

*Transport for Surrey*

# **CUMULATIVE ASSESSMENT OF FUTURE DEVELOPMENT IMPACTS ON THE HIGHWAY NETWORK**

## **Final Report**



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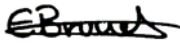
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## EXECUTIVE SUMMARY

The Surrey Infrastructure Capacity Project (SICP) is an exciting and innovative initiative. The project was set up to establish infrastructure planning to help manage the housing, employment, population and economic growth planned for Surrey between now and 2026. The project allows Surrey County Council to assess current and future countywide infrastructure requirements alongside the 11 district and borough councils, Surrey Police, Surrey Primary Care Trust, the business community and other key infrastructure and service providers including transport, utilities, education and health.

The project was also a response to the strong perception that Surrey has developed without adequate infrastructure, resulting in a deficit in provision in some parts of the county. This is because growth has spread unevenly across Surrey leading to increased pressure on certain areas. The situation has not been helped by the pattern of housing development, which has traditionally been delivered on small sites that do not attract associated infrastructure provision, leading to a cumulative strain on existing facilities and services

This 'Cumulative Assessment of Future Development Impacts on the Highway Network' study was undertaken to consider the cumulative impacts of all known future development within Surrey, as well as large developments located externally to the County, with respect to highway capacity, to the likely additional traffic generated by committed and non-committed planned residential and commercial development, as proposed in the emerging Core Strategies of the Local Development Frameworks for the borough and districts in and around Surrey.

The main aims of the cumulative transport assessment were to:

- Evaluate the highway capacity impacts of the cumulative county-wide strategic development within Surrey and large developments external to Surrey;
- Assist in assessing the sensitivity of both the Strategic Route Network (SRN) and Local Road Network (LRN), including classified A and B roads to satisfy the Highways Agency (HA) responsible for the SRN, and Surrey County Council (SCC) the designated highway authority for the LRN, on the ability of the highway network to cope with the predicted future traffic demand;
- Assist in identifying specific locations which may require additional infrastructure provision for transport services;
- And contribute towards the development and adoption of a costed strategic infrastructure schedule at a county-wide level.

The main objectives of the cumulative transport assessment were to:

- Identify the amounts and locations of additional commercial and residential development in Surrey and the large developments external to the County;
- Calculate the distribution of vehicle trips resulting from the additional development;
- Forecast the traffic impacts of individual developments on the SRN and LRN;
- Act as a starting point for identifying locations which may either require additional infrastructure provision for transport services or further study to identify appropriate mitigation measures;
- Report the likely highway capacity impacts on both SRN and LRN.

The main benefit of this approach was to ensure that any strategic infrastructure requirements identified could be used to support the districts and boroughs needs to produce local Infrastructure Delivery Plans (IDP) using a common and consistent strategic

evidence base. This evidence base could also be used to support future bids for Central Government funding for transport infrastructure and services.

The transport assessment used the strategic Surrey County Transport Model (SINTRAM V4.1) in conjunction with the OmniTRANS modelling software suite to evaluate highway capacity impacts on both the SRN and LRN, at present SINTRAM is unable to accurately assess queuing and individual driver behaviour at junctions or assess the provision of Public Transport such as bus and rail. SINTRAM encapsulates the detailed road network, including key junction for Surrey and surrounding local authorities and has been developed to meet the requirements of the Department of Transport (DfT) modelling guidance (WebTAG).

The SINTRAM model assess link capacity and therefore indicates which road sections are likely to experience delays as a result of traffic demand exceeding capacity with a consequent reduction in vehicle speeds. It can also indicate how traffic diverts away from busy routes (i.e. re-distribution effects), where traffic is slowed because of excessive demand, and adds to flows on secondary routes that may be less suitable and hence more sensitive to changes in flows. Thus making it a reasonable tool to assess the impacts of future development at a strategic county-wide level.

The transport assessment is currently based on an average AM peak hour (0700-1000) and includes a base year of 2011 and a forecast year of 2026.

The following scenarios have been included in this assessment:

- 2011 Base;
- 2026 Do-Nothing (includes growth for all of Great Britain, except Surrey and external developments, defined as the study area for this assessment);
- 2026 Do-Something (includes growth for all areas).

### **Main Outcomes**

Analysis of the available planning data suggests that in the 2026 Do-Something scenario the modelled zone in Surrey to incur the largest amount of estimated additional departure trips is zone 379 Ottershaw (Runnymede) with a projected increase of 758 departure trips. Whereas zone 383 Addlestone Moor (Runnymede) is projected to gain the largest amount of estimated additional arrival trips, 282 trips. Explanation as to why zone 379 Ottershaw is estimated to incur the largest amount of departure trips is related to the redevelopment of the former Defence Evaluation and Research Agency (DERA) site, that is located in close proximity to the zone in Runnymede. Modelled zones in the borough of Reigate and Banstead are predicted to incur the largest proportion of additional trips in the 2026 Do-Something, compared to all other Surrey borough/districts.

The main outcomes of this cumulative assessment are based on aggregations of modelled outputs from network summary statistics including vehicle kilometrage, travel times and average speeds and the relationships between them. Detailed analysis has been undertaken on the SRN by comparing journey times. Known congestion 'bottlenecks' have been assessed by comparing current cost of congestion data against volume capacity ratio plots. Traffic flow and congestion impacts between scenarios have been ranked for both the SRN and LRN and finally a highway capacity assessment has been undertaken on several motorway merges and diverges.

The main results for both the SRN and LRN are summarised in the table below. The table is based on the greatest changes in flow, density and speed between 2026 Do-Something and 2026 Do Nothing modelled scenarios.

Criteria	SRN	LRN
<b>Journey Time</b>	<ul style="list-style-type: none"> <li>M3 Junction 4 to 1 (specifically Junction 3 to 2)</li> </ul>	<ul style="list-style-type: none"> <li>A23 corridor</li> <li>A320 corridor</li> </ul>
<b>Volume/Capacity Ratio</b>	<ul style="list-style-type: none"> <li>M25 Junctions 13 to 14</li> <li>M3 Junctions 4 to 1</li> <li>A3 from Ripley to M25 Wisley Interchange</li> </ul>	<ul style="list-style-type: none"> <li>Horley Rd/ Mill Ln, westbound (Reigate &amp; Banstead)</li> <li>Chobham Ln, Trumps Green Rd and Stroude Rd, northbound (Runnymede)</li> <li>A245/B382 Old Woking Rd, westbound (Woking)</li> </ul>
<b>Difference in Flow</b>	<ul style="list-style-type: none"> <li>M25 Junction 11 to 13</li> <li>M25 J13 to 11</li> <li>M23 J10 to 8</li> </ul>	<ul style="list-style-type: none"> <li>B386 Holloway Hill, Green Ln, eastbound (Runnymede)</li> <li>Chobham Rd, Trumps Green Rd and Stroude Rd, northbound (Runnymede)</li> <li>A245/B382 Old Woking Rd, westbound (Woking)</li> <li>A331 Blackwater Valley Route, northbound (Surrey Heath)</li> </ul>

The table above highlights sections of both the SRN and LRN within Surrey that are sensitive to reasonably significant increases in traffic flow, exacerbating and prolonging existing levels of congestion, resulting in reduced levels of service and reduced journey time reliability during the am peak hour for local roads in and around urban areas and on the approaches and along the mainline of the SRN.

The analysis suggests that although major additional highway capacity infrastructure investment such as motorway widening, or local bypasses is not necessary to meet the demands of future development, other types of highway capital schemes in some urban areas, at key junctions and other sensitive locations **will** be required in order to promote and manage the additional demand due to the future development. These schemes will not necessarily create additional capacity but which will assist in managing or improving journey time reliability and levels of service by managing the impacts to ensure congestion - both delay and journey time reliability - does not deteriorate beyond current levels.

Given that providing additional capacity is no longer considered to be the best solution except in certain locations and for particular circumstances, a mix of solutions will be required involving a wide range of tools. This mix of solutions includes demand management, integrated land use & transport planning, network management, traffic management, freight & goods management and behavioural change. Many of these solutions are contained within Surrey's recently adopted Surrey Transport Plan (STP3) which include strategies and associated toolkits to provide adequate mitigation measures and assist in the formulation of robust Infrastructure Delivery Plans.

The results and analysis of this cumulative assessment of future development impacts in Surrey, have been presented and endorsed by the **'Surrey Infrastructure Project Board'** in July 2011.

### Limitations of Study

Given the strategic nature of the highway capacity assessment and modelling methodology used there are a number of limitations which need to be considered during the preparation and interpretation of the highway capacity impacts on both the SRN and LRN within this report which are set out below.

The results presented in this report are based on local planning estimates from the emerging Core Strategies of the boroughs and districts, which are all at different stages within the LDF process, and are based on estimates available as of February 2010, hence, any future changes to the size and distribution of housing and commercial provision may alter the impacts and interpretation of the analysis of this assessment.

The limitations of the planning estimates (such as the varying degrees of available planning data internally and external to Surrey and the uncertainty of the size, distribution and land-use of any future planned developments) the interpretation of the likely impacts on both the SRN and LRN within this assessment should be treated as broad strategic projections, and as such further work would be recommended, (including complementary analysis using appropriate modelling \ assessment tools), to further assist in the identification of additional infrastructure needs and other potential mitigation measures at a more local and detailed level.

The cumulative county-wide transport assessment assumes that all the committed and non-committed planned estimates of development would occur simultaneously and that any impacts described in this report do not account for any possible mitigation, demand management or infrastructure provision and effectively present a worse case situation.

## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 The Surrey Infrastructure Capacity Project (SICP) is an exciting and innovative initiative. The project was set up to establish infrastructure planning to help manage the housing, employment, population and economic growth planned for Surrey between now and 2026. The project allows Surrey County Council to assess current and future countywide infrastructure requirements alongside the 11 district and borough councils, Surrey Police, Surrey Primary Care Trust, the business community and other key infrastructure and service providers including transport, utilities, education and health.
- 1.1.2 The project was also a response to the strong perception that Surrey has developed without adequate infrastructure, resulting in a deficit in provision in some parts of the county. This is because growth has spread unevenly across Surrey leading to increased pressure on certain areas. The situation has not been helped by the pattern of housing development, which has traditionally been delivered on small sites that do not attract associated infrastructure provision, leading to a cumulative strain on existing facilities and services
- 1.1.3 This 'Cumulative Assessment of Future Development Impacts on the Highway Network' study was undertaken to consider the cumulative impacts of all known future development within Surrey, as well as large developments located externally to the County, with respect to highway capacity, to the likely additional traffic generated by committed and non-committed planned residential and commercial development, as proposed in the emerging Core Strategies of the Local Development Frameworks for the borough and districts in and around Surrey.
- 1.1.4 The aim of this project is to assess projected cumulative impacts on the strategic and local highway network in Surrey, as a result of additional traffic generated from projected future development, between 2011 and 2026.
- 1.1.5 The assessment takes account of all development within Surrey, as well as large development pressures located external to the County that are in close proximity to the boundary (including the borough of Rushmoor, Aldershot Urban Extension (AUE), the district of Hart, Bordon, Crawley, East Grinstead, Haywards Heath and Horsham).
- 1.1.6 The investigation into the cumulative impact of all such development was performed using the Strategic County Transport Model (SINTRAM).
- 1.1.7 SCC's Transport Studies modelling team have previously assisted many of Surrey's borough/districts with Transport Assessments (TA) in relation to their Local Development Frameworks (LDF) and Core Strategies (CS), using SINTRAM. The purpose of these assessments was to determine the sensitivity of the strategic and local highway network to the proposed future developments (commercial and residential) between 2005 and 2026. However, these assessments were all conducted in isolation and therefore only indicated projected highway impacts based on the individual boroughs/districts proposed developments. Such assessments have been completed for the following Surrey boroughs/districts:

- Reigate and Banstead



- Mole Valley
- Elmbridge
- Waverley
- Woking
- Runnymede
- Surrey Heath (joint with Hampshire borough/districts of Rushmoor and Hart to create the *Transport Assessment for the M3 Corridor J3 – 4a Joint LDF Study*).

## 1.2 Aims and Objectives

1.2.1 The main aims of the cumulative transport assessment were to:

- Evaluate the highway capacity impacts of the cumulative county-wide strategic development within Surrey and large developments external to Surrey;
- Assist in assessing the sensitivity of both the Strategic Route Network (SRN) and Local Road Network (LRN), including classified A and B roads to satisfy the Highways Agency (HA) responsible for the SRN, and Surrey County Council (SCC) the designated highway authority for the LRN, on the ability of the highway network to cope with the predicted future traffic demand;
- Assist in identifying specific locations which may require additional infrastructure provision for transport services;
- And contribute towards the development and adoption of a costed strategic infrastructure schedule at a county-wide level.

1.2.2 The main objectives of the cumulative transport assessment were to:

- Identify the amounts and locations of additional commercial and residential development in Surrey and the large developments external to the County;
- Calculate the distribution of vehicle trips resulting from the additional development;
- Forecast the traffic impacts of individual developments on the SRN and LRN;
- Act as a starting point for identifying locations which may either require additional infrastructure provision for transport services or further study to identify appropriate mitigation measures;
- Report the likely highway capacity impacts on both SRN and LRN.

1.2.3 The main benefit of this approach was to ensure that any strategic infrastructure requirements identified could be used to support the districts and boroughs needs to produce local Infrastructure Delivery Plans (IDP) using a common and consistent strategic evidence base. This evidence base could also be used to support future bids for Central Government funding for transport infrastructure and services.

## 1.3 Scope

1.3.1 The assessment uses the strategic County transport model (SINTRAM V4.1) and OmniTRANS transport modelling software as the modelling tool in this assessment.

1.3.2 For comparison purposes a 2011 base year and 2026 Do-Nothing scenario were developed as references. This is described later in *Section 4*. For this element of the study, one modelled network was used throughout the assessment, and this network reflects the road network in its current state (the Hindhead Improvement

Scheme was not modelled). Base and forecast scenario matrices were developed using trip generation derived from borough/districts planning data along with the Trip Rate Information Computer System (TRICS) database and forecasts from the Trip End Model Programme (TEMPRO).

- 1.3.3 The assessment only considers the impacts on highway capacity at a strategic level and as such the modelling methodology employed is unable to answer detailed questions regarding traffic interactions, such as queuing and individual driver behaviour at junctions. It does not consider other travel modes such as Public Transport including buses and rail.

## **1.4 Report Structure**

- 1.4.1 This technical report describes both the methodology and highway capacity implications from the transport assessment of cumulative impacts from future development. The technical report is structured as listed below:

- Section 2: A description of the model and its constraints;
- Section 3: The estimation of trip rates for the proposed developments and scenarios;
- Section 4: The development and summary results of the forecasting methodology;
- Section 5: Analysis and results of the modelling work undertaken, including network statistics, changes in traffic flow and capacity assessments;
- Section 6: Main conclusions of the impacts on both the SRN and LRN and summary of evaluation.

- 1.4.2 To accompany this technical report, a technical annex has been produced as a separate document containing additional reference information, including:

- Appendix A: Modelled Zone Plans of Surrey Borough \ Districts
- Appendix B: Origin & Destination Trip Ends for Modelled Zones in Surrey
- Appendix C: Flow Charts detailing Forecasting Methodologies
- Appendix D: DMRB Volume 6 Section 2 Junction Layout Geometry Guidance
- Appendix E: Assessment of M25 Junctions based on DMRB Guidance

## **2 MODEL DESCRIPTION**

### **2.1 Context**

- 2.1.1 The County model (SINTRAM Version 4.1\_SICP\_110615) was used to evaluate the cumulative assessment of future development proposals. SINTRAM is a strategic model that encapsulates the road network of Surrey and surrounding local authorities; at a national level the model incorporates all strategic roads within Great Britain.
- 2.1.2 All motorways, A and B roads together with some local roads are explicitly modelled within SINTRAM. Where traffic junctions and traffic signals are likely to have significant effects, the details of their general layout or timing of the signals are also included in the modelling. However, strategic modelling uses aggregate descriptions of traffic such as flow, density and speed, as well as the relationships between them and hence does not include every road or junction. As a result the model is unable to answer detailed questions regarding traffic interactions, such as queuing and individual driver behaviour. It can, however, provide approximate answers to a wide range of transport problems (i.e. re-distribution effects), making it a reasonable tool for the cumulative transport assessment and assessing potential impacts on the strategic and local network within the County.
- 2.1.3 The SINTRAM model assesses link capacity and therefore indicates which road sections are likely to experience delays as a result of traffic demand exceeding capacity with a consequent reduction in vehicle speeds. It can also indicate how traffic diverts away from busy routes (i.e. re-distribution effects), where traffic is slowed because of excessive demand, and adds to flows on secondary routes that may be less suitable and hence more sensitive to changes in flows. Thus making it a reasonable tool for the strategic cumulative assessment of development in the County until the forecast year of 2026.

### **2.2 Vehicle Types**

- 2.2.1 Cars, LGVs and HGVs are separately represented in the model. Trips by public transport are not modelled.

### **2.3 Time Period**

- 2.3.1 The evaluation was performed for the average hour of the AM peak period (0700 – 1000 hours).

### **2.4 Assignment Method**

- 2.4.1 A fixed matrix equilibrium assignment was performed using the Method of Successive Averages (MSA). This is an assignment using user equilibrium with optional Burrell type perturbations. The assignment allocates given travel demand (a set of trips with fixed origins and destinations) on the modelled network in order to obtain distribution of traffic flow. The resulting traffic flow represents the 'average' conditions for the time period under study. The assignment was performed for 80 iterations with a spreadfactor of 0.5 for all modelled scenarios.

## **2.5 Zoning System**

- 2.5.1 SINTRAM makes use of a zoning system. Zones within Surrey are based on national census output areas, whereas zones external to the County cover larger areas and are generally less refined in comparison, (a result of being located outside the models key study area, Surrey). See *Appendix A* for a modelled zone plan of every borough in Surrey.

## **2.6 Study Area**

- 2.6.1 The study area of this assessment covers all modelled zones within Surrey as well as zones covering large external development pressures to the County, such as the borough of Rushmoor, Bordon etc. *Figure 2.1* shows all modelled zones that additional trips were incorporated to in this assessment. However, it should be noted that all modelling results and analysis presented in this report, is for the SRN and LRN within the Surrey boundaries only.

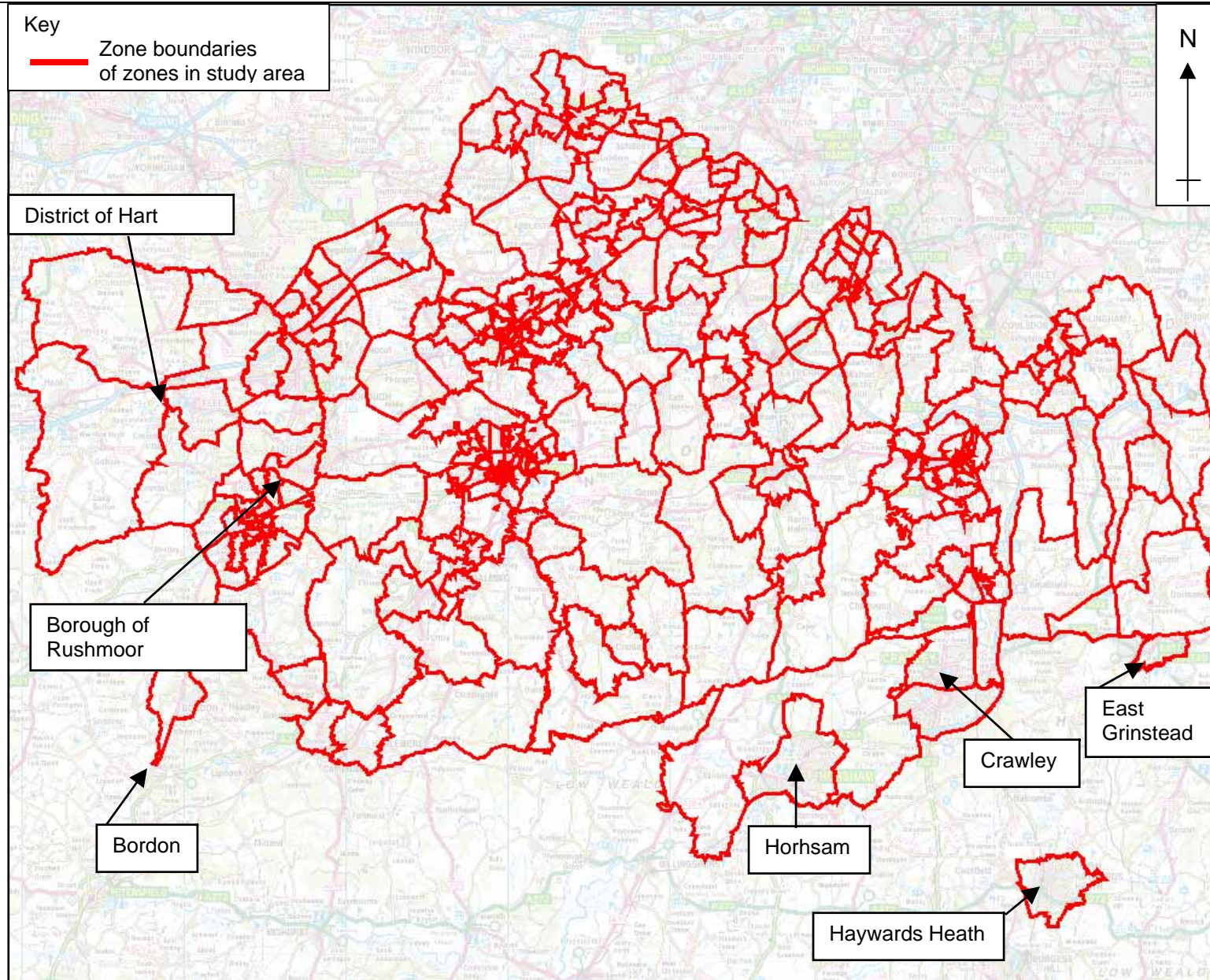


Figure 2.1: Study area defined by modelled zone boundaries (all Surrey zones and zones covering known large developments external to the County).



### 3 ESTIMATION OF TRIP RATES

#### 3.1 Trip Generation

3.1.1 Two sources were used to establish the trip generation for the study area (all modelled zones in Surrey and zones covering specific large external developments to Surrey) included in this assessment. These sources were:

- Borough/district planning data with use of TRICS (version 2010(a));
- TEMPRO (version 5.4).

3.1.2 *Table 3.1* informs which source of trip generation was utilised for all areas/developments in the study area.

Area / Development	Source of Trip Generation
Elmbridge BC	Planning data with TRICS
Epsom & Ewell BC	TEMPRO
Guildford BC	TEMPRO
Mole Valley DC	Planning data with TRICS
Reigate & Banstead BC	Planning data with TRICS
Runnymede BC	Planning data with TRICS
Spelthorne BC	TEMPRO
Surrey Heath BC	Planning data with TRICS
Tandridge DC	TEMPRO
Waverley BC	Planning data with TRICS
Woking BC	Planning data with TRICS
Rushmoor BC (including AUE)	Planning data with TRICS
Hart DC	Planning data with TRICS
Bordon	TEMPRO
Crawley	TEMPRO
East Grinstead	TEMPRO
Haywards Heath	TEMPRO
Horsham	TEMPRO

Table 3.1: Source of trip generation for all areas/developments involved in the assessment

3.1.3 It was thought appropriate to include projected large developments that are external to Surrey but in close proximity to the County boundary in this assessment. This will ensure that any traffic impacts related to these developments that may impact upon Surrey are accounted for. It is likely that traffic generated from such large external developments will travel in/out of Surrey due to their close proximity. The developments external to Surrey that have been included in this assessment are as follows:

- All developments in the borough of Rushmoor (including AUE);
- All developments in the district of Hart;
- Bordon
- Crawley
- East Grinstead
- Haywards Heath
- Horsham

#### 3.2 Planning Data & TRICS Trip Generation

3.2.1 As SCC has previously been involved in a number of the County's borough/districts LDFs, current and future planning was readily available.

- 3.2.2 Planning data was available for seven of the eleven County's boroughs which detailed the committed and planned commercial and residential developments from 2005 to 2026.
- 3.2.3 The planning data contained two key categories of development: commercial and residential. It reflects the borough/districts estimates of development to occur between 2005 and 2026. Details of these estimated developments were also provided, including the estimated location and size of developments.
- 3.2.4 The planning data provided details of whether each development had been committed by planning permission or not. Status of planning permission affects the implications of developments because it is not possible to influence the developments that have received planning permission. However, the planning data did not detail the years that the developments occurred or are proposed to occur. Due to this it was assumed that all committed developments was dated between 2005 and 2011, whereas all non-committed planned developments was dated between 2011 and 2026.
- 3.2.5 Development trip rates were obtained from TRICS with use of the planning data. A trip rate refers to the amount of trips generated by a development. These include both trips that arrive and depart from a development.
- 3.2.6 The TRICS database stores information recorded from past surveys completed in the UK for a range of locations and land uses, counting the number of vehicular trips made to and from individual sites. The TRICS database allows users to select sites that are relevant and similar in criteria to a development site in question. This enables the estimation of trip rates to and from proposed developments based on past surveyed sites.
- 3.2.7 It should be noted that TRICS is a '*subjective tool*'. This is because personal choice and judgement plays a key role in decision making when choosing appropriate sites to compare with the existing and proposed developments.
- 3.2.8 TRICS Good Practice Guide 2009 was followed for the interrogation of the database to determine comparative sites.
- 3.2.9 Trip rates produced from the TRICS database were calculated as a trip rate estimate per 100m<sup>2</sup> gross floor area (GFA) for commercial developments, and per household for residential developments. Estimates were then applied to the relevant (GFA) or number of households for each development, by modelled zone.
- 3.2.10 Trip rate estimates were generated for both the existing and proposed developments (where possible due to data limitations) using the TRICS database. Therefore it was possible to calculate the additional amount of trips per development by deducting the existing trip rate from the proposed.
- 3.2.11 Three vehicles types are modelled within SINTRAM: Cars, LGVs and HGVs. Consequently vehicle proportions were calculated for these vehicle types from the corresponding surveys in the TRICS database.
- 3.2.12 Whilst different trip rates were generated for each category of development for each land use, trip rates also needed to be extracted to appropriate corresponding (TRICS) locations. The (TRICS) database classifies all surveys conducted at a development as one of the following:

- town centre;
- edge of town centre;
- neighbourhood centre;
- suburban area;
- edge of town and
- free standing.

3.2.13 The methodology for assigning a TRICS location to each development differed between the developments, depending whether detailed locations were provided in the planning data. The developments that provided addresses for each development had a precise TRICS location assigned. Whereas, the developments that did not have precise locations were awarded a TRICS location based on the entire or proportion of the relevant modelled zone. TRICS locations were defined by use of local knowledge and aerial photography.

3.2.14 The planning data utilised in this assessment is the same as what was used previously in the individual borough/districts assessments. Therefore the planning data may not be as recent for some boroughs, but due to time constraints it was not feasible to re-visit all boroughs and ask for a re-evaluation of the planning data. This is also the reason why it was not possible to utilise detailed planning data for all other areas/developments in the study area.

### **3.3 TEMPRO Trip Generation**

3.3.1 At the time of this cumulative assessment being conducted SCC did not possess planning data for the entire study area of the assessment. Planning data was absent for four of SCC borough/districts (Guildford, Epsom and Ewell, Spelthorne and Tandridge) and all external developments to the County with exception to the borough of Rushmoor and district of Hart. Therefore it was not possible to calculate the estimated amount trip rates for all areas involved in the study area by use of TRICS. Therefore TEMPRO forecasts were used for trip generation in zones where planning data was not available.

3.3.2 TEMPRO (version 5.4) was used to extract the trip generation for a 2026 forecast. TEMPRO forecasts had already been extracted prior to this assessment for use in the County models demand matrices. As such the trip generation that was stored in the SINTRAM matrices was manipulated to represent the trip generation between 2005 and 2026 for zones that planning data was not available for. See *Section 4* and *Appendix C* for more detail on the methodology involved in manipulating TEMPRO forecasts/SINTRAM demand matrices.

3.3.3 Both TRICS and TEMPRO are industry standard software and conform to current government guideline methodologies.



## 4 SCENARIOS AND FORECAST MATRICES

### 4.1 Modelled Scenarios

- 4.1.1 For the purposes of this assessment it was thought best to create three modelled scenarios:
- 2011 Base;
  - 2026 Do-Nothing;
  - 2026 Do-Something.
- 4.1.2 Trip ends are the total number of trips that either have an origin (origin/departure trip ends) or destination (destination/arrival trip ends) within a defined modelled zone.
- 4.1.3 The 2011 Base represents the current situation and as such all trip ends are for 2011.
- 4.1.4 The 2026 Do-Nothing is where all trip ends external to the study area are for 2026, but trip ends within the study area (study area defined as Surrey zones and the zones in the borough of Rushmoor, district of Hart, Bordon, Crawley, East Grinstead, Haywards Heath and Horsham) are for the 2011 base year. Therefore the 2026 Do-Nothing represents the traffic impacts in Surrey as a result of the rest of the Country's development to the forecast year of 2026, as no future development occurs in the study area (as this is retained at the base year).
- 4.1.5 The 2026 Do-Something is the same as the 2026 Do-Nothing, but includes the 2011 to 2026 proposed development (non-committed planned estimated development) in the study area. Therefore the 2026 Do-Something is where all trip ends in the model represent the forecast year of 2026.
- 4.1.6 All three modelled scenarios were created using both sources of trip generation; planning data combined with TRICS and TEMPRO forecasts. Therefore the modelled scenarios make use of accurate planning data to enable trip generation where possible, instead of wholly relying on TEMPRO forecasts.
- 4.1.7 The 2011 base acts as a reference case for the 2026 Do-Nothing and the 2026 Do-Nothing acts as a reference for the 2026 Do-Something.

### 4.2 Additional Trips

- 4.2.1 *Tables 4.1 to 4.4* display a summary of the trip ends (for all modelled vehicles) by borough/district for the 2011 base, 2026 Do-Nothing and 2026 Do-Something. The absolute and percentage difference in trip ends shows the growth in trip ends between the scenarios and the relevant references.
- 4.2.2 *Table 4.1* indicates that there are no changes in departure trip ends within Surrey between the 2011 base and 2026 Do-Nothing. This is because Surrey trip ends are restrained to the 2011 base year in the 2026 Do-Nothing. *Table 4.1* shows that the borough of Reigate and Banstead is likely to incur the largest increase (16.5%) in departure trip ends within Surrey in the 2026 Do-Something (when compared to the 2026 Do-Nothing), followed by the boroughs of Woking (12.6% increase) and Runnymede (10.5% increase).
- 4.2.3 *Table 4.2* states the three boroughs that contain the largest proportions of total departure trips in the County are Guildford (16.3%, 16.3% and 15.9%), Reigate

and Banstead (11.4%, 11.4% and 12.3%) and Elmbridge (10.7%, 10.7% and 10.4%) in the 2011 base, 2026 Do-Nothing and 2026 Do-Something respectively.

- 4.2.4 *Table 4.3* indicates that there is a minimal increase in arrival trip ends in Surrey (135 trips) in the 2026 Do-Nothing, shown by a comparison to the 2011 base. This increase occurs, (even though the trip ends stay the same as the 2011 base year) as a result of the forecasting methodology using the furness method, which ends on a row balance, to create the 2026 Do-Nothing matrix. The furness method is a way of incorporating additional trips to a matrix, and the model does this by trying to add the trips to the relevant origin (rows) and destinations (columns) cells in the matrix. A matrix must balance the row and column totals, but a compromise is generally made to ensure the matrix totals balance, the compromise consists of a small amount of extra trips being added to the model. However, it is possible to state if the matrix balances to rows or columns, and in the case of the Do-Nothing, a row balance was chosen (as have greater reliance on origin data in AM peak hour). This row balance ensured that the desired amount of additional trips was added to the rows of the matrix and the small extra amount of trips (compromise) was added to the columns. Hence, no difference in origin trip ends being shown between the 2011 base and 2026 Do-Nothing in *Table 4.1* and *4.2*, but an additional 135 destination trips between the 2011 base and 2026 Do-Nothing being displayed in *Table 4.3* and *4.4*.
- 4.2.5 However, 135 additional trips generated from a furness method is a very minor amount in a model of this size, as shown by the percentage increases in *Table 4.3* (all below 0.2%).
- 4.2.6 The largest increase in arrival trip ends in the County between the 2026 Do-Nothing and 2026 Do-Something is an additional 1,669 arrival trips (11.1% increase) in the borough of Reigate and Banstead.
- 4.2.7 *Table 4.4* states that the three boroughs that incur the largest proportions of total arrival trips in the County are Guildford (15.6%, 15.6% and 15.5%), Reigate and Banstead (10.9%, 10.9% and 11.3%) and Elmbridge (10.6%, 10.6% and 10.3%) in the 2011 base, 2026 Do-Nothing and 2026 Do-Something respectively.
- 4.2.8 Therefore the borough of Reigate and Banstead incurs the largest increase in both departure (16.5% increase) and arrival trips (11.1% increase) in the 2026 Do-Something scenario (when compared to the 2026 Do-Nothing).
- 4.2.9 See *Appendix B* for trip ends (departure/origin and arrival/destination) for each modelled zone in Surrey.

Borough/District	Origin (Departure) Trip Ends			Absolute Difference		Percentage Difference	
	2011	2026 Do-Nothing	2026 Do-Something	2026 Do-Nothing less 2011	2026 Do-Something less 2026 Do-Nothing	2026 Do-Nothing less 2011	2026 Do-Something less 2026 Do-Nothing
Elmbridge	14,101	14,101	14,714	0	613	0.0%	4.3%
Epsom & Ewell	8,588	8,588	9,366	0	778	0.0%	9.1%
Guildford	21,358	21,358	22,571	0	1,213	0.0%	5.7%
Mole Valley	10,323	10,323	10,883	0	560	0.0%	5.4%
Reigate & Banstead	14,949	14,949	17,411	0	2,462	0.0%	<b>16.5%</b>
Runnymede	9,549	9,549	10,552	0	1,003	0.0%	10.5%
Spelthorne	11,158	11,158	11,960	0	802	0.0%	7.2%
Surrey Heath	7,921	7,921	8,607	0	686	0.0%	8.7%
Tandridge	9,898	9,898	10,459	0	561	0.0%	5.7%
Waverley	13,380	13,380	14,095	0	715	0.0%	5.3%
Woking	10,053	10,053	11,317	0	1,264	0.0%	12.6%
<b>Total</b>	<b>131,278</b>	<b>131,278</b>	<b>141,935</b>	<b>0</b>	<b>10,657</b>	<b>0%</b>	<b>8%</b>

Table 4.1: Average AM (0700 – 1000) peak hour origin (departure) trip ends for all modelled vehicles and scenarios within Surrey

Borough/District	Origin (Departure) Trip Ends		
	2011	2026 Do-Nothing	2026 Do-Something
Elmbridge	10.7%	10.7%	10.4%
Epsom & Ewell	6.5%	6.5%	6.6%
Guildford	<b>16.3%</b>	<b>16.3%</b>	<b>15.9%</b>
Mole Valley	7.9%	7.9%	7.7%
Reigate & Banstead	11.4%	11.4%	12.3%
Runnymede	7.3%	7.3%	7.4%
Spelthorne	8.5%	8.5%	8.4%
Surrey Heath	6.0%	6.0%	6.1%
Tandridge	7.5%	7.5%	7.4%
Waverley	10.2%	10.2%	9.9%
Woking	7.7%	7.7%	8.0%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Table 4.2: Percentage breakdown of origin (departure) trip ends within Surrey

Borough/District	Destination (Arrival) Trip Ends			Absolute Difference		Percentage Difference	
	2011	2026 Do-Nothing	2026 Do-Something	2026 Do-Nothing less 2011	2026 Do-Something less 2026 Do-Nothing	2026 Do-Nothing less 2011	2026 Do-Something less 2026 Do-Nothing
Elmbridge	14,713	14,723	15,277	10	554	0.1%	3.8%
Epsom & Ewell	9,373	9,380	9,908	7	528	0.1%	5.6%
Guildford	21,578	21,598	22,872	20	1,274	0.1%	5.9%
Mole Valley	11,024	11,034	11,716	10	682	0.1%	6.2%
Reigate & Banstead	15,033	15,069	16,738	36	1,669	<b>0.2%</b>	<b>11.1%</b>
Runnymede	11,277	11,289	12,463	12	1,174	0.1%	10.4%
Spelthorne	12,021	12,030	12,526	9	496	0.1%	4.1%
Surrey Heath	8,304	8,311	8,854	7	543	0.1%	6.5%
Tandridge	11,072	11,078	11,616	6	538	0.1%	4.9%
Waverley	14,002	14,014	14,718	12	704	0.1%	5.0%
Woking	10,030	10,036	10,983	6	947	0.1%	9.4%
<b>Total</b>	<b>138,427</b>	<b>138,562</b>	<b>147,671</b>	<b>135</b>	<b>9,109</b>	<b>0%</b>	<b>7%</b>

Table 4.3: Average AM (0700 – 1000) peak hour destination (arrival) trip ends for all modelled vehicles and scenarios within Surrey

Borough/District	Destination (Arrival) Trip Ends		
	2011	2026 Do-Nothing	2026 Do-Something
Elmbridge	10.6%	10.6%	10.3%
Epsom & Ewell	6.8%	6.8%	6.7%
Guildford	<b>15.6%</b>	<b>15.6%</b>	<b>15.5%</b>
Mole Valley	8.0%	8.0%	7.9%
Reigate & Banstead	10.9%	10.9%	11.3%
Runnymede	8.1%	8.1%	8.4%
Spelthorne	8.7%	8.7%	8.5%
Surrey Heath	6.0%	6.0%	6.0%
Tandridge	8.0%	8.0%	7.9%
Waverley	10.1%	10.1%	10.0%
Woking	7.2%	7.2%	7.4%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Table 4.4: Percentage breakdown of destination (arrival) trip ends within Surrey

### 4.3 Largest Increases in Trips

4.3.1 Tables 4.5 and 4.6 show the top twenty modelled zones within Surrey that have the largest amount of origin (departure) and destination (arrival) trip ends in the 2011 base matrix.

4.3.2 The area of the modelled zones (in hectares) is also displayed. It should be noted that the largest modelled zone in Surrey covers an area of 4,767 hectares (zone 320, Elstead & Thursley, Waverley).

Zone No.	Zone Name	Borough/District	2011 Origin Trip Ends	Area of Zone (Hectares)	No. of Trips to One Hectare
73	<b>Ash &amp; Normandy</b>	Guildford	2,434	3,249	0.75
186	<b>Knaphill / St Johns</b>	Woking	1,640	380	4.32
318	<b>Stoughton</b>	Guildford	1,180	123	9.59
279	<b>Park Barn</b>	Guildford	1,113	131	8.50
454	<b>Sunbury Common</b>	Spelthorne	1,078	174	6.20
415	<b>Leatherhead</b>	Mole Valley	1,004	617	1.63
264	Horley - Meath Green	Reigate & Banstead	978	328	2.98
450	<b>Sunbury &amp; Kempton Park</b>	Spelthorne	973	366	2.67
94	Burpham	Guildford	958	222	4.32
298	<b>Rydes Hill</b>	Guildford	950	109	8.72
455	West Bedfont	Spelthorne	933	252	3.70
452	Ashford Common	Spelthorne	926	154	6.01
385	<b>Chertsey</b>	Runnymede	886	545	1.63
398	Merstham	Reigate & Banstead	872	938	0.93
431	Walton on Thames Reservoirs	Elmbridge	862	583	1.48
448	<b>Staines - Kingston Rd (east)</b>	Spelthorne	857	131	6.54
519	Worplesdon	Guildford	857	1,109	0.77
396	Nork	Reigate & Banstead	852	363	2.35
408	<b>Dorking - south</b>	Mole Valley	846	402	2.10
446	Laleham	Spelthorne	840	1,070	0.79

Table 4.5: Top twenty Surrey zones with largest origin (departure) trip ends in 2011 base

Zone No.	Zone Name	Borough/District	2011 Destination Trip Ends	Area of Zone (Hectares)	No. of Trips to One Hectare
<b>73</b>	<b>Ash &amp; Normandy</b>	Guildford	1,958	3,249	0.60
<b>186</b>	<b>Knaphill / St Johns</b>	Woking	1,806	380	4.75
<b>454</b>	<b>Sunbury Common</b>	Spelthorne	1,353	174	7.76
407	Holmwood	Mole Valley	1,339	1,325	1.01
329	Hindhead	Waverley	1,229	682	1.80
383	Addlestone Moor	Runnymede	1,208	306	3.95
<b>385</b>	<b>Chertsey</b>	Runnymede	1,192	545	2.19
<b>450</b>	<b>Sunbury &amp; Kempton Park</b>	Spelthorne	1,174	366	3.21
264	Horley - Meath Green	Reigate & Banstead	1,130	328	3.45
<b>318</b>	<b>Stoughton</b>	Guildford	1,127	123	9.16
278	Onslow Village	Guildford	1,110	133	8.35
<b>408</b>	<b>Dorking - south</b>	Mole Valley	1,104	402	2.75
<b>448</b>	<b>Staines - Kingston Rd (east)</b>	Spelthorne	1,084	131	8.27
<b>298</b>	<b>Rydes Hill</b>	Guildford	1,067	109	9.79
386	Thorpe	Runnymede	1,043	856	1.22
445	Staines - Laleham Rd	Spelthorne	1,009	217	4.65
<b>415</b>	<b>Leatherhead</b>	Mole Valley	999	617	1.62
397	Banstead	Reigate & Banstead	991	462	2.15
384	Englefld Green	Runnymede	981	670	1.46
<b>279</b>	<b>Park Barn</b>	Guildford	973	131	7.43

Table 4.6: Top twenty Surrey zones with largest destination (arrival) trip ends in 2011 base

- 4.3.3 *Tables 4.5 and 4.6* report that zone 73 (Ash & Normandy) and 186 (Knaphill / St. Johns) contain the largest amount of origin (departure) trip ends, as well as destination (arrival) trip ends, in the 2011 base scenario.
- 4.3.4 These zones appear both in *Tables 4.5 and 4.6* indicating that these zones with the largest amount of origins also contain some of the largest amount of destinations trip ends. Zones within the boroughs of Guildford and Spelthorne are featured most in the top twenty zones of origin and destination trip ends in the 2011 base. Zones highlighted in bold, in *Tables 4.5 and 4.6*, indicates that the entry occurs in the top twenty of both largest origin and destination trip ends.
- 4.3.5 *Tables 4.7 and 4.8* show the top twenty modelled zones within Surrey that have the largest amount of origin and destination trip ends in the 2026 Do-Something matrix.
- 4.3.6 Data was not presented for the 2026 Do-Nothing, as the trip ends are virtually the same as the 2011 base (for the zones in Surrey) as shown by *Tables 4.1 to 4.4*.
- 4.3.7 It is important to note that the trip generation for the Surrey boroughs of Epsom & Ewell, Guildford, Spelthorne and Tandridge are purely based on TEMPRO forecasts.

Zone No.	Zone Name	Borough/District	2026 DS Origin Trip Ends	Area of Zone (Hectares )	No. of Trips to One Hectare
<b>73</b>	<b>Ash &amp; Normandy</b>	Guildford	2,649	3,249	0.82
<b>186</b>	<b>Knaphill / St Johns</b>	Woking	1,774	380	4.67
<b>264</b>	<b>Horley - Meath Green</b>	Reigate & Banstead	1,518	328	4.63
379	Ottershaw	Runnymede	1,512	1,835	0.82
<b>318</b>	<b>Stoughton</b>	Guildford	1,267	123	10.30
<b>279</b>	<b>Park Barn</b>	Guildford	1,212	131	9.25
<b>415</b>	<b>Leatherhead</b>	Mole Valley	1,124	617	1.82
<b>454</b>	<b>Sunbury Common</b>	Spelthorne	1,123	174	6.45
452	Ashford Common	Spelthorne	1,036	154	6.73
<b>450</b>	<b>Sunbury &amp; Kempton Park</b>	Spelthorne	1,031	366	2.82
<b>298</b>	<b>Rydes Hill</b>	Guildford	1,028	109	9.43
455	West Bedfont	Spelthorne	1,005	252	1.91
94	Burpham	Guildford	997	222	4.49
398	Merstham	Reigate & Banstead	979	938	1.04
396	Nork	Reigate & Banstead	951	363	2.62
105	Redhill - Marketfield Way	Reigate & Banstead	939	159	5.91
446	Laleham	Spelthorne	915	1,070	0.86
<b>448</b>	<b>Staines - Kingston Rd (east)</b>	Spelthorne	914	131	6.98
431	Walton on Thames Reservoirs	Elmbridge	908	583	1.56
<b>408</b>	<b>Dorking - south</b>	Mole Valley	900	402	2.24

Table 4.7: Top twenty Surrey zones with largest origin (departure) trip ends in 2026 Do-Something

Zone No.	Zone Name	Borough/District	2026 DS Destination Trip Ends	Area of Zone (Hectares )	No. of Trips to One Hectare
<b>73</b>	<b>Ash &amp; Normandy</b>	Guildford	2,080	3,249	0.64
<b>186</b>	<b>Knaphill / St Johns</b>	Woking	1,951	380	5.13
383	Addlestone Moor	Runnymede	1,491	306	4.87
407	Holmwood	Mole Valley	1,424	1,325	1.07
<b>454</b>	<b>Sunbury Common</b>	Spelthorne	1,389	174	7.98
<b>264</b>	<b>Horley - Meath Green</b>	Reigate & Banstead	1,286	328	3.92
385	Chertsey	Runnymede	1,272	545	2.33
329	Hindhead	Waverley	1,259	682	1.85
<b>450</b>	<b>Sunbury &amp; Kempton Park</b>	Spelthorne	1,192	366	3.26
278	Onslow Village	Guildford	1,190	133	8.95
<b>318</b>	<b>Stoughton</b>	Guildford	1,184	123	9.63
<b>408</b>	<b>Dorking - south</b>	Mole Valley	1,162	402	2.89
<b>448</b>	<b>Staines - Kingston Rd (east)</b>	Spelthorne	1,136	131	8.67
<b>298</b>	<b>Rydes Hill</b>	Guildford	1,124	109	10.31
386	Thorpe	Runnymede	1,110	856	1.30
518	Doversgreen & South Park	Reigate & Banstead	1,076	602	1.79
445	Staines - Laleham Rd	Spelthorne	1,071	217	4.94
397	Banstead	Reigate & Banstead	1,058	462	2.29
<b>415</b>	<b>Leatherhead</b>	Mole Valley	1,042	617	1.69
<b>279</b>	<b>Park Barn</b>	Guildford	1,035	131	7.90

Table 4.8: Top twenty Surrey zones with largest destination (arrival) trip ends in 2026 Do-Something



- 4.3.8 Zones highlighted in bold, in *Tables 4.7* and *4.8*, indicates that the entry occurs in the top twenty of both largest origin and destination trip ends.
- 4.3.9 *Tables 4.7* and *4.8* indicate that the two zones that contain the largest origin and destination trip ends in the 2011 base (zones 73 and 186) continue to be prevalent in the 2026 Do-Something. However, the growth in trip ends in these zones is not thought to be very large, for example the largest increase is 215 origin trips in zone 73 (Ash & Normandy).
- 4.3.10 Comparisons of zones containing the largest trip ends in the 2011 base and 2026 Do-Something indicates that the trends remain relatively constant. However, a main difference concerning origin trip ends is the appearance of zones 379 (Ottershaw) and 105 (Redhill – Marketfield Way) in *Table 4.7*. This refers to an increase in origin trip ends in these two zones caused by proposed non-committed planned development between 2011 and 2026.
- 4.3.11 The trend displayed between the 2011 and 2026 destination trip ends also remains relatively constant, with exception to zone 518 (Doversgreen & South Park) as this zone appears in the top twenty of largest trip ends in the 2026 Do-Something, but not in the 2011 top twenty.
- 4.3.12 *Figure 4.1* shows the disposition of additional departure trips projected to occur between 2011 and 2026 within Surrey, as well as the relevant large developments external to the County. Proportional circles plotted on the modelled network represent the additional departure trips. The areas of the circles are scaled to the zone containing the largest amount of additional departure trips.
- 4.3.13 Therefore *Figure 4.1* presents a pictorial representation of the quantity and location of the additional departure trips between the 2026 Do-Nothing and 2026 Do-Something (in the study area this refers to 2011 to 2026 non-committed development).
- 4.3.14 The proportional circles are positioned at the top left of each zone centroid (the area of zone where traffic loads on and off of the network).

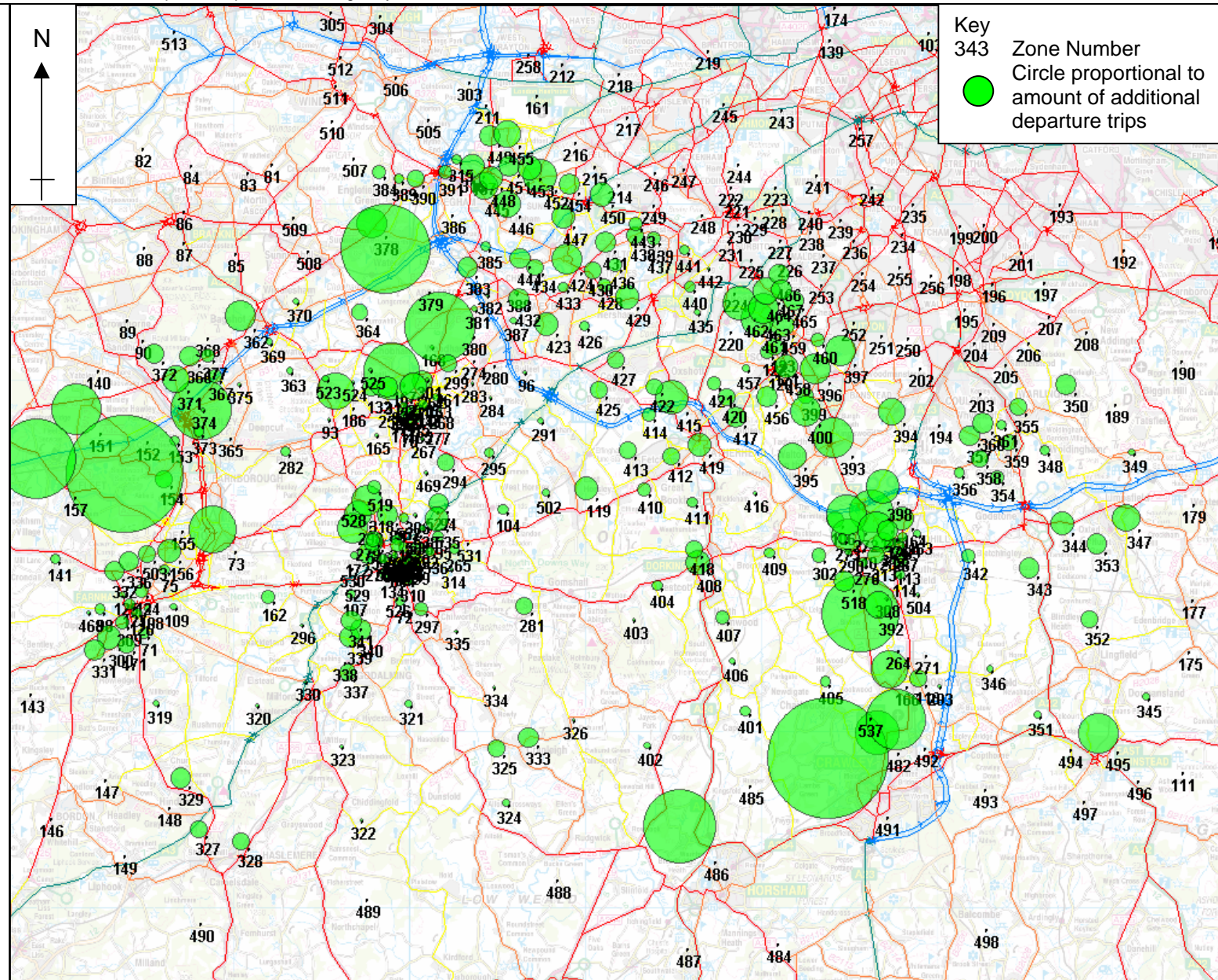


Figure 4.1: Additional departure (origin) trips between the 2026 Do-Nothing and 2026 Do-Something, for all zones in Surrey and large developments external to the County i.e. 2011 to 2026 non-committed planned development.

- 4.3.15 *Figure 4.1* indicates that the areas to incur the largest amount of additional departure trips in the 2026 Do-Something are external to County. Zone 491 Crawley South in West Sussex, is projected to generate some of the largest amounts of additional departure trips between 2011 and 2026. The zone containing the AUE development in Hampshire (zone 155 Aldershot Barracks) is also forecast to generate a large amount of additional departure trips.
- 4.3.16 *Figure 4.1* indicates that there are multiple areas of the County, which are forecast to incur relative amounts of additional departure trips in the average AM peak hour in close proximity. Broadly these areas are the boroughs of Runnymede and Reigate and Banstead. This trend shown by *Figure 4.1* has also been previously identified in *Table 4.1*, as these boroughs incur the largest proportions of additional departure trips in the 2026 Do-Something.
- 4.3.17 *Tables 4.9* and *4.10* show the twenty zones within Surrey that incur the largest increases in trip ends between the 2026 Do-Nothing (essentially the 2011 base) and the 2026 Do-Something. The absolute differences as well as the percentage differences are displayed. Therefore *Table 4.9* displays the same information shown in *Figure 4.1*, in absolute values, but only Surrey zones.
- 4.3.18 *Tables 4.9* and *4.10* report that, within Surrey, zone 379 (Ottershaw) experiences the largest increase (758 trips) in departure trips and zone 383 (Addlestone Moor) experiences the largest increase (282 trips) in arrival trips, between the 2026 Do-Nothing and 2026 Do-Something.
- 4.3.19 Zones within the borough of Reigate and Banstead are featured most frequently in the twenty largest increases in departure and arrival trip ends. This correlates to information previously shown in *Tables 4.1* and *4.3*, as Reigate and Banstead is to incur the largest proportion of additional trips compared to all other Surrey borough/districts.
- 4.3.20 Two of the top five zones with largest increases in departure trip ends, zone 379 Ottershaw and 365 Deepcut & Mytchett contain some of the largest developments (in terms of size) forecast to occur within the County. The redevelopment of the former Defence Evaluation and Research Agency (DERA) site (in Runnymede) is projected to occur between 2011 and 2026, and as such is represented in this modelling, giving explanation as to why zone 379 contains the largest increase in departure trips. Secondly the redevelopment of the Princess Royal Barracks at Deepcut has also been included in this assessment, and is an explanation for why zone 365 contains the fifth largest increase in departure trips.

Zone No.	Zone Name	Borough/District	Absolute Difference (2026 DS less 2026 DN)	Percentage Difference (2026 DS less 2026 DN)	Area of Zone (Hectares)
379	Ottershaw	Runnymede	758	101%	1,835
264	Horley - Meath Green	Reigate & Banstead	540	55%	328
274	West Byfleet Town Centre	Woking	468	224%	49
365	Deepcut & Mytchett	Surrey Heath	325	64%	1,015
275	Woking Town Centre	Woking	314	217%	24
73	Ash & Normandy	Guildford	215	9%	3,249
105	Redhill - Marketfield Way	Reigate & Banstead	175	23%	159
393	Kingswood	Reigate & Banstead	152	22%	1,409
272	Gatton Park & Wray Park	Reigate & Banstead	146	40%	442
186	Knaphill / St Johns	Woking	134	8%	380
312	Redhill - Marketfield Way	Reigate & Banstead	131	127%	159
166	Horley Town Centre	Reigate & Banstead	124	19%	215
110	Reigate Rd / Linkfield Corner	Reigate & Banstead	120	24%	95
415	Leatherhead	Mole Valley	120	12%	617
461	Longmead & Horton Hospitals East	Epsom & Ewell	113	17%	213
452	Ashford Common	Spelthorne	110	12%	154
398	Merstham	Reigate & Banstead	107	12%	938
462	Ruxley Lane	Epsom & Ewell	104	14%	240
279	Park Barn	Guildford	99	9%	131
396	Nork	Reigate & Banstead	99	12%	363

Table 4.9: Top twenty Surrey zones with largest difference in origin (departure) trip ends between the 2026 Do-Nothing and 2026 Do-Something

Zone No.	Zone Name	Borough/District	Absolute Difference (2026 DS less 2026 DN)	Percentage Difference (2026 DS less 2026 DN)	Area of Zone (Hectares)
383	Addlestone Moor	Runnymede	282	23%	306
387	New Haw	Runnymede	202	38%	357
264	Horley - Meath Green	Reigate & Banstead	155	14%	328
519	Worplesdon	Guildford	146	19%	1,109
186	Knaphill / St Johns	Woking	143	8%	380
518	Doversgreen & South Pk	Reigate & Banstead	131	14%	602
73	Ash & Normandy	Guildford	121	6%	3,249
105	Redhill - Marketfield Way	Reigate & Banstead	117	15%	159
382	Addlestone Town Centre	Runnymede	110	16%	264
398	Merstham	Reigate & Banstead	110	12%	938
380	West Byfleet - Woodham	Runnymede	104	22%	244
166	Horley Town Centre	Reigate & Banstead	97	14%	215
374	Frimley & Frimley Hospital	Surrey Heath	95	10%	214
110	Reigate Rd / Linkfield Corner	Reigate & Banstead	87	16%	95
381	Row Town	Runnymede	85	13%	318
407	Holmwood	Mole Valley	84	6%	1,325
271	Horley - North East	Reigate & Banstead	81	17%	269
278	Onslow Village	Guildford	79	7%	133
385	Chertsey	Runnymede	79	7%	545
272	Gatton Park & Wray Park	Reigate & Banstead	74	16%	442

Table 4.10: Top twenty Surrey zones with largest difference in destination (arrival) trip ends between the 2026 Do-Nothing and 2026 Do-Something.

## 4.4 Forecast Matrices

- 4.4.1 To generate the 2011 base matrix it was necessary to first obtain TEMPRO trip end forecasts for the years of 2005 and 2011. 2011 trip ends were applied to all zones in the model that SCC does not possess planning data for, whereas 2005 trip ends were initially applied to all zones that SCC does possess planning data for. 2005 to 2011 trip rates (sourced from committed planning data and TRICS trip generation) were then added to the 2005 trip ends using the growth factor method, based on a row balance.
- 4.4.2 The 2011 base matrix was then utilised in the creation of the 2026 Do-Nothing forecast matrix. All trip ends in zones covering the study area were retained at the 2011 base year whereas all other trips in the model represent the forecast year of 2026. 2026 trip end forecasts for all other zones external to the study area were sourced from TEMPRO. All trips in the 2026 Do-Nothing were incorporated into the matrix by using the furness method, based on a row balance.
- 4.4.3 The 2026 Do-Something matrix was created by initially using the 2026 Do-Nothing matrix, and then adding the 2011 to 2026 additional trips to the zones in the study area (SCC and large developments external to the County). 2011 to 2026 additional trip rates were sourced from non-committed planning data and TRICS (for study area zones that SCC obtained planning data for) as well as TEMPRO trip end forecasts (for study area zones that SCC did not obtain planning data for). The additional forecast trip ends between 2011 and 2026 were incorporated into the matrix using the growth factor method, based on a row balance.
- 4.4.4 Use of a row (origin) balance in the growth factor method was thought preferable to a column (destination) balance as departure trips can be assumed to be more reliable in the AM time period. A row balance causes the matrix to balance according to the matrix row total, causing any balancing (adding/subtracting of any additional trips) to occur in the column totals of the matrix, making the row trip ends more accurate. It could therefore be said that this assessment is more reliable in terms of projected additional departure (origin) trips in the scenarios, as these trips have been incorporated in the model in an accurate method.
- 4.4.5 Additional trips added to the relevant zones of the forecast matrices follow the base AM distribution of individual zones. Such distributions were established during the model validation process. It was thought appropriate to use these base distributions as no information was provided, or obtained, regarding the future distribution of proposed developments.
- 4.4.6 See *Appendix C* for detailed flow charts describing the processes undertaken to create the 2011, 2026 Do-Nothing and 2026 Do-Something matrices.
- 4.4.7 *Figures 4.2 to 4.4* show a diagrammatic views of the trip ends incorporated in the 2011, 2026 Do-Nothing and 2026 Do-Something matrices.



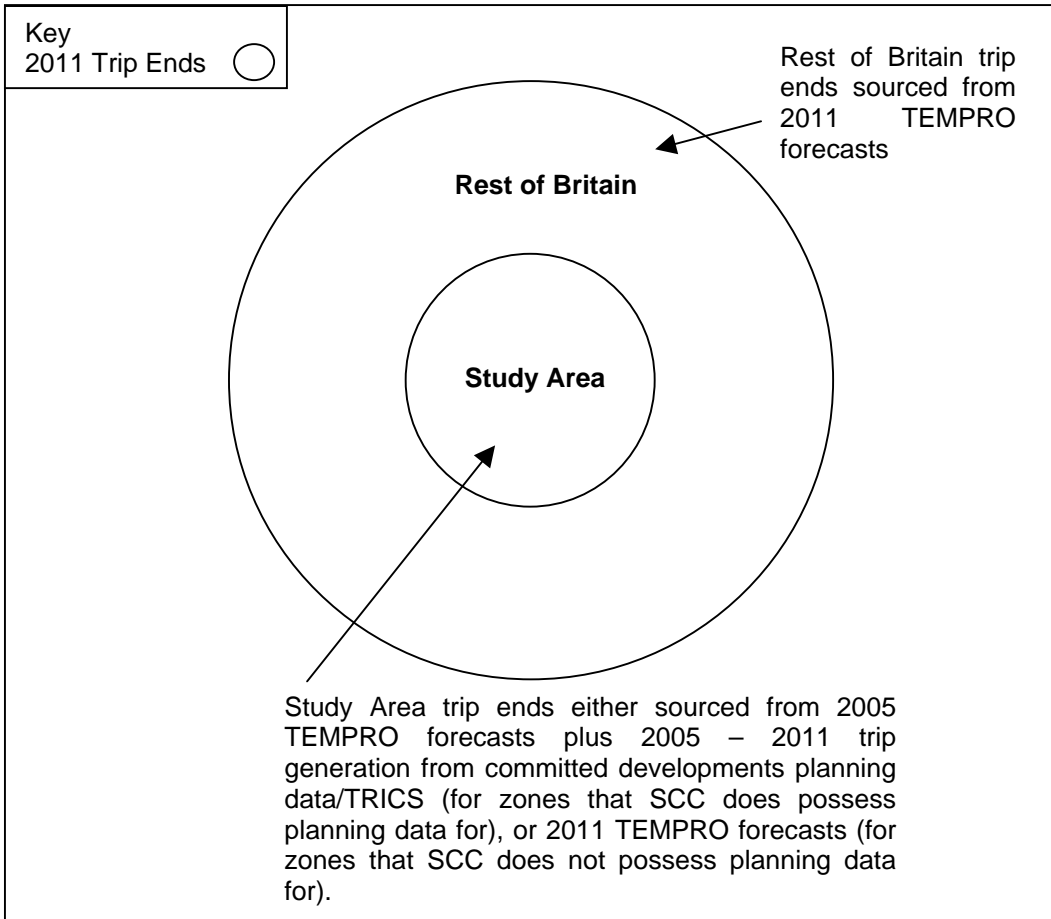


Figure 4.2: Diagrammatic view of trip ends incorporated in 2011 matrix

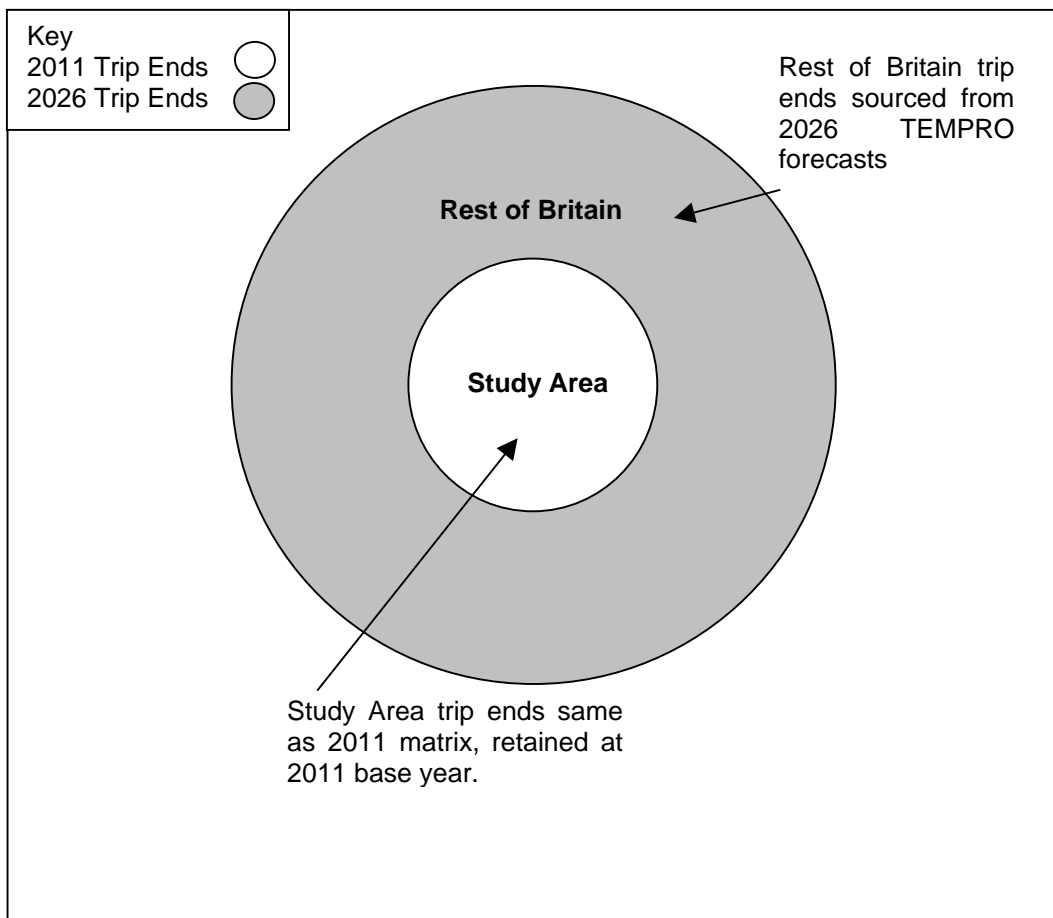


Figure 4.3: Diagrammatic view of trip ends incorporated in 2026 Do-Nothing matrix

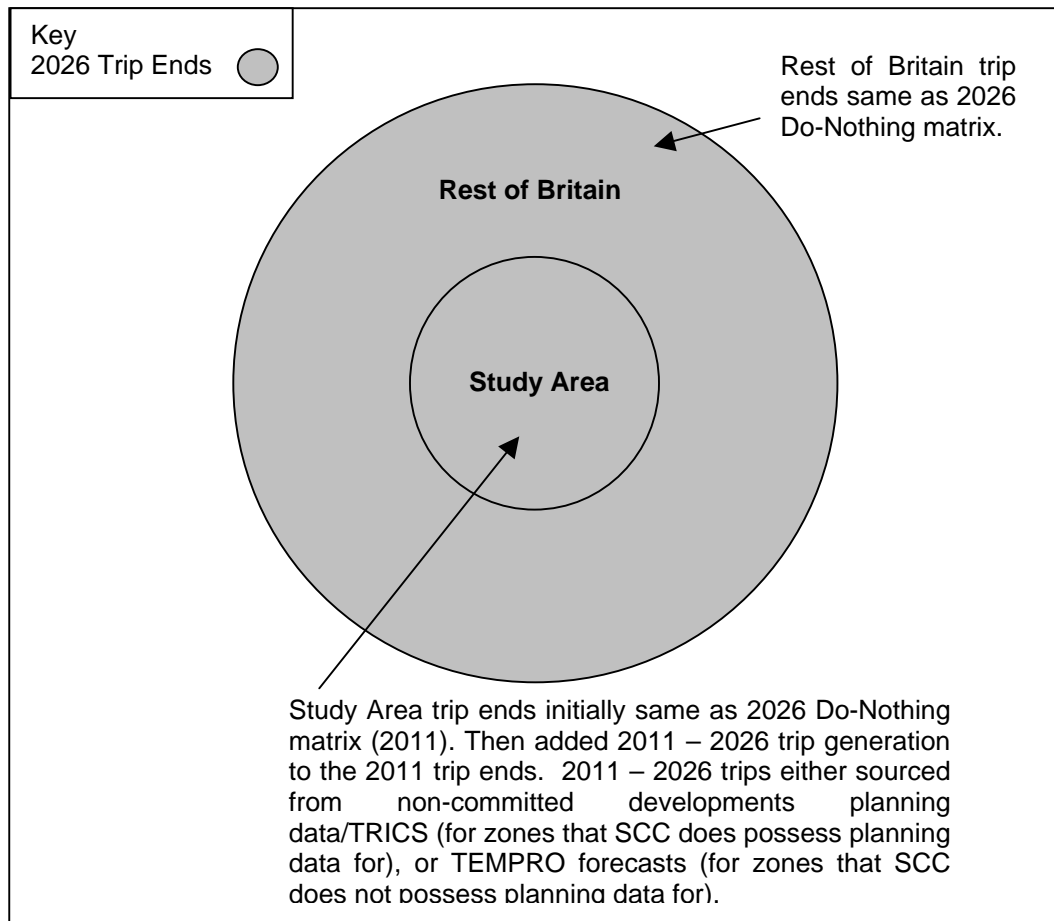


Figure 4.4: Diagrammatic view of trip ends incorporated in 2026 Do-Something matrix

- 4.4.8 *Tables 4.11 to 4.13* show the aggregated matrices for all modelled vehicle types for the AM average hour (0700 – 1000). The matrices have been aggregated into geographic sectors covering the borough/districts of Surrey, surrounding geographic areas and other areas of the Country.
- 4.4.9 *Table 4.14* shows the matrix totals and intra County trips as well as the absolute and percentage differences between the modelled scenarios and the 2011 base year.

	Elmbridge	Epsom & Ewell	Guildford	Mole Valley	Reigate & Banstead	Runnymede	Spelthorne	Surrey Heath	Tandridge	Waverley	Woking	Rushmoor & Hart	Bordon	Horsham & Crawley	E.Grinstead & H.Heath	London	Rest of Britain	Total
Elmbridge	9,426	25	488	376	12	830	382	3	2	287	325	15	0	63	0	1,369	496	14,099
Epsom & Ewell	80	3,849	29	665	644	17	112	2	2	126	18	13	0	25	0	2,730	224	8,534
Guildford	251	9	12,168	418	225	50	54	173	54	2,104	1,242	835	7	4	30	2,077	1,713	21,414
Mole Valley	365	457	482	6,866	504	4	4	4	6	203	34	15	0	172	1	340	866	10,322
Reigate & Banstead	5	643	495	457	8,507	32	29	164	616	97	226	123	0	783	2	1,836	935	14,951
Runnymede	492	2	109	9	100	5,684	704	326	3	102	727	23	0	54	0	135	1,080	9,549
Spelthorne	372	30	82	3	62	1,643	5,794	11	1	12	94	4	0	19	0	2,141	887	11,156
Surrey Heath	3	1	260	7	36	202	15	4,915	80	48	421	945	3	26	0	138	821	7,921
Tandridge	6	6	175	20	767	2	3	127	5,760	35	53	11	0	236	272	1,333	1,092	9,896
Waverley	142	39	2,585	110	15	6	8	25	16	6,603	283	368	434	1	0	866	1,876	13,376
Woking	191	1	1,896	5	84	678	17	279	12	388	5,108	150	6	63	0	396	777	10,051
Rushmoor & Hart	11	12	411	22	25	51	41	647	4	653	86	12,171	52	0	0	1,436	4,706	20,328
Bordon	1	0	3	0	0	0	0	0	0	402	1	1	190	0	0	3	981	1,581
Horsham & Crawley	27	45	45	1,136	1,033	23	26	2	293	124	78	8	0	8,853	88	926	7,843	20,548
E.Grinstead & H.Heath	1	2	42	6	11	0	0	0	313	1	4	0	0	89	359	11	3,749	4,589
London	2,468	3,985	1,355	389	2,215	698	3,297	122	2,206	367	776	339	19	1,927	4	595,810	45,481	661,457
Rest of Britain	871	177	1,042	536	796	1,360	1,533	1,505	1,703	2,449	551	6,242	615	11,656	4,915	179,218	4,832,708	5,047,877
<b>Total</b>	<b>14,712</b>	<b>9,282</b>	<b>21,667</b>	<b>11,024</b>	<b>15,035</b>	<b>11,278</b>	<b>12,019</b>	<b>8,304</b>	<b>11,070</b>	<b>14,001</b>	<b>10,026</b>	<b>21,263</b>	<b>1,326</b>	<b>23,970</b>	<b>5,672</b>	<b>790,765</b>	<b>4,906,235</b>	<b>5,887,649</b>

Table 4.11: 2011 Base aggregated matrix



	Elmbridge	Epsom & Ewell	Guildford	Mole Valley	Reigate & Banstead	Runnymede	Spelthorne	Surrey Heath	Tandridge	Waverley	Woking	Rushmoor & Hart	Bordon	Horsham & Crawley	E.Grinstead & H.Heath	London	Rest of Britain	Total
Elmbridge	9,617	25	446	383	11	822	350	2	2	271	289	12	0	59	0	1,331	479	14,099
Epsom & Ewell	86	3,895	27	676	664	16	114	1	1	123	18	13	0	24	0	2,637	238	8,534
Guildford	230	8	12,234	428	235	47	58	163	50	2,066	1,215	777	8	6	32	2,121	1,737	21,414
Mole Valley	405	434	484	6,923	459	3	4	3	6	189	32	14	0	203	1	309	857	10,322
Reigate & Banstead	4	649	493	440	8,351	29	27	155	629	91	231	122	0	920	2	1,876	943	14,963
Runnymede	438	2	108	8	108	5,734	692	314	2	116	744	22	0	50	0	135	1,073	9,549
Spelthorne	363	28	87	3	67	1,682	5,847	9	1	12	92	4	0	18	0	2,030	914	11,156
Surrey Heath	3	1	258	7	35	200	10	5,042	86	49	406	815	3	28	0	149	831	7,921
Tandridge	5	5	159	19	751	1	2	138	5,671	36	51	10	0	242	278	1,346	1,182	9,896
Waverley	154	42	2,542	106	15	6	7	22	10	6,530	275	350	408	1	0	922	1,986	13,376
Woking	167	1	1,891	5	86	678	19	272	15	372	5,182	146	6	69	0	401	743	10,052
Rushmoor & Hart	12	14	427	22	30	52	38	600	5	644	103	12,117	44	0	0	1,300	4,922	20,328
Bordon	1	0	5	0	0	0	0	0	0	400	1	0	281	0	0	5	888	1,581
Horsham & Crawley	24	41	41	1,051	1,116	16	21	2	250	89	69	7	0	8,266	90	835	8,630	20,548
E.Grinstead & H.Heath	1	2	40	6	13	0	0	0	311	1	4	0	0	120	371	10	3,710	4,589
London	2,363	3,969	1,385	409	2,320	676	3,357	110	2,248	364	777	340	17	2,008	4	631,900	49,476	701,723
Rest of Britain	851	176	1,059	548	807	1,325	1,480	1,477	1,792	2,661	548	6,529	559	11,969	4,898	180,945	5,322,541	5,540,166
<b>Total</b>	<b>14,724</b>	<b>9,290</b>	<b>21,686</b>	<b>11,033</b>	<b>15,065</b>	<b>11,287</b>	<b>12,028</b>	<b>8,311</b>	<b>11,078</b>	<b>14,013</b>	<b>10,035</b>	<b>21,278</b>	<b>1,327</b>	<b>23,984</b>	<b>5,675</b>	<b>828,252</b>	<b>5,401,148</b>	<b>6,420,217</b>

Table 4.12: 2026 Do-Nothing aggregated matrix

	Elmbridge	Epsom & Ewell	Guildford	Mole Valley	Reigate & Banstead	Runnymede	Spelthorne	Surrey Heath	Tandridge	Waverley	Woking	Rushmoor & Hart	Bordon	Horsham & Crawley	E.Grinstead & H.Heath	London	Rest of Britain	Total
Elmbridge	10,050	26	462	399	11	871	367	3	2	283	304	13	0	61	0	1,359	505	14,716
Epsom & Ewell	91	4,292	29	736	727	17	122	1	2	129	18	14	0	26	0	2,851	254	9,309
Guildford	243	8	12,942	460	249	49	61	173	52	2,181	1,270	850	8	7	32	2,221	1,825	22,631
Mole Valley	434	458	503	7,318	476	3	4	3	6	196	34	15	0	211	1	325	898	10,884
Reigate & Banstead	5	735	601	508	9,772	35	31	164	726	106	267	138	0	1,162	2	2,072	1,087	17,410
Runnymede	464	2	110	9	113	6,570	703	352	3	117	767	23	0	66	0	145	1,107	10,550
Spelthorne	387	30	92	3	71	1,812	6,293	10	1	12	97	4	0	20	0	2,158	972	11,960
Surrey Heath	3	1	275	7	39	209	13	5,467	97	57	424	930	3	31	0	165	888	8,608
Tandridge	5	6	164	20	786	2	2	145	6,022	37	54	11	0	251	286	1,426	1,243	10,461
Waverley	159	45	2,658	107	16	7	7	23	11	6,921	289	369	438	2	0	951	2,092	14,094
Woking	182	1	2,111	5	88	819	20	292	19	403	5,933	153	6	69	0	420	793	11,315
Rushmoor & Hart	12	14	485	22	30	53	42	632	5	729	117	14,000	49	0	0	1,409	5,195	22,792
Bordon	1	0	5	0	0	0	0	0	0	418	1	0	293	0	0	5	927	1,650
Horsham & Crawley	26	45	44	1,156	1,219	17	23	2	284	101	74	7	0	9,193	101	878	9,723	22,894
E.Grinstead & H.Heath	1	2	45	7	13	0	0	0	347	1	4	0	0	117	404	12	3,681	4,634
London	2,363	3,969	1,385	409	2,320	676	3,357	110	2,248	364	777	340	17	2,008	4	631,900	49,476	701,723
Rest of Britain	851	176	1,059	548	808	1,325	1,480	1,477	1,792	2,661	548	6,529	559	11,971	4,898	180,947	5,322,540	5,540,170
<b>Total</b>	<b>15,277</b>	<b>9,809</b>	<b>22,969</b>	<b>11,715</b>	<b>16,737</b>	<b>12,464</b>	<b>12,525</b>	<b>8,853</b>	<b>11,616</b>	<b>14,715</b>	<b>10,978</b>	<b>23,396</b>	<b>1,374</b>	<b>25,195</b>	<b>5,728</b>	<b>829,242</b>	<b>5,403,206</b>	<b>6,435,800</b>

Table 4.13: 2026 Do-Something aggregated matrix

<b>Scenario</b>	<b>Surrey Intra County Trips</b>	<b>Absolute Difference from 2011</b>	<b>% Difference from 2011</b>	<b>External to County Trips</b>	<b>Absolute Difference from 2011</b>	<b>% Difference from 2011</b>	<b>County to External Trips</b>	<b>Absolute Difference from 2011</b>	<b>% Difference from 2011</b>	<b>Matrix total</b>	<b>Absolute Difference from 2011</b>	<b>% Difference from 2011</b>
2011	102,436			35,982			28,833			5,887,649		
2026 Do-Nothing	102,399	-37	0.0%	36,213	231	0.6%	28,942	109	0.4%	6,420,217	532,568	9.0%
2026 Do-Something	110,978	8,542	8.3%	36,680	698	1.9%	30,960	2,127	7.4%	6,435,800	548,151	9.3%

Table 4.14: Matrix summaries