

GUILDFORD AND WOKING INTEGRATED TRANSPORT STUDY

Option Testing

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CONTENTS

PREFACE	4
1 INTRODUCTION	5
2 TRIP END FORECASTS	7
3 THE EFFECTS OF CONGESTION ON TRAFFIC GROWTH	12
4 TRAFFIC RESTRAINT MEASURES	15
5 ANALYSIS OF SCENARIOS	20
6 SUMMARY OF RESULTS	29

APPENDICES

APPENDIX 1	RESIDENTIAL TRIP GENERATION/ATTRACTION RATES
APPENDIX 2	ATTRACTION/GENERATION RATES FOR COMMERCIAL DEVELOPMENTS
APPENDIX 3	RESIDENTIAL DEVELOPMENT
APPENDIX 4	MODELLING OF PARKING CHARGES
APPENDIX 5	SENSITIVITY TEST FOR GENERATION FROM TOWN CENTRE ZONES
APPENDIX 6	TRAFFIC RESTRAINT SENSITIVITY TESTS

PREFACE

The Guildford and Woking Integrated Transport Study (GWITS) was undertaken by Surrey County Council following the Examination in Public (EiP) into Surrey County Council's Deposit Draft Structure Plan. Its objective was to undertake technical work to help inform the development of transport strategies for Guildford and Woking to support the level of development proposed in the Structure Plan and in accordance with the Regional Transport Strategy (RTS), the County Council's Local Transport Plan (LTP), Local Plans and the emerging Local Development Frameworks (LDFs) being developed by the respective Boroughs.¹

The study was overseen by a Joint Steering Group involving officers from the County Council, both Guildford and Woking Borough Councils and the Highways Agency. In addition, consultants acting on behalf of both the County Council and the Highways Agency provided assistance.

Initial work undertaken by Scott Wilson, the County Council's consultants, was completed in September 2005.² This was used as a basis for the next stage of work undertaken by the County Council's Transport Studies team, the results of which are reported in this technical document.

¹ GWITS Project Definition Report, May 2004

² Strategy testing Results (September 2005)
Combination Strategy Testing Results (September 2005)

1 INTRODUCTION

- 1.1 This Report sets out the results of further work³ on the GWITS model options carried out by Surrey County Council. The work is based on two forecast years and three different scenarios regarding the extent of housing development. It also uses revised assumptions concerning economic growth forecasts and various measures to restrict traffic growth.
- 1.2 The GWITS model represents the AM peak hour (0800-0900) for the base year of 2003 and for forecast years of 2011 and 2016. The scenarios that were investigated are set out in the table below:

Guildford & Woking	Development Scenario				
	Year	No Development	Committed Development		Full Development
		No Restraint	Traffic Restraint	No Restraint	Traffic Restraint
2003	X				
2011	X	X	X		
2016	X	X	X	X	X

- 1.3 The model aims to address *inter alia* various transport-related targets set out in the Local Transport Plan (LTP2). These are;
- Peak hour Traffic flows – in each of the three towns (Guildford, Woking and Redhill/Reigate) the LTP aim is to ensure that as far as possible that 2010 peak flows do not increase above the levels estimated for the base year of 2005/6 (LTP Paragraph 6.7).
 - Area Wide traffic – the LTP aims to continue to limit growth to less than 1% a year between 2004 and 2010 (LTP Paragraph 6.10)
- 1.4 In addition to the original forecasts for 2016, a number of sensitivity tests for 2016 were undertaken. These explored the effects of applying different levels of traffic restraint (Appendix 6) and varying the assumed trip rate generation for high density developments (Appendix 5).

³ Previous work is reported in

Revised Local Model Validation Report (July 2005) (3418/Reports/3418_DOC_03)

Trip End Forecasts AM Peak 2016 (July 2005) (3418/Reports/3418_DOC_02)

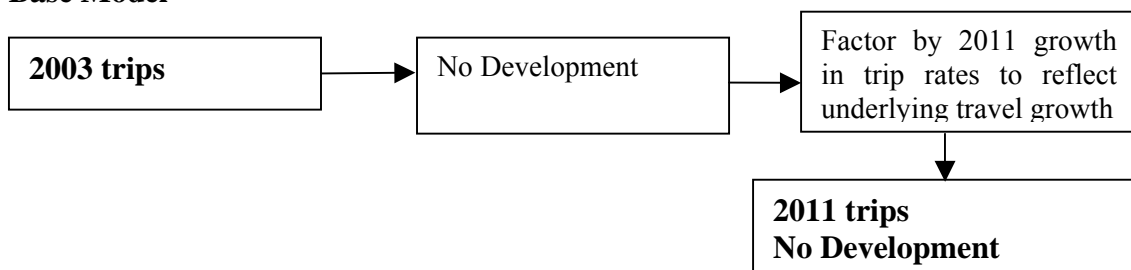
Strategy Testing Results (Sept 2005)

Combination Strategy Testing Results (Sept 2005)

Key Factors

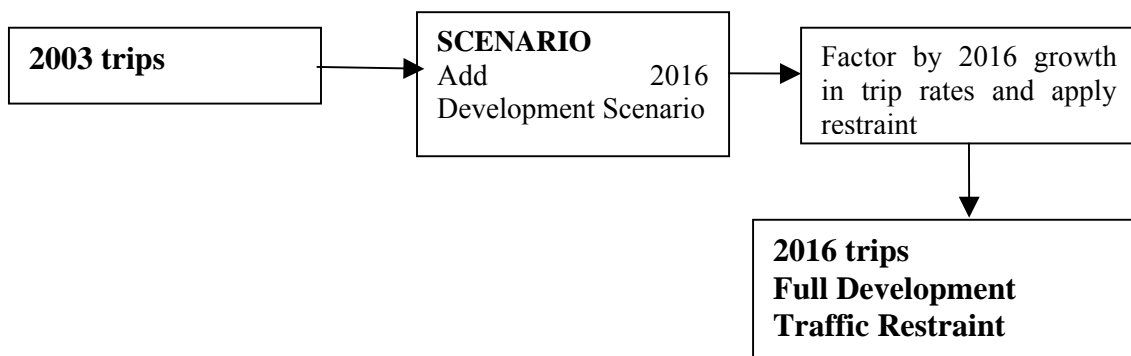
- 1.5 Traffic levels in the future will depend on many factors. The most important determinants can be summarised as:
- Demographic/economic factors influencing the numbers of motorised trips made by households
 - Changes in population (number and size of households) and the location of employment opportunities in relation to population
 - The level of congestion, and transport planning policies which may encourage or discourage the use of cars or Public Transport
- 1.6 The Government TEMPRO forecasts have been used to calculate an initial “underlying demand” reflecting the growth in trip making.
- 1.7 Data for forecast developments, households and employment, have been supplied by Guildford and Woking Boroughs. Three scenarios regarding the level of housing developments have been considered;
- Zero growth
 - Committed development only
 - Full Growth - Development scenario 1a
- 1.8 For each of these scenarios, the GWITS model has forecast the transport effects using the CUBE transport planning program. The overall process is represented in outline by the following schematic diagrams. Two examples are shown, one of the base model and one for the 2016 Full development scenario. Similar diagrams apply to each of the scenarios cited above.

Base Model



Scenario Model

(2016 Full Development shown)



2 TRIP END FORECASTS

2.1 Underlying growth

2.1.1 For all tests a forecast of the effect of “underlying growth” (due for example to increased car ownership) in car driver trips was made using data from the Government program TEMPRO. The forecast growth rates contained in TEMPRO were slightly reduced in the light of the Chancellor’s December 2005 pre-budget statement indicating that economic growth in the next few years would be lower than expected. It was assumed that growth in the next 3 years would be only 50% of the TEMPRO forecast. This gives underlying car driver growth forecasts 2003-2016 of 4.8% (Woking), 6.3% (Guildford). (Without the reduction, growths were 5.4% Woking, 7.1% Guildford).

2.2 Trips Generated by Developments

2.2.1 Forecast trips generated by new residential developments were added to the underlying growth. The trip rates for new **residential** developments were derived from the TRICS database. A distinction was made between developments with good Public Transport facilities, e.g. close to Woking or Guildford Stations, and other sites; car generations from the former would be lower. The rates used and their derivations are set out in Appendix 1. Since the rates assumed for residential flats (Table A1.2) are much less than for housing, a sensitivity test was conducted to assess the impact of doubling these rates. This test is reported in Appendix 5.

2.2.2 Trip rates for new **Commercial** developments were also derived from the TRICS database. These are set out in Appendix 2.

2.3 Development Scenarios

Zero Residential Growth

2.3.1 The scenario of zero residential growth considers only the underlying growth in travel for the existing population. Generations and attractions for 2011 and 2016 were derived from the 2003 base year model by factoring by the underlying growth in car driver trips only (paragraph 2.1.1).

Committed residential development in GWITS area

2.3.2 The residential development deemed to be committed for the Woking and Guildford areas is set out in Appendix 3. As a working assumption, this development was assumed to be completed for the forecast year 2011, so that the model runs for 2011 and 2016 included the committed development. For these runs the existing 2003 Generations were factored by the underlying growth as above and the forecast trips for the committed development added.

2.3.3 A similar procedure was adopted for the attractions. The 2003 attractions were factored by the average TEMPRO Surrey growth forecasts for 2011 and 2016. Attraction data for the committed residential development were included, but no additional attraction data for commercial and retail development were included in this scenario. The resulting overall attraction data were factored so that the total attractions matched the total productions. The productions are customarily taken as the control total since they are deemed to be more reliable than the attraction data.

Full development in the GWITS area (Scenario 1a)

- 2.3.4 This scenario relates to the 2016 forecasts. The full development includes both the committed and the planned development that is expected to be completed by 2016 as set out in Scenario 1a (Panel recommended developments). They are listed in Report 3418/doc/02; “Guildford and Woking Integrated Transport Study; Trip End Forecasts AM peak 2016”.

Generations

- 2.3.5 For these runs the existing 2003 Generations were factored by the underlying growth as above and the forecast trips for the full development were added. To these were added those morning peak hour trips forecast to be leaving (generated by) the proposed Commercial developments.

Attractions

- 2.3.6 The TEMPRO forecasts of growth in attractions from 2003 to 2016 are 28.3% in Guildford and 13.6% in Woking. The Woking forecast is roughly in line with the forecast growth in households of 8.7% (Panel Recommendation) plus the underlying growth. Woking has plans for increases of 10% in Office space and 30% in retail/leisure in the town centre so this growth in attractions could be realistic. For Guildford the TEMPRO growth in attractions was much higher than the forecast growth in generations. If these additional attractions materialised they would attract additional traffic from outside the Borough. Moreover the TEMPRO forecasts for Guildford were not reflected in the Guildford Borough’s view; Guildford has limited plans for retail/commercial development. So rather than using the specific TEMPRO forecast for Guildford, the average Surrey forecast was used instead.

Comparison with TEMPRO

- 2.3.7 The forecast TEMPRO growth in Car Driver trips from 2003-2016 are 17.3% for Guildford and 9.7% for Woking. The Table below sets out the forecasts of new households 2003-2016 in TEMPRO and those inherent in Scenario 1a. The GWITS number of new households in Guildford is fairly similar to the TEMPRO forecast, though in Woking it is much greater.

	Guildford	Woking
Households 2003 (TEMPRO)	54,364	38,245
Households 2016 (TEMPRO)	59,894	39,883
Therefore...TEMPRO forecast of growth in Households 2003-2016	5,530	1,638
GWITS Scenario 1a new households	4,700	3,340

2.4 Zones outside the GWITS area

2.4.1 For zones outside of the GWITS area, TEMPRO growth forecasts were also used (i.e. underlying + development growth) for generations and attractions, but again a reduced growth was assumed for the first three years.

2.4.2 The adjusted TEMPRO growths in Car Driver trips from 2003-2016 are 10.3% for Surrey and 11.9% for the South East.

2.5 Trip Generation Totals

2.5.1 Using the methodology described above, trip generation totals (before allowing for congestion and traffic management effects) were as follows;

Trip Generation Totals							
	2003	2011 developments		2016 developments			
	Base	Zero – underlying growth only	Comm-itted	Zero – underlying growth only	Comm-itted	Other	2016 Total
Guildford	15,591	554	569	975	668	1,217	18,451
Woking	9,560	253	404	455	621	918	11,554
Rest of Surrey*	10,489	597	0	1,079	17	-	11,585
External*	8,061	540	0	980	-	-	9,042
TOTAL	43,701	1,933	973	3,490	1,306	2,135	50,632

* =For the “Rest of Surrey” and “external” the figures in the underlying growth rate column include growth due to developments (taken from TEMPRO forecasts).

2.6 Growth in Goods Vehicle Trips

2.6.1 For goods vehicles, forecasts were derived from National Road Traffic Forecasts (NRTF) , but again assuming that the first three years will experience only 50% of expected growth. This gives forecast growth rates as follows;

	2003-2011	2003-2016
Light Goods (LGV)	12.7%	24.3%
Other Goods (OGV)	5.5%	10.8%

2.6.2 The number of Goods vehicle trips were assumed to be unaffected by traffic congestion or restraint policies.

2.7 Vehicle Totals

The resulting matrix vehicle trip totals, **before** allowing for congestion and traffic management effects, are shown below. These represent the vehicle trips generated in the model for the various forecast years and scenarios.

Year	Scenario	Area	Cars	LGV	HGV	Total
2003	Base	Guildford	9560	929	561	11050
		Woking	15591	1191	1434	18216
		Rest of Surrey	10489	988	441	11918
		External	8061	943	740	9744
		Total	43701	4051	3176	50928

Year	Scenario	Area	Cars	LGV	HGV	Total
2011	Zero Development	Guildford	9814	1047	593	11454
		Woking	16136	1341	1514	18991
		Rest of Surrey	11087	1116	464	12667
		External	8602	1062	780	10444
		Total	45639	4566	3351	53556

Year	Scenario	Area	Cars	LGV	HGV	Total
2011	Committed Development	Guildford	10218	1047	593	11858
		Woking	16704	1341	1514	19559
		Rest of Surrey	11089	1116	464	12669
		External	8601	1062	780	10443
		Total	46612	4566	3351	54529

Year	Scenario	Area	Cars	LGV	HGV	Total
2016	Zero Development	Guildford	10015	1153	625	11793
		Woking	16562	1474	1592	19628
		Rest of Surrey	11566	1226	489	13281
		External	9045	1168	820	11033
		Total	47188	5021	3526	55735

Year	Scenario	Area	Cars	LGV	HGV	Total
2016	Committed Development	Guildford	10637	1153	625	12415
		Woking	17230	1474	1592	20296
		Rest of Surrey	11584	1226	489	13299
		External	9045	1168	820	11033
		Total	48496	5021	3526	57043

Year	Scenario	Area	Cars	LGV	HGV	Total
2016	Full Development	Guildford	11552	1153	625	13330
		Woking	18448	1474	1592	21514
		Rest of Surrey	11584	1226	489	13299
		External	9044	1168	820	11032
		Total	50628	5021	3526	59175

3 THE EFFECTS OF CONGESTION ON TRAFFIC GROWTH

3.1 Key effects

3.1.1 The growth forecasts set out in section 2.5 above are produced using TEMPRO data, which assume in effect that travel times remain constant. If in fact times by car increase, drivers could react in four ways;

- Make fewer trips – (change generation rates)
- Change the time of their journey to avoid peak conditions
- Change mode, e.g to Public Transport
- Redistribution – change destination, e.g. find work closer to home

3.1.2 Increasing travel costs are likely to have a small effect on **generation** of trips in the peak hour, as the majority of trips (to school or work) are not optional. However short distance car trips could change to so-called “slow modes” (walking or cycling) in response to increased congestion; or some people may be able to make arrangements to work at home.

3.2 Time shift

3.2.1 Time shift occurs when drivers perceive that they can reduce their journey time by changing the time of travel, mainly from the peak hour to just before or after. Thus the size of the peak hour trip matrix will fall as some trips transfer to the shoulder peak periods. This has now been modelled in CUBE using Elastic assignment. For the GWITS study, a one hour peak period 0800-0900 is being modelled. The parameter values set out by the DfT (‘Illustrative Parameter Values’) for modelling this situation are as follows;

Trip purpose:	Overall	HBEd	HBW	HBEB	HBO + HBShop	NHEB	NHBO
<i>Observed proportion</i>	100%	14%	64%	11%	11%	-	-
<i>1 hour peak to 1 hour shoulders</i>	0.042	0.02	0.03	0.04	0.15	0.05	0.10

The overall parameter value of 0.042 was obtained by applying the proportions of journey purpose obtained from the GWITS surveys.

3.2.2 However, the parameter value so obtained was intended to be applied to a logit model of time of day choice, whereas in fact an exponential direct demand model was used in the GWITS model, of the form:

$$T_f = T_b \exp \lambda c ;$$

where T_f is the forecast value of demand, T_b is the base value of demand and c is the change in cost of travel between forecast and base, ie $c_f - c_b$. This model has a direct elasticity of demand with respect to cost of

$$E(T_f | c) = \frac{\partial T_f}{\partial c} \frac{c}{T_f} = \lambda T_b \exp \lambda c \cdot \frac{c}{T_b \exp \lambda c} = \lambda c .$$

- 3.2.3 By contrast, a logit model designed to select the peak hour as an alternative has a direct elasticity of

$$E(P_i | c_i) = \frac{\partial P_i}{\partial c_i} \frac{c_i}{P_i} = \frac{\partial}{\partial c} \frac{\exp \beta c_i}{\sum_j \exp \beta c_j} \cdot \frac{c_i}{P_i} = (1 - P_i) \cdot \beta c_i ;$$

where c_i is the change in costs in travelling during the peak period i and P_i is the probability of travelling during that period.

- 3.2.4 Equating elasticities, we see that to produce a comparable response with the exponential model, we would need to use a value of λ given by

$$\lambda = (1 - P_i) \beta .$$

- 3.2.5 We must therefore modify the value of β provided by the DfT guidance by $(1 - P_i)$, where P_i is the proportion of traffic currently travelling in the peak hour. Taking the peak hour is 0800-0900 hours, and the relevant shoulder peaks as 0700-0800 and 0900-1000 hours respectively, we find that the proportion of traffic currently travelling in the peak is 40%. Therefore an appropriate value of λ is given by

$$\lambda = (1 - 0.4) * 0.042 = 0.025 .$$

This value has been used in the GWITS model to simulate the effect of peak spreading.

3.3 Modal Split

- 3.4 A change in **modal split** can occur if the cost of a trip by private vehicle increases relative to the trip by Public Transport. These effects have been modelled in CUBE using a modal split model (logit) with a parameter value of -0.05, as recommended by the DfT.

3.5 Redistribution

- 3.5.1 Redistribution among destinations occurs where a driver changes their destination, e.g. to somewhere closer in time to their home, in response to increasing travel times. Thus the number of trips will stay constant, but trip distances will tend to fall to mitigate the effects of reduced travel speeds. In the peak hour this is likely to be very much a long term effect, as the major journey purpose in the morning peak period is the trip to work, and it is not likely that anyone would change an existing job as a response to a slower journey time. But in the longer term, when looking for possible employment, the travel time will have an effect on the choice of place of work. This effect has not been modelled, so the length of trips in forecast years may be slightly overestimated.

3.6 Do Minimum Network

3.6.1 The do-minimum highway network used to carry out tests for future years included a small number of changes;

a) Bus priority

Onslow Street Bus Lane

A322 Woodbridge Road Bus Lane, A322

Millbrook Bus Lane, A281

Marrow Corridor

These were modelled by increasing the inter-green periods at traffic signals on the routes by 10 to 15 seconds.

b) Walking

Gyratory System, A322/A281/A3100/A31, Guildford - Introduction of a pedestrian phase

c) Roads

York Rd J/W London Rd, Guildford - Widening of carriageway
Old Woking Road j/w Sheerwater Rd – Convert to Traffic Signals
B382 Old Woking Rd j/w Maybury Hill – Convert to Roundabout

3.7 Forecast Matrix Totals adjusted for Congestion

3.7.1 The time of day and modal shifts tend to reduce peak hour traffic as congestion increases. This is illustrated in the table below which shows the total trips from all zones forecast by the model. These effects are examined in more detail in subsequent sections in this report.

	Total Car Trips	Unadjusted	After adjustment for congestion	Growth from 2003
2003	Base	43,701		
2011	Zero Development	45,636	44,844	2.6%
	Committed Development	46,610	45,621	4.4%
2016	Zero Development	47,187	45,889	5.0%
	Committed Development	48,492	46,927	7.4%
	Full Development	50,632	48,661	11.3%

3.7.2 The Light Goods and Heavy Goods traffic are unaffected by these effects.

4 TRAFFIC RESTRAINT MEASURES

4.1 Surrey County Council's Policy

4.1.1 Surrey County Council have a policy to restrict traffic growth (section 1.2), and in addition to the effect of increased congestion Surrey have introduced or proposed a number of schemes. The following have been included in the model for 2016. For 2011, it was assumed that the effects of the measures would be half of those in 2016.

4.2 Parking Charges

4.2.1 The cost of parking all day in Guildford or Woking is about £7.50. This model represents the case where the charge is increased by £5 (67%) to £12.50 a day. This is an increase in real terms of about 6% a year if phased in over the next 10 years. The Car Park charges apply to all Car Park zones (i.e. the major multistoreys) in Guildford and Woking, but they do not apply to the Railway Car Parks in Woking. (See Appendix 4 for modelling details.)

4.3 Park & Ride

4.3.1 The Park & Ride sites in Guildford have been successful, particularly that at Artington. The do-minimum scenario included new sites at Mellow and Manor Farm. The tested scenario includes 3 more sites; at Martyrs Lane, Worplesdon Station and Whitmoor. The Martyrs Lane and Worplesdon Station sites were placed to attract Woking Based traffic.

4.3.2 Each of these sites has been forecast to attract 100 trips daily in the peak hour, somewhat less than Artington. In addition, a modestly increased usage by 2016 (an extra 60 vehicles in the peak hour) has been forecast for Artington and Mellow.

4.3.3 A site at Pyrford Common has not been modelled as there would be insufficient demand; and also that the approach roads to the site are not suitable. Knaphill was also not modelled, as there are currently good bus services.

4.4 Public Transport Improvements

4.4.1 A new railway station at Mellow indicated a peak hour usage of 250, most heading towards Guildford. The great majority of these were transfers from buses rather than from cars and there was little effect on flows on London Road.

4.4.2 A new station was also modelled at Park Barn. This attracted a very low usage (41); this could be due to a number of factors. Park Barn already has a fairly good bus service. Also, although the Station would serve the Royal Surrey County Hospital and the Business Park, the lack of a through train service between residential areas to the east of Guildford and Park Barn would make usage of rail relatively unattractive.

4.4.3 Airtrack was difficult to model satisfactorily, as Heathrow was not a distinct zone in the network, so the benefits of Airtrack in providing a direct link could not be modelled.

4.4.4 The “do-minimum” bus lanes as set out in 3.6 were modelled as producing bus journey time reductions of 20 seconds. This improvement was not sufficient to cause a significant change in Modal Split.

4.5 “Soft” Measures

4.5.1 Soft Measures are, generally speaking, a term to describe measures to persuade drivers not to use their cars. These include;

- the reduction of “school run” traffic by the provision of school buses or the encouragement of walking (“walking bus”) or cycling
- the setting up of Company Transport Plans that aim to limit the use of car travel to work
- the encouragement of the use of computer technology to enable more home working.
- The encouragement of cycling by installing measures such as cycle paths, cycle routes and cycle parking facilities

To take account of all these measures, the matrix output from the model, including the effects of congestion, increased Parking Charges and Park & Ride were factored by 0.97, a reduction of 3%.

4.5.2 This figure was derived from the Dft report ‘Smarter Choices – Changing the way we travel’. Note that the whole matrix was factored by 0.97, to acknowledge that Surrey CC are actively looking to introduce traffic reducing measures in all parts of the County. These blanket trip reductions therefore applied equally to Guildford and Woking

4.6 Measures not modelled

4.6.1 Road improvements

a) In addition to the do-minimum changes to the road network (3.6) a number of road improvement schemes had been included in earlier model runs;

- | | | |
|----|-------------------------------------------------------------|--------------------|
| a) | A320 Brookhouse RA to St Peters RA | Road widening |
| b) | A320 South of Woking (Hermon Rd – One-way system) | Dualling |
| c) | A320 Victoria Arch | Widen to two lanes |
| d) | A320 North of Guildford (Salt Box Rd- Burdenshott Rd) | Widening |
| e) | “Guildford Northern Relief Road” (Merrist Wood – Clay Lane) | Widening |
| f) | Monument Rd - Albert Drive | New Link |

- b) Schemes a-d are of short length and do not improve the operation of any junction, so they will not significantly increase the capacity of the system. The Monument Rd-Albert Drive link will reduce congestion at the junctions at the south end of Monument Rd; and the improvement to the “Guildford Northern Relief Road” will widen the road for a length of about 3 km. These two schemes will therefore increase the capacity of the system.
- c) The output from the CUBE model indicated that the road schemes would increase the size of the car trip matrix by 230 vehicles in the peak hour, an increase of 0.5%. However these schemes were **not** included in the tests described in this note.

4.6.2 There may be some scope for improving **Public Transport**, for instance by rationalising bus services. It is recommended that this is considered.

4.6.3 Charging for **Private non-residential parking** was considered, but was deemed not to be practical, even for users of Business Parks.

4.7 Effects of Traffic Restraint Measures

4.7.1 Tables 4.1 to 4.3 below set out the effects of applying traffic restraint measures on car generations and attractions for Guildford, Woking and the Rest of Surrey. The sector definitions used for this report are shown in Map 1 below.

Map 1 Study Sectors

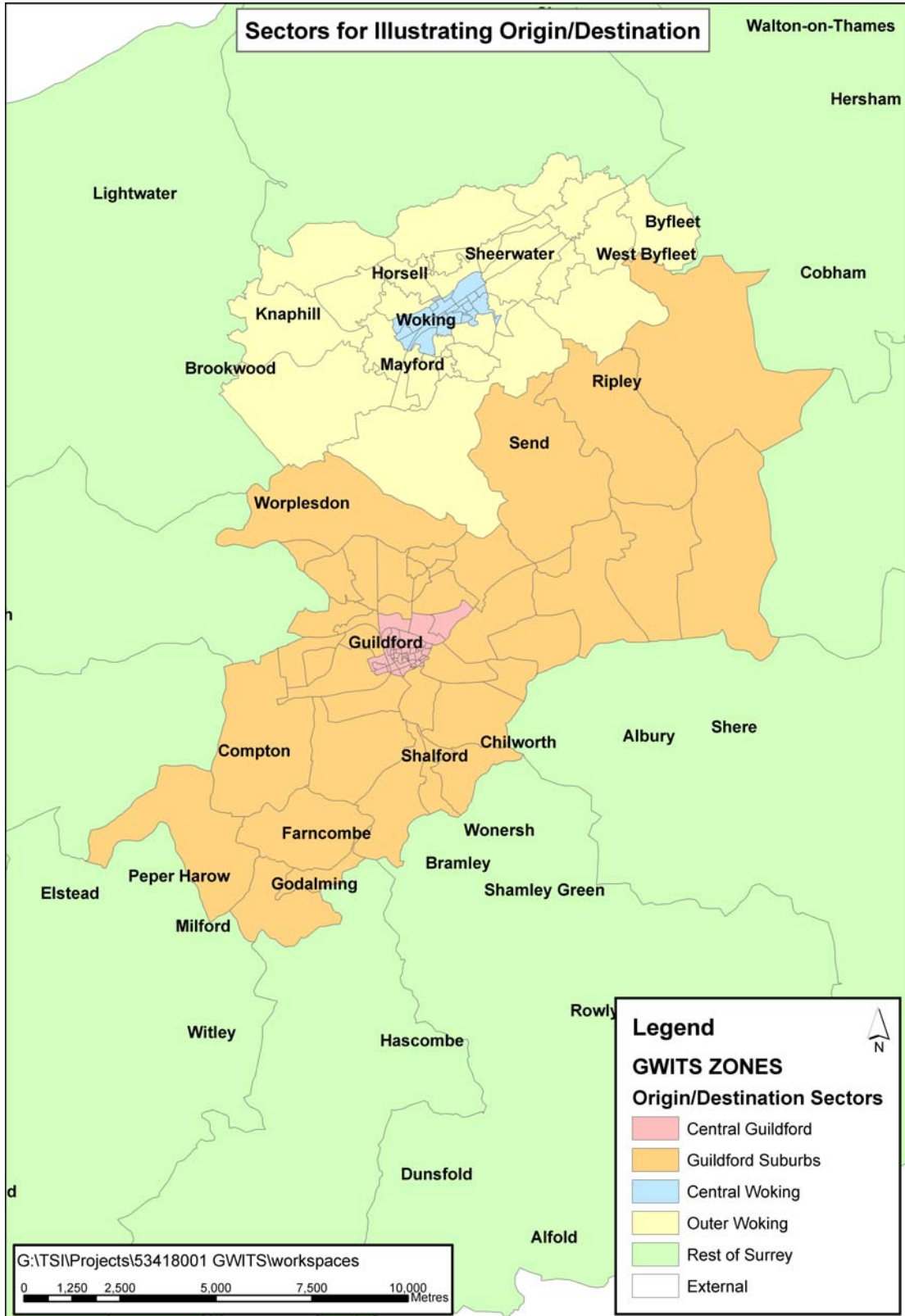


Table 4.1 Growth in Car trip origin/destinations, Guildford

Car trips		2003	2011			2016		
		Base	Restrained Trips	Effect of restraint	Change from 2003	Restrained Trips	Effect of Restraint	Change from 2003
starting in	Central Guildford	2,776	2,963	-2.0%	6.7%	3,149	-3.9%	13.4%
	Rest of Guildford	12,814	13,345	-1.9%	4.1%	14,124	-4.1%	10.2%
ending in	Central Guildford	4,814	4,924	-4.9%	2.3%	5,011	-10.6%	4.1%
	Rest of Guildford	12,409	13,013	-0.6%	4.9%	14,022	-1.2%	13.0%

Table 4.2 Growth in Car trip origin/destinations, Woking

Car trips		2003	2011			2016		
		Base	Restrained Trips	Effect of restraint	Change from 2003	Restrained Trips	Effect of Restraint	Change from 2003
starting in	Central Woking	3,195	3,403	-1.5%	6.6%	3,773	-2.9%	18.2%
	Outer Woking	6,366	6,467	-2.2%	1.7%	6,924	-4.5%	8.8%
ending in	Central Woking	3,780	3,802	-5.5%	0.7%	4,038	-10.5%	6.9%
	Outer Woking	6,082	6,343	0.2%	5.4%	6,820	0.1%	12.1%

Table 4.3 Growth in Car trip origin/destinations, External

Car trips		2003	2011			2016		
		Base	Restrained Trips	Effect of restraint	Change from 2003	Restrained Trips	Effect of Restraint	Change from 2003
starting in	External areas	18,551	18,651	-1.5%	0.5%	18,939	-3.0%	2.1%
ending in	External Areas	16,671	16,747	-1.5%	0.5%	17,018	-2.9%	2.1%

4.7.2 The effects of the restraint measures are most marked in trips terminating in the centres of Guildford and Woking, with reductions of over 10% in 2016. Trips terminating in the outer areas of Guildford and Woking are largely unchanged; this is because the reduction due to “soft measures” is offset by trips diverted from destinations in the town centres to Park & Ride sites. Trips starting in Guildford and Woking fall by slightly more than the 3% modelled for “soft measures”.

5 ANALYSIS OF SCENARIOS

5.1 Cordon Flows

5.1.1 To illustrate the effects of each scenario on traffic flows, Tables 5.1-5.3 overleaf set out the forecast traffic flows crossing cordons into Guildford and Woking town centres, and on the A3. These include all traffic, including Goods Vehicles. The locations of the cordons are illustrated in Figure 1.

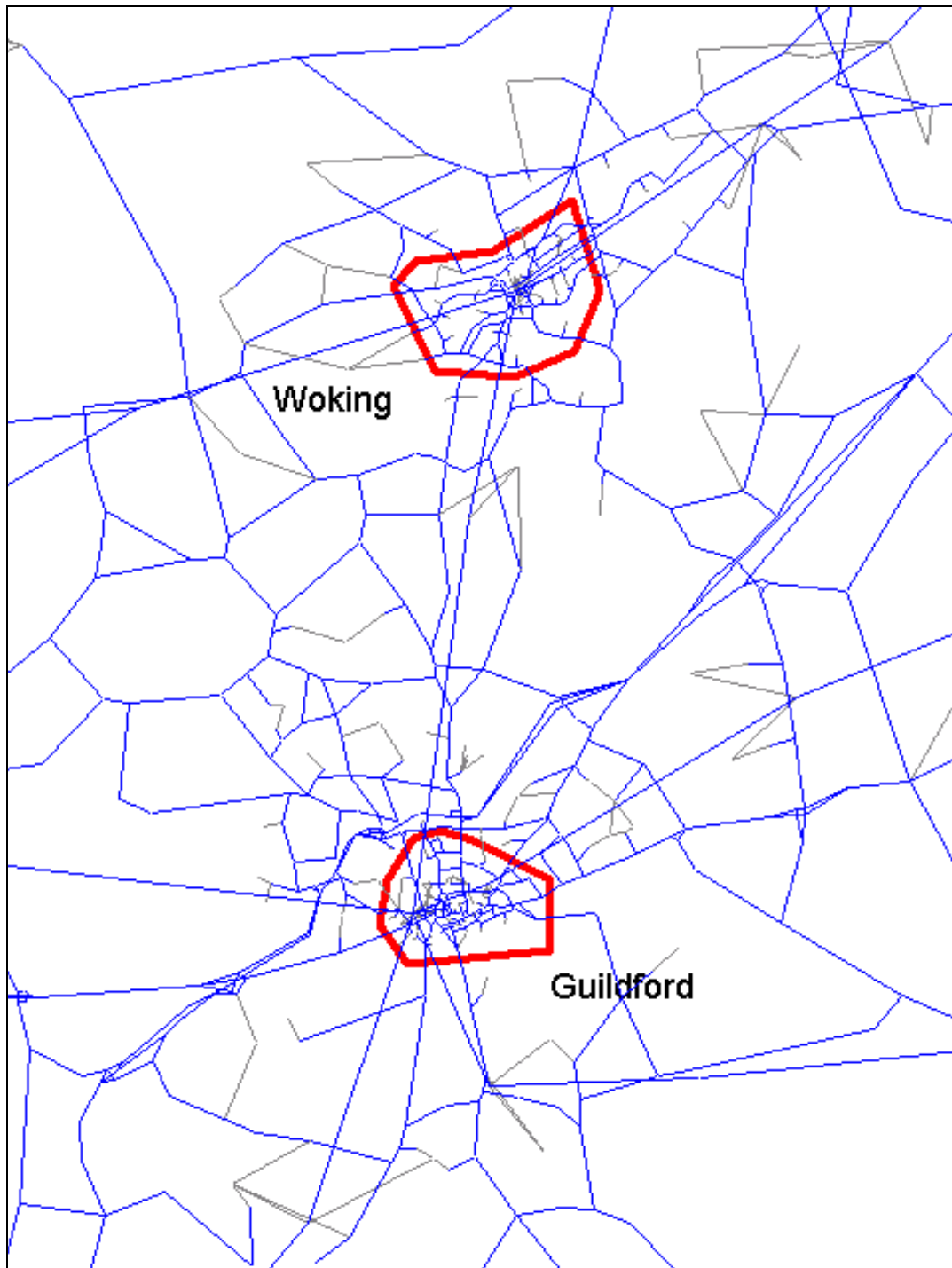


Figure 1 Woking & Guildford Cordons

Table 5.1 Inbound cordon crossing flows - Guildford

Inbound	2003 Base	2011 No Development		2011 Committed Development				2016 Full Development			
		No restraint		No restraint		With restraint		No restraint		With restraint	
Guildford		No restraint		No restraint		With restraint		No restraint		With restraint	
Shalford Rd A281	1,207	1,213	1%	1,212	0%	1,178	-2%	1,225	1%	1,155	-4%
Portsmouth Rd A3100	824	806	-2%	801	-3%	776	-6%	835	1%	795	-3%
Farnham Rd A31	920	909	-1%	900	-2%	886	-4%	905	-2%	887	-4%
The Chase	558	593	6%	624	12%	603	8%	655	18%	649	16%
University Access Road	77	92	19%	86	11%	91	17%	102	31%	94	21%
Walnut Tree Close	327	330	1%	336	3%	299	-8%	351	8%	312	-5%
Woodbridge Rd A322	1,443	1,189	-18%	1,223	-15%	1,217	-16%	1,271	-12%	1,182	-18%
Stoke Rd A320	1,346	1,511	12%	1,515	13%	1,464	9%	1,592	18%	1,557	16%
London Rd A3100	431	442	3%	426	-1%	422	-2%	550	27%	436	1%
Epsom Rd A246	729	678	-7%	687	-6%	643	-12%	710	-3%	646	-11%
Warren Rd	437	443	1%	443	1%	437	0%	455	4%	438	0%
Total	8,298	8,206	-1.1%	8,253	-0.5%	8,014	-3.4%	8,650	4.2%	8,151	-1.8%

Table 5.2 Outbound cordon crossing flows - Guildford

Outbound	2003 Base	2011 No Development		2011 Committed Development				2016 Full Development			
		No restraint		No restraint		With restraint		No restraint		With restraint	
Guildford		No restraint		No restraint		With restraint		No restraint		With restraint	
Shalford Rd A281 ¹	1,148	883	-23%	897	-22%	906	-21%	837	-27%	878	-24%
Portsmouth Rd A3100	481	547	14%	545	13%	544	13%	556	16%	584	21%
Farnham Rd A31	663	622	-6%	626	-6%	620	-7%	645	-3%	655	-1%
The Chase	336	346	3%	349	4%	345	3%	367	9%	358	7%
University Access Road	168	216	29%	221	32%	217	29%	226	35%	223	33%
Walnut Tree Close	368	407	11%	408	11%	408	11%	419	14%	415	13%
Woodbridge Rd A322 ¹	837	756	-10%	745	-11%	742	-11%	801	-4%	783	-7%
Stoke Rd A320	821	845	3%	901	10%	889	8%	924	13%	893	9%
London Rd A3100	90	568	-4%	584	-1%	569	-3%	687	17%	634	8%
Epsom Rd A246	644	632	-2%	641	-1%	633	-2%	685	6%	668	4%
Warren Rd	109	112	3%	121	11%	120	11%	139	28%	129	19%
Total	6,163	5,934	-3.7%	6,037	-2.0%	5,992	-2.8%	6,287	2.0%	6,221	0.9%

¹ The reductions in Woodbridge Road and Shalford Road are due to the introduction of the Woodbridge Road Bus Lane (do-minimum), see 3.6.

Table 5.3 Inbound cordon crossing flows - Woking

Inbound	2003 Base	2011 No Development		2011 Committed Development				2016 Full Development			
		No restraint		No restraint		With restraint		No restraint		With restraint	
Old Woking (High St)	569	583	2%	565	-1%	565	-1%	602	6%	581	2%
Egley Rd	1,010	1,025	2%	1,046	4%	987	-2%	1,205	19%	1,084	7%
Wych Hill	147	153	4%	153	4%	151	3%	166	13%	163	11%
College Lane	52	52	0%	51	-1%	48	-7%	48	-7%	39	-24%
Lockfield Drive	857	902	5%	917	7%	878	2%	973	14%	917	7%
Marston Rd	182	175	-4%	173	-5%	169	-7%	198	9%	190	4%
Brewery Rd	317	328	3%	320	1%	324	2%	365	15%	337	6%
Chobham Rd	560	557	0%	588	5%	542	-3%	674	20%	617	10%
Chertsey Rd	1,085	1,072	-1%	1,078	-1%	1,039	-4%	1,134	5%	1,052	-3%
Maybury Rd	412	414	0%	438	7%	416	1%	487	18%	480	17%
Oriental Rd	295	279	-6%	274	-7%	271	-8%	291	-2%	271	-8%
Pembroke Rd	225	239	6%	239	6%	210	-7%	254	13%	214	-5%
Rose Lane	208	208	0%	213	2%	209	0%	230	10%	214	3%
Total	5,919	5,985	1.1%	6,057	2.3%	5,809	-1.9%	6,626	11.9%	6,158	4.0%

Table 5.4 Outbound cordon crossing flows - Woking

Outbound	2003 Base	2011 No Development		2011 Committed Development				2016 Full Development			
		No restraint		No restraint		With restraint		No restraint		With restraint	
Old Woking (High St)	491	500	2%	504	3%	499	2%	578	18%	554	13%
Egley Rd	932	913	-2%	935	0%	920	-1%	1,046	12%	1,030	10%
Wych Hill	78	82	5%	83	6%	82	4%	83	6%	84	7%
College Lane	13	14	5%	14	7%	14	5%	16	23%	16	19%
Lockfield Drive	547	574	5%	591	8%	586	7%	648	18%	633	16%
Marston Rd	219	197	-10%	199	-9%	193	-12%	205	-6%	198	-10%
Brewery Rd	180	190	6%	192	7%	184	3%	238	32%	229	27%
Chobham Rd	475	447	-6%	471	-1%	472	0%	571	20%	538	13%
Chertsey Rd	1,030	1,038	1%	1,062	3%	1,052	2%	1,096	6%	1,106	7%
Walton Rd	791	762	-4%	785	-1%	762	-4%	812	3%	806	2%
Oriental Rd	399	409	2%	414	4%	410	3%	438	10%	428	7%
Pembroke Rd	119	123	3%	131	10%	137	15%	103	-14%	133	11%
Rose Lane	225	259	15%	283	26%	268	19%	375	66%	339	51%
Total	5,501	5,508	0.1%	5,664	3.0%	5,582	1.5%	6,210	12.9%	6,093	10.8%

Table 5.5 Flows on the A3

	2003 Base	2011 No Development		2011 Committed Development				2016 Full Development			
		No restraint		No restraint		With restraint		No restraint		With restraint	
A3 Northbound											
A3 south of A31	3,220	3,348	4%	3,355	4%	3,317	3%	3,504	9%	3,405	6%
A3 between A31 and Cathedral	4,986	5,148	3%	5,156	3%	5,099	2%	5,340	7%	5,205	4%
A3 between Cathedral and Dennis R/B	4,856	4,993	3%	5,015	3%	4,968	2%	5,185	7%	5,073	4%
A3 between Dennis R/B and A320	3,551	3,634	2%	3,649	3%	3,610	2%	3,674	3%	3,606	2%
A3 south of Burpham	4,345	4,475	3%	4,521	4%	4,470	3%	4,697	8%	4,602	6%
A3 north of Burpham	5,391	5,515	2%	5,593	4%	5,530	3%	5,832	8%	5,693	6%
TOTAL	26,348	27,114	2.9%	27,289	3.6%	26,994	2.4%	28,231	7.1%	27,583	4.7%
A3 Southbound											
A3 north of Burpham	5,192	5,388	4%	5,412	4%	5,334	3%	5,628	8%	5,469	5%
A3 south of Burpham	4,524	4,702	4%	4,737	5%	4,676	3%	4,870	8%	4,781	6%
A3 between A320 and Dennis R/B	3,365	3,536	5%	3,601	7%	3,545	5%	3,734	11%	3,609	7%
A3 between Dennis R/B and Cathedral	4,398	4,587	4%	4,646	6%	4,596	5%	4,792	9%	4,667	6%
A3 between Cathedral and A31	3,680	3,861	5%	3,914	6%	3,861	5%	4,062	10%	3,946	7%
A3 south of A31	2,376	2,578	8%	2,626	10%	2,582	9%	2,795	18%	2,682	13%
TOTAL	23,535	24,653	4.7%	24,936	6.0%	24,593	4.5%	25,882	10.0%	25,154	6.9%

5.1.2 It can be seen that the volume of traffic entering and leaving Woking for each scenario is roughly in line with the growth in overall trip generations (set out in 4.8). For Guildford, however, the increases are much less. The differences must be due to through traffic; for Woking there are few diversion routes, so most traffic must continue to travel through the town centre. For Guildford, however, there are a number of ways to avoid the centre; for example Salt Box Lane to the north or via Chilworth/Albury to the south; traffic on these roads has increased significantly. So if congestion in central Guildford is perceived as excessive traffic will transfer to routes avoiding the centre.

5.1.3 Traffic on the A3 has increased generally in line with the scenario traffic totals.

5.2 Vehicle Kilometrage

5.2.1 The Vehicle kilometrage data represents the total distance travelled by all vehicles within and between each sector. It is an indirect measure of congestion, but a good indicator of the quantity of area wide traffic on a network, as noted by the LTP (paragraph 2.35). The kilometrage forecasts are presented below, aggregated as the sum total of vehicle distance travelled in kilometres for all vehicular journeys in and between sectors, and also as the percentage difference in the forecast scenarios referred to the base.

Table 5.5 Vehicle kilometrage 2003 Base

2003 Base					
Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	1,523	5,974	294	6,116	14,697
Outer Woking	6,476	22,890	3,829	14,985	36,596
Central Guildford	744	3,048	404	9,338	33,034
Outer Guildford	5,276	11,133	16,706	88,854	146,546
Rest of Surrey	25,015	38,872	5,4478	135,137	114,613

Tables 5.6 Percentage change on 2003 base

2011 Zero Development					
Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	4%	4%	6%	2%	2%
Outer Woking	3%	3%	1%	1%	1%
Central Guildford	10%	8%	7%	3%	3%
Outer Guildford	4%	4%	10%	2%	2%
Rest of Surrey	4%	5%	0%	5%	2%

Committed development – 2011 with No Restraint Measures					
Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	10%	10%	13%	9%	7%
Outer Woking	6%	4%	6%	5%	4%
Central Guildford	13%	14%	8%	5%	5%
Outer Guildford	8%	5%	12%	4%	4%
Rest of Surrey	4%	4%	-1%	5%	2%

Committed development – 2011 with All Restraint Measures

Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	7%	8%	11%	7%	5%
Outer Woking	-2%	3%	-6%	5%	3%
Central Guildford	11%	12%	2%	4%	4%
Outer Guildford	-4%	6%	7%	3%	3%
Rest of Surrey	-2%	5%	-6%	5%	1%

Committed development – 2016 with No Restraint Measures

Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	14%	20%	22%	17%	13%
Outer Woking	9%	8%	9%	9%	7%
Central Guildford	19%	18%	15%	12%	9%
Outer Guildford	11%	8%	17%	8%	8%
Rest of Surrey	8%	8%	4%	10%	7%

Committed development – 2016 with All Restraint Measures

Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	10%	18%	19%	12%	10%
Outer Woking	-7%	6%	-15%	9%	5%
Central Guildford	14%	15%	0%	8%	6%
Outer Guildford	-12%	9%	6%	6%	5%
Rest of Surrey	-3%	10%	-8%	10%	4%

Full development – 2016 with No Restraint Measures

Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	26%	25%	29%	30%	18%
Outer Woking	24%	14%	19%	17%	11%
Central Guildford	18%	29%	22%	20%	11%
Outer Guildford	47%	15%	22%	11%	10%
Rest of Surrey	5%	7%	5%	11%	5%

Full development – 2016 with All Restraint Measures

Veh-Km	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	21%	21%	25%	25%	15%
Outer Woking	7%	12%	-4%	18%	8%
Central Guildford	12%	23%	7%	15%	8%
Outer Guildford	21%	16%	10%	9%	7%
Rest of Surrey	-6%	9%	-7%	11%	2%

5.3 Congestion Delay

5.3.1 Congestion Delay is defined as the difference in journey times for a given trip under uncongested (free flow) conditions and the normal travel time for the scenario in question. It is a direct measure of congestion, as noted by the LTP (paragraph 2.35). These delays are presented below, aggregated as a trip weighted average of the travel delays **in minutes** for vehicular journeys over all pairs of zones in the sector, and also as the percentage difference in the forecast scenarios referred to the base.

Table 5.7 Average vehicle delay (minutes)

2003 Base

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	1.77	2.87	6.36	5.46	4.94
Outer Woking	2.31	2.82	5.14	4.51	4.66
Central Guildford	6.64	5.88	2.06	3.56	5.59
Outer Guildford	5.21	4.76	4.11	3.39	4.79
Rest of Surrey	5.00	5.14	5.85	4.73	4.51

Tables 5.8 Percentage change on 2003 base delay

2011 Zero Development

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	14%	7%	6%	5%	6%
Outer Woking	4%	6%	11%	7%	5%
Central Guildford	14%	17%	25%	20%	15%
Outer Guildford	6%	8%	17%	12%	9%
Rest of Surrey	5%	8%	12%	9%	7%

Committed development – 2011 with No Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	20%	10%	-4%	8%	10%
Outer Woking	12%	7%	17%	10%	8%
Central Guildford	19%	22%	28%	26%	20%
Outer Guildford	10%	10%	20%	17%	14%
Rest of Surrey	6%	9%	13%	10%	9%

Committed development – 2011 with All Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	13%	8%	6%	6%	7%
Outer Woking	2%	4%	10%	5%	5%
Central Guildford	13%	15%	26%	24%	18%
Outer Guildford	6%	2%	16%	13%	11%
Rest of Surrey	3%	4%	9%	7%	5%

Committed development – 2016 with No Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	21%	15%	24%	11%	16%
Outer Woking	12%	14%	29%	17%	15%
Central Guildford	21%	28%	45%	38%	31%
Outer Guildford	15%	19%	32%	25%	23%
Rest of Surrey	13%	17%	24%	19%	19%

Committed development – 2016 with All Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	20%	9%	8%	9%	10%
Outer Woking	2%	7%	13%	6%	9%
Central Guildford	18%	21%	38%	29%	24%
Outer Guildford	10%	1%	18%	17%	15%
Rest of Surrey	7%	6%	13%	11%	11%

Full development – 2016 with No Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	44%	27%	29%	16%	23%
Outer Woking	23%	27%	33%	22%	20%
Central Guildford	35%	44%	51%	47%	40%
Outer Guildford	31%	31%	39%	34%	32%
Rest of Surrey	17%	24%	27%	22%	20%

Full development – 2016 with All Restraint Measures

Delay (minutes)	Central Woking	Outer Woking	Central Guildford	Outer Guildford	Rest of Surrey
Central Woking	39%	22%	23%	9%	18%
Outer Woking	15%	20%	24%	12%	15%
Central Guildford	27%	36%	40%	37%	29%
Outer Guildford	28%	14%	25%	24%	22%
Rest of Surrey	11%	13%	17%	13%	12%

5.4 Journey Times

Journey times (minutes) for a small selection of routes under each scenario are set out below. These give a feel for the representation of the model's road network.

Table 5.9 Sample Journey Times

Development scenario -->	Free Flow Time	2003 base	2011 Zero	2011 Committed – No restraint	2011 Committed – With restraint	2016 Full with Restraint
Guildford; Portsmouth Rd-Slyfield (80006- 80170)		9.18	11.31	10.76	11.02	12.77
Woking; Old Hill Estate-Ferndale Rd (122-113)		10.33	10.31	10.04	9.87	11.57
A3 northbound; A31 – Clay Lane (74846- 91092)		7.75	7.89	7.92	7.87	7.95

6 SUMMARY OF RESULTS

6.1 Model Forecasts

6.1.1 For comparison purposes, all statistics relating to the model forecasts are compared with those of the GWITS base year, 2003, which was the year for which the GWITS model was validated.

Peak Hour Traffic

6.1.2 The growth in peak hour traffic (vehicles) emanating from Guildford and Woking is shown in the table below. For the committed development scenario in 2011, total peak hour traffic emanating from Central Guildford and Central Woking increased by 9% and 8% respectively. The effect of traffic restraint was to restrain this growth to 7%.

6.1.3 For the full development scenario in 2016, total peak hour traffic emanating from Guildford and Woking increased by 18% and 23% respectively. The effect of traffic restraint was to restrain this growth to 13% and 19% respectively.

6.1.4 However this growth is not evenly spread and is lower in Outer Guildford and Outer Woking. As a result the impact of this growth on the cordon crossing traffic is much less, but its effects on vehicle delays become significant.

Table 6.1 Peak hour Traffic

Guildford & Woking	Peak Hour Traffic emanating from Central Guildford and Woking Growth in percent				
	No Development	Committed Development		Full Development	
Year		No Restraint	Traffic Restraint	No Restraint	Traffic Restraint
2003 Guildford	2776				
2003 Woking	2989				
2011 Guildford	6%	9%	7%		
2011 Woking	3%	8%	7%		
2016 Guildford	7.5%	12%	7%	18%	13%
2016 Woking	4%	15%	11%	23%	19%

Cordon Crossing traffic flows

- 6.1.5 An analysis of Cordon Crossing traffic provides us with an indication of the overall inbound and outbound flows to and from the GWITS boroughs. We would expect an increase of congestion within a borough to suppress inbound flows and encourage outbound flows while an increase in commercial and retail development would increase inbound peak hour flows, while an increase in residential development will tend to increase outbound flows. The results are shown in the table below. The flows include all traffic, including Goods Vehicles.
- 6.1.6 For the committed development scenario in 2011, the total inbound (outbound) traffic crossing the Guildford Cordon reduces by 1% (2%) before restraint and by 3% (3%) after restraint. For Woking there is an increase of 2% (3%) before restraint and a reduction of 2% (an increase of 2%) after restraint.
- 6.1.7 For the full development scenario in 2016 together with traffic restraint measures, the total inbound (outbound) cordon crossing traffic has decreased by 2% (increased by 1%) for Guildford and increased by 4% (11%) for Woking.

Table 6.2 Cordon Crossing Flows

Guildford & Woking	Cordon Crossing Flows into Guildford and Woking <i>Cordon Crossing Flows out of Guildford and Woking</i>				
	No Development	Committed Development		Full Development	
Year		No Restraint	Traffic Restraint	No Restraint	Traffic Restraint
2003 Guildford	8298 <i>6163</i>				
2003 Woking	5919 <i>5501</i>				
2011 Guildford	-1% <i>-4%</i>	-1% <i>-2%</i>	-3% <i>-3%</i>		
2011 Woking	1% <i>0%</i>	2% <i>3%</i>	-2% <i>2%</i>		
2016 Guildford	0 <i>-1%</i>	3 <i>1%</i>	-3% <i>0%</i>	4% <i>1.4%</i>	-2% <i>1%</i>
2016 Woking	2% <i>4%</i>	5.5% <i>8%</i>	-1.5% <i>7%</i>	12% <i>13%</i>	4% <i>11%</i>

Vehicle Kilometrage

- 6.1.8 The Vehicle kilometrage data represents the total distance travelled by all vehicles within and between each sector. It is only an indirect measure of congestion, but is a good indicator of the quantity of area wide traffic on a network, as noted by the LTP (Paragraph 2.35). These data have been calculated as the product of the distance travelled by each vehicle times the number of vehicles undertaking this journey, for each start and end zone in the study area. They are shown in the table below and indicate the incidence of the overall traffic growth in the Guildford and Woking regions.
- 6.1.9 For the 2011 Committed development scenario without restraint, traffic grew by 8% within Central Guildford and 10% within Central Woking. This growth is reduced by restraint to 1% (Guildford) and 7% (Woking). The corresponding figures for Outer Guildford and Outer Woking (not shown) are 4% for each borough before restraint and 3% for each borough after restraint.
- 6.1.10 For the 2016 Full development scenario without restraint, traffic grew by 22% within Central Guildford (26% within Central Woking). After restraint growth reduced to 7% (Guildford) and 21% (Woking) in the town centres. Growth was 11% within Outer Guildford and 14% within Outer Woking before restraint and 8% and 12% respectively after restraint (not shown).

Table 6.3 Vehicle Kilometrage

Guildford & Woking	Vehicle Kilometrage, within Central Guildford and within Central Woking				
	No Development	Committed Development		Full Development	
Year		No Restraint	Traffic Restraint	No Restraint	Traffic Restraint
2003 Guildford	744				
2003 Woking	1523				
2011 Guildford	6%	8%	1%		
2011 Woking	5%	10%	7%		
2016 Guildford	8%	15%	10%	22%	7%
2016 Woking	3%	14%	0%	26%	21%

Vehicle Delay

6.1.11 The effect of the traffic growth on congestion is best indicated by vehicular delay due to congestion. Vehicle Delay is defined as the difference in journey times for a given trip under normal travel (congested) conditions and uncongested (free flow) conditions for the scenario in question. It is a direct measure of congestion, as noted by the LTP (Paragraph 2.35). These forecasts are calculated over all trips in and between the same regions used for vehicle kilometrage and are shown the table below.

6.1.12 For the committed development in 2011 without restraint, traffic delays within Guildford and Woking would rise by 28% and 20% over their 2003 values respectively. The effect of applying traffic restraint measures is to reduce these to 26% and 13% respectively.

6.1.13 For the full development scenario in 2016, the effect of traffic growth on congestion is to increase delays by 44% and 51% for Guildford and Woking respectively. The effect of applying traffic restraint measures is to reduce these to 40% and 39% respectively.

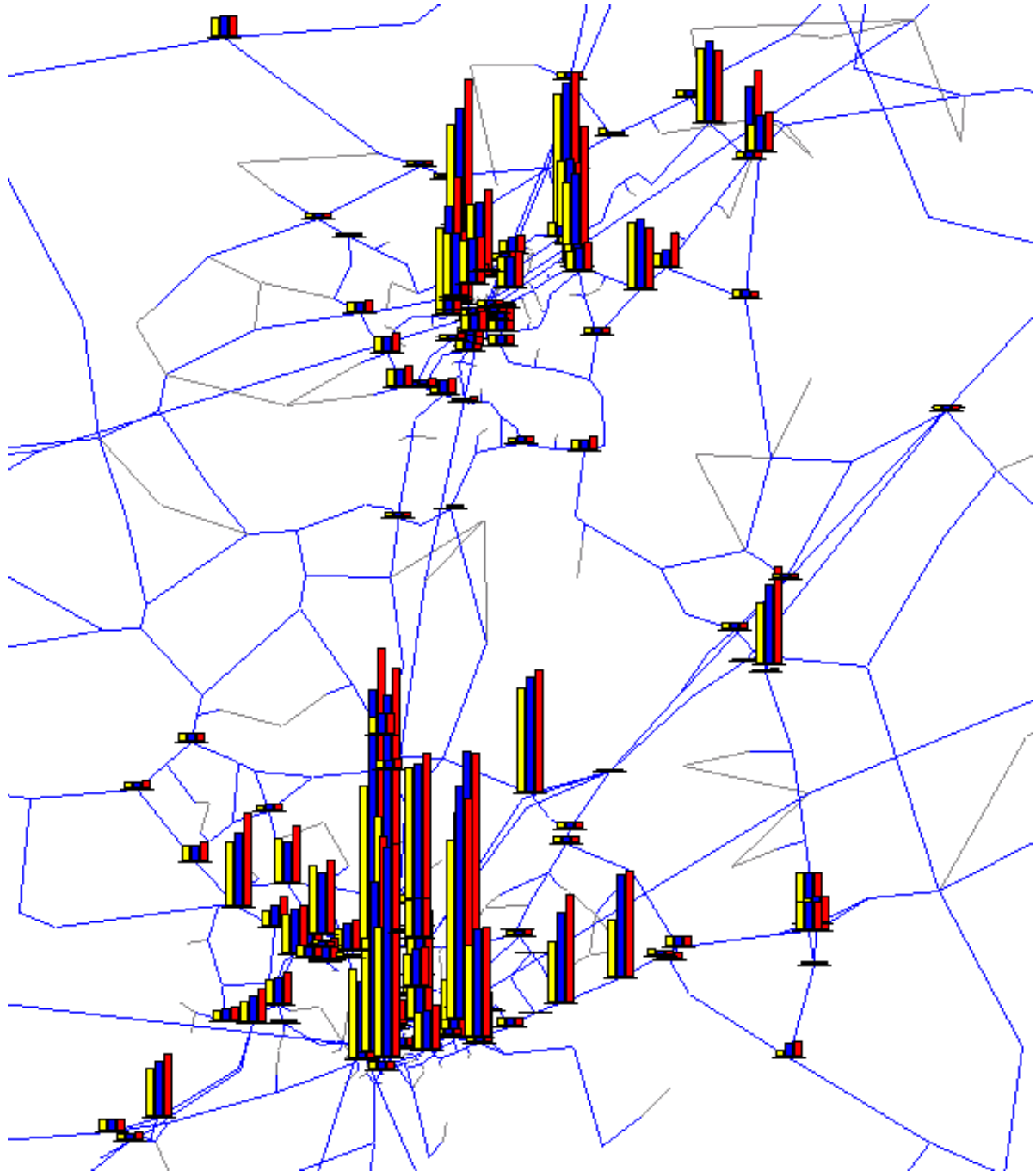
Table 6.4 Vehicle Delay

Guildford & Woking	Vehicular delay, Central Guildford and Central Woking (<i>free-flow time in italics</i>)				
	No Development	Committed Development		Full Development	
Year		No Restraint	Traffic Restraint	No Restraint	Traffic Restraint
2003 Guildford	2.1 minutes <i>3 minutes</i>				
2003 Woking	1.8 minutes <i>3.3 minutes</i>				
2011 Guildford	25%	28%	26%		
2011 Woking	14%	20%	13%		
2016 Guildford	32%	45%	38%	51%	40%
2016 Woking	14%	21%	20%	44%	39%

- 6.1.14 The substantial increase in delay for Central Guildford for 2011 appears to be due to the introduction of the proposed Woodbridge Road Bus lane scheme, which was introduced for the 2011 'No Development' scenario and which appears in all subsequent scenarios. This scenario shows a 25% increase in delay, although the corresponding vehicle kilometrage only rises by 6%.
- 6.1.15 With the exception of the bus lane, the main component of delay in urban areas arises from junction delay. The location and comparative severity of junction delays forecast for the 2016 full development scenario with traffic restraint are illustrated in Figure 2 below.

Figure 2 - Junction delays, Woking & Guildford area

Yellow 2003 Base
Blue 2011 Committed Development with restraint
Red 2016 Full Development with restraint



6.2 Effect of Growth in Households on traffic

The effect of the growth in households in the Woking and Guildford Boroughs in terms of trips, cordon crossings, vehicle kilometrage and vehicle delay is summarized in the table below. The housing development scenarios apply **only** to Guildford and Woking. For the Rest of Surrey and other external zones the growth in trips as forecast by the Government programme TEMPRO has been used.

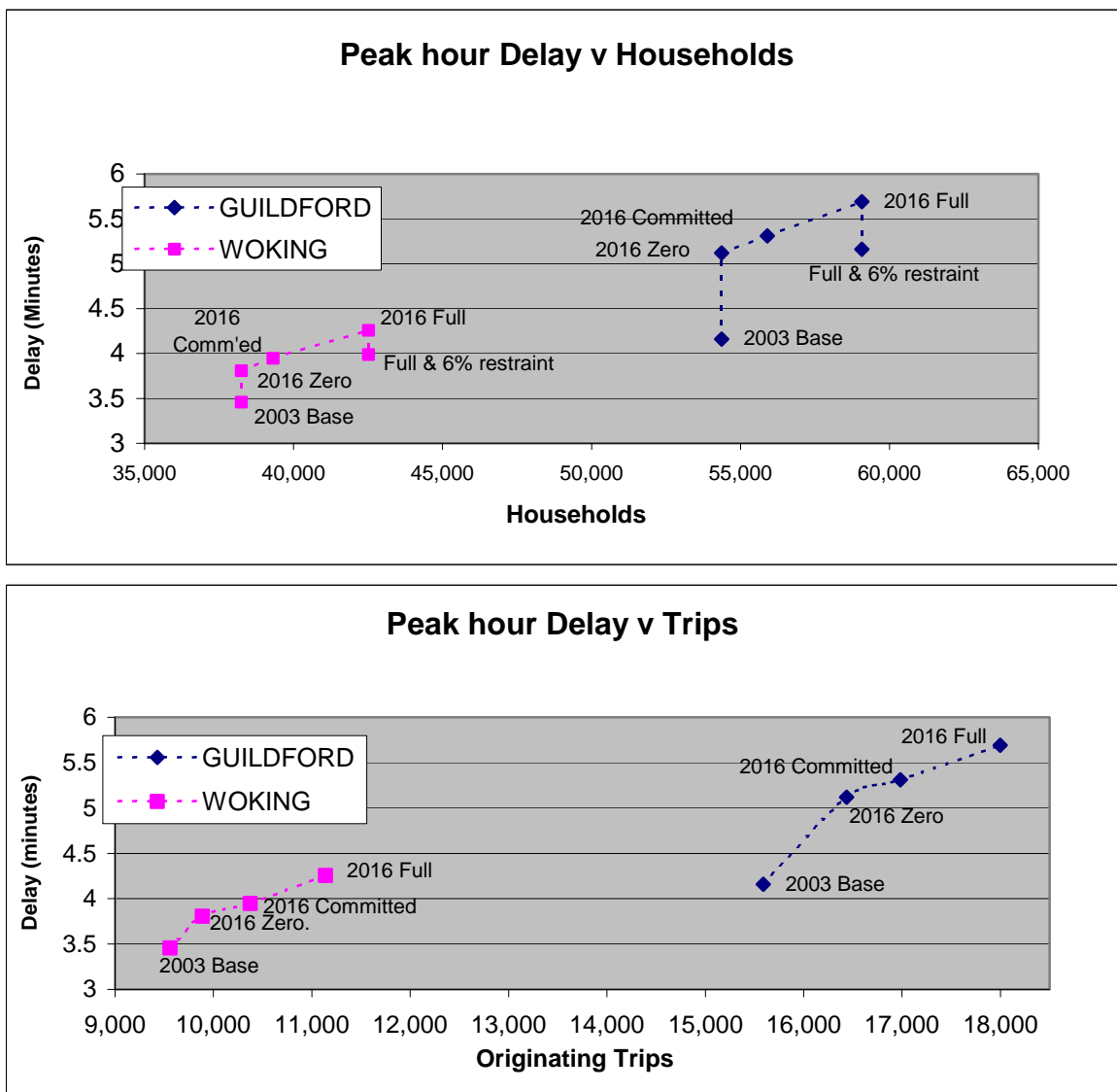
Table 6.4 Traffic Growth v. Household growth

Guildford & Woking	Growth in traffic (unrestrained)				
	Households in Borough	Peak hour trips generated in Borough	Cordon Flows Inbound <i>Outbound</i>	Vehicle Kilometrage within Borough	Vehicle Delay for trips originating in Borough (minutes)
2003 Guildford	54,364	15,591	8,298 6,163	115,302	4.2
2003 Woking	38,245	9,560	5,919 5,501	36,863	3.4
2016 Committed Guildford	+3%	+9%	+3% +1%	+10%	+28%
2016 Committed Woking	+3%	+9%	+6% +8%	+10%	+15%
2016 Full Guildford	+9%	+15.5%	+4% +1.5%	+14%	+37%
2016 Full Woking	+11%	+16.5%	+12% +13%	+18%	+24%
2016 Full Guildford with restraint	+9%	+11%	-2% +1%	+9.5%	+26%
2016 Full Woking with restraint	+11%	+12%	+4% +11%	+13%	+18%

6.2.1 The full development scenario results in 9% growth in Households for Guildford and an 11% growth for Woking in 2016. Together with underlying growth this would likely result in a 16% increase in trips generated in the boroughs if no traffic restraint were applied and 12% after restraint. (The hard measures modelled in this scenario (Car Park charge increases, introduction of Park & Ride) relate mainly to traffic terminating in the town centres so have little additional effect on originating traffic).

6.2.2 The increase in trip making would result in an average increase of 37% and 24 % in delay without restraint and 26% and 18% after restraint for the trips originating from Guildford borough and Woking Borough respectively. (Note that these results relate to all trips generated within each borough, and not just to trips within the central borough areas.)

Figure 3 – Delay v Underlying factors



Low trip rates

6.2.3 Some of the additional development was in the nature of high-density flats. These were assigned low (Class 1) trip rates as described in Appendix 1. As a sensitivity test, comparison forecasts were performed using doubled trip rates for the Class 1 development. The results are shown below. It can be seen that the effects are very small, indicating the results are not unduly sensitive to the value of the Class 1 trip rates used. (The slight reduction in overall delay for trips emanating from Woking appears to be a trip suppression effect. Additional Congestion in Central Woking appears to reduce outbound trips from Woking slightly – see Table A5.3 in Appendix 5. The effect is very small.)

Table 6.5 Effect of using doubled trip rates for high density dwellings on traffic

Guildford & Woking	Growth in traffic (with traffic restraint inc 3% reduction for soft measures)				
	Households in Borough	Peak hour trips generated in Borough	Cordon Flows Inbound <i>Outbound</i>	Vehicle Kilometrage within Borough	Vehicle Delay for trips originating in Borough (minutes)
Low trip rates for town centre households					
2016 Full Guildford	+9%	+11%	-2% +1%	+9.5%	+26%
2016 Full Woking	+11%	+12%	+4% +11%	+13%	+18%
Doubled trip rates for town centre households					
2016 Full Guildford	+9%	+11.5%	-2% +2%	+10%	+27%
2016 Full Woking	+11%	+12.5%	+5.5% +11%	+14%	+17%

6.3 Implications for the Local Transportation Plan

6.3.1 Section 2 of the 2nd Surrey Local Transportation Plan (LTP) states that Objective 1 of the Plan is “Tackling Congestion to limit delays”. To this end it described (paragraph 2.35) three indicators that relate directly to congestion:

- **Vehicle delay** provides a direct measure of congestion in specific areas. The indicator is generally intended for large urban areas (population greater than 250000).

- **Peak hour traffic** flows into main urban centres provide an indirect indicator (proxy) of congestion.
 - **Area-wide traffic** measured as vehicle kilometres on all roads provides a further indirect indicator of the level of congestion. This was used in the first LTP.
- 6.3.2 These indicators have been produced by the GWITS model and have been summarised in the previous section to forecast the impacts of development and traffic restraint measures on congestion within Guildford and Woking.
- 6.3.3 The LTP goes on to state (paragraph 6.7) that “In each of the three towns (Woking, Guildford and Redhill/Reigate) our target is to ensure that by 2010 peak flows do not increase above the levels in the base year of 2005/6.”
- 6.3.4 The GWITS model provides some guide as to how successful Woking and Guildford can expect to be in meeting this target. To see this we shall examine the 2011 forecast results.
- 6.3.5 The total inbound peak hour cordon crossing traffic flows for Guildford and Woking have reduced from the 2003 base to the 2011 committed development (with restraint) scenario by 3% and 2% respectively. This represents 8 years of growth. Interpolating these results to represent the four years of growth from 2006 to 2010 stated in the LTP we could expect something in the order of half of this figure; that is around 1.5% and 1% respectively. The corresponding figures for the outbound flow are a reduction of 1% for Guildford and an increase of 1% for Woking.
- 6.3.6 Although there is some reduction in cordon flow, as a whole the internal town traffic has increased somewhat and there is a concomitant increase in traffic over 8 years of 2% in Guildford and 8% in Woking. Over the four years from 2006 to 2010 we would therefore expect growth to be 1% and 4% respectively.
- 6.3.7 Similarly, total traffic on the network, as measured by vehicle-kilometres, has increased by 1% for Guildford and 4% for Woking over the same four year period.
- 6.3.8 Examining the effect of traffic growth on vehicle delays, we see that the average vehicular delay has increased by 26% and 13% over 8 years for Guildford and Woking respectively. This is an increase of 13% and 6.5% over the four years of the LTP target period. The disproportionate increase in vehicle delay for Central Guildford appears to be mainly the result of the proposed Woodbridge Bus Lane scheme.
- 6.3.9 The conclusions from the sensitivity testing are that very stringent measures requiring sustained political will would need to be adopted if the traffic growth expected from residential development is to be curtailed.
- 6.3.10 The overall picture implies that if restraint is applied the boroughs are more or less on course to meet their stated target for 2010; after 2010 congestion is set to rise substantially.

APPENDIX 1 RESIDENTIAL TRIP GENERATION/ATTRACTION RATES

The TRICS (Trip Rate Computer Information System) data was used to forecast the numbers of car trips that will be generated by the housing. The possible residential sites have very varied characteristics and it would be impractical to consider each site separately. This Study has distinguished between two very generalised types of residential development, defined as below:

Class 1 In Town centres

Developments are assumed to consist of flats.

Public Transport provision is very good (close to Guildford or Woking Stations), many facilities/jobs accessible by walking

Table A1.3 sets out the list of zones considered to comprise Class 1 developments;

Class 2 Outside Town centres

Developments are assumed to consist of houses.

Public Transport provision is average or poor, facilities/jobs in general not accessible by walking

Class 1

Class 1 developments are likely to generate less car trips than Class 2 developments as they are within walking distance of stations, jobs and other amenities, and also they will tend to be of smaller household size. To estimate trip generation rates for Class 1, TRICS sites defined as **residential flats privately owned was used**. TRICS contains data for 13 sites of this type nationwide. Of these, three were selected as having characteristics (principally, very good public transport) similar to flats near to Guildford or Woking stations. The trip data for these are set out in Table A1.1 and the calculated trip rates in Table A1.2.

**Table A1.1 Residential flats privately owned
Observed arrivals/Departures, AM peak**

Location	Number of flats	Departures		Arrivals	
		Car	Public Transport	Car	Public Transport
Kew	144	18	5	8	0
Kingston	132	15	15	9	0
Leeds	127	15	4	6	0
Total	403	48	24	23	0

Source; TRICS database

**Table A1.2 Residential flats privately owned
Trip Rate/flat, AM peak**

	Departures		Arrivals	
	Car	Public Transport	Car	Public Transport
Kew	0.125	0.035	0.056	0
Kingston	0.114	0.114	0.068	0
Leeds	0.118	0.031	0.047	0
Average	0.119	0.060	0.057	0

Even though the sample size is very small, the consistency between the sites gives confidence in the accuracy of the results. Kingston has a rather higher use of Public Transport. The TRICS data commented that proximity to Public Transport was a major selling point for the Kingston properties.

The forecast 2016 generations and attractions by car by using the trip rates set out in Table A2 are presented in Table A1.3.

Table A1.3 Class 1 zones; forecast trips from new developments, AM pk hr 2016

Zone	Description	Proposed Dwellings	Car generations	Car attractions
25	Guildford Park Road / Agrarian Road	100	12	6
30	Guildford Train Station	500	60	29
31	Walnut Tree	48	6	3
35	Mary Road	40	5	2
37	Bridge Street	134	16	8
49	Guildhall	32	4	2
50	Commercial Road	170	20	10
52	Leapale Lane	70	8	4
54	Martyr Place	130	15	7
102	Heathside Car Park	17	2	1
107	Oriental Road / Main Station Car Park	115	14	7
111	The Peacocks Shopping Centre	17	2	1
112	Victoria Way Car Park	145	17	8
114	Brewery Road Car Park	17	2	1
130	Town Centre / Commercial Way / High St	94	11	5
131	Railway Station / Oriental Road Car Park	17	2	1
132	Railway Station / Station Approach Car Park	257	31	15
Total		1901	226	108

Class 2

To estimate trip rates for **Class 2** developments, TRICS data for privately owned housing, covering ALL data in all parts of the UK, were used. The following **peak hour vehicle trip rates per household** were determined;

AM peak hour	
Arrivals	Departures
0.16	0.47

Source; TRICS covering ALL data in all parts of the country, categorised as follows;
Residential, privately owned housing

Summary

Table A1.4 sets out a summary of the trips generated by each type of development.

Table A1.4 Summary of trips generated by Class, 2016 AM peak hour

	Number of Dwellings	Generated Trip Rate (cars/dwelling)	Generated Peak hour Car Trips
Class 1	1,901	0.119	226
Class 2	6,131	0.47	2,882

Total	8,031		3,108
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APPENDIX 2

ATTRACTION/GENERATION RATES FOR COMMERCIAL DEVELOPMENTS

Trip attractions are more difficult to deal with, as the amount of travel by car will depend on how much car parking is available either on site or nearby, as well as the availability of Public Transport. There is currently parking space in the AM peak in Car Parks in both Guildford and Woking (though they may fill up during the day). So availability of parking is not likely to be a major restriction, though of course the cost of parking will have an influence (as will the availability and convenience of Park & Ride). However, close proximity to good public transport will definitely attract workers who prefer to use Public Transport.

For some proposed commercial developments, Transport Impact Assessments or similar data was available and where available that data was used. For sites with no data availability, generation rates for vehicle traffic to Offices and Retail developments (AM, 0800-0900) were derived from TRICS. The average trip rates over **all** sites listed in TRICS were

1.96 arrivals, 0.25 departures per 100m² Office space
0.92 arrivals, 0.41 departures per 100m² Retail space

These rates were used for sites with poor or average Public Transport access.

For sites in zones with very **good Public Transport access** (Class 1 areas), a rate 50% lower for attractions was used.

APPENDIX 3 RESIDENTIAL DEVELOPMENT

The Boroughs of Guildford and Woking provided data for committed developments, as follows.

Table A3.1 Guildford committed residential development

Name	Description	Households
8201	Park Barn	75
8203	Stoughton	525
8215	Slyfield	33
8303	Stockton Road / Recreation Road	90
8501	Burpham	100
8502	Bushy Hill	20
8707	Walnut Tree	48
8907	Guildhall	32
8909	Guildford Bus Station	170
8912	Martyr Place	130
8917	Civic Hall	72
9101	Charlotteville	130
13001	Send	18
13101	West Clandon / Clandon Park	64
14002	Shalford	15
14003	Shalford Common / Chilworth	15
	Total	1537
	Proportion of Full development	33%

Table A3.2 Woking committed residential development

Name	Description	Households
20012	Pirbright / Camberly / Bagshot / Highwater / Windlesham	21
20110	The Birches / Heathside Road / heathside Crescent	48
20310	Bracken Close / Coley Avenue	92
21310	Chertsey Road / Ferndale Road / Wheatsheaf Close	61
22010	Mount Hermon	15
22110	Woking Community Hospital	96
22710	West Byfleet Golfcourse / Forest Road / Princess Rd	30
23110	Maybury Road / Walton Road / Board School Rd	86
23410	Railway Station / Station Approach Car Park	240
23510	Goldsworth Road / Vale Farm Road	40
23610	Kingsway Avenue / Poole Road / Butts Road	23
24310	Woking Park Pool / Constitution HI / Claremont Dr	15
25112	Knaphill / Hermitage Road (A324) / Robin Hood Road	254
25212	Woking Golf Course / Berry Lane (B380)	14
25309	Byfleet / Rectory Lane / Church Road	25
	Total	1060
	Proportion of Full development	32%

For the 'Full Development Scenario', the forecasts of Residential developments as provided by Guildford and Woking Boroughs for (1a scenario) are set out in Tables A3.3

and A3.4. These are based on the “Panel recommended allocations” of 3340 for Woking and 4700 for Guildford.

Table A3.3 Residential Developments, Guildford (Scenario 1a)

Potential Sites	GWITS Zone	Number of Dwellings
Boxgrove Lane	8502	20
Walnut Tree Close	8707	48
Onslow St (Friary)	8909	170
Warren Rd	9101	104
North St	8907	32
41 Epsom Rd	9101	26
High St/Epsom Rd	8917	72
Station Rd Shalford	14002	15
Red Cross House, Slyfield Green	8215	33
Queen Elizabeth Park (Barracks)	8203	525
Sub Total		1045
Outstanding Capacity, Centre		
Guildford Station	8706	500
Leapale Rd	8910	70
Bedford Rd	8805	134
Bright Hill	8923	70
Fire Station, Ladymead	8302	50
Allotments, Woodside Rd	8201	45
New Inn Lane	8501	100
Oak Tree Drive	8204	27
Martyr Rd	8912	130
Green Man, Burpham	8501	70
Cumberland Avenue	8203	80
Civic Hall	8917	155
Guildford Park (CP)	8701	100
Keens Lane Worplesdon	8102	35
Mary Rd	8803	40
University (Manor Park)	9004	300
Slyfield	8205	1500
Sub Total		3406
Outstanding Capacity, Outside		
Meadowlands West Clandon	13101	18
Westonfields, Albury	14003	15
Abbotsway, Barnwood Rd	8201	25
Barnwood School	8201	50
Sub Total		108
Completed		
Send	13001	64
SEEBboard, Stockton Close	8303	90
Sub Total		154
Overall total		4713
Panel Recommendation		4700

Table A3.4 Residential Developments, Woking (Scenario Do Minimum 1a)

Location	GWITS Zone	Number of Dwellings
Old Woking / Woking College	4523	197
Kingfield Green	4540	130
Pirbright/Camberly/Bagshot	20012	21
The Birches / Heathside Road / heathside Crescent	20110	66
Bracken Close / Coley Avenue	20310	92
Oriental Road / Main Station Car Park	20710	98
Maybury	20810	15
Chobham Rd/Church St East	21210	128
Chertsey Road / Ferndale Road / Wheatsheaf Close	21310	175
York Road / Bradfield Close	21910	0
Mount Hermon	22010	15
Woking Community Hospital	22110	96
West Byfleet Golfcourse / Forest Road / Princess Rd	22710	30
Maybury Road / Walton Road / Board School Rd	23110	192
Town Centre / Woking Station / Commercial Way / High St	23210	77
Railway Station / Oriental Road Car Park	23310	0
Railway Station / Station Approach Car Park	23410	240
Goldsworth Road / Vale Farm Road	23510	118
Kingsway Avenue / Poole Road / Butts Road	23610	23
Woking Park Pool / Constitution HI / Claremont Dr	24310	70
Woodham Lane (B385) / Scotland Bridge Road / Faris Lane	24610	53
Littlewick / Carhouse Lane	24812	54
Knaphill / Hermitage Road (A324) / Robin Hood Road	25112	417
Woking Golf Course / Berry Lane (B380)	25212	14
Byfleet / Rectory Lane / Church Road	25309	96
TOTAL DEVELOPMENT (more than 15 dwellings)		2417
Panel Recommendations		3340
<i>Remainder to be allocated</i>		<i>3340-2417 =923</i>

The additional 923 dwellings required in Woking to reach the Panel recommendation were distributed evenly amongst all Woking zones.

APPENDIX 4 MODELLING OF PARKING CHARGES

This Appendix sets out the modelling of increases in parking charges in the town centres of Guildford and Woking. Since parking charges apply to the number of hours parked, there is of course no opportunity to reduce them by varying the time of day departure time. It was not therefore appropriate to include the charges to the time shift elasticity calculation. They were included in the modal split section. Increased charges were **not** applied to the Station Car parks, as this could discourage the use of Public Transport.

Woking

Table A4.1 sets out the modelled and observed trips to Car Parks in Woking for the modelled hour (0800-0900), together with the base year modelled flows to the other town centre zones. The modelled and observed flows are fairly similar with the exception of the trips to the Station Car Parks; the modelled figure of 435 is significantly higher than the observed 156. The discrepancy could be due to a considerable number of Kiss and Ride trips which go to the station but do not park. It is also probable that the GWITS zones, although designated as Car Parks, cover also other destinations.

Table A4.1 Trips Ending in Woking Town Centre zones

Zone number		2003 Observed	2003 Modelled	2016 Committed development with 3% reduction for soft measures
	Car Parks			
114	Brewery Rd	105	100	108
102	Heathside	179	126	136
112	Victoria Way	260	211	228
111	Peacocks	535	524	567
107,131,132	Station Car Park zones	156	435	471
	Total to Car Parks	1235	1396	1510
	Other Town Centre Zones			
130	Town Centre		473	512
133	Goldsworth Rd ⁴		514	556
101	The Birches		85	92
134	Kingsway Av (Poole Rd)		128	139
	Total to other		1235	1299
	Overall Total		2596	2809

The 235 trips observed terminating in Car Parks are 48% of the 2596 total trips to the town centre. The remainder (52%) would probably be a combination of Private Off street, On Street (metered) and trips that drop off passengers and do not park.

Changing the cost of Parking would have no effect on the 52% of trips to Woking Town centre which do not use the Car Parks.

⁴ NB; the Goldsworth Rd and Kingsway Avenue zones comprise both Town Centre and residential areas.

Guildford

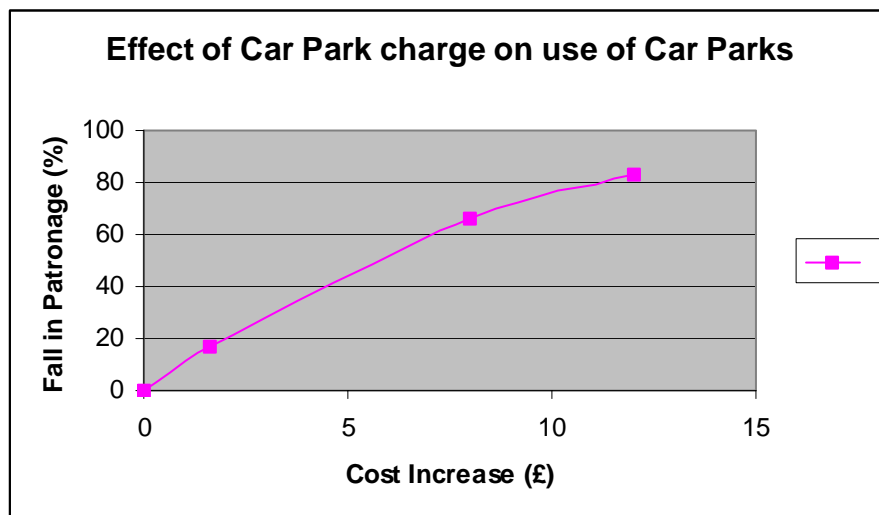
The modelling of Car Parks in Guildford is less straightforward, as only 3 zones were actually specified as representing Car Parks. So trips in the matrix were generally assigned to the final destination zones rather than a Car Park. To model changes in Car Park charges, therefore, in addition to the specified Car Parks a small number of additional zones were treated as if they were Car Parks so that parking charges could be imposed.

The 2001 Car Park survey counted 1077 trips entering the major car parks in the modelled peak hour, 0800-0900. With the addition of smaller public car parks not included in the Survey and some on-street parking, and allowing for a little growth 2001-2003, the total use of Car Parks 0800-0900 would be around 1400.

Modelled flows to the three specified Car Park zones– York Rd, Farnham Rd and Castle (zones 28,47 and 60) were 891 (somewhat higher than the observed (615)). In addition to these, two zones not specifically designated as Car Parks were therefore taken to be car parks for the purpose of modelling the effect of charging. These were College Rd (zone 55, 334 trips) and Civic Hall (zone 59, 181 trips). The total modelled flows to Car Park zones for the base year 2003 was therefore 1406.

Effects on usage of increased charges

The CUBE model was run to determine the effects of increasing car park charges. The graph below sets out the forecast use of Car Parks for different cost increases. The cost increase is taken to be an increase on the daily charge, on the assumption that most entrants in the peak period will be parking for the whole day. The elasticity calculation was carried out in absolute terms; thus, from the graph an increase of £5 a day (from the existing £7.50 to £12.50) would result in a fall in patronage of just over 40%. In practice it is unlikely that a large increase could be imposed at one time; it could be phased in over the years to 2016.



APPENDIX 5 SENSITIVITY TEST FOR GENERATION FROM TOWN CENTRE ZONES

The average household trip generation rates set out in Table A1.2 for Town Centre zones (Class 1) were based on a very small sample and are considerably lower than those for Class 2 zones. A sensitivity test was carried out to consider the effects of using a higher rate. The **Sensitivity Test** was carried out using trip generation rates of **twice** those set out in Table A1.2, i.e. 0.238 for car departures and 0.114 for Car arrivals. However, these are still considerably lower than the household trip rates as used for the Class 2 (non-town centre) sites (0.47 and 0.16 respectively). The use of these higher rates would double the forecast peak hour car trip generations for those zones set out in Table A1.3.

Table A5.1 below shows the source of all trip generations from Guildford and Woking forecast for 2016 using the trip rates set out in Appendix 1 (“the reference case”), together with the increase in Generations using the higher Sensitivity test rates

Table A5.1 Trips generated by Guildford & Woking zones, AM peak hour

	Base 2003	Increased trips due to Underlying growth	Trip generations from new developments 2016 (reference case)		Total trips	Effects of using higher trip rate for class 1 zones	
			Households	Commercial		Increase	Total
Class 1							
Woking	587	28	81	179	874	81	956
Guildford	225	14	146	0	385	146	531
Class 2							
Woking	8973	427	1242	38	10,679	0	10,679
Guildford	15,365	961	1640	100	18,066	0	18,066
Total	25,150	1,431	3108	317	30,005	278	30,283

For the Class 1 zones centred around Guildford and Woking Stations the doubling of rates indicates a significant increase in trip generations. For all Guildford and Woking zones Table A5 shows that the use of the higher trip generation rates represent an increase of 8% ($278/(3108+317)$) in trips generated by **new** developments. However, as a proportion of **total** generations they represent an increase of less than 1%.

Tables A5.2 and A5.3 below set out the Cordon Crossing flows comparing the revised trip rates with the Reference case (2016 Development Scenario 1a, with full restraint, 3% assumed for soft measures). For the reference case the total outbound flows from Guildford and Woking are 6221 and 6093 respectively; the trips generated by the increased generation rates (146 and 81) represent increases of 2.3% and 1.3%. These small changes are not enough to make a significant difference.

The total new trips generated in Guildford are 146, but there is an increase in outbound screenline crossings of only 61. This is because some of the new trips will be internal to Guildford; and other trips will be diverted away from Guildford by the increased congestion (even though the increase is very small).

For Woking, the outbound screenline crossings actually fall slightly; increased congestion within Woking Centre may have a slight suppression effect on Outer Woking trips which are forced to go through the town centre or make a long detour.

Table A5.2 Outbound cordon crossing flows - Guildford

	2003	2016		
Outbound		Reference Case	Increased Generations	Percentage change
Total	6163	6,221	6,282	1.0%

Table A5.3 Outbound cordon crossing flows - Woking

	2003	2016		
Outbound		Reference Case	Increased Generations	Percentage change
Total	5,501	6093	6076	-0.3%

APPENDIX 6 Traffic Restraint sensitivity tests

The 2016 scenario considered in this Report assumed that “soft” traffic restraint measures (set out in Section 4.5) would reduce the trip matrix by 3%. This is the lower bound of possibilities as set out in the DfT report ‘Smarter Choices – Changing the way we travel’. Two further tests were carried out to consider the effects of more rigorous (but hypothetical) measures that would reduce demand for Car Trips by 6% or 10%. This restraint was applied to trips with **both** trip ends in Guildford and Woking; 3% restraint was applied to trips to/from and within other Surrey zones, and no restraint to trips was applied between external zones. These tests have been performed on a ‘what if’ basis, that is to say they are not (at the time of writing) the expected outcome of a predefined set of traffic engineering measures.

Tables A6.1 to A6.4 below set out the same indicators as in the main text, this time comparing the different levels of restraint.

Table A6.1 Peak Hour Traffic

Guildford & Woking	Peak Hour Traffic emanating from Central Guildford and Woking Growth in percent				
	No Development	Full Development			
Year		No Restraint	3% Restraint	6% Restraint	10% Restraint
2003 Guildford	2776				
2003 Woking	2989				
2016 Guildford	7.5%	18%	13%	11%	9%
2016 Woking	4%	23%	19%	16%	13%

Table A6.2 Cordon Crossing Flows

Guildford & Woking	Cordon Crossing Flows into Guildford and Woking <i>Cordon Crossing Flows out of Guildford and Woking</i>				
	No Development	Full Development			
Year		No Restraint	3% Restraint	6% Restraint	10% Restraint
2003 Guildford	8298 <i>6163</i>				
2003 Woking	5919 <i>5501</i>				
2016 Guildford	0 <i>-1%</i>	4% <i>1.5%</i>	-2% <i>1%</i>	-3% <i>0%</i>	-4% <i>0%</i>
2016 Woking	2% <i>4%</i>	12% <i>13%</i>	4% <i>11%</i>	2% <i>9%</i>	1% <i>9%</i>

Table A6.3 Vehicle Kilometrage

Guildford & Woking	Vehicle Kilometrage, within Central Guildford and within Central Woking				
	No Development	Full Development			
Year		No Restraint	3% Restraint	6% Restraint	10% Restraint
2003 Guildford	744				
2003 Woking	1523				
2016 Guildford	8%	22%	7%	4%	1%
2016 Woking	3%	26%	21%	16%	11%

Table A6.4 Vehicular delay

Guildford & Woking	Vehicular delay, Central Guildford and Central Woking (<i>free-flow time in italics</i>)				
	No Development	Full Development			
Year		No Restraint	3% Restraint	6% Restraint	10% Restraint
2003 Guildford	2.1 minutes <i>3 minutes</i>				
2003 Woking	1.8 minutes <i>3.3 minutes</i>				
2016 Guildford	32%	44%	40%	37%	28%
2016 Woking	14%	51%	39%	30%	20%

The tests of increasing restraint quite clearly affect all of the key indicators.

Tables A6.5 to A6.7 set out the effects of increasing restraint of the cordon crossing flows. The effect is not so marked as in Table A6.1; when the volume of traffic in the towns increases, some traffic will divert to avoid the centre; when traffic levels fall, the reverse happens. For both towns, the effect of restraint is more marked for the inbound cordon, as Park & Ride and increased Car Park charging reduce traffic to the centre. So for Guildford the unconstrained increase of 4% could be reduced to -4% with the 10% soft measures; for Woking the unconstrained increase of 12% can in principle be removed entirely.

The effect on traffic on the A3 is much less marked, as much of the traffic on the A3 is external to Woking and Guildford; this traffic has not been restrained.

Table A6.5 Guildford cordon crossing flows, AM peak hour 2016

Guildford	2003	2016			
		No restraint	3% reduction	6% reduction	10% reduction
Inbound	8298	8,650 4.2%	8,151 -1.8%	8,078 -2.6%	7,969 -4.0%
Outbound	6163	6,253 1.4%	6,221 0.9%	6,179 0.3%	6,112 -0.8%

Table A6.6 Woking Cordon crossing flows, AM peak hour 2016

Woking	2003	2016							
		No restraint		3% reduction		6% reduction		10% reduction	
Inbound	5919	6626	11.9%	6158	4.0%	6056	2.3%	5926	0.1%
Outbound	5,501	6210	12.9%	6093	10.8%	5997	9.0%	5874	6.8%

Table A6.7 Flows on the A3, AM peak hour 2016

A3	2003	2016							
		No restraint		3% reduction		6% reduction		10% reduction	
Inbound	26,348	28,231	7.1%	27,583	4.7%	27,606	4.8%	27,482	4.3%
Outbound	23,535	25,882	10.0%	25,154	6.9%	25,188	7.0%	25,009	6.3%