BASINGSTOKE AND DEANE BOROUGH COUNCIL

BASINGSTOKE LOCAL PLAN

2014 – 2029

TRANSPORT ASSESSMENT

November 2014

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EXECUTIVE SUMMARY

Parsons Brinckerhoff has been commissioned by Basingstoke and Deane Borough Council (BDBC) to undertake a high level Transport Assessment in support of BDBC's emerging Local Plan[1]. The assessment has been undertaken using a spreadsheet model as well as industry standard junction modelling packages which consider growth in traffic flows on the Basingstoke network. The study is the first level of assessment of the potential impacts of Local Plan developments. The assessment is aimed at evaluating potential traffic impacts from developments in the emerging Local Plan[1] and exploring mitigation measures to alleviate adverse impacts where necessary. It considers a base year of 2012 and three forecasting years of 2019, 2024 and 2029, covering both the AM and PM peak hours.

In addition to a 2012 Base Year scenario, the transport assessment has considered six different sets of future land use assumptions, as set out below, including the committed and planned residential and employment development in the borough up to 2029. Data concerning these assumptions were provided by BDBC.

- **Reference Case 2019** – committed developments and background growth by 2019
- **Reference Case 2024** – committed developments and background growth by 2024
- **Reference Case 2029** – committed developments and background growth by 2029
- **Local Plan Scenario 2019** – Reference Case + Local Plan developments by 2019
- **Local Plan Scenario 2024** – Reference Case + Local Plan developments by 2024
- **Local Plan Scenario 2029** – Reference Case + Local Plan developments by 2029

The above Local Plan scenarios were constructed on the basis of, and compared to, a Reference Case scenario. This reference scenario is based on the anticipated growth in car use occurring as a result of background growth and committed developments in Basingstoke without any additional Local Plan development and traffic impacts from the Local Development Framework (LDF) or Local Plan developments to be brought forward by a number of neighbouring Planning Authorities.

BDBC and Parsons Brinckerhoff have worked with Hampshire County Council (HCC), as the Local Highway Authority, during the preparation of this Transport Assessment, which sets out the following:

- A description of the scope and objectives of the study;
- An overview of the model and the methodology used;
- An analysis of the development scenarios considered;
- Initial conclusions of the overall impact of the forecasted growth;
- Examination of key junctions in light of the forecasted travel demand increase and identification of mitigation measures and their indicative costs (where appropriate); and
- Assumptions and limitation of this study

[1] Basingstoke and Deane Revised Pre Submission Local Plan 2011 to 2029 – Draft for public consultation – April 2014

Development of Spreadsheet Modelling Tool

A spreadsheet tool was developed as part of this study with which high level analysis was undertaken to assess the network wide traffic impacts from different Local Plan scenarios and identify elements of the highway network that are likely to experience exacerbated delays in the future.

From a network wide perspective travel demand as a result of Local Plan developments generally increases the volume of traffic on most highway links modelled. However, there were only a few cases where such growth was forecasted to result in traffic flows larger than the capacity of road links. These links mainly include the A30 Winchester Road, A339 Kingsclere Road, some sections of Churchill Way and some sections of Ringway.

It should be acknowledged that the above conclusions were drawn based on unconstrained traffic growth to reflect a worst case scenario. In reality some of the forecasted demand may not materialise in the modelled time periods due to travellers avoiding congestion by altering their route, travelling at a different time of day (peak-spreading) or choosing to travel to/from a different location. In addition, the assessment considers all travel demand (demand flows in traffic modelling terms) that intends to go through individual junctions and assumes all this travel demand can reach the specific junction during the modelled period of time. In reality it is commonly recognised that some of the travel demand may not materialise in the modelled hours due to congestion elsewhere in the network, which leads to lower actual flows that arrive during a given period of time.

Alterations to mode choice as a result of congestion have been accounted for in the spreadsheet tool by applying a reduction to the number of trips. This represents drivers switching from car to a more sustainable mode of transport following the implementation of smarter choice measures. The amount of reduction is based on the trip distance using data from the Sustainable Travel Towns Study[2] as advised in WebTAG (Unit 3.10.6).

Network wide traffic impacts from different Local Plan scenarios

The spreadsheet tool was used to assess the performance of the network and junctions across Basingstoke with the addition of the Local Plan development, and to identify key congestion 'hotspots' for further investigation. Initially junctions were identified where the impact of the Local Plan developments resulted in one of the following two situations:

- The Ratio of Flow to Capacity (RFC) in the Reference Case is below 1 but the additional traffic from the Local Plan development increases the total demand beyond what the link or the downstream junction can accommodate (RFC > 1) in the modelled hours.
- The RFC is over 1 in both the 2029 Reference Case and Local Plan scenarios but the increase in the latter is greater than 10% when compared to the reference conditions.

It should be noted that these RFC values take into account the capacity of individual road links as well as constraints at entries to the downstream junction at the exit of links.

[2] Sloman L, Cairns S, Newson C, Anable J, Pridmore A & Goodwin P (2010), The Effects of Smarter Choices Programmes in Sustainable Travel Towns; Research Report, Part III Chapter 13

Discussions with BDBC and HCC refined the list to 13 key junctions in and around Basingstoke which required further detailed assessment. They were selected due to the scale of the predicted impact of the Local Plan development and/or to their importance to the strategic and local networks. Some junctions initially identified as a 'hotspot' have not been taken forward for further testing, since detailed junction assessments have been undertaken and proposed improvements have been developed outside of this study. HCC are currently undertaking assessments of A33 / Gaiger Avenue, A33 / Thornhill Way, Binfields roundabout, Winchester Road Roundabout, Thorneycroft Roundabout and Crockford Roundabout. In addition, Eastrop Roundabout is being assessed through the Basing View Masterplan.

Mitigation of traffic impacts at individual junctions

The study considered the transport infrastructure opportunities to mitigate the impact of development at the 13 identified junctions. This identification of mitigation measures was undertaken using standard junction modelling packages (LinSig and ARCADY) following a principle of achieving the greatest level of congestion relief within existing constraints such as highway boundaries, while avoiding any structural work at bridges and viaducts. Consideration was given to the affordability and deliverability of all measures proposed. The measures explored include common improvements such as lane widening and signalisation.

The table below summarises the 13 junctions investigated, the form of junction improvements recommended and their indicative costs. It should be noted that the mitigation measures summarised in the table are focused on relieving the traffic impacts from the Local Plan development. Further details of these proposals are presented in chapter 4 of the Transport Assessment.

No.	Junction Name	Form of Mitigations	Indicative costs
1	**A33 / Bramley Road Roundabout**	* Widening of circulatory * Flare both A33 entries * Provide exit funnels at both A33 exits	£373,000
23	**A30 / Wallop Drive Roundabout**	* Convert roundabout to a signalised * Add or lengthen flares on all entries	£2,484,000
		* Widen 750m of A30 southbound carriageway up to Kempshott roundabout	£5,490,000
13	**Kempshott Roundabout**	* Signalise the roundabout * Add or lengthen flares on all entries * Widen the circulatory	£3,696,000
6	**Brighton Hill Roundabout**	* Minor amendments based on a signalised 'Hamburger' design provided by BDBC	£6,360,000
27	**Worting Road / Roman Way Roundabout**	* Flare widening on 3 entries	£294,474
25	**B3400 Worting Road Roundabout**	* Flare widening 3 arms * Formalise 2 lane circulatory	£255,000
28	**West Ham Roundabout**	* Flare widening 3 entries * Widen the southern half of the circulatory	£667,000
19	**A339 / Roman Road Roundabout**	* Widen circulatory * Flare widening on 3 entries	£515,260
29	**A339 / Ringway West Roundabout**	* Full signalisation of the roundabout * Flare widening all entries * Widen the northern half of the circulatory	£1,282,000
2	**Aldermaston Road roundabout**	* Widen circulatory	£1,917,000
11	**Hackwood Road Roundabout**	* Flare widening of all entries and the circulatory carriageway	£1,920,000
22	**Victory Roundabout**	* signalise 3 out of 4 entries * Widen 2/3 of the circulatory to 3 lanes	£955,000
10	**Fiveways Junction**	* Re-align flares on 2 arms * Alter method of signal control * Extend 1 flare	£252,000
-	A33 / Gaiger Avenue Rdbt[3]	* HCC Widening Scheme	£400,000
-	A33 Thornhill Crossroads[2]	* HCC Widening Scheme	£700,000
-	A33 Binfields Rdbt[2]	* HCC Widening and Signalisation Scheme	£2,700,000
-	A33 Crockford Rdbt[2]	* HCC Widening and Signalisation Scheme	£2,200,000
-	Thorneycroft Rdbt[2]	* HCC Widening and Signalisation Scheme	£7,500,000
-	Winchester Road Rdbt[2]	* HCC Widening and Signalisation Scheme	£3,000,000

[3] Mitigation measures are not considered for these junctions in this Transport Assessment as HCC have commissioned separate studies to investigate solutions. They are included in order to present a complete picture of the issues across the network and the proposed solutions.

The table below measures the effectiveness of the mitigation proposals by presenting the number of arms fully mitigated as a percentage of the total number of arms at each junction. An arm is deemed mitigated if in the 2029 Local Plan scenario the Degree of Saturation (DoS) or Ratio of Flow to Capacity (RFC) for an arm is lower than 85% or is at a similar value to that of the 2029 Reference Case where no Local Plan developments are included. For any arm that was not fully mitigated the DoS bracket that the mitigated result falls within is shown to provide an understanding of the performance of the arm.

		Effectiveness of Mitigation					Arms Not Fully Mitigated							
		Total num of arms	Arms fully mitigated				DoS < 90%		DoS < 100%		DoS < 110%		DoS > 110%	
			AM		PM		AM	PM	AM	PM	AM	PM	AM	PM
No.	Junction Name													
1	A33 / Bramley Road Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
23	A30 / Wallop Drive Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
13	Kempshott Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
6	Brighton Hill Roundabout	6	2	33%	5	83%	-	-	1	-	1	1	2	-
27	Worting Road / Roman Way Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
25	B3400 Worting Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
28	West Ham Roundabout	6	6	100%	6	100%	-	-	-	-	-	-	-	-
19	A339 / Roman Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
29	A339 / Ringway West Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
2	Aldermaston Road roundabout	6	3	50%	5	83%	1	1	2	-	-	-	-	-
11	Hackwood Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
22	Victory Roundabout	4	3	75%	1	25%	1	1	-	1	-	1	-	-
10	Fiveways Junction	4	3	75%	4	100%	-	-	-	-	1	-	-	-

It is clear that the impact of Local Plan traffic on the assessed junctions can be effectively mitigated in the majority of case with high percentage values reported for most junctions. There are two exceptions. Brighton Hill Roundabout is forecast to operate with only 2 arms effectively mitigated in the AM peak hour with both Local Plan traffic and the proposed mitigation in place. However, all of the arms that are not fully mitigated are reported to operate below 110%. Similarly, the Aldermaston Road Roundabout is forecast to operate with only 3 out of 6 arms effectively mitigated in the AM peak hour with both Local Plan traffic and the proposed mitigation in place but all arms will operate below 100%.

The average delay per Passenger Car Unit (PCU) for each of the mitigated junctions is shown in the table below in the 2029 reference case and the Local Plan Scenario with and without mitigation. In most cases the mitigation proposal provides a reduction in average delay to a similar level as the Reference Case, and where the average delay does increase it remains at a reasonable level. The Local Plan development is forecast to have a substantial but not severe impact on the performance of these junctions.

No.	Junction Name	Time Period	Reference Case (s/PCU)	Local Plan without mitigation (s/PCU)	Local Plan with mitigation (s/PCU)
1	A33 / Bramley Road Roundabout	AM	12	17	3
		PM	12	15	3
23	A30 / Wallop Drive Roundabout	AM	5	204	26
		PM	11	379	28
13	Kempshott Roundabout	AM	426	665	14
		PM	130	269	11
6	Brighton Hill Roundabout	AM	702	864	259
		PM	371	811	107
27	Worting Road / Roman Way Roundabout	AM	903	1076	297
		PM	1174	1299	628
25	B3400 Worting Road Roundabout	AM	12	17	5
		PM	9	10	6
28	West Ham Roundabout	AM	42	10	7
		PM	75	167	6
19	A339 / Roman Road Roundabout	AM	145	293	5
		PM	53	108	6
29	A339 / Ringway West Roundabout	AM	184	314	14
		PM	5	7	12
2	Aldermaston Road roundabout	AM	27	50	33
		PM	28	52	27
11	Hackwood Road Roundabout	AM	793	1012	139
		PM	347	883	21
22	Victory Roundabout	AM	336	537	37
		PM	36	73	89
10	Fiveways Junction	AM	620	585	275
		PM	260	944	331

Whilst these suggested mitigations require further refinement or investigation in close liaison with HCC when developments in the Local Plan come forward in the future. It is recommended that prior to any future design work discussions with HCC are had to ensure the scope of additional work is determined. However, it is considered by BDBC that the assessment indicates that the majority of the impacts on the highway network resulting from the Local Plan development scenarios could be accommodated after mitigation.

Assumptions, limitations and further study

Analysis and findings from assessments documented in this report should be interpreted together with an understanding of the key assumptions made in this study.

The performance assessments within the spreadsheet tool adopt a worst case scenario approach and are based on unconstrained traffic growth on the highway network as a whole and at individual junctions. This approach ensures robustness of the assessments on the basis that, if unconstrained demand can be accommodated (along with reasonable mitigation), the Local Plan will be sound on transport grounds. However, this approach also means that benefits from further highway demand reductions as a result of the following considerations are not considered in this study (this list does not include shifts to sustainable modes which has been accounted for in the model):

- The spreading of journeys to times which are less busy
- The scope to divert to alternative routes to avoid congestion
- Changes to trip frequency, origins, destinations, or journey distance

In addition to the above assumptions, the assessment considers all travel demand (demand flows in traffic modelling terms) that intends to go through individual junctions and assume all of the travel demand can reach the specific junction during the modelled period of time. In reality, it is commonly recognised that some of the travel demand may not materialise in the modelled hours due to congestion elsewhere in the network, which leads to lower actual flows arriving during a given period of time.

The modelling tool developed in this study is in the form of a spreadsheet model. It therefore does not undertake any assignment so traffic will not re-route as a result of congestion. In light of these assumptions, the predicted traffic demand therefore represents a worst case scenario and therefore smaller scale mitigation proposals may actually be necessary.

In accordance with guidance in the National Planning Policy Framework (NPPF) 2012 this Transport Assessment has demonstrated that the Local Plan developments, if accompanied by the mitigation measures proposed, can be accommodated on the network without causing severe traffic impacts. Furthermore, the impact of the Local Plan developments on safety has been considered and can be successfully mitigated. For example there are several at-grade roundabouts in Basingstoke where an increase in demand could result in slip-road queues that reach the mainline causing a significant safety hazard. The Transport Assessment has demonstrated that the key at-grade junctions, including the M3 junction 6, M3 junction 7 and Aldermaston Road Roundabout can be improved so that this safety issue is mitigated.

REPORT STRUCTURE

This report covers the assessment of the transport impacts of the development scenarios. It has been divided into two parts: Part A and Part B. Part A gives an overview of the overall study and focuses on the analysis of traffic impacts from the Local Plan developments and the scope for mitigations at individual selected junctions. Part B provides detailed technical information on the methodology and modelling aspects of the study.

Part A

- Section 1 – Introduction
- Section 2 – An overview of the methodology and modelling undertaken
- Section 3 – Initial modelling results and analysis of development impacts prior to any mitigations
- Section 4 – Mitigation of adverse traffic impacts at selected junctions
- Section 5 – A summary of the assessment and conclusions

Part B

- Section 6 – Detailed specification of the model and its key features
- Section 7 – A summary of input data and relevant assumptions
- Section 8 – A detailed summary of the traffic forecasting methodology

PART A

1 INTRODUCTION

1.1 Background

1.1.1 Basingstoke and Deane Borough Council (BDBC) is currently in the process of producing an updated Local Plan for the borough. The Revised Pre-Submission Local Plan – Consultation Draft (April 2014) requires 748 dwellings per annum to be delivered over the plan period (2011 – 2029) and sets out the spatial distribution and strategic allocations required to accommodate this growth.

1.1.2 In order to support the Revised Pre-Submission Local Plan, BDBC commissioned Parsons Brinckerhoff to produce an updated Transport Assessment (TA) to evaluate potential traffic impacts from the Local Plan development and explore mitigation measures to alleviate such impacts where necessary. It was agreed that the TA would make the best use of relevant data (such as the transport related research previously undertaken in relation to the Core Strategy). Also, it would consider the up to date information on the levels of development growth to be delivered over the plan period (2011 – 2029) and the spatial distribution options for development in the borough.

1.2 Objectives

1.2.1 The main objectives of the TA were to:

- Collate information to identify the amounts and locations of development in the borough in the future reference and development scenarios;
- Estimate the quantum and distribution of vehicular trips resulting from the additional development in the future;
- Assess traffic impacts and junction performance in the defined highway network and identify key junctions requiring mitigations;
- Propose mitigation measures or test existing concept designs and advise on their effectiveness; provide costing and identify phasing for mitigations where appropriate;
- Report findings on the main traffic impacts on the highway network and how these can be managed with the identified mitigation measures.

1.3 Scope

1.3.1 The study to produce this TA was completed in two phases as set out below:

- Phase 1: Reference case transport model development
- Phase 2: Testing of agreed site allocations and reporting

1.3.2 The purpose of Phase 1 was to construct a Reference Case spreadsheet model to assess traffic impacts from different development scenarios with varying quantum and distribution. This model covers a base year of 2012 and three forecasting year of 2019, 2024 and 2029, covering both the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hours. This phase ended after the completion of a 2029 Reference Case forecasting, which incorporated all background and committed growth in the borough, and development in neighbouring authorities to provide a future reference case condition for subsequent tests. The spreadsheet model developed in this phase has a strategic nature. Its sole purpose is to support high level analysis to identify potential congestion 'hotspots' and inform individual junction assessment in subsequent phases of the study. This tool does not consider the influence on trip-making due to variations in travel cost so highway traffic is not going to re-route or shift to other modes of transport as a result of congestion.

1.3.3 Phase 2 involves concept level analysis of BDBC's agreed Local Plan allocations to demonstrate the impacts the development would have upon the highway network and test junction mitigation measures with costings and suggested phasing where appropriate.

2 OVERVIEW OF MODELLING AND METHODOLOGY

2.1 Suitability, Purpose and Study Approach

2.1.1 A bespoke spreadsheet model 'Local Plan Transport Assessment Tool' was developed for and used in this study to evaluate traffic impacts from the development proposals. This model was developed in accordance with the Highways Agency's (HA) suggested ETI (Evaluation of Transport Impact) guidance for constructing a link-based spreadsheet model in relation to Local Development Frameworks (LDF). Comments from Hampshire County Council (HCC) and BDBC were also sought during the development of the spreadsheet tool.

2.1.2 The spreadsheet model includes a borough wide network, with motorway, A roads and B roads together with their relevant junctions. The model takes input from the latest traffic counts as the volume of flows on the highway network. It also assesses link and junction capacities[4] and therefore indicates which sections of the highway network are forecasted to experience exacerbated delays in the future. This provides a practical tool that is able to quickly assess traffic impacts from the Local Plan scenario.

2.1.3 Spreadsheet modelling uses aggregate descriptions of travel demand and a simplified representation of interaction between traffic flow and capacity, so the role of the developed model remains at a high level as discussed above. More detailed analysis, such as interaction between traffic of conflicting movements, queuing and delays, at junctions is handled by individual junction models. These models were constructed using industry standard software packages, such as LinSig and ARCADY, for individual junctions that were identified as congestion 'hotspots' by the spreadsheet tool. The combined application of the developed spreadsheet model and detailed junction models provides a suite of tools for the strategic assessment of the traffic impacts from developments in the BDBC Local Plan.

2.2 Study Area

2.2.1 The study area of this assessment was defined by BDBC as shown in Figure 2-1 and Figure 2-2. All results presented in this document are related to traffic impacts incurred on the modelled highway network in Basingstoke and Deane Borough only.

[4] Junction capacity was built into the spreadsheet tool for each entry arm at individual junctions. These values were taken from existing junction models where available or the SATURN traffic model provided by HCC. Fixed values were also adopted as link capacity depending on link classification in accordance with guidance in TA79/99.

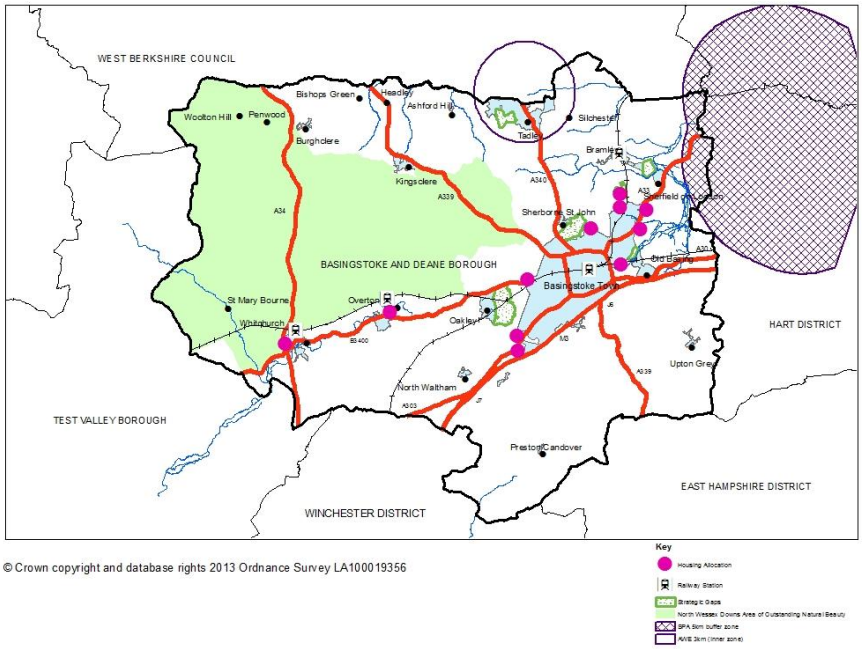


Figure 2-1 Extent of the Borough Wide Network Modelled5

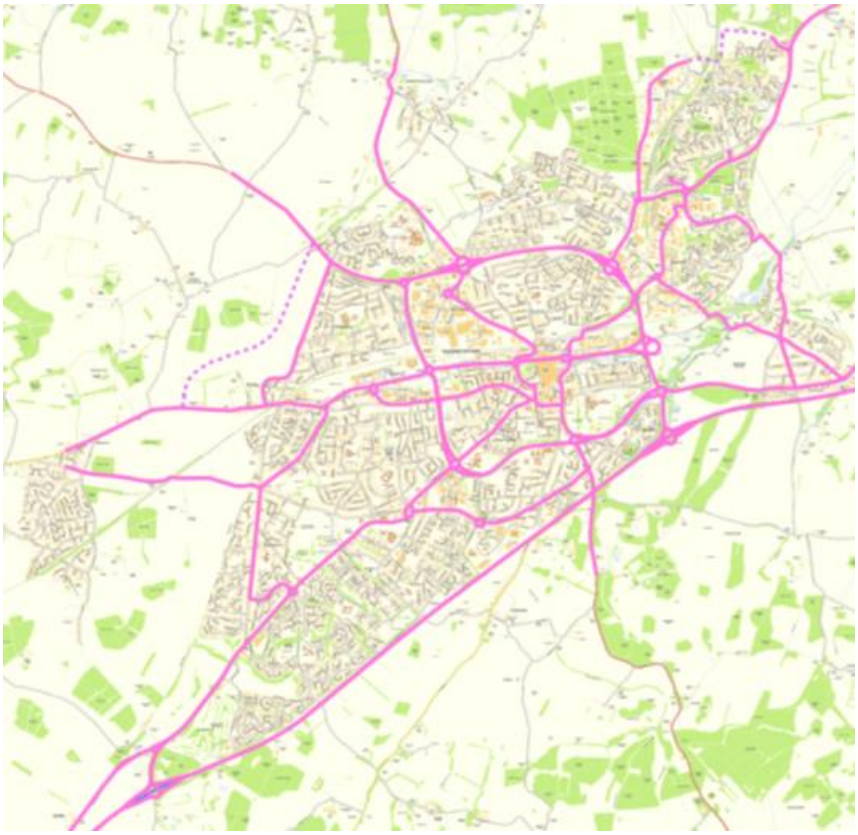


Figure 2-2 Extent of the Urban Network Modelled[6]

[5] This figure is copied from the original tender document issued by BDBC.
[6] This figure is copied from the original tender document issued by BDBC.

2.3 Forecasting Assumptions

Future land use and traffic growth

2.3.1 In addition to a 2012 Base Year scenario, the transport assessment has considered six different sets of future land use assumptions, as set out below, including the committed and planned residential and employment development in the borough up to 2029. Data concerning these assumptions were received from BDBC.

- **Reference Case 2019** – committed developments and background growth by 2019
- **Reference Case 2024** – committed developments and background growth by 2024
- **Reference Case 2029** – committed developments and background growth by 2029
- **Local Plan Scenario 2019** – Reference Case + Local Plan developments by 2019
- **Local Plan Scenario 2024** – Reference Case + Local Plan developments by 2024
- **Local Plan Scenario 2029** – Reference Case + Local Plan developments by 2029

2.3.2 Other factors that may have noticeable impacts on traffic growth in the future include background growth and influence from LDF (or Local Plan) developments in neighbouring areas. The former represents influences from changes in car ownership, income and fuel prices, while the latter captures the cumulative impacts from LDF developments in the following seven Local Planning Authorities:

- West Berkshire Council
- Hart District Council
- East Hampshire District Council
- Winchester City Council
- Test Valley Borough Council
- Reading Borough Council
- Wokingham Borough Council

2.3.3 The number of trips to and from the development in neighbouring areas, committed developments and Local Plan developments were quantified following a trip generation process agreed with the BDBC and HCC, based on data extracted from the Trip Rate Information Computer Database (TRICS).

2.3.4 Appendix A illustrates the location of all developments in individual forecasting scenarios. A breakdown of these development and detailed forecasting methodology are described in Part B, Chapter 8.

Smarter Choice Measures

2.3.5 The impact of smarter choice measures on the amount of trips generated by the developments has been modelled using a reduction of trip numbers according to their length. This methodology is now recommended within WebTAG (Unit 3.10.6) that quotes the Sustainable Travel Towns study[7] which found the following reductions in car use;

- Less than 1km = 22% reduction
- 1km-3km = 14% reduction
- 3km-5km = 10% reduction
- 5km-10km = 6% reduction
- 10km-50km = 3% reduction
- Over 50km = No reduction

2.3.6 The reduction was applied to all Local Plan allocations and the majority of committed developments. The selection of which committed sites to include is based on a qualitative assessment of accessibility undertaken by BDBC and is detailed in section 8.6 of part B.

Network improvements

2.3.7 Two key highway network improvements that are being considered by BDBC are also captured in the developed spreadsheet model. These are:

1) Black Dam Roundabout improvement[8]
2) Link road between B3400 Worting Rd and A339[9]

2.3.8 Figure 2-3 illustrates the indicative location of the network improvements.

[7] Sloman L, Cairns S, Newson C, Anable J, Pridmore A & Goodwin P (2010), The Effects of Smarter Choices Programmes in Sustainable Travel Towns; Research Report, Part III Chapter 13
[8] Based on design scheme design agreed by Highways Agency and Hampshire County Council in 2014
[9] Based on indicative drawings from BDBC on 09/04/2013

Figure 2-3 An Illustration of Network Changes in the Future

2.3.9 The network improvements included within each modelled scenario are described in Table 2-1 below.

Table 2-1 Network Changes in the Modelled Future Scenarios

Highway improvements \ Networks	Year	Black Dam Improvements	A339 / B3400 Link Road
Reference Case	2019	Yes	No
	2024	Yes	No
	2029	Yes	No
Local Plan Scenario	2019	Yes	No
	2024	Yes	No
	2029	Yes	Yes

2.3.10 The improvements at Black Dam Roundabout are represented by an increase in capacity of this location in the spreadsheet model. The introduction of the Link Road between the A339 and B3400 is captured by altering the routes of a proportion of traffic that could reasonably be expected to use the new Link Road as an alternative. This alleviates congestion at other locations in the network, in particular the A339 \ Ringway West Roundabout, Thorneycroft Roundabout, A339 / Roman Road Roundabout and Worting Road / Roman Way Roundabout.

3 INITIAL MODELLING RESULTS AND ANALYSIS

3.1 Introduction

3.1.1 This chapter provides graphical and tabulated findings of the traffic impacts resulting from different Local Plan development scenarios in comparison to a reference case condition in three forecasting years; 2019, 2024, 2029. The analysis covers traffic impacts such as additional flow on the modelled network and its subsequent effect on the performance of highway links and junctions.

3.1.2 It should be noted that the comparison reported within this chapter represents traffic impacts predicted to occur as a compounded result of the net increase in development between the 2029 reference case and Local Plan scenarios, the influences from background growth in Basingstoke and Deane Borough and cumulative impacts from LDF developments promoted by neighbouring Local Planning Authorities. No allowance was made for potential variable demand responses such as peak spreading, so the reported forecasting results represent a worst case scenario.

3.1.3 Traffic forecasts were undertaken for the land use scenarios detailed below. The Reference Case scenarios do not include any highway alterations, whereas all Local Plan scenarios include improvements to Black Dam Roundabout. The 2029 local Plan Scenario also includes the A339 / B3400 link road.

- **Reference Case 2019** – committed developments by 2019
- **Reference Case 2024** – committed developments by 2024
- **Reference Case 2029** – committed developments by 2029
- **Local Plan Scenario 2019** – Reference Case developments + Local Plan developments by 2019
- **Local Plan Scenario 2024** – Reference Case developments + Local Plan developments by 2024
- **Local Plan Scenario 2029** – Reference Case developments + Local Plan developments by 2029

3.2 Unconstrained Vehicle Travel Demand Increase

3.2.1 Table 3-1 through to Table 3-4 list the key components of travel demand growth considered in the study and the corresponding increase in the number of trips for different forecasting scenarios.

3.2.2 Certain elements of the growth, namely the background growth and any development sites with less than 40 dwellings or 30 jobs, are represented by area-wide growth factors and hence the exact trip number growth attributed to these contributors is not listed here. A detailed description of this process is available in Chapter 8 in Part B of this report.

Table 3-1 Unconstrained Vehicle Travel Demand Growth – AM Trips to Development

Source of Growth		Reference Case			Local Plan		
		2019	2024	2029	2019	2024	2029
Background growth		*			*	*	*
Committed	Identified residential and commercial sites (sites >= 40 dwellings or 30 jobs)	1248	1463	1463	1248	1463	1463
	Area wide growth (outstanding small site commitments and sites < 40 dwellings or 30 jobs)	*			*	*	*
Trips from Basingstoke to neighbouring areas**		872	1303	1555	611	886	1096
Basingstoke Local Plan allocations	Sites from emerging local plan and unallocated or non-committed sites from existing local plan (sites >= 40 dwellings or 30 jobs)	0	0	0	859	1536	2159
	Area wide growth (windfall and sites < 40 dwellings or 30 jobs)	*	*	*	*	*	*

* Background and small sites were implemented through area wide growth factors as detailed in Chapter 8, Part B of this report.

Table 3-2 Unconstrained Vehicle Travel Demand Growth – AM Trips from Development

Source of Growth		Reference Case			Local Plan		
		2019	2024	2029	2019	2024	2029
Background growth		*			*	*	*
Committed	Identified residential and commercial sites (sites >= 40 dwellings or 30 jobs)	1269	1425	1425	1269	1425	1425
	Area wide growth (outstanding small site commitments and sites < 40 dwellings or 30 jobs)	*			*	*	*
Trips from Basingstoke to neighbouring areas**		196	537	757	133	256	362
Basingstoke Local Plan allocations	Sites from emerging local plan and unallocated or non-committed sites from existing local plan (sites >= 40 dwellings or 30 jobs)	0			734	2081	3145
	Area wide growth (windfall and sites < 40 dwellings or 30 jobs)	*			*	*	*

* Background and small sites were implemented through area wide growth factors as detailed in Chapter 8, Part B of this report.

Table 3-3 Unconstrained Vehicle Travel Demand Growth – PM Trips to Development

Source of Growth		Reference Case			Local Plan		
		2019	2024	2029	2019	2024	2029
Background growth		*			*	*	*
Committed	Identified residential and commercial sites (sites >= 40 dwellings or 30 jobs)	1326	1471	1471	1326	1471	1471
	Area wide growth (outstanding small site commitments and sites < 40 dwellings or 30 jobs)	*			*	*	*
Trips from Basingstoke to neighbouring areas**		843	1262	1624	421	772	1089
Basingstoke Local Plan allocations	Sites from emerging local plan and unallocated or non-committed sites from existing local plan (sites >= 40 dwellings or 30 jobs)	0			1250	2569	3609
	Area wide growth (windfall and sites < 40 dwellings or 30 jobs)	*			*	*	*

* Background and small sites were implemented through area wide growth factors as detailed in Chapter 8, Part B of this report.

Table 3-4 Unconstrained Vehicle Travel Demand Growth – PM Trips from Development

Source of Growth		Reference Case			Local Plan		
		2019	2024	2029	2019	2024	2029
Background growth		*			*	*	*
Committed	Identified residential and commercial sites (sites >= 40 dwellings or 30 jobs)	1405	1606	1606	1405	1606	1606
	Area wide growth (outstanding small site commitments and sites < 40 dwellings or 30 jobs)	*			*	*	*
Trips from Basingstoke to neighbouring areas**		638	977	1257	465	710	913
Basingstoke Local Plan allocations	Sites from emerging local plan and unallocated or non-committed sites from existing local plan (sites >= 40 dwellings or 30 jobs)	0			1242	2068	2777
	Area wide growth (windfall and sites < 40 dwellings or 30 jobs)	*			*	*	*

* Background and small sites were implemented through area wide growth factors as detailed in Chapter 8, Part B of this report.

3.2.3 Table 3-5 through to Table 3-10 illustrate how the forecasted growth in total travel demand is cascaded to key links in the modelled network after going through the trip distribution and assignment processes (Chapter 8, Part B of this report). These links were selected according to the following three rules, as illustrated in Figure 3-1, to give a comprehensive view of changes on highway travel demand in Basingstoke in the future:

- Cordon links that directly feed traffic to the Ringway from all directions
- Selected links on different sections of the Ringway
- Selected links within the urban area enveloped by the Ringway

3.2.4 Table 3-5 through to Table 3-6 detail traffic flows on Cordon Links around the Ringway for different time periods and development scenarios. The variations in traffic volumes in the Local Plan scenarios are also reported as percentages of the link volume in the Reference Case.

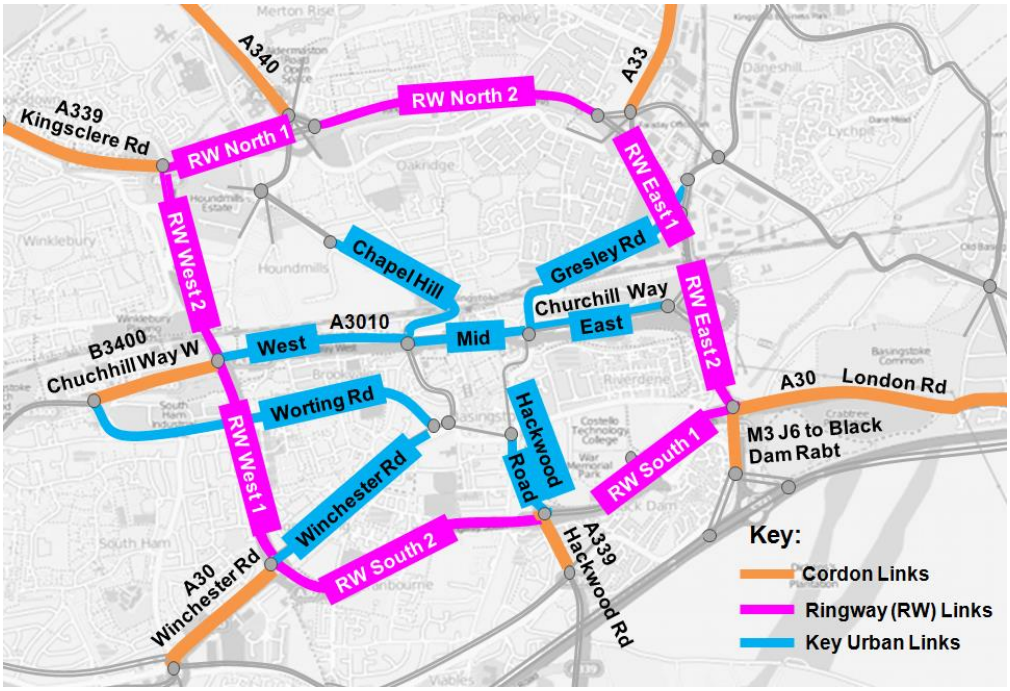


Figure 3-1 Key Highway Links (Cordon, Ringway and Inner Urban Area)

Table 3-5: AM Unconstrained Traffic Demand on Cordon Links (PCUs / Hour)

		Reference Case			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Inbound	A340	1636	1695	1730	1618	-1%	1676	-1%	1710	-1%
	A33	2619	2760	2817	2721	4%	3202	16%	3321	18%
	A30 London Rd	1245	1301	1342	1240	0%	1323	2%	1365	2%
	M3 J6 to Black Dam Rbt	3932	4051	4125	4038	3%	4194	4%	4296	4%
	A339 Hackwood Rd	1947	2030	2063	2064	6%	2221	9%	2327	13%
	A30 Winchester Rd	2230	2326	2379	2469	11%	2749	18%	3018	27%
	B3400 Churchill Way W	1585	1624	1649	1687	6%	1895	17%	2167	31%
	A339 Kingsclere Rd	2684	2805	2861	2752	3%	3186	14%	3604	26%
	Subtotal	**17878**	**18592**	**18966**	**18591**	**4%**	**20447**	**10%**	**21809**	**15%**
Outbound	A340	2100	2184	2241	2085	-1%	2163	-1%	2216	-1%
	A33	2881	2969	3013	2934	2%	3247	9%	3394	13%
	A30 London Rd	1106	1149	1179	1059	-4%	1102	-4%	1131	-4%
	M3 J6 to Black Dam Rbt	2372	2445	2492	2345	-1%	2423	-1%	2475	-1%
	A339 Hackwood Rd	1462	1509	1542	1487	2%	1539	2%	1575	2%
	A30 Winchester Rd	1709	1835	1864	1771	4%	1910	4%	1945	4%
	B3400 Churchill Way W	764	786	797	842	10%	975	24%	1177	48%
	A339 Kingsclere Rd	2106	2205	2259	2156	2%	2433	10%	2593	15%
	Subtotal	**14502**	**15083**	**15387**	**14679**	**1%**	**15792**	**5%**	**16507**	**7%**

Table 3-6: PM Unconstrained Traffic Demand on Cordon Links (PCUs / Hour)

		Reference Case			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Inbound	A340	1421	1483	1524	1409	-1%	1467	-1%	1505	-1%
	A33	2465	2580	2642	2554	4%	2911	13%	3075	16%
	A30 London Rd	823	874	912	802	-3%	841	-4%	870	-5%
	M3 J6 to Black Dam Rbt	2488	2592	2668	2480	0%	2581	0%	2657	0%
	A339 Hackwood Rd	1463	1539	1603	1567	7%	1652	7%	1723	7%
	A30 Winchester Rd	1442	1554	1604	1623	13%	1755	13%	1819	13%
	B3400 Churchill Way W	1041	1070	1091	1251	20%	1398	31%	1419	30%
	A339 Kingsclere Rd	1965	2072	2124	2031	3%	2343	13%	2600	22%
	Subtotal	**13108**	**13763**	**14169**	**13717**	**5%**	**14947**	**9%**	**15668**	**11%**
Outbound	A340	1692	1795	1869	1688	0%	1792	0%	1867	0%
	A33	2805	2956	3019	2892	3%	3391	15%	3539	17%
	A30 London Rd	814	864	902	767	-6%	842	-3%	896	-1%
	M3 J6 to Black Dam Rbt	2955	3065	3135	2998	1%	3161	3%	3264	4%
	A339 Hackwood Rd	2085	2170	2215	2197	5%	2359	9%	2474	12%
	A30 Winchester Rd	2290	2407	2476	2666	16%	2979	24%	3285	33%
	B3400 Churchill Way W	1465	1518	1554	1613	10%	1830	21%	2244	44%
	A339 Kingsclere Rd	2409	2579	2673	2546	6%	2839	10%	2979	11%
	Subtotal	**16516**	**17355**	**17844**	**17366**	**5%**	**19193**	**11%**	**20550**	**15%**

3.2.5 It can be observed from Table 3-5 and Table 3-6 that generally there is a clear increase in the volume of traffic in and out of Basingstoke as a result of the Local Plan development. This mainly covers key corridors such as the A33, A30 Winchester Road, B3400 and A339 Kingsclere Road.

3.2.6 The modelling results also suggest there may even be a minor reduction in demand (compared to the 2029 Reference Case) on some roads in the Local Plan scenarios. In reality, this can be attributed to different patterns in how travel demand growth is distributed across the highway network as a result of different land use patterns between the Reference Case and Local Plan scenarios

3.2.7 Table 3-7 and Table 3-8 present the volume of traffic on different sections of the Ringway together with their indicative link capacity. The increase in travel demand resulting from Local Plan development is clearly noticeable and the percentage of increase varies widely across different parts of Ringway.

Table 3-7 AM Unconstrained Traffic Demand on Ringway Links (PCUs / Hour)

		Reference Case			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Clockwise	Ringway North 1	2232	2321	2365	2466	10%	2718	17%	2970	26%
	Ringway North 2	2438	2532	2579	2487	2%	2704	7%	2838	10%
	Ringway East 1	4013	4168	4247	4114	3%	4670	12%	5162	22%
	Ringway East 2	3197	3319	3375	3232	1%	3546	7%	3777	12%
	Ringway South 1	3134	3284	3342	3186	2%	3538	8%	3716	11%
	Ringway South 2	3211	3305	3366	3192	-1%	3325	1%	3389	1%
	Ringway West 1	2237	2295	2332	2273	2%	2373	3%	2415	4%
	Ringway West 2	1210	1269	1289	1218	1%	1320	4%	1387	8%
Anti-clockwise	Ringway North 1	1729	1809	1838	1789	3%	1888	4%	1925	5%
	Ringway North 2	1911	2002	2033	1933	1%	2083	4%	2184	7%
	Ringway East 1	2914	3043	3102	2969	2%	3301	8%	3445	11%
	Ringway East 2	2537	2678	2764	2706	7%	3134	17%	3338	21%
	Ringway South 1	3051	3170	3247	3146	3%	3362	6%	3449	6%
	Ringway South 2	5008	5172	5277	5230	4%	5510	7%	5669	7%
	Ringway West 1	2262	2330	2371	2363	4%	2491	7%	2563	8%
	Ringway West 2	1378	1446	1478	1380	0%	1511	4%	1599	8%

Table 3-8 PM Unconstrained Traffic Demand on Ringway Links in Network A or C (PCUs / Hour)

		Reference Case			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Clockwise	Ringway North 1	1543	1671	1725	1772	15%	1968	18%	2054	19%
	Ringway North 2	1952	2088	2148	2015	3%	2258	8%	2199	2%
	Ringway East 1	3119	3301	3384	3227	3%	3683	12%	3917	16%
	Ringway East 2	2293	2434	2499	2511	10%	3044	25%	3313	33%
	Ringway South 1	1572	1672	1726	1728	10%	2058	23%	2289	33%
	Ringway South 2	3557	3712	3806	3839	8%	4143	12%	4350	14%
	Ringway West 1	1677	1757	1807	1953	16%	2109	20%	2224	23%
	Ringway West 2	896	980	1032	1273	42%	1516	55%	1707	65%
Anti-clockwise	Ringway North 1	2473	2573	2620	2530	2%	2775	8%	2952	13%
	Ringway North 2	2785	2901	2956	2826	1%	3046	5%	3379	14%
	Ringway East 1	3668	3910	4011	3822	4%	4252	9%	4562	14%
	Ringway East 2	3135	3299	3392	3256	4%	3597	9%	3819	13%
	Ringway South 1	2336	2484	2562	2417	3%	2632	6%	2720	6%
	Ringway South 2	3418	3597	3698	3509	3%	3754	4%	3857	4%
	Ringway West 1	1994	2104	2153	2104	6%	2298	9%	2362	10%
	Ringway West 2	1292	1379	1404	1295	0%	1452	5%	1541	10%

3.2.8 Table 3-9 and Table 3-10 present similar information for selected links in the urban area of Basingstoke bordered by the Ringway. It is forecasted that queuing and delays in the urban area would deteriorate in future years as a result of capacity constraint at entries to individual junctions rather than on the highway links. This is recognised as the most common contributing factor to traffic congestion in urban areas. Further analysis of junction performance is reported in Section 4 of this report.

Table 3-9 AM Unconstrained Traffic Demand on Selected Urban Links (PCUs / Hour)

Road Name	Dir	Baseline			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Chapel Hill	NB	1279	1308	1326	1302	2%	1357	4%	1377	4%
	SB	565	578	586	614	9%	680	18%	689	18%
Gresley Road	WB	578	635	642	742	28%	821	29%	866	35%
	EB	1047	1071	1086	1049	0%	1075	0%	1092	1%
A3010 Churchill Way East	WB	2870	2950	2989	3116	9%	3309	12%	3418	14%
	EB	800	818	830	843	5%	867	6%	882	6%
A3010 Churchill Way Mid	WB	982	1005	1019	989	1%	1019	1%	1035	2%
	EB	2206	2261	2292	2519	14%	2773	23%	3052	33%
A3010 Churchill Way West	WB	976	997	1010	1100	13%	1161	16%	1180	17%
	EB	1891	1939	1966	2186	16%	2412	24%	2685	37%
Worting Road	WB	789	807	818	790	0%	810	0%	823	1%
	EB	699	715	725	700	0%	717	0%	729	1%
Winchester Road	WB	709	771	781	711	0%	774	0%	784	0%
	EB	739	756	766	749	1%	776	3%	788	3%
Hackwood Road	NB	971	1013	1023	1005	3%	1131	12%	1195	17%
	SB	801	819	831	814	2%	847	3%	860	3%

Table 3-10: PM Unconstrained Traffic Demand on Selected Urban Links (PCUs / Hour)

Road Name	Dir	Baseline			Local Plan Scenarios					
		2019	2024	2029	2019		2024		2029	
Chapel Hill	NB	867	891	909	917	6%	995	12%	1014	12%
	SB	1045	1074	1095	1083	4%	1154	7%	1177	8%
Gresley Road	WB	822	845	861	823	0%	848	0%	866	1%
	EB	529	543	554	758	43%	790	45%	830	50%
A3010 Churchill Way East	WB	1368	1406	1433	1489	9%	1546	10%	1578	10%
	EB	1630	1676	1708	2055	26%	2135	27%	2221	30%
A3010 Churchill Way Mid	WB	1140	1172	1195	1254	10%	1309	12%	1349	13%
	EB	1312	1349	1375	1661	27%	1739	29%	1773	29%
A3010 Churchill Way West	WB	1792	1842	1877	1942	8%	2133	16%	2319	24%
	EB	699	716	728	1060	52%	1091	52%	1110	53%
Worting Road	WB	561	577	586	561	0%	577	0%	590	1%
	EB	917	944	959	917	0%	944	0%	964	1%
Winchester Road	WB	862	941	905	860	0%	940	0%	1000	10%
	EB	637	675	647	637	0%	675	0%	689	6%
Hackwood Road	NB	720	740	754	730	1%	760	3%	776	3%
	SB	1217	1250	1274	1374	13%	1442	15%	1485	17%

3.3 Network Link Performance

3.3.1 This section reports the capacity of key highway links (excluding junctions) and looks at the carriageway lane requirements between junctions in the modelled network in the Reference Case and Local Plan scenarios. The performance indicator used in this assessment is the Ratio of Flow over Capacity (RFC). A RFC value over 1 suggests that the highway demand intending to travel through a section of the highway over a given period of time is higher than its capacity for the same time period.

3.3.2 RFC values for key links highlighted in Figure 3-1 are tabulated in Table 3-11 to Table 3-16.

3.3.3 It should be noted that these RFC values take into account the capacity of individual road links as well as constraints at entries to the downstream junction at the exit of links. This approach is more realistic in reflecting how individual road links may operate in different future scenarios. Links are highlighted in red in the tables below for the following two situations:

- The RFC in the Reference Case is below 1 but the additional traffic from the Local Plan development increases the total demand beyond what the link or the downstream junction can accommodate (RFC > 1) in the modelled hours.
- The RFC is over 1 in both the 2029 Reference Case and Local Plan scenarios but the increase in the latter is greater than 10% when compared to the reference conditions.

3.3.4 It can be observed from the following tables that, although traffic growth from Local Plan development generally increases the travel demand and therefore the RFC on key links in the study area, there are relatively few cases where the growth from the Local Plan scenarios pushes the RFC values of these links over 1 or increases the RFC by more than 10%. Links where one of these instances occurs include Winchester Road, A339 Kingsclere Road, some sections of Churchill Way and sections of the Ringway, and are highlighted in red in the following tables.

3.3.5 It should be noted that the results presented reflect a worst case scenario as the RFC assessment considers all travel demand (demand flows) that intends to go through individual links. In reality some of this demand may not materialise in the modelled hours due to congestion elsewhere in the network. Therefore the actual congestion in the future network is likely to be less than what was forecasted by the model. Furthermore, the current assessment does not consider impacts from changes in travel behaviours as a result of increasing congestion which is likely to further limit the level of congestion that would occur as a result of the Local Plan development.

Table 3-11 AM RFCs on Cordon Links

		Road Type	Baseline			Local Plan Scenarios		
			2019	2024	2029	2019	2024	2029
Inbound	A340	S2-Rural-60	1.14	1.18	1.21	1.13	1.17	1.19
	A33	D2-Rural-50	0.64	0.67	0.69	0.66	0.78	0.81
	A30 London Rd	S1-Rural-60	0.87	0.91	0.94	1.93	2.06	2.12
	M3 J6 to Black Dam Rbt	D3-Rural-70	1.42	1.46	1.48	1.45	1.51	1.55
	A339 Hackwood Rd	S2-Rural-60	1.36	1.41	1.44	1.44	1.55	1.62
	A30 Winchester Rd	D2-Rural-50	0.80	0.84	0.85	0.89	0.99	1.08
	B3400 Churchill Way W	S2-Urban-50	1.10	1.13	1.15	1.18	1.32	1.51
	A339 Kingsclere Rd	D2-Rural-70	1.13	1.18	1.21	1.16	1.35	1.52
Outbound	A340	S2-Rural-60	1.46	1.52	1.56	1.45	1.51	1.54
	A33	D2-Rural-50	0.75	0.77	0.78	0.76	0.84	0.88
	A30 London Rd	S2-Rural-60	0.79	0.82	0.84	0.76	0.79	0.81
	M3 J6 to Black Dam Rbt	D2-Rural-70	0.85	0.87	0.89	0.84	0.87	0.88
	A339 Hackwood Rd	S2-Rural-60	1.02	1.05	1.07	1.04	1.07	1.10
	A30 Winchester Rd	D2-Rural-50	0.89	0.98	0.99	0.90	0.99	1.00
	B3400 Churchill Way W	S2-Urban-50	0.53	0.55	0.56	0.59	0.68	0.82
	A339 Kingsclere Rd	D2-Rural-70	0.63	0.67	0.69	0.66	0.78	0.79

Table 3-12 PM RFCs on Cordon Links

		Road Type	Baseline			Local Plan Scenarios		
			2019	2024	2029	2019	2024	2029
Inbound	A340	S2-Rural-60	0.99	1.03	1.03	0.98	1.02	1.05
	A33	D2-Rural-50	0.60	0.63	0.63	0.62	0.71	0.75
	A30 London Rd	S1-Rural-60	0.57	0.61	0.61	1.25	1.31	1.35
	M3 J6 to Black Dam Rbt	D3-Rural-70	0.90	0.93	0.93	0.89	0.93	0.96
	A339 Hackwood Rd	S2-Rural-60	1.02	1.07	1.07	1.09	1.15	1.20
	A30 Winchester Rd	D2-Rural-50	0.52	0.56	0.56	0.58	0.63	0.65
	B3400 Churchill Way W	S2-Urban-50	0.73	0.75	0.75	0.87	0.97	0.99
	A339 Kingsclere Rd	D2-Rural-70	0.83	0.87	0.87	0.86	0.99	1.10
Outbound	A340	S2-Rural-60	1.18	1.25	1.25	1.18	1.25	1.30
	A33	D2-Rural-50	0.74	0.78	0.78	0.76	0.90	0.94
	A30 London Rd	S2-Rural-60	0.57	0.60	0.60	0.53	0.59	0.62
	M3 J6 to Black Dam Rbt	D2-Rural-70	1.06	1.09	1.09	1.07	1.13	1.17
	A339 Hackwood Rd	S2-Rural-60	1.45	1.51	1.51	1.53	1.64	1.72
	A30 Winchester Rd	D2-Rural-50	1.43	1.50	1.50	1.71	1.92	2.13
	B3400 Churchill Way W	S2-Urban-50	1.02	1.06	1.06	1.12	1.28	1.56
	A339 Kingsclere Rd	D2-Rural-70	0.97	1.04	1.04	1.04	1.17	1.24

Table 3-13 AM RFCs on Ringway Links (PCUs / Hour)

			Baseline			Local Plan Scenarios		
		Road Type	2019	2024	2029	2019	2024	2029
Clockwise	Ringway North 1	D2-Urban-50	1.16	1.16	1.20	1.22	1.19	1.35
	Ringway North 2	D2-Urban-70	0.92	0.92	0.96	0.97	0.93	1.02
	Ringway East 1	D2-Urban-70	0.90	0.90	0.95	0.96	0.92	1.02
	Ringway East 2	D2-Urban-70	0.93	0.95	0.97	1.36	1.42	1.45
	Ringway South 1	D2-Urban-70	0.65	0.65	0.66	0.67	0.66	0.69
	Ringway South 2	S2-Urban-60	1.02	1.02	1.07	1.09	1.03	1.11
	Ringway West 1	D2-Urban-70	1.12	1.12	1.17	1.19	1.25	1.39
	Ringway West 2	D2-Urban-70	1.11	1.11	1.16	1.18	1.14	1.27
Anti-clockwise	Ringway North 1	D2-Urban-50	0.96	0.96	1.00	1.02	0.98	1.08
	Ringway North 2	D2-Urban-70	0.73	0.73	0.77	0.80	0.78	0.90
	Ringway East 1	D2-Urban-70	0.88	0.88	0.91	0.94	0.91	0.97
	Ringway East 2	D2-Urban-70	1.44	1.44	1.49	1.52	1.51	1.59
	Ringway South 1	D2-Urban-70	1.34	1.34	1.38	1.41	1.52	1.60
	Ringway South 2	S2-Urban-60	0.98	0.98	1.03	1.06	0.99	1.08
	Ringway West 1	D2-Urban-70	0.70	0.70	0.73	0.74	0.72	0.76
	Ringway West 2	D2-Urban-70	0.68	0.68	0.71	0.73	0.69	0.74

Table 3-14 PM RFCs on Ringway Links (PCUs / Hour)

			Baseline			Local Plan Scenarios		
		Road Type	2019	2024	2029	2019	2024	2029
Clockwise	Ringway North 1	D2-Urban-50	0.90	0.95	0.95	0.93	1.06	1.13
	Ringway North 2	D2-Urban-70	0.66	0.70	0.70	0.72	0.88	0.96
	Ringway East 1	D2-Urban-70	0.45	0.48	0.48	0.50	0.59	0.66
	Ringway East 2	D2-Urban-70	1.03	1.07	1.07	1.64	1.77	1.85
	Ringway South 1	D2-Urban-70	0.48	0.51	0.51	0.56	0.61	0.64
	Ringway South 2	S2-Urban-60	0.76	0.83	0.83	1.07	1.28	1.44
	Ringway West 1	D2-Urban-70	0.80	0.87	0.87	0.93	1.04	1.09
	Ringway West 2	D2-Urban-70	1.02	1.10	1.10	1.06	1.20	1.19
Anti-clockwise	Ringway North 1	D2-Urban-50	1.19	1.26	1.26	1.24	1.37	1.46
	Ringway North 2	D2-Urban-70	0.90	0.95	0.95	0.94	1.04	1.10
	Ringway East 1	D2-Urban-70	0.67	0.72	0.72	0.70	0.76	0.78
	Ringway East 2	D2-Urban-70	0.99	1.04	1.04	1.01	1.08	1.11
	Ringway South 1	D2-Urban-70	1.18	1.25	1.25	1.35	1.48	1.52
	Ringway South 2	S2-Urban-60	0.92	0.98	0.98	0.92	1.04	1.10
	Ringway West 1	D2-Urban-70	0.93	0.96	0.96	0.95	1.04	1.11
	Ringway West 2	D2-Urban-70	0.99	1.03	1.03	1.01	1.09	1.21

Table 3-15 AM RFCs on Selected Urban Links (PCUs / Hour)

Road Name	Dir	Road Type	Baseline			Local Plan Scenarios		
			2019	2024	2029	2019	2024	2029
Chapel Hill	NB	ChapelHill-Bridge	0.98	1.00	1.01	1.00	1.04	1.05
	SB		0.46	0.47	0.48	0.50	0.56	0.56
Gresley Road	WB	S2-Urban-30	0.40	0.44	0.45	0.52	0.57	0.60
	EB		0.73	0.75	0.76	0.73	0.75	0.76
A3010 Churchill Way East	WB	D2-Rural-70	0.78	0.81	0.82	0.81	0.88	0.90
	EB		0.20	0.20	0.21	0.21	0.22	0.22
A3010 Churchill Way Mid	WB	D2-Urban-30	0.40	0.41	0.41	0.45	0.47	0.48
	EB		0.69	0.71	0.72	0.73	0.80	0.88
A3010 Churchill Way West	WB	D2-Rural-50	0.45	0.46	0.47	0.51	0.54	0.55
	EB		0.97	0.99	1.01	1.12	1.24	1.38
Worting Road	WB	S2-Urban-30	0.85	0.87	0.88	0.85	0.87	0.88
	EB		0.86	0.88	0.89	0.86	0.88	0.90
Winchester Road	WB	S2-Urban-30	0.95	1.04	1.05	0.96	1.04	1.06
	EB		0.51	0.53	0.53	0.52	0.54	0.55
Hackwood Road	NB	S2-Urban-30	0.68	0.71	0.71	0.70	0.79	0.83
	SB		0.56	0.57	0.58	0.57	0.60	0.61

Table 3-16 PM RFCs on Selected Urban Links (PCUs / Hour)

Road Name	Dir	Road Type	Baseline			Local Plan Scenarios		
			2019	2024	2029	2019	2024	2029
Chapel Hill	NB	ChapelHill-Bridge	0.66	0.68	0.68	0.70	0.76	0.78
	SB		0.85	0.88	0.88	0.89	0.94	0.96
Gresley Road	WB	S2-Urban-30	0.57	0.59	0.59	0.57	0.59	0.60
	EB		0.37	0.38	0.38	0.53	0.55	0.58
A3010 Churchill Way East	WB	D2-Rural-70	0.44	0.46	0.46	0.45	0.47	0.48
	EB		0.41	0.42	0.42	0.51	0.53	0.56
A3010 Churchill Way Mid	WB	D2-Urban-30	0.57	0.59	0.59	0.64	0.67	0.69
	EB		0.49	0.51	0.51	0.55	0.58	0.60
A3010 Churchill Way West	WB	D2-Rural-50	0.61	0.62	0.62	0.68	0.76	0.84
	EB		0.31	0.32	0.32	0.50	0.51	0.52
Worting Road	WB	S2-Urban-30	0.60	0.62	0.62	0.60	0.62	0.63
	EB		0.86	0.88	0.88	0.86	0.88	0.90
Winchester Road	WB	S2-Urban-30	1.16	1.27	1.27	1.16	1.27	1.35
	EB		0.44	0.47	0.47	0.44	0.47	0.48
Hackwood Road	NB	S2-Urban-30	0.54	0.56	0.56	0.55	0.57	0.58
	SB		1.09	1.15	1.15	1.40	1.70	1.83

3.4 Junction Performance

3.4.1 In urban areas, traffic delay and congestion is most likely caused by capacity constraint at entries to junctions rather than the capacity of the link. This section is focused on changes in the performance of individual junctions in terms of RFC values in different forecasting scenarios based upon unconstrained travel demand growth. It should be noted that the RFC analysis presented in this section is based on the high level modelling results from the spreadsheet tool rather than detailed junction modelling. The outputs shown are indicative only and should not be considered definitive.

3.4.2 Figure 3-2 illustrates the location of junctions that would likely experience a worsening in performance in the Local Plan Scenario in comparison to the 2029 Reference conditions. In this context, 'worsening' is mainly defined by the following two rules:

- Junctions that operate with the maximum RFC on individual entries no more than 1 in 2029 Reference but over 1 in Local Plan scenario
- Junctions that operate with the maximum RFC on individual entries over 1 in both 2029 Reference and Local Plan scenario but the latter would lead to an maximum RFC at least 10% higher than the former

Figure 3-2 Junctions to Experience a Worsening Performance in the Local Plan Scenario

3.4.3 The junctions highlighted in Figure 3-2 were proposed as an initial list of congestion 'hotspots' for further assessment and screening. After discussion with BDBC and HCC, 13 junctions in and around Basingstoke were selected for further detailed assessment due to their importance to the network and the predicted impact of the Local Plan development. Some junctions identified as a 'hotspot' have not been taken forward for further testing, since detailed junction assessments have been undertaken and proposed improvements have been developed outside of this study. HCC are currently undertaking assessments of A33 / Gaiger Avenue, A33 / Thornhill Way, Binfields roundabout, Winchester Road Roundabout, Thorneycroft Roundabout and Crockford Roundabout. In addition, Eastrop Roundabout is being assessed through the Basing View Masterplan.

3.4.4 It is important to note that junctions outside of this area on the strategic highway network (such as those in Whitchurch and Overton) will operate within capacity in 2029 with Local Plan development. The location of the 13 selected junctions that are subject to detailed assessment is shown in Figure 3-3.

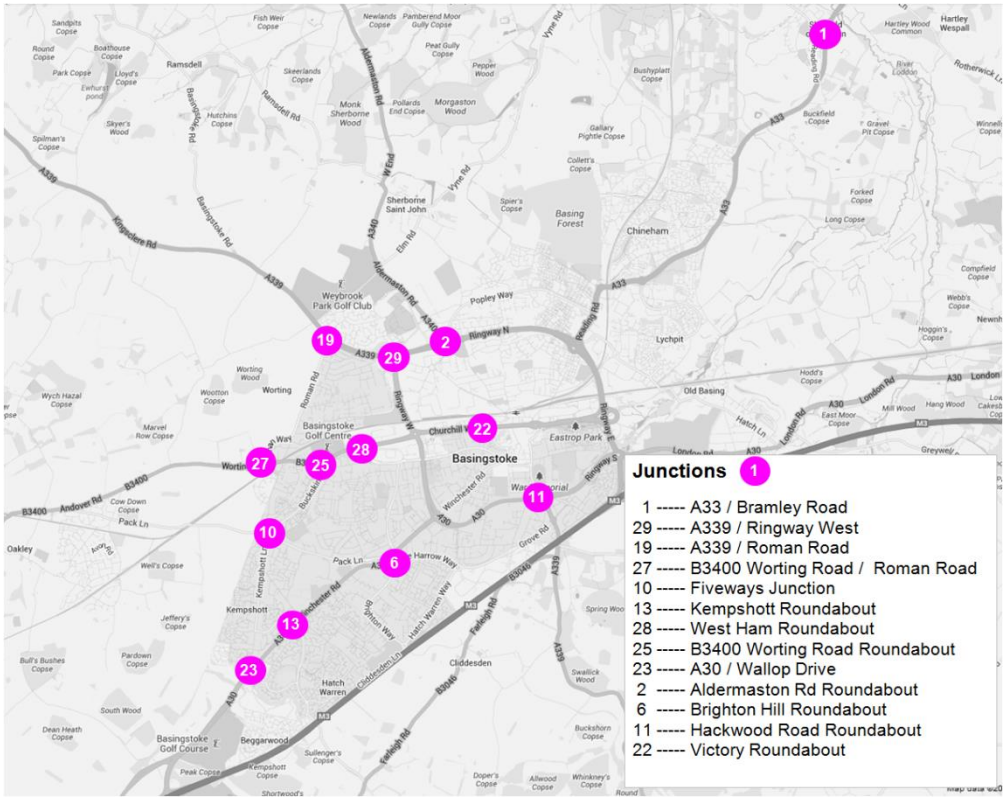


Figure 3-3 Key Junctions Selected for Mitigation

3.4.5 Table 3-17 to Table 3-20 present RFC values forecasted in the spreadsheet model for the 13 selected junctions. They demonstrate the change in junction performance with and without Local Plan developments. Both maximum and average RFCs are provided so the performance of junctions can be judged by either the worst performing entry or an average of all entry arms at individual junctions.

Table 3-17 An Overview of Junction Max RFC's in the AM Peak

no	Junction Names	Baseline			Local Plan Scenarios		
		2019	2024	2029	2019	2024	2029
1	A33 / Bramley Rd	0.97	1.04	1.06	1.08	1.26	1.36
29	A339 / Ringway West Rdbt	1.13	1.18	1.21	1.16	1.35	1.52
19	A339 / Roman Rd	0.98	1.02	1.05	1.03	1.28	1.53
27	B3400 Worting Rd / Roman Rd	1.25	1.29	1.32	1.42	1.74	1.91
10	Fiveways Junction	1.65	1.70	1.73	1.69	1.87	2.13
13	Kemptshott Rdbt	1.23	1.33	1.36	1.50	1.85	2.22
28	West Ham Rdbt	0.85	0.87	0.88	0.85	0.87	0.88
25	Worting Road Rdbt	0.74	0.76	0.77	0.83	1.00	1.16
23	A30 / Wallop Drive	0.71	0.74	0.76	0.79	0.96	1.13
2	Aldemaston Rd Rdbt	1.11	1.16	1.17	1.11	1.16	1.18
6	Brighton Hill Rdbt	1.13	1.20	1.23	1.30	1.52	1.73
11	Hackwood Rd Rdbt	0.98	1.03	1.06	0.99	1.08	1.14
22	Victory Rdbt	0.97	0.99	1.01	1.12	1.24	1.38

Table 3-18 An Overview of Junction Average RFC's in the AM Peak

no	Junction Names	Baseline			Local Plan Scenarios		
		2019	2024	2029	2019	2024	2029
1	A33 / Bramley Rd	0.71	0.75	0.76	0.77	0.93	1.02
29	A339 / Ringway West Rdbt	1.07	1.11	1.14	1.09	1.23	1.32
19	A339 / Roman Rd	0.62	0.65	0.67	0.64	0.75	0.81
27	B3400 Worting Rd / Roman Rd	0.83	0.85	0.87	0.91	1.10	1.18
10	Fiveways Junction	1.23	1.28	1.30	1.25	1.39	1.52
13	Kemptshott Rdbt	0.76	0.80	0.81	0.83	0.94	1.04
28	West Ham Rdbt	0.36	0.37	0.37	0.38	0.41	0.44
25	Worting Road Rdbt	0.41	0.42	0.43	0.45	0.53	0.60
23	A30 / Wallop Drive	0.54	0.57	0.58	0.58	0.66	0.72
2	Aldemaston Rd Rdbt	0.80	0.82	0.84	0.80	0.86	0.89
6	Brighton Hill Rdbt	0.85	0.89	0.90	0.88	0.95	1.00
11	Hackwood Rd Rdbt	0.83	0.86	0.88	0.86	0.91	0.95
22	Victory Rdbt	0.58	0.60	0.61	0.65	0.70	0.74

Table 3-19 An Overview of Junction Max RFC's in the PM Peak

no	Junction Names	Baseline			Local Plan Scenarios		
		2019	2024	2029	2019	2024	2029
1	A33 / Bramley Rd	1.06	1.12	1.14	1.19	1.43	1.58
29	A339 / Ringway West Rdbt	1.19	1.26	1.29	1.24	1.37	1.46
19	A339 / Roman Rd	0.97	1.04	1.08	1.04	1.17	1.30
27	B3400 Worting Rd / Roman Rd	0.94	0.98	1.00	1.06	1.41	1.55
10	Fiveways Junction	2.15	2.21	2.25	2.16	2.35	2.59
13	Kemptshott Rdbt	1.14	1.21	1.27	1.30	1.50	1.67
28	West Ham Rdbt	0.88	0.91	0.93	0.97	1.10	1.27
25	Worting Road Rdbt	0.71	0.73	0.75	0.79	0.91	1.06
23	A30 / Wallop Drive	0.92	0.98	1.00	1.11	1.35	1.58
2	Aldemaston Rd Rdbt	1.20	1.23	1.25	1.28	1.47	1.60
6	Brighton Hill Rdbt	1.43	1.50	1.53	1.71	1.92	2.13
11	Hackwood Rd Rdbt	1.09	1.15	1.17	1.40	1.70	1.83
22	Victory Rdbt	0.85	0.88	0.90	0.89	0.94	0.96

Table 3-20 An Overview of Junction Average RFC's in the PM Peak

no	Junction Names	Baseline			Local Plan Scenarios		
		2019	2024	2029	2019	2024	2029
1	A33 / Bramley Rd	0.72	0.77	0.78	0.83	1.00	1.10
29	A339 / Ringway West Rdbt	1.01	1.08	1.11	1.05	1.19	1.25
19	A339 / Roman Rd	0.62	0.66	0.68	0.65	0.75	0.80
27	B3400 Worting Rd / Roman Rd	0.78	0.81	0.84	0.94	1.13	1.23
10	Fiveways Junction	1.48	1.54	1.57	1.51	1.66	1.83
13	Kemptshott Rdbt	0.74	0.79	0.81	0.81	0.91	1.01
28	West Ham Rdbt	0.41	0.42	0.43	0.44	0.48	0.52
25	Worting Road Rdbt	0.40	0.41	0.42	0.47	0.55	0.62
23	A30 / Wallop Drive	0.64	0.68	0.69	0.71	0.81	0.90
2	Aldemaston Rd Rdbt	0.76	0.80	0.81	0.78	0.84	0.88
6	Brighton Hill Rdbt	0.90	0.96	0.98	0.95	1.04	1.09
11	Hackwood Rd Rdbt	0.83	0.88	0.90	0.96	1.09	1.16
22	Victory Rdbt	0.58	0.60	0.61	0.66	0.71	0.74

3.4.6 Compared to the Reference Case, the additional Local Plan development traffic is forecasted to result in at least one entry arm of most of the assessed junctions having insufficient capacity to accommodate the traffic demand in at least one modelled hour (indicated by a Max RFC > 1). However, from the spreadsheet model the average RFC's for these overcapacity junctions is much lower in many cases, indicating that some arms of the junction would still accommodate the expected demand.

3.4.7 Table 3-21 below summarises the modelled performance of the selected junctions in the AM and PM peak hours in 2029. Observations have been given to outline the reasons why they have been selected for mitigation investigations. It should be noted that observations presented in Table 3-21 are based on an analysis of the high level modelling results from the spreadsheet model. The sole purpose of this exercise is to inform the individual junction assessment, where individual junctions are modelled separately with their performance reported for each entry arm in Chapter 4 of this report.

Table 3-21 An Overview of Junction Performance based on Spreadsheet Modelling Results

No	Names	Control	Observations
1	A33 / Bramley Rd	Priority rdbt	A33 northbound and southbound arms are forecasted to have increased demand in all Local Plan scenarios. The forecasted delays/queuing are deemed to require mitigation to improve the flow on the A33.
29	A339 / Ringway West Roundabout	Priority rdbt	This junction is forecasted to operate over capacity in the 2012 Base and 2029 Reference scenarios. Modelling results suggest that improvements are required to accommodate any further demand increase from Local Plan development in Basingstoke.
19	A339 / Roman Rd	Priority rdbt	The A339 Kingsclere Road arms are predicted to be over capacity in the 2029 Reference scenario, eastbound in the AM and westbound in the PM. These two arms were forecast to worsen in the Local Plan scenarios. Investigation into appropriate mitigation is required considering the A339 is a key strategic route into Basingstoke.
27	B3400 Worting Rd / Roman Rd	Mini rdbt	The B3400 Worting Road eastbound arm is over capacity in the AM peak 2012 base and its performance deteriorates in the 2029 Reference Case and Local Plan scenarios. Similarly, Roman Way is overcapacity in 2012 Base and 2029 Reference Case in the PM peaks. This junction is on a key route in/out of Basingstoke and therefore requires further work to determine appropriate mitigation.
10	Fiveways Junction	Signal	All four arms of this junction are forecast to be overcapacity in at least one peak in both the 2012 and 2029 Base scenarios. Traffic from the Local Plan development, without mitigation, is forecasted to exacerbate the congestion on Pack Lane in the AM and Buckskin Lane, Pack Lane and Kempshott Lane in the PM.
13	Kempshott Rdbt	Priority rdbt	The A30 northbound and southbound arms are predicted to be over capacity in the 2029 Reference Case scenario and the addition of the Local Plan development causes further rise in the RFC for A30 northbound and southbound.
28	West Ham Rdbt	Priority rdbt	This junction is forecasted to operate over capacity in the 2029 Reference Case scenario and the addition of the Local Plan traffic is forecast to make the West Ham Close over-capacity in the AM peak and B3400 Churchill Way westbound in the PM peak.
25	B3400 Worting Road Rdbt	Priority rdbt	This junction is predicted to operate within capacity in the 2029 Reference Case scenario. The Local Plan development traffic is too large for the B3400 Worting Road eastbound and westbound arms to accommodate it and hence the junction requires mitigation.
23	A30 / Wallop Drive	Priority rdbt	This junction operates well in the 2012 and 2029 Base scenarios. However with the addition of Local Plan development traffic the A30 northbound and southbound arms are forecasted to be over capacity in the AM and PM peaks respectively.

No	Names	Control	Observations
2	Aldermaston Rd Rdbt	Priority rdbt	In the 2029 Reference Case scenario and the Local Plan scenarios the modelling results suggest that Aldermaston Road South would be unable to accommodate the required demand in at both peaks, and all other arms are very close to capacity.
6	Brighton Hill Rdbt	Priority rdbt	Brighton Hill roundabout operates within capacity in the 2012 Base, but is significantly over-capacity in the 2029 Reference case. Without any improvements the roundabout cannot accommodate the demand in the Local Plan scenarios.
11	Hackwood Rd Rdbt	Priority rdbt	Modelling results suggest that the 2029 Reference Case demand cannot be accommodated by this junction on the Ringway west arm, the Hackwood Road entry or the A339 entry. The inclusion of Local Plan demand traffic also results in the Ringway east operating very close to capacity and the junction therefore requires mitigating to improve the capacity of all arms.
22	Victory Rdbt	Priority rdbt	This is a key junction within the centre of Basingstoke and the A3010 Churchill Way west approach to the junction cannot accommodate the demand required in the 2029 Reference Case and Local Plan scenario in the AM peak. The junction therefore requires mitigation.
-	A33 / Gaiger Avenue Rdbt[10]	Priority rdbt	The A33 / Gaiger Avenue junction operates within capacity in the 2012 base model, but the demand in 2029 reference case cannot be accommodated with both A33 approaches overcapacity. The addition of the Local Plan demand exacerbates this problem.
-	A33 Thornhill Crossroads[8]	Signal	In the 2029 reference case the A33 northbound (PM peak) and South bound (AM peak) operate overcapacity. With the addition of the 2029 Local Plan, the junction requires improvement to accommodate all the demand.
-	A33 Binfields Rdbt[8]	Priority rdbt	The key issues at Binfileds Roundabout are on the A33 northbound and Southbound which both operate well over capacity in the 2029 reference case and Local Plan scenarios.
-	A33 Crockford Rdbt[8]	Priority rdbt	Crockford Roundabout operates close to, but within, capacity in the 2029 reference case. However, the 2029 Local Plan traffic is too large to be accommodated on the A33 northbound and southbound, and Carpenter's Down in the
-	Thorneycroft Rdbt[8]	Priority rdbt	In the 2029 reference case the A340 Ringway West northbound is overcapacity in the AM peak and southbound in the PM peak. In the 2029 Local Plan scenario the B3400 Churchill Way West is also overcapacity.
-	Winchester Road Rdbt[8]	Priority rdbt	The Winchester Road westbound approach operates over capacity in the 2029 reference case scenario. With the addition of the 2029 Local Plan traffic all arms operate over capacity in either the AM or PM peaks.

[10] Mitigation measures are not considered for these junctions in this Transport Assessment as HCC have commissioned separate studies to investigate solutions. They are included in order to present a complete picture of the issues across the network and the proposed solutions.

3.5 Impact on Highways Agency network

3.5.1 In response the HA's request for further testing to be undertaken in order to fully understand the potential impacts of the BDBC Local Plan on the SRN a sensitivity test was undertaken on Junction 6 (excluding Black Dam Roundabout) and Junction 7 on the M3.

3.5.2 The existing spreadsheet model assumes an equal split of development traffic between the A30 and M3. Given the relative levels of congestion on these roads, it is likely that a higher proportion of traffic would use the M3. In order to understand the impact of the development traffic on Junctions 6 and 7 of the M3, a worst case scenario was tested where all development traffic would use the M3 rather than the A30.

3.5.3 This sensitivity testing has been undertaken outside of the spreadsheet model using junction models, since the reassignment of traffic from the A30 to M3 has a negligible impact on the remainder of the modelled network. A LinSig model was developed for Junction 6, while updated flows were input into the existing ARCADY model for Junction 7. All traffic using the A30, which runs parallel to the M3, was reassigned onto the M3 in order to understand the likely impact on capacity at each junction with the additional demand.

3.5.4 Table 3-22 below shows the variation in the Degree of Saturation (DoS) resulting from the addition of development traffic from the A30 onto the M3 at Junction 6. It can be seen that, with the addition of the A30 traffic onto the M3, the junction would still operate within capacity on the majority of arms, and slightly over capacity on the M3 South arm during the AM peak. While the model results indicate that there would be a small increase in DoS in all instances, it should be noted that these modelled scenarios represent the worst case scenario, where all A30 traffic is routed onto the M3.

Table 3-22: Modelled DoS at Each Entry for the Junction 6 roundabout on the M3

DoS (%)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	86.9	90.0	87.1	89.7
	M3 South	98.3	101.8	103.7	103.7
	A339 - M3 Link	83.8	89.3	82.7	85.4
PM	M3 North	91.0	93.3	96.4	98.7
	M3 South	41.1	44.2	41.3	41.3
	A339 - M3 Link	91.3	98.0	90.9	96.5

3.5.5 Table 3-23 and Table 3-24 below show the variation in queue and delay at M3 Junction 6 resulting from the addition of development traffic from the A30 onto the M3. The queue on the M3 South entry to the roundabout (northbound offslip) is predicted to reach 38 PCU in the AM peak. Whilst this is a length queue, it can be accommodated on the existing slip-road and so will not cause a safety hazard on the mainline.

Table 3-23 Modelled Queue at Each Entry for the Junction 6 roundabout on the M3

Queue (PCU)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	26	29	26	29
	M3 South	25	31	38	38
	A339 - M3 Link	3	4	2	3
PM	M3 North	23	29	32	36
	M3 South	5	6	5	5
	A339 - M3 Link	6	14	5	11

Table 3-24 Modelled Delay per PCU at Each Entry for the Junction 6 roundabout on the M3

Delay (s/PCU)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	23	26	23	26
	M3 South	88	123	146	146
	A339 - M3 Link	6	8	5	6
PM	M3 North	37	41	56	70
	M3 South	29	31	29	29
	A339 - M3 Link	10	26	10	11

3.5.6 While the junction will operate slightly over capacity with the additional Local Plan Scenario traffic and the A30 traffic, the junction capacity is forecast to be only a small increase in comparison with the 2029 Reference Case (with and without the A30 traffic rerouted onto the M3). As the model results represent the worst case scenario, mitigation measures have not been proposed in this transport assessment for Junction 6.

3.5.7 Table 3-25 below shows the model results for the M3 at Junction 7. With the additional traffic there is an increase in the Ratio of Flow to Capacity (RFC) on most arms but the RFC never approaches 100%. The highest RFC of 60% occurs on the A30 Winchester Road in the PM peak Local Plan Scenario including the additional A30 Traffic.

Table 3-25: Modelled RFC at Each Entry for the Junction 7 roundabout on the M3

RFC (%)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	9.7	9.8	10.1	10.4
	Glebe Close	26.2	26.4	27.3	28.1
	M3 South	22.2	23.5	31.1	47.5
	A30 Winchester Rd	45.2	44.5	47.9	48.6
PM	M3 North	29.3	29.0	33.8	46.0
	Glebe Close	28.9	29.5	35.8	64.5
	M3 South	28.3	28.2	36.9	38.5
	A30 Winchester Rd	34.9	36.3	43.6	60.2

3.5.8 Table 3-26 and Table 3-27 below show the variation in queue and delay at M3 Junction 7 resulting from the addition of development traffic from the A30 onto the M3. On all arms in both peaks he queuing and delay is small.

Table 3-26 Modelled Queue at Each Entry for the Junction 7 roundabout on the M3

Queue (PCU)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	0	0	0	0
	Glebe Close	0	0	0	0
	M3 South	0	0	0	1
	A30 Winchester Rd	1	1	1	1
PM	M3 North	0	0	1	1
	Glebe Close	0	0	1	2
	M3 South	0	0	1	1
	A30 Winchester Rd	1	1	1	2

3.5.9 Table 3-27 Modelled Delay per PCU at Each Entry for the Junction 7 roundabout on the M3

Delay (s/PCU)		2029 Ref Case	2029 Ref Case + A30 Traffic	Local Plan Scenario	Local Plan Scenario + A30 Traffic
AM	M3 North	2	2	2	2
	Glebe Close	4	4	4	4
	M3 South	2	2	2	3
	A30 Winchester Rd	2	2	3	3
PM	M3 North	3	3	3	6
	Glebe Close	5	5	7	23
	M3 South	3	3	3	3
	A30 Winchester Rd	2	2	2	3

3.5.10 The junction is shown to have sufficient reserve capacity to cope with the worst case scenario where all A30 traffic reroutes onto the M3. Therefore, it is not necessary for any mitigation measures to be proposed in this transport assessment for Junction 7.

4 MITIGATION ASSESSMENT

4.1 General

4.1.1 Chapter 3 gives a high level assessment of the traffic impacts from the forecasted Local Plan land use scenarios. Based on findings from the modelling results and discussion with BDBC and HCC, 13 junctions were taken into concept level junction specific assessment, and are reported in this chapter. Assessment has been undertaken to consider opportunities for improving transport infrastructure to mitigate adverse traffic impacts of the Local Plan development. This involves modelling of the selected junctions using LinSig and ARCADY models. The assessments have been undertaken using the 2029 reference Case and 2029 Local Plan Scenario.

4.1.2 The study went on to consider the transport infrastructure opportunities to mitigate the impact of development at 13 identified junctions. This identification of mitigation measures was undertaken using standard junction modelling packages (LinSig and ARCADY) following a principle of achieving the greatest level of congestion relief within existing constraints (such as highway boundaries) while avoiding any structural work at bridges and viaducts where possible. The measures recommended include common improvements such as lane widening and signalisation. Further details of the proposed improvements for individual junctions are presented in the rest of this chapter.

4.1.3 Four junctions along the A33 Corridor, namely Gaiger Avenue Junction, Thornhill Way Junction, Binfields Roundabout and Crockford Roundabout, were omitted from a detailed assessment in this TA, as HCC are currently undertaking a detailed transport study on the A33 Corridor. Investigating mitigation measures within this study would duplicate the work currently being undertaken.

4.2 Constraining Growth to TEMPRO

4.2.1 It is acknowledged that results of the spreadsheet model should be interpreted with an understanding of the key assumptions made in its development and the limitation of the adopted worst case scenario approach.

4.2.2 All future travel demand was forecasted in the spreadsheet model based on a worst case scenario approach using unconstrained traffic growth on the highway network. This approach means that benefits from further highway demand reductions as a result of the following considerations are not considered in this study:

- The spreading of journeys to times which are less busy
- The scope to divert to alternative routes to avoid congestion
- Changes to trip frequency, origins, destinations, or journey distance

4.2.3 In addition to the above assumptions, the forecasted traffic flows consider all highway demand (demand flows in traffic modelling terms) that intends to go through individual junctions and assume all these can reach the specific junction during the modelled period of time. In reality it is commonly recognised that some of the demand may not materialise in the modelled hours due to congestion elsewhere in the network, which leads to lower actual flows that arrive during a given period of time.

4.2.4 The trip generation and distribution methodology has been developed by BDBC through regular consultation with HCC. It was noted that the increase in demand produced by the method is considerably larger than the growth in TEMPRO for the same period. A method was sought to address this, aiming to avoid proposing excessive mitigation measures. Following guidance in WebTAG a method was developed to constrain the growth across the model to that predicted by TEMPRO. These revised flows are used in the development of mitigation proposals in the junction models only.

4.2.5 The average growth predicted by the spreadsheet model is compared to TEMPRO growth predictions (using Alternative Assumptions) for Basingstoke and Deane in Table 4-1 below. The TEMPRO growth factors have been adjusted to account for changes in fuel cost, values of time and trip length using the National Transport Model (NTM) in line with guidance in WebTAG Unit M4.

	AM Peak		PM Peak	
	2012 to 2029 Ref Case	2012 to 2029 Local Plan	2012 to 2029 Ref Case	2012 to 2029 Local Plan
Modelled growth	21%	41%	28%	51%
TEMPRO growth	17%	24%	17%	24%

Table 4-1: Comparison of Spreadsheet model and TEMPRO predicted growth

4.2.6 The spreadsheet model consistently predicts a larger amount of growth than TEMPRO, reflecting the worst case assumptions made during development of the model. To assess a more realistic scenario, the demand flows at each junction have been constrained to the growth predicted by TEMPRO across Basingstoke and Deane.

4.3 A33 / Bramley Road Roundabout

4.3.1 This is a four arm roundabout, located in north east Basingstoke. The junction connects the A33 and Bramley Road. Figure 4-1 shows the Reference Case and the Local Plan demand on each entry arm, whilst Table 4-2 and Table 4-3 show the full turning movements. The major movements at this junction are between Arm A (A33 North) and Arm B (A33 South). These movements are increased as a result of the Local Plan development, which results in a similar increase in forecasted queues and delays.

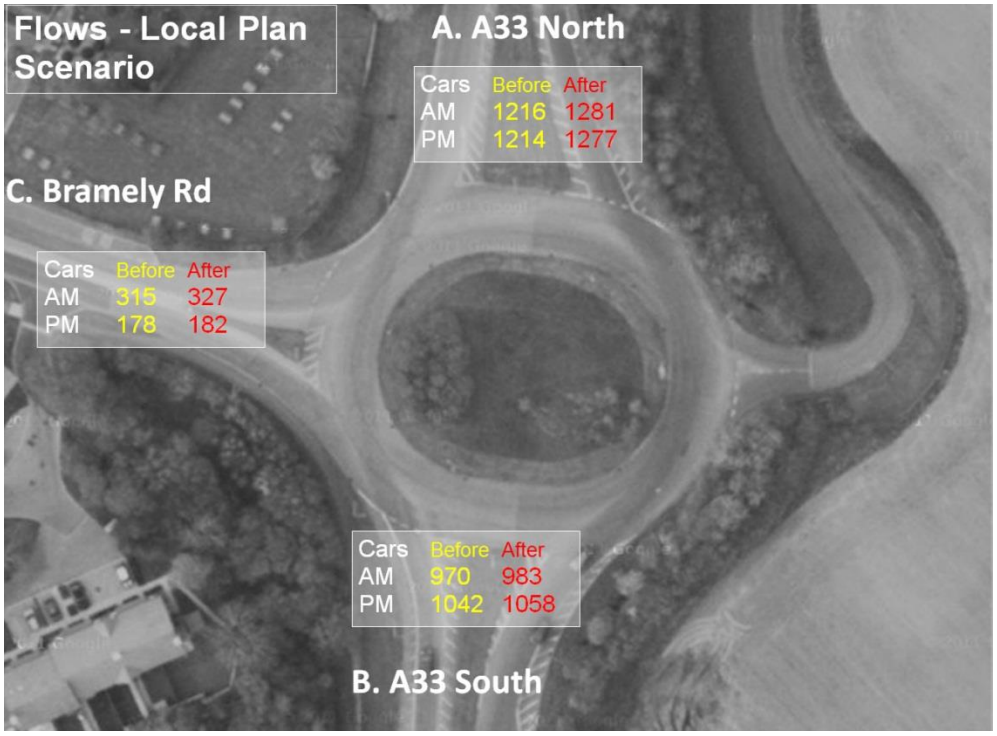


Figure 4-1 Demand at A33 / Bramley Road Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-2 AM Demand at A33 / Bramley Road Roundabout

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – A33 North	0	1158	58	1216
	Arm B – A33 South	897	0	73	970
	Arm C – Bramley Rd	124	191	0	315
	Total	1021	1349	131	2501
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – A33 North	0	1221	60	1281
	Arm B – A33 South	964	2	76	1042
	Arm C – Bramley Rd	128	199	0	327
	Total	1092	1421	136	2650

Table 4-3 PM Demand at A33 / Bramley Road Roundabout

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – A33 North	0	1043	171	1214
	Arm B – A33 South	918	0	65	983
	Arm C – Bramley Rd	83	95	0	178
	Total	1001	1138	236	2375
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – A33 North	0	1104	173	1277
	Arm B – A33 South	983	5	70	1058
	Arm C – Bramley Rd	84	97	0	182
	Total	1068	1206	243	2517

4.3.2 In order to mitigate the worst case scenario at the roundabout, it is proposed to:

- Convert approximately ¾ of the circulatory carriageway to two lanes, with the exception of the carriageway between the A33 South exit and entry lanes
- On the A33 North (Arm A) approach to the junction create a full two lane entry
- On the A33 South (Arm B) approach to the junction create a full two lane entry
- Provide exit funnels at both A33 exits (Arms A and B)

4.3.3 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. A diagram of this proposal is shown in Figure 4-2.

Figure 4-2 An Illustration of the Proposed Mitigation at A33 / Bramley Road Roundabout; Source: Google Maps (2013)

4.3.4 Table 4-4 below shows variations in the Ratio of Flow to Capacity resulting from different travel demand and the proposed mitigation measures. The modelling results suggest that the proposed highway improvements reduce the DoS forecast for the Local Plan in comparison to the Reference Case on all the arms in both peaks, and the roundabout would operate well within capacity.

Table 4-4 Modelled RFC at Each Entry for A33 / Bramley Road Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A33 North	85.8	90.8	55.2
	Arm B – A33 South	69.1	74.2	43.7
	Arm C - Bramley Road	30.5	32.9	32.9
PM	Arm A – A33 North	82.3	86.8	53.2
	Arm B – A33 South	73.4	79.1	46.0
	Arm C - Bramley Road	17.4	18.4	18.4

4.3.5 Table 4-5 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a reduction in delay when compared with the 'no mitigation' scenario and also present an improvement on the performance in the Reference Case.

Table 4-5 Modelled Average delay per pcu for A33 / Bramley Road Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	12	17	3
PM	12	15	3

4.3.6 Table 4-6 shows the cost estimates for the proposed improvements to the A33 / Bramley Road Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-6 Indicative Improvement Costs for A33 / Bramley Road Roundabout

A33 / Bramley Road Roundabout	Costs (£)
Site Clearance	11,000
Fencing	0
Pedestrian Guardrail etc	5,000
Drainage	46,000
Earthworks	40,000
Pavement	50,000
Kerbs & Footways	17,000
Signs & Markings (Inc Work to Traffic Lights)	16,000
Road Lighting Columns	17,000
Traffic Signals	0
Sub – Total	**202,000**
Preliminaries 7.5%	15,000
Traffic Management 20%	40,000
Sub – Total	**257,000**
Contingency / Risk 45%	116,000
Total £	**373,000**

4.4 A30 / Wallop Drive Roundabout

4.4.1 This is a three arm give-way roundabout located on the A30 to the south-west of Basingstoke. Figure 4-3 shows Reference Case and Local Plan demand on each entry arm, whilst Table 4-7 and Table 4-8 show the full turning demand at the junction.

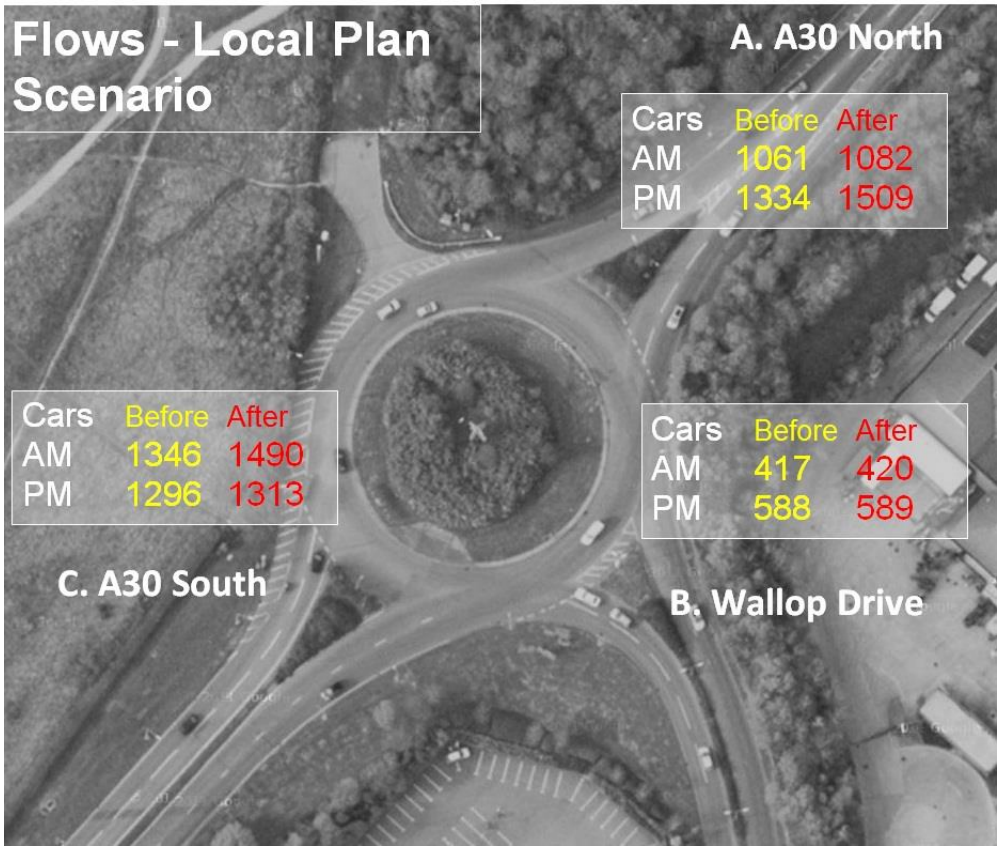


Figure 4-3: Demand at A30 / Wallop Drive Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-7 AM Demand at A30 / Wallop Drive Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A - A30 North	2	164	895	**1061**
	Arm B - Wallop Drive	76	2	338	**417**
	Arm C - A30 South	1146	199	1	**1346**
	Total	**1224**	**365**	**1234**	**2823**
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A - A30 North	2	166	914	**1082**
	Arm B - Wallop Drive	77	2	342	**420**
	Arm C - A30 South	1288	201	1	**1490**
	Total	**1367**	**369**	**1257**	**2992**

Table 4-8 PM Demand at A30 / Wallop Drive Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A - A30 North	2	297	1036	**1334**
	Arm B - Wallop Drive	262	46	280	**588**
	Arm C - A30 South	916	378	3	**1296**
	Total	**1179**	**720**	**1319**	**3218**
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A - A30 North	2	297	1210	**1509**
	Arm B - Wallop Drive	262	46	281	**589**
	Arm C - A30 South	932	379	3	**1313**
	Total	**1196**	**721**	**1493**	**3411**

4.4.2 It is clear from Table 4-7 and Table 4-8 that the major movement through the junction is the mainline traffic on the A30 (between Arm A and Arm C). This movement is also where the most significant increase in travel demand is forecasted to occur in the Local Plan scenario.

4.4.3 Modelling results suggest that the demand increase on both A30 arms would lead to significant queuing and congestion on the A30 South (Arm C) in the AM peak hour and the A30 North (Arm A) in the PM peak hour in the Local Plan scenario. In order to mitigate the adverse traffic impacts, the following junction improvements are proposed:

- Convert the roundabout to a signal controlled junction, which is more suitable to handle imbalanced flows during the modelled peak hours
- Widen the A30 southbound carriageway only between Kempshott roundabout and Wallop Drive (approximately 750m) to include two southbound lanes. The existing highway currently is hashed out along both sides of the carriageway so there may be sufficient space within the existing carriageway width without physical widening
- Widen the entry to accommodate the proposed two lane southbound approach and an 86m flare (Arm A)
- A two lane exit funnel on the A30 North (Arm A) exit arm in order to accommodate two lanes of exiting flow from the A30 South (Arm C)
- Extend the right turn flare on Wallop Drive (Arm B) to 100m
- Widen the A30 South (Arm C) northbound approach to four lanes at the stop line, to incorporate two 60m flares

4.4.4 Enhancements in junction performance, and therefore further reductions in queuing and delay, could be achieved through the use of a MOVA traffic signal control system at this junction.

4.4.5 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. A diagram of this proposal is shown in Figure 4-4.

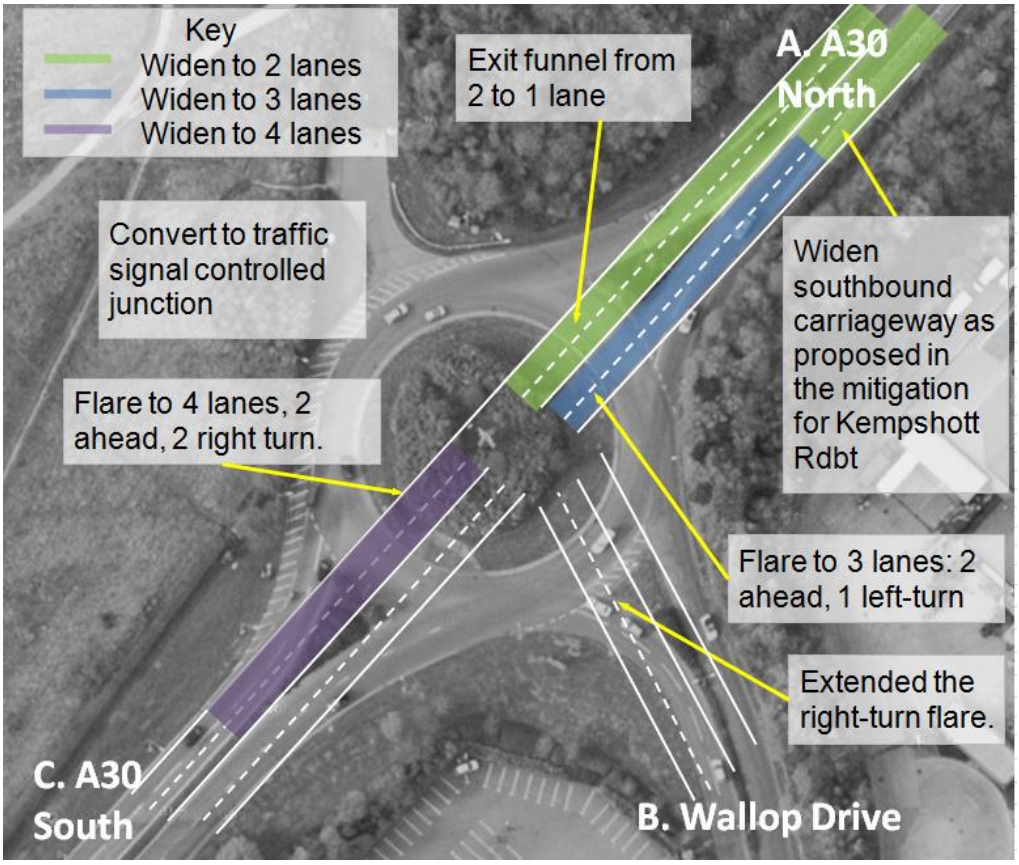


Figure 4-4 An Illustration of the Proposed Mitigation at A30 / Wallop Drive Roundabout; Source: Google Maps (2013)

4.4.6 Table 4-9 below shows the variations in the existing RFC and Degree of Saturation (DoS) resulting from different travel demand and the proposed mitigation measures. The Local Plan developments produce a large increase in traffic using the A30 (A30 South entry in the AM peak and the A30 North entry in the PM peak) compared to the Reference Case. The mitigation proposals have achieved a more balanced performance for the junction as a whole, particularly in terms of queuing. Queues on the A30 south are reduced by the mitigation from 275 PCU to 5 PCU in the AM peak, and in the PM peak on the A30 North the queue is reduced from 508 PCU to 11 PCU. Queue and delay results are presented in Appendix B.

Table 4-9 RFC and DoS at Each Entry for A30 / Wallop Drive Roundabout

Time	Arm	2029 Ref Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A - A30 North	54.7	55.8	45.1
	Arm B - Wallop Drive	30.3	31.0	55.3
	Arm C - A30 South	67.5	74.8	63.7
PM	Arm A - A30 North	74.3	84.0	70.5
	Arm B - Wallop Drive	45.7	49.8	66.2
	Arm C - A30 South	70.1	71.1	64.9

4.4.7 Table 4-10 shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a significant reduction in delay when compared with the 'no mitigation' scenario. Whilst the delay in the Local Plan mitigated scenario has increased from the Reference Case, the delay per vehicle remains within an acceptable level.

Table 4-10 Modelled Average delay per pcu for A30 / Wallop Drive Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	5	204	26
PM	11	379	28

4.4.8 Table 4-11 shows the cost estimates for the proposed improvements to the A30 / Wallop Drive Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage. It should be noted that the estimated cost for widening the southbound carriageway of the A30 between Kempshott Roundabout and this junction is summarised separately in Table 4-12.

Table 4-11 Indicative Improvement Costs for A30 / Wallop Drive Roundabout

A30 / Wallop Drive Roundabout	Costs (£)
Site Clearance	66,000
Fencing	0
Pedestrian Guardrail etc	27,000
Drainage	274,000
Earthworks	238,000
Pavement	299,000
Kerbs & Footways	104,000
Signs & Markings (Inc Work to Traffic Lights)	98,000
Road Lighting Columns	100,000
Traffic Signals	109,000
Planting etc.	28,000
Sub – Total	**1,343,000**
Preliminaries 7.5%	101,000
Traffic Management 20%	269,000
Sub – Total	**1,713,000**
Contingency / Risk 45%	771,000
Total £	**2,484,000**

4.4.9 The purpose of the aforementioned proposal is solely to demonstrate that traffic impacts from the Local Plan development can be mitigated within the highway boundary at reasonable costs. It should be noted that the exact form of these improvements should be investigated in further detail in any future design. Particular consideration should be given to the sufficiency of access to existing business via Wallop Drive, especially during the time periods that are not explicitly investigated in this study.

Table 4-12 Indicative Improvement Costs for Widening the A30 Southbound Carriageway between Kempshott Roundabout and Wallop Drive Roundabout

A30 Widening	Costs (£)
Site Clearance	128,000
Fencing	37,000
Pedestrian Guardrail/Safety Fence	120,000
Drainage	638,000
Earthworks	678,000
Pavement	733,000
Kerbs & Footways	201,000
Signs & Markings (Inc Work to Traffic Lights)	190,000
Road Lighting Columns	194,000
Traffic Signals	0
Accommodation Works/Planting	50,000
Sub – Total	**2,969,000**
Preliminaries 7.5%	223,000
Traffic Management 20%	594,000
Sub – Total	**3,786,000**
Contingency / Risk 45%	1,704,000
Total £	**5,490,000**

4.5 Kempshott Roundabout

4.5.1 This is a four arm priority roundabout located on the A30, a key strategic route in and out of Basingstoke. It is less than 800m upstream of the A30 / Wallop Drive junction discussed in the previous section of this report. Figure 4-5 shows the Reference Case and Local Plan demand on each entry arm whilst Table 4-13 and Table 4-14 show the full turning demand.

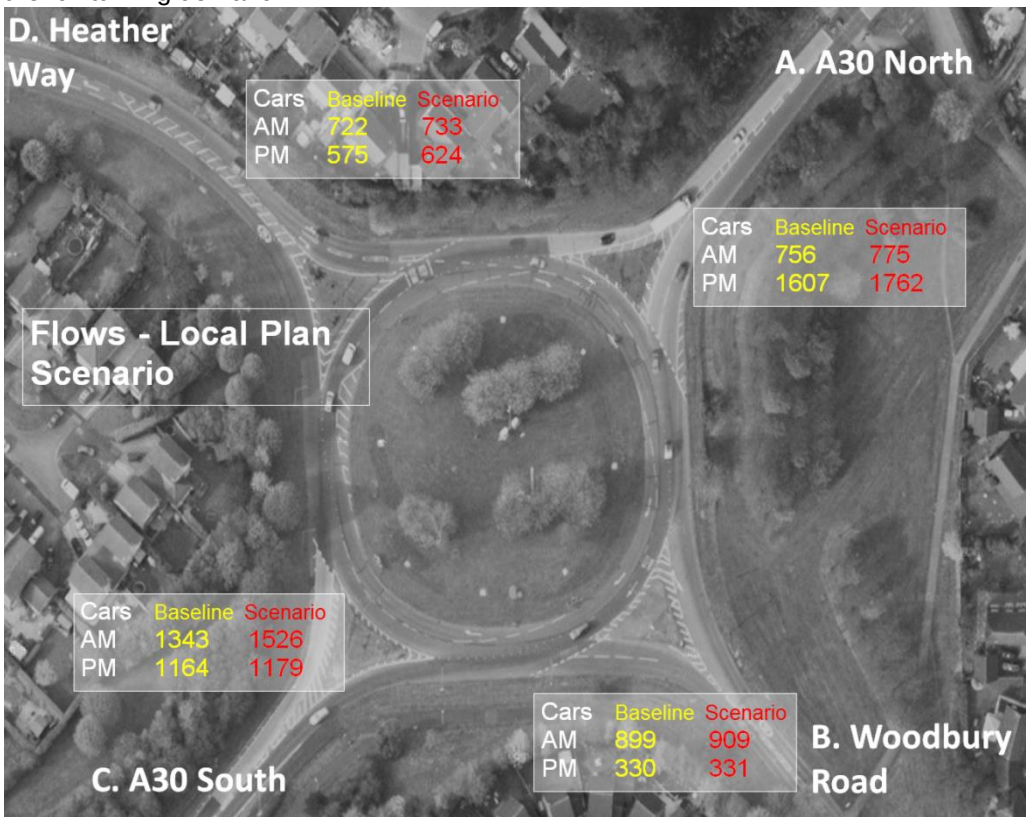


Figure 4-5 Demand at Kempshott Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-13 AM Demand at Kempshott Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A30 North	3	98	596	59	756
	Arm B – Woodbury Rd	475	0	106	318	899
	Arm C –A30 South	1110	8	1	224	1343
	Arm D – Heather Way	204	145	369	4	722
	Total	1791	251	1072	606	3720
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A30 North	3	99	613	60	775
	Arm B – Woodbury Rd	480	0	107	322	909
	Arm C –A30 South	1265	8	1	252	1526
	Arm D – Heather Way	206	147	376	4	733
	Total	1954	254	1097	638	3942

Table 4-14 PM Demand at Kempshott Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A30 North	4	302	1176	125	1607
	Arm B – Woodbury Rd	164	0	22	144	330
	Arm C –A30 South	682	49	2	430	1164
	Arm D – Heather Way	91	193	291	0	575
	Total	941	545	1491	699	3676
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A30 North	4	303	1331	125	1762
	Arm B – Woodbury Rd	164	0	22	144	331
	Arm C –A30 South	692	49	2	436	1179
	Arm D – Heather Way	91	193	340	0	624
	Total	951	545	1695	705	3896

4.5.2 It is clear from Table 4-13 and Table 4-14 that the major movement through the junction is the mainline traffic on the A30 between Arms A and C. This movement is also where the most significant increase in travel demand is forecasted to occur in the Local Plan scenario. In order to mitigate the junction it is proposed to:

- Fully signalise the roundabout
- Widen the circulatory carriageway from 2 lanes to 3 lanes, except between the A30 Winchester Road (Arm C) and Heather Way (Arm D) entry which requires widening from 1 lane to 2 lanes
- Extend the flares on the A30 Winchester Road (Arm A), Woodbury Road (Arm B0 and Heather Way (Arm D) entry arms to 90m, 30m and 60m respectively.
- Add a 115m flare to the A30 Winchester Road (South) entry arm (Arm C)
- Widen a 750m stretch of the A30 southbound carriageway from one to two lanes between this junction and the downstream Wallop Drive Roundabout to accommodate the PM peak hourly traffic of 2693 PCUs (this proposal is included as part of the mitigation for the A30 / Wallop Drive Roundabout. The estimated cost for this element of improvement is summarised in Table 4-12.

4.5.3 Enhancements in junction performance, and therefore further reductions in queuing and delay, could be achieved through the use of a MOVA traffic signal control system at this junction.

4.5.4 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. A diagram of this proposal is shown in Figure 4-6.

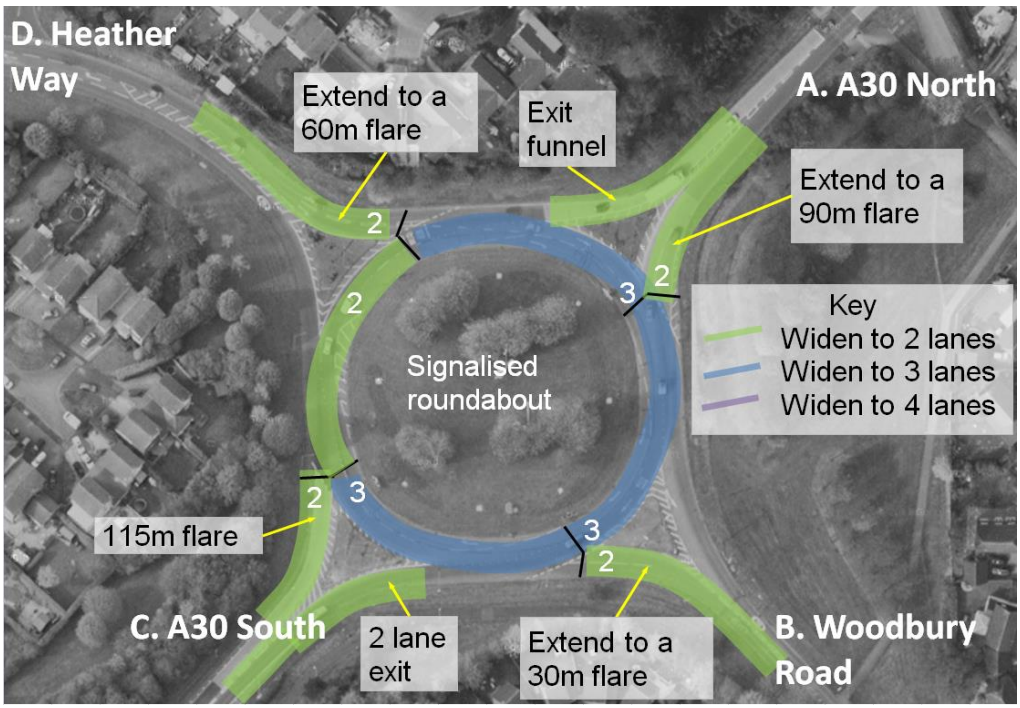


Figure 4-6 An Illustration of the Proposed Mitigation at Kempshott Roundabout; Source: Google Maps (2013)

4.5.5 Table 4-15 below shows the variations in RFC and mitigated Degree of Saturation (DoS) resulting from different travel demand and the proposed mitigation measures. In the AM peak, the A30 South operates over capacity with a DoS value of 162.9%, but the proposed mitigation is forecast to reduce the DoS on this arm to 75%. Likewise, the mitigation will reduce the DoS on both Woodbury Road and the A30 North to below Reference Case levels. Heather Way will see an decrease in DoS to 78%. In the PM peak, the A30 North and South show a considerable improvement in the mitigated DoS over the Reference Case level, with a reduction to 66% and 58% respectively. All arms in AM and PM peak will operate within capacity.

Table 4-15 RFC and DoS at Each Entry for Kempshott Roundabout

Time	Arm	2029 Ref Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A30 North	49.0	50.4	31.2
	Arm B – Woodbury Rd	74.0	75.5	72.6
	Arm C –A30 South	142.8	162.9	75.0
	Arm D – Heather Way	63.2	64.2	78.3
PM	Arm A – A30 North	104.4	116.3	66.3
	Arm B – Woodbury Rd	33.5	34.4	52.8
	Arm C –A30 South	104.6	105.5	58.4
	Arm D – Heather Way	43.4	47.1	57.7

4.5.6 Table 4-16 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a significant reduction in delay when compared with both the Local Plan with no mitigation scenario, and the 2029 Reference Case.

Table 4-16 Modelled Average delay per PCU for Kempshott Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	426	665	14
PM	130	269	11

4.5.7 Table 4-6 shows the cost estimates for the proposed improvements to the Kempshott Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage. Please note that the estimated cost for the aforementioned widening a stretch of the A30 is not included and has been reported in Table 4-12.

Table 4-17 Indicative Improvement Costs for Kempshott Roundabout

Kempshott Roundabout	Costs (£)
Site Clearance	99,000
Fencing	0
Pedestrian Guardrail/Safety Fence	41,000
Drainage	408,000
Earthworks	355,000
Pavement	447,000
Kerbs & Footways	155,000
Signs & Markings (Inc Work to Traffic Lights)	147,000
Road Lighting Columns	149,000
Traffic Signals	198,000
Accommodation Works/Planting	0
Sub – Total	**1,999,000**
Preliminaries 7.5%	150,000
Traffic Management 20%	400,000
Sub – Total	**2,549,000**
Contingency / Risk 45%	1,147,000
Total £	**3,696,000**

4.6 Brighton Hill Roundabout

4.6.1 This is a six arm priority controlled roundabout in the south-west of Basingstoke. Figure 4-7 shows reference case and Local Plan demand on each entry arm, whilst Table 4-18 and Table 4-19 show the full turning demand.

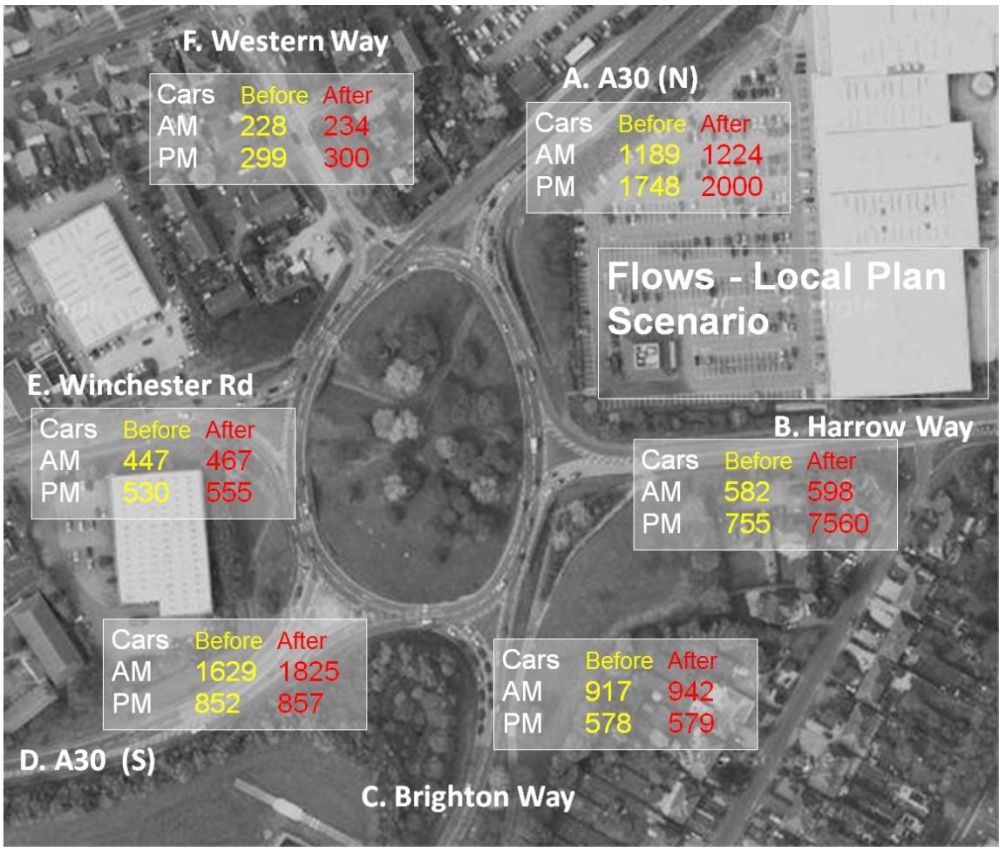


Figure 4-7 Demand at Brighton Hill Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-18 AM Demand at Brighton Hill Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A – A30 North	0	265	306	334	168	116	1189
	Arm B –Harrow Way	331	1	44	100	70	36	582
	Arm C – Brighton Way	417	154	0	114	129	103	917
	Arm D – A30 South	924	360	167	0	31	147	1629
	Arm E – Winchester Rd	197	125	57	56	0	12	447
	Arm F – Western Way	50	58	42	46	31	0	228
	Total	1919	964	617	651	429	413	4992
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm F**	**Total**
Local Plan Scenario	Arm A – A30 North	0	272	315	346	173	119	1224
	Arm B –Harrow Way	340	1	45	103	72	37	598
	Arm C – Brighton Way	428	158	0	118	133	105	942
	Arm D – A30 South	1073	371	172	0	59	151	1825
	Arm E – Winchester Rd	208	129	58	60	0	12	467
	Arm F – Western Way	52	60	44	48	31	0	234
	Total	2100	990	634	674	468	425	5291

Table 4-19 PM Demand at Brighton Hill Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A – A30 North	0	267	372	846	217	47	1748
	Arm B –Harrow Way	237	0	43	337	108	30	755
	Arm C – Brighton Way	243	60	0	76	137	62	578
	Arm D – A30 South	440	100	128	0	76	108	852
	Arm E – Winchester Rd	205	87	79	134	0	25	530
	Arm F – Western Way	38	51	59	112	39	0	299
	Total	1163	565	681	1505	578	271	4762
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm F**	**Total**
Local Plan Scenario	Arm A – A30 North	0	267	372	1066	247	47	2000
	Arm B –Harrow Way	237	0	43	337	109	30	756
	Arm C – Brighton Way	243	60	0	76	138	62	579
	Arm D – A30 South	445	100	128	0	76	108	857
	Arm E – Winchester Rd	206	87	79	158	0	25	555
	Arm F – Western Way	38	51	59	112	40	0	300
	Total	1169	565	682	1750	609	271	5047

4.6.2 The key movements through Brighton Hill roundabout are between the A30 North (Arm A) and the A30 South (Arm D). This movement is large in the northbound direction in the AM peak and in the southbound direction in the PM peak. A large proportion of the growth in traffic resulting from the Local Plan developments is predicted to use these movements too.

4.6.3 With the predicted level of growth, the junction is forecasted to experience significant congestion, even in the 2029 Reference Case, on a number of different arms in the AM and PM peak hours. Following a concept design provided by BDBC in April 2013, it is proposed to improve the operation of the junction by converting it to a signalised 'Hamburger' junction, with a segregated movement for traffic on the A30 northbound and southbound through the centre of the roundabout.

4.6.4 A few minor amendments to the design received from BDBC were made in order to accommodate the forecasted traffic patterns and volume of traffic as a result of the Local Plan development. To enable this junction to work efficiently the circulatory carriageway would require an additional lane. An additional circulatory lane is required at the stoplines next to Western Way, Winchester Road and A30 South entry arms.

4.6.5 The Western Way entry arm (Arm F) would require widening to two full lanes from the upstream junction with Buckland Avenue which is approximately 110m of carriageway.

4.6.6 A visual check has been undertaken, which confirmed that all proposed improvements could be accommodated within existing highway boundaries. An illustration of this proposed mitigation is shown in Figure 4-8.

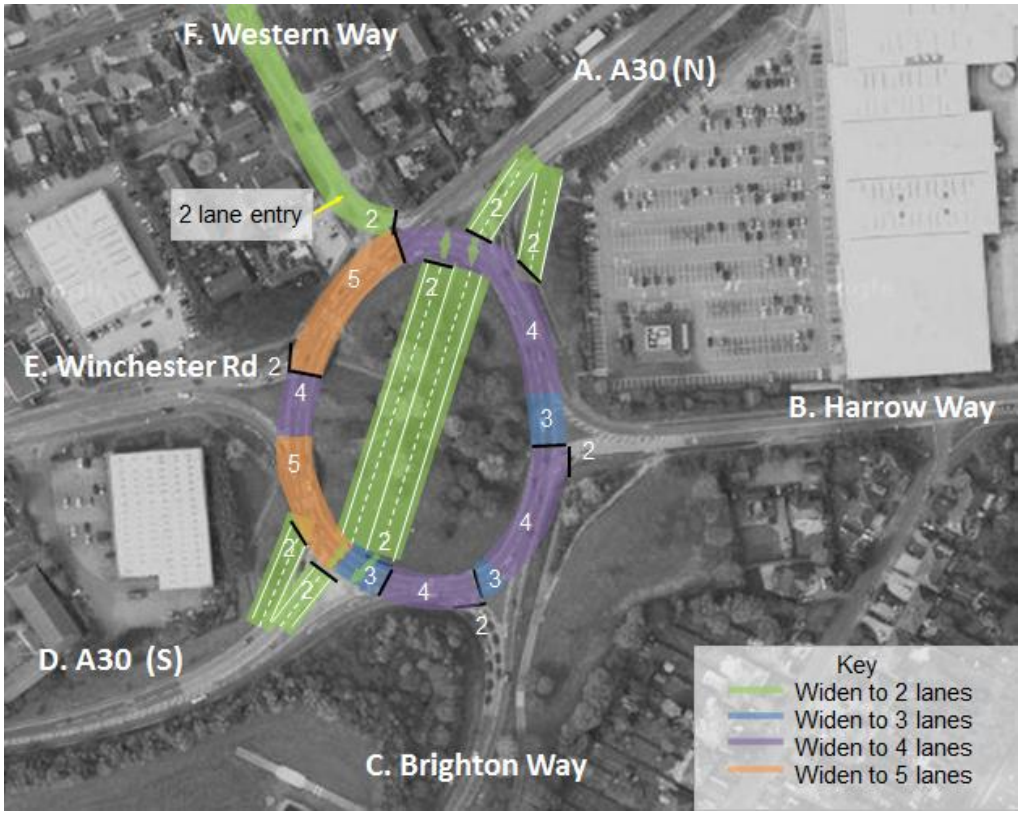


Figure 4-8 An Illustration of the Proposed Mitigation at Brighton Hill Roundabout; Source: Google Maps (2013)

4.6.7 Table 4-15 below shows the variations in Degree of Saturation (DoS) resulting from different travel demand and the proposed mitigation measures. The demand at the original priority roundabout layout significantly exceeded the capacity to the extent that the modelling results suggest there are few opportunities for traffic from Arm F in the AM peak to enter the roundabout. This is a direct result of the large amount of traffic on the A30 heading northbound in the AM peak. The proposed design alleviates these problems, allowing traffic to enter from all arms and noticeably reducing the queuing and delay on all arms.

Table 4-20 RFC and DoS at Each Entry for Brighton Hill Roundabout

Time	Arm	2029 Ref Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A30 North	85	86	126.1
	Arm B –Harrow Way	71	73	115.3
	Arm C – Brighton Way	85	90	108.1
	Arm D – A30 South	126	144	107.8
	Arm E – Winchester Rd	71	74	98.9
	Arm F – Western Way	-	-	90.0
PM	Arm A – A30 North	127	147	106.4
	Arm B –Harrow Way	121	124	97.4
	Arm C – Brighton Way	80	85.6	78.0
	Arm D – A30 South	55	56	64.8
	Arm E – Winchester Rd	49	51	101.8
	Arm F – Western Way	63	65	84.2

4.6.8 The overall performance of the Local Plan Scenario with mitigation appears worse than the Reference Case, particularly in the AM peak since four arms now have a DoS above 100%. However, it should be borne in mind that no traffic was able to enter the roundabout from Arm F in the Reference Case, and the mitigation measures have allowed this traffic into the junction.

4.6.9 Table 4-21 below shows the average delay per PCU across the whole junction. While the modelled average delay per PCU remains high in the Local Plan with mitigation scenario, it still shows a significant improvement when compared with both the Local Plan without mitigation scenario and the 2029 Reference Case.

Table 4-21 Modelled Average delay per PCU for Brighton Hill Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	702	864	259
PM	371	811	107

4.6.10 Table 4-22 shows the cost estimates for the proposed improvements to the Brighton Hill Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-22 Indicative Improvement Costs for Brighton Hill Roundabout

Brighton Hill Roundabout	Costs (£)
Site Clearance	134,000
Fencing	12,000
Pedestrian Guardrail etc	56,000
Drainage	555,000
Earthworks	671,000
Pavement	789,000
Kerbs & Footways	211,000
Signs & Markings (Inc Work to Traffic Lights)	200,000
Road Lighting Columns	203,000
Traffic Signals	499,000
Planting & Accommodation Works	110,000
Sub – Total	**3,440,000**
Preliminaries 7.5%	258,000
Traffic Management 20%	688,000
Sub – Total	**4,386,000**
Contingency / Risk 45%	1,974,000
Total £	**6,360,000**

4.7 Hackwood Road Roundabout

4.7.1 Hackwood Road roundabout is a four arm priority controlled roundabout on the southern part of the Ringway. Figure 4-9 shows demand on each entry arm in the 2029 Reference Case and Local Plan Scenario, whilst Table 4-23 and Table 4-24 show the full turning demand.

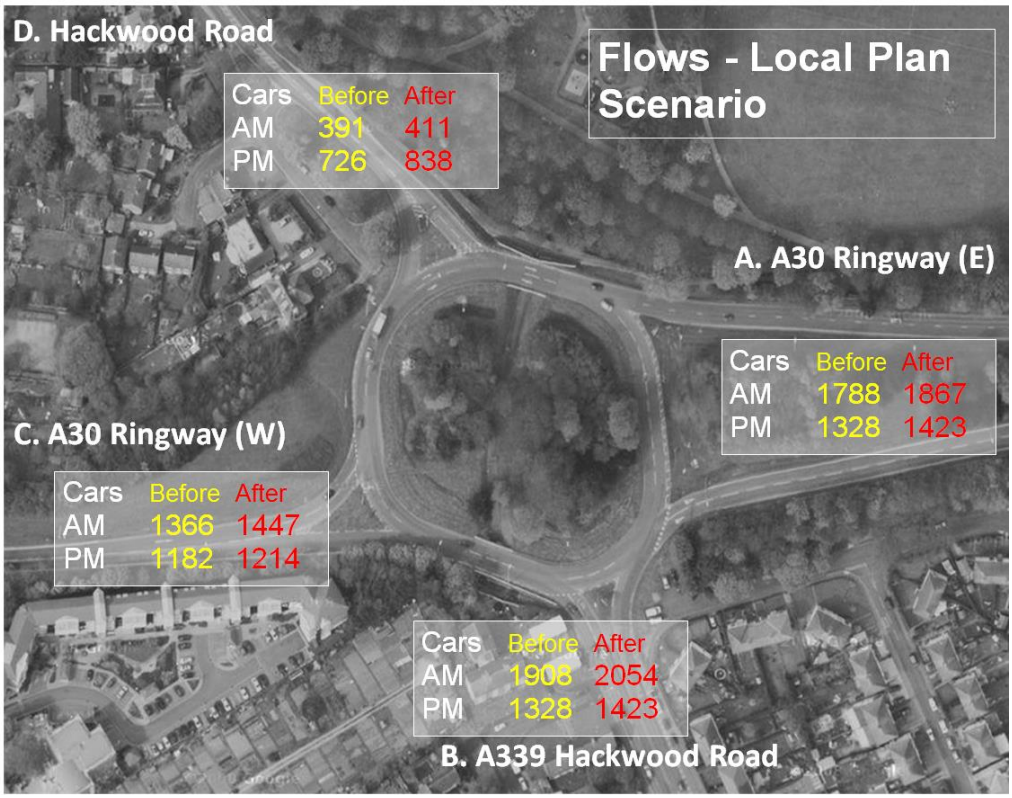


Figure 4-9 Demand at Hackwood Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-23 AM Demand at Hackwood Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A30 Ringway E	2	882	588	316	1788
	Arm B – A339	1157	23	461	267	1908
	Arm C –A30 Ringway W	691	319	4	352	1366
	Arm D – Hackwood Rd	109	203	69	10	391
	Total	1959	1426	1122	946	5454
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A30 Ringway E	2	917	607	341	1867
	Arm B – A339	1249	24	505	277	2054
	Arm C –A30 Ringway W	710	329	4	405	1447
	Arm D – Hackwood Rd	121	209	71	10	411
	Total	2081	1478	1188	1033	5780

Table 4-24 PM Demand at Hackwood Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A30 Ringway E	6	737	388	197	1328
	Arm B – A339	696	65	209	248	1218
	Arm C –A30 Ringway W	586	506	6	84	1182
	Arm D – Hackood Rd	151	434	141	0	726
	Total	1439	1742	743	529	4453
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A30 Ringway E	6	769	450	197	1423
	Arm B – A339	723	65	209	249	1246
	Arm C –A30 Ringway W	587	532	6	88	1214
	Arm D – Hackwood Rd	170	435	233	0	838
	Total	1486	1801	898	534	4720

4.7.2 The largest movements through this junction are between A30 Ringway E (Arm A) and A339 Hackwood Road (Arm B) in both peak hours. However, there are also several other large movements through the roundabout such as traffic moving between Arms A and C. The volume of traffic arriving at each arm of this junction is similar.

4.7.3 With the predicted level of demand growth, the junction is forecasted to experience significant congestion even in the 2029 Reference Case Scenario, particularly A339 Hackwood Rd (Arm B) in the AM peak and Hackwood Road (Arm D) in the PM peak. It is considered that the current form of the junction, a priority-controlled roundabout, does not provide sufficient capacity to accommodate the forecasted traffic flow. Following an initial design provided by HCC in August 2013, it is proposed to improve the operation of the junction by converting it to a signalised roundabout. A few minor amendments to the design received from HCC were made in order to accommodate the forecasted traffic patterns and volume of traffic as a result of the Local Plan development.

- Signalise the roundabout.
- The circulatory of the roundabout will be widened from 2 lanes to 3, with additional flares at stoplines near the A30 Ringway West and Hackwood Road (Arms C and D) entries to provide 4 lanes at these stoplines. This will increase the capacity on the circulatory to enable it to accommodate the likely queues and keep the circulatory free flowing.
- The existing flares on A30 Ringway West (Arm C) and Hackwood Road (Arm D) would be extended to 115m and 86m respectively, and a 60m flare would be added to the A30 Ringway East (Arm A) entry so that there are 3 lanes at the stopline.
- Existing exit funnels on A339 Hackwood Road (Arm B), A30 Ringway West (Arm C) and Hackwood Road (Arm D) will be utilised as part of the proposal. Some repainting of the exits may be required to formalise lane usage.

4.7.4 A visual check has been undertaken, which suggested that all proposed improvements may be accommodated within existing highway boundaries.

4.7.5 An illustration of the proposed mitigation is shown in Figure 4-10.

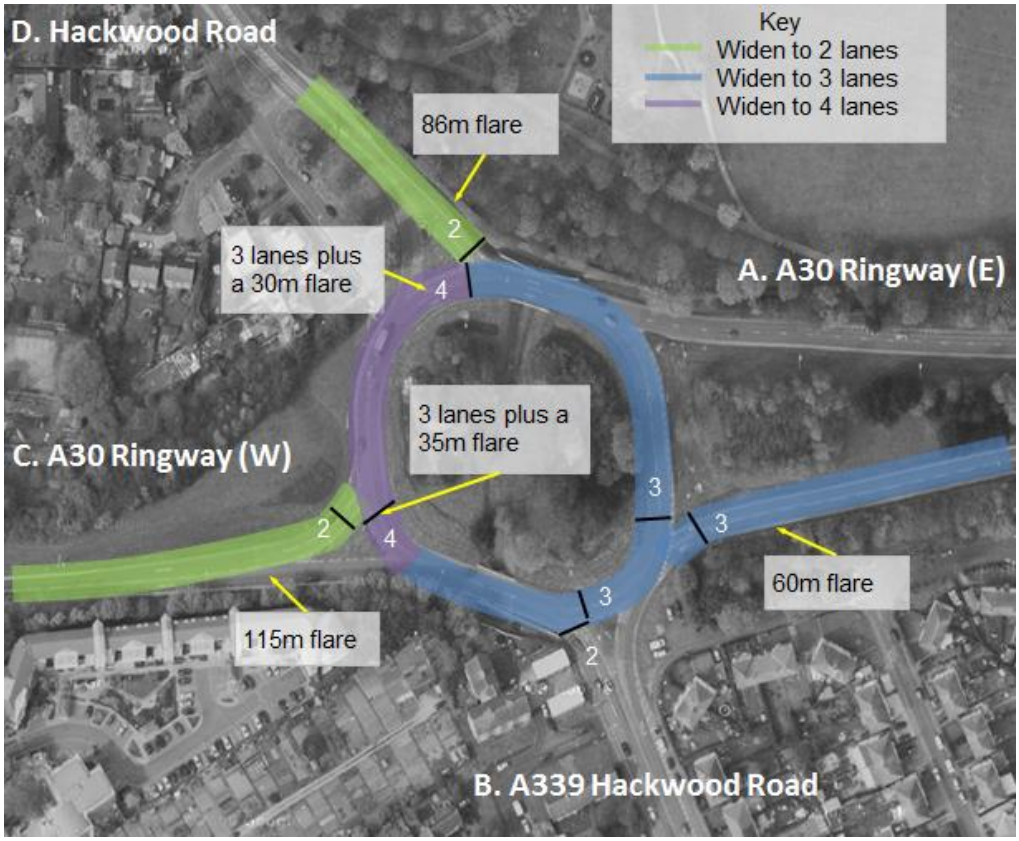


Figure 4-10 An Illustration of the Proposed Mitigation at Hackwood Roundabout; Source: Google Maps (2013)

4.7.6 Table 4-25 below shows variations in the RFC and DoS resulting from different travel demand scenarios and the proposed mitigation measures.

Table 4-25 Modelled RFC and DoS for Hackwood Roundabout entry arms

Time	Arm	2029 Ref Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A30 Ringway E	90.8	94.9	65.3
	Arm B – A339	156.0	172.1	117.8
	Arm C –A30 Ringway W	137.4	145.4	101.3
	Arm D – Hackwood Rd	64.2	65.2	74.7
PM	Arm A – A30 Ringway E	79.0	98.2	69.8
	Arm B – A339	85.8	105.2	74.9
	Arm C –A30 Ringway W	115.5	123.8	61.4
	Arm D – Hackwood Rd	150.8	235.8	72.6

4.7.7 It can be seen that the proposed improvements increase the capacity to accommodate almost all of the forecasted demand and the resulting DoS is similar to, or below those achieved in the Reference Case scenario. In particular the operation of the A339 (Arm B) in the AM peak and Hackwood Road (Arm D) in the PM peak is significantly improved. However, the A339 (Arm B) and A30 Ringway West (Arm C) are forecasted to remain over capacity in the AM peak which will result in delay and queuing on this arm.

4.7.8 Table 4-26 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a significant reduction in delay when compared with both the Local Plan with no mitigation scenario, and the 2029 Reference Case.

Table 4-26 Modelled Average delay per PCU for Hackwood Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	793	1012	139
PM	347	883	21

4.7.9 Table 4-27 shows the cost estimates for the proposed improvements to Hackwood Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-27 Indicative Improvement Costs for Hackwood Roundabout

Hackwood Roundabout	Costs (£)
Site Clearance	40,000
Fencing	0
Pedestrian Guardrail etc	17,000
Drainage	167,000
Earthworks	145,000
Pavement	270,000
Kerbs & Footways	63,000
Signs & Markings (Inc Work to Traffic Lights)	60,000
Road Lighting Columns	61,000
Traffic Signals	215,000
Planting & Accommodation Works	0
Sub - Total	**1,038,000**
Preliminaries 7.5%	78,000
Traffic Management 20%	208,000
Sub - Total	**1,324,000**
Contingency/Risk 45%	596,000
Total	**1,920,000**

4.7.10 It is recommended that liaison with HCC is required in any future design for this junction to clarify any discrepancies with the options being considered by HCC, the practicality and deliverability of the proposal from this study.

4.8 Victory Roundabout

4.8.1 This is presently a four-arm priority roundabout located on the A3010 Churchill Way. The traffic demand is shown in Figure 4-11, with and without the influence from the Local Plan developments. Table 4-28 and Table 4-29 also present detailed turning movements at this junction for the 2029 Reference Case and Local Plan Scenario.

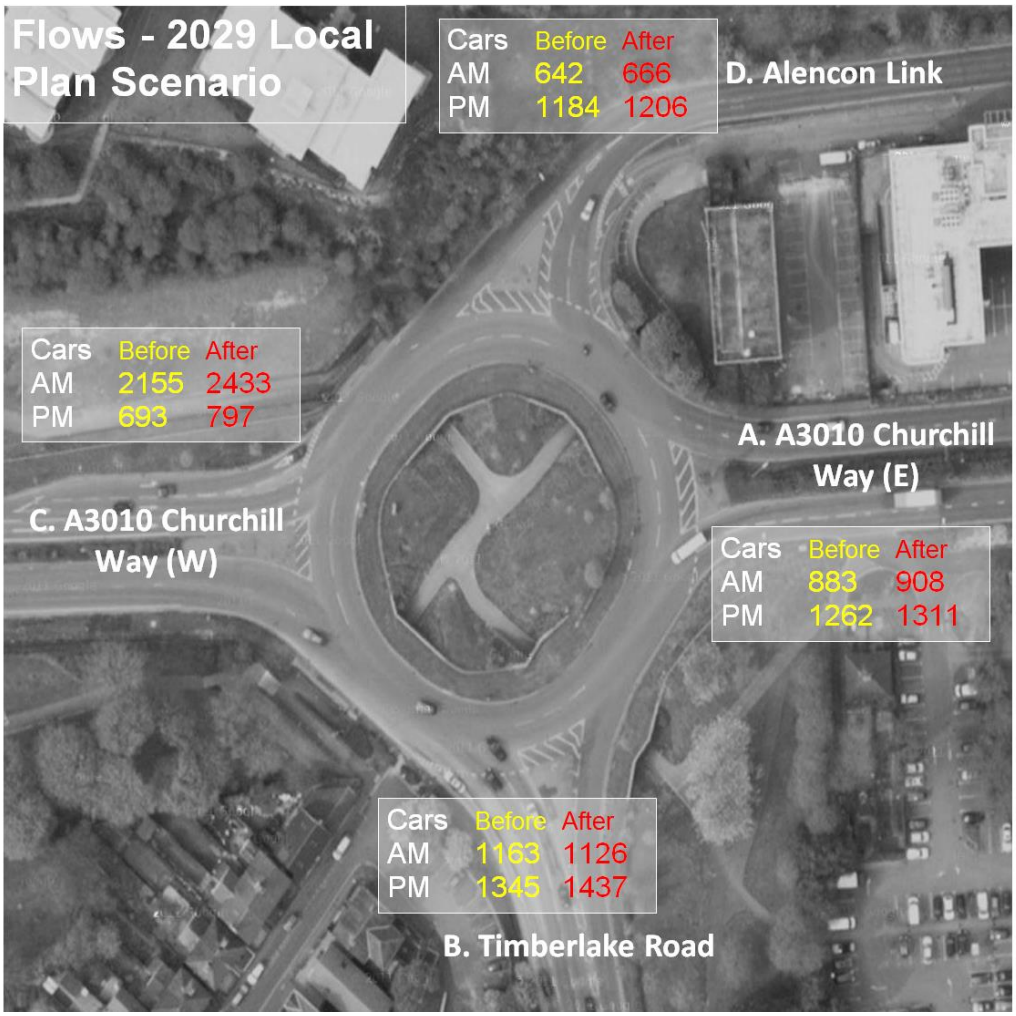


Figure 4-11 Demand at Victory Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

4.8.2 It can be seen from Table 4-28 and Table 4-29 that the current key movements at this junction are between Arm A (A3010 East) and Arm C (A3010 West) in both the AM and PM peak. Similarly, the demand increases as a result of the Local Plan developments are primarily focused on the movements between Arms A and C.

Table 4-28 AM Demand at Victory Roundabout in the AM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A3010 East	99	27	335	422	883
	Arm B – Timberlake Road	634	0	169	360	1163
	Arm C – A3010 West	1463	19	1	672	2155
	Arm D – Alencon Link	317	10	316	0	642
	Total	2513	56	820	1454	4843
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A3010 East	95	26	378	409	908
	Arm B – Timberlake Road	606	0	161	358	1126
	Arm C – A3010 West	1767	18	1	647	2433
	Arm D – Alencon Link	327	9	330	0	666
	Total	2795	53	871	1414	5133

Table 4-29 Demand at Victory Roundabout in the PM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – A3010 East	106	11	875	270	1262
	Arm B – Timberlake Road	514	0	397	433	1345
	Arm C – A3010 West	398	11	5	279	693
	Arm D – Alencon Link	426	5	752	0	1184
	Total	1444	26	2030	982	4482
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – A3010 East	106	11	918	277	1311
	Arm B – Timberlake Road	515	0	467	455	1437
	Arm C – A3010 West	501	11	5	280	797
	Arm D – Alencon Link	441	5	760	0	1206
	Total	1563	27	2150	1011	4751

4.8.3 With the predicted level of demand growth, Arm C A3010 West of this junction is forecasted to experience significant congestion even in the 2029 Reference Case Scenario. The existing layout provides sufficient capacity for most of the junction, however, the junction struggles to accommodate the heavy AM peak flows arriving on the A3010 Churchill Way (West).

4.8.4 The junction performance was investigated with a number of alternative layouts but a full solution could not be found where the cost of the improvements was in proportion with the enhancement in junction performance. The width of the circulatory is limited by the existing highway boundary, and the level of flow conflicting with the A3010 Churchill Way (West) entry flow cannot be mitigated within this space.

4.8.5 It is proposed to improve the operation of the junction with the following measures;

- Signalise entries (and adjacent circulatory carriageway) from Timberlake Road and A3010 Churchill Way East and West. Alencon Way will remain as a give-way entry.
- Extend the A3010 Churchill Way West flare to 150m
- Widen the circulatory to three lanes between the A3010 Churchill Way West entry and the A3010 Churchill Way East exit, and the Chirchill Way East entry to Timberlake Road entry

4.8.6 A visual check has been undertaken, which suggested that all proposed improvements may be accommodated within existing highway boundaries.

4.8.7 An illustration of the proposed mitigation is shown in Figure 4-10

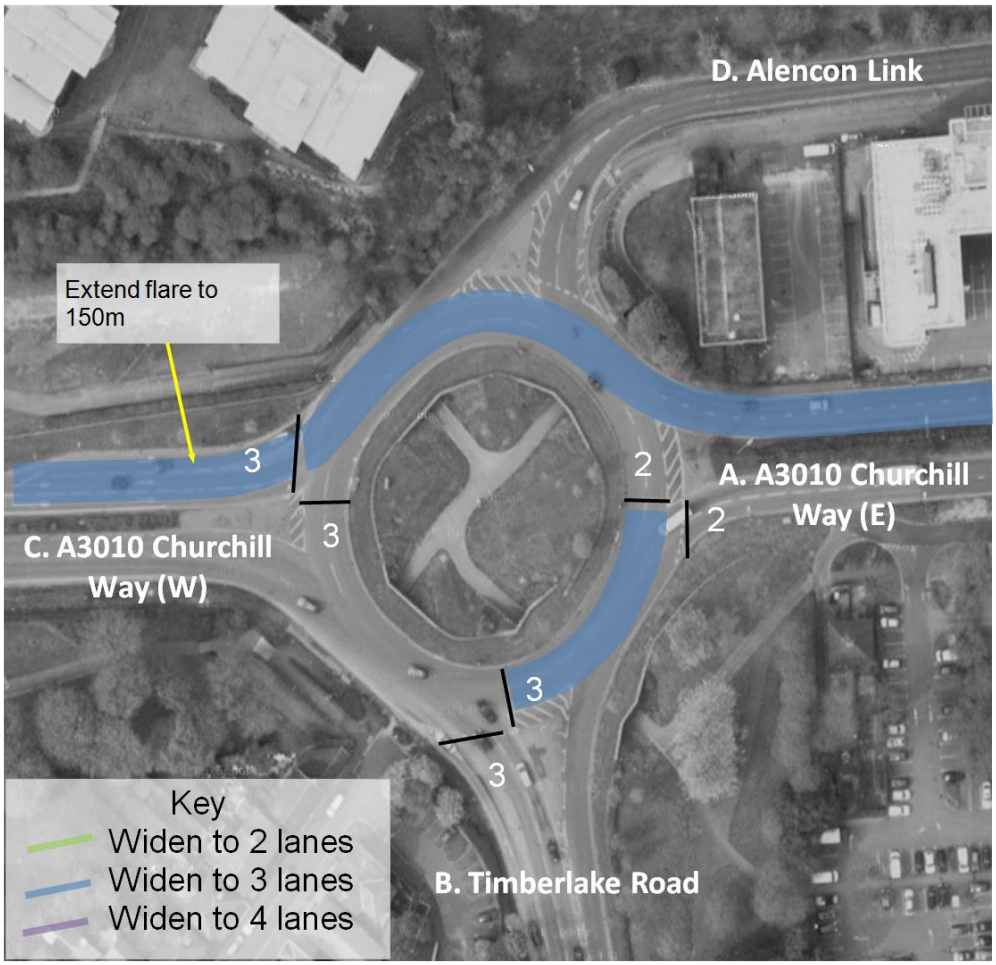


Figure 4-12 An Illustration of the Proposed Mitigation at Victory Roundabout; Source: Google Maps (2013)

4.8.8 Table 4-30 below shows variations in the RFC resulting from different travel demand scenarios and the proposed mitigation measures.

Table 4-30 Modelled RFC at Each Entry of Victory Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A3010 East	44	45	78
	Arm B – Timberlake Road	56	55	90
	Arm C – A3010 West	127	141	95
	Arm D – Alencon Link	84	91	69
PM	Arm A – A3010 East	71	73	109
	Arm B – Timberlake Road	88	95	98
	Arm C – A3010 West	38	44	88
	Arm D – Alencon Link	101	107	86

4.8.9 It can be seen that the proposed improvements increase the capacity to accommodate almost all of the forecasted demand and the resulting DoS is similar to, or below those achieved in the Reference Case scenario. In particular the operation of A3010 Churchill Way West (Arm C) in the AM peak and Alencon Link (Arm D) in the PM peak are significantly improved.

4.8.10 Table 4-31 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a small increase in the Local Plan with mitigation scenario when compared with the 2029 Reference Case in the PM peak, but a significant decrease in the AM peak.

Table 4-31 Modelled Average delay per PCU for Victory Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	336	537	37
PM	36	73	89

4.8.11 Table 4-32 shows the cost estimates for the proposed improvements to Victory Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-32 Indicative Improvement Costs for Victory Roundabout

Hackwood Roundabout	Costs (£)
Site Clearance	19,000
Fencing	3,000
Pedestrian Guardrail etc	12,000
Drainage	80,000
Earthworks	69,000
Pavement	87,000
Kerbs & Footways	30,000
Signs & Markings (Inc Work to Traffic Lights)	29,000
Road Lighting Columns	0
Traffic Signals	178,000
Planting & Accommodation Works	10,000
Sub - Total	**517,000**
Preliminaries 7.5%	39,000
Traffic Management 20%	103,000
Sub - Total	**659,000**
Contingency/Risk 45%	296,000
Total	**955,000**

4.9 Aldermaston Road Roundabout

4.9.1 Aldermaston is a large six arm grade separated roundabout on the A339. The peak hour arrival flows are illustrated in Figure 4-13 with and without the additional Local Plan developments. Table 4-33 and Table 4-34 present the turning movements at the junction for the 2029 Reference Case and Local Plan Scenario.

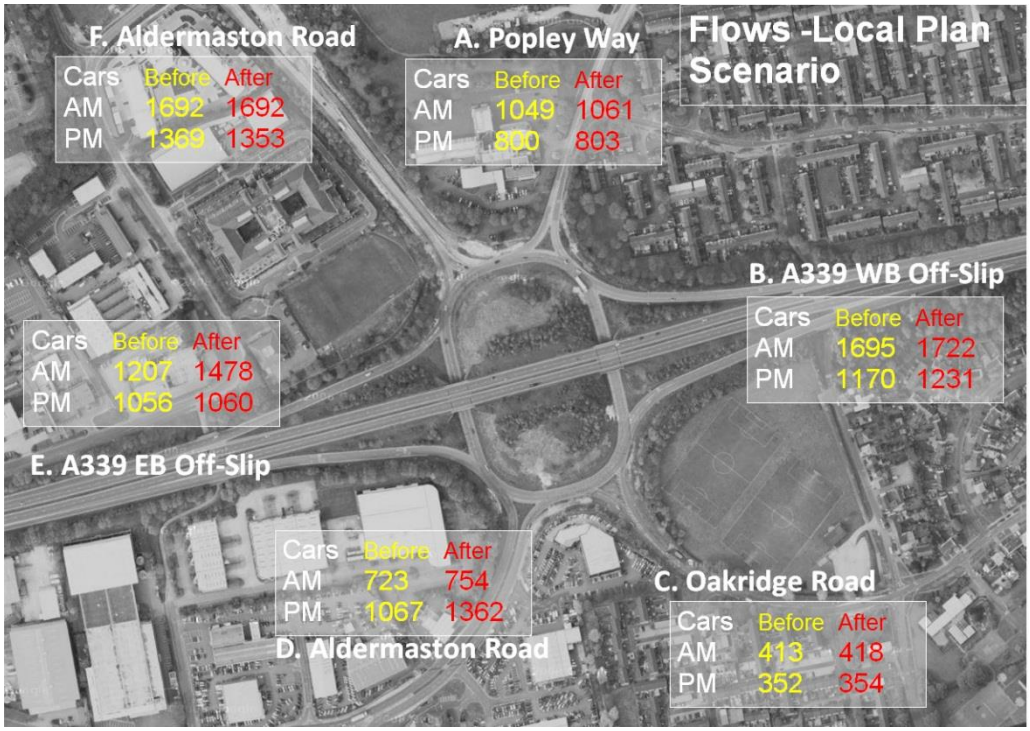


Figure 4-13 Demand at Aldermaston Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-33 Traffic Demand at Aldermartston Roundabout in the AM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A – Popley Way	7	255	98	317	306	66	1049
	Arm B – A339 WB Off-Slip	199	61	11	564	1	858	1695
	Arm C – Oakridge Road	24	26	7	63	121	171	413
	Arm D – Aldermaston Road	66	128	2	14	111	402	723
	Arm E - A339 EB Off-Slip	274	0	22	133	36	742	1207
	Arm F - Aldermaston Road	90	892	90	286	267	68	1692
	Total	660	1362	230	1377	841	2307	6778
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm F**	**Total**
Local Plan Scenario	Arm A – Popley Way	7	258	99	321	310	66	1061
	Arm B – A339 WB Off-Slip	202	62	12	635	1	861	1772
	Arm C – Oakridge Road	24	27	7	64	122	173	418
	Arm D – Aldermaston Road	66	150	2	14	114	407	754
	Arm E - A339 EB Off-Slip	278	0	22	400	36	743	1478
	Arm F - Aldermaston Road	91	894	91	290	267	69	1701
	Total	668	1390	233	1723	850	2319	7183

4.9.2 In the AM peak hour there is a significant increase in traffic demand on Arm E of this junction with the Local Plan development in place, all other arms of the junction experience small increases in demand over the Reference case forecasts.

Table 4-34 Traffic Demand at Aldermaston Roundabout in the PM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A – Popley Way	7	196	73	125	368	30	800
	Arm B – A339 WB Off-Slip	205	87	30	228	5	615	1170
	Arm C – Oakridge Road	28	40	3	50	109	122	352
	Arm D – Aldermaston Road	123	191	4	7	235	507	1067
	Arm E - A339 EB Off-Slip	366	14	14	46	50	566	1056
	Arm F - Aldermaston Road	117	516	99	167	427	44	1369
	Total	847	1043	223	623	1194	1884	5815
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm F**	**Total**
Local Plan Scenario	Arm A – Popley Way	7	196	74	125	370	31	803
	Arm B – A339 WB Off-Slip	205	88	31	291	5	611	1231
	Arm C – Oakridge Road	28	40	3	51	110	122	354
	Arm D – Aldermaston Road	123	313	4	7	404	510	1362
	Arm E - A339 EB Off-Slip	367	14	14	50	51	565	1060
	Arm F - Aldermaston Road	118	512	99	168	412	44	1353
	Total	850	1162	225	692	1352	1883	6163

4.9.3 In the PM peak hour the largest increase in traffic demand is predicted on Arm D of the junction with the Local Plan housing in place, all other arms experience a small increase in traffic over the Reference Case forecasts.

4.9.4 In order to accommodate the predicted increase in traffic demand, additional circulatory lanes are proposed, as illustrated in Figure 4-14. The space constraints at Aldermaston Roundabout do not allow for additional lanes on the approach roads nor on the gyratory links under the fly-over bridges to be added. As a result, additional gyratory lanes are proposed at the circulatory stop lines at the Popley Way, A339 WB off-slip, Oakridge Road and Aldermaston Road entries.

Figure 4-14 An Illustration of the Proposed Mitigation at Aldermaston Roundabout; Source: Google Maps (2013)

4.9.5 Table 4-35 below shows variations in the Degree of Saturation (DoS) resulting from different travel demand scenarios and the proposed mitigation measures.

Table 4-35 Modelled Degree of Saturation at Each Entry of Aldermaston Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A - Popley Way	88.7	95.5	87.7
	Arm B - A339 WB Off-slip	81.9	90.8	82
	Arm C - Oakridge Road	79.5	80.5	80.5
	Arm D - Aldermaston Rd S	83.1	107	87.8
	Arm E - A339 EB Off-slip	85.6	82.6	93.3
	Arm F - Aldermaston Road N	86.4	89.9	93.1
PM	Arm A - Popley Way	66.3	64.5	67.7
	Arm B - A339 WB Off-slip	67.8	68.6	79.3
	Arm C - Oakridge Road	79.5	53.6	48.7
	Arm D - Aldermaston Rd S	93.2	106.4	69.4
	Arm E - A339 EB Off-slip	79.1	77.3	81.8
	Arm F - Aldermaston Road N	80.4	80.5	85

4.9.6 It can be seen from the modelling results at Aldermaston roundabout that broadly the 2029 Reference Case scenario flows are predicted to operate near to capacity. All arms but one in the AM peak hour operate above 80% DoS indicating that there is little practical reserve capacity at the junction. In the PM peak hour Aldermaston Road South operates over 90% DoS indicating that peak hour queues will develop on these arms of the junction.

4.9.7 On most arms the performance of Aldermaston Road with the Local Plan Scenario and mitigation is predicted to be better than or similar to the Reference Case. In both the AM and PM peak all arms will operate with a DoS of less than 100% indicating that whilst there is likely to be some additional queuing, the junction will be able to operate on most occasions.

4.9.8 Careful consideration has been given to the level of queuing that can be accommodated on the circulatory of the roundabout and appropriate restrictions have been included in the model to ensure the queues do not exceed the stacking capacity.

4.9.9 Table 4-36 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a small increase between the Local Plan with mitigation scenario and the 2029 Reference Case in the average delay per PCU in the AM peak, and a similar delay across both scenarios in the PM peak. In both the AM and PM peaks, the Local Plan with mitigation scenario represents a significant decrease in the average delay per PCU over the 'no mitigation' scenario and the resulting delay per PCU remains reasonable.

Table 4-36 Modelled Average delay per PCU for Aldermaston Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	27	50	33
PM	28	52	27

4.9.10 Table 4-37 shows the cost estimates for the proposed improvements to Aldermaston Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-37 Indicative Improvement Costs for Aldermaston Roundabout

Aldarmaston Roundabout	Costs (£)
Site Clearance	45,000
Fencing	0
Pedestrian Guardrail etc	19,000
Drainage	185,000
Earthworks	161,000
Pavement	312,000
Kerbs & Footways	71,000
Signs & Markings (Inc Work to Traffic Lights)	67,000
Road Lighting Columns	68,000
Traffic Signals	109,000
Sub - Total	**1,037,000**
Preliminaries 7.5%	78,000
Traffic Management 20%	207,000
Sub - Total	**1,322,000**
Contingency/Risk 45%	595,000
Total	**1,917,000**

4.10 A339 / Ringway West Roundabout

4.10.1 This is a three-arm priority roundabout with entry flows as shown in Figure 4-15. These are presented for the Reference Case as well for Local Plan. Table 4-38 and Table 4-39 also present detailed turning movements at this junction.

Figure 4-15 Demand at A339 / Ringway West Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

4.10.2 Figure 4-15 shows clear increase in travel demand at all entry arms. It is clear from Table 4-38 and Table 4-39 that the major movements at this junction are between Arm A (A339 Ringway East) and Arm C (A339 Ringway West) as well as Arm A (A339 Ringway east) and Arm B (A340 Ringway South) in both the AM and PM peak hours.

Table 4-38 AM Demand at A339 / Ringway West Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – A339 RW E	0	910	1948	2858
	Arm B – A340 RW S	1609	0	133	1742
	Arm C – A339 RW W	2304	333	0	2637
	Total	3913	1243	2081	7237
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – A339 RW E	0	935	2057	2992
	Arm B – A340 RW S	1679	0	141	1820
	Arm C – A339 RW W	2520	338	0	2858
	Total	4198	1273	2198	7670

Table 4-39 PM Demand at A339 / Ringway West Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – A339 RW E	5	1189	2126	3320
	Arm B – A340 RW S	1393	0	125	1518
	Arm C – A339 RW W	1452	337	0	1789
	Total	2850	1526	2251	6627
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – A339 RW E	5	1256	2241	3502
	Arm B – A340 RW S	1429	0	125	1554
	Arm C – A339 RW W	1615	352	0	1967
	Total	3049	1609	2366	7023

4.10.3 The tables above indicate the increase in traffic demand between the 2029 Reference Case and the Local Plan Scenario. In order to mitigate against this increase in demand, and its associated increase in congestion and delay, the following junction modifications are proposed:

- Full signalisation of the junction
- Provide a 52m flare on the A339 Ringway West (Arm C) approach to the junction, to increase the number of lanes at the stop line from three lanes to four
- Increase the number of lanes on the circulatory from three lanes to four between the A339 Ringway West (Arm C) exit and the A339 Ringway East (Arm A) exit
- Provide an exit funnel, from four lanes into three lanes, on the A339 Ringway East (Arm A) exit from the junction
- Extend the existing 60m flare on the A340 Ringway South (Arm B) to 144m in length
- Provide an exit funnel, from three lanes into two lanes, at the A340 Ringway West (Arm C) exit from the junction

4.10.4 Enhancements in junction performance, and therefore further reductions in queuing and delay, could be achieved through the use of a MOVA traffic signal control system at this junction.

4.10.5 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. A diagram of this proposal is shown in Figure 4-16.

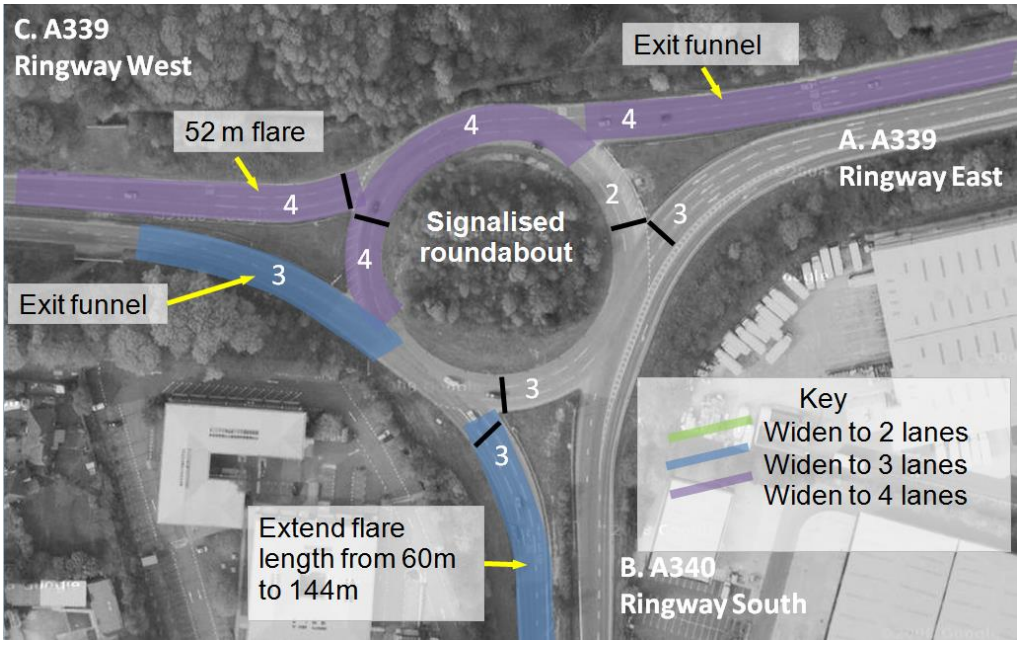


Figure 4-16 An Illustration of the Proposed Mitigation at A339 / Ringway West Roundabout; Source: Google Maps (2013)

4.10.6 Table 4-40 below tabulates variations in the RFC and DoS resulting from different travel demand and the proposed mitigation measures. It is clear that the proposed highway improvements can significantly reduce traffic congestion in comparison to the performance without mitigation. The model results indicate that the junction performs close to 2029 Reference Case in the Local Plan with mitigation scenario on both Arm A and Arm B in the AM peak, and exceeds the 2029 Reference Case performance on Arm C in the AM peak.

Table 4-40 RFC and DoS at Each Entry for A339 / Ringway West Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – A339 RW E	65.6	68.3	69.0
	Arm B – A340 RW S	79.2	85.9	82.1
	Arm C – A339 RW W	118.1	130.7	81.0
PM	Arm A – A339 RW E	77.0	81.5	72.7
	Arm B – A340 RW S	73.5	78.4	77.3
	Arm C – A339 RW W	75.4	83.7	61.7

4.10.7 Table 4-41 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a significant decrease in the AM peak average delay per PCU between the Local Plan with mitigation scenario and the 2029 Reference Case, with a slight increase shown to occur in the PM peak.

Table 4-41 Modelled Average delay per PCU for A339 / Ringway West Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	184	314	14
PM	5	7	12

4.10.8 Table 4-42 shows the cost estimates for the proposed improvements to A339 / Ringway West Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-42 Indicative Improvement Costs for A339 / Ringway West Roundabout

A33 / Ringway West Roundabout	Costs (£)
Site Clearance	26,000
Fencing	0
Pedestrian Guardrail etc	11,000
Drainage	105,000
Earthworks	92,000
Pavement	193,000
Kerbs & Footways	40,000
Signs & Markings (Inc Work to Traffic Lights)	38,000
Road Lighting Columns	39,000
Traffic Signals	149,000
Accommodation Works / Planting	0
Sub – Total	**693,000**
Preliminaries 10%	52,000
Traffic Management 20%	139,000
Sub – Total	**884,000**
Contingency / Risk 45%	398,000
Total £	**1,282,000**

4.11 A339 / Roman Road Roundabout

4.11.1 This is a four-arm priority controlled roundabout with two-lane entries from all arms. Its entry flows with and without the influence from the Local Plan developments are shown in Figure 4-17, whilst Table 4-43 and Table 4-44 present the full turning demand.

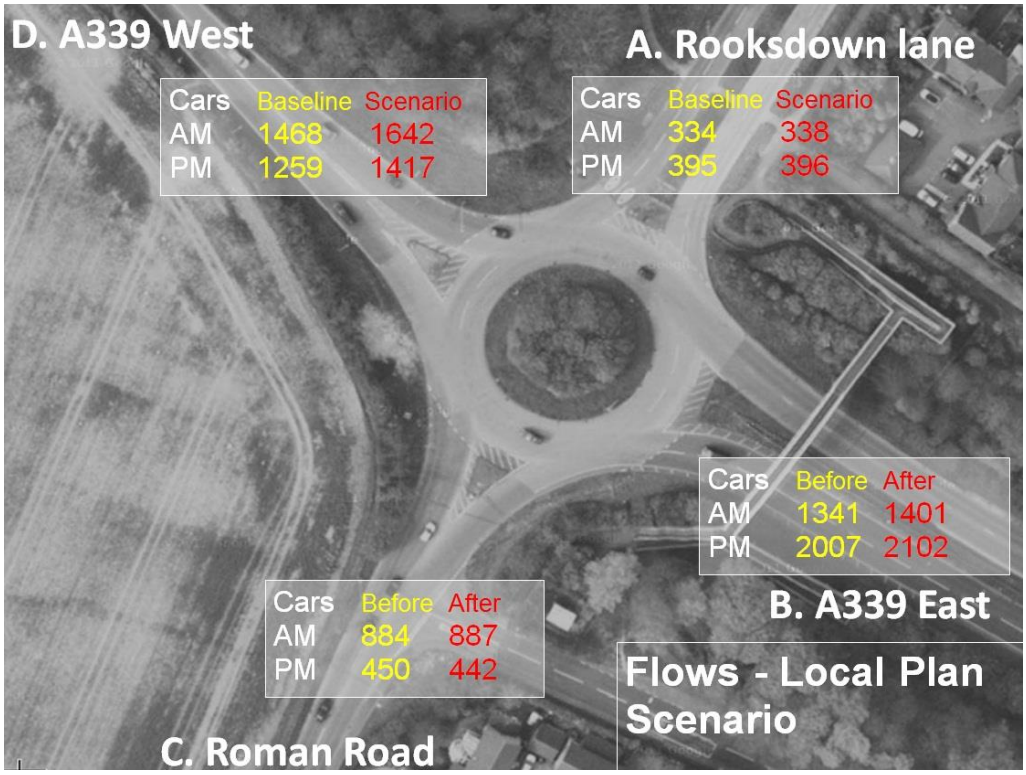


Figure 4-17 Demand at A339 / Roman Road Junction with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-43 AM Demand at A339 / Roman Road Junction by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – Rooksdown Ln	0	188	120	27	334
	Arm B – A339 East	117	0	379	846	1341
	Arm C – Roman Rd	252	522	0	110	884
	Arm D – A339 West	33	1363	72	0	1468
	Total	402	2073	571	982	4028
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Rooksdown Ln	0	190	121	27	338
	Arm B – A339 East	118	0	388	895	1401
	Arm C – Roman Rd	255	525	0	107	887
	Arm D – A339 West	34	1549	60	0	1642
	Total	407	2264	569	1029	4269

Table 4-44 PM Demand at A339 / Roman Road Junction by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – Rooksdown Ln	0	160	203	32	395
	Arm B – A339 East	111	0	632	1264	2007
	Arm C – Roman Rd	103	229	0	118	450
	Arm D – A339 West	15	1073	171	0	1259
	Total	230	1462	1005	1415	4111
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Rooksdown Ln	0	160	203	32	396
	Arm B – A339 East	112	0	615	1375	2102
	Arm C – Roman Rd	103	226	0	112	442
	Arm D – A339 West	15	1225	177	0	1417
	Total	230	1612	996	1520	4357

4.11.2 It is clear from the above two tables that the major movements at this junction are between the A339 arms in both directions. These two movements also receive the most significant increase in travel demand. The increase in travel demand on A339 is forecasted to cause significant delays and queuing in the future.

4.11.3 In order to mitigate against the increased traffic demand at the junction as a result of the Local Plan developments, the following measures are proposed:

- Increase the entry width of Rooksdown Lane (Arm A) to 3 lanes to accommodate a 30m long flare
- Increase the entry width of the A339 Kingsclere Road East (Arm B) to 3 lanes to accommodate a 30m long flare
- Repaint the road markings to formalise a 30m long flare on Roman Road (Arm C)
- Increase the width of both carriageways on the A339 Kingsclere Road West (Arm D) to include two lanes in each direction, to the proposed A339/B3400 Link Road junction
- Increase the entry width of the A339 Kingsclere Road East (Arm D) to 10.2m to include a 30m flare
- Repaint the road markings on the circulatory to formalise a three lane layout around the whole roundabout

4.11.4 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries.

4.11.5 An illustration of this proposed mitigation is shown in Figure 4-18.

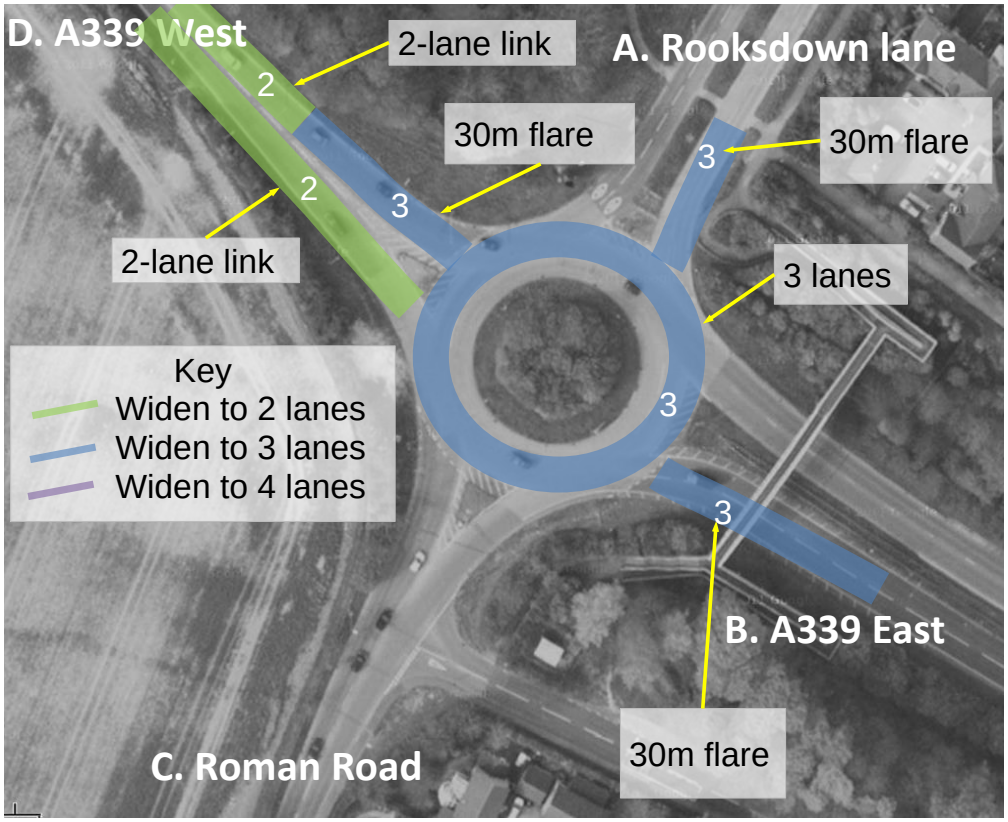


Figure 4-18 An Illustration of the Proposed Mitigation at A339 / Roman Road Junction; Source: Google Maps (2013)

4.11.6 Table 4-45 below tabulates variations in the RFC resulting from different travel demand and the proposed mitigation measures. It clearly demonstrates that the proposed measures can greatly improve the performance of both entries on the A339.

Table 4-45 RFC at Each Entry for A339 / Roman Road Junction

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – Rooksdown	34.0	34.4	30.0
	Arm B – A339 East	63.8	66.3	51.8
	Arm C - Roman Road	64.4	66.1	66.1
	Arm D - A339 West	113.5	127.4	75.1
PM	Arm A – Rooksdown	33.4	36.4	26.4
	Arm B – A339 East	101.6	106.6	82.3
	Arm C - Roman Road	39.5	39.8	42.0
	Arm D - A339 West	81.2	91.2	55.9

4.11.7 The above proposal is presented for the purpose of demonstrating a potential solution at the A339 / Roman Road Junction in light of the demand increase in the future. The proposal is subject to further refinement and should be considered in conjunction with the A339 / B3400 Link Road proposal in the future. Land around this junction may come available as part of the Manydown development which would allow alternative designs to be considered.

4.11.8 Table 4-46 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a significant decrease in the average delay per PCU at the junction between the Local Plan with mitigation scenario and the 2029 Reference Case

Table 4-46 Modelled Average delay per PCU for A339 / Roman Rd Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	145	293	5
PM	53	108	6

4.11.9 Table 4-47 shows the cost estimates for the proposed improvements to A339 / Ringway West Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-47 Indicative Improvement Costs for A339 / Roman Road Roundabout

A33 / Roman Road Roundabout	Costs (£)
Site Clearance	13,003
Fencing	4,840
Pedestrian Guardrail etc	7,852
Drainage	53,647
Earthworks	46,684
Pavement	87,779
Kerbs & Footways	20,440
Signs & Markings (Inc Work to Traffic Lights)	19,303
Road Lighting Columns	19,659
Traffic Signals	0
Accommodation Works / Planting	5,500
Sub – Total	**278,707**
Preliminaries 10%	20,903
Traffic Management 20%	55,741
Sub – Total	**355,351**
Contingency / Risk 45%	159,908
Total £	**515,260**

4.11.10 A remaining issue that should be considered at this junction, in close liaison with HCC as the highway authority, is managing access on surrounding routes such as the T-junction between Wellington Terrace and Roman Road. There is a known problem at this access for near miss accidents, particularly between vehicles turning right out of Wellington Terrace and those exiting the A339 / Roman Road roundabout.

4.12 B3400 Worting Road / Roman Way Roundabout

4.12.1 This is currently a three-arm priority roundabout located on the B3400. Its entry flows are shown in Figure 4-19, with and without the influence from the Local Plan developments. Table 4-48 and Table 4-49 also present detailed turning movements at this junction for the 2029 Reference Case and Local Plan Scenario.

Figure 4-19 Demand at B3400 Worting Road / Roman Way Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

4.12.2 It can be seen from Table 4-48 and Table 4-49 that demand is focused on the B3400 Worting Road (Arms B and C) approaches in the AM peak and more heavily on the Roman Way (Arm A) approach in the PM peak. The Local Plan developments mostly increase movements from the B3400 Worting Road approaches (Arms B and C).

Table 4-48 AM Demand at B3400 Worting Road / Roman Way Roundabout in the AM Peak

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – Roman Way	0	345	190	536
	Arm B – B3400 Worting Rd (E)	628	0	236	864
	Arm C – B3400 Worting Rd (W)	474	404	0	877
	Total	1102	749	426	2277
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – Roman Way	0	343	185	529
	Arm B – B3400 Worting Rd (E)	629	0	308	938
	Arm C – B3400 Worting Rd (W)	467	480	0	947
	Total	1097	823	494	2413

Table 4-49 Demand at B3400 Worting Road / Roman Way Roundabout in the PM Peak

	From / To	Arm A	Arm B	Arm C	Total
2029 Reference Case	Arm A – Roman Way	0	540	452	992
	Arm B – B3400 Worting Rd (E)	283	0	468	751
	Arm C – B3400 Worting Rd (W)	234	274	0	508
	Total	517	814	920	2251
	From / To	**Arm A**	**Arm B**	**Arm C**	**Total**
Local Plan Scenario	Arm A – Roman Way	0	542	446	988
	Arm B – B3400 Worting Rd (E)	284	0	537	822
	Arm C – B3400 Worting Rd (W)	230	347	0	576
	Total	514	888	984	2386

4.12.3 With the predicted level of demand growth, the junction is forecasted to experience congestion even in the 2029 Reference Case Scenario, particularly on B3400 Worting Rd (W) in the AM peak hour and Roman Way in the PM peak hour.

4.12.4 It is proposed that a 25m flare is included on the B3400 Worting Road East (Arm B) approach, and a 10m flare is included on the B3400 Worting Road West (Arm C) and Roman Way (Arm A) approaches.

4.12.5 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. A potential issue that needs investigation in future design is whether the provision of pedestrian facilities to the immediate south of the enlarged roundabout can be accommodated within the existing highway boundaries.

4.12.6 A diagram of this proposal is shown in Table 4-21.

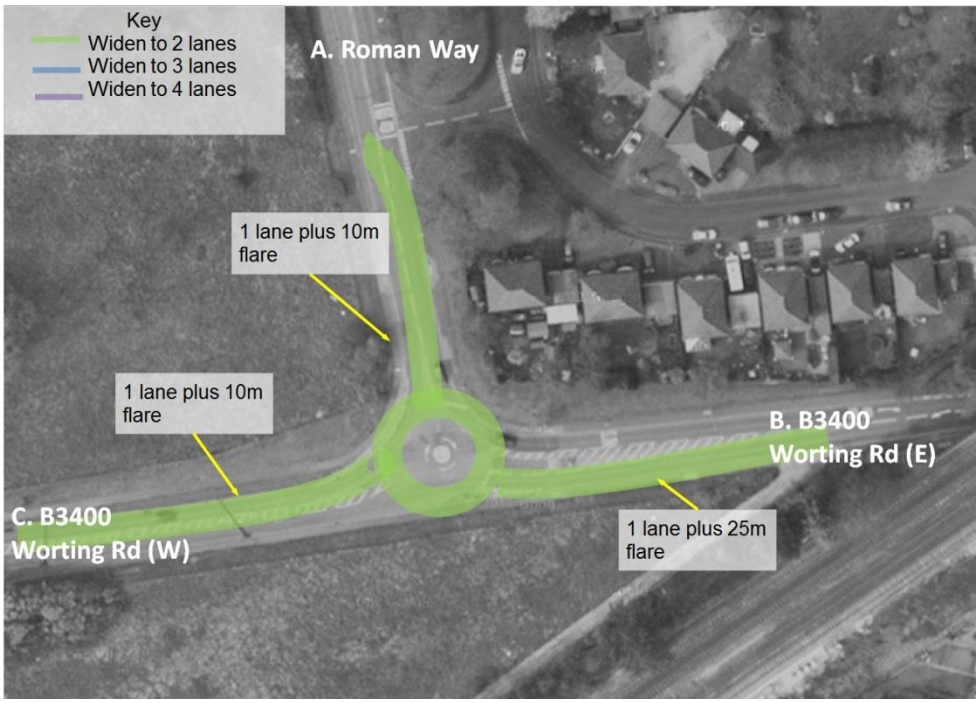


Figure 4-20 An Illustration of the Proposed Mitigation at B3400 Worting Road / Roman Way Roundabout; Source: Google Maps (2013)

4.12.7 Table 4-50 below shows variations in the RFC resulting from different travel demand scenarios and the proposed mitigation measures.

Table 4-50 Modelled RFC at Each Entry of B3400 Worting Road / Roman Way Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – Roman Way	100.6	102.2	85.7
	Arm B – B3400 Worting Rd (E)	96.6	104.2	69.4
	Arm C – B3400 Worting Rd (W)	180.6	191.1	126.1
PM	Arm A – Roman Way	196.9	213.1	155.2
	Arm B – B3400 Worting Rd (E)	87.2	93.7	65.0
	Arm C – B3400 Worting Rd (W)	81.4	92.5	62.9

4.12.8 It can be seen from the model results that the operation of the junction is significantly improved by the proposed mitigation measures in both modelled peak hours. As the junction is expected to operate at and above capacity, some delays and queuing do occur, although these are less than in the 2029 Reference Case.

4.12.9 Table 4-51 below shows the average delay per PCU across the whole junction. The average delay per PCU in the Local Plan with mitigation scenario remains high, although it represents a significant decrease when compared with the average delay per PCU in the 2029 Reference Case.

Table 4-51 Modelled Average delay per PCU for B3400 Worting Road / Roman Way Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	903	1076	297
PM	1174	1299	628

4.12.10 Table 4-52 shows the cost estimates for the proposed improvements to this junction. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-52 Indicative Improvement Costs for B3400 Worting Road / Roman Way Roundabout

B3400 Worting Road / Roman Way Roundabout	Costs (£)
Site Clearance	6,527
Fencing	2,750
Pedestrian Guardrail etc	2,699
Drainage	26,928
Earthworks	29,178
Pavement	47,634
Kerbs & Footways	10,260
Signs & Markings (Inc Work to Traffic Lights)	9,689
Road Lighting Columns	9,868
Traffic Signals	0
Accommodation Works	13,750
Sub – Total	**159,283**
Preliminaries 7.5%	11,946
Traffic Management 20%	31,857
Sub – Total	**203,086**
Contingency / Risk 45%	91,389
Total £	**294,474**

4.13 B3400 Worting Road Roundabout

4.13.1 This is presently a four-arm priority roundabout located on the B3400 Worting Road. The traffic demand is shown in Figure 4-21, with and without the influence from the Local Plan developments. Table 4-53 and Table 4-54 also present detailed turning movements at this junction for the 2029 Reference Case and Local Plan Scenario.

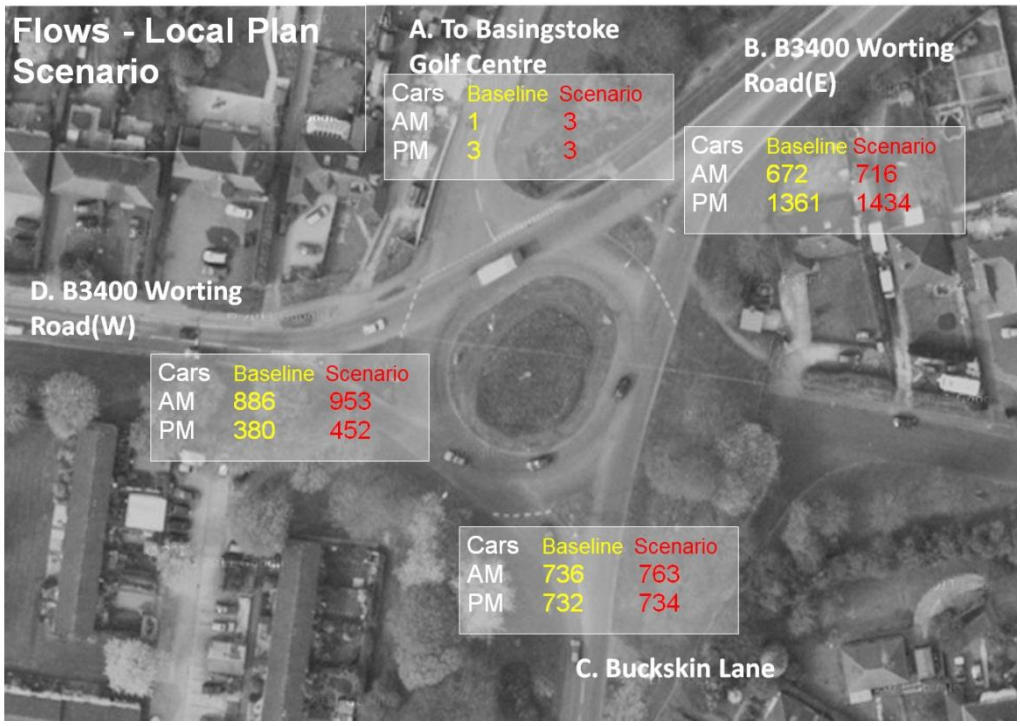


Figure 4-21 Demand at Worting Road Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

4.13.2 It can be seen from Table 4-53 and Table 4-54 that the current key movements at this junction are onto B3400 Worting Road East (Arm B) heading towards the town centre in the AM peak hour and leaving the town centre on Arm B in the evening peak hour.

Table 4-53 AM Demand at Worting Road Roundabout in the AM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference	Arm A – Worting Road	0	1	0	0	1
	Arm B – B3400 Worting Road (E)	0	0	397	276	672
	Arm C – Buckskin Lane	0	625	0	112	736
	Arm D – B3400 Worting Road (W)	1	691	193	0	886
	Total	1	1317	590	387	2296
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Worting Road	0	1	0	0	1
	Arm B – B3400 Worting Road (E)	0	0	397	319	716
	Arm C – Buckskin Lane	0	625	0	139	763
	Arm D – B3400 Worting Road (W)	1	759	193	0	953
	Total	1	1385	590	457	2433

Table 4-54 Demand at Worting Road Roundabout in the PM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – Worting Road	0	1	1	1	3
	Arm B – B3400 Worting Road (E)	1	0	652	708	1361
	Arm C – Buckskin Lane	4	500	0	228	732
	Arm D – B3400 Worting Road (W)	0	306	74	0	380
	Total	5	806	727	937	2476
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Worting Road	0	1	1	1	3
	Arm B – B3400 Worting Road (E)	1	0	658	775	1434
	Arm C – Buckskin Lane	4	501	0	229	734
	Arm D – B3400 Worting Road (W)	0	354	98	0	452
	Total	5	856	757	1005	2624

4.13.3 With the predicted level of demand growth, the junction is forecasted to experience congestion in the 2029 Local Plan Scenario, on the B3400 Worting Road West entry (Arm D) and the B3400 Worting Road East entry (Arm B).

4.13.4 To accommodate the additional traffic the following is proposed

- Extend the flares on the South approach to 20m. Remove the flares on the East and West approach and replace with full lane.
- Formalise a two-lane circulatory carriageway making use of the existing 8m wide carriageway.

4.13.5 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. An illustration of this proposed mitigation is shown in Figure 4-22.

Figure 4-22 An Illustration of the Proposed Mitigation at Worting Road Roundabout; Source: Google Maps (2013)

4.13.6 Table 4-55 below shows variations in RFC resulting from different travel demand scenarios and the proposed mitigation measures.

Table 4-55 Modelled RFC at Each Entry of Worting Road Roundabout

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – Worting Road	5	5	5
	Arm B – B3400 Worting Road (E)	39	41	34
	Arm C – Buckskin Lane	58	61	54
	Arm D – B3400 Worting Road (W)	84	91	61
PM	Arm A – Worting Road	5	5	5
	Arm B – B3400 Worting Road (E)	75	80	66
	Arm C – Buckskin Lane	71	73	64
	Arm D – B3400 Worting Road (W)	34	40	27

4.13.7 Overall the roundabout is forecast to be busier in the 2029 Local Plan scenario than the 2029 Reference Case but all the arms are operating within capacity and the performance of the roundabout is improved.

4.13.8 Table 4-56 below shows the average delay per PCU across the whole junction. There is a significant decrease shown between the mitigated and not mitigated Local Plan scenarios, and the mitigated results show an acceptable average delay in the AM peak. The mitigation measures proposed also result in a slight decrease between the mitigated Local Plan scenario and the 2029 Reference Case in the average delay per PCU in both the AM and PM peaks.

Table 4-56 Modelled Average delay per PCU for Worting Road Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	12	17	5
PM	9	10	6

4.13.9 Table 4-57 shows the cost estimates for the proposed improvements to this junction. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-57 Indicative Improvement Costs for Worting Road Roundabout

Worting Road Roundabout	Costs (£)
Site Clearance	7,000
Fencing	0
Pedestrian Guardrail etc	3,000
Drainage	28,000
Earthworks	25,000
Pavement	31,000
Kerbs & Footways	11,000
Signs & Markings (Inc Work to Traffic Lights)	10,000
Road Lighting Columns	10,000
Traffic Signals	0
Accommodation Works	10,000
Sub – Total	**135,000**
Preliminaries 10%	14,000
Traffic Management 20%	27,000
Sub – Total	**176,000**
Contingency / Risk 45%	79,000
Total £	**255,000**

4.14 West Ham Roundabout

4.14.1 This is a six arm priority roundabout on the B3400 to the west of the centre of Basingstoke. Figure 4-23 shows demand on each entry arm in the 2029 reference case and Local Plan demand, whilst Table 4-58 and Table 4-59 show the full turning demand.

Figure 4-23 Demand at West Ham Roundabout with and without Local Plan Developments; Source: Google Maps (2013)

Table 4-58 AM Demand at West Ham Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A - B3400 Churchill Way	0	73	218	7	343	72	**712**
	Arm B - Grafton Way	41	0	32	3	57	1	**135**
	Arm C - Worting Rd	288	179	0	41	263	78	**850**
	Arm D - West Ham Close	12	0	13	0	15	3	**44**
	Arm E - B3400 Worting Rd	698	124	417	13	1	68	**1321**
	Arm F - Uskirchen Way	35	21	73	0	33	0	**162**
	Total	**1075**	**397**	**752**	**64**	**713**	**222**	**3223**
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm D**	**Total**
Local Plan Scenario	Arm A - B3400 Churchill Way	0	72	216	7	426	71	**792**
	Arm B - Grafton Way	40	0	32	3	57	1	**133**
	Arm C - Worting Rd	286	177	0	40	260	78	**841**
	Arm D - West Ham Close	12	0	13	0	15	3	**44**
	Arm E - B3400 Worting Rd	829	123	412	13	1	67	**1446**
	Arm F - Uskirchen Way	35	21	72	0	32	0	**160**
	Total	**1202**	**393**	**745**	**63**	**793**	**220**	**3416**

Table 4-59 PM Demand at West Ham Roundabout by Turns

	From / To	Arm A	Arm B	Arm C	Arm D	Arm E	Arm F	Total
2029 Reference Case	Arm A - B3400 Churchill Way	0	71	475	11	790	245	**1592**
	Arm B - Grafton Way	99	0	89	0	146	2	**337**
	Arm C - Worting Rd	220	120	0	27	170	55	**592**
	Arm D - West Ham Close	1	0	9	0	12	2	**24**
	Arm E - B3400 Worting Rd	452	71	291	16	2	52	**885**
	Arm F - Uskirchen Way	50	10	104	0	27	0	**190**
	Total	**823**	**272**	**968**	**55**	**1147**	**356**	**3620**
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Arm E**	**Arm D**	**Total**
Local Plan Scenario	Arm A - B3400 Churchill Way	0	71	476	11	917	245	**1720**
	Arm B - Grafton Way	99	0	90	0	146	2	**337**
	Arm C - Worting Rd	221	120	0	27	170	55	**593**
	Arm D - West Ham Close	1	0	9	0	12	2	**24**
	Arm E - B3400 Worting Rd	538	71	292	16	2	52	**971**
	Arm F - Uskirchen Way	50	10	104	0	27	0	**190**
	Total	**909**	**272**	**970**	**55**	**1275**	**357**	**3837**

4.14.2 The key movements through West Ham Roundabout are along the B3400 between Churchill Way (Arm A) and Worting Road (Arm E). This movement is tidal with the majority of traffic heading eastbound in the AM peak and westbound in the PM peak.

4.14.3 With the predicted level of growth in travel demand, the junction is forecasted to experience significant congestion, particularly on the B3400 (Arms A and E) as a result of the Local Plan development. In order to improve the operation of the junction the following is proposed;

- Widen the B3400 Churchill Way entry (Arm A) by eliminating the flare and adding a full lane, widen Grafton Way (Arm B) with a 25m flare and Worting Road (Arm C) with a short 10m flare
- Increase the capacity of the B3400 Worting Road entry (Arm E) by replacing the flare with a full lane.
- The circulatory carriageway will require widening from 2 lanes to 3 lanes on the southern section between Arm A and Arm E
- 30m exit funnel from 2 lanes to 1 lane on the B3400 Worting Road (Arm E) exit.
- The roundabout would remain as priority controlled.

4.14.4 A visual check has been undertaken, which confirmed that all proposed improvements can be accommodated within existing highway boundaries. An illustration of this proposed mitigation is shown in Figure 4-24.

Figure 4-24 An Illustration of the Proposed Mitigation at West Ham Roundabout; Source: Google Maps (2013)

4.14.5 Table 4-60 below shows the variations in RFC resulting from different travel demand and the proposed mitigation measures. The model results show that, with mitigation in the Local Plan Scenario, the junction will operate at the same level or better than the 2029 Reference Case. All arms are reported to operate within capacity in both peaks.

Table 4-60 RFC at Each Entry for West Ham Roundabout

Time	Arm	2029 Ref Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A - B3400 Churchill Way	50.0	16.6	36.5
	Arm B - Grafton Way	16.4	81.7	13.2
	Arm C - Worting Rd	79.7	7.2	56.0
	Arm D - West Ham Close	6.9	109.0	7.2
	Arm E - B3400 Worting Rd	99.8	23.1	81.0
	Arm F - Uskirchen Way	23.0	23.1	21.0
PM	Arm A - B3400 Churchill Way	103.9	112.3	74.7
	Arm B - Grafton Way	63.3	64.1	52.9
	Arm C - Worting Rd	79.7	81.9	55.2
	Arm D - West Ham Close	5.5	5.7	6.4
	Arm E - B3400 Worting Rd	68.1	74.4	55.7
	Arm F - Uskirchen Way	21.0	21.9	19.0

4.14.6 Table 4-61 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in a decrease in the AM and PM peak, in the average delay per PCU between the Local Plan with mitigation scenario and the 2029 Reference Case. The PM peak average delay shows a significant decrease over the 'no mitigation' scenario, and average delays remain reasonable.

Table 4-61 Modelled Average delay per PCU for West Ham Roundabout (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	42	10	7
PM	75	167	6

4.14.7 Table 4-62 shows the cost estimates for the proposed improvements to the West Ham Roundabout. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage.

Table 4-62 Indicative Improvement Costs for West Ham Roundabout

West Ham Roundabout	Costs (£)
Site Clearance	19,000
Fencing	0
Pedestrian Guardrail etc	8,000
Drainage	78,000
Earthworks	68,000
Pavement	86,000
Kerbs & Footways	30,000
Signs & Markings (Inc Work to Traffic Lights)	28,000
Road Lighting Columns	29,000
Traffic Signals	0
Accommodation Works/Planting	15,000
Sub – Total	**361,000**
Preliminaries 7.5%	27,000
Traffic Management 20%	72,000
Sub – Total	**460,000**
Contingency / Risk 45%	207,000
Total £	**667,000**

4.15 Fiveways Junction

4.15.1 This is presently a four-arm traffic signal controlled junction located on Pack Lane to the west of Basingstoke town centre. The traffic demand is shown in Figure 4-25, with and without the influence from the Local Plan developments. Table 4-63 and Table 4-64 also present detailed turning movements at this junction for the 2029 Reference Case and Local Plan Scenario.

Figure 4-25 Demand at Fiveways Junction with and without Local Plan Developments; Source: Google Maps (2013)

4.15.2 It can be seen from Table 4-63 and Table 4-64 that the current key movements at this junction are between Arm C (Kempshott Lane) and Arm A (Buckskin Lane) in both the AM and PM peak.

Table 4-63 Demand at Fiveways Junction in the AM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – Buckskin Lane	0	138	416	12	566
	Arm B – Pack Lane (East)	171	0	6	311	488
	Arm C – Kempshott Lane	959	6	0	228	1194
	Arm D – Pack Lane (West)	163	111	144	0	418
	Total	1293	255	566	551	2665
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Buckskin Lane	0	135	408	14	558
	Arm B – Pack Lane (East)	241	0	6	309	556
	Arm C – Kempshott Lane	942	6	0	301	1248
	Arm D – Pack Lane (West)	198	116	149	0	462
	Total	1380	257	563	624	2825

Table 4-64 Demand at Fiveways Junction in the PM Peak

	From / To	Arm A	Arm B	Arm C	Arm D	Total
2029 Reference Case	Arm A – Buckskin Lane	0	57	1237	88	1383
	Arm B – Pack Lane (East)	303	0	37	249	589
	Arm C – Kempshott Lane	714	6	0	170	890
	Arm D – Pack Lane (West)	94	197	13	0	305
	Total	1111	260	1288	507	3166
	From / To	**Arm A**	**Arm B**	**Arm C**	**Arm D**	**Total**
Local Plan Scenario	Arm A – Buckskin Lane	0	57	1299	109	1465
	Arm B – Pack Lane (East)	303	0	37	277	617
	Arm C – Kempshott Lane	715	6	0	181	902
	Arm D – Pack Lane (West)	99	224	48	0	371
	Total	1118	287	1384	566	3356

4.15.3 With the predicted level of demand growth, the junction is forecasted to experience significant congestion even in the 2029 Reference Case Scenario.

4.15.4 The junction and all four approach roads are tightly bound on both sides by private land, limiting the space available for delivering junction improvements. In order to deliver the suggested junction mitigation, some adjustment of the existing highway footprint could be required.

4.15.5 The proposed scheme to enhance the capacity of Fiveways junction requires the following changes to the existing infrastructure:

- Realign the lanes on Buckskin Lane (Arm A) so that the flare is relocated to the offside
- Extend the existing flare on Pack Lane (E) (Arm B) from 17m to 23m and realign the lanes so that the flare is on the offside

4.15.6 The main benefit to the junction will come from changes to the signal staging. The junction currently runs with 3 stages in which the following arms receive a green signal;

- Buckskin Lane (Arm A)
- Kempshott lane (Arm C)
- Pack Lane East and West (Arms B and D)

4.15.7 The mitigated model uses a two stage sequence in which the following arms receive a green signal;

- Buckskin Lane and Kempshott lane (Arms A and C)
- Pack Lane East and West (Arms B and D)

4.15.8 Running Arms B and D together requires the right turning traffic to give way, but utilising phase delays at the end of each stage allows sufficient time for right turners to clear. The realignment of the flares to the offside on Bucksin Lane and Pack Lane East allows space for right turners to queue without hindering the ahead and left turning traffic.

4.15.9 To ensure the safety of vehicles following the alteration of the junction priorities non-hooking right turns should be marked on the road. Also, during the initial period following the junction alterations it may be necessary to implement appropriate signs (for example type 7014) to notify drivers of the alterations to signal priorities.

4.15.10 The proposed highway improvements are illustrated in Figure 4-26

Figure 4-26 An Illustration of the Proposed Mitigation at Fiveways Junction; Source: Google Maps (2013)

4.15.11 Table 4-65 below shows variations in the Degree of Saturation (DoS) resulting from different travel demand scenarios and the proposed mitigation.

Table 4-65 Modelled Degree of Saturation at Each Entry at Fiveways Junction

Time	Arms	2029 Reference Case (%)	Local Plan without mitigation (%)	Local Plan with mitigation (%)
AM	Arm A – Buckskin Lane	154.3	139.4	50.0
	Arm B – Pack Lane (East)	80.9	136.1	101.4
	Arm C – Kempshott Lane	152.4	140.3	122.7
	Arm D – Pack Lane (West)	155.4	123.2	119.9
PM	Arm A – Buckskin Lane	185.8	201.8	132.0
	Arm B – Pack Lane (East)	178.7	193.6	127.2
	Arm C – Kempshott Lane	185.3	201.5	91.0
	Arm D – Pack Lane (West)	59.3	66.3	57.2

4.15.12 Results presented in Table 4-65 suggest that the proposed improvements would mitigate traffic impacts from the Local Plan by enhancing the performance of the junction, with improvements over the 2029 Reference Case shown to occur in all half of the cases.

4.15.13 Table 4-66 below shows the average delay per PCU across the whole junction. The mitigation measures proposed result in high average delays in the Local Plan with mitigation scenario. However, these represent a substantial decrease over both the Local Plan without mitigation scenario, and the 2029 Reference Case in the AM peak. It is shown that, overall, the junction will perform best in the Local Plan with mitigation scenario.

Table 4-66 Modelled Average delay per PCU for Fiveways Junction (seconds)

	2029 Reference Case	Local Plan without mitigation	Local Plan with mitigation
AM	620	585	275
PM	260	944	331

4.15.14 Table 4-67 shows the cost estimates for the proposed improvements at this junction. The estimates have been rounded and contain a contingency to take account of uncertainty at the concept design stage. The estimated cost does not consider any land take required to accommodate the proposed junction improvements.

Table 4-67 Indicative Improvement Costs for Fiveways Junction

Fiveways Junction	Costs (£)
Site Clearance	6,000
Fencing	0
Pedestrian Guardrail etc	2,000
Drainage	24,000
Earthworks	21,000
Pavement	35,000
Kerbs & Footways	9,000
Signs & Markings (Inc Work to Traffic Lights)	9,000
Road Lighting Columns	9,000
Traffic Signals	22,000
Sub – Total	**137,000**
Preliminaries 7.5%	10,000
Traffic Management 20%	27,000
Sub – Total	**174,000**
Contingency / Risk 45%	78,000
Total £	**252,000**

4.16 Phasing of Infrastructure Improvements

4.16.1 The infrastructure improvements proposed in this chapter are based on assessments of the junction performance in the 2029 Local Plan Scenario compared to the 2029 Reference Case. However, in many cases all or part of the Local Plan developments are planned to come forward prior to 2029 and so mitigation may also be required prior to 2029.

4.16.2 For each of the 13 key junctions the maximum RFC per arm in each forecasting year with and without the Local Plan development is presented in Table 3-17 and Table 4-68. These results, taken from the spreadsheet modelling tool, have been used to determine at which stage a junctions performance becomes sufficiently worse in the Local Plan Scenario (no mitigation) than the Reference Case scenario and therefore requires mitigation. In this context 'worsening' is defined by the following two rules:

- Junction operates with the maximum RFC on individual entries no more than 1 in 2029 Reference but over 1 in Local Plan scenario
- Junction operates with the maximum RFC on individual entries over 1 in both 2029 Reference and Local Plan scenario but the latter would lead to an maximum RFC at least 10% higher than the former

4.16.3 For each of the forecasting years, 2019, 2024 and 2029, this assessment has been undertaken at the 13 key junctions in each peak period. Where a junction is deemed to require mitigation it is highlighted in Table 4-68. Some junctions have the same requirements for mitigation in the AM and PM peaks, while others require mitigating in only one peak. If a junction requires mitigating in either the AM or the PM peak (or both) then it is deemed to require mitigating in that year. The final phasing requirements for the mitigation proposals are summarised in last three columns of Table 4-68.

Table 4-68: Assessment of mitigation requirements in AM and PM peak

		AM peak			PM peak			Overall		
no	Junction Names	2019	2024	2029	2019	2024	2029	2019	2024	2029
1	A33 / Bramley Rd									
29	A339 / Ringway West Rdbt									
19	A339 / Roman Rd									
27	B3400 Worting Rd / Roman Rd									
10	Fiveways Junction									
13	Kemptshott Rdbt									
28	West Ham Rdbt									
25	Worting Road Rdbt									
23	A30 / Wallop Drive									
2	Aldemaston Rd Rdbt									
6	Brighton Hill Rdbt									
11	Hackwood Rd Rdbt									
22	Victory Rdbt									

4.16.4 In addition to the junction mitigation it is proposed that a section of the A30 southbound between Kempshott Roundabout and Wallop Drive Roundabout be widened to 2 lanes.

4.16.5 To give an indication of relative importance to the successful implementation of the Local Plan the junctions for which mitigation has been proposed are ranked in the list below. This is based on their performance with and without the Local Plan Developments, their importance to the delivery of the local Plan development and their location on the network. Junctions on strategic links have been prioritised since if traffic is delayed by congestion at these junctions the predicted performance of junctions nearer the centre of Basingstoke will not materialise. Implementation of mitigation at central junctions will therefore not be required until traffic can pass through strategic junctions without unnecessary delay.

2019

- Brighton Hill Roundabout
- Kempshott Roundabout
- A33 / Bramley Road
- B3400 Worting Road / Roman Road
- A339 / Roman Road
- A30 / Wallop Drive
- Hackwood Road Roundabout
- Victory Roundabout

2024

- A339 / Ringway West Roundabout
- Aldermaston Roundabout
- West Ham Roundabout

2029

- Fiveways Junction
- Worting Rd Roundabout

4.16.6 It should be recognised that whilst the impact of the Local Plan developments on a particular junction may not be sufficient to require mitigation, this does not mean that the performance of the junction is reasonable. For example, the impact of the Local Plan development does not require mitigating at Fiveways Junction until 2029 due to the Manydown South Parcel being allocated for development between 2024 and 2029. However, in both 2019 and 2024 scenarios (Reference Case and Local Plan) the demand at the junction exceeds capacity due to projected increases in traffic using this route. There may be benefit in implementing some of the proposed mitigation requirements earlier in the Local Plan period than is indicated in Table 4-68 in order to improve the performance of the network within Basingstoke.

4.16.7 It should be acknowledged that the above conclusions were drawn based on unconstrained traffic growth to reflect a worst case scenario. In reality some of the forecasted demand may not materialise in the modelled time periods due to travellers avoiding congestion by altering their route, travelling at a different time of day (peak-spreading) or choosing to travel to/from a different location. In addition, the assessment considers all travel demand (demand flows in traffic modelling terms) that intends to go through individual junctions and assumes all this travel demand can reach the specific junction during the modelled period of time. In reality it is commonly recognised that some of the travel demand may not materialise in the modelled hours due to congestion elsewhere in the network, which leads to lower actual flows that arrive during a given period of time.

4.16.8 It is important that the above considerations are taken into account when assessing the requirements for mitigation and it's phasing. In reality some junctions may require mitigation at a later stage in the Local Plan period than is identified by the model or the severity of mitigation that is required could be reduced.

4.16.9 The mitigations suggested in this study will require further refinement or investigation in close liaison with HCC when developments in the Local Plan come forward in the future. Whilst recommendations have been made in this Transport Assessment, the final design and implementation of mitigation measures will be determined by Hampshire County Council.

5 CONCLUSIONS

5.1 Summary

5.1.1 This Transport Assessment for Basingstoke and Deane Borough was aimed at evaluating potential traffic impacts from developments in the emerging Local Plan and exploring mitigation measures to alleviate such impacts where necessary. The assessment was based on background growth, committed and planned developments in the borough and surrounding areas covering a period of time between 2011 and 2029.

5.1.2 The first part of the assessment was undertaken using a bespoke spreadsheet model for the AM (08:00-09:00) and PM (17:00-18:00) peaks. The development of the tool and its use in the assessment of Local Plan scenarios has been described in this report. As the spreadsheet model is based on aggregate descriptions of travel demand and a simplified representation of the interaction between traffic flow and capacity, it was complemented by standard junction modelling packages such as LinSig and ARCADY, which specialise in evaluating the interaction between traffic of conflicting movements, queuing and delays at junctions. The combined application of the spreadsheet model and detailed junction models provides a suite of tools that are suitable for a strategic assessment of the traffic impacts from the Local Plan development from the perspectives of both the entire network and individual junctions.

5.1.3 The main objectives of the study were to:

- Collate information to identify the amounts and locations of development in the borough in the future reference and development scenarios;
- Estimate the volume and distribution of vehicular trips resulting from the additional development in the future;
- Assess traffic impacts and junction performance in the defined highway network and identify key junctions requiring mitigations;
- Propose mitigation measures or test existing concept designs and advise on their effectiveness; provide costing and identify phasing for mitigations where appropriate;
- Report findings on the main traffic impacts on the highway network and how these can be managed with the identified mitigation measures.

5.1.4 Base year traffic demand was established using information from existing traffic survey data and, where no data was available, the Basingstoke SATURN model. The forecasting of development related traffic growth was undertaken using local planning data / assumptions provided by BDBC and trip rates determined using TEMPRO / TRICS data. The study considered growth from development within Basingstoke and Deane Borough as well as the relevant LDF (or Local Plan) developments promoted by West Berkshire Council, Hart District Council, East Hampshire Council, Winchester City Council, Test Valley Borough Council, Reading Borough Council and Wokingham Borough Council. Area wide growth factors were determined to represent the background growth in traffic including changes to car ownership, income and fuel.

5.1.5 The distribution of trips was determined from the Census Journey to Work data and assumptions of routing through the network were made for base and forecast trips using AA route planner as suggested in the Highways Agency's ETI guidance for spreadsheet modelling.

5.1.6 A reduction for smarter choice measures has been applied to all Local Plan and the majority of committed developments in line with WebTAG guidance. The amount of reduction is based on the route distance using data from the Sustainable Travel Towns Study[11].

5.1.7 The scenarios listed below were assessed with the highway network alterations detailed in Table 5-1.

- **Reference Case 2019** – committed developments and background growth by 2019
- **Reference Case 2024 –** committed developments and background growth by 2024
- **Reference Case 2029 –** committed developments and background growth by 2029
- **Local Plan Scenario 2019 –** Reference Case + Local Plan developments by 2019
- **Local Plan Scenario 2024 –** Reference Case + Local Plan developments by 2024
- **Local Plan Scenario 2029 –** Reference Case + Local Plan developments by 2029

Table 5-1 Network Changes in the Modelled Future Highway Network

Highway improvements \ Networks	Year	Black Dam Improvements	A339 / B3400 Link Road
Reference Case	2019	Yes	No
	2024	Yes	No
	2029	Yes	No
Local Plan Scenario	2019	Yes	No
	2024	Yes	No
	2029	Yes	Yes

5.1.8 The improvements at Black Dam Roundabout are represented by an increase in capacity of this location in the spreadsheet model. The introduction of the Link Road between the A339 and B3400 is captured by altering the routes of a proportion of traffic that could reasonably be expected to use the new Link Road as an alternative. This alleviates congestion at other locations in the network, in particular the A339 \ Ringway West Roundabout, Thorneycroft Roundabout, A339 / Roman Road Roundabout and Worting Road / Roman Way Roundabout.

[11] Sloman L, Cairns S, Newson C, Anable J, Pridmore A & Goodwin P (2010), The Effects of Smarter Choices Programmes in Sustainable Travel Towns; Research Report, Part III Chapter 13

5.1.9 The developed spreadsheet model assumes no changes to mode choice or time of day of travel and is also not an assignment model. It is assumed that traffic will not re-route irrespective of the congestion on links or junctions. As such, forecasted travel demand from the model is considered to represent a worst case scenario.

5.1.10 Congestion 'hotspots' were identified in the modelled area and detailed junction analysis was undertaken to explore suitable improvements to mitigate the impacts of the Local Plan development traffic. Whilst the mitigations suggested in this study require further refinement or investigation in close liaison with HCC when developments in the Local Plan come forward in the future, it is considered by BDBC that the assessment indicates that the majority of the impacts on the highway network resulting from the Local Plan development scenarios could be accommodated after mitigation.

5.2 Traffic Impacts of Development

5.2.1 This transport assessment is focused on the projected unconstrained amount of trips generated by committed and planned development within Basingstoke and Deane and its surrounding areas. The impact of these trips has been assessed within Basingstoke and Deane Borough only.

5.2.2 The increase in traffic demand resulting from the committed and planned developments in each scenario is set out in Table 5-2 below (including the reduction for smarter choice measures). These figures do not include the area wide growth factors that are applied in addition to the trips specific to each development. As well as representing background growth, these factors incorporate the impact of small developments (less than 30 jobs or 40 dwellings) and planned developments for which a location has not yet been identified.

Table 5-2 Forecasted Travel Demand Growth

Source of Growth		Reference Case			Local Plan		
		2029	2024	2019	2029	2024	2019
AM trips to development	Committed	1394	1394	1189	1394	1394	1189
	Trips from Basingstoke to neighbouring areas	1401	1171	872	1096	883	610
	Basingstoke Local Plan	0	0	0	2041	1464	824
	Total	**2795**	**2565**	**2062**	**4532**	**3742**	**2623**
AM trips from development	Committed	1196	1196	1072	1196	1196	1072
	Trips from neighbouring areas to Basingstoke	450	319	167	362	255	133
	Basingstoke Local Plan	0	0	0	2945	1953	680
	Total	**1646**	**1515**	**1239**	**4503**	**3404**	**1885**
PM trips to development	Committed	1535	1535	1370	1535	1535	1370
	Trips from Basingstoke to neighbouring areas	1202	923	601	1089	771	420
	Basingstoke Local Plan	0	0	0	3369	2408	1169
	Total	**2737**	**2458**	**1971**	**5993**	**4714**	**2959**
PM trips from development	Committed	1835	1835	1593	1835	1835	1593
	Trips from neighbouring areas to Basingstoke	1078	838	548	913	703	461
	Basingstoke Local Plan	0	0	0	2628	1974	1194
	Total	**2913**	**2672**	**2141**	**5376**	**4511**	**3248**

5.3 Local Road Network Findings

5.3.1 A comparison was made between the Local Plan scenarios, the 2012 Base and the 2029 Reference Case scenarios to identify local roads that may experience congestion issues as a result of the Local Plan developments. The roads within Basingstoke were split into three sets for the purpose of this analysis;

- Cordon links that directly feed traffic to the Ringway from all directions
- Selected links on different sections of the Ringway
- Selected links within the urban area enveloped by the Ringway

5.3.2 To identify and isolate the impacts of the Local Plan developments this analysis has focused on identifying links where the RFC is below 1 in the Reference Case but over 1 in the Local Plan scenarios, or the increase is over 10% where the RFC is over 1 in both scenarios. The following cordon links meet this criteria in 2029;

- A30 London Rd inbound (AM and PM)
- A30 Winchester Road inbound (AM) and outbound (AM and PM)
- B3400 Churchill Way West inbound (AM) and outbound (PM)
- A339 Kingsclere Road inbound (AM & PM) and outbound (PM)
- A339 Hackwood Road inbound (AM and PM) and outbound (PM)

5.3.3 The following Ringway links meet this criteria in 2029 (the locations of these links can be seen in Figure 3-1);

- Ringway North 1 clockwise and anti-clockwise (AM & PM)
- Ringway North 2 clockwise (AM) and anti-clockwise (PM)
- Ringway East 1 clockwise (AM)
- Ringway East 2 clockwise (AM & PM)
- Ringway South 1 anti-clockwise (AM & PM)
- Ringway South 2 clockwise anti-clockwise (PM)
- Ringway West 1 clockwise (AM & PM) and anti-clockwise (PM)
- Ringway West 2 clockwise (AM) and anti-clockwise (PM)

5.3.4 On the following urban links the demand exceeds the capacity following the implementation of the Local Plan development;

- A3010 Churchill Way West eastbound (AM)
- Winchester Road westbound (PM)
- Hackwood Road southbound (PM)

5.4 Local Junction Mitigations

5.4.1 As well as considering the performance of links within the study area, an assessment of the junction performance was undertaken. 13 junctions were identified and agreed with BDBC as those requiring mitigation measures in order to accommodate the Local Plan development traffic.

5.4.2 The study considered the transport infrastructure opportunities to mitigate the impact of development at the 13 identified junctions. This identification of mitigation measures was undertaken using standard junction modelling packages (LinSig and ARCADY) following a principle of achieving the greatest level of congestion relief within existing constraints such as highway boundaries while avoiding any structural work at bridges and viaducts. Consideration was given to the affordability and deliverability of all measures proposed. The measures explored include common improvements such as lane widening and signalisation.

5.4.3 Table 5-3 presents a summary of the junction mitigation assessment. It details the names of the 13 junctions investigated, the form of junction improvements recommended and their indicative costs.

Table 5-3 An Overview of Junction Mitigation Findings

No.	Junction Name	Form of Mitigations	Indicative costs
1	**A33 / Bramley Road Roundabout**	* Widening of circulatory * Flare both A33 entries * Provide exit funnels at both A33 exits	£373,000
23	**A30 / Wallop Drive Roundabout**	* Convert roundabout to a signalised * Add or lengthen flares on all entries	£2,484,000
		* Widen 750m of A30 southbound carriageway up to Kempshott roundabout	£5,490,000
13	**Kempshott Roundabout**	* Signalise the roundabout * Add or lengthen flares on all entries * Widen the circulatory	£3,696,000
6	**Brighton Hill Roundabout**	* Minor amendments based on a signalised 'Hamburger' design provided by BDBC	£6,360,000
27	**Worting Road / Roman Way Roundabout**	* Flare widening on 3 entries	£294,474
25	**B3400 Worting Road Roundabout**	* Flare widening 3 arms * Formalise 2 lane circulatory	£255,000
28	**West Ham Roundabout**	* Flare widening 3 entries * Widen the southern half of the circulatory	£667,000
19	**A339 / Roman Road Roundabout**	* Widen circulatory * Flare widening on 3 entries	£515,260
29	**A339 / Ringway West Roundabout**	* Full signalisation of the roundabout * Flare widening all entries * Widen the northern half of the circulatory	£1,282,000
2	**Aldermaston Road roundabout**	* Widen circulatory	£1,917,000
11	**Hackwood Road Roundabout**	* Flare widening of all entries and the circulatory carriageway	£1,920,000
22	**Victory Roundabout**	* signalise 3 out of 4 entries * Widen 2/3 of the circulatory to 3 lanes	£955,000
10	**Fiveways Junction**	* Re-align flares on 2 arms * Alter method of signal control * Extend 1 flare	£252,000
-	A33 / Gaiger Avenue Rdbt[12]	* HCC Widening Scheme	£400,000
-	A33 Thornhill Crossroads[2]	* HCC Widening Scheme	£700,000
-	A33 Binfields Rdbt[2]	* HCC Widening and Signalisation Scheme	£2,700,000
-	A33 Crockford Rdbt[2]	* HCC Widening and Signalisation Scheme	£2,200,000
-	Thorneycroft Rdbt[2]	* HCC Widening and Signalisation Scheme	£7,500,000
-	Winchester Road Rdbt[2]	* HCC Widening and Signalisation Scheme	£3,000,000

[12] Mitigation measures are not considered for these junctions in this Transport Assessment as HCC have commissioned separate studies to investigate solutions. They are included in order to present a complete picture of the issues across the network and the proposed solutions.

5.4.4 Table 5-4 below measures the effectiveness of each mitigation proposal by presenting the number of arms fully mitigated as a percentage of the total number of arms. An arm is deemed mitigated if in the 2029 Local Plan scenario the Degree of Saturation (DoS) or RFC for an arm is lower than 85% or is at a similar value to that of the 2029 Reference Case where no Local Plan developments are included. For any arm that was not fully mitigated the DoS bracket that the mitigated result falls within is shown.

Table 5-4 Assessment of Effectiveness of Mitigation

		Effectiveness of Mitigation					Arms Not Fully Mitigated							
		Total num of arms	Arms fully mitigated				DoS < 90%		DoS < 100%		DoS < 110%		DoS > 110%	
			AM		PM		AM	PM	AM	PM	AM	PM	AM	PM
No.	Junction Name													
1	A33 / Bramley Road Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
23	A30 / Wallop Drive Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
13	Kempshott Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
6	Brighton Hill Roundabout	6	2	33%	5	83%	-	-	1	-	1	1	2	-
27	Worting Road / Roman Way Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
25	B3400 Worting Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
28	West Ham Roundabout	6	6	100%	6	100%	-	-	-	-	-	-	-	-
19	A339 / Roman Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
29	A339 / Ringway West Roundabout	3	3	100%	3	100%	-	-	-	-	-	-	-	-
2	Aldermaston Road roundabout	6	3	50%	5	83%	1	1	2	-	-	-	-	-
11	Hackwood Road Roundabout	4	4	100%	4	100%	-	-	-	-	-	-	-	-
22	Victory Roundabout	4	3	75%	1	25%	1	1	-	1	-	1	-	-
10	Fiveways Junction	4	3	75%	4	100%	-	-	-	-	1	-	-	-

5.4.5 It is clear that the impact of Local Plan traffic on the assessed junctions can be effectively mitigated in the majority of case with high percentage values reported for most junctions. There are two exceptions. Brighton Hill Roundabout is forecast to operate with only 2 arms effectively mitigated in the AM peak hour with both Local Plan traffic and the proposed mitigation in place. However, all of the arms that are not fully mitigated are reported to operate below 110%. Similarly, the Aldermaston Road Roundabout is forecast to operate with only 3 out of 6 arms effectively mitigated in the AM peak hour with both Local Plan traffic and the proposed mitigation in place but all arms will operate below 100%.

5.4.6 The average delay per PCU for each of the mitigated junctions is shown in Table 5-5 below in the 2029 Reference Case and the Local Plan Scenario with and without mitigation. In most cases the mitigation proposal shows a reduction in average delay to a similar level as the Reference Case, and where the average delay does increase it remains reasonable. The Local Plan development is forecast to have a substantial but not severe impact on the performance of these junctions.

Table 5-5: Average Delay per PCU at each Mitigated Junction

No.	Junction Name	Time Period	Reference Case (s/PCU)	Local Plan without mitigation (s/PCU)	Local Plan with mitigation (s/PCU)
1	A33 / Bramley Road Roundabout	AM	12	17	3
		PM	12	15	3
23	A30 / Wallop Drive Roundabout	AM	5	204	26
		PM	11	379	28
13	Kempshott Roundabout	AM	426	665	14
		PM	130	269	11
6	Brighton Hill Roundabout	AM	702	864	259
		PM	371	811	107
27	Worting Road / Roman Way Roundabout	AM	903	1076	297
		PM	1174	1299	628
25	B3400 Worting Road Roundabout	AM	12	17	5
		PM	9	10	6
28	West Ham Roundabout	AM	42	10	7
		PM	75	167	6
19	A339 / Roman Road Roundabout	AM	145	293	5
		PM	53	108	6
29	A339 / Ringway West Roundabout	AM	184	314	14
		PM	5	7	12
2	Aldermaston Road roundabout	AM	27	50	33
		PM	28	52	27
11	Hackwood Road Roundabout	AM	793	1012	139
		PM	347	883	21
22	Victory Roundabout	AM	336	537	37
		PM	36	73	89
10	Fiveways Junction	AM	620	585	275
		PM	260	944	331

5.4.7 The mitigations suggested in this study will require further refinement or investigation in close liaison with HCC when developments in the Local Plan come forward in the future. However, it is considered that the assessment indicates that the majority of the forecast impacts on the highway network resulting from the Local Plan development scenarios could be accommodated after mitigation.

5.4.8 The junctions considered in this Transport Assessment are those considered to be critical to the success of the Local Plan developments and most likely to struggle to accommodate the Local Plan development. Successful mitigation of these junctions indicates that the Local Plan can be accommodated on the network without causing severe traffic impacts. It should be noted that the list of junctions that may require mitigation is not exhaustive and other junctions and links (as identified in Chapter 2.3.10) within the modelled area may also require improvements in further studies as the Local Plan is taken forward.

5.5 Strategic Road Network Findings

5.5.1 The M3 between junction 6 and junction 8 is located within Basingstoke and Deane Borough with junctions 6 and 7 linking directly into Basingstoke.

5.5.2 The additional traffic generated by the Local Plan developments has a minimal impact on this section of the M3 due to the size of the increase in traffic relative to the existing flows. The largest increase in traffic is on the section between junction 7 and junction 8 where the flow increases by 4% (192 vehicles per hour) between the 2029 Reference Case and Local Plan Scenario.

5.5.3 A sensitivity test was undertaken at Junctions 6 and 7 to understand the impact of reassignment of all development traffic from the A30 onto the M3. This is considered to be a worst case scenario. The sensitivity test found that the impact of the Local Plan development traffic at both of these junctions was small. With and without the Local Plan development Junction 6 (excluding Black Dam Roundabout) is predicted to perform at capacity whilst Junction 7 would operate well within capacity.

5.5.4 All analysis undertaken within this transport assessment has not identified any significant worsening of the performance of the M3 within Basingstoke and Deane Borough.

5.6 Limitations of Study

5.6.1 Given the strategic nature of the study and the tools employed, there are a number of key assumptions and limitations which need to be considered during the interpretation of the identified highway impacts, conclusions and recommendations made in this report.

5.6.2 First of all, performance assessments within the spreadsheet tool adopt a worst case scenario approach and are based on unconstrained traffic growth on the highway network as a whole and at individual junctions. This approach ensures robustness of the assessments on the basis that, if unconstrained demand can be accommodated (along with reasonable mitigation), the Local Plan will be deliverable on transport grounds subject to sustainability requirements across all transport modes and developments. However, this approach also means that benefits from further highway demand reductions as a result of the following considerations are not considered in this study:

- The spreading of journeys to times which are less busy
- The scope to divert to alternative routes to avoid congestion

- Changes to trip frequency, origins, destinations, or journey distance

5.6.3 In addition to the above assumptions, the assessment considers all travel demand (demand flows in traffic modelling terms) that intends to go through individual junctions and assumes all this travel demand can reach the specific junction during the modelled period of time. In reality it is commonly recognised that some of the travel demand may not materialise in the modelled hours due to congestion elsewhere in the network, which leads to lower actual flows that arrive during a given period of time.

5.6.4 The modelling tool developed in this study is in the form of a spreadsheet model, which reflects the aforementioned assumptions and limitations. It does consider shifting of traffic between different modes by capturing the potential impacts on highway travel demand from the promotion of smarter choices measures. However it does not undertake any reassignment of traffic as a result of congestion. In a network which has some routes with available capacity, a reassigning model may be able to reduce the demand on junctions that are running at capacity.

5.6.5 In light of the aforementioned assumptions and limitations, it is important that reassignment of traffic as a result of congestion is taken into account in any further study as the Local Plan is taken forward; for example the North Hampshire Transport Model currently being developed by HCC.

5.6.6 In accordance with guidance in the National Planning Policy Framework (NPPF) 2012 this Transport Assessment has demonstrated that the Local Plan developments, if accompanied with the mitigation measures proposed, can be accommodated on the network without causing severe traffic impacts.

PART B

6 MODEL SPECIFICATION

6.1 Introduction

6.1.1 The spreadsheet model is a simple and fit for purpose tool for high-level analysis of traffic impacts from different development scenarios on the modelled highway network. Its main purpose is to inform further investigation to assess performance of selected individual junctions and identify mitigations.

6.1.2 The extent of the highway network in the spreadsheet model is already illustrated in Figure 2-1 and Figure 2-2 in Part A of this report. This was set out by BDBC at the start of this study.

6.1.3 The spreadsheet model has a base year of 2012 and three forecasting years of 2019, 2024 and 2029. The modelled periods are 08:00 to 09:00 for the AM peak and 17:00 to 18:00 for the PM peak

6.2 Model Configuration

6.2.1 Figure 6-1 shows a screenshot of the front end user interface of the spreadsheet model. Further detail on functionalities available via the user interface is given in Appendix D of this report.

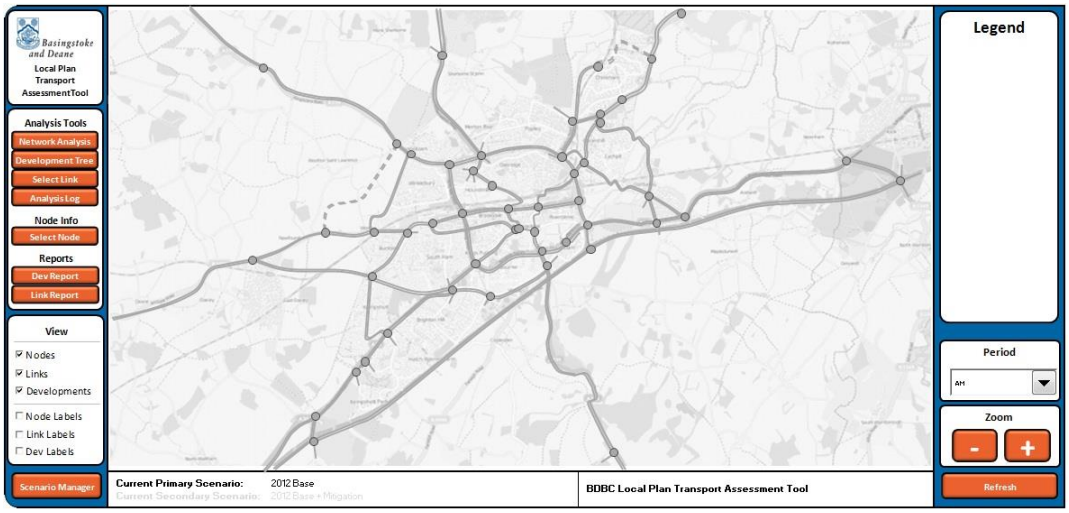


Figure 6-1: An Illustration of the Model User Interface

6.2.2 The model features three key areas of functionality:

- Scenario management – allows selection of different predefined development scenarios for subsequent analysis. In addition to a primary scenario, a secondary scenario can also be designated to enable cross scenario analysis. This function is provided for the purpose of understanding impacts on travel demand and network performance between two selected scenarios as a result of changes in land use scenarios or implementation of highway interventions.

- Analysis management – enables a variety of pre-defined analyses of one or two selected scenarios. This covers the visualisation of modelled flows and RFC (Ratio of Flow over Capacity) for links and nodes, and illustration of route choice of development related trips.
- Visualisation & tabulation – offers a range of functions to identify individual modelled elements (node, link and development labelling), visualise findings from any analysis undertaken and tabulate full details for further analysis by the advanced users.

6.2.3 All functions of the spreadsheet model are built upon six basic objects in the model as defined below:

- Nodes – each node represents a junction. 68 nodes were defined in the modelled network, 25 out of these have been identified by BDBC as key junctions. Each node has a set of basic attributes such as form of control, name, location and a unique junction number. Table 7-1 in the next chapter of this report contains a full list of 25 key junctions.
- Turns – three neighbouring nodes form a turn. Traffic going through any junctions (nodes) is defined on a turn-by-turn basis.
- Links – two neighbouring nodes form a link. Any two-way road is modelled as two different links based on the direction of travel. Basic attributes for a link include road classification, origin node, destination node, exit capacity, and upstream and downstream traffic flows.
- Developments – a proposal of certain quantum of different land uses that produce and attract trips.
- Network – a collection of nodes (junctions) and links; different networks are defined in the model in order to assess the changes brought by individual highway interventions.
- Scenarios – the combination of a network with a collection of developments of varying quantum and distribution in BDBC.
- Routes – a route is a sequence of consecutive nodes between the origin and destination of a journey. It carries a certain volume of traffic and is associated with specific scenario(s) and development(s)

6.3 Key Features

6.3.1 A range of features have been provided in the spreadsheet model for the purpose of demonstrating key assumptions made during the model development process and interrogating the modelling results to inform the transport assessment.

- Link and junction capacity map – capacity maps can be produced to highlight links and junctions that are likely to be congested in the future based on forecasted RFCs for links or each entry arm of individual junctions. The maps would inform the identification of junctions that should be brought into further junction modelling assessment and mitigation testing. All modelling results underpinning these maps can also be tabulated and reported separately.
- Junction turning flow output – detailed turning movement matrices are available for each modelled junction. These can be copied and pasted directly into separate junction models for more robust analysis.
- Development select link – an analysis to visualise all developments that contribute traffic to a specific link.
- Development route tree – an analysis to visualise the origins or destinations of all trips to or from the selected development.

7 DATA AND ASSUMPTIONS

7.1 Introduction

7.1.1 This section summarises traffic flow and capacity data that was incorporated in the spreadsheet model and key assumptions that were adopted to close gaps in some of these data.

7.1.2 A list of 25 key junctions within the modelled area was agreed with BDBC at the start of the study. These junctions were to be given more focus in terms of determining quality input data and consideration of mitigation requirements.

7.2 Traffic Counts

7.2.1 Junction turning counts collected in different years have been identified for all 25 key junctions in the modelled area. Table 7-1 shows a list of these junctions, the year of survey and scaling factors used to covert historic turning counts to the model base year 2012.

Table 7-1 A List of 25 Key Junctions with Scaling Factors Used

25 Key Junctions		Survey Year	Scaling Factors	
			AM	PM
1	A33 / Bramley Road	2013	1	1
2	Aldermaston Roundabout	2010	1.1045	1.0809
3	Beggarwood Lane / A30 Signalised Junction	2012	1	1
4	Binfields Roundabout	2011	1.0787	1.0625
5	Black Dam Roundabout	2011	1.0787	1.0625
6	Brighton Hill	2008	1.0463	0.9912
7	Crockford Lane Roundabout	2011	1.0787	1.0625
8	Daneshill Roundabout	2011	1.0787	1.0625
9	Eastrop Roundabout	2011	1.0787	1.0625
10	Fiveways	N/A	N/A	N/A
11	Hackwood Roundabout	2005	1.0559	1.0209
12	Hatch Lane / A30 Junction	2013	1	1
13	Kempshott Roundabout	2012	1	1
14	M3 Junction 6	2011	1.0787	1.0625
15	M3 Junction 7	2012	1	1
16	M3 Junction 8	2012	1	1
17	Pelton Road Junction	2011	1.0787	1.0625
18	Reading Road Roundabout	2011	1.0787	1.0625
19	Rooksdown Roundabout	2005	1.0559	1.0209
20	Thornhill Cross Roads	2012	1	1
21	Thornycroft Roundabout	2012	1	1
22	Victory Roundabout	2004	1.166	1.0313
23	Wallop Drive	2012	1	1
24	Winchester Road Roundabout	2011	1.0787	1.0625
25	Worting Road Roundabout	2012	1	1

7.2.2 Turning flows for 24 out of the 25 key junctions were extracted from count data as inputs to the spreadsheet model. Scaling factors, as demonstrated in Table 7-1, were applied during this process so all input flows have the same base year. These factors were derived using long term Automatic Traffic Count (ATC) data in order to scale the older counts to 2012 traffic levels. The only site with sufficiently long term coverage was on the A30 Ringway South between Hackwood Road and Winchester Road roundabouts. The counts available from this site are a mixture of whole year, single month and single week average volumes. The 2012 counts supplied for this site cover the last week of September (from 24/09/2012 to 01/10/2012), the other counts cover either May (2003-2005, 2007-2008) or the whole year (2004, 2009-2011). The supplied data allowed a comparison between the May and whole year data for 2004 which suggested that the observed flows in May were very similar to the whole year average. The 2006 traffic volume at this site has been estimated using 2005-2007 counts at two other locations around Basingstoke (A339 Ringway East and A30 Winchester Road).

7.2.3 A list of the scaling factors derived is given in Table 7-2. It can be observed from the table that the value of scaling factors for different years prior 2012 reflects influences from the recent economic recession and changes in the fuel price.

Table 7-2 A List of Scaling Factors for Traffic Counts

Year	AM	PM
2003	1.084	1.018
2004	1.166	1.031
2005	1.056	1.021
2006	1.050	0.989
2007	1.048	0.963
2008	1.046	0.991
2009	1.089	1.073
2010	1.105	1.081
2011	1.079	1.063
2012	1.000	1.000

7.2.4 A concern was raised by HCC that these scaling factors are dissimilar to those in TEMPRO for the same period, particularly for the more recent years (2008 onwards) where the TEMPRO factor is considerably lower than those reported here. In these cases, and where the junction has been taken forward for detailed investigation, the TEMPRO scaling factor has been used in order to avoid over-estimating the reference case traffic demand. This applied to two junctions only; Aldermaston Road Roundabout and Victory Roundabout. The scaling factors applied at these two junctions are detailed in Table 7-3 overleaf.

Table 7-3 Alternative TEMPRO scaling factors

Year	AM	PM
Aldermaston Rd Rbt	1.021	1.022
Victory Rbt	1.081	1.088

7.2.5 For the other 43 non-key junctions in the modelled area, traffic counts were only available for 6 of them. Therefore, for the remaining 37 non-key junctions and one key junction (no.10 Fiveways) where no existing turning data is available, it was agreed with BDBC to infill this gap in data following two approaches set out below:

- Deriving traffic turning volumes by extracting turning proportions from the existing SATURN model[13] and controlling link flow on each arm to the observed volumes where link counts are available.
- Where neither turning counts nor link flows can be found, junction turning movements are extracted from the SATURN model directly.

7.2.6 The above two approaches were deemed reasonable in light of data gaps as these links and junctions are unlikely to be critical in future years. If any of the junctions that were infilled with SATURN turning information and/or link flows are identified to be of significant concerns in the subsequent stages of the study, additional traffic surveys can be undertaken where appropriate to achieve better accuracy in base year traffic data.

7.3 Junction Models

7.3.1 Existing junction models were also collated during the spreadsheet model development process. For the 25 key junctions where no existing model is available, new models have been constructed (approximately 18 out of 25). This exercise enables detailed assessment of individual key junctions based on flows from the spreadsheet model in the subsequent stages of the work.

7.3.1 The junctions models collated or constructed during this process were also used to derive the entry arm capacity for individual key junctions. These capacities were then incorporated into the spreadsheet model to support the junction capacity map functionality. It should be noted that the input capacity for each arm would not vary in accordance with the variations in the modelled flows at each junction in traffic forecasting. Therefore the capacity map function of the spreadsheet model should only be used for illustrative purpose to identify junctions that might be under pressure in the future year rather than taking over the role of more accurate junction assessment that is planned at a later stage of the transport assessment.

7.3.2 The entry arm capacity for all the non-key junctions in the spreadsheet model was derived from the existing SATURN model.

[13] Basingstoke Transport Model provided by Hampshire County Council; the model was last reviewed and revalidated in 2009.

8 TRAFFIC FORECASTING

8.1 Overview

8.1.1 This section runs through the overarching structure of the traffic forecasting process based on land use assumptions received from the BDBC. Figure 8-1 below illustrates different components of traffic growth to be considered in the traffic forecasting process using the spreadsheet model.

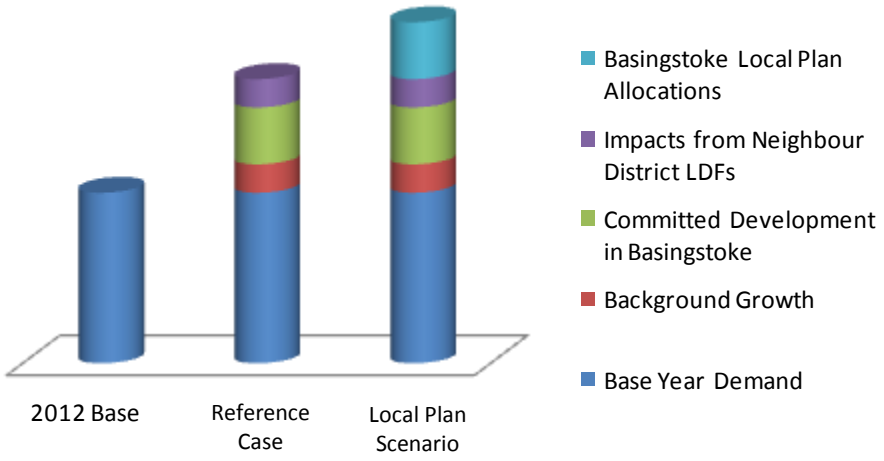


Figure 8-1: Illustration of Traffic Growth in the Model Network

8.1.2 It can be seen that there are broadly two types of forecasting scenarios. The former is a Reference Case, which contains all committed developments. The latter includes a group of Local Plan developments, which will be considered in addition to the growth assumed in the reference.

8.1.3 Table 8-1 illustrates the relationship between different components of identified development growth and proposed traffic forecasting scenarios. Individual components of this table are further explained in the remainder of this chapter with the forecasted number of trips in the 2029 Reference for illustration purpose.

Table 8-1 Components of Traffic Growth VS Forecasting Scenarios

		2012 Base	2029 Reference	2029 Local Plan scenarios
Base year demand		✓	✓	✓
Background growth		×	✓	✓
Committed developments	Identified residential and commercial sites	×	✓	✓
	Area wide growth (outstanding small site commitments and sites < 40 dwellings or 30 jobs)	×	✓	✓
Impact from neighbouring districts		×	✓	✓
Basingstoke Local Plan allocations	Local plan development sites	×	×	✓
	Unallocated or non-committed sites (from existing local plan)	×	×	✓
	Area wide growth (windfall and sites < 40 dwellings or 30 jobs)	×	×	✓

8.2 Background Growth

8.2.1 Background growth representing influences from changes in car ownership, income and fuel prices is applied using growth factors determined from NTEM dataset 6.2 and relevant guidance in WebTAG 3.15.2 as shown in Table 8-2 below.

Table 8-2 Background Traffic Growth for Basingstoke between 2012 and 2029

	2012-2029		2012-2024		2012-2019	
Sources of impacts \ time period	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Car ownership changes[14]	0.996	1.003	0.998	1.003	0.997	0.999
Income Adjustment	1.053	1.053	1.036	1.036	1.020	1.020
Fuel Adjustment	1.015	1.015	1.015	1.015	1.011	1.011
Combined Income & Fuel Adjustment	1.125	1.125	1.089	1.089	1.048	1.048
Combined background growth factor	**1.120**	**1.128**	**1.087**	**1.092**	**1.045**	**1.047**

8.3 Committed Developments in Basingstoke

8.3.1 A summary of committed development by 2029 was provided by BDBC. It was agreed that any development with over 40 dwellings or 30 jobs should be explicitly modelled in traffic forecasting in terms of their quantum and spatial distribution. For any development lower than this threshold, they will be incorporated into an area wide growth factor.

8.3.2 22 large commercial and retail developments are listed in Table 8-3, while the other 31 sites with lower than 30 jobs are summarised in Table 8-4. It can be seen from Table 8-5 that the small sites only account for 8% of the total growth in the number of jobs. Therefore the simplification of representing these small growths with an area wide factor is deemed reasonable.

[14] derived by zeroing all development growth between 2012 and 2029 using the 'alternative planning data' function in TEMPRO

Table 8-3: Large Reference Employment Development with at least 30 Jobs

No.	Ref	Large Development (with over 30 jobs)	Type of Land Use	Net gain in jobs	Net gain in 100 sqm	Included in Reference Case		
						2029	2024	2029
1	108	120-122 Worting Road	Retail trade	146	28	Y	Y	Y
2	1002	16-18 Winchester Road	Business	62	11	Y	Y	Y
3	040GA	Adjacent Alberto Culver	Business	100	20	Y	Y	Y
4	-	Airkix*	Recreation & sport	N/A[15]	N/A	Y	Y	Y
5	130	Armstrongs Yard	Business	N/A[16]	6	Y	Y	Y
6	124	Avenue Nurseries	Retail trade	46	9	Y	Y	Y
7	235	Boundary Hall	Residential	53	9	Y	Y	Y
8	010HA	Elderwood	Business	121	22	Y	Y	Y
9	216	Former Mod Site	Business	55	6	Y	Y	Y
10	142	Former Victoria And Eli Lilley Sites	Business	82	32	Y	Y	Y
11	252	J Sainsburys Plc	Industry, construction & transport	150	114	Y	Y	Y
12	136	Land At Gresley Road	Business	559	101	Y	Y	Y
13	001AH, 001BA, 001BC, 192	Land At Jays Close	Business	750	135	Y	Y	N
14	54	Land At North Of Popley Way	Retail trade	79	15	Y	Y	Y
15	104	Land At Winchester Road	Retail trade	529	90	Y	Y	Y
16	010K	Larchwood	Business	584	105	Y	Y	Y
17	113	Park Prewett Hospital	Retail trade	51	10	Y	Y	Y
18	010J	Redwood	Business	286	51	Y	Y	Y
19	123	The Annexe	Retail trade	45	1	Y	Y	Y
20	136	The White Building	Retail trade	50	2	Y	Y	Y
21	253	Unit A, Rutherford Road	Business	48	19	Y	Y	Y
22	233	Worting Park	Business	-70[17]	-3	Y	Y	Y
Total Large Employment				3726	783	-	-	-

[15] No information on the number of jobs at Airkix was provided. Number of development trips was taken directly from the relevant Transport Assessment.
[16] No information on the number of jobs at Armstrong Yard was provided.
[17] The site is currently occupied with 120 jobs. The proposed redevelopment would only provide 50 jobs so the net gain is -70.

Table 8-4: Small Reference Employment Development with less than 30 Jobs

No.	Ref	Large Development (with over 30 jobs)	Type of Land Use	Net Gain in Jobs		
				2029	2024	2029
1	17	TAYLORS FARM	Retail	25	17	8
2	131	YEW TREE FARM GARDEN CENTRE	Retail	26	17	9
3	132	FORMER SERVICE STATION	Retail	16	11	5
4	133	SHERFIELD ON LODDON GARDEN CENTRE	Retail	12	8	4
5	134	BARCLAY HOUSE	Retail	21	14	7
6	135	LAND AT FAROE CLOSE AND MALDIVE	Retail	18	12	6
7	129	35, WINCHESTER STREET	Retail	14	9	5
8	97	NORTH OF POPLEY WAY	Retail	23	15	8
9	111	UNITS 3A & 4A MONITON ESTATE	Retail	9	6	3
10	114	PARK PREWETT HOSPITAL	Retail	28	19	9
11	115	LAVERSTOKE PARK CRICKET CLUB	Retail	4	3	1
12	117	TAYLORS FARM	Retail	14	9	5
13	122	OVERTON RECREATION GROUND	Retail	5	3	2
14	126	THE HOLDING FIELD	Retail	3	2	1
15	107	HAMPSHIRE COURT HOTEL	Retail	19	13	6
16	128	105-107, CLIDDESDEN ROAD	Retail	5	3	2
17	137	SANDFORD SPRINGS GOLF CLUB	Retail	13	9	4
18	138	BARCLAY HOUSE	Retail	29	19	10
19	140	PREMIER INN	Retail	9	6	3
20	198	HARROW GARAGE	Industry and Office	-27[18]	-18	-9
21	218	T T TENTS LTD	Industry and Office	0	0	0
22	223	RIVERSIDE VIEW	Industry and Office	0	0	0
23	227	SHOTHANGER WORKS	Industry and Office	1	1	0
24	241	BLANDYS FARM	Industry and Office	16	11	5
25	242	LOWER LINK FARM	Industry and Office	0	0	0
26	244	CONSTRUCTION HOUSE	Industry and Office	2	1	1
27	248	VISA INTERNATIONAL	Industry and Office	10	7	3
28	249	WHITWAY FARM	Industry and Office	5	3	2
29	251	UNIT 5 THE CAROUSEL	Industry and Office	3	2	1
30	256	MODERN MOULDS ASSOCIATES LTD	Industry and Office	3	2	1
31	257	58-59 WATSON WAY	Industry and Office	24	16	8
			Total Small Employment	**337**	220	110

Table 8-5: Total Reference Employment Development in 2029

Category	Number of jobs	%
Total jobs in large employment sites	3,726	92%
Total jobs in small employment sites	337	8%
Total number of jobs	4,063	100%

[18] The site is currently occupied with 53 jobs. The proposed redevelopment would only provide 26 jobs so the net gain is -27.

8.3.3 For residential developments in the reference scenario, there are 13 large sites (at least 40 dwellings) and 9 small ones as summarised in Table 8-6 and Table 8-7. It can be seen from Table 8-8 that the small sites only account for 11% of the total increase in the number of dwellings. Therefore the simplification of representing these small sites with an area wide factor is deemed reasonable due to their marginal impact on road traffic.

Table 8-6: Large Reference Residential Development with at least 40 Dwellings

No.	Ref	Development	Number of Dwellings		
			2029	2024	2019
1	-	Beech Down Pre School	66	66	66
2	-	Boundary Hall	115	115	115
3	-	John Hunt School Site, Popley	164	164	164
4	-	Kempshott Park Industrial Estate	60	60	60
5	-	North Of Popley/ Merton Rise	784	784	650
6	-	Park Prewett	132	132	132
7	-	Taylors Farm /Sherfield Park	257	257	257
8	-	Webbers Garage, New Road	94	94	94
9	-	West Ham Lane (And To Moniton Estate)	50	50	0
10	TAD008	Land between Mulfords Hill and Silchester Road	40	40	0
11	BAS092	Aldermaston Road Triangle	150	150	150
12	BAS093	A339 Newbury Road 'Trumpet' Junction	122	122	122
13	BAS095	Land north of Park Prewett	585	585	390
		Total Households (>= 40)	**2,619**	**2,619**	**2,200**

Table 8-7: Small Reference Residential Development with less than 40 Dwellings

No.	Ref	Development	Number of Dwellings
1	-	Harrow Garage	27
2	-	11-19 Greytown House, Wote St	24
3	-	1 New St and 12 Cross St	12
4	-	Brook House	30
5	-	Maldive/Faroe Close	35
6	-	Broadview, Woods Lane.	10
7	-	Land adj to 85 Birches Crescent	11
8	-	Harwood Court	16
9	-	Outstanding Small site Commitments	174[19]
		Total Households (< 40)	**339**

Table 8-8: Total Reference Residential Development in 2029

Category	Number of HHs	%
Total dwelling in large residential sites	2,619	89%
Total dwellings in small residential sites	339	11%
Total number of dwellings	**2,958**	**100%**

[19] This represents a group of small sites which all have less than 40 dwellings.

8.3.4 It can be concluded from the previous tables that the in 2029 majority of the total increase, 3,726 jobs and 2,619 dwellings (illustrated in Figure 8-2), are large sites which will be accounted for as individual developments. The forecasting process, i.e. trip generation and distribution, is reported in further detail in the rest of Section 8.3 from Paragraph 8.3.7.

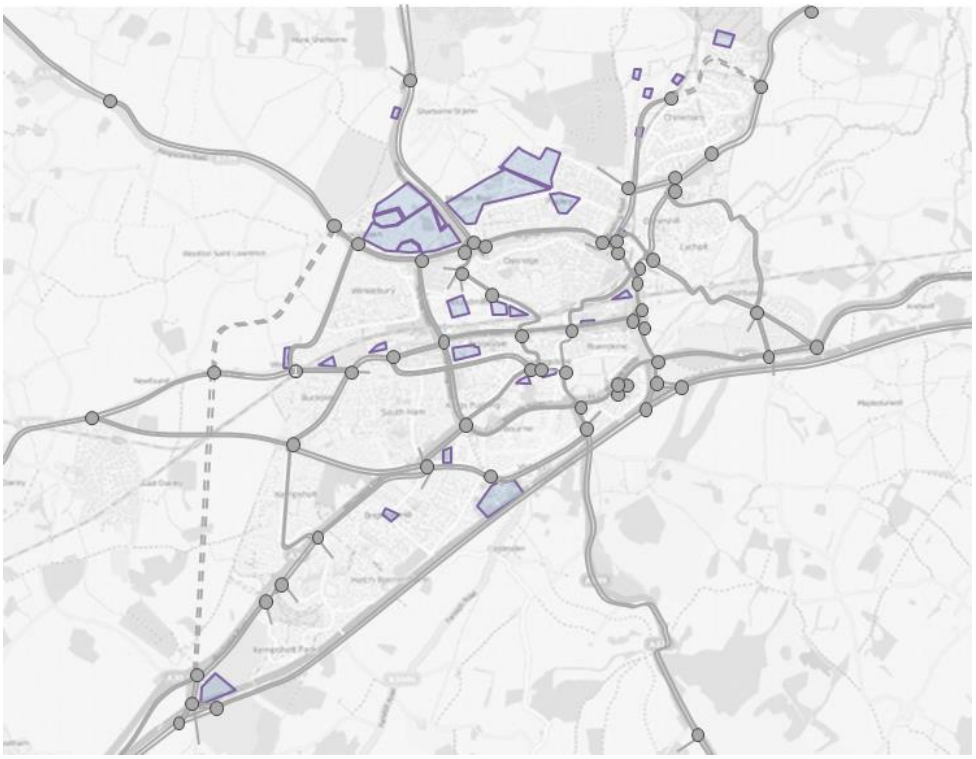


Figure 8-2: Illustration of Large Development Sites in 2029 Reference Case

8.3.5 The remainder of the increase in 2029, 337 jobs and 339 dwellings, is represented using area wide traffic growth factors as they are either too small to be considered as individual sites or their exact locations are not definitive as this stage. A third of the increase in small residential and commercial sites is assumed to happen in each of the forecasting periods (2012-2019, 2019-2024 and 2024-2029) in order to determine growth factors for 2019 and 2024. These growth factors, shown in

8.3.6 Table 8-9, were derived using the 'alternative planning data' function in TEMPRO. They were applied on top of the background growth factors presented in Table 8-2.

Table 8-9: Small Development Growth Factor

Reference Case Year	AM	PM
2029	1.0001	1.0075
2024	1.0007	1.0053
2019	0.9983	1.0005

Trip Generation

8.3.7 This process quantifies the number of trips to and from each development site. Typically, trip generation is based on the identification of suitable (person or vehicle) trip rates. A range of industry standard trip rate database tools are available that contain national, or more local, trip rates measured for typical land use sites.

8.3.8 TRICS was used to determine residential trip rates within Basingstoke by extracting trip rates for a number of similar sites from the database. Sites consisting of privately owned and rented houses and flats were selected in suburban or edge of town locations in the South East of the UK. In total, 52 sites were selected.

8.3.9 BDBC's Local Development Framework contains a policy of providing 40% affordable housing in all residential developments. Of the 40% affordable housing units 70% should be rented and 30% intermediate products including shared ownership.

8.3.10 After discussions with BDBC trips rates for rented and private residential developments were derived from the TRICS sites and combined in a weighted average (72% private and 28% rented) according to BDBC's policy. These trip rates are shown in Table 8-10 below.

Table 8-10: Residential Trip Rates

Trip Rates	AM arrivals	AM departures	PM arrivals	PM departures
TRICS sites - Flats and houses to rent	0.135	0.198	0.225	0.154
TRICS sites - Flats and houses privately owned	0.158	0.389	0.366	0.203
Combined rate (72% privately owned, 28% rented)	**0.152**	**0.335**	**0.327**	**0.189**

8.3.11 These trip rates will be applied to all sites except those classed as 'Edge of Town Centre' where the options to use other modes are greater and therefore trip rates are generally lower. Table 8-12 below details the average trip rate from TRICS for mixed private housing, Edge of Town Centre sites in England outside of London.

Table 8-11: Trip Rates for Edge of Town Centre Sites

	AM arrivals	AM departures	PM arrivals	PM departures
Trip Rate	0.086	0.204	0.204	0.151

8.3.12 Those sites within the ring road will be categorised as 'Edge of Town Centre'. These sites are;

- Land North of Churchill Way (BAS060)
- Former Victoria and Eli Lilley Sites, Kingsclere Road (BAS112)
- Webbers Garage, New Road (CRes8)
- Land at Tavener Close and Freemantle Close (BAS145)

8.3.13 To determine trip rates for commercial developments, trip rates for sites with similar land uses were extracted from the TRICS database in the South East of the UK and averaged. The types of land use covered by the sites extracted from TRICS include shopping centre, retail park, individual non-food superstores, business park, office, industrial unit, industrial estate, warehousing (commercial) and hotels. The trip rates established are shown in Table 8-12.

Table 8-12: Commercial trip rates

Land use	AM arrivals	AM departures	PM arrivals	PM departures
Office (B1)	1.12	0.11	0.06	0.9
Mixed Commercial (B1, B2, B8)	0.6	0.21	0.07	0.57
Hotel	0.68	0.47	0.78	0.7
Retail	3.25	2.98	3.66	4.02
Warehousing (storage & distribution)	0.253	0.204	0.052	0.299

8.3.14 Another point to consider during the trip generation process in this study is the internalisation of trips within large mixed use developments and short trips that may not get onto the modelled highway network. This has been estimated using the 2001 Census Journey to Work data. A sector system was prepared based on Census wards or their aggregation. The total amount of work trips leaving and arriving each sector were then derived using this Census data. Among these work trips, those that remain in the same sector were separated as proportions of the total number of journeys made.

8.3.15 It is also considered that the reduction of the generated trips to account for short trips and trip internalisation should only apply where developments are large and/or they contain a good mix of land use. After consideration of location of proposed developments and discussion with the BDBC, this method has only been applied to the following developments in 2029 Reference:

- John Hunt School
- North of Popley / Merton Rise

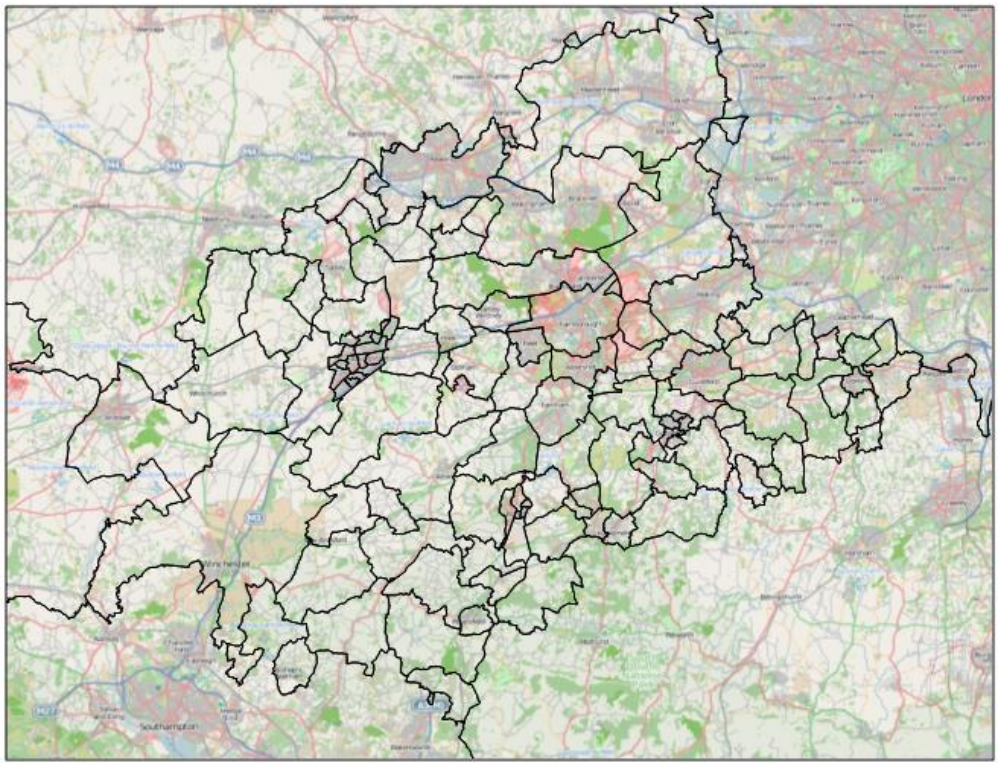


Figure 8-3: A Sector Map based on Aggregated Census Wards

8.3.16 Each development in the list above has been allocated to one of the sectors shown in Figure 8-3. The relevant proportions of trips to/from the allocated sector were analysed in order to estimate the short trips to / from the specific development that would not access the modelled network.

8.3.17 The development trips calculated for each large residential and employment site following the aforementioned method are summarised in Table 8-13 through to Table 8-20. The first four tables illustrate the residential trip generations, and the second four demonstrate the final employment trip generation. The external factor is the proportion of trips that will access the modelled network from individual developments.

Table 8-13: AM Arrivals to Large Residential Sites in 2029 Reference

Development	Dwellings	Trip Rate	Trips	External	Actual Trips
Park Prewett	132	0.152	20	100%	20
North Of Popley/ Merton Rise	784	0.152	119	80%	95
Taylors Farm /Sherfield Park	257	0.152	39	100%	39
Boundary Hall	115	0.152	17	100%	17
John Hunt School Site, Popley	164	0.152	25	100%	25
West Ham Lane (And To Moniton Estate)	50	0.152	8	100%	8
Beech Down Pre School	66	0.152	10	100%	10
Kempshott Park Industrial Estate	60	0.086	5	100%	5
Webbers Garage, New Road	94	0.152	14	100%	14
Land between Mulfords Hill and Silchester Road	40	0.152	6	100%	6
Aldermaston Road Triangle	150	0.152	23	100%	23
A339 Newbury Road 'Trumpet' Junction	122	0.152	19	100%	19
Land north of Park Prewett, former golf course	585	0.152	89	100%	89
Total Arrivals					370

Table 8-14: AM Departures from Large Residential Sites in 2029 Reference

Development	Dwellings	Trip Rate	Trips	External	Actual Trips
Park Prewett	132	0.335	44	100%	44
North Of Popley/ Merton Rise	784	0.335	263	51%	135
Taylors Farm /Sherfield Park	257	0.335	86	100%	86
Boundary Hall	115	0.335	39	100%	39
John Hunt School Site, Popley	164	0.335	55	53%	29
West Ham Lane (And To Moniton Estate)	50	0.335	17	100%	17
Beech Down Pre School	66	0.335	22	100%	22
Kempshott Park Industrial Estate	60	0.204	12	100%	12
Webbers Garage, New Road	94	0.335	31	100%	31
Land between Mulfords Hill and Silchester Road	40	0.335	13	100%	13
Aldermaston Road Triangle	150	0.335	50	100%	50
A339 Newbury Road 'Trumpet' Junction	122	0.335	41	100%	41
Land north of Park Prewett, former golf course	585	0.335	196	100%	196
Total Departures					

Table 8-15: PM Arrivals to Large Residential Sites in 2029 Reference

Development	Dwellings	Trip Rate	Trips	External	Actual Trips
Park Prewett	132	0.487	43	100%	43
North Of Popley/ Merton Rise	784	0.487	382	51%	196
Taylors Farm /Sherfield Park	257	0.487	125	100%	125
Boundary Hall	115	0.487	56	100%	56
John Hunt School Site, Popley	164	0.487	80	53%	42
West Ham Lane (And To Moniton Estate)	50	0.487	24	100%	24
Beech Down Pre School	66	0.487	32	100%	32
Kempshott Park Industrial Estate	60	0.29	17	100%	17
Webbers Garage, New Road	94	0.487	46	100%	46
Land between Mulfords Hill and Silchester Road	40	0.487	19	100%	19
Aldermaston Road Triangle	150	0.487	73	100%	73
A339 Newbury Road 'Trumpet' Junction	122	0.487	59	100%	59
Land north of Park Prewett, former golf course	585	0.487	285	100%	285
Total Arrivals					1019

Table 8-16: PM Departures from Large Residential Sites in 2029 Reference

Development	Dwellings	Trip Rate	Trips	External	Actual Trips
Park Prewett	132	0.327	25	100%	25
North Of Popley/ Merton Rise	784	0.327	256	80%	205
Taylors Farm /Sherfield Park	257	0.327	84	100%	84
Boundary Hall	115	0.327	38	100%	38
John Hunt School Site, Popley	164	0.327	54	100%	54
West Ham Lane (And To Moniton Estate)	50	0.327	16	100%	16
Beech Down Pre School	66	0.327	22	100%	22
Kempshott Park Industrial Estate	60	0.204	12	100%	12
Webbers Garage, New Road	94	0.327	31	100%	31
Land between Mulfords Hill and Silchester Road	40	0.327	13	100%	13
Aldermaston Road Triangle	150	0.327	49	100%	49
A339 Newbury Road 'Trumpet' Junction	122	0.327	40	100%	40
Land north of Park Prewett, former golf course	585	0.327	191	100%	191
Total Departures					779

Table 8-17: AM Arrivals to Large Employment Sites in 2029 Reference

Development	Land Use	Jobs	Trip Rate	Trips	External	Actual Trips
120-122 Worting Road	Retail trade	28	3.25	91	100%	91
16-18 Winchester Road	Business	11	1.12	12	100%	12
Adjacent Alberto Culver	Business	20	1.12	22	100%	22
Airkix*	Recreation & sport	0	0	13	100%	13
Armstrongs Yard	Business	6	1.12	7	100%	7
Avenue Nurseries	Retail trade	9	3.25	29	100%	29
Boundary Hall	Residential	9	1.12	10	100%	10
Elderwood	Business	22	1.12	25	100%	25
Former Mod Site	Business	6	0.6	4	100%	4
Former Victoria And Eli Lilley Sites	Business	32	0.6	19	100%	19
J Sainsburys Plc	Industry, construction & transport	114	0.6	68	100%	68
Land At Gresley Road	Business	101	0.6	61	100%	61
Land At Jays Close	Business	135	1.12	151	100%	151
Land At North Of Popley Way	Retail trade	15	3.25	49	100%	49
Land At Winchester Road	Retail trade	90	3.25	293	100%	293
Larchwood	Business	105	1.12	118	100%	118
Park Prewett Hospital	Retail trade	10	3.25	33	100%	33
Redwood	Business	51	1.12	57	100%	57
The Annexe	Retail trade	1	0.68	1	100%	1
The White Building	Retail trade	2	0.68	1	100%	1
Unit A, Rutherford Road	Business	19	0.6	11	100%	11
Worting Park	Business	-3	1.12	-3	100%	-3
Total Arrivals						1071

Table 8-18: AM Departures from Large Employment Sites in 2029 Reference

Development	Land Use	Jobs	Trip Rate	Trips	External	Actual Trips
120-122 Worting Road	Retail trade	28	2.98	83	100%	83
16-18 Winchester Road	Business	11	0.11	1	100%	1
Adjacent Alberto Culver	Business	20	0.11	2	100%	2
Airkix*	Recreation & sport	0	0	9	100%	9
Armstrongs Yard	Business	6	0.11	1	100%	1
Avenue Nurseries	Retail trade	9	2.98	27	100%	27
Boundary Hall	Residential	9	0.11	1	100%	1
Elderwood	Business	22	0.11	2	100%	2
Former Mod Site	Business	6	0.21	1	100%	1
Former Victoria And Eli Lilley Sites	Business	32	0.21	7	100%	7
J Sainsburys Plc	Industry, construction & transport	114	0.21	24	100%	24
Land At Gresley Road	Business	101	0.21	21	100%	21
Land At Jays Close	Business	135	0.11	15	100%	15
Land At North Of Popley Way	Retail trade	15	2.98	45	100%	45
Land At Winchester Road	Retail trade	90	2.98	268	100%	268
Larchwood	Business	105	0.11	12	100%	12
Park Prewett Hospital	Retail trade	10	2.98	30	100%	30
Redwood	Business	51	0.11	6	100%	6
The Annexe	Retail trade	1	0.47	0	100%	0
The White Building	Retail trade	2	0.47	1	100%	1
Unit A, Rutherford Road	Business	19	0.21	4	100%	4
Worting Park	Business	-3	0.11	0	100%	0
Total Departures						560

Table 8-19: PM Arrivals to Large Employment Sites in 2029 Reference

Development	Land Use	Jobs	Trip Rate	Trips	External	Actual Trips
120-122 Worting Road	Retail trade	28	3.66	102	100%	102
16-18 Winchester Road	Business	11	0.06	1	100%	1
Adjacent Alberto Culver	Business	20	0.06	1	100%	1
Airkix*	Recreation & sport	0	0	27	100%	27
Armstrongs Yard	Business	6	0.06	0	100%	0
Avenue Nurseries	Retail trade	9	3.66	33	100%	33
Boundary Hall	Residential	9	0.06	1	100%	1
Elderwood	Business	22	0.06	1	100%	1
Former Mod Site	Business	6	0.07	0	100%	0
Former Victoria And Eli Lilley Sites	Business	32	0.07	2	100%	2
J Sainsburys Plc	Industry, construction & transport	114	0.07	8	100%	8
Land At Gresley Road	Business	101	0.07	7	100%	7
Land At Jays Close	Business	135	0.06	8	100%	8
Land At North Of Popley Way	Retail trade	15	3.66	55	100%	55
Land At Winchester Road	Retail trade	90	3.66	329	100%	329
Larchwood	Business	105	0.06	6	100%	6
Park Prewett Hospital	Retail trade	10	3.66	37	100%	37
Redwood	Business	51	0.06	3	100%	3
The Annexe	Retail trade	1	0.78	1	100%	1
The White Building	Retail trade	2	0.78	2	100%	2
Unit A, Rutherford Road	Business	19	0.07	1	100%	1
Worting Park	Business	-3	0.06	0	100%	0
Total Arrivals						626

Table 8-20: PM Departures from Large Employment Sites in 2029 Reference

Development	Land Use	Jobs	Trip Rate	Trips	External	Actual Trips
120-122 Worting Road	Retail trade	28	4.02	113	100%	113
16-18 Winchester Road	Business	11	0	10	100%	10
Adjacent Alberto Culver	Business	20	0.9	18	100%	18
Airkix	Recreation & sport	0	0.9	26	100%	26
Armstrongs Yard	Business	6	0.57	5	100%	5
Avenue Nurseries	Retail trade	9	4.02	36	100%	36
Boundary Hall	Residential	9	0.9	8	100%	8
Elderwood	Business	22	0.9	20	100%	20
Former Mod Site	Business	6	0.9	3	100%	3
Former Victoria And Eli Lilley Sites	Business	32	0.57	18	100%	18
J Sainsburys Plc	Industry, construction & transport	114	0.57	65	100%	65
Land At Gresley Road	Business	101	0.57	58	100%	58
Land At Jays Close	Business	135	0.9	122	100%	122
Land At North Of Popley Way	Retail trade	15	4.02	60	100%	60
Land At Winchester Road	Retail trade	90	4.02	362	100%	362
Larchwood	Business	105	0.9	95	100%	95
Park Prewett Hospital	Retail trade	10	4.02	40	100%	40
Redwood	Business	51	0.9	46	100%	46
The Annexe	Retail trade	1	0.7	1	100%	1
The White Building	Retail trade	2	0.7	1	100%	1
Unit A, Rutherford Road	Business	19	0.9	11	100%	11
Worting Park	Business	-3	0.57	-3	100%	-3
Total Departures						1115

Trip Distribution

8.3.18 This process identifies origins / destinations of trips to / from individual developments. This was estimated on a sector by sector basis following the definition shown in Figure 8-3. Main origins / destinations for trips to / from each sector were identified using the 2001 Census Journey to Work data. Each development was then allocated to a single sector and the relevant development traffic was distributed across a number of origins and destinations following the proportions identified in the Census data.

Trip Assignment

8.3.19 For each traffic movement identified from the above trip generation and distribution processes, a route has been established using online route planner tools and engineering judgement. This method is in line with the HA's Evaluation of Transport Impact (ETI) Advice Note, which sets out their suggested approach to construct a simple link-based spreadsheet model. The developed model also provides a development route tree function to visualise the assignment routes for selected developments so these assumptions can be illustrated graphically and revisited where appropriate before the start of development testing.

8.4 Impacts from Neighbouring Districts

8.4.1 The cumulative impacts from LDF developments in neighbouring districts are also considered in this study to give a more realistic representation of future traffic conditions in the modelled network. Seven areas at immediate proximity to Basingstoke that are covered by the following councils have been considered:

- West Berkshire Council
- Hart District Council
- East Hampshire District Council
- Winchester City Council
- Test Valley Borough Council
- Reading Borough Council
- Wokingham Borough Council

8.4.2 Increases in traffic to and from Basingstoke relating to development growth in each of the above seven areas is estimated using TEMPRO and Census data. Firstly the total traffic growth from each area over the same forecasting period (2012 to 2029) is extracted from TEMPRO. Alternative planning assumptions are used where appropriate if more up-to-date LDF total growth is available. The Census journey-to-work data is then interrogated to derive the number of work trips travelling to Basingstoke from each area as a proportion of the total number of departures from the same place. This proportion is then applied to the total growth to estimate trips that would arrive at Basingstoke. This process is illustrated in Table 8-21 and Table 8-24.

Table 8-21: Derivation of Development Trips to Neighbouring Areas in AM peak

Neighbouring areas	Journey to work arrivals			2029		2024		2019	
	From UK	From B'stoke	Prop. Of trips from B'stoke*	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke
Winchester	39,910	872	2%	5,203	114	4,201	92	2,911	64
West Berkshire	50,801	5,992	12%	7,213	851	5,833	688	4,044	477
Test Valley	32,957	993	3%	2,889	87	2,475	75	1,821	55
Hart	23,645	2,145	9%	2,682	243	2,197	199	1,570	142
East Hampshire	24,828	503	2%	2,490	50	1,801	36	1,095	22
Wokingham	57,922	1,889	3%	4,875	159	4,875	159	4,875	159
Reading	54,481	1,913	4%	5,518	194	5,518	194	5,518	194

Table 8-22: Derivation of Development Trips to Neighbouring Areas in PM peak

Neighbouring areas	Journey to work arrivals			2029		2024		2019	
	From UK	From B'stoke	Prop. Of trips from B'stoke*	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke
Winchester	39,910	872	2%	4,159	91	3,027	66	1,726	38
West Berkshire	50,801	5,992	12%	9,106	1,074	6,491	766	3,571	421
Test Valley	32,957	993	3%	1,727	52	1,313	40	760	23
Hart	23,645	2,145	9%	3,290	298	2,432	221	1,264	115
East Hampshire	24,828	503	2%	3,202	65	2,168	44	1,123	23
Wokingham	57,922	1,889	3%	9,331	304	9,331	304	9,331	304
Reading	54,481	1,913	4%	5,973	210	5,973	210	5,973	210

Table 8-23: Derivation of Development Trips from Neighbouring Areas in AM peak

Neighbouring areas	Journey to work arrivals			2029		2024		2019	
	From UK	From B'stoke	Prop. Of trips from B'stoke*	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke
Winchester	31,241	1,534	5%	3,157	155	2,284	112	1,235	61
West Berkshire	46,951	1,786	4%	7,513	286	5,329	203	2,830	108
Test Valley	33,129	1,689	5%	727	37	583	30	290	15
Hart	30,106	2,126	7%	2,771	196	2,082	147	1,035	73
East Hampshire	33,928	1,323	4%	2,167	85	1,459	57	720	28
Wokingham	62,025	898	1%	8,672	155	5,560	99	2,632	47
Reading	45,533	601	1%	5,696	99	3,975	69	2,420	42

Table 8-24: Derivation of Development Trips from Neighbouring Areas in PM peak

Neighbouring areas	Journey to work arrivals			2029		2024		2019	
	From UK	From B'stoke	Prop. Of trips from B'stoke*	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke	LDF trips - arrivals	Trips from B'stoke
Winchester	31,241	1,534	5%	5,771	283	4,528	222	3,021	148
West Berkshire	46,951	1,786	4%	8,806	335	6,829	260	4,460	170
Test Valley	33,129	1,689	5%	3,206	163	2,635	134	1,852	94
Hart	30,106	2,126	7%	3,208	227	2,522	178	1,667	118
East Hampshire	33,928	1,323	4%	3,237	126	2,286	89	1,330	52
Wokingham	62,025	898	1%	6,316	113	4,739	85	2,712	48
Reading	45,533	601	1%	5,977	104	4,610	80	3,001	52

8.4.3 The inclusion of neighbouring district trips estimated from their respective LDF growth may lead to some double counting traffic growth in the future. This generally involves trips between new developments in Basingstoke and the above seven neighbouring areas. For example work trips from new homes in Reading to workplaces in Basing View would be accounted for twice in the forecasting process when traffic growth was estimated based on individual new development on either end of the journeys. Detailed investigation was undertaken to ascertain the scale and origin / destination of potential double counting. After liaison with HCC, a disaggregated approach was agreed to remove such double counting based on movements between each neighbouring areas and individual Wards in Basingstoke. This is considered a robust method and was subsequently implemented in the model covering all neighbouring district arrivals and departures in the AM and PM peaks following a similar principle. This resulted in reductions in numbers presented in Table 8-21 to Table 8-24. The reduced volume of traffic is presented in Table 8-25 to Table 8-28 . This process was implemented for the 2029 Reference Case and Local Plan scenarios separately due to their distinctive land use patterns.

Table 8-25: Adjusted Development Trips to Neighbouring Areas in AM Peak Reference Case

Neighbouring areas	2029		2024		2019	
	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke
Winchester	111	36	90	26	62	14
West Berkshire	794	206	642	146	445	78
Test Valley	87	15	74	12	55	6
Hart	179	83	147	62	105	31
East Hampshire	44	12	32	8	19	4
Wokingham	82	63	82	40	82	19
Reading	104	35	104	25	104	15
Total	**1401**	**450**	**1171**	**319**	**872**	**167**

Table 8-26: Adjusted Development Trips from Neighbouring Areas in PM Peak Reference Case

Neighbouring areas	2029		2024		2019	
	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke
Winchester	19	278	14	218	8	145
West Berkshire	806	254	575	197	316	129
Test Valley	19	162	15	134	9	94
Hart	133	157	98	124	51	82
East Hampshire	9	124	6	88	3	51
Wokingham	127	57	127	43	127	25
Reading	87	46	87	35	87	23
Total	**1202**	**1078**	**923**	**838**	**601**	**548**

Table 8-27: Adjusted Development Trips to Neighbouring Areas in AM Peak Local Plan Scenarios

Neighbouring areas	2029		2024		2019	
	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke
Winchester	101	15	81	11	56	6
West Berkshire	672	183	543	130	377	69
Test Valley	62	5	53	4	39	2
Hart	102	70	83	53	60	26
East Hampshire	44	11	32	7	19	4
Wokingham	47	52	38	33	23	16
Reading	69	26	55	18	37	11
Total	**1096**	**362**	**886**	**256**	**611**	**133**

Table 8-28: Adjusted Development Trips from Neighbouring Areas in PM Peak Local Plan Scenarios

Neighbouring areas	2029		2024		2019	
	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke	From Basingstoke	To Basingstoke
Winchester	9	278	6	218	4	145
West Berkshire	765	205	545	159	300	104
Test Valley	8	162	6	134	3	94
Hart	114	85	84	67	44	44
East Hampshire	9	124	6	88	3	51
Wokingham	106	32	69	24	34	14
Reading	79	26	55	20	33	13
Total	**1089**	**913**	**772**	**710**	**421**	**465**

8.5 Local Plan Developments in Basingstoke

8.5.1 In addition to the Reference Case forecasting scenarios, three Local Plan development scenarios have also been constructed in the model following information provided by BDBC. These three Local Plan scenarios, as listed below, include all developments assumed in the Reference case and also contain proposed developments of varying quantum and spatial distribution.

- 2019 Local Plan Scenario
- 2024 Local Plan Scenario
- 2029 Local Plan Scenario

8.5.2 The traffic forecasting process for these Local Plan scenarios is similar to that used for the Reference case following the same principles. Any development with over 40 dwellings or 30 jobs was explicitly modelled while the others were incorporated into an area wide growth factor.

8.5.3 Table 8-29 through to Table 8-37 present the large residential developments proposed in different Local Plan scenarios and the number of trips to and from individual developments and their cumulative totals. It is noted that development trips reported in these tables are in addition to the growth that has already been assumed for the 2029 Reference scenario.

Table 8-29: Large Residential Sites in Local Plan Scenarios

Development	Households		
	2029	2024	2019
Area N, Beggarwood	120	120	120
Aurum Site	150	150	0
Basingstoke Golf Club	1000	300	0
Bramley	200	200	0
Former Victoria and Eli Lilley Sites, Kingsclere Road	520	520	250
Kennel Farm	310	310	170
Kingsclere	200	50	0
Land at Tavener Close and Freemantle Close	98	98	98
Land East of Basingstoke	450	450	50
Land North of Churchill Way	45	45	0
Land South of Bloswood Lane & Manor Farm	150	150	90
Manydown North	3100	1500	100
Manydown South	300	0	0
North of Popley Fields	450	450	280
Oakley	200	150	0
Overton	150	0	0
Overton Hill, London Road	120	120	100
Playing Field, Pack Lane	100	100	0
Razors Farm	420	420	210
Redlands (adjacent to BAS121)	150	150	0
Swing Swang Lane	100	100	100
Upper Cufaude Farm	390	150	0
Whitchurch	50	100	0
Total	8773	5633	1568

Table 8-30: AM arrivals from Large Residential Sites in Local Plan Scenarios

Development	Trip Rate	Total trips			External	Actual Trips		
		2029	2024	2019		2029	2024	2019
Area N, Beggarwood	0.152	18	18	18	100%	18	18	18
Aurum Site	0.152	23	23	0	100%	23	23	0
Basingstoke Golf Club	0.152	152	46	0	94%	143	43	0
Bramley	0.152	30	30	0	100%	30	30	0
Former Victoria and Eli Lilley Sites, Kingsclere Rd	0.086	45	45	22	100%	45	45	22
Kennel Farm	0.152	47	47	26	100%	47	47	26
Kingsclere	0.152	30	8	0	100%	30	8	0
Land at Tavener Close and Freemantle Close	0.086	8	8	8	100%	8	8	8
Land East of Basingstoke	0.152	68	68	8	100%	68	68	8
Land North of Churchill Way	0.086	4	4	0	100%	4	4	0
Land South of Bloswood Lane & Manor Farm	0.152	23	23	14	100%	23	23	14
Manydown North	0.152	471	228	15	100%	471	228	15
Manydown South	0.152	46	0	0	94%	43	0	0
North of Popley Fields	0.152	68	68	43	80%	55	55	34
Oakley	0.152	30	23	0	100%	30	23	0
Overton	0.152	23	0	0	100%	23	0	0
Overton Hill, London Road	0.152	18	18	15	100%	18	18	15
Playing Field, Pack Lane	0.152	15	15	0	100%	15	15	0
Razors Farm	0.152	64	64	32	100%	64	64	32
Redlands (adjacent to BAS121)	0.152	23	23	0	100%	23	23	0
Swing Swang Lane	0.152	15	15	15	100%	15	15	15
Upper Cufaude Farm	0.152	59	23	0	100%	59	23	0
Whitchurch	0.152	8	15	0	100%	8	15	0

Table 8-31: Total AM Arrivals to Large Residential Sites in Local Plan Scenarios

Summary	Local Plan Scenarios		
	2029	2024	2019
Total number of dwellings	8773	5633	1568
Total trips generated	1290	812	215
Final Trips	1264	796	207

Table 8-32: AM Departures from Large Residential Sites in Local Plan Scenarios

Development	Trip Rate	Total trips			External	Actual Trips		
		2029	2024	2019		2029	2024	2019
Area N, Beggarwood	0.335	40	40	40	100%	40	40	40
Aurum Site	0.335	50	50	0	100%	50	50	0
Basingstoke Golf Club	0.335	335	101	0	93%	312	94	0
Bramley	0.335	67	67	0	100%	67	67	0
Former Victoria and Eli Lilley Sites, Kingsclere Rd	0.204	106	106	51	100%	106	106	51
Kennel Farm	0.335	104	104	57	100%	104	104	57
Kingsclere	0.335	67	17	0	100%	67	17	0
Land at Tavener Close and Freemantle Close	0.204	20	20	20	100%	20	20	20
Land East of Basingstoke	0.335	151	151	17	100%	151	151	17
Land North of Churchill Way	0.204	9	9	0	100%	9	9	0
Land South of Bloswood Lane & Manor Farm	0.335	50	50	30	100%	50	50	30
Manydown North	0.335	1039	503	34	100%	1039	503	34
Manydown South	0.335	101	0	0	88%	88	0	0
North of Popley Fields	0.335	151	151	94	83%	125	125	78
Oakley	0.335	67	50	0	100%	67	50	0
Overton	0.335	50	0	0	100%	50	0	0
Overton Hill, London Road	0.335	40	40	34	100%	40	40	34
Playing Field, Pack Lane	0.335	34	34	0	100%	34	34	0
Razors Farm	0.335	141	141	70	100%	141	141	70
Redlands (adjacent to BAS121)	0.335	50	50	0	100%	50	50	0
Swing Swang Lane	0.335	34	34	34	100%	34	34	34
Upper Cufaude Farm	0.335	131	50	0	100%	131	50	0
Whitchurch	0.335	17	34	0	100%	17	34	0

Table 8-33: Total AM Departures from Large Residential Sites in Local Plan Scenarios

Summary	Local Plan Scenarios		
	2029	2024	2019
Total number of dwellings	8773	5633	1568
Total trips generated	2852	1800	480
Final Trips	2791	1768	464

Table 8-34: PM Arrivals to Large Residential Sites in Local Plan Scenarios

Development	Trip Rate	Total trips			External	Actual Trips		
		2029	2024	2019		2029	2024	2019
Area N, Beggarwood	0.327	39	39	39	100%	39	39	39
Aurum Site	0.327	49	49	0	100%	49	49	0
Basingstoke Golf Club	0.327	327	98	0	93%	304	91	0
Bramley	0.327	65	65	0	100%	65	65	0
Former Victoria and Eli Lilley Sites, Kingsclere Rd	0.204	106	106	51	100%	106	106	51
Kennel Farm	0.327	101	101	56	100%	101	101	56
Kingsclere	0.327	65	16	0	100%	65	16	0
Land at Tavener Close and Freemantle Close	0.204	20	20	20	100%	20	20	20
Land East of Basingstoke	0.327	147	147	16	100%	147	147	16
Land North of Churchill Way	0.204	9	9	0	100%	9	9	0
Land South of Bloswood Lane & Manor Farm	0.327	49	49	29	100%	49	49	29
Manydown North	0.327	1014	491	33	100%	1014	491	33
Manydown South	0.327	98	0	0	88%	86	0	0
North of Popley Fields	0.327	147	147	92	83%	122	122	76
Oakley	0.327	65	49	0	100%	65	49	0
Overton	0.327	49	0	0	100%	49	0	0
Overton Hill, London Road	0.327	39	39	33	100%	39	39	33
Playing Field, Pack Lane	0.327	33	33	0	100%	33	33	0
Razors Farm	0.327	137	137	69	100%	137	137	69
Redlands (adjacent to BAS121)	0.327	49	49	0	100%	49	49	0
Swing Swang Lane	0.327	33	33	33	100%	33	33	33
Upper Cufaude Farm	0.327	128	49	0	100%	128	49	0
Whitchurch	0.327	16	33	0	100%	16	33	0

Table 8-35: Total PM Arrivals to Large Residential Sites in Local Plan Scenarios

Summary	Local Plan Scenarios		
	2029	2024	2019
Total number of dwellings	8773	5633	1568
Total trips generated	2787	1760	470
Final Trips	2728	1729	454

Table 8-36: PM Departures from Large Residential Sites in Local Plan Scenarios

Development	Trip Rate	Total trips			External	Actual Trips		
		2029	2024	2019		2029	2024	2019
Area N, Beggarwood	0.189	23	23	23	100%	23	23	23
Aurum Site	0.189	28	28	0	100%	28	28	0
Basingstoke Golf Club	0.189	189	57	0	94%	177	53	0
Bramley	0.189	38	38	0	100%	38	38	0
Former Victoria and Eli Lilley Sites, Kingsclere Rd	0.151	79	79	38	100%	79	79	38
Kennel Farm	0.189	59	59	32	100%	59	59	32
Kingsclere	0.189	38	9	0	100%	38	9	0
Land at Tavener Close and Freemantle Close	0.151	15	15	15	100%	15	15	15
Land East of Basingstoke	0.189	85	85	9	100%	85	85	9
Land North of Churchill Way	0.151	7	7	0	100%	7	7	0
Land South of Bloswood Lane & Manor Farm	0.189	28	28	17	100%	28	28	17
Manydown North	0.189	586	284	19	100%	586	284	19
Manydown South	0.189	57	0	0	94%	53	0	0
North of Popley Fields	0.189	85	85	53	80%	68	68	42
Oakley	0.189	38	28	0	100%	38	28	0
Overton	0.189	28	0	0	100%	28	0	0
Overton Hill, London Road	0.189	23	23	19	100%	23	23	19
Playing Field, Pack Lane	0.189	19	19	0	100%	19	19	0
Razors Farm	0.189	79	79	40	100%	79	79	40
Redlands (adjacent to BAS121)	0.189	28	28	0	100%	28	28	0
Swing Swang Lane	0.189	19	19	19	100%	19	19	19
Upper Cufaude Farm	0.189	74	28	0	100%	74	28	0
Whitchurch	0.189	9	19	0	100%	9	19	0

Table 8-37: Total PM Departures from Large Residential Sites in Local Plan Scenarios

Summary	Local Plan Scenarios		
	2029	2024	2019
Total number of dwellings	8773	5633	1568
Total trips generated	1633	1039	283
Final Trips	1600	1018	273

8.5.4 It is clear from Table 8-29 through to Table 8-37 that a small reduction on the total trips generated for individual development has been applied to account for short trips and trip internalisation. This only occurs where developments are large and/or they contain a good mix of land uses. After consideration of location of proposed developments and discussion with the BDBC, this adjustment has only been applied to the following three developments in the Local Plan scenarios:

- BAS098 Manydown
- BAS132 Basingstoke Golf Club
- BAS104 North of Popley Fields

8.5.5 Table 8-38 through Table 8-41 present the modelled trips from the only employment development assumed in Local Plan scenarios. The assumption is consistent across all three future scenarios. The development trips reported in these tables are in addition to the growth that has already been assumed for the 2029 Reference scenario.

Table 8-38: AM Arrivals to Basing View in Local Plan Scenarios

Land Use Types	GFA in 100 sqm			Trip Rates	Actual Trips		
	2029	2024	2019		2029	2024	2019
Office	35,000	25,000	20,000	1.45	508	363	290
Retail	10,500	10,500	10,500	2.83	297	297	297
Leisure	1,000	1,000	1,000	2.83	28	28	28
Hotel	10,000	10,000	10,000	0.21	21	21	21
Residential	300	300	150	0.05	15	15	8
Total	**56,800**	**46,800**	**41,650**	-	**869**	**724**	**644**

Table 8-39: AM Departures from Basing View in Local Plan Scenarios

Land Use Types	GFA in 100 sqm			Trip Rates	Actual Trips		
	2029	2024	2019		2029	2024	2019
Office	35,000	25,000	20,000	0.12	42	30	24
Retail	10,500	10,500	10,500	1.53	161	161	161
Leisure	1,000	1,000	1,000	1.53	15	15	15
Hotel	10,000	10,000	10,000	0.33	33	33	33
Residential	300	300	150	0.14	42	42	21
Total	**56,800**	**46,800**	**41,650**	-	**293**	**281**	**254**

Table 8-40: PM Arrivals to Basing View in Local Plan Scenarios

Land Use Types	GFA in 100 sqm			Trip Rates	Actual Trips		
	2029	2024	2019		2029	2024	2019
Office	35,000	25,000	20,000	0.13	46	33	26
Retail	10,500	10,500	10,500	6.15	646	646	646
Leisure	1,000	1,000	1,000	6.15	62	62	62
Hotel	10,000	10,000	10,000	0.24	24	24	24
Residential	300	300	150	0.15	45	45	23
Total	**56,800**	**46,800**	**41,650**	-	**822**	**809**	**780**

Table 8-41: PM Departures from Basing View in Local Plan Scenarios

Land Use Types	GFA in 100 sqm			Trip Rates	Actual Trips		
	2029	2024	2019		2029	2024	2019
Office	35,000	25,000	20,000	1.15	403	288	230
Retail	10,500	10,500	10,500	6.09	639	639	639
Leisure	1,000	1,000	1,000	6.09	61	61	61
Hotel	10,000	10,000	10,000	0.17	17	17	17
Residential	300	300	150	0.08	24	24	12
Total	**56,800**	**46,800**	**41,650**	-	**1,144**	**1,029**	**959**

8.5.6 As described in Paragraph 8.5.2, all the small residential developments (below 40 dwellings) are represented using area wide traffic growth factors as they are either too small to be considered as individual sites or their exact locations are not definitive as this stage. These individual sites are listed in Table 8-42 below. A third of the increase in small residential sites is assumed to happen in each of the forecasting periods (2012-2019, 2019-2024 and 2024-2029) in order to determine growth factors for 2019 and 2024.

Table 8-42: Small Reference Residential Development with less than 40 Dwellings

No.	Ref	Development	Number of Dwellings
1	BAS016	Carpenters Down	24
2	BAS088	Land north of Great Binfields School	12
3	BAS142	Land at QMC, Cliddesden Road	6
4	BAS143	Barn at Park Prewett	20
5	WHIT019	Land at Testbourne Community School	8
6	BAS021	The Hampshire Court Hotel, Great Binfields Road	16
7	BAS056	Church, Wessex Close	9
8	BAS059	Land East of Ringway West	25
9	BAS064	Castons Car Park, South of New Road	30
10	BAS067	Grove Road	12
11	BAS070	Newman Bassett House, Warwick Road, Basingstoke	10
12	BAS083	Brinkletts Car Park, Basingstoke	20
13	BAS144	Hillacre and Hilltop, Reading Road	9
14	BAS146	Park Hall Park Prewett	20
15	BRAM007	British Legion Club / Car Park	20
16	TAD005	30 Mount Pleasant	9
17	TAD007	38 New Road	7
18	TAD003	Burpham Copse Infant School	40
19	BAS084	Central Car Park	40
Total Households (< 40)			**337**

8.5.7 To include these developments in the model a Local Plan factor was derived using the ‘alternative planning data’ function in TEMPRO. This factor is applied to the base year traffic instead of, not as well as, the factor determined for the 2029 Reference scenario in

8.5.8 Table 8-9. As well as the Local Plan developments listed in Table 8-42, the Local Plan factor incorporates the impact of committed developments that are less than 40 dwellings or 30 jobs, windfall sites and neighbourhood development plans that have not been allocated a specific site. The quantum of development represented by the factor is listed in Table 8-43.

Table 8-43: Developments contributing to Local Plan scenario growth factor

Development		2029 Local Plan		2024 Local Plan		2019 Local Plan	
		Number Dwellings	Number jobs	Number Dwellings	Number jobs	Number Dwellings	Number jobs
Committed developments	Residential developments (<40 dwellings)	339		226		113	
	Commercial developments (<30 jobs)		337		225		112
Local Plan developments	Unallocated or Non-committed residential developments (<40 dwellings)	337		225		112	
	Windfall developments	350		233		117	
	Other neighbourhood plans	150		100		50	
Total		**1326**	**1176**	**337**	**784**	**225**	**112**

8.5.9 The factors determined are shown in Table 8-44 below. As with the background growth factor, influences from changes in car ownership, income and fuel prices are included using growth factors determined from NTEM dataset 6.2 and relevant guidance in WebTAG 3.15.2. These are shown in Table 8-2.

Table 8-44: Small Development Growth Factor for Local Plan Scenarios

Description	2029		2024		2019	
	AM	PM	AM	PM	AM	PM
Small developments Local Plan factor	1.0698	1.0859	1.0536	1.0634	1.0278	1.0325

8.6 Impact of Smarter Choice Measures

8.6.1 A number of Sustainable Transport measures will be promoted in Basingstoke over the course of the Local Plan period to reduce demand for travel by private car. These will likely include:

- Personal travel planning
- School travel planning
- Workplace travel planning
- Cycling and walking promotion
- Public transport information and marketing

8.6.2 The impact of the smarter choice measures on the forecast traffic demand of the Local Plan has been accounted for in the methodology used to derive the number of vehicle trips associated with each Local Plan development.

8.6.3 For each route in the Local Plan model, a reduction for Smarter Choice measures has been applied based on the route distance. The level of reduction has been based on the Sustainable Travel Towns Study[20], the reduction factors are set out in Table 8-45.

[20] Sloman L, Cairns S, Newson C, Anable J, Pridmore A & Goodwin P (2010), The Effects of Smarter Choices Programmes in Sustainable Travel Towns; Research Report, Part III Chapter 13

Table 8-45 Smarter Choice Measures Reduction by Journey Distance

Journey Distance	Reduction Factor
< 1km	22%
1 - 3km	14%
3 - 5km	10%
5 - 10km	6%
10 - 50km	3%
> 50km	0%

8.6.4 In the Local Plan model, routes are defined as a series of nodes, or junctions. The node co-ordinates have been used to calculate the crow fly distance between each connected pair of nodes. The journey distance of the overall route has therefore been estimated as the sum of the crow fly distances between nodes making up the route.

8.6.5 The Local Plan model includes a modelled area covering the Basingstoke and Dean Borough only, as illustrated in Figure 2-2. A number of trips either start or end outside of this modelled area, however the routes for these trips start or end at the edge of the modelled network. To represent accurately the Smarter Choice measures reduction for trips travelling beyond the modelled network, a weighted average of the reduction factors has been calculated based on the proportion of trips falling into each distance bracket.

8.6.6 The trip length distribution for trips travelling beyond the edge of the modelled network have been approximated using ward to ward crow fly distances from 2001 Census Travel to Work data.

Application of Smarter Choice Measures Reduction

8.6.7 Reduction factors for Smarter Choice Measures have been applied to all Local Plan developments and the majority of committed developments (those included in the Reference Case scenario). A qualitative assessment of the accessibility of each site has been undertaken by BDBC and is detailed in Table 8-46.

8.6.8 The location of each development is illustrated in Appendix A.

Table 8-46 Application of Smarter Choice Measures Reductions to committed development sites

Ref	Large Development (over 30 jobs)	Smarter Choice Measures Applied?
Employment Sites in 2029 Reference Case		
CRet3	120-122 Worting Road	Yes
CInd13	16-18 Winchester Road	Yes
CInd5	Adjacent Alberto Culver	Yes
CInd14	Airkix	Yes
CInd6	Armstrongs Yard	No
CRet5	Avenue Nurseries	No
CRes4	Boundary Hall	Yes
CInd2	Elderwood	Yes
CInd9	Former Mod Site	Yes
CInd8	Former Victoria And Eli Lilley Sites	Yes
CInd11	J Sainsburys Plc	Yes
CRes8	Kempshott Park Industrial Estate	No
CInd7	Land At Gresley Road	Yes
CInd1	Land At Jays Close	Yes
CRet1	Land At North Of Popley Way	Yes
CRet2	Land At Winchester Road	Yes
CInd4	Larchwood	Yes
CRet4	Park Prewett Hospital	Yes
CInd3	Redwood	Yes
CRet6	The Annexe	Yes
CRet7	The White Building	Yes
CInd12	Unit A, Rutherford Road	Yes
CInd10	Worting Park	No
Residential Sites in 2029 Reference Case		
CRes7	Beech Down Pre School	Yes
CRes4	Boundary Hall	Yes
CRes5	John Hunt School Site, Popley	Yes
CRes8	Kempshott Park Industrial Estate	No
CRes2	North Of Popley/ Merton Rise	Yes
CRes1	Park Prewett	Yes
CRes3	Taylors Farm /Sherfield Park	No
CRes9	Webbers Garage, New Road	Yes
CRes6	West Ham Lane (And To Moniton Estate)	Yes
TAD008	Land between Mulfords Hill and Silchester Road	Yes
BAS092	Aldermaston Road Triangle	Yes
BAS093	A339 Newbury Road 'Trumpet' Junction	Yes
BAS095	Land north of Park Prewett	Yes

8.6.9 The reduction in trips following the application of this method is summarised in Table 8-47 and Table 8-48 below. These tables show the number of committed development trips, trips from neighbouring districts and Local Plan development trips before and after the reduction for smarter choices.

Table 8-47: Number of Development Trips in Reference Case Scenarios with and without Smarter Choice Measures Reduction

Source of Growth		Without Smarter Choices			With Smarter Choices			% change		
		2029	2024	2019	2029	2024	2019	2029	2024	2019
AM trips to development	Committed	1431	1431	1220	1394	1394	1189	2.6%	2.6%	2.5%
	Trips from Basingstoke to neighbouring areas	1401	1171	872	1401	1171	872	0.0%	0.0%	0.0%
	Total	**2832**	**2602**	**2092**	**2795**	**2565**	**2062**	**1.3%**	**1.4%**	**1.5%**
AM trips from development	Committed	1274	1274	1141	1196	1196	1072	6.2%	6.2%	6.0%
	Trips from neighbouring areas to Basingstoke	450	319	167	450	319	167	0.0%	0.0%	0.0%
	Total	**1724**	**1593**	**1308**	**1646**	**1515**	**1239**	**4.5%**	**4.9%**	**5.3%**
AM Peak Total		**4556**	**4195**	**3400**	**4441**	**4080**	**3300**	**2.5%**	**2.8%**	**2.9%**
PM trips to development	Committed	1644	1644	1464	1535	1535	1370	6.6%	6.6%	6.4%
	Trips from Basingstoke to neighbouring areas	1202	923	601	1202	923	601	0.0%	0.0%	0.0%
	Total	**2846**	**2567**	**2065**	**2737**	**2458**	**1971**	**3.8%**	**4.2%**	**4.6%**
PM trips from development	Committed	1886	1886	1636	1835	1835	1593	2.7%	2.7%	2.6%
	Trips from neighbouring areas to Basingstoke	1078	838	548	1078	838	548	0.0%	0.0%	0.0%
	Total	**2964**	**2724**	**2184**	**2913**	**2672**	**2141**	**1.7%**	**1.9%**	**2.0%**
PM Peak Total		**5810**	**5290**	**4249**	**5650**	**5130**	**4112**	**2.8%**	**3.0%**	**3.2%**

8.6.10 The reduction in trips in the Reference Case scenarios is approximately 3% in the AM and PM peak Reference Case Scenarios for all three modelled years.

Table 8-48: Number of Development Trips in Local Plan Scenarios with and without Smarter Choice Measures Reduction

Source of Growth		Without Smarter Choices			With Smarter Choices			% change		
		2029	2024	2019	2029	2024	2019	2029	2024	2019
AM trips to development	Committed	1431	1431	1220	1394	1394	1189	2.6%	2.6%	2.5%
	Trips from Basingstoke to neighbouring areas	1096	883	610	1096	883	610	0.0%	0.0%	0.0%
	Basingstoke Local Plan	2133	1520	851	2041	1464	824	4.3%	3.6%	3.1%
	Total	**4660**	**3834**	**2681**	**4532**	**3742**	**2623**	**2.8%**	**2.4%**	**2.1%**
AM trips from development	Committed	1274	1274	1141	1196	1196	1072	6.1%	6.2%	6.0%
	Trips from neighbouring areas to Basingstoke	362	255	133	362	255	133	0.0%	0.0%	0.0%
	Basingstoke Local Plan	3084	2049	718	2945	1953	680	4.5%	4.7%	5.3%
	Total	**4720**	**3578**	**1992**	**4503**	**3404**	**1885**	**4.6%**	**4.9%**	**5.3%**
AM Peak Total		**9380**	**7413**	**4672**	**9034**	**7146**	**4509**	**3.7%**	**3.6%**	**3.5%**
PM trips to development	Committed	1644	1644	1464	1535	1535	1370	6.6%	6.6%	6.4%
	Trips from Basingstoke to neighbouring areas	1089	771	420	1089	771	420	0.0%	0.0%	0.0%
	Basingstoke Local Plan	3550	2538	1234	3369	2408	1169	5.1%	5.1%	5.3%
	Total	**6283**	**4953**	**3118**	**5993**	**4714**	**2959**	**4.6%**	**4.8%**	**5.1%**
PM trips from development	Committed	1886	1886	1636	1835	1835	1593	2.7%	2.7%	2.6%
	Trips from neighbouring areas to Basingstoke	913	703	461	913	703	461	0.0%	0.0%	0.0%
	Basingstoke Local Plan	2744	2047	1232	2628	1974	1194	4.2%	3.6%	3.0%
	Total	**5543**	**4636**	**3329**	**5376**	**4511**	**3248**	**3.0%**	**2.7%**	**2.4%**
PM Peak Total		**11826**	**9589**	**6448**	**11369**	**9226**	**6207**	**3.9%**	**3.8%**	**3.7%**

8.6.11 The reduction in trips in the Local Plan scenarios is approximately 3.5-4% in the AM and PM peak Reference Case Scenarios for all three modelled years.

APPENDICES

APPENDIX A

LOCATION OF DEVELOPMENT IN FORECASTING SCENARIOS

APPENDIX B

MODELLED QUEUING AND DELAY AT JUNCTIONS WHERE MITIGATION IS REQUIRED

A33 / BRAMLEY ROAD ROUNDABOUT

Modelled Queue at Each Entry at A33 / Bramley Road Roundabout

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	A. A33 North	6	9	1
	B. A33 South	2	3	1
	C. Bramley Rd	0	0	0
PM	A. A33 North	5	6	1
	B. A33 South	3	4	1
	C. Bramley Rd	0	0	0

Modelled Average Delay per Vehicle at Each Entry at A33 / Bramley Road Roundabout

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	A. A33 North	18	26	3
	B. A33 South	8	10	3
	C. Bramley Rd	5	5	5
PM	A. A33 North	14	18	3
	B. A33 South	10	13	3
	C. Bramley Rd	4	4	4

A30 / WALLOP DRIVE ROUNDABOUT

Modelled Queue at Each Entry at A30 / Wallop Drive Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A - A30 E	1	2	6
	Arm B - Wallop Drive	0	1	8
	Arm C - A30 W	2	275	5
PM	Arm A - A30 E	6	508	11
	Arm B - Wallop Drive	1	2	6
	Arm C - A30 W	4	10	5

Modelled Average Delay per Vehicle at Each Entry at A30 / Wallop Drive Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A - A30 E	4	5	12
	Arm B - Wallop Drive	4	4	33
	Arm C - A30 W	6	405	34
PM	Arm A - A30 E	15	834	20
	Arm B - Wallop Drive	6	11	27
	Arm C - A30 W	10	21	38

KEMPSHOTT ROUNDABOUT

Modelled Queue at Each Entry at Kempshott Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – A30 North	1	1	2
	Arm B – Woodbury Rd	3	3	6
	Arm C –A30 South	353	516	10
	Arm D – Heather Way	2	2	7
PM	Arm A – A30 North	76	221	9
	Arm B – Woodbury Rd	1	1	3
	Arm C –A30 South	60	68	6
	Arm D – Heather Way	1	1	6

Modelled Average Delay per Vehicle at Each Entry at Kempshott Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – A30 North	5	5	4
	Arm B – Woodbury Rd	11	12	15
	Arm C –A30 South	1165	1706	12
	Arm D – Heather Way	9	9	27
PM	Arm A – A30 North	165	457	7
	Arm B – Woodbury Rd	5	6	25
	Arm C –A30 South	180	201	7
	Arm D – Heather Way	5	5	20

BRIGHTON HILL ROUNDABOUT

Modelled Queue at Each Entry a Brighton Hill Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – A30 North	5	6	120
	Arm B –Harrow Way	2	3	60
	Arm C – Brighton Way	5	8	66
	Arm D – A30 South	297	485	64
	Arm E – Pack Lane	2	3	18
	Arm F – Western Way	192	204	7
PM	Arm A – A30 North	6	559	59
	Arm B –Harrow Way	3	129	23
	Arm C – Brighton Way	8	5	10
	Arm D – A30 South	485	1	6
	Arm E – Pack Lane	3	1	25
	Arm F – Western Way	204	2	6

Modelled Average Delay per Vehicle at Each Entry at Brighton Hill Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – A30 North	17	18	455
	Arm B –Harrow Way	15	16	314
	Arm C – Brighton Way	22	31	197
	Arm D – A30 South	714	1182	197
	Arm E – Pack Lane	20	21	112
	Arm F – Western Way	9999	9999	119
PM	Arm A – A30 North	739	18	166
	Arm B –Harrow Way	590	16	73
	Arm C – Brighton Way	25	31	39
	Arm D – A30 South	5	1182	35
	Arm E – Pack Lane	7	21	129
	Arm F – Western Way	20	9999	93

HACKWOOD ROUNDABOUT

Modelled Queue Length at Each Entry at Hackwood Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – A30 Ringway E	9	15	7
	Arm B – A339	598	750	129
	Arm C –A30 Ringway W	328	398	40
	Arm D – Hackwood Rd	2	2	6
PM	Arm A – A30 Ringway E	4	26	8
	Arm B – A339	6	68	14
	Arm C –A30 Ringway W	142	212	10
	Arm D – Hackwood Rd	213	555	9

Modelled Average Delay per Vehicle at Each Entry at Hackwod Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – A30 Ringway E	19	31	7
	Arm B – A339	1512	1942	315
	Arm C –A30 Ringway W	1024	1239	87
	Arm D – Hackwood Rd	16	16	44
PM	Arm A – A30 Ringway E	10	60	20
	Arm B – A339	18	184	22
	Arm C –A30 Ringway W	436	647	15
	Arm D – Hackwood Rd	1373	3665	30

VICTORY ROUNDABOUT

Modelled Queue Length at Each Entry at Victory Roundabout

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – A3010 East	1	1	11
	Arm B – Timberlake Road	1	1	16
	Arm C – A3010 West	406	622	25
	Arm D – Alencon Link	5	9	6
PM	Arm A – A3010 East	2	3	42
	Arm B – Timberlake Road	7	14	16
	Arm C – A3010 West	1	1	7
	Arm D – Alencon Link	34	80	11

Modelled Average Delay per Vehicle at Each Entry at Victory Roundabout

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – A3010 East	3	3	36
	Arm B – Timberlake Road	4	4	48
	Arm C – A3010 West	744	1117	39
	Arm D – Alencon Link	29	50	15
PM	Arm A – A3010 East	7	7	196
	Arm B – Timberlake Road	19	37	81
	Arm C – A3010 West	3	4	47
	Arm D – Alencon Link	106	233	11

ALDERMASTON ROAD ROUNDABOUT

Modelled Queue Length at Each Entry at Aldermaston Road Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – Popley Way	13	17	12
	Arm B – A339 WB Off-slip	11	15	10
	Arm C – Oakridge Road	6	6	6
	Arm D – Aldermaston Rd S	9	33	9
	Arm E – A339 EB Off-slip	11	12	17
	Arm F – Aldermaston Road N	12	15	18
PM	Arm A – Popley Way	7	7	8
	Arm B – A339 WB Off-slip	8	7	10
	Arm C – Oakridge Road	6	3	3
	Arm D – Aldermaston Rd S	17	55	9
	Arm E – A339 EB Off-slip	9	9	10
	Arm F – Aldermaston Road N	8	8	11

Modelled Average Delay per Vehicle at Each Entry at Aldermaston Road Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – Popley Way	27	47	30
	Arm B – A339 WB Off-slip	21	40	20
	Arm C – Oakridge Road	41	42	42
	Arm D – Aldermaston Rd S	34	184	52
	Arm E – A339 EB Off-slip	34	28	41
	Arm F – Aldermaston Road N	22	26	33
PM	Arm A – Popley Way	22	21	19
	Arm B – A339 WB Off-slip	21	21	25
	Arm C – Oakridge Road	43	27	24
	Arm D – Aldermaston Rd S	40	155	22
	Arm E – A339 EB Off-slip	29	27	32
	Arm F – Aldermaston Road N	24	23	35

A339 / RINGWAY WEST ROUNDABOUT

Modelled Queue Length at Each Entry for A339 / Ringway West Roundabout

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – A339 RW N	2	2	7
	Arm B – A340 RW	4	6	14
	Arm C – A339	357	588	9
PM	Arm A – A339 RW N	3	4	8
	Arm B – A340 RW	3	4	10
	Arm C – A339	3	5	6

Modelled Average Delay at Each Entry at A339 / Ringway West Roundabout

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – A339 RW N	2	3	11
	Arm B – A340 RW	8	12	19
	Arm C – A339	497	832	14
PM	Arm A – A339 RW N	4	5	10
	Arm B – A340 RW	7	8	20
	Arm C – A339	6	9	11

A339 / ROMAN ROAD JUNCTION

Modelled Queue Length at Each Entry at A339 / Roman Road Junction

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – Rooksdown Lane	1	1	0
	Arm B – A339 East	2	2	1
	Arm C - Roman Road	2	2	2
	Arm D - A339 West	159	312	3
PM	Arm A – Rooksdown Lane	1	1	0
	Arm B – A339 East	56	126	5
	Arm C - Roman Road	1	1	1
	Arm D - A339 West	4	9	1

Modelled Average Delay at Each Entry at A339 / Roman Road Junction

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – Rooksdown Lane	6	6	5
	Arm B – A339 East	5	5	3
	Arm C - Roman Road	7	8	8
	Arm D - A339 West	388	752	7
PM	Arm A – Rooksdown Lane	5	5	3
	Arm B – A339 East	99	206	8
	Arm C - Roman Road	5	5	6
	Arm D - A339 West	12	25	3

B3400 WORTING ROAD / ROMAN WAY ROUNDABOUT

Modelled Queue Length at Each Entry at B3400 Worting Road / Roman Way Roundabout

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – Roman Way	22	26	5
	Arm B – B3400 Worting Rd (E)	16	48	2
	Arm C – B3400 Worting Rd (W)	341	394	174
PM	Arm A – Roman Way	427	458	309
	Arm B – B3400 Worting Rd (E)	6	12	2
	Arm C – B3400 Worting Rd (W)	4	9	2

Modelled Average Delay per Vehicle at Each Entry at B3400 Worting Road / Roman Way Roundabout

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – Roman Way	154	183	39
	Arm B – B3400 Worting Rd (E)	72	179	9
	Arm C – B3400 Worting Rd (W)	2178	2463	726
PM	Arm A – Roman Way	2625	3056	1504
	Arm B – B3400 Worting Rd (E)	32	54	8
	Arm C – B3400 Worting Rd (W)	30	63	11

WORTING ROAD ROUNDABOUT

Modelled Queue Length at Each Entry at Worting Road Roundabout

Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – Worting Road	0	0	0
	Arm B – B3400 Worting Road (E)	1	1	1
	Arm C – Buckskin Lane	1	2	1
	Arm D – B3400 Worting Road (W)	5	9	2
PM	Arm A – Worting Road	0	0	0
	Arm B – B3400 Worting Road (E)	3	4	2
	Arm C – Buckskin Lane	2	3	2
	Arm D – B3400 Worting Road (W)	1	1	0

Modelled Average Delay per Vehicle at Each Entry at Worting Road Roundabout

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – Worting Road	1	1	1
	Arm B – B3400 Worting Road (E)	3	4	3
	Arm C – Buckskin Lane	7	7	5
	Arm D – B3400 Worting Road (W)	22	35	6
PM	Arm A – Worting Road	1	1	1
	Arm B – B3400 Worting Road (E)	8	10	5
	Arm C – Buckskin Lane	12	14	9
	Arm D – B3400 Worting Road (W)	5	5	3

WEST HAM ROUNDABOUT

Modelled Queue Length at Each Entry at West Ham Roundabout

Time	Arm	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A - B3400 Churchill Way	1	0	1
	Arm B - Grafton Way	0	4	0
	Arm C - Worting Rd	4	0	1
	Arm D - West Ham Close	0	113	0
	Arm E - B3400 Worting Rd	32	0	4
	Arm F - Euskirchen Way	0	0	0
PM	Arm A - B3400 Churchill Way	70	171	3
	Arm B - Grafton Way	2	2	1
	Arm C - Worting Rd	4	4	1
	Arm D - West Ham Close	0	0	0
	Arm E - B3400 Worting Rd	2	3	1
	Arm F - Euskirchen Way	0	0	0

Modelled Average Delay per Vehicle at Each Entry at West Ham Roundabout

Time	Arm	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A - B3400 Churchill Way	5	5	3
	Arm B - Grafton Way	5	19	4
	Arm C - Worting Rd	17	6	5
	Arm D - West Ham Close	6	273	6
	Arm E - B3400 Worting Rd	88	7	11
	Arm F - Euskirchen Way	7	7	6
PM	Arm A - B3400 Churchill Way	153	353	6
	Arm B - Grafton Way	18	19	12
	Arm C - Worting Rd	23	27	7
	Arm D - West Ham Close	9	9	10
	Arm E - B3400 Worting Rd	9	11	5
	Arm F - Euskirchen Way	5	5	4

FIVEWAYS JUNCTION

Modelled Queue Length at Each Entry at Fiveways Junction

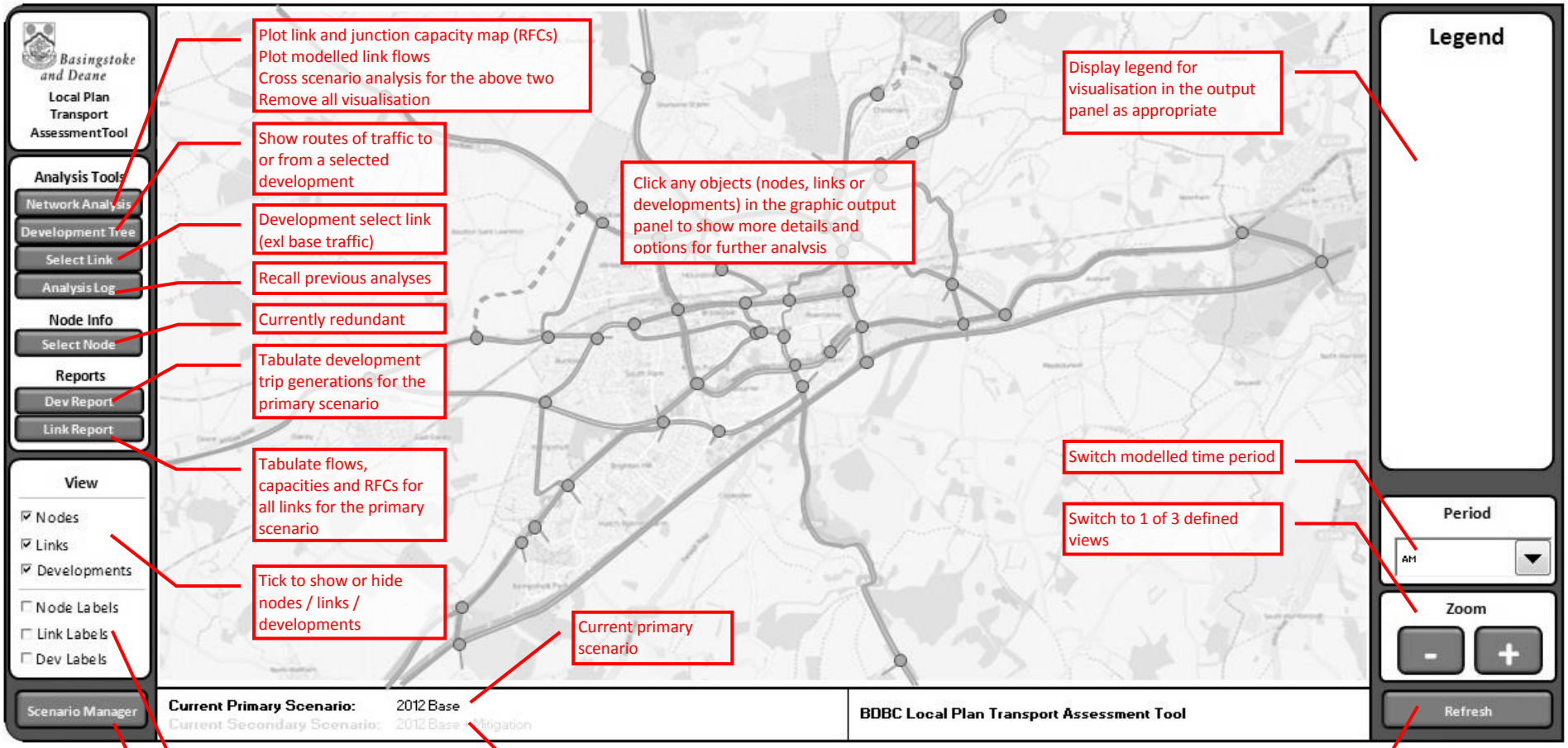
Time	Arms	2029 Reference Case (PCUs)	Local Plan without mitigation (PCUs)	Local Plan with mitigation (PCUs)
AM	Arm A – Buckskin Lane	128	105	11
	Arm B – Pack Lane (East)	17	103	27
	Arm C – Kempshott Lane	261	236	169
	Arm D – Pack Lane (West)	99	66	61
PM	Arm A – Buckskin Lane	389	448	241
	Arm B – Pack Lane (East)	167	190	92
	Arm C – Kempshott Lane	254	279	32
	Arm D – Pack Lane (West)	10	12	11

Modelled Average Delay per Vehicle at Each Entry at Fiveways Junction

Time	Arms	2029 Reference Case (sec)	Local Plan without mitigation (sec)	Local Plan with mitigation (sec)
AM	Arm A – Buckskin Lane	771	634	19
	Arm B – Pack Lane (East)	53	599	129
	Arm C – Kempshott Lane	722	607	406
	Arm D – Pack Lane (West)	786	446	407
PM	Arm A – Buckskin Lane	372	1056	515
	Arm B – Pack Lane (East)	157	1044	489
	Arm C – Kempshott Lane	241	1062	45
	Arm D – Pack Lane (West)	4	47	39

APPENDIX C

SPREADSHEET MODEL USERS GUIDE


Basingstoke and Deane
Local Plan Transport AssessmentTool
Analysis Tools
Network Analysis
Development Tree
Select Link
Analysis Log
Node Info
Select Node
Reports
Dev Report
Link Report
View
Nodes
Links
Developments
Node Labels
Link Labels
Dev Labels
Scenario Manager
Plot link and junction capacity map (RFCs)
Plot modelled link flows
Cross scenario analysis for the above two
Remove all visualisation
Show routes of traffic to or from a selected development
Development select link (exl base traffic)
Recall previous analyses
Currently redundant
Tabulate development trip generations for the primary scenario
Tabulate flows, capacities and RFCs for all links for the primary scenario
Tick to show or hide nodes / links / developments
Tick to show or hide labels
Click to set primary and secondary scenario(s)
Click any objects (nodes, links or developments) in the graphic output panel to show more details and options for further analysis
Current primary scenario
Current secondary scenario
Current Primary Scenario: 2012 Base
Current Secondary Scenario: 2012 Base + Mitigation
BDBC Local Plan Transport Assessment Tool
Legend
Display legend for visualisation in the output panel as appropriate
Switch modelled time period
Switch to 1 of 3 defined views
Period
AM
Zoom
Refresh
Try this if the visualisation in the output panel does not make sense.