4.343	Yes	No	557.783	458	4.443	Yes	No	49.46689	46	0.508	12.57083	13	0.035	480	428	2.444	Yes	Yes	405.6326	359	2.409	Yes	Yes	63.3399	57	0.800	10.87663	12	0.360	690	547	5.767	No	No	621.2836	488	5.671	No	No	62.99016	53	1.297	5.638251	6	0.012
242	Calibration	J35-A-Entry	0	80641	1532	609	611	0.095	Yes	Yes	502.3912	502	0.019	Yes	Yes	68.31142	68	0.040	38.31255	41	0.493	520	521	0.023	Yes	Yes	390.5246	391	0.024	Yes	Yes	72.87067	73	0.015	56.78963	57	0.012	765	763	0.075	Yes	Yes	676.7093	675	0.075	Yes	Yes	64.17865	64	0.027	23.95526	24	0.022
243	Calibration	J35-B-Entry	0	70396	5017	72	61	1.309	Yes	Yes	66.98549	57	1.311	Yes	Yes	3.533349	3	0.255	1.034928	1	0.110	53	34	2.965	Yes	Yes	45.49972	28	2.870	Yes	Yes	6.552404	4	0.948	1.049465	1	0.095	63	34	4.075	Yes	Yes	60.5816	32	4.153	Yes	Yes	1.188494	1	0.180	1.082473	1	0.063
244	Calibration	J35-D-Entry	0	80639	5017	824	806	0.626	Yes	Yes	609.3103	590	0.773	Yes	Yes	127.2006	127	0.027	87.27778	89	0.144	644	644	0.006	Yes	Yes	473.0917	473	0.005	Yes	Yes	95.90336	96	0.011	74.89514	75	0.017	947	952	0.184	Yes	Yes	810.7622	816	0.180	Yes	Yes	95.07948	95	0.040	40.87001	41	0.020
245	Calibration	J35-E-Entry	0	1550	1567	254	227	1.712	Yes	Yes	231.8729	205	1.838	Yes	Yes	17.66675	18	0.084	4.436367	5	0.117	185	185	0.024	Yes	Yes	148.0937	148	0.004	Yes	Yes	32.3649	32	0.064	4.628073	5	0.036	309	306	0.171	Yes	Yes	275.8396	273	0.187	Yes	Yes	28.52385	29	0.039	4.781662	5	0.051
246	Calibration	J36-A-Entry	0	70278	5087	452	450	0.078	Yes	Yes	398.0484	397	0.065	Yes	Yes	42.40019	42	0.049	11.23925	11	0.012	327	327	0.001	Yes	Yes	284.9442	285	0.002	Yes	Yes	31.17356	31	0.031	10.62109	11	0.034	447	441	0.309	Yes	Yes	415.0484	414	0.065	Yes	Yes	28.52385	23	1.028	3.473304	4	0.021
247	Calibration	J36-B-Entry	0	80576	5087	614	615	0.010	Yes	Yes	510.1203	510	0.004	Yes	Yes	76.5559	77	0.046	27.65988	28	0.012	548	544	0.173	Yes	Yes	457.1053	453	0.170	Yes	Yes	60.36154	60	0.069	30.75123	31	0.021	816	812	0.144	Yes	Yes	736.0019	732	0.158	Yes	Yes	68.93263	69	0.002	11.32345	12	0.053
248	Calibration	J36-C-Entry	0	80615	5087	355	355	0.004	Yes	Yes	307.8756	308	0.005	Yes	Yes	27.08901	27	0.017	19.82207	20	0.023	295	300	0.304	Yes	Yes	239.4445	241	0.125	Yes	Yes	34.15192	35	0.090	21.11701	24	0.587	397	404	0.361	Yes	Yes	359.6227	363	0.189	Yes	Yes	26.14686	26	0.027	11.32345	15	1.036
249	Calibration	J36-D-Entry	0	80573	5087	582	584	0.062	Yes	Yes	456.0166	458	0.100	Yes	Yes	75.37812	75	0.057	50.73843	51	0.019	468	469	0.050	Yes	Yes	360.8356	361	0.006	Yes	Yes	58.1774	59	0.107	48.91278	49	0.020	752	754	0.071	Yes	Yes	668.9755	671	0.064	Yes	Yes	54.6707	55	0.053	28.51104	28	0.020
250	Validation	J37-A-Entry	0	80583	5080	347	366	1.019	Yes	Yes	301.4347	293	0.469	Yes	Yes	29.44458	55	3.908	15.97227	18	0.478	309	304	0.310	Yes	Yes	236.8094	227	0.647	Yes	Yes	46.06538	53	1.044	26.55337	24	0.589	484	431	2.471	Yes	Yes	427.9381	368	3.019	Yes	Yes	43.97426	54	1.428	11.77522	9	0.807
251	Validation	J37-B-Entry	0	80627	5080	257	142	8.140	No	No	222.8556	129	7.075	No	Yes	21.2001	12	2.388	13.16415	2	4.238	146	100	4.108	Yes	Yes	117.5263	85	3.277	Yes	Yes	20.25288	14	1.617	8.303152	2	2.614	190	124	5.292	No	Yes	164.9882	107	4.981	Yes	Yes	22.58138	15	1.795	2.164946	2	0.273
252	Validation	J37-C-Entry	0	1534	5080	404	306	5.196	No	Yes	328.4865	242	5.104	No	Yes	47.11132	47	0.069	28.10149	17	2.355	367	324	2.292	Yes	Yes	295.309	247	2.964	Yes	Yes	45.46971	53	1.127	26.2457	24	0.349	585	470	4.977	Yes	No	542.6564	429	5.159	No	No	34.46631	35	0.096	7.624262	6	0.446
253	Validation	J38-A-Entry	0	80348	80365	241	256	1.001	Yes	Yes	212.5501	218	0.386	Yes	Yes	12.95561	28	3.409	15.08904	10	1.538	192	169	1.746	Yes	Yes	136.8505	125	1.014	Yes	Yes	27.40096	29	0.230	27.97046	15	2.822	257	246	0.681	Yes	Yes	220.4139	209	0.790	Yes	Yes	23.76987	27	0.620	13.08358	11	0.684
254	Validation	J38-C-Entry	0	1215	80365	169	183	1.075	Yes	Yes	141.7001	138	0.287	Yes	Yes	14.1334	29	3.194	12.72253	16	0.751	184	170	1.029	Yes	Yes	147.391	128	1.683	Yes	Yes	24.02548	27	0.600	12.34586	15	0.810	341	307	1.845	Yes	Yes	311.9308	265	2.733	Yes	Yes	26.14686	30	0.751	2.616716	12	3.435
266	Validation	J43-A-Entry	0	80467	5012	507	510	0.133	Yes	Yes	408.3539	412	0.197	Yes	Yes	81.26704	73	0.954	17.1589	25	1.618	336	341	0.307	Yes	Yes	246.9985	256	0.566	Yes	Yes	64.13413	58	0.723	24.56917	27	0.458	554	550	0.184	Yes	Yes	482.0748	471	0.501	Yes	Yes	59.42468	62	0.301	12.85769	17	1.102
267	Validation	J43-B-Entry	0	5010	5012	557	460	4.296	Yes	Yes	457.3048	377	3.929	Yes	Yes	77.73369	52	3.153	21.59527	30	1.731	328	271	3.303	Yes	Yes	241.0255	198	2.919	Yes	Yes	67.70817	48	2.638	19.44048	26	1.285	605	504	4.270	Yes	No	523.3219	434	4.090	Yes	Yes	55.8592	52	0.467	25.89432	18	1.632
268	Validation	J43-C-Entry	0	80462	5012	105	83	2.256	Yes	Yes	92.74914	63	3.401	Yes	Yes	9.422265	5	1.786	2.366512	15	4.346	81	47	4.171	Yes	Yes	59.37801	25	5.208	No	Yes	17.87019	9	2.561	3.363501	13	3.427	85	43	5.174	No	Yes	79.91615	35	5.984	No	Yes	4.753974	2	1.263	0	6	3.546
269	Calibration	J44-A-Entry	0	1088	1089	763	721	1.572	Yes	Yes	614.4631	572	1.761	Yes	Yes	94.22265	94	0.001	54.73318	55	0.010	475	475	0.001	Yes	Yes	329.9169	330	0.005	Yes	Yes	84.18846	84	0.018	60.8623	61	0.013	675	676	0.028	Yes	Yes	567.1469	570	0.109	Yes	Yes	76.06359	76	0.016	31.80541	30	0.312
270	Calibration	J44-B-Entry	0	1091	1089	568	567	0.047	Yes	Yes	434.1175	433	0.041	Yes	Yes	80.08925	80	0.023	53.69826	54	0.008	302	301	0.045	Yes	Yes	208.3501	208	0.024	Yes	Yes	51.02933	51	0.004	42.56385	42	0.064	592	592	0.025	Yes	Yes	511.7211	511	0.025	Yes	Yes	57.04769	57	0.008	23.72937	24	0.004
271	Calibration	J44-C-Entry	0	1090	1089	661	661	0.001	Yes	Yes	564.224	564	0.009	Yes	Yes	60.06694	60	0.014	36.68431	37	0.051	356	357	0.032	Yes	Yes	267.5524	268	0.026	Yes	Yes	63.93558	64	0.009	24.81425	25	0.020	564	563	0.041	Yes	Yes	487.2307	487	0.011	Yes	Yes	54.6707	55	0.043	22.42102	21	0.223
273	Calibration	J45-B-Entry	0	80474	5003	113	142	2.508	Yes	Yes	101.7664	112	0.979	Yes	Yes	7.066699	18	3.017	4.436367	12	2.641	59	64	0.740	Yes	Yes	43.39162	43	0.060	Yes	Yes	11.51635	12	0.141	3.77155	9	2.219	79	92	1.367	Yes	Yes	70.89336	75	0.521	Yes	Yes	5.942468	12	2.028	2.164946	4	1.169
274	Calibration	J45-E-Entry	0	1093	5003	472	473	0.070	Yes	Yes	385.1666	385	0.011	Yes	Yes	47.11132	49	0.230	39.34748	39	0.021	326	322	0.239	Yes	Yes	227.6743	228	0.022	Yes	Yes	55.99327	56	0.002	42.15971	38	0.737	651	592	2.368	Yes	Yes	571.0138	517	2.316	Yes	Yes	57.04769	57	0.012	22.6469	18	1.096
275	Calibration	J46-A-Entry	0	80257	80006	47	35	1.763	Yes	Yes	34.78093	28	1.175	Yes	Yes	9.422265	6	1.102	2.366512	1	1.275	31	30	0.074	Yes	Yes	25.47282	25	0.092	Yes	Yes	5.1625	5	0.072	0.166872	0	0.412	53	52	0.070	Yes	Yes	48.98087	49	0.004	Yes	Yes	2.376987	2	0.255	1.308358	1	0.143
276	Calibration	J46-B-Entry	0	80258	80007	113	112	0.045	Yes	Yes	104.3428	104	0.023	Yes	Yes	8.244482	8	0.086	0	0	0.000	46	48	0.272	Yes	Yes	38.47274	41	0.388	Yes	Yes	6.750961	7	0.095	0.834358	0	1.292	63	62	0.110	Yes	Yes	58.00366	58	0.001	Yes	Yes	3.565481	4	0.223	1.308358	0	1.618
277	Calibration	J46-C-Entry	0	80259	79951	22	26	0.879	Yes	Yes	20.61092	21	0.087	Yes	Yes	1.177783	5	2.050	0	0	0.880	11	13	0.427	Yes	Yes	8.608055	9	0.132	Yes	Yes	2.58125	3	0.506	0.166872	0	0.412	10	15	1.264	Yes	Yes	9.022791	11	0.610	Yes	Yes	1.188494	3	1.008	0	1	1.516
278	Calibration	J46-D-Entry	0	79934	79951	70	62	1.039	Yes	Yes	61.83276	53	1.116	Yes	Yes	5.888916	6	0.046	2.366512	2	0.044	33	27	1.106	Yes	Yes	27.05389	21	1.259	Yes	Yes	4.963942	5	0.016	0.667486	1	0.121	70	60	1.298	Yes	Yes	64.44851	54	1.419	Yes	Yes	4.753974	4	0.146	1.082473	2	0.618
279	Calibration	J47-A-Entry	0	80003	79935	214	214	0.029	Yes	Yes	176.481	176	0.033	Yes	Yes	29.44458	29	0.082	7.837807	9	0.449	136	136	0.008	Yes	Yes	89.24269	89	0.026	Yes	Yes	25.61394	26	0.076	21.1092	21	0.011	208	212	0.254	Yes	Yes	183.0338	183	0.000	Yes	Yes	11.88494	16	1.119	13.4884	13	0.137
280	Calibration	J47-B-Entry	0	79934	79935	123	141	1.561	Yes	Yes	114.6482	133	1.607	Yes	Yes	7.066699	7	0.025	1.034928	1	0.113	37	37	0.009	Yes	Yes	29.86468	30	0.027	Yes	Yes	6.353846	6	0.142	0.500615	1	0.334	40	40	0.003	Yes	Yes	32.22425	32	0.031	Yes	Yes	5.942468	6	0.024	2.164946	2	0.090
281	Calibration	J47-C-Entry	0	79936	79935	269	286	1.012	Yes	Yes	190.651	205	1.025	Yes	Yes	53.00024	55	0.206	25.29336	26	0.181	155	155	0.008	Yes	Yes	105.9318	106	0.007	Yes	Yes	30.18077	30	0.046	19.0585	19	0.020	299	300	0.021	Yes	Yes	261.6609	262	0.020	Yes	Yes	24.95836	25	0.008	12.63181	13	0.000
282	Calibration	J47-D-Entry	0	1170	79935	193	137	4.321	Yes	Yes	186.7865	131	4.410	Yes	Yes	5.888916	6	0.046	0	0	0.000	28	27	0.021	Yes	Yes	26.17551	26	0.034	Yes	Yes	0.992788	1	0.364	0.333743	0	0.817	29	32	0.473	Yes	Yes	27.06837	30	0.476	Yes	Yes	2.376987	2	0.060	0	0	0.000
283	Validation	J48-C-Entry	0	79938	79930	336	208	7.802	No	No	322.0456	197	7.756	No	No	11.77783	10	0.398	2.366512	0	2.176	64	53	1.502	Yes	Yes	58.14829	48	1.420	Yes	Yes	4.963942	5	0.042	1.049465	0	1.449	63	68	0.605	Yes	Yes	60.5816	61	0.010	Yes	Yes	2.376987	7	2.201	0	0	0.000
284	Validation	J48-D-Entry	0	1531	79930	114	123	0.816	Yes	Yes	109.4955	118	0.842	Yes	Yes	4.711132	5	0.052	0	0	0.000	62	53	1.170	Yes	Yes	56.74289	49	1.085	Yes	Yes	4.368269	4	0.044	1.0977	0	1.482	73	91	1.937	Yes	Yes	72.18233	85	1.467	Yes	Yes	1.188494	6	2.442	0	0	0.000
285	Calibration	J49-A-Entry	0	79927	79926	207	207	0.039	Yes	Yes	175.1928	175	0.005	Yes	Yes	28.26679	28	0.052	3.104783	4	0.410	130	133	0.235	Yes	Yes	109.6209	110	0.035	Yes	Yes	18.26731	21	0.542	2.002458	2	0.054	194	202	0.561	Yes	Yes	186.9007	187	0.039	Yes	Yes	7.130961	14	2.134	0	0	0.918
286	Calibration	J51-A-Entry	0	80521	5044	57	55	0.150	Yes	Yes	45.08639	45	0.016	Yes	Yes	9.422265	9	0.139	2.069855	1	0.447	33	33	0.058	Yes	Yes	25.47282	25	0.094	Yes	Yes	6.750961	7	0.095	1.264572	1	0.101	29	30	0.178	Yes	Yes	27.06837	27	0.007	Yes	Yes	2.376987	3	0.380	0	0	0.884
287	Calibration	J51-B-Entry	0	5093	5044	23	21	0.294	Yes	Yes	19.32274	19	0.074	Yes	Yes	2.355566	2	0.241	1.034928	0	0.848	16	16	0.003	Yes	Yes	9.662103	10	0.108	Yes	Yes	5.1625	5	0.072	1.334972	1	0.166	28	23	0.928	Yes	Yes	25.7794	21	0.971	Yes	Yes	2.376987	2	0.255	0	0	0.853
288	Calibration	J51-C-Entry	0	5092	5044	30	32	0.344	Yes	Yes	23.18729	23	0.033	Yes	Yes	7.066699	7	0.124	0	2	1.867	24	25	0.151	Yes	Yes	18.27016	18	0.071	Yes	Yes	4.963942	6	0.315	0.834358	1	0.320	64	65	0.148	Yes	Yes	56.71469	57	0.080	Yes	Yes	7.130961	7	0.053	0	1	1.200
290	Validation	J53-B-Entry	0	80909	5120	187	214	1.899	Yes	Yes	144.2764	162	1.431	Yes	Yes	32.97793	44	1.768	10.05936	8	0.584	160	148	0.957	Yes	Yes	122.6209	116	0.581	Yes	Yes	25.01827	24	0.298	12.43452	8	1.260	309	379	3.757	Yes	Yes	288.7293	336	2.689	Yes	Yes	20.20439	39	3.484	0	3	2.504
292	Validation	J55-A-Entry	0	1461	79959	45	56	1.585	Yes	Yes	39.93366	46	0.956	Yes	Yes	4.711132	9	1.544	0	1	1.390	33	41	1.231	Yes	Yes	23.89174	27	0.574	Yes	Yes	6.552404	10	1.066	2.840721	4	0.828	26	73	6.780	No	Yes	23.20146	58	5.440	No	Yes	2.376987	15	4.310	0	0	0.743
294	Calibration	J55-C-Entry	0	80966	79959	103	118	1.356	Yes	Yes	79.86732	98	1.892	Yes	Yes	20.02231	20	0.039	3.40144	0	2.608	113	126	1.258	Yes	Yes	90.29674	108	1.802	Yes	Yes	18.06875	18	0.014	4.149623	0	2.881	282	291	0.514	Yes	Yes	256.5051	270	0.854	Yes	Yes	20.20439	20	0.057	5.412366	0	3.290
295	Validation	J56-A-Entry	0	3101	3099	131	126	0.454	Yes	Yes	101.7664	120	1.697	Yes	Yes	29.44458	6	5.431	0	0	0.000	118	135	1.495	Yes	Yes	93.63456	126	3.090	Yes	Yes	22.83413	9	3.489	1.668715	0	1.827	207	194	0.891	Yes	Yes	183.0338	186	0.248	Yes	Yes	23.76987	8	4.023	0	0	0.000
296	Validation	J56-B-Entry	0	3102	3099	23	18	1.029	Yes	Yes	23.18729	18	1.254	Yes	Yes	0	1	1.386	0	0	0.000	27	27	0.037	Yes	Yes	23.71607	26	0.523	Yes	Yes	2.978365	1	1.661	0.54885	0	1.048	38	41	0.504	Yes	Yes	33.51322	41	1.200	Yes	Yes	4.753974	1	2.522	0	0	0.000
297	Calibration	J59-A-Entry	0	4189	3105	170	170	0.001	Yes	Yes	137.8355	138	0.019	Yes	Yes	27.08901	27	0.019	4.733024	5	0.066	163	163	0.018	Yes	Yes	130.7019	131	0.034	Yes	Yes	29.18798	29	0.035	3.029758	3	0.018	231	222	0.571	Yes	Yes	203.6573	204	0.026	Yes	Yes	27.33535	18	1.963	0	0	0.871
298	Calibration	J59-B-Entry	0	3107	3105	138	114	2.147	Yes	Yes	113.3601	114	0.059	Yes	Yes	24.73345	0	7.033	0	0	0.000	92	72	2.170	Yes	Yes	72.02658	72	0.014	Yes	Yes	18.66442	0	6.110	0.834358	0	1.292	148	133	1.261	Yes	Yes	132.7639	133	0.033	Yes	Yes	14.26192	0	5.341	1.082473	0	1.471
299	Calibration	J59-C-Entry	0	3106	3105	98	97	0.114	Yes	Yes	64.40913	64	0.064	Yes	Yes	29.44458	29	0.082	3.994754	4	0.085	115	115	0.042	Yes	Yes	87.1346	87	0.020	Yes	Yes	25.41538	25	0.083	2.911122	3	0.085	170	175	0.342	Yes	Yes	153.3874	156	0.240	Yes	Yes	16.63891	17	0.090	0	1	1.511
300	Calibration	J60-A-Entry	0	79939	79937	54	32	3.344	Yes	Yes	52.81548	31	3.368	Yes	Yes	1.177783	1	0.170	0	0	0.316	20	4	4.659	Yes	Yes	17.56746	3	4.355	Yes	Yes	2.382692	0	1.590	0.166872	0	0.467	28	4	6.028	No	Yes	25.7794	3	6.016	No	Yes	2.376987	1	1.060	0	0	0.196
301	Calibration	J60-B-Entry	0	1521	79937	187	155	2.492	Yes	Yes	176.481	143	2.642	Yes	Yes	10.60005	11	0.125	0	0	0.922	56	55	0.050	Yes	Yes	50.41861	50	0.060	Yes	Yes	4.963942	5	0.016	0.381979	0	0.026	63	66	0.424	Yes	Yes	60.5816	61	0.051	Yes	Yes	2.376987	5	1.366	0	0	0.884
302	Calibration	J60-C-Entry	0	80729	79937	115	115	0.013	Yes	Yes	106.9192	107	0.008	Yes	Yes	7.066699	7	0.025	1.034928	1	0.117	53	48	0.736	Yes	Yes	47.25647	43	0.702	Yes	Yes	5.361058	5	0.159	0.54885	0	0.243	83	79	0.459	Yes	Yes	78.62718	74	0.551	Yes	Yes	4.753974	5	0.129	0	0	0.875
303	Calibration	J1-A-Exit	0	1054	3325	181	181	0.015	Yes	Yes	161.0228	161	0.003	Yes	Yes	15.31118	15	0.085	4.436367	5	0.076	81	81	0.092	Yes	Yes	62.36448	62	0.046	Yes	Yes	14.29615	14	0.081	4.750614	5	0.074	145	146	0.082	Yes	Yes	131.475	131	0.050	Yes	Yes	11.88494	12	0.030	1.308358	3	1.019
304	Calibration	J1-B-Exit	0	1054	1219	274	255	1.160	Yes	Yes	247.331	230	1.094	Yes	Yes	18.84453	19	0.033	7.54115	5	0.826	170	163	0.570	Yes	Yes	140.0127	138	0.136	Yes	Yes	24.62115	22	0.524	5.558902	2	1.619	269	267	0.168	Yes	Yes	238.4595	238	0.026	Yes	Yes	27.33535	27	0.138	3.699189	2	0.960
305	Calibration	J1-D-Exit	0	1054	1053	303	298	0.303	Yes	Yes	253.772	254	0.015	Yes	Yes	32.97793	33	0.002	16.11723	11	1.502	238	238	0.004	Yes	Yes	193.5934	194	0.034	Yes	Yes	36.33606	36	0.063	8.496094	8	0.052	465	458	0.335	Yes	Yes	412.4704	410	0.128	Yes	Yes	42.78577	43	0.027	9.563324	5	1.785
310	Calibration	J5-D-Exit	0	1077	4057	325	273	3.039	Yes	Yes	231.8729	232	0.007	Yes	Yes	70.66699	36	4.793	22.77515	5	4.744	187	151	2.756	Yes	Yes	124.0263	124	0.002	Yes	Yes	49.44086	22	4.607	13.1724	5	2.744	156	143	1.057	Yes	Yes	125.0301	125	0.004	Yes	Yes	27.33535	17	2.231	3.473304	1	1.586
311	Calibration	J14-A-Exit	0	1136	1583	111	108	0.268	Yes	Yes	88.8846	89	0.011	Yes	Yes	20.02231	18	0.410	2.366512	1	0.838	77	74	0.402	Yes	Yes	60.78341	61	0.028	Yes	Yes	12.50913	11	0.353	4.127458	2	1.470	125	125	0.018	Yes	Yes	113.4294	113	0.003	Yes	Yes	10.69644	11	0.005	1.308358	1	0.198
312	Calibration	J14-B-Exit	0	1136	80480	350	345	0.260	Yes	Yes	255.0601	255	0.021	Yes	Yes	61.24472	61	0.034	33.57953	29	0.756	313	308	0.256	Yes	Yes	224.8635	225	0.010	Yes	Yes	57.58173	53	0.630	30.20628	30	0.004	612	583	1.184	Yes	Yes	501.4094	502	0.040	Yes	Yes	92.7025	63	3.399	18.04417	18	0.032
313	Calibration	J14-C-Exit	0	1136	3153	68	56	1.448	Yes	Yes	63.12094	51	1.585	Yes	Yes	3.533349	4	0.240	1.034928	1	0.110	29	30	0.138	Yes	Yes	22.66202	23	0.071	Yes	Yes	4.765385	5	0.106	1.361043	2	0.143	45	45	0.100	Yes	Yes	39.95807	40	0.007	Yes	Yes	4.753974	5	0.111	0	0	0.875
314	Calibration	J14-D-Exit	0	1136	1145	511	502	0.395	Yes	Yes	401.913	403	0.073	Yes	Yes	82.44482	72	1.183	26.7699	27	0.010	299	304	0.258	Yes	Yes	221.35	221	0.024	Yes	Yes	54.80192	55	0.025	23.08949	28	0.922	427	434	0.345	Yes	Yes	378.9572	380	0.049	Yes	Yes	36.8433	42	0.769	11.32345	13	0.401
315	Calibration	J15-A-Exit	0	1141	1582	17	30	2.517	Yes	Yes	10.30546	22	2.967	Yes	Yes	4.711132	5	0.131	2.366512	2	0.044	22	22	0.005	Yes	Yes	15.81071	16	0.047	Yes	Yes	4.169711	4	0.084	1.958128	2	0.030	10	21	2.746	Yes	Yes	9.022791	19	2.599	Yes	Yes	1.188494	2	0.636	0	0	0.875
316	Validation	J15-B-Exit	0	1141	1142	326	266	3.460	Yes	Yes	226.7201	184	2.966	Yes	Yes	53.00024	54	0.149	46.30206	28	2.972	253	224	1.853	Yes	Yes	170.9314	147	1.899	Yes	Yes	46.06538	48	0.304	35.8473	29	1.186	469	404	3.140	Yes	Yes	386.691	332	2.911	Yes	Yes	64.17865	55	1.168	18.27006	17	0.337
317	Calibration	J15-C-Exit	0	1141	3314	23	21	0.404	Yes	Yes	19.32274	19	0.104	Yes	Yes	3.533349	2	1.040	0	0	0.727	32	23	1.687	Yes	Yes	24.77012	21	0.884	Yes	Yes	6.750961	2	2.175	0.667486	1	0.108	74	65	1.086	Yes	Yes	64.44851	64	0.061	Yes	Yes	9.507948	1	3.817	0	0	0.487
318	Validation	J15-D-Exit	0	1141	1140	396	389	0.381	Yes	Yes	296.282	302	0.348	Yes	Yes	76.5559	62	1.755	23.36846	24	0.215	259	239	1.251	Yes	Yes	180.9448	171	0.735	Yes	Yes	46.66106	44	0.433	31.28572	24	1.345	401	374	1.368	Yes	Yes	346.733	321	1.428	Yes	Yes	39.22029	40	0.179	14.79675	13	0.528
319	Calibration	J16-A-Exit	0	3163	80494	159	120	3.289	Yes	Yes	126.2419	87	3.762	Yes	Yes	27.08901	27	0.017	6.064609	6	0.027	67	67	0.022	Yes	Yes	46.90512	47	0.014	Yes	Yes	13.50192	14	0.134	6.278529	6	0.318	58	59	0.031	Yes	Yes	48.98087	49	0.009	Yes	Yes	4.753974	5	0.116	4.555777	5	0.020
320	Calibration	J16-B-Exit	0	3163	3164	237	237	0.003	Yes	Yes	162.311	162	0.027	Yes	Yes	50.64467	51	0.048	24.10674	24	0.009	174	174	0.018	Yes	Yes	126.4857	126	0.042	Yes	Yes	29.5851	30	0.076	18.18636	18	0.040	266	268	0.138	Yes	Yes	215.258	215	0.008	Yes	Yes	45.16276	45	0.018	5.233431	7	0.896
321	Calibration	J16-C-Exit	0	3163	3162	84	70	1.523	Yes	Yes	55.39185	55	0.004	Yes	Yes	20.02231	13	1.717	8.134464	2	2.846	71	60	1.354	Yes	Yes	50.94563	48	0.475	Yes	Yes	12.31058	12	0.208	7.661736	1	3.359	124	117	0.615	Yes	Yes	105.6956	106	0.011	Yes	Yes	11.88494	11	0.265	6.09002	0	3.197
322	Calibration	J16-D-Exit	0	3163	3166	329	319	0.527	Yes	Yes	252.4838	251	0.124	Yes	Yes	47.11132	47	0.066	28.99146	22	1.402	210	194	1.099	Yes	Yes	144.2288	133	0.985	Yes	Yes	40.30721	36	0.629	25.4296	25	0.027	325	292	1.886	Yes	Yes	273.2617	241	2.042	Yes	Yes	40.40878	40	0.064	11.09757	11	0.008
323	Validation	J17-A-Exit	0	1043	1044	884	872	0.385	Yes	Yes	713.6531	719	0.195	Yes	Yes	108.356	97	1.092	61.82597	56	0.721	488	487	0.030	Yes	Yes	362.241	362	0.032	Yes	Yes	77.63606	78	0.029	48.07842	48	0.044	650	633	0.667	Yes	Yes	564.5689	548	0.716	Yes	Yes	59.42468	66	0.820	26.12021	20	1.363
324	Validation	J17-B-Exit	0	1042	1041	721	718	0.129	Yes	Yes	552.6303	545	0.319	Yes	Yes	104.8227	109	0.360	63.60592	64	0.038	619	632	0.549	Yes	Yes	463.4296	472	0.396	Yes	Yes	101.8601	105	0.286	53.45093	56	0.304	1082	1027	1.703	Yes	Yes	939.6592	895	1.481	Yes	Yes	117.6609	109	0.846	25.03773	24	0.295
325	Calibration	J17-C-Exit	0	3320	3211	185	185	0.017	Yes	Yes	144.2764	144	0.025	Yes	Yes	36.51128	37	0.061	4.436367	5	0.076	111	111	0.007	Yes	Yes	87.31027	87	0.033	Yes	Yes	19.65721	20	0.077	3.938422	4	0.056	190	189	0.045	Yes	Yes	166.2771	166	0.018	Yes	Yes	20.20439	20	0.043	3.24742	3	0.103
326	Calibration	J18-A-Exit	0	3217	3221	158	104	4.666	Yes	Yes	135.2592	92	4.044	Yes	Yes	18.84453	9	2.632	3.40144	3	0.240	80	41	5.032	No	Yes	63.24285	32	4.458	Yes	Yes	15.09038	7	2.434	1.216336	1	0.069	101	69	3.469	Yes	Yes	87.64997	63	2.787	Yes	Yes	11.88494	5	2.436	1.082473	0	0.752
327	Calibration	J18-D-Exit	0	3216	3211	113	53	6.623	No	Yes	91.46096	31	7.695	No	Yes	16.48896	17	0.032	5.029682	5	0.068	88	59	3.346	Yes	Yes	66.93202	38	3.986	Yes	Yes	15.68606	16	0.046	4.917486	5	0.030	101	66	3.787	Yes	Yes	91.51688	56	4.154	Yes	Yes	9.507948	10	0.199	0	0	0.880
328	Calibration	J18-E-Exit	0	3216	3322	87	76	1.256	Yes	Yes	72.13822	63	1.156	Yes	Yes	9.422265	9	0.152	5.767952	4	0.622	48	47	0.138	Yes	Yes	35.48627	35	0.079	Yes	Yes	9.332211	9	0.110	3.604679	3	0.083	78	78	0.036	Yes	Yes	69.60439	70	0.047	Yes	Yes	4.753974	5	0.111	3.24742	3	0.184
329	Calibration	J18-F-Exit	0	3217	3322	43	52	1.357	Yes	Yes	37.35729	46	1.383	Yes	Yes	4.711132	5	0.149	1.034928	1	0.106	41	41	0.010	Yes	Yes	33.55385	34	0.078	Yes	Yes	6.353846	6	0.142	0.930829	1	0.179	83	94	1.113	Yes	Yes	74.76027	85	1.163	Yes	Yes	8.319455	8	0.112	0	0	0.875
330	Validation	J19-A-Exit	0	1045	1046	999	955	1.404	Yes	Yes	829.5896	788	1.467	Yes	Yes	113.0672	110	0.326	56.49964	58	0.167	541	521	0.860	Yes	Yes	404.4029	392	0.608	Yes	Yes	86.76971	81	0.679	49.74714	48	0.208	688	663	0.952	Yes	Yes	595.5042	581	0.597	Yes	Yes	66.55564	63	0.492	26.12021	20	1.317
331	Calibration	J19-C-Exit	0	1045	3221	60	64	0.594	Yes	Yes	42.51002	55	1.728	Yes	Yes	11.77783	9	0.969	5.471295	1	2.331	69	68	0.108	Yes	Yes	56.0402	56	0.005	Yes	Yes	10.72212	11	0.084	2.314036	1	0.858	169	183	1.093	Yes	Yes	153.3874	168	1.150	Yes	Yes	15.45042	15	0.115	0	0	0.867
332	Calibration	J20-A-Exit	0	80507	72767	1177	1148	0.859	Yes	Yes	991.9006	962	0.949	Yes	Yes	121.3117	121	0.009	63.59917	64	0.037	649	629	0.787	Yes	Yes	497.3348	479	0.839	Yes	Yes	95.70481	96	0.029	56.07	54	0.221	868	852	0.548	Yes	Yes	742.4468	741	0.051	Yes	Yes	102.2104	90	1.255	23.72937	21	0.506
333	Calibration	J20-B-Exit	0	80507	80509	161	154	0.495	Yes	Yes	133.971	134	0.003	Yes	Yes	16.48896	16	0.121	10.05936	4	2.150	125	123	0.148	Yes	Yes	98.55345	99	0.046	Yes	Yes	20.84856	21	0.033	5.321629	3	1.100	247	248	0.097	Yes	Yes	226.8587	228	0.098	Yes	Yes	19.0159	19	0.004	1.082473	1	0.063
334	Calibration	J20-C-Exit	0	80507	80506	644	597	1.878	Yes	Yes	490.7975	444	2.145	Yes	Yes	89.51152	89	0.059	63.45422	64	0.021	616	545	2.983	Yes	Yes	475.0241	410	3.075	Yes	Yes	91.13798	84	0.763	50.22042	50	0.004	1058	1009	1.548	Yes	Yes	937.0813	888	1.617	Yes	Yes	99.83346	99	0.095	21.51748	22	0.006
335	Validation	J21-A-Exit	0	2028	2040	206	218	0.828	Yes	Yes	179.0574	197	1.306	Yes	Yes	22.37788	21	0.305	4.436367	0	2.979	98	83	1.645	Yes	Yes	83.26976	71	1.439	Yes	Yes	12.31058	12	0.089	2.71818	0	2.332	153	145	0.661	Yes	Yes	143.0757	132	0.979	Yes	Yes	8.319455	13	1.444	1.308358	0	1.618
336	Validation	J21-B-Exit	0	2028	2027	131	85	4.452	Yes	Yes	105.631	74	3.374	Yes	Yes	20.02231	9	2.828	5.471295	2	1.816	95	85	0.996	Yes	Yes	76.59412	71	0.706	Yes	Yes	16.08317	13	0.939	2.098929	2	0.104	197	219	1.543	Yes	Yes	179.1668	202	1.687	Yes	Yes	16.63891	16	0.198	1.082473	1	0.248
337	Validation	J21-C-Exit	0	2028	2039	97	88	0.945	Yes	Yes	91.46096	77	1.602	Yes	Yes	5.888916	11	1.665	0	1	1.262	75	45	3.823	Yes	Yes	57.44559	37	3.033	Yes	Yes	15.28894	8	2.150	2.16933	1	1.262	95	62	3.666	Yes	Yes	88.93894	55	4.008	Yes	Yes	4.753974	7	1.019	1.082473	0	1.286
338	Validation	J21-D-Exit	0	2028	2029	61	66	0.529	Yes	Yes	45.08639	55	1.373	Yes	Yes	15.31118	9	1.678	1.034928	1	0.371	48	55	1.000	Yes	Yes	39.70246	47	1.059	Yes	Yes	6.750961	7	0.270	1.64655	1	0.410	93	70	2.553	Yes	Yes	79.91615	66	1.627	Yes	Yes	13.07343	4	3.326	0	0	0.922
339	Calibration	J22-B-Exit	0	80103	80104	174	174	0.021	Yes	Yes	127.5301	128	0.042	Yes	Yes	15.31118	15	0.080	30.91636	31	0.021	78	102	2.442	Yes	Yes	22.135	45	3.949	Yes	Yes	10.52356	11	0.145	45.78265	46	0.028	30	85	7.177	No	Yes	10.31176	64	8.814	No	Yes	1.188494	2	0.731	18.94771	19	0.040
345	Calibration	J24-A-Exit	0	5058	80125	320	321	0.037	Yes	Yes	291.1293	292	0.042	Yes	Yes	21.2001	21	0.046	7.54115	8	0.052	195	192	0.192	Yes	Yes	173.9178	171	0.257	Yes	Yes	16.67885	17	0.076	4.223929	5	0.187	329	292	2.128	Yes	Yes	315.7977	278	2.186	Yes	Yes	10.69644	11	0.098	2.616716	2	0.086
346	Calibration	J24-C-Exit	0	5058	80119	278	216	3.976	Yes	Yes	247.331	189	3.918	Yes	Yes	23.55566	24	0.089	7.54115	3	2.249	298	224	4.542	Yes	Yes	257.3633	196	4.042	Yes	Yes	33.75481	25	1.528	6.537966	2	1.976	541	387	7.176	No	No	510.4322	360	7.204	No	No	30.90083	26	0.876	0	0	0.884
347	Calibration	J24-D-Exit	0	5058	80184	334	334	0.001	Yes	Yes	280.8238	281	0.013	Yes	Yes	41.22241	41	0.030	12.27417	12	0.002	220	221	0.007	Yes	Yes	170.053	170	0.004	Yes	Yes	43.88125	44	0.019	6.48973	7	0.011	328	327	0.092	Yes	Yes	296.4631	295	0.107	Yes	Yes	30.90083	31	0.018	1.082473	1	0.074
348	Validation	J25-B-Exit	0	5055	1477	254	216	2.478	Yes	Yes	198.3801	173	1.859	Yes	Yes	23.55566	28	0.943	32.10299	15	3.612	162	141	1.725	Yes	Yes	107.3372	96	1.143	Yes	Yes	26.80529	21	1.142	28.20382	24	0.809	290	362	3.980	Yes	Yes	257.794	316	3.435	Yes	Yes	24.95836	35	1.864	7.398377	11	1.150
349	Calibration	J25-C-Exit	0	5055	5098	197	200	0.187	Yes	Yes	172.6165	173	0.026	Yes	Yes	22.37788	22	0.084	2.366512	5	1.395	160	163	0.184	Yes	Yes	138.6073	139	0.033	Yes	Yes	17.67163	18	0.075	3.934516	6	0.747	315	333	0.954	Yes	Yes	296.4631	296	0.017	Yes	Yes	19.0159	34	2.987	0	2	2.011
350	Calibration	J26-A-Exit	0	5059	70417	312	306	0.310	Yes	Yes	265.3656	266	0.028	Yes	Yes	37.68906	38	0.051	8.872734	3	2.598	209	205	0.282	Yes	Yes	174.9719	175	0.002	Yes	Yes	27.2024	27	0.041	6.612272	3	1.793	379	378	0.046	Yes	Yes	328.6874	329	0.004	Yes	Yes	45.16276	45	0.026	4.781662	4	0.381

352	Calibration	J26-C-Exit	0	5059	80086	283	224	3.687	Yes	Yes	252.4838
353	Calibration	J26-D-Exit	0	5059	80060	90	94	0.387	Yes	Yes	79.86732
354	Validation	J27-A-Exit	0	1499	5115	757	778	0.760	Yes	Yes	499.8148
355	Validation	J27-B-Exit	0	1498	80270	151	145	0.494	Yes	Yes	124.9537
356	Validation	J27-C-Exit	0	5062	5067	518	500	0.827	Yes	Yes	354.2502
357	Validation	J27-D-Exit	0	1500	80075	323	222	6.130	No	No	261.5011
358	Calibration	J28-B-Exit	0	5066	80274	413	405	0.369	Yes	Yes	266.6538
359	Validation	J29-A-Exit	0	5071	80278	71	60	1.290	Yes	Yes	56.68003
360	Validation	J29-B-Exit	0	79913	5079	94	45	5.903	No	Yes	79.86732
361	Validation	J29-C-Exit	0	80283	5070	103	92	1.108	Yes	Yes	92.74914
362	Validation	J30-B-Exit	0	80324	42090	169	193	1.759	Yes	Yes	141.7001
363	Validation	J30-C-Exit	0	80322	80323	24	32	1.599	Yes	Yes	18.03456
364	Validation	J31-A-Exit	0	80321	80319	397	392	0.235	Yes	Yes	331.9487
365	Validation	J31-B-Exit	0	80321	80330	371	310	3.274	Yes	Yes	314.8921
366	Calibration	J31-C-Exit	0	80321	80325	86	86	0.041	Yes	Yes	80.03507
367	Calibration	J32-A-Exit	0	5076	80330	411	410	0.004	Yes	Yes	342.4451
368	Calibration	J32-B-Exit	0	5076	80327	123	108	1.409	Yes	Yes	97.09173
369	Calibration	J32-C-Exit	0	5076	5114	428	425	0.153	Yes	Yes	360.8139
370	Calibration	J33-A-Exit	0	1506	42100	668	674	0.223	Yes	Yes	542.3249
371	Calibration	J33-C-Exit	0	1505	1426	113	93	1.933	Yes	Yes	106.9192
372	Validation	J34-A-Exit	0	1593	5113	247	198	3.261	Yes	Yes	209.9738
373	Validation	J34-B-Exit	0	1574	80639	801	775	0.926	Yes	Yes	584.8349
374	Calibration	J35-A-Exit	0	1532	80641	662	669	0.261	Yes	Yes	523.0021
375	Calibration	J35-B-Exit	0	5017	70396	45	41	0.477	Yes	Yes	38.64548
376	Calibration	J35-D-Exit	0	5017	80639	584	516	2.901	Yes	Yes	524.2903
377	Calibration	J35-E-Exit	0	1567	1550	462	479	0.783	Yes	Yes	319.4693
378	Calibration	J36-A-Exit	0	5087	70278	451	451	0.005	Yes	Yes	399.3366
379	Calibration	J36-B-Exit	0	5087	80576	649	649	0.008	Yes	Yes	535.8839
380	Calibration	J36-C-Exit	0	5087	80615	375	375	0.044	Yes	Yes	314.3165
381	Calibration	J36-D-Exit	0	5087	80573	528	528	0.040	Yes	Yes	422.5239
382	Validation	J37-A-Exit	0	5080	80583	369	360	0.473	Yes	Yes	307.8756
383	Validation	J37-B-Exit	0	5080	80627	190	66	10.945	No	No	154.5819
384	Validation	J37-C-Exit	0	5080	1534	448	387	2.966	Yes	Yes	390.3193
385	Validation	J38-A-Exit	0	80365	80348	189	190	0.087	Yes	Yes	153.2937
386	Validation	J38-C-Exit	0	80365	1215	229	259	1.898	Yes	Yes	212.5501
398	Validation	J43-A-Exit	0	5012	80467	579	512	2.867	Yes	Yes	475.3394
399	Validation	J43-B-Exit	0	5012	5010	512	484	1.217	Yes	Yes	421.2357
400	Validation	J43-C-Exit	0	5012	80462	77	56	2.641	Yes	Yes	61.83276
401	Calibration	J44-A-Exit	0	1089	1088	902	857	1.527	Yes	Yes	714.9413
402	Calibration	J44-B-Exit	0	1089	1091	513	514	0.038	Yes	Yes	427.6766
403	Calibration	J44-C-Exit	0	1089	1090	577	577	0.019	Yes	Yes	470.1866
405	Calibration	J45-B-Exit	0	5003	80474	202	197	0.291	Yes	Yes	185.4983
406	Calibration	J45-E-Exit	0	5003	1093	595	586	0.367	Yes	Yes	454.7284
407	Calibration	J46-A-Exit	0	80006	80257	50	51	0.187	Yes	Yes	42.51002
408	Calibration	J46-B-Exit	0	80007	80258	88	85	0.272	Yes	Yes	73.42641
409	Calibration	J46-C-Exit	0	79951	80259	15	16	0.060	Yes	Yes	11.59364
410	Calibration	J46-D-Exit	0	79951	79934	99	84	1.565	Yes	Yes	94.03733
411	Calibration	J47-A-Exit	0	79935	80003	344	275	3.892	Yes	Yes	269.2302
412	Calibration	J47-B-Exit	0	79935	79934	83	84	0.130	Yes	Yes	74.71459
413	Calibration	J47-C-Exit	0	79935	79936	271	318	2.733	Yes	Yes	229.2965
414	Calibration	J47-D-Exit	0	79935	1170	100	100	0.004	Yes	Yes	95.32551
416	Validation	J48-B-Exit	0	79930	79932	106	121	1.377	Yes	Yes	100.4782
417	Validation	J48-C-Exit	0	79930	79938	22	7	3.822	Yes	Yes	19.32274
418	Validation	J48-D-Exit	0	79930	1531	340	186	9.497	No	No	327.1984
419	Calibration	J49-A-Exit	0	79926	79927	192	194	0.112	Yes	Yes	172.6165
420	Calibration	J49-B-Exit	0	79926	79930	11	14	0.665	Yes	Yes	9.017278
421	Calibration	J51-A-Exit	0	5044	80521	34	34	0.018	Yes	Yes	24.47547
422	Calibration	J51-B-Exit	0	5044	5093	27	21	1.281	Yes	Yes	20.61092
423	Calibration	J51-C-Exit	0	5044	5092	48	54	0.814	Yes	Yes	42.51002
426	Validation	J52-C-Exit	0	80012	72749	330	368	2.072	Yes	Yes	279.5356
427	Validation	J53-A-Exit	0	5120	5121	715	720	0.187	Yes	Yes	624.7685
429	Validation	J55-A-Exit	0	79959	1461	34	45	1.881	Yes	Yes	24.47547
431	Calibration	J55-C-Exit	0	79959	80966	263	278	0.957	Yes	Yes	228.0083
432	Validation	J56-A-Exit	0	3099	3101	167	142	2.035	Yes	Yes	139.1237
433	Validation	J56-B-Exit	0	3099	3102	31	52	3.236	Yes	Yes	19.32274
434	Calibration	J59-A-Exit	0	3105	4189	127	129	0.180	Yes	Yes	92.74914
435	Calibration	J59-B-Exit	0	3105	3107	115	91	2.344	Yes	Yes	91.46096
436	Calibration	J59-C-Exit	0	3105	3106	164	160	0.276	Yes	Yes	131.3946
437	Calibration	J60-A-Exit	0	79937	79939	62	15	7.451	No	Yes	57.96821
438	Calibration	J60-B-Exit	0	79937	1521	153	147	0.461	Yes	Yes	148.141
439	Calibration	J60-C-Exit	0	79937	80729	138	139	0.071	Yes	Yes	130.1064
441	Calibration	J2-A-Entry	0	1104	1147	497	496	0.013	Yes	Yes	443.1734
442	Calibration	J2-D-Entry	0	1013	80916	448	435	0.611	Yes	Yes	385.3207
443	Validation	J3-A-Entry	0	1108	1107	428	308	6.236	No	No	372.222
444	Validation	J3-B-Entry	0	3056	1107	154	82	6.663	No	Yes	137.5366
445	Validation	J3-C-Entry	0	1106	1107	468	445	1.089	Yes	Yes	410.4266
446	Validation	J3-D-Entry	0	3031	1107	246	239	0.395	Yes	Yes	220.4951
447	Calibration	J4-A-Entry	0	1077	80921	727	704	0.861	Yes	Yes	549.0547
448	Calibration	J4-C-Entry	0	1078	1022	991	997	0.173	Yes	Yes	854.6915
449	Validation	J5-A-Entry	0	1070	1071	460	431	1.355	Yes	Yes	355.8486
450	Validation	J5-B-Entry	0	3125	1074	237	269	2.034	Yes	Yes	203.0302
451	Validation	J5-C-Entry	0	1169	1073	895	856	1.323	Yes	Yes	773.9161
452	Validation	J5-D-Entry	0	4060	1072	148	34	11.943	No	No	123.3463
453	Calibration	J6-A-Entry	0	1069	1070	354	357	0.164	Yes	Yes	300.179
454	Calibration	J6-B-Entry	0	3106	1070	214	164	3.624	Yes	Yes	150.6353
456	Validation	J7-A-Entry	0	1163	1122	366	366	0.030	Yes	Yes	323.1018
457	Validation	J7-B-Entry	0	3335	1122	132	157	2.089	Yes	Yes	116.7969
458	Validation	J7-C-Entry	0	1121	1122	510	456	2.460	Yes	Yes	457.3637
459	Calibration	J8-A-Entry	0	3290	1062	451	450	0.050	Yes	Yes	400.6026
460	Calibration	J8-B-Entry	0	1153	1062	377	372	0.229	Yes	Yes	312.1862
461	Calibration	J8-C-Entry	0	1126	1062	372	372	0.011	Yes	Yes	324.1933
462	Calibration	J8-D-Entry	0	4207	1062	336	337	0.041	Yes	Yes	304.5453
463	Validation	J9-A-Entry	0	3292	3288	354	360	0.318	Yes	Yes	319.8271
464	Validation	J9-B-Entry	0	1409	3288	295	266	1.733	Yes	Yes	254.3335
465	Validation	J9-C-Entry	0	3287	3288	350	359	0.470	Yes	Yes	311.0946
466	Calibration	J10-B-Entry	0	1154	1065	505	471	1.543	Yes	Yes	424.6169
467	Calibration	J10-C-Entry	0	1064	1065	362	356	0.358	Yes	Yes	301.2706
468	Calibration	J11-B-Entry	0	1067	1066	469	471	0.098	Yes	Yes	395.1448
469	Calibration	J11-C-Entry	0	1154	1066	344	324	1.096	Yes	Yes	292.5381
470	Calibration	J12-A-Entry	0	1067	1068	414	414	0.031	Yes	Yes	370.0389
471	Calibration	J12-B-Entry	0	1435	1068	41	40	0.288	Yes	Yes	36.02148
472	Calibration	J12-D-Entry	0	3092	1068	160	162	0.092	Yes	Yes	139.7197
473	Validation	J13-A-Entry	0	1128	1127	612	604	0.353	Yes	Yes	534.8644
474	Validation	J13-B-Entry	0	3099	1127	138	95	3.908	Yes	Yes	117.8885
475	Validation	J13-C-Entry	0	1155	1127	361	330	1.707	Yes	Yes	301.2706
476	Validation	J13-D-Entry	0	3318	1127	335	397	3.222	Yes	Yes	287.0803
477	Validation	J14-B-Entry	0	2046	3098	338	406	3.513	Yes	Yes	283.8056
478	Calibration	J14-C-Entry	0	3339	2002	86	86	0.005	Yes	Yes	70.95141
479	Validation	J14-D-Entry	0	2045	2002	335	361	1.365	Yes	Yes	295.8128
480	Calibration	J15-A-Entry	0	2005	2006	336	337	0.023	Yes	Yes	278.3478
481	Calibration	J15-B-Entry	0	3293	2006	237	238	0.083	Yes	Yes	204.1217
482	Validation	J16-A-Entry	0	2008	2007	289	250	2.420	Yes	Yes	263.066
483	Validation	J16-B-Entry	0	2006	2007	194	171	1.748	Yes	Yes	156.0931
484	Validation	J16-C-Entry	0	3294	2007	83	101	1.847	Yes	Yes	72.04297
485	Calibration	J17-A-Entry	0	2011	2010	226	199	1.830	Yes	Yes	204.1217
486	Calibration	J17-B-Entry	0	3297	2010	28	29	0.053	Yes	Yes	22.92276
487	Calibration	J18-A-Entry	0	3261	3262	124	125	0.051	Yes	Yes	114.6138
488	Calibration	J18-B-Entry	0	3266	3264	39	39	0.006	Yes	Yes	36.02148
489	Calibration	J18-C-Entry	0	3265	3263	81	73	0.836	Yes	Yes	68.76829
490	Validation	J19-A-Entry	0	4084	3131	25	31	1.148	Yes	Yes	15.28184
491	Validation	J19-B-Entry	0	3132	3131	179	145	2.659	Yes	Yes	155.0015
492	Validation	J19-C-Entry	0	3130	3131	63	46	2.401	Yes	Yes	55.66956
493	Validation	J19-D-Entry	0	3115	3131	78	91	1.450	Yes	Yes	57.85268
494	Calibration	J20-A-Entry	0	1025	1024	765	773	0.279	Yes	Yes	622.1892
495	Calibration	J20-B-Entry	0	1023	1024	717	718	0.035	Yes	Yes	557.7872
496	Calibration	J20-C-Entry	0	3133	1024	121	121	0.013	Yes	Yes	60.0358
497	Validation	J21-A-Entry	0	3181	1131	235	200	2.385	Yes	Yes	204.1217
498	Validation	J21-C-Entry	0	1156	1131	408	388	1.021	Yes	Yes	324.1933
500	Calibration	J22-C-Entry	0	1031	80922	763	755	0.308	Yes	Yes	589.4424
501	Calibration	J22-D-Entry	0	1131	80923	384	384	0.003	Yes	Yes	301.2706
502	Calibration	J23-A-Entry	0	4008	3186	180	175	0.346	Yes	Yes	160.4593
503	Calibration	J23-B-Entry	0	3188	3187	107	89	1.818	Yes	Yes	98.24041
504	Calibration	J23-C-Entry	0	3184	3185	130	130	0.053	Yes	Yes	115.7054
505	Validation	J24-B-Entry	0	1146	1427	729	706	0.851	Yes	Yes	604.7243
506	Validation	J24-D-Entry	0	3190	1429	189	273	5.558	No	Yes	171.3749
507	Validation	J25-A-Entry	0	1040	1039	727	721	0.233	Yes	Yes	610.1821
508	Validation	J25-B-Entry	0	3209	1039	270	336	3.799	Yes	Yes	208.488
509	Validation	J25-C-Entry	0	1038	1039	1146	1164	0.525	Yes	Yes	921.2767
511	Calibration	J2-A-Exit	0	1147	1104	427	427	0.009	Yes	Yes	372.222
512	Calibration	J2-D-Exit	0	80916	1013	424	434	0.506	Yes	Yes	337.2921
513	Validation	J3-A-Exit	0	1107	1108	565	391	7.990	No	No	510.8501
514	Validation	J3-B-Exit	0	1107	3056	136	106	2.754	Yes	Yes	112.4307
515	Validation	J3-C-Exit	0	1107	1106	470	438	1.505	Yes	Yes	415.8844
516	Validation	J3-D-Exit	0	1107	3031	123	139	1.374	Yes	Yes	101.5151
517	Calibration	J4-A-Exit	0	80921	1077	978	988	0.322	Yes	Yes	812.1207
518	Calibration	J4-C-Exit	0	1403	1078	808	834	0.913	Yes	Yes	676.7673
519	Validation	J5-A-Exit	0	1071	1070	759	753	0.211	Yes	Yes	644.0205
520	Validation	J5-B-Exit	0	1074	3125	259	197	4.108	Yes	Yes	241.2348
521	Validation	J5-C-Exit	0	1073	1169	501	539	1.678	Yes	Yes	374.4051
522	Validation	J5-D-Exit	0	1072	4060	222	102	9.441	No	No	196.4808
523	Calibration	J6-A-Exit	0	1070	1069	651	653	0.082	Yes	Yes	567.6112
524	Calibration	J6-B-Exit	0	1070	3106	203	199	0.305	Yes	Yes	149.5437
526	Validation	J7-A-Exit	0	1122	1163	336	291	2.527	Yes	Yes	292.5381
527	Validation	J7-B-Exit	0	1122	3335	210	170	2.896	Yes	Yes	196.4808
528	Validation	J7-C-Exit	0	1122	1121	462	518	2.543	Yes	Yes	408.2435
529	Calibration	J8-A-Exit	0	1062	3290	420	420	0.010	Yes	Yes	367.8557
530	Calibration	J8-B-Exit	0	1062	1153	413	411	0.061	Yes	Yes	351.4823

531	Calibration	J8-C-Exit	0	1062	1126	494	493	0.068	Yes	Yes	440.9903	441	0.000	Yes	Yes	43.6624	44	0.042	9.824041	8	0.598	433	431	0.120	Yes	Yes	384.4111	382	0.139	Yes	Yes	43.6624	44	0.078	5.093947	5	0.127	500	498	0.101	Yes	Yes	459.5468	457	0.102	Yes	Yes	37.11304	37	0.083	3.27468	4	0.232
532	Calibration	J8-D-Exit	0	1062	4207	208	206	0.140	Yes	Yes	181.199	181	0.043	Yes	Yes	25.10588	24	0.313	2.18312	2	0.070	162	158	0.328	Yes	Yes	140.9932	137	0.299	Yes	Yes	19.46615	19	0.122	1.63734	2	0.074	215	215	0.000	Yes	Yes	197.5724	198	0.008	Yes	Yes	16.3734	16	0.123	1.09156	1	0.335
533	Validation	J9-A-Exit	0	3288	3292	261	239	1.355	Yes	Yes	225.9529	207	1.258	Yes	Yes	27.289	25	0.526	7.640921	7	0.084	271	269	0.109	Yes	Yes	240.5071	242	0.085	Yes	Yes	28.19864	25	0.632	2.18312	2	0.105	297	321	1.397	Yes	Yes	269.6153	293	1.388	Yes	Yes	27.289	28	0.143	0	1	1.025
534	Validation	J9-B-Exit	0	3288	1409	506	484	1.007	Yes	Yes	461.7299	443	0.883	Yes	Yes	43.6624	38	0.896	1.09156	3	1.431	391	391	0.027	Yes	Yes	348.0257	349	0.052	Yes	Yes	39.29616	37	0.306	4.002387	4	0.190	515	409	4.927	Yes	No	472.6455	383	4.356	Yes	Yes	40.38772	25	2.764	2.18312	2	0.062
535	Validation	J9-C-Exit	0	3288	3287	231	261	1.891	Yes	Yes	197.5724	230	2.215	Yes	Yes	29.47212	30	0.018	4.36624	2	1.622	247	283	2.199	Yes	Yes	221.2228	254	2.139	Yes	Yes	25.10588	27	0.321	0.909633	2	0.975	369	447	3.879	Yes	Yes	339.4752	423	4.282	Yes	Yes	28.38056	23	1.164	1.09156	2	0.525
537	Calibration	J10-B-Exit	0	1065	1154	335	356	1.103	Yes	Yes	279.4394	299	1.172	Yes	Yes	52.39488	52	0.039	3.27468	4	0.447	332	359	1.447	Yes	Yes	291.0827	313	1.235	Yes	Yes	38.02268	43	0.832	2.910827	3	0.078	410	443	1.560	Yes	Yes	383.1376	413	1.504	Yes	Yes	24.01432	26	0.448	3.27468	3	0.025
538	Calibration	J10-C-Exit	0	1065	1064	473	471	0.062	Yes	Yes	396.2363	396	0.010	Yes	Yes	63.31049	63	0.054	13.09872	12	0.202	384	384	0.028	Yes	Yes	335.6547	336	0.014	Yes	Yes	45.11782	44	0.124	3.27468	3	0.015	425	433	0.383	Yes	Yes	385.3207	394	0.415	Yes	Yes	34.92992	35	0.010	4.36624	4	0.154
539	Calibration	J11-B-Exit	0	1066	1067	415	392	1.116	Yes	Yes	372.222	350	1.166	Yes	Yes	40.38772	40	0.060	2.18312	2	0.077	395	379	0.804	Yes	Yes	344.5691	330	0.774	Yes	Yes	45.84552	46	0.002	4.36624	3	0.849	460	455	0.234	Yes	Yes	433.3494	428	0.257	Yes	Yes	22.92276	23	0.095	3.27468	3	0.070
540	Calibration	J11-C-Exit	0	1066	1154	505	505	0.027	Yes	Yes	428.9831	429	0.005	Yes	Yes	66.58517	67	0.036	9.824041	9	0.333	422	414	0.374	Yes	Yes	365.3088	365	0.020	Yes	Yes	52.57681	46	0.957	4.002387	3	0.289	470	462	0.375	Yes	Yes	427.8916	422	0.301	Yes	Yes	37.11304	35	0.288	5.4578	5	0.062
541	Calibration	J12-A-Exit	0	1068	1067	475	469	0.267	Yes	Yes	401.6941	396	0.265	Yes	Yes	64.40205	64	0.074	8.732481	9	0.026	454	454	0.035	Yes	Yes	401.5122	402	0.028	Yes	Yes	49.1202	49	0.024	3.092754	3	0.195	585	580	0.196	Yes	Yes	545.78	541	0.202	Yes	Yes	33.83836	34	0.019	5.4578	5	0.060
542	Calibration	J12-B-Exit	0	1068	1435	87	68	2.152	Yes	Yes	85.14169	66	2.207	Yes	Yes	2.18312	2	0.127	0	0	0.875	40	40	0.007	Yes	Yes	36.74919	37	0.050	Yes	Yes	3.092754	3	0.053	0.54578	0	0.239	74	66	0.967	Yes	Yes	74.22609	65	1.137	Yes	Yes	0	1	1.414	0	0	0.871
543	Calibration	J12-D-Exit	0	1068	3092	320	321	0.062	Yes	Yes	305.6368	306	0.020	Yes	Yes	13.09872	14	0.186	1.09156	1	0.065	281	286	0.293	Yes	Yes	260.8829	263	0.151	Yes	Yes	19.64808	20	0.068	0.363853	3	1.818	270	270	0.039	Yes	Yes	253.2419	254	0.046	Yes	Yes	16.3734	16	0.120	0	0	0.871
544	Validation	J13-A-Exit	0	1127	1128	446	399	2.289	Yes	Yes	371.1304	325	2.456	Yes	Yes	61.12736	57	0.486	14.19028	17	0.637	450	427	1.098	Yes	Yes	393.1436	344	2.543	Yes	Yes	51.8491	68	2.089	4.548167	14	3.160	673	599	2.969	Yes	Yes	622.1892	533	3.727	Yes	Yes	51.30332	58	0.890	0	8	4.025
545	Validation	J13-B-Exit	0	1127	3099	139	145	0.554	Yes	Yes	122.2547	137	1.301	Yes	Yes	15.28184	8	2.080	1.09156	0	1.478	158	145	1.101	Yes	Yes	132.8065	136	0.246	Yes	Yes	24.74203	9	3.815	0.727707	0	1.206	175	172	0.175	Yes	Yes	157.1847	164	0.517	Yes	Yes	16.3734	9	2.197	1.09156	0	1.478
546	Validation	J13-C-Exit	0	1127	1155	486	475	0.511	Yes	Yes	433.3494	418	0.740	Yes	Yes	48.02864	54	0.827	4.36624	3	0.987	396	370	1.281	Yes	Yes	343.1137	312	1.704	Yes	Yes	48.02864	56	1.107	4.36624	2	1.211	418	408	0.509	Yes	Yes	374.4051	366	0.455	Yes	Yes	43.6624	40	0.497	0	2	1.813
547	Validation	J13-D-Exit	0	1127	3318	375	406	1.551	Yes	Yes	314.3693	335	1.133	Yes	Yes	55.66956	61	0.688	5.4578	10	1.771	335	393	3.027	Yes	Yes	286.3526	330	2.466	Yes	Yes	44.57204	50	0.753	4.184314	13	3.132	449	523	3.392	Yes	Yes	411.5182	479	3.216	Yes	Yes	37.11304	39	0.240	0	5	3.299
548	Validation	J14-B-Exit	0	3098	2047	337	397	3.095	Yes	Yes	292.5381	340	2.676	Yes	Yes	32.7468	40	1.234	12.00716	16	1.128	337	387	2.648	Yes	Yes	286.5345	324	2.151	Yes	Yes	46.57323	50	0.550	3.82046	13	3.112	394	441	2.292	Yes	Yes	349.2992	394	2.294	Yes	Yes	43.6624	41	0.464	1.09156	7	2.854
549	Calibration	J14-C-Exit	0	3098	3097	56	72	2.020	Yes	Yes	48.02864	64	2.090	Yes	Yes	6.549361	7	0.173	1.09156	1	0.055	83	84	0.097	Yes	Yes	74.58994	75	0.055	Yes	Yes	7.640921	8	0.128	0.727707	1	0.053	98	99	0.027	Yes	Yes	93.87417	94	0.024	Yes	Yes	4.36624	4	0.174	0	0	0.880
550	Validation	J14-D-Exit	0	2002	2045	362	385	1.151	Yes	Yes	305.6368	316	0.587	Yes	Yes	53.48644	59	0.756	3.27468	9	2.460	355	393	1.979	Yes	Yes	306.5465	332	1.424	Yes	Yes	44.39011	48	0.593	4.002387	13	3.036	513	580	2.844	Yes	Yes	469.3708	530	2.722	Yes	Yes	43.6624	44	0.062	0	5	3.231
551	Calibration	J15-A-Exit	0	2006	2005	351	352	0.054	Yes	Yes	302.3621	304	0.072	Yes	Yes	37.11304	37	0.019	12.00716	12	0.039	287	296	0.488	Yes	Yes	246.3287	252	0.368	Yes	Yes	38.56846	38	0.040	2.546974	5	1.396	372	387	0.737	Yes	Yes	330.7427	342	0.612	Yes	Yes	41.47928	42	0.096	0	3	2.240
552	Calibration	J15-B-Exit	0	2006	3293	368	368	0.016	Yes	Yes	331.8343	332	0.004	Yes	Yes	34.92992	35	0.000	1.09156	1	0.329	322	321	0.055	Yes	Yes	284.1695	282	0.135	Yes	Yes	34.56607	36	0.183	3.27468	3	0.109	429	434	0.245	Yes	Yes	396.2363	400	0.191	Yes	Yes	32.7468	33	0.038	0	1	1.729
553	Validation	J16-A-Exit	0	2007	2008	179	163	1.246	Yes	Yes	141.9028	126	1.348	Yes	Yes	34.92992	33	0.293	2.18312	3	0.628	205	195	0.721	Yes	Yes	175.9231	166	0.757	Yes	Yes	26.5613	25	0.224	2.7289	4	0.472	271	253	1.095	Yes	Yes	246.6926	232	0.980	Yes	Yes	24.01432	20	0.825	0	1	1.616
554	Validation	J16-B-Exit	0	2007	2006	353	317	1.969	Yes	Yes	316.5524	283	1.951	Yes	Yes	30.56368	28	0.397	5.4578	5	0.040	239	236	0.223	Yes	Yes	203.9398	201	0.185	Yes	Yes	32.0191	30	0.416	3.092754	5	0.771	287	286	0.091	Yes	Yes	261.9744	260	0.146	Yes	Yes	25.10588	23	0.400	0	3	2.359
555	Validation	J16-C-Exit	0	2007	3294	35	42	1.079	Yes	Yes	32.7468	37	0.664	Yes	Yes	2.18312	5	1.308	0	0	0.844	58	65	0.789	Yes	Yes	50.21176	60	1.346	Yes	Yes	7.822847	4	1.708	0.363853	1	0.408	88	108	2.019	Yes	Yes	82.95857	104	2.139	Yes	Yes	5.4578	4	0.563	0	1	1.104
556	Calibration	J17-A-Exit	0	2010	2011	166	149	1.361	Yes	Yes	136.445	121	1.329	Yes	Yes	27.289	25	0.482	2.18312	3	0.304	157	146	0.854	Yes	Yes	136.9908	126	0.959	Yes	Yes	16.91918	17	0.128	2.7289	3	0.022	229	209	1.362	Yes	Yes	212.8542	192	1.443	Yes	Yes	16.3734	16	0.103	0	1	1.266
557	Calibration	J17-B-Exit	0	2010	3297	15	15	0.085	Yes	Yes	7.640921	8	0.128	Yes	Yes	7.640921	6	0.445	0	0	0.990	25	27	0.361	Yes	Yes	20.55771	21	0.097	Yes	Yes	3.456607	5	0.661	1.09156	1	0.055	27	28	0.207	Yes	Yes	27.289	27	0.055	Yes	Yes	0	1	1.414	0	0	0.875
558	Calibration	J18-A-Exit	0	3262	3261	90	99	0.952	Yes	Yes	78.59233	85	0.681	Yes	Yes	9.824041	13	0.879	1.09156	1	0.118	86	102	1.669	Yes	Yes	74.58994	90	1.750	Yes	Yes	10.00597	10	0.011	1.09156	1	0.206	156	159	0.203	Yes	Yes	148.4522	148	0.028	Yes	Yes	6.549361	10	1.156	1.09156	1	0.444
559	Calibration	J18-B-Exit	0	3264	3266	23	20	0.556	Yes	Yes	18.55652	19	0.100	Yes	Yes	4.36624	1	1.890	0	0	0.525	21	20	0.302	Yes	Yes	18.19267	18	0.057	Yes	Yes	3.092754	2	0.990	0	0	0.875	50	46	0.572	Yes	Yes	42.57084	43	0.064	Yes	Yes	7.640921	3	1.928	0	0	0.429
560	Calibration	J18-C-Exit	0	3263	3265	132	119	1.197	Yes	Yes	122.2547	109	1.267	Yes	Yes	8.732481	9	0.090	1.09156	1	0.055	90	89	0.147	Yes	Yes	76.95499	77	0.003	Yes	Yes	12.55294	11	0.425	0.727707	1	0.049	154	122	2.720	Yes	Yes	140.8113	111	2.697	Yes	Yes	10.9156	11	0.016	2.18312	0	1.535
561	Validation	J19-A-Exit	0	3131	4084	40	44	0.517	Yes	Yes	32.7468	38	0.867	Yes	Yes	5.4578	5	0.327	2.18312	1	0.825	33	33	0.035	Yes	Yes	23.46854	29	1.050	Yes	Yes	7.095141	2	2.138	2.7289	2	0.600	32	50	2.813	Yes	Yes	29.47212	45	2.615	Yes	Yes	2.18312	3	0.575	0	1	1.403
562	Validation	J19-B-Exit	0	3131	3132	82	121	3.895	Yes	Yes	67.67673	93	2.847	Yes	Yes	9.824041	18	2.290	4.36624	9	1.940	69	79	1.069	Yes	Yes	56.21534	64	1.029	Yes	Yes	10.36982	9	0.424	2.910827	5	1.243	171	148	1.891	Yes	Yes	151.7269	131	1.747	Yes	Yes	15.28184	13	0.615	4.36624	4	0.399
563	Validation	J19-C-Exit	0	3131	3130	128	42	9.255	No	Yes	108.0644	28	9.737	No	Yes	18.55652	14	1.087	1.09156	0	0.808	65	29	5.248	No	Yes	57.48883	22	5.571	No	Yes	7.095141	6	0.272	0.909633	1	0.278	104	67	3.922	Yes	Yes	96.05729	59	4.146	Yes	Yes	7.640921	8	0.029	0	0	0.862
564	Validation	J19-D-Exit	0	3131	3115	95	106	1.054	Yes	Yes	75.31765	96	2.216	Yes	Yes	17.46496	8	2.756	2.18312	2	0.119	58	59	0.096	Yes	Yes	45.48167	53	1.008	Yes	Yes	12.00716	3	3.147	0.909633	3	1.645	108	135	2.414	Yes	Yes	97.14885	128	2.911	Yes	Yes	10.9156	5	2.001	0	1	1.663
565	Calibration	J20-A-Exit	0	1024	1025	755	755	0.030	Yes	Yes	579.6184	580	0.017	Yes	Yes	111.3391	111	0.038	64.40205	64	0.105	474	472	0.087	Yes	Yes	340.5667	337	0.195	Yes	Yes	67.67673	68	0.037	65.31168	67	0.172	816	819	0.083	Yes	Yes	711.6972	711	0.043	Yes	Yes	79.68389	81	0.160	25.10588	27	0.409
566	Calibration	J20-B-Exit	0	1024	1023	640	648	0.347	Yes	Yes	493.3852	508	0.636	Yes	Yes	78.59233	79	0.037	67.67673	62	0.715	459	462	0.160	Yes	Yes	306.3645	320	0.779	Yes	Yes	71.49719	71	0.054	81.1393	71	1.133	806	807	0.059	Yes	Yes	699.69	703	0.116	Yes	Yes	70.95141	71	0.018	34.92992	34	0.212
567	Calibration	J20-C-Exit	0	1024	3133	208	209	0.040	Yes	Yes	167.0087	167	0.009	Yes	Yes	33.83836	34	0.076	7.640921	8	0.008	80	83	0.340	Yes	Yes	54.21415	58	0.461	Yes	Yes	13.28065	13	0.077	12.73487	13	0.027	156	156	0.006	Yes	Yes	126.621	127	0.066	Yes	Yes	22.92276	22	0.163	6.549361	7	0.017
568	Validation	J21-A-Exit	0	1131	3181	170	145	1.982	Yes	Yes	152.8184	133	1.669	Yes	Yes	10.9156	9	0.620	6.549361	4	1.332	153	144	0.687	Yes	Yes	130.4414	125	0.453	Yes	Yes	17.46496	14	0.799	4.730094	5	0.029	202	169	2.444	Yes	Yes	171.3749	153	1.412	Yes	Yes	27.289	14	2.968	3.27468	1	1.177
569	Validation	J21-C-Exit	0	1131	1156	658	623	1.395	Yes	Yes	558.8788	526	1.396	Yes	Yes	67.67673	64	0.434	31.65524	32	0.129	448	419	1.390	Yes	Yes	351.6643	325	1.448	Yes	Yes	54.94186	55	0.040	40.9335	38	0.413	536	491	1.966	Yes	Yes	469.3708	421	2.287	Yes	Yes	48.02864	54	0.829	18.55652	16	0.530
571	Calibration	J22-C-Exit	0	80922	1031	788	773	0.544	Yes	Yes	644.0205	629	0.590	Yes	Yes	86.23325	86	0.029	57.85268	58	0.005	486	484	0.101	Yes	Yes	337.1101	337	0.006	Yes	Yes	78.04655	76	0.229	70.58755	70	0.013	873	877	0.126	Yes	Yes	760.8174	768	0.249	Yes	Yes	85.14169	82	0.340	27.289	27	0.008
572	Calibration	J22-D-Exit	0	80923	1131	565	565	0.017	Yes	Yes	480.2864	480	0.008	Yes	Yes	50.21176	50	0.024	34.92992	35	0.013	374	374	0.041	Yes	Yes	281.6225	282	0.020	Yes	Yes	49.66598	50	0.044	42.38892	43	0.021	453	454	0.039	Yes	Yes	385.3207	386	0.038	Yes	Yes	50.21176	50	0.010	17.46496	18	0.036
573	Calibration	J23-A-Exit	0	3186	4008	116	93	2.226	Yes	Yes	103.6982	86	1.859	Yes	Yes	10.9156	6	1.608	1.09156	1	0.055	101	97	0.340	Yes	Yes	88.05251	86	0.177	Yes	Yes	12.00716	11	0.412	0.54578	0	0.552	151	122	2.463	Yes	Yes	134.2619	111	2.068	Yes	Yes	16.3734	10	1.706	0	0	0.871
574	Calibration	J23-B-Exit	0	3187	3188	96	96	0.015	Yes	Yes	87.32481	87	0.037	Yes	Yes	8.732481	9	0.036	0	0	0.875	43	44	0.107	Yes	Yes	36.74919	37	0.043	Yes	Yes	6.00358	6	0.006	0.363853	1	0.593	91	91	0.048	Yes	Yes	79.68389	80	0.002	Yes	Yes	10.9156	11	0.019	0	0	0.871
575	Calibration	J23-C-Exit	0	3185	3184	205	206	0.040	Yes	Yes	183.3821	183	0.027	Yes	Yes	20.73964	21	0.053	1.09156	2	0.576	115	115	0.074	Yes	Yes	103.5163	104	0.051	Yes	Yes	10.55175	11	0.131	0.54578	0	0.239	150	151	0.079	Yes	Yes	137.5366	138	0.034	Yes	Yes	12.00716	12	0.014	0	1	1.118
576	Validation	J24-B-Exit	0	1427	1146	378	436	2.879	Yes	Yes	279.4394	330	2.921	Yes	Yes	57.85268	76	2.192	40.38772	30	1.838	396	402	0.300	Yes	Yes	306.3645	315	0.468	Yes	Yes	59.12617	55	0.507	30.19983	32	0.283	738	774	1.331	Yes	Yes	656.0276	688	1.237	Yes	Yes	74.22609	66	0.968	7.640921	20	3.381
577	Validation	J24-D-Exit	0	1429	3190	148	192	3.344	Yes	Yes	132.0788	177	3.634	Yes	Yes	16.3734	13	1.000	0	2	2.123	96	114	1.709	Yes	Yes	82.95857	107	2.439	Yes	Yes	11.82523	7	1.729	1.63734	1	0.913	179	221	2.945	Yes	Yes	155.0015	215	4.391	Yes	Yes	24.01432	6	4.820	0	0	0.939
578	Validation	J25-A-Exit	0	1039	1040	967	1046	2.477	Yes	Yes	787.0148	856	2.399	Yes	Yes	138.6281	129	0.809	41.47928	61	2.684	556	591	1.482	Yes	Yes	434.6228	441	0.286	Yes	Yes	84.05013	99	1.521	36.93112	52	2.247	816	810	0.214	Yes	Yes	742.2609	700	1.560	Yes	Yes	66.58517	87	2.348	7.640921	23	3.896
579	Validation	J25-B-Exit	0	1039	3209	250	279	1.804	Yes	Yes	182.2905	187	0.332	Yes	Yes	43.6624	61	2.362	24.01432	32	1.471	164	204	2.976	Yes	Yes	107.8825	140	2.926	Yes	Yes	26.5613	39	2.149	29.10827	25	0.881	274	298	1.394	Yes	Yes	225.9529	241	1.015	Yes	Yes	37.11304	44	1.066	10.9156	12	0.371
580	Validation	J25-C-Exit	0	1039	1038	926	895	1.004	Yes	Yes	770.6414	701	2.576	Yes	Yes	105.8813	128	2.001	49.1202	67	2.353	688	727	1.454	Yes	Yes	522.8573	549	1.112	Yes	Yes	105.5175	110	0.391	59.85388	69	1.107	1281	1206	2.139	Yes	Yes	1142.863	1055	2.665	Yes	Yes	124.4378	119	0.461	14.19028	32	3.734
581	Calibration	J1-B-Entry	0	80026	79948	414	426	0.616	Yes	Yes	369.5092	370	0.005	Yes	Yes	31.04278	41	1.735	13.01794	15	0.555	233	231	0.099	Yes	Yes	188.0925	188	0.024	Yes	Yes	31.20967	30	0.228	13.68553	14	0.021	308	308	0.020	Yes	Yes	286.3947	286	0.002	Yes	Yes	18.02484	18	0.008	4.00552	4	0.183
582	Calibration	J1-C-Entry	0	80009	79948	388	462	3.597	Yes	Yes	329.454	385	2.921	Yes	Yes	39.05382	55	2.387	19.02622	22	0.562	275	294	1.097	Yes	Yes	230.6512	244	0.879	Yes	Yes	28.70622	32	0.684	16.02208	17	0.292	387	426	1.944	Yes	Yes	348.4802	382	1.734	Yes	Yes	29.04002	33	0.718	9.012419	11	0.642
583	Calibration	J4-B-Entry	0	80021	79956	231	237	0.365	Yes	Yes	211.2912	215	0.246	Yes	Yes	14.01932	15	0.263	6.008279	7	0.387	126	126	0.022	Yes	Yes	106.9808	107	0.004	Yes	Yes	16.35587	16	0.088	3.00414	3	0.037	151	188	2.830	Yes	Yes	140.1932	177	2.917	Yes	Yes	10.0138	10	0.004	1.00138	1	0.143
584	Calibration	J4-C-Entry	0	79941	79956	285	285	0.042	Yes	Yes	263.3629	263	0.045	Yes	Yes	18.02484	18	0.013	4.00552	4	0.012	193	195	0.188	Yes	Yes	170.9022	171	0.006	Yes	Yes	18.02484	20	0.542	3.671726	4	0.088	257	259	0.072	Yes	Yes	234.3229	234	0.018	Yes	Yes	21.02898	21	0.004	2.00276	3	0.882
585	Validation	J5-A-Entry	0	80016	79955	158	183	1.929	Yes	Yes	137.189	162	2.047	Yes	Yes	16.02208	17	0.192	5.0069	4	0.284	104	111	0.712	Yes	Yes	83.94902	92	0.905	Yes	Yes	13.01794	10	0.899	6.675866	9	0.697	155	168	0.989	Yes	Yes	146.2015	159	1.037	Yes	Yes	5.0069	5	0.139	4.00552	4	0.035
586	Validation	J5-B-Entry	0	42728	79955	328	275	3.055	Yes	Yes	293.4043	234	3.655	Yes	Yes	25.0345	28	0.602	10.0138	13	0.928	176	127	3.967	Yes	Yes	137.0222	87	4.678	Yes	Yes	25.36829	25	0.128	13.51863	15	0.366	250	180	4.808	Yes	Yes	222.3063	146	5.638	No	Yes	19.02622	29	1.947	9.012419	6	1.302
587	Validation	J5-C-Entry	0	79933	79955	391	423	1.608	Yes	Yes	330.4554	341	0.573	Yes	Yes	40.0552	50	1.474	20.0276	32	2.359	216	204	0.830	Yes	Yes	167.5642	146	1.745	Yes	Yes	25.0345	33	1.427	23.03174	25	0.438	354	351	0.189	Yes	Yes	315.4347	299	0.961	Yes	Yes	25.0345	36	2.026	14.01932	16	0.534
588	Calibration	J1-B-Exit	0	79948	80026	233	218	0.992	Yes	Yes	183.2525	179	0.353	Yes	Yes	32.04416	25	1.313	18.02484	15	0.778	254	250	0.236	Yes	Yes	208.9546	208	0.075	Yes	Yes	29.7076	27	0.426	15.52139	15	0.099	445	440	0.242	Yes	Yes	401.5533	397	0.204	Yes	Yes	32.04416	32	0.054	11.01518	10	0.410
589	Calibration	J1-C-Exit	0	79948	80009	340	344	0.201	Yes	Yes	290.4002	299	0.485	Yes	Yes	36.04968	32	0.670	14.01932	13	0.190	281	279	0.139	Yes	Yes	235.3243	232	0.219	Yes	Yes	30.70898	32	0.231	15.35449	15	0.072	407	417	0.502	Yes	Yes	365.5037	377	0.585	Yes	Yes	34.04692	35	0.077	7.009659	5	0.617
590	Calibration	J4-B-Exit	0	79956	80021	164	227	4.480	Yes	Yes	145.2001	208	4.712	Yes	Yes	16.02208	16	0.006	3.00414	3	0.037	126	133	0.624	Yes	Yes	109.4842	116	0.647	Yes	Yes	14.68691	15	0.081	2.00276	2	0.059	172	175	0.247	Yes	Yes	163.2249	163	0.019	Yes	Yes	7.009659	11	1.207	2.00276	2	0.059
591	Calibration	J4-C-Exit	0	79956	79941	335	341	0.294	Yes	Yes	302.4167	302	0.003	Yes	Yes	26.03588	31	0.895	7.009659	8	0.252	182	183	0.065	Yes	Yes	159.3863	159	0.031	Yes	Yes	19.6938	20	0.069	3.171036	4	0.508	300	305	0.292	Yes	Yes	286.3947	286	0.001	Yes	Yes	13.01794	18	1.239	1.00138	1	0.178
592	Validation	J5-A-Exit	0	79955	80016	227	293	4.087	Yes	Yes	202.2787	251	3.260	Yes	Yes	17.02346	27	2.159	8.011039	15	1.987	97	72	2.741	Yes	Yes	75.77108	57	2.322	Yes	Yes	12.85104	7	1.938	8.511729	8	0.076	126	102	2.264	Yes	Yes	116.1601	89	2.698	Yes	Yes	5.0069	8	1.198	5.0069	5	0.034
593	Validation	J5-B-Exit	0	79955	42728	267	162	7.181	No	No	218.3008	121	7.459	No	Yes	35.0483	23	2.147	14.01932	18	0.891	176	149	2.096	Yes	Yes	139.1918	105	3.084	Yes	Yes	20.52829	27	1.280	16.02208	17	0.282	286	280	0.370	Yes	Yes	257.3546	240	1.102	Yes	Yes	20.0276	29	1.809	9.012419	11	0.692
594	Validation	J5-C-Exit	0	79955	79933	383	426	2.181	Yes	Yes	340.4692	365	1.294	Yes	Yes	29.04002	44	2.514	13.01794	17	1.115	222	221	0.104	Yes	Yes	173.5725	164	0.763	Yes	Yes	30.0414	34	0.677	18.69242	23	0.989	347	316	1.706	Yes	Yes	310.4278	275	2.095	Yes	Yes	24.03312	32	1.579	13.01794	9	1.087
595	Calibration	J1-C-Entry	0	79956	80022	308	312	0.240	Yes	Yes	270.5288	274	0.233	Yes	Yes	30.7919	31	0.086	6.598264	6	0.039	250	248	0.073	Yes	Yes	214.4436	214	0.030	Yes	Yes	32.62475	32	0.197	2.565992	3	0.240	386	372	0.724	Yes	Yes	359.6054	343	0.898	Yes	Yes	25.29335	27	0.341	1.099711	2	0.788
596	Calibration	J1-D-Entry	0	79945	79942	4	12	2.722	Yes	Yes	4.398843	11	2.342	Yes	Yes	0	1	1.414	0	0	0.875	2	6	2.226	Yes	Yes	1.649566	5	1.938	Yes	Yes	0.183285	1	0.899	0	0	0.722	9	11	0.633	Yes	Yes	8.797686	9	0.213	Yes	Yes	0	1	1.414	0	0	0.821
597	Calibration	J2-B-Entry	0	79961	79960	20	31	2.299	Yes	Yes	16.49566	24	1.660	Yes	Yes	1.099711	4	1.655	2.199421	4	0.934	32	60	4.177	Yes	Yes	24.37692	52	4.498	Yes	Yes	5.681839	6	0.132	1.466281	2	0.054	47	120	7.980	No	Yes	42.88872	114	8.054	No	Yes	4.398843	4	0.195	0	2	2.030
599	Calibration	J3-B-Entry	0	1533	79944	277	259	1.105	Yes	Yes	232.039	219	0.856	Yes	Yes	40.6893	36	0.801	4.398843	4	0.136	316	239	4.618	Yes	Yes	283.7254	214	4.417	Yes	Yes	30.42533	23	1.416	1.832851	2	0.061	460	401	2.836	Yes	Yes	421.1892	369	2.617	Yes	Yes	38.48987	31	1.222	0	0	0.926
600	Calibration	J4-A-Entry	0	79962	5082	580	538	1.750	Yes	Yes	501.4681	468	1.531	Yes	Yes	73.68062	65	1.005	4.398843	5	0.325	533	415	5.394	No	No	459.3125	351	5.361	No	No	64.14979	55	1.212	9.347541	9	0.051	861	723	4.897	Yes	No	786.2931	654	4.924	Yes	No	73.68062	68	0.687	1.099711	1	0.100
601	Validation	J5-A-Entry	0	80034	80040	533	572	1.645	Yes	Yes	465.1776	500	1.587	Yes	Yes	64.88293	66	0.097	3.299132	6	1.383	444	425	0.914	Yes	Yes	381.0498	359	1.134	Yes	Yes	53.70254	55	0.227	8.797686	10	0.361	742	735	0.286	Yes	Yes	673.0229	665	0.312	Yes	Yes	68.18206	68	0.012	1.099711	1	0.192
602	Validation	J5-B-Entry	0	79962	80040	356	341	0.806	Yes	Yes	285.9248	276	0.589	Yes	Yes	60.48409	56	0.598	9.897396	9	0.201	233	232	0.040	Yes	Yes	192.8159	195	0.143	Yes	Yes	31.89161	29	0.454	8.24783	8	0.032	366	380	0.701	Yes	Yes	332.1126	341	0.457	Yes	Yes	30.7919	36	0.918	3.299132	3	0.086
603	Validation	J5-C-Entry	0	80010	80040	288	246	2.609	Yes	Yes	245.2355	212	2.209	Yes	Yes	36.29045	28	1.526	6.598264	6	0.235	300	197	6.592	No	No	263.3807	170	6.332	No	Yes	34.4576	24	1.936	2.565992	2	0.129	405	296	5.788	No	No	369.5028	268	5.676	No	No	34.09103	27	1.287	1.099711	1	0.079
604	Calibration	J6-A-Entry	0	1496	1533	14	36	4.368	Yes	Yes	13.19653	28	3.312	Yes	Yes	1.099711	6	2.477	0	2	2.158	90	90	0.022	Yes	Yes	85.77743	86	0.024	Yes	Yes	4.398843	4	0.195	0	0	0.875	120	120	0.047	Yes	Yes	111.0708	111	0.007	Yes	Yes	8.797686	9	0.068	0	0	0.875
606	Calibration	J9-C-Entry	0	80039	80038	91	55	4.270	Yes	Yes	80.27888	43	4.690	Yes	Yes	10.99711	11	0.001	0	0	0.875	147	68	7.659	No	Yes	138.3803	59	7.957	No	Yes	8.064545	8	0.026	0.549855	0	0.244	243	125	8.670	No	No	223.2413	118	8.085	No	No	19.79479	7	3.391	0	0	0.871
607	Calibration	J10-A-Entry	0	79980	79957	450	450	0.000	Yes	Yes	394.7961	395	0.024	Yes	Yes	48.38727	48	0.056	6.598264	6	0.039	267	268	0.028	Yes	Yes	220.3087	220	0.005	Yes	Yes	39.58959	40	0.063	7.51469	8	0.050	399	398	0.044	Yes	Yes	355.2066	355	0.012	Yes	Yes	42.88872	42	0.180	1.099711	1	0.050
608	Calibration	J10-B-Entry	0	79971	79957	142	143	0.088	Yes	Yes	125.367	125	0.033	Yes	Yes	16.49566	16	0.123	0	2	1.955	70	71	0.024	Yes	Yes	59.20109	59	0.026	Yes	Yes	9.897396	10	0.033	1.282996	2	0.253	92	92	0.009	Yes	Yes	86.87714	87	0.014	Yes	Yes	5.498553	5	0.218	0	0	0.951
609	Calibration	J10-C-Entry	0	80038	79957	536	540	0.174	Yes	Yes	442.0837	445	0.141	Yes	Yes	78.07946	79	0.106	15.39595	16	0.031	368	382	0.692	Yes	Yes	308.2856	321	0.731	Yes	Yes	50.22012	50	0.033	9.714111	10	0.211	620	640	0.801	Yes	Yes	558.653	579	0.856	Yes	Yes	57.18496	57	0.015	4.398843	4	0.089
610	Calibration	J10-D-Entry	0	80041	79957	190	137	4.183	Yes	Yes	164.9566	115	4.224	Yes	Yes	20.8945	18	0.758	4.398843	4	0.093	166	132	2.772	Yes	Yes	136.3641	109	2.451	Yes	Yes	24.56021	18	1.467	5.315268	5	0.019	389	307	4.407	Yes	Yes	364.0042	282	4.576	Yes	Yes	25.29335	25	0.077	0	0	0.875
612	Calibration	J1-B-Exit	0	80001	79960	100	101	0.085	Yes	Yes	91.27599	91	0.025	Yes	Yes	7.697975	8	0.108	1.099711	2	0.643	93	111	1.799	Yes	Yes	82.29502	100	1.849	Yes	Yes	10.26397	10	0.086	0.183285	1	1.035	166	167	0.111	Yes	Yes	156.1589	156	0.004	Yes	Yes	9.897396	10	0.029	0	1	1.670
613	Calibration	J1-C-Exit	0	80022	79956	372	372	0.023	Yes	Yes	321.1155	321	0.007	Yes	Yes	45.08814	45	0.050	5.498553	6	0.274	244	244	0.037	Yes	Yes	211.1445	211	0.010	Yes	Yes	30.42533	30	0.077	2.565992	3	0.007	405	404	0.022	Yes	Yes	378.3005	378	0.005	Yes	Yes	26.39306	25	0.209	0	1	1.028
614	Calibration	J1-D-Exit	0	79942	79945	11	12	0.329	Yes	Yes	10.99711	11	0.023	Yes	Yes	0	1	1.414	0	0	0.625	1	16	4.848	Yes	Yes	1.282996	15	4.724	Yes	Yes	0.183285	1	1.062	0	0	0.339	8	30	5.146	No	Yes	7.697975	29	4.965	Yes	Yes	0	1	1.414	0	0	0.463
615	Calibration	J2-A-Exit	0	79960	5082	512	478	1.528	Yes	Yes	431.0866	401	1.461	Yes	Yes	68.18206	67	0.105	13.19653	10	0.991	316	305	0.580	Yes	Yes	269.4291	260	0.581	Yes	Yes	37.57345	38	0.066	8.6144	7	0.418	434	435	0.010	Yes	Yes	395.8959	396	0.011	Yes	Yes	35.19074	35	0.024	3.299132	3	0.071
616	Calibration	J2-B-Exit	0	79960	79961	44	116	8.040	No	Yes	38.48987	105	7.850	No	Yes	3.299132	6	1.408	2.199421	4	1.253	26	40	2.515	Yes	Yes	18.32851	32	2.794	Yes	Yes	4.765413	5	0.106	2.565992	3	0.072	24	40	2.772	Yes	Yes	24.19364	38	2.477	Yes	Yes	0	1	1.726	0	0	0.875
620	Calibration	J3-C-Exit	0	79943	79942	225	245	1.265	Yes	Yes	188.0505	207	1.376	Yes	Yes	34.09103	34	0.017	3.299132	3	0.081	214	214	0.004	Yes	Yes	190.0667	190	0.006	Yes	Yes	22.1775	22	0.038	1.649566	2	0.158	365	365	0.000	Yes	Yes	337.6112	338	0.043	Yes	Yes	27.49277	26	0.232	0	0	0.888
621	Calibration	J4-A-Exit	0	5082	79962	367	328	2.125	Yes	Yes	295.8222	268	1.681	Yes	Yes	61.5838	53	1.179	9.897396	7	0.844	231	217	0.963	Yes	Yes	191.3497	181	0.762	Yes	Yes	31.70833	29	0.519	8.24783	7	0.419	366	338	1.513	Yes	Yes	332.1126	304	1.592	Yes	Yes	30.7919	31	0.046	3.299132	3	0.142
623	Calibration	J4-C-Exit	0	5082	1533	395	392	0.133	Yes	Yes	345.3092	343	0.127	Yes	Yes	45.08814	45	0.016	4.398843	4	0.089	308	249	3.560	Yes	Yes	276.7605	217	3.784	Yes	Yes	29.5089	30	0.002	1.832851	2	0.061	410	396	0.705	Yes	Yes	373.9016	366	0.394	Yes	Yes	36.29045	29	1.226	0	0	0.926
624	Validation	J5-A-Exit	0	80040	80034	597	583	0.571	Yes	Yes	493.7701	484	0.423	Yes	Yes	87.97686	84	0.476	15.39595	15	0.029	446	424	1.050	Yes	Yes	379.4002	360	1.009	Yes	Yes	56.08525	53	0.371	10.26397	11	0.080	666	672	0.224	Yes	Yes	601.5418	605	0.134	Yes	Yes	60.48409	63	0.328	4.398843	4	0.033
625	Validation	J5-B-Exit	0	80040	79962	581	576	0.213	Yes	Yes	502.5678	504	0.042	Yes	Yes	73.68062	66	0.957	4.398843	6	0.837	531	429	4.639	Yes	No	457.8462	364	4.620	Yes	Yes	63.96651	55	1.108	9.347541	10	0.178	847	738	3.850	Yes	Yes	773.0966	669	3.886	Yes	Yes	72.58091	68	0.510	1.099711	1	0.192
626	Calibration	J6-A-Exit	0	1533	1496	128	169	3.434	Yes	Yes	122.0679	152	2.565	Yes	Yes	5.498553	15	2.941	0	2	2.201	85	100	1.578	Yes	Yes	81.37859	89	0.852	Yes	Yes	3.482417	10	2.626	0	0	0.875	58	116	6.144	No	Yes	51.6864	108	6.319	No	Yes	6.598264	7	0.154	0	0	0.875
630	Calibration	J9-B-Exit	0	80038	80035	555	572	0.701	Yes	Yes	487.1718	500	0.578	Yes	Yes	64.88293	66	0.096	3.299132	6	1.383	418	425	0.332	Yes	Yes	358.1391	359	0.058	Yes	Yes	50.95326	55	0.607	8.6144	10	0.423	713	735	0.815	Yes	Yes	646.6299	665	0.715	Yes	Yes	64.88293	68	0.416	1.099711	1	0.192
631	Calibration	J9-C-Exit	0	80038	80039	103	80	2.428	Yes	Yes	92.3757	72	2.249	Yes	Yes	10.99711	8	1.061	0	0	0.867	148	62	8.440	No	Yes	139.1134	53	8.769	No	Yes	8.431115	8	0.150	0.916426	1	0.168	232	67	13.512	No	No	207.8453	58	13.024	No	No	24.19364	9	3.817	0	0	0.875
632	Calibration	J10-A-Exit	0	79957	79980	357	356	0.061	Yes	Yes	284.8251	285	0.017	Yes	Yes	57.18496	56	0.101	15.39595	15	0.024	286	286	0.003	Yes	Yes	241.0199	241	0.001	Yes	Yes	37.02359	37	0.004	8.064545	8	0.008	507	506	0.037	Yes	Yes	465.1776	465	0.023	Yes	Yes	38.48987	38	0.068	3.299132	3	0.046
633	Calibration	J10-B-Exit	0	79957	79971	99	98	0.052	Yes	Yes	73.68062	75	0.159	Yes	Yes	24.19364	22	0.416	1.099711	1	0.107	69	70	0.055	Yes	Yes	58.65124	59	0.047	Yes	Yes	8.797686	9	0.068	2.016136	2	0.072	129	129	0.072	Yes	Yes	117.669	118	0.031	Yes	Yes	10.99711	11	0.001	0	0	0.975
634	Calibration	J10-C-Exit	0	79957	80038	550	554	0.163	Yes	Yes	488.2715	489	0.043	Yes	Yes	58.28467	58	0.050	3.299132	7	1.466	365	377	0.603	Yes	Yes	307.3691	314	0.395	Yes	Yes	48.93713	52	0.438	8.6144	10	0.499	643	644	0.032	Yes	Yes	579.5475	579	0.012	Yes	Yes	62.68351	64	0.127	1.099711	1	0.089
635	Calibration	J10-D-Exit	0	79957	80041	311	261	2.992	Yes	Yes	280.4262	231	3.059	Yes	Yes	24.19364	24	0.025	6.598264	5	0.633	152	120	2.728	Yes	Yes	117.1192	95	2.113	Yes	Yes	29.5089	20	1.966	5.131983	5	0.116	222	158	4.619	Yes	Yes	202.3468	141	4.654	Yes	Yes	18.69508	16	0.662	1.099711	1	0.047
636	Calibration	16055	E	72577	72587	2181	2119	1.334	Yes	Yes	1263.971	1263	0.025	Yes	Yes	440.1518	403	1.796	476.3871	452	1.117	1584	1726	3.480	Yes	Yes	800.9058	936	4.568	Yes	No	280.2904	287	0.425	503.2083	503	0.008	2617	2610	0.146	Yes	Yes	1974.822	1967	0.170	Yes	Yes	323.9858	324	0.001	318.6571	319	0.005
637	Calibration	16055	W	72585	72578	2448	2390	1.171	Yes	Yes	1599.68	1540	1.507	Yes	Yes	331.446	334	0.119	516.8853	517	0.002	1731	1731	0.003	Yes	Yes	938.209	938	0.000	Yes	Yes	325.9397	326	0.003	466.973	467	0.003	2161	2064	2.112	Yes	Yes	1487.777	1488	0.009	Yes	Yes	362.3526	286	4.235	311.1969	290	1.220
638	Calibration	46054	E	72590	72597	2121	2121	0.002	Yes	Yes	1303.036	1303	0.002	Yes	Yes	422.9806	423	0.002	395.2791	395	0.005	2278	2278	0.001	Yes	Yes	1496.769	1497	0.003	Yes	Yes	385.1574	385	0.008	396.5221	397	0.001	3182	3183	0.004	Yes	Yes	2602.875	2603	0.003	Yes	Yes	340.9415	341	0.003	238.6591	239	0.002
639	Calibration	46054	W	72596	72588	2285	2286	0.009	Yes	Yes	1516.124	1516	0.002	Yes	Yes	350.5305	351	0.025	418.7188	419	0.002	2380	2380	0.005	Yes	Yes	1555.191	1555	0.000	Yes	Yes	443.0464	443	0.003	381.7835	382	0.010	2240	2239	0.002	Yes	Yes	1813.383	1811	0.059	Yes	Yes	275.9495	278	0.142	150.2274	150	0.002
640	Calibration	58447	N	80400	80399	384	384	0.001	Yes	Yes	298.3238	298	0.019	Yes	Yes	60.73021	61	0.036	24.50517	25	0.003	153	154	0.044	Yes	Yes	109.7406	110	0.027	Yes	Yes	28.76694	29	0.043	14.91619	15	0.008	232	233	0.020	Yes	Yes	189.6487	190	0.025	Yes	Yes	33.02871	33	0.005	9.58898	10	0.006
641	Calibration	58447	S	80399	80400	190	190	0.038	Yes	Yes	141.7038	142	0.021	Yes	Yes	25.57061	26	0.085	22.37429	22	0.032	179	179	0.037	Yes	Yes	121.8156	122	0.014	Yes	Yes	37.64563	38	0.058	19.17796	19	0.004	471	469	0.086	Yes	Yes	392.0828	392	0.004	Yes	Yes	61.79565	62	0.002	17.04708	15	0.450
642	Validation	80916	N	4053	1094	469	547	3.453	Yes	Yes	343.174	425	4.181	Yes	Yes	78.95107	79	0.059	47.37064	43	0.689	421	353	3.442	Yes	Yes	311.0672	260	3.045	Yes	Yes	64.03809	58	0.797	45.44072	35	1.576	576	632	2.278	Yes	Yes	494.76	549	2.381	Yes	Yes	64.21353	63	0.140	16.84289	20	0.632
643	Validation	80916	S	1094	4053	471	518	2.154	Yes	Yes	350.5427	406	2.875	Yes	Yes	70.52962	73	0.233	49.476	39	1.501	385	372	0.680	Yes	Yes	268.4336	276	0.441	Yes	Yes	71.40685	59	1.544	45.44072	37	1.249	462	549	3.857	Yes	Yes	390.5446	472	3.932	Yes	Yes	60.00281	58	0.237	11.57949	18	1.772
644	Calibration	80919	E	1209	80918	775	775	0.003	Yes	Yes	603.1861	604	0.034	Yes	Yes	104.2154	104	0.019	67.37158	67	0.086	449	449	0.005	Yes	Yes	307.7337	308	0.001	Yes	Yes	80.00375	80	0.003	60.88004	61	0.014	708	705	0.141	Yes	Yes	613.713	610	0.164	Yes	Yes	70.52962	71	0.050	24.21166	24	0.019
645	Calibration	80919	W	80918	1209	596	612	0.644	Yes	Yes	448.4421	448	0.035	Yes	Yes	103.1627	103	0.021	44.2126	61	2.314	465	457	0.412	Yes	Yes	317.7342	318	0.026	Yes	Yes	87.89885	79	1.011	59.82736	60	0.010	578	694	4.601	Yes	No	496.8654	611	4.865	Yes	No	64.21353	64	0.022	16.84289	19	0.402
648	Calibration	81558	E	79912	5066	601	619	0.712	Yes	Yes	360.0169	380	1.023	Yes	Yes	131.5851	129	0.196	109.4788	110	0.014	438	523	3.877	Yes	Yes	272.6443	332	3.407	Yes	Yes	55.44119	81	3.096	109.8297	110	0.018	977	975	0.074	Yes	Yes	824.2491	822	0.082	Yes	Yes	85.26715	85	0.002	67.37158	67	0.006
649	Calibration	81558	W	5066	79912	859	870	0.361	Yes	Yes	664.2416	664	0.021	Yes	Yes	96.84664	109	1.160	97.89932	97	0.060	430	543	5.140	No	No	268.2582	362	5.268	No	Yes	62.98541	83	2.339	98.60111	98	0.011	647	675	1.089	Yes	Yes	495.8127	530	1.498	Yes	Yes	87.37251	81	0.663	64.21353	64	0.023
654	Calibration	27424	W	1575	1551	575	576	0.023	Yes	Yes	472.6839	473	0.017	Yes	Yes	78.78065	79	0.025	23.53188	23	0.009	507	508	0.006	Yes	Yes	411.6374	412	0.019	Yes	Yes	71.95981	72	0.005	23.87292	24	0.059	622	651	1.147	Yes	Yes	540.2102	567	1.147	Yes	Yes	75.71127	76	0.080	6.138752	7	0.480
655	Calibration	27424	E	1551	1575	519	531	0.522	Yes	Yes	417.4351	419	0.054	Yes	Yes	84.9194	85	0.012	16.37001	27	2.306	522	505	0.766	Yes	Yes	428.86	429	0.006	Yes	Yes	74.34711	57	2.147	18.92782	19	0.020	615	618	0.122	Yes	Yes	560.6727	564	0.121	Yes	Yes	43.99439	44	0.005	10.23125	10	0.041
656	Calibration	37473	E	4062	80420	252	235	1.051	Yes	Yes	171.8851	172	0.010	Yes	Yes	30.69376	31	0.055	49.11002	32	2.638	158	146	0.972	Yes	Yes	90.88763	98	0.734	Yes	Yes	21.48563	22	0.193	45.6996	26	3.353	304	308	0.215	Yes	Yes	257.8276	264	0.378	Yes	Yes	29.67063	30	0.060	16.37001	14	0.693
657	Calibration	37473	W	80420	4062	257	265	0.510	Yes	Yes	188.2551	204	1.134	Yes	Yes	25.57813	30	0.866	42.97126	31	2.013	168	158	0.754	Yes	Yes	95.4917	104	0.825	Yes	Yes	25.40761	27	0.346	46.89324	27	3.224	244	254	0.664	Yes	Yes	202.5788	217	0.964	Yes	Yes	15.34688	19	0.884	25.57813	18	1.524
660	Calibration	46087	N	80310	80309	303	337	1.923	Yes	Yes	246.5732	278	1.947	Yes	Yes	48.08689	48	0.008	8.185003	11	0.943	152	176	1.897	Yes	Yes	119.3646	135	1.347	Yes	Yes	28.64751	29	0.068	4.092501	13	3.014	251	268	1.068	Yes	Yes	218.9488	231	0.777	Yes	Yes	30.69376	31	0.057	1.023125	6	2.742
661	Calibration	46087	S	80309	80310	209	225	1.076	Yes	Yes	179.0469	182	0.255	Yes	Yes	26.60126	27	0.077	3.069376	15	3.987	138	178	3.160	Yes	Yes	109.3039	122	1.172	Yes	Yes	24.38449	27	0.431	4.604064	30	6.039	317	355	2.049	Yes	Yes	267.0357	292	1.502	Yes	Yes	50.13314	50	0.070	0	13	5.088
664	Calibration	58295	N	1047	1048	946	955	0.285	Yes	Yes	765.2555	788	0.811	Yes	Yes	138.7608	110	2.614	42.45666	58	2.162	490	521	1.377	Yes	Yes	384.0085	392	0.419	Yes	Yes	68.69005	81	1.374	37.45161	48	1.655	653	663	0.390	Yes	Yes	579.8959	581	0.047	Yes	Yes	56.95406	63	0.730	16.56845	20	0.760
665	Calibration	58295	S	1048	1047	540	603	2.646	Yes	Yes	420.4245	453	1.568	Yes	Yes	85.94886	89	0.371	33.13691	60	3.951	494	562	2.950	Yes	Yes	374.1709	425	2.556	Yes	Yes	74.90322	87	1.298	45.04549	50	0.728	1043	1053	0.324	Yes	Yes	921.6203	926	0.148	Yes	Yes	103.5528	104	0.034	17.60398	23	1.245
666	Calibration	60060	W	72993	5002	668	668	0.005	Yes	Yes	502.5313	503	0.011	Yes	Yes	114.1165	114	0.015	51.30007	51	0.005	485	477	0.394	Yes	Yes	361.5434	353	0.437	Yes	Yes	76.42664	76	0.050	47.46129	48	0.007	647	646	0.023	Yes	Yes	555.9253	555	0.033	Yes	Yes	60.72254	61	0.036	30.36127	30	0.017
667	Calibration	60060	E	5002	72993	635	635	0.030	Yes	Yes	472.1701	472	0.009	Yes	Yes	98.41239	98	0.042	64.9103	65	0.018	510	485	1.103	Yes	Yes	380.2138	356	1.277	Yes	Yes	86.19808	86	0.022	43.62251	44	0.014	535	535	0.005	Yes	Yes	467.9823	468	0.009	Yes	Yes	45.01843	45	0.009	21.98575	22	0.054
670	Calibration	80918	N	1076	1433	735	735	0.012	Yes	Yes	600.6065	600	0.006	Yes	Yes	109.766	110	0.022	24.85268	25	0.010	558	558	0.013	Yes	Yes	462.8812	463	0.003	Yes	Yes	75.2484	75	0.029	20.02022	20	0.025	788	792	0.125	Yes	Yes	715.5501	715	0.039	Yes	Yes	68.34488	68	0.049	4.142114	9	1.930
671	Calibration	80918	S	1433	1076	527	527	0.022	Yes	Yes	406.9627	407	0.002	Yes	Yes	99.41073	99	0.042	20.71057	21	0.007	586	586	0.011	Yes	Yes	484.1095	484	0.005	Yes	Yes	84.22298	84	0.019	17.25881	17	0.005	739	738	0.033	Yes	Yes	687.5909	689	0.072	Yes	Yes	43.49219	43	0.014	8.284227	6	1.023
676	Calibration	99071	E	1365	80786	248	217	1.984	Yes	Yes	188.2551	188	0.019	Yes	Yes	33.76314	29	0.787	25.57813	0	7.152	132	114	1.612	Yes	Yes	89.86451	90	0.008	Yes	Yes	23.7024	24	0.061	18.24574	0	6.041	290	275	0.846	Yes	Yes	244.527	245	0.030	Yes	Yes	37.85564	30	1.291	7.161877	0	3.785
677	Calibration	99071	W	80786	1365	237	224	0.872	Yes	Yes	195.4169	195	0.021	Yes	Yes	28.64751	29	0.066	13.30063	0	5.158	139	120	1.677	Yes	Yes	89.86451	90	0.013	Yes	Yes	30.69376	30	0.172	18.24574	0	6.041	233	227	0.411	Yes	Yes	207.6944	208	0.024	Yes	Yes	19.43938	19	0.100	6.138752	0	3.504
678	Calibration	7407	E	80581	1535	331	331	0.045	Yes	Yes	259.5788	260	0.026	Yes	Yes	52.5338	53	0.063	18.54134	18	0.010	352	352	0.009	Yes	Yes	268.6777	269	0.019	Yes	Yes	59.0576	59	0.007	24.20675	24	0.016	481	482	0.051	Yes	Yes	440.8719	442	0.048	Yes	Yes	36.0526	36	0.001	4.120298	4	0.048
679	Calibration	7407	W	1535	80581	412	413	0.029	Yes	Yes	339.9246	340	0.004	Yes	Yes	54.59394	55	0.054	17.51127	18	0.030	363	360	0.186	Yes	Yes	280.6953	277	0.192	Yes	Yes	60.25935	60	0.057	22.31828	22	0.024	443	439	0.182	Yes	Yes	373.917	370	0.203	Yes	Yes	59.74432	60	0.021	9.27067	9	0.025
682	Calibration	37559	W	5007	5008	414	415	0.039	Yes	Yes	328.5937	329	0.022	Yes	Yes	64.89469	65	0.009	20.60149	21	0.071	281	281	0.024	Yes	Yes	201.0362	201	0.003	Yes	Yes	52.36212	52	0.049	27.98369	28	0.001	496	499	0.121	Yes	Yes	437.7816	438	0.013	Yes	Yes	46.35335	46	0.053	12.36089	15	0.756
683	Calibration	37559	E	5008	5007	422	428	0.269	Yes	Yes	352.2855	352	0.001	Yes	Yes	50.47365	50	0.070	19.57141	26	1.276	256	308	3.077	Yes	Yes	177.1728	228	3.596	Yes	Yes	52.5338	53	0.064	26.43858	26	0.000	409	415	0.313	Yes	Yes	356.4057	358	0.110	Yes	Yes	48.4135	48	0.067	4.120298	9	1.859
684	Calibration	56747	S	5067	5066	460	498	1.738	Yes	Yes	305.0385	344	2.148	Yes	Yes	54.07037	54	0.008	100.9994	100	0.058	475	475	0.011	Yes	Yes	306.0587	306	0.000	Yes	Yes	69.20327	69	0.026	99.63911	100	0.002	489	499	0.486	Yes	Yes	409.0985	409	0.017	Yes	Yes	31.62606	43	1.829	47.9492	48	0.002
685	Calibration	56747	N	5066	5067	578	579	0.033	Yes	Yes	385.634	386	0.025	Yes	Yes	81.61565	82	0.040	111.2013	111	0.006	416	416	0.008	Yes	Yes	248.7577	249	0.020	Yes	Yes	56.96092	57	0.004	110.5212	110	0.017	555	556	0.032	Yes	Yes	463.1688	464	0.020	Yes	Yes	39.78763	40	0.038	52.02998	52	0.012
686	Calibration	73708	W	79928	79927	185	177	0.641	Yes	Yes	151.6428	147	0.416	Yes	Yes	30.5321	26	0.817	3.05321	4	0.435	149	115	2.941	Yes	Yes	124.1639	95	2.781	Yes	Yes	22.55983	18	1.045	1.865851	2	0.045	234	184	3.439	Yes	Yes	220.8489	172	3.517	Yes	Yes	13.23058	12	0.252	0	0	0.918
687	Calibration	73708	E	79927	79928	189	171	1.349	Yes	Yes	166.9088	152	1.186	Yes	Yes	22.39021	16	1.409	0	3	2.471	154	119	3.013	Yes	Yes	131.288	98	3.123	Yes	Yes	20.8636	18	0.605	2.205096	3	0.534	233	178	3.824	Yes	Yes	208.636	157	3.797	Yes	Yes	22.39021	19	0.741	2.035473	2	0.082
688	Calibration	74008	S	5078	42098	558	628	2.865	Yes	Yes	429.2799	499	3.235	Yes	Yes	80.16038	80	0.019	48.51812	49	0.034	481	482	0.027	Yes	Yes	339.9784	340	0.006	Yes	Yes	95.27834	95	0.030	45.70548	46	0.113	880	882	0.074	Yes	Yes	713.0054	711	0.085	Yes	Yes	147.6639	146	0.104	18.98535	25	1.225
689	Calibration	74008	N	5113	5077	664	664	0.015	Yes	Yes	509.4403	509	0.020	Yes	Yes	98.09099	98	0.007	56.95606	57	0.020	511	511	0.000	Yes	Yes	373.2028	373	0.010	Yes	Yes	76.99615	77	0.002	60.82344	61	0.025	806	804	0.076	Yes	Yes	684.5274	682	0.081	Yes	Yes	92.81728	93	0.011	28.47803	28	0.030
694	Calibration	81557	W	80297	80298	572	574	0.105	Yes	Yes	468.4747	468	0.018	Yes	Yes	59.62405	60	0.046	43.65333	46	0.379	364	359	0.294	Yes	Yes	228.3814	228	0.023	Yes	Yes	67.07706	67	0.012	69.02904	64	0.631	468	461	0.369	Yes	Yes	311.9616	311	0.083	Yes	Yes	103.2774	103	0.070	53.23576	47	0.816
695	Calibration	81557	E	80294	73084	399	405	0.291	Yes	Yes	280.0201	280	0.020	Yes	Yes	84.11251	84	0.008	35.1356	41	1.008	297	296	0.076	Yes	Yes	191.4713	191	0.038	Yes	Yes	55.18774	55	0.028	50.39652	50	0.081	613	615	0.078	Yes	Yes	540.8754	541	0.005	Yes	Yes	58.55934	59	0.067	13.8413	15	0.397
696	Calibration	800650	E	1576	80787	43	16	5.121	No	Yes	19.57694	3	4.877	Yes	Yes	11.33402	0	4.692	12.36438	12	0.030	35	14	4.354	Yes	Yes	15.11202	3	4.056	Yes	Yes	9.445013	0	4.257	10.81883	11	0.028	80	9	10.731	No	Yes	69.03446	3	11.118	No	Yes	5.151825	0	3.136	6.18219	6	0.021
697	Calibration	800650	W	80787	1576	56	12	7.532	No	Yes	40.18424	3	8.042	No	Yes	9.273285	0	4.230	6.18219	9	0.989	43	17	4.595	Yes	Yes	18.20312	3	4.766	Yes	Yes	9.960195	0	4.403	14.42511	15	0.035	50	15	6.159	No	Yes	36.06278	5	6.929	No	Yes	4.12146	0	2.778	10.30365	10	0.013
698	Calibration	800948	W	80316	5112	72	73	0.015	Yes	Yes	63.88292	64	0.021	Yes	Yes	7.453007	7	0.169	1.064715	1	0.367	67	68	0.101	Yes	Yes	51.63869	52	0.050	Yes	Yes	13.66385	14	0.090	1.41962	2	0.108	42	48	1.024	Yes	Yes	37.26503	43	0.878	Yes	Yes	4.258861	4	0.058	0	1	1.541
699	Calibration	800948	E	5112	80316	54	56	0.224	Yes	Yes	41.5239	43	0.198	Yes	Yes	11.71187	12	0.084	1.064715	1	0.084	53	53	0.063	Yes	Yes	43.29842	43	0.045	Yes	Yes	9.227532	9	0.075	0.70981	1	0.074	71	72	0.122	Yes	Yes	56.42991	57	0.107	Yes	Yes	13.8413	14	0.035	1.064715	1	0.088
700	Calibration	800954	W	1078	3046	252	248	0.273	Yes	Yes	211.6892	212	0.021	Yes	Yes	35.62078	36	0.078	5.088683	0	3.190	173	182	0.694	Yes	Yes	150.7946	162	0.917	Yes	Yes	20.35473	20	0.079	1.865851	0	1.932	327	329	0.104	Yes	Yes	295.1436	297	0.080	Yes	Yes	31.54984	32	0.090	0	0	0.000
701	Calibration	800954	E	3046	1078	245	244	0.109	Yes	Yes	220.8489	221	0.013	Yes	Yes	23.40794	23	0.103	1.017737	0	1.427	173	162	0.814	Yes	Yes	144.349	144	0.022	Yes	Yes	27.81814	18	2.001	0.678491	0	1.165	204	205	0.123	Yes	Yes	175.0507	188	0.984	Yes	Yes	28.49663	17	2.413	0	0	0.000
702	Calibration	800974	W	3022	3021	25	24	0.384	Yes	Yes	19.337	19	0.063	Yes	Yes	3.05321	3	0.031	3.05321	1	1.043	28	23	1.152	Yes	Yes	23.40794	18	1.268	Yes	Yes	4.070947	4	0.035	1.017737	1	0.006	38	37	0.043	Yes	Yes	34.60305	35	0.071	Yes	Yes	2.035473	2	0.032	1.017737	0	0.758
703	Calibration	800974	E	3021	3022	56	56	0.027	Yes	Yes	50.88683	51	0.014	Yes	Yes	3.05321	3	0.031	2.035473	2	0.181	28	28	0.115	Yes	Yes	23.23832	22	0.175	Yes	Yes	3.901324	4	0.050	1.017737	1	0.127	28	45	2.704	Yes	Yes	27.47889	43	2.686	Yes	Yes	1.017737	1	0.008	0	0	0.875
704	Validation	800975	W	80703	80499	35	44	1.502	Yes	Yes	26.78193	36	1.606	Yes	Yes	7.210521	6	0.334	1.030074	2	1.040	40	32	1.325	Yes	Yes	20.77317	23	0.547	Yes	Yes	8.583954	6	0.821	10.47242	2	3.279	76	60	1.920	Yes	Yes	55.62402	50	0.826	Yes	Yes	8.240595	9	0.298	12.36089	2	4.068
705	Validation	800975	E	80499	80703	82	90	0.787	Yes	Yes	60.77439	68	0.925	Yes	Yes	17.51127	17	0.155	4.120298	5	0.246	40	29	1.829	Yes	Yes	24.55011	20	0.889	Yes	Yes	9.442349	7	0.814	6.008767	2	2.130	30	28	0.333	Yes	Yes	23.69171	24	0.071	Yes	Yes	3.090223	3	0.039	3.090223	1	1.568
706	Calibration	802399	N	80334	5102	40	61	2.889	Yes	Yes	29.53277	49	3.126	Yes	Yes	9.492676	9	0.162	1.054742	2	1.044	24	39	2.583	Yes	Yes	18.98535	33	2.776	Yes	Yes	3.867387	4	0.067	1.230532	1	0.127	30	83	7.168	No	Yes	22.14958	76	7.636	No	Yes	3.164225	4	0.274	4.218967	4	0.002
707	Calibration	802399	S	5102	80334	34	64	4.339	Yes	Yes	24.25906	54	4.786	Yes	Yes	8.437934	8	0.153	1.054742	2	0.669	21	35	2.717	Yes	Yes	17.22745	30	2.715	Yes	Yes	2.812645	3	0.116	0.703161	2	0.834	40	56	2.362	Yes	Yes	33.75174	50	2.558	Yes	Yes	5.273709	5	0.121	1.054742	1	0.097
708	Validation	802416	N	3010	1009	6	7	0.319	Yes	Yes	5.273709	2	1.443	Yes	Yes	1.054742	4	1.739	0	1	1.390	5	6	0.224	Yes	Yes	4.043177	1	1.974	Yes	Yes	1.230532	4	1.676	0	1	1.379	8	10	0.642	Yes	Yes	6.328451	7	0.192	Yes	Yes	2.109484	3	0.602	0	1	1.010
709	Validation	802416	S	1009	3010	4	10	2.310	Yes	Yes	3.164225	4	0.226	Yes	Yes	1.054742	6	2.503	0	1	1.595	3	6	1.618	Yes	Yes	2.285274	1	1.098	Yes	Yes	0.527371	4	2.409	0	1	1.488	5	7	0.699	Yes	Yes	4.218967	2	1.192	Yes	Yes	1.054742	4	2.038	0	0	0.975
710	Calibration	802426	N	80436	80438	41	84	5.405	No	Yes	33.75174	68	4.791	Yes	Yes	6.328451	6	0.132	1.054742	10	3.794	23	33	1.934	Yes	Yes	19.68851	23	0.740	Yes	Yes	2.812645	3	0.110	0.527371	7	3.389	34	39	0.817	Yes	Yes	31.64225	32	0.063	Yes	Yes		2	0.076		5	3.056
711	Calibration	802426	S	80438	80436	16	43	4.960	Yes	Yes	13.71164	22	2.034	Yes	Yes	1.054742	11	4.000	1.054742	9	3.675	28	60	4.791	Yes	Yes	23.38011	42	3.228	Yes	Yes	3.515806	11	2.876	1.054742	6	2.799	69	72	0.376	Yes	Yes	58.0108	58	0.000	Yes	Yes		12	0.533		1	1.640
712	Calibration	802431	N	3334	1082	0	19	6.110	No	Yes	0	15	5.508	No	Yes	0	3	2.404	0	1	1.100	2	4	1.174	Yes	Yes	1.190228	2	0.795	Yes	Yes	0.340065	1	0.806	0.170033	0	0.405	1	7	2.898	Yes	Yes	1.020196	5	2.422	Yes	Yes		1	1.414		0	0.875
713	Calibration	802431	S	1082	3334	1	4	2.076	Yes	Yes	1.020196	3	1.332	Yes	Yes	0	1	1.414	0	1	1.072	1	7	2.702	Yes	Yes	0.850163	5	2.303	Yes	Yes	0.340065	1	1.044	0.170033	1	0.967	3	10	2.774	Yes	Yes	3.060587	9	2.363	Yes	Yes		1	1.414		0	0.875
714	Calibration	803953	N	3261	3260	90	82	0.847	Yes	Yes	68.18836	68	0.007	Yes	Yes	20.35473	12	1.985	1.017737	1	0.123	84	81	0.332	Yes	Yes	73.44666	71	0.299	Yes	Yes	8.650762	9	0.131	2.035473	1	0.688	88	111	2.382	Yes	Yes	78.36572	102	2.442	Yes	Yes		9	0.016		1	1.128
715	Calibration	803953	S	3260	3261	90	93	0.313	Yes	Yes	83.45441	83	0.051	Yes	Yes	5.088683	8	1.275	1.017737	1	0.130	71	72	0.052	Yes	Yes	61.91231	62	0.011	Yes	Yes	7.633025	9	0.326	1.696228	1	0.483	101	111	1.023	Yes	Yes	86.50762	98	1.236	Yes	Yes		12	0.495		0	0.955
716	Calibration	805320	E	5068	1571	3	4	0.501	Yes	Yes	3.091095	3	0.046	Yes	Yes	0	1	1.068	0	0	0.955	3	4	0.253	Yes	Yes	2.575913	3	0.254	Yes	Yes	0.68691	0	0.790	0	1	1.065	2	21	5.498	No	Yes	1.030365	18	5.516	No	Yes		1	0.000		1	1.693
717	Calibration	805320	W	1571	5068	4	25	5.397	No	Yes	3.091095	23	5.467	No	Yes	1.030365	1	0.122	0	1	1.348	2	3	0.421	Yes	Yes	1.545548	2	0.348	Yes	Yes	0.343455	0	0.464	0	0	0.875	4	7	1.043	Yes	Yes	3.091095	4	0.586	Yes	Yes		1	0.030		1	1.624
718	Calibration	806077	W	80487	80486	105	107	0.178	Yes	Yes	90.79741	92	0.144	Yes	Yes	14.28274	14	0.020	0	0	0.875	58	56	0.233	Yes	Yes	48.96939	49	0.003	Yes	Yes	7.481435	7	0.179	1.700326	1	1.276	82	80	0.192	Yes	Yes	73.45409	72	0.205	Yes	Yes		7	0.027		1	0.088
719	Calibration	806077	E	80486	80487	62	62	0.014	Yes	Yes	54.07037	54	0.010	Yes	Yes	8.161565	8	0.071	0	0	0.875	60	59	0.069	Yes	Yes	48.45929	48	0.066	Yes	Yes	10.03192	10	0.010	1.190228	1	0.038	135	134	0.031	Yes	Yes	120.3831	120	0.041	Yes	Yes		14	0.078		0	0.875
722	Calibration	949836	W	1470	80526	36	103	8.069	No	Yes	32.64626	95	7.760	No	Yes	3.060587	7	1.677	0	2	1.766	28	43	2.511	Yes	Yes	23.9746	36	2.186	Yes	Yes	2.890554	6	1.451	1.530293	2	0.026	34	54	3.023	Yes	Yes	29.58567	47	2.831	Yes	Yes		6	0.703		1	1.336
723	Calibration	949836	E	80526	1470	9	56	8.149	No	Yes	9.181761	40	6.211	No	Yes	0	11	4.665	0	5	3.063	31	59	4.114	Yes	Yes	26.69512	48	3.430	Yes	Yes	3.060587	9	2.416	1.530293	2	0.573	37	85	6.159	No	Yes	36.72704	78	5.449	No	Yes	0	6	3.461	0	1	1.210

724	Calibration	26091	N	80293	80062	831	772	2.082	Yes	Yes	658.5358	637	0.863	Yes	Yes	104.3638	76	2.981	67.83649	59
725	Calibration	26091	S	80063	80294	345	346	0.010	Yes	Yes	227.5132	228	0.013	Yes	Yes	69.92377	70	0.010	48.00736	48
728	Calibration	36634	W	1508	80824	885	873	0.402	Yes	Yes	730.5468	731	0.030	Yes	Yes	85.57834	86	0.047	68.88013	56
729	Calibration	36634	E	80824	1508	458	447	0.537	Yes	Yes	320.397	320	0.040	Yes	Yes	94.97109	84	1.149	42.78917	43
732	Calibration	56056	E	72566	72576	2402	2337	1.319	Yes	Yes	1436.175	1434	0.059	Yes	Yes	511.0439	455	2.550	454.4856	449
733	Calibration	56056	W	72575	72565	2707	2719	0.244	Yes	Yes	1771.484	1747	0.595	Yes	Yes	396.9175	438	2.034	538.313	534
734	Calibration	56609	E	72217	72219	2449	2407	0.856	Yes	Yes	1723.529	1726	0.068	Yes	Yes	516.9578	472	2.013	209.0044	209
735	Calibration	56609	W	72218	70354	2214	2209	0.122	Yes	Yes	1828.536	1805	0.548	Yes	Yes	248.3821	260	0.754	137.3169	143
736	Validation	56631	E	1058	1059	272	248	1.509	Yes	Yes	247.3423	223	1.578	Yes	Yes	21.9164	20	0.511	3.130915	5
737	Validation	56631	W	1059	1058	164	174	0.760	Yes	Yes	133.5857	148	1.250	Yes	Yes	28.17823	22	1.289	2.087277	4
744	Calibration	81550	N	80833	80662	3034	3003	0.562	Yes	Yes	1844.109	1844	0.004	Yes	Yes	568.7829	540	1.244	620.9648	619
745	Calibration	81550	S	72502	80832	2422	2423	0.011	Yes	Yes	1489.272	1490	0.026	Yes	Yes	414.3244	414	0.016	518.6882	519
746	Calibration	81552	N	73131	73157	2846	2838	0.153	Yes	Yes	1827.411	1825	0.060	Yes	Yes	410.1499	405	0.246	608.4411	608
747	Calibration	81552	S	73134	80772	2177	2132	0.966	Yes	Yes	1266.977	1268	0.019	Yes	Yes	427.8917	383	2.251	482.1609	482
748	Calibration	81554	S	73136	72568	2505	2411	1.888	Yes	Yes	1489.703	1491	0.034	Yes	Yes	532.2532	437	4.306	482.7647	483
749	Calibration	81554	N	72567	73137	2825	2759	1.251	Yes	Yes	1877.531	1786	2.139	Yes	Yes	395.9075	421	1.246	551.4426	552
750	Validation	89150	N	5018	5113	922	1003	2.632	Yes	Yes	607.3975	694	3.387	Yes	Yes	172.2003	178	0.454	141.9348	131
751	Validation	89150	S	42098	42095	798	879	2.783	Yes	Yes	580.2629	629	1.994	Yes	Yes	107.4947	137	2.666	110.6257	113
752	Calibration	89186	N	80694	72776	750	744	0.217	Yes	Yes	602.9509	596	0.264	Yes	Yes	113.1164	114	0.042	34.33892	34
753	Calibration	89186	S	72776	80694	824	827	0.095	Yes	Yes	660.5191	667	0.264	Yes	Yes	118.1663	119	0.090	45.44856	40
757	Calibration	806735	W	4050	5056	269	262	0.404	Yes	Yes	230.2078	221	0.591	Yes	Yes	28.27113	31	0.449	10.09683	10
758	Calibration	806735	E	5056	4050	161	175	1.121	Yes	Yes	127.2201	127	0.023	Yes	Yes	29.28081	29	0.056	4.038733	19
759	Calibration	806987	W	1377	80543	67	21	7.020	No	Yes	50.65925	20	5.261	No	Yes	12.40635	1	4.356	4.135449	0
760	Calibration	806987	E	80543	1377	92	92	0.053	Yes	Yes	74.43808	84	1.085	Yes	Yes	13.44021	7	2.161	4.135449	1
763	Calibration	807101	N	80447	80446	40	40	0.110	Yes	Yes	31.30018	31	0.054	Yes	Yes	9.087149	7	0.676	0	2
764	Calibration	807101	S	80446	80447	22	22	0.063	Yes	Yes	18.1743	18	0.041	Yes	Yes	2.019366	2	0.014	2.019366	2
765	Calibration	807379	N	3008	1006	54	29	3.851	Yes	Yes	48.8819	25	3.882	Yes	Yes	4.987949	3	0.754	0	0
766	Calibration	807379	S	1006	3008	56	52	0.480	Yes	Yes	49.87949	50	0.006	Yes	Yes	5.985538	2	1.926	0	0
769	Calibration	808127	E	3152	3154	27	27	0.022	Yes	Yes	24.23923	24	0.049	Yes	Yes	3.029904	3	0.017	0	0
770	Calibration	808127	W	3154	3152	28	16	2.496	Yes	Yes	22.2193	12	2.437	Yes	Yes	6.059809	4	0.933	0	0
771	Calibration	808636	E	3002	3005	14	7	2.076	Yes	Yes	13.12588	6	2.324	Yes	Yes	1.009683	1	0.010	0	0
772	Calibration	808636	W	3005	3002	15	8	2.099	Yes	Yes	15.14525	7	2.584	Yes	Yes	0	1	1.414	0	0
773	Validation	809035	W	80346	80343	19	31	2.272	Yes	Yes	18.17943	26	1.606	Yes	Yes	1.009968	4	2.019	0	1
774	Validation	809035	E	80343	80346	38	66	3.775	Yes	Yes	35.34888	57	3.188	Yes	Yes	3.029904	8	2.198	0	0
775	Calibration	810501	E	4053	80456	21	44	4.028	Yes	Yes	15.14525	38	4.484	Yes	Yes	4.038733	4	0.019	2.019366	2
776	Calibration	810501	W	80456	4053	35	35	0.003	Yes	Yes	30.2905	30	0.055	Yes	Yes	4.038733	4	0.019	1.009683	1
777	Calibration	810776	E	80470	80472	11	16	1.214	Yes	Yes	5.04984	9	1.615	Yes	Yes	5.04984	5	0.022	1.009968	1
778	Calibration	810776	W	80472	80470	17	18	0.088	Yes	Yes	15.14952	15	0.039	Yes	Yes	1.009968	1	0.235	1.009968	1
779	Calibration	810840	S	2010	2009	205	212	0.487	Yes	Yes	177.571	185	0.585	Yes	Yes	24.93974	23	0.303	1.995179	3
780	Calibration	810840	N	2009	2010	140	147	0.644	Yes	Yes	114.7228	115	0.011	Yes	Yes	21.94697	29	1.484	2.992769	3
781	Calibration	812030	E	80542	80538	14	24	2.343	Yes	Yes	13.96626	21	1.620	Yes	Yes	0	3	2.494	0	0
782	Calibration	812030	W	80538	80542	7	33	5.792	No	Yes	5.985538	31	5.884	No	Yes	0.99759	1	0.002	0	0
783	Calibration	812221	W	80439	80647	91	87	0.411	Yes	Yes	71.68751	70	0.247	Yes	Yes	9.087149	7	0.580	10.09683	10
784	Calibration	812221	E	80647	80439	100	49	5.923	No	Yes	66.63909	27	5.853	No	Yes	20.19366	13	1.856	13.12588	10
785	Calibration	949552	N	2043	80515	224	224	0.044	Yes	Yes	206.7725	207	0.006	Yes	Yes	16.5418	17	0.105	1.033862	0
786	Calibration	949552	S	80515	2043	63	63	0.005	Yes	Yes	48.59153	49	0.066	Yes	Yes	14.47407	14	0.120	0	0
787	Calibration	949642	W	4188	3156	13	16	0.854	Yes	Yes	12.1162	15	0.857	Yes	Yes	1.009683	1	0.010	0	0
788	Calibration	949642	E	3156	4188	4	7	1.362	Yes	Yes	4.038733	6	0.939	Yes	Yes	0	1	1.414	0	0
789	Calibration	ATC 40	SB	80651	5009	487	481	0.278	Yes	Yes	384.6382	385	0.038	Yes	Yes	65.94032	66	0.005	36.65443	30
798	Calibration	Error 2042	SB	42099	5078	707	676	1.176	Yes	Yes	569.3054	569	0.007	Yes	Yes	87.73385	79	0.906	49.81104	27
842	Calibration	J19-B-Entry	0	1044	1045	873	874	0.013	Yes	Yes	720.094	720	0.004	Yes	Yes	97.756	98	0.002	55.46471	56
855	Calibration	J49-B-Entry	0	79930	79926	14	30	3.374	Yes	Yes	14.17001	28	2.995	Yes	Yes	0	2	2.059	0	0
861	Validation	J53-A-Entry	0	5121	5120	204	143	4.563	Yes	Yes	164.8874	108	4.914	Yes	Yes	29.44458	21	1.673	9.169392	15
912	Calibration	J19-B-Exit	0	1045	1044	575	614	1.615	Yes	Yes	426.3884	469	2.025	Yes	Yes	84.80038	85	0.037	63.90257	60
947	Validation	J12-C-Entry	0	1164	1068	627	634	0.295	Yes	Yes	554.5125	553	0.083	Yes	Yes	64.40205	72	0.869	7.640921	10
951	Calibration	J22-A-Entry	0	1425	80924	1171	1166	0.163	Yes	Yes	994.4112	989	0.164	Yes	Yes	124.4378	124	0.042	52.39488	52
962	Validation	J12-C-Exit	0	1068	1164	360	391	1.601	Yes	Yes	307.8199	332	1.377	Yes	Yes	50.21176	54	0.568	2.18312	4
966	Calibration	J22-A-Exit	0	80924	1425	965	967	0.050	Yes	Yes	760.8174	761	0.020	Yes	Yes	149.5437	150	0.040	54.578	55
969	Calibration	J1-A-Entry	0	79960	79948	326	359	1.782	Yes	Yes	264.3643	307	2.519	Yes	Yes	50.069	44	0.935	12.01656	9
978	Calibration	J1-A-Exit	0	79948	79960	554	685	5.263	No	No	489.6748	584	4.070	Yes	Yes	52.07176	83	3.815	12.01656	17
987	Calibration	J1-B-Entry	0	79960	80001	189	160	2.196	Yes	Yes	168.2557	144	1.916	Yes	Yes	18.69508	13	1.505	2.199421	3
988	Calibration	J2-A-Entry	0	5082	79960	332	297	1.992	Yes	Yes	293.6228	258	2.115	Yes	Yes	35.19074	35	0.036	3.299132	3
990	Calibration	J3-C-Entry	0	79942	79943	254	231	1.459	Yes	Yes	217.7427	200	1.223	Yes	Yes	30.7919	26	0.919	5.498553	5
997	Calibration	J9-B-Entry	0	80035	80038	548	583	1.497	Yes	Yes	448.682	484	1.654	Yes	Yes	83.57801	84	0.001	15.39595	15
1023	Calibration	57855	W	72769	73102	2384	2439	1.118	Yes	Yes	2047.274	1996	1.133	Yes	Yes	208.7176	299	5.685	127.8907	143
1024	Calibration	57855	E	80533	80799	2654	2768	2.194	Yes	Yes	1949.054	2064	2.565	Yes	Yes	503.3777	503	0.017	201.5557	201
1054	Calibration	ite 1-A-Ent	0	72807	72806	329	327	0.128	Yes	Yes	253.5717	253	0.010	Yes	Yes	44.68682	45	0.041	31.17685	29
1056	Calibration	ite 1-D-Ent	0	72813	72814	855	824	1.065	Yes	Yes	692.1261	667	0.979	Yes	Yes	108.0797	110	0.230	55.0791	47
1057	Calibration	ite 1-E-Ent	0	80911	72818	655	665	0.390	Yes	Yes	549.7518	560	0.444	Yes	Yes	67.54984	67	0.072	37.41222	38
1059	Calibration	ite 2-B-Ent	0	72669	72992	517	514	0.124	Yes	Yes	363.5021	361	0.125	Yes	Yes	105.4605	105	0.046	48.24256	48
1060	Calibration	ite 2-C-Ent	0	1208	1210	360	363	0.142	Yes	Yes	250.1882	253	0.158	Yes	Yes	26.92608	27	0.014	83.02208	83
1063	Calibration	Site 1-A-Ex	0	72809	72808	583	582	0.034	Yes	Yes	462.4566	461	0.049	Yes	Yes	84.17749	84	0.010	36.37299	37
1065	Calibration	Site 1-D-Ex	0	72812	72811	895	853	1.418	Yes	Yes	753.4405	693	2.262	Yes	Yes	94.56978	107	1.249	46.76527	53
1066	Calibration	Site 1-E-Ex	0	72818	80911	656	660	0.150	Yes	Yes	549.7518	551	0.055	Yes	Yes	80.02058	83	0.278	25.98071	26
1068	Calibration	Site 2-B-Ex	0	72992	72669	698	698	0.004	Yes	Yes	522.8147	523	0.007	Yes	Yes	116.6797	117	0.030	58.33984	58
1069	Calibration	Site 2-C-Ex	0	1211	1208	449	449	0.029	Yes	Yes	318.6253	319	0.020	Yes	Yes	52.73024	53	0.037	77.41248	77
1073	Calibration	0	0	80239	5045	67	77	1.225	Yes	Yes	56.91838	57	0.023	Yes	Yes	10.164	17	1.845	0	3
1074	Calibration	0	0	80248	5045	79	53	3.296	Yes	Yes	75.21357	47	3.616	Yes	Yes	4.065599	5	0.514	0	0
1076	Calibration	0	0	5045	80239	147	150	0.235	Yes	Yes	130.0992	130	0.001	Yes	Yes	17.27879	17	0.072	0	3
1077	Calibration	0	0	5045	80248	53	27	4.079	Yes	Yes	45.73798	20	4.475	Yes	Yes	7.114798	7	0.043	0	0
1078	Calibration	0	0	79963	5046	327	329	0.117	Yes	Yes	237.8375	238	0.038	Yes	Yes	71.14798	71	0.016	18	20
1079	Calibration	0	0	79923	5046	221	219	0.135	Yes	Yes	194.1323	194	0.012	Yes	Yes	20.32799	20	0.080	6	4
1080	Calibration	0	0	80209	5046	508	509	0.033	Yes	Yes	434.0026	434	0.000	Yes	Yes	51.83638	52	0.010	22	23
1081	Calibration	0	0	5046	79923	75	75	0.018	Yes	Yes	49.80358	50	0.041	Yes	Yes	18.29519	18	0.065	7	7
1082	Calibration	0	0	5046	79963	686	687	0.021	Yes	Yes	593.5774	594	0.002	Yes	Yes	67.08238	67	0.024	25	26
1083	Calibration	0	0	5046	80209	295	295	0.027	Yes	Yes	222.5915	223	0.025	Yes	Yes	57.93478	58	0.009	14	14
1084	Calibration	0	0	80203	5047	321	343	1.209	Yes	Yes	249.0179	271	1.358	Yes	Yes	59.96758	60	0.003	12.1968	12
1085	Calibration	0	0	79920	5047	122	120	0.189	Yes	Yes	110.7876	111	0.010	Yes	Yes	9.147597	9	0.049	2.032799	0
1086	Calibration	0	0	79921	5047	485	486	0.074	Yes	Yes	421.8059	422	0.011	Yes	Yes	43.70518	44	0.032	19.31159	21
1087	Calibration	0	0	5047	79920	68	67	0.119	Yes	Yes	53.86918	54	0.034	Yes	Yes	13.2132	13	0.059	1.0164	0
1088	Calibration	0	0	5047	79921	283	284	0.106	Yes	Yes	222.5915	223	0.031	Yes	Yes	48.78718	49	0.028	11.1804	12
1089	Calibration	0	0	5047	80203	577	598	0.857	Yes	Yes	505.1506	526	0.928	Yes	Yes	50.81998	51	0.014	21.34439	21
1091	Calibration	0	0	79920	79921	52	43	1.308	Yes	Yes	42.68879	42	0.098	Yes	Yes	8.131197	1	3.476	1.0164	0
1092	Calibration	0	0	79919	79921	491	486	0.202	Yes	Yes	426.8879	422	0.257	Yes	Yes	44.72158	44	0.120	19.31159	21
1094	Calibration	0	0	79921	79920	6	0	3.492	Yes	Yes	5.081998	0	3.188	Yes	Yes	1.0164	0	1.426	0	0
1095	Calibration	0	0	79921	79919	334	327	0.397	Yes	Yes	265.2803	265	0.013	Yes	Yes	56.91838	50	0.974	12.1968	12
1096	Calibration	0	0	80207	79920	174	163	0.855	Yes	Yes	153.4763	153	0.044	Yes	Yes	17.27879	10	2.036	3.049199	0
1099	Calibration	0	0	79920	80207	74	67	0.842	Yes	Yes	58.95118	54	0.643	Yes	Yes	14.2296	13	0.333	1.0164	0
1102	Calibration	A1M/9586A	NB	1557	72205	3469	3456	0.229	Yes	Yes	2181.224	2179	0.056	Yes	Yes	745.2829	735	0.385	542	542
1103	Calibration	M62/2300A	EB	71397	80829	3263	3264	0.020	Yes	Yes	2055.533	2057	0.033	Yes	Yes	574.0335	574	0.005	634	634
1105	Validation	A1M/9478B	SB	72202	73152	1938	1867	1.625	Yes	Yes	1253.683	1191	1.787	Yes	Yes	341.3395	341	0.030	343	335
1108	Validation	A1M/9587M	EB	72210	72215	1395	1527	3.450	Yes	Yes	1077.892	1134	1.691	Yes	Yes	220.5366	253	2.124	97	140
1109	Validation	A1M/9586J	WB	72214	72217	1531	1581	1.258	Yes	Yes	1182.941	1173	0.303	Yes	Yes	242.0297	208	2.237	106	200
1111	Calibration	9252/1	EB	72219	72749	2150	2102	1.041	Yes	Yes	1512.477	1512	0.022	Yes	Yes	453.6545	415	1.832	183	174
1112	Validation	8998/1	EB	72573	72577	205	238	2.176	Yes	Yes	129.3299	177	3.879	Yes	Yes	36.11702	29	1.316	40	32
1113	Validation	8998/2	EB	72576	72577	1870	1881	0.241	Yes	Yes	1084.268	1086	0.044	Yes	Yes	377.5739	375	0.151	409	421
1114	Validation	8999/2	WB	72578	72575	2162	2115	1.023	Yes	Yes	1413.091	1304	2.963	Yes	Yes	292.7856	320	1.549	457	491
1115	Validation	8999/1	WB	72578	72572	221	275	3.451	Yes	Yes	139.1333	236	7.078	No	Yes	38.85472	14	4.907	43	25
1116	Calibration	9251/1	WB	72748	72218	1866	1871	0.108	Yes	Yes	1540.824	1519	0.547	Yes	Yes	209.3002	225	1.075	116	126
1117	Calibration	3E+07	EB	72749	72759	2385	2470	1.727	Yes	Yes	1842.492	1835	0.181	Yes	Yes	376.9739	449	3.562	165	186
1118	Calibration	3E+07	WB	72758	72748	1934	2085	3.367	Yes	Yes	1494.009	1681	4.703	Yes	Yes	305.6741	269	2.159	134	134
1119	Validation	9255/1	EB	72773	72778	2639	2650	0.211	Yes	Yes	2038.622	1988	1.123	Yes	Yes	417.102	462	2.142	183	199
1120	Validation	9256/1	WB	72780	72772	2270	2173	2.042	Yes	Yes	1753.555	1705	1.176	Yes	Yes	358.7772	323	1.929	157	146
1122	Calibration	A1M/9435A	NB	73143	73146	2752	2752	0.005	Yes	Yes	1779.994	1780	0.004	Yes	Yes	484.6378	485	0.016	487	487
1123	Calibration	A1M/9436B	SB	73145	73142	2127	2128	0.024	Yes	Yes	1375.852	1377	0.019	Yes	Yes	374.6024	375	0.023	377	377
1126	Validation	A1M/9479A	NB	73151	1559	2468	2634	3.275	Yes	Yes	1596.619	1678	2.007	Yes	Yes	434.7104	491	2.609	437	465
1127	Validation	9254/1	WB	80534	80555	2205	2392	3.905	Yes	Yes	1703.218	1945	5.665	No	Yes	348.4783	305	2.408	153	142
1128	Validation	9253/1	EB	80699	73101	2785	2735	0.949	Yes	Yes	2151.536	2037	2.494	Yes	Yes	440.2042	497	2.608	193	201
1156	Calibration	ite 1-C-Ent	0	1034	72812	39	41	0.196	Yes	Yes	33.25531	33	0.043	Yes	Yes	6.23537	6	0.095	0	2
1157	Calibration	Site 1-C-Ex	0	72815	1034	157	170	1.034	Yes	Yes	148.6096	149	0.034	Yes	Yes	8.313827	16	2.083	0	6
1158	Calibration	A1M/9462M	Southbound	73149	73145	459	410	2.348	Yes	Yes	297.1324	297	0.015	Yes	Yes	80.90007	61	2.324	81	52
1159	Calibration	A1M/9650B	Southbound	72252	72256	2988	2988	0.001	Yes	Yes	1932.586	1933	0.011	Yes	Yes	526.1839	526	0.010	529	529
1160	Calibration	M62/2351K	Eastbound	72554	72566	370	373	0.152	Yes	Yes	233.0512	233	0.029	Yes	Yes	65.08251	74	1.082	72	65
1161	Calibration	A1M/9646M	Southbound	72257	72256	864	863	0.024	Yes	Yes	558.7431	558	0.022	Yes	Yes	152.1286	152	0.015	153	153
1162	Calibration	M62/2352L	Westbound	72565	72545	366	365	0.049	Yes	Yes	230.6984	235	0.287	Yes	Yes	64.42546	58	0.760	71	72
1163	Calibration	A1M/9650L	Southbound	72252	72255	171	189	1.314	Yes	Yes	110.788	129	1.627	Yes	Yes	30.16419	30	0.015	30	30
1164	Calibration	A1M/9592B	Southbound	72207	1558	3343	3346	0.064	Yes	Yes	2499.551	2156	7.121	No	Yes	435.5785	587	6.697	408	603
1165	Calibration	M62/2348B	Westbound	72565	72567	2366	2354	0.251	Yes	Yes	1490.568	1511	0.540	Yes	Yes	416.26	380	1.817	460	463
1167	Calibration	M62/2346A	Eastbound	72568	72566	1901	1965	1.443	Yes	Yes	1197.536	1200	0.084	Yes	Yes	334.4272	381	2.456	369	383
1168	Calibration	A1M/9646J	Northbound	72258	72259	1059	892	5.360	No	No	685.1968	587	3.877	Yes	Yes	186.5581	184	0.161	188	120
1169	Calibration	A1M/9592L	Southbound	72207	72206	518	505	0.602	Yes	Yes	335.2007	335	0.005	Yes	Yes	91.26489	91	0.038	92	78
1170	Calibration	A1M/9468K	Northbound	73147	73151	344	323	1.149	Yes	Yes	222.4786	222	0.042	Yes	Yes	60.57412	61	0.062	61	40
1171	Calibration	00100048_	Northbound	5060	1445	111	148	3.307	Yes	Yes	93.0672	130	3.460	Yes	Yes	14.07797	19	1.116	3.398132	0
1172	Calibration	00100048_	Southbound	1445	5060	111	145	3.052	Yes	Yes	93.0672	129	3.393	Yes	Yes	14.07797	16	0.558	3.398132	0
1173	Validation	2E+07	Northbound	80501	80508	257	183	4.965	Yes	Yes	216.2583	162	3.970	Yes	Yes	32.71269	17	3.103	7.896167	4
1174	Validation	2E+07	Southbound	80508	80501	188	132	4.415	Yes	Yes	157.8594	110	4.099	Yes	Yes	23.87888	17	1.616	5.763869	5
1175	Calibration	J1-A-Entry	Southbound	80228	5049	95	95	0.024	Yes	Yes	81.20595	81	0.018	Yes	Yes	10.15074	10	0.041	3.383581	3
1176	Calibration	J1-B-Entry	Westbound	5050	5049	35	35	0.016	Yes	Yes	30.45223	30	0.097	Yes	Yes	3.383581	4	0.316	1.12786	1
1177	Calibration	J1-C-Entry	Northbound	80222	5049	55	56	0.120	Yes	Yes	49.62586	50	0.054	Yes	Yes	4.511441	5	0.224	1.12786	1
1178	Calibration	J1-A-Exit	Northbound	5049	80228	56	58	0.234	Yes	Yes	50.75372	51	0.039	Yes	Yes	5.639302	6	0.145	0	1
1179	Calibration	J1-B-Exit	Eastbound	5049	5050	29	30	0.181	Yes	Yes	22.55721	23	0.093	Yes	Yes	4.511441	5	0.233	2.255721	2
1180	Calibration	J1-C-Exit	Southbound	5049	80222	99	97	0.204	Yes	Yes	87.97311	87	0.112	Yes	Yes	7.895022	8	0.037	3.383581	2
1181	Validation	J2-A-Entry	Westbound	80217	5048	120	124	0.359	Yes	Yes	106.0189	116	0.961	Yes	Yes	10.15074	6	1.561	3.383581	2
1182	Validation	J2-B-Entry	Northbound	1447	5048	77	67	1.085	Yes	Yes	65.4159	61	0.591	Yes	Yes	9.022883	4	1.876	2.255721	3
1183	Validation	J2-C-Entry	Eastbound	80214	5048	86	66	2.299	Yes	Yes	76.6945	60	2.012	Yes	Yes	7.895022	5	1.049	1.12786	0
1184	Validation	J2-A-Exit	Eastbound	5048	80217	83	90	0.753	Yes	Yes	75.56664	80	0.548	Yes	Yes	6.767162	8	0.527	1.12786	2
1185	Validation	J2-B-Exit	Southbound	5048	1447	106	102	0.443	Yes	Yes	92.48455	97	0.502	Yes	Yes	10.15074	3	2.754	3.383581	1
1186	Validation	J2-C-Exit	Westbound	5048	80214	92	65	3.135	Yes	Yes	80.07808	59	2.511	Yes	Yes	10.15074	4	2.372	2.255721	2
1187	Validation	J4-A-Entry	Westbound	80103	1480	370	337	1.737	Yes	Yes	268.4308	255	0.838	Yes	Yes	55.26516	46	1.286	46.24227	36
1188	Calibration	J4-B-Entry	Northbound	80097	5053	126	124	0.215	Yes	Yes	51.88158	54	0.335	Yes	Yes	33.83581	34	0.028	40.60297	36
1190	Calibration	J4-D-Entry	Southbound	80099	1483	127	136	0.723	Yes	Yes	92.48455	100	0.810	Yes	Yes	14.66218	15	0.088	20.30149	20
1191	Validation	J4-A-Exit	Eastbound	1480	80103	464	437	1.259	Yes	Yes	343.9974	340	0.190	Yes	Yes	55.26516	47	1.149	64.28804	49
1192	Calibration	J4-B-Exit	Southbound	5053	80097	420	419	0.025	Yes	Yes	330.4631	330	0.024	Yes	Yes	53.00944	53	0.001	36.09153	36
1194	Calibration	J4-D-Exit	Northbound	1483	80099	140	140	0.020	Yes	Yes	96.99599	97	0.001	Yes	Yes	20.30149	20	0.067	22.55721	23
1195	Calibration	J3-A-Entry	Southbound	1231	1491	244	216	1.832	Yes	Yes	201.887	173	2.106	Yes	Yes	27.06865	28	0.206	14.66218	15
1196	Calibration	J3-B-Entry	Westbound	1482	1490	535	535	0.027	Yes	Yes	358.6596	359	0.021	Yes	Yes	87.97311	88	0.008	87.97311	88
1197	Calibration	J3-C-Entry	Northbound	80092	1489	755	753	0.044	Yes	Yes	571.8252	571	0.035	Yes	Yes	82.33381	82	0.047	100.3796	100

1198	Calibration	J3-D-Entry	Eastbound	80094	1488	441	434	0.343	Yes	Yes	387.984	388	0.007	Yes	Yes	46.24227	46	0.039	6.767162	0	3.679
1199	Calibration	J3-A-Exit	Northbound	1491	1231	315	323	0.452	Yes	Yes	279.7094	279	0.044	Yes	Yes	16.91791	23	1.438	18.04577	20	0.537
1200	Calibration	J3-B-Exit	Eastbound	1490	1482	934	934	0.003	Yes	Yes	717.3192	717	0.015	Yes	Yes	112.786	113	0.020	103.7632	104	0.007
1201	Calibration	J3-C-Exit	Southbound	1489	80092	416	417	0.038	Yes	Yes	276.3258	276	0.020	Yes	Yes	62.03232	62	0.002	77.82236	79	0.125
1202	Calibration	J3-D-Exit	Westbound	1488	80094	309	265	2.608	Yes	Yes	247.0014	219	1.826	Yes	Yes	51.88158	46	0.881	10.15074	0	4.506
1203	Calibration	9255/1	EB	72779	72813	2639	2633	0.105	Yes	Yes	2038.622	2032	0.153	Yes	Yes	417.102	419	0.079	182.9986	183	0.007
1204	Calibration	9256/1	WB	72811	72781	2270	2259	0.227	Yes	Yes	1753.555	1753	0.010	Yes	Yes	358.7772	353	0.297	157.4093	153	0.384
1205	Calibration	9257/1	EB	1235	72861	2484	2396	1.775	Yes	Yes	1919.093	1831	2.046	Yes	Yes	392.6465	393	0.035	172.2691	172	0.015
1206	Calibration	9258/1	WB	1236	72807	1850	1733	2.754	Yes	Yes	1429.019	1314	3.116	Yes	Yes	292.3773	291	0.069	128.2771	128	0.001
1207	Calibration	9568A	NB	72220	72213	5376	5194	2.500	Yes	Yes	3477.228	3478	0.009	Yes	Yes	946.7426	947	0.010	951.8591	769	6.224
1208	Calibration	9568B	SB	72215	1182	5142	5019	1.719	Yes	Yes	3325.83	3360	0.595	Yes	Yes	905.5216	906	0.019	910.4153	753	5.461
1209	Calibration	York15	NB	80562	80563	487	436	2.359	Yes	Yes	445.3779	399	2.254	Yes	Yes	29.00135	31	0.322	12.42915	6	2.002
1210	Calibration	York15	SB	80563	80562	285	192	6.011	No	Yes	249.6188	168	5.641	No	Yes	31.07288	22	1.713	4.14305	2	1.434

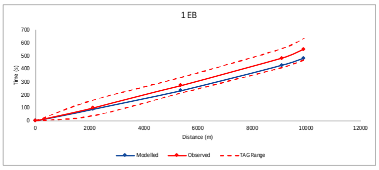
1198						0					0			0		
1199						0					0			0		
1200						0					0			0		
1201						0					0			0		
1202						0					0			0		
1203	2000	1777	5.118	No	Yes	1524.686	1328	5.206	No	Yes	312.9761	294	1.096	161.8851	155	0.531
1204	1954	1656	7.012	No	No	1489.677	1192	8.142	No	No	305.7897	306	0.011	158.168	158	0.004
1205	1612	1616	0.104	Yes	Yes	1228.929	1229	0.015	Yes	Yes	252.2653	256	0.219	130.4828	131	0.015
1206	1690	1616	1.836	Yes	Yes	1288.934	1214	2.119	Yes	Yes	264.5827	265	0.026	136.8539	137	0.008
1207	4441	4329	1.694	Yes	Yes	2817.762	2818	0.010	Yes	Yes	765.009	765	0.001	857.9378	745	3.979
1208	4783	4692	1.317	Yes	Yes	3034.741	3035	0.003	Yes	Yes	823.9176	824	0.003	924.0023	833	3.068
1209	111	111	0.023	Yes	Yes	91.1471	91	0.018	Yes	Yes	15.53644	16	0.117	4.14305	4	0.275
1210	198	197	0.048	Yes	Yes	168.8293	168	0.058	Yes	Yes	21.92364	22	0.016	6.905083	7	0.002

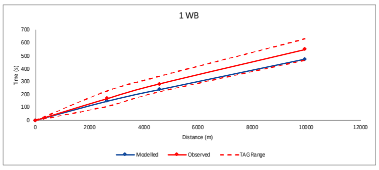
1198	312	306	0.382	Yes	Yes	290.988	290	0.040	Yes	Yes	19.17363	15	0.905	2.255721	0	2.124
1199	159	160	0.095	Yes	Yes	144.3661	146	0.105	Yes	Yes	10.15074	10	0.054	4.511441	5	0.053
1200	598	601	0.120	Yes	Yes	506.4093	507	0.013	Yes	Yes	32.70795	35	0.455	58.64874	59	0.001
1201	703	705	0.084	Yes	Yes	623.7068	624	0.005	Yes	Yes	34.96367	37	0.331	43.98655	44	0.017
1202	625	616	0.367	Yes	Yes	570.6973	563	0.337	Yes	Yes	53.00944	53	0.000	1.12786	0	1.502
1203	2698	2694	0.080	Yes	Yes	2360.875	2361	0.009	Yes	Yes	257.1544	260	0.183	79.97924	72	0.864
1204	2809	2757	0.993	Yes	Yes	2458.432	2424	0.705	Yes	Yes	267.7806	250	1.076	83.28418	83	0.025
1205	2223	2086	2.960	Yes	Yes	1945.182	1826	2.747	Yes	Yes	211.8758	194	1.271	65.89684	66	0.000
1206	2524	2461	1.247	Yes	Yes	2208.302	2152	1.214	Yes	Yes	240.5357	237	0.252	74.81054	73	0.198
1207	6013	5996	0.216	Yes	Yes	4590.708	4781	2.782	Yes	Yes	771.6313	772	0.011	650.4034	443	8.875
1208	5767	5735	0.425	Yes	Yes	4403.317	4403	0.005	Yes	Yes	740.1337	740	0.010	623.8543	592	1.303
1209	261	258	0.156	Yes	Yes	235.1181	235	0.005	Yes	Yes	22.78678	23	0.047	3.107288	0	1.998
1210	402	392	0.488	Yes	Yes	373.9103	370	0.191	Yes	Yes	20.71525	21	0.067	7.250338	1	3.140

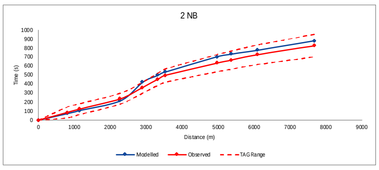
Appendix I

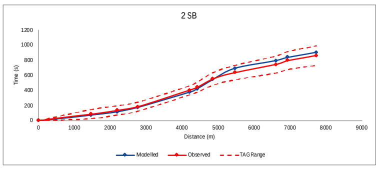
JOURNEY TIME ROUTE VALIDATION

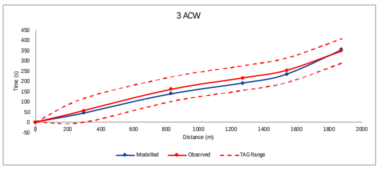
JT Graphs AM Peak

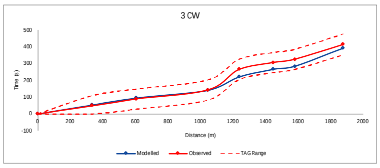


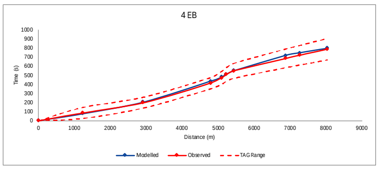


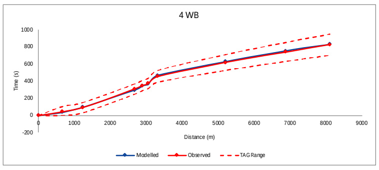


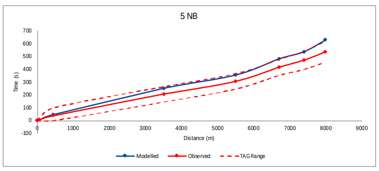


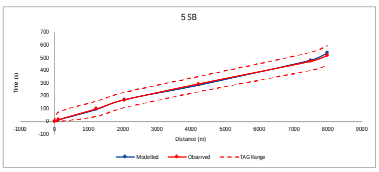


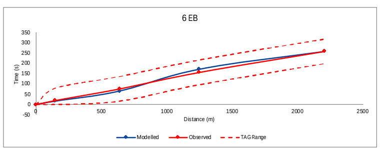




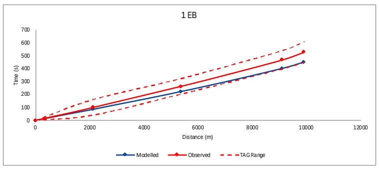


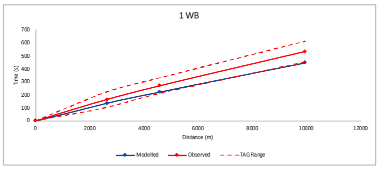


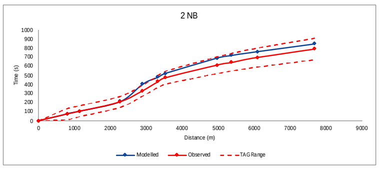


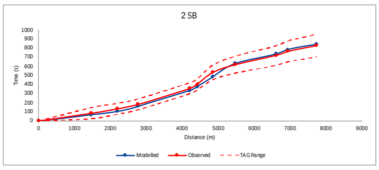


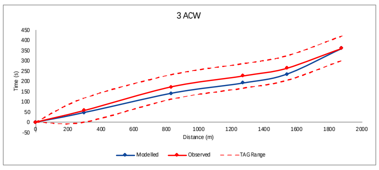
JT Graphs Inter Peak

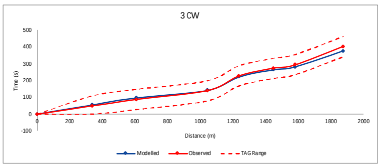


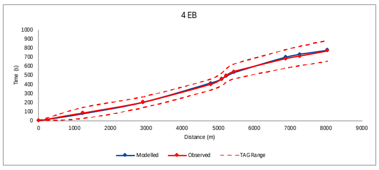


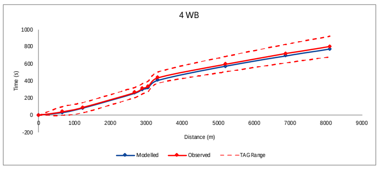


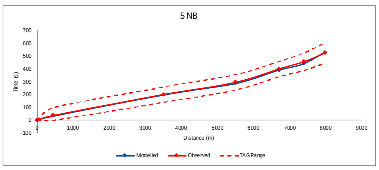


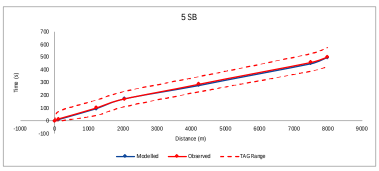


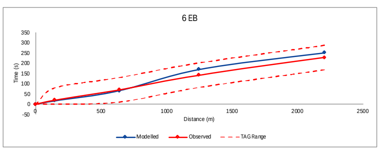




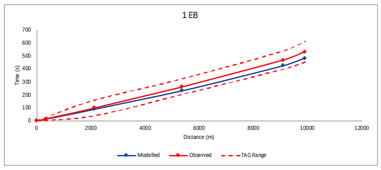


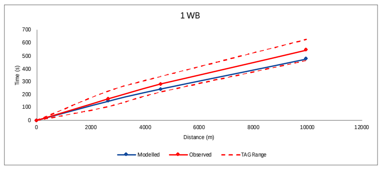


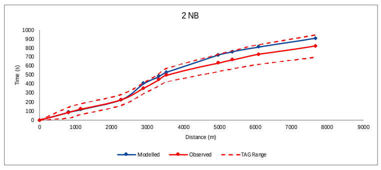


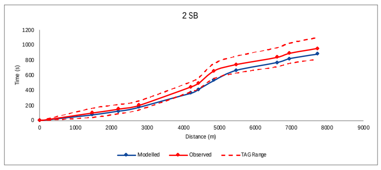


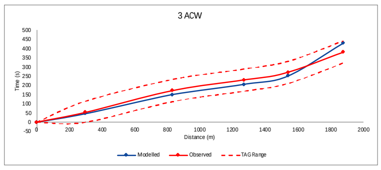
JT Graphs PM Peak

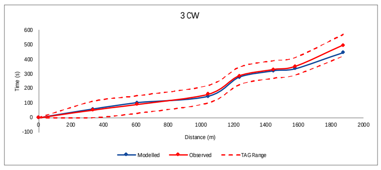


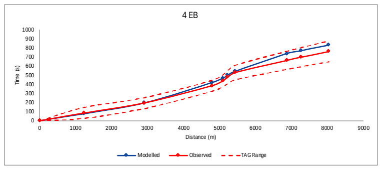


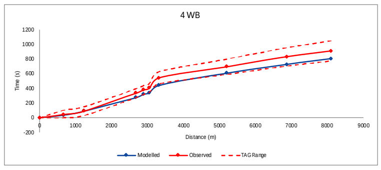


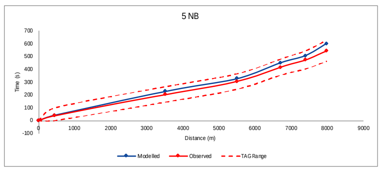


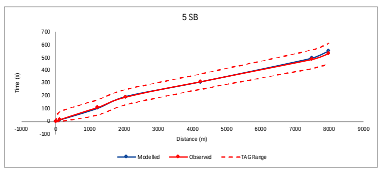


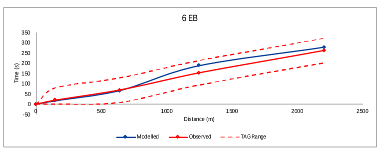


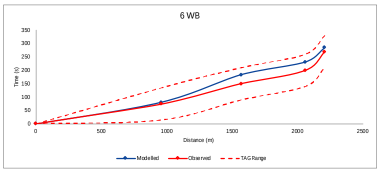








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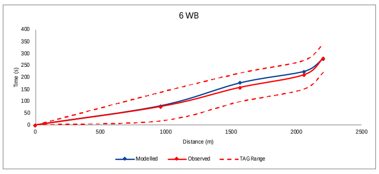
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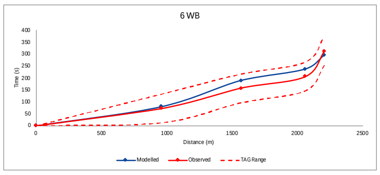
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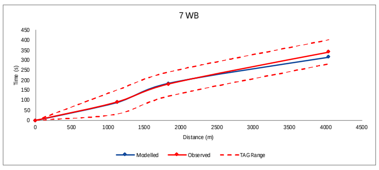
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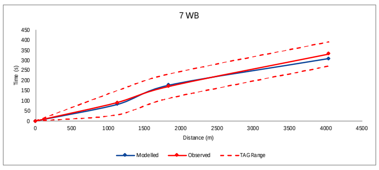
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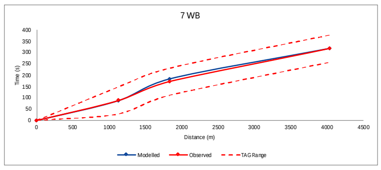
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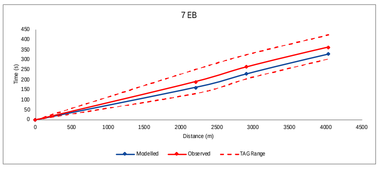
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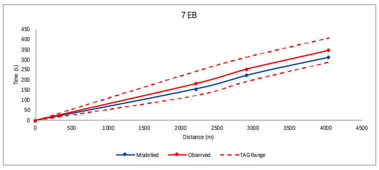
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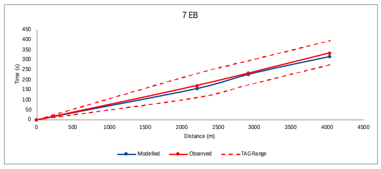
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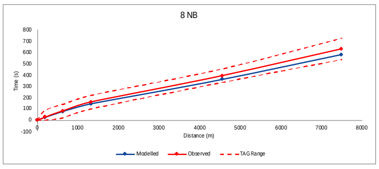
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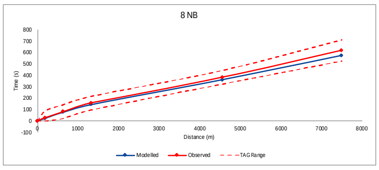
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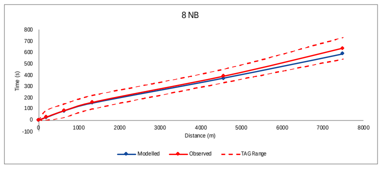
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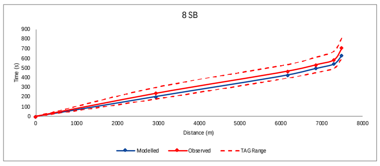
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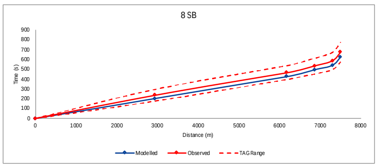
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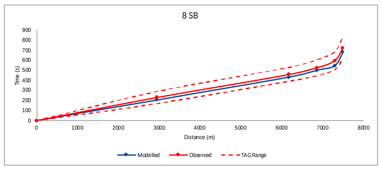
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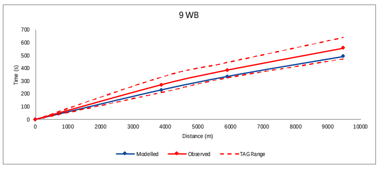
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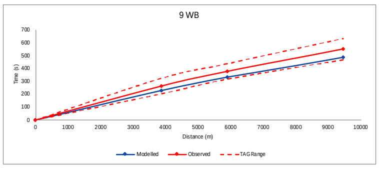
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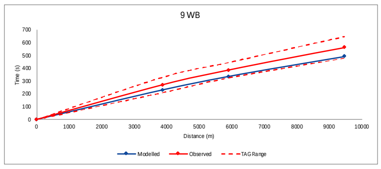
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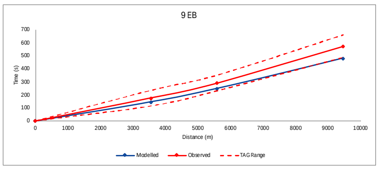
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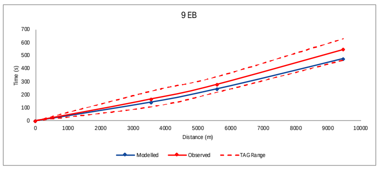
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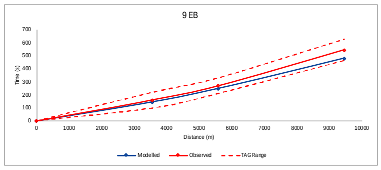
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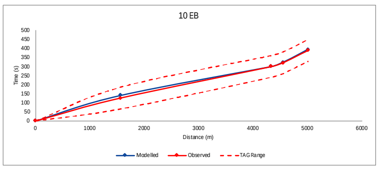
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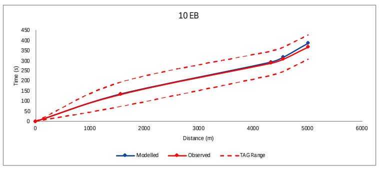
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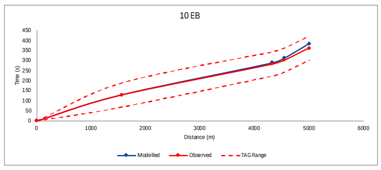
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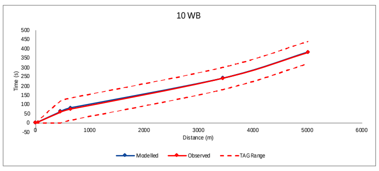
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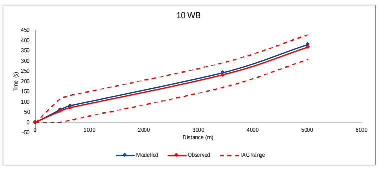
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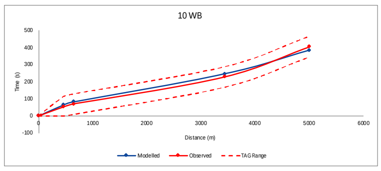
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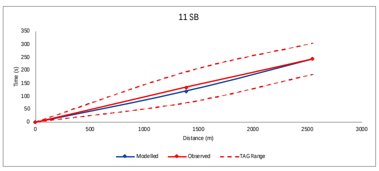
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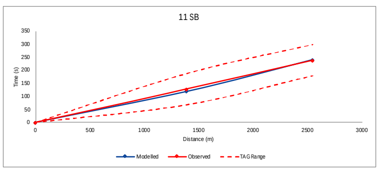
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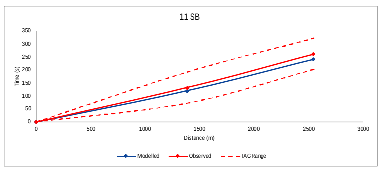
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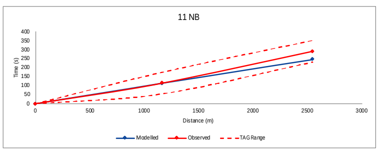
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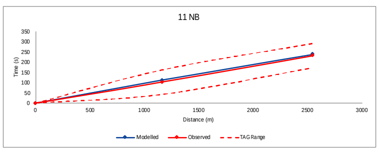
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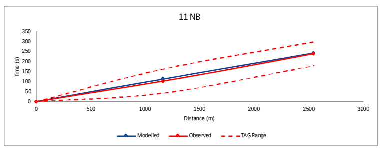
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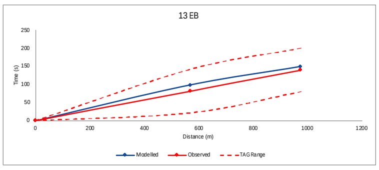
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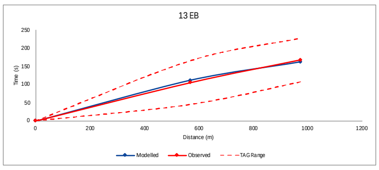
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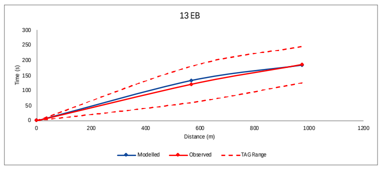
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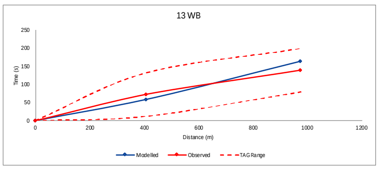
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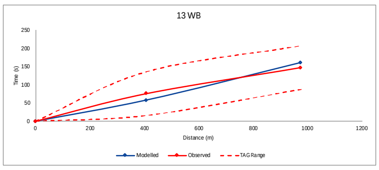
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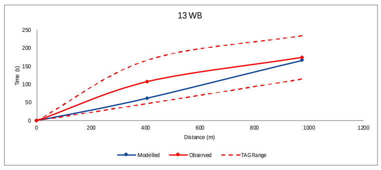
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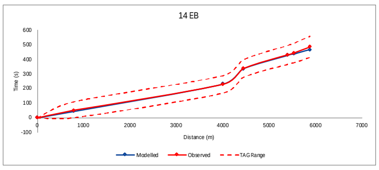
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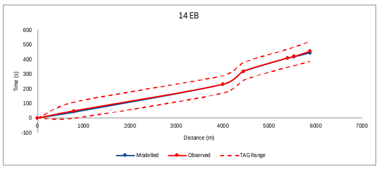
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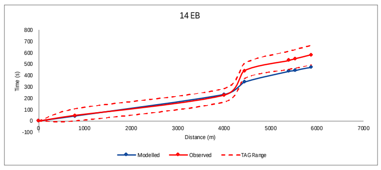
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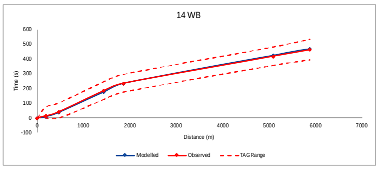
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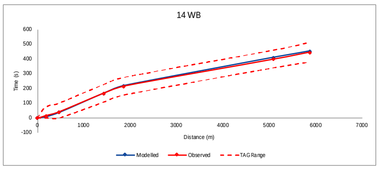
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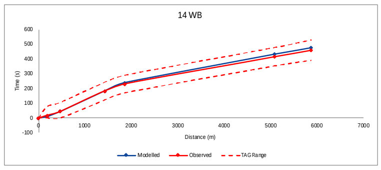
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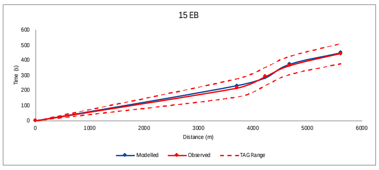
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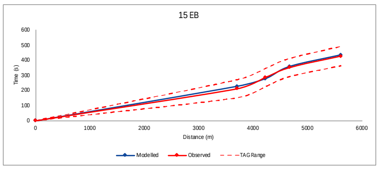
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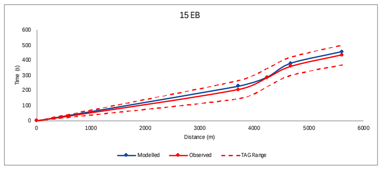
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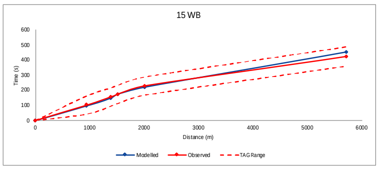
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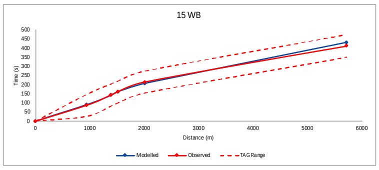
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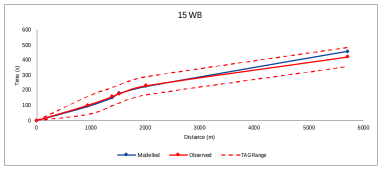
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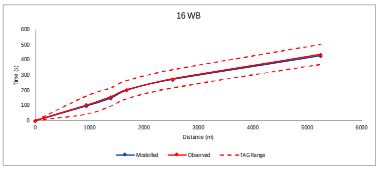
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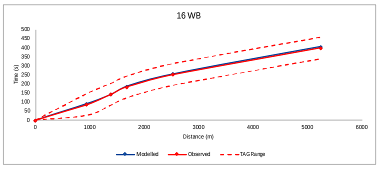
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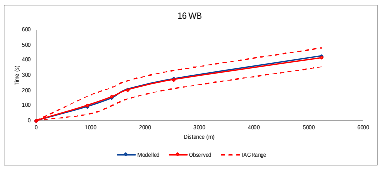
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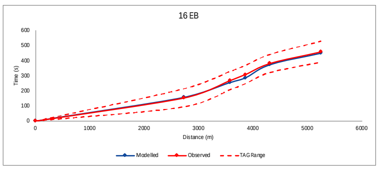
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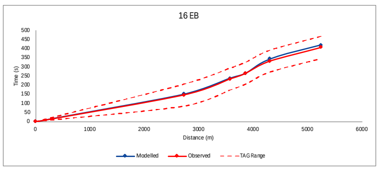
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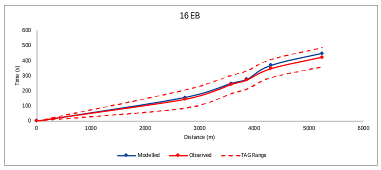
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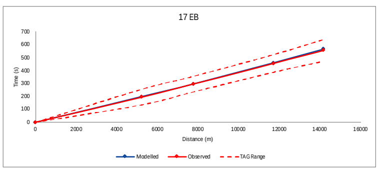
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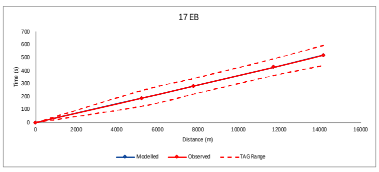
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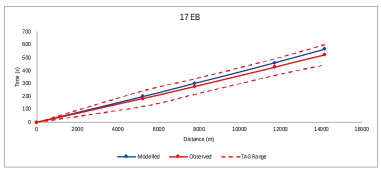
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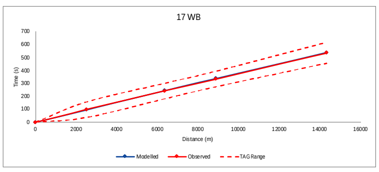
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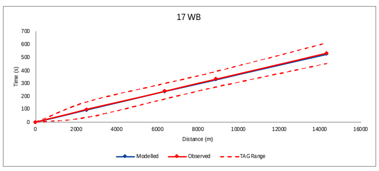
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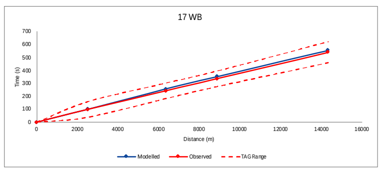
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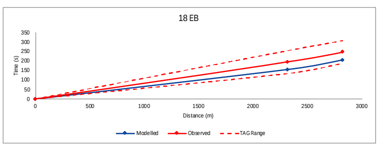
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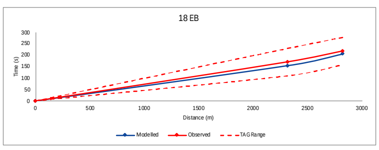
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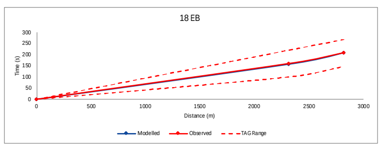
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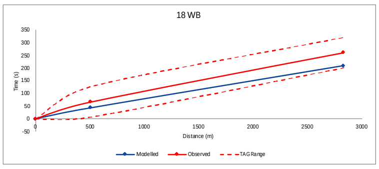
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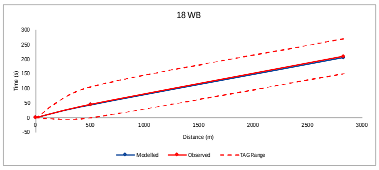
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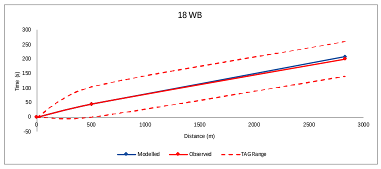
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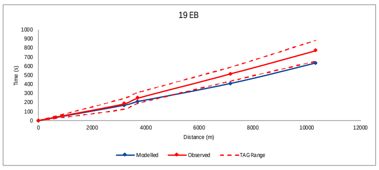
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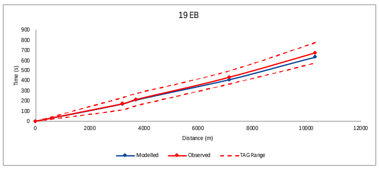
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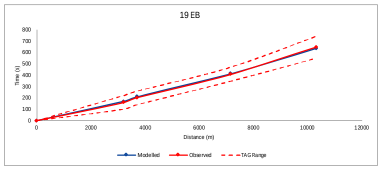
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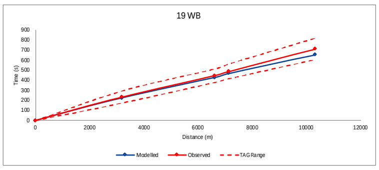
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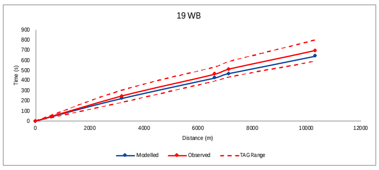
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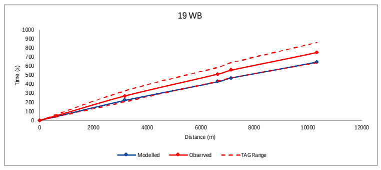
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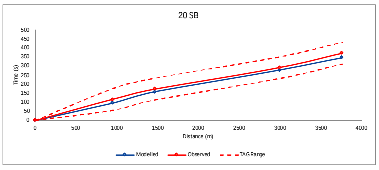
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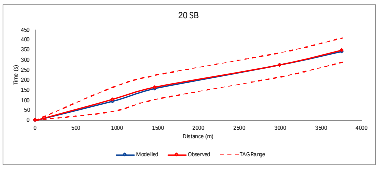
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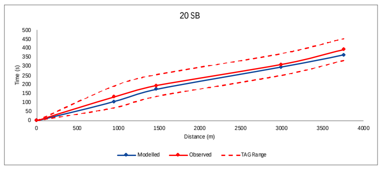
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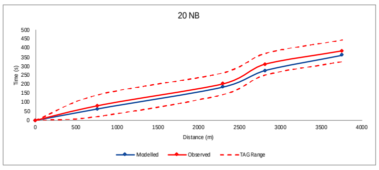
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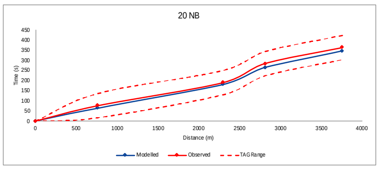
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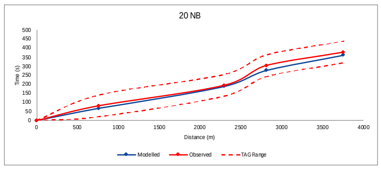
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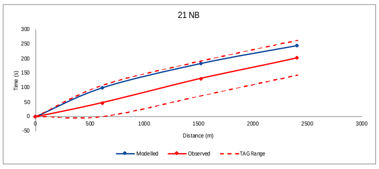
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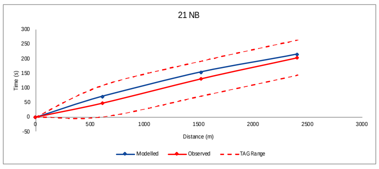
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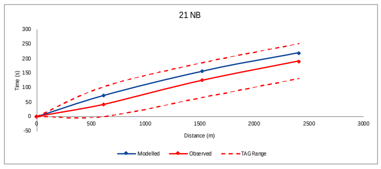
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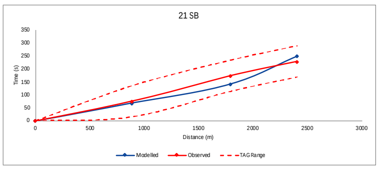
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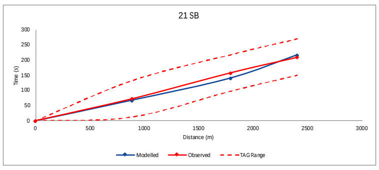
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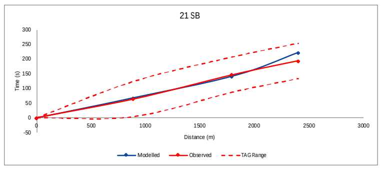
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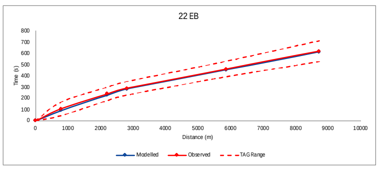
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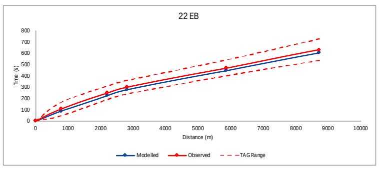
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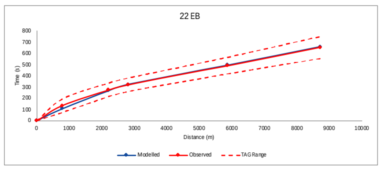
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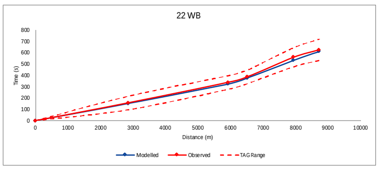
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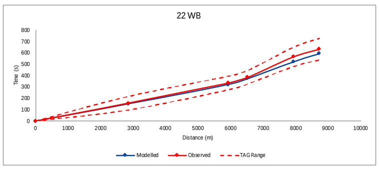
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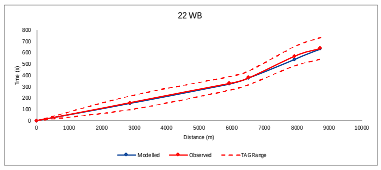
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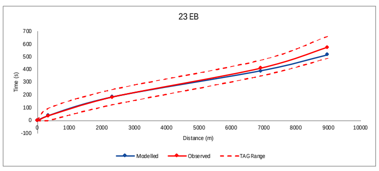
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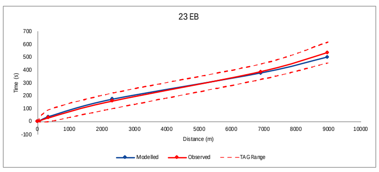
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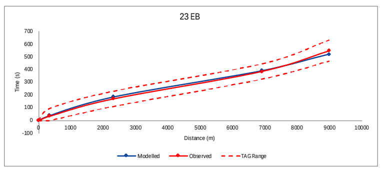
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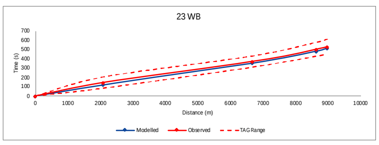
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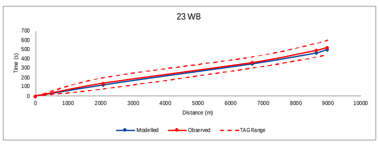
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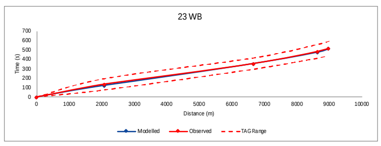
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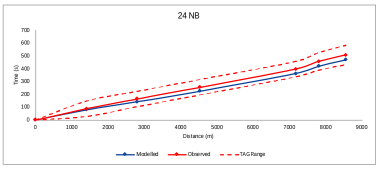
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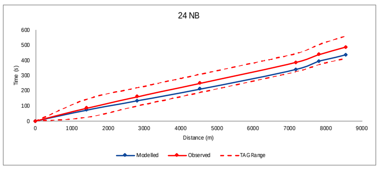
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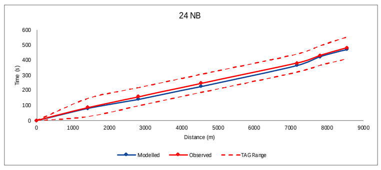
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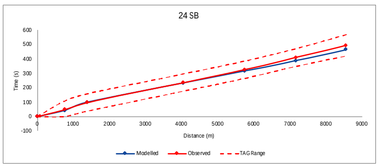
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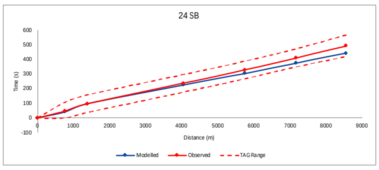
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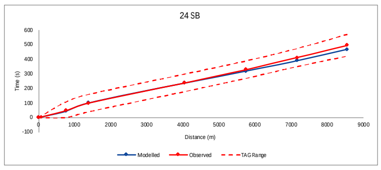
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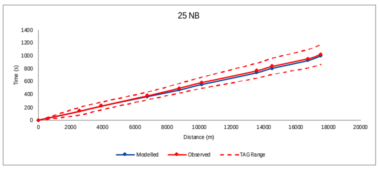
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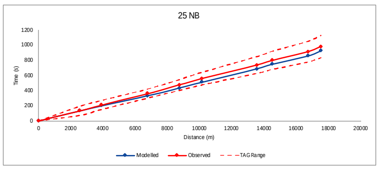
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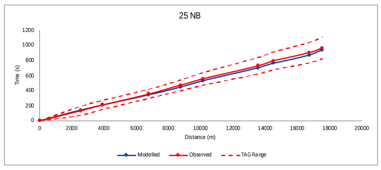
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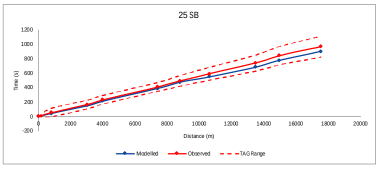
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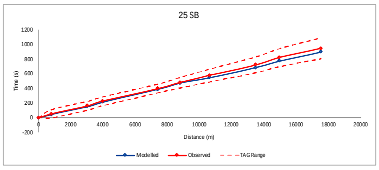
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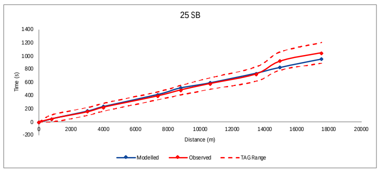
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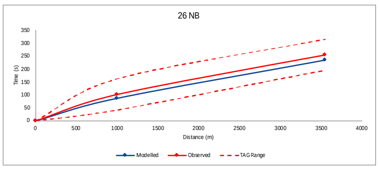
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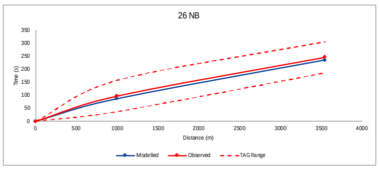
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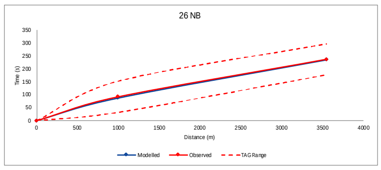
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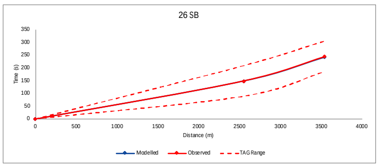
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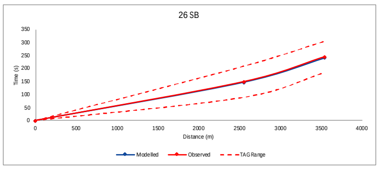
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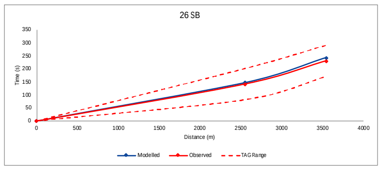
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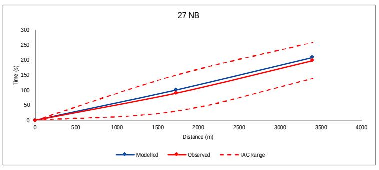
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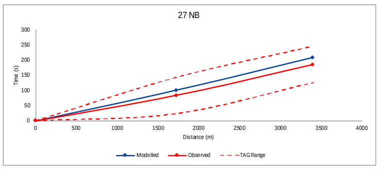
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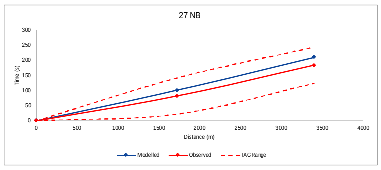
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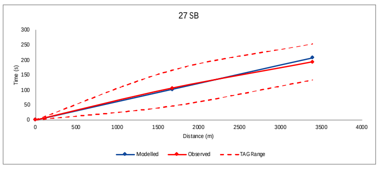
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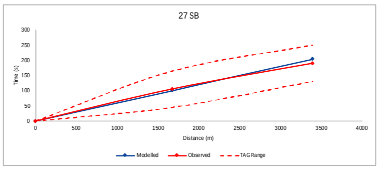
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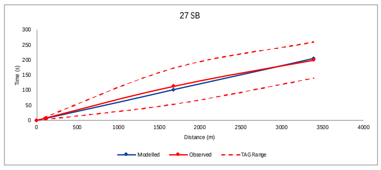
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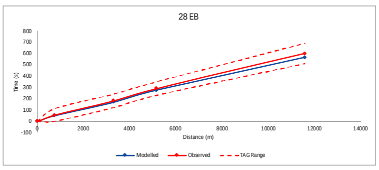
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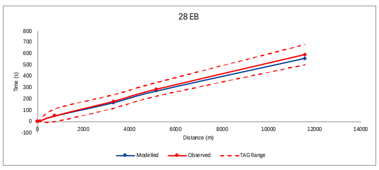
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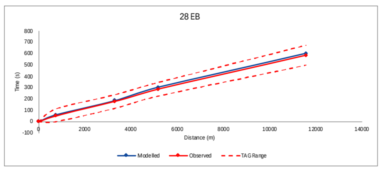
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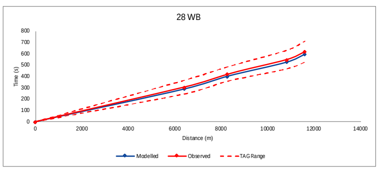
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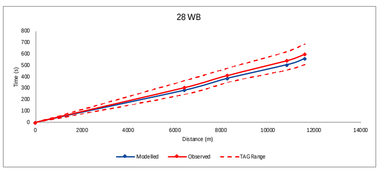
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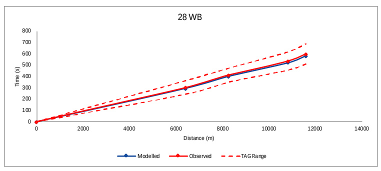
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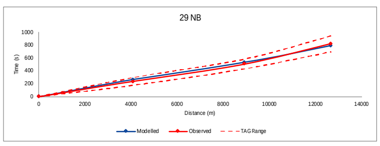
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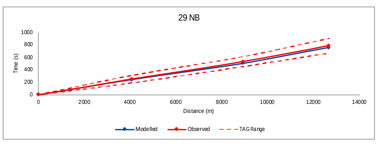
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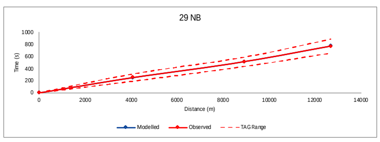
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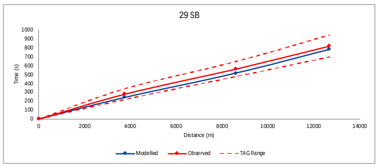
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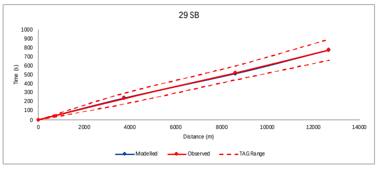
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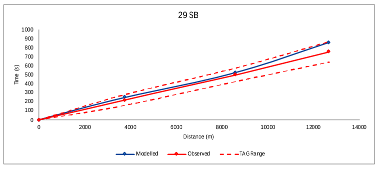
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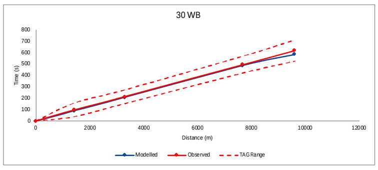
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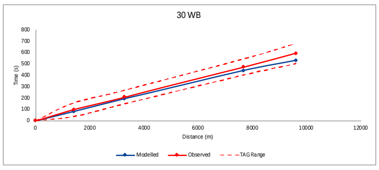
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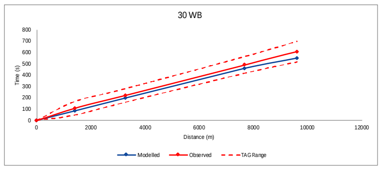
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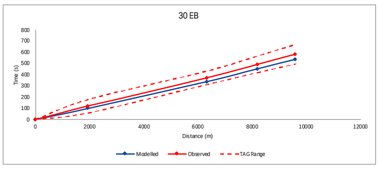
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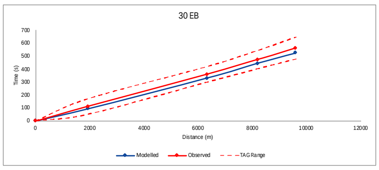
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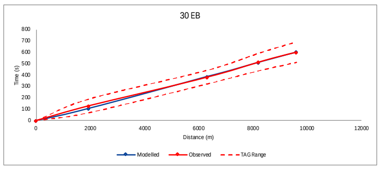
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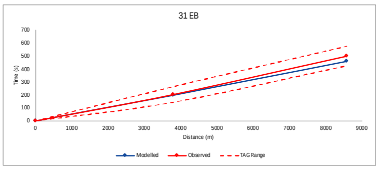
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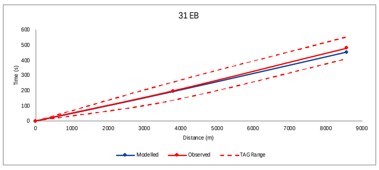
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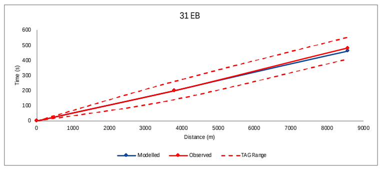
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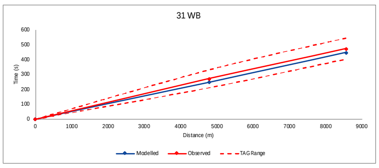
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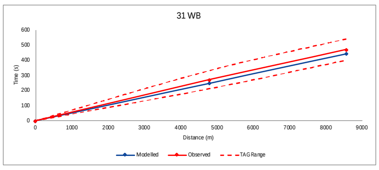
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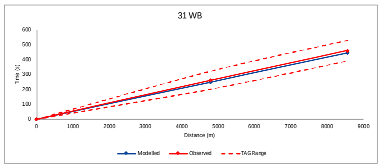
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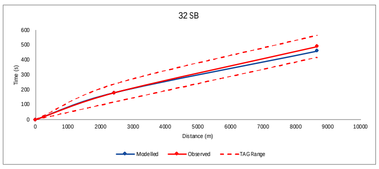
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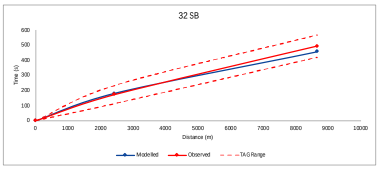
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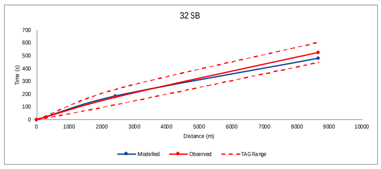
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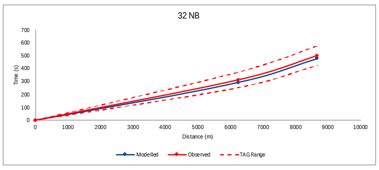
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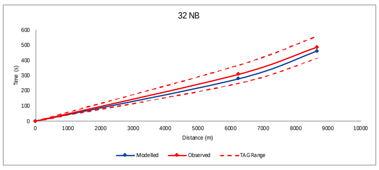
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Distance (m)
Modelled
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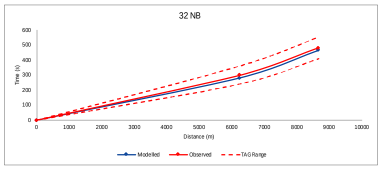
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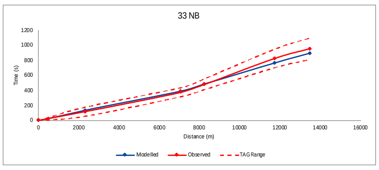
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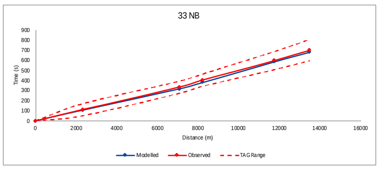
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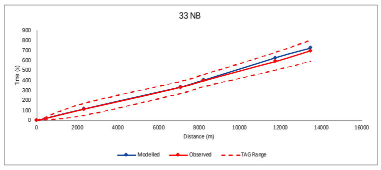
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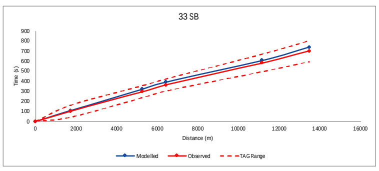
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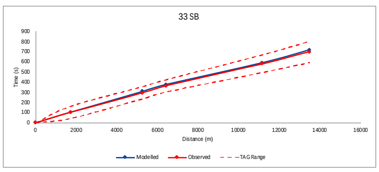
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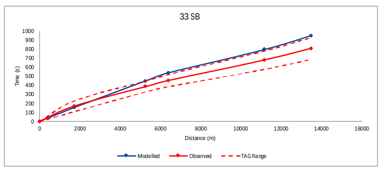
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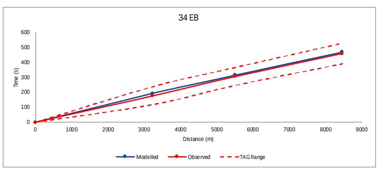
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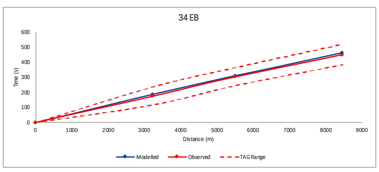
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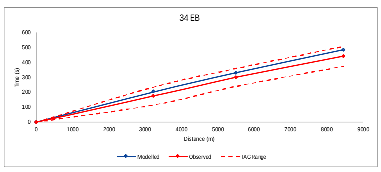
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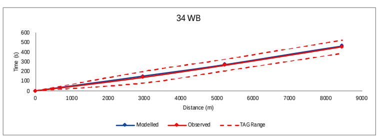
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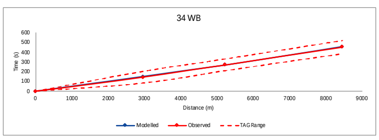
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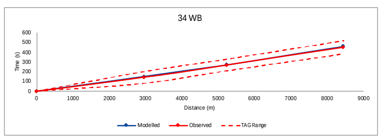
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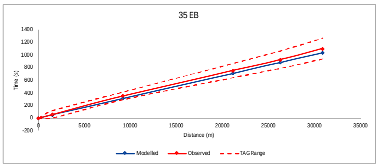
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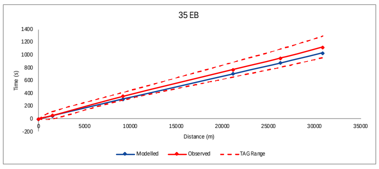
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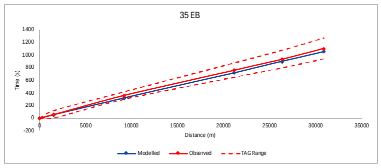
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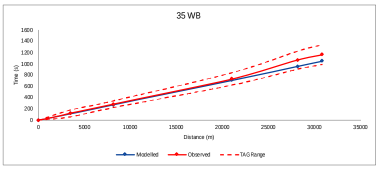
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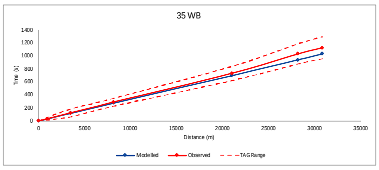
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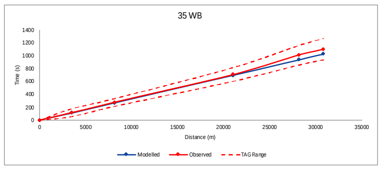
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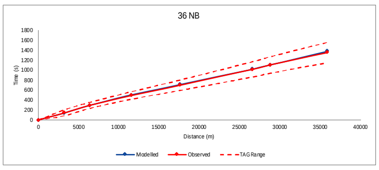
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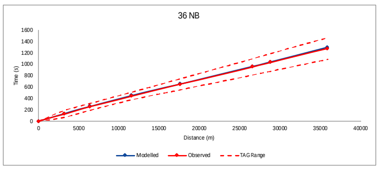
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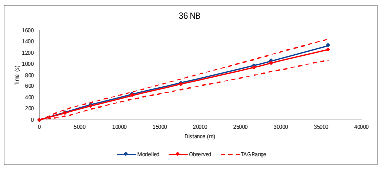
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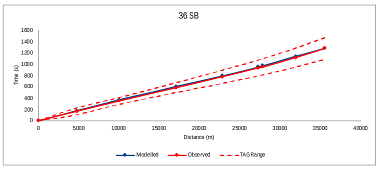
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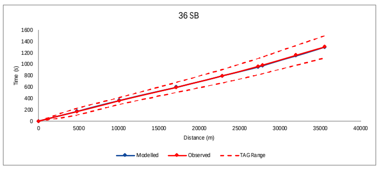
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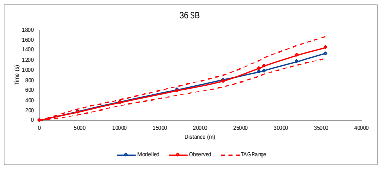
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