Canterbury VISUM Transport Model

Local Plan Preferred Option Testing Report

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1 Introduction

1.1 Background

Amey have been commissioned by Kent County Council (KCC) and Canterbury City Council (CCC) to provide transport modelling support to test the traffic impact of a revised Local Plan development scenario (Preferred Option) for Canterbury City and other local district centres.

The commission requires the use of the existing Canterbury VISUM model, as previously developed by Jacobs on behalf of KCC and CCC, to assess forecast demand for car travel, commercial road vehicles, park & ride, bus and rail services in support of the Local Plan process.

1.2 Existing VISUM Model

The existing model includes a 2008 Base Year and covers the Canterbury District with the detailed model area focussing on Canterbury City and immediate surrounding area (see **Figure 1-1** below).

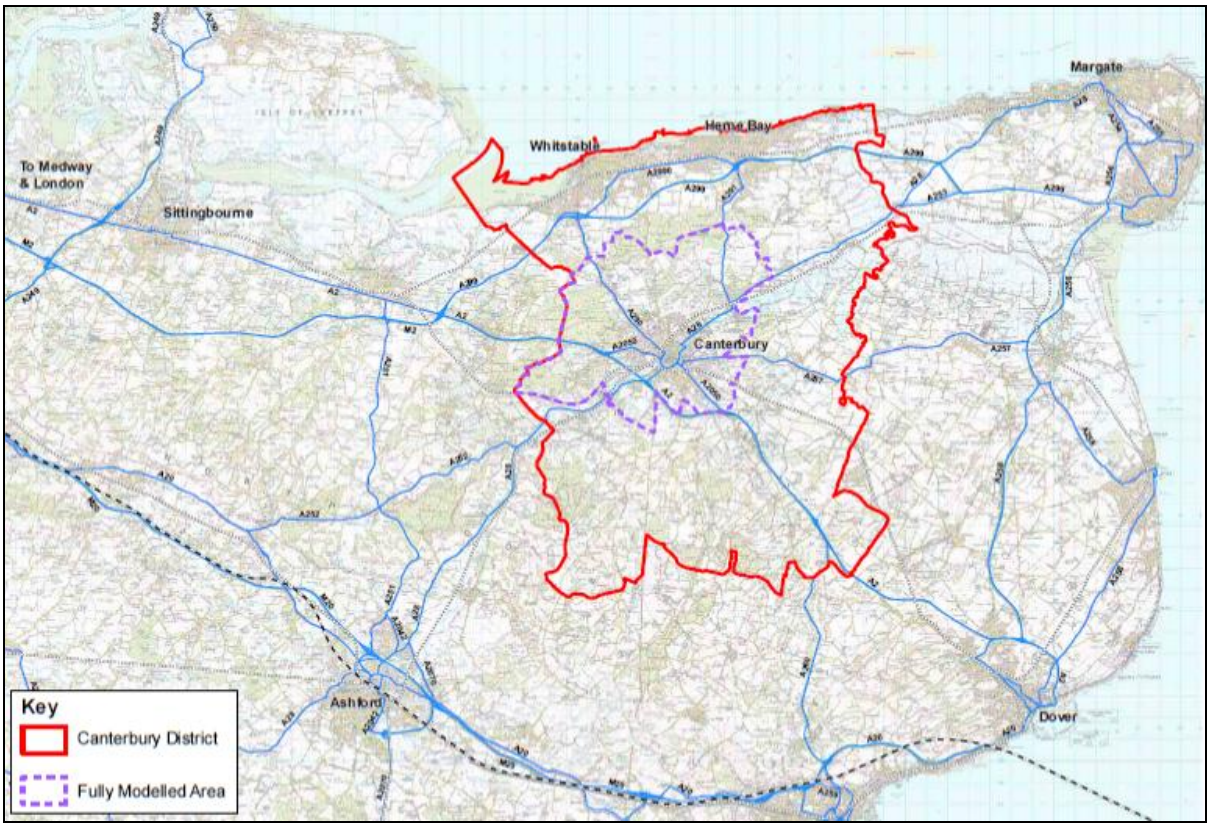


Figure 1-1 Canterbury Model Area

A Jacobs Local Model Validation Report (LMVR), dated June 2012, states that 'the model was measured against validation standards set by the DfT and was demonstrated to meet or exceed the minimum validation criteria as evidence that the model is validated' and further states that 'the model has been validated to a high standard and is now ready for forecast testing.' Amey have conducted a review of the LMVR and Jacobs modelling methodology and are satisfied that the model was developed in an appropriate manner. It is recommended that the 2012 LMVR should be referred to for the full technical background of the model.

Jacobs previously used a 2026 horizon year to test different geographical distributions of development across the district. The model outputs and network performance have been summarised in a Jacobs Option Testing Report dated October 2012. It is also recommended that this report is referred to as context for this latest study.

1.3 Purpose of Document

KCC and CCC have commissioned Amey to develop a 2031 forecast year to test a Do Minimum development scenario, including limited economic and housing growth with minor transport intervention, against a Do Something scenario (Preferred Option), including high economic and housing growth with significant transport intervention. This document provides background to the modelling methodology and a summary of the modelled outputs used to assess overall demand and network performance, including:

- Travel Demand;
- Mode Share;
- Average speeds; and
- Journey Times.

This document should be read within the context of previous modelling work, as undertaken by Jacobs, and also the emerging CCC Local Plan documents, in particular the Canterbury Transport Strategy.

2 Methodology

2.1 Overview

Previous forecast models for Canterbury were developed to represent 2026 Do Minimum and Do Something scenarios, for Options 1, 2 and 3. These models were developed from the Base model using planning data, trips rates derived from TRICS and growth factors from TEMPRO.

With the aim of maintaining consistency with previous work, the 2031 forecast model scenarios have been developed based on the data and files from earlier models that were made available to Amey. These files include base year matrices, highway and public transport networks, skimmed cost matrices and parameter values for mode choice. A number of assumptions have been applied as required where there have been complications in the transfer of data, omissions or ambiguities.

2.2 Modelling Approach

The general principal adopted was to mirror the approach used for the previous option testing as far as practicable. To this end the trip rates used are the same as used previously. The TEMPRO database in conjunction with the National Trip End Model (NTEM) has been employed to provide for background growth and external traffic growth.

2.2.1 Model Process

The model process consists of generating reference matrices from an existing start-point. For the Do Minimum, the starting point was the base which was growthed up to reflect general changes in trip-making (background growth) and to add trips for the specific land-use proposals identified (planning completions, permissions etc). A matrix-furnessing approach was used, with relevant adjustments to account for empty zones or sparse distributions.

The reference matrices were assigned to a network which incorporated changes anticipated for the highway or for public transport. These assignments allow skims to be generated for travel costs. This information can be used to inform an incremental mode-choice of car, bus and train.

There is also a final sub-mode choice for car trips between ‘car-all-the-way’ and ‘park & ride’ which was carried out at the absolute level to account for park & ride mode-choice.

The Do something matrices were developed in the same way with the addition of the key development locations.

2.2.2 Assumptions and modifications to the model

A number changes / assumptions were found to be necessary for the development of the 2031 forecast models and these are summarised in **Appendix A**. These include assumptions around the following items:

- Car parking availability and cost;
- Highway cost skims;
- Park and ride modelling;
- Bus services; and
- Network capacity.

2.2.3 Walking and Cycling

Walking and cycling modes of travel are not modelled specifically. Trip generation for the model is based on vehicle trips and an estimate of bus/rail trips is extrapolated from this. It is presumed that a further 20% of walk and cycle trips are not accounted for. The transport strategy aims to increase the walk and cycle trips, especially within the urban area. On this basis new development trips within the Canterbury urban area have been assumed to have the potential for a higher proportion of walking and cycling trips (30%) which would otherwise have been made by car. Car trips estimated for development are adjusted accordingly to reflect the higher proportion of walking and cycling trips.

Furthermore, an objective of the Canterbury Transport Strategy is to raise the mode share of walking and cycling in the Canterbury urban area for existing travel to 40%. This change has been reflected by the adjustment of trips which are: home based only; within the urban area; and of less than 5 km. The overall change in trip generation for the model, as a consequence of this adjustment, is of the order 700 to 1000 vehicles in the AM and PM peaks respectively.

2.2.4 Mode Choice

The forecast year mode choice is based on the balance of the generalised cost of travel by car and public transport. Travel costs are determined from parking costs, vehicle operating costs, value of time, bus and rail fares.

The mode choice model allows for the change of mode between car, bus and rail for Home Based Work (HBW) and Home Based Other (HBO) trips, excluding external to external trips.

For the purposes of the current modelled scenario the vehicle operating costs, public transport cost and value of time remain unaltered. Parking costs applied are adjusted to reflect an increase of 5% per annum for the city centre and also to take into account the paying and non-paying parking, long and short stay parking, subsidised parking etc.

2.3 Model Outputs

The objective of this modelling exercise is to provide a means of assessing the traffic impact of a revised Local Plan development scenario (Preferred Option) for Canterbury. The model is a strategic level model providing an overview of how traffic responds to changes in demand and in network provision across the wider area.

Output from the VISUM model has been extracted to provide an overall view of the expected level of travel demand for the Do Minimum and Do Something scenarios and the subsequent impact on network performance and efficiency.

The model network performance has been assessed using key indicators:

- Average network speed
- Total vehicle distance travelled (vehicle kilometres)
- Total travel time (vehicle hours)

The total vehicle kilometres (vkm) travelled and total vehicle hours (veh) recorded on the network, in relation to the number of trips made, provide an indication of the level of efficiency of the network (e.g higher vehicle kilometres indicate that people have to travel further or take longer routes; and higher vehicle hours indicate people are taking longer to travel on a congested network.). The average network speed is based on the total travel time and travel distance.

2.4 Summary

A modelling approach has been adopted to utilise the existing Canterbury VISUM Model and maintain consistency with previous Local Plan analysis. In the interests of best practice, a number of minor adjustments have been made to the model to ensure any model outputs best reflect the latest strategy decisions and also the forecast traffic situation.

The model outputs provide key indicators, including average speed, travel distance and journey times, to analyse future network performance and overall efficiency. This document summarises the outcomes of this analysis.

3 Development Scenarios

3.1 Overview

The modelling approach builds on the previous option testing exercise, undertaken by Jacobs, to assess the following three different development scenarios:

- **Option 1** – residential development primarily in and around Canterbury city and the Herne Bay area with a higher allocation of commercial development focussed in the same areas;
- **Option 2** – lowest allocation of residential units primarily located in coastal areas and A28 corridor at Sturry and Hersden. Commercial development is also focused in similar areas.
- **Option 3** – significant residential development distributed across the district. Lower level of commercial development distributed in the Herne Bay, Sturry and Hersden areas.

The option testing exercise, previously undertaken by Jacobs, demonstrated negligible differences in network performance between the three options in 2026. Notwithstanding a higher development allocation and travel demand, Option 1 demonstrated marginally improved performance over the other options through more beneficial transport interventions.

While, in transport terms there was limited geographical bias as to where development should be located, the forecast scenarios did identify that future development would have significant impacts on an already constrained network. Any development strategy would therefore need to bring forward significant transportation improvements to assist with existing and future capacity issues.

CCC and KCC have therefore derived a preferred development scenario, which combines key attributes of Options 1-3 to deliver beneficial transport infrastructure and encourage modal shift to park & ride, bus, rail, cycle and walking as well as deliver the economic and housing growth aspirations for the district up to 2031.

3.2 Development Assumptions

It was agreed that a 2031 Do Minimum scenario, incorporating committed schemes, existing allocations and permissions, would be tested alongside the Do Something (Preferred Option) scenario to provide a future year ‘baseline growth’ situation for comparison purposes.

The Draft Local Plan for 2011 to 2031 seeks to provide 15,600 houses and 97,000sqm for employment use.

The forecast models for 2031 are developed from the 2008 Base model. The development assumptions built in to the 2031 Do minimum forecast models also allow for allocations and planning permissions from the base year 2008 recorded as completed, under construction or not started. The Do something development scenario is built onto the Do Minimum, with the inclusion of the additional strategic housing and employment land allocations identified in the Draft Local Plan and including windfall development assumptions.

The total quantum of residential, employment and retail development assumptions included to create the 2031 Do Minimum and Do Something modelled scenarios from the 2008 Base are summarised in **Table 3-A** below.

Table 3-A Land Use Assumptions (2008 – 2031)

Land Use (2008 – 2031)	Do Minimum	Do Something
Housing (units)	4,800	16,900
Employment (all use classes) (sqm)	263,000	433,500
Retail (sqm)	8,200	65,291

The individual development assumptions have been allocated to the most appropriate model zone that best reflect location and likely access arrangements to the highway network. Windfall developments have been distributed in the respective zones using the proportion of housing allocated per zone. **Appendix B** includes a map of the key strategic development sites to be allocated in the Local Plan, including Canterbury, Herne Bay, Sturry, Hersden, Herne and Whitstable.

It should be noted that the Do Minimum accounts for development since 2008 and differs from the Do Minimum scenario previously tested by Jacobs, given variations between previous assumptions and development actually delivered.

3.3 Housing

The housing allocation for the Do Something scenario generally reflects the previously tested Option 1, with development primarily concentrated in and around the Canterbury urban area, e.g. Sturry and land at South Canterbury; with a secondary emphasis on Herne Bay. The remaining housing is located in Whitstable and dispersed across the rural areas.

The composition of housing for all development is assumed to comprise of:

- 1 bedroom flat 15%;

- 2 bedroom flat 15%;
- 2 bedroom house 30%;
- 3 bedroom house 30%;
- 4+ bedroom house 10%;
- 30% assumed affordable housing.

3.4 Employment

The composition of employment development focuses on a mix of 70% B1/B2 employment and 30% B8 Storage and Distribution/Sui Generis to include car show rooms. The employment allocation generally reflects the housing patterns with the majority of development centred in and around the Canterbury urban area, e.g. Hersden and land at South Canterbury, as well as Herne Bay.

3.5 Retail

A significant level of retail development will be concentrated in the Wincheap area to the south west of Canterbury city centre. The remaining development will be allocated in Herne Bay.

3.6 Other Development

The Do Something includes a 4 form primary school and a 3 GP doctor surgery on land at South Canterbury to support up to 4,000 dwellings. A doctor surgery and primary school are also proposed in Herne Bay to support respective mixed use developments at Herne Bay Golf Course and Hillborough.

The land use assumptions built into both the Do Something and Do Minimum scenarios, including the zone allocation for each development, are summarised in **Appendix B**.

3.7 Transport Interventions

The Do Something scenario requires the delivery of a package of highway, public transport and parking management improvements to mitigate the traffic impact associated with development growth. While these have been included in the model where possible, some specific measures, e.g. changes in parking capacity, are not directly accounted for.

KCC and CCC have identified a range of measures, which aim to address specific transport issues, while remaining deliverable through specific development clusters and within the known constraints. **Table 3-B** summarises the principal schemes included in the Do Minimum and Do

Something scenarios. The schemes are referenced with further details of their location and specific proposals at **Appendix C**.

A range of schemes, particularly in the Wincheap area, are likely to be delivered to relieve local congestion in the Do Minimum scenario. Building on this, the Do Something seeks to also address wider strategic issues with the delivery of an all movement A2 junction to replace the existing constraints at the Bridge Interchange and a southbound off slip at Wincheap.

New link roads are proposed at Herne, Chaucer Road, Sturry and Broad Oak to relieve excessive traffic demand on constrained routes and improve capacity. The layouts of such schemes are largely assumption based at this stage and are subject to design feasibility and more detailed modelling.

Table 3-B Proposed Do Minimum and Do Something Transport Interventions

Ref.	Highway Measures	Do Minimum	Do Something
1	New All movement A2 Junction at Bridge	×	✓
2	A2 southbound off-slip at Wincheap (includes gyratory layout)	×	✓
3	Wincheap Relief Road	✓	✓
4	Sturry Relief Road	×	✓
5	Broad Oak Relief Road	×	✓
6	Herne Relief Road	×	✓
7	Chaucer Road/Barracks Link Road	×	✓
Ref.	**Public Transport Measures**	**Do Minimum**	**Do Something**
8	Extend Sturry Road Bus Lane to Kingsmead Roundabout	×	✓
9	Old Dover Road Bus Gate and Priority Measures	×	✓
10	Fast Bus Link from South Canterbury Development	×	✓
11	Wincheap Bus Priority	✓	✓
	Bus Fare Subsidy South Canterbury Development	×	✓
Ref.	**Traffic Management Measures**	**Do Minimum**	**Do Something**
12	St Dunstans/Westgate Towers Environmental Improvements	✓	✓

Ref.	Parking Measures	Do Minimum	Do Something
13	New Dover Road P&R Increase Capacity to 1,000 (+400 spaces)	×	✓
14	Wincheap P&R Increase Capacity to 900 (+300 spaces)	×	✓
15	Sturry Road P&R Increase Capacity to 700 (+100 spaces)	×	✓
16	Remove 543 Spaces from City Centre Parking Capacity	×	✓
	5% Annual Increase in Parking Tariffs	✓	✓

Overall access to Park & Ride will be improved through improvements to the A2 junctions at Wincheap and New Dover Road; and through a link to the proposed Sturry Relief Road. Local bus priority measures, including extended bus lanes and bus gates, are proposed to improve park & ride bus journey times. Capacity will be increased at each site to accommodate any additional demand either resulting from improved access or displaced from the removal of city centre parking.

City wide bus priority measures will also support more frequent bus services and improve overall journey times. In particular, a new frequent 'Fast Bus' link is proposed to connect strategic sites at South Canterbury with the City Centre via Kent & Canterbury Hospital. It is envisaged that any service would be subject to subsidised fares to attract patronage in the initial years.

It should be noted, while the model makes provision for a number of economic and physical interventions, it does not account for all Travel Demand Management (TDM) measures including Smarter Choices, pedestrian and cycling improvements. It is therefore realistic to assume that further sustainable modal shift and mitigation could be achieved over and above the modelled outputs.

3.8 Summary

The Do Something builds on the previous option testing exercise undertaken for a 2026 horizon year. The revised proposals seek to deliver 12,120 houses, 170,500 sqm of employment and 57,100 sqm of retail by 2031 over and above the Do Minimum scenario. The largest proportion of development is allocated in and around Canterbury with a secondary emphasis on the Herne Bay area.

A comprehensive package of economic and physical transport interventions have been identified to address historic issues as well as mitigate future traffic growth and related impacts.

The Canterbury Transport Strategy also proposes a range of TDM initiatives, not fully accounted for in the model, to target additional sustainable modal shift over and above the modelled outputs.

It is recognised that a number of the key infrastructure improvements are still at the high level conceptual stage and details of capacity, junction arrangements and physical alignment are currently unknown. While various design assumptions have been made, it is recommended that any significant scheme, e.g. Sturry and Wincheap Relief Roads, are subject to more detailed assessment.

4 Travel Demand

4.1 Overview

A range of indicators have been used to demonstrate and compare the transport situation between the 2008 Base, 2031 Do Minimum and 2031 Do Something. The model demonstrates the estimated travel demand for highway and public transport trips for each scenario. While total travel demand is referred to throughout this document as person trips, walking and cycling trips are not modelled. This section looks at overall travel demand across the network and the patterns of trip origins and destinations for the AM and PM peak hours.

4.2 Total Travel Demand

The total travel demand (person trips) and the respective changes for each scenario are summarised in **Table 4-A** below. The model estimates highway, bus and rail trips will increase by up to 17% between the 2008 Base year and 2031 Do Minimum scenario. The delivery of the Do Something development scenario is estimated to increase total travel demand by up to 30% from the current situation and by 13% from the Do Minimum. The model demonstrates that the AM and PM peak hour demand levels are relatively consistent in each of the scenarios. The stated values do not include through trips travelling between areas external to the model which do not travel through the Canterbury urban area i.e. movements along the A2.

Table 4-A Person Trips by Scenario (excludes external to external trips)

Person Trips	AM Peak			PM Peak		
	Base	Do Min.	Do Som.	Base	Do Min.	Do Som.
Total Demand (per hour)	35100	40900	45600	36000	41200	46500
% increase from Base (2008)		17%	30%		15%	30%
% increase from Do minimum			11%			13%

The model output principally assesses the impact on the highway network. **Table 4-B** summarises the changes in vehicle trip demand across the network for each scenario. The values stated do include vehicle through trips travelling between areas external to the model. The results demonstrate in 2008 there were approximately 30,000 vehicle trips using the modelled network in the given peak hours. Vehicle demand will increase by up to 18% (6,000 vehicle trips) in the 2031 Do Minimum scenario and 29% (9,000 vehicle trips) in the 2031 Do Something scenario from current levels. However, the forecast traffic growth only represents a

10% increase between the Do Minimum and Do Something scenarios, which could potentially be addressed by additional TDM measures as set out in the Canterbury Transport Strategy.

Table 4-B Vehicle Trips by Scenario (includes external to external trips)

Vehicle Trips	AM Peak			PM Peak		
	Base	Do Min.	Do Som.	Base	Do Min.	Do Som.
Vehicle Demand (per hour)	30500	36100	39400	29800	35000	38500
% increase from Base (2008)		18%	29%		17%	29%
% increase from Do minimum			9%			10%

4.3 Travel Demand Patterns

4.3.1 Origin & Destination

The model outputs provide analysis of how new developments are expected to generate and attract new trips. The analysis provides an understanding of how future demand growth corresponds to existing and expected transportation issues. **Figures 4-1** and **4-2** illustrate the trip departures and arrivals generated by the additional development trips included in the Do Something. These have been grouped by sector to provide a more convenient representation. The sectors used are detailed in **Appendix D**.

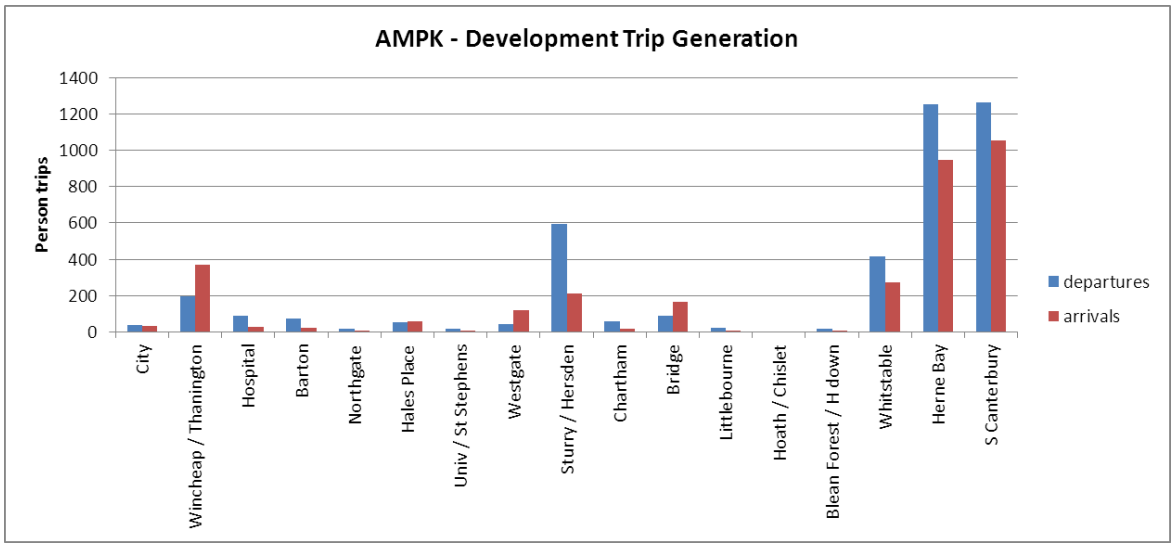


Figure 4-1 AM PK – Do Something Development Trip Generation

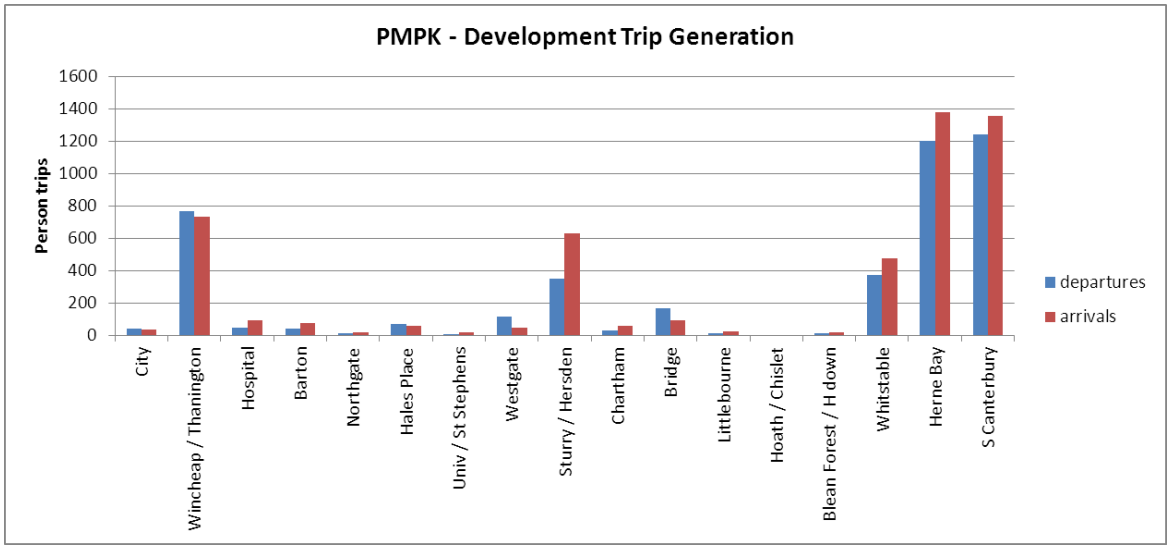


Figure 4-2 PM PK – Do Something Development Trip Generation

As would be expected, the outputs generally correspond with the allocation of new development in the Do Something scenario. Travel demand is primarily focused on areas in and around the Canterbury urban area, at Wincheap, South Canterbury and Sturry; with a secondary focus on Herne Bay.

4.3.2 Canterbury Cordon Flows

Inner and outer cordons, illustrated in **Figure 4-3**, have been used to assess traffic demand moving within the city and between the city and the immediate surrounding areas. **Figures 4-4** and **4-5** show the net traffic crossing the inner and outer cordons for the different scenarios. **Table 4-C** provides a summary of this analysis and the resulting changes between the three scenarios.

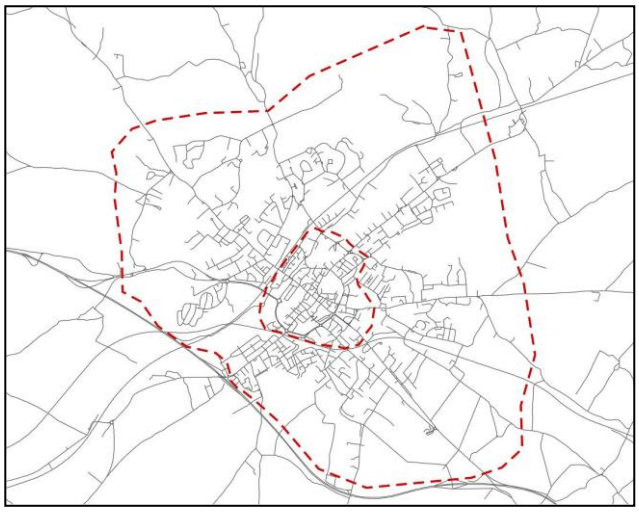


Figure 4-3 Canterbury - Inner and Outer Cordons

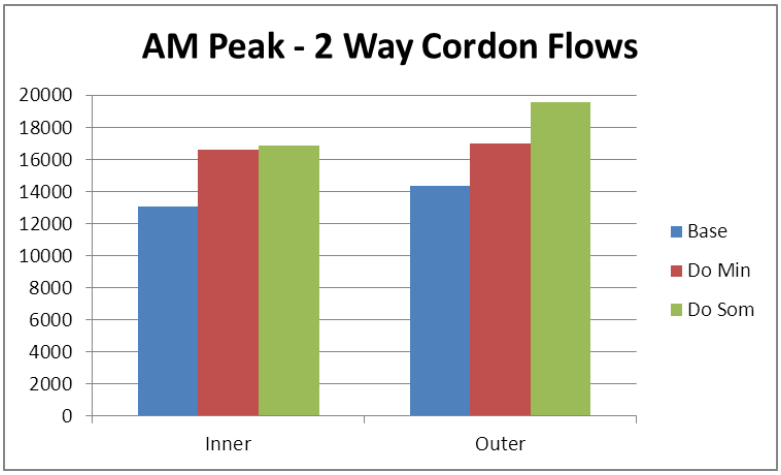


Figure 4-4 AM Peak – Cordon Flows

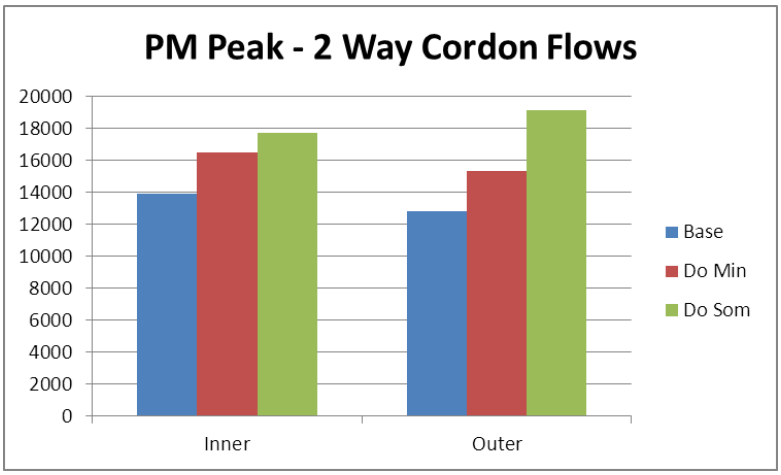


Figure 4-5 PM Peak – Cordon Flows

Table 4-C Canterbury Cordon Flows (Rounded)

Two Way Flows	AM Peak			PM Peak		
	Base	Do Min.	Do Som.	Base	Do Min.	Do Som.
Inner Cordon	13050	16600	16900	13950	16550	17750
Increase from Base (2008)		27%	30%		19%	27%
Increase from Do Minimum			2%			7%
Outer Cordon	14350	17000	19650	12850	15350	19150
Increase from Base (2008)		18%	37%		19%	49%
Increase from Do Minimum			15%			25%

The results demonstrate that, between 2008 and the Do Minimum, AM and PM peak hour traffic flows crossing the inner cordon will increase by up to 27% and up to 19% respectively. The comparative change between the 2031 Do Minimum and Do Something scenarios represents an increase to the inner cordon flows of only 2% in the AM peak and 7% in the PM peak. However, the increase is more notable for the outer cordon with a 15% increase in the AM peak and 25% increase in the PM peak.

The model outputs indicate that the Do Something scenario will have a greater impact on Canterbury's outlying highway network. The higher increases in the outer cordon, when compared to the inner cordon, are potentially due to: the higher distribution of development in these areas; saturation levels of city centre network; and also the impact of city centre transport interventions e.g. bus priority, bus frequency, fare incentives and the reduction of city centre parking stock.

4.3.3 Canterbury Link Flows

A more detailed analysis of specific links, as shown in **Figure 4-6**, has been undertaken to assess the impact of future development and the intervention of different transportation measures. **Table 4-D** and **Figures 4-7** & **4-8** provide a summary of the modelled traffic flows for the corresponding links.

Figure 4-6 Link Flow Locations

Table 4-D Canterbury Link Flows (Rounded)

2 Way Flows (vehs)	AM Peak			PM Peak		
	Base	Do Min	Do Som	Base	Do Min	Do Som
1 Rheims Way (A2050)	2450	3250	3050	2400	2650	2700
2 Whitstable Road (A290)	1350	1850	2100	1750	1750	2050
3 St Stephens Road	900	1150	1400	800	1300	1450
4 Broad Oak	900	1100	1450	1350	1350	1700
5 St Stephens Road (B2248)	1200	1250	1450	1350	1550	1500
6 Kingsmead Road (B2248)	1450	1550	1700	1650	1800	2150
7 Sturry Road (A28)	1350	1600	1700	1700	1700	1800
8 Barracks Link	NA	NA	800	NA	NA	800
9 St Martins Hill (A257)	1050	1350	1400	1150	1450	1500
10 New Dover Road (A2050)	1150	1500	2000	1000	1250	2150
11 Old Dover Road (B2068)	750	850	700	450	600	750
12 Wincheap (existing A28)	1400	103	107	1800	200	200
13 Wincheap (new route)	NA	2200	2450	NA	1950	2800
14 Broad St (A28)	1150	1300	1200	2150	2400	2350

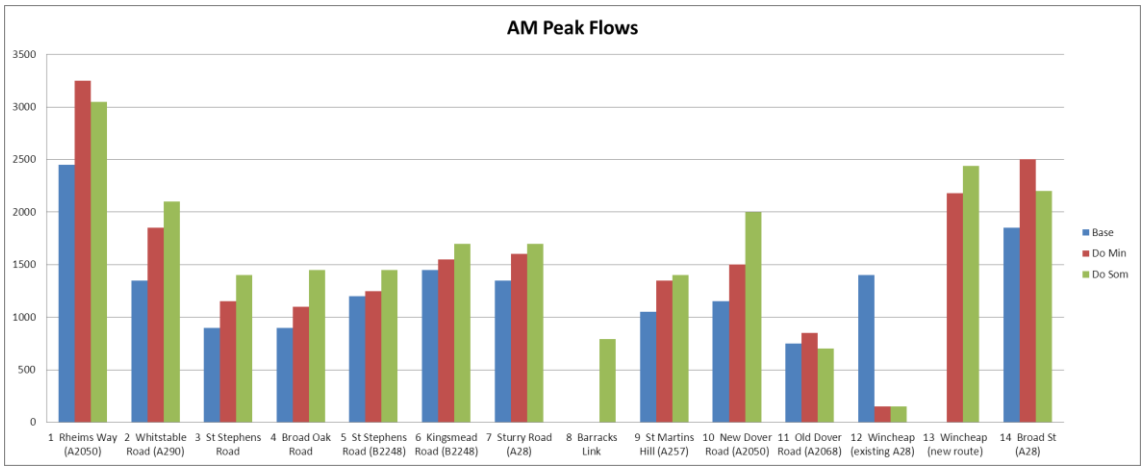


Figure 4-7 AM Peak – 2 Way Link Flows

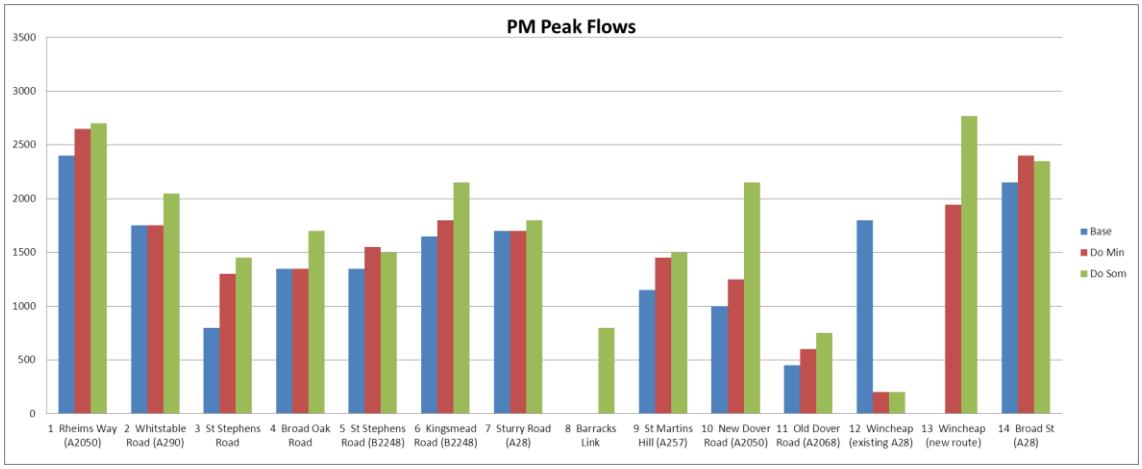


Figure 4-8 PM Peak – 2 Way Link Flows

While a general increase in traffic flows across Canterbury might be expected, with the additional development built in to the Do something scenario, the link flows indicate a number of key changes compared to the Do Minimum:

- **A2050 Rheims Way:**

The introduction of a southbound A2 off slip at Wincheap, in the Do Something scenario, will potentially divert some traffic away from this route reducing forecast peak traffic flows in the AM and only marginally increasing flows in the PM.

- **Broad Oak Road:**

The creation of a Sturry relief road and a more formal route to Broad Oak Road from the A28, in the Do Something scenario, will transfer traffic to this route as an alternative to the A28 Sturry Road. Forecast flows will therefore increase by up to 30% in peak periods on Broad Oak Road.

- **A28 Sturry Road:**

The transfer of trips to Broad Oak Road, as discussed in the previous point, the introduction of bus priority and increased Park and Ride capacity will result in relatively modest increases (6%) to forecast flows on the A28 Sturry Road in the Do Something situation.

- **A28 Broad Street/A257 St Martin's Hill (Barracks Link)**

The creation of a Barracks Link Road between A257 Littlebourne Road and Chaucer Road will attract approximately 800 peak hour trips in the Do Something. The transfer of these trips will reduce forecast traffic flows on the A28 Broad Street and limit any increase on A257 St Martin's Hill.

- **A2050 New Dover Road/Old Dover Road:**

The introduction of a Bus Gate on Old Dover Road, at the junction with St Lawrence Road, is likely to transfer traffic to the A2050 New Dover Road. Furthermore, the provision of an improved A2 Bridge junction will also increase forecast traffic flows significantly on A2050 New Dover Road.

- **A28 Wincheap:**

The creation of a new relief road through the existing Wincheap Estate and bus priority measures, in the Do Minimum, will remove all but local access and bus traffic from the current A28 alignment. The addition of the southbound A2 off slip and large scale retail development, in the Do Something scenario, will significantly increase forecast traffic flows in the Wincheap area, particularly in the PM peak.

4.4 Summary

The Do Minimum development assumptions, based on planning consents, permissions and completions, presents an almost inevitable increase in travel demand of up to 17% compared to 2008. The Do Something development assumptions results in an estimated increase of between 11% and 13% in travel demand over the Do Minimum for the AM and PM peak periods respectively.

The development located in South Canterbury will be the principal trip generator within the urban area. A significant amount of the trip generation occurs outside the immediate area of Canterbury near Herne Bay and a smaller amount at Sturry and Hersden.

The volume of traffic crossing the cordons indicates a higher increase in traffic moving between the outer area and Canterbury (15% to 25%) and a smaller increase in traffic crossing the inner cordon (2% to 7%) to move around the city. It is possible that the city centre road network has reached a level of saturation such that traffic takes longer routes to move around the city to reach their destination crossing the outer cordon but not the inner one.

The link flows indicate that there is a change in traffic pattern which is a consequence of not only the new development and associated trip making, but also the transport interventions included such as the A2 coast bound off slip, new A2 junction at Bridge, Barracks Link and constraint applied to Old Dover Road. The highest traffic volumes are recorded on Rheims Way, Wincheap and Broad Street.

5 Mode Share

5.1 Overview

The model calculates mode share and modal shift for car, bus, rail and park & ride trips only and does not specifically account for walking and cycling. This section addresses mode share for car, bus, rail and Park and Ride trips and compares the Do Minimum and Do Something scenarios. Section 2 of this document discusses how walking and cycling trips have been considered.

Home-based work (HBW) and home-based other (HBO) have been assessed, given these trips are most likely to have the opportunity for modal shift. It is assumed that employer's business and non-home-based other trips are unlikely to have much opportunity to change mode.

5.2 Car, Bus and Rail Trips

The mode share for car, bus and rail trips is based on the generalised cost of travel for each mode. Travel costs are derived from parking costs, vehicle operating costs, value of time and bus and rail fares. The modelling methodology retains the base year value for an element of these costs e.g. vehicle operating costs and fares. However, city centre parking costs have been increased by 5% per annum to encourage mode shift away from the car.

The attraction of bus and rail is also dependent on the origin and destination of trips, the accessibility of public transport at each end of the journey, service provision and the level of delay tolerable to drivers.

While the Do Minimum scenario does include some bus priority improvements at Wincheap and increased parking charges, the Do Something scenario also includes a subsidised fast bus service from the South of Canterbury development as well as bus priority on Old Dover Road and Sturry Road.

The forecast average peak mode share for HBW and HBO trips, as summarised in **Table 5-A** for both the Do Minimum and Do Something, demonstrate relatively little change between the two scenarios. The results generally reflect the outcomes of the previous Option Testing exercise undertaken by Jacobs and indicate that, while the proposed transport interventions will have a positive impact, any benefits would be offset by the overall increase in demand for car travel represented by the Do Something scenario.

A more substantial modal shift to public transport would therefore be reliant on more significant measures, e.g. improved services, further subsidy and increased parking charges, over and above those already tested by the model.

Table 5-A % Trips by Mode of Travel (HBW & HBO person trips)

	AM Peak		PM Peak	
	Do Min	Do Som	Do Min	Do Som
Car	82.7%	82.6%	80.9%	80.9%
Bus	11.7%	11.9%	12.5%	12.2%
Rail	5.6%	5.5%	6.6%	6.9%

5.3 Park & Ride Trips

The park & ride element of the model determines the proportion of car trips that might be expected to divert to the sites provided at Sturry, New Dover Road and Wincheap. This is dependent on travel time, travel costs, location of park and ride sites and level of bus service provided. However, it should be noted that the model does not specifically account for the impact of increasing the capacity of each of the three park & ride sites as proposed in the Do Something scenario.

The forecast park & ride demand, expressed as a proportion of car trips, for the Do Minimum and Do Something scenarios is summarised in **Table 5-B**.

Table 5-B Park and Ride as a % of Car Trips (person trips)

	AM Peak		PM Peak	
	Do Min	Do Som	Do Min	Do Som
P&R as proportion of Car trips	2.8%	3.9%	2.9%	3.4%

The Do Something scenario demonstrates an additional 0.5% to 1% of overall car trips will divert to park & ride. When considered against the increased travel demand of the Do Something scenario, this increase could potentially equate to a 30-40% increase in demand for park & ride over the Do Minimum; which would need to be reviewed against available and proposed capacity to ensure mode shift can be fully realised.

5.4 Summary

The model calculates mode choice for car, public transport and park & ride and assesses the propensity for future modal shift between these modes. Modal shift to walking and cycling modes has been adjusted as a separate calculation to reflect city centre targets proposed in the Transport Strategy.

The model outputs demonstrate relatively modest modal shift to public transport and indicate that the package of measures proposed in the Do Something, while providing benefits, will be offset by the overall increase in car demand. Additional measures are likely to be required to promote significant modal shift over the Do Minimum situation.

The model indicates that the proportion of car trips using park & ride will increase by up to 1%. When considered against the overall increase in travel demand, this will potentially represent a 30-40% increase in park & ride demand between the Do Minimum and Do Something.

6 Network Performance

6.1 Indicators

The overall performance of the model network is assessed for the different scenarios using the following indicators:

- Total vehicle kilometres (vkm) travelled;
- Average peak network speed (kph);
- Total travel time (veh hrs); and
- Journey times (mins).

This section provides a summary of network performance across the full model as well as for the more detailed modelled network focussed on the core Canterbury urban area. The core Canterbury area network is shown in **Appendix E**.

6.2 Network Overview

The total vehicle distance travelled, total vehicle travel time and average peak network speed have been extracted for both the wider network and Canterbury city area in the Do Minimum and Do Something, as shown in **Tables 6-A** & **6-B**.

Table 6-A Wider Network Performance Indicators

Wider Network	AM Peak		PM Peak	
	Do Min	Do Som	Do Min	Do Som
Total vkm	880098	918548	785276	835452
Av. peak network speed (kph)	61.6	58.9	63.6	55.2
Total travel time (vehicle hrs)	14289	15575	12354	15130

Table 6-B Canterbury Area Network Performance Indicators

Core Canterbury Area	AM Peak		PM Peak	
	Do Min	Do Som	Do Min	Do Som
Total vkm	90236	99599	85703	102694
Av. peak network speed (kph)	23.2	22.1	23.4	18.6
Total travel time (vehicle hrs)	3885	4505	3659	5531

The results provide a high level overview of network performance as the model responds to the increased travel demand associated with the additional development of the Do Something scenario. The indicators used represent total distance travelled, total travel time and average speeds for the full network and the core Canterbury area network and do not represent specific link analysis, which is considered later in this section through journey time analysis.

The extent of distance travelled (vkm) in the Do Something is largely due to the increased travel demand generated by the higher development offer. The impact of potential transport interventions, including a new A2 Bridge junction, Wincheap off slip and city wide bus priority measures, will also potentially divert trips away from shorter more congested city centre routes to either make longer journeys on the A2 or use a park & ride site.

The average peak speed, which accounts for the balancing of delays throughout the network and the reassignment of traffic to longer routes with less delay, will reduce across both the Canterbury and wider networks in the Do Something scenario. While the AM peak represents a marginal reduction across the whole network, there is a more notable reduction in the PM peak speeds within the core Canterbury area given the additional demand of proposed development.

The forecast increase in distance travelled and the reduction in average speeds correspond with an increase in total network travel time between the Do Minimum and Do Something scenarios. Travel time increases are more notable in the PM within the Canterbury area and reflect the more congested network associated with the higher development quantum and travel demand.

6.3 Journey Times

The model outputs have been assessed to derive journey time information for specific links, in and around the Canterbury urban area, to provide a more detailed analysis of network performance. The following **Figures 6-1 – 6-2** and **Table 6-C** compare the changes in peak hour inbound/outbound journey times (mins) on key routes for the Base and forecast scenarios. **Appendix F** includes a plan of the routes assessed.

While the increased travel demand of the forecast scenarios is reflected in a general increase in travel time across the network, analysis of the key radial routes indicate a number of key changes from the Do Minimum:

- **Wincheap:**

The introduction of the Wincheap Relief Road will reduce inbound journey times between the Base and Do Minimum scenarios. However, there is little impact on outbound journey times, which the model indicates will increase in the Do Minimum and Do Something.

The addition of the southbound A2 off slip and large scale retail development will significantly increase demand, particularly in the PM peak, which has a corresponding impact on both inbound and outbound journey times. However, until designs and development access arrangements have been finalised and tested in detail, these values should be treated with an element of caution.

- **Harbledown:**

The introduction of the southbound A2 off slip at Wincheap, in the Do Something, will reduce forecast demand on the A2050 at Harbledown and improve journey times. In particular, forecast inbound AM peak journey times will significantly reduce from the Do Minimum scenario.

- **St Stephen's Hill**

While there is limited development proposed in the Stephen's Hill area of Canterbury, forecast journey times are expected to increase in the Do Something scenario. It is anticipated that this route will be constrained by increased demand on city centre routes rather than any specific intervention or development proposal.

- **Sturry:**

The model indicates that the introduction of the Sturry Relief Road in the Do Something will potentially improve journey times on the A291/A28 in the PM peak. However, additional travel demand in the AM peak, particularly inbound, will potentially increase journey times. Again it is advised that until designs and development access arrangements have been finalised and tested in detail, these values should be treated with an element of caution.

Furthermore, the model analysis does not necessarily reflect the localised benefits of a relief road to Sturry's centre e.g. access to local businesses, environmental, release pressure on level crossing and opportunity for bus priority.

- **A257 Littlebourne Road:**

The Barracks Link road will reduce forecast demand on the A257 in the Do Something and will therefore benefit inbound journey times on this route.

- **New Dover Road:**

The addition of an Old Dover Road Bus Gate and an improved A2 junction at Bridge will significantly increase demand on A2050 New Dover Road in the Do Something. As a result, journey times are expected to increase significantly, particularly AM peak inbound and PM peak outbound and inbound. However until the precise nature of bus priority measures are known the impact on journey times cannot be accurately assessed.

Table 6-C Journey Time Route Analysis (mins)

Route	Journey Time (mins)	AM Peak			PM Peak		
		Base	Do Min	Do Som	Base	Do Min	Do Som
1	Wincheap_Inbound	10.5	7.6	8.9	10.3	7.9	11.1
	Wincheap_Outbound	4.9	7.9	9.8	5.6	7.3	12.9
2	Harbledown_Inbound	4.2	10.3	6.4	2.3	3.1	2.7
	Harbledown_Outbound	2.7	2.3	2.5	2.4	2.8	3.3
3	A290_Inbound	5.2	4.4	4.9	2.6	4.7	5.6
	A290_Outbound	4.6	4.5	4.9	4.1	4.3	6.7
4	St Stephens Hill_Inbound	2.7	5.4	8.2	2.5	4.2	5.6
	St Stephens Hill_Outbound	2.5	3.6	4.2	2.5	4.6	6.2
5	Broad Oak Rd_Inbound	3.4	3.0	3.4	2.7	3.2	3.8
	Broad Oak Rd_Outbound	2.5	2.6	3.3	2.4	2.7	3.9
6	Sturry Rd_Inbound	6.5	6.4	7.6	3.3	7.9	8.7
	Sturry Rd_Outbound	3.4	3.7	4.3	4.0	4.2	6.2
7	Sturry (A291)_Inbound	7.4	10.8	12.6	4.0	8.7	7.6
	Sturry (A291)_Outbound	3.7	4.0	6.7	6.1	6.1	5.7
8	A257_Inbound	6.8	9.6	9.7	5.7	10.0	9.4
	A257_Outbound	4.1	4.6	5.0	4.7	5.4	7.2
9	New Dover Rd_Inbound	5.0	5.5	8.7	3.7	4.0	6.6
	New Dover Rd_Outbound	3.8	3.8	4.6	4.1	5.0	7.9
10	Old Dover Rd_Inbound	6.1	5.9	NA	5.0	5.2	NA
	Old Dover Rd_Outbound	5.8	5.2	NA	4.3	5.5	NA

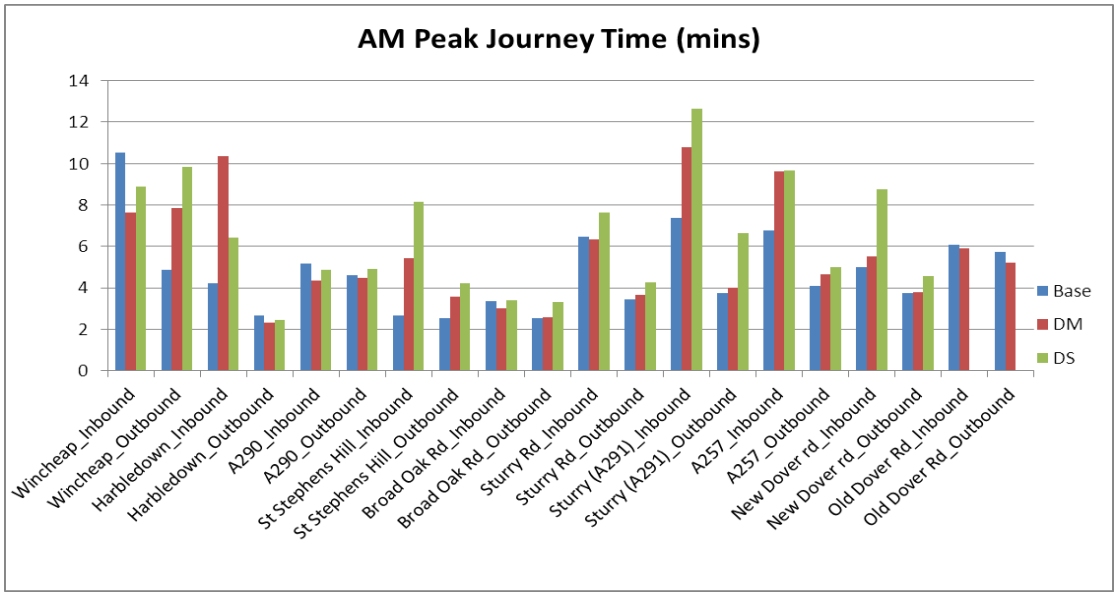


Figure 6-1 AM Peak Journey Time Route Analysis (mins)

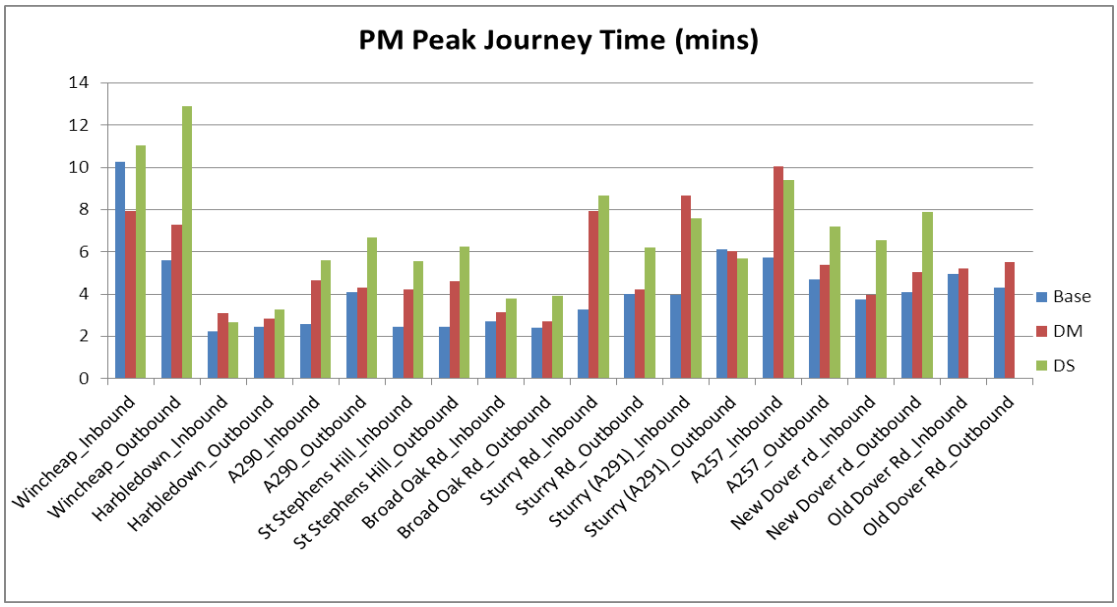


Figure 6-2 PM Peak Journey Time Route Analysis (mins)

6.4 Summary

The increased development proposals and resulting additional travel demand of the Do Something scenario will inevitably impact on overall network performance. The introduction of different transport interventions will also have both positive and negative impacts on network performance.

Average network speeds will generally decrease with a resulting increase on overall network travel time in the Do Something. The increases are more notable in the PM peak, which indicates the network is operating more efficiently in the AM peak, given overall network travel demand will increase by similar levels (c.10%) in both periods.

The impact of increased travel demand and potential transport interventions in the Do Something, e.g. new A2 junctions, bus priority and park & ride, will increase overall distance travelled on the network. While a significant element of this will be additional vehicles on the network, there is potential for trips to transfer to alternative longer routes to avoid congestion or use network improvements proposed in the Do Something.

A more detailed review of city centre journey times demonstrates that the Do Something will potentially introduce some benefit as well as dis-benefit to network performance. In particular, the A2050 at Harbledown and A257 Littlebourne Road will experience improved journey times, while the new A28 Wincheap alignment will be constrained by additional demand.

It should be noted that significant schemes, e.g. at Wincheap, Bridge and Sturry, have been modelled on assumptions in the absence of specific detail. It is therefore recommended that results at these locations are treated with an element of caution until more detailed analysis is undertaken.

7 Summary

Canterbury City Council (CCC) is preparing their emerging Local Plan which sets out the vision for the city up to 2031. As part of the supporting evidence, a VISUM transportation model was developed by Jacobs to test a range of development options. Building on this work, a separate modelling exercise has been undertaken by Amey to test a Preferred Option (Do Something scenario) and provide a strategic overview of the likely future transport situation.

A modelling approach has been adopted to maintain consistency, where practicable, with the previous Jacobs' work and Local Plan analysis. A set of network performance indicators, including travel demand, average speed and journey times, have been analysed to assess the impacts on car, bus, rail and park & ride in the forecast Do Something scenario. Further analysis has been undertaken of a 2031 Do Minimum scenario, i.e. growth scenario reflecting current Local Plan allocations; existing permissions; and planned transport schemes, as a base line comparator for benchmarking.

Building on the Do Minimum, the Do Something seeks to deliver 16,900 houses, 433,000 sqm of commercial and 65,300 sqm of retail by 2031 with development focused on the Canterbury urban area; with a secondary emphasis development at Herne Bay. A key consideration of the Local Plan is the delivery of transport improvements as part of these schemes. As such a number of transport interventions have been tested, including A2 junction improvements, relief roads at Herne, Sturry and Wincheap; and bus priority and service improvements. Additional consideration has also been given to walking, cycling and park & ride to reflect travel demand management proposals set out in the Canterbury Transport Strategy.

The headline model outputs, taken from the indicators used to assess and compare the network performance in the forecast Do Minimum and Do Something scenarios, include:

- **Travel Demand**
  - The Do Minimum scenario will increase overall travel demand (person trips) by up to 17% from current levels;
  - The Do Something scenario increases overall travel demand by a further 11-13% from Do Minimum levels;
  - The Do Something scenario will increase vehicle trips by approximately 10% from Do Minimum levels, and represent an element of modal shift when considered against the increases in overall travel demand;
  - Development located in South Canterbury and Herne Bay will be the principal trip generators across the district. Additional development at Sturry, Hersden, Wincheap and throughout Canterbury will further increase demand in and around the Canterbury urban area.

- **Traffic/Link Flows**
  - The Volume of traffic crossing the cordons indicates a higher increase in traffic moving between the outer area and Canterbury (15% to 25%), and a smaller increase in traffic crossing the inner cordon (2% to 7%) to move around the city;
  - The Highest traffic volumes are recorded on A2050 Rheims Way, Wincheap and Broad Street;
  - New relief roads at Sturry, Wincheap and Herne and the Barracks Link will reduce traffic on flows on the existing A28, A291 and A257 routes;
  - An improved A2 Bridge junction and Old Dover Road bus priority measures will significantly increase demand on New Dover Road; and
  - A southbound A2 off-slip at Wincheap reduces flows on A2050 Rheims Way and, in combination with additional retail development, increases flows on the proposed Wincheap relief road.
- **Mode Choice**
  - The Do Something scenario represents relatively modest modal shift to public transport and indicates additional measures are likely to be required to promote significant modal shift over the Do Minimum situation; and
  - The Proportion of car trips using park & ride will increase by up to 1%, representing a 30-40% increase in park & ride demand between the Do Minimum and Do Something.
- **Overall Network Performance**
  - Average network speeds will generally decrease with a resulting increase on overall network travel time in the Do Something scenario;
  - Travel time increases are more notable in the PM peak, indicating the network is operating more efficiently in the AM peak;
  - The impact of increased travel demand and potential transport interventions in the Do Something, e.g. new A2 junctions, bus priority and park & ride, will increase overall distance travelled on the network; and
  - City centre journey times demonstrate that the Do Something scenario will potentially introduce some benefit, e.g. the A2050 at Harbledown and A257 Littlebourne Road, as well as dis-benefit, e.g. A28 Wincheap and A2050 New Dover Road, to network performance.

The Local Plan and accompanying Transport Strategy seek to deliver the growth aspirations of the district while managing changes in travel demand through the introduction of infrastructure improvements and travel demand management measures. The key objective being to make more efficient use of the network by minimising travel on the highway; maximising sustainable modal shift and reducing travel times.

As with the previous modelling exercise undertaken by Jacobs, the modelling outcomes demonstrate an inevitable increase in travel demand associated with increased development. However, this is also true of the Do Minimum scenario and needs to be considered within the context of what the proposed Do Something scenario potentially delivers in terms of transport improvements. Any transport intervention will change the pattern of travel throughout the city and introduce solutions to some existing and future network constraints. Equally, the increase in growth and introduction of some schemes will have an added impact on other routes and it is realistic to assume that additional sustainable transport measures, over and above those tested in the model will be required to address future network pressures.

Appendix A Model Assumptions

Base Model

- Chaucer Road link closed to traffic
- Correction to junction turns modelled at Lady Wootton's Green

Forecast Models

- A number of small roundabouts comprised of links with inappropriate speed/flow values attributed to them, which potentially distorted delay for the heavily loaded forecast network. Link types were adjusted to remove the anomaly for forecast models.
- Signal arrangement adjusted to eliminate potential double counting of signal delay.
- Parking costs were previously assigned to zones with car parks. This does not reflect the reality of cars being parked in a zone which is not necessarily the final destination of the trip. Revised approach assigns estimated average car parking costs across city centre zones. The value attributed to the city centre zones takes into account the costs in the base model, proposed costs, journey purposes and availability of car parking.
- Car parks are not modelled specifically. In order to reflect the proposed reduction in car parking availability an adjustment was made to zone connector times. This reflects increased walking times for trips to the city centre zones as people would be expected to have to park further from their final destination.
- Proposed infrastructure changes are at an early conceptual stage and consequently a number of assumptions have had to be made regarding issues such as link capacity, junction arrangement, alignment, bus routes etc.
- Key bus services reviewed and additional services added to reflect current service pattern. Original timetables adjusted to reflect current travel times.
- Highway cost skims are based on congested travel time rather than on an impedance value used previously,
- The PM Park and Ride model operates independently of the AM peak Park and Ride model, rather than being simply a transposed matrix.
- Penalty (ASC) value of 5minutes applied to highway trips open to Park and Ride but driving all the way.
- Mode choice between car, bus and rail with no specific distinction for High Speed Rail.
- No allowance is made for car availability in the mode choice model.
- A Furnessing approach adopted based on development within existing zones. Adjustments were necessary to account for empty zones or those with sparse distribution.

Appendix B Key Development Locations

Key Local Plan proposed sites:

This map shows the seven main development sites being proposed in the draft plan. It also shows the important landscape and wildlife areas that the plan aims to protect in the long term.

1 South Canterbury

- 4,000 homes.
- 70,000 sqm employment space.
- Local shopping.
- Community centre, primary schools, health centre.
- Extended Park and Ride.
- 30ha new public open space including allotments.
- 20ha new woodland planting.
- New A2 junction and fast bus link to the city centre.
- New cycle routes.
- Combined heat and power facility.

2 Land at Sturry/ Broad Oak

- 1,000 homes.
- Business floorspace.
- Local shopping.
- Community facilities.
- Protection and enhancement of ancient woodland.
- New open space, public gardens and playing fields (including allotments).
- New relief road, including, closure/partial closure of crossings at Broad Oak and Sturry, new car park for Sturry Station.

3 Herne Bay Golf Club

- 400 homes.
- 1ha mixed commercial property.
- Local shopping.
- 8ha sports and leisure facilities.
- Site for new secondary school
- Doctor's surgery, care home.

4 Strode Farm

- 800 homes.
- 15,000 sqm employment floorspace.
- Local shopping.
- Community facilities including new parish hall.
- New relief route for Herne.
- New footpath, cycle path.

5 Hillborough

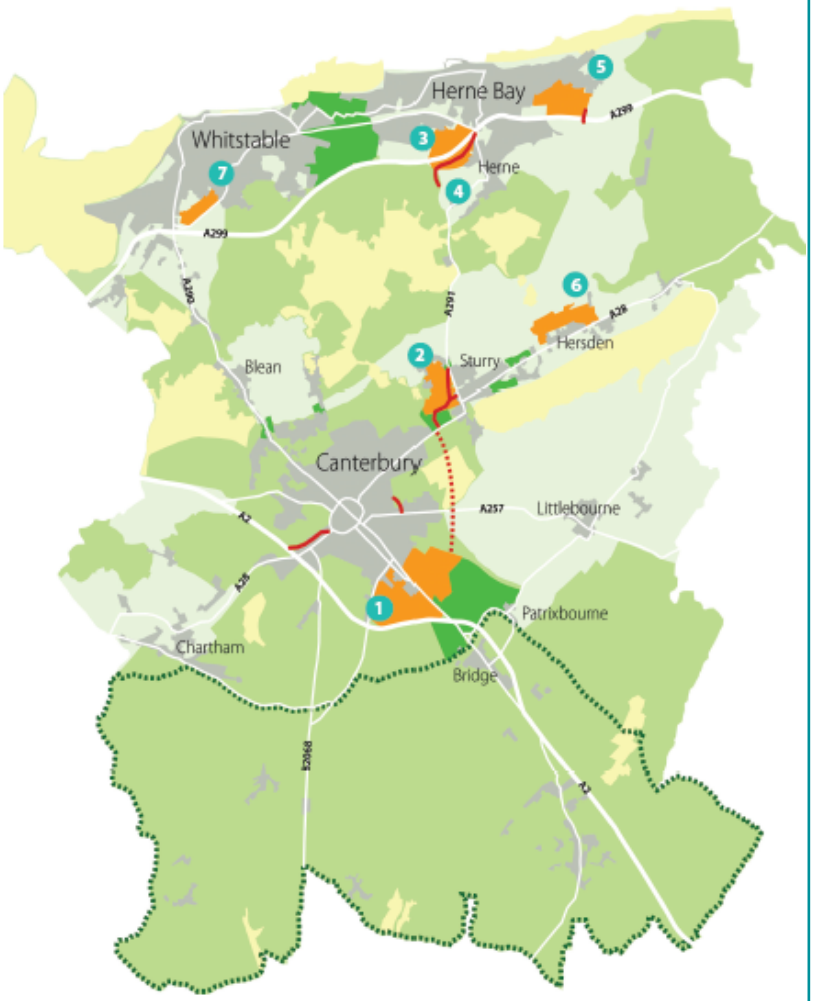
- 1,000 homes.
- 10ha new business space.
- New primary school with other community uses.
- Additional woodland.
- Open space north of the railway line
- Improvement to junction onto the Thanet Way

6 Land north of Hersden

- 800 homes.
- 1ha new business space.
- New community buildings, play areas and allotments, multi-use games area.
- Improved footpath/cycle path links.

7 Thanet Way

- 400 homes.
- Significant extension to Duncan Down open space and wildlife areas



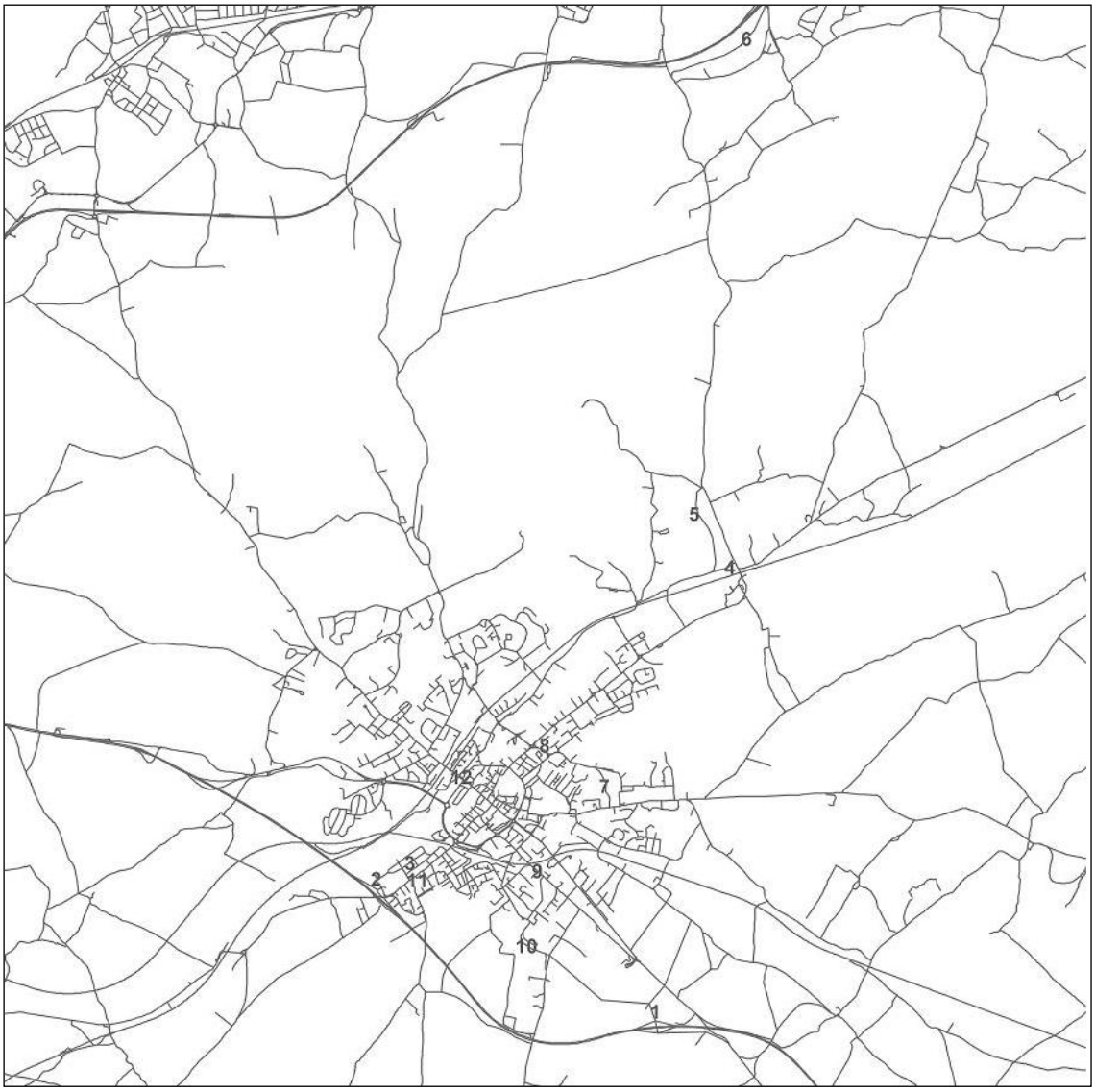
District map key

- Main development sites
- Road proposal
- Area of Search for possible Eastern Bypass
- Kent Downs Area of Outstanding Natural Beauty
- Area of High Landscape Value
- Protected National and International Wildlife Sites
- Protected Green Gap

Site ID	Model Zone	Location Canterbury City	Housing units	Business sqm	Retail sqm	Other
206	60 / 105	South Canterbury – local retail provision 1000sqm; 4-form primary school; 3-doctor GP surgery	4,000	70,000	1,000	4 form primary school, doctor surgery
147	102	Simon Langton Girls' School, Canterbury	270			
38	62	St.Martins Hospital , Canterbury	200			
	145	Kingsmead Field, Canterbury	100			
		Projected housing "windfall" sites - distribute equally to urban zones	462			
	114	50,000sqm comparison floorspace - Wincheap Industrial Estate			50,000	
	Assume walk /cycle	Main campus – 1,500 study bedrooms; 38,000sqm academic floorspace				
	Assume walk /cycle	Main Campus - 13,400sqm of academic/social space on the North Holmes Road site; various locations along a broad axis from Wincheap to the Parham Road area - 450 student residential units (net 300 units) (*Note: their Estates Strategy is to use opportunities to focus their activity in the City Centre, developing additional teaching, office and student accommodation in that area to create a "ribbon campus" at the edge of the city centre*)				
	135	Innovation Centre, University of Kent		12,000		
	152	Broad Oak Road/ Vauxhall Road		5,000		
	13	Canterbury West Station		1,500		
	110	Office Connection site, St.Andrews Close		1,200		

Site ID	Model Zone	Location Herne Bay	Housing units	Business sqm	Retail sqm	Other
208	316	Herne Bay Golf Course (plus doctors surgery, sports hub, including cricket pitch, 2 football pitches, 1 3G pitch, 1 hockey pitch, 4-6 tennis courts - 8.2ha)	400	3,000		doctor surgery
11	234	Strode Farm, Herne Bay (plus local shopping and community uses unspecified)	800	15,000	No detail	
129	319	Hillborough, Herne Bay (plus community uses and primary school)	1,000	15,000		primary school
10	313	Greenhill, Herne Bay	600			
13	313	Bullockstone Road	190			
		Projected housing "windfall" sites - distribute equally to urban zones	662			
	317	3,600sqm - Town Centre			3,600	
	315	Eddington Lane (various)		18,700		
	319	Metric Site		1,000		
Whitstable						
1	301	Thanet Way, Whitstable	400			
		Projected housing "windfall" sites - distribute equally to urban zones	618			
	302	2,500sqm - Town Centre		2,500		
	301	Land at Wraik Hill		12,000		
Rural Areas						
143; 177	206	Broad Oak/Sturry	1,000	2,000		
148	237	Hersden North	800			
96	237	Spires site, Hersden	131			
138	244	Barham Court Farm, Barham	25			
		"Windfall" housing sites – distribute equally to larger villages: Barham, Blean; Bridge; Chartham; Hersden, Littlebourne and Sturry.	462			
		Canterbury Business Park (Highland Court)		14,100		

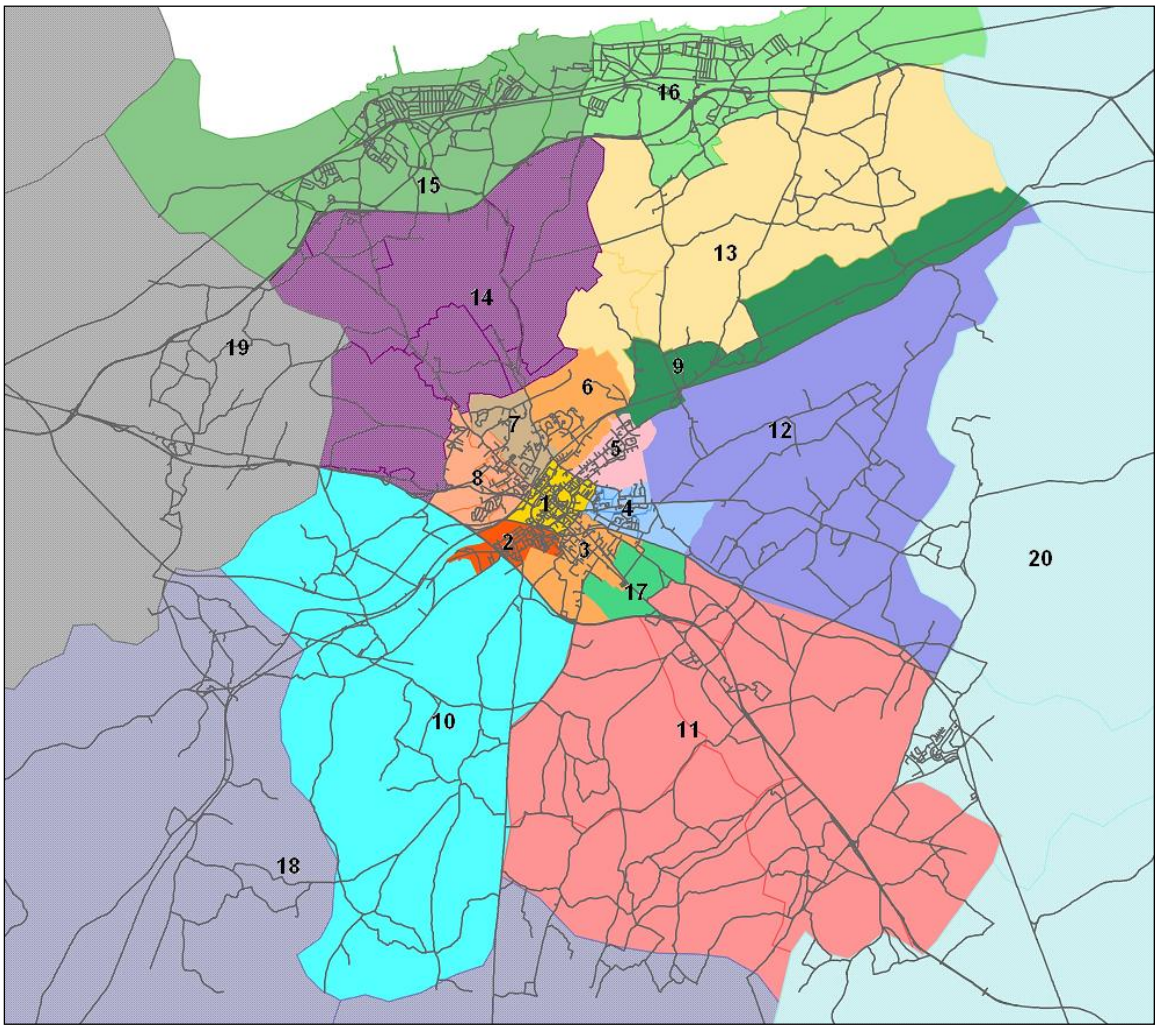
Appendix C Transport Interventions



Ref.	Highway Measures
1	New All movement A2 Junction at Bridge
2	A2 southbound off-slip at Wincheap (includes gyratory layout)
3	Wincheap Relief Road
4	Sturry Relief Road
5	Broad Oak Relief Road
6	Herne Relief Road
7	Chaucer Road/Barracks Link Road
8	Extend Sturry Road Bus Lane to Kingsmead Roundabout
9	Old Dover Road Bus Gate and Priority Measures
10	Fast Bus Link from South Canterbury Development
11	Wincheap Bus Priority
12	St Dunstans/Westgate Towers Environmental Improvements

Appendix D Sectors Used for Analysis

Sector	Description
1	City
2	Wincheap / Thanington
3	Hospital
4	Barton
5	Northgate
6	Hales Place
7	University / St Stephens
8	Westgate
9	Sturry / Hersden
10	Chartham
11	Bridge
12	Littlebourne
13	Hoath / Chislet
14	Blean Forest / Harbeldown
15	Whitstable / Chestfield
16	Herne Bay / Herne
17	South Canterbury
18	Folkestone / Ashford / South Kent / Sussex
19	N Kent / Medway / London
20	Thanet / Dover / East Kent
21	UK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Appendix E Canterbury Core Area

Appendix F Journey Time Routes