

South Oxfordshire District Council Local Plan

Evaluation of Transport Impacts: Stage 1 -
Development Scenarios
Oxfordshire County Council

16 March 2017

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Table of contents

Chapter	Pages
1. Introduction	5
1.1. Previous Work	5
2. Modelling Approach	8
2.1. Background	8
2.2. Description of the model	8
2.3. Description of the Demand Model	10
2.4. Approach	10
2.5. Modelled Scenarios and Land-use assumptions	11
2.6. Transport Network Assumptions	12
3. Demand Model results	13
3.1. Convergence	13
3.2. Growth in demand	13
4. Do Minimum Highway Network Performance - 2031	15
4.1. Introduction	15
4.2. Highway assumptions	15
4.3. Park and Ride assumptions	17
4.4. Public Transport assumptions	17
4.5. Do-Minimum Housing Scenario 2031	19
4.6. Summary	22
5. Scenario Highway Network Performance	23
5.1. Introduction	23
5.2. Scenario 1	23
5.3. Scenario 2	33
5.4. Scenario 3	43
5.5. Scenario 4	53
5.6. Scenario 5	63
5.7. Summary	73
6. Summary	75
Appendices	81
Appendix A. 82	
A.1. Summary of Demand Model results for the entire model	82
A.2. Summary of Demand Model results for South Oxfordshire	87

Figures

Figure 1	Detailed Modelled Area	9
Figure 2	Demand Model Hierarchy	10
Figure 3	Approach taken for this work	11
Figure 4	SODC volume-capacity ratio (%ge) – 2031 DM AM peak hour	21
Figure 5	SODC volume-capacity ratio (%ge) – 2031 DM PM peak hour	21
Figure 6	South Oxfordshire flow difference (S1 - DM) (PCU/hr) – 2031 AM peak hour	24
Figure 7	South Oxfordshire flow difference (S1 - DM) (PCU/hr) – 2031 PM peak hour	25
Figure 8	South Oxfordshire V/C for links and junctions– 2031 Scenario 1 AM peak hour	27
Figure 9	South Oxfordshire V/C for links and junctions– 2031 Scenario 1 PM peak hour	28
Figure 10	South Oxfordshire flow difference (S2 – DM) (PCU/hr) – 2031 AM peak hour	34
Figure 11	South Oxfordshire flow difference (S2 – DM) (PCU/hr) – 2031 PM peak hour	35

Figure 12 South Oxfordshire V/C for links and junctions– 2031 Scenario 2 AM peak hour	37
Figure 13 South Oxfordshire V/C for links and junctions– 2031 Scenario 2 PM peak hour	38
Figure 14 South Oxfordshire flow difference (S3 – DM) (PCU/hr) – 2031 AM peak hour	44
Figure 15 South Oxfordshire flow difference (S3 – DM) (PCU/hr) – 2031 PM peak hour	45
Figure 16 South Oxfordshire V/C for links and junctions– 2031 Scenario 3 AM peak hour	47
Figure 17 South Oxfordshire V/C for links and junctions– 2031 Scenario 3 PM peak hour	48
Figure 18 South Oxfordshire flow difference (S4 – DM) (PCU/hr) – 2031 AM peak hour	54
Figure 19 South Oxfordshire flow difference (S4 – DM) (PCU/hr) – 2031 PM peak hour	55
Figure 20 South Oxfordshire V/C for links and junctions– 2031 Scenario 4 AM peak hour	57
Figure 21 South Oxfordshire V/C for links and junctions– 2031 Scenario 4 PM peak hour	58
Figure 22 South Oxfordshire flow difference (S5 – DM) (PCU/hr) – 2031 AM peak hour	65
Figure 23 South Oxfordshire actual flow difference (S5 – DM) (PCU/hr) – 2031 PM peak hour	66
Figure 24 South Oxfordshire V/C for links and junctions– 2031 Scenario 5 AM peak hour	68
Figure 25 South Oxfordshire V/C for links and junctions– 2031 Scenario 5 PM peak hour	69

1. Introduction

Atkins have been commissioned by Oxfordshire County Council (OCC) and South Oxfordshire District Council (SODC) to undertake a preliminary Evaluation of Transport Impacts (ETI) in relation to the SODC Local Plan. The Local Plan sets out a policy framework for the delivery of sustainable development across the district up to 2033. It sets out the spatial strategy and strategic policies for the district to deliver sustainable development. It identifies the number of new homes and employment land to be provided in the area and makes provision for retail, leisure and commercial development and the infrastructure needed to support them.

One of the main purposes of the ETI is to inform the selection of strategic development sites to be allocated in the Local Plan 2033 and to help identify a package of highway mitigation to ensure the plan contributes towards the delivery of sustainable development. The ETI forms part of the evidence base to inform the Local Plan 2033 alongside other evidence, including: Landscape Capacity Study, Strategic Flood Risk Assessment, Sustainability Appraisal, Green Belt Review, and others.

This is the second stage of work associated with the ETI commission. The first stage considered the suitability of the Oxfordshire Strategic Model (OSM) to assess Local Plan impacts. This technical note examines transport impacts of five Local Plan scenarios. The next stage of the work will look in more detail at the impacts of the preferred development scenario, and prospective mitigation measures to support the final Local Plan

The base model performance check undertaken during the Stage 1 (Network and Model Performance Review) of this work determined where OSM is more suitable for the assessment of transport impacts in the district. In general, the areas where the model was found to be more suitable aligns well with the spatial distribution of proposed additional growth within the scenarios tested. Where the Network and Model Performance Review work identified that the model is less suitable for assessment, SODC are investigating alternative methods for assessing potential transport impacts.

1.1. Previous Work

1.1.1. Previous Local Plan Assessments

Transport modelling of previous versions of the Local Plan has been undertaken. At the time, these models were calibrated and validated using transport surveys collected locally. The calibration and validation of these models was within acceptable limits of modelling guidance at the time and they were deemed suitable for assessment of the Local Plan. These previous models, alongside their accompanying reports have now been superseded.

Since this previous round of work, the base model has been updated significantly and the 2031 forecast model planning data has also been updated. Comparing the most recent forecasting presented in this report against model runs from 2015 is not comparing like with like, the older modelling has marked differences to the latest modelling, which in-turn includes improvements to the model, such as updating to the latest version of TEMPRO, the two rounds of modelling are not directly comparable.

Specifically, differences in model performance have been identified around Watlington between the models prepared in 2007 and used for testing in 2015 and the most recent work undertaken in 2017 which used the updated Oxfordshire Strategic Model (OSM) which was calibrated and validated to a base year of 2013. Identified differences are as a result of changes to demand and supply (network), different model coding practices and application of new versions of the modelling software. The analysis undertaken during Stage 1 of this work gives comfort that results of the most up to date base year model are generally robust in those areas where significant growth has been tested.

This report should be considered in the context of SODC ETI modelling work undertaken in previous stages and summarised in Table 1 recognising the evolution of the models and inherent differences within them.

Table 1 Summary of ETI Stages

ETI and Local Plan Stage	Growth and Infrastructure Tested	Summary of Conclusions
South Oxfordshire ETI technical note, January 2015 (used previous version of the Oxfordshire transport model)	<p>The land use assumptions tested and summarised are</p> <ul style="list-style-type: none"> • Core Strategy – 9,100 houses apportioned with 55% of houses in Didcot and the remainder split 60% to Market Towns and 40% to the larger villages; • Scenario A – Additional 6,000 homes apportioned as per the Core Strategy distribution; • Scenario B – Additional 6,000 homes focussed on Science Vale (60%) with remainder across 'sustainable settlements'; • Scenario C – Additional 6,000 homes all in Science Vale; • Scenario D – Additional 6,000 homes all in a single new settlement (in this case around Milton Common); • Scenario E – Additional 6,000 homes dispersed evenly across all settlements (in this case 143 in each site); • Scenario F – Additional 6,000 homes next to neighbouring major urban areas (in this case split 3,000 near Reading and 3,000 near Oxford near Grenoble Road). 	<p>Overall, there was limited difference between scenarios in terms of resulting impacts on the highway network during either time period, although differences are more prominent between scenarios during the AM peak than the PM peak. Bearing this in mind Scenario C results in the greatest negative impact upon the South Oxfordshire network during both time periods.</p> <p>This is closely followed by Scenario D, whilst the impacts of Scenarios A and B could be considered identical and again very similar to Scenario E.</p> <p>Scenario F has the least impact upon the network during both time periods, however the trips generated by the proposed development are not accurately represented in the model due to the location of the development sites being on the periphery of the study area.</p>
Evaluation of Transport Impacts: Stage 1: Network and Model Performance Review	<p>Undertook an assessment of planned growth locations and recently observed traffic surveys against 2013 base year modelled flows to determine the suitability of using the OSM highway assignment model to assess the potential impacts of identified developments in the forthcoming South Oxfordshire Local Plan.</p>	<p>OSM developed as a strategic model to provide evidence base for planning and development mitigation as well as the appraisal of major transport schemes. Analysis undertaken suggested that it may require some refinements to ensure the model reflects recent observations.</p> <p>Model network coverage generally relates well to the development locations within the Local Plan.</p> <p>It was concluded that the model is generally suitable for testing strategic transport impacts, particularly in the central/ northern part of the district around Didcot, Chalgrove, Wheatley, Watlington and Stadhampton.</p>
Evaluation of Transport Impacts: Stage 1: Development Scenarios (to support LP preferred options consultation)	<p>In addition to the Do-minimum assumptions, the quantum of growth for each development scenario is presented in Table 2.</p> <p>There are no differences between the Do Minimum and the modelled scenario tests in terms of transport</p>	<p>Impact of the Local Plan scenarios are compared considering speeds along the key corridors against the Do-Minimum scenario, specifically for the morning peak hour:</p> <ul style="list-style-type: none"> • Scenario 1, with dwellings around the B480 and the A4074, average speed is forecast to reduce by 54%

ETI and Local Plan Stage	Growth and Infrastructure Tested	Summary of Conclusions
	supply assumptions (highway, park and ride and public transport).	<p>along the B480 and also reduce speeds along the A4074 by 7%;</p> <ul style="list-style-type: none"> • Scenario 2, with dwellings around the A4074 and A415, is forecast to reduce speeds by 10% along the A4074 and 1% along A415; • Scenario 3, with dwellings around the B480 and the A4074, is forecast to have a minor impact along the corridors considered; • Scenario 4, with dwellings around the A40 and the A329, is forecast to reduce speeds on the A329 by 7% and to reduce speeds on the A40 by 3%; • Scenario 5, with dwellings around the B480, A4074, A415 and the A329, is forecast to reduce speeds by 54% on the B480, 10 % on the A4074, 1% on the A415 and 5% on the A329.

Table 2 Summary of land use assumptions

	Do-Minimum	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Do-Minimum	11079	11079	11079	11079	11079	11079
Preferred Options	-	8732	8732	8732	8732	12232
Windfall Allowance	-	683	683	683	683	683
Total dwellings	11079	20494	20494	20494	20494	23994

The strategic sites included for each scenario are as follows:

- Scenario 1 – Berinsfield (1800) and Chalgrove (3500)
- Scenario 2 – Berinsfield (1800) and Culham (3500)
- Scenario 3 – Berinsfield (1800) and Grenoble Road (3500)
- Scenario 4 – Berinsfield (1800) and Harrington (3500)
- Scenario 5 – Berinsfield (1800), Culham (3500) and Chalgrove (3500)

1.1.2. Network Coding Review

Specific elements of the model network coding were reviewed in relation to the existing Culham and Clifton Hampden River Crossings, Shillingford Bridge, Wallingford Bridge, Wallingford town centre and Watlington town centre. Consideration of model performance at these locations does not suggest that current coding assumptions significantly affect model performance. We will monitor the impacts of the Local Plan scenarios to be tested at these locations. Once the final preferred Local Plan scenario is identified it has been suggested that sensitivity testing incorporating model network coding refinements and recalibration at these locations is undertaken to ensure that changes to the networks in these areas do not significantly impact upon the forecast scenario.

2. Modelling Approach

2.1. Background

The ETI work is being undertaken to inform the preparation of the South Oxfordshire Local Plan 2033, and has been completed in stages with the agreement of SODC, following the agreed methodological proposal.

2.2. Description of the model

The work is based on the Oxfordshire Strategic Model (OSM) developed by Atkins for Oxfordshire County Council (OCC). The OSM modelling system was developed to represent travel conditions in 2013 and consists of three key elements:

- a Highway Assignment Model (HAM) representing vehicle-based movements within and across the Oxfordshire County for a 2013 October weekday morning peak hour (08:00 – 09:00), an average inter-peak hour (10:00 – 16:00) and an evening peak hour (17:00 – 18:00);
- a Public Transport Assignment Model (PTAM) representing bus and rail-based movements across the same area and for the same time periods; and
- a five-stage multi-modal Demand Model (MMDM) that estimates frequency choice, main mode choice, time period choice, destination choice, and sub mode choice in response to changes in generalised costs of travel across the 24-hour period (07:00 – 07:00). It does this incrementally from the Base Year.

The entire OSM model covers the whole of Great Britain with different degrees of detail.

The OSM covers the strategic links in Oxfordshire and has a detailed modelled area and a fully modelled area as shown in Figure 1. The level of detail varies as follows:

- **Fully Modelled Area:** the area over which proposed interventions have influence, and in which junctions are in SATURN simulation, is further subdivided as:
 - **Area of Detailed Modelling** – the area over which significant impacts of interventions are certain and the modelling detail in this area would be characterised by: representation of all trip movements; small zones; very detailed networks; and junction modelling (including flow metering and blocking back).
 - **Rest of the Fully Modelled Area** – the area over which the impacts of interventions are considered to be quite likely but relatively weak in magnitude and would be characterised by: representation of all trip movements; somewhat larger zones and less network detail than for the Area of Detailed Modelling; and speed/flow modelling (primarily link-based but possibly also including a representation of strategically important junctions).
- **External Area:** the area where impacts of interventions would be so small as to be reasonably assumed to be negligible and would be characterised by: a SATURN buffer network representing a large proportion of the rest of Great Britain, a partial representation of demand (trips to, from and across the Fully Modelled Area); large zones; skeletal networks and simple speed/flow relationships or fixed speed modelling.

South Oxfordshire is partially situated inside the detailed modelled area (ADM), meaning that everything within that area has been subject to calibration and validation exercises.

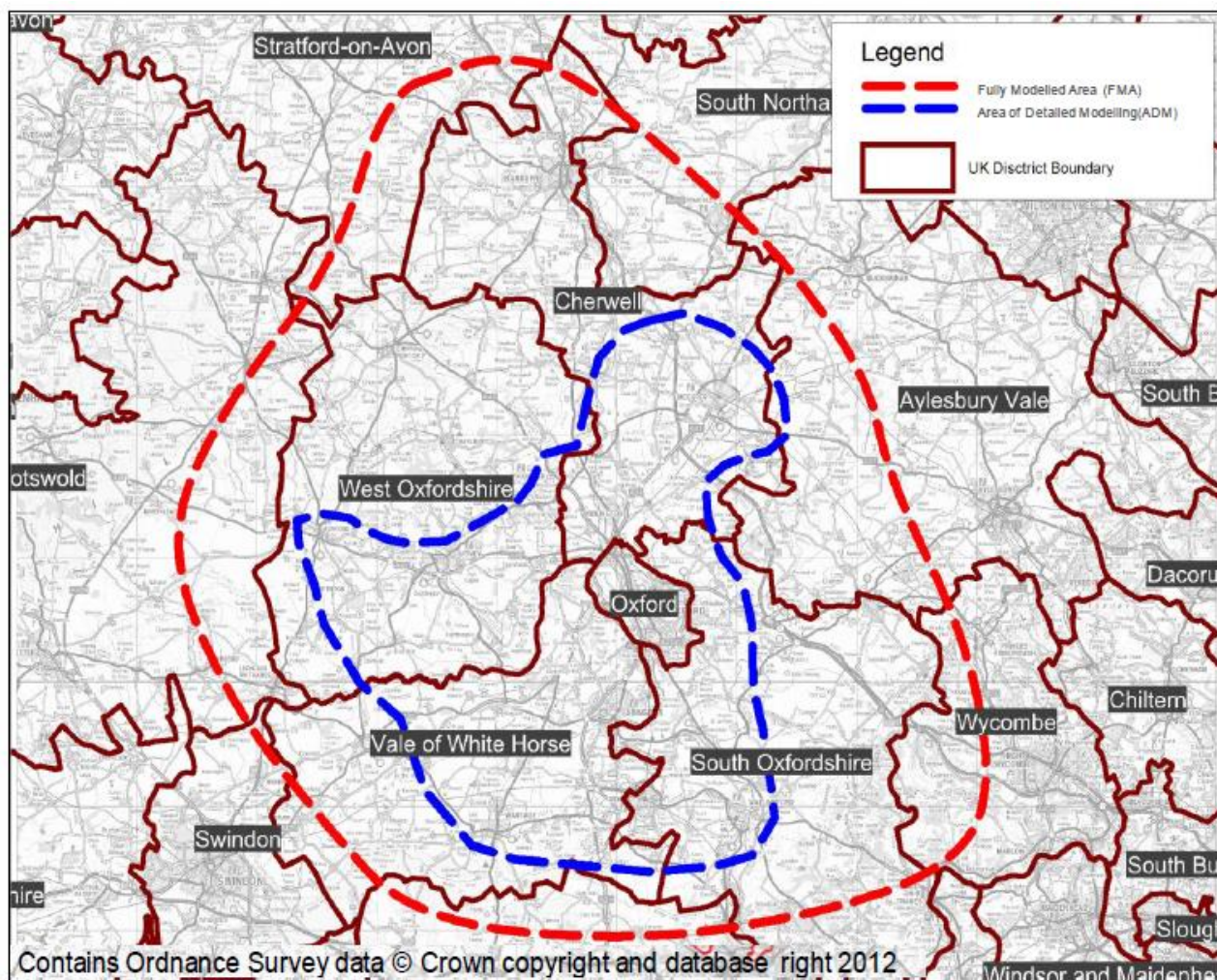


Figure 1 Detailed Modelled Area

2.3. Description of the Demand Model

The MMDM has a hierarchical logit choice structure as shown in Figure 2. Following WebTAG¹, it has an incremental demand modelling approach which responds to changes in travel 'cost' between the 2013 Base Year and the 2031 future year scenario. The process passes through different iterations until it converges.

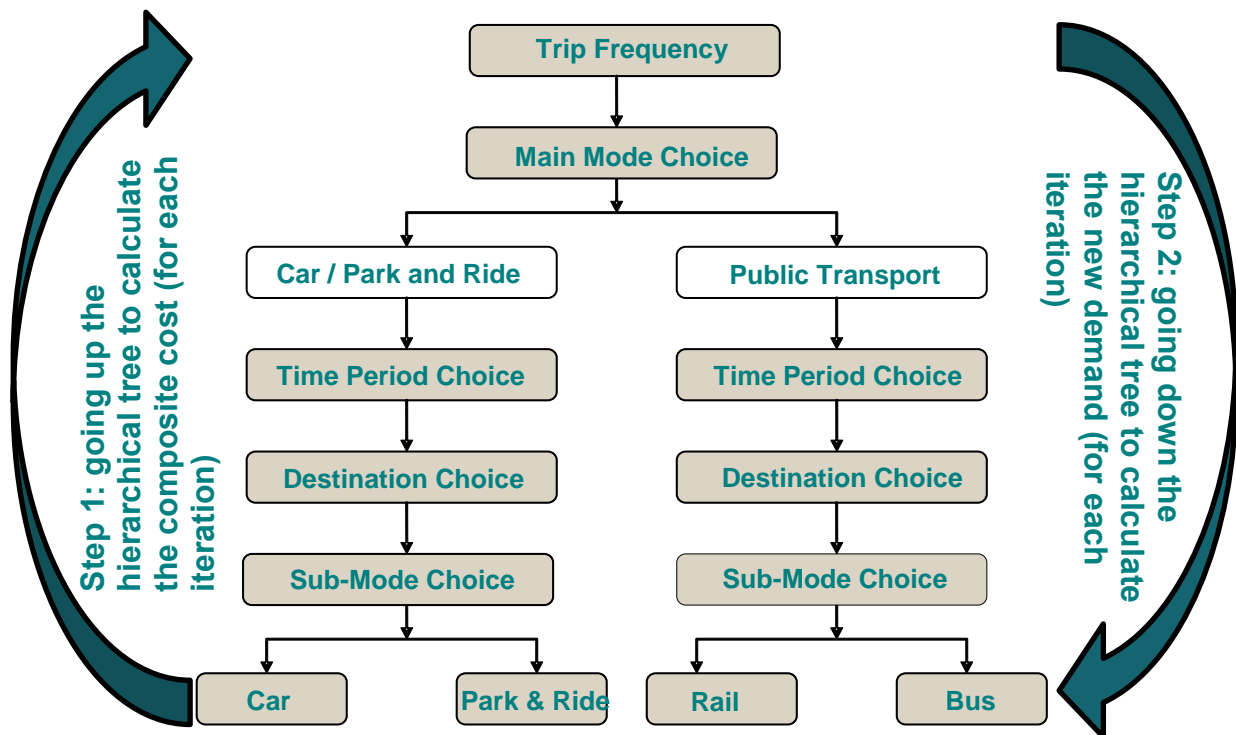


Figure 2 Demand Model Hierarchy

2.4. Approach

Figure 3 summarises the approach taken for every scenario that is tested in OSM. The model allows changes both in terms of supply and/or demand for each scenario. These inputs enter the Demand model, which will estimate how these changes will impact on the distribution of the demand over different time periods, different modes and different routes.

Once a demand model run has finished, a set of checks is performed to confirm the suitability of the results:

- Check that the additional demand is assigned to the expected zones and the level of post demand is consistent with the inputs;
- Check convergence of the demand model;
- Check convergence of the highway model.
- Check performance of the network near the added schemes; and
- Check delays on the highway network.

As a result of this process, some improvements might be necessary to be implemented into the network:

- Review of centroid connectors; and
- Optimisation of signal timings.

¹ Department for Transport (DfT) Transport analysis guidance: WebTAG, provides information on the role of transport modelling and appraisal. <https://www.gov.uk/guidance/transport-analysis-guidance-webtag>

If the changes are significant (e.g. changed centroid connectors or change of a number of signal timings on main routes), the demand model is rerun with the new inputs.

Once the performance of the model is satisfactory, the results are analysed and the necessary outputs are prepared.

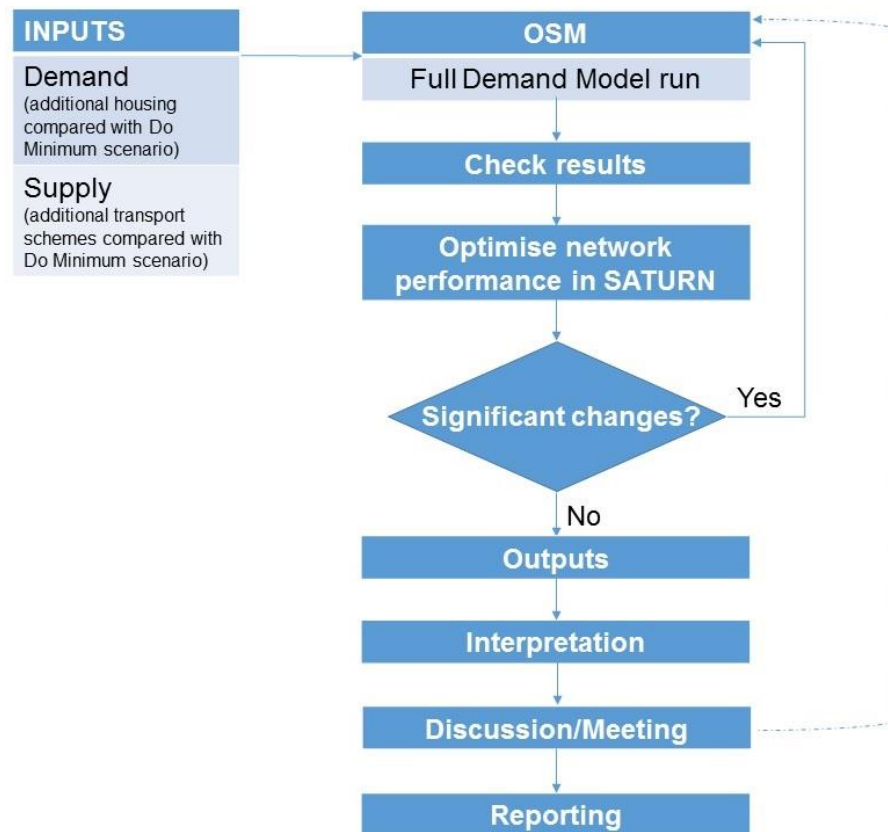


Figure 3 Approach taken for this work

2.5. Modelled Scenarios and Land-use assumptions

For the purposes of the Local Plan ETI, five Local Plan scenarios were outlined to inform preferred option selection. The proposed scenarios (Scenario 1, 2, 3, 4 and 5), provided by SODC, contain additional dwellings, when compared with the Do-Minimum scenario, to meet the SODC assessed housing need. Each scenario provides additional growth from the Do Minimum scenario, growth is not cumulative. The quantum of development is summarised in Table 3.

- *Do-minimum scenario*: includes planned growth in surrounding districts, and committed growth in South Oxfordshire (Sites with planning approval and strategic allocations from the Core Strategy, 2012)
- *Scenario 1*: Local Plan allocation 2033 which includes Do- minimum housing scenario and numbers of dwellings from the proposed new Local Plan sites based on the summer 2016 preferred options reference case. This includes the main strategic site at Chalgrove with 3,500 dwellings, new homes in existing settlements (Towns and Villages at 10% growth), the regeneration area of Berinsfield at 1,800 dwellings, and 800 homes at the brownfield sites of Wheatley and Culham.
- *Scenario 2*: As Scenario 1, with variation of main strategic site - Culham - 3,500 dwellings
- *Scenario 3*: As Scenario 1, with variation of main strategic site - Grenoble Road - 3,500 dwellings
- *Scenario 4*: As Scenario 1, with variation of main strategic site - Harrington - 3,500 dwellings
- *Scenario 5*: As Scenario 1, with variation of main strategic sites - with 3,500 dwellings at Culham and Chalgrove - total 7,000 dwellings

Table 3 is a summary of the development assumptions for each of the alternative scenarios tested in the South Oxfordshire District (the only difference is the number of dwellings as the employment does not change). The new South Oxfordshire Local Plan will allocate development growth to 2033. As the strategic

model currently has a forecast year of 2031, all local plan development to 2033 within the defined scenarios is added to the 2031 forecast year model for testing.

It is also important to note that the Scenario testing work outlined in this report has been undertaken in the period between the last preferred options document consulted upon in Summer 2016, and the new preferred options document going out to consultation in March 2017. As such, the testing takes as its starting point the development proposed within the previous preferred options document, and then tests variations in this proposed development scenario to inform local plan development. The final proposed schedule of development outlined in the latest preferred options has not specifically been tested, although overall levels of growth in key locations are similar in certain scenarios. The next stage of the work following the March 2017 consultation will inform development and submission of the final proposed local plan. It will include testing of the final proposed distribution of development, and proposed mitigation. This testing will also take into account updated information on planning commitments, taking into account development sites with new planning approvals.

Table 3 **Summary of tested land use assumptions**

Developments 2033	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Houses	20494	20494	20494	20494	23994
Jobs	4282	4282	4282	4282	4282

2.6. Transport Network Assumptions

There are no differences between the Reference case (Do-minimum scenario) and the modelled scenario tests 1 to 5 in terms of transport supply assumptions (highway, park and ride and public transport). The updated Do-minimum scenario used for this assessment includes homes delivered since 2013, current commitments (homes with planning approval) and 2012 Core Strategy sites.

3. Demand Model results

In this chapter, the results for the forecast year 2031 are compared with the Base year 2013 and geographical scenario runs.

3.1. Convergence

The convergence of the Demand Model is checked for all scenarios before preparing the results/outputs. WebTAG guidance suggests a convergence level of 0.2 within 25 iterations, which was achieved for the Do Minimum scenario and all the alternative scenarios except for Scenario 2 and Scenario 4 where the gap value after 25 iterations is 0.2085 and 0.2269 respectively. However, the SATURN highway assignments converged well within 30 for all time periods for both these scenarios.

3.2. Growth in demand

Table 4 summarises the growth in travel demand between the 2013 base year, the 2031 Do Minimum scenario and the five scenario test across the model area. Between the 2013 base year and the 2031 Do Minimum scenario, overall travel demand for all districts in Oxfordshire is forecast to grow by 40% over a 12 hour-period. Between the 2031 Do Minimum scenario and the proposed scenarios, overall travel demand is estimated to additionally increase by 2% for Scenario 1, Scenario 2, Scenario 3 and Scenario 4 whereas the increase is 3% for Scenario 5. The table does not include LGV and HGV demand.

Table 4 Summary of Demand Model results for the entire model – 12 hour period

Entire model	Base Year (BY)	Do Minimum (DM)	Scenario 1 (S1)	Scenario 2 (S2)	Scenario 3 (S3)	Scenario 4 (S4)	Scenario 5 (S5)
Reg car (veh.)	974,474	1,355,831	1,381,144	1,381,209	1,381,163	1,381,408	1,390,476
P&R (veh.)	6,477	8,127	8,130	8,117	8,250	8,167	8,134
Bus only (pax)	102,649	136,262	137,619	137,435	137,738	137,488	138,020
Rail (pax)	30,238	55,759	57,254	57,626	57,188	57,347	58,131
TOTAL (persons)	1,358,105	1,895,749	1,930,246	1,930,501	1,930,455	1,930,579	1,943,194

The Car and Public Transport mode share for all the scenarios are consistent when compared to Do-Minimum scenario as presented in Table 4 and Table 5.

Table 5 Mode share – 12 hour period

Entire model	Scenario 1 (S1)	Scenario 2 (S2)	Scenario 3 (S3)	Scenario 4 (S4)	Scenario 5 (S5)
No. of additional dwellings	9,415	9,415	9,415	9,415	12,915
Trips per dwelling over 12-hour	3.66	3.69	3.69	3.70	3.67
Car mode share	90%	89%	90%	90%	89%
PT mode share	10%	11%	10%	10%	11%

Table 6 and Table 7 summarise travel demand across the District. The growth in travel demand between the 2013 base year and the 2031 Do Minimum scenario shows an increase of 20% for the SODC as an origin and destination when considering the trips to/from other districts over a 12-hour period. The growth in travel demand between the 2031 Do Minimum scenario and 2031 Scenarios shows an additional increase of:

- 12% for SODC as origin and 11% for SODC as destination for Scenario 1
- 12% for SODC as origin and destination for Scenario 2
- 12% for SODC as origin and destination for Scenario 3
- 12% for SODC as origin and destination for Scenario 4

- 16% for SODC as origin and destination for Scenario 5.

Since the demand model is constrained to departures/dwellings, the increase in dwellings in each scenario satisfies more jobs which otherwise would be suppressed.

Table 6 Summary of Demand Model results for SODC - Origins 12 hour

SODC as origin	Base Year (BY)	Do Minimum (DM)	Scenario 1 (S1)	Scenario 2 (S2)	Scenario 3 (S3)	Scenario 4 (S4)	Scenario 5 (S5)
Reg car (veh.)	159,453	191,492	213,644	214,054	214,001	214,000	222,083
P&R (veh.)	385	488	524	512	607	565	529
Bus only (pax)	4,185	5,238	5,979	5,878	5,953	5,898	6,196
Rail (pax)	3,801	5,041	5,814	6,009	5,752	5,840	6,288
TOTAL (persons)	207,726	250,181	279,425	280,017	279,873	279,860	290,671

Table 7 Summary of Demand Model results for SODC - Destinations 12 hour

SODC as destination	Base Year (BY)	Do Minimum (DM)	Scenario 1 (S1)	Scenario 2 (S2)	Scenario 3 (S3)	Scenario 4 (S4)	Scenario 5 (S5)
Reg car (veh.)	157,434	188,809	209,953	210,612	210,462	210,511	218,059
P&R (veh.)	300	387	414	406	524	424	420
Bus only (pax)	3,526	4,674	5,376	5,322	5,372	5,328	5,605
Rail (pax)	3,608	4,944	5,692	5,939	5,650	5,732	6,203
TOTAL (persons)	204,257	246,054	273,964	274,973	274,676	274,664	284,844

4. Do Minimum Highway Network Performance - 2031

4.1. Introduction

Highway network performance is measured in a number of ways: at a high level using network wide statistics and specific statistics and journey times along identified corridors. The metrics used to measure the performance of the highway network are delay (pcu-hours), total time (pcu-hours), total distance (pcu-km) and average speed (km/hr), as defined:

- Link Cruise Time (pcu-hours): Time which would be spent travelling on links, which includes link based delay
- Total Travel Time (pcu-hours): The sum of both link and junction times
- Delay (pcu-hours) – Difference of TOTAL TRAVEL TIME and LINK CRUISE TIME
- Travel Distance (pcu-km): Vehicle or pcu-kms on simulation links
- Overall Average Speed (kph): Defined by (total distance) / (total time)

In addition, the model can be used to present graphics showing flow and link and junction volume to capacity ratios as well as changes in flow between different scenarios. More detailed analysis of model results has been undertaken along specific corridors within the District:

- A40 between Wheatley and M40 Junction 5
- A4074 between Shillingford and the Oxford Eastern By-pass
- B480 between Stadhampton and Watlington
- A329 between Thame and Shillingford
- B4009 between Benson and Chinnor
- A415 between Abingdon and Berinsfield

Understanding the impacts of the tested development scenarios on the highway sections covered by these corridors enables an assessment of modelled responses of committed and planned transport infrastructure in relation to increased levels of demand and begins to identify where highway mitigation and infrastructure interventions may need to be considered.

The analysis focuses on network performance, where the network is said to be operating:

- at operational capacity (i.e. conditions are such that traffic speed has dropped on links and minor incidents such as a turning vehicle have exaggerated impacts on traffic flow) with a volume to capacity ratio between 85% and 95%; and
- at capacity (i.e. it is not practically possible for additional traffic to proceed along the link) with a volume to capacity ratio of 95% and above.

Analysis of network performance and performance along relevant corridors has been undertaken to compare the Do-Minimum and the development scenarios for the modelled morning and evening peak hours.

4.2. Highway assumptions

Table 8 summarises all the highway schemes that have been included in the Do Minimum scenario as an addition to the Base Year network, and hence assumed to come forward for delivery by 2031. The drawings have been provided by OCC.

Table 8 Highway schemes included in the Do Minimum scenario (additional to Base Year network)

District	Highway scheme description
Cherwell	A41 / Neunkirchen Way roundabout (Rodney House)
Cherwell	A41 Oxford Road / Boundary Way roundabout improvement scheme

District	Highway scheme description
Cherwell	Bicester Town Centre changes
Cherwell	M40 J10 Improvements
Cherwell	M40 J9 Phase 2
Cherwell	Oxford Road / Pingle Drive junction
Cherwell	Bucknell Road/A4095 Howes Lane new priority junction
Cherwell	Pioneer Roundabout
Cherwell	South West Bicester Link Road
Cherwell	Upper Heyford improvement
Cherwell	Updated Bicester SE Perimeter Road as indicated by OCC, Langford Lane is not included in the model for being only a local access
Cherwell	Spine Road Through SE Bicester – modelled at a speed of 40 mph (64 kph) as indicated by OCC
Cherwell	Upgrade of the SE Segment of the A4421
Cherwell	Improvements to Skimmingdish Lane
Cherwell	Tunnel under the rail line – Howes Lane Realignment and the off-site mitigation at Lords Lane
Cherwell	London Road is now banned in the model
Cherwell	Charbridge Lane – dualled
Cherwell	Banbury schemes (Banbury East of M40 J11 Link Road, Banbury Hennef Way Corridor improvements, Banbury Salt Way, Banbury Bridge Street Junction (and other town centre)) were not modelled as Banbury is just outside the simulation area.
City	Becket Street extension and new junction with Oxpens Road – New site access and link road through Oxpens site
City	Botley interchange – Capacity improvements on circulatory and approaches
City	Cotteslowe and Wolvercote Roundabouts
City	Eastern Arc
City	Frideswide Square including changes to Beckett Street
City	Hinksey Hill – A423 to A34sb
City	Hinksey Hill – Science Transit
City	Kennington Roundabout Improvements
City	The Plain and Longwall Street junction – Signal retiming at Longwall Street and cycle improvements
City	West Way / Botley Road Junction
City	Worcester Street/George Street junction
City	Updated all infrastructure around Northern Gateway according to the latest layout (TN037 from PBA), which includes the internal link road open to through traffic, the A40-A44 link and improvements to Peartree Interchange
City	Updated Barton site access and bus link
City	Headington roundabout - phase 1 (completed)
City	Horspath Driftway (being completed as part of Access to Headington Package)
City	Includes Access to Headington package.
West	A4095/B4022 Staple Hall - Two mini-roundabouts connected by a short connecting link (2014 situation)
West	A415 Ducklington Lane/Station Lane junction improvement - Capacity increase on the Station Lane approach.
West	Brize Norton Village Traffic Calming - Capacity constraint on Minster Road between Elm Grove and Manor Road to reflect link layout change.
West	Down's Road/A40 new junction - At grade roundabout access for Downs Road connecting onto the A40.
West	B4477 Capacity Enhancement through widening (still single carriageway)
West	Straightening of the existing road between the A40 at Minster Lovell south to the roundabout junction north of Brize Norton

District	Highway scheme description
West	Includes bus lane eastbound between Eynsham and Duke's Cut Bridge and the related improvements to Eynsham and Cassington junction to accommodate the bus lane
West	Shilton Link Road from B4020 to Elmhurst Way
Vale/South	Harwell Link Road Section 1 (B4493 to A417)
Vale/South	Didcot Northern Perimeter Road Stage 3
Vale/South	Wantage Eastern Link Road (WELR)
Vale/South	A34 Milton Interchange Hamburger
Vale/South	A34 Chilton Northern Slip Roads
Vale/South	Foxhall Bridge Widening
Vale/South	Access to Harwell Section 2 (Hagbourne Hill)
Vale/South	Grove Northern Link Rd
Vale/South	Rowstock Roundabout improvements
Vale/South	Featherbed/Steventon Lights junction improvements
Vale/South	Great Western Park access
Vale/South	Valley Park spine road (A4130 – B4493)
Vale/South	Coding to reflect traffic management measures in villages (Harwell)
Vale/South	Harwell Oxford all access points junction improvements
Vale/South	Improvements to traffic signals at Frilford Junction (A415/A336)
Vale/South	Junctions on A4130
Vale/South	A420 Western Vale infrastructure (Faringdon – access to The Steeds development)
Vale/South	Lodge Hill Interchange (South facing slip roads onto the A34)
Vale/South	Clifton Hampden Bypass
Vale/South	Culham to Didcot Thames River Crossing
Vale/South	Science Bridge modelled with two roundabouts as in the OCC layout & A4130 Capacity Improvements
Vale/South	South Access to Valley Park Spine Road modelled according to the layout provided by Brookbanks in October (5 arm roundabout).
Vale/South	A420-Highworth Road, Shrivenham

4.3. Park and Ride assumptions

As informed by OCC on May 9, 2016, the six proposed peripheral Park and Ride sites should not be included in the updated Do Minimum scenario with the exception of Eynsham. The location and accesses of Eynsham P&R site have been provided by WODC when defining the scope of this work. All the existing P&R sites will be kept open and the catchment areas will be the ones defined for the A40 Corridor Study (October 2015).

4.4. Public Transport assumptions

Table 9 summarises all the public transport schemes that have been included in the Do Minimum scenario as an addition to the Base Year network. The details have been provided by OCC.

Table 9 Public Transport Schemes included in the scenarios

District	Bus scheme description
Cherwell	2 new buses per hour to Banbury via Bankside plus enhancement of service s4 between Deddington and Banbury via main road
Cherwell	Create additional services between Upper Heyford and Bicester, also Upper Heyford with Oxford with an additional frequency of 1 bph for all time periods. (new frequency 2 buses per hour)
Cherwell	Create new bus service from NW Bicester to Bicester Town Centre with a frequency of 6 buses per hour in each direction

District	Bus scheme description
Cherwell	Create new bus service between Bicester Town Centre and Oxford going through Graven Hill (using Spine Road Through SE Bicester and Bicester SE Perimeter Road) with a frequency of 2 buses per hour in each direction
Cherwell	Update of the bus service S5 to stop at Graven Hill;
Cherwell	As a consequence on the ban on London Road, all the buses using this segment previously were re-routed via Charbridge Lane.
City	Frequency update for services 700, 800 and 900
City	Bus services serving Barton development (re-routing of bus service 8 and new shuttle service between Barton and John Radcliffe Hosp. with a frequency of 2bph);
City/West	S7 service for Northern Gateway now operating all day with a frequency of 4 bph;
City/West	S2 service now operating with a frequency of 4 bph to serve Eynsham P&R
City/West	S1 service now operating with a frequency of 2 bph to serve compensate the improvements to S2.
West	2 buses per hour (Chipping Norton – Banbury) (currently one bus per hour)
Vale/South	Faringdon - Increase 66 service (Swindon-Oxford) to 3 buses/hour
Vale/South	Wallingford - Increase X39 service (Wallingford-Oxford) to 3 buses/hour
Vale/South	Thame - Increase 280 (Thame - Oxford) to 4 buses/hour
Vale/South	2 buses per hour Harwell-Crab Hill-Grove Airfield-Milton Park-Didcot (service 36) plus diversion of 2 buses per hour Wantage-Oxford through site (either x30 or 31)
Vale/South	“North East Didcot, 4 buses per hour to Didcot Town Centre and Station and then 2 of these extended to Milton Park and on to Harwell”
Vale/South	“Valley Park, 2 buses per hour Didcot-Wantage Road-Vallley Park-Milton Park plus 2 buses per hour Didcot - main road - Valley Park – Harwell”
Vale/South	“Great Western Park, same pattern as at Valley Park, 4 per hour to Didcot Town Centre, 2 to Milton Park, 2 to Harwell”

Line	Rail scheme description
East West Rail	East West Rail comprises four new services:
	• Reading – Bedford with a headway of 60 minutes all day;
	• Reading – Milton Keynes with a headway of 60 minutes all day;
	• Bletchley – Milton Keynes with a headway of 60 minutes all day;
Evergreen 3	• Milton Keynes – Marylebone with a headway of 60 minutes all day.
	Evergreen3 from Chiltern Railway consists in the creation of a new service between Oxford and London Marylebone, with a headway of 30 minutes all day.
	The services inherited from the Base Year have been substituted by the following (for all time periods):
	• Worcester to/from London Paddington – 1 tph
North Cotswolds Line	• Hanborough to/from London Paddington – 1 tph
	• Hanborough to/from Oxford – 1 tph
	The following services now stop at Culham and Radley (in all time periods):
Culham Station	• Reading to/from Bedford – 1 tph
	• Reading to/from Milton Keynes – 1 tph
Oxford to Didcot	Additionally, two more trains per hour stop at Radley and 1 train per hour stops at Appleton (in all time periods).
Didcot Parkway	For the service between Swindon and London Paddington, 1 more train per hour was added to the ones inherited from the Base Year, making a total of 3 tph (only AM and PM).
Henley-on-Thames	Shuttle service between Henley and Twyford with a frequency of 2 tph, allowing the transfer to the services to London and Oxford.
Banbury to Oxford	The direct service between Banbury and London Paddington was substituted by a shuttle between Banbury and Didcot (in AM and PM) and Banbury and Oxford (in IP) with a frequency of 1 tph.

Line	Rail scheme description
Oxford to Heathrow	A service with 2 tph already exists between Oxford – Didcot Parkway – Reading – Heathrow – London Paddington. Updated journey time.
Oxford - Swindon/Bristol	New regional service between (Nottingham – Loughborough - Leicester – Kettering - Wellingborough -) Bedford – Bletchley – Bicester Village – Oxford Parkway – Oxford – Didcot – Swindon – Chippenham - Bath – Bristol with 1 tph.
Cowley Branch	New service between Bicester and Oxford Retail Park with a frequency of 1 tph. The line and service are coded but not currently used in the PT model as it creates instability.

4.5. Do-Minimum Housing Scenario 2031

4.5.1. Network Performance

The modelled highway network performance within the District for the Do-Minimum (Scenario 2) for 2031 is shown in the Table 10. Comparisons against these statistics will provide a high-level summary of how the model has responded to the changes in land use assumptions associated with the scenarios. As identified during Stage 1, some of the District is outside of the detailed simulation area, these statistics are an average for the District as a whole and include all links (simulation and buffer) and all links - motorways, A-roads, B-roads and minor roads - hence why the average speed may be higher than expected since the detailed junction modelling is not included in the buffer network..

Table 10 South Oxfordshire District modelled network performance – 2031 Do-Minimum

Do-Minimum (Scenario 2)	South Oxfordshire	
	Morning Peak	Evening Peak
Delay (pcu h)	529	628
Total Time (pcu h)	6105	6753
Total Distance (pcu km)	378807	408810
Average Speed (km/h)	62.0	60.5

4.5.2. Corridor Performance

The key corridors for highway network analysis are described in Section 4.1. This section describes the corridor performance in the Do-Minimum scenario for the morning and evening peak hours. The volume-capacity plots are also presented.

4.5.2.1. A40

The A40 connects multiple settlements within Oxfordshire. Of relevance to South Oxfordshire, it connects Oxford, Wheatley, and Tetworth.

The Do-Minimum scenario shows that the A40 is forecast to be operating below operational capacity in the northbound and southbound directions between Wheatley and the M40 Junction for both the morning and evening peak hours.

The eastbound and westbound approaches at Headington roundabout are forecast to be operating above operational capacity.

4.5.2.2. A4074

The A4074 provides one of three north-south routes through the District, in this case between Shillingford and the Oxford Eastern By-pass. The route consists of traffic travelling from / to Oxford, Sandford- on-Thames, Nuneham Courtenay, Berinsfield, Burcot, Dorchester and Shillingford.

The Do-Minimum forecast suggests that the A4074 is operating at or above operational capacity in the morning peak hour in the northbound direction between Berinsfield roundabout and the Golden Balls roundabout and above capacity in the northbound direction between Heigh View and Lower Farm Lane, Benson Lane and Church Road, Golden Balls roundabout and Baldon Lane. In the evening peak hour, the

Do-Minimum modelling suggests that the A4074 is operating at or above operational capacity in the northbound direction between Baldon Lane and Lower Farm and above capacity between the Golden Balls roundabout and Baldon Lane in both directions and between Church Road and Crowmarsh roundabout southbound.

4.5.2.3. B480

The B480 caters for north-south movements between Oxford, Stadhampton, Chalgrove, Cuxham and Watlington.

The Do-Minimum forecast shows that the B480 is likely to be below operational capacity in both morning and evening peak hours.

4.5.2.4. A329

The A329 provides a route between the M40 at Milton Common and the A4074 at Shillingford passing through Little Milton, Stadhampton, Newington and Warborough in the east – west direction.

The Do-Minimum morning peak model results suggest that the A329 eastbound is likely to be at or above operational capacity at Stadhampton between School Lane and Milton Road / Thame Road roundabout and above capacity northbound between Stadhampton Road / A439 and Thame Road / Newington Road junctions and southbound on Milton Road, east of the Thame Road / Milton Road roundabout. In the evening peak, the A329 eastbound is forecast to be at or above operational capacity southbound on Milton Road, east of the Thame Road / Milton Road roundabout and above capacity eastbound between School Lane and Milton Road / Thame Road roundabout and northbound between Stadhampton Road / A439 and Thame Road / Newington Road junctions.

4.5.2.5. B4009

The B4009 provides an east-west route through the District between the M40 at Lewknor, Shirburn, Watlington, Britwell Salome and Benson.

The Do-Minimum results show that the B4009 is forecast to be below operational capacity in both the morning and evening peak hours.

4.5.2.6. A415

The A415 links the A420, A34 and the A4074 and provides an east-west route through the western part of the District between Abingdon-on-Thames, Culham, Clifton Hampden, and Berinsfield.

The Do-Minimum results suggest that the A415 is forecast to be above capacity in the morning and evening peak hours westbound between Tollgate Road and Thame Lane and eastbound between A415 / High St and Thame Lane / A415 junctions.

The volume-capacity ratio plots for Do-Minimum are presented in Figure 4 and Figure 5.

Figure 4 SODC volume-capacity ratio (%ge) – 2031 DM AM peak hour

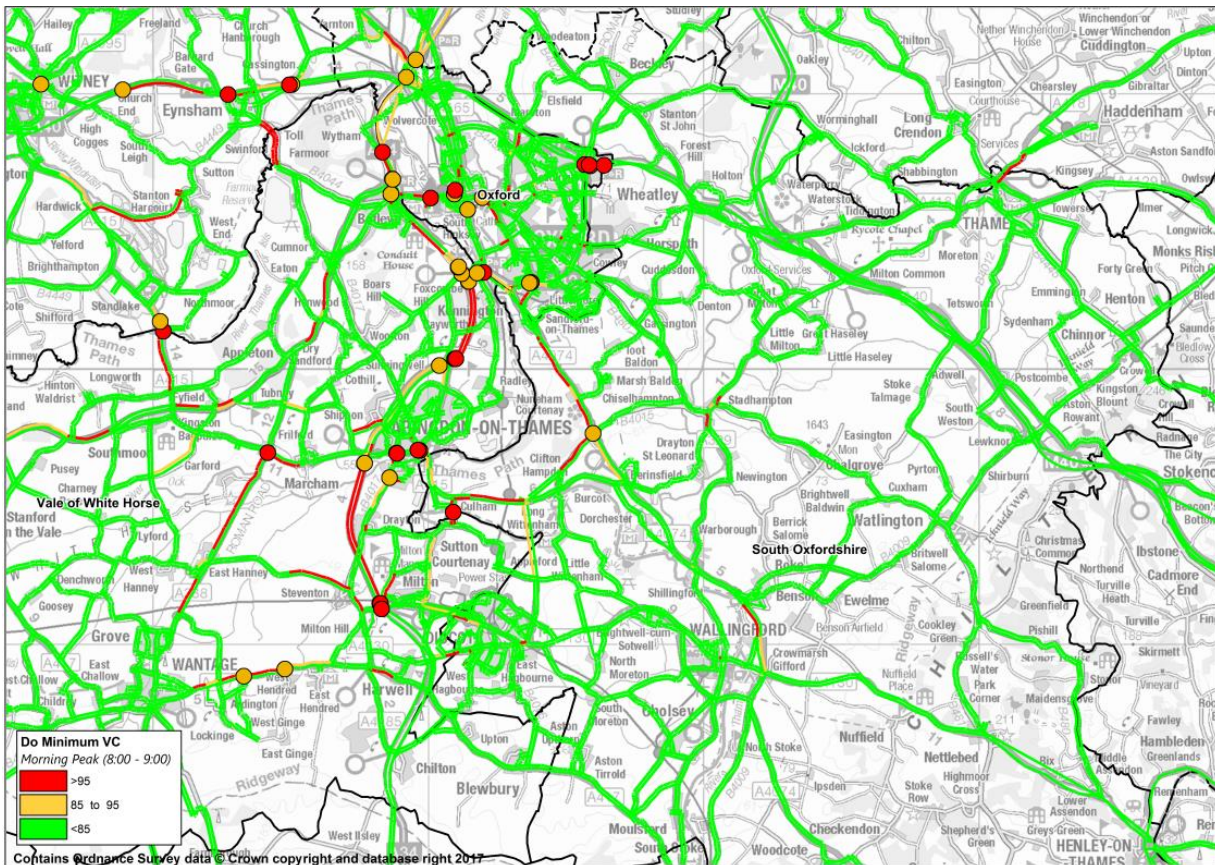
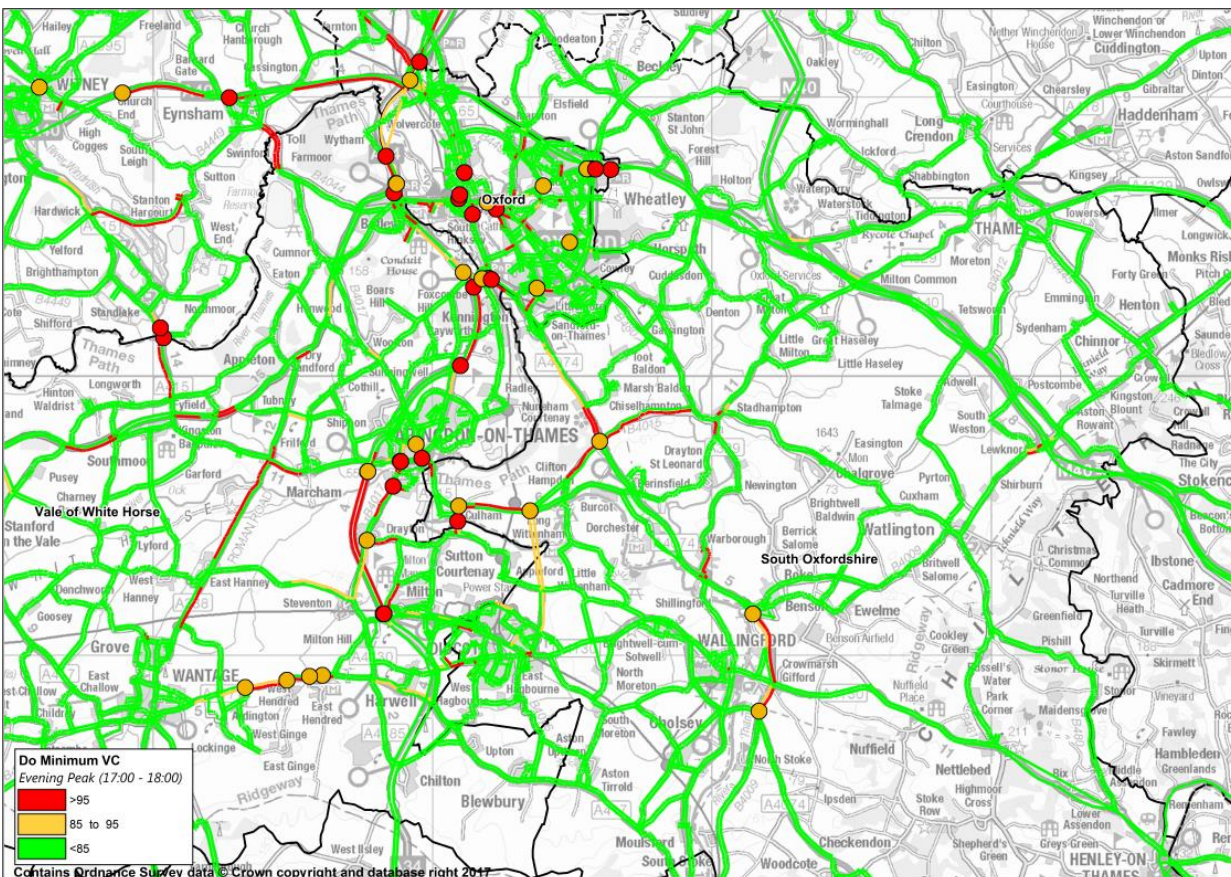


Figure 5 SODC volume-capacity ratio (%ge) – 2031 DM PM peak hour



4.6. Summary

Along the key corridors a comparison between ETI Core Strategy (Stage 1) and the current Do-Minimum scenario along the sections of the highway network in one or both peak hours is:

A4074

- The ETI Stage1 indicates the A4074 southbound between Warborough Road at Shillingford and the A329 junction is operating at or above capacity during the AM and PM peak. Northbound between the A329 junction and the B4009 junction is operating at operational capacity during the AM and PM peak. Three out of four arms approaching the A4074/A329 junction is operating at or over capacity during both time periods. Southbound between the B4009 junction and the A4130 junction is operating at operational capacity during the AM peak and at or over capacity during the PM peak, whilst northbound flow is operating at operational capacity in the PM peak. Between the A4130 junction and Nosworthy Way junction the A4074 is operating at or over capacity in both directions during both time periods;
- The Do-Minimum results show that the A4074 is operating at or above operational capacity in the northbound direction between Berinsfield roundabout and the Golden Balls roundabout and above capacity in the northbound direction between Heigh View and Lower Farm lane, Benson lane and Church Road, Golden Balls roundabout and Baldon lane. In the evening peak hour, the Do-Minimum results show that the A4074 is operating at or above operational capacity in the northbound direction between Baldon Lane and Lower Farm and above capacity between Golden Balls roundabout and Baldon lane in both directions and between Church Road and Crowmarsh roundabout southbound.

A329

- In the ETI Stage1 there are no capacity issues to report on the A329
- In the Do-Minimum scenario the A329 is forecast to be at or above operational capacity along most sections in both morning and evening peak hours.

B4009

- In the ETI Stage1 sections of the B4009 westbound between Lewknor and Watlington and Benson and the A4074 junction are operating at or above operational capacity in the AM and PM peak period.
- The Do-Minimum results show that the B4009 is forecast to be below operational capacity in both morning and evening peak hours.

A415

- In ETI Stage1 the A415 westbound is operating at or over capacity between Burcot and Clifton Hampden during the AM peak. Eastbound between the Burycroft Road junction and the Tollgate Road junction at Culham is operating at operational capacity during the AM peak. Eastbound between Burycroft Road and the River Thames crossing at Abingdon is operating at capacity during the AM peak. Westbound between the River Thames crossing at Abingdon and Abingdon ring road is operating at or over capacity during the AM and PM peak.
- The Do-Minimum results show that the A415 is forecast to be above capacity in the morning and evening peak hours westbound between Tollgate Road and Thame lane and eastbound between A415 / High Street and Thame lane / A415 junctions.

5. Scenario Highway Network Performance

5.1. Introduction

The highway network performance of the different scenarios is measured using the metrics discussed in section 4.1.

This section presents, for each scenario, the forecast impact of the development on those corridors and will also describe the modelled changes in flow and volume-capacity ratio between different scenarios.

5.2. Scenario 1

Scenario 1 includes the Do-minimum housing scenario as well as the local plan housing allocation numbers, including strategic sites (including Chalgrove: 3500 dwelling), new homes in existing settlements with a 10% growth in towns and villages and regeneration areas (including Berinsfield with 1800 dwelling). In total, the model assumptions suggest 9415 additional dwellings in Scenario 1 compared to the Do-minimum scenario.

5.2.1. Network Performance

The modelled highway network performance within the District for the Do-Minimum and Scenario 1 are shown in the Table 10 and Table 11. These statistics give a high-level summary of how the model has responded to the changes in land use assumptions.

The trips generated by the additional dwellings are forecast to increase delays, travel times and travel distances within the District during the morning and evening peak hours and have the effect of reducing average speed.

Table 10. South Oxfordshire District modelled network performance - morning peak hour 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 1 (S1)	% Difference (S1-DM)
Delay (pcu hr)	529	871	65%
Total Time (pcu hr)	6105	6779	11%
Total Distance (pcu km)	378807	396128	5%
Average Speed (km/h)	62.0	58.4	-6%

Table 11. South Oxfordshire District modelled network performance - evening peak 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 1 (S1)	% Difference (S1-DM)
Delay (pcu hr)	628	997	59%
Total Time (pcu hr)	6753	7513	11%
Total Distance (pcu km)	408810	429727	5%
Average Speed (km/h)	60.5	57.2	-5%

5.2.2. Flow Impacts

The forecast actual flow difference between Scenario 1 and Do-Minimum modelled across the District is shown in Figure 6 and Figure 7. For the purposes of the report, we focus on changes along the A40, A415, A329, A4074, B480 and B4009 corridors and where relevant will provide commentary on forecast impacts on other links.

In both the morning and evening peak hours, the actual flow is forecast to increase in both directions along the B480 between the A4142 / B480 Cowley Interchange and the B480 / A329 roundabout at Stadhampton and forecast to increase on the section towards B480 / B4009 at Watlington. This increase is likely to be

related to the additional dwellings at Chalgrove and Berinsfield with a similar pattern observed on the B4009 south of Chalgrove.

In the evening peak hour, the actual flow is forecast to decrease along the A329 northbound between the A329 / B480 roundabout at Stadhampton and the A329 / M40 roundabout. In the morning peak hour, there is forecast to be some small change in the actual flow along the A329 in both directions between the A329 / B480 roundabout and Shillingford roundabout.

In both the morning and evening peak hours, the actual flow is forecast to increase along the A4074, northbound between Berinsfield roundabout and the local road adjacent to the Burcot Farm and southbound between Berinsfield roundabout and Shillingford roundabout. This increase is likely to be related to the increased demand at Berinsfield.

In the morning peak hour, the model forecasts suggest an increase in flows along the A415 westbound between the A415 / A4074 junction and the A415 / B4015 junction. In the evening peak hour, there is forecast to be an increase in both directions along the same section of the A415, in the vicinity of the proposed developments at Berinsfield.

The model forecasts show minor changes along the A40 in both the morning and evening peak hours. Development trips are forecast to access the Chalgrove site via the B480, the modelling suggests a very slight reduction in trips along the M40/A40 corridor in both the morning and evening peak periods. Modelled trips originating from the Chalgrove site are loaded onto B480. Oxford bound trips are forecast to route along the B480 via Chiselhampton and access Oxford at the Cowley Interchange. Hence, the model forecasts a slight reduction in trips along the A40 which is a parallel route to B480.

Scenario 1 is not forecast to have any marked impact on the road network in the vicinity of Didcot in terms of vehicle flow change.

Figure 6 South Oxfordshire flow difference (S1 - DM) (PCU/hr) – 2031 AM peak hour

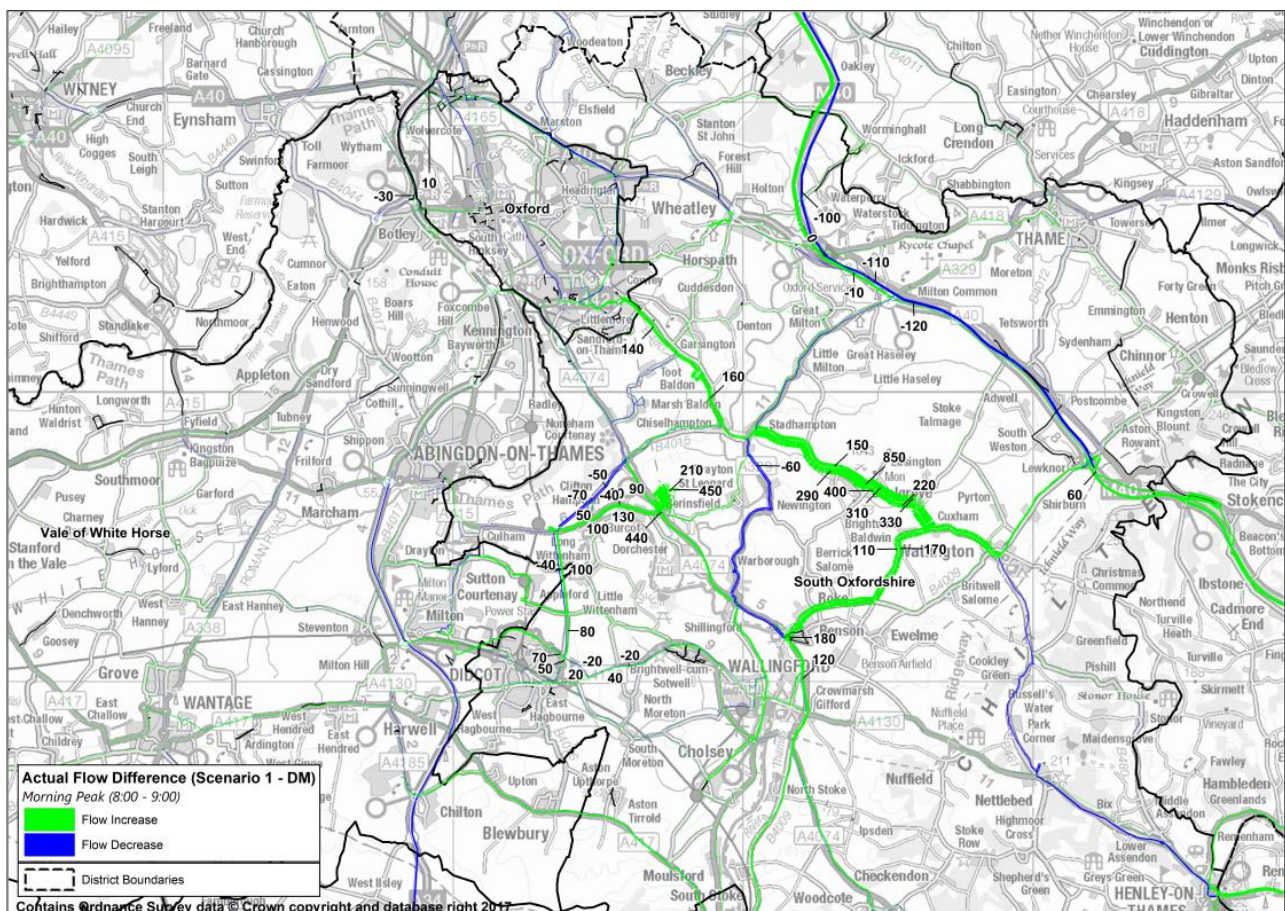
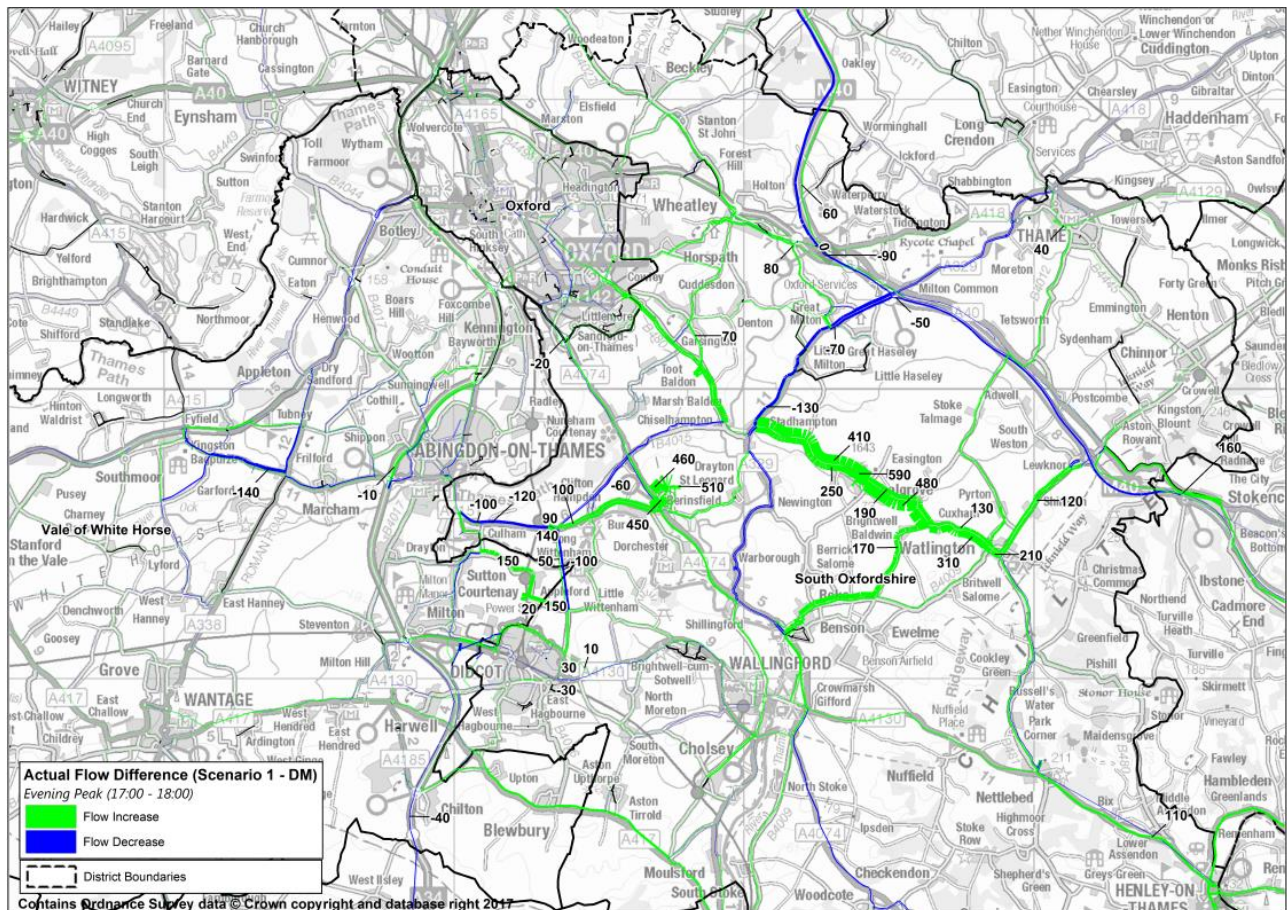


Figure 7 South Oxfordshire flow difference (S1 - DM) (PCU/hr) – 2031 PM peak hour



5.2.3. Capacity impacts

The forecast volume to capacity plots for Scenario 1 across the District are shown in Figure 8 and

Figure 9.

In Scenario 1, the B480 is forecast to exceed capacity at the following approaches:

- In the morning and evening peak hours, the B480 / A329 roundabout at Stadhampton.

The A329 is modelled to exceed capacity at the following approaches:

- In the morning peak hour, the A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road
- In the evening peak hour, the northbound direction between Newington Road / B480 Thame Road junction and Milton Road / Thame Road junction

The A415 is forecast to exceed capacity at the following approaches:

- In the morning and evening peak hours, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.

The model forecasts show that the A4074 exceeds capacity at the following approaches:

- In the morning peak hour, A4074 northbound between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the evening peak hour, both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the morning peak, the A4074 through Nuneham Courtney is forecast to exceed capacity with a V/C ratio of 90% on the 30mph section and 99% and 106% on neighbouring 50mph sections.
- In the evening peak, the A4074 through Nuneham Courtney is forecast to have a V/C of 85% on the 30mph section and 93% and 98% on neighbouring sections.

The B4009 and A40 are forecast to remain below capacity in both morning and evening peak hours.

Figure 8 South Oxfordshire V/C for links and junctions– 2031 Scenario 1 AM peak hour

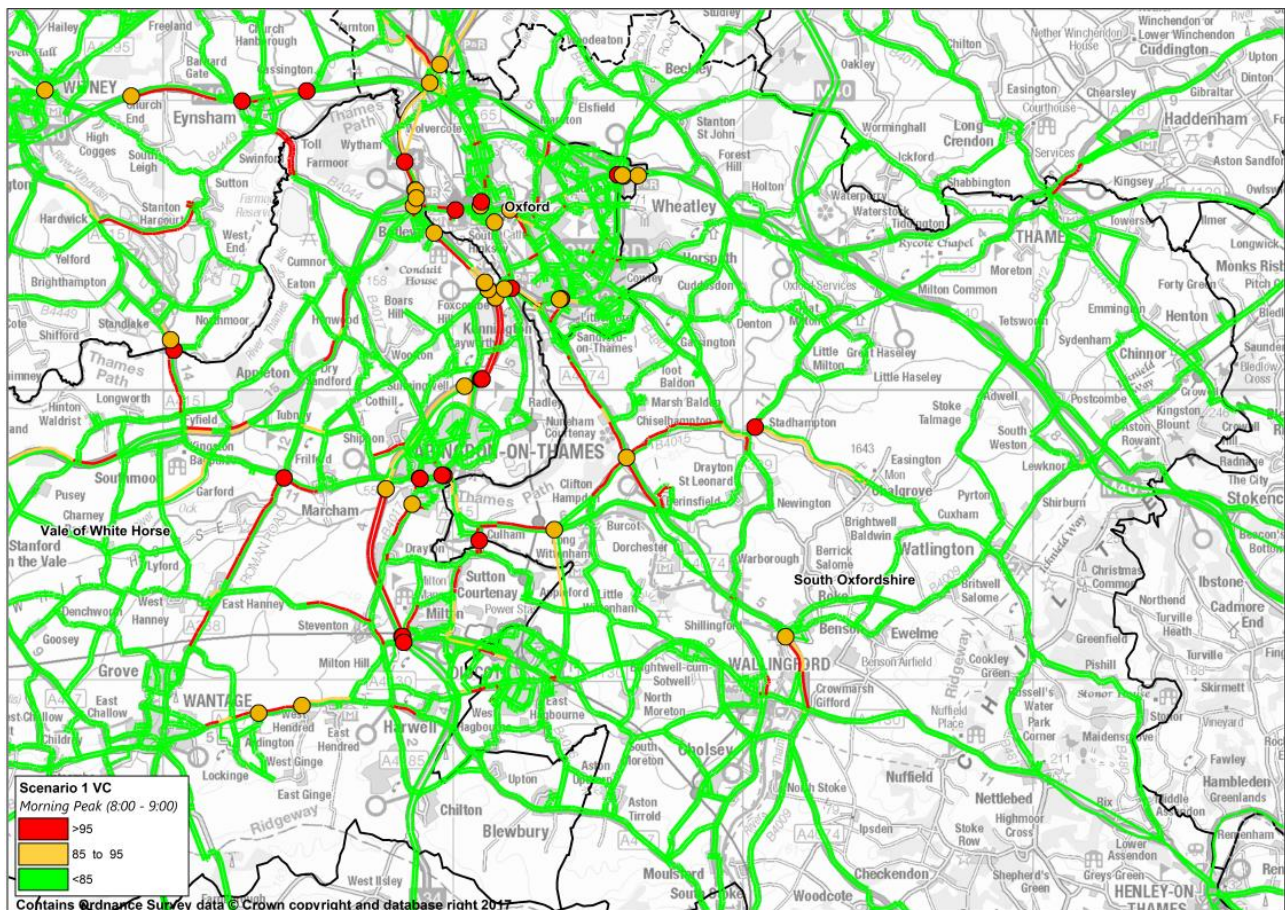
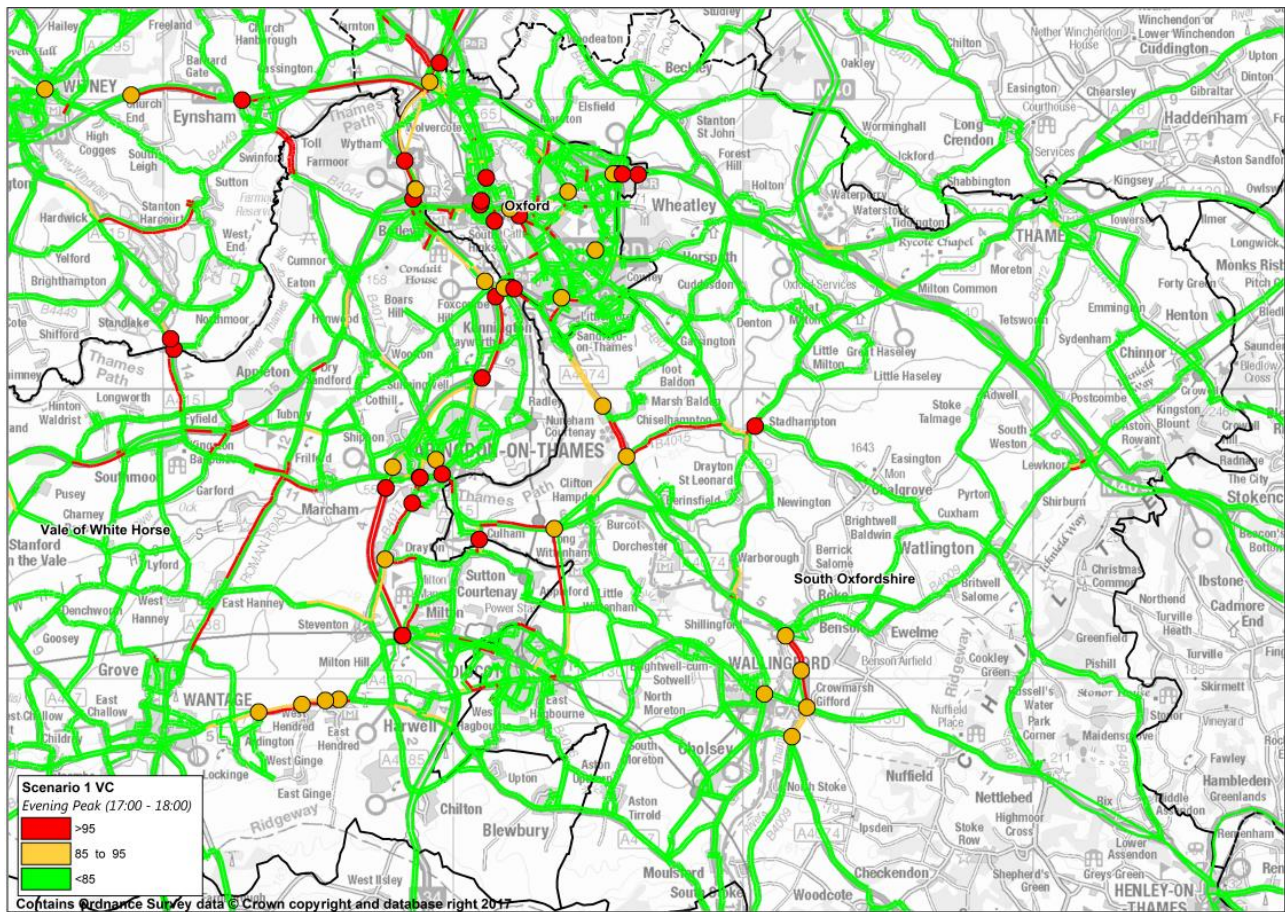


Figure 9 South Oxfordshire V/C for links and junctions– 2031 Scenario 1 PM peak hour



5.2.4. Corridor Performance

5.2.4.1. A40 Corridor

The network performance for Scenario 1 along the A40 corridor is shown in Table 12 and Table 13 for the morning and evening peak hours respectively.

In the morning peak hour, the model forecasts suggest a small increase in delay and total time, the total distance is forecast to remain broadly the same and the average speed is forecast to decrease.

In the evening peak hour, the delay is forecast to decrease while the travel time, travel distance and average speed are increasing.

In both morning and evening peak hours, the difference percentages presented look relatively small given the fact that the new developments are not in the vicinity of the A40 corridor and are not forecast to have a direct impact on its performance.

Table 12. A40 corridor performance in the morning peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	146	156	7%
Total Time (pcu hr)	520	531	2%
Total Distance (pcu km)	27267	27389	0%
Average Speed (km/h)	52.5	51.6	-2%

Table 13. A40 corridor performance in the evening peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	95	92	-3%
Total Time (pcu hr)	519	529	2%
Total Distance (pcu km)	30758	31630	3%
Average Speed (km/h)	59.2	59.8	1%

5.2.4.2. A415 Corridor

The modelled network performance for Scenario 1 along the A415 corridor is shown in Table 14 and Table 15 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The difference percentages presented are higher in the morning peak in comparison with the evening peak, this may be related to peak spreading in the evening peak. The new developments at Berinsfield to the east of the A415 corridor are forecast to increase traffic flow on the corridor potentially leading to the forecast increase in delay.

Table 14. A415 corridor performance in the morning peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	70	86	24%
Total Time (pcu hr)	215	243	13%
Total Distance (pcu km)	9254	9880	7%
Average Speed (km/h)	43.1	40.7	-6%

Table 15. A415 corridor performance in the evening peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	108	112	4%
Total Time (pcu hr)	269	281	5%
Total Distance (pcu km)	10138	10583	4%
Average Speed (km/h)	37.7	37.6	0%

5.2.4.3. A329 Corridor

The network performance for Scenario 1 along the A329 corridor is shown in Table 16 and Table 17 for the morning and evening peak hours respectively.

In the morning peak hour, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease.

In the evening peak hour, the additional dwellings are forecast to result in a large increase in delay and total travel time while the total distance and average speed are decreasing. The model forecasts suggests significant delays at the Milton Rd / Thame Rd roundabout in Stadhampton causing a significant decrease in the performance of the corridor and modelled rerouting of vehicles onto neighbouring roads, as highlighted by a forecast reduction in total distance during the modelled evening peak.

Table 16. A329 corridor performance in the morning peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	25	42	67%
Total Time (pcu hr)	375	395	5%
Total Distance (pcu km)	24474	24613	1%
Average Speed (km/h)	65.3	62.3	-5%

Table 17. A329 corridor performance in the evening peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	42	167	294%
Total Time (pcu hr)	394	495	26%
Total Distance (pcu km)	24615	23378	-5%
Average Speed (km/h)	62.4	47.2	-24%

5.2.4.4. A4074 Corridor

The network performance for Scenario 1 along the A4074 corridor is shown in Table 18 and Table 19 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. The new developments along this corridor are forecast to increase traffic flow on the A4074 leading to a forecast increase in delay along the corridor.

Table 18. A4074 corridor performance in the morning peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	77	114	50%
Total Time (pcu hr)	494	545	10%
Total Distance (pcu km)	26031	26742	3%
Average Speed (km/h)	52.7	49.0	-7%

Table 19. A4074 corridor performance in the evening peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	51	68	33%
Total Time (pcu hr)	487	521	7%
Total Distance (pcu km)	26878	27825	4%
Average Speed (km/h)	55.2	53.4	-3%

5.2.4.5. B480 Corridor

The modelled network performance for Scenario 1 along the B480 corridor is shown in Table 20 and Table 21 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in a large increase in delays, travel distance and total travel times while the average speed is forecast to decrease. The new developments along this corridor, specifically at Chalgrove, are forecast to increase traffic flow on the B480 leading to an increase in delay along the corridor.

Table 20. B480 corridor performance in the morning peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	2	236	12332%
Total Time (pcu hr)	115	433	278%
Total Distance (pcu km)	7427	12968	75%
Average Speed (km/h)	64.8	29.9	-54%

Table 21. B480 corridor performance in the evening peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	2	138	7567%
Total Time (pcu hr)	97	352	264%
Total Distance (pcu km)	6410	13882	117%
Average Speed (km/h)	66.3	39.5	-40%

5.2.4.6. B4009 Corridor

The network performance for Scenario 1 along the B4009 corridor is shown in Table 22 and Table 23 for the morning and evening peak hours respectively.

In both morning and evening peak hours, the model forecasts suggest an increase in delay, total travel time and total distance while the average speed is forecast to decrease. The difference percentages presented are greater in the evening peak in comparison with the morning peak.

Table 22. B4009 corridor performance in the morning peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	5.6	6.5	16%
Total Time (pcu hr)	276	318	15%
Total Distance (pcu km)	16881	19123	13%
Average Speed (km/h)	61.2	60.2	-2%

Table 23. B4009 corridor performance in the evening peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 1 (S1)	Difference (S1 - DM)
Delay (pcu hr)	46	77	65%
Total Time (pcu hr)	339	420	24%
Total Distance (pcu km)	17397	20184	16%
Average Speed (km/h)	51.4	48.1	-6%

5.3. Scenario 2

Scenario 2 includes the main strategic site with 3500 additional dwellings only at Culham and new homes in existing settlements with a 10% growth in towns and villages and regeneration areas. In total, the model assumes 9415 additional dwellings in Scenario 2.

5.3.1. Network Performance

The modelled highway network performance within the District for the Do-Minimum and the Scenario 2 are shown in the Table 24 and Table 25. These statistics give a high-level summary of how the model has responded to the changes in land use assumptions.

The trips generated by the additional dwellings are forecast to increase delays, travel times and travel distances within the District during the morning and evening peak hours and have the effect of reducing average speed.

Table 24. South Oxfordshire District modelled network performance - morning peak hour 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 2 (S2)	% Difference (S2-DM)
Delay (pcu hr)	529	660	25%
Total Time (pcu hr)	6105	6466	6%
Total Distance (pcu km)	378807	390412	3%
Average Speed (km/h)	62	60.4	-3%

Table 25. South Oxfordshire District modelled network performance - evening peak 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 2 (S2)	% Difference (S2-DM)
Delay (pcu hr)	628	761	21%
Total Time (pcu hr)	6753	7154	6%
Total Distance (pcu km)	408810	422461	3%
Average Speed (km/h)	60.5	59.1	-2%

5.3.2. Flow Impacts

The forecast actual flow difference between Scenario 2 and Do-Minimum modelled across the District is shown in Figure 10 and Figure 11. For the purposes of the report, we focus on changes along the A40, A415, A329, A4074, B480 and B4009 corridors, but where relevant will provide commentary on forecast impacts on other links.

In the morning peak hour, the actual flow is forecast to increase between Cuxham and Stadhampton and between Stadhampton and Cuddleston Way (on the outskirts of Oxford) along the B480 northbound. In the evening peak hour, the model forecasts suggest an increase in the actual flow along the B480 southbound between Stadhampton and Monument Road and between Southend and Clifton Hampden Road.

In the morning peak hour, the actual flow is forecast to increase on the B4009 – The Sands Road northbound and in the evening peak hour between Watlington Road and Shirburn Road.

In the morning peak hour, the actual flow is forecast to decrease on the A329 southbound between the A329 / B480 roundabout at Stadhampton and the A329 / Church Road junction while in the evening peak hour, the actual flow is forecast to increase on the same section of road along the A329.

The actual flow is modelled to decrease along the A4074 between Henley Road / A4074 junction and Golden Balls roundabout, southbound in the morning peak hour and northbound in the evening peak hour. The actual flow is forecast to increase along the A4074 between Berinsfield roundabout and Golden Balls roundabout, northbound in the morning peak hour and southbound in the evening peak hour. The actual flow is also modelled to increase between Berinsfield roundabout and Crowmarsh roundabout, southbound in the

morning peak hour and northbound in the evening peak hour. This increase is likely to be related to the increased level of demand at Culham.

In the morning peak hour, the model forecasts suggest an increase in actual flows along the A415 east and westbound along Abingdon Road in the vicinity of the A4074 and bounded by the Oxford Road / Abingdon Road junction, and along the A415 northbound between the Tollgate Road / Abingdon Road junction and High Street / Bridge Street junction. In the evening peak hour, there is forecast to be an increase in both directions along the same section on Abingdon Road in the vicinity of the A4074 and a decrease in both directions along the A415 between Culham Science Centre and The Burycroft junctions. The reduction of flow is due to the increased delays between Culham Science Centre and The Burycroft junctions which is forecast to re-route traffic along B4016. The model forecasts suggest an increase in the actual flow between the A415 / A4183 junction and The Burycroft junction southbound.

The model forecasts show minor changes along the A40 in both the morning and evening peak hours. The Local Plan development at Culham is not forecast to impact upon vehicle flow along the M40/A40 corridor.

In the Didcot area, to the south of the Culham development, there are forecast to be an increase in vehicle flow in the range of 150pcus at Lady Grove Road southbound direction and A4130 on the local network in this scenario. On the A415 between Culham and Clifton Hampden, reductions in vehicle flow are forecast, to the north of Didcot, these forecast reductions are mirrored by forecast increases in flow along the B4016.

Figure 10 South Oxfordshire flow difference (S2 – DM) (PCU/hr) – 2031 AM peak hour

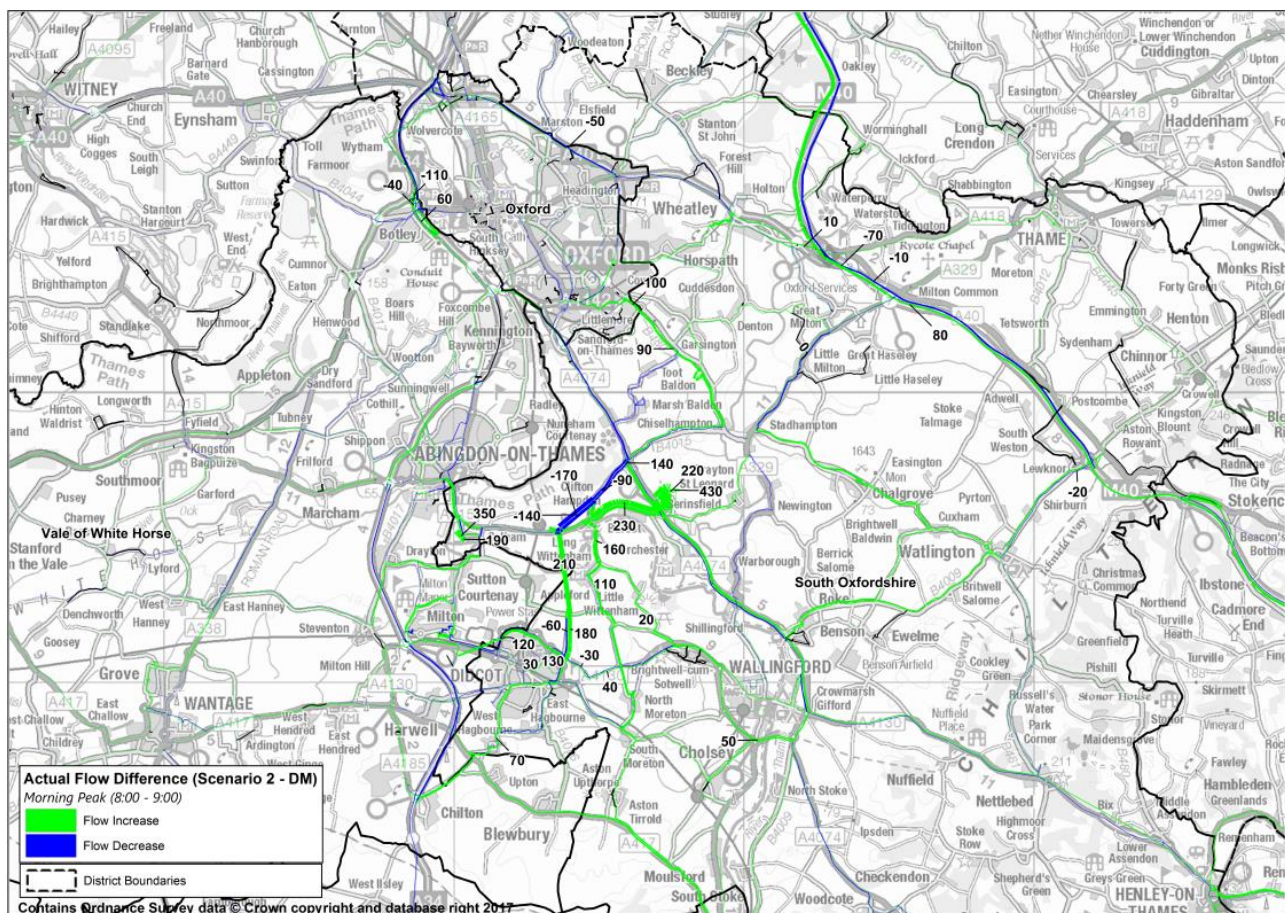
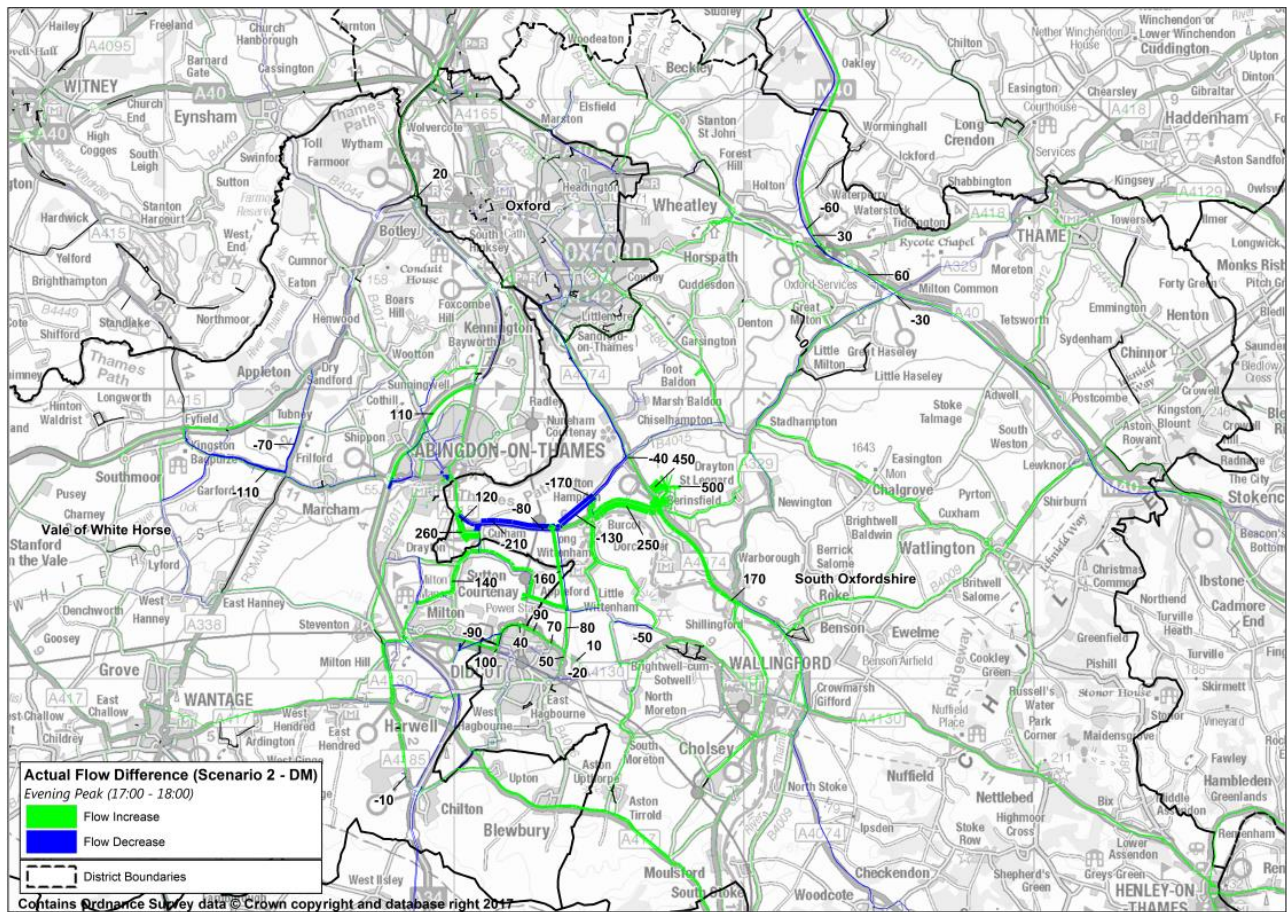


Figure 11 South Oxfordshire flow difference (S2 – DM) (PCU/hr) – 2031 PM peak hour



5.3.3. Capacity impacts

The forecast volume to capacity plots for Scenario 2 across the District are shown in Figure 12 and Figure 13.

The A329 is modelled to exceed capacity at the following approaches:

- In the morning peak hour, the A329 in a northbound direction between Stadhampston Road and the A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road
- In the evening peak hour, the A329 in a northbound direction between Stadhampston Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road and southbound between Sinodun View and Shillingford roundabout

The A415 is forecast to exceed capacity at the following approaches:

- In the morning peak hour, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.
- In the evening peak hour, the A415 eastbound between A415 / High Street and Thame Lane / A415 junctions.

The model forecasts show that the A4074 exceeds capacity on the following approaches:

- In the morning peak hour, the A4074 northbound between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the evening peak hour, southbound on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.

The B480, B4009 and A40 are forecast to remain below capacity in both morning and evening peak hours.

Figure 12 South Oxfordshire V/C for links and junctions– 2031 Scenario 2 AM peak hour

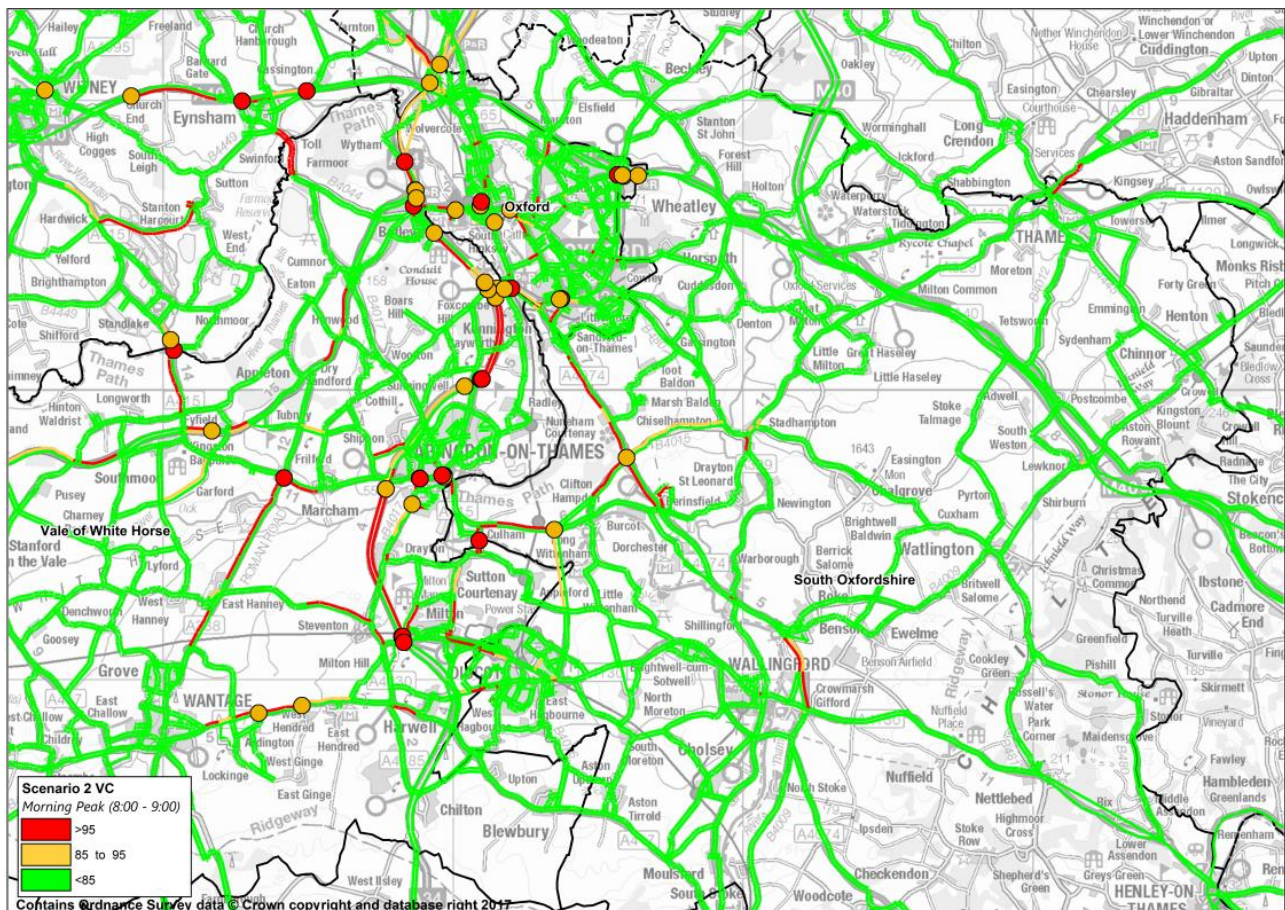
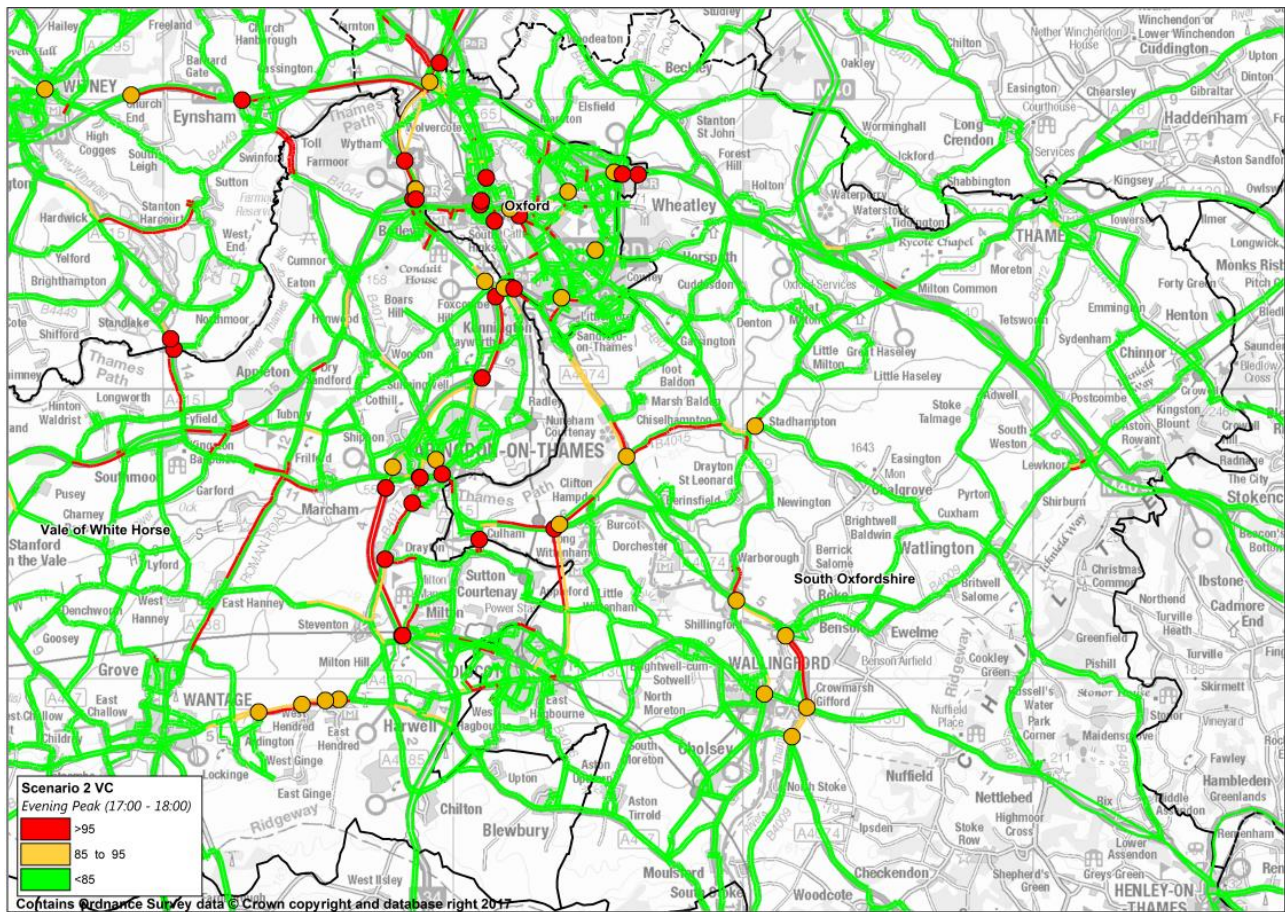


Figure 13 South Oxfordshire V/C for links and junctions– 2031 Scenario 2 PM peak hour



5.3.4. Corridor Performance

5.3.4.1. A40 Corridor

The network performance for Scenario 2 along the A40 corridor is shown in Table 26 and Table 27 for the morning and evening peak hours respectively.

In the morning peak hour the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. In the evening peak hour, the model forecasts suggest an increase in delay, total time and total distance while average speed remains broadly consistent. The Local Plan developments are not in the vicinity of the A40 corridor and therefore are unlikely to have a significant direct impact on its performance.

Table 26. A40 corridor performance in the morning peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	146	156	7%
Total Time (pcu hr)	520	531	2%
Total Distance (pcu km)	27267	27396	0%
Average Speed (km/h)	52.5	51.6	-2%

Table 27. A40 corridor performance in the evening peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	95	97	2%
Total Time (pcu hr)	519	529	2%
Total Distance (pcu km)	30758	31307	2%
Average Speed (km/h)	59.2	59.2	0%

5.3.4.2. A415 Corridor

The modelled network performance for Scenario 2 along the A415 corridor is shown in Table 28 and Table 29 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The new developments at Culham, along the A415 corridor, are forecast to increase traffic flow on the corridor which is likely to result in an increase in delay.

Table 28. A415 corridor performance in the morning peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	70	77	11%
Total Time (pcu hr)	215	244	14%
Total Distance (pcu km)	9254	10414	13%
Average Speed (km/h)	43.1	42.7	-1%

Table 29. A415 corridor performance in the evening peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	108	124	15%
Total Time (pcu hr)	269	291	8%
Total Distance (pcu km)	10138	10448	3%
Average Speed (km/h)	37.7	35.9	-5%

5.3.4.3. A329 Corridor

The network performance for Scenario 2 along the A329 corridor is shown in Table 30 and Table 31 for the morning and evening peak hours respectively.

In the morning peak hour, the model forecasts suggest an increase in delay and total travel time while the average speed is forecast to decrease and total distance remains approximately the same.

In the evening peak hour, the delay, total travel time and total distance are forecast to increase while the average speed is modelled to decrease.

Table 30. A329 corridor performance in the morning peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	25	39	53%
Total Time (pcu hr)	375	386	3%
Total Distance (pcu km)	24474	24357	0%
Average Speed (km/h)	65.3	63.1	-3%

Table 31. A329 corridor performance in the evening peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	42	50	17%
Total Time (pcu hr)	394	406	3%
Total Distance (pcu km)	24615	24813	1%
Average Speed (km/h)	62.4	61.2	-2%

5.3.4.4. A4074 Corridor

The modelled network performance for Scenario 2 along the A4074 corridor is shown in Table 32 and Table 33 for the morning and evening peak hours respectively.

In both the morning and evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. The proposed Berinsfield development along this corridor

are forecast to increase traffic flow on the A4074 which is likely to lead to an increase in delay along the corridor.

Table 32. A4074 corridor performance in the morning peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	77	131	71%
Total Time (pcu hr)	494	560	13%
Total Distance (pcu km)	26031	26649	2%
Average Speed (km/h)	52.7	47.6	-10%

Table 33. A4074 corridor performance in the evening peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	51	80	55%
Total Time (pcu hr)	487	534	10%
Total Distance (pcu km)	26878	27980	4%
Average Speed (km/h)	55.2	52.4	-5%

5.3.4.5. B480 Corridor

The modelled network performance for Scenario 2 along the B480 corridor is shown in Table 34 and Table 35 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to remain the same. The difference percentages presented look relatively high for delays but the change in the actual numbers is small. The additional dwellings included in Scenario 2 are forecast to have only a minor impact on the B480 corridor.

Table 34. B480 corridor performance in the morning peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	1.9	2.3	21%
Total Time (pcu hr)	115	128	12%
Total Distance (pcu km)	7427	8312	12%
Average Speed (km/h)	64.8	64.8	0%

Table 35. B480 corridor performance in the evening peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	1.8	2.2	22%
Total Time (pcu hr)	97	111	14%
Total Distance (pcu km)	6410	7325	14%
Average Speed (km/h)	66.3	66.2	0%

5.3.4.6. B4009 Corridor

The modelled network performance for Scenario 2 along the B4009 corridor is shown in Table 36 and Table 37 for the morning and evening peak hours respectively.

In both the morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The difference percentages presented and the change in the actual numbers are relatively small. The additional dwellings modelled in Scenario 2 have a minor impact on the B4009 corridor.

Table 36. B4009 corridor performance in the morning peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	5.6	5.9	5%
Total Time (pcu hr)	276	295	7%
Total Distance (pcu km)	16881	17861	6%
Average Speed (km/h)	61.2	60.6	-1%

Table 37. B4009 corridor performance in the evening peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 2 (S2)	Difference (S2 - DM)
Delay (pcu hr)	46	51	9%
Total Time (pcu hr)	339	363	7%
Total Distance (pcu km)	17397	18438	6%
Average Speed (km/h)	51.4	50.8	-1%

5.4. Scenario 3

Scenario 3 includes the main strategic sites with 3500 additional dwellings at Grenoble Road and new homes in existing settlements with a 10% growth in towns and villages and regeneration areas. In total, the model assumes 9415 additional dwellings in Scenario 3.

5.4.1. Network Performance

The modelled highway network performance within the District for the Do-Minimum and the Scenario 3 are shown in the Table 38 and Table 39. These statistics give a high-level summary of how the model has responded to the changes in land use assumptions.

The trips generated by the 9415 additional dwellings are forecast to increase delays, travel times and travel distances within the District during the morning and evening peak hours and have the effect of reducing modelled average speed.

Table 38. South Oxfordshire District modelled network performance - morning peak hour 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	529	672	27%
Total Time (pcu hr)	6105	6450	6%
Total Distance (pcu km)	378807	389426	3%
Average Speed (km/h)	62	60.4	-3%

Table 39. South Oxfordshire District modelled network performance - evening peak 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	628	779	24%
Total Time (pcu hr)	6753	7189	6%
Total Distance (pcu km)	408810	422805	3%
Average Speed (km/h)	60.5	58.8	-3%

5.4.2. Flow Impacts

The forecast actual flow difference between Scenario 3 and Do-Minimum modelled across the District is shown in Figure 14 and Figure 15. For the purposes of the report, we focus on changes along the A40, A415, A329, A4074, B480 and B4009 corridors, but where relevant will provide commentary on forecast impacts on other links.

In the morning peak hour, the actual flow is forecast to increase in the northbound direction along the B480 between Chiselhampton and Oxford Road / Watlington Road junction and south of the Milton Road / Thame Road roundabout. In the evening peak, the model forecast results suggest an increase in the southbound actual flow along the B480 between Oxford Road / Watlington Road and Watlington Road / Pettiwell junctions and between Southend and Clifton Hampden.

In the morning peak hour, the actual flow is forecast to increase along the B4009 northbound between the Hill Road / Couching Street junction and the Watlington Road in the vicinity of the M40.

The model forecasts show minor changes along the A40 and the A329 in both the morning and evening peak hours.

In the morning peak hour, the actual flow is forecast to increase along the A415 between Berinsfield roundabout and Culham Science Centre in the westbound direction. In the evening peak, the actual flow is forecast to increase in both directions between Berinsfield roundabout and Culham Science Centre and decrease in the eastbound direction between the Burycroft and High Street along the A415.

In the morning peak, the model forecasts suggest an increase along the A4074 in the northbound direction between Berinsfield and Golden Balls Roundabout, in the southbound direction between Golden Bells Roundabout and Henley Road and between Berinsfield and Mongewell roundabout. The actual flow is also forecast to decrease between Baldon Lane and Henley Road in the morning peak. In the evening peak, the actual flow along the A4074 is forecast to increase in the northbound direction between Mongewell roundabout and Berinsfield and southbound between Berinsfield roundabout and Clifton Hampden.

In the morning peak hour, the actual flow is forecast to increase in the northbound direction along the B480 between Clifton Hampden and Oxford Road / Watlington Road junction and south of the Milton Road / Thame Road roundabout. In the evening peak, the model forecast results suggest an increase in the southbound actual flow along the B480 between Oxford Road / Watlington Road and Watlington Road / Pettiwell junctions and between Southend and Clifton Hampden. The actual flow along both directions of the B480 is also forecast to increase in the vicinity of Chalgrove in the evening peak.

In the morning peak hour, the actual flow is forecast to increase along the B4009 northbound between the Hill Road / Couching Street junction and the Watlington Road in the vicinity of the M40.

The model forecasts show minor changes along the A40 and the A329 in both the morning and evening peak hours.

Along the M40/A40 corridor forecast changes in vehicle flow are generally less than 100 vehicles in both the morning and evening peak periods.

Figure 14 South Oxfordshire flow difference (S3 – DM) (PCU/hr) – 2031 AM peak hour

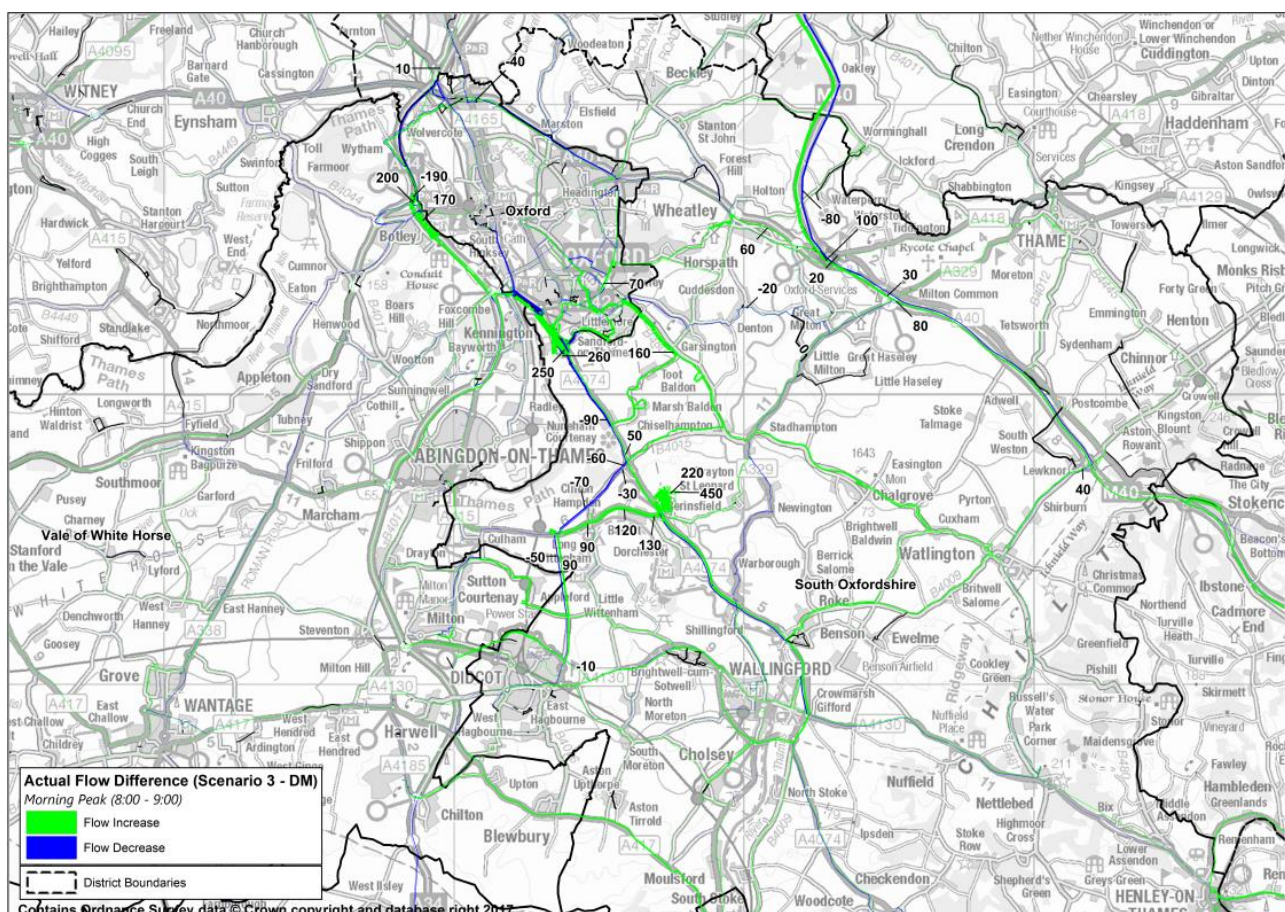
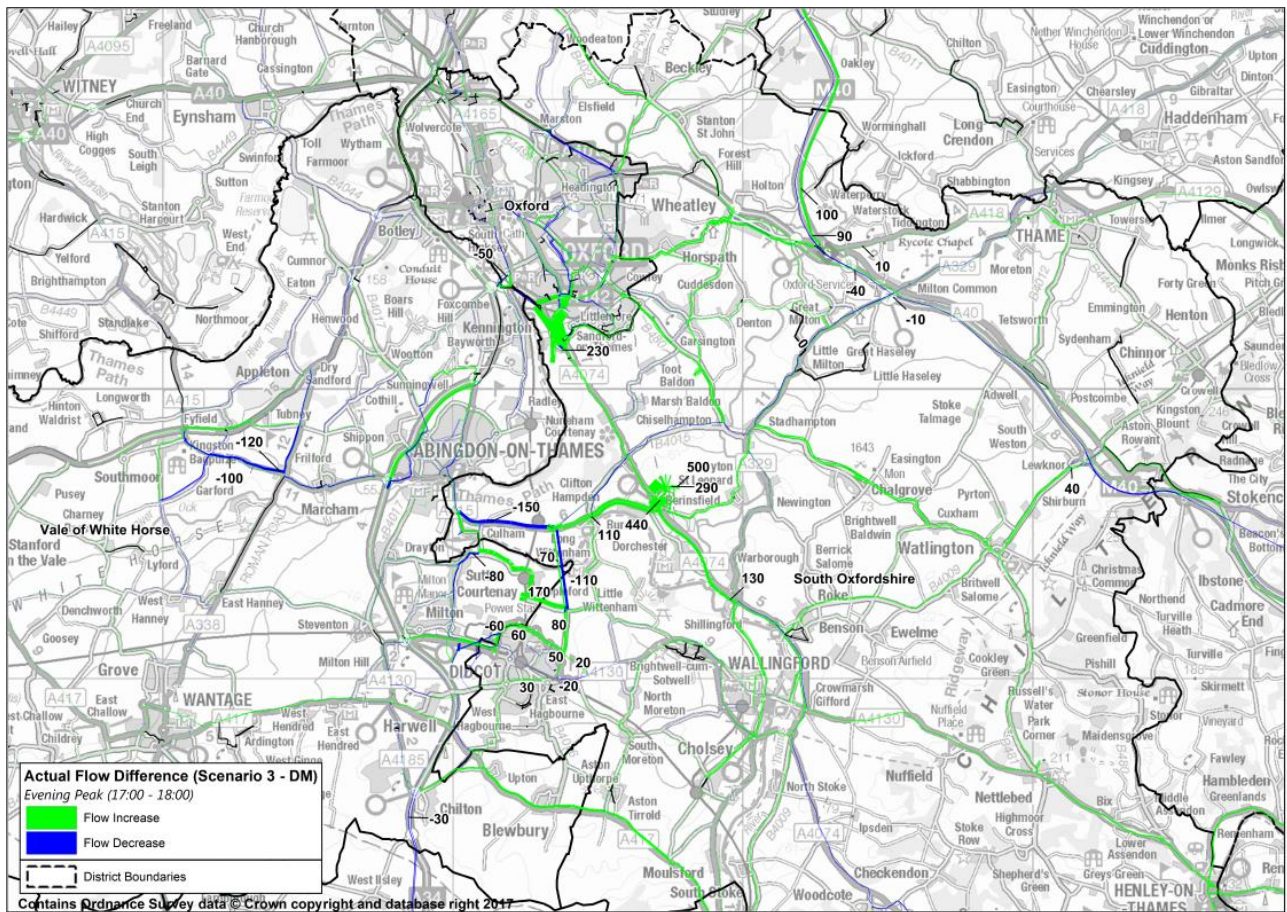


Figure 15 South Oxfordshire flow difference (S3 – DM) (PCU/hr) – 2031 PM peak hour



5.4.3. Capacity impacts

The forecast volume to capacity plots for Scenario 3 across the District are shown in Figure 16 and Figure 17.

The A329 is modelled to exceed capacity at the following approaches:

- In both the morning and evening peaks, the A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road

The A415 is forecast to exceed capacity at the following approaches:

- In both the morning and evening peaks, the A415 westbound between Tollgate Rd and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.

The model forecasts show that the A4074 exceeds capacity at the following approaches:

- In the morning peak hour, A4074 northbound between Berinsfield and Baldon Lane / A4074 junction, northbound between Sandford Road and Heyford Hill roundabout, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the evening peak hour, both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and the Crowmarsh roundabout.

The B480, B4009 and A40 are forecast to remain below capacity in both morning and evening peak hours.

Figure 16 South Oxfordshire V/C for links and junctions– 2031 Scenario 3 AM peak hour

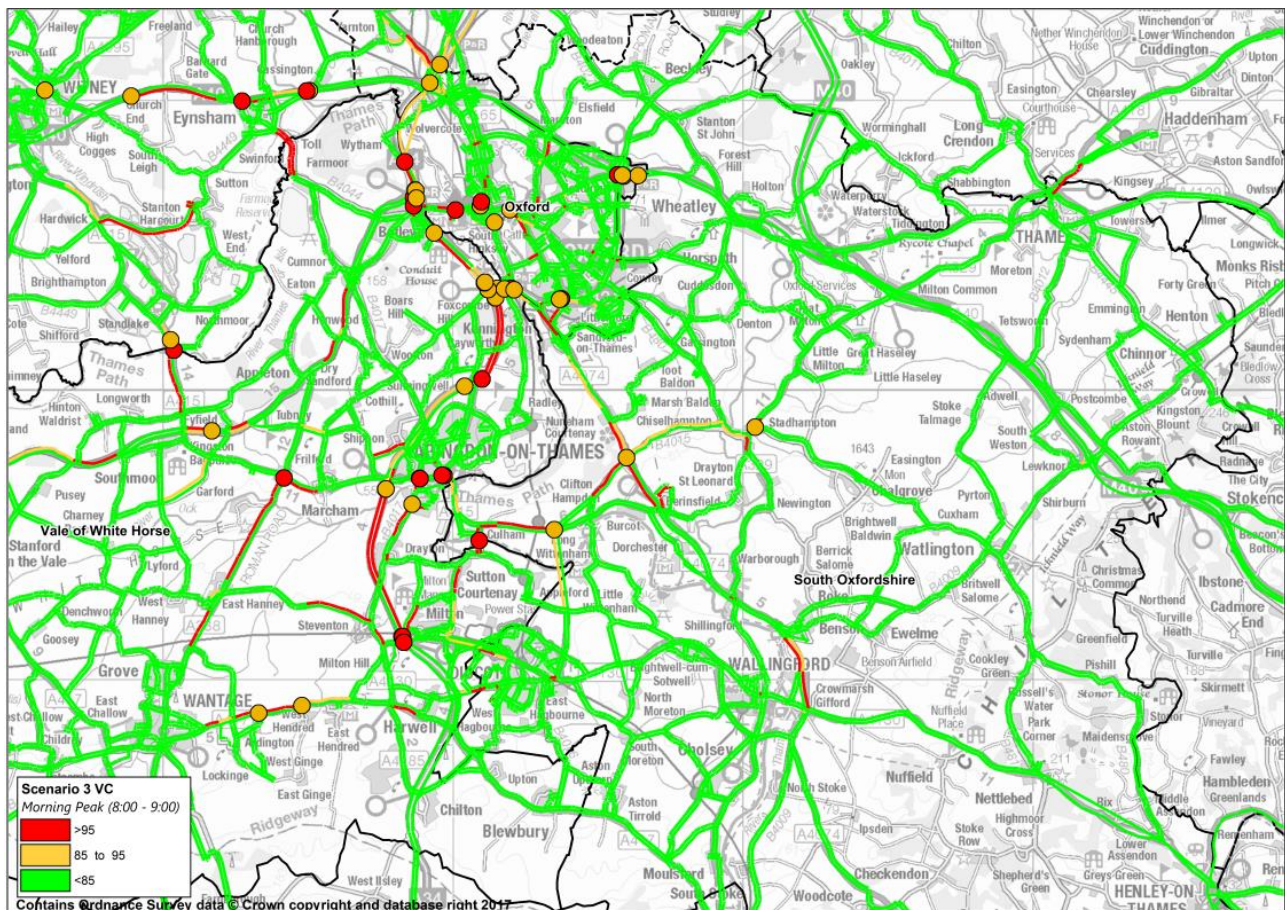
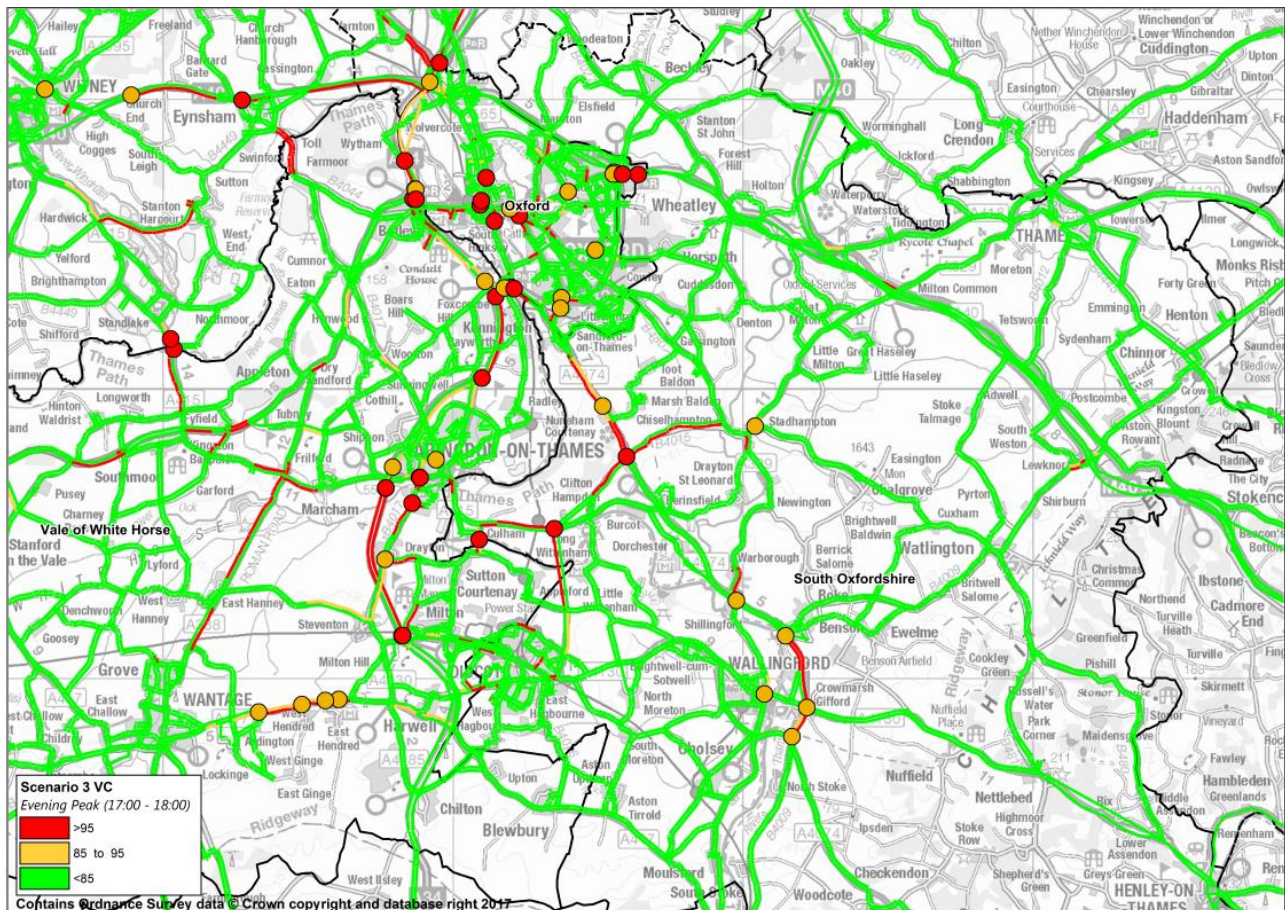


Figure 17 South Oxfordshire V/C for links and junctions– 2031 Scenario 3 PM peak hour



5.4.4. Corridor Performance

5.4.4.1. A40 Corridor

The network performance for Scenario 3 along the A40 corridor is shown in Table 40 and Table 41 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease.

Table 40. A40 corridor performance in the morning peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	146	156	7%
Total Time (pcu hr)	520	533	3%
Total Distance (pcu km)	27267	27531	1%
Average Speed (km/h)	52.5	51.6	-2%

Table 41. A40 corridor performance in the evening peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	95	99	4%
Total Time (pcu hr)	519	535	3%
Total Distance (pcu km)	30758	31450	2%
Average Speed (km/h)	59.2	58.8	-1%

5.4.4.2. A415 Corridor

The modelled network performance for Scenario 3 along the A415 corridor is shown in Table 42 and Table 43 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease.

Table 42. A415 corridor performance in the morning peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	70	89	27%
Total Time (pcu hr)	215	244	14%
Total Distance (pcu km)	9254	9805	6%
Average Speed (km/h)	43.1	40.2	-7%

Table 43. A415 corridor performance in the evening peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	108	134	24%
Total Time (pcu hr)	269	299	11%
Total Distance (pcu km)	10138	10349	2%
Average Speed (km/h)	37.7	34.7	-8%

5.4.4.3. A329 Corridor

The network performance for Scenario 3 along the A329 corridor is shown in Table 44 and Table 45 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease.

The difference percentages presented look relatively high in the morning peak in comparison to the evening peak.

Table 44. A329 corridor performance in the morning peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	25	34	35%
Total Time (pcu hr)	375	388	3%
Total Distance (pcu km)	24474	24683	1%
Average Speed (km/h)	65.3	63.7	-2%

Table 45. A329 corridor performance in the evening peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	42	51	19%
Total Time (pcu hr)	394	404	2%
Total Distance (pcu km)	24615	24705	0%
Average Speed (km/h)	62.4	61.2	-2%

5.4.4.4. A4074 Corridor

The network performance for Scenario 3 along the A4074 corridor is shown in Table 46 and Table 47 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase, while the average speed is forecast to decrease. The new developments along this corridor, at Grenoble Road, are forecast to increase traffic flow on the A4074 leading to the modelled increase in delay along the corridor.

The difference percentages presented look comparatively higher in the evening peak than in the morning peak.

Table 46. A4074 corridor performance in the morning peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	77	108	41%
Total Time (pcu hr)	494	536	8%
Total Distance (pcu km)	26031	26783	3%
Average Speed (km/h)	52.7	50.0	-5%

Table 47. A4074 corridor performance in the evening peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	51	102	98%
Total Time (pcu hr)	487	574	18%
Total Distance (pcu km)	26878	28703	7%
Average Speed (km/h)	55.2	50.0	-9%

5.4.4.5. B480 Corridor

The modelled network performance for Scenario 3 along the B480 corridor is shown in Table 48 and Table 49 for the morning and evening peak hours respectively.

In both morning and evening peaks, the increased level of demand generated by the proposed new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to remain broadly the same. The difference percentages presented look relatively high for delays and total time but the change in the actual numbers is small.

Table 48. B480 corridor performance in the morning peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	1.9	2.3	21%
Total Time (pcu hr)	115	128	11%
Total Distance (pcu km)	7427	8280	11%
Average Speed (km/h)	64.8	64.8	0%

Table 49. B480 corridor performance in the evening peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	1.8	2.2	22%
Total Time (pcu hr)	97	114	18%
Total Distance (pcu km)	6410	7554	18%
Average Speed (km/h)	66.3	66.2	0%

5.4.4.6. B4009 Corridor

The network performance for Scenario 3 along the B4009 corridor is shown in Table 50 and Table 51 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. The actual change in delay is however small.

Table 50. B4009 corridor performance in the morning peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	5.6	5.9	5%
Total Time (pcu hr)	276	293	6%
Total Distance (pcu km)	16881	17754	5%
Average Speed (km/h)	61.2	60.6	-1%

Table 51. B4009 corridor performance in the evening peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 3 (S3)	Difference (S3 - DM)
Delay (pcu hr)	46	51	10%
Total Time (pcu hr)	339	361	7%
Total Distance (pcu km)	17397	18328	5%
Average Speed (km/h)	51.4	50.7	-1%

5.5. Scenario 4

Scenario 4 includes the main strategic sites with 3500 additional dwellings at Harrington and new homes in existing settlements with a 10% growth in towns, villages and regeneration areas. In total, the model assumes 9415 additional dwellings for Scenario 4.

5.5.1. Network Performance

The modelled highway network performance within the District for the Do-Minimum and Scenario 4 are shown in the Table 52 and Table 53. These statistics give a high-level summary of how the model has responded to the changes in land use assumptions.

The trips generated by the additional dwellings are forecast to increase delays, travel times and travel distances within the District during the morning and evening peak hours and have the effect of reducing average speed.

Table 52. South Oxfordshire District modelled network performance - morning peak hour 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 4 (S4)	% Difference (S4-DM)
Delay (pcu hr)	529	662	25%
Total Time (pcu hr)	6105	6547	7%
Total Distance (pcu km)	378807	394488	4%
Average Speed (km/h)	62.0	60.3	-3%

Table 53. South Oxfordshire District modelled network performance - evening peak 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 4 (S4)	% Difference (S4-DM)
Delay (pcu hr)	628	784	25%
Total Time (pcu hr)	6753	7280	8%
Total Distance (pcu km)	408810	427945	5%
Average Speed (km/h)	60.5	58.8	-3%

5.5.2. Flow Impacts

The forecast actual flow difference between Scenario 4 and Do-Minimum modelled across the District is shown in Figure 18 and Figure 19. For the purposes of the report, we focus on changes along the A40, A415, A329, A4074, B480 and B4009 corridors, but where relevant will provide commentary on forecast impacts on other links.

In the morning peak, the actual flow is forecast to increase along the A40 southbound between Park Hill and junction 8A on the M40. In the evening peak, the actual flow is forecast to increase in the southbound direction along the A40 between Wheatley Road and Park Hill.

In the morning peak, the model forecasts suggest an increase in the actual flow along the A329 northbound between Church Lane and junction 7 on the M40 and a decrease in the southbound direction of the same road section. In the evening peak, the actual flow is forecast to decrease northbound between Gold Street and Rectory Road and increase southbound between Gold Street and the Milton Road / Thame Road junction and between Thame Road / Newington and Stadhampton Road / A329 junctions. The actual flow is also forecast to increase in the evening peak between Thame Road and the M40 junction 7 in both directions along the A329.

In the morning peak, the actual flow is forecast to increase along the A4074 in the northbound direction between Berinsfield roundabout and Golden Balls roundabout and in the southbound between Berinsfield roundabout and Mongewell roundabout. In the evening peak, the model results forecast an increase in the actual flow along the A4074, southbound between Golden Balls roundabout and Berinsfield roundabout and northbound between Crowmarsh roundabout and Berinsfield roundabout.

The model forecasts suggest an increase in the actual flow in the morning peak along the B4009 southbound between Eyres Lane and Littleworth Road, between the Britwell Road / Cuxham Road junction and the Turners Green / B4009 junction. In the evening peak, the actual flow is forecast to increase along the B4009 southbound between Hill Road and Love Lane.

In the morning peak, the actual flow is forecast to increase along the B480 northbound between Clifton Hampden and Oxford Road / Walington Road junction and in the northbound direction south of the Thame Road / Milton Road roundabout. In the evening peak, the model forecast results suggest an increase in the actual flow northbound south of the Milton Road / Thame Road roundabout.

The actual flow is forecast to increase in the westbound direction along the A415 between Berinsfield roundabout and Culham Science Centre in the morning peak period. In the evening peak, the model forecast results suggest an increase in the actual flow along the A415 in both directions between Berinsfield roundabout and High Street and a decrease in the eastbound direction between the Burycroft and High Street.

Along the M40/A40 corridor, the Harrington site is forecast to increase flow, particularly to the north of junction 8 in the morning peak and from junction 5 to 8 in the evening peak. Around Didcot, the modelling suggests that the Harrington site is unlikely to have a marked impact on vehicle flow.

Figure 18 South Oxfordshire flow difference (S4 – DM) (PCU/hr) – 2031 AM peak hour

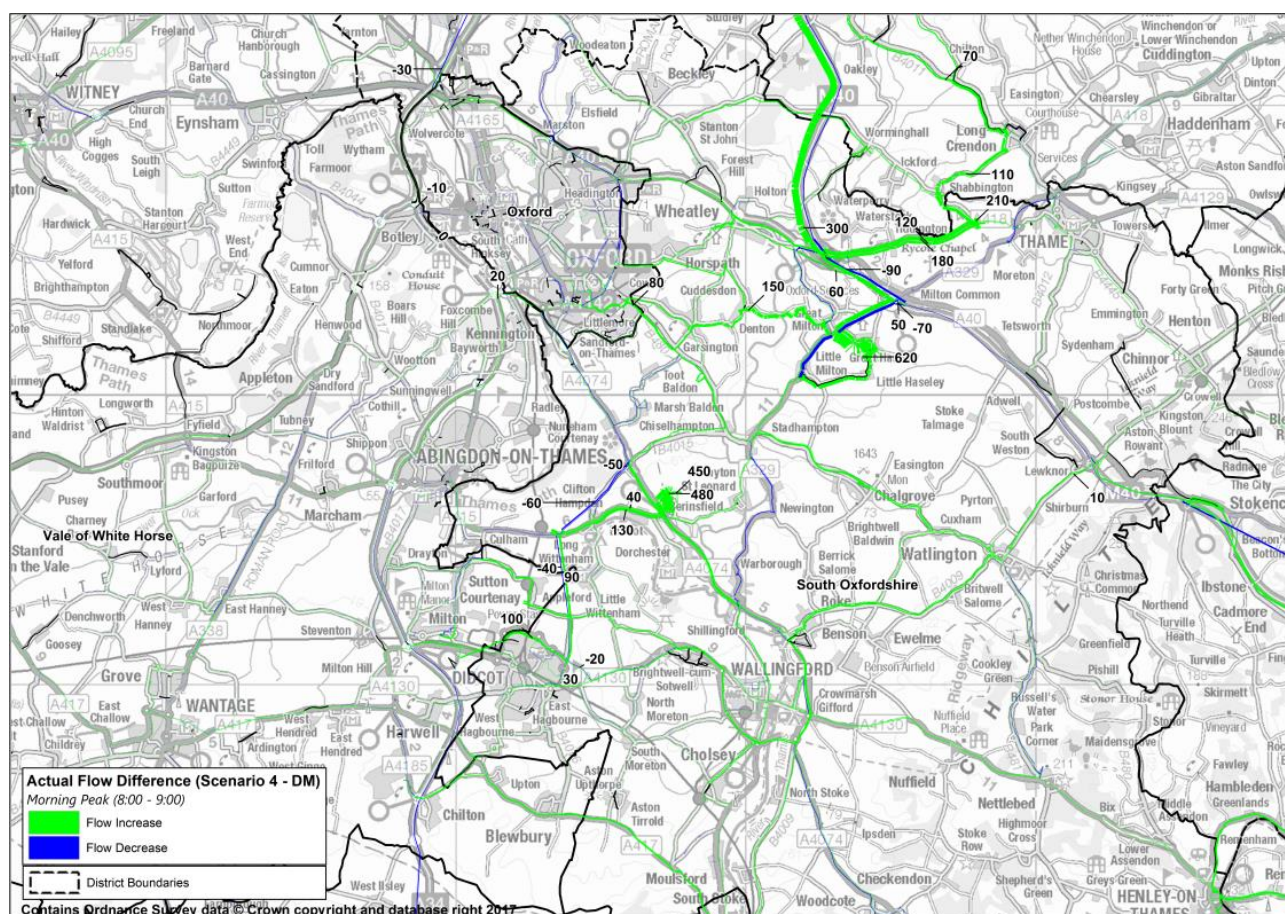
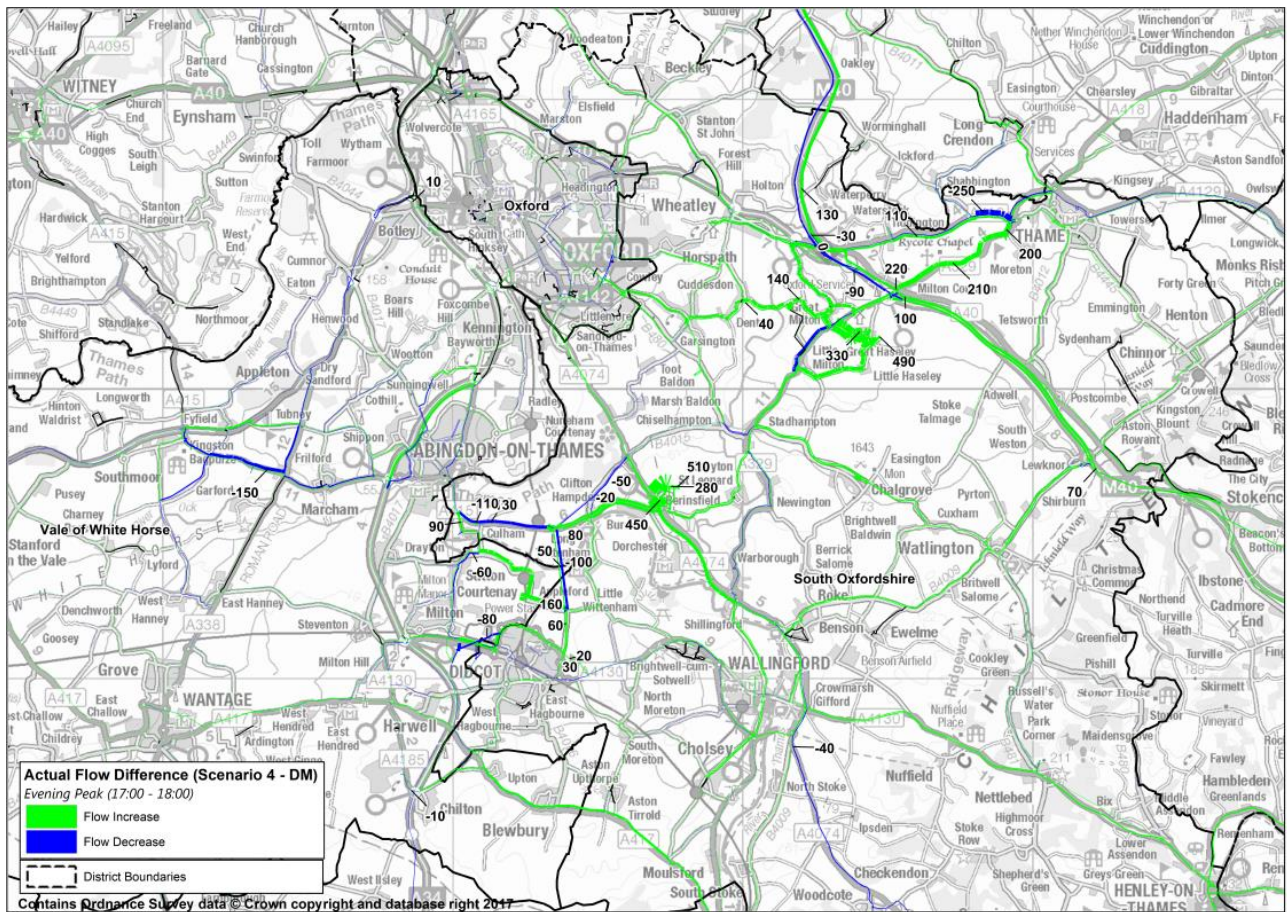


Figure 19 South Oxfordshire flow difference (S4 – DM) (PCU/hr) – 2031 PM peak hour



5.5.3. Capacity impacts

The forecast volume to capacity plots for Scenario 4 across the District are shown in Figure 20 and Figure 21.

The A329 is modelled to exceed capacity on the following approaches:

- In both the morning and evening peaks, the A329 northbound between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road

The A415 is forecast to exceed capacity at the following locations:

- In both the morning and evening peak hours, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.

The model forecasts show that the A4074 exceeds capacity on the following approaches:

- In the morning peak hour, A4074 northbound between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the evening peak hour, both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.

The eastbound and westbound approaches at Headington roundabout along A40 are forecast to be operating above operational capacity.

The B480, B4009 and M40 are forecast to remain below capacity in both morning and evening peak hours.

Figure 20 South Oxfordshire V/C for links and junctions– 2031 Scenario 4 AM peak hour

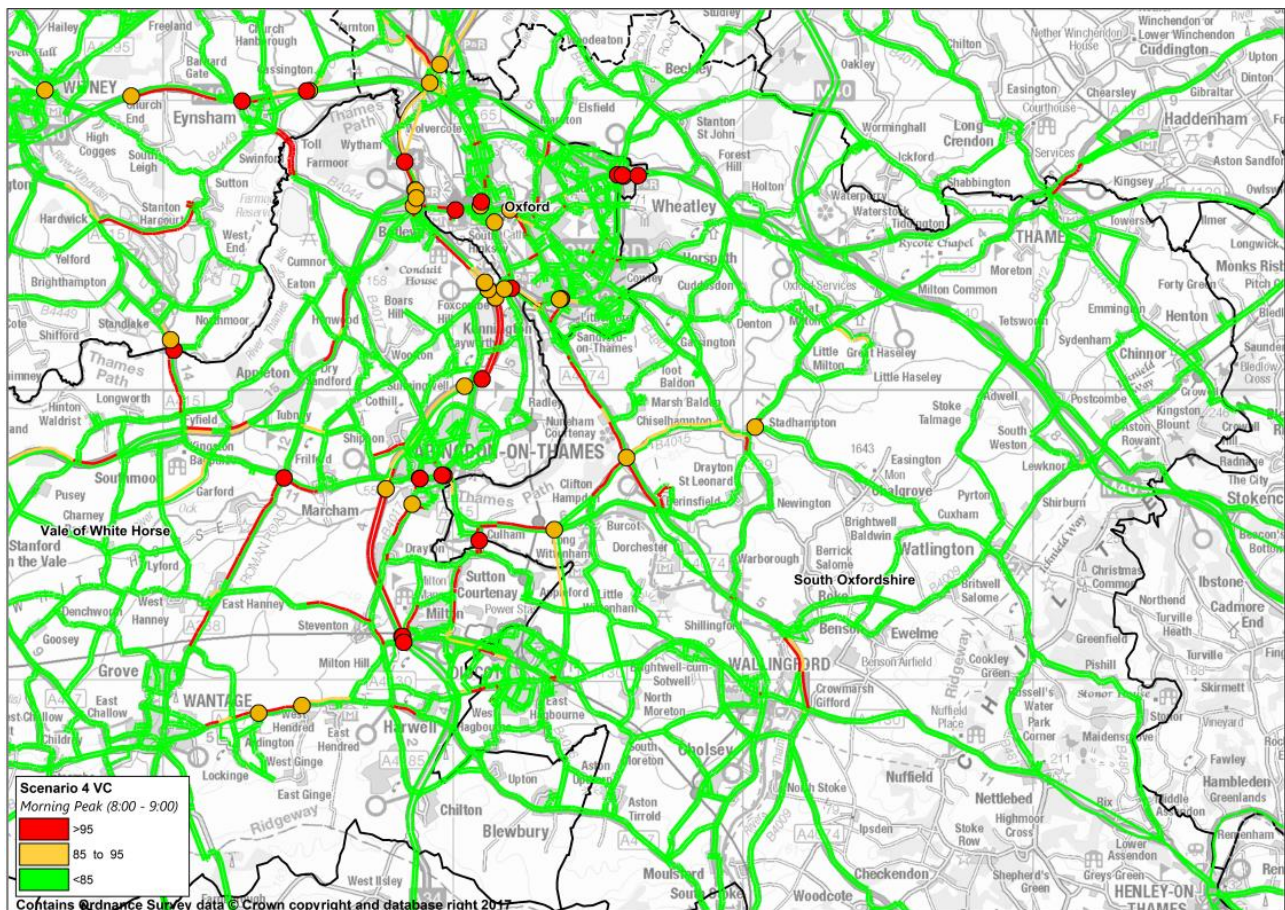
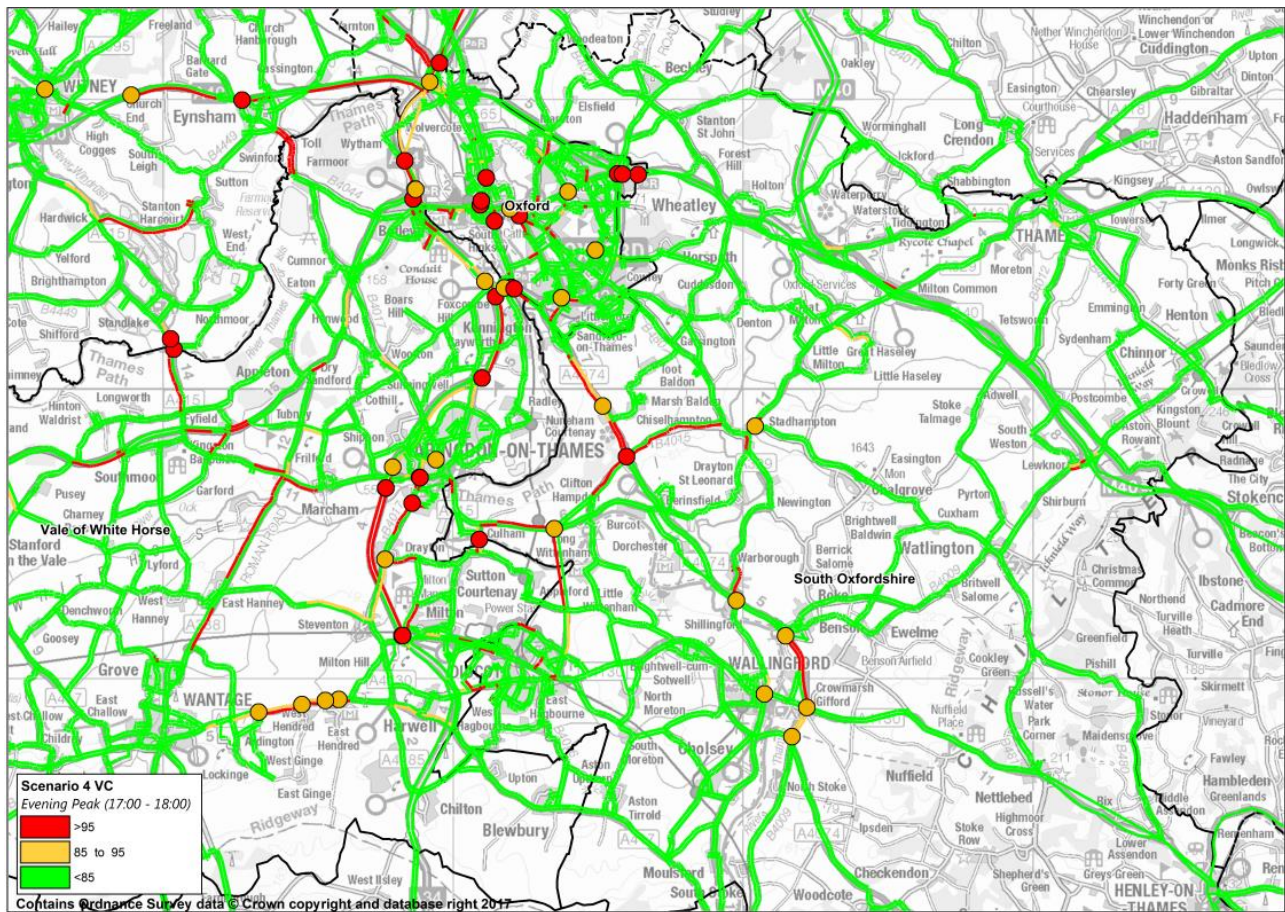


Figure 21 South Oxfordshire V/C for links and junctions– 2031 Scenario 4 PM peak hour



5.5.4. Corridor Performance

5.5.4.1. A40 Corridor

The network performance for Scenario 4 along the A40 corridor is shown in Table 54 and Table 55 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease.

Table 54. A40 corridor performance in the morning peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	146	168	15%
Total Time (pcu hr)	520	555	7%
Total Distance (pcu km)	27267	28169	3%
Average Speed (km/h)	52.5	50.7	-3%

Table 55. A40 corridor performance in the evening peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	95	99	4%
Total Time (pcu hr)	519	541	4%
Total Distance (pcu km)	30758	31949	4%
Average Speed (km/h)	59.2	59.0	0%

5.5.4.2. A415 Corridor

The modelled network performance for Scenario 4 along the A415 corridor is shown in Table 56 and Table 57 for the morning and evening peak hours respectively.

In both the morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The difference percentages presented are higher in the morning peak in comparison to the evening peak.

Table 56. A415 corridor performance in the morning peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	70	87	25%
Total Time (pcu hr)	215	242	13%
Total Distance (pcu km)	9254	9804	6%
Average Speed (km/h)	43.1	40.4	-6%

Table 57. A415 corridor performance in the evening peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	108	114	5%
Total Time (pcu hr)	269	281	5%
Total Distance (pcu km)	10138	10468	3%
Average Speed (km/h)	37.7	37.3	-1%

5.5.4.3. A329 Corridor

The network performance for Scenario 4 along the A329 corridor is shown in Table 58 and Table 59 for the morning and evening peak hours.

In both the morning and evening peaks, the increased level of demand generated by the new site at Harrington is forecast to result in large increases in delays, travel distance and total travel times while the average speed is forecast to decrease. The difference percentages presented are higher in the morning peak in comparison to the evening peak.

Table 58. A329 corridor performance in the morning peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	25	54	112%
Total Time (pcu hr)	375	405	8%
Total Distance (pcu km)	24474	24488	0%
Average Speed (km/h)	65.3	60.5	-7%

Table 59. A329 corridor performance in the evening peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	42	65	54%
Total Time (pcu hr)	394	440	12%
Total Distance (pcu km)	24615	25969	5%
Average Speed (km/h)	62.4	59.1	-5%

5.5.4.4. A4074 Corridor

The network performance for Scenario 4 along the A4074 corridor is shown in Table 60 and Table 61 for the morning and evening peak hours.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. The new developments along this corridor are forecast to increase traffic flow on the A4074 which may lead to a forecast increase in delay.

Table 60. A4074 corridor performance in the morning peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	77	108	45%
Total Time (pcu hr)	494	536	11%
Total Distance (pcu km)	26031	26783	4%
Average Speed (km/h)	52.7	50.0	-6%

Table 61. A4074 corridor performance in the evening peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	51	75	46%
Total Time (pcu hr)	487	536	10%
Total Distance (pcu km)	26878	28182	5%
Average Speed (km/h)	55.2	52.6	-5%

5.5.4.5. B480 Corridor

The modelled network performance for Scenario 4 along the B480 corridor is shown in Table 62 and Table 63.

In both the morning and evening peaks, the increased level of demand generated by the modelled new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to remain unchanged. The difference percentages presented may appear high for delays but the change in the actual numbers is small.

Table 62. B480 corridor performance in the morning peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	1.9	2.4	26%
Total Time (pcu hr)	115	128	12%
Total Distance (pcu km)	7427	8323	12%
Average Speed (km/h)	64.8	64.8	0%

Table 63. B480 corridor performance in the evening peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	1.8	2.3	28%
Total Time (pcu hr)	97	110	14%
Total Distance (pcu km)	6410	7279	14%
Average Speed (km/h)	66.3	66.2	0%

5.5.4.6. B4009 Corridor

The network performance for Scenario 4 along the B4009 corridor is shown in Table 64 and Table 65 for the morning and evening peak hours.

In both the morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The forecast impacts on the B4009 are likely to be because it connects to the M40 junction 6 which is to the south of the proposed Harrington site. Change in forecast flow along this section is modelled and hence considered for analysis.

Table 64. B4009 corridor performance in the morning peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	5.6	6.0	7%
Total Time (pcu hr)	276	298	8%
Total Distance (pcu km)	16881	18063	7%
Average Speed (km/h)	61.2	60.6	-1%

Table 65. B4009 corridor performance in the evening peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 4 (S4)	Difference (S4 - DM)
Delay (pcu hr)	46	51	11%
Total Time (pcu hr)	339	368	9%
Total Distance (pcu km)	17397	18666	7%
Average Speed (km/h)	51.4	50.7	-1%

5.6. Scenario 5

Scenario 5 includes the Do-minimum housing scenario as well as the new local plan housing allocation numbers, including strategic sites (Chalgrove 3500 dwellings and Culham 3500 dwellings), new homes in existing settlements with a 10% growth in towns, villages and regeneration areas (including Berinsfield with 1800 dwellings). In total, the model assumes 12,915 additional dwellings in Scenario 5 compared to the Do-minimum scenario.

5.6.1. Network Performance

The modelled highway network performance within the SODC district for the Do-Minimum and the Scenario 5 are shown in the Table 66 and Table 67. These statistics give a high-level summary of how the model has responded to the changes in land use assumptions.

The trips generated by the additional dwellings are forecast to increase delays, travel times and travel distances within the District during the morning and evening peak hours and to have the effect of reducing average speed.

Table 66. South Oxfordshire District modelled network performance - morning peak hour 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 5 (S5)	% Difference (S5-DM)
Delay (pcu hr)	529	902	71%
Total Time (pcu hr)	6105	6870	13%
Total Distance (pcu km)	378807	399127	5%
Average Speed (km/h)	62.0	58.1	-6%

Table 67. South Oxfordshire District modelled network performance - evening peak 2031

	South Oxfordshire		
	Do-Minimum (DM)	Scenario 5 (S5)	% Difference (S5-DM)
Delay (pcu hr)	628	1055	68%
Total Time (pcu hr)	6753	7628	13%
Total Distance (pcu km)	408810	432460	6%
Average Speed (km/h)	60.5	56.7	-6%

5.6.2. Flow Impacts

The forecast actual flow difference between Scenario 5 and the Do-Minimum modelled across the District is shown in Figure 22 and Figure 23. For the purposes of the report, we focus on changes along the A40, A415, A329, A4074, B480 and B4009 corridors, but where relevant will provide commentary on forecast impacts on other links.

In the morning peak, the actual flow is forecast to increase along the B480 corridor, in the northbound direction between the Britwell Road / Cuxham Road junction and the B480 / Cuddesdon Way junction, in the southbound direction between Thame Road / Milton Road roundabout and the Brook Street / Couching Street junction. In the evening peak, the model forecasts suggest an increase in actual flow between the Couching Street / Brook Street junction and Thame Road / Milton Road roundabout, and between Clifton Hampden and the Grenoble Road / Watlington Road roundabout in both directions. The actual flow is also forecast to increase in the southbound direction between Oxford City and Grenoble Road / Watlington Road roundabout and northbound between Britwell Hill Road and Couching Street / Brook Street junction in the evening peak.

In the morning peak, actual flow is forecast to increase along the B4009, in both directions between the White Hart Close / B4009 and Eyres Lane / B4009 junctions and eastbound between the B480/B4009 and the M40. In the evening peak, the model forecast results suggest an increase in both directions, between the White Hart Close / B4009 and Eyres Lane / B4009 junctions and between the B480/B4009 and the M40.

In the morning peak, the actual flow along the A4074 is forecast to increase, in the southbound direction, between Baldon Lane / A4074 and Golden Balls roundabout, between Berinsfield roundabout and Shillingford roundabout and between Mongewell roundabout and the A4074 / Church Road junction, in the northbound direction, between Berinsfield roundabout and Golden Balls roundabout and between Church Road and Shillingford roundabout. In the evening peak, the model forecasts suggest an increase in the actual flow along the A4074, in the northbound direction, between Crowmarsh roundabout and Church Road and between Shillingford roundabout and Berinsfield roundabout, in the southbound direction, between Grenoble Road / Brick Kiln Lane roundabout and Baldon Lane. The actual flow is also forecast to decrease along the A4074 in a northbound direction between Berinsfield roundabout and Heyford Hill roundabout in the evening peak. This decrease is due to the section of A4074 from Golden Bells Roundabout to Henley Road which is forecast to exceed capacity in the northbound direction. Due to this there is likely to be re-routing of northbound traffic onto B480 to enter into Oxford. This change is in the range of 50pcu.

In the morning peak, the actual flow is forecast to increase along the A415 in both directions between Berinsfield roundabout and the Oxford Road / Abingdon Road junction and westbound between Tollgate Road / Abingdon Road and Bridge Street / Market Place / High Street junctions. In the evening peak, the actual flow is forecast to increase in both directions along the A415 between Berinsfield roundabout and Oxford Road and southbound between Bridge Street / Market Place / High Street and Burycroft. The actual flow is also forecast to decrease along the A415 in both directions between Oxford Road and the Burycroft in the evening peak.

In the morning peak, the actual flow is forecast to decrease along the A329, northbound between Shillingford roundabout and Stadhampton Road and southbound between Church Road and Milton Road / Thame Road junction. In the evening peak, the actual flow is forecast to decrease along the A329, southbound between Thame Road / Milton Road roundabout and Newington / Thame Road junction, northbound between Thame Road / Milton Road and Church Road and between Sinodun View and Stadhampton Road and in both directions between Church Road and the M40.

The model forecasts show minor changes in actual flow along the A40 corridor in both morning and evening peaks.

Scenario 5 effectively combines the forecast impact of Scenario 1 and 2. Along the M40/A40 corridor, the modelling suggests a reduction in flow between junction 6 to 8 in both the morning and evening peak periods. This is likely to be associated with the Chalgrove development and forecast growth along the B480.

In the vicinity of the Culham site and around Didcot, the modelling forecasts an increase in vehicle flow along the B4016, which is mirrored by a reduction in modelled flow along the A415 between Culham and Clifton Hampden. This is because the section of A415 where the Culham trips are loaded is forecast to exceed capacity, due to which there is a re-routing of eastbound traffic along B4016 which is joining A415 back at A415/High Street/Oxford Road junction.

Figure 22 South Oxfordshire flow difference (S5 – DM) (PCU/hr) – 2031 AM peak hour

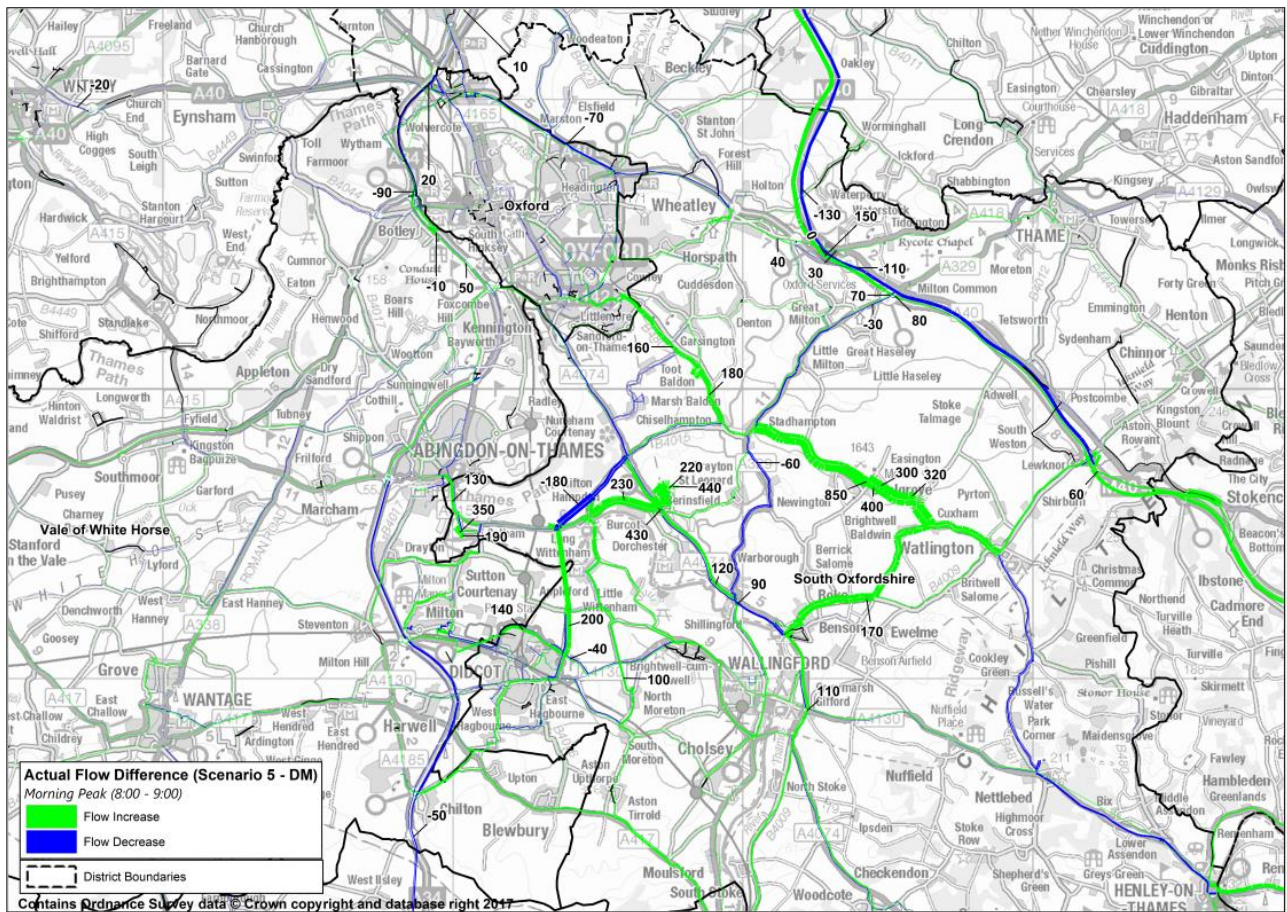
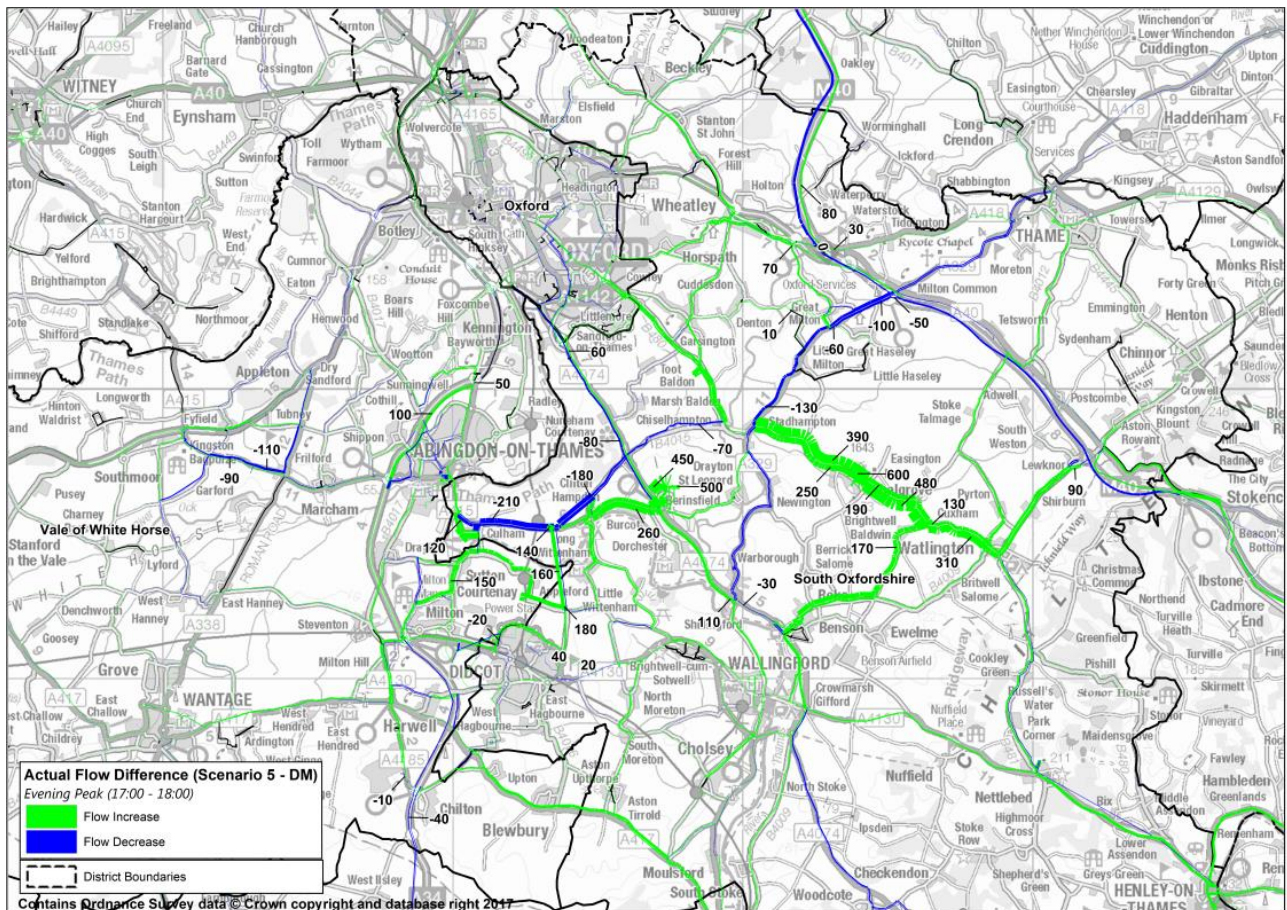


Figure 23 South Oxfordshire actual flow difference (S5 – DM) (PCU/hr) – 2031 PM peak hour



5.6.3. Capacity impacts

The forecast volume to capacity plots for Scenario 5 across the District are shown in Figure 24 and Figure 25.

In Scenario 5, the B480 is forecast to exceed capacity at the following approaches:

- In the morning and evening peak hours, the B480 / A329 roundabout at Stadhampton.

The A329 is modelled to exceed capacity at the following approaches:

- In the morning peak hour, the A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road
- In the evening peak hour, the northbound direction between Newington Road / B480 Thame Road junction and Milton Road / Thame Road junction

The A415 is forecast to exceed capacity at the following approaches:

- In the morning peak, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.
- In the evening peak, the A415 eastbound between A415 / High Street and Thame Lane.

The model forecasts show that the A4074 exceeds capacity at the following approaches:

- In the morning peak hour, A4074 northbound between Berinsfield and Henley Road / A4074 junction that is northbound from Berinsfield to Golden Bells Roundabout and Golden Bells Roundabout to Henley Road junction, northbound between Elm bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.
- In the evening peak hour, the southbound direction on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout.

The B4009 and A40 are forecast to remain below capacity in both morning and evening peak hours.

Figure 24 South Oxfordshire V/C for links and junctions– 2031 Scenario 5 AM peak hour

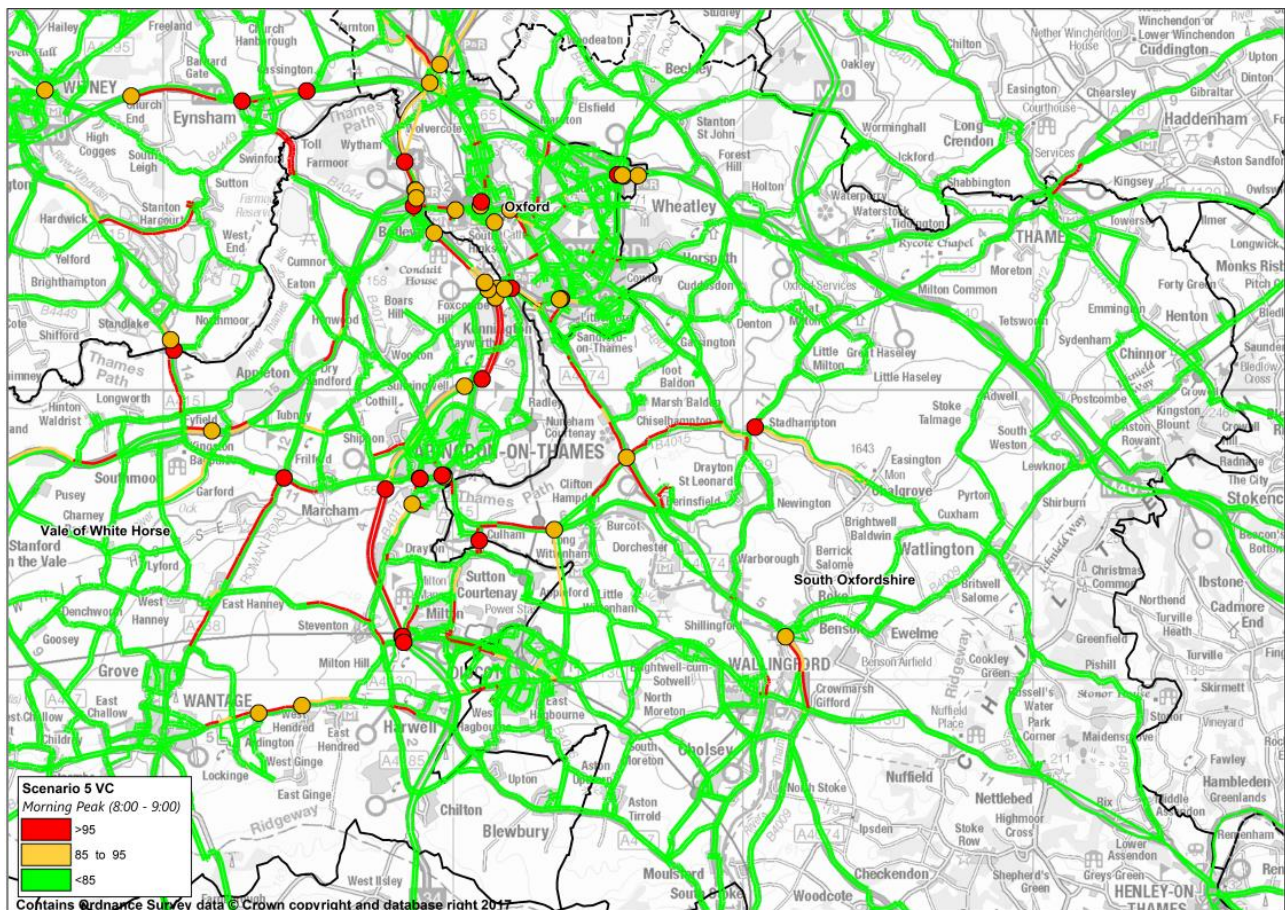
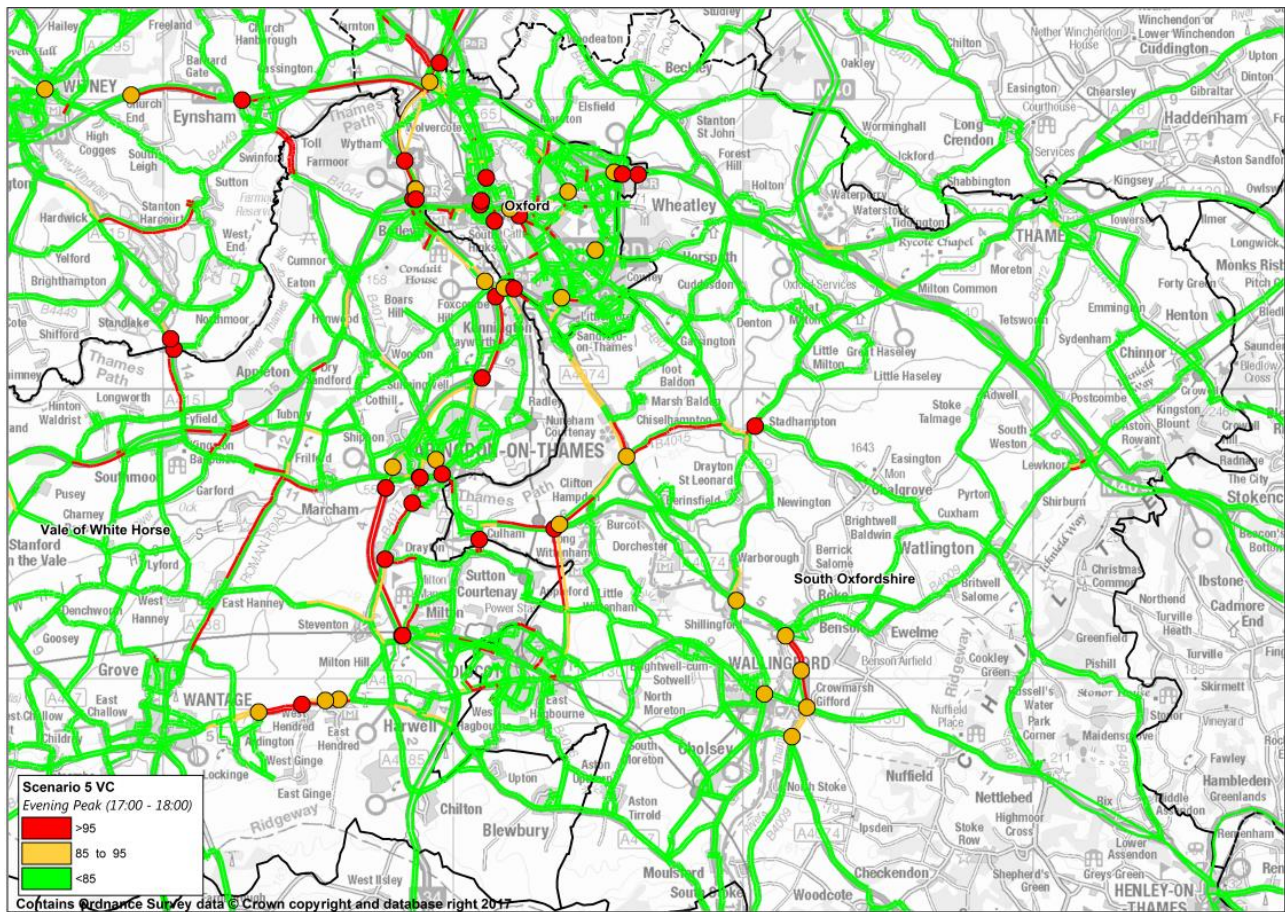


Figure 25 South Oxfordshire V/C for links and junctions– 2031 Scenario 5 PM peak hour



5.6.4. Corridor Performance

5.6.4.1. A40 Corridor

The network performance for Scenario 5 along the A40 corridor is shown in Table 68 and Table 69 for the morning and evening peak hours respectively.

In the morning peak hour the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. In the evening peak hour, the delay is forecast to decrease while the total time, total distance and average speed are forecast to increase.

Table 68. A40 corridor performance in the morning peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	146	158	8%
Total Time (pcu hr)	520	533	3%
Total Distance (pcu km)	27267	27399	0%
Average Speed (km/h)	52.5	51.4	-2%

Table 69. A40 corridor performance in the evening peak hour in 2031

	A40		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	95	92	-4%
Total Time (pcu hr)	519	529	2%
Total Distance (pcu km)	30758	31657	3%
Average Speed (km/h)	59.2	59.8	1%

5.6.4.2. A415 Corridor

The modelled network performance for Scenario 5 along the A415 corridor is shown in Table 70 and Table 71 for the morning and evening peak.

In both the morning and evening peaks, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease. The new developments along this corridor are forecast to increase traffic flow on the A415 leading to a forecast increase in delay.

Table 70. A415 corridor performance in the morning peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	70	78	12%
Total Time (pcu hr)	215	246	15%
Total Distance (pcu km)	9254	10490	13%
Average Speed (km/h)	43.1	42.6	-1%

Table 71. A415 corridor performance in the evening peak hour in 2031

	A415		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	108	123	14%
Total Time (pcu hr)	269	290	8%
Total Distance (pcu km)	10138	10471	3%
Average Speed (km/h)	37.7	36.1	-4%

5.6.4.3. A329 Corridor

The network performance for Scenario 5 along the A329 corridor is shown in Table 72 and Table 73 for the morning and evening peak hours respectively.

In the morning peak hour, the increased level of demand generated by the new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease.

In the evening peak hour, the additional dwellings result in a large increase in modelled delay and total travel time while the total distance and average speed are forecast to decrease. The model forecasts suggest significant delays at the Milton Road / Thame Road roundabout in Stadhampton causing a potential decrease in the performance of the corridor which may lead to the rerouting of vehicles onto neighbouring roads.

Table 72. A329 corridor performance in the morning peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	25	46	81%
Total Time (pcu hr)	375	397	6%
Total Distance (pcu km)	24474	24568	0%
Average Speed (km/h)	65.3	61.8	-5%

Table 73. A329 corridor performance in the evening peak hour in 2031

	A329		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	42	168	297%
Total Time (pcu hr)	394	497	26%
Total Distance (pcu km)	24615	23360	-5%
Average Speed (km/h)	62.4	47.0	-25%

5.6.4.4. A4074 Corridor

The network performance for Scenario 5 along the A4074 corridor is shown in Table 74 and Table 75 for the morning and evening peak hours respectively.

In both the morning and the evening peak hours the delay, total time and total distance are forecast to increase while the average speed is forecast to decrease. The new developments adjacent to this corridor are forecast to increase traffic flow on the A4074 leading to a forecast increase in delay.

The difference percentages presented are forecast to be comparatively higher for the in the morning peak delay compared with the evening peak.

Table 74. A4074 corridor performance in the morning peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	77	132	73%
Total Time (pcu hr)	494	559	13%
Total Distance (pcu km)	26031	26540	2%
Average Speed (km/h)	52.7	47.4	-10%

Table 75. A4074 corridor performance in the evening peak hour in 2031

	A4074		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	51	73	43%
Total Time (pcu hr)	487	525	8%
Total Distance (pcu km)	26878	27871	4%
Average Speed (km/h)	55.2	53.1	-4%

5.6.4.5. B480 Corridor

The modelled network performance for Scenario 5 along the B480 corridor is shown in Table 76 and Table 77 for the morning and evening peak hours respectively.

In both the morning and evening peaks, the increased level of demand generated by the proposed new site at Chalgrove is forecast to result in increases in delays, travel distance and total travel times while the average speed is forecast to decrease.

Table 76. B480 corridor performance in the morning peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	2	235	>100%
Total Time (pcu hr)	115	432	276%
Total Distance (pcu km)	7427	12972	75%
Average Speed (km/h)	64.8	30.0	-54%

Table 77. B480 corridor performance in the evening peak hour in 2031

	B480		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	2	140	>100%
Total Time (pcu hr)	97	353	265%
Total Distance (pcu km)	6410	13886	117%
Average Speed (km/h)	66.3	39.3	-41%

5.6.4.6. B4009 Corridor

The network performance for Scenario 5 along the B4009 corridor is shown in Table 78 and Table 79 for the morning and evening peak hours.

In both the morning and evening peaks, the increased level of demand generated by the modelled new sites is forecast to result in increased delays, travel distance and total travel times while the average speed is forecast to decrease.

The difference percentages presented are comparatively higher for delays and total travel time in the evening peak in comparison with the morning peak.

Table 78. B4009 corridor performance in the morning peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	5.6	6.6	18%
Total Time (pcu hr)	276	322	17%
Total Distance (pcu km)	16881	19344	15%
Average Speed (km/h)	61.2	60.1	-2%

Table 79. B4009 corridor performance in the evening peak hour in 2031

	B4009		
	Do-Minimum (DM)	Scenario 5 (S5)	Difference (S5 - DM)
Delay (pcu hr)	46	78	68%
Total Time (pcu hr)	339	422	25%
Total Distance (pcu km)	17397	20263	16%
Average Speed (km/h)	51.4	48.0	-7%

5.7. Summary

To summarise the impact of the Local Plan scenarios, speeds along the key corridors are compared with respect to the Do-Minimum scenario as shown in Table 80 and 0. In relation to the morning peak hour:

- Scenario 1, with more dwellings in the vicinity of the B480 and the A4074, average speed is forecast to reduce by 54% along the B480 and also to reduce speeds along the A4074 by 7%;
- Scenario 2, with more dwellings in the vicinity of the A4074 and A415, is forecast to reduce speeds by 10% along the A4074 and 1% along A415;
- Scenario 3, with more dwellings in the vicinity of the B480 and the A4074, is forecast to have a minor impact along the corridors considered, although it is recognised that there may be further impacts on other routes closer to Oxford not covered in the summary below.
- Scenario 4, with more dwellings in the vicinity of the A40 and the A329, is forecast to reduce speeds on the A329 by 7% and to reduce speeds on the A40 by 3%;
- Scenario 5, with more dwellings in the vicinity of the B480, A4074, A415 and the A329, is forecast to reduce speeds by 54% on the B480, 10 % on the A4074, 1% on the A415 and 5% on the A329.

Table 80. Change in average speed compared with Do-Minimum scenario- Morning Peak

Corridor	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
South	-6%	-3%	-3%	-3%	-6%
A40	-2%	-2%	-2%	-3%	-2%
A415	-6%	-1%	-7%	-6%	-1%
A329	-5%	-3%	-2%	-7%	-5%
A4074	-7%	-10%	-5%	-6%	-10%
B480	-54%	0%	0%	0%	-54%
B4009	-2%	-1%	-1%	-1%	-2%

In the evening peak hour,

- Scenario 1, with more dwellings in the vicinity of the B480 and the A4074, average speed is forecast to reduce by 40% along the B480 and also to reduce speeds along the A4074 by 3% and A329 by 24%;
- Scenario 2, with more dwellings in the vicinity of the A4074 and A415, is forecast to reduce speeds by 5% along the A4074 and the A415;
- Scenario 3, with more dwellings in the vicinity of the B480 and the A4074, average speed is forecast to reduce by 9% along A4074 and to have a minor impact along the B480 corridor, although it is recognised that there may be further impacts on other routes closer to Oxford not covered in the summary below.
- Scenario 4, with more dwellings in the vicinity of the A40 and the A329, is forecast to reduce speeds on the A329 by 5% and to have a minor impact along the A40;
- Scenario 5, with more dwellings in the vicinity of the B480, A4074, A415 and the A329, is forecast to reduce speeds by 41% on the B480, 4 % on the A4074, 4% on the A415 and 25% on the A329.

Table 81. Change in average speed compared with Do-Minimum scenario- Evening Peak

Corridor	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
South	-5%	-2%	-3%	-3%	-6%
A40	1%	0%	-1%	0%	1%
A415	0%	-5%	-8%	-1%	-4%
A329	-24%	-2%	-2%	-5%	-25%
A4074	-3%	-5%	-9%	-5%	-4%
B480	-40%	0%	0%	0%	-41%
B4009	-6%	-1%	-1%	-1%	-7%

6. Summary

One of the main purposes of the ETI is to inform the selection of strategic development sites to be allocated in the Local Plan 2033 and to help identify a package of highway mitigation measures that ensures that the plan contributes towards the delivery of sustainable development. The ETI forms part of the evidence base to inform the Local Plan 2033 alongside other evidence, including: Landscape Capacity Study, Strategic Flood Risk Assessment, Sustainability Appraisal, Green Belt Review, and others.

This is the second stage of work associated with the ETI commission using the Oxfordshire Strategy Model (OSM). The first stage considered the suitability of the OSM to assess Local Plan impacts. This followed previous work using the Central Oxfordshire Transport Model, reported upon in 2015 and as summarised in Table 1 on page 6. This technical note reports on the results of OSM model testing related to the transport impacts of five Local Plan scenarios.

This study utilises a suite of new modelling tools and different growth assumptions in the other districts of Oxfordshire compared with the previous work reported upon in 2015. These differences are described and reported upon in sections 1.1.1 and 4.6. The assessed scenarios each contain different numbers of housing allocations. The scenarios and the number of houses is shown in Table 82.

Table 82. Summary of Scenario housing allocation

Number	Dwellings	Description
Do-Minimum	11079	Includes planned growth in surrounding districts, and committed growth in South Oxfordshire (Sites with planning approval and strategic allocations from the Core Strategy, 2012)
Scenario 1	20494	Local Plan allocation 2033 which includes Do- min housing scenario and new Local Plan numbers based on the preferred options reference case consulted upon in summer 2016, including the strategic site of Chalgrove, new homes in existing settlements (Towns and Villages at 10% growth), the regeneration area of Berinsfield at 1800 homes, and the brownfield sites at Wheatley and Culham
Scenario 2	20494	Variation of numbers at main strategic site (i.e. instead of Chalgrove only) - Culham - 3500 homes
Scenario 3	20494	Variation of numbers at main strategic site (i.e. instead of Chalgrove only) - Grenoble Road - 3500 homes
Scenario 4	20494	Variation of numbers at main strategic site (i.e. instead of Chalgrove only) - Harrington - 3500 homes
Scenario 5	23994	Variation of numbers at main strategic site (i.e. instead of Chalgrove only) - Culham + Chalgrove - 3500 homes in each site

The forecast impact of each development scenario by corridor is summarised in Table 83.

Table 83. Summary of highway capacity impacts

Scenario	Time	Corridor					
		A40	A415	A329	A4074	B480	B4009
Do Min	Morning peak	The A40 is forecast to be operating below operational capacity in the northbound and southbound directions between Wheatley and the M40 Junction for both the morning and evening peak hours. The eastbound and westbound approaches at Headington roundabout are forecast to be operating above operational capacity.	The A415 is forecast to be above capacity in the morning and evening peak hours westbound between Tollgate Road and Thame Lane and eastbound between A415 / High St and Thame Lane / A415 junctions.	The A329 eastbound is likely to be at or above operational capacity at Stadhampton between School Lane and Milton Road / Thame Road roundabout and above capacity northbound between Stadhampton Road / A439 and Thame Road / Newington Road junctions and southbound on Milton Road, east of the Thame Road / Milton Road roundabout.	The A4074 is operating at or above operational capacity in the morning peak hour in the northbound direction between Berinsfield roundabout and the Golden Balls roundabout and above capacity in the northbound direction between Heigh View and Lower Farm Lane, Benson Lane and Church Road, Golden Balls roundabout and Baldon Lane.	The B480 is likely to be below operational capacity in both morning and evening peak hours.	The B4009 is forecast to be below operational capacity in both the morning and evening peak hours.
	Evening peak			The A329 eastbound is forecast to be at or above operational capacity southbound on Milton Road, east of the Thame Road / Milton Road roundabout and above capacity eastbound between School Lane and Milton Road / Thame Road roundabout and northbound between Stadhampton Road / A439 and Thame Road / Newington Road junctions.	The A4074 is operating at or above operational capacity in the northbound direction between Baldon Lane and Lower Farm and above capacity between the Golden Balls roundabout and Baldon Lane in both directions and between Church Road and Crowmarsh roundabout southbound.		
Scenario 1	Morning peak	A40 is forecast to remain below capacity in both morning and evening peak hours.	In the morning and evening peak hours, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions.	The A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to be operating at or above capacity.	The A4074 northbound direction between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.	In the morning and evening peak hours, the B480 is forecast to exceed capacity at the B480 / A329 roundabout at Stadhampton.	B4009 is forecast to remain below capacity in both morning and evening peak hours.

Scenario	Time	Corridor					
		A40	A415	A329	A4074	B480	B4009
	Evening peak			The northbound direction between Newington Road / B480 Thame Road junction and Milton Road / Thame Road junction are forecast to be operating at or above capacity.	Both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.		
Scenario 2	Morning peak	A40 is forecast to remain below capacity in both morning and evening peak hours.	The A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions are forecast to be operating at or above capacity.	The A329 in a northbound direction between Stadhampton Road and the A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to be operating at or above capacity.	The A4074 northbound between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.	B480 is forecast to remain below capacity in both morning and evening peak hours.	B4009 is forecast to remain below capacity in both morning and evening peak hours.
	Evening peak		The A415 eastbound between A415 / High Street and Thame Lane / A415 junctions are forecast to be operating at or above capacity.	The A329 in a northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road and southbound between Sinodun View and Shillingford roundabout are forecast to be operating at or above capacity.	Southbound on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.		

Scenario	Time	Corridor					
		A40	A415	A329	A4074	B480	B4009
Scenario 3	Morning peak	A40 is forecast to remain below capacity in both morning and evening peak hours.	In both the morning and evening peaks, the A415 westbound between Tollgate Rd and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions are forecast to exceed capacity.	In both the morning and evening peaks, the A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to exceed capacity.	A4074 northbound between Berinsfield and Baldon Lane / A4074 junction, northbound between Sandford Road and Heyford Hill roundabout, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to exceed capacity.	B480 is forecast to remain below capacity in both morning and evening peak hours.	B4009 is forecast to remain below capacity in both morning and evening peak hours.
	Evening peak				Both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to exceed capacity.		
Scenario 4	Morning peak	The eastbound and westbound approaches at Headington roundabout along A40 are forecast to be operating above operational capacity.	In both the morning and evening peak hours, the A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions are forecast to exceed capacity.	In both the morning and evening peaks, the A329 northbound between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to exceed capacity.	A4074 northbound between Berinsfield and Henley Road / A4074 junction, northbound between Elm Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to exceed capacity.	B480 is forecast to remain below capacity in both morning and evening peak hours.	B4009 is forecast to remain below capacity in both morning and evening peak hours.
	Evening peak				Both directions on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm		

Scenario	Time	Corridor					
		A40	A415	A329	A4074	B480	B4009
					Bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to exceed capacity.		
Scenario 5	Morning peak	A40 is forecast to remain below capacity in both morning and evening peak hours.	The A415 westbound between Tollgate Road and Thame Lane and eastbound between A415 / High Street and Thame Lane / A415 junctions are forecast to exceed capacity.	The A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to be operating at or above capacity.	A4074 northbound between Berinsfield and Henley Road / A4074 junction that is northbound from Berinsfield to Golden Bells Roundabout and Golden Bells Roundabout to Henley Road junction, northbound between Elm bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.	The A329 northbound direction between Stadhampton Road and A329 / B480 junction and between Cratlands Close and Thame Road / Milton Road are forecast to exceed capacity.	B4009 is forecast to remain below capacity in both morning and evening peak hours.
	Evening peak		The A415 eastbound between A415 / High Street and Thame Lane are forecast to exceed capacity.	The northbound direction between Newington Road / B480 Thame Road junction and Milton Road / Thame Road junction are forecast to be operating at or above capacity.	The southbound direction on the A4074 between Golden Balls roundabout and Baldon Lane / A4074 Roundabout, north and southbound between Elm bridge roundabout and A4074 / Benson Lane junction, southbound between Benson Lane / A4074 junction and Crowmarsh roundabout are forecast to be operating at or above capacity.	The northbound direction between Newington Road / B480 Thame Road junction and Milton Road / Thame Road junction are forecast to exceed capacity.	

To ascertain the extent to which the proposed dwellings impact different scenarios, Table 84 and Table 85 below show the impact of each scenario on delay in the corridor. At the District wide level, delay is forecast to be greater for Scenario 1 and 5. The level of forecast delay is also much greater along the B480 corridor for these scenarios,; and this is likely to be associated with the development growth at the Chalgrove site and would suggest that further transport infrastructure mitigation to that already planned and included in the model (as set out in section 4) may be required to accommodate growth at this location. This will be tested in more detail at the next stage of ETI work.

Table 84. Forecast changes in delay by corridor and scenario compared with the Do-Minimum Scenario - morning peak

Corridor	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
South	65%	25%	27%	25%	71%
A40	7%	7%	7%	15%	8%
A415	24%	11%	27%	25%	12%
A329	67%	53%	35%	112%	81%
A4074	50%	71%	41%	45%	73%
B480	>100%	21%	21%	26%	>100%
B4009	16%	5%	5%	7%	18%

*The absolute delay (pcu-hr) value for B480 are Do-Min- 1.9, S1-236.2, S2-2.3, S3-2.3, S4-2.4 and S5-234.7

Table 85. Forecast changes in delay by corridor and scenario compared with the Do-Minimum Scenario - evening peak

Corridor	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
South	59%	21%	24%	25%	68%
A40	-3%	2%	4%	4%	-4%
A415	4%	15%	24%	5%	14%
A329	>100%	17%	19%	54%	>100%
A4074	33%	55%	98%	46%	43%
B480	>100%	22%	22%	28%	>100%
B4009	65%	9%	10%	11%	68%

*The absolute delay (pcu-hr) value for B480 are Do-Min- 1.8, S1-138.0, S2-2.2, S3-2.2, S4-2.3 and S5-139.6

A comprehensive assessment of forecast development growth scenarios and associated transport impacts has been undertaken. The analysis summarised in this report will be used to inform decision making on the next stage of local plan development, including helping to determine a final preferred development scenario (housing and employment) to be included in the next stage of the Local Plan 2033. There will also need to be further work to help identify a package of highway and sustainable transport mitigation to support future housing and employment growth to ensure the plan contributes towards the delivery of sustainable development. Further refinement of model network coding may also be considered where appropriate.

Appendices



Appendix A.

A.1. Summary of Demand Model results for the entire model

A.1.1. Scenario 1

Morning peak period (07:00-10:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 1	S1-DM
Reg car (veh.)	239,449	328,747	89,298	335,279	6,532
P&R (veh.)	2,221	3,121	900	3,120	0
Bus only (pax)	27,925	34,231	6,307	34,796	565
Rail (pax)	9,302	15,654	6,353	16,347	693
TOTAL (persons)	338,981	464,252	125,271	473,674	9,422

Inter Peak period (10:00 – 16:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 1	S1-DM
Reg car (veh.)	418,193	613,993	195,800	625,297	11,304
P&R (veh.)	2,235	2,409	174	2,409	0
Bus only (pax)	46,839	68,075	21,236	68,416	341
Rail (pax)	9,824	22,478	12,654	22,771	293
TOTAL (persons)	581,864	860,694	278,830	875,459	14,765

Evening peak period (16:00 - 19:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 1	S1-DM
Reg car (veh.)	316,831	413,090	96,259	420,568	7,478
P&R (veh.)	2,021	2,597	576	2,601	4
Bus only (pax)	27,885	33,955	6,070	34,406	451
Rail (pax)	11,112	17,627	6,515	18,135	508
TOTAL (persons)	437,259	570,802	133,543	581,113	10,310

A.1.2. Scenario 2

Morning peak period (07:00-10:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 2	S2-DM
Reg car (veh.)	239,449	328,747	89,298	335,487	6,740
P&R (veh.)	2,221	3,121	900	3,113	-8
Bus only (pax)	27,925	34,231	6,307	34,712	481
Rail (pax)	9,302	15,654	6,353	16,478	823
TOTAL (persons)	338,981	464,252	125,271	473,973	9,721

Inter Peak period (10:00 – 16:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 2	S2-DM
Reg car (veh.)	418,193	613,993	195,800	624,990	10,997
P&R (veh.)	2,235	2,409	174	2,406	-3
Bus only (pax)	46,839	68,075	21,236	68,368	293
Rail (pax)	9,824	22,478	12,654	22,838	360
TOTAL (persons)	581,864	860,694	278,830	875,091	14,396

Evening peak period (16:00 - 19:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 2	S2-DM
Reg car (veh.)	316,831	413,090	96,259	420,731	7,641
P&R (veh.)	2,021	2,597	576	2,598	1
Bus only (pax)	27,885	33,955	6,070	34,355	400
Rail (pax)	11,112	17,627	6,515	18,311	684
TOTAL (persons)	437,259	570,802	133,543	581,438	10,635

A.1.3. Scenario 3

Morning peak period (07:00-10:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 3	S3-DM
Reg car (veh.)	239,449	328,747	89,298	335,532	6,785
P&R (veh.)	2,221	3,121	900	3,153	32
Bus only (pax)	27,925	34,231	6,307	34,820	589
Rail (pax)	9,302	15,654	6,353	16,303	649
TOTAL (persons)	338,981	464,252	125,271	474,007	9,755

Inter Peak period (10:00 – 16:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 3	S3-DM
Reg car (veh.)	418,193	613,993	195,800	625,105	11,111
P&R (veh.)	2,235	2,409	174	2,444	35
Bus only (pax)	46,839	68,075	21,236	68,480	405
Rail (pax)	9,824	22,478	12,654	22,766	288
TOTAL (persons)	581,864	860,694	278,830	875,315	14,621

Evening peak period (16:00 - 19:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 3	S3-DM
Reg car (veh.)	316,831	413,090	96,259	420,526	7,436
P&R (veh.)	2,021	2,597	576	2,654	57
Bus only (pax)	27,885	33,955	6,070	34,438	482
Rail (pax)	11,112	17,627	6,515	18,119	492
TOTAL (persons)	437,259	570,802	133,543	581,133	10,331

A.1.4. Scenario 4

Morning peak period (07:00-10:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 4	S4-DM
Reg car (veh.)	239,449	328,747	89,298	335,712	6,965
P&R (veh.)	2,221	3,121	900	3,147	26
Bus only (pax)	27,925	34,231	6,307	34,747	515
Rail (pax)	9,302	15,654	6,353	16,374	720
TOTAL (persons)	338,981	464,252	125,271	474,222	9,970

Inter Peak period (10:00 – 16:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 4	S4-DM
Reg car (veh.)	418,193	613,993	195,800	625,006	11,012
P&R (veh.)	2,235	2,409	174	2,417	8
Bus only (pax)	46,839	68,075	21,236	68,374	299
Rail (pax)	9,824	22,478	12,654	22,781	304
TOTAL (persons)	581,864	860,694	278,830	875,071	14,377

Evening peak period (16:00 - 19:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 4	S4-DM
Reg car (veh.)	316,831	413,090	96,259	420,691	7,600
P&R (veh.)	2,021	2,597	576	2,604	7
Bus only (pax)	27,885	33,955	6,070	34,367	412
Rail (pax)	11,112	17,627	6,515	18,191	564
TOTAL (persons)	437,259	570,802	133,543	581,286	10,484

A.1.5. Scenario 5

Morning peak period (07:00-10:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 5	S5-DM
Reg car (veh.)	239,449	328,747	89,298	337,687	8,940
P&R (veh.)	2,221	3,121	900	3,120	0
Bus only (pax)	27,925	34,231	6,307	34,955	724
Rail (pax)	9,302	15,654	6,353	16,722	1,067
TOTAL (persons)	338,981	464,252	125,271	477,217	12,965

Inter Peak period (10:00 – 16:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 5	S5-DM
Reg car (veh.)	418,193	613,993	195,800	629,482	15,489
P&R (veh.)	2,235	2,409	174	2,410	1
Bus only (pax)	46,839	68,075	21,236	68,518	443
Rail (pax)	9,824	22,478	12,654	22,938	460
TOTAL (persons)	581,864	860,694	278,830	880,959	20,265

Evening peak period (16:00 - 19:00)

Entire model	Base Year (BY)	Do Minimum (DM)	DM-BY	Scenario 5	S5-DM
Reg car (veh.)	316,831	413,090	96,259	423,307	10,217
P&R (veh.)	2,021	2,597	576	2,604	7
Bus only (pax)	27,885	33,955	6,070	34,548	592
Rail (pax)	11,112	17,627	6,515	18,471	844
TOTAL (persons)	437,259	570,802	133,543	585,017	14,215

A.2. Summary of Demand Model results for South Oxfordshire

A.2.1. Scenario 1

Morning peak period (07:00-10:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 1 (S1)		S1-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	38,092	32,002	48,983	38,409	10,891	6,407	55,874	41,753	6,891	3,344
P&R (veh.)	224	24	349	20	125	-4	376	20	27	1
Bus only (pax)	1,442	1,012	2,089	1,175	646	162	2,593	1,234	504	59
Rail (pax)	1,784	644	2,461	836	677	192	2,976	930	515	94
TOTAL (persons)	51,088	41,686	66,163	50,044	15,074	8,358	75,825	54,378	9,662	4,334

Inter Peak period (10:00 – 16:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 1 (S1)		S1-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	62,891	63,302	77,886	78,745	14,995	15,442	88,117	89,070	10,231	10,326
P&R (veh.)	129	133	112	147	-17	13	120	154	8	7
Bus only (pax)	1,883	1,458	2,206	1,902	323	445	2,395	2,165	189	262
Rail (pax)	1,124	997	1,407	1,399	283	402	1,583	1,639	176	239
TOTAL (persons)	81,762	81,730	101,093	101,894	19,331	20,164	114,255	115,311	13,162	13,417

Evening peak period (16:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 1 (S1)		S1-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	58,470	62,129	64,624	71,655	6,154	9,525	69,654	79,130	5,030	7,475
P&R (veh.)	32	144	26	220	-6	77	28	239	1	19
Bus only (pax)	860	1,055	944	1,597	84	541	991	1,978	48	381
Rail (pax)	893	1,967	1,173	2,709	280	742	1,255	3,123	82	414
TOTAL (persons)	74,876	80,842	82,925	94,117	8,050	13,275	89,344	104,276	6,419	10,159

12 hour-period (07:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 1 (S1)		S1-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	159,453	157,434	191,492	188,809	32,039	31,375	213,644	209,953	22,152	21,144
P&R (veh.)	385	300	488	387	103	86	524	414	36	27
Bus only (pax)	4,185	3,526	5,238	4,674	1,053	1,148	5,979	5,376	740	703
Rail (pax)	3,801	3,608	5,041	4,944	1,240	1,336	5,814	5,692	774	747
TOTAL (persons)	207,726	204,257	250,181	246,054	42,455	41,798	279,425	273,964	29,243	27,910

A.2.2. Scenario 2

Morning peak period (07:00-10:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 2 (S2)		S2-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	38,092	32,002	48,983	38,409	10,891	6,407	56,235	42,081	7,252	3,671
P&R (veh.)	224	24	349	20	125	-4	367	20	18	0
Bus only (pax)	1,442	1,012	2,089	1,175	646	162	2,524	1,208	435	33
Rail (pax)	1,784	644	2,461	836	677	192	3,096	948	635	111
TOTAL (persons)	51,088	41,686	66,163	50,044	15,074	8,358	76,317	54,778	10,155	4,734

Inter Peak period (10:00 – 16:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 2 (S2)		S2-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	62,891	63,302	77,886	78,745	14,995	15,442	87,849	89,114	9,963	10,369
P&R (veh.)	129	133	112	147	-17	13	118	153	6	7
Bus only (pax)	1,883	1,458	2,206	1,902	323	445	2,374	2,159	168	257
Rail (pax)	1,124	997	1,407	1,399	283	402	1,623	1,703	216	304
TOTAL (persons)	81,762	81,730	101,093	101,894	19,331	20,164	113,938	115,423	12,844	13,529

Evening peak period (16:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 2 (S2)		S2-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	58,470	62,129	64,624	71,655	6,154	9,525	69,970	79,418	5,347	7,763
P&R (veh.)	32	144	26	220	-6	77	27	233	1	13
Bus only (pax)	860	1,055	944	1,597	84	541	980	1,954	36	358
Rail (pax)	893	1,967	1,173	2,709	280	742	1,290	3,288	117	579
TOTAL (persons)	74,876	80,842	82,925	94,117	8,050	13,275	89,763	104,771	6,837	10,655

12 hour-period (07:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 2 (S2)		S2-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	159,453	157,434	191,492	188,809	32,039	31,375	214,054	210,612	22,561	21,804
P&R (veh.)	385	300	488	387	103	86	512	406	24	19
Bus only (pax)	4,185	3,526	5,238	4,674	1,053	1,148	5,878	5,322	640	648
Rail (pax)	3,801	3,608	5,041	4,944	1,240	1,336	6,009	5,939	968	994
TOTAL (persons)	207,726	204,257	250,181	246,054	42,455	41,798	280,017	274,973	29,836	28,918

A.2.3. Scenario 3

Morning peak period (07:00-10:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 3 (S3)		S3-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	38,092	32,002	48,983	38,409	10,891	6,407	56,173	42,034	7,190	3,624
P&R (veh.)	224	24	349	20	125	-4	443	20	94	1
Bus only (pax)	1,442	1,012	2,089	1,175	646	162	2,586	1,230	497	55
Rail (pax)	1,784	644	2,461	836	677	192	2,916	924	456	88
TOTAL (persons)	51,088	41,686	66,163	50,044	15,074	8,358	76,206	54,718	10,044	4,674

Inter Peak period (10:00 – 16:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 3 (S3)		S3-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	62,891	63,302	77,886	78,745	14,995	15,442	87,873	89,044	9,987	10,299
P&R (veh.)	129	133	112	147	-17	13	132	186	20	39
Bus only (pax)	1,883	1,458	2,206	1,902	323	445	2,381	2,170	175	268
Rail (pax)	1,124	997	1,407	1,399	283	402	1,581	1,622	174	223
TOTAL (persons)	81,762	81,730	101,093	101,894	19,331	20,164	113,949	115,301	12,855	13,407

Evening peak period (16:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 3 (S3)		S3-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	58,470	62,129	64,624	71,655	6,154	9,525	69,954	79,384	5,331	7,730
P&R (veh.)	32	144	26	220	-6	77	31	318	5	98
Bus only (pax)	860	1,055	944	1,597	84	541	986	1,973	43	376
Rail (pax)	893	1,967	1,173	2,709	280	742	1,254	3,103	81	394
TOTAL (persons)	74,876	80,842	82,925	94,117	8,050	13,275	89,718	104,657	6,793	10,540

12 hour-period (07:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 3 (S3)		S3-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	159,453	157,434	191,492	188,809	32,039	31,375	214,001	210,462	22,508	21,653
P&R (veh.)	385	300	488	387	103	86	607	524	119	138
Bus only (pax)	4,185	3,526	5,238	4,674	1,053	1,148	5,953	5,372	714	699
Rail (pax)	3,801	3,608	5,041	4,944	1,240	1,336	5,752	5,650	711	705
TOTAL (persons)	207,726	204,257	250,181	246,054	42,455	41,798	279,873	274,676	29,691	28,621

A.2.4. Scenario 4

Morning peak period (07:00-10:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 4 (S4)		S4-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	38,092	32,002	48,983	38,409	10,891	6,407	56,301	42,065	7,318	3,656
P&R (veh.)	224	24	349	20	125	-4	410	21	61	1
Bus only (pax)	1,442	1,012	2,089	1,175	646	162	2,540	1,225	451	50
Rail (pax)	1,784	644	2,461	836	677	192	2,996	938	535	102
TOTAL (persons)	51,088	41,686	66,163	50,044	15,074	8,358	76,363	54,768	10,201	4,724

Inter Peak period (10:00 – 16:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 4 (S4)		S4-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	62,891	63,302	77,886	78,745	14,995	15,442	87,854	89,154	9,968	10,409
P&R (veh.)	129	133	112	147	-17	13	127	161	15	15
Bus only (pax)	1,883	1,458	2,206	1,902	323	445	2,374	2,152	169	250
Rail (pax)	1,124	997	1,407	1,399	283	402	1,580	1,651	173	252
TOTAL (persons)	81,762	81,730	101,093	101,894	19,331	20,164	113,913	115,423	12,819	13,529

Evening peak period (16:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 4 (S4)		S4-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	58,470	62,129	64,624	71,655	6,154	9,525	69,845	79,292	5,221	7,637
P&R (veh.)	32	144	26	220	-6	77	28	242	1	21
Bus only (pax)	860	1,055	944	1,597	84	541	984	1,951	40	354
Rail (pax)	893	1,967	1,173	2,709	280	742	1,265	3,142	92	433
TOTAL (persons)	74,876	80,842	82,925	94,117	8,050	13,275	89,585	104,474	6,659	10,357

12 hour-period (07:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 4 (S4)		S4-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	159,453	157,434	191,492	188,809	32,039	31,375	214,000	210,511	22,507	21,702
P&R (veh.)	385	300	488	387	103	86	565	424	78	38
Bus only (pax)	4,185	3,526	5,238	4,674	1,053	1,148	5,898	5,328	660	654
Rail (pax)	3,801	3,608	5,041	4,944	1,240	1,336	5,840	5,732	799	787
TOTAL (persons)	207,726	204,257	250,181	246,054	42,455	41,798	279,860	274,664	29,679	28,610

A.2.5. Scenario 5

Morning peak period (07:00-10:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 5 (S5)		S5-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	38,092	32,002	48,983	38,409	10,891	6,407	58,514	43,203	9,531	4,794
P&R (veh.)	224	24	349	20	125	-4	381	20	31	1
Bus only (pax)	1,442	1,012	2,089	1,175	646	162	2,738	1,237	649	63
Rail (pax)	1,784	644	2,461	836	677	192	3,285	987	824	151
TOTAL (persons)	51,088	41,686	66,163	50,044	15,074	8,358	79,584	56,251	13,422	6,207

Inter Peak period (10:00 – 16:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 5 (S5)		S5-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	62,891	63,302	77,886	78,745	14,995	15,442	91,892	92,932	14,006	14,188
P&R (veh.)	129	133	112	147	-17	13	121	156	9	9
Bus only (pax)	1,883	1,458	2,206	1,902	323	445	2,455	2,258	249	356
Rail (pax)	1,124	997	1,407	1,399	283	402	1,682	1,784	275	385
TOTAL (persons)	81,762	81,730	101,093	101,894	19,331	20,164	119,135	120,380	18,041	18,486

Evening peak period (16:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 5 (S5)		S5-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	58,470	62,129	64,624	71,655	6,154	9,525	71,677	81,923	7,054	10,268
P&R (veh.)	32	144	26	220	-6	77	28	244	1	23
Bus only (pax)	860	1,055	944	1,597	84	541	1,003	2,110	59	513
Rail (pax)	893	1,967	1,173	2,709	280	742	1,322	3,432	149	723
TOTAL (persons)	74,876	80,842	82,925	94,117	8,050	13,275	91,952	108,214	9,027	14,097

12 hour-period (07:00 - 19:00)

SODC	Base Year (BY)		Do Minimum (DM)		DM-BY		Scenario 5 (S5)		S5-DM	
	Orig.	Dest.	Orig.	Dest.	Orig.	Orig.	Orig.	Dest.	Orig.	Dest.
Reg car (veh.)	159,453	157,434	191,492	188,809	32,039	31,375	222,083	218,059	30,591	29,250
P&R (veh.)	385	300	488	387	103	86	529	420	42	33
Bus only (pax)	4,185	3,526	5,238	4,674	1,053	1,148	6,196	5,605	958	931
Rail (pax)	3,801	3,608	5,041	4,944	1,240	1,336	6,288	6,203	1,248	1,259
TOTAL (persons)	207,726	204,257	250,181	246,054	42,455	41,798	290,671	284,844	40,489	38,790

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