Local Model Validation Report

Thanet Local Plan Evidence Base

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Contents

1 Introduction

1.1 Overview

1.1.1 This report describes the methods and components used to assemble a SATURN base year 2017 highway model for an area within Thanet District, broadly centred on the former Manston Airport (FMA) and the nearby A256/A254 and A28 corridors. The model will be used to test options and assess the impact of development proposals which may come forward in the Thanet Local Plan and to identify the issues arising and the effects of mitigating measures and potential new highway infrastructure on behalf of Kent County Council (KCC).

1.2 Background

1.2.1 There was an earlier VISUM model developed by Jacobs to sift between broad Local Plan scenarios. This was not deemed suitable for the next stage of the process. SATURN was seen as more useful for assessing the highway impacts of the proposed land use scenario.

1.2.2 A local area highway traffic model will assist in the assessment and development of an evidence base, in support of the emerging Local Plan and transport strategy. The local area model was developed with a view to being appropriate in terms of scale and cost to the purposes anticipated. It is envisaged that the role of the model would be to provide forecast traffic flows to form the basis for further detailed assessments, investigate the pressure on possible rat-runs and give indicative flows on proposed new infrastructure.

1.3 Base Year Model Considerations

1.3.1 The 2017 AM and PM peak Base year models for the Thanet district have been developed using SATURN software. The model has been assessed in line with the recommended criteria set out in the Transport Analysis Guidance (WebTAG) Unit M3.1).

1.3.2 It is anticipated that three forecast models will be developed to represent the future year 2031, marking the end of the Local Plan period. The broad outlines of the forecast models are expected to be as follows:

1. 2031 Do Nothing - 2031 with background traffic growth only (including any committed development as outlined in data provided by Thanet District Council);
2. 2031 Do Minimum – 2031 with all Local Plan allocations, background growth and committed development;
3. 2031 Do Something – As per do minimum, however, with Thanet Transport Strategy interventions included as outlined within the Thanet Transport Strategy – Infrastructure Proposals Plan.

1.4 Model Standards

1.4.1 Weekday peak hour scenarios have been developed for the Thanet Local Plan Model using SATURN software and following guidance provided in WebTAG Unit M3.1. The key characteristics of the model are summarised in Table 1-1 below.

Feature	Specification
Modelling Package	SATURN 11
Model Type	Highway Assignment
Base Year	2016
Time Periods	AM Peak hour (0800 – 0900) PM Peak hour (1700 – 1800)
Zones	93 zones (84LSOAs , 3 external, 2 bespoke extra zones, 1 split LSOA and 3 unused)
Calibration / Validation	In accordance with WebTAG Unit M3.1 guidance[1]

Table 1-1: Model Features

1.4.2 The Department of Transport provides guidance for Highway Assignment Modelling in TAG Unit M3.1. The recommended criteria for calibration and validation of the network, trip matrices, route choice and assignments within the models are summarised in **Appendix A**.

[1] Department of Transport (2014), TAG UNIT M3.1 Highway Assignment Methodology.

2 Key Features of the Model

2.1 Area of Interest

2.1.1 WebTAG guidance recommends that the coverage of a highway assignment model should:

- allow for strategic re-routing impacts of interventions;
- ensure that areas outside the main area of interest which are potential alternative destinations are properly represented; and
- ensure that the full length of trips are represented.

2.1.2 It is also recommended that the model should also be no larger than is necessary to meet these requirements.

2.1.3 Thanet is a coastal district, bounded by the North Sea to the north and east and consequently through movements are minimal. The A28, A299 and A256 are the key approaches which connect Thanet with the neighbouring districts of Canterbury (City) and Dover, to the west and south respectively.

2.1.4 The area around the former Manston airport is the rural portion of Thanet district, bounded by the A28 and A299 approaches to the Thanet conurbation to the east of the district.

2.1.5 The A256 and A28 corridors are the focus for significant development in Thanet within the Local Plan period, with potential for key infrastructure improvements being proposed in the emerging Thanet Transport Strategy. The model has been developed to support the emerging Local Plan and transport strategy, by providing a measure of the impact of development and proposed infrastructure improvements. With this in mind the area of interest is designed to extend sufficiently far to encompass key developments and the anticipated effect of potential infrastructure proposals on travel patterns.

2.1.6 The area of interest shown in Figure 2-1 is designed to capture traffic movements along the A256/A254 and A28 corridors and on local roads serving the areas in-between. The A256 is a key access into Thanet, and at Westwood changes direction from north-south to east-west towards Broadstairs; joining with the A254 which links Ramsgate and Margate.

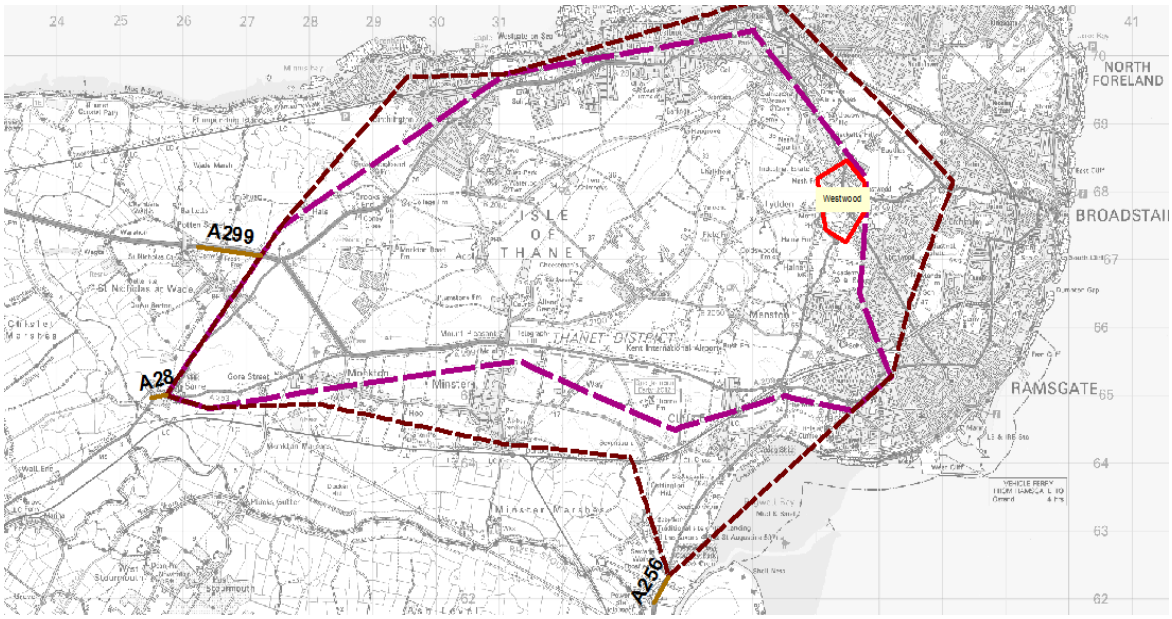


Figure 2-1: Area of interest

2.1.7 The modelling exercise has been undertaken as part of a wider support project which also included corridor studies on the A28 and A256/A254. These routes are shown in Figure 2-2

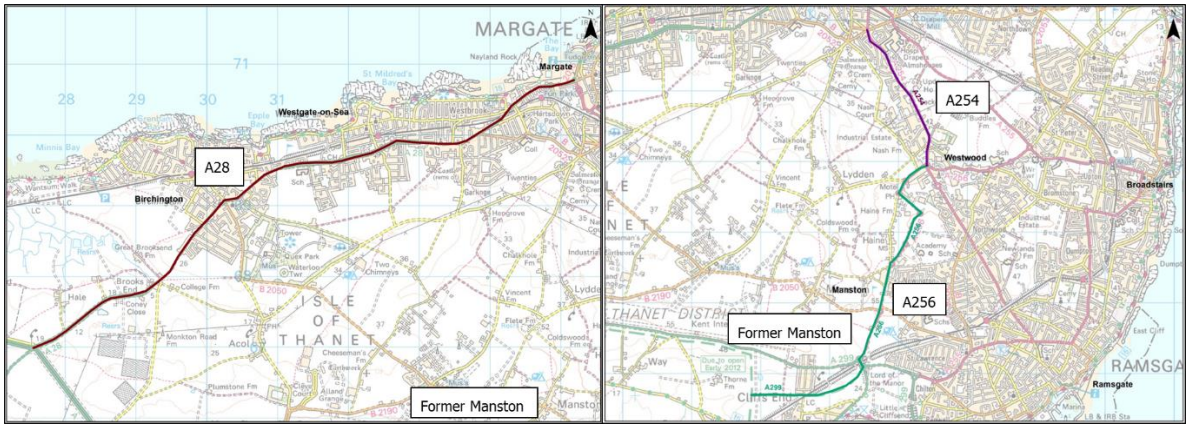


Figure 2-2: Corridor Studies

2.2 Zoning System

2.2.1 The model zoning system has two components; the Thanet area and external zones. The Thanet area zoning system comprises of 93 zones and is based largely on the 2011 Census Lower Layer Super Output Area (LSOA) boundaries.

2.2.2 There are 84 LSOAs in Thanet. However, in the urban areas there are pockets of zones that share the same, or similar, loading points. In particular, there are groups of 9 for Ramsgate town centre, 8 for Broadstairs town centre and 4 for Birchington. Therefore, there are effectively around 60 Middle Layer Super Output Area (MSOA) zones.

2.2.3 As the output areas do not specifically relate to the highway network, some leeway has been allowed in the positioning of the zone connectors. However, any distortion has been kept to a minimum.

2.2.4 There was one notably large output area which encompasses the rural hinterlands of Thanet. This has been divided into three zones, including a bespoke zone for the Manston Business Park on Columbus Ave.

2.2.5 The Westwood area, which comprises of Westwood Cross shopping centre, two supermarkets and three retail parks, has also been designated a zone.

2.2.6 The external zones are based on the three main approaches to Thanet; the A256 (from Dover district), A28 (from Canterbury) and the longer distance traffic on the A299 Thanet Way from the M2 and London. These zones do not disaggregate between length of trips from outside Thanet.

2.2.7 There are also three unused zones. Two of these allow for further updates on the A256 corridor. These are Discovery Park, an enterprise zone, just outside of Thanet district, and also one for the A257 which joins the A256 south of Discovery Park. The third unused zone is a minor parallel route to the A28 from Canterbury.

2.2.8 The zones have been sectored into 8 groups for analysis purposes. The sectors are external, A28 ribbon (Birchington to Westbrook), rural, Westwood, Newington, and the three towns (Ramsgate,Margate and Broadstairs).

2.3 Network Structure

2.3.1 The model network includes A roads, B roads and key local roads in the area of interest which serve the study area. It is noted that there are no elements of the Strategic Road Network in the district.

2.3.2 In addition to the A-roads previously discussed the key roads included are the B2190, B2050, Park Lane, Margate Hill, Shottendane Rd, Manston Road, the western end of the B2052, and B2014. The network also includes access to key residential and employment areas and known alternative routes ('rat-runs'), such as Manston Court Rd and Crispe Rd.

2.3.3 The network is modelled in sufficient detail to allow for local changes in route choice resulting from proposed introduction of new infrastructure. Models are ideally designed to be 'as simple as possible, while as detailed as necessary'. Therefore some areas of the model were modelled in a more simplistic fashion, where it was deemed that this would not detract from the key purpose of the model, and its role in the evidence base. Some examples are given:

2.3.4 Due to its likely spare capacity in the future, East Kent Access (A299/A256) was not coded with speed-flow curves; and the Lord of the Manor (LOTM) 'Roundabout' was coded to allow the key movements and signalisation to be reflected, rather than the nuances of the junction. The nearby village of Cliffsend, not a key growth site, and the 'old' Sandwich Rd (pre-EKA) were also modelled in less detail.

2.3.5 The area between the A28 and the sea incorporating Birchington-on-Sea, Westgate-On-Sea and Westbrook is not fully modelled.

2.3.6 As most of the strategic sites and transport strategy is centred around the former airport site, the conurbation (the towns of Margate, Ramsgate and Broadstairs) is modelled in a simplified way with the intra-conurbation movements broadly dismissed.

2.3.7 The Westwood retail and business area has sufficient detail to reflect the strategic movements, and to represent the key loading from the various land pockets. Trip-chaining is not represented and the zoning is at an aggregate level.

2.3.8 The Haine Road corridor comprising of the A256 from LOTM to Westwood includes several roundabouts and priority junctions. The key ones are included with smaller local ones are omitted. The turning counts available, and local knowledge allowed this rationalisation. The nature of the corridor is therefore still reflected.

2.3.9 The zoning system for Thanet does not isolate all notable 'sites' and some of these do fall into large zones e.g. Thanet Earth, some industrial/retail areas, and the hospital. This is acceptable for a strategic model.

2.3.10 The model is intended to reflect changes on the network within the area of interest as such will have limited application on those areas that fall outside of this.

2.4 Time Periods

2.4.1 AM and PM Peak hours (0800-0900 and 1700-1800) are modelled.

2.5 User Classes/Vehicle types

2.5.1 The Thanet model represents trips by all vehicle types and for all purposes.

2.6 Assignment Methodology

2.6.1 The model uses a Stochastic assignment within the SATURN software package (SUZIE=T). This was considered the most appropriate assignment to ensure the wide variety of route choices available were used; particularly an expectation of vehicles wishing to avoid a 'perceived' delay at Victoria lights and Coffin House Corner, south of Margate. A comparison was made against an equilibrium assignment.

2.6.2 A PPM (pence per minute) of 1.0 and PPK (pence per kilometre) of 0.75 were used. The use of a non-zero PPK added to more appropriate route choices, reflecting the possible shorter B-roads/minor roads used in preference to the A-road network; such as from Birchington to the A256 towards Dover.

3 Data Collation

3.1 Introduction

3.1.1 Traffic count data was available from pre-existing surveys within the modelled area and from a number of new surveys.

3.1.2 The following traffic surveys collected information at key locations in the study area:

- Mobile phone data (Citilogik)
- Manual Classified Junction Counts (MCC);
- Automatic Traffic Surveys (ATC);
- Queue Length Surveys (for corridor studies and used indicatively only);
- Journey Times; and
- A localised Automatic Number Plate Recognition (ANPR) survey was available for the cordon around the airport site.

3.2 Mobile phone data

3.2.1 Citilogik are an established agent in the provision of mobile phone data, and their processes keep up to date with evolving best practice.

3.2.2 Mobile phone data was provided in two datasets, 'the bulk' of the data and select link matrices for the three (main) entry points into Thanet. This data is expanded from the sample based on household population figures. It was provided for both the peak hours and also the extended peak periods. The latter was provided in case the anonymity threshold affected too many cells and was deemed excessively distorted.

3.2.3 Further disaggregation of the data were provided in terms of mode and static trips. The mode split was provided as highway versus rail. Bus usage could not be disaggregated but was not deemed of significance for Thanet. Static trips (short-stops within one zone) were also provided but not used as trip-chaining is not included in the modelling process.

3.3 Manual Classified Turning Counts (MCC)

3.3.1 A variety of Junction Turning Count (JTC) one-day surveys were made available from KCC in cooperation with a developer. A number of additional sites were added where the existing dataset appeared deficient.

3.3.2 The count locations are shown in Figure 3-1 below.

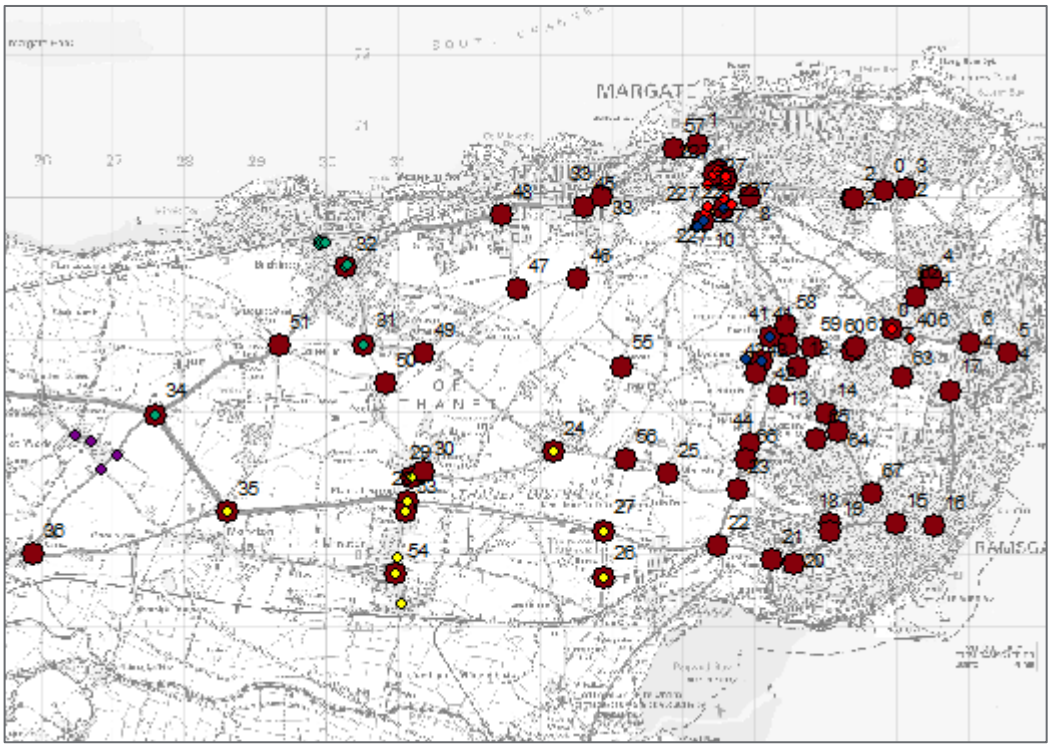


Figure 3-1: Count Locations

3.3.3 Any inconsistencies between adjacent junctions or repeat counts were investigated.

3.3.4 The counts in Cliffsend were noted as higher eastbound in both time peaks. A similar phenomenon occurred at All Saints Avenue/A28 due to one-way roads in the vicinity.

3.4 Automatic Traffic Counts (ATC)

3.4.1 Automatic traffic counts recorded over a period of a week were also available for a number of links. These were predominantly used to check that the turning counts were representative.

3.5 Journey Time Data

3.5.1 Moving observer surveys were available for three routes as shown in Figure 3-2 below. One of these routes falls outside the study area and is used only indicatively.

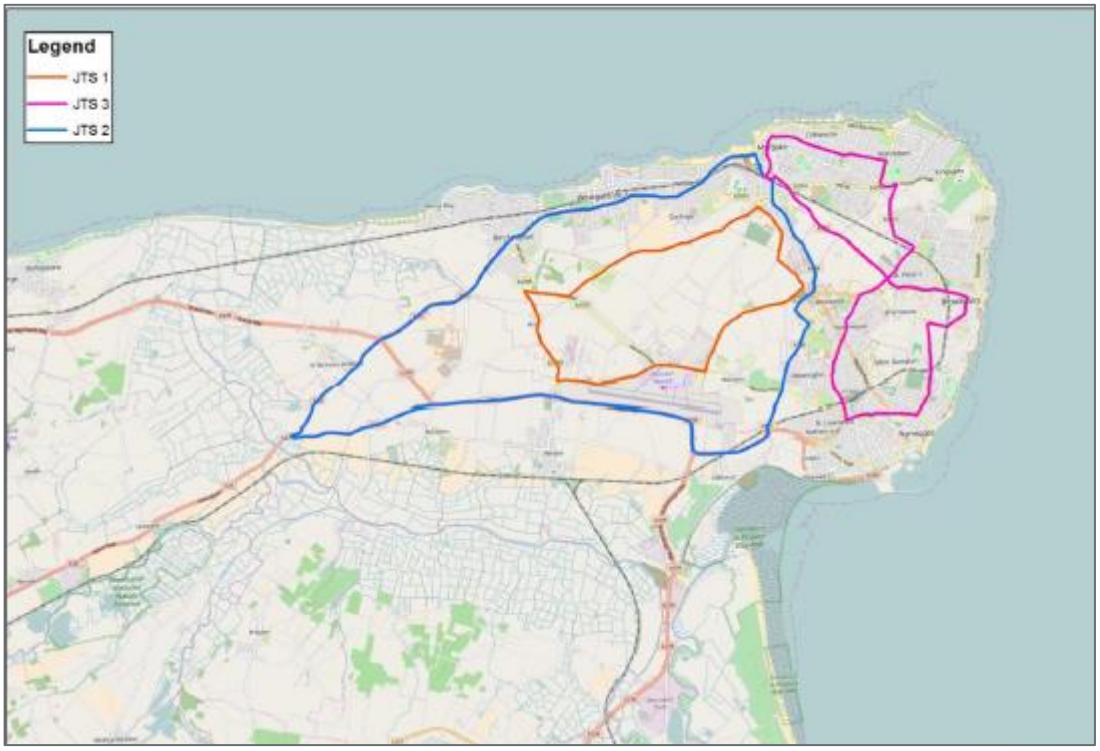


Figure 3-2: Journey time routes

3.6 ANPR

3.6.1 An ANPR survey was available for a cordon of 12 sites around the former airport site shown in Figure 3-3. In addition there were also point to point matches on the A256 corridor, north and south of Westwood matched to the A256 and A299 external points.

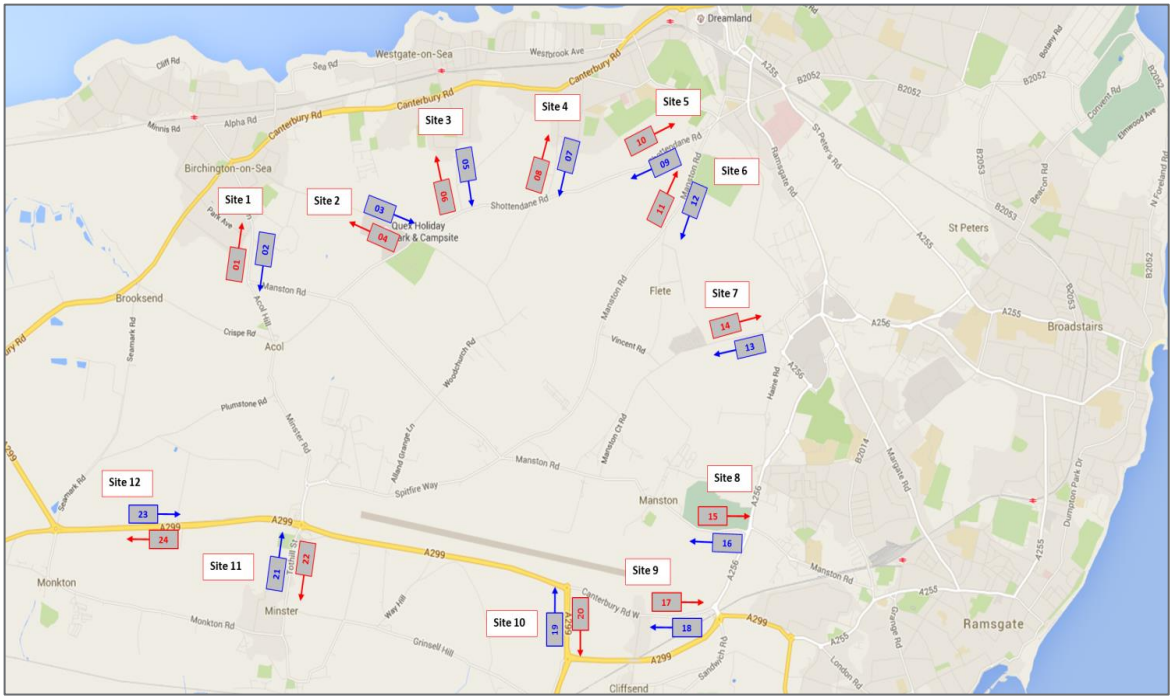


Figure 3-3: ANPR site location

4 Network Development

4.1 Introduction

4.1.1 A GIS background was loaded into SATURN to allow an initial skeleton network to be created.

4.1.2 Within the study area the network was tuned to reflect all the main roads, secondary routes and residential routes that carry a significant volume of traffic. Consideration was given to the location of zone loading points. Care was taken to ensure that the network was appropriate with regard to what is currently known of the potential future uses of the model.

4.2 Buffer/Simulation

4.2.1 A SATURN network usually has a 'simulation area' (fully-coded junctions and network) and a 'buffer area' (links from the external zones through the periphery into the study area).

4.2.2 The simulation area would ideally have all junctions fully coded. However, as the zoning system is not detailed enough to provide link flows on all arms of some junctions. This is particularly true around the Westwood area with the multiple land packets associated with this retail and employment area. However this is considered to be appropriate for the level of assessment being undertaken for land use scenario testing.

4.3 Junctions

4.3.1 The coverage of junctions is illustrated in Figure 4-1, highlighting the dominance of roundabouts (orange/blue) on the two corridors, the priority junctions (green) in the central rural area and a few signalised junctions (red). Approximately 50 junctions are included in the modelled area.

4.3.2 Aspects of some junctions are excluded for simplicity in the coding. For example at Victoria Lights, the turn from Beatrice Rd to College Rd is included in the signal sequence rather than the dedicated give-way, and similarly at Coffin House Corner from College Rd to Tivoli Road. The dedicated lane at Sevenscore roundabout is also excluded.

4.3.3 Roundabouts in SATURN should be noted as being indicative only, therefore, for this model and its intended use, namely route assignment, a broad representation has been provided. This is fundamentally the specification of the junction type as roundabout and an indicative saturation flow only. Single nodes were used, as no roundabouts needed multiple-node coding to reflect their function.

4.3.4 Pedestrian crossings are not explicitly included, instead adjustments have been made to adjacent links and nodes if appropriate.

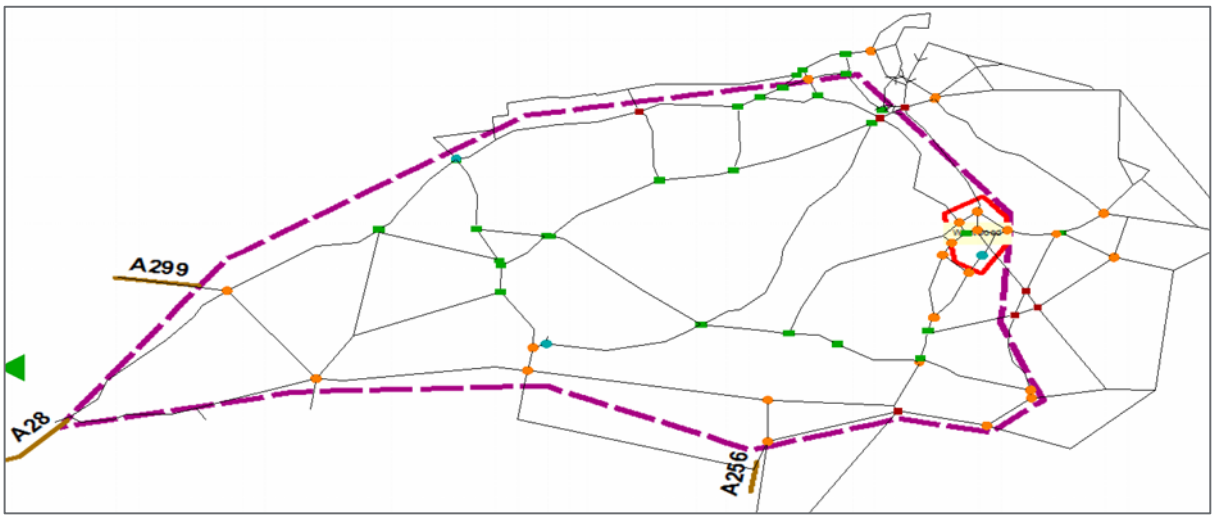


Figure 4-1: Simulation area

4.4 Links

4.4.1 A basic skeleton link structure was constructed with the appropriate link types in the '2222s' records in SATURN.

4.4.2 The model includes a substantial urban or suburban road network where travel times are generally impacted on by junction delay rather than link flows. Guidance from WebTAG unit M.3 indicates that it is advisable in urban areas to limit the use of speed/flow relationships to motorways and dual carriageway links.

4.4.3 There are two main exceptions exception to the above. Firstly, the Haine Road corridor between Staner Hill and Spratling Street has been allocated a speed-flow curve to reflect some of the nuances of this portion of the network. The coding has been developed iteratively so that the link delays generated are not excessive. Secondly, Shottendane Road has a speed flow-curve to reflect its specific geometry and the associated driver behaviour as flows increase.

4.4.4 Speed flow curves have also been used to reflect some unique links, including shuttle-running and narrow lane widths, where capacity on the link is limited due to the link rather than the junctions. The capacities have been set relatively low so that the use of these lower standard 'rat-runs' would suggest a poor level of service (LOS) on the expected routes. Similar coding has been included to reflect parked cars e.g. Star Lane, St Peters Road and Tivoli Road.

4.4.5 Some time penalties have been included to reflect other aspects of the network such as the slow nature of the seafront due to pedestrian interaction.

4.5 Other points

4.5.1 There has been a recent network change south of Margate where Queen's Avenue has been made one-way. However the counts were undertaken prior to this change, so the original configuration has been included.

4.5.2 The roundabout at Birchington Square has been coded to be no U-turns, to reflect the right turn that is taken into the adjacent Park Lane when approaching from the west; rather than the model looking for a U-turn and then a left turn into Park Lane.

4.5.3 Birchington square has also had a reduction in saturation flows to reflect the other aspects of the area including the pedestrian crossing on the A28 and the constrained streetscape such as the bus-stops.

4.5.4 There are 2 signalised junctions on the A254 north of Westwood. These are three-way junctions each with a minor arm to a specific location (Enterprise Road and the Hospital). However, as these are not specific zones in the current zoning, they have been modelled as two-arm junctions but with some representation of the signal timings.

4.6 Network Checking

4.6.1 It is important to eliminate as many errors or anomalies within the model network as possible before progressing to the calibration of the model. The model network was checked by displaying 'warnings' (in SATURN P1X) which were addressed as appropriate.

4.7 Network Calibration and Validation

4.7.1 Preliminary model runs with prior matrices were used to check whether the network performed as expected.

4.7.2 A selection of routes through the network were monitored in the initial model runs, both as 'forests' (OD pairs) and 'select links' (node to node) to identify any issues in the network performance. A selection of routes checked is included in **Appendix C**. These checks verified that the model was, at least, considering, expected alternative routes.

4.8 Stress Test

4.8.1 WebTAG Unit M3.1 recommends carrying out a stress test on the network to check how the model behaves under artificially inflated traffic demand. The objective of the test is to identify any problems within the model that are not apparent from calibration with base year demand.

4.8.2 Stress tests were carried out by inflating car demand by 10% and 20% and the network reviewed to determine any anomalies or issues beyond those that might be expected. No specific issues were identified during these stress tests.

5 Trip Matrix Development

5.1 Travel Demand

5.1.1 Highway travel demand to represent a 2017 Base year scenario has been developed for the Thanet Local Plan Model. The travel demand has been largely derived from mobile phone data, using the 2011 Census for comparison purposes.

5.1.2 All purpose, all-vehicle trip matrices have been developed for the AM and PM peak periods. It was not considered appropriate to disaggregate by either journey purpose or vehicle type as the primary matrix building data, namely mobile phone data, was limited in both regards.

5.2 Summary of Matrix Building Process

5.2.1 The key stages of the prior matrix building process are:

- *Internal-internal trips.* These trips were taken from the 'bulk' data, and trips involving external trip ends from the select link matrices.
- *Factoring up to external points*. The trips from 'cleaned' select link matrices were factored to known link counts. The 'cleaning' process excluded anomalies noted in terms of intra-zonal trips from the external zones. In addition, double counting was removed between the three external points.
- *Peak hour versus peak period*. The peak hour data rather than the peak period was used, with the advantage of more specific data outweighing the higher distortion of more anonymised cells.
- *Adjustment of internal-internal trips*. It was accepted that the rural areas may not be suitably identified by the mobile phone data. The rural areas were considered to account for too many trips (5% of total trips) and half were rezoned into adjacent built up areas. This recoding was supported by an investigation into the local ANPR data which gave an approximation for the trip-ends in the rural area; and by a comparison against census data.
- *Factoring/fixing internal points*. Whilst the zoning level remains at the LSOA level, some adjustments were made to reflect traffic counts at certain junctions to approximate more specific points of interest e.g. Manston Business Park, QEQM hospital, Enterprise road.

6 Matrix Estimation

6.1 Trip Matrix Estimation

6.1.1 The mobile phone data has provided a complete area coverage of trip origins and destinations, expanded to a full matrix. However, as expected the data still includes an element of sampling and has other limiting factors and consequently some matrix estimation would be expected.

6.1.2 As the matrix was already constrained by the three external points, the key matrix estimation was undertaken on a screenline across the study area from the A28 to the A299. Additional points on the A256/A254 were included at Staner Hill, Westwood and south of Margate town centre; a mini-screenline (2 links) of the A28 and B2052 George V Ave; and within each of St Lawrence and Peters double mini-roundabouts. These are indicated in Figure 6-1.

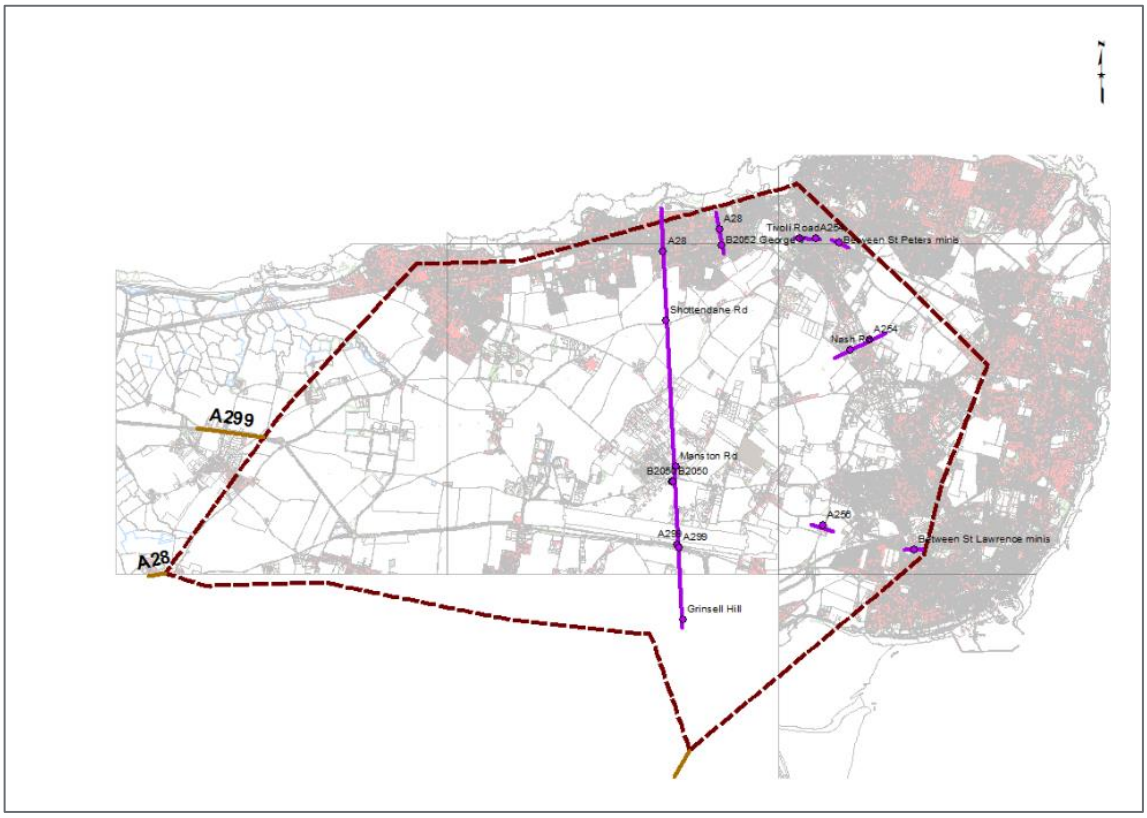


Figure 6-1 Matrix estimation

6.1.3 In addition some points of the matrix were frozen or constrained, including the through traffic from A299 to A256, and Manston Business Park.

6.1.4 Matrix estimation was carried out within the SATURN software

6.2 Post Matrix Estimation

6.2.1 On completion of the matrix estimation, checks were carried out to determine the impact of the process on the prior trip matrices and to ensure that there is no significant change in the pattern of movement. The changes resulting from the matrix estimation process are monitored by analysis of trip length distribution (not particularly relevant for this contained network), zonal cell values and trips ends prior and post matrix estimation.

6.2.2 The changes to matrix totals were observed. The post-ME matrices increased by 3% and 2% in the AM and PM respectively. These are small changes giving confidence in the prior matrices. The changes at both the row/column and individual cell level were also checked and deemed acceptable.

7 Model Validation

7.1 Assignment Validation

Overview

7.1.2 Validation of the assignment is designed to confirm that the model behaves in an acceptable manner and provides a reasonable reflection of the observed situation. The validation procedure was carried out based on independent data that was not used during the model development or for calibration. The model performance was validated based on screenline flow, independent traffic counts, ANPR counts, and journey times.

Count Validation

7.1.3 A number of independent link counts were selected to provide an indication of the performance of the model across the wider network. A total of 76 counts were identified, which gave good coverage of the study area. Of these 88% met the target GEH criteria in the AM peak and 82% met the GEH criteria in the PM peak. 89% and 87% of the link counts met the prescribed flow criteria for the AM peak and PM peak respectively. A full summary of the link flow validation is provided in **Appendix C**.

7.1.4 Figure 7-1 and Figure 7-2 show the difference between the observed and modelled flows at the selected validation links. Whilst all possible validation links are displayed visually, some are excluded from analysis due to points previously raised e.g. those outside study area, Westwood area (marked with red outline), and additionally Minster services.

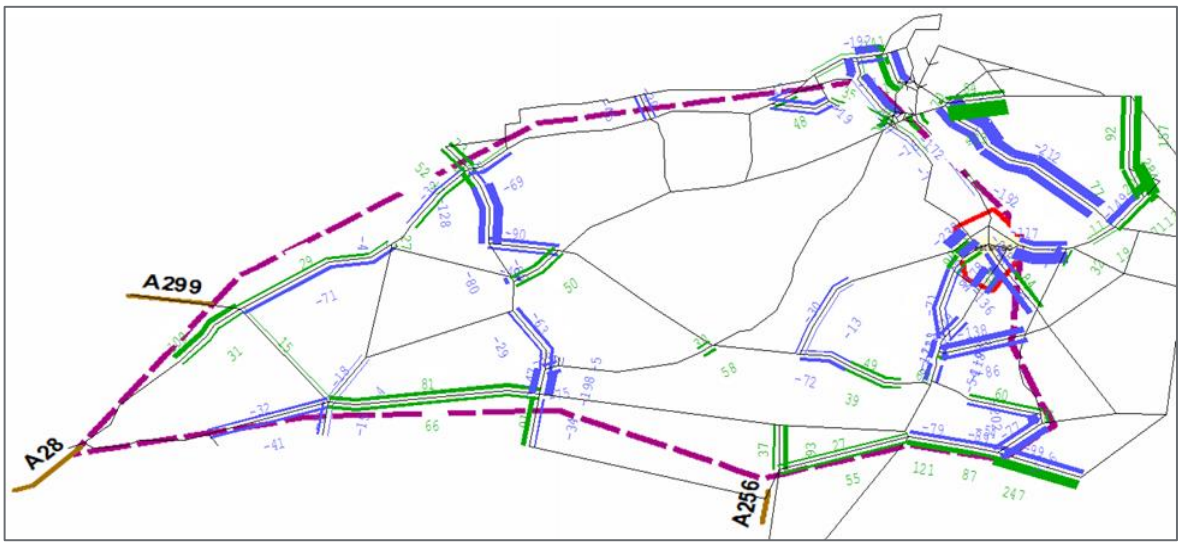


Figure 7-1: AM Flow Differences

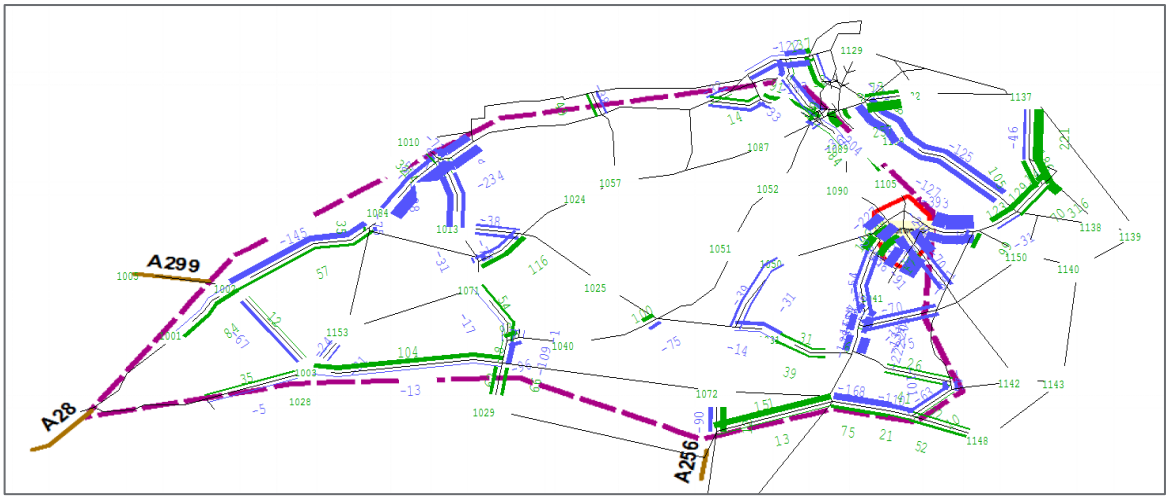


Figure 7-2: PM Flow Differences

7.1.5 Whilst there are some visual discrepancies, there are no significant concerns at the strategic level, and there is confidence that discrepancies in the model will not impact on final interpretation of the results.

7.1.6 The calibration stage and matrix estimation used the 'contained' cordon nature of Thanet and the key screenline from the A28 to the A299. Therefore, no benefit was seen in trying to assemble any further screenlines in the study area for validation purposes. However, where there were any large discrepancies in link flows, possible parallel routes were checked to check that they at least attenuated the discrepancy, from a mini-screenline perspective.

Turning Movements

7.1.7 Major turning movements such as St Nicholas roundabout (A299 Thanet Way meeting the A28) and Lord of The Manor were monitored as key routing points.

7.1.8 Other key junctions were also monitored to check that they had a reasonable match and turns with a GEH greater than 10 were investigated. One of the turns at Victoria lights is subject to notable differences. However, this is on the edge of the study area and is likely to be affected by zoning in the area. In addition, the area around Westwood, such as New Cross Rd and Nash Rd, is subject to some disparities. However this was expected and reflects the nature of the zoning in the area.

Minor Flows

7.1.9 The monitored links include a number with low flow links, which may in future become possible rat-running routes (e.g. Crispe Rd).

ANPR – cordon around Former Manston Airport

7.1.10 As the ANPR data was available, checks on routing could be included in addition to the standard checks on flows that are normally reported. This was particularly helpful for checking the routing via Manston Rd, Park Lane and Shottendane Rd. Although the observed flows were low, in terms of site-to-site movements, it was an useful exercise to show that the model was both reflecting observed 'through-traffic' in this area, and not allowing excessive 'through-traffic' flows along these routes. Whilst there are no particular standards for such an analysis of this data source, GEHs were calculated and anomalies addressed.

ANPR – other point to point matches

7.1.11 ANPR point to point matches sites allowed for checking of other routing, particularly the A254 north of Westwood to south of Westwood, the A299 and the A256. In addition the flows through the district from the A299 to the A256 could be validated. Once again GEHs were calculated and anomalies addressed.

Journey Time Validation

7.1.12 Journey times across the model are used to establish if the model provides a reasonable representation of cruise speeds and junction delays. Moving observer journey times were available on a circular route that contained the A28 and A256/A254 corridors. There was also an inner circuit but this is a low-congestion route and has little value in validation; and a 'figure of 8' in the conurbation which is outside the modelled/study area.

7.1.13 However, for this model journey time validation is of less importance as there is neither a need for skims for scheme appraisal nor an intention to extract journey times as a metric. Nonetheless, broad checks have been undertaken on the key routes, particularly the two named corridors; with a particular focus on assessing whether there is likely to be a distortion to expected route choices in the assignment.

7.1.14 It is noted that the model is generally quicker than the observed (around 80% rather than the targeted 85%) which is suitable for the current model runs in the Local Plan evidence base, although it is noted there are potentially some limitations for economic appraisal. This time-difference is spread across the routes, rather than being any particular one-off point. There are a number of unpredictable constraints that impact on journey time and these have been addressed as far as is practicable. Moreover, there are also some outliers in the observed data, where increased journey times have arguably unnecessarily raised the average observed time. These have not been removed at this stage; therefore the comparison is an underestimate.

7.1.15 Nonetheless, the model routing was considered to be realistic, achieving the key objective of the model and is acceptable for local plan land use scenario testing.

8 Summary and Conclusion

8.1 Summary of Model Development

8.1.1 The main purpose of the Thanet Local plan model is to support the emerging Local Plan and transport strategy for Kent County Council, in conjunction with Thanet District Council. The emerging local plan model is the focus of the model and this has defined the size and scope of the model.

8.1.2 Most focus is directed to the A256/A254 and the A28 corridors.

8.2 Summary of Standards Achieved

8.2.1 The model has been assessed following guidance in WebTAG Unit M3.1. The flow and journey time validation indicate that the model provides a reasonable representation of observed conditions in the study area for an average weekday AM and PM peak. The review of model convergence indicates an appropriate level of model stability is achieved. The AM and PM peak models are considered to behave with an acceptable level of accuracy and reliability based on observed data, local knowledge and WebTAG guidelines.

8.3 Conclusion

8.3.1 The scenarios to be assessed for the Local Plan are being considered. Based on the broad understanding of the likely options to test, the AM and PM peak base models are judged to provide an appropriate tool to assess the impact of potential development and infrastructure improvements on the local network to support the Local Plan.

8.3.2 The model includes a reasonable amount of detail around junction configuration. However any detailed analysis of individual junction performance will still need to be assessed independently.

Appendix A Model Standards

Validation and convergence standards the various elements and stages for highway assignment models are described in TAG Unit M3.1. The key criteria and acceptability guidelines are summarised here.

Trip Matrix Validation Criteria

For trip matrix validation, the measure which should be used is the percentage difference between modelled flows and counts. Comparisons at screenline level provide information on the quality of the trip matrices. TAG Unit M3.1 describes the validation criterion an acceptability guideline as shown below.

Screenline Flow Validation Criterion and Acceptability Guideline

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

With regard to screenline validation, the following should be noted:

- Screenlines should normally be made up of 5 links or more;
- The comparisons for screenlines containing high flow routes such as motorways should be presented both including and excluding such routes;
- The comparisons should be presented separately for (a) roadside interview screenlines; (b) the other screenlines used as constraints in matrix estimation (excluding the roadside interview screenlines even though they have been used as constraints in matrix estimation); and (c) screenlines used for independent validation;
- the comparisons should be presented by vehicle type (preferably cars, light goods vehicles and other goods vehicles); and
- the comparisons should be presented separately for each modelled period.

For this model the comparison for screenlines containing motorway links was not appropriate as motorway flows were manually adjusted to reflect observed data.

Link Flow and Turning Movement Validation Criteria

The two measures which should be used for the individual link (and turning movement) validation are flow and GEH. The flow measure is based on the relative flow difference between modelled flows and observed counts, with three different criteria set depending on the observed flows. The GEH statistic is defined as:

$$GEH = \sqrt{\frac{(M-C)^2}{0.5(M+C)}}$$

TAG Unit M3.1 outlines the Link Flow and Turning Movements Validation Criteria and Acceptability Guidelines as shown below.

Link Flow and Turning Movement Validation Criteria and Acceptability Guidelines

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

With regard to flow validation, the following should be noted:

- The above criteria should be applied to both link flows and turning movements;
- The acceptability guideline should be applied to link flows but may be difficult to achieve for turning movements;
- The comparisons should be presented for cars and all vehicles but not for other goods vehicles unless sufficiently accurate link counts have been obtained;

- The comparisons should be presented separately for each modelled period; and
- It is recommended that comparisons using both measures are reported in the model validation report.

Journey Validation Criteria

For journey time validation, the measure which should be used is the percentage difference between modelled and observed journey times, subject to an absolute maximum difference. TAG Unit M3.1 describes the Journey Time Validation Criterion and Acceptability Guideline as shown below.

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

With regard to the journey time validation, the following should be noted:

- It is expected that separate speed/flow relationships and/or link speeds are used for light and other vehicles; hence comparisons should be presented for light and other vehicles separately; otherwise, the comparisons should be presented for all vehicle types together;
- For validation of journey times by vehicle type, it will be necessary to obtain journey times by vehicle type to a level of accuracy which will allow a meaningful validation; if journey times by vehicle type are not available but separate speed/flow relationships for light and heavy vehicles have been used, a weighted average of the modelled light and heavy vehicle speeds should be compared with the surveyed all-vehicle speed; and
- The comparisons should be presented separately for each modelled period.

For this model the comparisons by vehicle type was not applicable as there was no disaggregation of journey time data to enable validation by vehicle type so the validation was performed for total vehicles only.

Matrix Comparisons

The screenline (or cordon) comparison between modelled flows and counts is used to demonstrate the quality of the trip matrices by checking the overall volumes of trips across the modelled area. The changes introduced by the application of matrix estimation should be understood and may be assessed using TAG Unit M3.1 criteria as shown below.

Significance of Matrix Estimation Changes

Measure	Significance Criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R2 in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R2 in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

All exceedances of these criteria should be examined and assessed for their importance for the accuracy of the matrices in the Fully Modelled Area or the area of influence of the scheme to be assessed.

It is also clear that matrix estimation should not be allowed to make significant changes to the prior matrices in order that the validation standards are met.

Convergence Criteria and Standards

The advice on model convergence is set out in TAG Unit M3.1, summarised below.

Summary of Convergence Measures and Base Model Acceptable Values

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

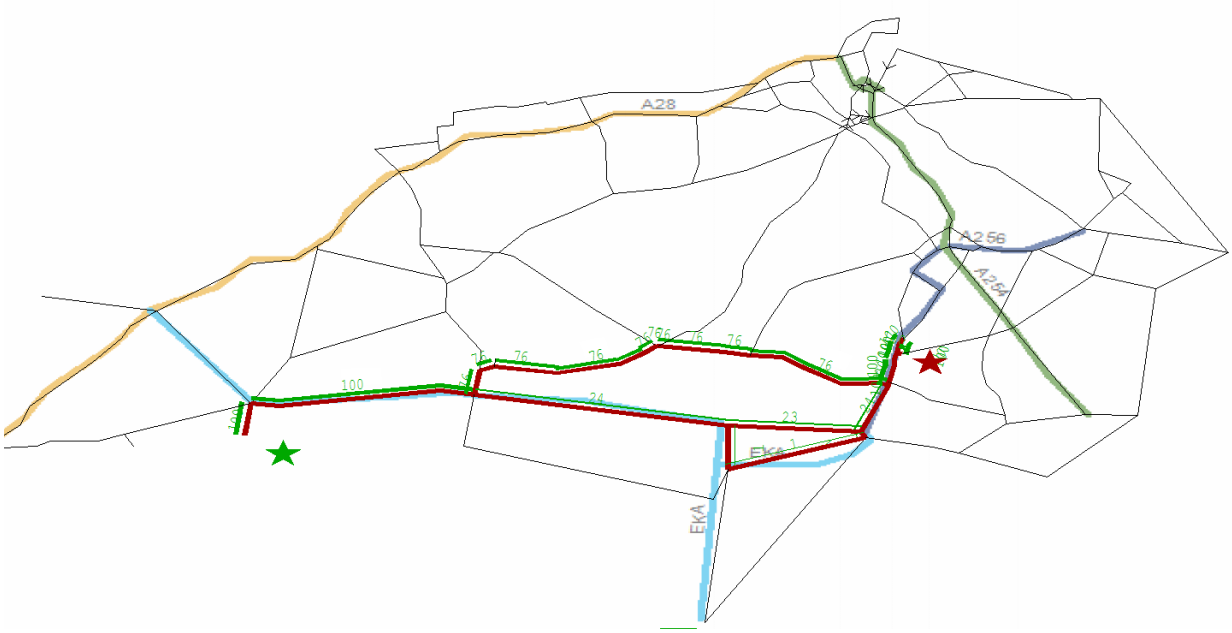
Fitness for Purpose

The overall test of fitness for purpose of a model is straightforward:

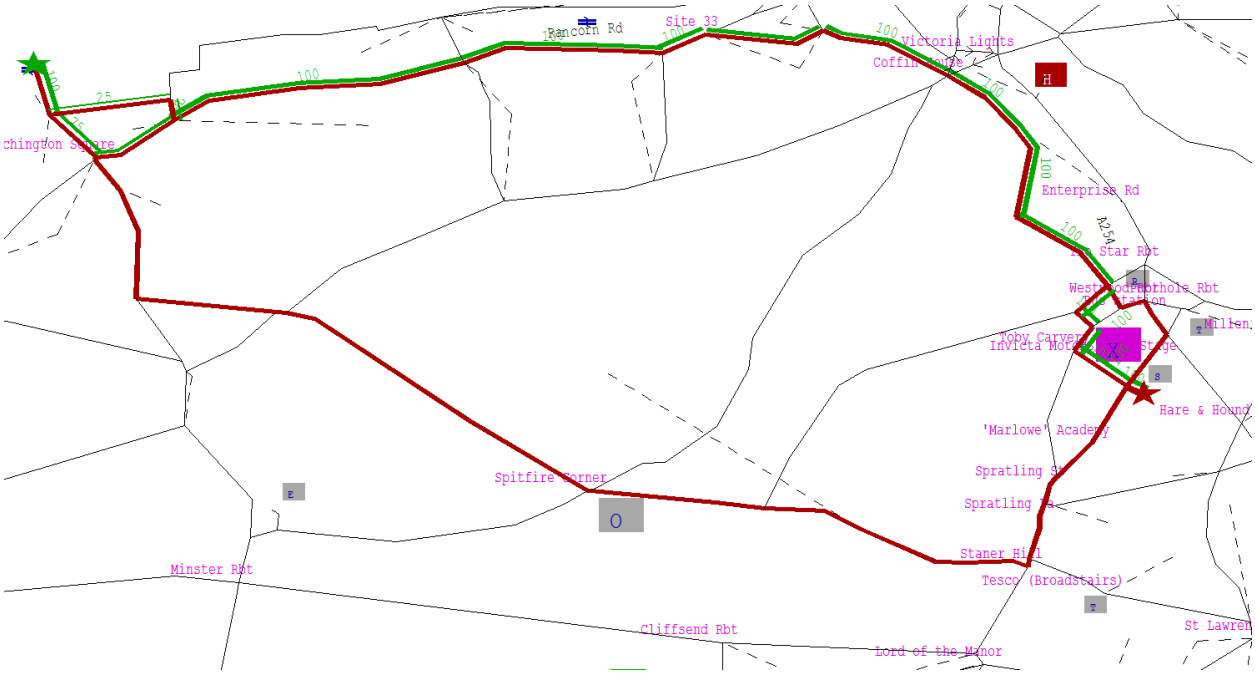
- Can robust conclusions be drawn from the model outputs?
- Validation Criteria and Acceptability Guidelines
- Convergence Criteria and Standards

However TAG Unit M3.1 states that the achievement of the validation acceptability guidelines does not guarantee that a model is 'fit for purpose' and likewise a failure to meet the specified validation standards does not mean that a model is not 'fit for purpose'.

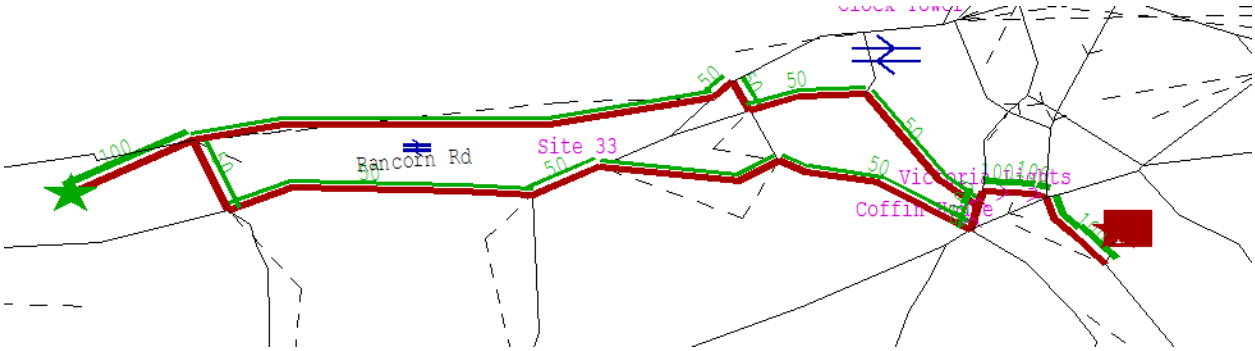
Appendix B Route Monitoring



From East Kent Access (Monkton) to Haine Rd (A256),showing alternatives routes of EKA, Cliffsend and Manston Rd (B2050).



Birchington to Westwood Cross



Westgate-on-Sea to QEQM hospital (not specifically modelled)

Appendix C Peak Link Flow Validation

Link	Dir	AM count	flow	diff	%	GEH	
Minster to Monkton		1137	1203	66	6	2	Pass
Minster to Monkton		1020	1101	81	8	2	Pass
Brooksend to St Nich		984	913	-70	-7	2	Pass
Brooksend to St Nich		692	721	29	4	1	Pass
Monkton to St Nich		831	831	0	0	0	Pass
Monkton to St Nich		790	805	15	2	1	Pass
LOTM - Ramsgate		1130	1251	121	11	4	Pass
LOTM - Ramsgate		841	762	-78	-9	3	Pass
Cant Rd E - Tunnel to Nethercourt		865	776	-88	-10	3	Pass
Cant Rd E - Tunnel to Nethercourt		1084	1171	87	8	3	Pass
St Peters double-rbt		919	814	-104	-11	4	Pass
St Peters double-rbt		750	820	70	9	2	Pass
West of station		891	908/989	17	2	1	Pass
West of station		837	883/851	14	2	0	Pass
Hengist Way NS		918	1074/1011/1041	93	10	3	Pass
Hengist Way NS		975	1028/1012/1059	37	4	1	Pass
Northwood Rd (At M Way)		447	333	-113	-26	6	Fail
Northwood Rd (At M Way)		266	298 1	32	12	2	Pass
St Lawr - B2050		463	409	-53	-12	3	Pass
St Lawr - B2050		437	497	60	14	3	Pass
West of Manston		372	411/511	39	10	2	Pass
West of Manston		371	500/299	-71	-19	4	Pass
East of Manston		319	299/447	-19	-6	1	Pass
East of Manston		309	447/358 1	49	16	3	Pass
Manston Court Rd		78	65	-12	-16	2	Pass
Manston Court Rd		105	75 1	-29	-29	3	Pass
A254 Enterprise-Hosp		847	918/861/1034	14	2	0	Pass
A254 Enterprise-Hosp		657	958/650/703	-6	-1	0	Pass
Tivoli Park Avenue		268	97	-170	-64	13	Fail
Tivoli Park Avenue		44	25	-18	-43	3	Pass
Hartsdown Rd (B2052)		441	476	35	8	2	Pass
Hartsdown Rd (B2052)		397	380	-16	-4	1	Pass
South of Invicta Motors		442	526/708	84	19	4	Fail
South of Invicta Motors		634	644/498 1	-135	-22	6	Fail
Coffin House - Manston Rd		470	591	121	26	5	Fail
Coffin House - Manston Rd		427	411	-15	-4	1	Pass
To Tivoli Park		783	786	3	0	0	Pass
From Tivoli Park		596	714	118	20	5	Fail
Hengist Way EW		1269	1327/1296/1323	27	2	1	Pass
Hengist Way EW		1439	1549/1494/1515	55	4	1	Pass
Haine Rd - N of St J		911	849	-61	-7	2	Pass
Haine Rd - N of St J		1128	> 1005 >	-122	-11	4	Pass
Haine Rd - S of St J		996	878 1	-117	-12	4	Pass
Haine Rd - S of St J		1105	> 984	-120	-11	4	Pass
South of Acol		351	288	-62	-18	4	Pass

South of Acol		235	206	-28	-12	2	Pass
Monkton (Willetts)		140	102	-37	-27	3	Pass
Monkton (Willetts)		77	62	-14	-20	2	Pass
Seamark Rd S		57	53	-3	-6	1	Pass
Seamark Rd S		50	32	-17	-37	3	Pass
Seamark Rd N		88	84	-3	-5	0	Pass
Seamark Rd N		69	96	27	38	3	Pass
Park Lane at A28		137	297/234 >	97	71	7	Pass
Park Lane at A28		264	209/332 1	-54	-21	4	Pass
Manston Business Park		62	57	-4	-8	1	Pass
Manston Business Park		247	238	-8	-4	1	Pass
Haine Rd (parallel old)		131	102	-28	-22	3	Pass
Haine Rd (parallel old)		729	673	-55	-8	2	Pass
SW of St Nich rbt (A28)		238	347	109	46	6	Fail
SW of St Nich rbt (A28)		386	417	31	8	2	Pass
A253		256	224	-31	-12	2	Pass
A253		405	364	-40	-10	2	Pass
Stirling Way		200	138/62/76	-137	-69	12	Fail
Stirling Way		220	142/134/206 1	-85	-39	6	Pass
N of Staner Hill		932	878	-53	-6	2	Pass
N of Staner Hill		1067	> 984	-82	-8	3	Pass
S of Victoria Lights		798	867 1	69	9	2	Pass
S of Victoria Lights		527	619	92	18	4	Pass
Tothill St (Village)		315	406 1	91	29	5	Pass
Tothill St (Village)		284	250	-33	-12	2	Pass
B2190 (Spitfire Corner)		334	392 1	58	17	3	Pass
B2190 (Spitfire Corner)		282	312	30	11	2	Pass
Manston Rd (west of Margate Hill)		130	81	-48	-38	5	Pass
Manston Rd (west of Margate Hill)		245	155	-89	-37	6	Pass
Birchington village to Square		424	497	73	17	3	Pass
Birchington village to Square		248	300	52	21	3	Pass

		PM					
Link	Dir	count	flow	diff	%	GEH	
Minster to Monkton		1100	1087	-12	-1	0	Pass
Minster to Monkton		1294	1398	104	8	3	Pass
Brooksend to St Nich		579	636	57	10	2	Pass
Brooksend to St Nich		1061	916	-144	-14	5	Pass
Monkton to St Nich		858	790	-67	-8	2	Pass
Monkton to St Nich		945	957	12	1	0	Pass
LOTM - Ramsgate		718	793	75	10	3	Pass
LOTM - Ramsgate		1245	1077	-167	-13	5	Pass
Cant Rd E - Tunnel to Nethercourt		1192	1082	-109	-9	3	Pass
Cant Rd E - Tunnel to Nethercourt		741	762	21	3	1	Pass
St Peters double-rbt		610	618	8	1	0	Pass
St Peters double-rbt		933	942	9	1	0	Pass
West of station		822	803/899	-18	-2	1	Pass
West of station		899	849/805	-93	-10	3	Pass
Hengist Way NS		909	1100/1030	121	13	4	Pass
Hengist Way NS		1027	970/937/989	-89	-9	3	Pass

Northwood Rd (At M Way)		358	291	-66	-19	4	Pass
Northwood Rd (At M Way)		243	342 1	99	41	6	Pass
St Lawr - B2050		312	453/353	41	13	2	Pass
St Lawr - B2050		461	487/504	26	6	1	Pass
West of Manston		377	416/493	39	10	2	Pass
West of Manston		353	493/339	-13	-4	1	Pass
East of Manston		334	249/399	-84	-25	5	Pass
East of Manston		289	399/320 1	31	11	2	Pass
Manston Court Rd		101	70	-30	-31	3	Pass
Manston Court Rd		112	73 1	-38	-35	4	Pass
A254 Enterprise-Hosp		807	861/807/1096	0	0	0	Pass
A254 Enterprise-Hosp		742	1012/826/889	84	11	3	Pass
Tivoli Park Avenue		193	104	-88	-46	7	Pass
Tivoli Park Avenue		71	38	-32	-46	4	Pass
Hartsdown Rd (B2052)		271	362	91	34	5	Pass
Hartsdown Rd (B2052)		564	492	-71	-13	3	Pass
South of Invicta Motors		614	544/687	-69	-11	3	Pass
South of Invicta Motors		594	652/503 1	-90	-15	4	Fail
Coffin House - Manston Rd		462	518	56	12	3	Pass
Coffin House - Manston Rd		375	339	-35	-10	2	Pass
To Tivoli Park		748	777	29	4	1	Pass
From Tivoli Park		638	711	73	11	3	Pass
Hengist Way EW		1436	1608/1587/1633	151	11	4	Pass
Hengist Way EW		1119	1186/1132/1169	13	1	0	Pass
Haine Rd - N of St J		1154	> 949	-204	-18	6	Fail
Haine Rd - N of St J		1051	> 897	-153	-15	5	Fail
Haine Rd - S of St J		1126	995 1	-130	-12	4	Pass
Haine Rd - S of St J		1035	> 874	-160	-16	5	Fail
South of Acol		162	216	54	33	4	Pass
South of Acol		353	336	-16	-5	1	Pass
Monkton (Willetts)		54	60	6	11	1	Pass
Monkton (Willetts)		114	104	-9	-9	1	Pass
Seamark Rd S		53	22	-30	-58	5	Pass
Seamark Rd S		56	32	-23	-42	4	Pass
Seamark Rd N		40	75	35	88	5	Pass
Seamark Rd N		146	71	-74	-52	7	Pass
Park Lane at A28		179	> 260/193 >	14	8	1	Pass
Park Lane at A28		191	206/305 1	15	8	1	Pass
Manston Business Park		203	202	0	-1	0	Pass
Manston Business Park		23	22	0	-6	0	Pass
Haine Rd (parallel old)		184	107	-76	-42	6	Pass
Haine Rd (parallel old)		879	752	-126	-14	4	Fail
SW of St Nich rbt (A28)		379	369	-9	-3	1	Pass
SW of St Nich rbt (A28)		212	296	84	39	5	Pass
A253		410	445	35	9	2	Pass
A253		252	247	-4	-2	0	Pass
Stirling Way		146	146/76/78	-69	-48	7	Pass
Stirling Way		207	150/132/229 1	-74	-36	6	Pass
N of Staner Hill		1217	> 995	-221	-18	7	Fail
N of Staner Hill		1012	> 874	-137	-14	5	Fail
S of Victoria Lights		689	775 1	86	13	3	Pass
S of Victoria Lights		636	813	177	28	7	Fail

Tothill St (Village)		187	249 1	62	33	4	Pass
Tothill St (Village)		274	340	66	24	4	Pass
B2190 (Spitfire Corner)		394	319 1	-74	-19	4	Pass
B2190 (Spitfire Corner)		365	465	100	27	5	Fail
Manston Rd (west of Margate Hill)		153	87	-65	-43	6	Pass
Manston Rd (west of Margate Hill)		166	128	-37	-23	3	Pass
Birchington village to Square		405	334	-70	-18	4	Fail
Birchington village to Square		343	375	32	9	2	Pass