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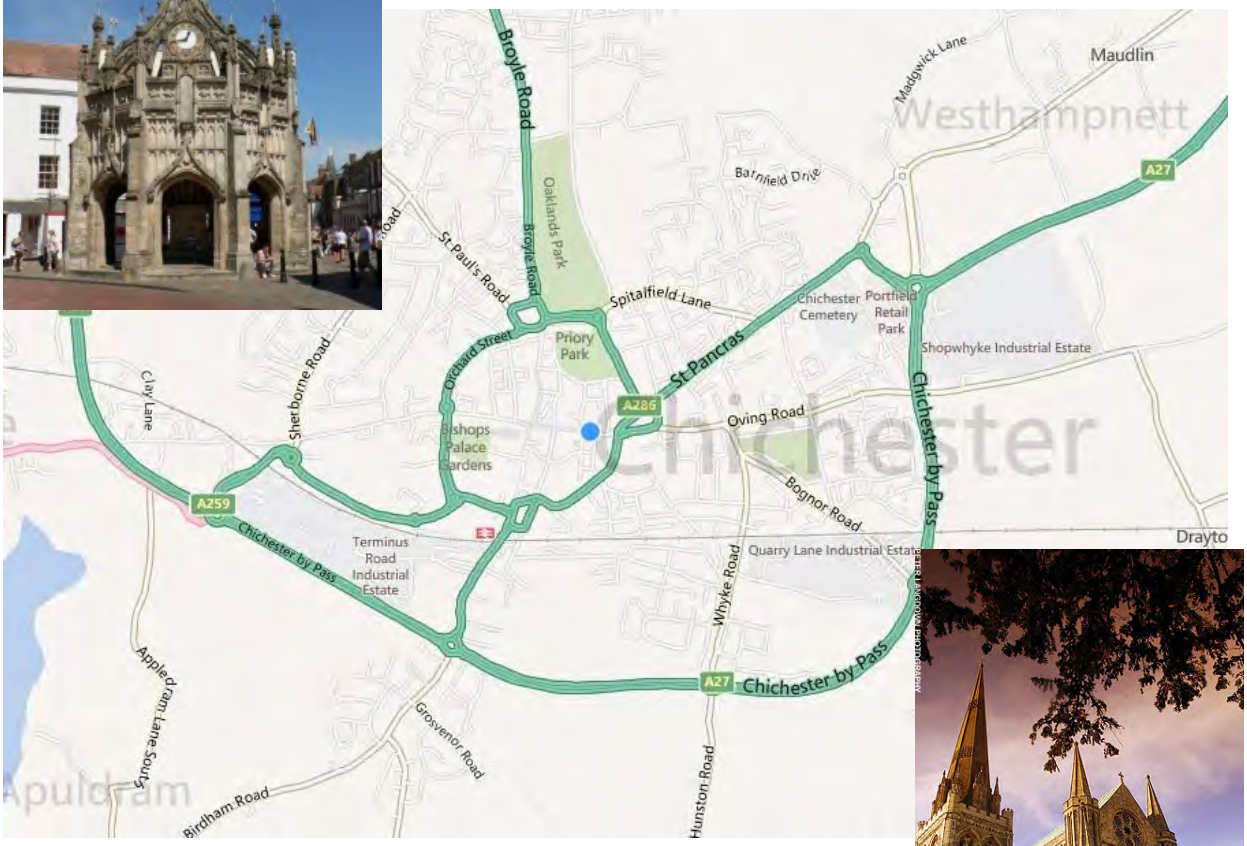
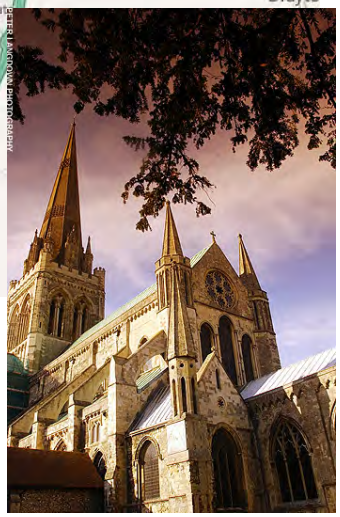
Chichester District Council – Local Plan

Transport Study of Strategic Development Options and Sustainable Transport Measures





FINAL REPORT

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Executive summary

Chichester District Council is preparing a new Local Plan to replace the adopted Development Plan. The Local Plan will provide the strategic framework for long term spatial and economic development in Chichester district (excluding the South Downs National Park)[1]. This study has been commissioned at a key stage of the Development Plan process and ahead of formal public consultation on the proposals.

The purpose of the Study is to assess the effects on the highways network likely to arise as a result of potential options under consideration for the Local Plan, and to identify measures that could potentially mitigate these impacts.

This report provides details of the area wide traffic assessments and forecasting of future travel demands and traffic effects of potential housing growth and other development in the Chichester area. This study has been carried out through collaborative partnership working between Chichester District Council, West Sussex County Council, the Highways Agency, and the housing developers for the Tangmere, West of Chichester and North East of Chichester (Westhampnett) development sites. This partnership has aimed to seek a sustainable approach to development planning in and around Chichester, with particular reference to ensuring long-term sustainable and efficient operation of local transport networks.

Jacobs has used the Chichester Area Transport Model (CATM) to examine area-wide impacts of local growth. The multi-modal model represents travel demands by all modes using a simplified network of local and strategic roads plus a multi-modal demand forecasting approach. Key characteristics of CATM are, as follows;

- *Forecasts for 2031, morning and evening peak hours*
- *Model performance in accordance with DfT technical guidance*
- *Prior use of CATM with regard to A27 traffic issues*

For assessment of future area-wide effects, CATM is considered to be the most appropriate, available tool to test network-wide impacts of growth in Chichester. The forecasts reflect a range of Local Plan scenarios, taking account of uncertainty over growth to 2031. The 2031 Baseline Scenario includes;

- *current / committed housing developments in wider area*
- *'non development' growth in travel demand e.g. car ownership growth*
- *committed improvements to the road network*

Development Scenarios reflect a range of different 2031 futures, as follows;

- *Low housing target – 3,250 additional homes*
- *High housing target – 5,400 additional homes*
- *Maximum housing target – 6,100 additional homes*

Through consideration of these different options and their local impacts, a Preferred Option has been developed based upon a district-wide housing target of approximately 4,700 additional homes by 2031. The delivery of this growth is

[1] The Study also takes account of previous transport modelling work undertaken in support of a planning application for major development at Shopwyke.

supported by a programme of defined transport mitigation measures and infrastructure improvements.

Key conclusions from tests of future housing growth scenarios, without transport mitigation measures to minimise local impacts were, as follows:

- Background traffic growth (2012-31) will reduce overall network performance without any additional housing growth beyond currently committed sites.
- With additional planned housing growth without mitigation – key indicators of journey times and congestion levels increase further, leading to deteriorating travel times and accessibility in Chichester and its environs.

Transport mitigation measures were tested to reduce these impacts of future growth. These measures include the following:

- Improvements to junctions on the A27. All proposals are 'at grade' (surface level) improvements, within existing highway boundaries, retaining all traffic movements
- 'Smarter Choice' and demand management measures to encourage public transport use and walking / cycling. These measures are especially important within the urban area of Chichester, providing sustainable options for local, shorter trips.

Key conclusions from testing the effectiveness of these mitigation measures are, as follows;

- A combination of the A27 junction improvements and Smarter Choices can effectively mitigate the area-wide impacts of planned housing growth. The effects lead to local traffic conditions broadly consistent with those forecast for 2031 without the planned housing growth levels, and in some localities/routes at levels less than forecast for 2031 without planned development (the 2031 baseline).
- Growth scenarios including mitigation measures will result in higher traffic volumes on key routes, including the A27 Chichester bypass, though junction improvements have the potential to ensure journey times, congestion levels and road safety are managed to levels comparable with current performance and better than the forecasts for 2031 without additional growth (the 2031 baseline).
- A comprehensive area-wide package of smarter choice initiatives can ensure significant reductions in local traffic, with particular benefits to the local road network within Chichester.

As a package of measures, the current tests demonstrate strong potential to secure long-term road network performance in and around Chichester, enabling growth without compromising traffic flow conditions. Further work will address the following delivery issues;

- Detailed design of A27 schemes will refine solutions at key junctions in partnership with the Highways Agency. Working solutions provide a basis for this work, following detailed junction modelling on behalf of the Highways Agency (Parsons Brinckerhoff) with findings fed back into the most recent area-wide assessments which inform the Preferred Approach.

- The timing of mitigation measures will be critical to deliver strategic outcomes linked to planned housing growth. The programming of smarter choice interventions will be important, as their greatest impact will coincide with key life-stage changes for residents i.e. when people move house/job/school. A coordinated programme of smarter choices measures is being developed jointly by West Sussex CC and Chichester DC.

The Study findings (together with the supplementary junction testing undertaken by Parsons Brinkerhoff) demonstrate that the transport mitigation measures tested are achievable and viable, and potentially could be delivered in conjunction with housing development through the Local Plan.

Completion of this programme of network appraisals and development of mitigations has informed the determination of the Local Plan Preferred Approach for growth in Chichester District. Following careful consideration of these analyses, the partners to this study are content that transport impacts of growth can be adequately mitigated in future, to sustain acceptable levels of performance for local and strategic roads.

This study demonstrates that the mitigation measures are deliverable, affordable and beneficial when associated with the proposed housing developments. As such, they represent the preferred options for mitigating the traffic impacts of growth and sustaining network performance throughout the plan period. The analysis provides a strong, in-depth evidence base to support the Local Planning Authority's view that proposals for sustainable development in and around Chichester are sound.

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Contents

1 Introduction

1.1 Overview

Chichester District Council is preparing a new Local Plan to replace the adopted Development Plan. This study has been commissioned at a key stage of the Plan process and ahead of consultation on the Local Plan Key Policies draft document.

This report provides details of the area wide travel demands and traffic assessments that have been carried out; forecasting the effects of future housing growth in Chichester. This study has been carried out with a collaborative partnership working arrangement between Chichester District Council, West Sussex County Council, the Highways Agency, and the housing developers for the Tangmere, West of Chichester and North East of Chichester (Westhampnett) development sites[2].

Jacobs used the Chichester Area Transport Model (CATM) to examine area-wide impacts of local growth, using forward planning inputs agreed by the working group for the purposes of this study. The model forecasts travel demands by all modes and uses a network of key local and strategic roads to reflect traffic flows and travel patterns. It forecasts the year 2031 in morning and evening peak hours. The CATM model has been updated and rigorously tested for scenario-testing to inform the Local Plan. The model performs in accordance with Department for Transport (DfT) guidance and has already been applied to assessment of A27 traffic issues. It is the most appropriate, available tool to test area-wide impacts of growth in Chichester, enabling development of a sound evidence base for the Local Plan.

The CATM model is a strategic model and provides an accurate forecast of traffic flows in the future year scenarios. This has been supplemented by more detailed modelling, undertaken by Parsons Brinkerhoff for the Highways Agency, of the A27 junctions around Chichester using flow information provided by the CATM model. This assessment is provided in Appendix G. The outcomes of junction modelling were subsequently fed back into the strategic assessment of the area-wide strategy, which has informed the identification of the Preferred Approach as proposed in the Local Plan.

[2] The Study also takes account of previous transport modelling work undertaken in support of a planning application for major development at Shopwyke which was under consideration by Chichester District Council at the time of the Study.

1.2 Scope of the Report

This report describes the modelling assumptions, methodology and the resulting highway traffic flows. In summary, the content of this report is, as below:

- Chapter 2 gives an overview of the CATM model;
- Chapter 3 describes the committed housing and development site assumptions;
- Chapter 4 describes the forecast impacts of housing growth on the strategic and local road network around Chichester;
- Chapter 5 documents the preliminary mitigation measures tested to support planned housing growth by 2031;
- Chapter 6 presents the key outputs from the mitigation scenario tests, including analyses of traffic flow, congestion and journey times;
- Chapter 7 considers the final Preferred Option (March 2013); and
- Chapter 8 presents an analysis of summer time traffic counts in and around Chichester.
- Chapter 9 presents a summary of the study conclusions.

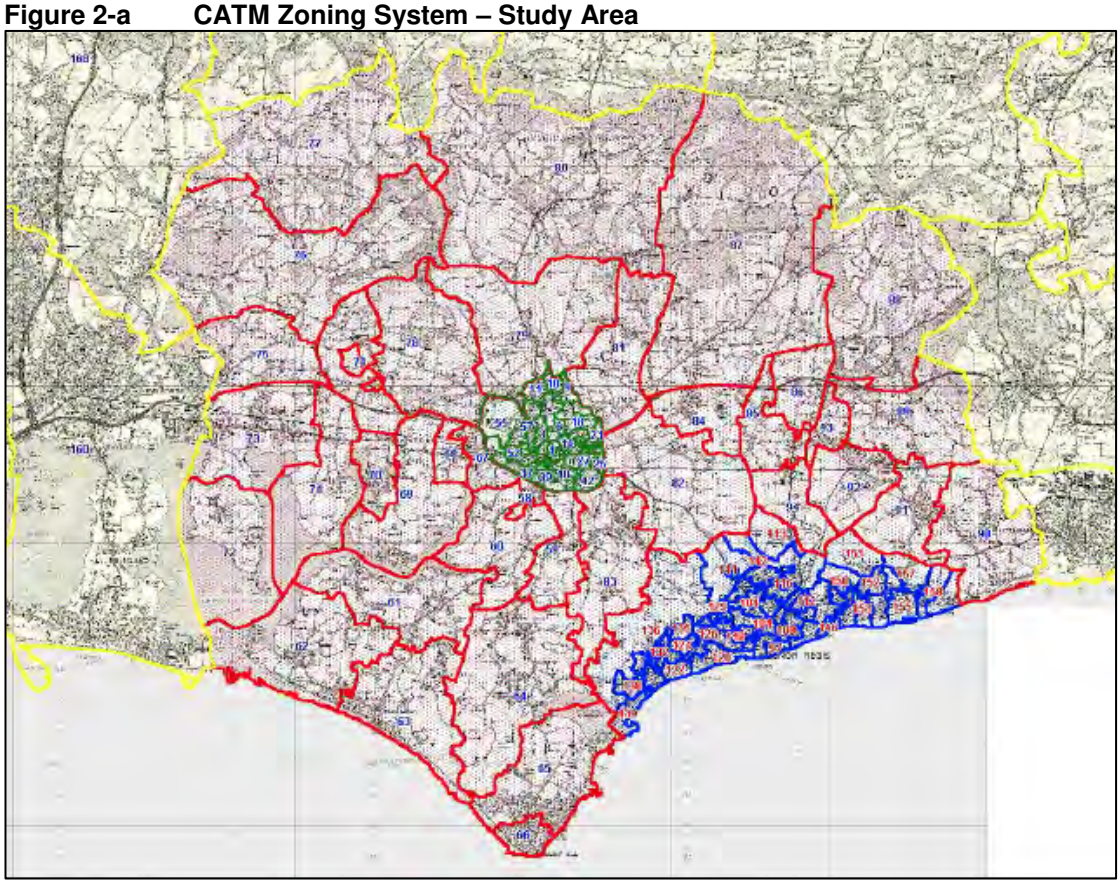
2 Chichester Area Transport Model (CATM)

The CATM model used in this study was developed by Jacobs for West Sussex County Council. It has enabled us to model the highway impacts of the housing developments. CATM is a multi-modal demand model that incorporates a public transport assignment model and a highway assignment model.

The highway model is validated to a base year of 2009 using count data on key cordons inside and outside the A27 Chichester Bypass and journey time survey data along the A27. The modelled turning movements were reviewed against turning movement surveys (from 2003 onwards) and found to be robust. Model preparation made intensive use of available local traffic data whilst avoiding the need for costly programmes of additional surveys. Before scenario testing was completed, model performance on key routes was verified against the most recent traffic flow data.

The peak hour assignments are based on the maximum one hour flows within the three hour periods 0700-1000 and 1600-1900. Further details on the CATM operation and its validation are shown in Appendices C and D.

Figure 2-a CATM Zoning System – Study Area



Source: Chichester Area Transport Model, Model Validation Report. Aug. 2006

3 Forecasting Assumptions

3.1 Introduction

The forecast year used for this study was 2031. The main scenarios tested are described below. The following assumptions were made in the modelling.

The forecasts reflect a range of Local Plan scenarios, taking account of uncertainty over future growth to 2031.

The 2031 Baseline Scenario includes;

- *current / committed housing developments*
- *'non development' growth in travel demand e.g. car ownership, employment & tourism growth*
- *committed improvements to the road network*

Development Scenarios reflect different 2031 futures, deriving overall development levels from strategic housing market assessments and the (former) South East Regional Plan. The scenarios were designed to test the impacts of a range of options, in terms of the overall level of housing and its distribution across the Plan area, focusing in particular on the potential strategic development sites, as follows;

- *Low housing target – 3,250 additional homes*
- *High housing target – 5,400 additional homes*
- *Maximum housing target – 6,100 additional homes*
- *Preferred option – approximately 4,700 additional homes*

Each of these scenarios includes strategic housing allocations and development at non-strategic sites as described in section 3.4. One of the strategic development sites – Shopwyke – is the subject of a live planning application which has a set of associated transport and access improvements. These have been carried forward into these assessments, without prejudice to the determination of that application.

3.2 Current / Committed Housing Development Assumptions

The housing development assumptions for 2031 were updated with the latest housing assumptions from Chichester and Arun district councils.

- Chichester District - HLS Appendix 2 - Tables A, B & C. Commitments (on sites of 6 or more dwellings) as at 1st April 2011
- Chichester District – Committed Small Developments as at 1st April 2011.
- Chichester District, Completed Developments – 2009-10, and 2010-11
- Major planning permissions from April 2012
- Arun District – Annual Monitoring Report – Appendix 2. Development Status and Phasing Data for Large and Small sites 2010 -2016.

The full details are shown in Appendix A.

This accounts for 4,123 additional homes. The location of strategic housing sites is illustrated in *Figure 3-a*, below. The Graylingwell Hospital site is a notable development currently underway with nearly 700 dwellings still outstanding.

3.3 Non housing development growth in travel demand

In addition to housing and employment growth, a number of factors affect future forecasts of travel demands in the model assessments. Within CATM, these factors are derived from the Department for Transport's NTEM 6.2 (national trip end model), as follows;

- *Population (excluding development sites) is updated using ONS 2008-based projections;*
- *Employment forecasts are updated consistent with more recent GDP forecasts from the Office of Budget Responsibility. The distribution of employment and workers has been updated using Workforce Jobs and the Labour Force Survey;*
- *The Car Purchasing Cost Index in the Car Ownership Model has been updated in line with more recent RPI data.*

NTEM datasets are long-term forecasts. They represent the DfT's best estimate of the long-term response to demographic and economic trends.

As a basis for estimating localised impacts of these structural influences on travel demands, NTEM provides the best available data source. It is used for comparable forecasts in other Local Plan assessments.

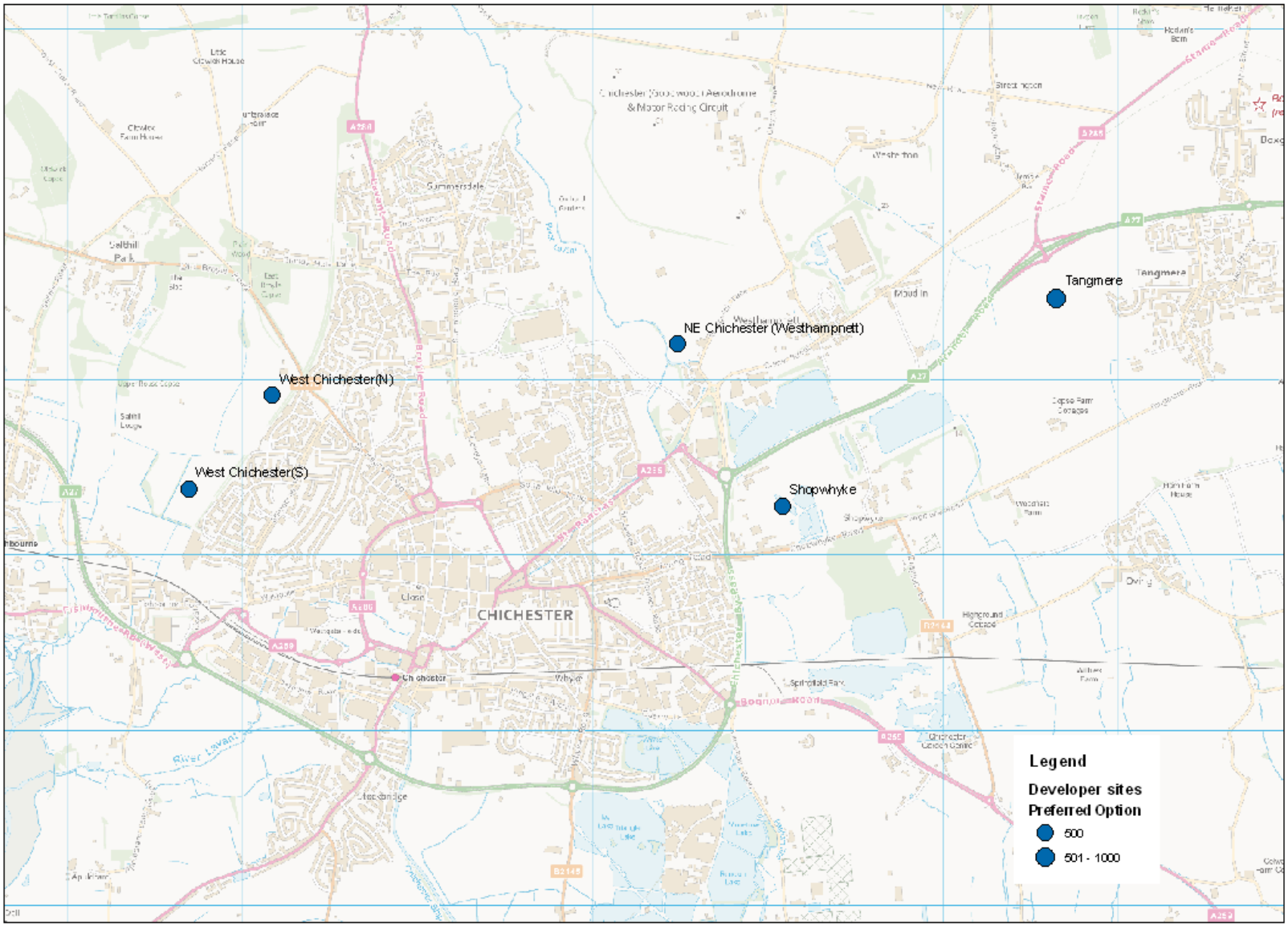
3.4 Non Strategic Sites Housing Growth

Non-strategic housing sites are typically prospective sites within the existing urban area or small greenfield sites suited to housing development under existing planning policies. Frequently they are brownfield or redevelopment sites of relatively small scale, identified in local housing land studies. The allocation of Non Strategic housing was based on an indicative distribution provided by Chichester District Council as is shown in the following figures. For the final Preferred Development Option, the non-strategic housing was based on the indicative parish housing numbers set out in the draft Local Plan.

Appendix A shows the housing assumption for each zone in the CATM model in this study.

In addition, the non-residential development at Portfield Quarry has been included, which presently holds outline planning consent for 17,468 sq metres of B8 (Storage and Distribution) use. This is connected by a left-in-left-out junction on the A27 between Portfield Roundabout and Shopwhyke Rd/Oving Road signals.

Figure 3-a Location of Strategic Housing sites



3.5 Strategic Housing Development Assumptions

Strategic Developments are potential larger opportunities for housing growth under consideration as part of the planned development strategy for Chichester district. The Local Plan process has identified 4 key strategic sites with good prospects – strategic, commercial and practical – for delivering a substantial contribution to long term growth in the Chichester Local Plan area. The following section describes the strategic housing development assumptions for each site, derived in consultation with planning officers and developers' representatives:

- *Tangmere*
- *North East of Chichester (Westhampnett)*
- *West of Chichester*
- *Shopwyke*

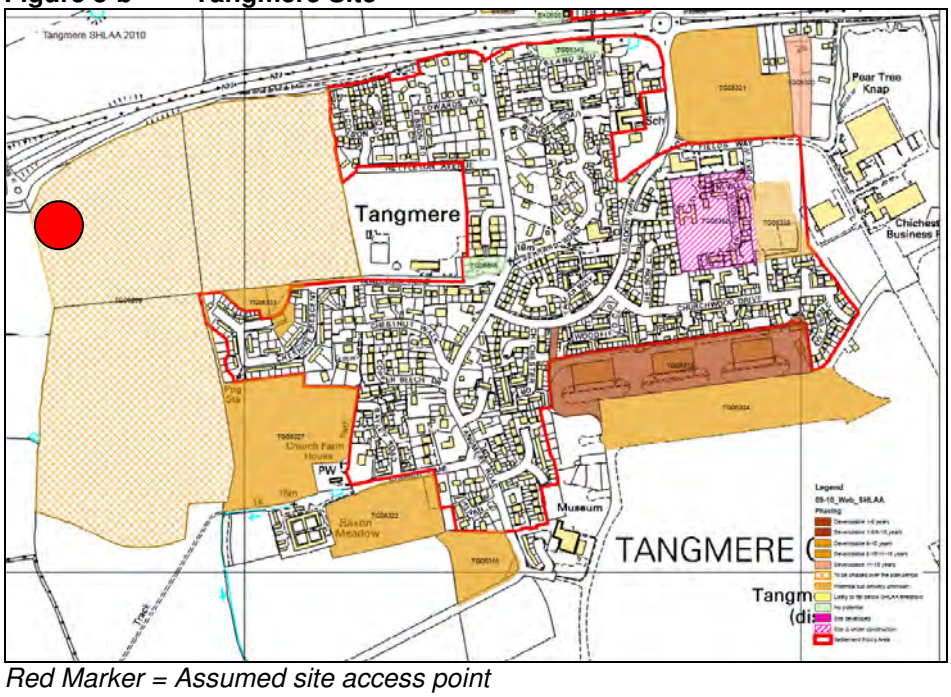
Each of these sites is a strategic development and not included in the Baseline scenario. These proposals and associated arrangements for access have been used for strategic assessments of the Plan. It should be noted that the development proposals and access arrangements assumed in the Study are indicative and have been adopted for modelling purposes only. However, the level of detail assumed is appropriate for transport modelling at the strategic level.

3.5.1 Tangmere

The Tangmere strategic site is situated east of Chichester, adjacent to the western edge of Tangmere village at the south side of the A27 / A285 junction. The site at Tangmere was modelled with the following development assumptions:

- *A range of 800 – 1,600 new homes*
- *Development road network connected to southern roundabout at A27/A285 junction*

Figure 3-b Tangmere Site



Red Marker = Assumed site access point

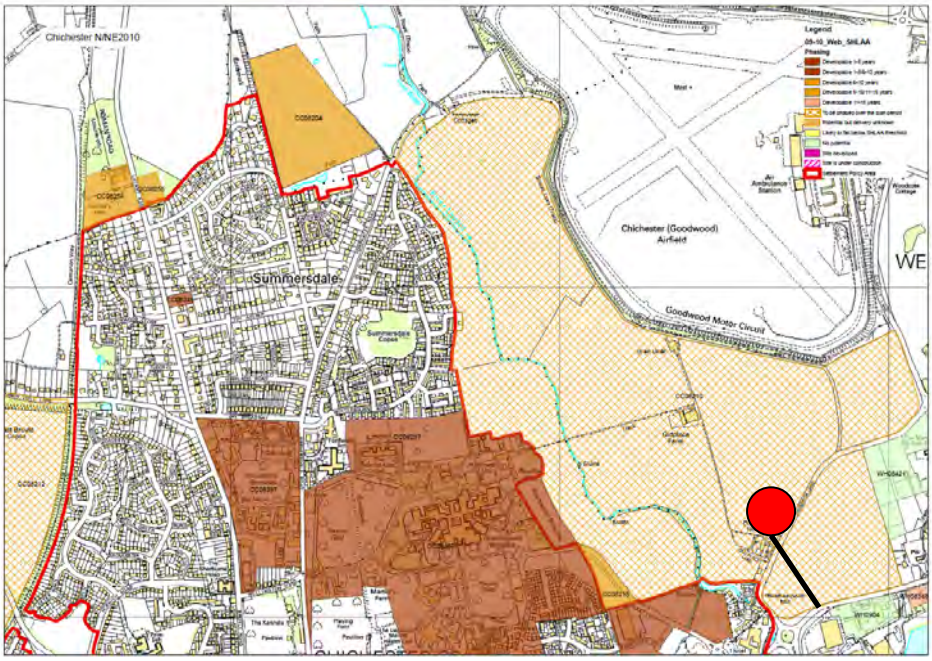
3.5.2 North East of Chichester (Westhampnett)

This strategic site is situated between the north eastern extent of Chichester's urban area and the Goodwood airfield. The site in North East of Chichester was modelled with the following assumptions:

- *A range of 500 – 1400 new homes*
- *Development roads linked to Madgwick Lane, with new connection from Madgwick Lane to Stane Street*
- *Madgwick Lane South to be closed to through traffic*

North East of Chichester is connected to Madgwick Lane, with a new link to Stane St and Madgwick Lane (south) bus-only. A possible secondary access to the west (from the east of Graylingwell) has not been modelled at this stage.

Figure 3-c North East of Chichester (Westhampnett)



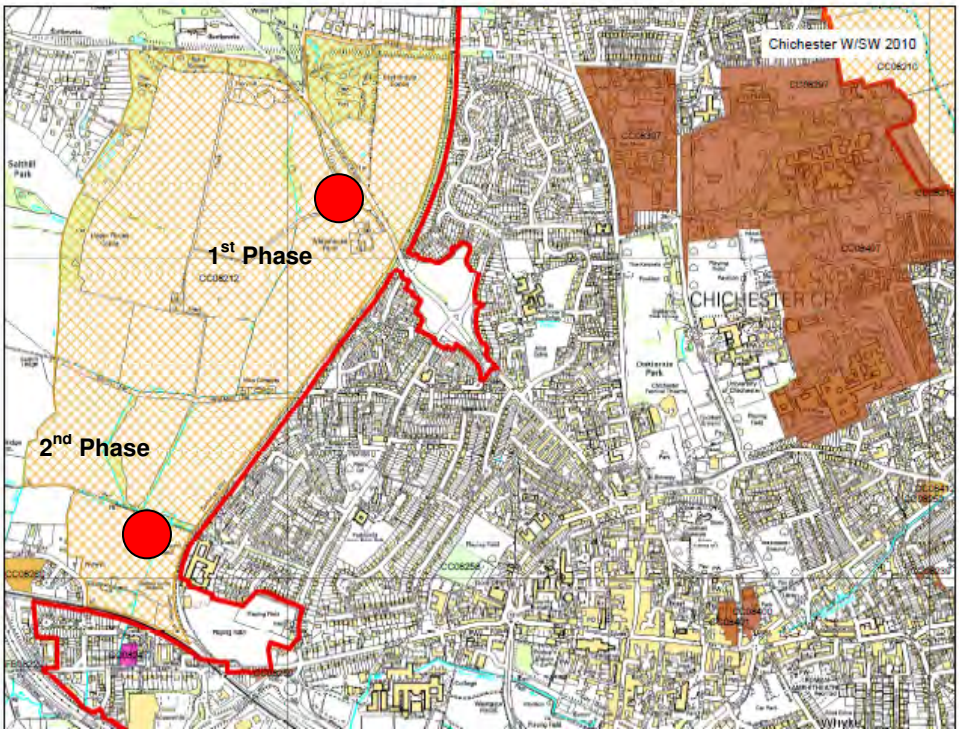
Red Marker = Assumed site access point

3.5.3 West of Chichester

The West of Chichester strategic site is situated adjacent to the existing western edge of the build-up area, extending northwards from the A27 to Old Broyle Road (B2178). The site in West of Chichester was modelled with the following assumptions:

- *A range of 500 – 1600 new homes*
- *A first phase of 500 additional homes connected to Old Broyle Road and Newlands Lane.*
- *The second phase connected to Westgate*

Figure 3-d West of Chichester Sites



Red Marker = Assumed site access point

3.5.4 Shopwyke

The Shopwyke strategic site is bounded to the north and east by the A27, immediately east of Chichester. To the south is the B2144 Shopwhyke Road. The site at the Shopwyke was modelled with the following assumptions :

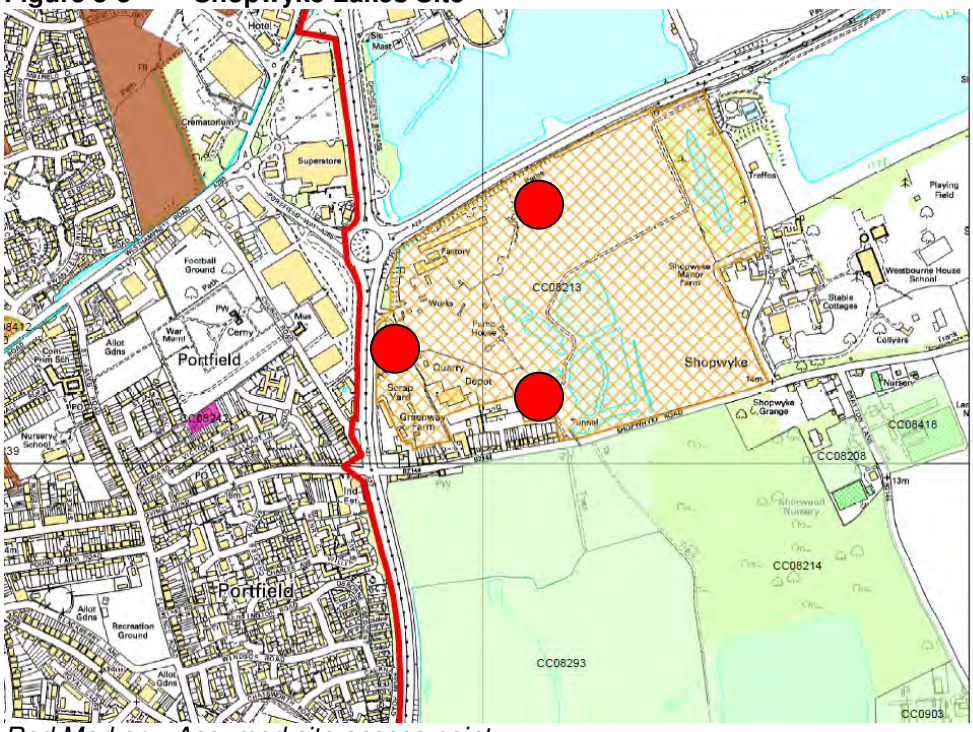
- 600 new homes
- The development is linked to A27 at north and west of development site and to Shopwhyke Rd to the south
- Shopwhyke Rd / A27 traffic movements are reduced by traffic management measures

A planning application for 500 dwellings covering most of the site has been submitted to Chichester DC, and had not yet been determined at the time of the Study. For the purposes of the Study, the Shopwyke Lakes proposal has been treated as a live application. Proposed highways improvements and junction alterations proposed as part of the application have been incorporated in the mitigation measures modelled in this Study. The highway improvements in the public domain were used in the initials stages of this study. In the final preferred option scenario (Chapter 7) the latest plans were released by the Highways Agency for use in this study.

The Shopwyke development, unlike the other sites, has network changes which affect other (non-development) traffic. Figure 3-f (below) shows the access points for Shopwyke

Shopwyke is connected to A27 Arundel Road (left-in left-out), the left-in, left-out at Portfield Quarry, and Shopwhyke Road. The movements to the Shopwhyke Road/A27 junction have been removed in the model. The internal site spine road provides an alternative route. In addition, the right-turn from A27 east to Oving road is also removed.

Figure 3-e Shopwyke Lakes Site



Red Marker = Assumed site access point

3.5.5 Employment Assumptions

At the time of the study, the size and location of employment sites to be allocated in the Local Plan had not been determined. Therefore, for this study it has been assumed that each strategic site will include new employment floorspace to be developed at a ratio of 20 sq.m per dwelling (i.e. 1,000 dwellings would be accompanied by 20,000 sq.m employment floorspace).

3.5.6 Trip Rates

For the strategic locations, i.e. Tangmere, West of Chichester and North East of Chichester, the trip rates were generated from the TRICS® database[3]. The methodology and assumptions used for the calculation of trip rates are summarised below. The rates below were agreed as appropriate for this study by Chichester District Council, West Sussex County Council, the Highways Agency, and the housing developers.

For residential trip rate estimation, the "*Mixed Private/Non-Private Housing*" category from TRICS was used, selecting all regions in the UK excluding Greater London. Due to the location of Chichester, the location types considered were Suburban area, Edge of Town and Neighbourhood centre.

A further filter was applied on TRICS data ("population within a 1 mile radius of up to 25,000"), resulting in a higher trip rate for the Tangmere site than the other strategic sites due to the more rural nature of the location.

The trip rates used for the development sites are summarized below in *Table 3-a*.

[3] TRICS@ is the national database of trip rates used for transport planning purposes.

Trips / House >	Arrivals	Departures
Non-Strategic		
Weekday AM Peak Hour	0.14	0.25
Weekday PM Peak Hour	0.26	0.14
West of Chichester / NE Chichester		
Weekday AM Peak Hour	0.07	0.26
Weekday PM Peak Hour	0.24	0.11
Tangmere		
Weekday AM Peak Hour	0.09	0.36
Weekday PM Peak Hour	0.28	0.16

Table 3-a Housing Trip Rates for Non-Strategic & Strategic Sites

An 'office' based trip rate was taken from TRICS for the strategic sites

Trips / 100sqm of Floorspace >	Arrivals	Departures
West of Chichester / NE Chichester / Tangmere		
Weekday AM Peak Hour	1.15	0.12
Weekday PM Peak Hour	0.09	0.92

Table 3-b Employment Trip Rates for Strategic Sites

For Shopwyke, the detailed trip rates used were those as derived in the associated Shopwyke Lakes planning application to ensure consistency of forecasting.

3.5.7 Distribution of Trips to/from Strategic Sites

The distributions of trips from the strategic sites have been estimated by using the distribution applied to a comparable existing zone, with similar socio-economic and land-use characteristics, located proximate to the strategic site under consideration.

The actual distribution – achieved through CATM modelling - was checked against the expected (target) distribution provided by the housing developers. It was agreed that a 'broadly-similar' distribution could used for this study given that the expected distribution would be heavily influenced by 2001 census data, which is aged, not peak-specific data considering only one journey purpose (travel to work).

Comparisons between the actual and target distributions are illustrated below. The general consistency between the two approaches is considered to demonstrate an acceptable degree of reliability in the applied approach to trip distributions.

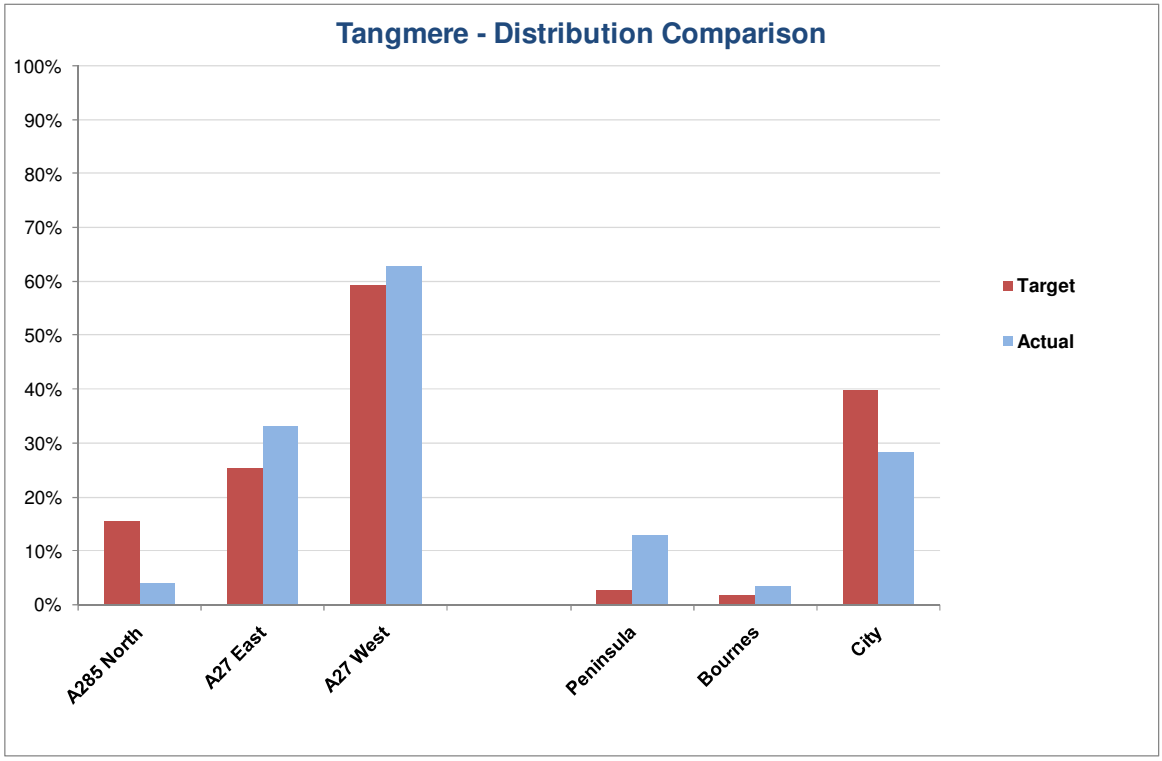


Figure 3-f Tangmere Distribution of Trips from the Site

It is noted that the A285 north and A27 East are too low and too high respectively. However both of these directions are away from Chichester, and therefore have fewer implications of key areas of concern.

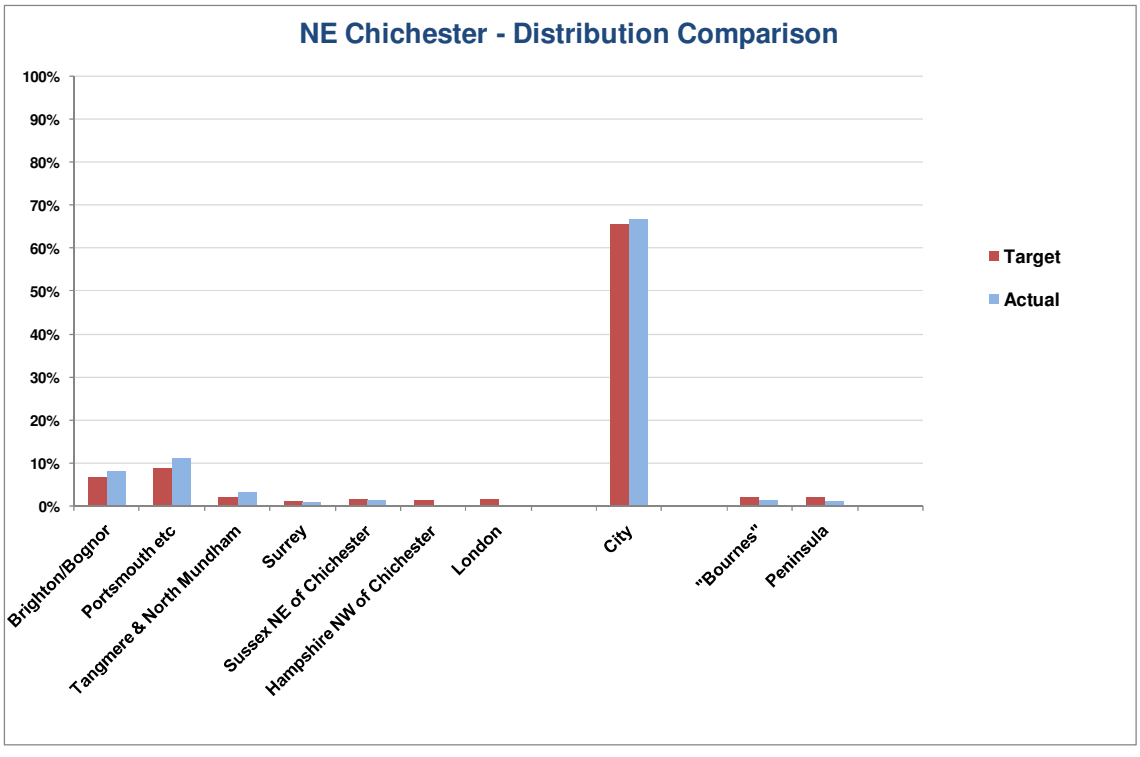


Figure 3-g North East of Chichester Distribution of Trips from the Site

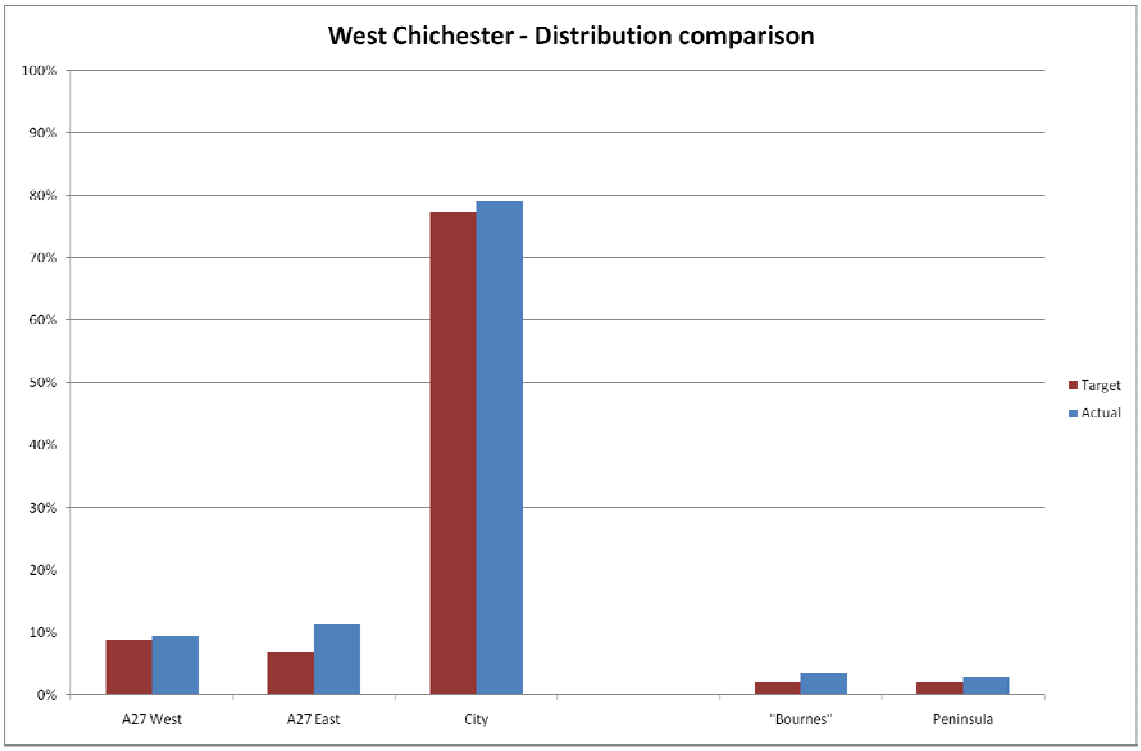


Figure 3-h West of Chichester Distribution of Trips to/from the Site

Plots of the flows from each of the sites is given in Appendix B

3.6 Heavy Goods Vehicle Growth

The growth in HGV trips was based on the DfT's NTM 2009 forecast growth in HGV vehicle kilometres. Growth rates were extracted for goods vehicles[4]. These were interpolated to calculate growth from the CATM base year of 2009.

Table 3-c sets out the total Goods Vehicle trips for base and the 2031 forecast year.

Time Period	2009	2031
AM Peak hour	713	815 (+14%)
PM Peak hour	371	425 (+14%)

Table 3-c Growth in CATM Heavy Vehicle Trip Matrix Totals, 2009 to 2031

3.7 Future Year Road Network Assumptions

Independent of Local Plan developments and associated transport improvements, a number of network changes are known to be "committed" during the period 2012-2031. These network changes need to be included in all future forecast scenarios.

[4] NTM 2009 : Table 2 Urban Area Growth change from 2003

The highway network improvements were confirmed by West Sussex CC and were added to the 2009 network to create the forecast highway network. The schemes included known network changes in relation to committed developments, road safety improvements on specified routes, pedestrianisation of traffic signals, and the introduction of the Bognor Regis Relief Road including, as follows;

- Roundabout on Westhampnett Road
- Disconnecting Church Road from A27
- Improvements at Sainsbury's roundabout
- Connections to Graylingwell site
- Bognor Regis Relief Road - North Bersted
- Bognor Regis Relief Road – Felpham (assumed by 2026)
- The addition of pedestrian phases at A259 Aldwick Road/Victoria Drive, Bognor
- The addition of pedestrian phases at Hawthorn Rd/Collyer Ave/Linden Rd, Bognor
- A29 Bury Hill speed management scheme – from 60 mph to 50 mph.
- A286 Cocking to Chichester - various signage and road marking changes with the Lavant section 30 mph speed limit extended.
- C123 Fishbourne Road East from 30 mph to 20 mph

4 Network Impacts of Growth Scenarios – 2031

4.1 Introduction

The initial part of this study focussed on the housing developments only and did not include any measures to mitigate the impacts of additional development-related traffic. Forecasts discussed in this chapter included all housing growth assumptions (under different scenarios) and the committed network improvements detailed previously.

A series of 10 scenarios were modelled with different allocations of non strategic and strategic housing developments in and around Chichester. These scenarios were defined with reference to available sites, and bounded by 3 broad housing targets, as below;

- *Low housing target – 3,250 additional homes*
- *High housing target – 5,400 additional homes*
- *Maximum housing target – 6,100 additional homes*

Ten different scenarios were modelled representing housing levels for the 3 different overall housing level targets in the non strategic and strategic housing development locations, within three broad bands of growth targets for the Chichester Local Plan area.

Development Scenarios	Low housing target			High housing target					Max housing target	
	1A	1B	1C	2A	2B	2C	2D	2E	3A	3B
Housing Allocations (units)										
Strategic Sites										
Shopwyke	600	600	500	600	600	600	500	-	600	600
NE of Chichester (Westh'pnett)	500	-	850	1,000	500	-	1,400	1,367	1,400	1,400
Tangmere	800	800	500	1,500	1,500	1,500	1,000	1,567	-	1,600
West of Chichester	-	500	500	-	500	1,000	1,600	1,566	1,600	1,600
Sub-Total	1,900	1,900	2,350	3,100	3,100	3,100	4,500	4,500	3,600	5,200
Non Strategic sites	1,350	1,350	900	2,300	2,300	2,300	900	900	2,500	900
Total	3,250	3,250	3,250	5,400	5,400	5,400	5,400	5,400	6,100	6,100
Business floorspace (Sq. Metres)										
Additional employment floorspace	65,000	65,000	65,000	108,000	108,000	108,000	108,000	108,000	122,000	122,000

Table 4-a: Composition of Development Scenarios illustrated in Figures 4a and 4b

The scenarios were selected to test the impacts of different levels of housing in different locations, both in terms of the balance between identified strategic locations (e.g. between sites to the west and east of the City) and the balance between strategic and non-strategic housing sites.

Figures 4a and 4b below illustrate the range of traffic flows arising under the 10 development option scenarios compared to a set of baseline scenarios for 2031. Traffic flows have been assessed at key locations along the A27 in each scenario and also at key locations on the local roads network.

Figure 4a illustrates morning (AM) peak hour conditions on the A27 under different development scenarios and Figure 4b shows morning peak (AM) traffic levels at key locations on local roads, in 2031, under different development scenarios.

Figure 4-a: A27 Traffic Volumes – AM Peak hour – All initial growth scenarios

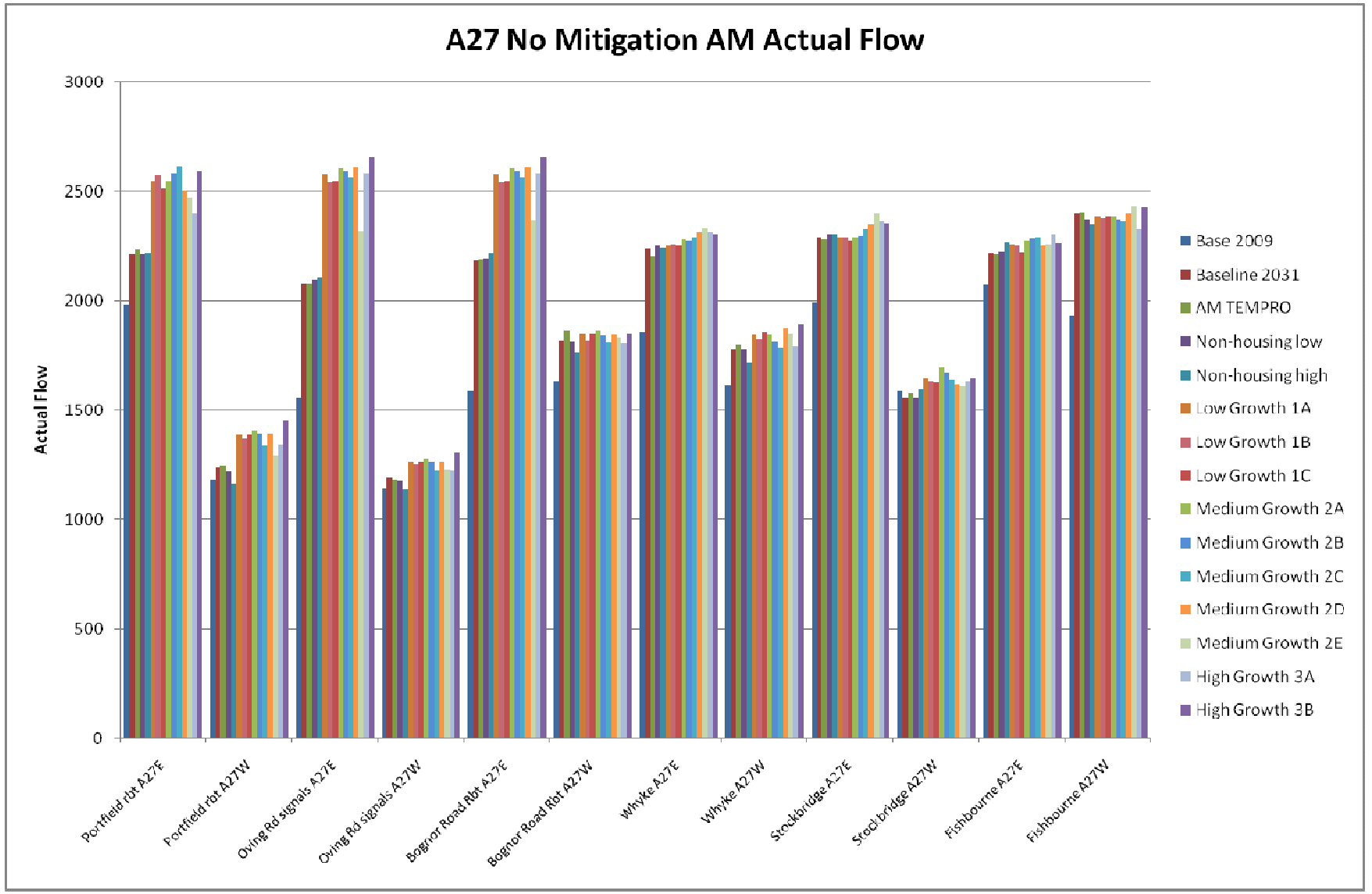
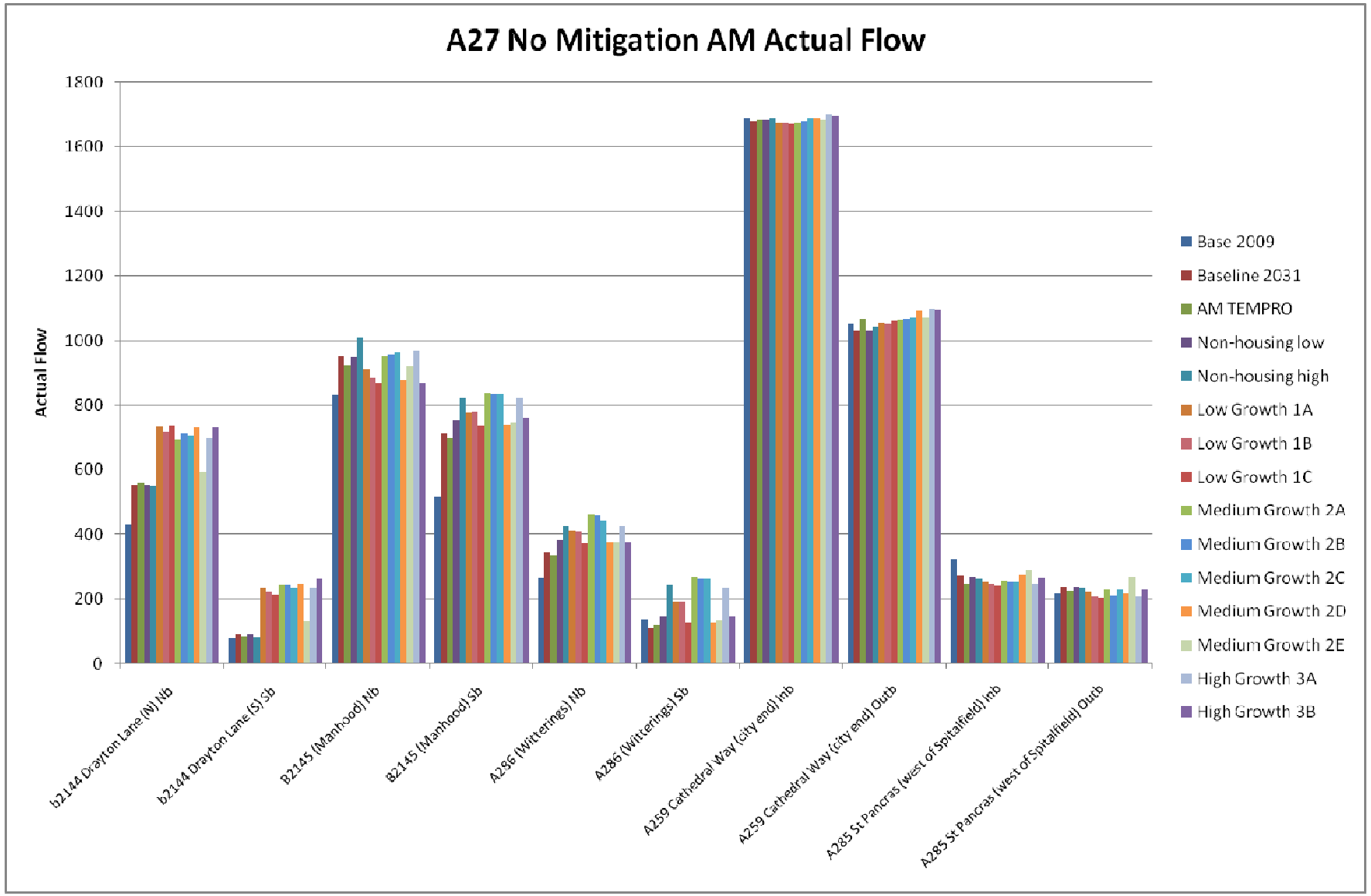


Figure 4-b Local Roads Traffic Volumes – AM Peak hour – All initial growth scenarios



As the study progressed it became apparent that variations between the 10 scenarios were relatively minor so, for clarity of reporting, a focus was developed on one of each of these broad bands, as follows;

- *Low housing target* – *3,250 additional homes* – *Scenario 1B*
- *High housing target* – *5,400 additional homes* – *Scenario 2B*
- *Maximum housing target* – *6,100 additional homes* – *Scenario 3B*

The following sections detail the modelling results from the key scenarios from this part of the study. A full list of the scenarios can be found in *Appendix B.*

In addition three additional scenarios were run, a TEMPRO Forecast, and low & high non-strategic housing only forecasts. The non-strategic housing forecasts reflected the non-strategic components of scenario 1B and 2B for low and high respectively.

4.2 Key Indicators

A number of key performance indicators were used to analyse the results of the modelling work:

- *Change in Traffic Flows across Chichester District area*
- *Traffic Queues at Key Junctions* – measured as the average queue length in the peak hour
- *Queued Flows at Key Junctions*
  Over-capacity at junctions prevents all traffic that seeks to get through the junction in a given time-period (AM & PM peak hours) from doing so. Subsequent junctions on the road network therefore have lower traffic flows due to trips being hindered at the earlier (upstream) junctions. Queued Flow is a measure of the number of trips that would have joined a queue if they had not been hindered earlier in their journey.
- *Journey Times*
  A series of routes across Chichester City and surrounding area, including along the A27, have been identified and journey times measured and compared between different development scenarios.
- *Local Road Traffic Volumes and Volume over Capacity (V/C) Ratios*
  Key local junctions are shown comparing traffic flow to available junction capacity.

4.3 Strategic Network Impacts

The following section shows key performance indicator results for the key scenarios.

4.3.1 Traffic Queues and Queued Flows at Key Junctions

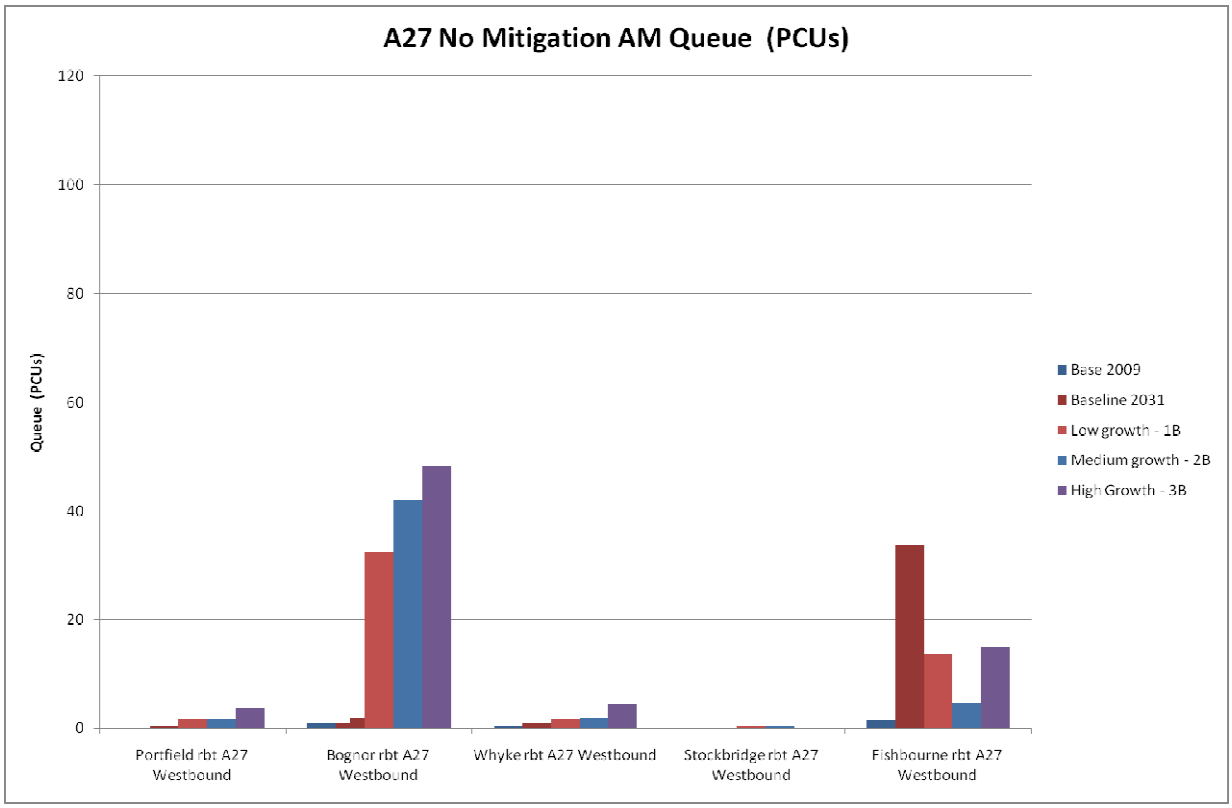


Figure 4-c A27 Westbound Traffic Queues – AM Peak Hour – No Mitigation

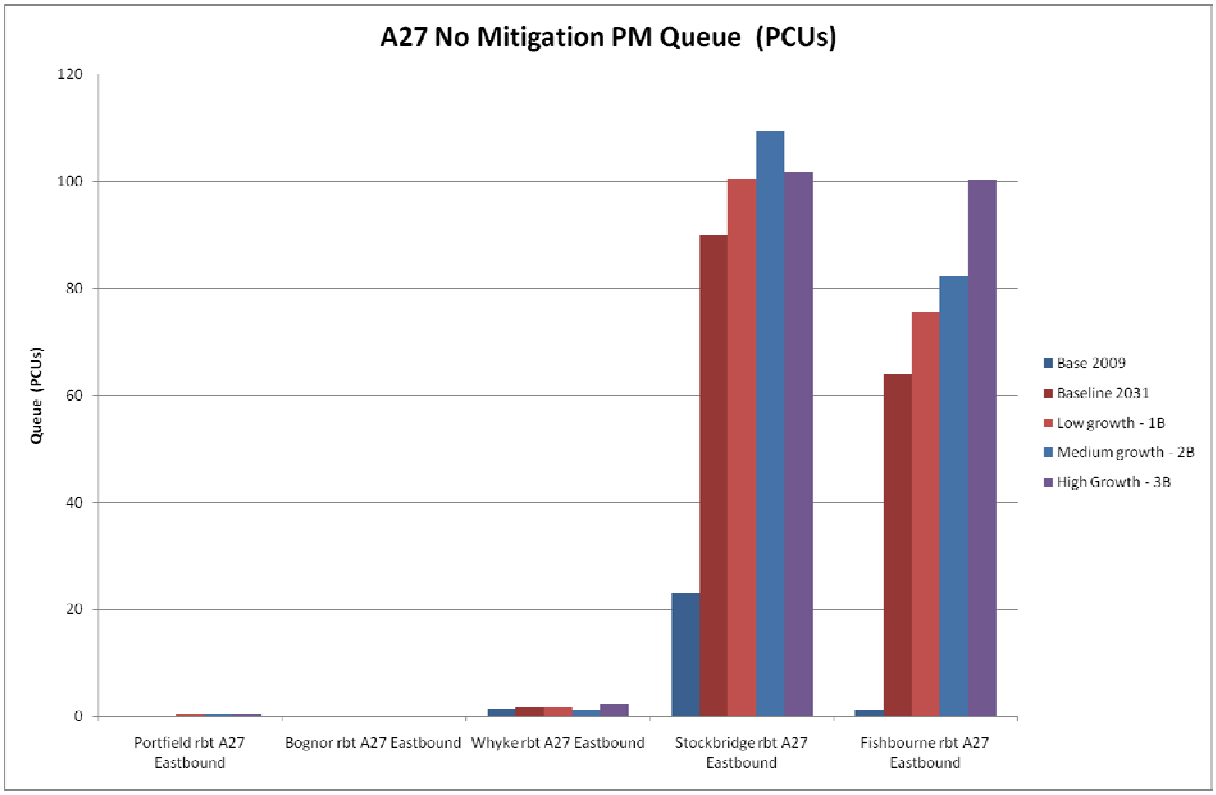


Figure 4-d A27 Eastbound Traffic Queues – PM Peak Hour – No Mitigations

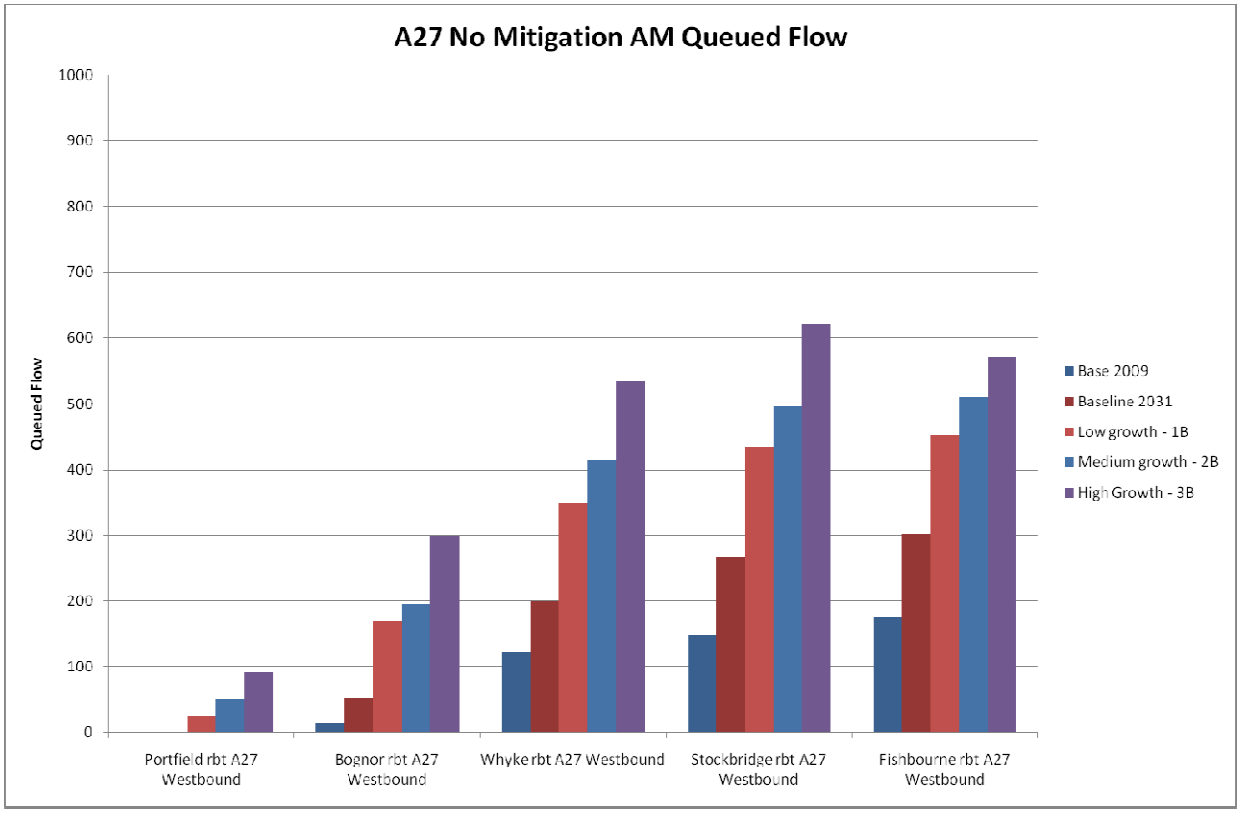


Figure 4-e A27 Westbound Traffic Queued Flows – PM Peak Hour – No Mitigation

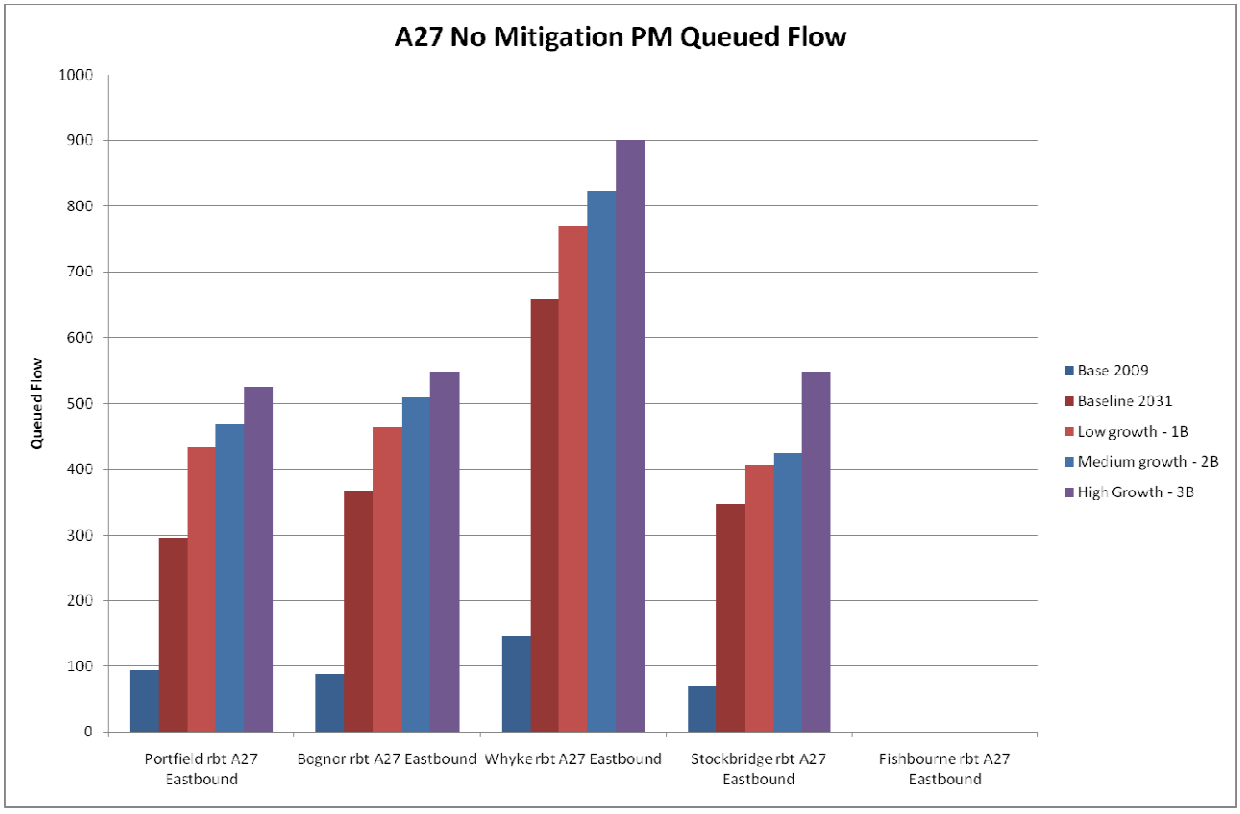


Figure 4-f A27 Eastbound Traffic Queued Flows – PM Peak Hour – No Mitigation

4.3.2 Change in Traffic Flows

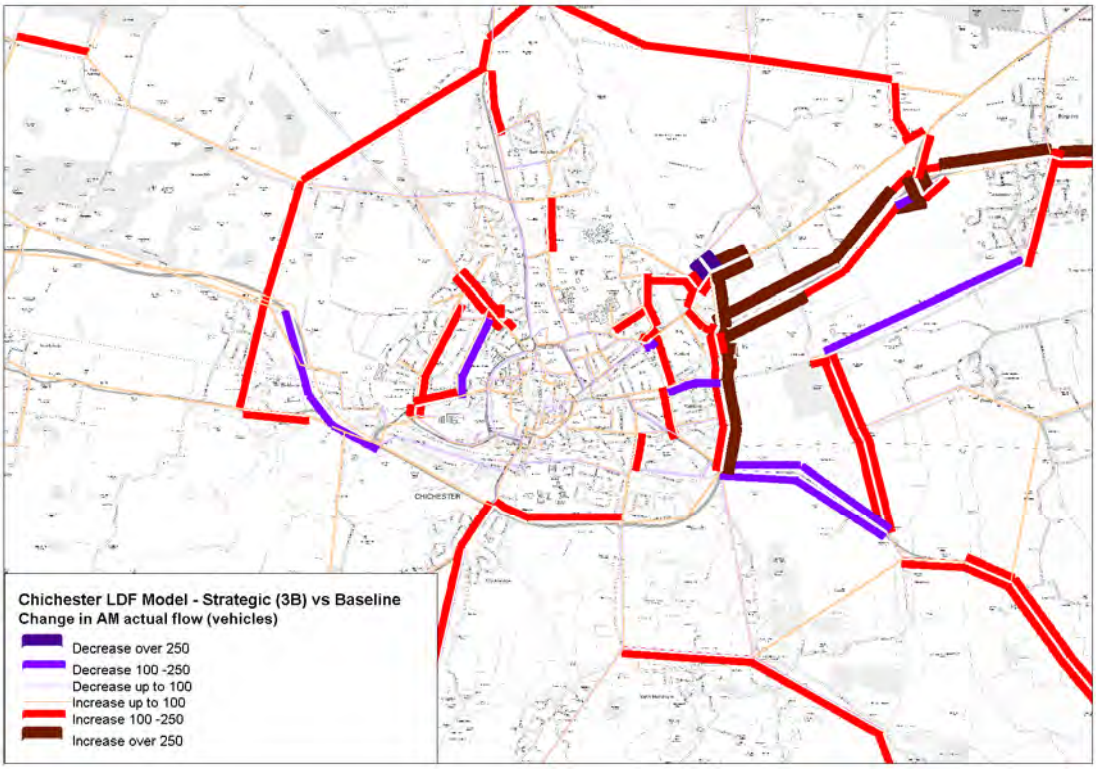


Figure 4-g Maximum Housing Scenario 3B versus 2031 Baseline – AM Peak Hour

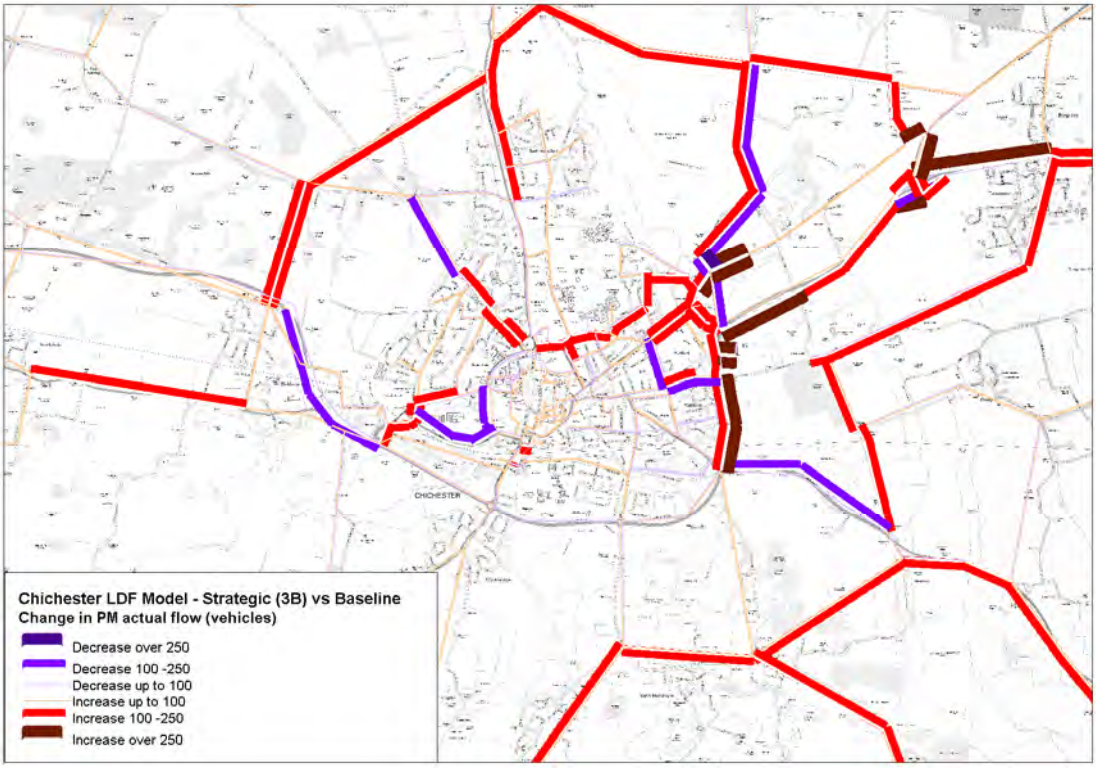


Figure 4-h Maximum Housing Scenario 3B versus 2031 Baseline – PM Peak Hour

4.3.3 Local Road Traffic Volume and Volume over Capacity Ratios

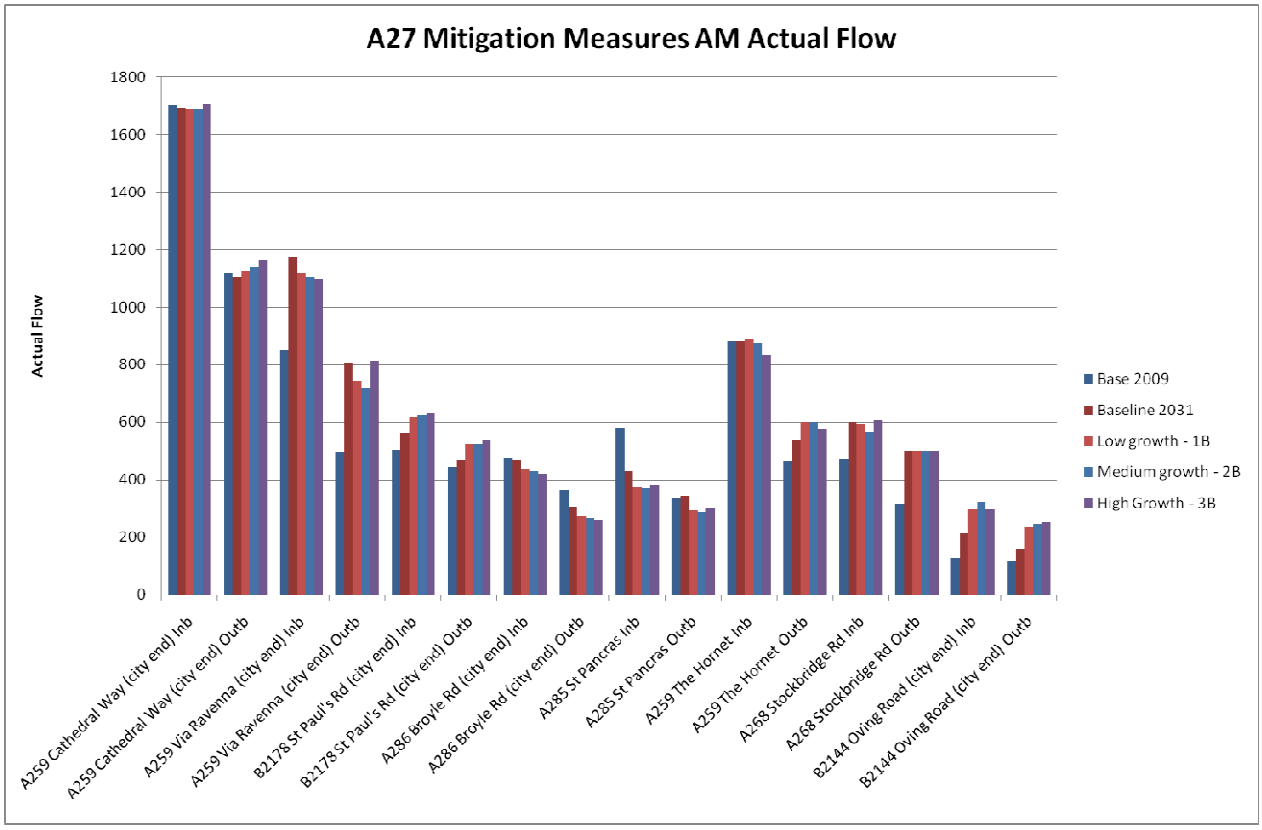


Figure 4-i Local Roads Flows– AM Peak Hour – No Mitigation

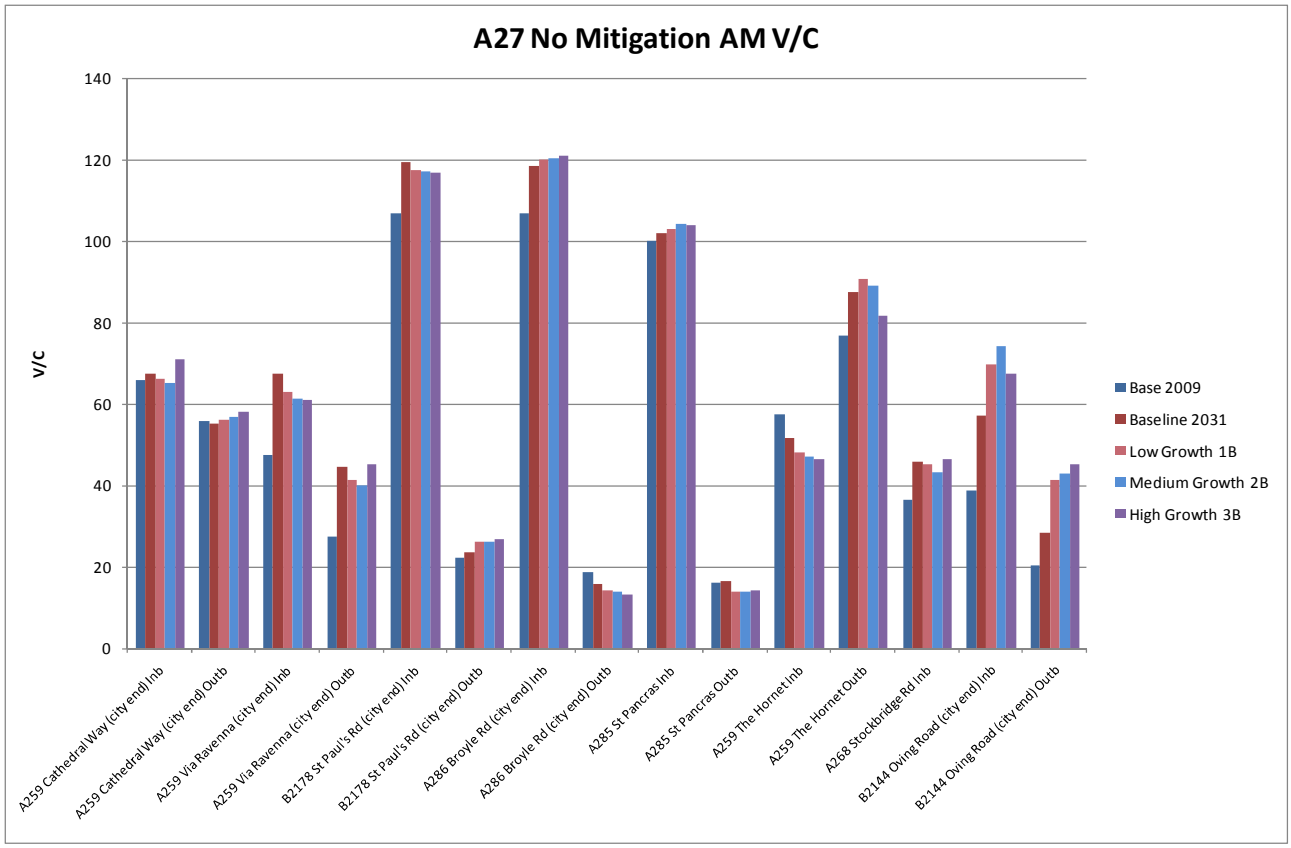


Figure 4-j Local Roads V/C – AM Peak Hour – No Mitigation

4.4 Conclusions from Key Indicators

The results presented focus on 3 key strategic housing scenarios. This is to give an overview of all 10 scenarios. The results for all scenarios are broadly similar on an area-wide basis, with variants in the local area of each strategic site dependant on the housing allocation. It should be noted that modelling results show significant increases in traffic flows and queues between 2009 Base and 2031 Baseline, resulting from already committed housing development and projected background growth in traffic. Differences between the 2031 Baseline and any of the 10 Local Plan scenarios are secondary effects compared to these background changes.

4.4.1 A27

Figure 4-c and *Figure 4-d* show a significant increase in traffic queues at the Fishbourne, Stockbridge and Bognor Rd roundabouts from the 2009 to the 2031 baseline. This increase in congestion in the 2031 Baseline is only caused by committed housing developments and background growth doesn't include any of the traffic growth from non strategic and strategic sites.

Figure 4-e and *Figure 4-f* show a significant increase in flows from 2009 to the Baseline 2031 scenario at all the key A27 junctions, and further increases for all strategic housing growth scenarios. This indicates an increase in congestion all along the A27 route as traffic is unable to complete its journey in the modelled time period due to high levels of congestion.

The change in flow plots (*Figure 4-g* to *Figure 4-h*) show the largest increases flows on the eastern side of Chichester on the A27 where the majority of the strategic developments are located. It also shows a diversionary route via Drayton Lane where traffic is avoiding the very congested Bognor Road roundabout in order to travel towards Bognor Regis.

4.4.2 Local Roads

Flow and V/C (volume over capacity – a measure of traffic congestion at junctions) are given in *Figure 4-i* and *Figure 4-j*.

Overall, there is little change on local roads from 2031 base flows, except on some low flow roads especially those adjacent to development sites east of Chichester.

There is evidence of local re-routing, for instance less traffic on St Pancras (In-bound) with re-routing around Spitalfield Lane. The model indicates increased flows on a diversionary route to the north of Chichester via East Lavant. In current circumstances this may not appear realistic, but the assessment indicates how the potentially high levels of future congestion on the A27 may cause this diversion to become increasingly attractive for some trips.

There are no excessive junction capacity problems, though some local pressures are evident e.g. on A285 mini-roundabouts. It is important to note that the performance of City Centre network is protected by "metering" effects of the A27 junctions, where congestion on the A27 limits the amount traffic entering the centre.

5 Network Mitigation Measures

5.1 Introduction

The housing development testing identified significant deterioration in network performance along the A27 around Chichester by 2031, and indicated that this would be further worsened as a result of growth in housing.

In conjunction with the housing developers targeted network improvements along the A27 were developed to address these outcomes in the 2031 development scenarios.

Smarter choices and demand management measures were also considered for application across Chichester which would encourage the use of public transport, cycling and walking rather than travel by car.

5.2 Core Housing Options for Mitigation Testing

The tests of potential transport mitigation measures focussed on 2 core housing scenarios as described here. In the first scenario, housing development was constrained to the South East Plan housing target (355 homes/year in the South of the District), whilst the second scenario tested a much higher level of housing (440 homes/year) derived by maximising housing potential at the strategic locations.

In addition, a final run was undertaken later using the Preferred Approach schedules (the housing distribution proposed in the draft Local Plan), and transport mitigation measures developed through work by West Sussex CC and the Highways Agency. The results of this test are presented in Chapter 7 of this report.

The table below shows the allocation of housing in each non strategic and strategic housing site, for the mitigation scenario tests.

	SE Plan Housing Target (355 homes/yr)	Maximum Housing Target (440 homes/yr)
Non-Strategic Housing Sites		
Chichester City (built-up area)	300	420
Southbourne	175	250
East Wittering & Bracklesham	240	340
Selsey	100	150
Tangmere	75	100
Elsewhere in south of District	310	440
Sub-total	***1,200***	***1,700***
Strategic Locations		
Shopwyke	500	500
NE of Chichester (Westhampnett)	900	1,200
Tangmere	1,000	1,350
West of Chichester City	1,000	1,350
Sub-total	***3,400***	***4,400***
Total Additional Housing (South of District)	**4,600**	**6,100**
Additional employment (B1-B8) floorspace (sq. metres)	92,000	122,000
North of District additional housing (outside South Downs National Park)	320	320

Table 5-a 2031 Growth Assumptions for Transport Mitigation tests

5.3 Road Network mitigations - A27 Junction Improvement Plans

The following section details the mitigation measures tested along A27 around Chichester.

A27 Mitigation Schemes were tested at the following junctions:

- *Fishbourne*
- *Stockbridge*
- *Whyke*
- *Bognor Road*
- *Portfield*
- *A27 Oving Road junction improvements*
- *Speed Limits reduced to 50mph between junctions along A27*

These junction improvement proposals were developed in conjunction with housing developers for the strategic sites at Tangmere, West of Chichester, and North East of Chichester (Westhampnett). The improvements at the Portfield Roundabout and Oving road junction are those used in the planning application for the Shopwyke Lakes site.

All junction improvements are within the existing highway boundary (shown as a dotted red line). All proposals are preliminary options prepared for the purpose of evaluation and consultation, with further detailed design work necessary before construction.

All of the proposed junction improvements retain all existing turning movements, with the following exceptions;

- At Oving Road junction, traffic is restricted from turning right from A27 onto Oving Road East. Bus Only exit from Oving Road East onto/across the A27 will be controlled by a rising bollard.
- At Bognor Road roundabout on the A27, traffic can no longer join the A27 from Vinnetrow Road which becomes one-way. The exit from the A27 to Vinnetrow Road is retained.

5.3.1 Fishbourne Roundabout

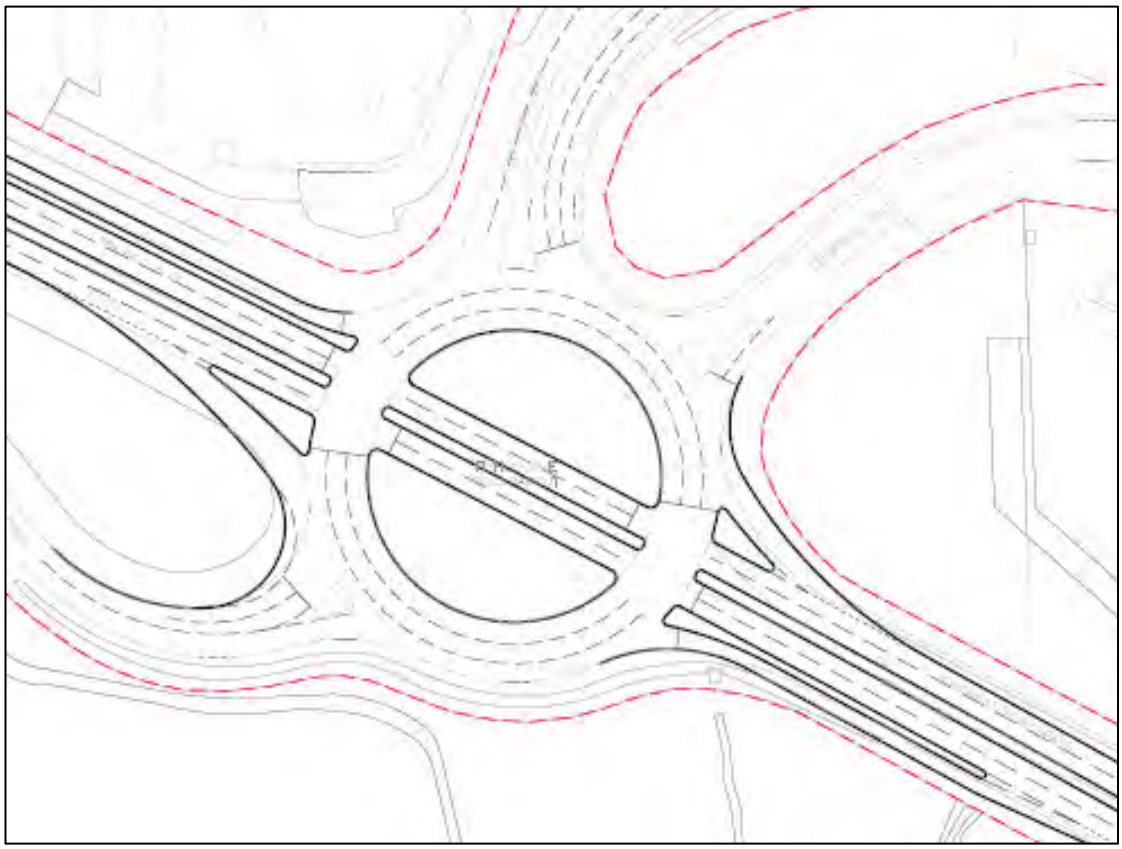


Figure 5-a Fishbourne Roundabout Improvement

Key features are;

- *'Hamburger' style signalised junction*
- *Allows direct cross movement for A27 traffic*
- *Retains all connections to local network with traffic signal control.*

5.3.2 Stockbridge Roundabout

Figure 5-b Stockbridge Roundabout Improvement

Key features are;

- *Signalised junction replacing existing roundabout*
- *Advance entry and exit lanes onto A27*
- *Dedicated right turn lane off A27 in both directions*

5.3.3 Whyke Roundabout

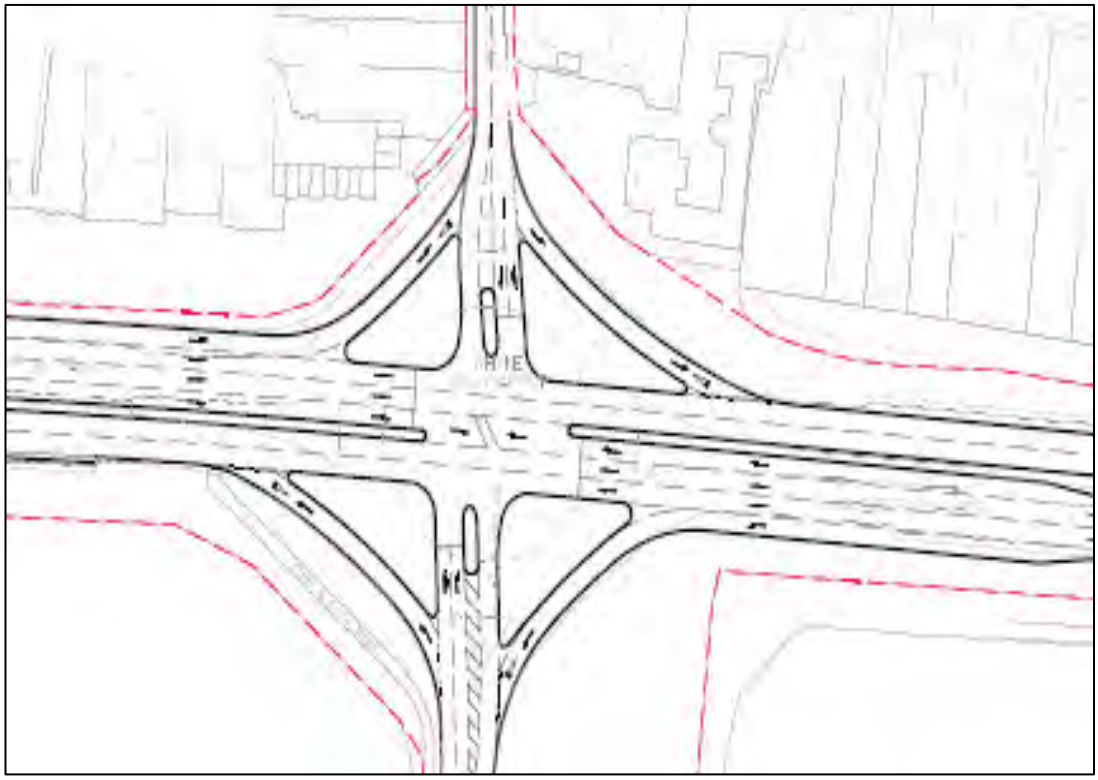


Figure 5-c Whyke Roundabout Improvement

Key features are;

- *Signalised junction replacing roundabout*
- *Advance entry and exit lanes from A27*
- *Dedicated right turn lanes off A27 in both directions*

5.3.4 Bognor Road Roundabout

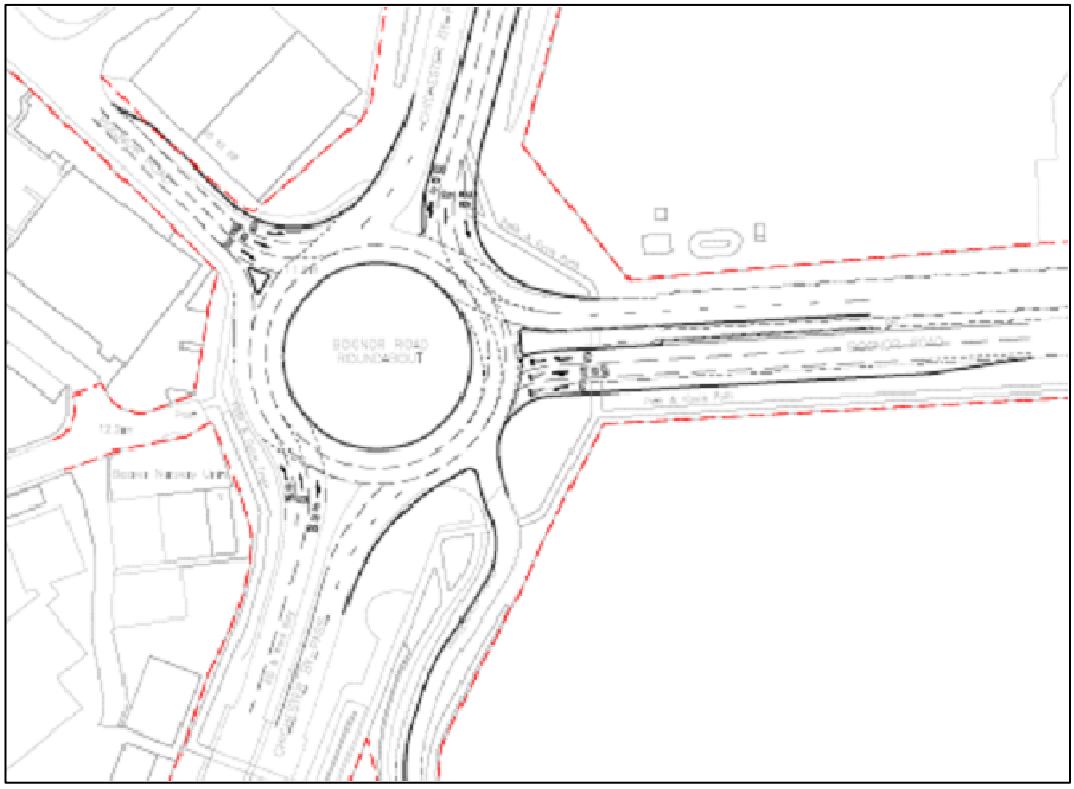


Figure 5-d Bognor Road Roundabout Improvement

Key features are;

- *Extra lane capacity from North, East & West*
- *Vinnetrow Road becomes exit only*

5.3.5 Oving Road Junction

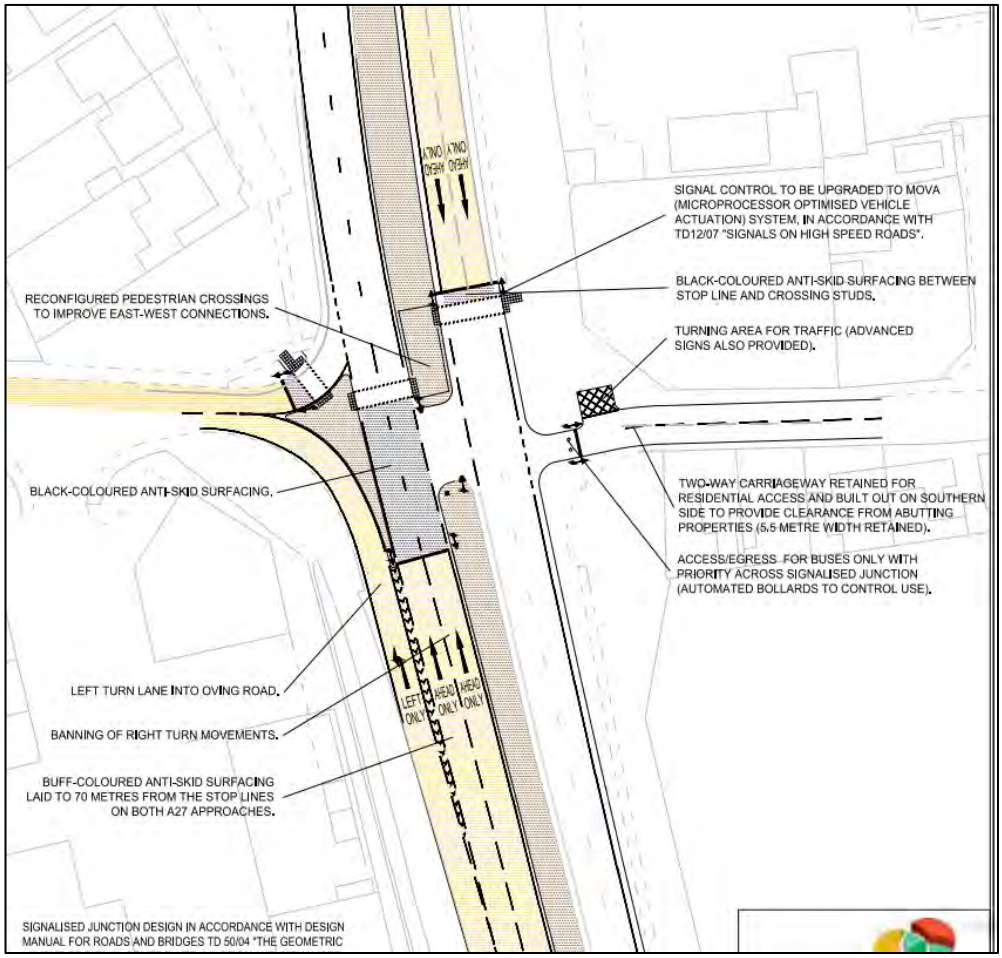


Figure 5-e Oving Road Junction Improvement

Key features are;

- *Dedicated left turn lane*
- *Banned right turn*
- *Upgraded signals with bus priority*
- *Bus only access – automatic bollard controls*

5.3.6 Portfield Road Roundabout

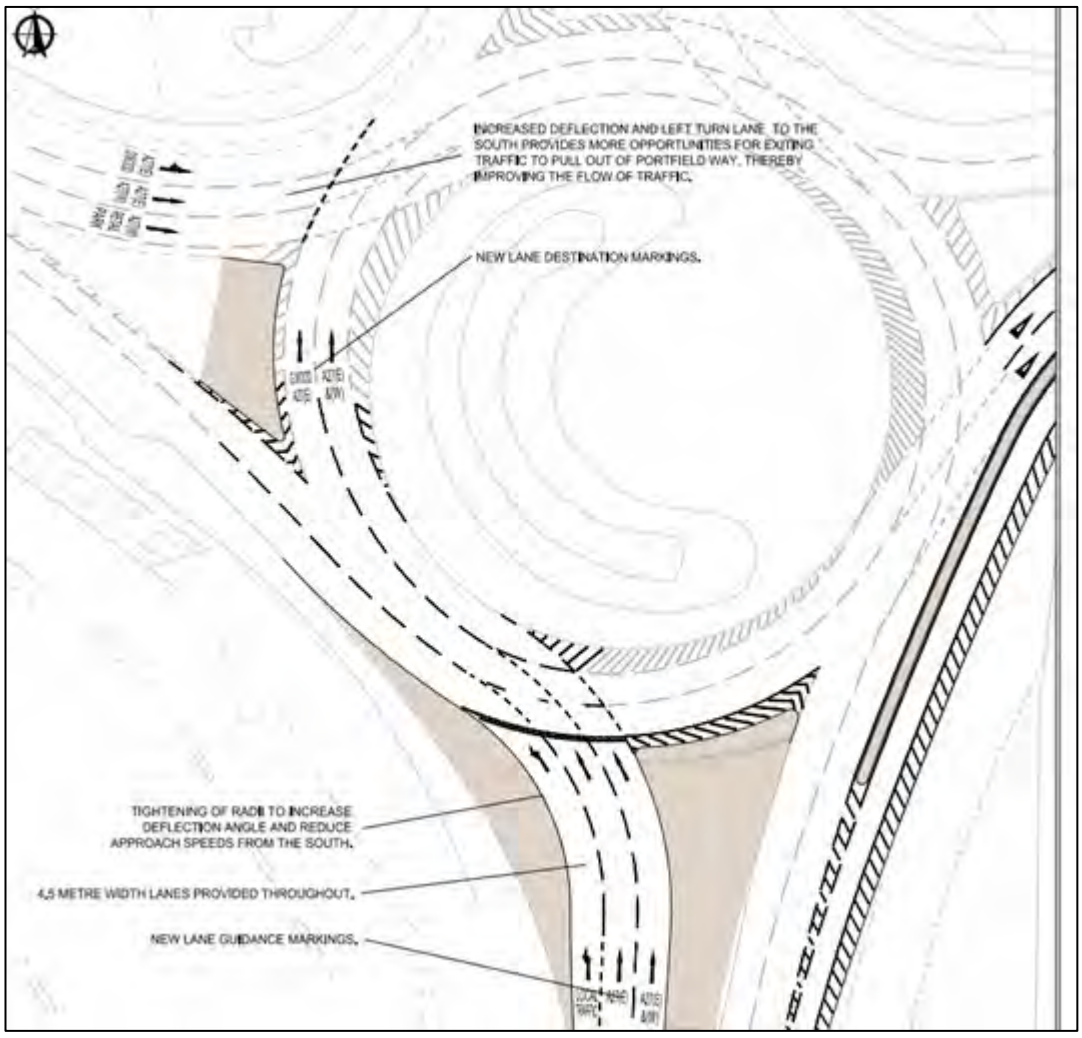


Figure 5-f Portfield Road Roundabout Improvement

Key features are;

- *A27 Westbound to Southbound - New Dedicated Lane*
- *Improved road safety with revised lane layout, geometry and markings*

5.3.7 Infrastructure Costs

To inform the planning process and negotiation of development contributions models for infrastructure delivery, initial budget cost estimates were prepared for each of the A27 junction improvements described above. These costs are summarised below.

Table 5-b: Budget cost estimates for A27 infrastructure improvements

Scheme	Budget cost estimate (£m)
Portfield Roundabout	0.619
Oving Road	0.459
Bognor Road Roundabout	1.220
Whyke Roundabout	2.225
Stockbridge Roundabout	2.644
Fishbourne Roundabout	1.734
Sub total	**8.901**
Optimism Bias (@44%)	3.916
TOTAL	**12.817**

Notes:

1. Scheme cost estimates were prepared independently by RPS Planning & Development and Vectos Consulting.
2. The figures shown above are the 80th percentile of the range costs between these independent estimates
3. Optimism bias has been calculated across the whole programme at 44%, although some proposals may be at a higher stage of development than others
4. Costs exclude any works associated with the Shopwyke planning application other than Oving Road and Portfield Roundabout, which are referenced within the application.
5. No estimate of costs relating to statutory undertakers/utilities equipment is included.

5.4 Smarter Choices and Demand Management Measures

Chichester DC and West Sussex CC acknowledge the role of travel demand management measures as part of a balanced strategy for sustainable transport systems in Chichester. Accordingly, within the package of mitigation measures, 'Smarter Choices' and demand management measures were tested to examine their contribution to an overall package of transport mitigations.

Smarter Choices measures are considered to be a range of incentives to promote behaviour changes and mode switch in favour of sustainable transport options, especially walking, cycling and public transport. Specific measures may encompass promotional and marketing initiatives, travel plans, traveller information systems, and network improvements such as cycle routes and bus priorities.

Demand management measures are considered to be a range of mechanisms that influence decisions to travel by private car – particularly as a lone driver. In conjunction with smarter choices, demand management measures can alter the balance between those factors that influence mode choice, timing and distance of journeys with a view to incentivising a more sustainable set of travel behaviours. Typical demand management measures can include changes to car park availability, parking charges, waiting and access restrictions, driver information, car sharing etc.

The West Sussex Local Transport Plan demonstrates a commitment to sustainable travel choices and embeds smarter choices and demand management in the range of measures to achieve this objective. West Sussex County Council is developing an integrated package of the following measures to reduce future travel demands arising from housing and economic growth in Chichester, including:

- *Cycle route improvements*
- *Bus priority measures*
- *Real-time Passenger information*
- *Better bus-rail interchange*
- *Driver information (Variable Message Signs)*
- *Parking management*
- *Travel Marketing*
- *Travel Plans*
- *Car sharing*

The following specific measures have been identified to mitigate the impact of future development in Chichester and have been identified following an initial assessment of the emerging Chichester Strategic Transport Study. At this stage, the list should not be considered to be exhaustive in its geographical coverage and some gaps still exist such as public transport services.

Smarter Choices Measures

Mode / Group of Measures	Measure	Cost Estimate
Smarter Choices	High intensity behaviour change programme (new commercial & residential development, existing employers & schools, personalised travel planning and marketing)	£120,000 per annum

Local Infrastructure Measures

Mode / Group of Measures	Measure	Cost Estimate
Public transport	Bus lane along A259 approaching Bognor Road Roundabout	£1,200,000
	RTPI screens at key locations	£150,000
	Bus / rail interchange improvements	To be determined
Cycling	Portfield cycle route	£120,000
	St Paul's cycle route	£140,000
	Summersdale cycle route	£230,000
	Oving cycle route	£80,000
	Chichester - Tangmere	£630,000
	Graylingwell cycle route	Committed
	Parklands cycle route	£440,000
	Chichester – Selsey cycle route	To be determined
	Selsey – Witterings cycle route	£200,000
	Gap-filling to complete the Chichester Cycle Network	£500,000
Traffic management	Variable Message Signing (VMS)	£8,000
	Right turn from Oaklands Way into Festival Theatre car park	£400,000
Junction improvements	Northgate Gyratory	£1,025,000
	Southgate Gyratory	£200,000
	Westhampnett Road/ St Pancras/ Spitalfield Lane/ St James Road double mini roundabouts	£1,000,000
	Sherborne Road / St Paul's Road	£540,000
	Cathedral Way / Via Ravenna	£170,000
	A286 Birdham Road / B2201 (Selsey Tram Roundabout)	£25,000
	B2145 / B1266	£100,000
Total Costs		**£7.158 million**

Table 5-c Indicative Smarter Choices Measures and Cost Estimates

These measures have been identified following a desk based investigation of the issues and at this stage are based largely on professional judgement. It should be noted that individual measures listed below have not been specifically tested as part of the transport modelling work. All schemes are subject to further design work, consultation, necessary approvals and, where appropriate, statutory processes.

The identified measures will improve the local road network as well as increasing the share of local travel by more sustainable modes such as walking, cycling and public transport. The package of junction improvements for the local road network has been identified to improve road capacity at key locations together with measures to also improve facilities for pedestrians and cyclists.

The costs associated with both Smarter Choices and local transport infrastructure improvements are summarised in Table 5c above. Local transport infrastructure measures are shown as estimated capital costs. Smarter choices will be delivered as a rolling programme of initiatives which have been costed on a per household basis at this stage. Table 5c shows the estimated annual costs of a Smarter Choices programme to support the Local Plan Preferred Approach. It is important to note that the local infrastructure improvements and the Smarter Choices measures support each other. The full impacts of one programme cannot be realised without the proposed complimentary investment in the other.

For the purposes of these strategic assessments of future travel demands and network performance, the combined long-term impacts of this integrated package of sustainable travel measures was assessed with reference to a number of benchmark demonstrations nationally. Benchmark impacts were defined with reference to DfT's Sustainable Travel Towns programme[5] and independent research[6] into the long term potential of such measures.

Through this review, the steering group considered that the following impacts be modelled in the 2031 scenario for Chichester, as follows:

- *7% reduction in trips to / from Chichester city centre in 2031 as a result of area-wide smarter choices and local infrastructure measures[7];*
- *5% reduction in trips to / from Strategic Development sites in 2031 as a result of development-specific travel planning and behaviour change packages[8].*

The assessment acknowledged that smarter choices measures would have greater impacts on short distance trips i.e. those less the 5km.

These changes in car-borne demands are considered to be realistic and robust estimates of the long-term impacts of measures designed to promote sustainable travel. The scale of change is comparable with behaviour changes already achieved in towns and cities of similar scale and profile to Chichester including Worcester, Exeter, Cambridge, York and Peterborough.

[5] "The Effects of Smarter Choice Programmes in the Sustainable Travel Towns: Summary Report." Sloman L. et al. DfT February 2010

[6] "Smarter Choices: Assessing the potential to achieve traffic reduction using soft measures." Cairns S. et al. Transport Reviews, University College London , 2004

[7] Changes due to Smarter Choices are compared to the 2031 Baseline scenario

[8] Changes due to Smarter Choices are compared to the 2031 Baseline scenario

5.5 Total Costs for Transport Mitigations

In summary, work to produce costs estimates for the transport mitigations package that will accompany planned growth to 2031 has been completed alongside the testing of options. Costs have been prepared A27 junction improvements (by RPS Planning & Development and Vectos Consulting) and for Smarter Choices and local transport infrastructure (by West Sussex CC). These costs have been reviewed by the study steering group, and a considered to be a reasonable basis for planning.

Table 5-d: Summary of Transport Mitigation Costs

Mitigation Measures	Cost Estimate
A27 Junction Improvements (1)	£12.817 million
Smarter Choices (1 year)(2)	£0.120 million
Local transport measures (2)	£7.158 million
TOTAL	**£20.095 million**

Notes

(1) – refer to Table 5-b for details
(2) – refer to Table 5-c for details
(3) All costs are considered to be budget cost estimates at this stage
(4) Further work is required to attribute costs to any future S106/278 or CIL contributions from developments within Chichester.
(5) Costs are expected to be met from a range of funding sources including developer contributions, local authority, and Department of Transport.

6 Network Impacts of Growth with Mitigation Measures - 2031

6.1 Introduction

The section details the results of model tests following the introduction of the mitigation measures alongside the growth scenarios. Analyses have been prepared to examine changes in network performance with reference to journey times, traffic flows and congestion (queues) in 2031. The key traffic performance indicators are presented as described in section 4.2.

6.2 Journey Times across Chichester

A series of key routes were identified across Chichester and are shown in *Figure 6-a*.

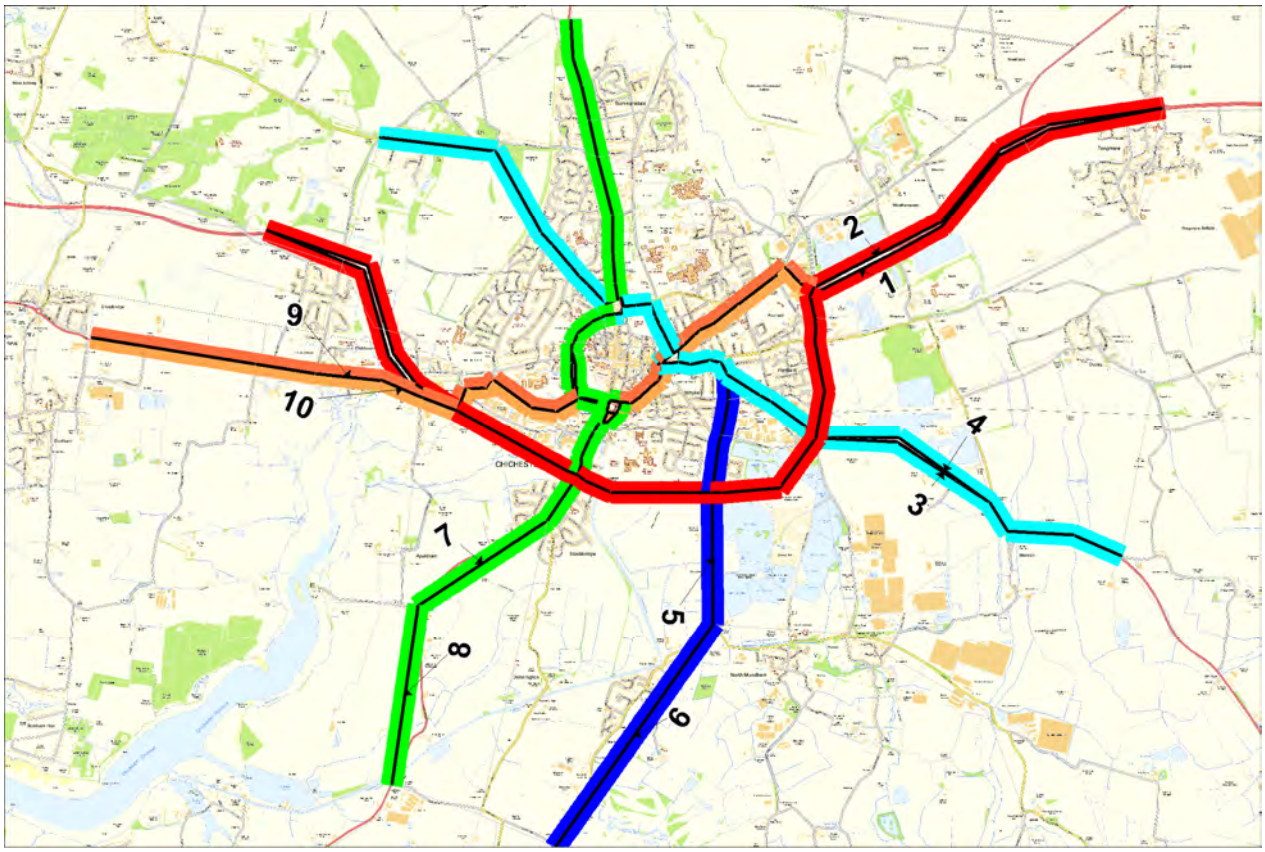


Figure 6-a Journey Time Routes

The following graphs show the journey times for the mitigation scenarios compared to the 2031 Baseline scenario. In addition the journey times for the non-mitigated scenarios are given in Appendix B.

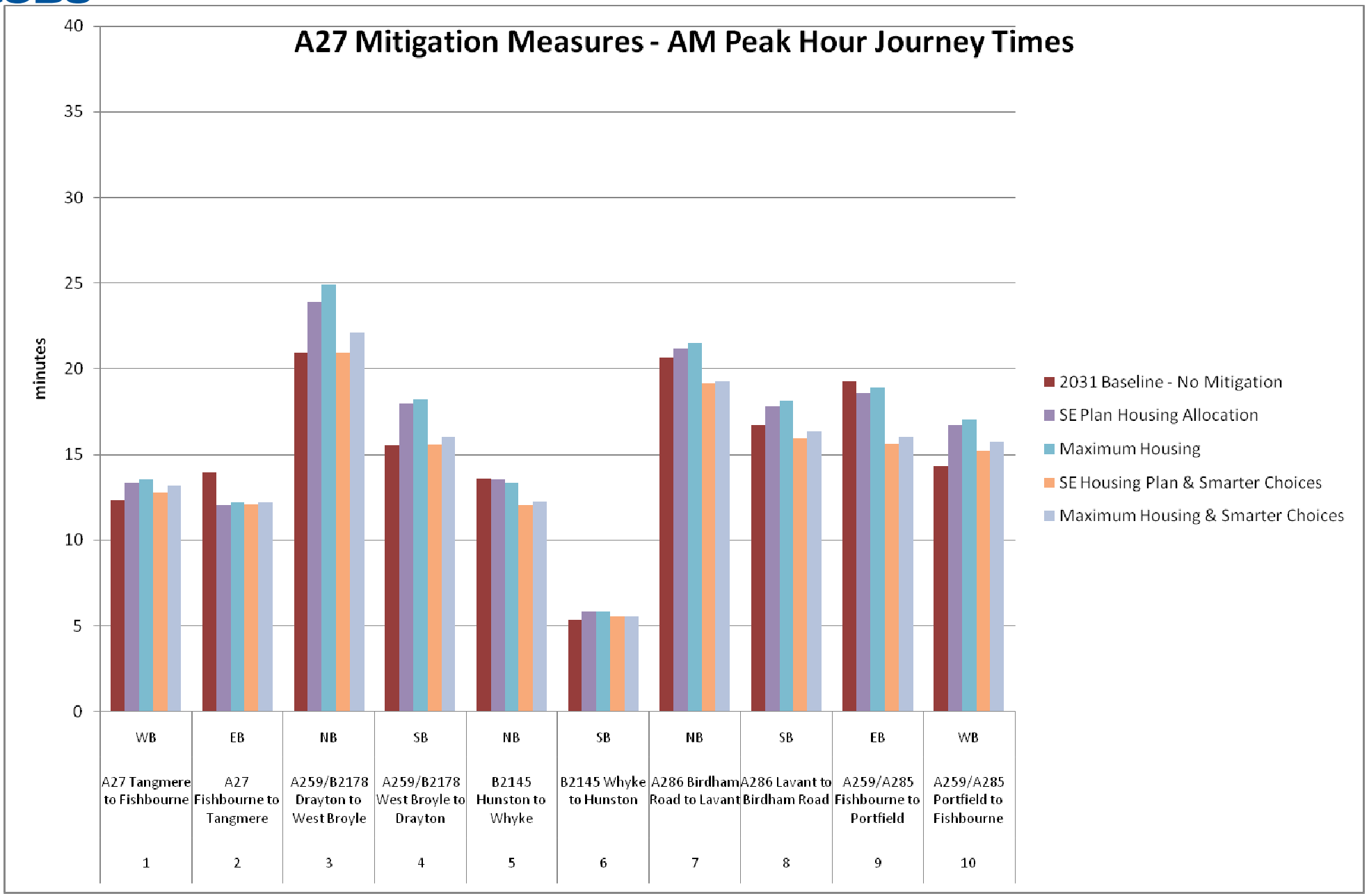


Figure 6-b Journey Times across Chichester – AM Peak Hour

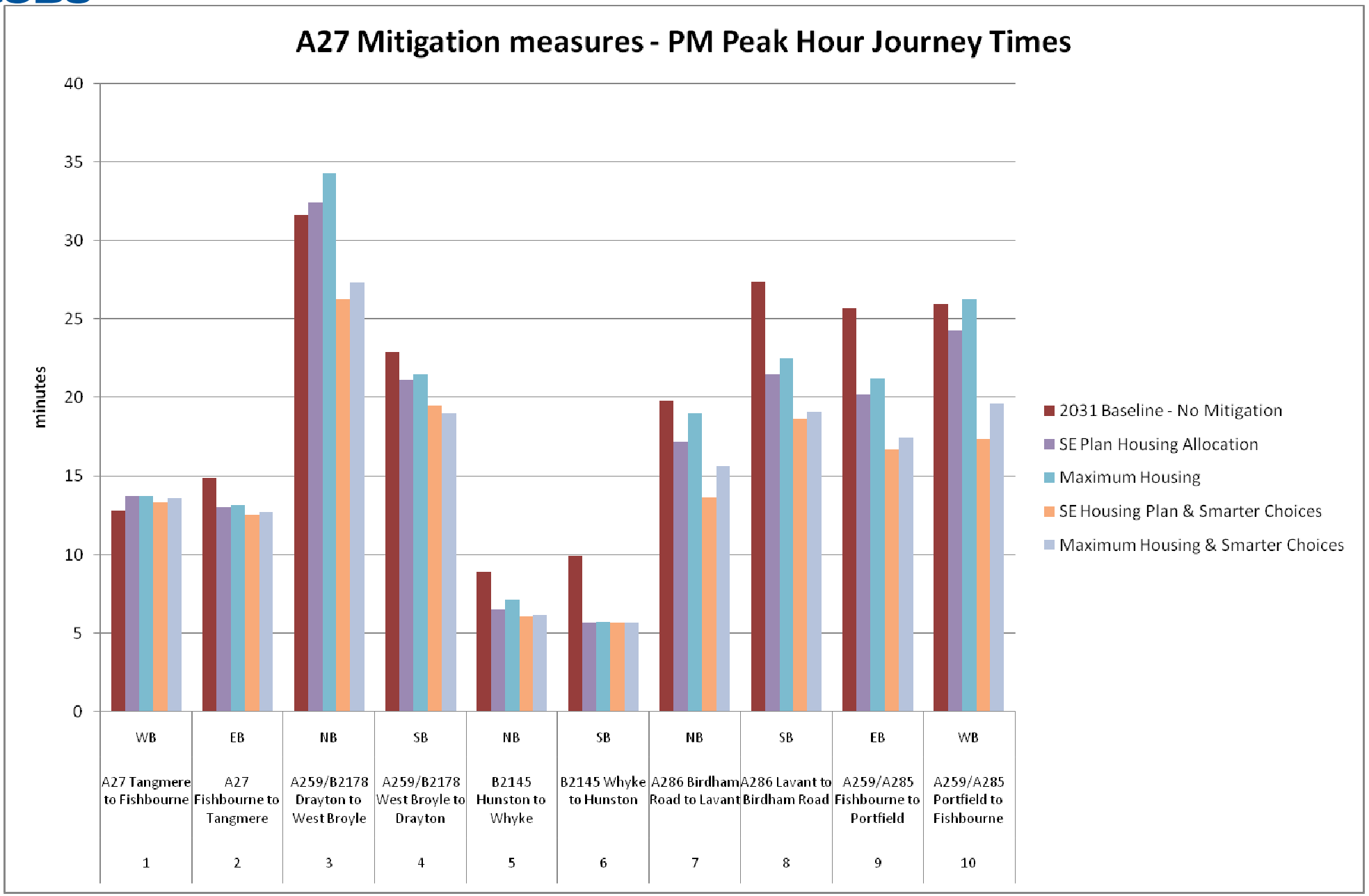


Figure 6-c Journey Times across Chichester – PM Peak Hour

6.3 Change in Traffic Flows Across Chichester

The following figures show in the change in traffic flows across Chichester for the mitigation scenarios compared to 2031 Baseline in both the AM & PM peak hour modelled time periods.

For each time period, two growth scenarios are shown as summarised in 5.2 above, namely:

1. South East plan targets for a total of 4,600 new homes by 2031
2. Maximum housing growth with a total of 6,100 new homes by 2031.

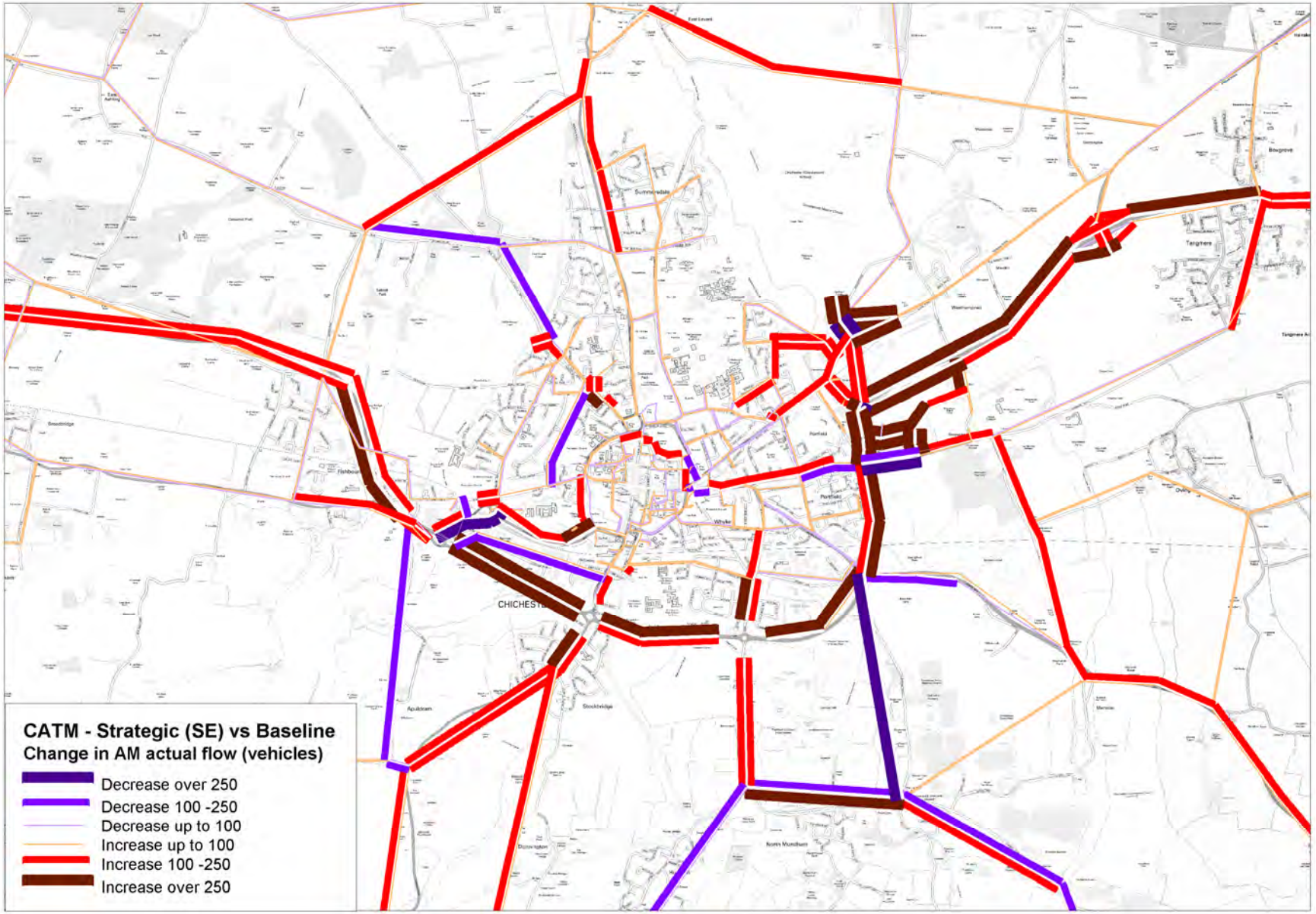


Figure 6-d Change in Traffic Flow – A27 Mitigation - South East Plan vs 2031 Baseline - AM Peak Hour

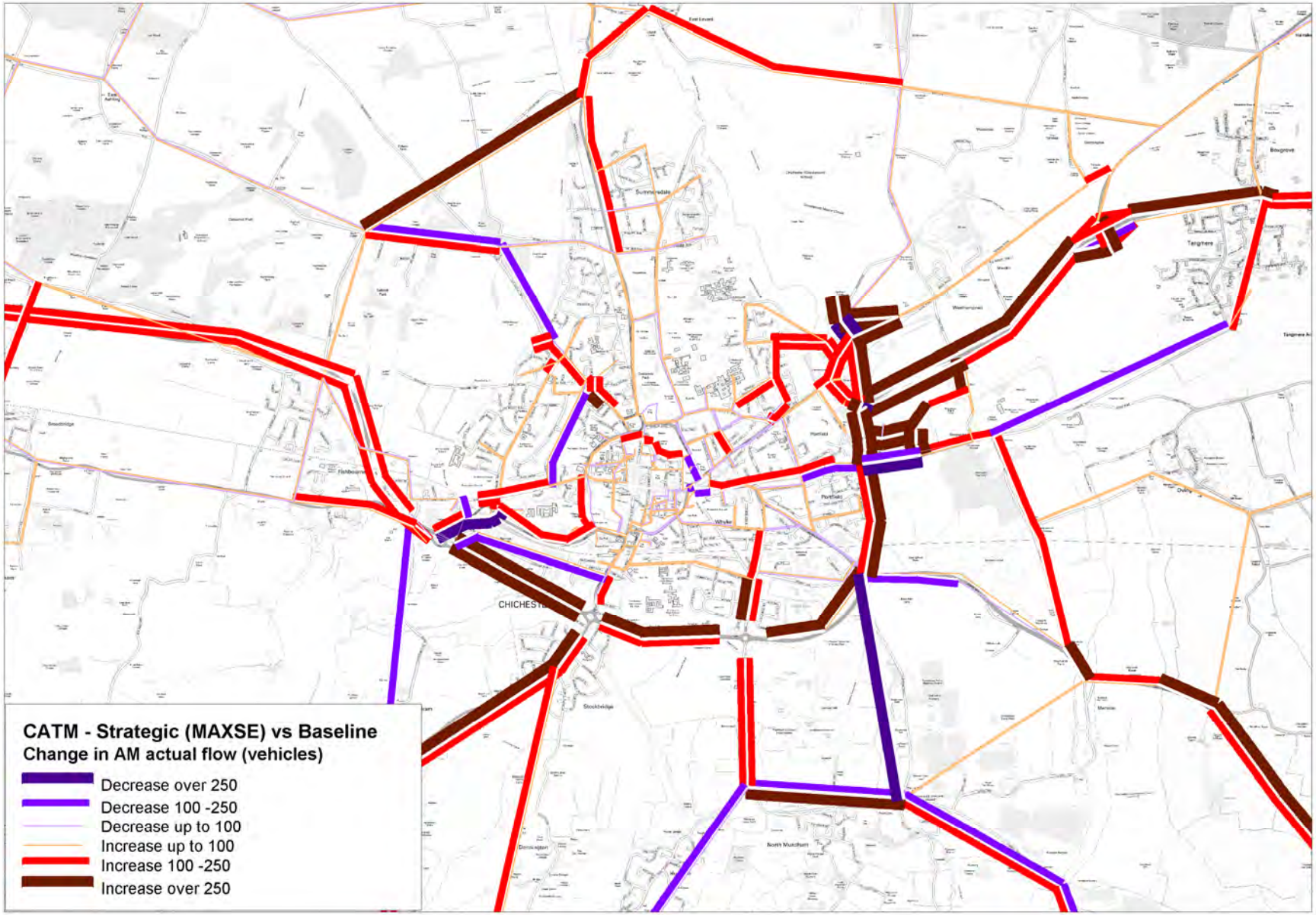


Figure 6-e Change in Traffic Flow – A27 Mitigation – Maximum Housing vs 2031 Baseline - AM Peak Hour

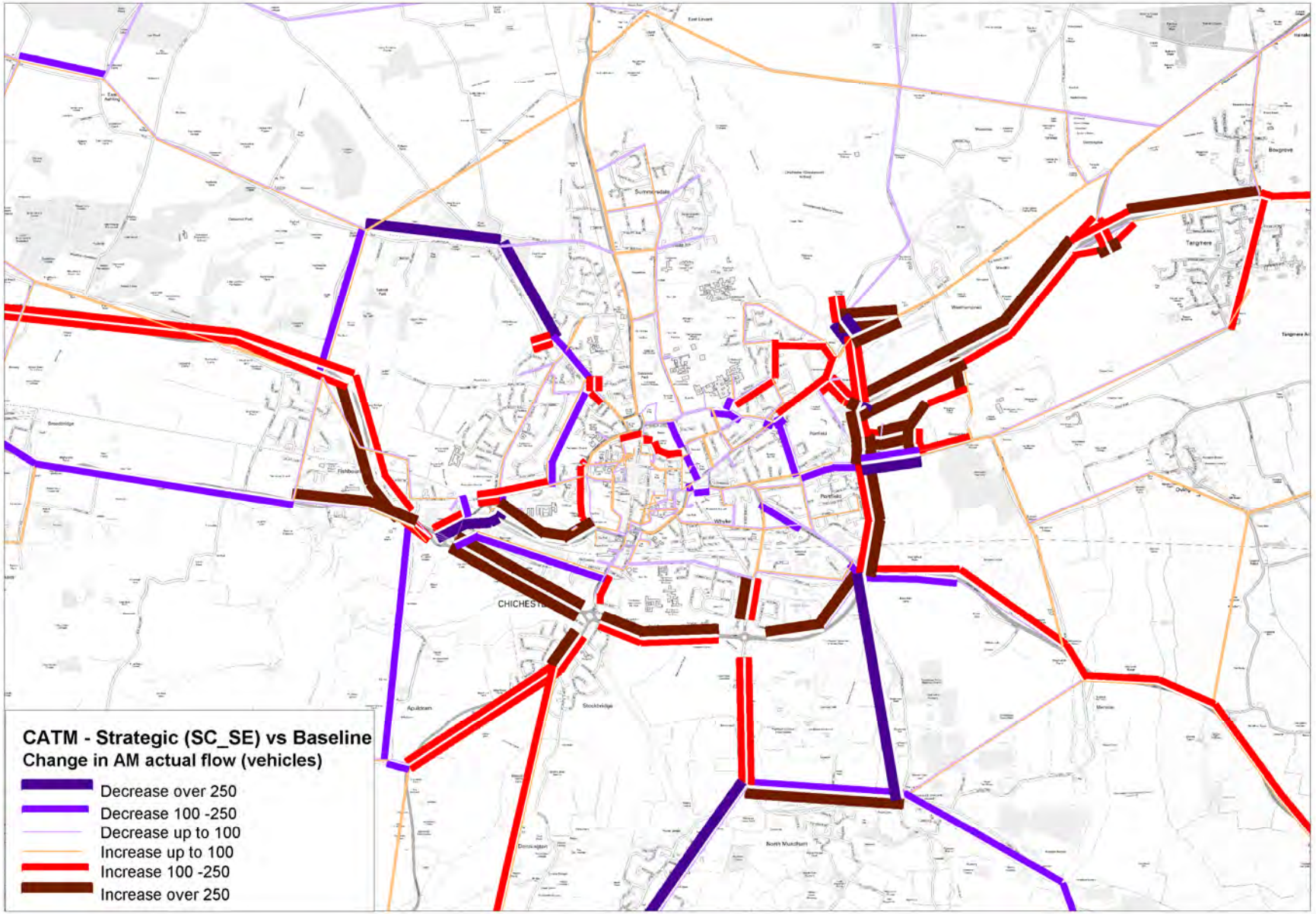


Figure 6-f Change in Traffic Flow – A27 Mitigation and Smarter Choices- South East Plan vs 2031 Baseline - AM Peak Hour

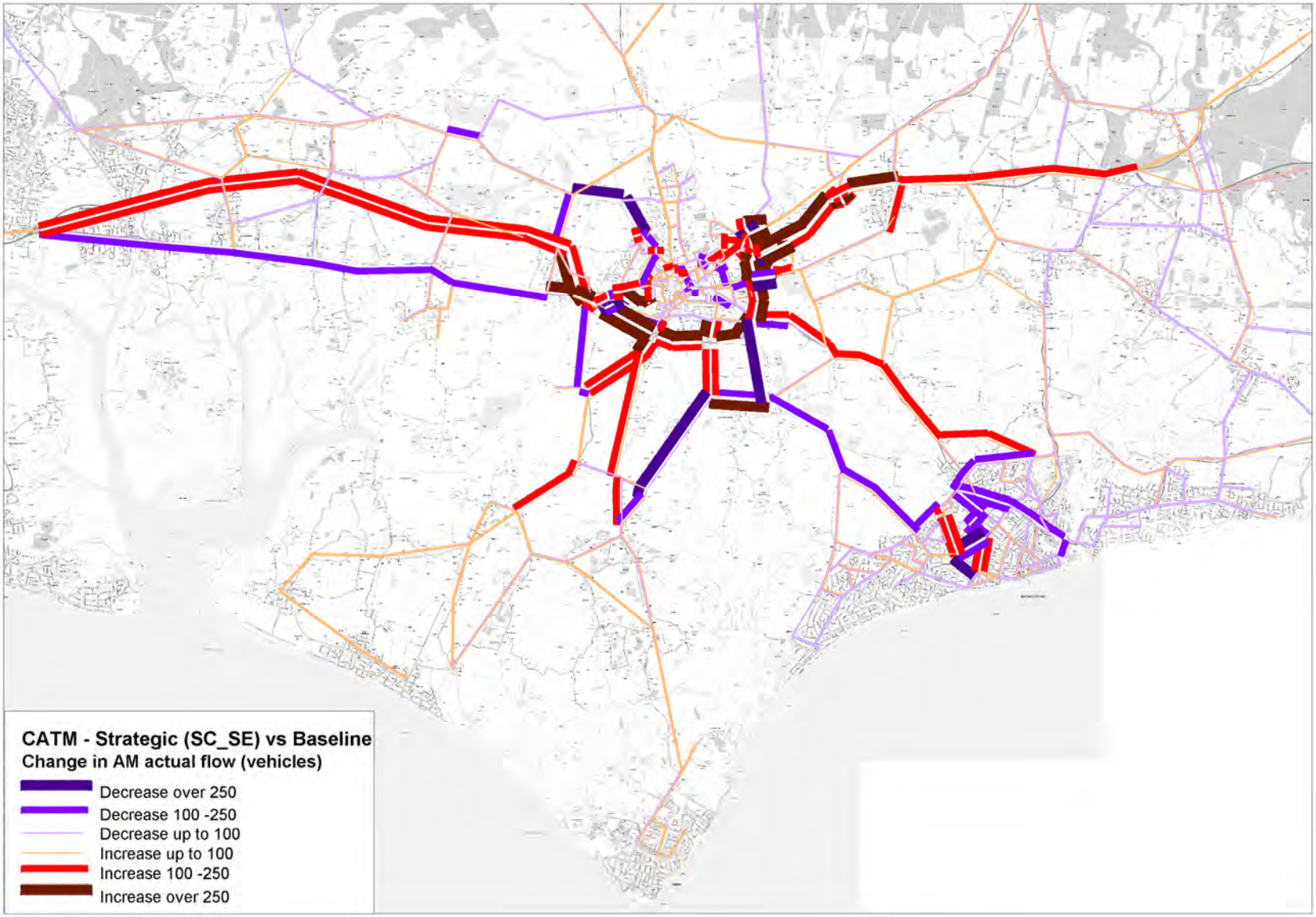


Figure 6-g **Change in Traffic Flow – A27 Mitigation and Smarter Choices- South East Plan vs 2031 Baseline - AM Peak Hour – Wider Area**

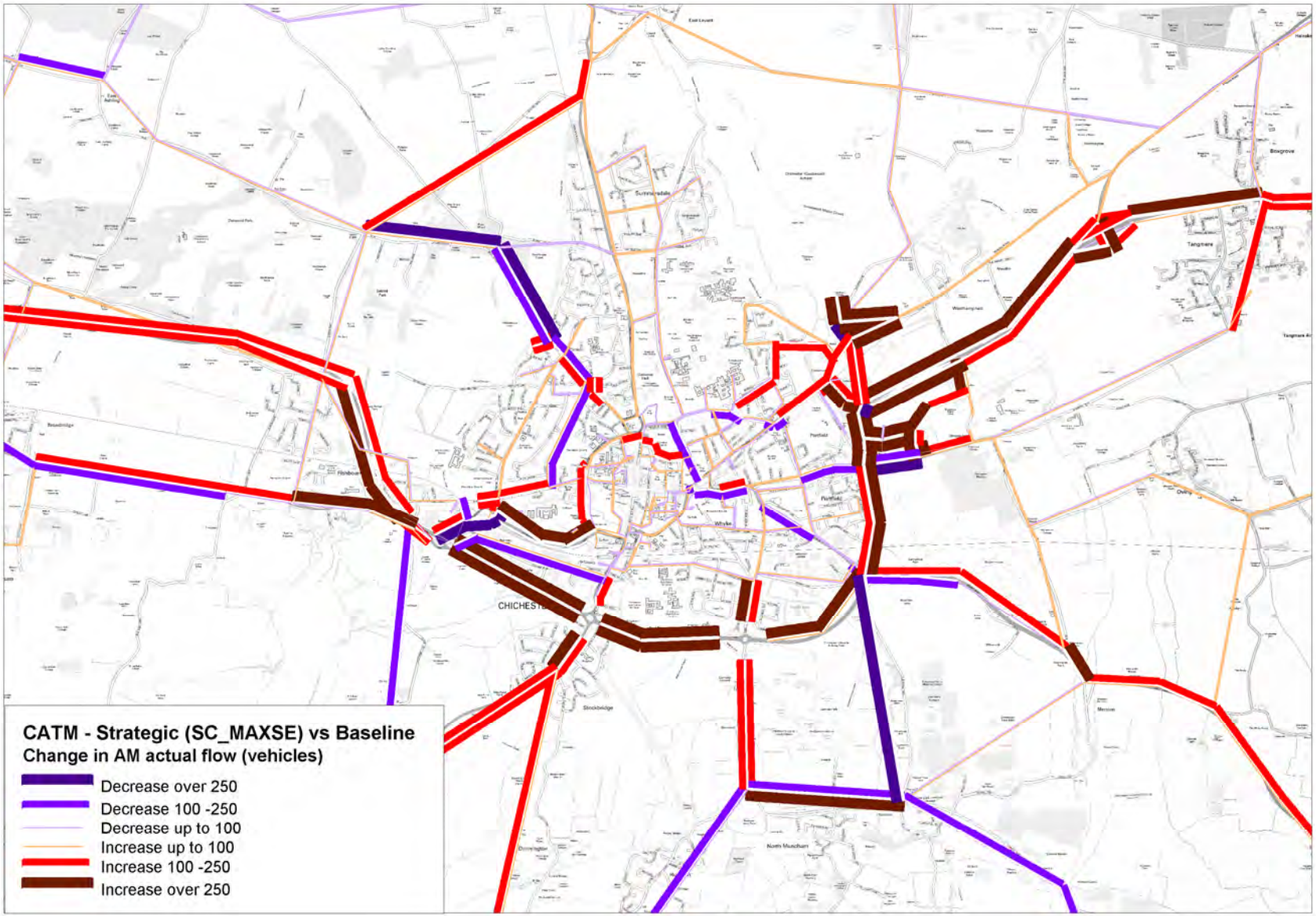


Figure 6-h Change in Traffic Flow – A27 Mitigation and Smarter Choices – Maximum Housing vs 2031 Baseline – AM Peak Hour

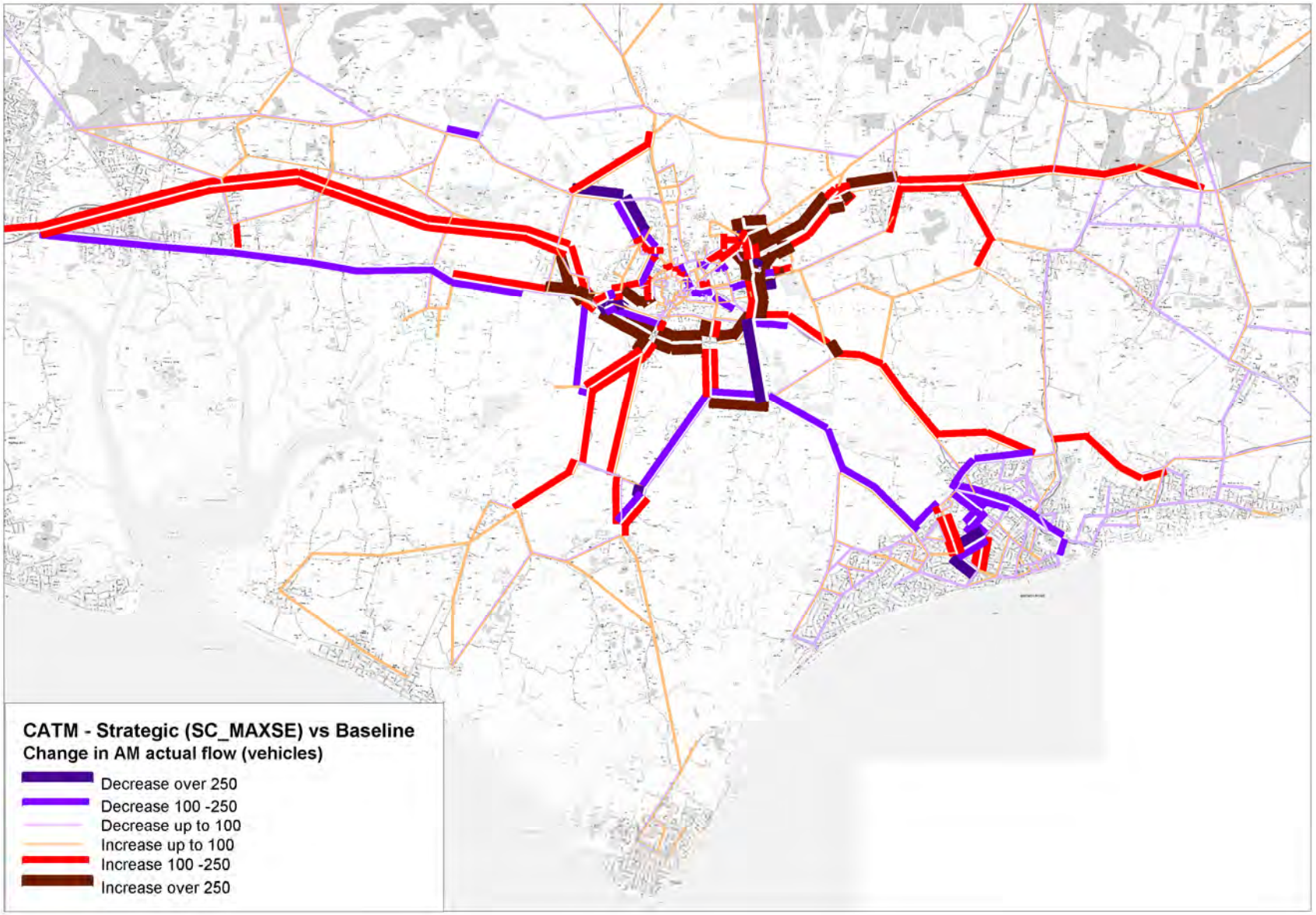


Figure 6-i Change in Traffic Flow – A27 Mitigation and Smarter Choices – Maximum Housing vs 2031 Baseline – AM Peak Hour – Wider Area

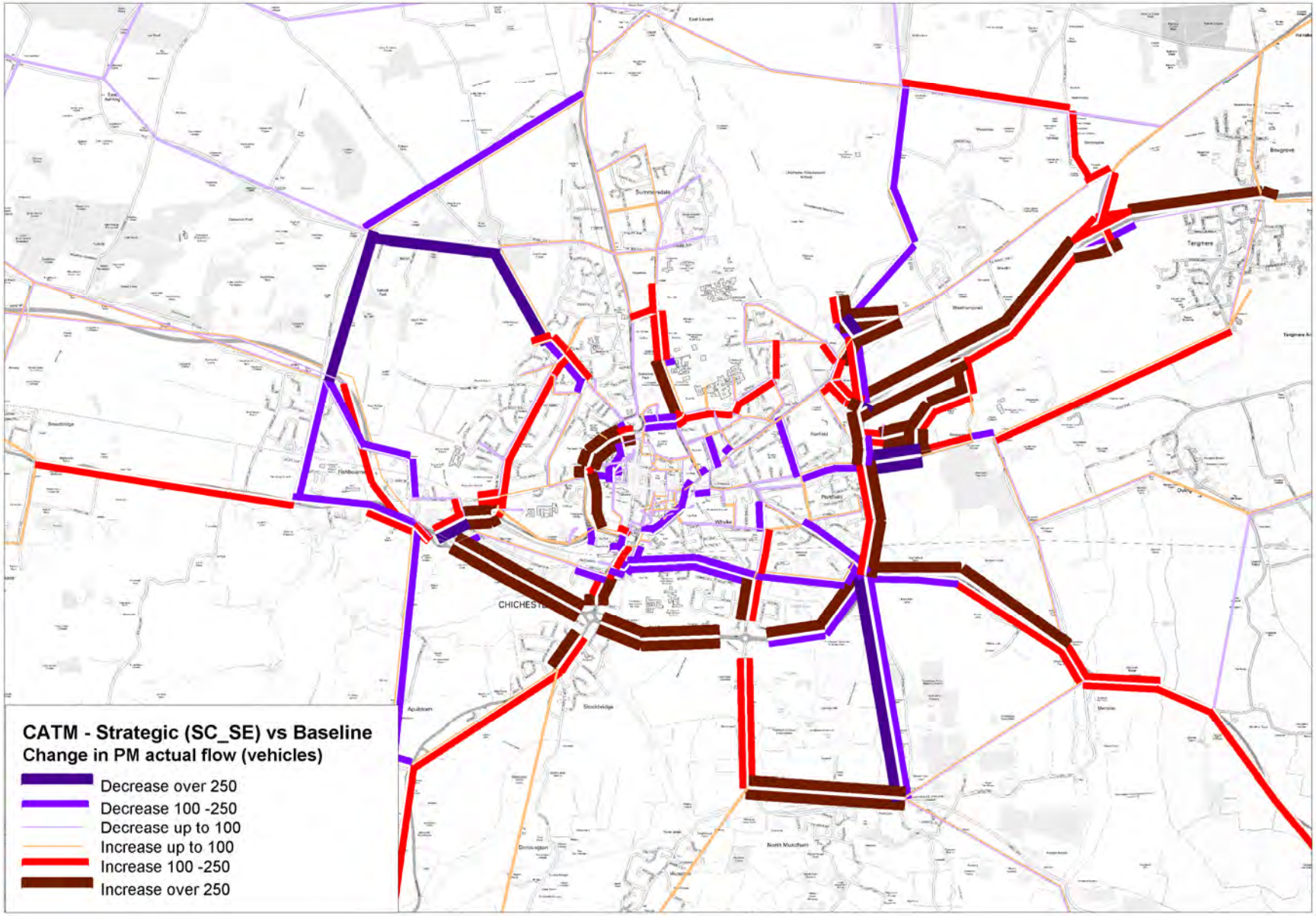


Figure 6-j Change in Traffic Flow – A27 Mitigation - South East Plan vs 2031 Baseline – PM Peak Hour

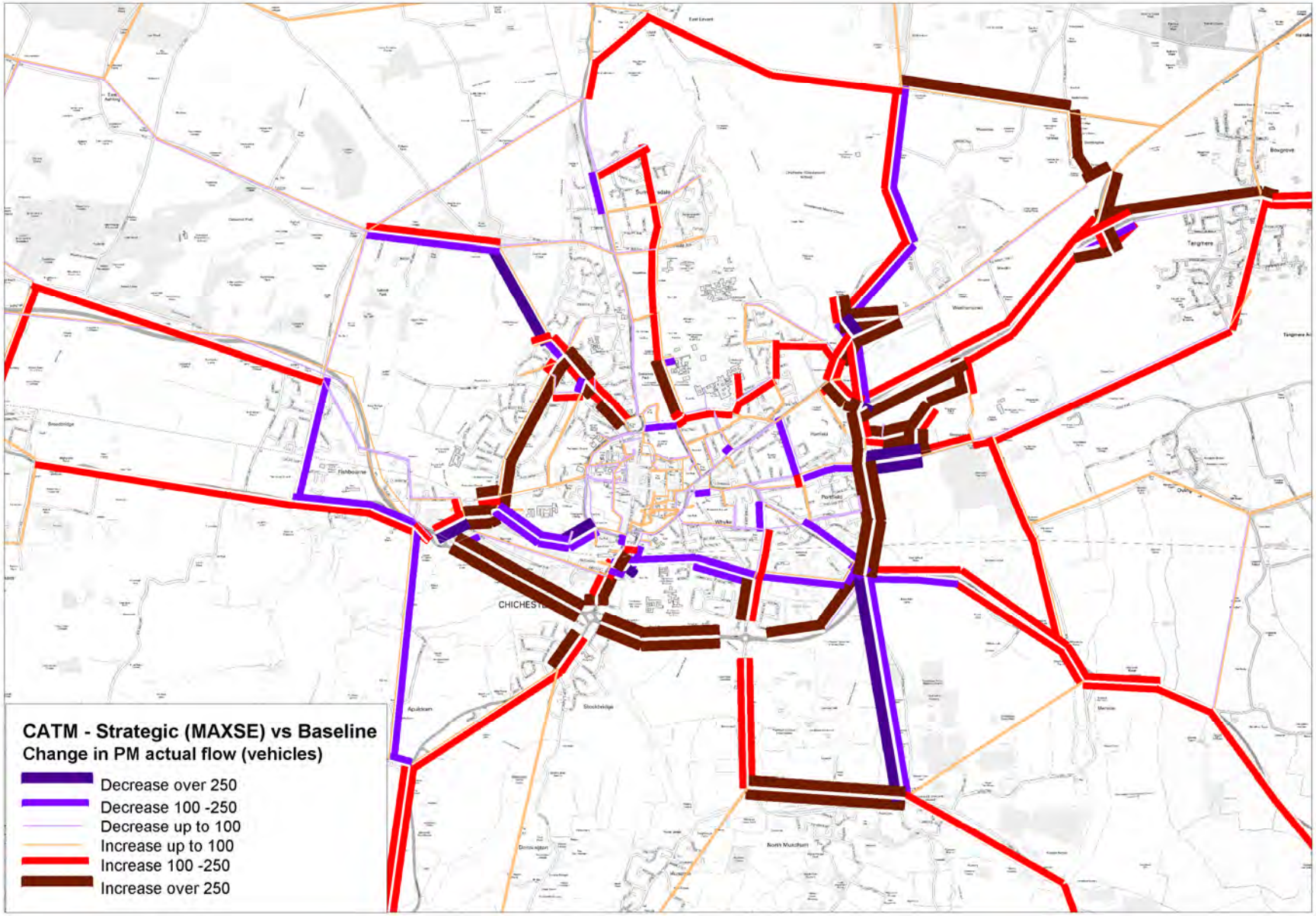


Figure 6-k Change in Traffic Flow – A27 Mitigation – Maximum Housing vs 2031 Baseline – PM Peak Hour

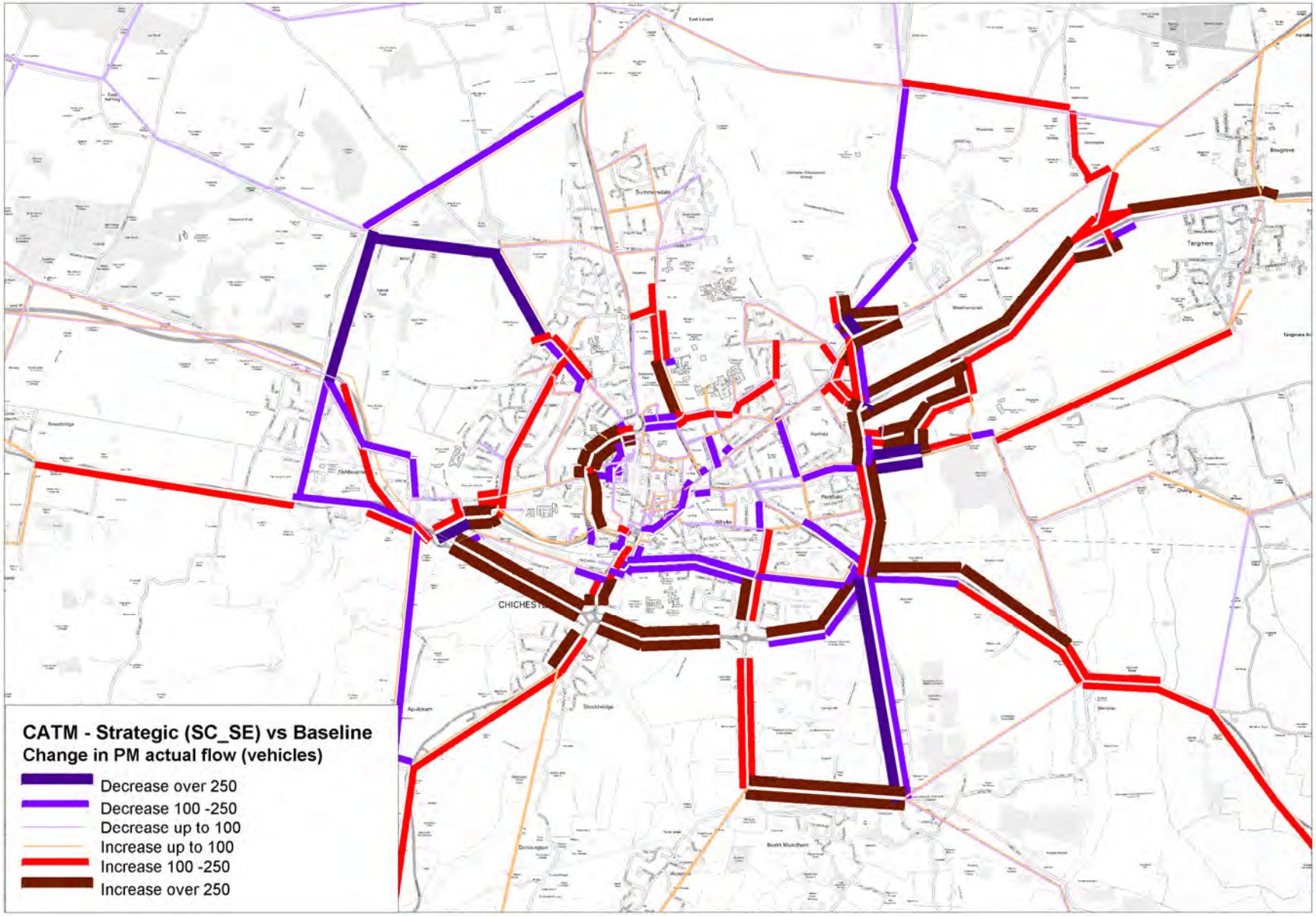


Figure 6-I Change in Traffic Flow – A27 Mitigation and Smarter Choices- South East Plan vs 2031 Baseline – PM Peak Hour

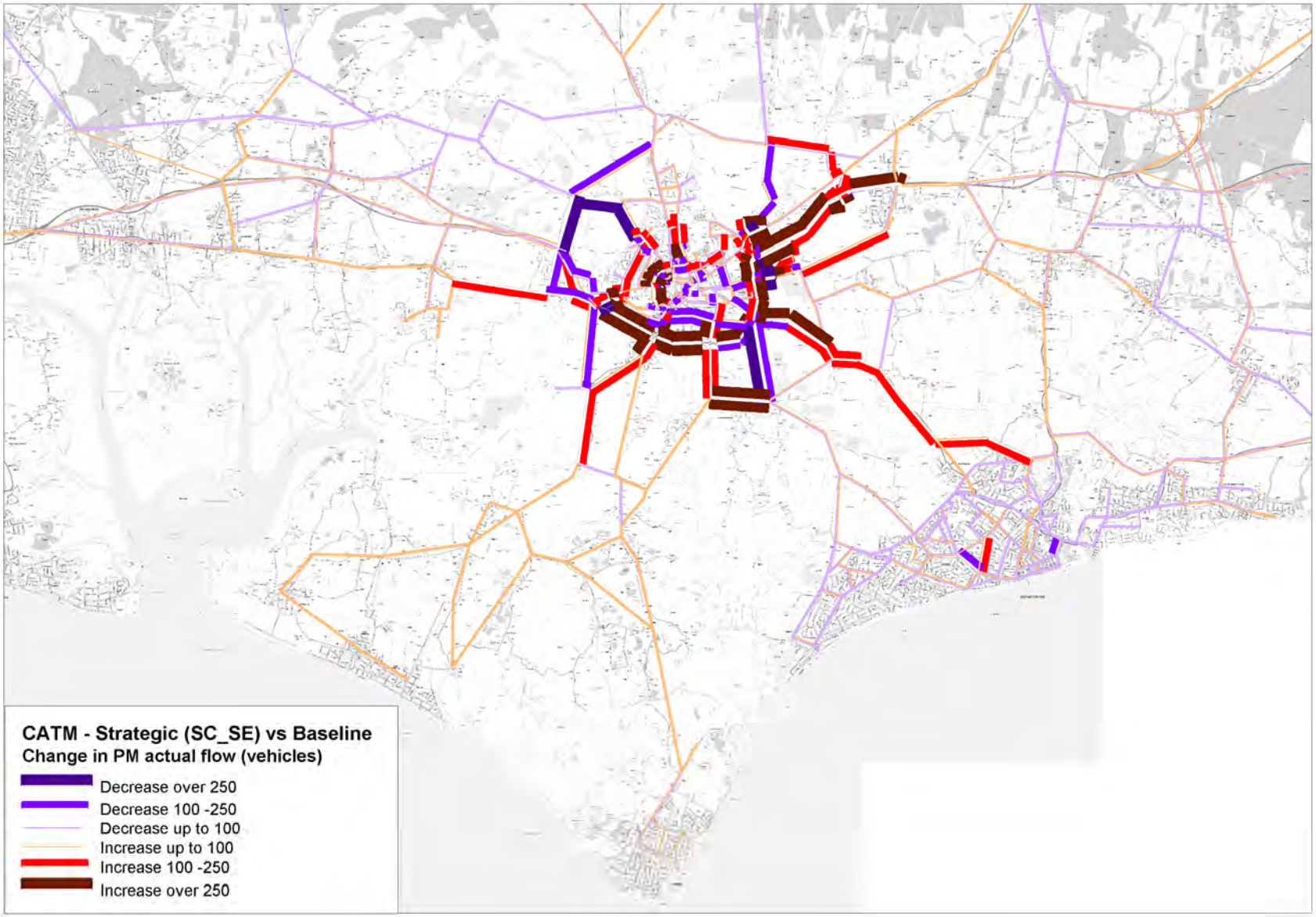


Figure 6-m: Change in Traffic Flow – A27 Mitigation and Smarter Choices- South East Plan vs 2031 Baseline – PM Peak Hour – Wider Area

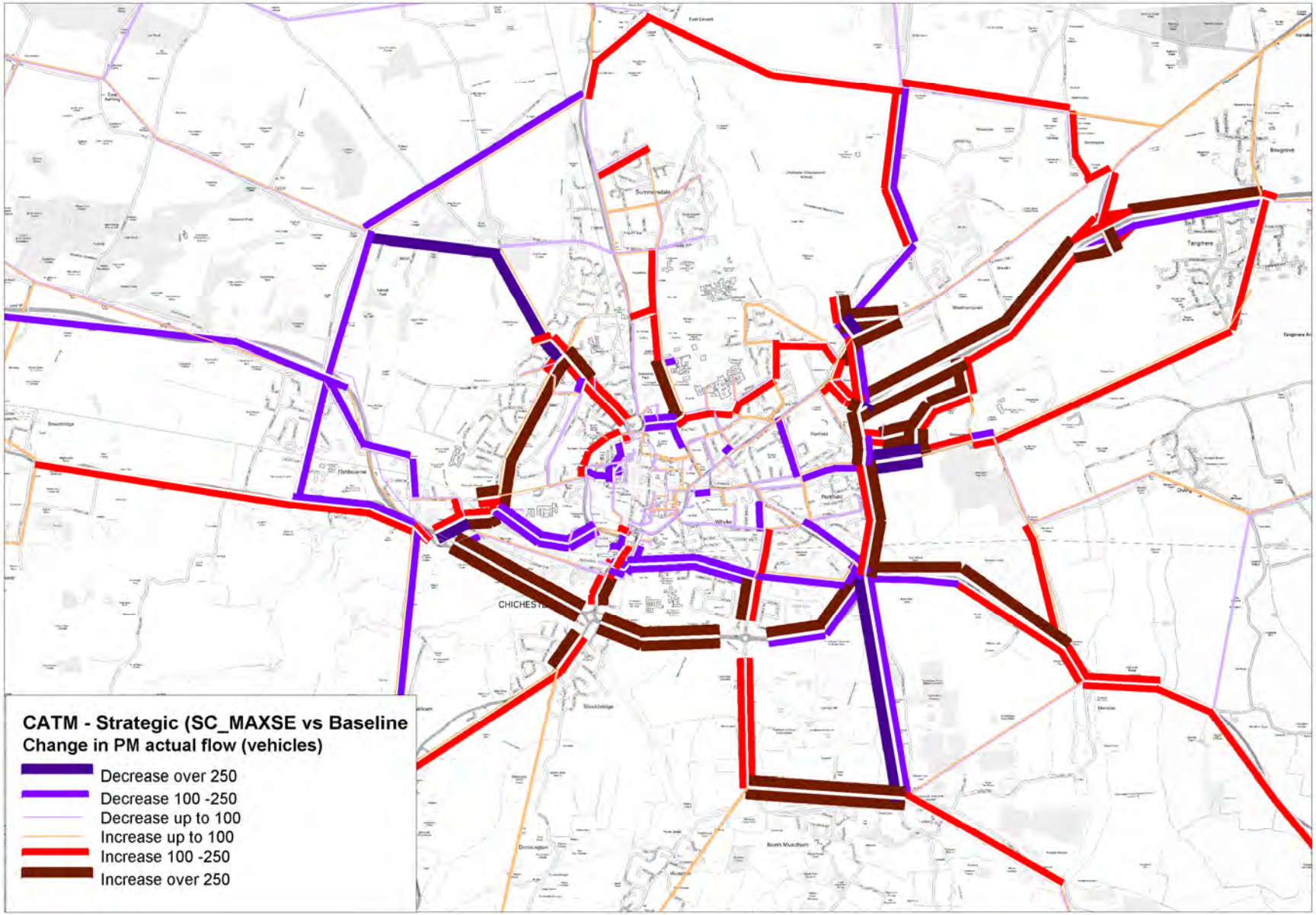


Figure 6-n Change in Traffic Flow – A27 Mitigation and Smarter Choices – Maximum Housing vs 2031 Baseline – PM Peak Hour

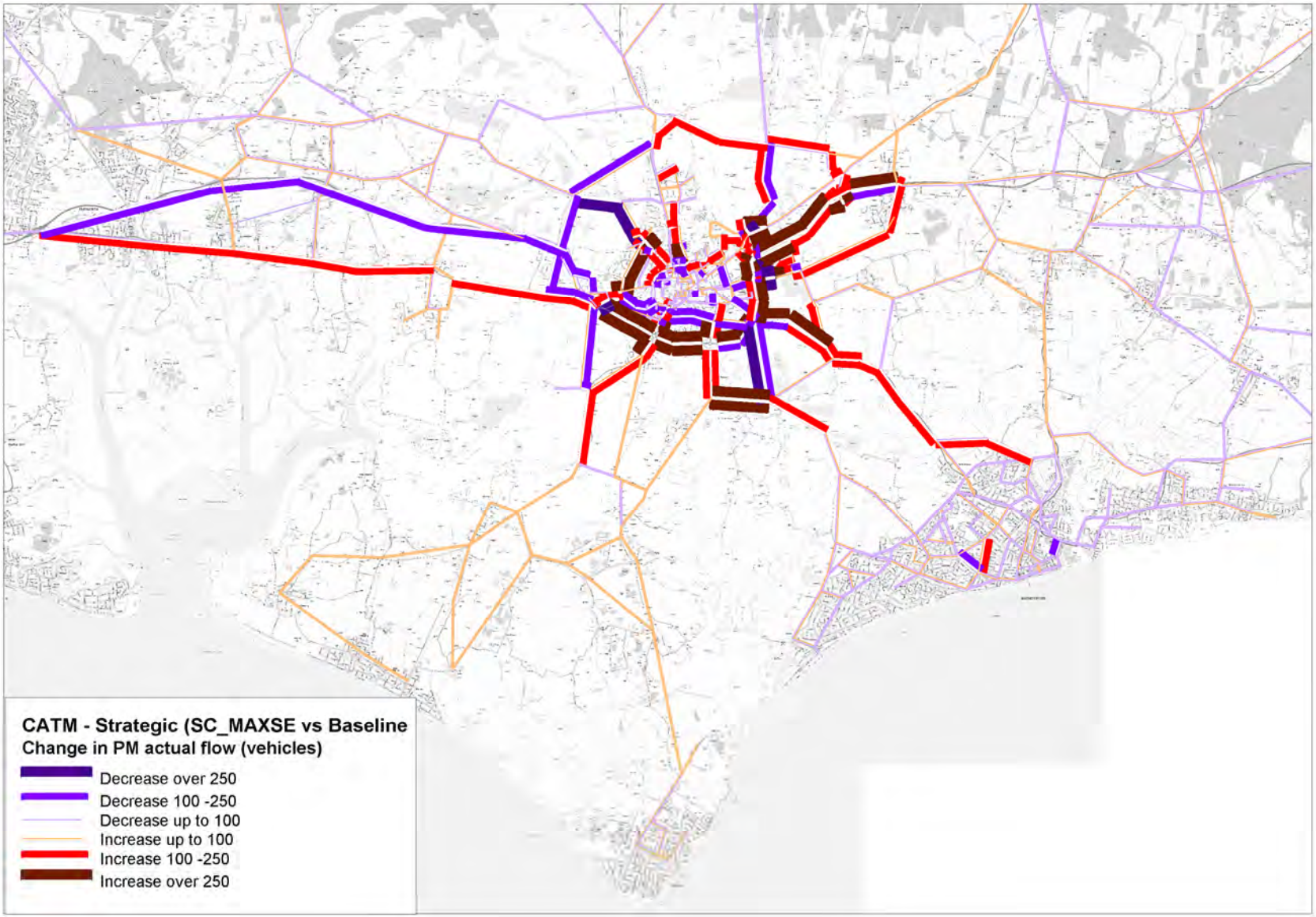


Figure 6-o Change in Traffic Flow – A27 Mitigation & Smarter Choices – Maximum Housing vs 2031 Baseline – PM Peak Hour – Wider Area

6.4 A27 Change in Traffic Queues

The following graphs show the change in average traffic queue lengths at the A27 junctions.

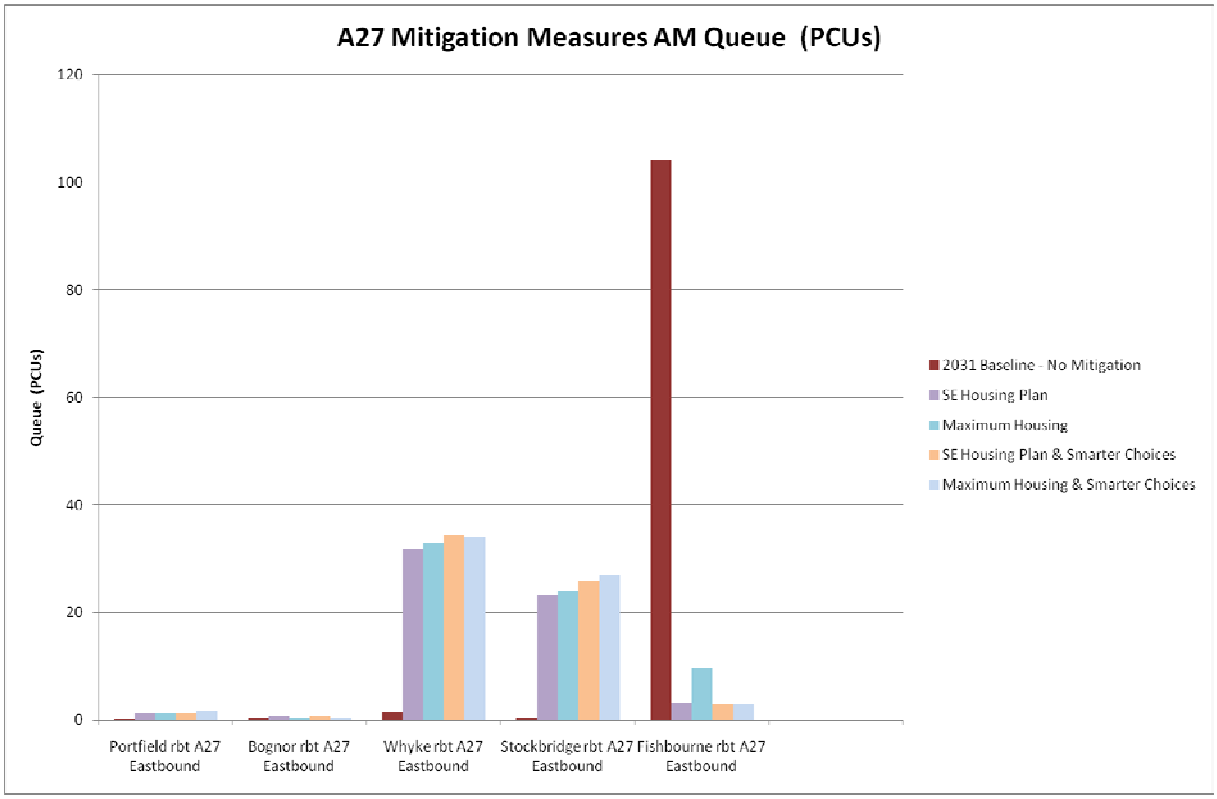


Figure 6-p Average Traffic Queue Length – AM Peak Hour – A27 Eastbound

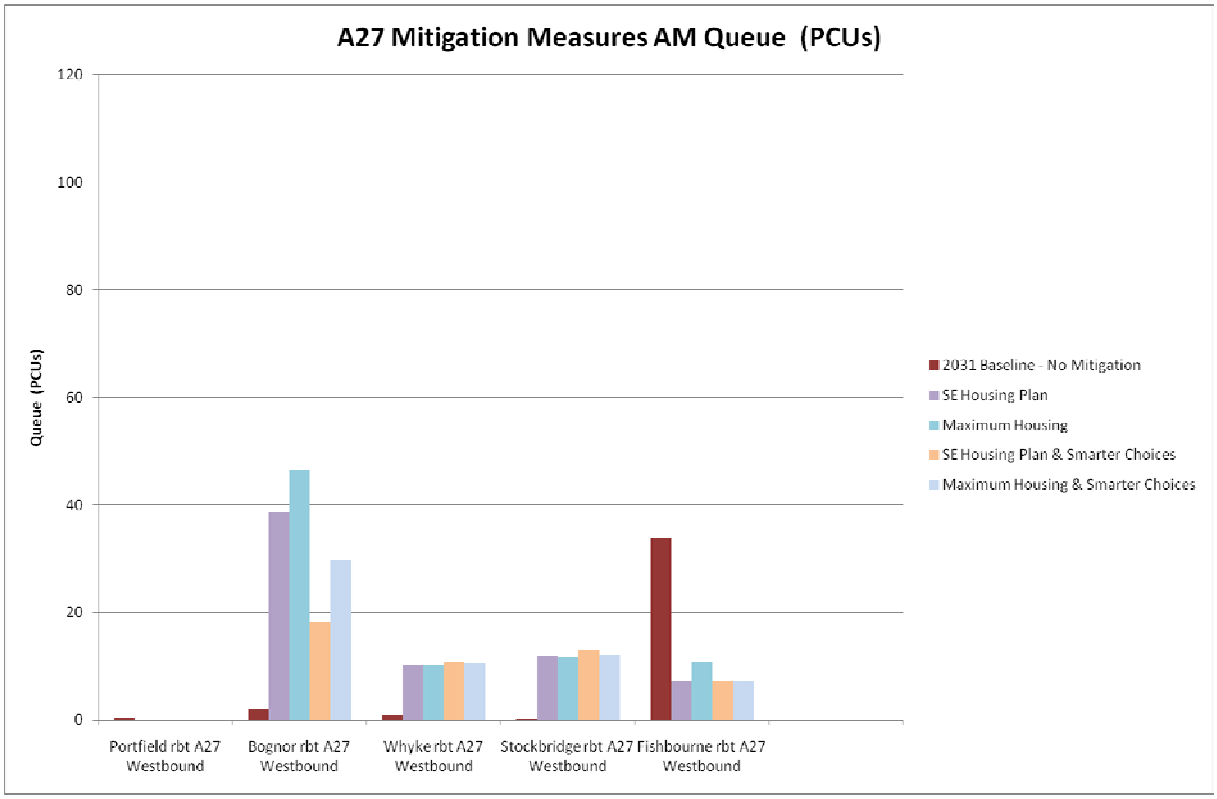


Figure 6-q Average Traffic Queue Length – AM Peak Hour – A27 Westbound

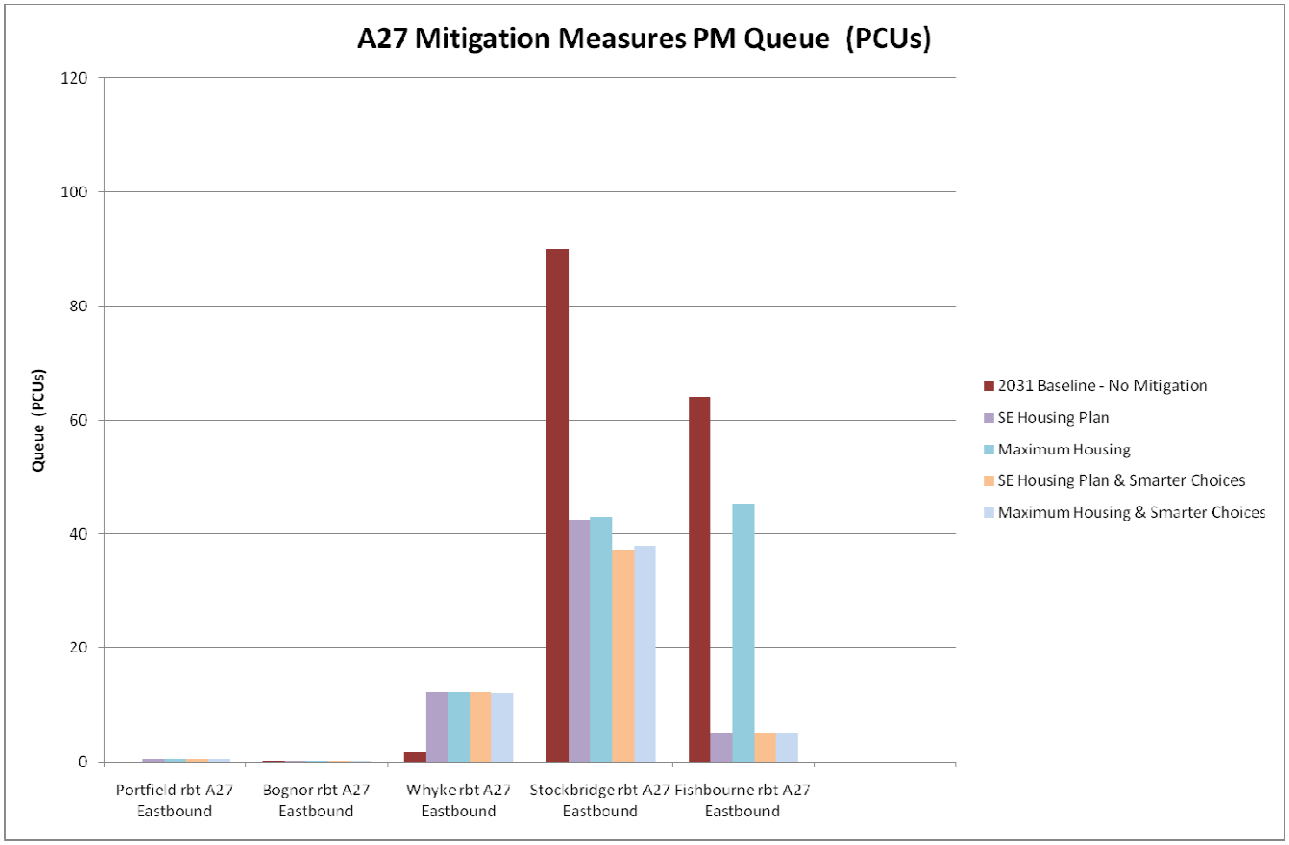


Figure 6-r Average Traffic Queue Length – PM Peak Hour – A27 Eastbound

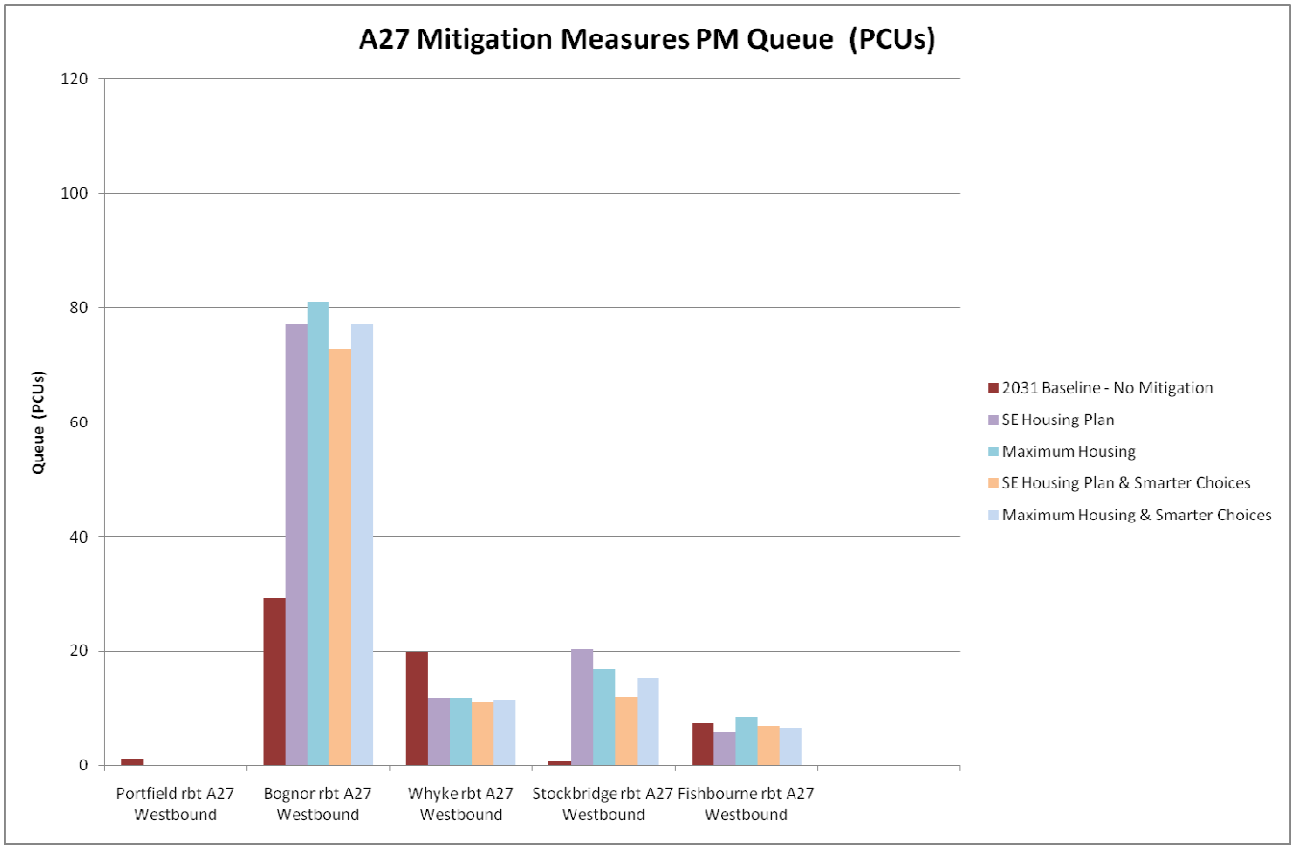


Figure 6-s Average Traffic Queue Length – PM Peak Hour – A27 Westbound

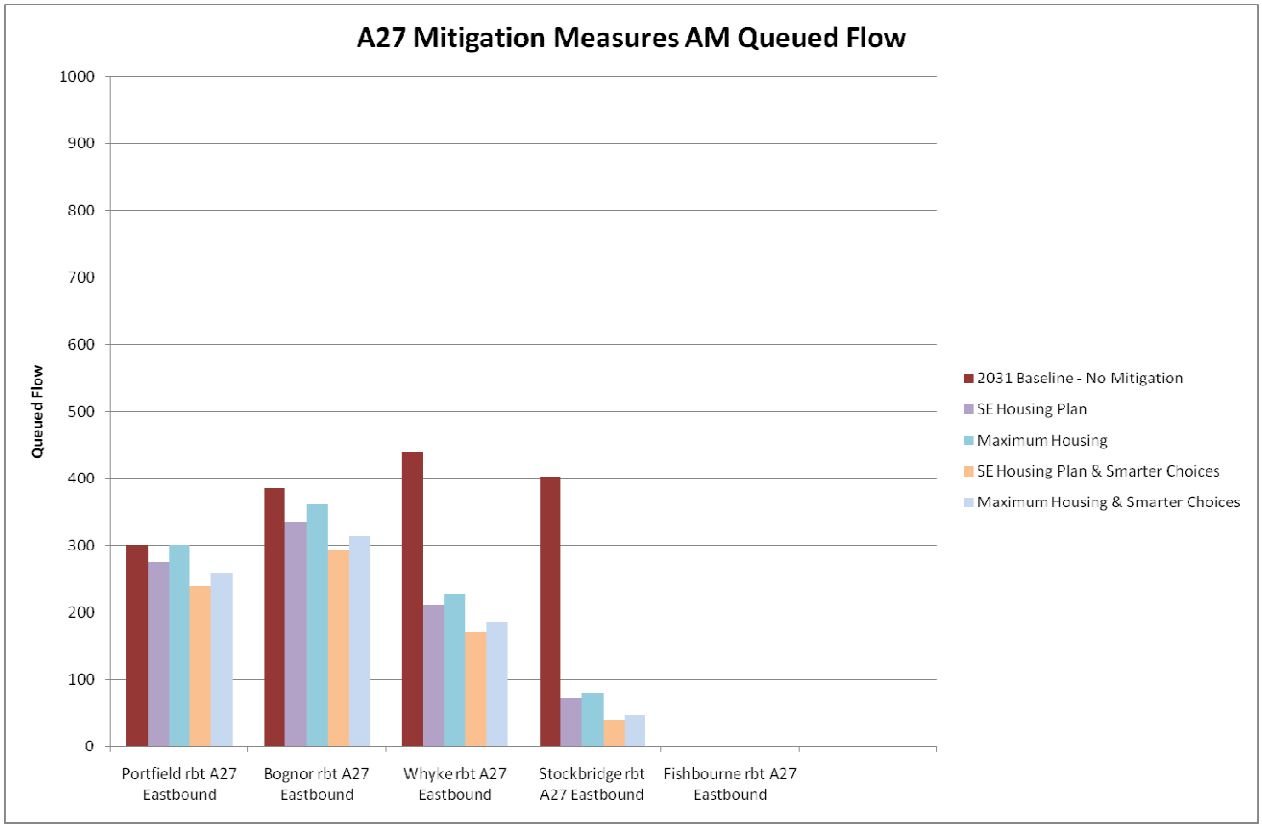


Figure 6-t A27 Eastbound Traffic Queued Flows – AM Peak Hour – With Mitigation

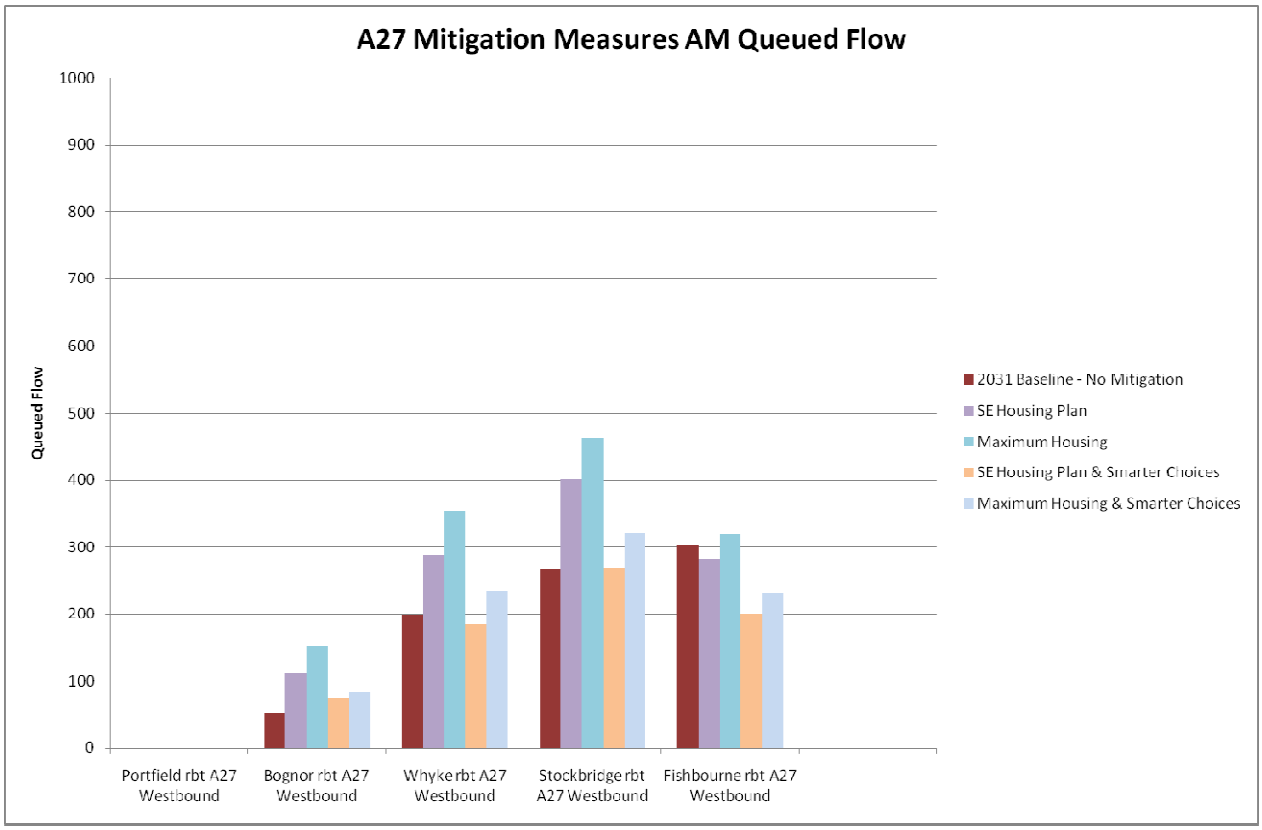


Figure 6-u A27 Westbound Traffic Queued Flows – AM Peak Hour – With Mitigation

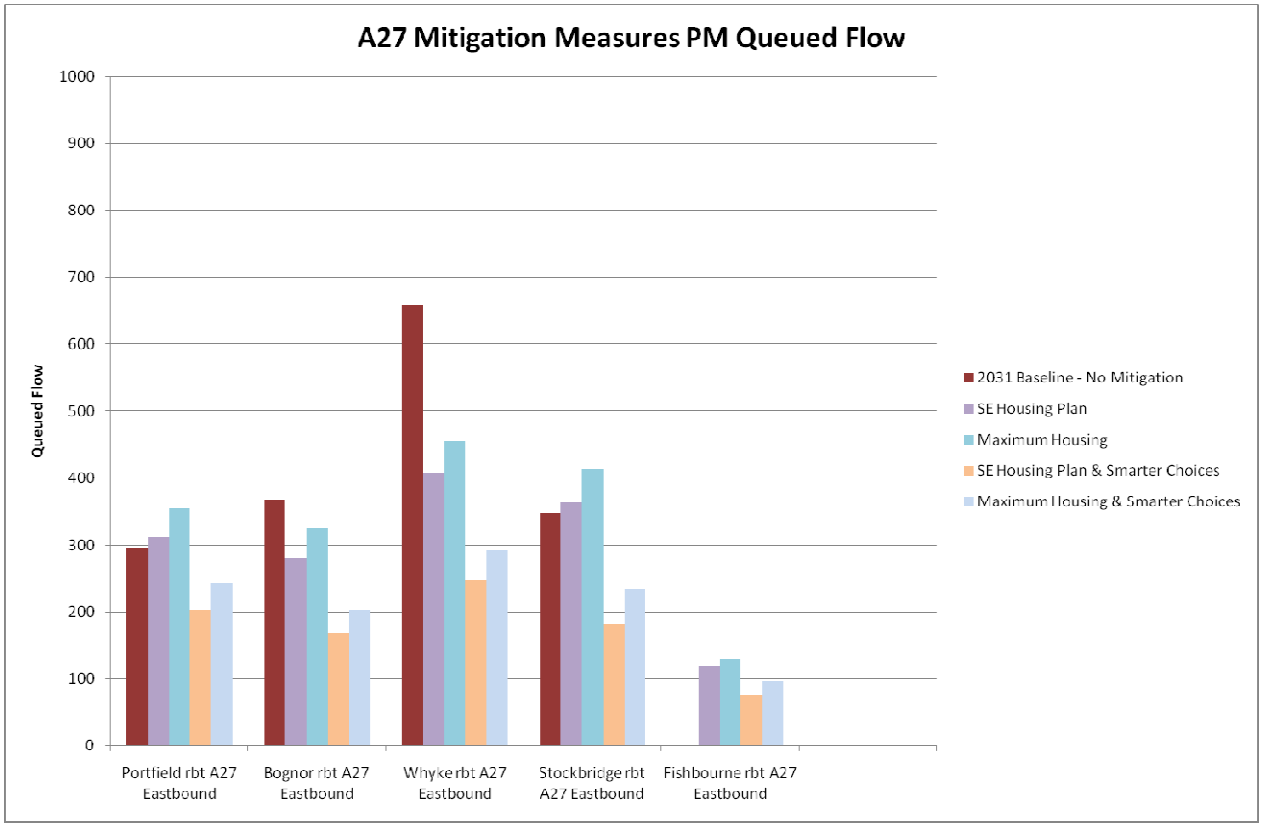


Figure 6-v A27 Eastbound Traffic Queued Flows – PM Peak Hour – With Mitigation

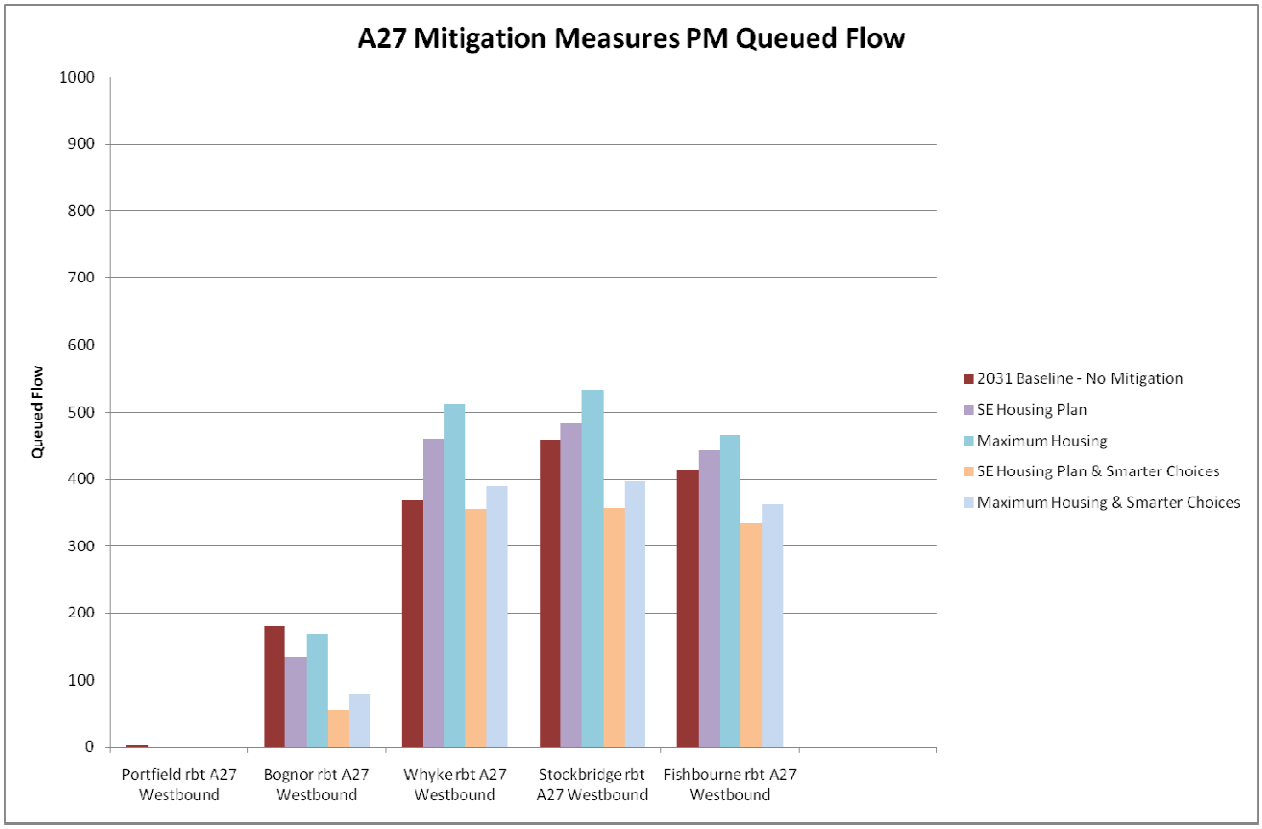


Figure 6-w A27 Westbound Traffic Queued Flows – PM Peak Hour – With Mitigation

6.5 Summary of findings

6.5.1 A27

When compared to the 2031 Baseline, the A27 mitigation measures have increased capacity and reduced congestion along the A27. Overall journey times along the A27 have reduced along the route except through the Bognor Rd roundabout.

The change in flow plots show an increase in traffic all along the A27 but the large traffic queues and queued flows graph have fallen significantly to below the 2031 baseline level. This indicates a reduction in congestion along the route despite the increase in total traffic flows, which suggests that the proposed mitigation measures will be effective.

There are large reductions in delay at Fishbourne and Stockbridge roundabout combined with a smaller increase in delay at the other junctions, caused by the increase in traffic along the A27. When including the Smarter Choices measures the journey times have reduced to the 2031 baseline levels.

The Bognor Rd roundabout has an increase congestion indicating the proposed mitigation scheme requires further refinement to its design. Identification of an improved solution has potential to further reduce journey times along the A27, potentially to levels lower than the 2031 Baseline case. At this stage, continued development of solutions for Bognor Road roundabout is required.

6.5.2 Local Roads

The introduction of the improvements to the A27 has allowed more traffic to travel through the Chichester city centre causing congestion at Northgate and Southgate gyratories. Prior to the A27 mitigation measures the congestion on the A27 'metered' the amount of traffic travelling into Chichester.

When combined with the Smarter Choices demand management measures the journey times on the local roads through Chichester fall to the 2031 baseline levels.

The large delays at Bognor Rd roundabout are shown in the route 3 and 4 (along the A259), but again the congestion here is reduced when smarter choices measures are introduced.

The change in traffic flow plots show that the smart choice measures will reduce traffic on the local roads compared to the baseline, when combined with the A27 mitigation measures, reducing the amount of traffic on diversionary routes to the North of Chichester.

Increase in flow remains on the A285 Westhampnett Road mini roundabouts in East Chichester leading to a small increase in journey time compared to the 2031 Baseline in the westbound direction, even when the A27 and Smarter Choice measures are in place.

For roads surrounding Chichester there are small changes relating which roads traffic use to approach Chichester. The changes at Bognor Rd roundabout have increased traffic on A259 and reduced it on the B2166. In the south there are increase on A286 and reduction on the B2145. However, it can be seen there is not overall large reduction in traffic to or from the Manhood peninsula.

7 Local Plan Preferred Approach

7.1 Introduction

This chapter presents the results from the final scenario run undertaken in this study which includes all the latest assumptions for the local plan. The run included

- *Local Plan Preferred Approach housing assumptions from Chichester District Council*
- *Finalised mitigation schemes. This includes modifications to the A27 mitigation schemes in response to detailed junction modelling work by Parsons Brinckerhoff on behalf of the Highways Agency (as documented in Appendix G) to ensure the schemes were deliverable.*

7.2 Preferred Development Schedule

This is presented in **Table 7-a**. The table also includes the previously tabulated SE Plan and Maximum housing target for comparison purposes.

	SE Plan Housing Target (355 homes/yr)	**Maximum Housing Target** (440 homes/yr)	**Local Plan Preferred Approach**
Non-Strategic Housing Sites			
Chichester City (built-up area)	300	420	335
Southbourne	175	250	400
East Wittering & Bracklesham	240	340	130
Selsey	100	150	240
Tangmere	75	100	20
Elsewhere in south of District	310	440	544
Sub-total	***1,200***	***1,700***	***1,669***
Strategic Locations			
Shopwyke	500	500	500
NE Chichester (Westhampnett)	900	1,200	500
Tangmere	1,000	1,350	1,000
West of Chichester City	1,000	1,350	1,000
Sub-total	***3,400***	***4,400***	***3,000***
Total Additional Housing (South of District)	**4,600**	**6,100**	**4,669**
Additional employment (B1-B8) floorspace (sq. metres)	92,000	122,000	93,380
North of District additional housing (outside South Downs National Park)	180	180	320

Table 7-a Preferred Approach Development Schedule[9]

The same "Current / Committed Housing Development Assumptions" and "Non housing development growth in travel demand" were also applied. (as documented in sections 3.2 and 3.3).

[9] Local Plan Preferred Approach figures include allowance for small sites windfall housing

In addition the same adjustments to travel demand in response to the Smarter Choices initiatives was applied as has been previously outlined in the earlier work (as documented section 5.4).

7.3 Updated Network Mitigation Measures

The network is similar to the established mitigation network. Adjustments have been made to fully reflect the final designs following the Highways Agency's assessment of them, with final designs incorporating changes to improve junction performance and reflect DMRB design standards for forward visibility for turning movements at junctions.

The 'hamburger' junction at Fishbourne now has give-ways on the Terminus Rd and Fishbourne Rd entries. In addition, the entry points to the A27 are now signalised.

The Bognor Rod Roundabout has been re aligned, although this has little impact for the strategic model.

Portfield roundabout designs have been updated to include the latest design included in the Shopwyke Lakes planning application. These were released into the public domain by the Highways Agency in January 2013. The other changes related to the Shopwyke Lakes access point and Oving Rd junction are unchanged from the earlier modelling.

The signal timings and phasing at Whyke and Stockbridge junction have been updated to correspond with those provided by the Highways Agency's assessment of the junction design. The biggest change is that an extra phase for the right turns off the mainline has been modelled.

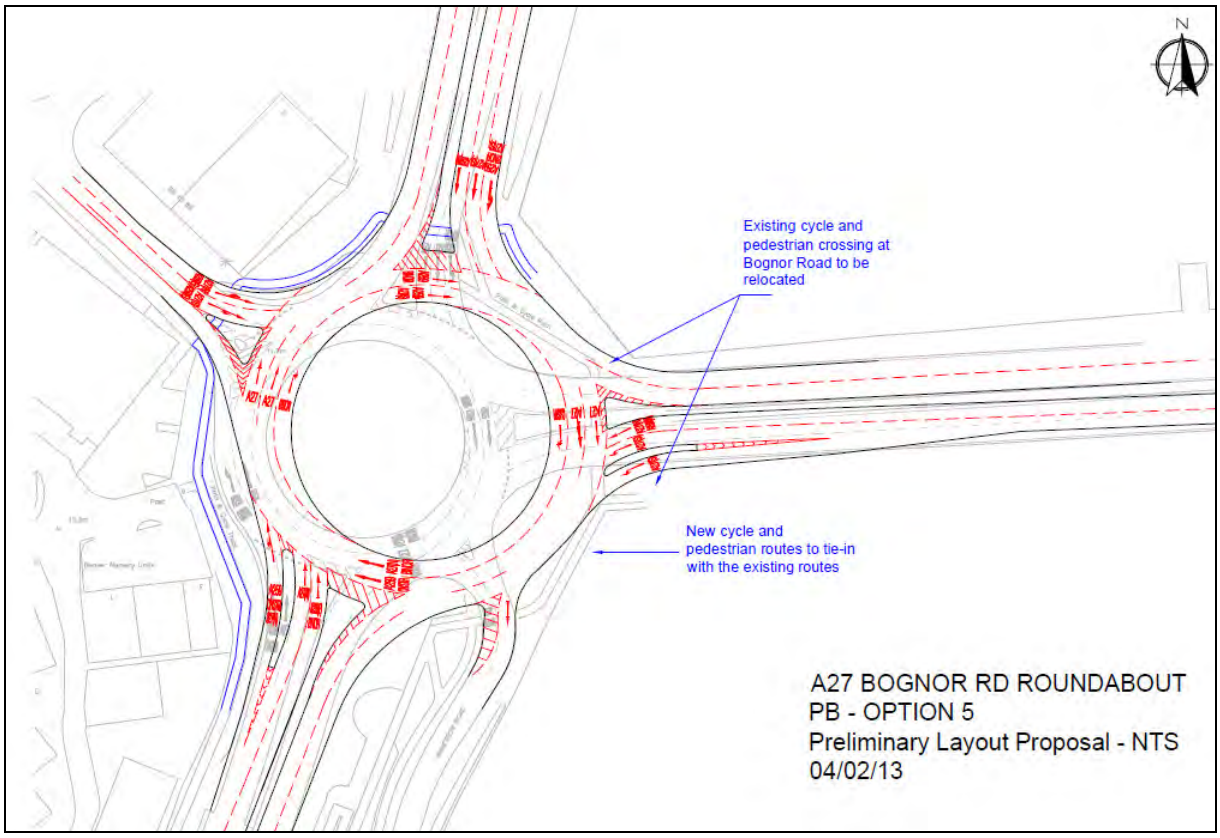


Figure 7-a Bognor Road Roundabout Improvement – Preferred Approach

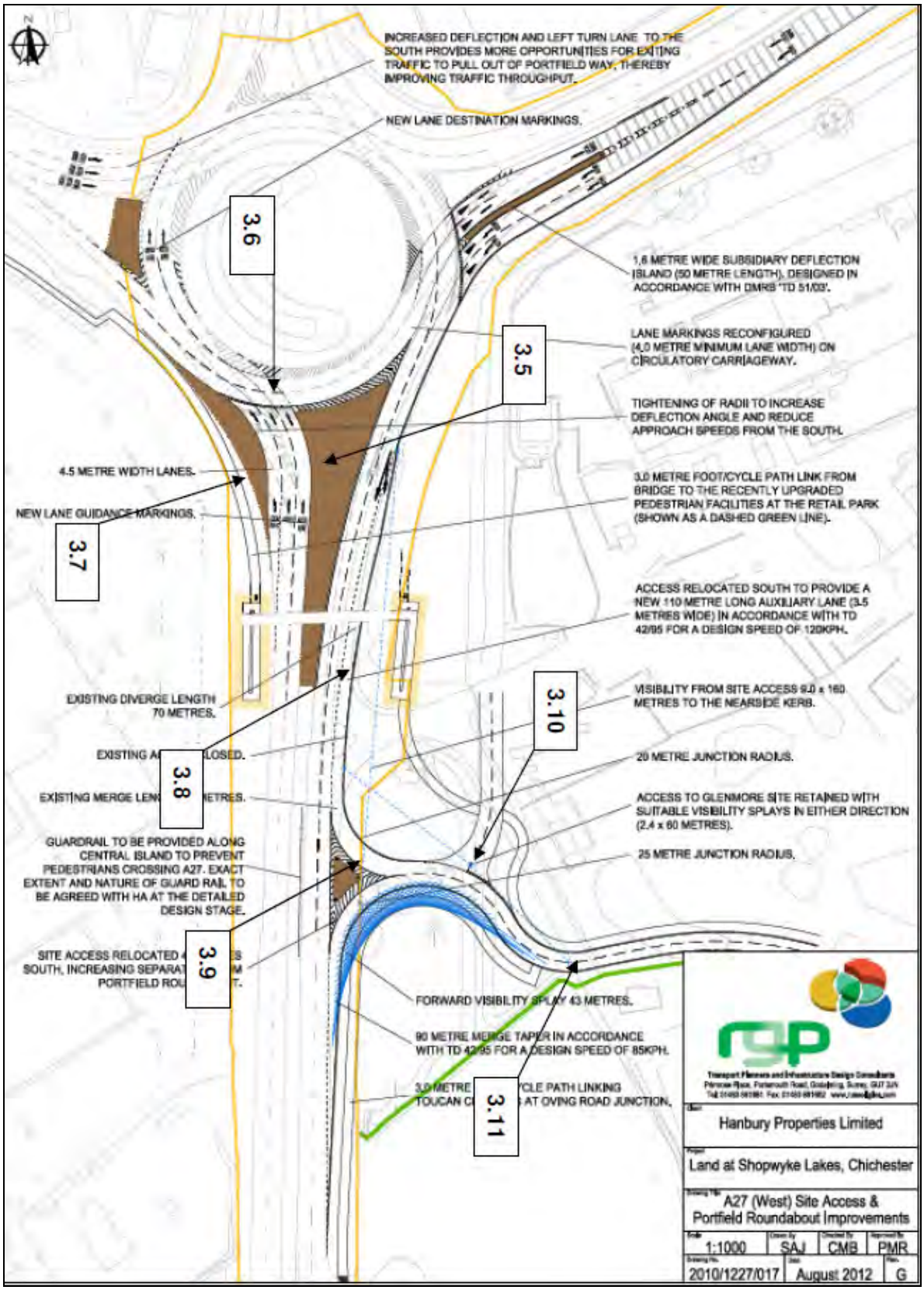


Figure 7-b Portfield Rd Roundabout Improvement – Preferred Approach

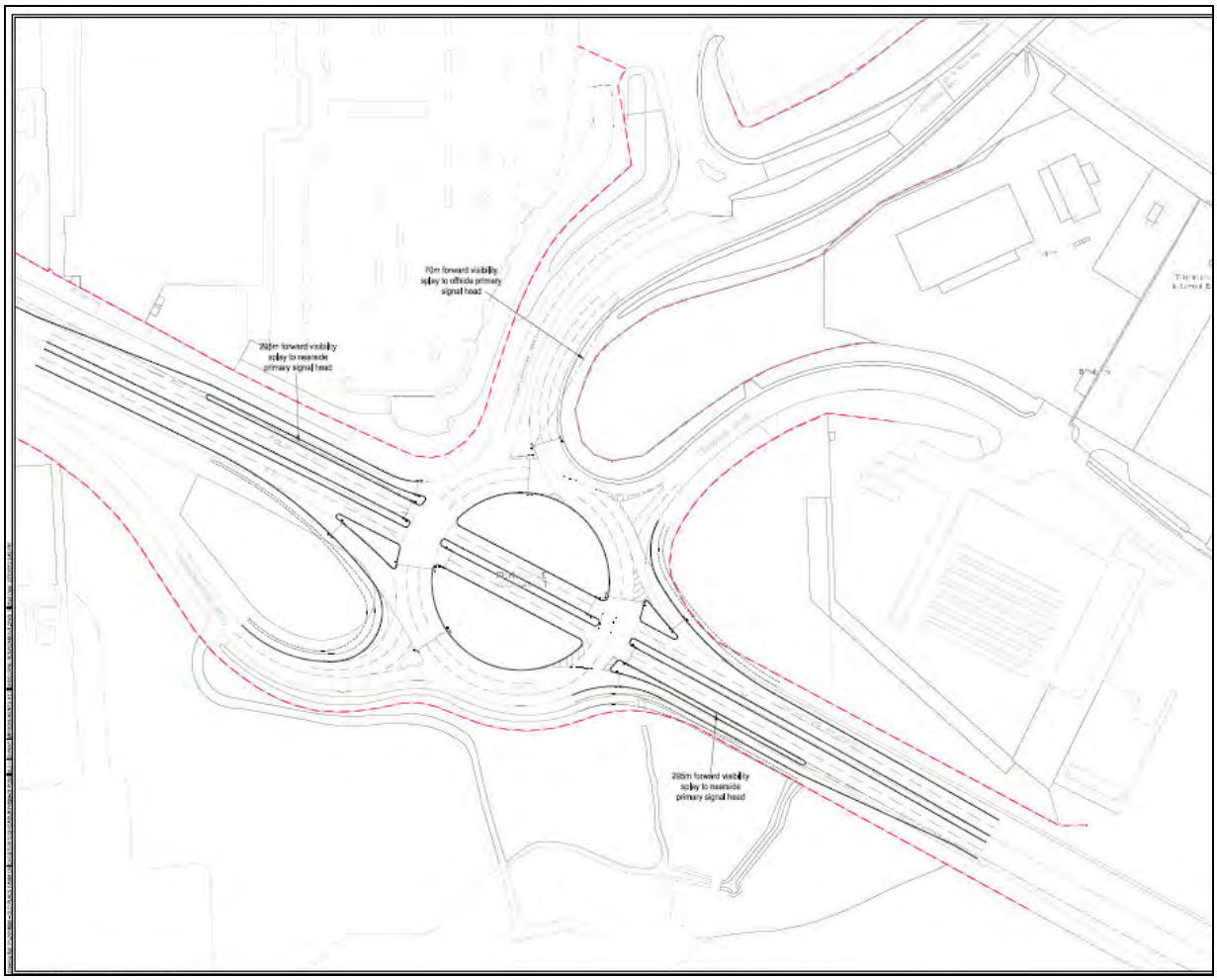


Figure 7-c Fishbourne Road Roundabout Improvement – Preferred Approach

Following further testing of junction performance (see Appendix G), it is recommended that the proposed mitigation layouts, for the Whyke and Stockbridge junctions, should be amended so that the A27 right turn bays comprise two short lanes of at least 100m in length.

The following changes to the Fishbourne roundabout mitigation layout are recommended.

- The Terminus Road and Fishbourne Road arms should have give-way entries.
- Cathedral Way should have an opposing, internal stop-line.

The left turns on to the A27 should be signalled.

- Lane drops and gains should be introduced:
- a lane drop at the left turn to A27 eastbound;
- a lane gain at Fishbourne Road;
- a lane drop and gain at Terminus Road.

Further investigation of Fishbourne junction layout scenarios was beyond the scope of this study.

Any measures to further reduce overall A27 route delays through the Whyke, Stockbridge and Fishbourne junctions, should focus on improving the capacity of the A27 ahead movement stop-lines.

Although there are still reservations concerning the predicted peak eastbound delays to A27 route traffic through all six junctions (particularly in the case of Stockbridge junction in the PM peak period), at this stage there is sufficient evidence to suggest that the mitigation layouts assessed in this study (and their associated costs) would be of sufficient overall magnitude to mitigate the impacts of both 2031 development scenarios.[10]

7.4 Key Indicators

The travel impacts of the Preferred Approach were assessed both without and with the proposed mitigation measures. The differences between the non-mitigation and mitigation scenarios are presented below for the following indicators:

- Journey times across Chichester City, for routes as previously set out in Figure 6-a, in the
    - Morning (AM) peak period
    - Evening (PM) peak period

- Traffic flows across Chichester District during both the morning and evening peak periods. Maps below show forecast traffic flows for each period as follows;
    - non-mitigated conditions,
    - mitigated conditions, and
    - changes in flows from non-mitigated to mitigated conditions

In addition, we show traffic flows over a wider geographical area including the Manhood peninsula.

[10] For details of junction modelling, see Appendix G (Parson Brinckerhoff Technical Note)

7.4.1 Forecast Changes in Journey Times

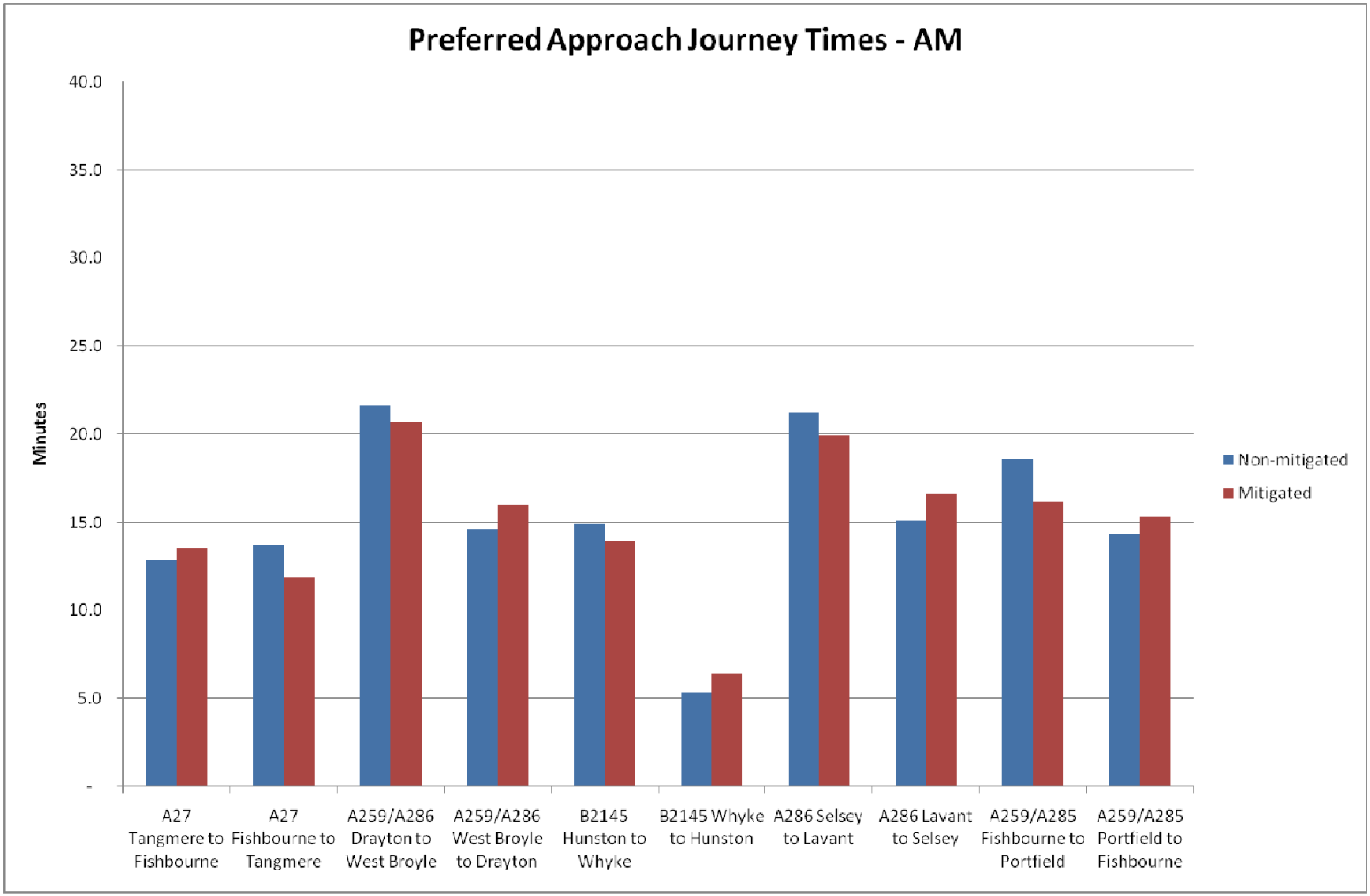


Figure 7-d Preferred Approach 2031 Journey Times – AM Peak Hour

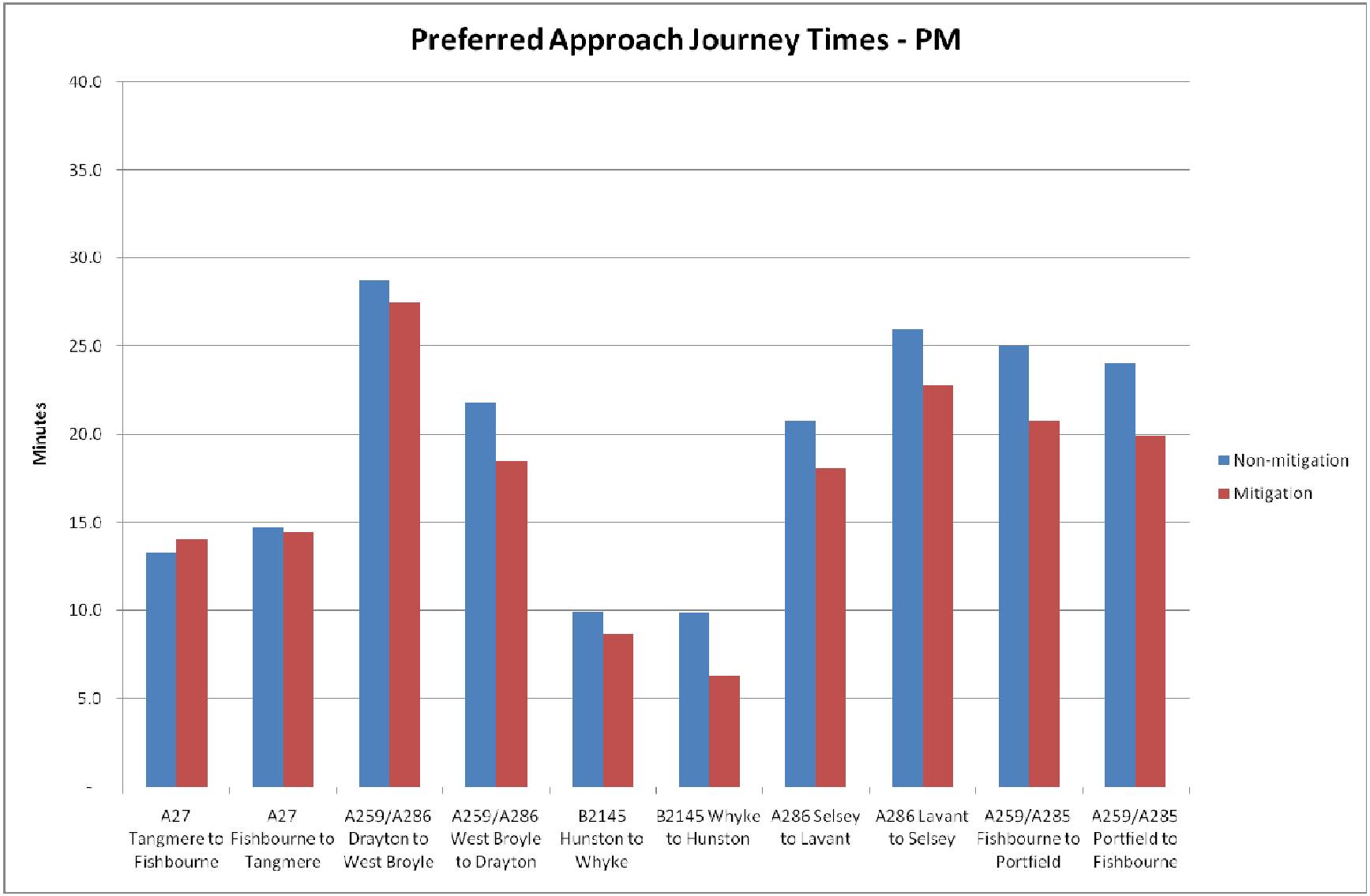


Figure 7-e Preferred Approach 2031 Journey Times – PM Peak Hour

7.4.2 Forecast Traffic Flows across Chichester

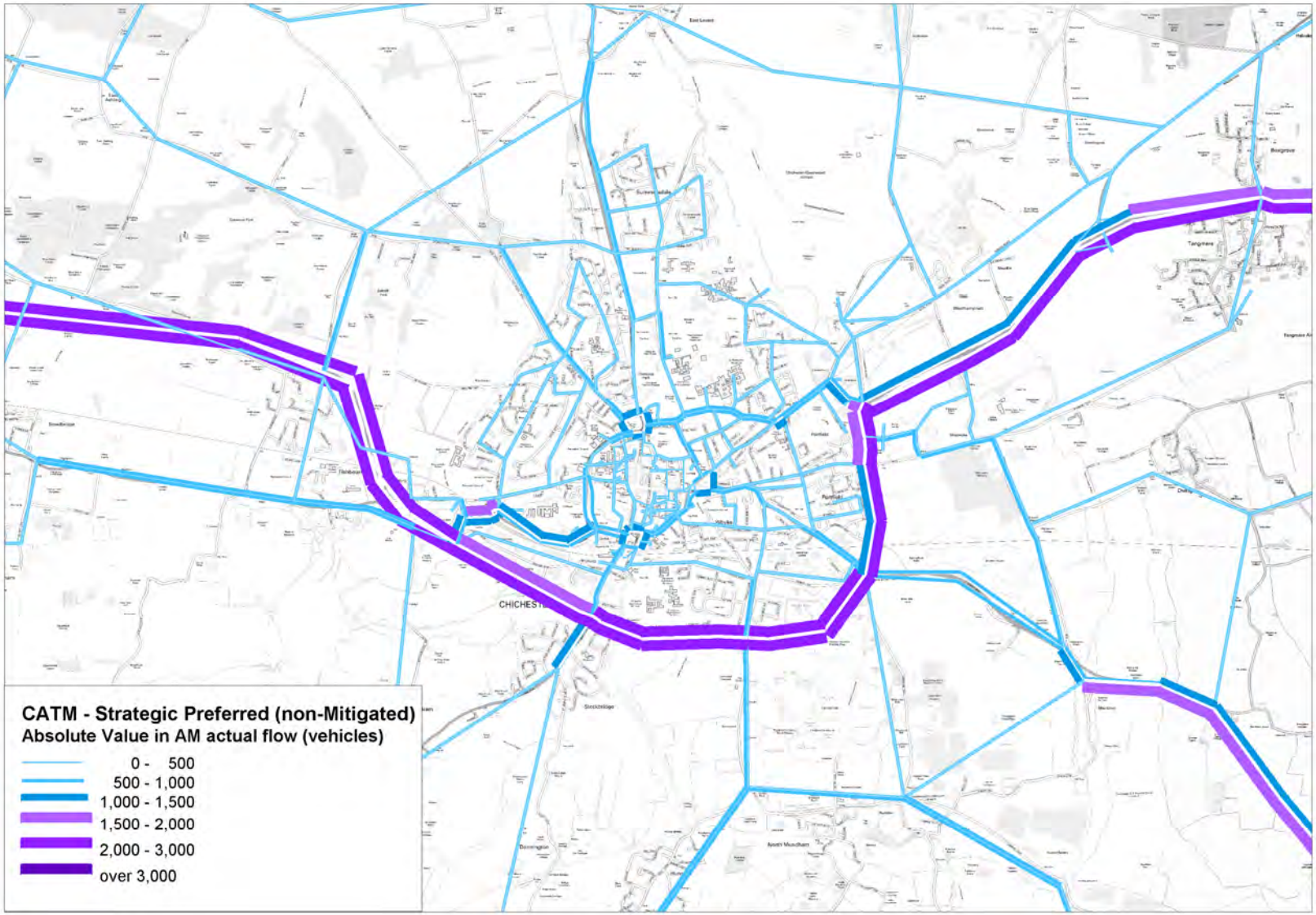


Figure 7-f 2031 Traffic Flows – Preferred Approach – Non Mitigated - AM Peak Hour

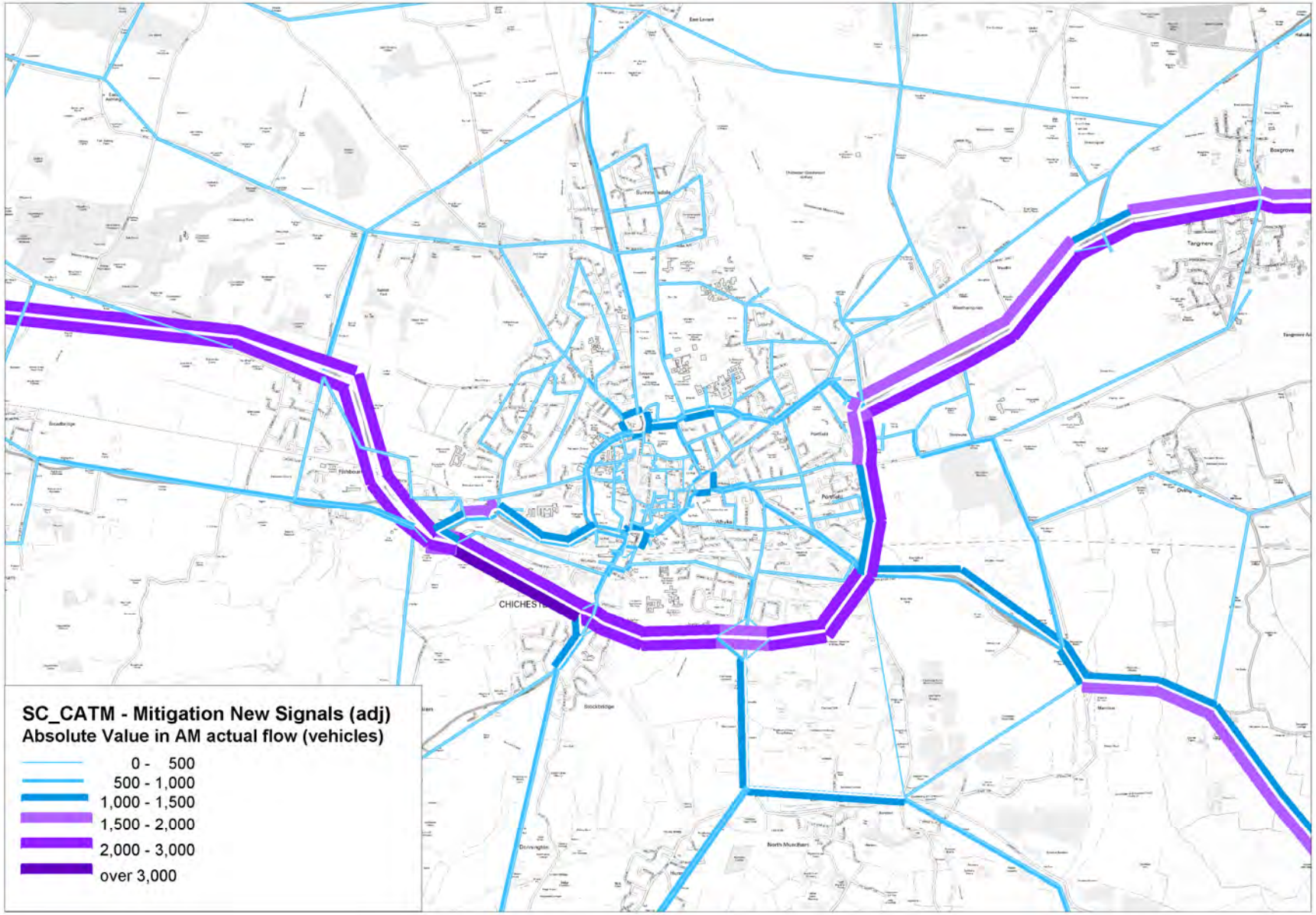


Figure 7-g 2031 Traffic Flows – Preferred Approach –Mitigated - AM Peak Hour

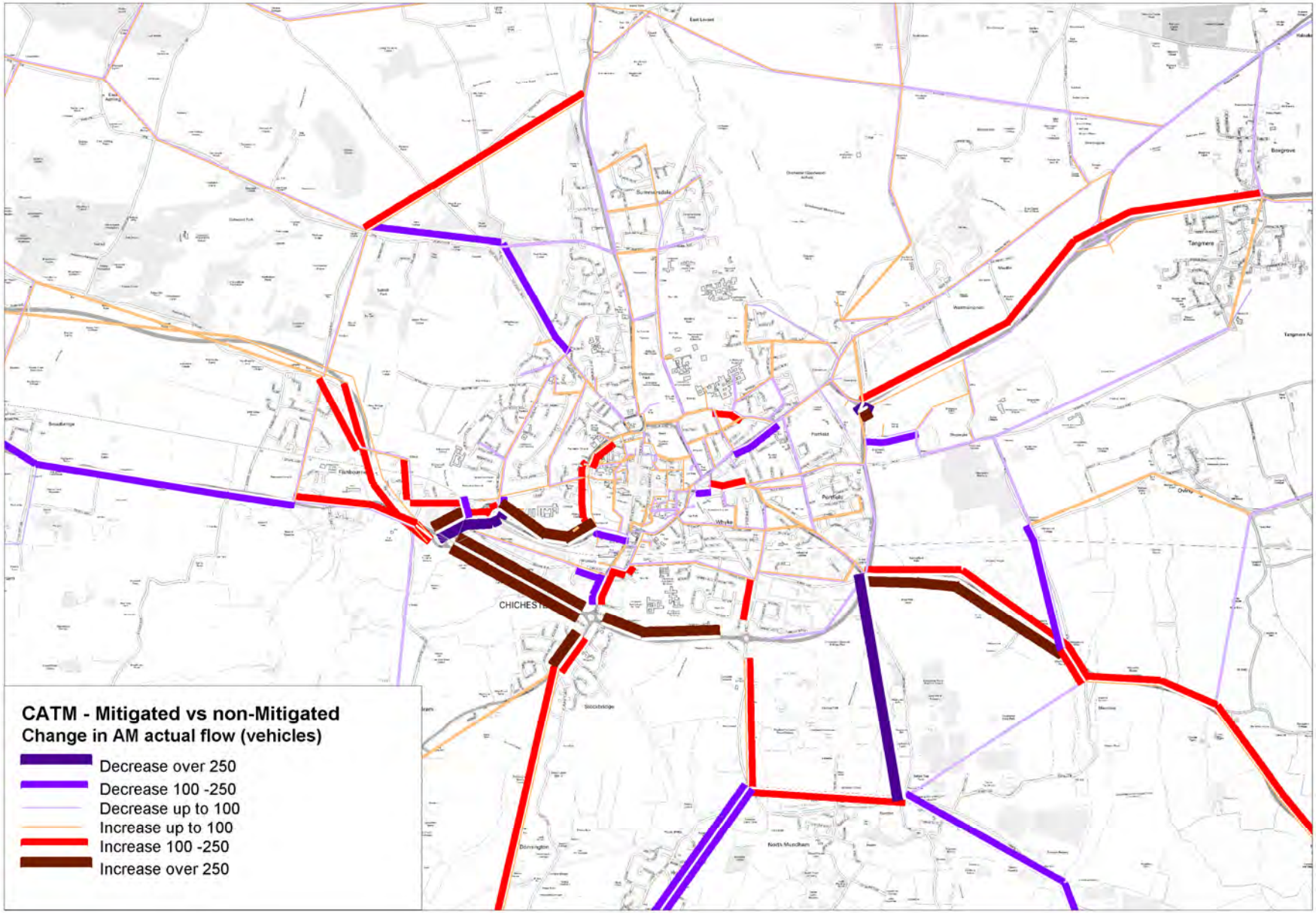


Figure 7-h 2031 Traffic Flows – Preferred Approach – Change from Non Mitigated to Mitigated - AM Peak Hour

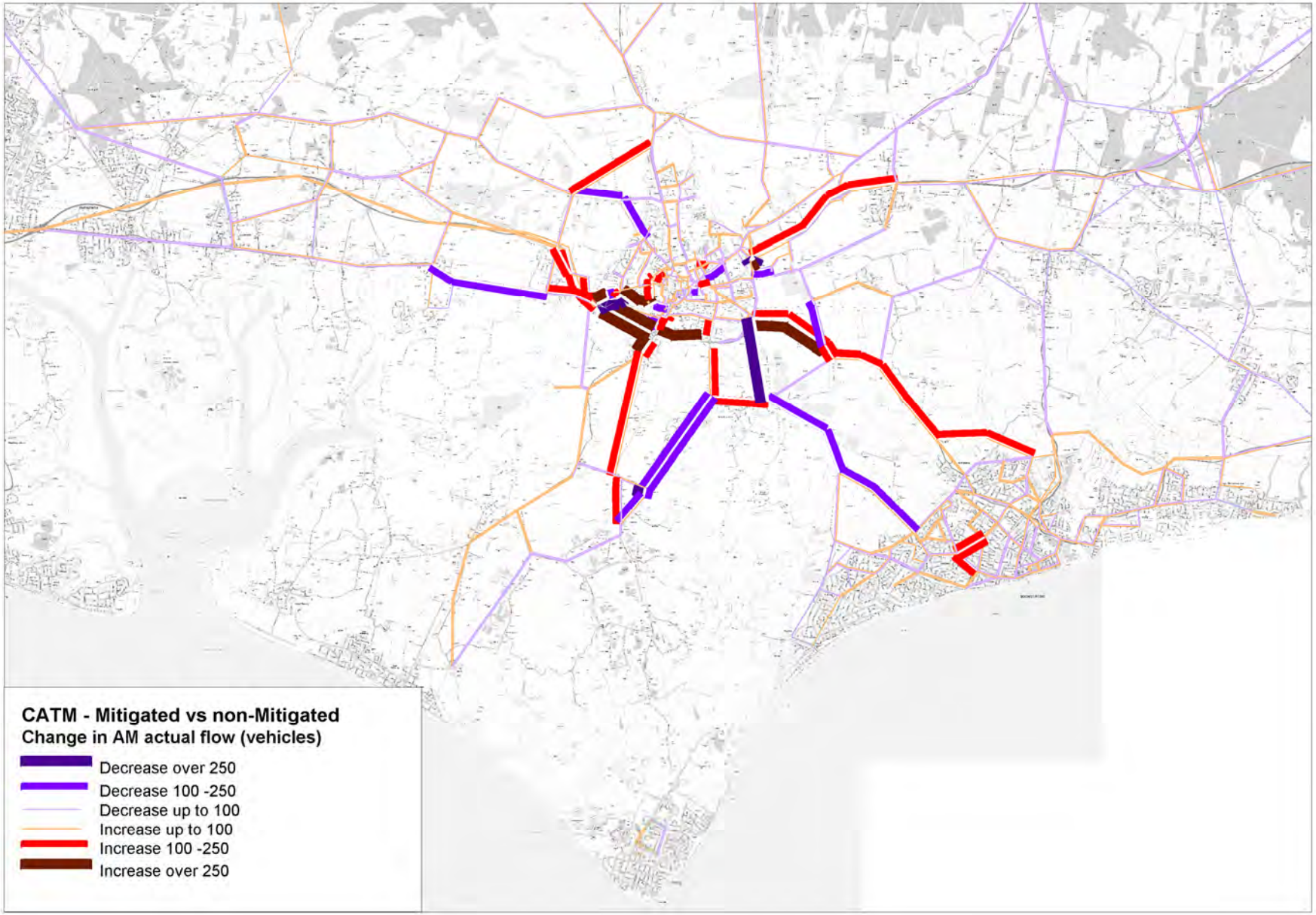


Figure 7-i 2031 Traffic Flows – Preferred Approach – Change from Non Mitigated to Mitigated - AM Peak Hour- Wider Area

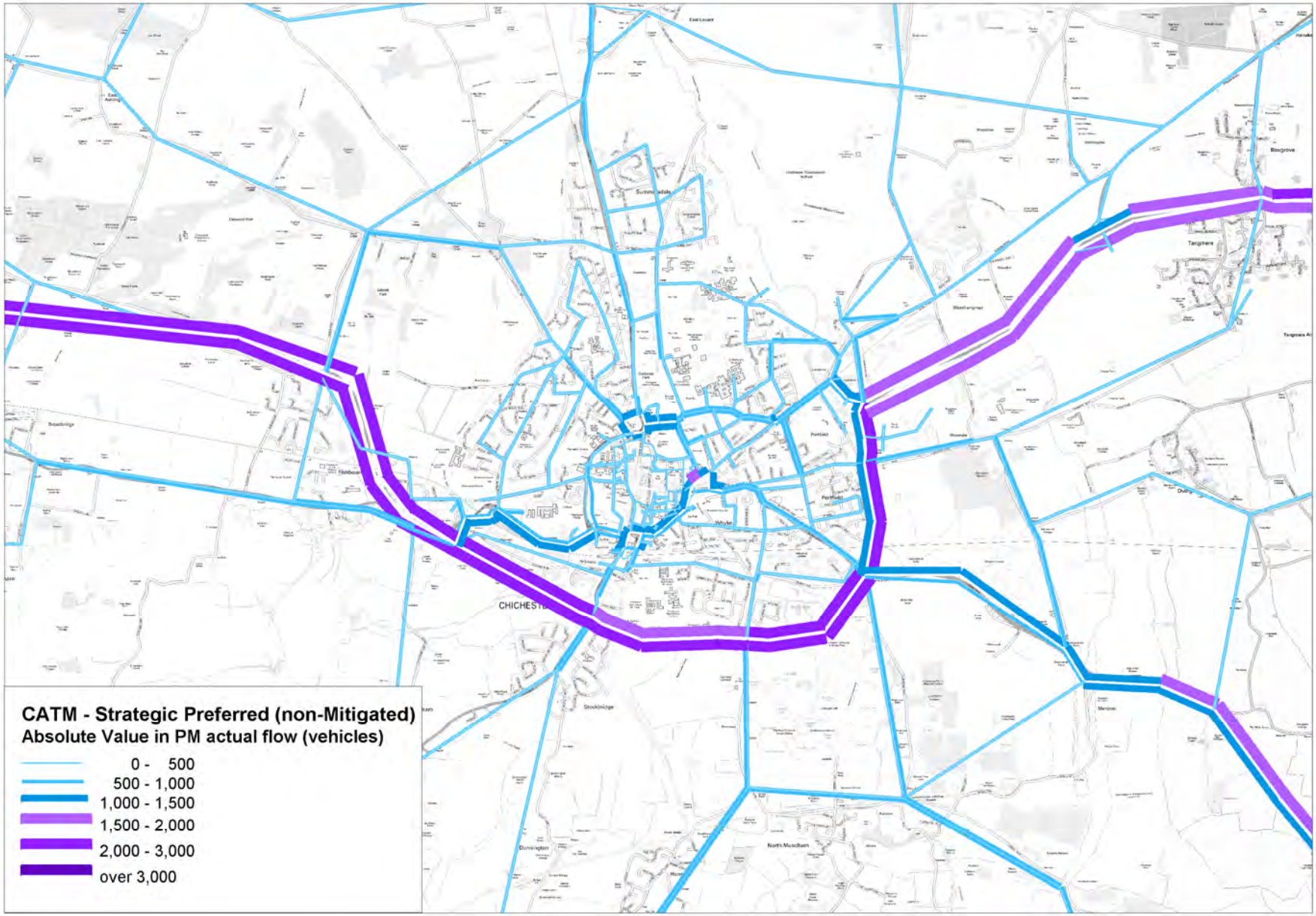


Figure 7-j 2031 Traffic Flows – Preferred Approach – Non Mitigated - PM Peak Hour

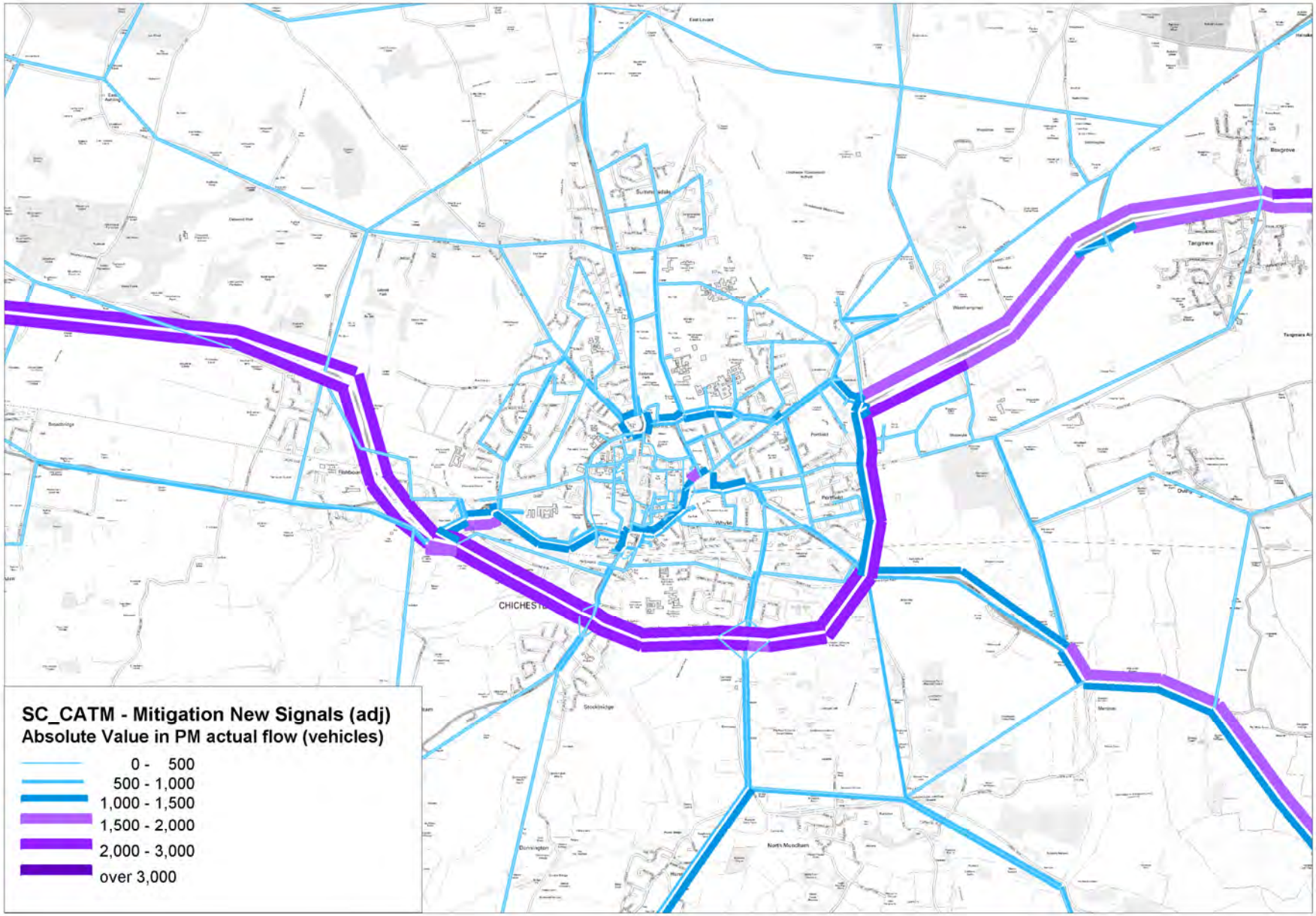


Figure 7-k 2031 Traffic Flows – Preferred Approach –Mitigated - PM Peak Hour

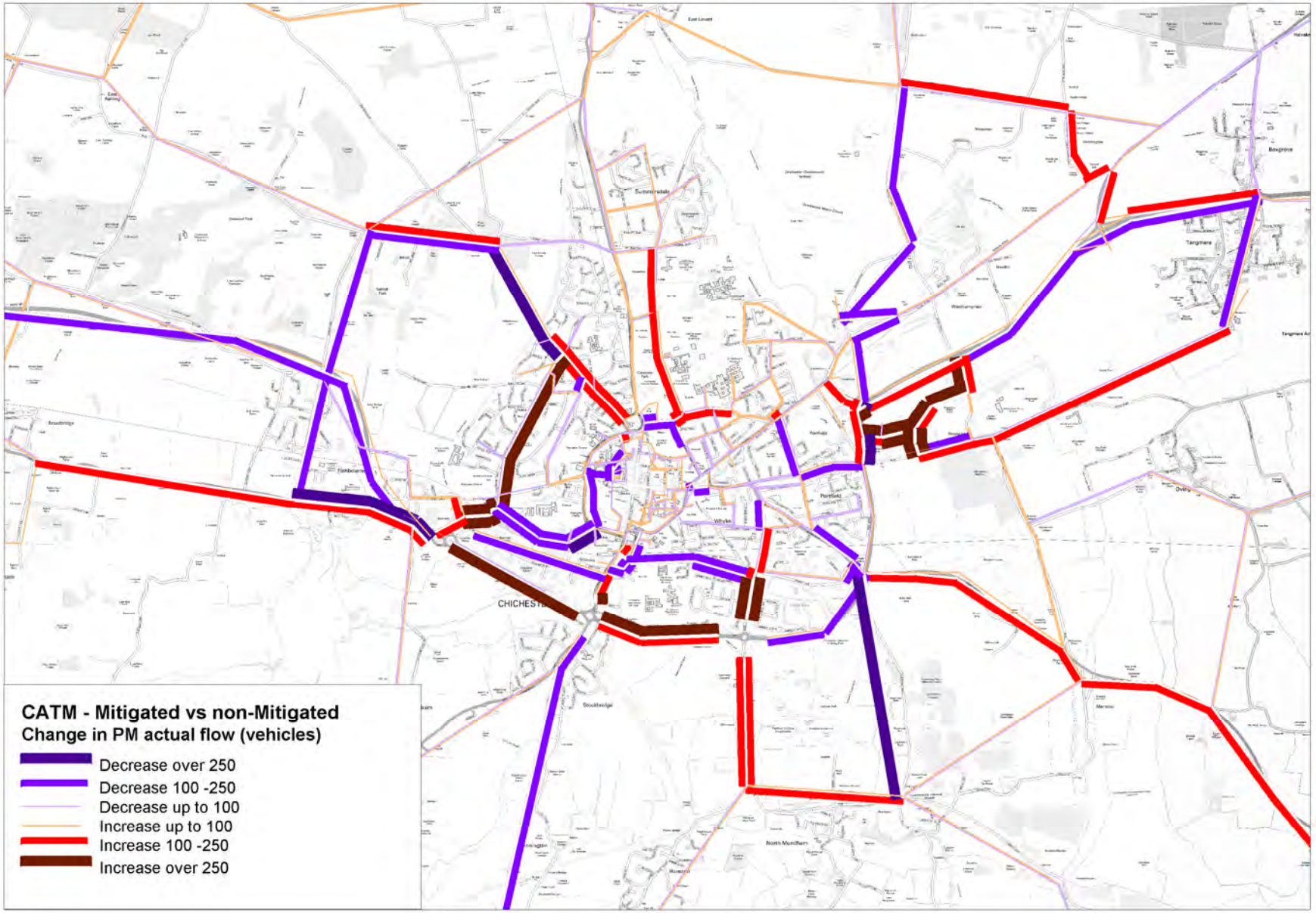


Figure 7-I Changes in 2031 Traffic Flows – Preferred Approach – Non Mitigated vs. Mitigated - PM Peak Hour

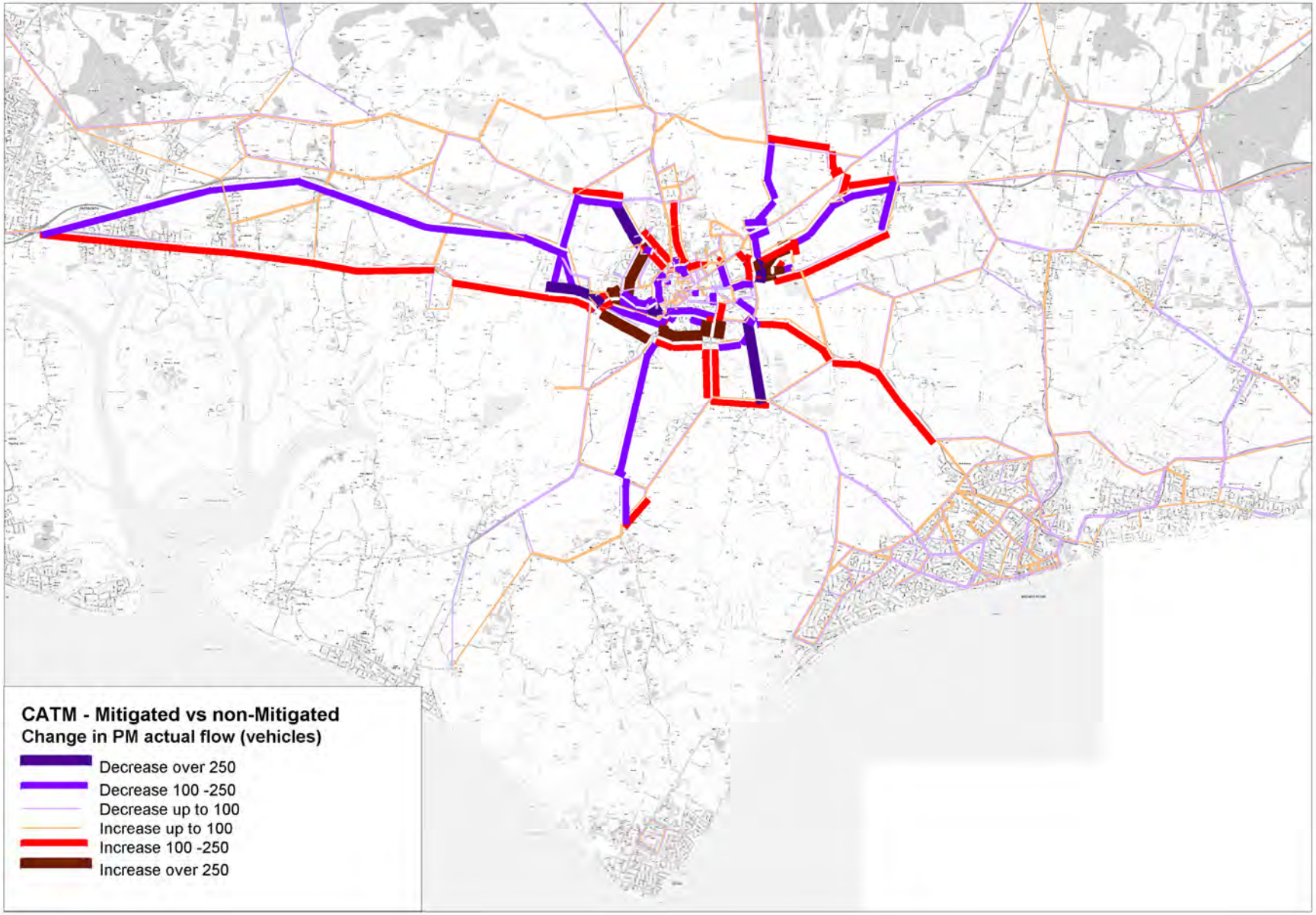


Figure 7-m Changes in 2031 Traffic Flows – Preferred Approach – Non Mitigated vs. Mitigated - PM Peak Hour – Wider Area

7.5 Summary of findings

When compared with the 2031 Baseline, the Local Plan Preferred Approach results show that the proposed mitigation measures are successful in mitigating the impacts of traffic flows from the proposed housing in the Local Plan Preferred Approach. This reinforces the findings from the previous mitigation testing.

The results show that:

- Increases in traffic flow on the A27 have not caused increases in journey times.
- Reduction in journey times into Chichester in the AM peak hour and for all routes in the PM peak hour.
- Limited effect on local roads inside and outside of Chichester;
- For roads surrounding Chichester, there are small changes in the use of roads approaching Chichester but no overall increase in traffic flow;
- It should be noted that there is no overall large reduction in traffic to or from the Manhood peninsula

The traffic flows from the final CATM runs were checked at the A27 junctions to confirm that they were at similar levels to flows in the previously tested and mitigated housing scenarios used by Parsons Brinckerhoff for the junction assessments reported in Appendix G. Completing this assessment ensured that the strategic travel demand model was reliably replicating the junction designs as tested using the junction-specific (microsimulation) models.

Although further detailed design work for all six junctions on the A27 is required as schemes are developed, at this stage there is sufficient evidence to suggest that the mitigation layouts assessed in this study (and their associated costs) would be of sufficient overall magnitude to mitigate the impacts of both 2031 development scenarios.

8 Summer Time Traffic Levels

8.1 Introduction

Jacobs were asked to consider the levels of additional traffic experienced by major traffic routes within the study area in the summer months, based on existing sources of traffic data and the possible effects for additional summer congestion at any of the traffic hotspots identified through the main study. This was done by analysing the available traffic count data in and around the Chichester area.

This analysis has been undertaken separately from the CATM testing, which is based on average annual traffic flows for the AM and PM peak hours. Travel patterns associated with new housing developments will be associated primarily with daily activities (e.g commuting to work, education, etc), therefore travel demands and traffic impacts will be greatest during the peak hour periods. The mitigation measures described and tested in the Transport Study have therefore been developed to address average peak hour traffic flows, which is consistent with standard transport planning practice.

Higher summer traffic levels result primarily from additional trips, originating outside the local area, associated with tourism and leisure activities, and would not be significantly impacted by new housing development (in addition peak hour traffic flows would reduce in summer due to school holidays etc). Whilst local residents in both existing and new development are also likely to make more leisure and tourism trips in the summer months, these will principally be at off-peak times and weekends. Furthermore those occurring at weekday peak times would often replace a regular journey to work. Therefore, the seasonal variations identified below do not affect the main conclusions of the Study set out in paragraph 7.5

8.2 Summer Time Traffic on the A27

Table 8-a shows the difference in traffic counts on the A27 in the summer months compared to the yearly average. The table shows that traffic on the A27 can be up to 9% higher than the levels experienced in an average month.

Appendix F shows the average weekday traffic counts for each month in 2010 and 2011 along the A27 around Chichester.

Site Name	Jun-11	Jul-11	Aug-11
A27 Chichester (WB) between A259 & A286	8%	7%	5%
A27 Chichester (EB) between A259 & A286	9%	6%	6%
A27 Portfield (WB)	5%	7%	5%
A27 Portfield (EB)	7%	8%	7%
A27 between A259 and A259 (EB)	6%	7%	9%
A27 between B2145 and A286 (WB)	6%	6%	3%
A27 between A286 and B2145 (EB)	6%	6%	5%
A27 between A285 Chichester west and east (WB)	7%	8%	7%
A27 between A285 Chichester west and east (EB)	7%	7%	8%

Table 8-a Difference in A27 Chichester Traffic counts from Yearly Average

8.3 Summer Time Traffic on Local Roads

Figure 8-a shows the difference in average weekday traffic counts on local roads in and around Chichester in the summer months compared to the yearly average (2011).

Whilst it is apparent that on the whole the summer months are busier the counts do not seem to be dramatically greater. Indeed parts of the city centre are less busy than average.

The roads with the biggest increase in traffic are on the A286 and to a lesser extent the B2201 to the Manhood Peninsula with increases of 14% and 6% respectively. There are also increases on the A286 (Broyle Rd) into the South Downs, via Mid-Lavant and West Dean. Finally, no particular increase is noted on the A259 to Bognor Regis.

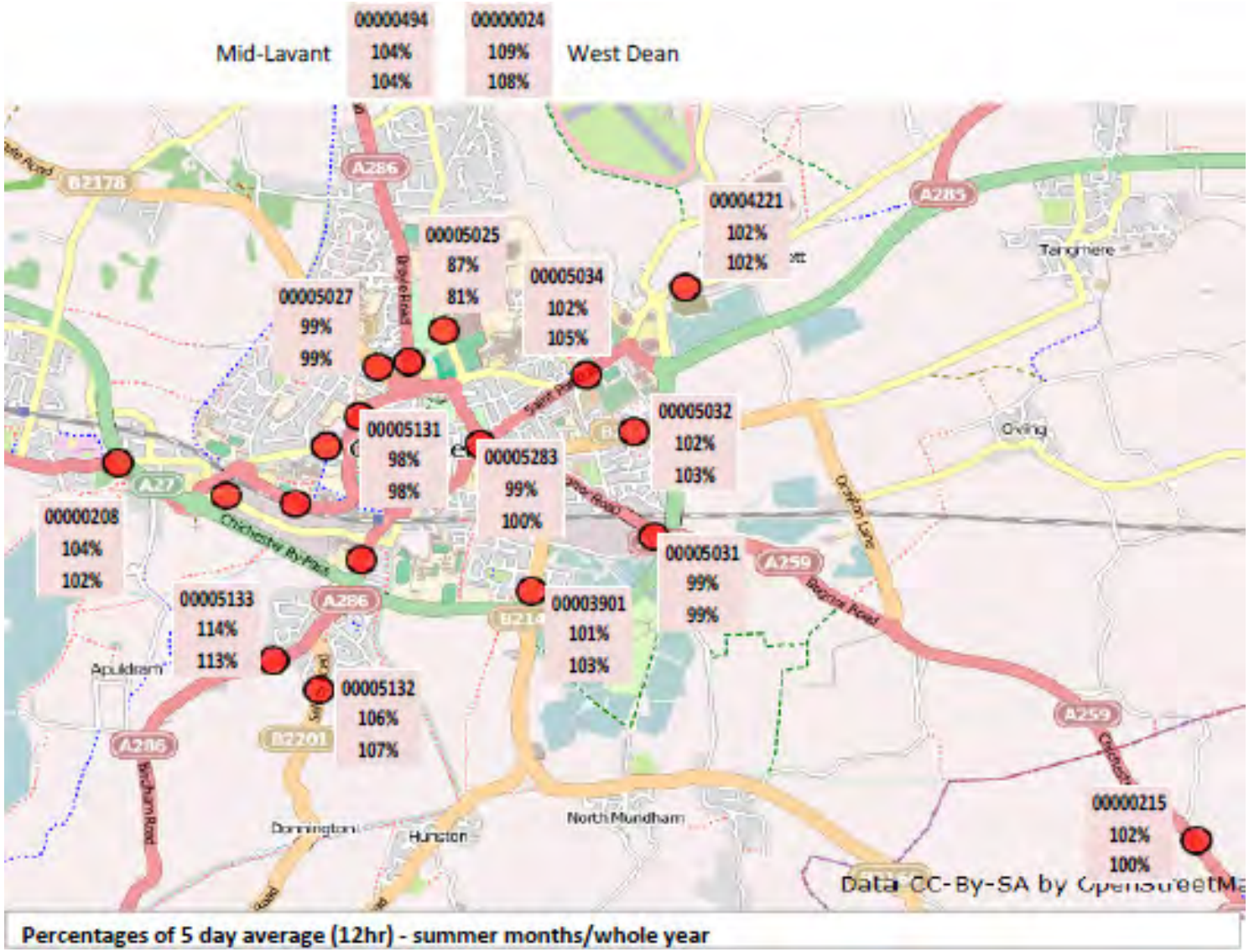


Figure 8-a Differences in traffic counts from Yearly Average on Chichester Local Roads

8.4 Conclusion

It has been noted[11] by West Sussex County Council that July and August in 2010 and 2011 had higher rainfall and lower sun hours / temperatures than the long-term average, along with unusually warm and dry periods in both spring and autumn. Therefore the comparison may slightly underestimate the degree of any seasonal variation in traffic counts in the longer term.

A working rule of thumb would put expected daily variation at about 10% on the A27; it is worth noting that the percentage increases in the summer months are generally within such a range.

We conclude that the presumption of busier summer months is correct. The A27 itself does appear busier, relatively consistently along its length near Chichester. This is mirrored on the roads leading to the Manhood Peninsula but not to Bognor Regis. The most significant seasonal increase in traffic levels affect roads serving the Manhood Peninsula, in particular the A286.

[11] http://www.metoffice.gov.uk/climate/uk/anomalygraphs

9 Summary

Chichester District Council is preparing a new Local Plan to replace the adopted Development Plan. The Local Plan will provide the strategic framework for long term spatial and economic development in Chichester district (excluding the South Downs National Park)[12]. This study has been commissioned at a key stage of the Development Plan process and ahead of formal public consultation on the proposals.

The purpose of the Study is to assess the effects on the highways network likely to arise as a result of potential options under consideration for the Local Plan, and to identify measures that could potentially mitigate these impacts.

As a package of measures, the current tests demonstrate strong potential to secure long-term road network performance in and around Chichester, enabling growth without compromising traffic flow conditions. Further work will address the following delivery issues;

- Detailed design of A27 schemes will refine solutions at key junctions in partnership with the Highways Agency. Working solutions provide a basis for this work, following detailed junction modelling on behalf of the Highways Agency (Parsons Brinckerhoff) with findings fed back into the most recent area-wide assessments which inform the Preferred Approach.

- The timing of mitigation measures will be critical to deliver strategic outcomes linked to planned housing growth. The programming of smarter choice interventions will be important, as their greatest impact will coincide with key life-stage changes for residents i.e. when people move house/job/school. A coordinated programme of smarter choices measures is being developed jointly by West Sussex CC and Chichester DC.

The Study findings (together with the supplementary junction testing undertaken by Parsons Brinkerhoff – Appendix G) demonstrate that the transport mitigation measures tested are achievable and viable, and potentially could be delivered in conjunction with housing development through the Local Plan.

The results for all growth scenarios are broadly similar on an area-wide basis, with variants in the local area of each strategic site dependant on the housing allocation. It should be noted that modelling results show significant increases in traffic flows and queues between 2009 Base and 2031 Baseline, resulting from already committed housing development and projected background growth in traffic. Differences between the 2031 Baseline and any of the Local Plan scenarios are secondary effects compared to these background changes.

The results show that the proposed mitigation measures are successful in mitigating the effects in traffic flow due to the proposed housing in the Local Plan Preferred Approach. The results show that:

- Increases in traffic flow on the A27 have not caused increases in journey times.

[12] The Study also takes account of previous transport modelling work undertaken in support of a planning application for major development at Shopwyke.

- Reduction in journey times into Chichester in the AM peak hour and for all routes in the PM peak hour.
- Limited effect on local roads inside and outside of Chichester;
- For roads surrounding Chichester, there are small changes in the use of roads approaching Chichester but no overall increase in traffic flow;
- It should be noted that there is no overall large reduction in traffic to or from the Manhood peninsula

The traffic flows from the final CATM runs were checked at the A27 junctions to confirm that they were at similar levels to flows in the previously tested and mitigated housing scenarios used by Parsons Brinckerhoff for the junction assessments reported in Appendix G. Completing this assessment ensured that the strategic travel demand model was reliably replicating the junction designs as tested using the junction-specific (microsimulation) models.

Although further detailed design work for all six junctions on the A27 and a number of the local transport measures is required, at this stage there is sufficient evidence to suggest that the measures assessed in this study (and their associated costs) would be of sufficient overall magnitude to mitigate the impacts of proposed Local Plan development scenarios.