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Yarnton, Cherwell
Modelling Update Note

162751A/N04

Introduction

1. In October 2021, Merton College ('the Applicant') submitted a planning application (Cherwell District Council ref. 21/03522/OUT) ('the Application') proposing a residential-led mixed used development on land to the west of the A44 and Rutten Lane in Yarnton ('the Proposed Development'). The Application relates to an allocated site contained within the adopted Cherwell Local Plan 2011-2031 Part 1 Partial Review – Oxford's Unmet Housing Needs (the Local Plan') and is referred to as Site PR9. It is supported by a Transport Assessment ('TA') and associated Transport Chapter in the Environmental Statement ('ES') that also forms part of the application.

2. In June 2022, Oxfordshire County Council ('OCC') in its capacity as local highway authority issued a consultation response to Cherwell District Council ('CDC'). In addition to the OCC response, a range of third parties (including Begbroke and Yarnton Parish Councils - 'BPC' and 'YPC' respectively -, local residents, and adjoining landowners) have made representations that raise similar comments to those made by OCC.

3. In December 2022 a Technical Note (TN) was prepared to respond to these comments which did not materially affect the conclusions reached in the TA that was prepared in support of application 21/03522/OUT. However, OCC issued a response dated 21st February 2023 that requested further information be provided with respect to:

   — The proposed access strategy, namely an Active Mode crossing on Rutten Lane; and,

   — The cumulative impacts of all PR sites, as informed by the OCC Growth Fund micro-simulation model that has been updated to test the infrastructure requirements of the Local Plan Partial review.

4. This TN has therefore been prepared to provide an update to the modelling results and the following query raised by OCC:

   "On the crossing for Rutten Lane, there is a consensus that a parallel crossing on a hump would be beneficial here. There is a slight concern over visibility for vehicles turning left from the roundabout and so it has been suggested that the zebra / cycle crossings could be reversed with the zebra nearer the roundabout. This would give left turning vehicles a second or so longer to note cyclists crossing whereas pedestrians typically can easily look left and right. We would have to consider how this would logically tie in with the segregated facilities to the north and south."

5. On the basis of the supplementary evidence presented in this note, it remains our view that the Proposed Development will:

- not have a severe residual cumulative impact on the adjacent transport network, from a NPPF perspective;
- not introduce a significant road safety issue, from a NPPF perspective; and,
- have a negligible residual effect that would be Negligible and Insignificant, from an ES perspective.

6. It also remains our view that the one remaining outstanding element of the Application is the need to secure agreement with both OCC and CDC as to level of financial contributions that the Applicant should provide towards the elements of the IDP that they are not delivering directly. We look forward to progressing these discussions in earnest in light of the additional information contained within this TN corroborating (i) the conclusions reached to date with respect to application 21/03522/OUT and (ii) the work that underpinned the allocation of this site within Local Plan Partial Review.

Collective PR Modelling Results Update

7. The conclusions of the TN submitted in December 2022 found that:

- The Growth Fund infrastructure and mode shift mitigation would have a positive impact on the delay vehicles experience on the network.
- With all Growth Fund works and mode shift implemented in 2031, there is negligible impact on average vehicle speeds compared to the '2018 Base'.
- There will not be a severe cumulative impact from a queuing perspective, including at the Peartree roundabout where worst case queue lengths are not expected to block back onto the mainline carriageway of the A34.
- The Level of Service results generated from the model do not show any residual effects that would warrant any further mitigation to that considered by the modelling.

8. Further to its review of the modelling, OCC has requested the following amendments be made to the assumptions that underpin the methodology that was discussed prior to the December 2022 TN being submitted:

- include traffic with further planned growth;
- reflect an alternative approach to predicting traffic linked to the Eynsham Garden Village; and,
- incorporate changes to the design of the growth fund scheme at Loop Farm Roundabout.

9. The outcome of the updated modelling is provided in **Appendix A**, with a summary of the key results presented in the following text using the same headings as considered in December 2022.

Network Statistics

10. The network statistics provide the active number of vehicles in the modelled network, the total number of vehicle trips completed and the latent demand (number of vehicles not able to enter the network) for all scenarios in the AM and PM 3 hour peak periods.

Table 1: Network Statistics Collective PR Assessment

		2018 Base	Future Year Reference	DS Mode Shift (Low)	DS Mode Shift (Medium)	DS Mode Shift (High)
Vehicles Active in the Network	AM Peak Period	2,126	2,177	2739	2521	2260
	PM Peak Period	2,803	2,439	3227	3145	3025
Vehicle Trips Completed	AM Peak Period	48,889	48,891	50,989	50,182	50,152
	PM Peak Period	50,229	50,400	52,840	52,321	52,091
Latent Demand at End of Simulation	AM Peak Period	1	25	47	90	40
	PM Peak Period	2	125	199	38	23
Total Input Vehicle Numbers	AM Peak Period	51,016	51,093	53,775	52,793	52,452
	PM Peak Period	53,034	52,964	56,226	55,504	55,139

11. Overall, in the Do Something (DS) scenarios, with the development, **Table 1** above shows that the anticipated future increase in vehicles on the network can travel through the network during the peak periods. This is evidenced by the latent demand remaining consistently very low.

Delay

12. Overall, the results demonstrate that following the introduction of the package of measures included within the IDP the impact of the PR sites will not result in a severe impact on vehicle delay with average delays per vehicle amounting to between 7 and 63 seconds.

Journey Times

13. The model forecasts some increases in journey times, focussed primarily along the A44 and A4260 corridors. The level of increase in journey time ranges depending on the level of mode shift of

background traffic as a result of the implementation of the IDP schemes. There are also some forecast journey time savings.

Queues

14. The addition of the PR sites and their mitigation provide an overall negligible impact at junctions within the study area. Where queuing does increase, this is this is anticipated to be an infrequent occurrence or does not block back to any key junction, or is adequately mitigated by the on-going delivery of the Growth Fund works. As a result, it is considered that there will not be a severe residual cumulative impact from a queuing perspective.

Level of Service

15. Where the Level of Service of junctions has worsened as a result of the PR sites, further assessment has been undertaken on each arm of the junction. The detailed assessment identifies that there are no residual effects which would be considered severe.

Summary

16. Given that the modelling undertaken makes no allowance for the ambitious reductions in background traffic set out in the Council’s adopted LTCP and therefore the results presented herein are arguably a ‘worst case’, it is concluded that subject to the appropriate apportionment of contributions towards the infrastructure identified as being necessary to mitigate the cumulative impact of development, the PR sites cannot be regarded as having either a severe cumulative impact on the highway network or an unacceptable impact on highway safety which would otherwise give rise to grounds for objection in line with paragraph 111 of the NPPF.

PR9 Development Impact

17. Notwithstanding the collective modelling results, a separate assessment has been undertaken which looks at the PR9 development in isolation. This has been prepared to update the analysis contained within the TA submitted in support of application 21/03522/OUT.

18. For the purposes of this assessment, reference has been made to the reference case of the VISSIM model (i.e. the scenario where the IDP infrastructure is not provided). The development related trips are consistent with those contained within the TA, which have previously been accepted by OCC.

19. The full technical modelling report is provided at **Appendix B**, with the results summarised below under the same headings as above.

Network Statistics

20. The network statistics provide the active number of vehicles in the modelled network, the total number of vehicle trips completed and the latent demand (number of vehicles not able to enter the network) for all scenarios in the AM and PM 3-hour peak periods.

Table 2: Network Statistics PR9 Only Assessment

		2018 Base	Future Ref + Growth Fund	Future DM PR9 Only
Vehicles Active in the Network	AM Peak	2,126	2,177	2,181
	PM Peak	2,803	2,439	2,506
Vehicle Trips Completed	AM Peak	48,889	48,891	48,902
	PM Peak	50,229	50,400	50,286
Latent Demand at End of Simulation	AM Peak	1	25	19
	PM Peak	2	125	175
Total Input Vehicle Numbers	AM Peak	51,016	51,093	51,102
	PM Peak	53,034	52,964	52,967

21. Overall, in the development scenario, **Table 2** above shows that the anticipated future increase in vehicles on the network can travel through the network during the peak periods although there is an increase in latent demand in the PM peak. The reduction in completed trips equates to a negligible amount that would fluctuate within 10% daily fluctuation figures. As such the development would not result in a severe impact across the network based on **Table 2**.

Delay

22. Overall, the results demonstrate that the addition of PR9 will not result in a severe impact on vehicle delay with average delays per vehicle amounting to circa 15 seconds.

Journey Times

23. The model forecasts some increases in journey times, focussed primarily along the A44 and A4260 corridors of typically 60 seconds. These increases are not considered severe and there are also some forecast journey time savings. In general, the journey time analysis shows that the PR9 site will not result in a severe impact on the highway network.

Queues

24. The addition PR9 overall has a negligible effect on queueing. Where queuing does increase, this is anticipated to be an infrequent occurrence and/or does not block back to any key junction on average.

Level of Service

25. Where the Level of Service of junctions has worsened as a result of the development, further assessment has been undertaken on each arm of the junction. The detailed assessment identifies that there are no residual effects which would be considered severe.

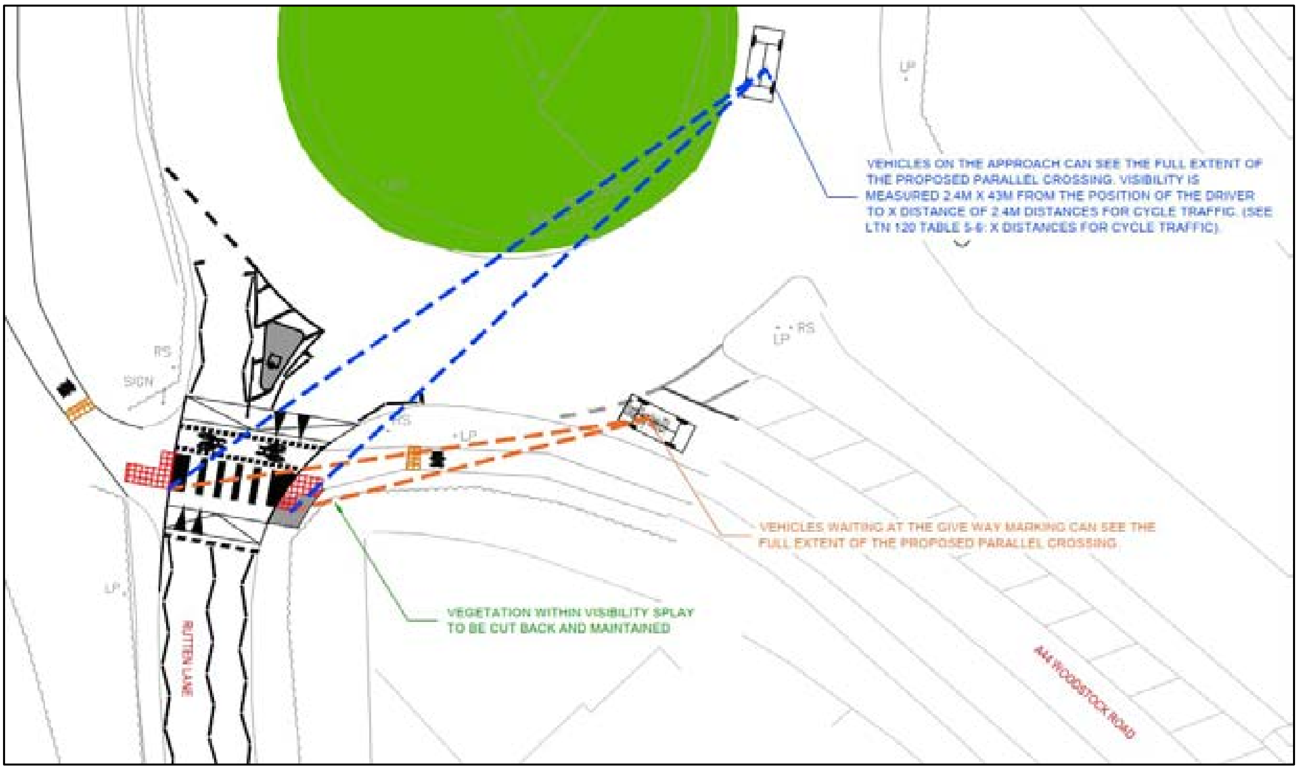
Summary

26. On this basis, the PR9 development (in isolation) would not exceed the 'severe' threshold referred to in the NPPF as the only legitimate reason to resist a development on transportation grounds. It is therefore clear that PR9 could be delivered in advance of the package of mitigation that is outlined in the IDP.

Rutten Lane Crossing

27. As stated above, a raised zebra crossing was requested by OCC on the Rutten Lane approach to the roundabout with A44 Woodstock Road. An insert of this design is provided in **Figure 1** below with the full drawing provided in **Appendix C**.

Figure 1: Rutten Lane Crossing



28. **Figure 1** shows that pedestrians and cyclists would have priority over vehicles in accordance with the movement hierarchy typically referred to by OCC. Visibility from vehicles routing to Rutten Lane from the circulatory carriageway and from the A44 South have both been assessed and found that there are no visibility issues as a result of the crossing's location.

29. The area also benefits from existing street lighting and due to its raised profile and white line markings would be conspicuous to approaching drivers.

Conclusion

30. It is accordingly concluded that the original TA and ES submitted with the Application are not altered by the work that has been undertaken to clarify the various issues that have arisen in the post-submission period. The original conclusions from these documents therefore remain as originally presented, namely that the Proposed Development will:

- make appropriate provision for access, parking and servicing in accordance with relevant guidance and standards;
- deliver a package of measures that will enhance the Site's accessibility utilising sustainable modes of transport;
- not exceed the 'severe' threshold referred to in the NPPF as the only legitimate reason to resist a development on transportation grounds;
- not introduce a significant road safety issue; and,
- have cumulative effect upon the local transport network that will be negligible and insignificant in Environmental Impact Assessment terms.

31. The Proposed Development is therefore considered to be entirely acceptable in transport terms. This is of course as to be expected, given that the Site is allocated in the Local Plan and that the Application is supported by a package of measures identified to mitigate the impact on the transport network.

32. It is therefore considered that attention should now be given to identifying a charging mechanism to be split between all PR sites to secure the works outlined in the IDP in line with the usual CIL 122 requirements. This is particularly evident given that the VISSIM modelling has not made any allowance for OCC stated policy of aiming to reduce background flows by some 25-33%.

33. To this end, the Applicant looks forward to continuing to work with CDC and OCC in a collaborative manner and, in particular, to ensure that the contribution identified meets the requirement of the Community Infrastructure Levy ('CIL') Regulations 2010[1] (as amended) that a planning obligation may only constitute a reason for granting planning permission if it is:

a) necessary to make the development acceptable in planning terms;

b) directly related to the development; and

c) fairly and reasonably related in scale and kind to the development.

[1] https://www.legislation.gov.uk/uksi/2010/948/contents/made

Appendix A

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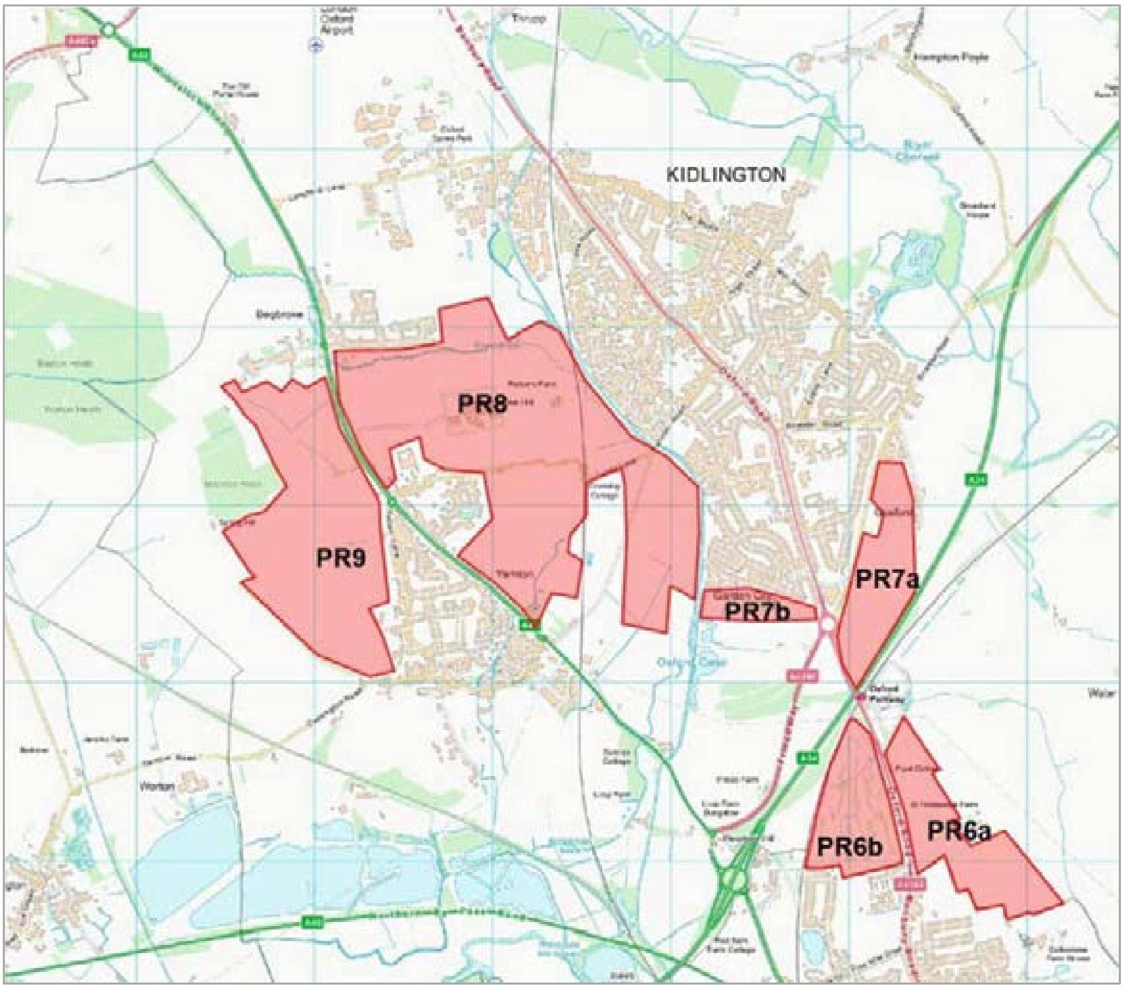
Technical Note – Traffic Modelling Outcomes Summary

Project No: ITB16565
Project Title: PR Sites Strategic Modelling
Title: Traffic Modelling Outcomes Summary
Ref: ITB16565-030B
Date: 17 July 2023

SECTION 1 Introduction

1.0.0 This Technical Note sets out the traffic modelling outcomes to support planning applications associated with the sites to the north of Oxford allocated in the Cherwell District Council (CDC) Local Plan Part 1 Partial Review, referred to collectively as the 'PR sites'. **Figure 1.1** shows the location of the PR sites included within this traffic modelling assessment.

Figure 1.1: Location of the PR sites



1.0.1 Oxfordshire County Council (OCC) has requested that the North Oxford VISSIM model is used to assess the impact of development generated traffic on the operation of the highway network in a future year once all of the PR sites are completed.

1.0.2 Traffic modelling has been undertaken collaboratively between the following consultants:

- i-Transport LLP on behalf of PR6A
- Vectos on behalf of PR9
- KMC on behalf of PR6B and PR8 (Oxford University Development (OUD))
- Glanville on behalf of PR8 (Hallam)
- Brookbanks on behalf of PR7a
- Vectos Microsimulation – transport modellers for the PR sites.

1.0.3 This note provides a summary of the results which have been extracted from the VISSIM modelling. It is intended that the future year modelling is utilised to determine whether the transport mitigation set out within the Infrastructure Delivery Plan (IDP), which is included as Appendix 4 of the Local Plan Part 1 Partial Review, is required and / or whether alternative mitigation beyond that currently envisaged is required.

1.0.4 This note follows the information presented within the modelling specification note which was submitted to OCC for review (*report reference: ITB16565-013)*. OCC raised comments on 21 April 2022 and those comments have been taken account of in subsequent modelling assessments. Subsequently VISSIM modelling was submitted to OCC on 13th December 2022, assessing the effects of the PR sites, and OCC provided a model audit report on 31st January 2023. Further amendments were made to the VISSIM modelling to take account of the OCC model audit. This note provides a summary of the updated VISSIM modelling outcomes following the amendments made to respond to the OCC model audit and comments from OCC highway officers.

1.0.5 Along with the modelling results, Vectos MicroSim has produced a number of separate technical notes, which provide further information (provided separately):

- Forecasting Report - **Appendix A**
- Forecast Capping Discussion Note - **Appendix B**
- Mode Shift Discussion Note - **Appendix C**
- Response to OCC Model Audit Note - **Appendix D**

1.0.6 The remainder of this technical note is structured as followed:

- **Section Two** – Provides an overview of the traffic model;
- **Section Three** – Sets out the agreed modelling approach and deliverables;
- **Section Four –** Summarises the findings of the modelling in terms of network statistics, queuing, journey time and Level of Service; and
- **Section Five** – Provides a summary and conclusion.

SECTION 2 Overview of North Oxford VISSIM Model

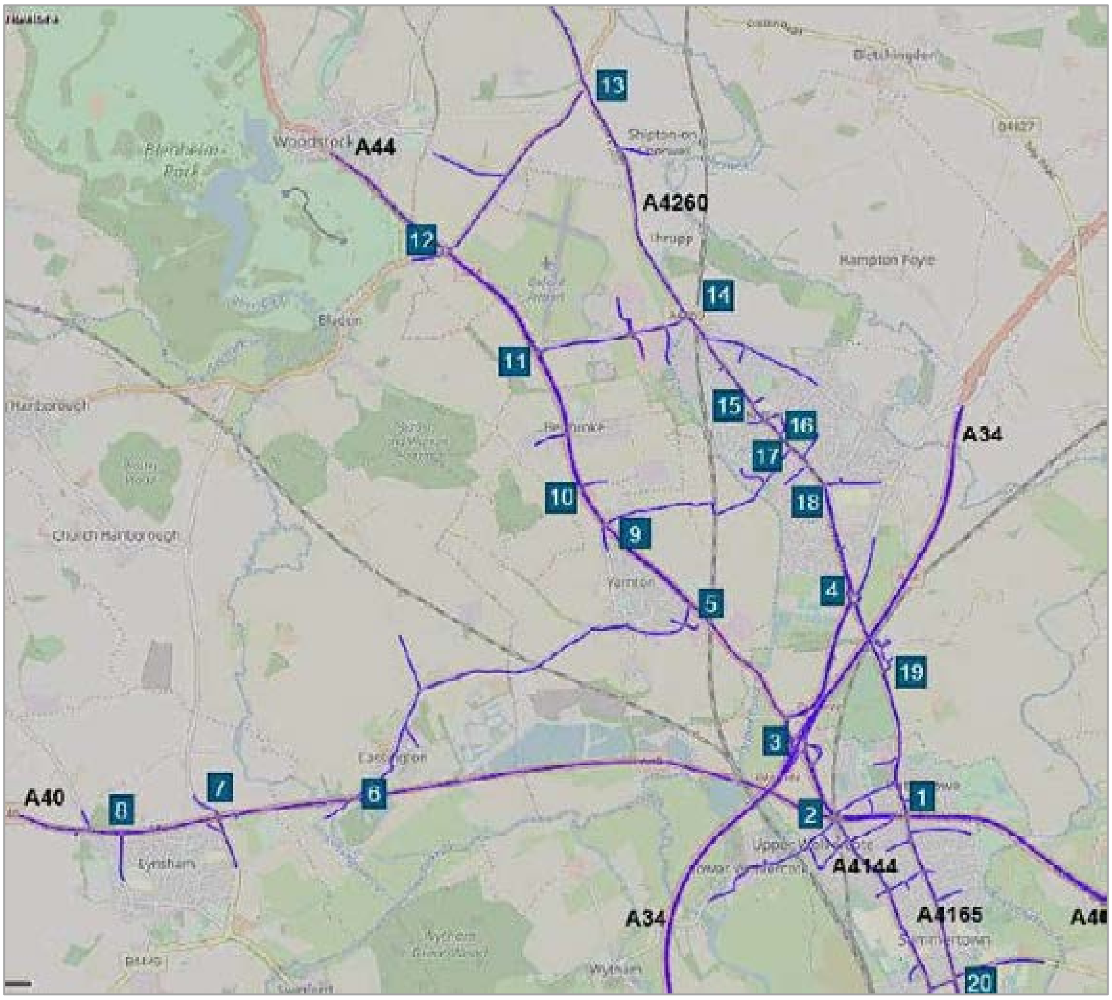
2.0.0 As agreed with Oxfordshire County Council (OCC), the North Oxford VISSIM model is to be used to assess the cumulative impact of development generated traffic from the PR sites on the operation of the highway network.

2.1 Local Model Validation Report

2.1.0 OCC has provided the Local Model Validation Report (LMVR) that was prepared to support the North Oxford VISSIM model. The LMVR provides an overview of the development, calibration, and validation of the 2018 Base North Oxford VISSIM model.

2.1.1 The North Oxford VISSIM model is a micro-simulation model representing a large study area. The model is primarily formed of four key corridors including a 7km section of the A34 corridor, an 11km section of the A40 corridor, an 11km section of the A44-A4144 corridor and a 12km section of the A4260-A4165 corridor. The model extent is shown in **Image 2.1** below.

Image 2.1 North Oxford VISSIM Model Extent



2.1.2 The VISSIM model has been developed using the specifications shown in **Image 2.2** below.

Image 2.2 North Oxford VISSIM Model Specifications

Base Year: 2018

Modelled Scenarios: AM and PM Base year.

Assignment: Dynamic

Modelled Time Periods: 06:30 – 10:30 and 14:30 – 18:30

Warm Up Period: A 30 minute (1800 simulation second) warm up period has been modelled to ensure that the traffic conditions in the model are realistic at the start of the evaluation period. AM between 06:30 – 07:00 and PM between 14:30 – 15:00.

Evaluation Period: A three-hour evaluation period has been used for the purposes of model calibration. Individual hours of 07:00 – 08:00, 08:00 – 09:00 and 09:00 – 10:00 have been assessed. For the PM peak individual hours of 15:00 – 16:00, 16:00 – 17:00 and 17:00 – 18:00 have been assessed. The validation of the model is representative of a single hour 08:00 – 09:00 (AM) and 17:00 – 18:00 (PM)

Cool Down Period: A 30 minute (1800 simulation second) cool down period has been modelled to ensure the accuracy of the model results and that all demands during the evaluation period are loaded onto the network. AM between 10:00 – 10:30 and PM between 18:00 – 18:30.

Vehicle Types: The following vehicle types have been modelled

- Light vehicles – comprising cars and light goods vehicles (LGV); and
- Heavy vehicles – comprising of OGV1 and OGV2.
- Buses – specified routing, timetables and bus stops for each service number.

VISSIM Version: 10.00-12

2.2 2023 Do Minimum Forecasting

2.2.0 The Modelling Options Report, North Oxford Corridor, March 2021 sets out details of the 2023 Forecasting (referred to as the 2023 Do Minimum). The future housing and employment development included in the 2023 matrices is shown below.

Table 6.1: Housing Developments Included in Matrices

Map Zone	Housing	Size (Sqm or No. of Units)	VISSIM Zone	VSSIM Zone Description
1	Eynsham Garden Village	440	27	Cuckoo Lane and Lower Road
2	West of Thornbury Road Eynsham	160	25	Wintey Lane
3	Eynsham Nursery and Plant Centre	77	101	Elm Place - Dummy
4	Land East of Woodstock	113	31	New Zone
5a	Barton Park - Outline	104	12	A40 Northern By-pass Rd
5b	Barton Park - Reserved Matters Phase 1	123	12	A40 Northern By-pass Rd
6	PR6a - Land East of Oxford Road	75	10	Oxford Parkway
7	PR7b - Land at Stratfield Farm	75	8	Oxford Road
8	PR8 - Land East of the A44	150	106	Begbroke Science Park - Grovelands
9	PR9 - Land West of Yarnton	105	29	Rutten Lane - Spring Hill Road
10	Wolvercote Papermill site	190	18	Godstow Road

Table 6.2: Employment Developments Included in Matrices

Map Zone	Employment	Size (Sqm or No. of Units)	VISSIM Zone	VSSIM Zone Description
A	Begbroke Science Park	12,500	30	Begbroke Science Park
B	Oxford Technology Park	40,362	105	Oxford Moor Park
C	Oxford North	15,850	107	Peartree Park and Ride
D	Cotswold Garden Village/Eynsham Garden Village	0	27	Cuckoo Lane and Lower Road

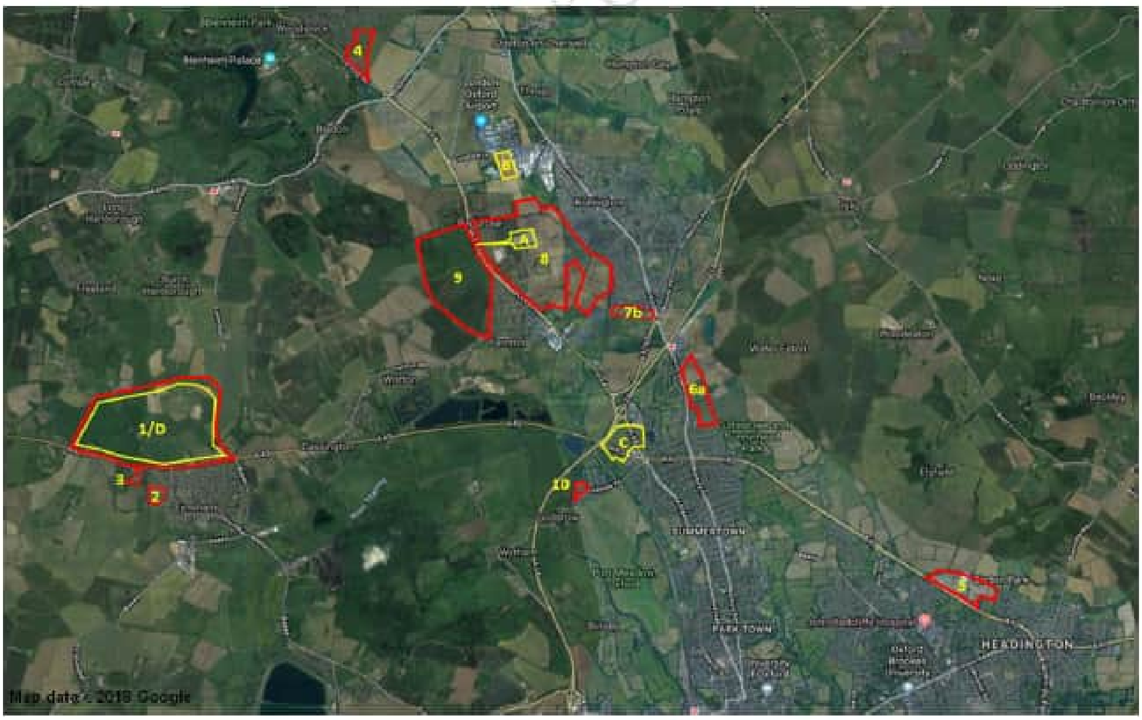


Figure 6.1: Housing Development Locations

2.2.1 The 2023 Do Minimum model therefore includes the majority of the PR sites, albeit the quantum of development included in the model relates to the predicted level of development in 2023 rather than the full allocation of the sites.

2.2.2 The 2023 modelling assumptions do not include other potential Growth Deal and Housing Infrastructure Fund (HIF) schemes coming forward including A40 HIF 2, Kidlington Roundabout improvements or A44 improvements (to and including Cassington Road junction). These schemes have been considered later in this note.

2.2.3 In terms of infrastructure, only high probability schemes that were expected to be built by 2023 were included in the model. These include the following:

- Sandy Lane level crossing closure; and
- A40 – A44 Eastern Link Road.

2.2.4 In terms of the current status of the above schemes, Sandy Lane level crossing has yet to be closed and the A40-A44 Eastern Link Road is currently under construction. Network Rail is currently progressing a Transport and Works Act Order (TWAO) for the closure of the Sandy Lane level crossing.

2.2.5 It is understood that the North Oxford VISSIM model currently has no other forecast years and as such it has been necessary to develop additional future year assessments.

SECTION 3 Modelling Parameters

3.0 Introduction

3.0.0 The Local Plan Part 1 Partial Review runs to 2031. The PR sites are expected to be constructed and completed during this period up to 2031, albeit OUD's element of PR8 is expected to be completed shortly after by 2033. Therefore, the future horizon period will establish local highway network conditions, taking into account any appropriate background traffic growth, consented development traffic and PR site traffic upon full completion.

3.0.1 This section summarises the assumptions with regards to traffic growth and committed development, which have informed the Future Year Reference Case model, when all of the PR sites are completed. In addition, this section summarises the PR sites traffic generation that has been included in the Future Year Reference + PR sites model.

3.1 Model Scenarios

3.1.0 The following sets out the inclusions contained within each modelled scenario. For each scenario is a modelled AM and PM peak period. The AM simulates 06:30-10:30 with the 07:00-10:00 period assessed hourly, and the PM simulates 14:30-18:30 with the 15:00-18:00 period assessed hourly:

- 2018 Base (as provided by Oxfordshire County Council (OCC))
- Future Year Reference Case
    - Includes all committed developments as described in the Forecasting Report (**Appendix A**), with background traffic forecasting methodology as described in the Capping Discussion Note (**Appendix B**).
- Future Year Do-Something Low Mode Shift
    - As above for the Future Year Reference Case, with background demands adjusted in line with low mode shift assumptions as set out in the Mode Shift Discussion Note (**Appendix C**) + PR sites traffic demand.
- Future Year Do-Something Medium Mode Shift
    - As above for the Future Year Reference Case, with background demands adjusted in line with medium mode shift assumptions as set out in the Mode Shift Discussion Note (**Appendix C**) + PR sites traffic demand.

- Future Year Do-Something High Mode Shift
    - As above for the Future Year Reference Case, with background demands adjusted in line with high mode shift assumptions as set out in the Mode Shift Discussion Note (**Appendix C**) + PR sites traffic demand.

3.2 Committed Development

3.2.0 Section 3 of the Vectos MicroSim Forecasting report (**Appendix A**) sets out the assumptions in terms of committed development which have been included within the model. These were agreed with OCC as part of the initial scoping exercise and have been updated as part of this updated VISSIM modelling exercise to reflect comments from OCC (i.e. refinements to assumptions for Eynsham Garden Village trip generation and addition of a proposed development in Woodstock, which are set out in **Appendix A**).

3.2.1 It was agreed not to include vehicular trips forecast to be generated by other allocated sites in Oxford City or South Oxfordshire within the Future Year Reference Case model as these sites have the same status as the PR sites at the time of preparing the model (i.e., they are allocated but do not have planning consent). Unlike the committed development sites, the allocated sites do not have agreed trip generation, distribution, access strategies and transport mitigation, which can be included in the VISSIM model. Including traffic generated by Local Plan allocated sites within the Future Year Reference Case model without any mitigation is not considered appropriate.

3.3 Trip Rates and Traffic Generation

3.3.0 The traffic generation associated with each of the PR sites is summarised in section 4 of the Vectos MicroSim Forecasting report (**Appendix A**). The trip generation has been derived for each of the PR sites based on their location, opportunity for trips to be undertaken via active modes and public transport, and likely internalisation of trips. The proposed trip rates for PR8 have been agreed with OCC in advance and applied to the other PR sites, taking account of site-specific factors. The trip generation associated with the proposed quantum of development for the PR sites has been modelled. PR6b is yet to fix the quantum of development to be applied for and therefore the trips associated with the allocated quantum of development for PR6b have been modelled.

3.3.1 Section 4 of the Vectos MicroSim Forecasting report (**Appendix A**) also identifies the proposed site access arrangements for each of the PR sites.

3.3.2 Section 5 of the Vectos MicroSim Forecasting report (**Appendix A**) presents a summary of the peak period input demands for both the committed development and the PR sites.

3.4 Traffic Growth

3.4.0 The Forecast Capping Discussion Note (**Appendix A**) sets out the methodology for assessing traffic growth and its application in the Future Year Forecast Model. In summary:

- Analysis and interpolation of the trends observed within the historic traffic data for the study area (2000 – 2017) revealed that, should the trends be projected forward, traffic levels would fall within the AM and PM peak hours by 2031 (Local Plan year) relative to 2017 levels.
- Comparison of the historic traffic trends (2000 and 2017) relative to housing delivery over that period revealed that the reduction in traffic volumes was accompanied by an increase in housing provision, which demonstrates that increased housing levels will not necessarily mean an increase in traffic volumes.
- Therefore, in order to reflect these trends within the traffic modelling, the Future Year Reference Case has been derived whereby total growth within the model, following the assignment of the committed development demands, remains at 0%.

3.4.1 The application of capping in the manner set out within the Capping Forecast Note (**Appendix B**) allows for realistic forecasts to be derived for assignment within the model such that the network capacity is not exceeded prior to any PR sites coming forward, as clearly that would not be a realistic position given the findings of the trend analysis which points to a steady decline in daily traffic volumes.

3.4.2 The resultant traffic figures assigned within the VISSIM model also align to some extent with OCC's adopted Local Transport and Connectivity Plan (LTCP). Continued application of increases in traffic volumes through the model forecasting would represent a significant failure in OCC's adopted policy approach.

3.5 Interventions in the Future Year Modelling scenarios

3.5.0 The following committed and planned infrastructure schemes and those planned to address growth elsewhere, have been included within the Future Year Reference Case:

- Infrastructure associated with Oxford North committed development;
- A40 HIF2 scheme improvement works;
- North Oxford Corridor schemes including sustainable travel improvements to:
  - Peartree Interchange, Loop Farm roundabout and Cassington roundabout;
  - A44 between Pear Tree Interchange and Cassington roundabout; and
  - Kidlington roundabout.

3.6 Testing of the Infrastructure Delivery Plan Interventions

3.6.0 In 2015, the County Council and its partners began Connecting Oxfordshire, a transformation of how people travel to and within Oxford, as part of their plan to create a less congested, less polluted city and county.

3.6.1 In allocating the PR sites, CDC and OCC had due regard to this strategy and the approach to delivering growth, which is predicated on the assumption that wholesale increases in road capacity is no longer a sustainable or acceptable option. It was established that the A44 and A4260 corridors were well placed to deliver growth in a sustainable manner due to:

- Their proximity and connections with Oxford;
- Them being served by high frequency bus services;
- There being an existing cycle network that encourages a relatively high proportion of cycle trips to be completed; and
- Access to local pedestrian infrastructure.

3.6.2 In addition to this it was recognised that there are opportunities to build upon and enhance the current sustainable transport networks to ensure their use is prioritised and maximised. These measures were developed by OCC having regard to its Strategic Transport Assessment (STA) and have been included in the Infrastructure Delivery Plan (IDP) in Appendix 4 of the Part 1 Partial Review Local Plan. They include:

- A Park and Ride at London-Oxford airport and expansion of Water Eaton Park and Ride (although it is understood that the latter is no longer proposed);
- Public transport priority improvements along the A44 corridor;
- Enhanced public transport services along the A44 corridor;
- Pedestrian and cycle improvements along the A44 with signalised crossings;
- Closure of Sandy Lane to through traffic and enhancements to assist its use by pedestrian and cyclists connecting between the A44 corridor and Kidlington; and
- Cycle superhighway along the A4260 and Oxford Road towards Oxford city centre.

3.6.3 The works set out in the IDP of the Local Plan provide a sustainable transport network to support the proposed allocations through limiting the need to travel by car and offering a genuine choice of transport modes.

3.6.4 The range of mitigation measures included within the IDP have be tested within the model. The Vectos MicroSim Mode Shift Assessment Discussion Note (**Appendix C**) sets out the assumptions that have been applied to the demands within the VISSIM model to replicate the expected effects of changes in travel behaviour arising from the delivery of enhancements to the sustainable and active travel networks. The note considers demand adjustments for:

- Delivery of Park and Ride;
- Active Modes;
- Cycle corridor improvements; and
- Bus corridor improvements.

3.6.5 To assist with understanding which measures may be a priority, the note identifies the level of adjustment made at each stage of assessment. This will help to establish the extents of the IDP schemes that are specifically required to offset the increases in vehicle trips associated with the PR sites.

3.6.6 **Table 3.1** summarises the infrastructure identified in Appendix 4 of the IDP which has been included within the modelled mode shift mitigation strategy. Schemes that have been omitted from the list are either due them not being necessary to mitigate the impacts of the PR sites, or are no longer being pursued by OCC, such as the expansion of the Water Eaton Park and Ride.

Table 3.1: Summary of Appendix 4 of IDP mitigation included in the modelling

Ref	Scheme	Comment*
1	Potential for new rail halt at Begbroke	Land reserved in masterplan for PR8
3	Park and Ride at Oxford airport	Mode shift accounted for in model
4a	Improved bus lanes on A4165 between Kidlington roundabout and past new housing sites	Included in Oxford Road improvement promoted by PR6a and 6b
6c	A44 southbound bus lane between Spring Hill Road junction and Pear Tree Interchange.	Southbound bus lane between Cassington roundabout and Pear Tree Interchange included in the model as part of the growth fund scheme. Options for A44 corridor north of Cassington roundabout currently being designed by OUD in consultation with other PR sites and OCC.
7	4 buses per hour between Oxford and Begbroke	Limited mode shift accounted for in model

Ref	Scheme	Comment*
8d	Upgrade of outbound bus stop on A4165 opposite Parkway	As part of mitigation package
9	Cycle superhighway along the A4260/A4165 to/from Oxford Parkway	Design work progressing as part of PR6a application.
10	Pedestrian and cycle improvements linking Kidlington, Begbroke and Yarnton: Potential closure of Sandy Lane to form green cycle/pedestrian route linking A44 and the A4260.	Active travel improvements linking A44 to Kidlington provided for in PR8 site master planning and bridge being progressed by Network Rail as part of Oxford Phase 2
12	Walking/cycling/wheelchair accessibility from land at Stratfield Farm (PR7b) to key facilities on the A4165, including proposed sporting facilities at PR7a	Included in site master planning of PR7b
13	New public bridleways suitable for pedestrians, all weather cycling, wheelchair use and horse riding and connecting with existing public rights of way network	Included in site master planning
14	Walking/cycling/ wheelchair accessibility from PR7b to PR8, including suitable crossing over the Oxford Canal	Included in site master planning of PR7b and PR8
15	New public bridleway / green link connecting PR7b with PR8 across Oxford canal and exploration of links with the wider PRoW east of A4165	
16	Wheelchair accessible pedestrian / cycle bridge over Oxford canal linking PR7b to PR8	Included in site master planning of PR7b and PR8
17	Sandy Lane – pedestrian and cycle new link over railway	Included in PR8 site master planning. To be applied for by Network Rail as part of closure of level crossing
17a	Sandy Lane ped/cycle railway bridge	Included in site master planning – PR8. To be applied for by Network Rail as part of closure of level crossing
18	Kidlington roundabout provision of ped/cycle crossing at roundabout	Growth fund scheme included
19	Connectivity from PR9 to local facilities within Yarnton	Included in PR9 site master planning
20	New walk and cycle routes from PR9 through Yarnton	Included in PR9 site master planning
21	Cycle and pedestrian improvements on A44, including ped/cycle crossing facilities	Included but extent and design of works to be agreed.
23	Reduction of speed limit and pedestrian/cycle crossing at key locations along A44 from Sandy Lane to Cassington Rd	Included
24	Footpaths / cycleways within all proposed development sites that link new development to existing and proposed networks	Included in site master planning for all PR sites
25	Pedestrian/cycle / wheelchair accessibility from PR6a to Water Eaton Park / Oxford Parkway	Included in PR6a site master planning
26	Ped/cycle/wheelchair accessibility from PR6b to employment opportunities at Oxford Northern Gateway	Routes through PR6b to be included in site master planning

Ref	Scheme	Comment*
27	Upgrade existing footbridge over railway linking PR6b to Northern Gateway	Subject to land ownership and liaison with stakeholders, including Network Rail
28	Ped/cycle/wheelchair accessibility across A4165 from PR6b to PR6a	Included in proposed design of upgrades to A4165 Oxford Road set out in PR6a application
29	Footway along southbound carriageway of Bicester Road	Included in PR7a site master planning
30	Ped/cycle/wheelchair accessibility to Oxford Parkway across to Bicester Road and to formal sports pitches on site	Included in PR7a site master planning
31	Vehicular spine route through PR8 capable of being used by buses	Included in PR8 site master planning
32	Highway works to Kidlington roundabout to enable site access for PR7b	Included in PR7b site master planning
33	Ped/cycle bridges over railway and Oxford Canal	Provided for in site master planning PR8/PR7b but subject to liaison with stakeholders

**It should be noted that notwithstanding the inclusion within the modelling of the interventions listed in Table 3.1, the direct delivery of individual infrastructure measures will be confirmed as part of the relevant PR site application(s). Equally, the funding of the proposed interventions that are not being delivered by each of the respective PR sites via inclusion within individual masterplans and/or Section 278 Agreements is to be agreed using a charging mechanism that accords with the usual requirements of Regulation 122 of the CIL Regulations. The PR sites look forward to working in a collaborative partnership with CDC and OCC to achieve this.*

3.7 Decide and Provide

3.7.0 Oxfordshire County Council's (OCC) Local Transport and Connectivity Plan (LTCP), adopted in July 2022, outlines a clear vision to deliver a net-zero Oxfordshire transport and travel system by 2040 as well as reducing private vehicle use, and prioritising walking, cycling, and public transport.

3.7.1 In order to achieve this, the LTCP sets out the way changes to the County's transport and travel system will be needed. This multi-pronged approach sets out the reshaping of the way places are connected, and infrastructure is upgraded and reconfigured in order to achieve these aspirations. The approach includes the forthcoming area transport strategies and transport corridor strategies, OCC's new Parking Standards for New Developments (2022), the OCC Street Design Guide (2021), and a shift from an approach to transport planning characterised as 'predict and provide' towards adopting a 'decide and provide' approach instead.

3.7.2 The recently approved OCC guidance 'Implementing Decide and Provide: Requirements for Transport Assessments' (September 2022) sets out how the transport assessment process needs to be adapted to help facilitate the 'decide and provide' approach, but also recognises that this is only one part of working towards and adopting this new approach to transport planning.

3.7.3 The OCC guidance is broken down into three subsections:

- Part One - Guiding Principles;
- Part Two - Transport Modelling, Evidencing Trip Rates, and Document Updates; and
- Part Three - Implementing 'Decide and Provide' within Transport Assessments.

Part One - Guiding Principles

3.7.4 The guidance sets out that:

> *… the 'decide and provide' approach to transport planning decides on a preferred vision of the future and then provides the means to work towards that whilst also accommodating uncertainty about the future. This offers the opportunity for more positive transport planning and will help to implement the LTCP transport user hierarchy by considering walking, cycling and public transport upfront.*
>
> *This approach is captured in LTCP Policy 36 (2022a, p.106), which states that: We will:*
>
> *a. Only consider road capacity schemes after all other options have been explored.*
>
> *b. Where appropriate, adopt a decide and provide approach to manage and develop the county's road network.*
>
> *c. Assess opportunities for traffic reduction as part of any junction or road route improvement schemes.*
>
> *d. Require transport assessments accompanying planning applications for new development to follow the County Council's 'Implementing 'Decide & Provide': Requirements for Transport Assessments' document.*
>
> *e. Promote the use of the 'decide and provide' approach in planning policy development to support site assessment.*

3.7.5 The guidance sets out that planning policy supports the 'decide and provide' approach, including National Planning Policy Framework (NPPF), local plans for the districts of Oxfordshire and the Oxfordshire LTCP.

3.7.6 The traffic modelling undertaken for the PR sites supports the approach of considering walking, cycling and public transport ahead of any capacity improvements and will be used to inform the Transport Assessments which support individual PR site applications.

Part Two - Transport Modelling, Evidencing Trip Rates, and Document Updates

3.7.7 This part of the 'decide and provide' guidance sets out the assumptions that should be made for:

- permitted, committed and planned growth;
- the suitability of various evidentiary sources;
- the consideration of the long-term effects of Covid-related transport impacts;
- the relationship between car parking provision and trip rates;
- the applicability of the car trip reduction targets in the LTCP;
- how this document should inform the evidence base for local plans; and
- the requirement for periodic updates to the document.

3.7.8 With regards to permitted, committed and planned growth, the guidance states that *"a scoping exercise will need to be undertaken to ensure that transport assessments (and transport statements) take appropriate account of permitted, committed, and planned growth which will generate traffic impacts on the area of the highway network also impacted by the proposed development."*

3.7.9 The PR sites have engaged with OCC over a number of years to agree the scope of the modelling including the model software, study area and assumptions for permitted, committed and planned growth.

3.7.10 With regards to evidence sources, the Forecasting Note and Forecast Capping Note included in **Appendices A** and **B** set out the proposed approach to traffic growth for the Future Year Reference Case based on various sources of evidence, including historic traffic data, housing projections and NTEM. The active travel and public transport mode shift assumptions set out in the Mode Shift Note included in **Appendix C** align with the infrastructure set out in Appendix 4 of the CDC Local Plan Part 1 Partial Review and provide a scenario which shows how these PR site interventions are likely to help towards OCC reaching their LTCP targets. Likewise, the trip rates and modal share for the PR sites have been based on TRICS data, local Census data, the destination of trips and ability to access facilities by active travel and public transport, both now and in the future, as well as future travel habits.

3.7.11 With regards to Covid related transport effects, the historic traffic trends analysis that has informed the traffic growth did not include traffic data during the Covid pandemic and therefore any traffic effects of the pandemic have not been accounted for by the PR sites modelling.

3.7.12 With regards to the relationship between car parking and trip rates, providing car and cycle parking in line with the latest OCC 'Parking Standards for New Developments' (2022) will form part of the wider strategy of the PR sites to encourage modal shift by providing improvements to sustainable and active modes, demand management measures, and master planning.

3.7.13 The LTCP includes the following targets for replacing or removing car trips across the County:

By 2030:

- Replace or remove 1 out of every 4 current car trips in Oxfordshire.
- Increase the number of cycle trips from 600,000 to 1 million cycle trips per week: and
- Reduce road fatalities or life changing injuries by 50%.

By 2040:

- Deliver a net-zero transport network; and
- Replace or remove an additional 1 out of 3 car trips in Oxfordshire.

By 2050:

- Deliver a transport network that contributes to a climate positive future; and
- Have zero, or as close as possible, road fatalities or life-changing injuries.

3.7.14 The LTCP mode shift targets have not been included in the PR site modelling. If the LTCP targets are realised (i.e., 25% mode shift away from the car by 2030) through a wider set of interventions currently being planned by the County, then the network will operate significantly better than predicted through the current PR sites modelling.

Part Three - Implementing 'Decide and Provide' within Transport Assessments

3.7.15 Part three of the 'decide and provide' guidance identifies three stages - *identifying accessibility characteristics; scenario testing; and monitoring and managing outcomes.*

Identifying accessibility characteristics

3.7.16 The PR sites have all been allocated based on their existing and future characteristics and are therefore all well located to existing settlements and facilities. They will bring forward a range of facilities and measures, both internally and externally which will facilitate internalisation of trips, reducing the need to travel and ensure that as many residual trips as possible are catered for by active travel and public transport modes.

Scenario testing

3.7.17 The 'decide and provide' guidance requires scenario testing to be undertaken. Separate to this VISSIM modelling exercise, alternative scenarios, which include the PR sites, have been tested within the following workstreams:

- The strategic modelling work which supported the Part 1 Partial Review Local Plan, and which identified the infrastructure package included within Appendix 4. This modelling was based on highly robust trip rates, which did not consider aspects such as mode shift or internalisation of trips. It also included traffic growth in background traffic and committed developments.
- Additional strategic modelling which is currently being undertaken by OCC to test implications of the LTCP and implementation of the Central Oxfordshire Travel Plan; and
- Additional scenario tests considered in individual Transport Assessments to support applications for some of the PR sites, whereby sites have been tested in isolation, and presented in terms of a 'predict and provide' approach to traffic growth, trip generation rates and distribution.

3.7.18 As part of this VISSIM modelling exercise, a number of scenarios have been tested. Scenario tests have been undertaken on the level of mode share that may be achieved for the background traffic as a result of the proposed infrastructure being brought forward to the north of Oxford. The low, medium and high mode shift scenario tests are set out in in the Mode Shift Discussion Note (**Appendix C**).

Monitoring and managing outcomes

3.7.19 The OCC 'decide and provide' guidance requires a Monitoring and Evaluation Plan (MEP) to be secured and implemented through the Travel Plan as part of the S106 agreement.

3.7.20 In accordance with the guidance, the MEP will record how the trip generation and mode share of the site evolves over time. The survey specification will need to be agreed with OCC and should employ the TRICS Standard Assessment Methodology or similar.

3.7.21 The PR sites are committed to monitoring trips into and out of the individual PR sites over a number of years through an MEP, secured through the Travel Plans.

3.8 Modelling Scenarios

3.8.0 On the basis of the above, the following modelling scenarios have been considered and are reported upon:

- 2018 Baseline (Morning and evening peak period)
- Future Year Reference Case + Growth Fund schemes (Morning and evening peak period)

- Future Year Do Something (DS) (Low Modal Shift) (Morning and evening peak period)
- Future Year Do Something (DS) (Medium Modal Shift) (Morning and evening peak period)
- Future Year Do Something (DS) (High Modal Shift) (Morning and evening peak period)

SECTION 4 Modelling Outcomes

4.0 Introduction

4.0.0 The modelling scenarios set out in Section 3 provide the information required to understand the cumulative impact of the PR sites and will be used to inform the Transport Assessment(s) for the PR sites and agree the scope of required mitigation.

4.0.1 This section of the note provides a summary of the following modelling outcomes:

- Network statistics across the network;
- Queue lengths and delay, including Level of Service assessment for the following junctions:
    - A44/ Cassington Road Roundabout;
    - Pear Tree Interchange;
    - Loop Farm Roundabout;
    - Wolvercote Roundabout;
    - Cutteslowe Roundabout; and
    - Kidlington Roundabout.
- Journey time information for the following routes:
    - Route 1: A34 within the model extents either side of the Pear Tree Interchange;
    - Route 2: A40 between Wolvercote Roundabout and River Cherwell;
    - Route 3: A44 / A4144 corridor between Oxford Airport and Staverton Road;
    - Route 4: A4260 / A4165 corridor between the A4095 and Linton Road;
    - Route 5: Upper Campsfield Road;
    - Route 6: Langford Lane between A44 Woodstock Road and A4260 Banbury Road;
    - Route 7: Frieze Way; and
    - Route 8: Bicester Road.

4.1 Network Statistics

Vehicle Trips

4.1.0 **Table 4.1** below identifies the active number of vehicles in the modelled network, the total number of vehicle trips completed and the latent demand (number of vehicles not able to enter the network) for all scenarios in the AM and PM 3 hour peak periods.

Table 4.1 Vehicles in Network (AM and PM 3 hour peak periods)

		2018 Base	Future Year Reference	DS Mode Shift (Low)	DS Mode Shift (Medium)	DS Mode Shift (High)
Vehicles Active in the Network	AM Peak Period	2,126	2,177	2739	2521	2260
	PM Peak Period	2,803	2,439	3227	3145	3025
Vehicle Trips Completed	AM Peak Period	48,889	48,891	50,989	50,182	50,152
	PM Peak Period	50,229	50,400	52,840	52,321	52,091
Latent Demand at End of Simulation	AM Peak Period	1	25	47	90	40
	PM Peak Period	2	125	199	38	23
Total Input Vehicle Numbers	AM Peak Period	51,016	51,093	53,775	52,793	52,452
	PM Peak Period	53,034	52,964	56,226	55,504	55,139

4.1.1 **Table 4.1** shows that despite there being more vehicles in the network in the Do Something (DS) scenarios compared to the Future Year Reference scenario, the latent demand remains consistently very low and in the PM peak period it reduces in the DS high and medium mode share scenarios compared to the Future Year Reference scenario. This demonstrates that the vehicle demand in the DS scenarios can travel through the network during the peak periods.

Vehicle Delay

4.1.2 **Table 4.2** below identifies the delay for vehicles travelling through the network for all scenarios in the AM and PM 3 hour peak periods.

Table 4.2 Vehicle Delay (Seconds)

		2018 Base	Future Year Reference	DS Mode Shift (Low)	DS Mode Shift (Medium)	DS Mode Shift (High)
Average Delay per Vehicle in the Network	AM Peak Period	169	187	+63	+39	+7
	PM Peak Period	202	144	+55	+49	+43
Overall Delay per Vehicle (including time off network)	AM Peak Period	171	189	+64	+41	+8
	PM Peak Period	203	153	+58	+43	+37

4.1.3 **Table 4.2** shows that the DS Mode Shift scenarios average vehicle delay in the AM 3 hour peak period increases by 7 to 63 seconds per vehicle compared to the Future Year Reference Case, depending on the level of mode shift within the DS scenarios. The overall delay per vehicle (delay of vehicles in the network + latent demand) in the AM peak period is very similar to the average delay as a result of the very low level of latent demand.

4.1.4 In the PM 3 hour peak period the average vehicle delay increases by 43 to 55 seconds per vehicle in the DS scenarios compared to the Future Year Reference Case. The overall delay per vehicle (delay of vehicles in the network + latent demand) in the PM peak period is very similar to the average delay as a result of the very low level of latent demand.

4.1.5 Overall, the results demonstrate that following the introduction of the package of measures included within the IDP the impact of the PR sites will not result in a severe impact on vehicle delay.

Average Vehicle Speeds

4.1.6 **Table 4.3** below summarises the average vehicle speeds (in mph) for all scenarios in the AM and PM 3 hour peak periods.

Table 4.3: Average Vehicle Speeds (MPH)

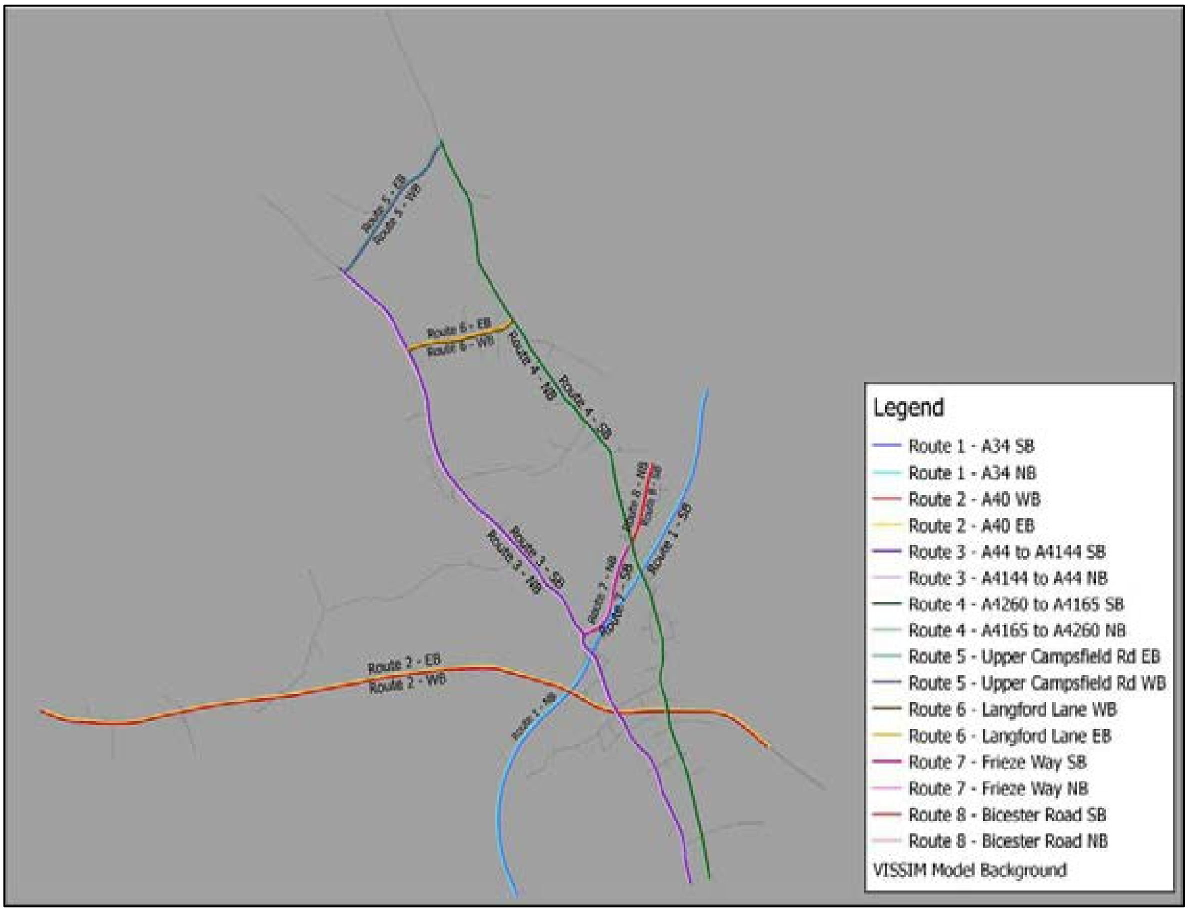
		2018 Base	Future Year Reference	DS Mode Shift (Low)	DS Mode Shift (Medium)	DS Mode Shift (High)
Average Vehicle Speeds (mph)	AM Peak Period	27	26	23	25	26
	PM Peak Period	25	29	26	26	26

4.1.7 **Table 4.3** shows that in the Do Something scenarios (i.e. with mode shift), there is negligible impact on average vehicle speeds across the network compared to the Future Year Reference Case.

4.2 Journey Times

4.2.0 Journey times along key corridors within the modelled network have been assessed. **Figure 4.1** below summarises the eight journey time routes that have been analysed within the model. Each journey time route has been analysed in each direction for each of the modelled hours within the AM and PM peak periods.

Figure 4.1: Journey Time Routes



4.2.1 **Table 4.4** below summarises the forecast Future Year Reference Case journey times for the eight routes in the AM peak period as well as the forecast change in journey times along the routes for the Future Year Do Something (DS) scenarios (i.e., Future Year Reference Case + PR sites and mode shift).

Table 4.4: Change in journey times (seconds) along routes in the AM peak period

Route			07:00-08:00				08:00-09:00				09:00-10:00			
			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
				Low	Med	High		Low	Med	High		Low	Med	High
1	A34	NB	323	+1	+1	+1	319	+3	+1	+2	323	+4	+3	+1
		SB	323	0	+1	+1	318	+3	+4	+4	322	+3	+2	+3
2	A40	EB	1954	+29	+41	+7	1,034	+30	+26	-11	1,000	+421	+167	-3
		WB	768	+36	+41	+48	1,121	-113	-227	-271	783	+68	+1	-5
3a	A44 Staverton Rd – PR8/PR9 Access	NB	632	+65	+47	+44	679	+212	+210	+94	657	+390	+198	+78
		SB	725	+106	+81	+44	1,096	+423	+301	+159	927	+388	+422	+41
3b	A44 PR8/PR9 Access – Oxford Airport	NB	160	+30	+28	+29	172	+29	+32	+30	164	+59	+49	+28
		SB	228	+58	+42	+36	269	+30	+13	+17	210	+52	+52	+45
4	A4260	NB	1,177	+30	+48	+24	1,311	+99	+37	+47	1,274	+416	+67	+32
		SB	1,418	-36	-17	-49	2,000	-270	-286	-336	1,393	+133	+22	-5
5	A4095	EB	155	-8	+7	-10	204	-38	+42	-45	157	-10	-5	-4
		WB	129	+2	+4	+2	132	+1	-1	-2	126	0	0	+1
6	Langford Lane	EB	162	0	-5	-2	175	-6	-8	-11	167	+4	-7	-10
		WB	151	0	-1	0	154	+1	-1	-1	150	+3	+1	0
7	Frieze Way	NB	62	0	+1	0	63	0	+1	+1	63	0	+1	+1
		SB	115	-2	-4	-1	127	+6	-12	-4	433	+270	+293	-106
8	Bicester Road	NB	39	+30	+28	+30	39	+29	+28	+29	40	+30	+30	+30
		SB	58	+25	+23	+22	52	+27	+28	+25	56	+58	+23	+19

4.2.2 The following conclusions are drawn from the journey time analysis in **Table 4.4**:

- Between 07:00-08:00 the journey times are forecast to increase by less than 60 seconds with all levels of mode shift in the DS scenario for all routes compared to the Future Year Reference Case, with the exception of A44 northbound between Staverton Road and PR8/PR9 access (ranging between +44 and +65 seconds) and A44 southbound between Staverton Road ad PR8/PR9 access (ranging between +44 and +106 seconds) depending on the level of mode shift.
- Between 08:00-09:00 the journey times are forecast to increase by no more than 60 seconds with all levels of mode shift in the DS scenario for all routes compared to the Future Year Reference Case, with the exception of A44 north and southbound, and the A4260 northbound.
  - The A44 northbound between Staverton Road and PR8/PR9 Access sees increases in journey time of +94 to +212 seconds and the A44 southbound sees increases of +159 to +423 seconds.
  - The A4260 northbound sees increases in journey time of +37 to +99 seconds.
  - There are also forecast to be some journey time savings on routes, most notably on the A4260 southbound (-270 to -336 seconds) and the A40 westbound (-113 to -271 seconds) depending on level of mode shift.
- Between 09:00-10:00 the journey times are forecast to increase by no more than 60 seconds with all levels of mode shift in the DS scenario for all routes compared to the Future Year Reference Case, with the exception of the A44 northbound and southbound, A40 eastbound and westbound, the A4260 northbound and southbound and Frieze Way southbound.
  - The A44 northbound between Staverton Road and PR8/PR9 Access sees increases in journey time of +78 to +390 seconds and the A44 southbound sees increases of +41 to +422 seconds.
  - The A4260 northbound sees increases in journey time of +32 to +416 seconds and the A4260 southbound sees changes in journey time of -5 to +133 seconds.
  - The A40 eastbound sees changes in journey time of -3 to +421 seconds and the A40 westbound sees changes in journey time of -5 to +68 seconds.
  - Frieze Way southbound sees changes in journey time of -106 to +293 seconds.

4.2.3 It is clear from the results that a small increase in mode shift between medium and high mode shift scenarios (e.g. 0.62% to 0.75% depending on the hour, as set out in the Mode Shift Discussion Note **Appendix C**) would have a material effect on journey time.

4.2.4 **Table 4.5** summarises the journey times for the eight routes in the PM peak period.

Table 4.5: Change in journey times (seconds) along routes in the PM peak period

Route			15:00 – 16:00				16:00 – 17:00				17:00 – 18:00			
			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
				Low	Med	High		Low	Med	High		Low	Med	High
1	A34	NB	317	+2	+3	+2	316	+2	+3	+2	314	+3	+3	+4
		SB	312	+4	+3	+2	314	+2	0	0	313	+2	+3	+2
2	A40	EB	1003	+12	+32	+26	1033	+15	+19	+9	967	+17	+18	+18
		WB	740	+15	+16	+18	742	+8	+17	+18	756	+16	+19	+20
3a	Staverton Rd – PR8/PR9 Access	NB	650	+11	+5	+1	691	+30	+21	+5	725	+38	+10	-9
		SB	692	+63	+46	+55	939	+330	+288	+266	689	+789	+800	+731
3 b	A44 PR8/PR9 Access – Oxford Airport	NB	164	+24	+24	+24	171	+29	+27	+25	192	+34	+26	+25
		SB	189	+30	+28	+27	201	+61	+47	+58	208	+78	+54	+34
4	A4260	NB	1217	+20	+18	+4	1211	+37	+31	+24	1240	+61	+57	+38
		SB	1228	+47	+44	+41	1319	+116	+111	+80	1243	+149	+134	+143
5	A4095	EB	134	+2	+2	0	141	-1	0	-3	147	-3	-1	-2
		WB	131	+2	0	0	132	+8	+8	+7	133	+15	+20	+14
6	Langford Lane	EB	153	+1	0	-1	160	+10	+8	+3	162	+46	+43	+43
		WB	147	+2	+2	+4	154	0	0	+1	155	+2	0	+3
7	Frieze Way	NB	63	0	-1	0	65	0	-1	0	65	0	0	-1
		SB	91	+4	+3	+4	97	+1	+1	+2	97	+1	+2	+3
8	Bicester Road	NB	38	+29	+31	+29	37	+29	+28	+29	38	+31	+29	+30
		SB	43	+23	+23	+24	44	+25	+25	+24	44	+30	+28	+28

4.2.5 The following conclusions are drawn from the journey time analysis in **Table 4.5**:

- Between 15:00-16:00 the journey times are forecast to increase by less than 60 seconds with all DS mode shift scenarios for all routes compared to the Future Year Reference Case, with the exception of A44 southbound between Staverton Road and PR8/PR9 Access (+46 to +63 seconds), depending on the mode shift.
- Between 16:00-17:00 the journey times are forecast to increase by no more than 60 seconds with all DS mode shift scenarios for all routes compared to the Future Year Reference Case, with the exception of A44 southbound and A4260 southbound.
    - A44 southbound between Staverton Road and PR8/PR9 access forecasts increases in journey time of +266 to +330 seconds.
    - A4260 southbound forecasts increases in journey time of +80 to +116 seconds.
- Between 17:00-18:00 the journey times are forecast to increase by no more than 60 seconds with all DS mode shift scenarios for all routes compared to the Future Year Reference Case, with the exception of A44 southbound and A4260 northbound and southbound.
    - The A44 southbound between Staverton Road and PR8/PR9 Access forecasts increases in journey time of +731 to +800 seconds and the A44 southbound between Oxford Airport and PR8/PR9 Access sees increases of +34 to +78 seconds.
    - A4260 southbound sees increases in journey time of +134 to +149 seconds and the A4260 northbound sees increases of +38 to +61 seconds.

4.2.6 It can be seen from the journey time results that the model forecasts some increases in journey times, focussed primarily along the A44 and A4260 corridors. The level of increase in journey time ranges depending on the level of mode shift of background traffic as a result of the implementation of the IDP schemes. There are also some forecast journey time savings.

4.2.7 With regards to the A44 corridor, a southbound bus lane is currently being constructed by OCC between Loop Farm roundabout and Cassington roundabout and therefore bus journey times will not be impacted on this section of the corridor. As part of the package of improvements in the IDP it is proposed to provide further bus priority and active travel improvements along the A44 between Cassington roundabout and Spring Hill Road, which would further mitigate bus journey time impacts. The modelling presented in this technical note does not include a southbound bus lane on the A44 between Cassington roundabout and Spring Hill Road. Whilst the PR sites are supportive of reallocating road space for sustainable modes, it would require further mode shift to buses than this assessment has provided for in order to understand the effects of such provision.

4.2.8 As stated earlier, the modelling of the PR sites does not take account of the LTCP schemes being implemented by OCC and the resultant targeted mode shift of 25% reduction of car trips by 2030. As such, with the implementation of LTCP transport schemes beyond the infrastructure being brought forward by the PR sites, there would be expected to be a further reduction in journey times along the key routes within the modelled area.

4.3 Queues

4.3.0 For the purposes of this section, queues have been reported for the scenarios outlined below to show the forecast change in average queue lengths at each junction:

- Future Year Reference Case + Growth Fund schemes (Morning and evening peak period)
- Future Year Do Something (DS) (Morning and evening peak period)

4.3.1 This has been undertaken at the six key junctions as shown in **Figure 4.2** and comprise:

- A - Woodstock Road/Cassington Road;
- B - Oxford Road/Bicester Road roundabout;
- C - Loop Farm Roundabout;
- D - Peartree Roundabout;
- E - Wolvercote Roundabout; and
- F - Cutteslowe Roundabout.

Figure 4.2: Study Area

Queue Difference Analysis

4.3.2 The average queue results in metres for each junction between the times of 07:00-10:00 and 15:00-18:00 is summarised in this section. A red/amber/green comparison of queue lengths is provided to understand the cumulative effect of the PR sites within each scenario based on the criteria set out in **Table 4.6**. It should be noted that the red/amber/green criteria are arbitrary ranges and are not linked to planning policy tests or any guidance on traffic modelling. It simply provides a pictural illustration of the range of increases in queuing at the junctions.

Table 4.6: Queue Length Criteria

	Colour Coding
Queue increases less than or equal to 50m	
Queue increase more than 50m, up to 100m	
Queue increase more than 100m, up to 150m	
Queue increases by greater than 150m	

#

Peak Hour Average Queue Differences

4.3.3 For the purposes of this section the queue differences between the DS scenarios and Future Reference Case the for the AM and PM peak periods have been summarised for each junction within the study area.

A44/Cassington Road

4.3.4 **Tables 4.7** and **4.8** below summarise the forecast change in average queue lengths at the A44/Cassington Road roundabout in the AM and PM peak periods respectively.

Table 4.7: A44/Cassington Road Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 SE Approach	1	0	0	0	1	0	0	0	0	0	0	0
Cassington Rd Approach	1	+3	+2	+4	2	+4	+5	+8	1	+2	+2	+3
A44 NW Approach	16	+147	+125	+76	13	+270	+265	+201	21	+162	+224	+98

4.3.5 **Table 4.7** shows that overall, there will be negligible changes in queuing on this junction in the AM peak period except for the A44 north-west approach to the roundabout which the model forecasts an average increase in queues ranging from +76m (13 vehicles) to +270m (47 vehicles) in the AM peak period depending on the hour and level of mode shift. The results show that a small change in mode shift (e.g. 0.62-0.75% in the AM peak period between the medium and high mode shift scenarios) would result in reductions in queue length on the A44 north-west approach to the junction.

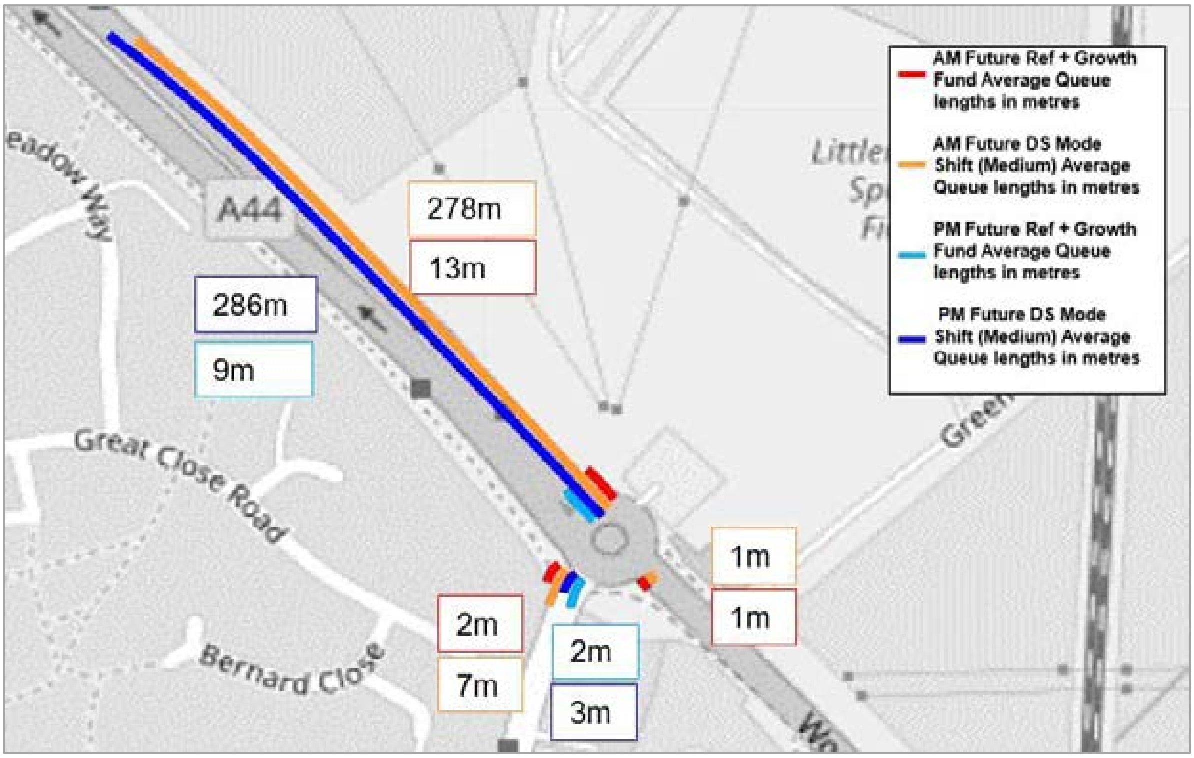
Table 4.8: A44/Cassington Road Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 SE Approach	0	0	0	0	0	0	0	0	0	0	0	0
Cassington Rd Approach	0	0	0	0	0	0	0	0	2	+2	+1	+1
A44 NW Approach	2	+51	+37	+32	3	+211	+194	+173	9	+277	+277	+277

4.3.6 **Table 4.8** shows that overall, there will be negligible changes in queuing on this junction in the PM peak period except for the A44 north-west approach to the roundabout which the model forecasts an average increase in queues ranging from +32m (6 vehicles) to +277m (48 vehicles) in the AM peak period depending on the hour and level of mode shift.

4.3.7 The analysis shows that the queue does not block back to any junctions in the AM and PM peak periods and is relatively short lived and is therefore not considered to have a severe impact on the network. This is demonstrated by the queue lengths for the AM (0800-0900) and PM (1700-1800) peak hours shown on **Figure 4.2**, which compares the DS medium mode shift queue lengths with the Future Year Reference Case queue lengths.#

Figure 4.2: A44/Cassington Road queue lengths in the AM and PM peak hours +3;3303<33# dqg#4:3304;33,



Oxford Road/Bicester Road roundabout

4.3.8 **Tables 4.9** and **4.10** below summarise the forecast change in average queue lengths at the Oxford Road/Bicester Road roundabout in the AM and PM peak periods respectively.

Table 4.9: Oxford Road/Bicester Road Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A4260 Oxford Rd Northern Arm	8	-4	-2	-3	2	+3	+5	+6	12	-1	+3	-7
Bicester Rd Approach Eastern Arm	4	+2	+2	+1	3	+3	+3	+3	3	+19	+1	-1
Oxford Rd Southern Arm	4	+1	+1	+1	5	+1	+1	+1	5	0	0	0
Frieze Way	1	0	0	0	1	0	+1	+1	1	0	0	0
Oxford Rd, Kidlington access road	2	0	+1	0	1	1	+1	+1	1	0	0	0

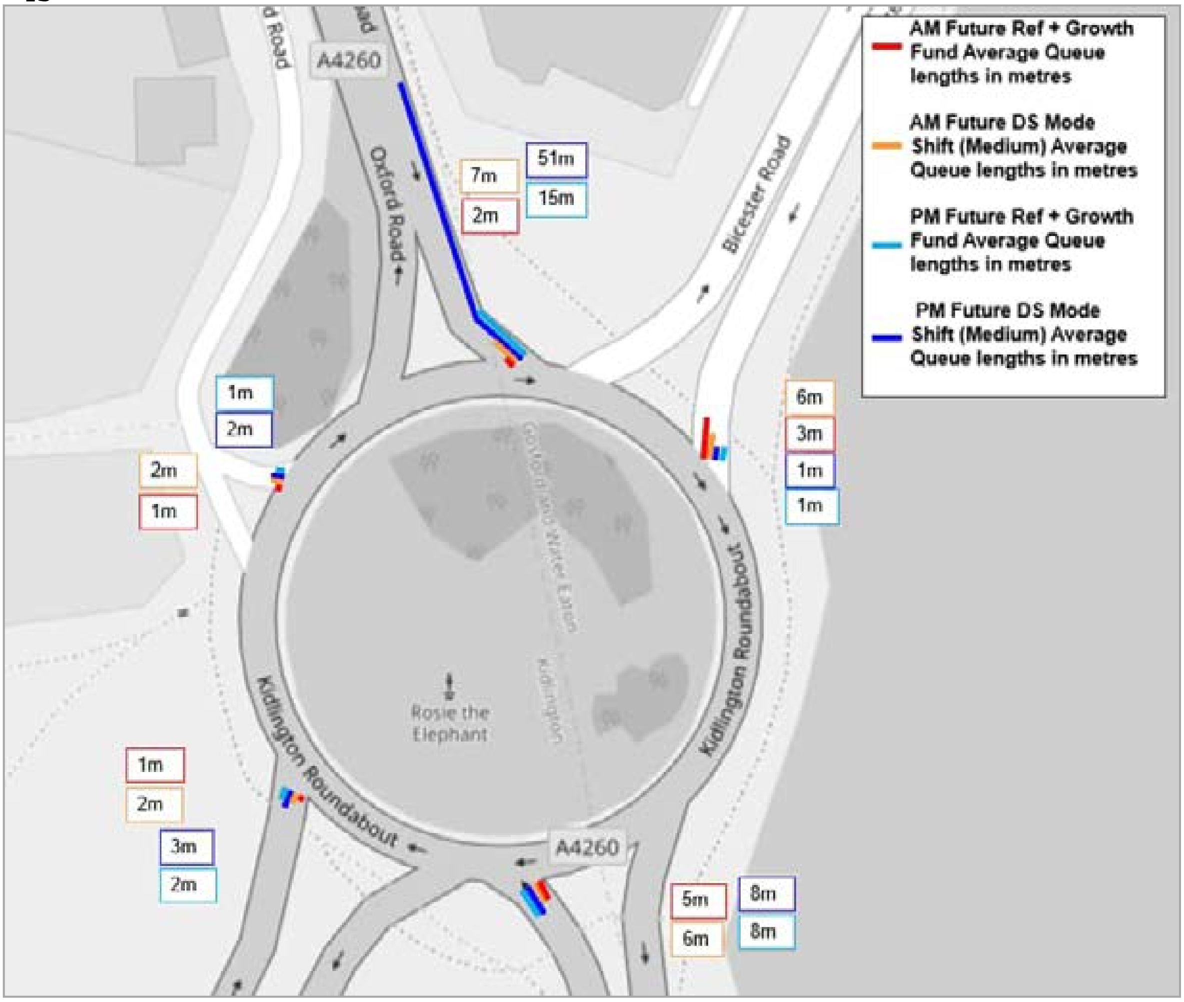
4.3.9 **Table 4.9** demonstrates that there would be a negligible increase in queue length in the AM peak period at the junction of Oxford Road/Bicester Road.

Table 4.10: Oxford Road/Bicester Road Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A4260 Oxford Rd Northern Arm	6	+7	+4	+9	12	+32	+26	+18	15	+47	+36	+58
Bicester Rd Approach Eastern Arm	0	0	0	0	1	0	0	0	1	0	0	0
Oxford Rd Southern Arm	7	0	0	0	8	0	0	0	8	0	0	0
Frieze Way	1	0	0	0	2	0	0	0	2	0	0	0
Oxford Rd, Kidlington access road	1	0	0	0	1	0	0	0	1	0	0	0

4.3.10 **Table 4.10** shows that in the PM peak period there are no changes in queue lengths on all arms except the A4260 Oxford Road northern arm, consisting of an increase in queue ranging between +4m (1 vehicle) to +58m (10 vehicles). It should be noted that these queues do not block back to any key junction. This is demonstrated by the queue lengths for the AM (0800-0900) and PM (1700-1800) peak hours shown on **Figure 4.3**, which compares the DS medium mode shift queue lengths with the Future Year Reference Case queue lengths.#

Figure 4.3: Oxford Road/Bicester Road Roundabout Average Queue lengths +3;3303<33# dqg#4:3304;33,



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Loop Farm Roundabout

4.3.11 **Tables 4.11** and **4.12** below summarise the forecast change in average queue lengths at Loop Farm roundabout in the AM and PM peak periods respectively.

Table 4.11: Loop Farm Roundabout Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 north-west approach	5	-2	+5	0	36	+38	-2	-3	196	+241	+173	-78
A4260 Frieze Way	8	+1	0	+1	16	+14	-3	+2	93	+52	+52	-26
A44 southern approach	3	+3	+4	+2	2	+7	+15	+4	1	+1	+1	+1

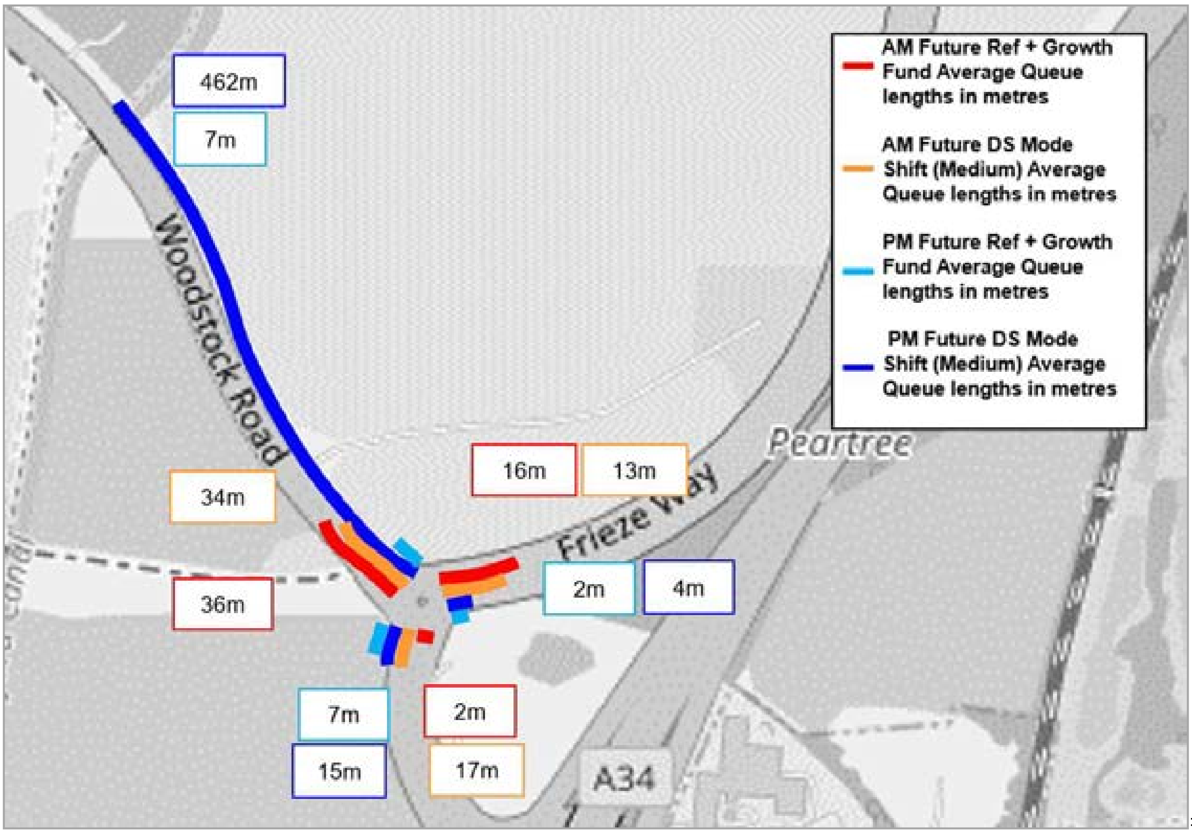
4.3.12 **Table 4.11** shows that overall, there will be negligible changes in queuing on this junction in the AM peak period except for the A44 north-west approach to the roundabout which the model forecasts an average increase in queues ranging from -3m to +241m (42 vehicles) in the AM peak period depending on the hour and level of mode shift. The results show that a small change in mode shift (e.g. 0.6-0.75% in the AM peak period between the medium and high mode shift scenarios) would result in betterment in queuing on the A44 north-west approach compared to the Future Case Reference Case.

Table 4.12: Loop Farm Roundabout Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 north-west approach	2	+4	+4	+4	9	+546	+560	+437	7	+263	+455	+350
A4260 Frieze Way	1	+2	+2	+2	1	+1	+2	+1	2	+2	+2	+3
A44 southern approach	2	+2	+2	+1	5	+10	+9	+8	7	+10	+9	+5

4.3.13 **Table 4.12** shows that the addition of the development would result in negligible changes in queues across the junction in the PM peak period with the exception of the A44 north-west approach, which the model forecasts to experience an increase in queue length ranging from +4m (1 vehicle) to +560m (99 vehicles) depending on the hour and level of mode shift. As shown in **Figure 4.4**, the increase in queuing on the A44 north-west approach does not result in blocking back to the Cassington Road roundabout. Likewise, buses would not be impacted as OCC has recently implemented a southbound bus lane on this section of the A44. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.3: Loop Farm Roundabout Average Queue lengths (0800-0900 and 1700-1800)



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Peartree Interchange

4.3.14 **Tables 4.13** and **4.14** below summarise the forecast change in average queue lengths at Peartree Interchange in the AM and PM peak periods respectively.

Table 4.13: Peartree Interchange (A44/A34) Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A34 South	11	+4	+4	+3	15	+5	+8	+5	10	+3	+2	+2
A44 Woodstock West	17	0	+1	0	63	+12	-6	-19	127	+23	+52	-41
A34 North	11	0	0	0	25	+9	+12	+9	37	+21	+19	+1
Oxford Peartree Services	3	+1	+2	0	65	+5	+10	-5	170	+13	+15	-3
A44 Woodstock East	9	+13	+11	+7	13	+14	+19	+9	10	+11	+17	+7

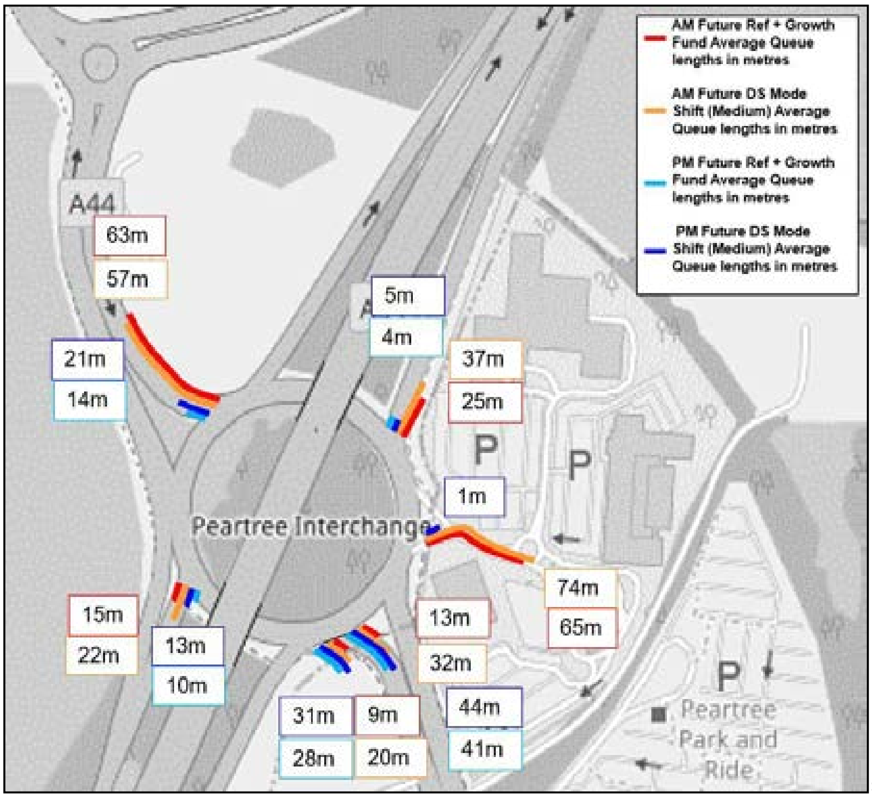
4.3.15 **Table 4.13** demonstrates that there would be a negligible increase in queue length in the AM peak period at the Peartree Interchange.

Table 4.14: Peartree Interchange Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A34 South	9	+1	+1	+1	11	+2	+2	+2	10	+3	+2	+2
A44 Woodstock West	10	+6	+5	+6	12	+3	+4	+3	14	+10	+7	+5
A34 North	5	0	0	0	4	0	0	0	4	0	+1	0
Oxford Peartree Services	0	0	0	0	0	0	0	0	0	+1	+1	+1
A44 Woodstock East	19	+2	0	-1	39	+3	+1	-6	41	+16	+2	-8

4.3.16 **Table 4.14** demonstrates that there would be a negligible increase in queue length in the PM peak period at the Peartree Interchange. **Figure 4.5** below illustrates the queue lengths in the AM and PM peak hours.

Figure 4.5: Peartree Interchange Average Queue Lengths (0800-0900 and 1700-1800)



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Wolvercote Roundabout

4.3.17 **Tables 4.15** and **4.16** below summarise the forecast change in average queue lengths at Wolvercote roundabout in the AM and PM peak periods respectively.

Table 4.15: Wolvercote Roundabout Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 northern arm	19	-3	-4	-3	16	-6	-6	-7	17	-5	-6	-5
Five Mile Drive	1	-1	-1	-1	0	0	0	0	1	0	-1	-1
A40 eastern arm	20	+43	+56	+63	45	+82	+43	+13	23	+109	+33	+16
A4144	11	+2	+1	-1	17	+5	+4	0	12	+4	+2	-2
Godstow Rd	1	0	0	0	1	0	0	0	1	+6	0	0
A40 western arm	21	+6	+5	-1	35	+25	+18	0	26	+209	+95	+2

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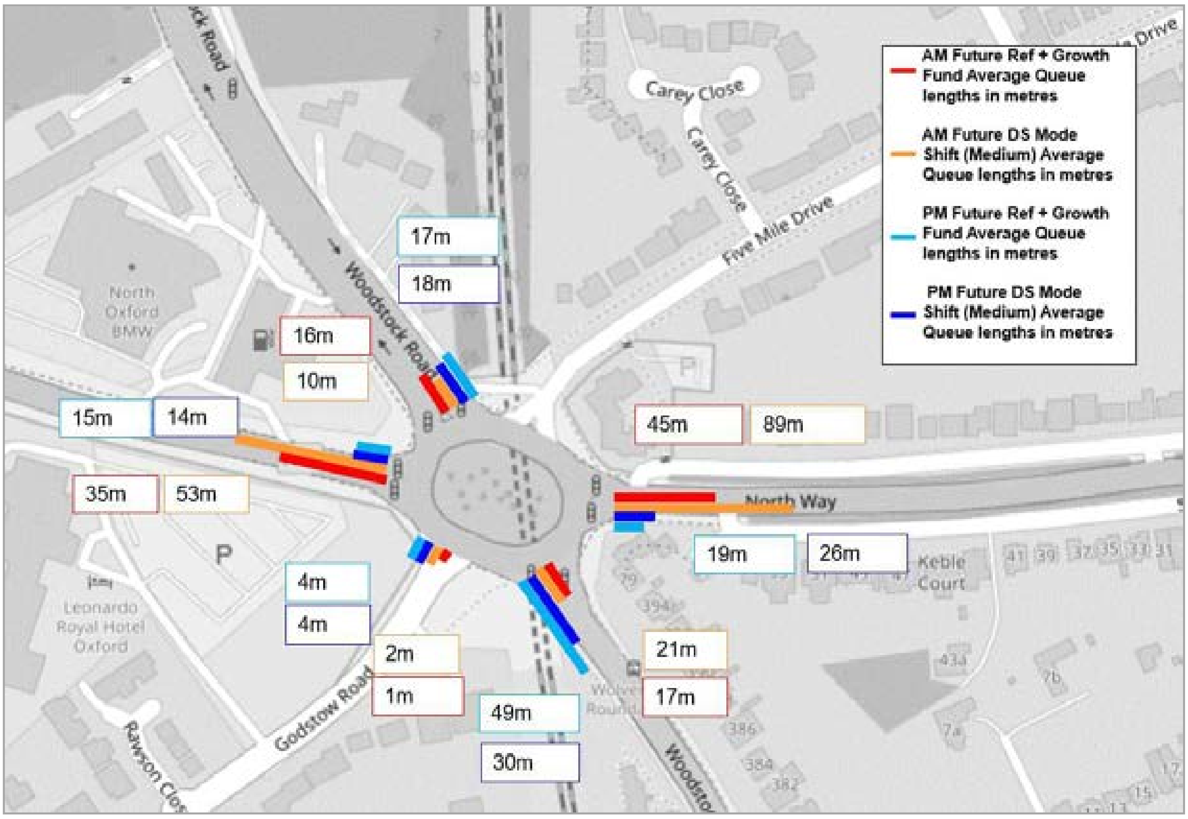
4.3.18 **Table 4.15** demonstrates that there would be a negligible increase in queue length in the AM peak period at the Wolvercote roundabout with the exception of the A40 east and west arms. The model forecasts the A40 eastern arm to experience an increase in queue length ranging from +13m (3 vehicles) to +109m (19 vehicles) depending on the hour and level of mode shift. The model forecasts the A40 western arm to experience an increase in queue length ranging from -1m to +209m (36 vehicles) depending on the hour and level of mode shift. The queuing does not result in blocking back to adjacent junctions and only materialises in the DS low mode shift scenario in one hour. As such the cumulative impact of the PR sites at this junction is not anticipated to have a severe residual impact or introduce a road safety issue.

Table 4.16: Wolvercote Roundabout Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A44 northern arm	18	+8	+8	+16	18	+7	+9	+23	17	-1	+1	-3
Five Mile Drive	0	0	0	0	0	0	0	0	0	0	0	0
A40 eastern arm	18	+7	+6	+6	18	+7	+7	+6	19	+10	+7	+7
A4144	26	-10	-11	-12	27	-9	-8	-10	49	-22	-19	-27
Godstow Rd	1	+1	0	0	1	0	0	0	4	+1	+1	0
A40 western arm	26	-2	+6	-2	52	-14	-12	-21	15	+1	-2	-2

4.3.19 **Table 4.16** demonstrates that there would be a negligible increase in queue length in the PM peak period at Wolvercote roundabout. **Figure 4.6** below illustrates the queue lengths in the AM and PM peak hours.

Figure 4.6: Wolvercote Average Queue lengths (0800-0900 and 1700-1800)



Cutteslowe Roundabout

4.3.20 **Tables 4.17** and **4.18** below summarise the forecast change in average queue lengths at Wolvercote roundabout in the AM and PM peak periods respectively.

Table 4.17: Cutteslowe Roundabout Change in Average Queue Length (m) AM Peak

Arm	07:00-08:00				08:00-09:00				09:00-10:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A4165 north arm	29	-8	-11	-12	502	-376	-467	-473	27	+58	-2	-7
A40 east arm	16	0	+1	0	345	-122	-239	-274	26	+6	-9	-9
A4165 south arm	4	+2	+2	0	18	+47	+15	-2	9	+515	+23	+8
A40 west arm	17	-5	-5	-4	36	-25	-25	-24	10	-2	-2	-1

4.3.21 **Table 4.15** demonstrates that there would be a negligible increase in queue length in the AM peak period at Cutteslowe roundabout with the exception of the A4165 south arm. The modelling forecasts reductions in queues, particularly on the A4165 north arm and A40 east arm. The queuing in the AM peak is forecast to decrease as there is a reduction in southbound movements due to the mitigations from the IDP package, which is expected to result in more people using other modes than the car. This would reduce the number of vehicles on A4165, which would reduce the number of instances of A40 traffic giving way to A4165 traffic.

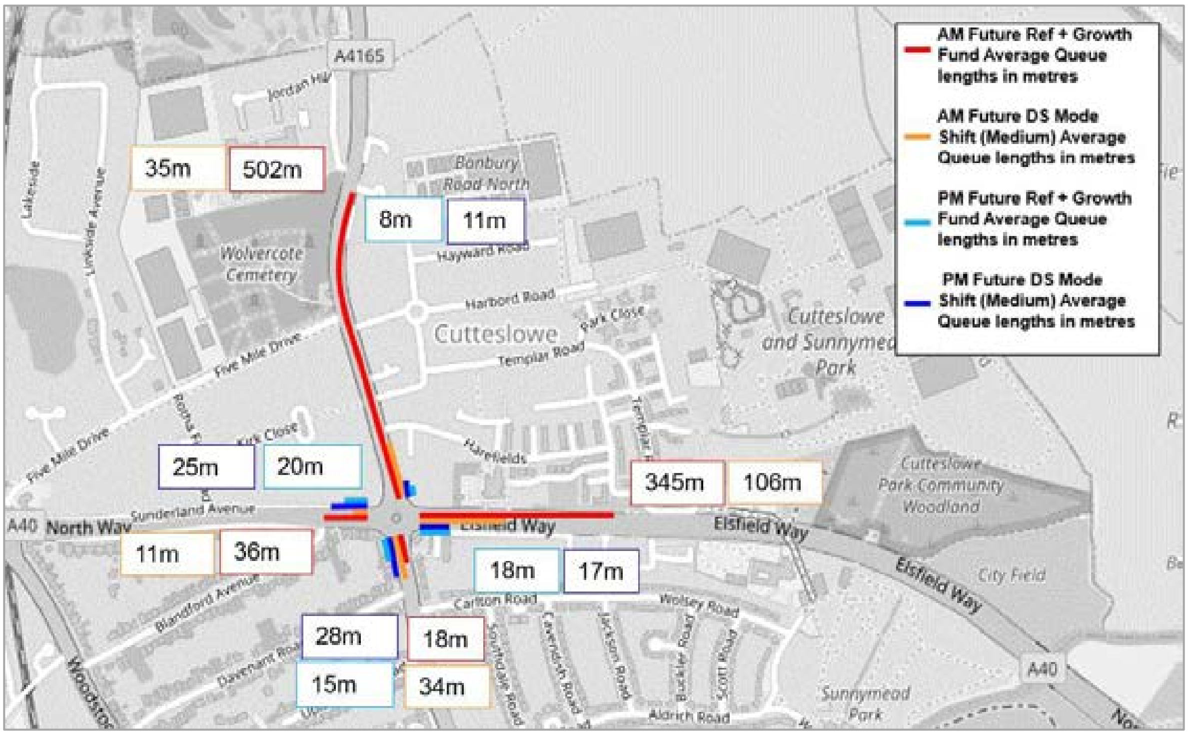
4.3.22 The model forecasts the A4165 south arm to experience an increase in queue length ranging from -2m to +515m (90 vehicles) depending on the hour and level of mode shift. The queuing does not result in blocking back to adjacent junctions and only materialises in the DS low mode shift scenario in one hour. As such the cumulative impact of the PR sites at this junction is not anticipated to have a severe residual impact or introduce a road safety issue.

Table 4.18: Cutteslowe Roundabout Change in Average Queue Length (m) PM Peak

Arm	15:00-16:00				16:00-17:00				17:00-18:00			
	Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift			Future Year Ref	DS Mode Shift		
		Low	Med	High		Low	Med	High		Low	Med	High
A4165 north arm	5	+2	+2	+2	7	+3	+2	+2	8	+4	+3	+4
A40 east arm	19	-1	-2	-1	17	0	0	-1	18	+1	-1	0
A4165 south arm	12	+2	-1	-1	9	+6	+3	+3	15	+22	+13	+7
A40 west arm	19	+3	+7	+5	21	0	+3	+1	20	+6	+5	+4

4.3.23 **Table 4.18** demonstrates that there would be a negligible increase in queue length in the PM peak period at Cutteslowe roundabout. **Figure 4.7** below illustrates the queue lengths in the AM and PM peak hours.

Figure 4.7: Cutteslowe Roundabout Average Queue lengths (0800-0900 and 1700-1800)#



Summary

4.3.24 In summary the addition of the PR sites and their mitigation provide an overall negligible impact at junctions within the study area. Where queuing does increase, this is this is anticipated to be an infrequent occurrence or does not block back to any key junction, or is adequately mitigated by the on-going delivery of the Growth Fund works As a result, it is considered that there will not be a severe residual cumulative impact from a queuing perspective.

4.4 Level of Service

4.4.0 Level of service (LOS) plots provide a qualitative measure of the operation of a junction based on the identified traffic scenarios. The LOS can be predicted as a measure of delay on each arm of the junction or across the junction as a whole. **Table 4.19** below defines the LOS by six levels ranging from level A to level F.

Table 4.19: Level of Service (LOS) Analysis

LoS	Signalised Intersection	Non-Signalised Intersection
LOS A	Delay <10 s or no volume	
LOS B	>10s to 20s	>10s to 15s
LOS C	>20s to 35s	>15s to 25s
LOS D	>35s to 55s	>25s to 35s
LOS E	>55s to 80s	>35s to 50s
LOS F	>80s	>50s

4.4.1 The peak time operation (08:00-09:00 and 17:00-18:00) has been considered in detail across the junctions contained in the traffic model. A LOS of C or above is unlikely to affect journey reliability and the delay is unlikely to be discernible from daily variations in overall journey times.

4.4.2 The off-site junctions that are forecast to have a LOS of D or below, following the introduction of the package of mitigation, are indicated below. The identified junctions represent those that potentially have a residual highway impact.

4.4.3 The comparison has also identified where the LOS improves following the introduction of the package of mitigation, demonstrating that the development impact has been mitigated. However, the comparison has identified the junctions where the LOS also worsens, and these are identified below in **Table 4.20**.

Table 4.20: LOS by Junction Comparison

Junction	LOS 08:00-09:00				LOS 17:00-18:00			
	Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift	Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift
Loop Farm Roundabout	C	C	C	C	B	D	D	D
First Turn/Woodstock Road	C	D	D	C	D	D	D	D
A40 / Eynsham Road / Cassington Road	D	D	D	D	D	D	E	D
Langford Lane/Banbury Road	F	E	F	F	C	D	D	D
Banbury Road/Moreton Road	E	E	E	E	D	E	E	E
B449/Harnborough Road	C	D	D	D	A	A	A	A
Woodstock Road/Sandy Lane/Rutten Lane Roundabout	C	F	F	F	C	E	E	D
Woodstock Road/Begbroke	A	D	D	D	A	D	D	D
Woodstock Road/Cassington Road	B	F	F	F	B	F	F	F
A40/Sunderland Avenue	D	F	E	D	B	C	C	C

4.4.4 In order to identify the potential impact of the PR sites, the delay across the individual approach arms at those junctions where the LOS is forecast to worsen has been reviewed, as indicated in **Table 4.21**. **Table 4.21** summarises the change in delay on each arm of the junctions in the DS scenarios compared to the Future Year Reference Case.

Table 4.21: Change in delay (seconds) at the junctions

Junction	Arm	AM (08:00-09:00) Peak Delay (Seconds)				PM Peak (17:00-18:00) Delay (Seconds)			
		Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift	Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift
Loop Farm Roundabout	A44 south arm	6	+8	+11	+4	10	+5	+4	+2
	A44 north west arm	19	+9	+1	+1	16	+41	+45	+42
	A4260 Frieze Way	40	+6	-10	-4	10	+2	+2	+4
	Total	**65**	**+23**	**+2**	**+1**	**36**	**+48**	**+51**	**+48**
First Turn / Woodstock Road	A4144 North	12	+1	-1	-2	8	0	+1	0
	First Turn	12	-1	0	-3	15	-4	-2	-3
	A4144 South	30	+6	+5	+3	39	+6	+6	+2
	Total	**54**	**+6**	**+4**	**-2**	**62**	**+2**	**+5**	**-1**
A40 / Eynsham Road / Cassington Road	A40 West	53	+6	+3	-1	53	+1	+8	+5
	A40 East	52	-9	-11	44	+5	+1	+4	+2
	Eynsham Rd	47	-2	-2	-1	46	+2	+3	0
	Total	**152**	**-5**	**-10**	**-10**	**148**	**-1**	**+11**	**+2**
Langford Lane/Banbury Road	Banbury Rd South	58	0	+2	+2	23	0	+1	0
	Banbury Rd North	179	-47	+16	+16	16	+2	+2	-1
	Langford Lane	18	-2	-2	-2	25	+29	+29	+28
	Total	**255**	**-49**	**+16**	**+16**	**64**	**+31**	**+32**	**+30**
Banbury Road/Moreton Road	Marston Ferry Road	46	+4	+2	+3	51	+8	+9	+4
	Banbury Rd South	41	+1	+1	+1	47	+3	+2	0
	Banbury Rd North	113	-78	-107	-33	67	+32	+22	+24
	Moreton Road	62	+7	+2	+5	66	+13	+18	+2
	Total	**262**	**-66**	**-32**	**-24**	**231**	**+56**	**+51**	**+30**
B449 / Harnborough Road	B449 North	11	+1	+3	+3	2	0	0	0
	Harnborough Rd	47	+14	+29	+34	4	+1	+1	+1
	B449 South	19	+7	+12	+15	3	0	0	0
	Total	**77**	**+22**	**+44**	**+52**	**9**	**+1**	**+1**	**+1**
Woodstock Road/Sandy Lane/ Roundabout	Woodstock Road South	21	+100	+88	+52	16	+1	0	+1
	Woodstock Road North	30	+20	+19	+22	21	+57	+41	+23

Junction	Arm	AM (08:00-09:00) Peak Delay (Seconds)				PM Peak (17:00-18:00) Delay (Seconds)			
		Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift	Future Year Ref	DS Low Mode Shift	DS Medium Mode Shift	DS High Mode Shift
	Rutten Lane	6	+11	+8	+9	8	+3	+2	0
	Total	**57**	**+131**	**+115**	**+83**	**45**	**+61**	**+43**	**+24**
Woodstock Road / Begbroke	Woodstock Rd South	4	+39	+48	+49	5	+27	+27	+27
	Woodstock Rd North	6	+46	+37	+40	6	+29	+22	+19
	Begbroke	20	+30	+30	+30	24	+108	+49	+51
	North Access	-	+41	+41	+40	-	+31	+32	+32
	Total	**30**	**+156**	**+156**	**+159**	**35**	**+195**	**+130**	**+129**
Woodstock Road/Cassington Road	A44 South	6	-1	-1	-2	4	-1	-1	-1
	A44 North	18	+189	+184	+135	16	+182	+188	+182
	Cassington Road	11	-10	+12	+12	14	+4	+3	+2
	Total	**35**	**+198**	**+195**	**+145**	**34**	**+185**	**+190**	**+183**
A40/Sunderland Avenue	A40 West	28	+25	+13	+4	14	+5	+3	+3
	Sunderland Avenue	-	-	-	-	-	-	-	-
	Total	**28**	**+25**	**+13**	**+4**	**14**	**+5**	**+3**	**+3**

Loop Farm Roundabout

4.4.5 The results show that In the AM peak hour the model forecasts an increase in total delay at the Loop Farm roundabout of 2 seconds in the DS scenario (medium mode shift) compared to the Future Year Reference Case, indicating that the impact of development will be indiscernible. In the PM peak hour the total delay across the junction increases by 51 seconds, with a delay of 45 seconds forecast on the A44 north-west arm in the peak hour period. The increases on A44 south and A4260 Frieze Way arms are negligible.

First Turn / Woodstock Road

4.4.6 The results show that the model forecasts that the AM and PM peak hours will see an increase in delay of between 4 and 5 seconds across the entire junction in the DS scenario (medium mode shift), indicating that the impact of PR sites at this junction will be negligible.

A40 / Eynsham Road / Cassington Road

4.4.7 In the AM peak hour, the entire junction is forecast to see a decrease in delay in the DS scenario (medium mode shift) compared to the Future Year Reference Case of 10 seconds. In the PM peak hour the junction is forecast to see an increase of 11 seconds in delay in the DS scenario (medium mode shift) compared to the Future Year Reference Case.

Langford Lane/Banbury Road

4.4.8 The total increase in delay at the junction is forecast to be 16 seconds in the AM peak hour and 32 seconds in the PM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case. Overall, this is a minimal impact at this junction.

Banbury Road/Moreton Road

4.4.9 In the AM peak hour, the total delay reduces across the entire junction by 32 seconds in the DS scenario (medium mode shift) compared to the Future Year Reference Case. In the PM peak hour, the total delay is forecast to increase across the junction by 51 seconds with the increases predicted on the Banbury Road (north) and Moreton Road arms being 22 and 18 seconds, respectively. The increases in delay on Banbury Road (south) and Marston Ferry Road is negligible. Overall, this is a minimal impact at this junction in the PM peak hour.

B449/Harnborough Road

4.4.10 The total increase in delay at the junction is forecast to be 44 seconds in the AM peak hour and 1 second in the PM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case. In the AM peak hour, the increase in delay is primarily experienced on the Harnborough Road arm, where there is forecast to be a 29 second delay increase. The impact on the other arms is negligible. Overall, there is considered to be a minimal impact on delays at this junction.

Woodstock Road/Sandy Lane/Rutten Lane Roundabout

4.4.11 There is forecast to be an increase in the total junction delay of 115 seconds in the AM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case. In the PM peak the increase in the total delay is forecast to be 43 seconds. There is forecast to be a delay of 88 seconds on Woodstock Road (south) arm in the AM peak hour and the impact across the Woodstock Road (north) arm and Rutten Lane during this period is negligible. In the PM peak hour, there is forecast to be an increase of 41 seconds on Woodstock Road (north). The increase on Woodstock Road (south) and Rutten Lane is negligible.

Woodstock Road/Begbroke

4.4.12 The total increase in delay at the junction is forecast to be 156 seconds in the AM peak hour and 130 seconds in the PM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case. However, there is a maximum of 49 seconds increase in delay on any one arm in the weekday peak hours in the DS scenario (medium mode shift), which is not considered to be a severe impact.

Woodstock Road/Cassington Road

4.4.13 The total increase in delay at the junction is forecast to be 195 seconds in the AM peak hour and 190 seconds in the PM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case. The majority of the delay in the AM and PM peak hours materialises on the A44 northern arm (i.e. southbound movement) as it is at this location that southbound traffic is required to merge from two lanes to one lane.

A40/Sunderland Avenue

4.4.14 The total increase in delay at the junction is forecast to be 13 seconds in the AM peak hour and 3 seconds in the PM peak hour in the DS scenario (medium mode shift) compared to the Future Year Reference Case, which would have a negligible effect on the junction.

SECTION 5 Summary and Conclusion

5.0 Summary

5.0.0 Oxfordshire County Council (OCC) has requested that the North Oxford VISSIM model is used to assess the cumulative impact of PR sites generated traffic on the operation of the highway network, in a future year when all the PR sites are fully occupied. This Technical Note sets out the traffic modelling outcomes of the modelling to support planning applications associated with the PR sites located to the north of Oxford, within Cherwell District.

Modelling Parameters

5.0.1 All committed development as identified by the PR consultants and OCC has been included in the future year model.

5.0.2 The trip generation has been derived for each of the PR sites based on their location, opportunity for trips to be undertaken via active modes and public transport, and likely internalisation, which will occur. The proposed trips have been agreed with OCC in advance.

5.0.3 To ensure a realistic level of background growth and growth occurring from committed development, trends in historic growth and housing delivery has been considered, alongside the DfT projections for growth. A methodology to cap growth and allow for realistic forecasts to be derived for assignment within the model has been outlined, such that the network capacity is not entirely exceeded prior to any development assessment work.

5.0.4 The resultant traffic figures assigned within the VISSIM model also accord with the reductions being targeted through Oxfordshire's LTCP. Continued application of increases in traffic volumes through the model forecasting would represent a significant failure in OCCs policy approach.

5.0.5 Planned and committed transport infrastructure designed to address growth elsewhere, as agreed with OCC have been included within the 'with development and mitigation' modelling runs.

5.0.6 In allocating the PR sites, CDC and OCC had due regard to the Oxford Transport Strategy approach to delivering growth, which is predicated on the assumption that wholesale increases in road capacity is no longer a sustainable or acceptable option. Furthermore, it was recognised that there are opportunities to build upon and enhance the current sustainable transport networks to ensure their use is prioritised and maximised. These measures were developed by OCC having regard to its Strategic Transport Assessment (STA) and have been included in the IDP in Appendix 4 of the Local Plan.

5.0.7 The range of mitigation measures included within the IDP have be tested within the model. The Vectos MicroSim Mode Shift Assessment Discussion Note sets out the assumptions to be applied to the demands within the VISSIM model to replicate the expected effects of changes in travel behaviour arising from the delivery of enhancements to the sustainable and active travel networks.

5.0.8 OCC's LTCP, adopted July 2022, outlines a clear vision to deliver a net-zero Oxfordshire transport and travel system by 2040, reducing private vehicle use, and prioritising walking, cycling, and public transport. The LTCP sets out the way changes to the county's transport and travel system will be needed. This multi-pronged approach sets out the reshaping of the way places are connected, and infrastructure is upgraded and reconfigured in order to achieve these aspirations. The approach includes the forthcoming area transport strategies and transport corridor strategies, OCC's new Parking Standards for New Developments (2022), the OCC Street Design Guide (2021), and a shift from an approach to transport planning characterised as 'predict and provide' towards adopting a 'decide and provide' approach instead.

5.0.9 The traffic modelling undertaken follows the 'Decide and Provide' approach and has considered multiple scenarios. The modelling process has effectively run multiple scenarios as it has tested cumulate impacts of various modal shift assumptions.

Modelling Outcomes

5.0.10 An assessment has been provided for the following:

- Network statistics across the network;
- Queue lengths and Delay for key junctions;
- Journey times across agreed key routes; and
- An assessment of the Level of Service for the key junctions.

5.1 Conclusion

5.1.0 In conclusion

- Overall across the modelled peak periods and network, the modelling shows that vehicles are able to travel through the network with latent demand continuing to remain low (i.e. vehicles not able to enter the network).
- Across the network the model forecasts a negligible effect on vehicle speed when compared with the Future Reference Case.

- Where queuing increases at junctions, this is not of a magnitude that would result in a material effect on the highway network. For example, no junctions are blocked as a result of the PR sites and the mitigation coming forward.
- Where the Level of Service of junctions has worsened as a result of the PR sites, further assessment has been undertaken on each arm of the junction. The detailed assessment identifies that there are no residual effects which would be considered severe.

5.1.1 The works set out in the IDP of the Local Plan provide the basis for the development of a sustainable transport network which will support the proposed PR sites allocations through limiting the need to travel by car and offering a genuine choice of transport modes in accordance with the NPPF.

5.1.2 A range of mitigation measures included within the IDP have be tested within the model and it is evident that the provision of active travel opportunities and public transport interventions, along with changes in travel behaviour arising from the delivery of enhancements to the sustainable and active travel networks will mitigate the impacts arising from the PR sites.

5.1.3 Given that the modelling undertaken makes no allowance for the ambitious reductions in background traffic set out in the Council's adopted LTCP and therefore the results presented herein are arguably a 'worst case', it is concluded that subject to the appropriate apportionment of contributions towards the infrastructure identified as being necessary to mitigate the cumulative impact of development, the PR sites cannot be regarded as having either a severe cumulative impact on the highway network or an unacceptable impact on highway safety which would otherwise give rise to grounds for objection in line with paragraph 111 of the NPPF.

Appendix A

vectos microsim.

REPORT

Forecasting Report

Oxford PR Site Testing VISSIM

May 2023

Contents

1 Introduction

1.1 Vectos Microsim (VM) has been commissioned by a multi-consultancy group working on behalf of a number of Partial Review (PR) Sites that are allocated within the adopted Cherwell Local Plan (Part 1) Partial Review.

1.2 VM is providing VISSIM microsimulation modelling support to all sites with a view to assisting in developing a suitable mitigation strategy for all Sites to come forward within the Local Plan period, working together with the Local Authority to agree an approach for the delivery of any infrastructure requirements and how these may be phased and financed.

1.3 The Partial Review (PR) Sites and their representatives are as follows:

i) PR6a (Land east of Oxford Road) – i-Transport LLP

ii) PR6b (Land west of Oxford Road) – KMC Transport Planning

iii) PR7a (Land South East of Kidlington) – Brookbanks

iv) PR8 (Land East of the A44) within the ownership of Oxford University Development (OUD) – KMC Transport Planning

v) PR8 (Land East of the A44) within the ownership of Hallam Land – Glanville

vi) PR9 (Land West of Yarnton) – Vectos

1.4 There are two other 'PR' Sites within the study area; PR6c (a proposed new Golf Course at Frieze Farm) and PR7b (Land at Stratfield Farm). In the case of PR6c, this is not considered to be a significant generator of peak hour traffic. In addition, the existing North Oxford Golf Club sits on the plot of land proposed for PR6b, currently designated for a residential development, meaning that the net impact of not explicitly including PR6c is negligible as the trips associated to the Golf Course are already included within the Baseline demands. The consultant on behalf of PR7b is not currently engaged with this tranche of work, however assumptions have been made to account for the site to ensure a robust assessment and this will be discussed later in the document.

2 Background

2.1 VM has received a series of VISSIM modelling files and documentation to be used as a basis for microsimulation model testing, as per the below:

i) North Oxford VISSIM Base Model – Filename "BaseModel2018_v37"

ii) Local Model Validation Report[1]

iii) North Oxford VISSIM Future Year Model – Filename "NOC PP A44 Sens Test O1D"

iv) Forecasting Report[2]

[1] North Oxford VISSIM LMVR_Issue_v3, Atkins January 2019
[2] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021

2.2 Both the VISSIM Base and Future Year Models include AM and PM scenarios covering the following time periods:

i) 06:30-10:30 (07:00-10:00 assessment period, with 30 minute warm up and cool down)

ii) 14:30-18:30 (15:00-18:00 assessment period, with 30 minute warm up and cool down)

2.3 VM has re-run the Base models (in VISSIM version 10.00-12, as per the received files) and found that results reported from these runs are identical to those presented within the LMVR. VM has also run the Future Year models (in VISSIM version 10.00-02) and compared them to the results of the 'Preferred Package' (PP) modelling presented within the Forecasting Report and found them to be very similar thereby giving assurances that the models used for the foundation of this testing are accurate.

Re-Cap – Preferred Package

2.4 SKANKSA and CAPITA Real Estate and Infrastructure were appointed by Oxfordshire County Council (OCC) to carry out microsimulation modelling iteratively testing a series of proposed schemes for four distinct corridors:

i) Corridor 1A: Cassington to Loop Farm (Cassington Roundabout)

ii) Corridor 1B: Kidlington Roundabout

iii) Corridor 1C: Kidlington to Cutteslowe (Oxford Parkway Junction)

iv) Corridor 1D: Loop Farm and Peartree Roundabouts

2.5 These were initially tested within the 2018 VISSIM Base model that underpins this testing, as well as scheme optioneering through local junction modelling including LINSIG and TRANSYT.

2.6 OCC requested that the schemes also be tested through a forecast 2023 model. Details of growth factors used and committed housing and employment development sites included, public transport amendments, and highway schemes and network changes applied to the 2018 Base to forecast the model to 2023, are found within the Forecasting Report[3].

2.7 The results of the 2023 testing put forward the preferred options as follows:

i) Corridor 1A: Staggered pedestrian crossing on the northern side of Cassington Roundabout[4]

ii) Corridor 1B: Option E was chosen, which includes signalisation and enhanced bus facilities at Kidlington Roundabout[5]

iii) Corridor 1C: No scheme proposed, as testing in the Base year scenario showed very little benefit from either of the two schemes selected for testing; and

iv) Corridor 1D: Enhanced pedestrian facilities on northern and eastern arms, and a southbound bus lane[6]

[3] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 6
[4] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 7
[5] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 8
[6] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 9

2.8 Subsequent review of the approved scheme drawings around Loop Farm show that the pedestrian facilities proposed are no longer part of the scheme delivery. As such these have been removed from the modelling.

2.9 The overarching conclusion of this Preferred Package (PP) model was that it provided a series of measures aimed primarily at sustainable transport users that were not significantly to the detriment of private vehicle users.

3 Model Updates || Committed Developments

3.1 VM has undertaken a series of updates to the received 2023 PP model with the task of developing a Future Year Reference Case for the purposes of this PR testing, which moves the forecast year to the full occupation of the PR sites.

3.2 The Local Plan Part 1 Partial Review runs to 2031. The PR sites are expected to be constructed and completed during this period up to 2031, albeit PR8 is expected to be completed shortly after by 2033. Therefore, the future horizon period will establish local highway network conditions, taking into account any appropriate background traffic growth, consented development traffic and PR site traffic upon full completion.

3.3 As the 2023 PP model includes partial build out of some of these sites, as well as partial assumptions for the PR sites, the first step was to set Baseline demands back to the 2018 position. This was carried out simply by replacing the matrices within the 2023 model with those contained within the 2018 Base. The re-forecasting process then included a 'layering-up' of specific committed development sites between the 2018 Base year and the 2031 forecast year. The following list provides the committed development sites requested by OCC to be included within the modelling:

Committed Development Sites:

i) Eynsham Garden Village

ii) West Eynsham Strategic Development Area (SDA)

iii) West Thornbury Road Eynsham

iv) Eynsham Nursery and Plant Centre

v) Land East of Woodstock (Policy EW1c)

vi) Barton Park

vii) Wolvercote Papermill Site

viii) St. Frideswide Farm (SP4)

ix) Hill Rise, Woodstock (Policy EW4)

x) Banbury Road, Woodstock (Policy EW5)

xi) Oxford North (CS6)

xii) Park View

xiii) Begbroke Science Park

xiv) Oxford Technology Park

3.4 VM will discuss each committed site in turn, detailing its location, site access arrangements, mitigation, and demand assumptions for including the site within the forecasting process.

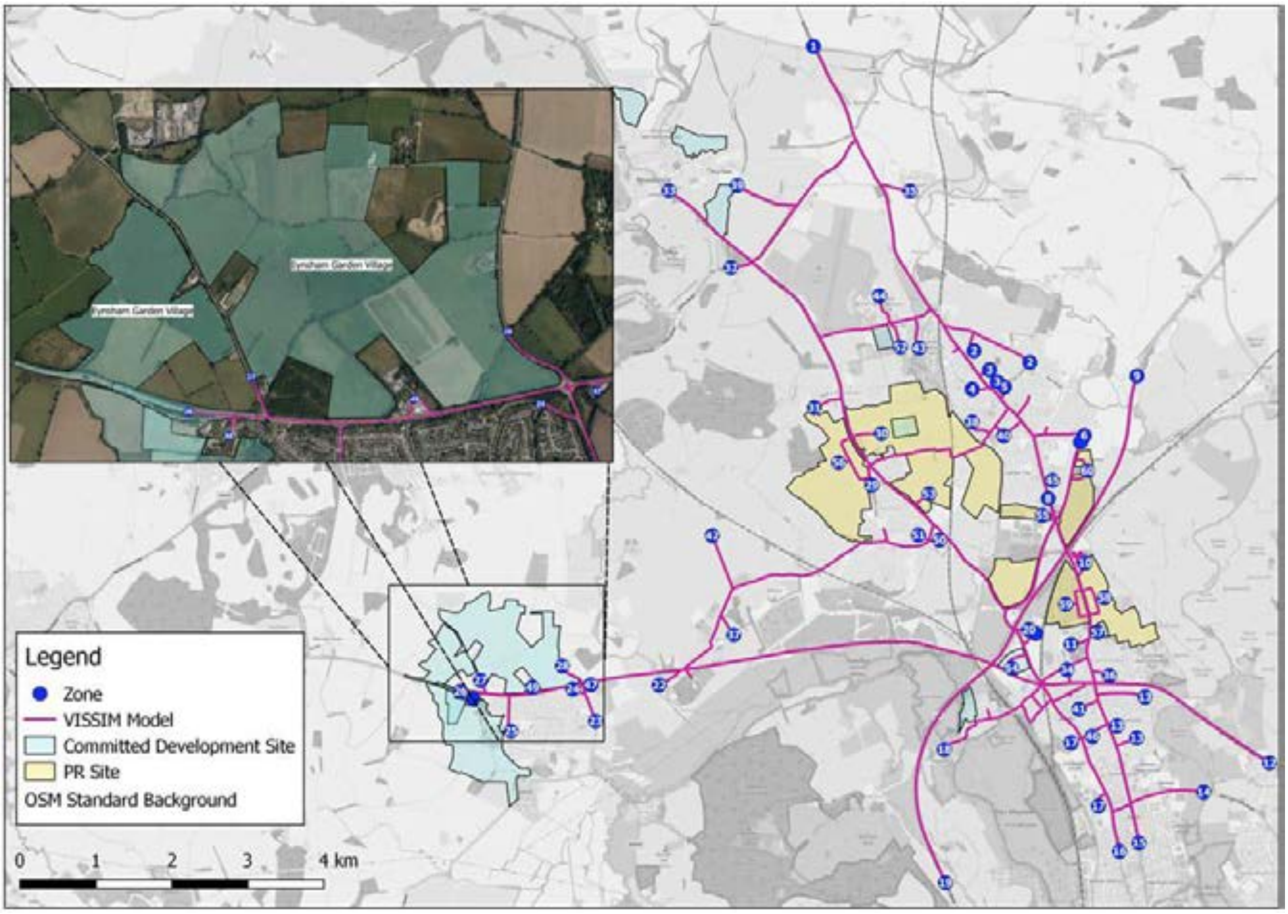
Eynsham Garden Village (20/01734/OUT)

3.5 Eynsham Garden Village (Land North of A40; A40 Section from Barnard Gate to Eynsham Roundabout, Eynsham, Oxfordshire) is identified in the Local Plan as an area for strategic growth. The site is proposed to be a mixed-use development providing both residential and employment growth, alongside a local centre, education, leisure and community facilities.

3.6 The highway proposals for the Garden Village involve new links between Lower Road and Cuckoo Lane, a new junction onto the A40, and then further connections southwards circumventing Witney Road on the west side before joining the B4449. As this Site is located to the far west of the VISSIM model extent, a simplified approach was taken whereby development trips are loaded onto existing Zone 26, which represents A40 western zone acting as the generator/attractor of all A40 traffic.

3.7 A map showing the location of Eynsham Garden Village within the context of the VISSIM modelling is provided below:

Figure 1: Eynsham Garden Village Site Location



3.8 In 2020 Wood, on behalf of OCC, carried out VISSIM modelling to test the highway impact of the Garden Village and West Eynsham SDA development proposals. OCC has identified that trip assumptions for that study should be replicated for this one, therefore trip generation has been taken from Table 1 of the Wood report[7].

3.9 The Wood Report only reports peak hour trip generation (08:00-09:00 and 17:00-18:00). Therefore a TRICS Residential Total Person temporal profile is calculated to estimate the vehicle trips in the shoulder peaks. The TRICS rates used for this, and for other committed development sites where applicable, are as follows:

Table 1: TRICS Residential Temporal Profile

	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	0.109	0.494	0.603	54%	66%	63%
08:00-09:00	0.202	0.749	0.951	100%	100%	100%
09:00-10:00	0.198	0.263	0.461	98%	35%	48%
PM Peak Period						
15:00-16:00	0.518	0.276	0.794	89%	101%	93%
16:00-17:00	0.520	0.269	0.789	89%	98%	92%
17:00-18:00	0.584	0.274	0.858	100%	100%	100%

3.10 The Report suggests that distribution was informed by SATURN OSM outputs. A VISUM model was then developed to assign the forecast trips through the VISSIM model extent, and finally outputs were converted back to static routes and run through VISSIM via static assignment. The output distribution is not provided within the report, therefore provided within the TA[8] are illustrations of the direction from/to which development trips are forecast to be travelling. These suggest that 28% of AM peak hour demand, and 35% of PM peak hour demand, travels to/from A40 east. Trips travelling north are expected to travel via Lower Road towards A4095 Bladon and onto the A44. Trips travelling west are expected to join or egress the A40 via the western-most proposed Site access and therefore not interact with the VISSIM model extent. Trips travelling south are expected to travel via B4044 towards Botley and onto the A420 or A34. As a result only eastern trips are considered.

3.11 These total trip generations are multiplied by the percentages of trips travelling to/from the east and assigned to existing Zone 26.

3.12 Distribution present within the existing zone 26 in the VISSIM model is interrogated to provide the wider distribution assumptions across the whole VISSIM network. Some zones are excluded as they a) refer to destinations/origins that would be travelled to/from by routes other than the A40, or b) they refer to sites that could be considered 'internal' as they are within the immediate vicinity of the proposed Site. This ensures a robust assessment of trips travelling along the A40 towards (or away from) the primary study area by discounting any short-distance trips within the Eynsham area that may have resulted by including those proximal zones within the distribution calculations.

[7] Garden Village AAP and West Enysham SPD Evidence Base, 2031 Forecast Year Modelling, July 2020.
[8] 20_01734_OUT-TRANSPORT_ASSESSMENT-856882, Figures 6-26 and 6-27.

3.13 Tables showing the derived in/out trip generation totals within the VISSIM model extent related to the Eynsham Garden Village committed site for each hour during the AM and PM peaks are given below.

Table 2: AM In/Out Totals for Eynsham Garden Village

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Eynsham Garden Village	163	144	303	218	297	77

Table 3: PM In/Out Totals for Eynsham Garden Village

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Eynsham Garden Village	221	351	222	342	249	349

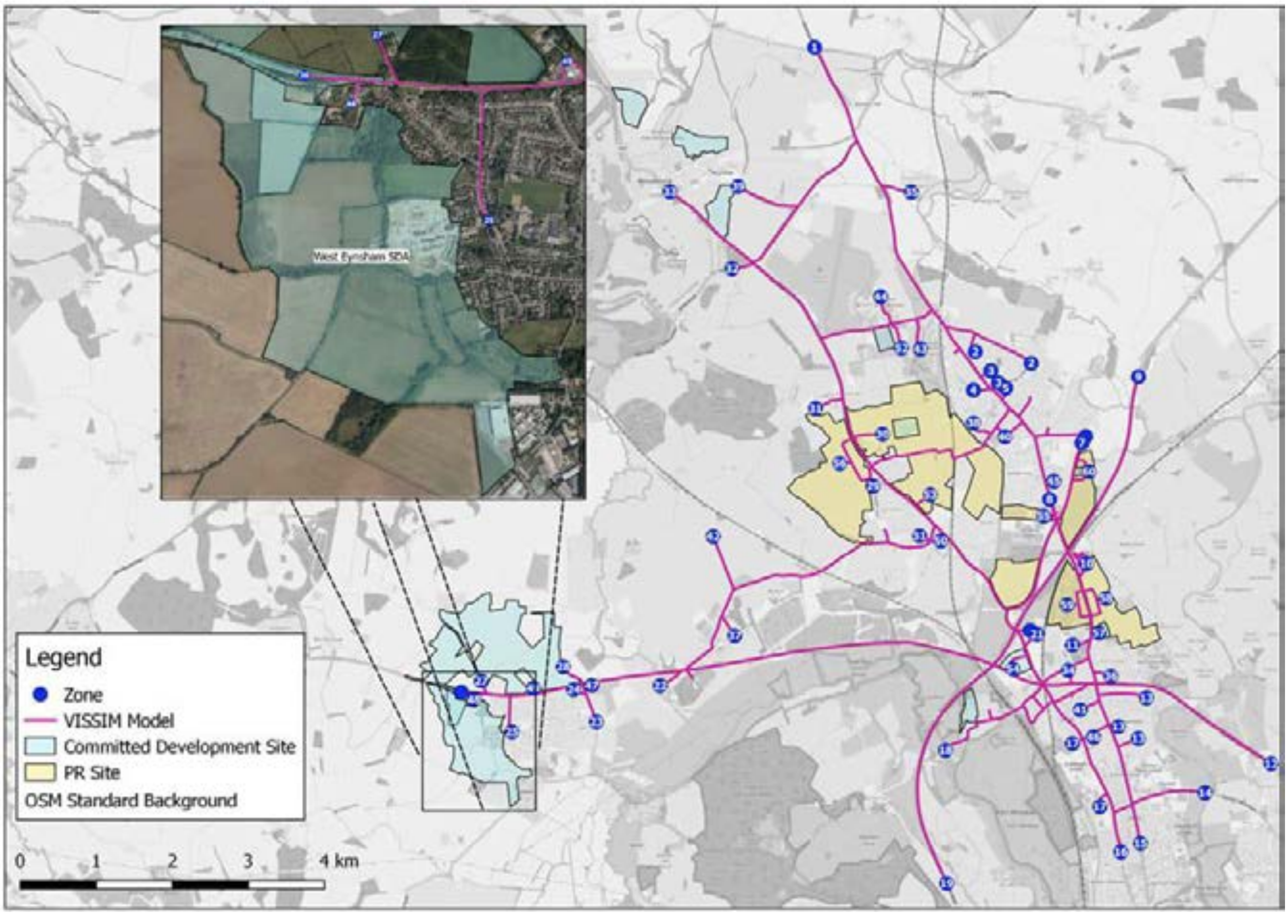
West Eynsham Strategic Development Area (20/03379/OUT)

3.14 The West Eynsham Strategic Development Area (SDA) is allocated as a site to accommodate a new sustainable and integrated community of approximately 1000 dwellings with supporting services and infrastructure. The total site covers approximately 88 hectares and lies immediately to the west of Eynsham.

3.15 The site is to be accessed via the fourth (southern) arm of a new A40 roundabout to be introduced as part of the Eynsham Park and Ride proposals.

3.16 A Figure showing the location of the West Eynsham Strategic Development Area within the context of the wider VISSIM model is provided below:

Figure 2: West Eynsham Strategic Area (SDA) Site Location



3.17 As per the methodology for calculating the Garden Village trip generation, Table 1 of the Wood report is used.

3.18 This site sits adjacent to Eynsham Garden Village, just on the southern side of the A40 rather than the northern side. As a result a similar approach has been taken to distribution across the wider VISSIM model. The same proportions of local distribution (i.e. north/east/south/west movements) has been applied to the total trip generation, and then distributed further based on the baseline distribution for zone 26 in the VISSIM model (which represents A40 West).

Table 4: AM In/Out Totals for West Eynsham Strategic Development Area (SDA)

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
West Eynsham (SDA)	20	51	37	77	36	27

Table 5: PM In/Out Totals for West Eynsham Strategic Development Area (SDA)

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
West Eynsham (SDA)	88	51	88	49	99	50

West Thornbury Road Eynsham

3.19 West Thornbury Road Eynsham is a committed development within the boundaries of the West Eynsham SDA and therefore, in/out trip generation has been considered within the calculations for the full West Eynsham Strategic Development Area (SDA) allocation as described above.

Eynsham Nursery and Plant Centre (15/00761/FUL)

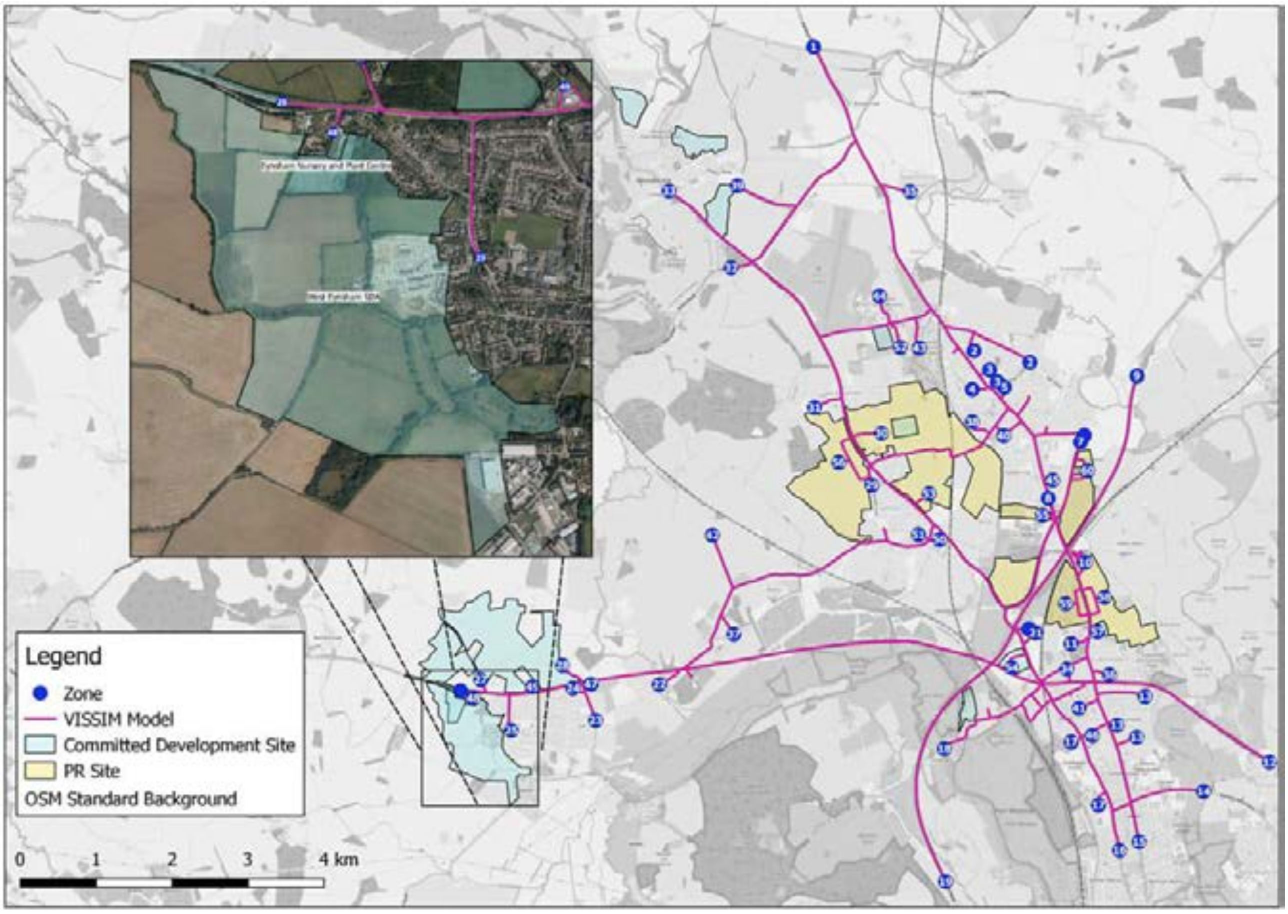
3.20 Eynsham Nursery and Plant Centre is a committed development site for 77 dwellings located west of Eynsham, sitting within the West Eynsham SDA. The site had not been delivered at the time of the VISSIM Base model development but has been since and is therefore included in this forecasting exercise.

3.21 An account for this site had been made during the forecasting process undertaken by SKANSKA/CAPITA as part of their work for the North Oxford Corridor 2023 PP modelling. Trips were assigned to the same zone that previously served the Nursery and Plant Centre. Having now been built, the site is actually accessed by an extension to Old Witney Road and a connection to the old access driveway that served the Nursery and Plant Centre, which has been stopped up at the request of OCC to avoid a direct link onto the A40.

3.22 The starting point for this exercise was to set the baseline demands to the 2018 position before re-forecasting, and so this exercise seeks to re-account for the trips associated with this development. The minor network updates required to formally and fully account for the delivery of this site have not been applied to the model as they would have no material impact on the outcomes of the testing.

3.23 Map showing the location of the Eynsham Nursery and Plant Centre along with the wider model network is provided below.

Figure 3: Eynsham Nursery and Plant Centre Site Location



3.24 Similarly to the Eynsham Garden Village and West Eynsham SDA sites, the same distribution assumptions are applied and Zone 26 (A40 West) is considered to be the development zone. This simplifies the process of including all committed development sites, whilst taking a robust approach to corridor flows along the A40 by ensuring vehicles are easily able to access the main route into Oxford.

3.25 Tables showing the in/out trip generation totals of the Eynsham Nursery and Plant Centre for each hour during the AM and PM peaks are provided below.

Table 6: AM In/Out Totals for Eynsham Nursery and Plant Centre

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Eynsham Nursery and Plant Centre	2	6	3	9	3	3

Table 7: PM In/Out Totals for Eynsham Nursery and Plant Centre

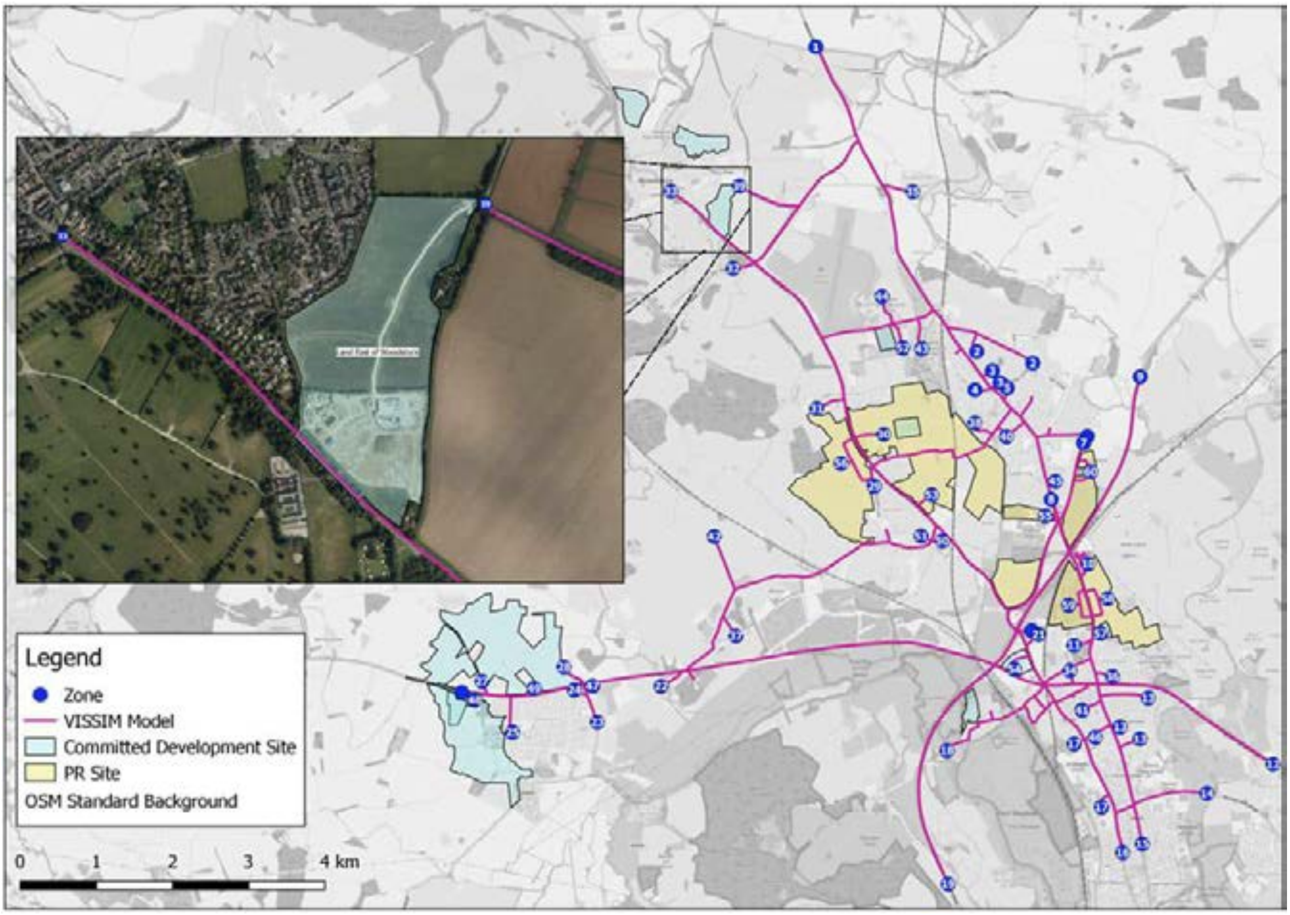
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Eynsham Nursery and Plant Centre	9	6	9	6	10	6

Land East of Woodstock (Policy EW1c) (16/01364/OUT)

3.26 Land East of Woodstock is a committed development site located north of the A44 Oxford Road. The site includes proposals for up to 300 residential dwellings and up to 1,100sqm of A1/A2/B1/D1 floorspace. The Site is served via two accesses; one via A44 Oxford Road and the other via Shipton Road. These are assigned to zones 33 and 39, and these are assumed to be the development zones.

3.27 A Figure showing the location of the Land East of Woodstock within the context of the wider VISSIM model is provided below.

Figure 4: Land East of Woodstock Site Location



3.28 The TA[9] outlined trip generation for the peak hours split between residential and office-based employment trip purposes. The TA also provides percentages for trip distribution across the wider Oxford area. These assumptions are used to assign one or more VISSIM zones to the links/locations provided within the trip assignment calculations and VISSIM matrices are then derived therefrom. Trip generation is available within the TA for all model peak hours via the residential and office trip rates present within Appendix C of the TA and Appendix B of the TA Addendum[10], respectively.

[9] 16_01364_OUT-ENVIRONMENTAL_STATEMENT_TECH_APPENDIX_E1-420981
[10] 16_01364_OUT-15291-03B_ADDENDUM_TRANSPORT_ASSESSMENT_13_-449339

3.29 Tables showing the in/out trip generation totals for the Land East of Woodstock site for each hour during the AM and PM peak periods are given below.

Table 8: AM In/Out Totals for Land East of Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Land East of Woodstock	26	63	46	84	44	44

Table 9: PM In/Out Totals for Land East of Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Land East of Woodstock	54	44	66	55	80	65

Barton Park (13/01383/OUT)

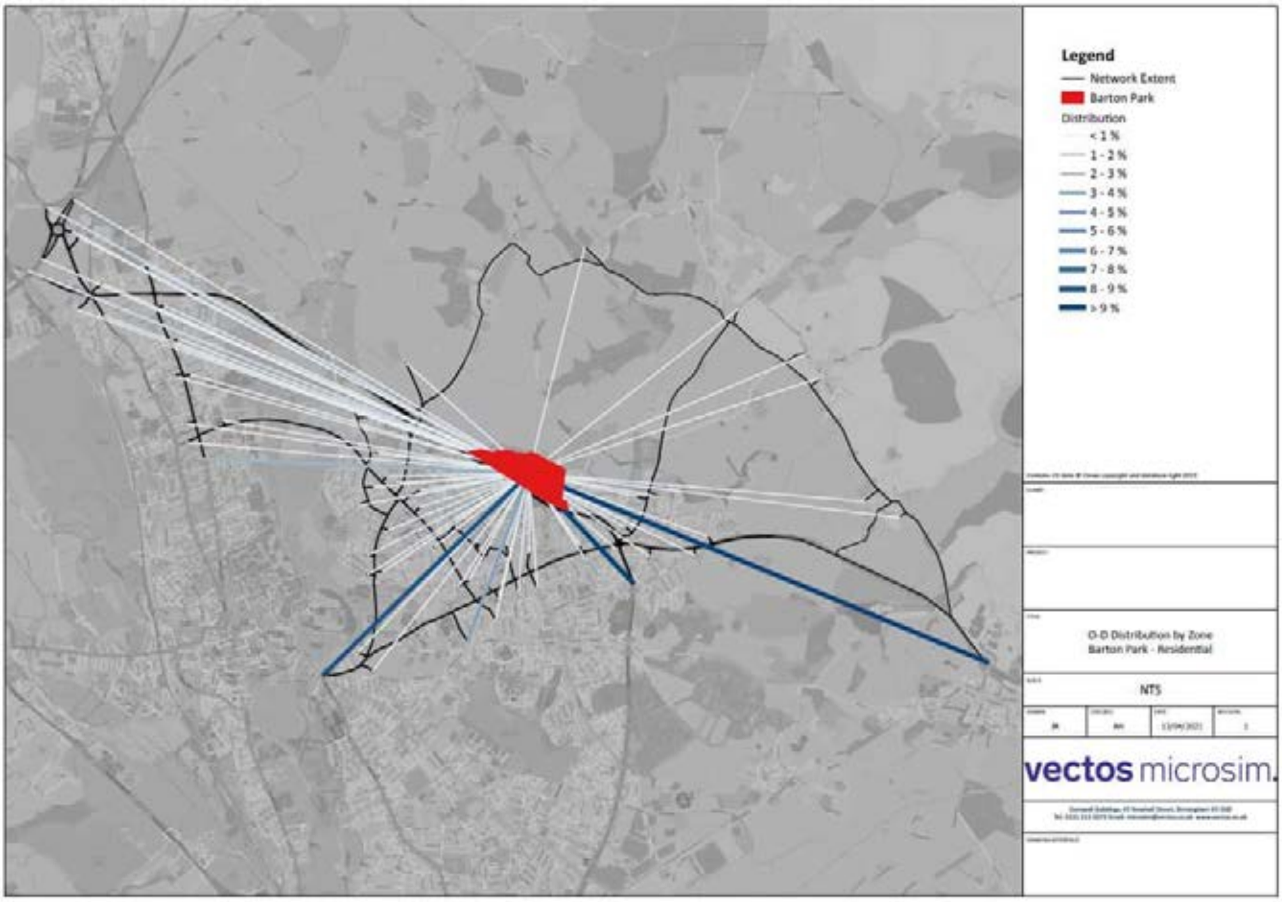
3.30 Barton Park is a committed development site lying just beyond the extent of the VISSIM network, located northwest of Headington Roundabout and east of the A40 Northern Bypass Rd. The outline application is for a maximum of 885 residential units, 2500sqm of employment, Care Home, School and community facilities.

3.31 Trip generation data for the peak hours only were available from the Transport Assessment[11]. Trip generation for the shoulder hours was calculated via the TRICS Residential Total Person temporal profile rates as provided in Table 1.

3.32 In regards to distribution, VM are currently engaged on a separate project within Oxfordshire that required the calculation of Barton Park distribution based on a combination of 2011 Census Travel to Work data and Google maps routing data to derive the most likely route. This resulted in a distribution plot as per the image overleaf:

[11] 13_01383_OUT-EIA_TRANSPORT_ASSESSMENT_PART_1_OF_2-1373941, Table 8.8

Figure 5: Barton Park Trip Distribution

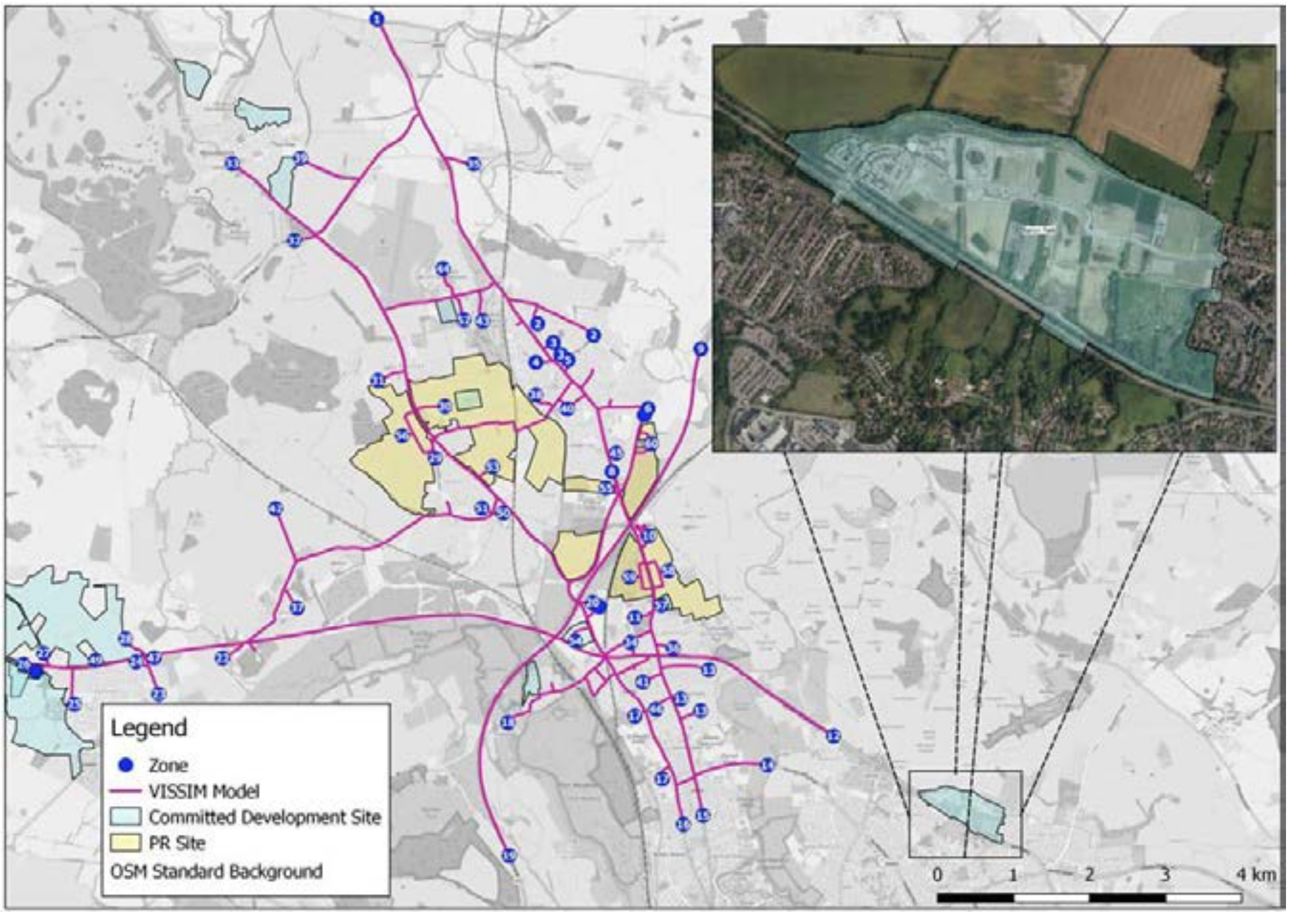


3.33 As the VISSIM network for this testing includes only part of this network, only trips travelling to/from west of Marston Interchange, and to/from west of the B4495 bridge over the River Cherwell, are considered which equates to a total of 10.48% of all trips interacting with the model network. As shown in the distribution plot, many of the site's trips are forecast to travel to/from Central Oxford, A40 Eastern By-Pass Road or A40 London Road towards Wheatley.

3.34 Depending on which origin/destination trips are travelling from/to, the development zone for Barton Park is assumed to be either 12 or 14, which relates to A40 East and B4495 Marston Ferry Way respectively. Trips travelling between Barton Park and A4165 or A4144 are assumed to travel via B4495 and therefore assume zone 14 as their entry/exit point to the VISSIM model, whereas all other trips assumed zone 12.

3.35 A Figure showing the location of Barton Park within the context of the wider VISSIM model is provided below.

Figure 6: Barton Park Site Location



3.36 Tables showing the in/out trip generation totals of the Barton Park for each hour during the AM and PM peaks are given below.

Table 10: AM In/Out Totals for Barton Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Barton Park	9	19	17	29	17	10

Table 11: PM In/Out Totals for Barton Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Barton Park	38	34	39	32	44	33

Wolvercote Papermill (13/01861/OUT)

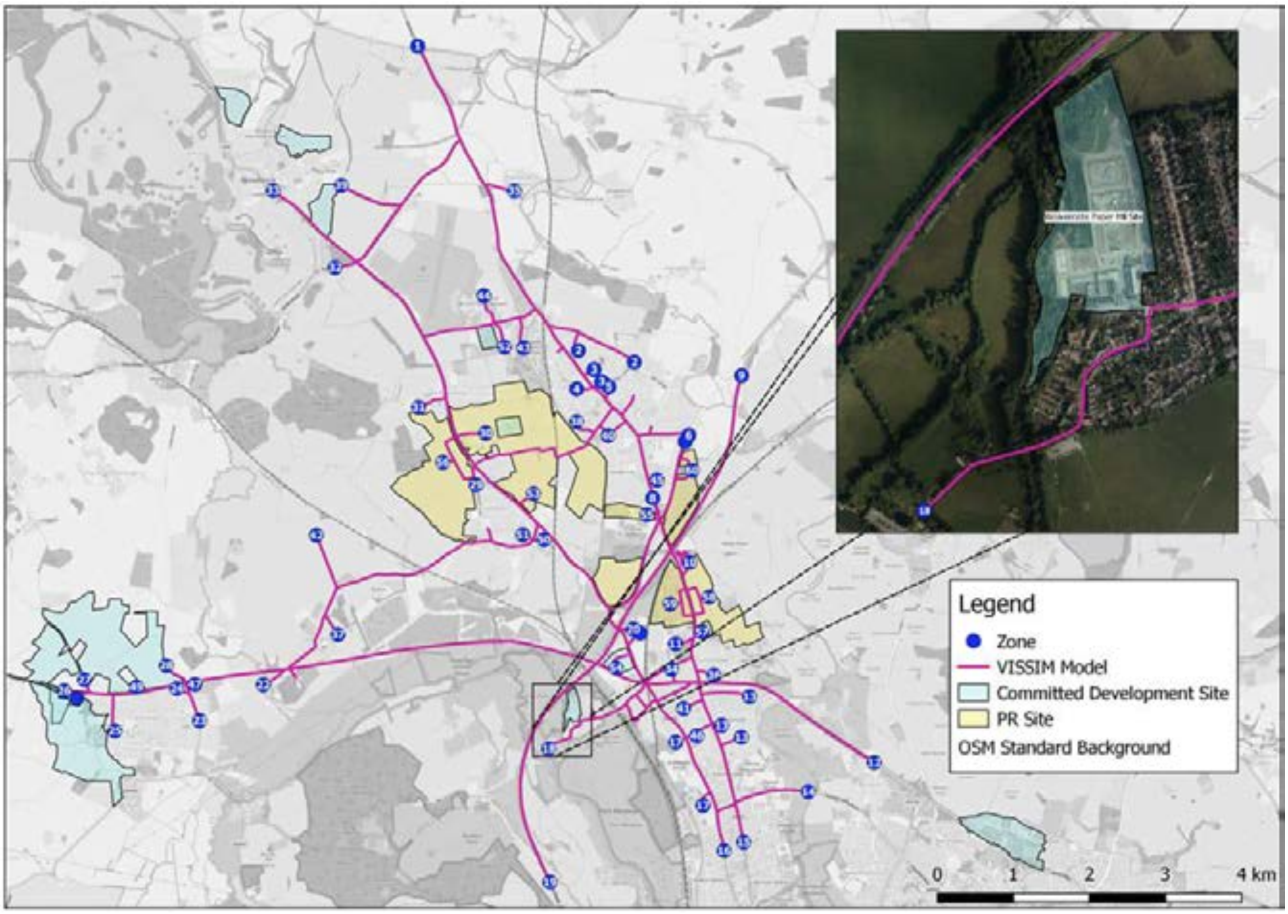
3.37 Wolvercote Papermill is a committed development site located north of Oxford and southwest of Wolvercote Roundabout. The site proposes up to 190 residential units, employment space, community facilities, public open space and ancillary services.

3.38 The VISSIM development zone is assumed to be Zone 18, which represents Godstow Road which will serve the Site. The TA contains the forecast trip generation for the Site[12] and these vehicles have been assigned to this zone. The trip generation for the purposes of the VISSIM model have been adjusted to account only for those trips that will interact with the VISSIM network, i.e. any trips approaching or exiting the site via Godstow Road west towards Wytham have been excluded.

3.39 Distribution across the VISSIM model area is based on the existing distribution present within Zone 18 of the 2018 Base model.

3.40 The Figure below showing the location of the Barton Park within the context of the wider VISSIM model is provided below.

Figure 7: Wolvercote Paper Mill Site Location



[12] 13_01861_OUT-TRANSPORT_ASSESSMENT-1386134, Table 7.2

3.41 Tables showing the in/out trip generation totals of the Wolvercote Papermill Site for each hour during the AM and PM peaks are given below.

Table 12: AM In/Out Totals for Wolvercote Papermill Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Wolvercote Papermill Site	5	47	8	67	8	34

Table 13: PM In/Out Totals for Wolvercote Papermill Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Wolvercote Papermill Site	35	17	36	17	45	20

St. Frideswide Farm (SP24) (21/01449/FUL)

3.42 St. Frideswide Farm is a committed development site proposing 134 dwellings and community facilities. The site is located along the northern edge of Oxford City and immediately north of Cutteslowe Roundabout. It is served via a priority T-junction with Oxford Road.

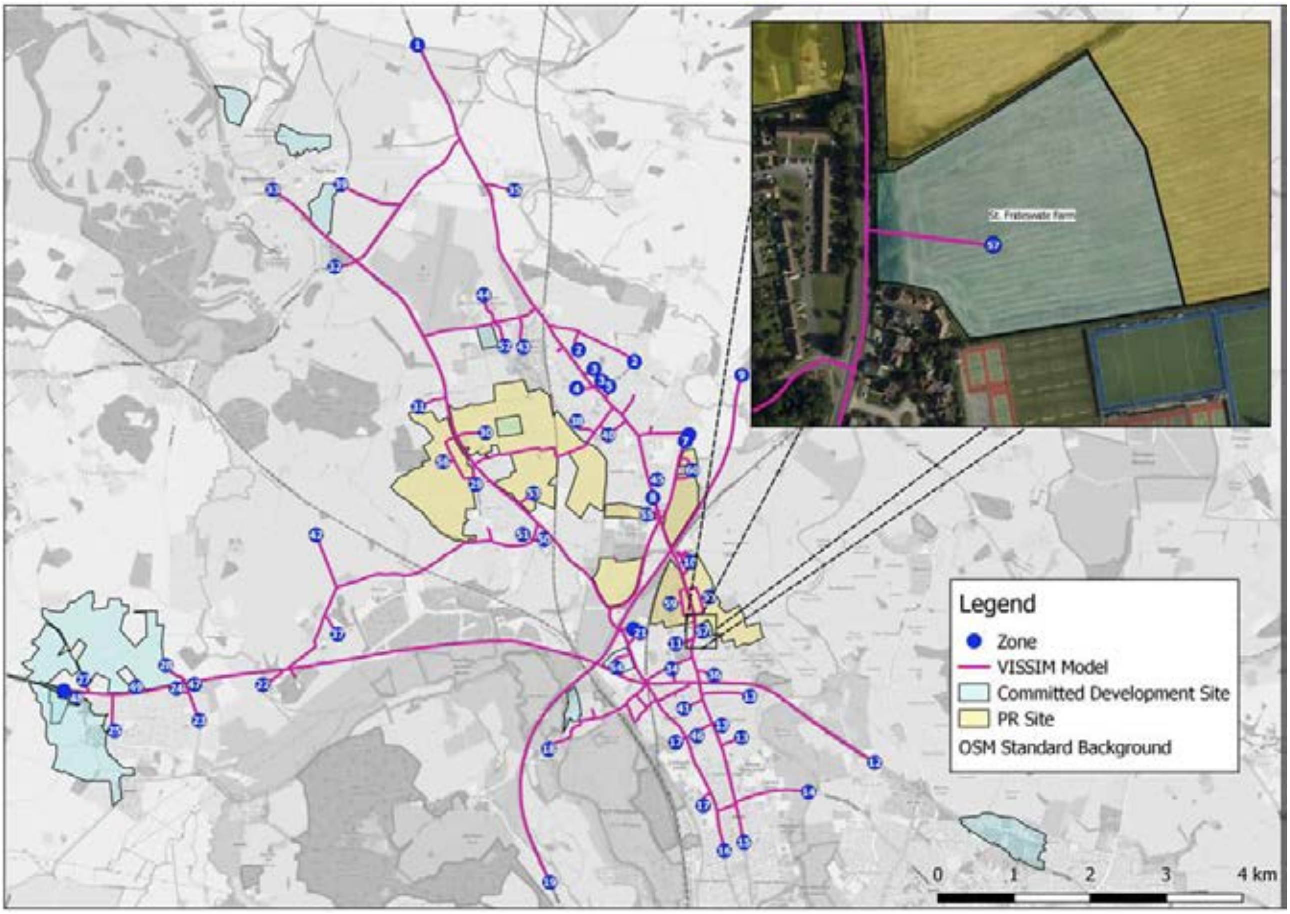
3.43 The site lies within the model extent but with no existing zone to assign the trips to. Therefore, a new zone (zone 57) has been assigned to this site.

3.44 Trip generation for the peak hours is taken directly from the TA[13]. Trip generation for the shoulder hours is calculated via the TRICS Residential Total Person temporal profile, as provided in Table 1. Distribution is informed by the existing distribution to/from Zone 36, which represents a residential zone immediately south of this proposed location (i.e. Harefields).

[13] 21_01449_FUL-TRANSPORT_ASSESSMENT__PART_1_-2552872, Table 6.5

3.45 The Figure below presents the location of St. Frideswide Farm in the context of the wider model network.

Figure 8: St. Frideswide Farm Site Location



3.46 The Figure below shows the proposed site access arrangement for St. Frideswide Farm.

Figure 9: St. Frideswide Farm Site Access Arrangements

3.47 Tables showing the in/out trip generation totals for St. Frideswide Farm Site for each hour during the AM and PM peaks are provided below.

Table 14: AM In/Out Totals for St. Frideswide Farm

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
St. Frideswide Farm	8	33	14	51	14	18

Table 15: PM In/Out Totals for St. Frideswide Farm

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
St. Frideswide Farm	34	16	34	16	38	16

Hill Rise, Woodstock (Policy EW4) (21/00189/FUL)

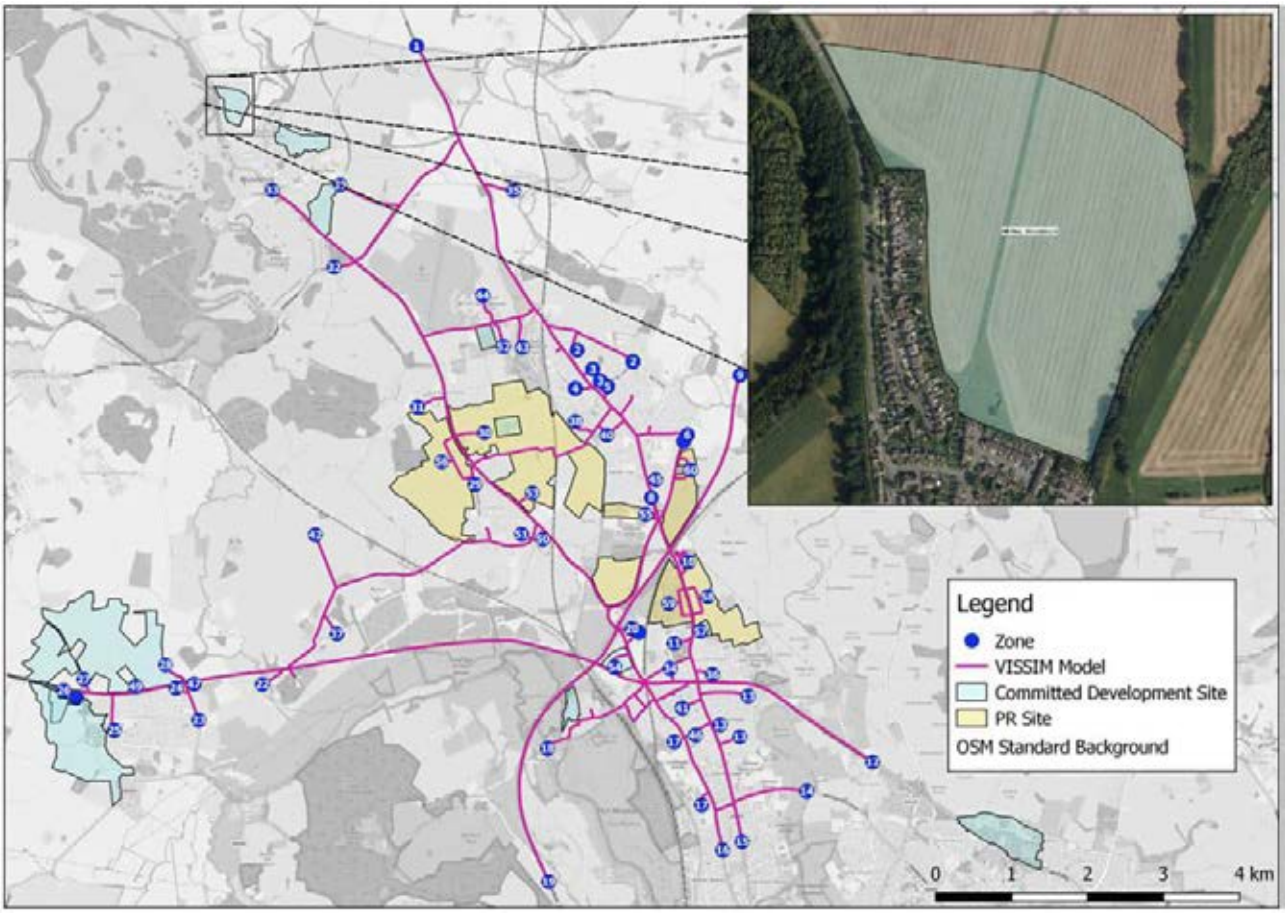
3.48 Hill Rise is a committed development site located North of Hill Rise in Woodstock. The hybrid planning application consists of 74 dwellings, 60sqm of community space and associated facilities and infrastructure.

3.49 Trip generation for the peak hours are taken directly from the TA[14]. Shoulder hours are calculated via the TRICS Residential Total Person temporal profile, as provided in Table 1.

3.50 The Site lies just north of the VISSIM Model network, served by A44 Manor Road in Woodstock. In the VISSIM model this location is represented by Zone 33 and development trips are assigned to this zone.

3.51 The Figure below shows the location of Hill Rise Woodstock in the context of the VISSIM model.

Figure 10: Hill Rise Woodstock Site Location



[14] 21_00189_FUL-TRANSPORT_ASSESSMENT-921976, Table 9

3.52 Tables showing the in/out trip generation totals for Hill Rise Woodstock for each hour during the AM and PM peaks are provided below.

Table 16: AM In/Out Totals for Hill Rise, Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Hill Rise, Woodstock	10	27	18	41	18	14

Table 17: PM In/Out Totals for Hill Rise, Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Hill Rise, Woodstock	34	23	34	23	38	23

Banbury Road, Woodstock (Policy EW5) (21/00217/OUT)

3.53 Banbury Road is a committed development site located north of Banbury Road in Woodstock. The site proposes up to 250 dwellings and associated community space.

3.54 Similarly to Land East of Woodstock, the Site is served via two accesses; one via A44 Oxford Road and the other via Shipton Road and therefore two existing zones (zone 33 and 39) are assumed to be the development zones.

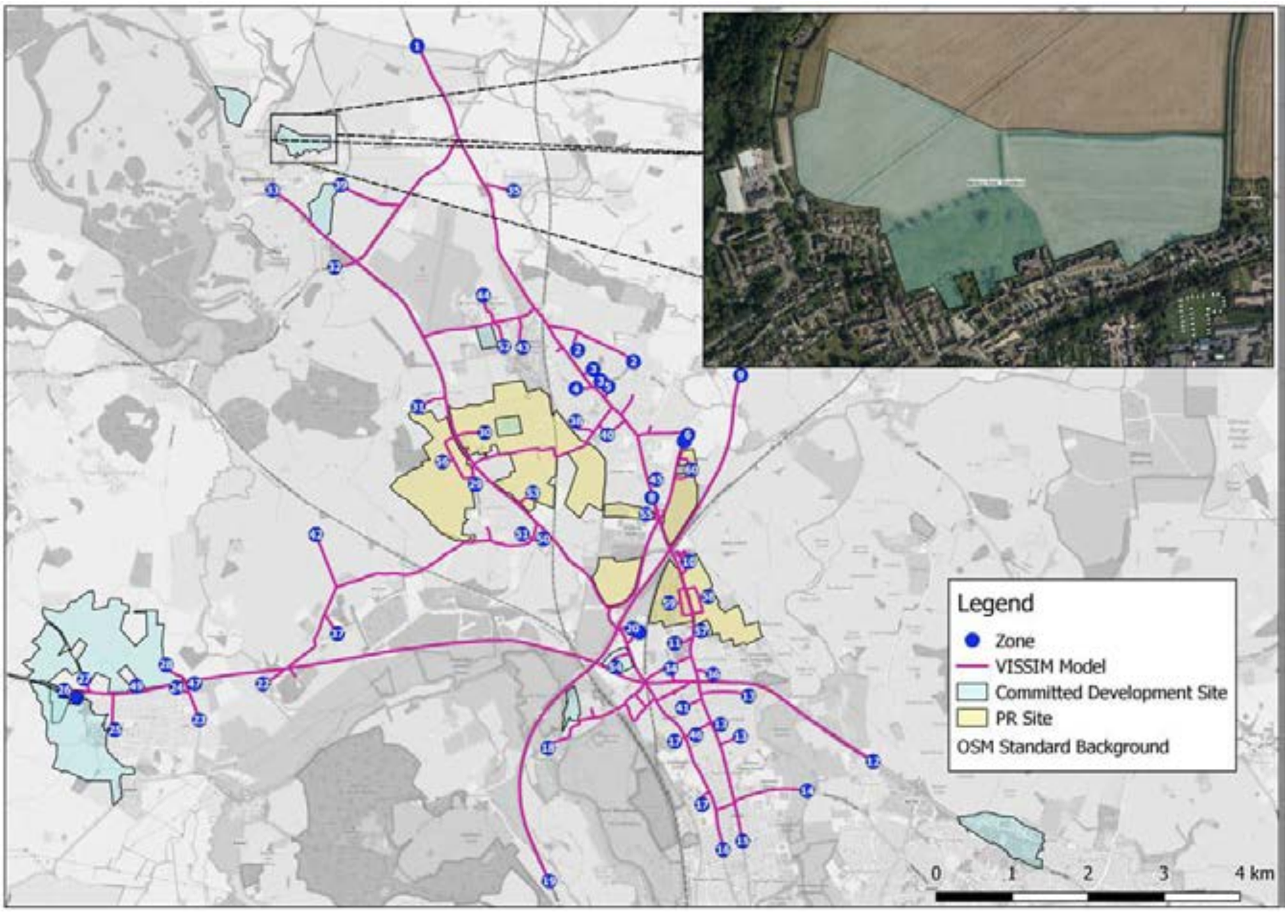
3.55 Trip generation for the peak hours is taken directly from the TA[15]. Trip generation for the shoulder hours is calculated from the TRICS Residential Total Person temporal profile, as provided in Table 1.

3.56 Local distribution is also taken from the TA[16]. Wider distribution beyond the local junctions is also defined within the TA[17], where percentages are assigned to links across Oxford and these locations are assigned a corresponding VISSIM zone.

[15] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Table 9
[16] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Appendix F
[17] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Table 11

3.57 The Figure below provides the location of the Banbury Road site within the wider VISSIM model network.

Figure 11: Banbury Road Woodstock Site Location



3.58 Tables showing the in/out trip generation totals for Banbury Road-Woodstock for each hour during the AM and PM peaks are provided below.

Table 18: AM In/Out Totals for Banbury Road, Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Banbury Road, Woodstock	20	53	37	82	32	39

Table 19: PM In/Out Totals for Banbury Road, Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Banbury Road, Woodstock	68	46	68	45	74	47

Oxford North (CS6) (18/02065/OUTFUL)

3.59 Oxford North is a proposed mixed use development site located north-west of Wolvercote roundabout. Proposals include 87,300m² of B1 employment, up to 480 dwellings, a hotel and up to 2,500m² of local retail uses.

3.60 The site is served via an internal link that is connected at either end by two signalised junctions; one on the north side with A44 Woodstock Road and the other one on the south side with A40 Northern Bypass Road. This Site is partially included within the 2023 network that is used for the basis of this testing, but only Phase 1 of the development demands and site access arrangement/mitigation that accompany Phase 1 is applied. For the purposes of developing a 2031 model the full demands and network upgrades have been included, which includes enhancements at Peartree Roundabout and along the A44 corridor to Wolvercote Roundabout. The drawings used to upgrade the VISSIM modelling to the forecast 2031 position are provided in Appendix A.

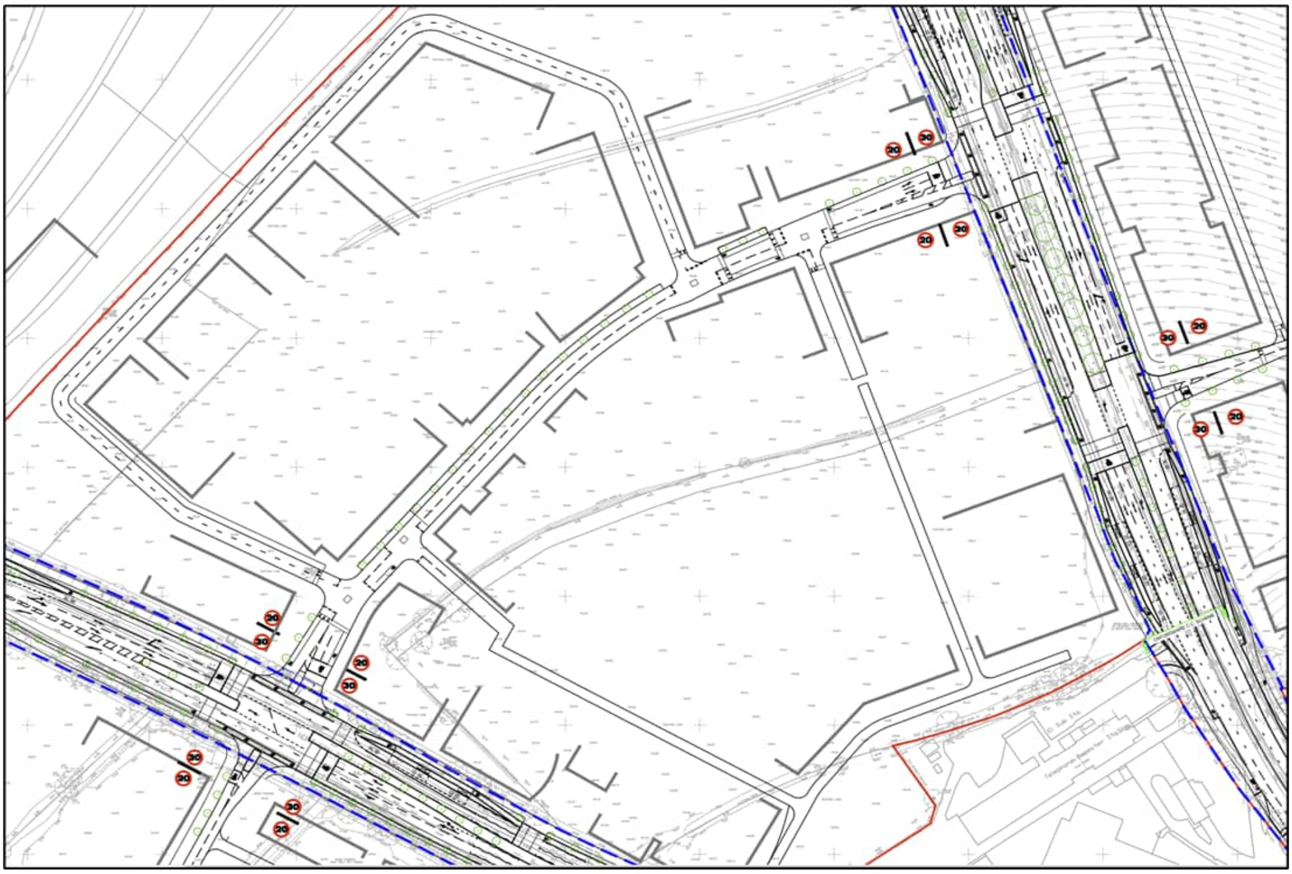
3.61 Regarding the demands, trip rates are taken directly from the TA[18]. These are then disaggregated into hourly rates and multiplied by the B1, Residential and Hotel land uses individually, before combining into hourly trip generation values. Distribution is informed by the existing distribution within the 2023 model.

3.62 Zone 107 in the 2023 model represents the Oxford North Site and this remains the development zone in the 2031 model; note however that zone numbers have been rationalised during the 2031 model build and therefore the zone number becomes Zone 54.

[18] 18_02065_OUTFUL-TRANSPORT_ASSESSMENT__PART_2__-_180731_TA_001-2020183, Table 4.2

3.63 The Figure showing the site access arrangements of Oxford North (CS6) is provided below.

Figure 12: Oxford North Site Access Arrangements

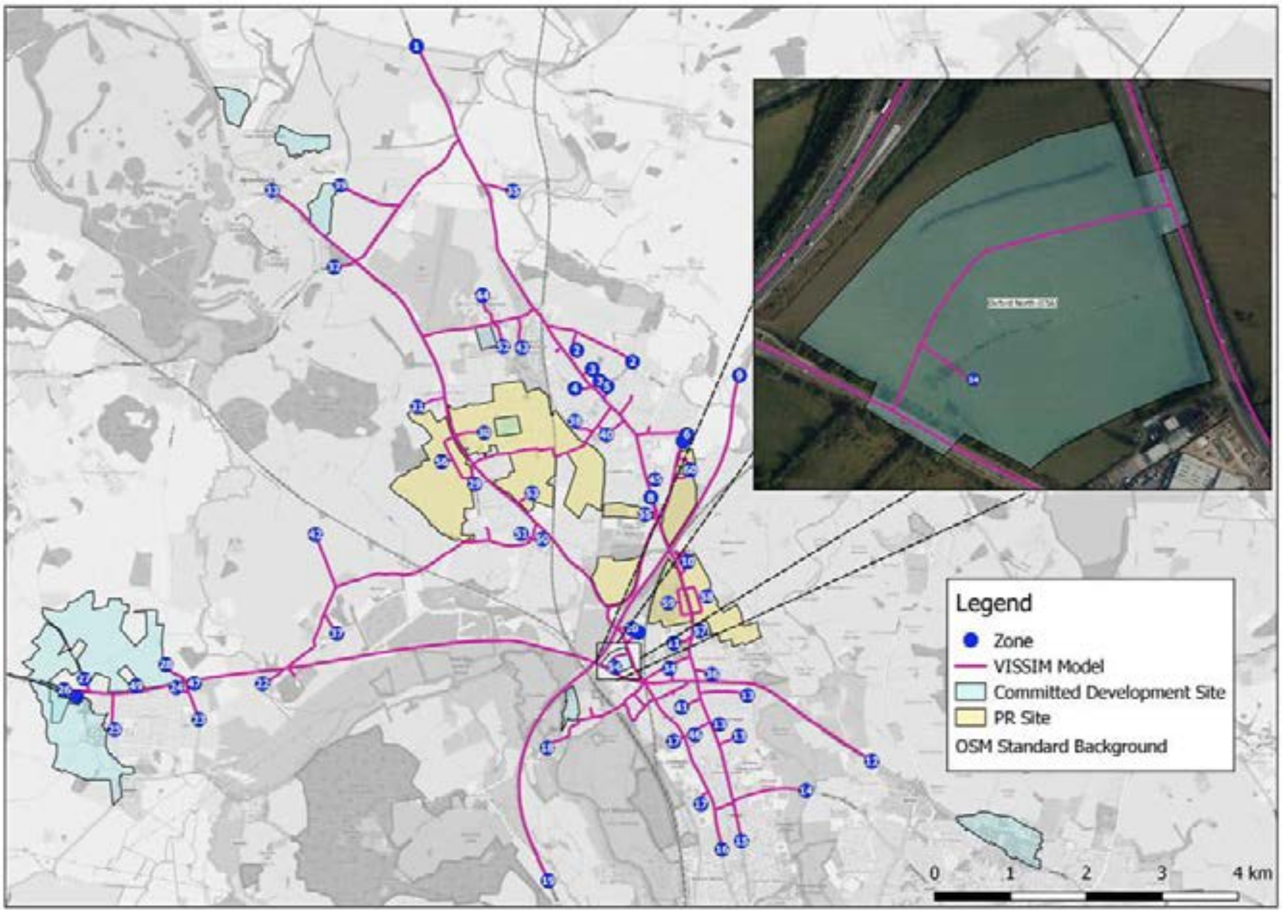


3.64 Although Oxford North includes proposals for land parcels on the eastern side of A44 and southern side of A40, all development demands for simplicity are assumed to travel via the plot of land served by the connector link above.

3.65 The signalised junctions on A44 and A40 corridor are however included, thereby mimicking the effects of demands travel to/from these land parcels.

3.67 A Figure showing the location of the Oxford North within the wider model network is provided below.

Figure 13: Oxford North Site Location



3.68 Tables showing the in/out trip generation totals for Oxford North for each hour during the AM and PM peaks are given below.

Table 20: AM In/Out Totals for Oxford North

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Oxford North	533	181	909	260	597	193

Table 21: PM In/Out Totals for Oxford North

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Oxford North	205	374	245	786	210	817

Land East of Park View (22/01715/OUT)

3.69 Blenheim Estates Homes is currently seeking planning consent for the development of 500 residential dwellings on land adjacent to the Park View development. It is not committed development but has been requested to be included in the Future Year Reference Case model by the local authorities, given it's proximity to the PR sites and proposed scale of development. The Site is served via an access onto A4095 Upper Campsfield Road which will link to the spine road provided by the adjacent Park View development. Land East of Park View development trips are assigned to zone 39.

3.70 A Figure showing the location of the Land East of Park View Woodstock within the context of the wider VISSIM model is provided below.

Figure 14: Land East of Park View Site Location

3.71 Tables showing the in/out trip generation totals for Oxford North for each hour during the AM and PM peaks are given below.

Table 22: AM In/Out Totals for Oxford North

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Land East of Park View	44	123	81	187	79	66

Table 23: PM In/Out Totals for Oxford North

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Land East of Park View	149	106	150	103	168	105

Begbroke Science Park (08/00803/OUT)

3.72 Begbroke Science Park is located approximately 5 miles north of Oxford City Centre and east of the A44. The site is connected to the A44 via a three-arm signalised junction with Begbroke Hill Road. The proposals are for an extension to the existing floorspace in the magnitude of an additional 12500sqm of B1 land use.

3.73 The Science Park is located within the boundaries of the PR8 Site but is included in the model via its own distinct zone. Specifically, existing zone 30 of the 2023 Reference Case model has been assigned as the Begbroke Science Park zone.

3.74 Trip generation for the peak hours are taken directly from the TA[19]. The TA only reports peak hour trip generation (08:00-09:00 and 17:00-18:00). Therefore, a TRICS B1b Total Person temporal profile is calculated to estimate the vehicle trips in the shoulder peaks. The TRICS rates used for this are as follows:

Table 24: B1b TRICS Rates

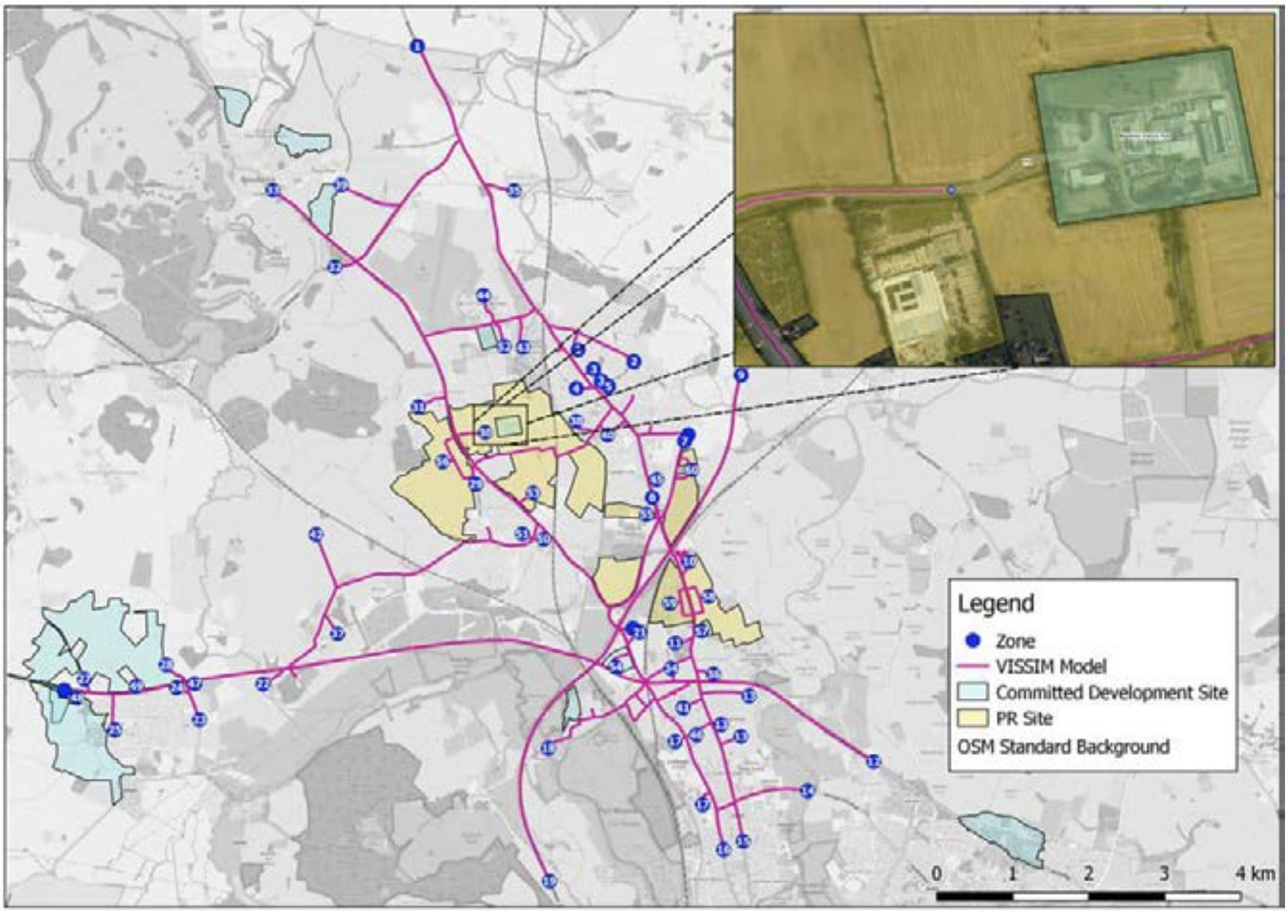
	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	1.028	0.12	1.148	57%	52%	56%
08:00-09:00	1.804	0.23	2.034	100%	100%	100%
09:00-10:00	0.779	0.199	0.978	43%	87%	48%
PM Peak Period						
15:00-16:00	0.176	0.551	0.727	114%	41%	48%
16:00-17:00	0.195	0.97	1.165	127%	72%	77%
17:00-18:00	0.154	1.35	1.504	100%	100%	100%

3.75 Trip distribution is informed by the existing distribution assigned to zone 30.

[19] Begbroke Science Park, Transport Assessment, May 2018, Figure 7 and Figure 8

3.76 A Figure showing the location of Begbroke Science Park in the context of the VISSIM model is provided below:

Figure 15: Begbroke Science Park Site Location



3.77 Tables showing the in/out trip generation totals for Begbroke Science Park for each hour during the AM and PM peaks are given below.

Table 25: AM In/Out Totals for Begbroke Science Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Begbroke Science Park	45	5	79	10	34	9

Table 26: PM In/Out Totals for Begbroke Science Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Begbroke Science Park	10	28	11	49	9	68

Oxford Technology Park

3.78 Oxford Technology Park is located 6 miles north of Oxford City Centre and just south of Oxford International Airport. The site lies adjacent to Technology Drive on the southern side of Langford Lane.

3.79 The proposals include 128,260sqft of B1a office, 47,960sqft of B1b research and development, and 237,050sqft of B8.

3.80 Development trips are assigned to existing zone 105 (which following rationalisation of the zone numbers through the 2031 model build becomes zone 52).

3.81 Trip generation for the peak hours are taken directly from the TA[20]. The TA reports Office TRICS rates for all required periods, but only reports peak hour trip rates (08:00-09:00 and 17:00-18:00) for B1b and B8 land uses. Therefore a TRICS B1b Total Person temporal profile is calculated as provided in Table 22 to estimate the B1b vehicle trips in the shoulder peaks, and a TRICS B8 Total Person temporal profile is calculated to estimate the B8 trips as per the table below:

Table 27: B8 TRICS Rates

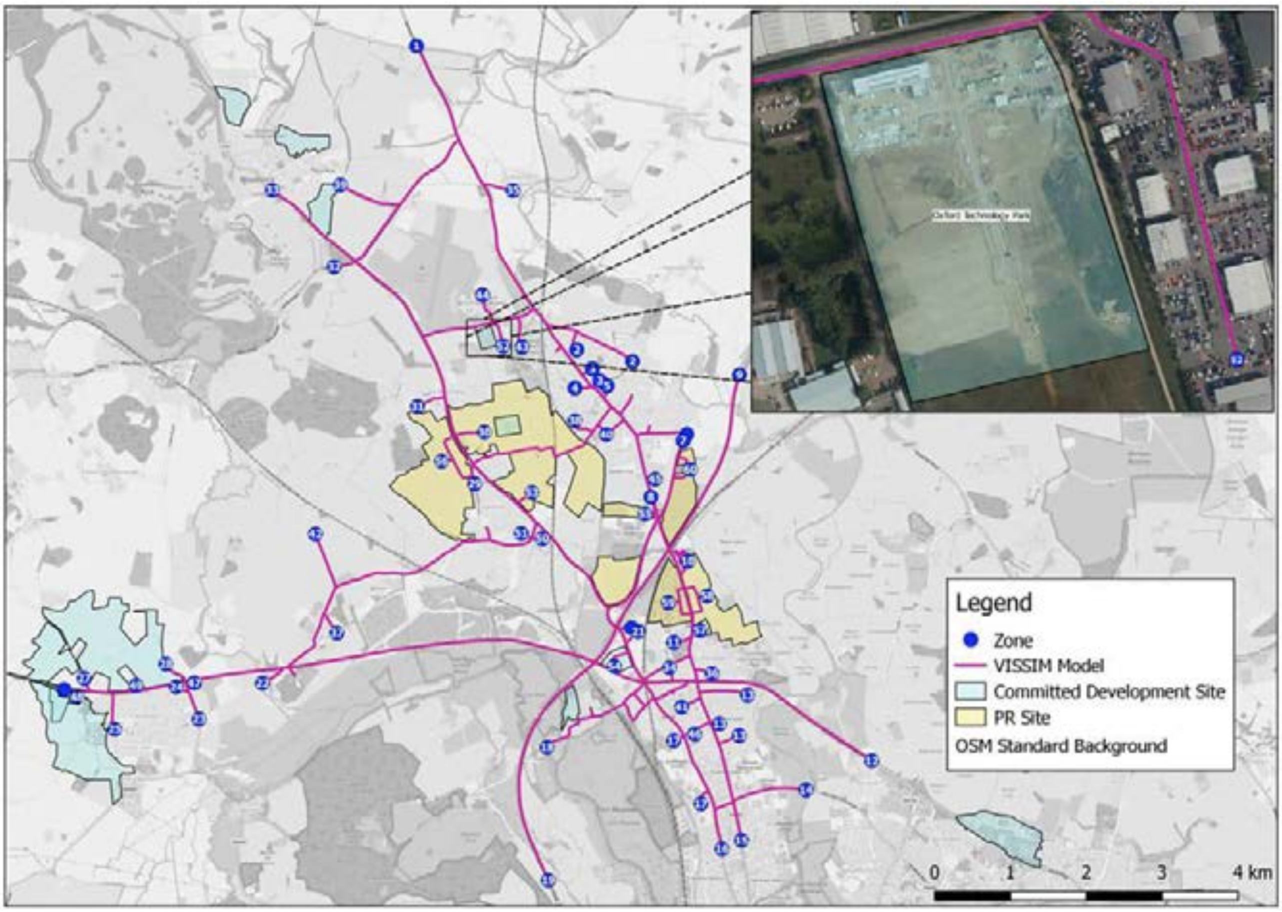
	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	0.18	0.094	0.274	118%	85%	104%
08:00-09:00	0.152	0.111	0.263	100%	100%	100%
09:00-10:00	0.116	0.077	0.193	76%	69%	73%
PM Peak Period						
15:00-16:00	0.097	0.115	0.212	103%	66%	79%
16:00-17:00	0.085	0.152	0.237	90%	87%	88%
17:00-18:00	0.094	0.175	0.269	100%	100%	100%

3.82 Trip distribution is informed by the existing distribution assigned to zone 44, which is the parcel of land on the northern side of Langford Lane. The reason this zone was chosen over the existing zone to which the development has been applied is that the land use on the northern land parcel shares more in common with the Technology Park proposals. Zone 44 represents airport support services and offices, whereas zone 52 represents a series of car dealerships.

[20] Oxford Technology Park Transport Assessment

3.83 A Figure showing the location of Oxford Technology Park in the context of the wider VISSIM network is provided below:

Figure 16: Oxford Technology Park Site Location



3.84 Tables showing the in/out trip generation totals for Oxford Technology Park for each hour during the AM and PM peaks are given below.

Table 28: AM In/Out Totals for Oxford Technology Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Oxford Technology Park	154	35	283	40	188	48

Table 29: PM In/Out Totals for Oxford Technology Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Oxford Technology Park	54	98	39	201	28	268

4 Model Updates || PR Sites

4.1 The specific purpose of this modelling exercise is to determine the capacity constraints on the network following inclusion of a series of PR sites around North Oxfordshire. These sites are:

i) PR6a (Land East of Oxford Road)

ii) PR6b (Land West of Oxford Road)

iii) PR7a (Land South East of Kidlington)

iv) PR8 (Land East of the A44)

v) PR9 (Land West of Yarnton)

4.2 VM continues to work alongside the consultants working on behalf of these sites to firstly use the VISSIM model tool to establish how the cumulative delivery of these sites impacts the network, and secondly to identify any mitigation strategies that may assist in allowing the network to accommodate the trips generated by the sites.

4.3 Each consultant has provided VM with a series of demand and distribution assumptions pertaining to their site, along with the access arrangements that are currently proposed to serve it.

4.4 This Chapter will discuss how the demand assumptions have been converted into matrices for entry into VISSIM, and the associated updates to the VISSIM model required for Site Access arrangements.

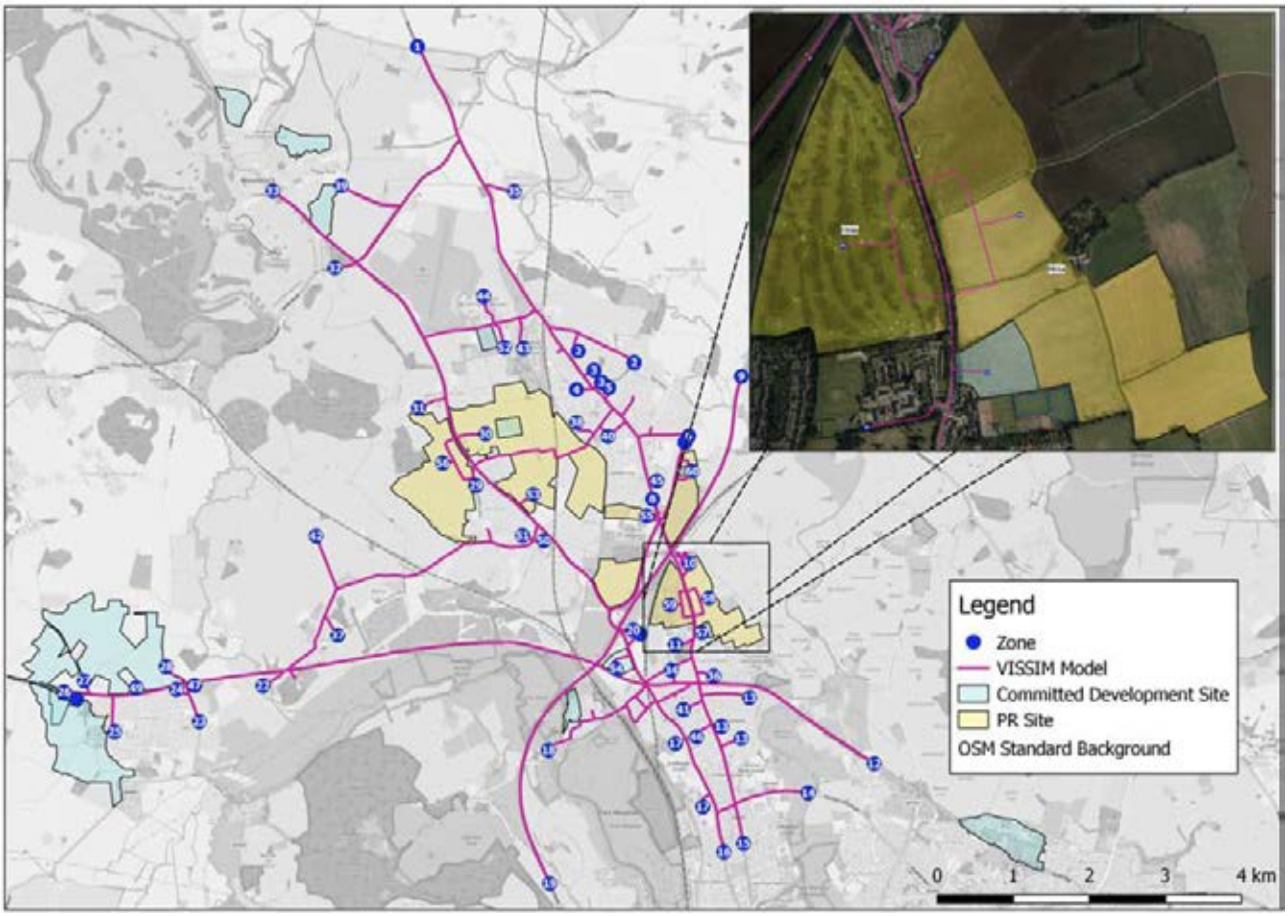
PR6a and PR6b (Land East and Land West of Oxford Road)

4.5 PR6a (Land East of Oxford Road) is a 48 hectare site located on the eastern side of A4165 Oxford Road. The site is proposed to allow for up to 820 dwellings along with associated infrastructure and supporting facilities. The transport consultant for the site is i-Transport.

4.6 PR6b (Lane West of Oxford Road) is a 32 hectare site located on the western side of A4165 Oxford Road. The site is allocated within the Local Plan for 670 dwellings along with associate infrastructure and supporting facilities. The transport consultant for the site is KMC Transport Planning. A planning application is yet to come forward for PR6b and therefore the allocated number of dwellings has been tested within the modelling at this stage.

4.7 The Figure below shows the location of the PR6a and PR6b sites in the context of the wider VISSIM model:

Figure 17: PR6a and PR6b Site Location



4.8 Together the respective consultants have compiled trip rates for their site. The trip rates are then converted to peak hour trip generation to apply to the VISSIM model hours, along with distribution assumptions to feed into the matrix development process.

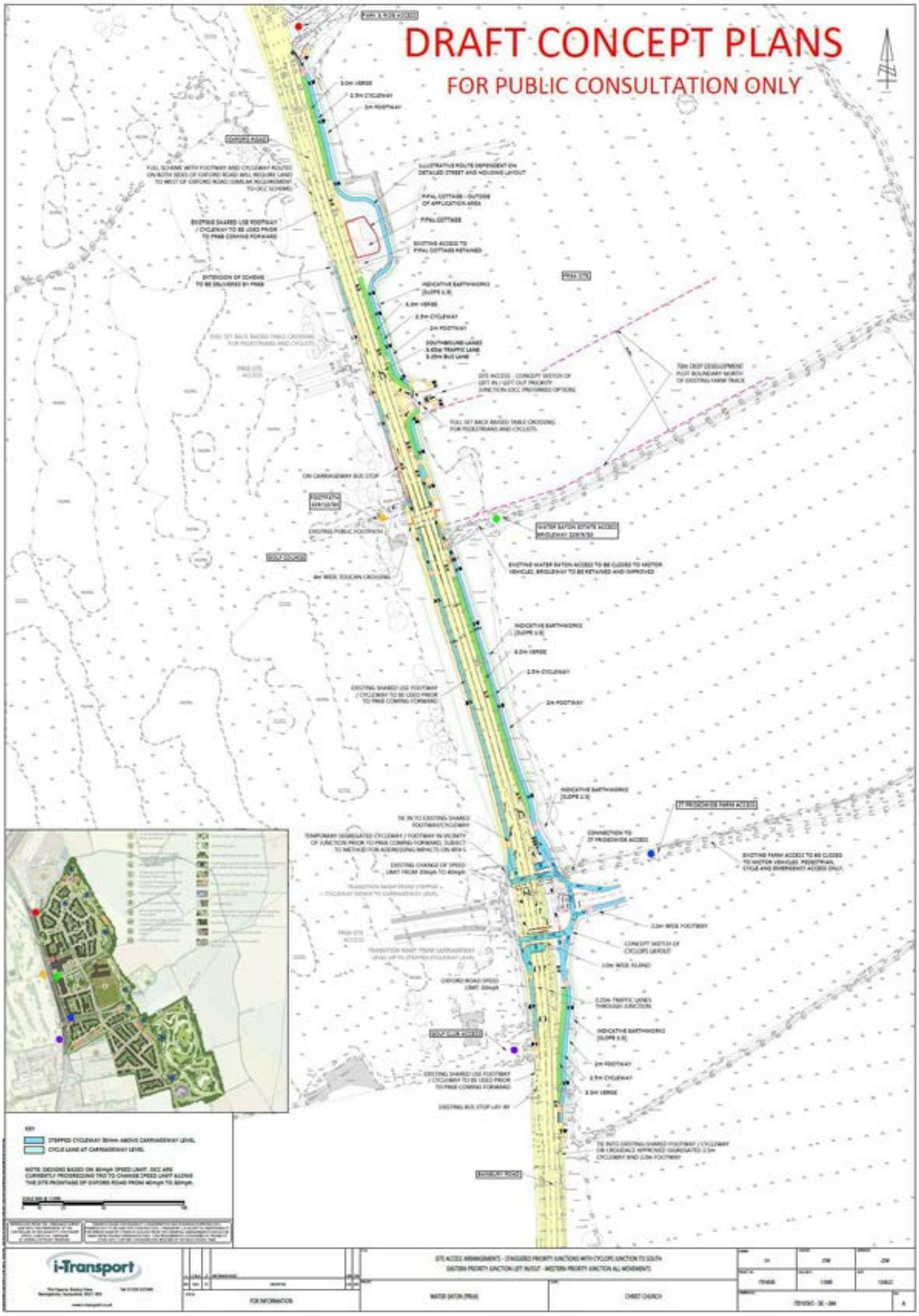
4.9 Both sites are served by two site access arrangements; one south and one north. Drawings of the site access arrangements have been provided by i-Transport. The southern accesses, located 70 meters north of the current Water Eaton Estate Road, comprises of a new four-arm signalised junction serving Oxford Road (north-south), access to PR6b (west) and access to PR6a (east).

4.10 The northern accesses are formed of two priority junctions, one serving each PR site on either side of carriageway. The eastern access for PR6a is a left-in-left-out arrangement while the western access for PR6b is all movements.

4.11 This has been represented in the VISSIM model by a single zone for each site; zone 58 for PR6a and zone 59 for PR6b respectively. Each of the site access points onto the A4165 are connected by an indicative internal connector road with the zone sitting off that connector.

4.12 The Figure below provides the site access arrangements for the PR6 sites.

Figure 18: PR6a and PR6b Access Arrangements



4.13 Tables showing the in/out trip generation totals for PR6a and PR6b Sites for each hour during the AM and PM peaks are provided below.

Table 30: AM In/Out Totals for PR6a Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR6a Site (Land East of Oxford Rd)	38	122	54	129	34	57

Table 31: PM In/Out Totals for PR6a Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR6a Site (Land East of Oxford Rd)	113	69	116	74	145	68

Table 32: AM In/Out Totals for PR6b Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR6b Site (Land West of Oxford Rd)	18	100	26	101	27	43

Table 33: PM In/Out Totals for PR6b Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR6b Site (Land West of Oxford Rd)	87	51	96	49	120	50

PR7a (Land South East of Kidlington)

4.14 PR7a (Land South East of Kidlington) is located South-east of the Kidlington Roundabout and includes proposals for approximately 430 dwellings. An illustrative masterplan document was used to inform the site access arrangements, which form two priority junctions located along Bicester Road.

4.15 For inclusion in VISSIM these accesses are connected by an internal connector road with a new zone assigned halfway along (Zone 60).

4.16 A Figure showing the location of the PR7a Site within the context of the wider VISSIM model is provided below:

Figure 19: PR7a Site Location

4.17 Trip generation for the PR7a site assumes the same trip rates as those used for PR6. Local Distribution is taken from the PR7b Transport Assessment (to be discussed in the following section). As PR7a and PR7b are located adjacent to each other, distributions are assumed to be the same.

4.18 Tables showing the in/out trip generation totals for PR7a Site for each hour during the AM and PM peaks are given below.

Table 34: AM In/Out Totals for PR7a Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR7a Site (Land SE of Kidlington)	12	66	18	69	19	29

Table 35: PM In/Out Totals for PR7a Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR7a Site (Land SE of Kidlington)	57	33	62	32	78	33

PR8 Site (Land East of the A44)

4.19 PR8 (Land East of the A44) is a 190 hectare site located to the east of A44. The transport consultants for the site are KMC Transport Planning for land within PR8 owned by Oxford University Development (OUD) and Glanville Consultants for land within PR8 owned by Hallam Land. OUD is to submit an outline planning application for up to 215,000 sqm of residential floorspace (which has been equated to 1,800 homes for the purposes of this assessment), up to 155,000 sqm of flexible employment uses and supporting social, retail, leisure and community uses, including two primary schools, a secondary school and local centre. Hallam Land is to submit an outline planning application for 300 residential dwellings.

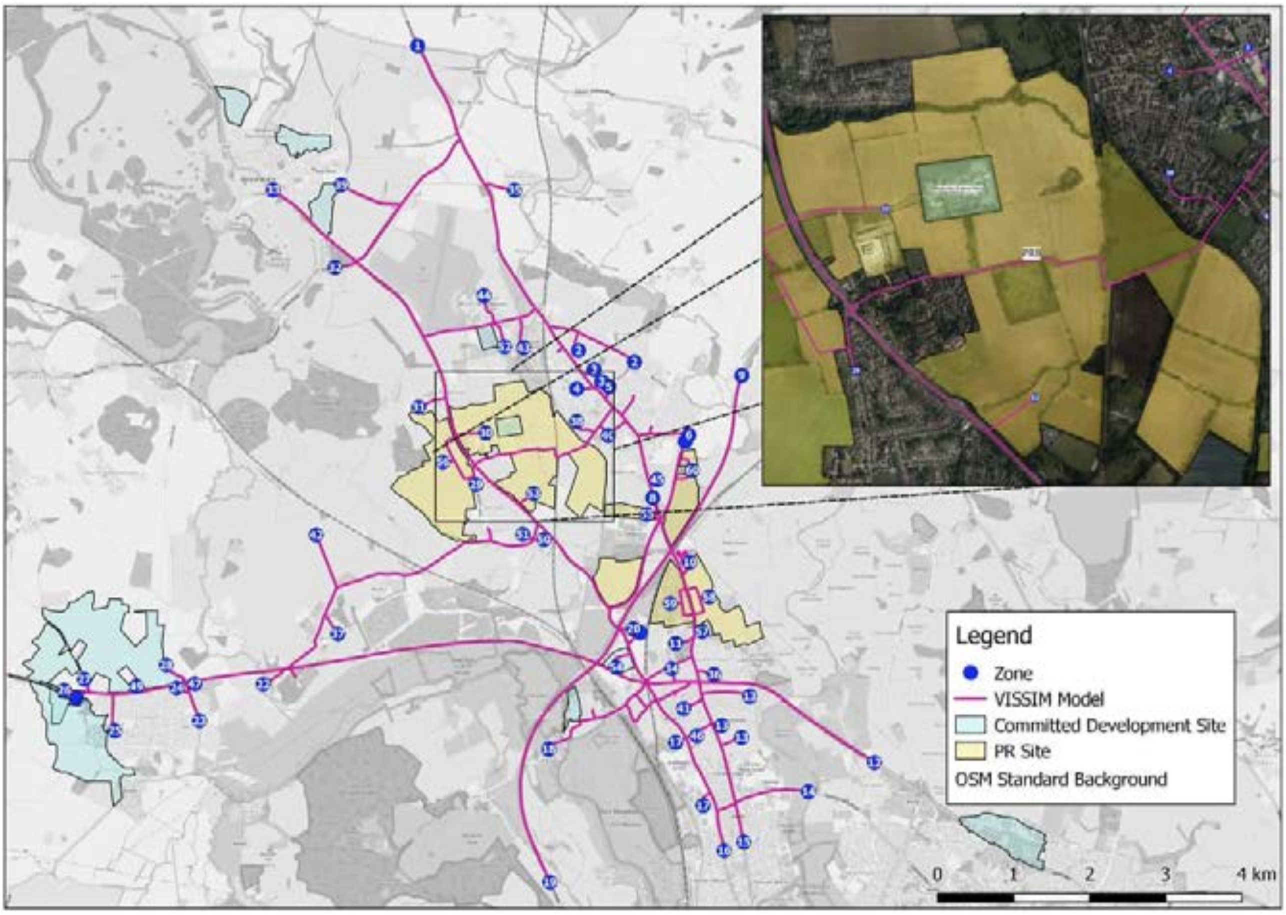
4.20 The northern site access is proposed to be accessed via the existing access to the Science Park (represented in the VISSIM model by zone 30) and is proposed to have a fourth arm and improved pedestrian and cycle crossing facilities provided by PR9 in order to provide access to the allocated site.

4.21 Site access arrangement for the PR8 southern access has been provided by Glanville Consultants, which proposes a three-arm signalised junction serving the A44 (North-south) and access to the site. The signalised junction is located on the northern side of the A44 carriageway approximately 60 meters south of the Shell Petrol Filling Station.

4.22 The 2023 model already contained a zone for PR8 and therefore no additional zone has been provided; calculated demands for PR8 replace the assumptions for PR8 that were entered into the 2023 forecast model.

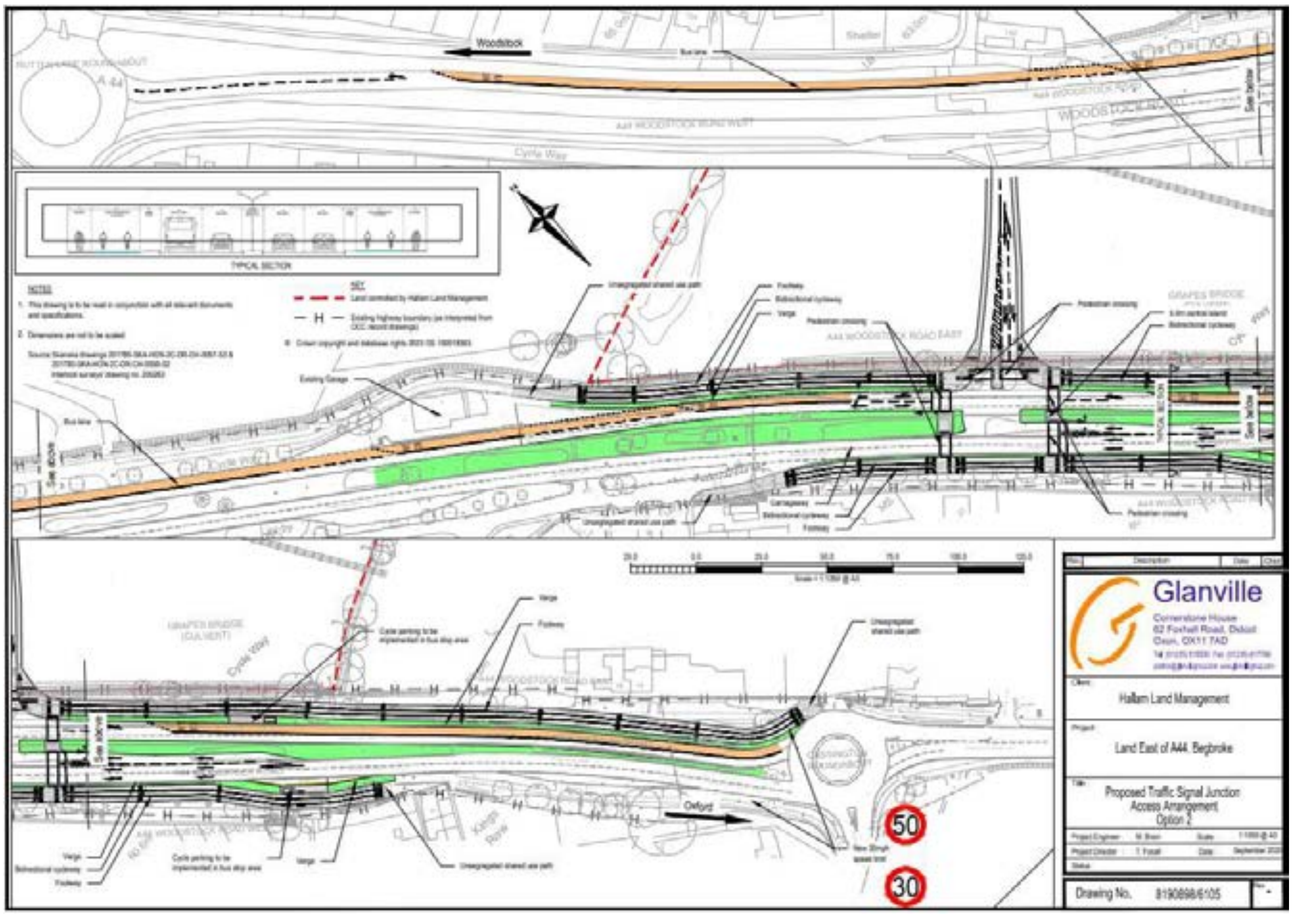
4.23 A Figure showing the location of the PR8 Site within the context of the wider VISSIM model is provided below:

Figure 20: PR8 Site Location



4.24 A Figure showing the southern site access arrangement for PR8 is provided below.

Figure 21: PR8 Southern Site Access Arrangement



4.25 The proposals above are for the purposes of the VISSIM modelling only and do not represent a commitment to deliver all works shown. PR8 is aware of OCC aspirations to include a bus lane along the A44 southbound between the Rutten Lane roundabout and Cassington Roundabout and the above access therefore ties in with those plans.

4.26 PR8 Site trip generation and distribution assumptions were provided by KMC Transport Planning, and these were converted into a demand matrix by apportioning MSOA areas to the nearest VISSIM zones.

4.27 Tables showing the in/out trip generation totals for PR8 Site for each hour during the AM and PM peaks are provided below.

Table 36: AM In/Out Totals for PR8 Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR8 Site (Land East of the A44)	771	282	735	269	644	236

Table 37: PM In/Out Totals for PR8 Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR8 Site (Land East of the A44)	295	603	309	632	288	589

PR9 Site (Land West of Yarnton)

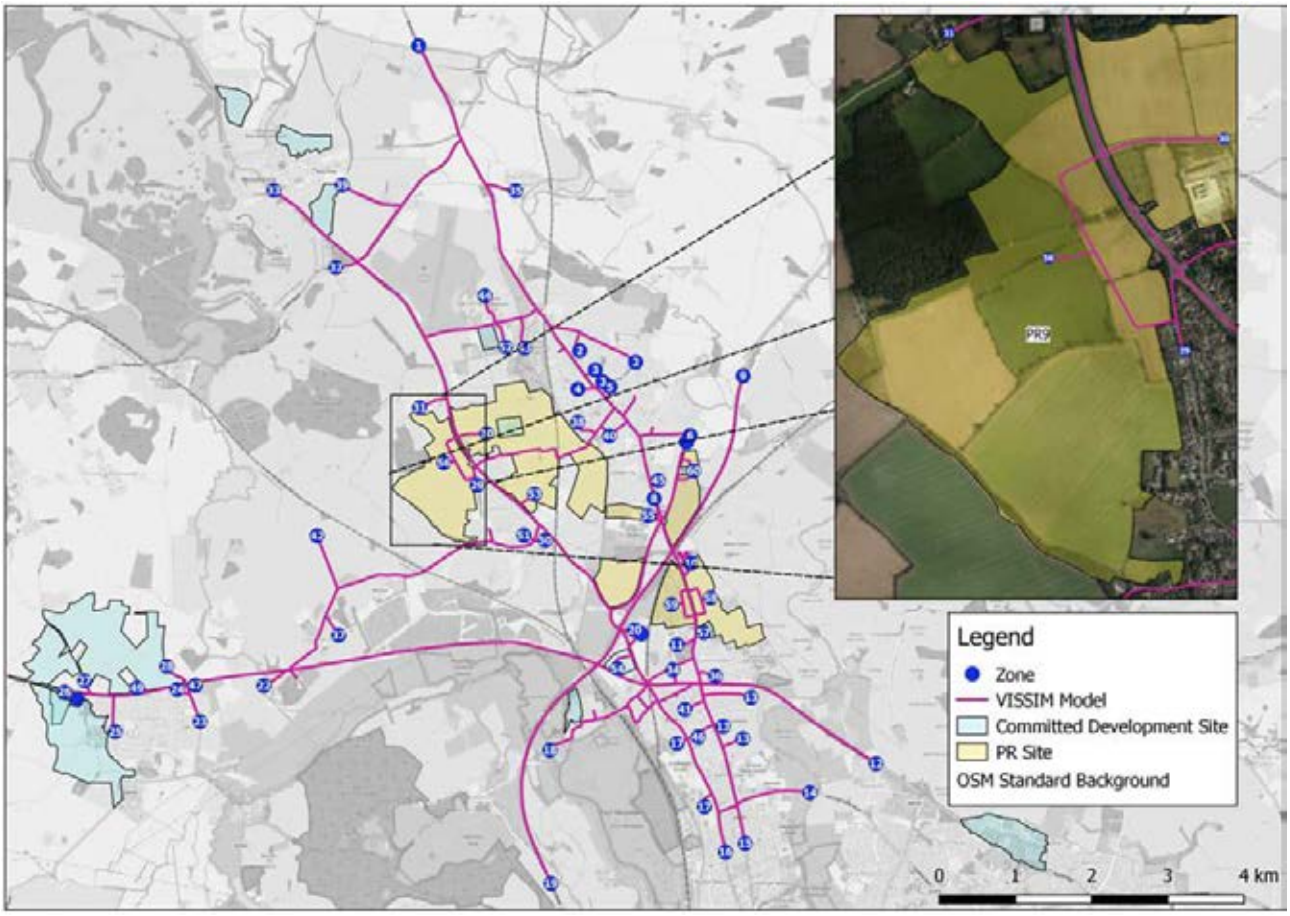
4.28 PR9 (Land West of Yarnton) is a 99 hectare site located to the east of A44. The site is proposed to allow for up to 540 dwellings along with associate infrastructure and supporting facilities. The transport consultant for the site is Vectos.

4.29 Site access arrangement for the PR9 Site have been provided by Vectos, which proposes two access points onto A44. The Northern access involves the addition of a fourth arm onto the existing 3-arm signalised junction serving A44 and Begbroke Hill to allow access into PR8 on the southern side of the carriageway. The Southern access is located off Rutten Lane, adjacent to Yarnton Medical Practice.

4.30 An indicative internal connector link has been included to connect the two access points with a new zone (zone 56) positioned halfway along to represent the development site.

4.31 A Figure showing the location of the PR9 Site along within the context of the wider VISSIM model is provided below:

Figure 22: PR9 Site Location



4.32 Figures showing the site access arrangements for the PR9 Site are provided below.

Figure 23: PR9 Site Access Arrangement (North)

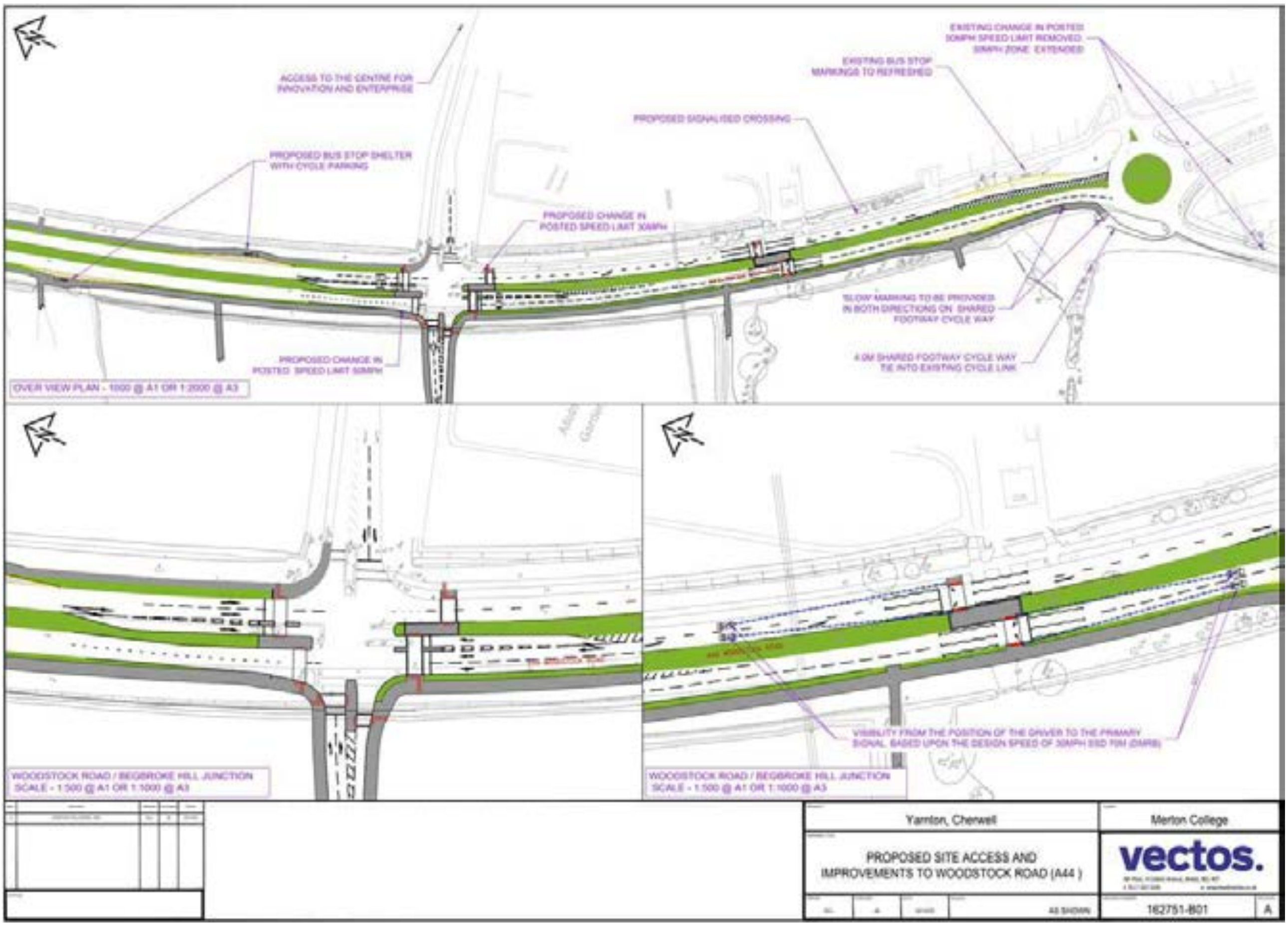
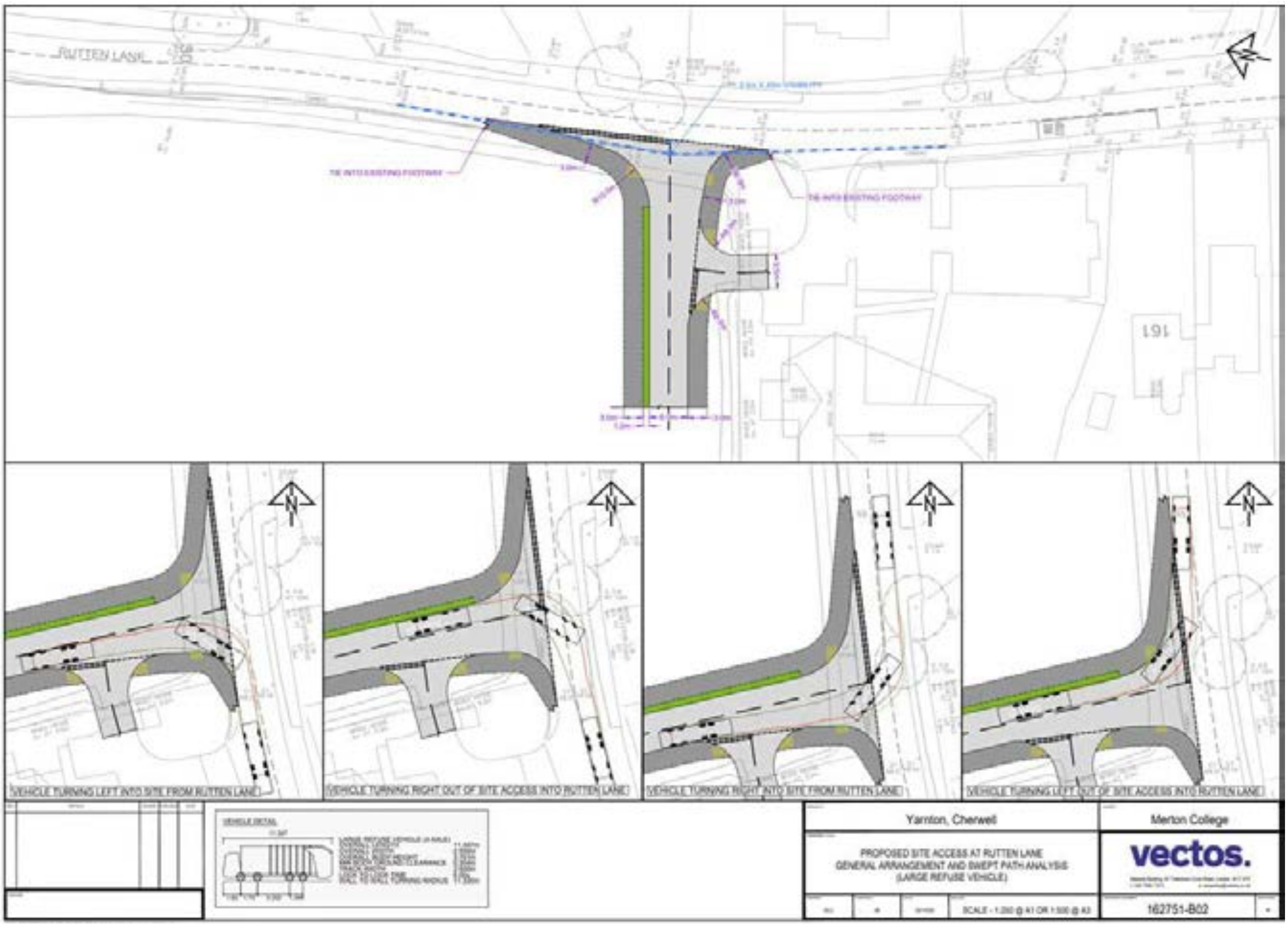


Figure 24: PR9 Site Access Arrangement (South)



4.33 Trip generation and localised distribution data for the site was provided by Vectos. In/out totals were provided and applied to two-way MSOA distribution assumptions which were in turn assigned to appropriate VISSIM zones to inform the matrix development process.

4.34 Tables showing the in/out trip generation totals for PR9 Site for each hour during the AM and PM peaks are provided below.

Table 38: AM In/Out Totals for PR9 Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR9 Site (Land West of Yarnton)	26	89	28	84	42	49

Table 39: PM In/Out Totals for PR9 Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR9 Site (Land West of Yarnton)	59	42	87	52	105	51

Other PR Sites

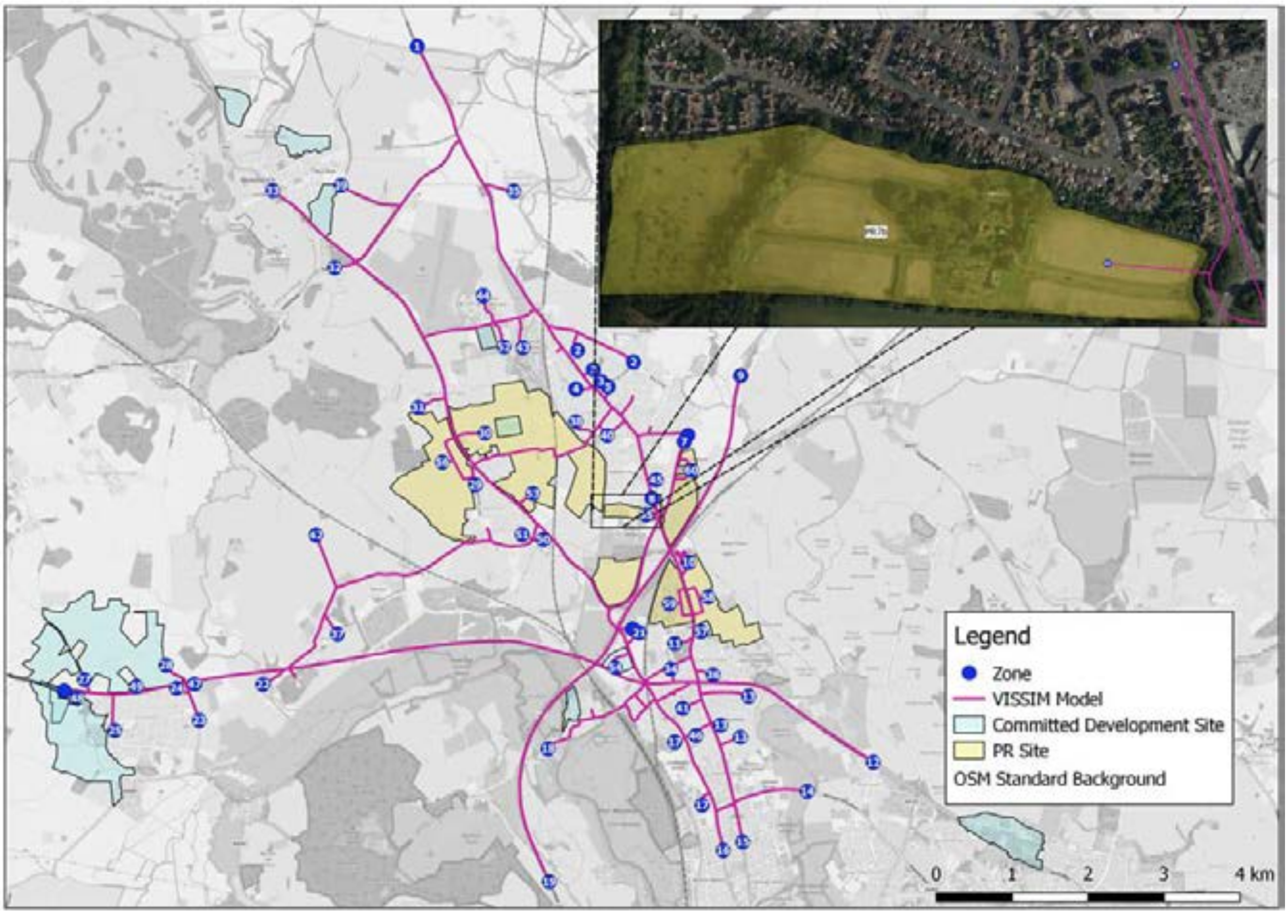
PR7b (Land at Stratfield Farm)

4.35 PR7b (Land at Stratfield Farm) is located off Oxford Road and includes proposals for approximately 120 dwellings and a care home. The site access arrangement involves a priority junction off Oxford Road just north of Kidlington Roundabout. A new zone (Zone 55) has been included to represent PR7b.

4.36 Trip generation for the PR7a site assumes the same trip rates as those used for PR6. Distribution has been taken from the Transport Assessment[21], produced by MAC Ltd in February 2019.

4.37 A Figure showing the location of the PR7b Site within the context of the wider VISSIM model is provided below:

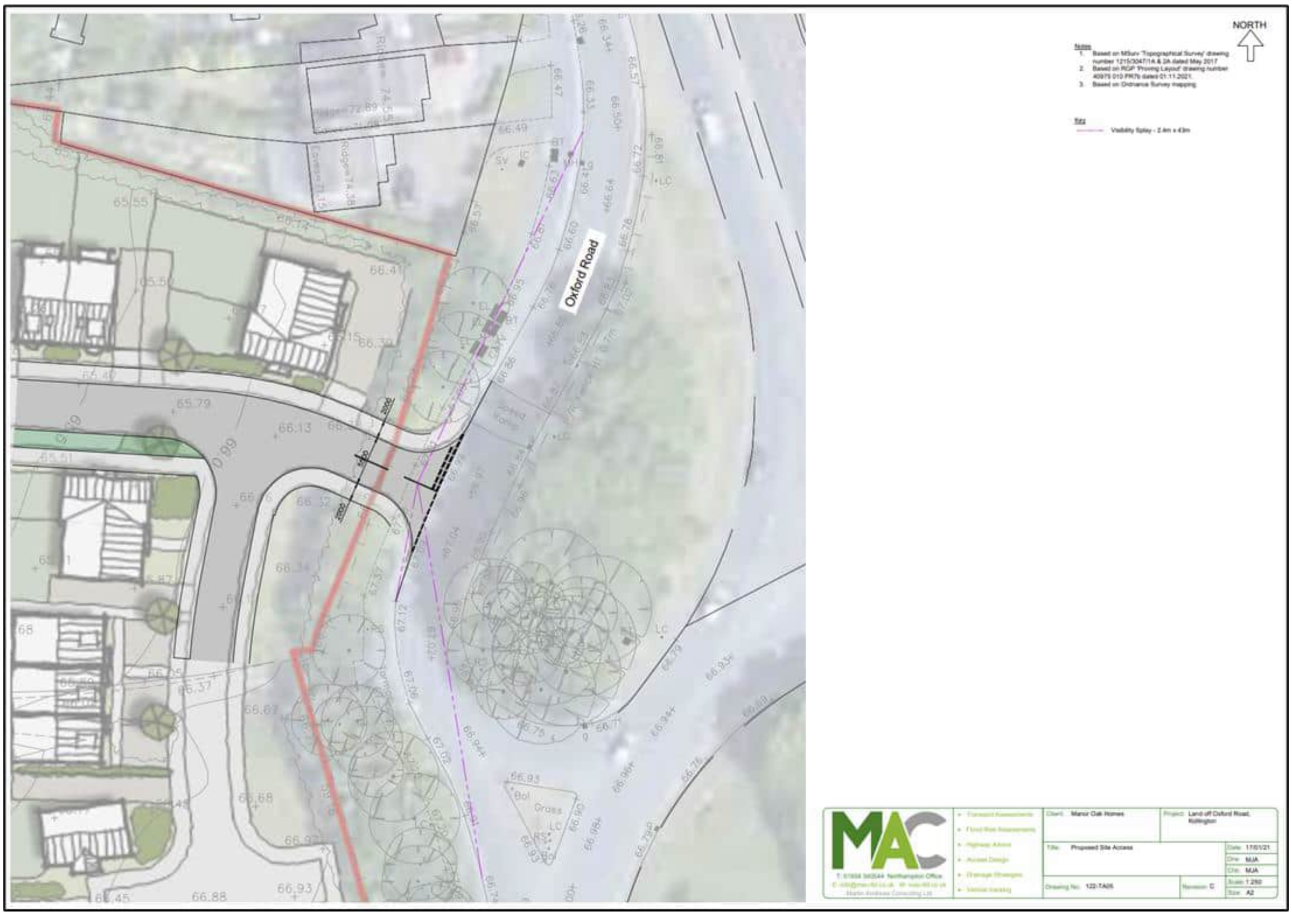
Figure 25: PR7b Site Location



[21] Proposed Residential Development, Land off Oxford Road, Report Reference 122-TS-01-B, Appendix L

4.38 Images showing site access arrangement of PR7b Site is given below.

Figure 26: PR7b Site Access Arrangement



4.39 Tables showing the in/out trip generation totals for PR7b Site for each hour during the AM and PM peaks are given below.

Table 40: AM In/Out Totals for PR7b Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR7b Site (Land at Stratfield Farm)	6	21	9	24	13	18

Table 41: PM In/Out Totals for PR7b Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR7b Site (Land at Stratfield Farm)	24	16	28	17	28	17

5 VISSIM Demand Summary

5.1 The Table below presents a summary of the peak hour input demands for the 2031 model.

Table 42: 2031 VISSIM Model Demand Summary

Description	AM			PM		
	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	15:00 – 16:00	16:00 – 17:00	17:00 – 18:00
Eynsham Garden Village	307	520	373	572	564	597
West Eynsham (SDA)	71	114	63	139	138	150
West Thornbury Rd	0	0	0	0	0	0
Eynsham Nursery	8	13	7	16	15	17
Land East of Woodstock	89	130	88	98	121	145
Barton Park	28	46	27	72	71	77
Wolvercote Papermill Site	52	75	42	52	52	65
St. Frideswide Farm	41	65	32	50	50	54
Hill Rise, Woodstock	37	59	32	57	56	61
Banbury Road, Woodstock	73	119	71	114	113	121
Oxford North (CS6)	714	1169	790	579	1031	1028
Land East of Park View	167	268	145	255	253	273
Begbroke Science Park	50	89	43	38	60	77
Oxford Technology Park	189	323	236	152	240	296
PR6a	160	183	91	182	190	213
PR6b	119	126	70	138	145	170
PR7a	78	87	48	90	94	110
PR7b	27	33	31	40	45	45
PR8	1054	1004	880	898	940	877
PR9	114	112	91	101	139	156
Committed Development Total	**1826**	**2990**	**1949**	**2191**	**2765**	**2960**
PR Site Total	**1552**	**1545**	**1211**	**1449**	**1553**	**1571**

Assigned Zones

5.2 Most of the proposed Committed Developments and PR Sites are located in areas which do not correspond to any of the existing zones of the base 2023 model. Therefore, new zones have been considered. Table below presents a summary of zones that have been assigned to each of the committed developments and PR Sites.

Table 43: 2031 Com Dev and PR Site Zone Assignment

Zone (1/2)	Site	Zone (2/2)	Site
12	Barton Park	39	Land East of Woodstock
14	Barton Park	39	Banbury Road, Woodstock
18	Wolvercote Papermill Site	52	Oxford Technology Park
26	Eynsham Garden Village	53	PR8 – Land East of the A44
26	West Eynsham (SDA)	54	Oxford North (CS6)
26	West Thornbury Rd Eynsham	55	PR7b – Land at Stratfield Farm
26	Eynsham Nursery and Plant Centre	56	PR9 – Land West of Yarnton
30	Begbroke Science Park	57	St. Frideswide Farm (SP24)
33	Land East of Woodstock	58	PR6a – Land East of Oxford Road
33	Hill Rise, Woodstock	59	PR6b – Land West of Oxford Road
33	Banbury Road, Woodstock	60	PR7a – Land Southeast of Kidlington Road
39	Land East of Park View		

6 Summary & Conclusion

6.1 Vectos Microsim (VM) has been commissioned by a multi-consultancy group working on behalf of a number of Partial Review (PR) Sites that are allocated within the Cherwell District Council Local Plan.

6.2 VM is providing VISSIM microsimulation modelling support to all sites with a view to assisting in developing a suitable mitigation strategy for all Sites to come forward within the Local Plan period, working together with the Local Authority to agree an approach for the delivery of any infrastructure requirements and how these may be phased and financed.

6.3 This Note sets out the forecasting methodology adopted to include all committed developments, as well as the demands totals and site access arrangements assumed for the PR Sites.

Appendix A

Oxford North Scheme Drawings

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Appendix B

Oxford PR Sites VISSIM Assessment
Forecast Capping Discussion Note

VM210467.DN02b
May 2023

Introduction

1. Vectos Microsim (VM) is assisting in the assessment of the impacts of delivering the allocated sites to the North of Oxford city, on the transport network, using the Oxford North VISSIM model.

2. The work is being undertaken on behalf of multiple site promotors and is assessing the effects of the allocated sites references PR6(a&b), PR7(a&b), PR8 and PR9.

3. The cumulative effect of delivering these sites is being considered alongside a series of key consented developments which have been identified for inclusion within the assessment through a separate scoping exercise conducted with Oxfordshire County Council (OCC).

4. The primary objective of this study is to identify the effects on network operation arising from traffic forecasts associated with the allocated and consented developments, inclusive of any consented infrastructure proposals. This will then be used to determine the appropriate extent and location of mitigation and/or sustainable transport measures that will need to be achieved to enable the allocation strategy to be delivered in a sustainable manner which is acceptable to OCC.

5. The VISSIM microsimulation model network extent, as well as the key development locations, is illustrated within **Figure 1** overleaf.

Purpose of this Note

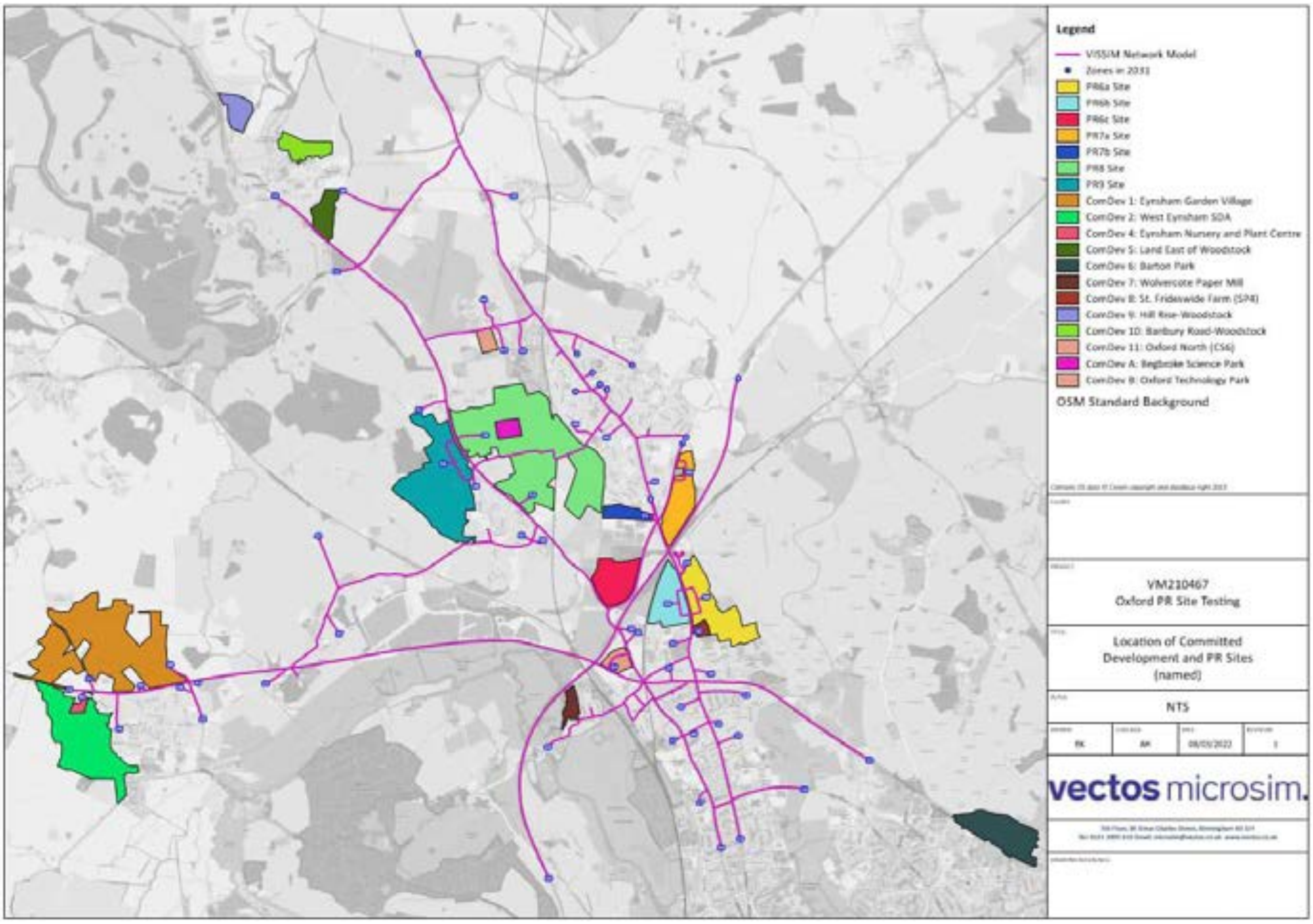
6. The purpose of this Note is to set out the assumptions applied to the demands within the VISSIM model to enable future changes in trip movements associated with the delivery of consented developments to be reflected within the VISSIM model in a realistic manner.

Background

7. The North Oxford VISSIM model has been provided to VM by OCC and has been adjusted to account for the traffic growth projected to occur through the delivery of an agreed set of committed developments and the allocated developments.

8. The assumptions contained within these model scenarios have been circulated and reported separately and have resulted in the development of a Future Year Reference Case model which contains all development proposals and associated infrastructure. The Local Plan Part 1 Partial Review runs to 2031. The PR sites are expected to be constructed and completed during this period up to 2031, albeit PR8 is expected to be completed shortly after by 2033. Therefore, the Future Reference Case model will establish local highway network conditions, taking into account any appropriate background traffic growth, consented development traffic and PR site traffic upon completion.

Figure 1: Model Extent and Development Locations



9. The Future Year model network, inclusive of the traffic projections, represents a situation where the network capacity has been exceeded. The network is not able to accommodate the projected traffic levels and so significant increases in congestion levels are observed. In all model runs under these

unadjusted demand conditions whereby the full quantum of committed development is included on top of the baseline, congestion reaches a critical point whereby the model is unable to function and locks up (due to, for example, vehicles conflicting with each other and the modelled environment being unable to 'unlock' these vehicles, leading to exponential increases in delay).

10. In this instance, a functioning network is one which is considered to demonstrate sensible patterns of flow build up and dissipation. Network failure is demonstrable by continued and exponential increases in traffic volumes (and delays), with no discharge patterns being discernible.

11. This is both unrealistic and implausible as, in reality, 'gridlock' is a modelling phenomenon which does not occur on the ground, as there are a very large number of driver responses which can occur (such as retiming, route switching, changing mode, not travelling at all) that are not accounted for within the algorithms of the modelling software, as well as the ability of drivers in reality to manoeuvre/interact/co-operate in ways that the simulation simply cannot replicate.

12. Whilst it is important to note the occurrence of such conditions, presenting results from models which are in effect 'gridlocked' undermines the credibility of any assessment. It should also be recognised that, in reality, drivers will make decisions to avoid the regular occurrence of such extreme situations, drivers will change mode, retime or even cease their trips in response to such adverse conditions.

13. Whilst an approach which accounts for all committed development demands as effectively 'new' trips will result in high traffic volumes being run through the model this is not necessarily the right approach. Partly this is because the model behaviour is manifestly unrealistic as a result and partly because it fails to recognise what is occurring on the road network.

14. In areas such as the road network around Oxford, traffic volumes are not necessarily increasing on an exponential basis as one would expect if traffic forecasts assumed all traffic associated with committed developments is 'new'.

15. In such instances it is appropriate to consider local traffic trends when deriving traffic forecasts to ensure that the outcome can be considered realistic and plausible.

Objective

16. The objective of this stage of the assessment is to establish the level of traffic growth to be assumed within the VISSIM modelling which reflects a realistic position based on interpretation of local evidence, and the need to ensure that the final model scenario is 'realistic' and can be used to reliably discern the effects of delivering both the allocated sites and the transport strategy required to support them.

17. A modelling assessment based on a network that does not function will only ever result in the prediction that significant additional road capacity will be required to support growth. This is even before the effects of traffic growth associated with any of the allocated sites is considered.

Forecast Adjustments

18. Having initially developed a model which is informed by a traffic forecasting exercise which assumed all trips are ‘new’ the outcome was a model network which does not function. Capacity has been significantly exceeded and the network operation, and resulting model outputs, cannot be considered either realistic or reliable.

19. The forecasts derived from the manual application of traffic growth, estimated to occur as a result of both the committed developments and the PR allocations, results in increases in traffic volumes over the baseline levels, of as much as 28%.

20. Given the fact that parts of the network are already close to capacity it is unrealistic to expect that the network will continue to be able to sustain such increases in traffic volumes. Furthermore, such growth would be contrary to Oxfordshire County Council’s Cabinet adopted Local Transport and Connectivity Plan (LTCP) which, among its many ambitions, aims to cut car journeys by a quarter by 2030 and reduce them by a third by 2040.

21. Adjustments are therefore required to determine what an appropriate level of growth may be assumed within the modelling in light of the current circumstances, cognisant of historic trends and forthcoming policies.

22. The previous forecasts of up to 28% growth are contrary to forthcoming policies from OCC and also yield unrealistic outcomes when assigned to the existing traffic model. This is not unusual, particularly given the deterministic nature of microsimulation modelling software and the limitations that the software has in terms of considering wider driver responses but it does mean that adjustments to the demands will be essential to engender confidence in the modelling outcomes.

23. This note sets out a method for determining an appropriate adjustment to the model demands to constrain traffic forecasts to levels which are both realistic and conform to forthcoming policy objectives.

24. Two different sets of analysis have been completed. The first simply considers the linear interpolation of existing traffic trends, based on a series of observed traffic surveys collected over an extended period of time, to project forward what will happen to traffic flows by the end of the Local Plan period in 2031. A second method also considers the housing build out patterns within the area to link development delivery with traffic growth.

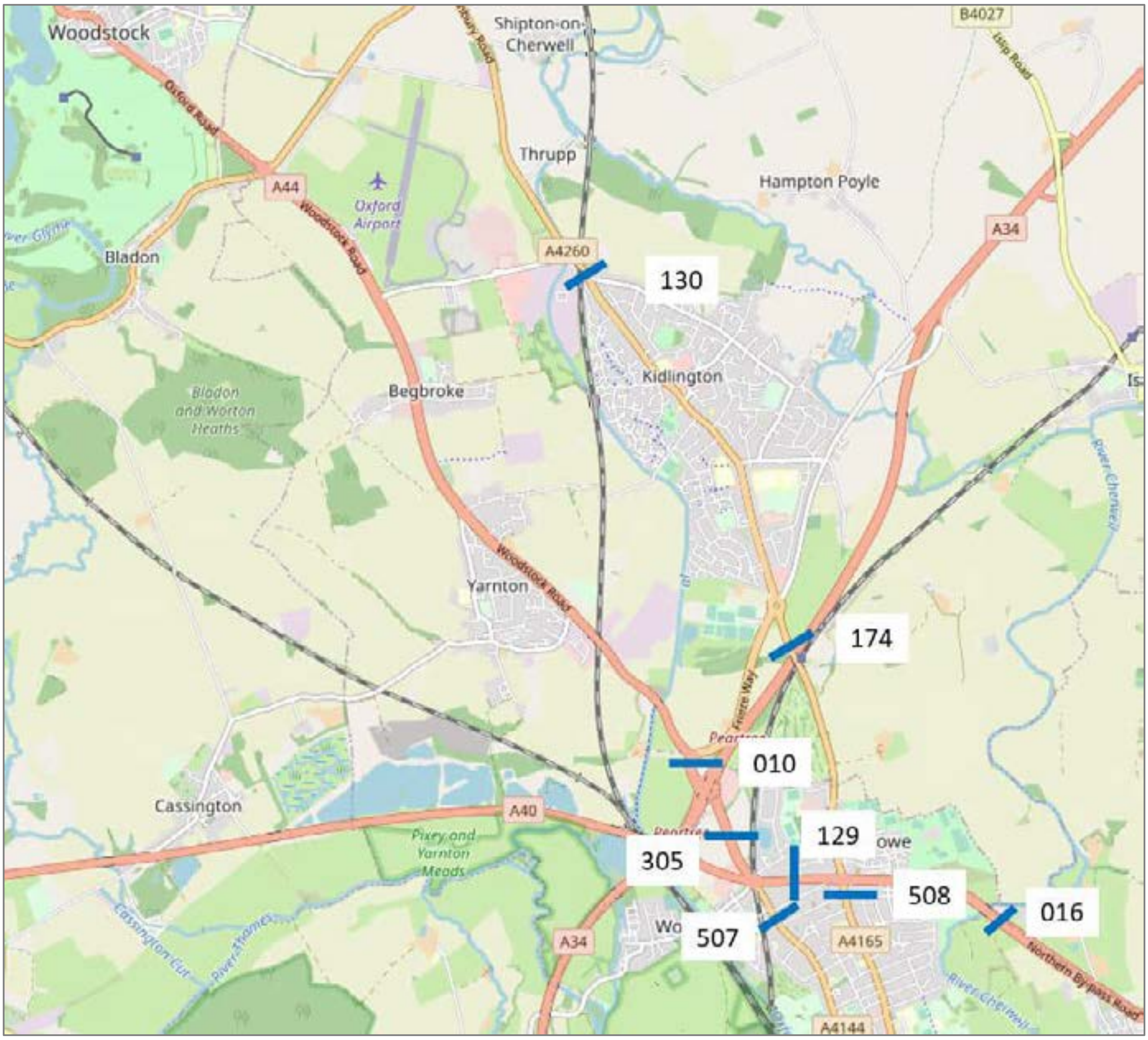
25. Each of these approaches and the resulting outcome is described further as follows:

Data Selection and Cleaning

26. The traffic data which has been used in the process has been provided by OCC and processed by Vectos to provide summary totals for each year that the traffic data has been collected for.

27. The site locations for which traffic data was provided are illustrated within the following **Figure 2**.

Figure 2: Traffic Survey Locations

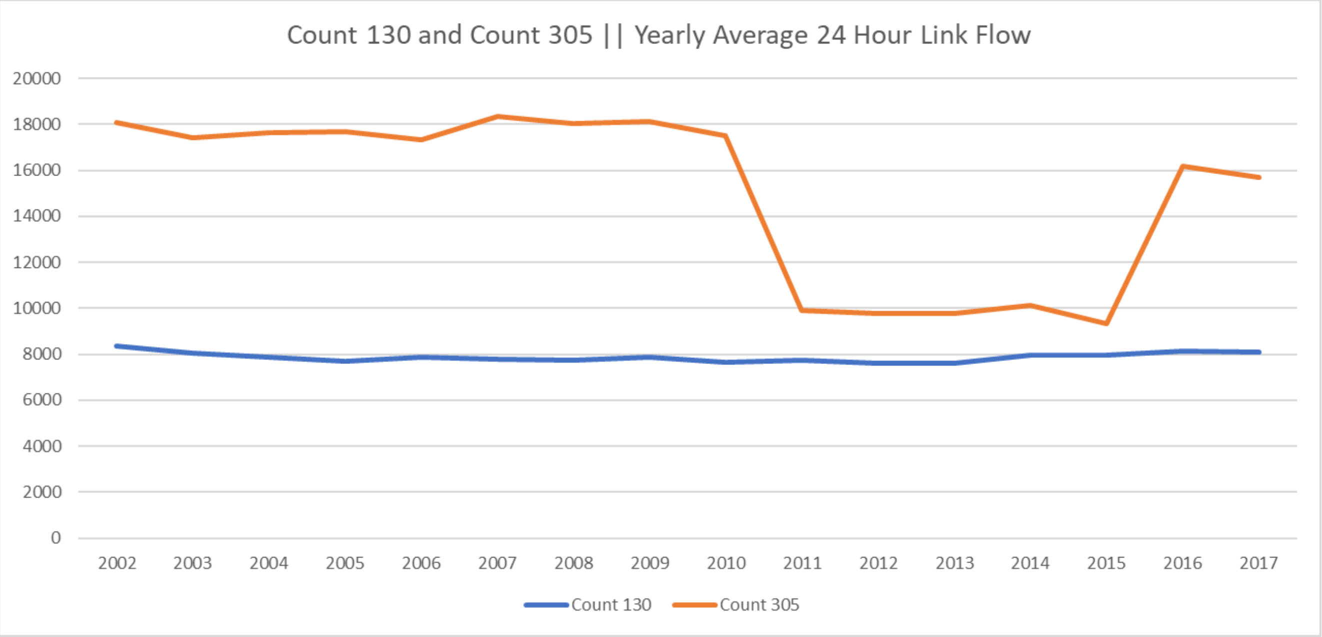


28. Traffic data for the majority of these sites has been provided for a range of periods between 2000 and 2021 on the following basis. Note that sites 130 and 305 are not included within the analysis as 130 lies at the northern extremity of the model extent and contained a series of anomalies within the

yearly data, as well as the A4260 corridor that it monitors being covered by site 174 further south, and 305 is covered by adjacent count sites both north and south of this location.

29. Despite this these two sites have been analysed independently and results are provided within the graph below:

Figure 3: Count Sites 130 and 305 Traffic Flows



30. The graph above demonstrates that while Count Site 305 exhibits erroneous data between the years 2011 and 2015, the trend of traffic levels between 2002 and 2017 is a negative one. This is corroborated by Count Site 130 which shows consistent traffic levels between 2002 and 2017, but with overall growth also exhibiting a negative trend.

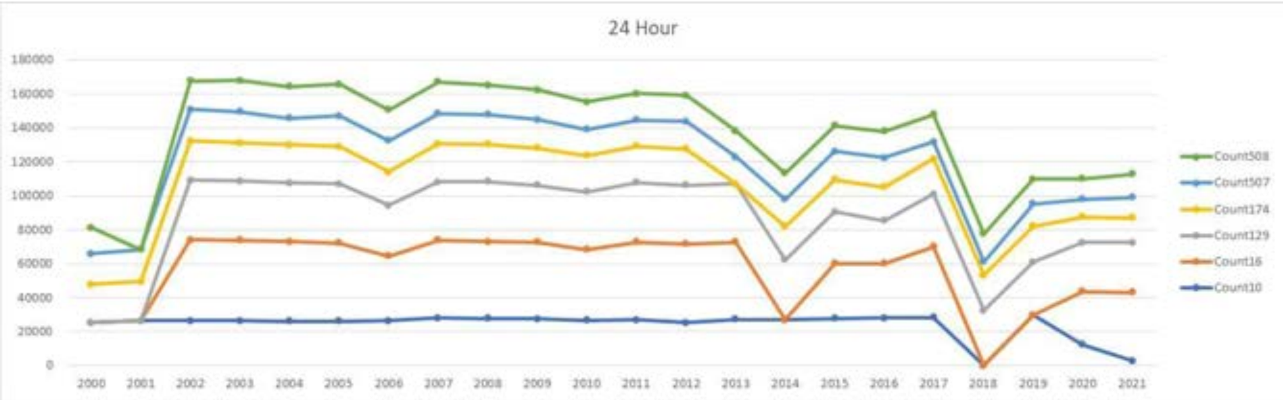
31. The process for analysing the remaining sites is detailed below.

Table 1: Traffic Survey Period

Count Point	From	To
010 A44 NORTH-WEST OF PEARTREE ROUNDABOUT	2000	2021
016 A40 OXFORD NORTHERN BYPASS	2002	2021
129 A40 SUNDERLAND AVENUE	2002	2021
174 A4165 South of Kidlington	2000	2021
507 A4144 Oxford, Woodstock Rd S of Blandford Ave	2000	2021
508 A4165 Oxford Banbury Rd South of A40	2000	2021

32. As a first stage, the traffic data for each site was revisited to ascertain whether it produced stable flow patterns over the relevant forecast period. Stacked analysis of each site was undertaken and is presented within the following Figure:

Figure 4: Stacked Count Data (24 Hours) 'Full Range'

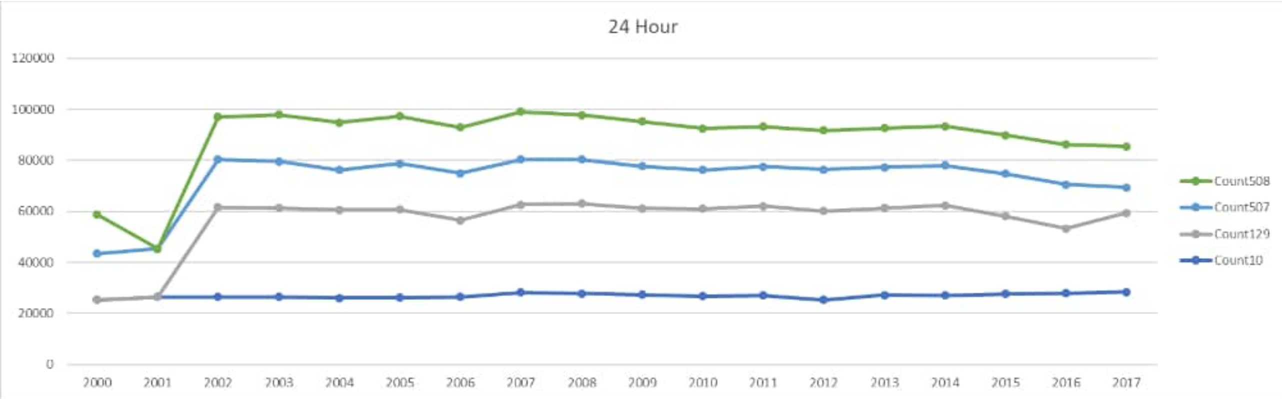


33. The count sites show a clearly discernible drop in traffic volumes in 2018 with modest recovery thereafter. The data has been checked and is not erroneous and therefore it was considered that the best course of action was to omit traffic data processed for 2018 onwards. Adopting this data within the analysis would simply result in a significant reduction in traffic volumes to be assigned in the future year scenarios. Even if this does transpire, there is an expectation that OCC will expect to see some element of traffic flow increases because of the forecasting process and so, for this reason, the cut off was implemented from 2018 onwards.

34. Count site 16 and 174 were identified as having missing data sets within the assessment period (2013 and 2041 respectively) and so both of these sites were also omitted from the interpolation.

35. This resulted in the following traffic patterns being used to interpolate future growth levels based on existing traffic trends:

Figure 5: Stacked Count Data (24 Hours) 'Selected Range'



36. Interestingly, even when traffic data has been processed and cleaned, to minimise the rate at which it predicts a reduction in traffic levels, these sites, when assessed over the AM and PM peak hours, would still result in the prediction that future traffic levels will drop by 2031 relative to 2017 (the last year chosen for the analysis).

37. Between 2013 to 2017 there remains a notable drop in the traffic volumes observed at each location. The biggest drop occurs within 2014, followed by a slight recovery in traffic flows but which remains below 2013 levels. The rate at which the traffic volumes recover affects whether the linear interpolation of future trends predicts growth or recession in traffic volumes.

38. Because the recovery in the AM and PM peak hours is much slower than the 24 hour levels, this results in the peak hour analysis predicting a reduction in traffic flows of between 10-11.5%, whilst the 24 hour analysis predicts a more modest reduction in traffic volumes of around 8%.

39. The trend analysis for the AM and PM peak hours is presented separately to the 24 hour period within the following **Figure 6** and **Figure 7** respectively:

Figure 6: Traffic Trend Analysis and Interpolation (AM and PM Peak Hours)

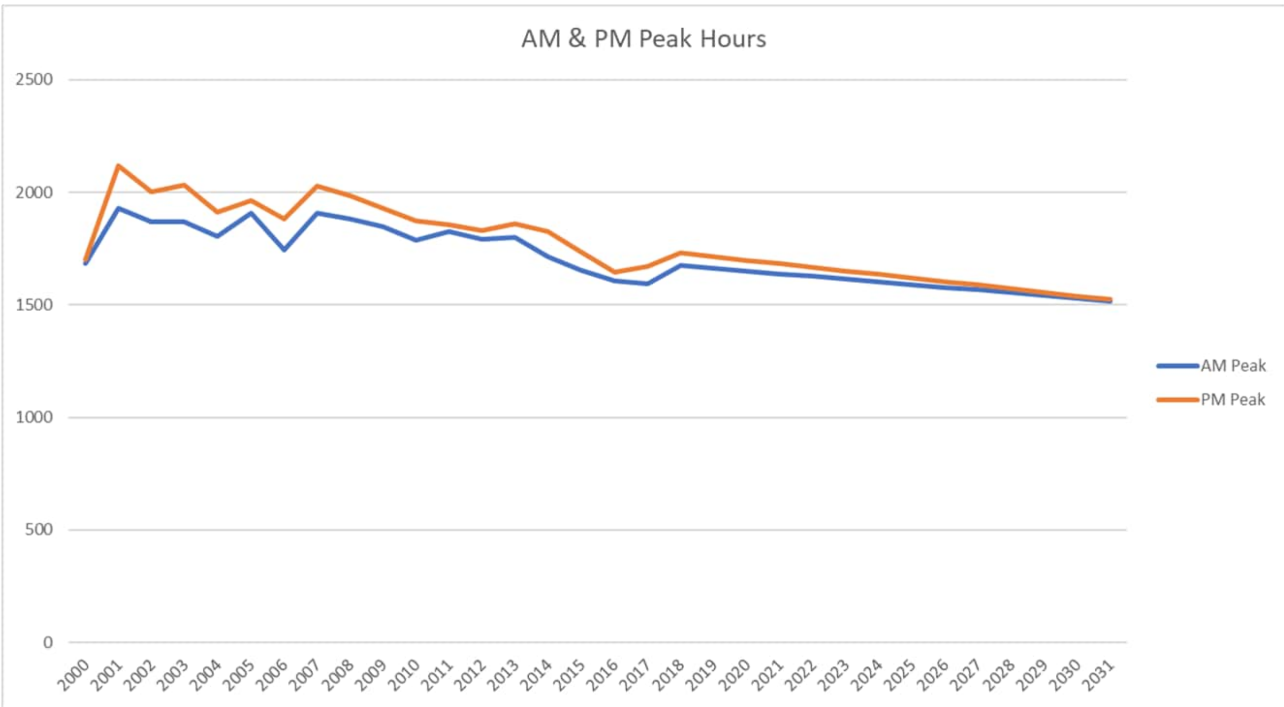
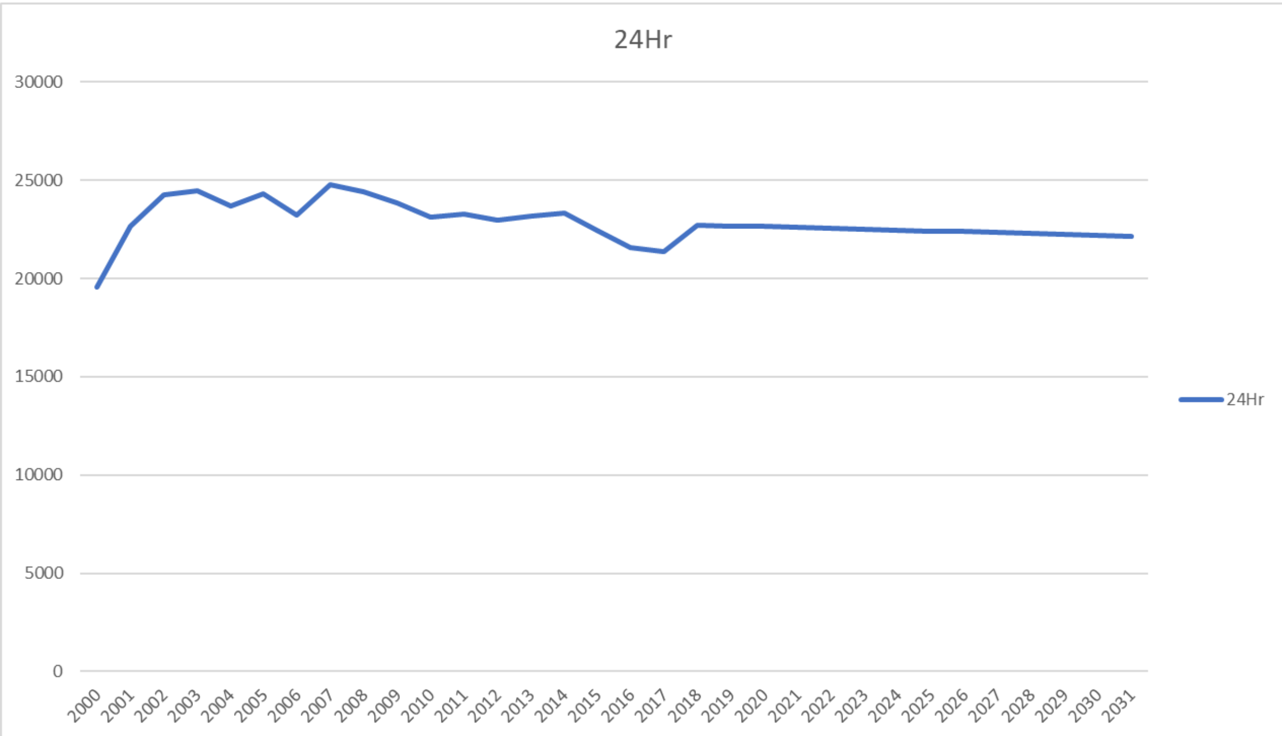


Figure 7: Traffic Trend Analysis and Interpolation (Daily Volumes)



Development Trajectory Analysis

40. Consideration has been given to establish if there is a relationship between changes in traffic volumes and the delivery of new housing within the study area.

41. This was considered particularly pertinent since most of the traffic trend analysis resulted in the prediction that traffic volumes would be lower in 2031 than those observed in 2017/2018.

42. It is possible, for example, that one could contend that traffic growth rates have been constrained due to limited housing delivery and a correction to the rate of housing delivery would, correspondingly increase the rate of traffic growth to be assumed within the modelling.

43. However, the availability of planning data to inform the projections for housing delivery was limited. Vectos has previously provided census data pertaining to housing levels identified within census for the years 2001 and 2011, no data is available beyond this point within the current census data.

44. Within NTEM there is some account of increasing dwelling figures within the planning assumptions. NTEM figures begin at 2011 however and when comparing the 2011 figures within NTEM with those presented within the census data there is a clear discrepancy within the figures.

45. The differences between the two figures for 2011 are presented within **Table 2** alongside the adjustment factor. This adjustment factor was subsequently applied to the 2001 census data to create an equivalent NTEM housing figure for 2001. This then allows NTEM to be interrogated for a 2017/18 housing figure as well which, in turn, allows projected housing delivery to be plotted against the traffic trends to understand if there is a discernible relationship between the two data sets. The outcome of this process is presented within **Table 3** and presented alongside the processed traffic volumes within **Figure 8**.

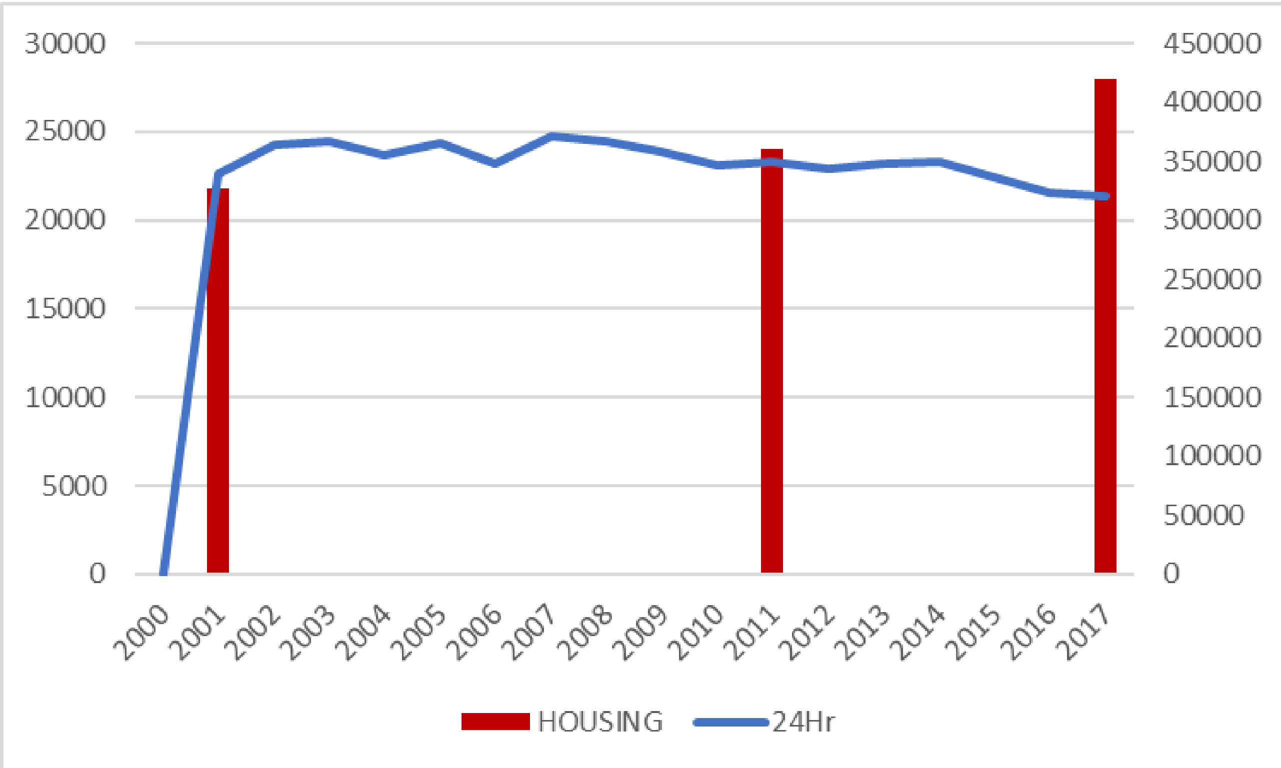
Table 2: Nomis versus NTEM Housing Projections

	NOMIS		NTEM	
Area	**2001**	**2011**	**2011**	**Difference**
Cherwell	23,117	23,440	56,890	2.427048
West Ox	32,051	32,620	43,512	1.333906
Oxford	134,248	151,906	259,319	1.707102
Total	**189,416**	**207,966**	**359,721**	**1.729711**

Table 3: Normalised Housing Projections (2001 to 2018)

Area	2001 Adjusted	2011 NTEM	2018 NTEM
Cherwell	56,106	56,890	85,346
West Ox	42,753	43,512	47,200
Oxford	229,175	259,319	287,588
Total	**327,635**	**359,721**	**420,134**

Figure 8: Normalised Housing Projections versus Average Daily Traffic Volumes



46. The previous figure reveals that the increase in housing projections actually corresponds to a modest reduction in traffic volumes. Whilst housing deliveries are increasing, traffic flows are reducing within the same period.

47. Although this has required a mix of NTEM estimates and observations through census, it clearly demonstrates that increased housing levels will not necessarily mean an increase in traffic volumes.

48. Therefore, in order to reflect this within the traffic modelling, it is proposed that the forecast scenario is derived whereby total growth within the model, following the assignment of the committed development demands, remains at 0%. The mechanics of the application of this methodology are described in the section below

Capping Application – A40 Adjustment

49. As a first step, it was considered necessary to apply demand adjustments in response to the inclusion of the A40 bus corridor scheme present within the 2031 VISSIM network. This scheme is to be delivered as part of the Growth Fund and was included within the 2023 VISSIM model received as the starting point for this assessment. However, in revising network demands back to 2018 baseline before reforecasting to include all committed sites (details of which can be found in the Forecasting Report[1]), modelled demands prior to this adjustment do not account for any potential shift from car trips to bus trips following delivery of the A40 bus infrastructure.

50. To account for this element of forecast modal shift, a catchment area was determined along the A40 covering zones located along the A40 corridor to the west which may present opportunities for mode shift, along with zones towards the east that reflect either the continued A40 off-network, or zones located within central Oxford that will be serviced by A40 bus routes.

51. Two determining factors have been established that control whether a trip within the OD matrix is potentially subject to an adjustment:

a. Whether the zone lies within the bus corridor catchment

b. The nature of the zones which make up the trip (i.e. Internal, External Minor, or External Major)

52. The magnitude of trips which are able to shift is based on the type of OD, with trips that a predominantly internal in nature being considered more likely to shift than trips that are largely linked to wider destinations. The relative adjustment potential for each trip type is presented within the following matrix:

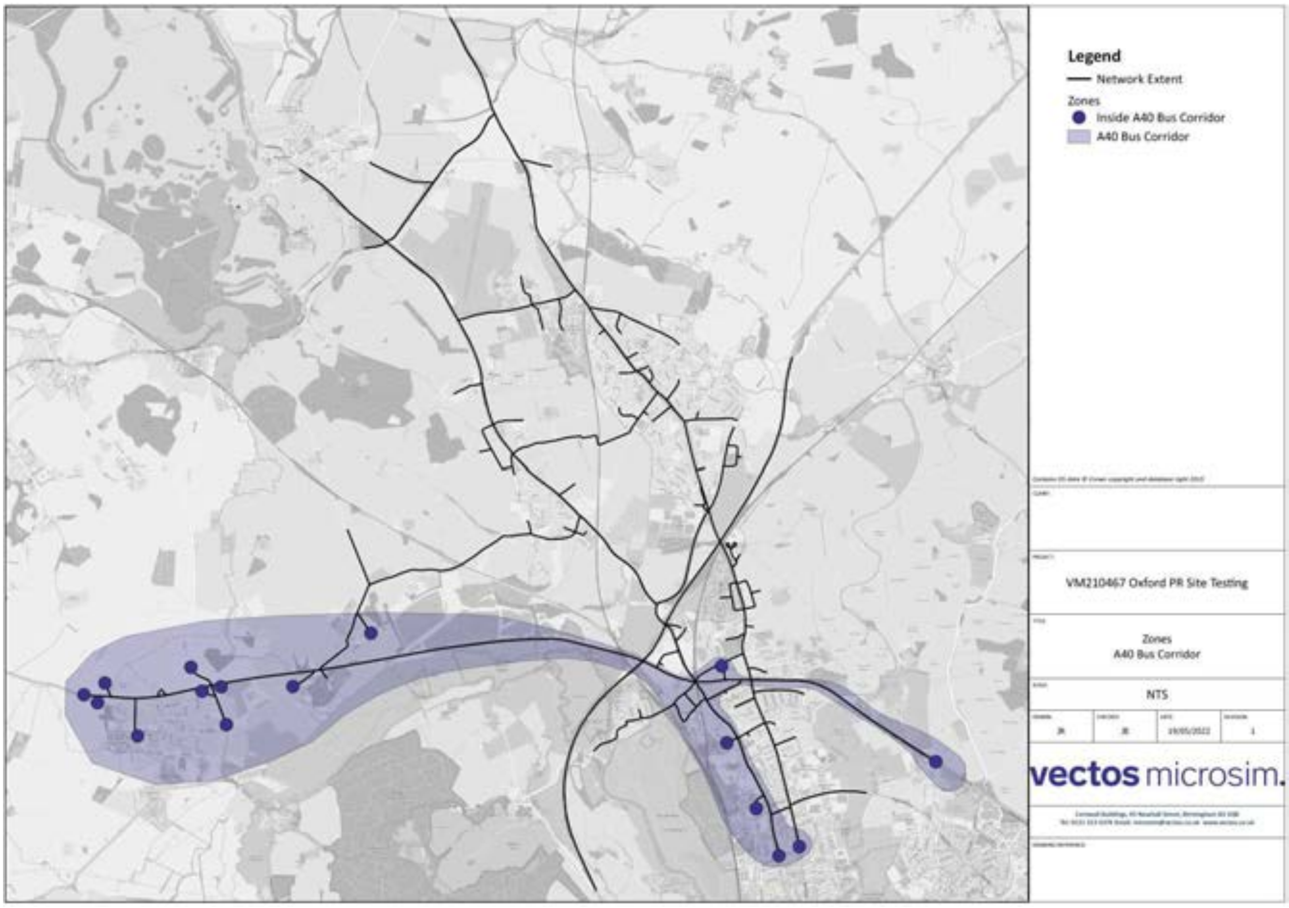
Table 4: Demand Adjustments for Linear Factors

From/To	External Major	External Minor	Internal
External Major	5.0%	7.5%	10.0%
External Minor	7.5%	5.0%	15.0%
Internal	10.0%	15.0%	25.0%

[1] VM210467.R001b Forecasting Report

53. The image below provides the catchment, along with the zones included as those which would benefit from improved bus services along the A40. A40 East and West zones are assumed to be External Major, zone 23 (which represents the B4449 south of A40, leading to Eynsham and connecting to A420 and A34 at Botley) is assumed to be classified as External Minor, while all other zones are assumed to be Internal.

Figure 9: A40 Bus Corridor Catchment



Capping Application – Eynsham Park and Ride

54. In addition to the mode shift forecast to be achieved via the introduction of the A40 bus lane, the proposals to bring forward a Park and Ride service at Eynsham is also considered. As these proposals are to be funded by sources outside of the PR sites considered in this assessment, the adjustments are applied to the Reference Case model and carried through into the testing.

55. The methodology identifies zones located near to the proposed location of Eynsham Park and Ride, and pairs these origin zones with destination zones in and around Oxford City Centre. For the AM, this provides a total possible intercept of 634 trips, i.e. 634 trips are identified as travelling from the Eynsham origin zones to the Oxford destination zones. In the PM, a total intercept of 442 trips is

identified, corresponding to the number of trips identified in the matrix travelling from Oxford zones to Eynsham zones.

56. Forecast accumulation for the Park and Ride is taken from the TA[2], which suggests a total 3 hour occupancy rate of 90.2% and a PM occupancy rate of 62.3%. This translates to a total of 767 AM trips and 530 PM trips that would be forecast to use the P&R service, and thus the number of trips that would be removed from the A40 corridor. This means that the number of trips available to be shifted within the VISSIM demands is lower than the forecast utilisation of the Park and Ride in both peak periods.

57. Notwithstanding this, the available OD movements are removed from the VISSIM demands on the basis that these trips are likely to shift to the new Park and Ride Service.

Capping Application – Remaining Background Cap

58. Following inclusion of the focussed adjustment on the A40 resulting from the Growth Fund scheme and the Eynsham Park and Ride, further adjustments are applied in line with the analysis undertaken above to cap the overall network demands to a level consistent with the baseline, ensuring an overall 0% growth level can be maintained.

59. To ensure that the distribution of growth reflects known development pressures, as is identified through the analysis of the committed developments, the matrices which have been derived for the committed developments have been retained with the existing trip generation figures fixed for each of these developments. This means that traffic generation figures related to the committed developments, and their associated impact, can be accounted for within the model network but there is a corresponding reduction in baseline trip figures from those zones which are predicted to experience increases in traffic volumes related to the committed developments.

60. Effectively, the committed development demands displace trips within the existing background matrices such that traffic volumes within the future year reference case, prior to the allocated sites being included, remains consistent with the volumes observed within the 2018 base model.

61. This is considered to be the most realistic forecast scenario to enable OCC to understand the outcomes that may occur following the inclusion of the allocated sites and associated sustainable transport interventions.

62. The demands build for the committed developments has resulted in 6764 trips being identified for inclusion within the model network during the AM period and 7916 trips being assigned within the PM period. The baseline figures for the AM and PM periods are 46420 and 49916 respectively.

63. In order for traffic growth within the model to be capped at 0% it is necessary to reduce the total background traffic which is assigned to the model by the same magnitude as the total committed development trips being added.

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[2] A40 Park and Ride and Bus Lane Scheme, Transport Assessment, Oxfordshire County Council, Table 6.2

64. The following steps have been adopted to achieve this level of adjustment within the model demands in a manner which also retains the assignment demands derived for the committed developments, as per the trip generation totals identified during the process of scoping out the future year model assumptions:

- The level of traffic required, per hour, to limit growth to 0% was identified.
- Correspondingly, the amount that traffic volumes needed to reduce by to enable 0% overall to be adopted within the model was identified on an hourly basis.
- This 'reduction' was distributed using the pattern of growth identified as a result of the individual hourly committed development matrices.
- The reduction, once distributed using the pattern of growth per the Com Dev matrices was then applied to the background matrix levels for each hour.
- In certain instances the application of this reduction resulted in negative trips occurring (i.e. Origin/Destination pairs where the volume of trips within the background matrix was lower than the quantum being removed) in such instances, a furnessing procedure was applied on the following basis:
    - Initially, zones which had negatives within the destination column were furnessed such that the negatives were subtracted from the existing positive figures within the respective matrix column.
    - Subsequently, where negative figures still remained within the matrices, the process was repeated using origin figures whereby the negatives were applied proportionally to the remaining positive figures.
    - Finally, in the rare instances were after both column and row adjustment negatives still remained, an adjustment was made whereby the remaining negatives were reduced from the whole matrix proportionally based on the remining positive trip generation totals.
- The resultant 'adjusted' background demand matrix levels were then assigned to the model alongside the full committed development matrices.

65. A summary of the outcome of this process is also provided within the following **Table 5** which sets out the adjustment which has been applied to the background matrix levels, and the resulting demand totals now assigned to the Reference Case as a result:

Table 5: Demand Adjustment Summary

Period	AM 07:00-08:00	AM 08:00-09:00	AM 09:00-10:00	PM 15:00-16:00	PM 16:00-17:00	PM 17:00-18:00
Background Lights	15668	16472	14280	15156	16900	17860
Com Dev	1826	2990	1949	2191	2765	2960
Initial Total	***17494***	***19462***	***16229***	***17347***	***19665***	***20820***
CD GROWTH	11.7%	18.2%	13.6%	14.5%	16.4%	16.6%
Periodic		14.6%			15.9%	
Target		0%			0%	
Diff		-14.6%			-15.9%	
figure		-5443			-6404	
Target adjustment	-1826	-2990	-1949	-2191	-2765	-2960
A40 Corridor Adjustment	-85	-76	-69	-67	-78	-53
Eynsham P&R Adjustment	-242	-161	-231	-88	-228	-127
Remaining Background Cap	-1499	-2753	-1649	-2037	-2460	-2780
Background Lights	13842	13482	12331	12965	14135	14900
Com Dev	1826	2990	1949	2191	2765	2960
Final Total	**15668**	**16472**	**14280**	**15156**	**16900**	**17860**

Summary

66. The modelling working group has developed a Future Year Reference Case VISSIM model which can be used to assess the implications of delivering the proposed PR allocations north of Oxford. As part of this process historic data provided by OCC has been reviewed for a number of sites within the area.

67. The traffic counts and survey periods have been rationalised to enable trend analysis to be completed. This has allowed traffic forecasts to be projected forward to Local Plan year of 2031 based on the trends observed within the historic traffic data collected at the selected locations.

68. This has also been compared with the planning assumptions contained within the NTEM database and the Census data to create a normalised housing delivery level for the years 2001, 2011 and 2018. This has been used to correspond the changes in traffic forecasts to housing delivery rates.

69. Analysis and interpolation of the trends observed within the traffic data reveals that traffic levels are predicted to drop within the AM and PM peak hours by 2031, relative to 2017 levels.

70. Comparison of the traffic trends relative to housing delivery reveals that the drop in traffic volumes is actually accompanied by an increase in housing provision and, as such, an adjustment has been defined whereby the traffic movements associated with the committed developments are contained

within the model traffic demands but trips associated with the same zones in the base model, as are affected by the committed development trip generation figures, are reduced. This is intended to ensure that the total demands within the model do not exceed the total of the trips contained within the base model.

71. This has resulted in adjustments to the traffic figures within the model to ensure that the overall traffic volumes within the model are capped at 0% above the baseline figures inclusive of the additional demands associated with the consented developments. The adjustments to the traffic forecasts have been applied to the background light vehicles; HGVs are fixed at the baseline levels.

72. It is considered that the application of capping in the manner set out within this note is sensible, as it allows for realistic forecasts to be derived for assignment within the model such that the network capacity is not entirely exceeded prior to any development assessment work, as clearly that would not be a realistic position particularly given the findings of the trend analysis which points to a steady decline in peak hour traffic volumes.

73. The resultant traffic figures assigned within the VISSIM model also accord with the reductions being targeted through Oxfordshire's LTCP. Continued application of increases in traffic volumes through the model forecasting would represent a significant failure in OCCs policy approach.

Appendix C

Oxford PR Sites VISSIM Assessment
Mode Shift Assessment Discussion Note

VM210467.DN01b
May 2023

Introduction

1. Vectos Microsim (VM) is assisting in the assessment of the impacts of delivering the allocated sites to the North of Oxford city, on the transport network, using the Oxford north VISSIM model.

2. The work is being undertaken on behalf of multiple site promotors and is assessing the effects of the allocated sites references PR6(a&b), PR7(a&b), PR8 and PR9.

3. The cumulative effect of delivering these sites is being considered alongside a series of key, consented developments which have been identified for inclusion within the assessment through a separate scoping exercise conducted with Oxfordshire County Council (OCC).

4. The primary objective of this study is to identify the effects on network operation arising from traffic forecasts associated with the allocated and consented developments, inclusive of any consented infrastructure proposals, to determine the level of mode shift which will need to be achieved to enable the allocation strategy to be delivered in a manner which is acceptable to OCC.

5. The VISSIM microsimulation model network extent, as well as the key development locations, is illustrated within **Figure 1** overleaf.

Purpose of this Note

6. The purpose of this note is to set out for discussion and agreement the assumptions to be applied to the demands within the VISSIM model to replicate the expected effects of changes in travel behaviour arising from the delivery of enhancements to the sustainable and active travel networks.

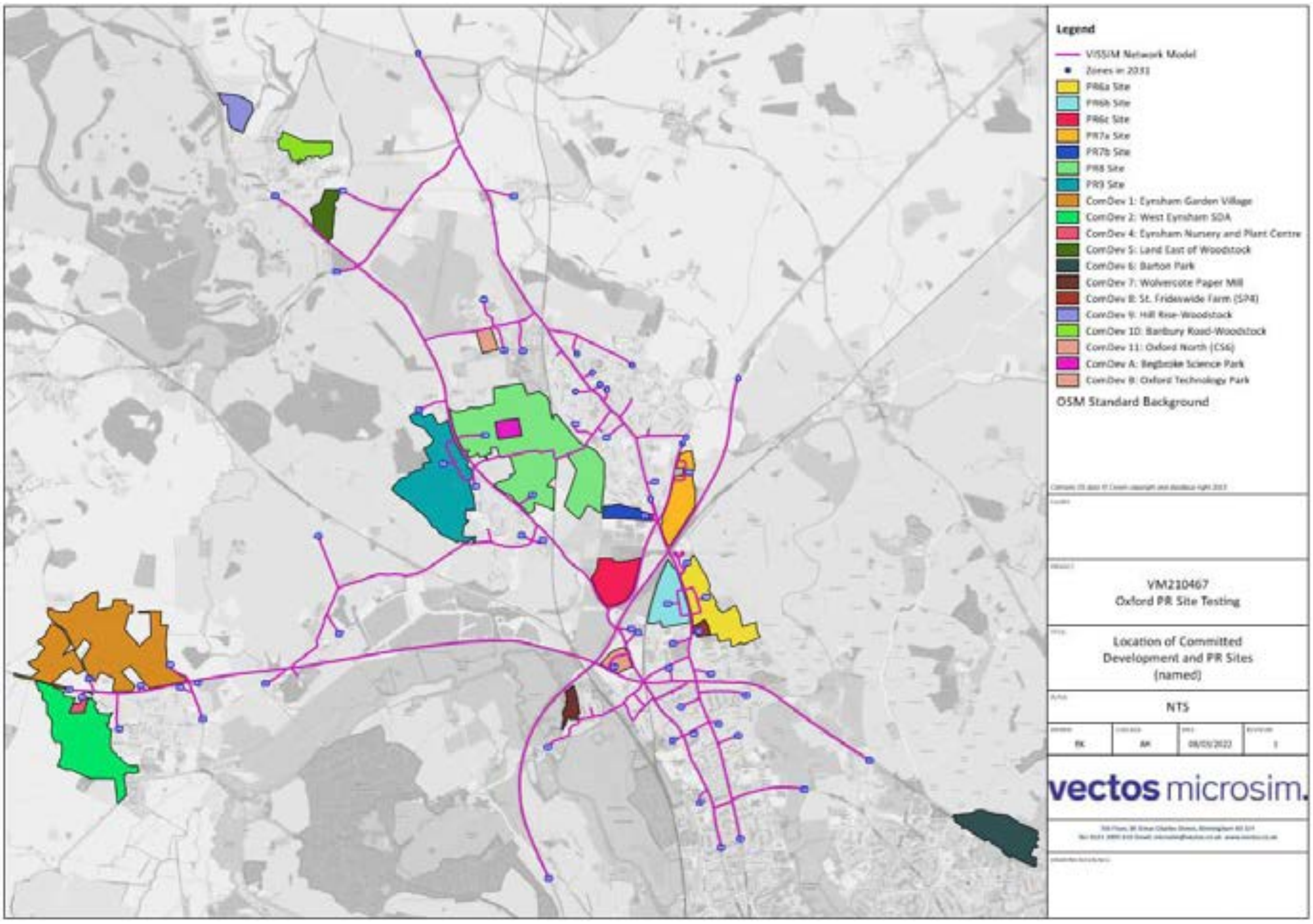
Background

7. The North Oxford VISSIM model has been provided to VM by OCC and has been adjusted to account for the traffic growth projected to occur because of the delivery of an agreed set of committed developments and the allocated PR sites.

8. The Local Plan Part 1 Partial Review runs to 2031. The PR sites are expected to be constructed and completed during this period up to 2031, albeit PR8 is expected to be completed shortly after by 2033. Therefore, the Future Reference Case model will establish local highway network conditions, taking into account any appropriate background traffic growth, consented development traffic and PR site traffic upon full completion.

9. The assumptions contained within these model scenarios have been circulated and reported separately and have resulted in the development of a Future Year set of models which contain committed development and PR sites and associated infrastructure.

Figure 1: Model Extent and Development Locations



Objective

10. The objective of this stage of the assessment is to test the impact of the cumulative PR site delivery on the road network, and to establish the mitigation and sustainability measures required to ensure the network is capable of accommodating the trips associated with these developments.

11. A package of measures has been identified in Infrastructure Delivery Plan (IDP) in Appendix 4 of the Cherwell Local Plan (Part 1) 2011-2031 Partial Review (referred to as the IDP package) that focus on sustainable transport interventions, to be funded by the PR sites, that are aimed at improving the operation of the network whilst also helping OCC achieve their modal shift targets. This note sets out how these measures have been included within the modelling.

Demand Responses

12. The deterministic nature of microsimulation modelling techniques means that the forecasts will need to be subject to manual adjustments to account for the expected behavioural responses.

13. Microsimulation modelling does not utilise Variable Demand Modelling (VDM) approaches to reduce traffic flows in the face of increasing journey costs. It should also be noted that traditional VDM approaches are limited with regards the ability to reflect changes induced by enhancements to the active travel network in any event.

14. Thus, it has been agreed that manual adjustments to the model demands are considered an acceptable way of accounting for the behavioural changes which are expected within the study area.

15. The primary behavioural change which is anticipated is that of a change in mode. However, a change in departure time may also occur (i.e. peak spreading) if, following the mode shift assumptions, the network function has not recovered to an acceptable level. Peak spreading has not been included as part of this modelling exercise but it is considered likely that it would occur.

16. There are four behavioural responses which this work seeks to capture:

- Park and Ride Shift: Whereby drivers terminate at the Park & Ride sites and continue their journeys in to the city via the P&R bus services.

- Active Travel Shift: Whereby drivers choose to switch to active travel modes which is informed by the distances being travelled and enhancements to the active travel network.

- Cycle Corridor Shift: Whereby key corridors have been defined to allow for an enhanced mode shift to be achieved, on a corridor basis, in response to the delivery of targeted infrastructure and, thus, is dependant upon the location of the zone relative to the corridor where the enhancements are being proposed.

- Bus Corridor Shift: Whereby the A44 corridor has been identified as a key corridor for enhanced public transport services and associated demand adjustments have been included.

17. These behavioural responses have been defined through a series of assumptions which can then be applied to the model demands to reflect the effect that the shift will have on network operation.

18. A key aspect of this methodology is the initial assumption set. These are the controls which effect how (and which) demands are adjusted to capture the various behavioural responses.

19. It is these assumptions which are to be agreed through this discussion note and are set out in detail towards the end of this note.

20. Whilst these four behavioural responses have been justified through the associated demand adjustments, there are other measures promoted within the Oxfordshire County Council Local Transport and Connectivity Plan (LTCP) that have not been accounted for, including traffic filters, zero emission zones and a workplace parking levy. It is therefore expected that the targeted measures set out in the LTCP will reduce traffic levels further than the cumulative adjustments undertaken for this modelling exercise, and whilst every attempt has been made to ensure the

proposed adjustments are sensible in magnitude and transparent in rationale, in reality demand ‘adjustments’ (i.e. modal shift and/or trip spreading) are likely to be far more wide-ranging.

Outline Methodology

21. At each stage of the process the demand responses are added incrementally and in the order stated. Thus, adjustments are first applied to reflect the impacts of the P&R switch before subsequently moving on to the Active Travel effects.

22. An overview of this method is summarised as follows:

— The zone system within the model has been reviewed and zones have been classified based on their location which, in turn, influences which behavioural responses they are susceptible to, and the level of susceptibility thereof.

— Catchment areas have been defined for the Oxford Airport P&R site and trips which travel past the P&R site into the city that may realistically shift to the P&R services have been identified and intercepted. The level of intercept being determined by the car park capacities and expected accumulations for Oxford Airport P&R utilising OCC data contained within the planning application for the Eynsham P&R.

— Using the zone classifications to guide which zones will be affected by Active Travel measures, the distances between different origin / destination pairs has been established. Shifts to walking have been based on journey distances of 1.65km or less whilst cycling intercepts are currently constrained to trip distances of up to 6.6km. Varying percentages have been applied to the trips which fall below these distances to reduce the car-based trips within the model and reflect the increased uptake in these modes.

— Additional analysis has been undertaken to assign zones to key corridors within the model area which may subsequently be subject to a further enhancement (i.e. in addition to that which occurs as a result of intercepts informed by trip distance). These corridor adjustments are informed by the presumption of effect on a corridor basis in response to proposed infrastructure being delivered along a specific corridor which will increase provision for cyclists which is expected to lead to a corresponding increase in cycling as a mode of transport as a result.

— A final adjustment is applied in response to the specific commitment by the PR working group to fund additional bus services along the A44 corridor.

23. Each stage requires a series of assumptions to be applied based on a combination of the origin/destination zone type and pair as well as, in some cases the trip distances. Details as to the initial assumptions applied for each discrete stage are provided within the following section.

24. OCC has provided a 2018 and a 2023 Base VISSIM model. The 2023 model has been derived by applying adjustments to the 2018 demands to account for the delivery of consented developments within the intervening period. Since the updated forecasting procedure being developed by VM includes for each individual development to be accounted for explicitly within the model network, the

2018 demands have been used as the starting point for the adjustments to then be applied as set out for each stage incrementally.

Initial Model Demands

25. At each stage the demand adjustments are applied to different matrix levels depending upon the nature of the adjustment being applied.

26. Within the VISSIM model, this is controlled by the fact that each of the key demand segments is assigned to the model via its own specific demand assignment matrix. This means that the demand associated with Light Vehicles, Heavy Vehicles, Committed Developments and each individual PR allocation can be identified separately within the model network.

27. Excluding the HGV vehicles as they are not expected to be affected by mode shift and behaviour change, there are 8 demand segments which assign vehicles within the model network. The initial demands which have identified following the review of development inputs, for light vehicles only, are presented within the following table:

Table 1: 2031 Cumulative Scenario Demands (no Adjustment)

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Background Lights	15668	16472	14280	15156	16900	17860
Com Dev	1826	2990	1949	2191	2765	2960
PR6a	160	183	91	182	190	213
PR6b	119	126	70	138	145	170
PR7a	78	87	48	90	94	110
PR7b	27	33	31	40	45	45
PR8	1054	1004	880	898	940	877
PR9	114	112	91	101	139	156
Total	**19046**	**21007**	**17440**	**18796**	**21218**	**22391**

28. This table reveals that, across the entire AM and PM period the traffic growth which is forecast to occur, in light vehicle movements within the study area, currently stands at around 22 to 28% which is made up of 12 to 18% increase derived from the inclusion of the consented development traffic growth and 8 to 10% growth derived from the PR allocations.

29. These demands were reviewed and considered to be unrealistic in light of the OCC LTCP mode shift targets as well as the outcome of local trend analysis which considered the rate at which traffic volumes had changed within the model alongside the rate at which housing levels had increased. As a result of this additional analysis it was deemed appropriate to adjust the demands to accommodate the traffic forecasts associated with the committed developments whilst constraining the overall traffic volumes within the model.

30. As a result of this process, the demands used as the basis for the mode shift analysis have been adjusted such that, when committed developments are included, the overall traffic volumes remain consistent with the base figures (i.e. growth is at 0%) and then the PR site demands are included in addition to these.

Table 2: 2031 Cumulative Scenario Demands (post trend Adjustment)

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Background Lights	13842	13482	12331	12965	14135	14900
Com Dev	1826	2990	1949	2191	2765	2960
PR6a	160	183	91	182	190	213
PR6b	119	126	70	138	145	170
PR7a	78	87	48	90	94	110
PR7b	27	33	31	40	45	45
PR8	1054	1004	880	898	940	877
PR9	114	112	91	101	139	156
Total	**17220**	**18017**	**15491**	**16605**	**18453**	**19431**

31. This table reveals that inclusion of the PR site demands alone, in addition to the committed developments which have already been supplanted within the baseline matrices, represents an increase in traffic volumes of between 8% to 10% per period.

32. These demand matrices have then been subject to the adjustments to account for changes in travel behaviour in response to increased uptake in different modes of transport. This has been set out in more details as follows.

Zone Classifications

33. The first stage of the methodology requires the model zones to be categorised into different types based upon the location of the zone and the type of loading point it represents.

34. Three classifications have been identified at this stage:

- **Internal Zones**: zones which represent loading points for local trips which are likely to have been generated close to the zone location.
- **External Major Zones**: zones which represent trips loading in via major roads such as the strategic road network, where the origin and destination are unknown but trip length distribution will likely be biased towards longer distance trips.
- **External Minor Zones**: Zones which represent loading points that link on to the local road network, A-Roads and B-Roads which will carry a lot of traffic but are not skewed towards SRN style long distance trips (such as those zones which represent the points of access in to the City).

35. The classification of zones that has been applied is illustrated within Figure 2 overleaf. These classifications inform the application of certain demand adjustments, specifically concerning the accounting for Active Travel within the model network.

Park and Ride Adjustments

36. The first demand adjustment which has been applied is intended to reflect the delivery of P&R proposals at Oxford Airport.

37. Car park accumulation data has been translated into an intercept level which extracts demands from the model network proportionally based on a select number of origin destination pairs until the car park accumulation has been equalled by a reduction in car trips on the model network.

38. An adjustment to the accumulation was then applied based on the demand profile within the model attributable to the OD pairs that fall within the intercept region. The accumulation profile was adjusted to reflect the proportions of trips within each hour that could be intercepted.

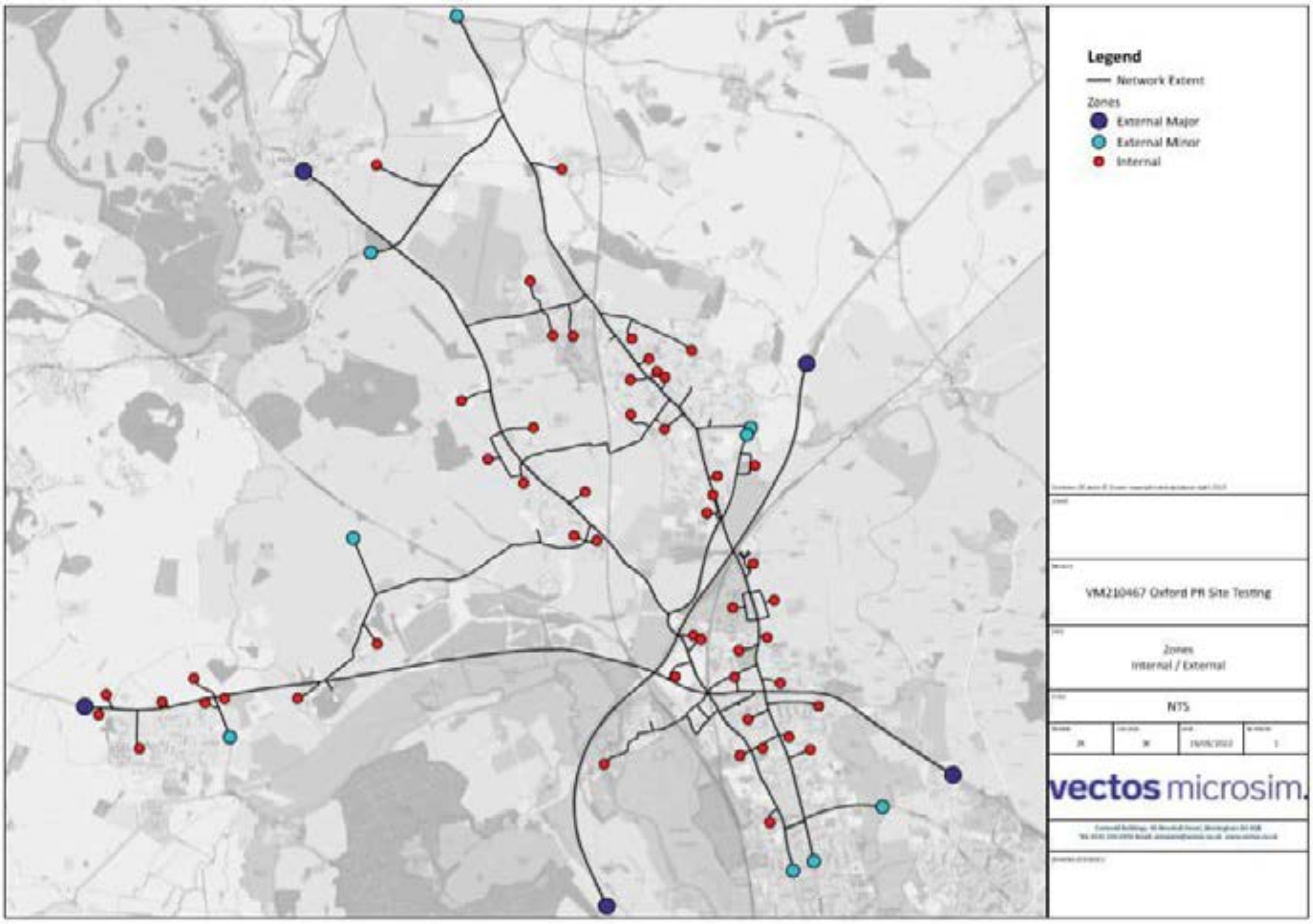
39. This means that if the car park was projected to fill 37% of the spaces but the model demands only exist for 35% of the spaces then the 35% target is used and the remaining 2% of spaces are filled in other hours where the demand is observed to exist. This ensured that the car park accumulation targets could be met, over the three hours, provided there was sufficient demand within the model over that period.

40. With Oxford Airport P&R the occupancy and accumulation percentages have been adjusted based on likely intercept levels and this has ensured that the car park accumulation targets are fully matched over the 3-hour model periods.

41. Trips are intercepted travelling between the Origin Zones to the Destination Zones during the AM. Instead of trips between the Origin and Destination zones the trips travel between the Origin zones to

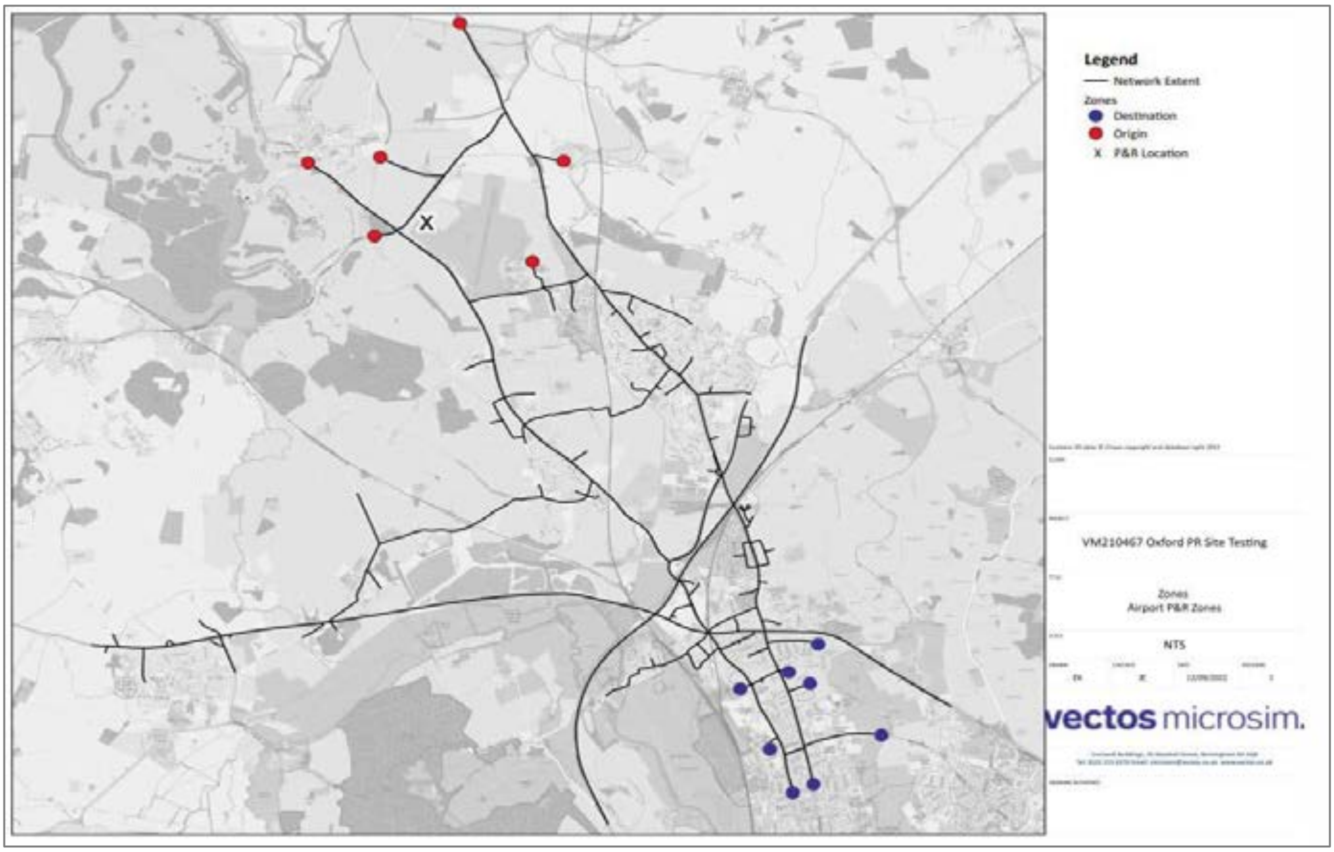
the P&R and then, during the PM they travel from the P&R to the Origin zones. The trips from the P&R to and from the destination zones in the AM/PM periods are assumed to be supplanted by the P&R services.

Figure 2: Zone Classifications



42. The catchment assumptions for the Airport Park and Ride is illustrated within **Figure 3.**

Figure 3: Airport P&R Catchment



43. As has been stated previously, the P&R intercepts work by identifying origin destination pairs that could realistically divert to use the P&R. They depart the Origin Zone and then travel to the P&R where the P&R service facilitates the remainder of the trip. During the PM the trips from the destination are removed and instead trips are implemented from the P&R zone to the original destination.

44. Trips are assumed to be intercepted from both Background and Committed Development matrices. The reductions are applied proportionally dependent upon the level of demand in each segment (i.e. as demands are typically higher within the background matrix level compared to the committed development matrices).

45. The total intercept for the Airport P&R, based on the car park occupancy, is 992 trips in the AM and 685 trips in the PM. Based on the analysis of the trips which are contained within the demand matrices there are a possible 892 AM and 966 PM trips which could divert in response to the delivery of the P&R leaving around 0 car trips in the AM and 281 trips in the PM which remain as car trips within the model. The remaining trips are now assumed to use the Airport P&R service.

46. A summary of the resultant impact on the model demands, arising from these changes, is provided within **Table 3** below.

47. **Table 3** illustrates that the net reduction in traffic volumes, arising from the application of the P&R induced demand adjustments, is around a 2% to 3% reduction in car trips across each individual hour. This effect would be reduced if the Airport P&R trips were reinstated at the P&R site but for

simplicity this stage has not been undertaken due to the limited impact upon the road network (as trips would be originating at northern zones and ending their trip at the new P&R zone located only a short distance away).

Table 3: 2031 P&R Demand Adjustment Summary

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Input Demands	15668	16472	14280	15156	16900	17860
Airport Subtracted	-376	-287	-230	-240	-232	-214
% Diff	-2.40%	-1.74%	-1.61%	-1.58%	-1.37%	-1.20%

48. These reductions are applied wholly to the Background Light and Committed Development matrices. The adjusted P&R demands have then been taken forward to the next step where adjustments have been made to account for walking and cycling.

Active Travel Adjustments

49. The application of Active Travel adjustments is intended to reflect the shift in trips from car to active modes in response to the provision of enhancements to the transport networks to encourage active travel uptake.

50. The adjustments to the demands have been applied to reflect two different shifts:

- Mode shift based on the intercepting of trips under a certain threshold.
- Mode shift due to proximity of trips to corridors where further enhancements may be proposed.

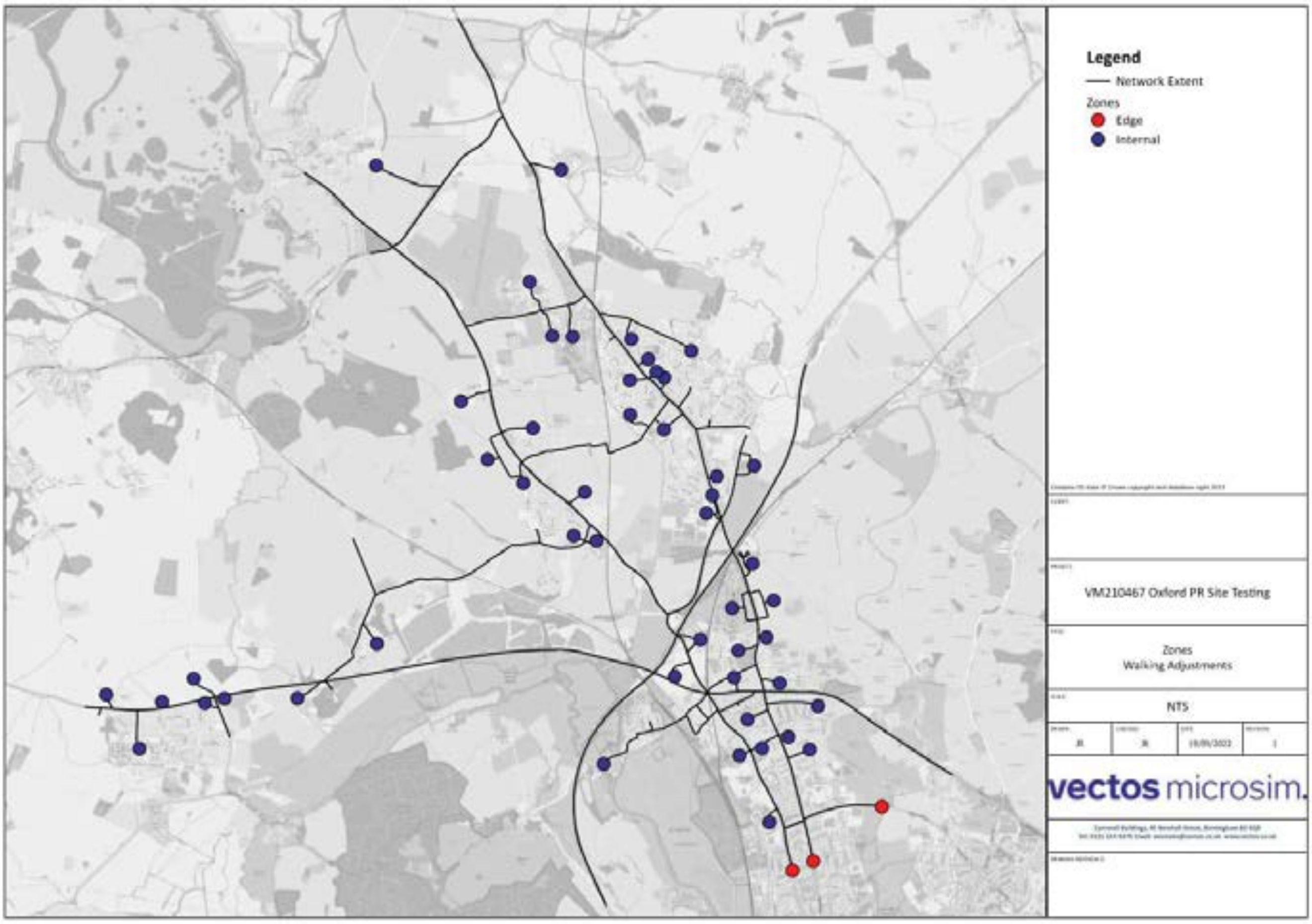
51. Adjustments to OD pairs to reflect a shift to Active modes needs to also be restricted to the zones where the shift can realistically be achieved. This means that trips where at least one trip end is associated with an External Major zone are omitted from this exercise. This is because those trip ends are generally expected to be significantly further away than the point of entry/exit represented by the zones within the model.

52. Similarly, several External Minor zones were excluded on the grounds that they also represent loading points for trips where the vast majority would be expected to travel further than the point represented by the External Minor zone. Not all External Minor zones were excluded from this process however as the zones to the north of the city are considered to be representative of a number of short distance trips as well as longer distance trips due to proximity to the city centre.

53. Those External Minor zones retained in this process have been classified as ‘Edge’ zones and a percentage of the trip interactions with these zones is affected by the adjustments whilst 100% of trips between the internal zones, which meet the distance criteria, can be adjusted to reflect the shift in mode.

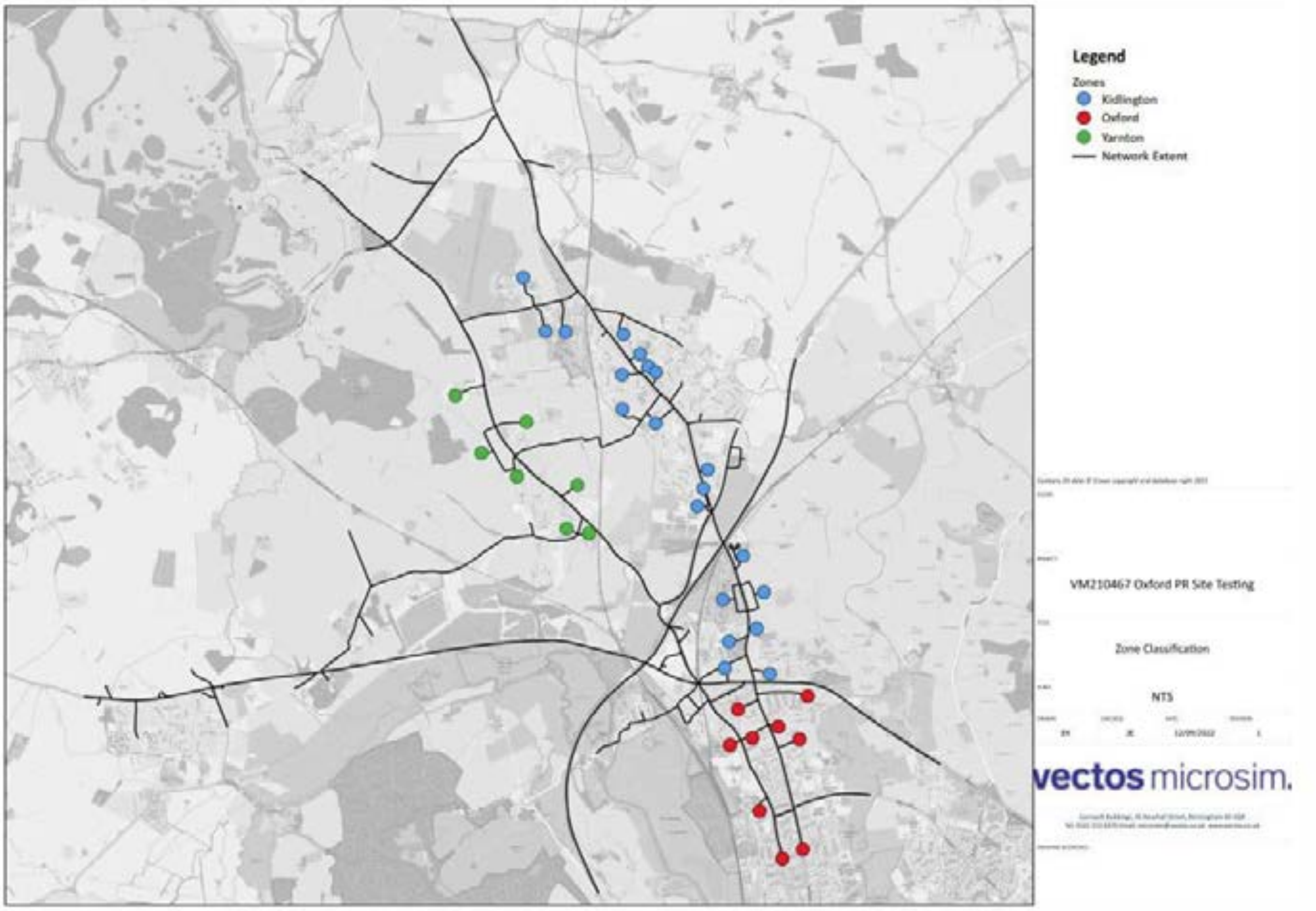
54. The Internal and Edge zones are therefore susceptible to demand reductions in response to Active travel uptake and the location of these zones is illustrated within **Figure 4**.

Figure 4: Active Travel Uptake Zones



55. Where the adjustments have been made on a corridor basis, zones have been subject to a further categorisation to reflect the location of the zone relative to the corridor being enhanced. The zone classifications adopted are illustrated within **Figure 5** overleaf and include Yarnton, Kidlington and Oxford with Yarnton and Kidlington being the areas for proposed enhancements but Oxford is also included on the basis that it is likely to be the case that a significant amount of the trips intercepted during the AM and PM peaks will have at least one trip end associated with Oxford City.

Figure 5: Bike Corridor Regions



56. Before any adjustments for trip distances or corridor enhancements are applied (but with the Edge adjustment set at 40%, described later within this Note) analysis of the trips between these zones, within the Background and Committed Development matrices accounts for between 10% and 12% of the total demand within the model. Thus, the potential effects of any changes at this stage are limited by the fact that these zones do not create many trips relative to the wider model demands.

57. Trips between the Edge zones are limited in magnitude in any event due to the location of these zones, however, they are also not subject to any adjustment at this stage meaning trips must have at least one trip end which commences at an internal zone for it to be considered as a candidate for adjustment.

58. The application of the adjustments was first applied based on trip distances and then, subsequently, on a corridor basis. Each of these adjustments is described in more detail as follows:

Active Travel Based On Journey Distance

59. When using the DfTs Active Travel Appraisal Toolkit to calculate the benefits of active travel uptake the current assumptions are for walking trips to be around 1.1km on average and cycling trips to be 4.4km which is, in turn, informed by National Travel Survey Data.

60. A buffer of 50% has been added to these distances to identify the distance between ODs which will be affected by these adjustments.

61. Having set the journey distances at 1.6km for walking and 6.6km for cycling, the DfT propensity to cycle tool was interrogated to provide an indication of the cycle intercept/driver reduction figures that may be reasonable to target within the modelling.

62. The 'Go Dutch' model was used for this purpose which indicated an uplift in cycling from around 6% to 24% of commuter trips. Therefore 18% of the commuter trips within the model area were identified as appropriately switching to cycling.

63. No similar data exists for walking and so, given that the expectation is that these trips are easier to intercept, a 50% shift was adopted although, as is noted later within this section, the small number of short distance trips means the effect of this adjustment is limited in any event.

64. The absolute figures, in terms of driver reductions, was also assessed to determine the level of trip intercept the PCT tool currently products with the Go Dutch model at key wards around the study area.

65. The wards selected included:

- Cherwell 017
- Cherwell 018
- Cherwell 019
- Oxford 001
- Oxford 002

66. The PCT tool predicted 1097 daily trips would be intercepted across all these wards. Using this as a target (and recognising that the City is the major draw for commuter trips) the edge factor was then adjusted until a value comparable to the 1097 was observed. Although this is a cycling-based analysis exercise, the same edge adjustment was applied to walking as no other information was available in a similar format to inform that estimate.

67. An edge zone adjustment of 40% was identified meaning that 40% of trips between the Edge zones and the internal zones, within 1.5km for walking and within 6.6km for cycling, would be subject to the same adjustment for switching to active modes as the internal-to-internal zones (i.e. 50% for walking and 18% for cycling).

68. Application of this factor resulted in 912 cycling trips being removed from the model area, which is considered comparable to the 1097 daily trips observed through the analysis of the PCT tool data when taking into account the model represents the 6 busiest hours and therefore the vast majority of forecast cycling trips (with the remaining shift occurring in the hours outside the 3-hour AM and PM peaks).

69. In summary, trip ends must comprise at least one internal zone to be considered as appropriate to adjust. Edge zones are adjusted by a fixed percentage and, again, only when the alternate trip end is an internal zone. The distance between ODs controls whether it can be adjusted and the walking adjustment has been applied first meaning that the cycling adjustment for any trips which lie between qualifying OD pairs is applied after the walking adjustment. It is possible to set a minimum Cycle distance if there is a wish to minimise the potential overlap between the two adjustments.

70. The critical assumptions applied during this process therefore are:

- Adjustments are constrained, at this stage, to just the background and committed development matrices.
- Trips must have at least one trip end associated with an internal zone.
- Trips associated with most External zones are excluded.
- For the External zones which are included, 40% of trips between the External zones (termed Edge) and other internal zones may be affected provided the fall within the following distance criteria:
- Trip lengths of 1.6km or less may shift to walking.
- Trip lengths of 6.6km or less may shift to cycling.
- 50% of trips which meet the walking criteria are assumed to shift.
- 18% of trips which meet the cycling criteria are assumed to shift.

71. An illustration of the effect that these adjustments has on the overall model demands is provided within **Table 4** overleaf.

Table 4: 2031 Active Mode Trip Distance Demand Adjustment Summary

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Input Demands	15668	16472	14280	15156	16900	17860
Post P&R	15292	16185	14050	14916	16668	17646
Post Active Mode Adjustment	15015	15709	13756	14704	16406	17390
Walking Adjustment	-108	-274	-164	-72	-141	-108
Cycling Adjustment	-170	-202	-131	-140	-121	-148
Net	-277	-476	-294	-212	-262	-256
Shift from initial	**-1.77%**	**-2.89%**	**-2.06%**	**-1.40%**	**-1.55%**	**-1.44%**

72. The data within **Table 4** reveals that the active travel adjustments induces a reduction of around 1.4 to 2.89% of car-based trips within the model area based on the application of the aforementioned criteria.

73. These demands have then been taken forward to the next stage where demands are subject to a further adjustment to account for increased cycle use.

<u>Cycle Corridor Adjustments</u>

74. Following the initial adjustment based on trip distances, a subsequent adjustment has been applied based on the proximity of the zone to proposed infrastructure.

75. Both the A44 and Kidlington corridors are proposed to be enhanced. Origin/destination pairs were identified whereby at least one trip end lies in the regions identified. Trips within each cycle corridor region (Yarnton or Kidlington) and trips between these regions the Oxford central region were identified and a further 20% adjustment applied to those OD pairs to reflect an increase in cycle uptake.

76. Trips within each region and between each region and Oxford, as well as trips internal to the Oxford region, were all subject to an adjustment of 20% to reflect increases in cycle trips and a corresponding reduction in car-based trips.

77. The effect that these adjustments have had on the demands is summarised within **Table 5** below. This illustrates that the additional reductions as a result of the corridor enhancements is lower than 1% per hour.

Table 5: Cycle Corridor Demand Adjustments

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Input Demands	15668	16472	14280	15156	16900	17860
Post P&R & Active Modes	15015	15709	13756	14704	16406	17390
Post Cycle Corridors	14892	15563	13625	14625	16298	17266
Corridor adjustments	-123	-146	-130	-79	-109	-124
Shift from initial	**-0.79%**	**-0.89%**	**-0.91%**	**-0.52%**	**-0.64%**	**-0.70%**

78. These demands have then been taken forward to the final stage where demands are subject to a further adjustment to account for increased bus service provision between Oxford and Begbroke.

A44 Bus Corridor Adjustments

79. As part of the mitigation strategy proposed by the Modelling Working Group, and in line with one of the items contained within the Oxfordshire Infrastructure Delivery Plan (IDP), it is proposed to fund an additional four services per hour along the A44 corridor between Oxford and Begbroke.

80. To account for the potential effect on private car demand along the corridor, the matrices for background and committed development trips were interrogated to identify OD movements that may benefit from the provision of these additional services.

81. The zones identified, and thus the north-to-south and south-to-north movements that would be included within the catchment of movements that are subject to adjustment, are illustrated in the Figure overleaf:

Figure 6: A44 Bus Corridor Zones

82. Of all the movements captured within these ODs, a value of 20% has been assumed as the rate of shift to utilise the new services, equating to a reduction in vehicle movements of 95-173 trips per hour, in turn equating to an average patronage on each service of between 25-45 passengers.

83. In addition, PR8 is proposing to fund a 20-seat ‘hopper-style’ community bus service between Yarnton and Kidlington. To account for the potential take up of this service, zones within the catchments of Yarnton and Kidlington were identified and as per the above methodology, 20% of the ODs within the catchment are assumed to shift to this service. The resulting shift is equal to ~15 trips per hour.

84. A breakdown of the adjustments applied can be found in **Table 6** below.

Table 6: A44 Bus Corridor Demand Adjustments

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Input Demands	15668	16472	14280	15156	16900	17860
Post P&R & Active Modes & Cycle Corridor	14892	15563	13625	14625	16298	17266
Post A44 Bus Corridor	14796	15434	13528	14527	16156	17093
A44 Bus Adjustments	-83	-104	-84	-83	-132	-159
'Hopper-Bus' Adjustment	-13	-25	-13	-14	-10	-14
Shift from initial	**-0.61%**	**-0.78%**	**-0.68%**	**-0.64%**	**-0.84%**	**-0.97%**

85. Following this final stage, the demands are taken forward and included within the Do-Something VISSIM modelling scenarios to provide an overview of network performance inclusive of the PR sites and the associated mitigation/sustainability measures.

Demand Adjustment Summary

86. A detailed breakdown of the effect of each adjustment on the overall demands is presented within **Table 7**.

Table 7: Incremental Adjustments By Stage

Corridor	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
P&R Adjustment	-376	-287	-230	-240	-232	-214
Active Mode Adjustment	-277	-476	-294	-212	-262	-256
Bike Corridor Adjustment	-123	-146	-130	-79	-109	-124
Bus Corridor Adjustment	-95	-129	-97	-97	-141	-173
Total	-872	-1038	-752	-629	-744	-767

87. This reveals that the largest shift in mode is realised by the P&R adjustment. The effect that these adjustments have on the overall model growth projects are summarised within **Table 8** which reveals that an overall reduction of between 4.2% and 6.3% of the vehicle movements within the VISSIM model network is achieved as a result of the application of the assumptions set out within this note.

Table 8: Revised Demand projections (pre assignment of PR sites)

Demand	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
Input Demands	15668	16472	14280	15156	16900	17860
Output Demands	14796	15434	13528	14527	16156	17093
Difference	-872	-1038	-752	-629	-744	-767
Shift from initial	**-5.56%**	**-6.30%**	**-5.27%**	**-4.15%**	**-4.40%**	**-4.29%**

Sensitivity Testing

88. Following an initial review by Pell Frischmann (PF) on behalf of Oxfordshire County Council (OCC), whilst the methodology was broadly agreeable PF requested that sensitivity testing be carried out that creates upper and lower limits against the core assumptions detailed above, in accordance with the OCC ‘Decide and Provide’ guidance.

89. At each stage of the mode shift adjustments, a series of assumptions are set to determine which demands are included as part of the adjustment process, and to what extent movements are reduced in line with the anticipated level of mode shift that might occur.

90. In Table 5.1 of their Review, PF advised a set of alternative criteria to be applied; an extract is provided below:

Figure 7: Pell Frischmann Alternative Assumptions for Sensitivity Testing

Table 5.1: Adjustable Parameters and Selected Values for Low and High Sensitivity Tests

Spreadsheet	Sheet	alues that can be altere	Cells	VM Value	Low value	High value
VM210467.SP009 Demand Adjustment A40 Growth Scheme - Audit	Demand Summary	Corridor A40	N2	Yes	N/A	N/A
		External Major	N5 to P5	5%, 7.5%, 10%	2.5%,5%,7.5%	7.5%,10%,12.5%
		External Minor	N6 to P6	7.5%, 5%, 15%	5%, 2.5%, 12.5%	10%, 7.5%, 17.5%
		Internal	N7 to P7	10%, 15%, 25%	7.5%, 12.5%,22.5%	12.5%,17.5%, 27.5%
VM210467.SP013 Demand Adjustment 1 - P&R - Audit	Demand Summary	Airport P&R	N2	Yes	N/A	N/A
		Eynsham	N3	Yes	N/A	N/A
		Airport P&R spaces	C42	1100	OCC to check	OCC to check
VM210467.SP015 Demand Adjustment 1 - Active Modes - Audit	Demand Summary	WALKING LIMIT (m)	X2	1650		
		SHIFT INTERNAL	X3	50%	20%	30%
		EDGE ADJUSTMENT	X4	40%	20%	30%
		CYCLE MINIMUM (m)	X17	0	800	1650
		CYCLE MAXIMUM (m)	X18	6600	4000	8250
		SHIFT INTERNAL	X19	18%	10%	25%
		EDGE ADJUSTMENT	X20	40%	20%	30%
VM210467.SP016 Demand Adjustment 1 - Bike Corridors - Audit	Demand Summary	Corridor Yarnton	N3 and O3	20%	10%	30%
		Corridor Kidlington	N4 and O4	20%	10%	30%
		Oxford internal	N5 and O5	20%	10%	30%
VM210467.SP017 Demand Adjustment - Additional A44 Bus Services - Audit	Total Catchment Base	Assumed % Shift	D32	20%	10%	30%
	Total Catchment Com Dev	Assumed % Shift	N32	20%	10%	30%

91. These have been calculated and run for the purposes of this revised assessment using the same methodology as detailed within this Note (just with the revised criteria as per the Table above). The adjustments by stage for the Low Sensitivity and High Sensitivity are provided below:

Table 9: Incremental Adjustments By Stage, Low Sensitivity

Corridor	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
P&R Adjustment	-376	-287	-230	-240	-232	-214
Active Mode Adjustment	-101	-181	-105	-85	-94	-90
Bike Corridor Adjustment	-66	-85	-75	-43	-62	-65
Bus Corridor Adjustment	-50	-67	-50	-50	-75	-91
Total	-593	-619	-459	-418	-463	-460
Shift from Initial	-3.78%	-3.76%	-3.21%	-2.76%	-2.74%	-2.57%

Table 10: Incremental Adjustments By Stage, High Sensitivity

Corridor	AM 1	AM 2	AM 3	PM 1	PM 2	PM 3
P&R Adjustment	-376	-287	-230	-240	-232	-214
Active Mode Adjustment	-304	-439	-288	-231	-240	-252
Bike Corridor Adjustment	-175	-225	-201	-116	-170	-183
Bus Corridor Adjustment	-133	-189	-140	-142	-205	-248
Total	-987	-1140	-859	-730	-846	-897
Shift from Initial	-6.30%	-6.92%	-6.02%	-4.82%	-5.00%	-5.02%

Appendix C

vectos microsim. — PART OF SLR

Oxford PR Sites VISSIM Assessment
Audit Response and Amendments to V9 Assessment

VM210467.DN03
May 2023

Introduction

1. Vectos Microsim (VM) has been commissioned by a multi-consultancy group working on behalf of a number of Partial Review (PR) Sites that are allocated within the adopted Cherwell Local Plan (Part 1) Partial Review.

2. VM has been working with all parties to deliver microsimulation modelling support with a view to identifying the necessary mitigation strategies required to all PR sites to come forward within the Local Plan period.

3. VM submitted the first package of models, supporting spreadsheets and reports in November 2022; this was known as v9. This was subsequently reviewed by Pell Frischmann (PF) in their capacity as highway consultants for Oxfordshire County Council (OCC). VM received the Pell Frischmann Audit on 31st January 2023.

4. VM reviewed the comments raised and a meeting between VM, the PR working group, PF and OCC was held in early February 2023. It was agreed that some revisions were necessary to the modelling and this Note serves as a document of the changes that have been made between the v9 submission and this latest submission, which is known as v13.

Responses to v9 Audit Comments

5. The section below will identify the paragraph number referred to within the PF review, followed by text to confirm the VM response to the issue(s) raised:

<u>Paragraph 3.1</u>

6. PF queried why the Base, 2031 Reference Case and 2031 DM/DS modelling was contained within three separate model folders. The reason is that the Base and 2023 model provided to VM were in separate model folders and therefore, as the 2023 was the starting point for the exercise this separation was maintained. However due to the requirement to update the modelling in other areas, the future year tests are now all contained within the same folder under Scenario Management. Note however that the Base remains a separate file due to the need to build the future year models from the received 2023.

Paragraph 3.2

7. PF raised a number of bullet points:

   i. A full review of layby usage has been undertaken and corrected (bus layby usage was present within the received model and is therefore a legacy issue)

   ii. Pedestrian crossings have been reinstated – some were erroneously missing from v9

   iii. The pedestrian crossing north of Hermes Road, and those on the exit crossings at Wolvercote and Cutteslowe Roundabouts were not present within the Base model and are therefore omitted from the future year to ensure the baseline is not invalidated

   iv. The issue on Link 31210 was in the received 2023 and corrected from the 2031 Reference Case onwards

   v. Operation of Cassington Roundabout is optimised as best as possible within the bounds of what can be reasonably achieved

   vi. Some trips were included in the demand matrix wishing to travel from Witney Road to the East of the model, which is an impossible movement. These have been removed from the demand matrices (the values were <1 trip and so their omission is of no consequence to the modelling)

Paragraph 3.3

8. PF raised four bullet points:

   i. Behaviour on Link 30322 is optimised as best as possible

   ii. The error message refers to an issue within the received signal configuration, but only occurs on start up and does not affect the model

   iii. Detector 11 missing at SC1021

   iv. Trips present within the matrix from Witney Road have been removed, as per the comment in paragraph 7 above

9. Furthermore, PF identified that bus services were identical between AM and PM peak periods. This error was present within the received 2023 model, but has now been corrected whereby the future year services match the respective baseline, with some exceptions as noted within Chapter 6.4 of the North Oxford Corridor Study[1] that details the development of the 2023 VISSIM model.

10. PF also queried whether new bus services proposed, and/or increased pedestrian frequencies should be included within the modelling in response to the anticipated increase in modal shift to non-

[1] North Oxford Corridor Study Mar 2021_v0.14

car-based travel. For this revised modelling bus services have been added into the Do-Something scenario where a specific bus service is proposed (such as the S3 service running a schedule of 4 per hour). Also, the percentage modal shift resulting from walking and cycling that has been calculated for each of the mode shift scenarios (Core, Lower Sensitivity and Higher Sensitivity) is applied to the crossing frequencies of all crossings across the model extent. For example, the core scenario identifies that active modes, under the assumptions calculated for modelling purposes, can achieve a reduction in car use of 3.7%, therefore all movements at pedestrian crossings have been uplifted by 3.7%. For the Lower Sensitivity, the uplift is 1.6% and for the Higher Sensitivity, the uplift is 4.2%.

Paragraph 5.1

11. PF identified a series of adjustments to the input parameters that would allow for sensitivity testing to be undertaken. These have been created as per PF's recommendations and are reported in the revised v13 results.

12. Note that due to some revisions to the mode shift calculations (to be described later in this Note), the output numbers from the exercise differ slightly to the numbers reported in the PF Audit. Inputs into the methodology however remain as per PF's recommendations.

Other Amendments

13. The sub-sections below detail further changes that have been made to the modelling since the v9 submission.

PR6a Trip Generation and Distribution

14. Following the v9 submission, VM were advised of a revision to the quantum and make-up of development proposed for PR6a. Whilst the trip generation figures remain the same, the forecast total number of dwellings has been reduced from 820 to 800, and a school is now proposed for the site.

15. Spreadsheet VM210467.So002a PR6a Trip Gen and Distribution is now included within the suite of spreadsheets submitted. This calculates the proposed dwelling and school trip generation and distributions separately before combining them at the end for entry into VISSIM.

16. PR6b demand matrices remain as per the v9 submission.

17. The Table below provides the updated PR6a development trip numbers for v13.

Table 1: Revised PR8 Trip Generation

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
V13 Submission	38	122	54	129	34	57
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
V13 Submission	113	69	116	74	145	68

PR8 Trip Generation

18. The v9 submission assumed that all PR8 trips entered and exited the site via zone number 53. This was an error and has been corrected for this v13 submission; PR8 is to be accessed via a northern access (zone 30), and a southern access (zone 53).

19. VM also received revised trip numbers for PR8 which has increased the number of in and out trips associated with the proposed development. The changes are summarised below, and the spreadsheet VM210467.Sp005 PR8 Trip Gen and Distribution has been updated with the latest numbers.

20. The Table below provides the updated PR8 development trip numbers for v13.

Table 2: Revised PR8 Trip Generation

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
V13 Submission	771	282	735	269	644	236
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
V13 Submission	295	603	309	632	288	589

Committed Development Demands

21. An error was highlighted in the demand calculations for the PM peak period whereby the total vehicle trips for the PM period were slightly higher than they should have been in the v9 submission. This was noted in paragraph 2.2 of the Pell Frischmann Audit. This has been corrected for v13.

22. In addition, the assumptions that underpinned the demand calculations for Eynsham Garden Village and West Eynsham SDA have been revised following queries raised by OCC.

23. The Table below provides the comparable Eynsham Garden Village trip numbers for v9 and v13.

Table 3: Revised Eynsham Garden Village Trip Generation

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
V9 Submission	61	78	113	118	111	41
V13 Submission	163	144	303	218	297	77
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
V9 Submission	163	137	163	134	183	136
V13 Submission	221	351	222	342	249	349

24. The Table below provides the comparable West Eynsham SDA trip numbers for v9 and v13.

Table 4: Revised West Eynsham SDA Trip Generation

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
V9 Submission	9	47	17	71	16	25
V13 Submission	20	51	37	77	36	27
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
V9 Submission	105	59	105	57	118	58
V13 Submission	88	51	88	49	99	50

25. Note that the trip numbers in the Tables above refer to the number of trips included within the demand matrices entered into VISSIM, and not the total site trip generation. Under the methodology described within the forecasting report[2] a proportion of total trips are included within the VISSIM demands based on their direction of travel to or from the site.

[2] VM210467.R001c Forecasting Report

26. An additional committed development has been included at the request of OCC; Land East of Park View (planning ref. 22/01715/OUT). Trip generation and distribution is informed by the Transport Assessment[3].

Reference Case Demands

27. The methodology of capping the Reference Case demands to a zero growth position remains as per the v9 submission. However the mechanism by which this is achieved has been revised slightly for the purposes of developing v13.

28. Firstly, the initial step remains to revise demands along the A40 corridor in response to the proposed A40 bus lane allocated for growth funding. This is set out in spreadsheet VM210467.Sp009 Demand Adjustment A40 Growth Scheme. However on review the method applied in v9 was erroneous as it affected movements from the northern side of the A40 to the southern side of the A40, and vice versa, where the provision of an east-to-west bus corridor would be unlikely to impact these movements.

29. Therefore, the spreadsheet was revised to include only movements between a catchment of zones to the east and a catchment of zones to the west (both directions). The outcome is that fewer trips are removed from the demand matrices.

30. A further error was noted in the v9 submission whereby demand adjustments resulting from the proposed Park & Ride scheme at Eynsham were included as part of the mode shift assumptions applied post-inclusion of the PR development sites. As Eynsham P&R is a committed development that is not proposed to be funded by the PR working group, this should have been entered into the assumptions that underpin the Reference Case.

31. This is now the case in this revised v13 submission. Spreadsheet VM210467.Sp009a Eynsham P&R Adjustment has been included which identifies the OD movements that would be susceptible to using the new Park and Ride service. In accordance with the utilisation data present within AECOM's Transport Assessment, baseline demands are removed from the matrices as part of the assumed shift on to the Park and Ride.

32. Both the A40 mode shift attached to the Growth Fund Scheme, and the mode shift attached to the delivery of Eynsham Park and Ride, are applied to the demand matrices before the cap to 0%. As a result the total number of trips present within the v13 Reference Case is identical to the total number of trips present within the v9 Reference Case.

[3] Land East of Park View Woodstock, Environmental Statement Technical Appendix F: Transport Assessment, Tables 7 and 9

Mode Shift Assumptions

33. The methodology adopted to layer mode shift assumptions into the VISSIM demands remains as per the v9 submission. There are however three key adjustments/enhancements:

a. The v9 submission included Eynsham Park and Ride adjustments into post-development mode shift and as identified above, this was erroneous and has instead been included in the Reference Case demand build for this v13 submission;

b. The process of adjusting A44 corridor demands as part of the shift due to bus provision has been adjusted; and

c. Sensitivity testing has been carried out for Lower and Higher criteria as identified by Pell Frischmann during their review of v9.

34. These updates are detailed within the revised Mode Shift Note[4].

Kidlington Roundabout

35. Where the v9 submission maintained the network arrangement present within the received 2023 Growth Fund model, the network arrangement at Kidlington Roundabout has been revised in line with the latest proposals. The latest scheme drawing is provided within Appendix A of this Note.

36. The signals are included via VISVAP and are a duplication of signal controller 1020, as this is a nearby existing pedestrian crossing of a similar size to those proposed at Kidlington Roundabout. The number of pedestrians assumed to use the crossings is 80 per hour, which is also in line with the assumptions used for a nearby existing crossing.

Summary

37. This Note has been compiled to highlight the differences between the v9 submission from November 2022, and the latest v13 submission. The Note serves as a response to Pell Frischmann's Audit, detailing the steps VM has taken to address the issues raised during review. Other issues not highlighted by Pell Frischmann but that are considered to be errors within the original v9 modelling have also been corrected and are identified in this Note to assist Pell Frischmann in their updated review. Finally some assumptions which underpin the PR site trip generation have also been revised, and are also documented within this Note and the other Reports that accompany the v13 submission.

[4] VM210467.DN01b PR VISSIM Mode Shift Discussion Note

Appendix B

Yarnton, Cherwell
PR9 Development Impact

162751A/N06

Introduction

1.1 This Technical Note sets out the traffic modelling outcomes to support the planning application associated with the site to the land west of Yarnton, Cherwell in the Cherwell District Local Plan Part 1 Partial Review referred to as 'PR9'. A plan showing the location of the PR9 site is included within **Annex A**.

1.2 Oxfordshire County Council (OCC) has requested that the North Oxford VISSIM model is used to assess the impact of development generated traffic on the operation of the highway network in a future year.

1.3 This note provides a summary of the results which have been extracted from the VISSIM modelling. It is intended that the future year modelling is utilised to determine whether the Land West of Yarnton (PR9), would exceed the 'severe' threshold referred to in the NPPF as the only legitimate reason to resist a development on transportation grounds.

1.4 Along with the modelling results, Vectos MicroSim has produced two separate technical notes which provide further information on their methodology (provided separately):

- Forecasting Report - **Annex B**
- Forecast Capping Discussion Note - **Annex C**

1.5 The remainder of this technical note is structured as followed:

- **Section Two** – Provides an overview of the traffic model.
- **Section Three** – Sets out the agreed modelling approach and deliverables.
- **Section Four** – Summarises the findings of the modelling in terms of network statistics, queuing, journey time and Level of Service; and
- **Section Five** – Provides a summary and conclusion.

2 Overview of North Oxford VISSIM Model

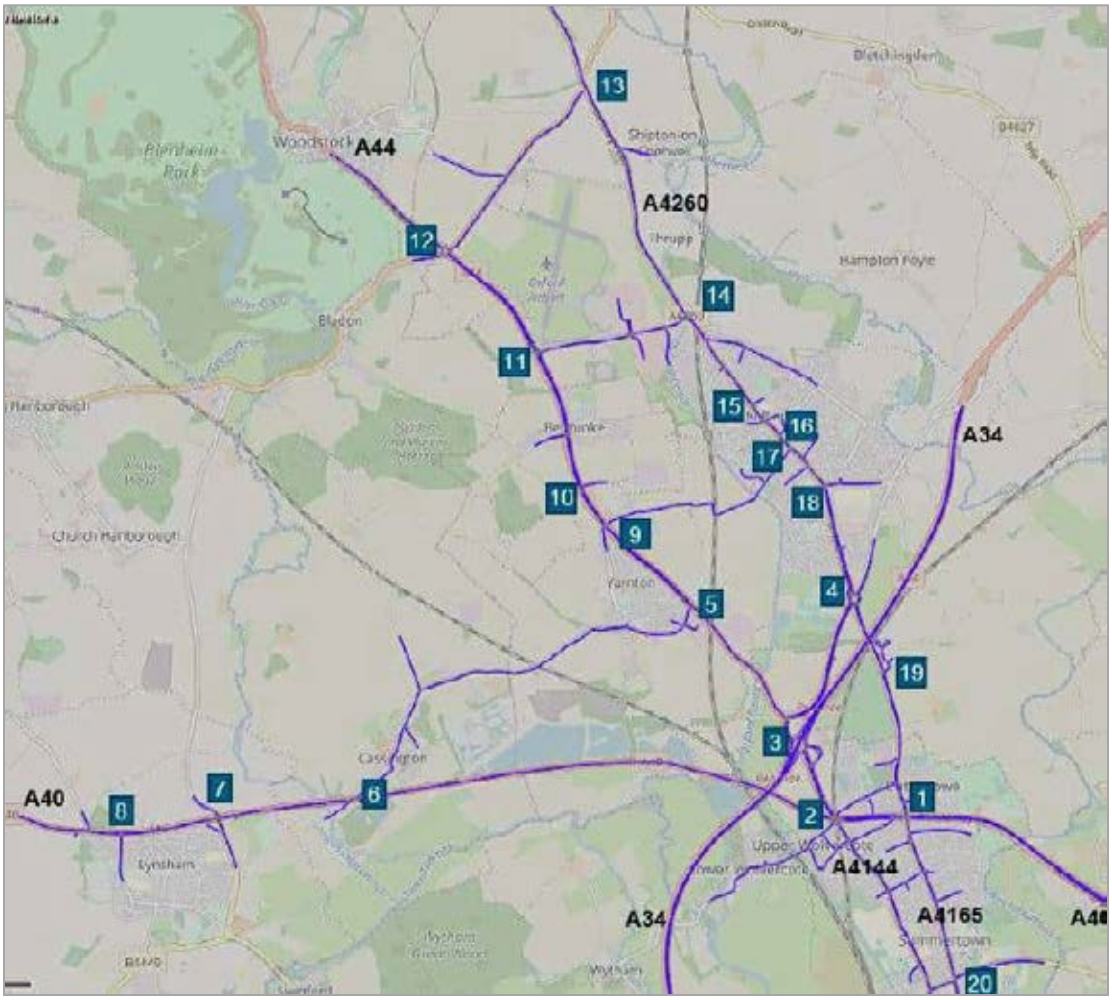
2.1 The North Oxford VISSIM model, which was developed to assess the cumulative impact of the PR sites has been used to assess the impact of development generated traffic from PR9 on the operation of the highway network.

Local Model Validation Report

2.2 OCC has provided the Local Model Validation Report (LMVR) that was prepared to support the North Oxford VISSIM model. The LMVR provides an overview of the development, calibration, and validation of the 2018 Base North Oxford VISSIM model.

2.3 The North Oxford VISSIM model is a micro-simulation model representing a large study area. The model is primarily formed of four key corridors including a 7km section of the A34 corridor, a 11km section of the A40 corridor, a 11km section of the A44-A4144 corridor and a 12km section of the A4260-A4165 corridor. The model extent is shown in **Figure 2.1** below:

Figure 2.1: North Oxford VISSIM Model Extent



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2.4 The VISSIM model has been developed using the specifications shown in **Figure 2.2** below.

Figure 2.2: North Oxford VISSIM Model Specifications

Base Year: 2018

Modelled Scenarios: AM and PM Base year.

Assignment: Dynamic

Modelled Time Periods: 06:30 – 10:30 and 14:30 – 18:30

Warm Up Period: A 30 minute (1800 simulation second) warm up period has been modelled to ensure that the traffic conditions in the model are realistic at the start of the evaluation period. AM between 06:30 – 07:00 and PM between 14:30 – 15:00.

Evaluation Period: A three-hour evaluation period has been used for the purposes of model calibration. Individual hours of 07:00 – 08:00, 08:00 – 09:00 and 09:00 – 10:00 have been assessed. For the PM peak individual hours of 15:00 – 16:00, 16:00 – 17:00 and 17:00 – 18:00 have been assessed. The validation of the model is representative of a single hour 08:00 – 09:00 (AM) and 17:00 – 18:00 (PM)

Cool Down Period: A 30 minute (1800 simulation second) cool down period has been modelled to ensure the accuracy of the model results and that all demands during the evaluation period are loaded onto the network. AM between 10:00 – 10:30 and PM between 18:00 – 18:30.

Vehicle Types: The following vehicle types have been modelled

- Light vehicles – comprising cars and light goods vehicles (LGV); and
- Heavy vehicles – comprising of OGV1 and OGV2.
- Buses – specified routing, timetables and bus stops for each service number.

VISSIM Version: 10.00-12

3 Modelling Parameters

Introduction

3.1 The Local Plan Part 1 Partial Review runs to 2031, taking into account any appropriate background traffic growth, consented development traffic but not including PR site traffic.

3.2 This section summarises the assumptions with regards to traffic growth and committed development, which have informed the Future Reference Case model.

Model Scenarios

3.3 The following sets out the inclusions contained within each modelled scenario. For each scenario is a modelled AM and PM peak period. The AM simulates 06:30-10:30 with the 07:00-10:00 period assessed hourly, and the PM simulates 14:30-18:30 with the 15:00-18:00 period assessed hourly:

- 2018 Base (as provided by Oxfordshire County Council (OCC))
- Future Reference Case
  - a. Includes all committed developments as described in the Forecasting Report (**Annex B**), with forecasting methodology as described in the Capping Discussion Note (**Annex C**).
- Future Do-Minimum PR9 Only
  - a. As above, with PR9 site demands and site access arrangements included as per the Forecasting Report (**Annex B**)

Committed Development

3.4 Section 3 of the Vectos MicroSim Forecasting report (**Annex B**) sets out the assumptions in terms of committed development which have been included within the model.

Trip Rates and Traffic Generation

3.5 The trip rates and traffic generation associated with PR9 is provided within the Transport Assessment under application reference 21/03522/OUT. These trip rates were agreed with OCC, within their response dated 21st June 2022, as being robust as they do not account for modal splits as a result of enhancement to sustainable transport options.

Traffic Growth

3.6 The Forecast Capping Discussion Note (**Annex C**) sets out the methodology for assessing traffic growth and its application in the Future Forecast Model. In Summary:

- Analysis and interpolation of the trends observed within the historic traffic data for the study area revealed that, should the trends be projected forward, traffic levels would fall within the AM and PM peak hours by 2031 relative to 2017 levels.
- Comparison of the historic traffic trends (between 2000 and 2017) relative to housing delivery over that period revealed that the reduction in traffic volumes was accompanied by an increase in housing provision.

3.7 On this basis an adjustment has been made whereby the traffic movements associated with the committed developments have been contained within the model traffic demands but trips associated with the same zones in the base model, as are affected by the committed development trip generation figures, are reduced. This is intended to ensure that the total demands within the model do not exceed the total of the trips contained within the base model.

3.8 Further analysis was undertaken, considering the latest release of NTEM (v8.0) by the Department for Transport (DfT). This version of NTEM now allows for a series of different growth projections to be developed which account for recognised uncertainties which affect how traffic forecasts will materialise in the future.

3.9 The application of capping in the manner set out within the Capping Forecast Note is sensible, as it allows for realistic forecasts to be derived for assignment within the model such that the network capacity is not exceeded prior to any PR sites coming forward, as clearly that would not be a realistic position given the findings of the trend analysis which points to a steady decline in peak hour traffic volumes.

3.10 The resultant traffic figures assigned within the VISSIM model also align to some extent with the reductions in traffic being targeted through Oxfordshire's adopted Local Transport and Connectivity Plan (LTCP). Continued application of increases in traffic volumes through the model forecasting would represent a significant failure in OCC's adopted policy approach.

Interventions in the Future Modelling scenarios

3.11 The following committed and planned infrastructure schemes and those planned to address growth elsewhere, have been included within the Future Reference Case modelling:

- Infrastructure associated with Oxford North.
- A40 HIF2 scheme improvement works.
- North Oxford Corridor schemes including improvements to:
  - Peartree Interchange and Loop Farm roundabout.
  - Cassington Roundabout; and
  - Kidlington Roundabout.

Infrastructure Delivery Plan (IDP) Interventions

3.12 The IDP interventions have not been included within this assessment. The assessment seeks to understand the impact of PR9 on the network without mitigation.

Modelling Scenarios

3.13 On the basis of the above, the following modelling scenarios have been considered and are reported upon.

- 2018 Baseline (Morning and evening peak period)
- Future Reference Case + Growth Fund schemes (Morning and evening peak period)
- Future Do Minimum (DM) PR9 Only (Morning and evening peak period)

4 Modelling Outcomes

Introduction

4.1 The modelling scenarios set out previously, provide the information required to understand the impact of the PR9 site and has been provided to corroborate the findings of the Transport Assessment for the PR9 site.

4.2 This section of the note provides a summary of the following modelling outcomes:

- Network Statistics across the network.
- Queue lengths and Delay, including Level of Service assessment for the following junctions:
  - A44/ Cassington Road Roundabout.
  - Pear Tree Interchange.
  - Loop Farm Roundabout.
  - Wolvercote Roundabout.
  - Cutteslowe Roundabout; and
  - Kidlington Roundabout.
- Journey Time Information for the following routes:
  - Route 1: A34 within the model extents either side of the Pear Tree Interchange
  - Route 2: A40 between Wolvercote Roundabout and River Cherwell
  - Route 3: A44 / A4144 corridor between Oxford Airport and Staverton Road
  - Route 4: A4260 / A4165 corridor between the A4095 and Linton Road
  - Route 5: Upper Campsfield Road
  - Route 6: Langford Lane between A44 Woodstock Road and A4260 Banbury Road
  - Route 7: Frieze Way
  - Route 8: Bicester Road

Network Statistics

Vehicle Trips

4.3 **Table 4.1** below identifies the number of vehicles in the network and the total number of vehicle trips for all Reference Cases in the AM and PM peak periods.

Table 4.1: Vehicles in Network

		2018 Base	Future Ref + Growth Fund	Future DM PR9 Only
Vehicles Active in the Network	AM Peak	2,126	2,177	2,181
	PM Peak	2,803	2,439	2,506
Vehicle Trips Completed	AM Peak	48,889	48,891	48,902
	PM Peak	50,229	50,400	50,286
Latent Demand at End of Simulation	AM Peak	1	25	19
	PM Peak	2	125	175
Total Input Vehicle Numbers	AM Peak	51,016	51,093	51,102
	PM Peak	53,034	52,964	52,967

4.4 The Vehicle Trips Completed in the AM peak varies minimally between all scenarios. In the PM peak, the addition of the development decreases the number of trips completed within the evening period of 15:00-18:00. The reduction equates to a negligible amount that would fluctuate within 10% daily fluctuation figures.

4.5 This is reflected by the latent demand whereby there is minimal latent demand remaining in the network in the AM peak 'Future + Growth Fund' and 'Future DM PR9 Only' scenarios, however it is recognised that latent demand in the PM peak may be higher than the '2018 Base'. This is a small percentage (0.35%) of the total number of trips completed in the with development scenario (Future DM PR9 Only) and means that the network peaks would spread over into adjacent hours with vehicles travelling at different times.

Vehicle Delay

4.6 **Table 4.2** below identifies the delay for vehicles travelling through the network for all Reference Cases in the AM and PM peak periods.

Table 4.2 Vehicle Delay

		2018 Base	Future Ref + Growth Fund	Future DM PR9 Only
Average Delay per Vehicle in the Network (s)	AM Peak	169	187	202
	PM Peak	202	144	150
Overall Delay per Vehicle (including time off network) (s)	AM Peak	171	189	204
	PM Peak	203	153	162

4.7 The addition of traffic from the PR9 site onto the network will result in an increase of additional delay of approximately 15s per vehicle in the AM peak, and 6s in the PM peak when compared to the Future Reference + Growth Fund scenario. It is considered that the additional delay of up to 15s would not significantly impact the ability of traffic to move through the network.

4.8 In addition, in the delay is lower in the PM peak for the Future DM PR9 Only scenario in comparison to the 2018 base scenario.

Average Vehicle Speeds

4.9 **Table 4.3** below identifies the average vehicle speeds (in mph) for all Reference Cases in the AM and PM peak periods.

Table 4.3: Average Vehicle Speeds

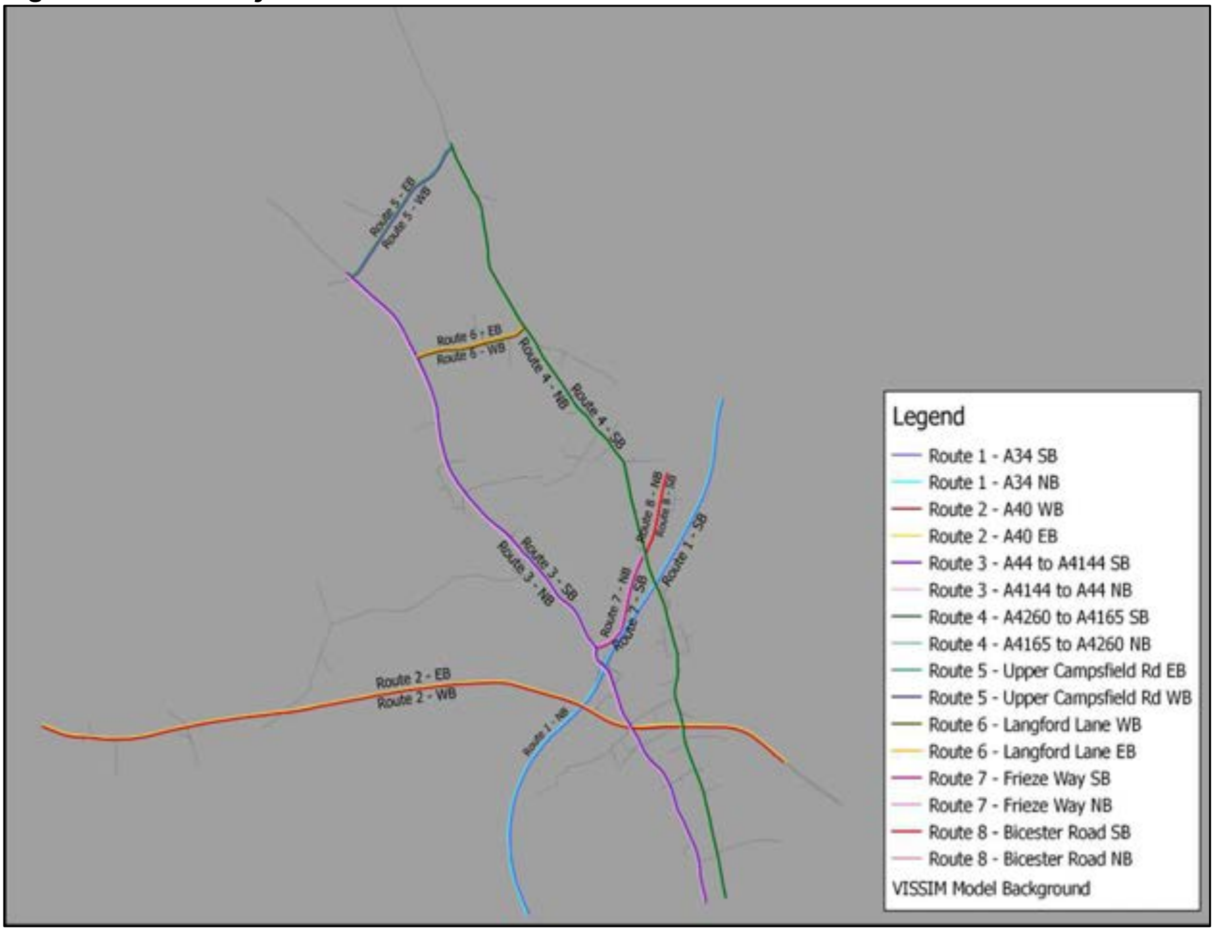
		2018 Base	Future Ref + Growth Fund	Future DM PR9 Only
Average Vehicle Speeds (mph)	AM Peak	27	26	26
	PM Peak	25	29	29

4.10 The table above shows that average vehicle speeds within the network remain relatively static in the AM peak over all scenarios however in the PM peak the average vehicle speed increases as a result of the Growth Fund by 4mph which is unchanged as a result of PR9.

Journey Times

4.11 Journey times along key corridors within the modelled network have been assessed. **Figure 4.1** below summarises the eight journey time routes that have been analysed within the model. Each journey time route has been analysed in each direction.

Figure 4.1: Journey Time Routes



4.12 **Table 4.4** below summarises the forecast Future Reference Case journey times for the eight routes in the AM peak period as well as the forecast change in journey times along the routes for the Future DM PR9 Only scenario.

Table 4.4: Journey Times along routes in the AM peak period

Route			07:00-08:00		08:00-09:00		09:00-10:00	
			Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)	Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)	Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)
1	A34	NB	323	-1	319	-1	323	+1
		SB	323	-1	318	+2	322	-1
2	A40	EB	954	+1	1034	-4	1000	-24
		WB	768	+8	1121	+63	783	+25
3	A44	NB	867	+26	929	+27	899	+28
		SB	1046	+42	1458	+65	1227	+54
4	A4260	NB	1177	-6	1311	+94	1274	+98
		SB	1418	+15	2000	+102	1393	+88
5	A4095	EB	155	+1	204	-7	157	+4
		WB	129	+1	132	-1	126	+2
6	Langford Lane	EB	162	+1	175	-1	167	+2
		WB	151	+1	154	0	150	+3
7	Frieze Way	NB	62	-1	63	0	63	0
		SB	115	+1	127	+7	433	-38
8	Bicester Road	NB	39	0	39	0	40	-1
		SB	58	+1	52	-13	56	+4

4.13 **Table 4.4** shows that during the hour between 07:00-08:00 the journey times are forecast to increase by less than 30 seconds for all routes with the exception of A44 southbound (+42 sec).

4.14 During the hour between 08:00-09:00 the journey times are forecast to increase by more than 30 seconds on only four routes, the A40 westbound (+63 sec), A44 southbound (+65 sec) and the A4260 northbound (+94 sec) and southbound (+102 sec). The modelling shows that the detriment on the A4260 is due to background traffic shifting from the A44 onto the competing A4260, which results in some delays on the approaches to the Langford Lane junction. These increases are not considered to be severe. There are forecast to be some journey time savings on routes, most notably on the Bicester Road southbound (-13 sec) and the A4095 eastbound (-7 sec).

4.15 During the hour between 09:00-10:00 the journey times are forecast to increase by more than 30 seconds for only three routes, the A44 southbound (+54 sec) and the A4260 northbound (+98 sec) and southbound (+88 sec). As for the 08:00-09:00 hour, this journey time increase is primarily forecast to occur on the A4260. These increases are not considered to be severe. Again, there are forecast to be some journey time savings in this hour, most notably on the A40 eastbound (-24 sec) and Frieze Way southbound (-38 sec).

4.16 **Table 4.5** summarises the journey times for the eight routes in the PM peak period.

Table 4.5: Change in Journey Times along routes in the PM peak period

Route			15:00-16:00		16:00-17:00		17:00-18:00	
			Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)	Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)	Future Ref + Growth Fund Total Journey Time (sec)	Future DM PR9 Only Change in journey time (sec)
1	A34	NB	317	-1	316	0	323	0
		SB	312	+1	314	-1	322	+1
2	A40	EB	1003	+3	1033	-13	1000	+3
		WB	740	0	742	+3	783	+6
3	A44	NB	892	+47	942	+55	899	+86
		SB	969	+26	1228	+35	1227	+30
4	A4260	NB	1217	-8	1211	-4	1274	-1
		SB	1228	+7	1319	+2	1393	+3
5	A4095	EB	134	-1	141	+1	157	0
		WB	131	-1	132	0	126	-1
6	Langford Lane	EB	153	+1	160	+3	167	-1
		WB	147	+2	154	0	150	+1
7	Frieze Way	NB	63	0	65	-1	63	0
		SB	91	+1	97	0	433	0
8	Bicester Road	NB	38	0	37	0	40	0
		SB	43	0	44	-6	56	0

4.17 During the hour between 15:00-16:00 the journey times are forecast to increase by less than 30 seconds for all routes with the exception of A44 northbound (+47 sec). The most significant journey time saving is found on the A4260 northbound (-8 sec).

4.18 During the hour between 16:00-17:00 the journey times are forecast to increase by no more than 30 seconds for all routes with the exception of A44 northbound (+55 sec) and southbound (+35 sec). These increases are mainly due to vehicles travelling back towards the site in the PM peak.

4.19 During the hour between 17:00-18:00 the journey times are forecast to increase by no more than 30 seconds for all routes with the exception of A44 northbound (+86 sec). As for the 16:00-17:00 hour, the A44 northbound increase is due to the number of vehicles that are heading back towards in the site within the PM peak.

4.20 It can be seen from the journey time results that the model forecasts some increases in journey times, focussed primarily along the A44 and A4260 corridors. There are also some forecast journey time savings, primarily in the AM peak period, as a result of the forecast change in travel patterns. In general, the journey time analysis shows that the PR9 site will not result in a severe impact on the highway network.

Queues

4.21 For the purposes of this note, queues have been reported for the scenarios outlined below to show the forecast queuing on each junction:

— Ref + Growth Fund (without development)

— DM PR9 Only (with development)

4.22 This has been undertaken at the six key junctions as shown in **Figure 4.2** and comprise:

— A - Woodstock Road/Cassington Road

— B - Oxford Road/Bicester Road roundabout

— C - Loop Farm Roundabout

— D - Peartree Roundabout

— E - Wolvercote Roundabout

— F - Cutteslowe Roundabout

Figure 4.2: Study Area

Queue Difference Analysis

4.23 The average queue results in metres for each junction between the times of 07:00-10:00 and 15:00-18:00 is provided in **Annex D**. Within **Annex D** there is also a red/amber/green comparison of queue lengths to understand the impact of the development within each scenario based on the criteria set out in **Table 4.6**.

Table 4.6: Queue Length Criteria

	Colour Coding
Queue increases less than or equal to 30m	
Queue increase more than 30m, up to 60m vehicles	
Queue increase more than 60m, up to 120m vehicles	
Queue increases by greater than 120m	

4.24 For the purposes of assessment only the hours of 08:00-09:00 and 17:00-18:00 were assessed as these hours generally showed the largest increases.

4.25 **Annex D** shows that of 32 approaches on six different roundabouts within the AM peak:

- Only 1 approach show queue increases over 120m
- Only 2 approaches show queue increases between 60-120m
- 2 approaches have queue increases between 30-60m; and
- The remaining 27 approaches have queues less than 30m, the equivalent of circa 5 vehicles.

4.26 **Annex D** shows that of 32 approaches on six different roundabouts within the PM peak:

- Zero approaches show a queue increase over 120m
- 1 approach shows queue increases between 60-120m
- Zero approaches have a queue increase between 30-60m; and
- The remaining 31 approaches have queues less than 30m, the equivalent of circa 5 vehicles or less.

Peak Hour Average Queue Differences

4.27 The maximum queues have not been used in this analysis as they are not considered representative of what the surrounding highway conditions would typically be.

4.28 Only queue increases designated as amber or red have been discussed for the junctions below.

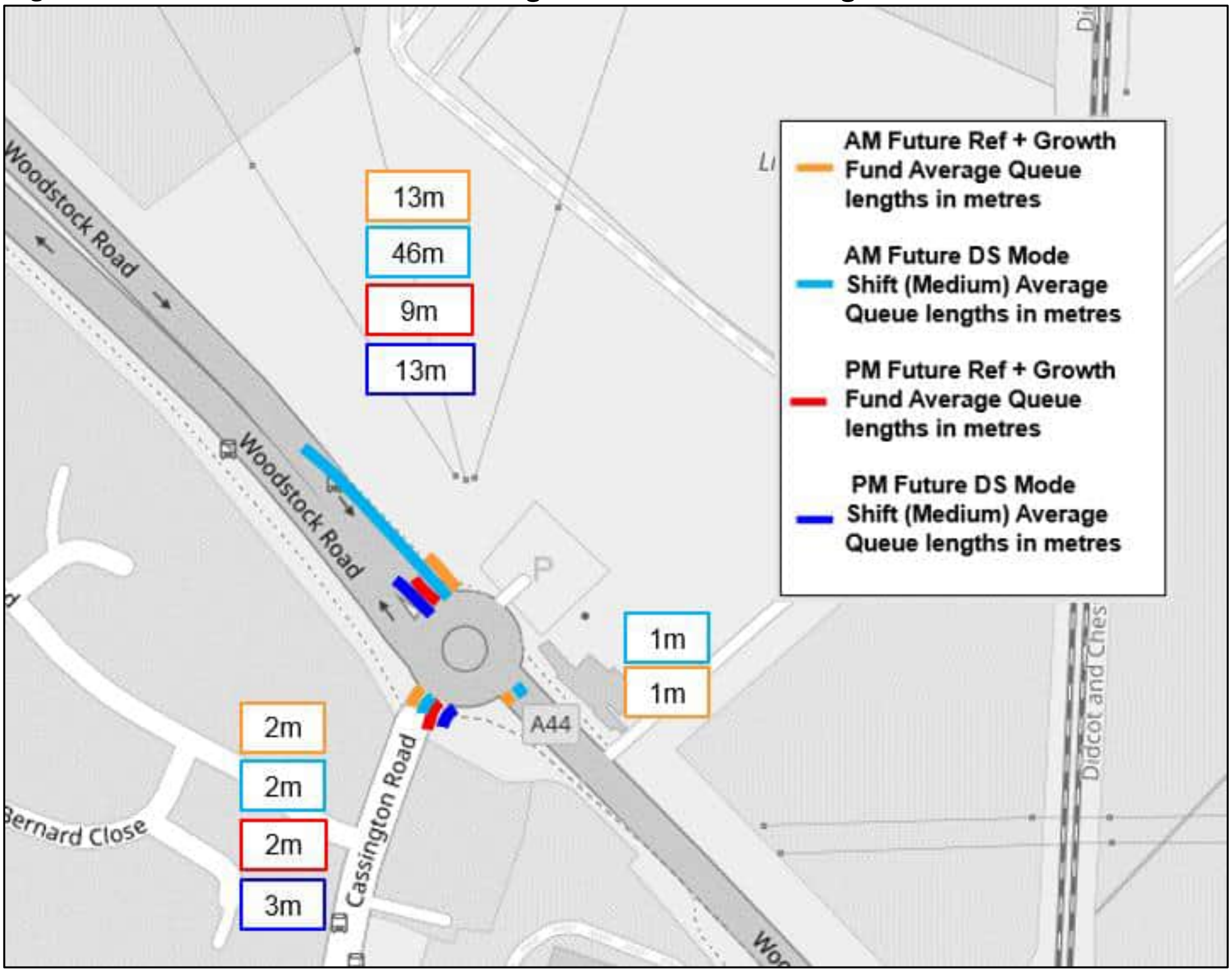
Woodstock Road/Cassington Road

Table 4.7: Woodstock Road/Cassington Road Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
Cassington Rbt SE	1	1	0	0	0	0
Casssington Rd	2	2	0	2	3	1
Cassington Rbt NW	13	46	33	9	13	4

4.29 **Table 4.7** shows that overall, there will be negligible changes in queuing on this junction. This is demonstrated by the queue lengths shown on **Figure 4.3**. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.3: Woodstock Road/Cassington Road Queue lengths



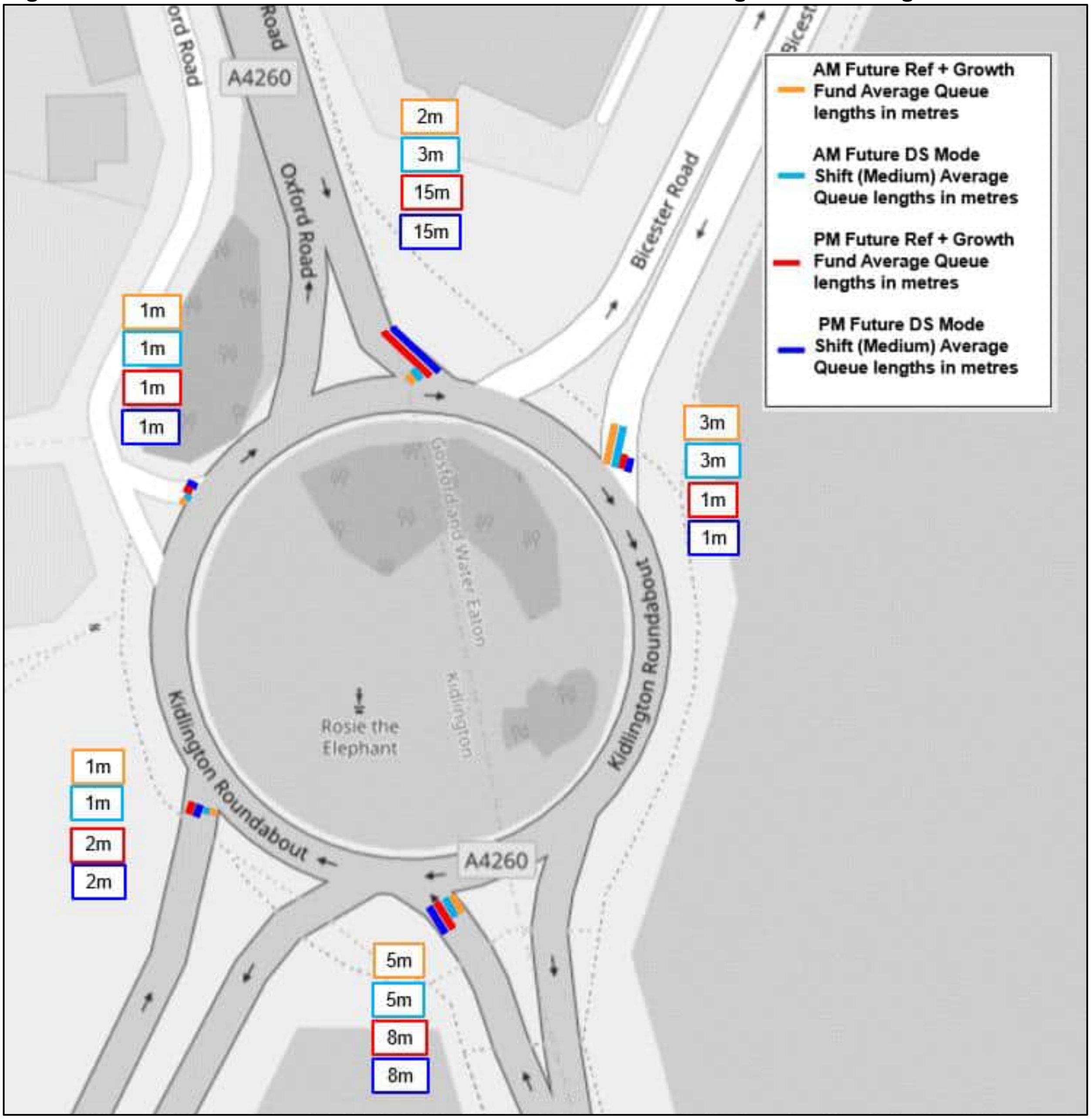
Oxford Road/Bicester Road roundabout

Table 4.8: Oxford Road/Bicester Road Roundabout Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
A4260 Oxford Rd	2	3	1	15	15	0
Bicester Rd	3	3	0	1	1	0
Oxford Rd	5	5	0	8	8	0
Frieze Way	1	1	0	2	2	0
Oxford Rd	1	1	0	1	1	0
Bicester Rd (Bus Lane)	0	0	0	0	0	0

4.30 **Table 4.8** shows that there are minimal changes in queue lengths with all but one of the queue lengths showing no difference with the development, this is shown in **Figure 4.4** below. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.4: Oxford Road/Bicester Road Roundabout Average Queue lengths



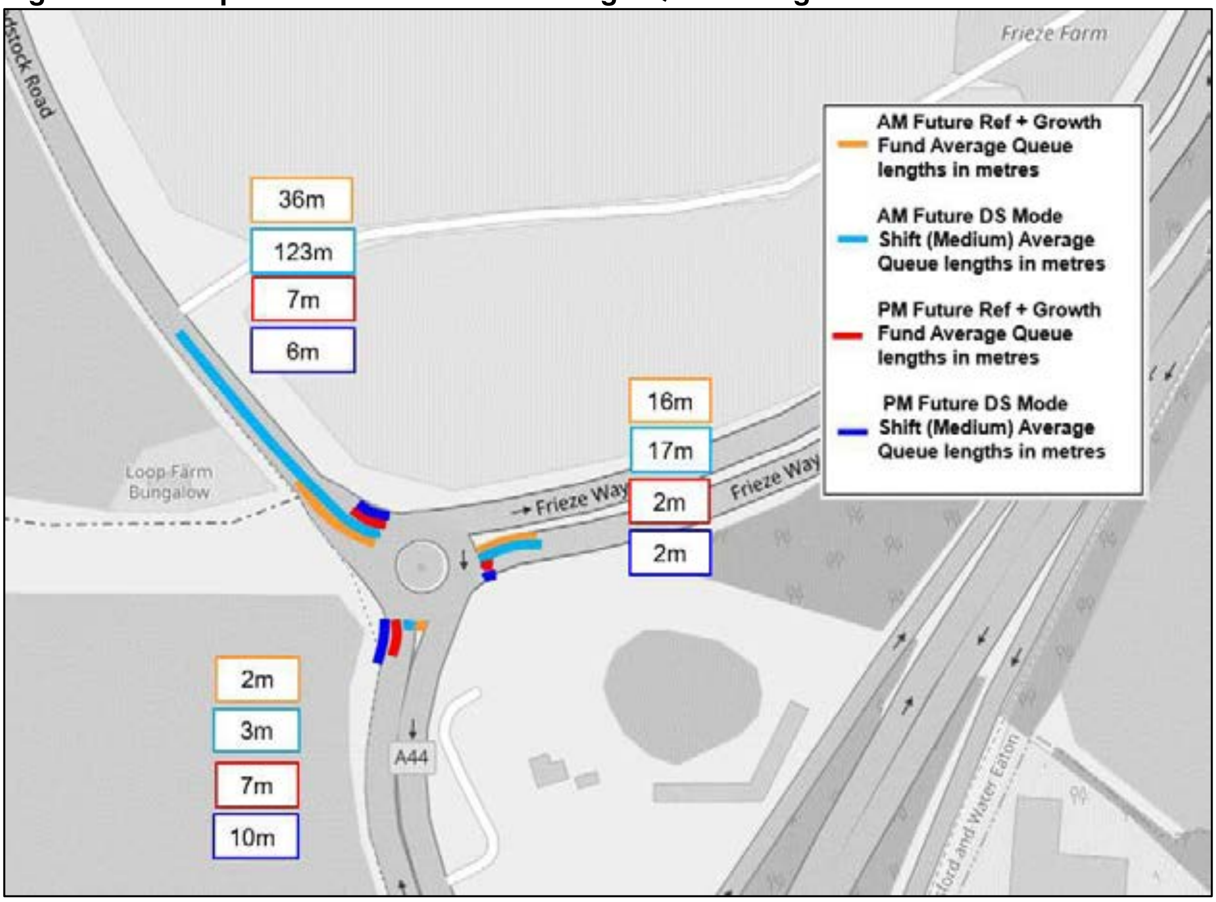
Loop Farm Roundabout

Table 4.9: Loop Farm Roundabout Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
A44 North-West	36	123	87	7	6	-1
A4260 East	16	17	1	2	2	0
A44 South	2	3	1	7	10	4

4.31 **Table 4.9** shows that the addition of the development would result in negligible changes in queues across the junction with the exception of the A44 North-West approach which shows an increase of 87m in the AM. As shown in **Figure 4.5**, the increase in queuing on the A44 North-West approach does not result in blocking back to the Cassington Road roundabout. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.5: Loop Farm Roundabout Average Queue lengths



Peartree Roundabout

Table 4.10: Peartree Roundabout Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
A34 South	15	14	0	10	11	1
A44 Woodstock West	63	66	3	14	14	0
A34 North	25	26	1	4	4	0
Oxford Peartree Services	65	58	-7	0	0	0
A44 Woodstock East	13	15	2	41	53	12
A44 East (bypass)	9	10	1	28	38	10

4.32 **Table 4.10** shows that there are minimal changes in queue lengths with many of the queue lengths showing minimal difference with the development, this is shown in **Figure 4.6** below. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

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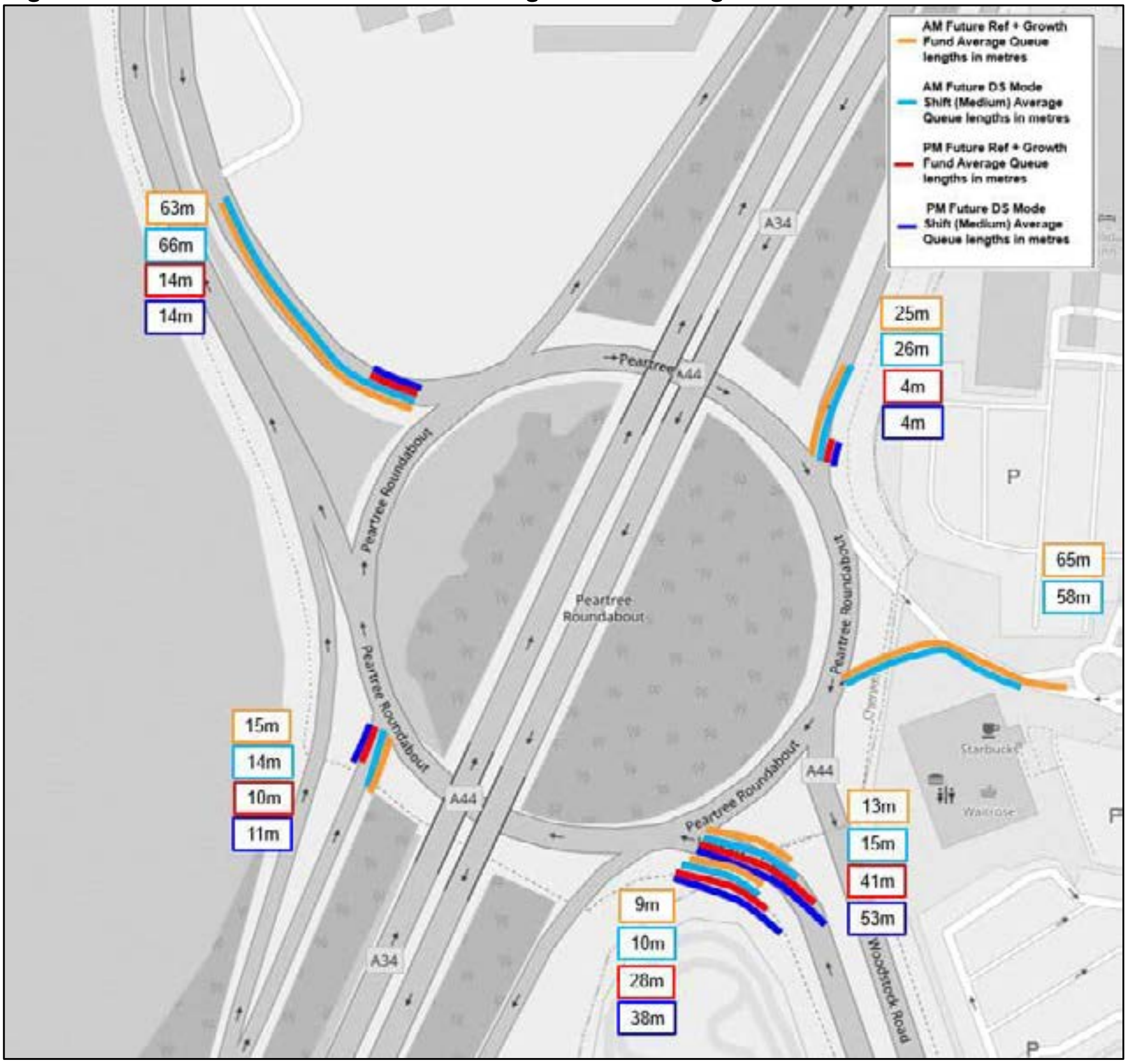
Figure 4.6: Peartree Roundabout Average Queue Lengths



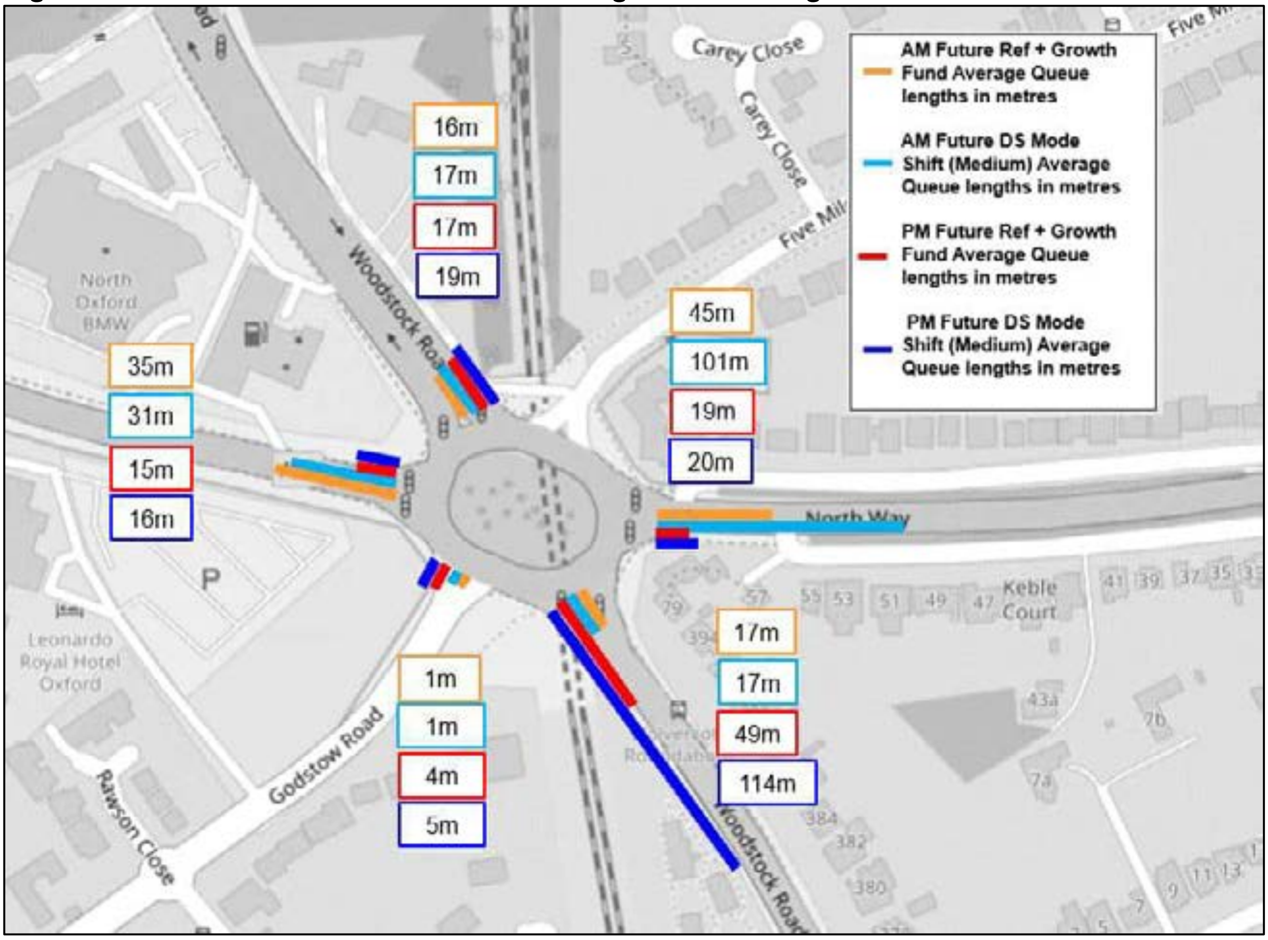
Wolvercote Roundabout

Table 4.11: Wolvercote Roundabout Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
A44	16	17	2	17	19	1
Five Mile Drive	0	0	0	0	0	0
A40 East	45	101	55	19	20	0
A4144	17	17	0	49	114	65
Godstow Rd	1	1	0	4	5	1
A40 West	35	31	-5	15	16	1

4.33 **Table 4.11** shows that there are minimal changes in queue lengths with many of the queue lengths showing no difference with the development, this is shown in **Figure 4.7** below. The largest difference will occur on the A4144 approach, with a difference of 65m. Queues will not result in the blocking of any major junction. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.7: Wolvercote Roundabout Average Queue lengths



Cutteslowe Roundabout

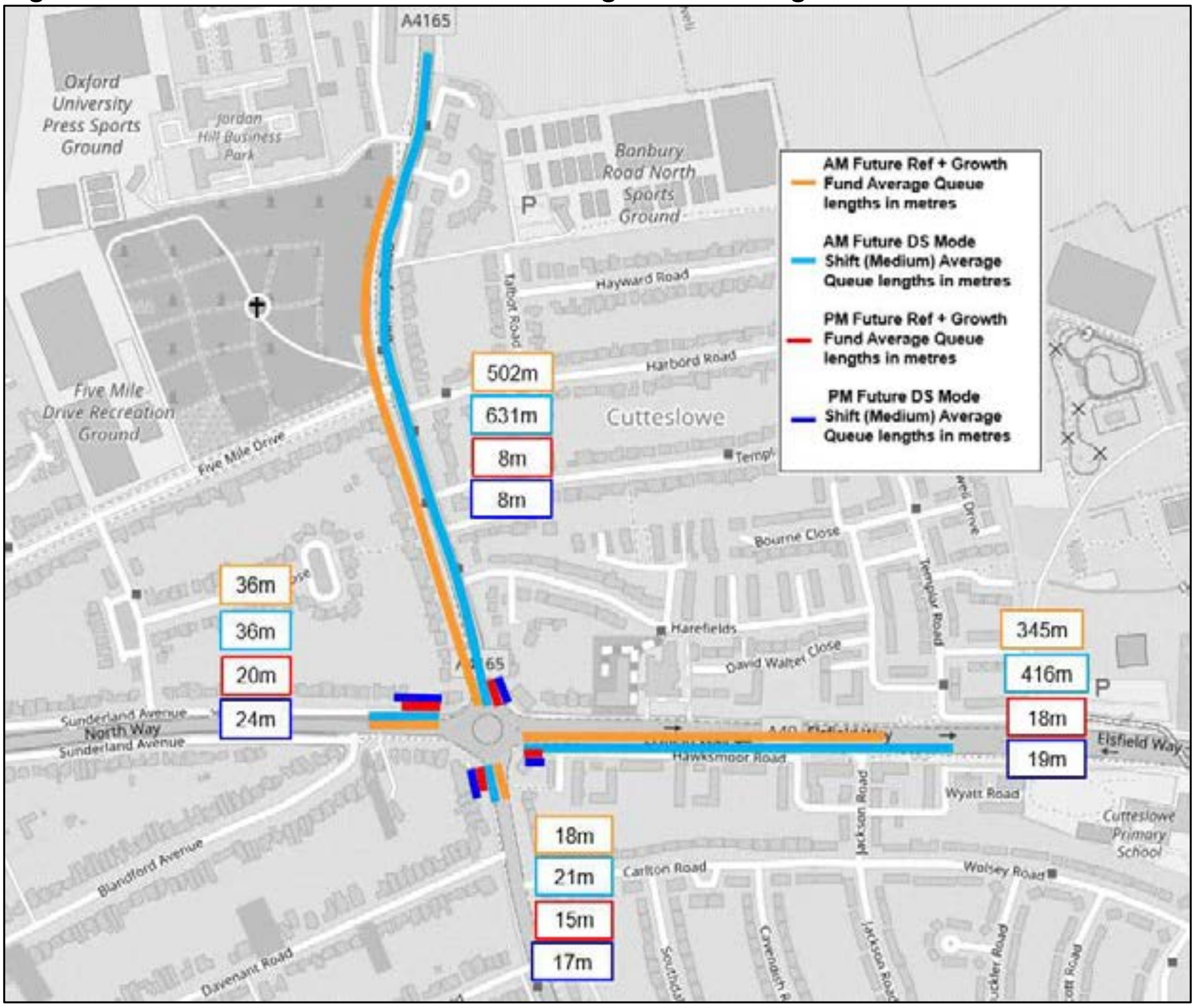
Table 4.12: Cutteslowe Roundabout Average Queue Differences

Approach	08:00-09:00			17:00-18:00		
	Future Ref + Growth Fund	Future DS Mode Shift	Difference	Future Ref + Growth Fund	Future DS Mode Shift	Difference
A4165 North	502	631	129	8	8	0
A40 East	345	416	71	18	19	1
A4165 South	18	21	2	15	17	2
A40 West	36	36	0	20	24	3

4.34 **Table 4.12** shows that there are minimal changes in queue lengths with many of the queue lengths showing little or no difference with the development. The exceptions to this are A4165 North and the A40 East in the morning peak only. The A4165 North shows an increase of 129m in the AM peak, and the A40 East shows an increase of 71m in the AM.

4.35 The additional lengths in queuing do not block back to any key junction as shown in **Figure 4.8** below. As such the impact of the development at this junction is not anticipated to have a severe residual cumulative impact or introduce a road safety issue.

Figure 4.8: Cutteslowe Roundabout Average Queue lengths



Summary

4.36 In summary the addition of the development overall has a negligible impact on queueing. Where queues do show increases, no new junctions are blocked as a result.

4.37 As a result, it is clear there will not be an impact from a queuing perspective.

Level of Service

4.38 Level of service (LOS) plots provide a qualitative measure of the operation of a junction based on the identified traffic scenarios. The LOS can be predicted, as a measure of delay, on each arm of the junction or across the junction as a whole. **Table 4.13** below defines the LOS by six levels ranging from level A to level F.

Table 4.13: Level of Service (LOS) Analysis

LoS	Signalised Intersection	Non-Signalised Intersection
LOS A	Delay <10 s or no volume	
LOS B	>10s to 20s	>10s to 15s
LOS C	>20s to 35s	>15s to 25s
LOS D	>35s to 55s	>25s to 35s
LOS E	>55s to 80s	>35s to 50s
LOS F	>80s	>50s

4.39 The peak time operation (0800-0900 and 1700-1800) has been considered in detail across the junctions contained in the traffic model. A LOS of C or above is unlikely to affect journey reliability and the delay is unlikely to be discernible from daily variations in overall journey times.

4.40 The off-site junctions that are forecast to have a LOS of D or below, for the Future DM PR9 Only scenario, are indicated below. The identified junctions represent those that potentially have a residual highway impact.

Table 4.14: LOS by Junction (Future DM PR9 Only)

Junction	Morning Peak (0800-0900) LOS	Evening Peak (1700-1800) LOS
Peartree Interchange	E	D
Park and Ride Access Junction	D	C
Wolvercote Roundabout	D	D
First Turn/Woodstock Road	C	D
Cuttleslowe Roundabout	F	D
A40 / Witney Road	D	D
A40 / B4449 Roundabout	E	F
A40 / Eynsham Road / Cassington Road	D	D
Langford Lane / Banbury Road	F	C
Banbury Road / Jordan Hill	E	B
A4165/Squitchey Lane / Hernes Road	E	A
Banbury Road / Moreton Road	E	D
Woodstock Road / Sandy Lane / Rutten Lane Roundabout	D	D
Woodstock Road / Spring Hill Road	D	C
A4095 Upper Campsfield Road / A44 Woodstock Road / A4095 Bladon Road / A44 Oxford Road	D	D
A40 / Sunderland Ave	E	B
Banbury Road / Harefields	E	C
A40 / Future Road for Access to Site C	D	D
A44 Woodstock Rd/Future Road for Access to Site C	D	D
Oxford Rd / Access to Com Dev 8	F	B

4.41 This indicates that there are 20 junctions that are predicted to have a LOS of D or greater within the Model extents. To identify the impact of the PR9 site the operation of the junctions identified above have been interrogated further. The Future DM PR9 Only scenario has been assessed against the Future Reference Case.

4.42 The comparison has identified the junctions where the LOS worsens from the Future Reference + Growth Fund scenario to the Future DM PR9 Only scenario, and these are identified below in **Table 4.15**.

Table 4.15: LOS by Junction Comparison

Junction	Morning Peak (0800-0900) LOS		Evening Peak (1700-1800) LOS	
	Future Ref + Growth Fund	Future Do Minimum	Future Ref + Growth Fund	Future Do Minimum
Banbury Road / The Moors	E	F	C	C
Banbury Road / Jordan Hill	D	E	B	B
Woodstock Road / Sandy Lane / Rutten Lane Roundabout	C	D	C	D
A40 / Sunderland Avenue	D	E	B	B
Oxford Road / Access to Com Dev 8	E	F	B	B

4.43 In order to identify the potential impact of the PR Allocations, the delay across the individual approach arms at those junctions where the LOS is forecast to worsen has been reviewed, as indicated in **Table 4.16**.

Table 4.16: Change in delay (seconds) at the junctions

Junction	Arm	Morning Peak Delay (0800-0900) (Seconds)		Evening Peak Delay (1700-1800) (Seconds)	
		Future Ref + Growth Fund	Future Do Minimum	Future Ref + Growth Fund	Future Do Minimum
Banbury Road / The Moors	Banbury Road North Through	10	0	7	+1
	Banbury Road North to The Moors	9	0	7	0
	Banbury Road South to The Moors	65	+30	40	0
	Banbury Road South Through	52	+33	26	0
	The Moors to Banbury Road South	118	+223	6	0
	The Moors to Banbury Road North	155	+247	12	+1
	Total	**409**	**+533**	**97**	**+2**
Banbury Road / Jordan Hill	Banbury Road North Through	32	+8	5	0
	Banbury Road North to Jordan Hill	33	+7	13	-5
	Jordan Hill to Banbury Road South	382	+233	13	-2
	Jordan Hill to Banbury Road North	199	+317	7	0
	Banbury Road South to Jordan Hill	16	-1	16	+3
	Banbury Road South Through	16	-1	18	0
	Total	**679**	**+562**	**73**	**-6**
Woodstock Road / Sandy Lane / Rutten Lane Roundabout	Sandy Lane to Woodstock Road North	0	0	0	0
	Sandy Lane to Woodstock Road South	0	0	0	0
	Sandy Lane to Rutten Lane	0	0	0	0
	Woodstock Road South to Sandy Lane	0	0	0	0
	Woodstock Road South to Woodstock Road North	21	-7	16	+4

Junction	Arm	Morning Peak Delay (0800-0900) (Seconds)		Evening Peak Delay (1700-1800) (Seconds)	
		Future Ref + Growth Fund	Future Do Minimum	Future Ref + Growth Fund	Future Do Minimum
	Woodstock Road South to Rutten Lane	20	-6	16	+3
	Woodstock Road North to Sandy Lane	0	0	0	0
	Woodstock Road North to Woodstock Road South	30	+16	21	+15
	Woodstock Road North to Rutten Lane	29	+16	23	+11
	Rutten Lane to Sandy Lane	0	0	0	0
	Rutten Lane to Woodstock Road North	6	0	8	1
	Rutten Lane to Woodstock Road South	6	0	8	-1
	Total	**112**	**+20**	**92**	**+33**
A40 / Sunderland Avenue	A40 East to A40 West	28	+16	14	+1
	A40 East to Sunderland Ave	0	0	0	0
	Sunderland Ave to A40 West	0	0	0	0
	Total	**28**	**+16**	**14**	**+1**
Oxford Road / Access to Com Dev 8	Oxford Rd South to Oxford Rd North	9	-1	10	0
	Oxford Rd South to Access to Com Dev 8	6	0	8	0
	Oxford Rd North to Oxford Rd South	60	+29	19	0
	Oxford Rd North to Access to Com Dev 8	33	+46	19	-1
	Access to Com Dev 8 to Oxford Rd South	11	-1	18	-1
	Access to Com Dev 8 to Oxford Rd North	11	-2	11	3
	Total	**131**	**+70**	**84**	**+1**

Banbury Road / The Moors

4.44 The total increase in delay across the junction in the AM peak hour is 533 seconds, mainly driven by the increases on The Moors to Banbury Road North and South arms. These approaches experience an increase in delay of 223 seconds and 247 seconds, respectively. Delays to journey times would already be occurring on the two approaches without the addition of PR9 of 118 and 155, respectively.

4.45 The delay on this arm is most likely overestimated because, in reality, these trips would be either let out of the junction or be able to etch out safely onto the A4260. It is also worthy to note that this only affects 50 vehicles on the Moors approach, which could travel in alterative hours.

4.46 In the PM peak hour, the increase in delay across the whole junction is only 2 seconds, which is negligible.

4.47 As such the PR9 development is not anticipated to have a severe residual cumulative impact on this junction or introduce a road safety issue.

Banbury Road / Jordan Hill

4.48 The total increase in delay across the junction in the AM peak hour is 562 seconds. This increase is mainly driven by the increase in delay on the Jordan Hill approaches, with an increase of 233 and 317 seconds.

4.49 As above, the model is likely overestimating these delays and these delays only affects 16 vehicles on the Jordan Hill approach which could travel in alterative hours. It should be noted that the model does not consider mode shifts that would occur due to increased car journey times or delay.

4.50 In the PM peak hour, there is a journey time improvement of 6 seconds between the Future Reference + Growth Fund scenario and the Future DM PR9 Only scenario.

4.51 As such the PR9 development is not anticipated to have a severe residual cumulative impact on this junction or introduce a road safety issue.

Woodstock Road / Sandy Lane / Rutten Lane Roundabout

4.52 The total increase in delay at the junction is forecast to be 20 seconds in the weekday morning peak in the with development scenario. The increase in delay on the majority of arms is negligible with the largest increase being 16 seconds on Woodstock Road North to Woodstock Road South and Woodstock Road North to Rutten Lane. In the evening peak the total delay is forecast to increase by 33 seconds with the largest increase of 15 seconds experienced on Woodstock Road North to Woodstock Road South. Overall, this is not considered a severe impact.

A40 / Sunderland Avenue

4.53 The weekday peak hours will see an increase in delay of between 16 and 1 seconds across the entire junction in the with development scenario, indicating that the impact of development will be negligible.

Oxford Road / Access to Com Dev 8

4.54 In the morning peak hour, the total delay across the junction will increase by 70 seconds. However, there is a maximum of 46 seconds on any one arm in the AM peak hours. As stated above, the model does not consider mode shifts that would occur due to increased car journey times or delay. As such this delay is unlikely to materialise.

4.55 In the evening peak hour, total delay increases by only 1 second in the with development scenario, which is negligible.

4.56 As such the PR9 development is not anticipated to have a severe residual cumulative impact on this junction or introduce a road safety issue.

5 Summary and Conclusion

Summary

5.1 Oxfordshire County Council (OCC) have requested that the North Oxford VISSIM model is used to assess the impact of development generated traffic on the operation of the highway network in a future year. This Technical Note sets out the traffic modelling outcomes of the 2031 modelling to support the planning application associated with the PR9 site located to the land west of Yarnton, within Cherwell District.

Modelling Parameters

5.2 In order to be robust, only a Do Minimum scenario was tested with the PR9 development, which does not take into account any modal shift assumptions or mitigation packages aimed at addressing the identified impacts from the traffic generated by PR9 trips.

5.3 To ensure a realistic level of background growth and growth occurring from committed development, trends in historic growth and housing delivery has been considered, alongside the DfT projections for growth. A methodology to cap growth and allow for realistic forecasts to be derived for assignment within the model has been outlined, such that the network capacity is not entirely exceeded prior to any development assessment work.

5.4 Planned and committed infrastructure designed to address growth elsewhere, as agreed with OCC have been included within the Future Reference Case and with development modelling runs.

Modelling Outcomes

5.5 An assessment has been provided for the following:

- Network Statistics across the network.
- Queue lengths and Delay for key junctions
- Journey times across previously agreed key routes
- An assessment of the Level of Service.

Conclusion

5.6 In conclusion:

- Although the vehicle trips on the network decreases with PR9, the reduction equates to a negligible amount that would fluctuate within 10% daily fluctuation figures.

- The addition of traffic from the PR9 site onto the network will result in an increase of additional delay of approximately 15s per vehicle in the AM peak, and 6s in the PM peak when compared to the without development scenario.

- Average vehicle speeds within the network remain relatively static in the AM peak over all scenarios however in the PM peak the average vehicle speed increases as a result of the Growth Fund by 4mph which is unchanged as a result of PR9.

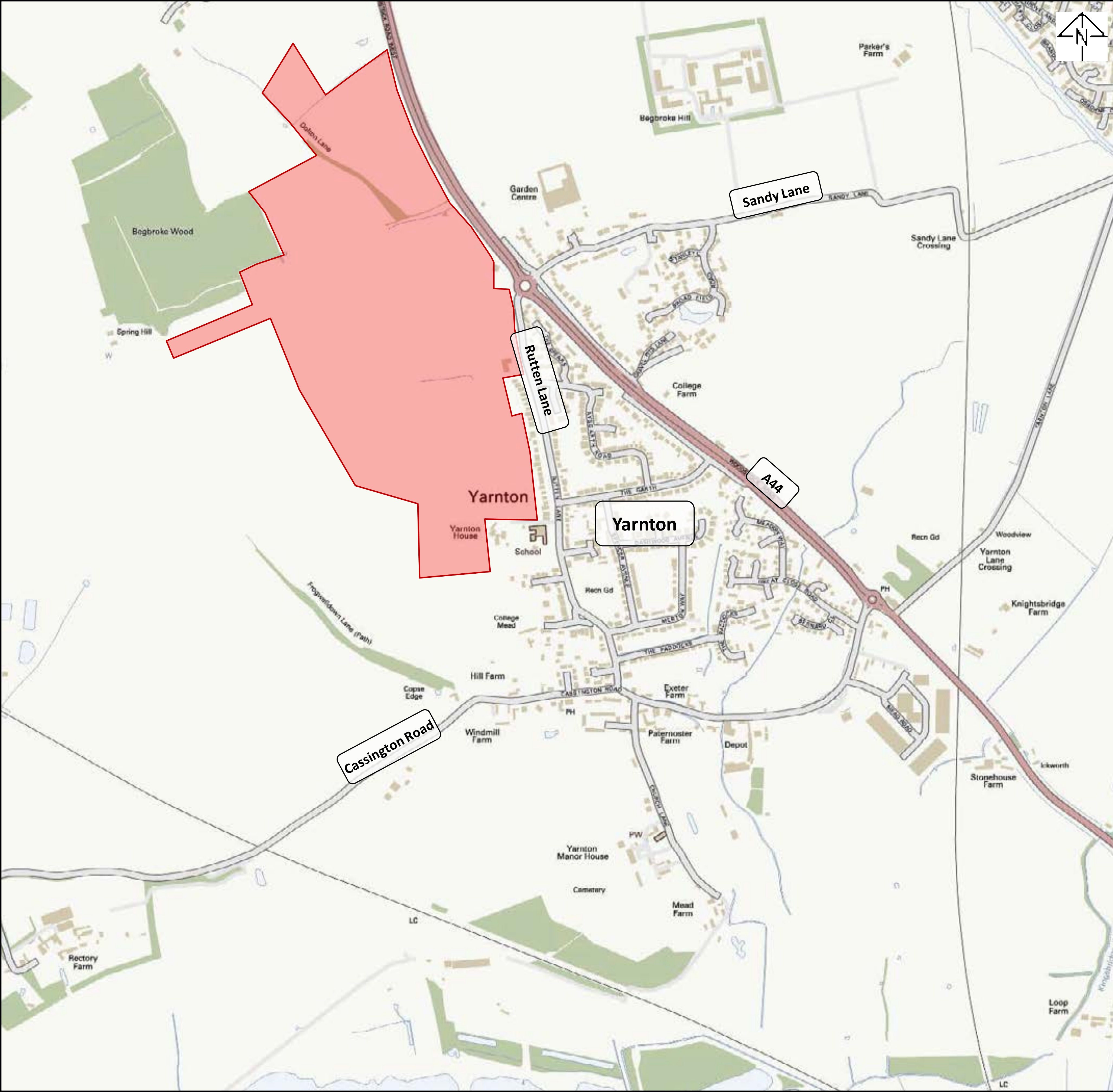
- It can be seen from the journey time results that the model forecasts some increases in journey times, focussed primarily along the A44 and A4260 corridors. In general, the journey time analysis shows that the PR9 site will not result in a severe impact on the highway network.

- The addition PR9 overall has a negligible effect on queueing. Where queuing does increase, this is this is anticipated to be an infrequent occurrence or does not block back to any key junction on average.

- A detailed review of the LOS results indicates that there are 20 junctions that are predicted to have a LOS of D or greater within the Model extents. Where the LOS has worsened as a result of PR9 (only four out of the 20 junctions) further assessment has been undertaken on each arm of the junction. The detailed assessment identifies that in general the delays are on two minor arms of the network including, The Moors and Jordan Hill where only a handful of vehicles are anticipated to be affected. As the model does not consider mode shifts that would occur due to increased car journey times or delay it is anticipated that delays will not materialise.

5.7 On this basis, the PR9 development would not exceed the 'severe' threshold referred to in the NPPF as the only legitimate reason to resist a development on transportation grounds. It is therefore clear that PR9 could be delivered in advance of the package of mitigation that is outlined in the IDP.

Annex A



Key

Indicative Site Boundary

Merton College, Oxford

Land West of Yarnton, Cherwell

Site Location Plan

(Local Context)

SCALES:	NTS		
DRAWN: MO	CHECKED: RB	DATE: 20/06/2023	REVISION: --

vectos.

Network Building, 97 Tottenham Court Road, London W1T 4TP
Tel: 020 7580 7373 Email: vectos@vectos.co.uk www.vectos.co.uk

DRAWING REFERENCE: Figure 1

Annex B

vectos microsim.

REPORT

Forecasting Report

Oxford PR Site Testing VISSIM

May 2023

Contents

1 Introduction

1.1 Vectos Microsim (VM) has been commissioned by a multi-consultancy group working on behalf of a number of Partial Review (PR) Sites that are allocated within the adopted Cherwell Local Plan (Part 1) Partial Review.

1.2 VM is providing VISSIM microsimulation modelling support to all sites with a view to assisting in developing a suitable mitigation strategy for all Sites to come forward within the Local Plan period, working together with the Local Authority to agree an approach for the delivery of any infrastructure requirements and how these may be phased and financed.

1.3 The Partial Review (PR) Sites and their representatives are as follows:

i) PR6a (Land east of Oxford Road) – i-Transport LLP

ii) PR6b (Land west of Oxford Road) – KMC Transport Planning

iii) PR7a (Land South East of Kidlington) – Brookbanks

iv) PR8 (Land East of the A44) within the ownership of Oxford University Development (OUD) – KMC Transport Planning

v) PR8 (Land East of the A44) within the ownership of Hallam Land – Glanville

vi) PR9 (Land West of Yarnton) – Vectos

1.4 There are two other 'PR' Sites within the study area; PR6c (a proposed new Golf Course at Frieze Farm) and PR7b (Land at Stratfield Farm). In the case of PR6c, this is not considered to be a significant generator of peak hour traffic. In addition, the existing North Oxford Golf Club sits on the plot of land proposed for PR6b, currently designated for a residential development, meaning that the net impact of not explicitly including PR6c is negligible as the trips associated to the Golf Course are already included within the Baseline demands. The consultant on behalf of PR7b is not currently engaged with this tranche of work, however assumptions have been made to account for the site to ensure a robust assessment and this will be discussed later in the document.

2 Background

2.1 VM has received a series of VISSIM modelling files and documentation to be used as a basis for microsimulation model testing, as per the below:

i) North Oxford VISSIM Base Model – Filename "BaseModel2018_v37"

ii) Local Model Validation Report[1]

iii) North Oxford VISSIM Future Year Model – Filename "NOC PP A44 Sens Test O1D"

iv) Forecasting Report[2]

[1] North Oxford VISSIM LMVR_Issue_v3, Atkins January 2019
[2] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021

2.2 Both the VISSIM Base and Future Year Models include AM and PM scenarios covering the following time periods:

i) 06:30-10:30 (07:00-10:00 assessment period, with 30 minute warm up and cool down)

ii) 14:30-18:30 (15:00-18:00 assessment period, with 30 minute warm up and cool down)

2.3 VM has re-run the Base models (in VISSIM version 10.00-12, as per the received files) and found that results reported from these runs are identical to those presented within the LMVR. VM has also run the Future Year models (in VISSIM version 10.00-02) and compared them to the results of the 'Preferred Package' (PP) modelling presented within the Forecasting Report and found them to be very similar thereby giving assurances that the models used for the foundation of this testing are accurate.

Re-Cap – Preferred Package

2.4 SKANKSA and CAPITA Real Estate and Infrastructure were appointed by Oxfordshire County Council (OCC) to carry out microsimulation modelling iteratively testing a series of proposed schemes for four distinct corridors:

i) Corridor 1A: Cassington to Loop Farm (Cassington Roundabout)

ii) Corridor 1B: Kidlington Roundabout

iii) Corridor 1C: Kidlington to Cutteslowe (Oxford Parkway Junction)

iv) Corridor 1D: Loop Farm and Peartree Roundabouts

2.5 These were initially tested within the 2018 VISSIM Base model that underpins this testing, as well as scheme optioneering through local junction modelling including LINSIG and TRANSYT.

2.6 OCC requested that the schemes also be tested through a forecast 2023 model. Details of growth factors used and committed housing and employment development sites included, public transport amendments, and highway schemes and network changes applied to the 2018 Base to forecast the model to 2023, are found within the Forecasting Report[3].

2.7 The results of the 2023 testing put forward the preferred options as follows:

i) Corridor 1A: Staggered pedestrian crossing on the northern side of Cassington Roundabout[4]

ii) Corridor 1B: Option E was chosen, which includes signalisation and enhanced bus facilities at Kidlington Roundabout[5]

iii) Corridor 1C: No scheme proposed, as testing in the Base year scenario showed very little benefit from either of the two schemes selected for testing; and

iv) Corridor 1D: Enhanced pedestrian facilities on northern and eastern arms, and a southbound bus lane[6]

[3] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 6
[4] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 7
[5] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 8
[6] North Oxford Corridor Study Mar 2021_v0.14, SKANSKA/CAPITA March 2021, Chapter 9

2.8 Subsequent review of the approved scheme drawings around Loop Farm show that the pedestrian facilities proposed are no longer part of the scheme delivery. As such these have been removed from the modelling.

2.9 The overarching conclusion of this Preferred Package (PP) model was that it provided a series of measures aimed primarily at sustainable transport users that were not significantly to the detriment of private vehicle users.

3 Model Updates || Committed Developments

3.1 VM has undertaken a series of updates to the received 2023 PP model with the task of developing a 2031 Reference Case for the purposes of this PR testing, which moves the forecast year to the end of the Local Plan period. These updates primarily involve the inclusion of committed development sites up to 2031.

3.2 As the 2023 PP model includes partial build out of some of these sites, as well as partial assumptions for the PR sites, the first step was to set Baseline demands back to the 2018 position. This was carried out simply by replacing the matrices within the 2023 model with those contained within the 2018 Base. The re-forecasting process then included a 'layering-up' of specific committed development sites between the 2018 Base year and the 2031 forecast year. The following list provides the committed development sites requested by OCC to be included within the modelling:

Committed Development Sites:

i) Eynsham Garden Village

ii) West Eynsham Strategic Development Area (SDA)

iii) West Thornbury Road Eynsham

iv) Eynsham Nursery and Plant Centre

v) Land East of Woodstock (Policy EW1c)

vi) Barton Park

vii) Wolvercote Papermill Site

viii) St. Frideswide Farm (SP4)

ix) Hill Rise, Woodstock (Policy EW4)

x) Banbury Road, Woodstock (Policy EW5)

xi) Oxford North (CS6)

xii) Park View

xiii) Begbroke Science Park

xiv) Oxford Technology Park

3.3 VM will discuss each committed site in turn, detailing its location, site access arrangements, mitigation, and demand assumptions for including the site within the forecasting process.

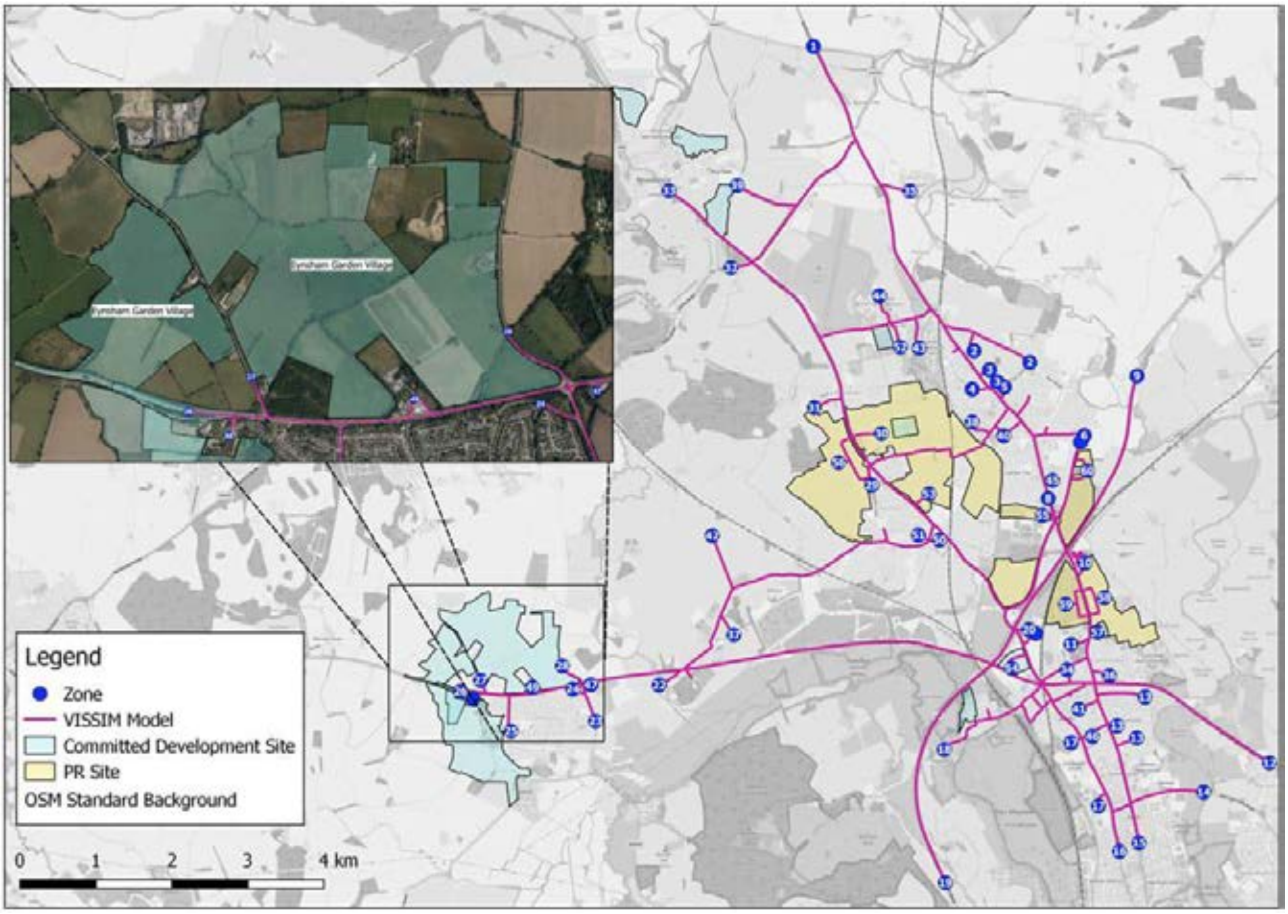
Eynsham Garden Village (20/01734/OUT)

3.4 Eynsham Garden Village (Land North of A40; A40 Section from Barnard Gate to Eynsham Roundabout, Eynsham, Oxfordshire) is identified in the Local Plan as an area for strategic growth. The site is proposed to be a mixed-use development providing both residential and employment growth, alongside a local centre, education, leisure and community facilities.

3.5 The highway proposals for the Garden Village involve new links between Lower Road and Cuckoo Lane, a new junction onto the A40, and then further connections southwards circumventing Witney Road on the west side before joining the B4449. As this Site is located to the far west of the VISSIM model extent, a simplified approach was taken whereby development trips are loaded onto existing Zone 26, which represents A40 western zone acting as the generator/attractor of all A40 traffic.

3.6 A map showing the location of Eynsham Garden Village within the context of the VISSIM modelling is provided below:

Figure 1: Eynsham Garden Village Site Location



3.7 In 2020 Wood, on behalf of OCC, carried out VISSIM modelling to test the highway impact of the Garden Village and West Eynsham SDA development proposals. OCC has identified that trip assumptions for that study should be replicated for this one, therefore trip generation has been taken from Table 1 of the Wood report[7].

3.8 The Wood Report only reports peak hour trip generation (08:00-09:00 and 17:00-18:00). Therefore a TRICS Residential Total Person temporal profile is calculated to estimate the vehicle trips in the shoulder peaks. The TRICS rates used for this, and for other committed development sites where applicable, are as follows:

Table 1: TRICS Residential Temporal Profile

	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	0.109	0.494	0.603	54%	66%	63%
08:00-09:00	0.202	0.749	0.951	100%	100%	100%
09:00-10:00	0.198	0.263	0.461	98%	35%	48%
PM Peak Period						
15:00-16:00	0.518	0.276	0.794	89%	101%	93%
16:00-17:00	0.520	0.269	0.789	89%	98%	92%
17:00-18:00	0.584	0.274	0.858	100%	100%	100%

3.9 The Report suggests that distribution was informed by SATURN OSM outputs. A VISUM model was then developed to assign the forecast trips through the VISSIM model extent, and finally outputs were converted back to static routes and run through VISSIM via static assignment. The output distribution is not provided within the report, therefore provided within the TA[8] are illustrations of the direction from/to which development trips are forecast to be travelling. These suggest that 28% of AM peak hour demand, and 35% of PM peak hour demand, travels to/from A40 east. Trips travelling north are expected to travel via Lower Road towards A4095 Bladon and onto the A44. Trips travelling west are expected to join or egress the A40 via the western-most proposed Site access and therefore not interact with the VISSIM model extent. Trips travelling south are expected to travel via B4044 towards Botley and onto the A420 or A34. As a result only eastern trips are considered.

3.10 These total trip generations are multiplied by the percentages of trips travelling to/from the east and assigned to existing Zone 26.

3.11 Distribution present within the existing zone 26 in the VISSIM model is interrogated to provide the wider distribution assumptions across the whole VISSIM network. Some zones are excluded as they a) refer to destinations/origins that would be travelled to/from by routes other than the A40, or b) they refer to sites that could be considered 'internal' as they are within the immediate vicinity of the proposed Site. This ensures a robust assessment of trips travelling along the A40 towards (or away from) the primary study area by discounting any short-distance trips within the Eynsham area that may have resulted by including those proximal zones within the distribution calculations.

[7] Garden Village AAP and West Enysham SPD Evidence Base, 2031 Forecast Year Modelling, July 2020.
[8] 20_01734_OUT-TRANSPORT_ASSESSMENT-856882, Figures 6-26 and 6-27.

3.12 Tables showing the derived in/out trip generation totals within the VISSIM model extent related to the Eynsham Garden Village committed site for each hour during the AM and PM peaks are given below.

Table 2: AM In/Out Totals for Eynsham Garden Village

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Eynsham Garden Village	163	144	303	218	297	77

Table 3: PM In/Out Totals for Eynsham Garden Village

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Eynsham Garden Village	221	351	222	342	249	349

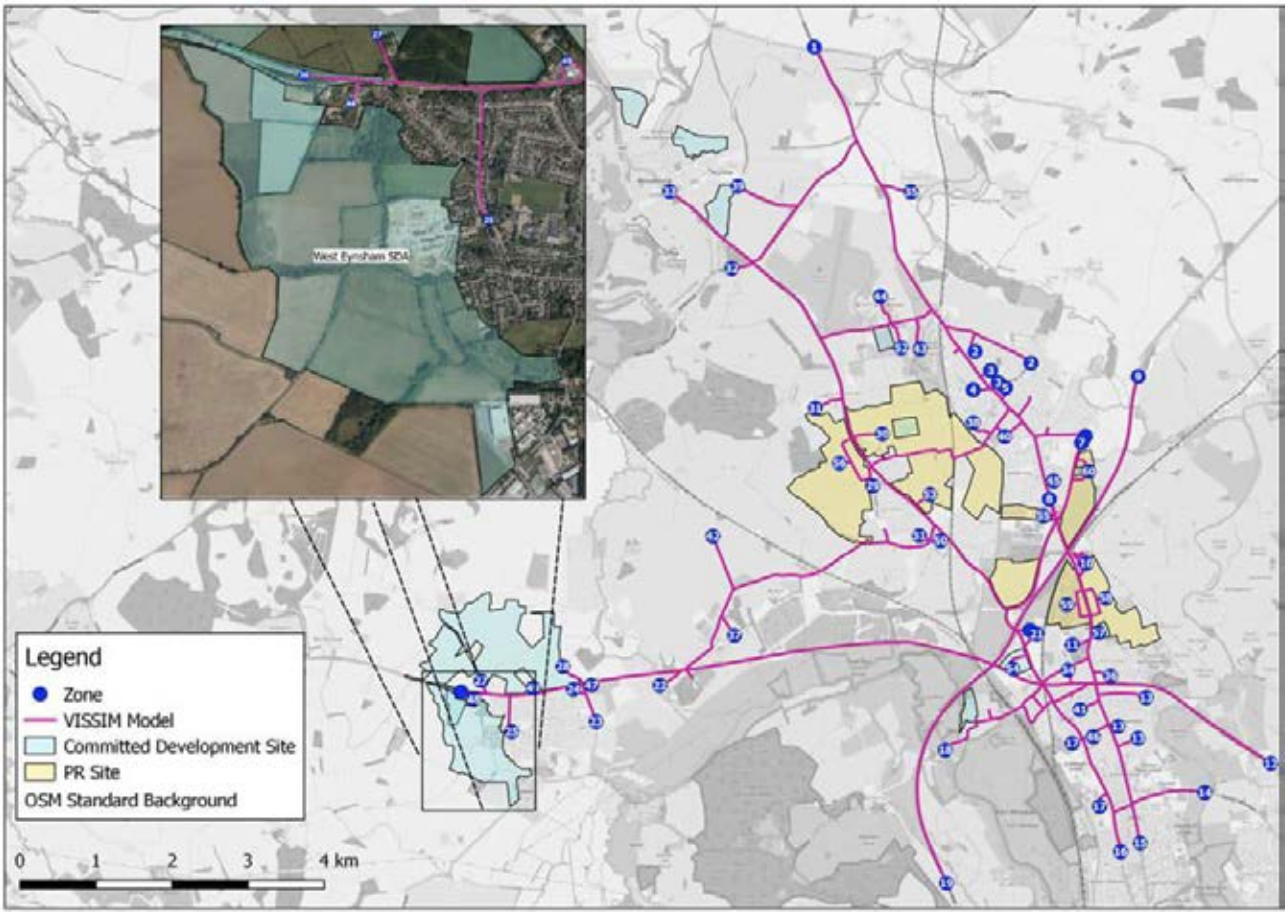
West Eynsham Strategic Development Area (20/03379/OUT)

3.13 The West Eynsham Strategic Development Area (SDA) is allocated as a site to accommodate a new sustainable and integrated community of approximately 1000 dwellings with supporting services and infrastructure. The total site covers approximately 88 hectares and lies immediately to the west of Eynsham.

3.14 The site is to be accessed via the fourth (southern) arm of a new A40 roundabout to be introduced as part of the Eynsham Park and Ride proposals.

3.15 A Figure showing the location of the West Eynsham Strategic Development Area within the context of the wider VISSIM model is provided below:

Figure 2: West Eynsham Strategic Area (SDA) Site Location



3.16 As per the methodology for calculating the Garden Village trip generation, Table 1 of the Wood report is used.

3.17 This site sits adjacent to Eynsham Garden Village, just on the southern side of the A40 rather than the northern side. As a result a similar approach has been taken to distribution across the wider VISSIM model. The same proportions of local distribution (i.e. north/east/south/west movements) has been applied to the total trip generation, and then distributed further based on the baseline distribution for zone 26 in the VISSIM model (which represents A40 West).

Table 4: AM In/Out Totals for West Eynsham Strategic Development Area (SDA)

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
West Eynsham (SDA)	20	51	37	77	36	27

Table 5: PM In/Out Totals for West Eynsham Strategic Development Area (SDA)

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
West Eynsham (SDA)	88	51	88	49	99	50

West Thornbury Road Eynsham

3.18 West Thornbury Road Eynsham is a committed development within the boundaries of the West Eynsham SDA and therefore, in/out trip generation has been considered within the calculations for the full West Eynsham Strategic Development Area (SDA) allocation as described above.

Eynsham Nursery and Plant Centre (15/00761/FUL)

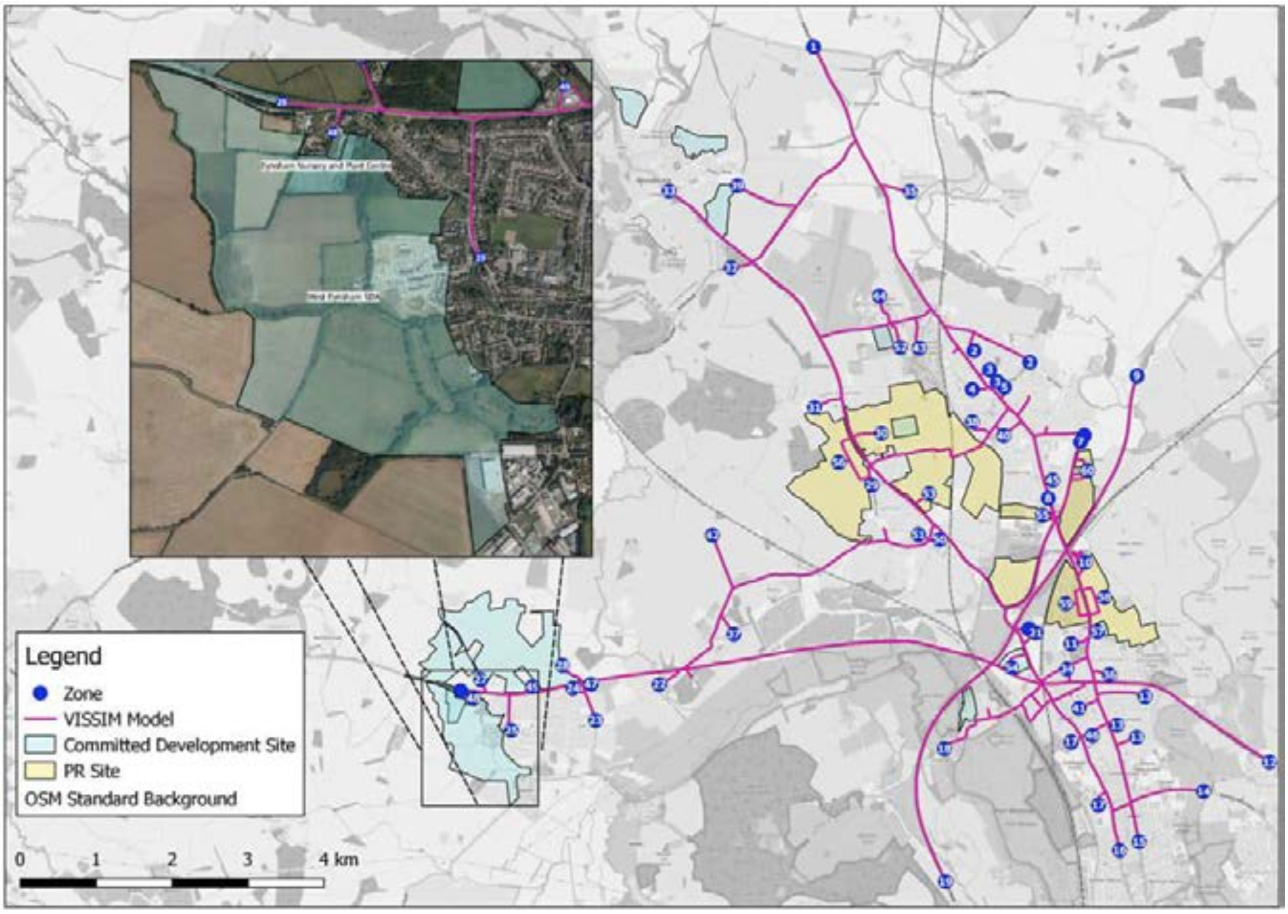
3.19 Eynsham Nursery and Plant Centre is a committed development site for 77 dwellings located west of Eynsham, sitting within the West Eynsham SDA. The site had not been delivered at the time of the VISSIM Base model development but has been since and is therefore included in this forecasting exercise.

3.20 An account for this site had been made during the forecasting process undertaken by SKANSKA/CAPITA as part of their work for the North Oxford Corridor 2023 PP modelling. Trips were assigned to the same zone that previously served the Nursery and Plant Centre. Having now been built, the site is actually accessed by an extension to Old Witney Road and a connection to the old access driveway that served the Nursery and Plant Centre, which has been stopped up at the request of OCC to avoid a direct link onto the A40.

3.21 The starting point for this exercise was to set the baseline demands to the 2018 position before re-forecasting, and so this exercise seeks to re-account for the trips associated with this development. The minor network updates required to formally and fully account for the delivery of this site have not been applied to the model as they would have no material impact on the outcomes of the testing.

3.22 Map showing the location of the Eynsham Nursery and Plant Centre along with the wider model network is provided below.

Figure 3: Eynsham Nursery and Plant Centre Site Location



3.23 Similarly to the Eynsham Garden Village and West Eynsham SDA sites, the same distribution assumptions are applied and Zone 26 (A40 West) is considered to be the development zone. This simplifies the process of including all committed development sites, whilst taking a robust approach to corridor flows along the A40 by ensuring vehicles are easily able to access the main route into Oxford.

3.24 Tables showing the in/out trip generation totals of the Eynsham Nursery and Plant Centre for each hour during the AM and PM peaks are provided below.

Table 6: AM In/Out Totals for Eynsham Nursery and Plant Centre

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Eynsham Nursery and Plant Centre	2	6	3	9	3	3

Table 7: PM In/Out Totals for Eynsham Nursery and Plant Centre

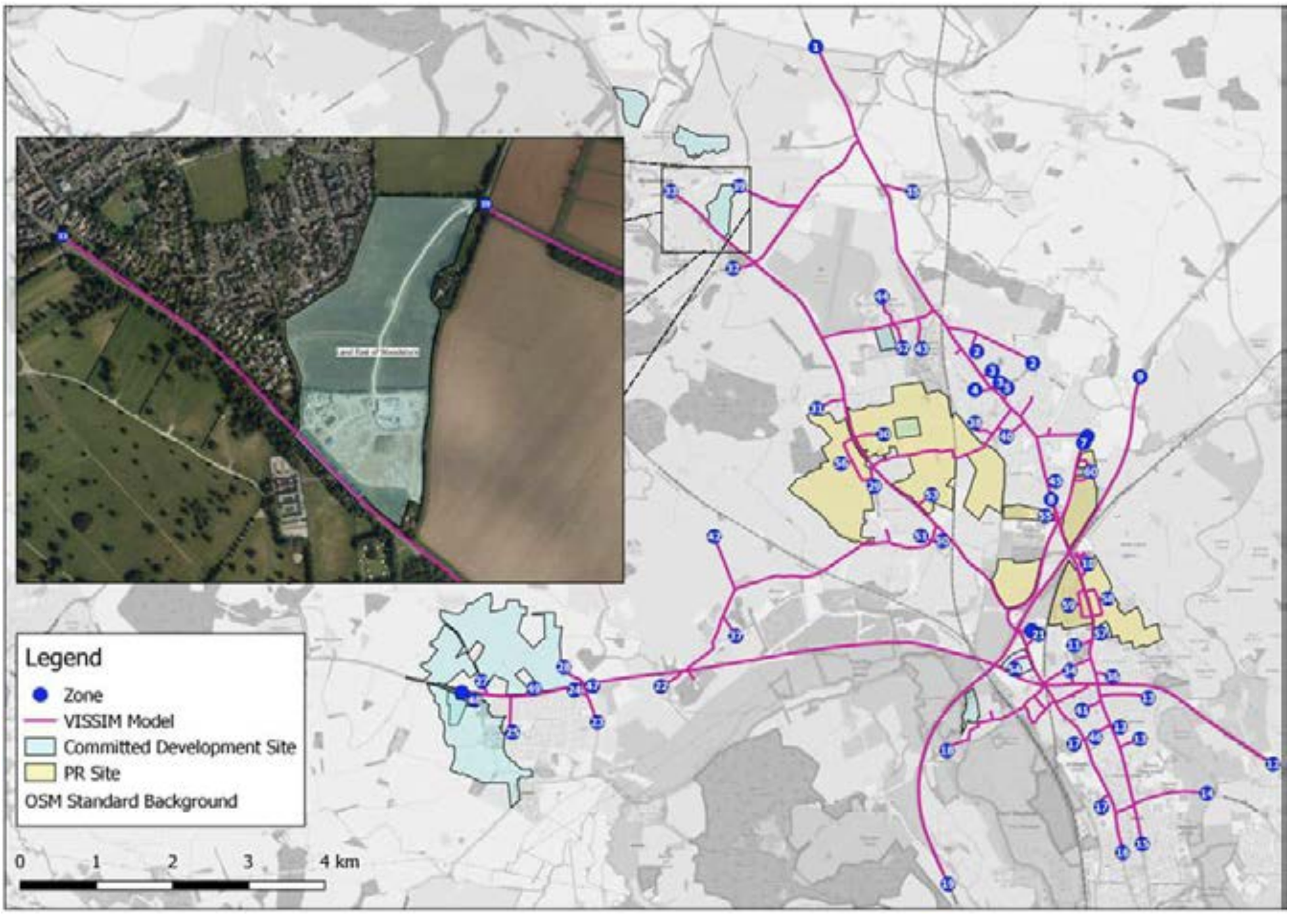
	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Eynsham Nursery and Plant Centre	9	6	9	6	10	6

Land East of Woodstock (Policy EW1c) (16/01364/OUT)

3.25 Land East of Woodstock is a committed development site located north of the A44 Oxford Road. The site includes proposals for up to 300 residential dwellings and up to 1,100sqm of A1/A2/B1/D1 floorspace. The Site is served via two accesses; one via A44 Oxford Road and the other via Shipton Road. These are assigned to zones 33 and 39, and these are assumed to be the development zones.

3.26 A Figure showing the location of the Land East of Woodstock within the context of the wider VISSIM model is provided below.

Figure 4: Land East of Woodstock Site Location



3.27 The TA[9] outlined trip generation for the peak hours split between residential and office-based employment trip purposes. The TA also provides percentages for trip distribution across the wider Oxford area. These assumptions are used to assign one or more VISSIM zones to the links/locations provided within the trip assignment calculations and VISSIM matrices are then derived therefrom. Trip generation is available within the TA for all model peak hours via the residential and office trip rates present within Appendix C of the TA and Appendix B of the TA Addendum[10], respectively.

[9] 16_01364_OUT-ENVIRONMENTAL_STATEMENT_TECH_APPENDIX_E1-420981
[10] 16_01364_OUT-15291-03B_ADDENDUM_TRANSPORT_ASSESSMENT_13_-449339

3.28 Tables showing the in/out trip generation totals for the Land East of Woodstock site for each hour during the AM and PM peak periods are given below.

Table 8: AM In/Out Totals for Land East of Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Land East of Woodstock	26	63	46	84	44	44

Table 9: PM In/Out Totals for Land East of Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Land East of Woodstock	54	44	66	55	80	65

Barton Park (13/01383/OUT)

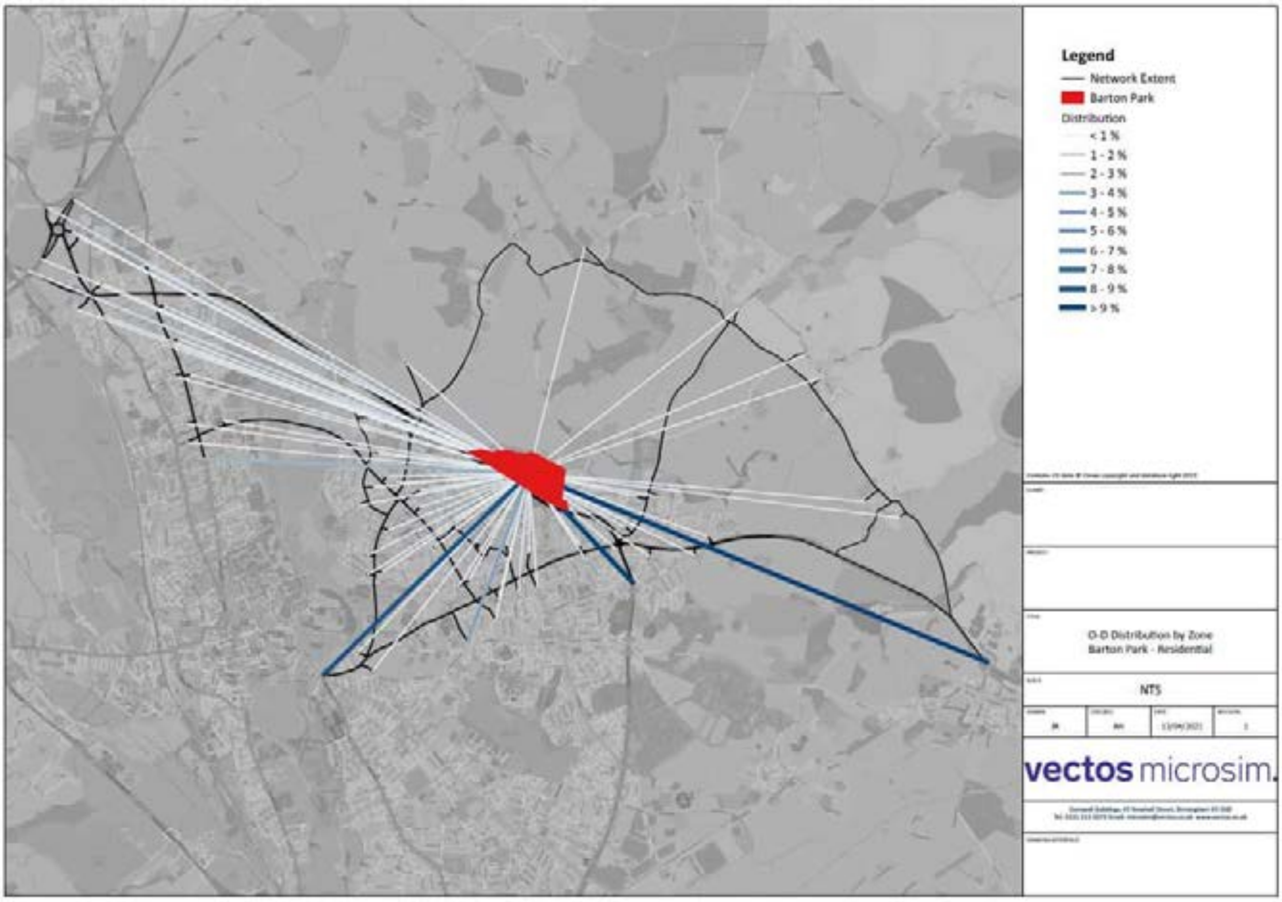
3.29 Barton Park is a committed development site lying just beyond the extent of the VISSIM network, located northwest of Headington Roundabout and east of the A40 Northern Bypass Rd. The outline application is for a maximum of 885 residential units, 2500sqm of employment, Care Home, School and community facilities.

3.30 Trip generation data for the peak hours only were available from the Transport Assessment[11]. Trip generation for the shoulder hours was calculated via the TRICS Residential Total Person temporal profile rates as provided in Table 1.

3.31 In regards to distribution, VM are currently engaged on a separate project within Oxfordshire that required the calculation of Barton Park distribution based on a combination of 2011 Census Travel to Work data and Google maps routing data to derive the most likely route. This resulted in a distribution plot as per the image overleaf:

[11] 13_01383_OUT-EIA_TRANSPORT_ASSESSMENT_PART_1_OF_2-1373941, Table 8.8

Figure 5: Barton Park Trip Distribution

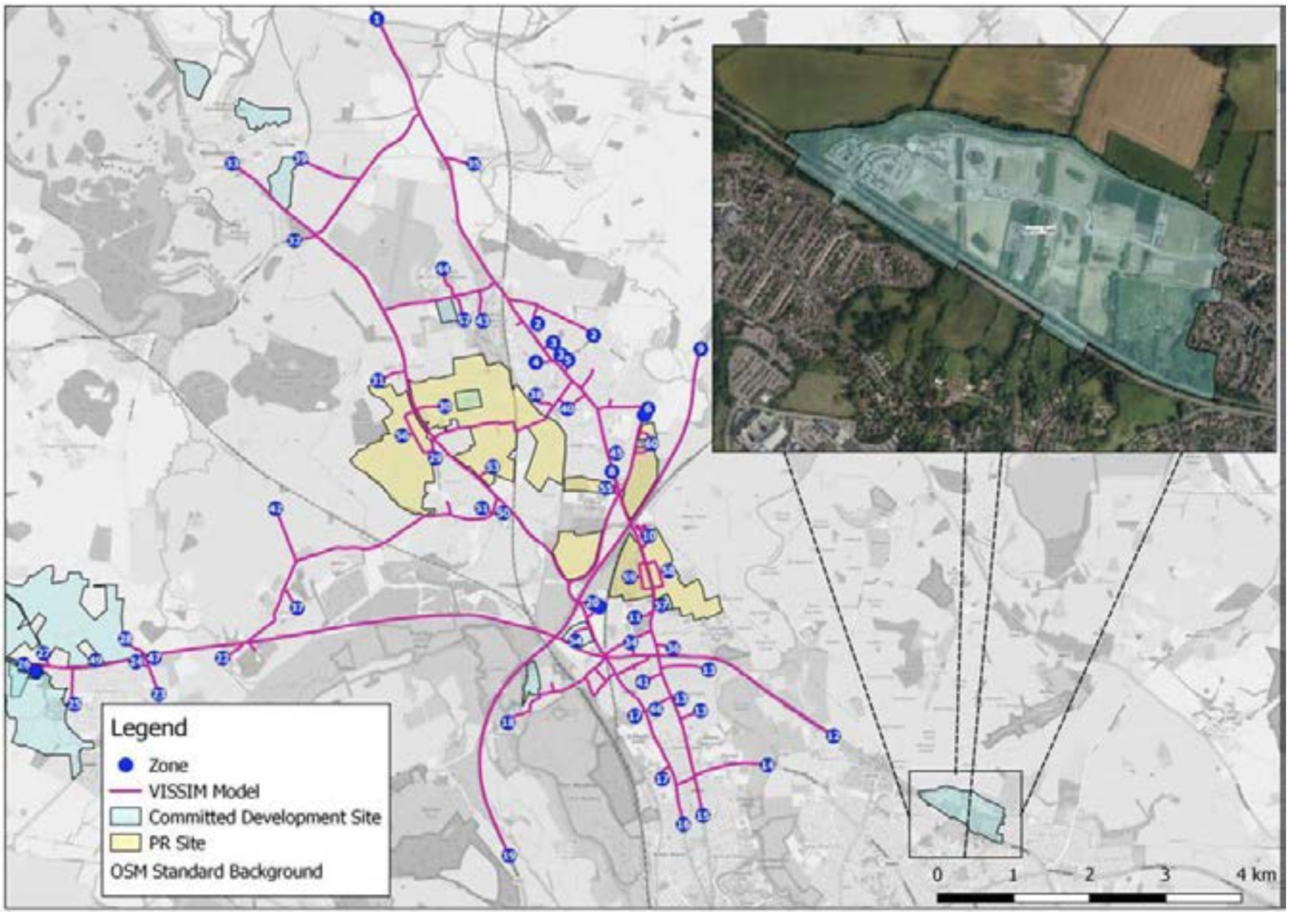


3.32 As the VISSIM network for this testing includes only part of this network, only trips travelling to/from west of Marston Interchange, and to/from west of the B4495 bridge over the River Cherwell, are considered which equates to a total of 10.48% of all trips interacting with the model network. As shown in the distribution plot, many of the site's trips are forecast to travel to/from Central Oxford, A40 Eastern By-Pass Road or A40 London Road towards Wheatley.

3.33 Depending on which origin/destination trips are travelling from/to, the development zone for Barton Park is assumed to be either 12 or 14, which relates to A40 East and B4495 Marston Ferry Way respectively. Trips travelling between Barton Park and A4165 or A4144 are assumed to travel via B4495 and therefore assume zone 14 as their entry/exit point to the VISSIM model, whereas all other trips assumed zone 12.

3.34 A Figure showing the location of Barton Park within the context of the wider VISSIM model is provided below.

Figure 6: Barton Park Site Location



3.35 Tables showing the in/out trip generation totals of the Barton Park for each hour during the AM and PM peaks are given below.

Table 10: AM In/Out Totals for Barton Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Barton Park	9	19	17	29	17	10

Table 11: PM In/Out Totals for Barton Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Barton Park	38	34	39	32	44	33

Wolvercote Papermill (13/01861/OUT)

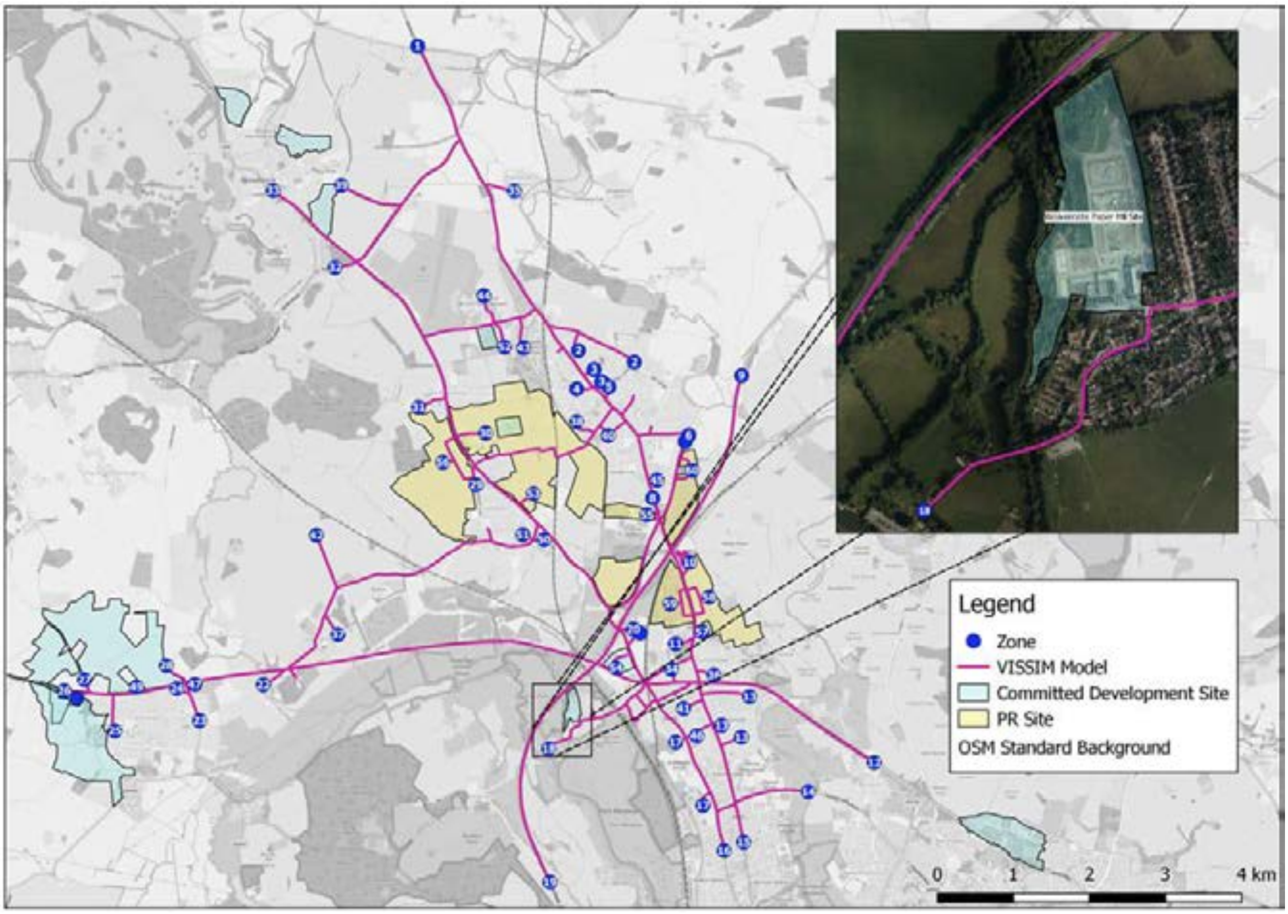
3.36 Wolvercote Papermill is a committed development site located north of Oxford and southwest of Wolvercote Roundabout. The site proposes up to 190 residential units, employment space, community facilities, public open space and ancillary services.

3.37 The VISSIM development zone is assumed to be Zone 18, which represents Godstow Road which will serve the Site. The TA contains the forecast trip generation for the Site[12] and these vehicles have been assigned to this zone. The trip generation for the purposes of the VISSIM model have been adjusted to account only for those trips that will interact with the VISSIM network, i.e. any trips approaching or exiting the site via Godstow Road west towards Wytham have been excluded.

3.38 Distribution across the VISSIM model area is based on the existing distribution present within Zone 18 of the 2018 Base model.

3.39 The Figure below showing the location of the Barton Park within the context of the wider VISSIM model is provided below.

Figure 7: Wolvercote Paper Mill Site Location



[12] 13_01861_OUT-TRANSPORT_ASSESSMENT-1386134, Table 7.2

3.40 Tables showing the in/out trip generation totals of the Wolvercote Papermill Site for each hour during the AM and PM peaks are given below.

Table 12: AM In/Out Totals for Wolvercote Papermill Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Wolvercote Papermill Site	5	47	8	67	8	34

Table 13: PM In/Out Totals for Wolvercote Papermill Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Wolvercote Papermill Site	35	17	36	17	45	20

St. Frideswide Farm (SP24) (21/01449/FUL)

3.41 St. Frideswide Farm is a committed development site proposing 134 dwellings and community facilities. The site is located along the northern edge of Oxford City and immediately north of Cutteslowe Roundabout. It is served via a priority T-junction with Oxford Road.

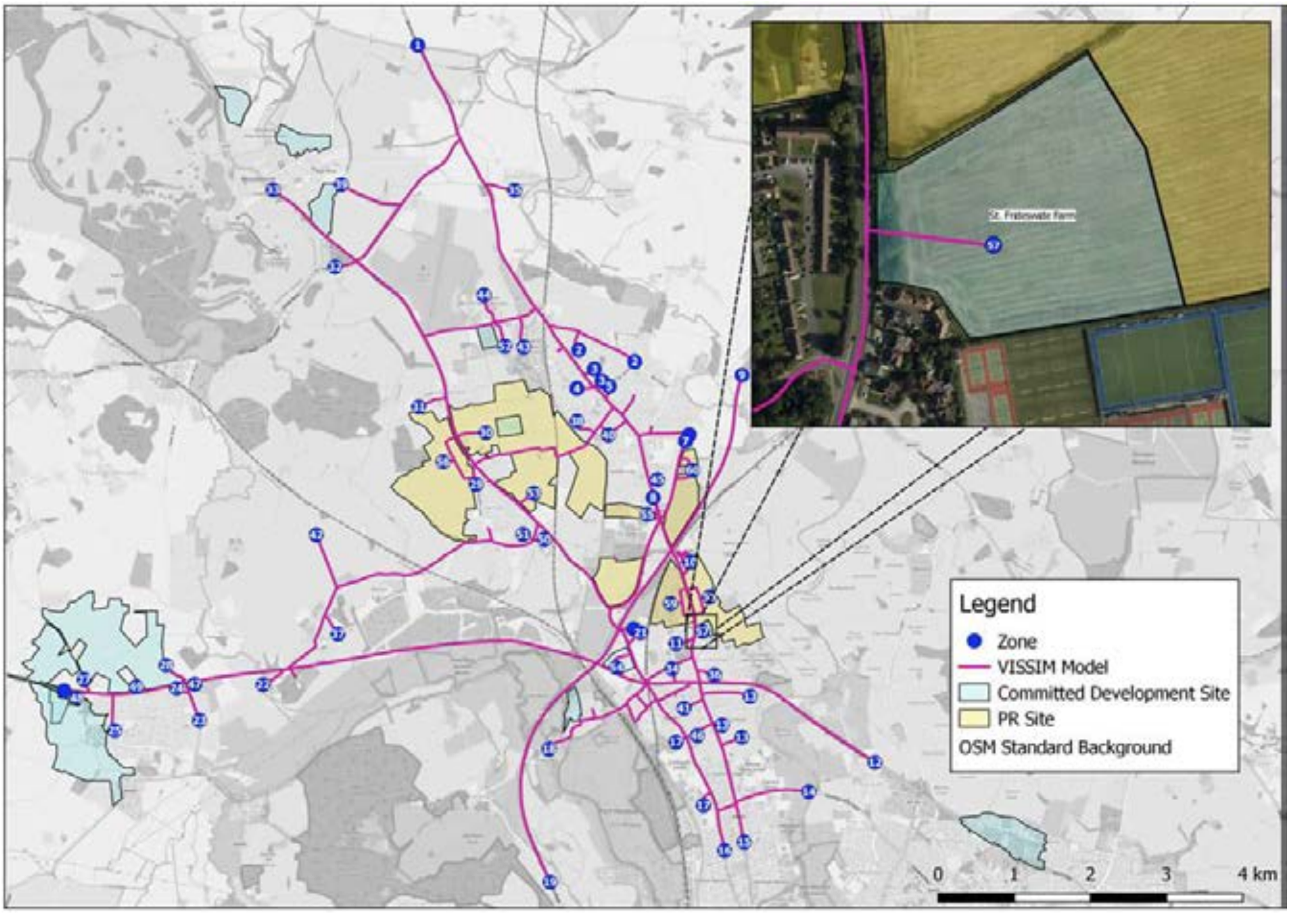
3.42 The site lies within the model extent but with no existing zone to assign the trips to. Therefore, a new zone (zone 57) has been assigned to this site.

3.43 Trip generation for the peak hours is taken directly from the TA[13]. Trip generation for the shoulder hours is calculated via the TRICS Residential Total Person temporal profile, as provided in Table 1. Distribution is informed by the existing distribution to/from Zone 36, which represents a residential zone immediately south of this proposed location (i.e. Harefields).

[13] 21_01449_FUL-TRANSPORT_ASSESSMENT__PART_1_-2552872, Table 6.5

3.44 The Figure below presents the location of St. Frideswide Farm in the context of the wider model network.

Figure 8: St. Frideswide Farm Site Location



3.45 The Figure below shows the proposed site access arrangement for St. Frideswide Farm.

Figure 9: St. Frideswide Farm Site Access Arrangements

3.46 Tables showing the in/out trip generation totals for St. Frideswide Farm Site for each hour during the AM and PM peaks are provided below.

Table 14: AM In/Out Totals for St. Frideswide Farm

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
St. Frideswide Farm	8	33	14	51	14	18

Table 15: PM In/Out Totals for St. Frideswide Farm

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
St. Frideswide Farm	34	16	34	16	38	16

Hill Rise, Woodstock (Policy EW4) (21/00189/FUL)

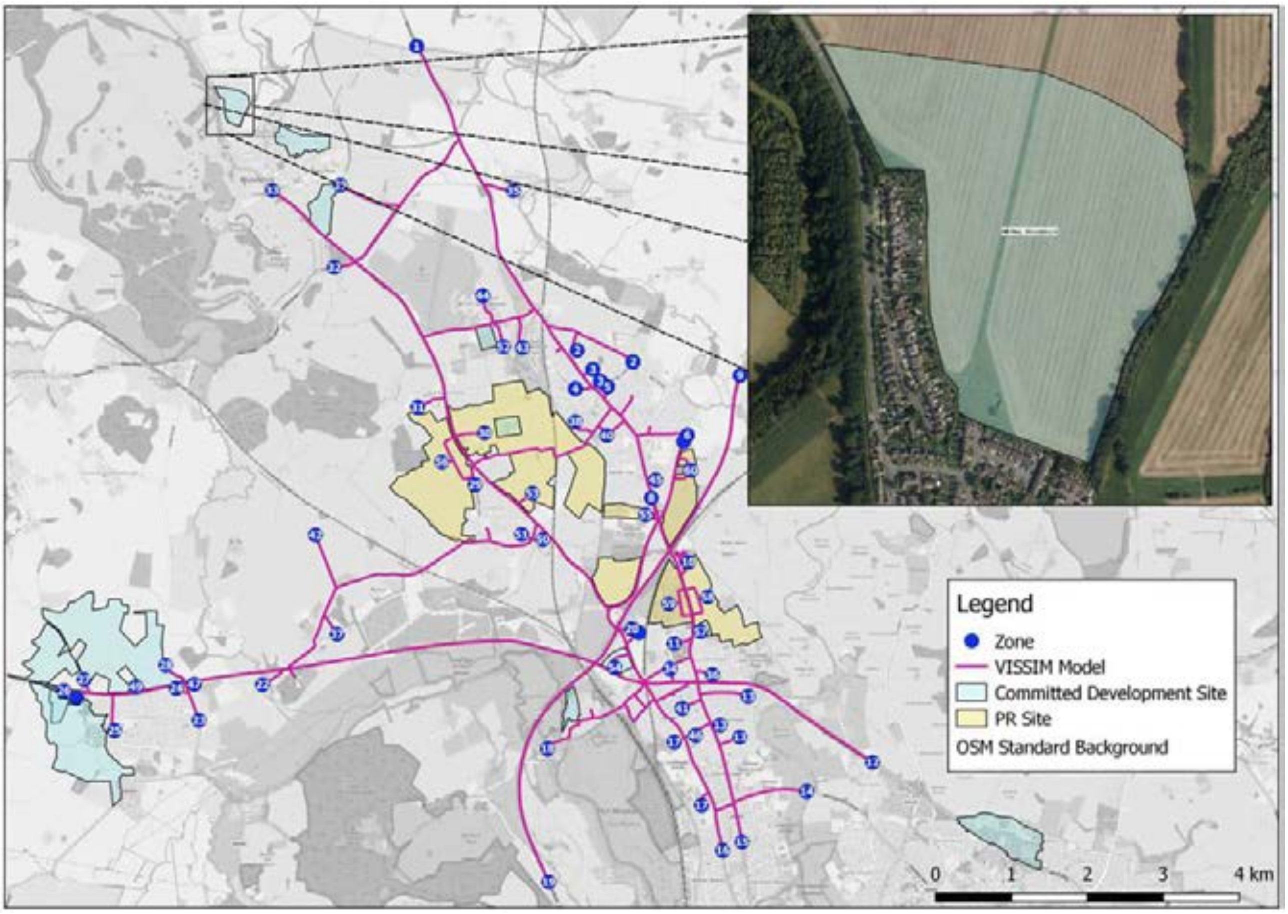
3.47 Hill Rise is a committed development site located North of Hill Rise in Woodstock. The hybrid planning application consists of 74 dwellings, 60sqm of community space and associated facilities and infrastructure.

3.48 Trip generation for the peak hours are taken directly from the TA[14]. Shoulder hours are calculated via the TRICS Residential Total Person temporal profile, as provided in Table 1.

3.49 The Site lies just north of the VISSIM Model network, served by A44 Manor Road in Woodstock. In the VISSIM model this location is represented by Zone 33 and development trips are assigned to this zone.

3.50 The Figure below shows the location of Hill Rise Woodstock in the context of the VISSIM model.

Figure 10: Hill Rise Woodstock Site Location



[14] 21_00189_FUL-TRANSPORT_ASSESSMENT-921976, Table 9

3.51 Tables showing the in/out trip generation totals for Hill Rise Woodstock for each hour during the AM and PM peaks are provided below.

Table 16: AM In/Out Totals for Hill Rise, Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Hill Rise, Woodstock	10	27	18	41	18	14

Table 17: PM In/Out Totals for Hill Rise, Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Hill Rise, Woodstock	34	23	34	23	38	23

Banbury Road, Woodstock (Policy EW5) (21/00217/OUT)

3.52 Banbury Road is a committed development site located north of Banbury Road in Woodstock. The site proposes up to 250 dwellings and associated community space.

3.53 Similarly to Land East of Woodstock, the Site is served via two accesses; one via A44 Oxford Road and the other via Shipton Road and therefore two existing zones (zone 33 and 39) are assumed to be the development zones.

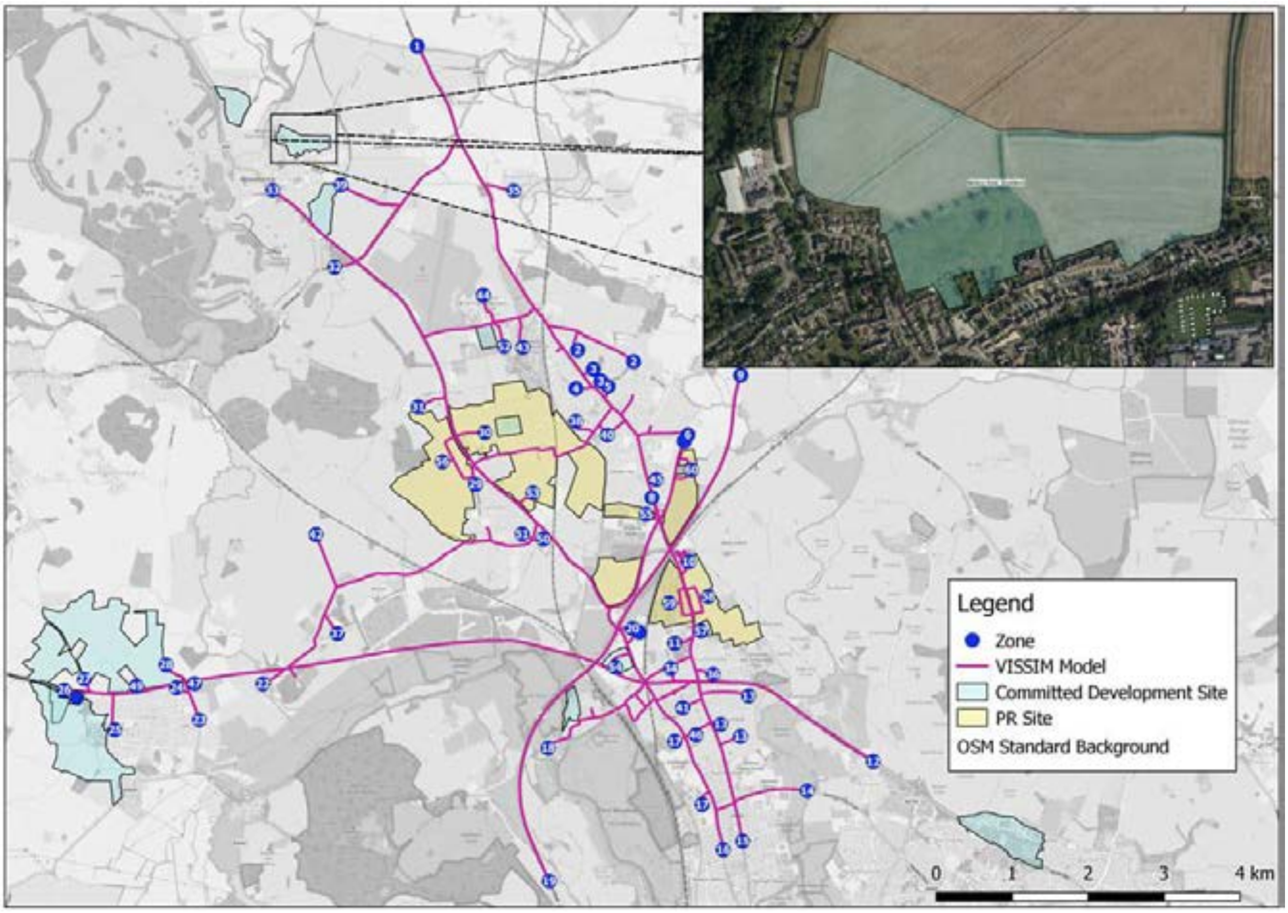
3.54 Trip generation for the peak hours is taken directly from the TA[15]. Trip generation for the shoulder hours is calculated from the TRICS Residential Total Person temporal profile, as provided in Table 1.

3.55 Local distribution is also taken from the TA[16]. Wider distribution beyond the local junctions is also defined within the TA[17], where percentages are assigned to links across Oxford and these locations are assigned a corresponding VISSIM zone.

[15] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Table 9
[16] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Appendix F
[17] 21_00217_OUT-TRANSPORT_ASSESSMENT-921845, Table 11

3.56 The Figure below provides the location of the Banbury Road site within the wider VISSIM model network.

Figure 11: Banbury Road Woodstock Site Location



3.57 Tables showing the in/out trip generation totals for Banbury Road-Woodstock for each hour during the AM and PM peaks are provided below.

Table 18: AM In/Out Totals for Banbury Road, Woodstock

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Banbury Road, Woodstock	20	53	37	82	32	39

Table 19: PM In/Out Totals for Banbury Road, Woodstock

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Banbury Road, Woodstock	68	46	68	45	74	47

Oxford North (CS6) (18/02065/OUTFUL)

3.58 Oxford North is a proposed mixed use development site located north-west of Wolvercote roundabout. Proposals include 87,300m² of B1 employment, up to 480 dwellings, a hotel and up to 2,500m² of local retail uses.

3.59 The site is served via an internal link that is connected at either end by two signalised junctions; one on the north side with A44 Woodstock Road and the other one on the south side with A40 Northern Bypass Road. This Site is partially included within the 2023 network that is used for the basis of this testing, but only Phase 1 of the development demands and site access arrangement/mitigation that accompany Phase 1 is applied. For the purposes of developing a 2031 model the full demands and network upgrades have been included, which includes enhancements at Peartree Roundabout and along the A44 corridor to Wolvercote Roundabout. The drawings used to upgrade the VISSIM modelling to the forecast 2031 position are provided in Appendix A.

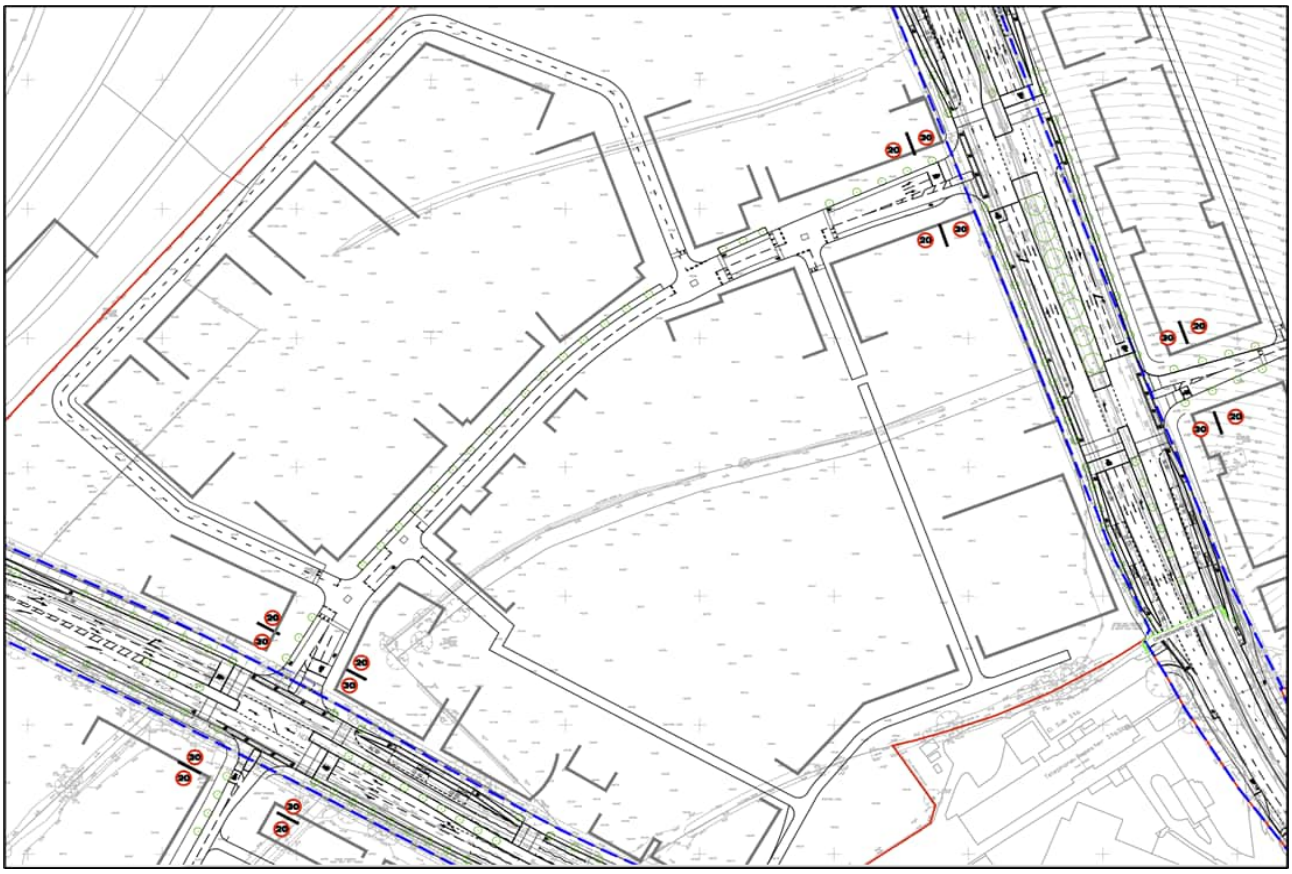
3.60 Regarding the demands, trip rates are taken directly from the TA[18]. These are then disaggregated into hourly rates and multiplied by the B1, Residential and Hotel land uses individually, before combining into hourly trip generation values. Distribution is informed by the existing distribution within the 2023 model.

3.61 Zone 107 in the 2023 model represents the Oxford North Site and this remains the development zone in the 2031 model; note however that zone numbers have been rationalised during the 2031 model build and therefore the zone number becomes Zone 54.

[18] 18_02065_OUTFUL-TRANSPORT_ASSESSMENT__PART_2__-_180731_TA_001-2020183, Table 4.2

3.62 The Figure showing the site access arrangements of Oxford North (CS6) is provided below.

Figure 12: Oxford North Site Access Arrangements

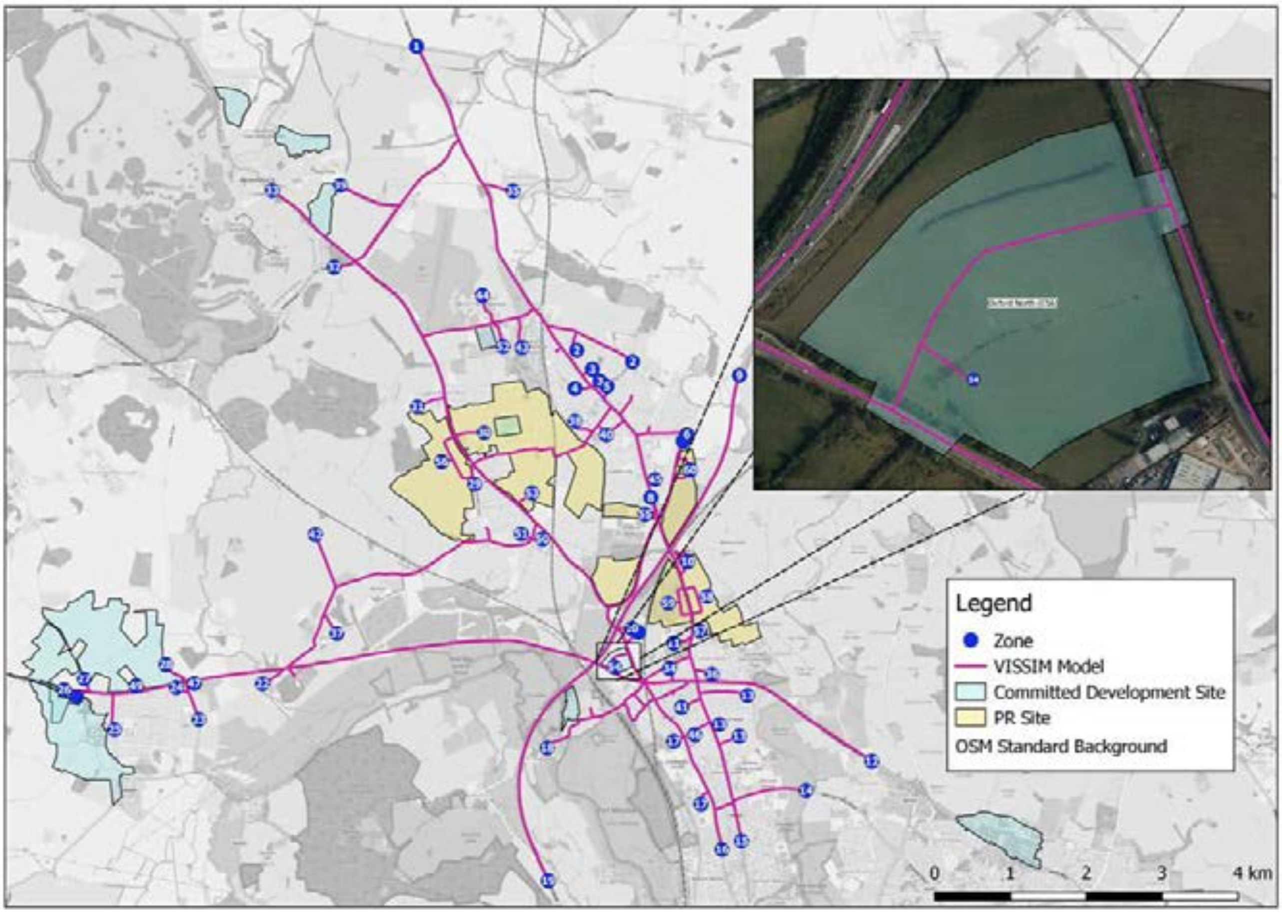


3.63 Although Oxford North includes proposals for land parcels on the eastern side of A44 and southern side of A40, all development demands for simplicity are assumed to travel via the plot of land served by the connector link above.

3.64 The signalised junctions on A44 and A40 corridor are however included, thereby mimicking the effects of demands travel to/from these land parcels.

3.66 A Figure showing the location of the Oxford North within the wider model network is provided below.

Figure 13: Oxford North Site Location



3.67 Tables showing the in/out trip generation totals for Oxford North for each hour during the AM and PM peaks are given below.

Table 20: AM In/Out Totals for Oxford North

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Oxford North	533	181	909	260	597	193

Table 21: PM In/Out Totals for Oxford North

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Oxford North	205	374	245	786	210	817

Land East of Park View (22/01715/OUT)

3.68 Land East of Park View is a committed development site located adjacent to the Park View development. The site includes proposals for up to 500 residential dwellings. The Site is served via an access onto A4095 Upper Campsfield Road which will link to the spine road provided by the adjacent Park View development. Land East of Park View development trips are assigned to zone 39.

3.69 A Figure showing the location of the Land East of Park View Woodstock within the context of the wider VISSIM model is provided below.

Figure 14: Land East of Park View Site Location

3.70 Tables showing the in/out trip generation totals for Oxford North for each hour during the AM and PM peaks are given below.

Table 22: AM In/Out Totals for Oxford North

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Land East of Park View	44	123	81	187	79	66

Table 23: PM In/Out Totals for Oxford North

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Land East of Park View	149	106	150	103	168	105

Begbroke Science Park (08/00803/OUT)

3.71 Begbroke Science Park is located approximately 5 miles north of Oxford City Centre and east of the A44. The site is connected to the A44 via a three-arm signalised junction with Begbroke Hill Road. The proposals are for an extension to the existing floorspace in the magnitude of an additional 12500sqm of B1 land use.

3.72 The Science Park is located within the boundaries of the PR8 Site but is included in the model via its own distinct zone. Specifically, existing zone 30 of the 2023 Reference Case model has been assigned as the Begbroke Science Park zone.

3.73 Trip generation for the peak hours are taken directly from the TA[19]. The TA only reports peak hour trip generation (08:00-09:00 and 17:00-18:00). Therefore, a TRICS B1b Total Person temporal profile is calculated to estimate the vehicle trips in the shoulder peaks. The TRICS rates used for this are as follows:

Table 24: B1b TRICS Rates

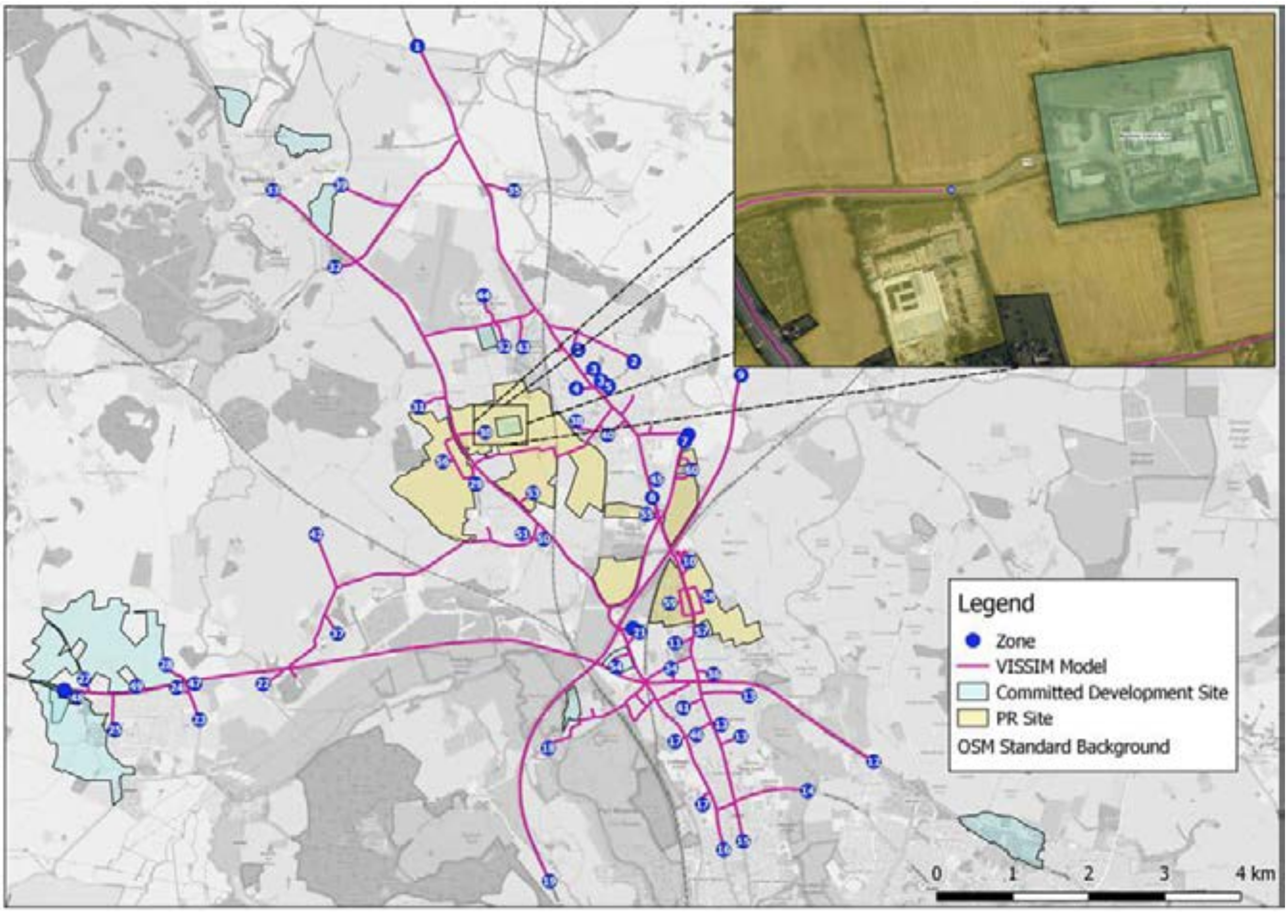
	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	1.028	0.12	1.148	57%	52%	56%
08:00-09:00	1.804	0.23	2.034	100%	100%	100%
09:00-10:00	0.779	0.199	0.978	43%	87%	48%
PM Peak Period						
15:00-16:00	0.176	0.551	0.727	114%	41%	48%
16:00-17:00	0.195	0.97	1.165	127%	72%	77%
17:00-18:00	0.154	1.35	1.504	100%	100%	100%

3.74 Trip distribution is informed by the existing distribution assigned to zone 30.

[19] Begbroke Science Park, Transport Assessment, May 2018, Figure 7 and Figure 8

3.75 A Figure showing the location of Begbroke Science Park in the context of the VISSIM model is provided below:

Figure 15: Begbroke Science Park Site Location



3.76 Tables showing the in/out trip generation totals for Begbroke Science Park for each hour during the AM and PM peaks are given below.

Table 25: AM In/Out Totals for Begbroke Science Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Begbroke Science Park	45	5	79	10	34	9

Table 26: PM In/Out Totals for Begbroke Science Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Begbroke Science Park	10	28	11	49	9	68

Oxford Technology Park

3.77 Oxford Technology Park is located 6 miles north of Oxford City Centre and just south of Oxford International Airport. The site lies adjacent to Technology Drive on the southern side of Langford Lane.

3.78 The proposals include 128,260sqft of B1a office, 47,960sqft of B1b research and development, and 237,050sqft of B8.

3.79 Development trips are assigned to existing zone 105 (which following rationalisation of the zone numbers through the 2031 model build becomes zone 52).

3.80 Trip generation for the peak hours are taken directly from the TA[20]. The TA reports Office TRICS rates for all required periods, but only reports peak hour trip rates (08:00-09:00 and 17:00-18:00) for B1b and B8 land uses. Therefore a TRICS B1b Total Person temporal profile is calculated as provided in Table 22 to estimate the B1b vehicle trips in the shoulder peaks, and a TRICS B8 Total Person temporal profile is calculated to estimate the B8 trips as per the table below:

Table 27: B8 TRICS Rates

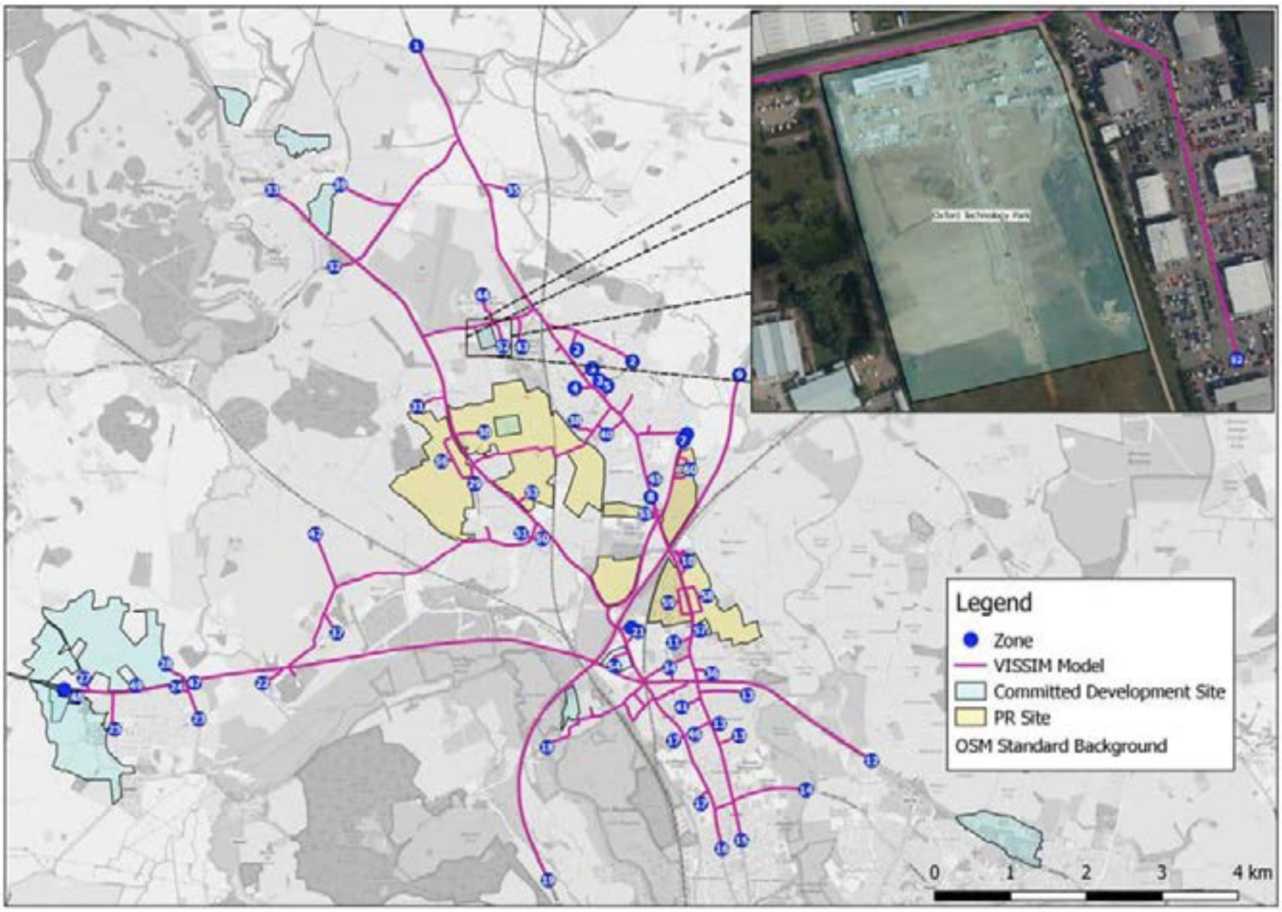
	Total Person Trip Rates			Proportions		
	In	Out	In	Out	In	Out
AM Peak Period						
07:00-08:00	0.18	0.094	0.274	118%	85%	104%
08:00-09:00	0.152	0.111	0.263	100%	100%	100%
09:00-10:00	0.116	0.077	0.193	76%	69%	73%
PM Peak Period						
15:00-16:00	0.097	0.115	0.212	103%	66%	79%
16:00-17:00	0.085	0.152	0.237	90%	87%	88%
17:00-18:00	0.094	0.175	0.269	100%	100%	100%

3.81 Trip distribution is informed by the existing distribution assigned to zone 44, which is the parcel of land on the northern side of Langford Lane. The reason this zone was chosen over the existing zone to which the development has been applied is that the land use on the northern land parcel shares more in common with the Technology Park proposals. Zone 44 represents airport support services and offices, whereas zone 52 represents a series of car dealerships.

[20] Oxford Technology Park Transport Assessment

3.82 A Figure showing the location of Oxford Technology Park in the context of the wider VISSIM network is provided below:

Figure 16: Oxford Technology Park Site Location



3.83 Tables showing the in/out trip generation totals for Oxford Technology Park for each hour during the AM and PM peaks are given below.

Table 28: AM In/Out Totals for Oxford Technology Park

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
Oxford Technology Park	154	35	283	40	188	48

Table 29: PM In/Out Totals for Oxford Technology Park

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
Oxford Technology Park	54	98	39	201	28	268

4 Model Updates || PR Sites

4.1 The specific purpose of this modelling exercise is to determine the capacity constraints on the network following inclusion of a series of PR sites around North Oxfordshire. These sites are:

i) PR6a (Land East of Oxford Road)

ii) PR6b (Land West of Oxford Road)

iii) PR7a (Land South East of Kidlington)

iv) PR8 (Land East of the A44)

v) PR9 (Land West of Yarnton)

4.2 VM continues to work alongside the consultants working on behalf of these sites to firstly use the VISSIM model tool to establish how the cumulative delivery of these sites impacts the network, and secondly to identify any mitigation strategies that may assist in allowing the network to accommodate the trips generated by the sites.

4.3 Each consultant has provided VM with a series of demand and distribution assumptions pertaining to their site, along with the access arrangements that are currently proposed to serve it.

4.4 This Chapter will discuss how the demand assumptions have been converted into matrices for entry into VISSIM, and the associated updates to the VISSIM model required for Site Access arrangements.

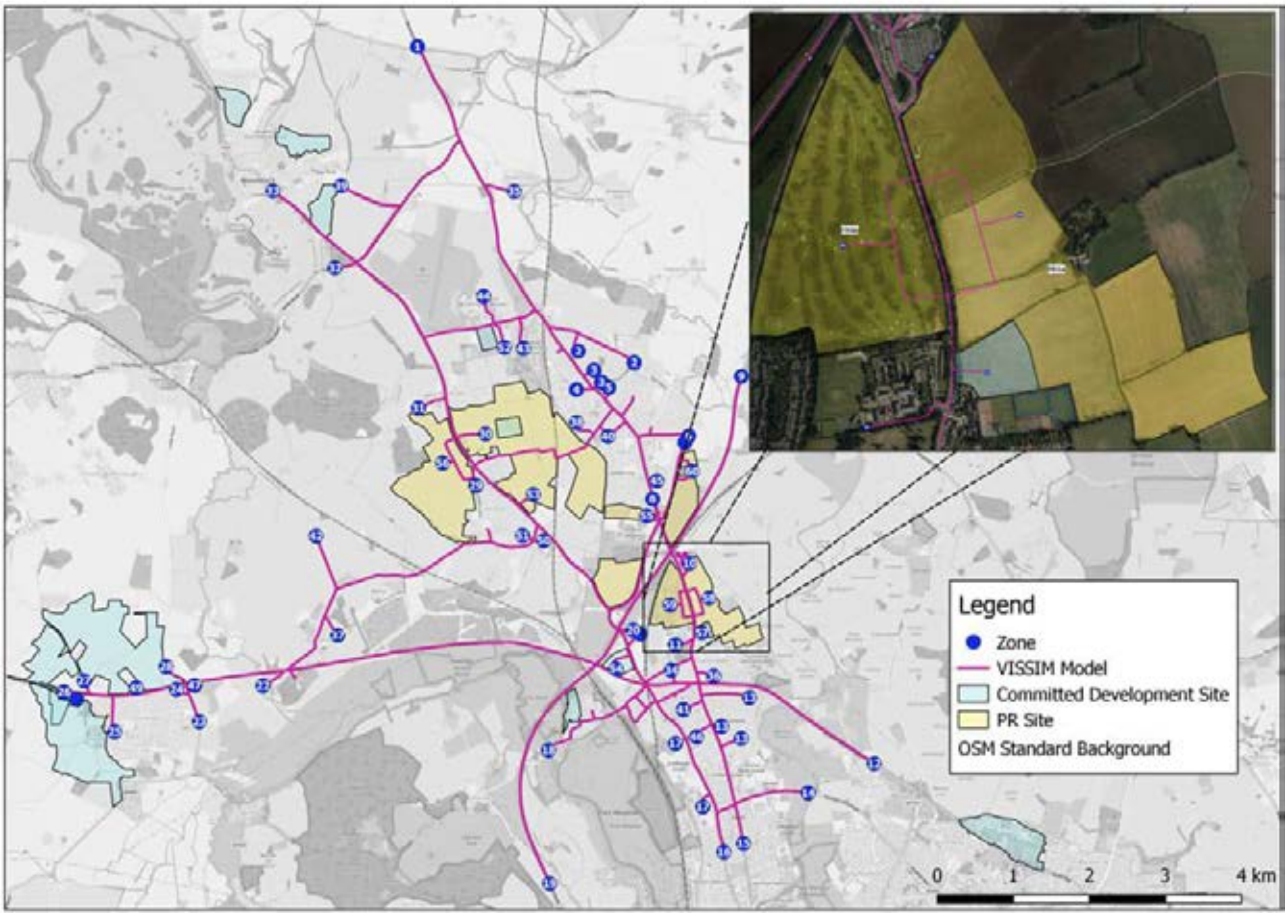
PR6a and PR6b (Land East and Land West of Oxford Road)

4.5 PR6a (Land East of Oxford Road) is a 48 hectare site located on the eastern side of A4165 Oxford Road. The site is proposed to allow for up to 820 dwellings along with associated infrastructure and supporting facilities. The transport consultant for the site is i-Transport.

4.6 PR6b (Lane West of Oxford Road) is a 32 hectare site located on the western side of A4165 Oxford Road. The site is proposed to allow for up to 670 dwellings along with associate infrastructure and supporting facilities. The transport consultant for the site is KMC Transport Planning.

4.7 The Figure below shows the location of the PR6a and PR6b sites in the context of the wider VISSIM model:

Figure 17: PR6a and PR6b Site Location



4.8 Together the respective consultants have compiled trip rates for their site. The trip rates are then converted to peak hour trip generation to apply to the VISSIM model hours, along with distribution assumptions to feed into the matrix development process.

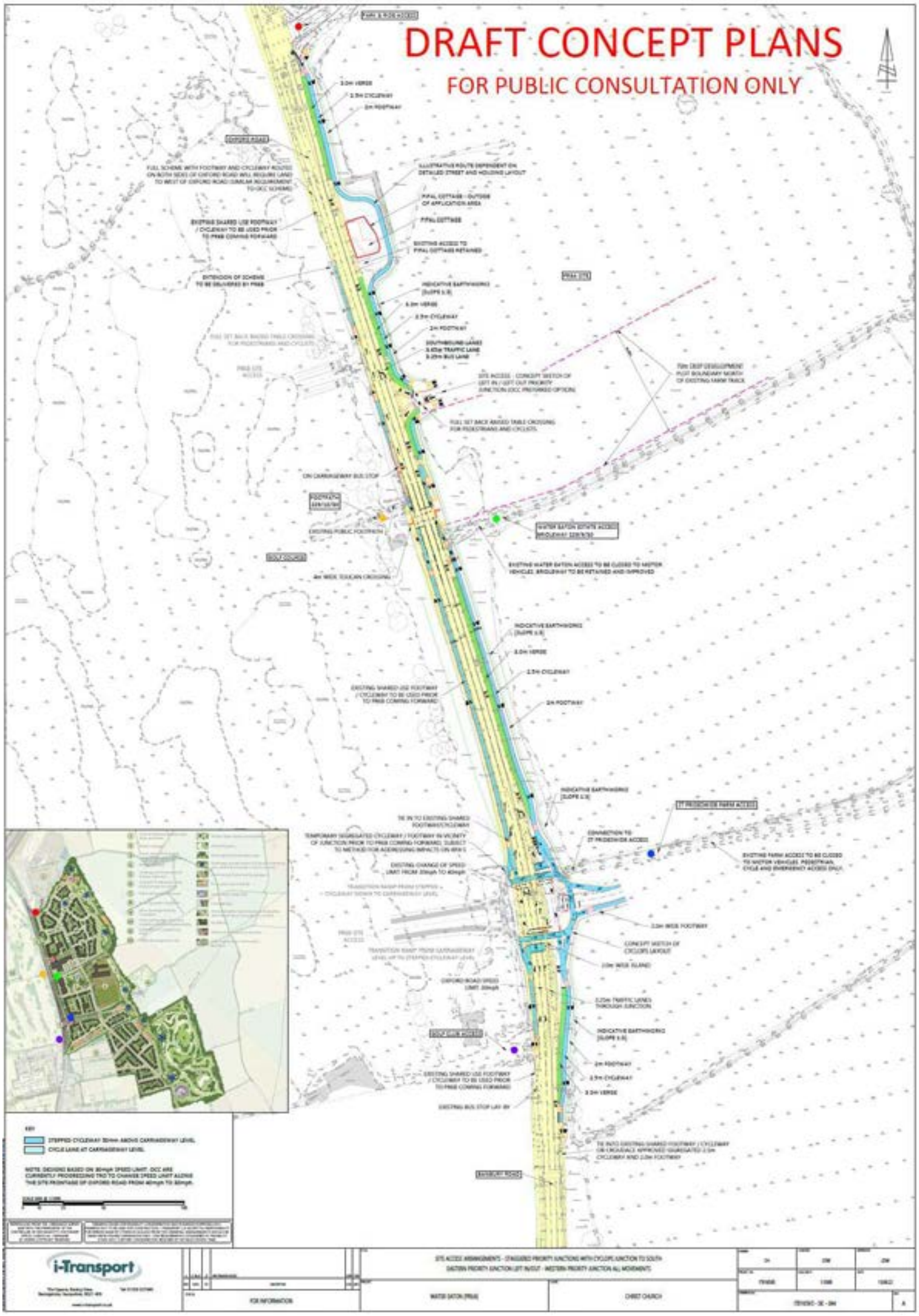
4.9 Both sites are served by two site access arrangements; one south and one north. Drawings of the site access arrangements have been provided by i-Transport. The southern accesses, located 70 meters north of the current Water Eaton Estate Road, comprises of a new four-arm signalised junction serving Oxford Road (north-south), access to PR6b (west) and access to PR6a (east).

4.10 The northern accesses are formed of two priority junctions, one serving each PR site on either side of carriageway. The eastern access for PR6a is a left-in-left-out arrangement while the western access for PR6b is all movements.

4.11 This has been represented in the VISSIM model by a single zone for each site; zone 58 for PR6a and zone 59 for PR6b respectively. Each of the site access points onto the A4165 are connected by an indicative internal connector road with the zone sitting off that connector.

4.12 The Figure below provides the site access arrangements for the PR6 sites.

Figure 18: PR6a and PR6b Access Arrangements



4.13 Tables showing the in/out trip generation totals for PR6a and PR6b Sites for each hour during the AM and PM peaks are provided below.

Table 30: AM In/Out Totals for PR6a Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR6a Site (Land East of Oxford Rd)	38	122	54	129	34	57

Table 31: PM In/Out Totals for PR6a Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR6a Site (Land East of Oxford Rd)	113	69	116	74	145	68

Table 32: AM In/Out Totals for PR6b Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR6b Site (Land West of Oxford Rd)	18	100	26	101	27	43

Table 33: PM In/Out Totals for PR6b Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR6b Site (Land West of Oxford Rd)	87	51	96	49	120	50

PR7a (Land South East of Kidlington)

4.14 PR7a (Land South East of Kidlington) is located South-east of the Kidlington Roundabout and includes proposals for approximately 430 dwellings. An illustrative masterplan document was used to inform the site access arrangements, which form two priority junctions located along Bicester Road.

4.15 For inclusion in VISSIM these accesses are connected by an internal connector road with a new zone assigned halfway along (Zone 60).

4.16 A Figure showing the location of the PR7a Site within the context of the wider VISSIM model is provided below:

Figure 19: PR7a Site Location

4.17 Trip generation for the PR7a site assumes the same trip rates as those used for PR6. Local Distribution is taken from the PR7b Transport Assessment (to be discussed in the following section). As PR7a and PR7b are located adjacent to each other, distributions are assumed to be the same.

4.18 Tables showing the in/out trip generation totals for PR7a Site for each hour during the AM and PM peaks are given below.

Table 34: AM In/Out Totals for PR7a Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR7a Site (Land SE of Kidlington)	12	66	18	69	19	29

Table 35: PM In/Out Totals for PR7a Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR7a Site (Land SE of Kidlington)	57	33	62	32	78	33

PR8 Site (Land East of the A44)

4.19 PR8 (Land East of the A44) is a 190 hectare site located to the east of A44. The site is proposed to allow for up to 1950 dwellings along with associate infrastructure and supporting facilities. The transport consultants for the site are KMC Transport Planning for the northern parcel and Glanville Consultants for the southern parcel.

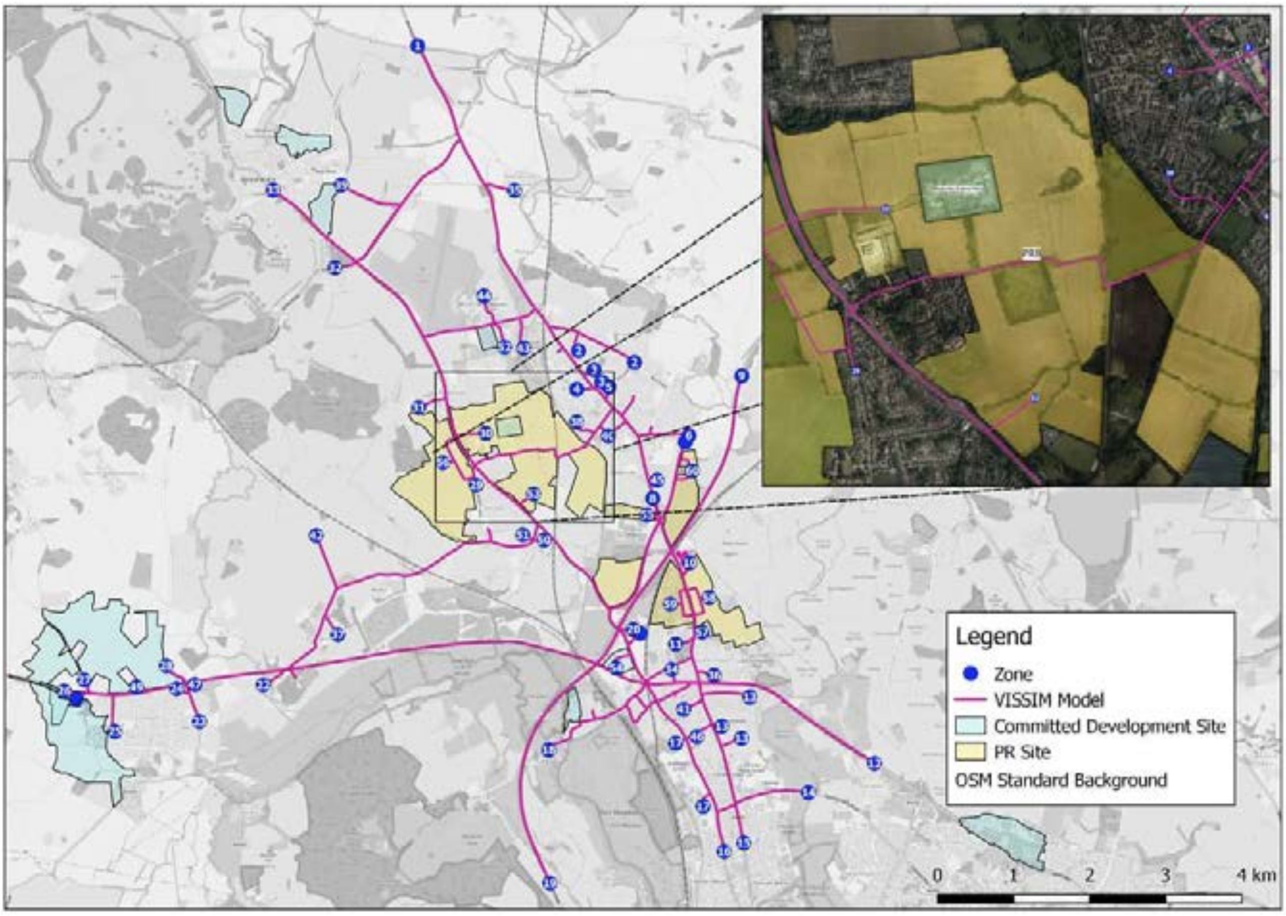
4.20 The northern site access is proposed to be accessed via the existing access to the Science Park (represented in the VISSIM model by zone 30).

4.21 Site access arrangement for the PR8 southern access has been provided by Glanville Consultants, which proposes a three-arm signalised junction serving the A44 (North-south) and access to the site. The signalised junction is located on the northern side of the A44 carriageway approximately 60 meters south of the Shell Petrol Filling Station.

4.22 The 2023 model already contained a zone for PR8 and therefore no additional zone has been provided; calculated demands for PR8 replace the assumptions for PR8 that were entered into the 2023 forecast model.

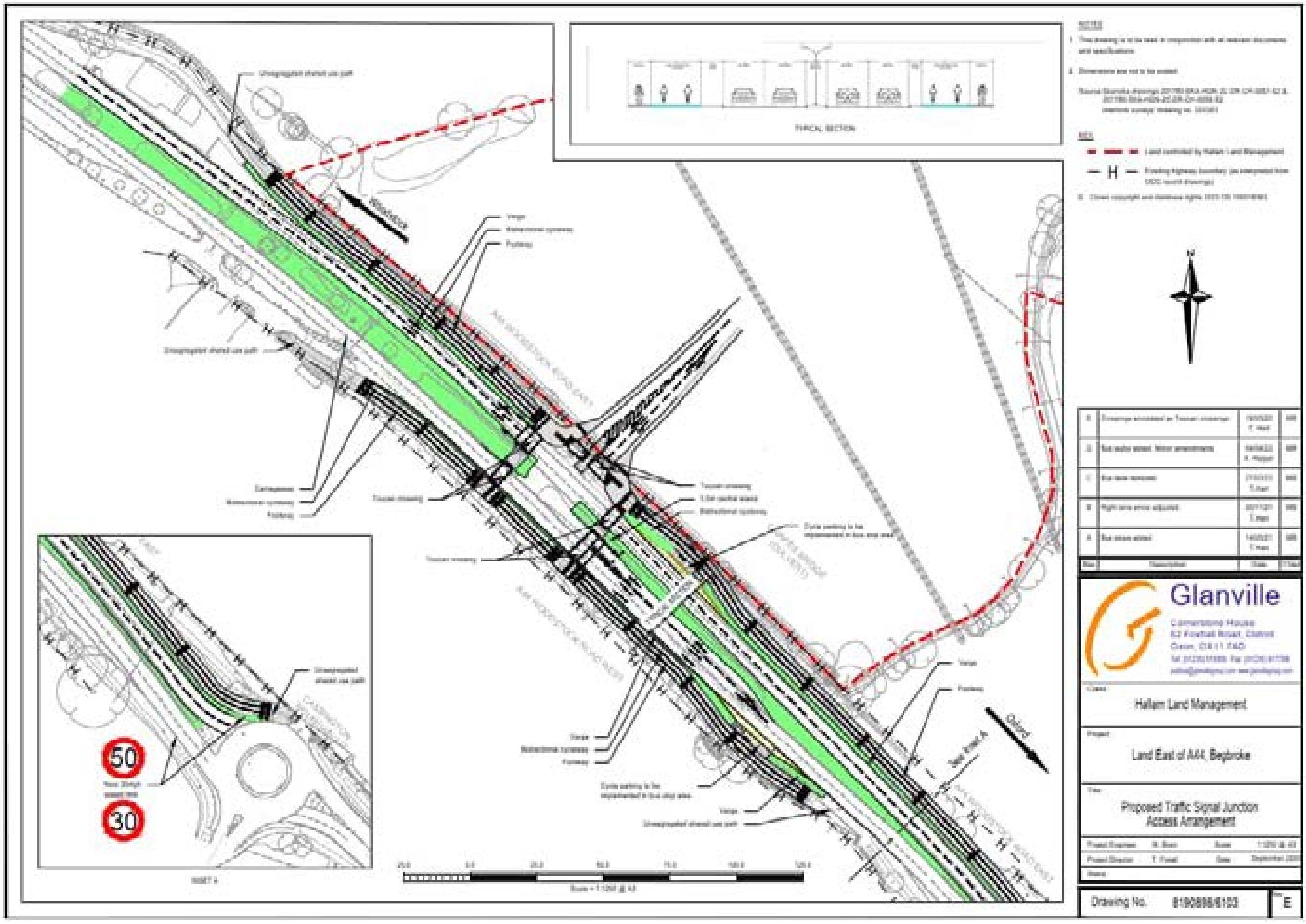
4.23 A Figure showing the location of the PR8 Site within the context of the wider VISSIM model is provided below:

Figure 20: PR8 Site Location



4.24 A Figure showing the southern site access arrangement for PR8 is provided below.

Figure 21: PR8 Southern Site Access Arrangement



4.25 The proposals above are for the purposes of the VISSIM modelling only and do not represent a commitment to deliver all works shown. PR8 is aware of OCC aspirations to include a bus lane along the A44 southbound between the Rutten Lane roundabout and Cassington Roundabout and the above access therefore ties in with those plans.

4.26 PR8 Site trip generation and distribution assumptions were provided by KMC Transport Planning, and these were converted into a demand matrix by apportioning MSOA areas to the nearest VISSIM zones.

4.27 Tables showing the in/out trip generation totals for PR8 Site for each hour during the AM and PM peaks are provided below.

Table 36: AM In/Out Totals for PR8 Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR8 Site (Land East of the A44)	771	282	735	269	644	236

Table 37: PM In/Out Totals for PR8 Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR8 Site (Land East of the A44)	295	603	309	632	288	589

PR9 Site (Land West of Yarnton)

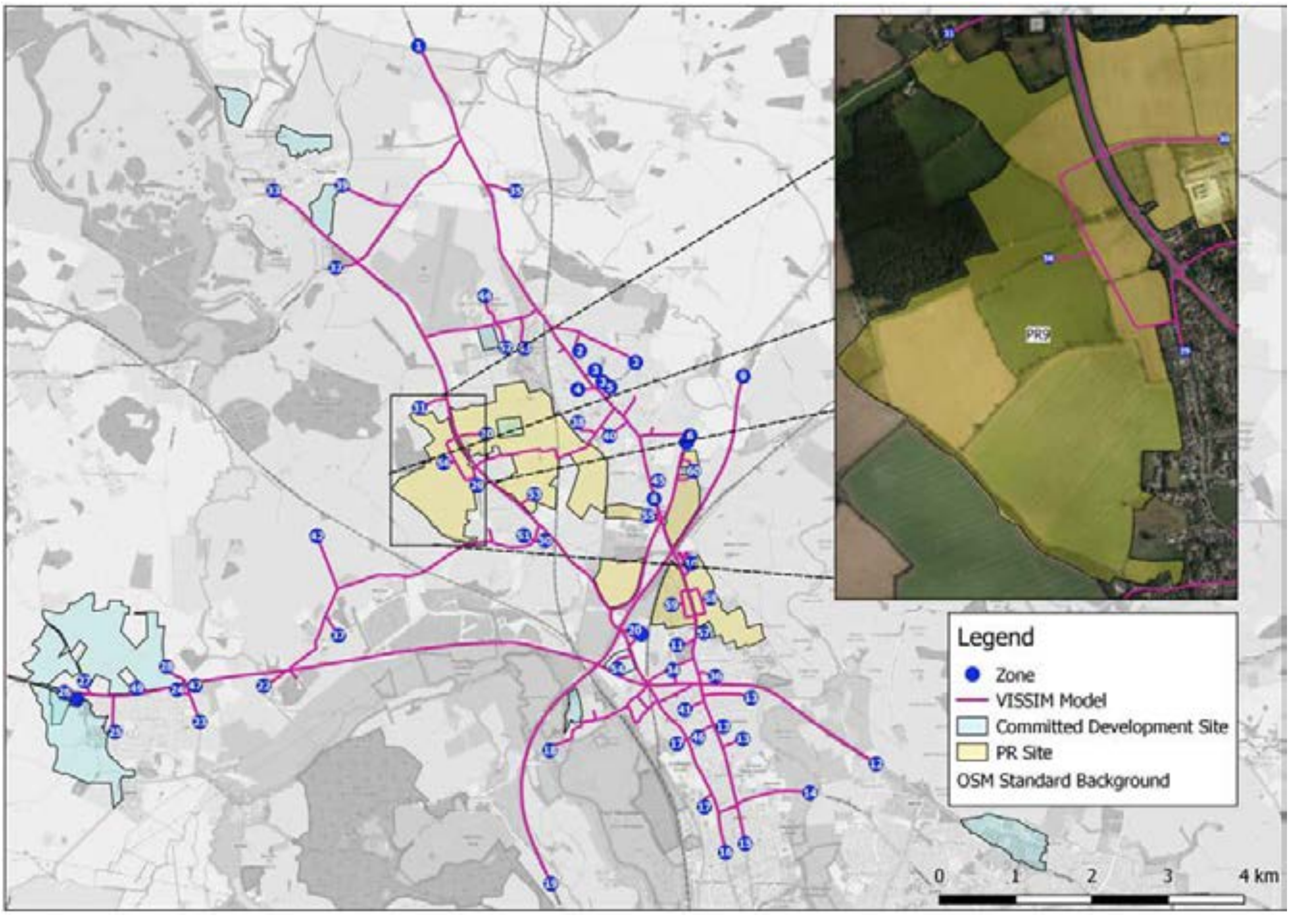
4.28 PR9 (Land West of Yarnton) is a 99 hectare site located to the east of A44. The site is proposed to allow for up to 540 dwellings along with associate infrastructure and supporting facilities. The transport consultant for the site is Vectos.

4.29 Site access arrangement for the PR9 Site have been provided by Vectos, which proposes two access points onto A44. The Northern access involves the addition of a fourth arm onto the existing 3-arm signalised junction serving A44 and Begbroke Hill to allow access into PR8 on the southern side of the carriageway. The Southern access is located off Rutten Lane, adjacent to Yarnton Medical Practice.

4.30 An indicative internal connector link has been included to connect the two access points with a new zone (zone 56) positioned halfway along to represent the development site.

4.31 A Figure showing the location of the PR9 Site along within the context of the wider VISSIM model is provided below:

Figure 22: PR9 Site Location



4.32 Figures showing the site access arrangements for the PR9 Site are provided below.

Figure 23: PR9 Site Access Arrangement (North)

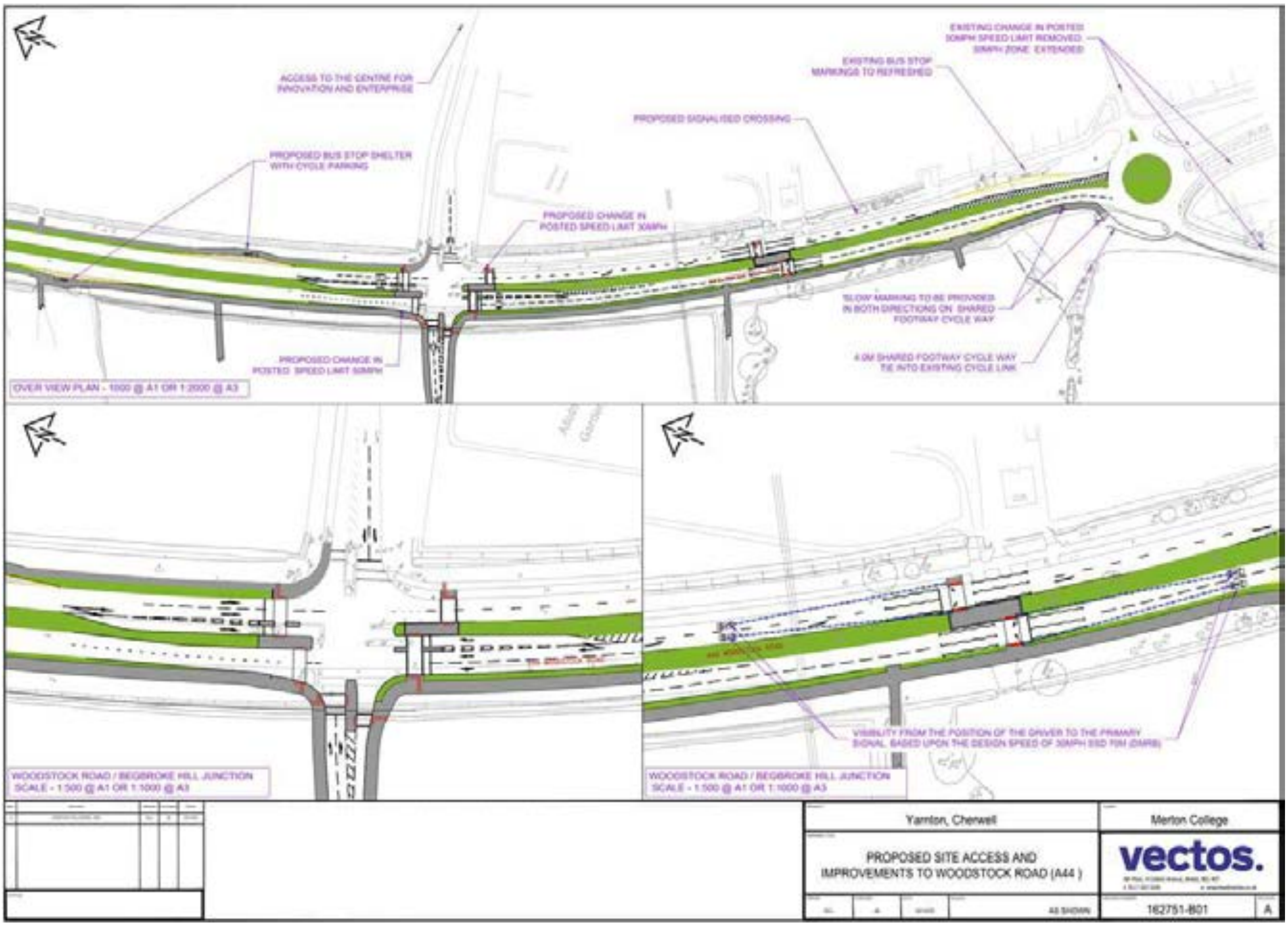
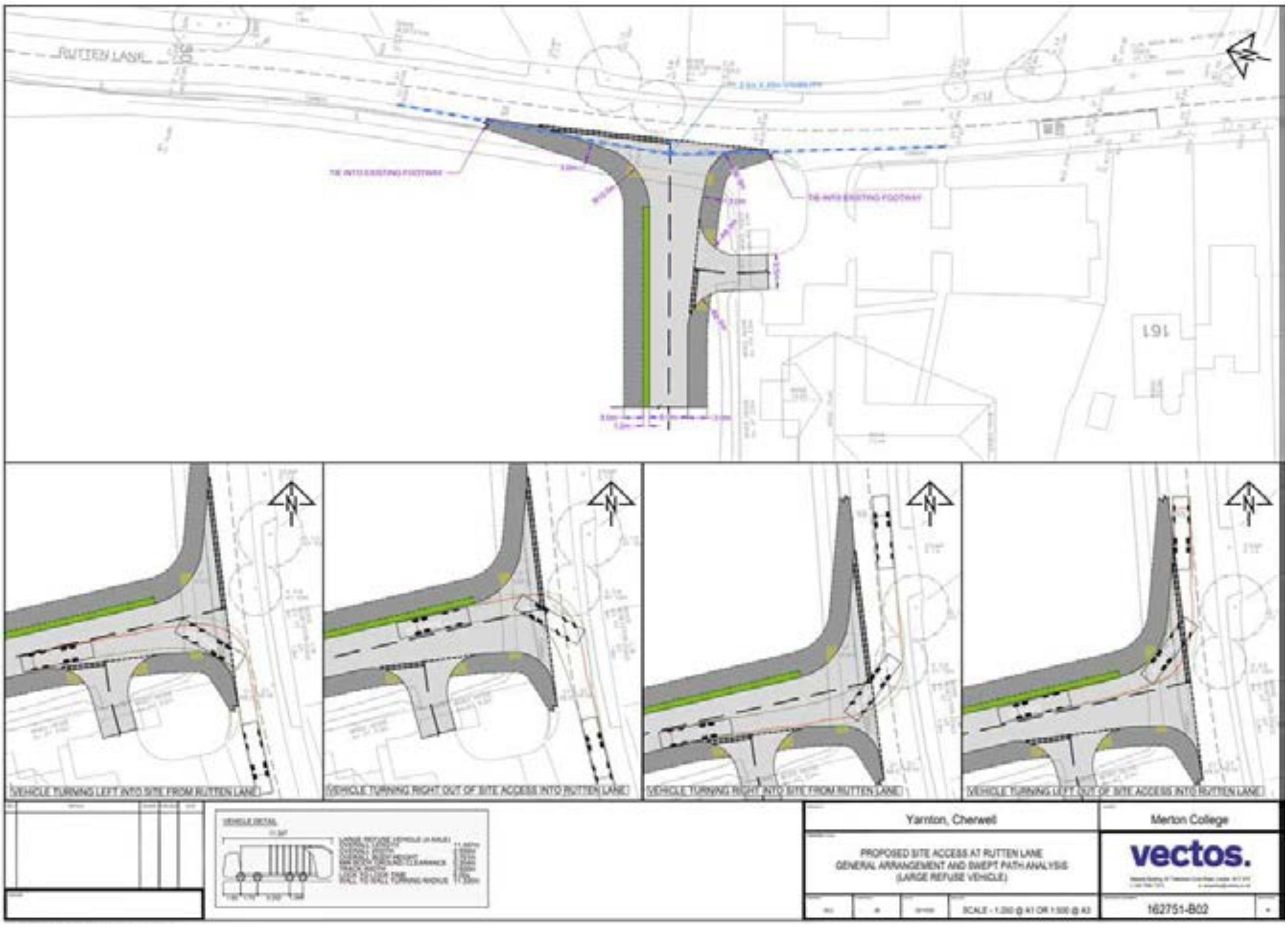


Figure 24: PR9 Site Access Arrangement (South)



4.33 Trip generation and localised distribution data for the site was provided by Vectos. In/out totals were provided and applied to two-way MSOA distribution assumptions which were in turn assigned to appropriate VISSIM zones to inform the matrix development process.

4.34 Tables showing the in/out trip generation totals for PR9 Site for each hour during the AM and PM peaks are provided below.

Table 38: AM In/Out Totals for PR9 Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR9 Site (Land West of Yarnton)	26	89	28	84	42	49

Table 39: PM In/Out Totals for PR9 Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR9 Site (Land West of Yarnton)	59	42	87	52	105	51

Other PR Sites

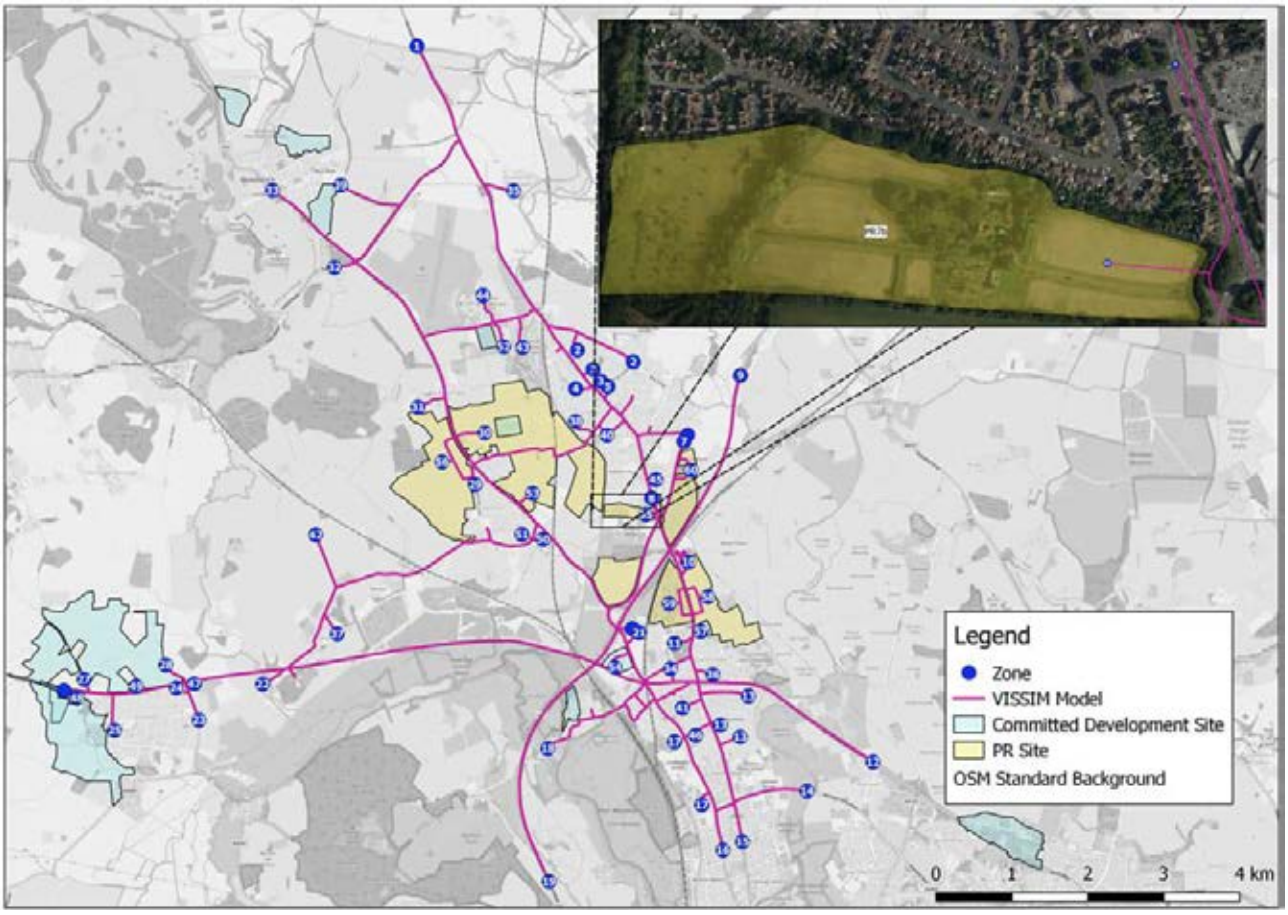
PR7b (Land at Stratfield Farm)

4.35 PR7b (Land at Stratfield Farm) is located off Oxford Road and includes proposals for approximately 120 dwellings and a care home. The site access arrangement involves a priority junction off Oxford Road just north of Kidlington Roundabout. A new zone (Zone 55) has been included to represent PR7b.

4.36 Trip generation for the PR7a site assumes the same trip rates as those used for PR6. Distribution has been taken from the Transport Assessment[21], produced by MAC Ltd in February 2019.

4.37 A Figure showing the location of the PR7b Site within the context of the wider VISSIM model is provided below:

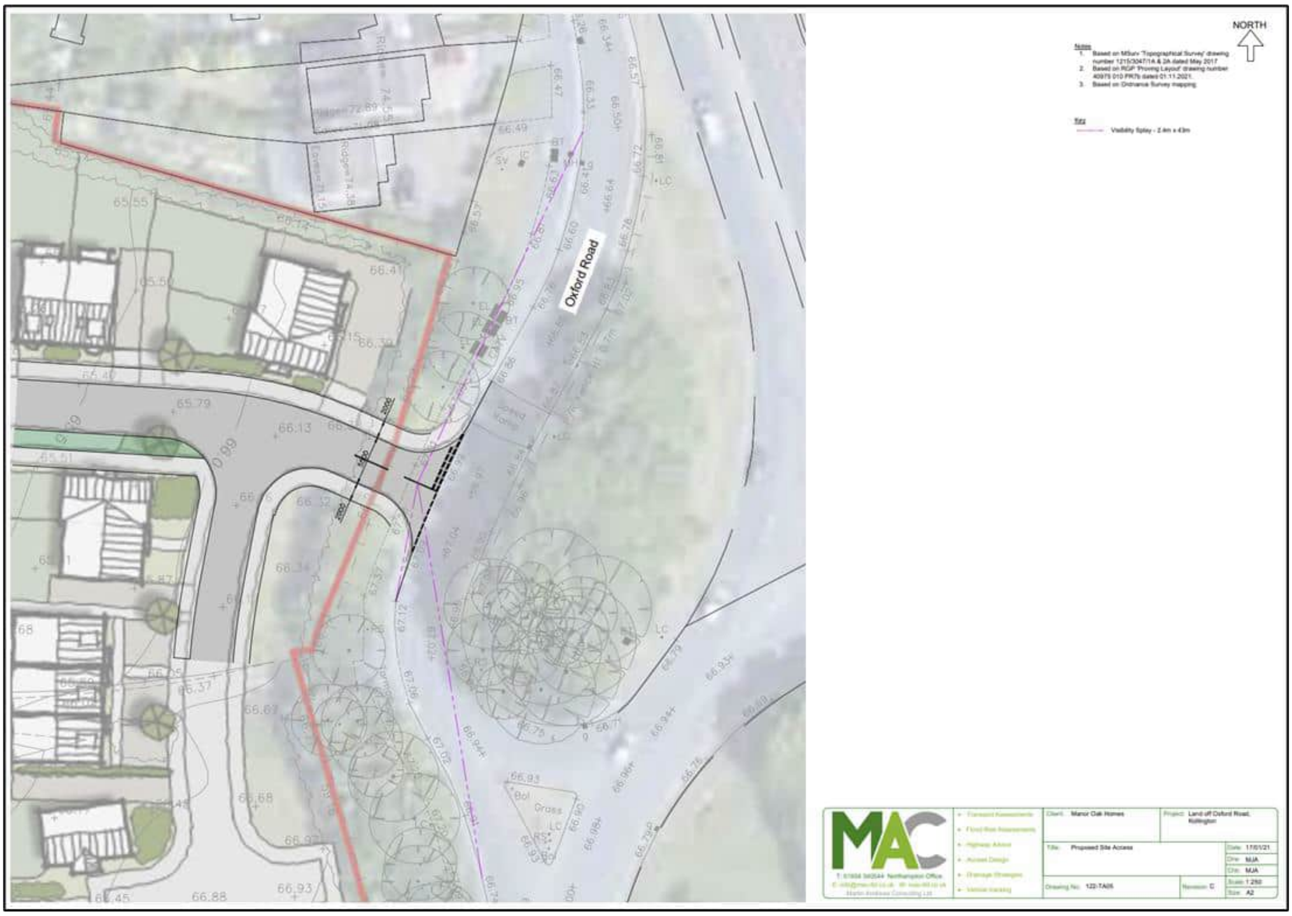
Figure 25: PR7b Site Location



[21] Proposed Residential Development, Land off Oxford Road, Report Reference 122-TS-01-B, Appendix L

4.38 Images showing site access arrangement of PR7b Site is given below.

Figure 26: PR7b Site Access Arrangement



4.39 Tables showing the in/out trip generation totals for PR7b Site for each hour during the AM and PM peaks are given below.

Table 40: AM In/Out Totals for PR7b Site

	07:00-08:00		08:00-09:00		09:00-10:00	
	In	Out	In	Out	In	Out
PR7b Site (Land at Stratfield Farm)	6	21	9	24	13	18

Table 41: PM In/Out Totals for PR7b Site

	15:00-16:00		16:00-17:00		17:00-18:00	
	In	Out	In	Out	In	Out
PR7b Site (Land at Stratfield Farm)	24	16	28	17	28	17

5 VISSIM Demand Summary

5.1 The Table below presents a summary of the peak hour input demands for the 2031 model.

Table 42: 2031 VISSIM Model Demand Summary

Description	AM			PM		
	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	15:00 – 16:00	16:00 – 17:00	17:00 – 18:00
Eynsham Garden Village	307	520	373	572	564	597
West Eynsham (SDA)	71	114	63	139	138	150
West Thornbury Rd	0	0	0	0	0	0
Eynsham Nursery	8	13	7	16	15	17
Land East of Woodstock	89	130	88	98	121	145
Barton Park	28	46	27	72	71	77
Wolvercote Papermill Site	52	75	42	52	52	65
St. Frideswide Farm	41	65	32	50	50	54
Hill Rise, Woodstock	37	59	32	57	56	61
Banbury Road, Woodstock	73	119	71	114	113	121
Oxford North (CS6)	714	1169	790	579	1031	1028
Land East of Park View	167	268	145	255	253	273
Begbroke Science Park	50	89	43	38	60	77
Oxford Technology Park	189	323	236	152	240	296
PR6a	160	183	91	182	190	213
PR6b	119	126	70	138	145	170
PR7a	78	87	48	90	94	110
PR7b	27	33	31	40	45	45
PR8	1054	1004	880	898	940	877
PR9	114	112	91	101	139	156
Committed Development Total	**1826**	**2990**	**1949**	**2191**	**2765**	**2960**
PR Site Total	**1552**	**1545**	**1211**	**1449**	**1553**	**1571**

Assigned Zones

5.2 Most of the proposed Committed Developments and PR Sites are located in areas which do not correspond to any of the existing zones of the base 2023 model. Therefore, new zones have been considered. Table below presents a summary of zones that have been assigned to each of the committed developments and PR Sites.

Table 43: 2031 Com Dev and PR Site Zone Assignment

Zone (1/2)	Site	Zone (2/2)	Site
12	Barton Park	39	Land East of Woodstock
14	Barton Park	39	Banbury Road, Woodstock
18	Wolvercote Papermill Site	52	Oxford Technology Park
26	Eynsham Garden Village	53	PR8 – Land East of the A44
26	West Eynsham (SDA)	54	Oxford North (CS6)
26	West Thornbury Rd Eynsham	55	PR7b – Land at Stratfield Farm
26	Eynsham Nursery and Plant Centre	56	PR9 – Land West of Yarnton
30	Begbroke Science Park	57	St. Frideswide Farm (SP24)
33	Land East of Woodstock	58	PR6a – Land East of Oxford Road
33	Hill Rise, Woodstock	59	PR6b – Land West of Oxford Road
33	Banbury Road, Woodstock	60	PR7a – Land Southeast of Kidlington Road
39	Land East of Park View		

6 Summary & Conclusion

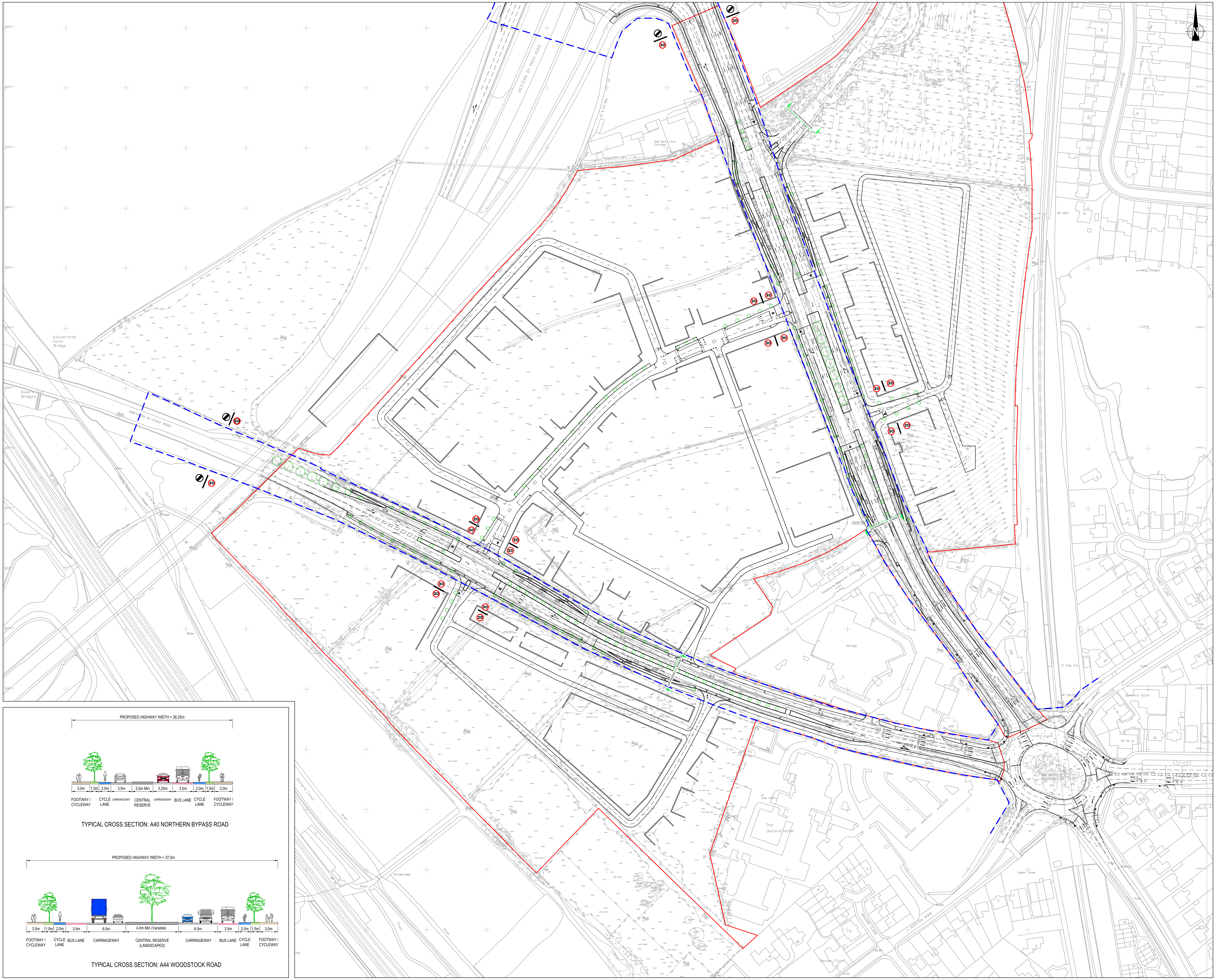
6.1 Vectos Microsim (VM) has been commissioned by a multi-consultancy group working on behalf of a number of Partial Review (PR) Sites that are allocated within the Cherwell District Council Local Plan.

6.2 VM is providing VISSIM microsimulation modelling support to all sites with a view to assisting in developing a suitable mitigation strategy for all Sites to come forward within the Local Plan period, working together with the Local Authority to agree an approach for the delivery of any infrastructure requirements and how these may be phased and financed.

6.3 This Note sets out the forecasting methodology adopted to include all committed developments, as well as the demands totals and site access arrangements assumed for the PR Sites.

Appendix A

Oxford North Scheme Drawings



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B	HIGHWAY UPDATES	08.09.16	JC	JH	JH
A	REVISED RED LINE BOUNDARY	18.08.16	AL	JH	JH

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PRELIMINARY CONCEPT LAYOUT

NORTHERN GATEWAY, OXFORD
A40 NORTHERN BYPASS ROAD CORRIDOR
PROPOSED HIGHWAY LAYOUT

DRAFT

Client
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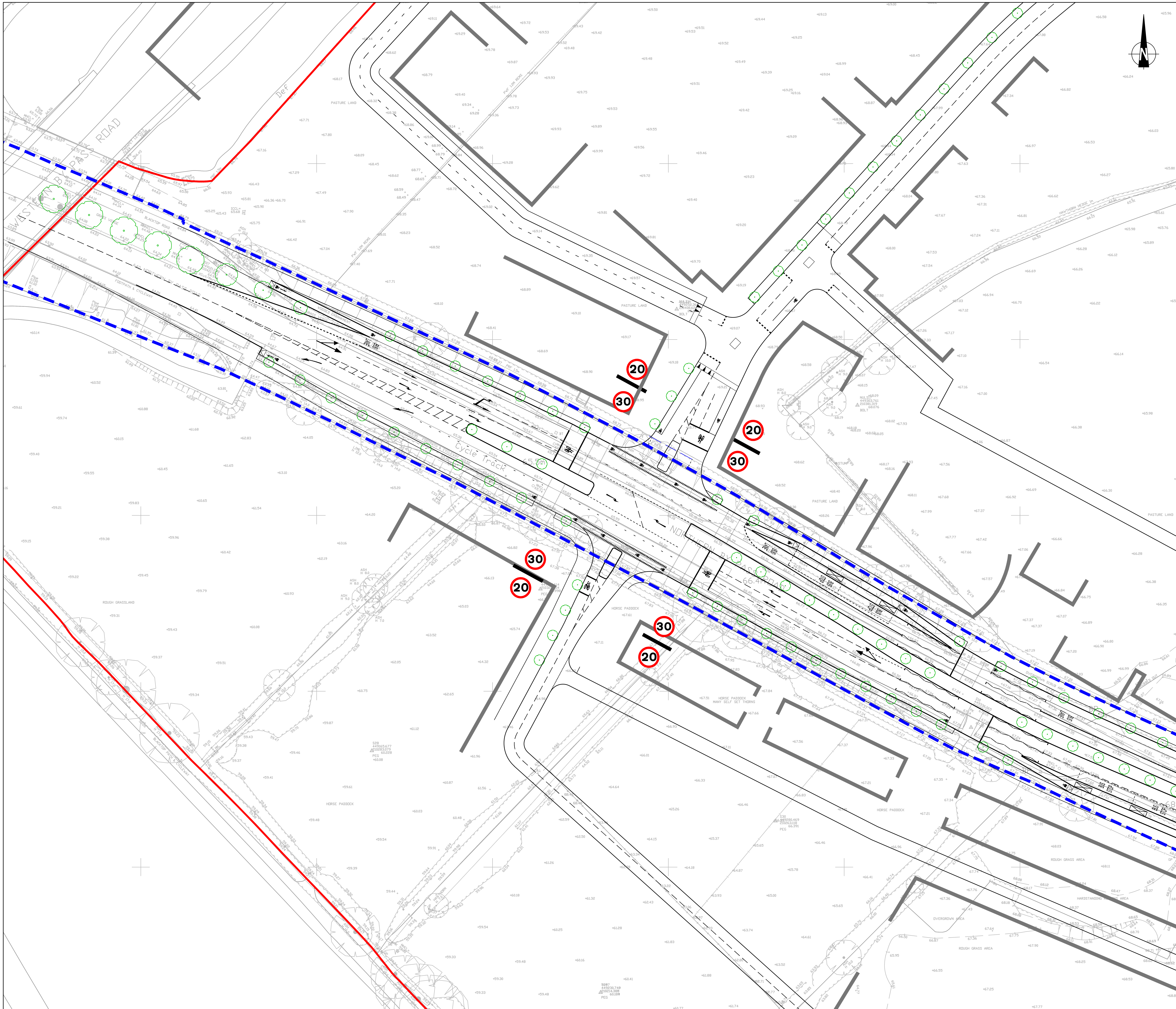

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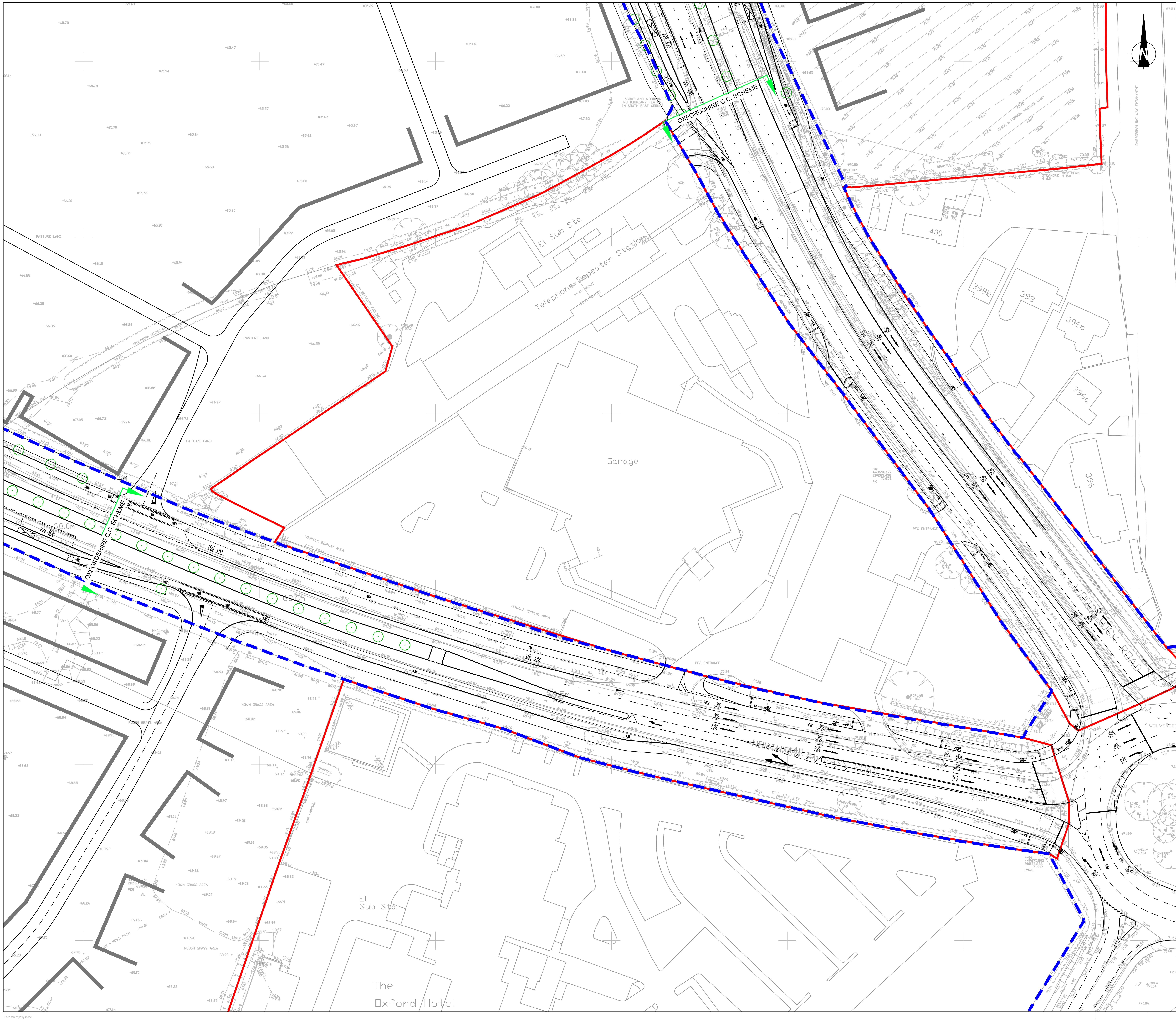

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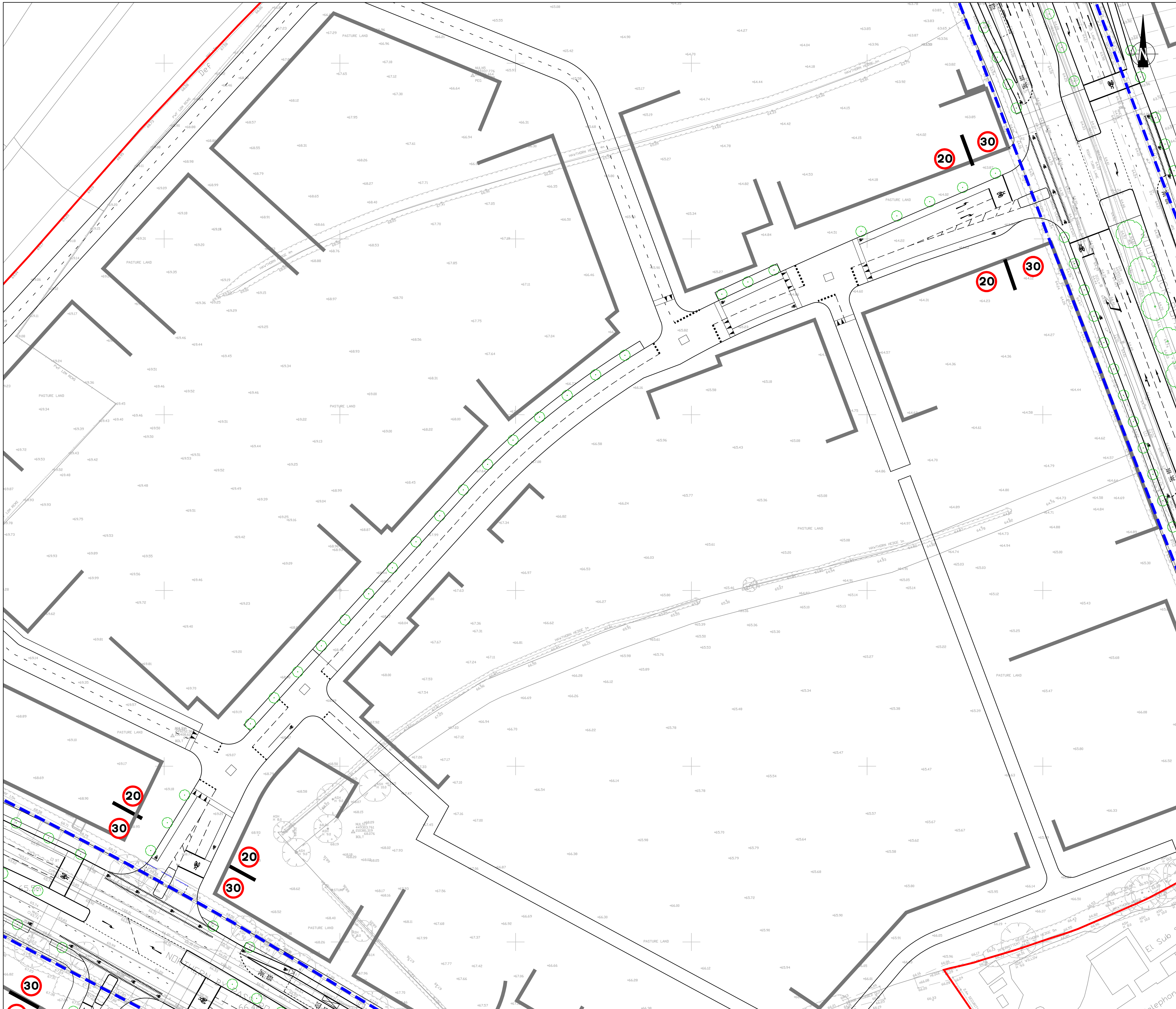

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NORTHERN GATEWAY, OXFORD
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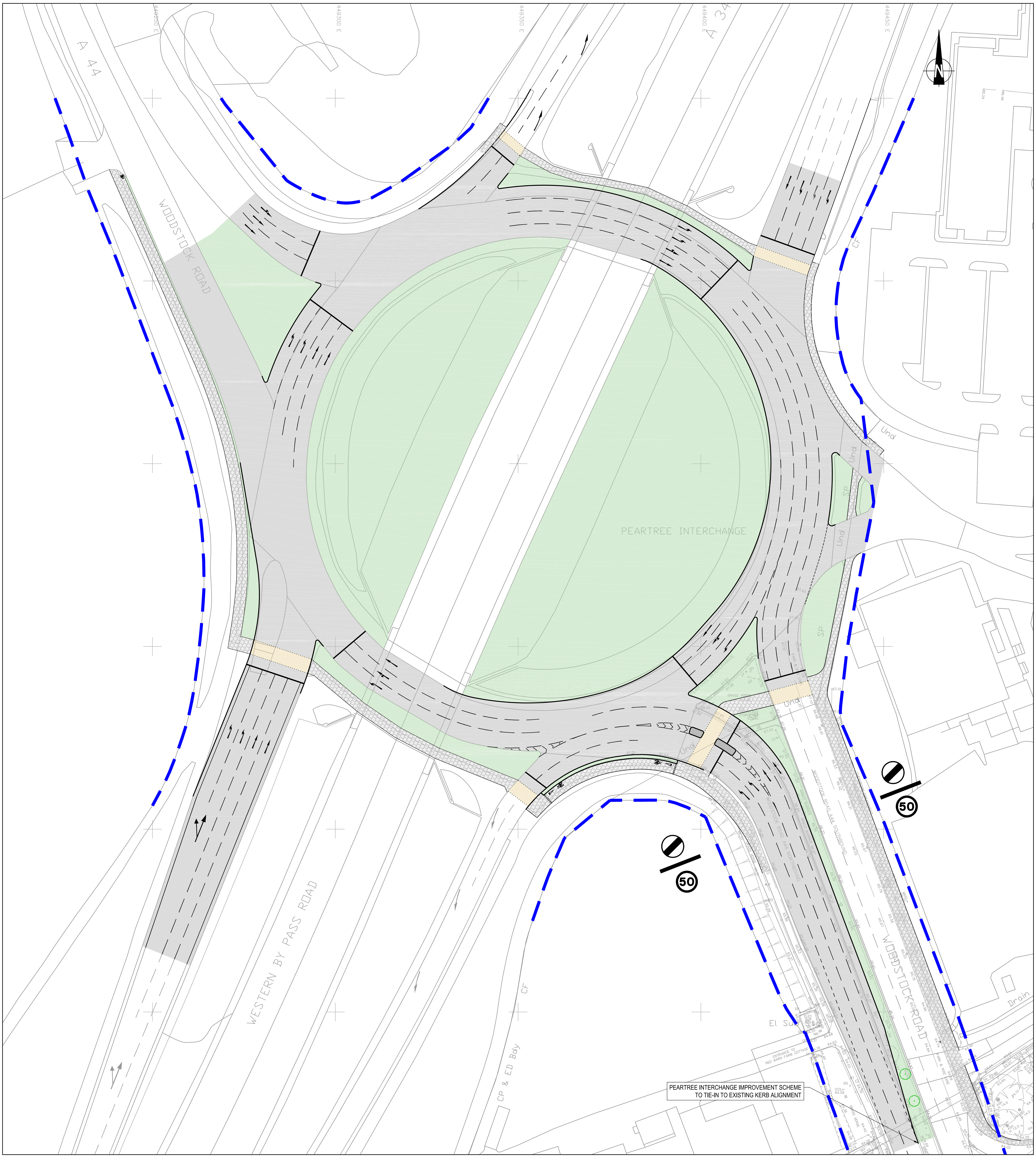

NOTES:

1. The layout is subject to Oxfordshire County Council approval, detailed design, ground investigations results & earthworks modelling, and utilities & services.
2. The detailed design layout will be designed in accordance with all relevant design guidance and standards.
3. This drawing should be read in conjunction with all relevant associated documents.
4. The use of the drawing does not absolve the client from their responsibilities in regards to health & safety and CDM regulations.

Peartree Interchange

- Peartree Interchange is a major junction on the A34 strategic Road Network providing access to North Oxford via the A44 link road.
- The existing interchange is a grade separated roundabout arrangement with the A34 passing over the junction. Northbound and southbound slip roads connect to the A44 Woodstock Road providing routes into central Oxford. There is currently no signal control operation at this junction
- The A34 and A44 are currently dual carriageway routes with a derestricted national speed limit of 70mph.

DESIGN SPECIFICATION

Scheme Design

The proposed design speed for the relevant sections of highway is shown on the drawings.

The layout of the Peartree Interchange, A44 and A40 corridor schemes and the corresponding design speed have been designed in accordance with DMRB - TD 50/04 - The Geometric Layout of Signal Controlled Junctions and Signalised Roundabouts, DMRB-TD 9/93 - Highway Link Design and TD 27/05 - Cross-sections and Headroom.

Pedestrian and Cycle facilities have been designed in accordance with DfT guidance standards and Local Transport Notes.

The site link road and on-site highways are all subject to a speed restriction of 20mph and will be designed in accordance with Manual for Streets.

A series of drawings have been produced to detail the design elements of the scheme and should be read in conjunction with this drawing:

28618/5510/SK(TBC) - Conformity of the design to DMRB standards requirements.

28618/5510/SK(TBC) - Vehicle swept path analysis.

Road Restraint Systems

An assessment of the need for road restraint systems for the highways will be undertaken in accordance with TD19/06 at a more detailed design stage.

Road Lighting

Road lighting currently exits on the local highway network. The construction of the proposed schemes and junctions will introduce additional "conflict areas" and will therefore be upgraded to a higher lighting specification. The highways will need to be lit in accordance to TD 34/07 - Design of Road Lighting for the Strategic Motorway and All Purpose Trunk Road Network.

The road lighting levels will be determined by following BS EN: 13201-2015 Road lighting: performance requirements and will be covered in a separate note to this drawing.

Traffic Signs

The design and position of the road signs and markings have not been undertaken at this stage, but will be designed as part of the detailed design process. Indicative road markings have been shown on the plans to identify lane usage and carriageway widths. Signage will be kept to an absolute minimum on the corridors and junction.

The signs will primarily consist of:

1) Advanced directional signs on the approaches to the junctions.
2) Speed and warning signs on the approach to junctions
3) Bus, cycle and pedestrian signs as necessary.

The use of passively safe columns and sign posts to BS EN 12767:2007 will be specified at the detailed design stage.

Pavement Construction

The proposed junction is to be of flexible pavement construction designed in accordance with DMRB Volume 7, section 2 - Pavement Design and Construction. As current pavement designs are based on performance specification, it is proposed that a range of suitable pavement designs will be produced based on asphalt and HBM base options, as per HD 26/06.

Highway Drainage

The existing carriageways are drained via a traditional kerb and gully systems. The proposed drainage for the highway schemes will be designed in accordance with DMRB Volume 2 Section 2 - Drainage and will be covered in a separate note to this drawing.

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NORTHERN GATEWAY, OXFORD
HIGHWAY INFRASTRUCTURE PROPOSALS
PHASE 2
PEARTREE INTERCHANGE PROPOSALS

Client: TWO THOMAS WHITE OXFORD

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Annex C

Oxford PR Sites VISSIM Assessment
Forecast Capping Discussion Note

VM210467.DN02b
May 2023

Introduction

1. Vectos Microsim (VM) is assisting in the assessment of the impacts of delivering the allocated sites to the North of Oxford city, on the transport network, using the Oxford North VISSIM model.

2. The work is being undertaken on behalf of multiple site promotors and is assessing the effects of the allocated sites references PR6(a&b), PR7(a&b), PR8 and PR9.

3. The cumulative effect of delivering these sites is being considered alongside a series of key consented developments which have been identified for inclusion within the assessment through a separate scoping exercise conducted with Oxfordshire County Council (OCC).

4. The primary objective of this study is to identify the effects on network operation arising from traffic forecasts associated with the allocated and consented developments, inclusive of any consented infrastructure proposals. This will then be used to determine the appropriate extent and location of mitigation and/or sustainable transport measures that will need to be achieved to enable the allocation strategy to be delivered in a sustainable manner which is acceptable to OCC.

5. The VISSIM microsimulation model network extent, as well as the key development locations, is illustrated within **Figure 1** overleaf.

Purpose of this Note

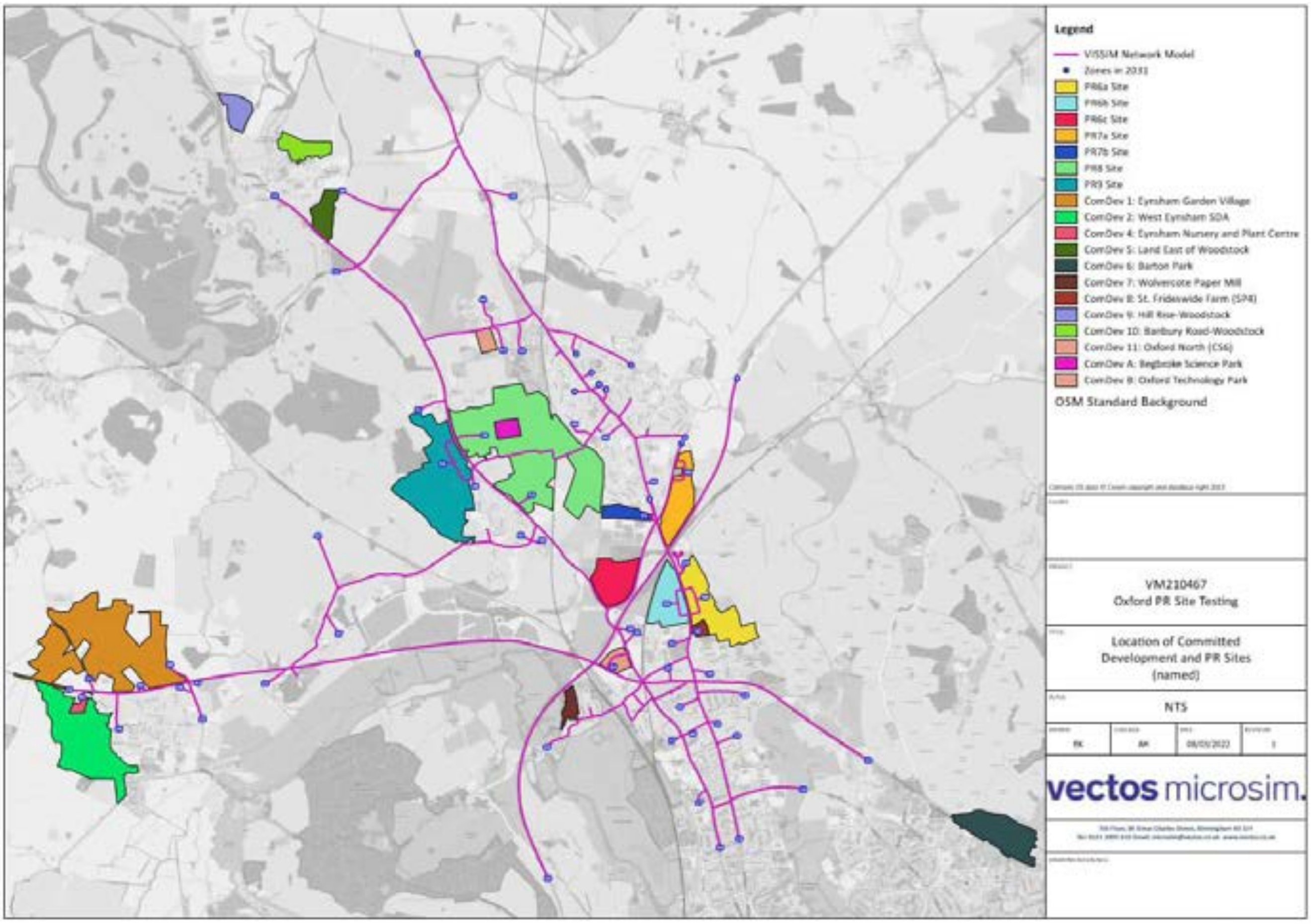
6. The purpose of this Note is to set out the assumptions applied to the demands within the VISSIM model to enable future changes in trip movements associated with the delivery of consented developments to be reflected within the VISSIM model in a realistic manner.

Background

7. The North Oxford VISSIM model has been provided to VM by OCC and has been adjusted to account for the traffic growth projected to occur through the delivery of an agreed set of committed developments and the allocated developments.

8. The assumptions contained within these model scenarios have been circulated and reported separately and have resulted in the development of a 2031 model scenario which contains all development proposals and associated infrastructure.

Figure 1: Model Extent and Development Locations



9. The 2031 model network, inclusive of the traffic projections, represents a situation where the network capacity has been exceeded. The network is not able to accommodate the projected traffic levels and so significant increases in congestion levels are observed. In all model runs under these unadjusted demand conditions whereby the full quantum of committed development is included on top of the baseline, congestion reaches a critical point whereby the model is unable to function and locks up (due to, for example, vehicles conflicting with each other and the modelled environment being unable to 'unlock' these vehicles, leading to exponential increases in delay).

10. In this instance, a functioning network is one which is considered to demonstrate sensible patterns of flow build up and dissipation. Network failure is demonstrable by continued and exponential increases in traffic volumes (and delays), with no discharge patterns being discernible.

11. This is both unrealistic and implausible as, in reality, ‘gridlock’ is a modelling phenomenon which does not occur on the ground, as there are a very large number of driver responses which can occur (such as retiming, route switching, changing mode, not travelling at all) that are not accounted for within the algorithms of the modelling software, as well as the ability of drivers in reality to manoeuvre/interact/co-operate in ways that the simulation simply cannot replicate.

12. Whilst it is important to note the occurrence of such conditions, presenting results from models which are in effect ‘gridlocked’ undermines the credibility of any assessment. It should also be recognised that, in reality, drivers will make decisions to avoid the regular occurrence of such extreme situations, drivers will change mode, retime or even cease their trips in response to such adverse conditions.

13. Whilst an approach which accounts for all committed development demands as effectively ‘new’ trips will result in high traffic volumes being run through the model this is not necessarily the right approach. Partly this is because the model behaviour is manifestly unrealistic as a result and partly because it fails to recognise what is occurring on the road network.

14. In areas such as the road network around Oxford, traffic volumes are not necessarily increasing on an exponential basis as one would expect if traffic forecasts assumed all traffic associated with committed developments is ‘new’.

15. In such instances it is appropriate to consider local traffic trends when deriving traffic forecasts to ensure that the outcome can be considered realistic and plausible.

Objective

16. The objective of this stage of the assessment is to establish the level of traffic growth to be assumed within the VISSIM modelling which reflects a realistic position based on interpretation of local evidence, and the need to ensure that the final model scenario is ‘realistic’ and can be used to reliably discern the effects of delivering both the allocated sites and the transport strategy required to support them.

17. A modelling assessment based on a network that does not function will only ever result in the prediction that significant additional road capacity will be required to support growth. This is even before the effects of traffic growth associated with any of the allocated sites is considered.

Forecast Adjustments

18. Having initially developed a model which is informed by a traffic forecasting exercise which assumed all trips are 'new' the outcome was a model network which does not function. Capacity has been significantly exceeded and the network operation, and resulting model outputs, cannot be considered either realistic or reliable.

19. The forecasts derived from the manual application of traffic growth, estimated to occur as a result of both the committed developments and the PR allocations, results in increases in traffic volumes over the baseline levels, of as much as 28%.

20. Given the fact that parts of the network are already close to capacity it is unrealistic to expect that the network will continue to be able to sustain such increases in traffic volumes. Furthermore, such growth would be contrary to Oxfordshire County Council's Cabinet adopted Local Transport and Connectivity Plan (LTCP) which, among its many ambitions, aims to cut car journeys by a quarter by 2030 and reduce them by a third by 2040.

21. Adjustments are therefore required to determine what an appropriate level of growth may be assumed within the modelling in light of the current circumstances, cognisant of historic trends and forthcoming policies.

22. The previous forecasts of up to 28% growth are contrary to forthcoming policies from OCC and also yield unrealistic outcomes when assigned to the existing traffic model. This is not unusual, particularly given the deterministic nature of microsimulation modelling software and the limitations that the software has in terms of considering wider driver responses but it does mean that adjustments to the demands will be essential to engender confidence in the modelling outcomes.

23. This note sets out a method for determining an appropriate adjustment to the model demands to constrain traffic forecasts to levels which are both realistic and conform to forthcoming policy objectives.

24. Two different sets of analysis have been completed. The first simply considers the linear interpolation of existing traffic trends, based on a series of observed traffic surveys collected over an extended period of time, to project forward what will happen to traffic flows by 2031. A second method also considers the housing build out patterns within the area to link development delivery with traffic growth.

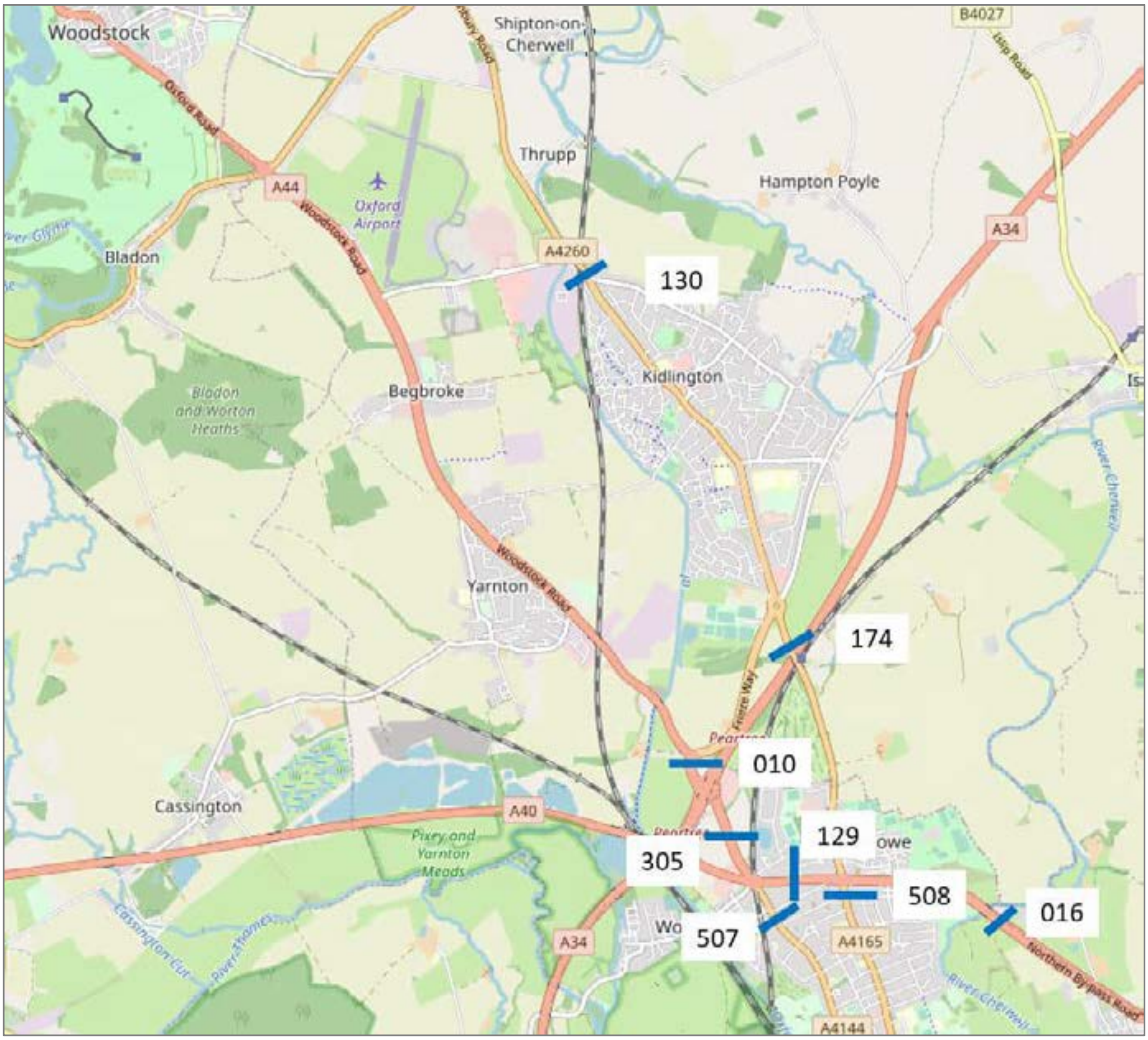
25. Each of these approaches and the resulting outcome is described further as follows:

Data Selection and Cleaning

26. The traffic data which has been used in the process has been provided by OCC and processed by Vectos to provide summary totals for each year that the traffic data has been collected for.

27. The site locations for which traffic data was provided are illustrated within the following **Figure 2**.

Figure 2: Traffic Survey Locations

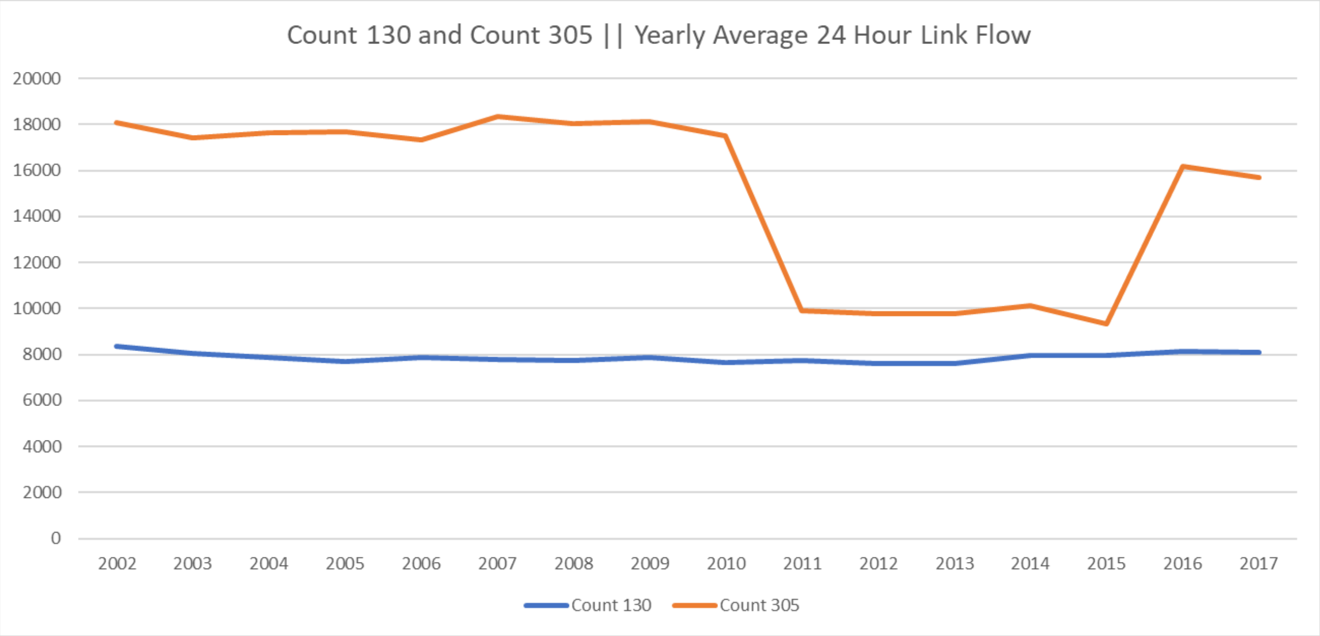


28. Traffic data for the majority of these sites has been provided for a range of periods between 2000 and 2021 on the following basis. Note that sites 130 and 305 are not included within the analysis as 130 lies at the northern extremity of the model extent and contained a series of anomalies within the

yearly data, as well as the A4260 corridor that it monitors being covered by site 174 further south, and 305 is covered by adjacent count sites both north and south of this location.

29. Despite this these two sites have been analysed independently and results are provided within the graph below:

Figure 3: Count Sites 130 and 305 Traffic Flows



30. The graph above demonstrates that while Count Site 305 exhibits erroneous data between the years 2011 and 2015, the trend of traffic levels between 2002 and 2017 is a negative one. This is corroborated by Count Site 130 which shows consistent traffic levels between 2002 and 2017, but with overall growth also exhibiting a negative trend.

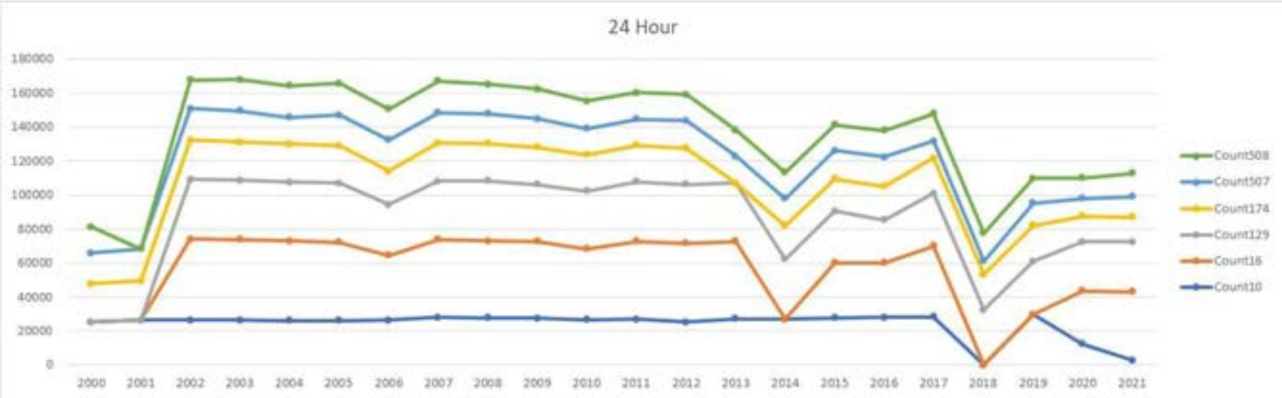
31. The process for analysing the remaining sites is detailed below.

Table 1: Traffic Survey Period

Count Point	From	To
010 A44 NORTH-WEST OF PEARTREE ROUNDABOUT	2000	2021
016 A40 OXFORD NORTHERN BYPASS	2002	2021
129 A40 SUNDERLAND AVENUE	2002	2021
174 A4165 South of Kidlington	2000	2021
507 A4144 Oxford, Woodstock Rd S of Blandford Ave	2000	2021
508 A4165 Oxford Banbury Rd South of A40	2000	2021

32. As a first stage, the traffic data for each site was revisited to ascertain whether it produced stable flow patterns over the relevant forecast period. Stacked analysis of each site was undertaken and is presented within the following Figure:

Figure 4: Stacked Count Data (24 Hours) 'Full Range'

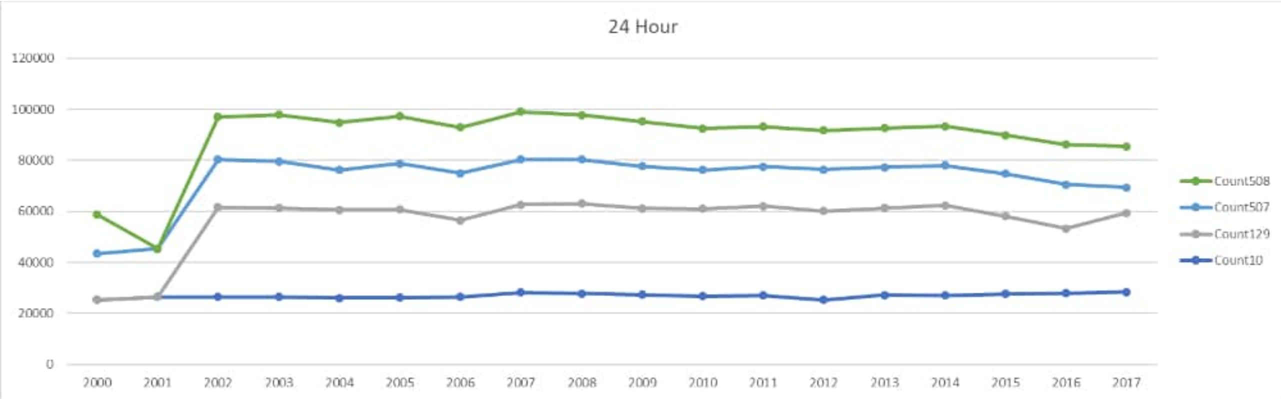


33. The count sites show a clearly discernible drop in traffic volumes in 2018 with modest recovery thereafter. The data has been checked and is not erroneous and therefore it was considered that the best course of action was to omit traffic data processed for 2018 onwards. Adopting this data within the analysis would simply result in a significant reduction in traffic volumes to be assigned in the future year scenarios. Even if this does transpire, there is an expectation that OCC will expect to see some element of traffic flow increases because of the forecasting process and so, for this reason, the cut off was implemented from 2018 onwards.

34. Count site 16 and 174 were identified as having missing data sets within the assessment period (2013 and 2041 respectively) and so both of these sites were also omitted from the interpolation.

35. This resulted in the following traffic patterns being used to interpolate future growth levels based on existing traffic trends:

Figure 5: Stacked Count Data (24 Hours) 'Selected Range'



36. Interestingly, even when traffic data has been processed and cleaned, to minimise the rate at which it predicts a reduction in traffic levels, these sites, when assessed over the AM and PM peak hours, would still result in the prediction that future traffic levels will drop by 2031 relative to 2017 (the last year chosen for the analysis).

37. Between 2013 to 2017 there remains a notable drop in the traffic volumes observed at each location. The biggest drop occurs within 2014, followed by a slight recovery in traffic flows but which remains below 2013 levels. The rate at which the traffic volumes recover affects whether the linear interpolation of future trends predicts growth or recession in traffic volumes.

38. Because the recovery in the AM and PM peak hours is much slower than the 24 hour levels, this results in the peak hour analysis predicting a reduction in traffic flows of between 10-11.5%, whilst the 24 hour analysis predicts a more modest reduction in traffic volumes of around 8%.

39. The trend analysis for the AM and PM peak hours is presented separately to the 24 hour period within the following **Figure 6** and **Figure 7** respectively:

Figure 6: Traffic Trend Analysis and Interpolation (AM and PM Peak Hours)

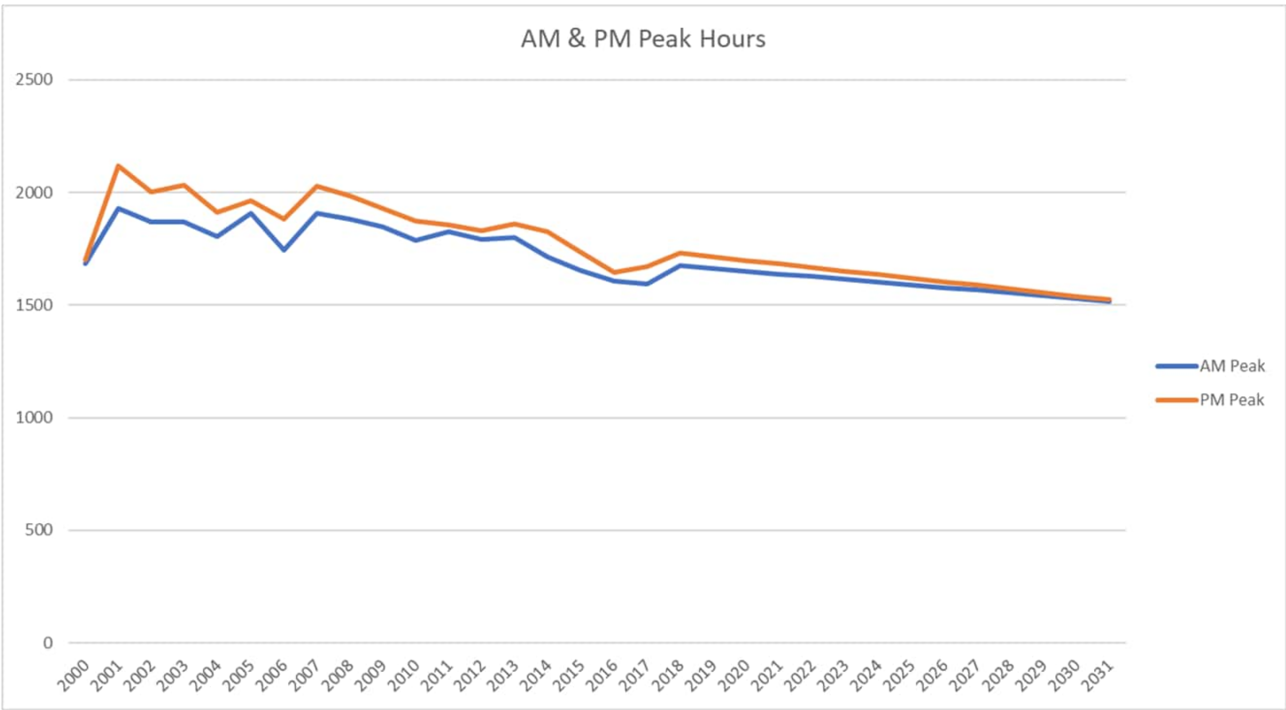
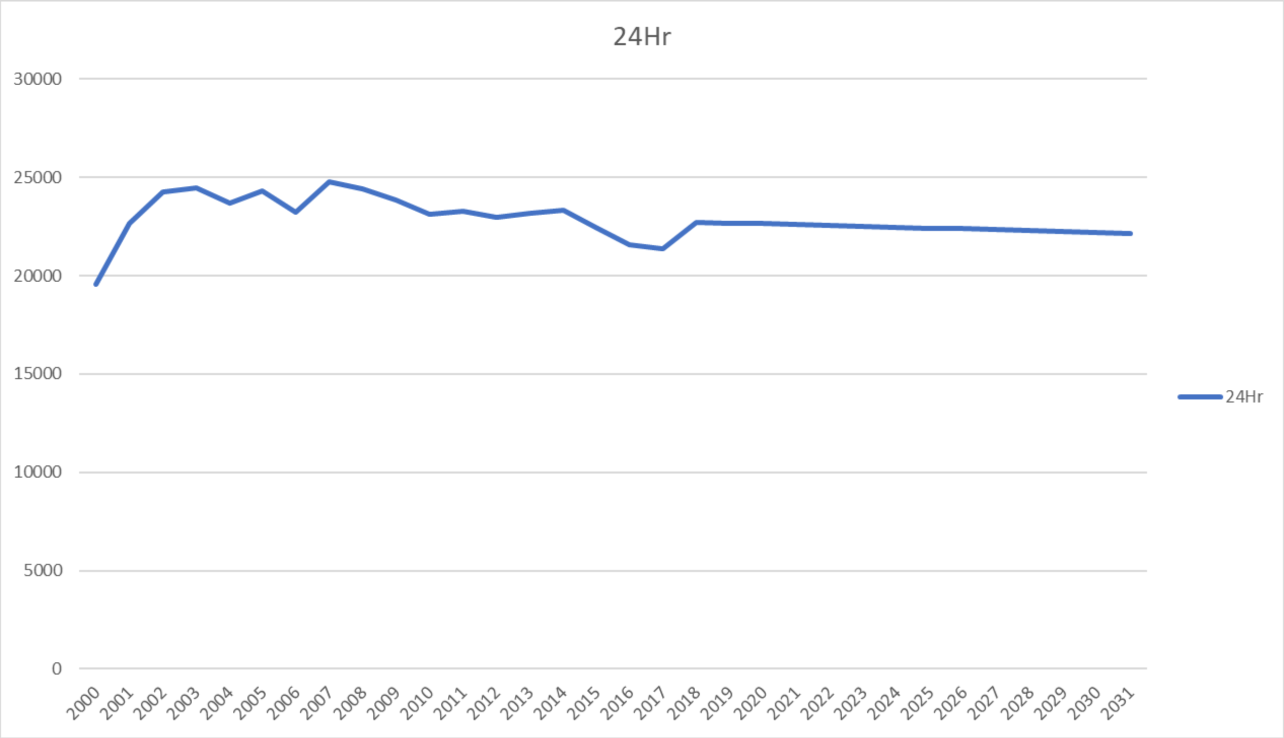


Figure 7: Traffic Trend Analysis and Interpolation (Daily Volumes)



Development Trajectory Analysis

40. Consideration has been given to establish if there is a relationship between changes in traffic volumes and the delivery of new housing within the study area.

41. This was considered particularly pertinent since most of the traffic trend analysis resulted in the prediction that traffic volumes would be lower in 2031 than those observed in 2017/2018.

42. It is possible, for example, that one could contend that traffic growth rates have been constrained due to limited housing delivery and a correction to the rate of housing delivery would, correspondingly increase the rate of traffic growth to be assumed within the modelling.

43. However, the availability of planning data to inform the projections for housing delivery was limited. Vectos has previously provided census data pertaining to housing levels identified within census for the years 2001 and 2011, no data is available beyond this point within the current census data.

44. Within NTEM there is some account of increasing dwelling figures within the planning assumptions. NTEM figures begin at 2011 however and when comparing the 2011 figures within NTEM with those presented within the census data there is a clear discrepancy within the figures.

45. The differences between the two figures for 2011 are presented within **Table 2** alongside the adjustment factor. This adjustment factor was subsequently applied to the 2001 census data to create an equivalent NTEM housing figure for 2001. This then allows NTEM to be interrogated for a 2017/18 housing figure as well which, in turn, allows projected housing delivery to be plotted against the traffic trends to understand if there is a discernible relationship between the two data sets. The outcome of this process is presented within **Table 3** and presented alongside the processed traffic volumes within **Figure 8**.

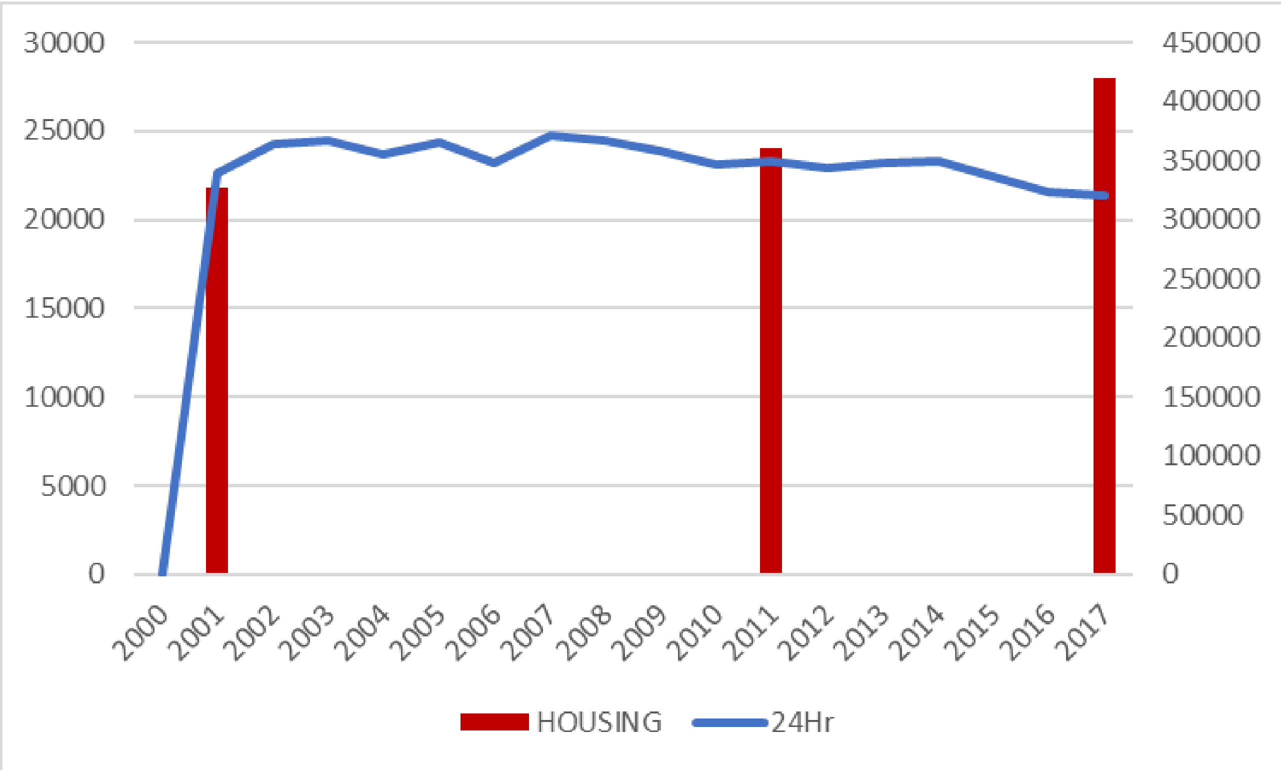
Table 2: Nomis versus NTEM Housing Projections

	NOMIS		NTEM	
Area	**2001**	**2011**	**2011**	**Difference**
Cherwell	23,117	23,440	56,890	2.427048
West Ox	32,051	32,620	43,512	1.333906
Oxford	134,248	151,906	259,319	1.707102
Total	**189,416**	**207,966**	**359,721**	**1.729711**

Table 3: Normalised Housing Projections (2001 to 2018)

Area	2001 Adjusted	2011 NTEM	2018 NTEM
Cherwell	56,106	56,890	85,346
West Ox	42,753	43,512	47,200
Oxford	229,175	259,319	287,588
Total	**327,635**	**359,721**	**420,134**

Figure 8: Normalised Housing Projections versus Average Daily Traffic Volumes



46. The previous figure reveals that the increase in housing projections actually corresponds to a modest reduction in traffic volumes. Whilst housing deliveries are increasing, traffic flows are reducing within the same period.

47. Although this has required a mix of NTEM estimates and observations through census, it clearly demonstrates that increased housing levels will not necessarily mean an increase in traffic volumes.

48. Therefore, in order to reflect this within the traffic modelling, it is proposed that the forecast scenario is derived whereby total growth within the model, following the assignment of the committed development demands, remains at 0%. The mechanics of the application of this methodology are described in the section below

Capping Application – A40 Adjustment

49. As a first step, it was considered necessary to apply demand adjustments in response to the inclusion of the A40 bus corridor scheme present within the 2031 VISSIM network. This scheme is to be delivered as part of the Growth Fund and was included within the 2023 VISSIM model received as the starting point for this assessment. However, in revising network demands back to 2018 baseline before reforecasting to include all committed sites (details of which can be found in the Forecasting Report[1]), modelled demands prior to this adjustment do not account for any potential shift from car trips to bus trips following delivery of the A40 bus infrastructure.

50. To account for this element of forecast modal shift, a catchment area was determined along the A40 covering zones located along the A40 corridor to the west which may present opportunities for mode shift, along with zones towards the east that reflect either the continued A40 off-network, or zones located within central Oxford that will be serviced by A40 bus routes.

51. Two determining factors have been established that control whether a trip within the OD matrix is potentially subject to an adjustment:

a. Whether the zone lies within the bus corridor catchment

b. The nature of the zones which make up the trip (i.e. Internal, External Minor, or External Major)

52. The magnitude of trips which are able to shift is based on the type of OD, with trips that a predominantly internal in nature being considered more likely to shift than trips that are largely linked to wider destinations. The relative adjustment potential for each trip type is presented within the following matrix:

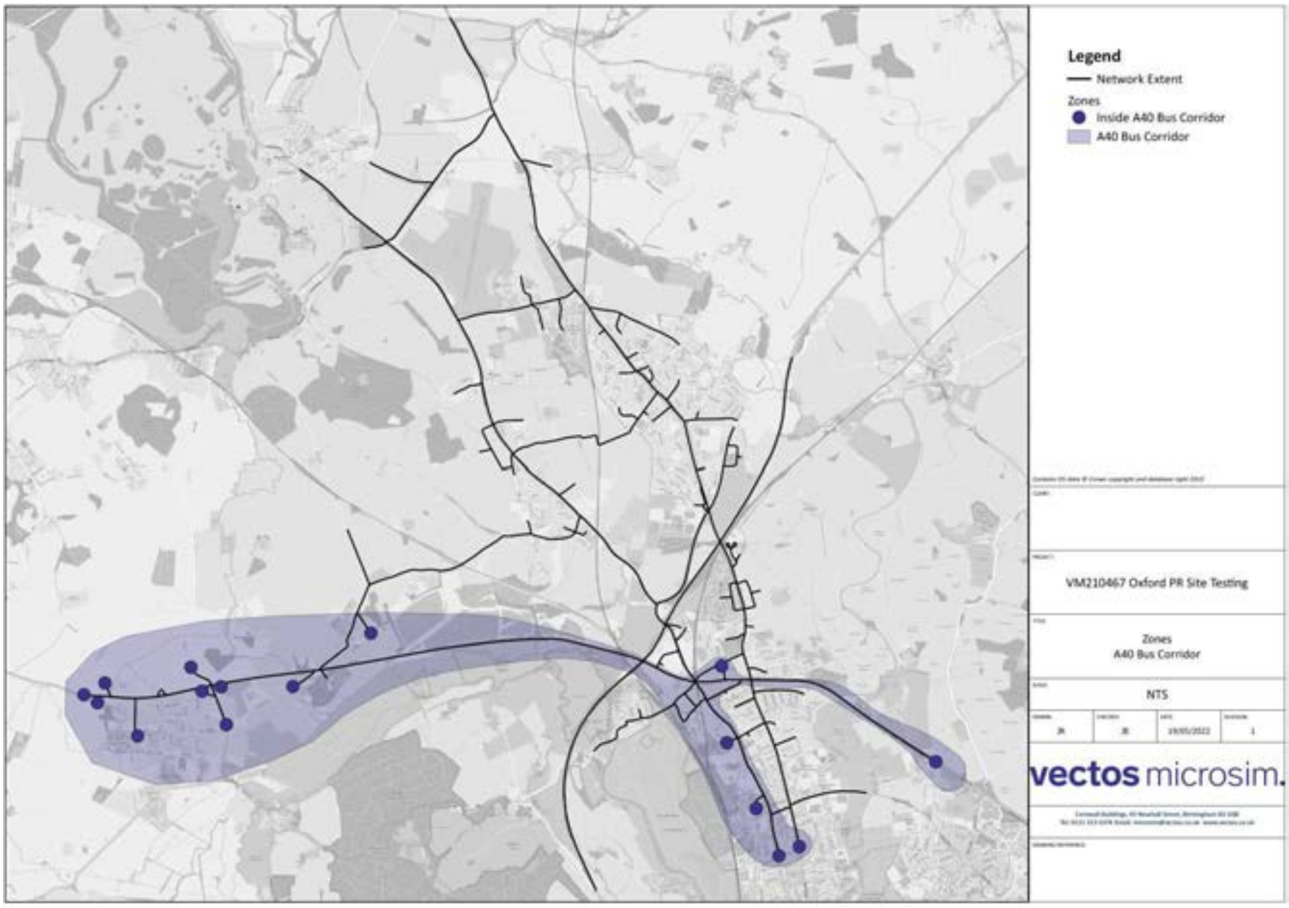
Table 4: Demand Adjustments for Linear Factors

From/To	External Major	External Minor	Internal
External Major	5.0%	7.5%	10.0%
External Minor	7.5%	5.0%	15.0%
Internal	10.0%	15.0%	25.0%

[1] VM210467.R001b Forecasting Report

53. The image below provides the catchment, along with the zones included as those which would benefit from improved bus services along the A40. A40 East and West zones are assumed to be External Major, zone 23 (which represents the B4449 south of A40, leading to Eynsham and connecting to A420 and A34 at Botley) is assumed to be classified as External Minor, while all other zones are assumed to be Internal.

Figure 9: A40 Bus Corridor Catchment



Capping Application – Eynsham Park and Ride

54. In addition to the mode shift forecast to be achieved via the introduction of the A40 bus lane, the proposals to bring forward a Park and Ride service at Eynsham is also considered. As these proposals are to be funded by sources outside of the PR sites considered in this assessment, the adjustments are applied to the Reference Case model and carried through into the testing.

55. The methodology identifies zones located near to the proposed location of Eynsham Park and Ride, and pairs these origin zones with destination zones in and around Oxford City Centre. For the AM, this provides a total possible intercept of 634 trips, i.e. 634 trips are identified as travelling from the Eynsham origin zones to the Oxford destination zones. In the PM, a total intercept of 442 trips is

identified, corresponding to the number of trips identified in the matrix travelling from Oxford zones to Eynsham zones.

56. Forecast accumulation for the Park and Ride is taken from the TA[2], which suggests a total 3 hour occupancy rate of 90.2% and a PM occupancy rate of 62.3%. This translates to a total of 767 AM trips and 530 PM trips that would be forecast to use the P&R service, and thus the number of trips that would be removed from the A40 corridor. This means that the number of trips available to be shifted within the VISSIM demands is lower than the forecast utilisation of the Park and Ride in both peak periods.

57. Notwithstanding this, the available OD movements are removed from the VISSIM demands on the basis that these trips are likely to shift to the new Park and Ride Service.

Capping Application – Remaining Background Cap

58. Following inclusion of the focussed adjustment on the A40 resulting from the Growth Fund scheme and the Eynsham Park and Ride, further adjustments are applied in line with the analysis undertaken above to cap the overall network demands to a level consistent with the baseline, ensuring an overall 0% growth level can be maintained.

59. To ensure that the distribution of growth reflects known development pressures, as is identified through the analysis of the committed developments, the matrices which have been derived for the committed developments have been retained with the existing trip generation figures fixed for each of these developments. This means that traffic generation figures related to the committed developments, and their associated impact, can be accounted for within the model network but there is a corresponding reduction in baseline trip figures from those zones which are predicted to experience increases in traffic volumes related to the committed developments.

60. Effectively, the committed development demands displace trips within the existing background matrices such that traffic volumes within the future year reference case, prior to the allocated sites being included, remains consistent with the volumes observed within the 2018 base model.

61. This is considered to be the most realistic forecast scenario to enable OCC to understand the outcomes that may occur following the inclusion of the allocated sites and associated sustainable transport interventions.

62. The demands build for the committed developments has resulted in 6764 trips being identified for inclusion within the model network during the AM period and 7916 trips being assigned within the PM period. The baseline figures for the AM and PM periods are 46420 and 49916 respectively.

63. In order for traffic growth within the model to be capped at 0% it is necessary to reduce the total background traffic which is assigned to the model by the same magnitude as the total committed development trips being added.

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[2] A40 Park and Ride and Bus Lane Scheme, Transport Assessment, Oxfordshire County Council, Table 6.2

64. The following steps have been adopted to achieve this level of adjustment within the model demands in a manner which also retains the assignment demands derived for the committed developments, as per the trip generation totals identified during the process of scoping out the future year model assumptions:

— The level of traffic required, per hour, to limit growth to 0% was identified.

— Correspondingly, the amount that traffic volumes needed to reduce by to enable 0% overall to be adopted within the model was identified on an hourly basis.

— This ‘reduction’ was distributed using the pattern of growth identified as a result of the individual hourly committed development matrices.

— The reduction, once distributed using the pattern of growth per the Com Dev matrices was then applied to the background matrix levels for each hour.

— In certain instances the application of this reduction resulted in negative trips occurring (i.e. Origin/Destination pairs where the volume of trips within the background matrix was lower than the quantum being removed) in such instances, a furnessing procedure was applied on the following basis:

  o Initially, zones which had negatives within the destination column were furnessed such that the negatives were subtracted from the existing positive figures within the respective matrix column.

  o Subsequently, where negative figures still remained within the matrices, the process was repeated using origin figures whereby the negatives were applied proportionally to the remaining positive figures.

  o Finally, in the rare instances were after both column and row adjustment negatives still remained, an adjustment was made whereby the remaining negatives were reduced from the whole matrix proportionally based on the remining positive trip generation totals.

— The resultant ‘adjusted’ background demand matrix levels were then assigned to the model alongside the full committed development matrices.

65. A summary of the outcome of this process is also provided within the following **Table 5** which sets out the adjustment which has been applied to the background matrix levels, and the resulting demand totals now assigned to the Reference Case as a result:

Table 5: Demand Adjustment Summary

Period	AM 07:00-08:00	AM 08:00-09:00	AM 09:00-10:00	PM 15:00-16:00	PM 16:00-17:00	PM 17:00-18:00
Background Lights	15668	16472	14280	15156	16900	17860
Com Dev	1826	2990	1949	2191	2765	2960
Initial Total	***17494***	***19462***	***16229***	***17347***	***19665***	***20820***
CD GROWTH	11.7%	18.2%	13.6%	14.5%	16.4%	16.6%
Periodic		14.6%			15.9%	
Target		0%			0%	
Diff		-14.6%			-15.9%	
figure		-5443			-6404	
Target adjustment	-1826	-2990	-1949	-2191	-2765	-2960
A40 Corridor Adjustment	-85	-76	-69	-67	-78	-53
Eynsham P&R Adjustment	-242	-161	-231	-88	-228	-127
Remaining Background Cap	-1499	-2753	-1649	-2037	-2460	-2780
Background Lights	13842	13482	12331	12965	14135	14900
Com Dev	1826	2990	1949	2191	2765	2960
Final Total	**15668**	**16472**	**14280**	**15156**	**16900**	**17860**

Summary

66. The modelling working group has developed a 2031 Reference Case VISSIM model which can be used to assess the implications of delivering the proposed PR allocations north of Oxford. As part of this process historic data provided by OCC has been reviewed for a number of sites within the area.

67. The traffic counts and survey periods have been rationalised to enable trend analysis to be completed. This has allowed traffic forecasts to be projected forward to 2031 based on the trends observed within the historic traffic data collected at the selected locations.

68. This has also been compared with the planning assumptions contained within the NTEM database and the Census data to create a normalised housing delivery level for the years 2001, 2011 and 2018. This has been used to correspond the changes in traffic forecasts to housing delivery rates.

69. Analysis and interpolation of the trends observed within the traffic data reveals that traffic levels are predicted to drop within the AM and PM peak hours by 2031, relative to 2017 levels.

70. Comparison of the traffic trends relative to housing delivery reveals that the drop in traffic volumes is actually accompanied by an increase in housing provision and, as such, an adjustment has been defined whereby the traffic movements associated with the committed developments are contained within the model traffic demands but trips associated with the same zones in the base model, as are

affected by the committed development trip generation figures, are reduced. This is intended to ensure that the total demands within the model do not exceed the total of the trips contained within the base model.

71. This has resulted in adjustments to the traffic figures within the model to ensure that the overall traffic volumes within the model are capped at 0% above the baseline figures inclusive of the additional demands associated with the consented developments. The adjustments to the traffic forecasts have been applied to the background light vehicles; HGVs are fixed at the baseline levels.

72. It is considered that the application of capping in the manner set out within this note is sensible, as it allows for realistic forecasts to be derived for assignment within the model such that the network capacity is not entirely exceeded prior to any development assessment work, as clearly that would not be a realistic position particularly given the findings of the trend analysis which points to a steady decline in peak hour traffic volumes.

73. The resultant traffic figures assigned within the VISSIM model also accord with the reductions being targeted through Oxfordshire’s LTCP. Continued application of increases in traffic volumes through the model forecasting would represent a significant failure in OCCs policy approach.

Annex D

Average Metres

no.	Location	Section	07:00-08:00			08:00-09:00			09:00-10:00		
			AM 2018 Base	AM Future Ref + Growth Fund	AM Future DM PR9 Only	AM 2018 Base	AM Future Ref + Growth Fund	AM Future DM PR9 Only	AM 2018 Base	AM Future Ref + Growth Fund	AM Future DM PR9 Only
			Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length
1	Peartree Roundabout	A34 South	1	11	12	1	15	14	1	10	10
2		A44 Woodstock West	2	17	18	3	63	66	3	127	121
3		A34 North	29	11	11	11	25	26	9	37	33
4		Oxford Peartree Services	47	3	3	20	65	58	4	170	168
5		A44 Woodstock East	10	9	10	6	13	15	4	10	13
6	Wolvercote Roundabout	A44	44	19	21	232	16	17	20	17	18
7		Five Mile Drive	10	1	1	55	0	0	0	1	1
8		A40 East	23	20	24	43	45	101	30	23	76
9		A4144	9	11	10	11	17	17	7	12	13
10		Godstow Rd	1	1	1	3	1	1	2	1	2
11		A40 West	99	21	19	559	35	31	1429	26	23
12	Cutteslow Roundabout	A4165 North	32	29	31	423	502	631	13	27	27
13		A40 East	21	16	21	470	345	416	50	26	46
14		A4165 South	4	4	3	25	18	21	15	9	20
15		A40 West	16	17	16	24	36	36	10	10	11
23	Loop Farm Roundabout	A44 North-West	1	5	5	1	36	123	1	196	233
24		A4260 East	6	8	9	2	16	17	1	93	74
25		A44 South	1	3	3	1	2	3	1	1	1
206	Peartree Roundabout	A44 East	-	8	8	-	9	10	-	10	10
310	Oxford Road / Bicester Road Roundabout	A4260 Oxford Rd Approach	1	8	6	0	2	3	0	12	10
311		Bicester Rd Approach	1	4	5	0	3	3	0	3	4
312		Oxford Rd Approach	0	4	4	0	5	5	0	5	4
313		Frieze Way Approach	0	1	1	0	1	1	0	1	1
314		Oxford Road	1	2	2	0	1	1	0	1	1
316		Bicester Rd Approach (Bus Lane)	-	0	0	-	0	0	-	0	0
318	Woodstock Road/Cassington Road	Cassington Rbt SE Approach	1	1	1	1	1	1	0	0	1
319		Casssington Rd Approach	2	1	1	4	2	2	1	1	1
320		Cassington Rbt NW Approach	61	16	23	33	13	46	2	21	59

no.	Location	Section	07:00-08:00	08:00-09:00	09:00-10:00
			Development Impact		
1	Peartree Roundabout	A34 South	0	0	0
2		A44 Woodstock West	0	3	-6
3		A34 North	0	1	-4
4		Oxford Peartree Services	0	-7	-2
5		A44 Woodstock East	2	2	2
6	Wolvercote Roundabout	A44	2	2	2
7		Five Mile Drive	0	0	0
8		A40 East	3	55	53
9		A4144	-1	0	1
10		Godstow Rd	0	0	0
11		A40 West	-2	-5	-3
12	Cutteslow Roundabout	A4165 North	2	129	0
13		A40 East	5	71	20
14		A4165 South	-1	2	12
15		A40 West	0	0	1
23	Loop Farm Roundabout	A44 North-West	0	87	37
24		A4260 East	2	1	-19
25		A44 South	0	1	0
206	Peartree Roundabout	A44 East	0	1	0
310	Oxford Road / Bicester Road Roundabout	A4260 Oxford Rd Approach	-2	1	-2
311		Bicester Rd Approach	0	0	1
312		Oxford Rd Approach	0	0	0
313		Frieze Way Approach	0	0	0
315		Oxford Road	0	0	0
316		Bicester Rd Approach (Bus Lane)	0	0	0
318	Woodstock Road/Cassington Road	Cassington Rbt SE Approach	0	0	0
319		Casssington Rd Approach	0	0	0
320		Cassington Rbt NW Approach	7	33	37

Key	
Queue increases less than or equal to 30m	(green)
Queue increase more than 30m, up to 60m vehicles	(yellow)
Queue increase more than 60m, up to 120m vehicles	(orange)
Queue increases by greater than 120m	(red)

Average Metres

no.	Location	Section	15:00-16:00 PM 2018 Base	15:00-16:00 PM Future Ref + Growth Fund	15:00-16:00 PM Future DM PR9 Only	16:00-17:00 PM 2018 Base	16:00-17:00 PM Future Ref + Growth Fund	16:00-17:00 PM Future DM PR9 Only	17:00-18:00 PM 2018 Base	17:00-18:00 PM Future Ref + Growth Fund	17:00-18:00 PM Future DM PR9 Only
			Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length	Q Length
1	Peartree Roundabout	A34 South	3	9	8	1	11	11	1	10	11
2		A44 Woodstock West	2	10	10	0	12	13	1	14	14
3		A34 North	2	5	5	1	4	4	2	4	4
4		Oxford Peartree Services	1	0	0	1	0	0	2	0	0
5		A44 Woodstock East	14	19	22	61	39	47	120	41	53
6	Wolvercote Roundabout	A44	20	18	23	23	18	20	22	17	19
7		Five Mile Drive	0	0	0	0	0	0	0	0	0
8		A40 East	20	18	19	26	18	19	29	19	20
9		A4144	24	26	56	22	27	45	23	49	114
10		Godstow Rd	4	1	2	2	1	2	5	4	5
11		A40 West	46	26	23	97	52	42	48	15	16
12	Cutteslow Roundabout	A4165 North	4	5	5	6	7	7	5	8	8
13		A40 East	1060	19	19	1461	17	20	773	18	19
14		A4165 South	21	12	10	101	9	10	288	15	17
15		A40 West	16	19	20	15	21	20	21	20	24
23	Loop Farm Roundabout	A44 North-West	1	2	2	4	9	7	3	7	6
24		A4260 East	1	1	2	3	1	1	6	2	2
25		A44 South	1	2	1	2	5	8	2	7	10
206	Peartree Roundabout	A44 East	-	12	13	-	26	33	-	28	38
310	Oxford Road / Bicester Road Roundabout	A4260 Oxford Rd Approach	1	6	13	1	12	12	1	15	15
311		Bicester Rd Approach	0	0	0	0	1	1	0	1	1
312		Oxford Rd Approach	0	7	7	1	8	8	1	8	8
313		Frieze Way Approach	0	1	1	1	2	2	1	2	2
314		Oxford Road	0	1	1	1	1	1	1	1	1
316		Bicester Rd Approach (Bus Lane)	-	0	0	-	0	0	-	0	0
318	Woodstock Road/Cassington Road	Cassington Rbt SE Approach	0	0	0	0	0	0	0	0	0
319		Casssington Rd Approach	0	0	0	1	0	1	2	2	3
320		Cassington Rbt NW Approach	0	2	3	0	3	4	1	9	13

no.	Location	Section	15:00-16:00	16:00-17:00	17:00-18:00
			Development Impact		
1	Peartree Roundabout	A34 South	0	0	1
2		A44 Woodstock West	0	0	0
3		A34 North	0	0	0
4		Oxford Peartree Services	0	0	0
5		A44 Woodstock East	4	7	12
6	Wolvercote Roundabout	A44	5	2	1
7		Five Mile Drive	0	0	0
8		A40 East	0	1	0
9		A4144	30	19	65
10		Godstow Rd	0	0	1
11		A40 West	-3	-10	1
12	Cutteslow Roundabout	A4165 North	1	0	0
13		A40 East	0	3	1
14		A4165 South	-2	0	2
15		A40 West	1	-1	3
23	Loop Farm Roundabout	A44 North-West	0	-2	-1
24		A4260 East	0	0	0
25		A44 South	0	3	4
206	Peartree Roundabout	A44 East	2	7	10
310	Oxford Road / Bicester Road Roundabout	A4260 Oxford Rd Approach	7	0	0
311		Bicester Rd Approach	0	0	0
312		Oxford Rd Approach	0	0	0
313		Frieze Way Approach	0	0	0
315		Oxford Road	0	0	0
316		Bicester Rd Approach (Bus Lane)	0	0	0
318	Woodstock Road / Cassington Road	Cassington Rbt SE Approach	0	0	0
319		Casssington Rd Approach	0	0	1
320		Cassington Rbt NW Approach	1	2	4

Key	
Queue increases less than or equal to 30m	Green
Queue increase more than 30m, up to 60m vehicles	Yellow
Queue increase more than 60m, up to 120m vehicles	Orange
Queue increases by greater than 120m	Red

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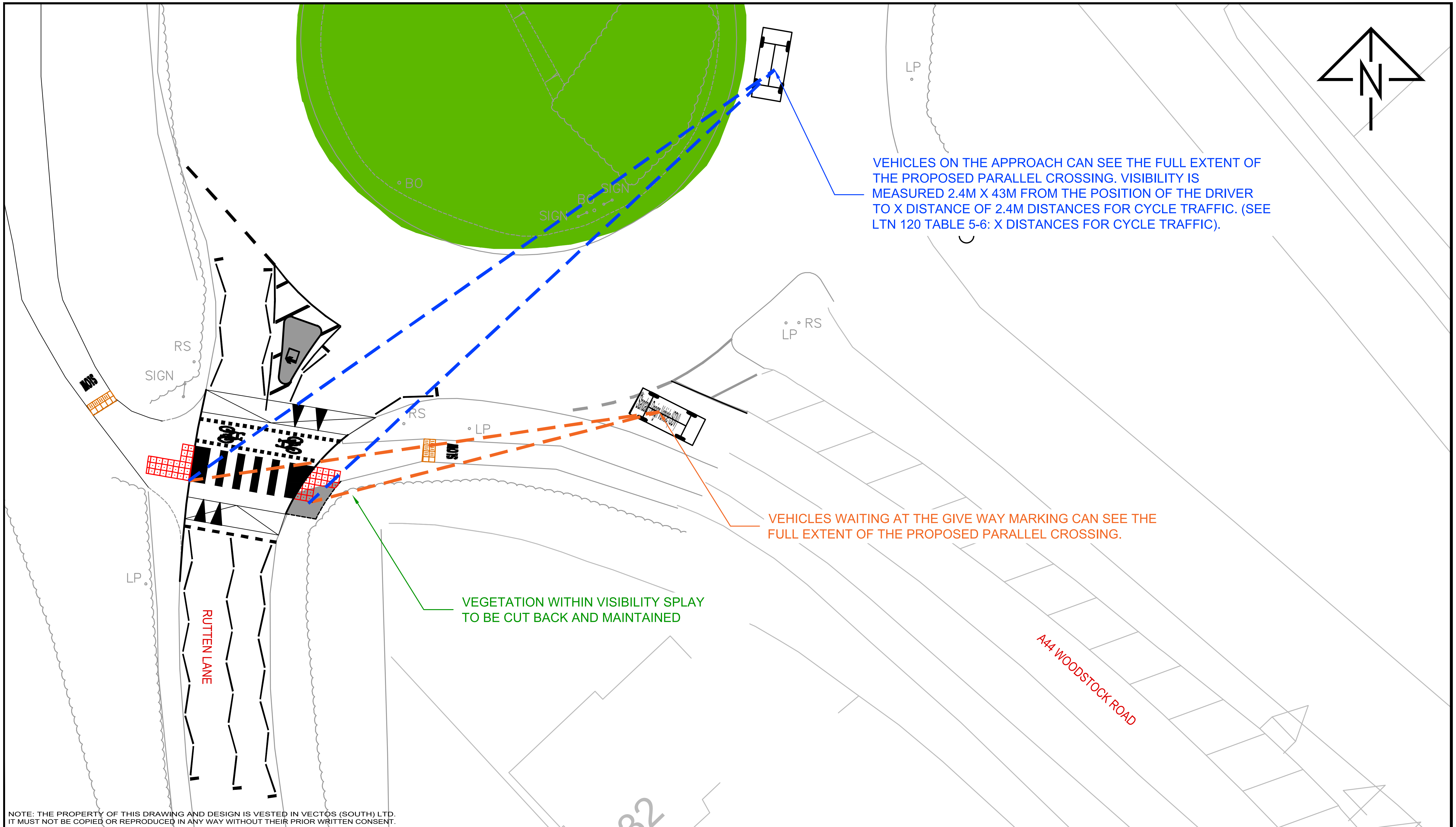
Appendix C



REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

STATUS:
INFORMATION ONLY

PROJECT: Yarnton, Cherwell

CLIENT: Merton College

DRAWING TITLE: INTER VISIBILITY BETWEEN DRIVERS OF VEHICLES & THE PROPOSED PARALLEL CROSSING

SLR

DRAWN:	CHECKED:	DATE:	SCALES:	DRAWING NUMBER:	REVISION:
SCJ	JB	05/07/23	1:250 @ A3	162751-B01.1	-

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