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Technical note

Project	Wycombe Transport Model	**Date**	17 May 2010
Note	Town Centre Masterplan Update	**Ref**	TNTC2
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1 Introduction

1.1 The Wycombe Local Development Framework (LDF) is now proceeding from the analysis of the Core Strategy to the investigation of individual site allocations. In 2006 Buckinghamshire County Council appointed Halcrow and Rand Europe to develop the Wycombe Transportation Study Model (WTS). The purpose of this model was to provide a tool to assess the impact of growth arising from the major developments proposed in the town. At the Core Strategy stage the model was used to assess a series of illustrative scenarios related to the LDF. A second phase of testing involved assessing the impact of each individual site by dropping each site/ or groups of sites from the Core Strategy. The model has been used to assess the impact of the Wycombe Coachway and development at the Sports Centre.

1.2 In 2009 the model was used to assess the impact of a series of proposals for the town centre Masterplan. The purpose of the modelling was to assess the impact of the overall Masterplan, having first assessed the impact of the individual components to identify those which should be included in the final strategy. The results of this was reported in 'Wycombe Transport Model: Town Centre Masterplan Tests Technical Note', Halcrow, March 2009 and 'Wycombe Transport Model: Town Centre Masterplan Note', BCC, June 2009.

1.3 The Wycombe District Council Delivery and Site Allocations (DSA) Update Consultation Development Plan Document (June 2009) updated the proposals regarding individual sites, the mix of development in the town including town centre Masterplan, and elements of the transport strategy, including Smarter Choices.

1.4 Since June 2009, further work has been carried out to assess the impacts of changes to the town centre network. This round of tests updates the 2026 scenario to reflect the DSA and focuses on the town centre. It does not seek to repeat the tests on the individual components of the Masterplan, but assesses the impact of the updated proposals on the 2026 base case and the preferred Masterplan configuration determined from the previous round of modelling.

2 Options for Testing

2.1 The modelling work undertaken in these tests assumes the full set of potential development sites that could come forward compatible with the DSA and also included the Smarter Choices elements of the transport strategy. Two tests are reported:

- Test 1 – 2026 full DSA proposals with preferred Masterplan configuration for the town centre.
- Test 2 – 2026 full DSA proposals with limited network improvements for the town centre.

Test 1 is the 2026 scenario assuming that the preferred Masterplan proposals for the town centre are implemented. Included in this set of tests is the additional business development that comes forward as a result of the reconfigured network is included in the town centre. This test is an update of the scenario reported in the previous modelling note as Option MP2.

Test 2 is the 2026 base case scenario assumes that the town centre network remains largely as it is. This is an update of the scenario reported as Option A in previous Town Centre Masterplan Technical Note.

3 Land Use Assumptions

3.1 WDC have provided a full specification of land use assumptions, including completions, current allocations and proposed LDF allocations (including small and large sites). This data had a 31st March 2008 base date for information such as completions and planning permissions.

3.2 Table 1 provides the land use for the main development sites within the DSA consultation document and are assumed in both tests. The mix of development on these sites has been updated since the previous modelling.

Site Name	**Quantum of Development**
Cressex Island	Car showroom 2,800m^2 + parking Large format Commercial Use 12,000 m^2
Sports Centre Site/Highways Dept	Sport Centre 11,000m^2 150 bed hotel, Business 33,105m^2 Coachway/Park and Ride incl. 650 parking spaces
Terriers Farm	400 dwellings Small Community building Care home Park and Ride
Gomm Valley	400 Dwellings 4,000 m^2. B1 offices 1,000 m^2. Community/retail use

Ashwells	100 dwellings
Former Compair Broomwade	672 student bedrooms 495sqm Business start up units 15,800 sqm retirement community 10,000m^2 offices 3,100 m^2 distribution 10 flats
Former De la Rue	120 dwellings 2,437m^2 B1(c) light industrial
RAF Daws Hill	550 dwellings (483 net) 3,000 m^2. B1 offices 800 m^2 retail 700 m^{2}A1-A5 uses Primary school
Abbey Barn South	550 dwellings 7,000 m^2 B1 Community Centre
Abbey Barn North	100 dwellings

Table 1: Assumptions for Individual Site Allocations

3.3 Other changes from previous model runs for developments in the town centre are reported in Table 2. All the elements are assumed in Test 1. Test 2 does not include the additional town centre sites except where stated.

Site	**New land use assumptions**
Wellesbourne campus (Kingshill Road)	238 dwellings (update from 156 – traffic zone 46)
John North Hall, Marlow Hill	106 dwellings (update from 25 – traffic zone 60)
Johnson and Johnson	13,620 sq m of additional B1 office (traffic zone 66)
ADDITIONAL TOWN CENTRE SITES:	
All sites except the hotel element of the Octagon Parade development rely on implementation of Masterplan, including removal of Abbey Way and downgrading of Archway.	
Octagon Parade	3,416 sq m hotel 8980 sq m A1 shops 5928 sq m B1 office No additional parking provided.
Suffield Road	11 dwellings
Abbey Way Developments	
Archway/Dovecot	3,640 sq m B1 office 1,799 sq m A1 shops 22 flats 2,460 sq m hotel

Swan Frontage (Scenario A)	13,062 sq m office 1750 sq m A1 shops 9 x 2-bed flats 4 x 1-bed flats Total Parking Provision = 141 spaces

Table 2: Town Centre Land Use Assumptions – Changes from Previous Tests

3.4 Based on the information provided by Wycombe District Council table 3 shows the land use data for the Wycombe model area used by the transport model for the various forecasts. The table shows that with the full DSA proposals the number of households is increased to 43,671. In Test 2 the number of jobs is 53,465. Test 1 has an additional 958 jobs with the additional town centre developments. A comparison with the previous modelling land use assumptions shows that there is a small decrease in households and an increase in jobs.

Test	Test Description	Population	Households	Employed Residents	Jobs
	2006	87,510	36,744	44,970	46,790
1	2026 full DSA proposals (with Masterplan)	103,889	43,671	53,674	54,423
2	2026 DSA proposals (existing Town Centre)	103,889	43,671	53,674	53,465
	2026 LDF proposals (March 2009)	102,991	43,984	54,132	52,118

Table 3: Land Use Information – Forecast Scenarios

Planning Data Assumptions- external area reference case

3.5 The current tests make use of Tempro version 6.2 programme for deriving trip growth outside of the Wycombe District with the Tempro 5.4 dataset. The Tempro inputs have been adjusted to take account of the SE Plan as adopted in May 2009. The external trip growth is fed from Tempro through the regional model to the local model.

4 Network Assumptions

Network Assumptions- all tests

4.1 BCC and WDC provided network assumptions for these tests. The scenarios include an updated set of measures in common. These included:

- Cressex Link Road;
- Handy Cross Improvements completed in 2008 (the timings and saturation flows are based on TRANSYT outputs supplied by the Highways Agency)

- M40 Gateway - Junction improvements at Sports Centre/Marlow Hill junction + Handy Cross Hub related junction changes- new access and egress junctions to Handy Cross Hub.
- Park and Ride is assumed at the Handy Cross Hub site (replacing the current site at Cressex Island) and at Terriers
- Desborough Avenue Bus Priority Works
- High Wycombe Railway Station proposals and associated junction amendments

- A40 London Road Corridor – Loudwater to Wycombe Town Centre, including:
  - New traffic signal junction on the A40 located approximately 100m east of Hatters Lane roundabout to serve Wycombe Marsh development. This junction will be completed in early 2010 and will be equipped with SCOOT and MOVA systems.
  - Improvements to existing traffic signal junctions of A40 London Road / Ryemead Way / Micklefield Road / Cock Lane and A40 London Road / Abbey Barn Road, both junctions linked with MOVA and SCOOT dynamic controls.
  - Signalisation of A40 London Road and Gomm Road, currently running vehicle activated control but planned upgrade to SCOOT in March 2010.
- A404 Marlow Hill Corridor - M40 Handy Cross to Wycombe Town Centre
  - A404 Marlow Hill junction of Daws Hill Lane - Existing Traffic Signals upgraded to SCOOT.
  - A404 Marlow Hill, Marlow Road, School Close gyratory – Existing traffic signals upgraded to SCOOT.
  - A404 Marlow Hill junction with Sports Centre – existing traffic signals upgraded to SCOOT.
- Heath End Road / Abbey Barn Lane junction- Improvements to widen Abbey Barn Lane at junction with Heath End Road to create separate left and right turn lanes onto Heath End Road. These works are being implemented for the Wycombe Marsh development to improve safety and increase capacity at this junction

<u>Network changes associated with the developments – all tests</u>

4.2 A series of assumptions were made regarding the access points from the major sites onto the network:

- Terriers Farm - access onto Kingshill Road.
- Gomm Valley - access on Hammersley Lane, Gomm Road
- Abbey Barn North- access onto Abbey Barn Lane.
- Cressex Island – signalised access onto Crest Road.

- Coachway- access from a new signal junction on Marlow Hill with egress through the Sports Centre junction and onto Marlow Hill.
- Sports Centre- as existing traffic signal junction.
- Daws Hill – access on Daws Hill Lane
- Abbey Barn South – access on Abbey Barn Lane,
- Link road between Daws Hill Lane and Abbey Barn Lane to serve Abbey Barn South and Daws Hill developments

4.3 The Hughenden area improvements are as follows:

- New road through the Compair and De La Rue from Morrisons to Coates Lane.
- At the southern end of this route, a gyratory is assumed using Parker Knoll Way and a new link south of the railway line.
- Access to the Morrisons supermarket would be from the new gyratory.
- Access to Dovecot would be from the gyratory.
- Glenisters Road would be narrowed in width.
- Temple End is bus only between Benjamin Road and Archway.
- A roundabout is provided at the Hughenden Avenue/ New link road junction.

<u>Network changes associated with the town centre</u>

4.4 The town centre assumptions in Test 1 are based on a PBA (Peter Brett Associates) drawing 14737/001/054C.

4.5 The network changes include:

- Abbey Way elevated section closed to vehicles
- Archway is reduced to single carriageway
- Provision of a new link through the Gas Works site
- Lily's Walk access to Eden car park only, remaining section at grade for eastbound buses
- Provision of a new link between Westbourne Street and West Wycombe Road
- Gyratory between Morrison's and Dovecot and improved Bellfield Road
- Two-way movement for all vehicles on Bridge Street
- Eastern end of Abbey Way ring junction includes two-way Easton Street and Queen Victoria Road
- High Street/ Easton Street/ Queen Victoria Road junction - allowed movements are changed to be all- left and straight ahead, except for a right turn from Queen Victoria Rd to Easton St
- A40/Easton St/Abbey Way – two-way on north-south link
- Abbey Way ring junction comprises two improved roundabouts - Marlow Hill/Queen Alexandra Road/Abbey Way and Abbey Way/Queen Victoria Road (northern section closed to vehicles) and associated widening
- Lily's Walk for access to Eden car park only, no-through road except for buses

5 Smarter Choices

5.1 One element BCC and WDC requested to be included in the test was a factor for Smarter Choices measures as part of a town wide package. These measures cannot be easily modelled using the generalised cost as their impacts on travel behaviour are based on elements outside of cost and time. WebTAG does not at the moment have an approach to modelling these measures. Therefore we have adopted a similar method to that adopted within the Aylesbury model.

5.2 In 2004 the DfT announced a 5 year project to demonstrate the effect a sustained package of 'Smarter Choice' measures can have when coupled with infrastructure improvements. Darlington, Peterborough and Worcester were selected from more than 50 local authorities in England who expressed an interest in becoming 'showcase' demonstration towns. The 3 towns share £10m of revenue funding during the project with building and improvement works funded LTP) capital funding.

5.3 The starting mode shares for travel within the towns are shown in table 4. In each case there is over 60% travel by car with Darlington having the lowest share. Public transport (PT) use is highest in Darlington at the start of the demonstration while cycling is highest in Peterborough at the start of the demonstration project.

Town	PT Use	Walking	Cycling	Car trips (driver + passenger
Darlington	12%	25%	1%	41% + 21%
Peterborough	6%	22%	5%	43% +23%
Worcester	6%	25%	3%	45% +21%

Table 4: Initial Mode Shares within the Demonstration Towns

5.4 44% of car journeys in Darlington were identified as having no sustainable travel mode (STM) alternative (61% in Peterborough and 54% in Worcester)

5.5 The overall changes in travel identified in the first few months of the demonstration projects in 2006 are given in the table below (source - Letter from Secretary of State 2007). These show similar reductions in car trips with corresponding increases in walking, cycling and public transport use.

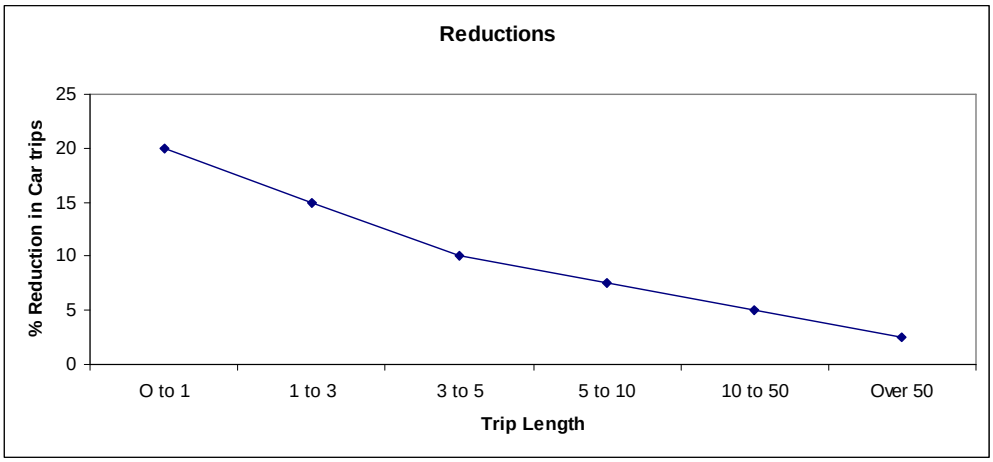
Town	PT Use	Walking	Cycling	Car trips
Darlington	+14%	+29%	+79%	-11%
Peterborough	+13%	+21%	+25%	-13%
Worcester	+22%	+17%	+36	-12%

Table 5: Travel Impacts in Demonstration Towns

5.6 The demonstration towns have managed to achieve a 10%+ reduction in trips resulting from the methods adopted. It is noted from the research that is not clear which trips have been reduced. Therefore in the strategy modelling a 10% reduction is applied to the trip matrix but applied according to different responses by distance (shown on Fig.1):

- 0 to 1 Km a 20% reduction
- 1 to 3 km a 15% reduction
- 3 to 5 km a 10% reduction
- 5 to 10 km a 7.5% reduction
- 10 to 50 km a 5% reduction
- Over 50km a 2.5% reduction

Figure 1: BCC Modelling Smarter Choices - reductions applied



5.7 In applying the reduction there is an adjustment in that the measures are not applied at the same rate across the town. Wycombe was divided into a series of sector.

- For those internal movements in sectors on the tops of the hills such as in Cressex and Hazlemere, or in the valley bottom the full reduction is applied;
- For movements up/down the hills half the reduction is applied.

5.8 The overall impact of the smarter choices is a reduction of around 3% in the total matrix and 6% for Wycombe based.

6 Overall Results

6.1 The results are presented for the network as a whole before assessing each local area in more detail later in this report.

6.2 Table 6 shows the vehicle trip matrix totals for each option. There is a small reduction in the number of trips made in Test 2. It is noted that there are still the same number of households in Test 2 as in Test 1, so there is a small change in the distribution of trips with a little more out-commuting and a small reduction in in-commuting.

6.3 The growth in highway demand over 12-hours for each of the tests is as follows:

- Full DSA = 16% growth in demand

The previous modelling had a 20% growth in demand

Test	Test Description	AM (0700-1000)	IP (1000-1600)	PM (1600-1900)	12-hr (0700-1900)
	2006	79,902	126,059	83,555	289,516
1	2026 full DSA proposals (Masterplan)	92,828	146,453	97,072	336,354
2	2026 full DSA proposals (existing town centre)	92,457	145,867	96,684	335,008

Table 6: Vehicle Trip Matrices

Network Summary Statistics

6.4 The traffic growth forecast within the various scenarios is 16% between 2006 and 2026. In the local area there is transfer to park and ride and a modest transfer to bus. The traffic growth equates to an annual average growth rate of 1%. We have not assumed any additional demand management or smarter choices measures to accompany these option tests other than those mentioned above.

6.5 Tables 7, 8 and 9 show the summary statistics obtained from the model for each of the modelled periods for these tests (the results of the previous tests are included for comparison). Table 10 provides a summary for the 12-hour period (0700-1900) which combines the periods. These include the total travel time and distance spent within the modelled periods as well as the free moving time. The difference between the total time and the free move time provides the amount of congestion. This is reflected in a congestion index which is taken as the ratio of the total time and the free moving time. The tables also provide the network speed for the whole modelled area (which includes the rural area outside Wycombe) and a generalised cost index (taken as total time + distance/100). The latter is taken as a proxy indicator for use in benefit calculations. It should be noted that the information includes the buffer area and the M40 motorway hence the base year speeds appear to be higher than an urban speed limit.

6.6 Table 7 shows that there is an increase in morning peak travel in 2026, resulting in increased queues and delays. The table shows that the network congestion index is 1.22 in both tests. In Test 1 there is more out commuting and hence increased travel over the network. The generalised cost index for the 2026 tests is around 7% lower than the previous modelling results, although it is still much higher than the 2006 result.

	Free moving Time	Total time	Distance	Speed	Queues	Congestion Index	GC Index
2006	19,796	22,503	1,562,269	69.4	12,089	1.14	38,125
Test 1	23,189	28,388	1,801,752	63.5	27,680	1.22	46,406
Test 2	23,152	28,297	1,801,669	63.7	27,255	1.22	46,313
Option MP2 (Mar09)	24,273	31,378	1,897,460	60.5	37,245	1.29	50,353
Option A (Mar09)	24,258	31,314	1,896,972	60.6	37,482	1.29	50,284

Table 7: Local Model Summary statistics- Morning Peak (0700-1000)

6.7 Table 8 shows that there is an increase in inter peak travel in 2026, resulting in increased queues and delays. The table shows that the network congestion index in both tests is 1.13. However there is a greater amount of queuing in the Test 1 with the Masterplan network than there is in Test 2 town centre test reflecting the reduced levels of jobs and activity in Test 2.

	Free moving Time	Total time	Distance	Speed	Queues	Congestion Index	GC Index
2006	30,387	33,326	2,424,698	72.8	2,802	1.10	57,572
Test 1	35,910	40,756	2,826,973	69.4	5,119	1.13	69,026
Test 2	35,751	40,353	2,824,798	70.0	4,547	1.13	68,601
Option MP2 (Mar09)	37,546	42,542	2,964,441	69.7	5,333	1.13	72,187
Option A (Mar09)	37,331	42,152	2,960,508	70.2	4,994	1.13	71,757

Table 8: Local Model Summary statistics- Inter Peak (1000-1600)

6.8 Table 9 shows that there is an increase in evening peak travel in 2026, resulting in increased queues and delays. The table shows that the network congestion index is 1.26 in Test 1. However there is a lesser amount of queuing in Test 2 with the existing network and without the Abbey Way developments so the congestion index is reduced to 1.23. The difference in generalised cost index between Test 1 and Test 2 is larger than the difference for the AM peak.

	Free moving Time	Total time	Distance	Speed	Queues	Congestion Index	GC Index
2006	21,492	24,266	1,726,557	71.2	11,554	1.13	41,531
Test 1	25,761	32,478	2,019,685	62.2	36,732	1.26	52,675
Test 2	25,404	31,141	2,007,907	64.5	29,726	1.23	51,220
Option MP2 (Mar09)	26,778	34,181	2,111,060	61.8	39,783	1.28	55,292
Option A (Mar09)	26,605	33,701	2,107,372	62.5	38,581	1.27	54,775

Table 9: Local Model Summary statistics- Evening Peak (1600-1900)

6.9 Table 10 shows that there is an overall change in 12-hour travel conditions in 2026, resulting in increased queues and delays. The table shows that the network congestion index is 1.20 in the Full DSA run. The table shows that in using the existing town centre network the Congestion Index is 1.18, as there is a reduction in overall time and queues. The overall statistics in this round of tests is much lower than the previous round of modelling mainly due to the impact of Smarter Choices but also the revised business land use. Although the generalised cost index for Test 1 is still an increase compared to 2006, however it is a 5% less than the previous Option MP2.

	Free moving Time	Total time	Distance	Speed	Queues	Congestion Index	GC Index
2006	71,675	80,095	5,713,524	71.3	26,444	1.12	137,230
Test 1	84,860	101,623	6,648,410	65.4	69,530	1.20	168,107
Test 2	84,307	99,790	6,634,374	66.5	61,529	1.18	166,134
Option MP2 (Mar09)	88,598	108,102	6,972,961	64.5	82,360	1.22	177,831
Option A (Mar09)	88,193	107,166	6,964,852	65.0	81,057	1.22	176,815

Table 10: Local Model Summary statistics- 12-hour

6.10 It should be noted that further investigation of key hotspots of congestion may identify additional improvements to junctions which could improve the congestion indices as in this round of testing the signals have not been optimised. The signal timings are the same in both Test 1 and Test 2, but there had been some signal optimisation performed on both sets of tests in March 2009.

Flows across Cordons and Screenlines

6.11 Tables 11 compare the traffic flows across a series of cordons and screenlines within the town. Flows are given for the peak hours, the average interpeak hour and the 12-hour daily flow. The locations include:

- Outer Cordon (equates to the BCC monitoring cordon)
- Railway screenline (equates to the BCC cordon)
- Handy Cross (excludes slip between A404 south and M40 west)
- Town Centre

	2006	Test 1 (Masterplan)	Test 2 (existing town ctr)
12 hr		Test 1	Test 2
Outer Screenline - Inbound Direction	94,694	103,759	102,616
Outer Screenline - Outbound Direction	91,603	102,775	102,013
Railway Screenline – Northbound	46,323	54,492	53,715
Railway Screenline – Southbound	48,674	54,984	55,104
Handy Cross- Inbound	75,788	82,185	83,547

Town Centre- Inbound	84,897	93,758	94,498
Town Centre- Outbound	80,921	94,252	95,032
Am Hour (0800-0900)			
Outer Screenline - Inbound Direction	10,038	11,671	11,151
Outer Screenline - Outbound Direction	8,763	9,413	9,087
Railway Screenline – Northbound	4,123	4,426	4,120
Railway Screenline – Southbound	6,330	6,843	6,383
Handy Cross- Inbound	7,668	8,658	8,548
Town Centre- Inbound	9,799	11,072	10,287
Town Centre- Outbound	7,221	8,630	8,183
Average Interpeak Hr			
Outer Screenline - Inbound Direction	7,276	7,741	7,731
Outer Screenline - Outbound Direction	6,852	7,750	7,750
Railway Screenline - Northbound	3,413	4,162	4,116
Railway Screenline - Southbound	3,455	3,928	3,971
Handy Cross- Inbound	5,495	5,624	5,828
Town Centre- Inbound	6,198	6,795	7,007
Town Centre- Outbound	6,086	7,013	7,204
PM Hour (1700-1800)			
Outer Screenline - Inbound Direction	9,395	9,796	9,666
Outer Screenline - Outbound Direction	10,737	11,789	11,507
Railway Screenline - Northbound	5,686	6,634	6,741
Railway Screenline - Southbound	4,267	4,961	5,155
Handy Cross- Inbound	8,179	9,109	8,900
Town Centre- Inbound	7,861	8,687	8,928
Town Centre- Outbound	9,311	10,968	10,904

Table 11: Flow difference – Cordons and Screenlines

6.12 The table shows that when looking at 12-hour flows that across the town centre cordon Test 2 flows are higher than Test 1. Although there is a higher level of flows across the town centre cordon inbound in the Am peak hour in Test 1 may be due to the increased level of employment within the town centre with the Masterplan in place.

6.13 The 12-hour flows across the screenlines in Test 1 are all less than reported in Option MP2 (previous full LDF proposals), with the exception of the northbound Railway screenline. The biggest reductions are in the outer screenlines (around 115,000 each direction), indicating that with this set of proposals there is less out commuting.

6.14 All the 12-hour flows across the screenlines in Test 2 are less than previously reported for Option A, which will be as a result of land use changes and Smarter Choices.

6.15 The flow changes across the Town Centre screenline links are given below.

	Inbound			**Outbound**		
	Test 1	Test 2	Difference T1-T2	Test 1	Test 2	Difference T1-T2
West Wycombe Road	838	1,062	-224	992	737	256
Desborough Road	587	590	-4	108	195	-87
Plumer Road	141	139	2	12	10	2
Desborough Avenue	687	606	81	1,441	1,365	76
Marlow Hill	1,797	1,983	-186	1,970	2,159	-189
London Road	1,426	1,450	-24	870	929	-60
Totteridge Road	635	684	-49	439	429	10
Amersham Hill	1,004	1,241	-237	731	703	28
Benjamin Road	403	306	97	486	413	74
Priory Avenue	455	397	59	266	170	97
Temple End	171	0	171	0	0	0
A4128	2,023	1,110	913	819	594	225
The Pastures	905	718	187	497	480	17
Total	**11,072**	**10,287**	**785**	**8,630**	**8,183**	**447**

Table 12: Flow change- Town Centre Cordon AM Peak

	Inbound			**Outbound**		
	Test 1	Test 2	Difference T1-T2	Test 1	Test 2	Difference T1-T2
West Wycombe Road	538	598	-60	530	666	-136
Desborough Road	266	264	2	309	237	72
Plumer Road	73	105	-32	128	150	-22
Desborough Avenue	681	608	73	892	799	94
Marlow Hill	1,375	1,541	-166	1,454	1,668	-214
London Road	1,291	1,424	-133	1,000	1,087	-87
Totteridge Road	71	116	-45	206	272	-66
Amersham Hill	558	435	122	726	668	58
Benjamin Road	144	38	107	146	25	121
Priory Avenue	304	287	17	395	305	90
Temple End	0	0	0	0	0	0
A4128	1,054	1,034	20	923	975	-51
The Pastures	441	558	-117	304	352	-49
Total	**6,795**	**7,007**	**-212**	**7,013**	**7,204**	**-191**

Table 13: Flow change- Town Centre Cordon Average Interpeak hour

	Inbound			**Outbound**		
	Test 1	Test 2	Difference T1-T2	Test 1	Test 2	Difference T1-T2
West Wycombe Road	522	636	-114	1,546	1,448	97
Desborough Road	551	504	47	398	380	18
Plumer Road	156	185	-29	51	48	3
Desborough Avenue	944	781	163	1,224	1,192	31
Marlow Hill	1,651	2,036	-385	1,882	2,131	-249
London Road	1,027	1,134	-107	1,480	1,449	31

Totteridge Road	339	435	-96	428	278	149
Amersham Hill	434	524	-91	916	992	-76
Benjamin Road	379	243	135	529	429	99
Priory Avenue	467	377	90	300	347	-47
Temple End	26	0	26	0	0	0
A4128	1,246	1,203	43	1,351	1,298	53
The Pastures	946	868	78	863	908	-45
Total	**8,688**	**8,928**	**-241**	**10,968**	**10,904**	**64**

Table 14: Flow change- Town Centre Cordon PM Peak

	Inbound			**Outbound**		
	Test 1	Test 2	Difference T1-T2	Test 1	Test 2	Difference T1-T2
West Wycombe Road	7,376	8,531	-1,154	9,058	9,414	-357
Desborough Road	4,656	4,558	98	3,388	3,056	332
Plumer Road	1,192	1,452	-260	1,071	1,226	-155
Desborough Avenue	8,325	7,362	964	12,492	11,560	932
Marlow Hill	17,685	19,702	-2,017	19,423	22,315	-2,891
London Road	14,512	16,578	-2,065	12,432	13,425	-993
Totteridge Road	2,997	3,159	-162	3,433	3,597	-164
Amersham Hill	7,401	7,158	243	8,731	8,328	404
Benjamin Road	2,679	1,401	1,278	3,389	1,512	1,877
Priory Avenue	4,338	3,878	460	4,285	3,603	682
Temple End	379	0	379	0	0	0
A4128	15,089	13,086	2,003	11,431	11,321	110
The Pastures	7,129	7,634	-505	5,118	5,676	-558
Total	**93,758**	**94,498**	**-740**	**94,252**	**95,032**	**-780**

Table 15: Flow change- Town Centre Cordon 12-hour

6.16 The tables show that in Test 1 there is more traffic using Benjamin Road, Priory Avenue and A4128 to the north of the town. This area appears to have the greatest potential for traffic diversion with the Masterplan scenario. The removal of Abbey Way and the other network changes means that the main route from Hughenden Road area to Amersham Hill area is not as direct and this has the potential to cause vehicles to rat run on these residential roads. Further work on minimising this potential will identify possible solutions.

Delays at junctions

6.17 The model can provide forecast delays on each junction approach within the study area. Typically a traffic signal junction has a cycle time between 60 and 120 seconds. Therefore, a delay of 60 seconds would equal half of a 120 second cycle so a vehicle arriving at the queue would wait for half the cycle before leaving the junction. With delays in excess of 120 seconds the vehicle would still be queued at the end of the green phase and would need to wait for the next green phase. A delay of 240 seconds would need at least two green phases before the vehicle clears the junction.

6.18 In Test 1 (Masterplan) the areas with the largest delays are:

- Pedestal (Am)
- West Wycombe/ Chapel Lane/ Plumer Hill area (AM and PM)
- Handy Cross (AM and PM)
- West Wycombe Rd/ Pastures (PM)
- Hughenden Valley (AM)
- Marlow Hill/ Daws Hill Lane junction (AM and PM)
- Terriers (AM and PM)
- Cressex (AM and PM)
- Abbey Way ring junction (AM and PM)
- London Road (Abbey Barn RD and Micklefield Rd area (AM)
- Rayners Avenue (AM)
- Winchbottom Lane (AM)
- Flackwell Heath (AM & PM)
- Treadway Hill/ Station Road (AM and PM)
- Desborough Road/ Desborough Avenue (PM)
- Amersham Hill/ Hamilton Rd (PM)

6.19 Appendices A and B show the level of delay in the morning and evening peak for Test 1 network wide and in the town centre.

Flows around the town centre

6.20 Appendix C shows the 2026 forecast flows for a selection of links in the town centre that would be affected by the implementation of the Masterplan proposals. The forecast flows for the March 2009 modelling are included for comparison. Overall the flows in this round of tests are lower than the previous due to the effect of Smarter Choices. There are some links where there is an increase in flows in Test 1 compared with Option MP2 and A. This is due to different land use especially the location of business, which effects which routes are used. As stated previously, this round of tests has not been through signal optimisation, and so increased queues and delays at junctions will encourage vehicles to use different routes.

6.21 In Test 1, Bellfield Rd has increased traffic compared to Test 2, as west to north traffic will use this route rather than the single carriageway Archway. Oxford Road and Archway are carrying less traffic as Abbey Way flyover is removed and Archway is a single carriageway.

6.22 There are increases on Desborough Avenue and Desborough Road due to the Gas Works link/Queen Alexandra Road being the main east-west route through the area. The Gas Works link in this Masterplan scenario does not carry as many vehicles as

predicted in the previous modelling work (19,000 predicted per day compared to 24,000).

6.23 To the east of the town, Easton Street eastbound and Abbey Way (at the ring junction) have reduced level of flows due to the network changes at the eastern end of Easton Street and A40, and with Queen Victoria Road and Easton Street becoming two ways.

7 Summary

7.1 The land use changes and incorporation of elements of the transport strategy have reduced the forecast level of traffic growth from 20% with the previous round of modelling to 16% in this round of modelling

7.2 The reduction in flows, queues and delays is not uniform over the whole road network, as some of the main routes in the town do not experience a reduction in flows in the peak periods. This can be seen by the small changes in cordon and screenline flow between the scenarios.

7.3 The distribution of trips on the network has changed between Test 1 and Test 2 with more in commuting in Test 1 due to the increase in business use in the town centre with the Masterplan in place.

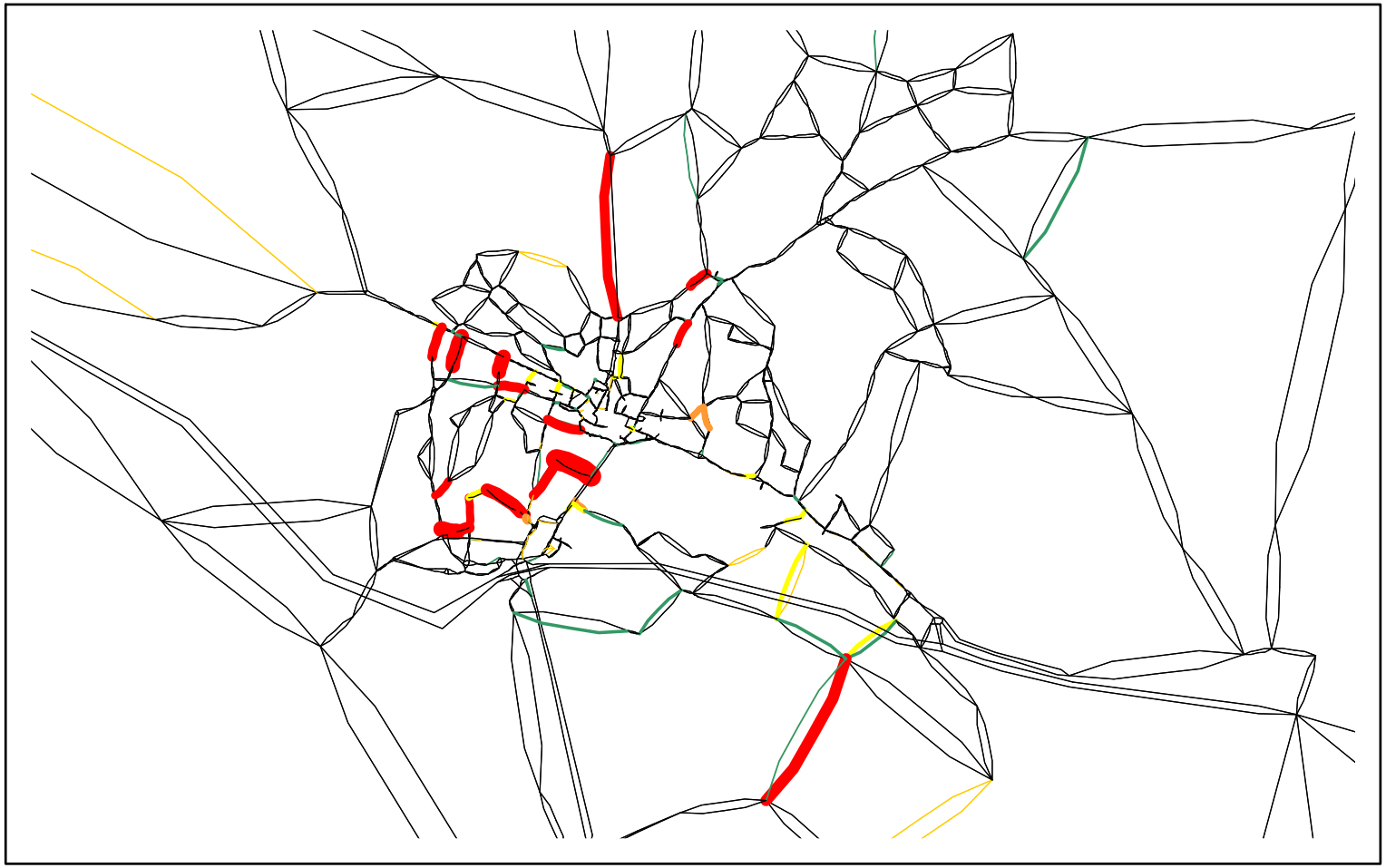
7.4 As there is an increase in flows on main routes and both queues and delays, there is an element of traffic that disperses onto less suitable routes (although not as significant as in the previous modelling). If these main routes then experience a reduction in traffic, then the dispersed traffic will reroute back to the main routes. Further work will be done as part of the transport strategy to monitor and manage this.

7.5 The implementation of the Masterplan does not have a significant effect when compared to 2026 with the existing town centre as the results show that the biggest impact on flows, time, distance and queues is still the forecast growth between 2006 and 2026.

Appendix A- Average Vehicle Delays- Network Wide

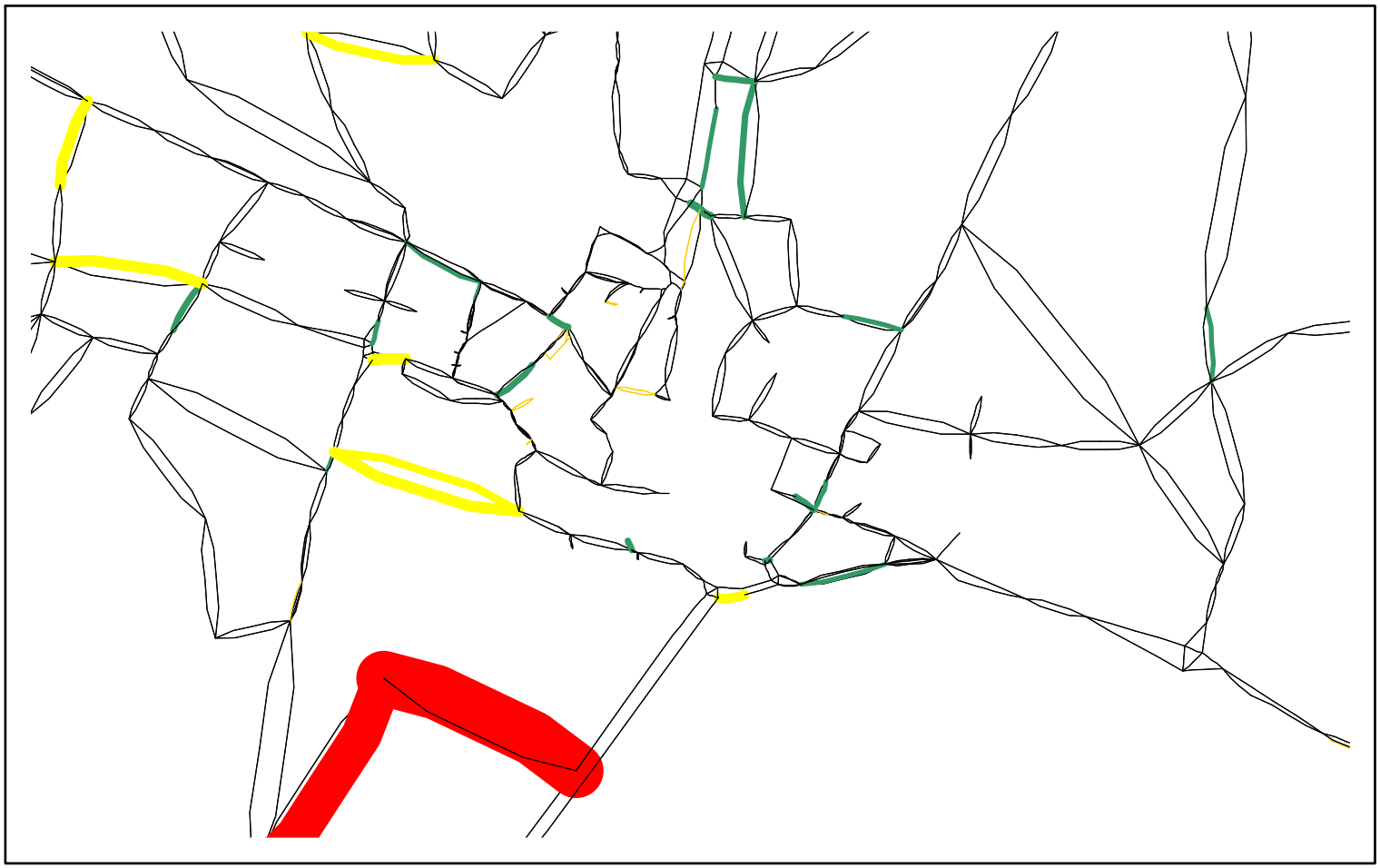
AM Peak Hour Test 1

PM Peak Hour Test 1

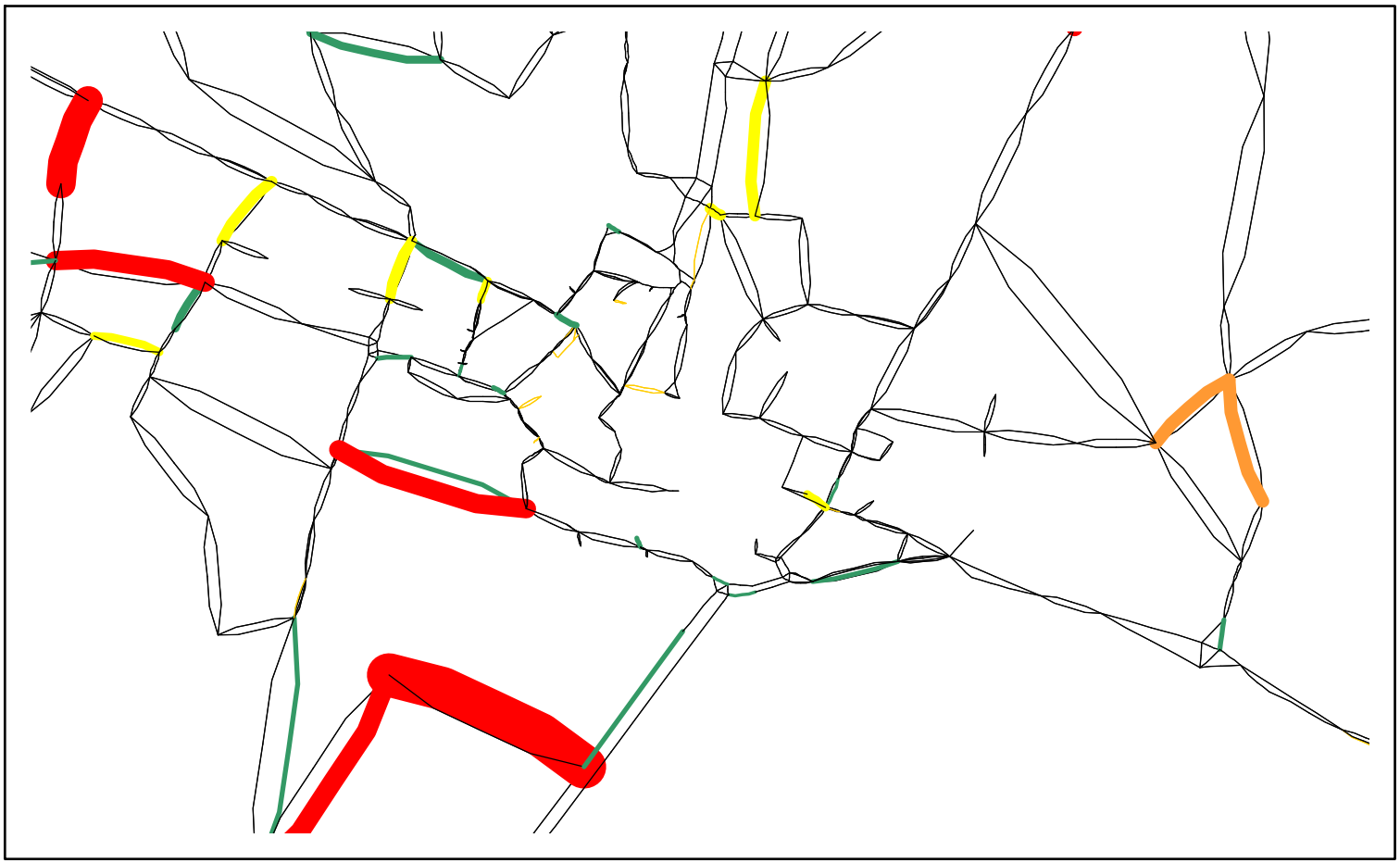


Appendix B- Average Vehicle Delays- Town Centre

AM Peak Hour Test 1



PM Peak Hour Test 1



Appendix C –
Flow changes on town centre links

Morning Peak Hour Flows

Town Centre Link	Test 1	Test 2	Difference T1-T2	Option MP2	Option A
Gas Works Links -Nb	914	434	480	1,218	
Gas Works Links -Sb	933	190	743	1,267	
Bridge St -Nb	278	95	182	283	622
Bridge St -Sb	575	114	461	585	40
Westbourne St -Nb	444			578	
Westbourne St -Sb	273			309	
Amersham Hill on bridge -Nb	499	607	-108	529	548
Amersham Hill on bridge -Sb	613	911	-298	622	830
Castle St -Eb	157	60	97	60	51
Castle St -Wb	297	108	189	276	104
Corporation St -Sb	412	564	-152	421	561
Crendon St -Nb	689	667	22	680	744
Crendon St -Sb	699	916	-218	705	819
Easton St -Eb	363	1,306	-943	310	1,254
Easton St -Wb	282			137	
Abbey Way (by WDC) -Eb	551	711	-160	720	790
Abbey Way (by WDC) -Wb	1,167	2,464	-1,297	1,560	2,539
Q Victoria Rd -Nb	964	1,126	-163	1,044	1,009
Q Victoria Rd -Sb	694			732	
Q Alexandra Rd -Eb	1,147	534	613	1,507	309
Q Alexandra Rd -Wb	782	436	346	1,204	992
Abbey Way elevated section -Wb		1,524			1,514
Abbey Way elevated section -Eb		1,253			1,673
Lily's Walk (at Abbey Way) -Eb		133			0
Lily's Walk (at Abbey Way) -Wb		482			554
Desborough Rd (by Eden) -Eb	759	190	569	958	577
Desborough Rd (by Eden) -Wb	731	467	264	1,151	79
Lily's Walk w of car park -Eb	206	264	-58	322	229
Lily's Walk w of car park -Wb	208	295	-87	171	256
Desborough Rd (w of Bridge St) -Eb	367	415	-49	224	288
Desborough Rd (w of Bridge St)-Wb	199	138	61	193	425
Desborough Rd (W end) -Eb	304	169	135	590	552
Desborough Rd (W end) -Sb	311	355	-44	330	350
Desborough Ave -Nb	577	639	-63	445	494
Desborough Ave -Sb	1,116	1,091	25	1,079	1,051
Suffield Rd -Eb	491	472	19	332	432
Suffield Rd -Wb	46	60	-14	44	52
W Wycombe Rd (e of Pastures) -Eb	843	1,129	-286	863	914
W Wycombe Rd (e of Pastures)-Wb	1,233	1,049	184	1,337	1,310
W Wycombe Rd (e of Westbourne St)-Eb	1,025	1,146	-122	895	925
W Wycombe Rd (e of Westbourne St)-Wb	1,229	891	338	1,175	1,305
Oxford Rd -Eb	48	478	-430	32	773
Oxford Rd -Wb	508	618	-110	571	990
Bellfield Rd -Nb	1,017	661	357	885	704
Bellfield Rd -Sb	1,198	434	764	987	339
Archway -Nb	12	330	-318	10	438
Archway -Sb	655	637	17	683	792

Average Inter Peak Hour Flows

Town Centre Link	Test 1	Test 2	Difference T1-T2	Option MP2	Option A
Gas Works Links -Nb	823	231	592	934	
Gas Works Links -Sb	605	237	368	856	
Bridge St -Nb	214	33	181	164	286
Bridge St -Sb	287	46	241	252	3
Westbourne St -Nb	236			138	
Westbourne St -Sb	59			49	
Amersham Hill on bridge -Nb	734	720	15	656	671
Amersham Hill on bridge -Sb	350	309	42	424	310
Castle St -Eb	85	5	80	77	20
Castle St -Wb	264	164	100	258	105
Corporation St -Sb	189	217	-27	159	182
Crendon St -Nb	901	819	82	843	789
Crendon St -Sb	435	314	121	503	288
Easton St -Eb	273	672	-399	270	537
Easton St -Wb	180	0	180	142	0
Abbey Way (by WDC) -Eb	763	870	-107	868	940
Abbey Way (by WDC) -Wb	1,125	1,841	-716	1,257	1,919
Q Victoria Rd -Nb	967	993	-26	964	918
Q Victoria Rd -Sb	524			549	
Q Alexandra Rd -Eb	964	565	399	1,133	617
Q Alexandra Rd -Wb	831	340	490	1,009	530
Abbey Way elevated section -Wb		1,289			1,097
Abbey Way elevated section -Eb		1,169			1,229
Lily's Walk (at Abbey Way) -Eb		40			0
Lily's Walk (at Abbey Way) -Wb		288			529
Desborough Rd (by Eden) -Eb	385	152	233	782	485
Desborough Rd (by Eden) -Wb	646	262	384	673	64
Lily's Walk w of car park -Eb	227	96	131	246	76
Lily's Walk w of car park -Wb	270	212	58	276	337
Desborough Rd (w of Bridge St) -Eb	366	209	157	69	348
Desborough Rd (w of Bridge St)-Wb	63	90	-27	9	240
Desborough Rd (W end) -Eb	136	134	2	449	352
Desborough Rd (W end) -Sb	357	290	67	550	494
Desborough Ave -Nb	612	524	87	666	374
Desborough Ave -Sb	949	704	245	974	839
Suffield Rd -Eb	435	334	100	357	638
Suffield Rd -Wb	165	205	-39	194	122
W Wycombe Rd (e of Pastures) -Eb	686	794	-108	646	472
W Wycombe Rd (e of Pastures)-Wb	857	813	44	745	871
W Wycombe Rd (e of Westbourne St)-Eb	746	794	-48	717	473
W Wycombe Rd (e of Westbourne St)-Wb	733	762	-29	680	871
Oxford Rd -Eb	16	282	-266	4	243
Oxford Rd -Wb	316	426	-110	251	494
Bellfield Rd -Nb	884	547	337	831	628
Bellfield Rd -Sb	689	424	265	668	499
Archway -Nb	67	563	-496	53	685
Archway -Sb	315	713	-398	293	757

PM Peak Hour Flows

Town Centre Link	Test 1	Test 2	Difference T1-T2	Option MP2	Option A
Gas Works Links -Nb	1,270	648	623	1,287	0
Gas Works Links -Sb	686	133	553	918	0
Bridge St -Nb	419	194	226	346	549
Bridge St -Sb	402	221	181	377	110
Westbourne St -Nb	565			532	0
Westbourne St -Sb	146			147	0
Amersham Hill on bridge -Nb	908	934	-26	855	865
Amersham Hill on bridge -Sb	292	611	-319	356	479
Castle St -Eb	326	43	284	359	50
Castle St -Wb	363	189	173	320	113
Corporation St -Sb	204	292	-88	251	304
Crendon St -Nb	908	980	-72	938	1,030
Crendon St -Sb	634	652	-18	697	491
Easton St -Eb	783	1,459	-676	863	1,036
Easton St -Wb	161	0	161	111	0
Abbey Way (by WDC) -Eb	796	946	-151	869	1,022
Abbey Way (by WDC) -Wb	976	2,085	-1,109	1,318	2,126
Q Victoria Rd -Nb	1,078	1,141	-63	1,193	1,054
Q Victoria Rd -Sb	546			568	0
Q Alexandra Rd -Eb	1,084	718	366	1,267	672
Q Alexandra Rd -Wb	747	167	580	892	559
Abbey Way elevated section -Wb		1,352			1,547
Abbey Way elevated section -Eb		1,063			1,447
Lily's Walk (at Abbey Way) -Eb		319			0
Lily's Walk (at Abbey Way) -Wb		417			431
Desborough Rd (by Eden) -Eb	630	216	413	1,235	650
Desborough Rd (by Eden) -Wb	1,142	702	441	879	121
Lily's Walk w of car park -Eb	240	337	-97	240	269
Lily's Walk w of car park -Wb	175	324	-149	232	272
Desborough Rd (w of Bridge St) -Eb	648	631	18	419	406
Desborough Rd (w of Bridge St)-Wb	237	158	78	124	358
Desborough Rd (W end) -Eb	473	222	252	646	440
Desborough Rd (W end) -Sb	659	667	-8	690	575
Desborough Ave -Nb	770	818	-47	794	745
Desborough Ave -Sb	973	836	137	1,062	1,038
Suffield Rd -Eb	353	395	-42	337	544
Suffield Rd -Wb	102	105	-3	77	76
W Wycombe Rd (e of Pastures) -Eb	494	694	-199	618	520
W Wycombe Rd (e of Pastures)-Wb	1,435	1,473	-37	1,410	1,429
W Wycombe Rd (e of Westbourne St)-Eb	771	701	70	882	528
W Wycombe Rd (e of Westbourne St)-Wb	1,102	1,126	-24	1,016	1,488
Oxford Rd -Eb	22	394	-372	16	747
Oxford Rd -Wb	590	745	-155	548	1,321
Bellfield Rd -Nb	1,100	661	439	1,163	803
Bellfield Rd -Sb	774	731	42	803	664
Archway -Nb	142	841	-699	95	741
Archway -Sb	509	720	-211	498	765

12-hour Flows

Town Centre Link	Test 1	Test 2	Difference T1-T2	Option MP2	Option A
Gas Works Links -Nb	10,581	3,898	6,682	12,571	
Gas Works Links -Sb	8,029	2,409	5,621	11,485	
Bridge St -Nb	2,953	747	2,207	2,556	4,662
Bridge St -Sb	4,169	952	3,217	3,782	266
Westbourne St -Nb	3,774			3,315	
Westbourne St -Sb	1,582			1,349	
Amersham Hill on bridge -Nb	8,389	8,532	-143	7,850	8,020
Amersham Hill on bridge -Sb	4,817	5,811	-995	5,498	5,418
Castle St -Eb	1,787	287	1,500	1,688	345
Castle St -Wb	3,365	1,797	1,568	3,076	1,226
Corporation St -Sb	2,637	3,399	-762	2,518	3,261
Crendon St -Nb	10,116	9,487	630	9,796	9,697
Crendon St -Sb	6,563	5,973	590	7,190	5,215
Easton St -Eb	4,580	11,279	-6,699	4,475	9,228
Easton St -Wb	2,197	0	2,197	1,566	0
Abbey Way (by WDC) -Eb	8,555	10,197	-1,642	9,808	10,971
Abbey Way (by WDC) -Wb	12,558	24,075	-11,517	15,230	24,653
Q Victoria Rd -Nb	11,694	12,095	-401	11,961	11,384
Q Victoria Rd -Sb	7,015			7,336	
Q Alexandra Rd -Eb	12,213	7,191	5,022	15,011	7,182
Q Alexandra Rd -Wb	9,423	4,009	5,414	12,273	7,420
Abbey Way elevated section -Wb		15,917			14,666
Abbey Way elevated section -Eb		13,934			16,021
Lily's Walk (at Abbey Way) -Eb		1,047			0
Lily's Walk (at Abbey Way) -Wb		4,130			6,130
Desborough Rd (by Eden) -Eb	5,865	1,937	3,928	10,691	6,179
Desborough Rd (by Eden) -Wb	8,584	4,473	4,110	9,627	887
Lily's Walk w of car park -Eb	2,688	1,913	775	3,024	1,477
Lily's Walk w of car park -Wb	2,856	2,963	-107	3,008	3,700
Desborough Rd (w of Bridge St) -Eb	4,927	3,848	1,079	2,060	4,174
Desborough Rd (w of Bridge St)-Wb	1,409	1,286	123	747	3,696
Desborough Rd (W end) -Eb	2,767	1,772	994	6,522	5,036
Desborough Rd (W end) -Sb	4,852	4,411	441	6,666	5,657
Desborough Ave -Nb	7,412	7,006	406	7,717	5,326
Desborough Ave -Sb	11,683	9,506	2,177	11,959	10,905
Suffield Rd -Eb	5,246	4,592	653	4,311	7,233
Suffield Rd -Wb	1,619	1,969	-350	1,784	1,190
W Wycombe Rd (e of Pastures) -Eb	8,429	10,145	-1,716	8,529	7,252
W Wycombe Rd (e of Pastures)-Wb	11,954	11,280	674	11,351	12,555
W Wycombe Rd (e of Westbourne St)-Eb	9,560	10,142	-582	9,424	7,251
W Wycombe Rd (e of Westbourne St)-Wb	10,472	9,939	533	9,737	12,558
Oxford Rd -Eb	265	3,970	-3,705	134	5,449
Oxford Rd -Wb	4,654	6,066	-1,412	4,060	8,565
Bellfield Rd -Nb	11,172	7,142	4,030	10,781	8,149
Bellfield Rd -Sb	9,437	5,574	3,863	8,829	5,953
Archway -Nb	743	6,586	-5,843	555	7,617
Archway -Sb	4,728	8,390	-3,662	4,553	8,930