

Oxfordshire County Council

Garden Village AAP and West Eynsham SPD Evidence Base

2031 Forecast Year Modelling

VISSIM Microsimulation
Modelling Report

Report for

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Doc Ref. 41596-WOD-XX-XX-RP-OT-0005_S3_p01

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Document revisions

No.	Details	Date
01	For Issue	27/08/2019
02	For Issue – updated with further results	17/09/2019
03	For Issue – updated following internal review	21/10/2019
04	For Issue – FINAL	13/12/2019
05	For Issue – updated FINAL	30/04/2020
06	For Issue – updated following client comments	05/05/2020
07	FINAL	06/07/2020

Garden Village AAP and West Eynsham SPD Evidence Base: 2031 Forecast Year Modelling: VISSIM Microsimulation Modelling Report, Wood, 6th July 2020

Oxfordshire County Council: Officer Response

Date: July 2020

Background

Wood was appointed by Oxfordshire County Council (OCC) to develop a transport microsimulation model using VISSIM software to test the impacts of the Oxfordshire Cotswold Garden Village (OCGV) and West Eynsham SDA development proposals. The following models were developed:

- 2018 Eynsham VISSIM Base Model;
- 2031 Eynsham VISSIM Future Base Model;
- 2031 Eynsham VISSIM 'With Development' Model.

The A40 improvements will bring significant benefits, including journey time savings, for bus users. However, the modelling indicates that based on the 'traditional' approach to estimating traffic growth and trip generation (i.e. with forecasting based on **historic** travel trends), there will be additional congestion and delay on the A40 corridor in 2031 during the AM peak (westbound and eastbound directions) and PM peak (eastbound) for general traffic. This is due to background traffic growth as well as trips generated by the OCGV and West Eynsham SDA, with Wolvercote roundabout being a key constraint on the network.

In the PM peak, proposed improvements at Eynsham Roundabout have a significant positive impact on westbound journey times.

Future travel behaviour

In recent years, there have been significant technological advances and changes in the social, economic and environmental conditions which influence travel behaviour. Indeed, there is a growing body of evidence to show that the traditional approach to transport planning using the 'predict and provide' process of basing future transport needs on past trends is inappropriate – and can lead to the over-provision of highway capacity which in turn 'induces' travel demand.

Current modelling does not take into account these future changing trends nor the mode shift that will take place as a result of the bold Connecting Oxford proposals and other policy interventions; the increasing momentum towards modal shift due to the climate emergency; and increased home/remote working. The HIF infrastructure improvements were also excluded from the modelling due to their uncertainty at the time that modelling for the OCGV and West Eynsham SDA began.

All of these initiatives will discourage driving along the A40 and will influence background traffic growth in the area as well as OCGV and West Eynsham SDA development-related trips.

Further work to model the impact of policy interventions and changing travel behaviours will be undertaken as part of the ongoing HIF modelling work and to further support the AAP process.

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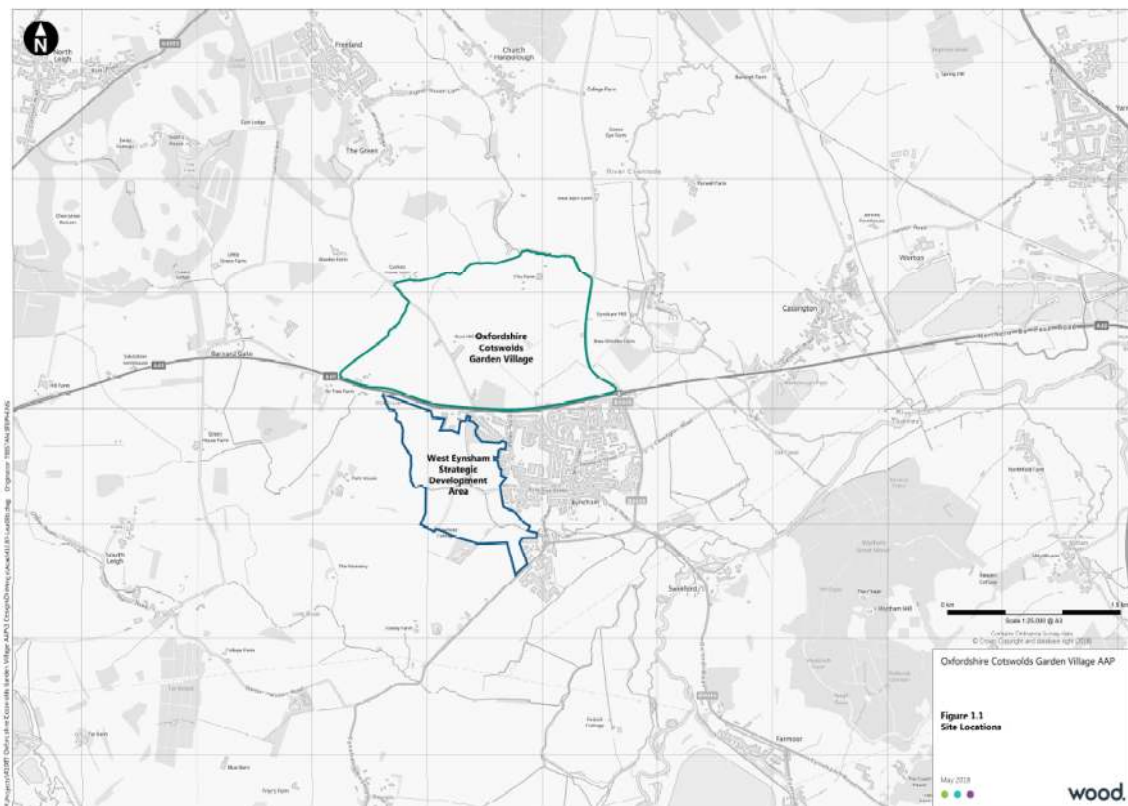
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1. Introduction

1.1 Background

Wood has been appointed by Oxfordshire County Council (OCC) to support the development of a transport evidence base to inform the Oxfordshire Cotswolds Garden Village Area Action Plan (AAP) and the West Eynsham Supplementary Planning Document (SPD). The location of the two sites is shown in **Figure 1**.

Figure 1 – Location of Oxfordshire Cotswolds Garden Village and West Eynsham Strategic Development Area



The Oxfordshire Cotswolds Garden Village has government backing and is one of the 14 sites announced in January 2017 as part of an expansion of the garden towns programme¹. The Garden Village Strategic Location for Growth (SLG) and the West Eynsham Strategic Development Area (SDA) are located in Eynsham Parish in West Oxfordshire and are identified as Allocated Sites within the West Oxfordshire Local Plan 2031, which was formally adopted in September 2018.

In total, the site allocations have the potential to provide around 3,200 new homes, a 40ha Science Park generating a significant number of new jobs, additional primary and secondary education provision and additional service facilities. The site will benefit from a proposed Park and Ride of 850 spaces which will be located to the west of the A40/Cuckoo Lane junction and which will be funded largely through the 'Local Growth Fund' administered by Central Government. Collectively this will create the opportunity for

¹The Expression of Interest submitted to the Government is available here:

<https://www.westoxon.gov.uk/media/vrcivylm/west-oxon-garden-village-expression-of-interest.pdf>

integrated housing, employment and transport hubs, with the Garden Village providing a new rural service centre.

The development of an AAP for the Garden Village and an SPD for the West Eynsham SDA by West Oxfordshire District Council (WODC) will provide planning frameworks for the sites to guide development proposals and delivery, and to ensure integration with each other and other initiatives in the area.

The transport evidence base being produced by Wood includes a transport microsimulation model using VISSIM software to test the impacts of the development proposals and identify a suitable package of mitigation measures to address capacity issues. The following models have been developed:

- 2018 Eynsham VISSIM Base Model based on the North Oxford VISSIM Model;
- 2031 Eynsham VISSIM Future Base Model;
- 2031 Eynsham VISSIM 'With Development' Model.

A Local Model Validation Report (LMVR) has been produced by Wood which sets out the approach to developing the 2018 Eynsham VISSIM Base Model (Doc Ref. 41596-WOD-XX-XX-RP-OT-0002_S3_P03).

This report sets out the results of the testing of the development proposals, referred to as the 2031 Eynsham VISSIM 'With Development' Model.

1.2 Report Content

This remainder of the report is made up of the following sections:

- Chapter 2 – Development of the 2031 Eynsham VISSIM 'With Development' Model;
- Chapter 3 – 'With Development' Eynsham VISSIM Model Traffic Data;
- Chapter 4 – Modelling outputs;
- Chapter 5 – Future Year (2031) 'With Development' Modelling Analysis;
- Chapter 6 - Mitigation Testing; and
- Chapter 7 – Summary and Recommendations.

2. Development of the 2031 Eynsham VISSIM 'With Development' Model

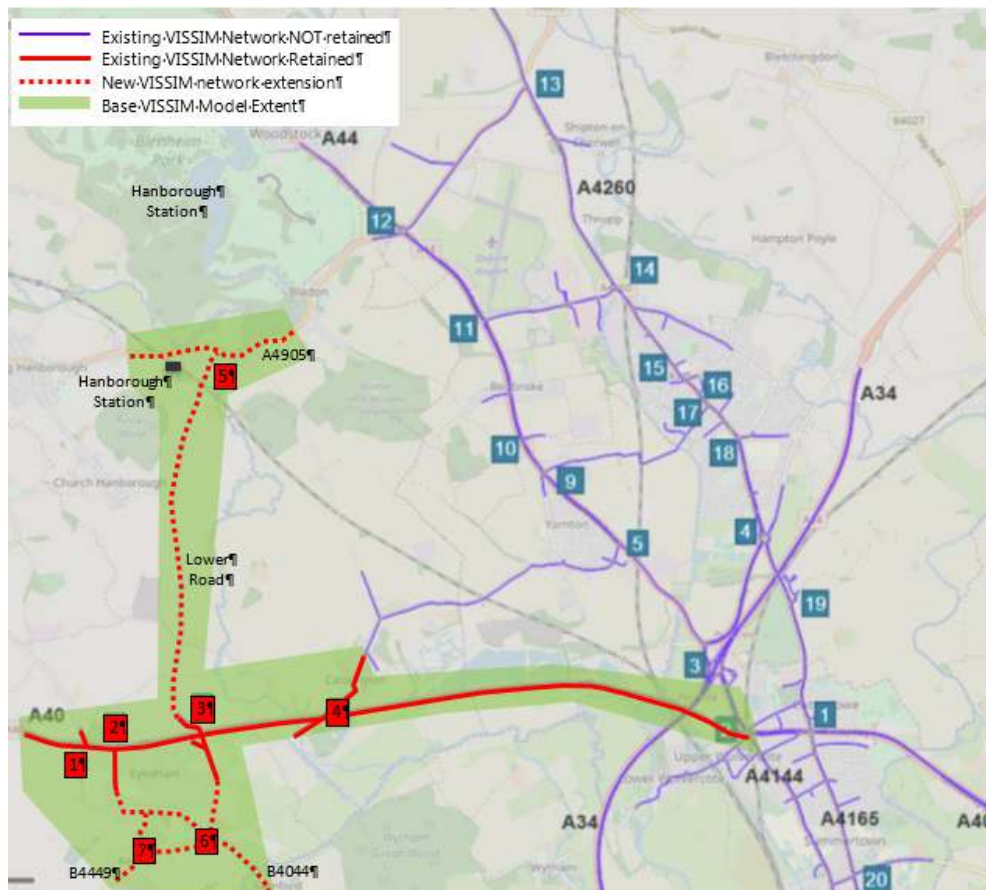
2.1 Introduction

As set out in the LMVR (Doc Ref. 41596-WOD-XX-XX-RP-OT-0002_S3_P03), the Eynsham VISSIM Model has been based on the North Oxford VISSIM Model which covers a wide study area across the north of Oxford, primarily formed of four key corridors including the A34, A40, A44/A4144 and A4260/A4165. The applicable section of the A40 network was extracted from the North Oxford VISSIM Model and two extensions were added, as shown in **Figure 2**:

- Lower Road (providing the link between Eynsham and Hanborough Station) including the junction with the A4905 at its northern end, given trips to/from the station are likely to increase upon completion of the proposed developments; and

An extension of the B4449 to cover the roundabout with the B4044 and the roundabout with Station Road to the south of Eynsham giving a greater coverage of network in the Eynsham area, which is likely to see an increase in traffic demand upon completion of the development schemes.

Figure 2 – Extent of Eynsham Base VISSIM Model



The updated Eynsham VISSIM Base model extents cover the following key junctions:

1. A40 / Cuckoo Lane – three arm, priority controlled junction;
2. A40 / Witney Road – three arm, signalised junction;
3. A40 / B4449 / Lower Road – four arm, priority controlled roundabout;
4. A40 Eynsham Road / Eynsham Road / Cassington Road – five arm, signalised junction;
5. Lower Road / A4095 Main Road – three arm, priority controlled junction;
6. B4449 / B4044 / Oxford Road, priority controlled roundabout; and
7. B4449 / Station Road / Old Station Way, priority controlled roundabout;

The Base VISSIM model is calibrated and validated in accordance with modelling standards and guidelines based on Manual Classified Traffic Counts (MCC) and journey times provided by OCC which were recorded on Thursday May 10th 2018.

Due to changes to the road network as a result of changes to the A40 to accommodate bus lanes and the Eynsham Park and Ride, and also the access proposals to the proposed development, the Eynsham VISSIM Base Model has been modified to reflect this, as set out in the next section.

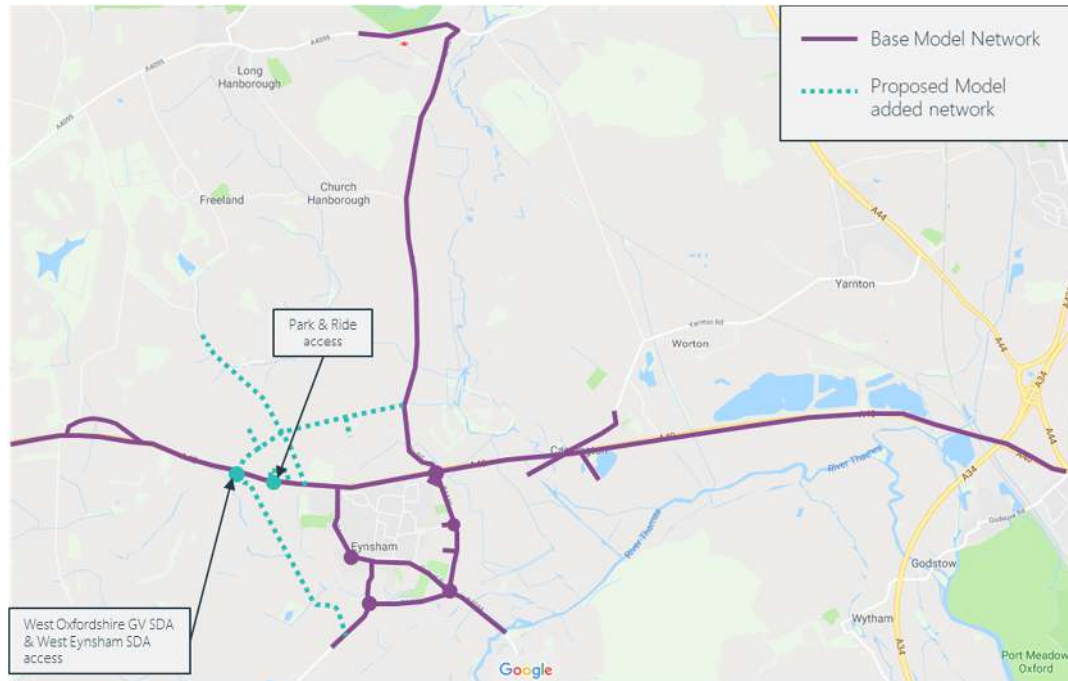
2.2 With Development Eynsham VISSIM Model - Modifications to the Road Network

The 2031 With Development Eynsham VISSIM Model uses the 2018 Eynsham VISSIM Base Model with the following modifications:

- Addition of a roundabout providing access from the A40 to the proposed Park & Ride site, located to the west of Cuckoo Lane. The detailed junction design has been produced by AECOM on behalf of OCC (Drawing Ref. 60551821-ACM-HSN-A40_SW_ZZ_ZZ-M2-CH-1201).
- Addition of a segregated bus lane along the A40 on the eastbound direction carriageway. Inclusion of the proposed bus lane has required updated designs of all the junctions along the A40 corridor between the proposed Park & Ride site and Wolvercote Roundabout. The design of the proposed bus lane and the updated junction designs along the A40 have been produced by AECOM on behalf of OCC and can be viewed online on the OCC consultation site - <https://consultations.oxfordshire.gov.uk/consult/ti/ImprovingtheA40corridor>
- Addition of two sections of segregated bus lane along the A40 on the westbound direction. The new bus lane was added between Horsemere Lane and the Lower Road/A40 Roundabout, and for a short (~500 metre section) west of Cassington signals. The design of the proposed bus lane and the updated junction designs along the A40 have been produced by AECOM on behalf of OCC and can be viewed online on the OCC consultation site - <https://consultations.oxfordshire.gov.uk/consult/ti/ImprovingtheA40corridor>
- Addition of a west access roundabout according to the design produced by Stuart Michael Associates Ltd and Western Relief Road (Drawing number: 5588.023 and 5588.004). This roundabout is located to the west of Cuckoo Lane and will provide access to both Oxfordshire Cotswolds Garden Village and West Eynsham Strategic Development Area (SDA).
- Addition of access roads to and from the new developments coded as per the 2031 SATURN model including a Spine Road through the West Eynsham SDA.

The extent of the Oxfordshire Cotswolds GV & West Eynsham SDA VISSIM Model is shown in **Figure 3**.

Figure 3 – Extent of Oxfordshire Cotswolds GV & West Eynsham SDA VISSIM Model



Map data ©2018 Google

3. With Development Eynsham VISSIM Model Traffic Data

The 'With Development' Eynsham VISSIM Model uses traffic data from the following sources:

- The OSM strategic 2031 SATURN models (updated with local area calibration/validation) as provided by OCC (OSM_31_O60_DS_99_CA_v2.UFS) and (OSM_31_O60_DS_99_CP_v2.UFS);
- Traffic generation for the Park & Ride Site is taken from the AECOM Transport Assessment (Transport_Assessment_Final Issue 2019-05-30 (003)); and
- Traffic generation for the proposed developments in the Eynsham area produced by Wood (*Oxfordshire Cotswolds Garden Village & West Eynsham SPD Traffic Generation Approach*, Doc Ref: 41087Lea004i2), included in **Appendix A** of this report.

3.1 Vehicle flow inputs

VISSIM inputs

A comparison between the SATURN OSM Base and forecast 2031 (with development) OSM model flows was undertaken to determine the factor by which traffic for each of the input links has increased or decreased. The factors calculated through this comparison were applied to the flows from the Base 2018 VISSIM model to calculate the flow inputs for the 2031 with development VISSIM model.

This methodology was applied to all entry links to the VISSIM network with the following exceptions:

- Where a zero value or no value was present in the base model and a non-zero value in the proposed model and thus making it impossible to calculate a proportional increase the absolute future value was used;
- A4095 westbound (WB) AM and PM – no base survey data at this location so the absolute SATURN value has been used for the proposed model.

In some cases, the base SATURN model differs significantly from the base VISSIM volume and a proportional increase would be significantly higher/lower than the absolute growth between the Base and 2031 Future Year with development OSM models. In these cases, the absolute difference between the Base OSM and Future Year with development OSM models has been applied, thus ensuring large flow increases/decreases located on links showing large discrepancies between the OSM base and VISSIM Base model are not transferred to the Future Year (2031) with development VISSIM model leading to a more accurate representation of future year flows in the VISSIM models:

- LGV and HGVs A40 eastbound (EB) AM (significant differences between base VISSIM and SATURN OSM model so absolute growth is used); and
- Car inputs for A40 WB PM and Cassington Road northbound (NB) PM (SATURN OSM base 2018 model is showing a much larger volume than the survey data therefore an absolute increase is applied to the VISSIM).

The absolute SATURN value has been used at the following locations:

- LGVs and HGVs at Cassington Road NB PM (SATURN OSM model is already predicting very significant increases in traffic volume on the A4095 – the absolute SATURN OSM model value

has been used as the input for Cassington Road as this results in a lower volume than using growth or absolute increases);

- HGVs A40 EB PM (SATURN OSM model is predicting a threefold decrease in HGV volume – the base SATURN is significantly higher than the survey data suggests). The proposed SATURN input is in line with the Base VISSIM model input; and
- HGVs A40 WB PM (SATURN OSM model showing a significant decrease between base and proposed – absolute SATURN has been used as using growth/absolute difference would decrease the volume input in the proposed VISSIM further).

The OSM model is a peak hour model and is being used as a guide to estimate flows for the hours before and after the peak in the VISSIM model. The proportional difference between the base flows for each of the peak period hours has been used to increase/decrease the peak hour flow to the other hours as required.

Development Flows Inputs

Development input flows for the Garden Village for the 4ha and 8ha employment build-out assumptions, and West Eynsham development were extracted from the Wood document, *Oxfordshire Cotswolds Garden Village & West Eynsham SPD Traffic Generation Approach* (Appendix A), these are summarised for the AM and PM peak hours in **Table 1**. Both the Garden Village and West Eynsham flows are present in the 'with development' models.

Table 1 – Development flows for OCGV (4ha and 8ha employment assumptions) and West Eynsham SDA

Garden Village 4ha employment		AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
Time	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way	
Residential	151	642	793	629	312	941	
Employment	446	60	506	41	342	383	
Primary School	25	7	32	1	1	2	
Sixth Form	15	11	26	2	3	5	
Garden Village 8ha employment		AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
Time	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way	
Residential	151	642	793	629	312	941	
Employment	892	120	1011	82	684	766	
Primary School	25	7	32	1	1	2	
Sixth Form	15	11	26	2	3	5	
West Eynsham		AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
Time	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way	
Residential	60	255	315	283	140	423	
Primary School	73	21	94	2	4	6	

3.2 Vehicle routings

A flow diagram was created for the AM and PM peak hour using data outputs from the 2031 SATURN model. In order to generate matrix inputs for dynamic assignment in VISSIM, a simple VISUM network was created for each user class and a matrix estimation procedure undertaken. A dynamic assignment was then run in VISSIM. Once the dynamic assignment was completed, the routings were converted to static assignment.

3.3 Other Assumptions

In this analysis it has been assumed that no changes are made to the operation at Wolvercote Roundabout, and thus the signal timings from the Base model have remained unchanged in the proposed model for both peaks.

Given that OSM only models the peak hours, the same routing proportions generated for the peak hour in the AM and PM models were also used for the other hours in the modelling run. (i.e. routing for 0800-0900 were applied to 0700-0800 and 0900-1000, and those for 1600-1700 were applied to 1500-1600 and 1700-1800)

The model vehicle inputs that can be extracted from the OSM model are also for the peak hour. The proportional difference between the Base VISSIM and calculated proposed 2031 vehicle inputs was applied equally to the other peak time periods. i.e. any growth in the AM peak hour (0800-0900) was also applied to the other hours in the modelling period (0700-0800 and 0900-1000), likewise for the PM peak.

Warm up traffic inputs and routing are assumed to be the same as the flows for the first model hour (same approach as was used in the Base model).

It has been identified that flows on the A40 eastbound through the Cassington Road signals for the hour before the peak are significantly higher than the peak hour flows in the 2018 survey. The model flow inputs for the A40 EB are based on proportionate increases/decreases against the peak hour. Therefore, the absolute increase that has been applied to the pre peak hour is higher than the increase for the peak hour. Similarly, for the A40 WB the absolute increase in flow from the peak hour had been applied to the pre-peak hour for the same reason.

Additionally, the OSM model includes a high level representation of the proposed A40/A44 link road (to Loop Farm Roundabout), which had confirmed funding at the time of OSM development. This scheme is now on hold² and adjustments have been made to the VISSIM modelling to account for the likely changes in traffic movements. It has been assumed for the purpose of modelling that traffic using the new strategic link road would instead use Cassington Road for trips between the A44 north/A34 north and the A40 east when there is congestion on the A40. This routing amendment has been applied to all traffic apart from the warm-up and first hour of the AM model (when there is insignificant queuing to Wolvercote Roundabout).

The OSM model also includes a link road from the A40 to the A44 which forms part of the recently approved Oxford North development, a major urban extension comprising 480 dwellings, employment, retail, and leisure uses. Given that the location of this access point is approximately 500m prior to the signals at Wolvercote Roundabout, the link has been added in the VISSIM model. As well as being an access to the development, the link road enables avoidance of Wolvercote Roundabout for traffic routeing to/from the A44, A34 and A4260 via Peartree Roundabout, and the Pear Tree Park & Ride.

² <https://www.oxfordshire.gov.uk/residents/roads-and-transport/roadworks/future-transport-projects/a40-a44-strategic-link-road>

3.4 Signal timings

Signal timings for Cassington Road and Witney Road junctions were initially optimised using LinSig based on demand flows extracted from the 2031 OSM model. The signal timings were then further optimised manually based on observations during the model simulation runs.

Signal timings for bus gates are assumed to give buses priority. Detectors are coded on each of the approaches to the bus gates and change the signal to green when a bus arrives.

The new standalone pedestrian crossings are coded to be demand dependant with a fixed pedestrian volume of 20 persons per hour at each crossing. This demand results in each crossing being called on average 10-20 times per hour.

3.5 Desired Speed Decisions (DSD) and Reduces Speed Areas (RSA)

A 50mph speed is modelled along the A40 corridor as per the AECOM design drawings.

A reduced speed area (RSA) coded in the Base model at Swinford Toll Bridge reducing traffic speed to an average of 3 mph, to the south east of the site, was resulting in a standstill of the traffic within the first modelled hour in the AM peak, in turn resulting in the model locking up. The OSM model appears to be overestimating the capacity of the Swinford Toll bridge. Given that the Swinford Toll bridge is already operating over capacity during the peak hours, the traffic volume in the southbound direction across the Swinford Toll bridge has been manually reduced to match closely the volume that was observed in the 2018 traffic counts.

3.6 Other model changes

The junction between Lower Road and the A4095 was seen to be operating over capacity with vehicles turning onto the A4095 unable to find sufficient gaps in traffic. This junction has been signalised in the 'with development' models to provide the additional capacity required for it to operate effectively.

4. Modelling outputs

4.1 Journey Times

Average journey times for all vehicles were extracted for all routes in each of the three-hour AM (07:00-08:00, 08:00-09:00 and 09:00-10:00) and PM (15:00-16:00, 16:00-17:00 and 17:00-18:00) peaks. The AM and PM models were run for 10 seeds and the results shown below are the average values for each peak. The extracted journey time results (in minutes and seconds) for the proposed (2031) scheme are compared against the Future Base (2031) and Base Model (2018) in the sections below.

The A40 has been broken down into sections (between key junctions) for which modelled vehicle travel times have been recorded as shown in **Table 2**. All the original journey time sections used in the Base model (sections 1 to 5 EB, and 6-10 WB) are included as well as some additional journey time sections covering the A40 between Hill Farm and Cuckoo Lane in the future scenarios to cover the journey time sections between the proposed junctions and further to the west along the A40.

Table 2 - Journey time sections

Direction	Section no.	From	To	Distance (km)
EB	0-0	Hill Farm	SDA/GV access Roundabout	2.94
EB	0-1	SDA/GV access Roundabout	P&R Roundabout	0.38
EB	0-2	P&R Roundabout	Cuckoo Lane	0.36
EB	1	Cuckoo Lane	Witney Road	0.36
EB	2	Witney Road	Lower Road	0.92
EB	3	Lower Road	Cassington Road	1.30
EB	4	Cassington Road	Eynsham Road	0.10
EB	5	Eynsham Road	Wolvercote Roundabout	4.75
WB	6	Wolvercote Roundabout	Eynsham Road	4.72
WB	7	Eynsham Road	Cassington Road	0.82
WB	8	Cassington Road	Lower Road	1.29
WB	9	Lower Road	Witney Road	0.98
WB	10	Witney Road	Cuckoo Lane	0.36
WB	11-1	Cuckoo Lane	Park & Ride Roundabout	0.26
WB	11-2	Park & Ride Roundabout	SDA/GV access Roundabout	0.39
WB	11-3	SDA/GV access Roundabout	Hill Farm	3.06

Tables 3 and 4 below show a summary comparing the journey time sections along the A40 from Hill Farm to Wolvercote Roundabout in both eastbound and westbound directions. The journey times shown are a weighted average for the entire 3-hour peak period for the AM and PM peaks and give an average indication of the impact of development traffic on journey times along the A40 corridor.

With the development traffic including the 4ha employment build-out traffic added to the Forecast Year (2031), journey times in the AM peak increase by an average of approximately 2 ½ minutes in the eastbound direction and ½ minute in the westbound direction. The corresponding increases for the PM peak are just over 1 minute in the eastbound direction and 1 ½ minutes in the westbound direction.

With the development traffic including the full 8ha employment build-out added to the Forecast Year (2031), journey times in the AM peak increase by an average of approximately 4 ½ minutes in the eastbound direction and 1 ½ minutes in the westbound direction. The corresponding increases for the PM peak are approximately 1 ½ minutes in the eastbound direction and 3 minutes in the westbound direction.

Table 3 – AM Weighted peak period journey time comparison (2031)

Direction	Future Base (2031)	With development (inc. 4ha employment)	Difference	With development (inc. 8ha employment)	Difference
EB (Hills Farm to Wolvercote)	18:31	21:09	2:38	23:13	4:42
WB (Wolvercote to Hills Farm)	14:10	14:53	0:35	15:42	1:32

Table 4 – PM Weighted peak period journey time comparison (2031)

Direction	Future Base (2031)	With development (inc. 4ha employment)	Difference	With development (inc. 8ha employment)	Difference
EB (Hills Farm to Wolvercote)	14:46	15:49	1:03	16:15	1:29
WB (Wolvercote to Hills Farm)	16:44	18:22	1:38	19:35	2:51

AM Journey Time Comparison

Tables 5 and 6 show a more detailed comparison between the Base Year (2018), Forecast Year (2031) and Forecast Year with Development (2031) journey times on individual journey time sections between each of the key junctions on the A40 for the AM peak period.

Looking at the journey time impacts in greater detail, the increase for the development with 4ha employment build-out is just under 1 minute for the start of the peak period and up to approximately 4 minutes towards the end of the peak period between Cuckoo Lane and Wolvercote Roundabout.

The addition of the development with full 8ha employment build-out development traffic generally increases journey times on the A40 eastbound, with journey times on the section between Cuckoo Lane and Wolvercote Roundabout increasing by between 1 minute at the start of the peak period and up to 6 minutes towards the end of the peak period.

Table 5 – Eastbound AM Peak A40 average general traffic journey times (4ha and 8 ha employment)

A40 EB Section	07:00-08:00				08:00-09:00				09:00-10:00			
			With Development				With Development				With Development	
	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)
0-0	-	2:28	2:34	2:36	-	2:32	3:22	5:06	-	2:28	2:40	4:16
0-1	-	0:30	0:32	0:32	-	0:31	0:34	0:35	-	0:29	0:31	0:32
0-2	-	0:35	0:35	0:35	-	0:40	0:42	0:41	-	0:34	0:36	0:40
1	0:52	0:32	0:33	0:33	0:41	0:38	0:40	0:39	0:38	0:34	0:34	0:38
2	3:32	1:34	1:35	1:38	2:18	1:43	1:52	2:02	2:02	1:35	1:39	1:49
3	4:39	1:56	1:58	1:58	2:39	2:07	2:22	2:18	1:57	1:52	2:25	2:36
4	0:21	0:17	0:76	0:16	0:18	0:17	0:17	0:17	0:17	0:16	0:18	0:19
5	6:56	7:09	7:24	7:31	12:45	13:31	15:20	15:49	9:33	11:28	14:53	16:18
1-5 Total	16:21	10:59	11:47	11:56	18:42	18:16	19:01	21:05	14:30	15:45	19:49	21:48
0-5 Total	-	15:04	15:30	15:42	-	22:03	23:43	27:30	-	19:20	23:40	27:11

In the westbound direction (between Wolvercote Roundabout to Cuckoo Lane) during the AM peak, the increase in delay for the development with 4ha employment build-out leads to increase of between 30 seconds and a minute across the peak period.

The addition of the traffic for the development with full 8ha build-out to the future year (2031) in the westbound direction (between Wolvercote Roundabout to Cuckoo Lane) during the AM peak results in an increase of approximately 1-2 minutes across the peak period. The majority of this increase is due to increased traffic congestion between Witney Road and Lower Road.

Table 6 - Westbound AM Peak A40 average general traffic journey times

A40 WB Section	07:00-08:00				08:00-09:00				09:00-10:00			
			With Development				With Development				With Development	
	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)
6	5:25	6:11	6:17	6:23	5:18	6:07	6:19	6:32	5:18	6:10	6:20	6:25
7	0:10	0:09	0:09	0:09	0:10	0:09	0:09	0:10	0:10	0:09	0:09	0:09
8	1:38	1:45	1:47	1:50	1:41	1:47	1:51	1:59	1:40	1:46	1:50	2:08
9	1:23	1:55	2:15	2:28	1:40	1:55	2:33	3:06	1:18	1:53	2:18	2:58
10	0:28	0:30	0:31	0:31	0:28	0:30	0:32	0:32	0:27	0:30	0:30	0:31
11-1	-	0:23	0:23	0:24	-	0:23	0:23	0:23	-	0:24	0:24	0:24
11-2	-	0:35	0:35	0:35	-	0:40	0:42	0:41	-	0:34	0:36	0:40
11-3	-	2:41	2:42	2:42	-	2:41	2:42	2:42	-	2:41	2:40	2:42
6-10 Total	9:04	10:30	10:59	11:21	9:19	10:28	11:24	12:19	8:56	10:28	11:07	12:11
6-11 Total	-	14:14	14:43	15:05	-	14:16	15:15	16:09	-	14:10	14:50	16:01

PM Journey Times Comparison

Tables 7 and 8 show a more detailed comparison between the Base Year (2018), Forecast Year (2031) and Forecast Year with Development (2031) journey times on individual journey time sections between each of the key junctions on the A40 for the PM peak period.

In the eastbound direction between Cuckoo Lane and Wolvercote Roundabout during the PM peak, the increase in delay for the development with 4ha employment build-out leads to increase of between 30 seconds and a minute across the peak period.

The addition of development traffic with full 8ha build-out to the future year (2031) in the eastbound direction (Cuckoo Lane and Wolvercote Roundabout) during the PM peak results in an increase of between 30 seconds and 2 minutes across the peak period. The majority of the delay increase occurs in the final section between Cassington Road and Wolvercote Roundabout).

Table 7 - Eastbound PM Peak A40 average general traffic journey times

A40 EB Section	15:00-16:00				16:00-17:00				17:00-18:00			
			With Development				With Development				With Development	
	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)
0-0	-	2:27	2:29	2:29	-	2:28	2:31	2:31	-	2:28	2:32	2:33
0-1	-	0:28	0:29	0:29	-	0:28	0:29	0:29	-	0:33	0:49	0:59
0-2	-	0:34	0:33	0:33	-	0:36	0:34	0:34	-	0:56	1:12	1:20
1	0:36	0:35	0:35	0:35	0:36	0:37	0:36	0:37	0:38	0:45	0:57	1:01
2	1:29	1:41	1:47	1:48	1:26	1:45	2:08	2:11	1:46	2:17	3:05	3:16
3	1:32	1:45	1:47	1:51	1:29	1:49	1:52	1:59	1:30	1:51	1:51	1:58
4	0:17	0:14	0:15	0:15	0:17	0:15	0:15	0:16	0:19	0:15	0:15	0:16
5	6:39	6:29	6:44	6:46	6:23	6:27	6:47	6:54	5:58	6:27	6:39	6:45
1-5 Total	10:36	10:44	11:08	11:15	10:13	10:53	11:38	11:57	10:13	11:35	12:47	13:16
0-5 Total	-	14:17	14:41	14:49	-	14:30	15:16	15:35	-	15:36	17:24	18:12

In the westbound direction (between Wolvercote Roundabout to Cuckoo Lane) during the PM peak, the increase in delay for the development with 4ha employment build-out leads to increase of 1 ½ minutes at the beginning of the peak period to an increase of up to 2 ½ minutes in the peak hour, and a negligible difference in the final hour of the peak period.

The addition of the development traffic with full 8ha employment build-out to the future year (2031) in the westbound (between Wolvercote Roundabout to Cuckoo Lane) direction during the PM peak results in an increase of 2 ½ minutes at the beginning of the peak period to an increase of up to 5 minutes in the peak hour, and 1 minute in the final hour of the peak period. The increase in journey times occurs almost entirely on the section between Wolvercote Roundabout and the Cassington Road junction. Blocking back from the Lower Road roundabout in the westbound direction does impede on the ability of traffic to pass through the Cassington Road signals.

Table 8 - Westbound PM Peak A40 average general traffic journey times

A40 WB Section	15:00-16:00				16:00-17:00				17:00-18:00			
			With Development				With Development				With Development	
	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)	Base (2018)	Future Base (2031)	4ha (2031)	8ha (2031)
6	7:36	7:29	9:08	9:22	13:41	6:35	8:26	9:57	16:25	6:43	6:52	6:55
7	0:16	0:09	0:10	0:10	0:27	0:09	0:10	0:11	0:30	0:09	0:09	0:09
8	5:29	2:39	2:50	3:17	8:22	2:42	3:24	4:14	8:50	2:04	2:14	2:33
9	3:03	3:30	3:27	3:32	3:40	2:50	2:46	2:43	3:39	2:09	2:11	2:20
10	0:24	0:29	0:30	0:29	0:23	0:29	0:29	0:29	0:23	0:29	0:29	0:29
11-1	-	0:23	0:24	0:24	-	0:23	0:24	0:24	-	0:23	0:24	0:24
11-2	-	0:34	0:33	0:33	-	0:36	0:34	0:34	-	0:56	1:12	1:20
11-3	-	2:42	2:44	2:45	-	2:40	2:42	2:44	-	2:41	2:43	2:44
6-10 Total	16:50	14:16	16:05	16:50	26:35	12:45	15:15	17:34	29:48	11:34	11:55	12:26
6-11 Total	-	17:59	19:50	20:36	-	16:27	18:59	21:19	-	15:38	16:18	16:57

4.2 A40 vehicle flows

Table 9 below shows the A40 flows at the key junctions along the corridor in the AM peak hour. In general, with increased development traffic there is an increase in actual flow along the A40. The notable exception to this is the AM eastbound development with 8ha employment scenario where there is slight drop in traffic volume (compared against the development with 4ha employment build-out) owing to greater congestion on the network and a lower volume of traffic passing through the network in the peak hour.

Table 9 – AM peak hour vehicle flows (2031)

Eastbound	Future Base	4ha	8ha	Westbound	Future Base	4ha	8ha
Garden Village Roundabout	1,137	1,292	1,310	Eynsham Road	568	661	738
Cuckoo Lane	1,160	1,202	1,137	Cassington Road	771	890	971
Witney Road	1,126	1,190	1,146	Lower Road	752	884	948
Lower Road	1,004	1,009	979	Witney Road	780	1,020	1,082
Cassington Road	1,075	1,165	1,154	Cuckoo Lane	867	1,186	1,270
Eynsham Road	866	937	941	Garden Village Roundabout	839	1,107	1,146

Table 10 shows the A40 traffic flows at key junctions across the corridor in the PM peak hour. All counts show increasing traffic flow with both development scenarios.

Table 10 – PM peak hour vehicle flows (2031)

Eastbound	Future Base	4ha	8ha	Westbound	Future Base	4ha	8ha
Garden Village Roundabout	1,095	1,371	1,392	Eynsham Road	802	941	963
Cuckoo Lane	1,304	1,214	1,225	Cassington Road	987	1,156	1,173
Witney Road	1,342	1,246	1,246	Lower Road	1,032	1,220	1,224
Lower Road	1,212	1,143	1,146	Witney Road	983	1,087	1,099
Cassington Road	975	1,094	1,153	Cuckoo Lane	1,050	1,156	1,168
Eynsham Road	690	806	850	Garden Village Roundabout	1,007	1,212	1,211

4.3 A40 and Vehicle speeds comparison

Tables 11 and **12** below show the average vehicle speeds in the EB and WB directions on the A40 between Hill Farm and Wolvercote Roundabout for the AM and PM peaks, respectively. The addition of the development traffic with the 8ha employment in the AM peak results in a reduction in the average speed along the A40 corridor in the eastbound and westbound directions of 4.6mph and 3.1mph, respectively. The corresponding decrease in travel speed for the PM peak is 2.6mph and 3.8mph.

Table 11 – AM Weighted peak period travel speed comparison (mph) (2031)

Direction	Future Base	4ha	8ha
EB	22.5	19.7	17.9
WB	31.5	29.9	28.4

Table 12 – PM Weighted peak period travel speed comparison (mph) (2031)

Direction	Future Base	4ha	8ha
EB	28.2	26.3	25.6
WB	26.6	24.2	22.8

5. Future Year (2031) With Development Modelling Analysis

5.1 Introduction

This section details the findings of the Future Year (2031) with development modelling. The analysis focuses on traffic congestion hot spots along the A40 corridor, the Swinford Toll Bridge and on the A4095 in the AM and PM peak periods.

5.2 2031 AM With Development Results

A40 corridor

The junctions along the A40 corridor are, on an individual level, able to accommodate the additional traffic demand in the AM peak period. In the eastbound direction, Wolvercote Roundabout is the key source of delay as vehicles queue at the traffic signals, for a very brief period at the end of the peak hour this results in queuing in the eastbound direction as far as the Cassington Road signals. The queue length then reduces throughout the post peak period.

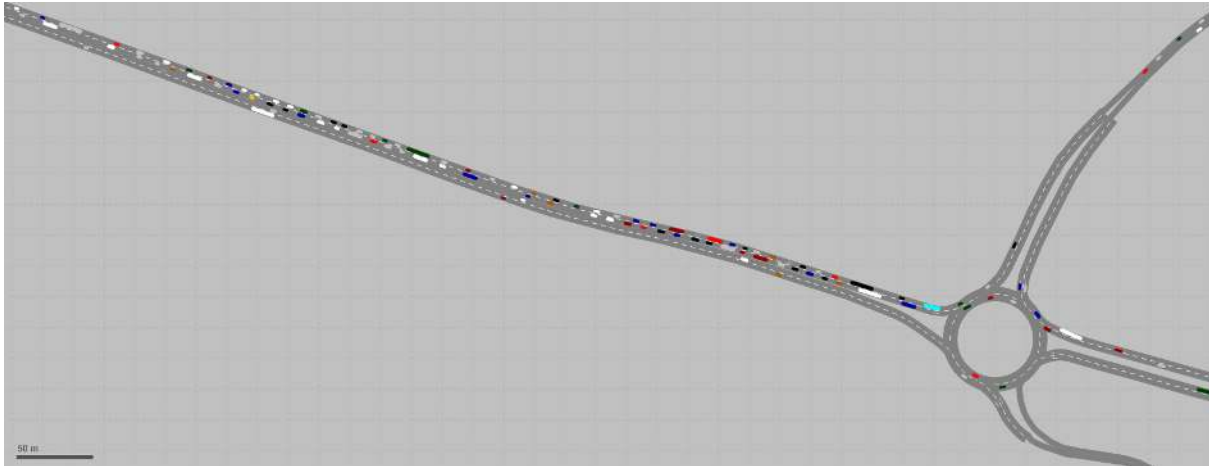
Additionally, on the odd occasion queuing for the Cassington Road signals during the peak period reaches as far back as the Lower Road roundabout as shown in **Figure 4**.

Figure 4- AM peak period blocking back on the A40 through the Lower Road roundabout in the eastbound direction



During the peak period a queue starts to form on the eastbound approach to the Garden Village and West Eynsham access roundabout. This queue is longest towards the end of the peak hour as shown in **Figure 5**. The queue then clears in the post peak period.

Figure 5- AM peak queue to Garden Village and West Eynsham SDA Roundabout (peak hour)



5.3 2031 PM

A40 corridor

In the PM peak the highest levels of congestion occur in the westbound direction on the A40. The high volume of traffic results in queuing in the peak hour extending from the Lower Road roundabout, which, for a brief period extends back through the Cassington Road junction. It should be noted this queue length is a rare occurrence and for the most part the queue does not extend as far as the Cassington signals.

On occasion, a queue forms on the approach to the Witney Road signals and blocks back to the Lower Road roundabout, again caused by a high volume of traffic trying to pass through. It should be noted this queue length is a rare occurrence and for the most part the queue does not extend as far as the Lower Road roundabout. The remainder of the westbound direction is operating without major delay.

Figures 6 and 7 illustrate the queuing issues.

Figure 6– Blocking back through Cassington Road signals in the westbound direction

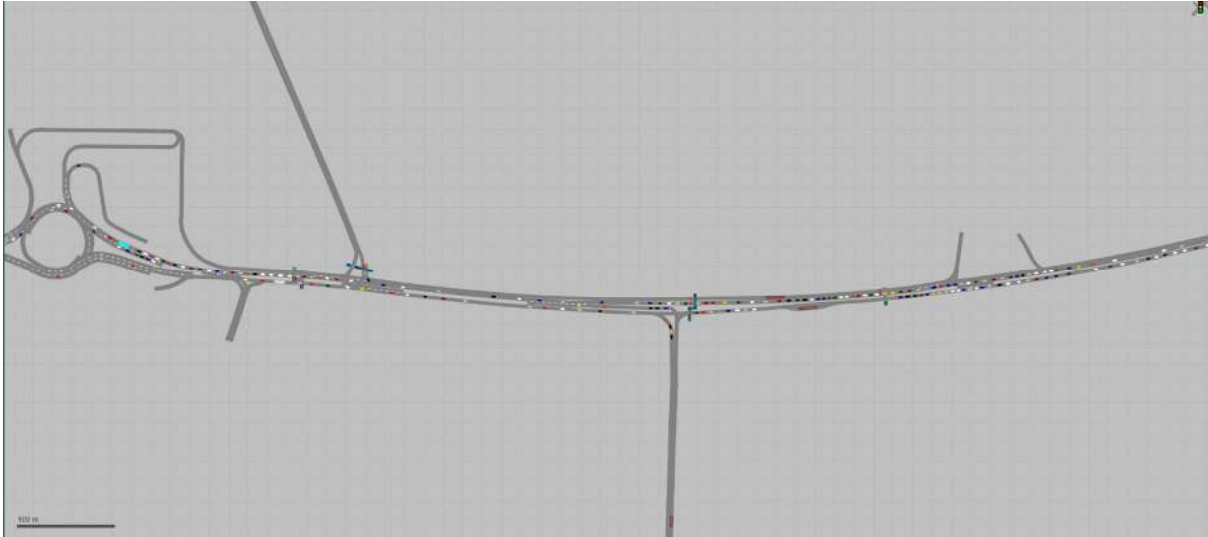


Figure 7 – PM peak queues on both A40 east and west approaches to the Lower Road roundabout



The eastbound approach to the Lower Road roundabout suffers from congestion towards the end of the modelling period in the PM peak due to the high volume of traffic trying to pass through. The eastbound queues build throughout the post peak hour extending through the proposed park and ride roundabout, as shown in **Figure 8**.

Figure 8 – PM peak queue on A40 eastbound



6. Summary and Conclusions

The 'Future Year 2031' Eynsham VISSIM models have been developed using the previously calibrated and validated Base 2018 models. The AECOM design proposals for the A40 and the Eynsham Park & Ride roundabout have been coded into the VISSIM model. The vehicle input flows for the Base (2018) VISSIM models have been adjusted in the Future Year (2031) model based on the proportional difference between the SATURN models (OSM) for 2018 and 2031. This uplift in traffic volume has generally resulted in increased average journey times on the A40 in both the east and westbound direction during the peak periods.

The 'Future Base 2031' model run shows results for a scenario under which development flows from the 'Future Year 2031 with development' VISSIM model are removed. This has assumed two development scenarios – one that includes full 8ha employment and one that includes 4ha employment build out. Both the scenarios include the combined Garden Village and West Eynsham SDA development traffic. A comparison between the results of the 'Future Base 2031' and 'Future Year 2031 with development' models has been undertaken.

Comparing the 'Future Base 2031' (without development) scenario with the Future Year 2031 with 8ha employment flows scenario across the entire modelled section of the A40 between Wolvercote and Hill Farm (approx. 6.9 miles) shows:

- AM peak journey times along the A40 in the eastbound direction increase by approximately 4 ½ minutes (corresponding to a speed reduction of 4.6mph)
- AM peak journey times along the A40 in the westbound direction increase by approximately 1 ½ minute (corresponding to a speed reduction of 2.9mph)
- PM peak journey times along the A40 in the eastbound direction increase by approximately 1 ½ minutes (corresponding to a speed reduction of 2.6mph)
- PM peak journey times along the A40 in the westbound direction increase by approximately 3 minutes (corresponding to a speed reduction of 3.8mph)

Comparing the Future Base '2031' scenario with the Future year 2031 with 4ha employment flows scenario across the entire modelled section of the A40 between Wolvercote and Hill Farm (approx. 11 miles) shows:

- AM peak journey times along the A40 in the eastbound direction increase by approximately 2 ½ minutes (corresponding to a speed reduction of 2.8mph)
- AM peak journey times along the A40 in the westbound direction increase by approximately ½ minute (corresponding to a speed reduction of 1.7mph)
- PM peak journey times along the A40 in the eastbound direction increase by approximately 1 minute (corresponding to a speed reduction of 1.9mph)
- PM peak journey times along the A40 in the westbound direction increase by approximately 1 ½ minutes (corresponding to a speed reduction of 2.4mph)

The key congestion hot spots and causes of delay in the future year 2031 with development scenario are summarised below:

- The additional delay in the AM peak in the eastbound direction is generally caused by additional congestion towards Wolvercote Roundabout and to a lesser extent between Witney Road through to Cassington Road signals. The eastbound approach to the Garden Village roundabout also suffers from additional congestion during the peak hour.

- The delay in the westbound direction in the PM peak is caused by an increase in traffic demand causing increased congestion at the Lower Road roundabout and Cassington Road signals.

Comparing the the 'Base 2018' scenario with the 'Future Year 2031 with 8ha employment flows' scenario across the entire modelled section of the A40 between Wolvercote and Cuckoo Lane (approx. 4.6 miles) shows:

- AM peak journey times along the A40 in the eastbound direction increase by approximately 2 minutes (corresponding to a speed reduction of 1.6mph)
- AM peak journey times along the A40 in the westbound direction increase by approximately 3 minutes (corresponding to a speed reduction of 7.2mph)
- PM peak journey times along the A40 in the eastbound direction increase by approximately 2 minutes (corresponding to a speed reduction of 4.0mph)
- PM peak journey times along the A40 in the westbound direction decrease by approximately 9 minutes (corresponding to a speed increase of 6.4mph)

Comparing the the 'Base 2018' (without development) scenario with the 'Future Year 2031 with 4ha employment flows' scenario across the entire modelled section of the A40 between Wolvercote and Cuckoo Lane (approx. 7.5 miles) shows:

- AM peak journey times along the A40 in the eastbound direction increase by approximately ½ minute (corresponding to a speed reduction of 0.35mph)
- AM peak journey times along the A40 in the westbound direction increase by approximately 2 minutes (corresponding to a speed reduction of 5.6mph)
- PM peak journey times along the A40 in the eastbound direction increase by approximately 1 ½ minutes (corresponding to a speed reduction of 3.4mph)
- PM peak journey times along the A40 in the westbound direction decrease by approximately 10 minutes (corresponding to a speed increase of 7.9mph)

The key differences in journey times between the Base 2018 and 'Future Year 2031 with development' scenarios are summarised below:

- Wolvercote traffic signals remain a capacity constraint and with increased traffic demand in the 2031 with development scenarios, queuing for the traffic signals increases and thus journey times also increase. It should be noted that the increase in journey time in the eastbound direction occurs almost entirely on the Eynsham Road to Wolvercote Roundabout section.
- The A40 proposals include a significantly lengthened flare on the eastern approach to the Lower Road roundabout which is leading to a significant improvement in capacity for the PM peak westbound traffic passing through it. This is resulting in reduced queuing and significantly reduced blocking back through Cassington signals. As a result the journey times between Wolvercote and Lower Road improve drastically.



Appendix A

Traffic Generation Technical Note

Technical note:

Oxfordshire Cotswolds Garden Village & West Eynsham SPD Traffic Generation Approach

1. Introduction

The purpose of this Technical Note is to set out an approach for identifying traffic generation for the Oxfordshire Cotswolds Garden Village Strategic Location for Growth (OCGV) and the West Eynsham Strategic Development Area (SDA).

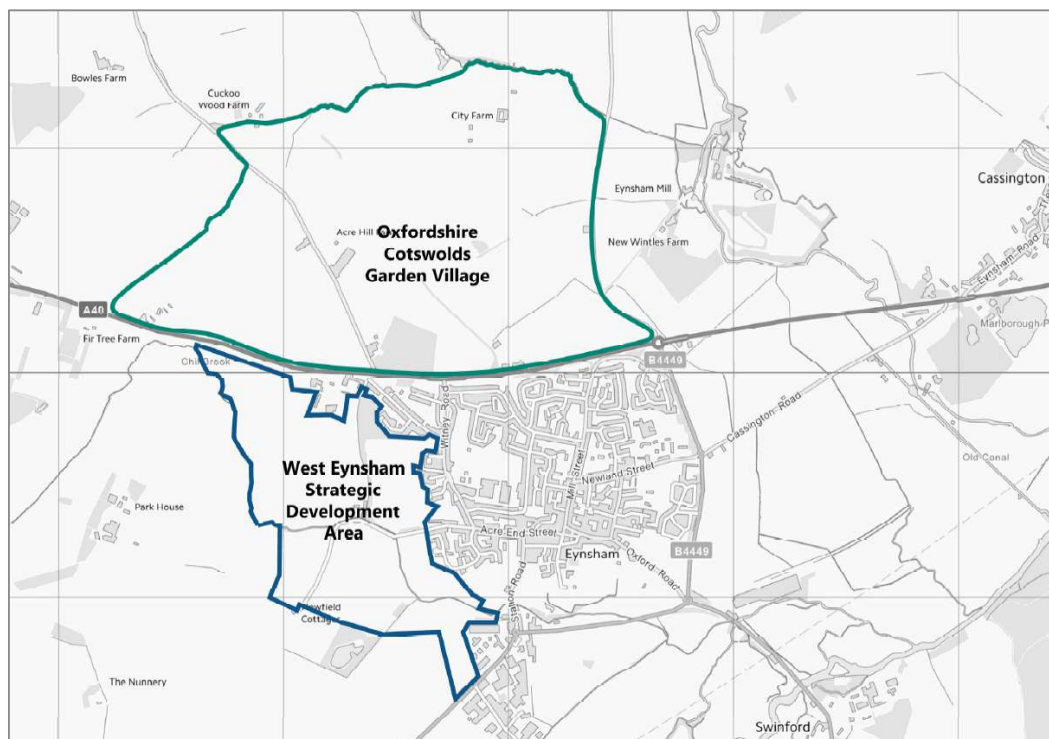
1.1 Background

OCGV is located in Eynsham Parish in West Oxfordshire and is identified as an Allocated Site within the West Oxfordshire Local Plan 2031, which was formally adopted in September 2018. The development of an Area Action Plan (AAP) for the Garden Village by West Oxfordshire District Council (WODC) will provide a planning framework to guide the development proposal and its delivery.

The Transport Strategy for OCGV has taken into consideration the West Eynsham Strategic Development Area (SDA) which is located to the south and will be developed within similar timescales. The combined sites will provide around 3,200 new homes, a Science Park generating a significant number of new jobs, primary and secondary education provision and additional service facilities.

The location of the site allocations is shown in **Figure 1.1**.

Figure 1.1 Oxfordshire Cotswolds Garden Village SLG and West Eynsham SDA



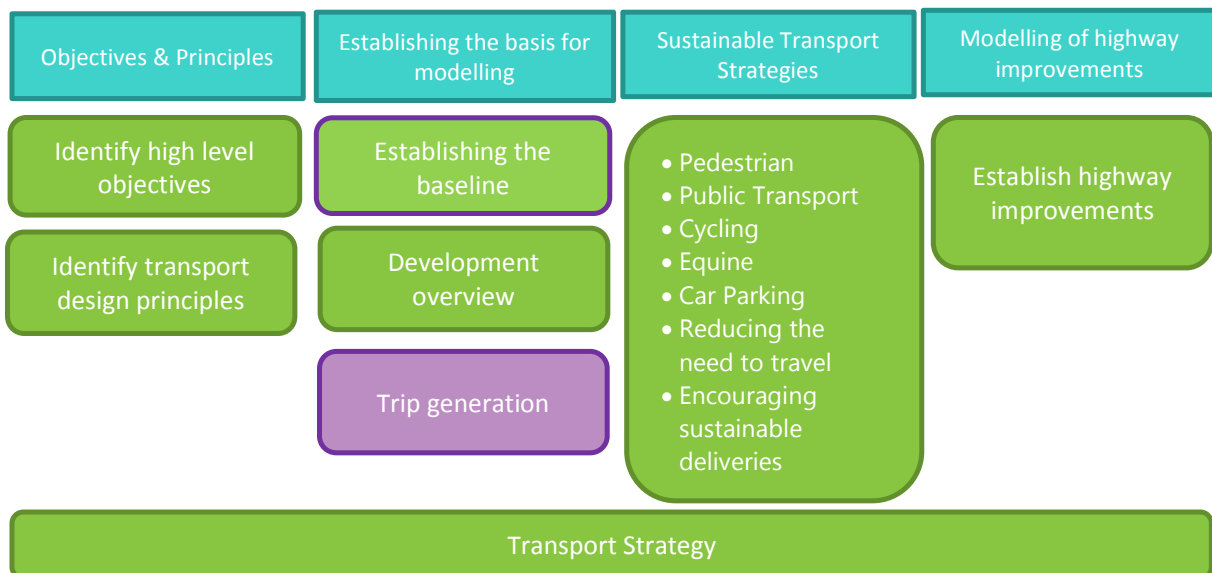
In total, the site allocations have the potential to provide around 3,200 new homes, a 40ha Science Park generating a significant number of new jobs, additional primary and secondary education provision and additional service facilities. The sites will benefit from a new Park and Ride of up to 1,000 spaces which will be located to the west of the A40/Cuckoo Lane junction and which will be funded largely through the 'Local Growth Fund' administered by Central Government. Collectively this will create the opportunity for integrated housing, employment and transport hubs, with the Garden Village providing a new rural service centre.

The development of an AAP for the Garden Village and an SPD for the West Eynsham SDA by West Oxfordshire District Council (WODC) will provide planning frameworks for the sites to guide development proposals and delivery, and to ensure integration with each other and other initiatives in the area.

A transport evidence base is being produced to identify the transport infrastructure required to support the delivery of the two Eynsham development sites which will need to:

- Consider connectivity opportunities and assess the cumulative impact of the Eynsham and wider Local Plan development; and
- Take account of and build on the A40 Science Transit improvements.

In accordance with the brief, the study comprises a number of stages, as illustrated below. This document reports on 'Trip generation'.



1.2 Purpose of Technical Note

There are several bespoke methodologies for establishing traffic generated by large, mixed use sites. This technical note sets out the methodology for deriving the person trip and traffic generation for use in the modelling of the impact of the developments on the surrounding road network.

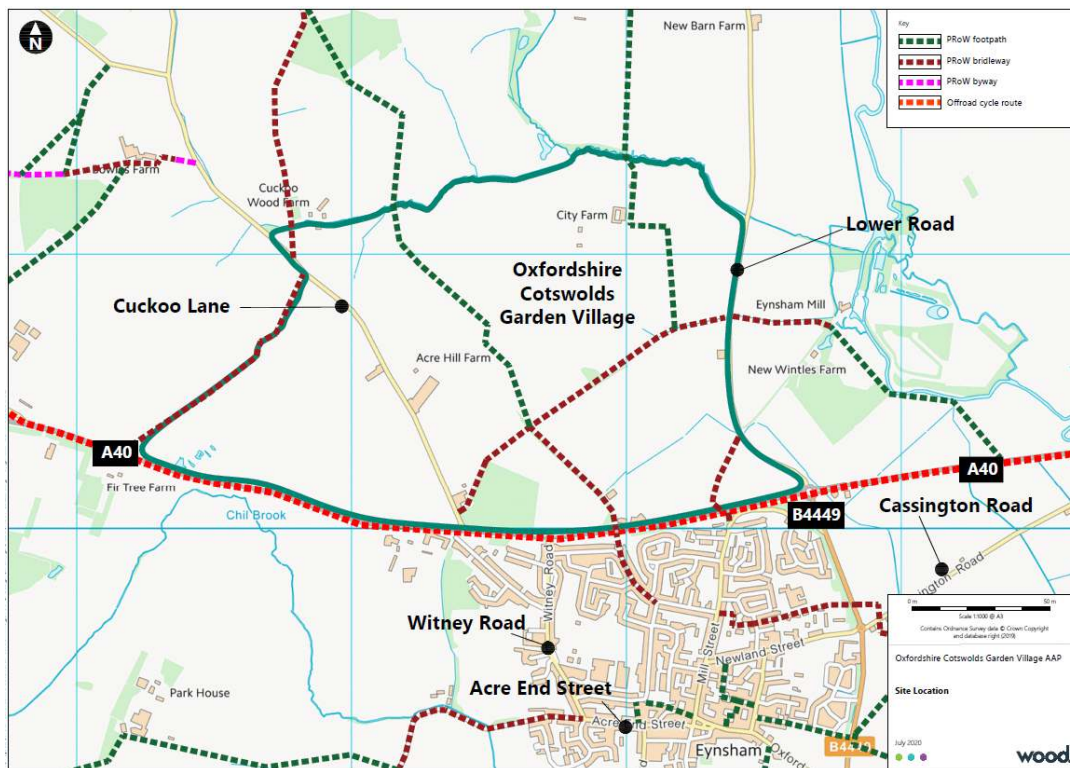
2. Development Descriptions

2.1 Oxfordshire Cotswolds Garden Village Site

Figure 2.1 shows the local road network in the vicinity of the site. The Garden Village is located immediately north of the A40 near Eynsham. Nearby settlements include Cassington, Church Hanborough, Long Hanborough, Freeland and North Leigh. In terms of roads surrounding the site:

- the southern boundary comprises the A40 from a point west of the layby on the northern side of the A40 (west of Cuckoo Lane) to the Lower Road roundabout;
- the eastern boundary comprises Lower Road (also the edge of the Oxford Green Belt);
- the northern boundary generally follows a watercourse to the north of City Farm; and
- the western boundary comprises a public right of way (PROW) between the A40 and Cuckoo Lane in addition to a section of Cuckoo Lane itself.

Figure 2.1 Oxfordshire Cotswolds Garden Village SLG Location



OCGV will comprise a comprehensive, mixed use development with a 'working assumption' in the Local Plan that the site will deliver the following.

- around 2,200 dwellings by 2031 (Local Plan Policy EW1).
- new business space (a new campus-style science park of around 40 hectares; Local Plan policy E1). For the purpose of assessment, 40,000 sqm and 80,000 sqm of business space has been assumed.

- education provision (primary and secondary).
- community facilities including open space and leisure.

The proposed Park & Ride facility west of Cuckoo Lane will provide the focus for a Sustainable Transport Hub, well located to serve the Garden Village and West Eynsham SDA.

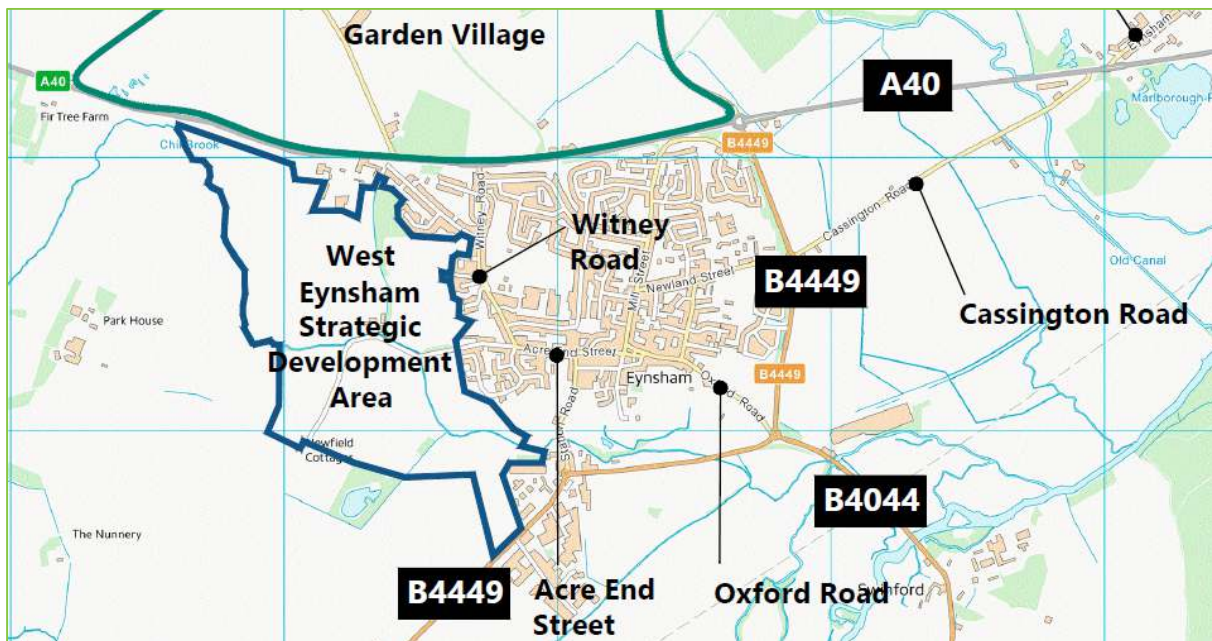
The preferred location emerging in the AAP for the new primary school and secondary school is to the east of Cuckoo Lane (north of the A40). The secondary facilities will mean that there will be a split school site: Years 7 and 8 or 6th form will be provided at OCGV whilst other year groups will be served by the existing secondary school site in Eynsham. A key pedestrian/cycle desire line will therefore exist for staff and pupils between the schools.

The provision of this mix of different uses will help to promote a strong degree of 'self-containment' ensuring that residents of the new Garden Village are less dependent on travelling to other locations to fulfil their needs.

2.2 West Eynsham SDA Site

The West Eynsham SDA site has a total site area of around 88 hectares (217 acres). **Figure 2.2** shows the roads surrounding the site.

Figure 2.2 West Eynsham SDA Location



The site is intended to accommodate a new sustainable and integrated community that will coalesce with Eynsham. The allocation envisages the provision of around 1,000 homes together with supporting infrastructure including a new primary school and a new western spine road which will connect the A40 with the B4449, providing additional route choice for traffic that might otherwise route through Eynsham. The new spine road would provide the main point of vehicular access into the SDA, acting as a primary route from which a series of secondary routes would allow vehicular access to the wider site, thus minimising the potential impact of the development on the existing road network in Eynsham.

It is anticipated that at the northern end of the spine road, connection to the A40 is likely to be provided through a new roundabout which could also potentially enable access into the Garden Village. Further assessment will be undertaken to determine the most appropriate alignment for the road, its size, type and specification, appropriate traffic speeds and how these factors will help to integrate it within the new residential environment.

At the southern end of the spine road, further work is needed to determine the most appropriate arrangements for connecting onto the B4449 Stanton Harcourt Road, which will need to consider the proximity of an adjoining scheduled monument. Land has however been identified as part of the permitted expansion of Polar Technology to potentially allow a connection to be made.

In August 2015, planning permission was granted for residential development of up to 160 dwellings on land west of Thornbury Road Eynsham (application ref. 15/03148/OUT). The site (some 6.94 hectares) is situated adjacent the western edge of the existing settlement, within the eastern boundary of the SDA. In addition, in June 2016 full planning permission (application ref. 15/00761/FUL) was granted on appeal for 77 dwellings on land at Eynsham Nursery and Garden Centre (WODC reference 15/00761/FUL; Appeal). The site (some 2.6 hectares) is situated immediately to the south of the A40, within the northern boundary of the SDA. For the purpose of the traffic generation estimations, as these sites have not yet been constructed, the full site allocation will be modelled.

3. Methodology

3.1 Residential Trips

The approach to identifying the residential traffic generation has been based on:

- person trip rates derived from the TRICS database;
- identification of person trip generation by journey purpose based on the DfT National Travel Survey data;
- identification of 'internalisation' of trips, i.e. those contained within the site e.g. trips between home and the local shop, employment and/or school, and using the internal road network;
- identification of modal splits by journey purpose based on the 2011 Census data; and
- identification of external trips by journey purpose and modal share.

Person trip rates

Person trip rates from the TRICS database have been based on 'Mixed Private/Affordable Housing' - housing developments where less than 75% of units are privately owned, and less than 75% of units are non-privately owned. "Non-privately owned" may be council rented or housing association rented/part-owned.

The following survey parameters have been excluded:

- all surveys conducted in Greater London, Scotland, Wales and Northern Ireland;
- town centre and edge of town centre surveys; and
- weekend surveys.

Table 3.1 sets out the person trip rates for mixed private/affordable housing.

Table 3.1 Residential Person Trip Rates

Time	Person trip rates per dwelling		
	Arrivals	Departures	Two-Way
0700-0800	0.113	0.488	0.601
0800-0900	0.183	0.776	0.959
0900-1000	0.213	0.283	0.496
Total	0.509	1.547	2.056
1600-1700	0.47	0.277	0.747
1700-1800	0.545	0.27	0.815
1800-1900	0.457	0.255	0.712
Total	1.472	0.802	2.274

Table 3.2 sets out the person trips rates for the Garden Village and for the West Eynsham SDA.

Table 3.2 Residential Person Trip Generation

Time	Garden Village – 2,200 dwellings			West Eynsham SDA – 1,000 dwellings		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
0700-0800	249	1074	1,322	113	488	601
0800-0900	403	1707	2,110	183	776	959
0900-1000	469	623	1,091	213	283	496
Total	1120	3403	4,523	509	1547	2,056
1600-1700	1034	609	1,643	470	277	747
1700-1800	1199	594	1,793	545	270	815
1800-1900	1005	561	1,566	457	255	712
Total	3238	1764	5,003	1472	802	2,274

Journey Purpose

Residential traffic generation is directly associated with trip purpose and where mixed-use developments offer services and facilities that meet with local demand, the proportion of new trips onto the external highway network are reduced. Given that the Garden Village is a mixed-use development providing employment, primary education, secondary education, retail and health, it is reasonable to consider containment of trips, i.e. trips between land uses which will be internal to the site. Similarly, with the West Eynsham SDA, this will provide education and is in close proximity to secondary education, retail and health and it is assumed that there would be containment of trips within Eynsham.

To identify the potential level of containment of trips, reference has been made to journey purpose by time of day data from the Department for Transport's (DfT) Table NTS0502 in the National Travel Survey (NTS)¹ (included in **Appendix A**). **Table 3.3** sets out the journey purpose proportions and resultant person trips.

Table 3.3 Trip start time by trip purpose (Mon- Fri)

Hour beginning	Commuting/ Business	Education/ Escort Education	Shopping	Other work, escort and personal	Leisure
07:00	55.5%	18.7%	3.1%	14.0%	8.8%
08:00	24.2%	51.2%	4.0%	14.0%	6.7%
09:00	16.4%	10.9%	22.0%	26.0%	24.6%
16:00	25.8%	10.9%	15.2%	21.0%	26.7%
17:00	37.0%	5.0%	12.1%	20.0%	26.2%
18:00	24.7%	2.0%	14.5%	18.0%	40.8%

Source: Table NTS0502-2017

The journey purpose figures can be further broken down for a number of the categories, as follows.

Education / Escort Education

Based on Table 1.c of the 2019 National Statistics (<https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2019>) which shows headcount of pupils by type of school by local authority area and region in England², the proportion of the different tiers of education in the Oxfordshire area has been identified, as shown below:

- State-funded Nursery and Primary education 48.7% of trips;
- State-funded Secondary education 35.0% of trips;
- Special needs education 1.1% of trips; and
- Private education 15.2% of trips.

Based on Table 3 of the 2019 National Statistics, 12.4% of state funded secondary education pupils are aged 16 to 19+, which is the age category for the Sixth Form college.

- State-funded Secondary education – ages 11 - 16 30.6% of trips
- State-funded Secondary education – Sixth Form 4.4% of trips

Shopping

Table NTSA19001³ of the NTS breaks down shopping into two categories and shows the proportion of trips for each based on location. In rural areas, the breakdown is as follows:

- Food shopping – 45%;
- Non-food shopping – 55%.

¹ <https://www.gov.uk/government/statistical-data-sets/nts04-purpose-of-trips>

² <https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2019>

³ <https://www.gov.uk/government/statistical-data-sets/ad-hoc-national-travel-survey-analysis>

Leisure

The NTS 2014 Factsheet on Leisure⁴ divides leisure trips into four journey purposes:

- Visiting friends/family, which accounts for around 50% of trips;
- Sport/Entertainment, which accounts for around 23% of trips;
- Holiday/Days out, which accounts for around 13% of trips; and
- Other inc. walking, cycling etc, which accounts for around 14% of trips.

Table 3.4 provides a summary of the percentage breakdown of trips in the AM and PM peak periods by journey purpose.

Table 3.4 Trip start time by journey purpose (Mon- Fri) - Percentage

Hour beginning		07:00	08:00	09:00	16:00	17:00	18:00
Commuting/ Business	All	55.5%	24.2%	16.4%	25.8%	37.0%	24.70%
Education/ Escort Education	All	18.7%	51.2%	10.9%	10.9%	5.0%	2.0%
	Nursery/Primary	9.1%	24.9%	5.3%	5.3%	2.4%	1.0%
	Secondary	5.7%	15.7%	3.3%	3.3%	1.5%	0.6%
	Sixth Form	0.8%	2.2%	0.5%	0.5%	0.1%	0.0%
	Special Needs	0.2%	0.6%	0.1%	0.1%	0.1%	0.0%
	Independent	2.9%	7.8%	1.7%	1.7%	0.8%	0.3%
Shopping	All	3.1%	4.0%	22.0%	15.2%	12.1%	14.5%
	Food	1.4%	1.8%	9.9%	6.8%	5.5%	6.5%
	Non-Food	1.7%	2.2%	12.1%	8.4%	6.7%	7.9%
Other Escort/ Personal Business	All	14.0%	14.0%	26.0%	21.0%	20.0%	18.0%
Leisure	All	8.8%	6.7%	24.6%	26.7%	26.2%	40.8%
	Visits	4.4%	3.4%	12.3%	13.3%	13.1%	20.4%
	Sport/ Entertainment	2.0%	1.6%	5.6%	6.1%	6.0%	9.4%
	Holidays/days out	1.1%	0.9%	3.2%	3.5%	3.4%	5.3%
	Other	1.2%	0.9%	3.4%	3.7%	3.7%	5.7%

Table 3.5 provides a summary of the person trips as arrivals and departures in the AM and PM peak periods by journey purpose for the Garden Village (2,200 dwellings) and Table 3.5 provides a summary of the person trips for the West Eynsham SDA (1,000 dwellings).

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/458434/why-people-travel-leisure.pdf

Table 3.5 Person trips by journey purpose (Mon- Fri) – Garden Village

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		249	1074	403	1707	469	623	1034	609	1199	594	1005	561
Commuting/ Business		138	596	97	413	77	102	267	158	443	219	248	138
Education/ Escort Education	All	47	201	206	874	51	68	113	66	60	30	20	11
	Nursery/Primary	23	98	100	426	25	33	55	32	29	14	10	5
	Secondary	14	62	63	267	16	21	34	20	18	9	6	3
	Sixth Form	2	9	9	38	2	3	5	3	3	1	1	0
	Special Needs	1	2	2	10	1	1	1	1	1	0	0	0
	Independent	7	31	31	133	8	10	17	10	9	5	3	2
Shopping	All	8	34	16	68	103	137	157	93	145	72	145	81
	Food	4	15	7	30	46	62	71	42	65	32	65	36
	Non-Food	4	19	9	37	57	75	86	51	80	40	80	45
Other Escort/ Personal Business		35	150	56	239	122	162	217	128	240	119	181	101
Leisure	All	22	94	27	115	115	153	276	162	314	155	410	229
	Visits	11	47	14	58	58	76	138	81	157	78	205	114
	Sport/ Entertainment	5	22	6	26	26	35	63	37	72	36	94	53
	Holidays/days out	3	12	4	15	15	20	36	21	41	20	53	30
	Other	3	13	4	16	16	21	39	23	44	22	57	32

Table 3.6 Person trips by journey purpose (Mon- Fri) – West Eynsham SDA

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		113	488	183	776	213	283	470	277	545	270	457	255
Commuting/ Business		63	271	44	188	35	46	121	72	201	100	113	63
Education/ Escort Education	All	21	91	94	397	23	31	51	30	27	14	9	5
	Nursery/Primary	10	45	46	194	11	15	25	15	13	7	4	2
	Secondary	6	28	29	122	7	9	16	9	8	4	3	2
	Sixth Form	1	4	4	17	1	1	2	1	1	1	0	0
	Special Needs	0	1	1	5	0	0	1	0	0	0	0	0
	Independent	3	14	14	61	4	5	8	5	4	2	1	1
Shopping	All	4	15	7	31	47	62	71	42	66	33	66	37
	Food	2	7	3	14	21	28	32	19	30	15	30	17
	Non-Food	2	8	4	17	26	34	39	23	36	18	36	20
Other Escort/ Personal Business		16	68	26	109	55	74	99	58	109	54	82	46
Leisure	All	10	43	12	52	52	70	125	74	143	71	186	104
	Visits	5	21	6	26	26	35	63	37	71	35	93	52
	Sport/ Entertainment	2	10	3	12	12	16	29	17	33	16	43	24
	Holidays/days out	1	6	2	7	7	9	16	10	19	9	24	14
	Other	113	488	183	776	213	283	470	277	545	270	457	255

Internalisation of Trips

Given that the mixed-use development provides employment, primary education, retail and community uses, it is reasonable to consider containment of trips, i.e. journeys with both origin and destination within the development. Reasonable assumptions on the proportion of types of trips internal to the site are as follows:

- **Commuting/business:** the proposals include B1 employment, size and location yet to be determined, however, it is likely that there will be a small proportion of residential person trips to the employment areas and therefore internal to the site.
- **Education/escort education:** the proposed provision of primary schools will be sufficient for the potential yield of primary school and sixth form pupils from the Garden Village households and it is assumed that most of the residential person trips to primary schools would be internal, with some allowance for parental choice.
- **Shopping:** the neighbourhood centre will include local shops, size to be determined, but it is likely that a proportion of residential person trips for the purpose of food (convenience) shopping will remain within the site.
- **Other escort/personal business:** allowance has been made for a proportion of these residential person trips to remain within the site.
- **Leisure/other:** the neighbourhood centre/area is proposed to include a pub, café, GP, sports pitches and community facilities and therefore allowance has been made for a proportion of leisure related residential person trips to remain within the site.

Table 3.7 sets out the percentage assumptions of the internalisation of person trips by journey purpose for the Garden Village and **Table 3.8** sets out the percentage assumptions for the west Eynsham SDA.

Table 3.7 Internal person trips by journey purpose (Mon- Fri) – Percentage – Garden Village

Hour beginning		07:00	08:00	09:00	16:00	17:00	18:00
Commuting/ Business		5%	5%	5%	5%	5%	5%
Nursery/Primary		95%	95%	95%	95%	95%	95%
Sixth Form		95%	95%	95%	95%	95%	95%
Food		10%	10%	10%	10%	10%	10%
Other Escort/ Personal Business		15%	15%	15%	15%	15%	15%
Leisure	Visits	10%	10%	10%	10%	10%	10%
	Sport/ Entertainment	10%	10%	10%	10%	10%	10%
	Other	50%	50%	50%	50%	50%	50%

Table 3.8 Internal person trips by journey purpose (Mon- Fri) – Percentage – West Eynsham SDA

Hour beginning		07:00	08:00	09:00	16:00	17:00	18:00
Commuting/ Business		5%	5%	5%	5%	5%	5%
Nursery/Primary		95%	95%	95%	95%	95%	95%
Secondary School		95%	95%	95%	95%	95%	95%
Food		10%	10%	10%	10%	10%	10%
Other Escort/ Personal Business		15%	15%	15%	15%	15%	15%
Leisure	Visits	10%	10%	10%	10%	10%	10%
	Sport/ Entertainment	10%	10%	10%	10%	10%	10%
	Other	50%	50%	50%	50%	50%	50%

Table 3.9 sets out the internal person trips by journey purpose for the Garden Village and **Table 3.10** sets out the internal person trips for the West Eynsham SDA. The resultant external person trips by journey purpose are set out in **Tables 3.11** and **3.12**.

Table 3.9 Internal person trips by journey purpose (Mon- Fri) – Garden Village

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		249	1074	403	1707	469	623	1034	609	1199	594	1005	561
Commuting/ Business		7	30	5	21	4	5	13	8	22	11	12	7
Nursery/Primary		22	93	95	404	24	31	52	31	28	14	9	5
Sixth Form		2	8	8	36	2	3	5	3	2	1	1	0
Food Shopping		1	2	1	5	7	9	11	6	10	5	10	5
Other Escort/ Personal Business		5	23	8	36	18	24	33	19	36	18	27	15
Leisure	Visits	1	5	1	6	6	8	14	8	16	8	21	11
	Sport/ Entertainment	1	2	1	3	3	4	6	4	7	4	9	5
	Other	2	7	2	8	8	11	19	11	22	11	29	16
Total Internal Trips		39	169	122	518	71	95	153	90	143	71	118	66
Total External Trips		209	904	280	1189	397	528	881	519	1056	523	887	495

Table 3.10 Internal person trips by journey purpose (Mon- Fri) – West Eynsham SDA

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		113	488	183	776	213	283	470	277	545	270	457	255
Commuting/ Business		3	14	2	9	2	2	6	4	10	5	6	3
Nursery/Primary		10	42	43	184	11	14	24	14	13	6	4	2
Secondary School		6	27	27	115	7	9	15	9	8	4	3	1
Food Shopping		0	1	0	2	3	4	5	3	4	2	4	2
Other Escort/ Personal Business		2	10	4	16	8	11	15	9	16	8	12	7
Leisure	Visits	0	2	1	3	3	3	6	4	7	4	9	5
	Sport/ Entertainment	0	1	0	1	1	2	3	2	3	2	4	2
	Other	1	3	1	4	4	5	9	5	10	5	13	7
Total Internal Trips		23	100	79	335	38	51	82	48	72	36	56	31
Total External Trips		90	388	104	441	175	232	388	229	473	234	401	224

Table 3.11 External person trips by journey purpose (Mon- Fri) – Garden Village

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		249	1074	403	1707	469	623	1034	609	1199	594	1005	561
Commuting/ Business		131	566	92	392	73	97	254	150	421	209	236	132
Education/ Escort Education	Nursery/Primary	1	5	5	21	1	2	3	2	1	1	0	0
	Secondary	14	62	63	267	16	21	34	20	18	9	6	3
	Sixth Form	0	0	0	2	0	0	0	0	0	0	0	0
	Special Needs	1	2	2	10	1	1	1	1	1	0	0	0
	Independent	7	31	31	133	8	10	17	10	9	5	3	2
Shopping	Food	3	13	6	26	40	52	60	35	56	28	56	31
	Non-Food	4	19	9	37	57	75	86	51	80	40	80	45
Other Escort/ Personal Business		30	128	48	203	104	138	185	109	204	101	154	86
Visits		10	42	12	52	52	69	124	73	141	70	185	103
Sport/ Entertainment		5	19	6	24	24	32	57	34	65	32	85	47
Holidays/days out		3	12	4	15	15	20	36	21	41	20	53	30
Other		2	7	2	8	8	11	19	11	22	11	29	16
Total External Trips		210	906	281	1191	397	527	877	517	1059	525	887	495

Table 3.12 External person trips by journey purpose (Mon- Fri) – West Eynsham SDA

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total person trips		113	488	183	776	213	283	470	277	545	270	457	255
Commuting/ Business		60	257	42	178	33	44	115	68	191	95	107	60
Education/ Escort Education	Nursery/Primary	1	2	2	10	1	1	1	1	1	0	0	0
	Secondary	0	1	1	6	0	0	1	0	0	0	0	0
	Sixth Form	1	4	4	16	1	1	2	1	1	1	0	0
	Special Needs	0	1	1	5	0	0	1	0	0	0	0	0
	Independent	3	14	14	61	4	5	8	5	4	2	1	1
Shopping	Food	1	6	3	12	18	24	27	16	25	13	25	14
	Non-Food	2	8	4	17	26	34	39	23	36	18	36	20
Other Escort/ Personal Business		13	58	22	92	47	63	84	49	93	46	70	39
Visits		4	19	6	24	24	31	56	33	64	32	84	47
Sport/ Entertainment		2	9	3	11	11	14	26	15	30	15	39	22
Holidays/days out		1	6	2	7	7	9	16	10	19	9	24	14
Other		1	3	1	4	4	5	9	5	10	5	13	7
Total External Trips		90	389	104	441	175	232	386	227	474	235	401	224

Modal Splits

Modal splits will be identified as part of the Travel Plan and Transport Strategy. **Table 3.13** shows the modal splits for the method of travel to work from the 2011 Census for the ward of Eynsham and Cassington and the parish of Eynsham which have been sourced from www.nomis.co.uk.

Table 3.13 2011 Modal Splits

Mode of Transport	Eynsham and Cassington Ward ¹		Eynsham Parish ²	
	Number	%	Number	%
Train	40	1.5%	33	1.5%
Bus, minibus or coach	346	12.8%	313	14.1%
Taxi	7	0.3%	6	0.3%
Motorcycle, scooter or moped	28	1.0%	22	1.0%
Driving a car or van	1757	65.0%	1411	63.6%
Passenger in a car or van	119	4.4%	95	4.3%
Bicycle	185	6.8%	155	7.0%
On foot	207	7.7%	175	7.9%
Other method of travel to work	13	0.5%	8	0.4%

1. Nomis Reference - Ward011qs:E05006639

2. Nomis Reference - parish2011:E04008284

Modal splits by journey purpose have been derived as follows and have been based on the location of the Garden Village and accessibility to journey purpose destinations.

- Commuting/business - reference has been made to the 2011 Census data for residents' journeys to work, as set out in Section 1, and adjustment made to allow for site location and travel options.
- Education - based on NTS data and site location in relation to other primary schools, the secondary schools, etc and travel options to these.
- Shopping - based on NTS data and site location in relation to food shopping and non food shopping and travel options to these.
- Leisure/other - based on site location in relation to leisure, banks, post office, etc and travel options to these and NTS data.

Table 3.14 shows the modal splits by journey purpose for external residential person trips.

Table 3.14 Modal splits by journey purpose – external residential person trips (Mon- Fri)

Total person trips	Walk	Cycle	Car Driver	Car Passenger	Local Bus	Rail
Commuting/ Business		10%	65%	8%	15%	2%
Nursery/Primary		3%	45%	50%	2%	
Secondary		15%	40%	40%	5%	
Sixth Form			60%	30%	10%	
Special Needs			40%	50%	10%	
Independent			40%	50%	10%	
Food			70%	25%	5%	
Non-Food			60%	30%	10%	
Other Escort/ Personal Business		5%	60%	30%	5%	
Leisure/Other		5%	50%	40%	5%	

The resultant traffic generation onto the external road network by the residential element of the Garden Village site is shown in **Table 3.15** and for the West Eynsham SDA in **Table 3.16**.

Table 3.15 External traffic generation by residential element (Mon- Fri) – Garden Village

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total External Person trips		210	906	281	1191	397	527	877	517	1059	525	887	495
Commuting/ Business		85	368	60	255	47	63	165	97	274	136	153	85
Education/ Escort/ Education	Nursery/Primary	1	2	2	10	1	1	1	1	1	0	0	0
	Secondary	6	25	25	107	6	8	14	8	7	4	2	1
		0	0	0	1	0	0	0	0	0	0	0	0
	Special Needs	0	1	1	4	0	0	1	0	0	0	0	0
	Independent	3	12	13	53	3	4	7	4	4	2	1	1
Shopping	Food	2	9	4	18	28	37	42	25	39	19	39	22
	Non-Food	3	11	5	22	34	45	52	31	48	24	48	27
Other Escort/ Personal Business		18	77	29	122	62	83	111	65	122	61	92	51
Leisure	Visits	5	21	6	26	26	34	62	37	71	35	92	51
	Sport/ Entertainment	2	10	3	12	12	16	29	17	32	16	42	24
	Holidays/days out	1	6	2	7	7	10	18	11	20	10	27	15
	Other	1	3	1	4	4	5	10	6	11	5	14	8
Total External Vehicle Trips		126	545	151	642	231	307	510	301	629	312	512	286

Table 3.16 External traffic generation by residential element (Mon- Fri) – West Eynsham SDA

Hour beginning		07:00		08:00		09:00		16:00		17:00		18:00	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total External Person trips		90	389	104	441	175	232	386	227	474	235	401	224
Commuting/ Business		39	167	27	116	22	29	75	44	124	62	70	39
Education/ Escort Education	Nursery/Primary	0	1	1	4	0	0	1	0	0	0	0	0
	Secondary	0	1	1	2	0	0	0	0	0	0	0	0
		1	2	2	10	1	1	1	1	1	0	0	0
	Special Needs	0	0	0	2	0	0	0	0	0	0	0	0
	Independent	1	6	6	24	1	2	3	2	2	1	1	0
Shopping	Food	1	4	2	8	13	17	19	11	18	9	18	10
	Non-Food	1	5	2	10	15	21	24	14	22	11	22	12
Other Escort/ Personal Business		8	35	13	55	28	38	50	30	56	28	42	23
Leisure	Visits	2	10	3	12	12	16	28	17	32	16	42	23
	Sport/ Entertainment	1	4	1	5	5	7	13	8	15	7	19	11
	Holidays/days out	1	3	1	3	3	5	8	5	9	5	12	7
	Other	0	1	0	2	2	2	4	3	5	2	7	4
Total External Vehicle Trips		55	239	60	255	103	137	227	134	283	140	232	129

4. Employment – Garden Village

The West Oxfordshire Local Plan identifies that new business space will be provided as a campus-style science park of around 40 hectares (Local Plan policy E1). For the purpose of the traffic modelling, two scenarios for the employment have been tested based on 40,000m² (4ha) and 80,000m² (8ha) of gross floor area (GFA) business space.

Person trip rates from the TRICS database have been based on 'Land Use 02 - EMPLOYMENT/B - BUSINESS PARK'.

The following survey parameters have been excluded:

- all surveys conducted in Greater London, Scotland, Wales and Northern Ireland;
- town centre and edge of town centre surveys; and
- weekend surveys.

Table 4.1 sets out the person trip rates and **Table 4.2** sets out the resultant person trip generation based on 8ha and 4ha GFA.

Table 4.1 Business Park Person Trip Rates

Time	Person trip rates per 100m ²		
	Arrivals	Departures	Two-Way
0700-0800	0.843	0.114	0.957
0800-0900	1.715	0.23	1.945
0900-1000	0.646	0.186	0.832
1600-1700	0.188	0.736	0.924
1700-1800	0.158	1.315	1.473
1800-1900	0.089	0.826	0.915

Table 4.2 Business Park Person Trip Generation – 8ha and 4ha

Time	8 ha			4 ha		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
0700-0800	674	91	766	337	46	383
0800-0900	1372	184	1556	686	92	778
0900-1000	517	149	666	258	74	333
1600-1700	150	589	739	75	294	370
1700-1800	126	1052	1178	63	526	589
1800-1900	71	661	732	36	330	366

Based on the modal split assumptions set out in Table 3.14 which shows 65% by car driver, the resultant traffic generation is shown in **Table 4.3**.

Table 4.3 Business Park Traffic Generation

Time	8 ha			4 ha		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
0700-0800	438	59	498	219	30	249
0800-0900	892	120	1011	446	60	506
0900-1000	336	97	433	168	48	216
1600-1700	98	383	480	49	191	240
1700-1800	82	684	766	41	342	383
1800-1900	46	430	476	23	215	238

5. Education

Trips generated by the primary and sixth form college would be subdivided into pupils and staff.

Pupils

A method for determining the proportion of trips generated by the school sites would be based on information from the Local Education Authority (LEA) on number of pupils per household. This would be used to determine an appropriate factor for calculating the number of primary, secondary school and sixth form pupils per household. It would be assumed that:

- any residual spaces in the primary schools and the sixth form college would be filled by pupils who are travelling in from other areas around.
- residual primary and sixth form pupil trips would be calculated by establishing the number of houses within a set radius and then the trip generation would be distributed proportionally across the zones within that radius.

An estimation of the potential number of pupils has been provided by the LEA, as shown in **Tables 5.1** and **5.2**.

Table 5.1 Garden Village Pupils

Education Type	Pupils per HH	No of pupils	Number of on-site school spaces	Surplus places
Early Years	0.048	106	To be identified	To be identified
Primary	0.265	584	630	46
Secondary	0.184	405	Not on site	N/A
Sixth Form	0.029	64	To be identified	To be identified

Table 5.2 West Eynsham Pupils

Education Type	Pupils per HH	No of pupils	Number of on-site school spaces	Surplus places
Early Years	0.048	48	To be identified	To be identified
Primary	0.280	280	420	140
Secondary	0.193	193	Not on site	N/A
Sixth Form	0.031	31	To be identified	To be identified

Person trip rates from the TRICS database have been based on 'Land Use 04 - EDUCATION/A - PRIMARY'.

The following survey parameters have been excluded:

- all surveys conducted in Greater London, Scotland, Wales and Northern Ireland;
- town centre and edge of town centre surveys; and
- weekend surveys.

Table 5.3 sets out the person trip rates per pupil.

Table 5.3 Primary School Person Trip Rates per Pupil

Time	Arrivals	Departures	Two-Way
0700-0800	0.086	0.019	0.105
0800-0900	1.160	0.333	1.493
0900-1000	0.123	0.129	0.252
1600-1700	0.096	0.370	0.466
1700-1800	0.029	0.060	0.089
1800-1900	0.044	0.025	0.069

Based on the modal split assumptions for primary school set out in Table 3.14 which shows 45% person trips by car driver, the resultant traffic generation for the primary school provision per site is shown in **Table 5.4**.

Table 5.4 Primary School Traffic Generation

Time	Garden Village Primary School Provision			West Eynsham SDA Primary School Provision		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
0700-0800	2	0	2	5	1	7
0800-0900	25	7	32	73	21	94
0900-1000	3	3	5	8	8	16
1600-1700	2	8	10	6	23	29
1700-1800	1	1	2	2	4	6
1800-1900	1	1	1	3	2	4

The size of the current sixth form college to be provided in the Garden Village is unknown at the current stage but as it is understood to be the sixth form provision for the Bartholomew School, it will generate trips from that school's catchment, including the new West Eynsham SDA. The current sixth form provision at St Bartholomew's is approximately 160 students based on the total number of students being 1,275 and assuming that 12.4% of secondary students are aged 16 – 19 according to national government statistics.

Based on the pupil yield set out in Table 5.1, it is expected that 64 sixth form students would be from the Garden Village. Therefore, if the capacity of the Sixth Form College is 160 students, 96 would be external to the site.

The TRICS database has been interrogated for person trips rates based on 'Land Use 04 - EDUCATION/B – SECONDARY' and the following survey parameters excluded:

- all surveys conducted in Greater London, Scotland, Wales and Northern Ireland;
- town centre and edge of town centre surveys; and
- weekend surveys.

This resulted in only one survey site which is insufficient to be representative. In order to identify more sites, the TRICS database has been interrogated for vehicle trip rates. This resulted in 31 survey sites based on the same survey parameter exclusions.

Table 5.5 sets out the vehicle trip rates per pupil and resultant traffic generation.

Table 5.5 Sixth Form Traffic Generation

Time	Vehicle Trip Rates			Traffic Generation		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
0700-0800	0.046	0.013	0.059	4	1	6
0800-0900	0.158	0.112	0.27	15	11	26
0900-1000	0.020	0.018	0.038	2	2	4
1600-1700	0.024	0.058	0.082	2	6	8
1700-1800	0.018	0.031	0.049	2	3	5
1800-1900	0.012	0.013	0.025	1	1	2

6. Neighbourhood Centre

The neighbourhood centre is likely to include local shops, pub, café, GP, sports pitches and community facilities. For the purpose of the traffic generation assumptions is assumed that all trips are internal to the site, and therefore there are no trips on the external road network.

7. Summary of Traffic Generation

The total traffic generation in the AM and PM peak hours for the Garden Village is summarised in **Tables 7.1** and **7.2**. This is based on the information presented in Tables 3.15, 4.3, 5.4, and 5.5.

Table 7.1 Garden Village Traffic Generation – 8ha Employment

Time	AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
Residential	151	642	793	629	312	941
Employment	892	120	1,011	82	684	766
Primary School	25	7	32	1	1	2
Sixth Form	15	11	26	2	3	5
Total	1,083	780	1,862	714	1,000	1,714

Table 7.2 Garden Village Traffic Generation – 4ha Employment

Time	AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
Residential	151	642	793	629	312	941
Employment	446	60	506	41	342	383
Primary School	25	7	32	1	1	2
Sixth Form	15	11	26	2	3	5
Total	637	720	1,357	673	658	1,331

The total traffic generation in the AM and PM peak hours for the West Eynsham SDA is summarised in Table 7.2. This is based on the information presented in Tables 3.16 and 5.4.

Table 7.3 West Eynsham SDA Traffic Generation

Time	AM Peak – 08:00 – 09:00			PM Peak – 17:00 – 18:00		
	Arrivals	Departures	Two-Way	Arrivals	Departures	Two-Way
Residential	60	255	315	283	140	423
Primary School	73	21	94	2	4	6
Total	133	276	409	285	144	429

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Management systems

This document has been produced by Wood Environment & Infrastructure Solutions UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Appendix A

Table NTS0502

Department for Transport statistics
[National Travel Survey](#)

Table NTS0502

Trip start time by trip purpose (Monday to Friday only): England, 2013/17

Start time	Percentage										Unweighted sample size (trips '000s)
	Commuting	Business	Education	Escort education	Shopping	escort and personal business	Visiting friends / entertainment / sport	Holiday / Day trip	All purposes		
0000 - 0059	41	4	-	-	3	11	35	6	100	1	
0100 - 0159	49	3	1	-	2	9	32	4	100	1	
0200 - 0259	63	4	0	-	1	8	15	10	100	-	
0300 - 0359	64	6	1	-	2	6	12	9	100	1	
0400 - 0459	70	8	1	-	1	7	3	10	100	2	
0500 - 0559	76	7	-	-	1	6	3	7	100	7	
0600 - 0659	68	7	1	-	2	9	4	9	100	20	
0700 - 0759	50	6	14	5	3	14	4	5	100	58	
0800 - 0859	21	3	29	22	4	14	3	3	100	122	
0900 - 0959	11	5	3	8	22	26	14	10	100	60	
1000 - 1059	5	4	2	1	34	25	16	13	100	62	
1100 - 1159	5	4	2	2	36	24	18	10	100	63	
1200 - 1259	7	5	3	2	31	24	20	8	100	60	
1300 - 1359	10	5	2	1	29	24	19	9	100	57	
1400 - 1459	10	4	4	10	25	21	18	9	100	64	
1500 - 1559	7	2	26	21	12	14	12	6	100	116	
1600 - 1659	22	4	7	4	15	21	18	9	100	78	
1700 - 1759	33	4	3	2	12	20	19	7	100	79	
1800 - 1859	22	3	1	1	14	18	32	9	100	58	
1900 - 1959	12	2	1	-	15	19	42	9	100	39	
2000 - 2059	13	2	1	-	13	16	44	9	100	24	
2100 - 2159	15	3	1	-	8	16	50	8	100	17	
2200 - 2259	21	3	-	-	4	12	53	6	100	12	
2300 - 2359	22	2	1	-	3	12	55	5	100	6	
All day	18	4	9	7	17	19	18	8	100	1,005	

1 Five survey years combined.

The figures in this table are National Statistics

The results presented in this table are weighted. The base (unweighted sample size) is shown in the table for information. Weights are applied to adjust for non-response to ensure the characteristics of the achieved sample match the population of Great Britain (1995-2012) or England (2013 onwards) and for the drop off in trip recording in diary data. The survey results are subject to sampling error.

Data for 2002-2015 have been revised, see publication for details.

Email: national.travelsurvey@dft.gov.uk

[Notes & definitions](#)

Source: National Travel Survey
 Last updated: 26 July 2018
 Next update: Summer 2019



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