Model Development Report

North Somerset Local Plan

North Somerset Council

March 2022

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Quality information

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1. Introduction and Background

Introduction

1.1 AECOM has been commissioned by North Somerset Council (NSC) to provide transport consultancy services in relation to their emerging Local Plan for 2038. As part of this, strategic transport modelling has been undertaken to be used as evidence for developing and appraising the transport impacts of the Local Plan.

1.2 This report outlines the approach and creation of a modelling platform to assess the proposed strategy, which includes a highway model with a public transport GIS-based model and Variable Demand Modelling element.

1.3 The proposed approach for the modelling has been detailed in the Appraisal Specification Report (ASR) (Feb 2021) which has been developed in line with Transport Appraisal Guidance (TAG). The ASR is shown in Appendix A. This has been agreed with the Client and has been reviewed by National Highways (NH). Comments provided by NH on the ASR have been addressed through the model development.

Background and objectives of study

1.4 North Somerset is a unitary authority in the South-West of England, bordered by Bristol, and Bath and North East Somerset (B&NES) to the east, and Sedgemoor and Mendip to the south. According to ONS data (2019), around 215,000 people live in and 86,000 people work in the region. The largest settlement is Weston-super-Mare, with other larger settlements including Clevedon, Portishead and Nailsea. North Somerset also houses Bristol Airport, which attracted more than 9 million passengers in 2019. Figure 1.1 shows the extent of the North Somerset area.

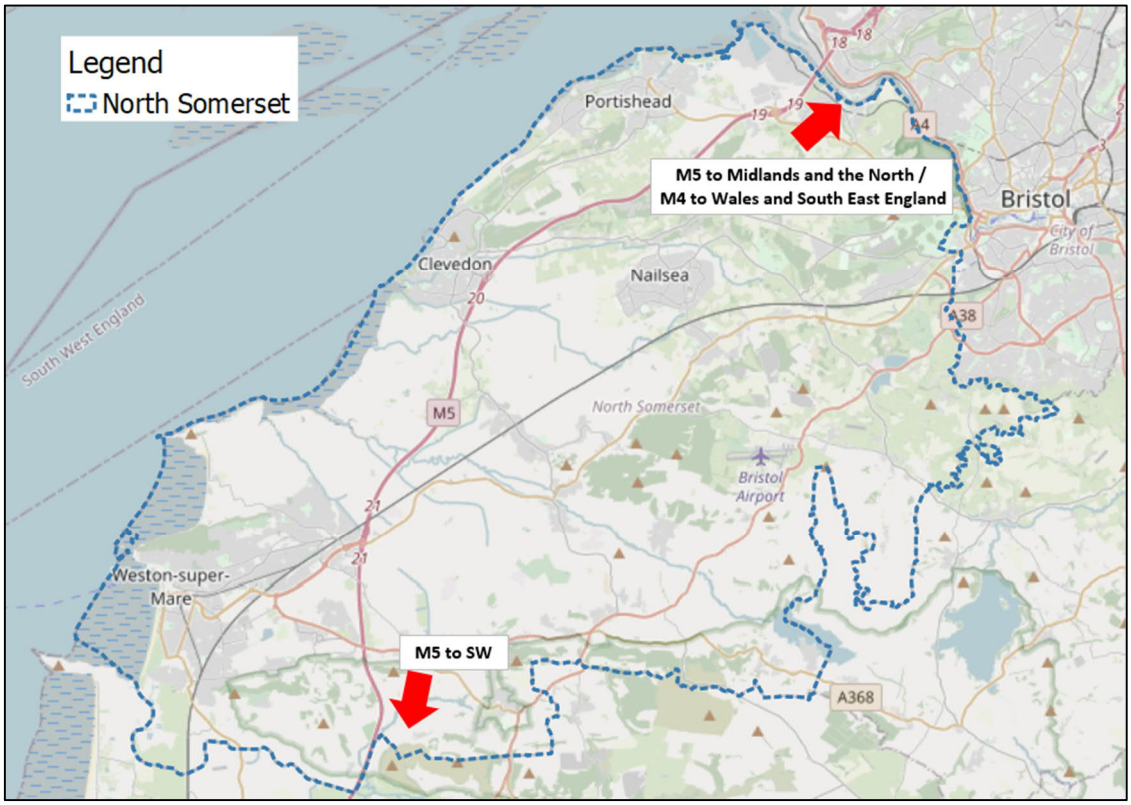

Figure 1.1: Map of North Somerset region

1.5 North Somerset Council is currently developing their Local Plan for the period up until 2038. This Local Plan outlines the strategic and detailed polices to guide development proposals across the county. This Plan will also detail the spatial strategy for developments across North Somerset.

1.6 This report outlines the development of a base transport model and the forecast Do-Minimum baseline model with the aim of this modelling suite being able to assess the proposed Local Plan spatial strategies, and potential mitigation options. This modelling suite will involve the use of the highway model, as well as a GIS-based public transport (PT) model which will be used together within a Variable Demand Model (VDM).

1.7 The transport model is one part of the appraisal process but is instrumental in highlighting additional network pressures. It also provides information on targeted PT and highway investment to release capacity and bring social, environmental, and economic benefits to North Somerset. In addition, North Somerset has an ambition to be carbon neutral by 2030 which means that delivering sustainable transport is an important factor of the Local Plan. Therefore, the modelling needs to include assessment of the impact of the Local Plan on other sustainable modes, and opportunities for sustainable transport to accommodate additional travel demand generated by growth.

1.8 The transport modelling informs, and will be used iteratively with, the development of sustainable transport mitigation. This will aim to accommodate growth in as sustainable manner as possible, with the potential for targeted capacity improvements to be considered and applied to the transport modelling.

2. Modelling Approach

2.1 The methodology of assessing Local Plan growth options for North Somerset has been guided based on the strengths and weaknesses of the data/models already available. It has also been guided on the various potential software/techniques to produce a suitable transport model. This will allow a flexible and robust approach to modelling multiple modes.

2.2 To create a modelling platform that will be robust in assessing the proposed Local Plan strategic allocations, three models have been created:

- A SATURN highway model, using the North Somerset Strategic Model (NSSM) as a starting point
- A TRACC based public transport model to provide public transport generalised costs to estimate the impact of potential mitigation measures.
- Data from the SATURN and TRACC models will feed into the DIADEM Variable Demand model which will estimate the impact of the Strategy on travel patterns and trip making, especially the choice between highway and PT modes of transport.

2.3 The modelling platform (PT supply model, highway assignment model and variable demand model) will work together to estimate the impact of the differing traffic patterns associated with development scenarios and indicate the impact on mode shift and highway flows and congestion. The modelling tool will also allow testing of the impact of potential mitigation measures (both highway and PT interventions) on mode shift, highway flows and congestion under different development scenarios.

2.4 An overall summary of the key elements of the modelling methodology can be seen in Figure 2.1.

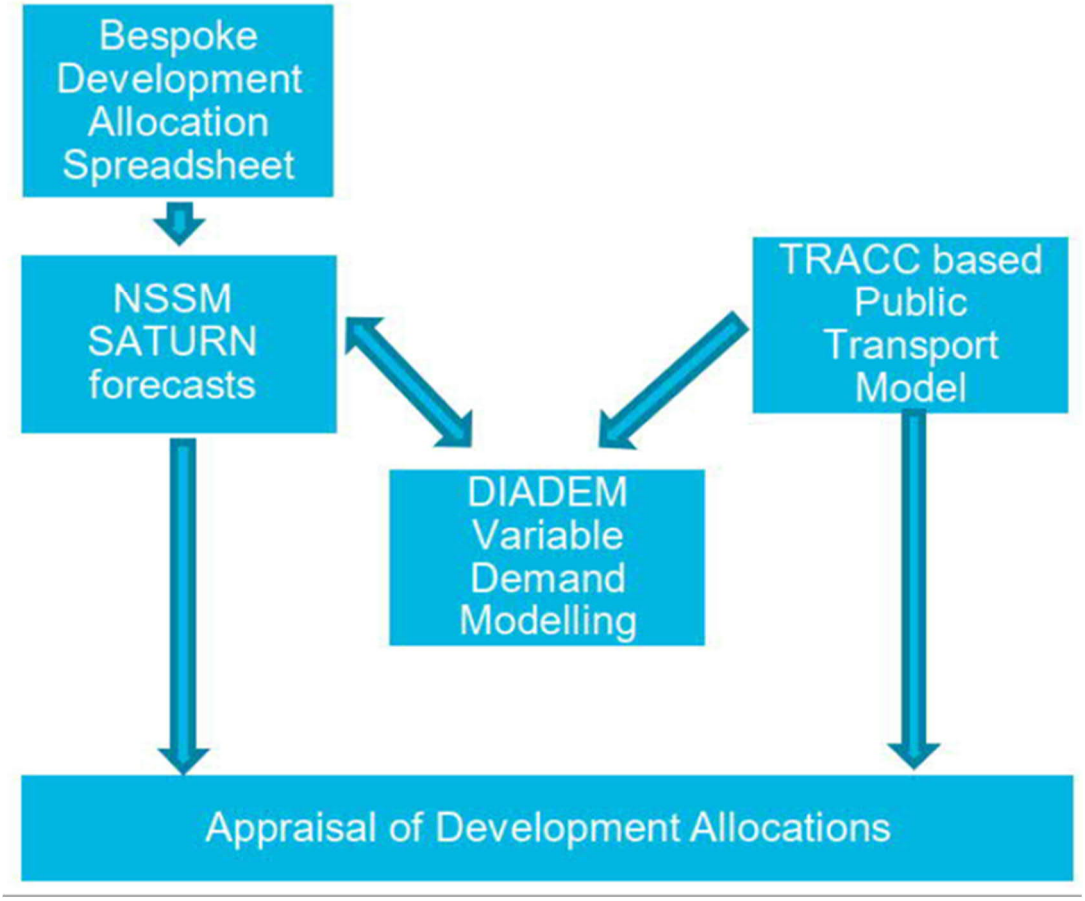

Figure 2.1: Transport Modelling Key Elements

2.5 For this phase of work, the highway and PT base and forecast Do-Minimum models have been created as well as the development of a VDM model. These models can now be taken forward for the assessment of the Local Plan strategy.

3. Highway Model: Base Model Enhancement

Outline of planned network changes

3.1 For the highway assessment, an enhanced version of the TAG-compliant NSSM has been developed and utilised. The current model has relatively good strategic network and zonal coverage of the North Somerset area and is calibrated well along most of the key routes. Calibration of the existing model is outlined in the NSSM Local Model Validation Report, September 2020 (LMVR). This report is attached in Appendix B.

3.2 To understand if this model was suitable for using for this study, a review was undertaken, and targeted enhancements of the model were identified. As the preferred Spatial Strategy is yet to be confirmed, the review of NSSM was based on the key strategic routes and locations within the model, and the overall network and zonal disaggregation across the region.

3.3 Following the review, four core areas for enhancements and updates have been undertaken which have been agreed with the Client & NH. These are;

- An expansion of the modelled simulation network into South West Bristol
- An expansion of network within Weston-super-Mare
- An update of the modelled speeds within the model area
- An update of the PPM/PPK factors in line with TAG.

3.4 Through these enhancements, the model has been checked against observed flows and journey times to ensure the model still conforms to TAG guidance. The enhancements set out were outlined in the ASR and presented to NSC and Highways England (NH) at a meeting on 5th January 2021 and agreed.

3.5 Comments on the ASR were outlined in an email to the project team on the 13th April 2021 by Andrew Ball at National Highways (NH). These have been addressed through the development of the model, which is described in the following sections.

Model Choice

3.6 As outlined in the ASR, there are two models covering the North Somerset area: the wider NSSM with a separate model covering the Weston-super-Mare area in more detail than the NSSM. NH favoured the use of one model, with the enhancement of the NSSM to cover more detail in the Weston-super-Mare area. This recommendation has been taken forward.

Route Choice between Bristol and NS

3.7 As part of the changes outlined for the network on the Bristol and North Somerset boundary, additional junctions on the edge of Bristol have been chosen to be converted from buffer to more detailed simulation to provide a more realistic response to congestion in this area, especially in the peak periods. NH has recommended that care should be given to ensure route choice remains realistic, especially comparing the M5 to potential competing routes to the north of North Somerset. As the model has been enhanced, route choices between Bristol and North Somerset have been reviewed and no issues have been identified.

Trip Rates

3.8 NH have recommended that trip rates for each site are agreed with themselves.

3.9 NH agree on the modelling approach that trip rates are developed on a site by site basis as location of the proposed allocation will strongly influence the mode share characteristic the proposed allocation site, thereby impact on the number of vehicle movements generated by the site.

3.10 There is also a recommendation that any consideration of internalisation at sites will need to take into account of the mode share proportion of the internal trips. That is, particularly for medium and larger potential allocations where internalisation can have a material impact on the number of external trips generated, the trip length aspect of mode share needs to be considered. This is because the majority of walk and cycle trips are shorter in length, and therefore a relatively high proportion of these will be contained within the allocation area. Conversely, the proportion of external to the allocation trips that are by

car and public transport will be higher, and when considering the ability for these trips to be undertaken by sustainable modes, it would not be realistic to assume that significant proportions could be transferred to walk and cycle modes. It is expected that the Bus Service Improvement Plan (BSIP) will create realistic opportunities to reduce trips and this will be considered as part of further stages of modelling where appropriate.

3.11 These comments refer to the development of the “Do Something” scenarios, i.e. testing the impact of Local Plan allocations against the Do Minimum in 2038. These scenarios are discussed in Section 8. At this stage of the Local Plan process, i.e. Reg.18 Consultation, it was decided to assess the broad strategic impact of a pattern of growth and site allocation which was in line with the Spatial Strategy. In order to complete this in time to publish for the consultation, it needed to commence at an early stage of site identification. As such, trip rates used are based on the locational characteristics of each of the growth areas, but do not include internalisation as information on supporting land uses was not known. This approach has been discussed with NH, and commitment has been made to go through a scoping exercise for trip rate and internalisation parameters as the modelling assessment is refined to account for greater knowledge on specific site allocations in the subsequent stage of Local Plan development.

Queuing at Motorway Slips

3.12 NH notes an issue on the M5 southbound in North Somerset. The issue occurs north of M5 J21, in the southbound direction, where traffic slows, seemingly in anticipation of the approaching slip road. However, the exact cause of the problem has not been identified. It is understood that SATURN may not be as robust in monitoring queue length, however, the outputs from SATURN may be a good indicator. Paragraph 4.28 of this report compares the operation of J21 with the original NSSM and shows that the volume vs capacity ratios around the junction are similar to the original NSSM.

Expansion of the modelled network into South West Bristol

3.13 The review concluded that there was a need to improve model route choice between Bristol and North Somerset, therefore it was decided to extend the simulation area further into the Bristol area to encompass some key junctions.

3.14 There are several key routes between Bristol and North Somerset which can become very congested within the peak hours and also many routes are parallel to each other therefore route choice can be sensitive. To help represent delay and congestion more accurately within the model, the following key junctions were represented in more detail (converted from buffer (peripheral) into more detailed simulation coding). These are shown in Figure 3.1.

- Parson Street Gyratory (A)
- Junctions around the Cumberland Basin (B, C, D) and.
- Hartcliffe roundabout (on Hengrove Way) (E)

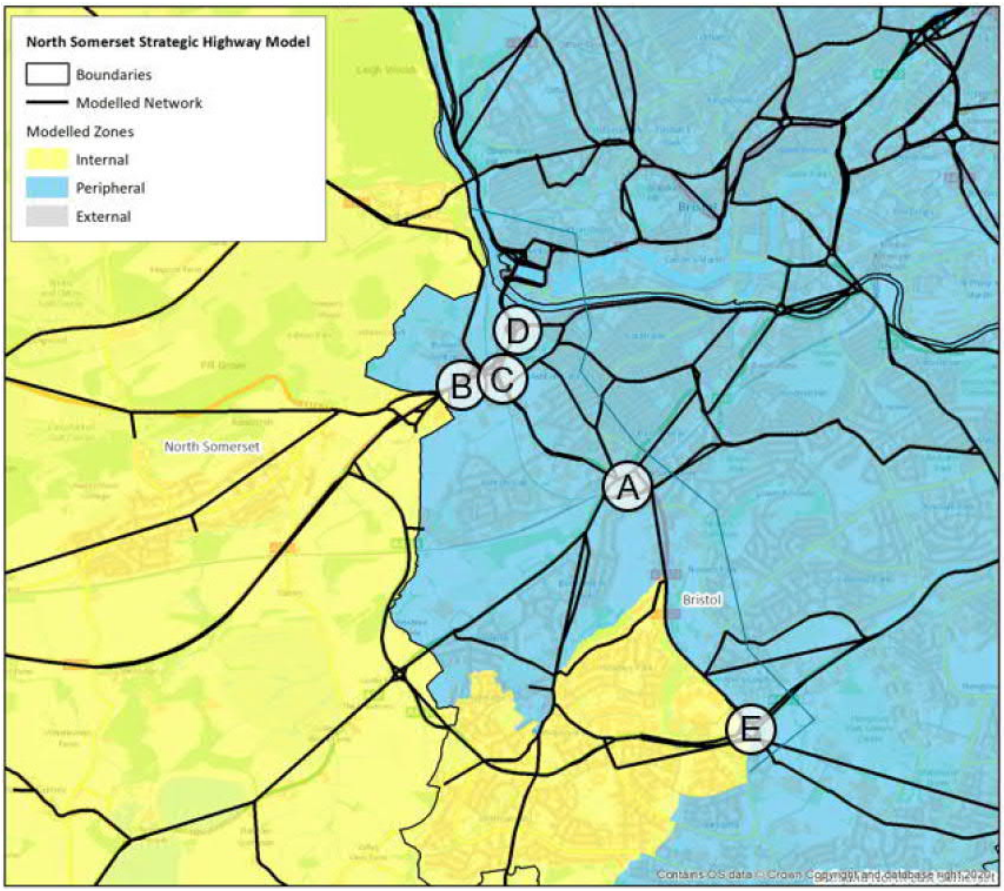

Figure 3.1: Locations for extending simulation network into South West Bristol

Expand Weston-super-Mare Network

3.15 As outlined in the ASR, the majority of the road network within the centre of Weston-super-Mare (W-s-M) is coded as less detailed, buffer network. This means that the model calculations are simplified and there is no calculation for junction delay. The NSSM LMVR states that there is a separate model of Weston-super-Mare (the Weston Town Model (WTM)) which could be used alongside the NSSM to provide more detailed modelling. However, following a

review, it was decided that the WTM is too old and would need extensive updating to be used for this study. Therefore, it was decided that to ensure the model is accurately representing delay in the centre of W-s-M, that the existing network has been improved in this area (by converting buffer coding in this area into simulation).

3.16 Signals in the newly formed simulation area were coded based on the signal information received from NSC. The data was analysed and appropriately applied to the stages.

3.17 Figure 3.2 outlines the area of the Weston-super-Mare network that has been converted into simulation. The main junctions, and corresponding links between the junctions, that were converted are shown by letters.

3.18 These are;

- A: A370/Broadway roundabout,
- B: A370/Winterstoke Road roundabout
- C: Winterstoke Road/Broadway mini roundabout
- D: A370/B440/A3033 roundabout

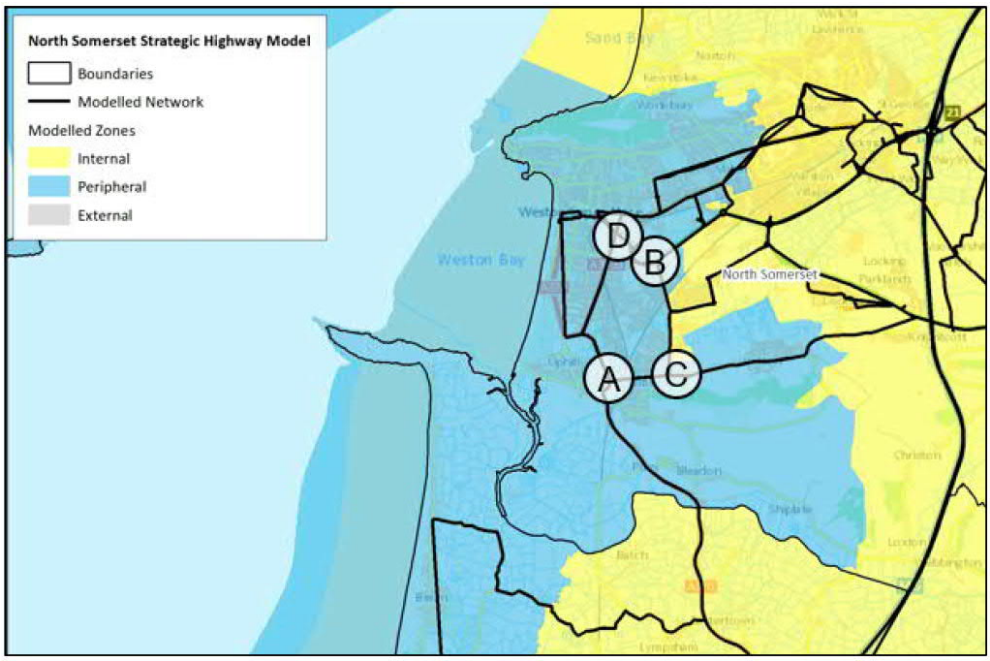

Figure 3.2: Locations for extending simulation network into Weston-super-Mare

Update of Modelled Speeds

3.19 The review highlighted that in some parts of the calibration of the original base model, speeds had been fixed to ensure that speeds reflected these levels of congestion. This includes routes where there is significant congestion in the peak periods. However, fixing speeds means that any changes in flow on the link will not change the speed. Therefore, in forecast years, the speeds will remain the same on these links as in the base year, which is not realistic. Therefore, the following updates were carried out to update these fixed speeds in the model:

- Checked all the low speed roads in model as mentioned in ASR (<=32 kph or 20 mph) and updated speeds where necessary with the speed limit mentioned on road
- Added Speed Flow Curves to all the major roads and critical areas – A-roads and slip roads to motorway, W-s-M and South Bristol
- For the area to the south of Bristol (bounded by the Harbourside to the north, A4 Bath Road to the east, and A4174 to the south) fixed speeds have been replaced with speed flow curves based on the speed limits on the ground. This is detailed in Figure 3.3.

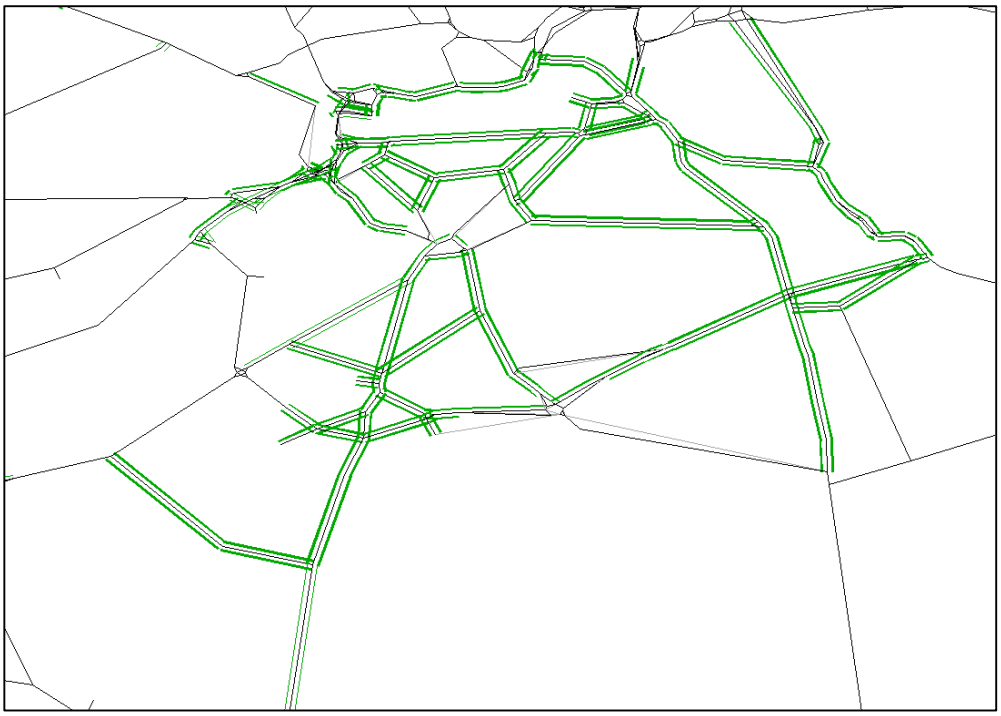

Figure 3.3: SATURN network of links which have been converted from fixed to variable speed

Update to Value of Time (VoT) and Vehicle Operating Cost (VOC)

3.20 In line with TAG, the Pence per Minute (PPM) and Pence per Kilometre (PPK) values have been updated using the values from the May 2021 TAG Databook. This Databook outlined the values for a forthcoming change which were formalised in July 2021 however due to timescales, the May 2021 values were used.

3.21 It should be noted that, as outlined in TAG Unit M3.1, the HGV values for PPM have been factored by 2 in accordance with guidance below:

"The value of time given in TAG unit A1.3 for HGVs relates to the driver's time and does not take account of the influence of owners on the routeing of these vehicles. On these grounds, it may be considered to be more appropriate to use a value of time around twice the TAG unit A1.3 values".

3.22 Table 3.1 shows a comparison between the PPM and PPK factors between the Original NSSM and the factors from the May 2021 Databook which have been used in the enhanced version of the model.

Table 3.1: PPM and PPK Values: Original NSSM vs updated May 2021 Databook

		AM Peak	AM Peak	Inter peak	Inter peak	PM Peak	PM Peak
		ppm	ppk	ppm	ppk	ppm	ppk
Original NSSM 2018 Base Model	Car Commute	20.67	6.09	21.01	6.09	20.74	6.09
	Car Employer's Business	30.82	12.50	31.59	12.50	31.27	12.50
	Car Other	14.26	6.09	15.19	6.09	14.93	6.09
	LGV	21.79	14.11	21.79	14.11	21.79	14.11
	HGV	22.12	36.83	22.12	36.83	22.12	36.83
Updated Model: using May 2021 Databook	Car Commute	20.55	6.29	20.89	6.29	20.62	6.29
	Car Employer's Business	30.65	12.68	31.40	12.68	31.09	12.68
	Car Other	14.18	6.29	15.10	6.29	14.85	6.29
	LGV	22.21	13.93	22.21	13.93	22.21	13.93
	HGV	44.24	43.85	44.24	43.85	44.24	43.85
Difference	Car Commute	*-0.12*	*0.20*	*-0.12*	*0.20*	*-0.12*	*0.20*
	Car Employer's Business	*-0.17*	*0.18*	*-0.19*	*0.18*	*-0.18*	*0.18*
	Car Other	*-0.08*	*0.20*	*-0.09*	*0.20*	*-0.08*	*0.20*
	LGV	*0.42*	*-0.18*	*0.42*	*-0.18*	*0.42*	*-0.18*
	HGV	*22.12*	*7.02*	*22.12*	*7.02*	*22.12*	*7.02*

3.23 To ensure a robust approach, a comparison of the PPM and PPK values in the May and July 2021 databooks have been undertaken, as shown in Table 3.2. Assignments have been undertaken and an analysis of the flow differences show that there is minimal impact in the North Somerset and the main impact is outside of the area around Bristol. The maximum flow change is around 25 pcus. This shows that the differences between the May and July 2021 TAG Databooks are negligible and that it is accepted that the May 2021 values can be used.

Table 3.2: PPM and PPK Values: Updated May 2021 Databook vs July 2021 Databook

		AM Peak	AM Peak	Inter peak	Inter peak	PM Peak	PM Peak
		ppm	ppk	ppm	ppk	ppm	ppk
Updated Model: using May 2021 Databook	Car Commute	20.55	6.29	20.89	6.29	20.62	6.29
	Car Employer's Business	30.65	12.68	31.40	12.68	31.09	12.68
	Car Other	14.18	6.29	15.10	6.29	14.85	6.29

	LGV	22.21	13.93	22.21	13.93	22.21	13.93
	HGV	44.24	43.85	44.24	43.85	44.24	43.85
July 2021 Databook	Car Commute	20.55	6.29	20.89	6.29	20.62	6.29
	Car Employer's Business	30.65	12.70	31.40	12.70	31.09	12.70
	Car Other	14.18	6.29	15.10	6.29	14.85	6.29
	LGV	22.21	13.94	22.21	13.94	22.21	13.94
	HGV	44.24	44.02	44.24	44.02	44.24	44.02
Difference	Car Commute	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Car Employer's Business	*0.00*	*0.02*	*0.00*	*0.02*	*0.00*	*0.02*
	Car Other	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	LGV	*0.00*	*0.01*	*0.00*	*0.01*	*0.00*	*0.01*
	HGV	*0.00*	*0.17*	*0.00*	*0.17*	*0.00*	*0.17*

4. Calibration and Validation of the enhanced NSSM model

4.1 As stated within the ASR, the model has been enhanced, it has not been recalibrated and revalidated. However, to ensure that the model has not been negatively impacted by these changes to the existing NSSM, checks have been undertaken to make sure that the model still calibrates in line with TAG.

4.2 Significance has been given to calibration in areas where the Local Plan allocation are likely to be located as well as on main routes across the network.

Model Statistics

4.3 TAG Unit M3-1 §3 provides guidance on the criteria and minimum Base Model acceptable values to which a highway assignment model should demonstrate assignment convergence. Table 4.1 presents the agreed convergence criteria for the RTM2 models.

Table 4.1: Measures of assignment convergence and Base Year acceptable values

Measure of convergence	TAG Unit M3-1
Proximity (Delta and %GAP)	Less than 0.1%, or at least stable with convergence fully documented and all other criteria met.
Stability (Percentage of links with a flow change <1%)	Four consecutive iterations greater than 98%

4.4 The model has been assigned using SATURN version 11.7.04H for the AM, IP and PM peak models.

4.5 Table 4.2 sets out the convergence statistics for the NSSM enhanced model compared to the original base model. The table shows the results for the last four iterations of each assigned peak.

Table 4.2: Convergence Statistics: Base Model

	Original NSSM Model			Enhanced NSSM model		
Time period	**Assignment Loop***	**%Flows**	**%GAP**	**Assignment Loop***	**%Flows**	**%GAP**
AM	17	98.5	0.00096	15	98	0.022
	18	98.9	0.00066	16	98.5	0.018
	19	99	0.0012	17	98.6	0.018
	20	99	0.00065	18	99.1	0.017
IP	9	98.4	0.00004	15	98.4	0.0093
	10	98.8	0.00003	16	98.2	0.0074
	11	99.5	0.00002	17	98.9	0.0055
	12	99.3	0.00003	18	98.9	0.0048
PM	16	98.3	0.0015	16	98.5	0.031
	17	98.7	0.0014	17	98.1	0.021
	18	98.9	0.002	18	98.5	0.017
	19	98.7	0.0014	19	98.7	0.016

* Last four iterations presented, as per the convergence stopping requirement

4.6 As we have increased the simulation area of the base model to areas on the edge of Bristol and Weston-super-Mare, it is expected that the convergence results would differ between the two models. The table shows that the enhanced model converges in less loops than original NSSM in the AM Peak which shows it is more stable. Although the IP and PM converge in either the same (in the case of the PM) or in slightly more loops than the original NSSM, the model still converges well within TAG criteria, which suggests the model is robust enough in terms of convergence to take forward to forecasting.

4.7 Table 4.3 to Table 4.5 shows model statistics taken from both the original NSSM and enhanced NSSM model by model peak. The table shows an increase in travel time and distance for the enhanced model, this is due to increasing the simulation area and changes to the network in the enhanced model. This has, in turn, reduced the average speed across the network which is likely to be attributed to the conversion of more congested areas of the network, especially in South West Bristol, to simulation.

Table 4.3: Base Model Statistics: Original NSSM vs enhanced NSSM – AM Peak

	Original Base		Enhanced NSSM	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	10,512	66,237	12,625	69,445

Travel distance (pcu kms)	667,396	4,241,956	715,322	4,248,539
Average Speed (kph)	63.5	64.0	56.7	61.2

Table 4.4: Base Model Statistics: Original NSSM vs enhanced NSSM – Interpeak

	Original Base		Enhanced NSSM	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	8,049.9	52,244.4	9,337.2	52,150.7
Travel distance (pcu kms)	574,229.4	3,884,168.8	613,464.2	3,885,308.0
Average Speed (kph)	71.3	74.3	65.7	74.5

Table 4.5: Base Model Statistics: Original NSSM vs enhanced NSSM – PM Peak

	Original Base		Enhanced NSSM	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	10,852.8	64,980.7	13,274.8	68,736.0
Travel distance (pcu kms)	676,085.8	4,096,456.3	725,319.3	4,105,017.0
Average Speed (kph)	62.3	63.0	54.6	59.7

Link Validation: Link Counts

4.8 The model shows good correlation with observed flows across the majority of the validation links. The AM, IP and PM models have overall pass rates of 85%, 86% and 88% respectively, and therefore pass the TAG criteria of 85% of links passing within the simulation area.

4.9 Table 4.6 provides a summary of the proportion of links that are passing in each peak. Figure 4.1 to Figure 4.3 show the link validation within the enhanced NSSM. Full results summary can be seen in Appendix C.

Table 4.6: Link Count Validation summary: Original NSSM vs Enhanced NSSM

Time Period	Criteria		Original NSSM		Enhanced NSSM	
		No. of Counts	No. of Passing	% Passing	No. of Passing	% Passing
AM	**Flow < 700**	121	102	84%	103	85%

Time Period	Criteria		Original NSSM		Enhanced NSSM	
		No. of Counts	No. of Passing	% Passing	No. of Passing	% Passing
	700 < Flow < 2700	39	32	82%	29	74%
	Flow > 2700	8	7	88%	7	88%
	All Flows	168	141	84%	139	83%
	GEH < 5	168	129	77%	128	76%
	Overall Pass (GEH or Flow)	168	143	85%	143	85%
IP	**Flow < 700**	113	98	87%	98	87%
	700 < Flow < 2700	24	20	83%	20	83%
	Flow > 2700	8	6	75%	6	75%
	All Flows	145	124	86%	124	86%
	GEH < 5	145	108	74%	108	74%
	Overall Pass (GEH or Flow)	145	126	87%	125	86%
PM	**Flow < 700**	119	107	90%	106	89%
	700 < Flow < 2700	38	31	82%	31	82%
	Flow > 2700	11	10	91%	9	82%
	All Flows	168	148	88%	146	87%
	GEH < 5	168	141	84%	137	82%
	Overall Pass (GEH or Flow)	168	153	91%	148	88%

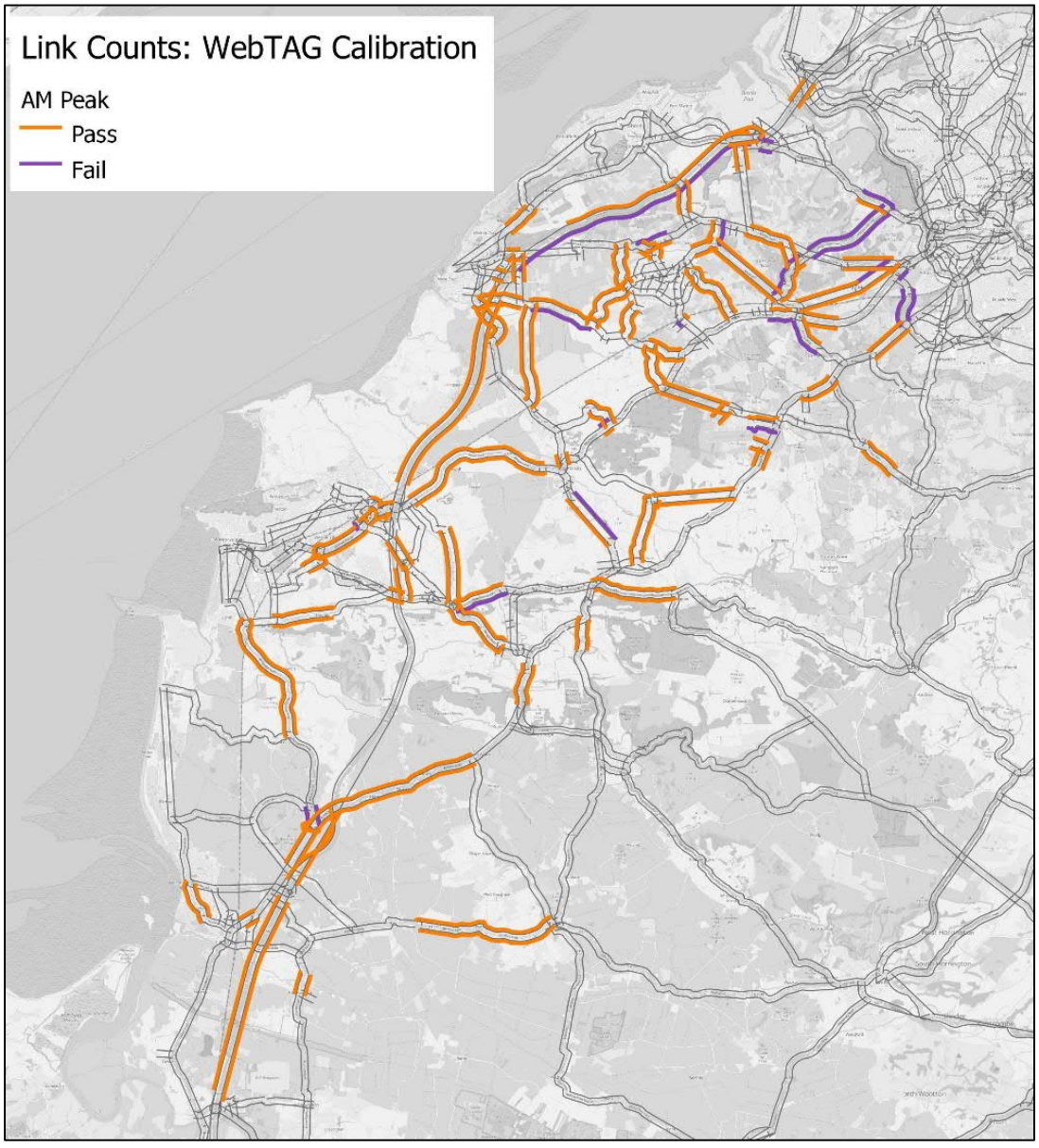

Figure 4.1: Enhanced NSSM: Link validation counts in AM peak

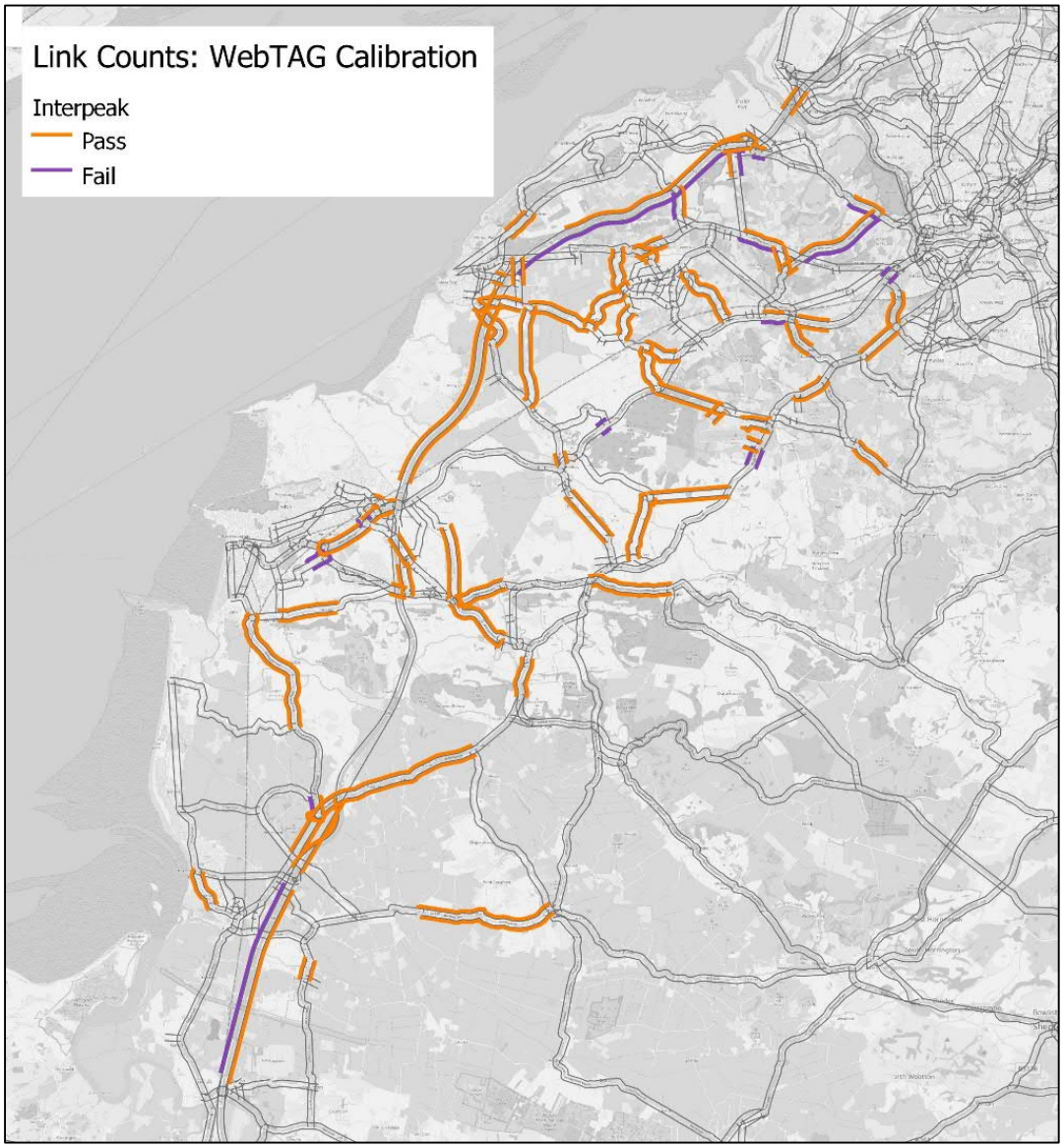

Figure 4.2: Enhanced NSSM: Link validation counts in Interpeak

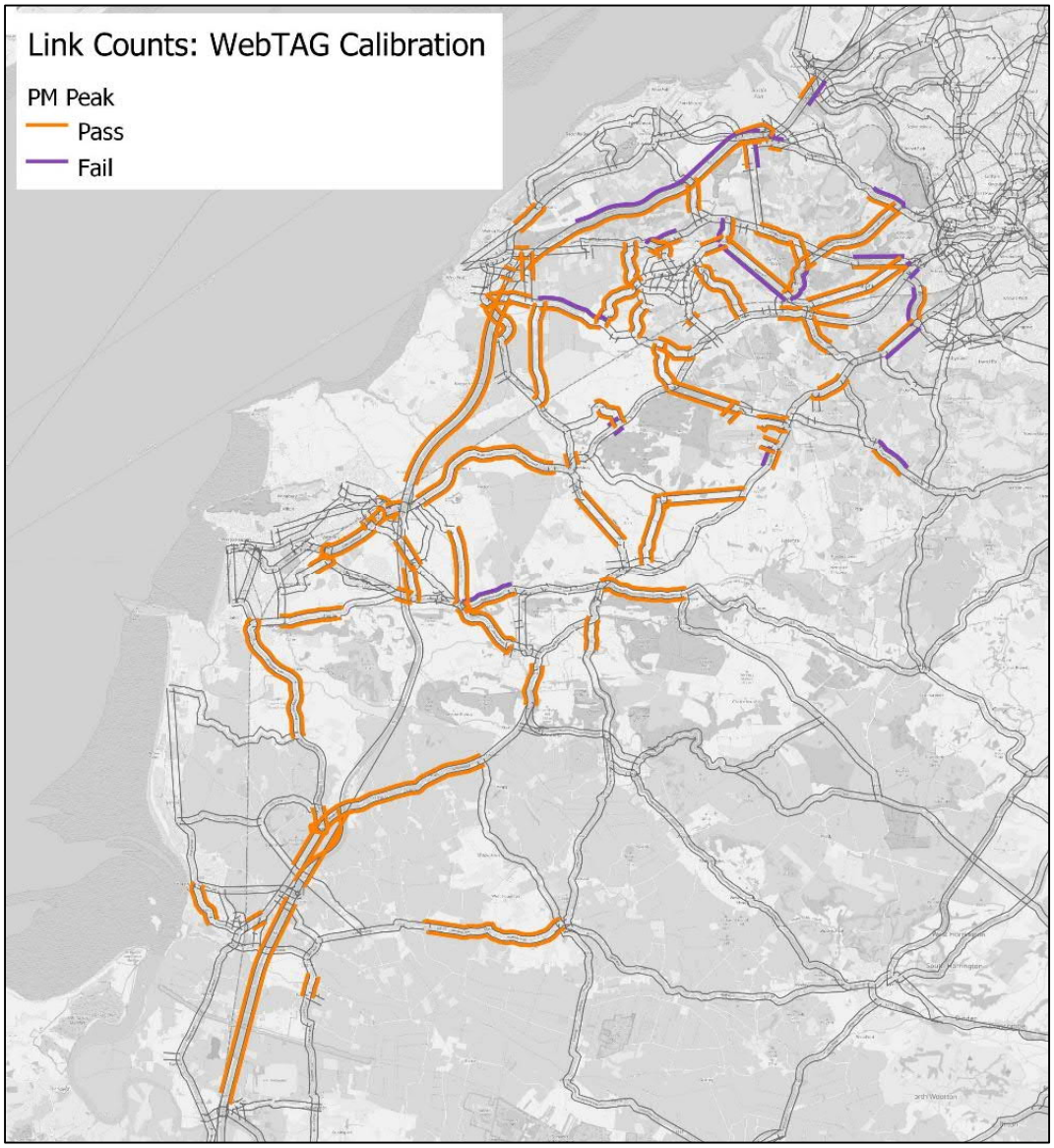

Figure 4.3: Enhanced NSSM: Link validation counts in PM Peak

4.10 The results show that there has been a slight change in calibration of the model as a result of the updates, however over 85% of links pass in each peak, and the changes have been necessary to improve the overall accuracy of the model and suitability to address changes in traffic flows in future years. Comparing the calibration between the original NSSM and the enhanced version of the model, a few conclusions have been drawn

- In the AM Peak, calibration has improved on links closer to Bristol such as A370 Long Ashton Bypass (WB) and A38 Bridgewater Road (SB) compared with the original NSSM. In addition, roads such as B3130 Tickenham Road (EB), B3133 Ettlingen Way (EB) and The Runway west of A371 Locking Moor Road (EB) all have improved calibration in the new enhanced model. There has been a small negative impact on some roads outside of the main routes between North Somerset and Bristol such as the B3130 at Barrow Gurney and Nailsea Wall. However, the majority of the links are outside the calibration screenlines.
- In the Interpeak, calibration has improved on links in and around W-s-M, along the A370 and B3124 between Weston and Clevedon. Two links on

screenlines have been pushed to fail TAG criteria in the enhanced NSSM – the A38 at Redhill (SB) and Clapton Lane in Portishead (NB) however they are only just outside TAG criteria.

- In the PM Peak, calibration has improved on links such as Beggar Bush Lane (WB), A369 Martcombe Road on approach to M5 J21 (WB) as well as the B3130 to the east of Nailsea. Of the links that do fail, the majority of these are close to passing the criteria, such as Nailsea Wall (which fails by one vehicle) and A368 East Street (east of Dark Lane) which fails by 23 vehicles)

4.11 On the M5, there is a 90% pass rate in the AM Peak and 85% in the Interpeak and PM Peak. In the AM Peak, the M5 southbound between J19 and J20 doesn't meet the TAG criteria, however it only fails by six vehicles. In the Interpeak, the M5 southbound between J19 and J20 fails with the modelled flow slightly lower than the observed. The M5 northbound between J23 and J22 fails with the modelled flow lower than the observed count, however it has improved from the original NSSM model and is only 43 vehicles away from passing.

4.12 In the PM Peak, the M5 to the north of Avonmouth Bridge fails southbound as well as the M5 northbound between J20 and J19. The link to the north of the Avonmouth Bridge fails as the model is slightly higher than the observed flow on this link. The northbound flow between J20 and J19 is lower than the observed count, however it only fails by 76 vehicles.

Link Validation: Screenlines

4.13 As per the NSSM LMVR reported criterion, all the screenline flows have been assessed with validation criteria of 10% flow difference and GEH, as some of the screenlines have a relatively low total observed flow and this makes the 5% TAG criterion difficult to meet in some cases (i.e. where a 5% threshold relates to a very small number of trips). The screenlines used in the original NSSM work are shown below in Figure 4.4.

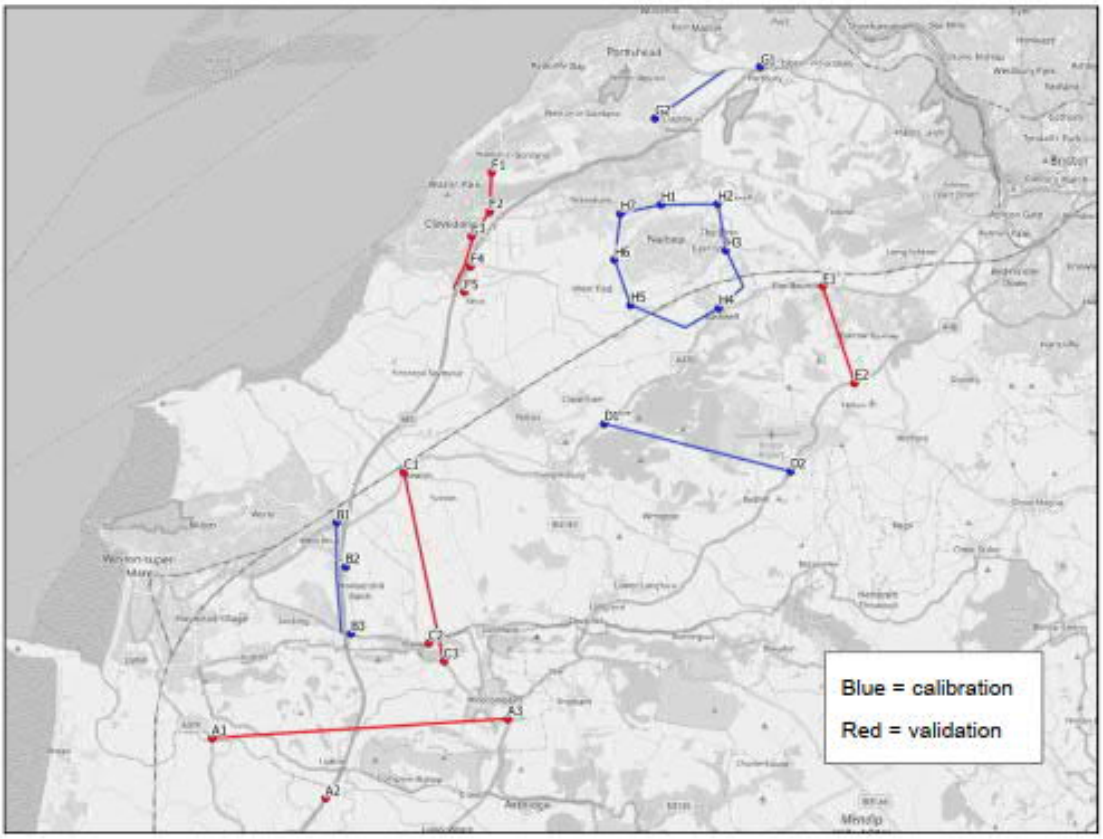

Figure 4.4: Screenlines used in NSSM (taken from NSSM LMVR)

4.14 Details on the screenlines are shown in Table 4.7.

4.15 Summary results for each peak are shown below in Table 4.8, Table 4.9 and Table 4.10. Full results comparing the results from the Original NSSM can be seen in Appendix D.

Table 4.7: Screenline Descriptions

Screenline	Cal/Val	Description
A	Validation	South of Weston-super-Mare, running from the A370, M5 and A38
B	Calibration	At Weston-super-Mare, running parallel to the M5 on the west side, between the A370, Wolvershill Road and A371.
C	Validation	At Weston-super-Mare, running parallel to the M5 on the east side, through Banwell and Hewish
D	Calibration	Between A370 and A38 to the south of Bristol Airport
E	Validation	Between the A370 and A38 near Barrow Gurney
F	Validation	At Clevedon, running parallel to the M5
G	Calibration	At Portishead, running parallel to the M5
H	Calibration	Cordon around Nailsea and Backwell

4.16 TAG suggests that differences between modelled and observed flows across a screenline should be within 5% for all or nearly all screenlines. However, as outlined in the LMVR of the original NSSM, some of the screenlines have a relatively low total observed flow and this makes this criterion difficult to meet in some cases (i.e., where a 5% threshold relates to a very small number of trips). Therefore, each screenline has also been assessed against a 10% flow difference criterion and GEH.

Table 4.8: Screenline Validation results for Enhanced NSSM: AM Peak

Screenline	Cal/Val	Direction	Obs	Mod	% Diff	<5%	<10%	GEH	GEH <5
A	**Val**	**NB**	4,073	4,098	0.6%	Pass	Pass	0.4	Pass
		SB	3,684	3,784	2.7%	Pass	Pass	1.6	Pass
B	**Cal**	**EB**	3,474	3,337	-4.0%	Pass	Pass	2.4	Pass
		WB	2,922	2,954	1.0%	Pass	Pass	0.6	Pass
C	**Val**	**EB**	1,171	1,101	-6.0%	Fail	Pass	2.1	Pass
		WB	1,292	1,336	3.4%	Pass	Pass	1.2	Pass
D	**Cal**	**NB**	1,420	1,349	-5.0%	Pass	Pass	1.9	Pass
		SB	1,001	975	-3.0%	Pass	Pass	0.8	Pass
E	**Val**	**EB**	1,631	1,625	-0.4%	Pass	Pass	0.2	Pass
		WB	1,194	1,361	14.0%	Fail	Fail	4.7	Pass
F	**Val**	**EB**	3,228	3,318	2.8%	Pass	Pass	1.6	Pass
		WB	3,364	3,389	0.7%	Pass	Pass	0.4	Pass
G	**Cal**	**NB**	1,360	1,367	0.5%	Pass	Pass	0.2	Pass
		SB	1,770	1,693	-4.4%	Pass	Pass	1.9	Pass
H	**Cal**	**In**	1,470	1,496	1.8%	Pass	Pass	0.7	Pass
		Out	1,722	1,669	-3.1%	Pass	Pass	1.3	Pass
				Pass Rate of all Screenlines		**88%**	**94%**		**100%**
				Pass Rate in Original NSSM		**94%**	**94%**		**94%**

4.17 The table shows that in the AM Peak, all screenlines pass in terms of GEH in the enhanced version of the NSSM. Looking further at the flow difference criteria, two screenlines fail within the 5% flow criteria. Screenline E (WB) fails in both versions of the model, however the enhanced NSSM has improved calibration on this screenline.

4.18 Screenline C (EB) has failed the flow percentage difference criterion in the enhanced model, however it is only just outside the 5% criteria, at 6%. On this screenline, of the three counts, only one fails the flow criteria (A370 Bristol Road) but it is only 2 vehicles higher than the pass criteria.

Table 4.9: Screenline Validation results for Enhanced NSSM: Interpeak

Screenline	Cal/Val	Direction	Obs	Mod	% Diff	<5%	<10%	GEH	GEH <5
A	**Val**	**NB**	3,830	3,885	1.4%	Pass	Pass	0.9	Pass
		SB	3,476	3,273	-5.9%	Fail	Pass	3.5	Pass
B	**Cal**	**EB**	2,211	2,203	0.0%	Pass	Pass	0.2	Pass
		WB	2,375	2,337	-2.0%	Pass	Pass	0.8	Pass
C	**Val**	**EB**	975	1,084	11.2%	Fail	Fail	3.4	Pass
		WB	1,044	1,076	3.0%	Pass	Pass	1.0	Pass
D	**Cal**	**NB**	962	998	3.7%	Pass	Pass	1.1	Pass
		SB	963	978	2.0%	Pass	Pass	0.5	Pass
E	**Val**	**EB**	1,131	1,214	7.4%	Fail	Pass	2.4	Pass
		WB	1,197	1,306	9.1%	Fail	Pass	3.1	Pass
F	**Val**	**EB**	2,052	2,227	8.6%	Fail	Pass	3.8	Pass
		WB	1,988	2,199	10.6%	Fail	Fail	4.6	Pass
G	**Cal**	**NB**	1,039	1,102	6.1%	Fail	Pass	1.9	Pass
		SB	1,011	1,051	3.9%	Pass	Pass	1.2	Pass
H	**Cal**	**In**	1,223	1,215	-0.7%	Pass	Pass	0.2	Pass
		Out	1,194	1,183	-0.9%	Pass	Pass	0.3	Pass
				Pass Rate of all Screenlines		**56%**	**88%**		**100%**
				Pass Rate in Original NSSM		**56%**	**94%**		**100%**

4.19 The table shows that in the Interpeak, all screenlines pass in terms of GEH in the enhanced version of the NSSM. Looking further at the flow difference criteria, eight screenlines are outside of the 5% flow criterion, which is the same number as the original NSSM. However, most of these screenlines are within 10% which is acceptable. The two screenlines which have a flow difference of more than 10% are Screenline C (EB) and Screenline F (WB), both validation screenlines. The flow difference of Screenline C (EB) is only two vehicles

different to the original NSSM, and Screenline F (WB) is only 22 vehicles different.

Table 4.10: Screenline Validation results for Enhanced NSSM: PM Peak

Screenline	Cal/Val	Direction	Obs	Mod	% Diff	<5%	<10%	GEH	GEH <5
A	**Val**	**NB**	4,020	3,811	-5.2%	Fail	Pass	3.3	Pass
		SB	4,312	4,157	-3.6%	Pass	Pass	2.4	Pass
B	**Cal**	**EB**	2,761	2,654	-4.0%	Pass	Pass	2.1	Pass
		WB	4,109	3,898	-5.0%	Pass	Pass	3.3	Pass
C	**Val**	**EB**	1,140	1,251	9.8%	Fail	Pass	3.2	Pass
		WB	1,564	1,534	-1.9%	Pass	Pass	0.8	Pass
D	**Cal**	**NB**	1,123	1,129	0.6%	Pass	Pass	0.2	Pass
		SB	1,652	1,562	-5.0%	Pass	Pass	2.3	Pass
E	**Val**	**EB**	1,315	1,469	11.7%	Fail	Fail	4.1	Pass
		WB	1,762	1,827	3.7%	Pass	Pass	1.5	Pass
F	**Val**	**EB**	3,214	3,203	-0.3%	Pass	Pass	0.2	Pass
		WB	3,308	3,360	1.6%	Pass	Pass	0.9	Pass
G	**Cal**	**NB**	1,976	1,897	-4.0%	Pass	Pass	1.8	Pass
		SB	1,353	1,290	-4.7%	Pass	Pass	1.7	Pass
H	**Cal**	**In**	1,773	1,716	-3.2%	Pass	Pass	1.3	Pass
		Out	1,496	1,569	4.9%	Pass	Pass	1.9	Pass
				Pass Rate of all Screenlines		**81%**	**94%**		**100%**
				Pass Rate in Original NSSM		**75%**	**100%**		**100%**

4.20 The table shows that in the PM Peak, all screenlines pass in terms of GEH in the enhanced version of the NSSM. Looking further at the flow difference criteria, three screenlines fail within the enhanced NSSM version, whereas there were four that failed within the original NSSM. Screenline E (WB) passes in this version of the model, it fails in the original NSSM with a percentage difference of 6.2%

4.21 Screenline A (NB) has improved compared with the original NSSM. The other two screenlines which fail are close to the 10% flow difference and have a relatively low observed flow.

Journey Time Analysis

4.22 As outlined as part of the ASR, it was identified that journey time calibration was a focus of the modelling enhancements, especially to improve routes between North Somerset and Bristol. Data from the calibration of the original NSSM was used, the routes are outlined below in Table 4.11.

Table 4.11: Journey Time Routes used in original NSSM (taken from NSSM LMVR, September 2020)

Route	Name	Start	End	Distance (km)
A	A38	Churchill	South Bristol Link Road	15.9
B	A369	Portishead	B3129	8.8
C	A370 (WsM to Brockley)	WsM	Brockley	15.8
D	A370 (Brockley to Bristol)	Brockley	Brunel Way	11.2
E	A371/A368	WsM	Churchill	10.4
F	B3128/B3130	Clevedon	Brunel Way	16.6
G	B3133	Langford	Clevedon	14.2
H	Barrow Street	A38	Weston Road	3.0
I	Downside Road	Brockley	Winford	7.7
J	M5 J18 to J21	J18	J21	23.2
K	Nailsea/Backwell	Backwell	Stone Edge Batch	5.5
L	Nailsea to M5 J18 via Causeway	Nailsea	M5 J18	20.5
M	Nailsea to M5 J18 via Pound Lane	Nailsea	M5 J18	14.1
N	Portbury Lane	Nailsea	A369	7.3
O	M5 J21 to J23	J21	J23	24.7
P	A370 (South of WsM)	A38	WsM	11.1
Q	A38 (South of Churchill)	A370	Churchill	19.2
R	A38 (East Brent to Dunball)	Dunball	A370	12.3
S	Burnham-on-Sea to M5 J23	Burnham-on-Sea	M5 J23	11.3

4.23 Table 4.12 shows how the enhanced model validates with observed journey time data used in the original NSSM in the AM Peak. The model has been significantly improved from the original NSSM model in terms of journey time validation on major routes.

Table 4.12: Journey Time Validation: AM Peak

			Enhanced NSSM			Original NSSM	
Route Direction	Direction	Obs (mm:ss)	Mod (mm:ss)	% Diff	TAG Criteria	% Diff	TAG Criteria

A	NB	16:25	16:10	-2%	Pass	-3%	Pass
	SB	16:36	14:47	-11%	Pass	-7%	Pass
B	EB	14:05	12:09	-14%	Pass	-23%	Fail
	WB	10:49	09:23	-13%	Pass	-18%	Fail
C	EB	22:03	18:46	-15%	Pass	-17%	Fail
	WB	18:37	18:48	1%	Pass	-3%	Pass
D	EB	19:12	14:56	-22%	Fail	-34%	Fail
	WB	12:15	12:12	0%	Pass	-2%	Pass
E	EB	19:02	18:51	-1%	Pass	2%	Pass
	WB	15:30	14:50	-4%	Pass	-8%	Pass
F	EB	25:04	22:20	-11%	Pass	-17%	Fail
	WB	20:24	20:22	0%	Pass	0%	Pass
G	NB	23:40	23:06	-2%	Pass	-5%	Pass
	SB	24:45	23:13	-6%	Pass	-8%	Pass
H	NB	04:20	04:20	0%	Pass	-3%	Pass
	SB	04:43	03:59	-16%	Pass	-16%	Pass
I	EB	10:19	11:41	13%	Pass	2%	Pass
	WB	10:31	10:42	2%	Pass	-4%	Pass
J	NB	14:05	13:31	-4%	Pass	-4%	Pass
	SB	13:01	12:32	-4%	Pass	-4%	Pass
K	NB	12:08	10:19	-15%	Pass	-6%	Pass
	SB	11:48	10:16	-13%	Pass	8%	Pass
L	NB	18:39	17:45	-5%	Pass	-5%	Pass
	SB	19:05	18:39	-2%	Pass	-6%	Pass
M	NB	19:10	17:03	-11%	Pass	-13%	Pass
	SB	17:58	17:08	-5%	Pass	-7%	Pass
N	NB	11:04	09:30	-14%	Pass	-18%	Fail
	SB	10:31	10:12	-3%	Pass	-9%	Pass
O	NB	12:52	13:22	4%	Pass	4%	Pass
	SB	13:03	13:38	4%	Pass	4%	Pass

P	NB	12:00	12:19	3%	Pass	0%	Pass
	SB	11:34	11:21	-2%	Pass	2%	Pass
Q	NB	13:59	12:48	-8%	Pass	3%	Pass
	SB	13:32	12:15	-9%	Pass	1%	Pass
R	NB	12:59	12:42	-2%	Pass	-2%	Pass
	SB	13:39	13:05	-4%	Pass	-4%	Pass
S	NB	07:12	07:06	-1%	Pass	-2%	Pass
	SB	08:00	08:06	1%	Pass	1%	Pass
			Pass Rate of all Journey Times		97%	84%	

4.24 In the AM Peak, route D (A370 Brockley-Bristol) fails in an eastbound direction. In the original NSSM, the model shows the route as approximately 6 minutes too fast compared with the observed data. This leads to a 34% difference between the modelled and observed. In the enhanced model, the difference has reduced to 22%, with the model being around 4 minutes too fast compared with the observed data. As outlined in the NSSM LMVR, this route can become extremely congested in the AM Peak, with vehicles travelling into Bristol. It is difficult to fully replicate the extent of the blocking back within the SATURN model however there has been some improvements on this route compared with the original NSSM.

4.25 Table 4.13 shows how the enhanced model validates with observed journey time data used in the original NSSM in the Interpeak. The model has been significantly improved from the original NSSM model in terms of journey time validation on major routes. All routes pass within the TAG criteria within the enhanced NSSM.

Table 4.13: Journey Time Validation: Interpeak

			Enhanced NSSM			Original NSSM	
Route Direction	Direction	Obs (mm:ss)	Mod (mm:ss)	% Diff	TAG Criteria	% Diff	TAG Criteria
A	NB	15:39	14:58	-4%	Pass	-7%	Pass
	SB	16:58	14:42	-13%	Pass	-12%	Pass
B	EB	10:34	09:35	-9%	Pass	-12%	Pass
	WB	10:30	09:12	-12%	Pass	-17%	Fail
C	EB	18:14	18:00	-1%	Pass	-6%	Pass
	WB	18:01	17:39	-2%	Pass	-4%	Pass

D	EB	12:22	11:55	-4%	Pass	-6%	Pass
	WB	12:53	12:19	-4%	Pass	-8%	Pass
E	EB	15:30	13:16	-14%	Pass	-15%	Fail
	WB	15:10	13:17	-12%	Pass	-14%	Pass
F	EB	19:30	19:31	0%	Pass	-1%	Pass
	WB	20:02	19:42	-2%	Pass	-4%	Pass
G	NB	22:04	21:59	0%	Pass	-4%	Pass
	SB	22:14	23:32	6%	Pass	2%	Pass
H	NB	04:06	03:52	-6%	Pass	-6%	Pass
	SB	04:30	03:51	-14%	Pass	-14%	Pass
I	EB	10:27	10:01	-4%	Pass	-5%	Pass
	WB	10:31	10:44	2%	Pass	-7%	Pass
J	NB	13:23	13:01	-3%	Pass	-3%	Pass
	SB	13:15	12:25	-6%	Pass	-6%	Pass
K	NB	10:52	10:02	-8%	Pass	-8%	Pass
	SB	11:27	10:28	-9%	Pass	-7%	Pass
L	NB	17:44	16:46	-5%	Pass	-6%	Pass
	SB	18:21	17:30	-5%	Pass	-5%	Pass
M	NB	16:55	16:14	-4%	Pass	-6%	Pass
	SB	17:30	16:54	-3%	Pass	-7%	Pass
N	NB	09:34	09:03	-5%	Pass	-10%	Pass
	SB	10:08	10:28	3%	Pass	-4%	Pass
O	NB	12:48	13:27	5%	Pass	5%	Pass
	SB	13:10	13:30	3%	Pass	3%	Pass
P	NB	11:50	11:39	-2%	Pass	2%	Pass
	SB	11:32	11:11	-3%	Pass	1%	Pass
Q	NB	13:49	13:00	-6%	Pass	4%	Pass
	SB	13:28	12:06	-10%	Pass	0%	Pass
R	NB	13:08	12:38	-4%	Pass	-4%	Pass
	SB	13:25	12:41	-5%	Pass	-6%	Pass

S	NB	07:18	07:12	-1%	Pass	-1%	Pass
	SB	07:50	07:51	0%	Pass	0%	Pass
			Pass Rate of all Journey Times		100%		95%

4.26 Table 4.14 shows how the enhanced model validates with observed journey time data used in the original NSSM in the PM Peak. All routes pass within the TAG criteria within the enhanced NSSM.

Table 4.14: Journey Time Validation: PM Peak

			Enhanced NSSM			Original NSSM	
Route Direction	Direction	Obs (mm:ss)	Mod (mm:ss)	% Diff	TAG Criteria	% Diff	TAG Criteria
A	NB	15:38	15:35	0%	Pass	-3%	Pass
	SB	18:01	15:41	-13%	Pass	-8%	Pass
B	EB	11:02	10:11	-8%	Pass	-12%	Pass
	WB	13:02	11:27	-12%	Pass	-20%	Fail
C	EB	19:03	19:08	0%	Pass	-4%	Pass
	WB	20:32	20:16	-1%	Pass	-5%	Pass
D	EB	12:13	12:33	3%	Pass	1%	Pass
	WB	13:56	15:47	13%	Pass	6%	Pass
E	EB	15:35	17:43	14%	Pass	13%	Pass
	WB	17:32	16:25	-6%	Pass	-8%	Pass
F	EB	19:50	19:45	0%	Pass	-2%	Pass
	WB	23:06	22:11	-4%	Pass	-8%	Pass
G	NB	23:40	23:08	-2%	Pass	-7%	Pass
	SB	24:27	24:24	0%	Pass	-5%	Pass
H	NB	04:14	04:05	-4%	Pass	-4%	Pass
	SB	04:31	04:14	-6%	Pass	-10%	Pass
I	EB	10:59	10:44	-2%	Pass	-6%	Pass
	WB	10:54	10:31	-4%	Pass	-7%	Pass
J	NB	13:04	12:51	-2%	Pass	-1%	Pass
	SB	15:31	13:41	-12%	Pass	-12%	Pass
K	NB	10:54	10:51	0%	Pass	0%	Pass
	SB	10:50	10:14	-6%	Pass	-7%	Pass
L	NB	18:31	17:21	-6%	Pass	-7%	Pass

	SB	20:15	18:24	-9%	Pass	-10%	Pass
M	NB	17:33	16:42	-5%	Pass	-9%	Pass
	SB	19:39	22:33	15%	Pass	8%	Pass
N	NB	10:08	09:13	-9%	Pass	-14%	Pass
	SB	12:58	14:23	11%	Pass	7%	Pass
O	NB	12:40	13:18	5%	Pass	5%	Pass
	SB	12:54	13:38	6%	Pass	6%	Pass
P	NB	11:55	11:53	0%	Pass	3%	Pass
	SB	11:39	11:26	-2%	Pass	2%	Pass
Q	NB	13:31	12:40	-6%	Pass	6%	Pass
	SB	13:24	12:46	-5%	Pass	6%	Pass
R	NB	13:20	13:05	-2%	Pass	-2%	Pass
	SB	13:18	12:49	-4%	Pass	-4%	Pass
S	NB	07:19	07:19	0%	Pass	0%	Pass
	SB	07:39	07:55	3%	Pass	3%	Pass
			Pass Rate of all Journey Times		100%		97%

Calibration: Motorway Junctions – Turning Counts

4.27 The following table shows junction turning counts at M5 Junction 21, the main gateway to A370 corridor, thus proving good correlation with the observed data. Compared with the original NSSM, the results are broadly similar. In the AM Peak, one movement fails (A370W to A370E) however the rest of the movements pass the criteria. In the PM Peak, all links pass the criteria.

Table 4.15: M5 Junction J21 turning flows

Time period	From	To	Obs	Mod	%Diff	GEH	TAG Criteria	
							Enhanced NSSM	Original NSSM
AM	M5 N	A370 E	114	87	-24%	2.7	Pass	Pass
	M5 N	A370 W	1,214	1,324	9%	3.1	Pass	Pass
	A370 E	M5 S	129	175	36%	3.7	Pass	Pass
	A370 E	A370 W	630	679	8%	1.9	Pass	Pass

Time period	From	To	Obs	Mod	%Diff	GEH	TAG Criteria	
							Enhanced NSSM	Original NSSM
	A370 E	M5 N	229	132	-42%	7.2	Pass	Pass
	M5 S	A370 W	313	342	9%	1.6	Pass	Pass
	M5 S	A370 E	115	122	6%	0.7	Pass	Pass
	A370 W	M5 N	1,768	1,877	6%	2.6	Pass	Pass
	A370 W	A370 E	585	439	-25%	6.4	Fail	Pass
	A370 W	M5 S	304	384	26%	4.3	Pass	Pass
	Total Entry Flow		5,401	5,562	3%	2.2	Pass	Pass
IP	M5 N	A370 E	79	104	32%	2.6	Pass	Pass
	M5 N	A370 W	972	1,181	22%	6.4	Fail	Fail
	A370 E	M5 S	92	168	82%	6.6	Pass	Pass
	A370 E	A370 W	574	510	-11%	2.7	Pass	Pass
	A370 E	M5 N	62	77	25%	1.8	Pass	Pass
	M5 S	A370 W	201	280	39%	5.1	Pass	Pass
	M5 S	A370 E	77	127	65%	5.0	Pass	Pass
	A370 W	M5 N	922	1,007	9%	2.8	Pass	Pass
	A370 W	A370 E	561	502	-11%	2.6	Pass	Pass
	A370 W	M5 S	209	220	5%	0.7	Pass	Pass
	Total Entry Flow		3,749	4,176	11%	6.8	Fail	Fail
PM	M5 N	A370 E	215	121	-44%	7.3	Pass	Fail
	M5 N	A370 W	1,897	2,043	8%	3.3	Pass	Pass
	A370 E	M5 S	148	137	-7%	0.9	Pass	Pass
	A370 E	A370 W	722	732	1%	0.4	Pass	Pass
	A370 E	M5 N	80	83	4%	0.3	Pass	Pass
	M5 S	A370 W	362	406	12%	2.3	Pass	Pass
	M5 S	A370 E	137	117	-14%	1.7	Pass	Pass
	A370 W	M5 N	1,130	1,037	-8%	2.8	Pass	Pass

Time period	From	To	Obs	Mod	%Diff	GEH	TAG Criteria	
							Enhanced NSSM	Original NSSM
	A370 W	A370 E	576	623	8%	1.9	Pass	Pass
	A370 W	M5 S	311	300	-3%	0.6	Pass	Pass
	Total Entry Flow		5,578	5,599	0%	0.3	Pass	Pass

4.28 Table 4.16 and Table 4.17 show entry flows at major junctions along M5, at junction 19, 20 and 21 for the AM and PM Peak respectively.

Table 4.16: AM Peak Entry Flows: M5 Junction J21, J20 and J19

	Entry arm	Observed	Modelled	Diff	% Diff	GEH	TAG criteria	Original NSSM TAG criteria
J21	M5 SB offslip	1328	1285	-43	-3%	1.2	Pass	Pass
	A370 (East)	988	921	-67	-7%	2.2	Pass	Pass
	M5 NB offslip	428	424	-4	-1%	0.2	Pass	Pass
	A370 (West)	2657	2567	-90	-3%	1.8	Pass	Pass
	Total	**5401**	**5197**	**-204**	**-4%**	**2.8**	**Pass**	**Pass**
J20	M5 NB offslip	1084	918	-166	-15%	5.2	Fail	Pass
	M5 SB offslip	492	473	-19	-4%	0.9	Pass	Pass
	Ettlingen Way	1473	1622	149	10%	3.8	Pass	Fail
	Total	**3049**	**3013**	**-36**	**-1%**	**0.7**	**Pass**	**Pass**
J19	Dock Road	258	173	-85	-33%	5.8	Pass	Pass
	M5 SB offslip	1497	1556	59	4%	1.5	Pass	Fail
	A369	1258	891	-367	-29%	11.2	Fail	Fail
	M5 NB offslip	779	493	-286	-37%	11.3	Fail	Fail
	A369 Portbury Hundred	1429	1189	-240	-17%	6.6	Fail	Pass
	Total	**5221**	**4302**	**-919**	**-18%**	**13.3**	**Fail**	**Pass**

4.29 In the AM Peak, J21 passes on all entry arms. At J20, the junction passes well overall. The M5 SB offslip has changed slightly and is shown as a fail however it is just outside the 15% flow difference change by less than 1%. At J19, the

M5 SB offslip has passed in the enhanced NSSM, and the M5 NB offslip has changed slightly from the original NSSM. Although the junction fails overall in the enhanced model, the flow difference is just outside 15%.

Table 4.17: PM Peak Entry Flows: M5 Junction J21, J20 and J19

	Entry arm	Observed	Modelled	Diff	% Diff	GEH	TAG criteria	Original NSSM TAG criteria
J21	M5 SB offslip	2112	2160	48	2%	1.0	Pass	Pass
	A370 (East)	950	949	-1	0%	0.0	Pass	Pass
	M5 NB offslip	499	534	35	7%	1.5	Pass	Pass
	A370 (West)	2017	1927	-90	-4%	2.0	Pass	Pass
	Total	**5578**	**5570**	**-8**	**0%**	**0.1**	**Pass**	**Pass**
J20	M5 NB offslip	649	645	-4	-1%	0.2	Pass	Pass
	M5 SB offslip	930	880	-50	-5%	1.7	Pass	Pass
	Ettlingen Way	1289	1412	123	10%	3.3	Pass	Pass
	Total	**2868**	**2937**	**69**	**2%**	**1.3**	**Pass**	**Pass**
J19	Dock Road	514	612	98	19%	4.1	Pass	Pass
	M5 SB offslip	1496	1930	434	29%	10.5	Fail	Fail
	A369	1331	1266	-65	-5%	1.8	Pass	Pass
	M5 NB offslip	422	220	-202	-48%	11.3	Fail	Fail
	A369 Portbury Hundred	1009	937	-72	-7%	2.3	Pass	Pass
	Total	**4772**	**4965**	**193**	**4%**	**2.8**	**Pass**	**Fail**

4.30 In the PM Peak, J21 and J20 pass the TAG criteria on all entry arms. At J19, two entry arms fail, as in the original NSSM, however, overall the junction passes.

Table 4.18: IP Entry Flows: M5 Junction J21

	Entry arm	Observed	Modelled	Diff	% Diff	GEH	TAG criteria	Original NSSM TAG criteria
J21	M5 SB off-slip	1051	1286	235	22%	6.9	Fail	Fail
	A370 (East)	728	755	27	4%	1.0	Pass	Pass

	M5 NB off-slip	278	408	130	47%	7.0	Fail	Fail
	A370 (West)	1692	1744	52	3%	1.3	Pass	Pass
	Total	3749	4193	444	12%	7.0	Fail	Fail

4.31 The original NSSM only provides observed interpeak data for J21. Comparing the original NSSM to the enhanced version, the junction performs similarly in both, with only a slight difference between the two models. Although the M5 off-slips fail within the TAG criteria, it should be noted that the GEH statistic is only just above 5.0 which is considered acceptable.

Calibration: Motorway Junctions – Queuing and Capacity Issues

4.32 In the original NSSM LMVR, paragraph 7.5.8 states that there are existing capacity issues at Junction 21 which have been represented within the model. These include the northbound onslip, the southbound offslip and the nearby Queensway junction. These have been reviewed to ensure that these capacity issues still exist within the enhanced model.

4.33 On the northbound onslip, the NSSM report refers to queuing in the AM Peak on this link. The original model has a V/C ratio of 103%. The enhanced model has the same V/C of 103%

4.34 On the southbound offslip, the original NSSM details queuing issues on the southbound carriageway due to high numbers of vehicles leaving the carriageway at this junction. There have been no changes to the calibration of the turning movement between the carriageway and the offslip that was added as part of the original NSSM. There is also negligible difference in V/C across the whole of the junction between the original and enhanced NSSM (between 1-2% maximum).

4.35 The original NSSM did not reflect the blocking back from the Queensway junction that can emerge during the PM peak period and reach back to Junction 21. The original NSSM did state that the journey times on this route did match well with Trafficmaster. This enhanced model also matches well with this route.

Summary

4.36 Although matrix estimation has not been undertaken in the build of the enhanced NSSM, the results show that the calibration is broadly similar to the original NSSM with the enhancements undertaken. However, validation and journey time results are much better in the enhanced model. In regard to journey time routes, only one journey time route fails the TAG criteria across all peaks.

4.37 Therefore, given these results, it has been decided that this model is robust enough to be taken forward for forecasting.

Note on COVID

4.38 There has always been a degree of uncertainty in traffic forecasts predicted by transport models as a result of national uncertainty (e.g. variations in GDP

projections; fuel price trends) and local uncertainty (e.g. related to proposed developments and transport schemes). Additional guidance was released in July 2020 ‘Appraisal and Modelling Strategy - A route map for updating TAG during uncertain times. Whilst national growth projections have been updated post Covid lockdown, there is currently no guidance that requires post Covid lockdown traffic flows to be used as the basis for developing transport models. Further phases of the modelling will take into consideration any changes in guidance including those based on assessing Covid scenarios.

5. Public Transport: Base Model

5.1 A TRACC-based PT model has been developed to provide public transport generalised costs to assess the potential impact of mitigation measures on mode shift under different development scenarios. This model is intended to provide PT data to inform the DIADEM Variable Demand Model. Prior to the project, no existing public transport model for the North Somerset area was available, prompting the need for the development of a new model.

5.2 TRACC software is a leading multi-modal transport accessibility analysis tool, developed in conjunction with the Department for Transport (DfT), local authorities and transport planners. TRACC analysis calculates travel times for non-highway modes (including rail, bus, walking and cycling) to give accurate journey times from many origins to many destinations in one calculation. It uses a physical network (i.e. roads and rail tracks) and public transport timetables to analyse travel times, distances, and accessibility across a defined network.

5.3 The creation of a TRACC model allowed for the assessment of journey times to various origin/destination points within and just beyond the North Somerset border using a pre-determined set of parameters. Although not a traditional form of public transport assignment model, TRACC can be used effectively to produce the data that would inform variable demand modelling (generalised cost of travel by public transport). An advantage to its use is that the PT network and service data is readily available in suitable format, and models do not require complex calibration.

5.4 Using procedures within TRACC, PT travel times and distances for origin and destination movements corresponding to the NSSM zone system have been extracted as key inputs into the variable demand model. These PT cost matrices reflect the bus and rail service routes and timetables in the base year. By including new or enhanced PT services proposed as mitigation for developing scenario impacts, we can accurately capture the effect on origin-destination PT generalised costs.

PT Model Construction

5.5 The model base year matches the highway model base year of 2018. The PT network was created using OpenStreetMap, with timetables obtained from DataCutter (a licenced repository of publicly available GTF (general transit feed) specifications). Timetable data has been included for the following PT modes:

- Bus;
- Coach;
- Rail; and
- Ferry

5.6 Origin and destination locations have been based on the population weighted centroid location of the NSSM zones. This has been done to ensure consistency between the generalised costs of travel (described in Section 6) calculated from the PT and highway models. Each zone centroid is linked to the walk network at its nearest point, and trips will use this walk network to access PT stops. The walk trip, rather than the centroid, represents the access/egress to PT stops, and therefore reflects any changes in walk network on access/egress times during a test scenario.

5.7 Where centroids were initially located far from the road network, they have been brought closer in order to enable connectivity within the model calculations. In instances where the nearest road link to a centroid was designated as motorway (with walk speed of 0, i.e. no walking allowed), its location was altered towards the nearest alternative road type which allows walking.

Model Calculations

5.8 Route times have been extracted from the TRACC model for each origin/destination pair in the zone system. Route time includes:

- Access walk time
- Wait time
- PT in-vehicle time
- Interchange walk/wait (if relevant)
- Egress walk time

5.9 The model is able to represent mitigation scenarios in two ways:

1) Inclusion of proposed mitigation services in TRACC service timetable – this will be appropriate where a specific new service, or enhanced frequency of existing service is proposed.
2) Manual adjustment of cost skim matrix for selected sector to sector movements – this will be appropriate to reflect broad enhancement to PT accessibility

5.10 Two calculation runs were performed to assess the base network: Origin-Destination, and Stop Frequency.

5.11 The Origin-Destination calculation represents a network accessibility calculation which can provide travel time or distance from origin to destination by varied modes of transport (public transport and walk, cycle and car). For the purposes of the project, a ‘Public Transport and Road Network’ combined calculation mode was selected, to calculate travel times using both the activated PT network and activated road network. For this form of calculation, walking time is worked out using the road links in the road network between origin/destination points to the PT stops and between PT stops.

5.12 Key parameters inputted into the Origin-Destination model calculation are outlined in Table 5.1.

Table 5.1: Key OD TRACC Parameter Inputs

Parameter	Input	Explanation
PT Mode	Bus, Coach, National Rail & Ferry	Choice of PT modes to be assessed.
Day/Time	Monday	Day of the week that the calculation is based on.
Start/End Time	07:00 – 19:00	Time of day when the calculation is run from/to.
Walk Speed	4.8Km/h	The walk speed when not on the network. Only applies to the walk between an origin and the road network, the road and a destination, and point where a PT stop is located off a road. When walking ON a road network, the default speeds internal to TRACC are used.
Walk Variance (when not on network)	4.0	Represents a multiplier applied to the straight-line distance from an origin point, a destination or PT stop to the nearest point on the road network. Accounts for any variation in the route taken, given that the route is unlikely to be a straight line.
Max. O/D Distance (as the crow flies)	200Km	This is the maximum straight-line distance from an origin to a destination. O/D pairs with a straight line greater than specified (e.g. 100km) are ignored in the calculation.
Maximum Internal Connection Distance	500 Meters	Represents the interchange distance between PT services. This is the maximum distance the calculation allows to walk between two different PT stops mid-journey. Connection distance applied to the road network (due to the inclusion of the 'Use road network for internal interchange' parameter, see below).
Interchange Penalty	5 Minutes	A time applied when interchanging between services. Added in the middle of the journey before boarding the next service, not at the end.
Use Road Network for Internal Interchange	True	Allows utilisation of the road network for interchanging from stop to stop.
Direction	Outbound	The direction used when calculating travel time/distance – outbound calculates from origin to destination.
Max. External Connection Distance	800 / 2000 / 5000 meters (see 5.13)	The maximum straight-line distance travelled from the origin to the nearest road, and from the nearest road to the destination. Access to the road network only granted to the closest road link.
Max. Connection Distance to First Stop	2000 / 2000 / 5000 meters (see 5.13)	A straight-line buffer with a radius of Xm that sits around the origin point and the destination point. Only stops within these buffers can be used as first or las stops for the journey, and

Source: Visography TRACC Help Guide v.1.2.1

5.13 Due to the nature of the TRACC software, pre-determined input distances were required for the Maximum External Connection Distance and Maximum Connection Distance to First Stop. As these represent maximum distances from O/D points to the road network and nearest PT stops respectively, there is a risk that too short a distance could prevent some O/D points from being accessible within the model, whilst too great a distance could over-estimate accessibility (especially in rural areas). As such, three separate model runs were completed (with all other input parameters kept the same), with the variations in distance parameters shown in Table 5.2. Whilst c.3,906 O/D points were not accessible within both Run 1 and 2, this number was reduced to c.786 O/D points in Run 3 – low enough for 5km distances to be taken forward as the parameter values used within both the base network and forecast model calculations.

Table 5.2: Variations in Base Network TRACC Model Runs

Parameter	Run 1 (Standard TRACC inputs)	Run 2 (2km)	Run 3 (5km)
Max. External Connection Distance	800m	2000m	5000m
Max. Connection Distance to First Stop	2000m	2000m	5000m

5.14 The locations of centroids (O/D points) for all inaccessible pairings were assessed using GIS, and all deemed to be sensible (being located in suitably rural/inaccessible areas).

5.15 Stop Frequency Calculations were also carried out in parallel with each iteration of the OD calculation runs. The Stop Frequency calculation presents an overview of the frequency of PT services at each stop. For the purposes of the project, the data outputted took the form of a .CSV report.

5.16 As with the OD calculation, the Stop Frequency run required several key parameters to be input prior to running, displayed in Table 5.3.

Table 5.3: Key Stop Frequency TRACC Parameter Inputs

Parameter	Input	Explanation
PT Mode	Bus, Coach, National Rail & Ferry	Choice of PT modes to be assessed.
Day/Time	Monday	Day of the week that the calculation is based on.
Start/End Time	07:00 – 19:00	Time of day when the calculation is run from/to.
Set Frequency	Service Frequency	Choice of either: *Service Frequency:* Provides the frequency value (number of services per hour) for the service

		that has the highest frequency at each stop that meet the transport mode and time criteria specified. *Combined Stop Frequency:* Provides a total frequency value for all services at that stop that meet the transport mode and time criteria specified. Result is the sum of all service frequencies.

5.17 Service Frequency was selected as the Set Frequency input, in order to represent the main levels of service provided at each PT stop. This also avoids generating values for wait times at stops with multiple services being much lower in the model than in reality. It must be noted however, that wait times for infrequent services sharing stops with more frequent routes will be underestimated when using this Set Frequency parameter.

6. Variable Demand Model

Introduction

6.1 This Chapter discusses the development, calibration, and validation of the Variable Demand Model (VDM). As noted in TAG Unit M2, there is a presumption that the effect of variable demand impacts should be estimated quantitatively unless there is a compelling reason not to do so. TAG Unit M2.1 §2.2 notes that 'it may be acceptable to limit assessment to a fixed demand analysis if there is no congestion or crowding on the network in the forecast year under current conditions.

6.2 Current evidence demonstrates congestion and delay exists across the highway network under current conditions, as detailed in Chapter 4. Therefore, there is no compelling reason not to quantitatively assess the effects of variable demand in the traffic forecasting.

Model Form

6.3 The VDM has been developed within the standard Department for Transport (DfT) tool DIADEM (Dynamic Integrated Assignment and Demand Modelling).

6.4 DIADEM is designed to enable practitioners to set up and run variable demand models. It allows for setting up a multi-stage transport demand model and finding equilibrium between demand and supply, using the SATURN package as the highway supply model. The process iterates between demand calculations and highway assignments until a converged solution is reached.

6.5 DIADEM is compliant with TAG with respect to model form, most notably model hierarchy and incremental nature of the model. The approach makes use of cost changes from relative differences between Base Year and Forecast Year travel costs, operated using a pivot point approach. Thus, the demand model form is incremental rather than absolute, which estimates changes in trip

patterns relative to a set of reference demand matrices derived from observed data.

6.6 Forecast changes in demand from the reference point are based on relative changes in travel costs and journey times. Changes in demand due to external factors such as population, employment and income, are applied separately to establish the reference matrices from the Base Year demand, detailed in Chapter 7.

Segmentation

6.7 Table 6.1 describes the model segmentation within the VDM with respect to modelled time periods and journey purposes and modes.

Table 6.1: VDM Segmentation Parameters

Parameter	Values	Notes
Modelled Time Slices	AM = 07:00-10:00 IP = 10:00-16:00 PM = 16:00-19:00 OP = 19:00-07:00	AM, IP, and PM travel costs derived from average period hour calibrated assignments. OP travel costs have been derived from an uncalibrated assignment of average hour data OP demand onto the IP network to represent uncongested conditions.
Time Period Factors	AM = 3 IP = 6 PM = 3 OP = 12	Simple calculation consistent across all movements and purposes as average period demand is assigned.
Assigned User Classes	From assignment models: – Car Employer's Business – Car Commute – Car Other – Light Goods Vehicles – Heavy Goods Vehicles	
VDM Demand Segments	Demand Segments (DS): 1. Home Based Employer's Business 2. Non-Home Based Employer's Business 3. Home Based Work 4. Home Based Other 5. Non-Home Based Other 6. Light Goods Vehicles 7. Heavy Goods Vehicles 8. Fixed Employer's Business 9. Fixed Work 10. Fixed Other	Fixed elements relate to External to External travel patterns that are assumed not to be subject to VDM response.

6.8 Home-based demand segments are represented as all-day Production-Attraction (PA) demand, whilst non-home-based demand segments are

represented as average hour Origin-Destination (OD) demand. All demand segments represent car available travel only.

6.9 A representation of Public Transport (PT) is required for the VDM. Base Year PT demand was derived from the highway demand by applying the relative proportions of car to PT travel calculated from 2011 Census Journey-to-Work (JTW) data. PT travel cost matrices were extracted from the TRACC PT model. PT fare matrices were derived based on the Regional Traffic Model (RTM) distance-based fare function below:

$$F = 0.28d^{0.9}$$

Where: F is the fare

d is the in-vehicle distance, derived from the TRACC analysis

6.10 Both highway and PT responses are modelled for the home-based and non-home-based demand segments. Forecast highway travel costs respond to changes in demand within each demand-supply loop in DIADEM, whilst PT costs are fixed. Goods vehicle traffic does not have a demand response, but route choice is modelled within the highway assignment.

6.11 The zone system within the demand model is identical to the zone system applied in the NSSM.

Generalised cost formulation

6.12 Generalised costs of travel are calculated using the guidance set out in TAG Unit M2. Within the DIADEM software, generalised costs of travel are represented in units of time, specifically generalised minutes. The formulation of the generalised costs of travel are given below:

$$G_{car} = 60.\left(t + \frac{VOC.d + toll}{VoT}\right)$$

$$G_{PT} = 60.\left(t + \frac{fare}{VoT}\right)$$

Where: G_{car} and G_{PT} are the generalised cost of travel for car and PT respectively

t is the travel time

d is the trip distance

$toll$ and $fare$ represent any monetary costs

VoT is the value of time, varying by purpose

VOC is the vehicle operating cost

6.13 The highway travel times, toll costs and trip distances are calculated by skimming the reference and forecast SATURN assignments. This happens automatically during the DIADEM run.

6.14 Public transport fare and perceived travel time (with appropriate weightings for walk, wait, in-vehicle, and interchange time) matrices were defined as fixed inputs into the VDM.

6.15 Values of time and vehicle operating costs applied to the highway and public transport cost matrices were derived from the May 2021 TAG Databook

(released as a forthcoming change to the official July 2021 Databook release). This is consistent with the economic parameters applied in the highway assignment model.

Generalised cost parameters

6.16 The generalised cost parameters used in the VDM have been derived from the May 2021 TAG Databook. This is the same TAG Databook used to define the Value of Time and Vehicle Operating Cost values in the highway assignment.

6.17 Values of time (VoTs) and vehicle operating costs (VOCs) are shown for the 2018 Base Year in Table 6.2.

Table 6.2: Generalised cost parameters for the 2018 Base Year

Demand Segment	Highway VoT (pence per hour)	Highway VOC (pence per km)	PT VoT (pence per hour)
Home-based employer's business	1868.67	12.68	1535.14
Non-home-based employer's business	1868.67	12.68	1535.14
Home-based work	1241.62	6.29	1093.39
Home-based other	889.97	6.29	498.89
Non-home-based other	889.97	6.29	498.89

Cost damping

6.18 TAG Unit M2.1 states that it may be necessary to include cost damping within the realism testing phase of the VDM. This is due to strong evidence that the sensitivity of demand responses to changes in generalised cost will reduce with increasing trip lengths.

6.19 There are two common approaches to cost damping set out in TAG:

- Varying cost as a function of distance, with common cost damping parameters are set out related to the distance function (TAG Unit M2.1 §3.3.15); and
- A power function of utility, for which common cost damping assumptions referred (TAG Unit M2.1 §3.3.18), for which a beta value of 0.75 (centre of range) was assumed and a value for mu estimated to set the mean generalised cost.

6.20 Cost damping is informed by realism testing. Therefore, this is an iterative process within realism testing. Within TAG, commonly used values are provided (α: 0.5, k: 30km, d': 30km); however, these are merely a guideline. TAG suggests that values are experimented with such that the results of the realism tests accord with TAG.

6.21 The final cost damping parameters applied in the NSSM VDM are shown in Table 6.3.

Table 6.3: Cost Damping Parameters

	k		α		d'	
	HW	PT	HW	PT	HW	PT
HB Emp Bus	60	60	0.8	0.4	60	60
NHB Emp Bus	60	60	0.8	0.4	60	60
HB Commute	17	17	0.1	0.2	17	17
HB Others	10	10	0.5	0.4	10	10
NHB Others	10	10	0.5	0.4	10	10

Choice model equations

6.22 The VDM is a hierarchical logit model operated via an incremental pivot point approach against the calibrated Base Year model. This calculates the likelihood of travellers making one choice over many alternatives based on changes in travel costs. Mode, destination and (macro) time period choices are represented in the demand model.

6.23 The time period choice formulation is as follows:

$$T_{t*i*} = T_{**i*} \cdot \frac{\sum_{mj} T^0_{tmij} e^{\theta_t \Delta C_{t*i*}}}{\sum_{tmj} T^0_{tmij} e^{\theta_t \Delta C_{t*i*}}}$$

with the change in composite travel cost across all modes calculated as follows:

$$\Delta C_{t*i*} = ln\left(\frac{\sum_{mj} T^0_{tmij} e^{\theta_m \Delta C_{tmi*}}}{\sum_{mj} T^0_{tmij}}\right)$$

6.24 The mode choice formulation, for choice between car and public transport, is then given by:

$$T_{tmi*} = T_{t*i*} \cdot \frac{\sum_{j} T^0_{tmij} e^{\theta_m \Delta C_{tmi*}}}{\sum_{j} T^0_{tPij} e^{\theta_m \Delta C_{tPi*}} + T^0_{tCij} e^{\theta_m \Delta C_{tCi*}}}$$

with the change in composite travel costs by mode calculated as follows:

$$\Delta C_{tmi*} = \ln\left(\frac{\sum_{j} T^0_{tmij} e^{\lambda_d \Delta C_{tmij}}}{\sum_{j} T^0_{tmij}}\right)$$

6.25 Finally, trip distribution is calculated as a function of the change in generalised cost as follows:

$$T_{tmij} = T_{tmi*} \cdot \frac{T^0_{tmij} e^{\lambda_d \Delta C_{tmij}}}{\sum_{j} T^0_{tmij} e^{\lambda_d \Delta C_{tmij}}}$$

with the change in generalised cost of travel, ΔC_{tmij}, calculated directly from the highway assignment skims.

6.26 In these formulations, the following parameters are used:

T_{tmij} is the output demand

T^0_{tmij} is the input demand

ΔC_{tmij} is the change in composite travel cost

θ_t is the time period choice sensitivity parameter

θ_m is the mode choice sensitivity parameter

i is the production or origin

j is the attraction or destination

t is the time period

m is the mode

$*$ represents aggregation across production, attraction, time period or mode

C is the car mode and P is the public transport mode

6.27 In-line with guidance in TAG Unit M2, commuting trips are doubly-constrained to ensure each zone produces and attracts a fixed number of total trip ends. Employer's business and other trips are singly constrained at the production end.

Choice model sensitivity parameters

6.28 Mode, destination and (macro) time period choices are represented in the demand model. The destination parameters give the sensitivities per minute of generalised car time; the mode and time parameters define the sensitivity of these choices relative to destination choice. These parameters imply that mode and (macro) time period choices are equally sensitive to changes in generalised car time.

6.29 In line with guidance in TAG Unit M2, destination choice sensitivity parameter values and main mode choice scaling factors are applied to composite costs of travel. The main mode choice scaling factors used are the median TAG values, shown in Table 6.4. Destination choice parameter values, shown in Table 6.5, have been calibrated through realism testing and are all within +/- 25% of the median values presented in TAG.

Table 6.4: TAG Median Main Mode Choice Scaling Parameters Used in NSSM VDM

Trip Purpose	NSSM Main Mode Choice Scaling Parameter
Home-based employer's business	0.45
Non-home-based employer's business	0.73

Home-based work	0.68
Home-based other	0.53
Non-home-based other	0.81

Table 6.5: Destination Choice Sensitivity Parameters Used in NSSM VDM

Trip Purpose	Car Median Value	Car NSSM Value	Car % Diff	PT Median Value	PT NSSM Value	PT % Diff
Home-based employer's business	0.067	0.050	-25%	0.036	0.027	-25%
Non-home-based employer's business	0.081	0.061	-25%	0.042	0.032	-25%
Home-based work	0.065	0.081	+25%	0.033	0.041	+25%
Home-based other	0.090	0.113	+25%	0.036	0.045	+25%
Non-home-based other	0.077	0.096	+25%	0.033	0.041	+25%

Convergence

6.30 All variable demand models iterate between the demand model and the assignment (or supply) model. This is because the volume of demand affects travel times, which in turn affect the volume of demand and so on.

6.31 It is important to monitor the convergence of this iterative process. Poor convergence causes noise in the model outputs, which in turn introduces errors into subsequent analyses such as economic and environmental appraisal.

6.32 TAG requirements for VDM convergence are set out in TAG Unit M2.1 §6.3. This defines the demand/supply gap as the preferred measure of convergence and states that 'tests indicate that gap values of less than 0.1% can be achieved in many cases, although in more problematic systems this may be nearer to 0.2%. Where the convergence level, as measured by the %GAP, is over 0.2% remedial steps should be taken to improve the convergence, by increasing the assignment accuracy.'

6.33 TAG also states that 'ideally the user benefits, as a percentage of network costs, should be at least 10 times the %GAP achieved in the without-scheme and with-scheme scenarios'. However, this relates to economic appraisal and forecasting and cannot be applied to Base Year realism testing.

6.34 Convergence of the demand model was calculated over the whole model. Based on TAG guidance, the stopping criteria in DIADEM was set to 0.1%.

6.35 The gap values achieved during realism testing, along with the number of demand-assignment loops required, are shown in Table 6.6. This shows that all realism tests converged to a gap value of less than 0.1% within 10 iterations.

Table 6.6: Realism test convergence statistics

Realism Test	% Gap	Number of Loops
Fuel Cost Realism Test (10%)	0.10%	5
Fuel Cost Realism Test (20%)	0.10%	6
Rail Fare Realism Test (10%)	0.09%	7

Calibration

6.36 The VDM has been calibrated using realism tests as defined in TAG Unit M2.1 §6.4.

6.37 Outturn demand elasticities have been calculated using the formula specified in the guidance:

$$e = \frac{\log(T^1) - \log(T^0)}{\log(C^1) - \log(C^0)}$$

Where: T^1 and T^0indicate values of demand in the test and base runs

C^1 and C^0 indicate levels of cost in the test and base runs

6.38 The realism of both fuel cost kilometrage elasticities and public transport fare elasticities have been assessed by running tests in the VDM. Highway travel time elasticities have been estimated from the fuel cost realism test.

Fuel cost realism test

6.39 The fuel price realism test analysed the impact on car vehicle kilometres with respect to a 10% increase in car fuel costs.

6.40 The guidance on fuel cost elasticities in TAG Unit M2.1 §6.4 states that the overall annual fuel cost elasticity across purposes should lie in the range -0.25 to -0.35. Guidance around expected purpose variation is also provided as follows:

- values for business travel are expected to be in the region of -0.1;
- values for commuting are expected to be in the region of -0.25; and
- values for discretionary travel are expected to be closer to -0.4.

6.41 The outturn fuel cost elasticities for the VDM are reported for trips originating in the internal model area and are shown in Table 6.7.

Table 6.7: Internal area fuel cost elasticities, by purpose and time period

Purpose	AM	IP	PM	Annual
Employer's Business	-0.20	-0.21	-0.13	-0.19
Home Based Work	-0.16	-0.21	-0.17	-0.17
Other	-0.34	-0.36	-0.27	-0.33

All Purpose	-0.24	-0.30	-0.21	-0.26

6.42 Table 6.7 shows that elasticity of car trip distance with respect to a 10% increase in car fuel cost is within the criteria range presented in TAG, although it is at the lower end. This suggests that the changes in travel patterns, either through time period, mode or destination choice, are smaller compared to the models used in the research used to produce the average outturn elasticities described in TAG.

6.43 This is largely driven by the car commute and car other elasticities, which are on the low side. This is to be expected due to large parts of North Somerset being more rural in nature, with more limited PT coverage, making changing mode from car to PT in response to an increase in car fuel cost more difficult.

6.44 Further analysis was undertaken to assess the elasticities only for trips originating in areas accessible to Weston-super-Mare, Worle, Yatton, and Nailsea & Backwell train stations. This represents a corridor within which mode shift between car and PT would be more achievable than in the rural areas of the authority. The elasticities for this sub-area are shown in Table 6.8, and are much closer to the TAG values.

Table 6.8: Fuel cost elasticities along rail corridor, by purpose and time period

Purpose	AM	IP	PM	Annual
Employer's Business	-0.22	-0.22	-0.13	-0.20
Home Based Work	-0.17	-0.23	-0.19	-0.19
Other	-0.37	-0.36	-0.26	-0.34
All Purpose	-0.26	-0.32	-0.22	-0.28

6.45 Using the fuel realism test results, highway journey time elasticities for the internal model area were estimated and are shown in Table 6.9. As described in TAG Unit M2, the elasticities with respect to highway journey times should be no greater than -2.0 for all journey purposes. This shows that all elasticities are lower than the TAG criteria and shows a sensible pattern across the purposes and by time period with the AM being higher than the inter-peak, which in turn is higher than the PM.

Table 6.9: Internal area journey time elasticities, by purpose and time period

Purpose	AM	IP	PM	Annual
Employer's Business	-0.47	-0.45	-0.28	-0.41
Home Based Work	-0.66	-0.74	-0.70	-0.70
Other	-1.02	-0.97	-0.85	-0.95

Public transport fare realism test

6.46 The public transport fare realism test analysed the impact on public transport trips in response to a 10% increase in public transport fares.

6.47 TAG Unit M2.1 quotes a public transport fare elasticity range of -0.2 to -0.9, i.e. a relatively wide range of values, based on 2004 TRL (Transport Research Laboratory) work.

6.48 The public transport fare elasticities for the VDM are reported for trips originating in the internal model area in Table 6.10. This shows that the annual outturn elasticities for each purpose are within the criteria range set out in TAG.

Table 6.10: Public transport fare elasticities, by purpose and time period

Time Period	AM	IP	PM	Annual
Employer's Business	-0.47	-0.44	-0.39	-0.44
Home Based Work	-0.54	-0.60	-0.60	-0.59
Other	-0.29	-0.50	-0.40	-0.38
All Purpose	-0.39	-0.46	-0.40	-0.42

Summary

6.49 The VDM for this enhanced North Somerset Strategic Model has developed in DIADEM and its build has been defined and aligned to TAG.

6.50 The VDM is a hierarchical logit model operated via an incremental pivot point approach against the calibrated Base Year model. The model has three demand responses: macro time period choice, mode choice, and destination choice.

6.51 The model has been subjected to realism testing and this shows that responses are within the criteria specified in TAG.

7. Do-Minimum Model

Highway Network

7.1 The Uncertainty Log provided by North Somerset Council outlines the housing and schemes that are planned for the North Somerset region. In terms of the highway network, infrastructure schemes that are 'near certain' or 'more than likely' have been included within the assessment, in line with TAG guidance. The Uncertainty Log is shown in Appendix E.

7.2 The highway improvement schemes coded over the Base Year network in-order to create the 2038 Do-Minimum (DM) highway network are as follows:

- J21 Northbound Merge Scheme
- Banwell Bypass

- North – South Link Road at Locking Parklands and
- Junction Improvements along A38

7.3 Key points of the schemes are elaborated below.

J21 Northbound Merge Scheme

- The existing northbound merge is currently a single lane, this scheme increases this to two lanes wide to increase traffic capacity from Weston-super-Mare onto the motorway.
- Within the model, the scheme has been implemented by adding an additional lane and doubling the capacity at the merge.

Banwell Bypass

- The Banwell Bypass scheme has been taken from the Banwell Bypass modelling provided by Arup. The scheme runs to the north of Banwell, with a roundabout at the western end of the bypass located to the east of Summer Lane, and a priority junction to the east of Banwell located near Towerbrook which will then remove through traffic through the centre of Banwell. The bypass also has junctions with Wolvershill Road and Moor Lane (although the latter is not included within this modelling due to the minor nature of the road)
- At the junction with Wolvershill Road, which is modelled as signal controlled, the southern section of Wolvershill Road is open only for buses or active travel.
- The scheme also involves some minor changes to the eastern end of Banwell, with a new alignment to link the A368 to Castle Hill to remove pressure on the current junction at East Street/Castle Hill.

North – South Link Road at Locking Parklands

- The North / South Link Road acts as a connection between A371 and Churchland Way.
- Scheme details are shown here https://www.n-somerset.gov.uk/sites/default/files/2020-02/North%20South%20Link%20Road%20layout.pdf
- Single lane configuration has been assumed throughout North-South Link Road. Spigots for zone loaders are provided along Lower Parade Ground Road and Anson Road.

Junction Improvements along A38

- This information has been taken from the public consultation on these proposals (https://a38mrn-engagement.com/)
- Barrow Gurney Junction Improvement: changes to improve the traffic signals at this junction including a separate left turn lane for traffic from A38 to Barrow Street.
- Airport Roundabout: lane widening to two lanes at the entry and exits of both roundabouts on A38 accessing Bristol Airport.

- Downside Road Junction Improvement: two lanes have been provided between the Airport and through Downside Road and West Lane in both directions and changes to the three junctions in line with the proposals.
- Strawberry Line Crossing: a signalised pedestrian and cycle crossing has been provided near Cross.
- Rook's Bridge: reduction of speed to 48kph on A38 through Rooksbridge village.
- Edithmead Roundabout: a signalised Hamburger roundabout where the right turning movement from M5 off-slip is connected to A38 through the Hamburger link.

Public Transport Network

7.4 An updated public transport model was created utilising TRACC software, in order to provide public transport generalised costs to assess the potential impact of mitigation measures on mode shift.

7.5 The same base network model was used, with updates to public transport supply, reflecting the proposed MetroWest Phase 1 re-opening of the Portishead Line to provide an hourly service between Portishead and Bristol Temple Meads, with new stations at Pill and Portishead. These schemes were coded as follows:

- The alignment of the rail line following the existing Portishead branch line.
- The opening of two new rail stations at Pill and Portishead, with Pill railway station sited at the location of the existing station, and Portishead station sited east of Portishead town centre, as proposed in the MetroWest Phase 1 plans.
- The addition of a new rail service from Bristol Temple Meads to Portishead. Whilst the exact timings of this proposed route are as yet unknown, it was assumed to be a daily train, operating hourly each way from 05:00 to 23:00. The total route journey time was estimated to be around 34 minutes each way, calling at Bristol Temple Meads, Bedminster, Parson Street, and the new Pill and Portishead stations.

7.6 The same model calculations and analysis as undertaken on the base network, and detailed in Chapter 5, were undertaken on the forecast year network. This analysis produced forecast year travel time and fare matrices for input into the VDM.

Reference Case Demand

Growth rates for Car demand within North Somerset Local Authority

Highway Model

7.7 As outlined in the ASR, highway trip growth between base year and future year has been based upon the forecast growth contained in the National Trip End Model (NTEM), at a spatial area consistent with the defined zone system.

7.8 The reference case demand also takes into consideration the Uncertainty Log provided by North Somerset Council and other relevant stakeholders to ensure the local planning data has been included within the model in line with TAG

guidance where applicable. This Uncertainty Log is shown in Appendix E. This log outlines the housing and employment developments planned across the North Somerset. It details the size of the development, timing and phasing of developments, location, year of completion and the level of uncertainty in terms of TAG guidance.

7.9 The Uncertainty Log allocates developments into one of four categories defined by the likelihood that they will be implemented. These categories are taken from TAG Unit M4 Table A2 as shown in Table 7.1 below. For the purposes of creating the core reference demand, only the categories of 'near certain' and 'more than likely' have been included.

Table 7.1: Classification of future inputs

Table A2 Classification of Future Inputs		
Probability of the Input	**Status**	**Core Scenario Assumption**
Near certain: The outcome will happen or there is a high probability that it will happen.	Intent announced by proponent to regulatory agencies. Approved development proposals. Projects under construction.	This should form part of the core scenario
More than likely: The outcome is likely to happen but there is some uncertainty.	Submission of planning or consent application imminent. Development application within the consent process.	This could form part of the core scenario [Refer to Section Developing the Core Scenario]
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	Identified within a development plan. Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented. Development conditional upon the transport strategy/scheme proceeding. Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty	These should be excluded from the core scenario but may form part of the alternative scenarios
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	Conjecture based upon currently available information. Discussed on a conceptual basis. One of a number of possible inputs in an initial consultation process. Or, a policy aspiration	These should be excluded from the core scenario but may form part of the alternative scenarios

Source: TAG Unit M4 Appendix A

7.10 To growth the 2018 base demand up to 2038, growth forecasts for cars have been calculated using the TEMPro 7.2 software and NTEM 7.2 dataset. Growth forecasts have been calculated for 2038 which is the extent of the Local Plan period.

7.11 Growth factors have been calculated for the following geographical areas:

- Middle Layer Super Output Area (MSOA) level within North Somerset using alternative assumptions based on information captured in the Uncertainty Log;
- District level for all districts surrounding the North Somerset region (i.e. City of Bristol, Bath and North East Somerset, South Gloucestershire, Mendip, Sedgemoor)
- County level for all counties within the South West outside of this area (i.e. Cornwall, Devon, Dorset, Wiltshire, Somerset and Gloucestershire)

- Regional level for all other regions outside of the South West (for example, East Midlands and Wales)

7.12 For the North Somerset area, the forecast growth as taken from TEMPro v7.2 is shown in Table 7.2. These have been split between 2018 to 2023, and 2023 to 2038, with 2023 being the anticipated start of the proposed Local Plan period.

7.13 Through discussions with North Somerset Council, it was decided that the TEMPro growth will include some housing and jobs that would be included as part of the Local Plan. Therefore to avoid double counting, it would be sensible to remove some of the projected growth in housing and jobs from in the Local Plan period for the Do Minimum scenario.

7.14 For the period between 2018 and 2023, growth in North Somerset will be assumed as outlined in TEMPro for both housing and employment.

7.15 For housing, it is expected that the Local Plan (2023-2038) will deliver 20,475 homes, of which 5,000 will be windfall/completions/small scale planning applications. Therefore, 5,000 will be included as part of the Do Minimum scenario. Therefore, the additional 15,475 homes will be assessed as part of the Do Something Local Plan scenarios and therefore removed from the Do Minimum scenario.

7.16 For employment, the likely number for jobs will be 13,500 across the period. Many of these will be delivered organically without development, or in conjunction with other schemes. Some will be incorporated in housing allocation sites, and there may be specific employment allocations which will need to be modelled. Therefore an assumption has been made that approximately 33% of jobs over the period will be generated independent of the housing growth as part of the Plan, with the other 66% of jobs being allocated as part of the Local Plan.

Table 7.2: Forecast housing and jobs growth for Do Minimum from TEMPro v7.2 (2018-2038)

	2018-2023		2023-2038		Total	
	Housing	Jobs	Housing	Jobs	Housing	Jobs
Growth for North Somerset as in TEMPro v7.2)	6,111	1,914	17,234	4,211	23,345	6,125
Amended TEMPro Growth for North Somerset for Do Minimum[1]	6,111	1,914	5,000	4,590	11,111	6,504

7.17 Following this, the Uncertainty Log has been reviewed and any housing developments over 100 dwellings and employment sites over 1 hectare have been allocated to the responding MSOA. Any sites less than these sizes would be incorporated within the remaining TEMPro growth.

Table 7.3: Uncertainty Log Developments: greater than 100 homes or 1 hectare for employment

Type	Schedule 1 Site Location	Area	Size (dwellings unless stated)	MSOA
Res	Winterstoke Village (former Weston Airfield)*	Weston-super-Mare	2548	E02006846
Res	Parklands Village (former RAF Locking site)*	Weston-super-Mare	3950	E02003087
Res	Westacres Caravan Park	Weston-super-Mare	125	E02006845
Res	Land north of Oldmixon Road. W-s-M	Weston-super-Mare	130	E02003087
Res	West of Engine Lane	Nailsea	171	E02003072
Res	Youngwood Lane, Nailsea	Nailsea	450	E02003072
Res	Severn Paper Mill	Portishead	117	E02003067
Res	Marine View, Harbour Road	Portishead	118	E02003065
Res	Woodborough Farm, Winscombe	Service Villages	175	E02003088
Res	Pudding Pie Lane (East), Churchill	Service Villages	141	E02003088
Res	Land at North End, Yatton	Service Villages	170	E02003076
Res	Arnolds Way, Sheltered Housing, Yatton	Service Villages	200	E02003076
Res	Land to the north of A368, Sandford	Infill Villages	118	E02003088
Emp	Weston Villages – other employment sites set out in Weston Villages SPD and sites with planning permission.	Weston-super-Mare	1760 ($100m^2$)	E02003087
Emp	Haywood Village Business Quarter	Weston-super-Mare	2400 ($100m^2$)	E02006846
		Total Houses	**8413**	
		Total Emp ($100m^2$)	**4160**	

7.18 For the employment sites at Weston Villages and Haywood Village, some assumptions have been used to calculate the number of jobs that will be created based on their size. The size given within the Uncertainty Log is based on Site Area however the actual development will be different to this e.g. space is needed for parking, employment may be over multiple floors etc. Therefore, this site area has been converted to Gross Floor Area (GFA).

7.19 For the employment sites at Weston Villages and Haywood Village, some assumptions have been used to calculate the number of jobs that will be created based on their size. The size given within the Uncertainty Log is based on Site Area however the actual development will be different to this e.g. space is needed for parking, employment may be over multiple floors etc. Therefore, this site area has been converted to Gross Floor Area (GFA). To calculate this, information has been gathered from the Banwell Bypass modelling team to ensure consistency between the models.

Table 7.4: Site Area vs GFA for Employment Sites

	Data used by Banwell team			Local Plan: Calculated GFA	
	Site Area (ha)	Est GFA (sq m)	Site Area to GFA Factor	Site Area (ha)	Est GFA (sq m)
Haywood	32.6	89,636	27%	24.0	60,860
Locking (Weston Villages)	9.8	22,757	23%	17.6	44,361
Average factor			25%		

7.20 From this, the number of jobs have been calculated as well as the factors to convert development floor area into jobs, shown in **Error! Reference source not found.**. This data has been taken from the Homes and Community Agency Employment Density Guide (3rd edition).

7.21 The total jobs calculated for each site is shown in **Error! Reference source not found.** The land use mix was provided by the Banwell Bypass modelling team.

Table 7.5: Factors to convert development floor area into jobs

Land use class	Job Density (sqm per employee)	Employees per sqm
B1 – Office	12	8.3
B2 – Industrial	36	2.8
A1 – Retail	17.5	5.7

Table 7.6: Number of jobs for employment sites

	Land use type	Land use split %	sqm	Jobs
Haywood	B1	31%	18,867	1572
	B2	54%	32,865	913
	A1	15%	9,129	522

	TOTAL	100%	60,681	3007
Rest of Weston V / Locking Parklands	B1	31%	13,836	1153
	B2	54%	24,101	669
	A1	15%	6,695	383
	TOTAL	100%	44631	2205

7.22 As the growth for the North Somerset region is to be constrained to a MSOA level, Table 7.7 compares the housing and employment growth between 2018 and 2038, in each Middle Super Output Area (MSOA) in North Somerset Local Authority. The table shows planning data as from TEMPRO and then the amended TEMPRO growth including specific Uncertainty Log developments.

Table 7.7: Forecast housing and jobs growth in each MSOA (2018-2038)

North Somerset MSOAs	Growth as per TEMPRO		Amended TEMPRO Growth	
	2018 to 2038		2018 to 2038	
	HHs	Jobs	HHs	Jobs
North Somerset Total	**23345**	**6125**	**11111**	**6504**
E02003065	1089	252	244	53
E02003066	716	148	83	31
E02003067	871	199	218	42
E02003068	733	314	85	66
E02003069	656	214	76	45
E02003070	1287	402	149	85
E02003071	969	264	112	56
E02003072	1133	272	752	57
E02003073	725	117	84	25
E02003074	947	146	109	31
E02003075	627	161	72	34
E02003076	1031	324	489	68
E02003077	480	344	55	73

North Somerset MSOAs	Growth as per TEMPRO		Amended TEMPRO Growth	
	2018 to 2038		2018 to 2038	
	HHs	Jobs	HHs	Jobs
E02003078	755	209	87	44
E02003079	1071	122	124	26
E02003080	1076	176	124	37
E02003081	1132	123	131	26
E02003082	1229	243	142	51
E02003084	1287	620	149	131
E02003085	909	197	105	42
E02003086	774	137	89	29
E02003087	777	121	4170	2230
E02003088	666	268	511	57
E02003089	695	355	80	75
E02006845	920	192	231	40
E02006846	792	205	2639	3050

7.23 Each of the MSOAs in North Somerset contain multiple model zones. Depending on the locations of developments, development within an MSOA may not be located within only one model zone. Thus, two sets of alternate planning assumptions are applied, namely,

- For model zones which have specific proposed development sites that were identified within the Uncertainty Log, growth in households and jobs is based on background growth and the additional housing and jobs associated with the proposed developments
- Background growth only is applied to model zones where specific developments are not proposed to be located within them

7.24 Growth rates for development and non-development model zones were extracted from the Trip End Model Presentation Program (TEMPro), a viewer for the NTEM dataset. This was done for both origin and destination trip growth at a time period level, and production and attraction trip growth for an average weekday, for each of the MSOAs in the North Somerset Local Authority area.

7.25 Production (P) and attraction (A) growth rates are used for home–based trips, and origin (O) and destination (D) growth rates are applied for non-home-based trips.

7.26 Table 7.8 shows the growth rates of car trips for development MSOAs in North Somerset Authority, whilst Table 7.9 shows the growth rates of car trips for non-development MSOAs. At non-development MSOAs, the background only growth ranges between 0% and 10%, with some MSOAs showing a reduction in trips. In development MSOAs, growth is around 10% to 20%, although two MSOAs (E02003088 and E02006846) show much higher growth with a doubling of trips between 2018 and 2038. This is due to the growth around Weston Villages.

Table 7.8: Growth rates for zones with specific developments in North Somerset

North Somerset MSOAs	Zone(s)	AM		IP		PM		Average Weekday	
		O	D	O	D	O	D	P	A
E02003065	30140	1.04	1.11	1.12	1.12	1.09	1.05	1.05	1.13
E02003067	30141	1.03	1.09	1.10	1.09	1.07	1.04	1.05	1.10
E02003072	30090	1.14	1.11	1.17	1.17	1.12	1.13	1.15	1.13
E02003076	30062	1.06	1.10	1.12	1.12	1.09	1.06	1.07	1.11
E02003087	30021, 30026	1.93	2.12	2.08	2.07	2.07	1.95	1.97	2.16
E02003088	30046, 30053, 30082	1.08	1.09	1.13	1.13	1.10	1.09	1.10	1.11
E02006845	30031	1.02	1.10	1.10	1.10	1.08	1.03	1.04	1.11
E02006846	30014	1.83	2.09	2.06	2.05	2.02	1.87	1.85	2.13

Table 7.9: Growth rates for all other zones with background growth only in North Somerset

North Somerset MSOAs	AM		IP		PM		Average Weekday	
	O	D	O	D	O	D	P	A
E02003065	1.02	1.11	1.11	1.11	1.09	1.03	1.03	1.12
E02003066	0.98	1.07	1.04	1.03	1.04	0.98	0.99	1.08
E02003067	1.00	1.08	1.08	1.07	1.06	1.01	1.02	1.09
E02003068	1.01	1.08	1.07	1.07	1.06	1.01	1.02	1.09

North Somerset MSOAs	AM		IP		PM		Average Weekday	
	O	D	O	D	O	D	P	A
E02003069	1.02	1.10	1.10	1.10	1.08	1.03	1.03	1.11
E02003070	0.98	1.08	1.07	1.06	1.06	1.00	1.00	1.10
E02003071	1.03	1.10	1.11	1.11	1.09	1.04	1.05	1.12
E02003072	1.03	1.10	1.10	1.10	1.08	1.03	1.04	1.12
E02003073	0.98	1.09	1.06	1.06	1.05	0.99	0.99	1.11
E02003074	0.99	1.08	1.07	1.06	1.05	1.00	1.00	1.11
E02003075	0.98	1.08	1.06	1.05	1.05	0.99	1.00	1.09
E02003076	0.99	1.09	1.08	1.08	1.07	1.00	1.00	1.11
E02003077	0.98	1.08	1.06	1.06	1.06	0.99	1.00	1.09
E02003078	1.01	1.10	1.10	1.09	1.09	1.03	1.03	1.12
E02003079	0.99	1.09	1.08	1.07	1.05	0.99	1.00	1.12
E02003080	1.06	1.09	1.10	1.10	1.08	1.05	1.07	1.10
E02003081	1.02	1.09	1.09	1.08	1.06	1.02	1.03	1.10
E02003082	1.07	1.10	1.12	1.12	1.09	1.07	1.08	1.11
E02003084	1.11	1.12	1.15	1.14	1.11	1.10	1.11	1.13
E02003085	1.09	1.10	1.12	1.12	1.09	1.09	1.09	1.11
E02003086	1.06	1.10	1.12	1.11	1.09	1.06	1.07	1.11
E02003087	0.99	1.07	1.06	1.06	1.05	1.00	1.01	1.09
E02003088	1.00	1.08	1.08	1.08	1.07	1.01	1.02	1.10
E02003089	1.07	1.10	1.12	1.12	1.10	1.07	1.08	1.11
E02006845	0.99	1.09	1.09	1.08	1.07	1.01	1.01	1.11
E02006846	1.01	1.09	1.10	1.09	1.07	1.02	1.02	1.11

7.27 It should be noted that there has been no changes to demand at Bristol Airport within this version of the model. In Feb 2022, the expansion of the Airport from 10 million to 12 million passengers per year was approved by central

Government. However, this decision has come too late to be included in this phase of the modelling, but will be reviewed in advance of the submission of the LP for Examination

Growth rates for car demand outside North Somerset Local Authority

7.28 For model zones outside North Somerset, growth in demand was taken directly from NTEM. Authority level growth rates were extracted from TEMPro for Authorities in the County of Somerset and the West of England Combined Authority region, whilst County level growth rates were extracted for the remainder of the South West region. Outside of the South West, Region level growth rates were applied. These are shown in Table 7.10 and are in the range of 15-20% growth.

Table 7.10: Growth rates applied outside of North Somerset

Area Description		AM		IP		PM		Weekday Average	
Level	Name	O	D	O	D	O	D	P	A
Authority	Bristol City	1.20	1.16	1.21	1.21	1.16	1.19	1.20	1.17
Authority	South Gloucestershire	1.15	1.15	1.19	1.19	1.15	1.15	1.16	1.16
Authority	Bath and North East Somerset	1.10	1.15	1.17	1.17	1.14	1.11	1.12	1.17
Authority	Mendip	1.10	1.15	1.17	1.17	1.14	1.11	1.12	1.16
Authority	North Somerset	1.19	1.17	1.22	1.22	1.17	1.19	1.21	1.18
Authority	Sedgemoor	1.12	1.15	1.17	1.17	1.14	1.12	1.13	1.16
County	Cornwall	1.15	1.15	1.16	1.16	1.14	1.15	1.15	1.15
County	Devon	1.15	1.15	1.17	1.17	1.15	1.14	1.15	1.16
County	Dorset	1.13	1.13	1.15	1.15	1.13	1.13	1.14	1.14
County	Gloucestershire	1.14	1.14	1.17	1.17	1.14	1.14	1.14	1.15
County	Somerset	1.15	1.16	1.19	1.19	1.15	1.15	1.16	1.17
County	Wiltshire	1.14	1.15	1.19	1.19	1.15	1.14	1.16	1.16
Region	Wales	1.13	1.13	1.15	1.15	1.13	1.13	1.14	1.14
Region	West Midlands	1.15	1.15	1.18	1.18	1.15	1.15	1.16	1.16
Region	Yorkshire and Humber	1.16	1.16	1.18	1.18	1.16	1.16	1.16	1.16
Region	East	1.16	1.17	1.24	1.24	1.18	1.17	1.19	1.20
Region	East Midlands	1.15	1.15	1.18	1.18	1.15	1.15	1.16	1.16

Area Description		AM		IP		PM		Weekday Average	
Level	Name	O	D	O	D	O	D	P	A
Region	London	1.20	1.18	1.24	1.24	1.19	1.21	1.22	1.20
Region	North West	1.15	1.15	1.16	1.16	1.14	1.14	1.15	1.15
Region	Scotland	1.16	1.16	1.17	1.17	1.15	1.15	1.16	1.16
Region	South East	1.16	1.16	1.21	1.21	1.16	1.16	1.17	1.18
Region	South West	1.15	1.15	1.18	1.18	1.14	1.14	1.15	1.15
Region	North East	1.16	1.16	1.16	1.16	1.15	1.15	1.16	1.16

Growth rates for public transport

7.29 Growth rates for public transport were calculated at the Authority, County and Regional level, without addition of specific development demand. This is at a lower level of disaggregation than applied for car growth and reflects the lower level of detail, and wider uncertainty, in the base year public transport demand matrices. Table 7.11 summarises the growth rate for public transport.

Table 7.11: Public transport trip growth rates

Area Description		AM		IP		PM		Weekday Average	
Level	Name	O	D	O	D	O	D	P	A
Authority	Bristol City	1.00	0.99	1.00	1.01	0.98	0.99	0.99	1.01
Authority	South Gloucestershire	1.02	1.01	1.05	1.04	1.00	1.02	1.04	1.01
Authority	Bath and North East Somerset	0.97	1.01	1.01	1.01	1.00	0.96	0.98	1.02
Authority	Mendip	0.97	1.00	1.01	1.01	1.00	0.96	0.98	1.02
Authority	North Somerset	1.05	1.02	1.06	1.06	1.02	1.04	1.06	1.02
Authority	Sedgemoor	0.97	1.00	1.01	1.00	1.00	0.97	0.98	1.02
County	Cornwall	0.99	0.98	0.96	0.97	0.96	0.96	0.98	0.97
County	Devon	0.96	0.97	0.97	0.97	0.95	0.95	0.96	0.97
County	Dorset	0.96	0.96	0.97	0.97	0.96	0.96	0.97	0.97
County	Gloucestershire	0.98	0.97	1.00	0.99	0.97	0.97	0.99	0.98

Area Description		AM		IP		PM		Weekday Average	
Level	Name	O	D	O	D	O	D	P	A
County	Somerset	1.00	1.01	1.03	1.03	1.00	1.00	1.01	1.02
County	Wiltshire	0.99	0.99	1.03	1.03	0.99	0.99	1.01	1.00
Region	Wales	0.93	0.93	0.92	0.92	0.92	0.92	0.93	0.93
Region	West Midlands	0.96	0.96	0.97	0.97	0.95	0.95	0.96	0.96
Region	Yorkshire and Humber	0.94	0.94	0.94	0.94	0.93	0.93	0.94	0.94
Region	East	1.01	1.05	1.10	1.09	1.06	1.02	1.04	1.09
Region	East Midlands	0.97	0.97	0.98	0.98	0.96	0.96	0.97	0.97
Region	London	1.08	1.07	1.11	1.11	1.08	1.09	1.10	1.08
Region	North West	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Region	Scotland	0.91	0.91	0.91	0.91	0.90	0.90	0.91	0.91
Region	South East	0.99	1.01	1.04	1.04	1.01	1.00	1.01	1.03
Region	South West	0.98	0.98	0.99	0.99	0.97	0.97	0.99	0.99
Region	North East	0.89	0.89	0.88	0.88	0.88	0.88	0.88	0.88

Growth rates for goods vehicles

7.30 Growth rates for HGV and LGV were interpolated from data provided in ‘Scenario 1’ of Road Traffic Forecast 2018 (RTF18), published by the DfT and applied as a global factor to the LGV and HGV demand matrices. ‘Scenario 1’ provides the central estimate of traffic growth in RTF18. The estimated growth in demand between 2018 and 2038 is 26% for LGVs and 1% for HGVs, as shown in Table 7.12.

Table 7.12: Growth rates for goods vehicles (2018-2038)

Vehicle Type	Road Type	Traffic - Billion Vehicle miles (bvm)					
		2015	2018 Interpolated	2035	2038 Interpolated	2040	Growth Rate (2018-2038)
LGV	All	4.8	5.1	6.2	6.4	6.6	1.26
HGV	All	1.4	1.4	1.4	1.4	1.4	1.007

Variable Demand Modelling

7.31 The calibrated DIADEM VDM setup was used to forecast the effects of updated highway and PT travel costs on the choice of time period, mode and destination of trips.

7.32 The pivot point for the DM VDM was the base year model, including the base year highway assignments, base year PT fares and journey times and the 2018 values of time and vehicle operating costs. Forecast year inputs were the forecast year highway networks, forecast year PT fares and journey times, and the 2038 values of time and vehicle operating costs. Reference demand was input based on applying the growth rates described earlier in this Chapter to the 2018 base year demand. This produced trip matrices growthed to account for changes in population, employment, trip rates and car ownership levels but without any consideration of changes in travel cost.

7.33 The 2038 values of time and vehicle operating costs input into the VDM are shown in Table 7.13. These are compared to the 2018 values shown in Table 6.2.

Table 7.13: Generalised cost parameters for the 2038 forecast year

	Highway VoT (pence per hour)	Highway VOC (pence per km)	PT VoT (pence per hour)
Home based employer's business	2351.60	9.21	1919.99
Non-home-based employer's business	2351.60	9.21	1919.99
Home based work	1562.49	4.30	1367.5
Home based other	1119.97	4.30	623.96
Non-home-based other	1119.97	4.30	623.96

7.34 No other parameters were changed from the calibrated VDM, including the destination choice lambda values, and mode and time period choice theta scaling values. In addition, the convergence criteria remained at 0.1% across the internal area where the demand model was applied and, as shown in Table 7.14, the Do-Minimum run converged to a suitable level within nine loops.

Table 7.14: 2038 Do-Minimum VDM convergence statistics

Scenario	% GAP	Number of Loops
2038 DM	0.07%	9

7.35 Demand matrices were compared pre- and post-VDM to ensure the responses looked sensible. As shown in Table 7.15, there are small increases in car vehicle trips, with associated decreases in PT passenger demand. This is a

result of the increasing cost of public transport relative to car travel, particularly driven by slower growth in car vehicle operating costs compared to public transport fares.

Table 7.15: Change in 12-hour demand totals, 2038 forecast year

Purpose	Highway Reference Trips	PT Reference Trips	Highway Post-VDM Trips	PT Post-VDM trips	Highway % Change	PT % Change
Employer's Business	162,624	21,766	163,642	20,240	0.6%	-7.0%
Home Based Work	489,459	76,845	490,002	74,956	0.1%	-2.5%
Other	1,066,305	156,567	1,068,186	148,658	0.2%	-5.1%
LGV	222,457	-	222,457	-	0.0%	-
HGV	118,166	-	118,166	-	0.0%	-

Model Statistics

7.36 Table 7.16 sets out the convergence statistics for the NSSM enhanced model, Do-Minimum scenario. The table shows the results for the last four iterations of each assigned peak. The table shows that both peak models converge within the TAG criteria for convergence.

Table 7.16: Convergence Statistics: 2038 Do-Minimum

Time period	Assignment Loop*	%Flows	%GAP
AM	25	99.0	0.016
	26	98.8	0.023
	27	98.6	0.016
	28	98.9	0.013
PM	22	98.9	0.022
	23	98.8	0.020
	24	99.0	0.030
	25	98.8	0.021

* Last four iterations presented, as per the convergence stopping requirement

7.37 Table 7.17 shows model statistics taken from both the enhanced NSSM Base and the NSSM 2038 Do Minimum models. The table shows that there is an increase in total travel time and travel distance between the base model and the 2038 model which is due to the increased demand between 2018 and 2038. This increase in demand is likely to cause the reduced average speed across the 2038 Do-Minimum model compared with the base.

Table 7.17: Model Statistics: Enhanced NSSM Base vs 2038 Do Minimum – AM Peak

	Enhanced NSSM Base		NSSM 2038 Do Minimum	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	12,625	69,445	14,740	81,364
Travel distance (pcu kms)	715,322	4,248,539	817,567	4,964,477
Average Speed (kph)	56.7	61.2	55.5	61.0

Table 7.18: Model Statistics: Enhanced NSSM Base vs 2038 Do Minimum – PM Peak

	Enhanced NSSM Base		NSSM 2038 Do Minimum	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	13,275	68,736	15,680	80,790
Travel distance (pcu hrs)	725,319	4,105,017	821,701	4,799,534
Average Speed (kph)	54.6	59.7	52.4	59.4

8. Do-Something Scenarios

Introduction

8.1 For the Do Something scenarios, two Local Plan allocation scenarios have been developed for the Consultation Publication. These are

- 2038 Do Something: Local Plan Allocations, no network changes
- 2038 Do Something: Local Plan Allocations, with some network changes

8.2 It should be noted that for these assessments for the consultation, only the highway model has been used and the full modelling package (using the Variable Demand Model and the TRACC PT Model) will be used in later assessments.

Do Something Demand

8.3 For the two scenarios, the demand created is the same, which is the Do-Minimum demand with the additional Local Plan development demand added.

8.4 To create this demand, sites have been allocated to new SATURN zones and trips have been added to the Do-Minimum demand.

8.5 The Local Plan allocations are outlined in Table 8.1. This table shows the number of dwellings assumed at each location, the location can be seen in Section 3 of the main report. The table also shows the existing SATURN zone that has been used to create the trip distribution of the new zone.

Table 8.1: Local Plan Allocations: demand for Do-Something scenarios

New Zone Number	Name	Units
50000	*Wolvershill, Site 1a*	*933*
50002	*Wolvershill, Site 1b*	*933*
50001	*Wolvershill, Site 1c*	*933*
50003	*N&B , Site 1*	*590*
50006	*N&B , Site 2*	*600*
50013	*N&B , Site 4*	*600*
50009	*N&B , Site 6*	*710*
50012	*Yanley Lane , Site 4*	*2700*
50011	*Yanley Lane , Site 5*	*500*
50015	*Yatton Rugby Club*	*87*
50016	*Yatton Rectory Farm*	*142*
50017	*Yatton Claverham*	*251*
50018	*Portishead Clevedon Rd*	*230*
50019	*WSM North of Ebdon road*	*100*
50020	*WSM North of Elborough*	*526*
50021	*WSM West of Hutton*	*74*
Total number of dwellings		*9909*

8.6 Trip rates for each of these developments have been developed and agreed with NSC. To ensure a more robust modelling approach, trip rates have been developed for specific locations of developments. This takes into consideration factors such as the location and size of development as well as approved trip rates for other developments which have been approved within the vicinity of the site.

Trip Rates: Wolvershill

8.7 The trip rates associated with the 'Wolvershill' growth area are presented below in Table 8.2. This is for weekday mixed private/affordable housing sites based on location type 'Neighbourhood Centre (PPS6 Local Centre)'. Vehicle trip rates have been adjusted to the agreed rates for Banwell Bypass for the AM and PM peak to ensure that the AM and PM peak capacity assessment is based on trip rates approved by NSC and National Highways for this growth area.

Table 8.2: Trip Rates – Wolvershill

Time Period	Trip Rate Per Dwelling		
	Vehicles		
	Arrival	Departure	Two-Way
AM Peak (08:00-09:00)	0.109	0.400	0.509
PM Peak (17:00-18:00)	0.400	0.162	0.562

Trip Rates: Nailsea and Backwell

8.8 The trip rates associated with the 'Nailsea and Backwell' growth area are presented below in Table 8.3. Trip rates have been derived from the consented nearby residential development at Youngwood Lane (Planning Ref. 20/P/2347/RM).

Table 8.3: Trip Rates – Nailsea & Backwell

Time Period	Trip Rate Per Dwelling		
	Vehicles		
	Arrival	Departure	Two-Way
AM Peak (08:00-09:00)	0.133	0.437	0.570
PM Peak (17:00-18:00)	0.372	0.208	0.580

Trip Rates: Yanley Lane

8.9 The trip rates associated with the 'Yanley Lane' growth area are presented below in Table 8.4. This is for weekday mixed private/affordable housing sites based on location type 'Neighbourhood Centre (PPS6 Local Centre)'.

Table 8.4: Trip Rates – Yanley Lane

Time Period	Trip Rate Per Dwelling		
	Vehicles		
	Arrival	Departure	Two-Way
AM Peak (08:00-09:00)	0.100	0.401	0.501
PM Peak (17:00-18:00)	0.364	0.142	0.506

Trip rates for Other sites

8.10 For the other sites outside this area which are included within the Do-Something scenarios, these have been allocated trip rates from the locations above. These have been assigned based on vicinity to the areas above and type of settlement to ensure the trip rates are the most realistic.

8.11 These are shown in Table 8.5.

Table 8.5: Trip Rates used for Other developments

Location	*Trip Rate Location*
Yatton Rugby Club	Nailsea & Backwell
Yatton Rectory Farm	Nailsea & Backwell
Yatton Claverham	Nailsea & Backwell
Portishead Clevedon Rd	Yanley Lane
WSM North of Ebdon Road	Wolvershill
WSM North of Elborough	Wolvershill
WSM West of Hutton	Wolvershill

Highway Network

8.12 For the *2038 Do Something: Local Plan Allocations, no network changes*, the modelled highway network remains the same as the 2038 Do Minimum scenario

8.13 For the *2038 Do Something: Local Plan Allocations, with network changes,* a number of network changes have been made, in the Banwell/Wolvershill Road area. This includes:

- Closure of Wolvershill Road between Banwell Bypass and Summer Lane
- Developments 1(b) and 1(c) are loaded onto Wolvershill Road in the no network changes scenario. With the network changes and closure of Wolvershill Road between Summer Lane and Banwell Bypass, these are changed;
  - 1(b) is loaded onto Summer Lane
  - 1(c) is loaded onto the Banwell Bypass to the east of Wolvershill Road.
- Upgrade of the existing priority junction to signals at A371/Summer Lane
- Closures at the Wolvershill Road/Summer Lane/Silver Moor Lane junction to discourage rat running
- Additional link between development 1(b) and 1(c) to allow trips in the zone to load onto Summer Lane directly onto Banwell Bypass.

Model Statistics

8.14 Table 8.6 shows the convergence statistics for the two scenarios. In the AM peak, the model reaches the maximum number of loops to converge and does not meet TAG criteria. A review of the models shows some large delays at some minor arms of some junctions which can cause convergence issues. However, as we are not undertaking economic appraisal, it is not as important

to ensure that the models have converged fully. This will be looked into further in the next phase of the modelling.

Table 8.6: Convergence Statistics: 2038 Do-Something Scenarios

	2038: Do Something – no network changes			2038: Do Something – network changes		
Time period	**Assignment Loop***	**%Flows**	**%GAP**	**Assignment Loop***	**%Flows**	**%GAP**
AM	47	94.3	0.037	47	95.2	0.030
	48	92.6	0.024	48	95.2	0.030
	49	94.1	0.025	49	95.0	0.041
	50	94.3	0.025	50	93.9	0.028
PM	27	98.4	0.034	25	98.2	0.034
	28	98.0	0.028	26	98.1	0.038
	29	98.1	0.030	27	98.1	0.032
	30	98.0	0.026	28	98.5	0.032

* Last four iterations presented, as per the convergence stopping requirement

8.15 Table 8.7 and Table 8.8 shows the model statistics for the two Do-Something scenarios. The table shows that the results for the two runs are similar in both peak hours which would be expected due to the minor differences between the models. The demand for both models is the same, there is just a minor change to the network.

Table 8.7: Model Statistics: 2038 Do Something Scenarios – AM Peak

	2038 DS – no network changes		2038 DS – with network changes	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	17,037	84,683	17,268	84,932
Travel distance (pcu hrs)	849,928	5,039,292	849,901	5,039,525
Average Speed (kph)	49.9	59.5	49.2	59.3

Table 8.8: Model Statistics: 2038 Do Something Scenarios – PM Peak

	2038 DS – no network changes		2038 DS – with network changes	
Parameter	**Simulation**	**Full Model**	**Simulation**	**Full Model**
Total travel time (pcu.hrs)	18,111	84,342	18,315	84,566
Travel distance (pcu hrs)	859,555	4,887,940	859,869	4,888,827

Average Speed (kph)	47.5	58.0	46.9	57.8

8.16 To analyse the impact of the scenarios, Figure 8.1 to Figure 8.6 below show the differences in actual flow between the 2038 Do Minimum and the 2038 Do Something, no network change scenarios for the AM and PM peaks.

8.17 Figure 8.1 and Figure 8.2 show the differences between the Do Minimum and the 2038 Do Something: Local Plan Allocations, no network changes scenario around Wolvershill in the AM and PM peaks respectively. The diagrams show that there is some additional traffic around the A371 and A370 due to new developments along Wolvershill Road. There is some redistribution of traffic, including along the North South Link Road where vehicles are choosing to use the A371/A370 which is likely due to congestion caused by additional demand using Wolvershill Road.

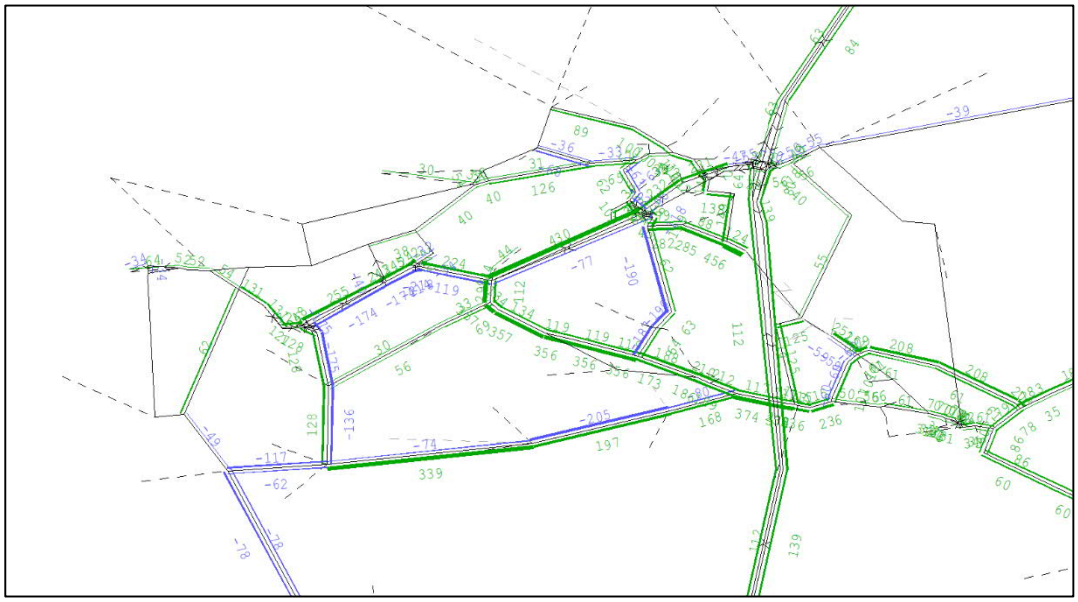

Figure 8.1: Local Plan Allocations, no network changes vs Do Minimum, Wolvershill, AM Peak

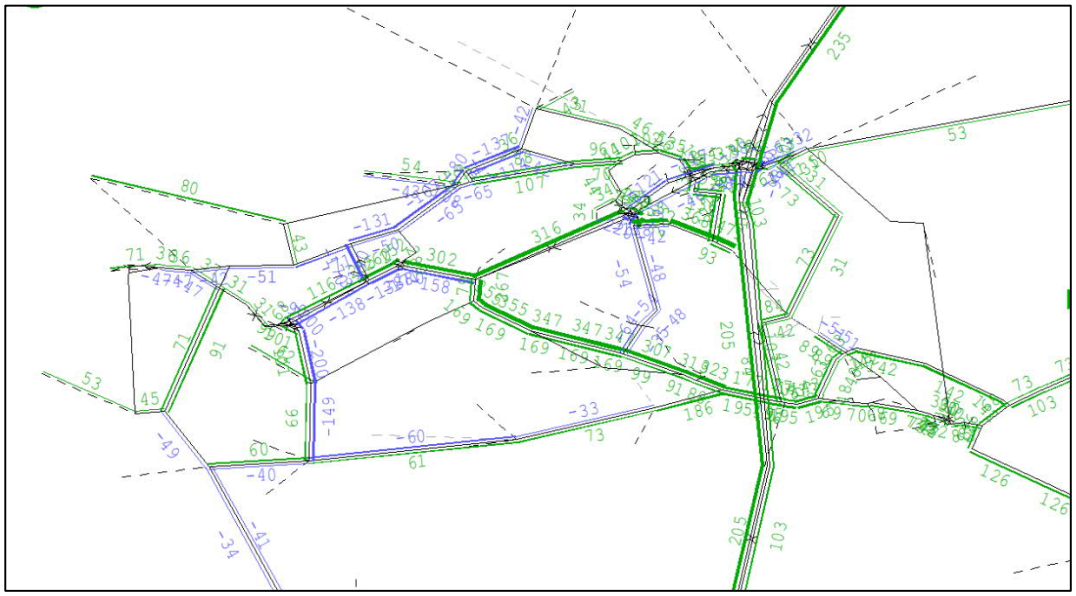

Figure 8.2: Local Plan Allocations, no network changes vs Do Minimum, Wolvershill, PM Peak

8.18 Figure 8.3 and Figure 8.4 show the differences between the Do Minimum and the 2038 Do Something: Local Plan Allocations, no network changes scenario around Nailsea and Backwell in the AM and PM peaks respectively. The diagrams show that there are largely increases in all routes, especially in the PM peak which suggest very little redistribution of traffic The AM Peak does show some reductions in traffic on the A370 which suggest traffic is switching onto other routes to avoid congestion at the Backwell crossroads.

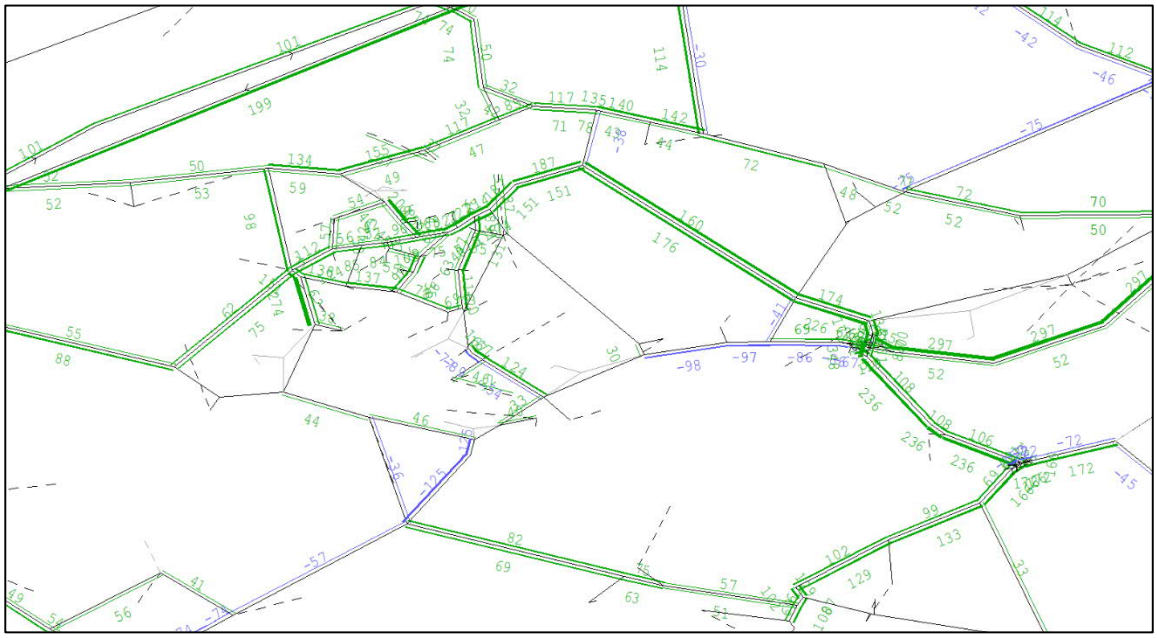

Figure 8.3: Local Plan Allocations, no network changes vs Do Minimum, Nailsea & Backwell, AM Peak

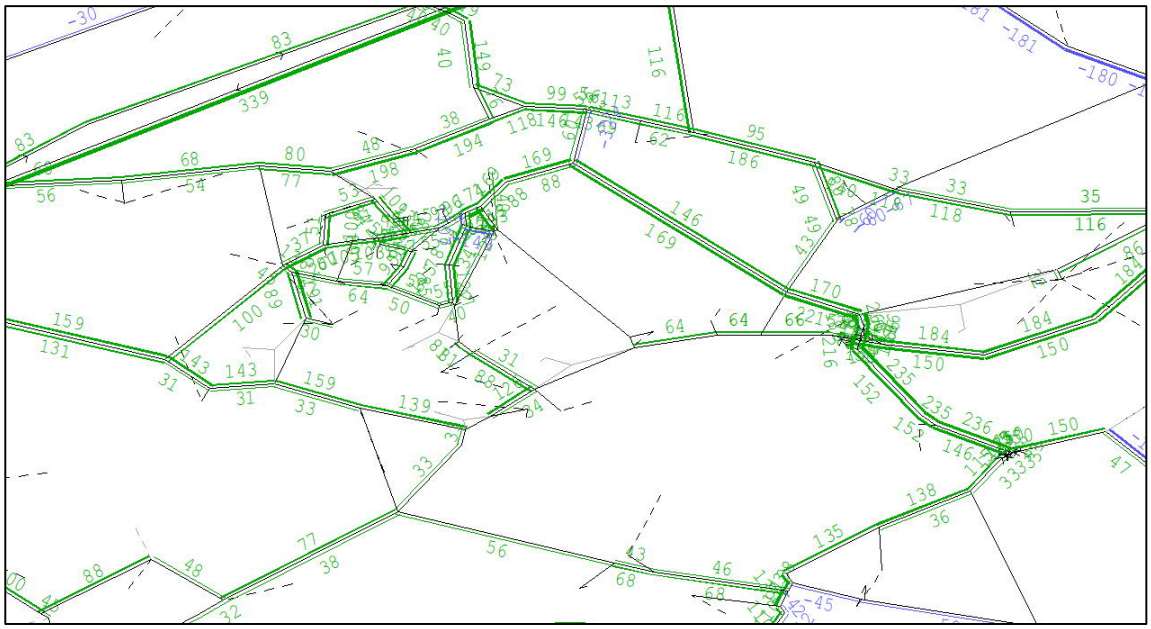

Figure 8.4: Local Plan Allocations, no network changes vs Do Minimum, Nailsea & Backwell, PM Peak

8.19 Figure 8.5 and Figure 8.6 show the differences between the Do Minimum and the 2038 Do Something: Local Plan Allocations, no network changes scenario around Yanley Lane in the AM and PM peaks respectively. As the network here is different between the two models, differences are not apparent close to the developments. However, the AM Peak diagram shows some redistribution of traffic around Parson St Gyratory and along the Ring Road. There is an increase along the A370 which would suggest that there is an increase in trips using the South Bristol Link Road and through Cumberland Basin to access Bristol in this peak compared with through Parson St Gyratory. In the PM Peak, there is less of an impact on redistribution however there is an obvious increase on the A370 suggesting an increase on the South Bristol Link Road.

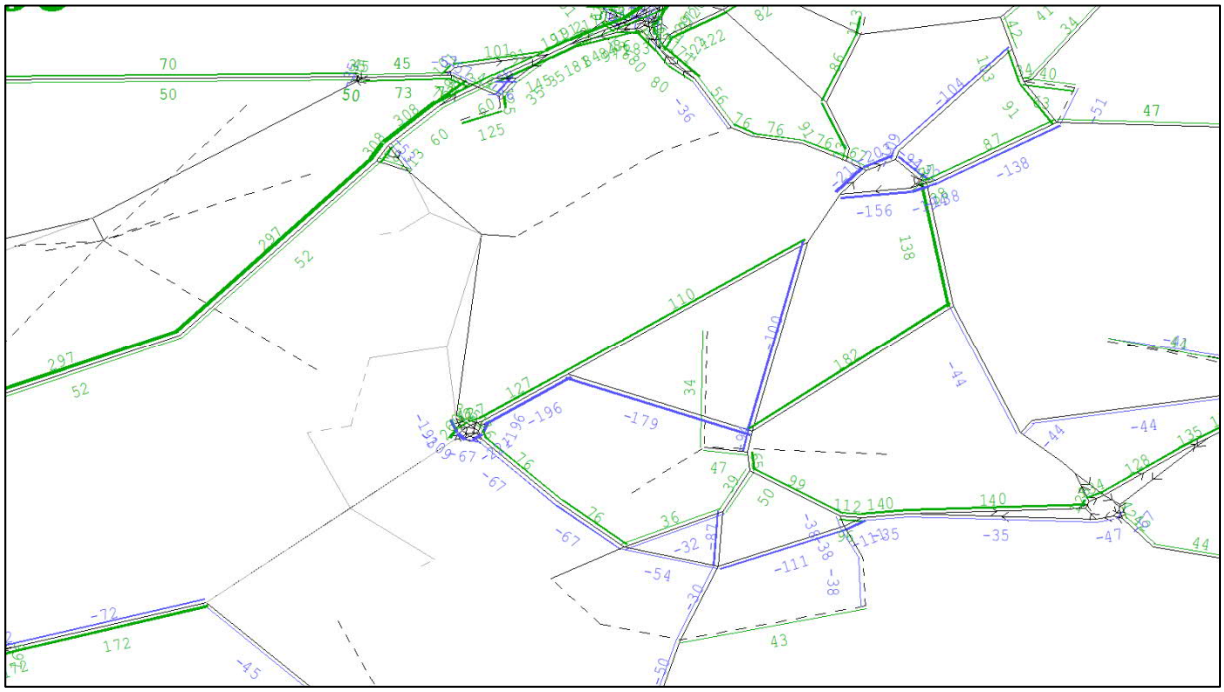

Figure 8.5: Local Plan Allocations, no network changes vs Do Minimum, Yanley Lane, AM Peak

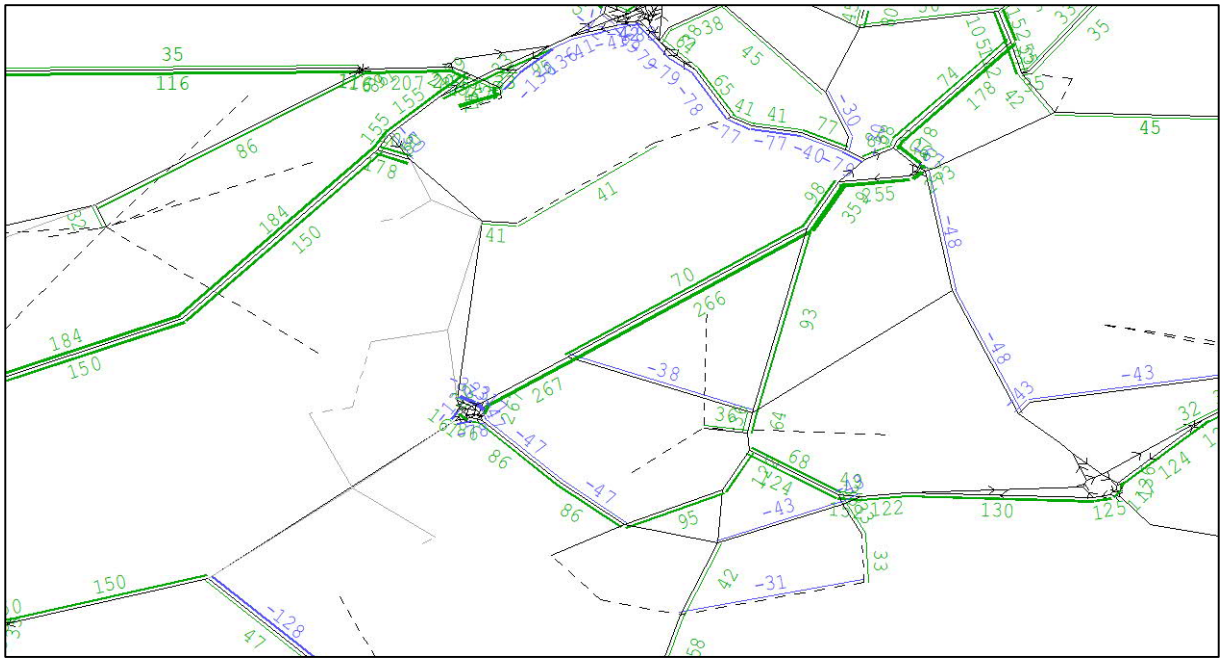

Figure 8.6: Local Plan Allocations, no network changes vs Do Minimum, Yanley Lane, PM Peak

8.20 With the 2038 Do Something: Local Plan Allocations, with network changes scenario, an actual flow comparison between this scenario and the other Do-Something scenario has been undertaken to see the impact of the closure of Wolvershill Road to vehicles. This is shown in Figure 8.7 and Figure 8.8. The diagrams show that there is an obvious increase in traffic using the A370/A371 with the closure of the road, including a decrease on the Banwell Bypass heading eastbound. There is also an increase in traffic using the North South Link Road as an alternative to Wolvershill Road. In the AM Peak, there is a section of the North South Link Road which has a difference of less than 50 vehicles. This would suggest that that some of the increase on this link is

related to rerouting to access to the developments located around Weston Villages.

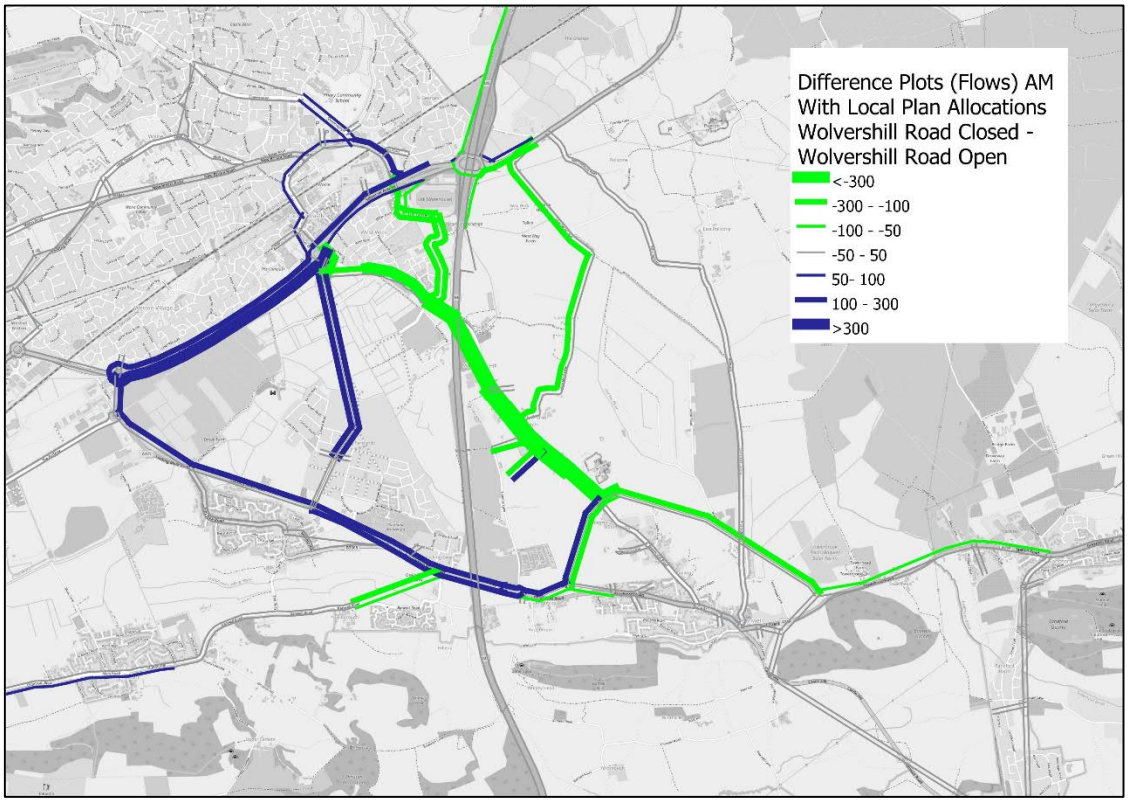

Figure 8.7: Actual Flow Difference Plot: Wolvershill Road Closure impact, AM Peak

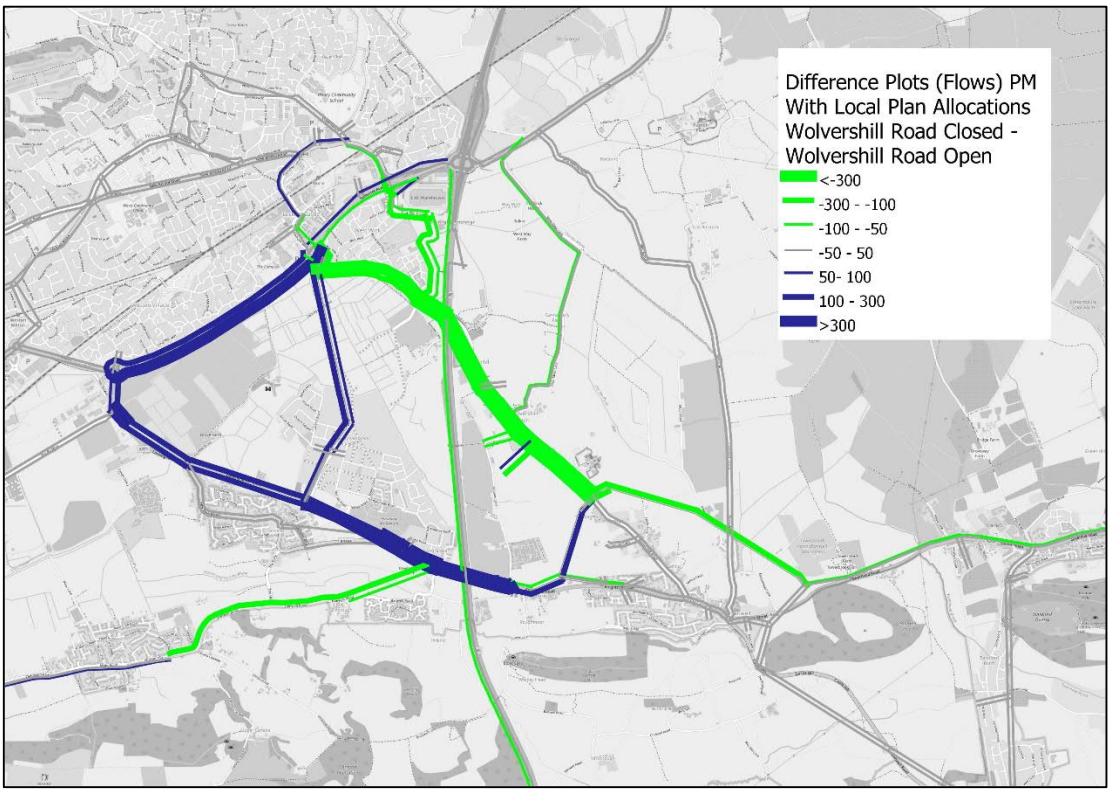

Figure 8.8: Actual Flow Difference Plot: Wolvershill Road Closure impact, PM Peak

9. Summary

9.1 AECOM has been commissioned by North Somerset Council (NSC) to provide transport consultancy services in relation to their emerging Local Plan for 2038. As part of this, strategic transport modelling has been undertaken to be used as evidence for developing and appraising the transport impacts of the Local Plan.

9.2 For the 2018 Base Year, an enhanced version of the TAG-compliant NSSM highway assignment model has been developed and utilised. This is supported by a public transport supply model, developed in TRACC, with both models feeding transport costs into a TAG compliant variable demand model developed in DIADEM.

9.3 A Do-Minimum model has been produced for a 2038 forecast year, incorporating supply and demand changes as detailed in a local Uncertainty Log.

9.4 The 2038 forecast year highway network contains the M5 J21 Northbound Merge Scheme, Banwell Bypass, the North-South Link Road and A38 Junction Improvement schemes, whilst the public transport supply is improved with the inclusion of the re-opened Portishead Rail Line, new stations at Pill and Portishead, and associated hourly rail services.

9.5 Demand growth has been forecast using NTEM background growth alongside Local Plan data to inform the specific locations of larger developments and allow for the application of detailed local growth factors. The forecast year produced is 2038.

9.6 The base year travel costs, 2038 reference demand, and 2038 highway and public transport networks have been processed through the VDM to produce traffic and demand forecasts incorporating changes in housing, employment, trip rates, car ownership, economic parameters and travel costs.

9.7 These Do-Minimum forecasts will be used as the basis of testing other interventions, and developments, to assess the transport impacts of the Local Plan.

9.8 Two Do-Something scenarios have been built for the purposes of the Public Consultation in early 2022. These scenarios both have an allocation of houses as provided by NSC however one tests some changes to the road network around Wolvershill.

Appendix A: North Somerset Local Plan Modelling, Appraisal Specification Report

DRAFT

AECOM Imagine it. Delivered.

Appraisal Specification Report

North Somerset Local Plan

North Somerset Council

Project reference: North Somerset Local Plan

19 February 2021

Quality information

Prepared by	Checked by	Verified by	Approved by
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CC 12/02/21	LK 17/02/21	DA 18/02/21	CC

Revision History

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1. Introduction and Objectives

Introduction

1.1 AECOM has been commissioned by North Somerset Council to provide transport consultancy services in relation to their emerging Local Plan for 2038. As part of this, strategic transport modelling will be undertaken to be used as evidence for developing and appraising the transport impacts of the Local Plan.

1.2 This Appraisal Specification Report (ASR) sets out the proposed approach to transport modelling and identifies how outputs from this work can contribute to appraisal of local plan scenarios against TAG impact areas. The ASR has been developed in line with information outlined in TAG guidance "Guidance for the Technical Project Manager".

1.3 Chapter 2 reviews existing transport modelling tools; Chapter 3 outlines the proposed strategic transport modelling approach for this study, for both the highway and public transport modelling, and the involvement of Variable Demand Modelling (VDM). This strategic modelling will be used to assess both the impact on the highway network up until the end of the Local Plan period without any mitigation as well as assessing where transport interventions may be required to mitigate the proposed growth over this period.

1.4 Chapter 4 sets out approach to forecasting future year scenarios, including different local plan development scenarios and modelling of potential mitigation measures (highway and Public Transport (PT)).

1.5 Chapter 5 outlines how the outputs from the transport model could support appraisal of selected transport impacts of Local Plan development scenarios.

1.6 This ASR is a working document that can be defined further during subsequent phases of the project.

Background

1.7 North Somerset is a unitary district in the South-West of England, bordered by Bristol and Bath and North East Somerset to the east, Sedgemoor and Mendip to the south. According to ONS data (2019), around 215,000 people live in and 86,000 people work in the region. The largest settlement is Weston-super-Mare, with other larger settlements including Clevedon, Portishead and Nailsea. North Somerset also houses Bristol Airport, which attracted more than 9 million passengers in 2019. Figure 1.1 shows the extent of the North Somerset district.

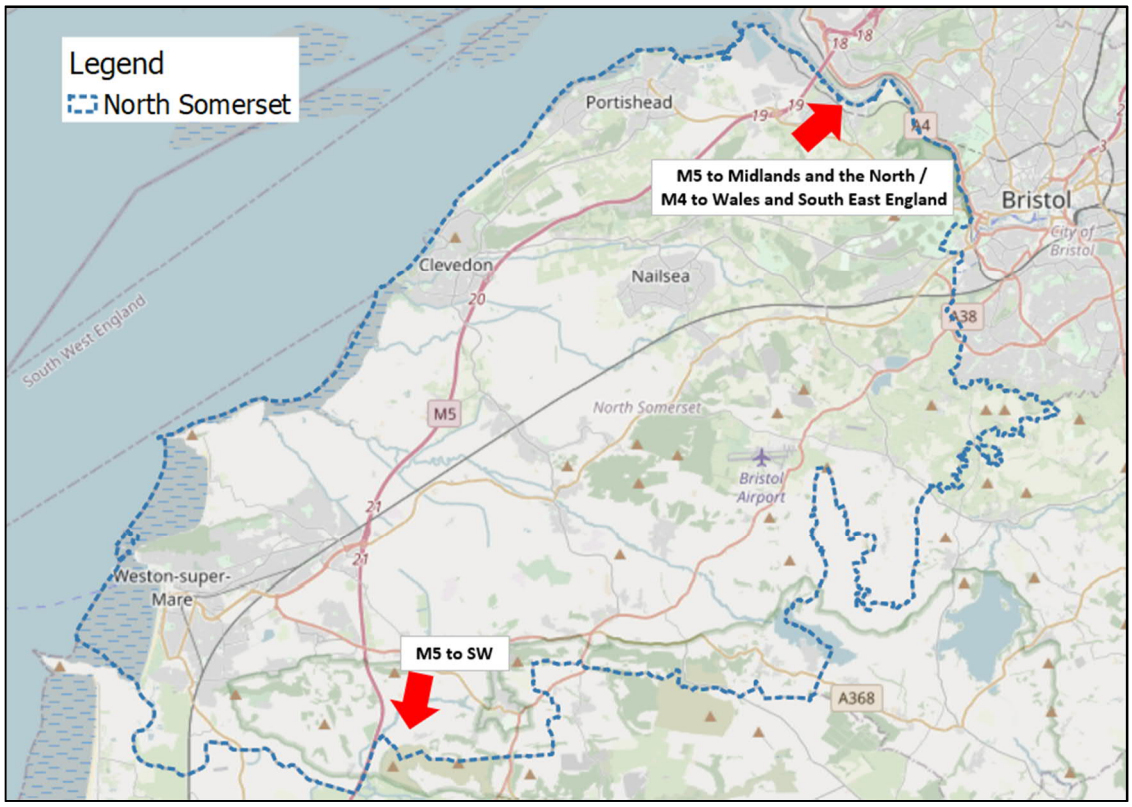

Figure 1.1: North Somerset District

1.8 The M5 runs through the district, with three major junctions located at Weston-super-Mare (Junction 21), Clevedon (Junction 20) and Portishead/Bristol (Junction 19). There are also major routes through the district including the;

- A38 (providing access to Bristol International Airport),
- A370 (Backwell, Nailsea and Weston-super-Mare),
- A368 (Banwell and Weston-super-Mare) and;
- A369 (Portishead)

1.9 In terms of rail, the Bristol to Exeter line runs through the region between Bristol Temple Meads in the east and Weston-super-Mare in the west, stopping at Nailsea and Backwell, Yatton, Worle and Weston Milton. Between Weston-super-Mare and Bristol Temple Meads, train travel times are around 30-40 minutes and there are 2 to 3 trains per hour in each direction.

1.10 Figure 1.2 shows the railway line and rail stations located within the North Somerset area.

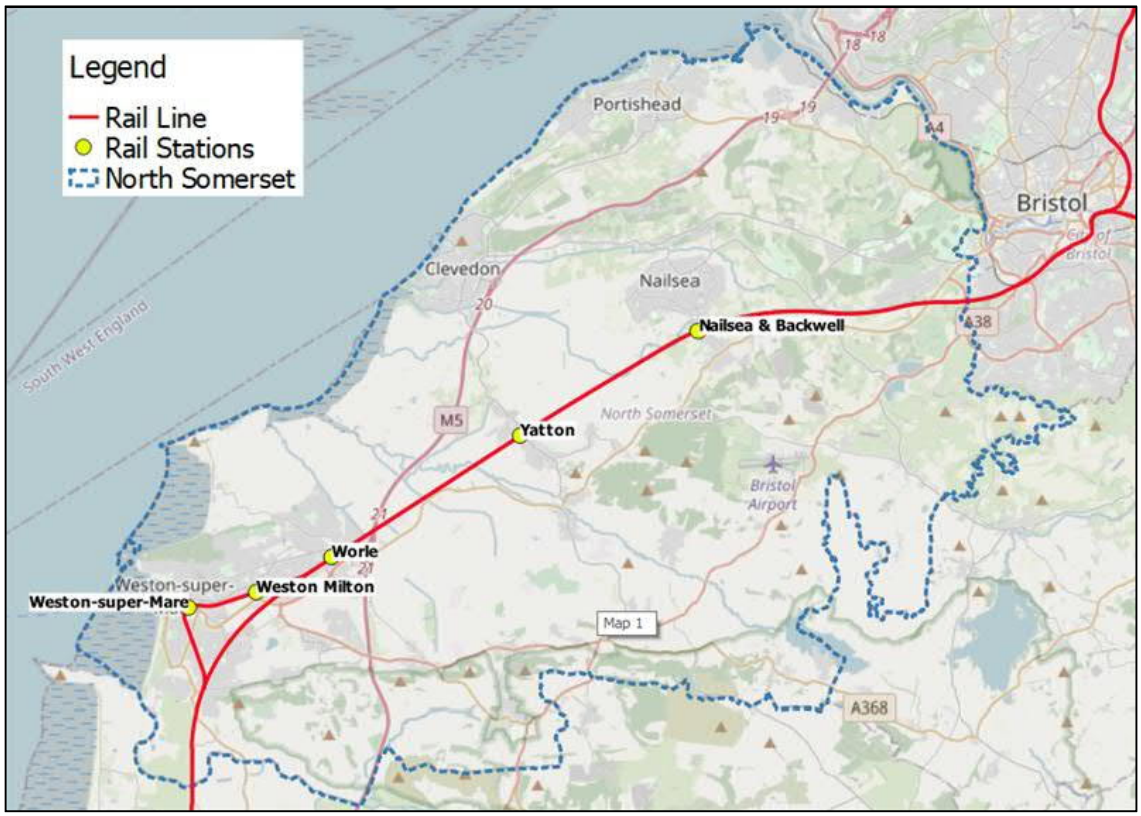

Figure 1.2: Rail Stations within North Somerset

1.11 Figure 1.3 and Figure 1.4 show the routes covered by bus services in North Somerset. There is a good coverage of services, both within and between major settlements as well as along key routes to Bristol and Bath and south towards Wells and Bridgwater. There are services which serve the Airport from Bristol, Bath, Weston-super-Mare as well as a local villages route for places such as Wrington, Sandford and Churchill. There is also a Park and Ride service for Bristol located within the North Somerset boundary located at Long Ashton.

1.12 Although there is a good network coverage of services, the frequency of services varies significantly by route. This is particularly evident on two of the major routes through North Somerset; where the A370 has a much higher frequency of services than along the A38.

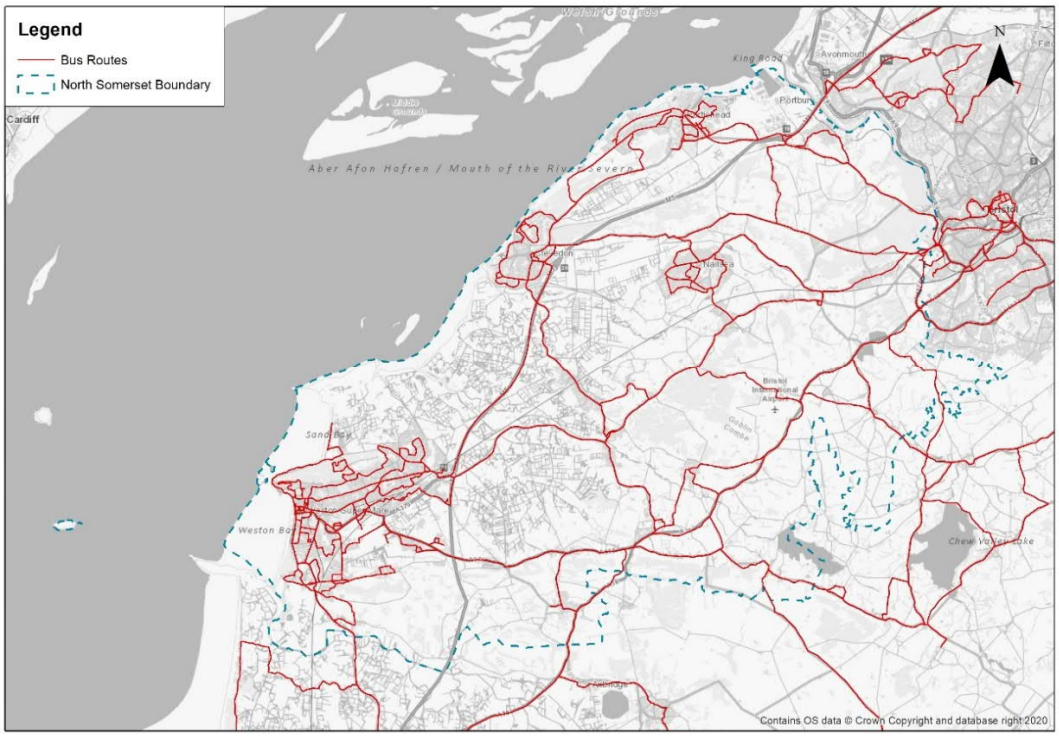

Figure 1.3: Routes covered by Bus Services in North Somerset

Figure 1.4: Main bus services serving North Somerset

Figure 1.5: Main bus services serving Weston-super-Mare (as of August 2020)

Objectives of the study

1.13 The aim of this project is to inform the development of a new Local Plan for North Somerset, using strategic modelling to assess the impact of the proposed strategy on the transport network.

1.14 The transport model is one part of the appraisal process but is instrumental in highlighting additional network pressures, providing information on targeted PT and highway investment to release capacity and bring social, environmental and economic benefits to North Somerset. In addition, North Somerset has an ambition to be carbon neutral by 2030 therefore delivering sustainable transport is an important factor of the Local Plan. Therefore, the modelling needs to include assessment of the impact of the Local Plan on other sustainable modes, and opportunities for sustainable transport to accommodate additional travel demand generated by growth.

1.15 The transport modelling will inform, and be developed iteratively with, a Sustainable Transport Strategy which will aim to accommodate growth in as sustainable manner as possible, with the potential for targeted capacity improvements to be considered and applied to the transport modelling.

2. Existing Data and Models

Existing modelling

2.1 There are currently two transport models available which cover the North Somerset area – these are the North Somerset Strategic Model (NSSM) and the Weston Town Model. Both models are highway-only assignment models built using SATURN. These will now be discussed in turn.

North Somerset Strategic Model

2.2 The NSSM was developed by WSP to be used as a main strategic modelling tool for North Somerset Council, including a specific objective to inform the modelling for the North Somerset Local Plan. The model was originally cordoned from Highways England's South West Regional Transport Model (SWRTM).

2.3 The base year for this model is 2018 and it was built in line with WebTAG guidance. The model represents an average weekday (Monday to Thursday) and covers three time periods,

- Peak AM Hour (08:00 to 09:00)
- Average interpeak hour (10:00 to 16:00)
- Peak PM Hour (17:00 to 18:00)

2.4 The model was calibrated in line with TAG guidance, with details of the calibration outlined in the Local Model Validation Report, September 2020. It is currently being used in its current form to assess the Banwell Bypass scheme.

2.5 The model covers all the main road network in North Somerset as well as main strategic corridors and main access points to major towns/urban centres in the area. The coverage of the model can be seen in Figure 2.1.

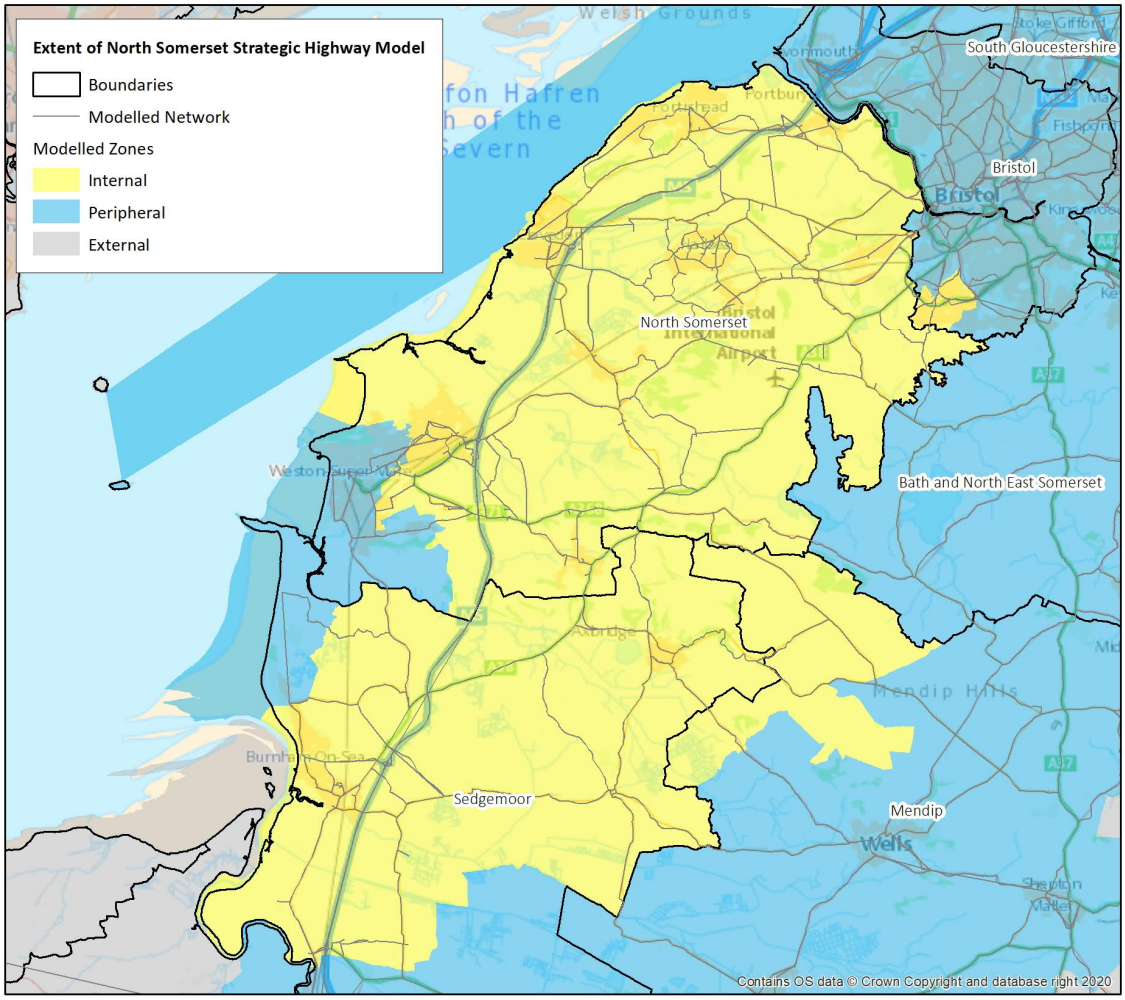

Figure 2.1: Coverage of the NSSM

2.6 Figure 2.1 shows that although the model covers all major strategic road network, there are areas within North Somerset where network coverage is less than other areas. In terms of Weston-super-Mare, there is less detail within the centre as it was expected that the NSSM could be used alongside the Weston Town Model to assess local impacts. In addition, Clevedon and Portishead have skeletal network coverage within their centres. However, it should be noted that the NSSM includes screenlines along each

of the main access points to each of these three areas which have been used to calibrate trips into and out of each town. The screenlines are shown in Figure 2.2

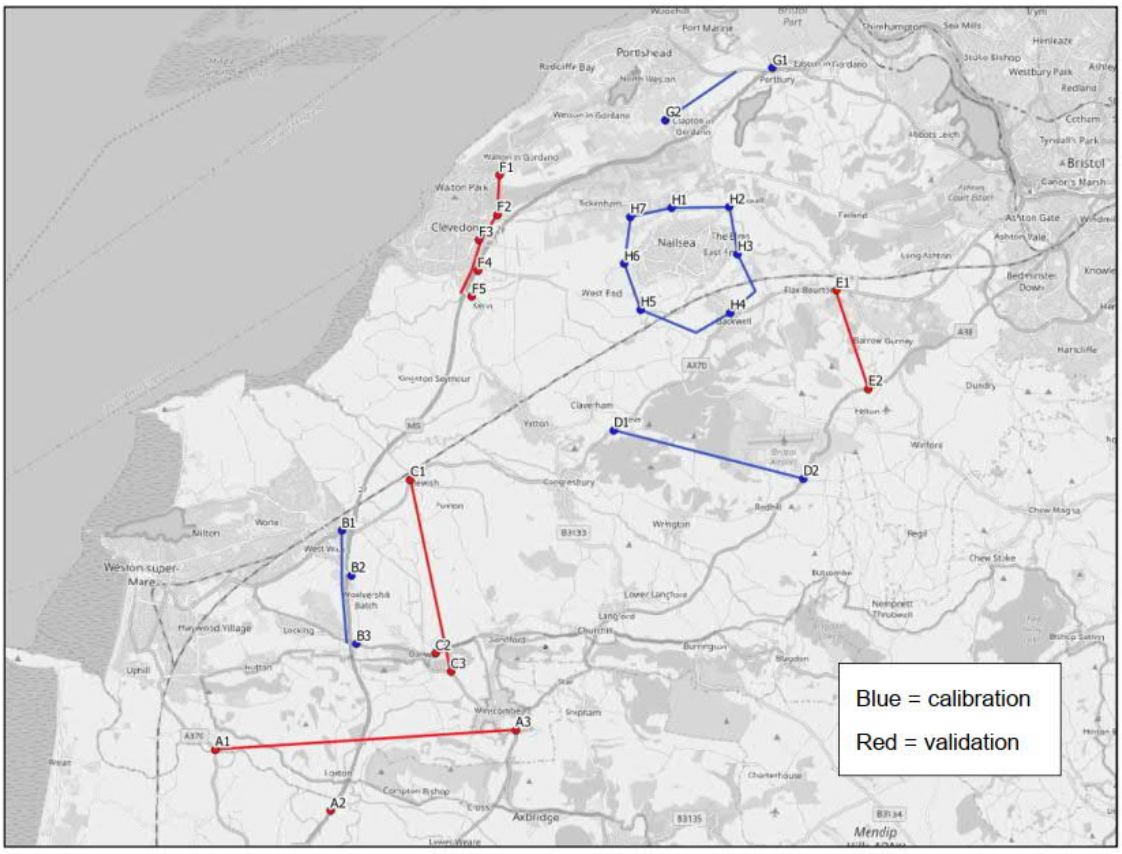

Figure 2.2: Calibration and Validation Screenlines for the NSSM

2.7 The user classes are consistent with the original RTM's, with three user classes for cars (Car Business, Car Commuting and Car Other respectively) and LGV's and HGV's. The matrices are in PCUs, with HGV's having a PCU factor of 2.5

2.8 It is our understanding that the model has been calibrated and validated in line with TAG guidance, with details of the calibration outlined in the Local Model Validation Report, September 2020.

2.9 The calibration and validation results for the model are outlined in the NSSM LMVR, the tables below show the calibration and validation results by screenline for the AM, IP and PM Peak respectively. Largely, the screenlines pass TAG criteria however there are areas, especially in the PM Peak, where the screenlines do not meet TAG criteria

Table 2.1: NSSM – Screenline Calibration and Validation: AM Peak

Screen line	Cal/Val	Direction	AM Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	4,073	4,102	30	0.7%	Pass	Pass	0.5	Pass
		SB	3,684	3,792	108	2.9%	Pass	Pass	1.8	Pass
B	Cal	EB	3,474	3,389	-85	-2.5%	Pass	Pass	1.5	Pass
		WB	2,922	2,969	47	1.6%	Pass	Pass	0.9	Pass
C	Val	EB	1,171	1,158	-12	-1.1%	Pass	Pass	0.4	Pass
		WB	1,292	1,351	59	4.6%	Pass	Pass	1.6	Pass
D	Cal	NB	1,420	1,440	20	1.4%	Pass	Pass	0.5	Pass
		SB	1,001	972	-29	-2.9%	Pass	Pass	0.9	Pass
E	Val	EB	1,631	1,622	-9	-0.6%	Pass	Pass	0.2	Pass
		WB	1,194	1,377	183	15.3%	Fail	Fail	5.1	Fail
F	Val	EB	3,228	3,299	70	2.2%	Pass	Pass	1.2	Pass
		WB	3,364	3,354	-10	-0.3%	Pass	Pass	0.2	Pass
G	Cal	NB	1,360	1,360	-1	0.0%	Pass	Pass	0.0	Pass
		SB	1,770	1,727	-43	-2.4%	Pass	Pass	1.0	Pass
H	Cal	In	1,470	1,472	2	0.1%	Pass	Pass	0.1	Pass
		Out	1,722	1,638	-83	-4.8%	Pass	Pass	2.0	Pass
Pass rate over all screenlines							94%	94%		94%

Table 2.2: NSSM – Screenline Calibration and Validation: Interpeak

Screen line	Cal/Val	Direction	IP Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	3,830	3,894	64	1.7%	Pass	Pass	1.0	Pass
		SB	3,476	3,276	-200	-5.8%	Fail	Pass	3.4	Pass
B	Cal	EB	2,211	2,205	-7	-0.3%	Pass	Pass	0.1	Pass
		WB	2,375	2,325	-50	-2.1%	Pass	Pass	1.0	Pass
C	Val	EB	975	1,082	107	11.0%	Fail	Fail	3.3	Pass
		WB	1,044	1,096	52	4.9%	Pass	Pass	1.6	Pass
D	Cal	NB	962	965	3	0.3%	Pass	Pass	0.1	Pass
		SB	963	961	-2	-0.2%	Pass	Pass	0.1	Pass
E	Val	EB	1,131	1,167	36	3.2%	Pass	Pass	1.1	Pass
		WB	1,197	1,281	84	7.0%	Fail	Pass	2.4	Pass
F	Val	EB	2,052	2,199	147	7.2%	Fail	Pass	3.2	Pass
		WB	1,988	2,177	189	9.5%	Fail	Pass	4.1	Pass
G	Cal	NB	1,039	1,118	79	7.6%	Fail	Pass	2.4	Pass
		SB	1,011	1,083	72	7.1%	Fail	Pass	2.2	Pass
H	Cal	In	1,223	1,198	-26	-2.1%	Pass	Pass	0.7	Pass
		Out	1,194	1,166	-28	-2.4%	Pass	Pass	0.8	Pass
Pass rate over all screenlines							56%	94%		100%

Table 2.3: NSSM – Screenline Calibration and Validation: PM Peak

Screen line	Cal/Val	Direction	PM Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	4,020	3,803	-217	-5.4%	Fail	Pass	3.5	Pass
		SB	4,312	4,167	-145	-3.4%	Pass	Pass	2.2	Pass
B	Cal	EB	2,761	2,689	-72	-2.6%	Pass	Pass	1.4	Pass
		WB	4,109	3,974	-136	-3.3%	Pass	Pass	2.1	Pass
C	Val	EB	1,140	1,229	90	7.9%	Fail	Pass	2.6	Pass
		WB	1,564	1,600	36	2.3%	Pass	Pass	0.9	Pass
D	Cal	NB	1,123	1,100	-23	-2.0%	Pass	Pass	0.7	Pass
		SB	1,652	1,576	-76	-4.6%	Pass	Pass	1.9	Pass
E	Val	EB	1,315	1,408	93	7.1%	Fail	Pass	2.5	Pass
		WB	1,762	1,871	109	6.2%	Fail	Pass	2.6	Pass
F	Val	EB	3,214	3,118	-96	-3.0%	Pass	Pass	1.7	Pass
		WB	3,308	3,283	-25	-0.8%	Pass	Pass	0.4	Pass
G	Cal	NB	1,976	1,942	-35	-1.7%	Pass	Pass	0.8	Pass
		SB	1,353	1,336	-17	-1.3%	Pass	Pass	0.5	Pass
H	Cal	In	1,773	1,709	-63	-3.6%	Pass	Pass	1.5	Pass
		Out	1,496	1,555	59	4.0%	Pass	Pass	1.5	Pass
Pass rate over all screenlines							75%	100%		100%

Table 2.4: Overall Pass Rate for NSSM

Time Period	Pass Rate		
	5% Criterion (TAG)	10% Criterion	GEH < 5 Criterion
AM	94%	94%	94%
PM	75%	100%	100%
IP	56%	94%	100%

2.10 The model also has been validated against observed journey time data derived from TrafficMaster data, with the observed data being taken over the whole of 2018. These cover the main strategic routes across the area, including the M5. The locations of the journey time routes are shown below in Figure 2.3, Figure 2.4 and Figure 2.5.

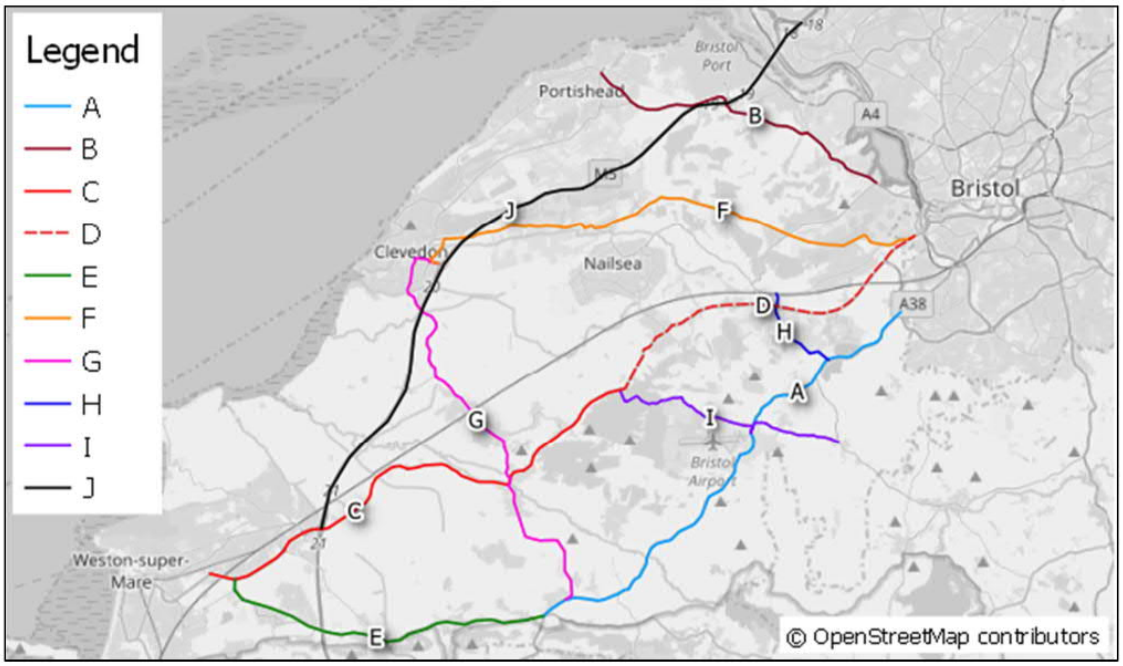

Figure 2.3: Journey Time Routes for NSSM – Part 1

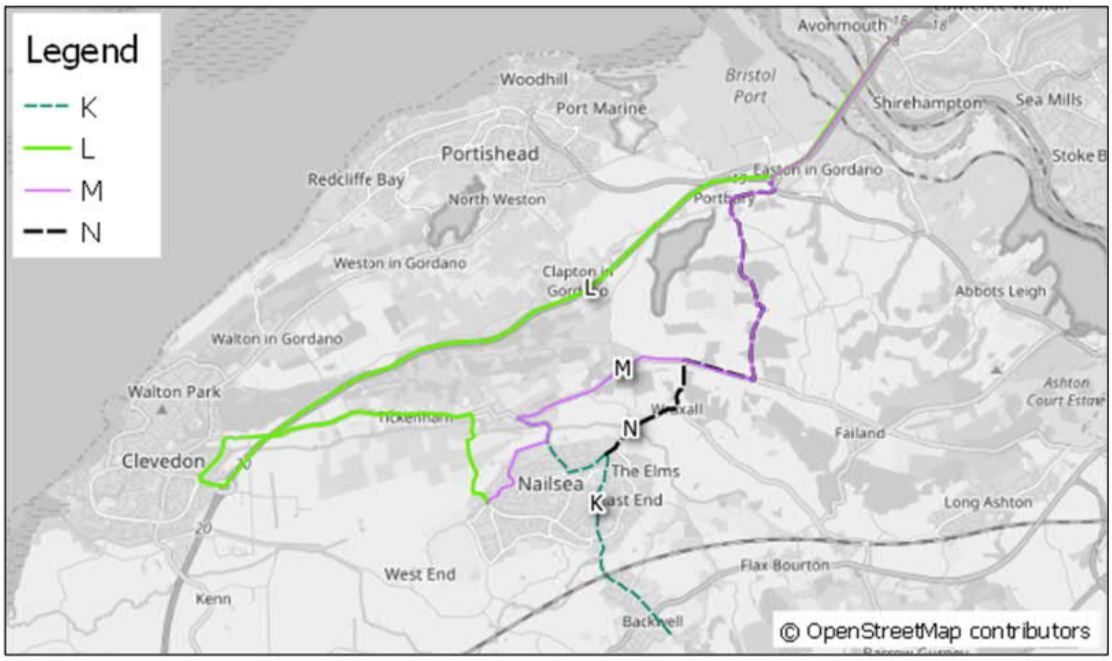

Figure 2.4: Journey Time Routes for NSSM – Part 2

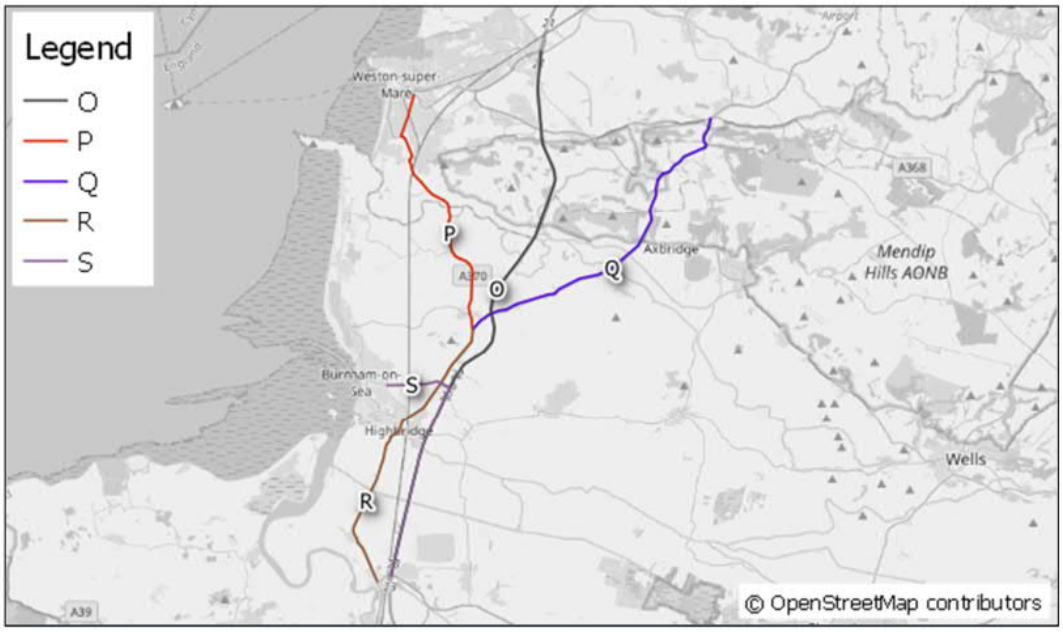

Figure 2.5: Journey Time Routes for NSSM – Part 3

2.11 Table 2.5 summarises the results from the journey time calibration. Within the PM Peak, nearly all routes pass the TAG criteria, whereas in the AM Peak this slips to 84%. Those routes which fail include:

- Route D (along the A370 into Bristol) in the AM peak – the model is too fast along this route as congestion is not fully represented close to Bristol and the A4174
- Route C (along the A370 into W-s-M) in the AM peak – the model is too fast and not representing enough delay close to the town
- Route B (between Portishead and Bristol) in all time periods – the model is too fast on this route.

2.12 The M5 and A38 journey times are generally well represented within the modelling.

Table 2.5: Journey Time Routes within NSSM - Validation Results

Time period	No. of journey time routes	Journey time routes passing	% routes passing
AM	38	32	84%
IP	38	36	95%
PM	38	37	97%

Weston Town Model

2.13 The Weston Town Model was built from an update of the existing North Somerset Traffic Model in 2015, with a focus on the urban area of Weston-super-Mare. This model, built by CH2M in SATURN, has a base year of 2015.

2.14 This model update includes a revision of the demand of the peak hours for trips travelling to and from Weston-super-Mare using Census Data and gravity modelling. The LMVR states that the model is largely WebTAG compliant, “although it potentially still falls short of full requirements as Census data only relates to journeys to work”. The coverage of the model is shown in Figure 2.6.

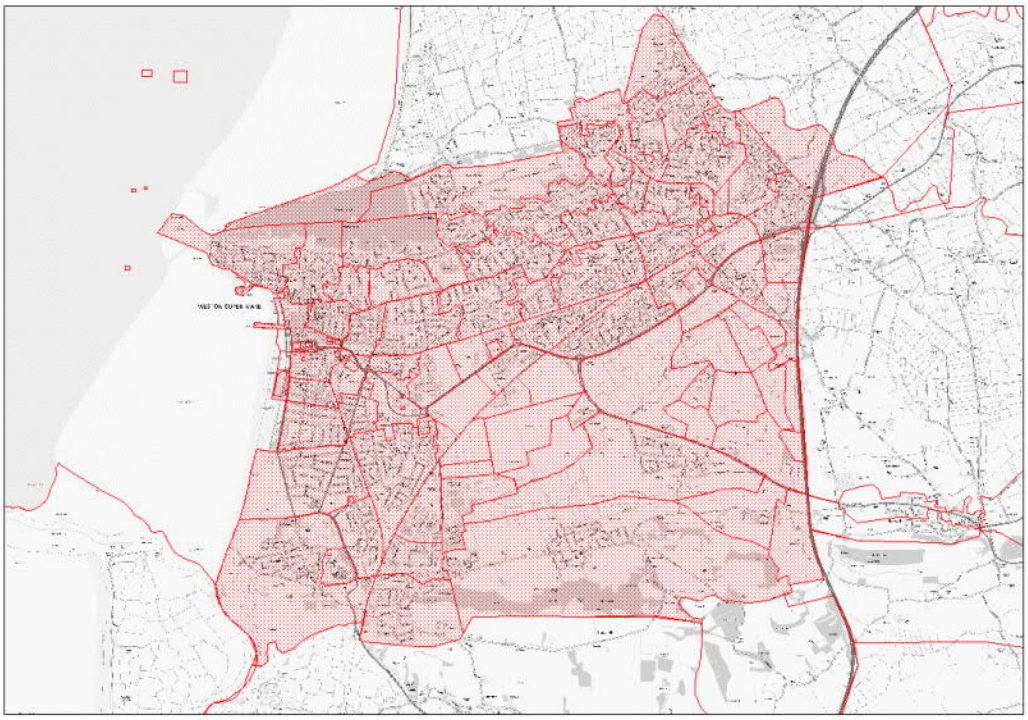

Figure 2.6: Weston Town Model Area (with zone boundaries) - taken from LMVR

2.15 The model has been recalibrated at key locations, the location of the counts and screenlines are shown in Figure 2.6. There are three screenlines covering the Weston-super-Mare area, one on the outer edge of the town, one around the centre, and one around the middle of the town. In addition to these, there are also some validation counts located around some key area including;

- Central Weston-super-Mare (close to the Railway Station)
- M5 mainline to the north and south of Junction 21
- Flowerdown Bridge

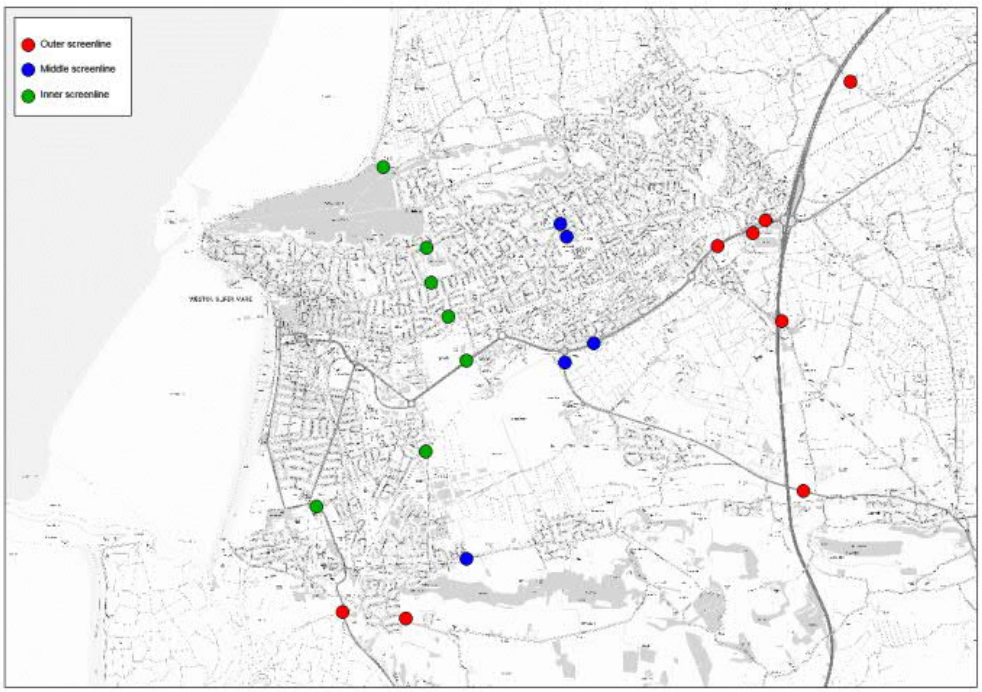

Figure 2.7: Weston Town Model – location of counts and screenlines for validation - taken from LMVR

2.16 The model has also been validated to journey times on routes within Weston-super-Mare including the main routes (A370, A371), New Bristol Road (through Worle) and through Bournville.

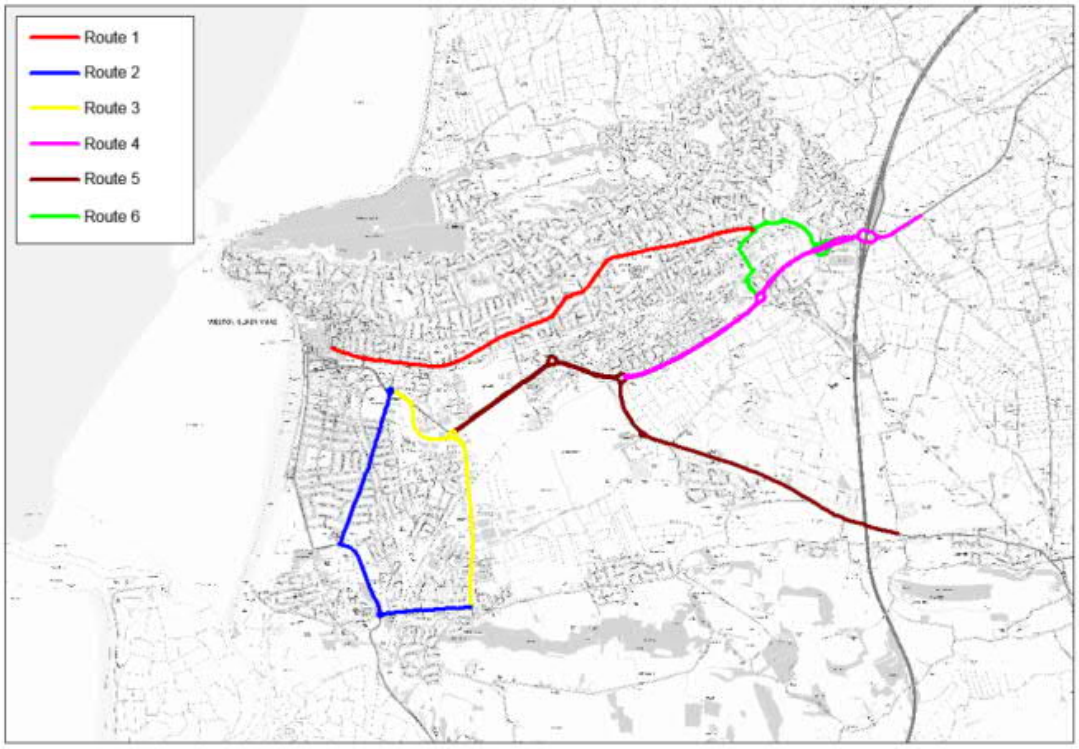

Figure 2.8: Weston Town Model – location of counts and screenlines for validation - taken from LMVR

2.17 In 2017, CH2M created forecast scenarios to be used to assess schemes and developments being brought forward in the Weston-super-Mare area. These forecast scenarios cover both 2021 and 2026 and involves the use of DIADEM as a variable demand model.

Summary

2.18 Two existing models have been reviewed for use in this study, the North Somerset Strategic Model and Weston Town Model. The key points are summarised below;

NSSM

- A WebTAG-compliant strategic highway model which covers the region and into areas such as Bristol and Bath
- Has a base year of 2018, covering the AM Peak hour (08:00 to 09:00), average Interpeak hour (10:00 to 16:00) and PM Peak hour (18:00 to 19:00).
- Is deemed suitable for use in this study, following some network enhancements

Weston Town Model

- A highway model which covers the Weston Super Mare area, with less detail across the rest of the North Somerset region
- It is not fully WebTAG-compliant
- Has a base year of 2015 therefore it is dated and would need significant updates to be used for this study

Transport Modelling Methodology

Proposed Modelling Approach

2.19 The methodology of assessing Local Plan growth options for North Somerset has been guided based on the strengths and weaknesses of the data/models already available and various potential softwares/techniques to produce a fit for purpose model that will allow a flexible and robust approach to modelling multiple modes. The proposed approach will use a bespoke spreadsheet outlining the trip rates for potential Local Plan Allocations. This tool will feed trip information into an enhanced version of the NSSM highway model. A TRACC-based public transport model will also be developed to provide public transport generalised costs to estimate the impact of potential mitigation measures. Data from these models will feed into the DIADEM Variable Demand model which will produce updated highway generalised costs (travel time and distance) which will assess the impact of the Strategy on the highway network.

2.20 The modelling platform (PT supply model, highway assignment model and variable demand model) will work together to estimate the impact of the differing traffic patterns associated with development scenarios and indicate the impact on mode shift and highway flows and congestion. The modelling tool will also allow testing of the impact of potential mitigation measures (both highway and PT interventions) on mode shift, highway flows and congestion under different development scenarios.

2.21 An overall summary of the key parts of the modelling methodology can be seen in Figure 0.1.

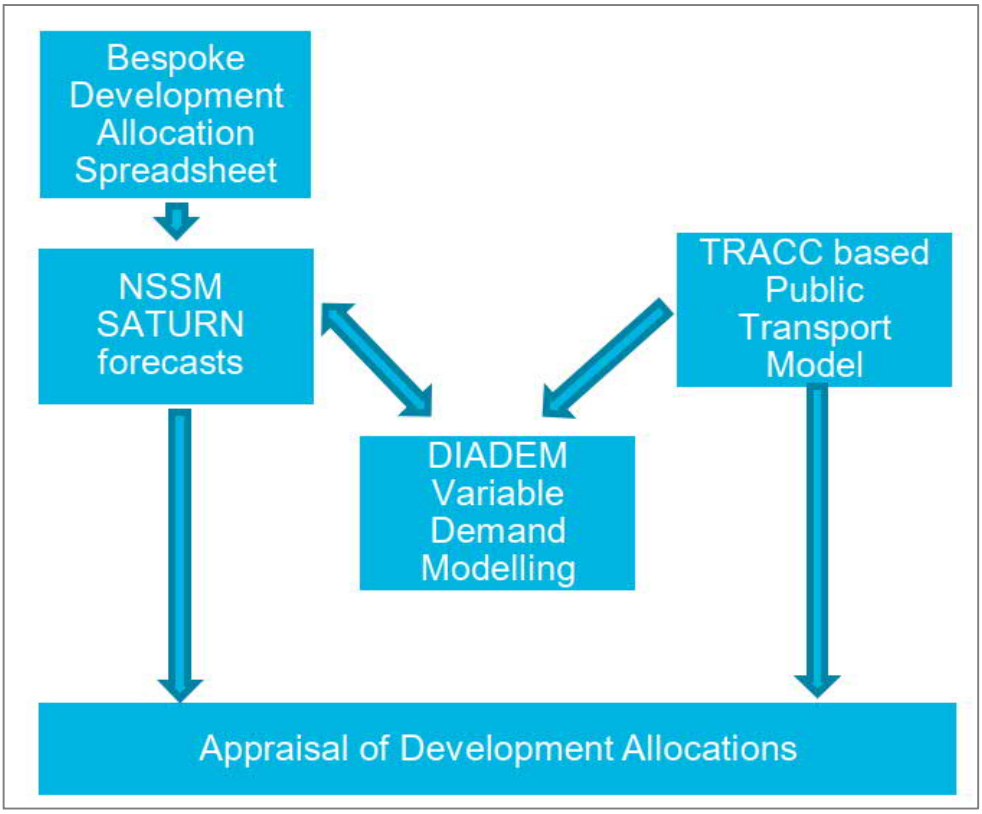

Figure 0.1: Methodology for assessing the proposed North Somerset Local Plan Options

Base Highway Model Enhancement

2.22 For the highway assessment, an enhanced version of the TAG-compliant NSSM will be developed and utilised. The current model has relatively good strategic network and zonal coverage of the North Somerset area and is calibrated well along most of the key routes. Calibration of the existing model is outlined in the NSSM LMVR. Use of the Weston Town Model as a full entity has been discounted due to

the age of the model (base year is over 5 years old) however information from the WTM model may be used for extra detail within the Weston-super-Mare urban area update to NSSM.

2.23 Following a review of the NSSM, a need to undertake targeted enhancements of the model have been identified. As the preferred Spatial Strategy is yet to be confirmed and Local Plan site allocation options have not been developed yet, the review of NSSM has been based on the key strategic routes within the model, and the overall network and zonal disaggregation across the region. As detailed development sites are identified additional local network updates may also be required to allow trip loading.

2.24 There are three focus areas for which enhancements will be undertaken, however, this is subject to review once site allocations for assessment are confirmed. Through these enhancements, the model will be checked against observed flows and journey times to ensure the model still conforms to TAG guidance. The enhancements set out were presented to NSC and Highways England (HE) at a meeting on 5th January 2021 and agreed as reasonable in principal.

Expansion of the modelled network into South West Bristol

2.25 Discussions with the Council and other relevant stakeholders including Highways England (HE) have identified the importance of ensuring trips heading between North Somerset and Bristol are modelled accurately, in terms of flow levels, congestion and route choice availability. Figure 0.2 shows that the current NSSM model is in simulation (internal network) however several key junctions in south west Bristol which define key route choices are in buffer (peripheral network), including

- Parson Street Gyratory (A)
- Junctions around the Cumberland Basin (B,C,D) and;
- Hartcliffe roundabout (on Hengrove Way) (E)

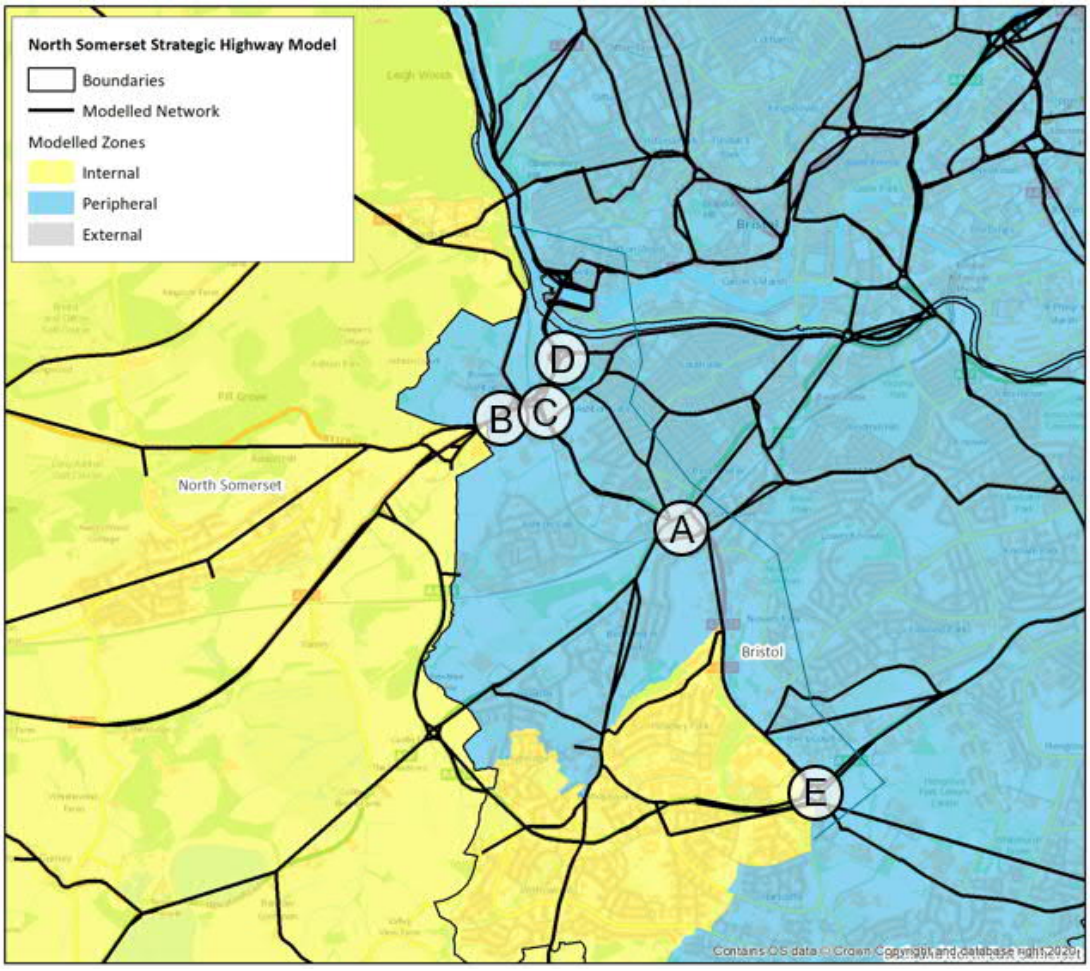

Figure 0.2: Proposed change of simulation area around South West Bristol.

2.26 Therefore, as part of the enhancement it is proposed to extend the simulation area to cover these three junctions (and other associated network where related). These three junctions will be converted as a minimum; however, more junctions may be added to the simulation area as the modelling progresses. The aim of this change is to improve calibration of journey times on these two key routes into Bristol from North Somerset; and, accurately represent congestion which is typically experienced between North Somerset and Bristol. This will also ensure that speeds in future years are not fixed and instead are dependent on traffic flow levels (as in realty changing levels of demand would change the speeds in which vehicles are travelling). It is not proposed that model zone system or demand within south west Bristol will be adjusted.

Expand Weston-super-Mare network

2.27 The current NSSM has the centre of Weston-super-Mare in buffer, as it was originally intended by the developers of the model to use the Weston Town Model in parallel. Use of the Weston Town Model has been discounted, and as the Local Plan may potentially involve developments in the vicinity of W-s-M, this area of the NSSM model will require enhancement into the central Weston-super-Mare area. Figure 0.3 shows the model coverage of the W-s-M urban area and the peripheral area which is coded in buffer.

2.28 It is proposed that four key junctions (marked as A-D in Figure 0.3) and joining links are brought into the fully modelled area. It is not proposed that model zone system or demand will be adjusted.

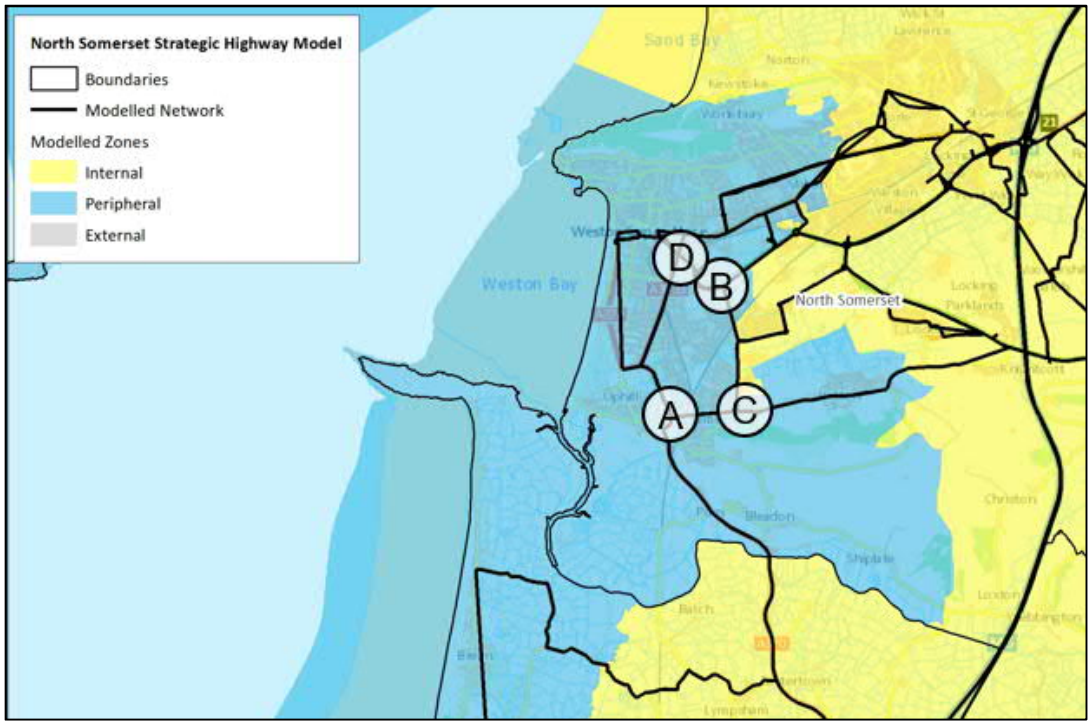

Figure 0.3: Weston-super-Mare proposed highway model changes

Update of the modelled speeds

2.29 As outlined in the NSSM LMVR, across the internal modelled network, most of the road network has been allocated free flow speeds that are relevant to the speed limit of the road, with speed flow curves being used where appropriate. However, in the original NSSM, there are several links where the modelled speed is significantly lower than speed limits. Links with speeds less than 32kph (20mph) are shown in Figure 0.4. These links will be reviewed as part of the model enhancement. These links include a number within Weston-super-Mare and some more rural links within the region. The focus will be on the links within the 'internal' area although there may be some focus on the links closest to the boundary, i.e. within Bristol and Weston-super-Mare.

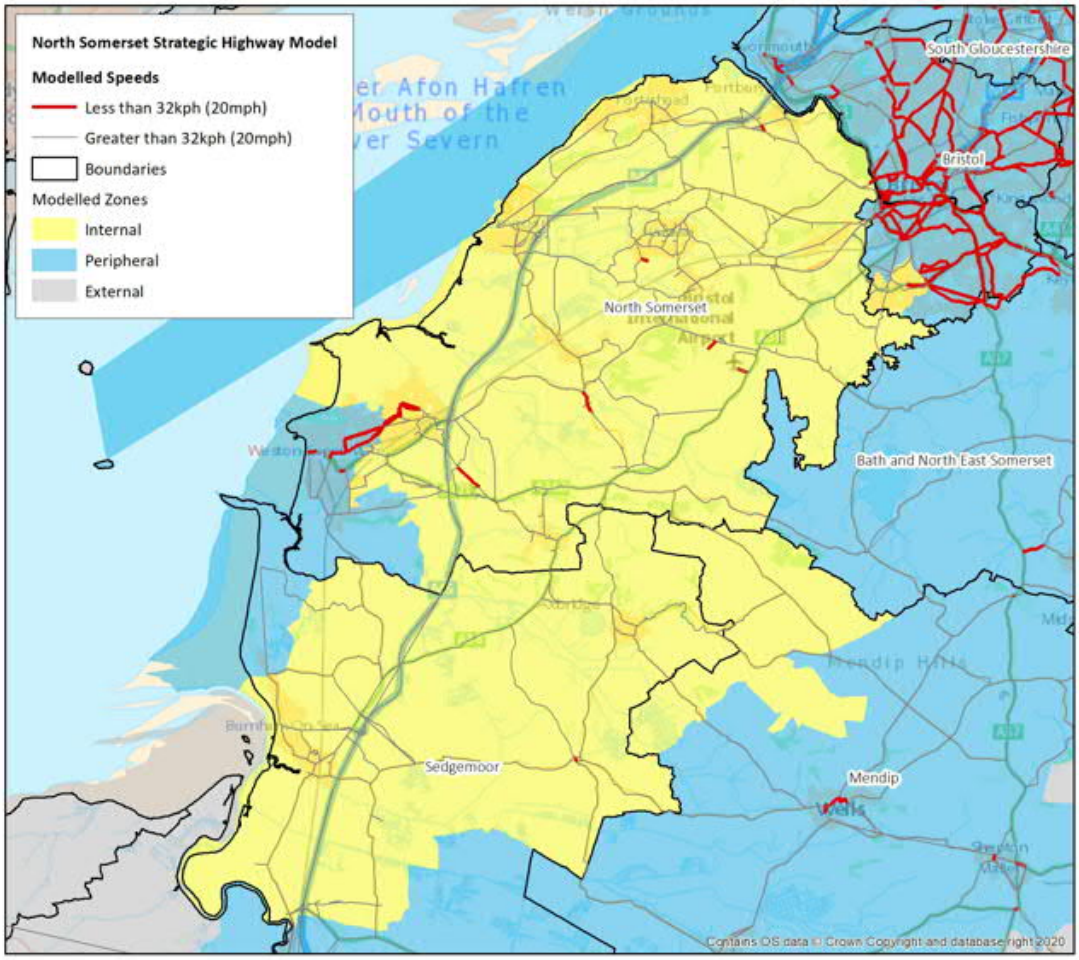

Figure 0.4: Low Modelled Speeds within the NSSM

2.30 In addition, the LMVR states that the A370 route into Bristol, is severely congested in the peak hours and speed data appears to show that vehicles regularly tail back along the A370 into North Somerset towards the South Bristol Link Road. The LMVR also states that the traffic flow on the A369 corridor and use of the Clifton Suspension Bridge (Toll) is sensitive to delay on the A370. To partially address these issues, the original NSSM takes observed 2018 speed data along the A370 as fixed speed inputs to replicate conditions within the south west of Bristol. Given that these speeds are fixed, this may not be appropriate for forecast years where flows, and consequently congestion and link speeds, are expected to change from 2018 levels. Figure 0.5 shows the area where the modelled speeds have been replaced with fixed observed speeds.

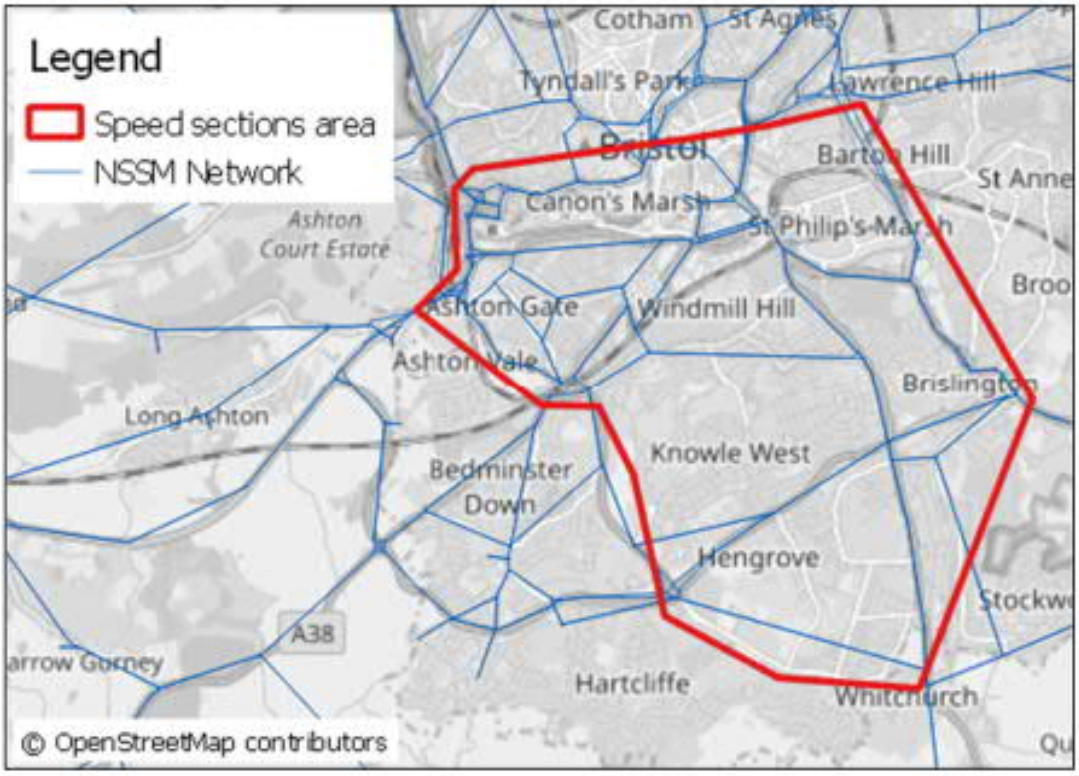

Figure 0.5: Area within Bristol where observed speeds applied in original NSSM (taken from LMVR)

2.31 For the purposes of assessment of development scenario impacts, it is essential that congestion and route choice is accurately reflected in this area when developments and potential mitigating measures are introduced. To do this, speeds need to change in response to demand and congestion. Therefore, this will be addressed in the model upgrade alongside the extension of the simulation network in this area.

Other enhancements

2.32 It is unlikely that outside of these focused areas that any significant network changes will be made however this may be reviewed further once the location of the development allocations are known. In addition, it is not expected that changes to the matrices or zone system will be undertaken however this will also be reviewed further once the site allocations for assessment are known.

2.33 As this is an enhancement rather than a recalibration exercise, matrix estimation will not be rerun. Therefore, as the enhancements are completed, the model will be checked against the observed flows and journey times outlined in the LMVR to ensure that the calibration has not been significantly negatively impacted.

Base Public Transport Modelling Development

2.34 Currently there is no existing public transport model for the North Somerset area that could be used for this project therefore a new public transport model will need to be developed. TAG Unit M3.2 states that *"the key role of public transport assignment models in demand forecasting is the provision of levels of service, the travel times, distances and costs associated with trips between origin-destination pairs, distinguishing components such as transfer and wait times, and, where relevant, different transport modes".*

2.35 Given this, it is proposed to develop a public transport accessibility model within TRACC, which will provide a supply side assessment to PT generalised cost, to aid the assessment of the potential mode shift of trips associated with proposed development allocations and/or mitigation interventions.

2.36 TRACC software is a leading multi-modal transport accessibility analysis tool, developed in conjunction with the Department for Transport, local authorities and transport planners. TRACC analysis calculates travel times for non-highway modes (including rail, bus, walking and cycling) to give accurate journey times from many origins to many destinations in one calculation. It uses a physical network (i.e. roads and

rail tracks) and public transport timetables to analyse travel times, distances and accessibility across a defined network.

2.37 This model will allow the assessment of journey times to various destinations within and just outside of the North Somerset border using a pre-determined set of parameters. Although TRACC is not a traditional public transport assignment model, it can be used effectively to produce the data that would inform variable demand modelling (generalised cost of travel by public transport). TRACC models have the advantage that the PT network and service data is readily available in suitable format, and models do not require complex calibration. Using procedures within TRACC, public transport travel times and distances for origin and destination movements corresponding to the NSSM zone system can be extracted as a key input into the variable demand model. These PT cost matrices will reflect the bus and rail service routes and timetables in the base year and, by including new or enhanced PT services proposed as mitigation for develop scenario impacts can accurately capture the effect on origin – destination public transport generalised costs.

2.38 The model base year will match the highway model base year of 2018. The public transport model network will be created using OpenStreetMap. Timetables will be obtained from DataCutter which is a licenced repository of publicly available GTF (general transit feed) specifications. These timetables will be made up of the following public transport modes;

- Bus;
- Rail; and
- Coach.

2.39 Origin and destination locations in the public transport model will be based on the population weighted centroid location of the NSSM zones. This will ensure consistency between cost skims derived from PT and highway models.

2.40 Route times will be extracted from the TRACC for each Origin / Destination pair in the zone system. Route time will include:

- Access walk time
- Wait time
- PT in vehicle time
- Interchange walk / walk (if relevant)
- Egress walk time

2.41 The TRACC model will be able to represent mitigation scenarios in two ways:

1. Inclusion of proposed mitigation services in TRACC service timetable – this will be appropriate where a specific new service, or enhanced frequency of existing service is proposed
2. Manual adjustment of cost skim matrix for selected sector to sector movements – this will be appropriate to reflect broad enhancement to PT accessibility

Variable Demand Model

2.42 DfT TAG guidance recommends VDM when appraising the impact of transport demand on network conditions. Given the basis of this study, it is proposed to include a variable demand model response using DIADEM software developed for DfT to implement the TAG recommended approach to variable demand modelling and interfacing with SATURN assignment model.

2.43 This software has been chosen for the following key features:

- DIADEM has been developed in line with TAG recommended approaches. The latest version (DIADEM 7.0 - May 2020) will be used unless an update is released before the modelling commences
- DIADEM interfaces with SATURN assignment models (the software used to run NSSM)

- DIADEM uses fixed public transport cost data (as extracted from the TRACC model) to assess mode share impacts.

2.44 DIADEM will combine fixed public transport costs from the TRACC model with highway travel costs from the updated NSSM to estimate the demand response to additional congestion associated with Local Plan development and impact of any mitigating public transport or highway schemes. DIADEM includes a procedure to iterate between highway assignments in NSSM and demand model estimations to reach convergence.

2.45 Demand model responses modelled will include mode choice, destination choice and macro-time-period choice. NSSM user classes will be retained in the DIADEM model with variable demand responses applied to car trips (commute, business, other) and freight trips unchanged.

2.46 The outcome from the DIADEM model will be an indication of change in mode share and trip distribution of development trips with highway trips assigned to the forecast highway network. Standard SATURN model data (link flows and journey times) will be available to support appraisal.

2.47 Figure 0.6 shows the VDM process as outlined in the DIADEM user manual.

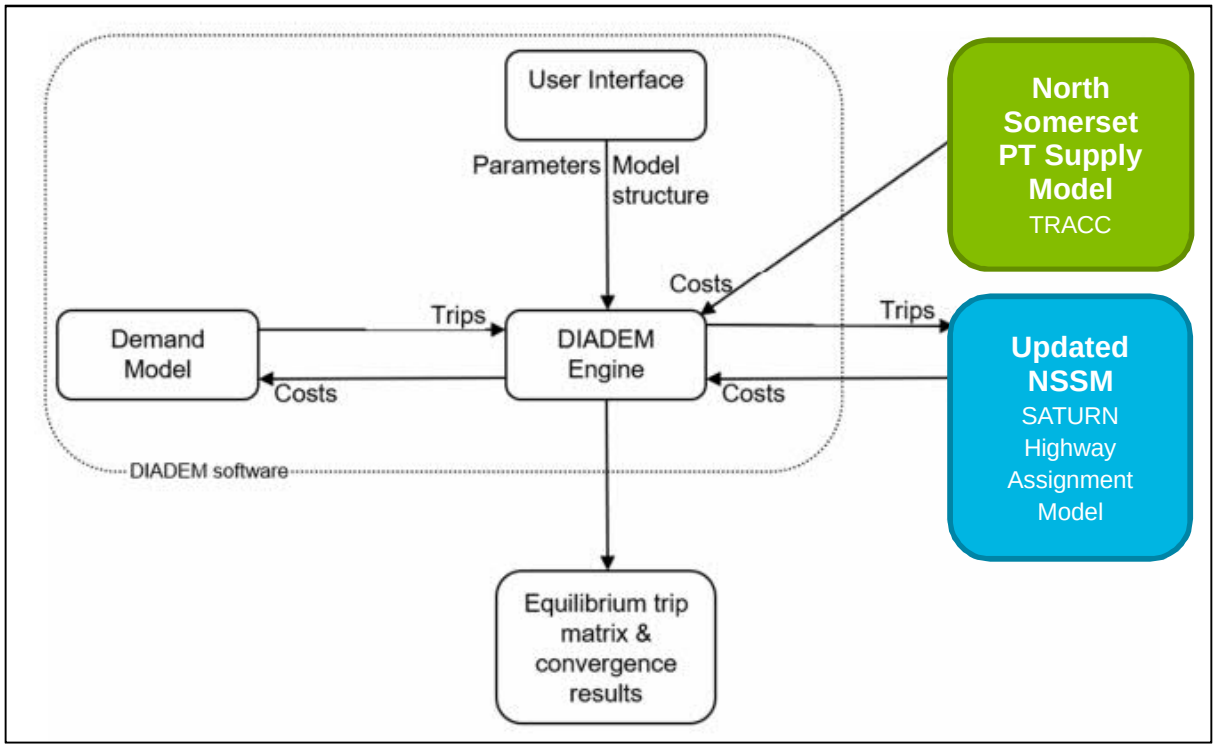

Figure 0.6: DIADEM software structure

3. Forecasting Approach

Reference Case

3.1 The assessment of the transport impacts of the Local plan development scenarios requires assessment of conditions in future years with and without development traffic. The current NSSM only consists of a base year model (2018). It will therefore be necessary to develop a forecasting approach and reference case forecast models for both highway and public transport models. The approach and models will be developed following guidance in TAG Unit M4 – Forecasting and Uncertainty.

3.2 The following forecast year will be assessed;

- 2038 (the end of the Local Plan period)

3.3 A core scenario will be defined reflecting expected network changes in model year and in line with TAG guidance, it will be:

- Based on published plans (not including speculative proposals);
- Unbiased (un-likely to over or under achieve, given existing plans and evidence);
- Coherent and self-consistent (if X is unlikely to go ahead unless Y also goes ahead, then X should only be included if Y is also included); and
- Realistic and plausible.

Highway Model

3.4 Highway trip growth between base year and future year will be based upon the forecast growth contained in the National Trip End Model (NTEM), at a spatial area consistent with the defined zone system. Freight traffic growth will be based on DfT national model forecasts (RTF18).

3.5 An uncertainty log will be developed in discussion with North Somerset Council and other relevant stakeholders (e.g. Highways England) to ensure the local planning data is included within the core scenario and will be included in the model in line with TAG guidance. A version has been supplied by NSC and this will be reviewed and confirmed at the time of starting work on forecast models. This will assume that any developments and schemes that are 'more than likely' or 'near certain' will be included within the core scenarios. This data will be used to define the spatial distribution of future growth, whilst retaining the total growth levels forecast within the National Trip End Model (NTEM). Development trips within this core reference case agreed volume of development in each scenario will be calculated using trip rates either supplied or agreed with NSC and the land area of each development. These development trips may be loaded at specific and representative locations in the model, with the remaining growth based on NTEM growth forecasts spread across existing trip ends.

3.6 For the future year, any committed highway infrastructure / schemes, which will be open by the future model year, will be added to the respective future year networks.

3.7 There is expected to be an update to TAG guidance at the end Feb 2021 which may need to be considered within this study as it may involve consideration to other factors including COVID and BREXIT. Even without this guidance, it is expected that sensitivity tests will be required to investigate the potential long-term impacts of COVID on trip making behaviour. These tests could be undertaken to understand the uncertainty of travel behaviour with more people working from home and shifting away from public transport. This scenario would be developed, if required, once TAG guidance is issued.

Public Transport Model

3.8 The public transport model only includes supply side data (service rotes and timetables). It is assumed that in the reference case public transport service levels will be maintained at base year levels, unless otherwise specified in the Uncertainty Log. As the PT model does not consider PT demand assumptions, defining growth in PT trips are not required.

Scenario Testing

Development Scenarios

3.9 For this study, several development scenarios will be tested based on potential site allocations as outlined through the Local Plan process. The number of scenarios will be agreed further along in the site sifting process. Each of these scenarios will identify development allocations across the district and will have allocated to each site a trip rate for highway and public transport that will be fed into the modelling. These trip rates will be allocated to the relevant existing zone within the network or where deemed appropriate (i.e. for larger developments) the development will be attributed its own model zone. These trip rates will have already taken into consideration factors such as trip internalisation. The number of trips for each development will then be calculated based on land use size.

3.10 The distribution for each zone will be attributed based on its location and size. For smaller developments located close to existing development i.e. on the edge of a town, the distribution will be taken from a SATURN zone which is close to the proposed development location and has a similar land use. Where developments may be bigger and/or located away from existing development, assumptions will be made based on surrounding zones and general trip attractors/producers to assume a robust and fair distribution for the proposed development.

3.11 Where schemes may be added as part of a development (i.e. a new bus route to serve a development), this will be adjusted within the public transport and highway model to accommodate this change in transport provision.

Mitigation Measures

3.12 As part of the assessment of the development scenarios above, analysis will be undertaken on the delay and congestion associated with the scenario. From this, there is likely to be some further analysis on proposed mitigation measures which could relieve the impact of the developments i.e. a new bus route or highway scheme/junction improvements. The number of these scenarios will be determined once the development scenarios have been modelled and analysed.

Potential COVID sensitivity testing

3.13 It is likely that an alternative assessment will need to be undertaken to analyse the potential impact on future travel patterns post-COVID from systemic changes in trip making behaviour. There is expected to be an update to TAG guidance in Feb 2021 which may provide guidance on this topic. However, if for any reason this is not available, then some assessment for this may need to be defined, agreed, and undertaken.

3.14 This could involve assessments such as;

- Reducing the number of commuting private cars due to a higher proportion of working from home;
- Different mode shifts due to less people using public transport.

3.15 At the time when development scenarios are finalised, COVID scenarios will be devised if relevant. These will be based on TAG guidance if available at the time.

4. Transport Appraisal

4.1 For this assessment, the modelling platforms will provide forecasts for a base year, reference case and various scenario tests. These will cover both a core scenario based on the definition from TAG as well as core plus Local Plan, and core plus Local Plan plus mitigation scenarios.

4.2 The outputs from this modelling can provide information on various impact areas that could be affected by development traffic including economic, environment and social impacts. Based on AECOM's role as transport consultants for the project, our reporting will set out the transport implications of each of the scenarios on the network, set out in terms of metrics such as;

- Change in link flows
- Change in link speeds
- Change in overall levels of congestion (V/C)
- Change in total number of vehicle trips
- Change in total number of vehicle kms travelled

4.3 TAG expects an Appraisal Specification Summary Table to be produced for an ASR. This table outlines how each of the impacts could be analysed by data output from the transport modelling and states which areas cannot be assessed or do not need to be assessed by the transport evidence at this stage. With the exception of Greenhouse Gas (GHG) emissions, it is assumed that these outputs will be used by others in their assessment of the Local Plan.

4.4 For the economy impact, TUBA will be used to provide information on the impact of the development scenarios on the various users. This includes information on user time savings, vehicle operating cost changes, fuel usage, emissions impacts and changes in indirect tax revenues. TUBA is a piece of DfT software that will economically appraise a transport scheme in line with TAG. Although not totally relevant for this study, it can be used to estimate the impact of the strategy on various factors such as emissions and vehicle operating costs.

4.5 In terms of environmental impacts, greenhouse gas emissions from road vehicles can be calculated as a result of change in fuel usage using TAG calculations outlined in TAG Unit A3. It should be noted that for this assessment, this would not include bus and train emissions.

4.6 The impact on accident rates and costs could be assessed using model data on vehicle kilometres by road type in different scenarios combined with a calculation of change in accident and injury numbers using COBA parameters.

4.7 The model would also provide other outputs which can inform a qualitative approach to the appraisal for other impact areas such as;

- vehicle kilometres,
- journey times;
- mode share,
- link flows and delays.

4.8 In some cases, the impacts are unable to be assessed as part of the transport evidence base developed from this study due to either the outputs from this stage of assessment not being detailed enough or that the impacts are dependent on the assessment of individual schemes which have not yet been identified or defined. These impacts would be reviewed in further stages of the study, if required.

4.9 The suggested contribution of the transport evidence base to the Appraisal Specification Table (AST) for the chosen Local Plan scenario is summarised in Table 4.1 below, although this will need to be confirmed with the consultants responsible for undertaking each of these work areas.

Table 4.1: Appraisal Specification Summary Table

Impacts / Sub-impacts		Proposed proportionate appraisal methodology	Reference to evidence and rationale in support of proposed methodology	Type of Assessment Output (Quantitative/ Qualitative/ Monetary/ Distributional)
Economy	Business users & transport providers	To be assessed using outputs from TUBA assessment	Assessment to be based on TAG and with a TAG-compliant traffic model	Quantitative PVB
	Reliability impact on Business users	Qualitative assessment based on journey times from model	Transport model outputs could provide indication of locations with significant change in congestion leading to increased journey times	Qualitative
	Regeneration	Not assessed as part of transport evidence base at this stage		
	Wider Impacts	Not assessed as part of transport evidence base at this stage		
Environmental	Noise	Not assessed as part of transport evidence base at this stage		
	Air Quality	Not assessed as part of transport evidence base at this stage		
	Greenhouse gases	To be assessed using outputs from TUBA assessment	Assessment to be based on TAG and with a TAG-compliant traffic model	Quantitative PVB
	Landscape	Not assessed as part of transport evidence base at this stage		
	Townscape	Not assessed as part of transport evidence base at this stage		
	Heritage of Historic resources	Not assessed as part of transport evidence base at this stage		
	Biodiversity	Not assessed as part of transport evidence base at this stage		
	Water Environment	Not assessed as part of transport evidence base at this stage		
Social	Commuting and Other users	To be assessed using outputs from TUBA assessment	Assessment to be based on TAG and with a TAG-compliant traffic model.	Quantitative PVB
	Reliability impact on Commuting and Other users	Qualitative assessment based on journey times from model	Transport model outputs could provide indication of locations with significant change in congestion leading to increased journey times.	Qualitative
	Physical activity	Qualitative assessment based on development location versus trip attractors	Based on review of location development relative to services/trip attractors and cycling facilities.	Qualitative
	Journey quality	Not assessed as part of transport evidence base at this stage		
	Accidents	High level COBA based calculation using change in vehicle kms	Assessment to be based on TAG and with a TAG-compliant traffic model	Quantitative
	Security	Not assessed as part of transport evidence base at this stage		

	Access to services	Qualitative assessment based on development location versus trip attractors	Based on review of location development relative to services/trip attractors and cycling facilities	Qualitative
	Affordability	Qualitative assessment based on development location to PT services	Based on review of location development accessibility to public transport	Qualitative
	Severance	Not assessed as part of transport evidence base at this stage		
	Option values	Not relevant		
Public Account	**Cost to Broad Transport Budget**	Not assessed as part of transport evidence base at this stage		
	Indirect Tax Revenues	To be assessed using outputs from TUBA assessment	Assessment to be based on TAG and with a TAG-compliant traffic model	Quantitative PVB

Appendix B: NSSM LMVR

North Somerset Council

NORTH SOMERSET STRATEGIC HIGHWAY MODEL

Local Model Validation Report

LMVR
SEPTEMBER 2020

CONFIDENTIAL

North Somerset Council

NORTH SOMERSET STRATEGIC HIGHWAY MODEL

Local Model Validation Report

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 70065221

OUR REF. NO. LMVR

DATE: SEPTEMBER 2020

North Somerset Council

NORTH SOMERSET STRATEGIC HIGHWAY MODEL

Local Model Validation Report

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft issued on completion of base model.	Updated for A38 MRN OBC and to incorporate comments from NSC on first issue.		
Date	April 2020	August 2020		
Prepared by	Edward Dawn	Edward Dawn		
Signature				
Checked by	Neal Dyson	Neal Dyson		
Signature				
Authorised by	Chris Sanders	Chris Sanders		
Signature				
Project number	70062683	70065221		
Report number	LMVR	LMVR		
File reference	-	-		

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M5 JUNCTION 21 VALIDATION

APPENDIX H

JOURNEY TIME RESULTS

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP has been commissioned by North Somerset Council (NSC) to create a strategic highway assignment model of North Somerset. The model will be used to develop and assess the next North Somerset Local Plan and to support business cases and funding bids. It will also perform a more general role as the main strategic modelling tool available to NSC. In the longer term it is envisaged that it will interface with the new transport model developed for the West of England Combined Authority (WECA).

1.1.2. The new model is an enlarged and refined version of a previous SATURN model that was developed for the BSWEL SOBC and Banwell HIF bid. It was originally developed as a cordon from Highways England's South West Regional Transport Model (SWRTM) but has now become a standalone model with its own external network and zone system. The new model has been updated to cover a wider validation area which encompasses the main highway network within the North Somerset authority area. It also includes part of the highway network in Somerset for the purpose of assessing the A38 Major Road Network (MRN) scheme.

1.1.3. This Local Model Validation Report (LMVR) describes how the model has been developed and presents model validation results.

1.2 PURPOSE OF THE STRATEGIC MODEL

1.2.1. The North Somerset Strategic Model (NSSM) will be used for several purposes:

- To facilitate the development of the next Local Plan and provide an evidence base which can be drawn upon at Examination.
- To inform business cases (OBC/FBC stage) and funding bids for major schemes (e.g. A38 MRN, other schemes within BSWEL, Local Plan facilitation schemes etc.).
- To progress the development of schemes once funding is secured (e.g. Banwell Bypass).
- To provide North Somerset Council with a strategic model that can be used more generally for ongoing functions within the authority.

1.2.2. In order for the NSSM to be suitable for these purposes, in particular for developing the Local Plan, it covers all of the main A and B roads, strategic corridors, access to the motorway and key connections to major towns.

1.2.3. The following areas are not represented in detail at this stage but will be refined through future updates as required:

- Weston-super-Mare (WsM) – the model only includes a skeletal representation of WsM because the intention is to use the Weston Traffic Model (WTM) in tandem with outputs from NSSM to assess WsM schemes and developments. However, the total traffic flow into and out of WsM has been considered as part of model validation.
- Coastal towns of Clevedon and Portishead – similarly, these areas only have a skeletal representation in the model however the total traffic flow into and out of these areas has been considered as part of model validation.

1.3 REPORT STRUCTURE

1.3.1. This LMVR describes the development of the base year model and sets out how the model has been calibrated. It also describes the validation of the model and discusses the model's suitability for its intended purposes.

1.3.2. After this introductory section, this report is structured as follows:

- **Section 2 – Model Overview** – Details the model extent, demand segmentation and key parameters.
- **Section 3 – Observed Data** – Summarises the traffic data used to inform, calibrate and validate the model.
- **Section 4 – Network Development** – Describes the creation of the initial network and the changes made.
- **Section 5 – Matrix Development** – Describes the process used to create the prior matrices.
- **Section 6 – Model Calibration** – Describes how the model was calibrated against observed traffic flows and journey times.
- **Section 7 – Model Validation** – Presents how the model compares to independent validation data.
- **Section 8 – Summary and Conclusions** – Summarises the final state of the model.

2 MODEL OVERVIEW

2.1 MODEL EXTENT

2.1.1. The Area of Detailed Modelling (ADM) is shown in Figure 2-1 and covers North Somerset and part of the neighbouring district of Sedgemoor. In this area all highway trips are fully represented and the network is coded as detailed simulation coding (e.g. individual turning movements modelled at junctions).

2.1.2. Outside the ADM is the 'peripheral' area, shown in Figure 2-2, which covers the neighbouring local authority areas: Bristol, South Gloucestershire, Bath and North East Somerset, Mendip and the remaining area of Sedgemoor. Within this area, the demand is also fully represented but the network is buffer coding with fixed link speeds. The ADM and peripheral area together make up the Fully Modelled Area (FMA). In TAG the peripheral area is also referred to as the 'Rest of the Fully Modelled Area'.

2.1.3. Beyond the Fully Modelled Area is the external area, shown in Figure 2-3, which covers the rest of the UK with a very simplified radial network that only includes key routes used to access the FMA. Trip demand in the external area of the model only includes trips that pass into, out of or through the Fully Modelled Area.

Figure 2-1 - Map of Area of Detailed Modelling

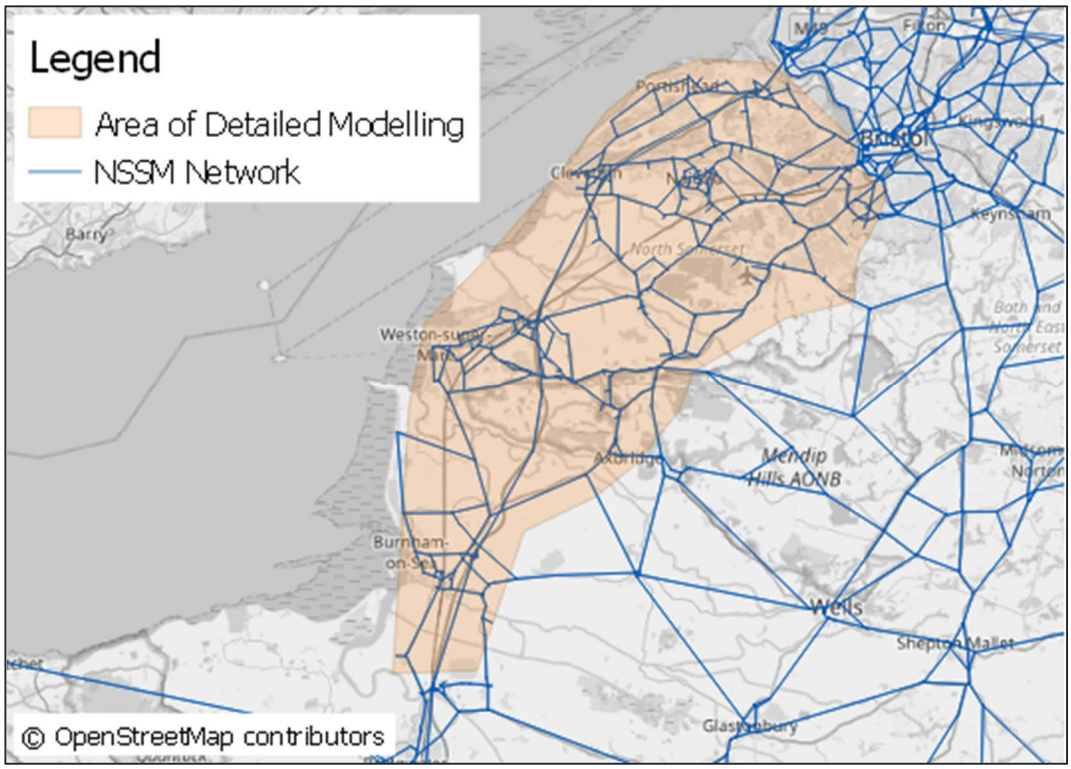


Figure 2-2 - Map of Peripheral Area

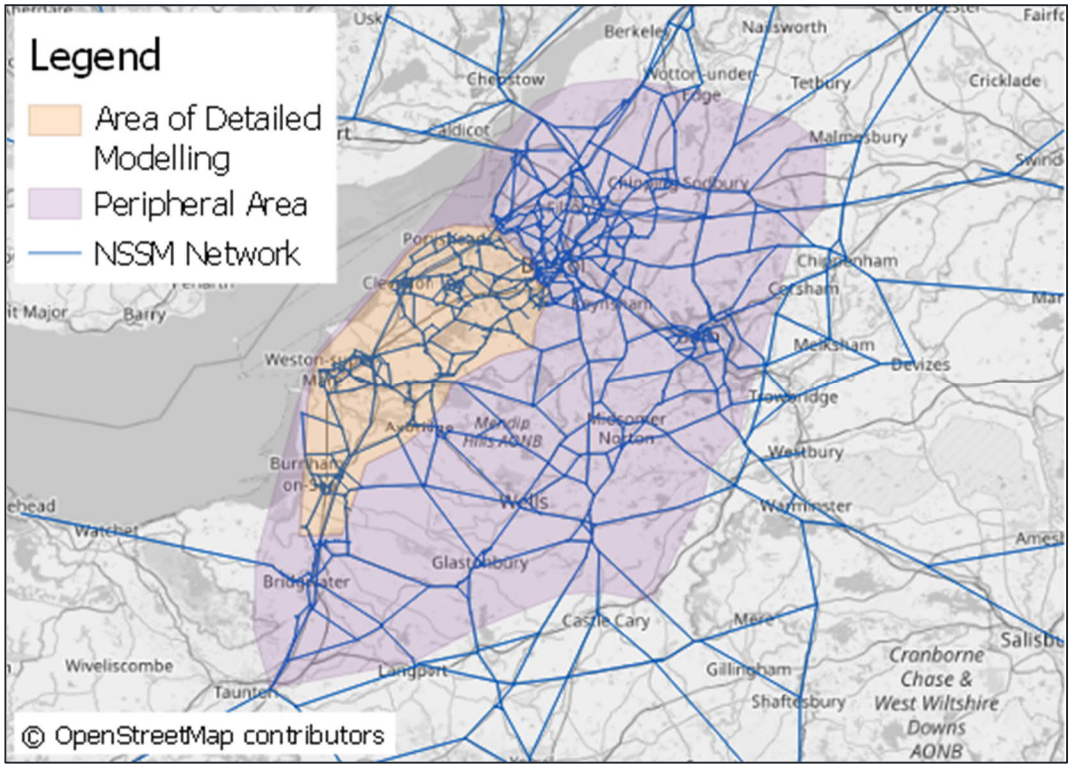
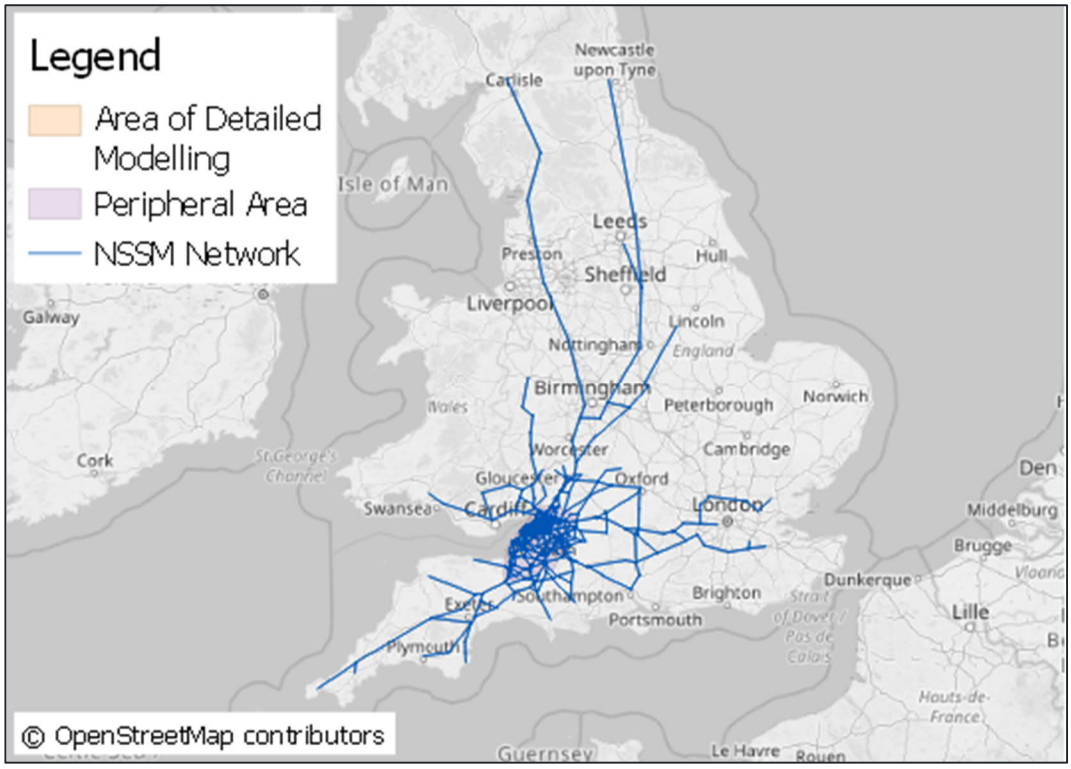


Figure 2-3 - Map of External Area



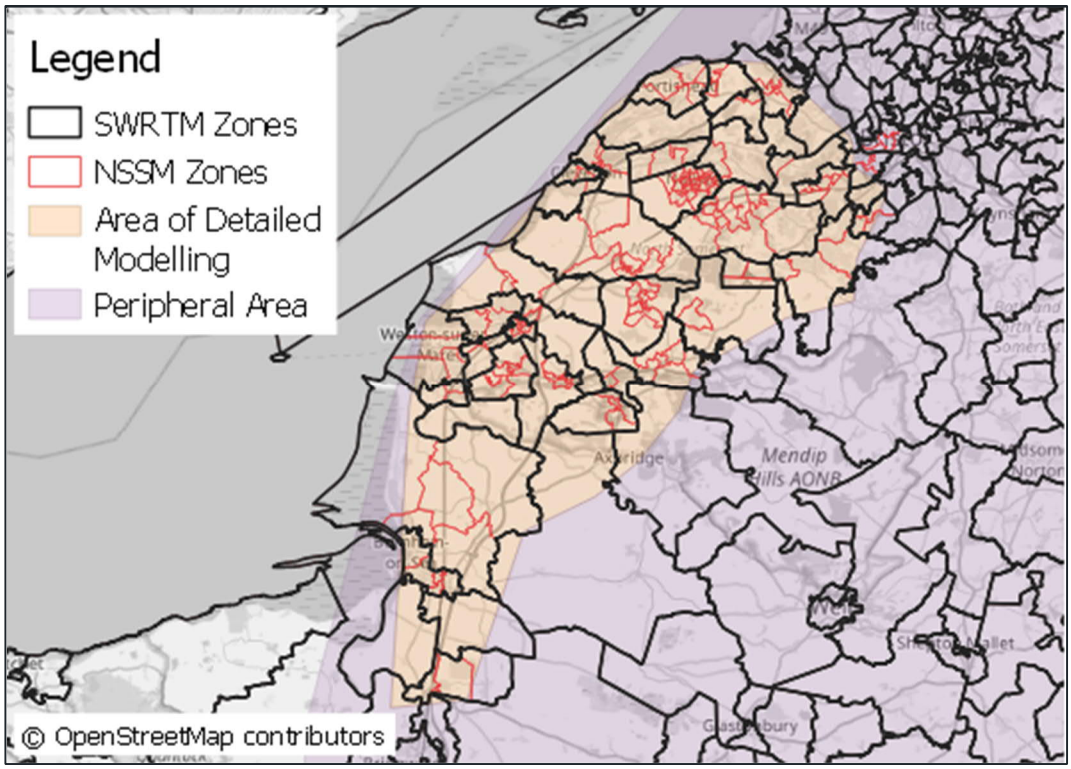
2.2 ZONE SYSTEM

2.2.1. The zone system is derived from the SWRTM zone system, with additional disaggregation of zones in the Area of Detailed Modelling and aggregation of zones in the External Area. The zone system in the peripheral area is largely unchanged from the SWRTM zone system except for some disaggregation in central Bristol to facilitate traffic routing.

2.2.2. Most of the zones follow Census OA/LSOA/MSOA geography. Some developments – Weston Gateway Business Park, Bristol Airport and Long Ashton Park and Ride – were not well represented by the 2010 Census boundaries and so additional zones were disaggregated in order to model them. There are 485 zones in total, of which 189 are new disaggregated zones that were added as part of the model's development. Most of these new zones are located within the ADM, while a few are within the peripheral area in Bristol and south of WsM.

2.2.3. Figure 2-4 below shows the zone system overlaid on the original SWRTM zone system.

Figure 2-4 - Map of zone boundaries in the Area of Detailed Modelling



2.3 BASE YEAR AND TIME PERIODS

2.3.1. The NSSM represents an average weekday (Monday – Thursday) in a base year of 2018. Most of the traffic survey data used to calibrate and validate the model was collected in 2018.

2.3.2. The model represents the following time periods:

- Peak AM hour (08:00 – 09:00)
- Average inter-peak hour (10:00 – 16:00)
- Peak PM hour (17:00 – 18:00)

2.3.3. The specific hours to be modelled during the AM and PM peak periods were identified by analysing the average daily pattern of flows observed at various ATC sites within the network. The diagrams below (Figure 2-5 and Figure 2-6 overleaf) show that peak flows occur at most sites between 8AM and 9AM and between 5PM and 6PM.

2.3.4. Some of the sites nearer to Bristol have an earlier peak between 7AM and 8AM and between 4PM and 5PM. However, it was agreed with NSC that the later peak hours would be more suitable for the strategic model, and more representative of North Somerset as a whole.

2.4 DEMAND SEGMENTATION

2.4.1. The demand matrices are divided into five user classes as shown in Table 2-1. This segmentation was inherited from SWRTM and remains suitable for this model.

2.4.2. The demand matrices are Passenger Car Unit (PCU) matrices. The PCU factors are shown in Table 2-2.

Table 2-1 – User classes

User class	Vehicle class / Trip purpose
1	Car – Business
2	Car – Commuting
3	Car – Other
4	Light Goods Vehicle (LGV)
5	Heavy Goods Vehicle (HGV)

Table 2-2 – PCU factors

Vehicle class	PCU factor
Car	1.0
LGV	1.0
HGV	2.5

Figure 2-5 - Observed peak hours at ATC locations (AM)

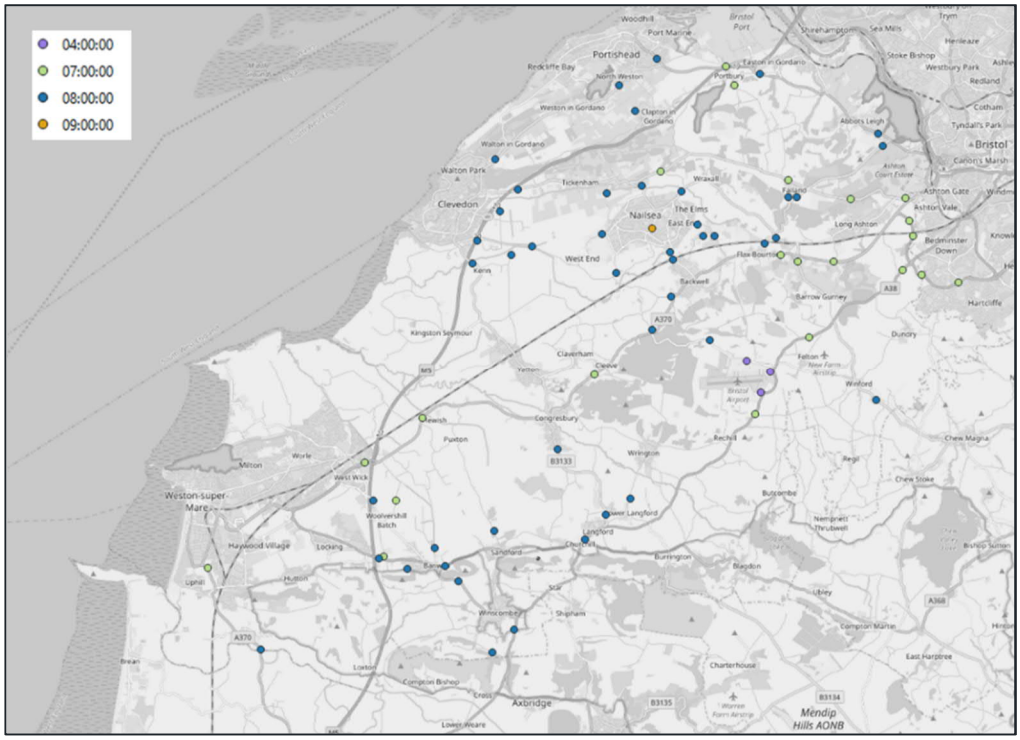
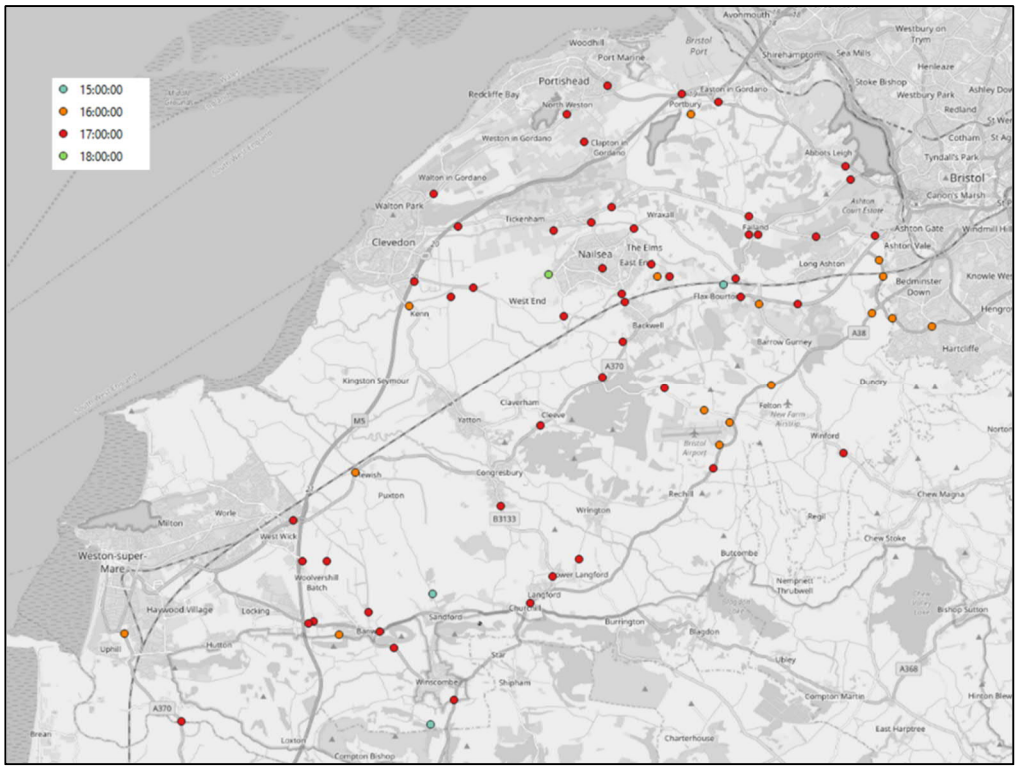


Figure 2-6 - Observed peak hours at ATC locations (PM)



3 OBSERVED DATA

3.1 TRAFFIC COUNTS

3.1.1. Automated Traffic Count (ATC) and Manual Classified Count (MCC) data was provided by NSC, Somerset County Council (SCC) and Sedgemoor District Council (SDC). Count data for the M5 was retrieved from the Highways England WebTRIS online system. Some additional manual classified counts were retrieved from the Department for Transport Road Traffic Statistics database.

3.1.2. The ATC and HE WebTRIS count locations are shown in Figure 3-1 and

3.1.3. Figure 3-2. The ATC data is a mix of permanent sites (from which data was extracted for a period of one neutral month) and temporary sites with a typical duration of 1-2 weeks.

3.1.4. For ATC data, outlier values have been removed based on a two-tailed t-test with the critical value (+/-1.96) by considering the mean and standard deviation. The average flows for all the individual ATCs are calculated after the removal of outliers from the raw data.

3.1.5. The MCC locations are shown in Figure 3-3 and Figure 3-4. These were classified turning counts which were mostly undertaken for the AM and PM peak hours. Some of the MCCs were undertaken for a 12-hour period and therefore provide information about inter-peak flows.

3.1.6. A combined list of all the count data used from the wider dataset, including details about duration and survey date, is provided in Appendix A.

Figure 3-1 - ATC locations (North Somerset)

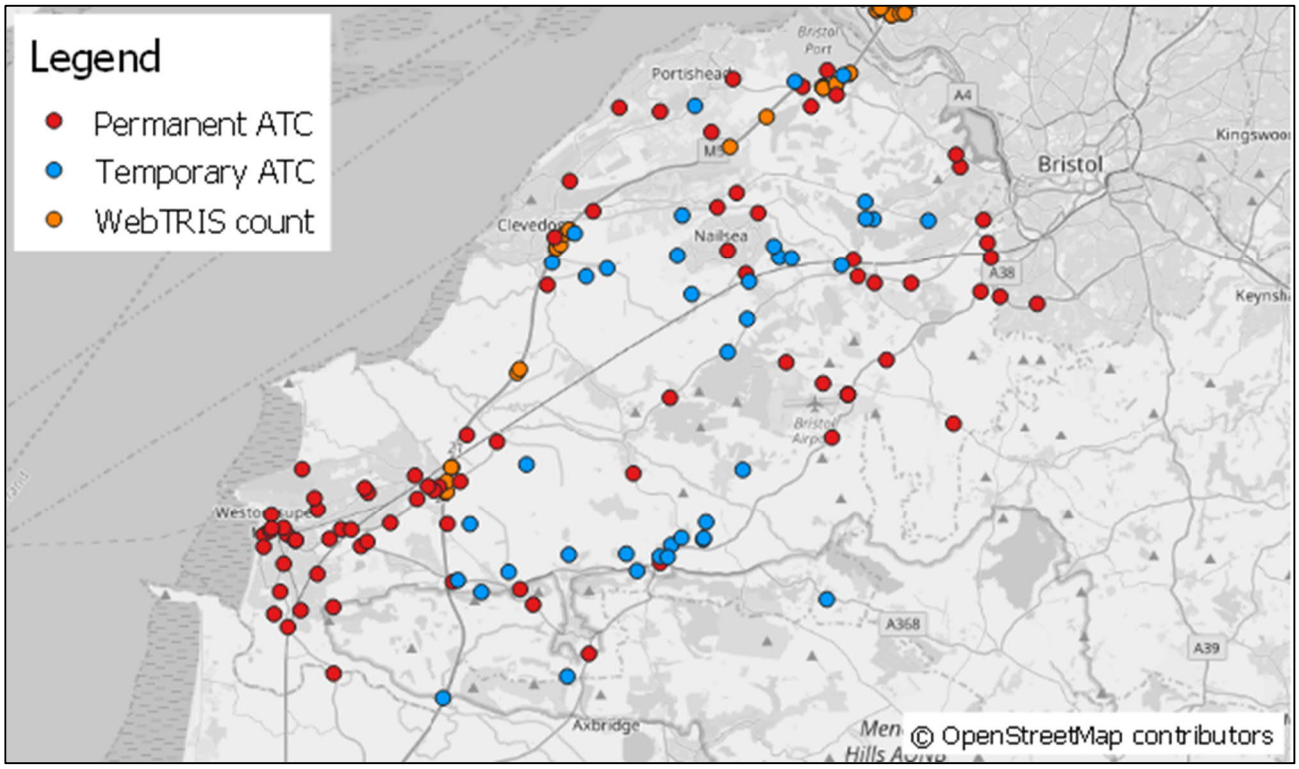


Figure 3-2 - ATC locations (Sedgemoor)

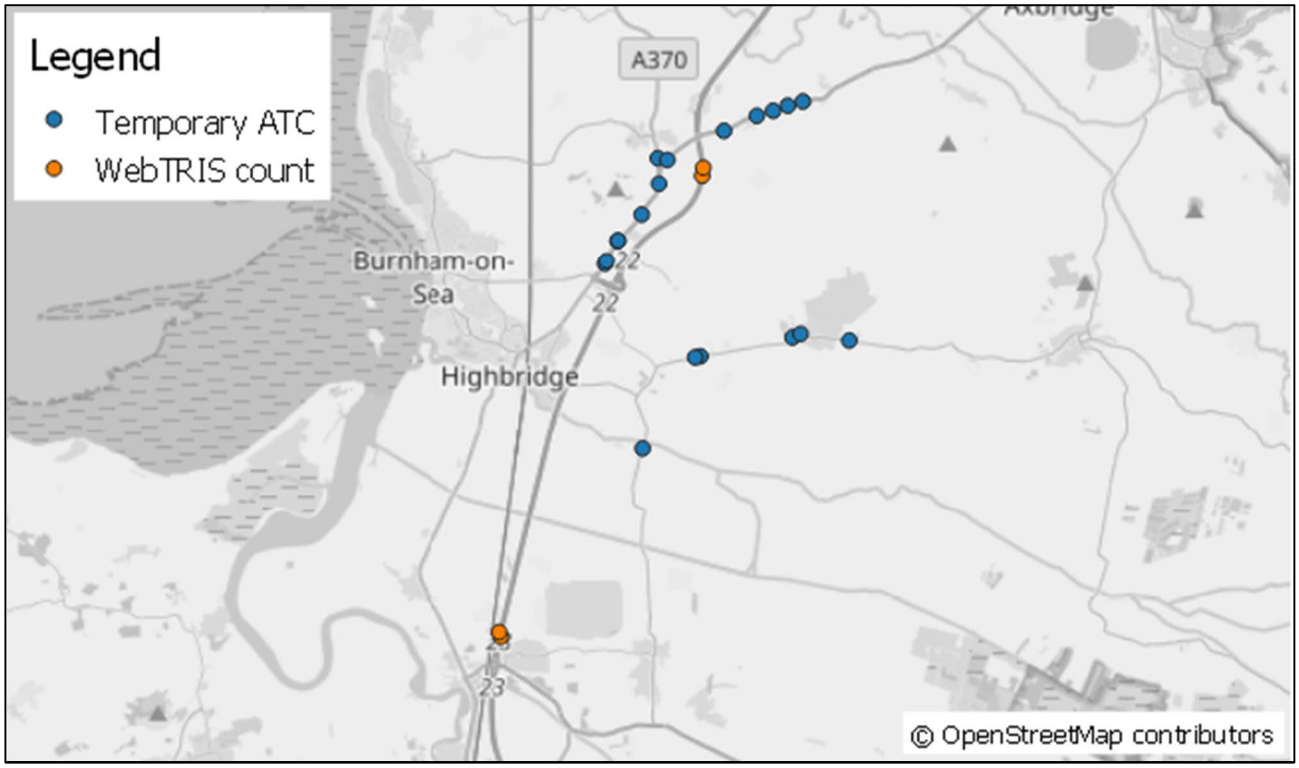


Figure 3-3 - MCC locations (North Somerset)

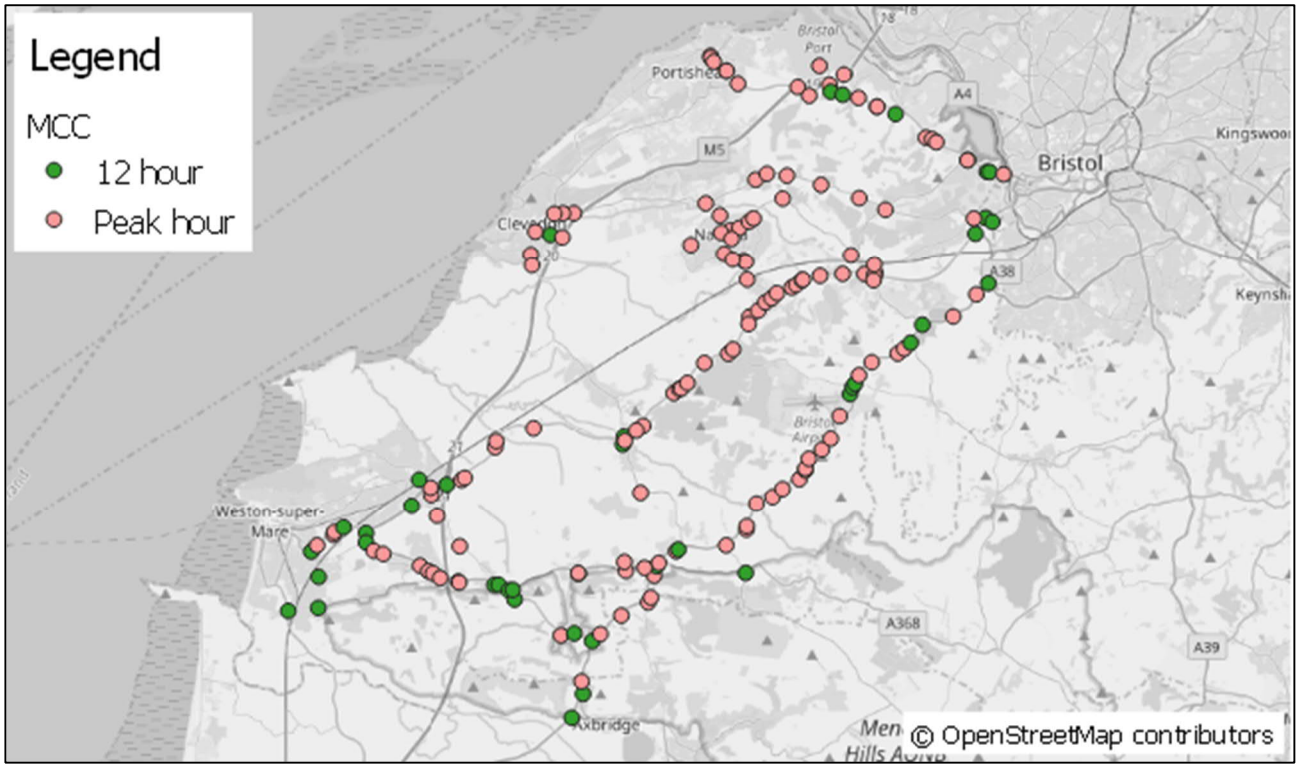


Figure 3-4 - MCC locations (Sedgemoor)

3.2 JOURNEY TIME DATA

3.2.1. Journey time data was sourced from the Trafficmaster database and provided by NSC and SCC for 19 routes as listed in Table 3-1 and illustrated in Figure 3-5 to Figure 3-7. These cover all of the major routes through North Somerset and many of the important routes that are key to local travel.

3.2.2. The samples of journey time data taken from the Trafficmaster dataset were based on the following parameters:

- Date range: 01/01/2018 – 31/12/2018
- Time range: 08:00-09:00 (AM), 10:00-16:00 (IP), 17:00-18:00 (PM)
- Days: Monday – Thursday
- All vehicle classes combined

Table 3-1 – Journey time routes

Route	Name	Start	End	Distance (km)
A	A38	Churchill	South Bristol Link Road	15.9
B	A369	Portishead	B3129	8.8
C	A370 (WsM to Brockley)	WsM	Brockley	15.8
D	A370 (Brockley to Bristol)	Brockley	Brunel Way	11.2
E	A371/A368	WsM	Churchill	10.4
F	B3128/B3130	Clevedon	Brunel Way	16.6
G	B3133	Langford	Clevedon	14.2
H	Barrow Street	A38	Weston Road	3.0
I	Downside Road	Brockley	Winford	7.7
J	M5 J18 to J21	J18	J21	23.2
K	Nailsea/Backwell	Backwell	Stone Edge Batch	5.5
L	Nailsea to M5 J18 via Causeway	Nailsea	M5 J18	20.5
M	Nailsea to M5 J18 via Pound Lane	Nailsea	M5 J18	14.1
N	Portbury Lane	Nailsea	A369	7.3
O	M5 J21 to J23	J21	J23	24.7
P	A370 (South of WsM)	A38	WsM	11.1
Q	A38 (South of Churchill)	A370	Churchill	19.2
R	A38 (East Brent to Dunball)	Dunball	A370	12.3
S	Burnham-on-Sea to M5 J23	Burnham-on-Sea	M5 J23	11.3

Figure 3-5 - Map of journey time routes (A-J)

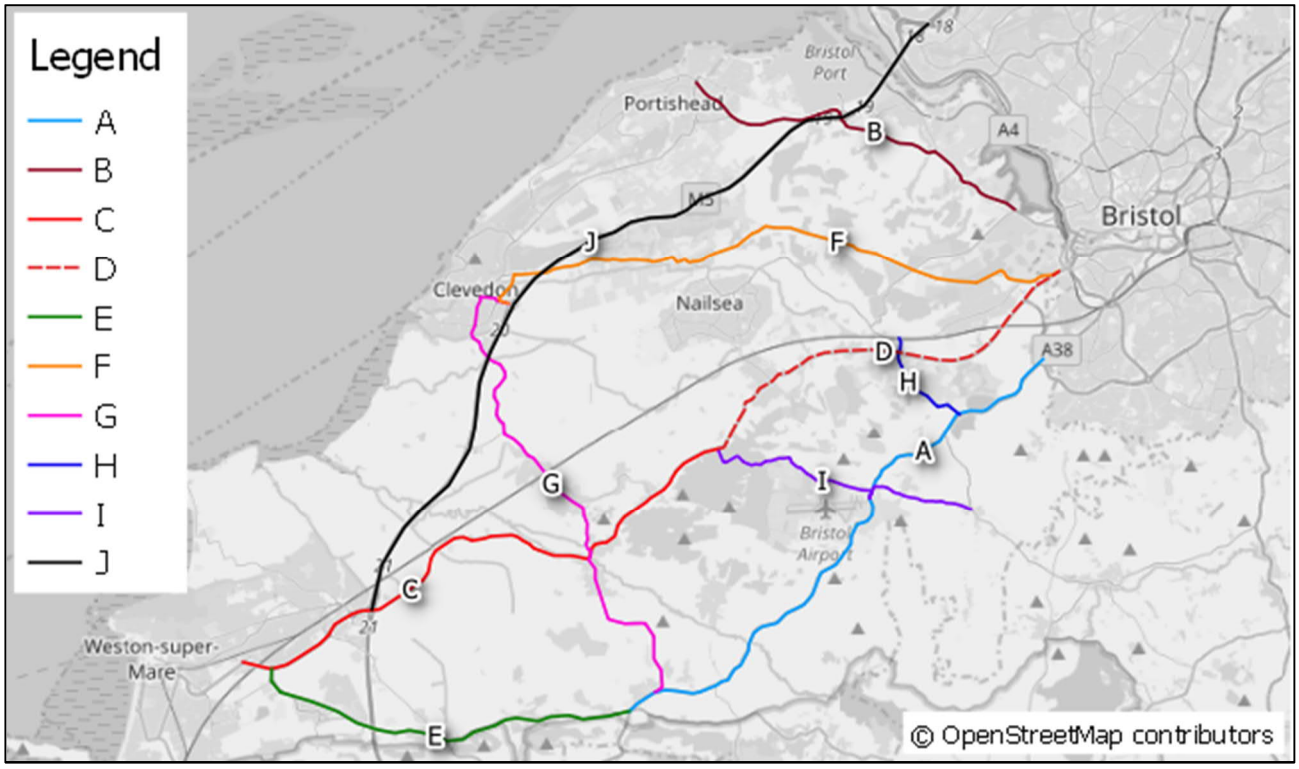


Figure 3-6 - Map of journey time routes (K-N)

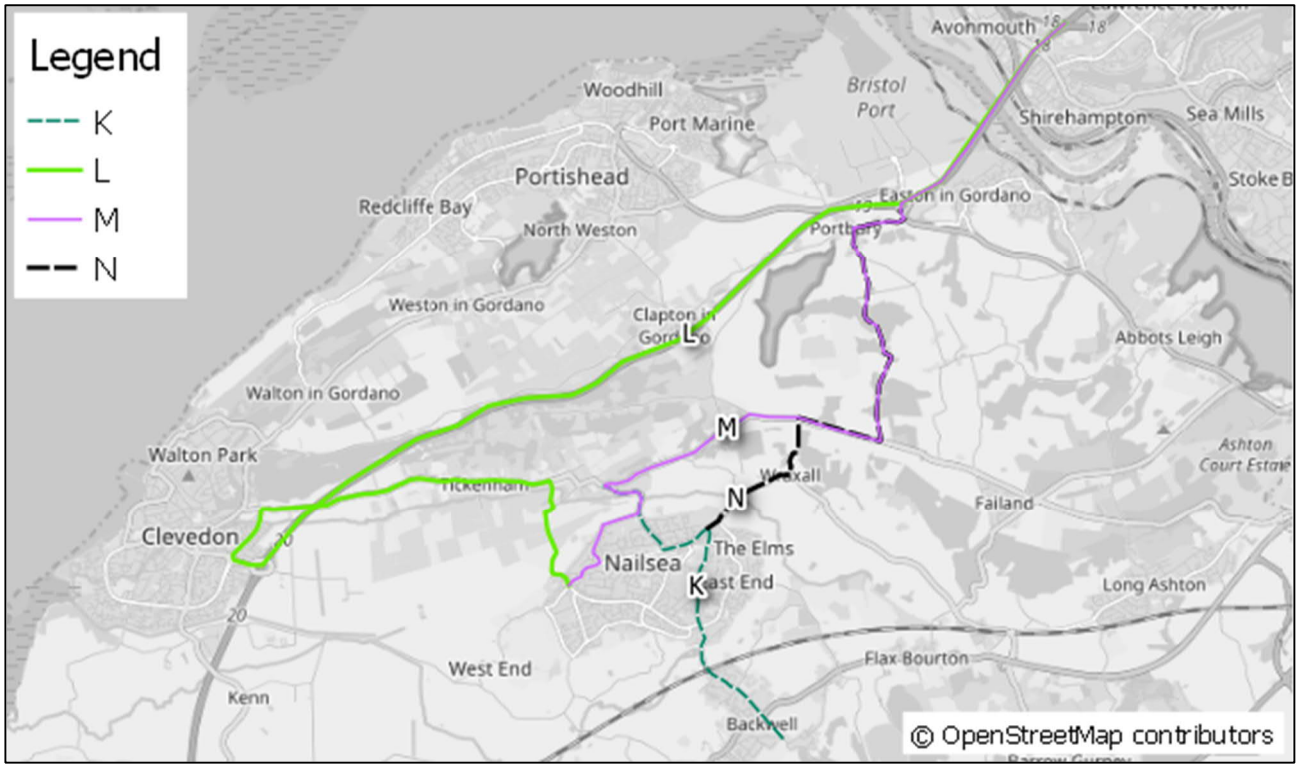
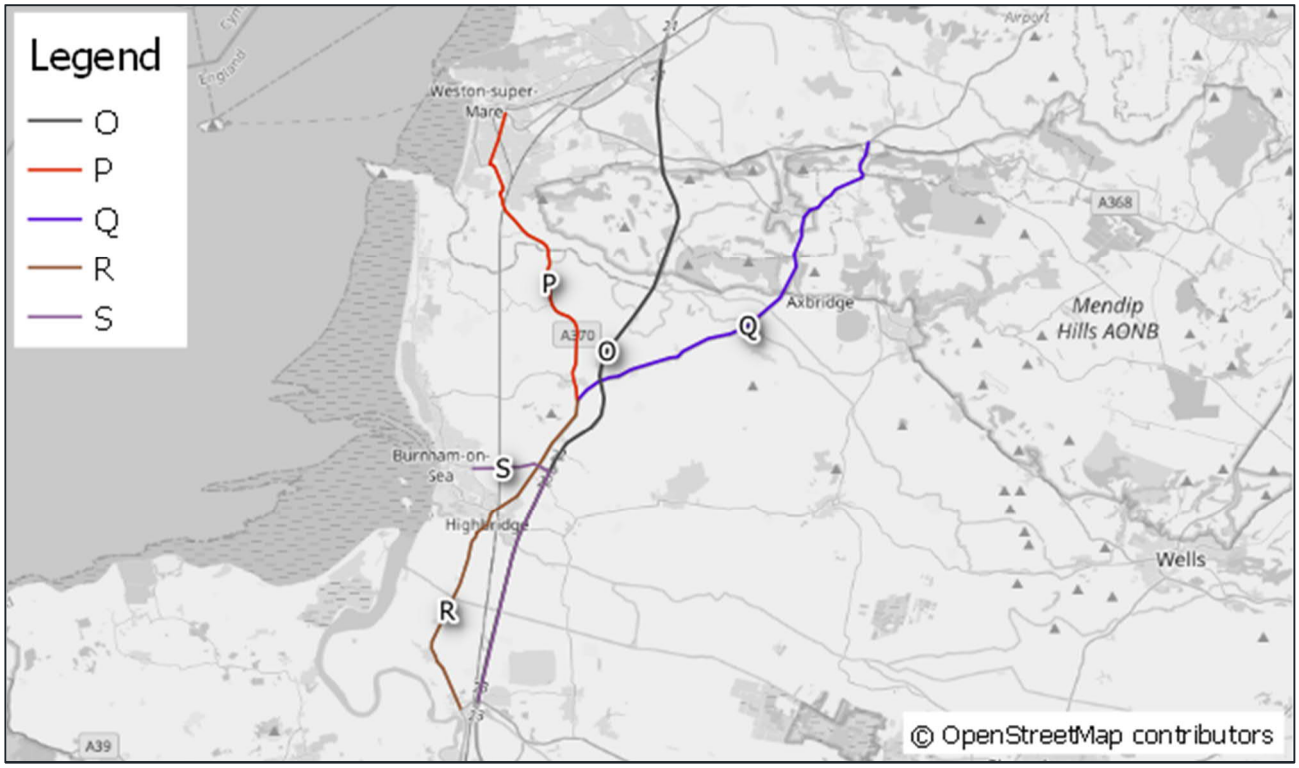


Figure 3-7 - Map of journey time routes (O-S)



4 NETWORK DEVELOPMENT

4.1 NETWORK CODING

4.1.1. The initial network was created from a combination of existing models. The previous BSWEL model network was used as a starting point for the ADM, and the original cordon of SWRTM was used for the peripheral network. The external network was generated as new network and added onto the edge of the peripheral network afterwards.

4.2 AREA OF DETAILED MODELLING

Network Detail

4.2.1. A number of changes were made, primarily to increase the detail of modelling around Highbridge, Nailsea, Weston-super-Mare, Clevedon, Portishead, and the south-west area of Bristol. Figure 4-1 to Figure 4-4 below show the additional links that were added within the ADM – the black links are the initial network and the grey links are the final network.

Figure 4-1 - Network changes (Weston-super-Mare)

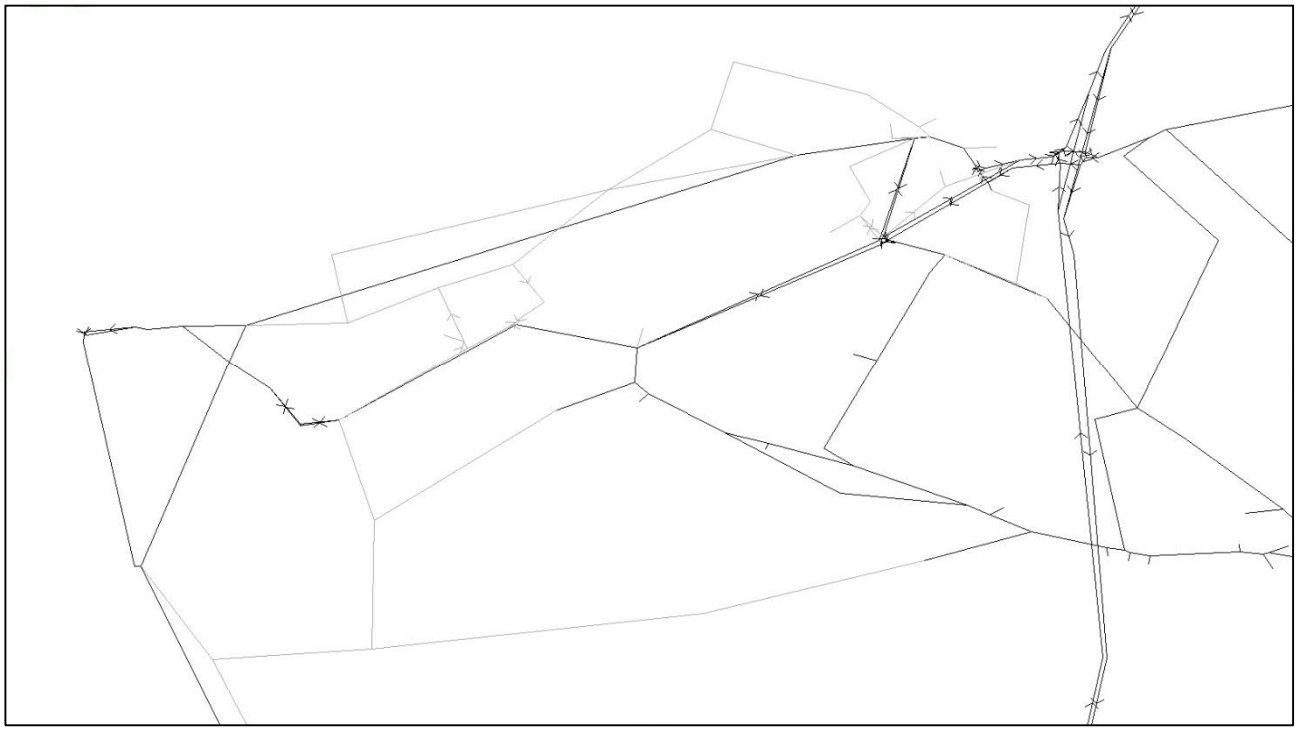


Figure 4-2 - Network changes (Nailsea and Clevedon)

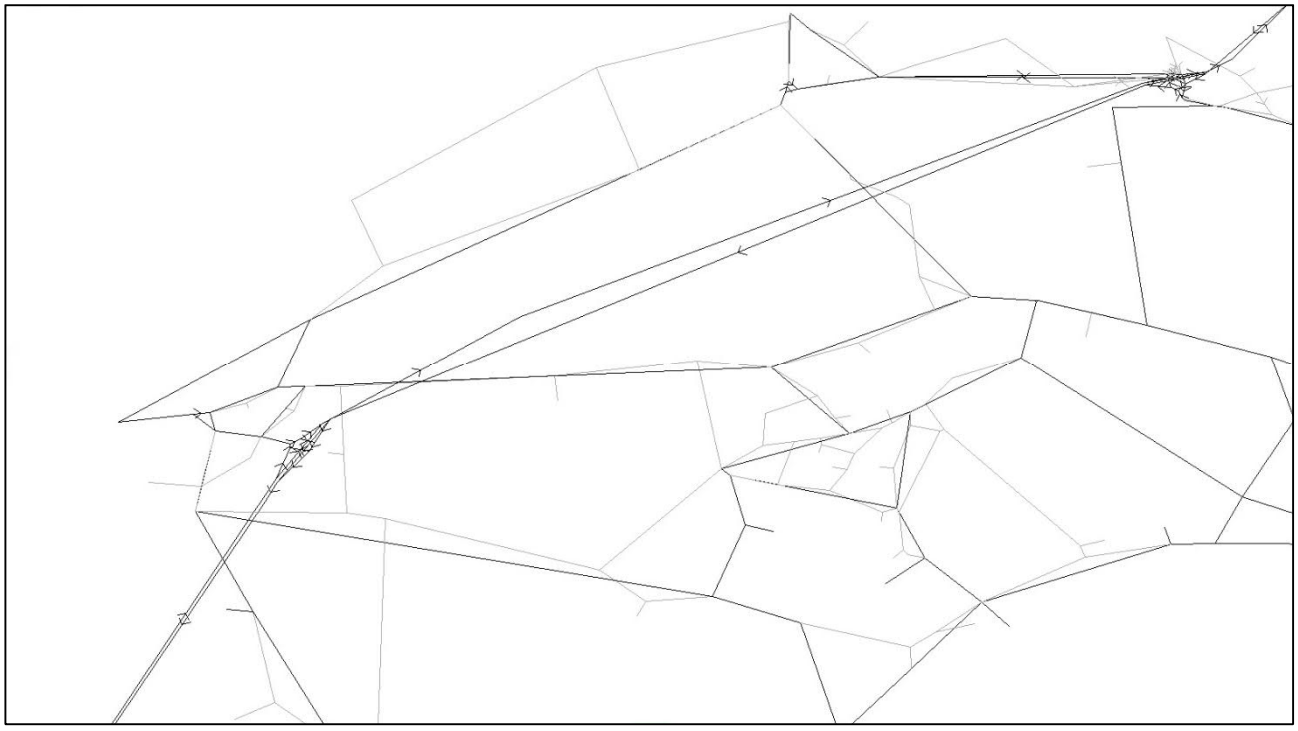


Figure 4-3 - Network changes (Southwest Bristol)

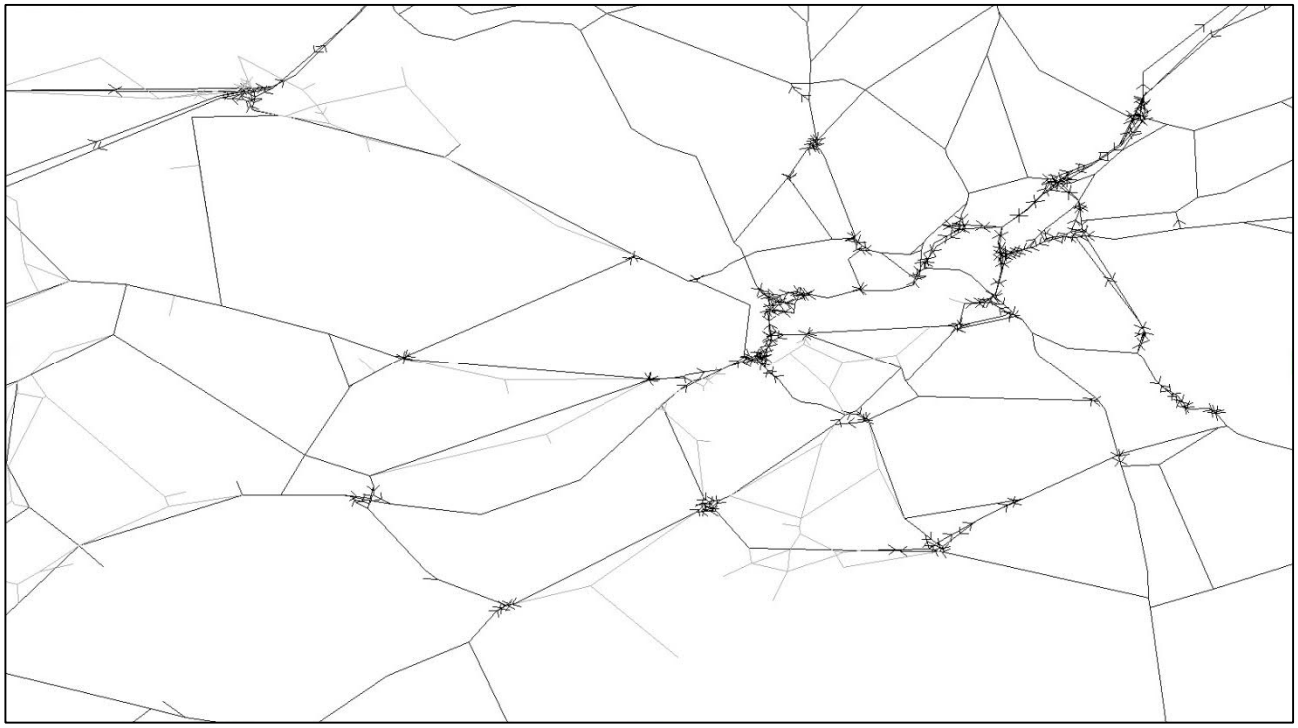
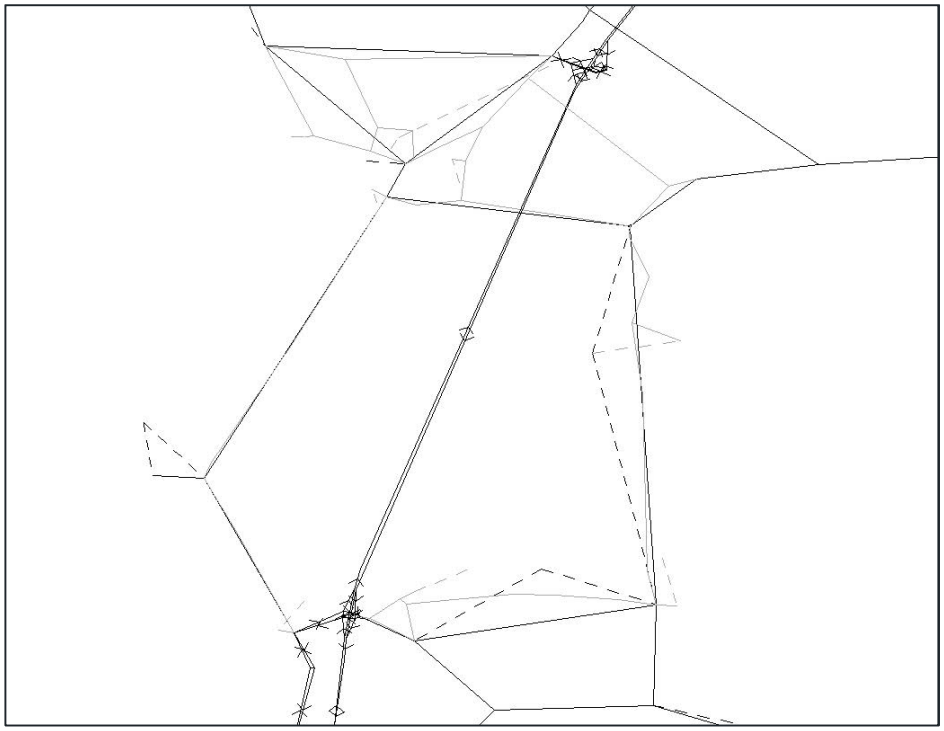


Figure 4-4 - Network changes (Highbridge)



Speed Flow Curves

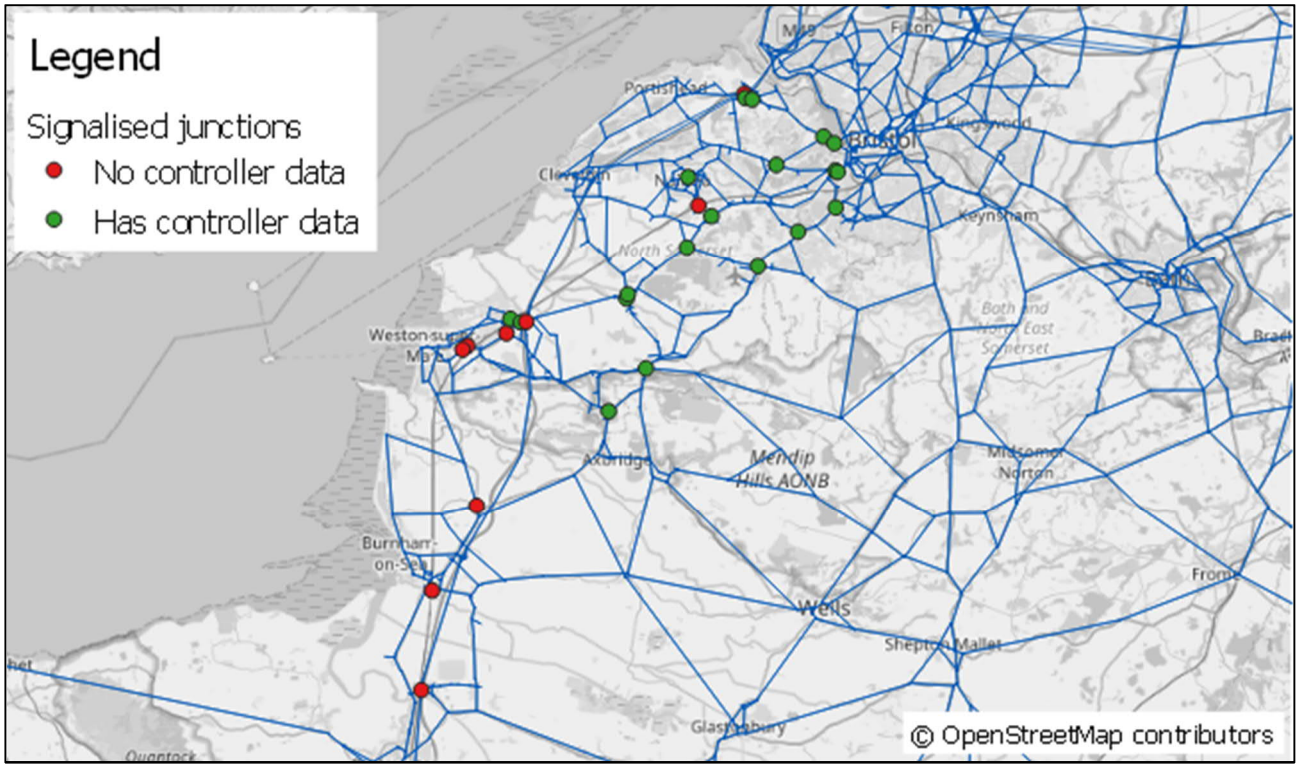
4.2.2. Given the rural nature of much of the network, many of the links in the ADM have retained the speed flow curves allocated to them within SWRTM. For some links speed flow curves have been substituted for others from the standard set of RTM curves where it was felt that they did not correctly represent speeds or capacities.

4.2.3. In some cases where minor rural links were added to the network, new bespoke speed flow curves were used with more restrictive capacities and speeds than those available in the standard RTM curves.

Traffic Signals

4.2.4. Signal controller data was available for the majority of signalised junctions in the ADM (See Figure 4-5). The signal stages and timings for these junctions were initially coded according to the controller data based on maximum green times. For signalised junctions with no available controller data, stages and timings were assumed using typical staging and inter-green times.

Figure 4-5 - Signalised junctions in NSSM



4.2.5. Signals with controller data were optimised manually, adjusting both green times and cycle times within the constraints of the data. Signalised junctions with no available data were optimised using the SIGOPT process, which adjusts both green times and offsets to minimise V/Cs and queues. West Wick roundabout, M5 Junction 19 and M5 Junction 21 consist of multiple adjacent signalised nodes, so these were optimised as groups in SIGOPT.

4.2.6. Signal optimisation was carried out regularly as further changes were made to the network and the matrices.

4.3 REST OF FULLY MODELLED AREA

4.3.1. The structure of SWRTM network was retained for the peripheral network with no links added or removed. It was converted from simulation to buffer coding and speeds were fixed to the congested speeds present within SWRTM for each time period. The peripheral area of the model therefore reflects base year SWRTM both in terms of demand and speed.

4.3.2. A different approach was taken for south-west Bristol and WsM where the coded link speeds were set to observed speeds along key routes where these were found to be important to route choice for trips to and from North Somerset, and for which it was difficult to obtain a sufficient level of delay with typical simulation coding or speed-flow relationships.

Bristol network

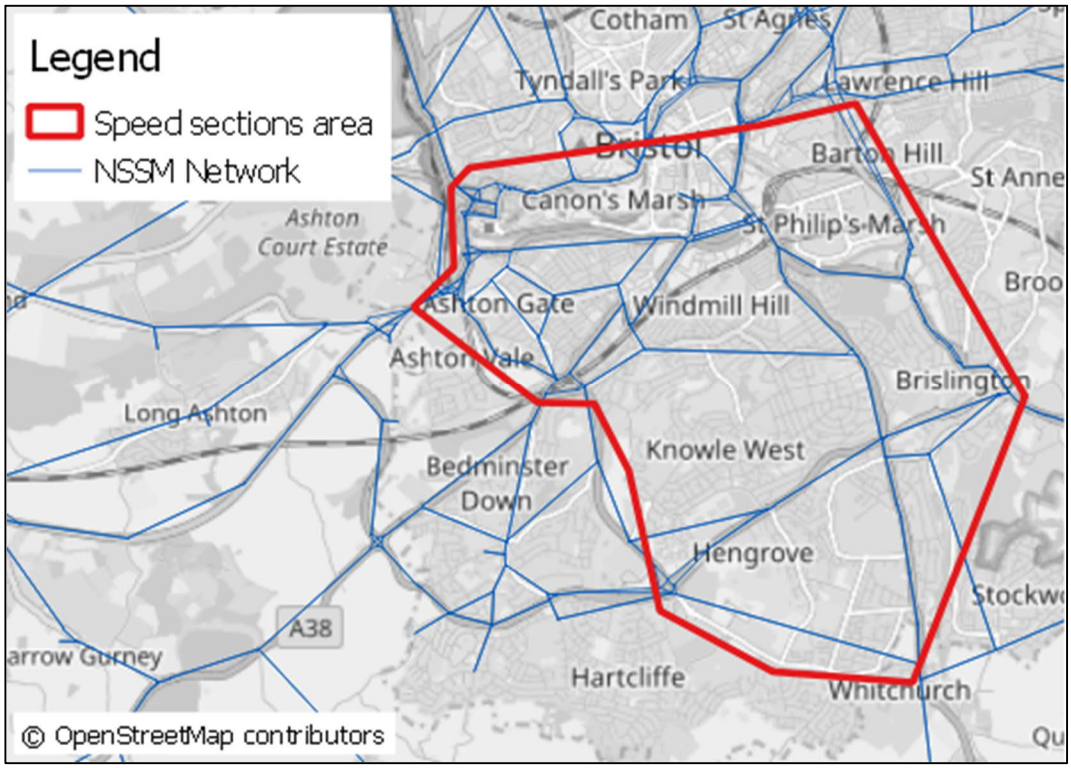
4.3.3. The A370 route into Bristol (via Brunel Way or Bedminster bridge) is severely congested in the peak hours and, based on available speed information, appears to tail back onto the A370 into North Somerset as far as the South Bristol Link. It is not possible to create this level of delay or represent the tail back conditions in SATURN and yet the delays are important for to obtaining satisfactory

route choice within the model. Traffic flow on the A369 corridor in particular, and use of the Clifton toll bridge, is sensitive to delay on the A370 route and insufficient inbound delay results in overuse of the A369 and under-use of the M5 and Clifton routes.

4.3.4. It was found that the best approach for ensuring that sufficient delay is present in the model was to code the observed congested speeds into the network within the south west area of Bristol. Figure 4-6 shows the area within which observed speeds were applied. These observed speeds were taken from Trafficmaster data for the A370 and A38, and for minor roads speeds were estimated using Google Maps travel times (an average of minimum and maximum peak hour travel times was found to yield the best overall assigned flows in the area). Whilst this approach does ensure realistic delays and improves route choice in the base year, the speeds are fixed and the model will therefore not reflect any further reduction in speed in the future years without manual intervention. However, it was felt that this was the best overall solution without extending the ADM to cover central Bristol and validating this area in detail.

4.3.5. It is envisaged that the speeds on links will be manually adjusted during forecasting to reflect the impact of any further traffic growth. In the short term, for the purpose of Local Plan forecasting, this may be based on growth forecasts from the GBATS model and NTEM. In the longer term it is expected that a new model of the WECA area will be developed and will provide an up to date and detailed representation of this area of Bristol.

Figure 4-6 - Area within Bristol where observed speeds applied

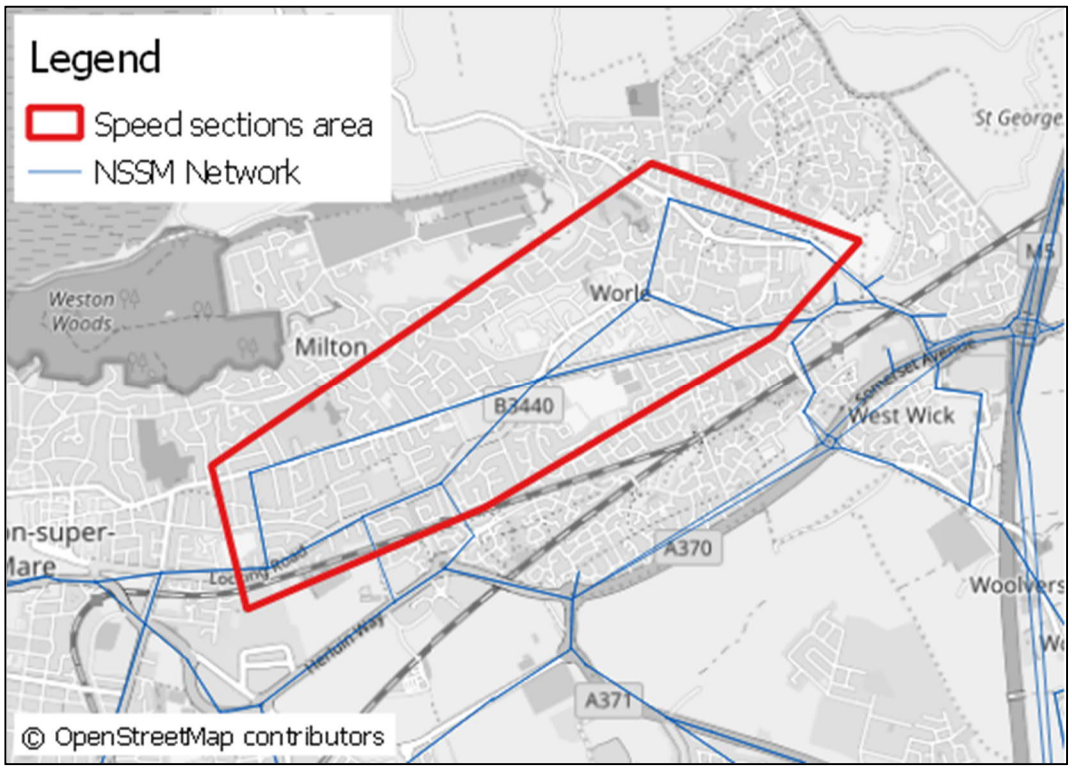


Weston-super-Mare

4.3.6. WsM was coded with a skeletal representation, so buffer style coding was used for links west of Queensway and Flowerdown bridge. A similar approach whereby fixed speeds were used on this

part of the network was necessary to improve route choice between the A370 and B3440. Figure 4-7 shows the area within which observed speeds were applied.

Figure 4-7 - Area within WsM where observed speeds applied



4.4 EXTERNAL NETWORK

4.4.1. The external network was created to represent long-distance trips to and from North Somerset and is modelled at a low level of detail. For example, motorway links were coded with fixed 70mph speeds and all other links were coded with fixed 50mph speeds. Coded distances were straight line point-to-point distances only.

4.4.2. To define the routes that should be represented in the external network, a select link analysis based on a cordon around North Somerset was carried out within the full SWRTM model. This showed which routes carried a significant amount of traffic to, from and through North Somerset.

5 MATRIX DEVELOPMENT

5.1 OVERVIEW

5.1.1. There were three main steps in developing the prior matrix:

1. Expansion of the cordon edge zones to the proposed external zone system – this step involved aggregating zones outside of the FMA and removing trips to and from these external zones that do not pass through the ADM.
2. Disaggregation of zones inside the ADM where additional detail was required.
3. Convert the AM and PM matrices from average hour matrices to peak hour.

5.1.2. Whilst the SWRTM model has a 2015 base year, no specific steps were taken to apply growth over the period between 2015 and the new base year of 2018. It was felt that traffic volumes would not have changed substantially enough in the three-year period and that any differences could be accounted for within matrix calibration.

5.2 ZONE STRUCTURE

Cordon expansion

5.2.1. As the initial network was only a cordon of SWRTM, the cordon matrix had to be expanded to add the external zone system in place of the zones at the cordon edge. The following method was adopted for this:

- A select link analysis was carried out in the full version of SWRTM to provide a matrix of all external trips moving into or through the cordon (with all internal-internal trips removed).
- The zones in this matrix were combined to form the proposed zone system in the external area.
- This aggregated matrix of external trips was added into the cordon matrix.
- The cordon edge zones were removed from the cordon matrix.

5.2.2. After this step, the matrix included the external area zones as new zones, without changing the trip matrix within the internal area.

Zone Disaggregation

5.2.3. For the second step, another zone plan was created that disaggregated zones inside the ADM. The splitting was carried out along census boundaries, and more built-up areas were split into a greater number of zones than rural areas. Weston-super-Mare and Nailsea in particular were disaggregated into small zones reflecting Census Output Areas.

5.2.4. Census data was used to disaggregate zones. Trips were divided amongst the new zones based on the number of car-owning households located within the new disaggregated zone compared to the wider parent zone. Intra-zonal trips in the parent zone were divided similarly between the child zones and therefore became inter-zonal trips between the child zones.

5.2.5. In areas where a large amount of zone disaggregation was undertaken, it was necessary to refine the trip distribution using matrix estimation later during model calibration.

5.3 PEAK HOUR ADJUSTMENT

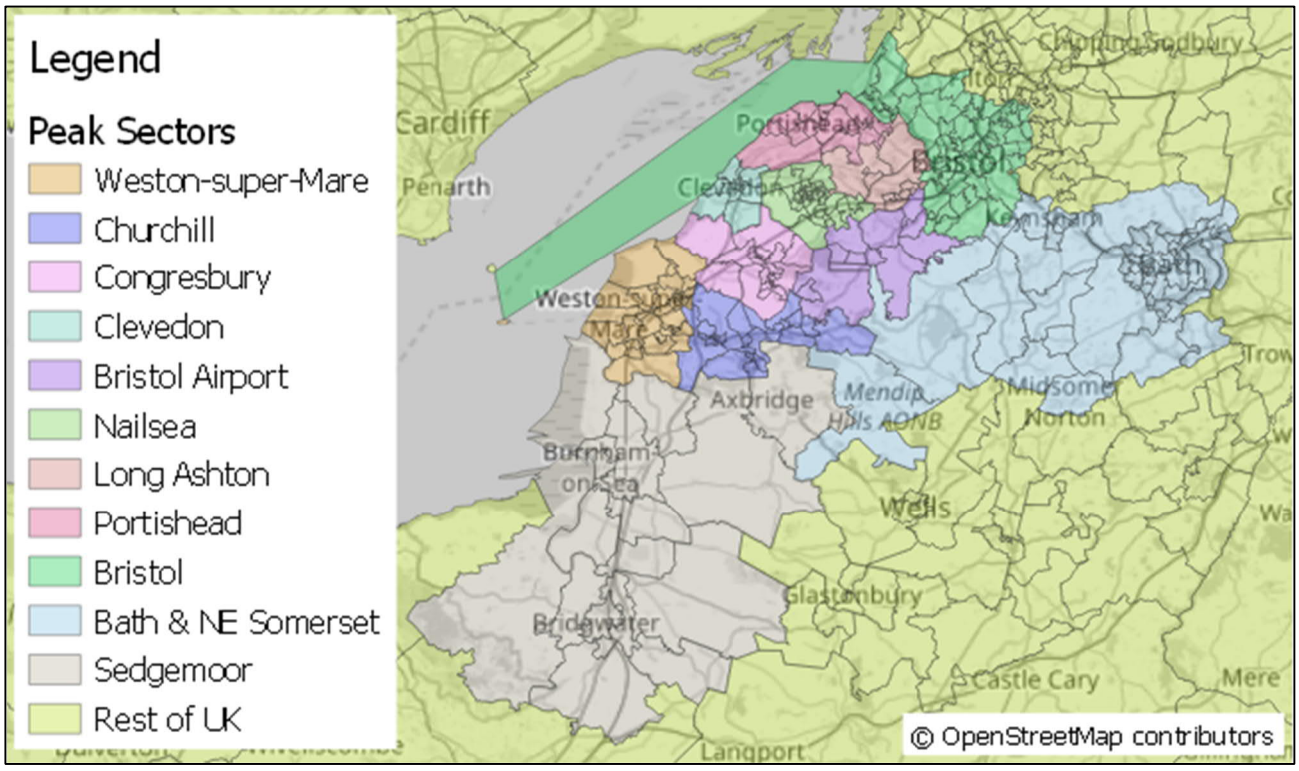
5.3.1. For the third step, the AM and PM matrices were adjusted from their original average peak hour format (i.e. average hour between 7-10AM and 4-7PM) to the modelled peak hours of 8-9AM and 5-6PM.

5.3.2. Several methodologies for making this adjustment were investigated:

- A global adjustment factor based on all available count data - this approach was considered to be too coarse.
- Sector-based adjustment factors based on count data within the sector – this was applied to intra-sector trips but was still felt to be too coarse for inter-sector movement.
- Directional factors into and out of sectors based on uplift factors derived from traffic count data on links broadly defining the edge of the sectors. This approach allows for the differential in peak times between different areas and was felt to be the best approach for inter-sector movements.

5.3.3. The sectors used are displayed in Figure 5-1. For sectors outside North Somerset the inter-sector adjustment was applied (as this may have an impact to traffic demand to/from North Somerset) but it was not necessary to apply the intra-sector adjustment as flows in these sectors do not have a bearing on the North Somerset area. No adjustment was made to the 'Rest of UK' sector.

Figure 5-1 - Map of peak hour sectors



6 MODEL CALIBRATION

6.1 NETWORK CALIBRATION

6.1.1. The main changes made to the network during model calibration were as follows:

- Updating link properties such as free-flow speeds and distances.
- Updating junction layouts, including lanes and lane turn allocations.
- Increasing specific turn saturation flows, particularly where observed flows were higher than the modelled turn capacity.
- Changing speed-flow curves for links where the cruise speeds or capacities were inconsistent with observed data.

6.1.2. At some junctions signal timings were adjusted in line with delays evident in the observed journey time data. Where signal controller data was available, stage timings were kept within the stated minimum and maximum green times.

6.2 MATRIX CALIBRATION

Overview

6.2.1. The trip matrices have been calibrated through a series of manual matrix adjustments and subsequently a matrix estimation procedure using a selection of the available traffic count data.

6.2.2. Refinement of the prior matrices was a key step as the matrices were derived from a much larger strategic model with limited local detail and a coarser zone system. In addition, the source model was older than the base year and based on average on average peak hour demand. Whilst some steps were taken to apply a peak hour uplift when developing the prior matrices, there is still a need for local calibration.

Manual Matrix Adjustments

6.2.3. Before carrying out matrix estimation, a number of manual matrix adjustments were made to calibrate link flows, particularly where there were larger discrepancies between assigned and observed flows.

6.2.4. Table 6-1 shows the net change in the prior matrix due to the manual adjustments. The manual adjustments have reduced the overall number of trips modelled, but only by about one percent, which is not a significant change.

Table 6-1 – Prior matrix totals

Time period	Initial Prior	Final Prior	Net Diff	% Diff
AM	168,879	167,354	-1,525	-0.9%
IP	126,781	125,852	-929	-0.7%
PM	170,864	168,723	-2,141	-1.3%

Matrix Estimation

6.2.5. Following the manual matrix adjustments, a matrix estimation process was undertaken using the matrix estimation functions within SATURN. The following constraints were input into matrix estimation as these were key locations that needed refinement:

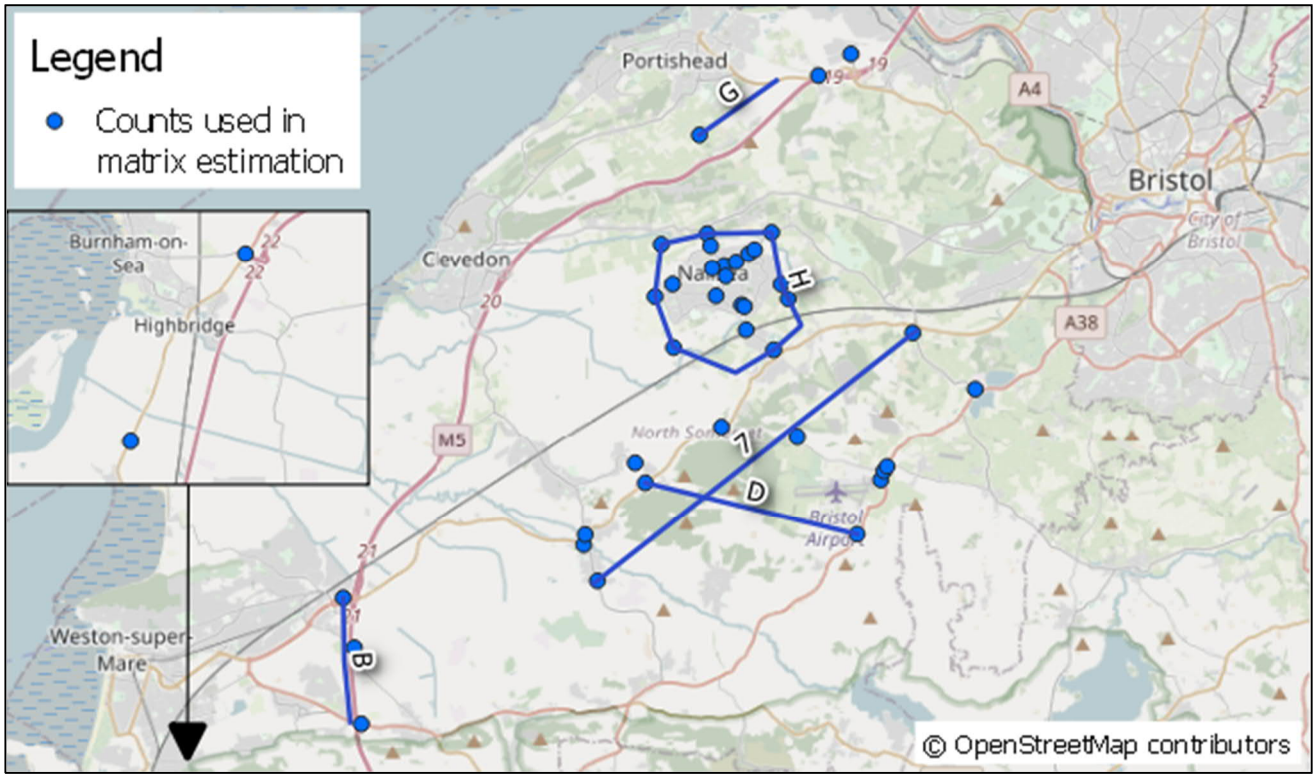
- Screenlines B, D, and G.
- Cordon around Nailsea covering all available routes in and out of the town (Screenline H) – this was necessary due to the amount of new network and zonal detail added to the model in this area.
- Trip end constraints at zones representing Bristol Airport and Royal Portbury Docks – these trip ends had been directly observed and therefore it was useful to keep them fixed throughout the calibration process.

6.2.6. In addition to the screenlines, a number of turning counts were also included as constraints in matrix estimation. These were focussed on areas where a large amount of zone disaggregation had been applied and more detailed count information was necessary to refine the trip distribution. The following turning count constraints were applied:

- All available turning count data within Nailsea (applies to AM and PM peak only as inter-peak data was not available) – this was included because the network and zone system had been updated significantly in this area as it was only represented with a single zone in the parent SWRTM model.
- Turning counts at junctions in Congresbury.
- Turning counts at Edithmead roundabout, A38 / Downside Road and A38 / Barrow Street.

6.2.7. Figure 6-1 shows the location of the calibration counts and screenlines.

Figure 6-1 - Matrix estimation count locations



Changes due to matrix estimation

6.2.8. The TAG criteria for the significance of changes caused by matrix estimation are shown in Table 6-2 below.

Table 6-2 – TAG criteria for significance of matrix estimation changes

Measure	Significance criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R^2 in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R^2 in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

Matrix Totals

6.2.9. Table 6-3 below shows the matrix totals before and after matrix estimation. The overall net change is not significant in any time period, being less than one percent in the AM and PM peaks and two percent in the IP period.

Table 6-3 – Post ME2 matrix totals (pcus)

Vehicle class	Prior	Post ME2	Net Diff	% Diff
AM				
Car	140,347	141,010	+664	+0.5%
LGV	17,951	18,510	+559	+3.1%
HGV	9,056	9,398	+341	+3.8%
Total	167,354	168,918	+1,563	+0.9%
IP				
Car	101,582	103,424	+1,843	+1.8%
LGV	15,069	15,484	+415	+2.8%
HGV	9,201	9,469	+269	+2.9%
Total	125,852	128,378	+2,526	+2.0%
PM				
Car	148,624	149,251	+627	+0.4%
LGV	14,212	14,693	+481	+3.4%
HGV	5,887	5,672	-215	-3.6%
Total	168,723	169,616	+893	+0.5%

Regression Statistics

6.2.10. Table 6-4 below shows the regression statistics based on all cells for each time period. The corresponding scatter plots can be found in Appendix B. Every measure in every time period remains within the TAG significance criteria.

Table 6-4 – ME2 regression statistics

Time period	Measure	Intercept	Slope	R^2
AM	Cell to cell	0.006	1.000	0.9978
	Row totals	3.548	0.999	0.9983
	Column totals	4.164	0.997	0.9988
IP	Cell to cell	0.010	1.001	0.9986
	Row totals	3.563	1.006	0.9982
	Column totals	3.630	1.006	0.9984
PM	Cell to cell	0.003	1.000	0.9967
	Row totals	2.835	0.997	0.9992
	Column totals	1.758	1.000	0.9978

Trip Length

6.2.11. The mean trip lengths and the standard deviations before and after matrix estimation are shown in Table 6-5. All the means and standard deviations are changed by one percent or less, well within the 5% TAG criteria.

6.2.12. Trip length distributions before and after matrix estimation are shown in Figure 6-2 to Figure 6-4.

Table 6-5 – Trip length statistics

Time period	Mean trip length (km)		% diff	Standard deviation (km)		% diff
	Prior	Post		Prior	Post	
AM	26.9	26.8	-0.4%	49.1	49.0	-0.1%
IP	32.2	32.4	0.4%	60.3	60.2	-0.3%
PM	25.8	25.5	-1.1%	48.6	48.4	-0.6%

Figure 6-2 - AM trip length distribution

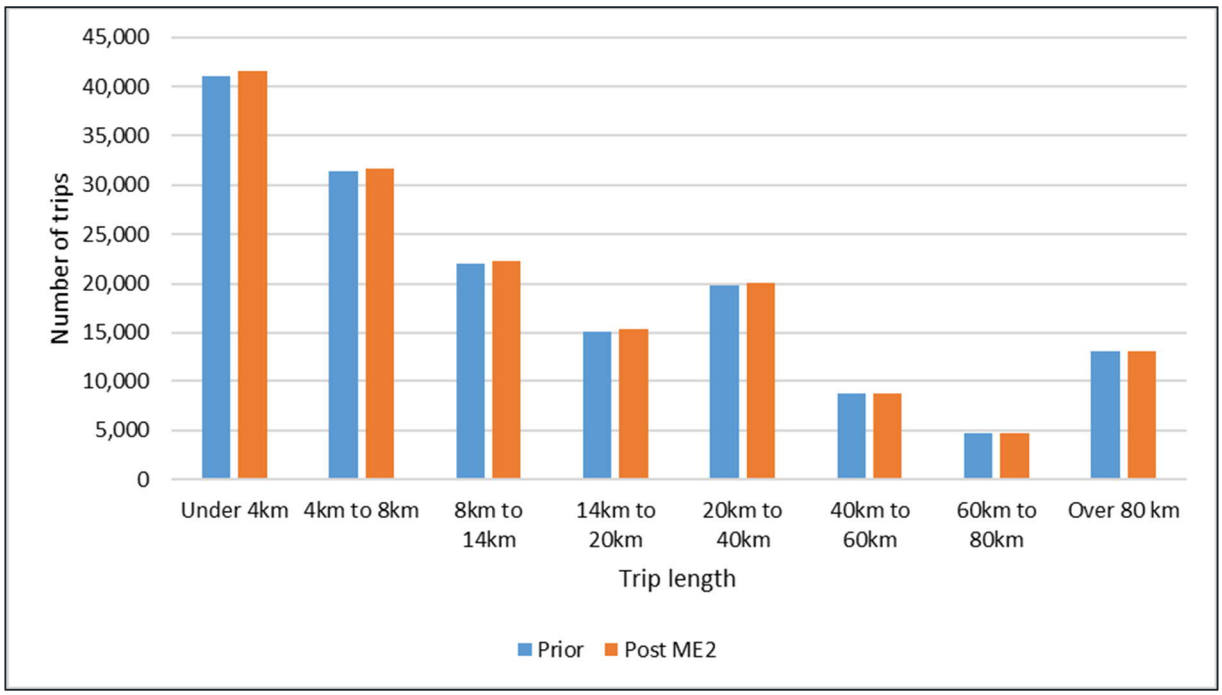


Figure 6-3 - IP trip length distribution

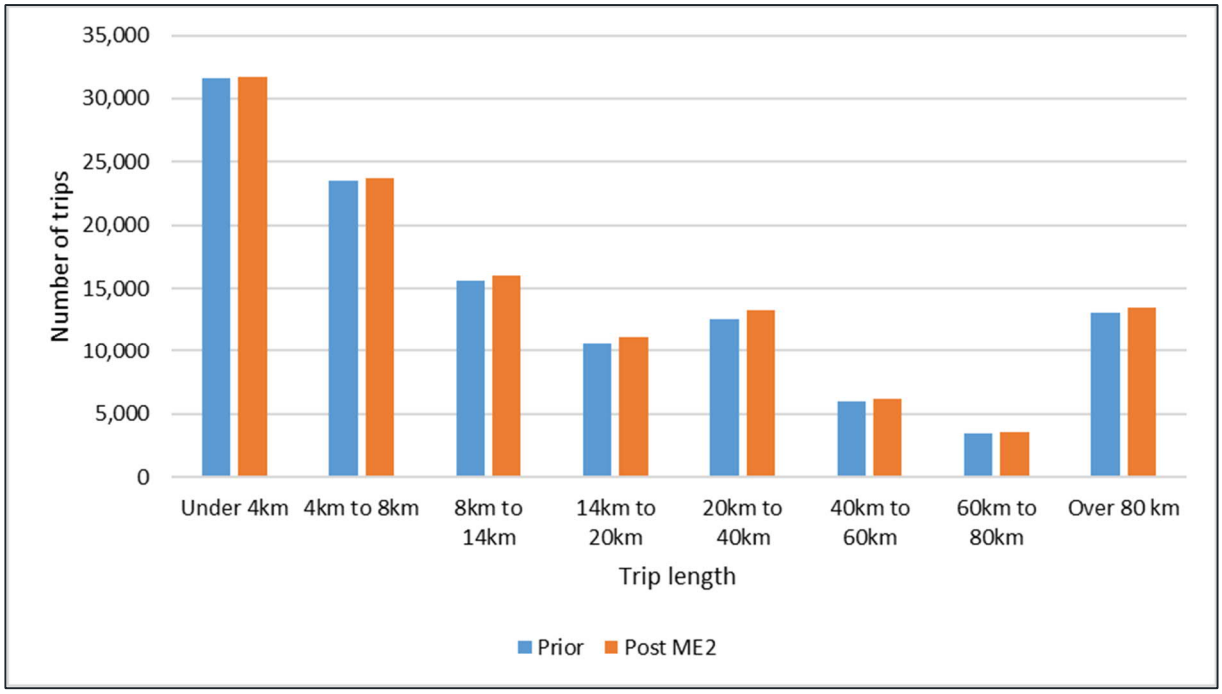
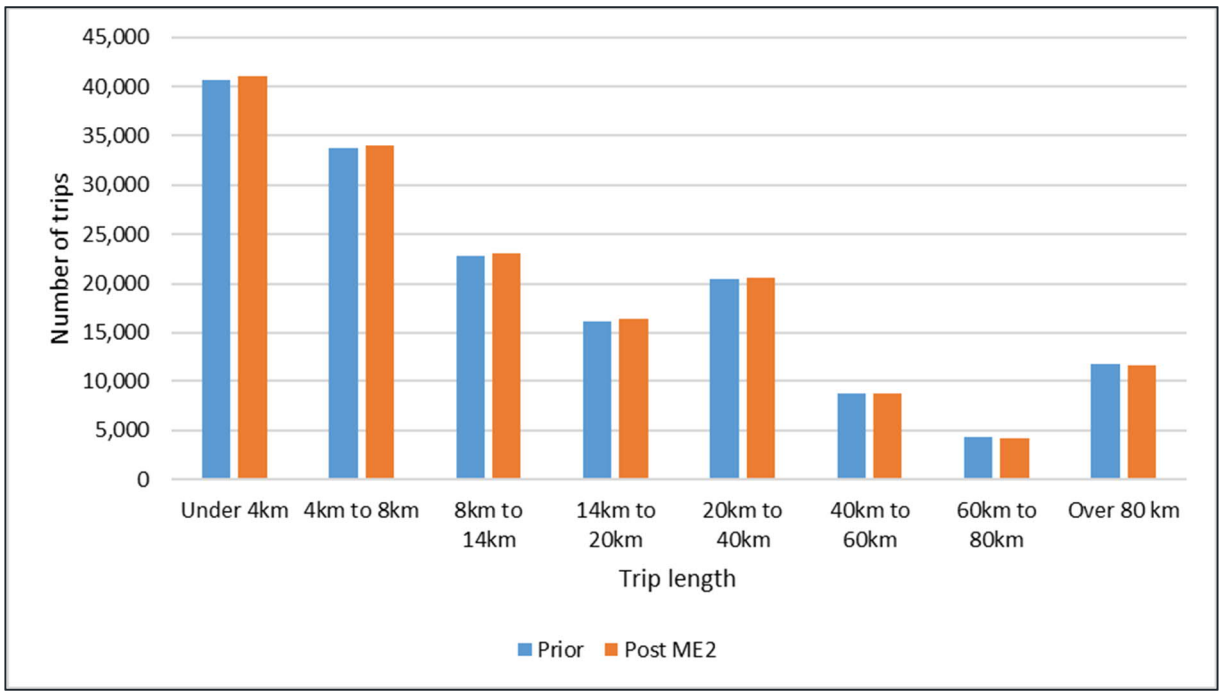


Figure 6-4 - PM trip length distribution



Distributional Change by Sector

6.2.13. Table 6-6 to Table 6-8 below show trip totals by sector before and after matrix estimation. This suggests that matrix estimation has not significantly altered the trip distribution within the matrix. The sectors for Nailsea, Bristol Airport, Congresbury show more significant changes of 10% or more.

- Nailsea – this area had a very simple representation in the original SWRTM model and therefore was a focus for refinement during matrix estimation. Therefore, it is expected that there would be a more significant change here and that this change reflects an enhancement to the model.
- Bristol Airport – the trip ends for the airport were constrained to observed data and therefore the calibrated model now accurately reflects the observed flows into and out of the airport.
- Congresbury – this sector is close to screenline D which was included as a constraint in matrix estimation.

6.2.14. Sector-to-sector matrices from both before and after matrix estimation are provided in Appendix C. Between the tables below and the sector-to-sector matrices, it can be seen that there is very little change in the number of trips in the sectors outside of North Somerset and Sedgemoor: Bristol, Bath & NE Somerset, and the rest of the UK. This suggests that the longer distance trips in the model (which were a key strength of the parent SWRTM model) have not been significantly affected by matrix estimation.

Table 6-6 – AM sector analysis

Sector	Origins		% diff	Destinations		% diff
	Prior	Post		Prior	Post	
Weston-super-Mare	10,926	11,112	2%	10,531	10,700	2%
Churchill, Winscombe, Langford	1,667	1,666	0%	1,304	1,464	12%
Congresbury	1,933	1,845	-5%	1,561	1,401	-10%
Clevedon	2,396	2,366	-1%	2,348	2,466	5%
Bristol Airport	1,215	1,365	12%	1,032	1,129	9%
Nailsea	2,373	2,931	24%	2,120	2,677	26%
Long Ashton	1,343	1,357	1%	1,427	1,385	-3%
Portishead	3,320	3,493	5%	3,200	3,321	4%
Bristol	44,623	44,926	1%	52,064	52,018	0%
Bath & NE Somerset	20,783	20,690	0%	22,807	22,762	0%
Sedgemoor	11,424	11,947	5%	10,944	11,406	4%
Rest of UK	65,352	65,220	0%	58,015	58,189	0%
Total	167,354	168,918	1%	167,354	168,918	1%

Table 6-7 – IP sector analysis

Sector	Origins		% diff	Destinations		% diff
	Prior	Post		Prior	Post	
Weston-super-Mare	9,075	9,274	2%	9,304	9,457	2%
Churchill, Winscombe, Langford	935	1,025	10%	914	1,083	18%
Congresbury	1,401	1,660	18%	1,411	1,634	16%
Clevedon	1,554	1,629	5%	1,533	1,590	4%
Bristol Airport	817	1,208	48%	872	1,342	54%

Nailsea	1,508	1,733	15%	1,628	1,886	16%
Long Ashton	1,119	1,127	1%	1,067	1,066	0%
Portishead	2,588	2,869	11%	2,800	2,873	3%
Bristol	32,189	32,511	1%	31,541	31,894	1%
Bath & NE Somerset	16,008	16,005	0%	15,934	15,940	0%
Sedgemoor	9,713	10,058	4%	9,640	10,025	4%
Rest of UK	48,943	49,279	1%	49,207	49,588	1%
Total	125,852	128,378	2%	125,852	128,378	2%

Table 6-8 – PM sector anaylsis

Sector	Origins		% diff	Destinations		% diff
	Prior	Post		Prior	Post	
Weston-super-Mare	10,684	10,898	2%	12,090	12,168	1%
Churchill, Winscombe, Langford	1,249	1,343	8%	1,523	1,526	0%
Congresbury	1,818	1,646	-9%	2,097	2,017	-4%
Clevedon	2,098	2,039	-3%	2,185	2,218	2%
Bristol Airport	1,190	1,437	21%	1,259	1,394	11%
Nailsea	1,980	2,613	32%	2,605	2,851	9%
Long Ashton	1,465	1,419	-3%	1,310	1,295	-1%
Portishead	3,442	3,548	3%	3,539	3,527	0%
Bristol	51,770	51,712	0%	46,629	46,905	1%
Bath & NE Somerset	21,533	21,465	0%	20,196	20,117	0%
Sedgemoor	11,720	12,064	3%	12,069	12,447	3%
Rest of UK	59,776	59,430	-1%	63,221	63,151	0%
Total	168,723	169,616	1%	168,723	169,616	1%

6.3 SUMMARY OF MODEL CALIBRATION

6.3.1. It was necessary to calibrate the prior trip matrices given that they were derived from SWRTM which is a coarser and more strategic model.

6.3.2. Table 6-9 below shows the overall net change to the prior matrix trip totals from both the manual adjustments and matrix estimation. This shows that the change to the number of trips in the model is relatively small in each time period.

Table 6-9 – Overall matrix total calibration changes

Time period	Initial Prior	Final Prior	Post ME2	Net Diff	% Diff
AM	168,879	167,354	168,918	+39	0.0%
IP	126,781	125,852	128,378	+1,597	1.3%
PM	170,864	168,723	169,616	-1,248	-0.7%

6.3.3. The amount of change in the matrix due to matrix estimation has been compared against WebTAG criteria and found to be within the acceptable thresholds:

- Regression statistics for cells and trip ends showed that the post estimation matrices were very well correlated with the prior matrices and within the TAG thresholds with R-sq values close to 1.
- Sector change within the matrix was generally within the 5% TAG criteria for most areas including longer distance movements. This suggests that the wider strategic movements that were a strength of the original SWRTM model were not affected by matrix estimation.
- Trip lengths in the model remain very similar after matrix calibration suggesting that the adjustments have not added a disproportionate number of shorter or longer distance trips. Mean and standard deviations were well within the 5% TAG criteria.

7 MODEL VALIDATION

7.1 OVERVIEW

7.1.1. The process of model calibration was concerned with adjusting and refining the model to ensure it is representative. Once calibrated, the model is validated by comparing against observed data to demonstrate that it is representative of observed data and therefore provides a suitable basis for developing forecasts.

7.1.2. The following sections discuss how well the model validates in terms of flows and journey times across the area of detailed modelling. Additionally, as the model will be used to support the business case for the A38 MRN scheme, some more detailed analyses of traffic flows along the A38 corridor has been included.

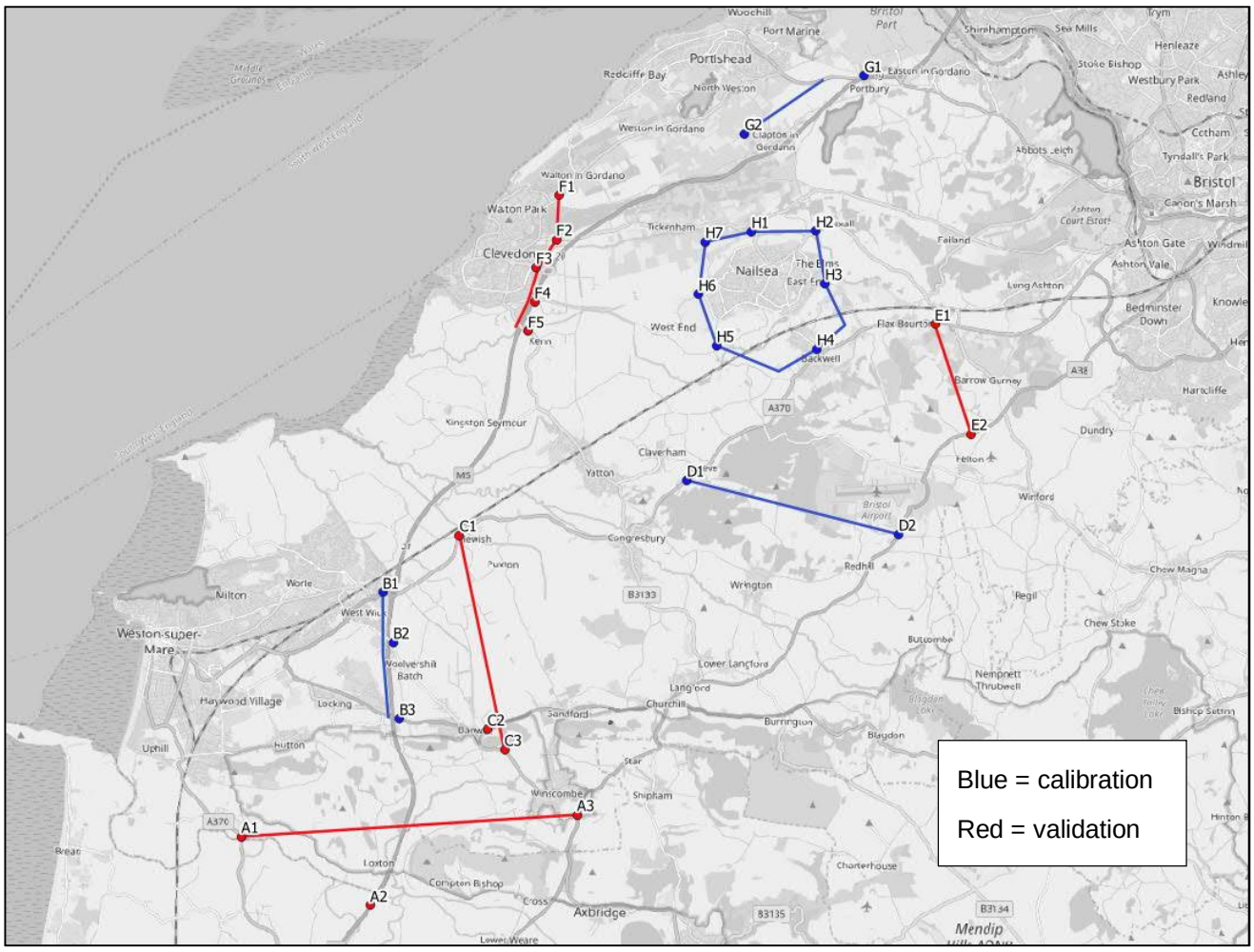
7.2 SCREENLINE FLOWS

7.2.1. Eight screenlines have been defined to capture key strategic corridors across North Somerset. Table 7-1 lists the screenlines and Figure 7-1 displays their count locations.

Table 7-1 – List of screenlines

Screenline	Cal/Val	Description
A	Val	South of North Somerset – monitors traffic entering exiting North Somerset on the A370, M5 and A38
B	Cal	Weston-super-Mare – monitors traffic entering/exiting to the east of WsM
C	Val	Monitors traffic between WsM and Congresbury/Churchill
D	Cal	Monitors A370 and A38 traffic just south of Bristol International Airport
E	Val	Monitors A370 and A38 traffic between Nailsea and Bristol
F	Val	Clevedon – monitors traffic entering/exiting Clevedon
G	Cal	Monitors traffic to the east of Portishead
H	Cal	Nailsea – monitors traffic entering/exiting Nailsea

Figure 7-1 Location of screenlines



7.2.2. The TAG recommendation for screenline flow validation is that the total flow passing a screenline should be within 5% of the observed flow for all or nearly all screenlines. However, it should be noted that some of the screenlines have a relatively low total observed flow and this makes this criterion difficult to meet in some cases (i.e. where a 5% threshold relates to a very small number of trips). Therefore, each screenline has also been assessed against a 10% flow difference criterion and GEH.

Table 7-2 – TAG screenline flow validation criteria

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

7.2.3. The summary results for both calibration and validation screenlines are shown in Table 7-3 to Table 7-5 below. Full results for each screenline including the listing of individual screenline links can be found in Appendix D.

Table 7-3 – AM screenline results

Screen line	Cal/Val	Direction	AM Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	4,073	4,102	30	0.7%	Pass	Pass	0.5	Pass
		SB	3,684	3,792	108	2.9%	Pass	Pass	1.8	Pass
B	Cal	EB	3,474	3,389	-85	-2.5%	Pass	Pass	1.5	Pass
		WB	2,922	2,969	47	1.6%	Pass	Pass	0.9	Pass
C	Val	EB	1,171	1,158	-12	-1.1%	Pass	Pass	0.4	Pass
		WB	1,292	1,351	59	4.6%	Pass	Pass	1.6	Pass
D	Cal	NB	1,420	1,440	20	1.4%	Pass	Pass	0.5	Pass
		SB	1,001	972	-29	-2.9%	Pass	Pass	0.9	Pass
E	Val	EB	1,631	1,622	-9	-0.6%	Pass	Pass	0.2	Pass
		WB	1,194	1,377	183	15.3%	Fail	Fail	5.1	Fail
F	Val	EB	3,228	3,299	70	2.2%	Pass	Pass	1.2	Pass
		WB	3,364	3,354	-10	-0.3%	Pass	Pass	0.2	Pass
G	Cal	NB	1,360	1,360	-1	0.0%	Pass	Pass	0.0	Pass
		SB	1,770	1,727	-43	-2.4%	Pass	Pass	1.0	Pass
H	Cal	In	1,470	1,472	2	0.1%	Pass	Pass	0.1	Pass
		Out	1,722	1,638	-83	-4.8%	Pass	Pass	2.0	Pass
Pass rate over all screenlines							94%	94%		94%

Table 7-4 – PM screenline results

Screen line	Cal/Val	Direction	PM Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	4,020	3,803	-217	-5.4%	Fail	Pass	3.5	Pass
		SB	4,312	4,167	-145	-3.4%	Pass	Pass	2.2	Pass
B	Cal	EB	2,761	2,689	-72	-2.6%	Pass	Pass	1.4	Pass
		WB	4,109	3,974	-136	-3.3%	Pass	Pass	2.1	Pass
C	Val	EB	1,140	1,229	90	7.9%	Fail	Pass	2.6	Pass
		WB	1,564	1,600	36	2.3%	Pass	Pass	0.9	Pass
D	Cal	NB	1,123	1,100	-23	-2.0%	Pass	Pass	0.7	Pass
		SB	1,652	1,576	-76	-4.6%	Pass	Pass	1.9	Pass
E	Val	EB	1,315	1,408	93	7.1%	Fail	Pass	2.5	Pass
		WB	1,762	1,871	109	6.2%	Fail	Pass	2.6	Pass
F	Val	EB	3,214	3,118	-96	-3.0%	Pass	Pass	1.7	Pass
		WB	3,308	3,283	-25	-0.8%	Pass	Pass	0.4	Pass
G	Cal	NB	1,976	1,942	-35	-1.7%	Pass	Pass	0.8	Pass
		SB	1,353	1,336	-17	-1.3%	Pass	Pass	0.5	Pass
H	Cal	In	1,773	1,709	-63	-3.6%	Pass	Pass	1.5	Pass
		Out	1,496	1,555	59	4.0%	Pass	Pass	1.5	Pass
Pass rate over all screenlines							75%	100%		100%

Table 7-5 – IP screenline results

Screen line	Cal/Val	Direction	IP Screenline Totals							
			Obs	Mod	Diff	% Diff	<5%	<10%	GEH	GEH <5
A	Val	NB	3,830	3,894	64	1.7%	Pass	Pass	1.0	Pass
		SB	3,476	3,276	-200	-5.8%	Fail	Pass	3.4	Pass
B	Cal	EB	2,211	2,205	-7	-0.3%	Pass	Pass	0.1	Pass
		WB	2,375	2,325	-50	-2.1%	Pass	Pass	1.0	Pass
C	Val	EB	975	1,082	107	11.0%	Fail	Fail	3.3	Pass
		WB	1,044	1,096	52	4.9%	Pass	Pass	1.6	Pass
D	Cal	NB	962	965	3	0.3%	Pass	Pass	0.1	Pass
		SB	963	961	-2	-0.2%	Pass	Pass	0.1	Pass
E	Val	EB	1,131	1,167	36	3.2%	Pass	Pass	1.1	Pass
		WB	1,197	1,281	84	7.0%	Fail	Pass	2.4	Pass
F	Val	EB	2,052	2,199	147	7.2%	Fail	Pass	3.2	Pass
		WB	1,988	2,177	189	9.5%	Fail	Pass	4.1	Pass
G	Cal	NB	1,039	1,118	79	7.6%	Fail	Pass	2.4	Pass
		SB	1,011	1,083	72	7.1%	Fail	Pass	2.2	Pass
H	Cal	In	1,223	1,198	-26	-2.1%	Pass	Pass	0.7	Pass
		Out	1,194	1,166	-28	-2.4%	Pass	Pass	0.8	Pass
Pass rate over all screenlines							56%	94%		100%

AM Peak

7.2.4. The model performs well over most screenlines with only one screenline failing the criteria.

- **Screenline E (westbound)** – the flow on the A370 at this location is high by about 180 vehicles, while the flow on the A38 passes. The total flow misses the GEH criteria by only 4 vehicles.

PM Peak

7.2.5. The model also has representative flows on a majority of the screenlines in the PM peak with a 75% pass rate against the 5% criterion and a 100% pass rate against the 10% criterion. The screenlines which do not pass the 5% criterion are as follows:

- **Screenline A (northbound)** – the flows are low on the M5 and A370 – whilst they meet the individual link validation criteria in combination they cause the screenline to fail the 5% criterion.
- **Screenline C (eastbound)** – the flow on the A368 Towerhead Road is high by about 90 vehicles, which meets the individual link validation criteria but causes the screenline to fail the 5% criterion.
- **Screenline E (eastbound)** – both eastbound links are high by about 90 vehicles in total and therefore the overall screenline flow misses the 5% criterion by about 30 vehicles. However, it is noted that individually the links both pass the link validation criteria therefore this is not considered to be a significant issue.
- **Screenline E (westbound)** – the flows are too high on the A370, leading to an overall screenline flow that is too high by about 110 vehicles. Both links pass the link validation criteria. The total flow misses the 5% criterion by about 25 vehicles.

Inter-peak

7.2.6. The model passes the 5% criterion on 56% of the screenlines but it is noted that in a majority of cases the discrepancy on the remaining links is only just outside this threshold (amounting to relatively small differences in absolute flow). The following screenlines have the largest differences:

- **Screenline A (southbound)** – the total flow is too flow due to the flow on the M5 SB being low by about 260 vehicles. The M5 link itself passes the link validation criteria, and the overall screenline is well within the 10% criterion.
- **Screenline C (eastbound)** – the flow on the A368 Towerhead Road is high by about 85 vehicles, which causes the screenline to fail the 10% criterion by 4 vehicles. The link itself passes the link validation criteria.

Summary

7.2.7. Table 7-6 below summarises the screenline validation results by time period. Based on the analysis above, there are no significant issues with respect to screenline flows and in a majority of instances where screenlines fall outside the 5% TAG criterion (particularly in the inter-peak period), the modelled flows are very close to the acceptable threshold.

Table 7-6 – Summary of screenlines validation

Time Period	Pass Rate		
	5% Criterion (TAG)	10% Criterion	GEH < 5 Criterion
AM	94%	94%	94%
PM	75%	100%	100%
IP	56%	94%	100%

7.3 LINK FLOW VALIDATION

7.3.1. Figure 7-2 shows the link flow validation counts in North Somerset, with WsM counts shown in more detail in Figure 7-3. These links cover all of the main inter-urban routes within North Somerset as well as some of the main arterial links within WsM. Figure 7-4 shows the link flow validation counts in Sedgemoor.

Figure 7-2 - Map of link flow validation counts in North Somerset

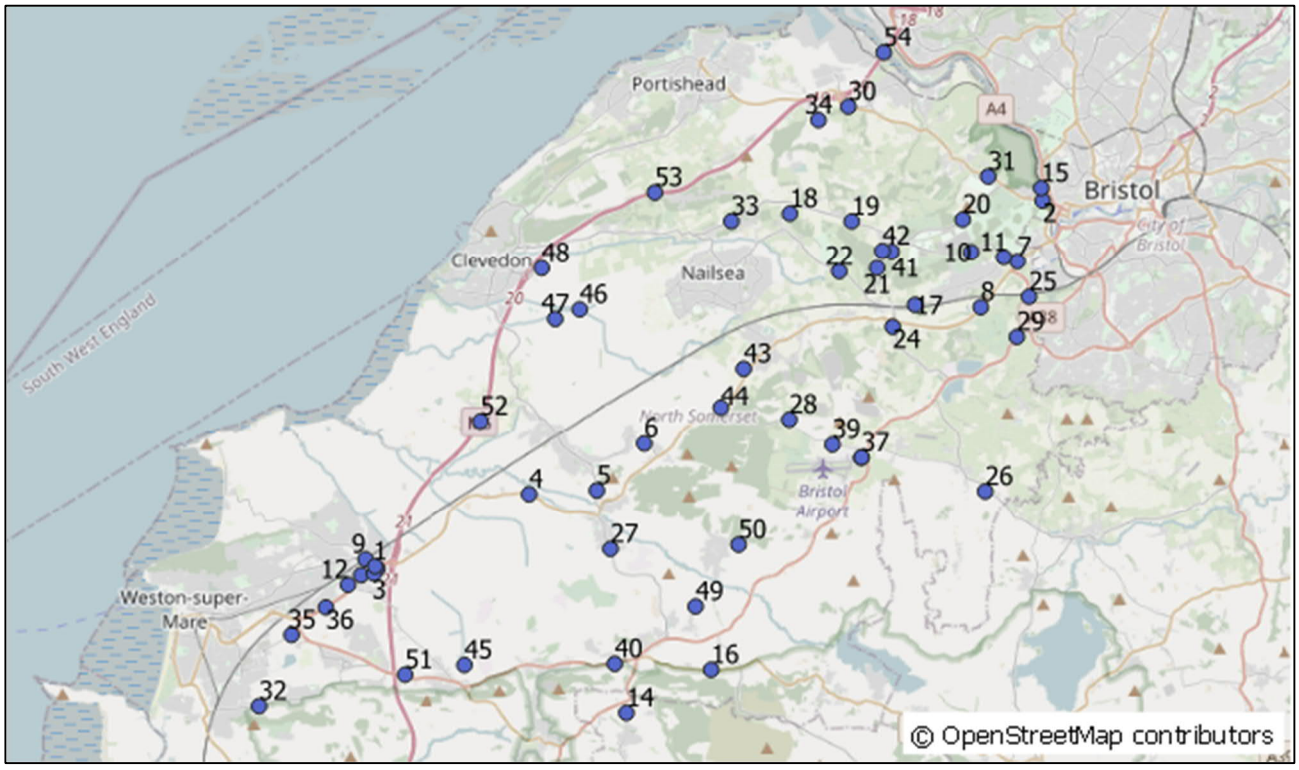


Figure 7-3 - Map of link flow validation counts in WsM

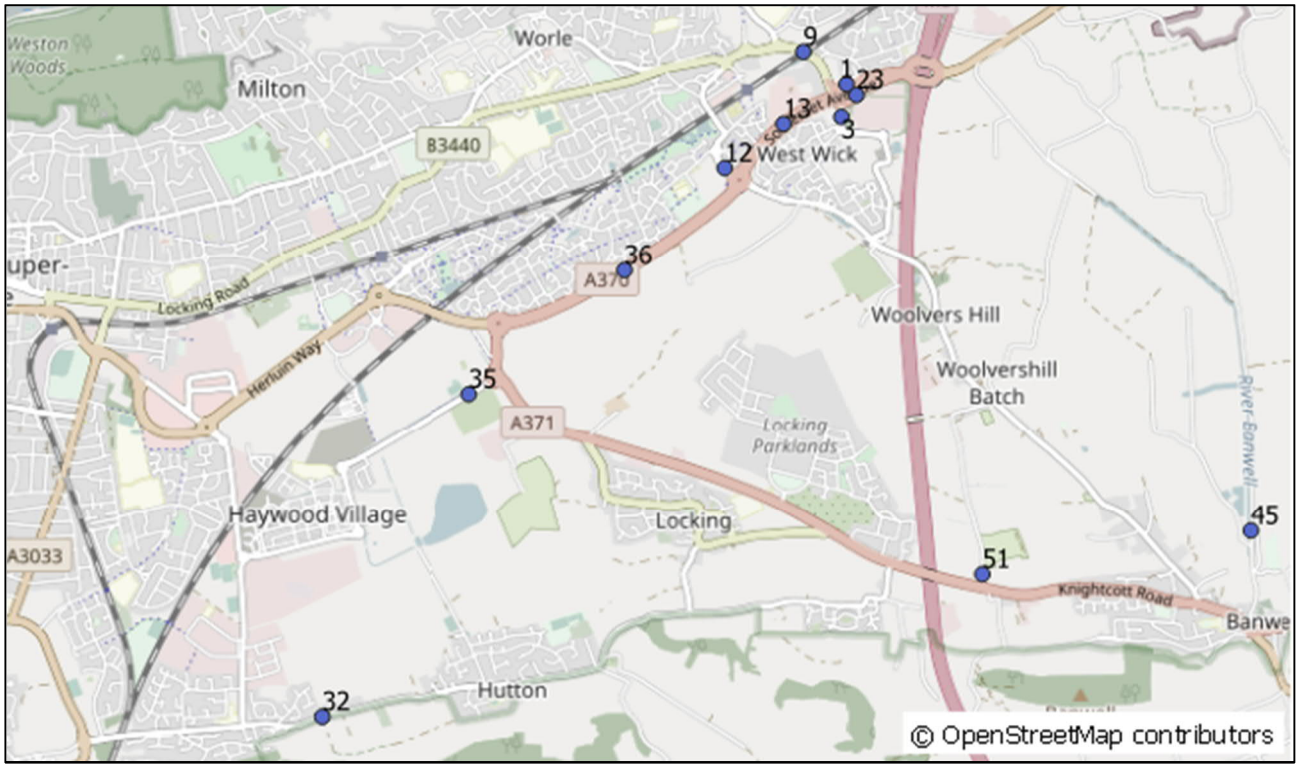
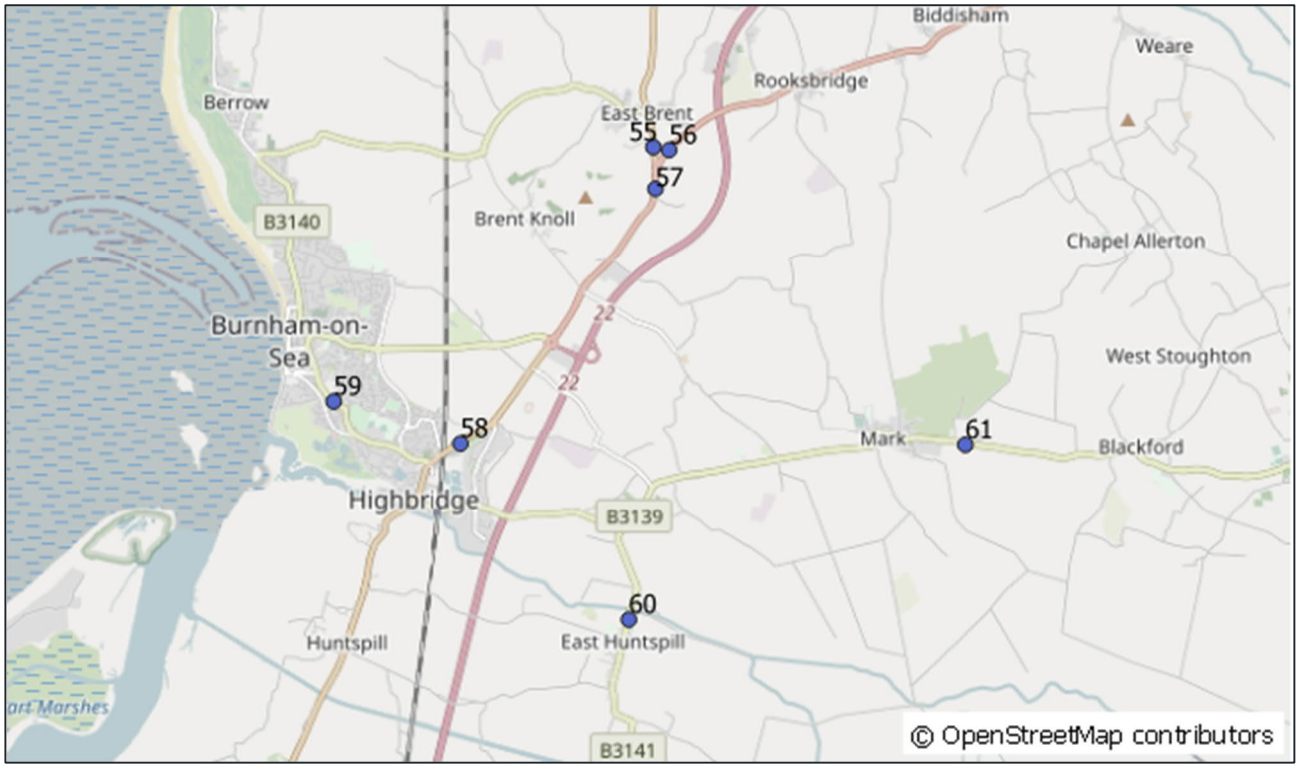


Figure 7-4 - Map of link flow validation counts in Sedgemoor



7.3.2. The TAG criteria for link flow validation are shown in Table 7-7 below. As set out in TAG Unit 3.1 paragraph 3.2.7, link flows are considered to be acceptable if they pass one or both criteria.

Table 7-7 – TAG link flow validation criteria

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

7.3.3. A summary of the link flow validation results is shown in Table 7-8 – the full results are provided in Appendix E.

7.3.4. In general, the model shows a good correlation with observed flows across a majority of the validation links. The AM, IP and PM time periods have overall pass rates of 85%, 86% and 91% respectively and therefore pass the TAG guideline for link flows.

Table 7-8 – Link flow results

Time period	Criteria	No. of counts	No. passing	% passing
AM	Flow < 700	121	102	84%
	700 < Flow < 2700	39	32	82%
	Flow > 2700	8	7	88%
	All Flows	168	141	84%
	GEH < 5	168	129	77%
	Overall	**168**	**143**	**85%**
IP	Flow < 700	113	97	86%
	700 < Flow < 2700	24	20	83%
	Flow > 2700	8	6	75%
	All Flows	145	123	85%
	GEH < 5	145	106	73%
	Overall	**145**	**125**	**86%**

Time period	Criteria	No. of counts	No. passing	% passing
PM	Flow < 700	119	107	90%
	700 < Flow < 2700	38	31	82%
	Flow > 2700	11	10	91%
	All Flows	168	148	88%
	GEH < 5	168	141	84%
	Overall	**168**	**153**	**91%**

7.3.5. Figure 7-5 to Figure 7-7 below illustrate where links are passing and failing the link flow validation criteria in each time period. A majority of links pass in both directions and there are very few locations where links fail the criteria in both directions. The key links which do fail the criteria in both directions are as follows:

- Link 18 – Wraxall Hill (AM only) – traffic flows too high in both directions. Most nearby links validate in both directions, including the links into and out of Nailsea, so this is probably only a localised issue.
- Link 20 – Beggar Bush Lane (AM only) – traffic flows too low in both directions. In the model this route primarily carries traffic to and from Bristol and the flows appear to be sensitive to the relative cost between the Clifton bridge route and the A370 route. The relative weighting of cost between these routes may be incorrect given the difficulties experienced with representing delays on the A370 as discussed in section 4.3 above and in section 7.6 below.
- Link 12 – Elmham Way (IP only) – traffic flows too low in both directions, more so southbound. This issue is related to the skeletal representation of the WsM network and the resulting routing of local traffic within WsM – as NSSM is not intended to model local WsM traffic in great detail, this is not considered to be a significant issue.
- Link 35 – Runway Link (IP only) – traffic flows too high in both directions, more so northbound. This is an issue with the balance of the assignment of traffic between the A370 and The Runway, again related to the skeletal representation of WsM.

Figure 7-5 - AM link validation

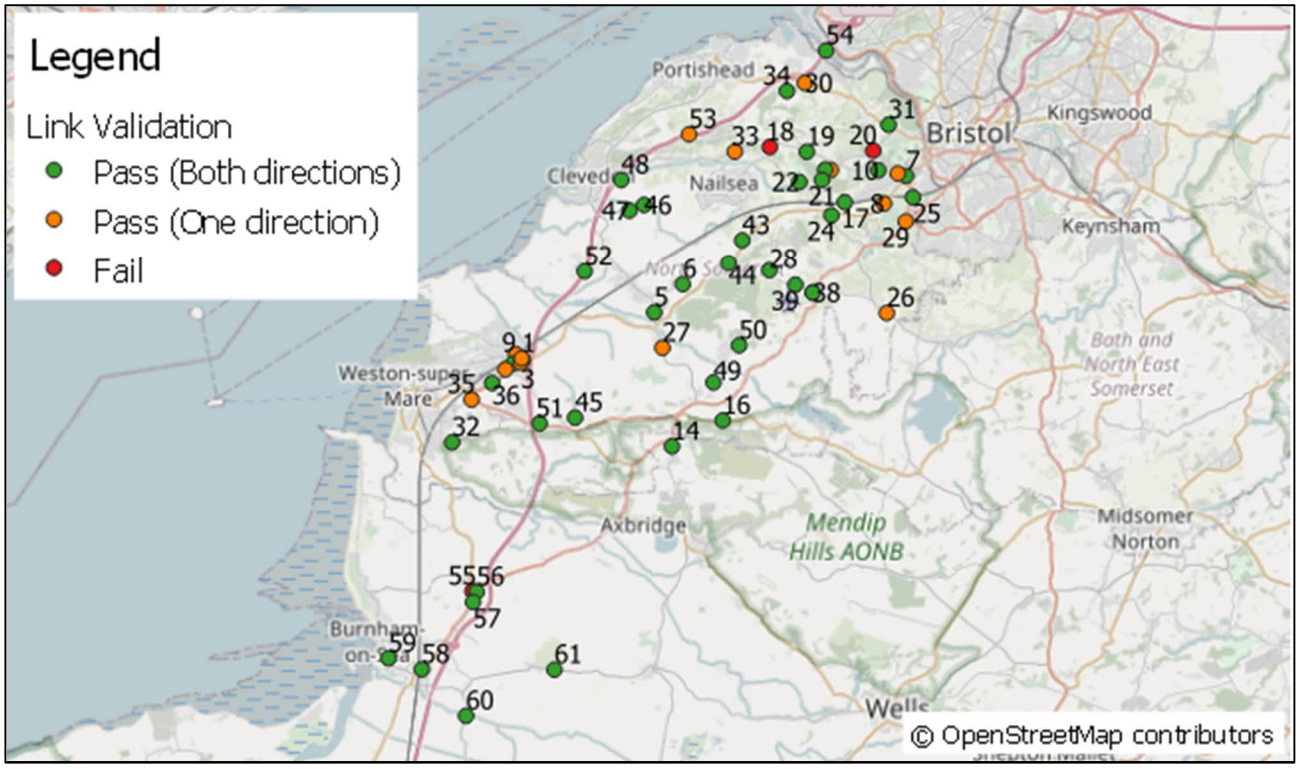


Figure 7-6 - PM link validation

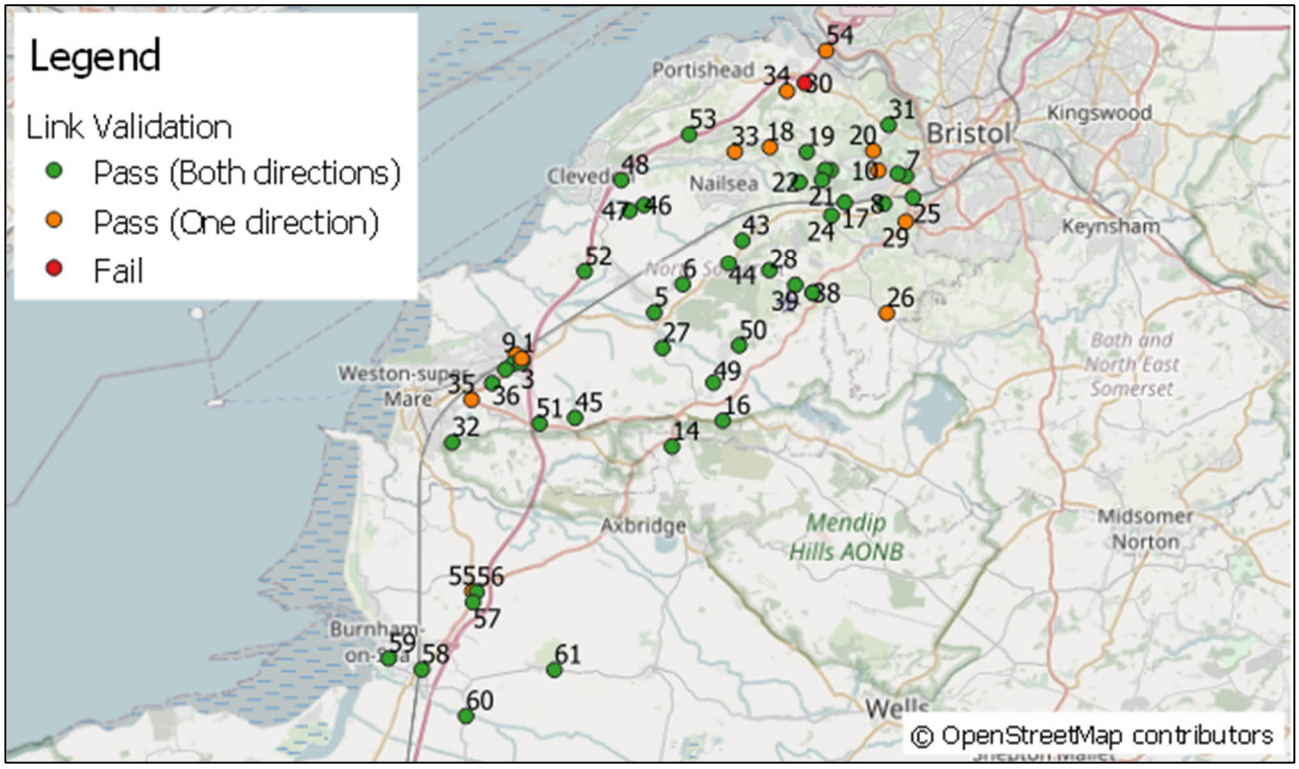
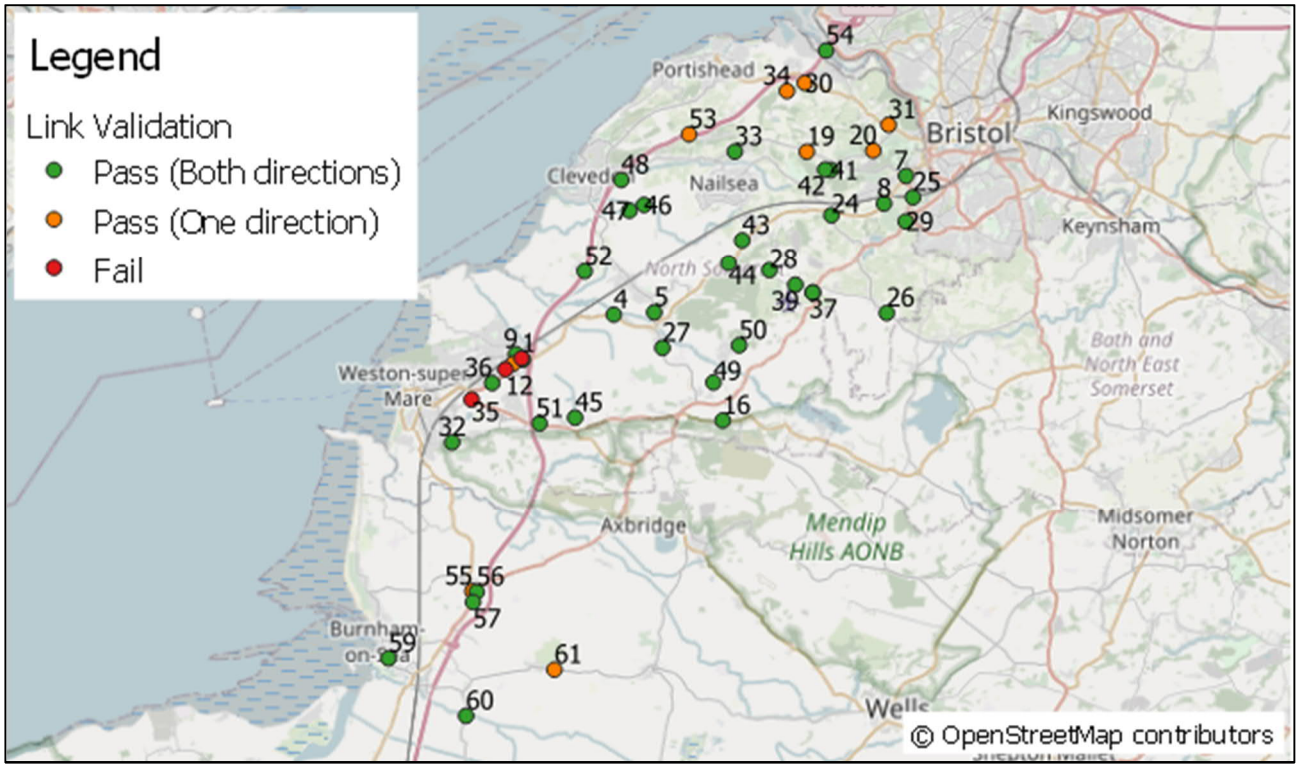


Figure 7-7 - IP link validation



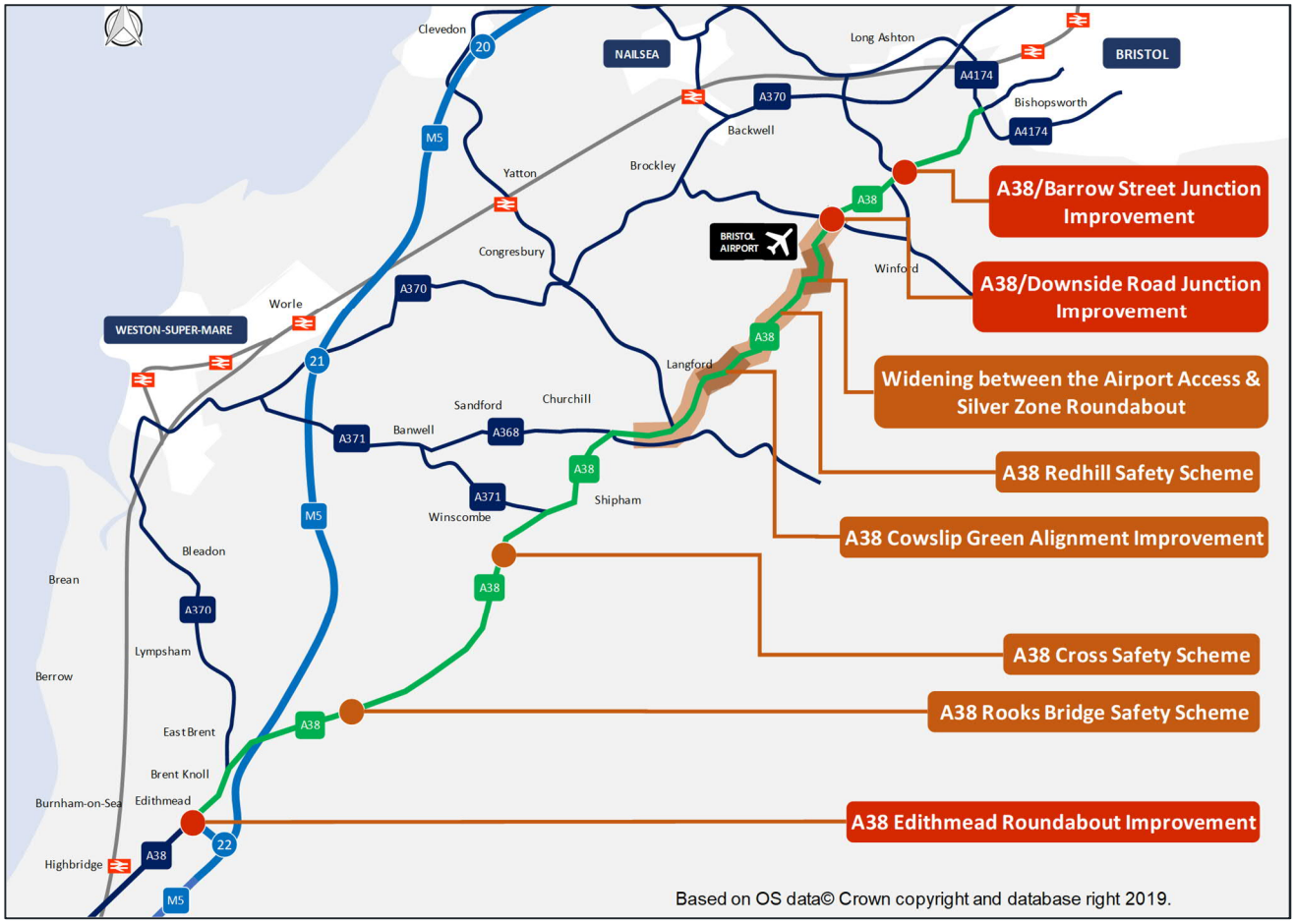
7.4 TRAFFIC FLOW ON A38 CORRIDOR

7.4.1. North Somerset Council and Somerset County Council are jointly developing the A38 MRN scheme which will enhance the A38 corridor between Barrow Gurney and the M5 at Junction 22 (Figure 7-8). The appraisal supporting the Outline Business Case will be based on traffic forecasts from this model and therefore the modelled flows on the A38 corridor have been examined in further detail below.

7.4.2. The scheme interventions include junction improvements at Barrow Street, Downside Road and Edithmead roundabout whilst the other schemes improve intermediate sections of the corridor through widening, carriageway realignment and safety improvements.

7.4.3. The improvements at Downside Road and Edithmead roundabout are intended to provide additional capacity and address traffic congestion issues. These elements of the scheme are therefore expected to generate travel time savings for highway users.

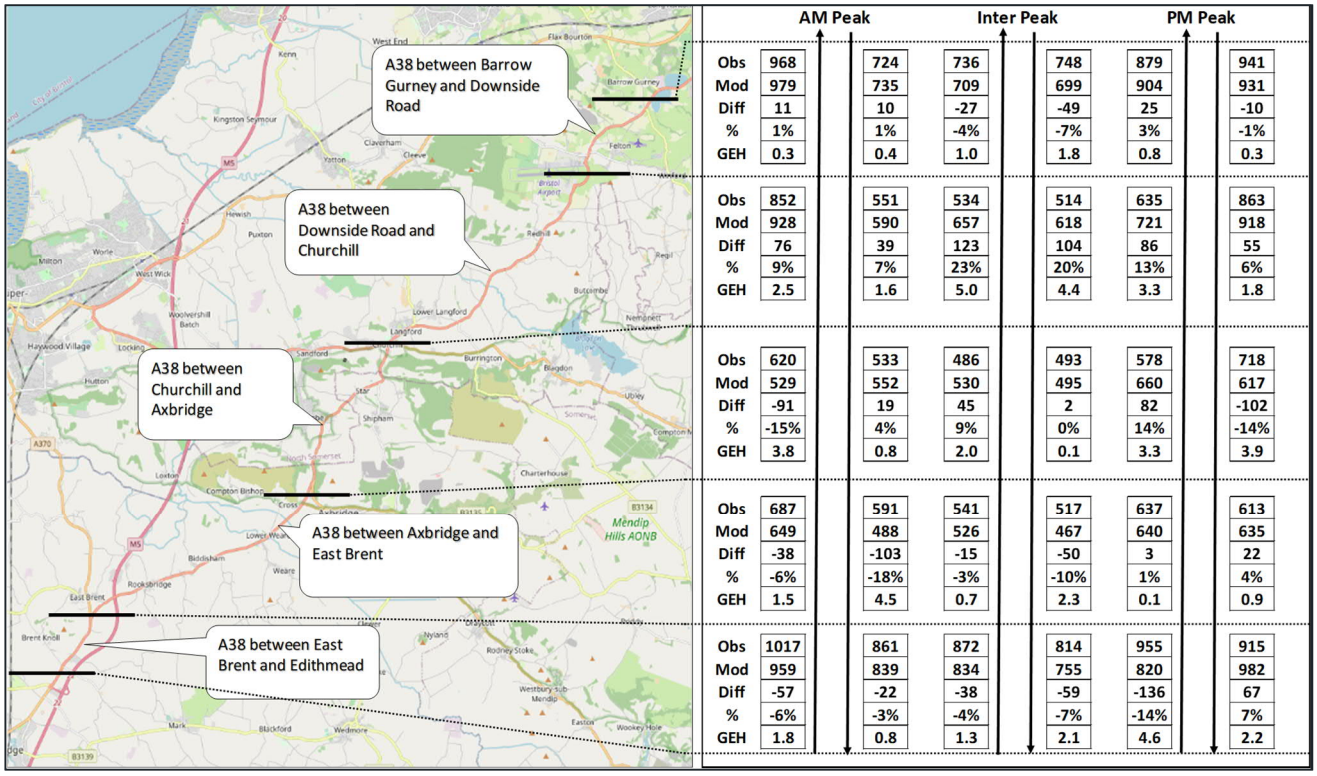
Figure 7-8 - Schematic of the A38 MRN scheme



LINK FLOWS

7.4.4. Figure 7-9 shows a comparison of modelled and observed traffic flow along sections of the A38 corridor. This shows that the model is a very good representation of flow along this corridor and that all links along this route pass TAG validation criteria.

Figure 7-9 - Traffic flow validation along A38 corridor



	AM Peak		Inter Peak		PM Peak	
Obs	968	724	736	748	879	941
Mod	979	735	709	699	904	931
Diff	11	10	-27	-49	25	-10
%	1%	1%	-4%	-7%	3%	-1%
GEH	0.3	0.4	1.0	1.8	0.8	0.3
Obs	852	551	534	514	635	863
Mod	928	590	657	618	721	918
Diff	76	39	123	104	86	55
%	9%	7%	23%	20%	13%	6%
GEH	2.5	1.6	5.0	4.4	3.3	1.8
Obs	620	533	486	493	578	718
Mod	529	552	530	495	660	617
Diff	-91	19	45	2	82	-102
%	-15%	4%	9%	0%	14%	-14%
GEH	3.8	0.8	2.0	0.1	3.3	3.9
Obs	687	591	541	517	637	613
Mod	649	488	526	467	640	635
Diff	-38	-103	-15	-50	3	22
%	-6%	-18%	-3%	-10%	1%	4%
GEH	1.5	4.5	0.7	2.3	0.1	0.9
Obs	1017	861	872	814	955	915
Mod	959	839	834	755	820	982
Diff	-57	-22	-38	-59	-136	67
%	-6%	-3%	-4%	-7%	-14%	7%
GEH	1.8	0.8	1.3	2.1	4.6	2.2

A38 MRN SCHEME JUNCTIONS

7.4.5. The following junctions will be improved as part of the A38 MRN scheme. The turning counts for each of these junctions were used as constraints in calibration. Turning flow diagrams for these junctions can be found in Appendix F.

A38 / Barrow Street junction

7.4.6. Table 7-9 compares observed and modelled turning flows at this junction in the peak hours. The modelled entry flows are all slightly lower than the observed flows, but both the individual and total entry flows all pass the TAG link flow validation criteria.

Table 7-9 – A38 / Barrow Street junction entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	A38 N	879	778	-101	-12%	PASS
	A38 S	1,251	1,103	-148	-12%	PASS
	Barrow St	256	192	-64	-25%	PASS
	Total	**2,386**	**2,073**	**-313**	**-13%**	**PASS**

IP	A38 N	762	739	-23	-3%	PASS
	A38 S	814	792	-22	-3%	PASS
	Barrow St	138	128	-10	-7%	PASS
	Total	**1,714**	**1,659**	**-55**	**-3%**	**PASS**
PM	A38 N	1,083	926	-157	-15%	PASS
	A38 S	1,037	1,012	-25	-2%	PASS
	Barrow St	312	250	-62	-20%	PASS
	Total	**2,432**	**2,188**	**-244**	**-10%**	**PASS**

Downside Road / West Lane

7.4.7. Table 7-10 and Table 7-11 compare observed and modelled turning flows at these adjacent junctions in the peak hours. Entry flows at both junctions are slightly low, but all entry flows in all time periods pass the validation criteria.

Table 7-10 – A38 / Downside Road junction entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	A38 N	1,008	959	-49	-5%	PASS
	A38 S	1,217	1,147	-70	-6%	PASS
	Downside Road	290	244	-46	-16%	PASS
	Total	**2,515**	**2,350**	**-165**	**-7%**	**PASS**
IP	A38 N	807	806	-1	0%	PASS
	A38 S	870	853	-17	-2%	PASS
	Downside Road	185	183	-2	-1%	PASS
	Total	**1,862**	**1,842**	**-20**	**-1%**	**PASS**
PM	A38 N	1,152	1,035	-117	-10%	PASS
	A38 S	1,247	1,119	-128	-10%	PASS
	Downside Road	258	238	-20	-8%	PASS
	Total	**2,657**	**2,391**	**-266**	**-10%**	**PASS**

Table 7-11 – A38 / West Lane junction entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	A38 N	769	717	-52	-7%	PASS
	West Lane	299	242	-57	-19%	PASS
	A38 S	1,116	1,060	-56	-5%	PASS
	Total	**2,184**	**2,018**	**-166**	**-8%**	**PASS**
IP	A38 N	694	658	-36	-5%	PASS
	West Lane	166	149	-17	-10%	PASS
	A38 S	832	814	-18	-2%	PASS
	Total	**1,692**	**1,621**	**-71**	**-4%**	**PASS**
PM	A38 N	959	826	-133	-14%	PASS
	West Lane	222	209	-13	-6%	PASS
	A38 S	1,112	1,087	-25	-2%	PASS
	Total	**2,293**	**2,121**	**-172**	**-7%**	**PASS**

Edithmead roundabout

7.4.8. Table 7-12 compares observed and modelled turning flows at Edithmead roundabout in the AM and PM peak hours only, as data was not available for the inter-peak time period. Entry flows are slightly low, but all pass the validation criteria.

Table 7-12 – Edithmead roundabout entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	A38 N	1,188	1,125	-63	-5%	PASS
	M5 J22	1,051	975	-76	-7%	PASS
	A38 S	745	653	-92	-12%	PASS
	B3140	690	701	11	2%	PASS
	Total	**3,674**	**3,454**	**-220**	**-6%**	**PASS**

PM	A38 N	1,225	1,177	-48	-4%	PASS
	M5 J22	1,355	1,307	-48	-4%	PASS
	A38 S	622	523	-99	-16%	PASS
	B3140	474	502	28	6%	PASS
	Total	**3,676**	**3,509**	**-167**	**-5%**	**PASS**

7.5 TRAFFIC FLOW ON STRATEGIC ROAD NETWORK

7.5.1. This section presents link and junction flows for the M5 corridor between J19 and J23 in order to demonstrate how well the model represents the Strategic Road Network.

M5 CORRIDOR

7.5.2. Table 7-13 to Table 7-15 below compare the observed and modelled flows between each M5 junction from junction 19 to 23. Most sections pass validation criteria, but some fail in the AM and IP time periods:

- M5 SB between J19 and J20 (AM and IP) – this southbound section has too little flow in the AM and IP time periods.
- M5 NB between J23 and J22 (IP only) – this northbound section has too much flow in the IP time period.

Table 7-13 – M5 AM Link flows

Section	Direction	Obs	Mod	Diff	%Diff	GEH	TAG
J19-J20	NB	4,289	4,020	-269	-6%	4.2	PASS
	SB	3,297	2,885	-412	-12%	7.4	FAIL
J20-J21	NB	3,945	4,157	212	5%	3.3	PASS
	SB	3,296	3,285	-11	0%	0.2	PASS
J21-J22	NB	2,648	2,734	87	3%	1.7	PASS
	SB	2,523	2,491	-32	-1%	0.6	PASS
J22-J23	NB	2,757	2,899	142	5%	2.7	PASS
	SB	3,060	2,996	-64	-2%	1.2	PASS

Table 7-14 – M5 IP Link flows

Section	Direction	Obs	Mod	Diff	%Diff	GEH	TAG
J19-J20	NB	3,435	3,195	-240	-7%	4.2	PASS
	SB	3,437	2,843	-594	-17%	10.6	FAIL
J20-J21	NB	3,212	3,369	157	5%	2.7	PASS
	SB	3,296	3,006	-290	-9%	5.2	PASS
J21-J22	NB	2,844	2,732	-112	-4%	2.1	PASS
	SB	2,469	2,205	-263	-11%	5.4	PASS
J22-J23	NB	2,906	3,358	452	16%	8.1	FAIL
	SB	2,561	2,643	82	3%	1.6	PASS

Table 7-15 – M5 PM Link flows

Section	Direction	Obs	Mod	Diff	%Diff	GEH	TAG
J19-J20	NB	3,370	2,983	-387	-11%	6.9	PASS
	SB	4,587	4,584	-3	0%	0.0	PASS
J20-J21	NB	3,191	3,190	0	0%	0.0	PASS
	SB	4,522	4,665	144	3%	2.1	PASS
J21-J22	NB	2,773	2,597	-176	-6%	3.4	PASS
	SB	2,826	2,701	-125	-4%	2.4	PASS
J22-J23	NB	3,060	3,095	35	1%	0.6	PASS
	SB	2,991	2,892	-99	-3%	1.8	PASS

M5 JUNCTION 22

7.5.3. M5 Junction 22 is located adjacent to Edithmead roundabout (Figure 7-10).

Figure 7-10 - M5 Junction 22

7.5.4. The observed and modelled entry flows for Junction 22 are shown in Table 7-16. No observed interpeak data was available. Most of the entry flows pass except for the southbound offslip in the PM peak, where the modelled flow is low by 126 vehicles.

Table 7-16 – M5 J22 entry flows

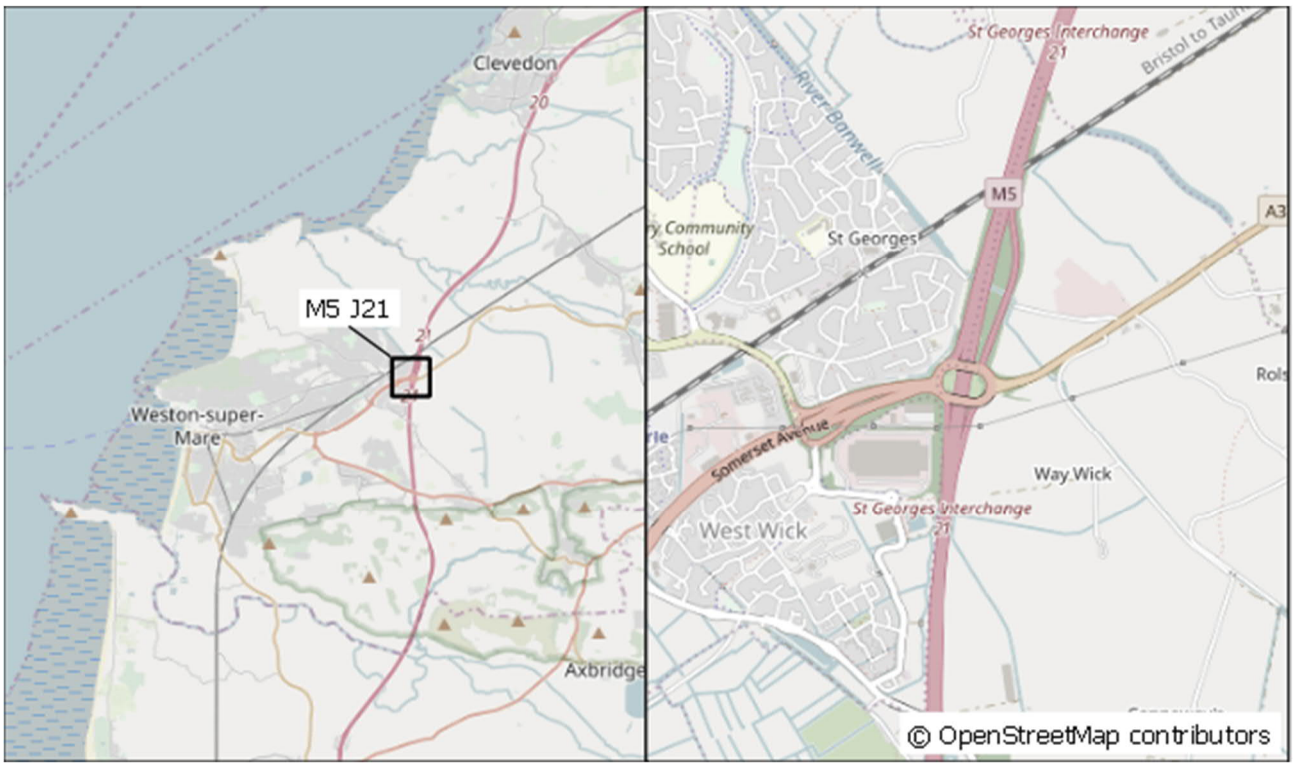
Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	M5 NB offslip	730	650	-80	-11%	PASS
	M5 SB offslip	323	309	-14	-4%	PASS
	Edithmead roundabout	1,354	1,298	-55	-4%	PASS
	Total	**2,407**	**2,257**	**-150**	**-6%**	**PASS**

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
PM	M5 NB offslip	757	853	96	13%	PASS
	M5 SB offslip	580	454	-126	-22%	FAIL
	Edithmead roundabout	974	1,000	26	3%	PASS
	Total	**2,311**	**2,308**	**-3**	**0%**	**PASS**

M5 JUNCTION 21

7.5.5. M5 Junction 21 is located to the east of WsM (Figure 7-11) and is an important location in the model because it provides the main gateway to WsM and the A370 corridor. Given its importance, the modelled turning flows have been compared with observed flows and checked against TAG validation criteria. As set out in WebTAG, the validation criteria used for turning flows are the same as used for link flows (i.e. as per Table 7-7 above).

Figure 7-11 - M5 Junction 21



Entry flows

7.5.6. The entry flows for each arm are shown in Table 7-17. The AM and PM modelled flows entering through each arm are overall good representations of the observed flows, with all arms passing the

validation criteria. The modelled offslip flows in the interpeak are higher than observed, which leads the overall entry flow to fail the validation criteria, but only by 10 vehicles.

Table 7-17 – M5 J21 entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	M5 SB offslip	1,328	1,400	72	5%	PASS
	A370 (East)	988	1,009	21	2%	PASS
	M5 NB offslip	428	474	46	11%	PASS
	A370 (West)	2,657	2,755	98	4%	PASS
	Total	**5,401**	**5,638**	**237**	**4%**	**PASS**
IP	M5 SB offslip	1,051	1,256	205	20%	FAIL
	A370 (East)	728	776	48	7%	PASS
	M5 NB offslip	278	395	117	42%	FAIL
	A370 (West)	1,692	1,731	39	2%	PASS
	Total	**3,749**	**4,159**	**410**	**11%**	**FAIL**
PM	M5 SB offslip	2,112	2,164	52	2%	PASS
	A370 (East)	950	973	23	2%	PASS
	M5 NB offslip	499	528	29	6%	PASS
	A370 (West)	2,017	2,017	0	0%	PASS
	Total	**5,578**	5,681	103	2%	**PASS**

Turning Flows

7.5.7. Individual turning flows are shown in Appendix G. These are overall a good representation of the observed flows, with the vast majority of turning flows passing validation criteria. The only turning movements that fail the validation criteria are the M5 SB offslip to A370 westbound movement in the IP period (high by 193 vehicles), and the M5 SB offslip to A370 eastbound movement in the PM period (low by 117 vehicles).

Junction delays

7.5.8. There are existing capacity issues at Junction 21 which are also represented in the model. They include the northbound onslip, southbound offslip and the nearby Queensway junction.

- Northbound onslip – In the AM period there are queuing issues at the northbound onslip. In the model the northbound onslip is over-capacity with a V/C ratio of 103%.
- Southbound offslip – In the PM period there are queuing issues on the SB carriageway related to the high level of flow exiting the motorway at Junction 21. The model represents this and is over-capacity on the turning movement between the mainline and the offslip. In practice delays can occur further north on the mainline but it was felt that the model's representation of delay at the diverge point was a suitable approximation. The capacity of the turning movement was calibrated to match the observed flow otherwise the standard RTM saturation flow would not have allowed sufficient traffic onto the slip road (saturation flow was increased from RTM standard 1,930 pcu to 2,160 pcu). The roundabout itself operates within capacity in the model and it is understood that this is representative of present-day conditions. The northbound offslip signal intersection is close to capacity and may experience delays in the future years.

7.5.9. The model does not reflect blocking back from the Queensway junction which can sometimes emerge during the PM peak period and reach back to Junction 21. However, it is noted that westbound journey times into WsM on the A370 validate well against Trafficmaster data (see route C westbound in section 7.6 below which passes the TAG journey time criteria in each time period).

M5 JUNCTION 20

7.5.10. M5 Junction 20 provides access to Clevedon, Portishead and the B3130 corridor towards Nailsea (Figure 7-12).

Figure 7-12 - M5 Junction 20

7.5.11. The modelled flows on each approach during the AM and PM peak hours are compared with observed flows in Table 7-18. The inter-peak hour flows have not been compared because count data was not available for the inter-peak period. The comparison shows that in general the modelled flows are a good representation of the observed flows in both peak hours with most arms comparing well to the observed data and passing the TAG criteria. The flow for the Ettlingen Way to M5 southbound turning movement is too high in the AM peak, so the Ettlingen Way entry arm flow fails the validation criteria, but only by 50 vehicles.

Table 7-18 – M5 J20 entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	M5 NB offslip	1,084	975	-109	-11%	PASS
	M5 SB offslip	492	518	26	5%	PASS
	Ettlingen Way	1,473	1,743	270	18%	FAIL
	Total	**3,049**	**3,236**	**187**	**6%**	**PASS**

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
PM	M5 NB offslip	649	657	8	1%	PASS
	M5 SB offslip	930	852	-78	8%	PASS
	Ettlingen Way	1,289	1,394	105	8%	PASS
	Total	**2,868**	**2,903**	**35**	**1%**	**PASS**

M5 JUNCTION 19

7.5.12. M5 Junction 19 is located at Portishead (Figure 7-13) and provides access to Portishead, Portbury Docks and the A369 to the south. The Gordano motorway services is also accessed from this junction but this is not represented in the model.

Figure 7-13 - M5 Junction 19

7.5.13. The modelled flows on each approach during the AM and PM peak hours are compared with observed flows in Table 7-19. Inter-peak hour flows have not been compared because count data was not available for the inter-peak period.

7.5.14. In the AM peak, the model has lower flows than observed on the A369 east approach and from the M5 northbound carriageway. However, the level of flow entering from the A369 Portbury Hundred

and Dock Road compare better and pass the TAG criteria. Overall the model has a deficit in flow of 8% across the junction as a whole and falls just within the TAG criteria.

7.5.15. In the PM peak, the modelled flows compare better with traffic on the A369 approaches and Dock Road passing the TAG criteria. There is surplus flow on the M5 southbound approach and a deficit on the M5 northbound approach. Overall, the total flow entering the junction is 10% higher than observed and falls just outside TAG criteria.

Table 7-19 – M5 J19 entry flows

Time period	Entry arm	Observed	Modelled	Diff	% Diff	TAG criteria
AM	Dock Road	258	242	-16	-6%	PASS
	M5 SB offslip	1,497	1,725	228	15%	FAIL
	A369	1,258	1,007	-251	-20%	FAIL
	M5 NB offslip	779	501	-278	-36%	FAIL
	A369 Portbury Hundred	1,429	1,350	-79	-6%	PASS
	Total	**5,221**	**4,825**	**-396**	**-8%**	**PASS**
PM	Dock Road	514	597	83	16%	PASS
	M5 SB offslip	1,496	1,930	434	29%	FAIL
	A369	1,331	1,469	138	10%	PASS
	M5 NB offslip	422	269	-153	-36%	FAIL
	A369 Portbury Hundred	1,009	981	-28	-3%	PASS
	Total	**4,772**	**5,246**	**474**	**10%**	**FAIL**

7.6 JOURNEY TIME VALIDATION

7.6.1. The journey time validation routes are shown again in Figure 7-14 to Figure 7-16 below. These routes cover all the key corridors within North Somerset including the A38, A370 and A369 in addition to some more minor routes.

7.6.2. TAG recommends that the total journey times should be within 15% of the observed times (or else within one minute if outside 15%) for at least 85% of the journey time routes.

Table 7-20 – TAG journey time validation criteria

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

Figure 7-14 - Map of journey time routes (A-J)

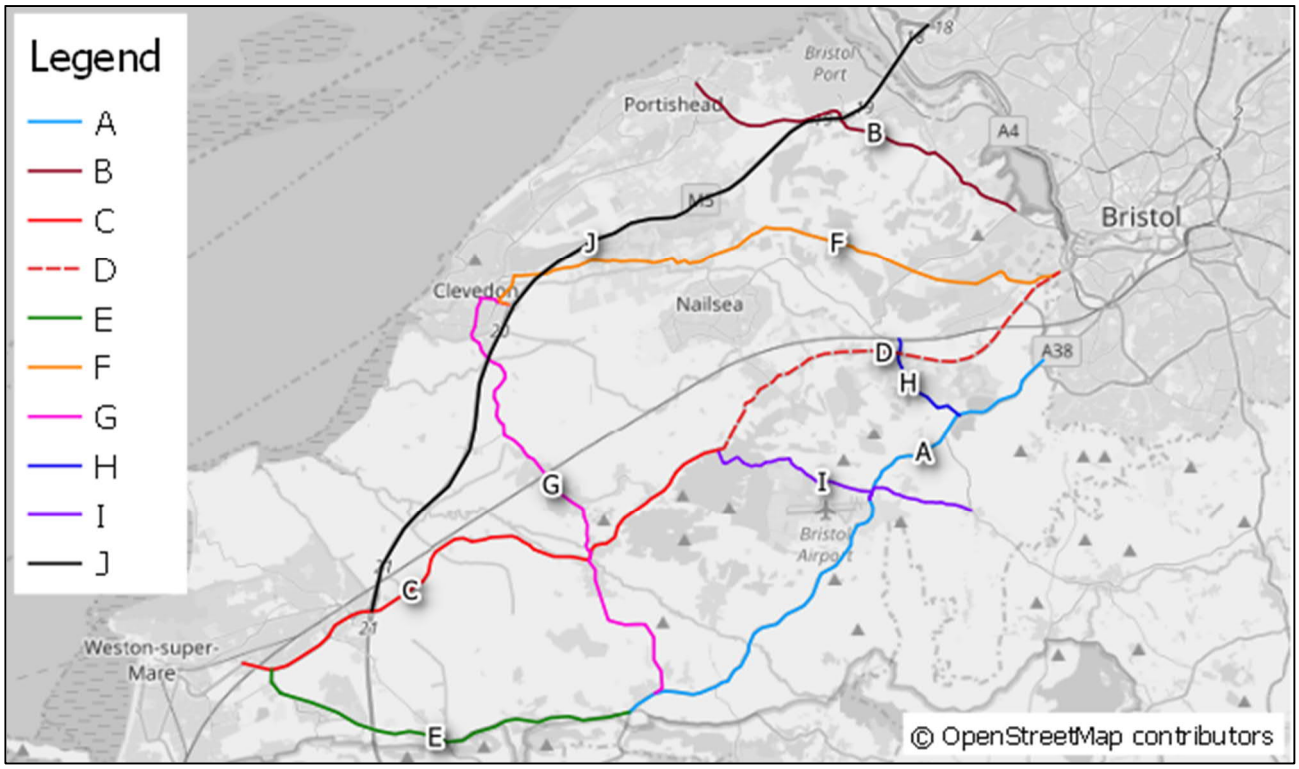


Figure 7-15 - Map of journey time routes (K-N)

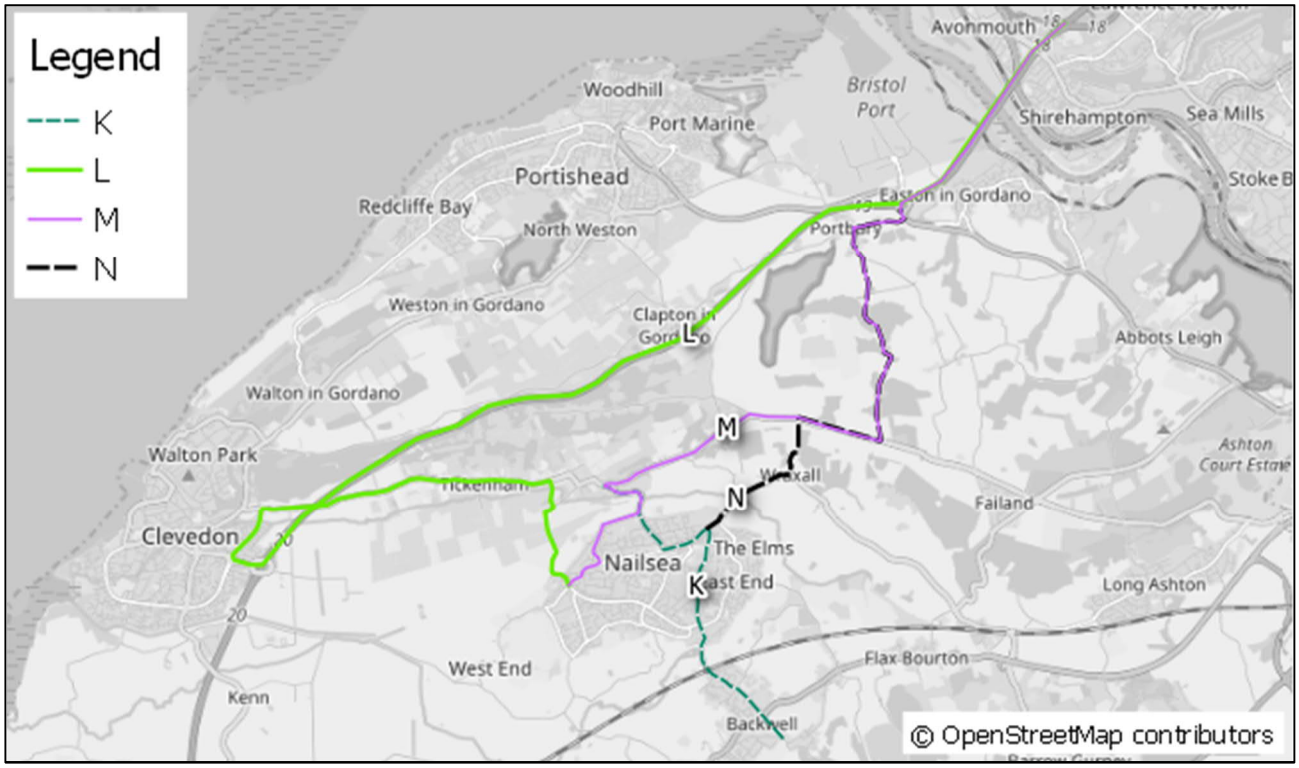
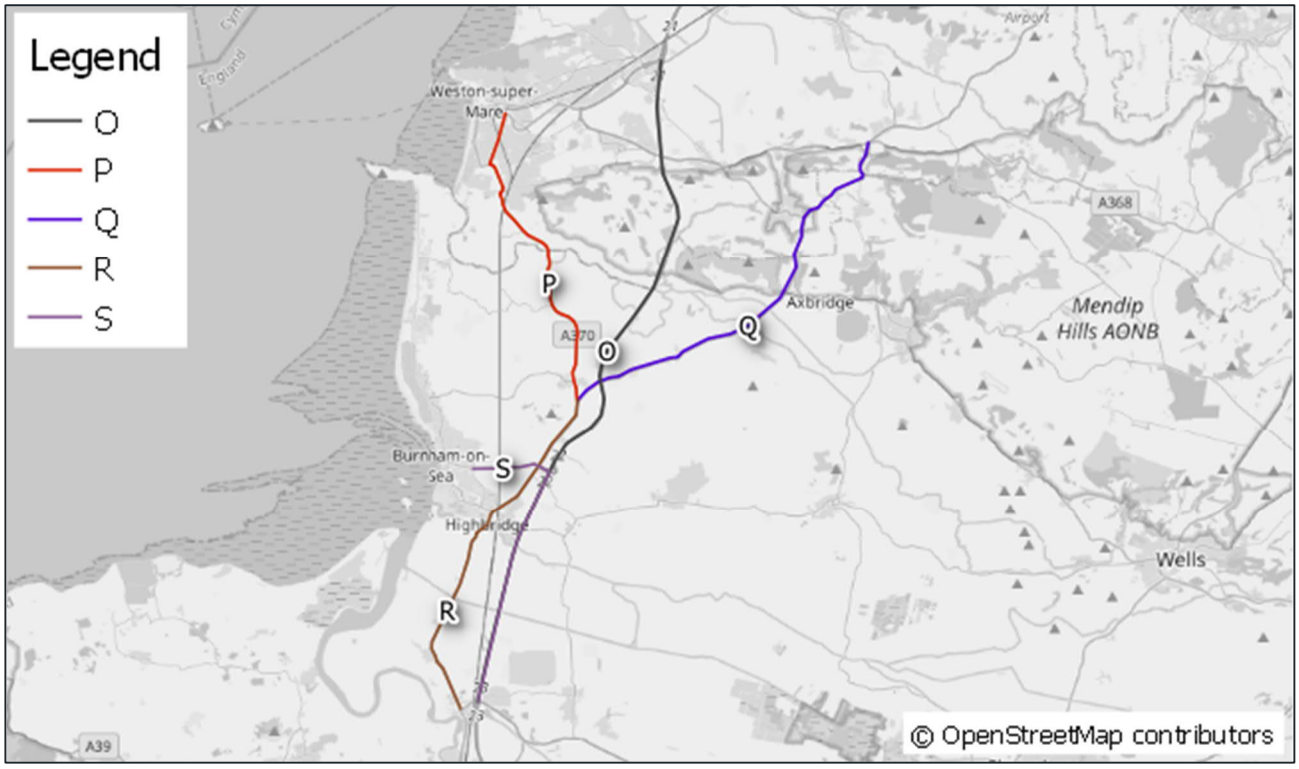


Figure 7-16 - Map of journey time routes (O-S)



SUMMARY OF ROUTES ON LOCAL NETWORK

7.6.3. The model is a good representation for the majority of the routes on the local network, though the modelled times tend to be slightly faster than the observed times in most cases. The AM peak has a pass rate of 84% (just below the TAG criteria but still considered to be a good representation) and the IP and PM peak have pass rates of 95% and 97% respectively. The summary results are shown in Table 7-21, and the full results and time-distance graphs can be found in Appendix H.

Table 7-21 – Journey time results summary

Time period	No. of journey time routes	Journey time routes passing	% routes passing
AM	38	32	84%
IP	38	36	95%
PM	38	37	97%

7.6.4. The following routes are generally very well represented in all time periods:

- Route A, A38 Churchill Gate to South Bristol Link (both directions) – the profiles of the A38 journey times agree very well with the observed times in the peak hours.
- Route C, A370 Brockley to WsM (westbound) – very good match of the modelled and observed time profiles, both showing delays at Congresbury and at M5 Junction 21.
- Route D, A370 Bristol to Brockley (westbound) – reasonably good fit of profiles between the B3128 and Brockley. Delays at Backwell Crossroads are also represented in model.
- Route E (both directions) – observed delay at Banwell is replicated to a reasonable extent in model, given that SATURN cannot specifically model a single-file road. There is not quite enough modelled delay in the eastbound direction inter-peak period to pass validation, though it only fails the 15% criterion by 6 seconds.
- Route F (both directions) – very good match of the modelled and observed time profiles, except for the approach to Brunel Way in the AM (see 7.6.6).
- Route K (both directions) – modelled times through Nailsea match well, and the delays at Backwell Crossroads are reasonably well represented.
- Route L (both directions) – modelled and observed times match well, both for the Nailsea to Junction 20 section and the M5 between Junction 20 and 18. Shows the same J19 SB offslip issue as route J.
- Route M (both directions) – modelled times match well, with delays at Junction 19 represented. The southbound PM route also correctly represents the significant delays turning right out of Portbury Lane onto the B3128.
- Route O, M5 J21-J23 (both directions) – very good match of modelled and observed times in both directions.
- Route P, A370 WsM to East Brent (both directions) – very good match of modelled and observed times in both directions

- Route Q, A38 Churchill Gate to East Brent (both directions) – generally good match of modelled and observed time profiles, though modelled delays at the A371 Sidcot Lane signals are high despite the signal timings correctly reflecting the signal controller data.
- Route R, A38 East Brent to Dunball (both directions) – modelled times represent delays through Highbridge and at Edithmead roundabout reasonably well.
- Route S, Burnham-on-Sea to M5 J23 (both directions) – this route represents delays for the B3140-to-M5 and M5-to-B3140 movements at Edithmead roundabout reasonably well.

7.6.5. The following routes have specific issues:

Route D (A370 journey times into Bristol in AM peak)

7.6.6. As mentioned in 4.3.3, the A370 heading into Bristol is very congested during the AM peak but the model does not represent the tail backs which reach as far as the A4174 roundabout. This is evident on the journey time graph for route D in the eastbound direction (see Appendix H) and also route F on the approach to the A370. Beyond the A369 intersection the journey times are accurate as they have been fixed in accordance with observed speeds, however it is not possible for the model to reflect the wider impact of the tail back.

Route C (A370 leaving WsM in AM peak)

7.6.7. The model does not represent the extent of delay eastbound on the A370 on the approach to the B3440 signals during the AM peak hour. The modelled signals are close to capacity and could possibly be adjusted to generate some additional delay but it would not be possible to represent the full extent of delay within the simulation network without adopting fixed speeds. For the current strategic model, the route choice and level of traffic flow to and from WsM appears to be reasonable (as demonstrated by flow comparisons at screenline B) but it is suggested that this element of the model is reconsidered if further detail is to be added to the WsM area at a later date.

Route B (A369)

7.6.8. The overall journey time on this route is faster than observed in each of the time periods, however the modelled speed on the A369 appears to be representative. The deficit in journey time is mostly accumulated as the route passes through M5 Junction 19 or approaching Bristol in the AM peak. The AM traffic flows entering Junction 19 from the A369 are lower than observed (as shown in section 7.5 above) and this is likely to be the reason why the delays on these approaches are lower than observed.

JOURNEY TIME ON STRATEGIC NETWORK

7.6.9. The journey time along the M5 between J19 and J23 is captured by routes J and O. The modelled and observed profiles match very well northbound. Southbound also matches well except for the model being too fast on the section between J18 and J19. In practice there can be extensive queuing on the southbound carriageway approaching J19. The model shows delay at the offslip but is not able to reflect the extent of the tailback and associated delay that occurs on the mainline carriageway.

JOURNEY TIME ON A38 CORRIDOR

Route A – Churchill Gate to South Bristol Link (15.9 km)

7.6.10. This section covers the A38 in North Somerset, including Bristol Airport. Modelled journey times on this section of the A38 agree well with observed times in all time periods and both directions. The IP times are slightly fast between Churchill and Bristol Airport in both directions.

Route Q – Churchill Gate to East Brent roundabout (14.3 km)

7.6.11. This route covers the A38 from Churchill Gate to the East Brent roundabout where the A370 joins. There is a generally good match of modelled and observed time profiles with the exception of the delay at the A371 Sidcot Lane signalised junction. There is too much delay at this junction despite the modelled signal timings being based on controller data.

Route R – East Brent roundabout to Dunball roundabout (12.3km)

7.6.12. This section covers the A38 through Edithmead roundabout and Highbridge, and the northbound modelled time profile generally agrees with the observed profile along the whole route in every time period. The southbound profile is similar, although the modelled times between East Brent roundabout and Edithmead are slightly fast.

8 SUMMARY AND CONCLUSIONS

8.1 OVERVIEW

8.1.1. This report has described the development of the North Somerset Strategic Model and has examined how well it validates in a base year of 2018. The model will be used to for a number of purposes, including the preparation of an evidence base for the next Local Plan, the development and appraisal of highway schemes and also to provide North Somerset Council with a strategic modelling tool that can be used more generally for ongoing functions within the authority.

8.1.2. The model is a strategic highway assignment model that primarily represents the inter-urban arterial routes within North Somerset. It is derived from Highways England's SWRTM model and therefore contains good underlying strategic demand derived from mobile phone data. Further detail has been added to the model in the form of additional links and smaller zones so that it better represents key local areas within North Somerset.

8.2 MODEL CALIBRATION

8.2.1. The model has been calibrated through a typical iterative process of analysis and adjustment. The demand matrices have been manually adjusted and then an automated matrix estimation process has been used to further refine the trip distribution in key areas. An examination of the post estimation matrices shows that the change in the matrix due to matrix estimation is within the thresholds set out in TAG.

8.3 MODEL VALIDATION

LINK FLOWS

8.3.1. Traffic flows in the model have been validated at a number of key screenlines and links throughout the network. The total flows passing the screenlines correlate well with observed flows and a majority of screenlines pass the TAG criteria in all time periods. Where screenline flows fall outside the TAG threshold they tend to be close to passing and in many cases it can be demonstrated that the individual links making up the screenline pass the link flow validation criteria even if the sum of flow over the screenline is slightly too high or low.

8.3.2. The assigned flows also correlate well with observed data across the set of links selected for link flow validation. The AM peak, inter-peak and PM peak models all meet TAG acceptability guidelines with pass rates of 85%, 86% and 91% respectively.

JOURNEY TIMES

8.3.3. Journey times in the model have been validated against Trafficmaster data along a number of different key routes through the network. The model is a good representation of a majority of the routes and passes the WebTAG criteria in almost all cases, although in general tends to be slightly faster than the observed route times.

8.3.4. There are two specific instances where the model under-represents key delays in the peak hours:

- A370 eastbound into Bristol between the A4174 South Bristol Link and Brunel Way/Bedminster Bridge – this is a very congested route during the AM peak and leads to very slow speeds and queuing back into North Somerset. It is not possible to replicate these delays and the associated

tail back into the simulation network within North Somerset, however model speeds on buffer network links representing this corridor outside North Somerset have been adjusted to match observed speeds to improve route choice.

- A370 eastbound out of Weston-super-Mare – this is another congested route during the AM peak hour and leads to significant delays which cannot be represented in SATURN. As there is limited route choice out of Weston, and the modelled flows appear to be accurate at the Weston screenline, this is not considered to be a significant issue.

A38 CORRIDOR

8.3.5. The modelled link flows along the A38 corridor between Barrow Gurney and Edithmead roundabout overall validate well against TAG criteria. Key junctions for the A38 MRN scheme were calibrated against observed turning counts, and most of the modelled turning counts at these junctions pass TAG criteria.

8.3.6. Journey times along the A38 corridor between the South Bristol Link Road and Dunball roundabout were validated across three journey time routes, all of which passed TAG criteria.

STRATEGIC ROAD NETWORK

8.3.7. The model appears to be a good representation of the strategic network, with traffic flows along the M5 between J19 and J23 mostly comparing well against observed flows from WebTRIS. Similarly, entry flows at each motorway junction also appear to be a reasonable representation with the possible exception of Junction 19 where the model has some discrepancies.

8.3.8. Given its importance in the network, Junction 21 has been examined in more detail and the flows on individual turning movements have been validated. In the AM peak and PM peak the model has a very good representation of flows at this junction. The model also reflects existing capacity issues on the northbound onslip (AM peak) and southbound offslip (PM peak). The roundabout itself operates within capacity and it is understood that this is representative of present-day conditions.

8.4 MODEL SUITABILITY

8.4.1. It is considered that the base model is suitable for its main intended purpose in supporting the development of the next Local Plan for North Somerset and to assess potential highway infrastructure schemes.

- It has been developed and validated in line with the principles and criteria set out in WebTAG and is therefore considered to be TAG compliant.
- It has suitable network coverage and sufficient detail in the network and zone system
- It generally validates well in terms of link flows and journey times.
- It generally models the strategic network well and has a good representation of M5 J21.

8.4.2. The model will be used to appraise the A38 MRN scheme at OBC stage and therefore this validation report has examined its representation of A38 corridor in further detail. This has shown that the model is a strong representation of the corridor both in terms of traffic flow and journey times. It is therefore considered that the model will be a good platform on which to develop forecasts to assess the scheme, and that it should provide a reliable estimate of potential travel time savings.

Appendix A

COUNT DATA

Type	Short Site ID	Long Site ID	Location	Grid Ref		Data Duration	Start Date
				X	Y		
Permanent	1	50105011	SBL south of Gurney Rbt - Long Ashton	355,851	170,419	1 month	27/08/2018
Permanent	2	50205021	SBL south of Brookgate - Long ashton	355,964	169,919	1 month	28/08/2017
Permanent	3	50305031	SBL - south of A38 - Bishopsworth	356,253	168,615	1 month	27/08/2018
Permanent	4	50405041	SBL south of Queens Rd	357,477	168,373	1 month	27/08/2018
Permanent	7	60506051	A370 Somerset Avenue west of West Wick Rab W-s-M	335,998	161,362	1 month	28/05/2018
Permanent	8	60606061	A370 Flowerdown Bridge east of Herluin Way W-s-M	334,680	161,140	1 month	28/05/2018
Permanent	9	60806081	A370 Somerset Avenue east of West Wick Rab W-s-M	336,894	162,163	1 month	27/08/2018
Permanent	11	61206121	Queensway west of Wansborough Rd., Worle	336,834	162,936	1 month	28/08/2017
Permanent	13	62706271	Winterstoke Road south of Byron Road W-s-M	333,562	159,699	1 month	01/09/2018
Permanent	14	64306431	A370 Somerset Ave, east of B3440 Merge	337,625	162,567	1 month	28/08/2017
Permanent	15	64406441	B3440 Bristol Rd., (A370 Off-Slip)	337,462	162,437	1 month	28/05/2018
Permanent	16	70137014	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	352,107	169,106	1 month	28/05/2018
Permanent	17	70407041	A370 Main Road e/o B3129 Station Road Flax Bourton	351,558	169,335	1 month	27/08/2018
Permanent	18	70707071	A38 Bristol Road east of Ladymead Lane Churchill	344,923	159,931	1 month	27/08/2018
Permanent	19	70807081	A38 north of New Road Redhill	350,649	164,035	1 month	27/08/2018
Permanent	20	70907091	B3130 Chew Road east of Kentshare Lane Winford	354,677	164,454	1 month	27/08/2018
Permanent	21	71507151	B3133 Brinsea Road south of Silver St. Congresbury	344,065	162,921	1 month	27/08/2018
Permanent	22	71607161	A371 west of M5 overbridge Locking	338,046	159,382	1 month	28/08/2017
Permanent	23	71857186	A370 Long Ashton Bypass telemetry site	353,314	169,091	1 month	28/08/2017
Permanent	24	71907191	B3128 Ashton Road east of Long Aston Road	355,725	171,174	1 month	28/08/2017
Permanent	25	72207221	A369 The Portbury Hundred west of M5 Junc 19 Rab	349,786	175,604	1 month	27/08/2018
Permanent	26	72307231	Brockley Combe Road west of Downside Road Lulsgate	349,160	166,523	1 month	27/08/2018
Permanent	27	72507251	A38 Bridgwater Road east of Yanley Lane Dundry	355,612	168,793	1 month	27/08/2018
Permanent	28	72807281	A369 Wyndham Way north of B3124	347,497	175,881	1 month	04/09/2017
Permanent	29	73107311	B3440 Bristol Rd s/o Shepherds Way StGeorges W-s-M	337,261	162,579	1 month	27/08/2018
Permanent	30	73307331	A368 East Street east of Dark Lane Banwell	340,268	159,115	1 month	27/08/2018
Permanent	31	73407341	A371 Banwell Road east of Castle Hill Banwell	340,697	158,602	1 month	15/10/2018
Permanent	32	74007401	B3129 Beggar Bush Lane south of A369	354,971	172,918	1 month	31/08/2015
Permanent	33	75437544	A38 Bridgwater Road south of A371 Sidcot	342,528	156,958	1 month	27/08/2018
Permanent	34	77207721	A369 Martcombe Road south of High Street Portbury	350,913	175,325	1 month	27/08/2018
Permanent	35	77357736	B3133 Ettlingen Way west of M5 Junc20 RAB Clevedon	341,550	170,740	1 month	08/10/2018
Permanent	36	78507851	A369 west of B3129 Beggarbush Lane Leigh Woods	354,840	173,327	1 month	27/02/2017
Permanent	37	61406141	Locking Road west of Drove Road, W-s-M	332,462	161,245	1 month	01/11/2016
Permanent	38	61906191	Oldmixon Road east of Broadway, Hutton	334,072	158,602	1 month	27/08/2018
Permanent	40	72607261	A370 (River Axe bridge)	334,057	156,406	1 month	17/09/2018
Permanent	41	61006101	B3440 Locking Road east of Annadale Road W-s-M	335,280	162,390	1 month	01/09/2016
Permanent	42	61806181	A3033 Drove Road north of Quantock Road, W-s-M	332,450	160,051	1 month	01/09/2017
Permanent	43	62506251	Milton Road west of Shaftesbury Road W-s-M	333,596	161,846	1 month	01/09/2016
Permanent	45	70607061	Royal Portbury Dock Rd N/o M5 Junc 19 Rab Portbury	350,610	176,134	1 month	28/08/2017
Permanent	46	71007101	B3130 south of Towerhouse Lane Nailsea	348,283	171,471	1 month	27/08/2018
Permanent	47	71107111	Station Road south of Bucklands End Nailsea	347,860	169,461	1 month	27/08/2018
Permanent	48	71207121	B3124 Walton Road east of Holly Lane Clevedon	342,072	172,588	1 month	28/08/2017
Permanent	49	71307131	Clapton Lane south of Mayfields Close Portishead	346,766	174,146	1 month	28/08/2017
Permanent	50	71407141	B3130 Clevedon Road s/o Tickenham Hill Nailsea	346,937	171,672	1 month	28/08/2017
Permanent	51	72007201	B3133 Kenn Road south of M5 Overbridge Kenn	341,291	169,159	1 month	27/08/2018
Permanent	53	73207321	B3128 Tickenham Hill west of Towerhouse Lane	347,580	172,140	1 month	27/08/2018
Permanent	54	73507351	Wolvershill Road south of M5 overbridge Banwell	337,891	161,307	1 month	27/08/2018
Permanent	55	74107411	Mill Lane south of Mill Close Portbury	350,066	174,954	1 month	27/08/2018
Permanent	56	74207421	Coast Road west of Charlcombe Rise, Portishead	343,733	174,981	1 month	29/08/2016
Permanent	57	74407441	Valley Road north of B3124 Clevedon Rd., Portishead	345,078	174,838	1 month	05/09/2016
Permanent	58	74507451	A38 Bridgwater Road west of Dial Lane, Potters Hill	352,478	166,570	1 month	27/08/2018
Permanent	60	77657766	B3130 Tickenham Rd east of M5 Overbridge Clevedon	342,831	171,591	1 month	27/08/2018
Permanent	61	78107811	B3130 Clevedon Road s/o B3129 Belmont Hill Flax Bourton	351,411	169,899	1 month	29/08/2016
Permanent	66	64506451	The Runway - CAL - west of A371Locking Moor Road	335,007	160,619	1 month	27/08/2018
Permanent	72	61306131	High Street west of Nutwell Sq., Worle	335,167	162,545	1 month	01/06/2016
Permanent	76	70307031	A370 Rodyate Hill west of Warners Close Cleeve	345,304	165,399	1 month	27/08/2018
Permanent	77	72407241	BIA Main Entrance north of A38 Lulsgate	351,189	165,447	1 month	27/08/2018
Permanent	78	72457246	BIA Silver Zone Parking - north of A38	351,189	165,447	1 month	27/08/2018
Permanent	79	72707271	BIA Freight Entrance Downside Road Lulsgate	350,373	165,822	1 month	27/08/2018
Permanent	80	73707371	A370 Weston Road north of Wick St Lawrence turn HEWISH	339,564	164,014	1 month	27/08/2018
Permanent	81	78207821	Mizzymead Road south of Hillcrest Road Nailsea	347,265	170,237	1 month	29/05/2017
Temporary	2		Nye Rd, Sandford	341,898	160,237	1 week	07/12/2018
Temporary	3		Riverside, Banwell	339,897	159,689	1 week	07/12/2018
Temporary	4		Summer Lane, Banwell	338,213	159,437	1 week	25/02/2019
Temporary	9		Backwell Common, Backwell	348,965	169,995	1 week	07/12/2018
Temporary	10		Backwell Bow (South), Backwell	349,370	169,962	1 week	17/01/2019
Temporary	16		Station Rd, Backwell	347,960	169,198	1 week	27/11/2017
Temporary	17		B3129 Weston Rd, Failand	352,093	171,232	1 week	07/06/2017
Temporary	18		B3128 Clevedon Rd, Failand	351,825	171,804	1 week	07/06/2017

Temporary	19		Flax Bourton Rd, Failand	351,836	171,255	1 week	07/06/2017
Temporary	20		Chelvey Rd, Backwell	347,885	167,966	1 week	07/03/2018
Temporary	21		Brockley Lane, Backwell	347,229	166,881	1 week	07/03/2018
Temporary	22		Netherton Wood Lane, Nailsea	346,056	168,798	1 week	07/03/2018
Temporary	23		West End Lane, Nailsea	345,599	170,086	1 week	07/03/2018
Temporary	24		Causeway, Tickenham	345,772	171,417	1 week	07/03/2018
Temporary	25		Backwell Bow (North), Nailsea	348,793	170,363	1 week	22/03/2018
Temporary	28		B3128 Clarken Coombe	353,904	171,166	1 week	01/11/2017
Temporary	29		B3129 Station Rd, Flax Bourton	351,016	169,709	1 week	01/11/2017
Temporary	30		A368 Bath Rd, Blagdon	350,428	158,670	1 week	01/11/2017
Temporary	31		Nailsea Wall, Kenn	343,271	169,687	1 week	28/03/2019
Temporary	32		Kenmoor Rd, Kenn	342,576	169,426	1 week	28/03/2019
Temporary	33		Court Lane, Clevedon	342,211	170,868	1 week	28/03/2019
Temporary	34		Davis Lane, Clevedon	341,455	169,896	1 week	28/03/2019
Temporary	35		B3133 Stock Lane, Langford	345,634	160,753	1 week	28/03/2019
Temporary	36		Half Yard, Langford	346,456	161,269	1 week	28/03/2019
Temporary	37		B3124 Clevedon Rd, North Weston	346,230	175,011	1 week	28/03/2019
Temporary	39		Long Lane (east of Wrington)	347,690	163,001	1 week	01/03/2019
Temporary	40		Sheepway (Portbury)	349,540	175,781	1 week	01/09/2018
Temporary	1	90322400	A38, Bristol Road, Brent Knoll, (site 1), crossroads sign	333,875	149,479	1 week	04/12/2017
Temporary	2	90322401	A38 Bristol Road, Brent Knoll, (site 2)	334,108	149,884	1 week	04/12/2017
Temporary	3	90322402	A38 Bristol Road, Brent Knoll, (site 3), Keep Left sign	334,118	149,895	1 week	04/12/2017
Temporary	4	40000252	Tarnock A38 Bristol Road (Site 252)(SRS40000252)	337,589	152,570	1 week	11/07/2016
Temporary	5	90321784	ROOKS BRIDGE - A38 Bristol Road Jct Chapel Road, W of Tarnock, S	337,292	152,470	1 week	29/05/2014
Temporary	6	90322209	A38 Rooksbridge, Bristol Road	336,960	152,373	1 week	03/10/2016
Temporary	7	90322523	Mr Peak View Farm, Sedgemoor	336,291	152,079	1 week	18/05/2018
Temporary	8	90322403	A370 Bridgwater Road, East Brent, (site 4)	334,942	151,545	1 week	04/12/2017
Temporary	9	90322522	NE of Yew Tree Farm, Sedgemoor (R)	335,137	151,507	1 week	18/05/2017
Temporary	10	90322521	Nr Collis Farm, Sedgemoor	334,961	151,031	1 week	18/05/2018
Temporary	11	90322520	A38, East Brent	334,603	150,415	1 week	18/05/2018
Temporary	12	90321785	E of TARNOCK - A38 Bristol Road (opp Manor Fm), Sedgemoor ◆	337,896	152,651	1 week	29/05/2014
Temporary	13	90033439	EDITHMEAD - A38, N of Highbridge, Sedgemoor (CA)(T)(CLS)	333,847	149,420	1 year	01/01/2018
Temporary		5414	B3139 East Huntspill	338,778	147,805	1 week	01/11/2019
Temporary		5457	B3139 Mark Causeway	334,562	145,682	1 week	13/12/2018
Temporary		90322407	B3139, Mark Causeway, Mark (site 1), Nr White Horse Inn	335,755	147,524	1 week	08/01/2018
Temporary		90322408	B3139, Church Street, Mark (site 2), narrow road point	337,791	147,950	1 week	08/01/2018
Temporary		90322409	B3139, Blackford Road, Mark (site 3)	337,629	147,882	1 week	08/01/2018
Temporary		90322546	Mark Causeway	335,649	147,504	1 week	09/07/2018
WebTRIS	30360115		M5 NB between J19 and J18	351,325	175,996	1 year	01/01/2017
WebTRIS	30360179		M5 SB between J18 and J19	351,364	176,040	1 year	01/01/2017
WebTRIS	30360133		M5 NB between J22 and J21	335,838	151,180	1 year	01/01/2018
WebTRIS	30360132		M5 SB between J21 and J22	335,861	151,344	1 year	01/01/2018
WebTRIS	30360164		M5 SB between J20 and J21	340,260	166,273	1 year	01/01/2017
WebTRIS	30360166		M5 NB between J21 and J20	340,339	166,399	1 year	01/01/2017
WebTRIS	30360116		M5 NB between J20 and J19	347,373	173,655	1 year	01/01/2018
WebTRIS	30360117		M5 SB between J19 and J20	348,591	174,627	1 year	01/01/2018
WebTRIS	30360120		M5 Between J22 and J23	331,604	142,001	1 year	01/01/2018
WebTRIS	30360121		M5 Between J22 and J23	331,634	141,904	1 year	01/01/2018

Short Site ID	Area	Location	Grid Ref		Survey Duration	Survey Date
			X	Y		
8	A369	M5 J19	350,676	175,618	Peak hr	09/05/2017
9	A369	A369 Martcombe Rd / High St	350,719	175,391	12 hr	02/07/2019
10	A369	A369 / St Georges Hill	351,113	175,286	12 hr	02/07/2019
14	A369	A369 / Pill Road	352,854	174,637	12 hr	02/07/2019
19	A369	Abbots Leigh Road / Bridge Road	355,849	172,716	12 hr	02/07/2019
1	A370	A370 Herluin Way Rbt	333,368	160,407	12 hr	21/11/2018
2	A370	Winterstoke Rd / CAL	333,601	159,572	12 hr	18/10/2018
7	A370	A370 / Maltlands (Hutton Moor Rbt)	334,447	161,195	12 hr	21/11/2018
8	A370	A370 / A371 Airport Rbt	335,193	160,994	12 hr	21/11/2018
9	A370	A370 West Wick Rbt	336,711	161,888	12 hr	18/10/2018
10	A370	B3440 Off-Slip / Scot Elm	337,368	162,249	Peak hr	25/09/2018
11	A370	A370 On-Slip / B3440 Overbridge Merge	337,341	162,469	12 hr	25/09/2018
12	A370	M5 J21	337,878	162,582	12 hr	18/10/2018
13	A370	A370 / Silvermoor Lane	338,369	162,726	12 hr	25/09/2018
14	A370	A370 / West Rolestone Rd	338,481	162,797	12 hr	03/10/2018
18	A370	A370 / B3133 High St Congresbury	343,728	163,837	12 hr	22/11/2018
19	A370	A370 / B3133 Smallway Congresbury	343,768	164,095	12 hr	22/11/2018
21	A370	Bishops Rd, Cleeve	345,429	165,508	12 hr	18/09/2018
22	A370	Brockley Coombe	347,246	166,783	12 hr	19/06/2018
23	A370	Chelvey Lane	347,962	167,991	12 hr	25/06/2018
26	A370	Backwell Cross Roads	348,697	168,591	12 hr	05/06/2018
31	A370	Backwell Hill (E) / Chapel Hill	349,740	169,194	12 hr	06/09/2018
34	A370	A370- Flax B- west of B3130	351,774	169,367	12 hr	20/06/2018
35	A370	A370- ebd On-slip- B3130	352,138	169,394	12 hr	27/06/2018
36	A370	A370 east bound off-slip- B3130	352,108	169,317	12 hr	20/06/2018
37	A370	A370- Barrow Street	352,073	169,156	12 hr	21/06/2018
38	A370	A370 / A4174 SBL	355,458	170,679	12 hr	04/10/2018
39	A370	A370 B3128 Ashton Road EB On-slip	355,790	171,201	12 hr	23/10/2018
40	A370	B3128 Park and Ride	356,021	171,065	12 hr	23/10/2018
41	A370	B3440 / Queensway	336,970	162,755	12 hr	18/10/2018
43	A370	B3128 / Long Ashton Road	355,409	171,183	Peak hr	03/10/2017
37	A371	A370- Barrow Street	352,073	169,156	13 hr	22/06/2018
4	A38	A38 / A371 Sidcot Lane	342,639	157,348	12 hr	22/11/2018
7	A38	A38 / New Rd (Shipham)	344,508	158,601	Peak hr	11/10/2018
10	A38	A38 / A368	344,802	159,791	12 hr	04/10/2018
13	A38	A38 / B3133 Stock Lane	345,526	160,329	12 hr	22/11/2018
26	A38	A38 / Silverzone Rbt	350,911	164,697	Peak hr	10/10/2018
27	A38	A38 / Bristol airport (Main Entrance)	351,262	165,415	12 hr	04/10/2018
28	A38	A38 / Downside Rd	351,344	165,638	12 hr	17/10/2018
29	A38	A38 / West Lane	351,424	165,754	12 hr	17/10/2018
34	A38	A38 / B3130 Barrow Lane	353,280	167,084	12 hr	17/10/2018
35	A38	A38 / B3130 Barrow Street	353,676	167,675	12 hr	17/10/2018
36	A38	A38 / Dundry Lane	354,697	167,938	Peak hr	02/10/2018
38	A38	A38 / A4174 SBL	355,867	169,015	12 hr	04/10/2018
1	Banwell	Wolvershill Road / Scot Elm Way	337,549	161,544	12 hr	25/09/2018
2	Banwell	Wolvershill Road / Summer Lane	338,288	160,521	12 hr	25/09/2018
3	Banwell	A371 / CAL	335,186	160,688	12 hr	18/10/2018
9	Banwell	A371 / Banwell Rd	337,628	159,483	12 hr	25/09/2018
10	Banwell	A371 / Summer Lane	338,218	159,358	12 hr	25/09/2018
13	Banwell	A371 / Wolvershill Rd	339,560	159,238	12 hr	22/11/2018
14	Banwell	A371 / A368 Banwell Narrows	339,890	159,053	12 hr	22/11/2018
16	Banwell	A368 / Dark Lane	340,025	159,067	12 hr	22/11/2018
18	Banwell	A371 / Sandford Rd	342,048	157,610	12 hr	22/11/2018
19	Banwell	A368 / Hill Rd Sandford	342,209	159,573	12 hr	22/11/2018
25	Banwell	A368 / B3134 Burrington Combe	347,750	159,537	12 hr	17/10/2018
1	Bristol	A4 Portway	356,324	173,433	12 hr	26/04/2016
1	Clevedon	B3130 - Court Lane Jct	342,195	171,489	12 hr	06/09/2019
2	Clevedon	B3130 - Northern Way Rbt	341,831	171,490	12 hr	19/09/2018
5	Clevedon	B3133 Ettlingen Way Rbt	341,412	170,786	12 hr	04/10/2018
5	Clevedon	B3133 Ettlingen Way Rbt	342,195	171,489	12 hr	04/10/2018
6	Clevedon	M5 J20 Rbt	341,739	170,671	12 hr	19/09/2018
8	Clevedon	B3133 - Davis Lane Jct	340,789	169,774	12 hr	19/09/2018
232	M5	M5 Junction 23	331,945	143,111	Peak hr	15/11/2018
233	M5	A38 / A39 Dunball Roundabout	330,932	141,073	Peak hr	15/11/2018
1	Nailsea	B3130-B3128 Stonedge Batch	346,554	171,766	Peak hr	29/06/2018
4	Nailsea	B3128 West Hill	349,245	172,651	Peak hr	06/09/2018

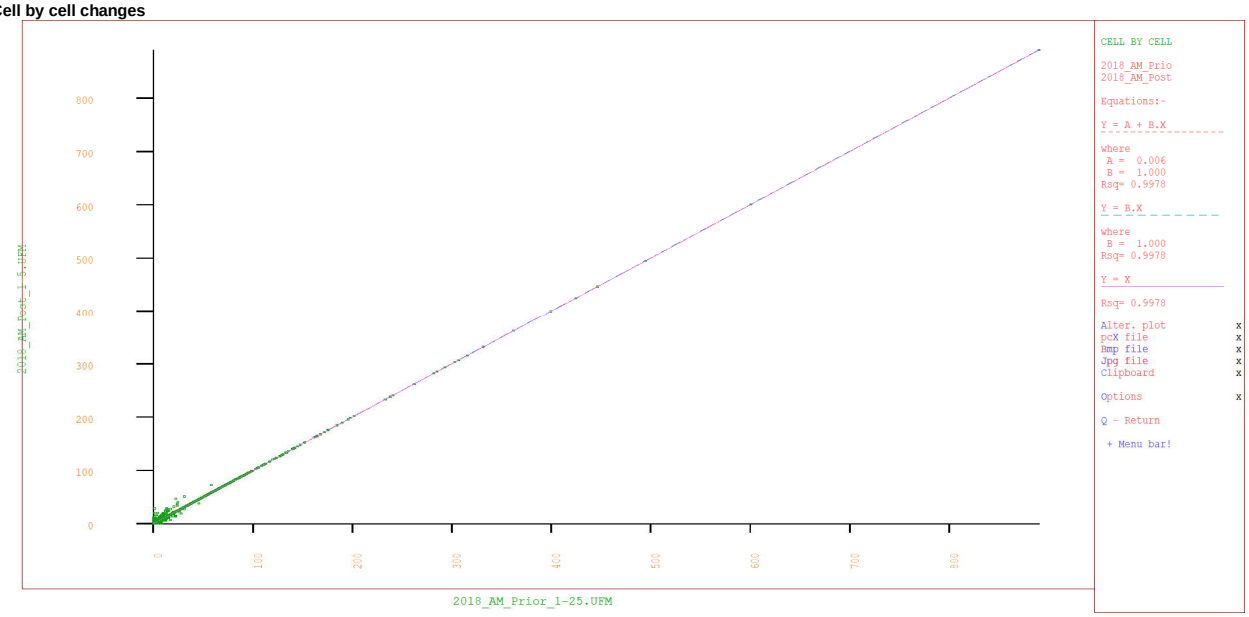
5	Nailsea	B3130 Wraxall Hill	349,099	171,895	Peak hr	26/06/2018
6	Nailsea	B3128 Portbury Lane	350,369	172,336	Peak hr	24/04/2018
7	Nailsea	B3128-Flax Bourton Road	351,627	171,887	Peak hr	21/06/2018
8	Nailsea	B3128-B3129 Failand	352,489	171,497	12 hr	23/10/2018
9	Nailsea	B3130-B3129 Belmont Junction	351,337	169,998	Peak hr	27/06/2018
10	Nailsea	B3130 / Weston Road	352,103	169,675	Peak hr	21/06/2018
11	Nailsea	A369-B3129 Beggar Bush	355,215	173,099	12 hr	23/10/2018
1	Somerset	M5 Junction 22	334,010	148,961	12 hr	15/11/2018
2	Somerset	Edithmead Roundabout	333,630	149,151	12 hr	15/11/2018
3	Somerset	M5 Junction 23	331,525	141,336	12 hr	15/11/2018
2	Sedgemoor	Burnham Road/Pepperall Road	331,738	147,811	Peak hr	12/07/2018
3	Sedgemoor	A370/B3140	334,873	151,968	Peak hr	12/07/2018
4	Sedgemoor	B3140/Love Lane Roundabout	331,470	149,093	Peak hr	12/07/2018
6	Sedgemoor	A38/B3139 Burnham Road	332,105	147,634	Peak hr	12/07/2018
7	Sedgemoor	A38/A370	334,986	151,314	Peak hr	12/07/2018
11	Sedgemoor	A38/B3139 Market Street	331,904	147,175	12 hr	12/07/2018
12	Sedgemoor	A38 Bennetts Road Roundabout	332,918	148,148	Peak hr	12/07/2018
13	Sedgemoor	A38 Bristol Road/Brent Street/Harp Road (Fox and Goose)	334,046	149,788	Peak hr	12/07/2018
11/19/00003	Sedgemoor	Mark Road / Bennett Road / Commerce Way roundabout	332,690	147,118	Peak hr	17/07/2018

Appendix B

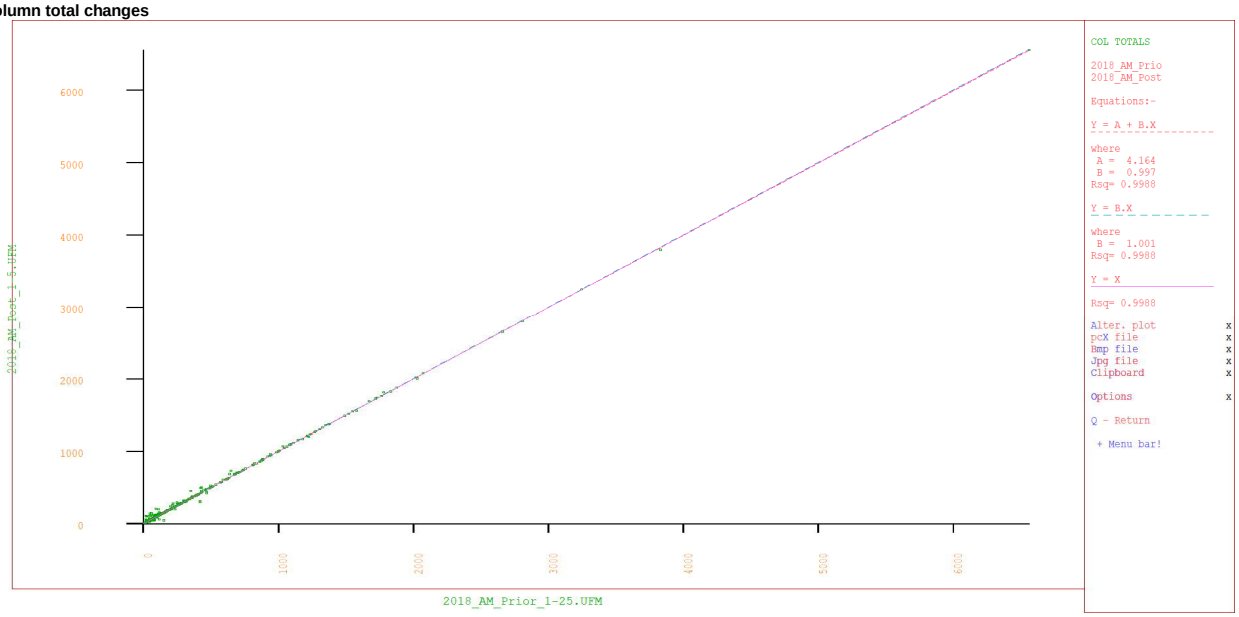
ME2 REGRESSION PLOTS

ME2 AM

Cell by cell changes



Column total changes



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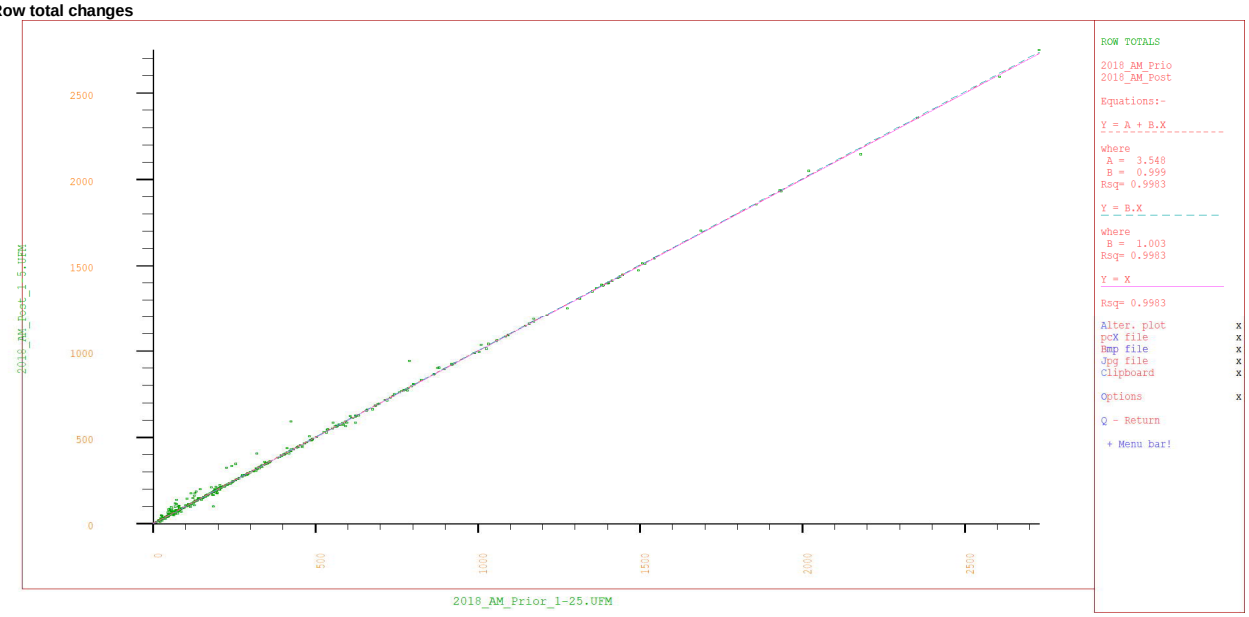
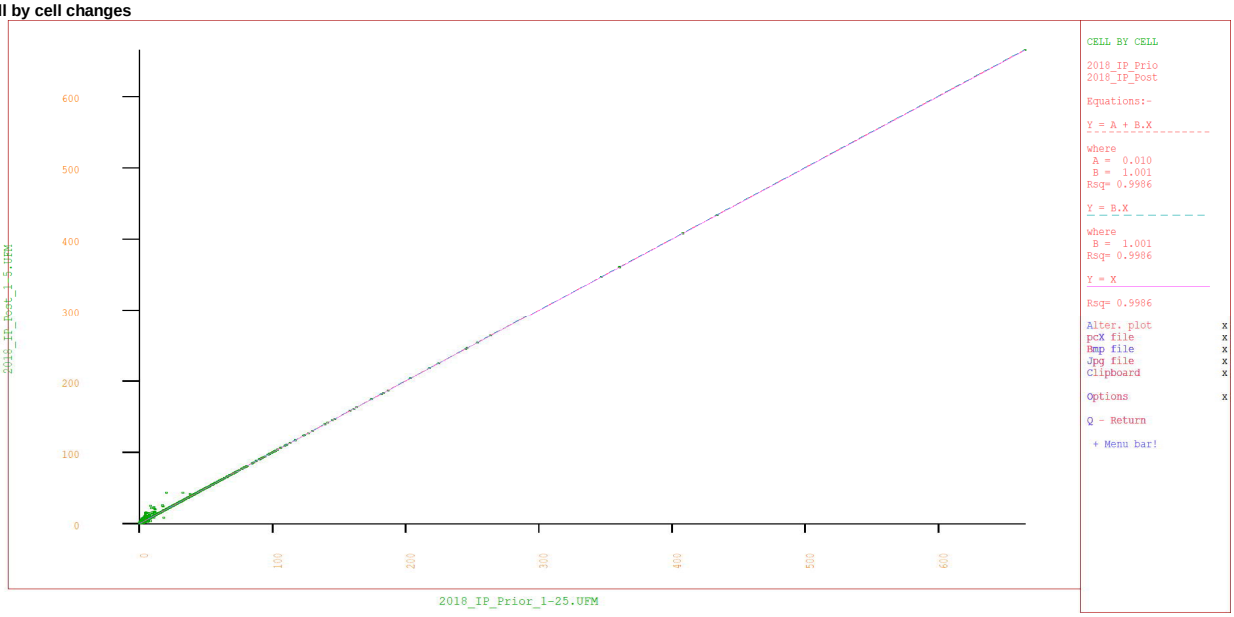
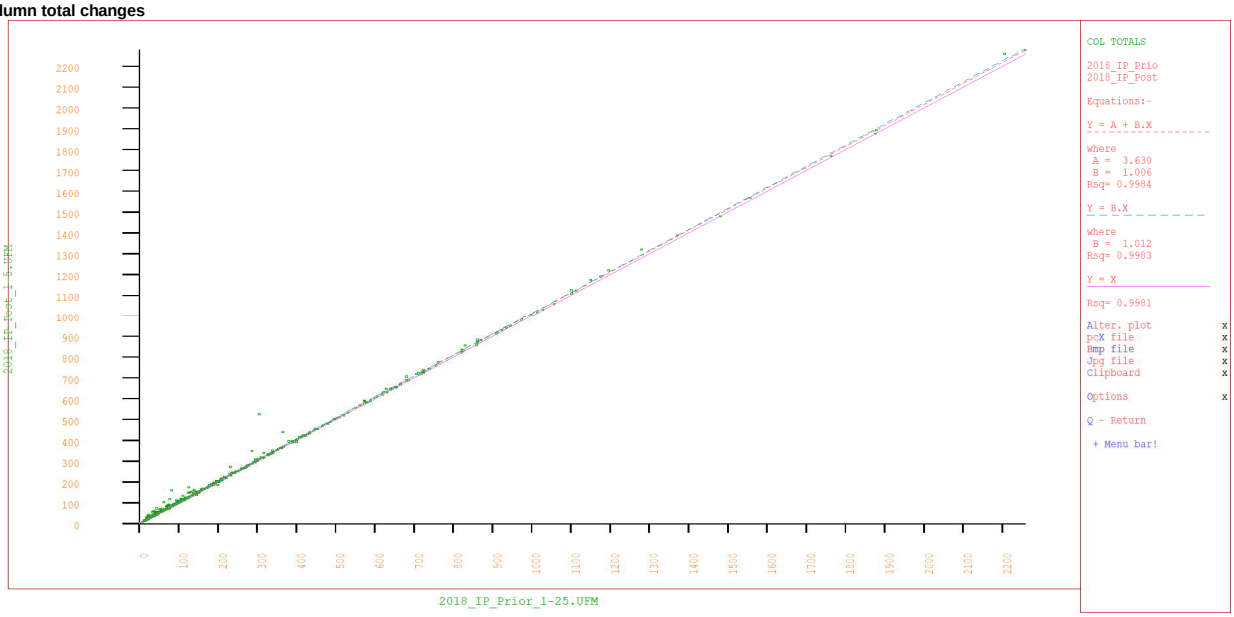


ME2 IP

Cell by cell changes



Column total changes



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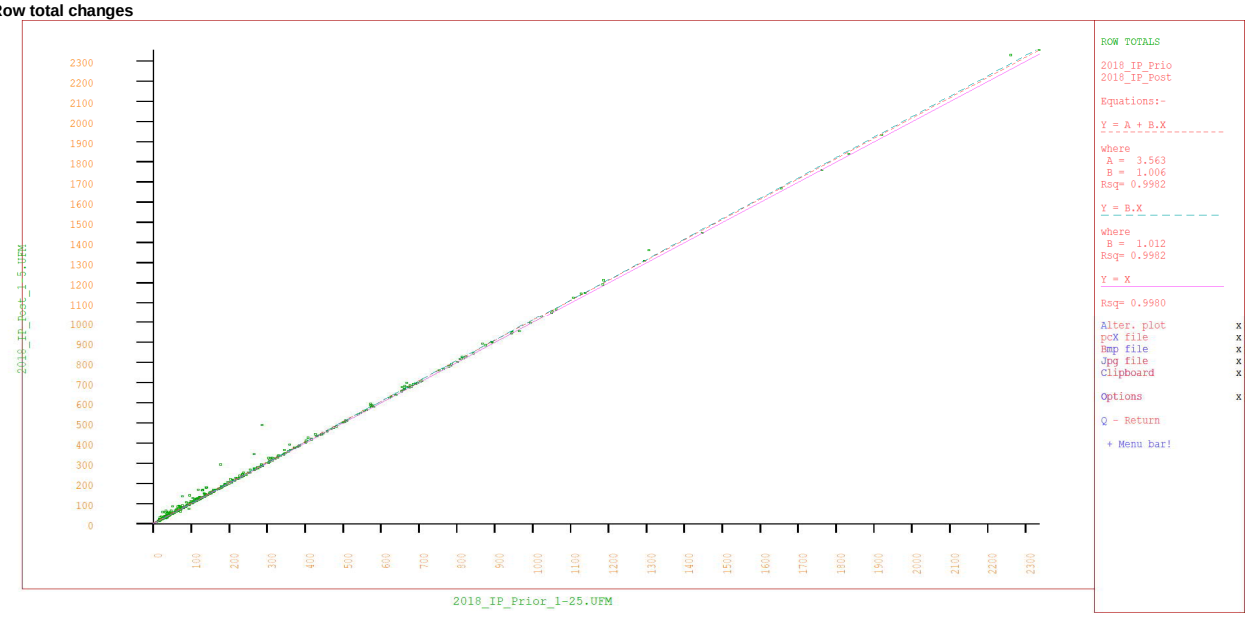
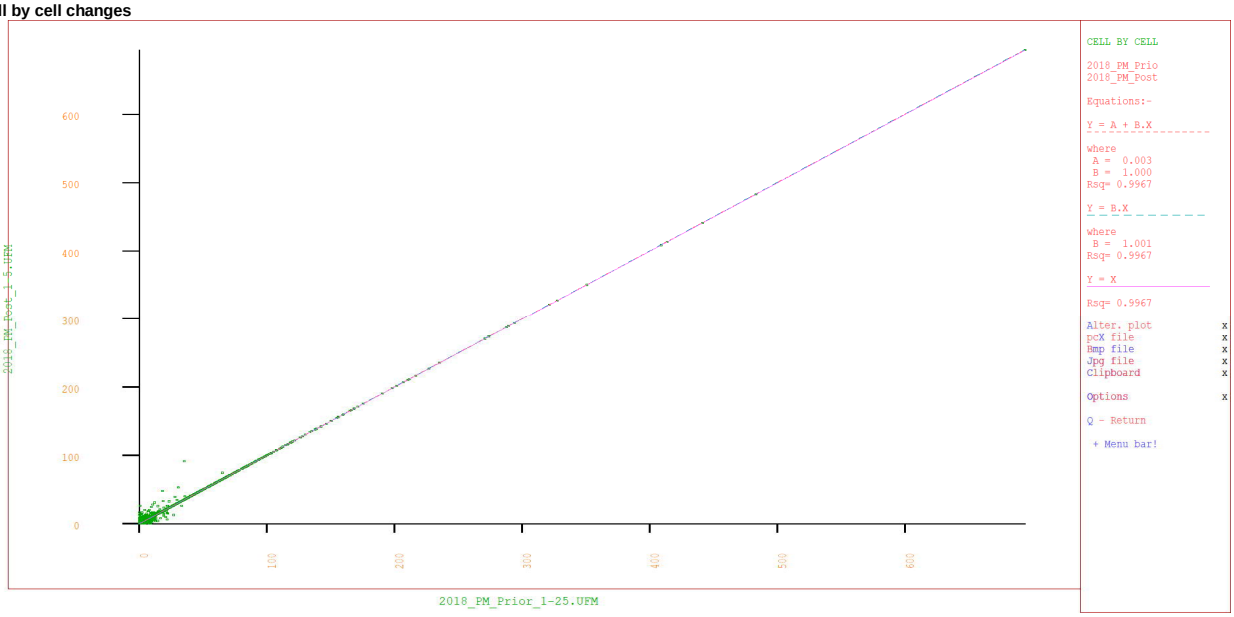


ME2 PM

Cell by cell changes



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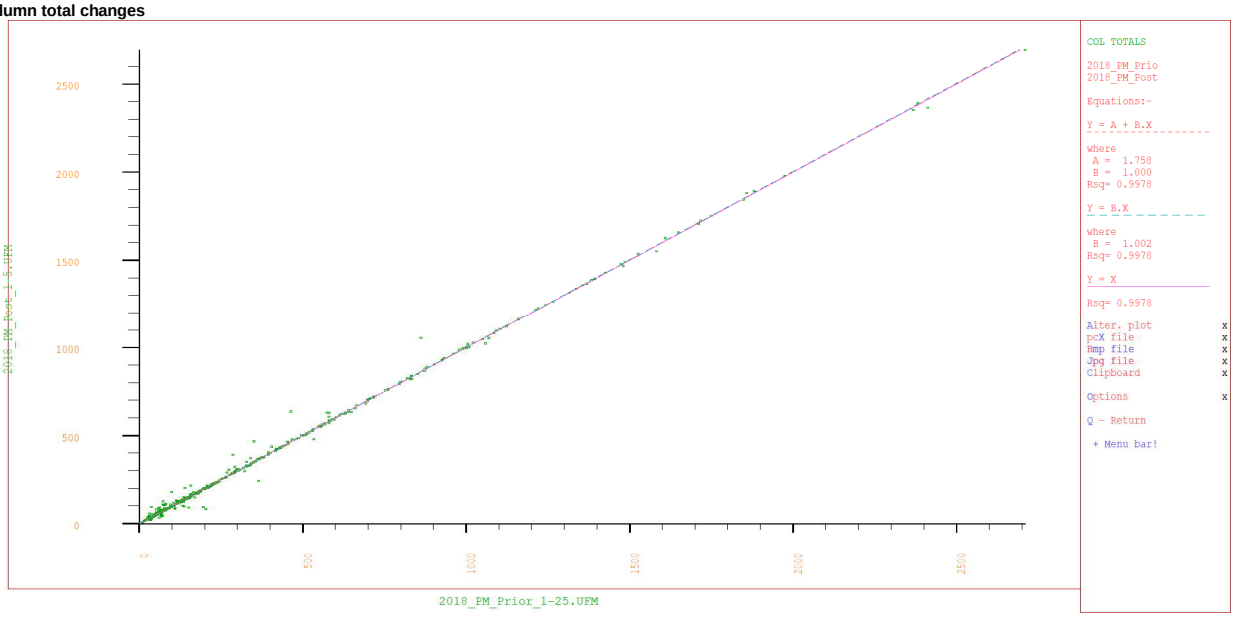
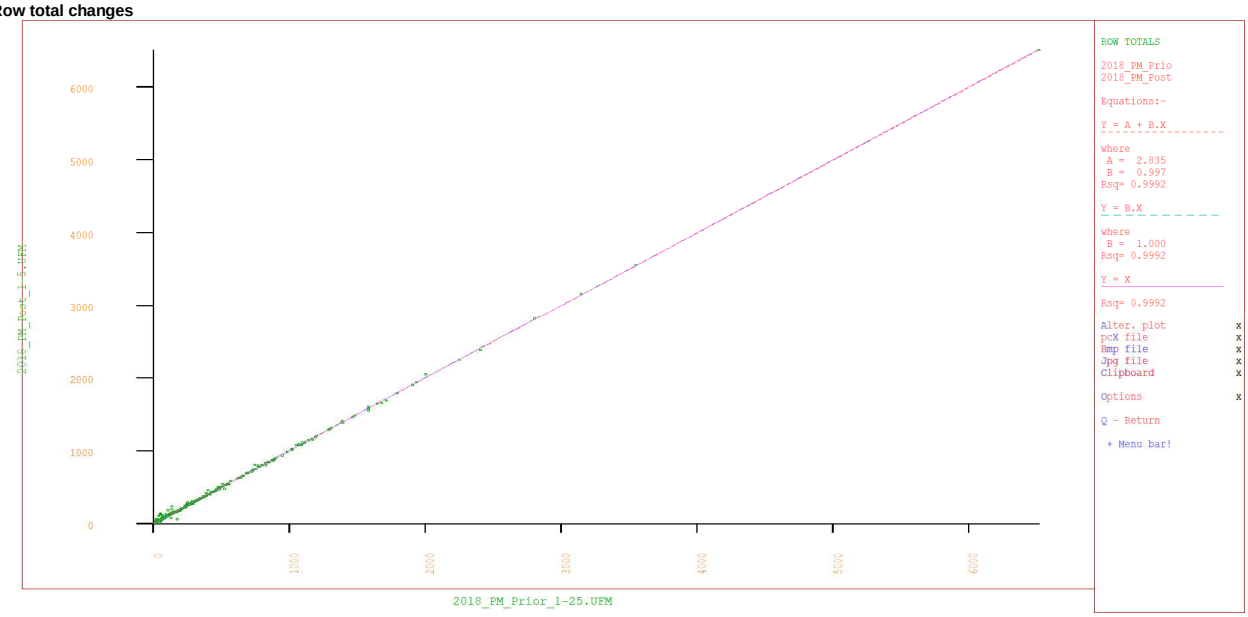


Row total changes



Appendix C

ME2 SECTOR-TO-SECTOR MATRICES

AM Sector-to-sector matrices

Prior	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	7,029	267	261	296	101	176	43	196	649	101	891	917	10,926
Churchill	424	362	106	54	56	53	39	32	211	36	127	168	1,667
Congresbury	467	120	174	232	33	57	88	145	266	29	97	225	1,933
Clevedon	213	35	230	526	23	108	150	230	460	27	93	301	2,396
Bristol Aiport	69	82	41	22	66	53	80	21	413	58	41	268	1,215
Nailsea	222	31	54	150	46	489	146	73	721	57	98	287	2,373
Long Ashton	28	4	63	110	11	101	182	81	626	12	14	110	1,343
Portishead	149	15	134	219	21	160	146	701	1,064	38	44	629	3,320
Bristol	284	87	137	209	218	450	327	712	30,072	1,557	184	10,385	44,623
Bath & NE Somerset	57	32	24	25	53	55	26	48	2,092	14,199	155	4,017	20,783
Sedgemoor	857	163	110	177	68	87	37	74	272	138	6,875	2,566	11,424
Rest of UK	734	107	226	327	336	331	162	887	15,218	6,554	2,326	38,142	65,352
Total	10,531	1,304	1,561	2,348	1,032	2,120	1,427	3,200	52,064	22,807	10,944	58,015	167,354

Post	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	7,037	375	188	315	82	145	39	196	696	117	935	987	11,112
Churchill	422	362	95	58	64	40	38	30	238	34	124	162	1,666
Congresbury	424	120	180	222	32	72	64	110	248	30	105	238	1,845
Clevedon	214	36	193	526	19	120	154	228	457	24	96	300	2,366
Bristol Aiport	106	84	63	45	72	95	84	26	447	42	43	259	1,365
Nailsea	241	38	56	180	52	1,063	131	123	637	36	113	260	2,931
Long Ashton	38	3	39	117	13	97	182	103	627	8	18	112	1,357
Portishead	155	17	97	221	20	182	159	715	1,085	37	46	760	3,493
Bristol	337	115	128	229	347	445	327	757	30,072	1,557	221	10,389	44,926
Bath & NE Somerset	65	30	43	30	51	37	17	41	2,046	14,199	143	3,986	20,690
Sedgemoor	958	176	104	186	83	85	35	75	307	138	7,172	2,626	11,947
Rest of UK	703	109	213	337	294	296	156	916	15,158	6,538	2,389	38,110	65,220
Total	10,700	1,464	1,401	2,466	1,129	2,677	1,385	3,321	52,018	22,762	11,406	58,189	168,918

Post - Prior % diff	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	0%	40%	-28%	6%	-19%	-18%	-9%	0%	7%	16%	5%	8%	2%
Churchill	0%	0%	-10%	7%	14%	-25%	-3%	-6%	13%	-6%	-2%	-4%	0%
Congresbury	-9%	0%	3%	-4%	-3%	26%	-27%	-24%	-7%	3%	8%	6%	-5%
Clevedon	0%	3%	-16%	0%	-17%	11%	3%	-1%	-1%	-11%	3%	0%	-1%
Bristol Aiport	54%	2%	54%	105%	9%	79%	5%	24%	8%	-28%	5%	-3%	12%
Nailsea	9%	23%	4%	20%	13%	117%	-10%	68%	-12%	-37%	15%	-9%	24%
Long Ashton	36%	-25%	-38%	6%	18%	-4%	0%	27%	0%	-33%	29%	2%	1%
Portishead	4%	13%	-28%	1%	-5%	14%	9%	2%	2%	-3%	5%	21%	5%
Bristol	19%	32%	-7%	10%	59%	-1%	0%	6%	0%	0%	20%	0%	1%
Bath & NE Somerset	14%	-6%	79%	20%	-4%	-33%	-35%	-15%	-2%	0%	-8%	-1%	0%
Sedgemoor	12%	8%	-5%	5%	22%	-2%	-5%	1%	13%	0%	4%	2%	5%
Rest of UK	-4%	2%	-6%	3%	-13%	-11%	-4%	3%	0%	0%	3%	0%	0%
Total	2%	12%	-10%	5%	9%	26%	-3%	4%	0%	0%	4%	0%	1%

IP Sector-to-sector matrices

Prior	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	6,523	206	337	152	54	115	24	136	266	45	624	594	9,075
Churchill	251	227	87	23	55	19	4	14	63	13	93	86	935
Congresbury	334	86	176	192	31	45	47	128	113	15	73	160	1,401
Clevedon	164	24	195	355	20	82	106	193	157	13	59	187	1,554
Bristol Aiport	58	50	41	18	40	36	20	22	187	36	42	268	817
Nailsea	119	27	45	81	36	329	84	99	389	35	46	217	1,508
Long Ashton	26	4	49	107	20	91	81	135	441	13	13	139	1,119
Portishead	119	12	116	167	21	101	128	567	604	30	40	683	2,588
Bristol	310	70	124	177	199	446	407	697	20,241	987	114	8,418	32,189
Bath & NE Somerset	41	18	16	15	43	41	14	38	1,029	10,956	94	3,703	16,008
Sedgemoor	695	91	62	50	38	40	11	40	99	91	6,478	2,016	9,713
Rest of UK	664	98	163	197	315	284	141	731	7,953	3,699	1,963	32,736	48,943
Total	9,304	914	1,411	1,533	872	1,628	1,067	2,800	31,541	15,934	9,640	49,207	125,852

Post	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	6,527	263	330	152	106	148	28	136	293	57	641	592	9,274
Churchill	251	227	101	28	79	28	5	12	100	13	93	89	1,025
Congresbury	351	106	266	200	47	46	46	132	131	22	111	203	1,660
Clevedon	164	39	205	355	27	111	107	193	157	17	60	194	1,629
Bristol Aiport	93	70	59	26	50	33	25	27	326	32	61	405	1,208
Nailsea	168	36	60	113	48	403	75	95	429	30	54	222	1,733
Long Ashton	33	4	51	106	25	92	81	131	441	10	13	139	1,127
Portishead	127	13	118	171	25	130	129	579	653	27	42	856	2,869
Bristol	335	102	154	176	370	491	407	699	20,241	988	131	8,417	32,511
Bath & NE Somerset	44	18	22	16	53	31	12	32	1,029	10,956	94	3,698	16,005
Sedgemoor	700	96	74	50	63	53	13	41	121	91	6,707	2,050	10,058
Rest of UK	664	108	195	198	449	319	141	796	7,972	3,698	2,016	32,723	49,279
Total	9,457	1,083	1,634	1,590	1,342	1,886	1,066	2,873	31,894	15,940	10,025	49,588	128,378

Post - Prior % diff	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	0%	28%	-2%	0%	96%	29%	17%	0%	10%	27%	3%	0%	2%
Churchill	0%	0%	16%	22%	44%	47%	25%	-14%	59%	0%	0%	3%	10%
Congresbury	5%	23%	51%	4%	52%	2%	-2%	3%	16%	47%	52%	27%	18%
Clevedon	0%	63%	5%	0%	35%	35%	1%	0%	0%	31%	2%	4%	5%
Bristol Aiport	60%	40%	44%	44%	25%	-8%	25%	23%	74%	-11%	45%	51%	48%
Nailsea	41%	33%	33%	40%	33%	22%	-11%	-4%	10%	-14%	17%	2%	15%
Long Ashton	27%	0%	4%	-1%	25%	1%	0%	-3%	0%	-23%	0%	0%	1%
Portishead	7%	8%	2%	2%	19%	29%	1%	2%	8%	-10%	5%	25%	11%
Bristol	8%	46%	24%	-1%	86%	10%	0%	0%	0%	0%	15%	0%	1%
Bath & NE Somerset	7%	0%	38%	7%	23%	-24%	-14%	-16%	0%	0%	0%	0%	0%
Sedgemoor	1%	5%	19%	0%	66%	33%	18%	3%	22%	0%	4%	2%	4%
Rest of UK	0%	10%	20%	1%	43%	12%	0%	9%	0%	0%	3%	0%	1%
Total	2%	18%	16%	4%	54%	16%	0%	3%	1%	0%	4%	1%	2%

PM Sector-to-sector matrices

Prior	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	7,563	381	439	171	55	97	19	130	286	105	872	565	10,684
Churchill	291	268	111	42	59	37	6	20	107	23	171	114	1,249
Congresbury	441	120	224	276	37	53	44	162	152	26	119	162	1,818
Clevedon	294	47	285	455	24	102	102	264	209	21	91	205	2,098
Bristol Aiport	109	51	47	22	55	54	22	21	267	57	81	404	1,190
Nailsea	287	48	70	142	45	413	49	66	522	49	84	205	1,980
Long Ashton	79	31	135	99	63	233	177	95	366	15	26	143	1,465
Portishead	243	26	147	229	25	132	118	759	833	48	63	819	3,442
Bristol	810	195	300	380	406	920	598	1,149	30,744	1,968	262	14,038	51,770
Bath & NE Somerset	102	30	27	24	65	78	13	38	1,716	13,189	159	6,093	21,533
Sedgemoor	896	145	102	71	44	50	12	50	222	169	7,473	2,486	11,720
Rest of UK	977	181	211	275	379	436	150	786	11,202	4,526	2,667	37,986	59,776
Total	12,090	1,523	2,097	2,185	1,259	2,605	1,310	3,539	46,629	20,196	12,069	63,221	168,723

Post	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	7,570	424	377	192	80	120	28	143	338	128	928	571	10,898
Churchill	293	268	111	45	79	46	9	19	172	23	175	104	1,343
Congresbury	366	109	222	239	38	72	41	109	172	20	103	156	1,646
Clevedon	294	43	244	455	15	134	82	255	214	13	87	204	2,039
Bristol Aiport	151	63	72	32	70	81	23	15	369	50	105	407	1,437
Nailsea	324	61	99	172	59	876	46	110	559	35	85	186	2,613
Long Ashton	113	25	120	110	57	164	177	109	366	12	25	142	1,419
Portishead	250	21	108	231	20	134	142	778	888	43	60	871	3,548
Bristol	877	187	348	375	481	753	594	1,114	30,744	1,968	256	14,015	51,712
Bath & NE Somerset	102	29	27	20	62	47	10	30	1,716	13,189	158	6,074	21,465
Sedgemoor	891	138	96	76	75	60	15	52	276	142	7,772	2,471	12,064
Rest of UK	937	158	193	270	358	363	128	793	11,092	4,494	2,694	37,950	59,430
Total	12,168	1,526	2,017	2,218	1,394	2,851	1,295	3,527	46,905	20,117	12,447	63,151	169,616

Post - Prior % diff	WSM	Churchill	Congresbury	Clevedon	Bristol Aiport	Nailsea	Long Ashton	Portishead	Bristol	Bath & NE Somerset	Sedgemoor	Rest of UK	Total
WSM	0%	11%	-14%	12%	45%	24%	47%	10%	18%	22%	6%	1%	2%
Churchill	1%	0%	0%	7%	34%	24%	50%	-5%	61%	0%	2%	-9%	8%
Congresbury	-17%	-9%	-1%	-13%	3%	36%	-7%	-33%	13%	-23%	-13%	-4%	-9%
Clevedon	0%	-9%	-14%	0%	-38%	31%	-20%	-3%	2%	-38%	-4%	0%	-3%
Bristol Aiport	39%	24%	53%	45%	27%	50%	5%	-29%	38%	-12%	30%	1%	21%
Nailsea	13%	27%	41%	21%	31%	112%	-6%	67%	7%	-29%	1%	-9%	32%
Long Ashton	43%	-19%	-11%	11%	-10%	-30%	0%	15%	0%	-20%	-4%	-1%	-3%
Portishead	3%	-19%	-27%	1%	-20%	2%	20%	3%	7%	-10%	-5%	6%	3%
Bristol	8%	-4%	16%	-1%	18%	-18%	-1%	-3%	0%	0%	-2%	0%	0%
Bath & NE Somerset	0%	-3%	0%	-17%	-5%	-40%	-23%	-21%	0%	0%	-1%	0%	0%
Sedgemoor	-1%	-5%	-6%	7%	70%	20%	25%	4%	24%	-16%	4%	-1%	3%
Rest of UK	-4%	-13%	-9%	-2%	-6%	-17%	-15%	1%	-1%	-1%	1%	0%	-1%
Total	1%	0%	-4%	2%	11%	9%	-1%	0%	1%	0%	3%	0%	1%

Appendix D

SCREENLINE FLOW VALIDATION

AM SCREENLINES

SCREENLINE A

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
A1	A370 Bridgwater Rd	NB	805	839	34	4%	1.2	PASS	PASS
A2	M5	NB	2,648	2,734	87	3%	1.7	PASS	PASS
A3	A38 Bridgwater Rd	NB	620	529	-91	-15%	3.8	PASS	PASS
Total			4,073	4,102	30	1%	0.5		
A1	A370 Bridgwater Rd	SB	628	749	121	19%	4.6	FAIL	PASS
A2	M5	SB	2,523	2,491	-32	-1%	0.6	PASS	PASS
A3	A38 Bridgwater Rd	SB	533	552	19	4%	0.8	PASS	PASS
Total			3,684	3,792	108	3%	1.8		

SCREENLINE B

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
B1	A370 Somerset Av	EB	2,687	2,651	-37	-1%	0.7	PASS	PASS
B2	Wolvershill Rd	SB	224	191	-33	-15%	2.3	PASS	PASS
B3	A371	EB	563	547	-16	-3%	0.7	PASS	PASS
Total			3,474	3,389	-85	-2%	1.5		
B1	A370 Somerset Av	WB	2,169	2,221	52	2%	1.1	PASS	PASS
B2	Wolvershill Rd	NB	320	302	-18	-6%	1.0	PASS	PASS
B3	A371	WB	433	446	13	3%	0.6	PASS	PASS
Total			2,922	2,969	47	2%	0.9		

SCREENLINE C

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
C1	A370 Bristol Rd	EB	552	552	0	0%	0.0	PASS	PASS
C2	A368 Towerhead Rd	EB	377	318	-59	-16%	3.2	PASS	PASS
C3	A371 Castle Hill	SB	242	289	47	20%	2.9	PASS	PASS
Total			1,171	1,158	-12	-1%	0.4		
C1	A370 Bristol Rd	WB	732	726	-6	-1%	0.2	PASS	PASS
C2	A368 Towerhead Rd	WB	212	317	105	49%	6.4	FAIL	FAIL
C3	A371 Castle Hill	NB	348	308	-40	-12%	2.2	PASS	PASS
Total			1,292	1,351	59	5%	1.6		

SCREENLINE D

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
D1	A370 Main Rd	NB	568	512	-56	-10%	2.4	PASS	PASS
D2	A38 Bristol Rd	NB	852	928	76	9%	2.5	PASS	PASS
Total			1,420	1,440	20	1%	0.5		
D1	A370 Main Rd	SB	450	382	-68	-15%	3.3	PASS	PASS
D2	A38 Bristol Rd	SB	551	590	39	7%	1.6	PASS	PASS
Total			1,001	972	-29	-3%	0.9		

SCREENLINE E

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
E1	A370 Main Rd	EB	663	643	-20	-3%	0.8	PASS	PASS
E2	A38 Bridgwater Rd	EB	968	979	11	1%	0.3	PASS	PASS
Total			1,631	1,622	-9	-1%	0.2		
E1	A370 Main Rd	WB	470	642	173	37%	7.3	FAIL	FAIL
E2	A38 Bridgwater Rd	WB	724	735	10	1%	0.4	PASS	PASS
Total			1,194	1,377	183	15%	5.1		

SCREENLINE F

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
F1	B3124 Walton Rd (to Portishead)	EB	508	537	29	6%	1.3	PASS	PASS
F2	B3130 Tickenham Rd	EB	797	594	-203	-26%	7.7	FAIL	FAIL
F3	B3133 Ettlingen Way	EB	1,421	1,645	224	16%	5.7	FAIL	FAIL
F4	Davis Lane	EB	124	119	-4	-3%	0.4	PASS	PASS
F5	B3133 Kenn Road	SB	379	403	24	6%	1.2	PASS	PASS
Total			3,228	3,299	70	2%	1.2		
F1	B3124 Walton Rd (from Portishead)	WB	472	566	94	20%	4.1	PASS	PASS
F2	B3130 Tickenham Rd	WB	702	731	29	4%	1.1	PASS	PASS
F3	B3133 Ettlingen Way	WB	1,626	1,383	-243	-15%	6.3	PASS	FAIL
F4	Davis Lane	WB	85	127	42	49%	4.1	PASS	PASS
F5	B3133 Kenn Road	NB	479	548	69	14%	3.0	PASS	PASS
Total			3,364	3,354	-10	0%	0.2		

SCREENLINE G

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
G2	Clapton Lane	NB	346	349	2	1%	0.1	PASS	PASS
G1	A369 Portbury Hundred	WB	1,014	1,011	-3	0%	0.1	PASS	PASS
Total			1,360	1,360	-1	0%	0.0		
G2	Clapton Lane	SB	504	520	16	3%	0.7	PASS	PASS
G1	A369 Portbury Hundred	EB	1,266	1,207	-59	-5%	1.7	PASS	PASS
Total			1,770	1,727	-43	-2%	1.0		

SCREENLINE H

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
H1	B3130 Clevedon Road	SB	457	455	-2	0%	0.1	PASS	PASS
H2	B3130 Stanton Lane	WB	361	373	12	3%	0.6	PASS	PASS
H3	Backwell Bow	WB	31	31	0	-1%	0.1	PASS	PASS
H4	Station Road	NB	380	376	-4	-1%	0.2	PASS	PASS
H5	Netherton Wood Lane	NB	90	83	-7	-8%	0.7	PASS	PASS
H6	West End Lane	EB	49	65	16	34%	2.2	PASS	PASS
H7	Causeway	WB	103	89	-13	-13%	1.4	PASS	PASS
Total			1,470	1,472	2	0%	0.1		
H1	B3130 Clevedon Road	NB	419	411	-8	-2%	0.4	PASS	PASS
H2	B3130 Stanton Lane	EB	594	592	-2	0%	0.1	PASS	PASS
H3	Backwell Bow	EB	40	45	6	14%	0.8	PASS	PASS
H4	Station Road	SB	317	270	-47	-15%	2.7	PASS	PASS
H5	Netherton Wood Lane	SB	116	131	15	13%	1.4	PASS	PASS
H6	West End Lane	WB	24	45	22	93%	3.7	PASS	PASS
H7	Causeway	EB	214	145	-69	-32%	5.1	PASS	FAIL
Total			1,722	1,638	-83	-5%	2.0		

IP SCREENLINES

SCREENLINE A

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
A1	A370 Bridgwater Rd	NB	501	632	131	26%	5.5	FAIL	FAIL
A2	M5	NB	2,844	2,732	-112	-4%	2.1	PASS	PASS
A3	A38 Bridgwater Rd	NB	486	530	45	9%	2.0	PASS	PASS
Total			3,830	3,894	64	2%	1.0		
A1	A370 Bridgwater Rd	SB	515	576	61	12%	2.6	PASS	PASS
A2	M5	SB	2,469	2,205	-263	-11%	5.4	PASS	FAIL
A3	A38 Bridgwater Rd	SB	493	495	2	0%	0.1	PASS	PASS
Total			3,476	3,276	-200	-6%	3.4		

SCREENLINE B

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
B1	A370 Somerset Av	EB	1,637	1,632	-5	0%	0.1	PASS	PASS
B2	Wolvershill Rd	SB	190	189	-1	-1%	0.1	PASS	PASS
B3	A371	EB	385	384	0	0%	0.0	PASS	PASS
Total			2,211	2,205	-7	0%	0.1		
B1	A370 Somerset Av	WB	1,762	1,823	61	3%	1.4	PASS	PASS
B2	Wolvershill Rd	NB	211	153	-58	-28%	4.3	PASS	PASS
B3	A371	WB	402	349	-53	-13%	2.7	PASS	PASS
Total			2,375	2,325	-50	-2%	1.0		

SCREENLINE C

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
C1	A370 Bristol Rd	EB	568	569	1	0%	0.1	PASS	PASS
C2	A368 Towerhead Rd	EB	195	282	87	44%	5.6	PASS	FAIL
C3	A371 Castle Hill	SB	212	231	19	9%	1.3	PASS	PASS
Total			975	1,082	107	11%	3.3		
C1	A370 Bristol Rd	WB	608	608	0	0%	0.0	PASS	PASS
C2	A368 Towerhead Rd	WB	198	254	56	28%	3.7	PASS	PASS
C3	A371 Castle Hill	NB	238	234	-4	-2%	0.3	PASS	PASS
Total			1,044	1,096	52	5%	1.6		

SCREENLINE D

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
D1	A370 Main Rd	NB	428	308	-120	-28%	6.2	FAIL	FAIL
D2	A38 Bristol Rd	NB	534	657	123	23%	5.0	FAIL	FAIL
Total			962	965	3	0%	0.1		
D1	A370 Main Rd	SB	449	342	-106	-24%	5.3	FAIL	FAIL
D2	A38 Bristol Rd	SB	514	618	104	20%	4.4	FAIL	PASS
Total			963	961	-2	0%	0.1		

SCREENLINE E

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
E1	A370 Main Rd	EB	395	458	63	16%	3.1	PASS	PASS
E2	A38 Bridgwater Rd	EB	736	709	-27	-4%	1.0	PASS	PASS
Total			1,131	1,167	36	3%	1.1		
E1	A370 Main Rd	WB	448	582	134	30%	5.9	FAIL	FAIL
E2	A38 Bridgwater Rd	WB	748	699	-49	-7%	1.8	PASS	PASS
Total			1,197	1,281	84	7%	2.4		

SCREENLINE F

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
F1	B3124 Walton Rd (to Portishead)	EB	352	463	111	32%	5.5	FAIL	FAIL
F2	B3130 Tickenham Rd	EB	434	351	-83	-19%	4.2	PASS	PASS
F3	B3133 Ettlingen Way	EB	824	907	83	10%	2.8	PASS	PASS
F4	Davis Lane	EB	60	79	19	31%	2.2	PASS	PASS
F5	B3133 Kenn Road	SB	382	399	17	5%	0.9	PASS	PASS
Total			2,052	2,199	147	7%	3.2		
F1	B3124 Walton Rd (from Portishead)	WB	356	455	99	28%	4.9	PASS	PASS
F2	B3130 Tickenham Rd	WB	426	370	-56	-13%	2.8	PASS	PASS
F3	B3133 Ettlingen Way	WB	772	918	146	19%	5.0	FAIL	FAIL
F4	Davis Lane	WB	69	65	-5	-7%	0.6	PASS	PASS
F5	B3133 Kenn Road	NB	364	370	6	2%	0.3	PASS	PASS
Total			1,988	2,177	189	10%	4.1		

SCREENLINE G

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
G2	Clapton Lane	NB	201	293	92	46%	5.8	PASS	FAIL
G1	A369 Portbury Hundred	WB	838	825	-12	-1%	0.4	PASS	PASS
Total			1,039	1,118	79	8%	2.4		
G2	Clapton Lane	SB	192	283	91	48%	5.9	PASS	FAIL
G1	A369 Portbury Hundred	EB	819	800	-19	-2%	0.7	PASS	PASS
Total			1,011	1,083	72	7%	2.2		

SCREENLINE H

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
H1	B3130 Clevedon Road	SB	285	285	0	0%	0.0	PASS	PASS
H2	B3130 Stanton Lane	WB	402	388	-14	-3%	0.7	PASS	PASS
H3	Backwell Bow	WB	26	26	0	0%	0.0	PASS	PASS
H4	Station Road	NB	333	335	2	0%	0.1	PASS	PASS
H5	Netherton Wood Lane	NB	59	56	-3	-4%	0.3	PASS	PASS
H6	West End Lane	EB	23	22	-1	-6%	0.3	PASS	PASS
H7	Causeway	WB	95	85	-10	-10%	1.0	PASS	PASS
Total			1,223	1,198	-26	-2%	0.7		
H1	B3130 Clevedon Road	NB	305	305	-1	0%	0.0	PASS	PASS
H2	B3130 Stanton Lane	EB	372	363	-9	-2%	0.5	PASS	PASS
H3	Backwell Bow	EB	23	22	-1	-3%	0.2	PASS	PASS
H4	Station Road	SB	327	320	-7	-2%	0.4	PASS	PASS
H5	Netherton Wood Lane	SB	55	50	-5	-9%	0.7	PASS	PASS
H6	West End Lane	WB	27	26	-1	-5%	0.3	PASS	PASS
H7	Causeway	EB	86	81	-5	-5%	0.5	PASS	PASS
Total			1,194	1,166	-28	-2%	0.8		

PM SCREENLINES

SCREENLINE A

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
A1	A370 Bridgwater Rd	NB	669	547	-122	-18%	5.0	FAIL	PASS
A2	M5	NB	2,773	2,597	-176	-6%	3.4	PASS	PASS
A3	A38 Bridgwater Rd	NB	578	660	82	14%	3.3	PASS	PASS
Total			4,020	3,803	-217	-5%	3.5		
A1	A370 Bridgwater Rd	SB	768	850	82	11%	2.9	PASS	PASS
A2	M5	SB	2,826	2,701	-125	-4%	2.4	PASS	PASS
A3	A38 Bridgwater Rd	SB	718	617	-102	-14%	3.9	PASS	PASS
Total			4,312	4,167	-145	-3%	2.2		

SCREENLINE B

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
B1	A370 Somerset Av	EB	2,013	1,961	-52	-3%	1.2	PASS	PASS
B2	Wolvershill Rd	SB	270	262	-8	-3%	0.5	PASS	PASS
B3	A371	EB	478	465	-12	-3%	0.6	PASS	PASS
Total			2,761	2,689	-72	-3%	1.4		
B1	A370 Somerset Av	WB	3,298	3,192	-106	-3%	1.9	PASS	PASS
B2	Wolvershill Rd	NB	302	331	28	9%	1.6	PASS	PASS
B3	A371	WB	509	451	-58	-11%	2.6	PASS	PASS
Total			4,109	3,974	-136	-3%	2.1		

SCREENLINE C

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
C1	A370 Bristol Rd	EB	667	656	-11	-2%	0.4	PASS	PASS
C2	A368 Towerhead Rd	EB	224	317	93	41%	5.6	PASS	FAIL
C3	A371 Castle Hill	SB	249	256	8	3%	0.5	PASS	PASS
Total			1,140	1,229	90	8%	2.6		
C1	A370 Bristol Rd	WB	912	825	-87	-10%	2.9	PASS	PASS
C2	A368 Towerhead Rd	WB	265	356	91	34%	5.2	PASS	FAIL
C3	A371 Castle Hill	NB	387	418	31	8%	1.6	PASS	PASS
Total			1,564	1,600	36	2%	0.9		

SCREENLINE D

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
D1	A370 Main Rd	NB	487	379	-108	-22%	5.2	FAIL	FAIL
D2	A38 Bristol Rd	NB	635	721	86	13%	3.3	PASS	PASS
Total			1,123	1,100	-23	-2%	0.7		
D1	A370 Main Rd	SB	790	659	-131	-17%	4.9	FAIL	PASS
D2	A38 Bristol Rd	SB	863	918	55	6%	1.8	PASS	PASS
Total			1,652	1,576	-76	-5%	1.9		

SCREENLINE E

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
E1	A370 Main Rd	EB	436	504	69	16%	3.2	PASS	PASS
E2	A38 Bridgwater Rd	EB	879	904	25	3%	0.8	PASS	PASS
Total			1,315	1,408	93	7%	2.5		
E1	A370 Main Rd	WB	821	940	119	15%	4.0	PASS	PASS
E2	A38 Bridgwater Rd	WB	941	931	-10	-1%	0.3	PASS	PASS
Total			1,762	1,871	109	6%	2.6		

SCREENLINE F

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
F1	B3124 Walton Rd (to Portishead)	EB	500	563	63	13%	2.7	PASS	PASS
F2	B3130 Tickenham Rd	EB	659	540	-119	-18%	4.9	FAIL	PASS
F3	B3133 Ettlingen Way	EB	1,352	1,337	-15	-1%	0.4	PASS	PASS
F4	Davis Lane	EB	130	119	-10	-8%	0.9	PASS	PASS
F5	B3133 Kenn Road	SB	574	559	-14	-2%	0.6	PASS	PASS
Total			3,214	3,118	-96	-3%	1.7		
F1	B3124 Walton Rd (from Portishead)	WB	483	526	43	9%	1.9	PASS	PASS
F2	B3130 Tickenham Rd	WB	756	726	-30	-4%	1.1	PASS	PASS
F3	B3133 Ettlingen Way	WB	1,520	1,463	-57	-4%	1.5	PASS	PASS
F4	Davis Lane	WB	122	127	5	4%	0.4	PASS	PASS
F5	B3133 Kenn Road	NB	427	441	14	3%	0.7	PASS	PASS
Total			3,308	3,283	-25	-1%	0.4		

SCREENLINE G

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
G2	Clapton Lane	NB	530	464	-66	-12%	3.0	PASS	PASS
G1	A369 Portbury Hundred	WB	1,446	1,478	32	2%	0.8	PASS	PASS
Total			1,976	1,942	-35	-2%	0.8		
G2	Clapton Lane	SB	310	399	89	29%	4.8	PASS	PASS
G1	A369 Portbury Hundred	EB	1,043	937	-106	-10%	3.4	PASS	PASS
Total			1,353	1,336	-17	-1%	0.5		

SCREENLINE H

Count ID	Link Description	Direction	Obs	Mod	Diff	% Diff	GEH	Criteria 1	Criteria 2
H1	B3130 Clevedon Road	SB	381	302	-79	-21%	4.3	PASS	PASS
H2	B3130 Stanton Lane	WB	589	651	62	10%	2.5	PASS	PASS
H3	Backwell Bow	WB	56	54	-2	-4%	0.3	PASS	PASS
H4	Station Road	NB	427	416	-11	-3%	0.5	PASS	PASS
H5	Netherton Wood Lane	NB	101	80	-20	-20%	2.1	PASS	PASS
H6	West End Lane	EB	42	65	23	56%	3.2	PASS	PASS
H7	Causeway	WB	177	142	-35	-20%	2.8	PASS	PASS
Total			1,773	1,709	-63	-4%	1.5		
H1	B3130 Clevedon Road	NB	467	457	-10	-2%	0.5	PASS	PASS
H2	B3130 Stanton Lane	EB	345	448	103	30%	5.2	FAIL	FAIL
H3	Backwell Bow	EB	33	42	9	27%	1.4	PASS	PASS
H4	Station Road	SB	378	346	-32	-8%	1.7	PASS	PASS
H5	Netherton Wood Lane	SB	93	68	-25	-26%	2.7	PASS	PASS
H6	West End Lane	WB	64	85	21	33%	2.4	PASS	PASS
H7	Causeway	EB	117	109	-7	-6%	0.7	PASS	PASS
Total			1,496	1,555	59	4%	1.5		

Appendix E

LINK FLOW VALIDATION

ID	Link Description	Direction	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
1	B3440 EB onslip to A370	EB	1,325	1,166	-159	4.5	PASS	PASS	PASS
3	Scot Elm Drive	NB	434	296	-138	7.2	FAIL	FAIL	FAIL
3	Scot Elm Drive	SB	94	72	-22	2.5	PASS	PASS	PASS
5	B3133 south of Yatton	NB	503	416	-87	4.0	PASS	PASS	PASS
5	B3133 south of Yatton	SB	381	371	-10	0.5	PASS	PASS	PASS
6	Bishops Road, Claverham	NB	118	153	35	3.0	PASS	PASS	PASS
6	Bishops Road, Claverham	SB	149	141	-8	0.7	PASS	PASS	PASS
7	A370 north of SBL	EB	1,419	1,418	-1	0.0	PASS	PASS	PASS
7	A370 north of SBL	WB	1,008	868	-140	4.6	PASS	PASS	PASS
8	A370 Long Ashton Bypass	EB	946	878	-68	2.2	PASS	PASS	PASS
8	A370 Long Ashton Bypass	WB	401	519	118	5.5	FAIL	FAIL	FAIL
9	Bristol Road south of Queensway	NB	889	1,072	183	5.9	FAIL	FAIL	FAIL
9	Bristol Road south of Queensway	SB	889	906	17	0.6	PASS	PASS	PASS
10	B3128 Clarken Coombe	EB	553	468	-85	3.8	PASS	PASS	PASS
10	B3128 Clarken Coombe	WB	368	312	-56	3.0	PASS	PASS	PASS
11	Long Ashton Road	NB	336	462	126	6.3	FAIL	FAIL	FAIL
11	Long Ashton Road	SB	196	206	10	0.7	PASS	PASS	PASS
12	Elmham Way	NB	741	901	160	5.6	FAIL	FAIL	FAIL
12	Elmham Way	SB	1,045	1,031	-14	0.4	PASS	PASS	PASS
13	A370 east of West Wick roundabout	EB	1,371	1,475	104	2.8	PASS	PASS	PASS
13	A370 east of West Wick roundabout	WB	1,452	1,236	-216	5.9	PASS	FAIL	PASS
14	New Road (through Shipham)	NB	254	275	21	1.3	PASS	PASS	PASS
14	New Road (through Shipham)	SB	132	144	12	1.0	PASS	PASS	PASS
16	A368 east of Churchill Gate	EB	274	355	81	4.6	PASS	PASS	PASS
16	A368 east of Churchill Gate	WB	226	256	30	1.9	PASS	PASS	PASS
17	Weston Road west of Long Ashton	EB	158	234	76	5.4	PASS	FAIL	PASS
17	Weston Road west of Long Ashton	WB	208	235	27	1.8	PASS	PASS	PASS
18	Wraxhall Hill	NB	256	395	139	7.7	FAIL	FAIL	FAIL
18	Wraxhall Hill	SB	237	419	182	10.1	FAIL	FAIL	FAIL
19	B3218 north of Failand	EB	826	750	-76	2.7	PASS	PASS	PASS
19	B3218 north of Failand	WB	502	489	-13	0.6	PASS	PASS	PASS
20	Beggar Bush Lane	EB	464	225	-239	12.9	FAIL	FAIL	FAIL
20	Beggar Bush Lane	WB	164	42	-122	12.0	FAIL	FAIL	FAIL
21	B3129 Belmont Hill	NB	267	174	-93	6.2	PASS	FAIL	PASS
21	B3129 Belmont Hill	SB	200	169	-31	2.3	PASS	PASS	PASS
22	B3130 Bristol Road	SB	459	459	0	0.0	PASS	PASS	PASS
22	B3130 Bristol Road	NB	250	216	-34	2.2	PASS	PASS	PASS
23	B3440 Bristol Rd., (A370 Off-Slip)	WB	784	985	201	6.7	FAIL	FAIL	FAIL
23	A370 Somerset Avenue Total Westbound	WB	2,169	2,221	52	1.1	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB	233	308	75	4.6	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB	173	200	27	2.0	PASS	PASS	PASS
25	SBL south of Brookgate - Long ashton	NB	948	1,039	92	2.9	PASS	PASS	PASS
25	SBL south of Brookgate - Long ashton	SB	703	765	62	2.3	PASS	PASS	PASS
26	B3130 Chew Road east of Kentshare Lane Winford	EB	347	239	-108	6.3	FAIL	FAIL	FAIL
26	B3130 Chew Road east of Kentshare Lane Winford	WB	330	309	-21	1.2	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	NB	363	322	-41	2.2	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	SB	456	319	-137	7.0	FAIL	FAIL	FAIL
28	Brockley Combe Road west of Downside Road Lulsgate	EB	255	213	-42	2.7	PASS	PASS	PASS
28	Brockley Combe Road west of Downside Road Lulsgate	WB	208	168	-40	2.9	PASS	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	NB	1,043	898	-146	4.7	PASS	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	SB	799	653	-146	5.4	FAIL	FAIL	FAIL
30	A369 Martcombe Road south of High Street Portbury	NB	834	687	-146	5.3	FAIL	FAIL	FAIL
30	A369 Martcombe Road south of High Street Portbury	SB	1,044	1,044	0	0.0	PASS	PASS	PASS
31	A369 west of B3129 Beggarbush Lane Leigh Woods	EB	989	983	-6	0.2	PASS	PASS	PASS
31	A369 west of B3129 Beggarbush Lane Leigh Woods	WB	812	832	20	0.7	PASS	PASS	PASS
32	Oldmixon Road east of Broadway, Hutton	EB	219	121	-98	7.5	PASS	FAIL	PASS
32	Oldmixon Road east of Broadway, Hutton	WB	307	246	-61	3.7	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	EB	518	462	-56	2.5	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	WB	287	405	119	6.4	FAIL	FAIL	FAIL
34	Mill Lane south of Mill Close Portbury	NB	344	285	-59	3.3	PASS	PASS	PASS
34	Mill Lane south of Mill Close Portbury	SB	289	335	46	2.6	PASS	PASS	PASS
35	The Runway - CAL - west of A371Locking Moor Road	EB	421	599	178	7.9	FAIL	FAIL	FAIL

35	The Runway - CAL - west of A371Locking Moor Road	WB	535	617	82	3.4	PASS	PASS	PASS
36	A370 Somerset Avenue west of West Wick Rab W-s-M	EB	1,356	1,511	156	4.1	PASS	PASS	PASS
36	A370 Somerset Avenue west of West Wick Rab W-s-M	WB	1,703	1,619	-84	2.1	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	EB	285	214	-72	4.5	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	WB	402	282	-121	6.5	FAIL	FAIL	FAIL
38	BIA Silver Zone Parking - north of A38	EB	60	49	-11	1.4	PASS	PASS	PASS
38	BIA Silver Zone Parking - north of A38	WB	151	198	47	3.5	PASS	PASS	PASS
39	BIA Freight Entrance Downside Road Lulsgate	NB	44	21	-23	4.0	PASS	PASS	PASS
39	BIA Freight Entrance Downside Road Lulsgate	SB	63	29	-34	5.0	PASS	FAIL	PASS
41	B3129 Weston Rd, Failand	NB	218	86	-132	10.7	FAIL	FAIL	FAIL
41	B3129 Weston Rd, Failand	SB	79	71	-8	0.9	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	NB	199	172	-27	2.0	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	SB	170	181	12	0.9	PASS	PASS	PASS
43	Chelvey Rd, Backwell	NB	37	66	29	4.1	PASS	PASS	PASS
43	Chelvey Rd, Backwell	SB	45	69	24	3.1	PASS	PASS	PASS
44	Brockley Lane, Backwell	NB	76	63	-14	1.6	PASS	PASS	PASS
44	Brockley Lane, Backwell	SB	78	92	14	1.6	PASS	PASS	PASS
45	Riverside, Banwell	NB	60	118	58	6.2	PASS	FAIL	PASS
45	Riverside, Banwell	SB	49	131	81	8.6	PASS	FAIL	PASS
46	Nailsea Wall, Kenn	EB	124	164	40	3.3	PASS	PASS	PASS
46	Nailsea Wall, Kenn	WB	86	178	92	8.0	PASS	FAIL	PASS
47	Kenmoor Rd, Kenn	NB	219	180	-39	2.8	PASS	PASS	PASS
47	Kenmoor Rd, Kenn	SB	97	156	60	5.3	PASS	FAIL	PASS
48	Court Lane, Clevedon	NB	223	178	-45	3.2	PASS	PASS	PASS
48	Court Lane, Clevedon	SB	119	163	43	3.7	PASS	PASS	PASS
49	Half Yard, Langford	NB	52	38	-14	2.1	PASS	PASS	PASS
49	Half Yard, Langford	SB	89	65	-25	2.8	PASS	PASS	PASS
50	Long Lane (east of Wrington)	EB	86	148	62	5.7	PASS	FAIL	PASS
50	Long Lane (east of Wrington)	WB	67	43	-23	3.2	PASS	PASS	PASS
51	Summer Lane, Banwell	NB	212	121	-90	7.0	PASS	FAIL	PASS
51	Summer Lane, Banwell	SB	55	82	28	3.4	PASS	PASS	PASS
52	M5 Between J20 and J21	SB	3,296	3,285	-11	0.2	PASS	PASS	PASS
52	M5 Between J20 and J21	NB	3,945	4,157	212	3.3	PASS	PASS	PASS
53	M5 Between J20 and J19	NB	4,289	4,020	-269	4.2	PASS	PASS	PASS
53	M5 Between J20 and J19	SB	3,297	2,885	-412	7.4	FAIL	FAIL	FAIL
54	M5 Avonmouth Bridge north of J19	NB	5,322	5,050	-272	3.8	PASS	PASS	PASS
54	M5 Avonmouth Bridge north of J19	SB	3,936	4,149	213	3.4	PASS	PASS	PASS
55	A370 Bridgwater Road, East Brent	NB	529	679	149	6.1	FAIL	FAIL	FAIL
55	A370 Bridgwater Road, East Brent	SB	509	720	211	8.5	FAIL	FAIL	FAIL
56	A38 NE of Yew Tree Farm, Sedgemoor	EB	687	649	-38	1.5	PASS	PASS	PASS
56	A38 NE of Yew Tree Farm, Sedgemoor	WB	591	488	-103	4.5	FAIL	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	NB	1,017	959	-57	1.8	PASS	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	SB	861	839	-22	0.8	PASS	PASS	PASS
58	A38 Bristol Road	EB	484	530	46	2.0	PASS	PASS	PASS
58	A38 Bristol Road	WB	365	408	43	2.2	PASS	PASS	PASS
59	B3139 Highbridge Road	NB	352	271	-81	4.6	PASS	PASS	PASS
59	B3139 Highbridge Road	SB	304	281	-23	1.3	PASS	PASS	PASS
60	B3141 Church Road	NB	187	185	-2	0.2	PASS	PASS	PASS
60	B3141 Church Road	SB	120	119	-1	0.1	PASS	PASS	PASS
61	B3139 Blackford Road	EB	249	181	-68	4.6	PASS	PASS	PASS
61	B3139 Blackford Road	WB	182	230	48	3.3	PASS	PASS	PASS
A1	A370 (River Axe bridge)	NB	805	839	34	1.2	PASS	PASS	PASS
A1	A370 (River Axe bridge)	SB	628	749	121	4.6	FAIL	PASS	PASS
A2	M5 Between J21 and J22	SB	2,523	2,491	-32	0.6	PASS	PASS	PASS
A2	M5 Between J21 and J22	NB	2,648	2,734	87	1.7	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	NB	620	529	-91	3.8	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	SB	533	552	19	0.8	PASS	PASS	PASS
B1	A370 Somerset Ave, east of B3440 Merge	EB	2,687	2,651	-37	0.7	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	NB	320	302	-18	1.0	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	SB	224	191	-33	2.3	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	EB	563	547	-16	0.7	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	WB	433	446	13	0.6	PASS	PASS	PASS
C1	A370 Bristol Road	EB	552	552	0	0.0	PASS	PASS	PASS
C1	A370 Bristol Road	WB	732	726	-6	0.2	PASS	PASS	PASS

C2	A368 East Street east of Dark Lane Banwell	EB	377	318	-59	3.2	PASS	PASS	PASS
C2	A368 East Street east of Dark Lane Banwell	WB	212	317	105	6.4	FAIL	FAIL	FAIL
C3	A371 Banwell Road east of Castle Hill Banwell	NB	348	308	-40	2.2	PASS	PASS	PASS
C3	A371 Banwell Road east of Castle Hill Banwell	SB	242	289	47	2.9	PASS	PASS	PASS
D1	A370 Rodyate Hill west of Warners Close Cleeve	NB	568	512	-56	2.4	PASS	PASS	PASS
D1	A370 Rodyate Hill west of Warners Close Cleeve	SB	450	382	-68	3.3	PASS	PASS	PASS
D2	A38 north of New Road Redhill	NB	852	928	76	2.5	PASS	PASS	PASS
D2	A38 north of New Road Redhill	SB	551	590	39	1.6	PASS	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	663	643	-20	0.8	PASS	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	470	642	173	7.3	FAIL	FAIL	FAIL
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	968	979	11	0.3	PASS	PASS	PASS
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	724	735	10	0.4	PASS	PASS	PASS
F1	B3124 Walton Road east of Holly Lane Clevedon	EB	508	537	29	1.3	PASS	PASS	PASS
F1	B3124 Walton Road east of Holly Lane Clevedon	WB	472	566	94	4.1	PASS	PASS	PASS
F2	B3130 Tickenham Road	EB	797	594	-203	7.7	FAIL	FAIL	FAIL
F2	B3130 Tickenham Road	WB	702	731	29	1.1	PASS	PASS	PASS
F3	B3133 Ettlingen Way	EB	1,421	1,645	224	5.7	FAIL	FAIL	FAIL
F3	B3133 Ettlingen Way	WB	1,626	1,383	-243	6.3	PASS	FAIL	PASS
F4	Davis Lane, Clevedon	EB	124	127	3	0.3	PASS	PASS	PASS
F4	Davis Lane, Clevedon	WB	85	153	68	6.2	PASS	FAIL	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	NB	479	548	69	3.0	PASS	PASS	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	SB	379	403	24	1.2	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	1,266	1,207	-59	1.7	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	1,014	1,011	-3	0.1	PASS	PASS	PASS
G2	Clapton Lane south of Mayfields Close Portishead	NB	346	349	2	0.1	PASS	PASS	PASS
G2	Clapton Lane south of Mayfields Close Portishead	SB	504	520	16	0.7	PASS	PASS	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	419	411	-8	0.4	PASS	PASS	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	457	455	-2	0.1	PASS	PASS	PASS
H2	B3130	EB	594	592	-2	0.1	PASS	PASS	PASS
H2	B3130	WB	361	373	12	0.6	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	EB	40	45	6	0.8	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	WB	31	31	0	0.1	PASS	PASS	PASS
H4	Station Road near Backwell Crossroads	NB	380	298	-82	4.5	PASS	PASS	PASS
H4	Station Road near Backwell Crossroads	SB	317	262	-55	3.2	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	NB	90	83	-7	0.7	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	SB	116	131	15	1.4	PASS	PASS	PASS
H6	West End Lane, Nailsea	EB	49	65	16	2.2	PASS	PASS	PASS
H6	West End Lane, Nailsea	WB	24	45	22	3.7	PASS	PASS	PASS
H7	Causeway, Tickenham	EB	214	145	-69	5.1	PASS	FAIL	PASS
H7	Causeway, Tickenham	WB	103	89	-13	1.4	PASS	PASS	PASS

ID	Link Description	Direction	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
4	A370 Bristol Road	EB	568	569	1	0.1	PASS	PASS	PASS
4	A370 Bristol Road	WB	608	608	0	0.0	PASS	PASS	PASS
5	B3133 south of Yatton	NB	468	418	-50	2.4	PASS	PASS	PASS
5	B3133 south of Yatton	SB	452	452	0	0.0	PASS	PASS	PASS
7	A370 north of SBL	EB	988	942	-46	1.5	PASS	PASS	PASS
7	A370 north of SBL	WB	1,139	973	-166	5.1	PASS	FAIL	PASS
8	A370 Long Ashton Bypass	EB	537	487	-50	2.2	PASS	PASS	PASS
8	A370 Long Ashton Bypass	WB	564	509	-55	2.4	PASS	PASS	PASS
9	Bristol Road south of Queensway	NB	752	831	79	2.8	PASS	PASS	PASS
9	Bristol Road south of Queensway	SB	686	777	91	3.4	PASS	PASS	PASS
12	Elmham Way	NB	849	682	-167	6.1	FAIL	FAIL	FAIL
12	Elmham Way	SB	860	427	-433	17.1	FAIL	FAIL	FAIL
13	A370 east of West Wick roundabout	EB	992	829	-163	5.4	FAIL	FAIL	FAIL
13	A370 east of West Wick roundabout	WB	1,073	1,009	-64	2.0	PASS	PASS	PASS
16	A368 east of Churchill Gate	EB	167	224	57	4.0	PASS	PASS	PASS
16	A368 east of Churchill Gate	WB	183	191	8	0.6	PASS	PASS	PASS
19	B3218 north of Failand	EB	373	419	46	2.3	PASS	PASS	PASS
19	B3218 north of Failand	WB	153	394	241	14.6	FAIL	FAIL	FAIL
20	Beggar Bush Lane	EB	138	56	-82	8.3	PASS	FAIL	PASS
20	Beggar Bush Lane	WB	153	38	-115	11.8	FAIL	FAIL	FAIL
23	B3440 Bristol Rd., (A370 Off-Slip)	WB	731	814	83	3.0	PASS	PASS	PASS
23	A370 Somerset Avenue Total Westbound	WB	1,762	1,823	61	1.4	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB	162	153	-9	0.7	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB	155	147	-7	0.6	PASS	PASS	PASS
25	SBL south of Brookgate - Long ashton	NB	590	607	17	0.7	PASS	PASS	PASS
25	SBL south of Brookgate - Long ashton	SB	650	617	-33	1.3	PASS	PASS	PASS
26	B3130 Chew Road east of Kentshare Lane Winford	EB	246	166	-80	5.5	PASS	FAIL	PASS
26	B3130 Chew Road east of Kentshare Lane Winford	WB	236	192	-44	3.0	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	NB	239	234	-5	0.3	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	SB	282	271	-11	0.7	PASS	PASS	PASS
28	Brockley Combe Road west of Downside Road Lulsgate	EB	175	175	-1	0.0	PASS	PASS	PASS
28	Brockley Combe Road west of Downside Road Lulsgate	WB	152	147	-6	0.5	PASS	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	NB	768	652	-116	4.4	FAIL	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	SB	819	699	-121	4.4	PASS	PASS	PASS
30	A369 Martcombe Road south of High Street Portbury	NB	624	875	252	9.2	FAIL	FAIL	FAIL
30	A369 Martcombe Road south of High Street Portbury	SB	696	693	-3	0.1	PASS	PASS	PASS
31	A369 west of B3129 Beggarbush Lane Leigh Woods	EB	611	639	28	1.1	PASS	PASS	PASS
31	A369 west of B3129 Beggarbush Lane Leigh Woods	WB	524	742	218	8.7	FAIL	FAIL	FAIL
32	Oldmixon Road east of Broadway, Hutton	EB	206	153	-53	4.0	PASS	PASS	PASS
32	Oldmixon Road east of Broadway, Hutton	WB	186	150	-36	2.8	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	EB	260	273	13	0.8	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	WB	248	265	17	1.1	PASS	PASS	PASS
34	Mill Lane south of Mill Close Portbury	NB	217	257	40	2.6	PASS	PASS	PASS
34	Mill Lane south of Mill Close Portbury	SB	242	420	178	9.8	FAIL	FAIL	FAIL
35	The Runway - CAL - west of A371Locking Moor Road	EB	295	712	417	18.6	FAIL	FAIL	FAIL
35	The Runway - CAL - west of A371Locking Moor Road	WB	283	438	155	8.2	FAIL	FAIL	FAIL
36	A370 Somerset Avenue west of West Wick Rab W-s-M	EB	1,327	1,374	47	1.3	PASS	PASS	PASS
36	A370 Somerset Avenue west of West Wick Rab W-s-M	WB	1,360	1,210	-150	4.2	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	EB	531	478	-53	2.4	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	WB	572	513	-59	2.5	PASS	PASS	PASS
38	BIA Silver Zone Parking - north of A38	EB	144	133	-11	0.9	PASS	PASS	PASS
38	BIA Silver Zone Parking - north of A38	WB	164	155	-9	0.7	PASS	PASS	PASS
39	BIA Freight Entrance Downside Road Lulsgate	NB	75	34	-41	5.5	PASS	FAIL	PASS
39	BIA Freight Entrance Downside Road Lulsgate	SB	66	30	-36	5.2	PASS	FAIL	PASS
41	B3129 Weston Rd, Failand	NB	77	59	-18	2.2	PASS	PASS	PASS
41	B3129 Weston Rd, Failand	SB	77	56	-21	2.6	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	NB	106	136	30	2.8	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	SB	99	168	70	6.0	PASS	FAIL	PASS
43	Chelvey Rd, Backwell	NB	23	41	19	3.3	PASS	PASS	PASS
43	Chelvey Rd, Backwell	SB	26	47	21	3.5	PASS	PASS	PASS
44	Brockley Lane, Backwell	NB	44	54	9	1.3	PASS	PASS	PASS
44	Brockley Lane, Backwell	SB	49	62	13	1.7	PASS	PASS	PASS
45	Riverside, Banwell	NB	22	83	61	8.4	PASS	FAIL	PASS
45	Riverside, Banwell	SB	40	96	57	6.9	PASS	FAIL	PASS

46	Nailsea Wall, Kenn	EB	56	101	45	5.1	PASS	FAIL	PASS
46	Nailsea Wall, Kenn	WB	59	85	26	3.1	PASS	PASS	PASS
47	Kenmoor Rd, Kenn	NB	92	151	59	5.4	PASS	FAIL	PASS
47	Kenmoor Rd, Kenn	SB	89	164	76	6.7	PASS	FAIL	PASS
48	Court Lane, Clevedon	NB	101	161	60	5.3	PASS	FAIL	PASS
48	Court Lane, Clevedon	SB	93	176	83	7.2	PASS	FAIL	PASS
49	Half Yard, Langford	NB	50	46	-5	0.7	PASS	PASS	PASS
49	Half Yard, Langford	SB	48	42	-7	1.0	PASS	PASS	PASS
50	Long Lane (east of Wrington)	EB	39	42	3	0.5	PASS	PASS	PASS
50	Long Lane (east of Wrington)	WB	42	47	5	0.7	PASS	PASS	PASS
51	Summer Lane, Banwell	NB	73	57	-16	2.0	PASS	PASS	PASS
51	Summer Lane, Banwell	SB	60	76	16	2.0	PASS	PASS	PASS
52	M5 Between J20 and J21	SB	3,296	3,006	-290	5.2	PASS	FAIL	PASS
52	M5 Between J20 and J21	NB	3,212	3,369	157	2.7	PASS	PASS	PASS
53	M5 Between J20 and J19	NB	3,435	3,195	-240	4.2	PASS	PASS	PASS
53	M5 Between J20 and J19	SB	3,437	2,843	-594	10.6	FAIL	FAIL	FAIL
54	M5 Avonmouth Bridge north of J19	NB	4,235	4,112	-123	1.9	PASS	PASS	PASS
54	M5 Avonmouth Bridge north of J19	SB	3,984	3,774	-210	3.4	PASS	PASS	PASS
55	A370 Bridgwater Road, East Brent	NB	389	515	126	5.9	FAIL	FAIL	FAIL
55	A370 Bridgwater Road, East Brent	SB	466	495	29	1.3	PASS	PASS	PASS
56	A38 NE of Yew Tree Farm, Sedgemoor	EB	541	526	-15	0.7	PASS	PASS	PASS
56	A38 NE of Yew Tree Farm, Sedgemoor	WB	517	467	-50	2.3	PASS	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	NB	872	834	-38	1.3	PASS	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	SB	814	755	-59	2.1	PASS	PASS	PASS
59	B3139 Highbridge Road	NB	261	271	9	0.6	PASS	PASS	PASS
59	B3139 Highbridge Road	SB	233	281	49	3.0	PASS	PASS	PASS
60	B3141 Church Road	NB	115	185	70	5.7	PASS	FAIL	PASS
60	B3141 Church Road	SB	111	119	8	0.7	PASS	PASS	PASS
61	B3139 Blackford Road	EB	122	181	59	4.8	PASS	PASS	PASS
61	B3139 Blackford Road	WB	113	230	117	8.9	FAIL	FAIL	FAIL
A1	A370 (River Axe bridge)	NB	501	632	131	5.5	FAIL	FAIL	FAIL
A1	A370 (River Axe bridge)	SB	515	576	61	2.6	PASS	PASS	PASS
A2	M5 Between J21 and J22	SB	2,469	2,205	-263	5.4	PASS	FAIL	PASS
A2	M5 Between J21 and J22	NB	2,844	2,732	-112	2.1	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	NB	486	530	45	2.0	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	SB	493	495	2	0.1	PASS	PASS	PASS
B1	A370 Somerset Ave, east of B3440 Merge	EB	1,637	1,632	-5	0.1	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	NB	211	153	-58	4.3	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	SB	190	189	-1	0.1	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	EB	385	384	0	0.0	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	WB	402	349	-53	2.7	PASS	PASS	PASS
C1	A370 Weston Road north of Wick St Lawrence turn HEWISH	EB	632	569	-63	2.6	PASS	PASS	PASS
C1	A370 Weston Road north of Wick St Lawrence turn HEWISH	WB	698	608	-90	3.5	PASS	PASS	PASS
C2	A368 East Street east of Dark Lane Banwell	EB	195	282	87	5.6	PASS	FAIL	PASS
C2	A368 East Street east of Dark Lane Banwell	WB	198	254	56	3.7	PASS	PASS	PASS
C3	A371 Banwell Road east of Castle Hill Banwell	NB	238	234	-4	0.3	PASS	PASS	PASS
C3	A371 Banwell Road east of Castle Hill Banwell	SB	212	231	19	1.3	PASS	PASS	PASS
D1	A370 Rodyate Hill west of Warners Close Cleeve	NB	428	308	-120	6.2	FAIL	FAIL	FAIL
D1	A370 Rodyate Hill west of Warners Close Cleeve	SB	449	342	-106	5.3	FAIL	FAIL	FAIL
D2	A38 north of New Road Redhill	NB	534	657	123	5.0	FAIL	FAIL	FAIL
D2	A38 north of New Road Redhill	SB	514	618	104	4.4	FAIL	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	395	458	63	3.1	PASS	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	448	582	134	5.9	FAIL	FAIL	FAIL
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	736	709	-27	1.0	PASS	PASS	PASS
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	748	699	-49	1.8	PASS	PASS	PASS
F1	B3124 Walton Road east of Holly Lane Clevedon	EB	352	463	111	5.5	FAIL	FAIL	FAIL
F1	B3124 Walton Road east of Holly Lane Clevedon	WB	356	455	99	4.9	PASS	PASS	PASS
F3	B3133 Ettlingen Way	EB	826	907	81	2.8	PASS	PASS	PASS
F3	B3133 Ettlingen Way	WB	805	918	113	3.8	PASS	PASS	PASS
F4	Davis Lane, Clevedon	EB	60	79	19	2.2	PASS	PASS	PASS
F4	Davis Lane, Clevedon	WB	69	65	-5	0.6	PASS	PASS	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	NB	364	370	6	0.3	PASS	PASS	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	SB	382	399	17	0.9	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	819	800	-19	0.7	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	838	825	-12	0.4	PASS	PASS	PASS

G2	Clapton Lane south of Mayfields Close Portishead	NB	201	293	92	5.8	PASS	FAIL	PASS
G2	Clapton Lane south of Mayfields Close Portishead	SB	192	283	91	5.9	PASS	FAIL	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	305	305	-1	0.0	PASS	PASS	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	285	285	0	0.0	PASS	PASS	PASS
H2	B3130 south of Towerhouse Lane Nailsea	EB	372	363	-9	0.5	PASS	PASS	PASS
H2	B3130 south of Towerhouse Lane Nailsea	WB	402	388	-14	0.7	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	EB	23	22	-1	0.2	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	WB	26	26	0	0.0	PASS	PASS	PASS
H4	Station Road south of Bucklands End Nailsea	NB	333	335	2	0.1	PASS	PASS	PASS
H4	Station Road south of Bucklands End Nailsea	SB	327	320	-7	0.4	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	NB	59	56	-3	0.3	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	SB	55	50	-5	0.7	PASS	PASS	PASS
H6	West End Lane, Nailsea	EB	23	22	-1	0.3	PASS	PASS	PASS
H6	West End Lane, Nailsea	WB	27	26	-1	0.3	PASS	PASS	PASS
H7	Causeway, Tickenham	EB	86	81	-5	0.5	PASS	PASS	PASS
H7	Causeway, Tickenham	WB	95	85	-10	1.0	PASS	PASS	PASS

ID	Link Description	Direction	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
1	B3440 EB onslip to A370	EB	752	764	12	0.4	PASS	PASS	PASS
3	Scot Elm Drive	NB	108	200	92	7.4	PASS	FAIL	PASS
3	Scot Elm Drive	SB	107	105	-2	0.2	PASS	PASS	PASS
5	B3133 south of Yatton	NB	458	449	-9	0.4	PASS	PASS	PASS
5	B3133 south of Yatton	SB	417	399	-18	0.9	PASS	PASS	PASS
6	Bishops Road, Claverham	NB	192	172	-20	1.5	PASS	PASS	PASS
6	Bishops Road, Claverham	SB	115	111	-4	0.3	PASS	PASS	PASS
7	A370 north of SBL	EB	1,103	1,054	-49	1.5	PASS	PASS	PASS
7	A370 north of SBL	WB	1,613	1,698	85	2.1	PASS	PASS	PASS
8	A370 Long Ashton Bypass	EB	601	634	33	1.3	PASS	PASS	PASS
8	A370 Long Ashton Bypass	WB	970	1,035	65	2.0	PASS	PASS	PASS
9	Bristol Road south of Queensway	NB	1,062	1,265	203	5.9	FAIL	FAIL	FAIL
9	Bristol Road south of Queensway	SB	783	772	-11	0.4	PASS	PASS	PASS
10	B3128 Clarken Coombe	EB	541	348	-193	9.2	FAIL	FAIL	FAIL
10	B3128 Clarken Coombe	WB	632	561	-71	2.9	PASS	PASS	PASS
11	Long Ashton Road	NB	180	157	-23	1.8	PASS	PASS	PASS
11	Long Ashton Road	SB	387	406	19	1.0	PASS	PASS	PASS
12	Elmham Way	NB	1,225	1,205	-20	0.6	PASS	PASS	PASS
12	Elmham Way	SB	894	813	-81	2.8	PASS	PASS	PASS
13	A370 east of West Wick roundabout	EB	1,181	1,214	33	1.0	PASS	PASS	PASS
13	A370 east of West Wick roundabout	WB	2,060	1,968	-92	2.1	PASS	PASS	PASS
14	New Road (through Shipham)	NB	137	194	57	4.5	PASS	PASS	PASS
14	New Road (through Shipham)	SB	210	185	-25	1.7	PASS	PASS	PASS
16	A368 east of Churchill Gate	EB	247	319	72	4.3	PASS	PASS	PASS
16	A368 east of Churchill Gate	WB	312	326	14	0.8	PASS	PASS	PASS
17	Weston Road west of Long Ashton	EB	122	179	57	4.6	PASS	PASS	PASS
17	Weston Road west of Long Ashton	WB	212	188	-24	1.7	PASS	PASS	PASS
18	Wraxhall Hill	NB	163	269	106	7.2	FAIL	FAIL	FAIL
18	Wraxhall Hill	SB	365	412	47	2.4	PASS	PASS	PASS
19	B3218 north of Failand	EB	513	508	-5	0.2	PASS	PASS	PASS
19	B3218 north of Failand	WB	785	696	-89	3.3	PASS	PASS	PASS
20	Beggar Bush Lane	EB	130	49	-81	8.5	PASS	FAIL	PASS
20	Beggar Bush Lane	WB	329	153	-176	11.3	FAIL	FAIL	FAIL
21	B3129 Belmont Hill	NB	204	159	-45	3.3	PASS	PASS	PASS
21	B3129 Belmont Hill	SB	244	267	23	1.5	PASS	PASS	PASS
22	B3130 Bristol Road	SB	342	328	-14	0.7	PASS	PASS	PASS
22	B3130 Bristol Road	NB	473	393	-80	3.8	PASS	PASS	PASS
23	B3440 Bristol Rd., (A370 Off-Slip)	WB	1,094	1,224	130	3.8	PASS	PASS	PASS
23	A370 Somerset Avenue Total Westbound	WB	3,298	3,192	-106	1.9	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB	198	267	69	4.5	PASS	PASS	PASS
24	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB	219	273	54	3.4	PASS	PASS	PASS
25	SBL south of Brookgate - Long ashton	NB	843	711	-132	4.7	FAIL	PASS	PASS
25	SBL south of Brookgate - Long ashton	SB	1,009	1,005	-5	0.1	PASS	PASS	PASS
26	B3130 Chew Road east of Kentshare Lane Winford	EB	448	301	-147	7.6	FAIL	FAIL	FAIL
26	B3130 Chew Road east of Kentshare Lane Winford	WB	361	305	-57	3.1	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	NB	420	333	-87	4.5	PASS	PASS	PASS
27	B3133 Brinsea Road south of Silver St. Congresbury	SB	375	312	-63	3.4	PASS	PASS	PASS
28	Brockley Combe Road west of Downside Road Lulsgate	EB	214	196	-18	1.2	PASS	PASS	PASS
28	Brockley Combe Road west of Downside Road Lulsgate	WB	264	202	-61	4.0	PASS	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	NB	861	758	-103	3.6	PASS	PASS	PASS
29	A38 Bridgwater Road east of Yanley Lane Dundry	SB	1,099	878	-220	7.0	FAIL	FAIL	FAIL
30	A369 Martcombe Road south of High Street Portbury	NB	987	1,206	219	6.6	FAIL	FAIL	FAIL
30	A369 Martcombe Road south of High Street Portbury	SB	973	797	-175	5.9	FAIL	FAIL	FAIL
31	A369 west of B3129 Beggarbush Lane Leigh Woods	EB	948	932	-17	0.5	PASS	PASS	PASS
31	A369 west of B3129 Beggarbush Lane Leigh Woods	WB	937	1,081	143	4.5	FAIL	PASS	PASS
32	Oldmixon Road east of Broadway, Hutton	EB	310	221	-89	5.5	PASS	FAIL	PASS
32	Oldmixon Road east of Broadway, Hutton	WB	177	187	10	0.8	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	EB	352	385	33	1.7	PASS	PASS	PASS
33	B3128 Tickenham Hill west of Towerhouse Lane	WB	457	302	-155	7.9	FAIL	FAIL	FAIL
34	Mill Lane south of Mill Close Portbury	NB	332	269	-62	3.6	PASS	PASS	PASS
34	Mill Lane south of Mill Close Portbury	SB	301	423	123	6.5	FAIL	FAIL	FAIL
35	The Runway - CAL - west of A371Locking Moor Road	EB	500	813	313	12.2	FAIL	FAIL	FAIL

35	The Runway - CAL - west of A371Locking Moor Road	WB	505	579	74	3.2	PASS	PASS	PASS
36	A370 Somerset Avenue west of West Wick Rab W-s-M	EB	1,535	1,602	67	1.7	PASS	PASS	PASS
36	A370 Somerset Avenue west of West Wick Rab W-s-M	WB	1,938	1,903	-35	0.8	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	EB	583	539	-44	1.9	PASS	PASS	PASS
37	BIA Main Entrance north of A38 Lulsgate	WB	517	459	-57	2.6	PASS	PASS	PASS
38	BIA Silver Zone Parking - north of A38	EB	189	235	46	3.2	PASS	PASS	PASS
38	BIA Silver Zone Parking - north of A38	WB	103	99	-4	0.4	PASS	PASS	PASS
39	BIA Freight Entrance Downside Road Lulsgate	NB	103	45	-58	6.8	PASS	FAIL	PASS
39	BIA Freight Entrance Downside Road Lulsgate	SB	76	32	-43	5.9	PASS	FAIL	PASS
41	B3129 Weston Rd, Failand	NB	86	63	-22	2.6	PASS	PASS	PASS
41	B3129 Weston Rd, Failand	SB	157	151	-6	0.5	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	NB	175	169	-6	0.5	PASS	PASS	PASS
42	Flax Bourton Rd, Failand	SB	154	189	35	2.6	PASS	PASS	PASS
43	Chelvey Rd, Backwell	NB	31	27	-3	0.6	PASS	PASS	PASS
43	Chelvey Rd, Backwell	SB	37	45	8	1.3	PASS	PASS	PASS
44	Brockley Lane, Backwell	NB	81	77	-5	0.5	PASS	PASS	PASS
44	Brockley Lane, Backwell	SB	83	51	-32	3.9	PASS	PASS	PASS
45	Riverside, Banwell	NB	20	110	90	11.1	PASS	FAIL	PASS
45	Riverside, Banwell	SB	89	136	46	4.4	PASS	PASS	PASS
46	Nailsea Wall, Kenn	EB	97	158	62	5.5	PASS	FAIL	PASS
46	Nailsea Wall, Kenn	WB	113	163	49	4.2	PASS	PASS	PASS
47	Kenmoor Rd, Kenn	NB	122	189	67	5.4	PASS	FAIL	PASS
47	Kenmoor Rd, Kenn	SB	172	194	22	1.6	PASS	PASS	PASS
48	Court Lane, Clevedon	NB	137	181	44	3.5	PASS	PASS	PASS
48	Court Lane, Clevedon	SB	182	192	11	0.8	PASS	PASS	PASS
49	Half Yard, Langford	NB	74	43	-31	4.1	PASS	PASS	PASS
49	Half Yard, Langford	SB	73	39	-34	4.6	PASS	PASS	PASS
50	Long Lane (east of Wrington)	EB	51	73	22	2.8	PASS	PASS	PASS
50	Long Lane (east of Wrington)	WB	88	94	6	0.7	PASS	PASS	PASS
51	Summer Lane, Banwell	NB	112	85	-27	2.7	PASS	PASS	PASS
51	Summer Lane, Banwell	SB	109	135	26	2.3	PASS	PASS	PASS
52	M5 Between J20 and J21	SB	4,522	4,665	144	2.1	PASS	PASS	PASS
52	M5 Between J20 and J21	NB	3,191	3,190	0	0.0	PASS	PASS	PASS
53	M5 Between J20 and J19	NB	3,370	2,983	-387	6.9	PASS	FAIL	PASS
53	M5 Between J20 and J19	SB	4,587	4,584	-3	0.0	PASS	PASS	PASS
54	M5 Avonmouth Bridge north of J19	NB	4,447	4,286	-161	2.4	PASS	PASS	PASS
54	M5 Avonmouth Bridge north of J19	SB	4,960	5,695	735	10.1	FAIL	FAIL	FAIL
55	A370 Bridgwater Road, East Brent	NB	531	578	47	2.0	PASS	PASS	PASS
55	A370 Bridgwater Road, East Brent	SB	611	745	135	5.2	FAIL	FAIL	FAIL
56	A38 NE of Yew Tree Farm, Sedgemoor	EB	637	640	3	0.1	PASS	PASS	PASS
56	A38 NE of Yew Tree Farm, Sedgemoor	WB	613	635	22	0.9	PASS	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	NB	955	820	-136	4.6	PASS	PASS	PASS
57	A38 near Collis Farm, Sedgemoor	SB	915	982	67	2.2	PASS	PASS	PASS
58	A38 Bristol Road	EB	369	451	82	4.0	PASS	PASS	PASS
58	A38 Bristol Road	WB	617	575	-42	1.7	PASS	PASS	PASS
59	B3139 Highbridge Road	NB	307	310	3	0.2	PASS	PASS	PASS
59	B3139 Highbridge Road	SB	285	293	8	0.4	PASS	PASS	PASS
60	B3141 Church Road	NB	151	152	1	0.0	PASS	PASS	PASS
60	B3141 Church Road	SB	187	120	-67	5.4	PASS	FAIL	PASS
61	B3139 Blackford Road	EB	181	224	43	3.0	PASS	PASS	PASS
61	B3139 Blackford Road	WB	144	180	36	2.9	PASS	PASS	PASS
A1	A370 (River Axe bridge)	NB	669	547	-122	5.0	FAIL	PASS	PASS
A1	A370 (River Axe bridge)	SB	768	850	82	2.9	PASS	PASS	PASS
A2	M5 Between J21 and J22	SB	2,826	2,701	-125	2.4	PASS	PASS	PASS
A2	M5 Between J21 and J22	NB	2,773	2,597	-176	3.4	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	NB	578	660	82	3.3	PASS	PASS	PASS
A3	A38 Bridgwater Road south of A371 Sidcot	SB	718	617	-102	3.9	PASS	PASS	PASS
B1	A370 Somerset Ave, east of B3440 Merge	EB	2,013	1,961	-52	1.2	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	NB	302	331	28	1.6	PASS	PASS	PASS
B2	Wolvershill Road south of M5 overbridge Banwell	SB	270	262	-8	0.5	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	EB	478	465	-12	0.6	PASS	PASS	PASS
B3	A371 west of M5 overbridge Locking	WB	509	451	-58	2.6	PASS	PASS	PASS
C1	A370 Bristol Road	EB	667	656	-11	0.4	PASS	PASS	PASS
C1	A370 Bristol Road	WB	912	825	-87	2.9	PASS	PASS	PASS

C2	A368 East Street east of Dark Lane Banwell	EB	224	317	93	5.6	PASS	FAIL	PASS
C2	A368 East Street east of Dark Lane Banwell	WB	265	356	91	5.2	PASS	FAIL	PASS
C3	A371 Banwell Road east of Castle Hill Banwell	NB	387	418	31	1.6	PASS	PASS	PASS
C3	A371 Banwell Road east of Castle Hill Banwell	SB	249	256	8	0.5	PASS	PASS	PASS
D1	A370 Rodyate Hill west of Warners Close Cleeve	NB	487	379	-108	5.2	FAIL	FAIL	FAIL
D1	A370 Rodyate Hill west of Warners Close Cleeve	SB	790	659	-131	4.9	FAIL	PASS	PASS
D2	A38 north of New Road Redhill	NB	635	721	86	3.3	PASS	PASS	PASS
D2	A38 north of New Road Redhill	SB	863	918	55	1.8	PASS	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	436	504	69	3.2	PASS	PASS	PASS
E1	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	821	940	119	4.0	PASS	PASS	PASS
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	879	904	25	0.8	PASS	PASS	PASS
E2	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	941	931	-10	0.3	PASS	PASS	PASS
F1	B3124 Walton Road east of Holly Lane Clevedon	EB	500	563	63	2.7	PASS	PASS	PASS
F1	B3124 Walton Road east of Holly Lane Clevedon	WB	483	526	43	1.9	PASS	PASS	PASS
F2	B3130 Tickenham Road	EB	659	540	-119	4.9	FAIL	PASS	PASS
F2	B3130 Tickenham Road	WB	756	726	-30	1.1	PASS	PASS	PASS
F3	B3133 Ettlingen Way	EB	1,352	1,337	-15	0.4	PASS	PASS	PASS
F3	B3133 Ettlingen Way	WB	1,520	1,463	-57	1.5	PASS	PASS	PASS
F4	Davis Lane, Clevedon	EB	130	119	-10	0.9	PASS	PASS	PASS
F4	Davis Lane, Clevedon	WB	122	127	5	0.4	PASS	PASS	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	NB	427	441	14	0.7	PASS	PASS	PASS
F5	B3133 Kenn Road south of M5 Overbridge Kenn	SB	574	559	-14	0.6	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	1,043	937	-106	3.4	PASS	PASS	PASS
G1	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	1,446	1,478	32	0.8	PASS	PASS	PASS
G2	Clapton Lane south of Mayfields Close Portishead	NB	530	464	-66	3.0	PASS	PASS	PASS
G2	Clapton Lane south of Mayfields Close Portishead	SB	310	400	90	4.8	PASS	PASS	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	467	457	-10	0.5	PASS	PASS	PASS
H1	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	381	302	-79	4.3	PASS	PASS	PASS
H2	B3130	EB	345	448	103	5.2	FAIL	FAIL	FAIL
H2	B3130	WB	589	651	62	2.5	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	EB	33	42	9	1.4	PASS	PASS	PASS
H3	Backwell Bow (North), Nailsea	WB	56	54	-2	0.3	PASS	PASS	PASS
H4	Station Road near Backwell Crossroads	NB	427	396	-31	1.5	PASS	PASS	PASS
H4	Station Road near Backwell Crossroads	SB	378	409	31	1.6	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	NB	101	80	-20	2.1	PASS	PASS	PASS
H5	Netherton Wood Lane, Nailsea	SB	93	68	-25	2.7	PASS	PASS	PASS
H6	West End Lane, Nailsea	EB	42	65	23	3.2	PASS	PASS	PASS
H6	West End Lane, Nailsea	WB	64	85	21	2.4	PASS	PASS	PASS
H7	Causeway, Tickenham	EB	117	109	-7	0.7	PASS	PASS	PASS
H7	Causeway, Tickenham	WB	177	142	-35	2.8	PASS	PASS	PASS

Appendix F

A38 MRN JUNCTION VALIDATION

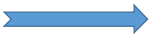
Barrow Street	Obs	Mod	Diff	%Diff	GEH
L	84	52	-32	-38%	3.8
S					
R	172	140	-32	-19%	2.6
T-Entry	256	192	-64	-25%	4.3
T-Exit	451	292	-159	-35%	8.3

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	707	667	-40	-6%	1.5
R	172	110	-62	-36%	5.2
T-Entry	879	778	-101	-12%	3.5
T-Exit	1056	974	-82	-8%	2.6

A38 S	Obs	Mod	Diff	%Diff	GEH
L	279	182	-97	-35%	6.4
S	972	922	-50	-5%	1.6
R					
T-Entry	1251	1103	-148	-12%	4.3
T-Exit	879	807	-72	-8%	2.5

AM

A38 / B3130 Barrow Street Junction



Barrow Street	Obs	Mod	Diff	%Diff	GEH
L	36	30	-6	-18%	1.1
S					
R	102	98	-4	-4%	0.4
T-Entry	138	128	-10	-7%	0.9
T-Exit	159	142	-17	-11%	1.4

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	722	709	-13	-2%	0.5
R	40	29	-11	-27%	1.8
T-Entry	762	739	-23	-3%	0.9
T-Exit	731	710	-21	-3%	0.8

A38 S	Obs	Mod	Diff	%Diff	GEH
L	119	112	-7	-5%	0.6
S	695	680	-15	-2%	0.6
R					
T-Entry	814	792	-22	-3%	0.8
T-Exit	824	808	-16	-2%	0.6

IP

A38 / B3130 Barrow Street Junction

Barrow Street	Obs	Mod	Diff	%Diff	GEH
L	52	46	-6	-11%	0.8
S					
R	260	204	-56	-22%	3.7
T-Entry	312	250	-62	-20%	3.7
T-Exit	263	241	-22	-8%	1.4

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	1035	891	-144	-14%	4.6
R	48	34	-14	-28%	2.1
T-Entry	1083	926	-157	-15%	5.0
T-Exit	874	851	-23	-3%	0.8

A38 S	Obs	Mod	Diff	%Diff	GEH
L	215	207	-8	-4%	0.6
S	822	805	-17	-2%	0.6
R					
T-Entry	1037	1012	-25	-2%	0.8
T-Exit	1295	1096	-199	-15%	5.8

PM

A38 / B3130 Barrow Street Junction

Downside Rd	Obs	Mod	Diff	%Diff	GEH
L	216	176	-40	-19%	2.9
S					
R	74	69	-5	-7%	0.6
T-Entry	290	244	-46	-16%	2.8
T-Exit	315	262	-53	-17%	3.1

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	1008	959	-49	-5%	1.6
R					
T-Entry	1008	959	-49	-5%	1.6
T-Exit	1118	1061	-57	-5%	1.7

AM

A38 / Downside Road Junction

A38 S	Obs	Mod	Diff	%Diff	GEH
L	315	262	-53	-17%	3.1
S	902	885	-17	-2%	0.6
R					
T-Entry	1217	1147	-70	-6%	2.0
T-Exit	1082	1028	-54	-5%	1.7

Downside Rd	Obs	Mod	Diff	%Diff	GEH
L	125	124	-1	-1%	0.1
S					
R	60	59	-1	-1%	0.1
T-Entry	185	183	-2	-1%	0.2
T-Exit	165	164	-1	-1%	0.1

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	807	806	-1	0%	0.0
R					
T-Entry	807	806	-1	0%	0.0
T-Exit	830	813	-17	-2%	0.6

IP

A38 / Downside Road Junction

A38 S	Obs	Mod	Diff	%Diff	GEH
L	165	164	-1	-1%	0.1
S	705	689	-16	-2%	0.6
R					
T-Entry	870	853	-17	-2%	0.6
T-Exit	867	865	-2	0%	0.1

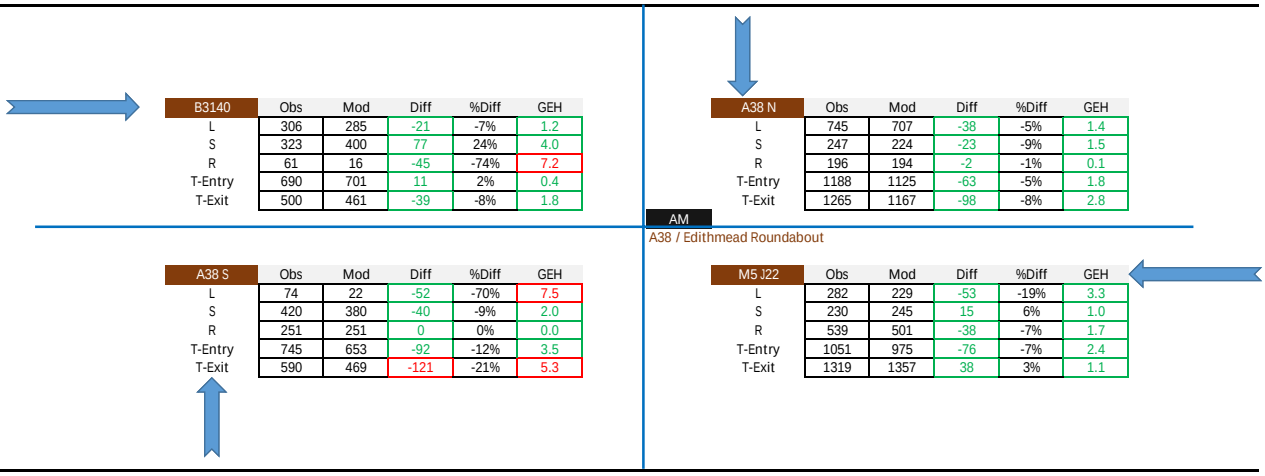
Downside Rd	Obs	Mod	Diff	%Diff	GEH
L	184	171	-13	-7%	1.0
S					
R	74	67	-8	-10%	0.9
T-Entry	258	238	-20	-8%	1.3
T-Exit	298	203	-95	-32%	6.0

A38 N	Obs	Mod	Diff	%Diff	GEH
L					
S	1152	1035	-117	-10%	3.6
R					
T-Entry	1152	1035	-117	-10%	3.6
T-Exit	1133	1087	-46	-4%	1.4

PM

A38 / Downside Road Junction

A38 S	Obs	Mod	Diff	%Diff	GEH
L	298	203	-95	-32%	6.0
S	949	916	-33	-4%	1.1
R					
T-Entry	1247	1119	-128	-10%	3.7
T-Exit	1226	1101	-125	-10%	3.7



B3140	Obs	Mod	Diff	%Diff	GEH
L	306	285	-21	-7%	1.2
S	323	400	77	24%	4.0
R	61	16	-45	-74%	7.2
T-Entry	690	701	11	2%	0.4
T-Exit	500	461	-39	-8%	1.8

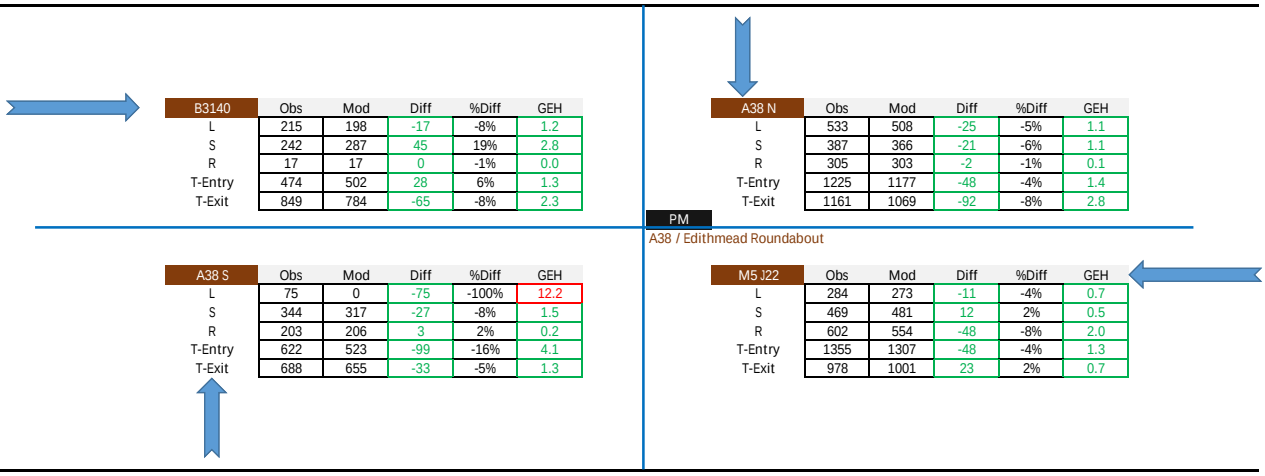
A38 N	Obs	Mod	Diff	%Diff	GEH
L	745	707	-38	-5%	1.4
S	247	224	-23	-9%	1.5
R	196	194	-2	-1%	0.1
T-Entry	1188	1125	-63	-5%	1.8
T-Exit	1265	1167	-98	-8%	2.8

AM

A38 / Edithmead Roundabout

A38 S	Obs	Mod	Diff	%Diff	GEH
L	74	22	-52	-70%	7.5
S	420	380	-40	-9%	2.0
R	251	251	0	0%	0.0
T-Entry	745	653	-92	-12%	3.5
T-Exit	590	469	-121	-21%	5.3

M5 J22	Obs	Mod	Diff	%Diff	GEH
L	282	229	-53	-19%	3.3
S	230	245	15	6%	1.0
R	539	501	-38	-7%	1.7
T-Entry	1051	975	-76	-7%	2.4
T-Exit	1319	1357	38	3%	1.1



B3140	Obs	Mod	Diff	%Diff	GEH
L	215	198	-17	-8%	1.2
S	242	287	45	19%	2.8
R	17	17	0	-1%	0.0
T-Entry	474	502	28	6%	1.3
T-Exit	849	784	-65	-8%	2.3

A38 N	Obs	Mod	Diff	%Diff	GEH
L	533	508	-25	-5%	1.1
S	387	366	-21	-6%	1.1
R	305	303	-2	-1%	0.1
T-Entry	1225	1177	-48	-4%	1.4
T-Exit	1161	1069	-92	-8%	2.8

PM

A38 / Edithmead Roundabout

A38 S	Obs	Mod	Diff	%Diff	GEH
L	75	0	-75	-100%	12.2
S	344	317	-27	-8%	1.5
R	203	206	3	2%	0.2
T-Entry	622	523	-99	-16%	4.1
T-Exit	688	655	-33	-5%	1.3

M5 J22	Obs	Mod	Diff	%Diff	GEH
L	284	273	-11	-4%	0.7
S	469	481	12	2%	0.5
R	602	554	-48	-8%	2.0
T-Entry	1355	1307	-48	-4%	1.3
T-Exit	978	1001	23	2%	0.7

Appendix G

M5 JUNCTION 21 VALIDATION

Time period	From	To	Obs	Mod	Diff	%Diff	GEH	TAG Criteria
AM	M5 N	A370 E	114	78	-36	-31%	3.7	PASS
	M5 N	A370 W	1,214	1,322	108	9%	3.0	PASS
	A370 E	M5 S	129	179	50	39%	4.0	PASS
	A370 E	A370 W	630	700	70	11%	2.7	PASS
	A370 E	M5 N	229	130	-99	-43%	7.4	PASS
	M5 S	A370 W	313	339	26	8%	1.4	PASS
	M5 S	A370 E	115	136	21	18%	1.8	PASS
	A370 W	M5 N	1,768	1,859	91	5%	2.1	PASS
	A370 W	A370 E	585	539	-46	-8%	1.9	PASS
	A370 W	M5 S	304	356	52	17%	2.9	PASS
	Total entry flow		5,401	5,638	237	4%	3.2	PASS
IP	M5 N	A370 E	79	91	12	15%	1.3	PASS
	M5 N	A370 W	972	1,165	193	20%	5.9	FAIL
	A370 E	M5 S	92	177	85	93%	7.4	PASS
	A370 E	A370 W	574	526	-49	-8%	2.1	PASS
	A370 E	M5 N	62	73	11	19%	1.4	PASS
	M5 S	A370 W	201	257	56	28%	3.7	PASS
	M5 S	A370 E	77	138	61	79%	5.9	PASS
	A370 W	M5 N	922	1,009	87	9%	2.8	PASS
	A370 W	A370 E	561	509	-52	-9%	2.3	PASS
	A370 W	M5 S	209	213	4	2%	0.3	PASS
	Total entry flow		3,749	4,159	410	11%	6.5	FAIL
PM	M5 N	A370 E	215	98	-117	-54%	9.3	FAIL
	M5 N	A370 W	1,897	2,065	168	9%	3.8	PASS
	A370 E	M5 S	148	139	-9	-6%	0.8	PASS
	A370 E	A370 W	722	746	24	3%	0.9	PASS
	A370 E	M5 N	80	89	9	11%	1.0	PASS
	M5 S	A370 W	362	407	45	13%	2.3	PASS
	M5 S	A370 E	137	120	-17	-12%	1.5	PASS
	A370 W	M5 N	1,130	1,075	-55	-5%	1.7	PASS
	A370 W	A370 E	576	664	88	15%	3.5	PASS
	A370 W	M5 S	311	278	-33	-11%	1.9	PASS
	Total entry flow		5,578	5,681	103	2%	1.4	PASS

Appendix H

JOURNEY TIME RESULTS

AM Journey Times

Route	Direction	Observed (mm:ss)	Modelled (mm:ss)	Diff (mm:ss)	% Diff	TAG Criteria
A	NB	16:25	15:58	-00:27	-3%	PASS
	SB	16:36	15:24	-01:12	-7%	PASS
B	EB	14:05	10:49	-03:16	-23%	FAIL
	WB	10:49	08:55	-01:54	-18%	FAIL
C	EB	22:03	18:14	-03:49	-17%	FAIL
	WB	18:37	18:04	-00:33	-3%	PASS
D	EB	19:12	12:46	-06:26	-34%	FAIL
	WB	12:15	11:58	-00:17	-2%	PASS
E	EB	19:02	19:29	00:27	2%	PASS
	WB	15:30	14:15	-01:15	-8%	PASS
F	EB	25:04	20:53	-04:12	-17%	FAIL
	WB	20:24	20:23	-00:01	0%	PASS
G	NB	23:40	22:31	-01:09	-5%	PASS
	SB	24:45	22:53	-01:52	-8%	PASS
H	NB	04:20	04:11	-00:10	-4%	PASS
	SB	04:43	03:58	-00:45	-16%	PASS
I	EB	10:19	10:32	00:13	2%	PASS
	WB	10:31	10:06	-00:25	-4%	PASS
J	NB	14:05	13:30	-00:35	-4%	PASS
	SB	13:01	12:31	-00:30	-4%	PASS
K	NB	12:08	11:22	-00:46	-6%	PASS
	SB	11:48	12:48	01:00	8%	PASS
L	NB	18:39	17:47	-00:52	-5%	PASS
	SB	19:05	17:59	-01:06	-6%	PASS
M	NB	19:10	16:35	-02:35	-13%	PASS
	SB	17:58	16:45	-01:13	-7%	PASS
N	NB	11:04	09:05	-01:59	-18%	FAIL
	SB	10:31	09:36	-00:55	-9%	PASS
O	NB	12:52	13:21	00:29	4%	PASS
	SB	13:03	13:38	00:35	4%	PASS
P	NB	12:00	12:02	00:02	0%	PASS
	SB	11:34	11:47	00:13	2%	PASS
Q	NB	13:59	14:21	00:21	3%	PASS
	SB	13:32	13:44	00:12	1%	PASS
R	NB	12:59	12:41	-00:18	-2%	PASS
	SB	13:39	13:06	-00:33	-4%	PASS
S	NB	07:12	07:05	-00:07	-2%	PASS
	SB	08:00	08:06	00:06	1%	PASS
Pass rate over all journey time routes						84%

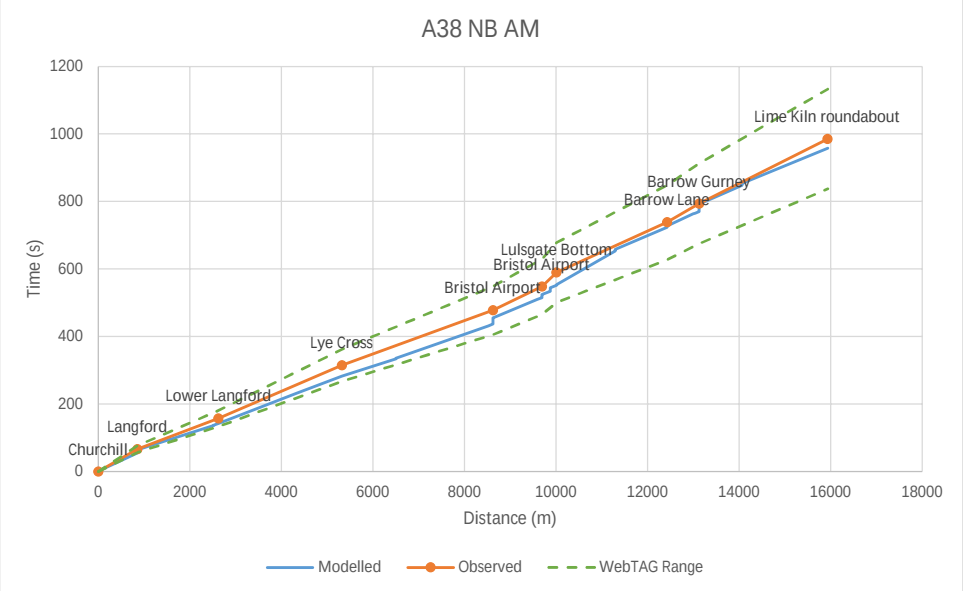
IP Journey Times

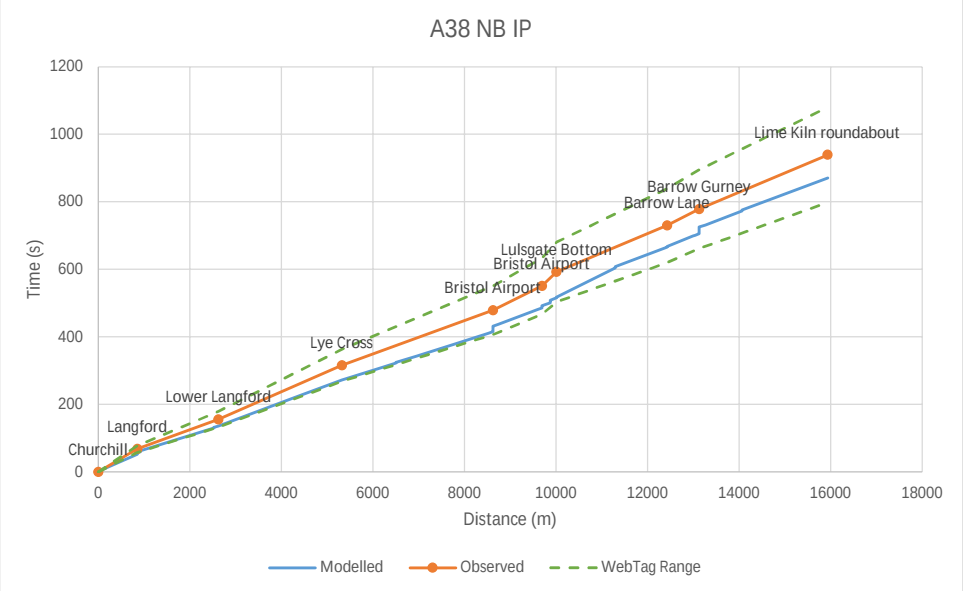
Route	Direction	Observed (mm:ss)	Modelled (mm:ss)	Diff (mm:ss)	% Diff	TAG Criteria
A	NB	15:39	14:31	-01:08	-7%	PASS
	SB	16:58	15:00	-01:58	-12%	PASS
B	EB	10:34	09:21	-01:13	-12%	PASS
	WB	10:30	08:44	-01:46	-17%	FAIL
C	EB	18:14	17:07	-01:07	-6%	PASS
	WB	18:01	17:15	-00:46	-4%	PASS
D	EB	12:22	11:38	-00:45	-6%	PASS
	WB	12:53	11:48	-01:06	-9%	PASS
E	EB	15:30	13:07	-02:24	-15%	FAIL
	WB	15:10	13:05	-02:05	-14%	PASS
F	EB	19:30	19:15	-00:15	-1%	PASS
	WB	20:02	19:18	-00:44	-4%	PASS
G	NB	22:04	21:10	-00:54	-4%	PASS
	SB	22:14	22:46	00:33	2%	PASS
H	NB	04:06	03:52	-00:14	-6%	PASS
	SB	04:30	03:51	-00:40	-15%	PASS
I	EB	10:27	09:57	-00:30	-5%	PASS
	WB	10:31	09:48	-00:43	-7%	PASS
J	NB	13:23	13:02	-00:21	-3%	PASS
	SB	13:15	12:25	-00:50	-6%	PASS
K	NB	10:52	10:03	-00:49	-8%	PASS
	SB	11:27	10:38	-00:49	-7%	PASS
L	NB	17:44	16:41	-01:03	-6%	PASS
	SB	18:21	17:24	-00:57	-5%	PASS
M	NB	16:55	15:51	-01:04	-6%	PASS
	SB	17:30	16:14	-01:16	-7%	PASS
N	NB	09:34	08:36	-00:58	-10%	PASS
	SB	10:08	09:44	-00:23	-4%	PASS
O	NB	12:48	13:27	00:39	5%	PASS
	SB	13:10	13:30	00:20	3%	PASS
P	NB	11:50	12:01	00:11	2%	PASS
	SB	11:32	11:42	00:10	1%	PASS
Q	NB	13:49	14:23	00:34	4%	PASS
	SB	13:28	13:32	00:04	0%	PASS
R	NB	13:08	12:36	-00:32	-4%	PASS
	SB	13:25	12:40	-00:44	-5%	PASS
S	NB	07:18	07:12	-00:06	-1%	PASS
	SB	07:50	07:50	00:00	0%	PASS
Pass rate over all journey time routes						95%

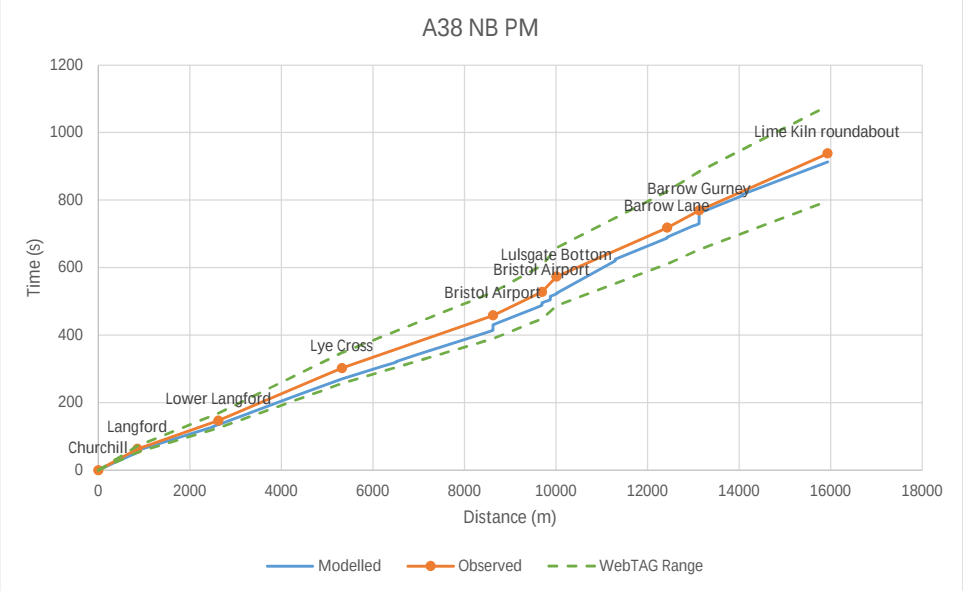
PM Journey Times

Route	Direction	Observed (mm:ss)	Modelled (mm:ss)	Diff (mm:ss)	% Diff	TAG Criteria
A	NB	15:38	15:14	-00:24	-3%	PASS
	SB	18:01	16:38	-01:23	-8%	PASS
B	EB	11:02	09:42	-01:20	-12%	PASS
	WB	13:02	10:27	-02:35	-20%	FAIL
C	EB	19:03	18:20	-00:43	-4%	PASS
	WB	20:32	19:34	-00:58	-5%	PASS
D	EB	12:13	12:18	00:05	1%	PASS
	WB	13:56	14:44	00:49	6%	PASS
E	EB	15:35	17:40	02:05	13%	PASS
	WB	17:32	16:13	-01:20	-8%	PASS
F	EB	19:50	19:28	-00:22	-2%	PASS
	WB	23:06	21:14	-01:52	-8%	PASS
G	NB	23:40	22:07	-01:33	-7%	PASS
	SB	24:27	23:14	-01:14	-5%	PASS
H	NB	04:14	04:04	-00:10	-4%	PASS
	SB	04:31	04:05	-00:26	-10%	PASS
I	EB	10:59	10:22	-00:37	-6%	PASS
	WB	10:54	10:09	-00:45	-7%	PASS
J	NB	13:04	12:53	-00:11	-1%	PASS
	SB	15:31	13:38	-01:53	-12%	PASS
K	NB	10:54	10:54	00:00	0%	PASS
	SB	10:50	10:07	-00:43	-7%	PASS
L	NB	18:31	17:09	-01:22	-7%	PASS
	SB	20:15	18:14	-02:01	-10%	PASS
M	NB	17:33	16:03	-01:30	-9%	PASS
	SB	19:39	21:13	01:34	8%	PASS
N	NB	10:08	08:42	-01:26	-14%	PASS
	SB	12:58	13:55	00:57	7%	PASS
O	NB	12:40	13:18	00:38	5%	PASS
	SB	12:54	13:37	00:42	5%	PASS
P	NB	11:55	12:13	00:18	3%	PASS
	SB	11:39	11:56	00:17	2%	PASS
Q	NB	13:31	14:17	00:46	6%	PASS
	SB	13:24	14:15	00:51	6%	PASS
R	NB	13:20	13:02	-00:18	-2%	PASS
	SB	13:18	12:49	-00:29	-4%	PASS
S	NB	07:19	07:18	-00:01	0%	PASS
	SB	07:39	07:55	00:16	4%	PASS
Pass rate over all journey time routes						97%

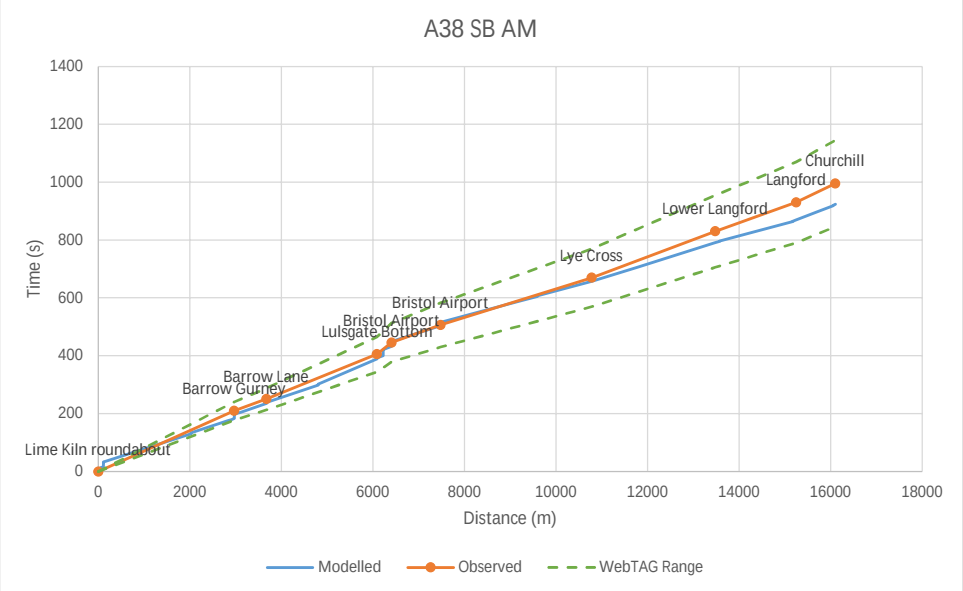
Journey Time Route A - A38 NB

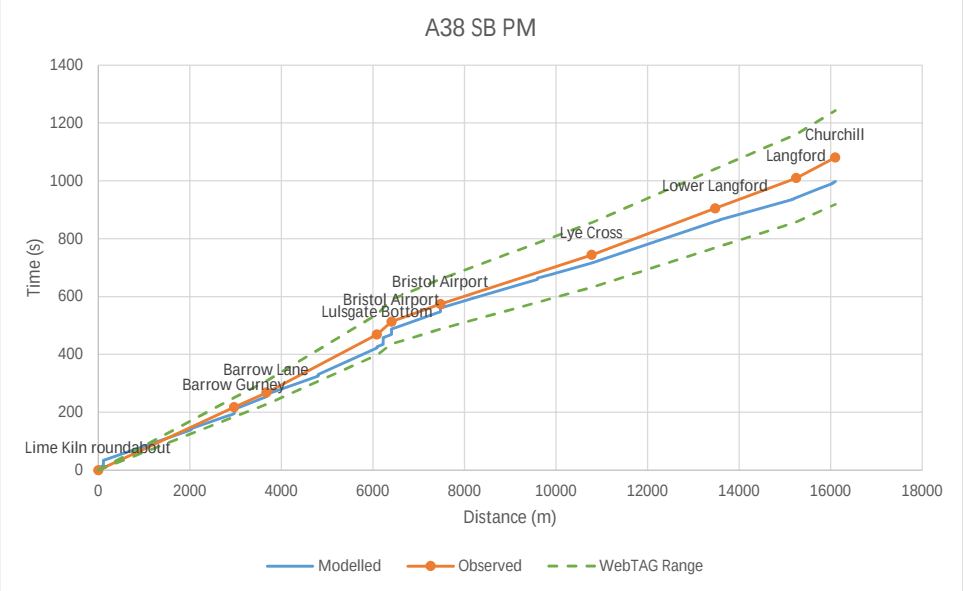




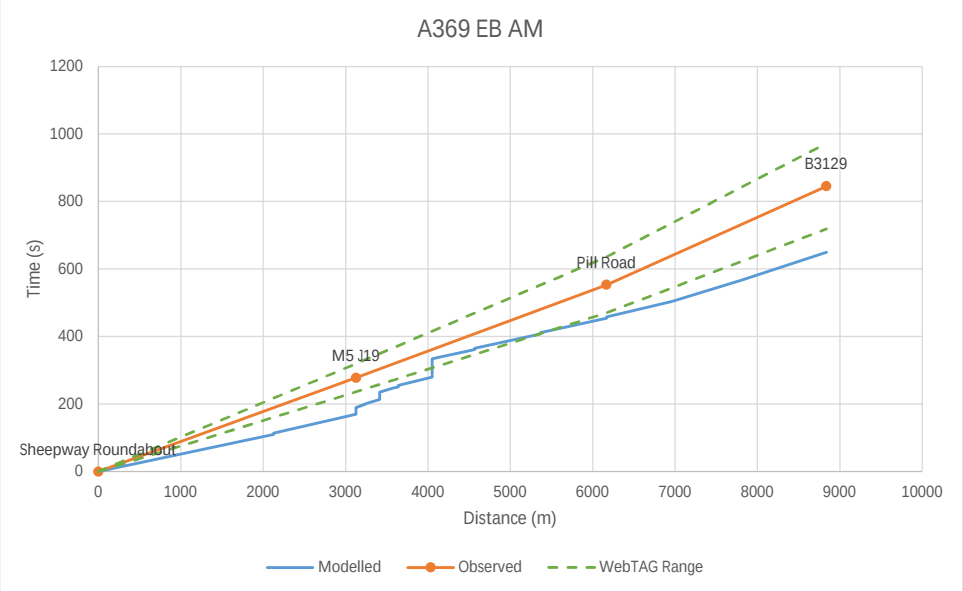


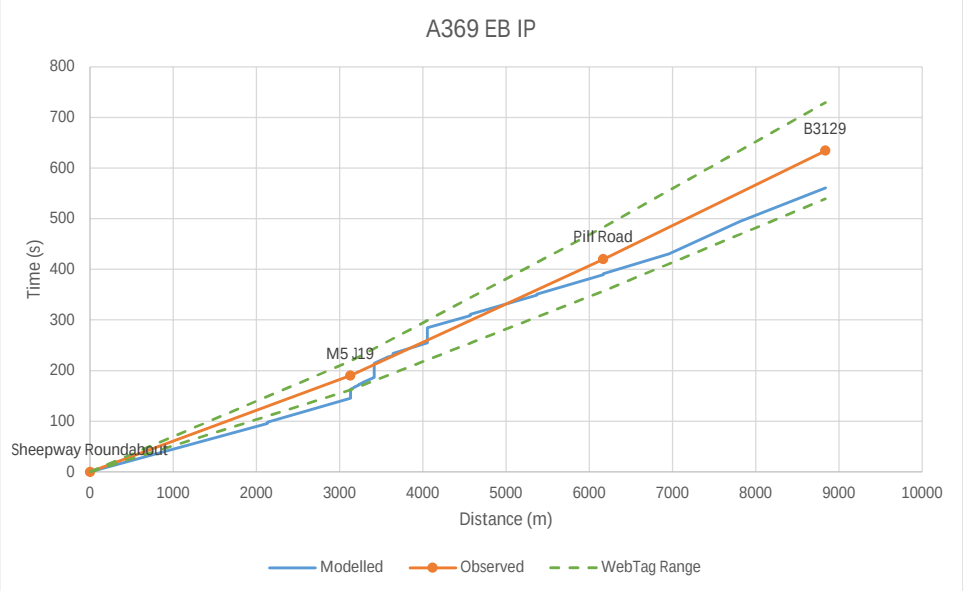
Journey Time Route A - A38 SB

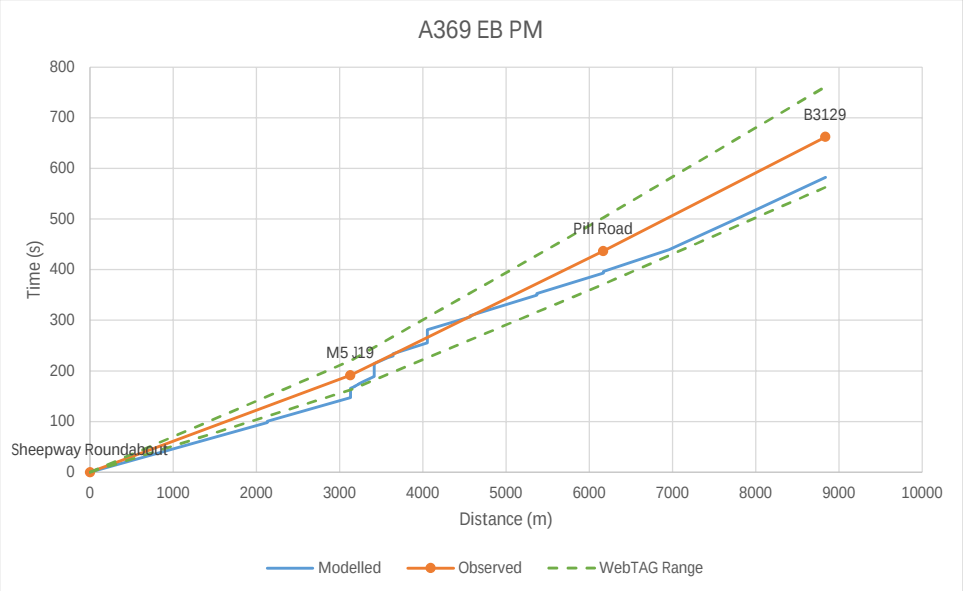




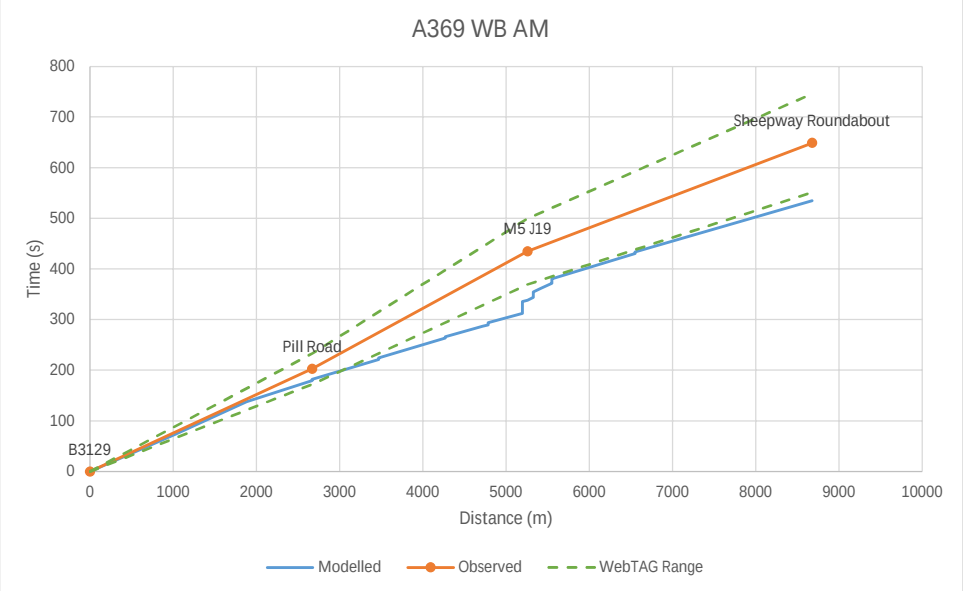
Journey Time Route B - A369 EB

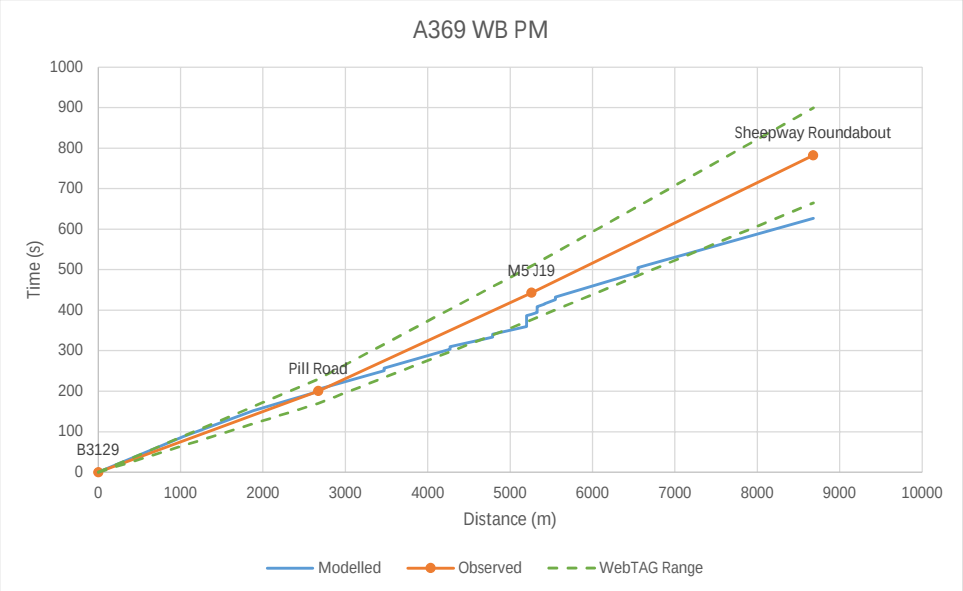




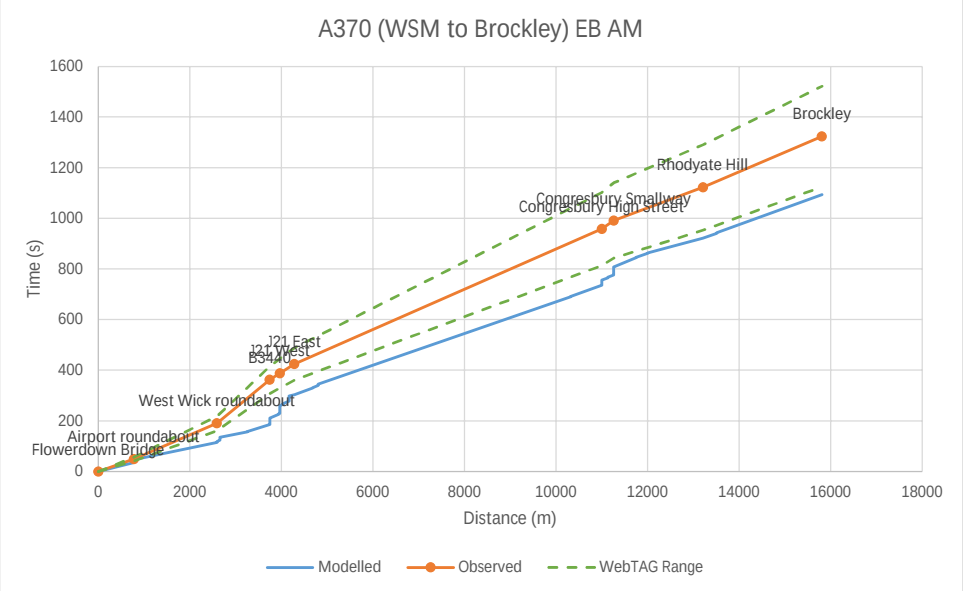


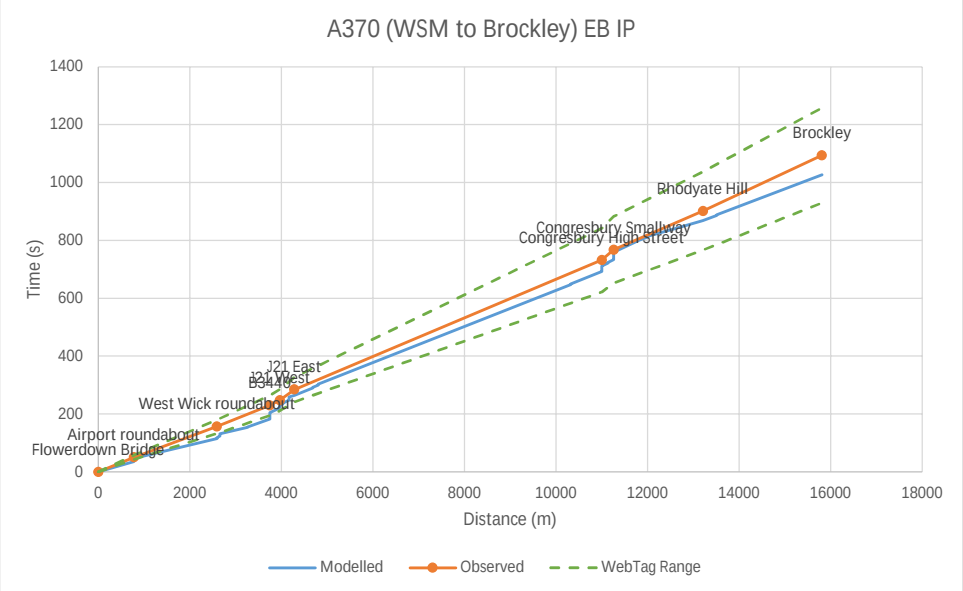
Journey Time Route B - A369 WB

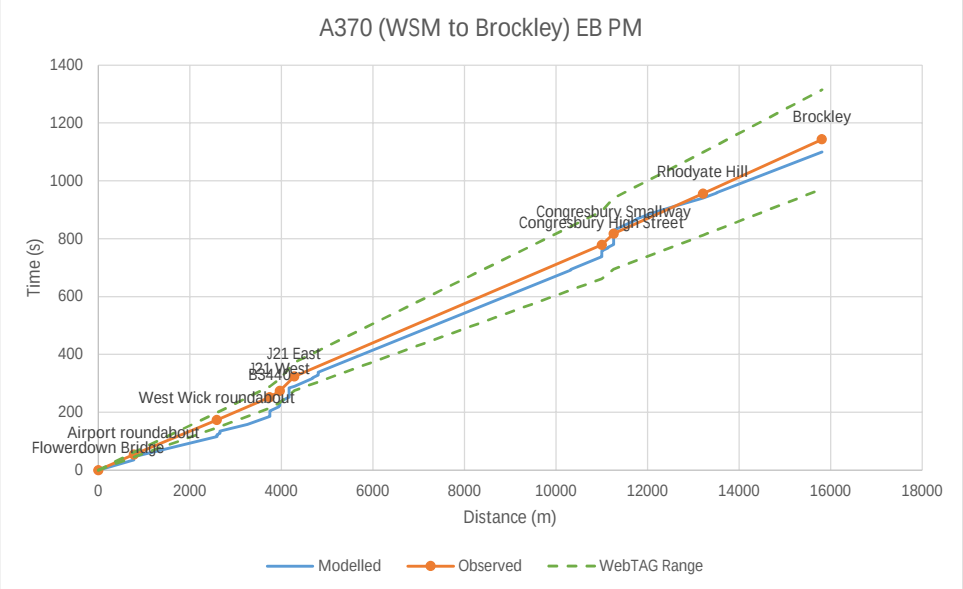




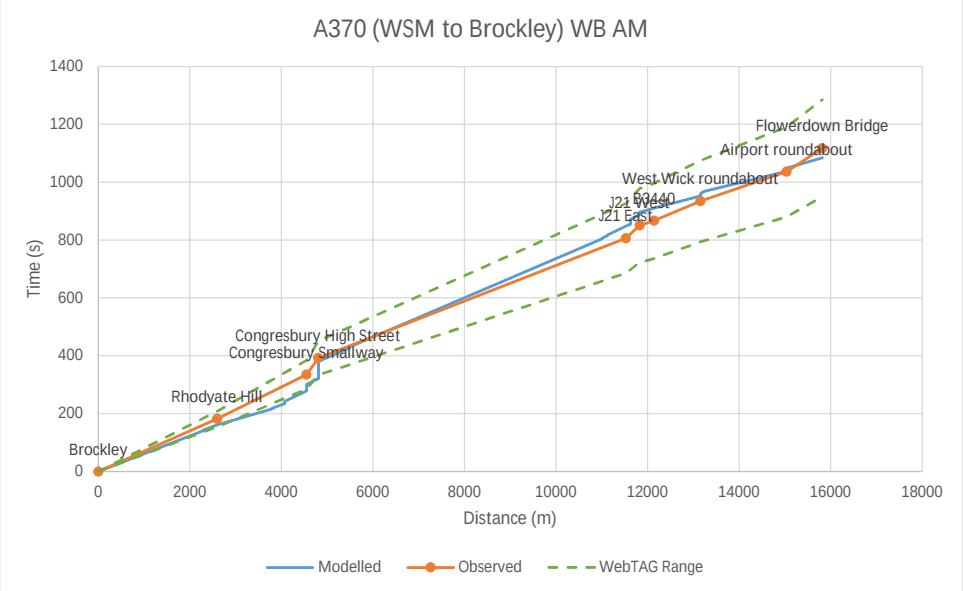
Journey Time Route C - A370 (WSM to Brockley) EB

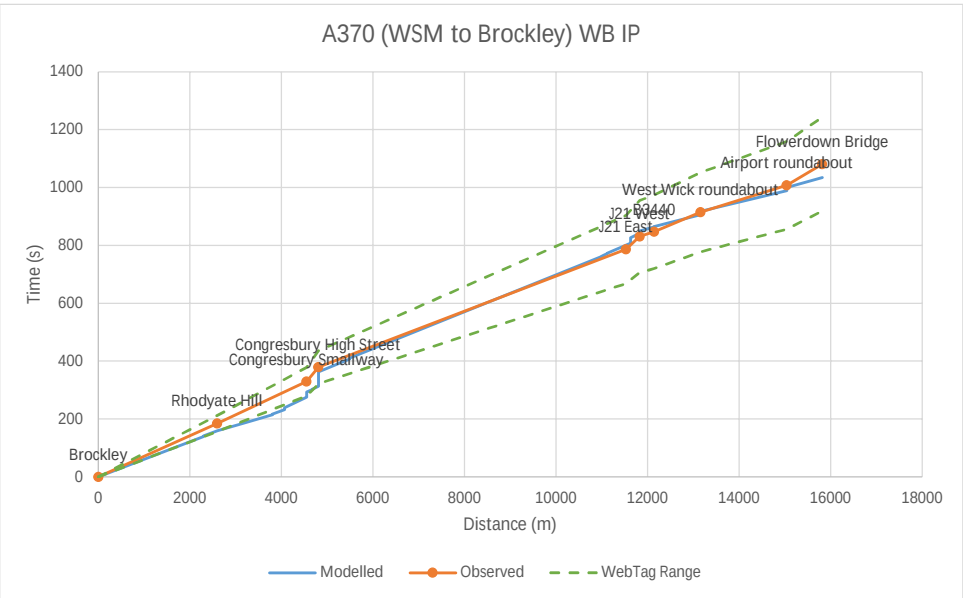


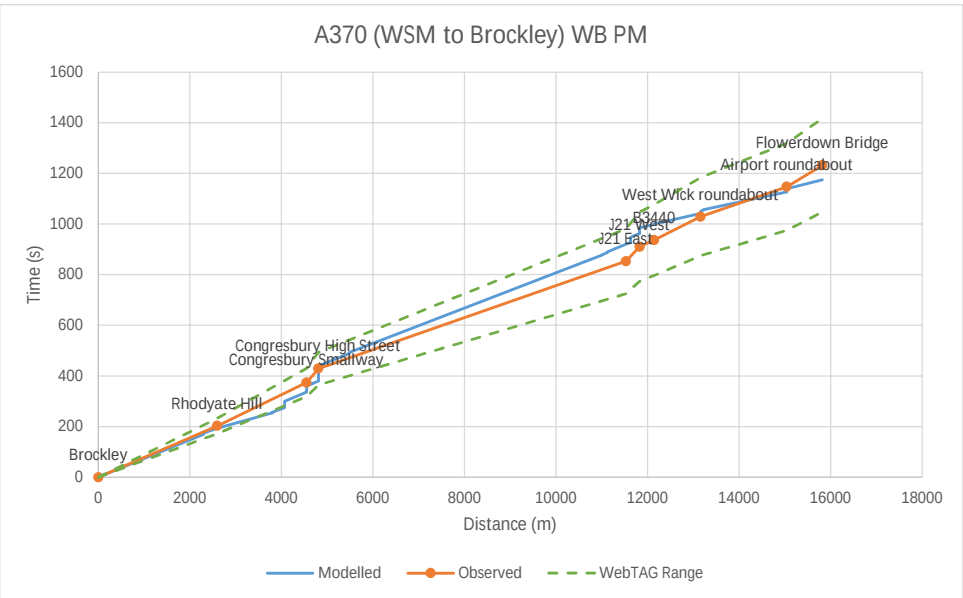




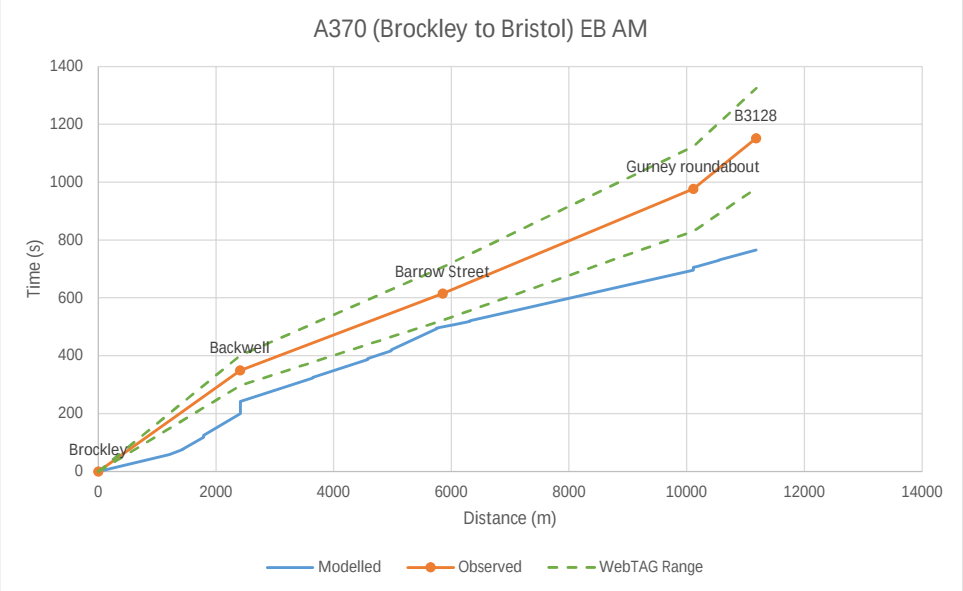
Journey Time Route C - A370 (WSM to Brockley) WB

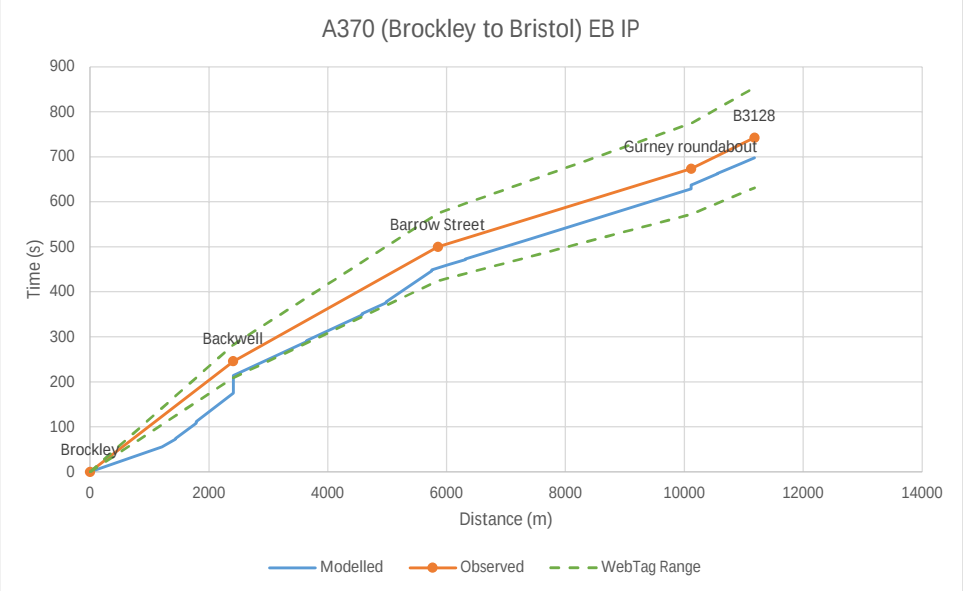


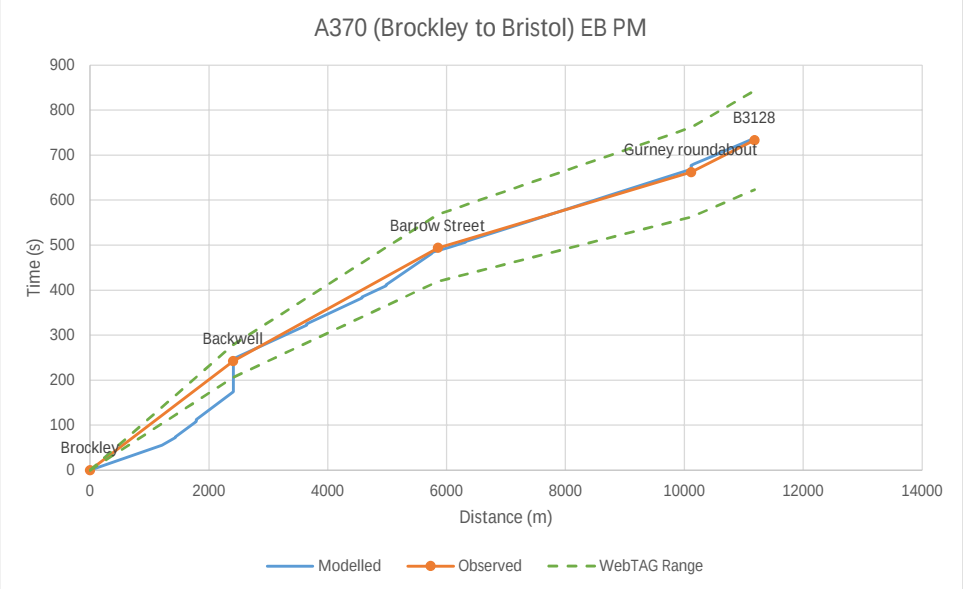




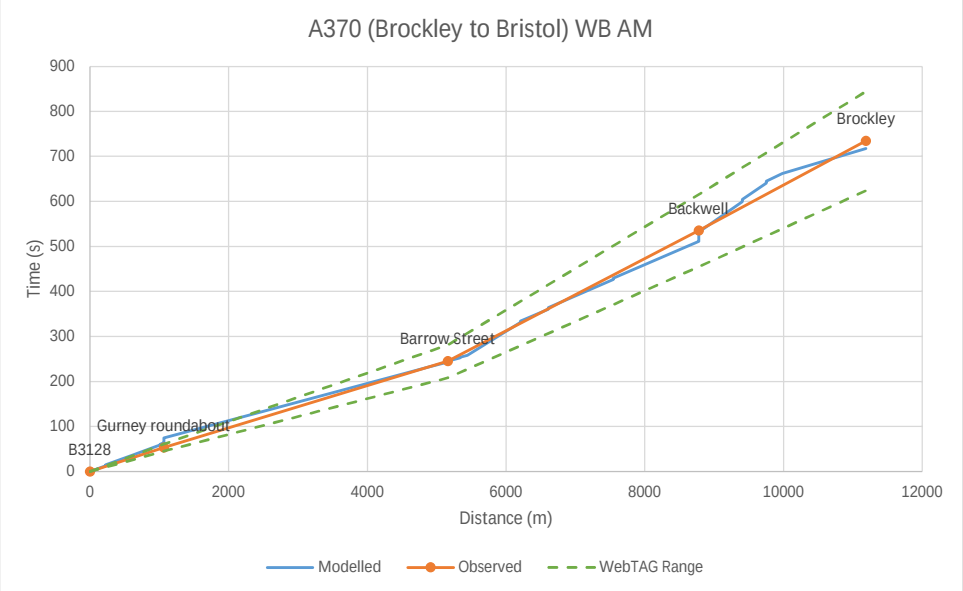
Journey Time Route D - A370 (Brockley to Bristol) EB

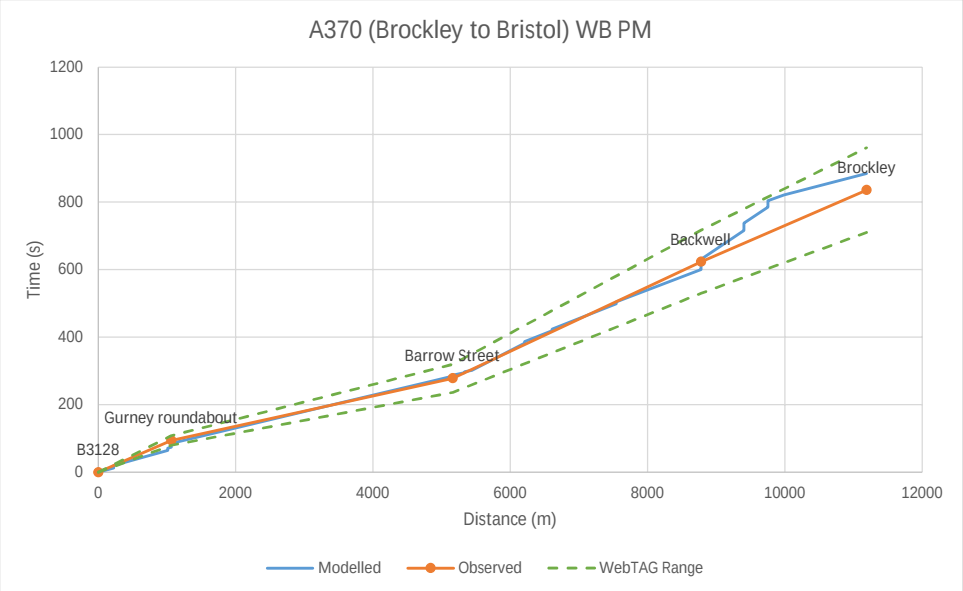




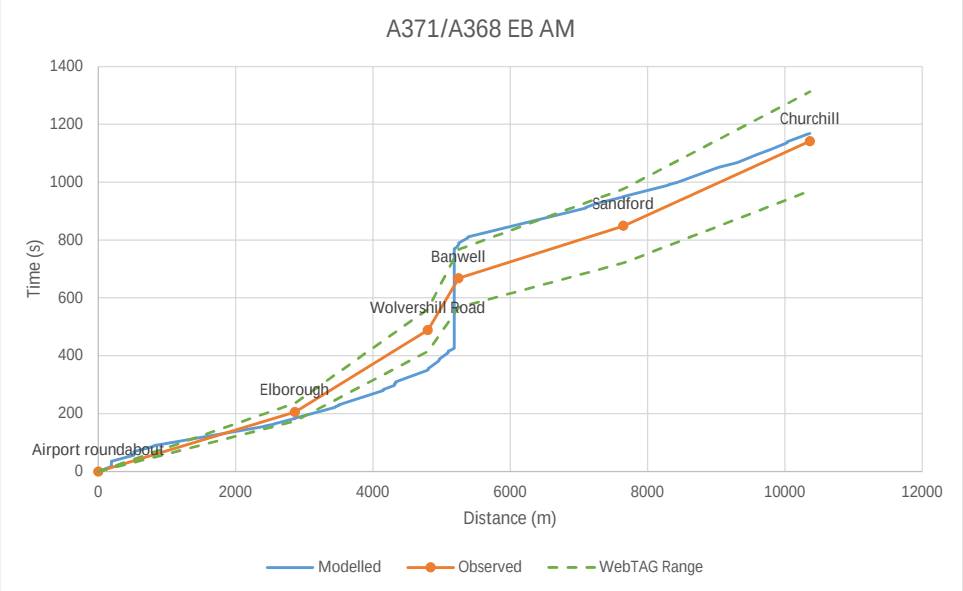


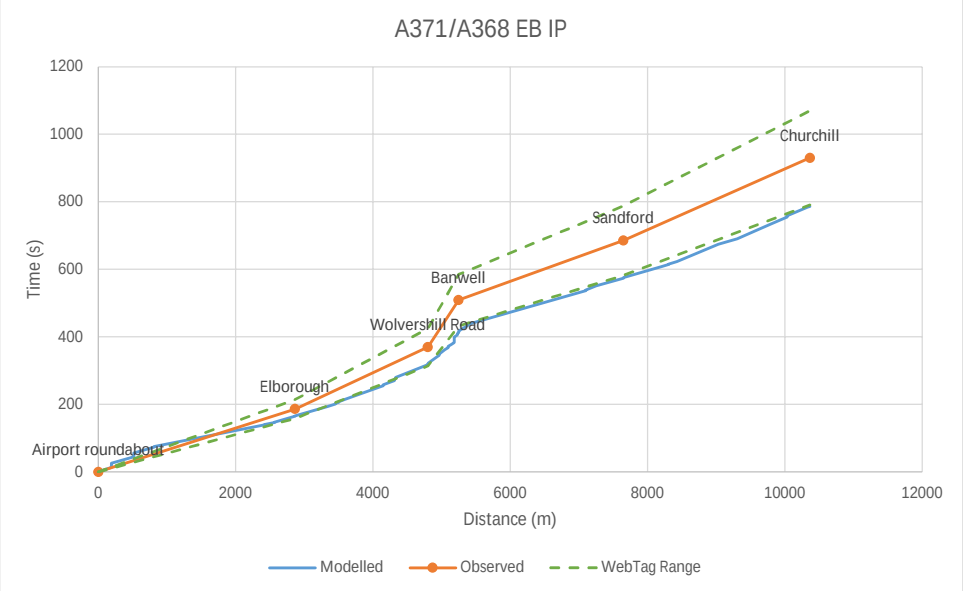
Journey Time Route D - A370 (Brockley to Bristol) WB

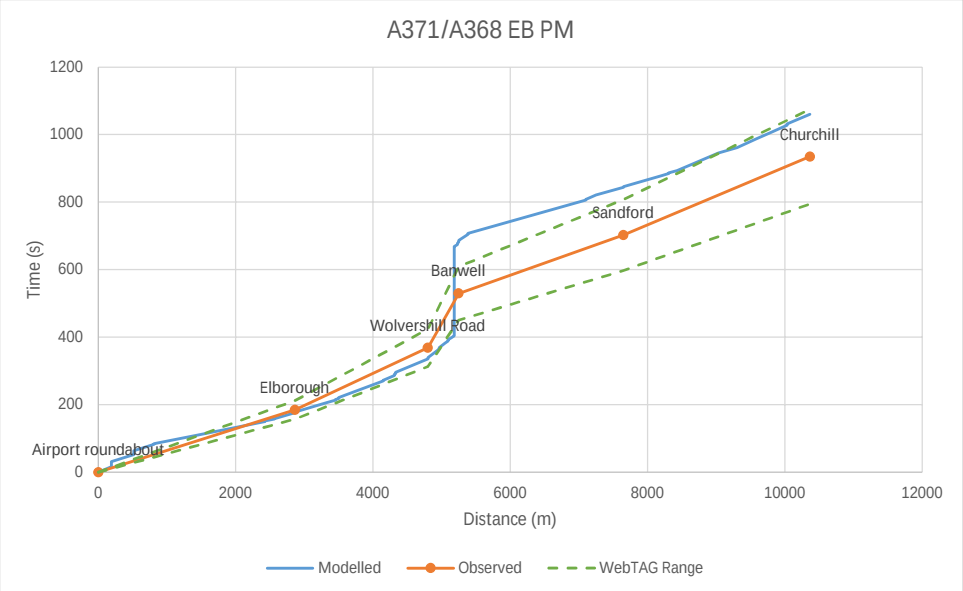




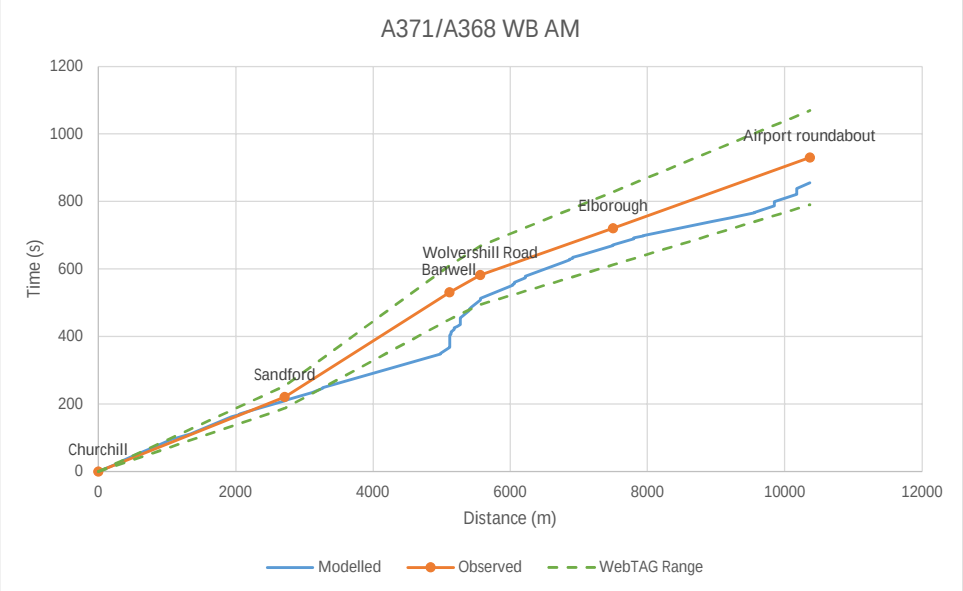
Journey Time Route E - A371/A368 EB

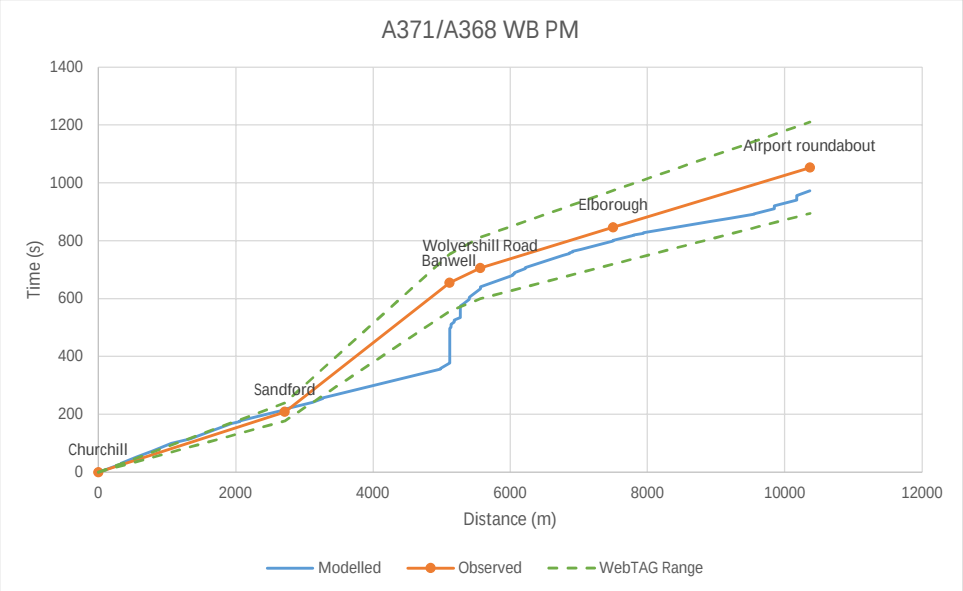




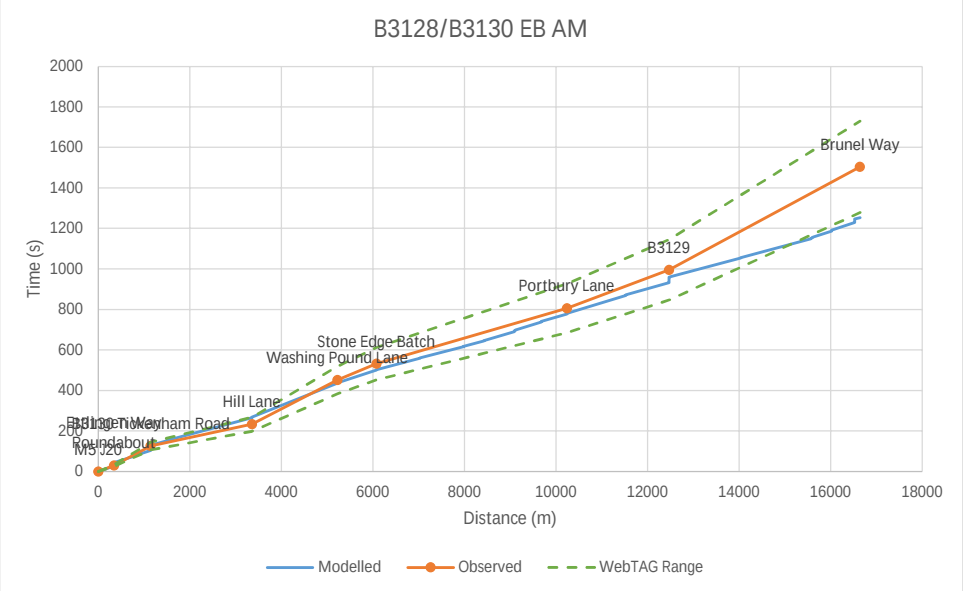


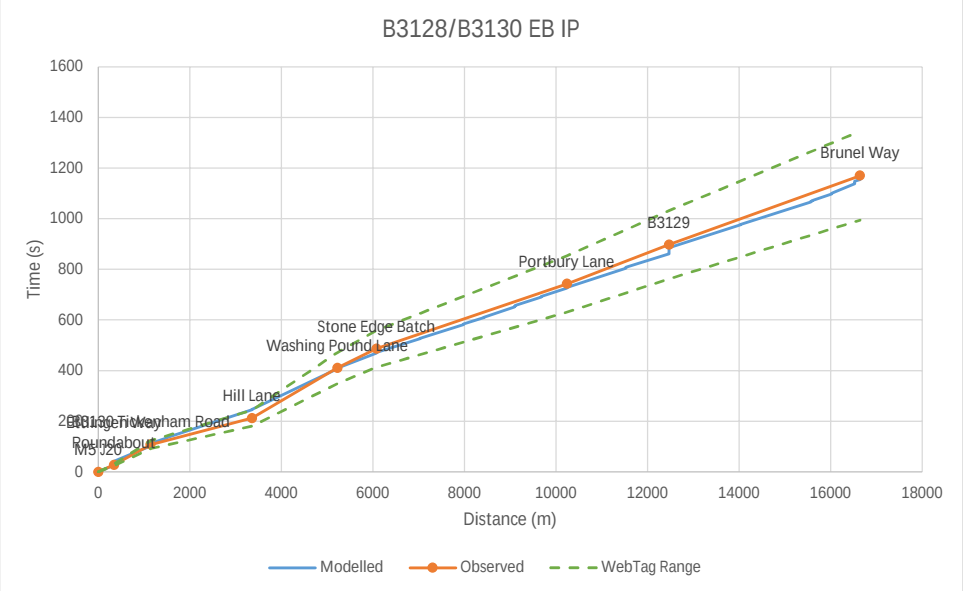
Journey Time Route E - A371/A368 WB

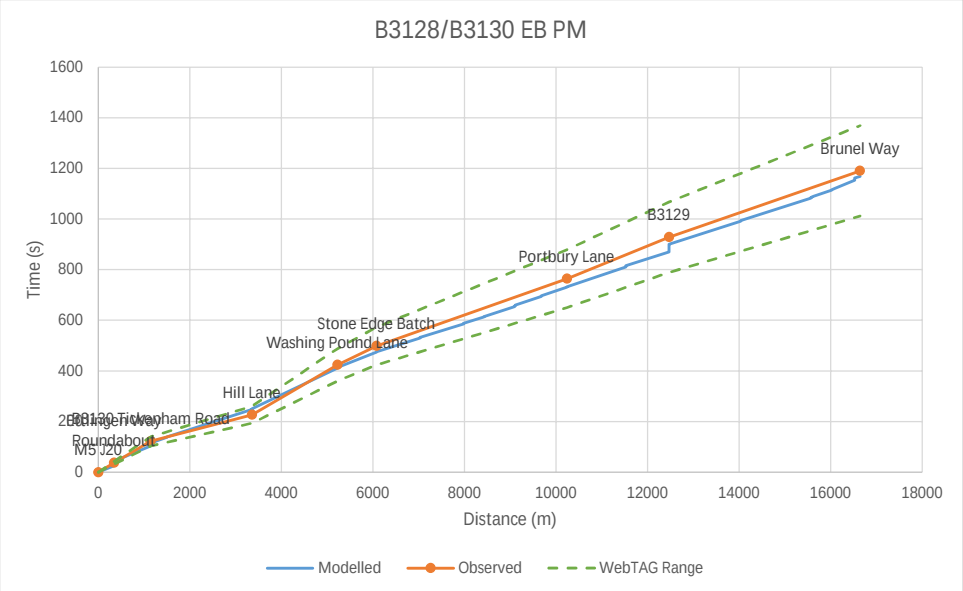




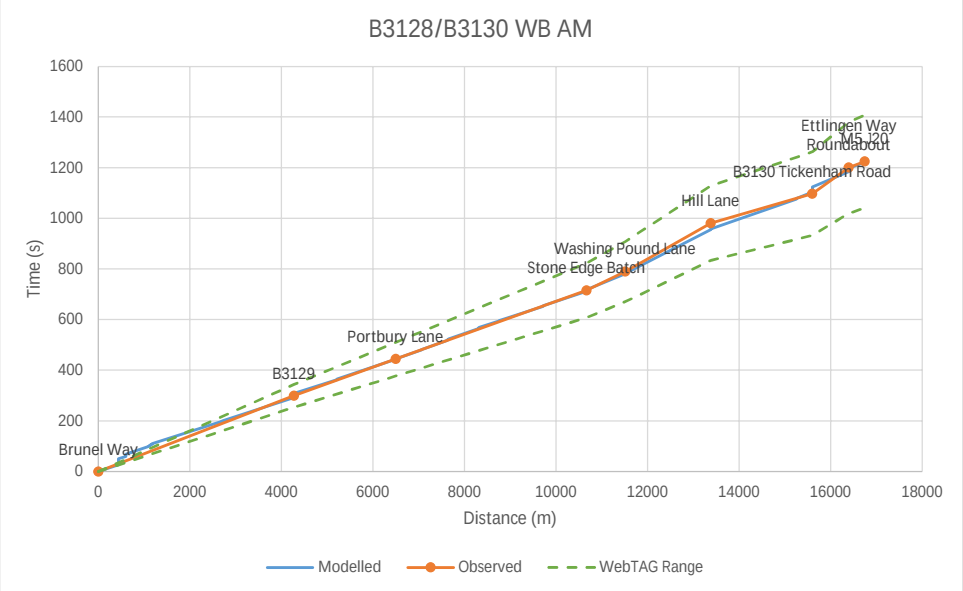
Journey Time Route F - B3128/B3130 EB

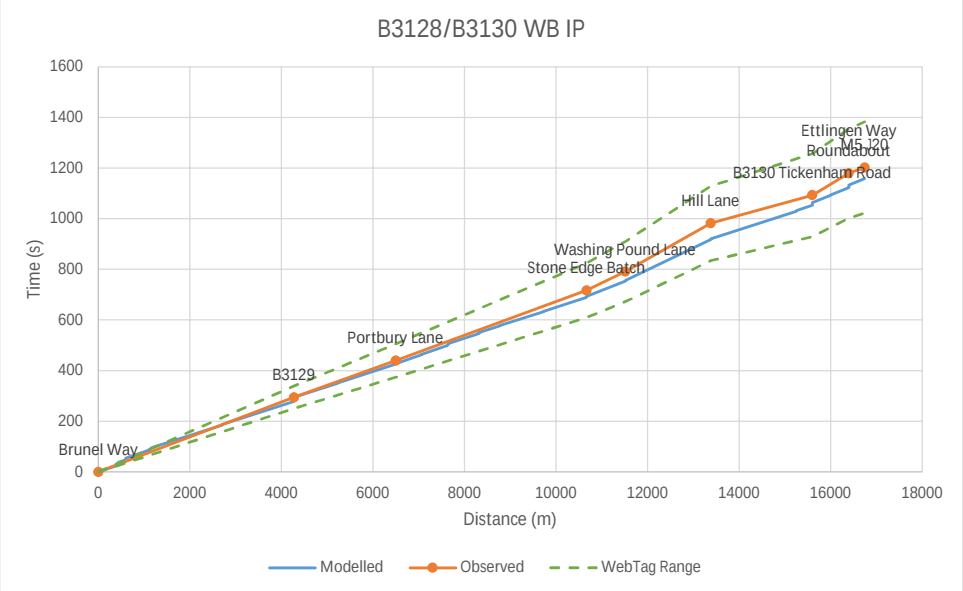


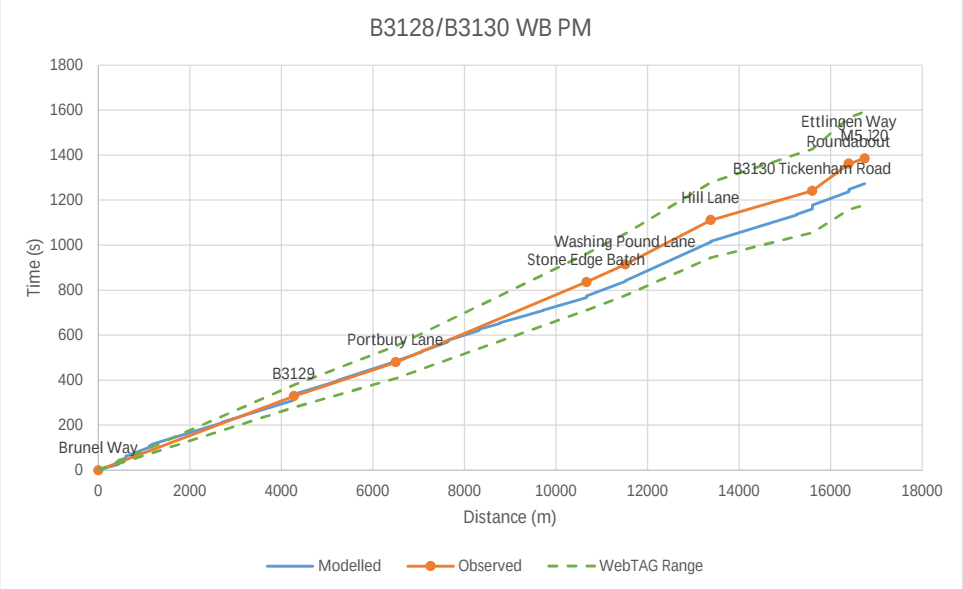




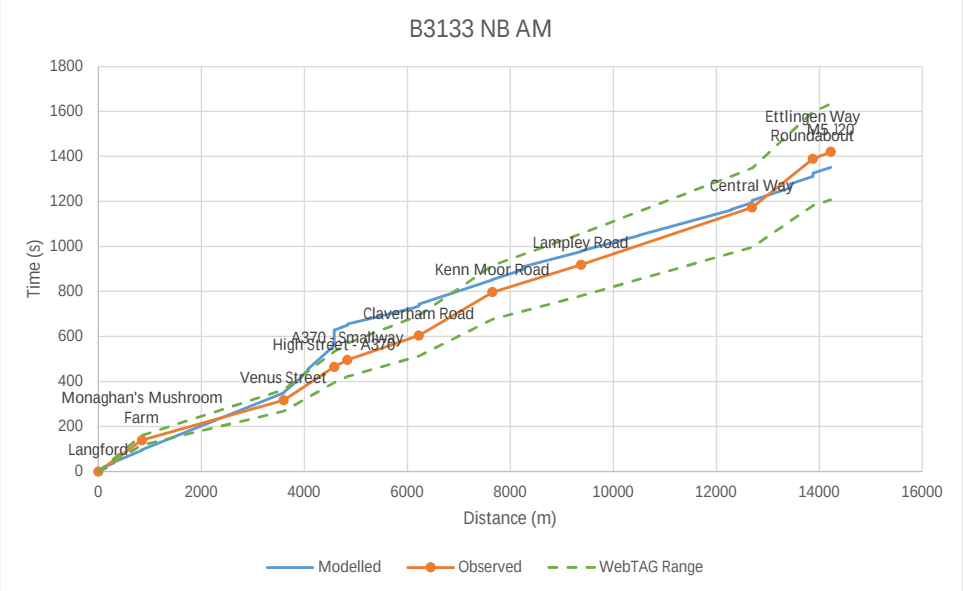
Journey Time Route F - B3128/B3130 WB

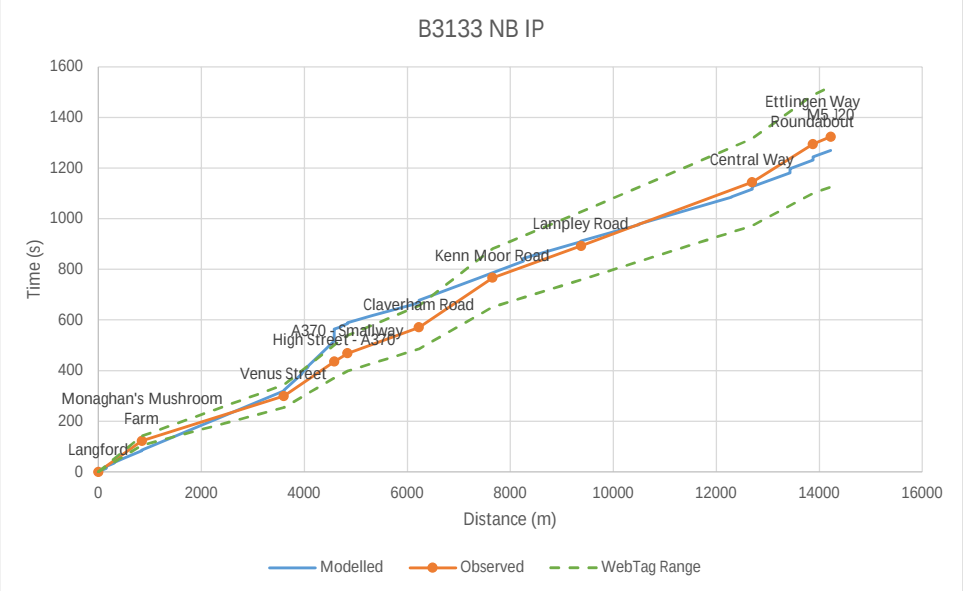


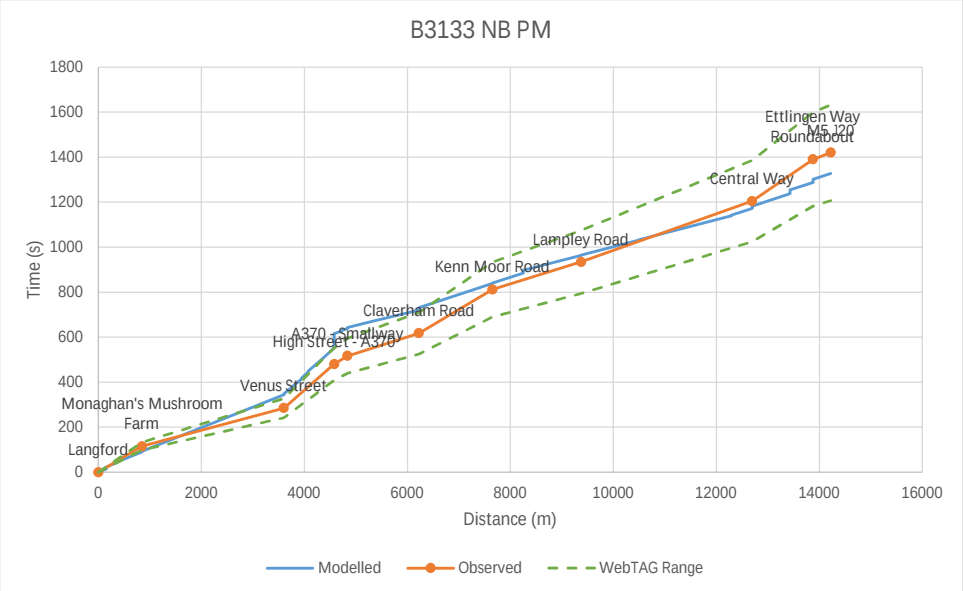




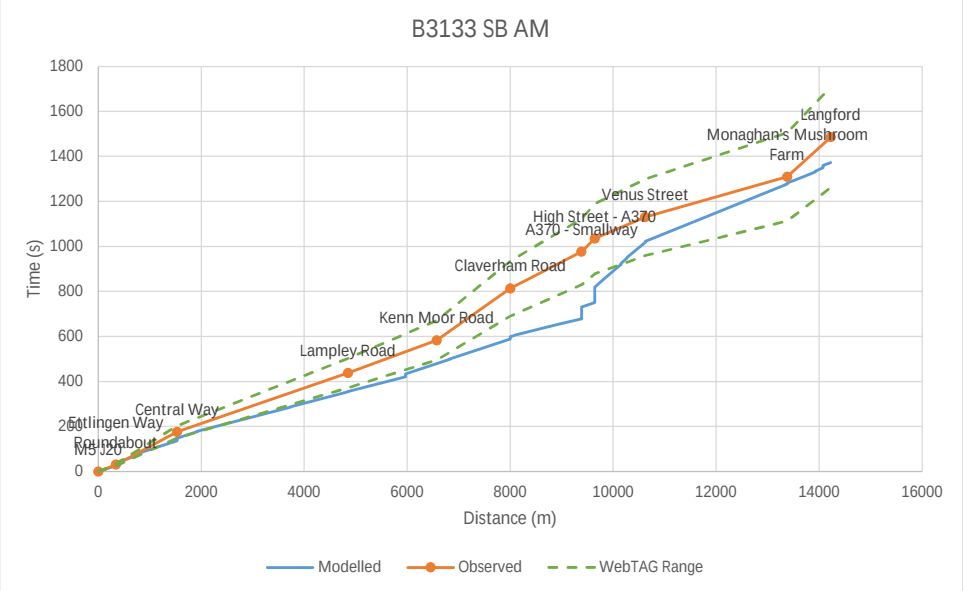
Journey Time Route G - B3133 NB

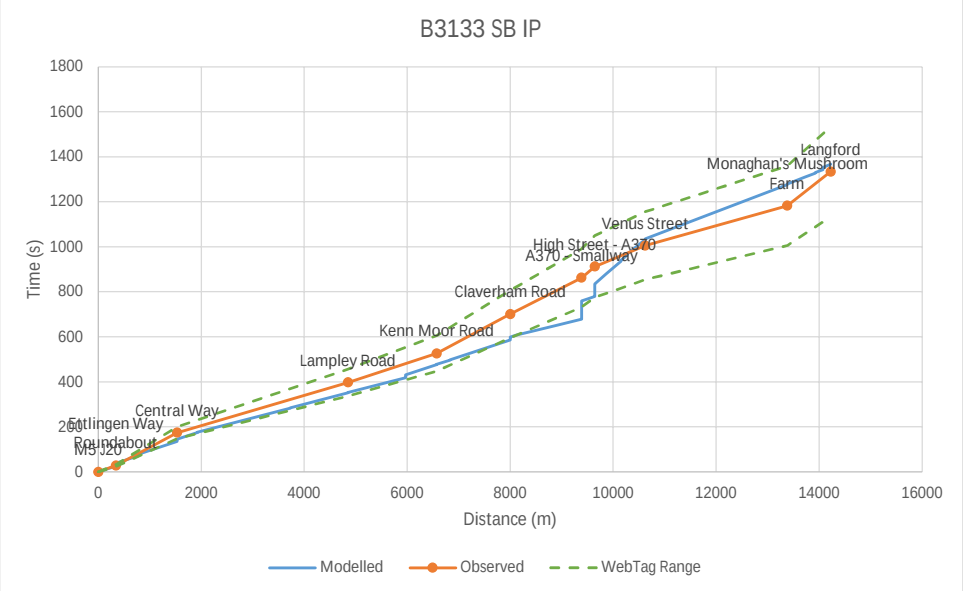


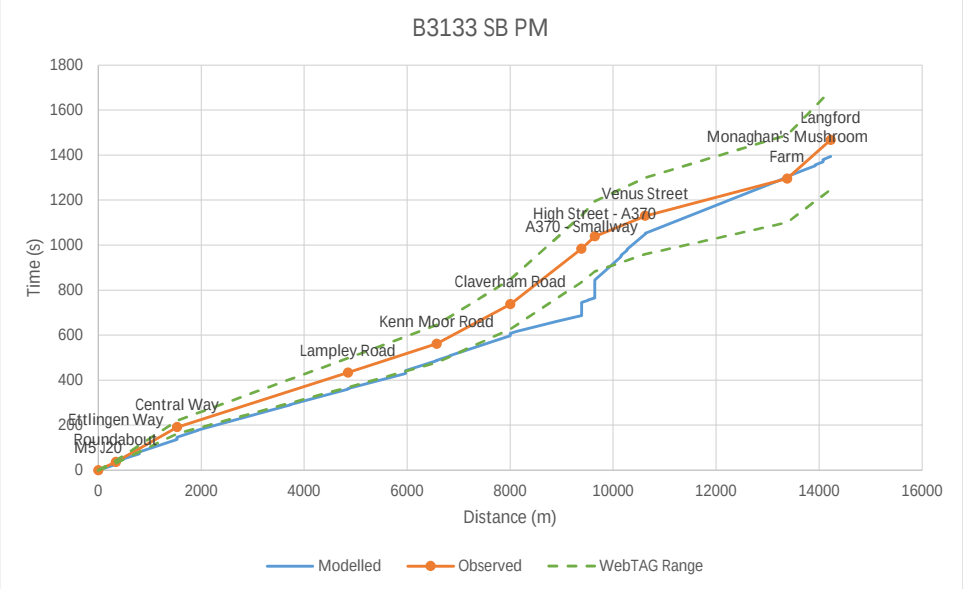




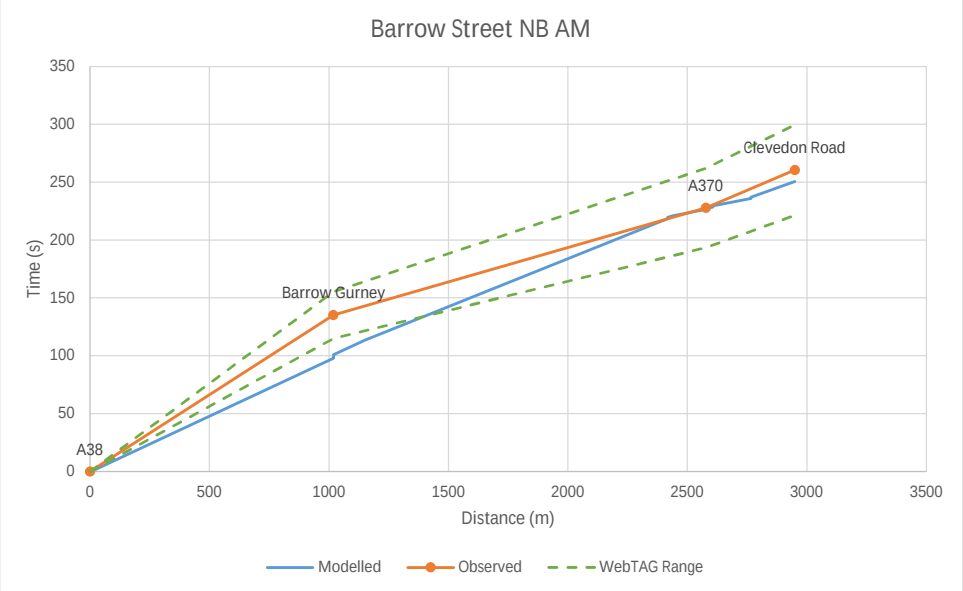
Journey Time Route G - B3133 SB

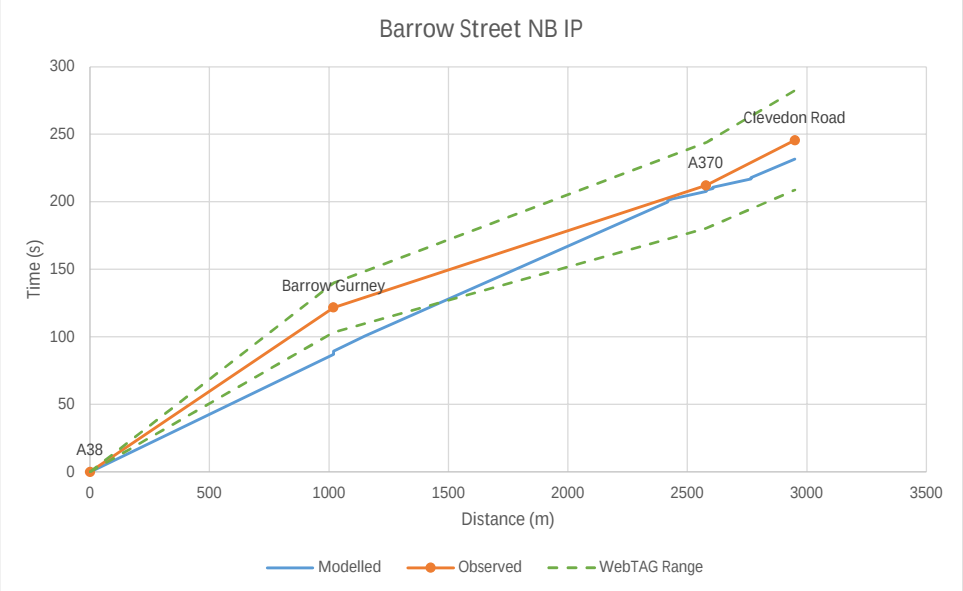






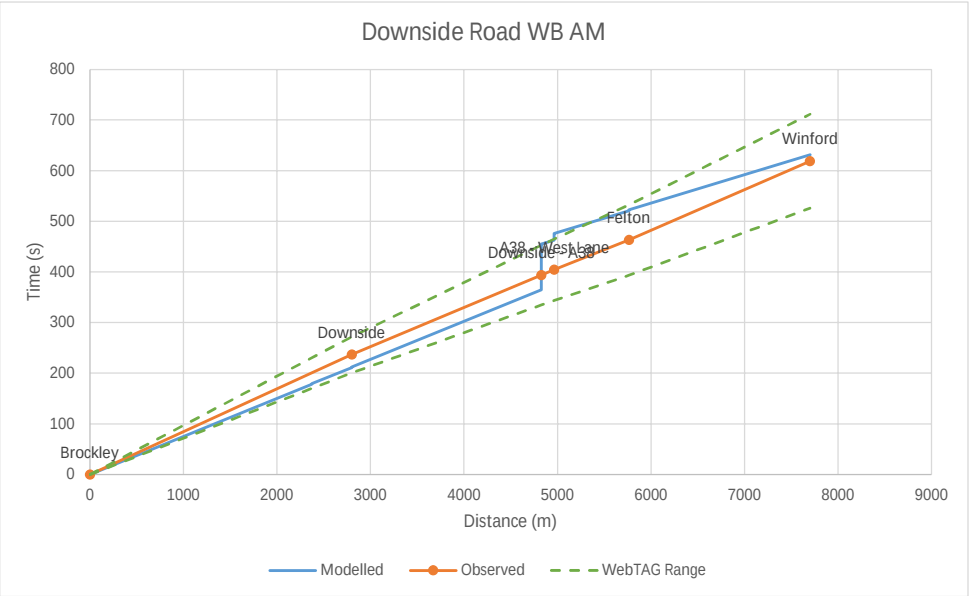
Journey Time Route H - Barrow Street NB

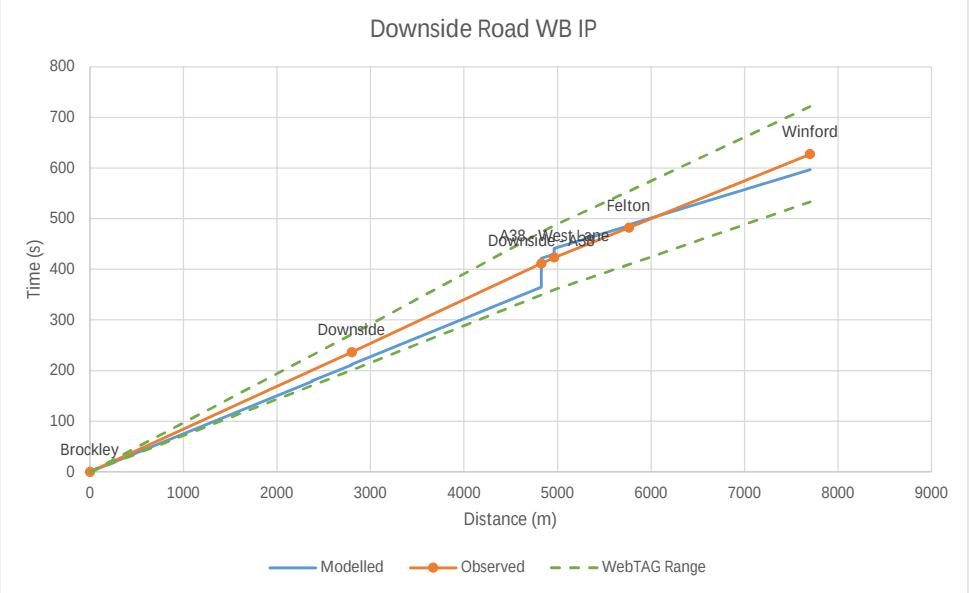


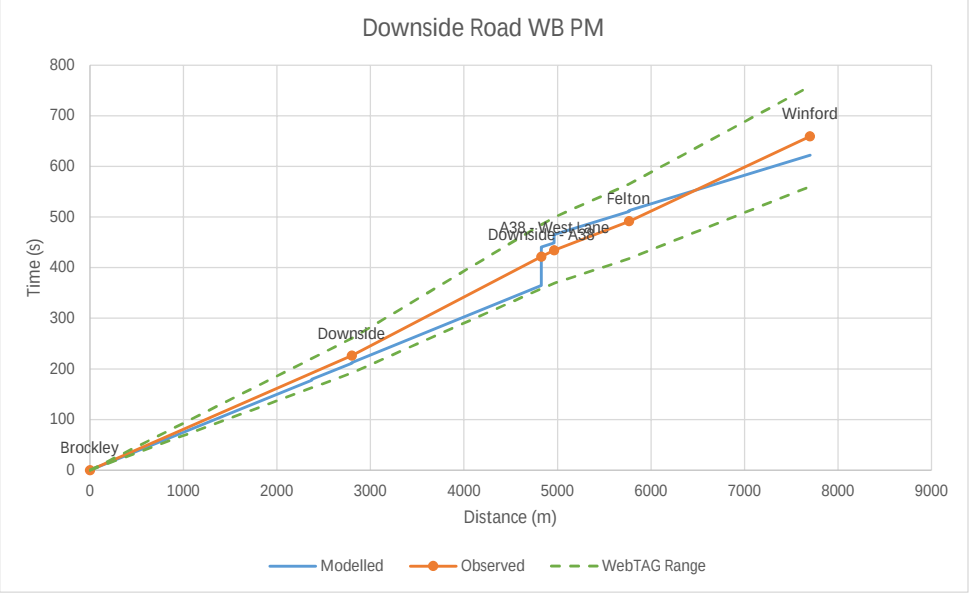


Journey Time Route H - Barrow Street SB

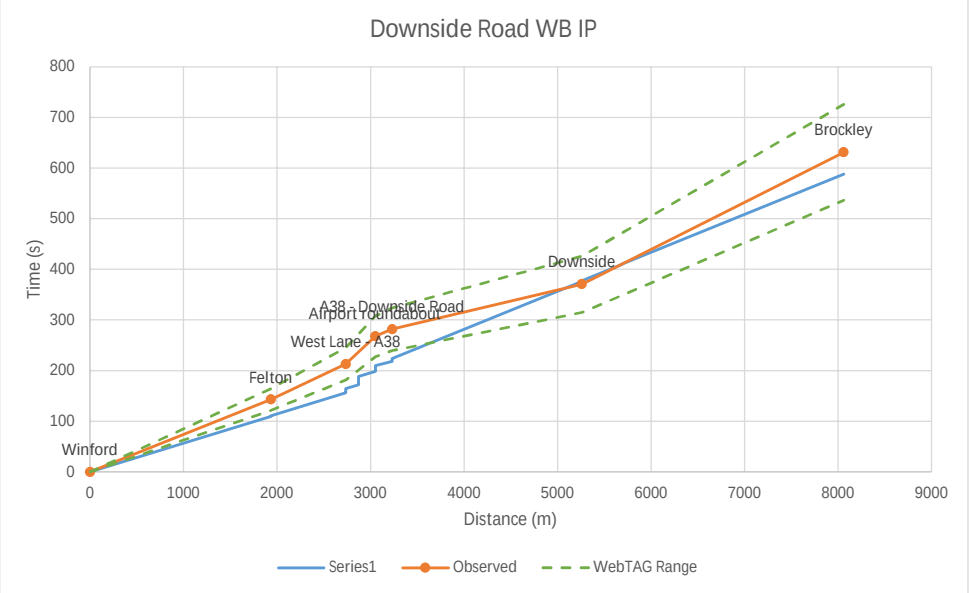
Journey Time Route I - Downside Road EB

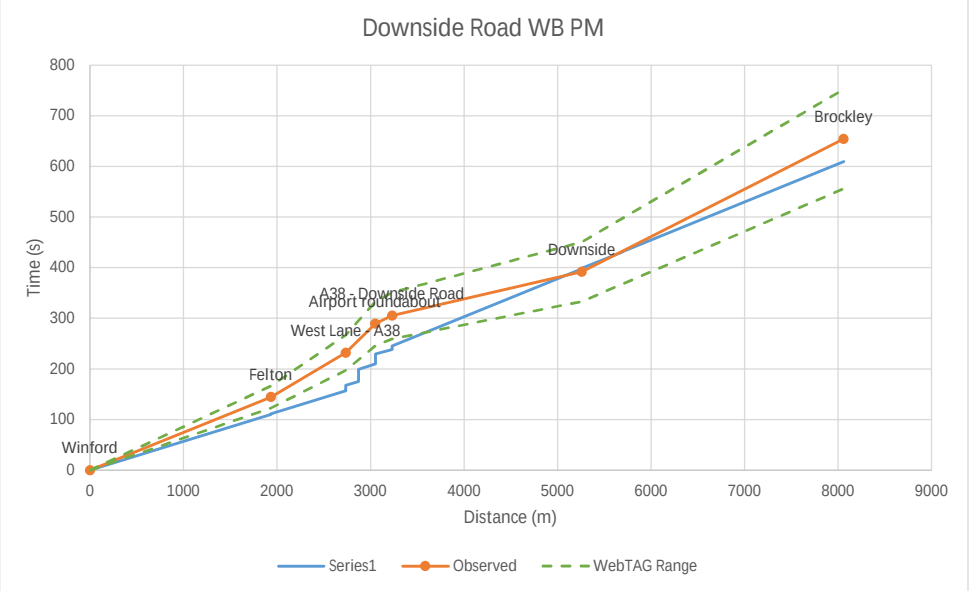




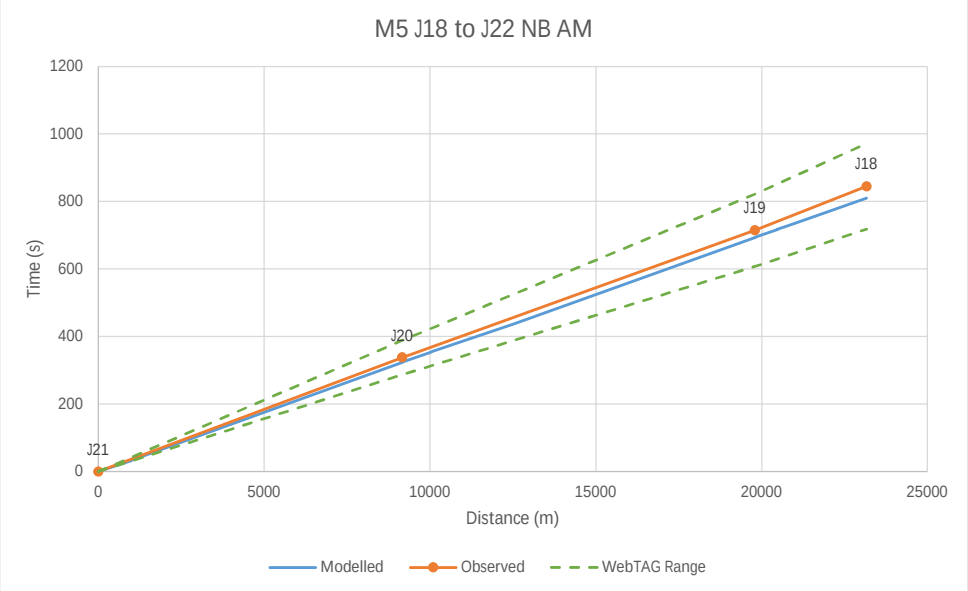


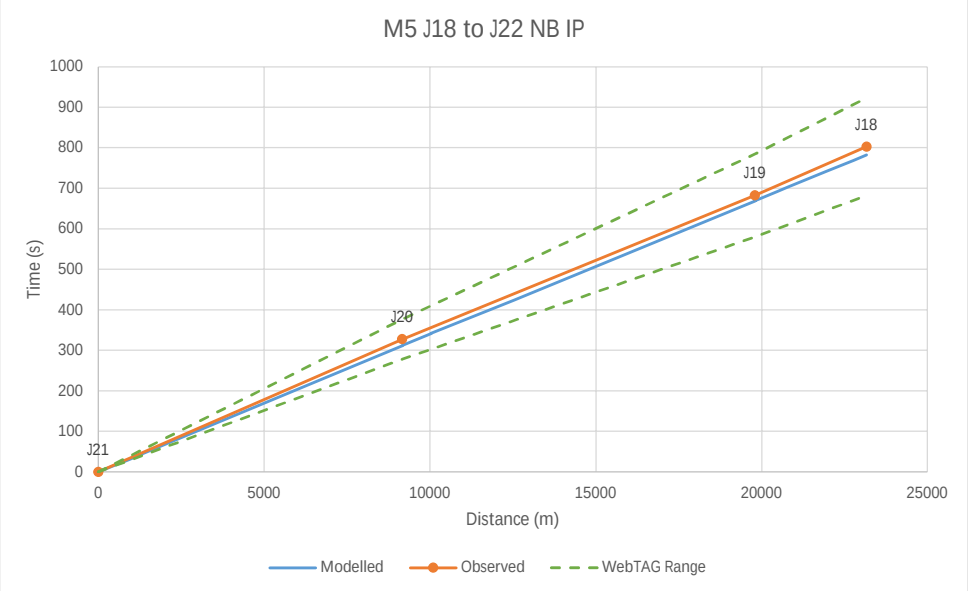
Journey Time Route I - Downside Road WB

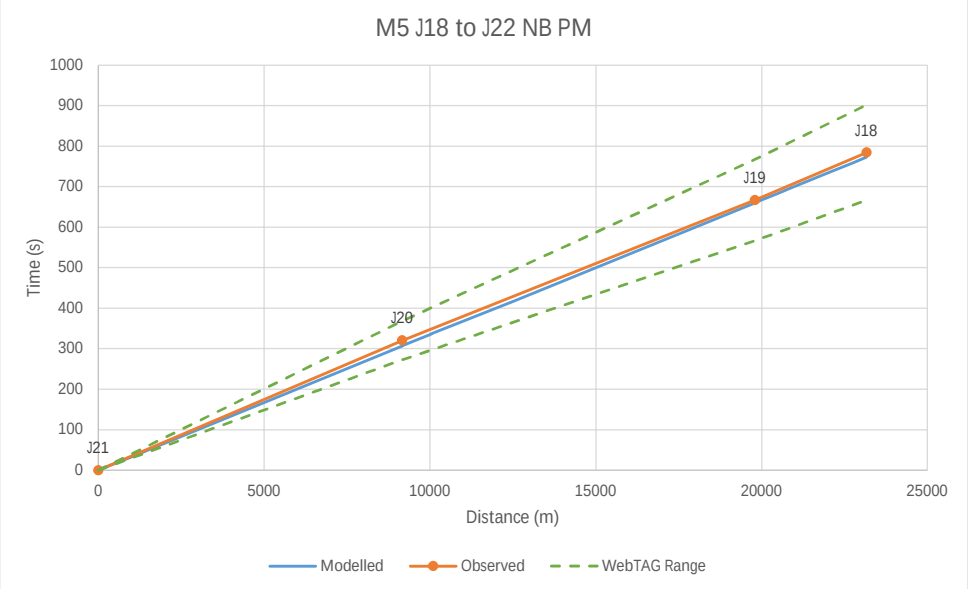




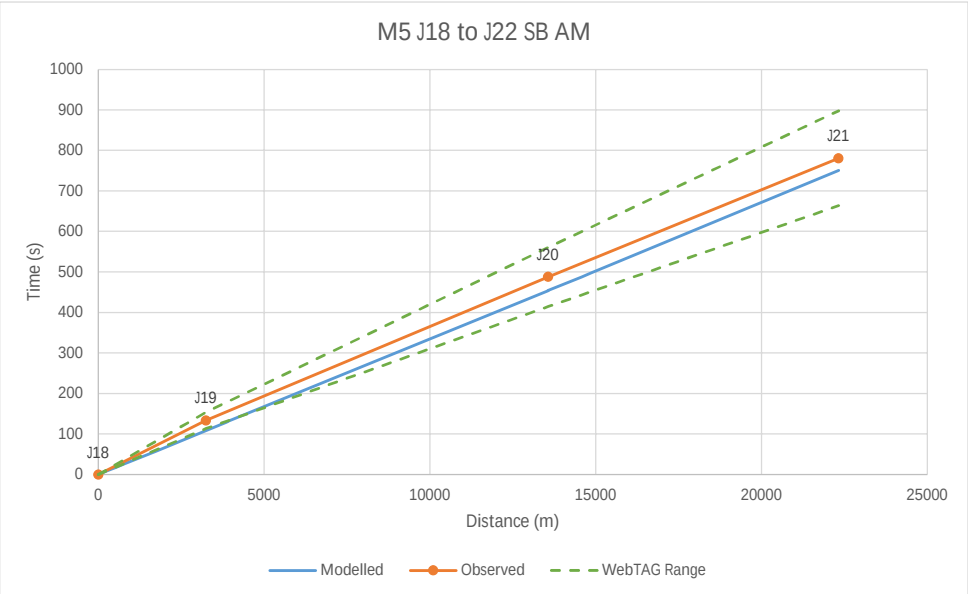
Journey Time Route J - M5 J18 to J21 NB

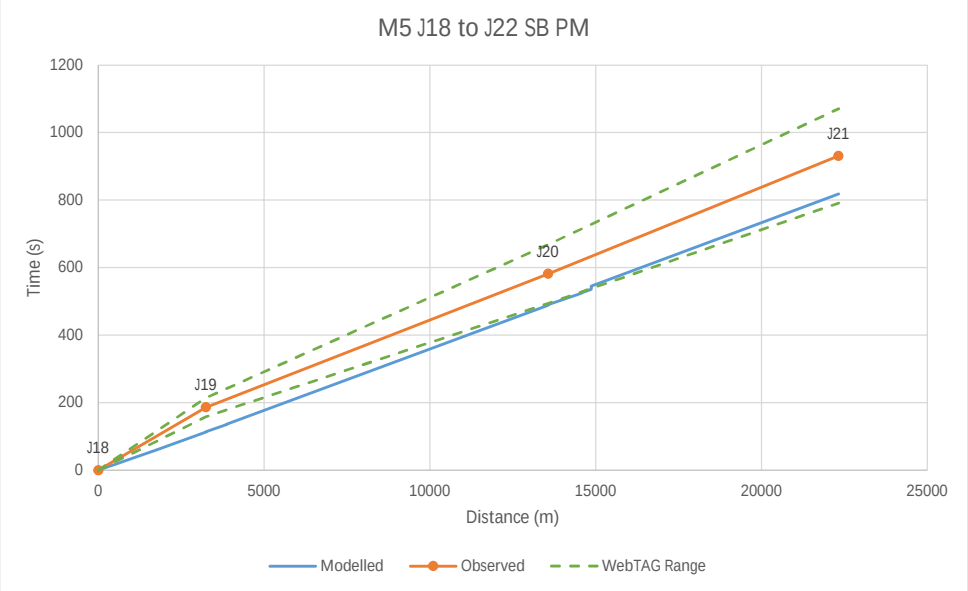




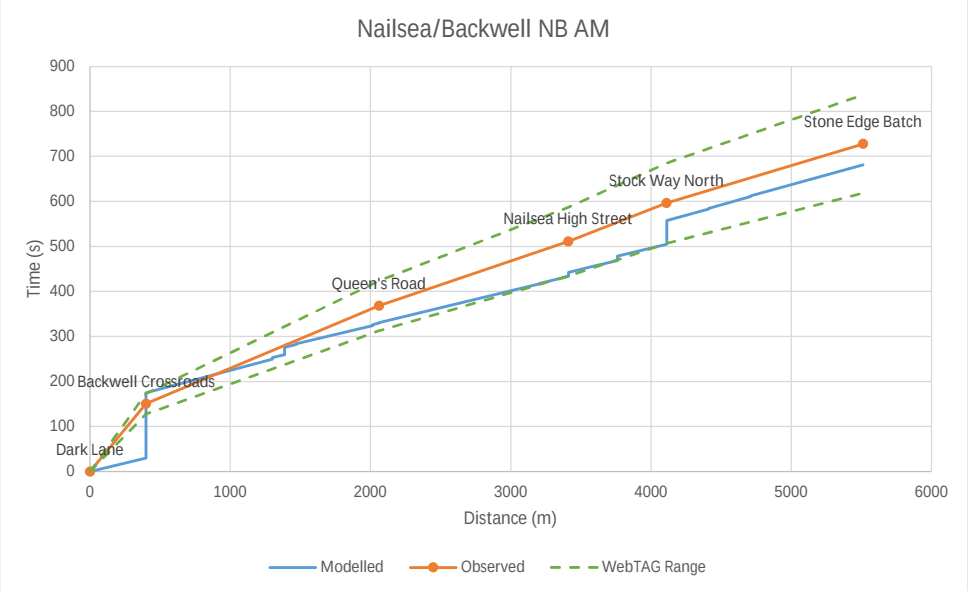


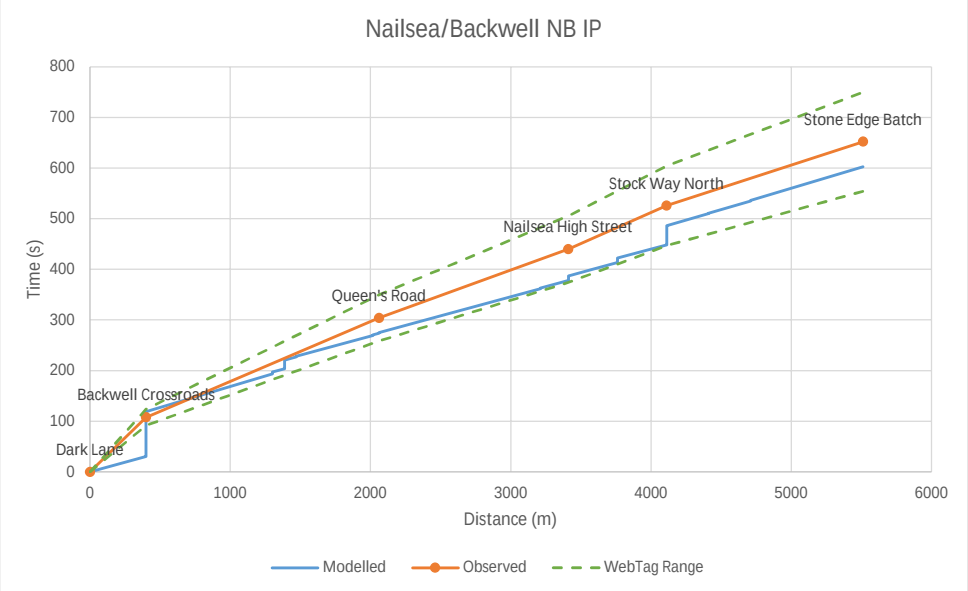
Journey Time Route J - M5 J18 to J21 SB

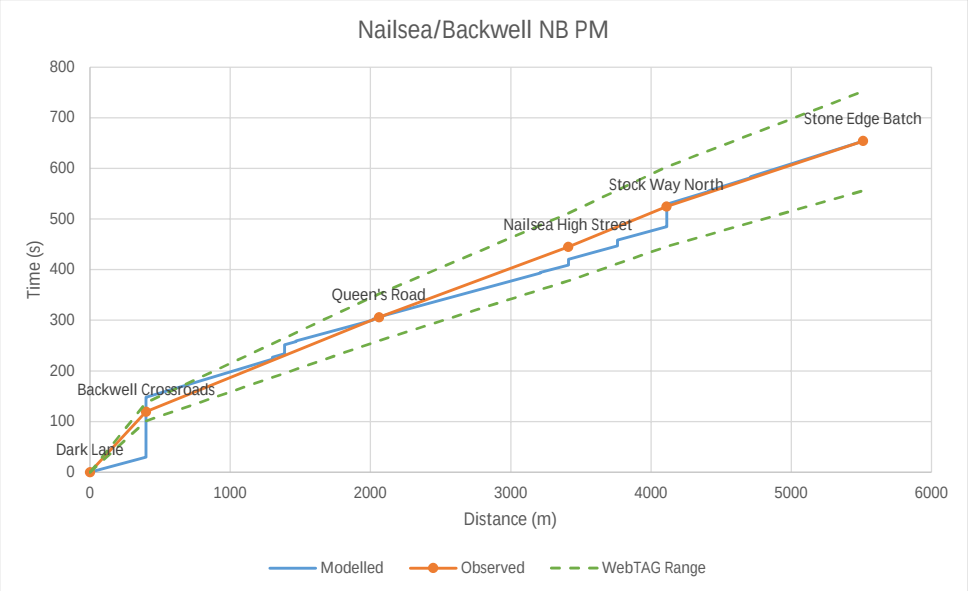




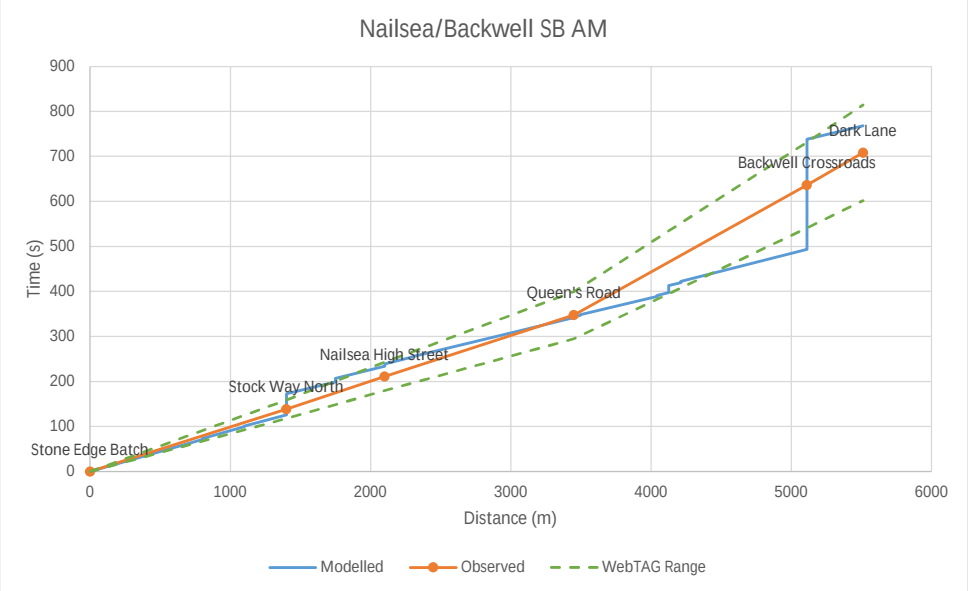
Journey Time Route K - Nailsea/Backwell NB

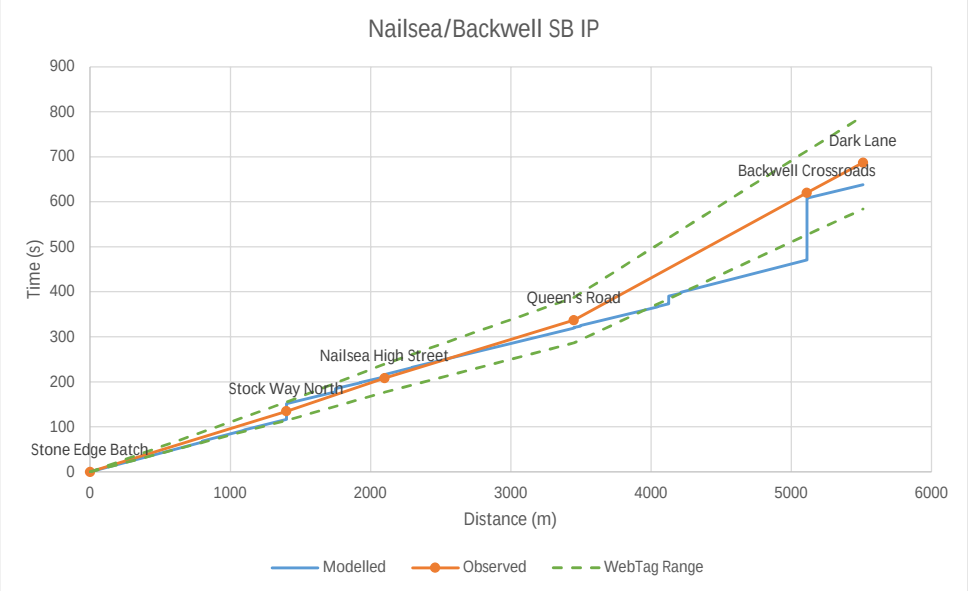


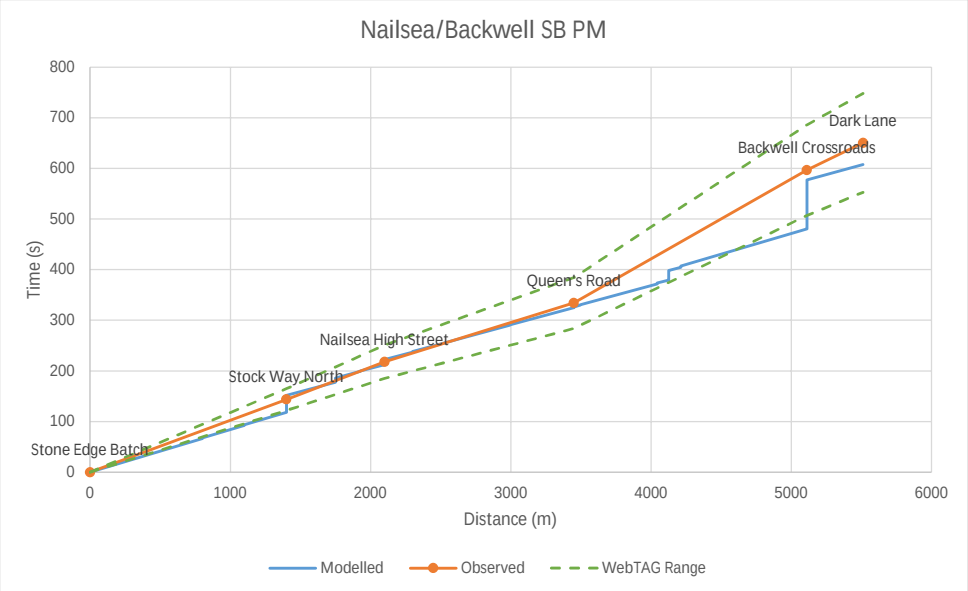




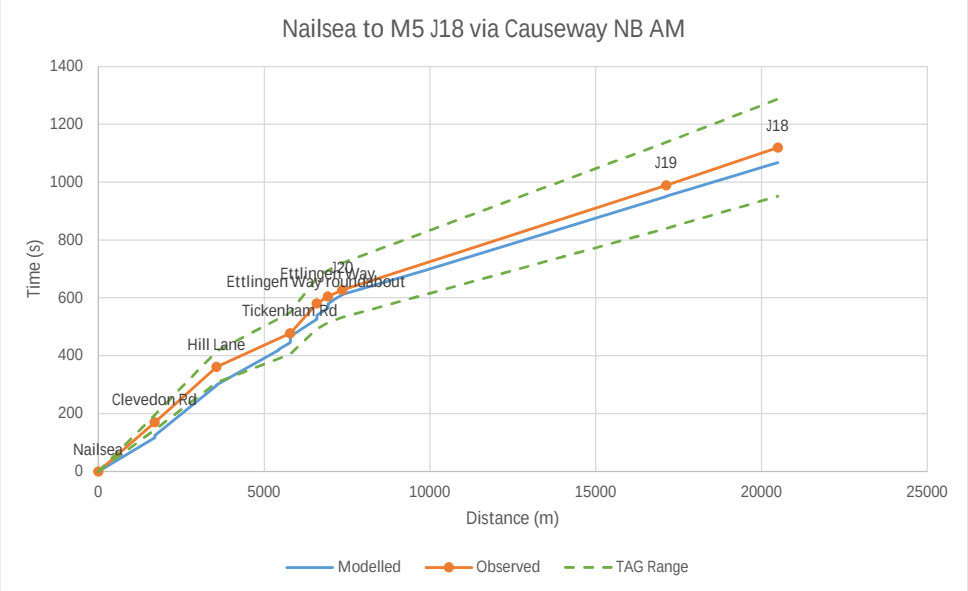
Journey Time Route K - Nailsea/Backwell SB

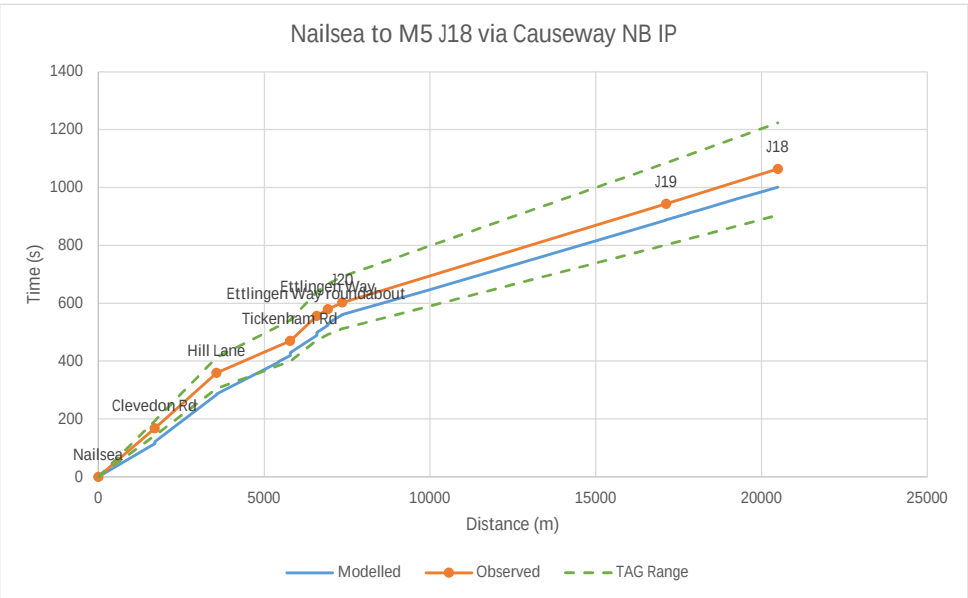


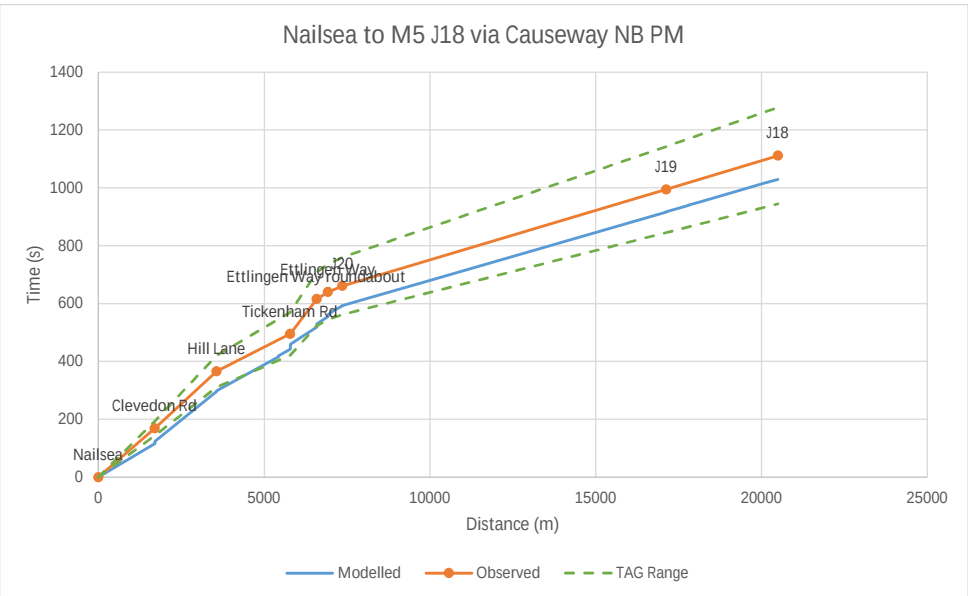




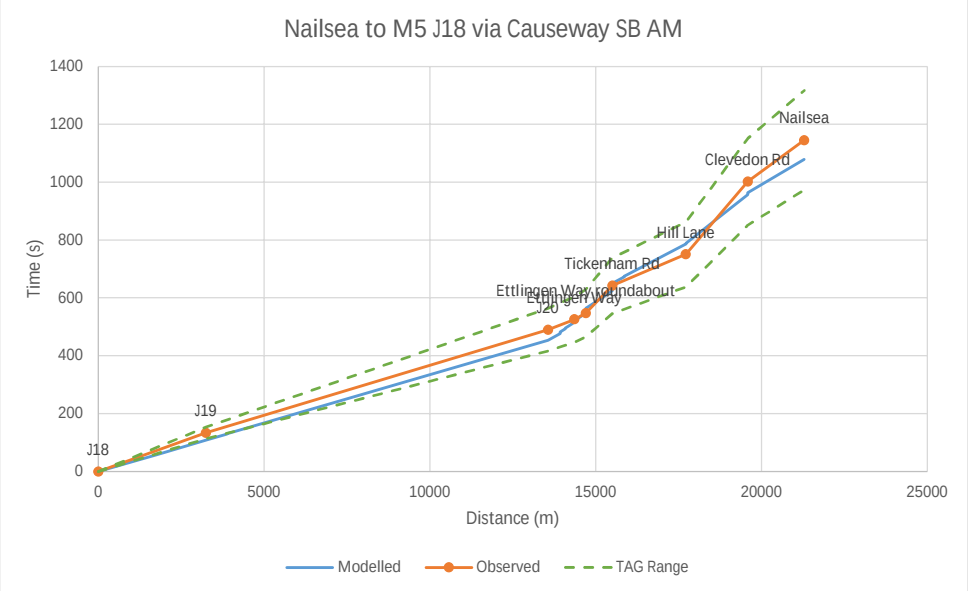
Journey Time Route L - Nailsea to M5 J18 via Causeway NB

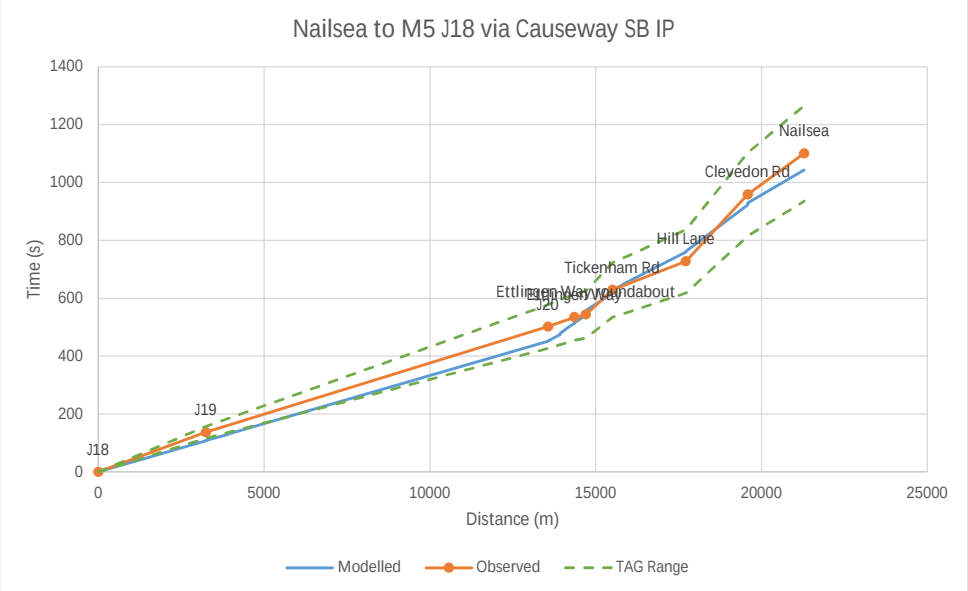


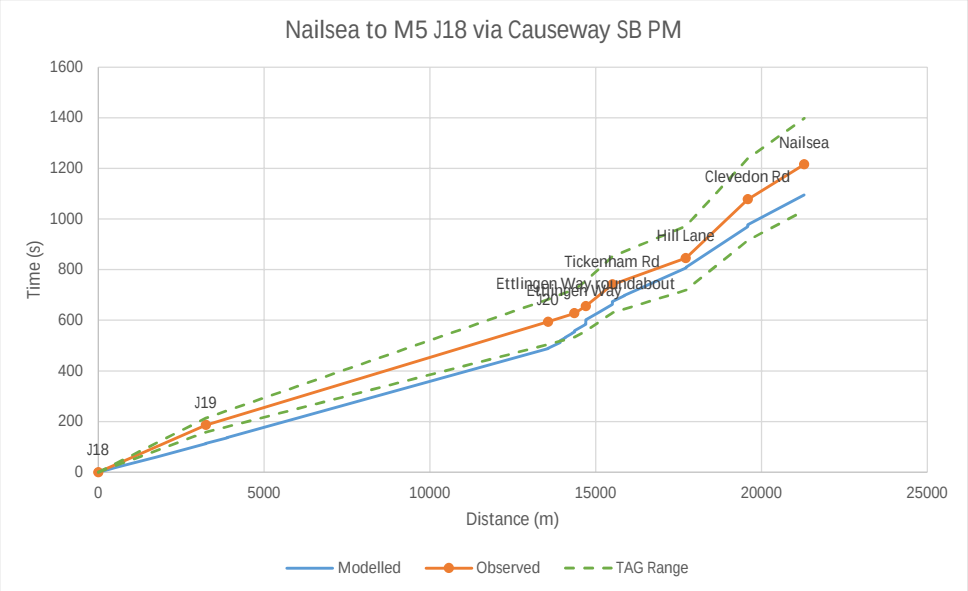




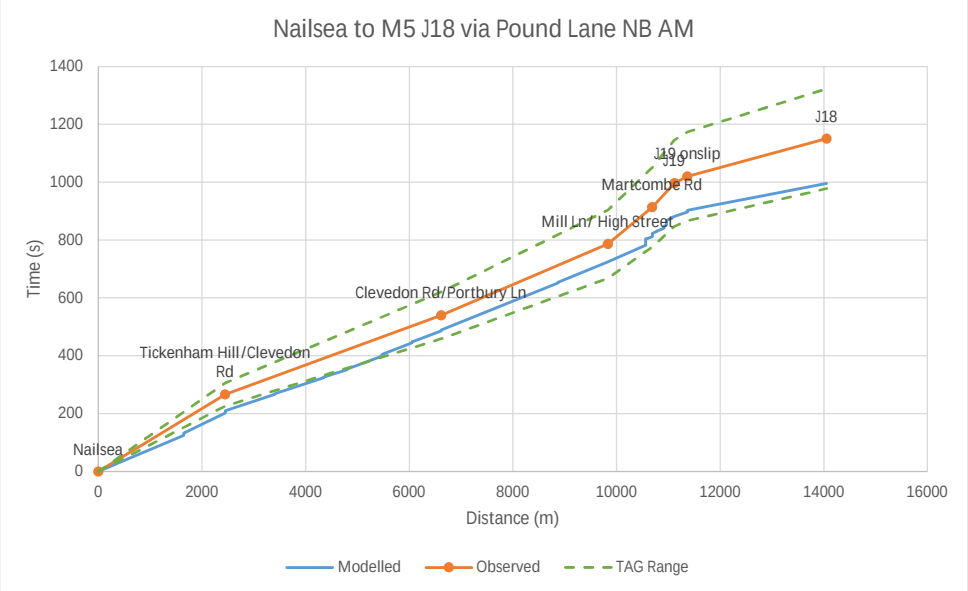
Journey Time Route L - Nailsea to M5 J18 via Causeway SB

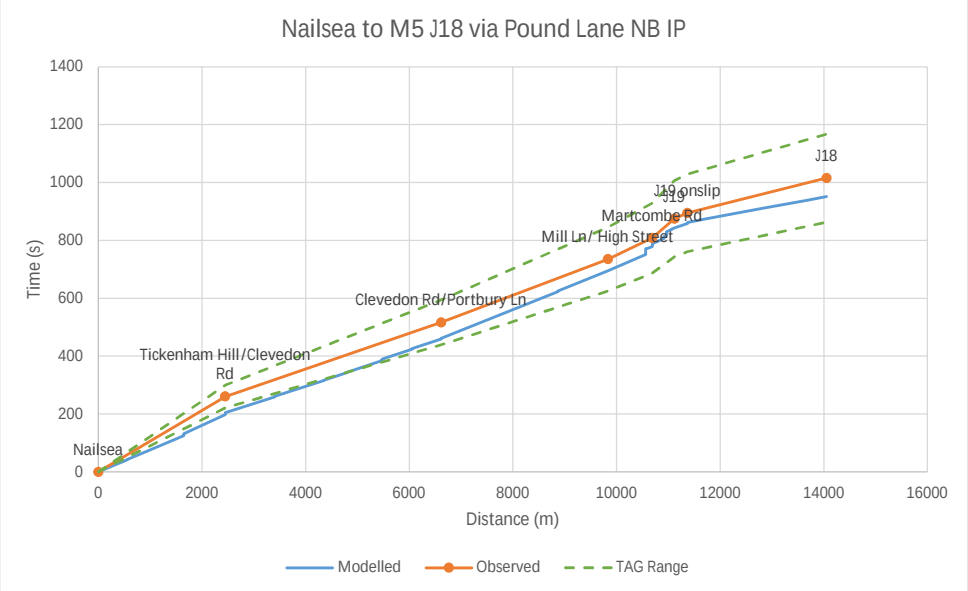


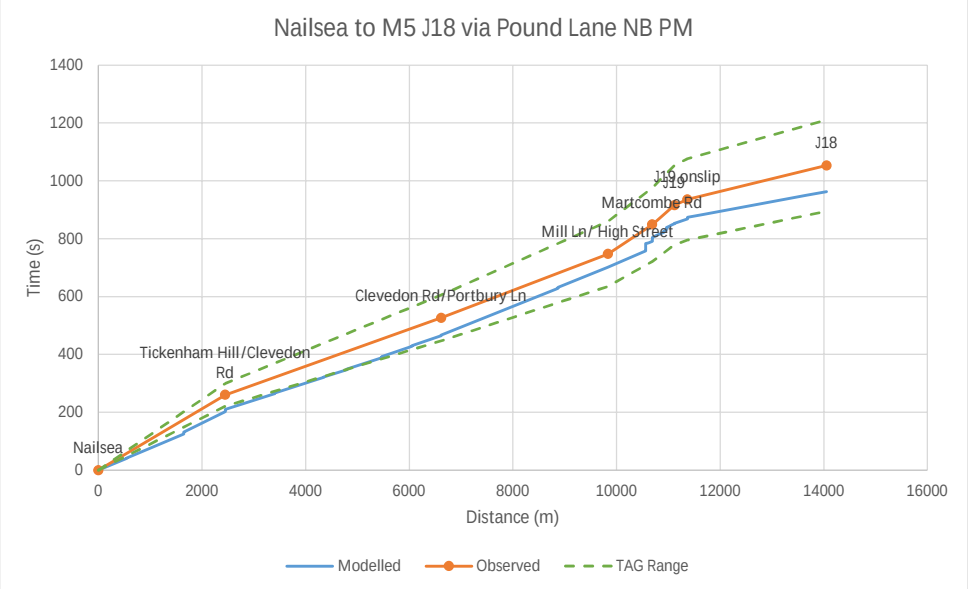




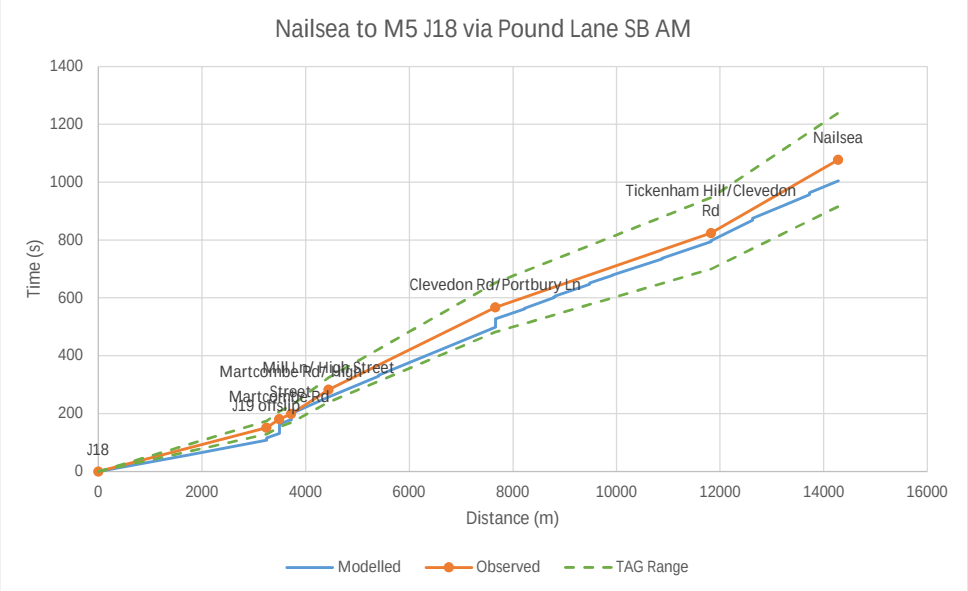
Journey Time Route M - Nailsea to M5 J18 via Pound Lane NB

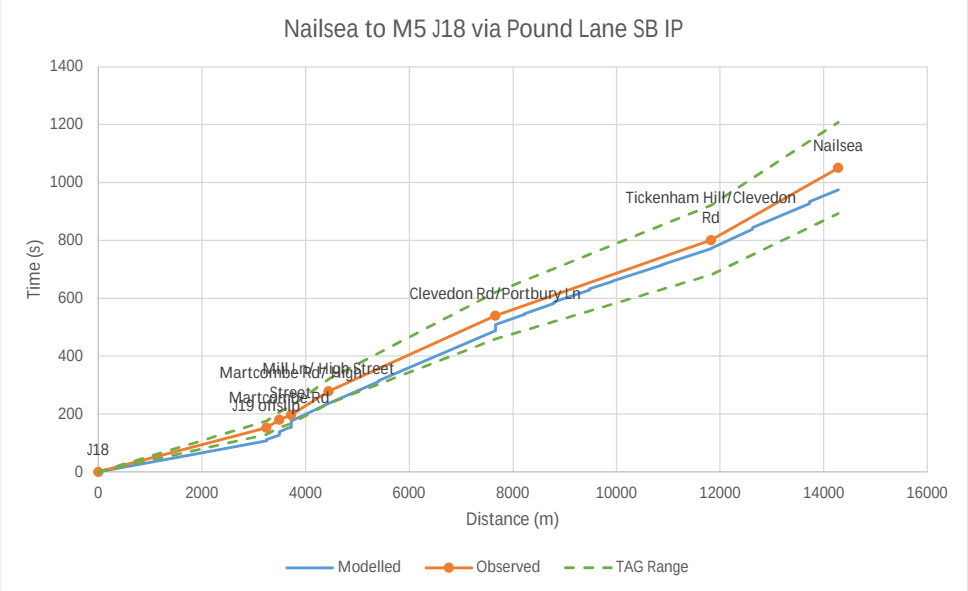


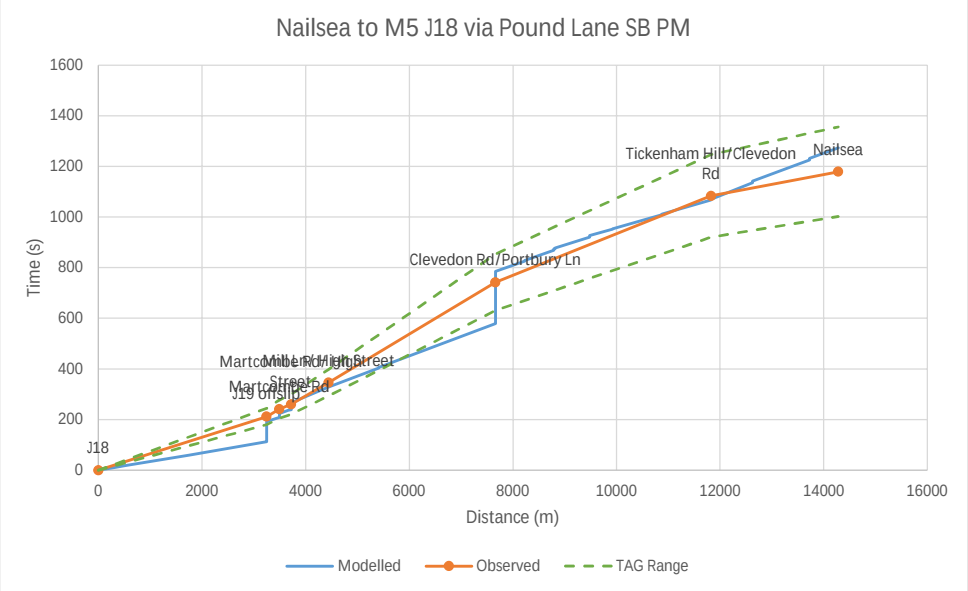




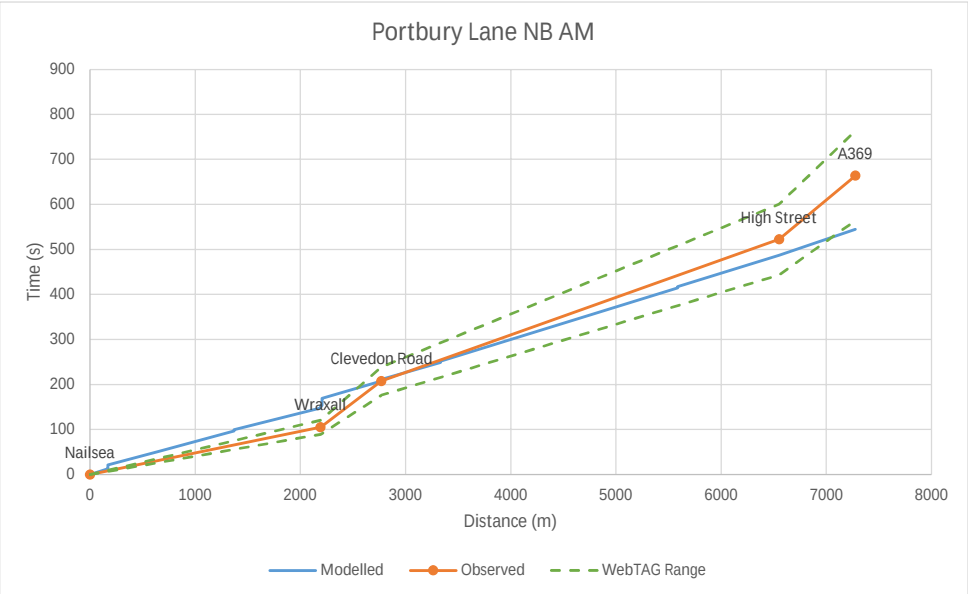
Journey Time Route M - Nailsea to M5 J18 via Pound Lane SB

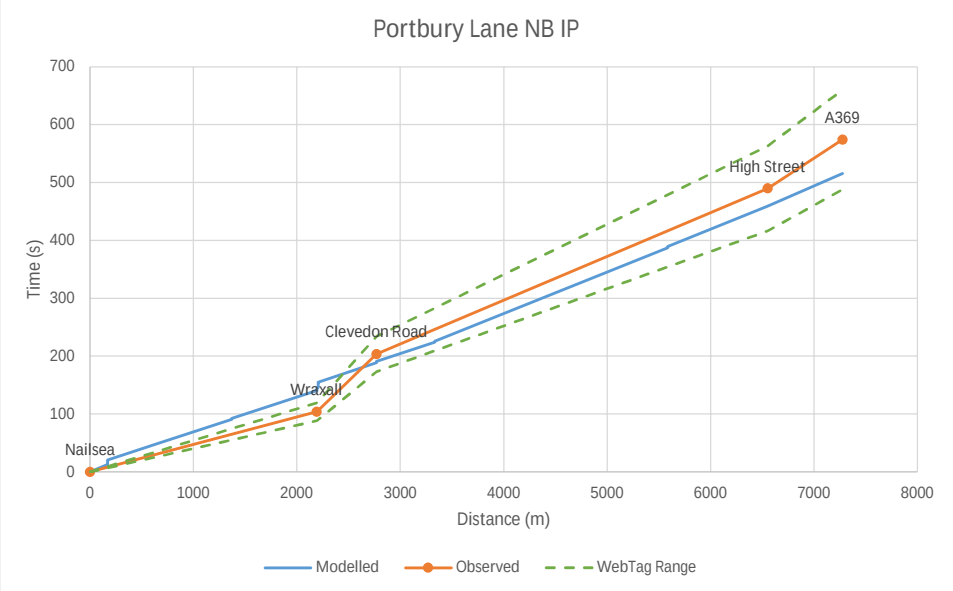


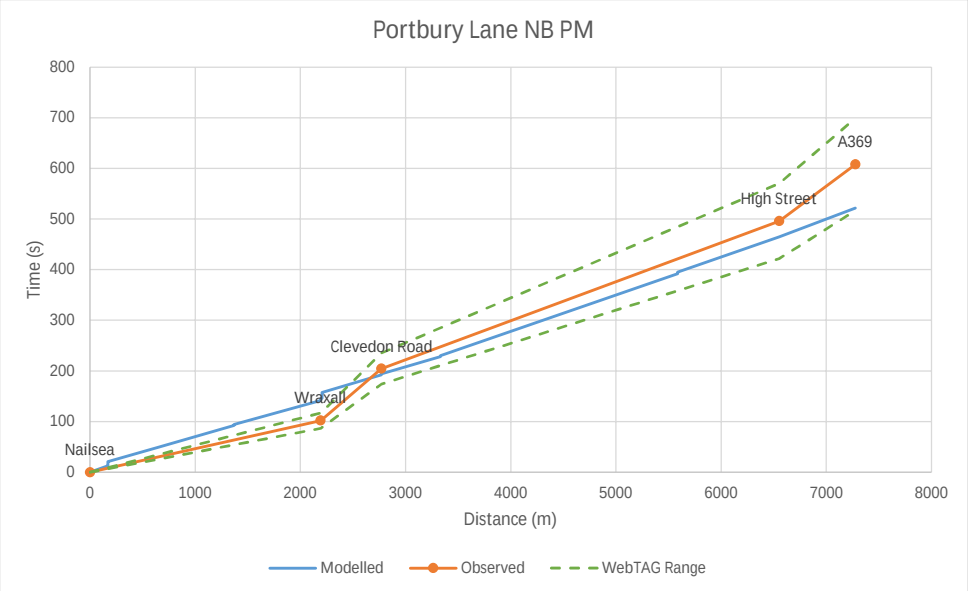




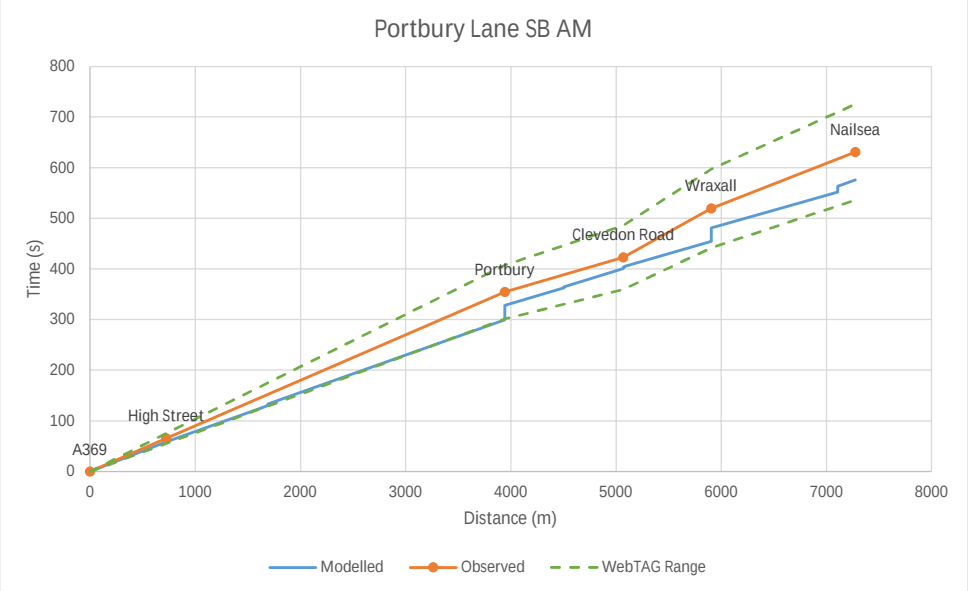
Journey Time Route N - Portbury Lane NB

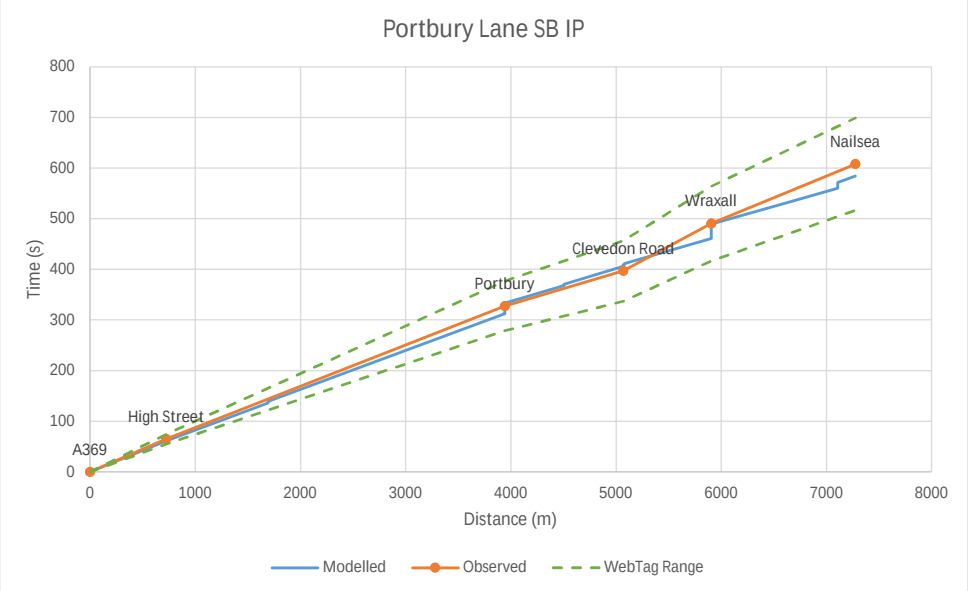


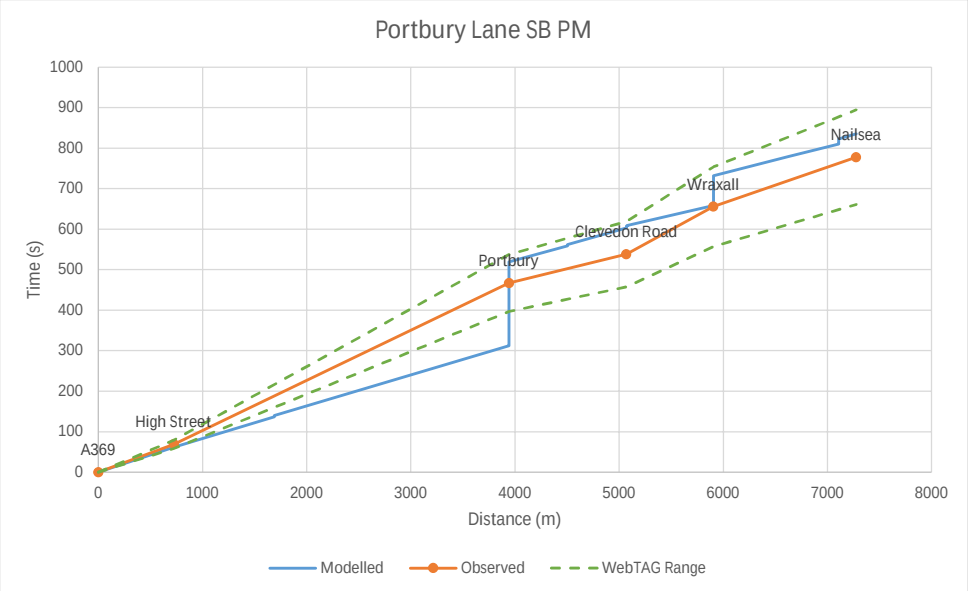




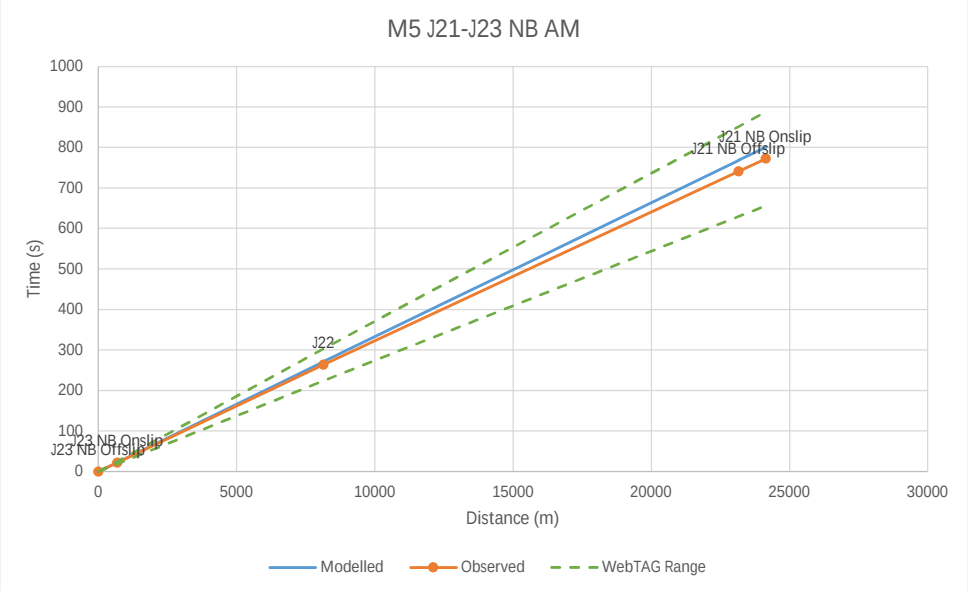
Journey Time Route N - Portbury Lane SB

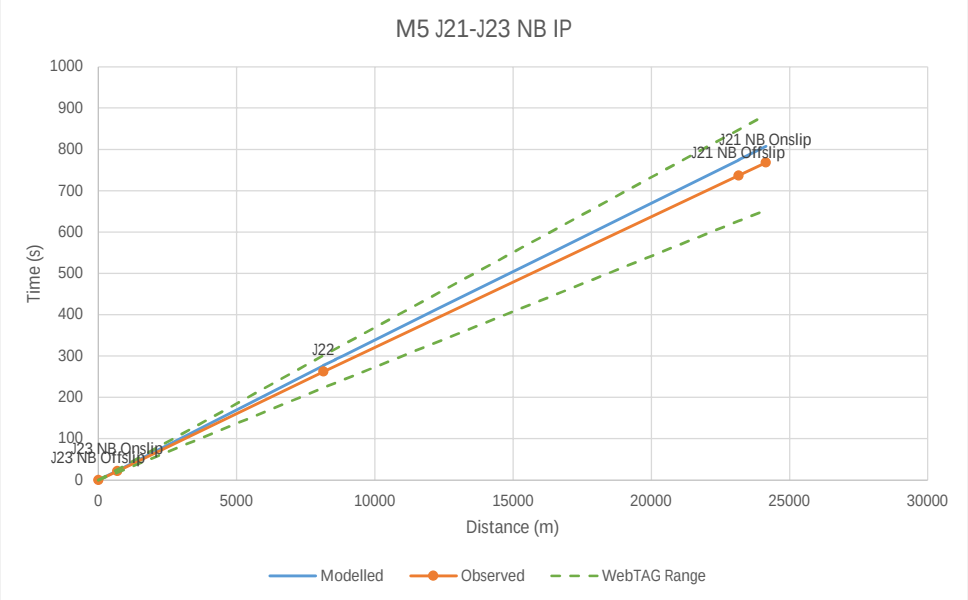


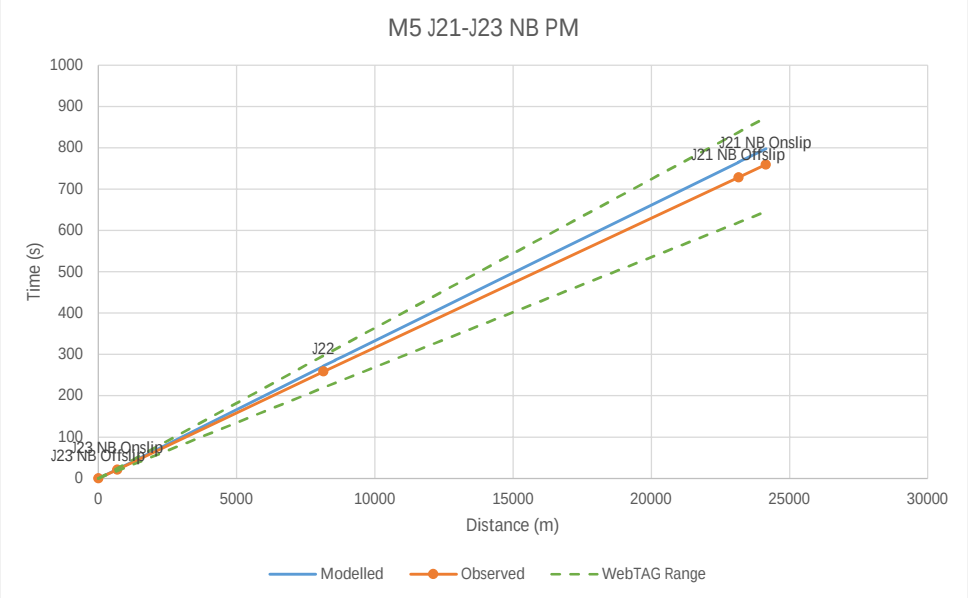




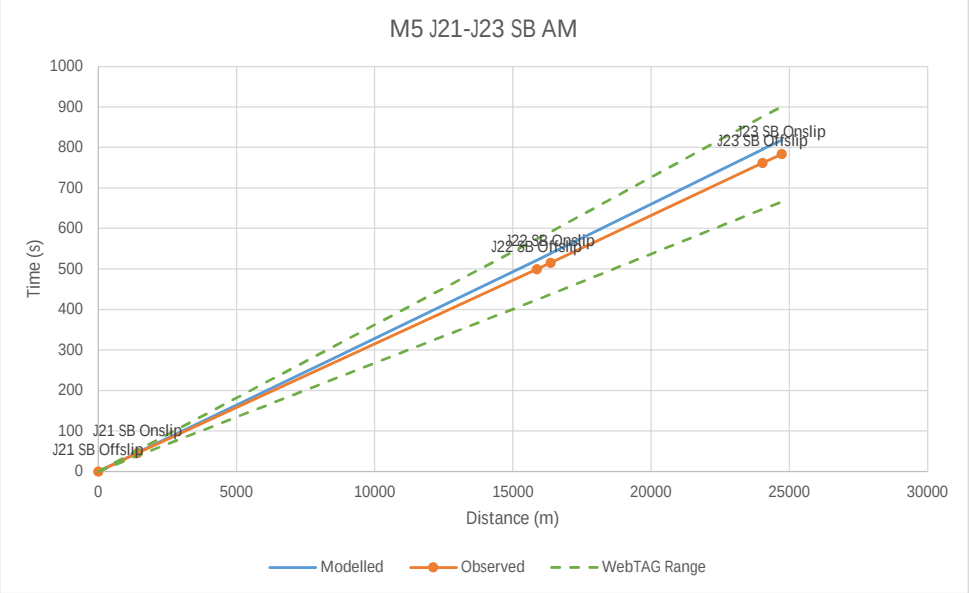
Journey Time Route O - M5 J21 to J23 NB

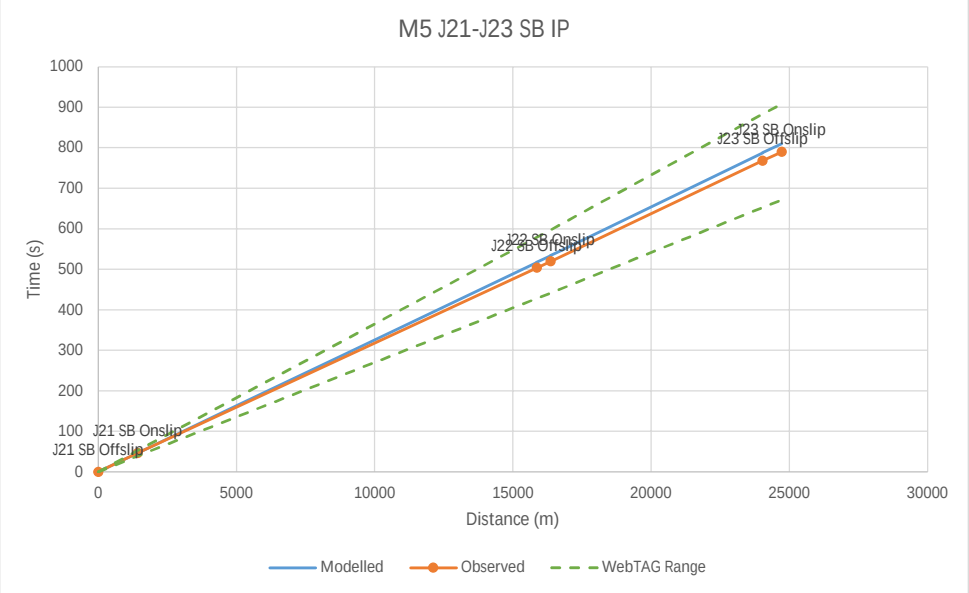


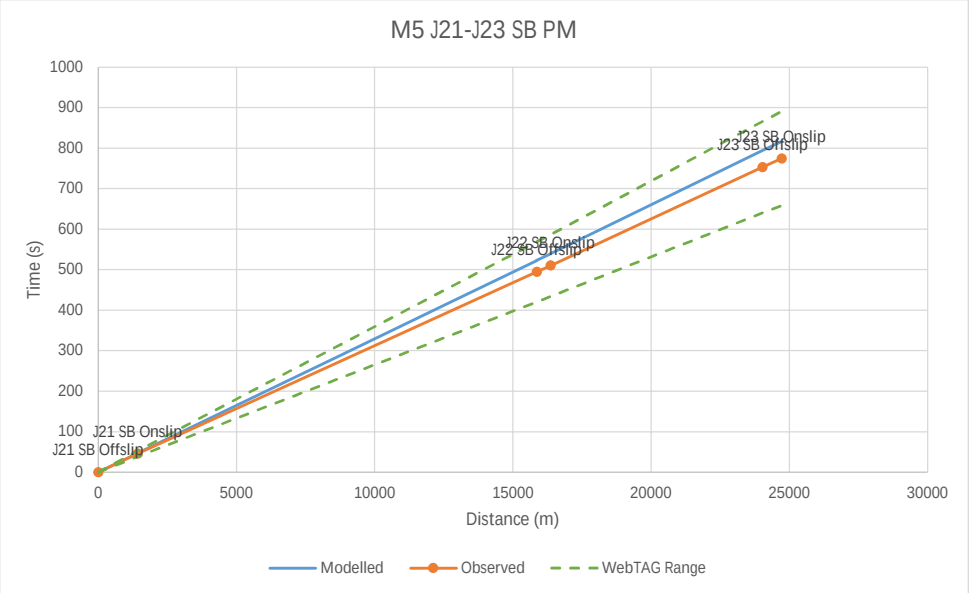




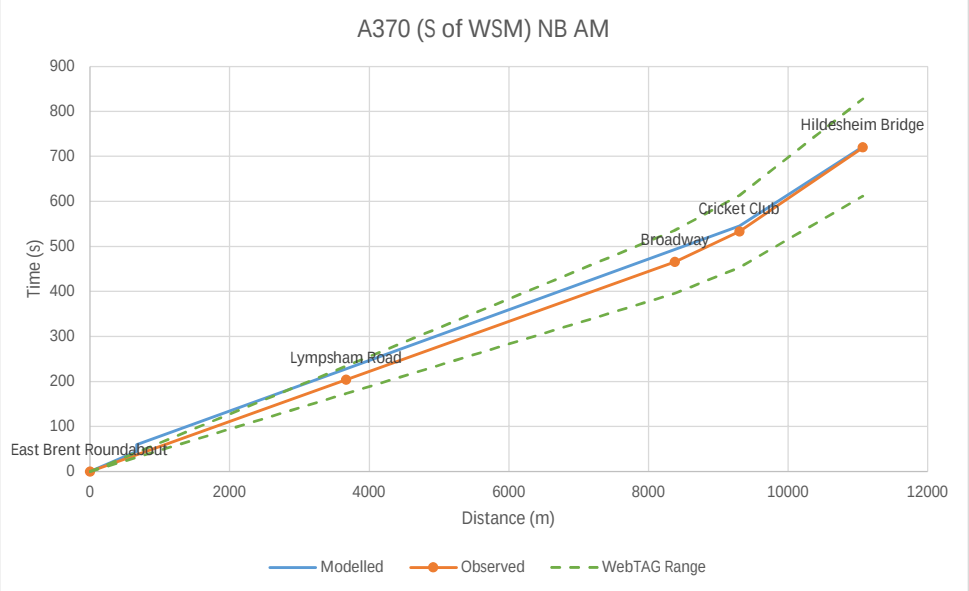
Journey Time Route O - M5 J21 to J23 SB

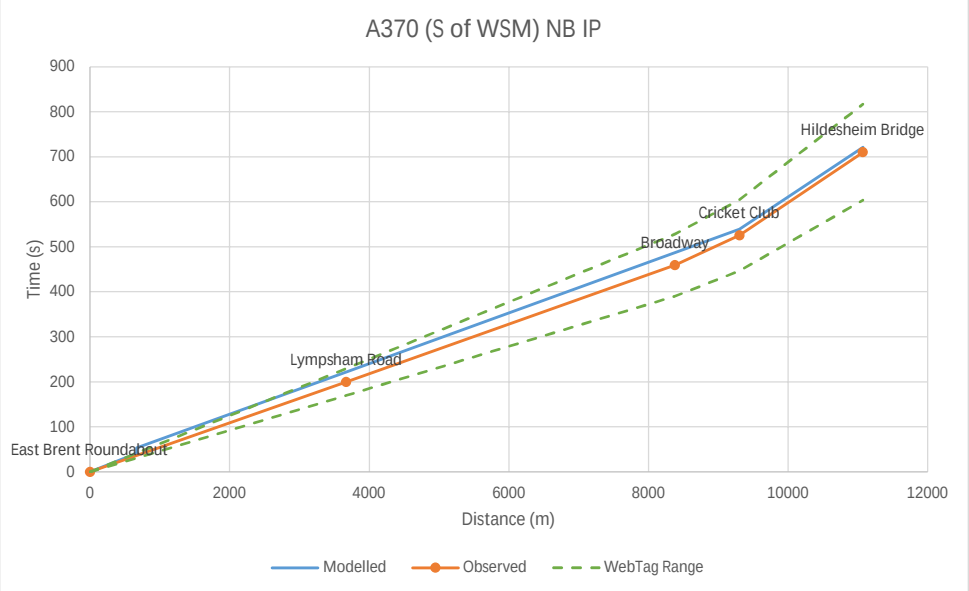


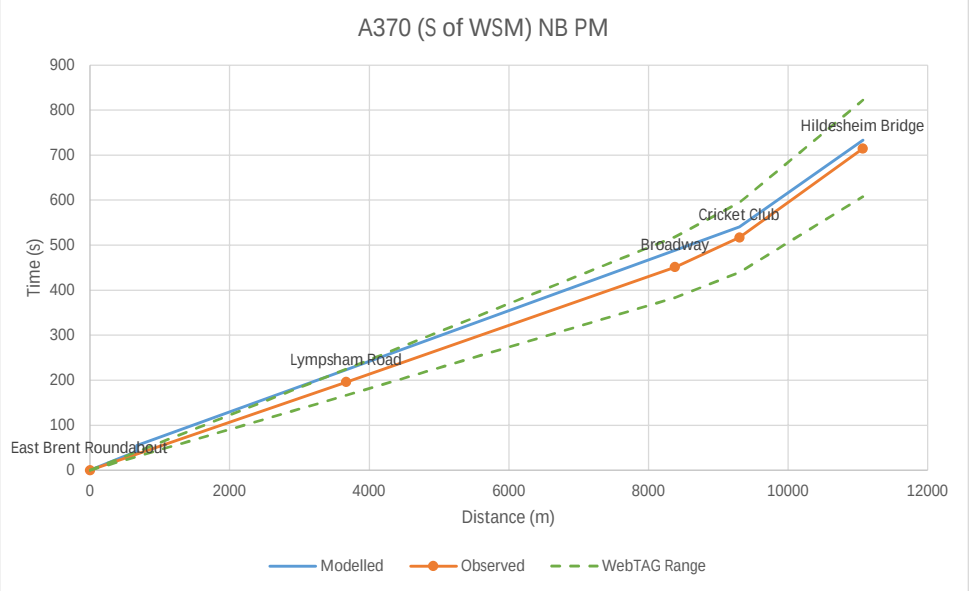




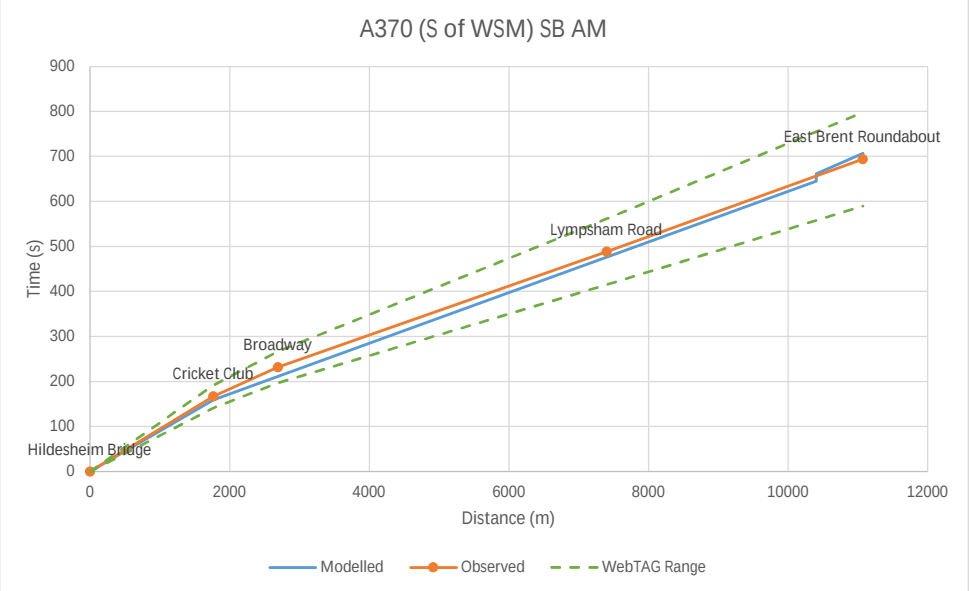
Journey Time Route P - A370 (South of WsM) NB

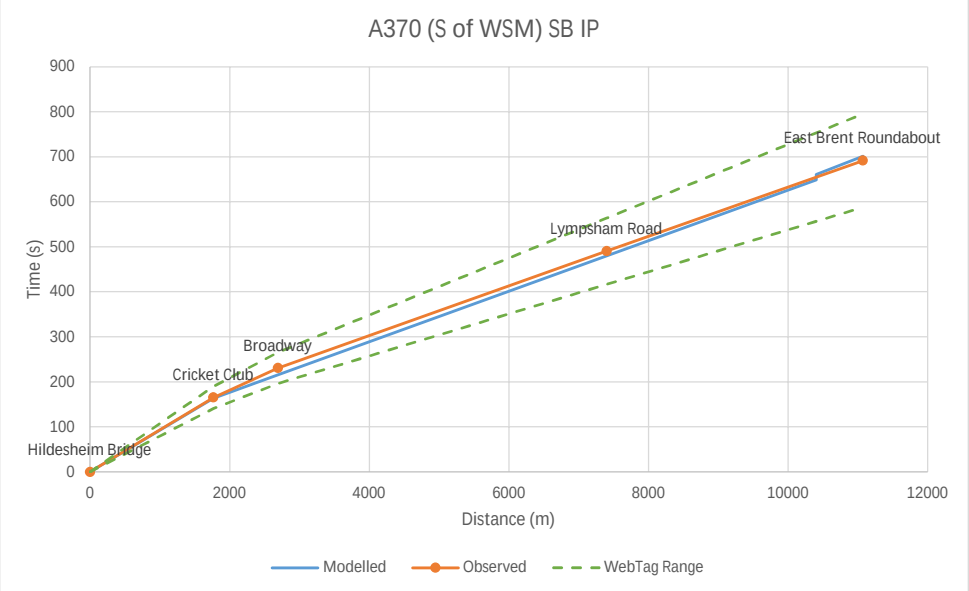


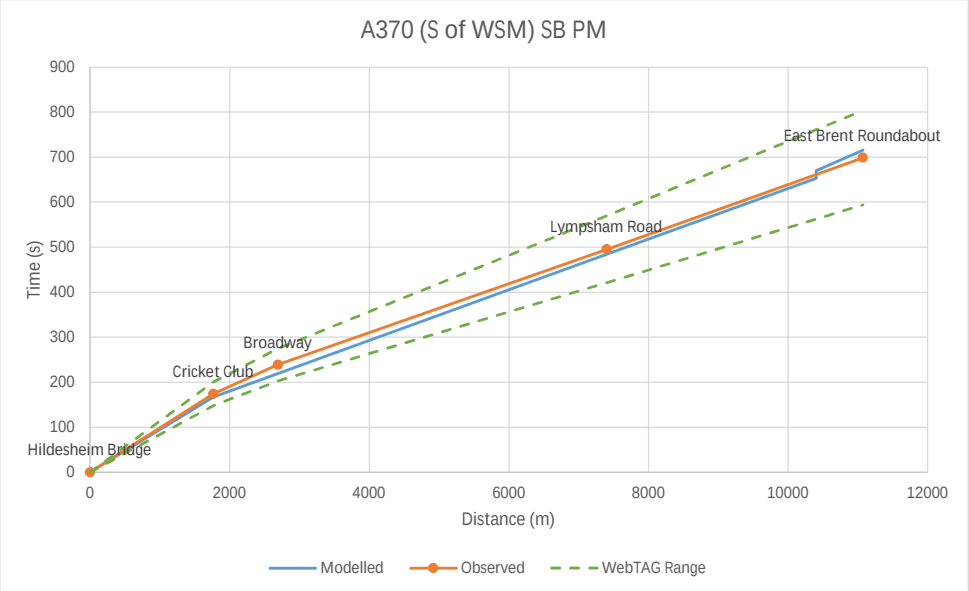




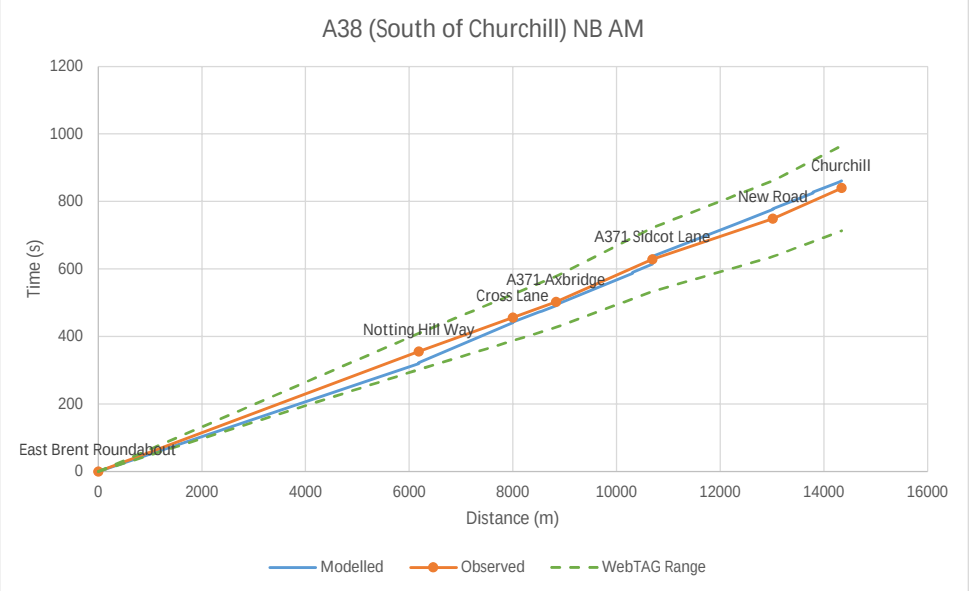
Journey Time Route P - A370 (South of WsM) SB

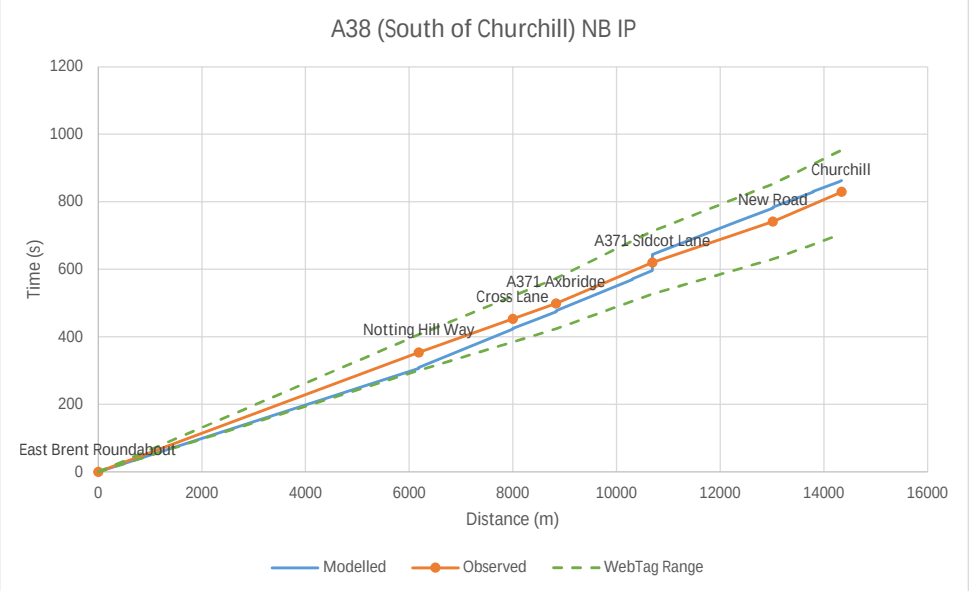


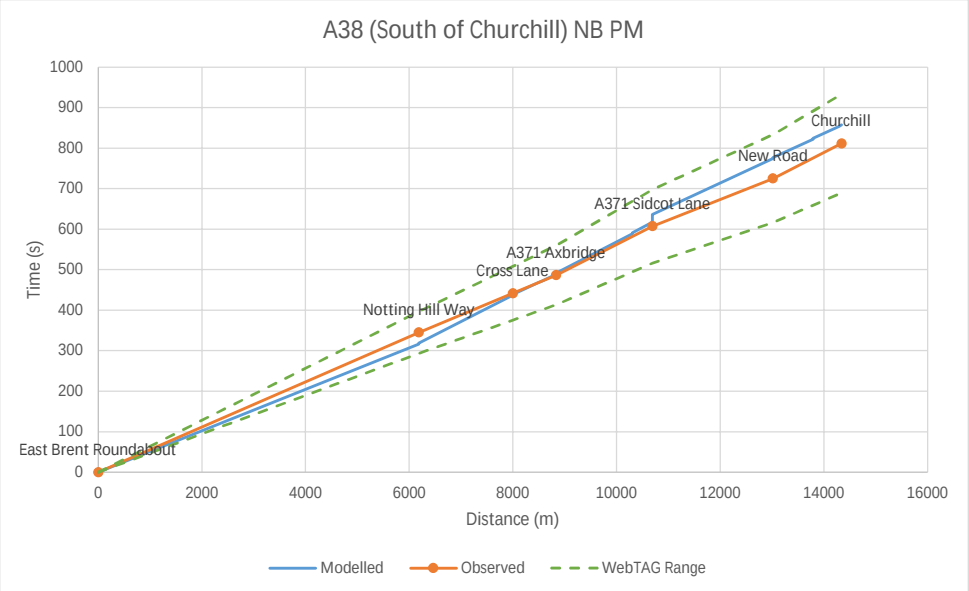




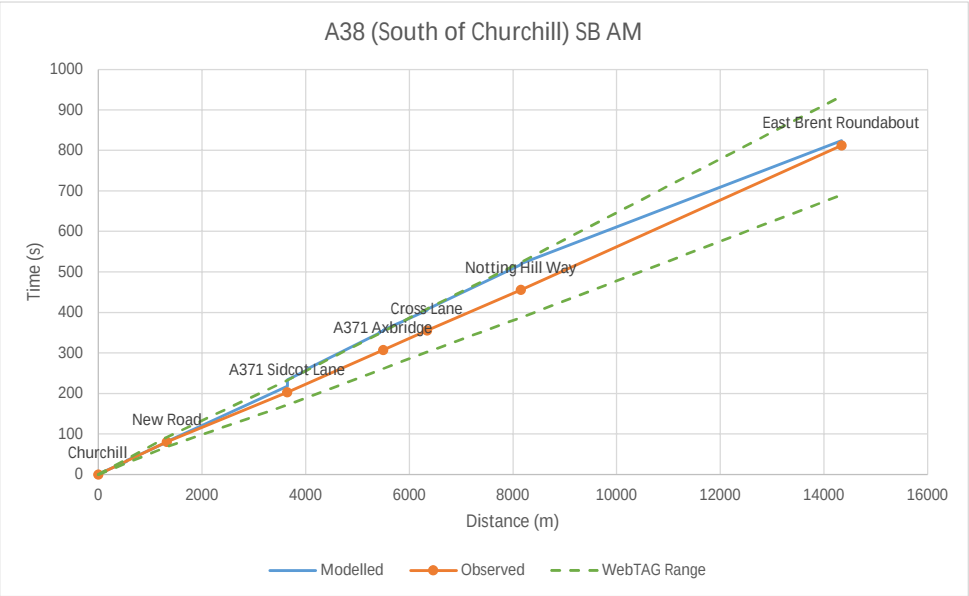
Journey Time Route Q - A38 (South of Churchill) NB

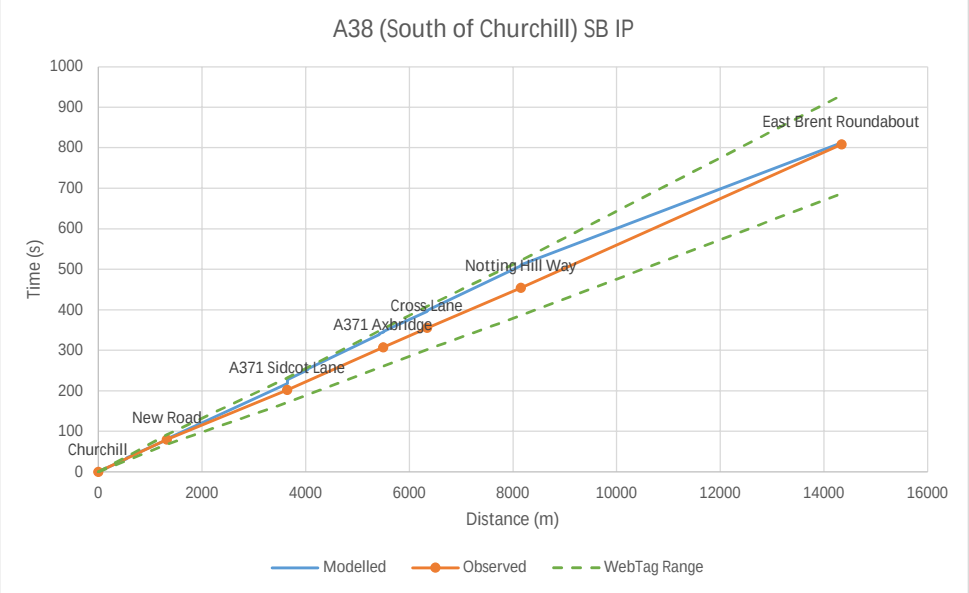


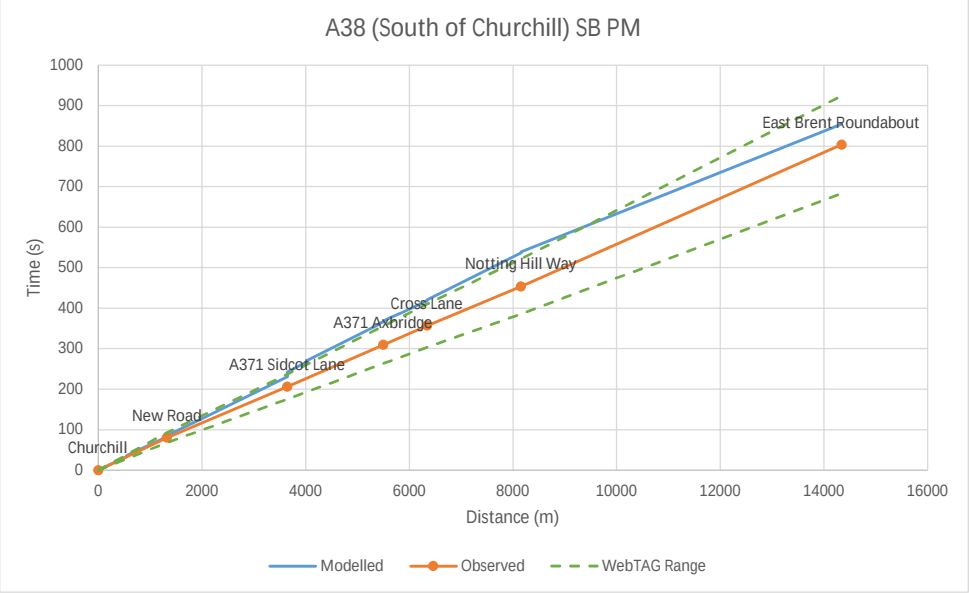




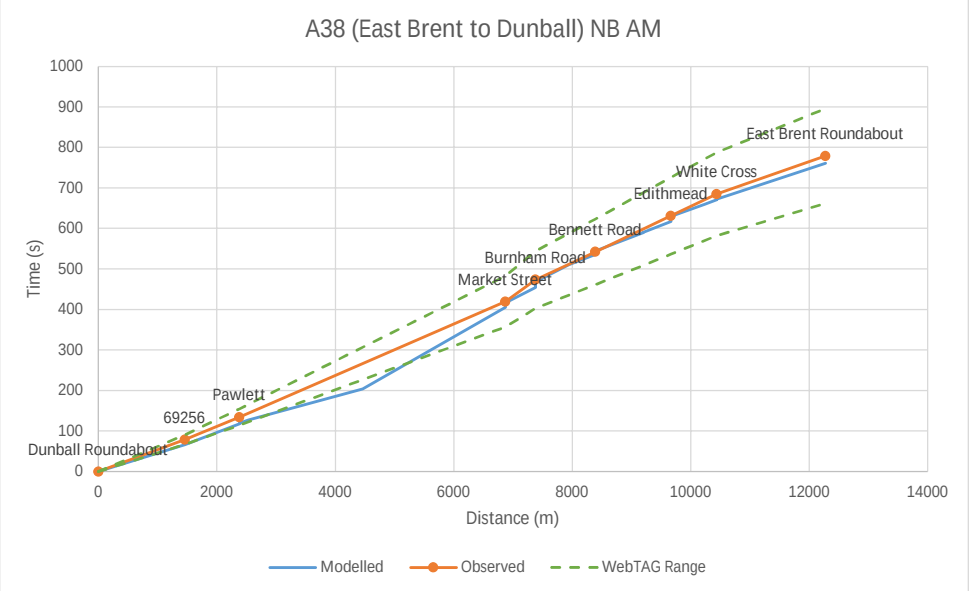
Journey Time Route Q - A38 (South of Churchill) SB

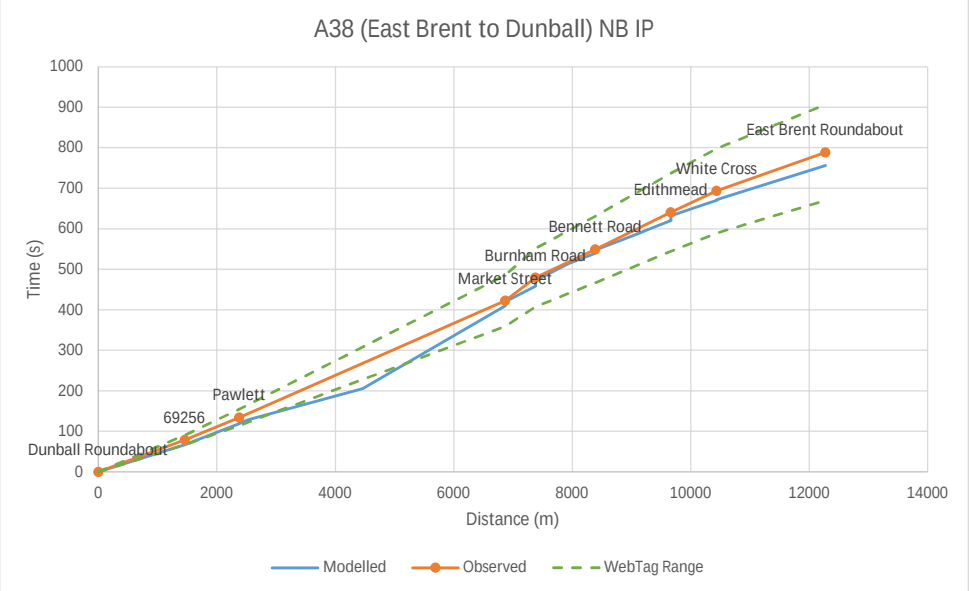


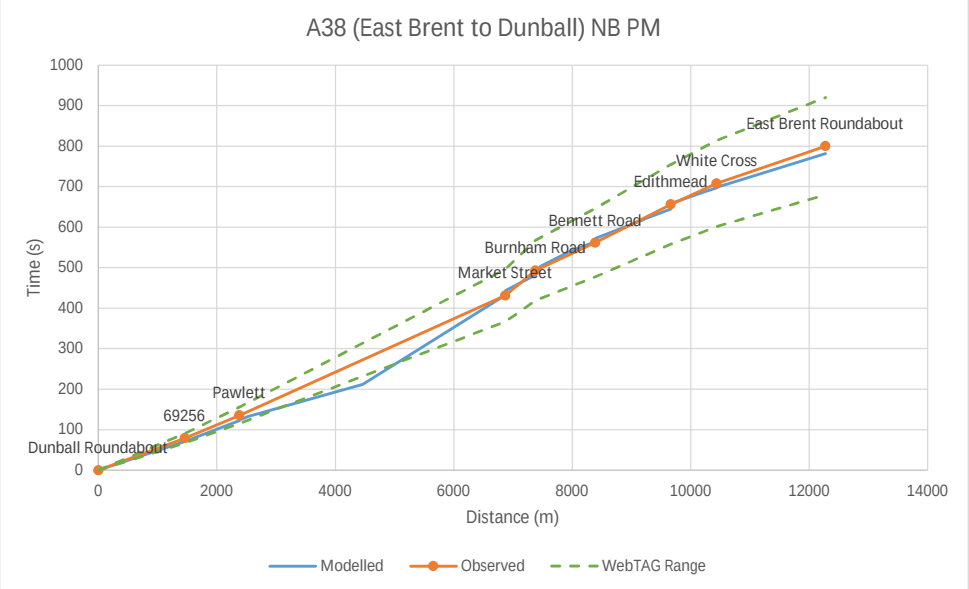




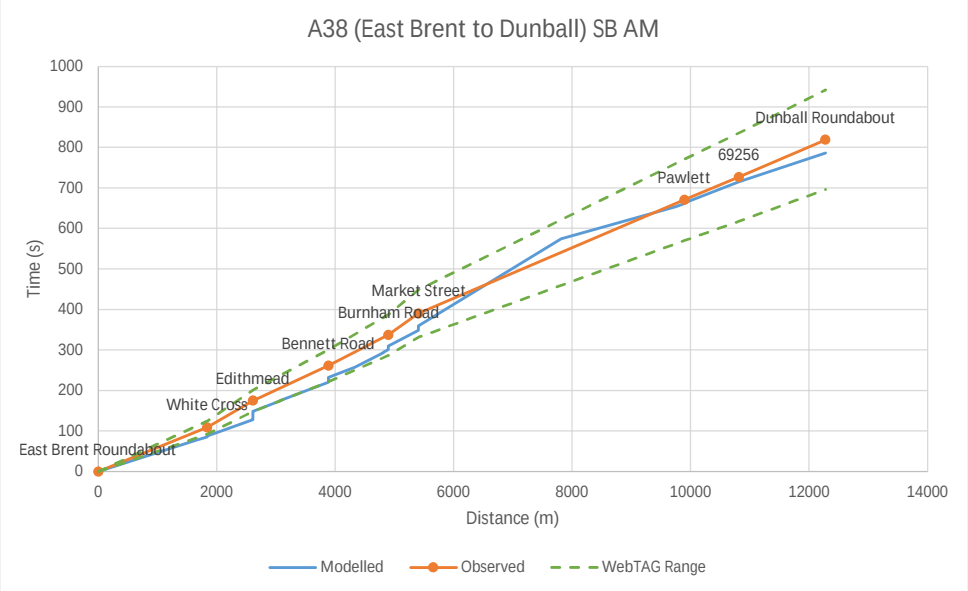
Journey Time Route R - A38 (East Brent to Dunball) NB

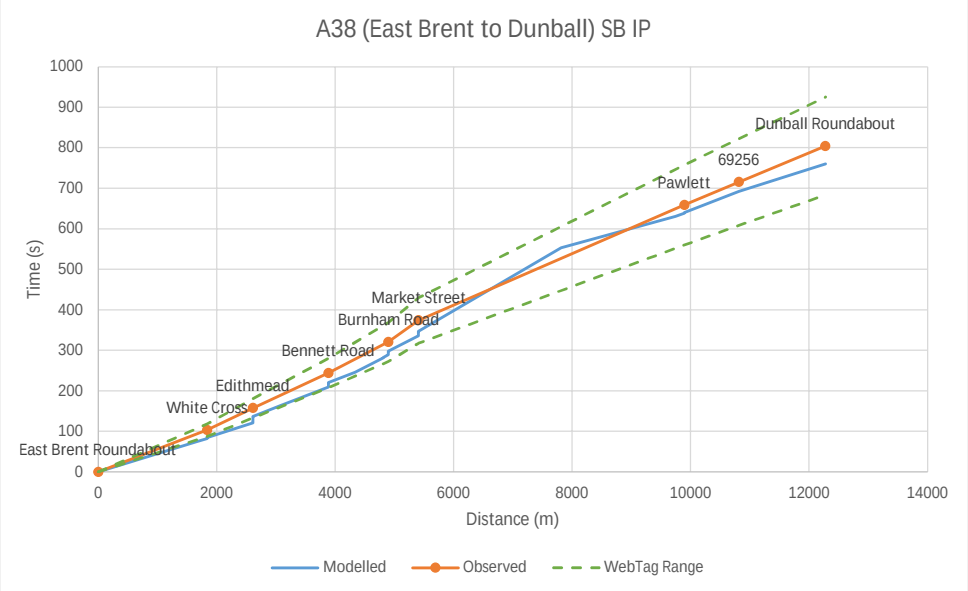


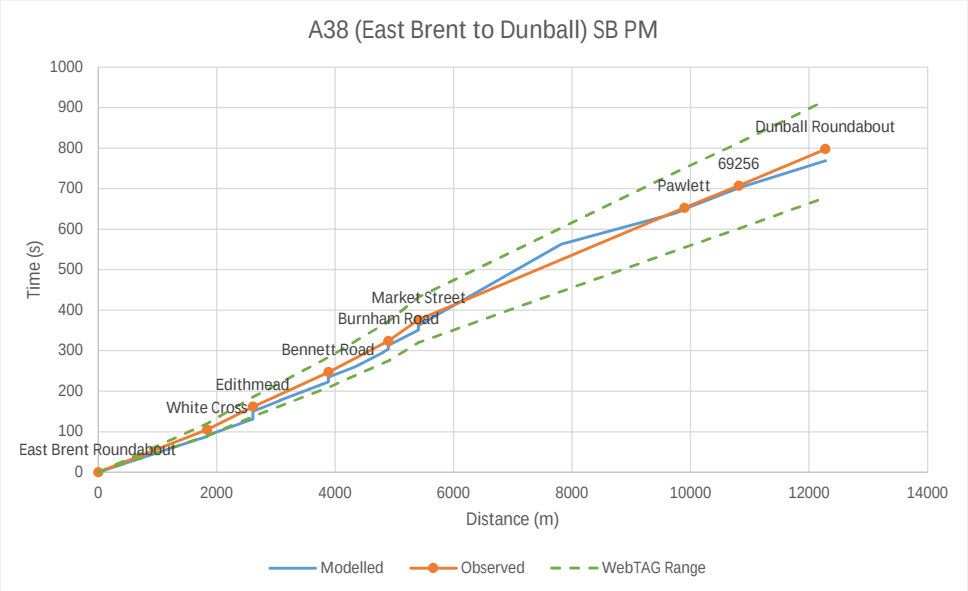




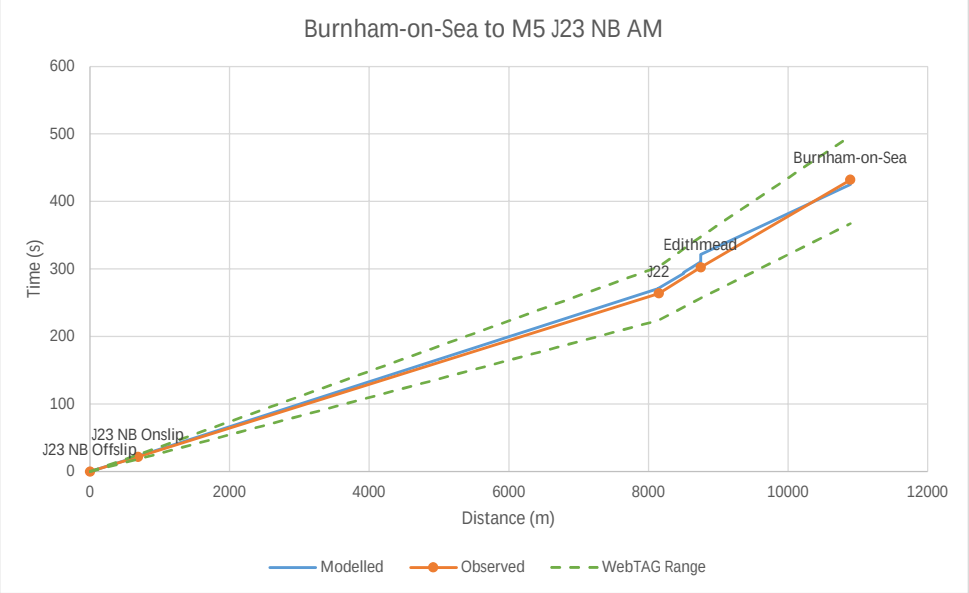
Journey Time Route R - A38 (East Brent to Dunball) SB

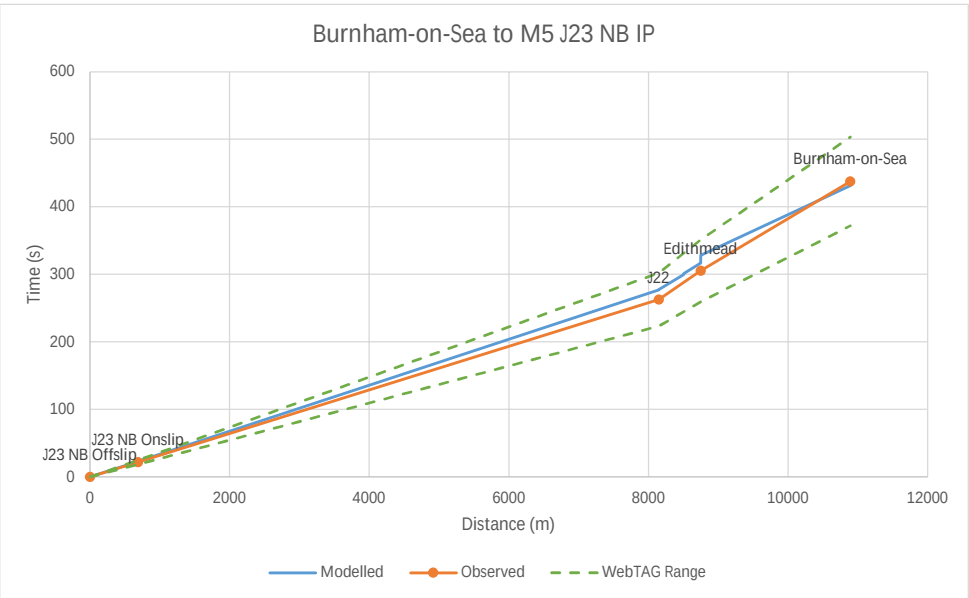


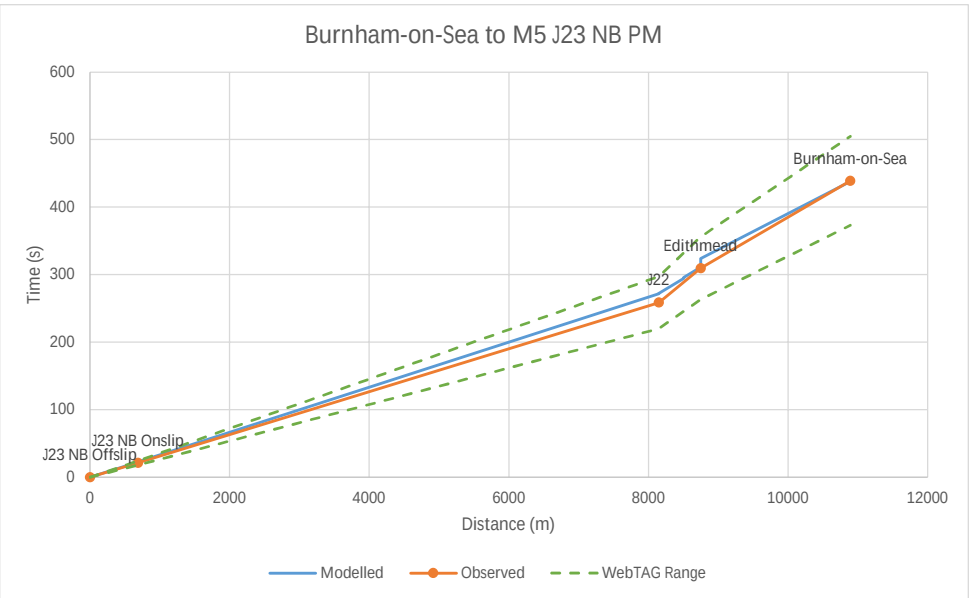




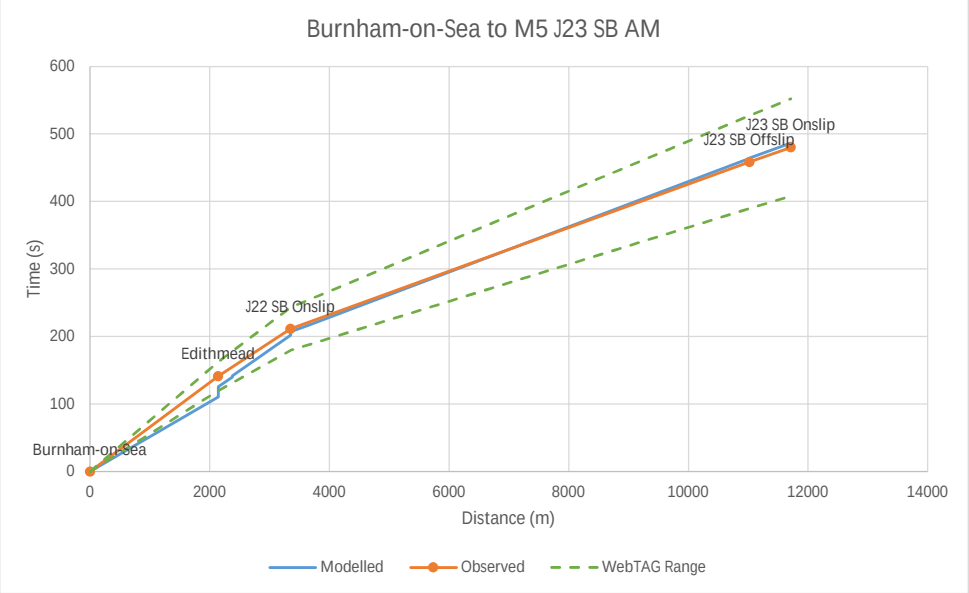
Journey Time Route S - Burnham-on-Sea to M5 J23 NB

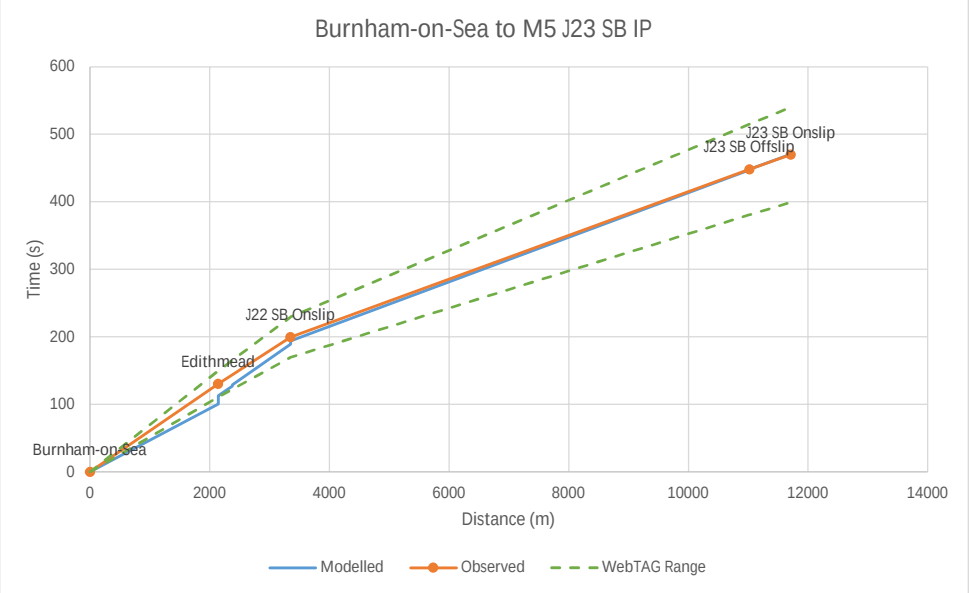


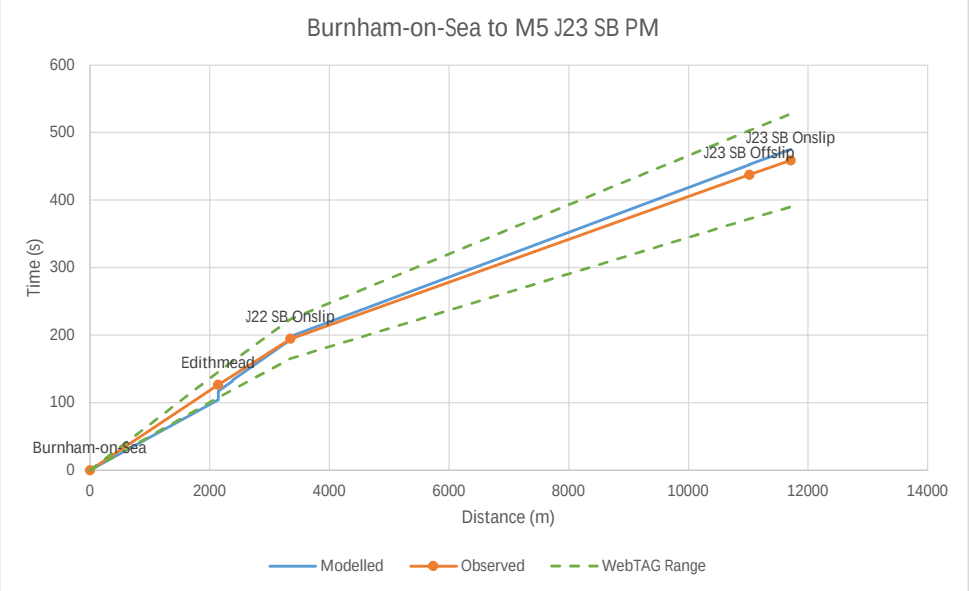




Journey Time Route S - Burnham-on-Sea to M5 J23 SB







1st Floor, Keble House
Southernhay Gardens, Southernhay East
Exeter, Devon
EX1 1NT

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Appendix C: Link Results

					Enhanced NSSM: AM Peak						
a	b	Link Description	Direction	Screenline	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
61475	61476	A370 Somerset Ave, east of B3440 Merge	EB	B	2,687	2,567	-120	2.3	PASS	PASS	PASS
61221	61218	B3440 Bristol Rd., (A370 Off-Slip)	WB		784	745	-39	1.4	PASS	PASS	PASS
2178	61515	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB		233	366	133	7.7	FAIL	FAIL	FAIL
61515	2178	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB		173	181	8	0.6	PASS	PASS	PASS
2017	61508	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	E	663	617	-46	1.8	PASS	PASS	PASS
61508	2017	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	E	470	591	121	5.3	FAIL	FAIL	FAIL
2071	2113	A38 north of New Road Redhill	NB	D	852	964	112	3.7	PASS	PASS	PASS
2113	2071	A38 north of New Road Redhill	SB	D	551	613	62	2.6	PASS	PASS	PASS
3011	69211	SBL south of Brookgate - Long ashton	NB		948	1,119	171	5.3	FAIL	FAIL	FAIL
69211	3011	SBL south of Brookgate - Long ashton	SB		703	516	-187	7.6	FAIL	FAIL	FAIL
2067	2165	B3130 Chew Road east of Kentshare Lane Winford	EB		347	262	-85	4.9	PASS	PASS	PASS
2165	2067	B3130 Chew Road east of Kentshare Lane Winford	WB		330	320	-10	0.6	PASS	PASS	PASS
2195	2197	B3133 Brinsea Road south of Silver St. Congresbury	NB		363	316	-47	2.6	PASS	PASS	PASS
2197	2195	B3133 Brinsea Road south of Silver St. Congresbury	SB		456	317	-139	7.1	FAIL	FAIL	FAIL
2031	2193	A371 west of M5 overbridge Locking	EB	B	563	510	-53	2.3	PASS	PASS	PASS
2193	2031	A371 west of M5 overbridge Locking	WB	B	433	420	-13	0.6	PASS	PASS	PASS
69134	61713	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	G	1,266	1,189	-77	2.2	PASS	PASS	PASS
61712	69134	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	G	1,014	1,017	3	0.1	PASS	PASS	PASS
2008	9020	Brockley Combe Road west of Downside Road Lulsgate	EB		255	226	-29	1.8	PASS	PASS	PASS
9020	2008	Brockley Combe Road west of Downside Road Lulsgate	WB		208	174	-34	2.4	PASS	PASS	PASS
311	3009	A38 Bridgwater Road east of Yanley Lane Dundry	NB		1,043	922	-121	3.9	PASS	PASS	PASS
3009	311	A38 Bridgwater Road east of Yanley Lane Dundry	SB		799	679	-120	4.4	FAIL	PASS	PASS
2141	2115	A368 East Street east of Dark Lane Banwell	EB	C	377	334	-43	2.3	PASS	PASS	PASS
2115	2141	A368 East Street east of Dark Lane Banwell	WB	C	212	313	101	6.2	FAIL	FAIL	FAIL
2087	61214	A371 Banwell Road east of Castle Hill Banwell	NB	C	348	319	-29	1.6	PASS	PASS	PASS
61214	2087	A371 Banwell Road east of Castle Hill Banwell	SB	C	242	316	74	4.4	PASS	PASS	PASS
61207	69331	A38 Bridgwater Road south of A371 Sidcot	NB	A	620	535	-85	3.5	PASS	PASS	PASS
69331	61207	A38 Bridgwater Road south of A371 Sidcot	SB	A	533	594	61	2.6	PASS	PASS	PASS
69144	64979	A369 Martcombe Road south of High Street Portbury	NB		834	601	-233	8.7	FAIL	FAIL	FAIL
64979	69144	A369 Martcombe Road south of High Street Portbury	SB		1,044	692	-352	12.0	FAIL	FAIL	FAIL
69176	61705	A369 west of B3129 Beggarbush Lane Leigh Woods	EB		989	796	-193	6.4	FAIL	FAIL	FAIL
61705	69176	A369 west of B3129 Beggarbush Lane Leigh Woods	WB		812	684	-128	4.7	FAIL	PASS	PASS
69103	61304	Oldmixon Road east of Broadway, Hutton	EB		219	129	-90	6.8	PASS	FAIL	PASS
61304	69103	Oldmixon Road east of Broadway, Hutton	WB		307	265	-42	2.5	PASS	PASS	PASS
61303	69104	A370 (River Axe bridge)	NB	A	805	818	13	0.5	PASS	PASS	PASS
69104	61303	A370 (River Axe bridge)	SB	A	628	682	54	2.1	PASS	PASS	PASS
61498	69173	B3124 Walton Road east of Holly Lane Clevedon	EB	F	508	481	-27	1.2	PASS	PASS	PASS
69173	61498	B3124 Walton Road east of Holly Lane Clevedon	WB	F	472	557	85	3.7	PASS	PASS	PASS
69133	69192	Clapton Lane south of Mayfields Close Portishead	NB	G	346	350	4	0.2	PASS	PASS	PASS
69192	69133	Clapton Lane south of Mayfields Close Portishead	SB	G	504	504	0	0.0	PASS	PASS	PASS
69111	61506	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	H	419	409	-10	0.5	PASS	PASS	PASS
61506	69111	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	H	457	464	7	0.3	PASS	PASS	PASS
2185	68217	B3133 Kenn Road south of M5 Overbridge Kenn	NB	F	479	549	70	3.1	PASS	PASS	PASS
68217	2185	B3133 Kenn Road south of M5 Overbridge Kenn	SB	F	379	405	26	1.3	PASS	PASS	PASS
312	61506	B3128 Tickenham Hill west of Towerhouse Lane	EB		518	457	-61	2.7	PASS	PASS	PASS
61506	312	B3128 Tickenham Hill west of Towerhouse Lane	WB		287	480	193	9.9	FAIL	FAIL	FAIL
2303	2029	Wolvershill Road south of M5 overbridge Banwell	NB	B	320	334	14	0.8	PASS	PASS	PASS
2029	2303	Wolvershill Road south of M5 overbridge Banwell	SB	B	224	260	36	2.3	PASS	PASS	PASS
306	2023	Mill Lane south of Mill Close Portbury	NB		344	265	-79	4.5	PASS	PASS	PASS
2023	306	Mill Lane south of Mill Close Portbury	SB		289	341	52	2.9	PASS	PASS	PASS
61502	61501	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	E	968	1,008	40	1.3	PASS	PASS	PASS
61501	61502	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	E	724	770	46	1.7	PASS	PASS	PASS
2500	65066	The Runway - CAL - west of A371Locking Moor Road	EB		421	351	-70	3.6	PASS	PASS	PASS
65066	2500	The Runway - CAL - west of A371Locking Moor Road	WB		535	526	-9	0.4	PASS	PASS	PASS
61216	61229	A370 Somerset Avenue west of West Wick Rab W-s-M	EB		1,356	1,160	-196	5.5	PASS	FAIL	PASS
61228	61216	A370 Somerset Avenue west of West Wick Rab W-s-M	WB		1,703	1,875	172	4.1	PASS	PASS	PASS
2063	69127	A370 Rodyate Hill west of Warners Close Cleeve	NB	D	568	385	-183	8.4	FAIL	FAIL	FAIL
69127	2063	A370 Rodyate Hill west of Warners Close Cleeve	SB	D	450	362	-88	4.4	PASS	PASS	PASS
2070	2069	BIA Main Entrance north of A38 Lulsgate	EB		285	214	-71	4.5	PASS	PASS	PASS
2069	2070	BIA Main Entrance north of A38 Lulsgate	WB		402	281	-121	6.6	FAIL	FAIL	FAIL
9022	61499	BIA Silver Zone Parking - north of A38	EB		60	49	-11	1.5	PASS	PASS	PASS
61499	9022	BIA Silver Zone Parking - north of A38	WB		151	197	46	3.5	PASS	PASS	PASS
9021	9020	BIA Freight Entrance Downside Road Lulsgate	NB		44	21	-23	4.0	PASS	PASS	PASS
9020	9021	BIA Freight Entrance Downside Road Lulsgate	SB		63	29	-34	5.1	PASS	FAIL	PASS
61478	61221	A370 Somerset Avenue Total Westbound	WB	B	2,169	2,200	31	0.7	PASS	PASS	PASS
61174	61175	A38 just south of A370/A38 roundabout	NB		1,017	971	-46	1.4	PASS	PASS	PASS
61175	61174	A38 just south of A370/A38 roundabout	SB		861	835	-26	0.9	PASS	PASS	PASS
61175	62433	A370 just north of A370/A38 roundabout	NB		529	697	168	6.8	FAIL	FAIL	FAIL
62433	61175	A370 just north of A370/A38 roundabout	SB		509	695	186	7.6	FAIL	FAIL	FAIL
61175	66359	A38 just east of A370/A38 roundabout	EB		687	642	-45	1.7	PASS	PASS	PASS
66359	61175	A38 just east of A370/A38 roundabout	WB		591	508	-83	3.5	PASS	PASS	PASS
2020	308	B3129 Weston Rd, Failand	NB		218	88	-130	10.5	FAIL	FAIL	FAIL
308	2020	B3129 Weston Rd, Failand	SB		79	68	-11	1.3	PASS	PASS	PASS
2019	2021	Flax Bourton Rd, Failand	NB		199	155	-44	3.3	PASS	PASS	PASS
2021	2019	Flax Bourton Rd, Failand	SB		170	177	8	0.6	PASS	PASS	PASS
69124	2007	Chelvey Rd, Backwell	NB		37	65	28	3.9	PASS	PASS	PASS
2007	69124	Chelvey Rd, Backwell	SB		45	40	-5	0.8	PASS	PASS	PASS
2008	2007	Brockley Lane, Backwell	NB		76	74	-2	0.3	PASS	PASS	PASS
2007	2008	Brockley Lane, Backwell	SB		78	52	-26	3.2	PASS	PASS	PASS
2001	2002	Netherton Wood Lane, Nailsea	NB	H	90	93	3	0.3	PASS	PASS	PASS
2002	2001	Netherton Wood Lane, Nailsea	SB	H	116	89	-27	2.6	PASS	PASS	PASS
69110	2004	West End Lane, Nailsea	EB	H	49	92	43	5.2	PASS	FAIL	PASS
2004	69110	West End Lane, Nailsea	WB	H	24	57	34	5.3	PASS	FAIL	PASS
2004	69109	Causeway, Tickenham	EB	H	214	143	-71	5.3	PASS	FAIL	PASS
69109	2004	Causeway, Tickenham	WB	H	103	94	-9	0.9	PASS	PASS	PASS
69137	325	Backwell Bow (North), Nailsea	EB	H	40	58	19	2.6	PASS	PASS	PASS
325	69137	Backwell Bow (North), Nailsea	WB	H	31	29	-2	0.4	PASS	PASS	PASS
2305	2330	Riverside, Banwell	NB		60	120	60	6.4	PASS	FAIL	PASS
2330	2305	Riverside, Banwell	SB		49	133	84	8.8	PASS	FAIL	PASS
69106	69110	Nailsea Wall, Kenn	EB		124	165	41	3.4	PASS	PASS	PASS
69110	69106	Nailsea Wall, Kenn	WB		86	191	105	8.9	FAIL	FAIL	FAIL
69105	69106	Kenmoor Rd, Kenn	NB		219	181	-38	2.7	PASS	PASS	PASS
69106	69105	Kenmoor Rd, Kenn	SB		97	155	59	5.2	PASS	FAIL	PASS
319	69108	Court Lane, Clevedon	NB		223	182	-41	2.8	PASS	PASS	PASS
69108	319	Court Lane, Clevedon	SB		119	158	39	3.3	PASS	PASS	PASS
68217	69107	Davis Lane, Clevedon	EB	F	124	133	10	0.8	PASS	PASS	PASS
69107	68217	Davis Lane, Clevedon	WB	F	85	165	80	7.1	PASS	FAIL	PASS
69130	69141	Half Yard, Langford	NB		52	38	-14	2.1	PASS	PASS	PASS
69141	69130	Half Yard, Langford	SB		89	69	-20	2.3	PASS	PASS	PASS
69141	2213	Long Lane (east of Wrington)	EB		86	140	54	5.1	PASS	FAIL	PASS
2213	69141	Long Lane (east of Wrington)	WB		67	43	-24	3.2	PASS	PASS	PASS
2304	2327	Summer Lane, Banwell	NB		212	161	-51	3.7	PASS	PASS	PASS
2327	2304	Summer Lane, Banwell	SB		55	92	38	4.4	PASS	PASS	PASS
2176	61172	M5 Between J21 and J22	SB	A	2,523	2,508	-15	0.3	PASS	PASS	PASS
66458	2171	M5 Between J21 and J22	NB	A	2,648	2,745	97	1.9	PASS	PASS	PASS
61995	61482	M5 Between J20 and J21	SB	C	3,296	3,280	-16	0.3	PASS	PASS	PASS
61534	61493	M5 Between J20 and J21	NB	C	3,945	4,172	227	3.6	PASS	PASS	PASS
65730	65567	M5 Avonmouth Bridge north of J19	NB		5,322	5,080	-242	3.4	PASS	PASS	PASS
65486	65729	M5 Avonmouth Bridge north of J19	SB		3,936	4,166	230	3.6	PASS	PASS	PASS
61680	61704	M5 Between J20 and J19	NB		4,289	4,013	-276	4.3	PASS	PASS	PASS
61703	61495	M5 Between J20 and J19	SB		3,297	2,891	-406	7.3	FAIL	FAIL	FAIL
66456	61170	M5 Between J22 and J23	NB	I	2,757	2,907	150	2.8	PASS	PASS	PASS
66457	61104	M5 Between J22 and J23	SB	I	3,060	2,978	-82	1.5	PASS	PASS	PASS
2302	2101	A368 east of Congresbury	EB	C	552	451	-101	4.5	FAIL	PASS	PASS
2101	2302	A368 east of Congresbury	WB	C	732	704	-28	1.0	PASS	PASS	PASS
2055	66363	New Road (through Shipham)	NB		254	277	23	1.4	PASS	PASS	PASS
66363	2055	New Road (through Shipham)	SB		132	143	11	0.9	PASS	PASS	PASS

					Enhanced NSSM: AM Peak						
a	b	Link Description	Direction	Screenline	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
61517	61524	A370 Long Ashton Bypass	EB		946	924	-22	0.7	PASS	PASS	PASS
61524	61517	A370 Long Ashton Bypass	WB		401	497	96	4.5	PASS	PASS	PASS
2022	2021	B3218 north of Failand	EB		826	748	-78	2.8	PASS	PASS	PASS
2021	2022	B3218 north of Failand	WB		502	448	-54	2.5	PASS	PASS	PASS
2326	69108	B3130 Tickenham Road	EB	F	797	677	-120	4.4	FAIL	PASS	PASS
69108	2326	B3130 Tickenham Road	WB	F	702	727	25	0.9	PASS	PASS	PASS
2325	61494	B3133 Ettlingen Way	EB	F	1,421	1,622	201	5.2	PASS	FAIL	PASS
61494	2325	B3133 Ettlingen Way	WB	F	1,626	1,391	-235	6.1	PASS	FAIL	PASS
2079	69189	Station Road near Backwell Crossroads	NB	H	380	254	-126	7.1	FAIL	FAIL	FAIL
69189	2079	Station Road near Backwell Crossroads	SB	H	317	384	67	3.6	PASS	PASS	PASS
61226	61271	A368 east of Churchill Gate	EB		274	335	61	3.5	PASS	PASS	PASS
61271	61226	A368 east of Churchill Gate	WB		226	242	16	1.0	PASS	PASS	PASS
61229	69161	Elmham Way	NB		741	608	-133	5.1	FAIL	FAIL	FAIL
69161	61217	Elmham Way	SB		1,045	1,068	23	0.7	PASS	PASS	PASS
61217	69166	A370 east of West Wick roundabout	EB		1,371	1,308	-63	1.7	PASS	PASS	PASS
61221	61227	A370 east of West Wick roundabout	WB		1,452	1,455	3	0.1	PASS	PASS	PASS
2314	61218	Scot Elm Drive	NB		434	346	-88	4.5	PASS	PASS	PASS
61218	2314	Scot Elm Drive	SB		94	45	-49	5.9	PASS	FAIL	PASS
61219	61475	B3440 EB onslip to A370	EB		1,325	1,249	-76	2.1	PASS	PASS	PASS
61101	61467	Bristol Road south of Queensway	NB		889	856	-33	1.1	PASS	PASS	PASS
61467	61101	Bristol Road south of Queensway	SB		889	937	48	1.6	PASS	PASS	PASS
61487	2107	B3133 south of Yatton	NB		503	443	-60	2.8	PASS	PASS	PASS
2107	61487	B3133 south of Yatton	SB		381	373	-8	0.4	PASS	PASS	PASS
69127	69140	Bishops Road, Claverham	NB		118	112	-6	0.6	PASS	PASS	PASS
69140	69127	Bishops Road, Claverham	SB		149	129	-20	1.7	PASS	PASS	PASS
2013	2014	Wraxhall Hill	NB		256	338	82	4.8	PASS	PASS	PASS
2014	2013	Wraxhall Hill	SB		237	414	177	9.8	FAIL	FAIL	FAIL
2013	61507	B3130 Bristol Road	SB		459	450	-9	0.4	PASS	PASS	PASS
61507	2013	B3130 Bristol Road	NB		250	248	-2	0.1	PASS	PASS	PASS
61507	2018	B3129 Belmont Hill	NB		267	165	-102	6.9	FAIL	FAIL	FAIL
2018	61507	B3129 Belmont Hill	SB		200	167	-33	2.4	PASS	PASS	PASS
65772	310	Weston Road west of Long Ashton	EB		158	235	77	5.5	PASS	FAIL	PASS
310	65772	Weston Road west of Long Ashton	WB		208	237	29	1.9	PASS	PASS	PASS
61526	61707	Beggar Bush Lane	EB		464	167	-297	16.7	FAIL	FAIL	FAIL
61707	61526	Beggar Bush Lane	WB		164	33	-131	13.2	FAIL	FAIL	FAIL
309	2025	B3128 Clarken Coombe	EB		553	534	-19	0.8	PASS	PASS	PASS
2025	309	B3128 Clarken Coombe	WB		368	298	-70	3.8	PASS	PASS	PASS
310	2024	Long Ashton Road	NB		336	453	117	5.9	FAIL	FAIL	FAIL
2024	310	Long Ashton Road	SB		196	196	0	0.0	PASS	PASS	PASS
69219	61544	A370 north of SBL	EB		1,419	1,390	-29	0.8	PASS	PASS	PASS
61544	69219	A370 north of SBL	WB		1,008	555	-453	16.2	FAIL	FAIL	FAIL
315	2013	B3130	EB	H	594	515	-79	3.4	PASS	PASS	PASS
2013	315	B3130	WB	H	361	388	27	1.4	PASS	PASS	PASS
69260	61166	B3139 Highbridge Road	NB		352	271	-81	4.6	PASS	PASS	PASS
61166	69260	B3139 Highbridge Road	SB		304	284	-20	1.2	PASS	PASS	PASS
69242	69241	B3141 Church Road	NB	I	187	185	-2	0.1	PASS	PASS	PASS
69241	69242	B3141 Church Road	SB	I	120	119	-1	0.1	PASS	PASS	PASS
69154	66362	B3139 Blackford Road	EB		249	181	-68	4.6	PASS	PASS	PASS
66362	69154	B3139 Blackford Road	WB		182	230	48	3.3	PASS	PASS	PASS
69263	69233	A38 Bristol Road	EB		484	525	41	1.8	PASS	PASS	PASS
69233	69263	A38 Bristol Road	WB		365	406	41	2.1	PASS	PASS	PASS

					Enhanced NSSM: Interpeak						
a	b	Link Description	Direction	Screenline	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
61475	61476	A370 Somerset Ave, east of B3440 Merge	EB	B	1,637	1,625	-11	0.3	PASS	PASS	PASS
61221	61218	B3440 Bristol Rd., (A370 Off-Slip)	WB		731	768	37	1.3	PASS	PASS	PASS
2178	61515	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB		162	145	-17	1.3	PASS	PASS	PASS
61515	2178	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB		155	134	-20	1.7	PASS	PASS	PASS
2017	61508	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	E	395	480	86	4.1	PASS	PASS	PASS
61508	2017	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	E	448	615	167	7.2	FAIL	FAIL	FAIL
2071	2113	A38 north of New Road Redhill	NB	D	534	707	172	6.9	FAIL	FAIL	FAIL
2113	2071	A38 north of New Road Redhill	SB	D	514	645	131	5.4	FAIL	FAIL	FAIL
3011	69211	SBL south of Brookgate - Long ashton	NB		590	564	-26	1.1	PASS	PASS	PASS
69211	3011	SBL south of Brookgate - Long ashton	SB		650	557	-93	3.8	PASS	PASS	PASS
2067	2165	B3130 Chew Road east of Kentshare Lane Winford	EB		246	167	-79	5.5	PASS	FAIL	PASS
2165	2067	B3130 Chew Road east of Kentshare Lane Winford	WB		236	161	-76	5.4	PASS	FAIL	PASS
2195	2197	B3133 Brinsea Road south of Silver St. Congresbury	NB		239	236	-3	0.2	PASS	PASS	PASS
2197	2195	B3133 Brinsea Road south of Silver St. Congresbury	SB		282	266	-16	1.0	PASS	PASS	PASS
2031	2193	A371 west of M5 overbridge Locking	EB	B	385	365	-20	1.0	PASS	PASS	PASS
2193	2031	A371 west of M5 overbridge Locking	WB	B	402	345	-57	2.9	PASS	PASS	PASS
69134	61713	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	G	819	791	-28	1.0	PASS	PASS	PASS
61712	69134	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	G	838	800	-38	1.3	PASS	PASS	PASS
2008	9020	Brockley Combe Road west of Downside Road Lulsgate	EB		175	164	-11	0.8	PASS	PASS	PASS
9020	2008	Brockley Combe Road west of Downside Road Lulsgate	WB		152	97	-55	5.0	PASS	PASS	PASS
311	3009	A38 Bridgwater Road east of Yanley Lane Dundry	NB		768	678	-90	3.4	PASS	PASS	PASS
3009	311	A38 Bridgwater Road east of Yanley Lane Dundry	SB		819	708	-111	4.0	PASS	PASS	PASS
2141	2115	A368 East Street east of Dark Lane Banwell	EB	C	195	285	90	5.8	PASS	FAIL	PASS
2115	2141	A368 East Street east of Dark Lane Banwell	WB	C	198	257	59	3.9	PASS	PASS	PASS
2087	61214	A371 Banwell Road east of Castle Hill Banwell	NB	C	238	222	-16	1.1	PASS	PASS	PASS
61214	2087	A371 Banwell Road east of Castle Hill Banwell	SB	C	212	252	40	2.6	PASS	PASS	PASS
61207	69331	A38 Bridgwater Road south of A371 Sidcot	NB	A	486	558	72	3.2	PASS	PASS	PASS
69331	61207	A38 Bridgwater Road south of A371 Sidcot	SB	A	493	532	39	1.7	PASS	PASS	PASS
69144	64979	A369 Martcombe Road south of High Street Portbury	NB		624	772	149	5.6	FAIL	FAIL	FAIL
64979	69144	A369 Martcombe Road south of High Street Portbury	SB		696	610	-86	3.4	PASS	PASS	PASS
69176	61705	A369 west of B3129 Beggarbush Lane Leigh Woods	EB		611	561	-49	2.0	PASS	PASS	PASS
61705	69176	A369 west of B3129 Beggarbush Lane Leigh Woods	WB		524	656	131	5.4	FAIL	FAIL	FAIL
69103	61304	Oldmixon Road east of Broadway, Hutton	EB		206	157	-49	3.7	PASS	PASS	PASS
61304	69103	Oldmixon Road east of Broadway, Hutton	WB		186	144	-41	3.2	PASS	PASS	PASS
61303	69104	A370 (River Axe bridge)	NB	A	501	618	117	4.9	FAIL	PASS	PASS
69104	61303	A370 (River Axe bridge)	SB	A	515	565	50	2.1	PASS	PASS	PASS
61498	69173	B3124 Walton Road east of Holly Lane Clevedon	EB	F	352	431	79	4.0	PASS	PASS	PASS
69173	61498	B3124 Walton Road east of Holly Lane Clevedon	WB	F	356	439	82	4.1	PASS	PASS	PASS
69133	69192	Clapton Lane south of Mayfields Close Portishead	NB	G	201	302	101	6.4	FAIL	FAIL	FAIL
69192	69133	Clapton Lane south of Mayfields Close Portishead	SB	G	192	259	68	4.5	PASS	PASS	PASS
69111	61506	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	H	305	304	-1	0.1	PASS	PASS	PASS
61506	69111	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	H	285	286	1	0.1	PASS	PASS	PASS
2185	68217	B3133 Kenn Road south of M5 Overbridge Kenn	NB	F	364	366	2	0.1	PASS	PASS	PASS
68217	2185	B3133 Kenn Road south of M5 Overbridge Kenn	SB	F	382	395	13	0.7	PASS	PASS	PASS
312	61506	B3128 Tickenham Hill west of Towerhouse Lane	EB		260	316	56	3.3	PASS	PASS	PASS
61506	312	B3128 Tickenham Hill west of Towerhouse Lane	WB		248	303	55	3.3	PASS	PASS	PASS
2303	2029	Wolvershill Road south of M5 overbridge Banwell	NB	B	211	152	-59	4.3	PASS	PASS	PASS
2029	2303	Wolvershill Road south of M5 overbridge Banwell	SB	B	190	213	23	1.6	PASS	PASS	PASS
306	2023	Mill Lane south of Mill Close Portbury	NB		217	233	16	1.1	PASS	PASS	PASS
2023	306	Mill Lane south of Mill Close Portbury	SB		242	408	165	9.2	FAIL	FAIL	FAIL
61502	61501	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	E	736	734	-2	0.1	PASS	PASS	PASS
61501	61502	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	E	748	691	-58	2.2	PASS	PASS	PASS
2500	65066	The Runway - CAL - west of A371Locking Moor Road	EB		295	445	150	7.8	FAIL	FAIL	FAIL
65066	2500	The Runway - CAL - west of A371Locking Moor Road	WB		283	422	139	7.4	FAIL	FAIL	FAIL
61216	61229	A370 Somerset Avenue west of West Wick Rab W-s-M	EB		1,327	1,174	-152	4.3	PASS	PASS	PASS
61228	61216	A370 Somerset Avenue west of West Wick Rab W-s-M	WB		1,360	1,258	-103	2.8	PASS	PASS	PASS
2063	69127	A370 Rodyate Hill west of Warners Close Cleeve	NB	D	428	291	-137	7.2	FAIL	FAIL	FAIL
69127	2063	A370 Rodyate Hill west of Warners Close Cleeve	SB	D	449	333	-116	5.9	FAIL	FAIL	FAIL
2070	2069	BIA Main Entrance north of A38 Lulsgate	EB		531	478	-53	2.4	PASS	PASS	PASS
2069	2070	BIA Main Entrance north of A38 Lulsgate	WB		572	513	-60	2.6	PASS	PASS	PASS
9022	61499	BIA Silver Zone Parking - north of A38	EB		144	133	-11	0.9	PASS	PASS	PASS
61499	9022	BIA Silver Zone Parking - north of A38	WB		164	155	-9	0.7	PASS	PASS	PASS
9021	9020	BIA Freight Entrance Downside Road Lulsgate	NB		75	34	-41	5.5	PASS	FAIL	PASS
9020	9021	BIA Freight Entrance Downside Road Lulsgate	SB		66	30	-36	5.2	PASS	FAIL	PASS
61478	61221	A370 Somerset Avenue Total Westbound	WB	B	1,762	1,839	77	1.8	PASS	PASS	PASS
61174	61175	A38 just south of A370/A38 roundabout	NB		872	867	-5	0.2	PASS	PASS	PASS
61175	61174	A38 just south of A370/A38 roundabout	SB		814	772	-42	1.5	PASS	PASS	PASS
61175	62433	A370 just north of A370/A38 roundabout	NB		389	529	140	6.5	FAIL	FAIL	FAIL
62433	61175	A370 just north of A370/A38 roundabout	SB		466	500	33	1.5	PASS	PASS	PASS
61175	66359	A38 just east of A370/A38 roundabout	EB		541	558	17	0.7	PASS	PASS	PASS
66359	61175	A38 just east of A370/A38 roundabout	WB		517	493	-24	1.1	PASS	PASS	PASS
2020	308	B3129 Weston Rd, Failand	NB		77	58	-19	2.3	PASS	PASS	PASS
308	2020	B3129 Weston Rd, Failand	SB		77	57	-20	2.5	PASS	PASS	PASS
2019	2021	Flax Bourton Rd, Failand	NB		106	126	20	1.9	PASS	PASS	PASS
2021	2019	Flax Bourton Rd, Failand	SB		99	165	66	5.8	PASS	FAIL	PASS
69124	2007	Chelvey Rd, Backwell	NB		23	29	7	1.3	PASS	PASS	PASS
2007	69124	Chelvey Rd, Backwell	SB		26	51	25	4.0	PASS	PASS	PASS
2008	2007	Brockley Lane, Backwell	NB		44	51	6	0.9	PASS	PASS	PASS
2007	2008	Brockley Lane, Backwell	SB		49	63	14	1.8	PASS	PASS	PASS
2001	2002	Netherton Wood Lane, Nailsea	NB	H	59	56	-2	0.3	PASS	PASS	PASS
2002	2001	Netherton Wood Lane, Nailsea	SB	H	55	61	6	0.7	PASS	PASS	PASS
69110	2004	West End Lane, Nailsea	EB	H	23	23	-1	0.2	PASS	PASS	PASS
2004	69110	West End Lane, Nailsea	WB	H	27	43	16	2.7	PASS	PASS	PASS
2004	69109	Causeway, Tickenham	EB	H	86	76	-10	1.1	PASS	PASS	PASS
69109	2004	Causeway, Tickenham	WB	H	95	98	3	0.3	PASS	PASS	PASS
69137	325	Backwell Bow (North), Nailsea	EB	H	23	20	-3	0.6	PASS	PASS	PASS
325	69137	Backwell Bow (North), Nailsea	WB	H	26	27	0	0.1	PASS	PASS	PASS
2305	2330	Riverside, Banwell	NB		22	77	55	7.9	PASS	FAIL	PASS
2330	2305	Riverside, Banwell	SB		40	113	73	8.4	PASS	FAIL	PASS
69106	69110	Nailsea Wall, Kenn	EB		56	106	50	5.5	PASS	FAIL	PASS
69110	69106	Nailsea Wall, Kenn	WB		59	97	38	4.3	PASS	PASS	PASS
69105	69106	Kenmoor Rd, Kenn	NB		92	154	62	5.6	PASS	FAIL	PASS
69106	69105	Kenmoor Rd, Kenn	SB		89	160	72	6.4	PASS	FAIL	PASS
319	69108	Court Lane, Clevedon	NB		101	162	61	5.3	PASS	FAIL	PASS
69108	319	Court Lane, Clevedon	SB		93	170	78	6.8	PASS	FAIL	PASS
68217	69107	Davis Lane, Clevedon	EB	F	60	82	22	2.6	PASS	PASS	PASS
69107	68217	Davis Lane, Clevedon	WB	F	69	77	7	0.9	PASS	PASS	PASS
69130	69141	Half Yard, Langford	NB		50	46	-4	0.6	PASS	PASS	PASS
69141	69130	Half Yard, Langford	SB		48	42	-7	1.0	PASS	PASS	PASS
69141	2213	Long Lane (east of Wrington)	EB		39	42	3	0.4	PASS	PASS	PASS
2213	69141	Long Lane (east of Wrington)	WB		42	45	3	0.5	PASS	PASS	PASS
2304	2327	Summer Lane, Banwell	NB		73	60	-13	1.5	PASS	PASS	PASS
2327	2304	Summer Lane, Banwell	SB		60	90	30	3.4	PASS	PASS	PASS
2176	61172	M5 Between J21 and J22	SB	A	2,469	2,176	-293	6.1	PASS	FAIL	PASS
66458	2171	M5 Between J21 and J22	NB	A	2,844	2,710	-134	2.5	PASS	PASS	PASS
61995	61482	M5 Between J20 and J21	SB	C	3,296	2,999	-297	5.3	PASS	FAIL	PASS
61534	61493	M5 Between J20 and J21	NB	C	3,212	3,334	122	2.1	PASS	PASS	PASS
65730	65567	M5 Avonmouth Bridge north of J19	NB		4,235	4,071	-164	2.5	PASS	PASS	PASS
65486	65729	M5 Avonmouth Bridge north of J19	SB		3,984	3,745	-239	3.8	PASS	PASS	PASS
61680	61704	M5 Between J20 and J19	NB		3,435	3,136	-299	5.2	PASS	FAIL	PASS
61703	61495	M5 Between J20 and J19	SB		3,437	2,796	-641	11.5	FAIL	FAIL	FAIL
66456	61170	M5 Between J22 and J23	NB	I	2,906	3,349	443	7.9	FAIL	FAIL	FAIL
66457	61104	M5 Between J22 and J23	SB	I	2,561	2,633	72	1.4	PASS	PASS	PASS
2302	2101	A368 east of Congresbury	EB	C	568	547	-21	0.9	PASS	PASS	PASS
2101	2302	A368 east of Congresbury	WB	C	608	596	-12	0.5	PASS	PASS	PASS
61517	61524	A370 Long Ashton Bypass	EB		537	531	-6	0.3	PASS	PASS	PASS
61524	61517	A370 Long Ashton Bypass	WB		564	563	-1	0.0	PASS	PASS	PASS
2022	2021	B3218 north of Failand	EB		373	414	41	2.1	PASS	PASS	PASS
2021	2022	B3218 north of Failand	WB		153	433	280	16.3	FAIL	FAIL	FAIL
2325	61494	B3133 Ettlingen Way	EB	F	826	915	89	3.0	PASS	PASS	PASS
61494	2325	B3133 Ettlingen Way	WB	F	805	910	105	3.6	PASS	PASS	PASS
2079	69189	Station Road near Backwell Crossroads	NB	H	333	324	-9	0.5	PASS	PASS	PASS
69189	2079	Station Road near Backwell Crossroads	SB	H	327	328	2	0.1	PASS	PASS	PASS
61226	61271	A368 east of Churchill Gate	EB		167	209	42	3.0	PASS	PASS	PASS
61271	61226	A368 east of Churchill Gate	WB		183	184	1	0.1	PASS	PASS	PASS
61229	69161	Elmham Way	NB		849	438	-411	16.2	FAIL	FAIL	FAIL
69161	61217	Elmham Way	SB		860	460	-400	15.6	FAIL	FAIL	FAIL
61217	69166	A370 east of West Wick roundabout	EB		992	877	-115	3.8	PASS	PASS	PASS
61221	61227	A370 east of West Wick roundabout	WB		1,073	1,071	-2	0.1	PASS	PASS	PASS
61101	61467	Bristol Road south of Queensway	NB		752	805	53	1.9	PASS	PASS	PASS
61467	61101	Bristol Road south of Queensway	SB		686	722	36	1.3	PASS	PASS	PASS
61487	2107	B3133 south of Yatton	NB		468	412	-56	2.7	PASS	PASS	PASS
2107	61487	B3133 south of Yatton	SB		452	440	-12	0.6	PASS	PASS	PASS
61526	61707	Beggar Bush Lane	EB		138	50	-88	9.1	PASS	FAIL	PASS
61707	61526	Beggar Bush Lane	WB		153	44	-109	11.0	FAIL	FAIL	FAIL
69219	61544	A370 north of SBL	EB		988	781	-207	6.9	FAIL	FAIL	FAIL
61544	69219	A370 north of SBL	WB		1,139	810	-329	10.6	FAIL	FAIL	FAIL
69260	61166	B3139 Highbridge Road	NB		261	290	29	1.8	PASS	PASS	PASS
61166	69260	B3139 Highbridge Road	SB		233	309	77	4.7	PASS	PASS	PASS
69242	69241	B3141 Church Road	NB	I	115	104	-11	1.1	PASS	PASS	PASS
69241	69242	B3141 Church Road	SB	I	111	82	-29	3.0	PASS	PASS	PASS
69154	66362	B3139 Blackford Road	EB		122	147	25	2.1	PASS	PASS	PASS
66362	69154	B3139 Blackford Road	WB		113	129	16	1.5	PASS	PASS	PASS

					Enhanced NSSM: PM Peak						
a	b	Link Description	Direction	Screenline	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
61475	61476	A370 Somerset Ave, east of B3440 Merge	EB	B	2,013	1,862	-151	3.4	PASS	PASS	PASS
61221	61218	B3440 Bristol Rd., (A370 Off-Slip)	WB		1,094	1,203	109	3.2	PASS	PASS	PASS
2178	61515	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	NB		198	259	61	4.0	PASS	PASS	PASS
61515	2178	B3130 Barrow Street n/o Barrow Ct Cambridge Batch	SB		219	312	93	5.7	PASS	FAIL	PASS
2017	61508	A370 Main Road e/o B3129 Station Road Flax Bourton	EB	E	436	527	91	4.2	PASS	PASS	PASS
61508	2017	A370 Main Road e/o B3129 Station Road Flax Bourton	WB	E	821	891	70	2.4	PASS	PASS	PASS
2071	2113	A38 north of New Road Redhill	NB	D	635	776	141	5.3	FAIL	FAIL	FAIL
2113	2071	A38 north of New Road Redhill	SB	D	863	930	67	2.2	PASS	PASS	PASS
3011	69211	SBL south of Brookgate - Long ashton	NB		843	633	-210	7.7	FAIL	FAIL	FAIL
69211	3011	SBL south of Brookgate - Long ashton	SB		1,009	1,025	16	0.5	PASS	PASS	PASS
2067	2165	B3130 Chew Road east of Kentshare Lane Winford	EB		448	296	-152	7.9	FAIL	FAIL	FAIL
2165	2067	B3130 Chew Road east of Kentshare Lane Winford	WB		361	284	-77	4.3	PASS	PASS	PASS
2195	2197	B3133 Brinsea Road south of Silver St. Congresbury	NB		420	344	-76	3.9	PASS	PASS	PASS
2197	2195	B3133 Brinsea Road south of Silver St. Congresbury	SB		375	305	-70	3.8	PASS	PASS	PASS
2031	2193	A371 west of M5 overbridge Locking	EB	B	478	459	-19	0.9	PASS	PASS	PASS
2193	2031	A371 west of M5 overbridge Locking	WB	B	509	433	-76	3.5	PASS	PASS	PASS
69134	61713	A369 The Portbury Hundred west of M5 Junc 19 Rab	EB	G	1,043	895	-149	4.8	PASS	PASS	PASS
61712	69134	A369 The Portbury Hundred west of M5 Junc 19 Rab	WB	G	1,446	1,466	20	0.5	PASS	PASS	PASS
2008	9020	Brockley Combe Road west of Downside Road Lulsgate	EB		214	193	-20	1.4	PASS	PASS	PASS
9020	2008	Brockley Combe Road west of Downside Road Lulsgate	WB		264	190	-74	4.9	PASS	PASS	PASS
311	3009	A38 Bridgwater Road east of Yanley Lane Dundry	NB		861	800	-61	2.1	PASS	PASS	PASS
3009	311	A38 Bridgwater Road east of Yanley Lane Dundry	SB		1,099	877	-222	7.1	FAIL	FAIL	FAIL
2141	2115	A368 East Street east of Dark Lane Banwell	EB	C	224	347	123	7.3	FAIL	FAIL	FAIL
2115	2141	A368 East Street east of Dark Lane Banwell	WB	C	265	352	86	4.9	PASS	PASS	PASS
2087	61214	A371 Banwell Road east of Castle Hill Banwell	NB	C	387	400	14	0.7	PASS	PASS	PASS
61214	2087	A371 Banwell Road east of Castle Hill Banwell	SB	C	249	297	49	3.0	PASS	PASS	PASS
61207	69331	A38 Bridgwater Road south of A371 Sidcot	NB	A	578	666	88	3.5	PASS	PASS	PASS
69331	61207	A38 Bridgwater Road south of A371 Sidcot	SB	A	718	673	-45	1.7	PASS	PASS	PASS
69144	64979	A369 Martcombe Road south of High Street Portbury	NB		987	1,003	16	0.5	PASS	PASS	PASS
64979	69144	A369 Martcombe Road south of High Street Portbury	SB		973	628	-344	12.2	FAIL	FAIL	FAIL
69176	61705	A369 west of B3129 Beggarbush Lane Leigh Woods	EB		948	781	-168	5.7	FAIL	FAIL	FAIL
61705	69176	A369 west of B3129 Beggarbush Lane Leigh Woods	WB		937	894	-43	1.4	PASS	PASS	PASS
69103	61304	Oldmixon Road east of Broadway, Hutton	EB		310	230	-80	4.9	PASS	PASS	PASS
61304	69103	Oldmixon Road east of Broadway, Hutton	WB		177	199	22	1.6	PASS	PASS	PASS
61303	69104	A370 (River Axe bridge)	NB	A	669	566	-103	4.2	FAIL	PASS	PASS
69104	61303	A370 (River Axe bridge)	SB	A	768	722	-45	1.7	PASS	PASS	PASS
61498	69173	B3124 Walton Road east of Holly Lane Clevedon	EB	F	500	527	26	1.2	PASS	PASS	PASS
69173	61498	B3124 Walton Road east of Holly Lane Clevedon	WB	F	483	506	23	1.0	PASS	PASS	PASS
69133	69192	Clapton Lane south of Mayfields Close Portishead	NB	G	530	432	-98	4.5	PASS	PASS	PASS
69192	69133	Clapton Lane south of Mayfields Close Portishead	SB	G	310	396	86	4.6	PASS	PASS	PASS
69111	61506	B3130 Clevedon Road s/o Tickenham Hill Nailsea	NB	H	467	458	-9	0.4	PASS	PASS	PASS
61506	69111	B3130 Clevedon Road s/o Tickenham Hill Nailsea	SB	H	381	360	-21	1.1	PASS	PASS	PASS
2185	68217	B3133 Kenn Road south of M5 Overbridge Kenn	NB	F	427	453	26	1.2	PASS	PASS	PASS
68217	2185	B3133 Kenn Road south of M5 Overbridge Kenn	SB	F	574	570	-3	0.1	PASS	PASS	PASS
312	61506	B3128 Tickenham Hill west of Towerhouse Lane	EB		352	450	97	4.9	PASS	PASS	PASS
61506	312	B3128 Tickenham Hill west of Towerhouse Lane	WB		457	313	-144	7.3	FAIL	FAIL	FAIL
2303	2029	Wolvershill Road south of M5 overbridge Banwell	NB	B	302	317	14	0.8	PASS	PASS	PASS
2029	2303	Wolvershill Road south of M5 overbridge Banwell	SB	B	270	330	60	3.5	PASS	PASS	PASS
306	2023	Mill Lane south of Mill Close Portbury	NB		332	260	-72	4.2	PASS	PASS	PASS
2023	306	Mill Lane south of Mill Close Portbury	SB		301	411	111	5.9	FAIL	FAIL	FAIL
61502	61501	A38 Bridgwater Road west of Dial Lane, Potters Hill	NB	E	879	941	62	2.1	PASS	PASS	PASS
61501	61502	A38 Bridgwater Road west of Dial Lane, Potters Hill	SB	E	941	935	-6	0.2	PASS	PASS	PASS
2500	65066	The Runway - CAL - west of A371Locking Moor Road	EB		500	485	-15	0.7	PASS	PASS	PASS
65066	2500	The Runway - CAL - west of A371Locking Moor Road	WB		505	570	65	2.8	PASS	PASS	PASS
61216	61229	A370 Somerset Avenue west of West Wick Rab W-s-M	EB		1,535	1,353	-182	4.8	PASS	PASS	PASS
61228	61216	A370 Somerset Avenue west of West Wick Rab W-s-M	WB		1,938	1,940	2	0.0	PASS	PASS	PASS
2063	69127	A370 Rodyate Hill west of Warners Close Cleeve	NB	D	487	353	-135	6.6	FAIL	FAIL	FAIL
69127	2063	A370 Rodyate Hill west of Warners Close Cleeve	SB	D	790	631	-158	5.9	FAIL	FAIL	FAIL
2070	2069	BIA Main Entrance north of A38 Lulsgate	EB		583	539	-44	1.9	PASS	PASS	PASS
2069	2070	BIA Main Entrance north of A38 Lulsgate	WB		517	458	-59	2.7	PASS	PASS	PASS
9022	61499	BIA Silver Zone Parking - north of A38	EB		189	235	46	3.2	PASS	PASS	PASS
61499	9022	BIA Silver Zone Parking - north of A38	WB		103	99	-4	0.4	PASS	PASS	PASS
9021	9020	BIA Freight Entrance Downside Road Lulsgate	NB		103	45	-58	6.8	PASS	FAIL	PASS
9020	9021	BIA Freight Entrance Downside Road Lulsgate	SB		76	32	-44	5.9	PASS	FAIL	PASS
61478	61221	A370 Somerset Avenue Total Westbound	WB	B	3,298	3,147	-151	2.7	PASS	PASS	PASS
61174	61175	A38 just south of A370/A38 roundabout	NB		955	872	-83	2.7	PASS	PASS	PASS
61175	61174	A38 just south of A370/A38 roundabout	SB		915	978	63	2.1	PASS	PASS	PASS
61175	62433	A370 just north of A370/A38 roundabout	NB		531	647	116	4.8	FAIL	PASS	PASS
62433	61175	A370 just north of A370/A38 roundabout	SB		611	709	99	3.8	PASS	PASS	PASS
61175	66359	A38 just east of A370/A38 roundabout	EB		637	627	-9	0.4	PASS	PASS	PASS
66359	61175	A38 just east of A370/A38 roundabout	WB		613	671	58	2.3	PASS	PASS	PASS
2020	308	B3129 Weston Rd, Failand	NB		86	69	-16	1.8	PASS	PASS	PASS
308	2020	B3129 Weston Rd, Failand	SB		157	235	78	5.6	PASS	FAIL	PASS
2019	2021	Flax Bourton Rd, Failand	NB		175	171	-4	0.3	PASS	PASS	PASS
2021	2019	Flax Bourton Rd, Failand	SB		154	239	85	6.0	PASS	FAIL	PASS
69124	2007	Chelvey Rd, Backwell	NB		31	40	10	1.6	PASS	PASS	PASS
2007	69124	Chelvey Rd, Backwell	SB		37	69	33	4.5	PASS	PASS	PASS
2008	2007	Brockley Lane, Backwell	NB		81	75	-6	0.7	PASS	PASS	PASS
2007	2008	Brockley Lane, Backwell	SB		83	40	-43	5.4	PASS	FAIL	PASS
2001	2002	Netherton Wood Lane, Nailsea	NB	H	101	90	-10	1.0	PASS	PASS	PASS
2002	2001	Netherton Wood Lane, Nailsea	SB	H	93	60	-32	3.7	PASS	PASS	PASS
69110	2004	West End Lane, Nailsea	EB	H	42	66	24	3.3	PASS	PASS	PASS
2004	69110	West End Lane, Nailsea	WB	H	64	94	31	3.5	PASS	PASS	PASS
2004	69109	Causeway, Tickenham	EB	H	117	115	-2	0.2	PASS	PASS	PASS
69109	2004	Causeway, Tickenham	WB	H	177	155	-22	1.7	PASS	PASS	PASS
69137	325	Backwell Bow (North), Nailsea	EB	H	33	49	16	2.5	PASS	PASS	PASS
325	69137	Backwell Bow (North), Nailsea	WB	H	56	47	-8	1.2	PASS	PASS	PASS
2305	2330	Riverside, Banwell	NB		20	113	93	11.4	PASS	FAIL	PASS
2330	2305	Riverside, Banwell	SB		89	141	51	4.8	PASS	PASS	PASS
69106	69110	Nailsea Wall, Kenn	EB		97	198	101	8.4	FAIL	FAIL	FAIL
69110	69106	Nailsea Wall, Kenn	WB		113	191	78	6.3	PASS	FAIL	PASS
69105	69106	Kenmoor Rd, Kenn	NB		122	192	70	5.6	PASS	FAIL	PASS
69106	69105	Kenmoor Rd, Kenn	SB		172	192	20	1.5	PASS	PASS	PASS
319	69108	Court Lane, Clevedon	NB		137	183	46	3.7	PASS	PASS	PASS
69108	319	Court Lane, Clevedon	SB		182	184	2	0.2	PASS	PASS	PASS
68217	69107	Davis Lane, Clevedon	EB	F	130	157	28	2.3	PASS	PASS	PASS
69107	68217	Davis Lane, Clevedon	WB	F	122	148	26	2.2	PASS	PASS	PASS
69130	69141	Half Yard, Langford	NB		74	49	-25	3.2	PASS	PASS	PASS
69141	69130	Half Yard, Langford	SB		73	41	-32	4.2	PASS	PASS	PASS
69141	2213	Long Lane (east of Wrington)	EB		51	73	22	2.8	PASS	PASS	PASS
2213	69141	Long Lane (east of Wrington)	WB		88	88	0	0.0	PASS	PASS	PASS
2304	2327	Summer Lane, Banwell	NB		112	99	-13	1.3	PASS	PASS	PASS
2327	2304	Summer Lane, Banwell	SB		109	148	39	3.5	PASS	PASS	PASS
2176	61172	M5 Between J21 and J22	SB	A	2,826	2,760	-65	1.2	PASS	PASS	PASS
66458	2171	M5 Between J21 and J22	NB	A	2,773	2,579	-194	3.8	PASS	PASS	PASS
61995	61482	M5 Between J20 and J21	SB	C	4,522	4,680	158	2.3	PASS	PASS	PASS
61534	61493	M5 Between J20 and J21	NB	C	3,191	3,099	-92	1.6	PASS	PASS	PASS
65730	65567	M5 Avonmouth Bridge north of J19	NB		4,447	4,334	-113	1.7	PASS	PASS	PASS
65486	65729	M5 Avonmouth Bridge north of J19	SB		4,960	5,878	918	12.5	FAIL	FAIL	FAIL
61680	61704	M5 Between J20 and J19	NB		3,370	2,894	-476	8.5	FAIL	FAIL	FAIL
61703	61495	M5 Between J20 and J19	SB		4,587	4,592	5	0.1	PASS	PASS	PASS
66456	61170	M5 Between J22 and J23	NB	I	3,060	3,093	33	0.6	PASS	PASS	PASS
66457	61104	M5 Between J22 and J23	SB	I	2,991	2,881	-110	2.0	PASS	PASS	PASS
2302	2101	A368 east of Congresbury	EB	C	667	606	-61	2.4	PASS	PASS	PASS
2101	2302	A368 east of Congresbury	WB	C	912	782	-130	4.5	PASS	PASS	PASS
2055	66363	New Road (through Shipham)	NB		137	174	37	3.0	PASS	PASS	PASS
66363	2055	New Road (through Shipham)	SB		210	175	-35	2.5	PASS	PASS	PASS

					Enhanced NSSM: PM Peak						
a	b	Link Description	Direction	Screenline	Obs	Mod	Diff	GEH	Flow Criteria	GEH Criteria	TAG Criteria
61517	61524	A370 Long Ashton Bypass	EB		601	691	90	3.5	PASS	PASS	PASS
61524	61517	A370 Long Ashton Bypass	WB		970	889	-81	2.7	PASS	PASS	PASS
2022	2021	B3218 north of Failand	EB		513	535	22	1.0	PASS	PASS	PASS
2021	2022	B3218 north of Failand	WB		785	752	-33	1.2	PASS	PASS	PASS
2326	69108	B3130 Tickenham Road	EB	F	659	595	-64	2.5	PASS	PASS	PASS
69108	2326	B3130 Tickenham Road	WB	F	756	781	25	0.9	PASS	PASS	PASS
2325	61494	B3133 Ettlingen Way	EB	F	1,352	1,354	2	0.0	PASS	PASS	PASS
61494	2325	B3133 Ettlingen Way	WB	F	1,520	1,471	-49	1.3	PASS	PASS	PASS
2079	69189	Station Road near Backwell Crossroads	NB	H	427	365	-62	3.1	PASS	PASS	PASS
69189	2079	Station Road near Backwell Crossroads	SB	H	378	414	36	1.8	PASS	PASS	PASS
61226	61271	A368 east of Churchill Gate	EB		247	318	71	4.2	PASS	PASS	PASS
61271	61226	A368 east of Churchill Gate	WB		312	341	29	1.6	PASS	PASS	PASS
61229	69161	Elmham Way	NB		1,225	1,048	-177	5.3	PASS	FAIL	PASS
69161	61217	Elmham Way	SB		894	950	56	1.8	PASS	PASS	PASS
61217	69166	A370 east of West Wick roundabout	EB		1,181	1,143	-38	1.1	PASS	PASS	PASS
61221	61227	A370 east of West Wick roundabout	WB		2,060	1,944	-116	2.6	PASS	PASS	PASS
2314	61218	Scot Elm Drive	NB		108	143	35	3.2	PASS	PASS	PASS
61218	2314	Scot Elm Drive	SB		107	73	-34	3.6	PASS	PASS	PASS
61219	61475	B3440 EB onslip to A370	EB		752	735	-17	0.6	PASS	PASS	PASS
61101	61467	Bristol Road south of Queensway	NB		1,062	1,213	151	4.5	PASS	PASS	PASS
61467	61101	Bristol Road south of Queensway	SB		783	732	-51	1.9	PASS	PASS	PASS
61487	2107	B3133 south of Yatton	NB		458	456	-2	0.1	PASS	PASS	PASS
2107	61487	B3133 south of Yatton	SB		417	386	-31	1.5	PASS	PASS	PASS
69127	69140	Bishops Road, Claverham	NB		192	152	-40	3.1	PASS	PASS	PASS
69140	69127	Bishops Road, Claverham	SB		115	111	-4	0.4	PASS	PASS	PASS
2013	2014	Wraxhall Hill	NB		163	280	117	7.8	FAIL	FAIL	FAIL
2014	2013	Wraxhall Hill	SB		365	428	63	3.2	PASS	PASS	PASS
2013	61507	B3130 Bristol Road	SB		342	333	-9	0.5	PASS	PASS	PASS
61507	2013	B3130 Bristol Road	NB		473	361	-112	5.5	FAIL	FAIL	FAIL
61507	2018	B3129 Belmont Hill	NB		204	171	-33	2.4	PASS	PASS	PASS
2018	61507	B3129 Belmont Hill	SB		244	405	161	8.9	FAIL	FAIL	FAIL
65772	310	Weston Road west of Long Ashton	EB		122	176	54	4.4	PASS	PASS	PASS
310	65772	Weston Road west of Long Ashton	WB		212	198	-14	1.0	PASS	PASS	PASS
61526	61707	Beggar Bush Lane	EB		130	82	-48	4.7	PASS	PASS	PASS
61707	61526	Beggar Bush Lane	WB		329	250	-79	4.7	PASS	PASS	PASS
309	2025	B3128 Clarken Coombe	EB		541	299	-242	11.8	FAIL	FAIL	FAIL
2025	309	B3128 Clarken Coombe	WB		632	602	-30	1.2	PASS	PASS	PASS
310	2024	Long Ashton Road	NB		180	153	-27	2.1	PASS	PASS	PASS
2024	310	Long Ashton Road	SB		387	411	24	1.2	PASS	PASS	PASS
69219	61544	A370 north of SBL	EB		1,103	732	-371	12.2	FAIL	FAIL	FAIL
61544	69219	A370 north of SBL	WB		1,613	1,300	-313	8.2	FAIL	FAIL	FAIL
315	2013	B3130	EB	H	345	440	95	4.8	PASS	PASS	PASS
2013	315	B3130	WB	H	589	614	25	1.0	PASS	PASS	PASS
69260	61166	B3139 Highbridge Road	NB		307	310	3	0.1	PASS	PASS	PASS
61166	69260	B3139 Highbridge Road	SB		285	300	15	0.9	PASS	PASS	PASS
69242	69241	B3141 Church Road	NB	I	151	152	1	0.1	PASS	PASS	PASS
69241	69242	B3141 Church Road	SB	I	187	120	-67	5.4	PASS	FAIL	PASS
69154	66362	B3139 Blackford Road	EB		181	220	39	2.8	PASS	PASS	PASS
66362	69154	B3139 Blackford Road	WB		144	191	47	3.6	PASS	PASS	PASS
69263	69233	A38 Bristol Road	EB		369	450	81	4.0	PASS	PASS	PASS
69233	69263	A38 Bristol Road	WB		617	571	-46	1.9	PASS	PASS	PASS

Appendix D: Screenline Results

Base Enhanced NSSM: AM Peak

SCREENLINE A

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
A1	A370 Bridgwater Rd	NB	805	818	13	2%	0.5	PASS	PASS
A2	M5	NB	2,648	2,745	97	4%	1.9	PASS	PASS
A3	A38 Bridgwater Rd	NB	620	535	-85	-14%	3.5	PASS	PASS
Total			4,073	4,098	25	1%	0.4		
A1	A370 Bridgwater Rd	SB	628	682	54	9%	2.1	PASS	PASS
A2	M5	SB	2,523	2,508	-15	-1%	0.3	PASS	PASS
A3	A38 Bridgwater Rd	SB	533	594	61	12%	2.6	PASS	PASS
Total			3,684	3,784	100	3%	1.6		

SCREENLINE B

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
B1	A370 Somerset Av	EB	2,687	2,567	-120	-4%	2.3	PASS	PASS
B2	Wolvershill Rd	SB	224	260	36	16%	2.3	PASS	PASS
B3	A371	EB	563	510	-53	-9%	2.3	PASS	PASS
Total			3,474	3,337	-137	-4%	2.4		
B1	A370 Somerset Av	WB	2,169	2,200	31	1%	0.7	PASS	PASS
B2	Wolvershill Rd	NB	320	334	14	4%	0.8	PASS	PASS
B3	A371	WB	433	420	-13	-3%	0.6	PASS	PASS
Total			2,922	2,954	32	1%	0.6		

SCREENLINE C

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
C1	A370 Bristol Rd	EB	552	451	-101	-18%	4.5	FAIL	PASS
C2	A368 Towerhead Rd	EB	377	334	-43	-11%	2.3	PASS	PASS
C3	A371 Castle Hill	SB	242	316	74	31%	4.4	PASS	PASS
Total			1,171	1,101	-70	-6%	2.1		
C1	A370 Bristol Rd	WB	732	704	-28	-4%	1.0	PASS	PASS
C2	A368 Towerhead Rd	WB	212	313	101	48%	6.2	FAIL	FAIL
C3	A371 Castle Hill	NB	348	319	-29	-8%	1.6	PASS	PASS
Total			1,292	1,336	44	3%	1.2		

SCREENLINE D

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
D1	A370 Main Rd	NB	568	385	-183	-32%	8.4	FAIL	FAIL
D2	A38 Bristol Rd	NB	852	964	112	13%	3.7	PASS	PASS
Total			1,420	1,349	-71	-5.0%	1.9		
D1	A370 Main Rd	SB	450	362	-88	-20%	4.4	PASS	PASS
D2	A38 Bristol Rd	SB	551	613	62	11%	2.6	PASS	PASS
Total			1,001	975	-26	-3%	0.8		

SCREENLINE E

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
E1	A370 Main Rd	EB	663	617	-46	-7%	1.8	PASS	PASS
E2	A38 Bridgwater Rd	EB	968	1,008	40	4%	1.3	PASS	PASS
Total			1,631	1,625	-6	0%	0.2		
E1	A370 Main Rd	WB	470	591	121	26%	5.3	FAIL	FAIL
E2	A38 Bridgwater Rd	WB	724	770	46	6%	1.7	PASS	PASS
Total			1,194	1,361	167	14%	4.7		

Base Enhanced NSSM: AM Peak

SCREENLINE F

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
F1	B3124 Walton Rd (to Portishead)	EB	508	481	-27	-5%	1.2	PASS	PASS
F2	B3130 Tickenham Rd	EB	797	677	-120	-15%	4.4	FAIL	PASS
F3	B3133 Ettlingen Way	EB	1,421	1,622	201	14%	5.2	PASS	FAIL
F4	Davis Lane	EB	124	133	10	8%	0.8	PASS	PASS
F5	B3133 Kenn Road	SB	379	405	26	7%	1.3	PASS	PASS
Total			3,228	3,318	90	3%	1.6		
F1	B3124 Walton Rd (from Portishead)	WB	472	557	85	18%	3.7	PASS	PASS
F2	B3130 Tickenham Rd	WB	702	727	25	4%	0.9	PASS	PASS
F3	B3133 Ettlingen Way	WB	1,626	1,391	-235	-14%	6.1	PASS	FAIL
F4	Davis Lane	WB	85	165	80	94%	7.1	PASS	FAIL
F5	B3133 Kenn Road	NB	479	549	70	15%	3.1	PASS	PASS
Total			3,364	3,389	25	1%	0.4		

SCREENLINE G

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
G2	Clapton Lane	NB	346	350	4	1%	0.2	PASS	PASS
G1	A369 Portbury Hundred	WB	1,014	1,017	3	0%	0.1	PASS	PASS
Total			1,360	1,367	7	1%	0.2		
G2	Clapton Lane	SB	504	504	0	0%	0.0	PASS	PASS
G1	A369 Portbury Hundred	EB	1,266	1,189	-77	-6%	2.2	PASS	PASS
Total			1,770	1,693	-77	-4%	1.9		

SCREENLINE H

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
H1	B3130 Clevedon Road	SB	457	464	7	2%	0.3	PASS	PASS
H2	B3130 Stanton Lane	WB	361	388	27	7%	1.4	PASS	PASS
H3	Backwell Bow	WB	31	29	-2	-6%	0.4	PASS	PASS
H4	Station Road	NB	380	336	-44	-12%	2.3	PASS	PASS
H5	Netherton Wood Lane	NB	90	93	3	4%	0.3	PASS	PASS
H6	West End Lane	EB	49	92	43	89%	5.2	PASS	FAIL
H7	Causeway	WB	103	94	-9	-8%	0.9	PASS	PASS
Total			1,470	1,496	26	2%	0.7		
H1	B3130 Clevedon Road	NB	419	409	-10	-2%	0.5	PASS	PASS
H2	B3130 Stanton Lane	EB	594	515	-79	-13%	3.4	PASS	PASS
H3	Backwell Bow	EB	40	58	19	47%	2.6	PASS	PASS
H4	Station Road	SB	317	398	81	26%	4.3	PASS	PASS
H5	Netherton Wood Lane	SB	116	89	-27	-23%	2.6	PASS	PASS
H6	West End Lane	WB	24	57	34	143%	5.3	PASS	FAIL
H7	Causeway	EB	214	143	-71	-33%	5.3	PASS	FAIL
Total			1,722	1,669	-53	-3%	1.3		

Base Enhanced NSSM: Interpeak

SCREENLINE A

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
A1	A370 Bridgwater Rd	NB	501	618	117	23%	4.9	PASS	PASS
A2	M5	NB	2,844	2,710	-134	-5%	2.5	PASS	PASS
A3	A38 Bridgwater Rd	NB	486	558	72	15%	3.2	PASS	PASS
Total			3,830	3,885	54	1%	0.9		
A1	A370 Bridgwater Rd	SB	515	565	50	10%	2.1	PASS	PASS
A2	M5	SB	2,469	2,176	-293	-12%	6.1	PASS	FAIL
A3	A38 Bridgwater Rd	SB	493	532	39	8%	1.7	PASS	PASS
Total			3,476	3,273	-203	-6%	3.5		

SCREENLINE B

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
B1	A370 Somerset Av	EB	1,637	1,625	-11	-1%	0.3	PASS	PASS
B2	Wolvershill Rd	SB	190	213	23	12%	1.6	PASS	PASS
B3	A371	EB	385	365	-20	-5%	1.0	PASS	PASS
Total			2,211	2,203	-9	0%	0.2		
B1	A370 Somerset Av	WB	1,762	1,839	77	4%	1.8	PASS	PASS
B2	Wolvershill Rd	NB	211	152	-59	-28%	4.3	PASS	PASS
B3	A371	WB	402	345	-57	-14%	2.9	PASS	PASS
Total			2,375	2,337	-38	-2%	0.8		

SCREENLINE C

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
C1	A370 Bristol Rd	EB	568	547	-21	-4%	0.9	PASS	PASS
C2	A368 Towerhead Rd	EB	195	285	90	46%	5.8	PASS	FAIL
C3	A371 Castle Hill	SB	212	252	40	19%	2.6	PASS	PASS
Total			975	1,084	109	11%	3.4		
C1	A370 Bristol Rd	WB	608	596	-12	-2%	0.5	PASS	PASS
C2	A368 Towerhead Rd	WB	198	257	59	30%	3.9	PASS	PASS
C3	A371 Castle Hill	NB	238	222	-16	-7%	1.1	PASS	PASS
Total			1,044	1,076	31	3%	1.0		

SCREENLINE D

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
D1	A370 Main Rd	NB	428	291	-137	-32%	7.2	FAIL	FAIL
D2	A38 Bristol Rd	NB	534	707	172	32%	6.9	FAIL	FAIL
Total			962	998	36	4%	1.1		
D1	A370 Main Rd	SB	449	333	-116	-26%	5.9	FAIL	FAIL
D2	A38 Bristol Rd	SB	514	645	131	25%	5.4	FAIL	FAIL
Total			963	978	15	2%	0.5		

SCREENLINE E

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
E1	A370 Main Rd	EB	395	480	86	22%	4.1	PASS	PASS
E2	A38 Bridgwater Rd	EB	736	734	-2	0%	0.1	PASS	PASS
Total			1,131	1,214	84	7%	2.4		
E1	A370 Main Rd	WB	448	615	167	37%	7.2	FAIL	FAIL
E2	A38 Bridgwater Rd	WB	748	691	-58	-8%	2.2	PASS	PASS
Total			1,197	1,306	109	9%	3.1		

Base Enhanced NSSM: Interpeak

SCREENLINE F

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
F1	B3124 Walton Rd (to Portishead)	EB	352	431	79	23%	4.0	PASS	PASS
F2	B3130 TickenhIP Rd	EB	434	404	-30	-7%	1.4	PASS	PASS
F3	B3133 Ettlingen Way	EB	824	915	91	11%	3.1	PASS	PASS
F4	Davis Lane	EB	60	82	22	36%	2.6	PASS	PASS
F5	B3133 Kenn Road	SB	382	395	13	3%	0.7	PASS	PASS
Total			2,052	2,227	175	9%	3.8		
F1	B3124 Walton Rd (from Portishead)	WB	356	439	82	23%	4.1	PASS	PASS
F2	B3130 TickenhIP Rd	WB	426	408	-18	-4%	0.9	PASS	PASS
F3	B3133 Ettlingen Way	WB	772	910	138	18%	4.8	FAIL	PASS
F4	Davis Lane	WB	69	77	7	11%	0.9	PASS	PASS
F5	B3133 Kenn Road	NB	364	366	2	1%	0.1	PASS	PASS
Total			1,988	2,199	211	11%	4.6		

SCREENLINE G

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
G2	Clapton Lane	NB	201	302	101	50%	6.4	FAIL	FAIL
G1	A369 Portbury Hundred	WB	838	800	-38	-4%	1.3	PASS	PASS
Total			1,039	1,102	63	6%	1.9		
G2	Clapton Lane	SB	192	259	68	35%	4.5	PASS	PASS
G1	A369 Portbury Hundred	EB	819	791	-28	-3%	1.0	PASS	PASS
Total			1,011	1,051	40	4%	1.2		

SCREENLINE H

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
H1	B3130 Clevedon Road	SB	285	286	1	0%	0.1	PASS	PASS
H2	B3130 Stanton Lane	WB	402	401	-1	0%	0.1	PASS	PASS
H3	Backwell Bow	WB	26	27	0	1%	0.1	PASS	PASS
H4	Station Road	NB	333	324	-9	-3%	0.5	PASS	PASS
H5	Netherton Wood Lane	NB	59	56	-2	-4%	0.3	PASS	PASS
H6	West End Lane	EB	23	23	-1	-3%	0.2	PASS	PASS
H7	Causeway	WB	95	98	3	3%	0.3	PASS	PASS
Total			1,223	1,215	-8	-1%	0.2		
H1	B3130 Clevedon Road	NB	305	304	-1	0%	0.1	PASS	PASS
H2	B3130 Stanton Lane	EB	372	351	-20	-5%	1.1	PASS	PASS
H3	Backwell Bow	EB	23	20	-3	-13%	0.6	PASS	PASS
H4	Station Road	SB	327	328	2	1%	0.1	PASS	PASS
H5	Netherton Wood Lane	SB	55	61	6	10%	0.7	PASS	PASS
H6	West End Lane	WB	27	43	16	58%	2.7	PASS	PASS
H7	Causeway	EB	86	76	-10	-11%	1.1	PASS	PASS
Total			1,194	1,183	-11	-1%	0.3		

Base Enhanced NSSM: PM Peak

SCREENLINE A

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
A1	A370 Bridgwater Rd	NB	669	565	-104	-16%	4.2	PASS	PASS
A2	M5	NB	2,773	2,579	-194	-7%	3.7	PASS	PASS
A3	A38 Bridgwater Rd	NB	578	666	88	15%	3.5	PASS	PASS
Total			4,020	3,811	-209	-5%	3.3		
A1	A370 Bridgwater Rd	SB	768	722	-45	-6%	1.7	PASS	PASS
A2	M5	SB	2,826	2,760	-65	-2%	1.2	PASS	PASS
A3	A38 Bridgwater Rd	SB	718	674	-44	-6%	1.7	PASS	PASS
Total			4,312	4,157	-155	-4%	2.4		

SCREENLINE B

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
B1	A370 Somerset Av	EB	2,013	1,865	-148	-7%	3.4	PASS	PASS
B2	Wolvershill Rd	SB	270	330	60	22%	3.5	PASS	PASS
B3	A371	EB	478	459	-19	-4%	0.9	PASS	PASS
Total			2,761	2,654	-107	-4%	2.1		
B1	A370 Somerset Av	WB	3,298	3,148	-151	-5%	2.7	PASS	PASS
B2	Wolvershill Rd	NB	302	316	14	5%	0.8	PASS	PASS
B3	A371	WB	509	433	-75	-15%	3.5	PASS	PASS
Total			4,109	3,898	-212	-5%	3.3		

SCREENLINE C

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
C1	A370 Bristol Rd	EB	667	607	-60	-9%	2.4	PASS	PASS
C2	A368 Towerhead Rd	EB	224	347	123	55%	7.3	FAIL	FAIL
C3	A371 Castle Hill	SB	249	298	49	20%	3.0	PASS	PASS
Total			1,140	1,251	112	10%	3.2		
C1	A370 Bristol Rd	WB	912	782	-130	-14%	4.5	PASS	PASS
C2	A368 Towerhead Rd	WB	265	353	88	33%	5.0	PASS	PASS
C3	A371 Castle Hill	NB	387	400	13	3%	0.6	PASS	PASS
Total			1,564	1,534	-30	-2%	0.8		

SCREENLINE D

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
D1	A370 Main Rd	NB	487	352	-135	-28%	6.6	FAIL	FAIL
D2	A38 Bristol Rd	NB	635	777	141	22%	5.3	FAIL	FAIL
Total			1,123	1,129	6	1%	0.2		
D1	A370 Main Rd	SB	790	631	-158	-20%	5.9	FAIL	FAIL
D2	A38 Bristol Rd	SB	863	931	68	8%	2.3	PASS	PASS
Total			1,652	1,562	-91	-5%	2.3		

SCREENLINE E

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
E1	A370 Main Rd	EB	436	527	91	21%	4.2	PASS	PASS
E2	A38 Bridgwater Rd	EB	879	942	63	7%	2.1	PASS	PASS
Total			1,315	1,469	154	12%	4.1		
E1	A370 Main Rd	WB	821	891	70	9%	2.4	PASS	PASS
E2	A38 Bridgwater Rd	WB	941	936	-6	-1%	0.2	PASS	PASS
Total			1,762	1,827	65	4%	1.5		

Base Enhanced NSSM: PM Peak

SCREENLINE F

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
F1	B3124 Walton Rd (to Portishead)	EB	500	527	27	5%	1.2	PASS	PASS
F2	B3130 TickenhPM Rd	EB	659	595	-64	-10%	2.5	PASS	PASS
F3	B3133 Ettlingen Way	EB	1,352	1,353	1	0%	0.0	PASS	PASS
F4	Davis Lane	EB	130	158	28	21%	2.3	PASS	PASS
F5	B3133 Kenn Road	SB	574	570	-3	-1%	0.1	PASS	PASS
Total			3,214	3,203	-11	0%	0.2		
F1	B3124 Walton Rd (from Portishead)	WB	483	507	23	5%	1.0	PASS	PASS
F2	B3130 TickenhPM Rd	WB	756	782	26	3%	0.9	PASS	PASS
F3	B3133 Ettlingen Way	WB	1,520	1,471	-49	-3%	1.3	PASS	PASS
F4	Davis Lane	WB	122	148	26	21%	2.2	PASS	PASS
F5	B3133 Kenn Road	NB	427	453	26	6%	1.3	PASS	PASS
Total			3,308	3,360	52	2%	0.9		

SCREENLINE G

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
G2	Clapton Lane	NB	530	432	-98	-18%	4.5	PASS	PASS
G1	A369 Portbury Hundred	WB	1,446	1,465	19	1%	0.5	PASS	PASS
Total			1,976	1,897	-79	-4%	1.8		
G2	Clapton Lane	SB	310	396	86	28%	4.6	PASS	PASS
G1	A369 Portbury Hundred	EB	1,043	895	-149	-14%	4.8	PASS	PASS
Total			1,353	1,290	-63	-5%	1.7		

SCREENLINE H

Count ID	Link Description	Dir	Obs	Mod	Diff	% Diff	GEH	Criteria 1: Flow Bands	Criteria 2: GEH
H1	B3130 Clevedon Road	SB	381	361	-21	-5%	1.1	PASS	PASS
H2	B3130 Stanton Lane	WB	589	614	25	4%	1.0	PASS	PASS
H3	Backwell Bow	WB	56	47	-8	-15%	1.2	PASS	PASS
H4	Station Road	NB	427	383	-44	-10%	2.2	PASS	PASS
H5	Netherton Wood Lane	NB	101	90	-10	-10%	1.0	PASS	PASS
H6	West End Lane	EB	42	66	24	57%	3.3	PASS	PASS
H7	Causeway	WB	177	155	-22	-13%	1.7	PASS	PASS
Total			1,773	1,716	-56	-3%	1.3		
H1	B3130 Clevedon Road	NB	467	458	-9	-2%	0.4	PASS	PASS
H2	B3130 Stanton Lane	EB	345	440	95	28%	4.8	PASS	PASS
H3	Backwell Bow	EB	33	50	17	50%	2.6	PASS	PASS
H4	Station Road	SB	378	351	-27	-7%	1.4	PASS	PASS
H5	Netherton Wood Lane	SB	93	60	-32	-35%	3.7	PASS	PASS
H6	West End Lane	WB	64	95	31	48%	3.5	PASS	PASS
H7	Causeway	EB	117	115	-2	-2%	0.2	PASS	PASS
Total			1,496	1,569	73	5%	1.9		

Appendix E: Uncertainty Log

Table A2 Classification of Future Inputs		
Probability of the Input	**Status**	**Core Scenario Assumption**
Near certain: The outcome will happen or there is a high probability that it will happen.	Intent announced by proponent to regulatory agencies. Approved development proposals. Projects under construction.	This should form part of the core scenario
More than likely: The outcome is likely to happen but there is some uncertainty.	Submission of planning or consent application imminent. Development application within the consent process.	This could form part of the core scenario [Refer to Section Developing the Core Scenario]
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	Identified within a development plan. Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented. Development conditional upon the transport strategy/scheme proceeding. Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty	These should be excluded from the core scenario but may form part of the alternative scenarios
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	Conjecture based upon currently available information. Discussed on a conceptual basis. One of a number of possible inputs in an initial consultation process. Or, a policy aspiration	These should be excluded from the core scenario but may form part of the alternative scenarios

Schedule 1

Schedule to Policy SA 1

Proposed large sites for residential development (over 10 dwellings)

Sites marked * are the residential element of a mixed use scheme and are subject to Policy SA 3

Changes between April 2020 and April 2021 highlighted yellow

Schedule 1 Site Location	Status at April 2021	Relevant planning per-mission ref	Capacity remaining (at April 2021)	Uncertainty Log	Site specific details / notes
WESTON-SUPER-MARE					
Winterstoke Village (former Weston Airfield)*	Part full consent, part outline	Various	1552	NC	Major strategic mixed use allocation from Core Strategy. Further details in Weston Villages Supplementary Planning Document
Parklands Village (former RAF Locking site)*	Part full consent, part outline, part no consent	Various	3330	NC	Major strategic mixed use allocation from Core Strategy. Further details in Weston Villages Supplementary Planning Document
Land at Atlantic Road South	Full planning permission	19/P/2933/MMA	18	NC1	Carried over from North Somerset Replacement Local Plan – Site H14
Land at Milton Hill	Full planning permission	08/P/0570/RM	0	NC1	Complete 2017/18
Land adjacent to Plum Tree Farm, off Summer Lane	Full planning permission	08/P/0626/RM	8	NC1	Carried over from North Somerset Replacement Local Plan – Site H27
Brimbleworth Farm St Georges	Full planning permission	11/P/2214/F	0	NC1	Complete 2018/19
Scot Elm Drive	Full planning permission	20/P/0792/FUL	57	NC	Current permission, new allocation
Land at Wellsea Grove	Full planning permission	14/P/0156/F	0	NC1	complete
Royal Pier Hotel	Full planning permission subject to legal agreement	11/P/0006/F	63	NC	Carried over from North Somerset Replacement Local Plan – Site H65
Lynton House Hotel	Full planning permission	19/P/2018/FUL	40	NC	New allocation. Capacity based on past consent
The Bayside Hotel	Full planning permission	14/P/1791/F	0	NC1	Complete 2019/20
Westacres Caravan Park	Full planning permission	19/P/0413/FUL	125	NC	Carried over from North Somerset Replacement Local Plan – H20b A Flood Risk Assessment, sequential and exception test will need to accompany any planning application
Orchard House, Ebdon Road	No current consent		0	?	Carried over from North Somerset Replacement Local Plan – H29 A Flood Risk Assessment, sequential and exception test will need to accompany any planning application
Land to the rear of Locking Road	No current consent		24	RF	New allocation A Flood Risk Assessment, sequential and exception test will need to accompany any planning application
Former Weston Library and adjacent BT building,	Full planning permission	16/P/0507/F	0	NC	Complete 2019/20
Lawrence Court, Lawrence Road	Full Planning Permission	15/P/1616/F	0	NC	complete
Former TJ Hughes Store, High St	Full planning permission	17/P/1832/F	19	ML	New allocation Retail/ restaurants on ground floor. Planning consent

Walliscote Place*	No current consent		70	RF	New allocation Key Town Centre site, Landmark high rise buildings may be appropriate, Demolition of former Police Station building, Conversion of Magistrate Courts (listed building), Some commercial development on the footprint of Roselawn/ Central Chambers buildings	
Dolphin Square*	No current consent		183	RF	New allocation; Phase 4 of the redevelopment scheme, Includes land/buildings fronting Sea Front Pedestrian link required between Carton St Car Park and Oxford St Development to have regard to and relate well to Phase 3 development (leisure)	
Land to the west of Winterstoke Road*	No current consent		70	RF	New allocation Loss of sports pitch needs to be addressed Layout to have regard to industrial units to the south and railway line to the west Access off Winterstoke Rd 0.5 ha employment on northern boundary. Consideration of fact that site is within 5km consultation zone for Bats SAC (North Somerset and Mendip Bats Special Area of Conservation) A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	
Land to the north of the A370, Summer Lane	Full planning		0	NC	complete	
Bridge Farm, Bristol Road*	No current consent		0	?	Carried over from North Somerset Replacement Local Plan - Sites H63 & M4 mixed use site to include 0.5 hectares employment. Flood Zone has been reassessed and site is in Flood Zone 3 - Flood Risk Assessment sequential and exception test required. Layout to have regard to proximity of railway line. Consideration of fact that site is within 5km for Bats SAC	
Birnbeck Pier*	No current consent		0	?	New allocation for mixed use scheme. Residential, leisure, hotel and tourism, ancillary retail, cafes, bars and restaurants and community facilities. Does not include 63 dwellings on Royal Pier Hotel, Dorville or Lynton House Hotel. Prince Consort Gardens to be kept free from development. Madiera Car Park has potential for development.	
Gas Works, Winterstoke Road	No current consent		95	RF	New allocation Contamination study required. Access off A370. High quality design required on key appoach to Town Centre. Landmark buildings facing Drove Road roundabout. Ped access to Rectors Way footpath to the south, Newlands Road and Marchfield Way. Health and Safety executive to be consulted. A Flood Risk assessment, sequential and exception test will need to accompany any planning application.	
Nightingale Close, Mead Vale *	No current consent		40	RF	New allocation for mixed use scheme, redevelopment to include retail, restaurant/café uses, 40 residential units, community uses and car A Flood Risk assessment, sequential and exception test will need to accompany any planning application.	
South of Herluin Way, Avoncrest Site*	No current consent		750	RF	New allocation for mixed use scheme to include the following - Spine Road with access off Aisecombe Way to the east and Winterstoke Rd to the south. Site for Primary School. Remediation work to eliminate risk of contamination. Noise buffer alongside the railway line. Safeguarding of Airfield bridge link. Open Space. 2.5 ha of Employment land on western part of site.	This allocation is not being carried forward

Former Bournville School Site, Sellworthy Road	No current consent		45	ML	New allocation. A Flood Risk assessment, sequential and exception test will need to accompany any planning application.	
Former Sweat FA Site, Winterstoke	No current consent		37	RF	New allocation Vehicular and pedestrian access off Bridge Rd Layout and design to have regard to working garage to the west. Health and Safety Executive to be consulted. Contaiminated Land to be assessed A Flood Risk assessment, sequential and exception test will need to accompany any planning application.	
Station Gateway*	No current consent		429	ML	New allocation. Includes Sunnyside Road, Locking Road Car Park, Station Approach and part of Tesco car park. HQ Design on key approach to Town Centre. Design Standards to be set out in Town Centre Regeneration SPD. Retention of public car parking levels through multi storey development Improved pedestrian links to and across railway station. Area included in the "area of search " for a new Primary School site. Area suitable for office development. A Flood Risk assessment, sequential and exception test will need to accompany any planning application.	
Land at Bridgwater Road	Outline consent	17/P/1138/O	60	RF 2021, ML 2026	New allocation Hedge/tree boundaries to be retained wherever possible Highway access to be delivered south of site onto Bleadon Hill Transport Assessment to assess safety aspects of increased vehicular and pedestrian movements at the A370 junction. Consideration of fact that site is within 5km consultation zone for Bats SAC	
Land at Wentwood Drive, W-s-M	Full planning permission	18/P/3466/RM	50	NC	under construction	
Land north of Oldmixon Road. W-s-M	Outline consent	16/P/0150/O	130	ML	Allocated and has outline consent	
Dauncey's Hotel, Claremont Crescent, W-s-M	Full planning permission	18/P/4932/FUL, 18/P/4990/FUL, 18/P/4934/FUL, 18/P/4936/FUL	28	ML		
26 Bristol Road Lower, W-s-M	Full planning permission	18/P/4732/FUL	9	NC	Allocated and has consent	
Queensway / Midhaven Rise, W-s-M	Sites & Policies 2017 allocation		35	RF	Allocation	
Land at Wilson Gardens / Scot Elm Drive, W-s-M	Full planning permission	17/P/0752/F	49	NC	Allocated and application submitted	
69-71 Locking Road	Full planning permission	18/P/4822/FUL	11	NC	New site - Granted consent during 2019/20	
1 Clevedon Road	Full planning permission	19/P/1846/FUL	0	NC	New site - Granted consent during 2019/20	Complete 2021
Madeira Cove Hotel	Full planning permission	18/P/3335/FUL	10	NC	New site - Granted consent during 2019/20	
38-40 Birnbeck Rd	Full planning permission	19/P/3151/FUL	26	NC	New site - Granted consent during 2020/21	
Land adjacent to Diamond Batch	Full planning permission	20/P/1059/FUL	20	NC	New site - Granted consent during 2020/21	
TOTAL FOR WESTON-SUPER-MARE			7383			
CLEVEDON						

Clevedon Hall Estate	Full planning permission	12/P/1539/F 15/P/2135/F	0	NC1	Complete 2018/19	
Marine Hill House, Marine Hill	Full planning permission	11/P/2183/F	0	NC1	Complete 2018/19	
Moor Lane	No current consent		0	?	Carried over from North Somerset Replacement Local Plan – Site H87 A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	This allocation is not being carried forward
Yeolands Farm	No current consent		0	?	New Allocation A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	This allocation is not being carried forward
North of Churchill Avenue	No current consent		44	RF	New Allocation Part of site to be given over to improved play/ POS facilities. Access via Wordsworth Rd A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	
Millcross site	No current consent		70	RF	New Allocation Previously proposed as a new hospital site Site large enough to accommodate some health/care facilities Mix of 2-3 storey development appropriate A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	
Waverley House, Old Church Roads, Clevedon	Full planning permission	18/P/5239/CQA	0	NC	Allocated and has consent	Complete 2021
2-6 Bay Road, Clevedon	Full planning permission	17/P/1078/F	19	NC	Allocated and has consent	
Court Farm, All Saints Lane	Full planning permission	19/P/1719/RM	0	NC	Allocated and has consent	Complete 2021
Land at 173-175 Kenn Road	Permission subject to legal agreement	18/P/4846/FUL	54	NC	New site - Granted consent during 2019/20	
TOTAL FOR CLEVEDON			187			
NAILSEA						
Trendlewood Way	Outline consent	18/P/5234/OUT	24	NC	New allocation. Was previously proposed as mixed development Retention of wooded area fronting Trendlewood Way required Land to be made available for local shop unit Consideration of fact that site is within 5km consultation zone for Bats SAC Coal Mining Risk Assessment Required	Now has consent - expect to deliver soon
Police Station	Full planning permission		0	RF 2021, ML 2026	Complete 2019/20	
Land at West End	Outline consent	17/P/0712/O	6	RF 2021, ML 2026	New allocation Consideration of fact that site is within 5km consultation zone for Bats SAC	
West of Engine Lane	Full planning permission	17/P/1250/F	171	NC, 100 in 2021, 195 in 2026	New allocation, access off Engine Lane Strong hedge boundaries to be retained. Footpath on western side of Engine Lane. Full TA required. Replacement or improved sport facilities required. Housing mix to meet local needs. Consideration of fact that site is within 5km consultation zone for Bats SAC	
Land south of The Uplands	No current consent		50	NC	New allocation Access off The Uplands (to be widened) Requires retention of strong hedge boundaries especially on southern boundary. Housing mix to meet local needs. Consideration of fact that site is within 5km consultation zone for Bats SAC	

Land at North West Nailsea	No current consent		450	ML	New allocation. Capacity of 450 dwellings considered a maximum Spine Road running through site (from Pound Lane to Watery Lane) required. Pylons to be removed Undergrounding of 132kv line on northern boundary Transport Assessment required New Primary School to be included as part of development Relocation or replacement of Fryth Way sports pitch Where possible retention of Tree Preservation Order trees Retention of strong hedge boundaries especially to the north PROW links to Causeway View Coal Mining Risk Assessment required Housing mix to meet local needs Protection of adjacent Tickenham, Nailsea and Kenn Moor Site of Special Scientific Interest Consideration of fact that site is within 5km consultation zone for Bats SAC	
Coates House, High Street , Nailsea	Full planning permission	17/P/2086/CUPA	0	NC	Complete 2019/20	
Former Royal Oak, High Street, Nailsea	Full planning permission	16/P/0907/F	0	NC	Complete 2019/20	
Weston College Site, Somerset Square, Nailsea	Sites & Policies 2017 allocation	15/P/0977/O	28	RF	Allocation, planning application under consideration	
Youngwood Lane, Nailsea	Part full, part outline	16/P/1677/OT2	450	NC	Outline consent granted at appeal	Now has reserved matters for first 168 units
TOTAL FOR NAILSEA			1179			
PORTISHEAD						
Elm Walk, Battens Orchard	Full planning permission	17/P/0122/RM	0	NC	Complete 2019/20	
Severn Paper Mill	Full planning permission	14/P/1186/RM	0	NC	Complete 2018/19	
South west of Severn Paper Mill	Full planning permission	16/P/1608/F	0	NC	Complete 2019/20	
Old Mill Road*	No current consent		20	ML	New allocation. Proposed as a mix of employment uses, retail, leisure, café's, bars and restaurants and 20 residential units. Pedestrian/cycleway links to dockside development, adjacent supermarket and proposed rail station required Existing businesses to be relocated or incorporated into redevelopment scheme A Flood Risk Assessment , sequential and exception test will need to accompany any planning application	
Land south of Downside	No current consent		23	RF	New Allocation Access through Downside Requires retention of strong hedge boundaries and trees to the west	
Marine View, Harbour Road	Full planning permission	14/P/2570/F	0	NC	Complete 2019/20	
Harbour Road / Gordano Gate, Portishead	Full planning permission	16/P/2066/F	93	NC	Allocation with consent	Under construction
Land at Wyndham Way, Portishead	Full planning permission	17/P/1229/F	33	NC	Allocation with consent subject to S106	
Site V2, Harbour Road, Portishead	Full planning permission	18/P/3512/FUL	26	NC	Consent	Under construction
TOTAL FOR PORTISHEAD			195			
SERVICE VILLAGES						

The Chestnuts, south of Sidcot Lane, Winscombe	Outline planning permission	10/P/0592/O	0	NC1	Complete	
Woodborough Farm, Winscombe	Full planning permission	18/P/3214/RM and 19/P/1866/RM	145	NC	under construction	UC - residual capacity updated
Land to the east and west of Wemberham Lane, Yatton	No current consent		24	RF	Carried over from Replacement Local Plan – Site H43 Consideration of fact that site is within 5km consultation zone for Bats SAC A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	
Oxford Plasma, Yatton	Full planning permission	15/P/1299/O	55	ML	Carried over from Replacement Local Plan – Site H86 Capacity updated to reflect current application	
Arnolds Way, Yatton Phase 1	Full planning permission	15/P/1498/RM	0	NC	Complete	
Yatton Station	No current consent		21	ML	New allocation Improved capacity of existing railway car park required as part of development proposal	
Moor Lane, Backwell	Full planning permission	18/P/2169/RM	20	NC	under construction	UC - residual capacity updated
Cobthorn Way, Congresbury	Full planning permission	18/P/3708/RM	0	NC	under construction	Complete 2021
Venus Street, Congresbury	Full planning permission	16/P/0147/F	0	NC1	complete	
Pudding Pie Lane (West), Churchill	No current consent		35	ML	New allocation Access off Pudding Pie Lane Retention of existing hedgerows required Layout to address overlooking issues from neighbouring properties Links to Public Right of Way on eastern boundary Consideration of fact that site is within 5km consultation zone for Bats SAC	
Pudding Pie Lane (East), Churchill	Full planning permission	17/P/1894/RM	28	NC	under construction	UC - residual capacity updated
Says Lane, Churchill	Full planning permission	17/P/2560/RM	0	NC	under construction	Complete 2021
Land at North End, Yatton	Outline planning consent	15/P/0946/O	170	NC	Reserved matters under consideration	Construction commenced
Arnolds Way, (Phase 2) Yatton	Full planning permission	18/P/4344/RM	0	NC	under construction	Complete 2021
Land to the east of Wolvershill Road, Banwell	Full planning permission	18/P/2275/RM	0	NC	under construction	Complete 2021
Moor Road, Yatton	No current consent		60	ML	New allocation Layout to respect Grange Farm (Listed Building). No development in the orchard apart from access road. Landscape Buffer alongside Stowey Rhyne. Contribution to comprehensive Surface Water Strategy. Contribution to road safety/congestion solutions in the wider area. Replacement / relocation of rugby playing pitches. Consideration of fact that site is within 5km consultation zone for Bats SAC	
Land at Wrington Lane, Congresbury	Outline consent	16/P/1521/O	50	NC	Allocation with planning permission	
Arnolds Way, Sheltered Housing, Yatton	Full planning permission	18/P/2170/RM	0	NC	under construction	Complete 2021
Land at Cox's Green, Wrington	Full planning permission	18/P/2691/RM, 18/P/2692/RM	45	NC	under construction	UC - residual capacity updated
Land south of Bristol Road, Churchill	Full planning permission	18/P/4241/RM	38	NC	Allocation with planning permission	UC - residual capacity updated

Land south of Cadbury Garden Centre, Congresbury	Full planning permission	18/P/3367/RM	21	NC	under construction	
Land at Shipham Lane, Winscombe	Sites & Policies 2017 allocation		28	RF	New allocation	
Land adjoining Coombe Farm, Winscombe	Sites & Policies 2017 allocation		24	RF	New allocation	
Broadleaze Farm, Winscombe	Sites & Policies 2017 allocation		75	RF	New allocation	
Leonard Elms Care Home, Congresbury	Full planning permission	18/P/3461/RM	11	ML	New consent	
Titan Ladders, Yatton	Full planning permission	17/P/2377/F	0	NC	under construction	Complete 2021
Land at Western Trade Centre Banwell	Full planning permission	19/P/0230/RM	10	NC	New consent	
Land north of Egret Drive, Yatton	Full planning permission	19/P/0834/FUL	8	NC	New consent	UC - residual capacity updated
Land south of Station Road Congresbury	Outline consent	18/P/2532/OUT	13	NC	New consent	
Land at Smallway Congresbury	Outline consent	18/P/3905/OUT	20	NC	New consent	
Land south of William Daw Close, Banwell	Outline consent	18/P/3334/OUT	26	NC	New consent	
Land south of Station Rd adjoining Church Farm, Congresbury	Allocated in Neighbourhood Plan		20	RF	New allocation	
The Causeway, corner of Dolemoor Lane, Congresbury	Allocated in Neighbourhood Plan		10	RF	New allocation	
Bristol Rd A370 opposite Tesco Express store, Congresbury	Allocated in Neighbourhood Plan		25	RF	New allocation	
Unit C Estune Business Park Long Ashton	Full planning permission	20/P/2574/COA	24	NC	New site - Granted consent during 2020/21	
Unit A Estune Business Park Long Ashton	Full planning permission	20/P/1665/COA	18	NC	New site - Granted consent during 2020/21	
TOTAL FOR SERVICE VILLAGES			1,024			
INFILL VILLAGES						
Bleadon Quarry, Bleadon *	Outline consent	19/P/0835/OUT	42	ML	New allocation for a mixed use scheme. 500 sq metres of employment floorspace at entrance of the site. Traffic Calming measures on Bridge Road. Pedestrian link along Mulberry Lane	
Jackson Barstow House, Uphill	No current consent		0	?	New Allocation A Flood Risk Assessment, sequential and exception test will need to accompany any planning application	Allocation not being carried forward
Land to the north of A368, Sandford	Full planning permission	17/P/1799/RM	16	NC	under construction	UC - residual capacity updated

Tickenham Garden Centre, Clevedon Road, Tickenham	Full planning permission	20/P/0413/RM	32	NC	Reserved matters under consideration	
Winford Coach Station, High Street, Winford	Full planning permission	17/P/1146/RM	0	NC	under construction	Complete 2021
F Sweeting & Son site, Station Road, Sandford	Outline consent	18/P/2024/OUT	16	ML	Expected to be used as temporary park and ride for 3 years before permission implemented	
UTAS site, Claverham Works, Claverham	Full planning permission	18/P/3659/FUL	69	NC	under construction	UC - residual capacity updated
Golden Acres Fruit Farm, Tickenham	Full planning permission	20/P/1260/FUL	18	NC	New site - Granted consent during 2020/21	
TOTAL FOR INFILL VILLAGES			193			
OTHER SETTLEMENTS AND COUNTRYSIDE						
Barrow Hospital, Barrow Gurney (0)	Full Planning permission	13/P/0749/RM	0	NC1	Complete	
Barrow Hospital (1)	Full planning permission	15/P/2301/F	66	NC	New allocation has permission	
Barrow Hospital (2)	Full planning permission	15/P/2302/F	14	NC	New allocation has permission	
Redwood Lodge, Failand	Full Planning Permission	15/P/0574/F	0	NC	complete	
Walton Bay Caravan Park	Full planning permission	17/P/1339/F	0	NC	under construction	Complete 2021
Blagdon Water Gardens	Full planning permission	19/P/1963/FUL	11	NC	New site - Granted consent during 2020/21	
TOTAL FOR OTHER SETTLEMENTS AND COUNTRYSIDE			91			

Schedule 2

Proposed Employment Sites

See Policy SA 4

Changes between April 2020 and April 2021 highlighted yellow

Schedule 2 Site location	Hectares allocated for B use classes	Uncertainty Log	Comments	Linked to a residential site?
WESTON-SUPER-MARE				
Weston Villages – other employment sites set out in Weston Villages SPD and sites with planning permission.	17.6	NC	Figures and boundary to be confirmed through masterplanning and approved plans associated with planning permissions at the Weston Villages development.	Y
Haywood Village Business Quarter	24.0	NC	Park and Ride site, public house and The Hive removed from allocation.	Y
West Wick Business Park – Land adjacent to west of M5	4.7	ML	Carried over from Replacement Local Plan – E22. Forms remaining and consolidated part of allocation.	N
Europark	13.6	ML	Existing employment site and residual allocation from Replacement Local Plan – E12	N
~~Weston Gateway, South of A370~~	~~1.2~~	~~ML~~	Now allocated for housing in Sites & Policies 2017	
Summer Lane, North of A370	3.6	ML	Carried over from mixed use allocation in the Replacement Local Plan – M2 3.6ha remaining without reserved matters consent.	Y
Land at Aisecombe Way	0.5	RF	Reserved for waste associated development	N
Moor Park, A371	4.5	ML	Site size reduced from 5.3ha within Sites & Policies 2017	N
TOTAL FOR WESTON- SUPER-MARE	69.7			
CLEVEDON				
Land to the west of Kenn Road	8.2	RF	Allocation carried over from Replacement Local Plan – E39 Outline permission for employment	N
Clevedon 5/20 Kenn Road Business Park / Yeo Bank	2.1	ML	Residual allocation from Replacement Local Plan – E26 PP 2011 for office, 2012 5 industrial units Portbury House removed from allocation.	N
TOTAL FOR CLEVEDON	10.3			
NAILSEA				
Land at North West Nailsea	1.5	ML	1.5 hectare B1(a) allocation as part of wider mixed use allocation. Employment provision to be located at the eastern end of the site.	Y
TOTAL FOR NAILSEA	1.5			
PORTISHEAD				
Gordano Gate	1.1	RF	Reduced from 1.6ha by Sites & Policies 2017	Y
TOTAL FOR PORTISHEAD	1.1			
SERVICE VILLAGES				
Elliott Medway, Congresbury	0.3	NC1	Planning permission for dwellings and B1 units	N
Estune Business Park, former Long Ashton Research Station, Long Ashton	0.38	NC1	Existing employment site and residual allocation from Replacement Local Plan – E28 Planning permission still valid as only part built	N
Burnett Industrial Estate and Havyatt Business Park, Wrington	0.51	NC1	Existing employment site and residual allocation from Replacement Local Plan – E29 Planning permission for single storey warehouse	N
Park Farm, Yatton	0.42	ML1	Carried over from Replacement Local Plan – allocation E32	N
TOTAL FOR SERVICE VILLAGES	1.61			
TOTAL EMPLOYMENT ALLOCATION	85.51			

Changes between April 2020 and April 2021 highlighted yellow

Ref.	JLTP page	Action (within JLTP4)	Uncertainty Log	Notes / Comments
App3	T1 Bristol City Centre to Airport	Segregated mass transit route connecting Bristol Airport and South Bristol with city centre. Through the current mass transit studies and the Bristol South West Economic Link project (BSWEL) (see Scheme Ref. E1), various options are being considered for assessment. Those options which perform well against an initial set of criteria will then be developed into more detailed option variants for further assessment. Options are being considered for bus, metrobus, tram, tram-train, mass transit (fully segregated underground running) and heavy rail. Route to be determined balancing maximising patronage against engineering costs. The heavy rail option assessment includes a potential heavy rail link from Bristol Temple Meads.	Reasonably foreseeable	As a tram or train - Hypothetical As a bus/metrobus - Reasonably foreseeable
App3	E1 Bristol South West Economic Link (BSWEL)	New multimodal corridor between the M5 and the A38, Bristol Airport, South Bristol and Bristol City Centre to improve connectivity and overall network resilience. The BSWEL Options Assessment Report grouped together the various options to form packages, based on their broad geographical location and their likely ability to meet the project objectives in a coherent way. The packages are labelled from 1-8, indicating the potential order of implementation, although this will depend on funding sources and engagement with external partners. HRA Mitigation For BSWEL Packages 6, 7 & 8, the JLTP4 HRA recommends that this scheme is subject to a project-level HRA when sufficient scheme information is available. If a Likely Significant Effect (LSE) is screened-in during the project level HRA then an Appropriate Assessment should be undertaken. The Appropriate Assessment should input into the design and location of this scheme to ensure no adverse effect on European sites occur. Permission should only be granted and this scheme allowed to go ahead if the Appropriate Assessment are able to conclude that no adverse effects will occur on European sites.		This box describes the study that is now complete. The Packages below refer to the major scheme recommendations as a result of the study.
App3	E1 Bristol South West Economic Link (BSWEL)	• Package 1: Weston-super-Mare bus network improvements; Weston-super-Mare to Bristol bus services with metrobus compatibility (complementary services);	Hypothetical	
App3	E1 Bristol South West Economic Link (BSWEL)	• Package 2: A38 online improvements between A368 to Bristol Airport, along with Downside Road junction improvements. A38 widening at Bristol Airport;	More than likely	
App3	E1 Bristol South West Economic Link (BSWEL)	• Package 3: Banwell Bypass; Rail options: Weston Parkway station; Weston-superMare (WsM) – Weston Parkway – Bristol Airport bus service;		Banwell Bypass = More than likely WsM - Weston Parkway - Airport bus service = Reasonably foreseeable
App3	E3 M5 Junction 19	9 Improvements to M5 Junction 19 to improve access between the M5 and the Royal Portbury Dock, Portishead, Portbury and Pill. The scheme will provide enhanced capacity to improve the efficiency of movements for freight using the Royal Portbury Dock, enhancing connectivity to national road networks. The scheme will also assist in accommodating future traffic growth generated by planned housing and employment growth in the area.	Hypothetical	
App3	E4 Passenger Rail Service and Capacity Improvements, Station Upgrades and New Stations Package	Package of rail improvement measures: Rail service improvements, bringing the frequency of local rail services up to a minimum of 2 tph, plus hourly rail services from Weston-super-Mare to London.	Reasonably foreseeable	
App3	E4 Passenger Rail Service and Capacity Improvements, Station Upgrades and New Stations Package	• Infrastructure to support service improvements including double tracks on the loop line between Weston Railway Station, reinstating the southern chord at Westonsuper-Mare, and the Herluin Way to Locking Road Link (bridge replacement to enable width for double tracking).	Hypothetical	
App3	E4 Passenger Rail Service and Capacity Improvements, Station Upgrades and New Stations Package	• Longer rolling stock to cater for increased demand, in conjunction with longer platforms where required (including Worle, Nailsea & Backwell and Yatton), with higher quality rolling stock from all stations.	Hypothetical	
App3	E4 Passenger Rail Service and Capacity Improvements, Station Upgrades and New Stations Package	• Station upgrades for existing rail stations with a focus on developing transport interchanges (interchange with metrobus, Mass Transit, bus services and cycle and car parking provision), in conjunction with schemes to improve access to existing rail stations by sustainable modes on key routes to stations across the West of England.	Reasonably foreseeable	

App3	E9 Interurban cycle routes	Strategic cycle routes across the region to supplement those detailed in the Corridor Scheme Packages to mitigate growth. Many of these will be delivered along the metrobus corridors and some will be identified through the West of England Local Cycling and Walking Infrastructure Plan. HRA Mitigation: Protecting & enhancing the natural environment with Interurban Cycle Routes The proposed cycleways within the JLTP4 are indicative at this stage and yet to be finalised. It is therefore not possible to fully assess the potential environmental effects of each route. Some cycle routes will be included within the Cycling and Walking Infrastructure Plan. It is therefore recommended that an HRA of the Local Cycling and Walking Infrastructure Plans would ascertain the predicted level of use of new cycle routes in the WoE and therefore more accurately predict the potential for an adverse effect on the European sites identified and be able to put forward suitable mitigation. The Interurban cycle routes which form part of scheme E9 will not be included within the Cycling and Walking Infrastructure Plan. It is therefore proposed that the potential effects of recreational pressures resulting from the following cycle routes are assessed through project-level HRA of the individual schemes, as well as a separate HRA of the WoE Local Cycling and Walking Infrastructure Plan: • Strawberry Line Cycle Route (Interurban Cycle Routes - E9); • Weston Town Centre to J21 Cycle Route (Weston-super-Mare: Local walking & cycling infrastructure improvements – LP5); • Banwell - Churchill Cycle Route (Banwell and Churchill: Sustainable travel package – LP6); and • North Somerset Coastal Towns Cycle Route, particularly the WSM to Sand Bay and Sand Bay to Clevedon sections (Interurban Cycle Routes - E9). It is recommended that the requirement for HRA of individual cycle route schemes is included within the JLTP4. If an LSE is identified in screening during the project level HRA then an Appropriate Assessment should be undertaken and schemes should only be granted permission and allowed to go ahead if the Appropriate Assessment is able to demonstrate that there would be no adverse effects on these European sites, either alone or in combination with other plans and projects. The Appropriate Assessment should input into the design and location of the cycleways as appropriate. There is also an opportunity for the cycleways to provide linkages as a part of the local green infrastructure networks and it is recommended that this opportunity if referred to within the JLTP4. It is also assumed that all cycleways will eventually be incorporated into Local Plans as part of infrastructure delivery. Local Plans will be subject to their own HRAs and new cycleways will be considered within the HRAs along with other developments. Through their HRAs, the Local Plans of the WoE authorities would need to demonstrate that there would be no adverse effect on the North Somerset Bats SAC and the Severn Estuary SPA, SAC and Ramsar as a result of the transport schemes before the plans are adopted.		Strawberry Line Cycle Route = Reasonably foreseeable Weston Town Centre to J21 Cycle Route = Hypothetical Banwell - Churchill Cycle Route = Hypothetical North Somerset Coastal Towns Cycle Route = Reasonably foreseeable
App3	E12 Metrobus consolidation package	A package of measures to make further enhancements to the existing metrobus network, with potential measures including fleet upgrade, addition of descoped infrastructure, signals replacement, and Great Stoke ('Rabbit') roundabout.	Near Certain	
App3	E14 Regional Electric Vehicle Charging Network	Increasing public charging infrastructure, including through 'Go Ultra Low West' (Source West) EV charging infrastructure programme.	Near Certain	
App3	E18 Weston-superMare Package 2	Package of multimodal highway/junction improvements to complement and support the other Weston-super-Mare schemes. These could include, but not be limited to, the M5 Junction 21 Bypass, A370/A371 Airport Roundabout, Cross Airfield Link/A371 Roundabout, West Wick Roundabout, Airfield Bridge Link (which is likely to be bus/ cycle/ped only) and Herluin Way to Locking Road Link.	Hypothetical	
App3	E19 Weston-superMare Cycling and Walking Network	Completion of a network of legible, attractive and safe strategic cycle routes in the Weston-super-Mare area, with a focus on east-west routes from Worle and Weston Villages into the town centre. Within the Weston-super-Mare Town Centre Masterplan and SPD. This includes better pedestrian and cycling facilities to serve Weston-superMare as part of future strategic planning and Core Strategy growth.	Hypothetical	
App3	E20 Banwell Bypass	Bypass to the north of Banwell, linking the A371 with A368. The bypass will enable potential development opportunities north of Banwell and support the delivery of Weston Villages; provide a more suitable strategic route for HGVs, and most importantly provide significant improvements to air quality and public realm in the centre of the village. This new infrastructure is a key element of the Bristol South West Economic Link (BSWEL).	More than likely	
App3	LP2 Nailsea and Backwell	Nailsea sustainable travel, rail station and local network improvements Enhanced bus services, including options for improved connections to Bristol via the Long Ashton Park & Ride and metrobus M2 service, explore improved interchange at Nailsea & Backwell rail station.	Hypothetical	
App3	LP5 Weston-superMare	Weston-super-Mare Park & Ride New Park & Ride site at either A370/A371 junction, M5 J21 or new junction J21A.	Hypothetical	
App3	LP5 Weston-superMare	Local bus improvements Additional bus priority measures and bus stop infrastructure to improve journey reliability.	Hypothetical	
App3	LP5 Weston-superMare	Local highway junction improvements Upgrades and improvements to a number of junctions related to the primary distributor route and other key junctions around the Weston-super-Mare area.	Hypothetical	
App3	LP5 Weston-superMare	Local walking & cycling infrastructure improvements Package of walking and cycling infrastructure improvements, to promote sustainable transport	More than likely	
App3	LP6 Churchill	Local highway improvements Improvements to other junctions affected by additional traffic, including A368/A38 Churchill signals. Local sustainable travel package Improvements to strategic and local walking and cycle networks, to improve sustainable travel connectivity along the corridor between the A38, Churchill, Sandford and Banwell.		A368/A38 Churchill signals (part of Banwell Bypass) = Reasonably foreseeable Local walking & cycling netowrks = Hypothetical
App3	L6 M5 Junction 20 Local Highway Improvements	Improvements to the local highway network in the vicinity of M5 Junction 20 (Clevedon) to improve transport connectivity. The scheme should look to include bus infrastructure and priority improvements and the reallocation of roadspace to more sustainable modes wherever possible.	Hypothetical	

Core Strategy 2017

CS10		Weston Package Phase 1		complete
CS10		Ashton Vale to Temple Meads Rapid Transit		complete

CS10		South Bristol Link		complete
CS10		Reopening of Portishead to Bristol rail line to passenger services	ML	
CS10		J21 Bypass or Relief Road	H	
CS10		Bristol Rail Metro (opening of bay platform at Weston rail station	H	
CS10		A371 and Wolvershill Road / Churchland Way link, W-s-M		Under construction
CS10		Banwell Bypass	ML	
CS10		M5 J19 improvements		tweaking scheme is currently being implemented. A wider more costly scheme is Hypothetical
CS10		Herluin Way to Locking Road link, W-s-M	H	
CS10		Double tracking of loop line between Weston railway station and Worle	H	
CS10		Extended car parking facilities at Nailsea / Backwell rail station with improved pedestrian access		complete
CS10		Expansion of Park & Ride at Long Ashton	RF	WECA are actively studying
CS10		New Park & Ride site at W-s-M	RF	
CS10		Investigation of Bus Rapid Transit for W-s-M	H	
CS10		Airfield Bridge Link between Weston Airfield and Winterstoke Road	H	
CS10		Weston Southern Rail Chord	H	

Pipeline Schemes (not in JLTP4 or Core Strategy)		**Only includes schemes that are likely to impact on A & B roads**		
		M5 J21 Northbound Merge	NC	anticipated implementation in late 2022
		Weston Town Centre Enhancements	NC	Various carriageway space reallocations
		Queensway Junction capacity improvements	RF	still looking for funding
		Tutshill Sluice (W-s-M to Clevedon off-road cycle & ped route, part of coastal footpath)	ML	Off-road cycle route parallel to B3133 and M5
Active Travel Fund		1. Clevedon Seafront & Hill Road Segregated Cycleways	ML	Carriageway space reallocation
Active Travel Fund		2. Summerlands to the Seafront Active Travel Priority Corridor (Baker Street & Milton Road (WsM) cycle scheme)	ML	Carriageway space reallocation
Active Travel Fund		3. Weston Station Active Travel Gateway (Hildesheim Bridge & Regent Street)	RF	Includes Hildesheim Bridge being reduced from dual-carriageway to single carriageway
Active Travel Fund		4.North Somerset School Pedestrian & Cycle Zones	ML	road closures around schools