Slough Mass Rapid Transit SMaRT

Modelling Report

July 2014

Plan Design Enable

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1. Introduction

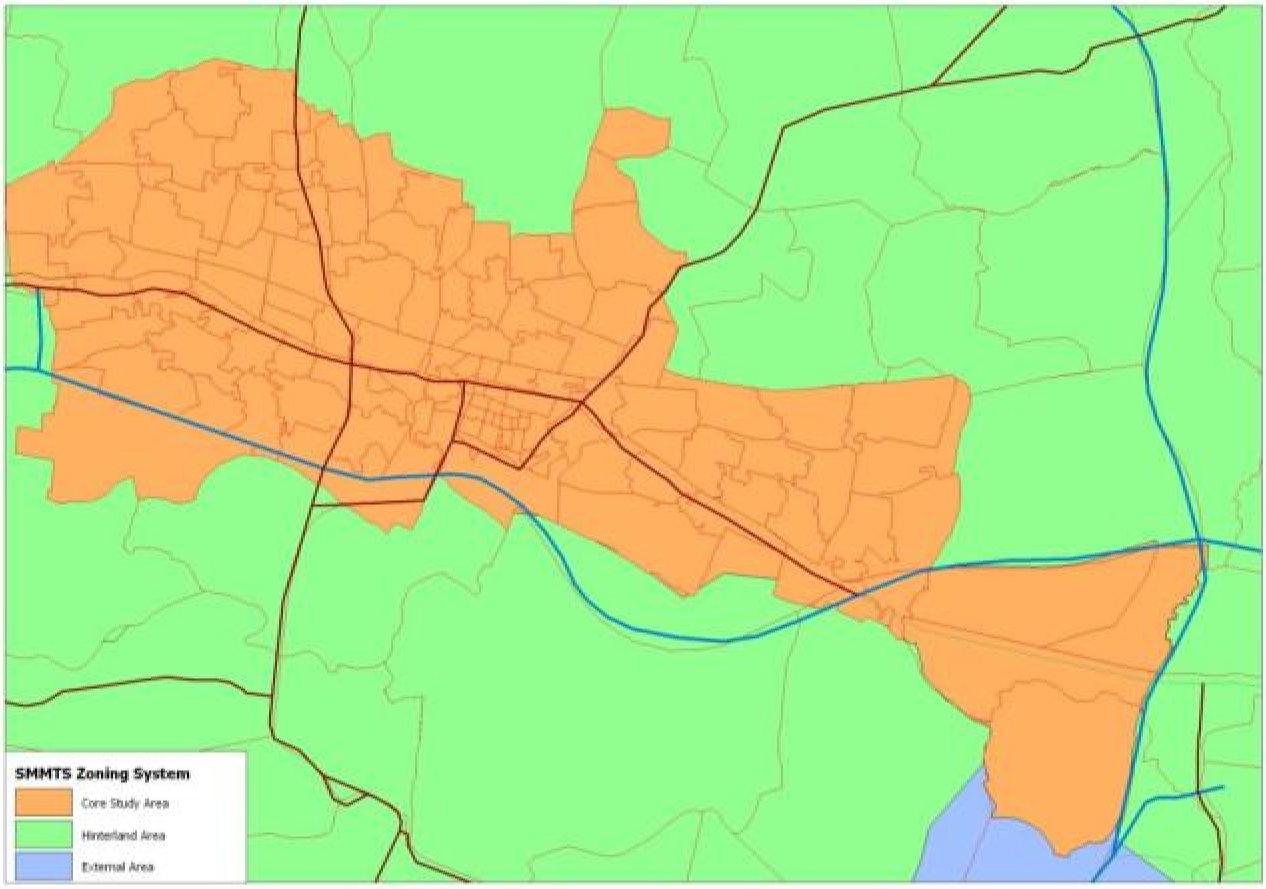
The existing modelling framework

1.1. Atkins developed a multi mode model framework for Slough Borough Council (SBC) in 2009. The Slough Multi-Modal Transport Model (SMMTM) framework has a 2009 base year and contained the following elements:

- A highway assignment model in SATURN;
- A public transport assignment model in EMME;
- A WebTAG compliant demand model in EMME; and
- A DIADEM model for assessing the impact of highway interventions.

1.2. The models cover the entire town of Slough, with a hinterland of Berkshire, Buckinghamshire and the London Boroughs of Ealing, Hillingdon and Hounslow, whilst the rest of the UK made up the external areas. The core study area is shown in Figure 1-1.

Figure 1-1 2009 SMMTS model core study area



1.3. All of the supplied models cover the morning peak, inter and evening peak periods. The base year highway SATURN model has the following modelling characteristics:

- A total of 341 zones, covering the UK;
- Three time periods, AM peak (08:00-09:00), average Inter Peak hour (10:00-16:00) and PM peak (17:00-18:00); There are also one hour pre-peak periods for both AM and PM peak operated by PASSQ function within SATURN;
- Five modelled user classes, including, car employer business, car commuting, car other, light goods vehicles (LGV) and heavy goods vehicles (HGV).

1.4. The base year highway demand has come from a variety of sources such as Road Side Interviews, journey to work census and school data. The SATURN highway assignment model has been calibrated and validated following DMRB's and latest WebTAG guidance, which is fully documented in the Local Model Validation Report (LMVR) issued in January 2011.

1.5. The public transport Assignment Model is EMME based and includes bus and rail modes. The demand is based on specifically collected bus & rail passenger interview survey data and other supplementary datasets such as bus Electronic Ticketing Machine (ETM) and rail NRTS. The model was calibrated and validated in line with guidance, which is fully documented in the Local Model Validation Report (LMVR), and submitted to SBC in December 2011.

1.6. The EMME based Demand Model is a five-stage incremental model that considers the impact of changes in generalised cost of travel on highway and public transport on demand. The demand responses cover frequency choice, main mode choice, time period choice, destination choice, and sub mode choice in increasing sensitivity, in line with WebTAG. The Demand Model represents travel demand over a 24-hour period. It is a Production-Attraction based model with explicit time period choice modelling based on the use of fixed return proportions derived from national average values obtained from DfT NTS survey datasets, subject to local adjustments. The Demand Model iterates between the hourly-based AM, IP and PM supply models and the 24-hour demand model until the required levels of convergence stipulated by TAG are achieved. The utility function uses cost damping and the Value of Time varies with trip length. The demand response sensitivity was calibrated through realism testing on car fuel elasticity, car journey time elasticity and public transport fare.

1.7. Prior to developing the full demand model, an interim tool was required to assess the impact of essentially highway interventions. A DIADEM1 was developed in 2011 for the AM Peak (08:00-09:00), average Inter Peak hour (10:00-16:00) and PM Peak (17:00-18:00). Realism tests were undertaken by measuring demand responses with respect to changes in fuel cost and journey times across three modelled time periods, thereby calibrating the model parameters. The DIADEM allowed for the most sensitive response – destination choice, and also frequency choice (for 'other' trip purpose). It did not account for demand responses due to mode choice because there was felt to be insufficient modal competition to justify its inclusion.

1.8. The highway model has been used to support pinch point funding and for testing the impacts of the Slough International Freight Exchange (SIFE) in Slough Colnbrook area. The public transport and demand models have not been used to date.

The scheme

1.9. The Slough Mass Rapid Transit (SMaRT) is made up of the following elements:

Phase 1 Central Section

1.10. The Phase 1 Central Section of the scheme (as shown in Dwg SBC/T/IT/00248/000/015 in Appendix B) runs from the A4 Wellington Street junction with the Tesco Store Access to the A4 London Road junction with the High Street Langley.

1.11. In the eastbound direction of the Central Section the SMaRT scheme will:

- Widen the carriageway for 60m on the approach to the Tesco access to allow for a larger stacking capacity;
- Create carriageway build outs to help with realignments at the A4 Wellington Street and Wexham Road crossing;
- Widening the carriageway to increase stacking capacity to turn North and South at the A4/A412 Uxbridge Road junction;
- Widen the carriageway for 300m to accommodate a dedicated bus lane starting from Upton Court Road up until High Street Langley. Westbound, it is proposed to widen the road and extend the existing bus lane from Cedar Way to existing bus lane at Cedar Way.

1.12. In the eastbound direction of the western section the SMaRT scheme will:

[1] Dynamic Integrated Assignment and Demand Modelling

- Widen the carriageway for 70m between the junction with High Street Langley Ditton Park Road; and
- Extend the existing bus lane from Cedar Way to Drake Avenue.

Phase 1 Western Section

1.13. The Phase 1 Western Section of the scheme (as shown in Dwg SBC/T/IT/00248/14 in Appendix B) runs from the A4 Bath Road junction with Dover Road to the A4 Bath Road junction with the A355 Farnham Road/ Tuns Lane.

1.14. In the eastbound direction of the Western Section the SMaRT scheme will:

- Realign bus routes to the service road between Dover Road and Galvin Road which runs parallel to the A4 Bath Road thereby avoiding congestion and queues on the A4;
- The service road will be bus only access from the west, with the Dover Road junction amended to include yellow box markings to remove the potential delay for buses;
- Existing parking along the Service Road will be removed (through application of Traffic Orders) and waiting and loading restrictions added along the whole road;
- Bus stops will be relocated onto the service road, providing direct access to the businesses in the Slough Trading Estate. Existing bus stops lay-bys on the A4 will be filled in;
- Widen the A4 Bath Road carriageway for 150m between 172-184 Bath Road to the junction of Salt Hill Avenue to facilitate a westbound bus lane. This requires the purchase of two plots of privately owned land. Aside from being able to widen the carriageway, it is proposed that the remaining land (along with council owned land in between) will be developed by SBC as housing development land;
- Within the purchased lane a one-way bus only lane will be created providing access from the service road (east of Galvin Road) back onto the (widened) A4 Bath Road;
- A 110m section of carriageway on the A4 Bath Road between the junctions of Dover Road and Twinches Lane, and 140m between Ipswich Road and Leigh Road is to be widened to allow for longer approach lanes to signalised junctions.

1.15. In the westbound direction of the western section the SMaRT scheme will:

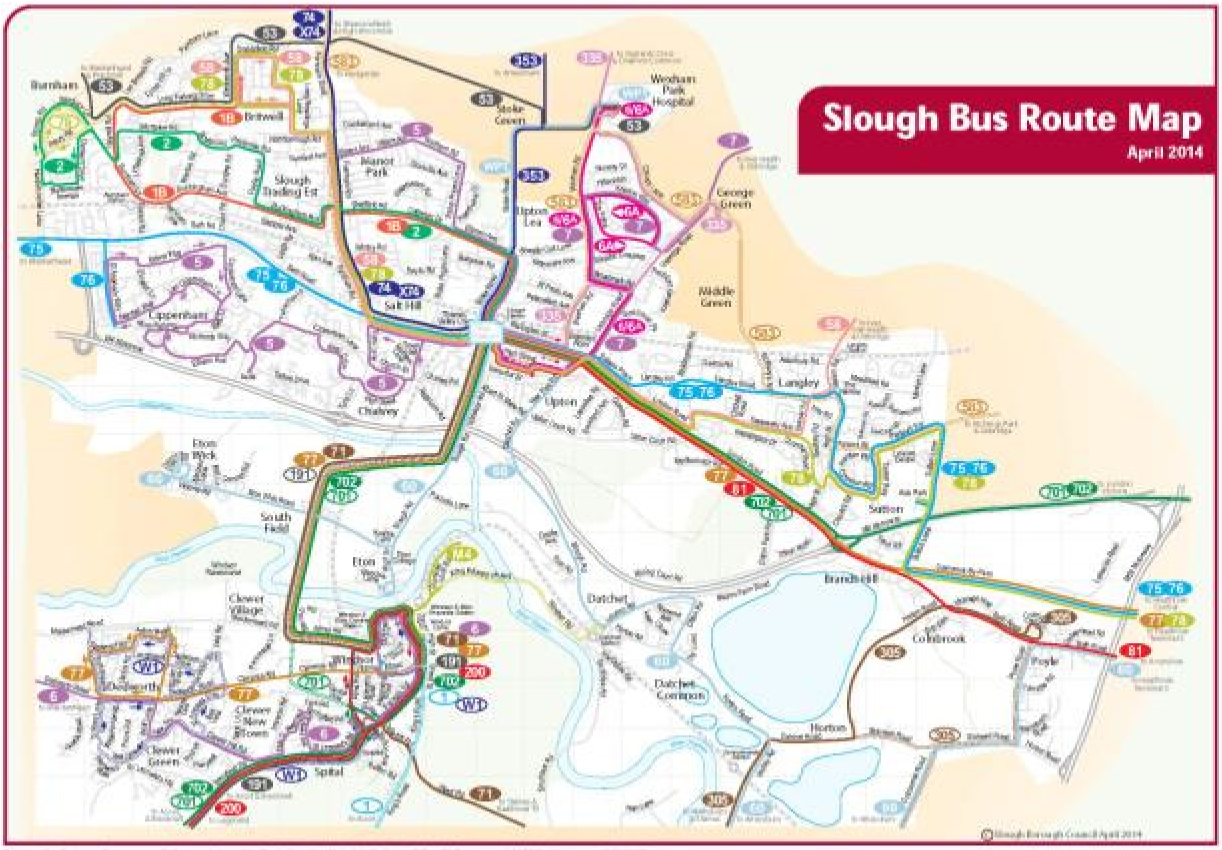
- Widen the carriageway for 100m leading up to Leigh Road junction, and for 60m after the junction to allow for two ahead lanes and one dedicated right-turn lane;
- Create a140m long segregated bus lane which bypasses the Ipswich Road junction.

Scale of impact

1.16. The bus lanes that the scheme introduces do not encroach on highway capacity, so the impacts they produce are fairly neutral on highway users. There is some limited gain in the extension of stacking capacity for (eastbound) traffic using the left-turn lane at the Tesco junction. There will also be some journey time savings due to the implementation of MOVA at some junctions. These will be most achieved outside of peak periods. However, the interventions are unlikely to create generalised cost savings to the highway traffic that would lead to any demand responses, besides potentially some re-routing.

1.17. The impact of the scheme on public transport users is likely to be exclusively to bus passengers, as there are no changes to the rail network. The bus network is shown in Figure 1-2. Bus services on the western section (Three Tuns – A4 West) are operated exclusively by First Beeline under the 7-series branding for Heathrow services. Bus services on the central section (Three Tuns – Brands Hill) are operated by a more complex mix of operators, but the major ones are First (under the 7-series, Green Line and ‘local’ brands), whose services are operated predominantly commercially, and Transport for London (route 81). Other operators (Arriva, Carousel and Redline) provide services between Three Tuns and Slough Bus Station as part of a regional network both commercially and under contract to Buckinghamshire County Council.

Figure 1-2 Slough Bus Route Map



1.18. The services that will most benefit from the scheme are routes 75, 76, 77 and 81, with some improvements to routes 58, 74 and 78. The frequency of service along the western section (phase 1) will be increased from the current 4 buses per hour (bph) to 6 bph. In addition to savings in waiting time, there will be savings in journey (in-vehicle) time of up to 4 minutes2. The network as a whole will benefit from better reliability for all the services, translated into more reliable frequencies and journey times.

1.19. It is worth noting that there are shuttle buses operated by employers on the Slough Trading Estate serving roughly a quarter of the 20,000 employees on the Estate. Users of these shuttle buses could well benefit from using the scheme infrastructure in terms of journey time savings and improved reliability. However, these passengers are not accounted for in the public transport model and any user benefits they are likely to incur will not be estimated through the modelling process but will be accounted for separately.

[2] PM in 2025 DS.

2. Local and current year validation

Introduction

2.1. The assignment models (which have a base year of 2009) cover three time periods for a typical weekday consisting of an AM Peak (08:00-09:00), Inter-peak (10:00-16:00) and PM Peak (17:00-18:00). Ideally, a current year validation would be undertaken whereby a model forecast for 2014 is compared to the current situation. Forecasts could then proceed from 2014 as a more current base year, as opposed to 2009. However, there is insufficient data to progress this validation in terms of inputs such as demand, traffic data, and the time required would pose a major risk to delivery. Instead, we have compared the traffic situation now to how it was in 2009 for journey time and flows on highways and bus. The model is a strategic one covering a large area, and it is also important to check its validation in the main area of interest, the A4 corridor, before the model can be used for scheme testing.

Developments

2.2. In terms of development, there has not been a significant change since 2009. The development in the Heart of Slough (residential, Thames Valley University, land of the Old Library and offices at the bus station) did not take place. Similarly, the SIFE and LRCC2 have not taken place, and the following developments are under construction and will be completed after 2015:

- Cippenham Phase 4 and Phase 5;
- Keneddy Park; Castleview;
- and Linden Homes

2.3. The Asphalt Plant is under construction, and the Rivington and Lexington Apartments are built but partially occupied. Finally, Colnbrook Logistics centre and Horton Quarry are operational, but the traffic, mostly HGV, is primarily between the site and Heathrow airport.

Highway traffic analysis

2.4. The journey time will be a key element to estimating user benefits which will underpin the business case. The LMVR (issued January 2011) indicates good parity between model and observed highway journey times on the A4, as shown in Table 2-1, except for the AM in the westbound direction at the eastern section.

Figure 2-1 Journey time Survey routes

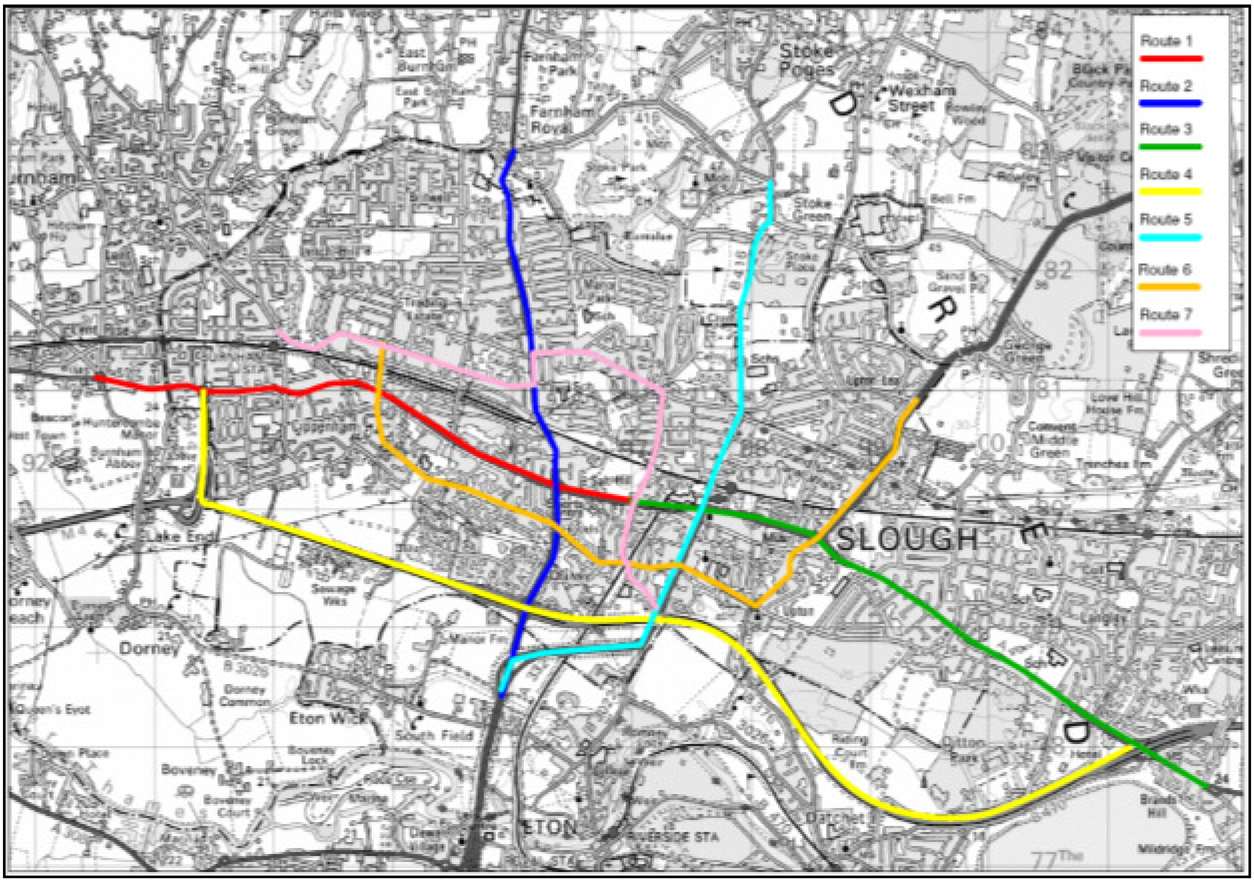


Table 2-1 Base year - highway journey time validation AM, IP, PM modelled & observed

Route No.	Route Description	Direction	Journey Time		Diff in sec	% Diff	Within 15% (or 60secs if higher)
			Observed	Modelled			
AM							
Route 1	A4 Bath Rd/ Lake End Rd to Stoke Pages Lane	EB	00:19:33	00:19:36	3	0%	✓
		WB	00:13:13	00:15:04	111	14%	✓
Route 3	A4 Bath Rd/ Stoke Page Lane to A4 London Rd/ Sutton Lane	EB	00:11:46	00:11:36	-10	-1%	✓
		WB	00:18:58	00:14:10	-288	-25%	×
IP							
Route 1	A4 Bath Rd/ Lake End Rd to Stoke Pages Lane	EB	00:11:01	00:11:10	9	1%	✓
		WB	00:10:24	00:11:28	64	10%	✓

Route No.	Route Description	Direction	Journey Time		Diff in sec	% Diff	Within 15% (or 60secs if higher)
			Observed	Modelled			
Route 3	A4 Bath Rd/ Stoke Page Lane to A4 London Rd/ Sutton Lane	EB	00:11:06	00:10:57	-9	-1%	✓
		WB	00:11:39	00:11:07	-32	-5%	✓
PM							
Route 1	A4 Bath Rd/ Lake End Rd to Stoke Pages Lane	EB	00:12:41	00:12:55	14	2%	✓
		WB	00:15:47	15:56	9	1%	✓
Route 3	A4 Bath Rd/ Stoke Page Lane to A4 London Rd/ Sutton Lane	EB	00:15:34	00:13:20	-134	-14%	✓
		WB	00:14:27	00:13:59	-28	-3%	✓

2.5. Similarly, the LMVR indicates that the screenline SL2 for the A4 shows good association between model and observed flows, as listed in Table 2-2

Figure 2-2 RSI Screenlines and Cordons with Survey Directions

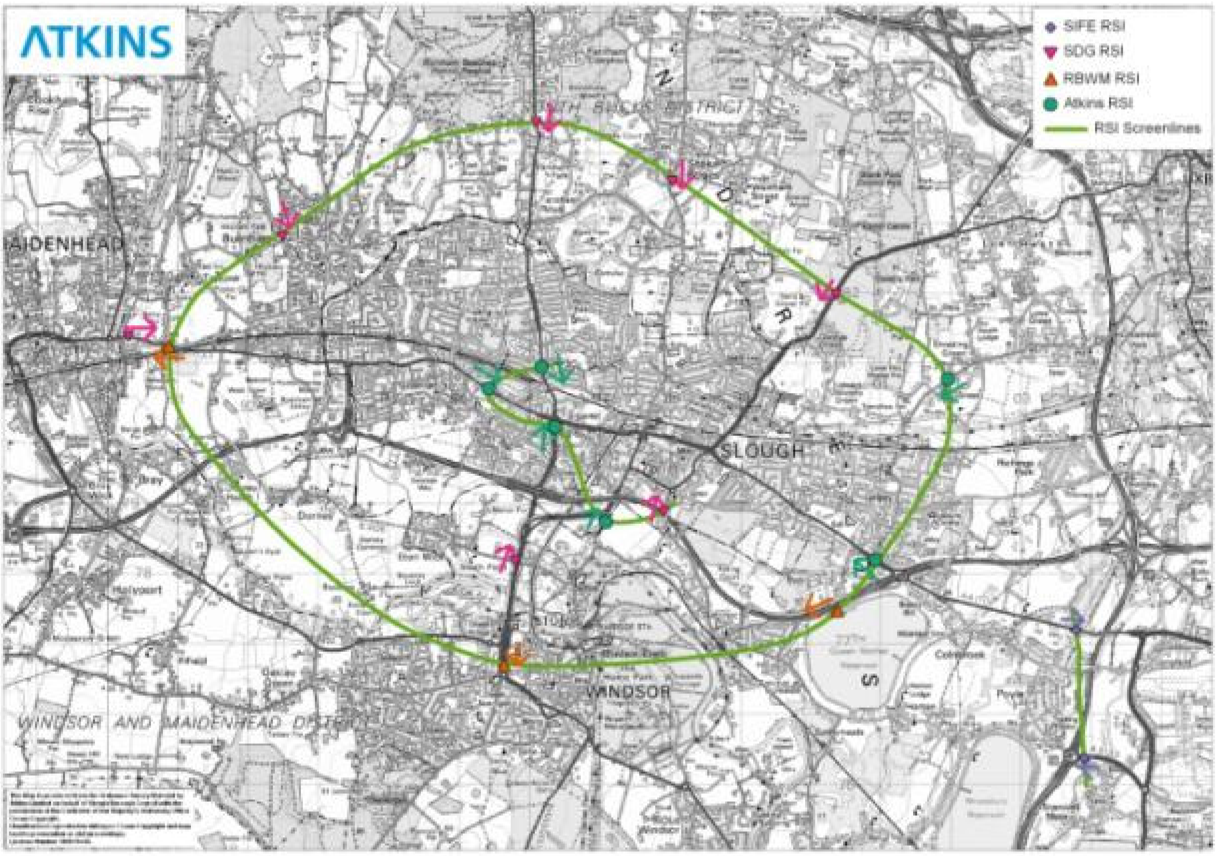


Table 2-2 Base year - highway traffic volumes across A4 corridor modelled & observed (pcu/hr)

Period	Direction	Obs.	Mod.	Abs. Diff	% Diff.	GEH	DMRB	
							Flow	GEH
AM	NB	5299	5207	-92	-2%	1.3	✓	✓
	SB	5327	5141	-186	-3%	2.6	✓	✓
IP	NB	4075	3825	-250	-6%	4	✓	✓
	SB	3946	3995	49	1%	1	✓	✓
PM	NB	5594	5506	-88	-2%	1	✓	✓
	SB	5177	5090	-87	-2%	1	✓	✓

2.6. In terms of flow validation on the A4 link itself, Table 2-3 shows that the model generally validates well.

Table 2-3 Base year - highway validation on A4 modelled & observed (pcu/hr)

Location	Direction	Count (Total PCUs)	Model	Diff.	% Diff.	GEH	DMRB	
							Flow	GEH
AM								
A4 Bath Road (Inner Screenline)	Inbound(EB)	602	387	-215	-36%	9.7	✓	✓
A4 Bath Road (Inner Screenline)	Outbound(WB)	378	348	-30	-8%	1.6	✓	✓
A4 Bath Road (Outer Cordon)	Inbound(EB)	833	947	114	14%	3.8	✓	✓
A4 Bath Road (Outer Cordon)	Outbound(WB)	984	1331	347	35%	10.2	✓	✓
IP								
A4 Bath Road (Inner Screenline)	Inbound(EB)	492	419	-73	-15%	3.4	✓	✓
A4 Bath Road (Inner Screenline)	Outbound(WB)	519	450	-69	-13%	3.2	✓	✓
A4 Bath Road (Outer Cordon)	Inbound(EB)	854	834	-20	-2%	0.7	✓	✓
A4 Bath Road (Outer Cordon)	Outbound(WB)	842	895	53	6%	1.8	✓	✓
PM								
A4 Bath Road (Inner Screenline)	Inbound(EB)	387	359	-28	-7%	1.4	✓	✓
A4 Bath Road (Inner Screenline)	Outbound(WB)	800	431	-369	-46%	14.9	✓	✓

Location	Direction	Count (Total PCUs)	Model	Diff.	% Diff.	GEH	DMRB	
							Flow	GEH
A4 Bath Road (Outer Cordon)	Inbound(EB)	1027	1056	29	3%	0.9	✓	✓
A4 Bath Road (Outer Cordon)	Outbound(WB)	1009	1302	293	29%	8.6	✓	✓

2.7. The above provides some evidence that although the SMMTM is of a strategic nature, nevertheless it validates well in the area of interest and provides a good basis for forecasting interventions on the A4.

2.8. Table 2-4 compares flows at major junctions along the A4, between 2010, when the model was being developed and Manual Classified Counts (MCC) undertaken in June 2013.

Table 2-4 Flows along the A4

Name of Junction	Entry Arm	AM Peak (07:00-10:00)			PM Peak (16:00-19:00)		
		May 2010	June 2013	Growth	May 2010	June 2013	Growth
A4 Bath Road/A355 Tuns Lane	North	2544	2386	-6%	2651	2187	-18%
	East	3487	4304	23%	4223	4542	8%
	South	4634	4464	-4%	3228	3185	-1%
	West	2122	2022	-5%	2808	3492	24%
A4 Bath Road/Stoke Poges Lane	North	1453	1179	-19%	1447	1010	-30%
	East	3315	3195	-4%	4023	3245	-19%
	South	931	1215	31%	1166	1300	11%
	West	3442	3136	-9%	3516	3493	-1%
A4 Wellington Street/ William Street	North	2865	2312	-19%	2980	2585	-13%
	East	3002	2427	-19%	3230	2546	-21%
	West	4045	5150	27%	4228	5789	37%
A4 Wellington Street/ A412 Uxbridge Road	North	3639	3713	2%	3034	3704	22%
	East	3529	3275	-7%	3444	3261	-5%
	South	1975	1967	0%	2034	2067	2%
	West	3160	3418	8%	5009	4881	-3%

2.9. Data for 2013 was available for the AM and PM peak periods only. The differences in traffic flows have in part resulted from changes to the local road network between 2010 and 2013, forcing traffic to divert via other routes. Two examples of this would be, the introduction of the Chalvey Way One-Way scheme has caused traffic to divert via the A4 Bath Road/A355 Tuns Lane junction. Moreover, the regeneration of the Heart of Slough Scheme (most notably the closure of the southern entry to the A4 Wellington Street/William Street) has caused traffic to divert via the western arm of the same junction. In any case, it can be seen that although there has been some increases in volume, overall traffic has in fact reduced by about 5% on 2010 in either peak. Caution also needs to be applied as due to changes to the network (including the above), traffic flow may not be reflective of normal conditions (i.e. driver route choice takes time to settle).

2.10. Table 2-5 compares Tomtom journey times between 2010 and 2013, along the A4 between Leigh Road and Colnbrook Bypass. This shows that between 2010 when the SMMTM was built and 2013, travel times have increased in the peak periods in the peak direction.

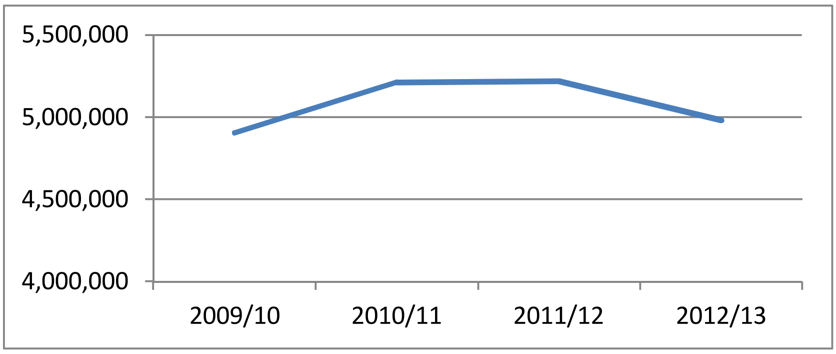
Table 2-5 Tomtom Journey times along A4

Time Period	Direction	2013 (min)	2010 (min)	Increase
AM	EB	24.2	20.2	20%
	WB	26.7	24.8	8%
IP	EB	16.6	15.3	9%
	WB	18.0	15.7	14%
PM	EB	21.0	19.2	9%
	WB	27.2	22.1	23%

Public transport analysis

2.11. Information on individual bus operator patronage is confidential, but the total patronage for all buses operating in Slough has not changed significantly between 2009 and 2013, as can be seen by Figure 2-3.

Figure 2-3 Bus Patronage in Slough (passengers per annum)



2.12. This comparison is for the whole network, what is more pertinent is the number of bus patronage along the corridor. So, if we sum the important services on the corridor (routes 58, 74-78, and 81), the total patronage in 2009 was 3.2 mppa3. This compares well with the model bus usage for these routes of 3.6 mppa.

2.13. The public transport LMVR (issued December 2011) showed extremely good correlation in passenger flows along the A4 as can be seen from Table 2-6.

[3] Million passengers per annum

Table 2-6 Bus passenger comparison, 2009

Location	Direction	Passenger Count	Model	Diff.	% Diff.	GEH	DMRB	
							Flow	GEH
AM								
A4 London Road	Inbound(WB)	392	293	-99	-25%	5.4	✓	✓
A4 London Road	Outbound(EB)	131	134	3	2%	0.3	✓	✓
A4 Bath Road	Inbound(EB)	60	88	28	47%	3.3	✓	✓
A4 Bath Road	Outbound(WB)	66	66	1	1%	0.1	✓	✓
IP								
A4 London Road	Inbound(WB)	139	163	24	17%	1.9	✓	✓
A4 London Road	Outbound(EB)	174	167	-7	-4%	0.5	✓	✓
A4 Bath Road	Inbound(EB)	45	66	21	47%	2.8	✓	✓
A4 Bath Road	Outbound(WB)	27	49	22	81%	3.6	✓	✓
PM								
A4 London Road	Inbound(WB)	186	181	-5	-3%	0.4	✓	✓
A4 London Road	Outbound(EB)	207	213	7	3%	0.4	✓	✓
A4 Bath Road	Inbound(EB)	72	73	1	1%	0.1	✓	✓
A4 Bath Road	Outbound(WB)	49	47	-2	-4%	0.3	✓	✓

2.14. The journey time according to the timetable has increased materially between 2009 and 2014 for most services, especially in the AM and PM peaks, as can be seen from Table 2-7.

Table 2-7 Bus timetable journey times (JT) (min)

Timetable JT (mins.)		2009			2014			2014-2009			2014-2009 (%)		
Line	Direction	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
58	EB	72	65	70	79	71	83	7	6	13	10%	9%	19%
	WB	67	63	70	81	70	85	14	7	15	21%	11%	21%
74	EB	73	59	65	78	59	72	5	0	7	7%	0%	11%
	WB	65	60	70	73	61	75	8	1	5	12%	2%	7%
75	EB	85	66	76	85	66	76	0	0	0	0%	0%	0%
	WB	80	69	81	80	69	81	0	0	0	0%	0%	0%

Timetable JT (mins.)		2009			2014			2014-2009			2014-2009 (%)		
Line	Direction	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
76	EB	64	54	62	64	56	62	0	2	0	0%	4%	0%
	WB	65	58	69	65	58	69	0	0	0	0%	0%	0%
77	EB	74	62	70	86	72	89	12	10	19	16%	16%	27%
	WB	78	63	78	66	57	66	-12	-6	-12	-15%	-10%	-15%
78	EB	62	55	59	67	62	72	5	7	13	8%	13%	22%
	WB	58	59	60	71	58	70	13	-1	10	22%	-2%	17%
81	EB	-	-	-	59	60	69	-	-	-	-	-	-
	WB	-	-	-	55	53	66	-	-	-	-	-	-

2.15. It can be seen that the run time for route 77 has changed significantly, but this is due to the change in definition of where the directional routes start. If the eastbound and westbound run times are summed, the result is that the total gives no change in AM, 4 min. additional in IP and 7 min. in the PM.

3. Forecast methodology

Proportionality in modelling approach

3.1. The analysis in the previous sections has demonstrated that the SMMTM validates reasonably well for highway and public transport passengers in the area of interest, both in terms of flows and journey times. It was also observed that the change between 2009 when the model was developed, and the current situation is not significant, thereby minimising the need for a current year validation.

3.2. Section 3.2 of WebTAG (Unit T) discusses the concept of proportionality in model design. Below we provide a summary of salient points in that section that need to be considered.

3.3. The Unit states[4] that the most appropriate modelling approach will depend on the type of scheme, the circumstances, its objectives and the stage of the appraisal and decision- making process. In the early stages when the best transport options to solve the identified problems are examined, more light-touch methods may be appropriate. That said, one must ensure that the indications from such models do not give rise to unrealistic expectations of benefits that are unlikely to result from a full modelling approach.

3.4. For highway schemes, WebTAG recommends that '.. the potential impact of induced traffic should be recognised and it is highly recommended to scope the need for a demand model at an early stage..'. In the case of public transport schemes, much of the patronage will be extracted from existing public transport services, and a public transport assignment model provides information on the potential viability of the scheme. In later stages of scheme development, WebTAG states that a fully specified appraisal and the proportionality of the modelling approach will need to be discussed in the ASR.

3.5. WebTAG discusses the trade-offs between model complexity and constraints on resource, data requirements and expertise. In general, the model design will depend on the nature of the problem and their likely solution, the size of the study area, the number of options to be tested, data availability and the need to update models and conduct new surveys, timescale for model development; and finally the required accuracy of the recommendations.

3.6. The WebTAG Unit states that the scheme scope may not necessitate a "full" modelling specification in some circumstances. For example, '..a bus priority strategy aimed primarily at providing a better level of service for existing bus passengers with no affect on other modes may require only a public transport supply (assignment) model to provide the necessary inputs to a relatively simple appraisal…'

3.7. The scheme being considered effectively involves the addition of some off-line dedicated bus lanes, and the improvement of signal timing through MOVA, with minimal increase in stacking capacity for left turns at the Tesco and Sainsbury junctions. For those reasons, we believe that the proposed scheme does not require a fully specified variable demand model, rather minimal modelling because the scheme simply enhances the bus service offering with hardly any encroachment on the highway supply.

The proposed approach

3.8. The key objective of the strategic modelling is to be able to give an accurate forecast of the likely transport impacts that the proposed SMaRT scheme would have on public transport passengers, and highway users on the A4 and the surrounding road network. The scheme will improve journey times and journey time reliability of the existing bus services through a segregated route next to the STE and a series of priority measures and localized frequency changes. The scheme also involves changes to some junctions to give them greater capacity and improved timings.

3.9. It is expected that the journey time savings are not sufficiently significant to impact on modal shift. The full variable and WebTAG compliant model built within SMMTM in 2009 has the following demand response hierarchy (in line with WebTAG): choice of frequency, mode, departure time,

[4] Para-phrasing

destination, sub-mode, ranked in increasing sensitivity. The demand model calibration produced a theta (scaling parameter) for mode choice of about 0.7 for most trip purposes, and at the same level as departure time choice, which means that mode choice is 30% weaker than destination choice.

3.10. In the demand model, the public transport destination choice has a lambda (sensitivity parameter) of around 0.03, compared to route choice which would typically have a value of around 0.1. This implies that when a cost change is introduced following a public transport intervention, the most sensitive response is to change route. This is followed by a change in destination which is 3 times weaker than the route change response, followed by mode choice which is yet again 30% weaker than destination choice. Although this is an extremely rough estimate, it does give the order of magnitude of the likely demand responses to a public transport intervention. Given the scope of scheme impacts, and the WebTAG advice, it is proposed that the appraisal uses a 'fixed matrix' assignment for highway and public transport in the first place. Any other more involved modelling is not justified and will lead to extreme risk of delivery, given the complexity of the demand model and the fact that it has not been used in forecast mode to date. It is also worth noting that the public transport model does not allow for crowding, and when the supply elasticity is zero, fixed matrix assignment will understate benefits and overstate disbenefits.

3.11. The potential impacts of the SMaRT are analysed using the existing SATURN and EMME highway and public transport assignment models respectively, currently available at SBC. The appraisal using this proportionate approach is if anything under-stating benefits. The direct benefits received by users changing mode from car to public transport and the indirect impacts of this on reduced congestion is not captured and the benefit total will therefore err on the side of caution.

3.12. Forecasts for two years, 2015/16 (the year of scheme opening) and 2025/26 (ten years thereafter) are carried out. The Do-Minimum (DM) scenario includes all key committed development and (highway and public transport) schemes in Slough that are forecast to be completed by the end of each forecast year.

3.13. Transport demand growth is accounted for in two ways:

- Demand generated by new key development sites will be added according to information obtained from the relevant Transport Assessments (TA), and in agreement with SBC. The trip ends were checked against databases such as TRICS and applied to the relevant zone(s) affected. The trip distribution of these zones is in line either with the TA or with any existing trip patterns already there;
- Background demand growth will then be applied using TEMPRO v6.2 minus growth already accounted for in the above so that growth is restrained to NTEM. As a demand model is not used when undertaking the forecasts, elasticity of fuel cost and income is applied using TEMPRO factors (Table 4A, TEMPRO Guidance Note, 2006). This will reflect the impact of these two factors on the travel patterns.

3.14. The Do-Something (DS) scenario considers the sole addition of bus lanes, the new SMaRT service, the improvement to signalling through MOVA, and additional stacking capacity as outlined in section 1.6.

Transport Models

3.15. In order to provide a base for assessing the impact of the scheme four scenarios-strategies have been created:

- 2015 Do Minimum – derived from the Base Year with a check of the TEMPRO growth and committed development assumptions plus the incorporation of committed highway interventions;
- 2015 Do Something – based on the 2015 Do Minimum with the addition of the changes due to the proposed scheme;
- 2025 Do Minimum – derived from the 2015 Do-minimum plus TEMPRO growth and development assumptions in the intervening period between 2015 and 2025 and ; and

- 2025 Do Something – derived from the 2015 Do-Something plus TEMPRO growth and development assumptions.

4. Demand assumptions

Introduction

4.1. The DM was developed from the base year case by taking into account the growth in demand arising from changes in demographics and macro-economic factors between the 2009 base year and 2015/25 forecast years. The forecast growth in travel demand is described in more detail within this section.

Growth in Demand

4.2. WebTAG Unit M4, Section 7 states that the forecast trip end growth should be consistent with TEMPRO at the study area level, in order to allow consistency between different parts of the country when justifying transport proposals, as well as reducing the risk of optimism bias.

4.3. Accordingly, the growth in demand between the base year and the forecast years were derived using two datasets:

- Central Government forecasts provided by TEMPRO v6.2 dataset; and
- Local planning data provided by SBC including the indentified development sites within the model area.

4.4. The trip end growth was restricted to TEMPRO growth forecasts at the study area level within the Slough sub-region and distributed within each TEMPRO district on the basis of the more detailed local planning data. Outside the Slough sub-region, TEMPRO growth was applied directly.

4.5. The development of the trip ends was undertaken in the following six steps:

1. Determine the growth factors projected by TEMPRO for the UK and the sub-region between the base and the forecast years;
2. Apply the TEMPRO growth to the base year trip ends at the TEMPRO district level;
3. Within the Slough sub-region, redistribute the forecast growth in trip ends using more detailed planning data provided by the local authorities;
4. Control the resulting demand matrices to the growth in TEMPRO trip ends to ensure consistency with the sub-regional and national forecasts.
5. Produce forecast year demand matrices by furnessing the existing base demand matrices to match the forecast trip ends; and finally
6. Apply the correction to allow for the impact of fuel cost and real terms income on travel patterns

4.6. This process was applied independently for each time period and

- Mode (bus and rail), for the PT model, and
- User class, for the HY model.

4.7. The SMMTS base year model includes 3 vehicle types, i.e. car, light good vehicles (LGV) and heavy goods vehicles (HGV). The car matrix is split into 3 trip purposes during matrix construction, as follows;

- Employer Business (in-Work);
- Commute; and
- Other.

4.8. No purpose split has been applied to LGV and HGV matrices. This brings the total modelled classes to 5. Further details of each stage in the process are provided below.

Step 1 - TEMPRO Growth Factors

4.9. The growth forecasts were calculated using TEMPRO (version 6.2) to extract data from the National Trip End Model (NTEM) version 6.2 dataset in May 2014. The growth factors for both highway and public transport are presented in Appendix A.

Step 2 - Applying the TEMPRO Growth

4.10. The TEMPRO growth was applied to the base year trip ends at the TEMPRO zone level using the following process:

- aggregate 2009 base year origin/ destination (O/D) demand matrices, individually by time period and mode (for PT) or user class (for HY);
- apply the TEMPRO growth factors between the 2009 base year and the 2015 and 2025 forecast year trip ends; and
- calculate the trip ends for the 2015 and 2025 forecast years by time period and mode (for PT) or user class (for HY), using the formula:

  *OD_Future_background = OD_base * growth factor*

Step 3 – Using Local Planning Data

Development Sites

4.11. SBC provided information regarding the identified land use developments planned for the Slough area up to 2015 and 2025 to enable the TEMPRO growth to be distributed across the sub-region. The location of the developments and their planning status is summarised in Table 4-1.

Table 4-1 Development List

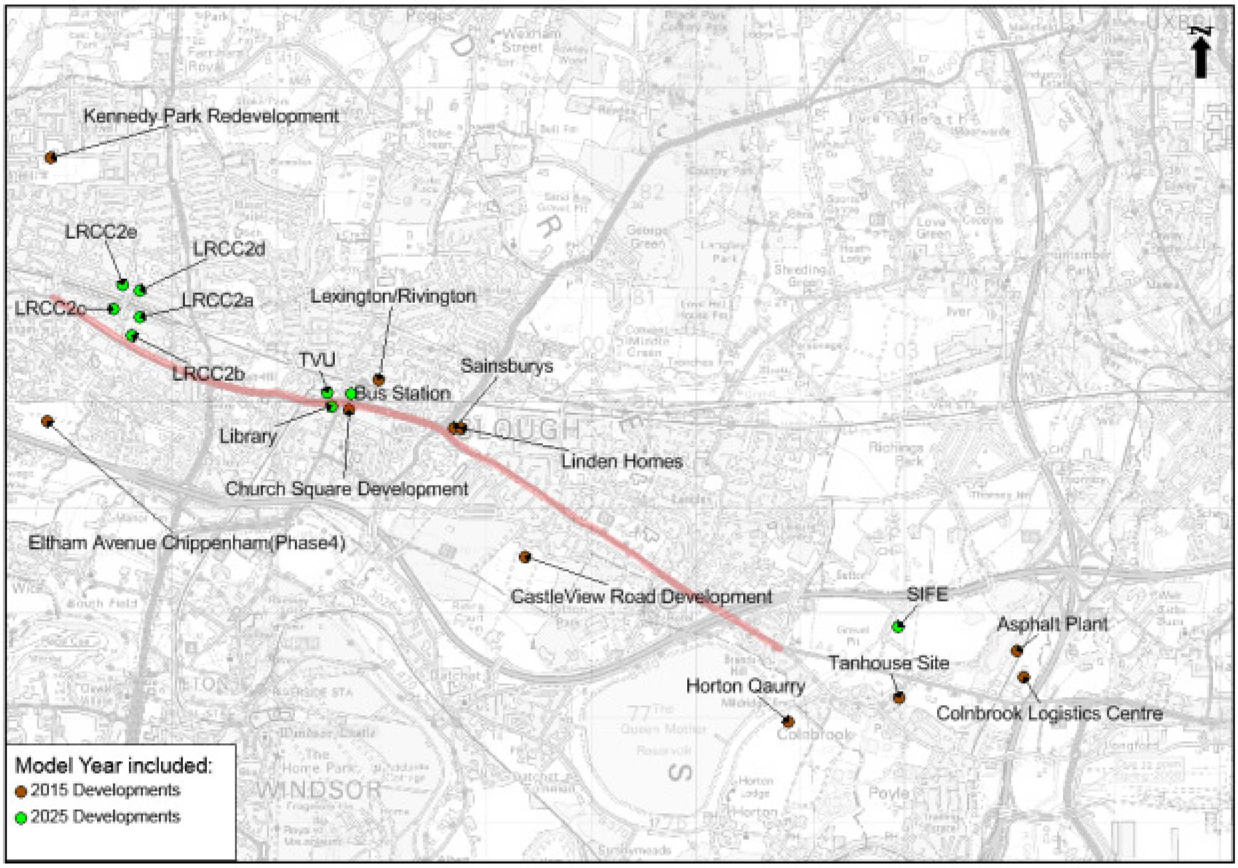
Development	2015 Consider?	2025 Consider?	Type	Gross Floor Area (m2)
Rivington and Lexigton Apartments	Yes	Yes	Mixed Use (383 dwellings + 1627m² retail + community uses)	
TVU[5] Site - Housing	No	Yes	Residential (1500 dwellings)	-
TVU Site - Education	No	Yes	Education Facility	2,500
TVU Site - Offices	No	Yes	Office	4,908
TVU Site - Retail	No	Yes	Retail	3,580
Old Library Site - Housing	No	Yes	Residential (91 dwellings)	-
Old Library Site - Hotel	No	Yes	Hotel (120 rooms)	-
Old Library Site - Retail	No	Yes	Retail	1,072
Former Bus Station Site (Office Tower)	No	Yes	Office	43,800

[5] Thames Valley University

Development	2015 Consider?	2025 Consider?	Type	Gross Floor Area (m2)
1 Brunel Way	No	Yes	Office	increase of 3,978
Octagon (parking lot near bus station)	No	Yes	Office (B1)	27,845
Cippenham Phase 4	Yes	Yes	Residential (164 dwellings)	-
Cippenham Phase 5	Yes	Yes	Residential (20 dwellings)	-
Asphalt Plant	Yes	Yes	Industrial	-
Colnbrook Logistics	No	Yes	Industrial	-
Aggregate Processing Plant	No	Yes	Industrial	
Kennedy Park - Housing	Partial	Total	Residential (258 social dwellings)	1,500
Kennedy Park - Retail (A1/A2/A3)	Partial	Total	Retail	1,161
Kennedy Park - Community Centre (D1)	No	Yes	Community land use	411
Castleview	Partial	Total	Residential (300 dwellings)	-
Sainsburys	Yes	Yes	Retail	9,282
Linden Homes - Rear of Sainsburys	Yes	Yes	Residential (120 dwellings)	-
Regeneration of Slough Trading Estate	Partial	Total	Office/hotels (assume the same demand as in the present)	-
Church Square (The New Library)	Yes	Yes	Assume the same demand as the old library	-
Tanhouse MRF	No	No	Assume the same demand as the present facility	-
SIFE	No	Yes	Industrial	-

4.12. The locations of the identified developments in the Slough area are depicted below in Figure 4-1 for 2015 and 2025.

Figure 4-1 Developments in Slough for 2015 and 2025



Development Trip Ends

4.13. The local planning data specified the location of development sites, the land-use and number of households and/or employment but the transportation models requires the number of trips. In order to calculate the number of trips associated with each development site, trip rates were applied to each development. For the highway demand, the trip rates were taken from the Transport Assessment available for each of the sites

4.14. For the public transport, the trip rate database package TRICS (version 6.8.1) was used since the Transport Assessment had no information on this subject. The TRICS database stores an extensive set of surveys recording travel demand (including, for example, by mode, by time of day etc), throughout UK for a wide range of the different land-uses (and sizes).

4.15. Trip generation rates were extracted from TRICS for the whole of the UK (excluding Northern Ireland) for those sites which did not specifically have trips assigned in their corresponding Transport Assessment Trip generation rates were based on the corresponding land use type. The criteria for selection varied according to the availability of sites.

4.16. The trip rates for Public Transport are given in Table 4-5 and applies to bus and rail combined as in many cases there was no data available for individual sub-modes.

Table 4-2 Trip rates for highway

Development Site	Type of Land Use	Trip Rate Unit (per)	Opening Year	AM Trip Rates		IP Trip Rates		PM Trip Rates	
				In	Out	In	Out	In	Out
Heart of Slough	TVU – Residential	dwelling	2025	0.05	0.22	0.077	0.082	0.2	0.09
	TVU – Education	GFA 100m²	2025	1.53	0.42	0.55	0.75	0.34	0.69
	TVU – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.99	0.52	0.65	0.625	0.86	1.1
	TVU –- Offices	GFA 100m²	2025	1.48	0.2	0.189	0.223	0.19	1.15
	Old Library – Residential	dwelling	2025	0.05	0.22	0.077	0.082	0.2	0.09
	Old Library – Hotel	room	2025	0.13	0.21	0.110	0.114	0.17	0.11
	Old Library – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.99	0.52	0.65	0.625	0.86	1.1
	Bus Station – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.99	0.52	0.65	0.625	0.86	1.1
	Office –- Old Bus Station	GFA 100m²	2025	1.48	0.17	0.189	0.223	0.2	1.21
	Office – Octagon	GFA 100m²	2025	1.48	0.17	0.189	0.223	0.2	1.21
	Office – 1 Brunel Way	GFA 100m²	2025	1.48	0.17	0.189	0.223	0.2	1.21
	Church Square – Community Uses (New Library)	GFA 100m²	2015	0.075	0.087	0.083	0.041	0.062	0.05
Leigh Road Central Core (LRCC) 2	Offices	GFA 100m²	2025	N/A[6]		0.219	0.232	N/A[7]	
	Hotels	room	2025			0.162	0.157		
	Ancillary Buildings	GFA 100m²	2025			0.65	0.625		
		GFA 100m²	2025			0.65	0.625		

[6] Calculated separately due to the big number of uses and inherent complexity of calculations.
[7] Calculated separately due to the big number of uses and inherent complexity of calculations.

Development Site	Type of Land Use	Trip Rate Unit (per)	Opening Year	AM Trip Rates		IP Trip Rates		PM Trip Rates	
				In	Out	In	Out	In	Out
LRCC2 (cont.)		GFA 100m²	2025			0.65	0.625		
Cippenham Phase 4	Residential (1/2 Bedrooms)	dwelling	2015	0.119	0.325	0.071	0.082	0.263	0.163
	Residential (3/4/5 bedrooms)	dwelling	2015	0.157	0.539	0.077	0.085	0.464	0.278
Cippenham Phase 5	Residential	dwelling	2015	0.157	0.539	0.077	0.085	0.464	0.278
Asphalt Plant	Industrial	-	2015	N/A					
Kennedy Park	Residential	dwelling	2015	0.126	0.326	0.083	0.041	0.311	0.193
	Retail	GFA 100m²	2015	2.589	1.798	4.66	4.611	6.373	6.346
Horton Quarry	Aggregate plant	-	2015	N/A					
Colnbrook Logistics	CLC	-	2015	N/A					
Castleview	Residential	dwelling	2015	0.137	0.423	0.077	0.083	0.410	0.233
	Education	-	2015	N/A					
Sainsburys	Retail	GFA 100m²	2015	2.589	1.798	4.66	4.611	3.673	3.986
Linden Homes	Residential	dwelling	2015	0.293	0.46	0.077	0.085	0.507	0.36
Rivington Apartments	Residential	dwelling	2015	0.049	0.227	0.077	0.082	0.223	0.113
	A1/A3/A4/D2	GFA 100m²	2015	0.99	0.52	0.65	0.625	0.86	1.1
Lexington Apartments	Residential	dwelling	2015	0.06	0.18	0.077	0.082	0.17	0.11

Table 4-3 Trip rates for public transport

Development Site	Type of Land Use	Trip Rate Unit (per)	Opening Year	AM Trip Rates		IP Trip Rates		PM Trip Rates	
				In	Out	In	Out	In	Out
Heart of Slough	TVU – Residential	dwelling	2025	0.004	0.05	0.01	0.006	0.025	0
	TVU – Education	GFA 100m²	2025	1.89	0.064	0.224	0.968	0.106	0.625
	TVU – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255
	TVU – Offices	GFA 100m²	2025	0.23	0.002	0.032	0.04	0.023	0.209
	Old Library – Residential	dwelling	2025	0.004	0.05	0.01	0.006	0.025	0
	Old Library – Hotel	room	2025	0.008	0.073	0.065	0.025	0.003	0.004
	Old Library – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255
	Bus Station – Retail (A1/A3/A4/D2)	GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255
	Office –- Old Bus Station	GFA 100m²	2025	0.23	0.002	0.032	0.04	0.023	0.209
	Office – Octagon	GFA 100m²	2025	0.23	0.002	0.032	0.04	0.023	0.209
	Office – 1 Brunel Way	GFA 100m²	2025	0.23	0.002	0.032	0.04	0.023	0.209
	Church Square – Community Uses (New Library)	GFA 100m²	2015	0.198	0	0.611	0.496	0.076	0.115
Leigh Road Central Core 2	Offices	GFA 100m²	2025	0.23	0.002	0.032	0.04	0.023	0.209
	Hotels	room	2025	0.008	0.073	0.065	0.025	0.003	0.004
	Ancillary Buildings	GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255
		GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255
		GFA 100m²	2025	0.132	0.111	0.28	0.29	0.222	0.255

Development Site	Type of Land Use	Trip Rate Unit (per)	Opening Year	AM Trip Rates		IP Trip Rates		PM Trip Rates	
				In	Out	In	Out	In	Out
Cippenham Phase 4	Residential (1/2 Bedrooms)	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
	Residential (3/4/5 bedrooms)	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
Cippenham Phase 5	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
Asphalt Plant	Industrial	-	2015	N/A					
Kennedy Park	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
	Retail	GFA 100m²	2015	1.26	0.703	2.804	2.97	1.983	2.071
Horton Quarry	Aggregate plant	-	2015	N/A					
Colnbrook Logistics	CLC	-	2015	N/A					
Castleview	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
	Education	pupil	2015	0.164	0.034	0.062	0.191	0.002	0.002
Sainsburys	Retail	GFA 100m²	2015	0.132	0.111	0.28	0.29	0.222	0.255
Linden Homes	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
Rivington Apartments	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0
	A1/A3/A4/D2	GFA 100m²	2015	1.26	0.703	2.804	2.97	1.983	2.071
Lexington Apartments	Residential	dwelling	2015	0.004	0.05	0.01	0.006	0.025	0

Step 4 – Controlling to TEMPRO Forecast Trip Ends

4.17. The sub-regional trip ends derived from the local planning data and TRICS generation rates were controlled to the TEMPRO-derived growth in trip-ends to ensure consistency with the sub-regional forecasts.

Step 5 – Trip Distribution

4.18. For all the zones with trip ends in the base year model, the distribution of the future year trip ends adopted the distribution from the base year model. However, for development sites in zones with no base year trips ends, the distribution to other zones was taken in proportion to the inverse of the distance squared between the development zone and the other zones. The resulting demand matrices were controlled with the growth in TEMPRO forecast trip ends (through a Furness process) to produce the final demand matrices and ensure consistency with the national forecasts.

Step 6 - Additional growth for the Highway Demand

4.19. Since a demand model is not being used in appraising the scheme, it is necessary to carry out an additional step for the Highway Model, in compliance with TAG Unit M4, paragraph 7.4.13. This consists in factoring up the demand matrices (for all user classes, including HGV and LGV) to take into account the impact of real terms change in income and fuel cost on demand. The factors were calculated based on TAG Data Book Table M4.2.1 – Use of TEMPRO data and are as follows:

Table 4-4 Factors for additional growth

Year	Income	Fuel	Overall income adjustment factor	Overall fuel adjustment factor	Overall adjustment factor
2009/2010[8]	1	1			
2015	1.002388	1.006398	1.002	1.006	1.009
2025	1.028484	1.05715	1.028	1.057	1.087

Growth for Light and Heavy Goods Vehicles

4.20. The growth in LGV and HGV demand was derived from the Department for Transport's National Road Transport Forecasts 2013 for England. HGV demand was also calculated for new development using trip generation rates from the relevant Transport Assessment. Table 4-5 below shows the growth rates used to forecast LGV and HGV from 2010 (as this was the earliest available base year) to 2015 and 2025 respectively.

Table 4-5 Growth for Light and Heavy Goods Vehicles

Vehicle Type	2010 – 2015	2010 – 2025
Light Goods Vehicles	1.065	1.375
Heavy Goods Vehicles	0.984	1.092

Source: DfT National Road Traffic Forecasts 2013 (England)

[8] There is no data available for 2009.

Growth in Demand

4.21. Following the methodology described in Chapter 3, the demand estimated for the forecast years is as presented in Table 4-6 and Table 4-7. Since this a fixed assignment model the matrices are the same for the DM and DS scenarios.

Table 4-6 Growth in highway travel demand by time period

Mode	Time period	2009	2015	Growth 2009-2015	2025	Growth 2009-2025	Growth 2015-2025
Car Business	AM	5064	5,357	5.79%	6,129	21.03%	14.41%
	IP	5280	5,568	5.45%	6,369	20.63%	14.39%
	PM	4689	4,929	5.12%	5,630	20.07%	14.22%
Car Commute	AM	26631	28,527	7.12%	32,637	22.55%	14.41%
	IP	6546	6,930	5.87%	7,938	21.26%	14.55%
	PM	23199	24,476	5.50%	27,905	20.29%	14.01%
Car Other	AM	14242	15,210	6.80%	17,761	24.71%	16.77%
	IP	15638	16,715	6.89%	19,643	25.61%	17.52%
	PM	18513	19,795	6.92%	23,060	24.56%	16.49%
LGV	AM	3243	3,454	6.51%	4,459	37.50%	29.10%
	IP	3810	4,058	6.51%	5,239	37.51%	29.10%
	PM	3438	3,661	6.49%	4,727	37.49%	29.12%
HGV	AM	3243	3,305	1.91%	3,697	14.00%	11.86%
	IP	3735	3,823	2.36%	4,277	14.51%	11.88%
	PM	2245	2,282	1.65%	2,598	15.72%	13.85%

Table 4-7 Growth in public transport travel demand by time period

Mode	Time period	2009	Growth 2009-2015	2025	Growth 2009-2025	Growth 2015-2025	Growth 2009-2015
	AM	1891	1956	3%	2236	18%	14%
	IP	1579	1697	7%	1919	22%	13%
BUS	PM	1580	1642	4%	1816	15%	11%
	AM	3234	3340	3%	3814	18%	14%
	IP	1060	1097	3%	1176	11%	7%
RAIL	PM	2565	2645	3%	2741	7%	4%

5. Network Assumptions

The Highway Model

5.1. The 2009 Base Year Model was created by Atkins for SBC as a suitable basis for assessing the impact of future infrastructure schemes in Slough. The following committed schemes are added to produce the future DM networks:

- Better Bus Area Fund Scheme 2012/2013
- Chalvey One-Way scheme
- Cippenham Roundabout (western arm – increased from one to two right turn lanes)
- A4/Stoke Poges Lane junction (northern arm - increased from one to two right turn lanes)
- Heart of Slough Scheme
- Brunel Way
- Long Reading Lane Traffic Calming
- Leigh Road Central Core 2 Railway Bridge replacement
- Windsor Road/Albert Road Junction Layout
- Changes to road layout changes caused by opening of Sainsbury's Store
- M4 Hard Shoulder Running (for 2025 only)

5.2. In addition, signal timings were updated along the A4 corridor as well the developments mentioned earlier in the report.

5.3. Generalised cost coefficients for the highway model were calculated using the most current Department for Transport (DfT) Transport Analysis Guidance databook (January 2014) to calculate the Values of Time (VOT) and Operating Costs (VOC). The TAG databook was used to calculate values for both the 2015 and 2025 forecast models (based on 2012) prices. The VOT varies by purpose, (either working or non-working), vehicle type and occupancy levels. Similarly VOC are vehicle dependent and vary by speed.

Table 5-1 Generalised Coefficients 2015 (based on 2012 prices)

Category	VoT (pence/min)	Fuel Cost (pence/km)	Non-fuel Cost (pence/km)	Fuel + Non-fuel
AM				
Car Work	55.76	5.79	7.35	13.14
Car commuting	13.82	5.79	0.00	5.79
Car other	17.59	5.79	0.00	5.79
LGV	24.75	8.56	8.16	16.74
HGV	25.44	25.76	15.26	41.02
IP				
Car Work	54.49	5.79	7.35	13.14
Car commuting	13.72	5.79	0.00	5.79
Car other	18.30	5.79	0.00	5.79
LGV	24.75	8.56	8.16	16.74

Category	VoT (pence/min)	Fuel Cost (pence/km)	Non-fuel Cost (pence/km)	Fuel + Non-fuel
HGV	25.44	25.76	15.26	41.02
PM				
Car Work	53.61	5.79	7.35	13.14
Car commuting	13.52	5.79	0.00	5.79
Car other	18.83	5.79	0.00	5.79
LGV	24.75	8.56	8.16	11.63
HGV	25.44	25.76	15.26	41.02

Table 5-2 Generalised Coefficients 2025 (based on 2012 prices)

Category	VoT (pence/min)	Fuel Cost (pence/km)	Non-fuel Cost (pence/km)	Fuel + Non-fuel
AM				
Car Work	67.57	4.69	7.26	11.95
Car commuting	16.72	4.69	0.00	4.69
Car other	20.92	4.69	0.00	4.69
LGV	30.19	7.60	8.16	15.76
HGV	31.03	28.80	15.26	44.06
IP				
Car Work	66.15	4.69	7.26	11.95
Car commuting	16.60	4.69	0.00	4.69
Car other	21.73	4.69	0.00	4.69
LGV	30.19	7.60	8.16	15.76
HGV	31.03	28.80	15.26	44.06
PM				
Car Work	64.98	4.69	7.26	11.95
Car commuting	16.40	4.69	0.00	4.69
Car other	22.46	4.69	0.00	4.69
LGV	30.19	7.60	8.16	15.76
HGV	31.03	28.80	15.26	44.06

The Public Transport Network

5.4. The public transport model uses the highway network as a skeleton, imported from SATURN. On this, it is coded the public transport network considered for the project. A complete list of routes, with headway, can be found in Appendix B.

5.5. The scheme that is appraised has two different types of impacts on the public transport network. One impact comes from the general improvements considered for the highway network, through changes made to the layout of specific junctions and installation of MOVA controlled signal timings, which directly affects all forms of transport including public transport. The second impact comes from the bus lanes that are part of the DS scenario and influences directly the lines operating along the A4 corridor.

5.6. Routes 75 and 76 operate on the western part and partially on the eastern part of the corridor. Routes 77 and 81 operate along the full section of the eastern part of the corridor.

Figure 5-1 Route 75 (partial image)

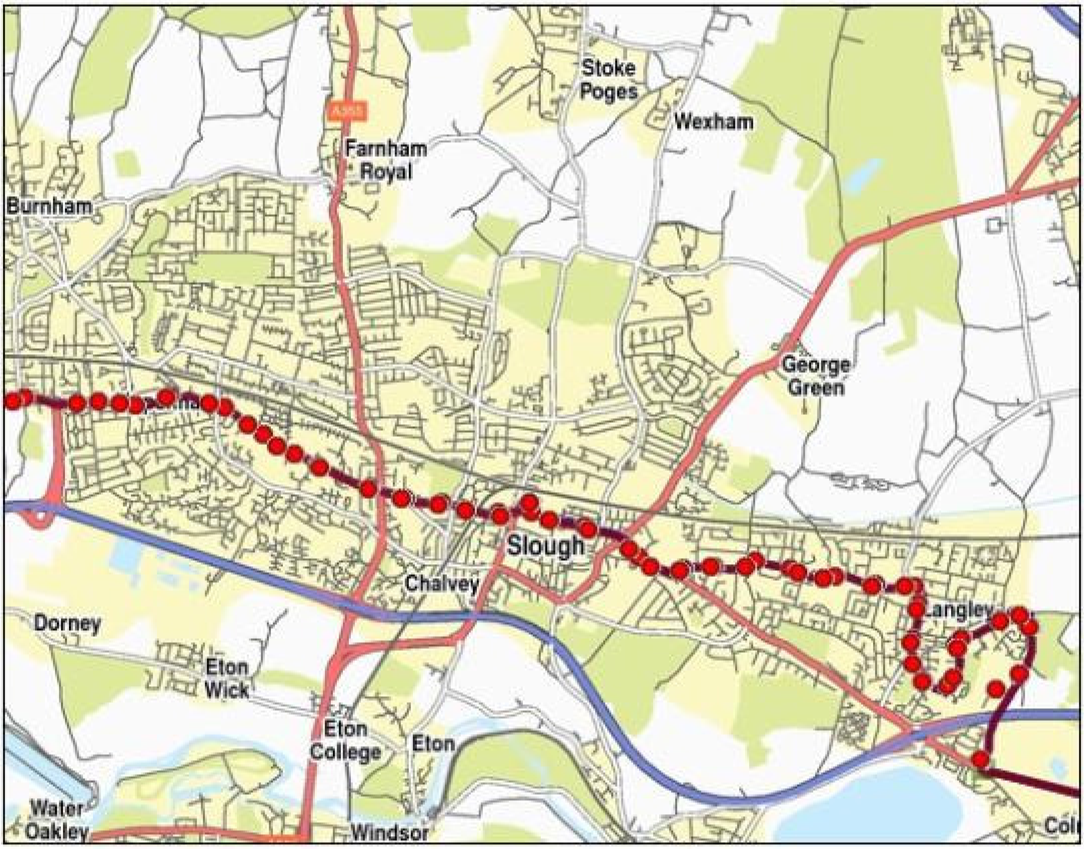


Figure 5-2 Route 76 (partial image)

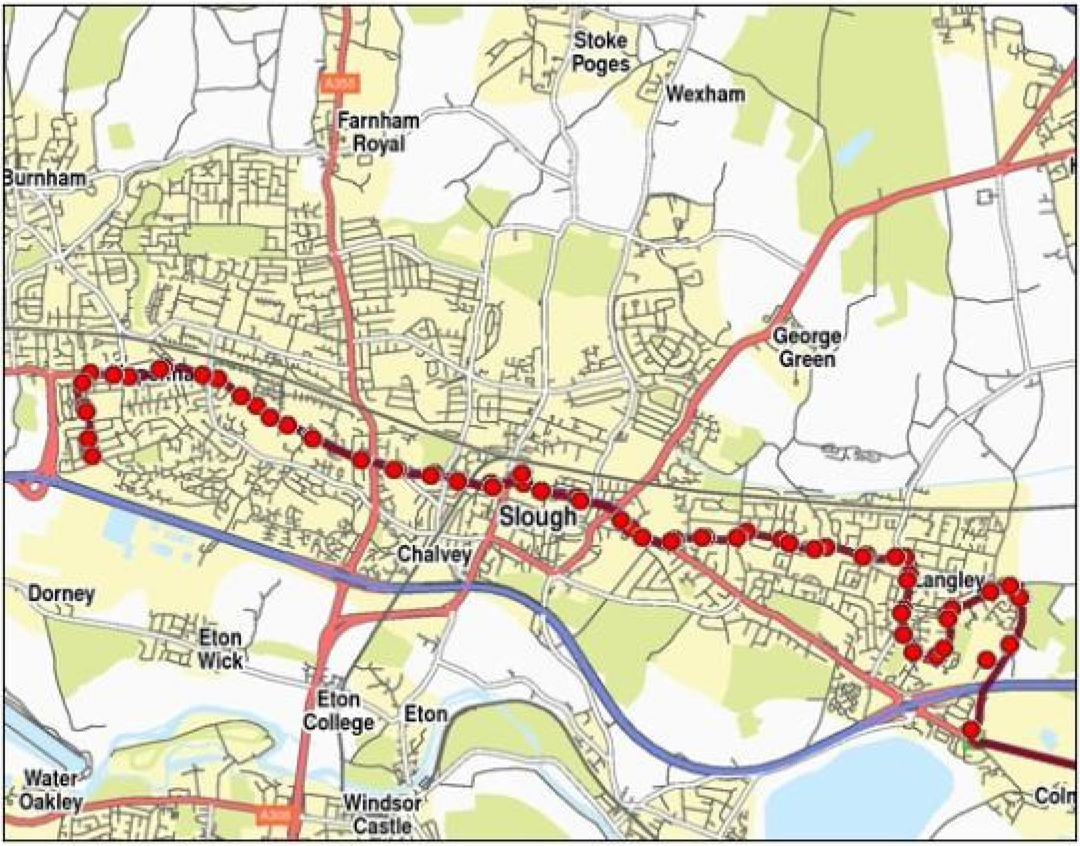


Figure 5-3 Route 77 (partial image)

Figure 5-4 Route 81 (partial image)

Source: http://www.travelinesoutheast.org.uk

5.7. The parameters used in the models are the same as those calibrated in the Base Year model:

- For the bus assignment:
  - Wait Time Weight: 1.5
  - Walk Time Weight: 2
  - Boarding Weight: 1
- For the rail assignment:
  - Wait Time Weight: 2.5
  - Walk Time Weight: 1.5
  - Boarding Weight: 1.

6. Do-Minimum Traffic Forecasts

Introduction

6.1. The DM model is run for each forecast year (2015 and 2025,using the following for each time period:

- Run the highway model in SATURN;
- Feed the travel times and delays on links and turns into the public transport model;
- Run the public transport model in EMME.

6.2. The standard set of model reports was produced to assess the impact of the growth in the demand for travel between 2009 and the 2015 and 2025 forecast years. The outputs cover the following performance measures:

- Highway:
- the resulting changes in travel times
- the resulting changes in total distance travelled
- the forecast growth in demand within the road network.
- Public Transport:
- the forecast growth in travel demand as described in section 1.5; and
- the resulting changes in the performance of the Public Transport network.

Model outputs for the highway model

Highway Global Statistics

6.3. Highway SATURN model statistics were calculated for the 2015 and 2025 Do-Minimum Scenarios. These are shown below in Table 6-1 across all three time periods.

Table 6-1 Highway Global Statistics for 2009 Base, 2015 and 2025 Do-Minimum

Statistics (per pcu)	2009	2015	2025
AM Peak			
Total Trips (pcus/hr)	51945	56121	64365
Average Travel Distance (km)	18.44	19.12	19.03
Average Travel Time (mins)	18.38	19.25	19.98
Average Delay (mins)	3.25	3.53	4.16
Inter-Peak			
Total Trips (pcus/hr)	34784	36857	43240
Average Travel Distance (km)	19.24	19.67	17.82
Average Travel Time (mins)	16.96	17.16	16.27
Average Delay (mins)	2.07	2.04	2.22
PM Peak			

Statistics (per pcu)	2009	2015	2025
Total Trips (pcus/hr)	51848	54902	63657
Average Travel Distance (km)	19.15	19.87	19.71
Average Travel Time (mins)	18.70	19.11	19.76
Average Delay (mins)	3.05	3.04	3.61

Traffic Flows

6.4. Traffic flows for the SATURN models are shown below in Figure 6-1 to Figure 6-6. Traffic flow is particularly high along the M4 which runs south of Slough. The part of the A4 corridor affected by the SMaRT scheme has been highlighted using a faint red line (so as not to obscure the traffic output). It can be seen that traffic flow generally varies 1000 to 1,500 pcus per hour per direction in the peaks, though there is not a significant reduction in traffic flow during the Inter-Peak Period.

Figure 6-1 2015 AM Peak Do-Minimum SATURN Model Traffic Flows

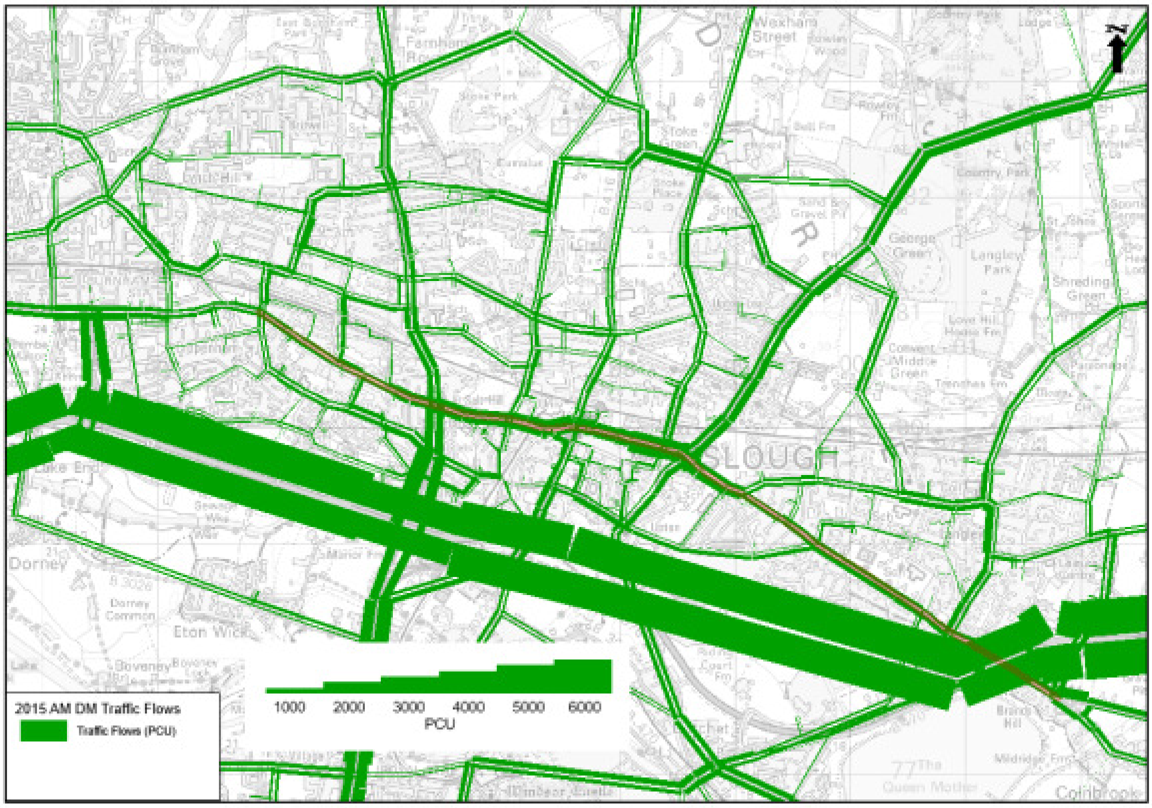


Figure 6-2 2015 IP Do-Minimum SATURN Model Traffic Flows

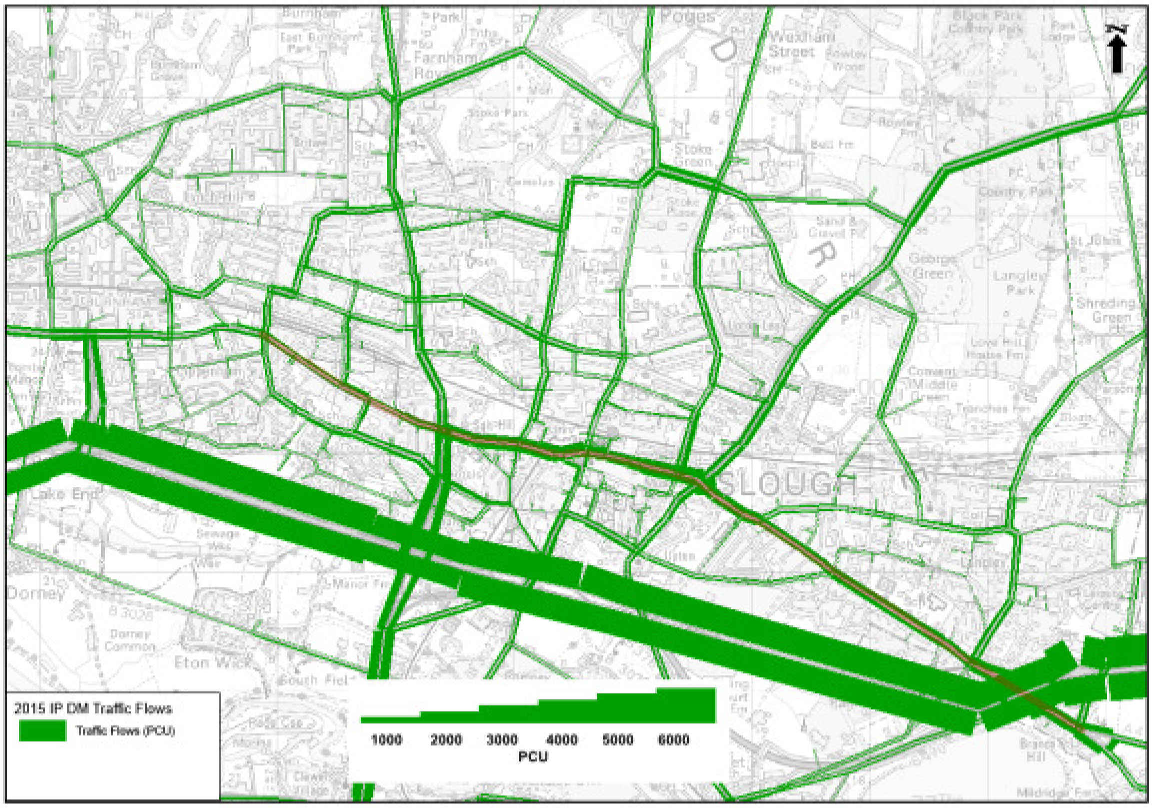


Figure 6-3 2015 PM Peak Do-Minimum SATURN Model Traffic Flows

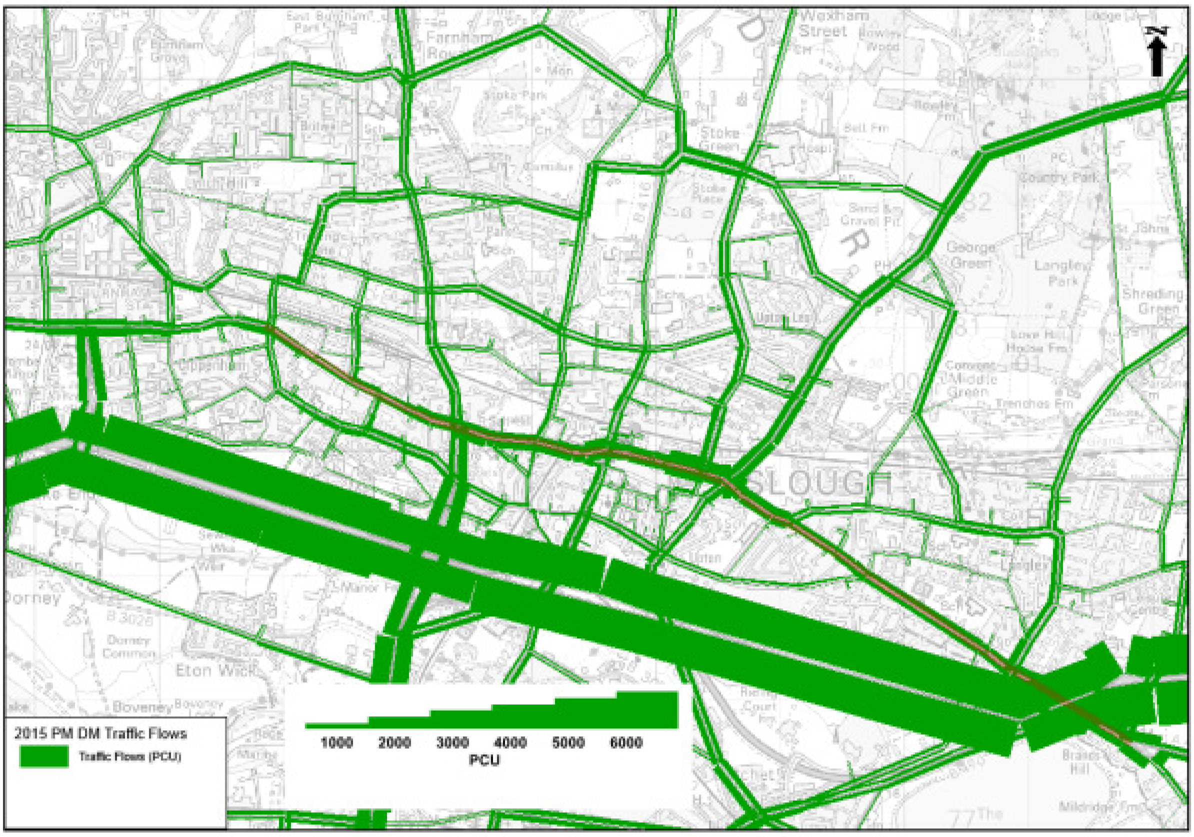


Figure 6-4 2025 AM Peak Do-Minimum SATURN Model Traffic Flows

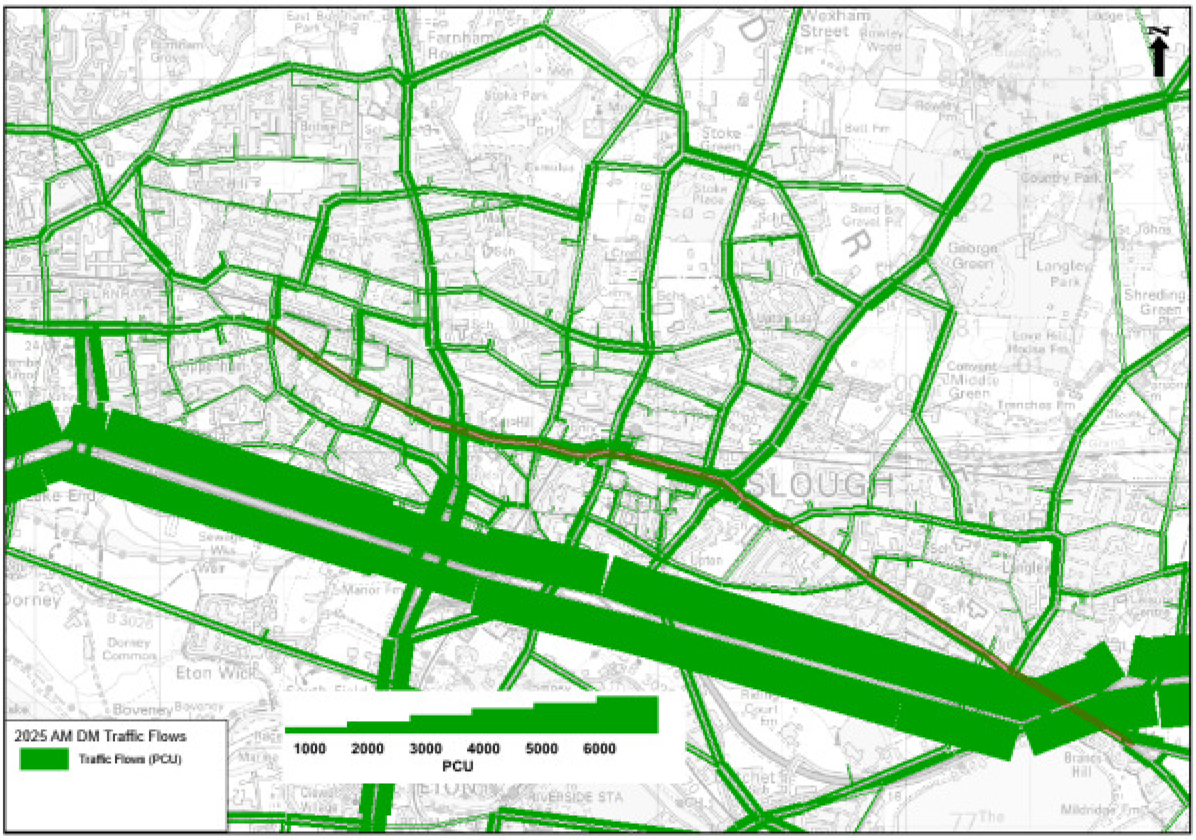


Figure 6-5 2025 IP Peak Do-Minimum SATURN Model Traffic Flows

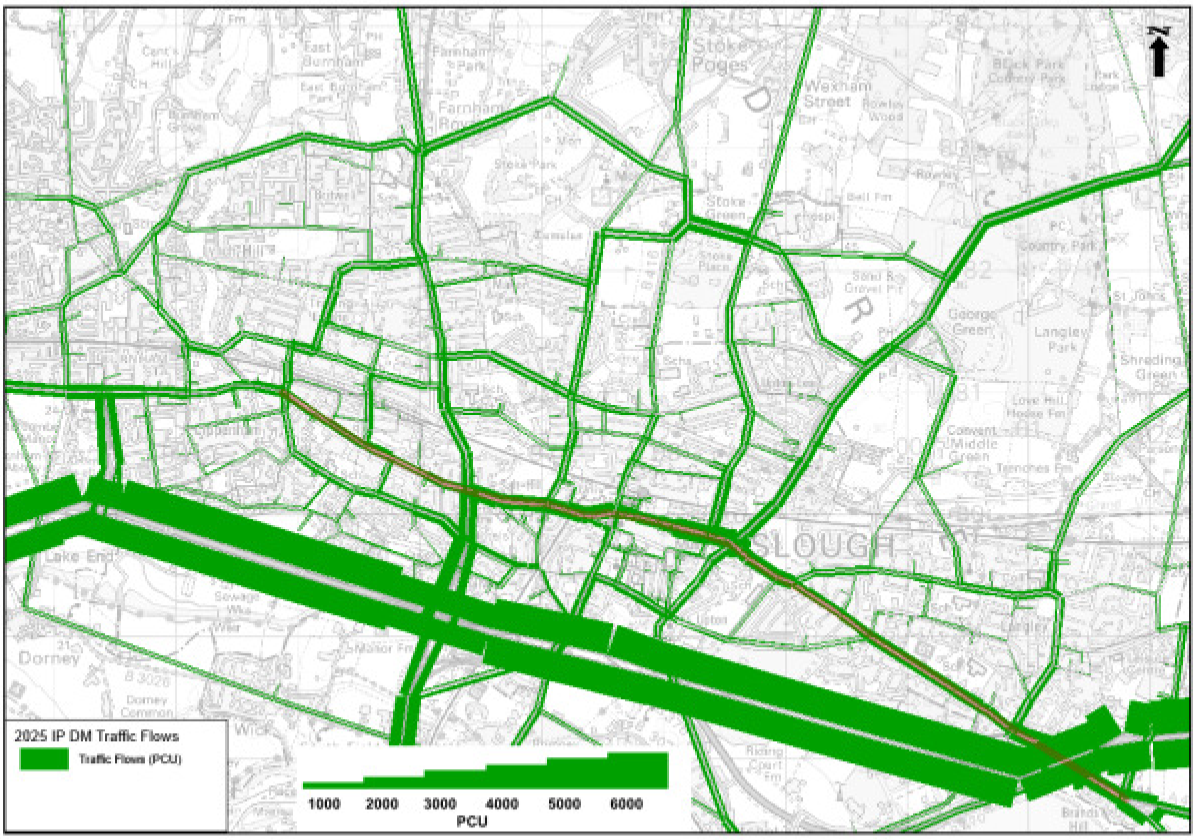
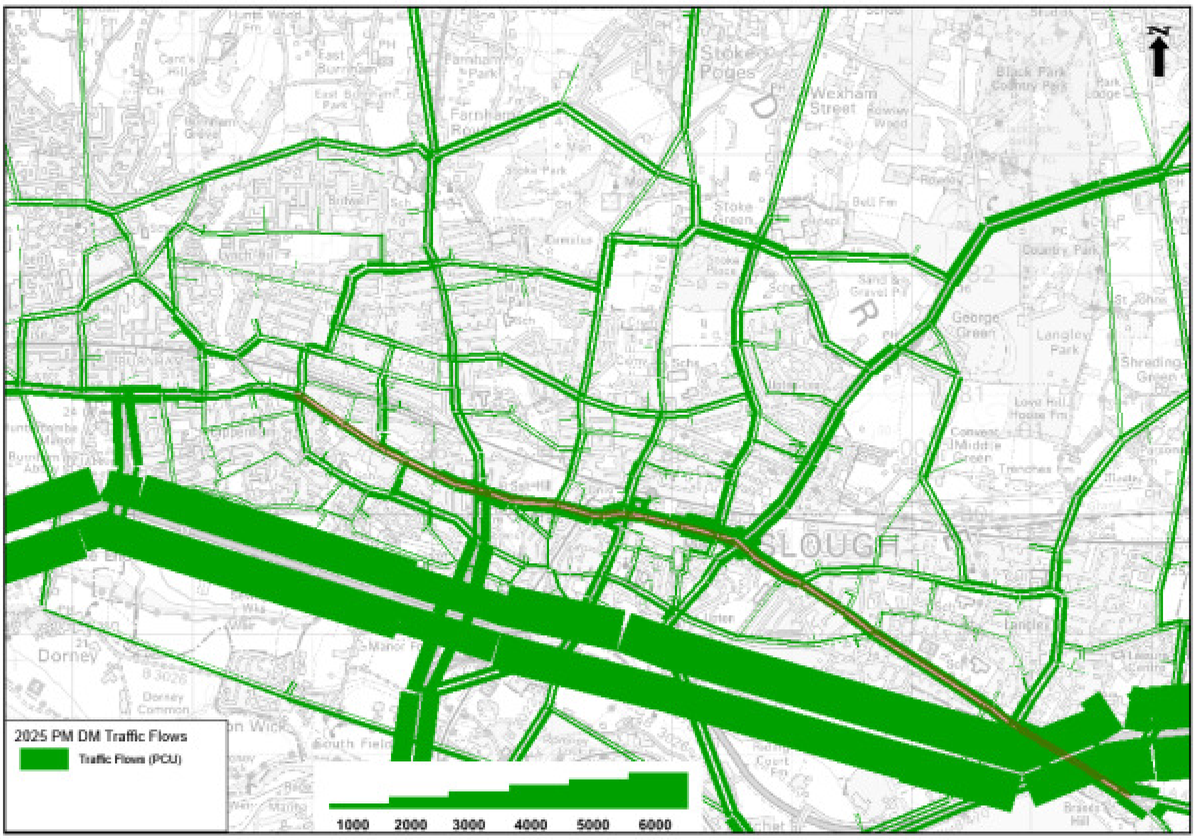


Figure 6-6 2025 PM Peak Do-Minimum SATURN Model Traffic Flows



Junction Delay

6.5. Junction delay on the road network is evident at certain points, especially with regards to traffic entering and exiting Slough via the M4. Along the A4 corridor, delay is most evident at Junction 5 of the M4 during the AM and PM Peaks. However delay is also found to occur along many parts of the A4 corridor, in particular at the A412 Uxbridge Road Roundabout and Stoke Poges Lane/Ledgers Road Signalised junction. The latter in particular suffers from capacity issues with at least three of the four arms found to be approaching full capacity across all three model periods.

Journey Time Data

6.6. The SATURN model was interrogated for journey time data along the A4 corridor between Dover Road and the Colnbrook Bypass, using the Joyride facility in SATURN. The section was split into five sections as follows:

- Dover Road to A355 Tuns Lane
- A355 Tuns Lane to William Street
- William Street to A412 Uxbridge Road
- A412 Uxbridge Road to Upton Court Road
- Upton Court Road to Colnbrook Bypass

6.7. The above is for the Eastbound direction route with a reverse order taken for the Westbound direction. Figure 6-7 to Figure 6-12 show a comparison between the 2015 and 2025 DM Journey Times results obtained from SATURN across all three time periods. The data shows a fairly standard proportional increase in journey times which would be expected as a result of the increase in traffic flow into the future. It can be seen that the increase in journey time is greater in the AM and PM peaks than the IP period.

Figure 6-7 Journey Time for the Eastbound Direction in the AM Peak for 2015 DM v 2025 DM

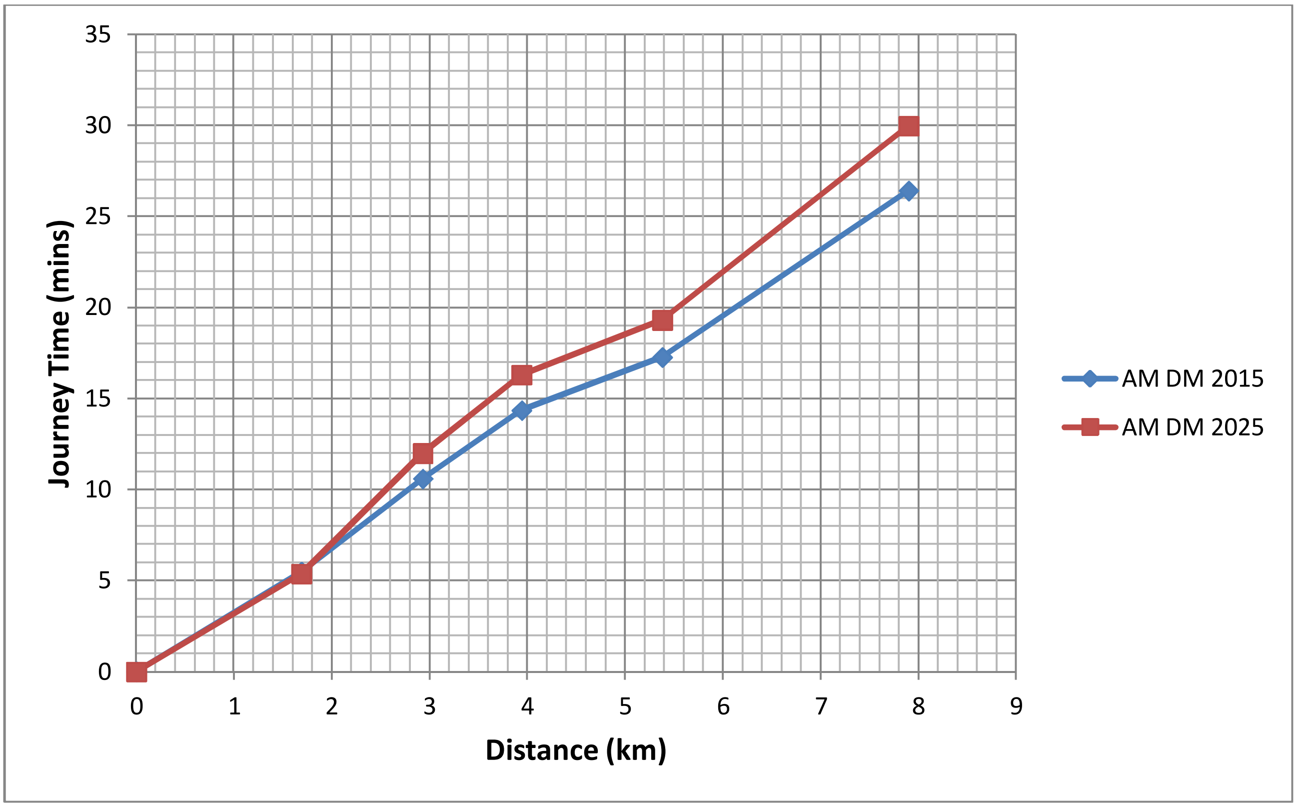


Figure 6-8 Journey Time for the Westbound Direction in the AM Peak for 2015 DM v 2025 DM

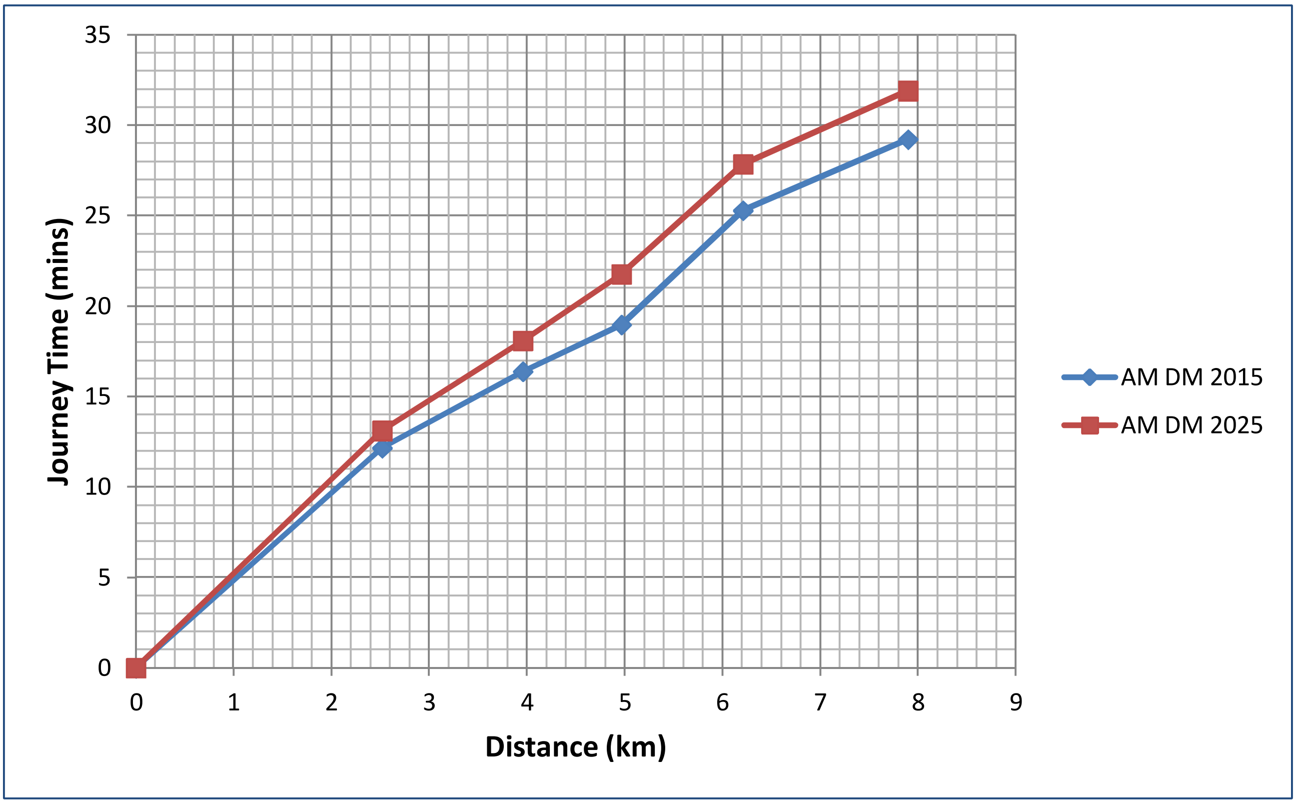


Figure 6-9 Journey Time for the Eastbound Direction in the IP period for 2015 DM v 2025 DM

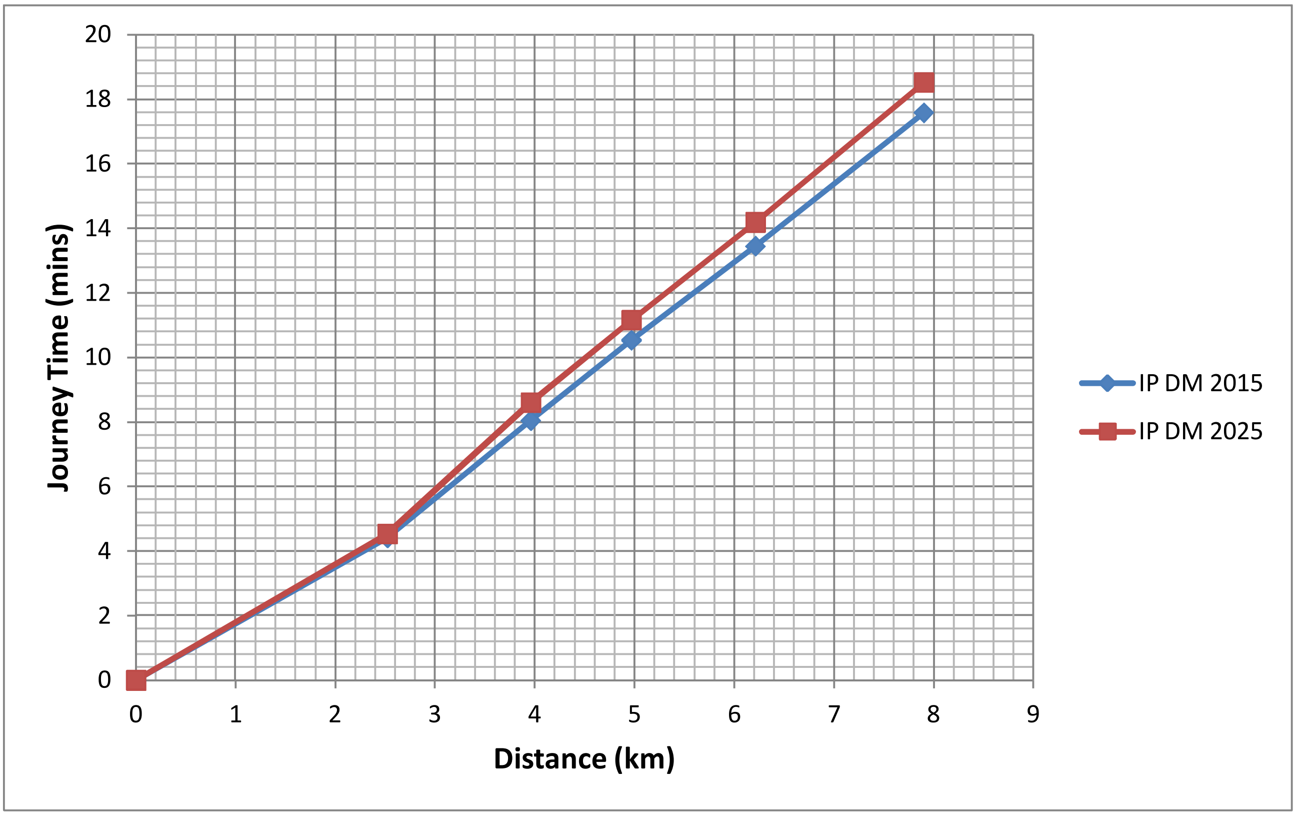


Figure 6-10 Journey Time for the Westbound Direction in the IP period for 2015 DM v 2025 DM

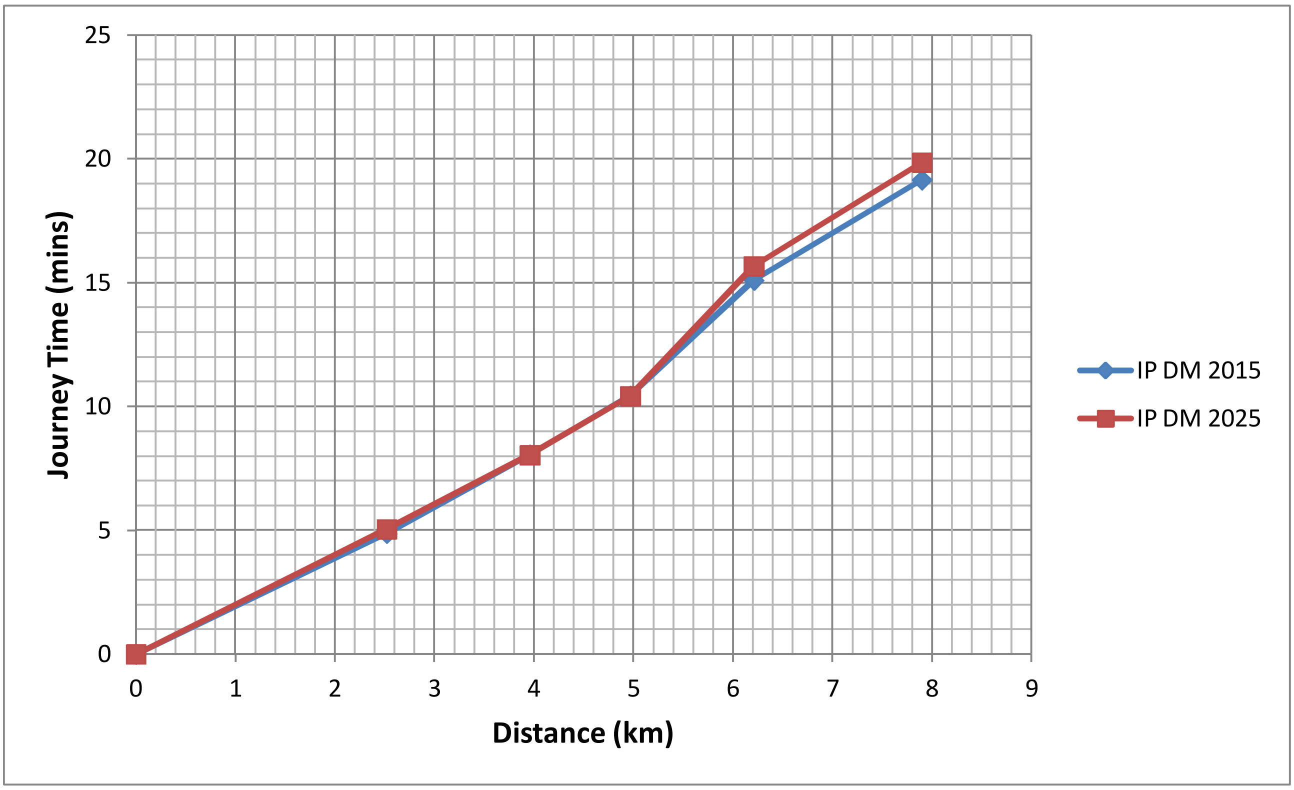


Figure 6-11 Journey Time for the Eastbound Direction in the PM Peak for 2015 DM v 2025 DM

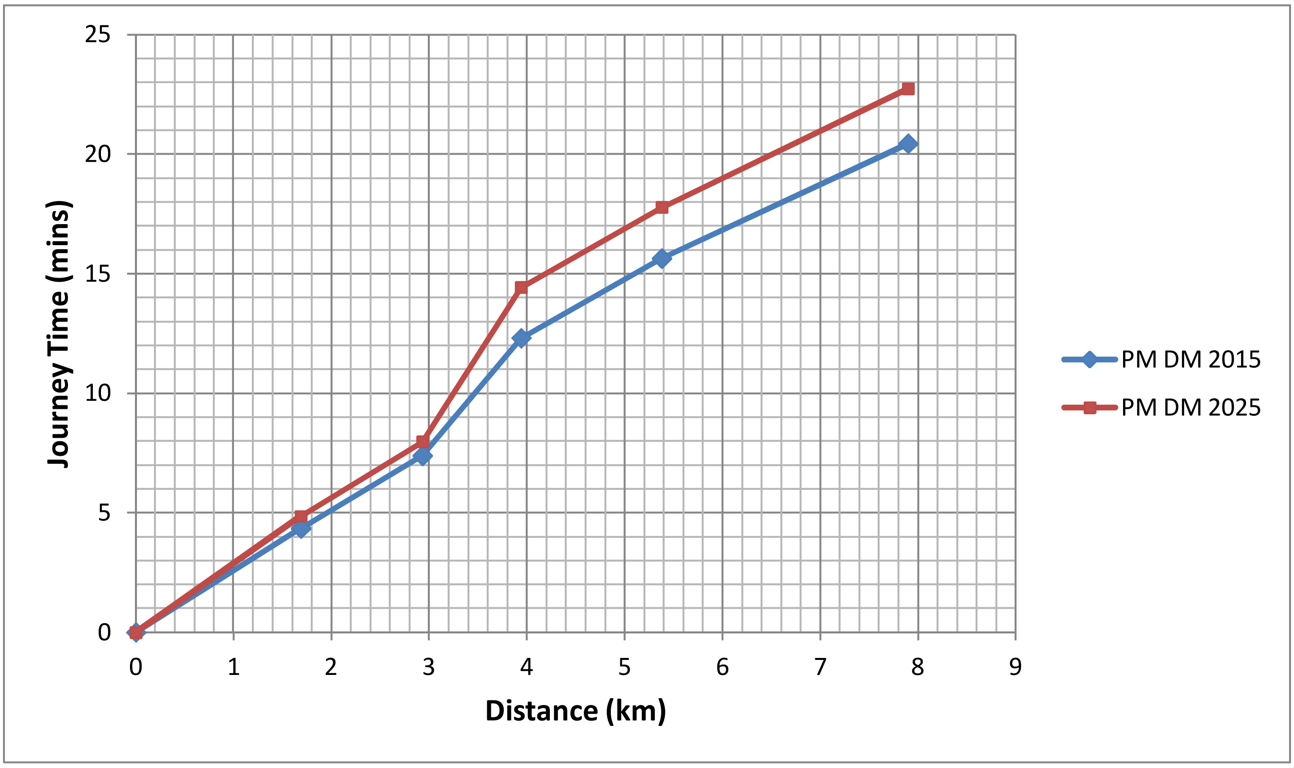
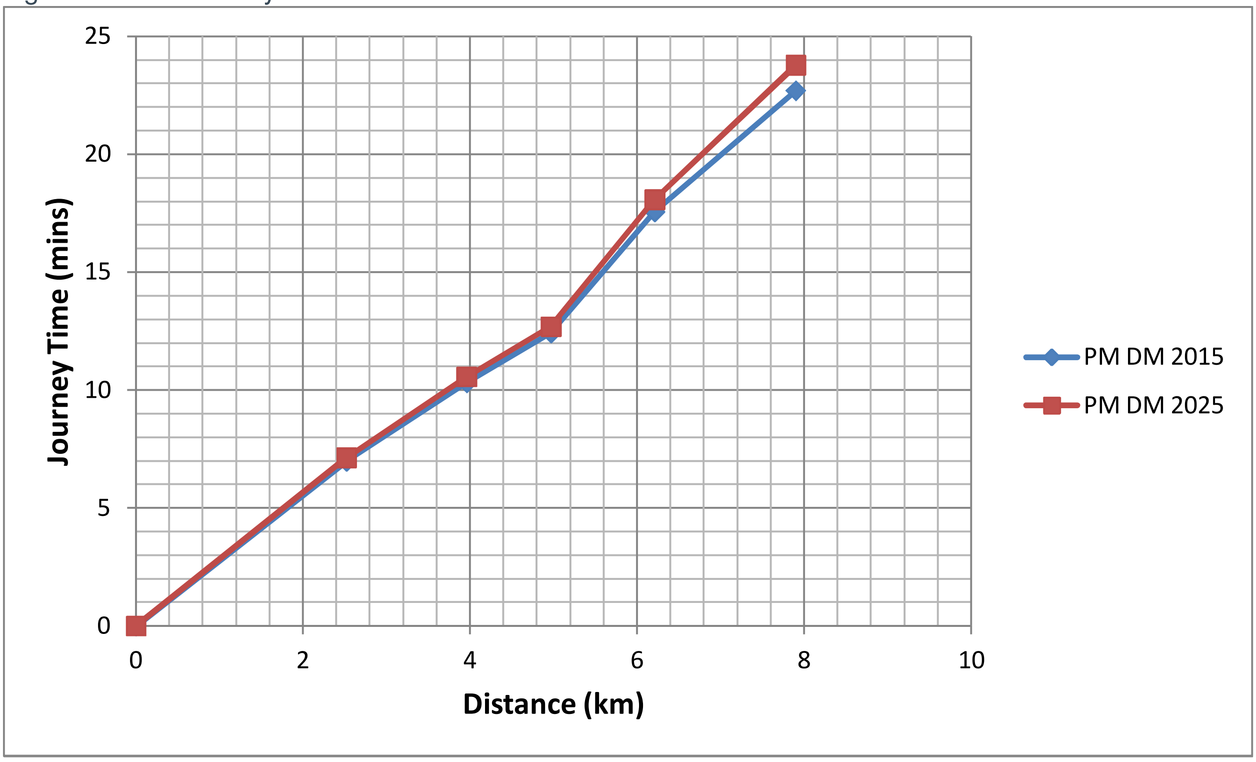


Figure 6-12 Journey Time for the Westbound Direction in the PM Peak for 2015 DM v 2025 DM



Public Transport Model Outputs

6.8. The overall network performance for the Public Transport model for the 2015 and 2025 Do-Minimum Scenarios is shown in Table 6-2 across all three time periods.

Table 6-2 Overall network performance DM

Time period	2009	2015 DM	Diff. 2015 DM - 2009 (%)	2025 DM	Diff. 2025 DM - 2009 (%)	Diff. 2025 DM – 2015 DM (%)
AM						
Demand (person trips)	**1,891**	**1,956**	**3%**	**2,236**	**18%**	**14%**
Boardings	**2,211**	**2,274**	**3%**	**2,383**	**8%**	**5%**
Average No. Boardings	**1.17**	**1.16**	**-1%**	**1.07**	**-9%**	**-8%**
Pax*hours	**3,623**	**3,714**	**3%**	**4,033**	**11%**	**9%**
Total GTT[9] (pass.min)	**217,405**	**222,815**	**2%**	**241,952**	**11%**	**9%**
Average GTT (mins.)	**115**	**114**	**-1%**	**108**	**-6%**	**-5%**
Total IVT[10] (pass.min)	**45,409**	**49,912**	**10%**	**55,031**	**21%**	**10%**
Average IVT (mins.)	**24.01**	**25.52**	**6%**	**24.61**	**2%**	**-4%**
Total Walk[11] (pass.min)	**66,132**	**67,873**	**3%**	**73,821**	**12%**	**9%**
Average Walk (mins.)	**34.97**	**34.70**	**-1%**	**33.01**	**-6%**	**-5%**
Total Wait[12] (pass.min)	**19,637**	**18,520**	**-6%**	**19,583**	**0%**	**6%**
Average Wait (mins.)	**10.38**	**9.47**	**-9%**	**8.76**	**-16%**	**-8%**
IP						
Demand (person trips)	**1,579**	**1,697**	**7%**	**1,919**	**22%**	**13%**

9 Generalised travel time
10 In-vehicle time (un-weighted)
11 Walking access time (un-weighted)
12 Waiting time (un-weighted)

Time period	2009	2015 DM	Diff. 2015 DM - 2009 (%)	2025 DM	Diff. 2025 DM - 2009 (%)	Diff. 2025 DM – 2015 DM (%)
Boardings	1,735	1,751	1%	1,847	6%	5%
Average No. Boardings	1.10	1.03	-6%	0.96	-12%	-7%
Pax*hours	2,018	2,118	5%	2,279	13%	8%
Total GTT[13] (pass.min)	121,084	127,050	5%	136,769	13%	8%
Average GTT (mins.)	77	75	-3%	71	-8%	-5%
Total IVT[14] (pass.min)	28,003	32,927	18%	35,059	25%	6%
Average IVT (mins.)	17.73	19.40	9%	18.27	3%	13%
Total Walk[15] (pass.min)	31,208	32,598	4%	35,558	14%	5%
Average Walk (mins.)	19.76	19.21	-3%	18.53	-6%	-7%
Total Wait[16] (pass.min)	14,951	14,449	-3%	15,293	2%	8%
Average Wait (mins.)	9.47	8.51	-10%	7.97	-16%	-5%
PM						
Demand (person trips)	1,580	1,642	4%	1,815	15%	11%
Boardings	1,726	1,874	9%	1,921	11%	3%
Average No. Boardings	1.09	1.14	4%	1.06	-3%	-7%
Pax*hours	2,773	2,911	5%	3,026	9%	4%

[13] Generalised travel time
[14] In-vehicle time (un-weighted)
[15] Walking access time (un-weighted)
[16] Waiting time (un-weighted)

Time period	2009	2015 DM	Diff. 2015 DM - 2009 (%)	2025 DM	Diff. 2025 DM - 2009 (%)	Diff. 2025 DM – 2015 DM (%)
Total GTT[17] (pass.min)	**166,375**	**174,688**	**5%**	**181,554**	**9%**	**4%**
Average GTT (mins.)	**105**	**106**	**1%**	**100**	**-5%**	**-6%**
Total IVT[18] (pass.min)	**34,913**	**43,388**	**24%**	**44,857**	**28%**	**3%**
Average IVT (mins.)	**22.10**	**26.42**	**20%**	**24.71**	**12%**	**-6%**
Total Walk[19] (pass.min)	**49,260**	**50,179**	**2%**	**52,480**	**7%**	**5%**
Average Walk (mins.)	**31.18**	**30.56**	**-2%**	**28.91**	**-7%**	**-5%**
Total Wait[20] (pass.min)	**16,306**	**15,606**	**-4%**	**15,992**	**-2%**	**2%**
Average Wait (mins.)	**10.32**	**9.50**	**-8%**	**8.81**	**-15%**	**-7%**

[17] Generalised travel time
[18] In-vehicle time (un-weighted)
[19] Walking access time (un-weighted)
[20] Waiting time (un-weighted)

6.9. The growth of demand between 2009, 2015 and 2025 is reflected in an increase in the number of boardings and total generalised travel time. The average values, which are a better measure of the impact of growth on the individual trips, show a decrease as expected.

6.10. The worsening congestion between 2009 and 2015 is reflected in the public transport journey times. The results for 2025 are also influenced by the fact that all the developments sites are along the A4 corridor which results in low generalised travel times for many OD pairs, producing lower averages than in 2015.

Table 6-3 Journey Times for key routes of the bus network DM (AM)

Line	2009	2015 DM	Diff. 2015 DM - 2009 (mins.)	2025 DM	Diff. 2025 DM - 2009 (mins.)	Diff. 2025 DM – 2015 DM (mins.)
1B_I	27.22	26.59	-0.63	30.4	3.18	3.81
1B_O	21.65	24.66	3.01	26.76	5.11	2.1
2_I	32.51	29.98	-2.53	33.19	0.68	3.21
2_O	21.99	27.45	5.46	30.94	8.95	3.49
58_E	67.19	78.72	11.53	80.5	13.31	1.78
58_W	65.52	69.9	4.38	73.9	8.38	4
74_N	53.18	53.07	-0.11	55.24	2.06	2.17
74_S	54.44	60.72	6.28	61.95	7.51	1.23
75_E	70.68	84.51	13.83	85.75	15.07	1.24
75_W	66.89	79.63	12.74	85.09	18.2	5.46
76_E	54.45	63.74	9.29	64.86	10.41	1.12
76_W	58.09	65.15	7.06	70.13	12.04	4.98
77_E	56.33	65.96	9.63	66.8	10.47	0.84
77_W	65.12	86.52	21.4	92.61	27.49	6.09
78_E	80.1	66.03	-14.07	68.12	-11.98	2.09
78_W	83.28	65.61	-17.67	71.02	-12.26	5.41
721_E	-	41.65	-	48.58	-	6.93
7_W	-	36.97	-	38.43	-	1.46
81_I	50.16	53.19	3.03	57.2	7.04	4.01
81_O	49.9	57.78	7.88	58.57	8.67	0.79
WP1N	9.03	11.4	2.37	12.14	3.11	0.74
WP1S	7.38	11.37	3.99	14	6.62	2.63

6.11. Service 78 is a special case because after 2009 it derives benefits from the improvements implemented as part of Better Bus Area Fund, e.g. the southbound bus lane on the approach to A4/A355 junction.

[21] Line 7did not exist in 2009.

Table 6-4 Journey Times for key routes of the bus network DM (IP)

Line	2009	2015 DM	Diff. 2015 DM - 2009 (mins.)	2025 DM	Diff. 2025 DM - 2009 (mins.)	Diff. 2025 DM – 2015 DM (mins.)
1B_I	22.26	21.89	-0.37	23.27	1.01	1.38
1B_O	19.19	19.98	0.79	20.65	1.46	0.67
2_I	26.33	24.72	-1.61	26.12	-0.21	1.4
2_O	20.27	24.71	4.44	25.63	5.36	0.92
58_E	59.4	70.57	11.17	71.95	12.55	1.38
58_W	53	69.47	16.47	70.27	17.27	0.8
74_N	43.76	42.81	-0.95	43.43	-0.33	0.62
74_S	51.89	42.99	-8.9	43.76	-8.13	0.77
75_E	59.71	66.59	6.88	67.63	7.92	1.04
75_W	56.4	68.43	12.03	69.95	13.55	1.52
76_E	48.24	56.01	7.77	56.83	8.59	0.82
76_W	47.45	58.89	11.44	59.96	12.51	1.07
77_E	50.6	66.5	15.9	67.98	17.38	1.48
77_W	52.46	57.29	4.83	58.53	6.07	1.24
78_E	69.24	59.06	-10.18	60.45	-8.79	1.39
78_W	66.09	56.44	-9.65	57.44	-8.65	1.00
7_E	-	34.97	-	35.41	-	0.44
7_W	-	34.22	-	35.13	-	0.91
81_I	37.56	52.45	14.89	53.33	15.77	0.88
81_O	38.44	63.46	25.02	64.29	25.85	0.83
WP1N	8.48	9.37	0.89	9.77	1.29	0.4
WP1S	6.71	9.51	2.8	9.68	2.97	0.17

Table 6-5 Journey Times for key routes of the bus network DM (PM)

Line	2009	2015 DM	Diff. 2015 DM - 2009 (mins.)	2025 DM	Diff. 2025 DM - 2009 (mins.)	Diff. 2025 DM – 2015 DM (mins.)
1B_I	26.06	24.58	-1.48	24.1	-1.96	-0.48
1B_O	24.26	24.18	-0.08	26.31	2.05	2.13
2_I	28.08	26.51	-1.57	26.13	-1.95	-0.38
2_O	26.27	28.58	2.31	31.98	5.71	3.4

Line	2009	2015 DM	Diff. 2015 DM - 2009 (mins.)	2025 DM	Diff. 2025 DM - 2009 (mins.)	Diff. 2025 DM – 2015 DM (mins.)
58_E	66.09	82.54	16.45	84.84	18.75	2.3
58_W	67.23	85.01	17.78	85.74	18.51	0.73
74_N	51.64	55.13	3.49	56.27	4.63	1.14
74_S	58.8	51.58	-7.22	52.52	-6.28	0.94
75_E	68.94	76.11	7.17	78.83	9.89	2.72
75_W	71.77	80.44	8.67	84.06	12.29	3.62
76_E	57.08	58.14	1.06	60.01	2.93	1.87
76_W	62.13	68.75	6.62	72.48	10.35	3.73
77_E	54.23	88.51	34.28	90.38	36.15	1.87
77_W	61.6	69.16	7.56	73.52	11.92	4.36
78_E	78.1	67.43	-10.67	69.37	-8.73	1.94
78_W	88.65	68.68	-19.97	70.65	-18	1.97
7_E	-	42.43	-	44.31	-	1.88
7_W	-	40.74	-	42.83	-	2.09
81_I	47.55	65.62	18.07	65.8	18.25	0.18
81_O	41.33	67.04	25.71	68.61	27.28	1.57
WP1N	10.05	12.39	2.34	14.93	4.88	2.54
WP1S	7.47	12.31	4.84	12.65	5.18	0.34

27.1. The numerous development sites that are implemented between 2015 and 2025 cause a significant increase in the patronage of most the services that operate along the A4 corridor, as shown in Table 6-6 to Table 6-8.

Table 6-6 Patronage for key routes of the bus network DM (AM)

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	49	205.7	12.1	46	186.7	12.7	-6%	-9%	5%
1B_O	44	126.9	6.4	47	133.1	7.3	7%	5%	14%
2_I	37	147.6	9	33	120.3	8.5	-11%	-18%	-6%
2_O	32	125	6.8	34	126.5	7.6	6%	1%	12%
58_E	78	416.1	24.5	80	468	29.4	3%	12%	20%
58_W	50	234	13.7	51	236.2	14.8	2%	1%	8%
74_N	114	1341.3	49.3	125	1475.2	55.2	10%	10%	12%
74_S	53	497.3	24	55	506.6	25.1	4%	2%	5%
75_E	107	594.3	36.9	122	662	41.8	14%	11%	13%
75_W	122	478.4	27.5	132	518.5	32.3	8%	8%	17%
76_E	82	440.3	24.9	94	503.9	28.7	15%	14%	15%
76_W	111	381.8	21.6	119	408.9	25.5	7%	7%	18%
77_E	26	199.8	10.4	32	221.8	12.1	23%	11%	16%
77_W	88	443.6	27.6	90	477.7	32.3	2%	8%	17%
78_E	69	252.2	18.6	70	264.5	20.2	1%	5%	9%
78_W	62	228.7	14.3	64	224.7	15.4	3%	-2%	8%
7_E	13	59.4	4.3	11	55.3	4.5	-15%	-7%	5%
7_W	37	180.7	9.7	38	197.9	10.6	3%	10%	9%

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
81_I	477	4893.1	233.7	491	5034	256.9	3%	3%	10%
81_O	176	2073.3	99.3	189	2205.8	106	7%	6%	7%
WP1N	1	2.2	0.2	1	1.5	0.1	0%	-32%	-50%
WP1S	9	22.5	1.3	13	36.2	2.6	44%	61%	100%

Table 6-7 Patronage for key routes of the bus network DM (IP)

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	34	138.7	6.6	35	140.4	7.2	3%	1%	9%
1B_O	41	165.4	6.7	47	181	7.6	15%	9%	13%
2_I	29	116.8	6.1	29	117.8	6.5	0%	1%	7%
2_O	37	166.1	8	40	176.2	8.8	8%	6%	10%
58_E	57	409.9	20	58	415.9	20.6	2%	1%	3%
58_W	52	361.5	19.9	54	372.8	20.6	4%	3%	4%
74_N	58	445.8	15.8	59	461.3	16.5	2%	3%	4%
74_S	79	586.5	21.8	84	616.5	23.5	6%	5%	8%
75_E	91	670.6	32.2	102	718.9	35.7	12%	7%	11%
75_W	59	308.4	15.6	65	333.2	17.4	10%	8%	12%
76_E	80	593.2	25.3	90	634.1	28.2	13%	7%	11%
76_W	66	299.7	15.1	72	314.7	16.2	9%	5%	7%

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
77_E	49	254.1	12.3	50	263.4	13.1	2%	4%	7%
77_W	62	328.6	15.4	65	348.5	16.8	5%	6%	9%
78_E	36	122.1	8	37	122.1	8.2	3%	0%	2%
78_W	41	151.4	9.2	43	156.4	9.6	5%	3%	4%
7_E	34	210.6	10.6	35	215.7	10.9	3%	2%	3%
7_W	46	270.1	12.8	48	276.9	13.6	4%	3%	6%
81_I	199	1679.4	79.6	208	1740.9	84.6	5%	4%	6%
81_O	186	1703.1	84.9	192	1750.4	88.5	3%	3%	4%
WP1N	1	1.4	0.1	1	1.8	0.1	0%	29%	0%
WP1S	7	16.7	0.8	8	17.9	0.9	14%	7%	13%

Table 6-8 Patronage for key routes of the bus network (PM)

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	24	105.4	5.7	26	110.7	5.8	8%	5%	2%
1B_O	44	185.4	9.2	46	188.7	10.1	5%	2%	10%
2_I	21	102.4	5.6	24	111.7	6	14%	9%	7%
2_O	36	162.3	9.2	36	158.8	9.7	0%	-2%	5%
58_E	57	326.7	19.3	57	322.5	19.7	0%	-1%	2%
58_W	68	377.9	24.3	70	389.9	25.1	3%	3%	3%

Line	2015 DM			2025 DM			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
74_N	88	806.4	36.8	88	792.3	36.8	0%	-2%	0%
74_S	55	536.7	21.3	57	567.6	22.8	4%	6%	7%
75_E	112	872.8	46.5	123	1007.1	54.3	10%	15%	17%
75_W	90	483.4	28.7	93	492.8	30.8	3%	2%	7%
76_E	114	969.8	40.5	109	889.8	39.1	-4%	-8%	-3%
76_W	79	333.6	19	83	336.9	20.6	5%	1%	8%
77_E	46	211.7	14.9	47	231.6	16.3	2%	9%	9%
77_W	50	304.3	17.6	51	303.7	18.7	2%	0%	6%
78_E	47	170.2	11.5	48	173	12.1	2%	2%	5%
78_W	52	199.6	15.2	50	177.4	14	-4%	-11%	-8%
7_E	23	152.6	8.3	24	155.9	8.8	4%	2%	6%
7_W	34	188.1	10.1	34	185.4	10.5	0%	-1%	4%
81_I	234	2124	125.5	246	2212.7	131.2	5%	4%	5%
81_O	235	2331.2	123.9	241	2291.6	122.1	3%	-2%	-1%
WP1N	3	4.2	0.3	2	3.2	0.3	-33%	-24%	0%
WP1S	18	52.9	3.2	21	61.4	3.8	17%	16%	19%

7. Do Something Traffic Forecasts

Introduction

7.1. As mentioned earlier, there are forecasts for 2015 and 2025, and for each year the same steps were undertaken as for the DM scenarios:

- Run the highway model in SATURN;
- Feed the travel times and delays on links and turns into the public transport model;
- Run the public transport model in EMME.

7.2. For the highway network, the coding of the DS Scenario within the SATURN model included the introduction of MOVA at four signalised junctions. Since SATURN does not specifically cater for MOVA, a very conservative estimate was made by increasing saturation flows by 2.8% for each entry arm using this method. This estimate is based on formulas from the Transport Research Laboratory (TRL) Research Report 67 (RR67). For the public transport network, the significant extension of the present bus lane network is the major change. This chapter reports on the DS results, and the following chapter compares results of the DS to the DM.

Highway Model outputs

Global Statistics

7.3. The global statistics extracted from SATURN for the 2009 (Base), 2015 and 2025 DS models are presented in **Error! Reference source not found.** below.

Table 7-1 Highway Global Statistics for the 2009 Base, 2015 and 2025 DS SATURN Models

Statistics (per pcu)	2009	2015	2025
AM Peak			
Total Trips (pcus/hr)	51945	56121	64365
Average Travel Distance (km)	18.44	19.12	19.03
Average Travel Time (mins)	18.38	19.21	19.92
Average Delay (mins)	3.25	3.50	4.11
Inter-Peak			
Total Trips (pcus/hr)	34784	36857	43240
Average Travel Distance (km)	19.24	19.66	17.81
Average Travel Time (mins)	16.96	17.15	16.25
Average Delay (mins)	2.07	2.05	2.22
PM Peak			
Total Trips (pcus/hr)	51848	54902	63657
Average Travel Distance (km)	19.15	19.87	19.71
Average Travel Time (mins)	18.70	19.10	19.73
Average Delay (mins)	3.05	3.03	3.57

Traffic flows

7.4. Traffic flows for the SATURN models are shown below (Figure 7-1 to Figure 7-6). Traffic flow is particularly high along the M4 which runs south of Slough.

Figure 7-1 2015 AM Peak Do-Something SATURN Model Traffic Flows

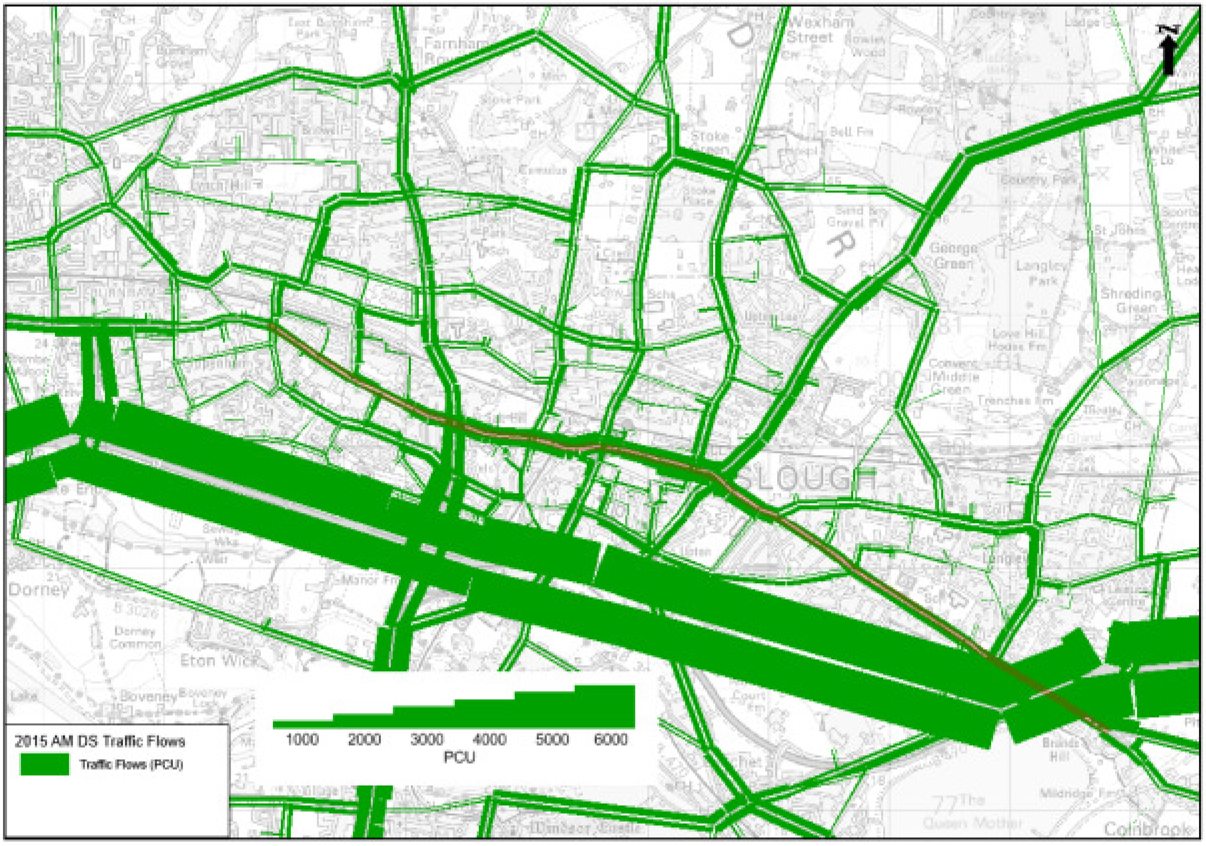


Figure 7-2 2015 IP Do-Something SATURN Model Traffic Flows

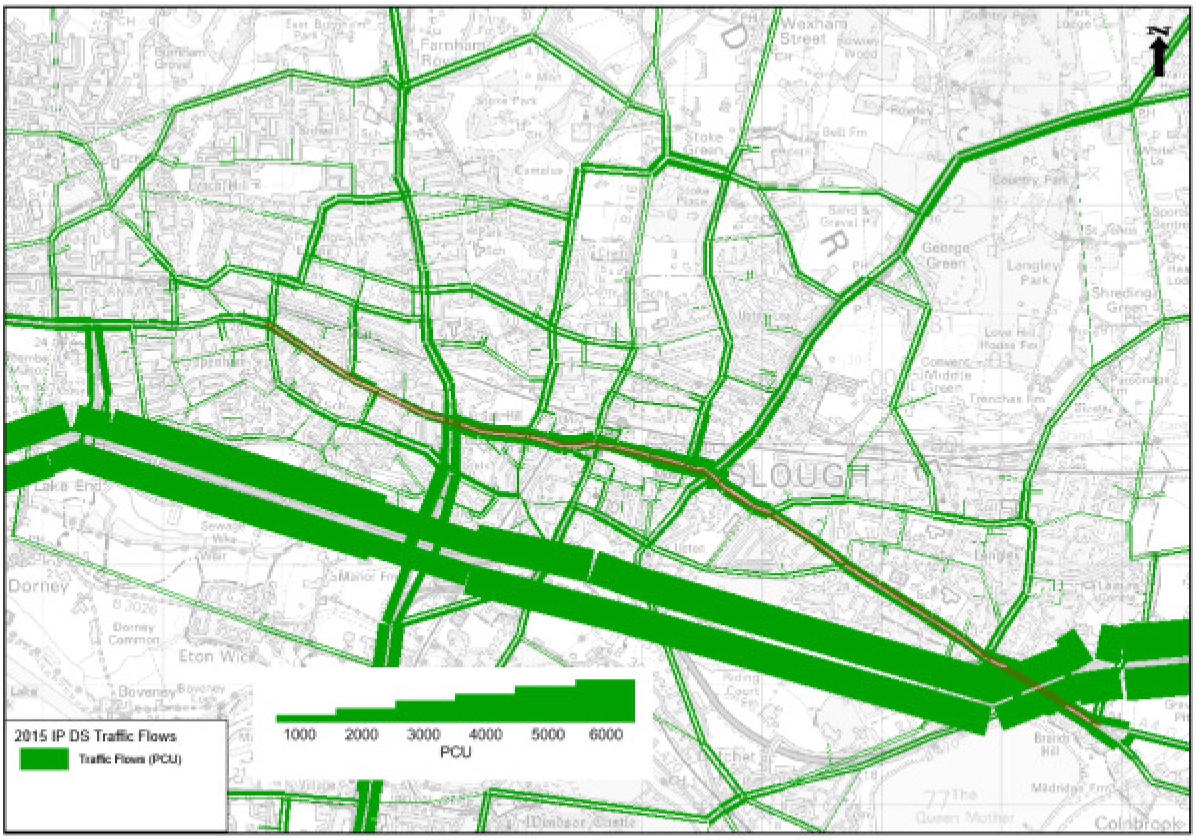


Figure 7-3 2015 PM Peak Do-Something SATURN Model Traffic Flows

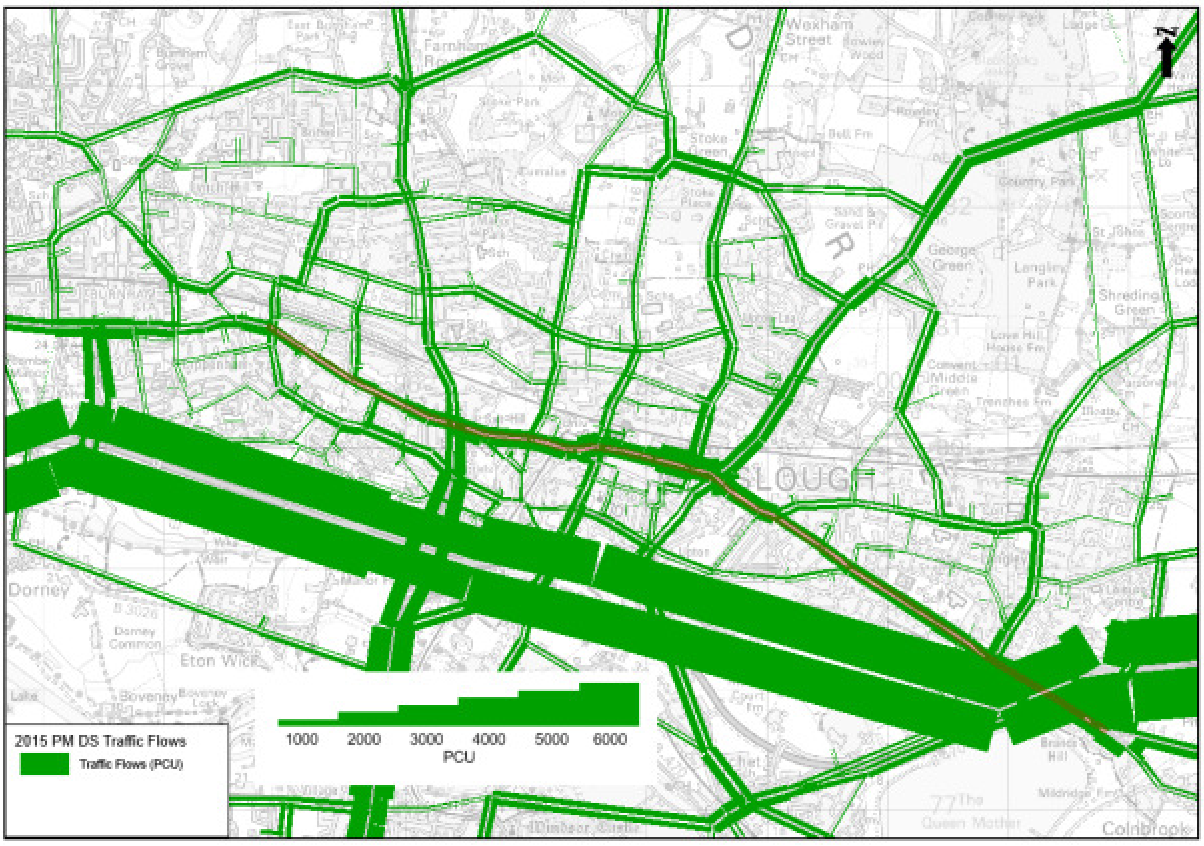


Figure 7-4 2025 AM Peak Do-Something SATURN Model Traffic Flows

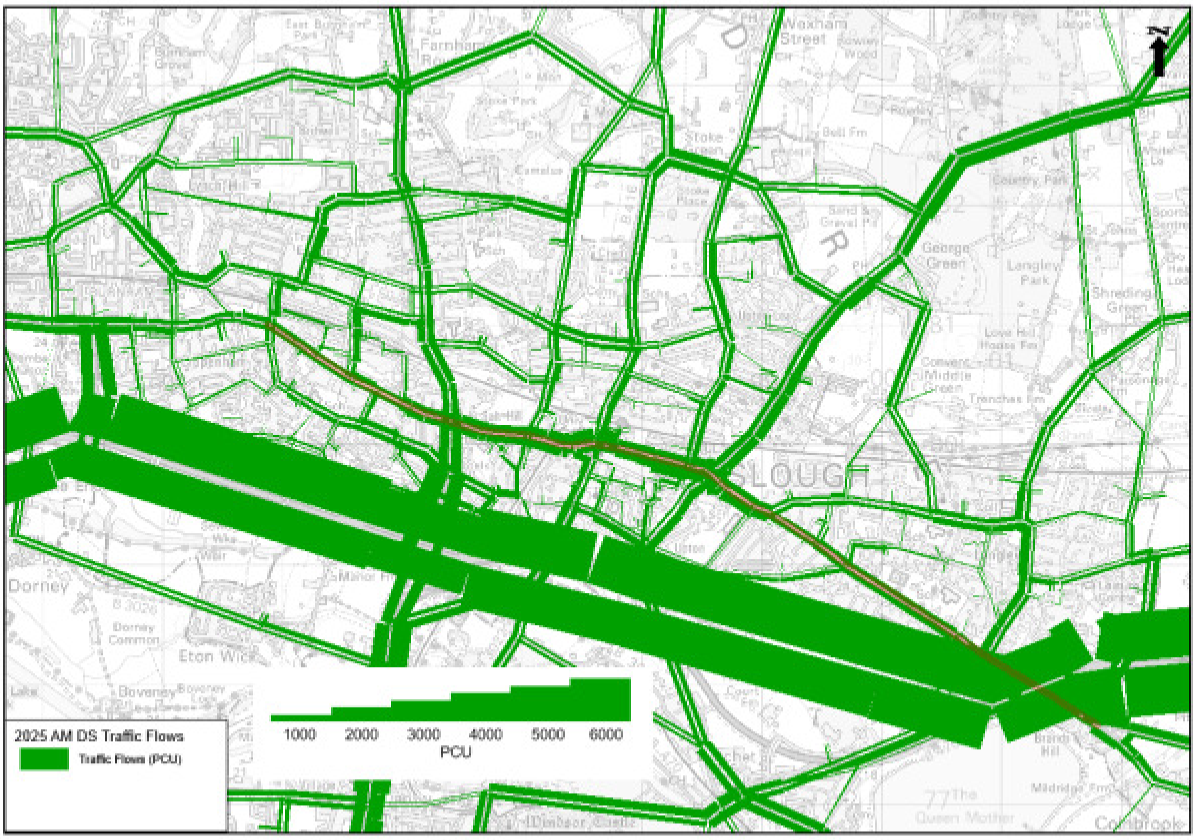


Figure 7-5 2025 IP Do-Something SATURN Model Traffic Flows

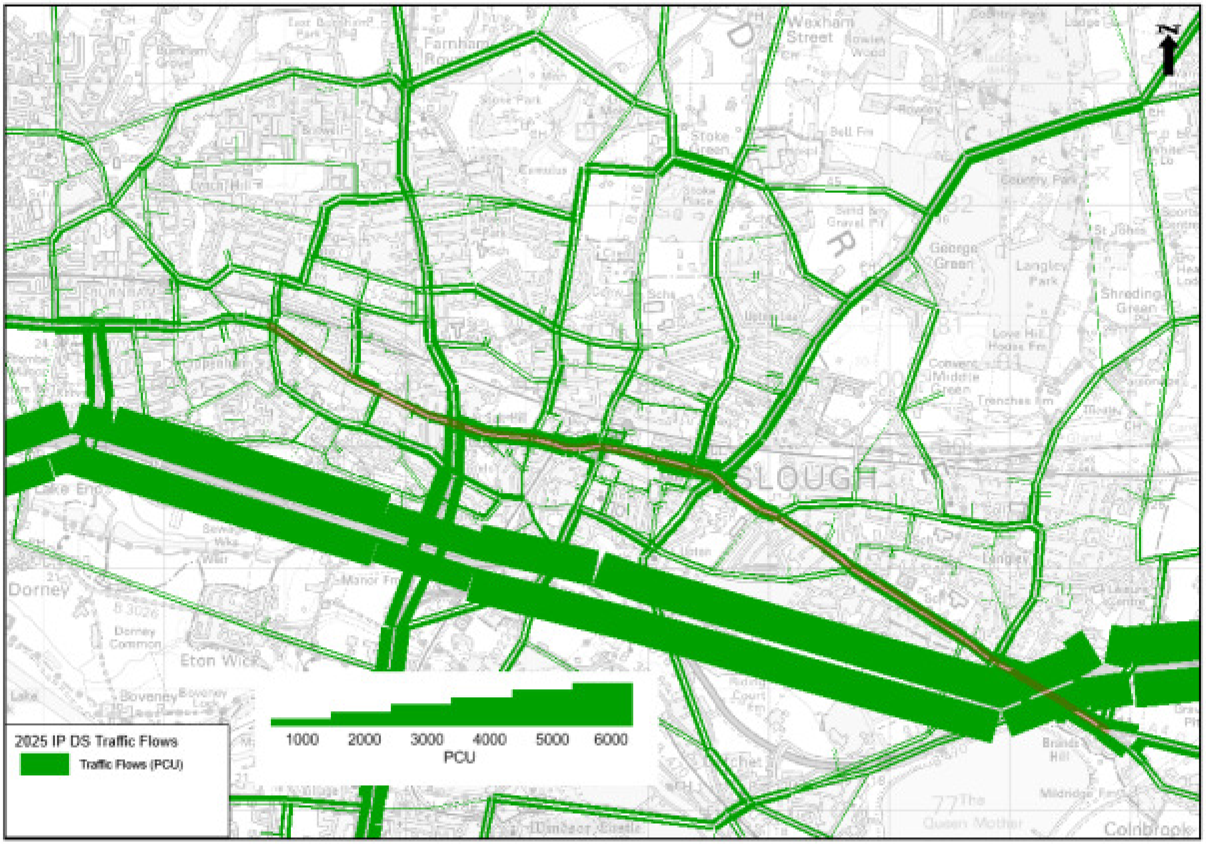
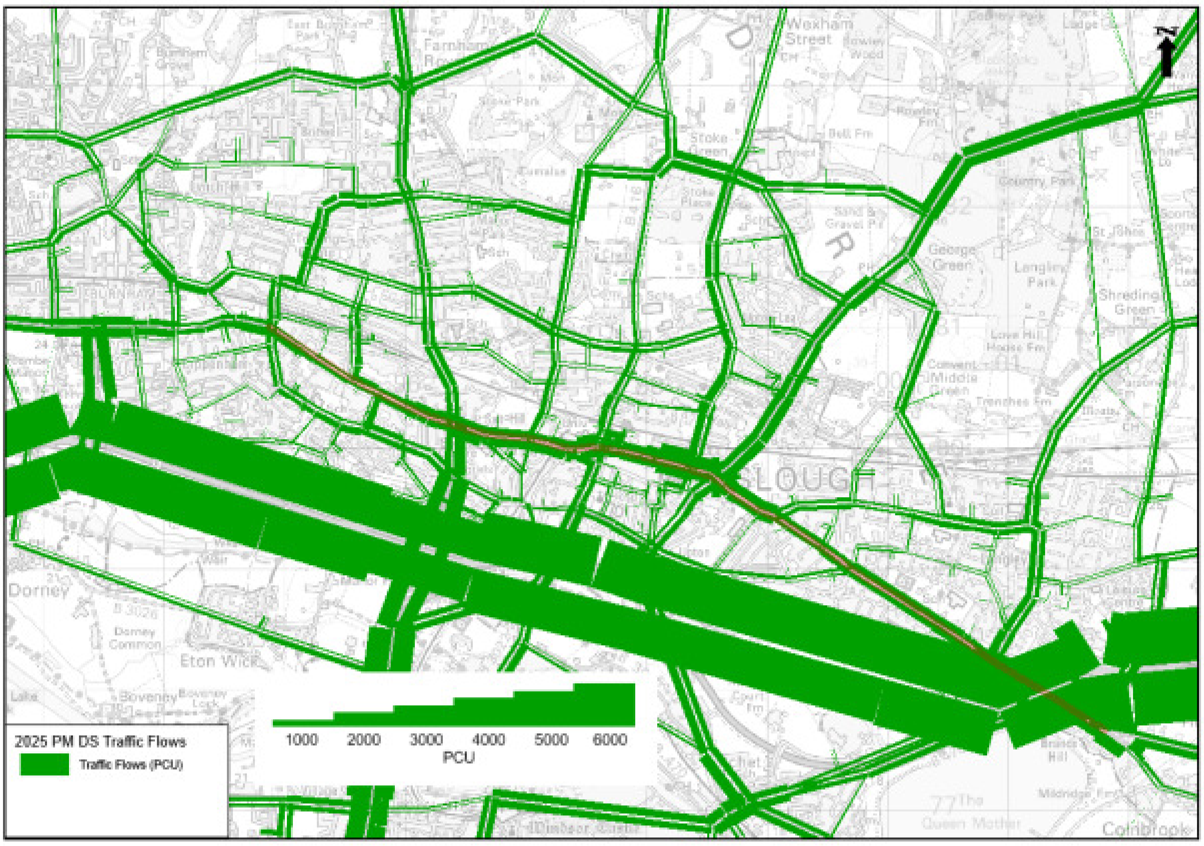


Figure 7-6 2025 PM Do-Something SATURN Model Traffic Flows



Journey Time Data

7.5. Figure 7-12 shows the results of journey time analysis carried out using the Joyride facility in SATURN. Once again, as expected, the 2025 DS shows an increase in comparison with the 2015 DS scenario.

Figure 7-7 Journey Time for the Eastbound Direction in the AM Peak for 2015 DS v 2025 DS

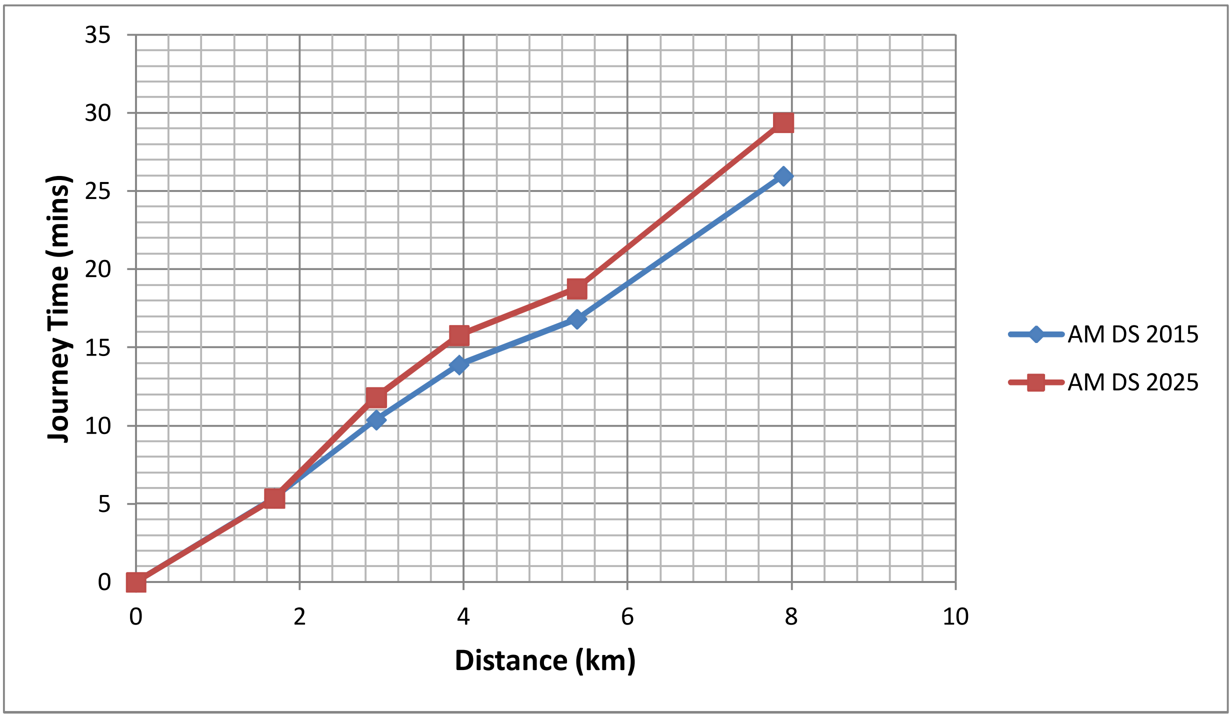


Figure 7-8 Journey Time for the Westbound Direction in the AM Peak for 2015 DS v 2025 DS

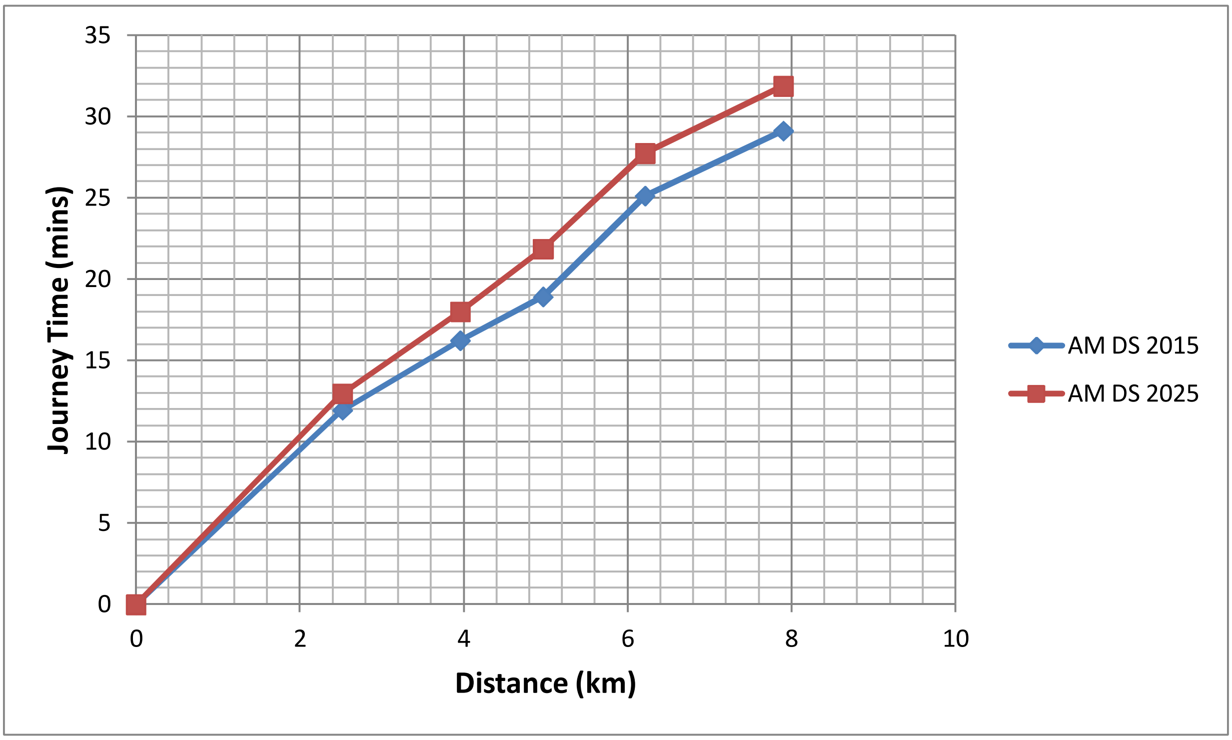


Figure 7-9 Journey Time for the Eastbound Direction in the IP period for 2015 DS v 2025 DS

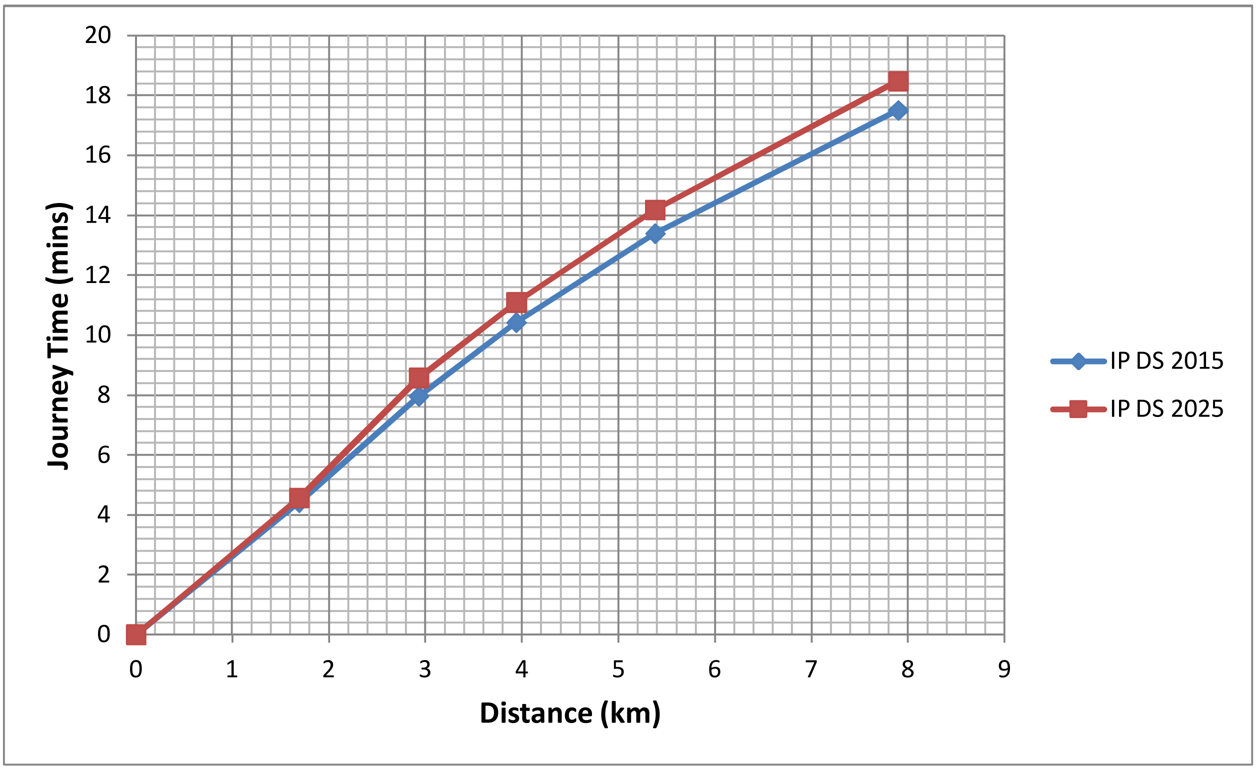


Figure 7-10 Journey Time for the Westbound Direction in the IP period for 2015 DS v 2025 DS

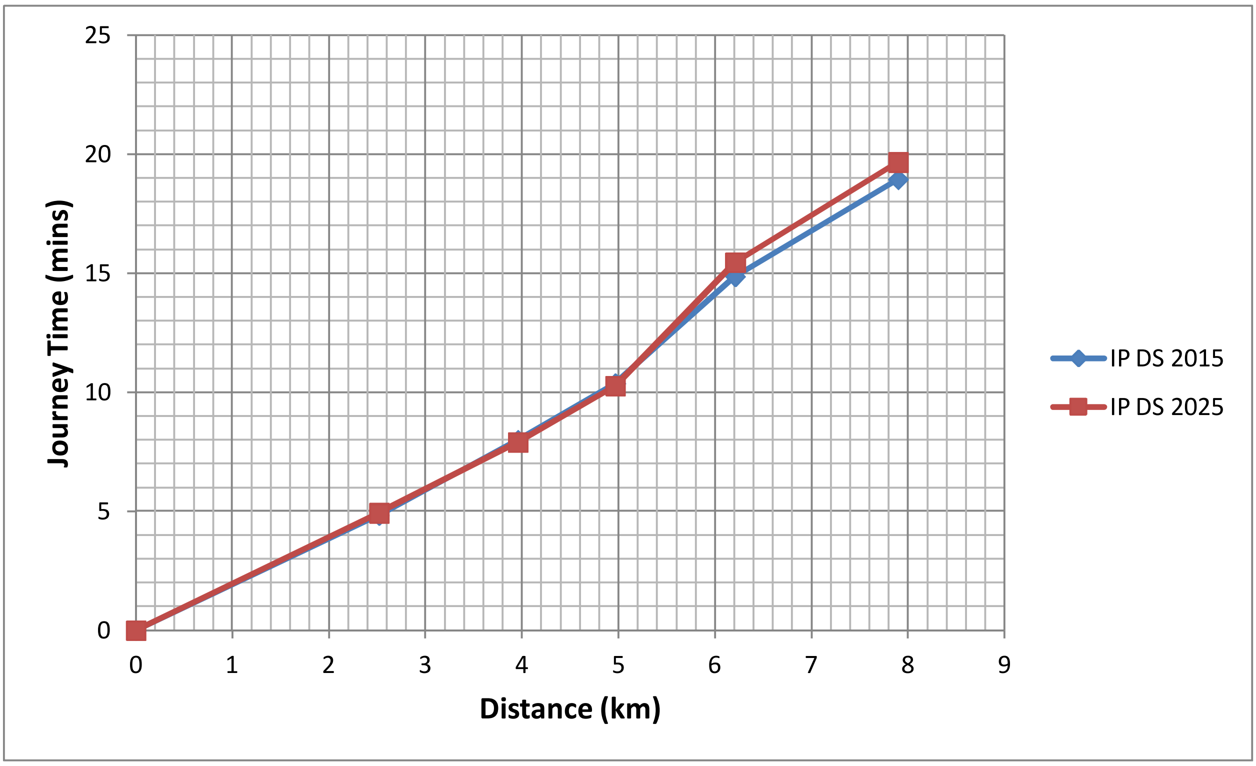
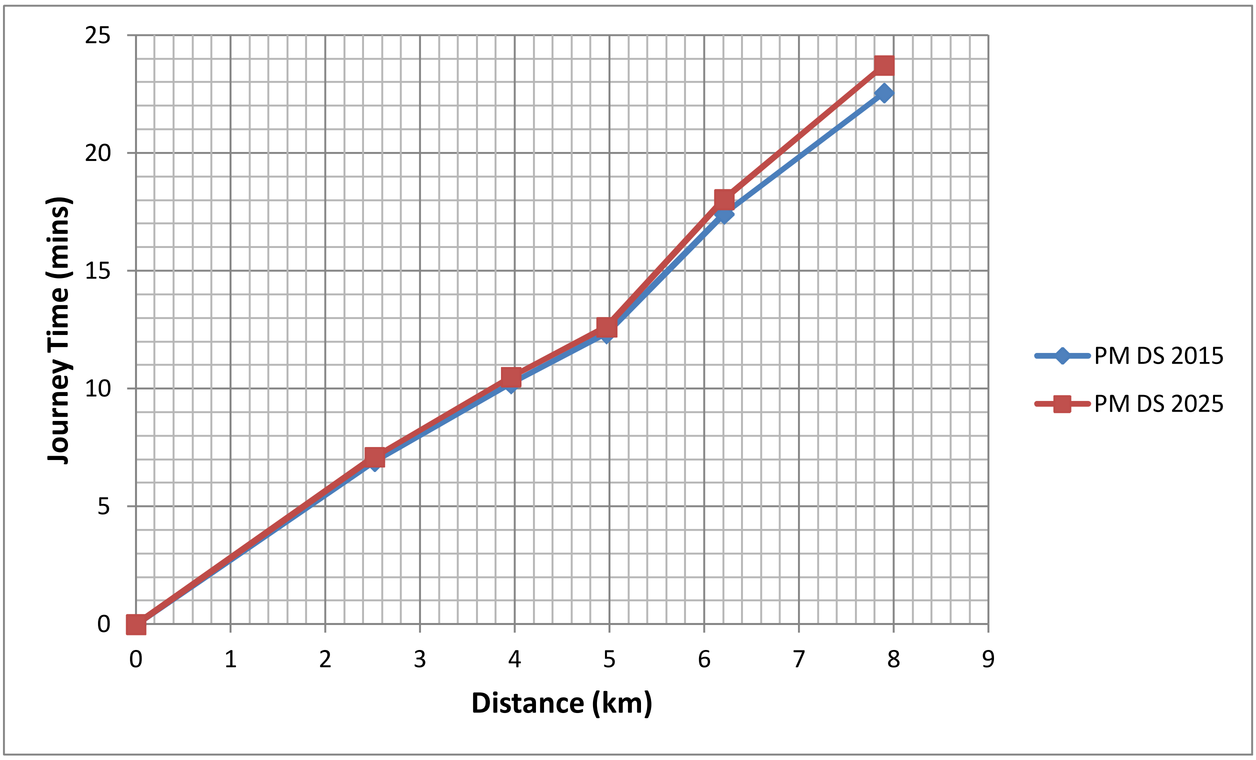


Figure 7-11 Journey Time for the Eastbound Direction in the PM Peak for 2015 DS v 2025 DS

Figure 7-12 Journey Time for the Westbound Direction in the PM Peak for 2015 DS v 2025 DS



Model outputs for the public transport model

7.6. The DM and DS matrices are the same because we are running a fixed demand assignment. But since the travel time on the highway changes over the years, this impacts on bus run times and results in different overall results, as shown below in Table 7-2 across all three time periods.

7.7. As in DM, the growth in demand between 2009, 2015 and 2025 results in an increase of the number of boardings and the total generalised travel time. The average values, which are more indicative of the impact on the individual trips, is also presented and shows a decrease.

7.8. In DS the decrease in the average waiting time is due mainly to higher frequency for some services as well as the introduction of a new service. This is almost identical to service 76, and increase the frequency on the A4 corridor from 4 buses per hour (in 2009 and DM) to 6 buses per hour. A summary of the headways considered in each scenario can be found in Appendix B.

7.9. The proposed scheme has a localised impact, namely along the A4 corridor. Routes 75 and 76 benefit from the introduction of the eastbound bus lane along Slough Trading Estate. Routes 77 and 81 that operate on all the eastern part of the corridor also benefit from the introduction of several segments of bus lane between Upton Court Road and Junction 5 with M4.

Table 7-2 Overall network performance DS

Time period	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
AM						
Demand (person trips)	1,891	1,956	3%	2,236	18%	14%
Boardings	2,211	2,337	6%	2,456	11%	5%
Average No. Boardings	1.17	1.19	2%	1.10	-6%	-8%
Pax*hours	3,623	3,650	1%	3,963	9%	9%
Total GTT[22] (pass.min)	217,405	218,984	1%	237,782	9%	9%
Average GTT (mins.)	115	112	-3%	106	-8%	-5%
Total IVT[23] (pass.min)	45,409	48,903	8%	53,883	19%	10%
Average IVT (mins.)	24.01	25.00	4%	24.10	0%	-4%
Total Walk[24] (pass.min)	66,132	67,593	2%	73,454	11%	9%
Average Walk (mins.)	34.97	34.56	-1%	32.85	-6%	-5%
Total Wait[25] (pass.min)	19,637	16,947	-14%	17,929	-9%	6%
Average Wait (mins.)	10.38	8.66	-17%	8.02	-23%	-7%
IP						
Demand (person trips)	1,579	1,697	7%	1,919	22%	13%
Boardings	1,735	1,777	2%	1,893	9%	7%

[22] Generalised travel time
[23] In-vehicle time (un-weighted)
[24] Walking access time (un-weighted)
[25] Waiting time (un-weighted)

Time period	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
Average No. Boardings	1.10	1.05	-5%	0.99	-10%	-6%
Pax*hours	2,018	2,087	3%	2,246	11%	8%
Total GTT (pass.min)	121,084	125,243	3%	134,740	11%	8%
Average GTT (mins.)	76.68	73.80	-4%	70.21	-8%	-5%
Total IVT (pass.min)	28,003	32,186	15%	34,170	22%	6%
Average IVT (mins.)	17.73	18.97	7%	17.81	0%	-6%
Total Walk (pass.min)	31,208	32,666	5%	35,500	14%	9%
Average Walk (mins.)	19.76	19.25	-3%	18.50	-6%	-4%
Total Wait (pass.min)	14,951	13,685	-8%	14,592	-2%	7%
Average Wait (mins.)	9.47	8.06	-15%	7.60	-20%	-6%
PM						
Demand (person trips)	1,580	1,642	4%	1,815	15%	11%
Boardings	1,726	1,934	12%	1,981	15%	2%
Average No. Boardings	1.09	1.18	8%	1.09	0%	-7%
Pax*hours	2,773	2,850	3%	2,962	7%	4%
Total GTT (pass.min)	166,375	170,982	3%	177,706	7%	4%
Average GTT (mins.)	105	104	-1%	98	-7%	-6%
Total IVT (pass.min)	34,913	41,736	20%	43,305	24%	4%
Average IVT (mins.)	22.10	25.42	15%	23.86	8%	-6%

Time period	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
Total Walk (pass.min)	49,260	50,286	2%	52,531	7%	4%
Average Walk (mins.)	31.18	30.63	-2%	28.94	-7%	-5%
Total Wait (pass.min)	16,306	13,987	-14%	14,307	-12%	2%
Average Wait (mins.)	10.32	8.52	-17%	7.88	-24%	-7%

7.10. In the DS scenarios, again generalised journey times are increasing due to the growing congestion in highway traffic demand between 2009 and the two forecast years.

7.11. As would be expected the DS scenario shows a bigger impact on the A4 corridor due to the introductions of the scheme. Journey times for key routes are shown in Table 7-3 to Table 7-5Table 7-5 Journey for key routes of the bus network DS (PM)Table 7-5. Service 78 continues to show improved journey times on 2009 due to the enhancements implemented as part of Better Bus Area Fund, e.g. the southbound bus lane on the approach to A4/A355 junction.

Table 7-3 Journey Times for key routes of the bus network DS (AM)

Line	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
1B_I	27.22	26.57	-0.65	29.11	1.89	2.54
1B_O	21.65	24.6	2.95	26.72	5.07	2.12
2_I	32.51	30	-2.51	31.91	-0.6	1.91
2_O	21.99	27.37	5.38	30.85	8.86	3.48
58_E	67.19	78.48	11.29	80.34	13.15	1.86
58_W	65.52	69.94	4.42	73.92	8.4	3.98
74_N	53.18	53.07	-0.11	55.04	1.86	1.97
74_S	54.44	60.78	6.34	61.86	7.42	1.08
75_E	70.68	82.4	11.72	83.86	13.18	1.46
75_W	66.89	79.27	12.38	84.85	17.96	5.58
76_E	54.45	61.48	7.03	63.05	8.6	1.57
76_W	58.09	64.81	6.72	69.91	11.82	5.1
77_E	56.33	64.05	7.72	65.8	9.47	1.75
77_W	65.12	85.41	20.29	91.34	26.22	5.93
78_E	80.1	65.68	-14.42	67.95	-12.15	2.27
78_W	83.28	65.65	-17.63	70.87	-12.41	5.22
7_E	-	41.48	-	48.32	-	6.84
7_W	-	36.77	-	38.53	-	1.76
81_I	50.16	52.37	2.21	56.25	6.09	3.88
81_O	49.9	56.77	6.87	58.13	8.23	1.36
MRT26_E	-	55.36	-	56.68	-	1.32
MRT_W	-	59.33	-	64.48	-	5.15
WP1N	9.03	11.4	2.37	12.07	3.04	0.67
WP1S	7.38	11.31	3.93	13.92	6.54	2.61

[26] The MRT service only exists in DS scenario.

Table 7-4 Journey Times for key routes of the bus network DS (IP)

Line	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
1B_I	22.26	23.24	0.98	23.35	1.09	0.11
1B_O	19.19	20.03	0.84	20.69	1.5	0.66
2_I	26.33	26.19	-0.14	26.21	-0.12	0.02
2_O	20.27	24.74	4.47	25.68	5.41	0.94
58_E	59.4	70.2	10.8	71.89	12.49	1.69
58_W	53	69.76	16.76	70.47	17.47	0.71
74_N	43.76	42.86	-0.9	43.36	-0.4	0.5
74_S	51.89	42.94	-8.95	43.98	-7.91	1.04
75_E	59.71	64.87	5.16	66.04	6.33	1.17
75_W	56.4	68.2	11.8	69.57	13.17	1.37
76_E	48.24	54.28	6.04	55.25	7.01	0.97
76_W	47.45	58.69	11.24	59.59	12.14	0.9
77_E	50.6	66	15.4	67.4	16.8	1.4
77_W	52.46	56.27	3.81	57.54	5.08	1.27
78_E	69.24	58.73	-10.41	60.39	-8.85	1.66
78_W	66.09	56.72	-9.37	57.63	-8.46	0.91
7_E	-	34.91	-	35.32	-	0.41
7_W	-	34.21	-	35.13	-	0.92
81_I	37.56	51.46	13.9	52.37	14.81	0.91
81_O	38.44	63.1	24.66	63.87	25.43	0.77
MRT_E	-	49.89	-	50.76	-	0.87
MRT_W	-	53.25	-	54.02	-	0.77
WP1N	8.48	9.36	0.88	9.75	1.27	0.39
WP1S	6.71	9.51	2.8	9.8	3.09	0.29

Table 7-5 Journey for key routes of the bus network DS (PM)

Line	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
1B_I	26.06	24.52	-1.54	24.1	-1.96	-0.42
1B_O	24.26	24.14	-0.12	26.23	1.97	2.09
2_I	28.08	26.46	-1.62	26.11	-1.97	-0.35

Line	2009	2015 DS	Diff. 2015 DS - 2009 (mins.)	2025 DS	Diff. 2025 DS - 2009 (mins.)	Diff. 2025 DS – 2015 DS (mins.)
2_O	26.27	28.48	2.21	31.91	5.64	3.43
58_E	66.09	81.93	15.84	84.03	17.94	2.1
58_W	67.23	84.79	17.56	85.77	18.54	0.98
74_N	51.64	54.99	3.35	56.38	4.74	1.39
74_S	58.8	51.55	-7.25	52.54	-6.26	0.99
75_E	68.94	73.08	4.14	75.14	6.2	2.06
75_W	71.77	79.99	8.22	83.58	11.81	3.59
76_E	57.08	54.58	-2.5	56.04	-1.04	1.46
76_W	62.13	68.3	6.17	72.01	9.88	3.71
77_E	54.23	87.89	33.66	89.63	35.4	1.74
77_W	61.6	68.41	6.81	72.03	10.43	3.62
78_E	78.1	66.81	-11.29	68.56	-9.54	1.75
78_W	88.65	68.43	-20.22	70.7	-17.95	2.27
7_E	-	41.04	-	44.02	-	2.98
7_W	-	40.78	-	42.08	-	1.3
81_I	47.55	64.84	17.29	65.02	17.47	0.18
81_O	41.33	66.3	24.97	67.56	26.23	1.26
MRT_E	-	49.96	-	51.39	-	1.43
MRT_W	-	62.69	-	66.41	-	3.72
WP1N	10.05	12.35	2.3	14.97	4.92	2.62
WP1S	7.47	12.29	4.82	12.62	5.15	0.33

7.12. The numerous development sites to be implemented between 2015 and 2025 create a significant increase in the patronage for most services that operate on the A4 corridor, as shown in Table 7-6 to Table 7-8.

7.13. It is noteworthy that services 75 and 76 operate together with the new SMaRT services in the DS, so the demand is divided on three services instead of two. This should be considered when the patronage on the corridor is examined.

Table 7-6 Patronage for key routes of the bus network DS (AM)

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	46	189.5	11.1	44	175.8	11.3	-4%	-7%	2%
1B_O	42	117.9	5.9	45	122.7	6.7	7%	4%	14%
2_I	34	131.9	8.1	31	111.5	7.4	-9%	-15%	-9%
2_O	27	109.9	6	28	106.6	6.3	4%	-3%	5%
58_E	75	414.8	24	75	451	27	0%	9%	13%
58_W	53	240.3	13.8	54	240	14.7	2%	0%	7%
74_N	111	1329.8	48.2	123	1469.9	54.5	11%	11%	13%
74_S	48	486.2	23	50	492.9	23.8	4%	1%	3%
75_E	104	566	33.1	117	642	39.4	13%	13%	19%
75_W	107	446.4	24.1	117	486	28.1	9%	9%	17%
76_E	84	499.1	25.8	94	556.5	29.1	12%	12%	13%
76_W	94	334.3	17.5	103	358.9	20.5	10%	7%	17%
77_E	45	280.4	14.6	44	270.4	14.3	-2%	-4%	-2%
77_W	81	432.4	26.4	84	466.3	30.8	4%	8%	17%
78_E	67	237.9	17.4	67	246.3	18.7	0%	4%	7%
78_W	54	169.7	10.5	55	172.6	11.5	2%	2%	10%
7_E	12	56.2	4.1	10	51.5	4.3	-17%	-8%	5%
7_W	37	175.2	9.4	37	190.3	10.3	0%	9%	10%

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
81_I	475	4756.5	223.8	492	4893.8	246	4%	3%	10%
81_O	154	1763.8	81.6	171	1901.1	89	11%	8%	9%
MRT_E	64	394.8	19.9	72	433.7	22.3	13%	10%	12%
MRT_W	88	301	15.7	96	321.5	18.4	9%	7%	17%
WP1N	2	2.6	0.2	1	1.8	0.2	-50%	-31%	0%
WP1S	9	22.5	1.3	14	37.4	2.7	56%	66%	108%

Table 7-7 Patronage for key routes of the bus network DS (IP)

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	29	118.4	6	33	131.6	6.7	14%	11%	12%
1B_O	40	159	6.4	43	163.8	6.9	8%	3%	8%
2_I	24	96.1	5.3	27	108.3	6	13%	13%	13%
2_O	36	161.9	7.8	36	159.1	7.9	0%	-2%	1%
58_E	50	371	17.5	52	380.1	18.2	4%	2%	4%
58_W	51	352.1	19.3	53	363.8	20	4%	3%	4%
74_N	55	442	15.6	57	458.4	16.2	4%	4%	4%
74_S	79	587	21.7	83	613.7	23.4	5%	5%	8%
75_E	80	551.5	25.8	94	648.2	30.6	18%	18%	19%
75_W	47	268.2	13.2	53	292.6	14.8	13%	9%	12%

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
76_E	79	587.1	24.4	85	590.7	25.2	8%	1%	3%
76_W	53	202	10.3	60	223.1	11.6	13%	10%	13%
77_E	49	259.4	12.6	52	274.7	13.7	6%	6%	9%
77_W	59	319.7	14.8	62	337.2	16	5%	5%	8%
78_E	30	96.1	6.2	32	98.3	6.6	7%	2%	6%
78_W	36	124.9	7.7	38	129.1	8.1	6%	3%	5%
7_E	33	211.2	10.5	34	217.8	11	3%	3%	5%
7_W	47	275.6	13	49	282.9	13.8	4%	3%	6%
81_I	204	1695.4	77.8	212	1747.8	82.5	4%	3%	6%
81_O	173	1463.2	71.4	179	1463.9	71.7	3%	0%	0%
MRT_E	69	517.4	21	75	522.8	21.8	9%	1%	4%
MRT_W	50	178.3	9	56	192.3	9.9	12%	8%	10%
WP1N	1	1.9	0.1	1	2	0.1	0%	5%	0%
WP1S	7	16.5	0.8	8	17.8	0.9	14%	8%	13%

Table 7-8 Patronage for key routes of the bus network DS (PM)

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
1B_I	19	78.9	4.2	20	80.7	4.2	5%	2%	0%
1B_O	40	165.2	8.2	39	154.8	8.2	-3%	-6%	0%

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
2_I	17	76.5	4.2	19	85.4	4.6	12%	12%	10%
2_O	35	159.5	9	34	147.2	8.9	-3%	-8%	-1%
58_E	53	313.4	17.4	50	289.3	16.6	-6%	-8%	-5%
58_W	70	383.1	23.9	74	400.4	25.1	6%	5%	5%
74_N	85	797	35.8	84	785.5	36.3	-1%	-1%	1%
74_S	49	529.3	20.6	51	555.2	22.1	4%	5%	7%
75_E	106	887.1	45.3	109	908.5	47.6	3%	2%	5%
75_W	80	376.8	22.4	85	391.9	24.4	6%	4%	9%
76_E	104	865.6	33.6	106	851	34.3	2%	-2%	2%
76_W	69	270.9	15	73	274.7	16.4	6%	1%	9%
77_E	43	217.6	14.6	46	241.7	16.2	7%	11%	11%
77_W	49	308.4	17.7	49	301.9	18.1	0%	-2%	2%
78_E	37	132.1	8.8	38	132.5	9	3%	0%	2%
78_W	50	160	12	51	158	12.1	2%	-1%	1%
7_E	22	150	7.9	23	150.1	8.4	5%	0%	6%
7_W	32	175.5	9.5	33	175.1	9.8	3%	0%	3%
81_I	248	2161.9	125.4	259	2245.6	130.7	4%	4%	4%
81_O	228	1985.3	103.5	231	1998.2	105.2	1%	1%	2%
MRT_E	93	800.9	30.3	93	778.6	30.5	0%	-3%	1%

Line	2015 DS			2025 DS			% Diff.		
	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour	Pass.	Pass.*km	Pass.*hour
MRT_W	59	215.1	11.7	63	218.4	12.9	7%	2%	10%
WP1N	3	4.3	0.3	2	3.7	0.4	-33%	-14%	33%
WP1S	17	51.1	3.1	21	61.7	3.9	24%	21%	26%

8. Summary of Scheme Impacts

8.1. To better illustrate the changes that are introduced by the scheme in the DS scenario, we compare below the results of the DM and DS scenario, and the respective differences.

Highway Model outputs

Journey Times

8.2. Journey time comparisons between the modelled Do-Minimum and Do-something scenarios were undertaken along the A4 corridor between its junctions with Dover Road and the Colnbrook Bypass. The results of these runs can be seen in Table 8-1 and Table 8-2. The results show that for every time period across both 2015 and 2025, the introduction of the scheme would improve journey times, though marginally.

Table 8-1 Change in Journey Times as a result of the scheme for 2015

	AM		IP		PM	
	DM	DS	DM	DS	DM	DS
Easbound (Dover Rd - Colnbrook Bypass) Total Journey Time (mins)	26.41	25.98	17.58	17.50	20.44	20.26
Westbound (Colnbrook Bypass - Dover Road) Total Journey Time (mins)	29.22	29.12	19.15	18.94	22.70	22.55

Table 8-2 Change in Journey Times as a result of the scheme for 2025

	AM		IP		PM	
	DM	DS	DM	DS	DM	DS
Easbound (Dover Rd - Colnbrook Bypass) Total Journey Time (mins)	29.96	29.38	18.52	18.47	22.74	22.51
Westbound (Colnbrook Bypass - Dover Road) Total Journey Time (mins)	31.91	31.87	19.85	19.66	23.78	23.72

Traffic Flow

8.3. Changes in traffic flow as a result of the scheme across all three time periods in 2015 and 2025 are shown in Figure 8-1 to Figure 8-6 below. It can be seen that in the 2015 and 2025 AM Peaks, there is a large increase in flow along the A412 Uxbridge Road and part of the A4 corridor between the A355 Tuns Lane and A412 junctions. The reason for this is likely to be increased capacity due to MOVA installations along the same part of the corridor. In the 2015 PM Peak, increases in flows are most predominant along the Stoke Poges Lane/Ledgers Lane junction entering the A4 (around 40 pcu/hr). The reason for this appears to be a combination of extra capacity created by MOVA at the Stoke Poges Lane/Ledgers Road for North-South traffic and existing congestion along the A4 corridor westbound leading to traffic re-routing and entering the corridor at a later point. In the 2025 PM Peak, there is generally less change with the Wrexham Road and the A412 north of the A4 corridor. In the Inter Peak, re-routing of traffic flows is generally seen to be small along the corridor. This is to be expected given that traffic flows are lower and therefore MOVA would have less impact. It should be noted that whilst changes in the network are evident, the size of those changes against base flows are relatively minor, hence the small changes in journey times.

Figure 8-1 Changes in traffic flows in the 2015 AM Peak between the DS and DM scenarios

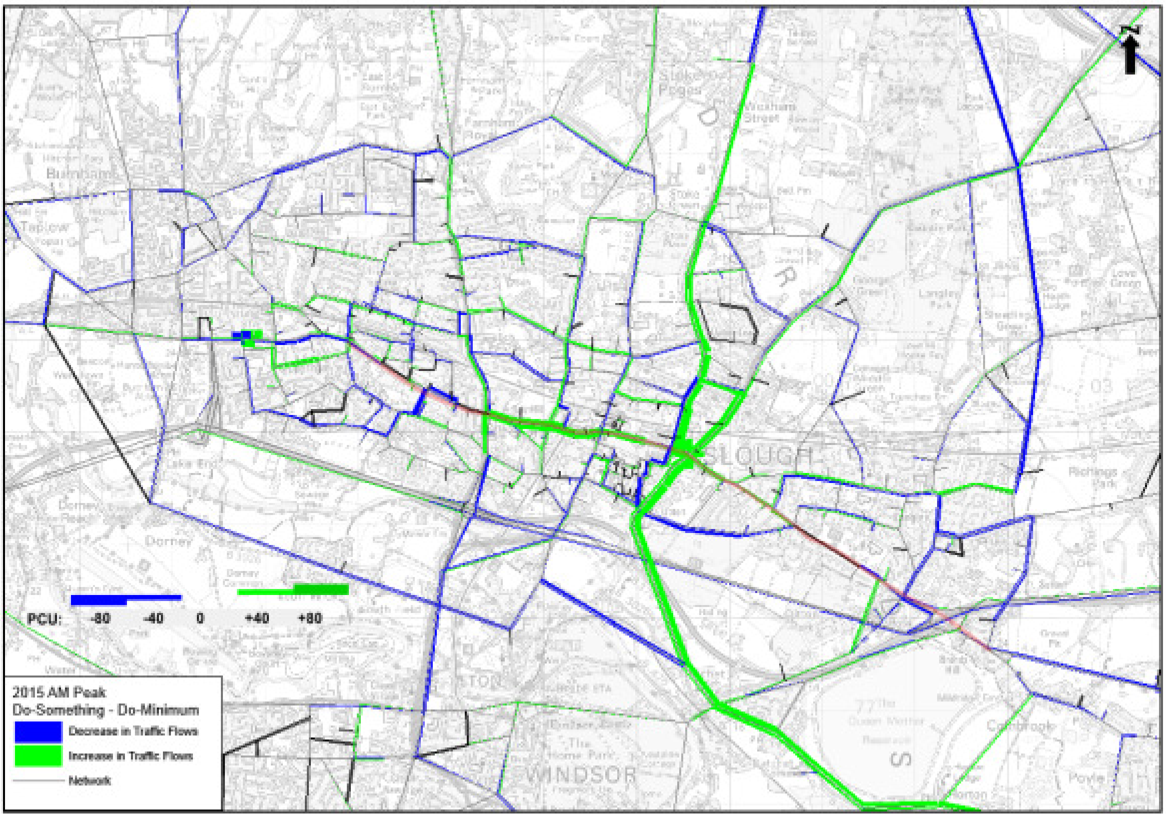


Figure 8-2 Changes in traffic flows in the 2015 IP between the DS and DM scenarios

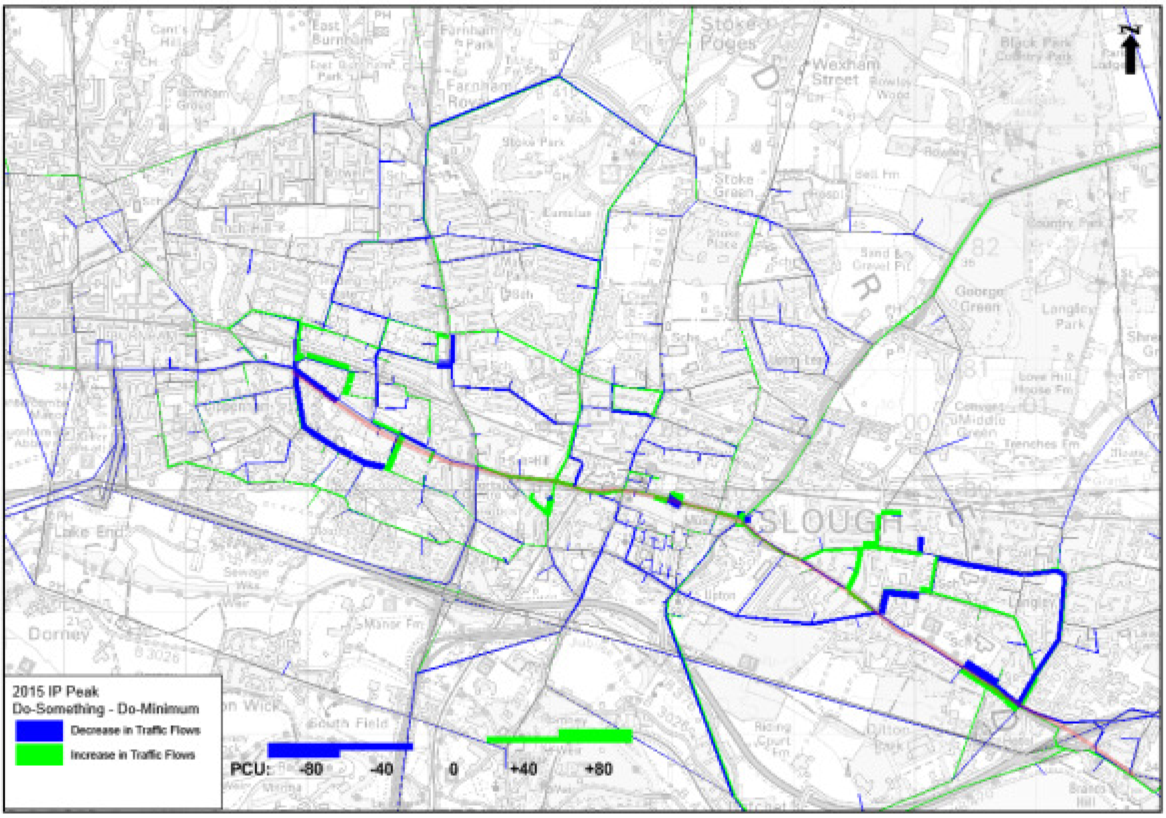


Figure 8-3 Changes in traffic flows in the 2015 PM Peak between the DS and DM scenarios

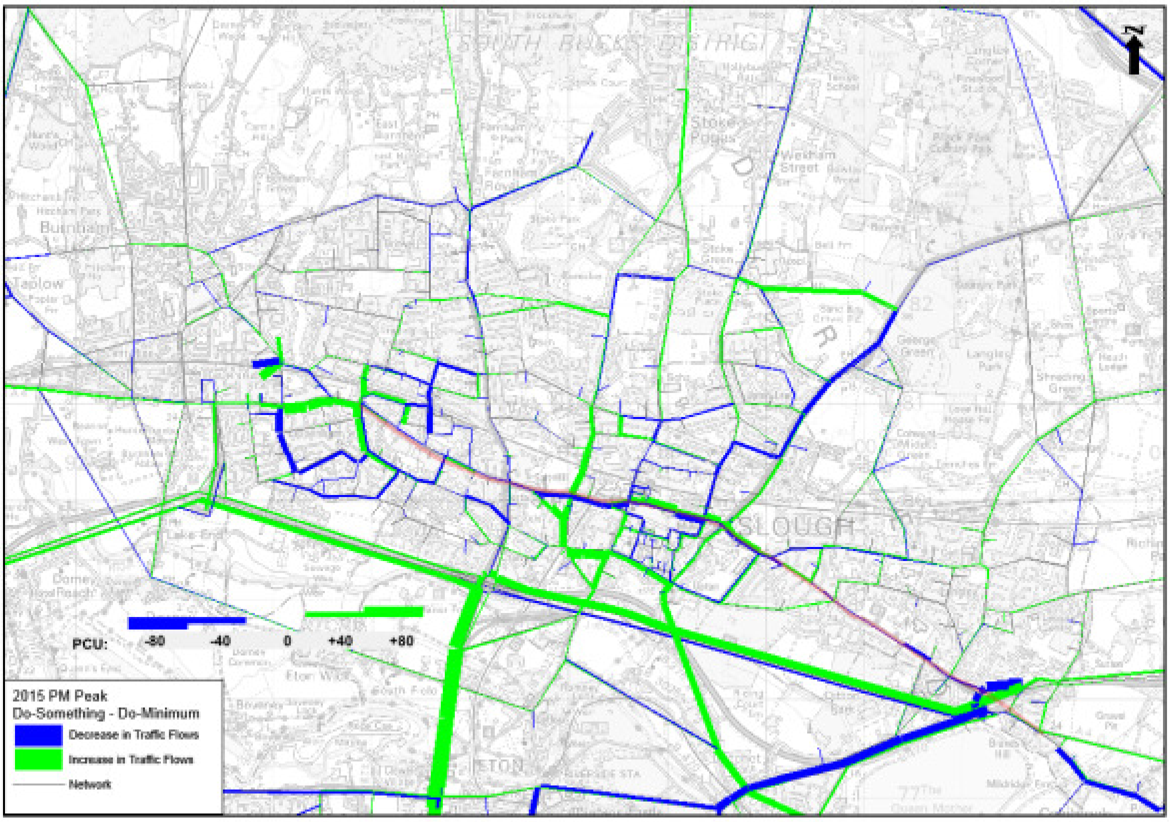


Figure 8-4 Changes in traffic flows in the 2025 AM Peak between the DS and DM scenarios

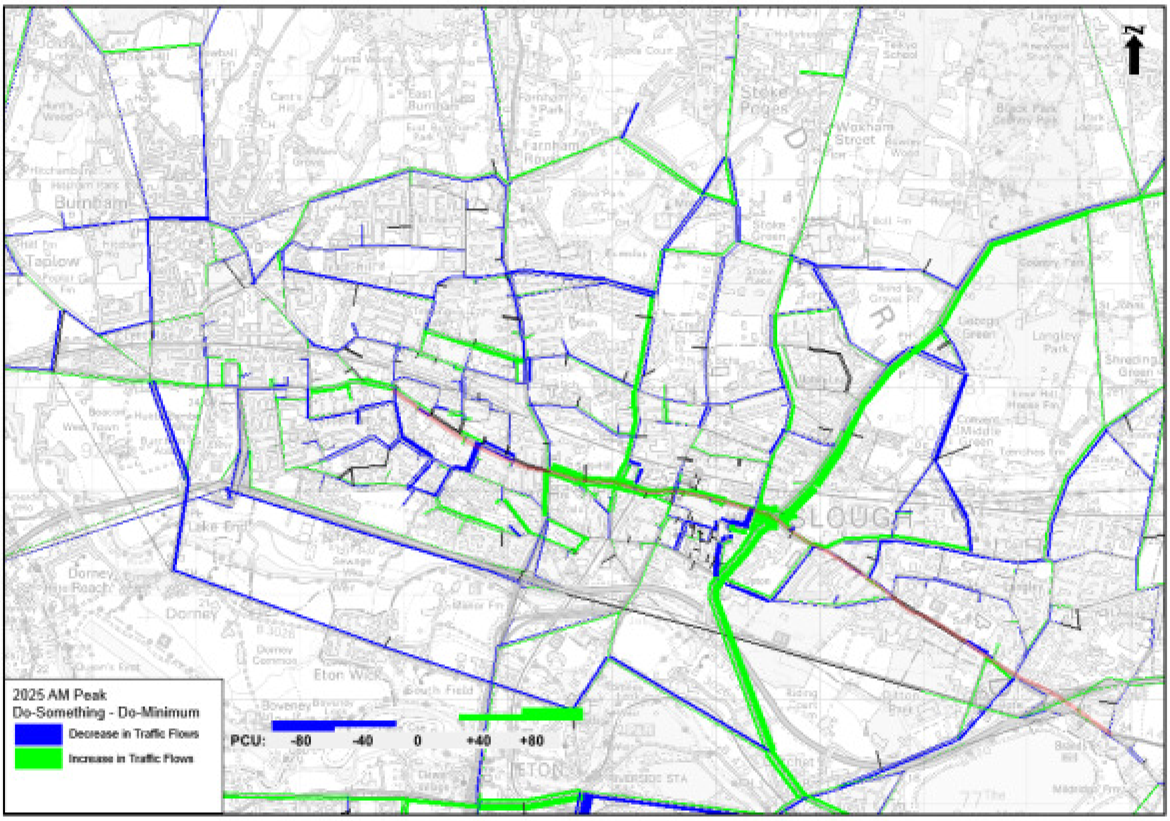


Figure 8-5 Changes in traffic flows in the 2025 IP Peak between the DS and DM scenarios

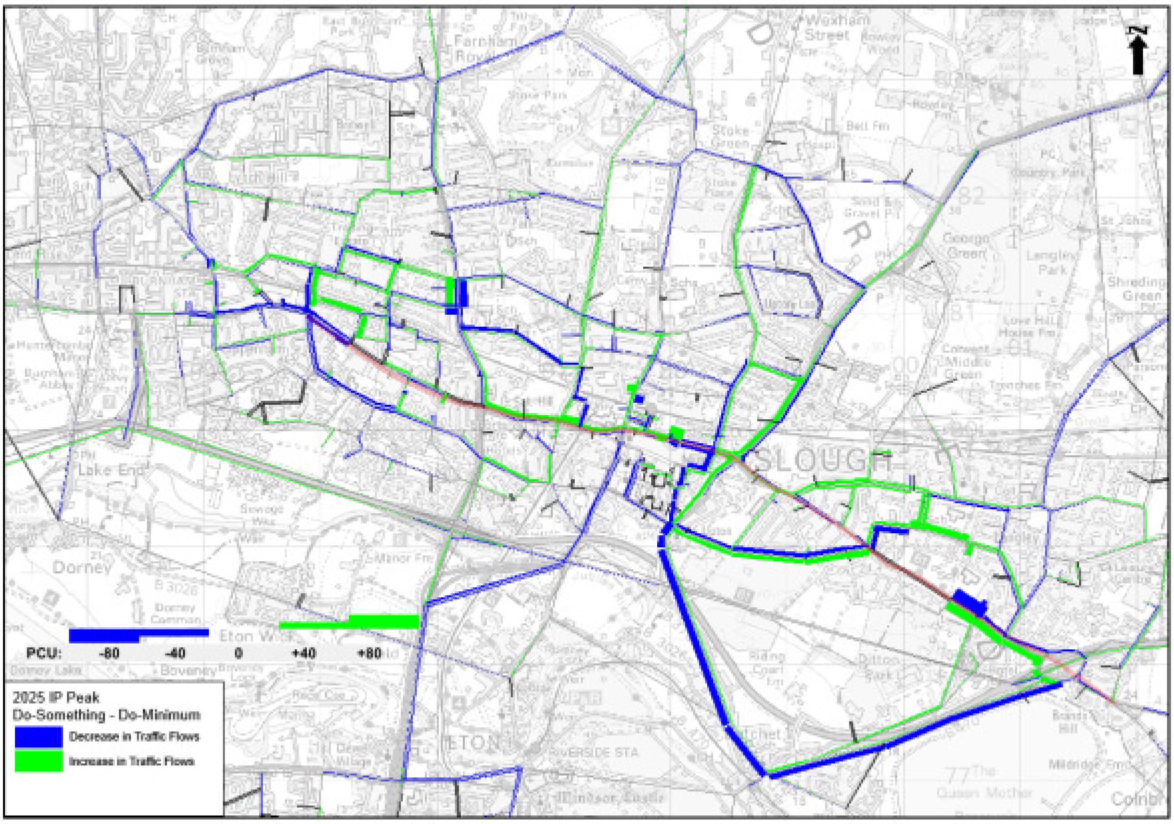
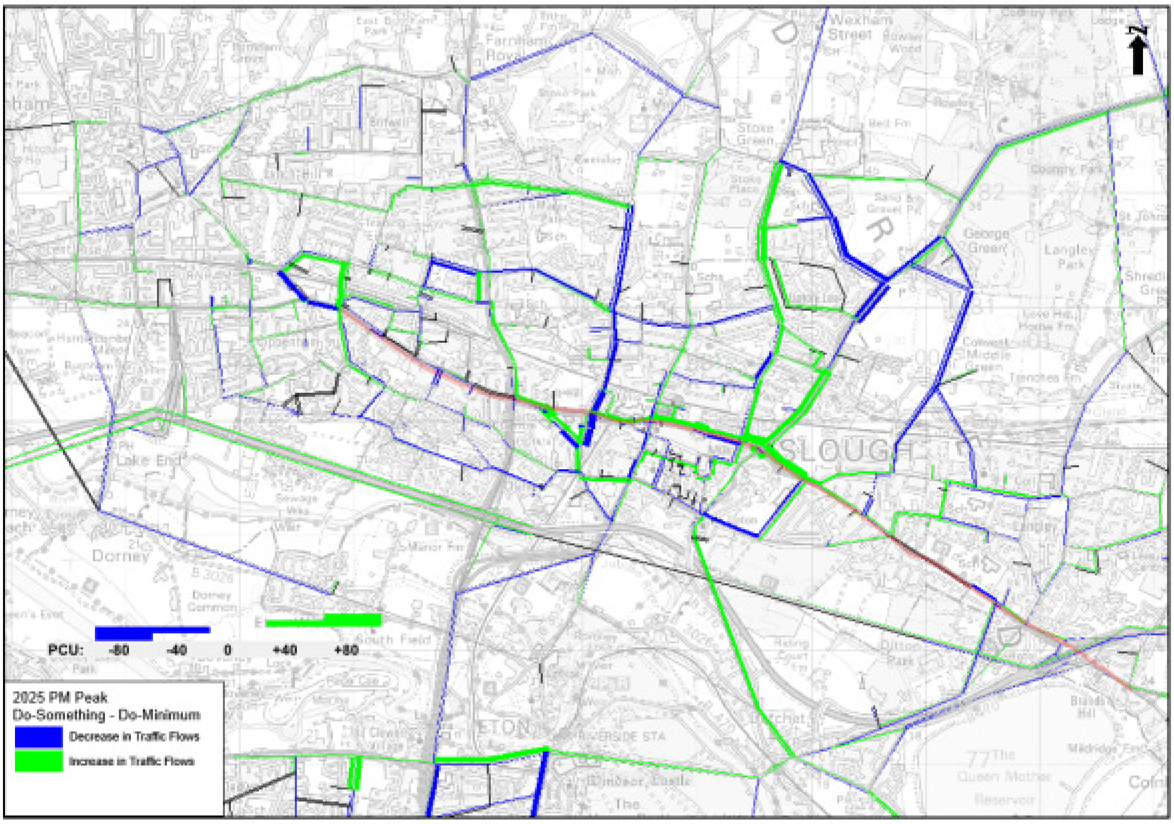


Figure 8-6 Changes in traffic flows in the 2025 PM Peak between the DS and DM scenarios



Model outputs for the public transport model

8.4. The results presented in Table 8-3 and Table 8-4 are a synthesis of the previous chapters, and are a comparison of DM and DS for each of the forecast years. This should give a better understanding of the impacts of the schemes that are proposed.

8.5. As mentioned before, the demand for each of the forecast years is the same both for DM and DS. The results are different though due to the performance of the networks and the changes on the supply side.

Table 8-3 Overall network performance DS vs DM for 2015

Time period	2015 DM	2015 DS	% Diff. 2015 DS - 2015 DM
AM			
Demand (person trips)	1,956	1,956	0.00%
Boardings	2,274	2,337	2.77%
Average No. Boardings	1.16	1.19	2.59%
Pax*hours	3,714	3,650	-1.72%
Total GTT[27] (pass.min)	222,815	218,984	-1.72%
Average GTT (mins.)	114	112	-1.71%
Total IVT[28] (pass.min)	49,912	48,903	-2.02%
Average IVT (mins.)	25.52	25.00	-2.04%
Total Walk[29] (pass.min)	67,873	67,593	-0.41%
Average Walk (mins.)	34.70	34.56	-0.40%
Total Wait[30] (pass.min)	18,520	16,947	-8.49%
Average Wait (mins.)	9.47	8.66	-8.55%
IP			
Demand (person trips)	1,697	1,697	0.00%
Boardings	1,751	1,777	1.48%
Average No. Boardings	1.03	1.05	1.94%
Pax*hours	2,118	2,087	-1.44%
Total GTT (pass.min)	127,050	125,243	-1.42%
Average GTT (mins.)	75	74	-1.43%
Total IVT (pass.min)	32,927	32,186	-2.25%

[27] Generalised travel time
[28] In-vehicle time (un-weighted)
[29] Walking access time (un-weighted)
[30] Waiting time (un-weighted)

Time period	2015 DM	2015 DS	% Diff. 2015 DS - 2015 DM
Average IVT (mins.)	19.40	18.97	-2.22%
Total Walk (pass.min)	32,598	32,666	0.21%
Average Walk (mins.)	19.21	19.25	0.21%
Total Wait (pass.min)	14,449	13,685	-5.29%
Average Wait (mins.)	8.51	8.06	-5.29%
PM			
Demand (person trips)	1,642	1,642	0.00%
Boardings	1,874	1,934	3.20%
Average No. Boardings	1.14	1.18	3.51%
Pax*hours	2,911	2,850	-2.10%
Total GTT (pass.min)	174,688	170,98	-2.12%
Average GTT (mins.)	106	104	-2.12%
Total IVT (pass.min)	43,388	41,736	-3.81%
Average IVT (mins.)	26.42	25.42	-3.79%
Total Walk (pass.min)	50,179	50,286	0.21%
Average Walk (mins.)	30.56	30.63	0.23%
Total Wait (pass.min)	15,606	13,987	-10.38%
Average Wait (mins.)	9.50	8.52	-10.32%

Table 8-4 Overall network performance DS vs DM for 2025

Time period	2025 DM	2025 DS	% Diff. 2025 DS - 2025 DM
AM			
Demand (person trips)	2,236	2,236	0.00%
Boardings	2,383	2,456	3.06%
Average No. Boardings	1.07	1.10	2.80%
Pax*hours	4,033	3,963	-1.74%
Total GTT (pass.min)	241,952	237,782	-1.72%
Average GTT (mins.)	108	106	-1.73%
Total IVT (pass.min)	55,031	53,883	-2.09%
Average IVT (mins.)	24.61	24.10	-2.07%
Total Walk (pass.min)	73,821	73,454	-0.50%
Average Walk (mins.)	33.01	32.85	-0.48%

Time period	2025 DM	2025 DS	% Diff. 2025 DS - 2025 DM
Total Wait (pass.min)	19,583	17,929	-8.44%
Average Wait (mins.)	8.76	8.02	-8.45%
IP			
Demand (person trips)	1,919	1,919.00	0.00%
Boardings	1,847	1,893.00	2.49%
Average No. Boardings	0.96	0.99	3.13%
Pax*hours	2,279	2,246.00	-1.45%
Total GTT (pass.min)	136,769	134,739.80	-1.48%
Average GTT (mins.)	71	70	-1.49%
Total IVT (pass.min)	35,059	34,170	-2.53%
Average IVT (mins.)	18.27	17.81	-2.52%
Total Walk (pass.min)	35,558	35,500	-0.16%
Average Walk (mins.)	18.53	18.50	-0.16%
Total Wait (pass.min)	15,293	14,592	-4.58%
Average Wait (mins.)	7.97	7.60	-4.64%
PM			
Demand (person trips)	1,815	1,815	0.00%
Boardings	1,921	1,981	3.12%
Average No. Boardings	1.06	1.09	2.83%
Pax*hours	3,026	2,962	-2.12%
Total GTT (pass.min)	181,554	177,706	-2.12%
Average GTT (mins.)	100	98	-2.12%
Total IVT (pass.min)	44,857	43,305	-3.46%
Average IVT (mins.)	24.71	23.86	-3.44%
Total Walk (pass.min)	52,480	52,531	0.10%
Average Walk (mins.)	28.91	28.94	0.10%
Total Wait (pass.min)	15,992	14,307	-10.54%
Average Wait (mins.)	8.81	7.88	-10.56%

8.6. The DS results show a decrease of the generalised travel time and all its components compared with DM. The biggest impact is on waiting time, due to the increase of reliability for all the services, which translated into higher frequencies. This is one of the problems identified in the present, when frequencies are irregular due to unpredictability of traffic conditions.

8.7. In the following figures, it is shown an example of the changes in load on a part of the network, namely between Dover Road and Slough Bus Station which includes the new segregated bus lanes near Slough Trading Estate. As mentioned before, in DS the sums include the new service introduced as part of the scheme.

Figure 8-7 Load on bus routes between Dover Road and Slough Bus Station (2015 DM AM)

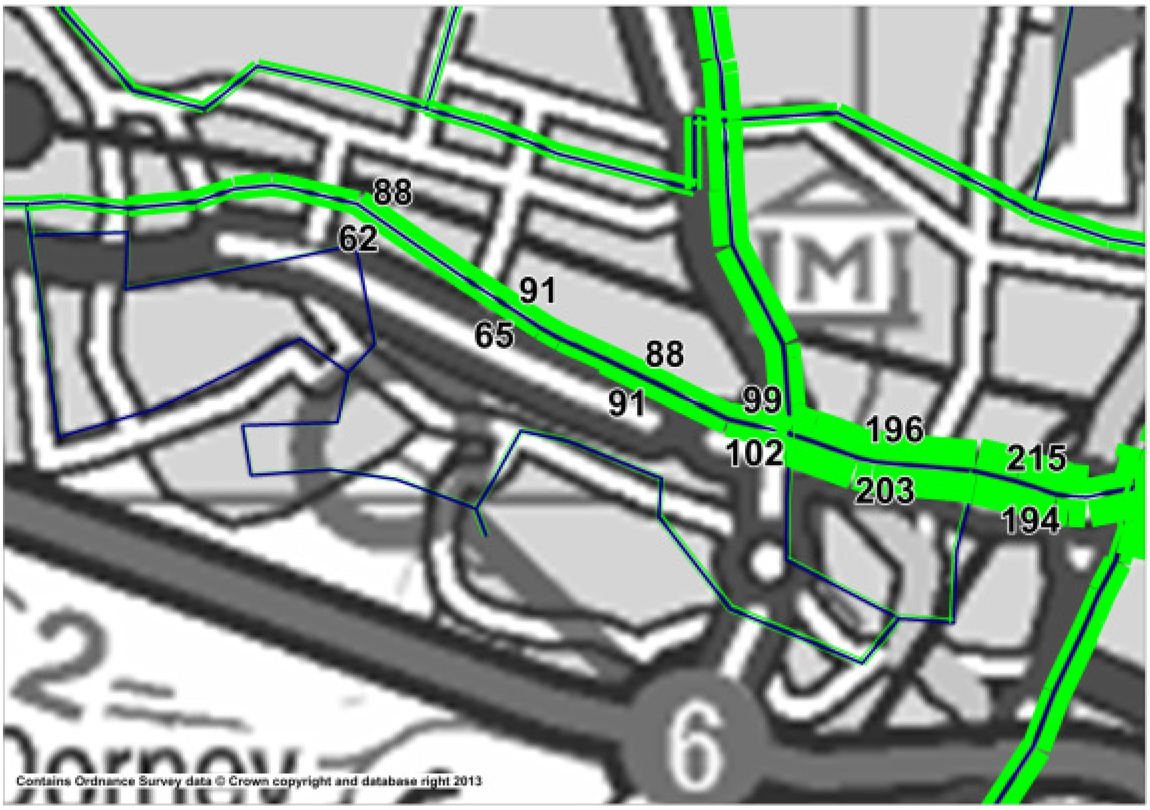


Figure 8-8 Load on bus routes between Dover Road and Slough Bus Station (2025 DM AM)

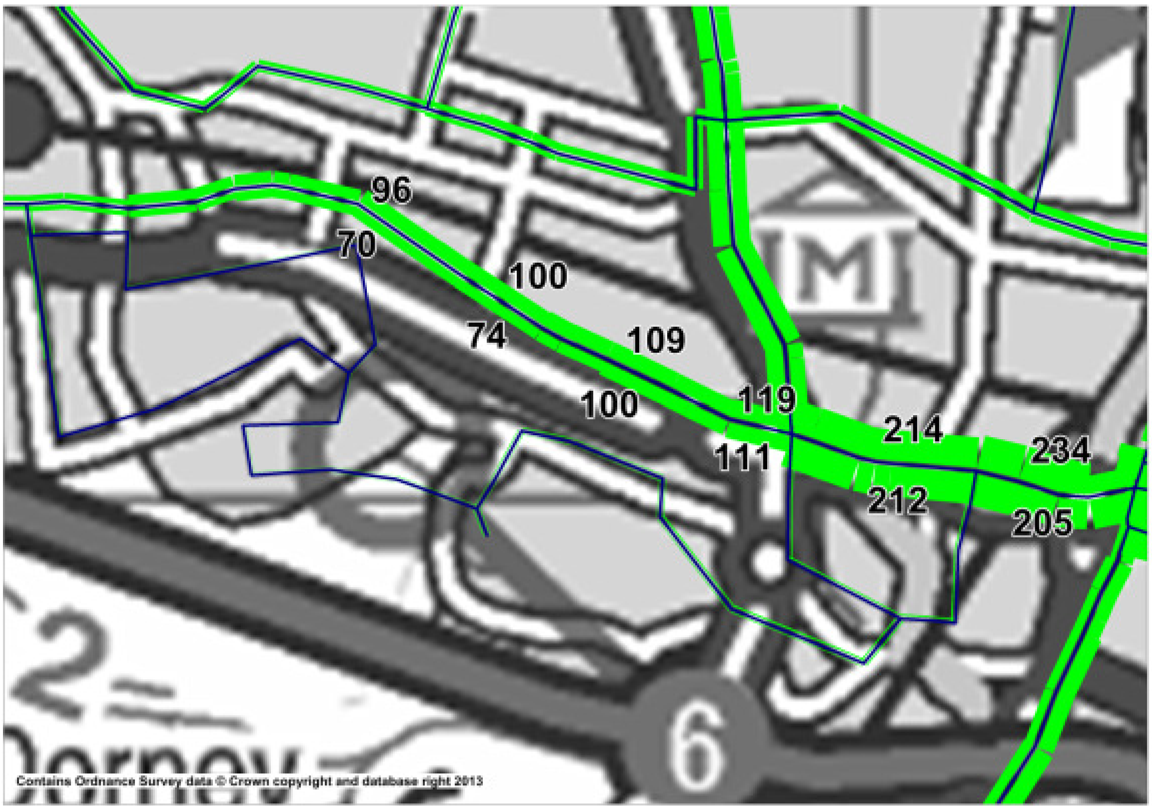


Figure 8-9 Load on bus routes between Dover Road and Slough Bus Station (2015 DS AM)

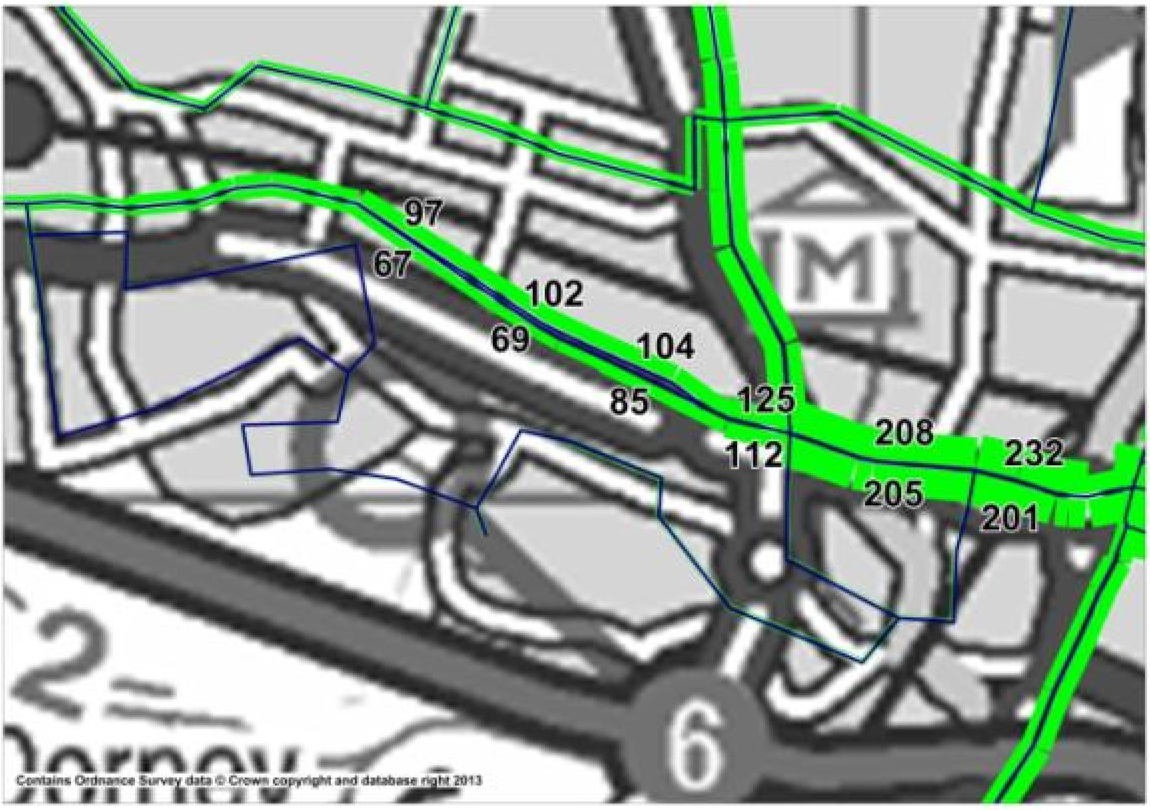
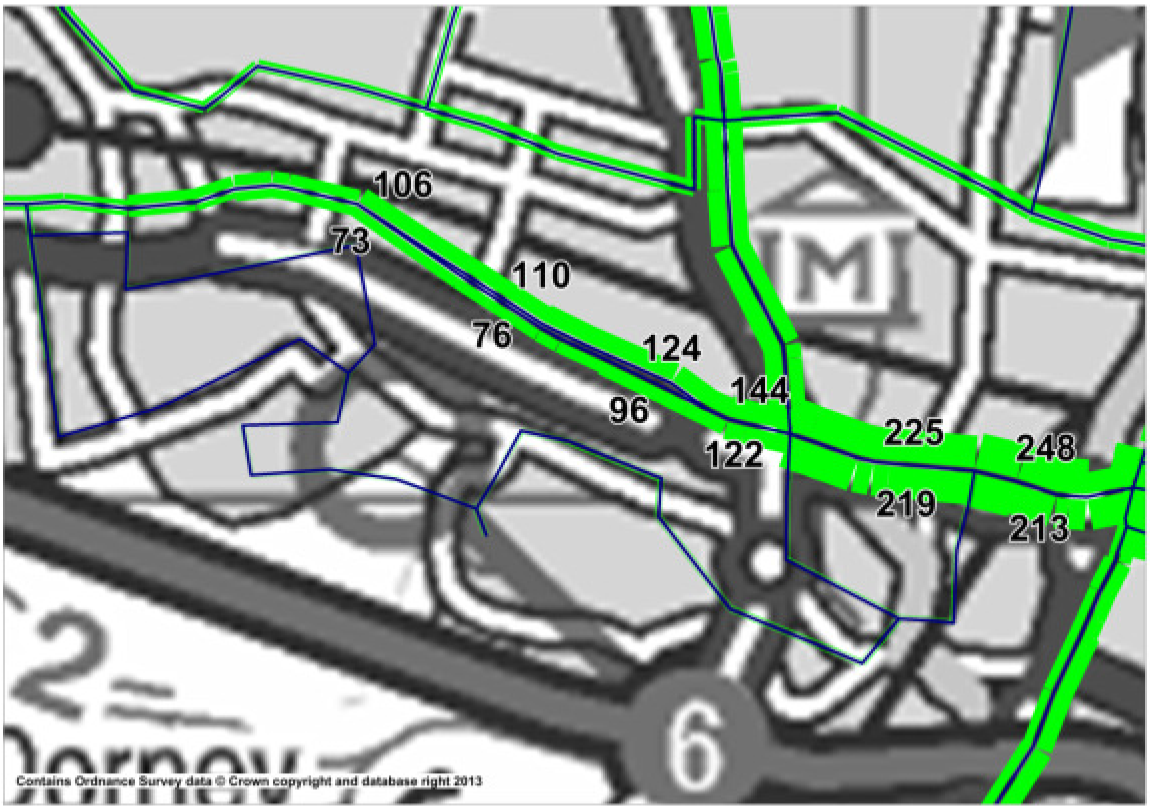


Figure 8-10 Load on bus routes between Dover Road and Slough Bus Station (2025 DS AM)



9. Sensitivity Testing

Introduction

9.1. The following sensitivity testing were considered to the central forecast:

- WebTAG Unit M4 section 4.2 defines the how and low growth scenarios that need to be applied to the central forecast to allow for uncertainty. We undertook these high and low forecasts in accordance to the method outlined in WebTAG that fed into the economic scheme appraisal;
- The enhanced public transport services offered by the scheme will undoubtedly lead to an increase in bus passenger demand which the central forecast (using fixed matrix assignment) does not allow for. We will use generic bus elasticity of demand (with respect with respect to in-vehicle time and waiting time) to estimate the induced demand. This additional demand does not necessarily come from mode shift, it can be abstracted from other public transport services, or due to changes in destinations, or a change in the departure time (shifting for example from the shoulders of the peak to the peak, which has become less congested due to the introduction of the scheme). Abstraction from other bus routes is likely to be the biggest contributor to the increased usage on the scheme. However, the reduction in the number of passengers on other routes due to abstraction will not diminish from the overall benefit calculation because there is no journey time savings on those routes.
- The shuttle bus operation and their patronage is not included in the model. The economic evaluation will test the sensitivity of options for continuing or stopping those bus services, on the overall Value for Money of the scheme;
- WebTAG Unit M2 paragraph 2.2.6 gives a test to assess the need for variable demand modelling: "..Where preliminary calculations using an existing variable demand model are carried out, it will be acceptable in general to use a fixed demand assessment where the resulting difference in suppressed/induced traffic when using the demand model does not change benefits resulting from a scheme by more than 10% in the opening year and 15% in the forecast year (10 to 15 years later) relative to a fixed demand case. This test has not been applied, but the journey time saving due to the scheme has been quite marginal, as can be seen from Table 8-1 and Table 8-2. The saving on the A4 is less than half a minute (2%) in the AM peak, and quite negligible in other time periods. Even if we consider a trip which only uses the full section of the A4, the time saving of 2% implies an increase in trips of 0.5%[31], which does not seem to warrant the application of variable demand modelling.

9.2. The upside or 'high' scenario was not considered as it will not have a material impact on the viability of the scheme. Only the modelling of the low scenario, was considered more relevant in the context. In line with TAG Unit M4, Section 4.2, the parameters that were used, for all time periods, are:

- Parameter p
  - p = 2.5 % for highway demand (all user classes)
  - p = 1.5 % for bus demand
  - p = 2.0 % for rail demand
- Proportion of base year:
  - For 2015: $\sqrt{(2015-2009)} = \sqrt{6} = 2.45$
  - For 2025: $\sqrt{(2025-2009)} = \sqrt{16} = 4$

9.3. The demand for the low scenario was calculated with the following formula, for both DM and DS:

$$T_{low} = T_{core} - T_{Base} * p * proportion \quad of \quad base \quad year$$

[31] Using a generic elasticity of -0.3 [DMRB vol 12 section 2 part 2]

9.4. When applied to the demand matrices, the overall growth factors for highway are shown in Table 9-1. The difference between high and low is due to the necessity to cap the demand to zero when the formula would generate negative results for demand.

Table 9-1 Growth factors for high and low scenarios for highway

	Low	High
2015	-5.6 %	5.8 %
2025	-7.8 %	8.0 %

9.5. Table 9-2 and Table 9-3**Error! Reference source not found.** show the change in public transport travel demand by sub-mode and time period for 2015 and 2025 respectively.

Table 9-2 Change in public transport travel demand by mode and time period for 2015

Mode	Time period	2015 Core	2015 Low	Diff. % (low-core)	2015 High	Diff. % (high-core)
	AM	1956	1888	-3.48%	2025	3.53%
	IP	1697	1640	-3.36%	1755	3.42%
BUS	PM	1642	1585	-3.47%	1700	3.53%
	AM	3340	3194	-4.37%	3499	4.76%
	IP	1097	1046	-4.65%	1149	4.74%
RAIL	PM	2645	2526	-4.50%	2770	4.73%

Table 9-3 Change in public transport travel demand by mode and time period for 2025

Mode	Time period	2025 Core	2025 Low	Diff. % (low-core)	2025 High	Diff. % (high-core)
	AM	2236	2126	-4.92%	2349	5.05%
	IP	1919	1826	-4.85%	2014	4.95%
BUS	PM	1815	1722	-5.12%	1909	5.18%
	AM	3814	3574	-6.29%	4073	6.79%
	IP	1176	1093	-7.06%	1261	7.23%
RAIL	PM	2741	2548	-7.04%	2946	7.48%

Model outputs for the highway model

9.6. Table 9-4 to Table 9-9 show the comparison between the core and low growth DM and DS Scenarios across all time periods in 2015 and 2025.

Table 9-4 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2015 AM Peak

AM Peak Statistics	2015 DM Core	2015 DM Low	Difference (Low-Core) %	2015 DS Core	2015 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	56121	52298	-6.81%	56121	52298	-6.81%
Transient Queues (pcu.hrs)	2743	2348	-14.39%	2734	2311	-15.46%
Over-Capacity Queues (pcu.hrs)	559	361	-35.44%	543	346	-36.24%
Link Cruise Times (pcu.hrs)	14699	13510	-8.09%	14690	13509	-8.04%
Total Travel Times (pcu.hrs)	18001	16219	-9.90%	17966	16166	-10.02%
Travel Distance (pcu-kms)	1073162	995223	-7.26%	1072932	995159	-7.25%
Average Speed (Overall- km/h)	59.6	61.4	3.02%	59.7	61.6	3.18%
Delay (pcu.hours)	3302	2709	-17.96%	3277	2657	-18.90%
Total Delay / Vehicle (mins/veh)	3.530	3.108	-11.96%	3.503	3.049	-12.97%

Table 9-5 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2015 Inter Peak

Inter-Peak Statistics	2015 DM Core	2015 DM Low	Difference (Low-Core) %	2015 DS Core	2015 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	36857	34825	-5.51%	36857	34825	-5.51%
Transient Queues (pcu.hrs)	1195	1113	-6.89%	1203	1115	-7.32%
Over-Capacity Queues (pcu.hrs)	58	52	-10.52%	56	52	-6.28%
Link Cruise Times (pcu.hrs)	9286	8720	-6.09%	9274	8717	-6.01%
Total Travel Times (pcu.hrs)	10539	9885	-6.21%	10533	9884	-6.16%
Travel Distance (pcu-kms)	724855	683682	-5.68%	724604	683412	-5.68%
Average Speed (Overall- km/h)	68.8	69.2	0.58%	68.8	69.1	0.44%
Delay (pcu.hours)	1253	1164	-7.07%	1259	1167	-7.27%
Total Delay / Vehicle (mins/veh)	2.040	2.006	-1.65%	2.049	2.011	-1.86%

Table 9-6 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2015 PM Peak

PM Peak Statistics	2015 DM Core	2015 DM Low	Difference (Low-Core) %	2015 DS Core	2015 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	54902	51872	-5.52%	54902	51872	-5.52%
Transient Queues (pcu.hrs)	2536	2289	-9.73%	2524	2276	-9.83%
Over-Capacity Queues (pcu.hrs)	243	143	-41.25%	245	132	-45.91%
Link Cruise Times (pcu.hrs)	14710	13817	-6.07%	14705	13809	-6.10%
Total Travel Times (pcu.hrs)	17489	16249	-7.09%	17473	16217	-7.19%
Travel Distance (pcu-kms)	1090949	1029871	-5.60%	1090650	1029433	-5.61%
Average Speed (Overall- km/h)	62.4	63.4	1.60%	62.4	63.5	1.76%
Delay (pcu.hours)	2779	2432	-12.49%	2769	2408	-13.01%
Total Delay / Vehicle (mins/veh)	3.037	2.813	-7.38%	3.026	2.786	-7.93%

Table 9-7 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2025 AM Peak

AM Peak Statistics	2025 DM Core	2025 DM Low	Difference (Low-Core) %	2025 DS Core	2025 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	64365	59396	-7.72%	64365	59396	-7.72%
Transient Queues (pcu.hrs)	3164	2665	-15.78%	3138	2664	-15.10%
Over-Capacity Queues (pcu.hrs)	1298	715	-44.89%	1273	700	-44.99%
Link Cruise Times (pcu.hrs)	16968	15441	-9.00%	16963	15445	-8.95%
Total Travel Times (pcu.hrs)	21430	18821	-12.17%	21374	18809	-12.00%
Travel Distance (pcu-kms)	1224690	1130872	-7.66%	1224591	1130937	-7.65%
Average Speed (Overall- km/h)	57.1	60.1	5.25%	57.3	60.1	4.89%
Delay (pcu.hours)	4462	3380	-24.24%	4411	3364	-23.73%
Total Delay / Vehicle (mins/veh)	4.159	3.414	-17.90%	4.111	3.398	-17.35%

Table 9-8 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2025 Inter-Peak

Inter-Peak Statistics	2025 DM Core	2025 DM Low	Difference (Low-Core) %	2025 DS Core	2025 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	43240	40283	-6.84%	43240	40283	-6.84%
Transient Queues (pcu.hrs)	1510	1365	-9.62%	1512	1367	-9.55%
Over-Capacity Queues (pcu.hrs)	90	77	-14.41%	89	73	-17.72%
Link Cruise Times	10123	9356	-7.58%	10112	9346	-7.57%

Inter-Peak Statistics	2025	2025	Difference	2025 DS	2025	Difference
(pcu.hrs)						
Total Travel Times (pcu.hrs)	11722	10797	-7.89%	11712	10787	-7.90%
Travel Distance (pcu-kms)	770588	715657	-7.13%	770215	715305	-7.13%
Average Speed (Overall- km/h)	65.7	66.3	0.91%	65.8	66.3	0.76%
Delay (pcu.hours)	1600	1442	-9.88%	1601	1440	-10.01%
Total Delay / Vehicle (mins/veh)	2.220	2.147	-3.27%	2.221	2.145	-3.40%

Table 9-9 Comparison of network statistics between Core and Low Growth DM and DS Scenarios for 2025 PM Peak

PM Peak Statistics	2025 DM Core	2025 DM Low	Difference (Low-Core) %	2025 DS Core	2025 DS Low	Difference (Low-Core) %
Matrix totals (pcus/hr)	63657	58709	-7.77%	63657	58709	-7.77%
Transient Queues (pcu.hrs)	2928	2467	-15.74%	2918	2412	-17.35%
Over-Capacity Queues (pcu.hrs)	900	487	-45.91%	872	501	-42.60%
Link Cruise Times (pcu.hrs)	17138	15637	-8.76%	17140	15123	-11.77%
Total Travel Times (pcu.hrs)	20965	18590	-11.33%	20930	18035	-13.83%
Travel Distance (pcu-kms)	1254366	1156551	-7.80%	1254434	1115260	-11.09%
Average Speed (Overall- km/h)	59.8	62.2	4.01%	59.9	61.8	3.17%
Delay (pcu.hours)	3827	2954	-22.83%	3790	2913	-23.15%
Total Delay / Vehicle (mins/veh)	3.607	3.018	-16.33%	3.572	2.977	-16.68%

Model outputs for the public transport model

9.7. **Error! Reference source not found.**10 and **Error! Reference source not found.** show the overall network performance obtained from the Public Transport model for the low growth sensitivity model run across 2015 and 2025, respectively.

9.8. The decrease (for Low) and increase (for High) of the demand does have impact on the overall results, namely the totals, where we multiply the times with the demand for each OD pair. But this impact is much lower when it comes to average travel times.

Table 0-10 Overall network performance for 2015

Time period	2015 DM Core	2015 DM Low	Diff. % (low-core)	2015 DS Core	2015 DS Low	Diff. % (low-core)
AM						
Demand	1,956	1,888	-3.5%	1,956	1,888	-3.5%
Boardings	2,274	2,187	-3.8%	2,337	2,254	-3.6%
Average No. Boardings	1.16	1.16	-0.4%	1.19	1.19	-0.1%
Pax*hours	3,714	3,559	-4.2%	3,650	3,500	-4.1%
Total GTT (pass min)	222,815	213,522	-4.2%	218,984	209,981	-4.1%
Average GTT (mins.)	114	113	-0.7%	112	111	-0.7%
Total IVT (pass min)	49,912	46,831	-6.2%	48,903	46,122	-5.7%
Average IVT (mins.)	25.52	24.80	-2.8%	25.00	24.43	-2.3%
Total Walk (pass min)	67,873	65,455	-3.6%	67,593.30	65,077	-3.7%
Average Walk (mins.)	34.70	34.67	-0.1%	34.56	34.47	-0.3%
Total Wait (pass min)	18,520	17,864	-3.5%	16,947.20	16,386	-3.3%
Average Wait (mins.)	9.47	9.46	-0.1%	8.66	8.68	0.2%
IP						
Demand	1,697	1,640	-3.4%	1,697	1,640	-3.4%
Boardings	1,751	1,688	-3.6%	1,777	1,719	-3.3%
Average No. Boardings	1.03	1.03	-0.2%	1.05	1.05	0.1%
Pax*hours	2,118	2,040	-3.7%	2,087	2,011	-3.6%
Total GTT (pass min)	127,050	122,382	-3.7%	125,243	120,645	-3.7%

Time period	2015 DM Core	2015 DM Low	Diff. % (low-core)	2015 DS Core	2015 DS Low	Diff. % (low-core)
Average GTT (mins.)	75	75	-0.3%	74	74	-0.3%
Total IVT (pass min)	32,927	31,566	-4.1%	32,186	30,858	-4.1%
Average IVT (mins.)	19.40	19.25	-0.8%	18.97	18.82	-0.8%
Total Walk (pass min)	32,598	31,513	-3.3%	32,666	31,503	-3.6%
Average Walk (mins.)	19.21	19.22	0.0%	19.25	19.21	-0.2%
Total Wait (pass min)	14,449	13,867	-4.0%	13,685	13,214	-3.4%
Average Wait (mins.)	8.51	8.46	-0.7%	8.06	8.06	-0.1%
PM						
Demand	1,642	1,585	-3.5%	1,642	1,585	-3.5%
Boardings	1,874	1,806	-3.6%	1,934	1,868	-3.4%
Average No. Boardings	1.14	1.14	-0.2%	1.18	1.18	0.1%
Pax*hours	2,911	2,801	-3.8%	2,850	2,742	-3.8%
Total GTT (pass min)	174,688	168,085	-3.8%	170,982	164,505	-3.8%
Average GTT (mins.)	106	106	-0.3%	104	104	-0.3%
Total IVT (pass min)	43,388	41,416	-4.5%	41,736	40,111	-3.9%
Average IVT (mins.)	26.42	26.13	-1.1%	25.42	25.31	-0.4%
Total Walk (pass min)	50,179	48,387	-3.6%	50,286	48,285	-4.0%
Average Walk (mins.)	30.56	30.53	-0.1%	30.63	30.46	-0.5%
Total Wait (pass min)	15,606	15,107	-3.2%	13,987	13,623	-2.6%

Time period	2015 DM Core	2015 DM Low	Diff. % (low-core)	2015 DS Core	2015 DS Low	Diff. % (low-core)
Average Wait (mins.)	9.50	9.53	0.3%	8.52	8.59	0.9%

Table 0-11 Overall network performance for 2025

Time period	2025 DM Core	2025 DM Low	Diff. % (low-core)	2025 DS Core	2025 DS Low	Diff. % (low-core)
AM						
Demand	2,236	2,126	-4.9%	2,236	2,126	-4.9%
Boardings	2,383	2,278	-4.4%	2,456	2,357	-4.0%
Average No. Boardings	1.07	1.07	0.5%	1.10	1.11	0.9%
Pax*hours	4,033	3,779	-6.3%	3,963	3,685	-7.0%
Total GTT (pass min)	241,952	226,713	-6.3%	237,782	221,088	-7.0%
Average GTT (mins.)	108	107	-0.9%	106	104	-1.9%
Total IVT (pass min)	55,031	50,181	-8.8%	53,883	47,885	-11.1%
Average IVT (mins.)	24.61	23.60	-4.1%	24.10	22.52	-6.5%
Total Walk (pass min)	73,821	69,580	-5.7%	73,454	68,969	-6.1%
Average Walk (mins.)	33.01	32.73	-0.9%	32.85	32.44	-1.2%
Total Wait (pass min)	19,583	18,633	-4.8%	17,929	17,120	-4.5%
Average Wait (mins.)	8.76	8.76	0.1%	8.02	8.05	0.4%
IP						
Demand	1,919	1,827	-4.8%	1,919	1,827	-4.8%

Time period	2025 DM Core	2025 DM Low	Diff. % (low-core)	2025 DS Core	2025 DS Low	Diff. % (low-core)
Boardings	1,847	1,752	-5.1%	1,893	1,784	-5.8%
Average No. Boardings	0.96	0.96	-0.4%	0.99	0.98	-1.0%
Pax*hours	2,279	2,151	-5.6%	2,246	2,118	-5.7%
Total GTT (pass min)	136,769	129,032	-5.7%	134,74	127,108	-5.7%
Average GTT (mins.)	71	71	-0.9%	70	70	-0.9%
Total IVT (pass min)	35,059	32,743	-6.6%	34,170	31,968	-6.4%
Average IVT (mins.)	18.27	17.92	-1.9%	17.81	17.50	-1.7%
Total Walk (pass min)	35,558	33,647	-5.4%	35,500	33,631	-5.3%
Average Walk (mins.)	18.53	18.42	-0.6%	18.50	18.41	-0.5%
Total Wait (pass min)	15,293	14,492	-5.2%	14,592	13,775	-5.6%
Average Wait (mins.)	7.97	7.93	-0.5%	7.60	7.54	-0.8%
PM						
Demand	1,815	1,722	-5.1%	1,815	1,722	-5.1%
Boardings	1,921	1,795	-6.6%	1,981	1,868	-5.7%
Average No. Boardings	1.06	1.04	-1.5%	1.09	1.08	-0.6%
Pax*hours	3,026	2,834	-6.3%	2,962	2,783	-6.0%
Total GTT (pass min)	181,554	170,045	-6.3%	177,706	166,952	-6.1%
Average GTT (mins.)	100	99	-1.3%	98	97	-1.0%
Total IVT (pass min)	44,857	41,404	-7.7%	43,305	40,196	-7.2%

Time period	2025 DM Core	2025 DM Low	Diff. % (low-core)	2025 DS Core	2025 DS Low	Diff. % (low-core)
Average IVT (mins.)	24.71	24.04	-2.7%	23.86	23.34	-2.2%
Total Walk (pass min)	52,480	49,395	-5.9%	52,531	49,522	-5.7%
Average Walk (mins.)	28.91	28.68	-0.8%	28.94	28.76	-0.6%
Total Wait (pass min)	15,992	15,091	-5.6%	14,307	13,533	-5.4%
Average Wait (mins.)	8.81	8.76	-0.5%	7.88	7.86	-0.3%

Elasticity

9.9. After comparing different sources[32], the elasticity of demand with respect to generalised travel time used for bus was -0.4. The number of additional trips was calculated using the following formula:

$$T_{ij}^{test} = T_{ij}^{base}\left(\frac{C_{ij}^{test}}{C_{ij}^{base}}\right)^{\alpha}$$

Where:

T_{ij}^{test} = estimated number of trips for test scenario

T_{ij}^{base} = number of trips for base scenario

C_{ij}^{test} = generalised travel time for test scenario

C_{ij}^{base} = generalised travel time for base scenario

α = -0.4

9.10. The travel demand for bus, obtained by adopting this methodology, is summarised in **Error! Reference source not found.**. The results show that the savings in generalised time introduced by the scheme has little impact on induced traffic. These results were used to intorm the Economic Appraisal.

Table 0-12 Elasticity results for bus

Sum of matrices	AM	IP	PM
Demand 2025 DM (T_{ij}^{base})	2236	1919	1815
GJT 2025 DS(C_{ij}^{test})	125,728,168	124,472,648	125,363,176
GJT 2025 DM(C_{ij}^{base})	126,035,952	124,643,176	125,716,160
Results for demand (T_{ij}^{test})	2256	1931	1833
Diff (T_{ij}^{test} - T_{ij}^{base})	20	12	18

[32] "The Demand for Public Transport", Transport and Road Research Laboratory, 1980, "PDFH – Passenger Demand Forecasting Handbook" – Table B2.9, "The Demand for Public Transport", TRL Report TRL593 – Table 6.55

Appendices

Appendix A. TEMPRO growth factors

A.1.1. The growth forecasts were calculated using TEMPRO (version 6.2) to extract data from the National Trip End Model (NTEM) version 6.2 dataset in May 2014.

Growth Factors from 2009 to 2015 for Rail/Underground/Bus (AM peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.045	1.023	1.032	1.031	1.044	1.038	1.039	1.033
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.024	1.020	1.023	1.018	1.004	0.999	1.011	1.007
12	Hillingdon+Ealing+Hounslow	1.046	1.034	1.047	1.038	1.017	1.033	1.037	1.036
13	LON-Hillingdon-Ealing-Hounslow	1.048	1.045	1.044	1.040	1.039	1.035	1.042	1.038
14	Surrey+Kent+East Sussex+West Sussex	1.039	1.045	1.024	1.031	1.015	1.014	1.019	1.021
15	Windsor and Maidenhead	1.037	1.051	1.034	1.054	1.008	1.007	1.019	1.033
16	Reading+Wokingham+Bracknell Forest	1.052	1.046	1.048	1.049	1.026	1.019	1.036	1.036
17	EAST	1.035	1.035	1.017	1.021	1.039	1.044	1.030	1.035
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.030	1.032	1.011	1.012	1.011	1.010	1.011	1.012
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.015	1.014	0.997	0.997	1.028	1.026	1.015	1.015
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.005	1.005	0.981	0.981	1.014	1.014	1.000	1.000

Growth Factors from 2009 to 2015 for Rail/Underground/Bus (IP peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.033	1.037	1.022	1.022	1.003	1.014	1.007	1.016
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.021	1.021	1.012	1.014	1.003	1.004	1.005	1.005
12	Hillingdon+Ealing+Hounslow	1.044	1.036	1.035	1.037	1.013	1.011	1.018	1.017
13	LON-Hillingdon-Ealing-Hounslow	1.048	1.048	1.036	1.037	1.030	1.031	1.032	1.033
14	Surrey+Kent+East Sussex+West Sussex	1.049	1.051	1.024	1.025	1.017	1.016	1.019	1.018
15	Windsor and Maidenhead	1.049	1.052	1.039	1.037	1.008	1.008	1.014	1.013
16	Reading+Wokingham+Bracknell Forest	1.052	1.050	1.041	1.041	1.018	1.019	1.023	1.024
17	EAST	1.043	1.042	1.020	1.021	1.041	1.039	1.038	1.037
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.036	1.036	1.010	1.010	1.012	1.012	1.013	1.012
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.022	1.022	0.999	1.000	1.019	1.019	1.016	1.017
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.013	1.013	0.982	0.982	1.003	1.003	1.001	1.001

Growth Factors from 2009 to 2015 for Rail/Underground/Bus (PM peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.025	1.038	1.026	1.025	1.020	1.018	1.024	1.022
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.021	1.024	1.013	1.018	1.004	1.008	1.008	1.013
12	Hillingdon+Ealing+Hounslow	1.038	1.044	1.034	1.043	1.027	1.017	1.031	1.033
13	LON-Hillingdon-Ealing-Hounslow	1.043	1.047	1.037	1.041	1.033	1.036	1.036	1.039
14	Surrey+Kent+East Sussex+West Sussex	1.042	1.035	1.026	1.021	1.020	1.018	1.023	1.020
15	Windsor and Maidenhead	1.052	1.038	1.049	1.031	1.015	1.013	1.033	1.021
16	Reading+Wokingham+Bracknell Forest	1.050	1.054	1.045	1.043	1.022	1.026	1.036	1.035
17	EAST	1.034	1.031	1.020	1.017	1.040	1.038	1.032	1.028
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.028	1.026	1.009	1.008	1.013	1.013	1.012	1.012
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.012	1.012	0.996	0.996	1.019	1.020	1.009	1.009
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	0.999	0.999	0.980	0.980	1.003	1.003	0.993	0.993

Growth Factors from 2009 to 2015 for Car (AM peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.057	1.026	1.075	1.040	1.067	1.067
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.025	1.022	1.034	1.027	1.034	1.038
12	Hillingdon+Ealing+Hounslow	1.061	1.045	1.071	1.057	1.056	1.067
13	LON-Hillingdon-Ealing-Hounslow	1.074	1.062	1.078	1.066	1.076	1.072
14	Surrey+Kent+East Sussex+West Sussex	1.053	1.064	1.054	1.064	1.066	1.068
15	Windsor and Maidenhead	1.040	1.054	1.045	1.060	1.044	1.044
16	Reading+Wokingham+Bracknell Forest	1.064	1.054	1.073	1.062	1.067	1.057
17	EAST	1.045	1.048	1.049	1.051	1.079	1.082
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.043	1.045	1.046	1.048	1.064	1.064
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.027	1.028	1.033	1.033	1.069	1.068
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.027	1.027	1.030	1.030	1.066	1.066

Growth Factors from 2009 to 2015 for Car (IP peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.039	1.032	1.049	1.053	1.063	1.065
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.025	1.025	1.029	1.029	1.041	1.041
12	Hillingdon+Ealing+Hounslow	1.053	1.048	1.057	1.060	1.061	1.062
13	LON-Hillingdon-Ealing-Hounslow	1.066	1.065	1.066	1.070	1.075	1.075
14	Surrey+Kent+East Sussex+West Sussex	1.062	1.063	1.061	1.057	1.075	1.075
15	Windsor and Maidenhead	1.051	1.053	1.052	1.051	1.049	1.048
16	Reading+Wokingham+Bracknell Forest	1.059	1.057	1.062	1.066	1.067	1.067
17	EAST	1.050	1.049	1.053	1.051	1.089	1.089
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.047	1.047	1.048	1.047	1.073	1.073
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.032	1.031	1.036	1.036	1.077	1.077
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.030	1.030	1.033	1.033	1.074	1.074

Growth Factors from 2009 to 2015 for Car (PM peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.034	1.055	1.038	1.070	1.065	1.066
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.024	1.027	1.026	1.032	1.040	1.040
12	Hillingdon+Ealing+Hounslow	1.050	1.059	1.055	1.066	1.064	1.060
13	LON-Hillingdon-Ealing-Hounslow	1.065	1.073	1.063	1.074	1.072	1.070
14	Surrey+Kent+East Sussex+West Sussex	1.063	1.055	1.062	1.052	1.070	1.071
15	Windsor and Maidenhead	1.054	1.043	1.057	1.044	1.049	1.047
16	Reading+Wokingham+Bracknell Forest	1.058	1.065	1.060	1.071	1.067	1.069
17	EAST	1.049	1.047	1.050	1.048	1.077	1.077
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.047	1.045	1.047	1.044	1.065	1.065
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.030	1.030	1.033	1.033	1.063	1.063
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.029	1.029	1.030	1.030	1.060	1.060

Growth Factors from 2009 to 2025 for Rail/Underground/Bus (AM peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.089	1.063	1.046	1.077	1.115	1.119	1.086	1.094
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.058	1.081	1.032	1.071	1.038	1.059	1.036	1.064
12	Hillingdon+Ealing+Hounslow	1.092	1.063	1.085	1.061	1.073	1.110	1.081	1.080
13	LON-Hillingdon-Ealing-Hounslow	1.097	1.089	1.076	1.065	1.133	1.121	1.095	1.084
14	Surrey+Kent+East Sussex+West Sussex	1.069	1.078	1.030	1.041	1.071	1.071	1.053	1.059
15	Windsor and Maidenhead	1.098	1.115	1.076	1.115	1.053	1.052	1.063	1.087
16	Reading+Wokingham+Bracknell Forest	1.114	1.100	1.085	1.101	1.108	1.083	1.099	1.094
17	EAST	1.083	1.091	1.029	1.051	1.142	1.158	1.093	1.118
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.053	1.055	1.006	1.009	1.083	1.084	1.051	1.053
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.054	1.051	1.005	1.004	1.073	1.069	1.045	1.043
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.031	1.032	0.966	0.966	1.025	1.025	1.001	1.001

Growth Factors from 2009 to 2025 for Rail/Underground/Bus (IP peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.086	1.084	1.055	1.049	1.061	1.077	1.061	1.073
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.076	1.073	1.052	1.039	1.068	1.060	1.067	1.058
12	Hillingdon+Ealing+Hounslow	1.085	1.070	1.062	1.066	1.081	1.076	1.077	1.074
13	LON-Hillingdon-Ealing-Hounslow	1.095	1.098	1.065	1.065	1.129	1.131	1.114	1.117
14	Surrey+Kent+East Sussex+West Sussex	1.090	1.091	1.037	1.040	1.088	1.087	1.083	1.081
15	Windsor and Maidenhead	1.113	1.123	1.091	1.086	1.064	1.062	1.070	1.067
16	Reading+Wokingham+Bracknell Forest	1.115	1.114	1.086	1.089	1.085	1.092	1.087	1.092
17	EAST	1.107	1.104	1.053	1.057	1.161	1.158	1.148	1.143
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.069	1.069	1.016	1.014	1.095	1.094	1.084	1.083
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.069	1.068	1.006	1.008	1.060	1.061	1.054	1.055
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.048	1.048	0.964	0.964	1.007	1.007	1.003	1.003

Growth Factors from 2009 to 2025 for Rail/Underground/Bus (PM peak)

Sectors	Base Year	Employer Business		Commuting		Others		All purposes	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.073	1.076	1.070	1.037	1.088	1.070	1.078	1.055
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.081	1.048	1.065	1.026	1.071	1.051	1.069	1.041
12	Hillingdon+Ealing+Hounslow	1.065	1.083	1.055	1.078	1.094	1.076	1.069	1.077
13	LON-Hillingdon-Ealing-Hounslow	1.078	1.088	1.062	1.071	1.114	1.123	1.081	1.092
14	Surrey+Kent+East Sussex+West Sussex	1.070	1.059	1.034	1.027	1.085	1.078	1.065	1.053
15	Windsor and Maidenhead	1.115	1.096	1.107	1.070	1.068	1.064	1.089	1.068
16	Reading+Wokingham+Bracknell Forest	1.104	1.110	1.094	1.080	1.085	1.098	1.091	1.090
17	EAST	1.086	1.070	1.051	1.033	1.154	1.140	1.113	1.088
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.047	1.044	1.007	1.005	1.087	1.087	1.051	1.049
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.042	1.043	0.999	1.000	1.060	1.060	1.033	1.033
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.013	1.013	0.959	0.959	1.007	1.007	0.986	0.986

Growth Factors from 2009 to 2025 for Car (AM peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.129	1.077	1.153	1.105	1.163	1.170
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.064	1.095	1.065	1.100	1.092	1.121
12	Hillingdon+Ealing+Hounslow	1.128	1.090	1.147	1.114	1.146	1.176
13	LON-Hillingdon-Ealing-Hounslow	1.158	1.129	1.164	1.131	1.198	1.183
14	Surrey+Kent+East Sussex+West Sussex	1.097	1.117	1.098	1.112	1.160	1.163
15	Windsor and Maidenhead	1.103	1.131	1.109	1.135	1.122	1.114
16	Reading+Wokingham+Bracknell Forest	1.142	1.124	1.153	1.136	1.164	1.142
17	EAST	1.105	1.119	1.107	1.122	1.215	1.225
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.077	1.082	1.080	1.085	1.166	1.166
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.088	1.088	1.096	1.095	1.168	1.166
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.091	1.091	1.093	1.093	1.154	1.154

Growth Factors from 2009 to 2025 for Car (IP peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.103	1.085	1.117	1.124	1.165	1.169
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.089	1.093	1.088	1.081	1.121	1.121
12	Hillingdon+Ealing+Hounslow	1.110	1.095	1.121	1.123	1.167	1.170
13	LON-Hillingdon-Ealing-Hounslow	1.139	1.136	1.137	1.149	1.199	1.199
14	Surrey+Kent+East Sussex+West Sussex	1.113	1.117	1.112	1.105	1.183	1.183
15	Windsor and Maidenhead	1.124	1.129	1.121	1.122	1.131	1.130
16	Reading+Wokingham+Bracknell Forest	1.133	1.130	1.136	1.143	1.169	1.169
17	EAST	1.123	1.122	1.128	1.121	1.243	1.242
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.087	1.088	1.092	1.090	1.193	1.192
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.095	1.095	1.100	1.100	1.187	1.188
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.095	1.095	1.096	1.096	1.173	1.173

Growth Factors from 2009 to 2025 for Car (PM peak)

Sectors	Base Year	Employer Business		Commuting		Others	
	Name	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	Slough	1.095	1.124	1.100	1.144	1.157	1.158
11	Buckinghamshire-Aylesbury Vale-Milton Keynes	1.093	1.069	1.095	1.062	1.112	1.105
12	Hillingdon+Ealing+Hounslow	1.103	1.120	1.110	1.135	1.159	1.151
13	LON-Hillingdon-Ealing-Hounslow	1.134	1.156	1.124	1.157	1.173	1.171
14	Surrey+Kent+East Sussex+West Sussex	1.116	1.102	1.109	1.094	1.157	1.159
15	Windsor and Maidenhead	1.129	1.109	1.129	1.107	1.123	1.120
16	Reading+Wokingham+Bracknell Forest	1.131	1.143	1.130	1.149	1.157	1.162
17	EAST	1.122	1.109	1.121	1.105	1.202	1.202
18	SW-Gloucestershire-Avon-Swindon-North Wiltshire+Hampshire+Isle of Wight	1.085	1.082	1.084	1.079	1.157	1.158
19	WM+Northamptonshire+Gloucestershire+Avon+Swindon+North Wiltshire+Oxfordshire+West Berkshire+Aylesbury Vale+Milton Keynes	1.093	1.093	1.093	1.093	1.158	1.159
20	SCOTLAND+YH+NE+NW+WALES+EM-Northamptonshire	1.094	1.094	1.088	1.088	1.148	1.148

Appendix B. List of public transport services

Headway (min.) for public transport services (AM peak)

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
191S	bus	Slough-Bracknell	60	#N/A	#N/A	#N/A	#N/A
1B_I	bus	TE-Bus station	34	TE-Bus station	34	TE-Bus station	34
1B_O	bus	Bus station-TE	35	Bus station-TE	35	Bus station-TE	35
2_I	bus	Burnham-Slough	34	Burnham-Slough	34	Burnham-Slough	34
2_O	bus	Slough-Burnham	36	Slough-Burnham	36	Slough-Burnham	36
3_E	bus	Slough-W.P. Hosp.	36	#N/A	#N/A	#N/A	#N/A
3_W	bus	W.P. Hosp.-Slough	36	#N/A	#N/A	#N/A	#N/A
353N	bus	#N/A	#N/A	Amersham-Slough	90	Amersham-Slough	90
353S	bus	#N/A	#N/A	Slough-Amersham	90	Slough-Amersham	90
5_E	bus	#N/A	#N/A	Cippenham-ManorPark	35	Cippenham-ManorPark	35
5_W	bus	#N/A	#N/A	ManorPark-Cippenham	35	ManorPark-Cippenham	35
53_E	bus	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60
53_W	bus	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60
58_E	bus	Britwell-Uxbridge	36	Britwell-Uxbridge	33	Britwell-Uxbridge	30
58_W	bus	Uxbridge-Britwell	36	Uxbridge-Britwell	34	Uxbridge-Britwell	30
583_N	bus	#N/A	#N/A	Hedgerley-Slough	90	Hedgerley-Slough	90
583_S	bus	#N/A	#N/A	Slough-Uxbridge	90	Slough-Uxbridge	90

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
6_N	bus	#N/A	#N/A	Slough-WexhamHosp(d)	60	Slough-WexhamHosp(d)	60
60_E	bus	Eton Wick-Heathrow	60	Eton Wick-Heathrow	60	Eton Wick-Heathrow	60
60_W	bus	Heathrow-Eton Wick	65	Heathrow-Eton Wick	65	Heathrow-Eton Wick	65
6A_N	bus	#N/A	#N/A	Slough-WexhamParkHos	45	Slough-WexhamParkHos	45
6A_S	bus	#N/A	#N/A	WexhamParkHosp-Sloug	30	WexhamParkHosp-Sloug	30
7_E	bus	#N/A	#N/A	Uxbridge-Slough	60	Uxbridge-Slough	60
7_W	bus	#N/A	#N/A	Slough-Uxbridge	30	Slough-Uxbridge	30
702N	bus	Bracknell-London	50	Bracknell-London	40	Bracknell-London	40
702S	bus	London-Bracknell	60	London-Bracknell	60	London-Bracknell	60
71_I	bus	Heathrow T5-Slough	35	Heathrow T5-Slough	40	Heathrow T5-Slough	40
71_O	bus	Slough-Heathrow T5	40	Slough-Heathrow T5	40	Slough-Heathrow T5	40
74_N	bus	Slough-High Wycombe	30	Slough-High Wycombe	16	Slough-High Wycombe	16
74_S	bus	High Wycombe-Slough	24	High Wycombe-Slough	24	High Wycombe-Slough	24
75_E	bus	Cippenham-Heathrow	35	Cippenham-Heathrow	33	Cippenham-Heathrow	30
75_W	bus	Heathrow-Cippenham	34	Heathrow-Cippenham	35	Heathrow-Cippenham	30
76_E	bus	Cippenham-Heathrow	34	Cippenham-Heathrow	33	Cippenham-Heathrow	30
76_W	bus	Heathrow-Cippenham	34	Heathrow-Cippenham	35	Heathrow-Cippenham	30
77_E	bus	Heathrow- Dedworth	35	Heathrow- Dedworth	43	Dedworth-Heathrow	30
77_W	bus	Dedworth-Heathrow	38	Dedworth-Heathrow	31	Heathrow- Dedworth	30
78_E	bus	Britwell-Heathrow T5	36	Britwell-Heathrow T5	33	Britwell-Heathrow T5	30

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
78_W	bus	Heathrow T5-Britwell	36	Heathrow T5-Britwell	33	Heathrow T5-Britwell	30
8_E	bus	Cippenham-W.P. Hosp.	34	#N/A	#N/A	#N/A	#N/A
8_W	bus	W.P.Hosp.-Cippenham	34	#N/A	#N/A	#N/A	#N/A
81_I	bus	Hounslow-Slough	12	Hounslow-Slough	12	Hounslow-Slough	10
81_O	bus	Slough-Hounslow	12	Slough-Hounslow	12	Slough-Hounslow	10
Cen1_E	rail	Liv St-Ealing B	5	Liv St-Ealing B	5	Liv St-Ealing B	5
Cen1_W	rail	Ealing Boad-Liv St	5	Ealing Boad-Liv St	5	Ealing Boad-Liv St	5
Dis1_E	rail	South Ken-Ealing B	5	South Ken-Ealing B	5	South Ken-Ealing B	5
Dis1_W	rail	Ealing B-South Ken	5	Ealing B-South Ken	5	Ealing B-South Ken	5
GW_E1	rail	Reading-London(reg.)	55	Reading-London(reg.)	55	Reading-London(reg.)	55
GW_E2	rail	Reading-London(exp.)	60	Reading-London(exp.)	60	Reading-London(exp.)	60
GW_E3	rail	Reading-London(reg.)	27	Reading-London(reg.)	27	Reading-London(reg.)	27
GW_E4	rail	Reading-London(reg.)	60	Reading-London(reg.)	60	Reading-London(reg.)	60
GW_N1	rail	GW-Twyford-Henley- 0	20	GW-Twyford-Henley- 0	20	GW-Twyford-Henley- 0	20
GW_N2	rail	GW-Maiden-Marlow 0 0	40	GW-Maiden-Marlow 0 0	40	GW-Maiden-Marlow 0 0	40
GW_N3	rail	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20
GW_S1	rail	GW-Henley-Twyford- 0	30	GW-Henley-Twyford- 0	30	GW-Henley-Twyford- 0	30
GW_S2	rail	GW-Marlow-Maiden 0 0	30	GW-Marlow-Maiden 0 0	30	GW-Marlow-Maiden 0 0	30
GW_S3	rail	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20
GW_W1	rail	London-Reading(reg.)	60	London-Reading(reg.)	60	London-Reading(reg.)	60

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
GW_W2	rail	London-Reading(exp.)	16	London-Reading(exp.)	16	London-Reading(exp.)	16
GW_W3	rail	London-Reading(reg.)	30	London-Reading(reg.)	30	London-Reading(reg.)	30
HC_E1	rail	Heath.123-Paddington	30	Heath.123-Paddington	30	Heath.123-Paddington	30
HC_W1	rail	Paddington-Heath.123	30	Paddington-Heath.123	30	Paddington-Heath.123	30
HX_E1	rail	Heath.123-Paddington	15	Heath.123-Paddington	15	Heath.123-Paddington	15
HX_W1	rail	Paddington-Heath.123	15	Paddington-Heath.123	15	Paddington-Heath.123	15
MRT_E	bus	#N/A	#N/A	#N/A	#N/A	SloughTrade Est-Heat	30
MRT_W	bus	#N/A	#N/A	#N/A	#N/A	Heathrow-SloughTrade	30
Pic1_E	rail	Piccadilly-Uxbridg	5	Piccadilly-Uxbridg	5	Piccadilly-Uxbridg	5
Pic1_W	rail	Uxbridge-Piccadill	5	Uxbridge-Piccadill	5	Uxbridge-Piccadill	5
Pic2_E	rail	Piccadilly-Heathro	5	Piccadilly-Heathro	5	Piccadilly-Heathro	5
Pic2_W	rail	Heathrow-Piccadill	5	Heathrow-Piccadill	5	Heathrow-Piccadill	5
SW_E1	rail	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30
SW_W1	rail	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30
WP1N	bus	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15
WP1S	bus	W.P. Hosp.-Slough	15	W.P. Hosp.-Slough	15	#N/A	#N/A

Frequencies for public transport services (IP)

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
1B_I	bus	TE-Bus station	30	TE-Bus station	30	TE-Bus station	30
1B_O	bus	Bus station-TE	30	Bus station-TE	30	Bus station-TE	30
2_I	bus	Burnham-Slough	30	Burnham-Slough	30	Burnham-Slough	30
2_O	bus	Slough-Burnham	30	Slough-Burnham	30	Slough-Burnham	30
3_E	bus	Slough-W.P. Hosp.	30	#N/A	#N/A	#N/A	#N/A

3_W	bus	W.P. Hosp.-Slough	30	#N/A	#N/A	#N/A	#N/A
353N	bus	#N/A	#N/A	Amersham-Slough	60	Amersham-Slough	60
353S	bus	#N/A	#N/A	Slough-Amersham	60	Slough-Amersham	60
5_E	bus	#N/A	#N/A	Cippenham-ManorPark	30	Cippenham-ManorPark	30
5_W	bus	#N/A	#N/A	ManorPark-Cippenham	30	ManorPark-Cippenham	30
53_E	bus	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60
53_W	bus	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60
58_E	bus	Britwell-Uxbridge	30	Britwell-Uxbridge	30	Britwell-Uxbridge	30
58_W	bus	Uxbridge-Britwell	30	Uxbridge-Britwell	30	Uxbridge-Britwell	30
583_I	bus	#N/A	#N/A	Uxbridge-Slough	360	Uxbridge-Slough	360
583_O	bus	#N/A	#N/A	Slough-WexhamParkHos	360	Slough-WexhamParkHos	360
60_E	bus	Eton Wick-Heathrow	60	Eton Wick-Heathrow	60	Eton Wick-Heathrow	60
60_W	bus	Heathrow-Eton Wick	60	Heathrow-Eton Wick	60	Heathrow-Eton Wick	60
6A_N	bus	#N/A	#N/A	Slough-WexhamParkHos	30	Slough-WexhamParkHos	30
6A_S	bus	#N/A	#N/A	WexhamParkHosp-Sloug	30	WexhamParkHosp-Sloug	30
7_E	bus	#N/A	#N/A	Uxbridge-Slough	30	Uxbridge-Slough	30
7_W	bus	#N/A	#N/A	Slough-Uxbridge	30	Slough-Uxbridge	30
702N	bus	Bracknell-London	60	Bracknell-London	60	Bracknell-London	60
702S	bus	London-Bracknell	60	London-Bracknell	30	London-Bracknell	30

71_I	bus	Heathrow T5-Slough	30	Heathrow T5-Slough	30	Heathrow T5-Slough	30
71_O	bus	Slough-Heathrow T5	30	Slough-Heathrow T5	30	Slough-Heathrow T5	30
74_N	bus	Slough-High Wycombe	20	Slough-High Wycombe	15	Slough-High Wycombe	15
74_S	bus	High Wycombe-Slough	20	High Wycombe-Slough	15	High Wycombe-Slough	15
75_E	bus	Cippenham-Heathrow	30	Cippenham-Heathrow	30	Cippenham-Heathrow	30
75_W	bus	Heathrow-Cippenham	30	Heathrow-Cippenham	30	Heathrow-Cippenham	30
76_E	bus	Cippenham-Heathrow	30	Cippenham-Heathrow	30	Cippenham-Heathrow	30
76_W	bus	Heathrow-Cippenham	30	Heathrow-Cippenham	30	Heathrow-Cippenham	30
77_E	bus	Heathrow- Dedworth	30	Heathrow- Dedworth	30	Dedworth-Heathrow	30
77_W	bus	Dedworth-Heathrow	30	Dedworth-Heathrow	30	Heathrow- Dedworth	30
78_E	bus	Britwell-Heathrow T5	30	Britwell-Heathrow T5	30	Britwell-Heathrow T5	30
78_W	bus	Heathrow T5-Britwell	30	Heathrow T5-Britwell	30	Heathrow T5-Britwell	30
8_E	bus	Cippenham-W.P. Hosp.	30	#N/A	#N/A	#N/A	#N/A
8_W	bus	W.P.Hosp.-Cippenham	30	#N/A	#N/A	#N/A	#N/A
81_I	bus	Hounslow-Slough	12	Hounslow-Slough	12	Hounslow-Slough	10
81_O	bus	Slough-Hounslow	12	Slough-Hounslow	12	Slough-Hounslow	10
Cen1_E	rail	Liv St-Ealing Broad	5	Liv St-Ealing Broad	5	Liv St-Ealing Broad	5
Cen1_W	rail	Ealing Broad-Liv St	5	Ealing Broad-Liv St	5	Ealing Broad-Liv St	5
Dis1_E	rail	South Kens-Ealing B	5	South Kens-Ealing B	5	South Kens-Ealing B	5
Dis1_W	rail	Ealing B-South Kens	5	Ealing B-South Kens	5	Ealing B-South Kens	5

GW_E1	rail	Reading-London(reg.)	30	Reading-London(reg.)	30	Reading-London(reg.)	30
GW_E2	rail	Reading-London(exp.)	30	Reading-London(exp.)	30	Reading-London(exp.)	30
GW_E3	rail	Reading-London(reg.)	30	Reading-London(reg.)	30	Reading-London(reg.)	30
GW_N1	rail	GW-Twyford-Henley- 0	45	GW-Twyford-Henley- 0	45	GW-Twyford-Henley- 0	45
GW_N2	rail	GW-Maiden-Marlow 0 0	60	GW-Maiden-Marlow 0 0	60	GW-Maiden-Marlow 0 0	60
GW_N3	rail	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20
GW_S1	rail	GW-Henley-Twyford- 0	45	GW-Henley-Twyford- 0	45	GW-Henley-Twyford- 0	45
GW_S2	rail	GW-Marlow-Maiden 0 0	60	GW-Marlow-Maiden 0 0	60	GW-Marlow-Maiden 0 0	60
GW_S3	rail	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20
GW_W1	rail	London-Reading(reg.)	30	London-Reading(reg.)	30	London-Reading(reg.)	30
GW_W2	rail	London-Reading(exp.)	30	London-Reading(exp.)	30	London-Reading(exp.)	30
GW_W3	rail	London-Reading(reg.)	30	London-Reading(reg.)	30	London-Reading(reg.)	30
HC_E1	rail	Heath.123-Paddington	30	Heath.123-Paddington	30	Heath.123-Paddington	30
HC_W1	rail	Paddington-Heath.123	30	Paddington-Heath.123	30	Paddington-Heath.123	30
HX_E1	rail	Heath.123-Paddington	15	Heath.123-Paddington	15	Heath.123-Paddington	15
HX_W1	rail	Paddington-Heath.123	15	Paddington-Heath.123	15	Paddington-Heath.123	15
MRT_E	bus	#N/A	#N/A	#N/A	#N/A	SloughTrade Est-Heat	30
MRT_W	bus	#N/A	#N/A	#N/A	#N/A	Heathrow-SloughTrade	30
Pic1_E	rail	Piccadilly-Uxbridge	5	Piccadilly-Uxbridge	5	Piccadilly-Uxbridge	5
Pic1_W	rail	Uxbridge-Piccadilly	5	Uxbridge-Piccadilly	5	Uxbridge-Piccadilly	5
Pic2_E	rail	Piccadilly-Heathrow	5	Piccadilly-Heathrow	5	Piccadilly-Heathrow	5
Pic2_W	rail	Heathrow-Piccadilly	5	Heathrow-Piccadilly	5	Heathrow-Piccadilly	5

SW_E1	rail	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30
SW_W1	rail	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30
WP1N	bus	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15
WP1S	bus	W.P. Hosp.-Slough	15	W.P. Hosp.-Slough	15	W.P. Hosp.-Slough	15

Headway for public transport services (PM peak)

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
1B_I	bus	TE-Bus station	34	TE-Bus station	34	TE-Bus station	34
1B_O	bus	Bus station-TE	35	Bus station-TE	35	Bus station-TE	35
2_I	bus	Burnham-Slough	35	Burnham-Slough	35	Burnham-Slough	35
2_O	bus	Slough-Burnham	36	Slough-Burnham	36	Slough-Burnham	36
3_E	bus	Slough-W.P. Hosp.	38	#N/A	#N/A	#N/A	#N/A
3_W	bus	W.P. Hosp.-Slough	36	#N/A	#N/A	#N/A	#N/A
353N	bus	#N/A	#N/A	Amersham-Slough	90	Amersham-Slough	90
5_E	bus	#N/A	#N/A	Cippenham-ManorPark	40	Cippenham-ManorPark	40
5_W	bus	#N/A	#N/A	ManorPark-Cippenham	35	ManorPark-Cippenham	35
53_E	bus	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60	WexhamParkHosp-Bienf	60
53_W	bus	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60	Bienfield-WexhamPark	60
58_E	bus	Britwell-Uxbridge	38	Britwell-Uxbridge	34	Britwell-Uxbridge	30
58_W	bus	Uxbridge-Britwell	35	Uxbridge-Britwell	33	Uxbridge-Britwell	30
583_I	bus	#N/A	#N/A	Uxbridge-Slough	90	Uxbridge-Slough	90
583_O	bus	#N/A	#N/A	Slough-WexhamParkHos	90	Slough-WexhamParkHos	90

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
60_E	bus	Eton Wick-Heathrow	65	Eton Wick-Heathrow	65	Eton Wick-Heathrow	65
60_W	bus	Heathrow-Eton Wick	60	Heathrow-Eton Wick	60	Heathrow-Eton Wick	60
6A_N	bus	#N/A	#N/A	Slough-WexhamParkHos	30	Slough-WexhamParkHos	30
6A_S	bus	#N/A	#N/A	WexhamParkHosp-Sloug	38	WexhamParkHosp-Sloug	38
7_E	bus	#N/A	#N/A	Uxbridge-Slough	40	Uxbridge-Slough	40
7_W	bus	#N/A	#N/A	Slough-Uxbridge	40	Slough-Uxbridge	40
702N	bus	Bracknell-London	60	Bracknell-London	60	Bracknell-London	60
702S	bus	London-Bracknell	30	London-Bracknell	30	London-Bracknell	30
71_I	bus	Heathrow T5-Slough	45	Heathrow T5-Slough	37	Heathrow T5-Slough	37
71_O	bus	Slough-Heathrow T5	35	Slough-Heathrow T5	45	Slough-Heathrow T5	45
74_N	bus	Slough-High Wycombe	23	Slough-High Wycombe	18	Slough-High Wycombe	18
74_S	bus	High Wycombe-Slough	28	High Wycombe-Slough	20	High Wycombe-Slough	20
75_E	bus	Cippenham-Heathrow	40	Cippenham-Heathrow	37	Cippenham-Heathrow	30
75_W	bus	Heathrow-Cippenham	36	Heathrow-Cippenham	34	Heathrow-Cippenham	30
76_E	bus	Cippenham-Heathrow	40	Cippenham-Heathrow	37	Cippenham-Heathrow	30
76_W	bus	Heathrow-Cippenham	36	Heathrow-Cippenham	34	Heathrow-Cippenham	30
77_E	bus	Heathrow- Dedworth	36	Heathrow- Dedworth	33	Dedworth-Heathrow	30
77_W	bus	Dedworth-Heathrow	35	Dedworth-Heathrow	33	Heathrow- Dedworth	30
78_E	bus	Britwell-Heathrow T5	38	Britwell-Heathrow T5	34	Britwell-Heathrow T5	30
78_W	bus	Heathrow T5-Britwell	36	Heathrow T5-Britwell	33	Heathrow T5-Britwell	30

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
8_E	bus	Cippenham-W.P. Hosp.	37	#N/A	#N/A	#N/A	#N/A
8_W	bus	W.P.Hosp.-Cippenham	36	#N/A	#N/A	#N/A	#N/A
81_I	bus	Hounslow-Slough	12	Hounslow-Slough	12	Hounslow-Slough	10
81_O	bus	Slough-Hounslow	12	Slough-Hounslow	12	Slough-Hounslow	10
Cen1_E	rail	Liv St-Ealing Broad	5	Liv St-Ealing Broad	5	Liv St-Ealing Broad	5
Cen1_W	rail	Ealing Broad-Liv St	5	Ealing Broad-Liv St	5	Ealing Broad-Liv St	5
Dis1_E	rail	South Kens-Ealing B	5	South Kens-Ealing B	5	South Kens-Ealing B	5
Dis1_W	rail	Ealing B-South Kens	5	Ealing B-South Kens	5	Ealing B-South Kens	5
GW_E1	rail	Reading-London(reg.)	30	Reading-London(reg.)	30	Reading-London(reg.)	30
GW_E2	rail	Reading-London(exp.)	30	Reading-London(exp.)	30	Reading-London(exp.)	30
GW_E3	rail	#N/A	#N/A	Reading-London(reg.)	30	Reading-London(reg.)	30
GW_E4	rail	Reading-London(reg.)	60	Reading-London(reg.)	60	Reading-London(reg.)	60
GW_N1	rail	GW-Twyford-Henley- 0	30	GW-Twyford-Henley- 0	30	GW-Twyford-Henley- 0	30
GW_N2	rail	GW-Maiden-Marlow 0 0	45	GW-Maiden-Marlow 0 0	45	GW-Maiden-Marlow 0 0	45
GW_N3	rail	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20	Windsor-Slough 0 0 0	20
GW_S1	rail	GW-Henley-Twyford- 0	40	GW-Henley-Twyford- 0	40	GW-Henley-Twyford- 0	40
GW_S2	rail	GW-Marlow-Maiden 0 0	60	GW-Marlow-Maiden 0 0	60	GW-Marlow-Maiden 0 0	60
GW_S3	rail	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20	Slough-Windsor 0 0 0	20
GW_W1	rail	London-Reading(reg.)	30	London-Reading(reg.)	30	London-Reading(reg.)	30
GW_W2	rail	London-Reading(exp.)	30	London-Reading(exp.)	30	London-Reading(exp.)	30

Line	Mode	Base year		DoMinimum		DoSomething	
		Description	Headway	Description	Headway	Description	Headway
GW_W3	rail	London-Reading(reg.)	30	London-Reading(reg.)	30	London-Reading(reg.)	30
HC_E1	rail	Heath.123-Paddington	30	Heath.123-Paddington	30	Heath.123-Paddington	30
HC_W1	rail	Paddington-Heath.123	30	Paddington-Heath.123	30	Paddington-Heath.123	30
HX_E1	rail	Heath.123-Paddington	15	Heath.123-Paddington	15	Heath.123-Paddington	15
HX_W1	rail	Paddington-Heath.123	15	Paddington-Heath.123	15	Paddington-Heath.123	15
MRT_E	bus	#N/A	#N/A	#N/A	#N/A	SloughTrade Est-Heat	30
MRT_W	bus	#N/A	#N/A	#N/A	#N/A	Heathrow-SloughTrade	30
Pic1_E	rail	Piccadilly-Uxbridge	5	Piccadilly-Uxbridge	5	Piccadilly-Uxbridge	5
Pic1_W	rail	Uxbridge-Piccadilly	5	Uxbridge-Piccadilly	5	Uxbridge-Piccadilly	5
Pic2_E	rail	Piccadilly-Heathrow	5	Piccadilly-Heathrow	5	Piccadilly-Heathrow	5
Pic2_W	rail	Heathrow-Piccadilly	5	Heathrow-Piccadilly	5	Heathrow-Piccadilly	5
SW_E1	rail	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30	Windsor-London 0 0 0	30
SW_W1	rail	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30	London-Winsdor 0 0 0	30
WP1N	bus	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15	Slough-W.P. Hosp.	15
WP1S	bus	W.P. Hosp.-Slough	15	W.P. Hosp.-Slough	15	W.P. Hosp.-Slough	15

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