Report

Local Plan Transport Evidence Base: Transport Assessment Report Update for the Pre-submission Local Plan

Transport Modelling Report

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Sweco UK Limited
3rd Floor Eldon House
2 Eldon Street
London, EC2M 7LS
+44 20 3002 1210

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Reg. Office Address:
Sweco UK Limited
Grove House
Mansion Gate Drive
Leeds, LS7 4DN
+44 113 262 0000

Reg. No.: 2888385
Reg. Office: Leeds

www.sweco.co.uk

Sweco UK Limited
Lector Court
151-153 Farringdon Road
London, EC1R 3AF
+44 20 3002 1210

Dermot Hanney
Principal Transport Planner
+44 20 3002 1219

dermot.hanney@sweco.co.uk

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Executive Summary

This report sets out the modelling and analysis undertaken to support the Tunbridge Wells Borough Council Local Plan. A SATURN highway model has been developed, with the core model simulation network centred around the key settlement centres of Royal Tunbridge Wells, Pembury, Tonbridge, and Paddock Wood.

The Base Case has been developed using surveys from 2018 and 2019. The calibration and validation process, as set out in sections 6, 7 and 8, has delivered a model that is within DfT TAG acceptability criteria.

The model demand for the Local Plan Scenario (LPS) includes projected growth up to 2038. The overall impact of local plan scenario growth in trip demand is an 18% increase in model trips in the morning peak period (AM) and 17% in evening (PM).The biggest increases in link and junction demand are in the Paddock Wood and Tudeley areas. This reflects the locations of the largest Local Plan sites allocations. There are 33 junctions in the AM and 28 in the PM that are overcapacity both in the Local Plan Scenario and the Reference Case (RC) scenario (as shown in **Table 9-11** and **Table 9-13**).

These junctions are primarily focussed on the A26 north south corridor through Royal Tunbridge Wells and Tonbridge, as well as the A264 and A267 junctions around Royal Tunbridge Wells. Additional congestion has been identified at Kippings Cross roundabout on the A21. The full analysis is presented in Section 9.

Analysis in **Chapter 10** shows that the package of highway and mitigation measures (**Table 9-1**) currently put forward in the LPS has some impact in relieving the additional congestion generated but there remains 15 locations to consider further mitigation. **Table 0-1** outlines the junctions that require further mitigation beyond current proposals from developers as part of the Local Plan and wider transport assessment work.

Table 0-1 Junctions requiring further mitigation as a result of Local Plan development

Junction ID	Description	Location	Existing Junction Type	AM	PM
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	Tudeley	Roundabout	✓	✓
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	Paddock Wood	Roundabout	✓	✓
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	Pembury	Signals	✓	✓
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	Pembury	Roundabout		✓

24	A264 Pembury Road / Sandhurst Road	Royal Tunbridge Wells	T-junction	✓	✓
25	A264 Pembury Road / Sandrock Road	Royal Tunbridge Wells	T-junction	✓	
31	Longfield Road / Knights Park	North Farm	Roundabout	✓	
35	Kippings Cross Roundabout	Pembury	Roundabout	✓	
66	A264/Coach Road	Royal Tunbridge Wells	T-junction		✓
74	Forest Road/Warwick Park	Royal Tunbridge Wells	T-junction	✓	
86	A26 Hadlow Road East/ Three Elm Lane	Tonbridge (T&M)	T-junction	✓	
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	Tudeley	T-junction	✓	
89	B2160 Maidstone Road/Lucks Lane	Paddock Wood	T-junction		✓
105	Colts Hill Bypass/A228 Colts Hill	Colts Hill	New scheme	✓	

Work has then been undertaken to understand what mitigation measures could be applied to help reduce congestion. Mitigation measures have been identified to offset the effects of additional trips from Local Plan developments on the local transport network. The initial focus was to understand if the additional demand from the Local Plan sites could be offset by physical highway mitigations only in the LPS Highway Mitigation (LPSHM) model runs. The follow on LPS Sustainable Mitigation (LPSMS) model runs focussed both on reducing the highway trips generated by the Local Plan sites and also, where necessary, increasing local highway capacity to bring it in line with projected demand. Mitigations have been identified with multimodal, highway, public transport, and cycling/walking schemes. These mitigations were then benchmarked against the implementation of similar schemes in the UK to identify the potential for modal shift for the sustainable transport schemes, in conjunction with reviewing the outputs for the Tunbridge Wells region from the Propensity to Cycle Tool (PCT) modal shift analysis. This identified a potential 10% modal shift in projected new Local Plan trips from highway to sustainable transport. **Table 10-2**, **Table 10-3**, **Table 10-4**, and **Table 10-5** outline the mitigations put forward as part of both mitigation packages. This report has been written in cooperation with the team working on the Garden Settlements plan and the scheme costs are consistent across both studies.

The key wider sustainable transport measures include:

- High quality high frequency bus services connecting Paddock Wood, Tudeley and Pembury to Tonbridge and Royal Tunbridge Wells

- High quality cycle network driven by the Local Cycling and Walking Infrastructure Plan (LCWIP) for Royal Tunbridge Wells and surrounding urban area and Paddock Wood
- Additional developer contributed cycle and walking infrastructure through Tudeley, North Farm and along the A228

The mitigation analysis, as outlined in Section 11, compares the high-level simulation network performance between the Base, RC, LPS, LPSHM and LPSMS scenarios in **Table 11-2**. The table highlights that the LPS performs overall close to that of the Reference Case, though not as well in the AM Peak in particular. The LPSHM scenario applies highway mitigations only to improve this situation. However, the impacts of these schemes alone are negative on the overall model performance. This is primarily because the ability to add additional highway capacity is limited by third party ownership and topography. Therefore the schemes that can be put forward are more focussed on rebalancing junction flows. However adjusting flows at individual junctions often leads to unintended knock on effects that then requires additional mitigation to fix at surrounding junctions. The demand on the network in the more urban areas continues to outweigh the capacity that can be feasibly be provided.

In contrast the LPSMS scenario reduces highway demand so that it fits better within the underlying highway network, thus leading to reduced congestion on the network. The positive effect of the LPSMS mitigations, which include sustainable transport measures and robustly assessed modal shift, can be seen in the increase in the average model network speed and reduction in total model travel time compared the Local Plan Scenario. This improvement is further reinforced by the improved travel time per trip.

The above analysis identifies the need for additional capacity above that included within the LPS scenario. However, local highway improvements do not resolve the issues and barring a significant programme of further road building in the borough, at considerable and unacceptable environmental and financial costs, an alternative approach is required. The results from the LPSMS show that delivering sustainable transport schemes with high levels of modal shift can bring about the congestion relief required. It can deliver improvements on the Reference Case overall. This outcome follows the direction of travel from the Government with a need for more focus on enabling walking and cycling and using public transport. Our evidence base for Sustainable Travel Towns shows that with a concerted effect to fund and build sustainable transport schemes, significant modal shift is possible.

Nonetheless some additional local highway improvements are required and should be considered, namely:

- **A26 / B2017** – increase capacity on B2017 Tudeley Road and A26 Woodgate Way approach;
    - Signalise junction
    - Additional approach arm on Tudeley Road B2017 approach
- Capacity enhancements on Whetsted Rd approach to **A228 / B2160** junction
- **A21 Kippings Cross**

- Add a second approach lane on the B2160 at Kippings Cross to allow for left and right turn movements.
- Potentially add signals to optimise flow at junction between all arms
- This offsets the main congestion caused by the Local Plan but of course does not relieve the existing congestion issues on the A21, which is the matter of ongoing work by Highways England;

- **Hartlake Road / B2017**
  - Close link to through traffic.
  - If possible the link should be closed completely with the traffic diverted via the new appropriately designed link roads ("Five Oak Green bypass" and others) built as part of the Tudeley Garden Settlement,
  - Scheme brings both congestion and safety improvement for road users in the area; and
- **Colts Hill Bypass**
  - Additional capacity added at the next stage of design of the link, from the junction with the Five Oak Green Bypass to the A228 / B2017 roundabout junction, is recommended.
  - Additional approach capacity on the A228 northbound primarily required.

For the A264/A228 Pembury Road it is recommended the schemes proposed by LPSMS should be taken forward as they offer the best balance of minimising congestion and allowing and encouraging a shift from car to public transport and cycling. These schemes include:

- Woodsgate Corner A228 / Tonbridge Road / Pembury High Street re-signalling to increase flow between Tonbridge Road and the A228 Pembury Bypass. This will divert some demand to the A21 Longfield Road junction that has the capacity needed, away from the Pembury Road and A21 junction that does not and cannot be realistically created;
- Signalise Sandhurst Road and Sandrock Road junctions on the A264 to help regulate demand and traffic flow;
- Develop a high quality cycle path for the A264 and ensure high quality crossings are created for the side roads, with cycle priority at Woodsgate Corner; and
- Use signals to offer greater bus priority on the A264 corridor, with the addition of making Calverley Park Gardens bus only.

The LPSMS scenario offers a significant overall improvement in congestion relief and mitigations for the Local Plan wider impacts. This will require an additional investment with final definition of costs coming from the LCWIP and key sites masterplanning process. It is understood that the Local Plan viability assessments undertaken have identified the ability to deliver appropriate developer contributions which can be used to contribute to this, with further funding support from regional authorities and central Government.

The next steps required are as follows:

- Additional model scenario analysis to identify the point in time the junction improvements will be required.

- Further strategic and junction model runs will be required upon refined design as assessed through Transport Assessments/Statements submitted for individual planning applications. For each application the model can be used to ensure schemes are fully sized for all highway demand
- The schemes are likely to come forward as follows:
    - Tudeley/Paddock Wood/Kippings Cross through the Garden Settlement masterplans,
    - Pembury Road through development in the Royal Tunbridge Wells / Pembury area.

1 Overview

1.1 Background

Tunbridge Wells Borough Council (TWBC) has a statutory duty to prepare a Local Plan, which will be used to guide development and inform planning decisions once adopted.

Following the previous Local Plan assessment work undertaken by Sweco in 2019, Sweco have been appointed by TWBC to assess the transport impact of changes to the Local Plan covering the period up to 2038. Sweco have undertaken traffic modelling to assess the transport implications of the Preferred Growth Strategy and have developed a borough-wide Transport Strategy to support the emerging Local Plan.

This report sets out the modelling undertaken and the conclusions drawn as part of the Transport Assessment to support the pre-submission Local Plan.

1.2 Modelling Context

To undertake this assessment, a Saturn based traffic model has been developed. The model has been used to identify existing network capacity issues, assess the impact of future development growth and the effectiveness of different mitigation policies.

This report is intended to document the highway models development and demonstrate its suitability for the assessment. The report details the model's base year calibration and validation as well as its subsequent use for future year demand forecasting. The contents of this report have been determined by the standards and guidance provided by the Department for Transport (DfT) within Transport Analysis Guidance (TAG).

1.3 Report Structure

This report initially summarises the development of a 2018 base year traffic model and its validation (Chapters 2 – 8). The next stage outlines the development of the future year Reference Case, which includes forecasted trips associated with the Local Plan Development (Chapter 9). The following chapters outline the proposed mitigations and their effectiveness at reducing congestion on the highway network (Chapter 10-11). Chapter 12 then provides the summary and conclusions of the modelling assessment. The report structure is listed as follows:

Chapter 2 provides an overview of the model's set up, including its extents and key parameters;

Chapter 3 describes the observed data used in the model development;

Chapter 4 provides an overview of the network development;

Chapter 5 outlines the development of the demand matrices;

Chapter 6 discusses the assignment methodology;

Chapter 7 summarises the calibration;

Chapter 8 presents the results of the validation;

Chapter 9 details the development of the future year reference case and local plan scenarios;

Chapter 10 provides a summary of the mitigation tests;

Chapter 11 analyses the mitigation test outputs; and

Chapter 12 presents the summary and conclusions.

2 Model Description

2.1 Overview

The key requirement of the Tunbridge Wells Traffic Model (TWTM) is that it should be capable of representing the existing traffic patterns on the strategic road network within the study area. This model will then provide a solid foundation for future year forecasts which need to be sensitive to routes, such as (but not exclusively) the A21 and A26.

A cordon of the Highways England's South East Regional Traffic Model (SERTM) has been used as a starting point for the study. Within this cordoned model new links and nodes have been coded to ensure greater detail within the study area. The network has been calibrated and validated against local traffic movement and journey time data. **Figure 2-1** presents the extent of the cordoned model. The TWTM study area includes the towns of Royal Tunbridge Wells and Tonbridge, and the town of Paddock Wood.

Figure 2-1 – The Extend of the Model

A 2018 base year traffic model has been developed using the strategic traffic assignment software Saturn (version 11.3.12W).

2.2 Parameters

2.2.1 <u>Modelled times</u>

As agreed with the client and Kent County Council (KCC), and following a review of the traffic flow profile, the AM and PM peak weekday single hours are modelled. These periods represent the most important periods of traffic flow within the Borough. The AM and PM peak modelled time periods are from 0800 – 0900 and 17:00-18:00 respectively, which is also consistent with SERTM.

2.2.2 Demand Segmentation

Different types of journeys will likely display different characteristics in terms of trip distribution, mode sensitivity, travel time sensitivity and growth patterns. For this reason, the base year model trip matrix was split into five different ‘user classes’ and built in terms of Passenger Car Units (PCUs). The user class definitions are consistent between the TWTM and SERTM models. **Table 2-1** shows the modelled user classes and their associated PCU factors. The user classes selected for this model meet the current TAG guidance, as well as the required splits for a TUBA economic assessment.

Table 2-1 - List of User Classes and PCU Factor

User Class	Vehicle Type/Purpose	PCU Factor
1	Car – employer’s business	1
2	Car – home-based work	1
3	Car – other	1
4	Light Goods Vehicles (LGV)	1
5	Heavy Goods Vehicles (HGV)	2

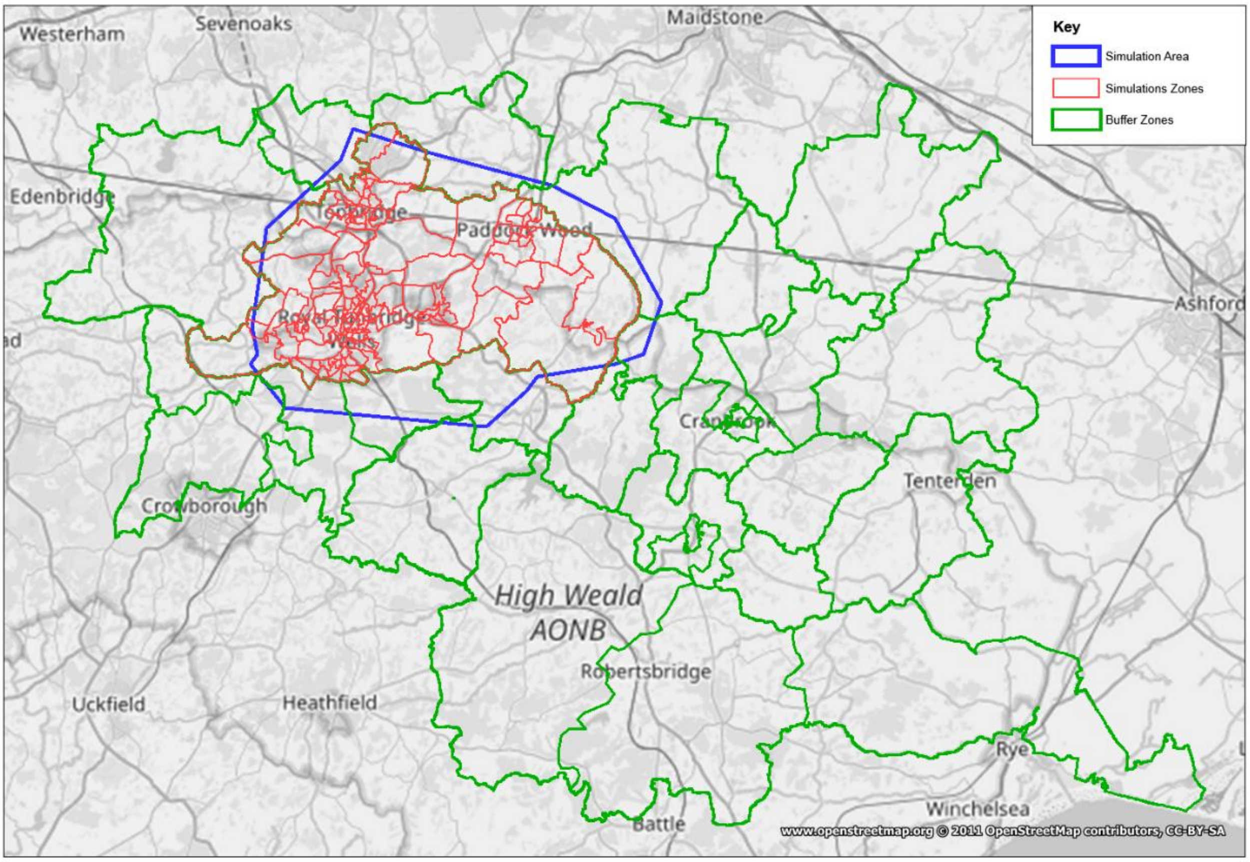
2.3 Zoning System

2.3.1 Zoning System

The model zoning system was inherited from the SERTM model, which also provided the corresponding prior matrix data. Zones were split on the basis of proportion of land uses within the zone, and by the lower layer super output area (LSOA) spatial definitions. Census data was used to identify the proportions of each newly split zone from their donor zone. **Figure 2-2** shows the TW zoning system.

The cordoned SERTM network resulted in 24 SERTM zones and 26 cordon crossings. SERTM zones were further disaggregated by LSOAs within the simulation area and locations of developments.

Figure 2-2 - TW Zoning System



2.3.2 Detailed Disaggregation

For zones where using LSOAs to disaggregate was considered too coarse, zones were split further based on land use densities (residential or employment), and where sources of trips are known (such as carparks, supermarkets and business parks) as indicated by Google Maps.

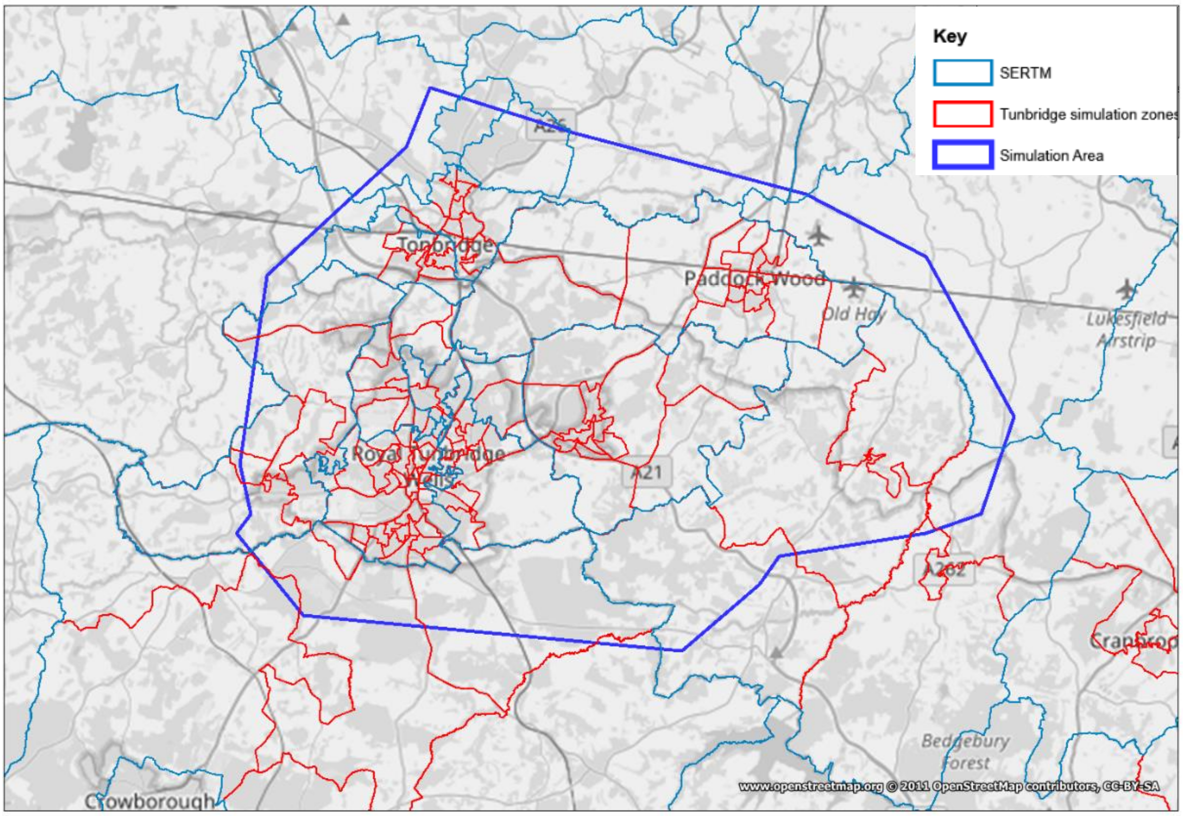
Table 2-2 summarises the number of zones in the simulation and buffer at each stage of disaggregation.

Table 2-2 - Zoning System

	SERTM	LSOA	Final Disaggregation
Simulation	12	67	161
Buffer - Other	12	23	32
Buffer - Cordon Crossing	26	26	26
Total	**50**	**116**	**219**

The disaggregated zones in the simulation area are illustrated in **Figure 2-3**.

Figure 2-3 - TW Disaggregated Simulation Area Zones



3 Traffic Data Collection

3.1 Traffic Data Collection Summary

Local traffic data, collected by Tunbridge Wells Borough Council, has been incorporated into the model. **Table 3-1** summarises the data sources used in the model development.

Table 3-1 - Traffic Data Summary

Traffic Data Type	Number	Year
Automatic Traffic Count (ATC)	26	2018/2019
Manual Classified Counts (MCC)	64	Dec 2018
ANPR Survey Locations	36	Dec 2018
Journey Time Routes	20	2018
ANPR Survey in North Farm	21	July 2019
Manual Classified Counts (MCC) in North Farm	6	July 2019
WebTRIS Data	17	June 2018

3.2 Automatic Traffic Count Data

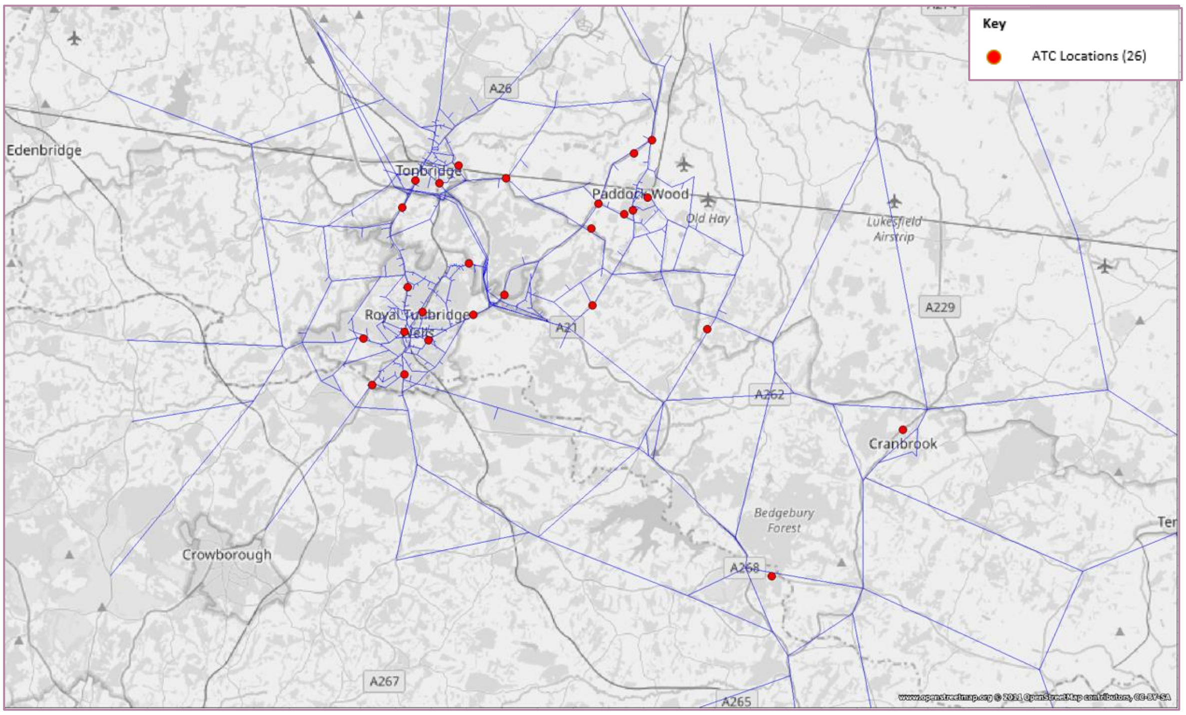
A total of 26 Automatic Traffic Counts (ATC) that were commissioned by Tunbridge Wells Borough Council on links around the Borough. **Figure 3-1** shows the locations of these ATC's links. The majority of these surveys were undertaken for 1-2 weeks within December 2018 while some were carried out between December 2018 and January 2019.

The data was collected at 15 minutes intervals for 24 hours at each site. The data recorded the following vehicle classes:

- Car
- LGV
- 2 axled rigid
- 3 axled rigid
- 4 axled rigid
- 3 axled artic
- 4 axled artic
- 5+ axled artic
- Bus
- Cycle
- Motorcycle

The ATC data was used for model link flow calibration, which is outlined within Chapter 6 Model Calibration and Validation, ensuring that the flow along the strategic links are accurately represented within the model.

Figure 3-1 - ATC Locations



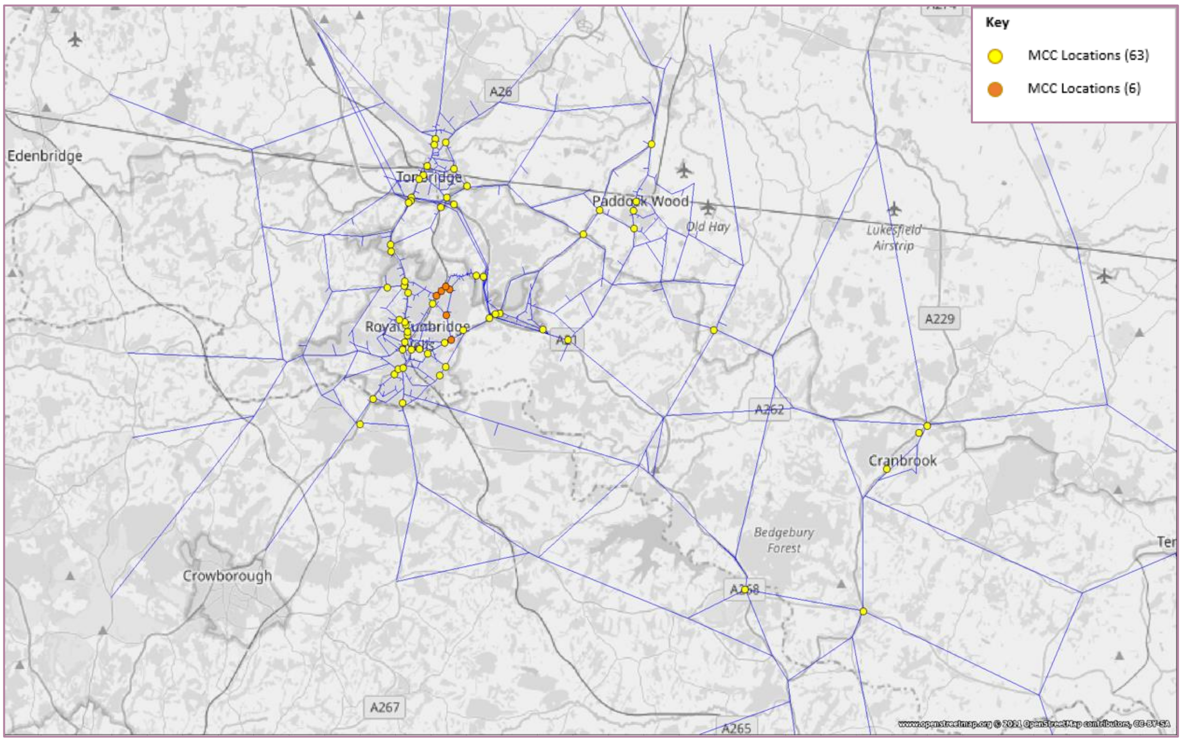
3.3 Manual Classified Count Data

A total of 70 Manual Classified Counts (MCC, primarily junctions counts) were commissioned by Tunbridge Wells Borough Council (TWBC) across the Borough. The data was collected at 15-minute intervals for 12 hours at each site. The data recorded the following vehicle classes are given below:

- Cars
- LGV
- OGV1
- OGV2
- Bus
- Motorcycle
- Cycle

To ensure that traffic flows are accurately represented in the base year assessment, the MCC data has been used for model calibration and validation . The majority of the MCC surveys (64 out of 70 surveys in total) were undertaken for 12 hours on the 11th or 13th December 2018.In addition, 6 junctions MCCs were carried out on 10th July 2019 for 12 hours as part of North Farm study. **Figure 3-2** shows the locations of the MCC surveys.

Figure 3-2 – Manual Classified Count Locations



3.4 Automated Number Plate Recognition (ANPR) And Journey Time

In total 57 ANPR surveys have been undertaken in December 2018 and January 2019. The locations of the 57 ANPRs are shown in **Figure 3-3**.

ANPR data has been collated from 36 different locations across the study area over a 12-hour period on Tuesday the 11th of December 2018. The data obtained has been broken down into 15-minute intervals.

Additionally, 21 ANPR data collection surveys were carried out on 10th July 2019 as part of the North Farm study. This data was used to enhance the model's representation of traffic movements in the North Farm area as shown in **Figure 3-4**.

Figure 3-3 - ANPR Locations

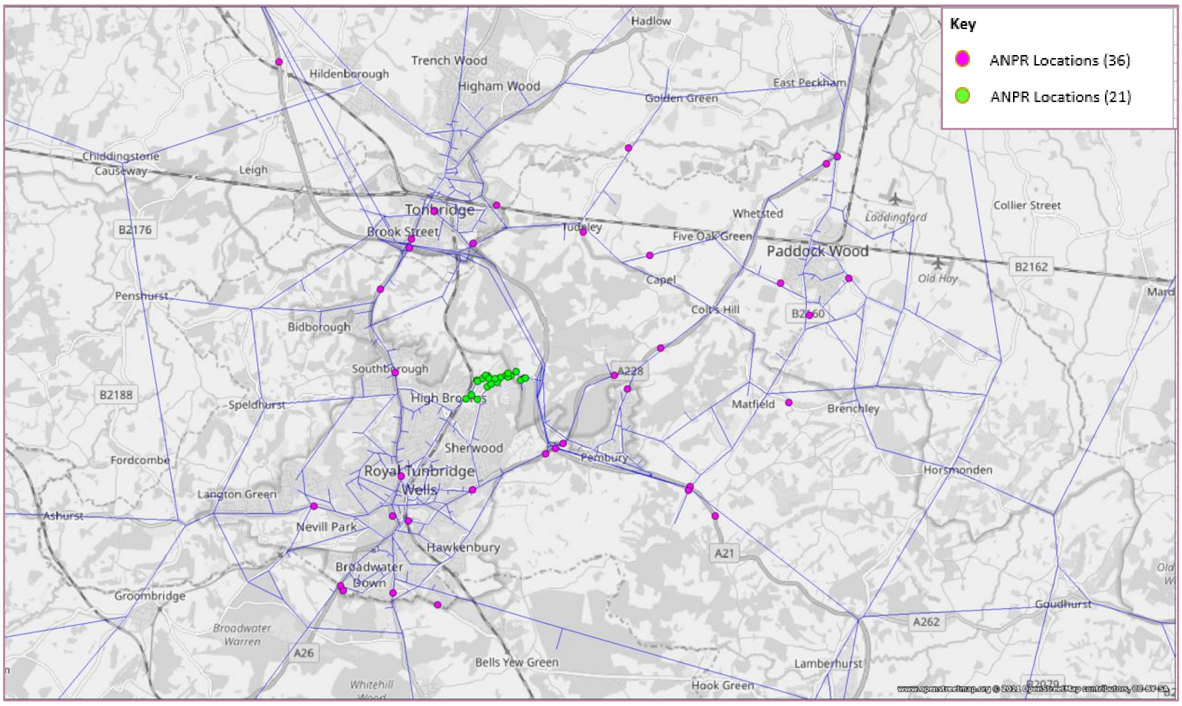
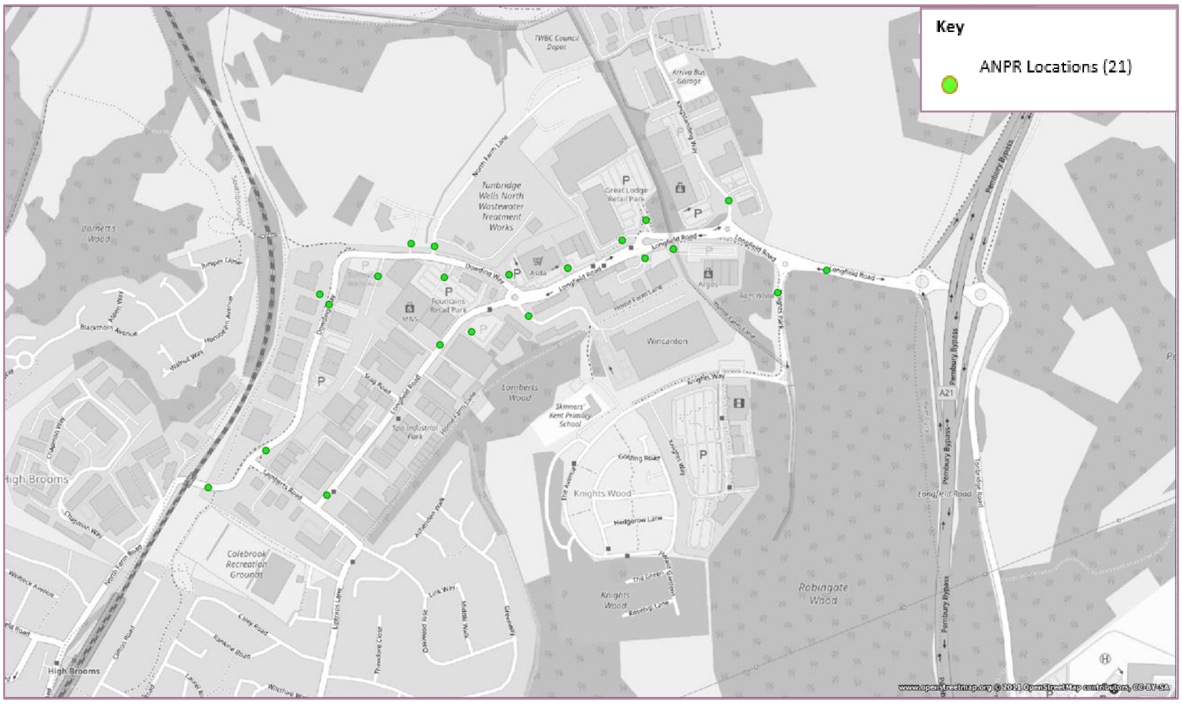
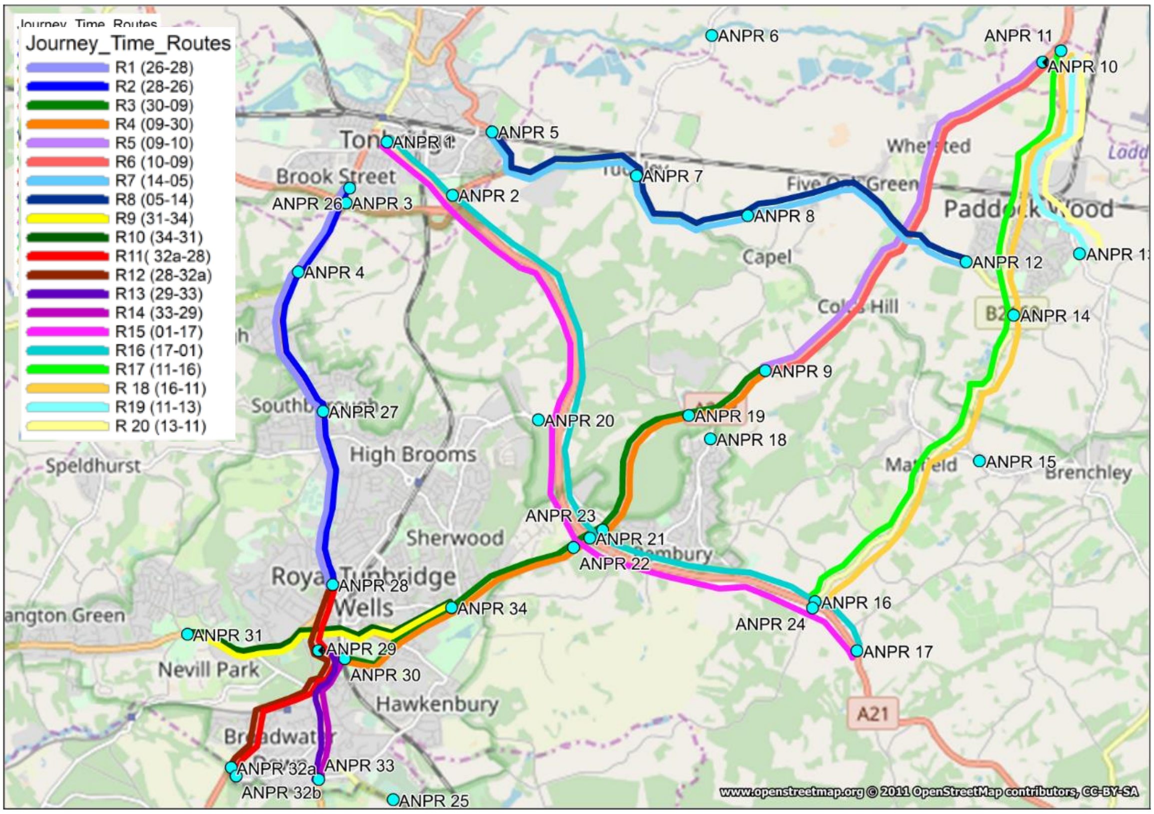


Figure 3-4 - Locations of ANPR Data in North Farm Area



The ANPR data has been used to derive validation journey time routes. **Figure 3-5** shows the locations of the ANPR's as well as the derived journey routes.

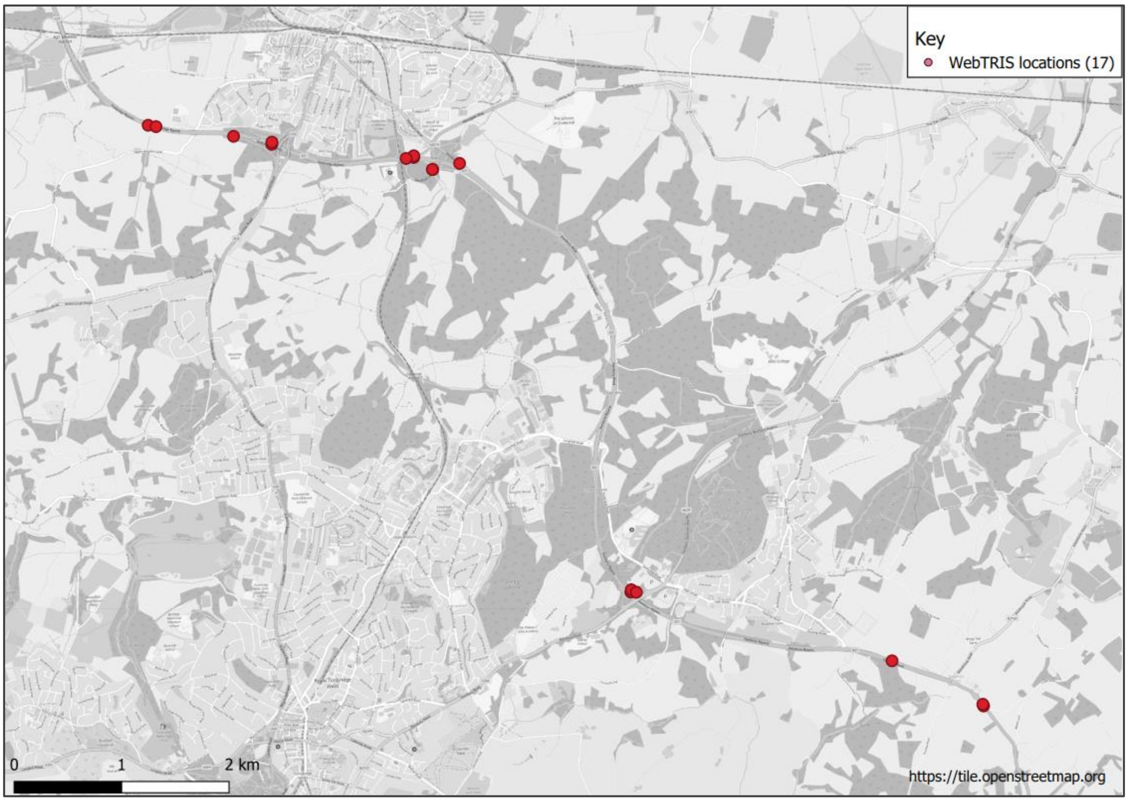
Figure 3-5 - ANPR Locations and Journey Time Routes



3.5 WebTRIS data

Following discussions with Highways England, traffic data for 17 sites was extracted from the WebTRIS database. These sites were used to enhance the base model's representation of the merges and diverges along the A21 corridor. The WebTRIS sites are shown in **Figure 3-6**.

Figure 3-6 -WebTRIS Sites Along A21



3.6 Seasonality Factor

As the ATC and MCC data was primarily collected in early December 2018, rather than a neutral month, further seasonality factor analysis was undertaken to assure the suitability of this traffic data.

The 2018 WebTRIS data in Tunbridge Wells was used to assess the seasonality within the study area. Out of the 17 sites mentioned in section 3.5 one site, the A21 northbound between A26 near Tonbridge (west) and A225, was excluded from this analysis as it didn't contain December 2018 data. The remaining 16 WebTRIS sites as shown in **Figure 3-7** were analysed for the first two weeks of December 2018 against a neutral month to assess the seasonality factor.

Appendix A shows the average of weekday 24-hour flow in a neutral month 2018 and first two weeks of December 2018 for each site. Based on this analysis, the seasonality factor was calculated to be 0.99. It was therefore decided to use the December 2018 data without any adjustment.

Figure 3-7 – WebTRIS Data Used in Seasonality Factor Analysis

4 Model Network Development

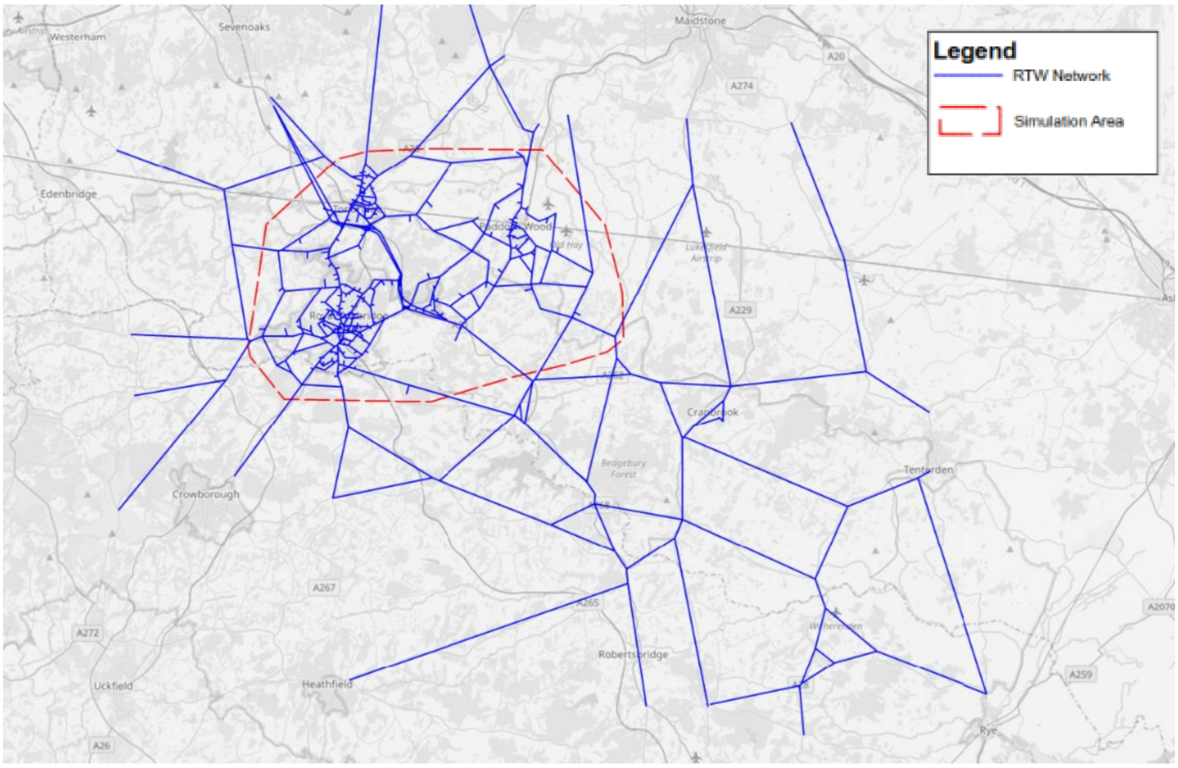
4.1 Use of Existing Sources

The SERTM model's network forms the basis of the TWTM network. However, as SERTM is primarily a strategic model covering the whole of the South East, with national buffer network coverage, the detail within the Royal Tunbridge Wells (RTW) study area was insufficient. As such a detailed simulation highway network was coded, to include all A roads and B roads in the region, the main junctions within and between the town centres, as well as all strategically important local roads in Tonbridge, Paddock Wood and Pembury. In order to finalise the network coverage, decisions had to be made as to which links were likely to carry a minimum threshold of trips and for which the quality and capacity of the road meant that it was suitable for inclusion in a strategic model.

4.2 Buffer and External Area Network

For the buffer/external area, SERTM model network coding has been used. The buffer links included in the TWTM Highway Model as represented within SERTM are shown in **Figure 4-1**.

Figure 4-1 - TWTM buffer network (outside of simulation area's red boundary)



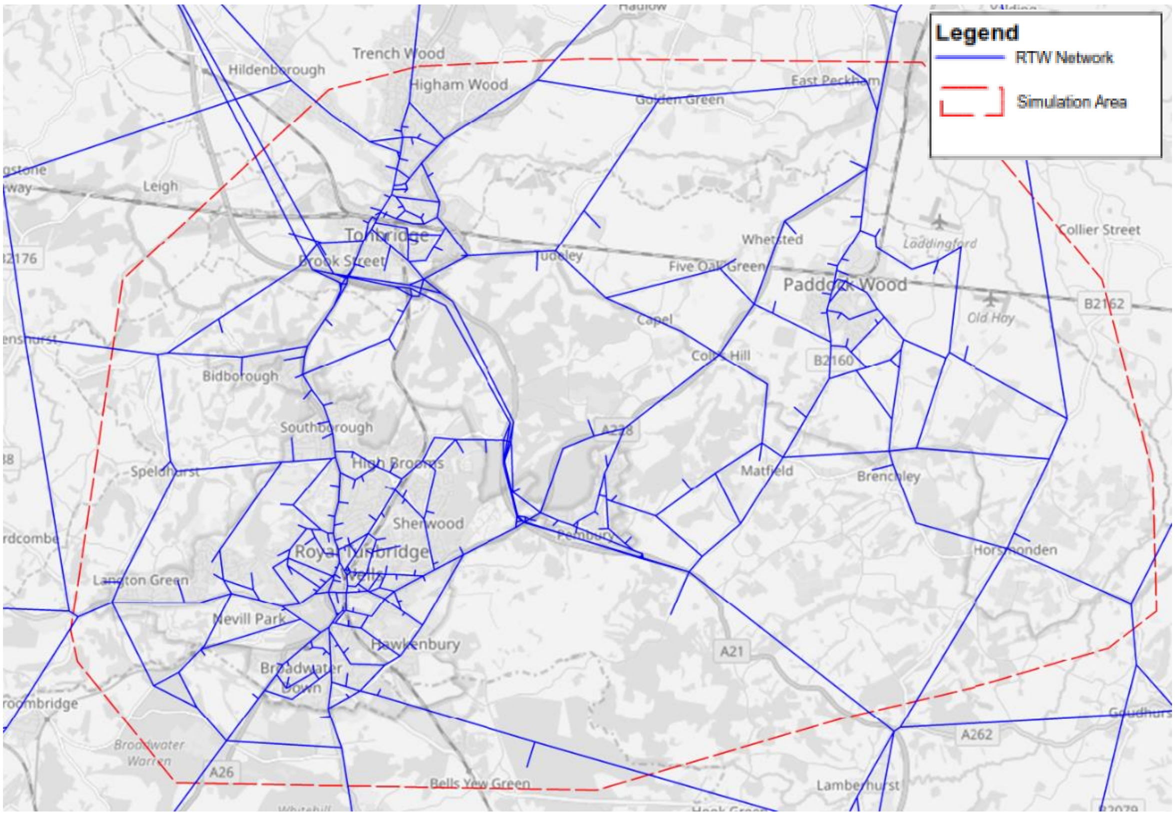
4.3 Simulation Network

As part of the model development a detailed simulation highway network was coded. **Figure 4-2** shows the extent of the detailed simulation network which includes all A roads and B roads in the region as well as all strategically important local roads in Tunbridge, Paddock Wood and Pembury.

The data sources used to inform the simulation network development include Google Maps imagery and traffic data. Traffic signal phasing plans were provided by Kent County Council (KCC) where available.

Most of the junctions and links within the study area have been modelled, particularly along the A and B Roads. The main attractor sites such as stations, shopping centres and industrial areas were coded as different zones where possible. Residential roads leading to smaller residential areas have not been coded but are captured by the centroid connectors.

Figure 4-2 - Simulation area in TWTM



Saturation flows for turning movements have been derived according to both Highways England RTM coding manual and Transport for London network coding guidance, which were used to code the capacity of turning movements within the simulation area.

The development of the simulation network was conducted according to the following sub-tasks:

1) Overlay SATURN simulation coding junction by junction across the area;
2) Connect zones to the network at suitable locations to reflect how traffic will access the highway network; and
3) Conduct network coding consistency checks;

The following components of the network were reviewed whilst undertaking the network consistency checks:

- Distance
- Priority junction saturation flows
- Signalised junction saturation flows
- Roundabout saturation flows
- Roundabout circulation capacities
- Gap acceptance
- Cruise speeds
- Cycle times
- Connectors
- Speed flow curve relationships
- Fixed speeds
- Route choice

5 Model Demand Development

5.1 Overview of Existing Sources

To be consistent with the network coding methodology, the primary source of matrix data was SERTM. The SERTM matrices provide a nationally consistent set of demand matrices based on 2015 Mobile phone data and provide a readily available data source as a start point for matrix development for strategic models derived from SERTM.

5.2 Matrix Disaggregation and In-Filling

The SERTM matrices were first split on the basis of proportion of land uses within the zone, and by the census Lower Super Output Area (LSOA) spatial definitions. Census data was then used to identify the proportions of each newly split zone from their donor zone.

The initial SERTM zones were large and coarse within the TWTM study area. To create a prior matrix for the detailed modelling within the TWTM simulation area, the SERTM matrices were initially split based on the Lower Super Output area (LSOA) spatial definitions. Subsequently where required the zones were further disaggregated around the major developments and town centres. As discussed in Section 2.3, a total of 219 TWTM zones were created from 50 SERTM zones. Census data was used to calculate the proportions of each newly split zone from their donor SERTM zone. **Appendix B** illustrates the proportions used for disaggregating SERTM zones into TWTM zones within the core study area.

No intra-zonal trips where represented within the large SERTM zones. This meant that when the SERTM zones were split to finer TWTM zones, the intra-zonal trips were missing from the prior matrix. In order to take account of the missing intra-zonal movements, a small number of trips were added to the prior matrix to infill the intra zonal cells (in the range of 0.1-0.2 per cell). This infilling process allows the matrix estimation procedure to generate an estimate of the intra-zonal trips based on the observed traffic count data.

Furthermore, to allow for the difference between the SERTM base year model (2015) and TWTM base year (2018), the prior matrix from the SERTM model was uplifted by 3% before using it as the prior matrix for the TWTM modelling. The 3% uplift was based on the growth derived from TEMPro 7.2 for Kent and Tunbridge Wells.

6 Model Assignment Process

6.1 Modelling Assumptions and Parameters

The generalised cost parameters (Value of Time and Vehicle Operating Cost) used in the AM and PM models are listed in **Table 6-1**. Those values are derived from TAG Databook July 2020 and were 2018 values based in 2010 price bases.

Table 6-1 - Assumptions of Value of Time (PPM) and Vehicle Operating Cost (PPK)

User Class	PPM	PPK
Car - Employer's Business	30.75	12.08
Car - Commuting	20.62	5.54
Car - Other	14.23	5.54
LGV	21.73	13.34
HGV	50.75	40.5

6.2 TAG Model Acceptability Guidelines

The TAG criteria used to determine the suitability of the calibration and validation processes are summarised in this section.

6.2.1 Screenline Flow Criterion and Acceptability Guidelines

TAG sets out criteria for screenlines as shown in **Table 6-2**.

Table 6-2 - Screenline flow criterion and acceptability guideline

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

6.2.2 Link Flow Criterion and Acceptability Guidelines

The criteria for the link flow calibration and validation is set out within TAG unit M3.1 and can be seen in **Table 6-3**. TAG states these two measures are broadly consistent and link flows that meet either criterion should be regarded as satisfactory. The criteria were applied to both link flows and turning movements. The comparisons using both measures are reported in Chapter 8 of the report.

Table 6-3 - Link flow and turning movement validation criteria and acceptability guidelines

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	
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	
2	GEH <5 for individual flows	

The GEH (Geoffrey E. Havers) statistic based on a comparison of observed and modelled flow and is used as an indicator of "goodness of fit". The formula for the GEH statistic is $\sqrt{\frac{(M-O)^2}{(0.5M+0.5O)}}$

6.2.3 Journey Time Criterion and Acceptability Guidelines

TAG sets out the criteria for journey times in unit M3.1. The criteria can be seen in **Table 6-4**.

Table 6-4 - Journey time validation criterion and acceptability guideline

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

6.3 SATURN Model Details and Convergence Criteria

Model convergence is essential to the production of a stable model suitable for option testing, forecasting and economic analysis. One important reason for requiring a high degree of model convergence is to reduce model noise as far as practical so that genuine small option supply and demand effects are not masked. Convergence is based on the following two criteria:

- Stability of the model outcomes between consecutive iterations; and
- Proximity to the assignment objective (a measure of whether the lowest cost solution has been found).

Convergence stability for SATURN is based on changes in link costs and flows between successive model iterations. The measures used are the percentage of links in the model where, respectively, flows and delays (or total link costs) differ by less than a set value. Proximity is measured as part of the assignment criteria. convergence proximity is measured by the convergence duality %Gap value or delta, as measured by SATURN. %Gap expresses the flow-weighted difference between current total cost estimates on the network, as determined by the present flow pattern and the speed-flow curves, and the costs if all traffic would use minimum cost routes (as calculated by the next all-or-nothing assignment).

The SATURN deterministic assignment method was implemented for its runtime benefits given the significant number of scenarios that require testing. The parameters controlling the stopping criteria for the final assignment runs of the TWTM Highway Model are defined and shown in **Table 6-5**, with the proximity (%Gap) target set by the STPGAP parameter in SATURN.

Table 6-5 - Primary model convergence criteria (final assignment)

SATURN Parameter	Value	Description
STPGAP	0.025	Critical %Gap value to stop assignment loops
UNCRTS	0.025	Wardrop assignment parameter monitoring epsilon
NISTOP	4	The number of successive loops which must satisfy RSTOP
RSTOP	98	Stopping criteria for assignment/simulation loops
PCNEAR	2	Percentage change in flows in successive assignments
KONSTP	5	KONtrol of StoPping Criteria - STPGAP AND RSTOP

The TWTM convergence was judged directly against meeting the %Gap and RSTOP criterion on four (NISTOP) successive iterations, consistent with the choice of KONSTP equal to 5 in the SATURN parameters.

The RSTOP test for convergence of the assignment/simulation loops stops the assignment automatically if RSTOP (%Flows) of the link flows change by less than "PCNEAR" percent (default 1%) from one assignment to the next. The model's "STPGAP" (stopping criteria) for assignment convergence has been reduced from the suggested TAG guidance of 0.05 to 0.025 to achieve a high level of convergence and reduce any possible model noise.

%Gap is the single most valuable indicator of overall model convergence. It has a definite theoretical interpretation, differentially weights good and bad fits and is easy to compare between networks of very different sizes, complexity and degrees of congestion. It is used to measure overall model convergence for the TWTM, with convergence met if %Gap falls under 0.025% on four successive model iterations.

Table 6-6 and **Table 6-7** show that stable assignment convergence has been achieved for both the AM Peak and PM Peak of the Tunbridge Wells Highway models.

Table 6-6 - AM Peak Convergence – Final 4 Iterations

Loop	%Flows	%Delays	%Gap
48	98.1	99.2	0.019
49	98.3	99.2	0.019
50	98.3	99.4	0.019
51	98.2	99.3	0.019

Table 6-7 - PM Peak Convergence – Final 4 Iterations

Loop	%Flows	%Delays	%Gap
23	99.4	98.9	0.024
24	99.5	99	0.025
25	99.6	98.9	0.020
26	99.4	99.2	0.017

7 Model Calibration

7.1 Overview

The section describes the calibration of the AM and PM traffic model, which represents the fine tuning of the model inputs and parameters and the processes involved in ensuring and demonstrating that the base year model is accurately defined and thus a suitable tool for testing and forecasting.

The calibration and validation process involves the comparison of observed data with the modelled data calculated by assigning updated matrices to the updated network.

The following assessments were undertaken as part of model calibration:

- Adjustment and checking of the network to ensure plausible and realistic routing of traffic in the model; and
- Comparison of observed against modelled flows across screenlines, and at other locations.

The key criteria that will be looked at in this section are:

- Screenline calibration
- Link flow calibration

7.2 Matrix Estimation

Matrix Estimation (ME) was undertaken to adjust the prior origin-destination (OD) matrix so that the assignment flows in the model on the road network matched as closely as possible to observed flows. This process should only result in fine tuning of the matrix to the observed data and should not result in a significant change in prior matrix distribution. To constrain the impact of ME an XAMAX value of 5 was adopted. XAMAX is a user defined SATURN input balancing factor which is used to limit excessive change to the input prior matrix. It is considered that this approach is sufficient to allow SATURN's SATME2 module to achieve a good match with the observed counts whilst not distorting the prior matrix distribution.

This section details the analysis of the consistency of the post matrix estimation compared to the input prior matrix with respect to changes in the following:

- Matrix totals and sector movement
- Trip length distribution

7.2.1 Matrix Totals

Differences between the adjusted and prior OD matrices were examined to check the changes and the consistency between different user classes. A comparison between the prior and post matrices adjustments for AM and PM for various demand segments is presented in **Table 7-1**.

Table 7-1 - Matrix Totals Pre and Post Matrix Estimation

Demand Segmentation		AM			PM		
		Prior	Post	% Changes	Prior	Post	% Changes
Car - Employer's Business	UC1	2478	2885	16%	2028	2348	16%
Car - Commuting	UC2	11143	13411	20%	8877	10229	15%
Car - Other	UC3	12960	16237	25%	15935	20180	27%
LGV	UC4	3472	4696	35%	2938	4227	44%
HGV	UC5	2563	2669	4%	1660	1279	-23%
Total	-	32616	39898	22%	31437	38263	22%

To better understand the impact of the ME process and the changes between the prior and post ME matrix totals, matrices were sectored into 3 levels (Simulation, Buffer and Cordon Crossing) and the differences were examined. The sector level OD matrix comparison is shown in **Table 7-2** and **Table 7-3** for AM and PM respectively.

The increase in post – ME matrix within the simulation area is mainly due to the relatively large size of SERTM zones and the lack of intrazonal trips in the prior matrix. The sector level matrices also shows changes between simulation and buffer/cordon crossing and vice versa. This is mainly due to the wide spread of calibration counts across the whole model network used in the ME process as seen later in **Figure 7-4** of this report.

Table 7-2 – Pre and Post Matrix Estimation Changes at sector level – AM Peak

Pre ME	Simulation	Buffer	Cordon crossing
Simulation	6872	1249	4597
Buffer	1794	1899	4025
Cordon crossing	5269	4182	2729

Post ME	Simulation	Buffer	Cordon crossing
Simulation	11725	1787	5619
Buffer	2634	1891	3416
Cordon crossing	7270	3530	2024

% Change	Simulation	Buffer	Cordon crossing
Simulation	71%	43%	22%
Buffer	47%	0%	-15%
Cordon crossing	38%	-16%	-26%

Table 7-3 – Pre and Post Matrix Estimation Changes at sector level – PM Peak

Pre ME	Simulation	Buffer	Cordon crossing
Simulation	6730	1630	4968
Buffer	1218	1792	4236
Cordon crossing	4122	3753	2989

Post ME	Simulation	Buffer	Cordon crossing
Simulation	1848	1776	3495
Buffer	5082	3085	2145
Cordon crossing	11893	2465	6473

% Change	Simulation	Buffer	Cordon crossing
Simulation	77%	51%	30%
Buffer	52%	-1%	-17%
Cordon crossing	23%	-18%	-28%

7.2.2 Trip Length Distribution

Differences in trip length distribution between the post and prior OD matrices were examined to ensure the process did not adversely altered the trip distribution in the prior matrices As shown in **Figure 7-1** and **Figure 7-2** the matrix estimation has resulted in more short distance trips which were mainly excluded in SERTM prior matrix due to the large size of the model.

Figure 7-1 - Trip Length Distribution – AM Peak

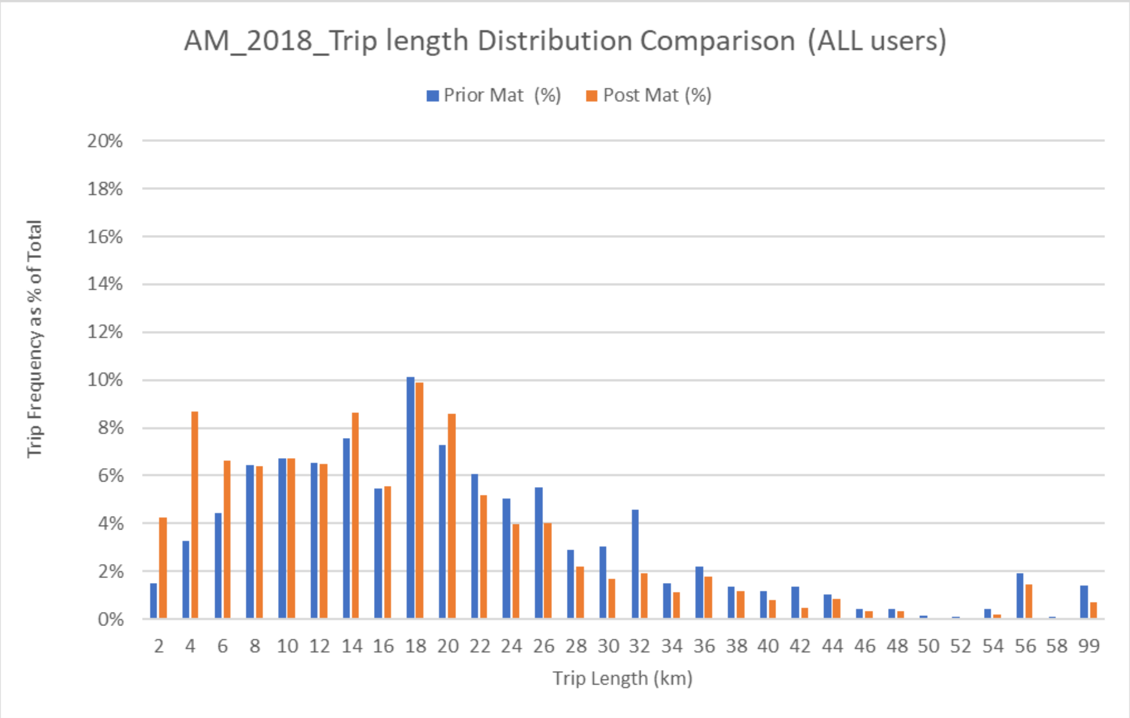
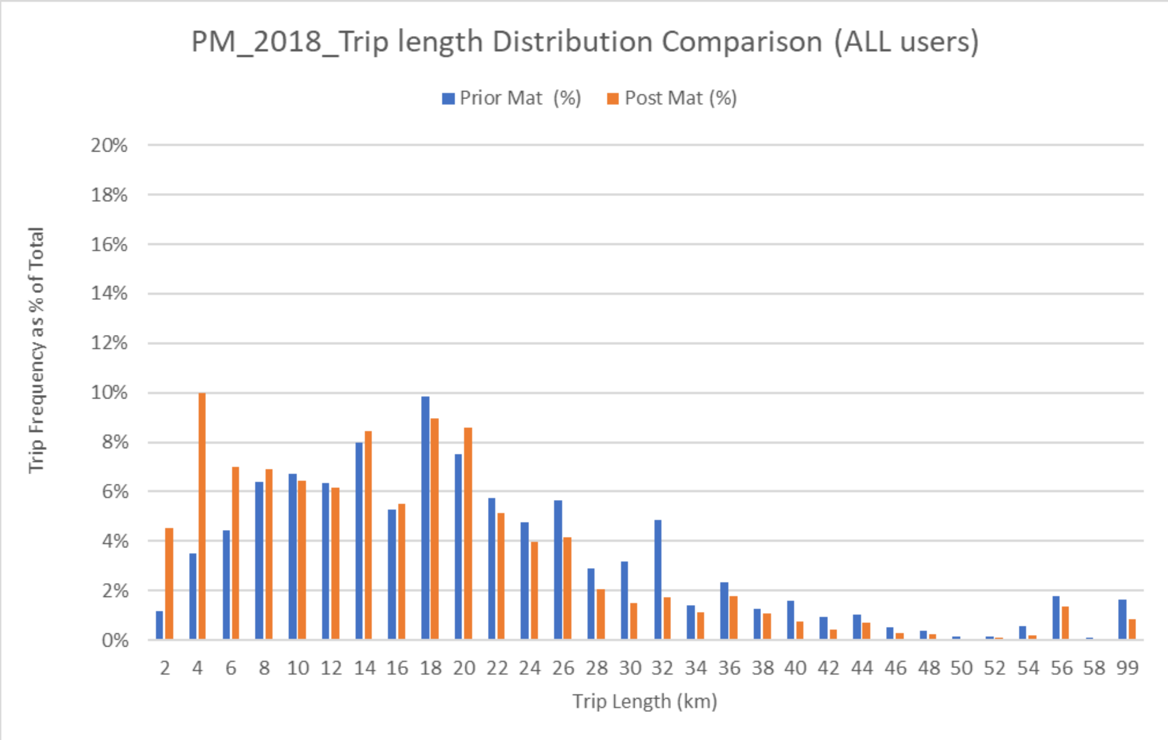


Figure 7-2 - Trip Length Distribution – PM Peak



7.3 Screenline Performance

A total of 16 screenlines (by direction. i.e. 8 two-way screenlines) are used for the calibration of Tunbridge Wells model as shown in **Figure 7-3**. Calibration screenline results are presented in **Table 7-4** and **Table 7-5** for the AM and PM respectively.

Overall the model shows a high-level screenline calibration, achieving 94% and 88% for AM and PM respectively. Thus satisfying the TAG acceptability criteria outlined in section 6.2, which specifies that the difference between modelled flow and counts should be less than 5% of the counts.

The full breakdown of screenline calibration for each time period be seen in **Appendix A** and **Appendix D** .

Figure 7-3 - Screenline Location

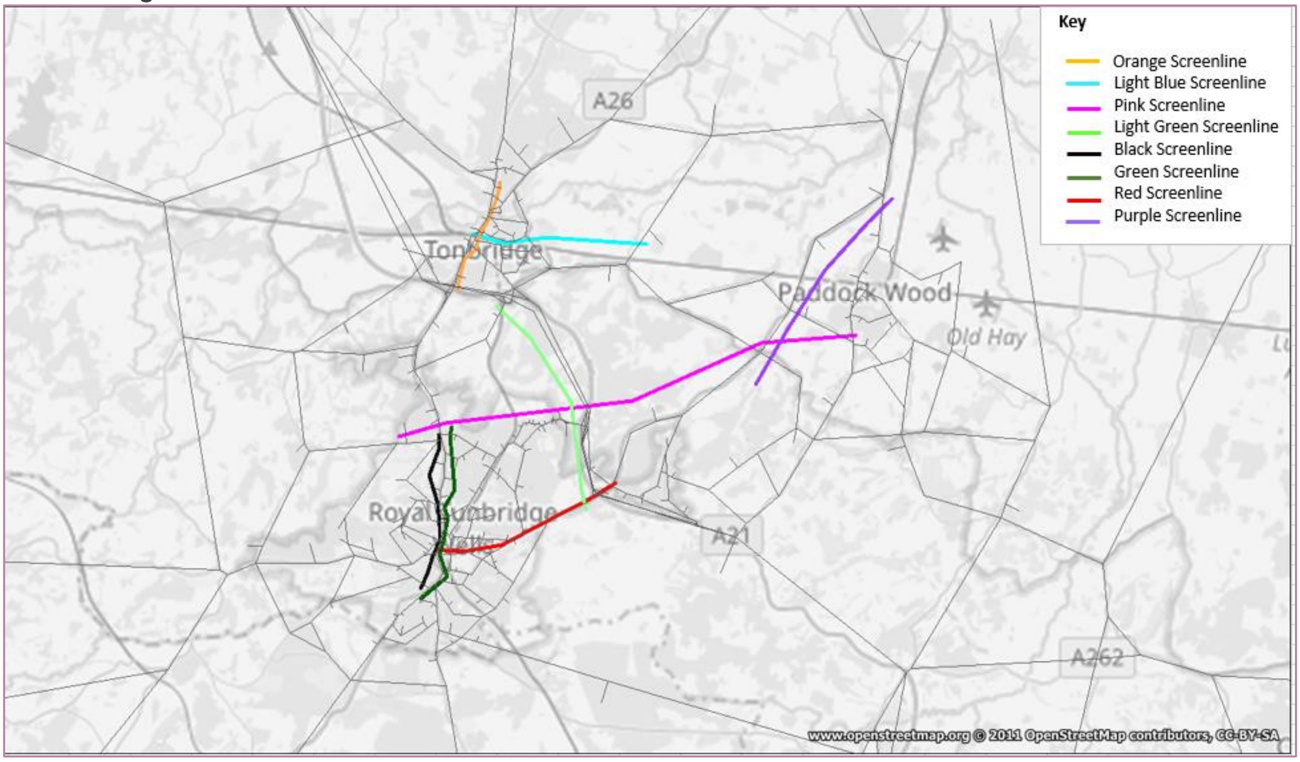


Table 7-4 – Screenline Calibration Results – AM Peak

Name	Dir	Observed	Modelled	Diff	% Diff	GEH	GEH pass	Flow pass
Orange	EB	1148	1104	-44	-4%	1	✓	✓
	WB	1115	1163	48	4%	1	✓	✓
Light Blue	NB	1803	1802	-1	0%	0	✓	✓
	SB	1410	1429	19	1%	1	✓	✓
Pink	NB	4657	4532	-125	-3%	2	✓	✓
	SB	4736	4651	-85	-2%	1	✓	✓
Light Green	EB	2128	1996	-132	-6%	3	✓	✗
	WB	2718	2695	-23	-1%	0	✓	✓
Black	EB	2048	2095	47	2%	1	✓	✓
	WB	2001	1927	-74	-4%	2	✓	✓
Green	EB	2487	2387	-100	-4%	2	✓	✓
	WB	2492	2436	-56	-2%	1	✓	✓
Red	NB	5894	5769	-125	-2%	2	✓	✓
	SB	5022	5099	77	2%	1	✓	✓
Purple	NB	1036	991	-45	-4%	1	✓	✓
	SB	1216	1230	14	1%	0	✓	✓

Table 7-5 – Screenline Calibration Results – PM Peak

Name	Dir	Observed	Modelled	Diff	% Diff	GEH	GEH pass	Flow pass
Orange	EB	1264	1155	-116	-9%	3	✓	✗
	WB	1224	1164	-58	-5%	2	✓	✓
Light Blue	NB	1384	1369	-11	-1%	0	✓	✓
	SB	1715	1708	-2	0%	0	✓	✓
Pink	NB	4666	4650	-20	0%	0	✓	✓
	SB	4824	4794	-15	0%	0	✓	✓
Light Green	EB	2526	2495	-25	-1%	0	✓	✓
	WB	2245	2333	92	4%	2	✓	✓
Black	EB	1931	1976	42	2%	1	✓	✓
	WB	1748	1852	111	6%	3	✓	✗
Green	EB	2644	2572	-47	-2%	1	✓	✓
	WB	2362	2434	88	4%	2	✓	✓
Red	NB	4931	4860	-127	-3%	2	✓	✓
	SB	5381	5333	-56	-1%	1	✓	✓
Purple	NB	1074	1079	6	1%	0	✓	✓
	SB	1173	1149	-21	-2%	1	✓	✓

7.4 Individual Flows

Figure 7-4 shows the location of the calibration counts used in the ME process and the results for the individual flow count calibration are shown in **Table 7-6**. The TAG acceptability criteria as outlined in Section 6.2 are achieved comfortably for both link and turn flows for AM and PM time periods In summary, out of 367 link and 454 turning counts the model achieves the following results:

- Link Calibration (< GEH 5) AM = 93%, PM = 93%;
- Link Calibration (DMRB Flow Criteria) AM=94%. PM=94%;
- Turn Calibration (< GEH 5) AM = 85%, PM = 86%; and
- Turn Calibration (DMRB Flow Criteria) AM = 85%, PM = 86%.

Figure 7-4 – Locations of Model Calibration Counts

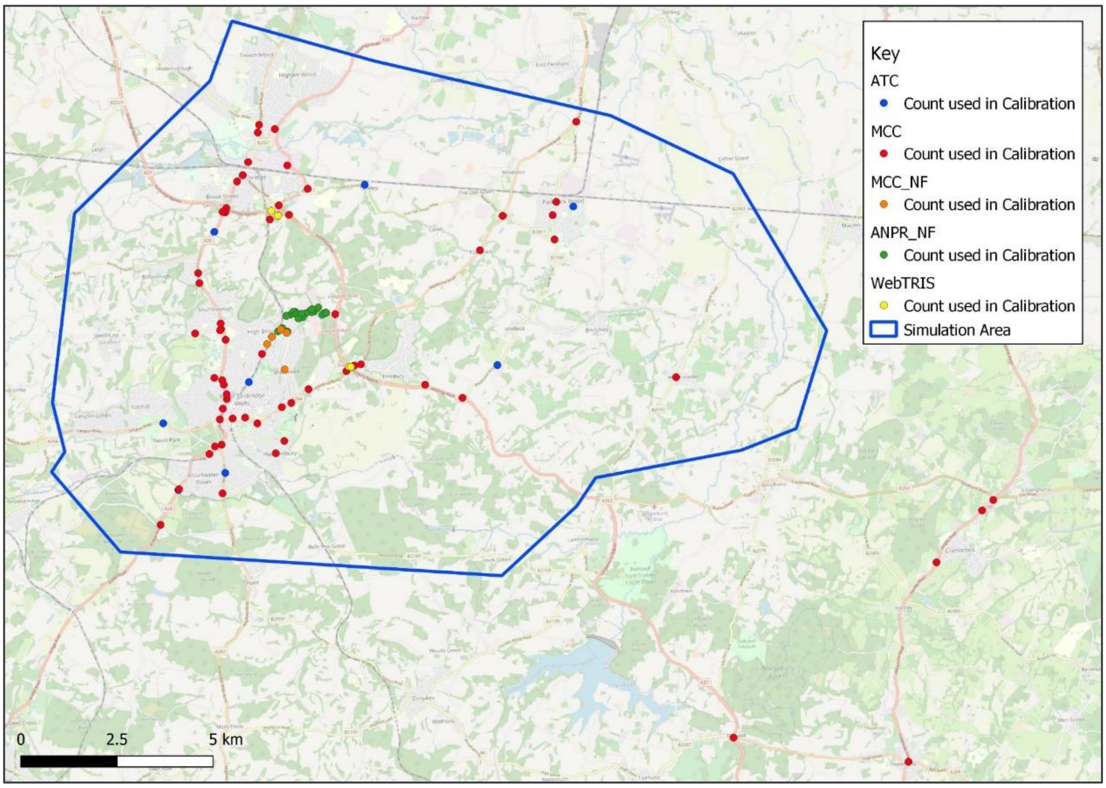


Table 7-6 - Individual Flow Calibration Summary Results

	AM Peak		PM Peak	
Criteria	No of Counts	PASS Criteria	No of Counts	PASS Criteria
Individual Link flow - Counts with GEH<5	367	93%	367	93%
Individual Link flow - DMRB Flow Criteria	367	94%	367	94%
Individual Turn flow - Counts with GEH<5	454	85%	454	86%
Individual Turn flow - DMRB Flow Criteria	454	85%	454	86%

7.5 A21 Corridor

The WebTRIS data mentioned in Section 3.5 above were used for both calibration and validation of the A21 corridor. Out of those 17 sites, the following 4 sites were used in calibration while the rest of the sites were used in validation:

- TMU Site 5861/1 on A21 northbound access from A26 near Tonbridge (east)
- TMU Site 5862/1 on link A21 southbound exit for A26 near Tonbridge (east)
- TMU Site 5994/2 on A21 southbound access from A228
- TMU Site 5994/3 on A21 southbound within the A228 junction

The results of the A21 corridor calibration and validation are shown in **Table 7-7**, with 100% and 94 % achieved for AM and PM for both GEH and DMRB criteria. **Table 7-8** and **Table 7-9** together with **Figure 7-5** and **Figure 7-6** below show the results of calibration and validation by each link for AM and PM respectively.

Table 7-7 – A21 Link Flow Calibration and Validation Summary Results

	AM Peak		PM Peak	
Criteria	No of Counts	PASS Criteria	No of Counts	PASS Criteria
Individual Link flow - Counts with GEH<5	17	100%	17	94%
Individual Link flow - DMRB Flow Criteria	17	100%	17	94%

Table 7-8 – A21 Link Flow Calibration and Validation Results – AM Peak

Site No	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	%Diff	GEH	GEH Pass	Flow PASS
1	A21 access from A26 near Tonbridge (west)	NB	15268	15266	826	716	-110	-13%	4	✓	15268
2	A21 between A228 and B2160	SB	17786	15173	1165	1010	-156	-13%	5	✓	17786
3	A21 between A26 near Tonbridge (west) and A225	NB	15266	15280	2288	2234	-53	-2%	1	✓	15266
4	A21 between A225 and A26 near Tonbridge (west)	SB	15281	15272	2099	2070	-29	-1%	1	✓	15281
5	A21 exit for A26 near Tonbridge (west)	SB	15272	15274	694	718	24	3%	1	✓	15272
6	A21 between A26 near Tonbridge (west) and A26 near Tonbridge (east)	SB	15272	15298	1395	1352	-43	-3%	1	✓	15272
7	**A21 access from A26 near Tonbridge (east)**	**SB**	**15301**	**18141**	**474**	**481**	**7**	**1%**	**0**	**✓**	**15301**
8	A21 exit for A26 near Tonbridge (east)	NB	18141	15301	861	861	0	0%	0	✓	18141
9	**A21 exit for A26 near Tonbridge**	**NB**	**15298**	**15301**	**365**	**355**	**-10**	**-3%**	**1**	**✓**	**15298**
10	A21 within the A26 near Tonbridge (east) junction	SB	15298	15304	1029	997	-32	-3%	1	✓	15298
11	A21 access from A26 near Tonbridge (east)	SB	15301	15304	861	893	33	4%	1	✓	15301
12	A21 between B2160 and A262	SB	15173	16695	965	840	-125	-13%	4	✓	15173
13	A21 between A262 and B2160	NB	16695	15173	1212	1109	-103	-9%	3	✓	16695
14	A21 within the A26 near Tonbridge (east) junction	NB	15299	15297	1125	1169	44	4%	1	✓	15299
15	A21 exit for A228	SB	15166	15170	386	322	-64	-17%	3	✓	15166
16	**on A21 access from A228**	**SB**	**15170**	**15169**	**175**	**142**	**-34**	**-19%**	**3**	**✓**	**15170**
17	**A21 within the A228 junction**	**SB**	**15166**	**15169**	**836**	**719**	**-117**	**-14%**	**4**	**✓**	**15166**

* Count used in calibration highlighted in bold

Table 7-9 – A21 Link Flow Calibration and Validation Results – PM Peak

Site No	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	%Diff	GEH	GEH Pass	Flow PASS
1	A21 access from A26 near Tonbridge (west)	NB	15268	15266	645	649	4	1%	0	✓	✓
2	A21 between A228 and B2160	SB	17786	15173	1400	1413	13	1%	0	✓	✓
3	A21 between A26 near Tonbridge (west) and A225	NB	15266	15280	1781	1856	75	4%	2	✓	✓
4	A21 between A225 and A26 near Tonbridge (west)	SB	15281	15272	2387	2296	-91	-4%	2	✓	✓
5	A21 exit for A26 near Tonbridge (west)	SB	15272	15274	839	772	-66	-8%	2	✓	✓
6	A21 between A26 near Tonbridge (west) and A26 near Tonbridge (east)	SB	15272	15298	1527	1524	-3	0%	0	✓	✓
7	**A21 access from A26 near Tonbridge (east)**	**SB**	**15301**	**18141**	**314**	**371**	**57**	**18%**	**3**	✓	✓
8	A21 exit for A26 near Tonbridge (east)	NB	18141	15301	780	770	-10	-1%	0	✓	✓
9	**A21 exit for A26 near Tonbridge**	**NB**	**15298**	**15301**	**322**	**370**	**47**	**15%**	**3**	✓	✓
10	A21 within the A26 near Tonbridge (east) junction	SB	15298	15304	1210	1154	-55	-5%	2	✓	✓
11	A21 access from A26 near Tonbridge (east)	SB	15301	15304	654	789	135	21%	5	×	×
12	A21 between B2160 and A262	SB	15173	16695	1171	1130	-41	-3%	1	✓	✓
13	A21 between A262 and B2160	NB	16695	15173	722	718	-4	-1%	0	✓	✓
14	A21 within the A26 near Tonbridge (east) junction	NB	15299	15297	938	955	17	2%	1	✓	✓
15	A21 exit for A228	SB	15166	15170	315	296	-19	-6%	1	✓	✓
16	**on A21 access from A228**	**SB**	**15170**	**15169**	**187**	**227**	**40**	**21%**	**3**	✓	✓
17	**A21 within the A228 junction**	**SB**	**15166**	**15169**	**1271**	**1248**	**-23**	**-2%**	**1**	✓	✓

* Count used in calibration highlighted in bold

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Figure 7-5 - A21 Link Flow Calibration and Validation by Junction – AM Peak

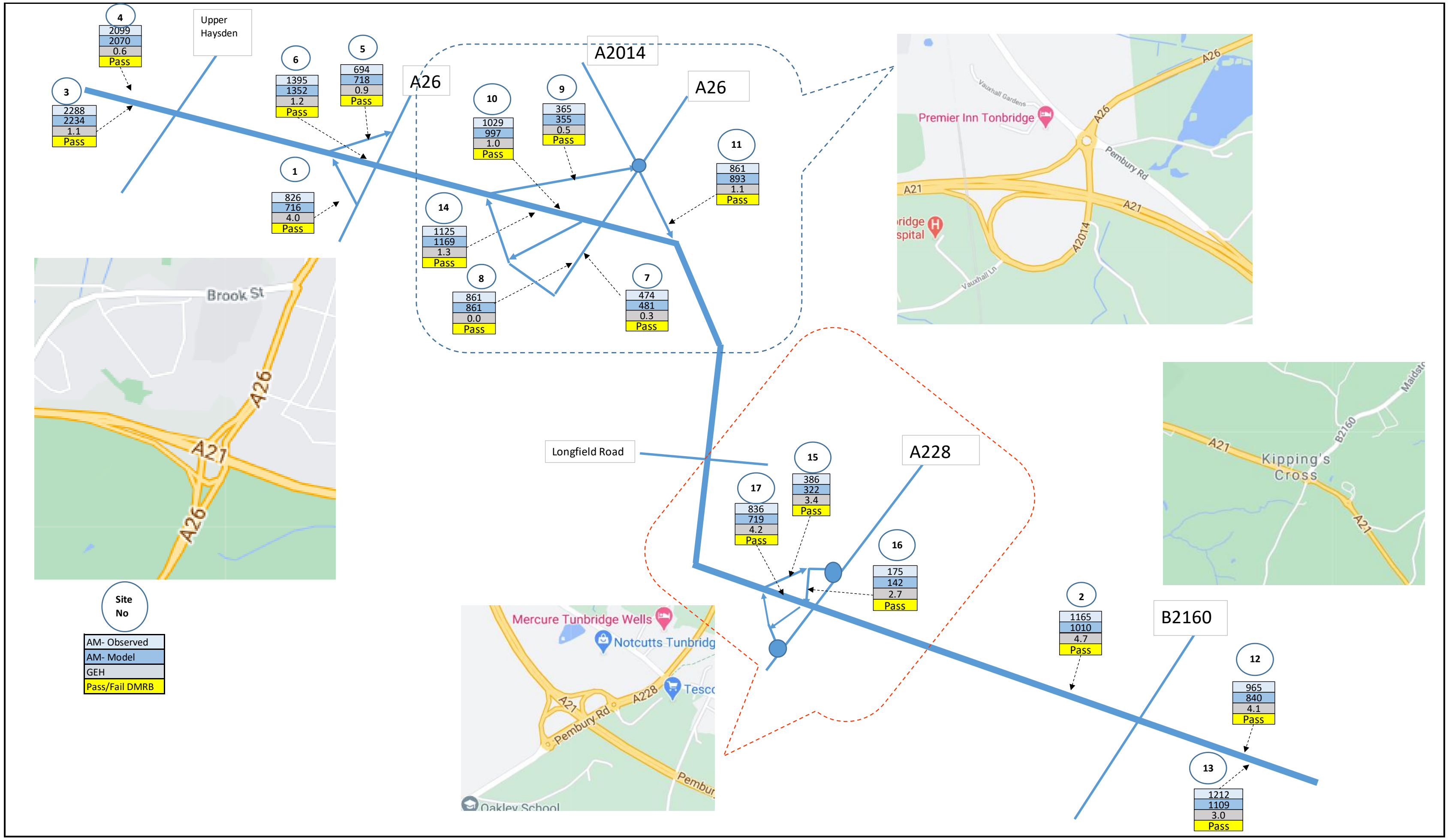
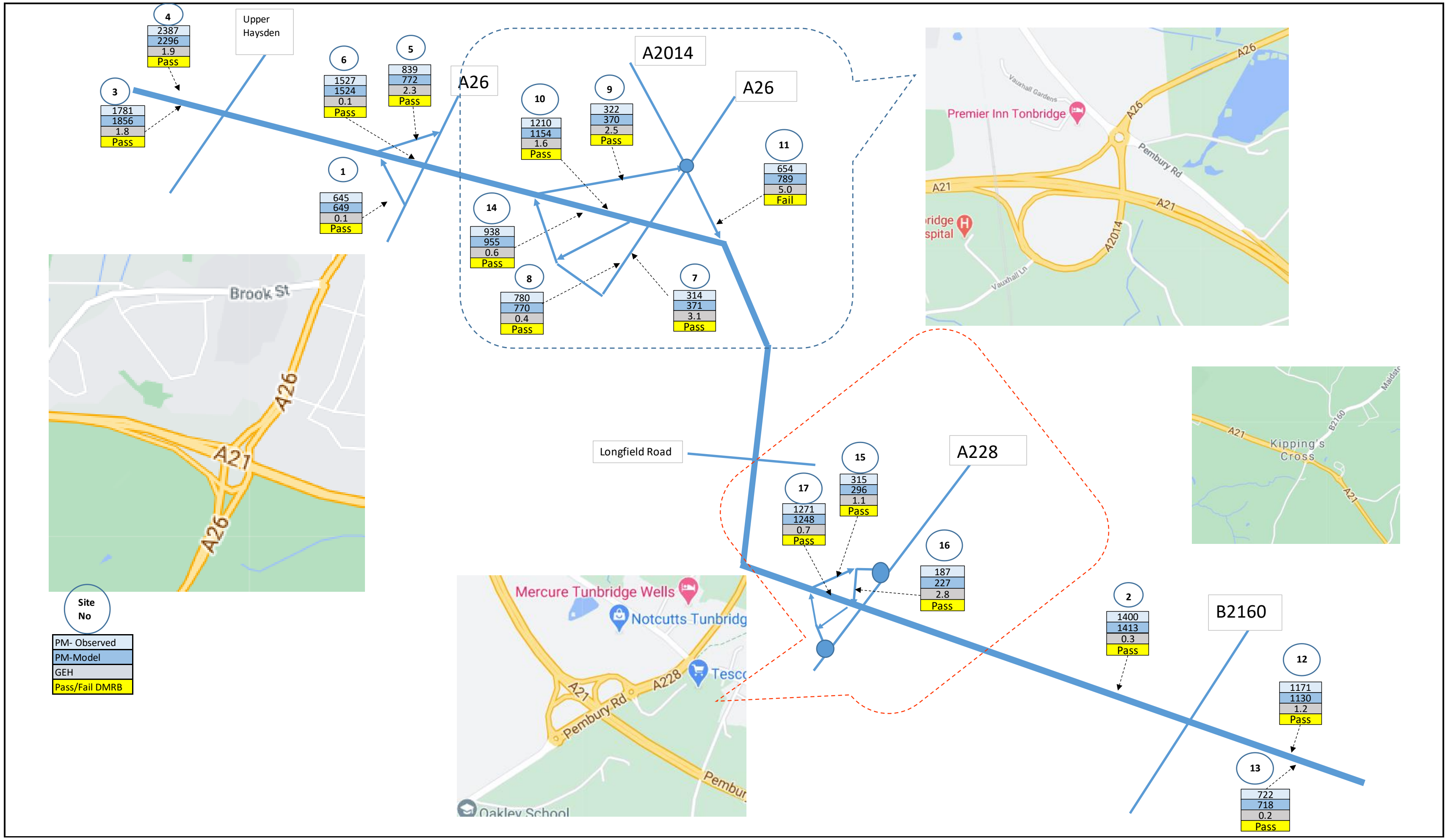


Figure 7-6 - A21 Link Flow Calibration and Validation by Junction – PM Peak



![SWECO]

8 Model Validation

8.1 Overview of Assignment Flow Validation

The validation of the TWTM includes the following assessments:

- Comparison of modelled flows against independent observed flows; and
- Comparison of observed and modelled journey time routes.

8.2 Individual Flows

The results for the individual flow count validation (*on links not used in Matrix Estimation)* are provided in **Table 8-1** and **Figure 8-1** shows the location of the validation counts, The TAG acceptability criteria as outlined in section 6.2 was achieved for link flows. The AM peak passing both the GEH <5 and DMRB flow criteria with 88% and 90%. The PM also passed the GEH <5 and TAG flow with 85% and 86%.

Figure 8-1 – Locations of Model Validation Counts

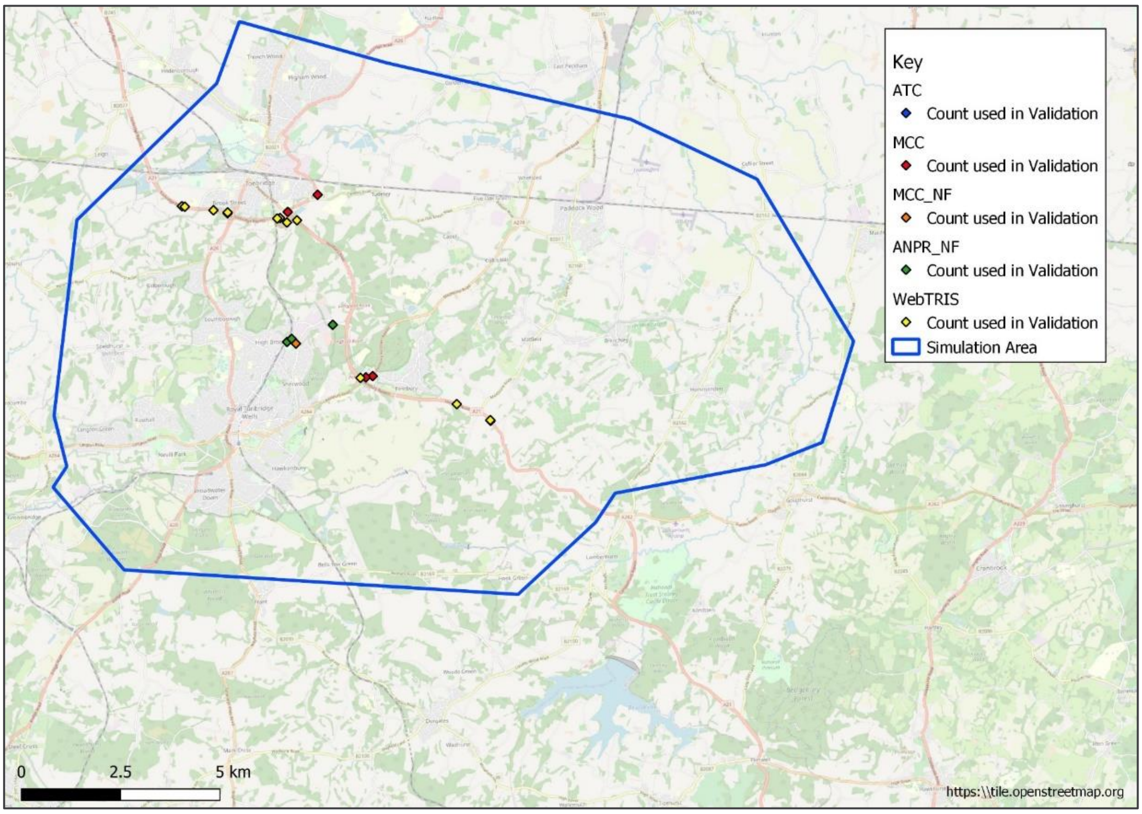


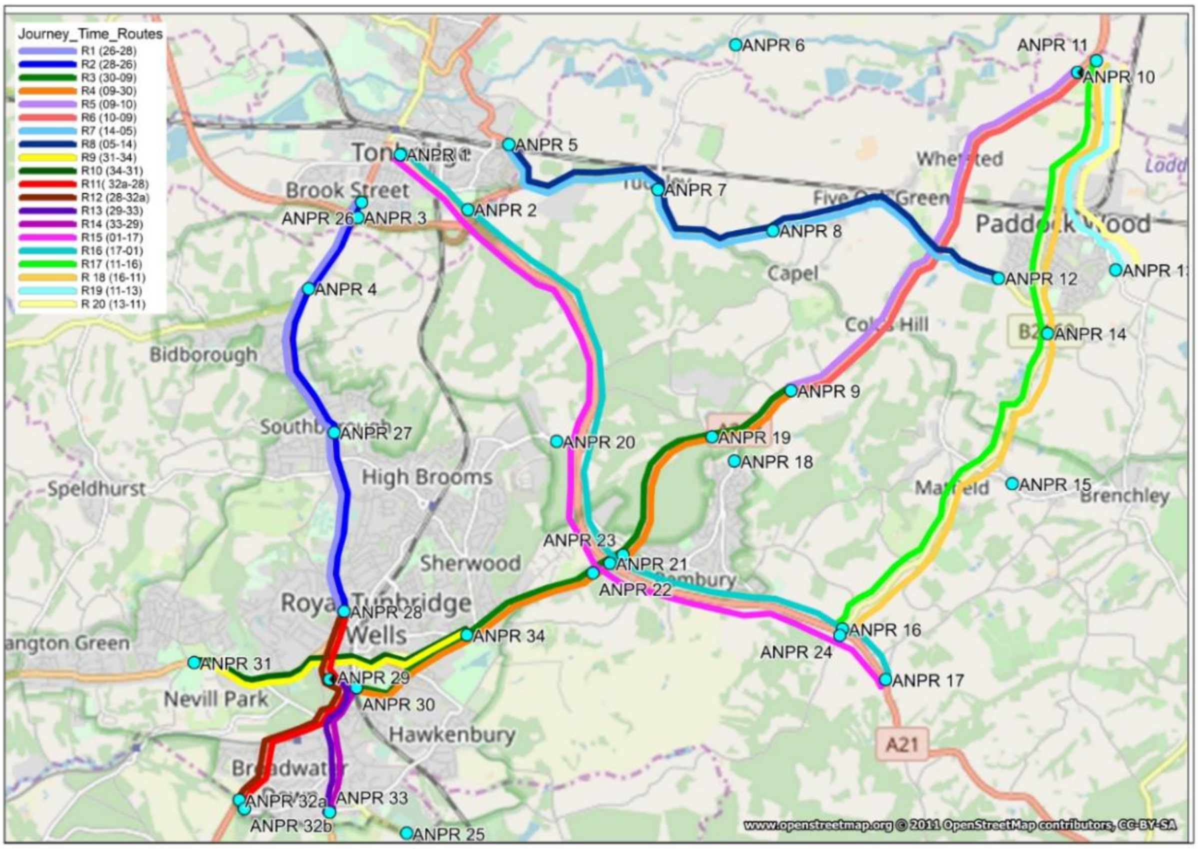
Table 8-1 - Individual Flow Validation Summary Results

	AM Peak		PM Peak	
Criteria	No of Counts	PASS Criteria	No of Counts	PASS Criteria
Individual Link flow - Counts with GEH<5	72	88%	72	85%
Individual Link flow - DMRB Flow Criteria	72	90%	72	86%

8.3 Journey Time Validation Results

The ANPR data has been used to derive real journey time routes and subsequently used to validate the model. **Figure 8-2** shows the locations of the ANPRs and the journey time routes.

Figure 8-2 - ANPR Locations and Journey Time Routes



There are 20 journey time routes defined in study area. The routes cover all main roads in study areas (A21, A26, A264, and A228). Modelled journey times for identified routes have been compared to observed journey times taken from the ANPR.

The TAG criteria requires the model to produce modelled times which are within 15% of the observed results for at least 85% of routes or within 1 minute of the observed results. The TWTM journey times validation for meet the TAG criteria; with 85% of routes passing in the AM and PM peaks. The journey time validation results are summarised in **Table 8-2** and detailed in **Table 8-3** and **Table 8-4** for the AM and PM peaks respectively.

Table 8-2 - Journey Time Validation Summary Result

	AM Peak		PM Peak	
Criteria	No of Routes	PASS	No of Routes	PASS
Journey Time Validation	20	85%	20	85%

Table 8-3 - Journey Time Validation Results by route – AM Peak

Route	Observed	Modelled	Diff	% Diff	DMRB JT	Pass
R1	1729	1471	-257	-14.9%	1	✓
R2	1162	1301	139	11.9%	1	✓
R3	1348	1071	-277	-20.5%	0	×
R4	1653	1153	-500	-30.2%	0	×
R5	360	381	21	5.9%	1	✓
R6	489	428	-60	-12.4%	1	✓
R7	562	527	-35	-6.2%	1	✓
R8	568	548	-19	-3.4%	1	✓
R9	894	658	-236	-26.4%	0	×
R10	773	773	0	0.0%	1	✓
R11	637	616	-21	-3.2%	1	✓
R12	432	412	-20	-4.5%	1	✓
R13	279	258	-21	-7.4%	1	✓
R14	478	428	-50	-10.5%	1	✓
R15	742	643	-99	-13.3%	1	✓
R16	317	296	-21	-6.7%	1	✓
R17	924	989	66	7.1%	1	✓
R18	990	993	3	0.3%	1	✓
R19	491	461	-30	-6.1%	1	✓
R20	495	507	11	2.3%	1	✓

Table 8-4 - Journey Time Validation Results by route – PM Peak

Route	Observed	Modelled	Diff	% Diff	DMRB JT	Pass
R1	1525	1653	128	8.4%	1	✓
R2	1079	1379	300	27.8%	0	✗
R3	1205	1113	-92	-7.6%	1	✓
R4	1053	1100	47	4.4%	1	✓
R5	446	491	46	10.3%	1	✓
R6	409	348	-61	-15.0%	1	✓
R7	530	491	-39	-7.4%	1	✓
R8	637	665	28	4.5%	1	✓
R9	805	771	-34	-4.2%	1	✓
R10	734	751	18	2.4%	1	✓
R11	368	471	103	28.1%	0	✗
R12	502	558	56	11.1%	1	✓
R13	409	393	-16	-3.8%	1	✓
R14	347	288	-59	-17.0%	1	✓
R15	506	569	63	12.4%	1	✓
R16	372	290	-82	-22.0%	0	✗
R17	828	944	115	13.9%	1	✓
R18	914	1030	116	12.7%	1	✓
R19	490	449	-41	-8.3%	1	✓
R20	530	483	-47	-8.8%	1	✓

8.4 Calibration and Validation Result Summary

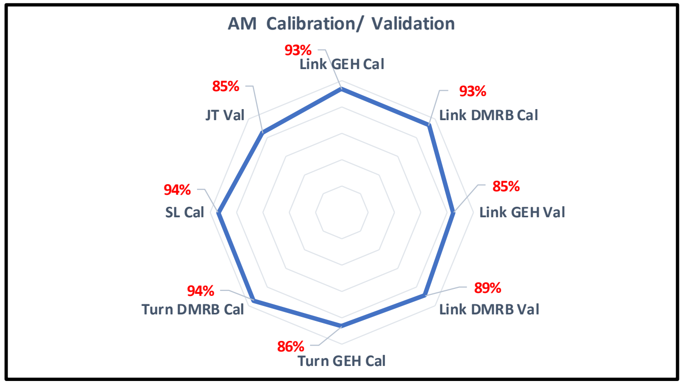
Figure 8-3 shows a high-level summary of the top line statistics for each modelled time period. These are displayed as a “spider” graph, where the area of the graph represents the total level of calibration / validation of the model. Analysis of these graphs confirms the above analysis, that a high level of model calibration and validation performance has been achieved. Based on this assessment, it is considered that the model is fit for the purpose of forecasting. In summary, the following results have been achieved:

- Link Calibration (< GEH 5) AM = 93%, PM = 93%;
- Link Calibration (DMRB Flow Criteria) AM=93%. PM=95%;
- Link Validation (< GEH 5) AM = 85%, PM = 85%;
- Link Validation (DMRB Flow Criteria) AM=89%. PM 86%;
- Turn calibration (< GEH 5) AM = 86%, PM = 87%;
- Turn Calibration (DMRB Flow Criteria) AM=94%. PM=93%;
- Screenline calibration (flow Difference <5%): AM = 94%, PM = 88%; and
- Journey time validation: AM = 85%, PM = 85%.

Figure 8-3 – Top Line Summary Statistics

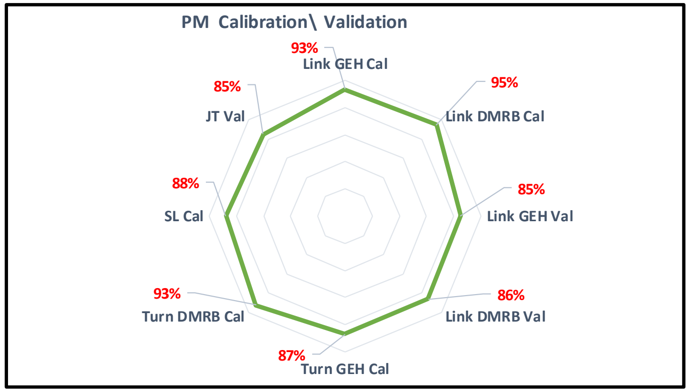
Top Line Summary Statstics - Tunbridge Well

AM Peak



Criteria	No of Counts	% Pass
Link Cal- Counts With GEH <5	366	93%
Link Cal- DMRB Flow Criteria	366	93%
Link Val- Counts with GEH <5	73	85%
Link Val- DMRB Flow Criteria	73	89%
Turn Cal- Counts With GEH <5	454	86%
Turn Cal- DMRB Flow Criteria	454	94%
Screen Line Cal- Flow Difference <5%	16	94%
JT Routes- Time difference <15% or 1 min if greater	20	85%

PM Peak



Criteria	No of Counts	% Pass
Link Cal- Counts With GEH <5	366	93%
Link Cal- DMRB Flow Criteria	366	95%
Link Val- Counts with GEH <5	73	85%
Link Val- DMRB Flow Criteria	73	86%
Turn Cal- Counts With GEH <5	454	87%
Turn Cal- DMRB Flow Criteria	454	93%
Screen Line Cal- Flow Difference <5%	16	88%
JT Routes- Time difference <15% or 1 min if greater	20	85%

9 Model Development – Forecast Models

9.1 Overview

The 2018 base year model has been utilised to develop future year models, to assess the impact of the forecast scenario demand and transport infrastructure options. The future year models were developed for a single forecast year of 2038 when the local plan will be fully delivered. Four forecast scenarios have been considered, namely:

- **Reference Case without Local Plan (RC) -** a scenario where forecast demand is solely uplifted by TEMPro background growth across all model zones and there is no change in the highway network in regard to transport supply;
- **Local Plan Scenario (LPS)** – a scenario where demand generated by new local plan development sites are specifically modelled while the rest of the areas are uplifted by TEMPro. The overall growth on the total forecast demand has been kept the same as Reference Case and there are some committed schemes in place within the future year highway network;
- **Local Plan Scenario with Highway Mitigation only (LPSHM)** – same assumption as Local Plan Scenario but with additional network improvements applied to mitigate wider Local Plan impacts; and
- **Local Plan Scenario with Highway Mitigation and Sustainable Transport (LPSMS)** – same assumption as Local Plan Scenario but with network mitigation and sustainable transport demand management applied to mitigate wider Local Plan impacts.

This section details the approach adopted to produce the first two scenarios above and summarises the analysis of their respective traffic impacts on the future year network. Details of the third and fourth scenarios (LPSHM and LPSMS) are reported separately in Chapter 10 and 11.

9.2 Forecast Supply

Highway networks have been produced for both the RC and LPS scenarios. For the RC scenario, it has been assumed that the network supply will remain the same as the base. For the LPS, the following committed and planned and designed access schemes shown in **Table 9-1** are coded in the network, based on information provided by TWBC and local plan developers. Measures to form an acceptable highways access around Paddock Wood and Tudeley Village have been identified as part of the Garden Settlement infrastructure plans for development undertaken by TWBC.

SWECO

Table 9-1 – 2038 LPS Network Assumptions

Location	Scheme Description	Type
Halls Hole Road/ A264 Pembury Road/ Blackhurst Lane	Four-arm roundabout	Committed Scheme – developer funded
Pedestrian Crossing on A264 Pembury Road	Pedestrian crossing moved to 100m from A21/A264 west roundabout. 2-lane on A264 Pembury Road WB between pedestrian crossing and A21/A264 west roundabout.	Committed Scheme – developer funded
Colts Hill	Proposed new bypass	Identified development access scheme from Tudeley and Paddock Wood Masterplan
Five Oak Green	Proposed new bypass	Identified development access scheme from Tudeley and Paddock Wood Masterplan
Kingstanding Way - Longfield Road/ Knights Park	Left in Left out North Farm development site	Committed Scheme – developer funded
Badsell Road / Mascalls Court Road / B2160	Four-arm signalised junction	Committed Scheme – developer funded
A21/Tonbridge Road/Longfield Road	Signal control at A21 approaching arms and Longfield Road	Committed Scheme – developer funded
A26/ A2014 Vauxhall Roundabout	Road widening on A26 southbound and A2014 southbound to accommodate two-lane approach	Committed Scheme – developer funded

9.3 Forecast Demand

9.3.1 Forecast Growth of Reference Case

For the RC scenario, car background growth factors across the entire modelled area were derived from TEMPro and split by trip purposes and time periods. The model study area growth factors, shown in **Appendix E** have been adopted based on TEMPro zones. For external zones growth factors for GB have been applied (see **Appendix E**). The growth factors are derived as Origin and Destination factors for each of the user classes in line with the assignment model. Freight growth factors have been extracted from the RTF 2018 Scenario 1 for the South East region (as shown in **Table 9-2**).

Table 9-2 - LGV and HGV NTEM Factors

Vehicle Class	Forecast	Factor
LGV	2018-2038	1.285
HGV	2018-2038	1.102

9.3.2 LPS Development Data

Housing Assumption

The forecast housing data for 2038 were provided by TWBC. The summary and locations of the development sites are shown in **Table 9-3**,

Figure 9-2 and

Figure 9-2. In summary, it is forecasted that there are 10,118 dwellings to be constructed by 2038 from allocated sites. It should be noted that existing permissions are also taken into account within the modelling. It should be noted that whilst the Local Plan considers that 2,100 houses will be delivered at Capel (Tudeley) by 2038 with a further 700 post this period, for the purpose of the modelling the worst case scenario, i.e. the full amount of housing (2,800) has been included in this scenario, reflecting discussions with the highway authorities.

Table 9-3 - Summary of Residential Development Proposals by Settlement

Parish	Estimated Number of Dwellings
Benenden	118
Brenchley and Matfield	60
Capel (Tudeley)	2,800
Cranboook and Sissinghurst	467
Frittenden	30
Goudhurst	25
Hawkhurst	170
Horsmonden	320
Lamberhurst	30
Paddock Wood	4,037
Pembury	417
Royal Tunbridge Wells	1,545
Rusthall	15
Sandhurst	30
Southborough	42
Speldhurst	12
Total	**10,118**

Figure 9-1 - Map of Allocated Sites – West of the Borough

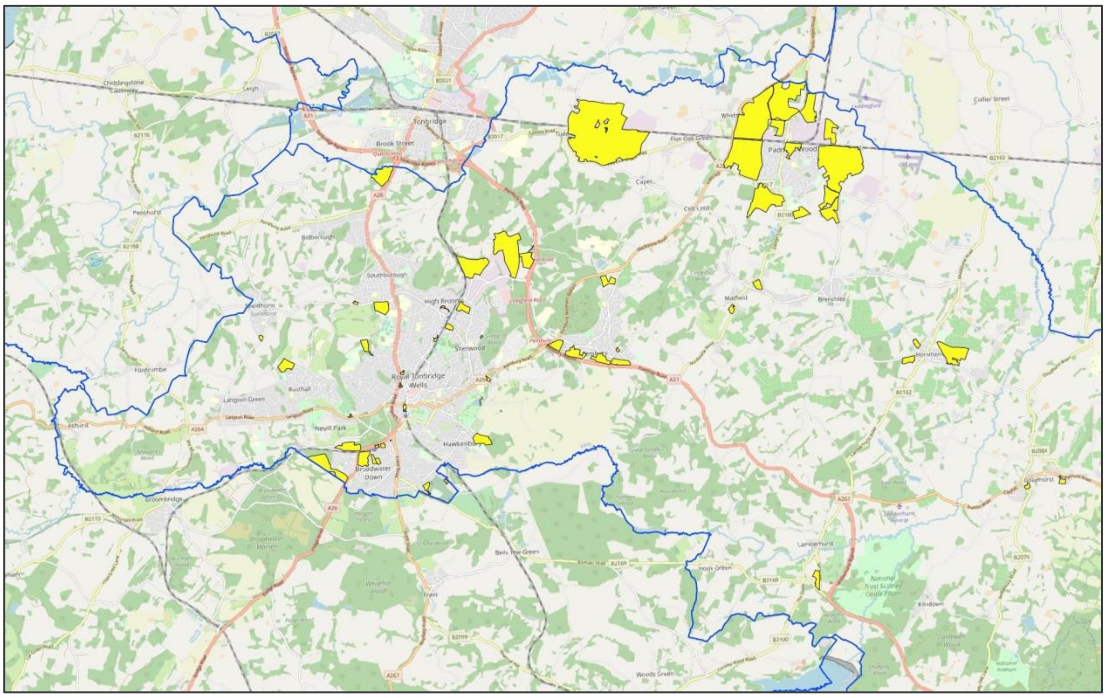
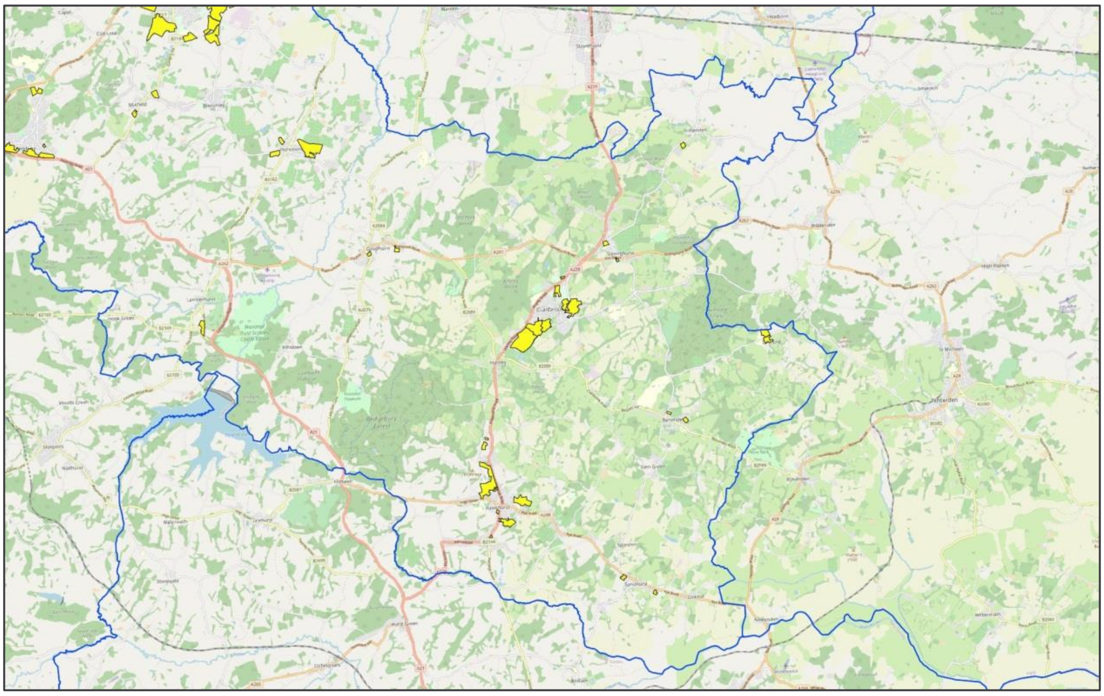

Chiddingstone Causeway
Leigh
Tonbridge
Brook Street
B2017
A21
B2176
A26
Penshurst
B2188
Bidborough
Southborough
High Brooms
Fordcombe
Sherwood
Royal Tunbridge Wells
Rusthall
Langton Green
Ashurst
A264
Nevill Park
Hawkenbury
Broadwater Down
Groombridge
B2110
Bells Yew Green
B2099
A267
Frant
Five Oak Green
Capel
Colts Hill
B2162
Matfield
Brenchley
Collier Street
A21
B2084
Goudhurst
A262
Lamberhurst
B2079
Hook Green
B2169
B2100
National Trust Scotney Castle Estate
Kilndown
Woods Green

Figure 9-2 - Map of Allocated Sites – East of the Borough



Employment Assumptions

The full list of mixed-use developments is presented in **Table 9-4**. All assumptions have been agreed in consultation with TWBC. In summary it is forecast that there are 9,080 jobs to be generated by 2038.

For the majority of the employment developments presented in **Table 9-4** , the amount of either land area or floorspace available was provided, rather than the number of jobs as per units of the NTEM v7.2 trip rate discussed in section 9.3.3 below. Therefore, a conversion between square metres of floorspace to number of jobs was applied for each of the land use types in line with the guidance outlined in the Home and Communities Agency Employment Density Guide (2015). However for land use type D2 a consideration has been used to take account of the impact of both employees and visitors. Where these sites are allocated for playing pitches and ancillary developmentthere are not likely to be significant employment tripsgenerated, but there will be people travelling to the site (e.g. for sport matches) and therefore it is appropriate to include the number of jobs figure as a proxy for this overall demand.

Table 9-4 - Summary of Employment Development Proposals by Settlement

Parish	Policy No.	Description	Total Area	Proposed Land Use Class	Proposed GFA	Number of jobs
Royal Tunbridge Wells	AL/RTW 17	Land adjacent to Longfield Road	444,354.82	Mixed B1-B8	74,000	3,720
	No longer an allocation, but land removed from green belt for potential future allocation	Land at Colebrook House, Pembury Road	77,130.92	Mixed B1-B8	10,000	250
	RTW18	Former North Farm Landfill Site	211,640.99	D2	31,746	292
	RTW19	Hawkenbury Rec	71,047.17	D2	10,657	98
	RTW8	TN2 Centre	1,991.01	D1	1,593	32
Southborough	SO2	Land at Mabledon House	134,117.96	C1	2,524	45
Hawkhurst	HA6	Sports Pavilion	25,454.83	D2	1,630	14
	HA7	Hawkhurst Station Business Park	21,380.96	Mixed B1-B8	8,552	214
	HA8	Site at Limes Grove	5,475.84	Mixed B1-B8	2,190	55
Speldburst	SP2	Land adjacent to Rusthall recreation ground,	61,959.97	D2	9,294	85

Parish	Policy No.	Description	Total Area	Proposed Land Use Class	Proposed GFA	Number of jobs
		Southwood Road, Rusthall				
Paddock Wood	Site B	EMP05, EMP06, EMP07, EMP08	150,174.76	Mixed B1-B8	72,500	1,813
	Site A	EMP01, EMP02, EMP03, EMP04	102,572.11	Mixed B1-B8	45,600	1,140
	AL/PW2	Paddock Wood Town Centre	348,176.50	B1	10,214	786
Capel (Tudeley)	AL/CA1	Village Centre	6249.2	A1/B1	4687/1562	355
	AL/CA1	Neighbourhood Centre 1	1325.9	A1/B1	994/331	75
	AL/CA1	Neighbourhood Centre 2	1080.7	A1/B1	811/270	61
	AL/CA1	Neighbourhood Centre 3	794.2	A1/B1	596/199	45
Total						9,080

9.3.3 Trip Generation and Distribution for Modelled Developments

Car trip ends were generated from the development data based on trip rates derived from NTEM v7.2 using the 'alternative forecasting assumptions' available within the TEMPro software. The procedures allow, for each of the areas identified, the manual introduction of a number of households, jobs (for instance 1,000) and the calculation of a trip rate per house/job by dividing the expected NTEM output number of trips by 1,000. This approach has been adopted using the 2018 year for both AM Peak and PM Peak and for each home-based and non-home-based trip purposes. The breakdown of the trip rates by TEMPro zones is shown in Appendix E for household and employment separately.

The methodology for distributing future development trip-ends using the base demand matrices required the base demand at zone level, where the development has been allocated to be populated with some trips in the base year. For the vast majority of the developments, the existing model zones had trips associated which could be used. In rare occurrences where the base zone was empty then a zone with a similar land use type and trip distribution was chosen to distribute the development trips.

The employment development sites are also expected to generate LGV and HGV trips. For the purpose of calculating trip-ends generated by these, NTEM trip rates, as shown in **Appendix E** , could not be used as they refer to car only. Therefore, TRICs trip rates were used instead. **Table 9-5** and
Table *9-6* show the average TRICs trip rates per employee by vehicle type applied to the number of jobs specified or calculated for each of the development employment sites.

Table 9-5 – LGV Trip Rates (per employee)

Land Use	Description	AM Peak		PM Peak	
		O	D	O	D
A1	Retail/Warehouse	0.026	0.028	0.032	0.039
A2	Finance and Prof/Serv	0.000	0.000	0.000	0.000
A3	Rest/Café	0.000	0.000	0.000	0.000
A4	Drinking	0.000	0.000	0.000	0.000
A5	Hot Food/Takeaway	0.000	0.000	0.000	0.000
B1	Business	0.003	0.006	0.000	0.000
B2	General industry	0.058	0.065	0.030	0.004
B8	Storage or distribution	0.074	0.082	0.016	0.008
B1-B8	Mixed	0.045	0.051	0.015	0.004
C1	Hotels	0.000	0.022	0.011	0.000
C2	Residential institution	0.000	0.000	0.000	0.000
D1	School	0.111	0.074	0.037	0.037
D2	Leisure	0.111	0.074	0.037	0.037
SG	Sui Generis	0.026	0.028	0.037	0.037

Table 9-6 - HGV Trip Rates (per employee)

Land Use	Description	AM Peak		PM Peak	
		O	D	O	D
A1	Retail/Warehouse	0.004	0.002	0.004	0.004
A2	Finance and Prof/Serv	0.000	0.000	0.000	0.000
A3	Rest/Café	0.000	0.000	0.000	0.000
A4	Drinking	0.000	0.000	0.000	0.000
A5	Hot Food/Takeaway	0.000	0.000	0.000	0.000
B1	Business	0.000	0.000	0.000	0.000
B2	General industry	0.004	0.008	0.006	0.002
B8	Storage or distribution	0.008	0.016	0.000	0.000
B1-B8	Mixed	0.004	0.008	0.002	0.001
C1	Hotels	0.022	0.022	0.000	0.000
C2	Residential institution	0.004	0.003	0.001	0.001
D1	School	0.000	0.000	0.000	0.000
D2	Leisure	0.000	0.000	0.000	0.000

Land Use	Description	AM Peak		PM Peak	
		O	D	O	D
SG	Sui Generis	0.000	0.000	0.000	0.000

9.3.4 LPS Forecast Demand

The derivation of the LPM scenario demand matrices included the following steps, with total matrix demand constrained to NTEM as per the RC scenario:

- The local plan development sites are allocated into a total number of 62 zones within the highway model simulation area. Each of those zones is uplifted by trips generated from Local Plan site(s) within that zone;
- The rest of the model zones within the simulation area together with buffer network zones are uplifted by TEMPro only;
- An unconstrained LPM forecast demand matrix is then derived through a furnessing process in SATURN. Comparison is made at total matrix level between this unconstrained LPM matrix and the reference case matrix; and
- Adjustments have been made on the growth of the non-development simulation zones (while keeping the trip demand for development simulation zones unchanged) to derive the constrained LPM forecast demand matrix.

9.4 Matrix Growth

Table 9-7 and **Table 9-8** show the comparison of matrix totals against base year matrix. Overall there is 17% increase both in origins and destinations across the whole study area between 2018 and 2038. In the LPS there is a 39% increase (O+D) in the AM peak and 32% increase (O+D) in the PM peak in development zones (Sim Zones with Developments) as compared to the base. In comparison, the RC scenario shows a 16% increase in origins and 17% increase in destinations for those development zones.

Table 9-7 - AM Matrix Total Changes

	2018 Base Year		2038 RC		2038 LPS	
	O	D	O	D	O	D
Sim Zones with Developments	6,234	7,107	7,154	8,327	9,049	9,431
Sim Zones with No Developments	15,004	16,528	17,667	19,306	16,633	18,432
OTHER	18,660	16,263	21,778	18,967	20,917	18,737
TOTAL	**39,898**	**39,898**	**46,600**	**46,600**	**46,600**	**46,600**

Table 9-8 - PM Matrix Total Changes

	2018 Base Year		2038 RC		2038 LPS	
	O	D	O	D	O	D
Sim Zones with Developments	6,640	5,824	7,809	6,785	8,650	7,838
Sim Zones with No Developments	16,035	14,662	18,915	17,324	18,257	16,843
OTHER	15,588	17,776	18,278	20,894	18,095	20,321
TOTAL	**38,263**	**38,263**	**45,002**	**45,002**	**45,002**	**45,002**

9.5 Generalised Cost

Details of the generalised cost parameters used for the forecast year of 2038 in pence per minute (PPM) and pence per kilometre (PPK) are shown in **Table 9-9**. Those cost parameters are developed based on TAG Databook July 2020 v1.13.1.

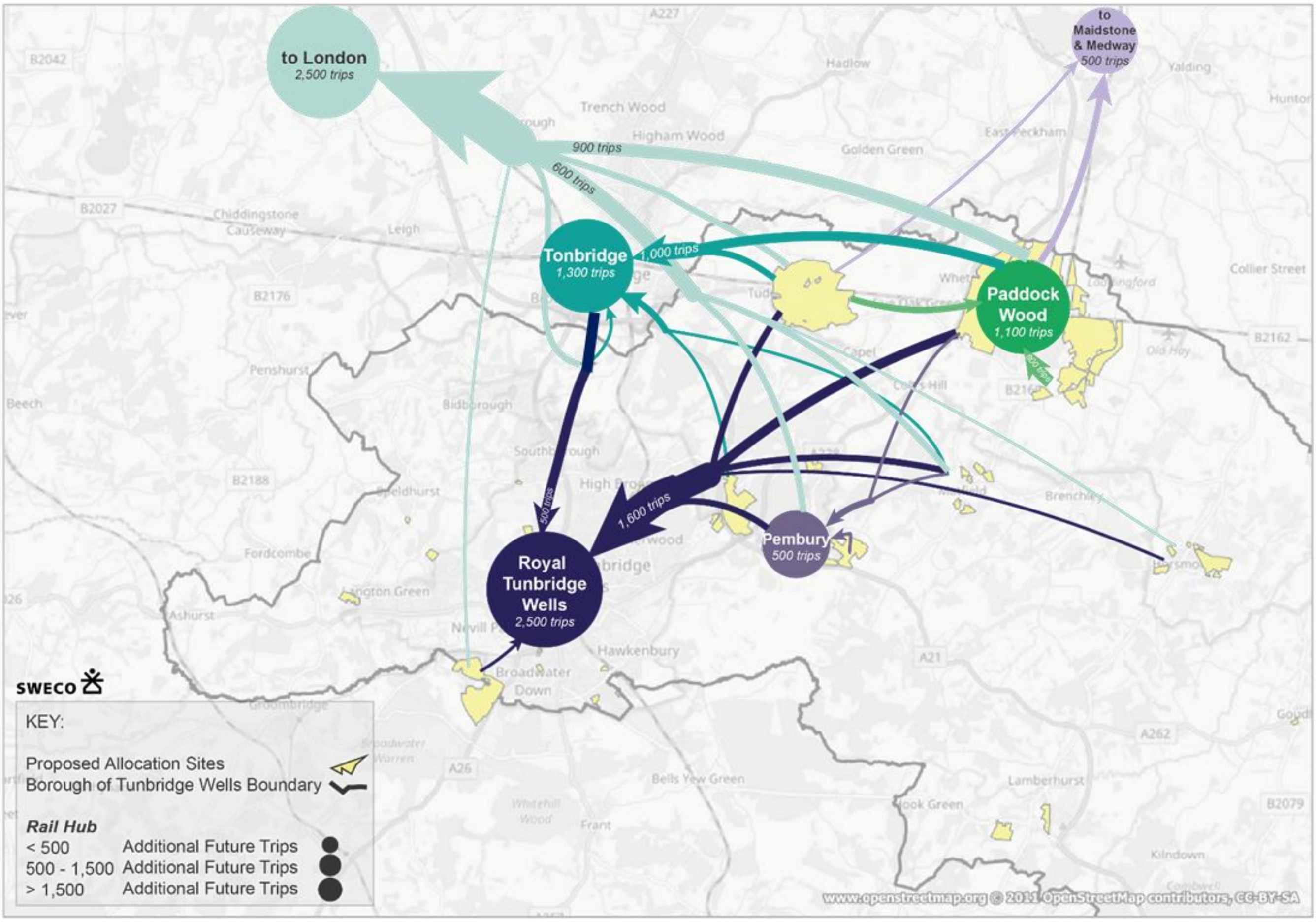
Table 9-9 – 2038 Generalised Cost Parameters (2010 Prices)

User Class	2038 AM		2038 PM	
	PPM	PPM	PPK	PPK
Car - Employer's Business	42.13	10.77	42.73	10.77
Car - Commuting	28.25	4.46	28.35	4.46
Car - Other	19.49	4.46	20.41	4.46
LGV	30.53	13.39	30.53	13.39
HGV	30.40	40.09	30.40	40.09

9.6 Traffic Flow Analysis

A high-level flow analysis was undertaken by combining trip rates from new Local Plan developments with Census distribution. The summary distribution of new trips generated by Local Plan development sites is outlined in **Figure 9-3**.

Figure 9-3 – High-level summary of trip distribution of Local Plan developments



9.6.1 Flow Difference between 2038 Local Plan Scenario and Reference Case

There are 104 key junctions in the Tunbridge Wells Highway Model that cover Tunbridge Wells borough. A small number of junctions close to the Tunbridge Wells borough border fall within Tonbridge and Malling and Wealden borough/district.

Figure 9-4 shows an overall change in modelled flow in 2038 Local Plan Scenario compared to the 2038 Reference Case in the AM peak hour (Green bars indicate an increase in the modelled flow and blue bars indicates a decrease). PM flow change results are shown in

Figure *9-5*. The figure shows the Tunbridge Wells modelled area, as well as Tonbridge, Pembury, and Paddock Wood.

Most links show an increase in traffic due to higher demand in the forecast year. This causes certain junctions to be overloaded resulting in traffic re-routing. In particular, the Kipping's Cross roundabout has significant junction delay in 2038, especially for the traffic approaching it from A21 northbound. This results in traffic re-routing which reduces the flow on the A21 from Kipping's Cross roundabout to Lamberhurst.

Figure 9-4 - Model Flow Difference AM Peak between Local Plan Scenario and Reference Case - Increase (Green), Reduction (Blue)

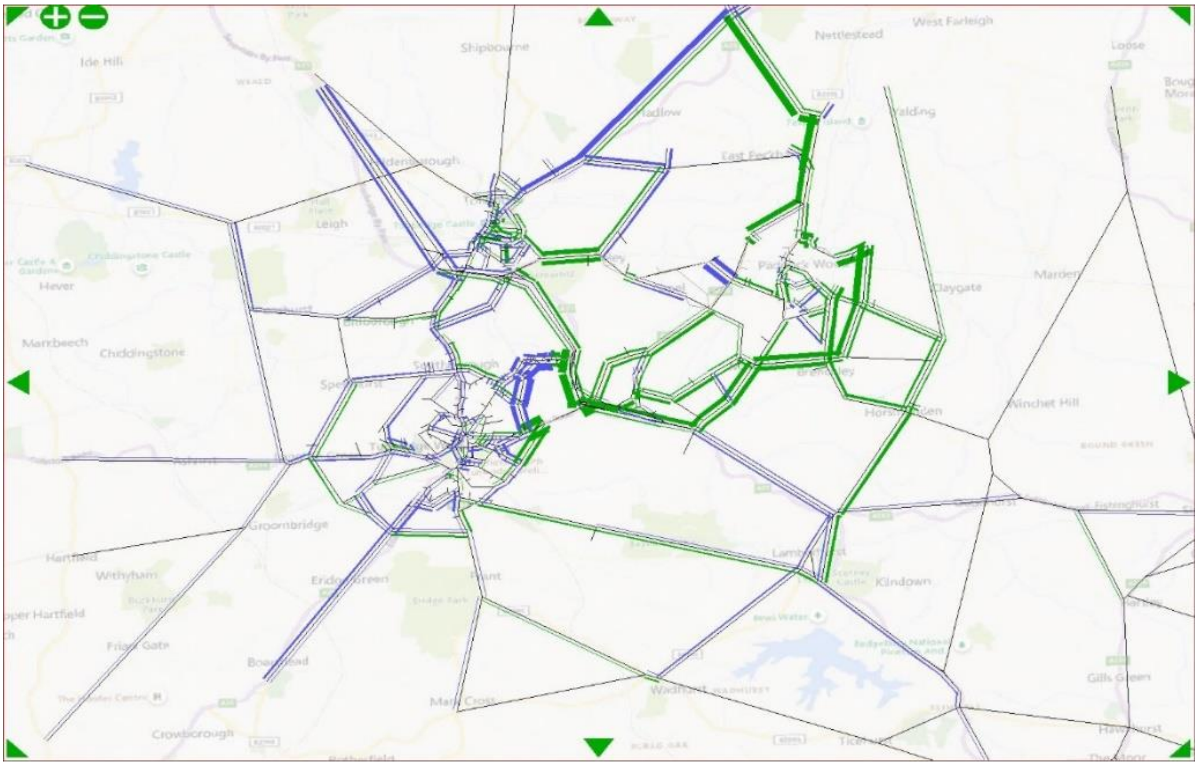
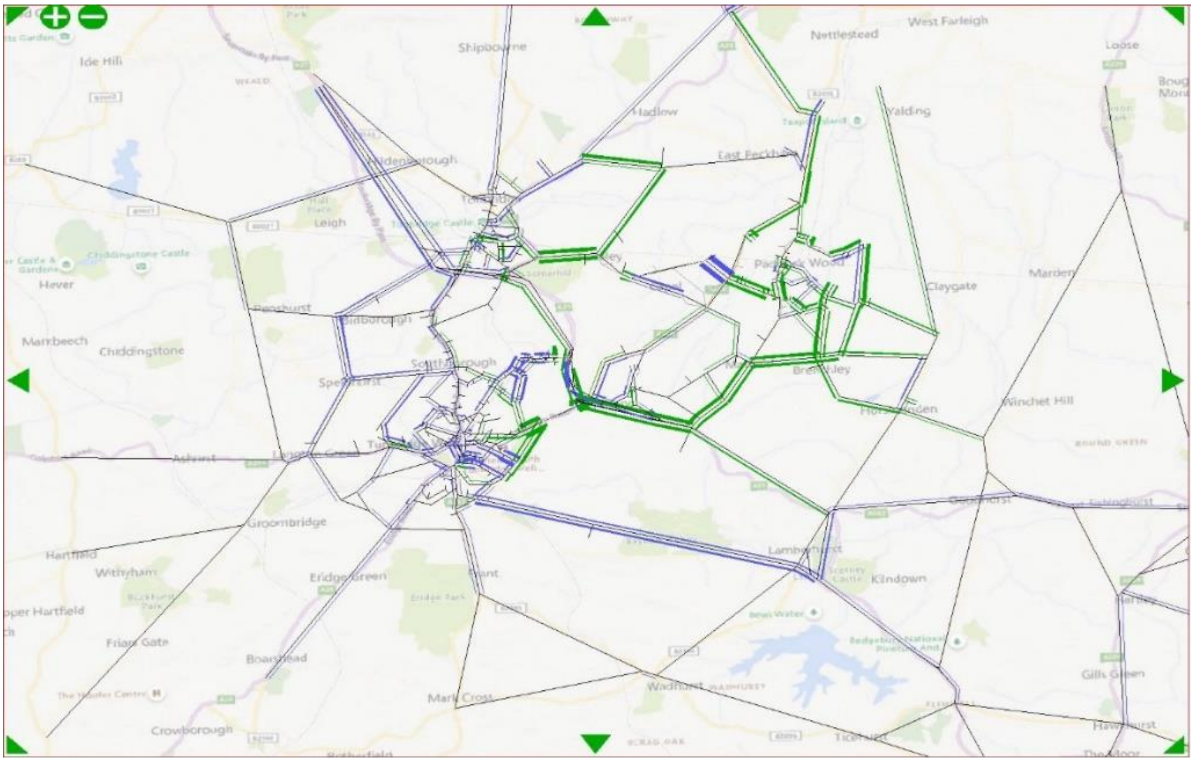


Figure 9-5 – Model Flow Difference PM Peak between Local Plan Scenario and Reference Case – Increase (Green), Reduction (Blue)



9.6.2 Network Delays and Congestions

Volume over Capacity ratio (V/C), also known as Degree of Saturation, can provide a useful indication of network delay and congestion at key junctions and links. **Figure 9-6** to **Figure 9-11** show the degree of saturation for the key junctions for the 2018 base and the 2038 Reference Case in the both AM and PM peaks and for the Local Plan Scenario in the AM peak only.

The figures give a summary of congestion (highest V/C%) in a tabular form with different colours representing degree of congestions as defined below:

- Overloaded (>100%);
- Above practical capacity (95-100%);
- At practical capacity (90-95%);
- Exceeding capacity threshold (85-90%);
- Approaching capacity threshold (80-85%); and
- Below 80% capacity.

Figure 9-6 - 2018 Junction and Link Volume over Capacity Plot – AM Base

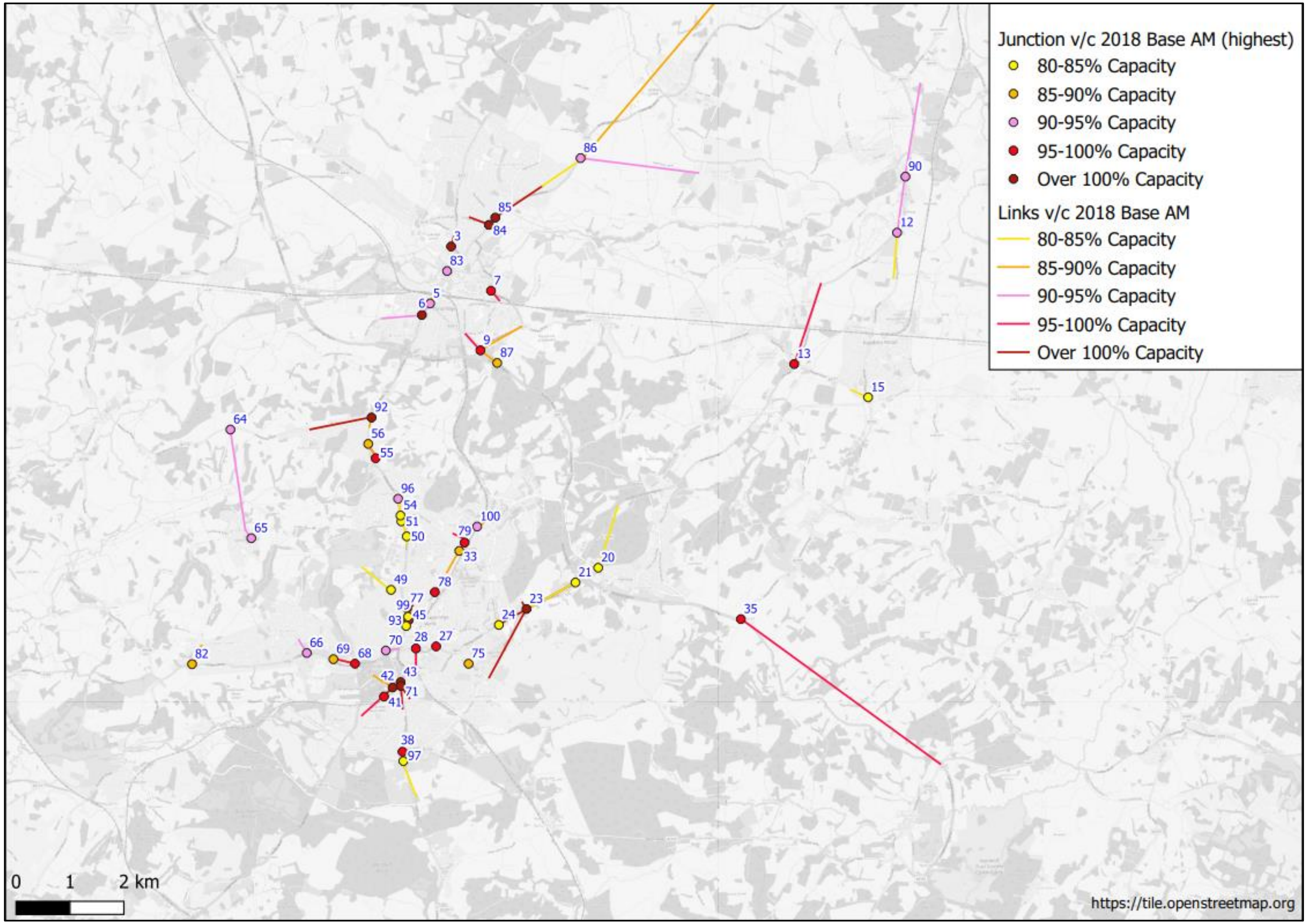


Figure 9-7 - 2038 Junction and Link Volume over Capacity Plot – AM Reference Case

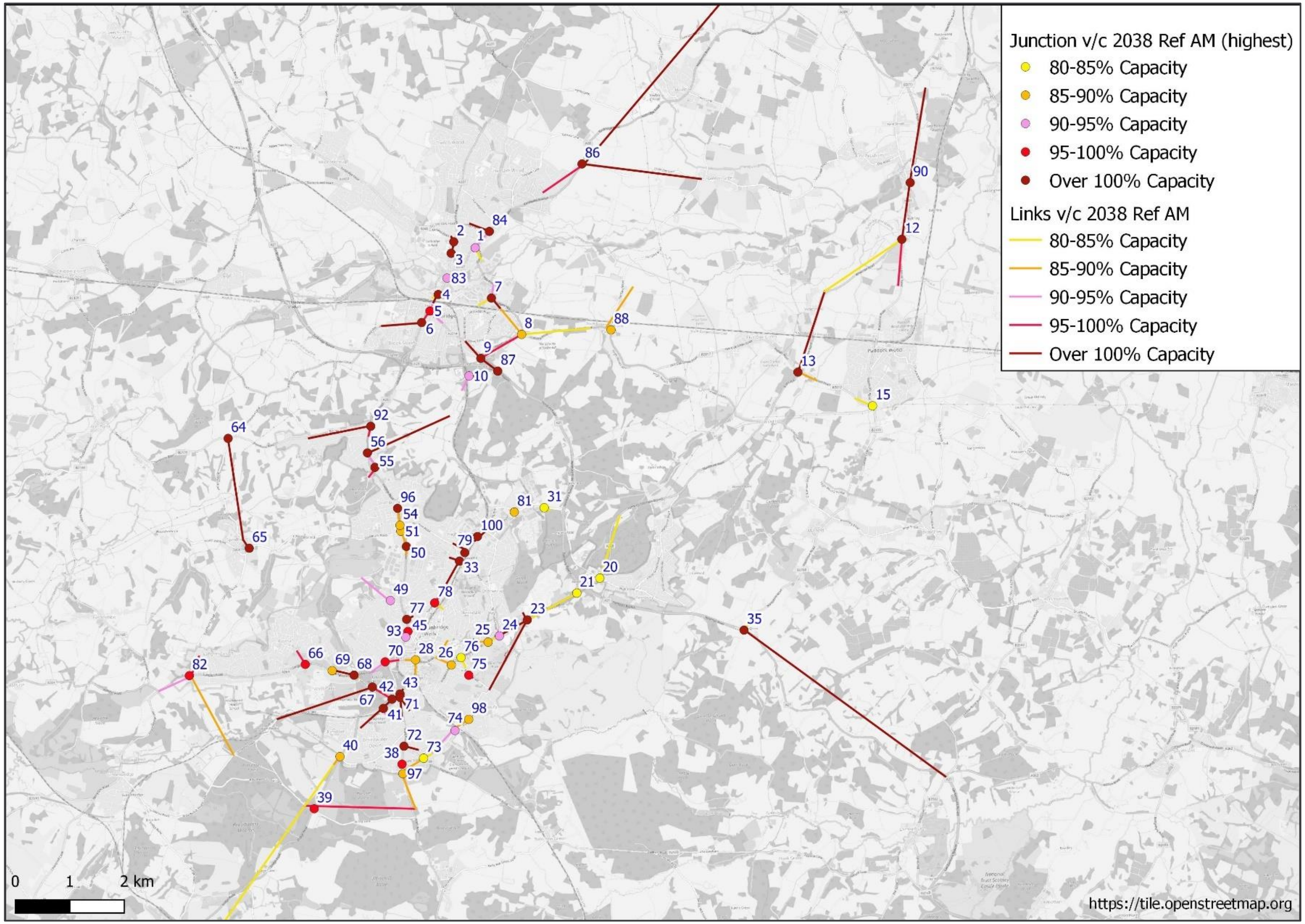


Figure 9-8 - 2038 Junction and Link Volume over Capacity Plot – AM Local Plan Scenario

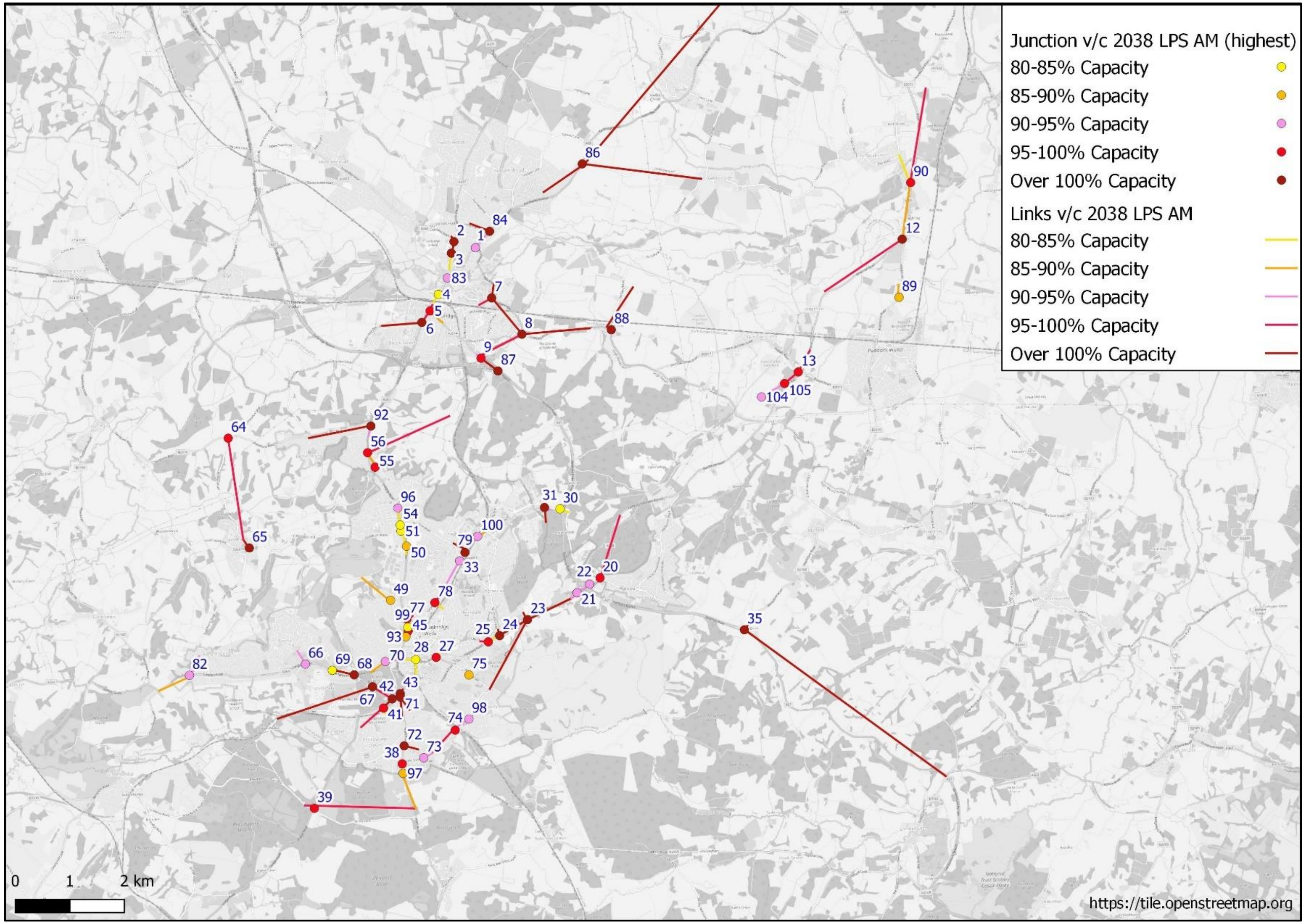


Figure 9-9 - 2018 Junction and Link Volume over Capacity Plot – PM Base

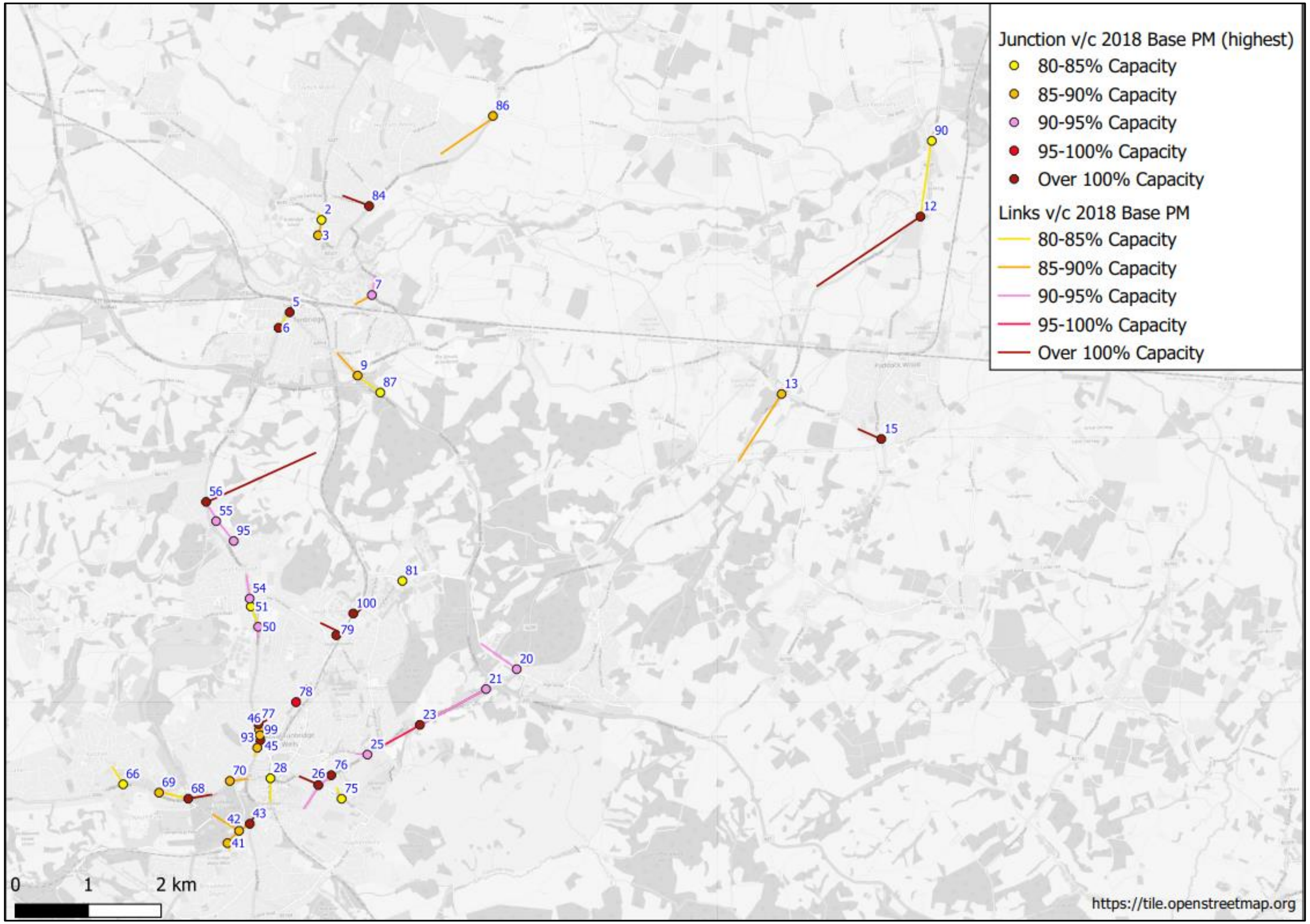


Figure 9-10 - 2038 Junction and Link Volume over Capacity Plot – PM Reference Case

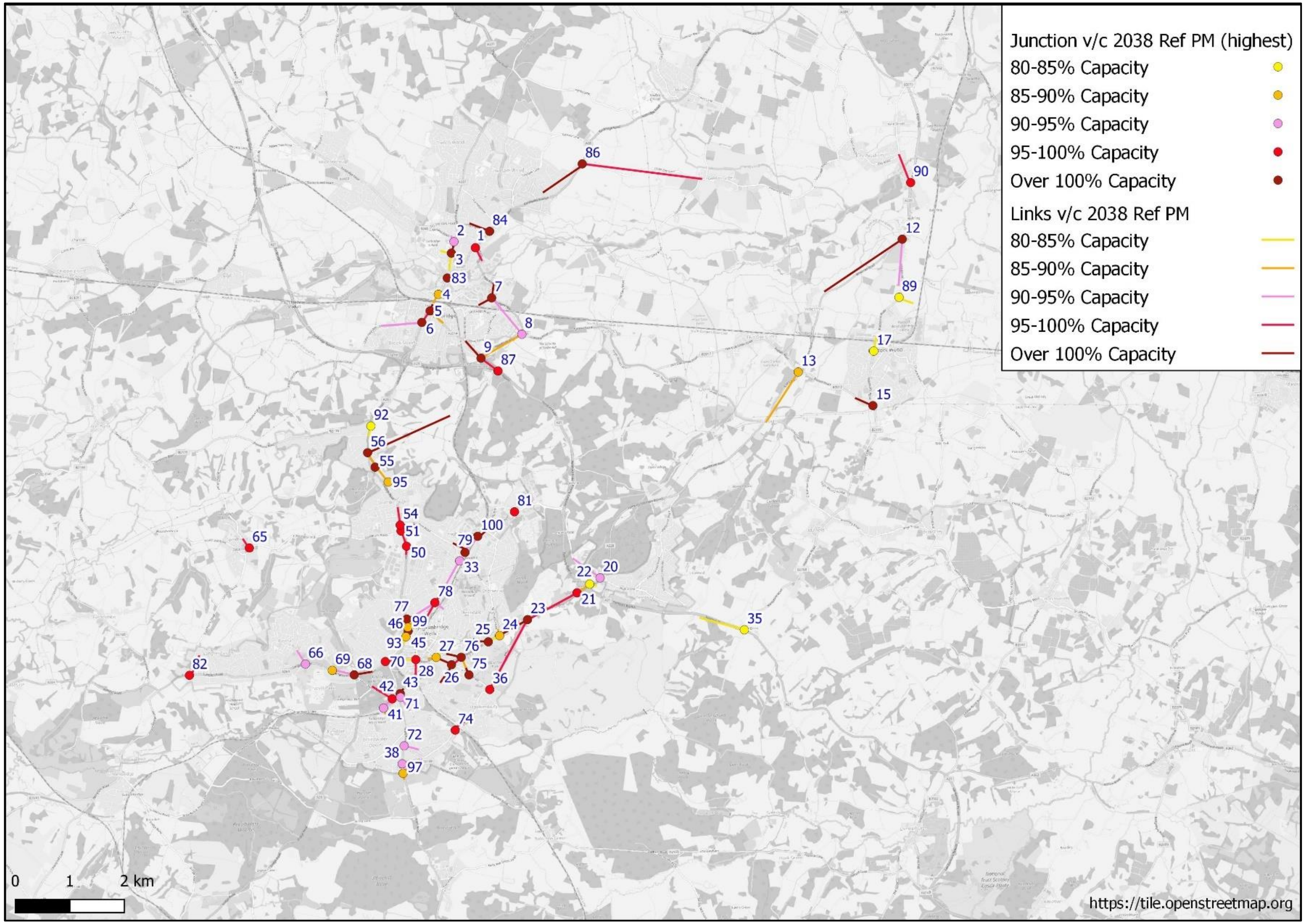


Figure 9-11 – 2038 Junction and Link Volume over Capacity Plot – PM Local Plan Scenario

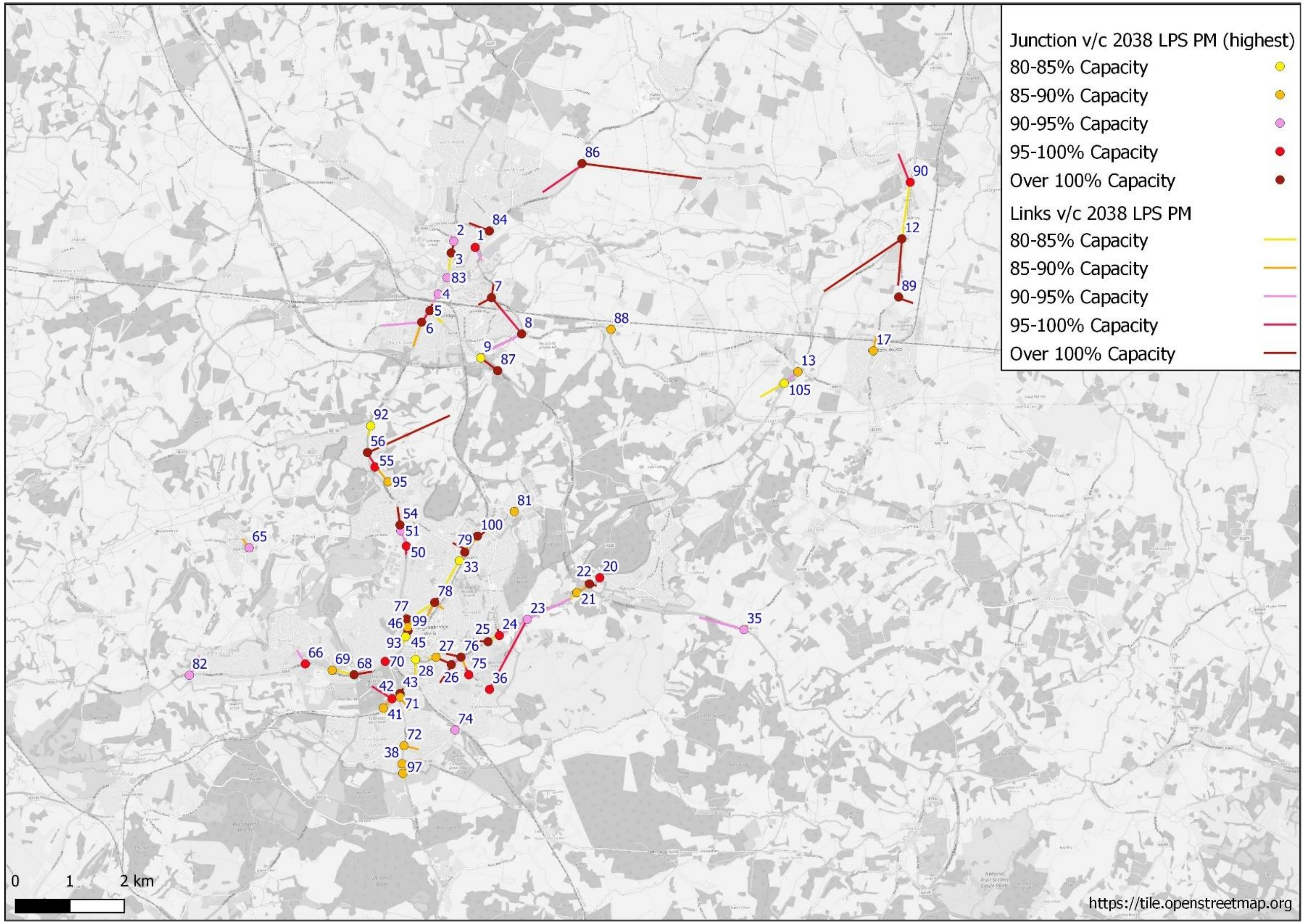


Table 9-10 and **Table 9-12** outlines the junctions that are under capacity in the Reference Case and over practical capacity (>95%) in the Local Plan scenario in the AM peak and PM Peak respectively. This table outlines the key locations that require mitigation in the transport assessment work for the Local Plan.

For the AM Peak, 8 junctions have been identified that are over capacity in the Local Plan scenario but not in the Reference Case. For the same comparison in the PM, there are 6 junctions.

Table 9-11 and **Table 9-13** outline the junctions that are over practical capacity (>95%) in the Reference Case and Local Plan scenario in the AM peak and PM Peak respectively. These junctions will require wider work around mitigations to tackle the underlying causes of congestion in these areas beyond the new Local Plan developments. These schemes do not fall within this study. However our wider mitigation work, that looks at demand reduction due to modal shift from car to other modes, does consider what impact demand change would have on these junctions.

Under this comparison there are 33 junctions over capacity in both Reference Case and Local Plan in the AM and 28 junctions for the same comparison in the PM Peak.

Table 9-10 - Junctions within capacity in Reference Case but over practical capacity (>95% capacity) in Local Plan Scenario – AM peak

Junction ID	Description	Location	Existing Junction Type	Highest		
				2018 Base AM	2038 RC AM	2038 LPS AM
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	Tudeley	Roundabout			
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	Pembury	Signals			
24	A264 Pembury Road / Sandhurst Road	Royal Tunbridge Wells	T-junction			
25	A264 Pembury Road / Sandrock Road	Royal Tunbridge Wells	T-junction			
31	Longfield Road / Knights Park	North Farm	Roundabout			
74	Forest Road/Warwick Park	Royal Tunbridge Wells	T-junction			
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	Tudeley	T-junction			
105	Colts Hill Bypass/A228 Colts Hill	Colts Hill	New scheme			

Table 9-11 - Junctions over practical capacity (>95% capacity) in Reference Case and Local Plan Scenario – AM peak

Junction ID	Description	Location	Existing Junction Type	Highest		
				2018 Base AM	2038 Ref AM	2038 LP AM
2	A227 Shipbourne Road / Portman Park / A227 High Street / B245 London Road	Tonbridge (T&M)	Signals			
3	A227 High Street / B2260 High Street / A227 Bordyke / Lansdowne Road	Tonbridge (T&M)	Signals			
5	B2260 Quarry Hill Road / A2014 Pembury Road / A26 Quarry Hill Road	Tonbridge (T&M)	Roundabout			
6	A26 Quarry Hill Road / Brook Street	Tonbridge (T&M)	Roundabout			
7	A26 Vale Road / A26 Vale Rise / Vale Road	Tonbridge (T&M)	Roundabout			
9	A26 Woodgate Way / Pembury Road / A2014 Vauxhall Lane / A21 / A2014 Pembury Road	Tonbridge (T&M)	Roundabout			
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	East Peckham (T&M)	Roundabout			
13	A228 Maidstone Road / B2017 Badsell Road	Paddock Wood	Roundabout			
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road	Royal Tunbridge Wells	Signals			
27	Calverley Road / Lansdowne Road / A264 Calverley Road / A264 Crescent Road	Royal Tunbridge Wells	Roundabout			
35	Kippings Cross Roundabout	Pembury	Roundabout			
38	A267 Frant Road / Forest Road	Royal Tunbridge Wells	T-junction			
39	A26 Eridge Road / Bunny Lane / Broadwater Forest Lane	Royal Tunbridge Wells	Staggered			
41	A26 Eridge Road / Nevill Terrace	Royal Tunbridge Wells	Roundabout			
42	A26 London Road / Major York's Road	Royal Tunbridge Wells	Roundabout			
43	A26 London Road / A267 Nevill Street	Royal Tunbridge Wells	Roundabout			
45	A26 St. John's Road / Grosvenor Road / A26 Mount Ephraim	Royal Tunbridge Wells	Roundabout			
55	A26 London Road / Church Road	Royal Tunbridge Wells	Signals			
56	A26 London Road / Vauxhall Lane	Southborough	T-junction			
64	B2176/Barden Road	Southborough	T-junction			
65	Barden Road/Speldhurst Hill	Southborough	T-junction			
67	Major York's Road/Hungershall Park	Royal Tunbridge Wells	4 arm yield			

68	A264 Langton Road/Major York's Road	Royal Tunbridge Wells	Roundabout			
71	A267 Frant Road/Warwick Road	Royal Tunbridge Wells	T-junction			
72	A267 Frant Road/Bayham Road	Royal Tunbridge Wells	T-junction			
77	St John's Road/Woodbury Park Road	Royal Tunbridge Wells	T-junction			
78	Upper Grosvenor Road/Dunstan Road/Quarry Road	Royal Tunbridge Wells	Signals			
79	North Farm Road/High Brooms Road	High Brooms	T-junction			
84	A26 Hadlow Road/Yardley Park Road	Tonbridge (T&M)	T-junction			
86	A26 Hadlow Road East/Three Elm Lane	Tonbridge (T&M)	T-junction			
87	A21 Tonbridge Bypass/Pembury Road	Vauxhall	Merge			
90	A228 Boyle Way/Branbridges Road	Tonbridge (T&M)	Roundabout			
92	A26 London Road/B2176 Bidnorough Ridge	Bidborough	T-junction			

Table 9-12 - Junctions within capacity in Reference Case but over practical capacity (>95% capacity) in Local Plan Scenario – PM peak

Junction ID	Description	Location	Existing Junction Type	Highest		
				2018 Base AM	2038 RC AM	2038 LPS AM
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	Tudeley	Roundabout			
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	Pembury	Signals			
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	Pembury	Roundabout			
24	A264 Pembury Road / Sandhurst Road	Royal Tunbridge Wells	T-junction			
66	A264/Coach Road	Royal Tunbridge Wells	T-junction			
89	B2160 Maidstone Road/Lucks Lane	Paddock Wood	T-junction			

Table 9-13 - Junctions over practical capacity (>95% capacity) in Reference Case and Local Plan Scenario – PM peak

Junction ID	Description	Location	Existing Junction Type	Highest		
				2018 Base AM	2038 Ref AM	2038 LP AM
1	A227 Hadlow Road / A26 Cannon Lane	Tonbridge (T&M)	Signals			
3	A227 High Street / B2260 High Street / A227 Bordyke / Lansdowne Road	Tonbridge (T&M)	Signals			
5	B2260 Quarry Hill Road / A2014 Pembury Road / A26 Quarry Hill Road	Tonbridge (T&M)	Roundabout			
6	A26 Quarry Hill Road / Brook Street	Tonbridge (T&M)	Roundabout			
7	A26 Vale Road / A26 Vale Rise / Vale Road	Tonbridge (T&M)	Roundabout			
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	East Peckham (T&M)	Roundabout			
25	A264 Pembury Road / Sandrock Road	Royal Tunbridge Wells	T-junction			
26	A264 Calverley Road / A264 Pembury Road / Bayhall Road / B2023 Prospect Road	Royal Tunbridge Wells	Signals			
36	Halls Hole Road / Bayhall Road / Forest Road	Royal Tunbridge Wells	T-junction			
42	A26 London Road / Major York's Road	Royal Tunbridge Wells	Roundabout			
43	A26 London Road / A267 Nevill Street	Royal Tunbridge Wells	Roundabout			
45	A26 St. John's Road / Grosvenor Road / A26 Mount Ephraim	Royal Tunbridge Wells	Roundabout			
50	A26 St John's Road / Powder Mill Lane	Royal Tunbridge Wells	T-junction			
54	A26 London Road / Yew Tree Road	Southborough	Signals			
55	A26 London Road / Church Road	Southborough	T-junction			
56	A26 London Road / Vauxhall Lane	Southborough	T-junction			
68	A264 Langton Road/Major York's Road	Royal Tunbridge Wells	Roundabout			
70	A264/Mount Ephraim	Royal Tunbridge Wells	T-junction			
75	Bayhall Road/Kingswood Road	Royal Tunbridge Wells	T-junction			
76	A264 Pembury Road/Kingswoods Road	Royal Tunbridge Wells	T-junction			
77	St John's Road/Woodbury Park Road	Royal Tunbridge Wells	T-junction			
78	Upper Grosvenor Road/Dunstan Road/Quarry Road	Royal Tunbridge Wells	Signals			
79	North Farm Road/High Brooms Road	High Brooms	T-junction			

84	A26 Hadlow Road/Yardley Park Road	Tonbridge (T&M)	T-junction			
86	A26 Hadlow Road East/Three Elm Lane	Tonbridge (T&M)	T-junction			
87	A21 Tonbridge Bypass/Pembury Road	Vauxhall	Merge			
90	A228 Boyle Way/Branbridges Road	Tonbridge (T&M)	Roundabout			
100	North Farm Road under rail bridge	North Farm	Signals			

Additional analysis has been undertaken to understand any additional queueing in the highway model on the back of the Local Plan development. This analysis for the AM Peak is presented in **Table 9-14** and the PM Peak in **Table 9-15.** This highlights additional queueing at 3 junctions in the AM Peak and 1 junction in the PM Peak.

Table 9-14 - Junction with Average Queue Totals > 30 (pcu) - AM peak

ID	Junction name	Type	Key Local Plan link(s)	Comments
8	A26 Woodgate Way/ B2017 Tudeley Road	Roundabout	B2017 Tudeley Road WB	B2017 Tudeley Road is overloaded due to significant increase demand from LP in Tudeley.
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	Roundabout	A228 arms	Additional demand with a high level of underlying demand is causing queueing on approach to junction
35	Kippings Cross Roundabout	Roundabout	A21 WB/ B2160 Maidstone Road	The impact of additional Local Plan traffic using the B2160 Maidstone Road is additional delays both on this arm but also on the A21 westbound arm approaching from Hastings direction
86	A26 Hadlow Road East/ Three Elm Lane	3-arm Junction	A26 Hadlow Road East SB/ Three Elm Lane	The junction is overloaded on Hadlow Road and Three Elm Lane due to extra demand from LP.

Table 9-15 - Junction with Average Queue Totals > 30 (pcu) - PM peak

ID	Junction name	Type	Key link(s)	Comments
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	Roundabout	A228 and B2160 arms	Additional demand with a high level of underlying demand is causing queueing on approach to junction
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	Roundabout	Access to/from Tesco	There are delays and queues from TESCO access due to extra demand from LP.

9.7 A21 Merge and Diverge Analysis

Volume over capacity ratios have been assessed on the merges and diverges along the A21 corridor between the A21/A26 junction in the north and the A21/A228 junction in the south.

Table 9-16 shows all slip roads are forecasted to operate within capacity in 2038 for both RC and LP scenarios, with the exception of the eastbound merge at the A21/A2104 junction. The A21/A2014 eastbound merge V/C is forecasted to operate over the 85% threshold in both the AM (101%) and PM (99%) peaks in the RC scenario. In the LPS scenario, the V\C ratios on this merge slightly increase, from the RC scenario, in both the AM (105%) and PM (102%) peaks . However, it should be noted that the A21/A2014 eastbound merge is operating close to or above the advised 85% capacity in both the AM (87%) and PM (81%) peaks.

Modelled peak hour maximum traffic flows along the A21 were also used to examine the type of merges and diverges according to Design Manual for Road and Bridges (DMRB) CD122 Revision 1. As shown in **Table 9-17**, it is reasonable to assume that all the merges and diverges under the 85% V/C threshold would still operate satisfactorily (✓) based on the existing layout. On the A21/A2014 eastbound merge, it is estimated that while there would still be enough capacity to accommodate the mainline traffic under the existing type B (parallel merge) layout, the eastbound merge itself is forecasted to have a peak hour flow slightly over the 1,200 vehicle threshold and therefore would require a type D (lane gain) layout in both the RC and LPS scenarios.

Table 9-16 Forecast Merge and Diverge V/C along the A21 corridor

Junction	Merge/Diverge	Direction	AM - V/C			PM - V/C		
			Base	RC	LPS	Base	RC	LPS
A21/A26	Diverge	EB	21	21	20	22	25	25
	Merge	WB	57	62	51	48	55	51
A21/A2014	Diverge	EB	54	71	66	44	67	71
	Merge	EB	87	101	105	81	99	102
	Diverge	WB	33	38	42	29	36	39
	Merge	WB	27	31	37	18	22	22
A21/Longfield Rd	Diverge	NB	50	76	26	31	50	43
	Merge	NB	52	61	35	56	69	65
	Diverge	SB	54	72	60	44	51	57
	Merge	SB	11	15	17	26	33	49
A21/A228	Diverge	SB	19	24	32	17	19	28
	Merge	SB	11	11	31	19	21	35
	Diverge	NB	13	12	16	6	6	14
	Merge	NB	32	35	66	28	34	46

Table 9-17 Forecast Merge and Diverge Type along A21 corridor

Junction	Merge/Diverge	Direction	Existing Type	Base	RC	LPS
A21/A26	Diverge	EB	C	✓	✓	✓
	Merge	WB	A	✓	✓	✓
A21/A2014	Diverge	EB	A	✓	✓	✓
	Merge	EB	B	✓	D	D
	Diverge	WB	A	✓	✓	✓
	Merge	WB	A	✓	✓	✓
A21/Longfield Rd	Diverge	NB	A	✓	✓	✓
	Merge	NB	A	✓	✓	✓
	Diverge	SB	D	✓	✓	✓
	Merge	SB	A	✓	✓	✓
A21/A228	Diverge	SB	A	✓	✓	✓
	Merge	SB	A	✓	✓	✓
	Diverge	NB	A	✓	✓	✓
	Merge	NB	B	✓	✓	✓

9.8 Summary – Locations to Mitigate

Taking account of the analysis in the previous section, the Local Plan transport assessment work has identified 13 junctions that require mitigation measures. A summary of key junctions and locations that require mitigations as a specific result of the Local Plan development are as follows:

Table 9-18 Junctions requiring further mitigation as a result of Local Plan development

Junction ID	Description	Location	Existing Junction Type	AM	PM
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	Tudeley	Roundabout	✓	✓
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	Paddock Wood	Roundabout	✓	✓
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	Pembury	Signals	✓	✓
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	Pembury	Roundabout		✓
24	A264 Pembury Road / Sandhurst Road	Royal Tunbridge Wells	T-junction	✓	✓
25	A264 Pembury Road / Sandrock Road	Royal Tunbridge Wells	T-junction	✓	
31	Longfield Road / Knights Park	North Farm	Roundabout	✓	
35	Kippings Cross Roundabout	Pembury	Roundabout	✓	
66	A264/Coach Road	Royal Tunbridge Wells	T-junction		✓
74	Forest Road/Warwick Park	Royal Tunbridge Wells	T-junction	✓	
86	A26 Hadlow Road East/ Three Elm Lane	Tonbridge (T&M)	T-junction	✓	
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	Tudeley	T-junction	✓	
89	B2160 Maidstone Road/Lucks Lane	Paddock Wood	T-junction		✓
105	Colts Hill Bypass/A228 Colts Hill	Colts Hill	New scheme	✓	

SWECO

In addition, junction 23 (Halls Hall Road / Blackhurst Lane / A264) is under review as a result of a plan to mitigate existing issues with a roundabout junction. As a result, in our mitigation analysis this junction is being considered in parallel with the schemes proposed along the A264 for junctions 20, 22, 24 and 25.

10 Mitigation Identification

10.1 Overview

The previous sections of the report focuses on expected highway demand conditions based on the existing network, and the demand and planned highway changes that will come forward with committed developments and proposed allocations, such as new accesses and link roads. This is set out in the 3 sets of models for SATURN highway modelling:

- **2018 Base Scenario** (present traffic conditions);
- **2038 Reference Case** (growth distributed across the district based on Tempro); and
- **2038 Local Plan Scenario - LPS** (traffic growth capped with Tempro but growth areas are driven by proposed Local Plan sites, committed network developments and trip rates and distribution based around existing patterns).

Scenario 3 (Local Plan Scenario – LPS) includes expected infrastructure changes to be delivered as a result of the current plans for the Local Plan sites and wider Kent County Council (KCC) transport plans. The Garden Settlement infrastructure plans for Paddock Wood and Tudeley Village include comprehensive walking, cycling, bus service and bus stop infrastructure within the development area, and new links to the wider networks. An improvement scheme for the A228 is also proposed as well as a new link to bypass Five Oak Green and additional changes to local roads and junctions.

The trip rates applied in the highway modelling for Scenario 3 LPS to the new Garden Settlements at Tudeley and Paddock Wood are aligned with those utilised in the Paddock Wood and Tudeley Access & Movement Report (December 2020). The trip rates used recognise that not all Local Plan trips are additional and some simply replace existing trips on the network prior to new development coming forward.

Chapters 10 and 11 focus on identifying any wider mitigations required to offset unforeseen or wider impacts beyond what has already been planned. The outcome of these chapters will be a package of measures that need to come forward to support the scale of Local Plan development proposed throughout Tunbridge Wells borough.

10.2 Local Plan Scenario with Highway Mitigation and Sustainable Transport (LPSHM)

Local Plan Scenario with Highway Mitigation and Sustainable Transport (LPSHM) contains the same assumption as the Local Plan Scenario but with network mitigations applied where congestion issues have been identified, as outlined in Chapter 9. This scenario follows the ‘Predict and Provide’ process with a focus on physical highway mitigations to alleviate congestion issues from Local Plan identified. It is focussed on identifying general highway improvements around the wider Local Plan area.

The schemes included in this scenario are identified in **Table 10-3**. The schemes look to work within what is viable within the available space and topography constraints around the locations with residual issues.

10.3 The need for an additional scenario

National guidance supports the need for the development of a scenario that puts sustainable transport mitigations and interventions first when considering the transport impacts of new developments in an area.

10.3.1 Ministry of Housing, Communities and Local Government National Planning Policy Framework (NPPF)

An overarching objective in the Local Plan is to follow Ministry of Housing, Communities and Local Government National Planning Policy Framework (NPPF) guidance including Chapter 9 'Promoting sustainable transport', in particular paragraph 102:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that opportunities to promote walking, cycling and public transport use are identified and pursued"

And paragraph 108

"In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location"

And paragraph 110 which states that amongst others:

"applications for development should give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use".

10.3.2 Highways England (HE) 'The Strategic Road Network: Planning for the Future' (2015)

In addition, Highways England (HE) 'The Strategic Road Network Planning for the Future' Paragraph 34 outlines the need to demonstrate how proposals will reduce car trips and improve accessibility for all modes and only then consider appropriate and proportional mitigation measures that assess the likely impact of residual car trips. HE goes on to advise local planning authorities to

"refuse or place conditions on developments only where the residual cumulative impacts of development on the capacity of the SRN (once proposed mitigations are taken into account) are still assessed to be severe."

In Paragraph 41, HE also states that the promoter should take all reasonable steps to minimise the level of physical mitigation required, through the use of measures such as Travel Plans and travel demand management measures. Consequently, a key aim of the Local Plan work outlined here is to minimise the residual new car trips on the highway network that would need further physical highway mitigation measures.

10.4 Actions within project

As a result, a fourth scenario **(Local Plan Scenario Mitigation Strategy – LPSMS)** has been developed to capture the impact of locating new development sites close to active travel and sustainable transport networks, as well as measuring the impacts of these new transport networks on the existing communities that could use them. Therefore, this scenario is looking to leverage Local Plan development for wider community benefits rather than only at the Local Plan sites themselves.

A list of schemes has been developed that are needed to support Local Plan development across the borough and beyond. These are set out in the attached document, including an initial estimation of cost and the scenario in which the mitigation is first applied.

To develop a robust scenario, it needs to be based upon an accepted evidence base. Highways England has indicated their acceptance of Sustainable Travel Towns (STT) case studies as a source from which to derive working assumptions. The STT work was funded by DfT funding and included a subsequent detailed empirical analysis of the impacts of delivering sustainable transport schemes to three towns in England over a prolonged period. The section below outlines the evidence taken forward to support the assumptions made in the LPSMS scenario.

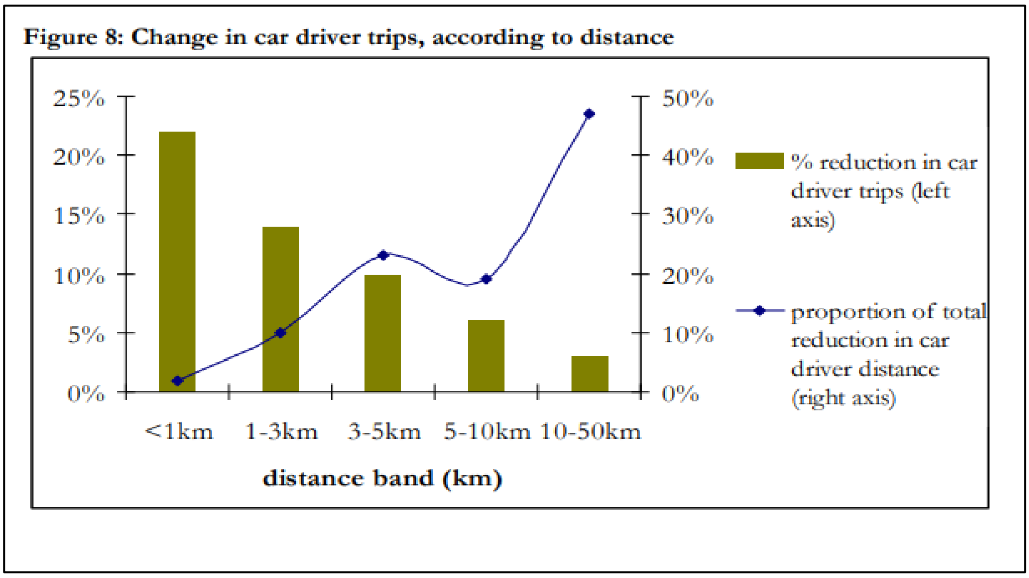
10.5 Evidence Base

10.5.1 Sustainable Travel Towns (STT)

In 2004, three towns - Darlington, Peterborough and Worcester – jointly received £10 million funding from the Department for Transport for the implementation of large-scale ‘smarter choice’ programmes over a five year period, as part of the ‘Sustainable Travel Towns’ (STT) demonstration project. A report was completed in 2018 ‘Sustainable travel towns: An evaluation of the longer-term impacts’. In summary, the report found that through improvements to walking, cycling, bus network and railway stations, in combination with developer funds and other transport funds such as Local Sustainable Transport Fund (LSTF), there was a reduction of 7-10% in the number of car driver trips per resident.

In addition, analysis showed the impact of car trip reduction was over all distances, although the higher reductions were concentrated in shorter distance trips.

Figure 10-1The Effects of Smarter Choice Programmes in the STT: Summary Report, p.25



The populations of each town at the time (Peterborough 183,631; Worcester 98,768; and Darlington 105,564) appear proportionate to Tunbridge Wells borough's latest population projection of 118,054 (2018). As a result, this study on the impacts of transport investment is appropriate to apply to Tunbridge Wells borough. The plans proposed for wider sustainable transport amount to approximately £15 million. This would not all be from one source of funding and could include a combination of development funding, SELEP bids and other government backed transport funds. This funding only considers schemes that would be directly beneficial for the Local Plan schemes. There are plans for a significant amount of additional wider sustainable transport measures to come as part of plans including Tunbridge Wells Local Cycling and Walking Infrastructure Plan (LCWIP).

The additional funding includes upgrades and connections for cycling and walking in and around Royal Tunbridge Wells, including the A264 Pembury Road, North Farm and the A26. Funding is also earmarked for enhanced bus services in the Pembury area and enhanced priority at Woodsgate Corner and through signals along the A264 Pembury Road. The signal bus connection will minimise bus services journey times along the key corridor with Royal Tunbridge Wells. There are wider benefits to this work that will not be captured in any highway modelling but are no less important, such as increased health and wellbeing and reduced carbon emissions. The outcomes of this work feeds into wider council objectives following the declaration of a 'Climate Emergency' and having an aim of the borough becoming carbon neural by 2030.

10.5.2 Propensity to Cycle Tool (PCT)

The PCT is as a strategic planning tool designed to assist transport planners and policy makers to prioritise investments and interventions to promote cycling, including where cycling has the greatest potential to grow. The tool was initially funded by the Department for Transport (DfT) to create the National Propensity to Cycle Tool for England (2015-2017, with further funding in 2018-19). By showing what the rate of cycling could feasibly look like in different parts of cities and regions, and illustrating the associated increase in cycle use on the road network, the PCT can inform policies that seek a wider shift towards sustainable transport.

Our analysis for the core area – from the Tonbridge border across to Paddock Wood and down to Royal Tunbridge Wells town centre - including North Farm and Pembury – identifies a potential modal shift of 10% from car. This Scenario (Go Dutch) is based on the core cycling network in Tunbridge Wells Borough being developed to a high standard allowing people of ages to cycle for everyday trips.

This 10% mode share target through the PCT tool is achieved through a high coverage of high-quality cycle links. This level of coverage is currently being planned through the Tunbridge Wells Local Cycling and Walking infrastructure Plan (LCWIP) with a focus on building up a network of high quality cycle routes and Low Traffic Neighbourhoods (LTN's) We have identified the potential for bus services and pedestrian facilities to be improved in conjunction with new Local Plan developments. We would see the coverage of these interventions as having the ability to replicate the effects of high-quality cycling facilities in places where universal coverage of cycle infrastructure may not be possible. The non-cycling sustainable transport interventions could have the potential to increase mode shift further than 10% but, for a robust assessment, we have not increased that figure.

Analysis of case studies has been undertaken to verify that the 10% mode shift has been benchmarked against other schemes as part of the DfT Sustainable Travel Towns analysis.

10.6 Applying changes to Scenario 4 – LPSMS

It is proposed to reduce the number of car trips in the core Local Plan development area (Royal Tunbridge Wells, Pembury, Paddock Wood and Tudeley) by approximately 10%, in line with the STT evidence base. Given the level of funding proposed for the Tunbridge Wells Local Plan surpasses the £10million earmarked for each town in STT, this is seen as a conservative estimate. It is considered that this strategy is aligned with the strategic vision of the current Tunbridge Wells Transport Strategy (2015 – 2026).

"By 2026, Tunbridge Wells will have a transport network which is less reliant on the private car, with a greater mode share towards walking, cycling and public transport, especially for shorter journeys."

The proposals also align with the need to deliver the projects set out in the Tunbridge Wells Cycling Strategy as outlined by TWBC and KCC in the Local Transport Plan (4). More recent work presented in the LCWIP and Low Traffic Neighbourhood Evidence Base document identifies an additional set of projects which aim to facilitate a significant modal shift away from the private car to active travel modes. These interventions include, urban cycle and pedestrian routes, inter-urban longer distance cycle routes and a network of Low Traffic Neighbourhoods focused on urban areas of the borough.

Transport for the South East (TfSE) used Scenario Forecasting techniques to explore and quantify different transport and socio-economic outcomes for the future of the South East. Two scenarios reference a vision led sustainable transport approach, with their 'Sustainable Future' and 'Sustainable Route to Growth' referencing car trip reductions of 15% and 9% respectively by 2050.

The car trip reduction proposed reflects the impact of sustainable transport schemes above and beyond that proposed in the LPS. This reduction relates to area wide trips. Taking account of the distance banding identified in the STT work, we propose a 10% overall trip reduction for the Tunbridge Wells area in the highway model. The core area where this modal shift has been applied is shown in **Figure 10-2**.

Figure 10-2 – Sustainable Transport Zone

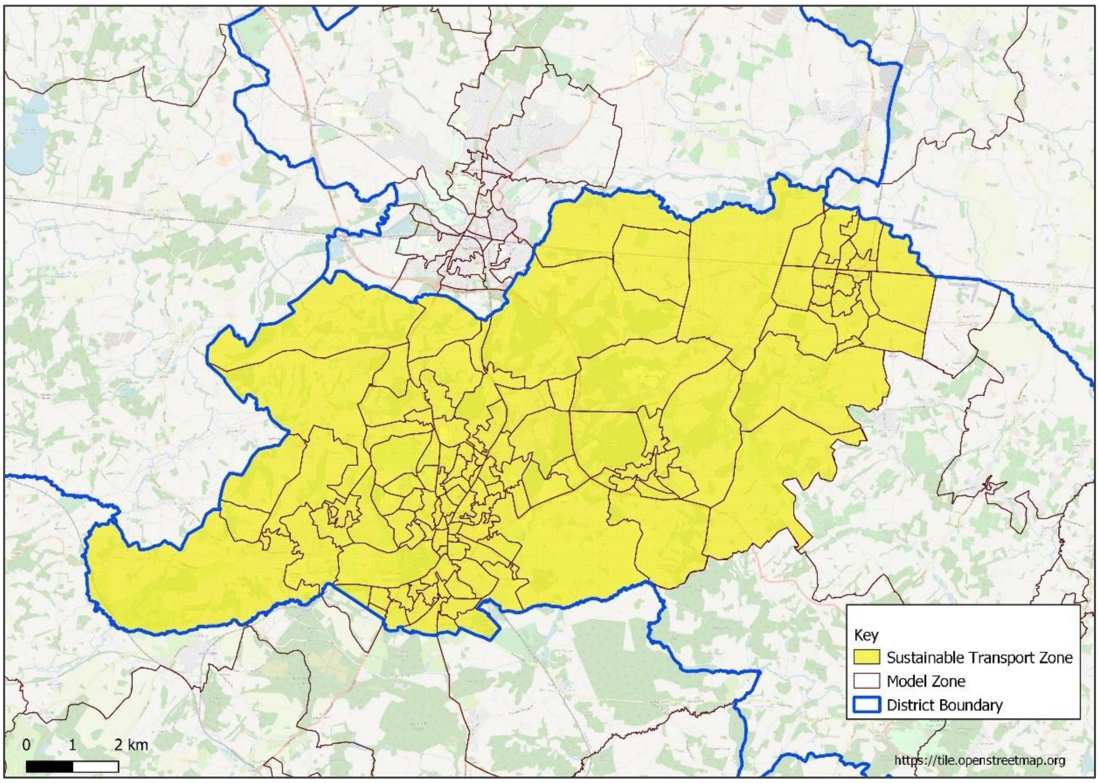


Table 10-1 Car modal shift impacts of sustainable transport mitigations

Modal Shift Locations	Sustainable Zones	Rest of TW	Other
Sustainable Transport Zones	-15%	-5%	-5%
Rest of TW	-5%	-	-
Other	-5%	-	-

The impact of these changes sees a reduction of about 1,900 private vehicle trips in both the AM and PM Peak models. This reduction equates to approximately 9% of total Tunbridge Wells borough highway demand and 5% of total model area highway demand.

The result of the measures in this scenario is an increased level of accessibility and connectivity for all in the Tunbridge Wells borough and a reduced reliance on the car to move around.

10.7 Mitigation Measures proposed

Table 10-2, **Table 10-3**, **Table 10-4** and **Table 10-5** summarise the key mitigation interventions proposed by type, with a split between multi-modal, highway, bus, walking, and cycling schemes.

The columns “LPS”, “LPSHM” and “LPSMS” show the scenarios the mitigations have been applied within. For all other mitigation schemes identified, a high-level view of mode shift in the core areas of Royal Tunbridge Wells, Paddock Wood, and Pembury, as well as the Local Plan sites within this area, has been made to reflect the mode shift effect of the proposed public transport, walking, and cycling mitigations.

Table 10-2 Area wide multi-modal measures to support Local Plan

Scheme Type	Scheme Number	Mitigation Measure	Short Description	Included in Highway Model	LPS	LPSHM	LPSMS	Initial high level costs (£m)
Area wide Multi-modal measures to support Local Plan	100	A26 corridor upgrade	Reallocation of space with smart traffic management to improve journey time reliability and access for sustainable modes	Indirect - Potential modal shift tested	-	-	✓	Costed as part of LCWIP
	101	Area Wide Travel Plans (AWTPs)	Stimulate travel behaviour change across a development area, reducing existing car trips	Indirect - Potential modal shift tested	-	-	✓	£ 350,000
	102	5G new small cell mobile base stations	Develop 5G capability in area to facilitate the evolution of highly connected and, ultimately, fully autonomous vehicles.	No	-	-	-	To be costed as part of future studies
	103	Low Traffic Neighbourhoods (LTNs)	LTNs for Royal Tunbridge Wells and the surrounding urban are including Langton Green, Rusthall, Southborough and Bidborough	No	-	-	-	Costed as part of LCWIP

Table 10-3 Highway measures to support Local Plan

Scheme Type	Scheme Number	Mitigation Measure	Short Description	Included in Highway Model	LPS	LPSHM	LPSMS	Initial high level costs (£m)
Highway Schemes	201	New bypass link of Colts Hill Off-line/on-line including cycle infrastructure	Reduce congestion at key junctions + match link capacity and link quality to adjoining Pembury bypass standard. Includes upgrade of junctions at Badsell Road / Five Oak Green and Crittenden Road	Yes	✓	✓	✓	Costed as part of Masterplan studies
	202	A228 Maidstone Road / B2017 Badsell Road (Colts Hill) roundabout	Increased capacity	Yes	✓	✓	✓	Costed as part of Masterplan studies
	203	Link road connecting B2017 with Colts Hill By-pass south of Five Oak Green	Will remove highway trips through Five Oak Green	Yes	✓	✓	✓	Costed as part of Masterplan studies
	204	Five Oak Green traffic calming	Remove through traffic with filters	Yes	✓	✓	✓	Costed as part of Masterplan studies
	205	A228 Whetsted Rd/B2160 Maidstone Rd jct upgrade	Existing demand + new demand from Local Plan development requires additional capacity at junction to alleviate delay	Yes	✓	✓	✓	Requires an additional £1,000,000 to what is costed as part of Masterplan studies
	206	Junction – Blackhurst Lane / A264 / Hall's Hole Road	New roundabout	Yes	✓	✓	✓	Costed as part of Kingstanding

								development North Farm
	207	B2107 /B2160 Maidstone Rd/ Mascalls Court Rd signals	Upgrade junction to remove delay generated by additional new highway trip demand	Yes	✓	✓	✓	Costed as part of Masterplan studies
	208	A26 / A2014 / Pembury Road (Vauxhall Roundabout)	Upgrade roundabout to support new developments	Yes	✓	✓	✓	Costed as part of Masterplan studies
	209	Longfield Road / Knights Park development access	Kingstanding Way adjacent site access	Yes	✓	✓	✓	Costed as part of Kingstanding development North Farm
	210	A21 / Longfield Road	Dumbbell roundabout upgrade	Yes	✓	✓	✓	Costed as part of Kingstanding development North Farm
	211	Pembury Road A228 / A21	Move toucan crossing on A264 to support better flow around A21 junction	Yes	✓	✓	✓	Costed as part of Kingstanding development North Farm
	212	B2017 Tudeley Rd/Hartlake Rd junction upgrade	Close link at junction. Route traffic through Tudeley. Remove through access on Hartlake Road at River Medway. Potential for ANPR for local through access	In mitigation scenarios	-	✓	✓	£ 100,000
	213	A26 Woodgate Way/B2017 Tudeley Rd junction upgrade + B2017 widening	Upgrade to redirect traffic flow away from A21 / A2228 / A264 junction to use A21/ Longfield Road junction where possible. Augment for cycle/walking priority signals through junction. Widen B2017	In mitigation scenarios	-	✓	✓	Requires an additional £500,000 to what is costed as part of Masterplan studies
	214	B2160 Maidstone Road/Lucks	Undertake a road widening of Lucks Lane	In mitigation	-	✓	✓	£ 500,000

		Lane	to match link capacity to demand	scenarios				
	215	A228 Pembury Northern Bypass / High Street / Tonbridge Road (Woodsgate Corner)	Redesign to improve walking and cycling crossing, added priority for buses to hospital and improve movement from A228 to A21 via Tonbridge Road	In mitigation scenarios	-	✓	✓	£ 1,500,000
	216	Signalise T junction – A264 Pembury Road / Sandhurst Road	Link junctions on A264 by signals to control traffic flow and provide safer walking and cycling crossings	In mitigation scenarios	-	✓	✓	£ 500,000
	217	Signalise T junction – A264 Pembury Road / Sandrock Road	Link junctions on A264 by signals to control traffic flow and provide safer walking and cycling crossings	In mitigation scenarios	-	✓	✓	£ 500,000
	218	A21 Kippings Cross / Blue Boys	Multi-modal corridor study required - Underlying issues which need HE/LEP funding Interim scheme focuses on additional B2160 approach lane and signals at roundabout	In mitigation scenarios	-	✓	✓	£ 1,500,000

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Table 10-4 Bus measures to support Local Plan

Scheme Type	Scheme Number	Mitigation Measure	Short Description	Included in Highway Model	LPS	LPSHM	LPSMS	Initial high level costs (£m)
Bus infrastructure	301	Paddock Wood to Tonbridge via Tudeley bus corridor	Mix of new and existing link roads with bus priority over whole corridor. Reliant on Masterplan delivery	Potential modal shift tested fully tested in LPSMS	✓	✓	✓	Costed as part of Masterplan studies
	302	Paddock Wood / Tudeley to Tunbridge Wells via Pembury bus services	New buses, bus stop upgrades, improve interchange facilities at hospital and train stations. Link bus priority through signals to junction upgrades on corridor	Potential modal shift tested fully tested in LPSMS	✓	✓	✓	Costed as part of Masterplan studies
	303	Bus Gates	Masterplan sites at Tudeley and Paddock Wood to include bus access roads	Potential modal shift tested	✓	✓	✓	Costed as part of Masterplan studies
	304	Bus priority - A264 (Woodsgate Corner to A264 Pembury Road)	Inbound (towards RTW) bus priority section to allow bus services to get ahead of any traffic at A21 junction	Potential modal shift tested	-	✓	✓	Costed as part of highway schemes
	305	Bus only route through Calverley Park Gardens	Used as bus bypass of Calverley Road / Pembury Road / Bayhall Road / Prospect Road junction	Potential modal shift tested	-	-	✓	£200,000
	306	Bus Gate and traffic measures for through traffic	Five Oak Green, Colts Hill	Potential modal shift tested	-	-	✓	Costed as part of Masterplan studies
	307	Bridge Paddock Wood High Street	Bus Gate	No	-	-	-	£500,000
Bus services	308	Improved 205 Service between Paddock Wood and Tonbridge, via Tudeley Village	High frequency service with bus priority links and limited stops. Bus stops located centrally in new development areas	Potential modal shift tested fully tested in LPSMS	✓	✓	✓	Costed as part of Masterplan studies
	309	Improved 6 Service between Paddock Wood and Royal Tunbridge Wells	High frequency service with bus priority links. Bus stops located centrally in new development areas	Potential modal shift tested fully tested in LPSMS	✓	✓	✓	Costed as part of Masterplan studies

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	310	DRB (Demand Responsive Bus) - Rural on-demand bus service in east Tunbridge Wells	Connect east Tunbridge Wells to key hubs such as rail stations, Paddock Wood, Tunbridge Wells Hospital, and North Farm.	Potential modal shift tested	-	-	✓	£500,000
	311	DRB (Demand Responsive Bus) - Paddock Wood Masterplan area	Connect new developments in area to key locations such as employment sites and railway station	Potential modal shift tested	-	-	✓	Costed as part of Masterplan studies
	312	Express Bus (Pembury – North Farm/Pembury hub – Tunbridge Wells – Broadwater Down)	High frequency service with bus priority links and limited stops. Bus stops located centrally in new development areas	Potential modal shift tested	-	-	✓	£1,000,000

Table 10-5 Walking and Cycling measures to support Local Plan

Scheme Type	Scheme Number	Mitigation Measure	Short Description	Included in Highway Model	LPS	LPSHM	LPSMS	Initial high level costs (£m)
Cycling and Walking measures	401	LTN 1/20 standard Cycle/Walking route to link Paddock Wood to Tonbridge via Tudeley village	Make use of new road and bus around Tudeley Masterplan for high quality cycle and walking priority links	Potential modal shift tested	✓	✓	✓	Costed as part of Masterplan studies
	402	LTN 1/20 standard New cycling/Walking infrastructure within Paddock Wood and Tudeley (LCWIP)	Use of Paddock Wood and Tudeley Masterplan low traffic links, develop segregated cycle link with link to Hop Picker Line and National Route 18 of the National Cycle Network. High Quality walk and cycle links	Potential modal shift tested	✓	✓	✓	Costed as part of Masterplan studies / LCWIP
	403	LTN 1/20 standard Inter-urban route Paddock Wood – Tunbridge Wells via improved A228	Connect Paddock Wood to the upgraded cycle path on A264 via the enhanced A228 works	Potential modal shift tested	✓	✓	✓	Costed as part of Masterplan studies
	404	LTN 1/20 standard Upgraded cycle route along A264 Pembury Road	Dedicated 2-way segregated cycle link from Pembury to Tunbridge Wells Station with high quality crossings to ensure high quality cycling and walking link	Potential modal shift tested	-	-	✓	Costed as part of LCWIP
	405	LTN 1/20 standard Upgrade cycle route from Pembury to North Farm along High Street / Tonbridge Road	Protected on road separation for cycling where required. Integration with shared use paths where it's lower cycling demand. Woodsgate Corner upgrade included.	Potential modal shift tested	-	-	✓	£500,000 (Woodsgate Corner costed as part of highway scheme)
	406	LTN 1/20 standard Cycling/Walking corridor and rights of way between Tunbridge Wells and Tudeley via Half Moon Lane	Supports e-bikes and other bikes. Offers quality cycle link to North Farm – includes linking in High Brooms station	Potential modal shift tested	-	-	✓	Costed as part of LCWIP

	407	LTN 1/20 standard Cycling/Walking corridor and rights of way between Tunbridge Wells and Tonbridge, including A26 A26 Active Travel Corridor	Integrate Kingstanding and North Farm cycle links with A21 cycle route, and upgrade A26 corridor to high quality walk and cycle corridor	Potential modal shift tested	-	-	✓	Costed as part of Kingstanding development North Farm / LCWIP
	408	Cycle support for Tunbridge Wells / Pembury / Paddock Wood / Tudeley	Focus on supporting cycle businesses establish in area	Potential modal shift tested	-	-	✓	£ 50,000
	409	LCWIP Royal Tunbridge Wells + surrounding urban area	walking and cycling routes in Royal Tunbridge Wells and the surrounding urban area	No	-	-	✓	Costed as part of LCWIP
	410	Hop Pickers Route	Upgrade Hop Pickers Route for walking and cycling	No	-	-	-	Costed as part of LCWIP
	411	LTN 1/20 standard Provide continuous footpath and cycle links between Hawkhurst and Sissinghurst along A229 corridor	Enhances accessibility between proposed Local Plan sites and existing settlements, as well as improving access to existing bus stops	No	-	-	-	£ 1,000,000

Figure 10-3, **Figure 10-4** and **Figure 10-5** are maps of the proposed mitigation measures.

Figure 10-3 – Highway Mitigation Interventions Mapped

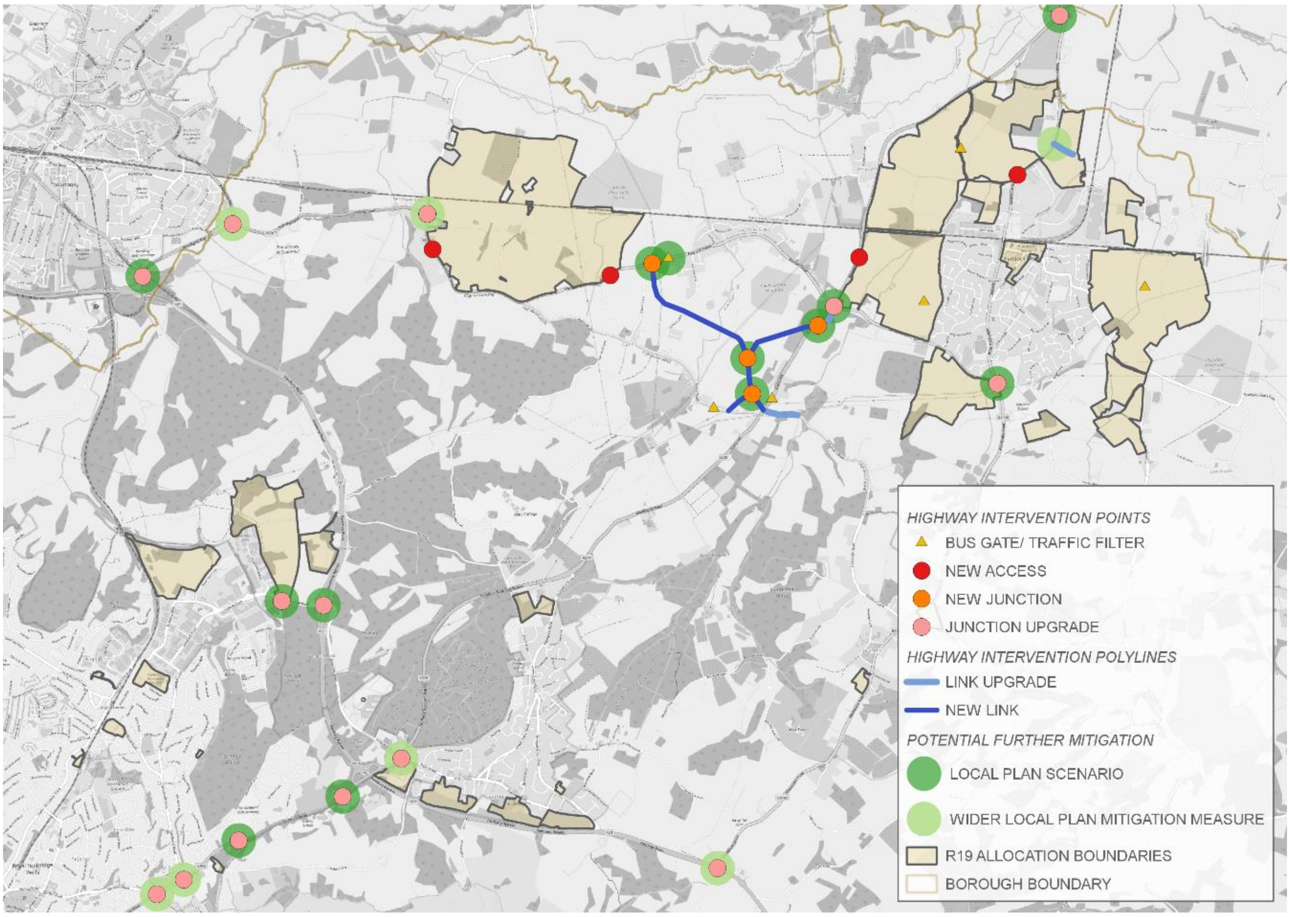


Figure 10-4 - Mitigation Interventions Mapped – Bus

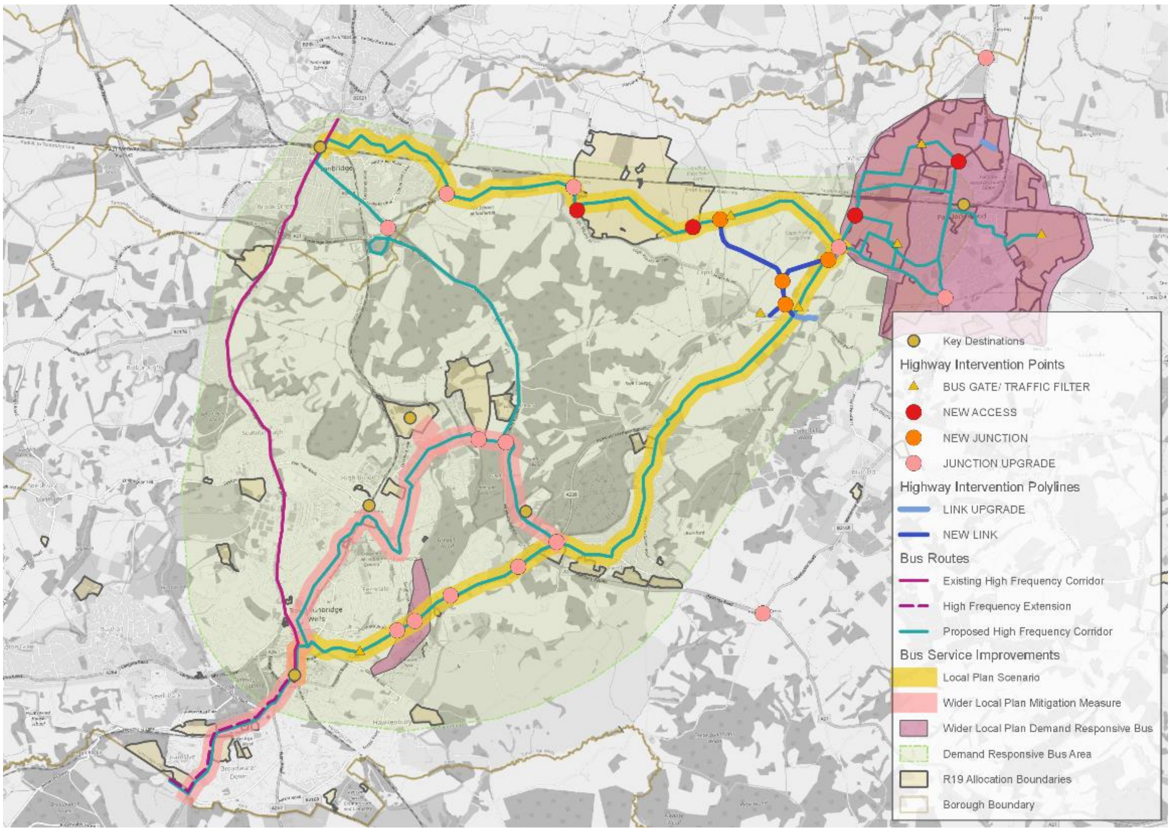
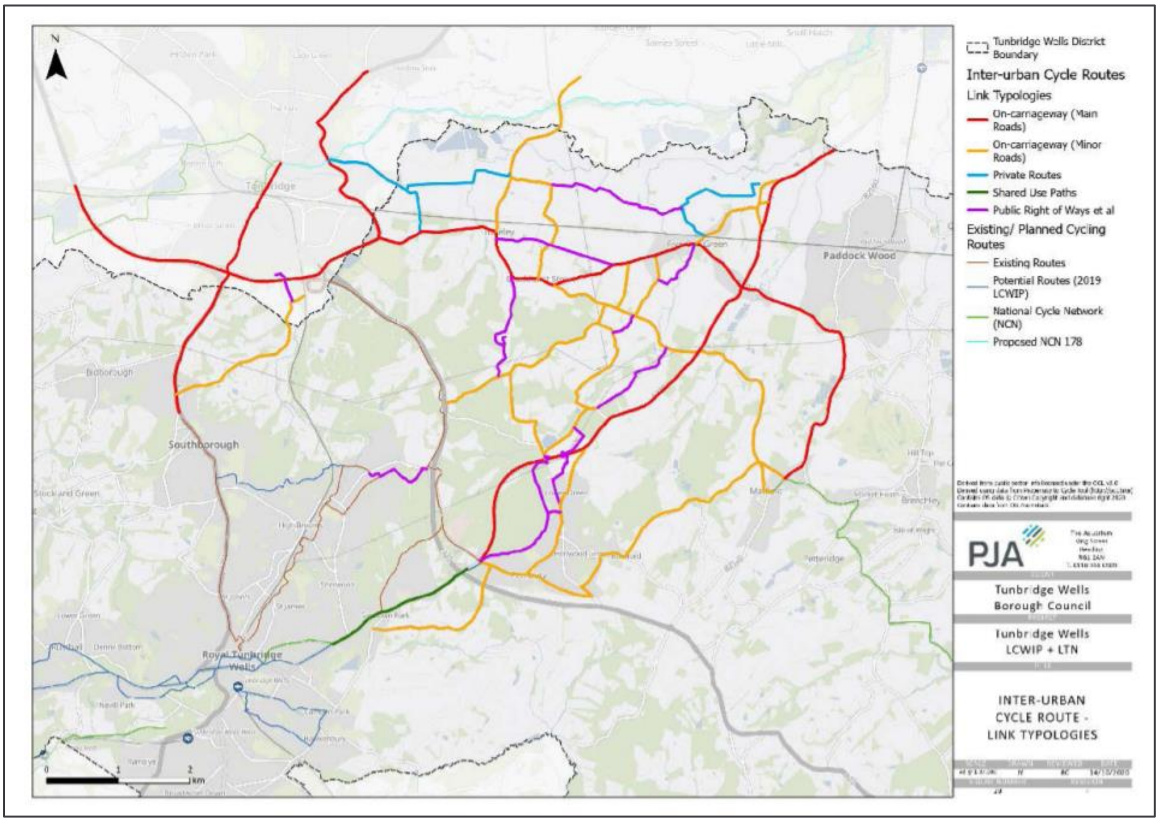


Figure 10-5 - Mitigation Interventions Mapped – Cycling (courtesy of PJA consultants LCWIP analysis)



11 Mitigation Analysis

This section analyses the positive impacts of the highway and sustainable transport mitigations proposed in Chapter 10.

The positive impacts are assed in modelling for the Base data, Reference Case data, Local Plan Scenario (LPS) data and the Local Plan Mitigation scenarios. This includes both a highway mitigation (LPSHM) and sustainable transport mitigation scenario (LPSMS).

The metric for link and junction performance is presented in **Table 11-1**.

Table 11-1 - Metric for junction performance

Overloaded (>100%)
Above practical capacity (95-100%)
At practical capacity (90-95%)
Exceeding capacity threshold (85-90%)
Approaching capacity threshold (80-85%)
Below 80% capacity

11.1 Overall Model Performance

Table 11-2 outlines the key high-level data from each of the core model scenarios.

Table 11-2 Simulation Network Performance

Peak	Metric	2018 Base	2038 Ref Case (RC)	2038 LPS	2038 LPSHM	2038 LPSMS
AM	Total Travel Time (PCU HRS)	6,652	8,636	8,777	9,205	8,423
	Comparison to RC			102%	107%	98%
	Total Travel Distance (PCU KMS)	293,881	339,135	352,594	355,056	342,496
	Comparison to RC			104%	105%	101%
	Simulation Network Speed (KPH)	44.2	39.3	40.2	38.6	40.7
	Comparison to RC			102%	98%	104%
PM	Total Travel Time (PCU HRS)	6,415	8,392	8,244	8,385	7,548
	Comparison to RC			98%	100%	90%
	Total Travel Distance (PCU KMS)	275,796	325,321	331,316	330,677	317,861
	Comparison to RC			102%	102%	98%
	Simulation Network Speed (KPH)	43	38.8	40.2	39.4	42.1
	Comparison to RC			104%	102%	109%

* Total travel time: The sum of all time taken for all vehicles to travel across the simulation network for all links and junctions
* Total travel distance: The sum of all distance travelled in the dimulation network
* Simulation network speed: Defined by total simulation distance/ total simulation time

The high level results can be summarised as follows:

- In the AM Peak, the LPS scenario with current proposed access schemes and masterplan site sustainable transport schemes performs close to that of Reference Case, with only a 2% increase in total travel time (PCU Hours). There is a simulation network speed (KPH) increase of 2% which shows there are positive effects of the current schemes proposed. The PM Peak sees the scenario performing better than the Reference Case;
- The additional highway schemes as part of the LPSHM scenario in the AM Peak do not increase capacity and end up increasing travel time (+7% to RC) and reducing average speed (-2% to RC). This suggests that general highway improvements are not enough to offset the wider residual impact of Local Plan developments.. For the PM Peak, the total travel time impact

is neutral, with a small 2% increase in network speed. Overall, the LPSHM scenario shows that the highway network is at capacity in key locations and that the general highway changes bring no perceptible capacity increases, as the space available to expand junctions is limited. The scenario looks to rebalance some junctions to better aid flow, but an unintended consequence of this are new highway capacity issues at downstream junctions. The LPSHM scenario indicates the only solutions available for key areas of congestion are either significant new road building that bring a step change in highway capacity, or the application of demand management / modal shift from car to bring demand better in line with available capacity. The latter is in line with Government and local policy and is achievable, whilst the former would have undesirable environmental and financial costs; and

- In the AM Peak, LPSMS shows the positive impact of significant investment in sustainable transport schemes in the area. Total travel time falls by 2% below Reference Case level and simulation network speed increases by 4% compared to the Reference Case. For the PM Peak, this scenario sees a 10% reduction in total travel time in comparison with the Reference Case. Network Speed see a 9% improvement when set against the Reference Case.

11.2 Model Link Performance

Below are the link demand changes comparing LPSMS with the LPS. This sees the following changes, as shown in **Figure 11-1** and ***Figure 11-2***:

- There is a general reduction of vehicle demand in the Royal Tunbridge Wells area as the sustainable transport schemes have a big impact on existing and future trips that converge on and emanate from the area;
- There is an overall decrease in demand on the A264 Pembury Road. This link does not offer much scope for corridor capacity expansion in terms of highway schemes. The LPSMS looks to focus trip demand on walking, cycling and bus services that use this corridor;
- There is an increase in the use of the Five Oak Green link road and Colts Hill Bypass as traffic is diverted from using the rural Hartlake Road on to the A roads in the area;
- There is an increase in the use of B2160 Maidstone Road towards Kippings Cross Roundabout as this scenario includes a two lane approach from this link on to the roundabout; and
- Overall the reduction in traffic flow is concentrated in the larger urban areas as there is expected to be a general improvement in walking and cycling conditions with a step change in the level of bus service provided and the knock on benefit of better access to key rail hubs in the area.

Figure 11-1 - Model Flow Difference between *LPSMS* and *LPS* - Increase (Green), Reduction (Blue)

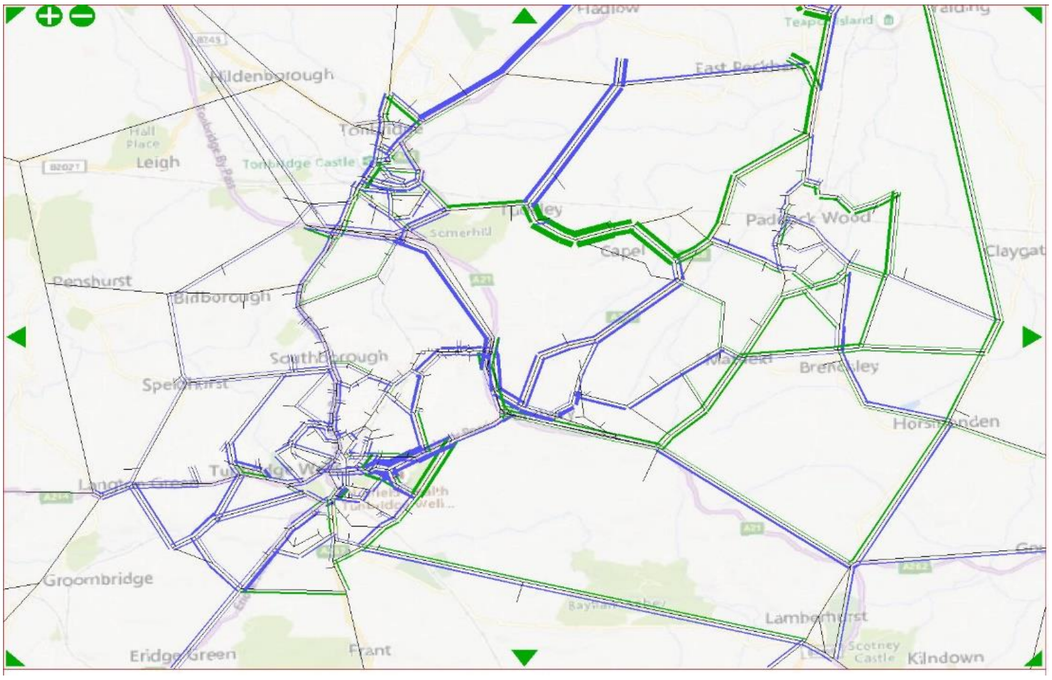
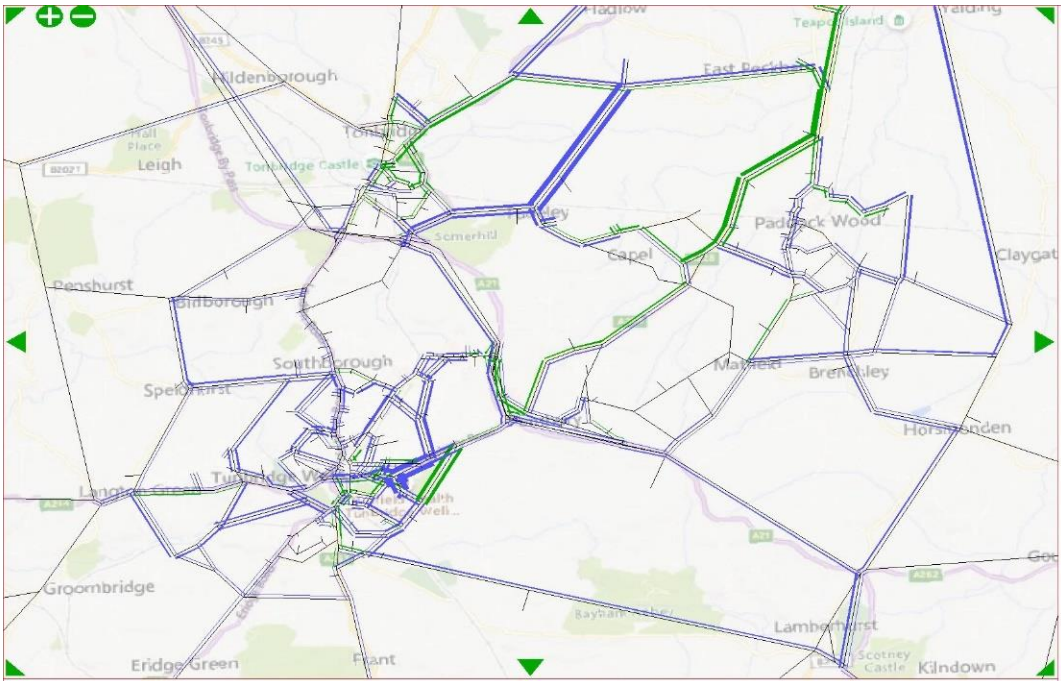


Figure 11-2 - Model Flow Difference between LPSMS and LPS - Increase (Green), Reduction (Blue)



11.3 Model Junction Performance

Figure 11-3 and **Figure 11-4** take into account the overall performance of the junctions in the model. They highlight that the mitigation scenario brings additional junctions within capacity because of the mitigation measures undertaken.

Figure 11-3 - Junction Performance Comparison Across Network – AM peak

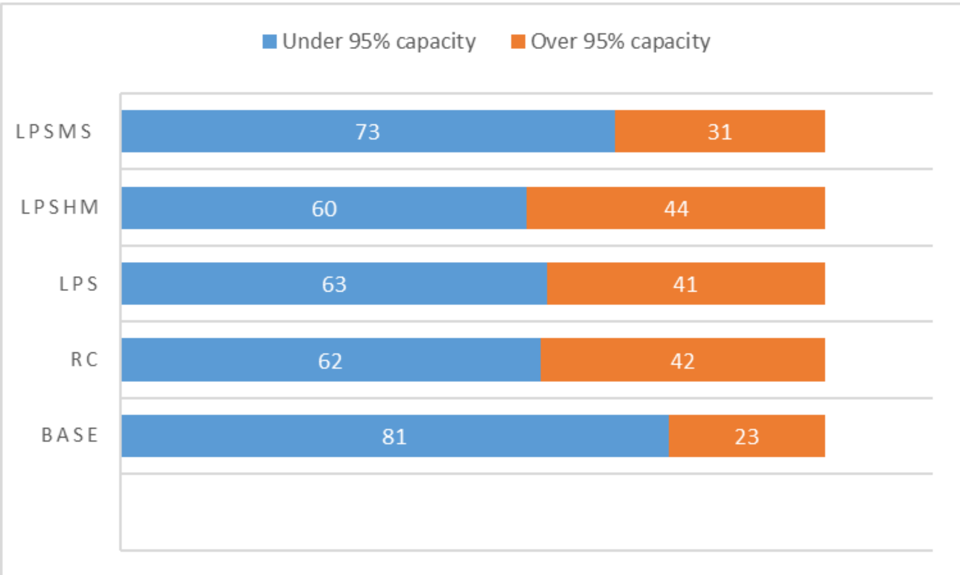
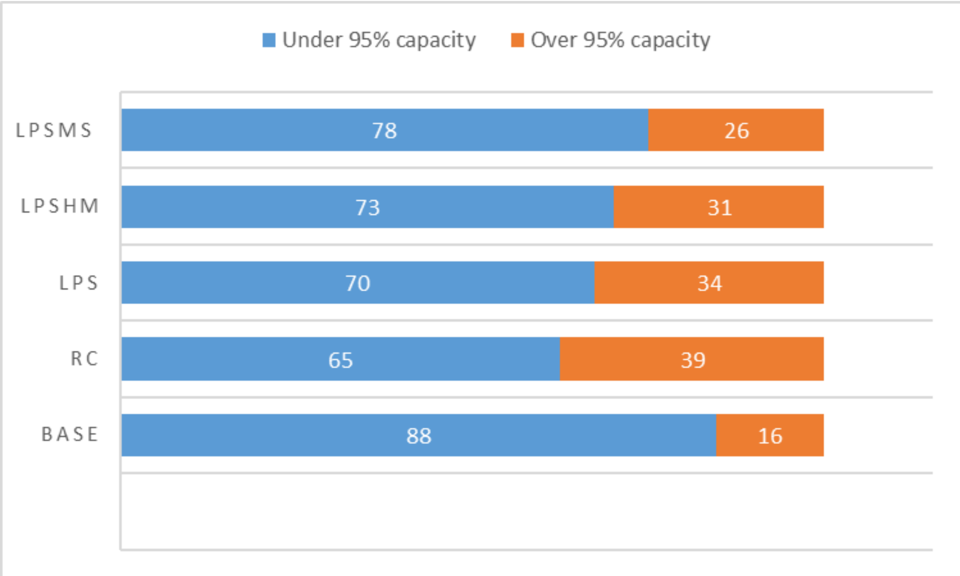


Figure 11-4 - Junction Performance Comparison Across Network – PM peak



In the Local Plan models there are 104 junctions identified. **Figure 11-3** shows which junctions are over capacity in each scenario tested for the AM Peak. In summary:

- The Reference Case has 62 junctions under capacity and 42 over capacity;
- The Local Plan Scenario (LPS), with highways access to new Local Plan sites included, has 63 junctions under capacity with 41 over capacity;
- The Highways Mitigation (LPSHM) scenario includes additional potential highway schemes that may be needed to offset some wider Local Plan impacts. However, the analysis shows that these general highway improvement schemes do not lead to an overall network improvement, with 3 additional junctions over capacity compared to LPS and an additional 2 junctions over capacity for RC; and
- The Sustainable Mitigation (LPSMS) scenario, that includes sustainable transport schemes and corresponding mode shift away from car, shows a significant improvement on the number of junctions below capacity (an additional 11 and 10 junctions below when compared to RC and LPS respectively). The mode shift assessed is robust and probably pessimistic.

The PM Peak has fewer congested junctions when compared with the AM Peak scenario. **Figure 11-4** shows which junctions are over capacity in each scenario tested for the PM Peak. In summary:

- For future year scenarios, the Reference Case has 65 junctions under capacity and 39 over capacity;
- The Local Plan Scenario (LPS) has 70 junctions under capacity with 34 over capacity;
- The Highways Mitigation (LPSHM) scenario again shows that these general highway improvement schemes do not lead to an overall network improvement, with 3 fewer junctions over capacity compared to LPS and 8 junctions under capacity compared to RC; and
- The Sustainable Mitigation (LPSMS) scenario again shows a significant reduction in congestion (an additional 13 and 8 junctions under capacity when compared to RC and LPS respectively).

Figure 11-5 and **Figure 11-6** shows the junction and link capacity issues in the LPSMS scenario. This plot shows worst case junction arm rather than junction average.

Figure 11-5 – 2038 Junction and Link Volume over Capacity Plot – AM LPSMS

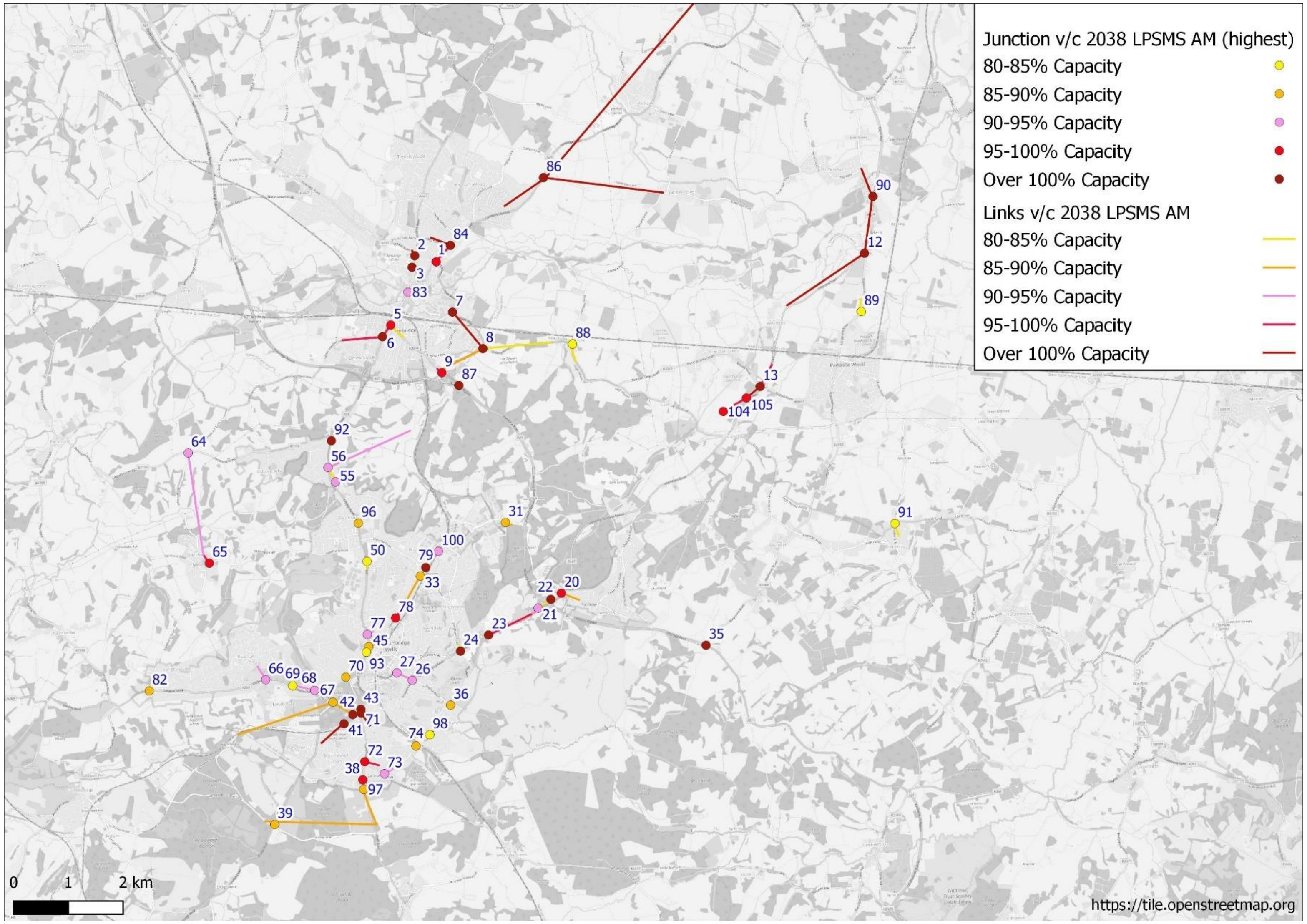


Figure 11-6 - 2038 Junction and Link Volume over Capacity Plot – PM LPSMS

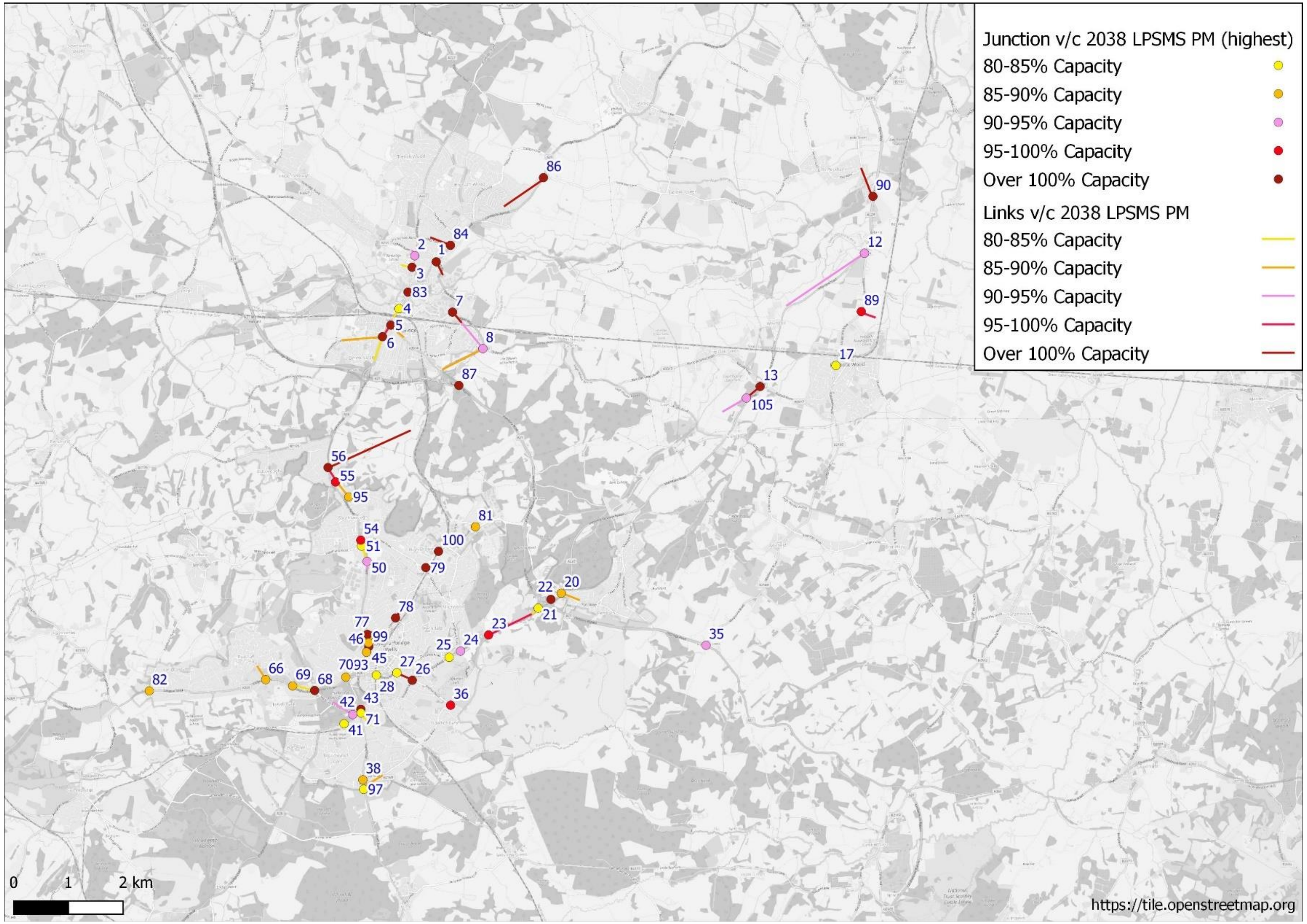


Table 11-3 – Maximum junction Volume over Capacity – Locations identified wider mitigations - AM peak

JunctionID	Description	WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	68	87	117	105	105
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	91	102	104	102	101
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	81	85	99	98	96
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	51	65	93	101	100
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road	105	120	110	118	123
24	A264 Pembury Road / Sandhurst Road	80	94	103	104	100
25	A264 Pembury Road / Sandrock Road	70	86	96	77	70
31	Longfield Road / Knights Park	66	80	128	92	88
35	Kippings Cross Roundabout	97	107	115	122	115
66	A264/Coach Road	93	96	92	92	92
74	Forest Road/Warwick Park	79	94	96	94	88
86	A26 Hadlow Road East/Three Elm Lane	92	115	133	160	162
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	54	90	115	80	80
89	B2160 Maidstone Road/Lucks Lane	68	77	88	85	84
105	Colts Hill Bypass/A228 Colts Hill	0	0	95	102	100

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Table 11-4 – Average junction Volume over Capacity – Locations identified wider mitigations - AM peak

JunctionID	Description	WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	63	81	101	91	90
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	84	96	94	95	94
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	61	64	79	78	75
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	45	49	81	67	66
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road	104	110	102	101	101
24	A264 Pembury Road / Sandhurst Road	75	69	77	82	78
25	A264 Pembury Road / Sandrock Road	49	57	57	69	63
31	Longfield Road / Knights Park	55	68	80	76	72
35	Kippings Cross Roundabout	74	82	92	93	89
66	A264/Coach Road	58	57	57	57	58
74	Forest Road/Warwick Park	61	74	76	74	69
86	A26 Hadlow Road East/Three Elm Lane	85	100	114	125	124
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	35	50	68	74	74
89	B2160 Maidstone Road/Lucks Lane	59	66	74	72	71
105	Colts Hill Bypass/A228 Colts Hill	0	0	89	97	96

Table 11-5 - Maximum junction Volume over Capacity – Locations identified wider mitigations - PM peak

JunctionID	Description	WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	79	94	100	92	95
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	102	110	108	93	91
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	91	93	99	94	89
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	69	81	122	104	102
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road	102	107	93	101	95
24	A264 Pembury Road / Sandhurst Road	75	86	98	88	92
25	A264 Pembury Road / Sandrock Road	91	101	103	102	85
31	Longfield Road / Knights Park	48	59	61	63	62
35	Kippings Cross Roundabout	70	82	93	94	91
66	A264/Coach Road	84	95	95	95	87
74	Forest Road/Warwick Park	61	97	95	89	74
86	A26 Hadlow Road East/Three Elm Lane	86	100	103	102	102
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	53	63	86	75	73
89	B2160 Maidstone Road/Lucks Lane	52	80	102	101	98
105	Colts Hill Bypass/A228 Colts Hill	0	0	80	90	90

Table 11-6 – Average junction Volume over Capacity – Locations identified wider mitigations - PM peak

JunctionID	Description	WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane	67	79	87	78	79
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road	73	83	89	80	77
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road	73	78	81	82	74
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road	62	67	92	71	67
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road	96	100	88	97	93
24	A264 Pembury Road / Sandhurst Road	65	67	72	73	68
25	A264 Pembury Road / Sandrock Road	50	55	57	76	59
31	Longfield Road / Knights Park	38	47	58	60	59
35	Kippings Cross Roundabout	60	71	84	82	79
66	A264/Coach Road	59	62	63	62	59
74	Forest Road/Warwick Park	50	75	72	68	58
86	A26 Hadlow Road East/Three Elm Lane	72	88	88	83	83
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road	42	50	75	62	60
89	B2160 Maidstone Road/Lucks Lane	47	58	65	66	64
105	Colts Hill Bypass/A228 Colts Hill	0	0	75	82	81

Table 11-3, **Table 11-4**, **Table 11-5** and **Table 11-6** show the difference in junction performance between Reference Case and the Local Plan scenarios. It outlines the maximum congestion impact as well as the average congestion for each identified junction. Analysis from **Section 9** outlines the need to consider mitigations to alleviate additional congestion generated as a result of the new Local Plan developments. These are the junctions considered here.

The key findings from this analysis are in **Table 11-7**.

Table 11-7 - Key findings from mitigation analysis

Area	Location	Initial scheme proposal	Scheme Reference Chapter 10	Impact	Residual impacts	Scheme adjustments from modelling analysis	Final expected outcome	Cost impact beyond existing studies
Tudeley	Junction 8 - A26 / B2017	Two lane approach on the B2017 arm	213	In highway modelling, the junction upgrade relieves the congestion on this arm. V/C < 85%	Congestion remains on A26 Woodgate Way SB approach. V/C > 100%	Signalisation of this junction to offset all Local Plan impacts should be considered. Can integrate walking and cycling signals.	Improved flow through junction for all users including public transport and active travel	Added scheme costs £500,000
Tudeley	Junction 88 - B2017 / Hartlake Road	Close Hartlake Road to through traffic, principally required to improve safety on this rural lane as part of the wider strategy for the area.	212	In highway modelling, the junction upgrade relieves the congestion on this arm. Reduced junction movements also bring safety benefits	Rerouting impacts can be seen as a result on the Five Oak Green link road and Colts Hill Bypass / A228, which are more appropriate routes for this traffic.	None	Enhanced road safety with rural links not impacted by additional Local Plan highway demand	New scheme costs £100,000
Paddock Wood	Junction 12 - A228 / B2160	Additional capacity on A228 Whetsted Road (SW) approach arm as a result of Local Plan	205	Reduced congestion on A228 Whetsted Road (SW)	A228 Branbridges Road (NE) at capacity due to underlying traffic issues	Improve capacity on A228 Whetsted Rd approach to mitigate impacts of Local Plan demand. Remaining junction issues require wider approach to tackle underlying congestion in area.	Improved flow through junction	No added scheme costs
Paddock Wood	Junction 89 - B2160 / Lucks Lane	Initially modelled without highway link changes.	241	High congestion on Lucks Lane	Difficult access to new employment sites	Land is proposed for allocation on both northern and southern side of Lucks Lane, in vicinity of junction. Thus wider access roads to key employment areas, located close to western end of Lucks Lane are proposed	Enhanced local road network	New scheme costs £500,000
Paddock Wood	Junction 13 A228 / B2017	Additional capacity required as part of Colts Hill Bypass	202	Additional capacity to support Local Plan growth	Demand on network strong on A228	Additional capacity required in final Colts Hill Bypass design	Scheme will work within capacity	No added scheme costs
Paddock Wood	Junction 105 A228 Colts Hill Bypass	The new junction that will connect the Bypass and the existing A228 at Colts Hill	201	Additional capacity to support Local Plan growth	Demand on network strong on A228	Additional space for stacking turning vehicles and an extra lane on the approach to the Five Oak Green B2017 roundabout	Scheme will work within capacity	No added scheme costs

Paddock Wood	Junction 104 Colts Hill Bypass / Five Oak Green Bypass	The new junction that will connect the Bypass and the Five Oak Green Bypass	201	Additional capacity to support Local Plan growth	Demand on network strong on A228	There is need to increase approach capacity on the Colts Hill Bypass northbound approach arm	Scheme will work within capacity	No added scheme costs
Pembury	A264 / A228 Pembury Road	Capacity issues highlighted in LPS scenario. This corridor is significantly constrained by third party land ownership and topography. Initial mitigation model run LPSHM included highway improvements for example- signalisation that tried to manage flows on corridor. Schemes include resignaling Woodsgate Corner tp push traffic to use Tonbridge Road, new signals at Sandrock Road and Sandhurst Road junctions, in addition to new roundabout at Halls Hole Road.	215 , 216, 217	The added demand and junction layout changes negatively impact A264/A228 corridor flow. Limited room for additional lanes for extra capacity. Key junction arms at capacity observed for Woodsgate Corner and Halls Hole Road.	Junctions along corridor key arms V/C > 100%	Package of sustainable transport measures that induce modal shift from car and reduce vehicle trips on the A264 corridor - fund additional bus services in Pembury and new cycle paths. No single scenario sees all junctions from Woodsgate Corner to Sandrock Road operate within capacity but overall LPSMS performs best, with the average V/C data showing only Junction 23 over capacity. The positive impacts of the bus and cycle improvements are likely to be much greater than has been tested and modelled in terms of mode shift, health, air quality and safety.	The A264 corridor performs well with the side roads seeing the biggest delays. The queuing in side roads does not affect the overall operation of the network, with impacts of these to be assessed through Transport Assessments/Statements submitted for individual planning applications.	New scheme costs £3,000,000
A21	Junction 35 A21 Kippings Cross / Blue Boys	Additional Lane on B2160 approach arm	2018	Relieve Local Plan congestion on B2160 Maidstone Road	Impacts on flow on A21	Additional redesign of junction to offset A21 delay on arm from Hastings direction in AM Peak. May require signals to optimise flow	Balanced flow between A and B road arms until a wider scheme arrives	New scheme costs £1,500,000

Table 12.7 outlines how further mitigation will be effective and the additional highway costs directly associated with this. In order to achieve the optimum network performance additional costs are also incurred in improving the quality of the walking, cycling and bus network in the area also as set out in earlier sections of this report.

For the A228/A264 Pembury Road corridor, no single scenario sees all junctions from Woodsgate Corner to Sandrock Road being within capacity. The LPSMS scenario performs best, with the average V/C data showing only Junction 23 over capacity. For this junction, the A264 corridor performs well with the side roads seeing the biggest delays. LPSMS focusses on managing traffic flow with signals and improvements to the existing cycle route. Traffic signals would also give priority to bus services along the corridor. There is a need to improve the traffic flow from the Tonbridge Road at Junction 20 Woodsgate Corner, providing a good alternative for A21 traffic so reducing demand coming off the A21 southbound at Junction 22.

The data in **Table 11-2** shows the best option in terms of capacity relief is modal shift from car. Concerted modal shift strategies as evidenced from Sustainable Travel Towns show that significant modal shift to sustainable transport is possible.

The next steps required are as follows:

- Additional model scenario analysis to identify the point in time the junction improvements will be required.
- Further strategic and junction model runs will be required upon refined design s assessed through Transport Assessments/Statements submitted for individual planning applications. For each application the SATURN model can be used to ensure schemes are fully sized for all highway demand
- The schemes are like to come forward as follows:
    - Tudeley/Paddock Wood/Kippings Cross through the Garden Settlement masterplans,
    - Pembury Road through development in the Royal Tunbridge Wells / Pembury area

12 Summary and Conclusions

This report sets out the modelling and analysis undertaken to support the Tunbridge Wells Borough Council Local Plan. A SATURN highway model has been developed, with the core model simulation network centred around the key settlement centres of Royal Tunbridge Wells, Pembury, Tonbridge, and Paddock Wood.

The Base Case has been developed using surveys from 2018 and 2019. The calibration and validation process, as set out in sections 6, 7 and 8, has delivered a model that is within DfT TAG acceptability criteria.

The model demand for the Local Plan Scenario (LPS) includes projected growth up to 2038. The overall impact of local plan scenario growth in trip demand is an 18% increase in model trips in the morning peak period (AM) and 17% in evening (PM).The biggest increases in link and junction demand are in the Paddock Wood and Tudeley areas. This reflects the locations of the largest Local Plan sites allocations. There are 33 junctions in the AM and 28 in the PM that are overcapacity both in the Local Plan Scenario and the Reference Case (RC) scenario (as shown in **Table 9-11** and **Table 9-13**). These junctions are primarily focussed on the A26 north south corridor through Royal Tunbridge Wells and Tonbridge, as well as the A264 and A267 junctions around Royal Tunbridge Wells. Additional congestion has been identified at Kippings Cross roundabout on the A21. The full analysis is presented in Section 9.

Analysis in **Chapter 9** shows that the package of highway and mitigation measures (**Table 9-1**) currently put forward in the LPS has some impact in relieving the additional congestion generated but there remains 15 locations to consider further mitigation for, as outlined in **Table 9-18**. Work has then been undertaken to understand what general mitigation measures could be applied to help reduce congestion.

Mitigation measures have been identified to offset the effects of additional trips from Local Plan developments on the local transport network. The initial focus was to understand if the additional demand from the Local Plan sites could be offset by physical highway mitigations only in the LPS Highway Mitigation (LPSHM) model runs. The follow on LPS Sustainable Mitigation (LPSMS) model runs focussed both on reducing the highway trips generated by the Local Plan sites and also, where necessary, increasing local highway capacity to bring it in line with projected demand. Mitigations have been identified with multimodal, highway, public transport, and cycling/walking schemes. These mitigations were then benchmarked against the implementation of similar schemes in the UK to identify the potential for modal shift for the sustainable transport schemes, in conjunction with reviewing the outputs for the Tunbridge Wells region from the Propensity to Cycle Tool (PCT) modal shift analysis. This identified a potential 10% modal shift in projected new Local Plan trips from highway to sustainable transport. **Table 10-2**, **Table 10-3**, **Table 10-4**, and **Table 10-5** outline the mitigations put forward as part of both mitigation packages. This report has been written in cooperation with the team working on the Garden Settlements plan and the scheme costs are consistent across both studies.

The mitigation analysis, as outlined in Section 11, compares the high-level simulation network performance between the Base, RC, LPS, LPSHM and LPSMS scenarios in

Table 11-2. The table highlights that the LPS performs overall close to that of the Reference Case, though not as well in the AM Peak in particular. The LPSHM scenario looks to apply highway changes only to improve this situation. However, the impacts of these schemes alone are negative on the overall model performance. The positive effect of the LPSMS mitigations, which include sustainable transport measures and robustly assessed modal shift, can be seen in the increase in the average model network speed and reduction in total model travel time compared the Local Plan Scenario. This improvement is further reinforced by the improved travel time per trip.

The above analysis identifies the need for additional capacity above what the LPS offers. However, local highway improvements do not resolve the issues and barring a significant programme of further road building in the borough, at considerable and unacceptable environmental and financial costs, an alternative approach is required. The results from the LPSMS show that delivering sustainable transport schemes with high levels of modal shift can bring about the congestion relief required. It can deliver improvements on the Reference Case overall. This outcome follows the direction of travel from the Government with a need for more focus on enabling walking and cycling and using public transport. Our evidence base for Sustainable Travel Towns shows that with a concerted effect to fund and build sustainable transport schemes, significant modal shift is possible.

Nonetheless some additional local highway improvements are required and should be considered, namely:

- **A26 / B2017** – increase capacity on B2017 Tudeley Road and A26 Woodgate Way approach;
    - Signalise junction
    - Additional approach arm on Tudeley Road B2017 approach
- Capacity enhancements on Whetsted Rd approach to **A228 / B2160** junction
- **A21 Kippings Cross**
    - Add a second approach lane on the B2160 at Kippings Cross to allow for left and right turn movements.
    - Potentially add signals to optimise flow at junction between all arms
    - This offsets the main congestion caused by the Local Plan but of course does not relieve the existing congestion issues on the A21, which is the matter of ongoing work by Highways England;
- **Hartlake Road / B2017**
    - Close link to through traffic.
    - If possible the link should be closed completely with the traffic diverted via the new appropriately designed link roads built as part of the Tudeley Garden Settlement,
    - Scheme brings both congestion and safety improvement for road users in the area; and
- **Colts Hill Bypass**
    - Additional capacity added at the next stage of design of the link, from the junction with the Five Oak Green Bypass to the A228 / B2017 roundabout junction, is recommended.
    - Additional approach capacity on the A228 northbound primarily required

For the A264/A228 Pembury Road it is recommended the schemes proposed by LPSMS should be taken forward as they offer the best balance of minimising congestion and allowing and encouraging a shift from car to public transport and cycling. These schemes include:

- Woodsgate Corner A228 / Tonbridge Road / Pembury High Street re-signalling to increase flow between Tonbridge Road and the A228 Pembury Bypass. This will divert some demand to the A21 Longfield Road junction that has the capacity needed, away from the Pembury Road and A21 junction that does not and cannot be realistically created;
- Signalise Sandhurst Road and Sandrock Road junctions on the A264 to help regulate demand and traffic flow;
- Develop a high quality cycle path for the A264 and ensure high quality crossings are created for the side roads, with cycle priority at Woodsgate Corner; and
- Use signals to offer greater bus priority on the A264 corridor, with the addition of making Calverley Park Gardens bus only.

The LPSMS scenario offers a significant overall improvement in congestion relief and mitigations for the Local Plan wider impacts. This will require an additional investment with high level costs set out through the LCWIP preparation and key sites masterplanning process. The Local Plan viability assessments undertaken have identified the ability to deliver appropriate developer contributions which can be used to contribute to this, with the ability to seek further funding support from regional authorities and central Government.

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Appendix A Seasonality Factor

WebTRIS site ID	Site Description	Average of weekday 24-hour Flows (veh)	
		Neutral Month 2018	Dec-18 (first two wks)
30360423	A21 southbound between A228 and B2160; Southbound	16321	17080
30360426	A21 southbound between A225 and A26 near Tonbridge (west); Southbound	26152	25716
5861/1	A21 northbound access from A26 near Tonbridge (east); ; Northbound	3589	4061
5861/2	A21 northbound exit for A26 near Tonbridge (east); Northbound	9303	9876
5863/1	A21 southbound access from A26 near Tonbridge (east); Southbound	9380	10111
5867/2	A21 northbound between A262 and B2160; Northbound	14574	13933
5867/1	A21 southbound between B2160 and A262; Southbound	14848	14401
5862/2	A21 southbound within the A26 near Tonbridge (east) junction; Southbound	13620	13870
5862/1	A21 southbound exit for A26 near Tonbridge (east); Southbound	3182	3679
5860/2	A21 southbound between A26 near Tonbridge (west) and A26 near Tonbridge (east); Southbound	16814	17709
5860/1	A21 southbound exit for A26 near Tonbridge (west); Southbound	9109	7995
5859/1	A21 northbound access from A26 near Tonbridge (west); Northbound	9489	9119
5983/1	A21 northbound within the A26 near Tonbridge (east) junction; Northbound	13817	13795
5994/3	A21 southbound within the A228 junction; Southbound	12997	12776
5994/1	A21 southbound exit for A228; Southbound	5655	6568
5994/2	A21 southbound access from A228; Southbound	3519	3373
Average of All Sites		11398	11504
Seasonality Factor (Jun/Dec)		**0.99**	

Appendix B Zone Disaggregation

SERTM zone	TWTM zone	LSOA	% Population	% Job	Population	Job	Sum of Population and Job	% of Population and Job
80252	81047	E01024732	18%	24%	1896	2093	3989	21%
	81048	E01024733	17%	2%	1773	136	1909	10%
	81070	E01024756	16%	1%	1653	106	1759	9%
	81045	E01024766	19%	38%	1974	3327	5301	28%
	81046	E01024767	15%	12%	1543	998	2541	13%
	80252	E01024768	16%	23%	1686	2000	3686	19%
80253	81050	E01024757	19%	21%	1596	571	2167	20%
	80253	E01024758	19%	29%	1585	772	2357	22%
	81051	E01024778	19%	11%	1579	296	1875	17%
	81052	E01024779	22%	30%	1806	814	2620	24%
	81049	E01024780	20%	9%	1638	241	1879	17%
80254	80254	E01024787	17%	31%	1294	781	2075	20%
	81068	E01024788	20%	8%	1489	201	1690	17%
	81069	E01024790	17%	35%	1305	882	2187	22%
	81067	E01024791	18%	14%	1337	352	1689	17%
	81066	E01024803	29%	13%	2180	320	2500	25%
80255	81062	E01024789	27%	45%	2374	1009	3383	31%
	81064	E01024807	18%	8%	1594	171	1765	16%
	81065	E01024808	18%	17%	1616	385	2001	18%
	81063	E01024809	17%	7%	1478	153	1631	15%
	80255	E01024810	19%	23%	1701	509	2210	20%
80256	81054	E01024792	22%	26%	1895	512	2407	23%
	81056	E01024794	20%	5%	1721	101	1822	17%
	81053	E01024804	17%	25%	1501	486	1987	19%
	80256	E01024805	20%	25%	1706	483	2189	21%
	81055	E01024806	21%	19%	1826	371	2197	21%
80257	81004	E01024840	12%	3%	2019	98	2117	11%
	81005	E01024841	12%	4%	1929	127	2056	11%
	81006	E01024842	10%	7%	1602	211	1813	9%
	81007	E01024843	9%	32%	1489	984	2473	13%
	80257	E01024821	12%	18%	2054	560	2614	13%
	81000	E01024822	11%	19%	1881	571	2452	13%

SERTM zone	TWTM zone	LSOA	% Population	% Job	Population	Job	Sum of Population and Job	% of Population and Job
	81001	E01024824	10%	9%	1609	275	1884	10%
	81002	E01024832	10%	5%	1664	168	1832	9%
	81003	E01024834	14%	2%	2245	70	2315	12%
80258	80258	E01024798	23%	17%	2467	749	3216	21%
	81008	E01024811	11%	1%	1220	56	1276	8%
	81009	E01024812	12%	17%	1312	745	2057	14%
	81010	E01024813	16%	44%	1666	1909	3575	24%
	81011	E01024814	12%	15%	1338	639	1977	13%
	81012	E01024815	13%	0%	1346	16	1362	9%
	81013	E01024816	13%	5%	1371	237	1608	11%
80259	80259	E01024793	22%	10%	1682	210	1892	19%
	81014	E01024825	20%	64%	1544	1360	2904	29%
	81015	E01024826	19%	7%	1467	158	1625	16%
	81016	E01024827	20%	10%	1576	220	1796	18%
	81017	E01024828	20%	8%	1541	172	1713	17%
80260	80260	E01024839	100%	100%	1750	3368	5118	100%
80261	80261	E01024837	24%	32%	1963	496	2459	25%
	81018	E01024844	20%	20%	1647	302	1949	20%
	81019	E01024846	20%	17%	1600	259	1859	19%
	81020	E01024849	20%	19%	1655	295	1950	20%
	81021	E01024850	16%	12%	1335	188	1523	16%
80262	80262	E01024836	29%	24%	1760	147	1907	28%
	81022	E01024845	22%	13%	1354	80	1434	21%
	81023	E01024847	27%	38%	1623	229	1852	28%
	81024	E01024848	22%	24%	1358	146	1504	22%
80263	80263	E01024829	21%	7%	1658	98	1756	19%
	81025	E01024851	22%	44%	1723	630	2353	25%
	81026	E01024852	17%	15%	1355	208	1563	17%
	81027	E01024853	18%	18%	1367	259	1626	18%
	81028	E01024854	22%	17%	1696	238	1934	21%
80272	81031	E01024799	6%	3%	1991	579	2570	5%
	81032	E01024800	5%	1%	1678	225	1903	4%
	81043	E01024835	7%	1%	2123	121	2244	4%
	81044	E01024838	6%	5%	1741	973	2714	5%

SERTM zone	TWTM zone	LSOA	% Population	% Job	Population	Job	Sum of Population and Job	% of Population and Job
	81033	E01024801	8%	29%	2594	5503	8097	16%
	81034	E01024802	7%	2%	2040	372	2412	5%
	81039	E01024823	6%	33%	1819	6308	8127	16%
	81042	E01024833	8%	3%	2409	551	2960	6%
	80272	E01024795	5%	0%	1455	81	1536	3%
	81029	E01024796	5%	3%	1408	517	1925	4%
	81040	E01024830	6%	1%	1869	259	2128	4%
	81041	E01024831	5%	1%	1449	135	1584	3%
	81030	E01024797	5%	0%	1623	45	1668	3%
	81035	E01024817	6%	1%	1829	182	2011	4%
	81036	E01024818	6%	1%	1727	110	1837	4%
	81037	E01024819	5%	16%	1705	2973	4678	9%
	81038	E01024820	5%	0%	1706	76	1782	4%

Appendix C Screenline Summary – AM

AM Screenline 1 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
1	Orange	Portman Park	Eastbound	15309	18133	8	9	1	16%	0	1	1	✓	✓
1	Orange	Bordyke	Eastbound	15308	15311	322	270	-52	-16%	3	1	1	✓	✓
1	Orange	Vale Road	Eastbound	15300	18301	278	286	8	3%	0	1	1	✓	✓
1	Orange	Pembury Road	Eastbound	14800	18210	540	539	-1	0%	0	1	1	✓	✓
					Total	**1148**	**1104**	**-44**	**-3.8%**	**1**	**1**	**1**	✓	✓
					No of counts								4	4
					%Pass								100%	100%

AM Screenline 1 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
1	Orange	Portman Park	Westbound	18133	15309	10	11	1	10%	0	1	1	✓	✓
1	Orange	Bordyke	Westbound	15311	15308	286	261	-25	-9%	2	1	1	✓	✓
1	Orange	Vale Road	Westbound	18301	15300	245	335	90	37%	5	1	0	×	✓
1	Orange	Pembury Road	Westbound	18210	14800	574	556	-18	-3%	1	1	1	✓	✓
					Total	**1115**	**1163**	**48**	**4.3%**	**1**	**1**	**1**	✓	✓
					No of counts								4	4
					%Pass								75%	100%

AM Screenline 2 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
2	Light Blue	B2260	Northbound	18208	15300	666	624	-42	-6%	2	1	1	✓	✓
2	Light Blue	A26 Woodgate Way	Northbound	18321	15302	1137	1178	41	4%	1	1	1	✓	✓
					Total	**1803**	**1802**	**-1**	**-0.1%**	**0**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

AM Screenline 2 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
2	Light Blue	B2260	Southbound	15300	18208	367	424	57	16%	3	1	1	✓	✓
2	Light Blue	A26 Woodgate Way	Southbound	15302	18321	1043	1005	-38	-4%	1	1	1	✓	✓
					Total	**1410**	**1429**	**19**	**1.4%**	**1**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

AM Screenline 3 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
3	Pink	Kibbles Lane	Northbound	18174	18175	190	190	0	0%	0	1	1	✓	✓
3	Pink	A26 ST John's Road	Northbound	15901	18060	812	825	13	2%	0	1	1	✓	✓
3	Pink	A21	Northbound	18204	15299	1951	1963	12	1%	0	1	1	✓	✓
3	Pink	Alders Road	Northbound	18034	18144	92	92	0	0%	0	1	1	✓	✓
3	Pink	A228 Colt's Hill	Northbound	18034	15313	650	659	9	1%	0	1	1	✓	✓
3	Pink	B2017 Badsell Road	Northbound	15314	18466	409	361	-48	-12%	2	1	1	✓	✓
3	Pink	B2160 Maidstone Road	Northbound	15314	18030	553	443	-110	-20%	5	0	1	✓	×
					Total	**4657**	**4532**	**-125**	**-2.7%**	**2**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								100%	86%

AM Screenline 3 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
3	Pink	Kibbles Lane	Southbound	18175	18174	241	256	14.91	6%	1	1	1	✓	✓
3	Pink	A26 ST John's Road	Southbound	18060	15901	628	652	23.55	4%	1	1	1	✓	✓
3	Pink	Alders Road	Southbound	18144	18034	53	34	-19	-36%	3	1	1	✓	✓
3	Pink	A21	Southbound	15304	15294	1865	1890	25.47	1%	1	1	1	✓	✓
3	Pink	A228 Colt's Hill	Southbound	15313	18034	903	911	8.04	1%	0	1	1	✓	✓
3	Pink	B2017 Badsell Road	Southbound	18466	15314	361	344	-16.67	-5%	1	1	1	✓	✓
3	Pink	B2160 Maidstone Road	Southbound	18030	15314	685	563	-121.6	-18%	5	0	1	✓	×
					Total	**4736**	**4651**	**-85**	**-1.8%**	**1**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								100%	86%

AM Screenline 4 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
4	Light Green	Vauxhall Lane	Eastbound	18366	15293	93	115	22.49	24%	2	1	1	✓	✓
4	Light Green	Longfield Road	Eastbound	18433	14773	872	844	-28.31	-3%	1	1	1	✓	✓
4	Light Green	A264 Pembury Road	Eastbound	17779	15167	1163	1037	-126	-11%	4	1	1	✓	✓
					Total	**2128**	**1996**	**-132**	**-6.2%**	**3**	**0**	**1**	✓	×
					No of counts								3	3
					%Pass								100%	100%

AM Screenline 4 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
4	Light Green	Vauxhall Lane	Westbound	15293	18366	183	180	-3.33	-2%	0	1	1	✓	✓
4	Light Green	Longfield Road	Westbound	14773	18433	1436	1363	-72.78	-5%	2	1	1	✓	✓
4	Light Green	A264 Pembury Road	Westbound	15167	17779	1099	1152	52.82	5%	2	1	1	✓	✓
					Total	**2718**	**2695**	**-23**	**-0.9%**	**0**	**1**	**1**	✓	✓
					No of counts								3	3
					%Pass								100%	100%

AM Screenline 5 - Eastbound Run16

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
5	Blue	A26 Woodgate Way	Eastbound	15301	15306	819	846	27	3%	1	1	1	✓	✓
5	Blue	Tonbridge Road	Eastbound	18149	15172	286	299	13	5%	1	1	1	✓	✓
5	Blue	A228 Pembury Road	Eastbound	12572	15172	745	427	-318	-43%	13	0	0	×	×
					Total	**1850**	**1572**	**-278**	**-15.0%**	**7**	**0**	**0**	×	×
					No of counts								3	3
					%Pass								67%	67%

AM Screenline 5 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
5	Blue	A26 Woodgate Way	Westbound	15306	15301	1108	1059	-49	-4%	1	1	1	✓	✓
5	Blue	Tonbridge Road	Westbound	15172	18149	853	723	-130	-15%	5	0	1	✓	×
5	Blue	A228 Pembury Road	Westbound	15172	12572	450	452	2	1%	0	1	1	✓	✓
					Total	**2411**	**2235**	**-176**	**-7.3%**	**4**	**0**	**1**	✓	×
					No of counts								3	3
					%Pass								100%	67%

AM Screenline 6 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
6	Black	Speldhurst Road	Eastbound	18062	15125	350	330	-20	-6%	1	1	1	✓	✓
6	Black	Culverden Down	Eastbound	18229	18168	191	219	28	14%	2	1	1	✓	✓
6	Black	Culverden Park	Eastbound	18165	18164	197	182	-15	-8%	1	1	1	✓	✓
6	Black	A264 Mount Ephraim	Eastbound	18163	15153	268	339	71	26%	4	1	1	✓	✓
6	Black	A264 Churhc Road	Eastbound	15147	15151	502	491	-11	-2%	0	1	1	✓	✓
6	Black	Major York's Road	Eastbound	18157	17777	540	534	-6	-1%	0	1	1	✓	✓
					Total	**2048**	**2095**	**47**	**2.3%**	**1**	**1**	**1**	✓	✓
					No of counts								6	6
					%Pass								100%	100%

AM Screenline 6 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
6	Black	Speldhurst Road	Westbound	15125	18062	281	275	-7	-2%	0	1	1	✓	✓
6	Black	Culverden Down	Westbound	18168	18229	119	133	14	12%	1	1	1	✓	✓
6	Black	Culverden Park	Westbound	18164	18165	124	125	1	1%	0	1	1	✓	✓
6	Black	A264 Mount Ephraim	Westbound	15153	18163	282	267	-15	-5%	1	1	1	✓	✓
6	Black	A264 Churhc Road	Westbound	15151	15147	413	420	7	2%	0	1	1	✓	✓
6	Black	Major York's Road	Westbound	17777	18157	782	708	-74	-9%	3	1	1	✓	✓
					Total	**2001**	**1927**	**-74**	**-3.7%**	**2**	**1**	**1**	✓	✓
					No of counts								6	6
					%Pass								100%	100%

AM Screenline 7 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
7	Green	Yew Tree Road	Eastbound	15901	18069	300	272	-28	-9%	2	1	1	✓	✓
7	Green	Powder Mill Lane	Eastbound	18172	18173	294	237	-57	-19%	4	1	1	✓	✓
7	Green	Queens Road	Eastbound	18166	18167	78	79	1	1%	0	1	1	✓	✓
7	Green	Grosvenor Road	Eastbound	15154	18241	243	261	18	7%	1	1	1	✓	✓
7	Green	Mount Ephraim Road	Eastbound	15153	18162	276	275	-1	0%	0	1	1	✓	✓
7	Green	A264 Church Road	Eastbound	15151	18103	550	542	-8	-1%	0	1	1	✓	✓
7	Green	A267 Frant Road	Eastbound	15146	17802	482	465	-17	-4%	1	1	1	✓	✓
7	Green	Nevill Terrace	Eastbound	18087	18093	264	256	-8	-3%	1	1	1	✓	✓
					Total	**2487**	**2387**	**-100**	**-4.0%**	**2**	**1**	**1**	✓	✓
					No of counts								8	8
					%Pass								100%	100%

AM Screenline 7 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
7	Green	Yew Tree Road	Westbound	18069	15901	294	313	19	6%	1	1	1	✓	✓
7	Green	Powder Mill Lane	Westbound	18173	18172	230	226	-4	-2%	0	1	1	✓	✓
7	Green	Queens Road	Westbound	18167	18166	178	179	1	1%	0	1	1	✓	✓
7	Green	Grosvenor Road	Westbound	18241	15154	305	321	16	5%	1	1	1	✓	✓
7	Green	A264 Church Road	Westbound	18103	15151	421	404	-17	-4%	1	1	1	✓	✓
7	Green	A267 Frant Road	Westbound	17802	15146	606	558	-48	-8%	2	1	1	✓	✓
7	Green	Nevill Terrace	Westbound	18093	18087	458	435	-23	-5%	1	1	1	✓	✓
					Total	**2492**	**2436**	**-56**	**-2.2%**	**1**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								100%	100%

AM Screenline 8 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
8	Red	A26 London Road	Northbound	15151	18239	651	556	-95	-15%	4	1	1	✓	✓
8	Red	Mount Pleasant Road	Northbound	15152	17764	297	273	-24	-8%	1	1	1	✓	✓
8	Red	Calverley Road	Northbound	15162	18116	289	285	-4	-1%	0	1	1	✓	✓
8	Red	Lansdowne Road	Northbound	15162	18117	355	352	-3	-1%	0	1	1	✓	✓
8	Red	Sandrock Road	Northbound	17772	18005	327	432	105	32%	5	0	0	×	×
8	Red	Sandhurst Road	Northbound	17805	18364	223	296	73	33%	5	1	1	✓	✓
8	Red	Blackhurst Lane	Northbound	17779	18017	193	193	0	0%	0	1	1	✓	✓
8	Red	A21 on-slip	Northbound	15167	15168	427	434	7	2%	0	1	1	✓	✓
8	Red	A21	Northbound	17781	15171	1554	1612	58	4%	1	1	1	✓	✓
8	Red	A21 off-slip	Northbound	12572	15170	157	142	-15	-10%	1	1	1	✓	✓
8	Red	Tonbridge Road	Northbound	15172	18149	853	723	-130	-15%	5	0	1	✓	×
8	Red	Pembury Northern Bypass	Northbound	15172	18037	568	472	-96	-17%	4	1	1	✓	✓
					Total	**5894**	**5769**	**-125**	**-2.1%**	**2**	**1**	**1**	✓	✓
					No of counts								12	12
					%Pass								92%	83%

AM Screenline 8 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
8	Red	A26 London Road	Southbound	18239	15151	438	415	-23	-5%	1	1	1	✓	✓
8	Red	Mount Pleasant Road	Southbound	17764	15152	294	308	14	5%	1	1	1	✓	✓
8	Red	Calverley Road	Southbound	18116	15162	112	73	-39	-35%	4	1	1	✓	✓
8	Red	Lansdowne Road	Southbound	18117	15162	445	534	89	20%	4	1	1	✓	✓
8	Red	Sandrock Road	Southbound	18005	17772	326	322	-4	-1%	0	1	1	✓	✓
8	Red	Sandhurst Road	Southbound	18364	17805	421	569	148	35%	7	0	0	×	×
8	Red	Blackhurst Lane	Southbound	18017	17779	206	212	6	3%	0	1	1	✓	✓
8	Red	A21 on-slip	Southbound	15168	15167	439	454	15	3%	1	1	1	✓	✓
8	Red	A21	Southbound	15169	17782	860	861	1	0%	0	1	1	✓	✓
8	Red	A21 off-slip	Southbound	15170	12572	417	322	-95	-23%	5	1	1	✓	✓
8	Red	Tonbridge Road	Southbound	18149	15172	286	299	13	5%	1	1	1	✓	✓
8	Red	Pembury Northern Bypass	Southbound	18037	15172	778	729	-49	-6%	2	1	1	✓	✓
					Total	**5022**	**5099**	**77**	**1.5%**	**1**	**1**	**1**	✓	✓
					No of counts								12	12
					%Pass								92%	92%

AM Screenline 9 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
9	Purple	B2160 Maidstone Road	Northbound	18259	15315	482	484	2	0%	0	1	1	✓	✓
9	Purple	B2017 Badsell Road	Northbound	18314	15313	424	410	-14	-3%	1	1	1	✓	✓
9	Purple	Crittenden Road	Northbound	18035	18034	129	97	-32	-25%	3	1	1	✓	✓
					Total	**1035**	**991**	**-44**	**-4.2%**	**1**	**1**	**1**	✓	✓
					No of counts								3	3
					%Pass								100%	100%

AM Screenline 9 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
9	Purple	B2160 Maidstone Road	Southbound	15315	18259	809	844	35	4%	1	1	1	✓	✓
9	Purple	B2017 Badsell Road	Southbound	15313	18314	364	345	-19	-5%	1	1	1	✓	✓
9	Purple	Crittenden Road	Southbound	18034	18035	43	41	-2	-4%	0	1	1	✓	✓
					Total	**1216**	**1230**	**14**	**1.1%**	**0**	**1**	**1**	✓	✓
					No of counts								3	3
					%Pass								100%	100%

AM Screenline 10 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
10	Yellow	A26 Eridge Road	Eastbound	18354	18155	492	493	1	0	0	1	1	✓	✓
10	Yellow	A267 Frant Road	Eastbound	17787	18110	546	552	6	0	0	1	1	✓	✓
					Total	**1038**	**1045**	**7**	**0.7%**	**0**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

AM Screenline 10 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
10	Yellow	A26 Eridge Road	Westbound	18155	18354	758	712	-46	0	2	1	1	✓	✓
10	Yellow	A267 Frant Road	Westbound	18110	17787	1068	1040	-28	0	1	1	1	✓	✓
					Total	**1826**	**1752**	**-74**	**-4.0%**	**2**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

Appendix D Screenline Summary – PM

PM Screenline 1 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
1	Orange	Portman Park	Eastbound	15309	18133	12	13	1	7%	0	1	1	✓	✓
1	Orange	Bordyke	Eastbound	15308	15311	403	311	-92	-23%	5	1	1	✓	✓
1	Orange	Vale Road	Eastbound	15300	18301	241	240	-1	-1%	0	1	1	✓	✓
1	Orange	Pembury Road	Eastbound	14800	18210	608	591	-17	-3%	1	1	1	✓	✓
					Total	**1264**	**1155**	**-109**	**-8.6%**	**3**	**0**	**1**	✓	×
					No of counts								4	4
					%Pass								100%	100%

PM Screenline 1 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
1	Orange	Portman Park	Westbound	18133	15309	11	11	0	-1%	0	1	1	✓	✓
1	Orange	Bordyke	Westbound	15311	15308	253	211	-42	-17%	3	1	1	✓	✓
1	Orange	Vale Road	Westbound	18301	15300	442	439	-3	-1%	0	1	1	✓	✓
1	Orange	Pembury Road	Westbound	18210	14800	518	503	-15	-3%	1	1	1	✓	✓
					Total	**1224**	**1164**	**-60**	**-4.9%**	**2**	**1**	**1**	✓	✓
					No of counts								4	4
					%Pass								100%	100%

PM Screenline 2 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
2	Light Blue	B2260	Northbound	18208	15300	543	542	-1	0%	0	1	1	✓	✓
2	Light Blue	A26 Woodgate Way	Northbound	18321	15302	841	827	-14	-2%	0	1	1	✓	✓
					Total	**1384**	**1369**	**-15**	**-1.1%**	**0**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

PM Screenline 2 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
2	Light Blue	B2260	Southbound	15300	18208	589	552	-37	-6%	2	1	1	✓	✓
2	Light Blue	A26 Woodgate Way	Southbound	15302	18321	1126	1157	31	3%	1	1	1	✓	✓
					Total	**1715**	**1708**	**-7**	**-0.4%**	**0**	**1**	**1**	✓	✓
					No of counts								2	2
					%Pass								100%	100%

PM Screenline 3 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
3	Pink	Kibbles Lane	Northbound	18174	18175	163	161	-2	-1%	0	1	1	✓	✓
3	Pink	A26 ST John's Road	Northbound	15901	18060	891	928	37	4%	1	1	1	✓	✓
3	Pink	A21	Northbound	18204	15299	1609	1680	71	4%	2	1	1	✓	✓
3	Pink	Alders Road	Northbound	18034	18144	65	30	-35	-53%	5	1	0	×	✓
3	Pink	A228 Colt's Hill	Northbound	18034	15313	944	918	-26	-3%	1	1	1	✓	✓
3	Pink	B2017 Badsell Road	Northbound	15314	18466	373	365	-8	-2%	0	1	1	✓	✓
3	Pink	B2160 Maidstone Road	Northbound	15314	18030	621	568	-53	-9%	2	1	1	✓	✓
					Total	**4666**	**4650**	**-16**	**-0.3%**	**0**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								86%	100%

PM Screenline 3 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
3	Pink	Kibbles Lane	Southbound	18175	18174	174	174	0.13	0%	0	1	1	✓	✓
3	Pink	A26 ST John's Road	Southbound	18060	15901	813	767	-46.48	-6%	2	1	1	✓	✓
3	Pink	Alders Road	Southbound	18144	18034	109	110	0.69	1%	0	1	1	✓	✓
3	Pink	A21	Southbound	15304	15294	1891	1943	51.94	3%	1	1	1	✓	✓
3	Pink	A228 Colt's Hill	Southbound	15313	18034	662	669	7	1%	0	1	1	✓	✓
3	Pink	B2017 Badsell Road	Southbound	18466	15314	504	484	-19.8	-4%	1	1	1	✓	✓
3	Pink	B2160 Maidstone Road	Southbound	18030	15314	671	648	-23.46	-3%	1	1	1	✓	✓
					Total	**4824**	**4794**	**-30**	**-0.6%**	**0**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								100%	100%

PM Screenline 4 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
4	Light Green	Vauxhall Lane	Eastbound	18366	15293	53	65	11.58	22%	2	1	1	✓	✓
4	Light Green	Longfield Road	Eastbound	18433	14773	1303	1223	-79.62	-6%	2	1	1	✓	✓
4	Light Green	A264 Pembury Road	Eastbound	17779	15167	1170	1207	36.73	3%	1	1	1	✓	✓
					Total	**2526**	**2495**	**-31**	**-1.2%**	**1**	**1**	**1**	✓	✓
					No of counts								3	3
					%Pass								100%	100%

PM Screenline 4 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
4	Light Green	Vauxhall Lane	Westbound	15293	18366	89	138	48.58	55%	5	1	1	✓	✓
4	Light Green	Longfield Road	Westbound	14773	18433	1016	1051	34.65	3%	1	1	1	✓	✓
4	Light Green	A264 Pembury Road	Westbound	15167	17779	1140	1145	4.99	0%	0	1	1	✓	✓
					Total	**2245**	**2333**	**88**	**3.9%**	**2**	**1**	**1**	✓	✓
					No of counts								3	3

PM Screenline 5 - Eastbound Run16

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
5	Blue	A26 Woodgate Way	Eastbound	15301	15306	1030	955	-75	-7%	2	1	1	✓	✓
5	Blue	Tonbridge Road	Eastbound	18149	15172	609	520	-89	-15%	4	1	1	✓	✓
5	Blue	A228 Pembury Road	Eastbound	12572	15172	810	628	-182	-22%	7	0	0	×	×
					Total	**2449**	**2103**	**-346**	**-14.1%**	**7**	**0**	**0**	×	×
					No of counts								3	3
					%Pass								67%	67%

PM Screenline 5 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
5	Blue	A26 Woodgate Way	Westbound	15306	15301	925	958	33	4%	1	1	1	✓	✓
5	Blue	Tonbridge Road	Westbound	15172	18149	393	384	-9	-2%	0	1	1	✓	✓
5	Blue	A228 Pembury Road	Westbound	15172	12572	676	676	0	0%	0	1	1	✓	✓
					Total	**1994**	**2017**	**23**	**1.2%**	**1**	**1**	**1**	✓	✓
					No of counts								3	3
					%Pass								100%	100%

PM Screenline 6 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
6	Black	Speldhurst Road	Eastbound	18062	15125	310	284	-26	-8%	1	1	1	✓	✓
6	Black	Culverden Down	Eastbound	18229	18168	134	199	65	48%	5	1	0	×	✓
6	Black	Culverden Park	Eastbound	18165	18164	99	105	6	6%	1	1	1	✓	✓
6	Black	A264 Mount Ephraim	Eastbound	18163	15153	304	264	-40	-13%	2	1	1	✓	✓
6	Black	A264 Churhc Road	Eastbound	15147	15151	408	430	22	5%	1	1	1	✓	✓
6	Black	Major York's Road	Eastbound	18157	17777	676	694	18	3%	1	1	1	✓	✓
					Total	**1931**	**1976**	**45**	**2.4%**	**1**	**1**	**1**	✓	✓
					No of counts								6	6
					%Pass								83%	100%

PM Screenline 6 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
6	Black	Speldhurst Road	Westbound	15125	18062	195	245	50	26%	3	1	1	✓	✓
6	Black	Culverden Down	Westbound	18168	18229	106	126	20	19%	2	1	1	✓	✓
6	Black	Culverden Park	Westbound	18164	18165	131	128	-3	-3%	0	1	1	✓	✓
6	Black	A264 Mount Ephraim	Westbound	15153	18163	386	409	23	6%	1	1	1	✓	✓
6	Black	A264 Churhc Road	Westbound	15151	15147	444	414	-30	-7%	1	1	1	✓	✓
6	Black	Major York's Road	Westbound	17777	18157	486	531	45	9%	2	1	1	✓	✓
					Total	**1748**	**1852**	**104**	**5.9%**	**2**	**0**	**1**	✓	×
					No of counts								6	6
					%Pass								100%	100%

PM Screenline 7 - Eastbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
7	Green	Yew Tree Road	Eastbound	15901	18069	290	269	-21	-7%	1	1	1	✓	✓
7	Green	Powder Mill Lane	Eastbound	18172	18173	223	243	20	9%	1	1	1	✓	✓
7	Green	Queens Road	Eastbound	18166	18167	87	86	-1	-1%	0	1	1	✓	✓
7	Green	Grosvenor Road	Eastbound	15154	18241	313	255	-58	-19%	3	1	1	✓	✓
7	Green	Mount Ephraim Road	Eastbound	15153	18162	237	235	-2	-1%	0	1	1	✓	✓
7	Green	A264 Church Road	Eastbound	15151	18103	423	423	0	0%	0	1	1	✓	✓
7	Green	A267 Frant Road	Eastbound	15146	17802	703	692	-11	-2%	0	1	1	✓	✓
7	Green	Nevill Terrace	Eastbound	18087	18093	368	368	0	0%	0	1	1	✓	✓
					Total	**2644**	**2572**	**-72**	**-2.7%**	**1**	**1**	**1**	✓	✓
					No of counts								8	8
					%Pass								100%	100%

PM Screenline 7 - Westbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
7	Green	Yew Tree Road	Westbound	18069	15901	292	361	69	24%	4	1	1	✓	✓
7	Green	Powder Mill Lane	Westbound	18173	18172	145	166	21	15%	2	1	1	✓	✓
7	Green	Queens Road	Westbound	18167	18166	158	159	1	1%	0	1	1	✓	✓
7	Green	Grosvenor Road	Westbound	18241	15154	436	357	-80	-18%	4	1	1	✓	✓
7	Green	A264 Church Road	Westbound	18103	15151	512	499	-13	-3%	1	1	1	✓	✓
7	Green	A267 Frant Road	Westbound	17802	15146	388	460	72	19%	4	1	1	✓	✓
7	Green	Nevill Terrace	Westbound	18093	18087	431	431	0	0%	0	1	1	✓	✓
					Total	**2362**	**2434**	**72**	**3.0%**	**1**	**1**	**1**	✓	✓
					No of counts								7	7
					%Pass								100%	100%

PM Screenline 8 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
8	Red	A26 London Road	Northbound	15151	18239	686	673	-13	-2%	1	1	1	✓	✓
8	Red	Mount Pleasant Road	Northbound	15152	17764	185	189	4	2%	0	1	1	✓	✓
8	Red	Calverley Road	Northbound	15162	18116	260	238	-22	-8%	1	1	1	✓	✓
8	Red	Lansdowne Road	Northbound	15162	18117	325	361	36	11%	2	1	1	✓	✓
8	Red	Sandrock Road	Northbound	17772	18005	278	289	11	4%	1	1	1	✓	✓
8	Red	Sandhurst Road	Northbound	17805	18364	260	304	44	17%	3	1	1	✓	✓
8	Red	Blackhurst Lane	Northbound	17779	18017	136	136	0	0%	0	1	1	✓	✓
8	Red	A21 on-slip	Northbound	15167	15168	412	413	1	0%	0	1	1	✓	✓
8	Red	A21	Northbound	17781	15171	930	918	-12	-1%	0	1	1	✓	✓
8	Red	A21 off-slip	Northbound	12572	15170	194	227	33	17%	2	1	1	✓	✓
8	Red	Tonbridge Road	Northbound	15172	18149	393	384	-9	-2%	0	1	1	✓	✓
8	Red	Pembury Northern Bypass	Northbound	15172	18037	872	728	-144	-17%	5	0	0	×	×
					Total	**4931**	**4860**	**-71**	**-1.4%**	**1**	**1**	**1**	✓	✓
					No of counts								12	12
					%Pass								92%	92%

PM Screenline 8 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
8	Red	A26 London Road	Southbound	18239	15151	589	428	-161	-27%	7	0	0	×	×
8	Red	Mount Pleasant Road	Southbound	17764	15152	254	325	71	28%	4	1	1	✓	✓
8	Red	Calverley Road	Southbound	18116	15162	157	64	-93	-60%	9	1	0	×	✓
8	Red	Lansdowne Road	Southbound	18117	15162	408	478	70	17%	3	1	1	✓	✓
8	Red	Sandrock Road	Southbound	18005	17772	339	441	102	30%	5	0	0	×	×
8	Red	Sandhurst Road	Southbound	18364	17805	312	492	180	58%	9	0	0	×	×
8	Red	Blackhurst Lane	Southbound	18017	17779	82	82	0	1%	0	1	1	✓	✓
8	Red	A21 on-slip	Southbound	15168	15167	195	215	20	10%	1	1	1	✓	✓
8	Red	A21	Southbound	15169	17782	1478	1474	-4	0%	0	1	1	✓	✓
8	Red	A21 off-slip	Southbound	15170	12572	315	296	-19	-6%	1	1	1	✓	✓
8	Red	Tonbridge Road	Southbound	18149	15172	609	520	-89	-15%	4	1	1	✓	✓
8	Red	Pembury Northern Bypass	Southbound	18037	15172	643	519	-124	-19%	5	0	0	×	×
					Total	**5381**	**5333**	**-48**	**-0.9%**	**1**	**1**	**1**	✓	✓
					No of counts								12	12
					%Pass								58%	67%

PM Screenline 9 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
9	Purple	B2160 Maidstone Road	Northbound	18259	15315	661	664	3	0%	0	1	1	✓	✓
9	Purple	B2017 Badsell Road	Northbound	18314	15313	366	368	2	0%	0	1	1	✓	✓
9	Purple	Crittenden Road	Northbound	18035	18034	46	47	1	2%	0	1	1	✓	✓
					Total	**1073**	**1079**	**6**	**0.6%**	**0**	**1**	**1**	**✓**	**✓**
					No of counts								3	3
					%Pass								100%	100%

PM Screenline 9 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
9	Purple	B2160 Maidstone Road	Southbound	15315	18259	518	520	2	0%	0	1	1	✓	✓
9	Purple	B2017 Badsell Road	Southbound	15313	18314	493	481	-12	-2%	1	1	1	✓	✓
9	Purple	Crittenden Road	Southbound	18034	18035	162	148	-14	-9%	1	1	1	✓	✓
					Total	**1173**	**1149**	**-24**	**-2.1%**	**1**	**1**	**1**	**✓**	**✓**
					No of counts								3	3
					%Pass								100%	100%

PM Screenline 10 - Southbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
10	Yellow	A26 Eridge Road	Eastbound	18354	18155	633	633	0	0	0	1	1	✓	✓
10	Yellow	A267 Frant Road	Eastbound	17787	18110	1051	1050	-1	0	0	1	1	✓	✓
					Total	**1684**	**1683**	**-1**	**0.0%**	**0**	**1**	**1**	**✓**	**✓**
					No of counts								2	2
					%Pass								100%	100%

PM Screenline 10 - Northbound

Ref	Name	Description	Dir.	A Node	B Node	Observed	Modelled	Diff	% Diff	GEH	DMRB	GEH < 5	GEH Pass	Flow PASS
10	Yellow	A26 Eridge Road	Westbound	18155	18354	505	513	8	0	0	1	1	✓	✓
10	Yellow	A267 Frant Road	Westbound	18110	17787	573	573	0	0	0	1	1	✓	✓
					Total	**1078**	**1085**	**7**	**0.7%**	**0**	**1**	**1**	**✓**	**✓**
					No of counts								2	2
					%Pass								100%	100%

Appendix E NTEM Growth Factors (2018-2038)

AM Peak	Commuting		Emp Business		Other	
TEMPro Zone	O	D	O	D	O	D
GB	1.132	1.132	1.138	1.138	1.203	1.203
Rother 001	1.080	1.131	1.100	1.141	1.172	1.210
Rother 002	1.112	1.137	1.128	1.148	1.194	1.215
Rother 003	1.078	1.134	1.098	1.146	1.171	1.202
Wealden 002	1.045	1.135	1.066	1.143	1.132	1.184
Wealden 005	1.045	1.126	1.068	1.129	1.148	1.183
Ashford 011	1.154	1.126	1.160	1.143	1.306	1.278
Ashford 013	1.182	1.122	1.180	1.131	1.330	1.269
Maidstone 017	1.093	1.116	1.105	1.130	1.240	1.230
Maidstone 018	1.091	1.118	1.106	1.129	1.239	1.251
Maidstone 019	1.070	1.119	1.090	1.125	1.229	1.241
Sevenoaks 015	0.968	1.114	1.000	1.126	1.116	1.191
Tonbridge and Malling	1.098	1.120	1.111	1.131	1.253	1.249
Tonbridge and Malling 001	1.067	1.120	1.091	1.132	1.235	1.242
Tonbridge and Malling 002	1.116	1.121	1.140	1.127	1.263	1.243
Tonbridge and Malling 003	1.124	1.123	1.125	1.129	1.252	1.264
Tonbridge and Malling 005	1.124	1.124	1.127	1.133	1.269	1.273
Tonbridge and Malling 006	1.071	1.120	1.088	1.130	1.232	1.230
Tonbridge and Malling 007	1.054	1.119	1.084	1.129	1.200	1.235
Tonbridge and Malling 008	1.065	1.112	1.087	1.127	1.234	1.223
Tonbridge and Malling 009	1.135	1.123	1.144	1.125	1.293	1.276
Tonbridge and Malling 010	1.087	1.118	1.097	1.135	1.255	1.246
Tonbridge and Malling 011	1.132	1.120	1.141	1.134	1.283	1.251
Tonbridge and Malling 012	1.127	1.120	1.136	1.130	1.278	1.249
Tonbridge and Malling 013	1.122	1.113	1.133	1.127	1.273	1.229
Tonbridge and Malling 014	1.091	1.122	1.110	1.136	1.261	1.244
Tunbridge Wells	1.044	1.117	1.070	1.129	1.206	1.236
Tunbridge Wells 001	1.021	1.113	1.055	1.127	1.185	1.219
Tunbridge Wells 002	1.034	1.109	1.057	1.121	1.187	1.212
Tunbridge Wells 003	1.069	1.119	1.095	1.129	1.236	1.260
Tunbridge Wells 004	1.012	1.123	1.047	1.129	1.184	1.243
Tunbridge Wells 005	1.072	1.118	1.093	1.117	1.222	1.230
Tunbridge Wells 006	1.019	1.116	1.045	1.118	1.176	1.214
Tunbridge Wells 007	1.053	1.111	1.082	1.126	1.217	1.230
Tunbridge Wells 008	1.096	1.123	1.120	1.133	1.262	1.272
Tunbridge Wells 009	1.065	1.117	1.083	1.133	1.240	1.244
Tunbridge Wells 010	1.070	1.117	1.104	1.133	1.240	1.244
Tunbridge Wells 011	1.009	1.112	1.038	1.119	1.158	1.202
Tunbridge Wells 012	1.050	1.120	1.076	1.129	1.227	1.253
Tunbridge Wells 013	1.033	1.112	1.059	1.122	1.198	1.231

PM Peak	Commuting		Emp Business		Other	
TEMPro Zone	O	D	O	D	O	D
GB	1.120	1.120	1.134	1.134	1.185	1.185
Rother 001	1.118	1.067	1.133	1.105	1.177	1.164
Rother 002	1.125	1.102	1.140	1.130	1.199	1.189
Rother 003	1.120	1.069	1.140	1.099	1.177	1.168
Wealden 002	1.120	1.036	1.129	1.073	1.155	1.135
Wealden 005	1.112	1.036	1.126	1.076	1.158	1.143
Ashford 011	1.114	1.150	1.137	1.163	1.259	1.279
Ashford 013	1.116	1.177	1.133	1.172	1.266	1.283
Maidstone 017	1.105	1.084	1.127	1.114	1.211	1.222
Maidstone 018	1.108	1.085	1.119	1.112	1.207	1.217
Maidstone 019	1.105	1.064	1.126	1.095	1.206	1.213
Sevenoaks 015	1.100	0.962	1.104	1.006	1.139	1.123
Tonbridge and Malling	1.110	1.089	1.127	1.112	1.217	1.228
Tonbridge and Malling 001	1.107	1.063	1.120	1.094	1.199	1.208
Tonbridge and Malling 002	1.111	1.110	1.126	1.135	1.224	1.242
Tonbridge and Malling 003	1.114	1.117	1.134	1.132	1.231	1.228
Tonbridge and Malling 005	1.116	1.106	1.131	1.126	1.240	1.236
Tonbridge and Malling 006	1.109	1.067	1.125	1.096	1.203	1.216
Tonbridge and Malling 007	1.107	1.046	1.123	1.081	1.181	1.183
Tonbridge and Malling 008	1.098	1.058	1.116	1.089	1.198	1.208
Tonbridge and Malling 009	1.120	1.129	1.138	1.144	1.250	1.260
Tonbridge and Malling 010	1.106	1.079	1.121	1.099	1.220	1.227
Tonbridge and Malling 011	1.108	1.128	1.125	1.132	1.241	1.269
Tonbridge and Malling 012	1.110	1.106	1.130	1.128	1.222	1.236
Tonbridge and Malling 013	1.099	1.106	1.119	1.118	1.215	1.244
Tonbridge and Malling 014	1.110	1.086	1.127	1.111	1.216	1.236
Tunbridge Wells	1.104	1.032	1.121	1.072	1.192	1.187
Tunbridge Wells 001	1.100	1.010	1.113	1.063	1.174	1.168
Tunbridge Wells 002	1.090	1.019	1.114	1.054	1.172	1.167
Tunbridge Wells 003	1.108	1.053	1.123	1.090	1.208	1.203
Tunbridge Wells 004	1.111	1.008	1.123	1.053	1.197	1.172
Tunbridge Wells 005	1.097	1.062	1.117	1.086	1.188	1.192
Tunbridge Wells 006	1.105	1.012	1.120	1.053	1.180	1.167
Tunbridge Wells 007	1.096	1.038	1.110	1.073	1.193	1.196
Tunbridge Wells 008	1.114	1.069	1.130	1.118	1.218	1.212
Tunbridge Wells 009	1.100	1.055	1.121	1.081	1.204	1.210
Tunbridge Wells 010	1.101	1.063	1.134	1.105	1.199	1.208
Tunbridge Wells 011	1.101	1.004	1.112	1.040	1.159	1.153
Tunbridge Wells 012	1.103	1.040	1.122	1.082	1.193	1.198
Tunbridge Wells 013	1.104	1.023	1.119	1.067	1.191	1.181

Appendix F NTEM Trip Rates

Car Trip Rates – Per Household (AM Peak)

AM Peak	HBW		HBEB		HBO		NHBEB		NHBO		Total	
TEMPro Zone	O	D	O	O	D	O	D	O	D	D	O	D
Tunbridge Wells	0.145	0.008	0.018	0.001	0.052	0.016	-	-	-	-	0.215	0.024
Tunbridge Wells 001	0.164	0.008	0.023	0.001	0.060	0.017	-	-	-	-	0.247	0.027
Tunbridge Wells 002	0.161	0.009	0.019	0.001	0.052	0.016	-	-	-	-	0.232	0.026
Tunbridge Wells 003	0.132	0.007	0.015	0.001	0.045	0.014	-	-	-	-	0.192	0.022
Tunbridge Wells 004	0.162	0.008	0.023	0.001	0.065	0.019	-	-	-	-	0.250	0.028
Tunbridge Wells 005	0.116	0.007	0.013	0.001	0.042	0.013	-	-	-	-	0.172	0.021
Tunbridge Wells 006	0.161	0.008	0.023	0.001	0.067	0.019	-	-	-	-	0.251	0.028
Tunbridge Wells 007	0.144	0.008	0.016	0.001	0.046	0.014	-	-	-	-	0.205	0.023
Tunbridge Wells 008	0.118	0.007	0.012	0.001	0.030	0.010	-	-	-	-	0.160	0.018
Tunbridge Wells 009	0.133	0.007	0.015	0.001	0.045	0.014	-	-	-	-	0.193	0.022
Tunbridge Wells 010	0.120	0.007	0.014	0.001	0.041	0.013	-	-	-	-	0.175	0.020
Tunbridge Wells 011	0.172	0.009	0.025	0.001	0.069	0.020	-	-	-	-	0.266	0.029
Tunbridge Wells 012	0.142	0.008	0.016	0.001	0.049	0.015	-	-	-	-	0.207	0.024
Tunbridge Wells 013	0.151	0.007	0.021	0.001	0.062	0.018	-	-	-	-	0.235	0.026
Tunbridge Wells 014	0.157	0.008	0.022	0.001	0.064	0.019	-	-	-	-	0.243	0.028

Car Trip Rates – Per Household (PM Peak)

PM Peak	HBW		HBEB		HBO		NHBEB		NHBO		Total	
TEMPro Zone	O	D	O	O	D	O	D	O	D	D	O	D
Tunbridge Wells	0.010	0.088	0.002	0.012	0.049	0.069	-	-	-	-	0.061	0.170
Tunbridge Wells 001	0.009	0.098	0.002	0.014	0.052	0.076	-	-	-	-	0.063	0.188
Tunbridge Wells 002	0.012	0.100	0.002	0.012	0.054	0.074	-	-	-	-	0.069	0.186
Tunbridge Wells 003	0.011	0.082	0.002	0.010	0.046	0.064	-	-	-	-	0.059	0.156
Tunbridge Wells 004	0.008	0.096	0.002	0.014	0.054	0.080	-	-	-	-	0.065	0.191
Tunbridge Wells 005	0.010	0.073	0.002	0.009	0.043	0.060	-	-	-	-	0.055	0.142
Tunbridge Wells 006	0.008	0.096	0.002	0.015	0.055	0.081	-	-	-	-	0.065	0.192
Tunbridge Wells 007	0.011	0.089	0.002	0.011	0.048	0.065	-	-	-	-	0.061	0.164
Tunbridge Wells 008	0.010	0.074	0.002	0.008	0.038	0.049	-	-	-	-	0.049	0.131
Tunbridge Wells 009	0.010	0.083	0.002	0.010	0.046	0.063	-	-	-	-	0.059	0.156
Tunbridge Wells 010	0.010	0.076	0.002	0.009	0.043	0.059	-	-	-	-	0.055	0.144
Tunbridge Wells 011	0.008	0.102	0.003	0.016	0.058	0.085	-	-	-	-	0.068	0.202
Tunbridge Wells 012	0.011	0.088	0.002	0.011	0.050	0.068	-	-	-	-	0.063	0.168
Tunbridge Wells 013	0.008	0.090	0.002	0.014	0.052	0.076	-	-	-	-	0.062	0.180
Tunbridge Wells 014	0.008	0.094	0.002	0.014	0.054	0.079	-	-	-	-	0.064	0.187

Car Trip Rates – Per Job (AM Peak)

AM Peak	HBW		HBEB		HBO		NHBEB		NHBO		Total	
TEMPro Zone	O	D	O	O	D	O	D	O	D	D	O	D
Tunbridge Wells	0.006	0.114	0.001	0.014	0.008	0.027	0.006	0.004	0.008	0.010	0.028	0.169
Tunbridge Wells 001	0.007	0.124	0.001	0.017	0.006	0.020	0.006	0.005	0.007	0.008	0.028	0.174
Tunbridge Wells 002	0.006	0.113	0.001	0.014	0.006	0.021	0.007	0.004	0.010	0.011	0.030	0.162
Tunbridge Wells 003	0.006	0.121	0.001	0.016	0.011	0.036	0.007	0.005	0.008	0.013	0.033	0.191
Tunbridge Wells 004	0.007	0.130	0.001	0.017	0.009	0.042	0.007	0.005	0.009	0.012	0.033	0.205
Tunbridge Wells 005	0.006	0.123	0.001	0.015	0.004	0.015	0.006	0.004	0.006	0.006	0.023	0.162
Tunbridge Wells 006	0.007	0.132	0.001	0.016	0.006	0.024	0.007	0.005	0.009	0.009	0.030	0.187
Tunbridge Wells 007	0.006	0.114	0.001	0.014	0.008	0.030	0.006	0.004	0.010	0.012	0.031	0.174
Tunbridge Wells 008	0.005	0.094	0.001	0.011	0.008	0.027	0.005	0.003	0.006	0.009	0.025	0.143
Tunbridge Wells 009	0.006	0.112	0.001	0.015	0.009	0.034	0.006	0.004	0.009	0.012	0.032	0.176
Tunbridge Wells 010	0.006	0.101	0.001	0.013	0.010	0.029	0.006	0.004	0.008	0.009	0.029	0.156
Tunbridge Wells 011	0.007	0.137	0.001	0.016	0.005	0.018	0.007	0.004	0.008	0.007	0.028	0.182
Tunbridge Wells 012	0.005	0.099	0.001	0.011	0.008	0.024	0.005	0.003	0.006	0.008	0.025	0.146
Tunbridge Wells 013	0.007	0.122	0.001	0.016	0.009	0.030	0.006	0.004	0.009	0.011	0.032	0.183
Tunbridge Wells 014	0.007	0.135	0.001	0.017	0.007	0.027	0.007	0.005	0.010	0.010	0.032	0.194

Car Trip Rates – Per Job (PM Peak)

PM Peak	HBW		HBEB		HBO		NHBEB		NHBO		Total	
TEMPro Zone	O	D	O	O	D	O	D	O	D	D	O	D
Tunbridge Wells	0.068	0.007	0.009	0.002	0.034	0.019	0.005	0.004	0.014	0.016	0.130	0.047
Tunbridge Wells 001	0.073	0.007	0.010	0.002	0.028	0.013	0.005	0.005	0.013	0.013	0.129	0.040
Tunbridge Wells 002	0.067	0.007	0.009	0.002	0.032	0.018	0.005	0.004	0.016	0.017	0.130	0.047
Tunbridge Wells 003	0.072	0.007	0.010	0.002	0.042	0.025	0.005	0.004	0.015	0.024	0.145	0.063
Tunbridge Wells 004	0.077	0.008	0.011	0.002	0.045	0.021	0.005	0.005	0.018	0.017	0.156	0.053
Tunbridge Wells 005	0.072	0.007	0.009	0.002	0.021	0.010	0.005	0.004	0.010	0.009	0.118	0.032
Tunbridge Wells 006	0.078	0.008	0.011	0.002	0.033	0.015	0.005	0.004	0.017	0.013	0.144	0.042
Tunbridge Wells 007	0.069	0.007	0.009	0.002	0.041	0.029	0.005	0.004	0.017	0.025	0.141	0.066
Tunbridge Wells 008	0.055	0.005	0.007	0.001	0.032	0.018	0.004	0.003	0.012	0.015	0.110	0.043
Tunbridge Wells 009	0.066	0.007	0.009	0.002	0.040	0.021	0.005	0.004	0.016	0.019	0.137	0.052
Tunbridge Wells 010	0.060	0.006	0.008	0.002	0.038	0.022	0.005	0.004	0.017	0.017	0.128	0.050
Tunbridge Wells 011	0.081	0.008	0.010	0.002	0.029	0.016	0.005	0.004	0.015	0.014	0.140	0.044
Tunbridge Wells 012	0.059	0.006	0.007	0.001	0.029	0.016	0.004	0.003	0.012	0.014	0.111	0.040
Tunbridge Wells 013	0.073	0.007	0.010	0.002	0.039	0.024	0.005	0.004	0.018	0.021	0.145	0.058
Tunbridge Wells 014	0.080	0.008	0.011	0.002	0.035	0.016	0.005	0.005	0.017	0.014	0.149	0.045

Appendix G Full List of Junction Performance

AM peak

JunctionID	Description	Maximum V/C arm				
		WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
1	A227 Hadlow Road / A26 Cannon Lane					
2	A227 Shipbourne Road / Portman Park / A227 High Street / B245 London Road					
3	A227 High Street / B2260 High Street / A227 Bordyke / Lansdowne Road					
4	B2260 High Street / Railway Approach / Vale Road / Barden Road					
5	B2260 Quarry Hill Road / A2014 Pembury Road / A26 Quarry Hill Road					
6	A26 Quarry Hill Road / Brook Street					
7	A26 Vale Road / A26 Vale Rise / Vale Road					
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane					
9	A26 Woodgate Way / Pembury Road / A2014 Vauxhall Lane / A21 / A2014 Pembury Road					
10	A21 / A2014 Vauxhall Lane / Vauxhall Lane					
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road					
13	A228 Maidstone Road / B2017 Badsell Road					
14	A228 Maidstone Road / Alders Road / Crittenden Road					
15	B2017 Badsell Road / B2160 Maidstone Road					
16	B2016 Maidstone Road / Commercial Road					
17	B2016 Maidstone Road / Station Road					
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road					
21	A21 / A228 Pembury Road / A264 Pembury Road					
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road					
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road					
24	A264 Pembury Road / Sandhurst Road					

SWECO

JunctionID	Description	Maximum V/C arm				
25	A264 Pembury Road / Sandrock Road					
26	A264 Calverley Road / A264 Pembury Road / Bayhall Road / B2023 Prospect Road					
27	Calverley Road / Lansdowne Road / A264 Calverley Road / A264 Crescent Road					
28	Mount Pleasant Road / A264 Cresent Road / A264 Church Road					
29	A264 Church Road / A26 London Road					
30	A21 / Tonbridge Road / Longfield Road					
31	Longfield Road / Knights Park					
33	Sandhurst Road / North Farm Road / Upper Grosvenor Road					
34	Henwood Green Road / A21 Hastings Road					
35	Kippings Cross Roundabout					
36	Halls Hole Road / Bayhall Road / Forest Road					
37	Forest Road / Hawkenbury Road					
38	A267 Frant Road / Forest Road					
39	A26 Eridge Road / Bunny Lane / Broadwater Forest Lane					
40	A26 Eridge Road / Broadwater Down					
41	A26 Eridge Road / Nevill Terrace					
42	A26 London Road / Major York's Road					
43	A26 London Road / A267 Nevill Street					
44	A26 Mount Ephraim / Mount Ephraim Road / A26 London Road / Mount Ephraim					
45	A26 St. John's Road / Grosvenor Road / A26 Mount Ephraim					
46	A26 St John's Road / Culverden Park					
47	A26 St John's Road / Queens Road					
48	A26 St John's Road / Culverden Down					
49	Reynolds Lane / Culverden Down					
50	A26 St John's Road / Powder Mill Lane					
51	A26 St John's Road / Speldhurst Road					
52	Speldhurst Road / Reynolds Lane					

JunctionID	Description	Maximum V/C arm				
53	Speldhurst Road / Kibbles Lane					
54	A26 London Road / Yew Tree Road					
55	A26 London Road / Church Road					
56	A26 London Road / Vauxhall Lane					
57-1	A26 Quarry Hill Road / A21					
57-2	A26 Quarry Hill Road / A21 / A26 London Road					
57-3	A26 Quarry Hill Road / A21 / A26 London Road					
58	A21 London Road / A268 Hawkhurst Road / B2087 High Street					
59	A229 Cranbrook Road / A268 Rye Road / A229 Highgate Hill / A268 High Street					
60	A229 Angley Road / High Street					
61	A229 Angley Road / Waterloo Road					
62	A262 Sissinghurst Road / A229 Angley Road / A262 Goudhurst Road					
63	B2162 Maidstone Road / Goudhurst Road / B2162 Lamberhurst Road / Brenchley Road					
64	B2176/Barden Road					
65	Barden Road/Speldhurst Hill					
66	A264/Coach Road					
67	Major York's Road/Hungershall Park					
68	A264 Langton Road/Major York's Road					
69	A264 Langton Road/Rusthall Road					
70	A264/Mount Ephraim					
71	A267 Frant Road/Warwick Road					
72	A267 Frant Road/Bayham Road					
73	Forest Road/Bayham Road					
74	Forest Road/Warwick Park					
75	Bayhall Road/Kingswood Road					
76	Pembury Road/Kingswoods Road					
77	St John's Road/Woodbury Park Road					

JunctionID	Description	Maximum V/C arm				
78	Upper Grosvenor Road/Dunstan Road/Quarry Road					
79	North Farm Road/High Brooms Road					
80	North Farm Road/Lamberts Road/Dowding Way					
81	Longfield Road/Dowding Way					
82	A264 Langton Road/The Green/Broom Lane					
83	High Street/Medway Wharf Road					
84	A26 Hadlow Road/Yardley Park Road					
85	A26 Hadlow Road/The Ridgeway					
86	A26 Hadlow Road East/Three Elm Lane					
87	A21 Tonbridge Bypass/Pembury Road					
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road					
89	B2160 Maidstone Road/Lucks Lane					
90	A228 Boyle Way/Branbridges Road					
91	Windmill Hill/Pixot Hill/Crook Road					
92	London Road/Bidnorough Ridge					
93	A26/King Charles Square					
94	Camden Road/Victoria Road/Garden Road					
95	A26 London Road/Pennington Road					
96	A26 London Road/Meadow Road					
97	A267/St Marks Road					
98	Forest Road/Farmcombe Road					
99	A26/Pelican					
100	North Farm Road under rail bridge					
101	Lamberts Road/Longfield Road					
102	A21/Tonbridge Rd Rabt					
103	Five Oak Green/Bypass					
104	Five Oak Green Bypass/ Colts Hill Bypass					

JunctionID	Description	Maximum V/C arm				
105	Colts Hill Bypass/A228 Colts Hill					
106	Colts Hill Bypass/Alders Rd					

PM peak

JunctionID	Description	Maximum V/C arm				
		WC2018 Base	WC2038 Ref	WC2038 LPS	WC2038 LPSHM	WC2038 LPSMS
1	A227 Hadlow Road / A26 Cannon Lane					
2	A227 Shipbourne Road / Portman Park / A227 High Street / B245 London Road					
3	A227 High Street / B2260 High Street / A227 Bordyke / Lansdowne Road					
4	B2260 High Street / Railway Approach / Vale Road / Barden Road					
5	B2260 Quarry Hill Road / A2014 Pembury Road / A26 Quarry Hill Road					
6	A26 Quarry Hill Road / Brook Street					
7	A26 Vale Road / A26 Vale Rise / Vale Road					
8	A26 Woodgate Way / B2017 Tudeley Road / Tudeley Lane					
9	A26 Woodgate Way / Pembury Road / A2014 Vauxhall Lane / A21 / A2014 Pembury Road					
10	A21 / A2014 Vauxhall Lane / Vauxhall Lane					
12	A228 Branbridges Road / B2160 Maidstone Road / A228 Whetsted Road					
13	A228 Maidstone Road / B2017 Badsell Road					
14	A228 Maidstone Road / Alders Road / Crittenden Road					
15	B2017 Badsell Road / B2160 Maidstone Road					
16	B2016 Maidstone Road / Commercial Road					
17	B2016 Maidstone Road / Station Road					
20	A228 Pembury Northern Bypass / High Street / Tonbridge Road					
21	A21 / A228 Pembury Road / A264 Pembury Road					
22	A21 / A228 Pembury Northern Bypass / A228 Pembury Road					
23	Blackhurst Lane / A264 Pembury Road / Hall's Hole Road					
24	A264 Pembury Road / Sandhurst Road					
25	A264 Pembury Road / Sandrock Road					
26	A264 Calverley Road / A264 Pembury Road / Bayhall Road / B2023 Prospect Road					

SWECO

27	Calverley Road / Lansdowne Road / A264 Calverley Road / A264 Crescent Road					
28	Mount Pleasant Road / A264 Cresent Road / A264 Church Road					
29	A264 Church Road / A26 London Road					
30	A21 / Tonbridge Road / Longfield Road					
31	Longfield Road / Knights Park					
33	Sandhurst Road / North Farm Road / Upper Grosvenor Road					
34	Henwood Green Road / A21 Hastings Road					
35	Kippings Cross Roundabout					
36	Halls Hole Road / Bayhall Road / Forest Road					
37	Forest Road / Hawkenbury Road					
38	A267 Frant Road / Forest Road					
39	A26 Eridge Road / Bunny Lane / Broadwater Forest Lane					
40	A26 Eridge Road / Broadwater Down					
41	A26 Eridge Road / Nevill Terrace					
42	A26 London Road / Major York's Road					
43	A26 London Road / A267 Nevill Street					
44	A26 Mount Ephraim / Mount Ephraim Road / A26 London Road / Mount Ephraim					
45	A26 St. John's Road / Grosvenor Road / A26 Mount Ephraim					
46	A26 St John's Road / Culverden Park					
47	A26 St John's Road / Queens Road					
48	A26 St John's Road / Culverden Down					
49	Reynolds Lane / Culverden Down					
50	A26 St John's Road / Powder Mill Lane					
51	A26 St John's Road / Speldhurst Road					
52	Speldhurst Road / Reynolds Lane					
53	Speldhurst Road / Kibbles Lane					
54	A26 London Road / Yew Tree Road					
55	A26 London Road / Church Road					

56	A26 London Road / Vauxhall Lane					
57-1	A26 Quarry Hill Road / A21					
57-2	A26 Quarry Hill Road / A21 / A26 London Road					
57-3	A26 Quarry Hill Road / A21 / A26 London Road					
58	A21 London Road / A268 Hawkhurst Road / B2087 High Street					
59	A229 Cranbrook Road / A268 Rye Road / A229 Highgate Hill / A268 High Street					
60	A229 Angley Road / High Street					
61	A229 Angley Road / Waterloo Road					
62	A262 Sissinghurst Road / A229 Angley Road / A262 Goudhurst Road					
63	B2162 Maidstone Road / Goudhurst Road / B2162 Lamberhurst Road / Brenchley Road					
64	B2176/Barden Road					
65	Barden Road/Speldhurst Hill					
66	A264/Coach Road					
67	Major York's Road/Hungershall Park					
68	A264 Langton Road/Major York's Road					
69	A264 Langton Road/Rusthall Road					
70	A264/Mount Ephraim					
71	A267 Frant Road/Warwick Road					
72	A267 Frant Road/Bayham Road					
73	Forest Road/Bayham Road					
74	Forest Road/Warwick Park					
75	Bayhall Road/Kingswood Road					
76	Pembury Road/Kingswoods Road					
77	St John's Road/Woodbury Park Road					
78	Upper Grosvenor Road/Dunstan Road/Quarry Road					
79	North Farm Road/High Brooms Road					
80	North Farm Road/Lamberts Road/Dowding Way					
81	Longfield Road/Dowding Way					

82	A264 Langton Road/The Green/Broom Lane					
83	High Street/Medway Wharf Road					
84	A26 Hadlow Road/Yardley Park Road					
85	A26 Hadlow Road/The Ridgeway					
86	A26 Hadlow Road East/Three Elm Lane					
87	A21 Tonbridge Bypass/Pembury Road					
88	B2017 Crockhurst Street/Tudeley Road/Hartlake Road					
89	B2160 Maidstone Road/Lucks Lane					
90	A228 Boyle Way/Branbridges Road					
91	Windmill Hill/Pixot Hill/Crook Road					
92	London Road/Bidnorough Ridge					
93	A26/King Charles Square					
94	Camden Road/Victoria Road/Garden Road					
95	A26 London Road/Pennington Road					
96	A26 London Road/Meadow Road					
97	A267/St Marks Road					
98	Forest Road/Farmcombe Road					
99	A26/Pelican					
100	North Farm Road under rail bridge					
101	Lamberts Road/Longfield Road					
102	A21/Tonbridge Rd Rabt					
103	Five Oak Green/Bypass					
104	Five Oak Green Bypass/ Colts Hill Bypass					
105	Colts Hill Bypass/A228 Colts Hill					
106	Colts Hill Bypass/Alders Rd					