CC1

THE OXFORDSHIRE COUNTY COUNCIL (DIDCOT GARDEN TOWN HIGHWAYS INFRASTRUCTURE – A4130 IMPROVEMENT (MILTON GATE TO COLLETT ROUNDABOUT), A4197 DIDCOT TO CULHAM LINK ROAD, AND A415 CLIFTON HAMPDEN BYPASS) COMPULSORY PURCHASE ORDER 2022

THE OXFORDSHIRE COUNTY COUNCIL (DIDCOT TO CULHAM THAMES BRIDGE) Scheme 2022

THE OXFORDSHIRE COUNTY COUNCIL (DIDCOT GARDEN TOWN HIGHWAYS INFRASTRUCTURE – A4130 IMPROVEMENT (MILTON GATE TO COLLETT ROUNDABOUT), A4197 DIDCOT TO CULHAM LINK ROAD, AND A415 CLIFTON HAMPDEN BYPASS) (SIDE ROADS) ORDER 2022

AND

THE CALLED-IN PLANNING APPLICATION BY OXFORDSHIRE COUNTY COUNCIL FOR THE DUALLING OF THE A4130 CARRIAGEWAY, CONSTRUCTION OF THE DIDCOT SCIENCE BRIDGE, ROAD BRIDGE OVER THE APPLEFORD RAILWAY SIDINGS AND ROAD BRIDGE OVER THE RIVER THAMES, AND ASSOCIATED WORKS BETWEEN THE A34 MILTON INTERCHANGE AND THE B4015 NORTH OF CLIFTON HAMPDEN, OXFORDSHIRE (APPLICATION NO: R3.0138/21)

PLANNING INSPECTORATE REFERENCE:

APP/U3100/V/23/3326625 and NATTRAN/SE/HAO/286 (DPI/U3100/23/12)

Proof of Evidence of

CLAUDIA LESLEY CURRIE

(Traffic Modelling)

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1. INTRODUCTION AND QUALIFICATIONS

1.1 I am Claudia Lesley Currie and I am an Associate Director of Transport Planning at AtkinsRéalis. I joined Atkins in September 2022, which has since had a name change following a rebranding to AtkinsRéalis, which took effect from 13 September 2023. I have the following relevant qualifications and professional memberships and I am a both a Chartered Engineer (2006) and a Chartered Transport Planning Professional (2008) who also has a long-term interest in Road Safety as I am also a RoSPA trained Road Safety Engineer.

Educational Background:

- **BSc (Hons) Chemistry**
- **MSc Transportation Planning and Highway Engineering**
- **Post Graduate Diploma in Environmental Decision Making**
- **Diploma in Pollution Control**

Professional Qualifications:

- **Chartered Engineer**
- **Chartered Transport Planning Professional**

Professional memberships:

- **Fellow of the Chartered Institution of Highways and Transportation (FCIHT)**
- **Fellow of the Institution of Civil Engineers (FICE)**
- **Fellow of the Chartered Management Institute (FCMI)**
- **Fellow of Chartered Institute of Logistics and Transport (FCILT)**
- **Practitioner Member of the Institute of Environmental Management and Assessment (PIEMA)**

1.2 I have over 35 years' experience in transport planning, highway engineering and traffic modelling. In that time, I have worked in both the public and private sectors developing, reviewing and approving traffic models and highways Schemes for use as part of the transport planning evidence in support, or otherwise, of strategic developments.

1.3 My role at AtkinsRéalis is to provide Transport Planning, Development Control and Expert Witness advice to public and private clients; develop evidence to support business cases for projects on highway and rail, and to mentor/train emerging professionals to ensure lessons learned are shared and that the knowledge base I have gained over many years is available to all. I regularly manage multi-disciplinary teams collated from across the business, and also other Consultants in Joint Ventures projects, as the needs arise.

Scope of Evidence

1.4 This Proof of Evidence has been prepared regarding highway modelling matters relating to:

1.4.1 The called-in planning application by Oxfordshire County Council for the dualling of the A4130 carriageway, construction of the Didcot Science Bridge, road bridge over the Appleford Railway Sidings and road bridge over the River Thames, and associated works between the A34 Milton Interchange and the B4015 north of Clifton Hampden, Oxfordshire (Application No: R3.0138/21) (the **Planning Application**);

1.4.2 The Oxfordshire County Council (Didcot Garden Town Highways Infrastructure – A4130 Improvement (Milton to Collett Roundabout), A4197 Didcot to Culham Link Road, and A415 Clifton Hampden Bypass) Compulsory Purchase Order 2022 (the **CPO**);

1.4.3 The Oxfordshire County Council (Didcot to Culham Thames Bridge) Scheme 2022 (the **Bridge Scheme**); and

1.4.4 The Oxfordshire County Council (Didcot Garden Town Highways Infrastructure– A4130 Improvement (Milton to Collett Roundabout), A4197 Didcot to Culham Link Road, and A415 Clifton Hampden Bypass) (Side Roads) Order 2022 (the **SRO**) (the CPO, Bridge Scheme and SRO taken together are referred to as the **Orders**).

1.5 The Planning Application was submitted, and the Orders were made, to facilitate the delivery of the Access to Didcot Garden Town Highway Improvements (the **Scheme**) which consists of a highway Scheme approximately 11km in length, including converting 1.8km of single carriageway to dual carriageway, 6.8km of new single carriageway and approximately 20km of new and/or improved off-carriageway cycling and pedestrian infrastructure. Connections into the existing public rights of way network will also be provided. The Scheme also includes three over bridges.

1.6 The Orders were made by Oxfordshire County Council in its capacity as acquiring authority (the Acquiring Authority) on 21 December 2022 and submitted to the Secretary of State for Transport on 26 January 2023.

1.7 The Planning Application was submitted to Oxfordshire County Council in its capacity as Local Planning Authority (**LPA**) by Oxfordshire County Council in its capacity as applicant (the **Applican**t) on 4 October 2021 and called-in by the Secretary of State for Levelling Up, Housing and Communities for his determination on 25 July 2023.

1.8 The Planning Application and the Orders are now due to be considered by an Inspector, Lesley Coffey, at conjoined Public Inquiries scheduled to open on 20 February 2024. This Proof of Evidence has been prepared in connection with those Inquiries.

1.9 The purpose of my evidence is to explain the approach and methodology taken to identifying current and future traffic issues, and the operational performance of the highways surrounding the proposed Scheme. I will explain the traffic modelling work undertaken and address concerns raised about the adequacy of the specific elements of the modelling undertaken during the development of the Scheme that have been raised in a number of representations and objections.

1.10 My Proof of Evidence should be read in conjunction with other separate, but interrelated proofs of evidence submitted on behalf of the Applicant and/or Acquiring Authority, which have used the traffic modelling information from a number of interdependent traffic models to support the proposed Scheme including:

1.10.1 Strategic Need and Benefits, Highway Issues, Scheme Selection and Alternatives, prepared by Aron Wisdom of Oxfordshire County Council;

1.10.2 Local Transport and Connectivity Plan, prepared by John Disley of Oxfordshire County Council;

1.10.3 Technical Traffic and Highways Engineering – A4130 Widening and Didcot Science Bridge, prepared by Andrew Blanchard of AECOM;

1.10.4 Technical Traffic and Highways Engineering - Culham River Crossing and Clifton Hampden Bypass, prepared by Karl Chan of AECOM;

1.10.5 Environmental Impact Assessment, prepared by Alex Maddox of AECOM;

1.10.6 Noise and Vibration, prepared by Andrew Pagett of AECOM;

1.10.7 Air Quality, prepared by Anna Savage of AECOM;

1.10.8 Climate Change, prepared by Chris Landsburgh of AECOM;

1.10.9 Landscape and Visual Impact, prepared by Jane Ash of AECOM;

1.10.10 Planning, prepared by Bernard Greep of Stantec;

1.10.11 Negotiations and Acquisition prepared by Steven Moon of Gateley Hamer; and

1.10.12 Compulsory Purchase Justification prepared by Timothy Mann of Oxfordshire County Council.

1.11 I confirm that the evidence that I have prepared in respect of the Inquiries is given in accordance with the guidance of my professional institutions and I can confirm that the opinions expressed are my true and professional opinions.

Structure of Evidence

1.12 **Section 2** - Traffic Modelling Approach

This section will cover the approach to modelling and explain the nature of the flow of information and output data from one model to another. It will cover the models and will confirm their soundness for use to support the Scheme development from its consideration at the Local Plan stage (policy development) through to the detailed Planning Application. This section will also include a summary of the calibration and validation of the models and report on the statistics that demonstrate that the methodology used to develop each of the supporting models is robust and that they support the Scheme.

Detail modelling statistics are included separately for the Strategic Model in Atkins' Highway Assignment Model Report and for both the Paramics Modelling and Transport Assessment in CDA.7. These key modelling statistics have been summarised in Appendices CC2.1, CC2.2 and CC2.4, respectively, to this proof of evidence.

- Oxfordshire Strategic Model – covering Oxfordshire County
- Paramics Microsimulation Model – covering the Didcot area
- Individual junction models – covering key junctions in the Scheme area

1.13 **Section 3** – Local Development Plan Approach

This section will cover the evolution of the Scheme as informed the strategic modelling for Oxfordshire using the Oxfordshire Strategic Model.

1.14 **Section 4** – The Transport Assessment for the Scheme

This section will cover the approach to modelling and explain how traffic modelling data was used to support the detailed assessment of the operational impact on the existing junctions and the proposed new junctions. The junction modelling statistics are included in CDA.7. This section will also cover elements of the response to the Planning Application from Oxfordshire County Council's Transport Development Control Team, as the Highway Authority, which is covered in full in CDO.2.

1.15 **Section 5** – **Evidence Base for Response to Objectors' Points of Concern**

This section will cover the evidence base that supports a number of the rebuttals and specific responses to individual objectors' comments, in particular:

- Induced traffic
- Alleged conflict with Local Transport and Connectivity Plan (CDG.4) using Decide and Provide traffic modelling
- Geographic scope of the modelling
- COVID / Brexit

Comments from representations to the Planning Application and/or objections to the Orders outside of the four key themes above are addressed in Appendix CC2.7.

1.16 **Section 6 – Summary and Conclusions**

This section will summarise this Proof of Evidence.

1.17 **Section 7 – Glossary of Technical Terms**

This section lists the acronyms for the Technical Terms used throughout this Proof of Evidence.

1.18 **Appendices (in separate document – CC2)**

Where technical summary information would help clarify and support this Proof of Evidence it has been included in separate appendices to enable ease of reference. Where possible, this summary information has been extracted from other CD documents and it has been appropriately referenced.

CC2.1 Oxfordshire Strategic Model Validation Statistics

CC2.2 Paramics Model Validation Statistics

CC2.3 Housing and Employment Trajectory

CC2.4 Transport Assessment Junctions

CC2.5 The Scheme (S5C Scenario included in Local Plans)

CC2.6 Historic Traffic Data for Covid Effects

CC2.7 Response to Concerns Raised in Respect of Modelling.

CC2.8 SYSTRA HIF1 Paramics Modelling Appleford Road Closure

CC2.9 Didcot Garden Town Housing Infrastructure Fund 2034 Traffic Flows Update

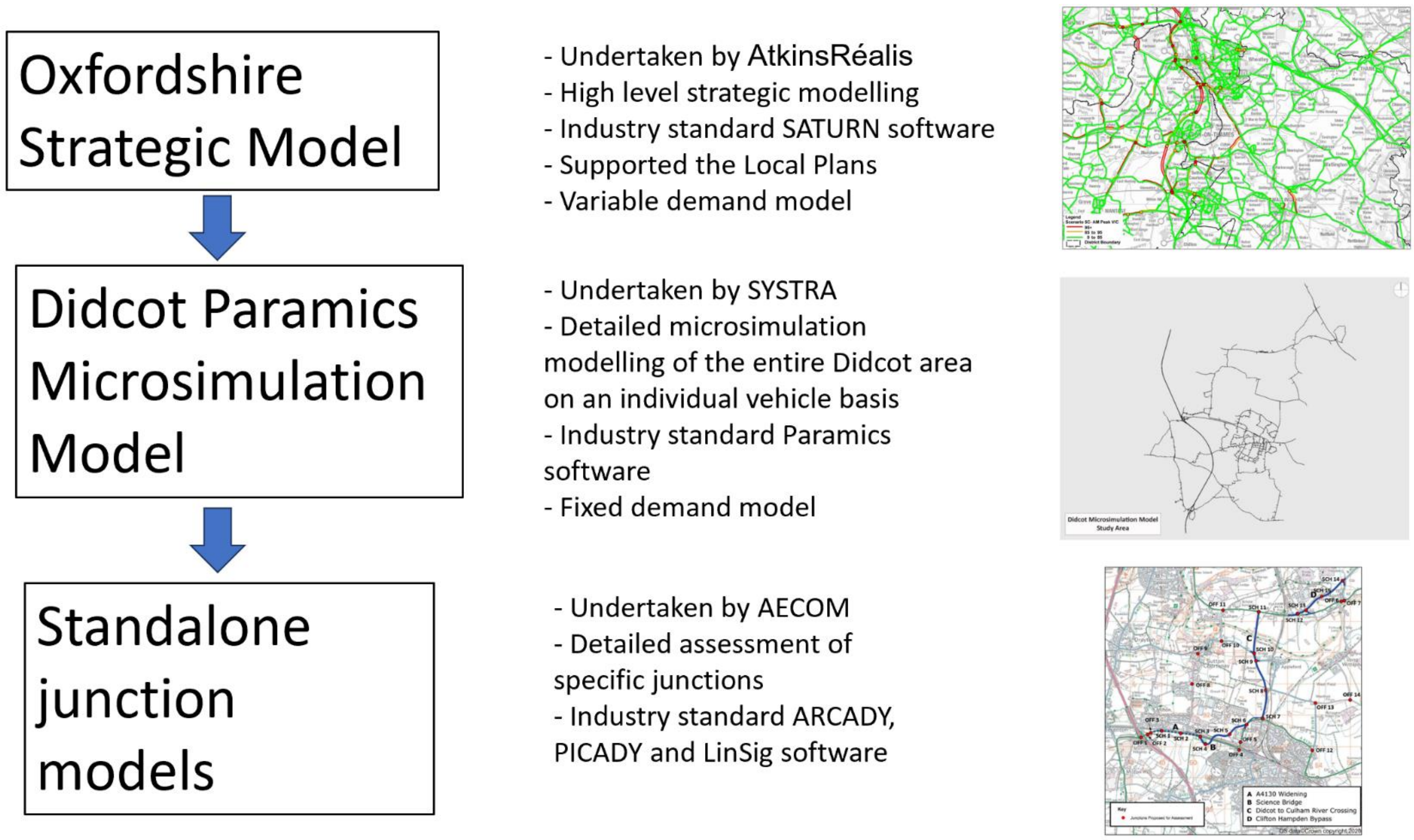
2 TRAFFIC MODELLING APPROACH

2.1 The modelling approach that has led to this Scheme has been developed over a number of years and has used the best available traffic models available at the time. A traffic model is simply a mathematical model representation of a real-world situation. It is used to provide an estimate of the likely future outcome based on the best available historic and forecast data, together with an understanding of the way drivers are likely to make their decisions for each journey (trip) that they will make on the roads included within the model boundaries (network). All traffic models consist of a matrix of trips and a network of roads. Public Transport service provisions which cover the study area of interest have also been included in the models. Within the strategic model this enables mode transfer effects and existing mode choices to be considered.

2.2 Models can be strategic in nature and used to support the development of local plans to help make strategic transport decisions, or more detailed where Scheme refinement occurs, or finally with extreme detail coded in where the junction type and operational effects would be determined. These three types of models will be needed at different times of the decision-making process, but all will need to be developed in order to support the final Scheme to be delivered. Each model will be used to inform the more detailed model that follows, will be updated as appropriate and will refine the network detail used to ensure the best available evidence is available to support the decision-making process required. For any future scenario the modelling effort needs to be proportionate to the scale of a potential intervention.

2.3 The traffic modelling that has been carried out for the Scheme has been done in three separate, but interdependent stages, each one building on the previous work and ensuring that the best available traffic data has been used in the decision-making process. Figure 1 overleaf provides a flow chart of how the strategic, microsimulation and junction models cascade information from the top down into one another. The standalone junction models, which are the final detailed outputs of the Transport Assessment process (CDA.7), submitted by AECOM in support of the Planning Application**,** have been accepted by the LPA’s Transport Development Control Team who have recommended approval of the Scheme (CD E29, CD E.36, CD E.42 and CD E.71).

Figure 1: Traffic Model Development



2.4 I will now describe each of the three models and provide a high-level description of how they were made and why they are robust. AtkinsRéalis did not directly undertake the modelling used in the Paramics model and Transport Assessment, but have developed the Oxfordshire Strategic Model. As the Expert Witness for the modelling elements of the Scheme, I have reviewed the methodologies reported in the Planning Application documents and note that they follow industry-standard procedures using industry-standard tools and used the up-to-date assumptions that were appropriate at the time. Therefore, the modelling methodologies used to support the Scheme are robust, I view the results derived from them as sound and I can confirm they can be used to consider the impact of the Scheme on the surrounding geographical area.

Oxfordshire Strategic Model

Overview

2.5 The Oxfordshire Strategic Model (OSM) forms the first step of the three-step modelling process used in the development of the Scheme, as shown above (Figure 1).

2.6 The Applicant commissioned Atkins in 2013 to develop a suite of multi-modal strategic models to provide evidence to support robust future assessments for funding bids and Scheme prioritisation, particularly in respect of transport Scheme assessments that meet the Department for Transport (DfT) Transport Appraisal Guidance (TAG). The Oxfordshire Strategic Model (OSM) is a strategic transport model that has been developed specifically to assess land use and transport interventions in Oxfordshire, to identify the impact of transport and development in the county, as well as developing a model that could be used to support business cases and planning applications. The model is multi-modal and TAG compliant so can be used to underpin the decision-making process requirements of the DfT and other interested parties.

2.7 The key considerations for developing a new TAG compliant OSM was to provide an evidence base for planning and development mitigation as well as the appraisal of major highway and public transport schemes.

2.8 The OSM modelling system was developed to represent travel conditions in 2013 and consists of three key elements:

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

2.9 TAG Unit M3.1 states that the geographic coverage of strategic highway assignment models generally needs to: allow for the strategic re-routeing impacts of interventions; ensure that areas outside the main area of interest, which are potential alternative destinations, are properly represented; and to ensure that the full lengths of trips are represented for the purpose of deriving costs. The modelled area therefore needs to be large enough to include these elements, but within the modelled area the level of detail will vary as follows (See Figure 2 below):

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

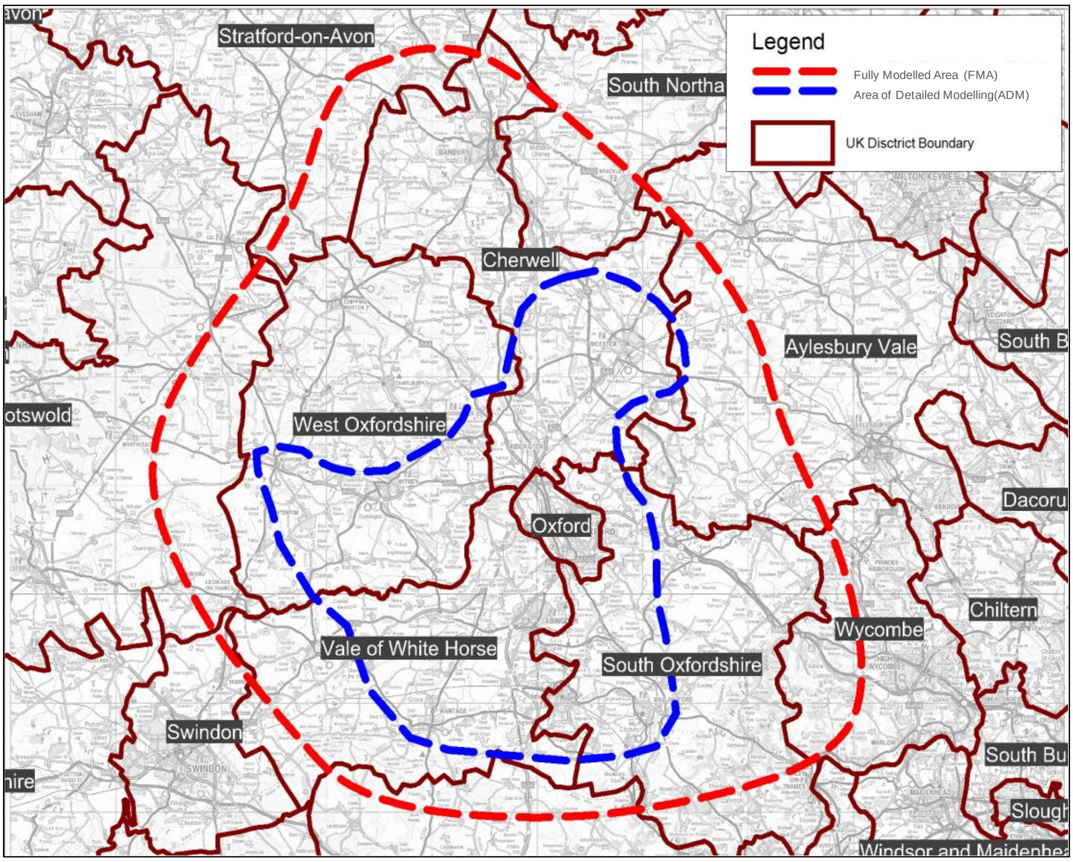
2.10 In the OSM highway assignment model, the Area of Detailed Modelling (ADM) covers the area bounded by:

- Bicester to the north;
- Wallingford to the east;
- Burford and Witney to the west; and
- Wantage and Didcot to the south.

2.11 The rest of the Fully Modelled Area (FMA) covers the remainder of Oxfordshire County in addition to some hinterland area including Swindon, Reading, High Wycombe and Stratford-upon-Avon, as shown in Figure 2. The External Area covers the rest of Great Britain in a skeletal form and connects the ADM via the rest of FMA.

2.12 SATURN is used for HAM, which is an industry-standard modelling software. Atkins (now AtkinsRéalis) are the software developers of SATURN.

Figure 2 Area of Detailed Modelling and Fully Modelled Area for OSM



2.13 In the spring of 2017, several parameters within the development of the OSM were updated, for example: the value of time, the vehicle operating cost and the change in vehicle occupancy. None of these updates had a material impact on the OSM but were required to be updated to ensure ongoing compliance with appropriate TAG Guidance, which is regularly updated. Accordingly, the TAG Databook v1.7, released in March 2017, was used to update the OSM modelling parameters. As the OSM was only built in 2013/2014, there was no need to fully rebuild the Base Year Model, but testing the impact that the new values of time would have on the results was carried out and these do not show any material impact on the modelled flows that would change the decision making process.

2.14 The principal objective of the OSM is to appropriately represent travel conditions on the highway and public transport networks for the appraisal of various schemes and future development scenarios. The OSM provides output that shows changes between the existing validated modelled situation and future years based on the input data.

2.15 The potential interventions that can be appraised in OSM include major highway improvements, large traffic management schemes and/or large-scale public transport schemes.

2.16 The fundamental feature of the OSM model is that it is strategic in nature. For local traffic assessments, outputs from the OSM should be used with the appropriate micro-simulation packages and/or junction modelling software. It may be that in such situations further local calibration and validation is needed as part of the local model approach to more accurately reflect flows on the local network. These refined models for local interventions are described later in my Proof of Evidence.

Highway Assignment Model (HAM)

2.17 The following paragraphs of this section will focus on the HAM, as it is the main area of interest for the Scheme in terms of strategic modelling. It provides output information for further development into the micro-simulation model and then into the detailed individual junctions assessments.

2.18 As is normal traffic modelling practice for a large study area strategic model, OSM was constructed for the Applicant in accordance with DfT Traffic Appraisal Guidance (a suite of living TAG Units). The calibration and validation process described below is simply the way of checking the level of accuracy of the model build work and showing how well the computer-generated traffic model can 'mimic' the existing observed situation. A good calibration and validation of the base year model then allows a good degree of certainty to the results provided for the forecast years and also any future highway infrastructure improvements, and/or mode shift changes.

2.19 The HAM was calibrated and validated using independent traffic data from an acceptable Neutral month period in 2013. The calibration and validation process also used mobile phone data in accordance with DfT TAG.

2.20 A new version of the TAG Databook (v1.7) was released in 2017 and it included changes to several of the factors and parameters used in the OSM (and inherently HAM and PTAM), of particular importance being the value of time and the vehicle operating costs, which were revised for the Base Year for the OSM. The next parameter update in July 2022 has not been used in the evidence presented as this update only became available after the window of opportunity to refresh the extensive traffic modelling evidence base, noting that the Planning Application was submitted in October 2021. However, consistency checks have been carried out and I can confirm that the parameter updates on OSM do not affect the modelling approach nor materially affect the modelling output, such that any decisions made on the 2014 modelling evidence remain sound.

2.21 These consistency checks included the industry standard parameters specified in TAG UNIT M3.1), such as screenline checks, journey times and assignment convergence criteria.

2.22 DfT TAG Guidance as set out in Unit M3.1 states how a traffic model can be shown to be sound, through the use of a summary set of statistics. These key statistical measures are then used to indicate the level of accuracy of the base model modelling and are captured in the SATURN output statistics. For the HAM these show a level of fit which supports the use of this model for future highway development and traffic forecasting. The DfT TAG guidance confirms that when these parameters are within the stated ranges the model is 'fit for purpose' and can be used with confidence to assess any number of future scenarios.

2.23 The OSM, built in 2014, is fully compliant with the TAG requirements and the HAM passed the appropriate calibration/validation criteria. These criteria are summarised in Appendix CC2.1, which confirms that the HAM is a robust traffic model.

2.24 The following paragraphs summarise the HAM matrix development to provide robust supporting evidence for strategic decision-making in Oxfordshire. The network information was extracted from OS Mapping, as built drawings and detailed design packages.

2.25 The HAM has been developed to simulate the movement of traffic on the road network within the Oxfordshire County area. It is used to test and assess the traffic impacts of future land-use scenarios, proposed highway Schemes and mitigation measures. The model includes Oxford City in detail along with Cherwell, West Oxfordshire, Vale of White Horse and South Oxfordshire which are all coded in the fully modelled area.

2.26 The model utilised data from a number of local and national sources, supplemented by bespoke data collected for the study, which includes INRIX, TrafficMaster and TomTom data. All these data sources are Industry standards and are accepted as reliable data sources.

2.27 The model validation reporting describes the development of the modelled networks and trip matrices, and their calibration and validation. In particular, Matrix Estimation procedures, following the required methodology stated in the DfT TAG Unit 3.1, have been used to fit the highway prior trip matrices to a set of observed traffic count data. The model has been successfully tested against the TAG calibration and validation criteria, which are summarised in full in Appendix CC2.1. The assignment model is shown to be stable for the three modelled peak periods (AM, PM and Interpeak as shown in Appendix CC2.1) and also meets the convergence criteria for:

- Link flows across selected screenlines, individual flows;
- Model convergence;
- Journey time comparison;
- Significance of Matrix Estimation Changes;
- Modelled flows across cordons and screenlines meet TAG criteria for most screenlines;
- At a link level the model performance against TAG criteria shows high level of compliance for total flow across the screenlines;
- The replication of observed journey times meets TAG requirements.

2.28 The validation screenline performed less well, as is often the case. However, these resulted from the necessary compromise to ensure that the impact of the Matrix Estimation process was kept to a minimum.

2.29 The HAM calibration and validation is well within allowed tolerances as stated by the relevant TAG Unit M3.1 and as such can be used to provide robust supporting evidence for strategic decision-making in Oxfordshire. On this basis, the model is considered to be fit for the purpose of forecasting the strategic effects of land-use strategies and the public transport Schemes and highway improvements within the core modelled area.

Variable Demand Model (VDM)

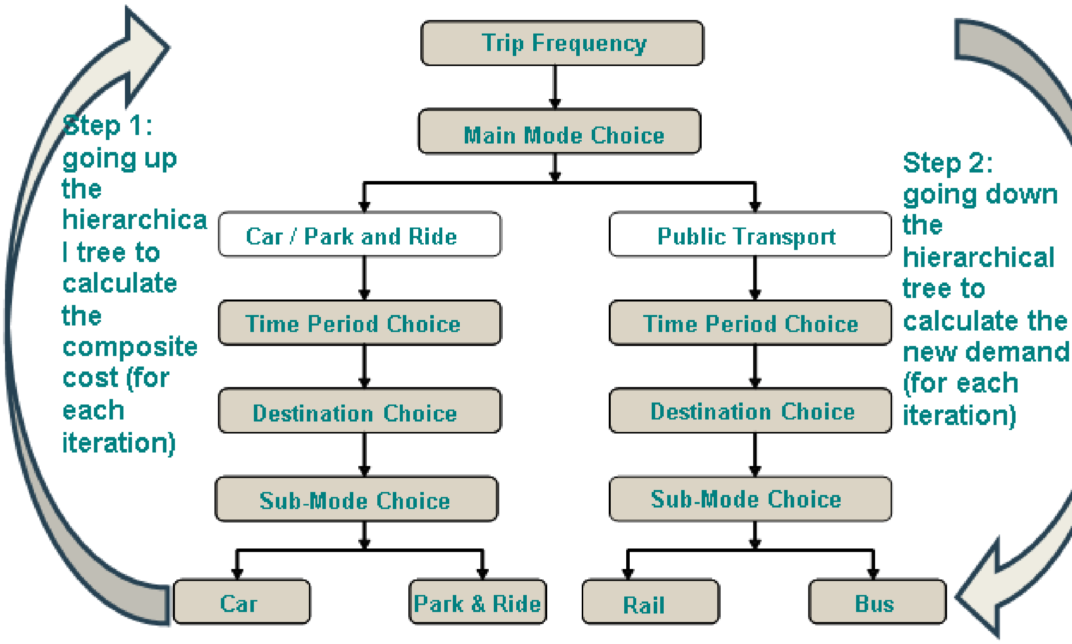
2.30 The following paragraphs of this section will focus on the VDM, as it is the main characteristic of OSM. One of its many key elements is it allows for choices to be made between modes, in different future scenarios.

2.31 The VDM has a hierarchical choice structure as shown in Figure 3, overleaf. Following TAG, it has an incremental demand modelling approach which responds to changes in travel ‘cost’ between the Base Year and the Forecast Year scenarios. The modelling process passes through multiple iterations until it converges.

2.32 Within the VDM there is a sub-mode choice between rail and bus. However, further mode choice between bus and bus rapid transit (BRT), when/if available in the future is undertaken within the Public Transport Assignment Model (PTAM), i.e., they are within the same segmentation in the demand model. This is achieved by defining bus and BRT as different modes in EMME (industry standard modelling software), which has previously been agreed in discussion with DfT.

2.33 The validity of the VDM has been assessed through realism tests. The main purpose of the realism tests is to demonstrate that the chosen model parameters (either locally calibrated or adopted from the nationally recommended parameters) replicate long-term elasticities derived from empirical observations and/or best practice.

Figure 3 Demand Model Hierarchy



Public Transport Assignment Model (PTAM)

2.34 The PTAM was developed in EMME, which is also an industry-standard software modelling package. The zone system and network definitions for the highway, public transport and demand models are consistent. The highway network was converted to an EMME based public transport (PT) model as the skeleton network. Bus services from major operators such as Stagecoach and Oxford Bus were then coded as the equivalent bus lines for the public transport network. The rail network, covering the main line between London Paddington and Reading, including the branch lines and part of London Tube network, was added to the EMME bus network to create an integrated PT network.

Conclusion

2.35 The OSM is a large strategic traffic model and has been used to provide dynamic traffic predictions using industry standard accepted variable demand matrix estimations.

2.36 The OSM has been successfully used as the evidence base for a number of strategic initiatives in Oxfordshire (See Section 3 for more detail), including the successful examination and adoption of numerous Local Plans, most relevant to the Scheme being:

- Vale of White Horse District Council Local Plan 2031 Part 1 (2016) (CDG.2.1);
- Vale of White Horse District Council Local Plan 2031 Part 2 (2019) (CDG.2.7);
- South Oxfordshire District Council Local Plan 2035 (2020) (CDG.1); and

2.37 The Scheme has been developed over a number of years and its impact has been considered as each of the local district plans detailed above have been developed. This iterative process enables this mitigation solution to be considered in context and at a number of different levels to ensure it remains the right Scheme to progress.

2.38 Accordingly, in my opinion the OSM is fit for purpose and has been appropriately used to support the Applicant's and relevant District Council's strategic development planning decisions since 2014, as it has followed the industry standard development process for strategic traffic and also meets the required levels of statistical compliance. This enables the traffic output information to be used in subsequent traffic models with confidence.

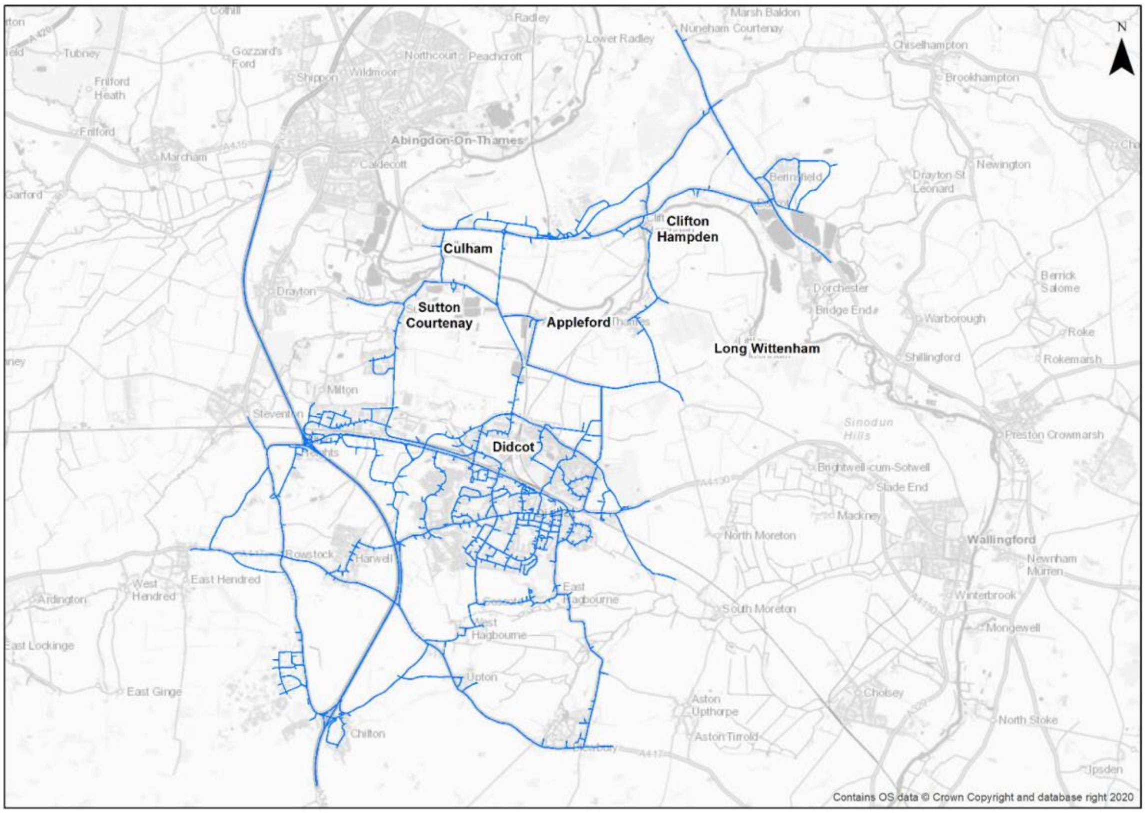
Micro-simulation Model (Paramics Model and links with OSM)

2.39 In the previous section I have discussed the higher level strategic level model, OSM, and explained why it is robust. This section will describe the Paramics Microsimulation model, its links with OSM, how it was used to support the Planning Application, and why it is also robust. The Paramics model forms the second step of the three-step modelling process used in the development of the decision making process for Scheme, as shown in Figure 1.

Base Year

2.40 SYSTRA developed a Traffic Microsimulation model of the Didcot area on behalf of the Applicant, South Oxfordshire District Council and Vale of White Horse District Council, to assist in examining planning and infrastructure proposals for the area. The base model reflects the state of the road network, and traffic flows and conditions in 2017) above and covering the area shown below in Figure 4.

Figure 4 – The Paramics model extent in 2034 with HIF Scheme in place



2.41 Compared to the plan showing the Fully Modelled Area of OSM in Figure 2 above (page 9 of my proof of evidence), it can be seen that Paramics is a smaller model which enables it to include more local detail within its modelling parameters.

2.42 Three SYSTRA Paramics model reports are appended to the Transport Assessment (CDA.7) which set out in detail how the model was developed. These reports are:

2.42.1 Transport Assessment - Appendix E – Didcot Microsimulation Base Model Development Report (September 2018)

2.42.2 Transport Assessment - Appendix F – HIF1 Paramics Modelling Forecasting Note (September 2021)

2.42.3 Transport Assessment - Appendix G – HIF1 Paramics Modelling Future Year Infrastructure Note (September 2021)

2.43 I do not intend to replicate all of the information from those reports in my Proof of Evidence, but I highlight some of the key elements below. The base year model was developed in Paramics Discovery Software. The below extracts in italics are from pages of the Transport Assessment (CDA.7, Appendix E pages 6 to 8 – Didcot Microsimulation Base Model Development Report September 2018).

> *"Paramics Discovery is an industry standard traffic microsimulation product. Microsimulation reflects individual vehicles, and their interactions with each other and the road network, and thus provides an increased level of detail when compared to traditional assignment modelling packages such as SATURN, which is used for the Oxfordshire Strategic Model (OSM). In Paramics Discovery, individual vehicles choose routes from their origin to destination based on their perception of the best route available, and considering traffic congestion within the study area as they would in reality.*
>
> *The model has been coded using Ordnance Survey mapping to ensure that the road layout is as accurate as possible. Lane markings at junctions have been coded to reflect those on street, and where traffic signals are present these have been coded to reflect the real-world signal timings. Bus services within the study area have been included with stopping patterns and timetables as current in 2017."*
>
> *"The model reflects the following time periods, for a normal, neutral month:*
>
> - *AM – 07:00-10:00*
> - *Inter Peak – 10:00-16:00*
> - *PM 16:00 - 19:00"*
>
> *"Traffic demands for each period of the model have been developed using an extensive set of traffic count data collected late in 2016 and in 2017. This included detailed turning count surveys at the significant junctions within the study area. The traffic demands were informed by data from OSM to ensure that the traffic patterns within the study area were as consistent as possible with those in the strategic model. The build-up and dissipation of traffic within each time period has been reflected through the inclusion of a series of demand release profiles for the key movements into, within, and out of the study area."*

2.44 The zones, used to control the release and destination of vehicles in the Paramics model, were based on a disaggregation of the OSM zoning system and were developed by grouping relevant Census Output Areas output areas within each OSM zone based on land use and proximity to links for loading onto the network. This disaggregation of the OSM zones resulted in 124 Paramics Zones in the model, 99 'internal' and 25 'external'. The external zones identified at the cordon points around the study area enable movements to and from areas outside the model to access/egress the network, i.e., from the boundary with the OSM.

> *"The model provides a fixed trip matrix assessment - the input demand matrix, in this case for the base model, does not change in response to network conditions. Whilst the model reflects bus services, no public transport demand, or changes in this in response to network changes, increased demand etc., are considered. In future year scenarios, should the network become congested, all of the assigned demand will attempt to travel; no reduction in demand in response to congestion occurs.*
>
> *The model has been calibrated to ensure that the traffic behaviour, and thus conditions, across the model reflect those observed in reality as closely as possible. Particular areas/issues which were focussed upon in detail were:*
>
> - *Milton Park/Milton Interchange congestion*

- *Culham Crossing congestion*
- *Clifton Hampden Signals congestion*
- *A4130/Frank Williams Drive area congestion*

Comparisons of the modelled and observed turning counts have been undertaken in line with published guidance for model development. DfT's WebTAG guidance provides acceptable thresholds for the comparison of modelled and observed turning movements in the context of calibrating and validating traffic flows within a model".

2.45 The validation data are shown in Appendix CC2.2. These results confirm that the model is a robust base for use in assessing developments and infrastructure proposals.

Future Year

2.46 The future year Paramics models were developed using information from the OSM for the future year forecasts to ensure consistency between OSM and the Didcot Paramics model was maintained throughout the micro-simulation model development process.

2.47 The forecast increase in traffic between external model zones (i.e., traffic travelling through and not stopping the study area) was derived from information from the OSM models for 2013, 2021 and 2031 years interpolated to provide the Paramics future years. The Paramics forecast traffic modelling years are 2020, 2024, 2034, 2039. Cordon matrices from OSM were extracted for the Paramics model study area and they were then disaggregated to the local Paramics zones.

2.48 The Trip distributions for the new developments, both commercial and residential, were derived from the OSM 2031 cordon matrices. The OSM and Paramics forecast traffic flows associated with each development was defined, in consultation with the Local Councils, to provide a distribution for each site in each time period, based on their housing and employment growth assumptions. The housing and employment trajectories were provided by the Vale of White Horse and South Oxfordshire Local Planning Authorities. These totalled an additional 15,825 dwellings in the model area from 2017 Base Year to 2034, and 747,446 sqm additional Employment Floor Area across different use classes (see Appendix CC2.3 - Tables 5.1 and 5.2 of the Transport Assessment, CDA.7).

2.49 Of particular importance to note in the modelling approach is the demand reduction (this element of 'decide and provide' is discussed in more detail in section 5 of my Proof of Evidence), comparing the 2034 scenario to the 2020 and 2024 scenarios. This is also explained in the Transport Assessment (CDA.7, paragraph 5.3.8):

"For the 2034 scenarios the model assumes 100% demand of existing trips present in the 2017 base, and 80% of demand for new growth. The justification for this approach is set out in SYSTRA Technical Note 'HIF1 Paramics Modelling – Forecasting Note' (September 2021) in Appendix F, and is summarised below (Section 6 of the SYSTRA Technical Note refers):

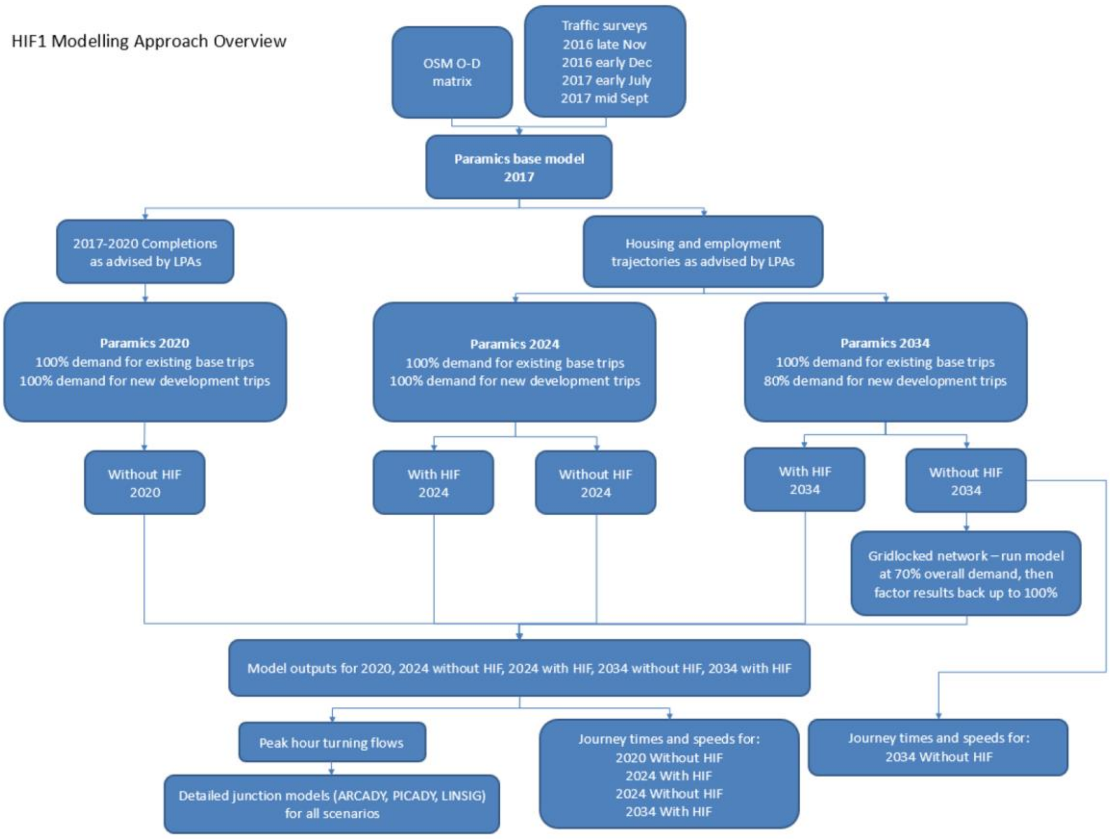
The model uses a generic trip rate across all development in the area. A demand reduction is required to align the trip generation with trip rates recently accepted by OCC TDC for planning applications sites in Didcot. This accounts for approximately half of the demand reduction. See below paragraph for more information.

It is assumed that the Garden Town principles will continue to be enacted in this area over the next 14 years, increasing the usage of sustainable modes. Modal shift from these developments later in the plan period (over a decade away) is more likely as they are coming alongside significantly improved pedestrian / cycle / public transport provisions. The Paramics model is not multi-modal so cannot automatically account for improved NMU infrastructure, therefore a demand reduction is used as *a proxy. This and the following point account for approximately half of the demand reduction.*

The largest new sites follow good spatial strategies and are in more sustainable locations near public transport hubs and / or are located nearer the growing employment areas which will have significantly improved NMU routes."

2.50 In order to inform the Scheme Transport Assessment, SYSTRA ran the 2020, 2024 and 2034 models and extracted outputs which were passed to AECOM for the next stage of modelling. Figure 5 below summarises the Paramics modelling approach that created the data to inform the Transport Assessment (CDA.7 - replication of Figure 5.2).

Figure 5 – Paramics modelling approach informing the transport assessment



2.51 SYSTRA also extracted model outputs for various scenarios with and without the Scheme, as required to inform future changes to Noise, Air Quality, and Greenhouse Gas emissions. These are reported in the relevant chapters of the Environmental Statement in CDA.15 Chapter 6 Air Quality, Chapter 10 Noise and Vibration, and Chapter 15 Climate.

Standalone junction modelling (Junctions 9 and LinSig with Paramics models)

2.52 Detailed junction models were developed from the Paramics Micro-simulation traffic model by AECOM using output data from the Paramics model that has previously been developed from the OSM. This ensures that all the modelling carried out to support this development is consistent and robust. The full extent of the detailed Junction Modelling area is shown in Appendix CC2.4. The junction modelling forms the third step of the three-step modelling process used to develop this Scheme, as shown in Figure 1 above. A detailed map of the junctions modelled are shown in Appendix CC2.4 and it can be seen that these junctions model provide a better degree of clarity on their operational performance under different modelling scenarios.

2.53 The results of the capacity assessments have been presented in the Transport Assessment (CDA.7) to demonstrate the impact of the Scheme on existing junctions and the anticipated performance of new and improved junctions in the assumed year of opening (2024) and the future year (2034). The results are summarised in Tables 6.1 and 6.17 of the Transport Assessment (CDA.7) for the existing junctions and new Scheme junctions.

2.54 Impacts on existing junctions and the capacity of proposed junctions along the Scheme were assessed using industry-standard software tools. Priority junctions and roundabouts were assessed using the Junctions 9 software package, developed by TRL Software. Junctions 9 was the version of the software current at the time the capacity assessments were undertaken; the latest version of the software is Junctions 10. Junctions 9 consists of ARCADY (the roundabout module) and PICADY (the priority junction module). The two modules are used to model and predict capacity, queues and delays at junctions. Inputs to the models are the junction geometry and vehicle turning movements obtained from the Paramics model for 2020, 2024 and 2034 scenarios. Junction geometry for existing junctions was measured from OS mapping, and for all proposed junctions the geometry was taken from the design drawings.

2.55 The key outputs from Junctions 9 include the Ratio of Flow to Capacity (RFC) and the average queue length which are reported for each arm of the junction. An RFC value of 0.85, or below, indicates that the arm is operating within expected design capacity. An RFC value of 0.85 to 1.00 indicates that the arm is operating above design capacity, but within theoretical capacity, while an RFC value of 1.00 or more indicates that the arm is operating above theoretical capacity and significant queuing and delays may occur when additional pressures are put on the junction.

2.56 Signalised junctions were assessed using the LinSig software package, developed by JCT Consultancy. LinSig is used to model individual signalised junctions or networks of several junctions. Inputs to the model include the vehicle turning movements between arms (taken from the Paramics model for forecast flows), junction geometry and traffic signal operation parameters. The Highway Authority provided plans and signal controller information (signal phasing, staging, intergreen periods, etc) for each of the existing junctions.

2.57 The performance of the signalised junctions has been assessed by considering the Degree of Saturation (DoS) for each of the approach arms. A DoS value of 90% or below indicates that the arm is operating within expected design capacity. A DoS value of 90% to 100% indicates that the approach is operating above design capacity but within theoretical capacity, while a DoS value of 100% or more indicates that the arm is operating above theoretical capacity where significant queuing and delays may occur. The results for the LinSig models also present the Mean Max Queue (MMQ) for each approach arm. This is detailed in the Transport Assessment (CDA.7).

2.58 Both Junctions 9 and LinSig, for traffic signal-controlled junctions, models were used to assess the performance of existing and new junctions in both the AM and PM peak periods for the 2024 and 2034 assessment years, both without and with the Scheme in place. Turning movements for each junction were obtained from the Paramics model for each modelling scenario together with the proportion of Heavy Goods Vehicle in the vehicle mix.

2.59 As explained in the above sections the validation of each model process is an important step in ensuring that the model used at each level is performing to an acceptable level of accuracy and allows good certainty of the results from the model. Individual junction assessments included in the Transport Assessment (CDA.7) use model output flows from the validated Paramics model (Appendix CC2.2). Additionally, the junction models have been verified as part of the Planning Application process, such that no highway concerns were raised in the Highway Authority Consultation Response dated 1 August 2022 (CDE.42). Further information on the Highway Authority statutory consultee response is detailed in paragraph 4.10, which confirms the positive outcome of the audit checks made on the traffic modelling.

2.60 Therefore, I am satisfied that the individual modelling process is sound and that the information they provide is a realistic assessment of the future operation of the junctions modelled.

Model Interdependency

2.61 The interdependencies of the three traffic modelling techniques detailed above show how the traffic flows derived from OSM and the supporting network information has been cascaded down to the individual junction assessments included in the Transport Assessment for the Scheme, via the Paramics model.

2.62 The geographical areas for each model have also been shown to be appropriately linked with modelling information being passed on at each interface in accordance with good modelling practice.

2.63 The model outputs from all three traffic models - OSM, Paramics and the individual junction models - have been shown to be sound and will therefore be used address the concerns raised in representations to the Planning Application and/or objections to the Orders.

2.64 The Scheme has been identified through an iterative approach that has been developed through the systematic involvement of a number of experts all of whom have influenced the input data needed to develop the final design through the assessment of their area of expertise. For the traffic movements assessed, this has been developed conceptually through the Local Plan process and in more detail for the Scheme in the Transport Assessment (CDA.7)**.**

2.65 The traffic modelling has been shown to be robust at all stages and has included the effects of the wider traffic impacts. It has also considered mode shift options and ensured that output information has flowed from OSM through the Paramics modelling and then on to the individual junction model assessment reported in the Transport Assessment (CDA.7).

3 LOCAL DEVELOPMENT PLAN APPROACH

3.1 The OSM model has been established, above, as a sound model to use in the support of Local Development Plans and decisions within Oxfordshire and has been used, consistently, across a number of Local Plans to develop future scenarios. The traffic flow information from OSM, suitably updated as time has passed, has been used as the basis for the evaluation of traffic impacts for key geographical areas in the following plans which include the Scheme, with the modelling approaches for each of the Local Plans described below:

- Vale of White Horse District Council Local Plan 2031 Part 1 (2016);
- Vale of White Horse District Council Local Plan 2031 Part 2 (2019); and
- South Oxfordshire District Council Local Plan 2035 (2020).

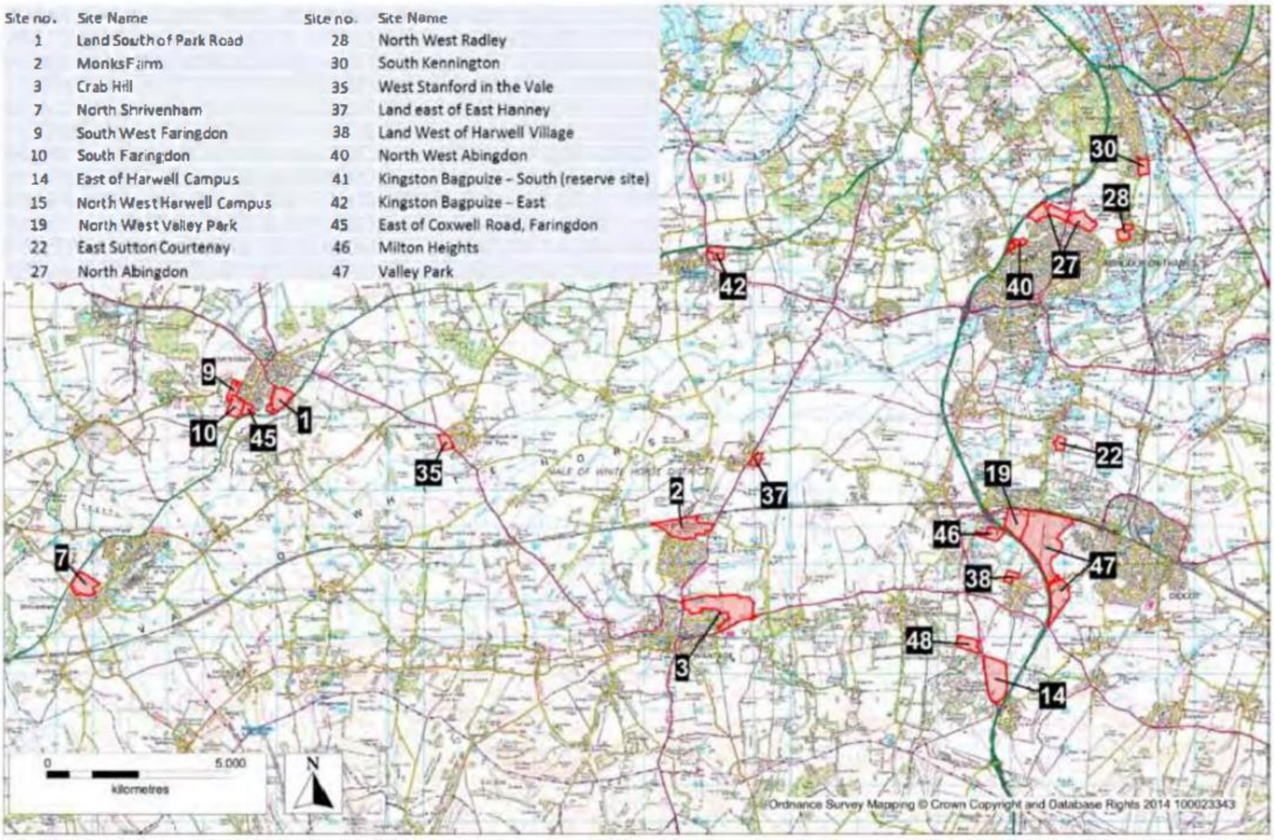
<u>Vale of White Horse District Council Local Plan 2031 Part 1 (2016) (CDG.2.1)</u>

3.2 The Evaluation of Transport Impacts (ETI) Study (CDG 2.3) published in November 2014, used the Central Oxfordshire Transport Model (COTM), to inform the Vale of White Horse District Council Local Plan 2031 Part 1 Strategic Sites and Policies, which was later confirmed using OSM. The ETI work followed an iterative five-stage process, which considered a number of different levels of potential development in various locations within the district. The final quantum of housing and employment across the district was 20,560 homes and 23,000 jobs. This iterative process included the consideration of a variety of different mitigation measures, which led to the preferred package of schemes, within which the Scheme was included, including improvements for all transport modes to be included in the resultant local plan policies and infrastructure delivery plan.

3.3 In the Inspector's Report on the Examination into the Vale of White Horse Local Plan 2031 (Part 1) dated 30 November 2016 (CDG.2.5), it was recognised that the package of mitigation to support the plan, which includes the Scheme, as identified in the ETI (CDG2.3, para. 144, p.39): "…*would largely mitigate the impacts of the proposed new development in the district, albeit that some congestion issues would remain*."

3.4 ETI Report, November 2014 (CDG2.3) sets out in its Figure 7.1 (copied below for ease of reference in Figure 6) the housing site assumptions which were included in the final publication version of that Local Plan, known as Stage 5 (or S5). Their impacts were modelled in accordance with industry standard methodologies and the extents of the geographical area are shown below in detail in Appendix CC2.5.

Figure 6: ETI Stage 5 Strategic Development Sites

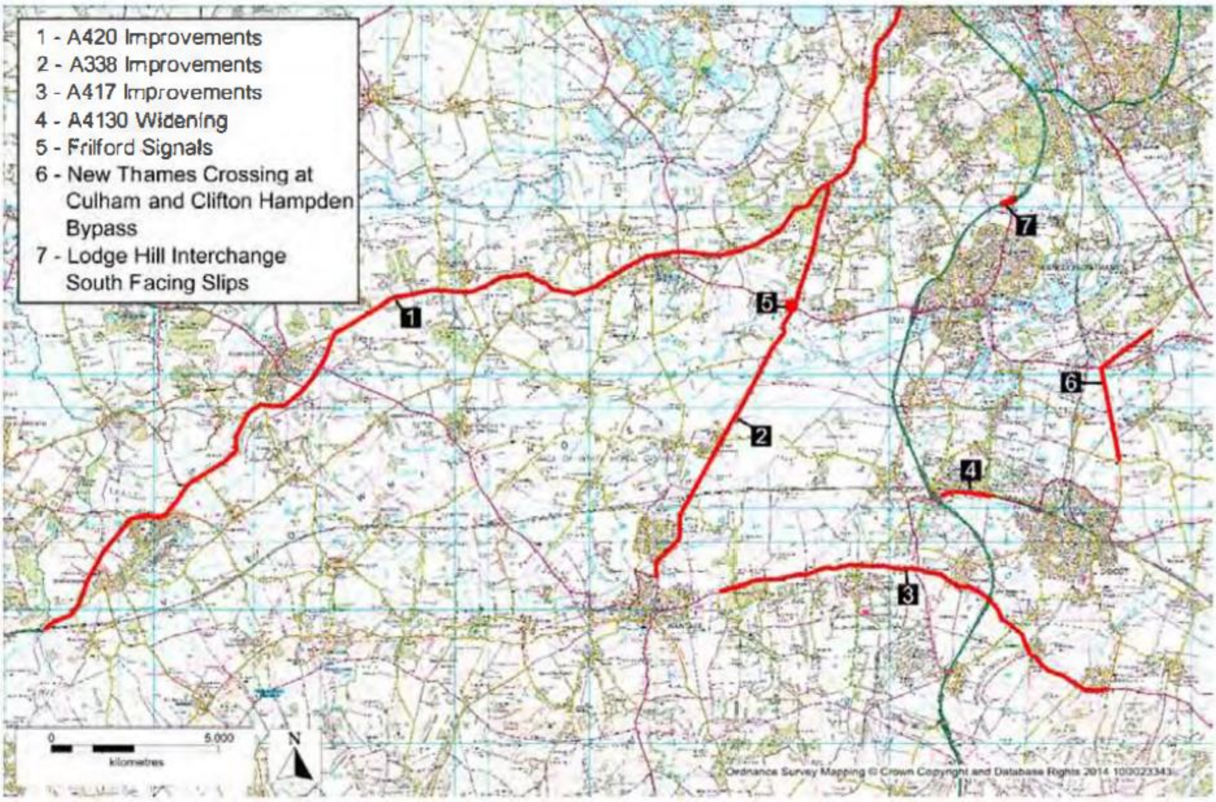


3.5 This ETI which assessed these allocations and potential mitigation strategies utilised the Central Oxfordshire Transport Model (COTM), which was OCC's strategic model at the time. (COTM was the precursor to OSM). Multiple mitigation strategies were considered, with Scenario 5B being considered to be the most appropriate, which included versions of the Scheme as assumed at that time, noting that Science Bridge (now referred to as Didcot Science Bridge) is included as stated in Table 1 and shown in Figure 7 (Table 7-3 and Figure 7-3 of CDG2.3 both copied below for ease of reference).

Table 1: ETI Stage 5 Scenarios

Scenario	Description
ETI Stage 5	• No additional highway mitigation
ETI Stage 5 A	• Scenario 5 with A4130 widening between Milton Interchange and Science Bridge, Lodge Hill south facing slip roads and improvements to the traffic signals at the A415 / A338 junctions at Frilford • Corridor studies along the A420, A338 and A417.
ETI Stage 5 B	• Scenario 5A with a new Thames crossing at Culham and a Clifton Hampden Bypass
ETI Stage 5 C	• Scenario 5A with A34 widening between Hinksey and Milton.

Figure 7: Stage 5B Highway mitigation measures



3.6 The results of the modelling assessments of this Stage 5B scenario are shown in CDG.2.4 the ETI Final Report Appendices (a summary of which is included in Appendix CD2.5). The modelling assessments show that with the Scheme in place, there is an acceptable level of operation of the transport corridors, albeit with some areas of congestion.

Vale of White Horse District Council Local Plan 2031 Part 2 (2019) (CDG.2.7)

3.7 The Evaluation of Transport Impacts - Stage 2 for Vale of White Horse District Council Local Plan 2031 Part 2 (CDG.2.12) was published in October 2017. Utilising the same approach to the ETI work undertaken for Part 1, the work for Part 2 followed an iterative process considering different spatial strategies and used OSM to model the potential traffic impacts. As the need for improvement schemes and the area-wide transport strategy had already been established in the adopted Part 1 plan, the elements that now comprise the Scheme were assumed to be necessary to facilitate additional growth and therefore were included in the 'do-minimum' scenario as well as the various 'with development' scenarios.

3.8 The ETI Report CDG.2.12 sets out in its Table 16 (copied below as Table 2 for ease of reference) the housing site assumptions that were modelled in OSM, with Option 2 being closest to final adopted Local Plan Part 2 (noting that the Harwell Campus allocation was not included in the adopted Local Plan).

Table 2: Local Plan Stage 2 - ETI Options

Option	Site	Capacity (No. of dwellings)
Option 1	Dalton Barracks (Shippon)	1,200
	East of Kingston Bagpuize with Southmoor	600
	Marcham	520
	East Hanney	130
	Harwell Campus	1,000
	North West of Grove	400
	West of Harwell Village	100
	Total	**3,950**
Option 2	Dalton Barracks (Shippon)	1,200
	East of Kingston Bagpuize with Southmoor	600
	Marcham	120
	East Hanney	130
	Harwell Campus	1,000
	North West of Grove	400
	Total	**3,450**
Option 3	Dalton Barracks (Shippon)	600
	East of Kingston Bagpuize with Southmoor	600
	Marcham	120
	East Hanney	130
	Harwell Campus	1,000
	North West of Grove	400
	Total	**2,850**

3.9 In that same document, CDG.2.12, it states in its Table 13 (extracted below as Table 3 showing only the Vale/South area) a list of the highway schemes that are included in the 'Do Minimum', which included all four elements of the Scheme as highlighted (note that "Access to Culham Science Centre – Phase 1" was an earlier name for the element of the Scheme now named 'Clifton Hampden Bypass'.

Table 3: Extract of Vale/South Highway Schemes

Vale/South	Harwell Link Road Section 1 (B4493 to A417)
Vale/South	Didcot Northern Perimeter Road Stage 3
Vale/South	Wantage Eastern Link Road (WELR)
Vale/South	A34 Milton Interchange Hamburger
Vale/South	A34 Chilton Northern Slip Roads
Vale/South	Foxhall Bridge Widening
Vale/South	Access to Harwell Section 2 (Hagbourne Hill)
Vale/South	Grove Northern Link Rd
Vale/South	Rowstock Roundabout improvements
Vale/South	Featherbed/Steventon Lights junction improvements
Vale/South	Great Western Park access
Vale/South	Valley Park spine road (A4130 – B4493)
Vale/South	Coding to reflect traffic management measures in villages (Harwell)
Vale/South	Harwell Oxford all access points junction improvements
Vale/South	Improvements to traffic signals at Frilford Junction (A415/A336)
Vale/South	Junctions on A4130
Vale/South	A420 Western Vale infrastructure (Faringdon – access to The Steeds development)
Vale/South	Lodge Hill Interchange (South facing slip roads onto the A34)
Vale/South	Access to Culham Science Centre - Phase 1
Vale/South	Didcot to 'Culham Thames Crossing' (Access to Culham Science Centre - Phase 2 (Option 3))
Vale/South	Science Bridge modelled with two roundabouts as in the OCC layout & A4130 Capacity Improvements
Vale/South	South Access to Valley Park Spine Road modelled according to the layout provided by Brookbanks in October (5 arm roundabout).
Vale/South	A420-Highworth Road, Shrivenham

3.10 The results of the OSM modelling assessments of the Vale of White Horse Local Plan Part 2 scenario 'Option 2 with mitigation' scenario are shown in the ETI (CDG2.12, figures 20 and 21) and in Appendix CC2.5, which show that with the Scheme in place that there is an acceptable level of operation of the transport corridors, albeit with some areas of congestion.

<u>South Oxfordshire District Council Local Plan 2035 (2020) (CDG.1)</u>

3.11 As with the ETIs for the Vale of White Horse local plans, the evaluation of transport impacts for the Stage 3 of the South Oxfordshire District Council Local Plan published as a summary in the 'Explanation of Change to TRA06.6' (CD G1.7) and in detail in CD G1.4, CD G1.5 and CD G1.6 which followed an iterative process of testing a variety of spatial strategies and transport mitigation packages. As before, given that the need for the Scheme had been established through previous ETI processes, these remained necessary to accommodate the cumulative development associated with adopted local plans at the time. In addition to this, the funding bid for the Scheme was announced as successful in March 2019, which was prior to the completion of the latter stages of the ETI and therefore the Scheme remained appropriate for inclusion in the 'do-minimum' scenarios.

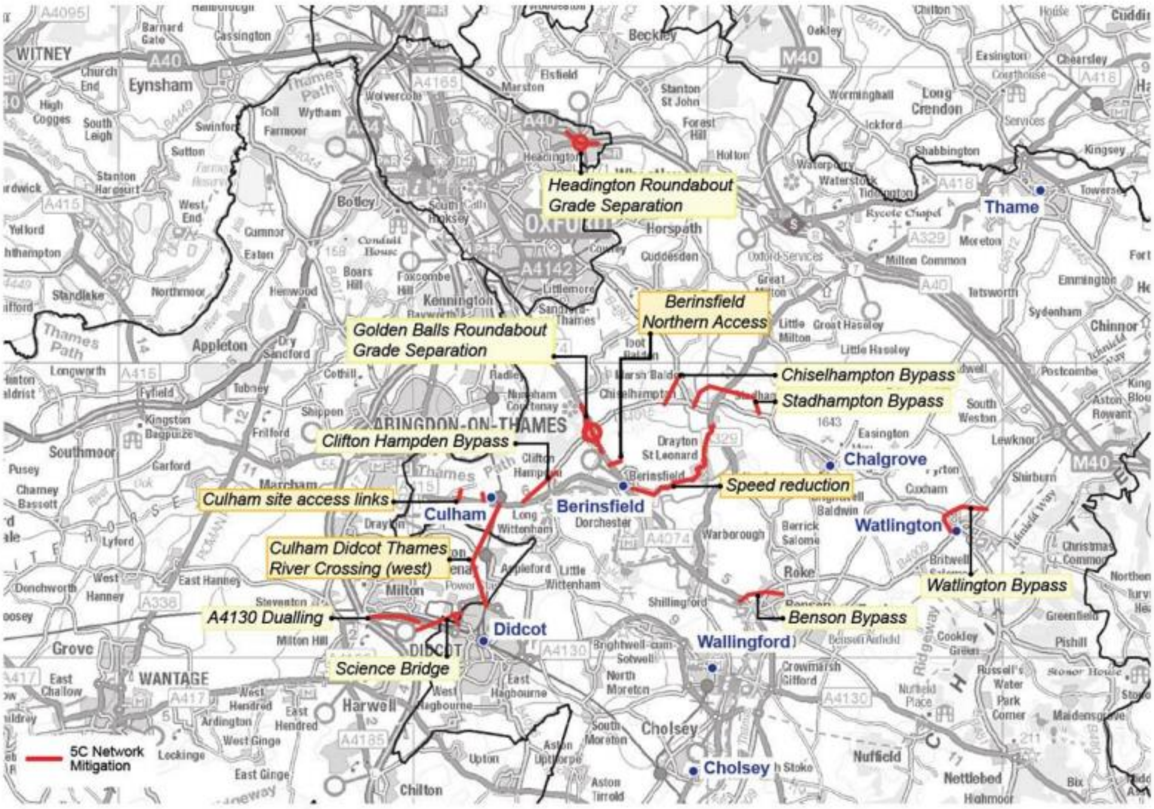
3.12 In the Inspector's Report on the Examination of the SODC LP 2035 dated 27 November 2020 (CD G.1.8), it was recognised that the package of mitigation to support the plan, which also includes the Scheme, identified in the updated ETI (para. 214, p.214), would: *"…enable STRAT8 [Culham Science Centre], STRAT9 [Land Adjacent to Culham Science Centre] and STRAT10 [Berinsfield Garden Village] to proceed. They are part of a wider highway strategy to support the delivery of housing growth in the wider Didcot Garden Town area and to mitigate the impact of existing, approved and allocated developments".*

3.13 Atkins' report 'TRA06.6 Evaluation of Transport Impacts Stage 3 – 5c Addendum March 2019 (CDG.1.6) (updated on 22 July 2020) sets out in Table 4 (extracted below) the housing site assumptions included in the OSM modelling. Figure 8 shows the highway scheme mitigations included in the modelling, noting that the Scheme was included, and at this time the Didcot to Culham River Crossing element of the Scheme alignment is now proposed to west of the Cherwell Valley Railway Line in the report.

Table 4 ETI Scenario 5C Developments and Transport Mitigation (2031)

Scenario	Proposed Developments	Mitigation Included
5c	Northfield (1,800), Grenoble Road (3,000), Chalgrove (3,000), Culham (3,500), North of Bayswater Brook (formally called Wick Farm/ Lower Elsfield (1,100), Berinsfield (1,700), Wheatley (300), NE Didcot (additional 150) and Neighbourhood Plan commitments and targets.	Benson Bypass, Chiselhampton Bypass, Stadhampton Bypass, Watlington Bypass, Culham Site Access Links, Culham Didcot Thames River Crossing Western Alignment, Berinsfield northern access, Speed reductions to Dorchester/Stadhampton Road to 20mph, six additional bus routes, the grade separation of Golden Balls roundabout and the grade separation of the A40 at Headington roundabout.

Figure 8: Proposed Highway Schemes for scenario 5C

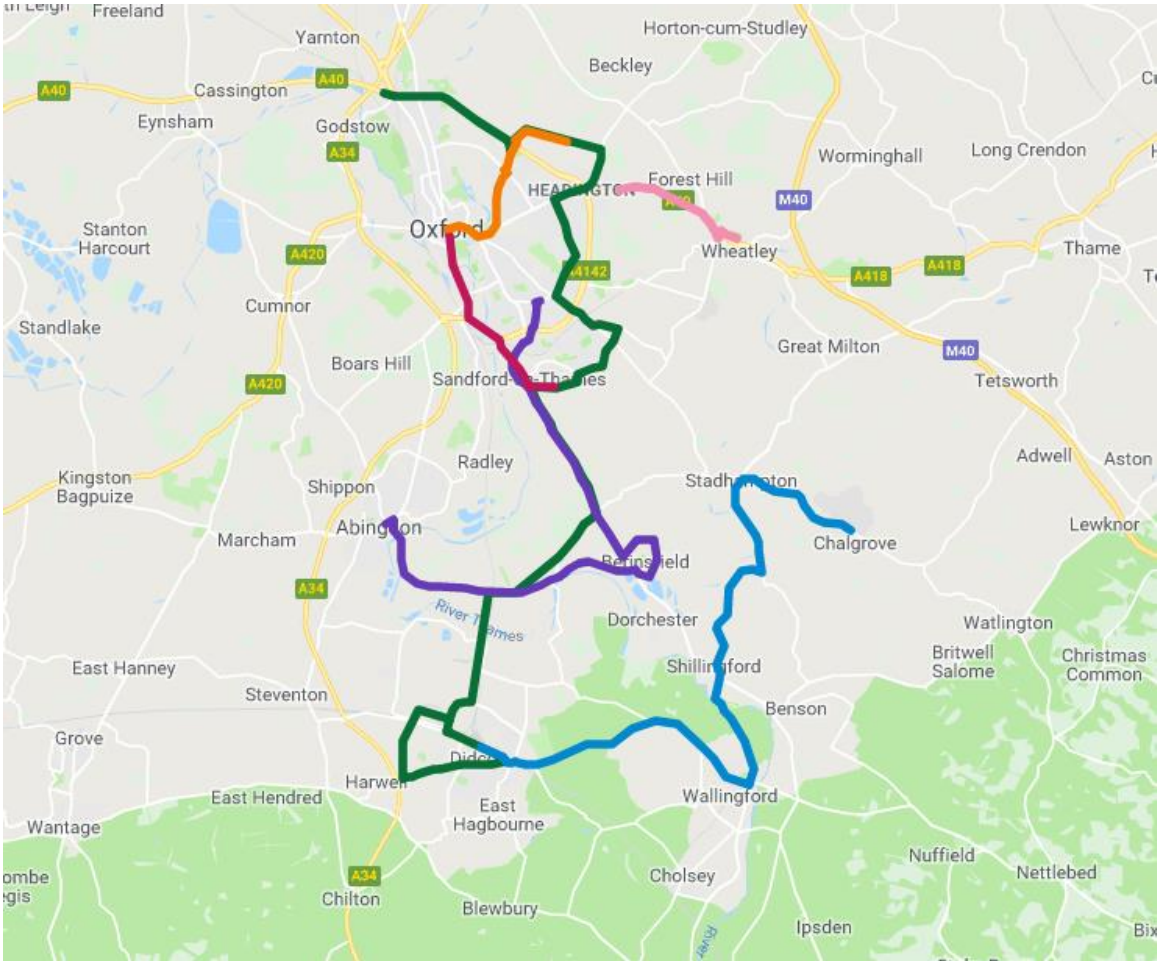


3.14 Within the OSM modelling, six new bus routes as shown in Figure 9 below were included as part of Scenario 5c to serve South Oxfordshire and the proposed new developments. Table 5 shows the assumed frequencies for each route. The frequency of the existing route T1 between Oxford and Chalgrove was also revised to four buses per hour in each modelled time period.

Table 5 - Scenario 5c New Bus Services and Frequencies

Route ID	Route Name	Frequency (per hour)
1 (Green)	Didcot Parkway to Northern Gateway	4
2 (Purple)	Abingdon to Cowley Centre	2
3 (Blue)	Chalgrove to Didcot	2
4 (Red)	Grenoble Road to Oxford City Centre	6
5 (Orange)	Bayswater to Oxford City Centre	3
6 (Pink)	Wheatley to Thornhill	2

Figure 9 – Scenario 5c New South Oxfordshire Bus Services



3.15 The results of the OSM modelling assessments of the South Oxfordshire District Council Local Plan 2035 Scenario 5c are shown in Figures 3-5 and 3-6 of TRA06.6 Evaluation of Transport Impacts Stage 3 – 5c Addendum March 2019 (CDG.1.6) (updated on 22 July 2020), which are included in Appendix CC2.5. These show that with the Scheme in place, there is an acceptable level of operation of the transport corridors, albeit with some areas of congestion.

Conclusion

3.16 From the above summary of the modelling methodology used to support the three Local Plans in the area, it is clear that the Scheme was shown to be required in the earliest of the Local Plans and so was subsequently required to be retained in later Local Plans, which added significantly more growth in the area. During the evolution of the Local Plans, the Scheme was informed by ongoing investigations (further detail is provided in Aron Widsom's Proof of Evidence), resulting in the alignment of the proposed Didcot to Culham River Crossing changing from the east to the west of the Cherwell Valley Railway Line, which was replicated in the Local Plan modelling.

3.17 Through the Local Plan modelling, traffic impacts of the proposals in the Local Plans, including the Scheme, were assessed across a wide area. The modelling showed that the Scheme supports the level of growth at an acceptable level of highway operation across the area, but that some areas of congestion could remain (See CC2.5). This is an element of 'Decide and Provide', whereby the intention has not been to maximise the level of highway intervention by providing excess levels of spare capacity.

4 THE TRANSPORT ASSESSMENT FOR THE SCHEME

4.1 This section will cover the approach to modelling and explain how traffic modelling data was used to support the detailed assessment of the operational impact on the existing junctions and the proposed new junctions, carried out by AECOM. A summary of the junction modelling statistics is included in the Transport Assessment for the Scheme (CDA.7), and these have been summarised in Appendix CC2.4 to my Proof of Evidence.

4.2 Atkins did not directly undertake the modelling used in the Transport Assessment. As the Expert Witness for the modelling elements of the Scheme, I have reviewed the methodologies reported in the Planning Application documents and their appendices, which I note have followed industry-standard procedures using industry-standard tools and appropriate up-to-date assumptions that were available at the time. I can confirm that the modelling methodologies used to support the Scheme are robust, and therefore I also view the results as robust.

4.3 Before considering the modelling output, it is helpful to first consider what limited conclusions could be reached without the use of the model and imagining what the highway network might look like in the future after significant planned housing and employment growth is built. Considering the 'likely imagined' average speeds across the network is a simple way to consider the overall situation.

4.4 Taking a 2020 base year where there is already congestion and applying four years of traffic growth due to the new housing and employment, then the average speed would decrease, as more vehicles on the same road space would introduce more congestion and create more queueing. If another decade of growth on top of this is applied with no transport interventions, then the average speed would be lower again as congestion and queueing increases further. Similarly with journey times, more cars on the same network would increase the journey times. Paragraph 4.9 of my Proof of Evidence includes the Paramics model average speed results extracted from the Transport Assessment (CDA.7), which are sensible and show what I would expect to see.

4.5 Without a model available, it would be assumed that in 2024 the average speeds in the area would increase, possibly to a level higher than in 2020 as the availability of new road capacity would be larger than the growth over those four years. However, with another decade of growth, by 2034 with the Scheme in place, I would expect the average speed to have reduced compared to 2024 with the Scheme, but still be significantly higher than the 2034 situation without the Scheme.

4.6 The Paramics model confirms this and has the additional ability to look at any number of transport intervention packages to enable a preferred solution to be decided upon. Overall, the results show what I would expect to see if a model was not available, but in more detail and with the ability to quantify the impact on the surrounding highway network in detail for a number of scenarios.

4.7 The Transport Assessment (CDA.7) also sets out the modelling, which shows that the Scheme enables the network to operate in 2034 similarly to 2024 without the Scheme, whilst experiencing ten years of housing and employment growth. This is part of a balanced transport strategy, where the Scheme does not aim to provide unlimited highway capacity for cars or to remove all congestion.

4.8 Tables 3.4 to 3.15 and tables 6.1 to 6.39 of the Transport Assessment, together with the text relating to these tables, clearly set out the results of the modelling methodology. As such, I have not repeated the full report here on a junction-by-junction basis. Instead, I present a summary extract from the Transport Assessment (Section 6.11 of CDA.7) and discuss some of the higher-level, overall network results from the Paramics model report that help to illustrate the Scheme impacts.

4.9 The text in italics below is as set out in the Transport Assessment (CDA.7) and has not been edited for inclusion in my Proof of Evidence, but is presented here for ease of reference.

"6.11 Overall Network Statistics

6.11.1 The average speeds of vehicles were extracted from the Paramics model to represent the overall performance of the network with and without the HIF1 Scheme. The demand scenarios are explained in Figure 5.2. Results from 2020, 2024 and 2034 scenarios without and with the HIF1 Scheme for AM and PM peaks are presented in Figure 6.29 and Figure 6.30 below.

Figure 6.29: AM Average Speed

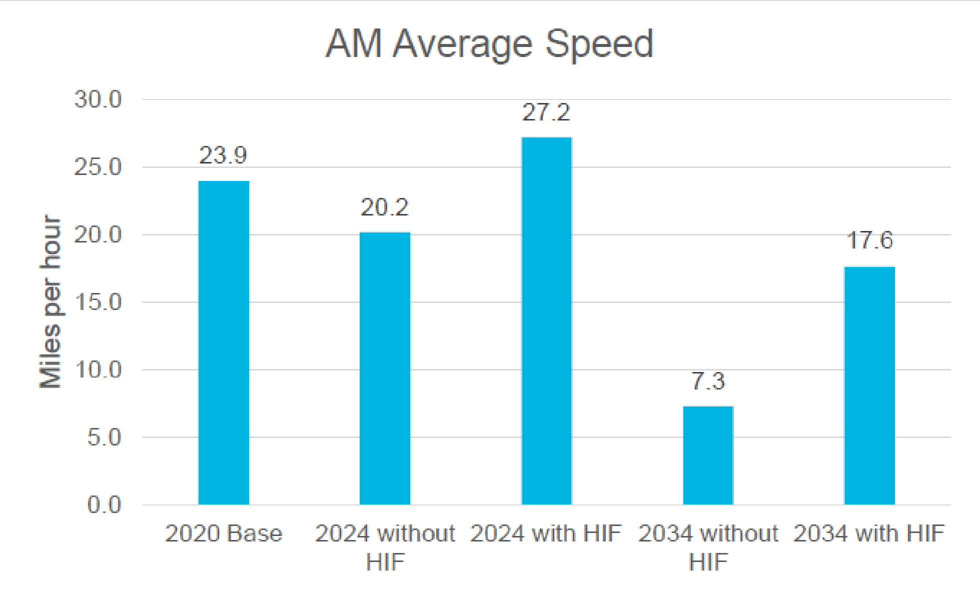
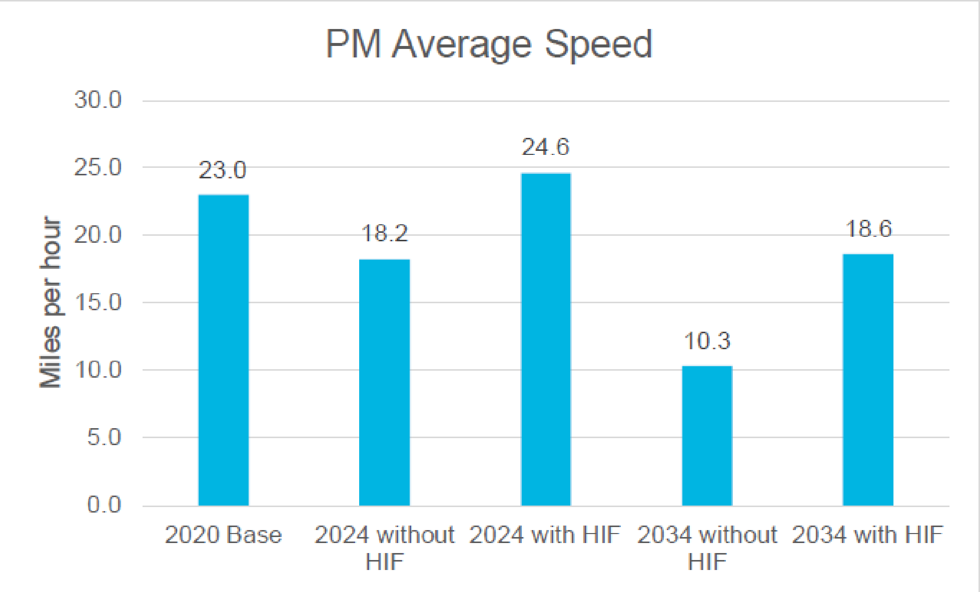


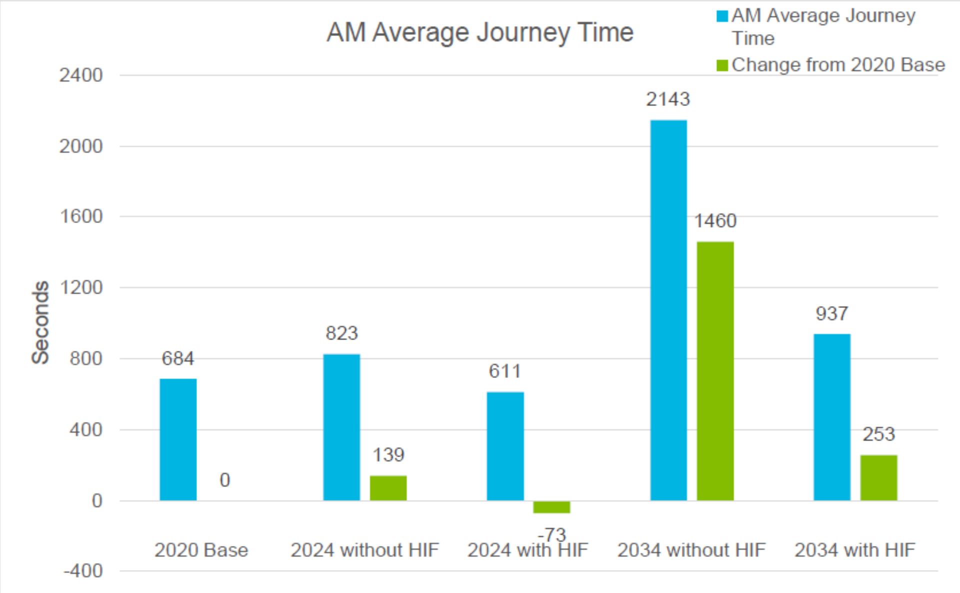
Figure 6.30: PM Average Speed



6.11.2 The Figures above show that additional growth in the model area without the HIF1 Scheme results in a slower moving network, which can be considered as a proxy for congestion. For example, four years of growth from 2020 to 2024 results in a 3.7mph reduction in the AM and 4.8mph reduction in the PM. The HIF1 Scheme in 2024 enables the network to operate more efficiently than 2020, as shown by the higher average speeds. The 2034 without HIF scenario shows a significant reduction in average speed across the network, due to the gridlock situation that develops in *the model. The HIF1 Scheme enables the 2034 network to operate similarly to 2024 without HIF. It should be noted that the highway elements of the HIF1 Scheme are intended to be one part of a balanced transport strategy. The high quality walking and cycling infrastructure elements of the Scheme help to offer alternative options for many journey types and routes.*

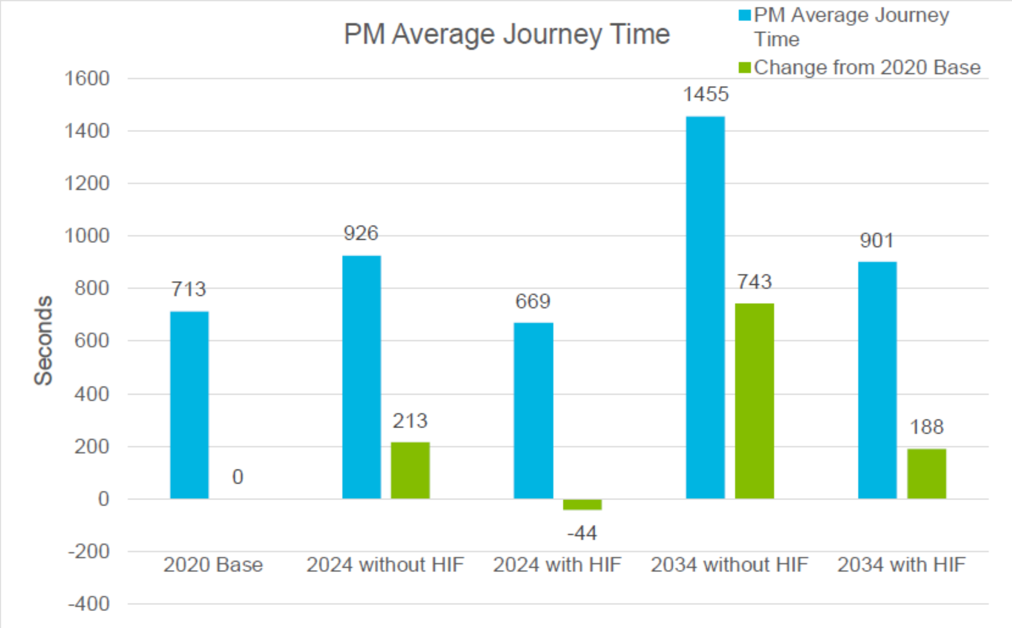
6.11.3 The average journey times of vehicles were extracted from the Paramics model to represent the overall performance of the network with and without the HIF1 Scheme. The demand scenarios are explained in Figure 5.2. Results from 2020, 2024 and 2034 scenarios without and with the HIF1 Scheme for AM and PM peaks are presented in Figure 6.31 and Figure 6.32 respectively. For ease of comparison, the change from 2020 Base is also presented in the same figure for each scenario.

Figure 6.31: Average Journey Time (AM Peak)



6.11.4 Figure 6.31 shows that in the AM peak, four years of growth from 2020 Base, without the HIF Scheme, is modelled to increase average journey times by over two minutes (139 secs). This is significantly worsened with an additional ten years of growth to 2034, with the average journey time increasing by over 24 minutes (1,460 secs) compared to the 2020 base. In 2024, the HIF1 Scheme reduces average journey times compared to the 2020 base by over one minute (-73 secs). In 2034, the HIF1 Scheme has enabled 14 years of growth with an average journey time increase of just over four minutes (253 secs). The average journey time with the HIF1 Scheme in 2034 is less than half of that without HIF1 (937 to 2,143). The HIF1 Scheme enables the 2034 network to operate similarly to 2024 without HIF1.

Figure 6.32: Average Journey Time (PM Peak)



> *6.11.5 Figure 6.32 shows that in the PM peak, four years of growth from the 2020 Base, without the HIF1 Scheme, is modelled to increase average journey times by three and a half minutes (213 secs). This is significantly worsened with an additional ten years of growth to 2034, with the average journey time increasing by almost twelve and a half minutes (743 secs) compared to the 2020 Base. In 2024, the HIF1 Scheme reduces average journey times compared to the 2020 base by almost one minute (-44 secs). In 2034, the HIF1 Scheme has enabled 14 years of growth with an average journey time increase of just over three minutes (188 secs). The average journey time with the HIF1 Scheme in 2034 is less than two thirds of that without HIF1 (901 to 1,455). The HIF1 Scheme enables the 2034 network to operate similarly to 2024 without HIF."*

4.10 The LPA's Transport Development Control Team, as Highway Authority, provided a number of responses to the Planning Application and subsequent Regulation 25 submissions. The response dated 2022 (CDE.42) included as Appendix 1 a technical note audit called *"HIF1 Scheme Package" Model Audits*" dated 28 January 2022. This note by JCT Consulting, procured by Oxfordshire County Council's Transport Development Control Team, was an independent audit of the 28 junction models that informed the Transport Assessment (CDA.7). In this document, the modelling methodology and audit report findings are summarised as:

> *"18.3. The modelling methodology and approach was agreed with OCC and the model validates and has been used correctly. OCC are satisfied with the modelled years, data and growth figures used. The model does not identify any areas that will require further mitigation as a result of the HIF1 Schemes.*
>
> *18.4. An independent model review has examined all the junctions in the Scheme (Appendix A). The consistent issue which arose in the roundabout modelling, was the unequal lane balancing, however, it was concluded that even if this were refined in the modelling, the junctions in question would still operate to a level acceptable to OCC. It is also accepted that despite some junctions operating at overcapacity in the future years, HIF1 is part of wider strategy to mitigate the impact of growth across a wide area which can only be delivered incrementally as funding becomes available, either through government grants or developer funding. The report raised a discrepancy at the OFF13 junction, which must be clarified."*

4.11 In summary, the audit report suggested that various changes could be made to the junction models, but overall the conclusions drawn in the TA would not be changed. The 'OFF13 junction' matter was investigated and subsequently resolved, with the most recent TDC response (CDE.71 dated 01/02/2023) explaining it was a labelling error:

> *"2.6. Just for transparency, the arm names have been amended in the Junctions 9 input file and the capacity assessment has been re-run for this junction. As the only change to the modelling input data is the arm names (i.e. traffic flows and junction geometric parameters are unchanged) the results are unchanged and the conclusions in the TA are still valid."*

4.12 In that same response, TDC states on page 1 of CDE.71:

> *"Oxfordshire County Council (OCC), as the Local Highway Authority are recommending this planning application for approval."*

4.13 In summary, the modelling has been reviewed by the LPA's Transport Development Control Team as Highway Authority, they employed an independent consultant to review the junction models, and following clarification and consideration they found it to be robust and recommended the Planning Application for approval.

5 EVIDENCE BASE FOR RESPONSE TO POINTS OF CONCERN

5.1 This section will cover the evidence base that supports a number of the rebuttals and specific responses to the comments contained with representations to the Planning Application and objections to the Orders. The key areas of concern are:

- Induced traffic
- Alleged conflict with the Local Transport and Connectivity Plan (CDG.4) using Decide and Provide traffic modelling, including:
  - What a Predict and Provide approach would have looked like
  - Third Party Decide and Provide Review
- Geographic scope of the modelling
- COVID / Brexit

Comments outside of the four key themes above are addressed in Appendix CC2.7. These specifically respond to concerns raised by Professor Goodwin, Adrian Dorrian (Planning Aid England), East Hendred Parish Council and comments in relation to Sutton Courtenay and Appleford Junctions

Induced traffic considerations completed during the model development

5.2 A number of representations to the called-in Planning Application and objections to the Orders refer to concerns around induced demand not being accounted for in the modelling, which they suggest invalidates the model data and therefore the overall assessment of the Scheme. Those parties include, POETS (CDL.7), Councillor Sarah James (CDN.15), Adrian Wear (CDN.22), Councillor Charlie Hicks (CDN.30), Robin Draper (CDN.25), Ian Palmer (CDN.14), Oxford Roads Action Alliance (CDN.26), Victoria Shephard (CDN.23), Friends of the Earth (CDN.24), Sutton Courtenay Parish Council (CDJ.9), the NPC-JC (CDL.6, CDE.41 and CDE.69), Greg O'Broin on behalf of Appleford Parish Council and the NPC-JC (CDN.21) and Appleford Parish Council (CDJ.11).

5.3 Many of the comments that relate to induced demand reference Professor Phil Goodwin's comments of 28 February 2022 as appended to the NPC-JC 13 June 2022 representation (CDE.41) and, particularly Appendix 2 "Outline Comments on HIF Forecasts and Appraisal" by Professor Phil Goodwin, BSc (Econ), PhD (Civil Engineering), FCILT, FIHT. I respond to Professor Goodwin's comments specifically in my Appendix CC2.7.

5.4 As already stated for the Strategic Traffic Model (OSM/HAM), DfT has a number of TAG Units which have determined the modelling parameter checks that need to be carried out in order to confirm that a traffic model is robust and 'fit for purpose'. It can then be reasonably used to demonstrate the likely forecast situation for any number of infrastructure interventions. The parameters cover both the base year model and the matrix forecast years, such that any decision making is supported by a robust evidence base.

5.5 A major review of the evidence on induced demand was undertaken by DfT for the Transport Standing Advisory Committee on Trunk Road Assessment (SACTRA) in 1994, as there was a concern that traffic models did not necessarily take account of this possible additional traffic and would therefore underestimate traffic flows.

5.6 'Induced traffic' can occur, in principle, if a scheme is developed such that individuals now choose to travel by car instead of public transport and/or decide to travel when they otherwise would not have done. To ensure 'induced traffic' effects are considered for all schemes, and not ignored, DfT has set out the principal concepts and methods for the treatment of induced traffic in traffic models. These concepts are now embodied in transport appraisal methodology as prescribed in TAG.

5.7 The SACTRA study reviewed the empirical evidence on induced demand, with a view to understanding the size of the effect and where and under what conditions it occurs. In practice, measured induced traffic effects will depend on the time period and geographical area over which they are measured, and whether short-run or long-run effects are included as well. Consequently, all large geographical traffic models, such as the OSM, are assessed for possible induced traffic effects. Induced traffic effects can occur when new highway capacity speeds up traffic allowing travellers to drive further, which in turn can cause further congestion which creates a potential for a vicious cycle of ever-increasing traffic flows. This is why the traffic modelling used to develop this Scheme has adhered to the DfT modelling requirements detailed in TAG.

5.8 One of the main future year checks carried out on the OSM, with the Scheme in place, was therefore the consideration of whether there is any evidence of induced traffic effects in the future year matrices, and if so at what level these effects are seen. The future year matrices, which were built-up in accordance with TAG guidance using an Uncertainty Log of all known development plans for the area, were inspected to see if there is a need to carry out additional modelling runs and checks resulting from any possible induced traffic effects.

5.9 A comprehensive review of the Uncertainty Log development has been ongoing for the OSM as it is a living model, but it remains the best representation of the most likely future traffic situation across the Oxfordshire County geographical area. The resultant traffic matrices were reviewed by the Atkins project team, and checks were carried out to enable an opinion to be reached on the likelihood of induced traffic affects being present in the future years. TAG guidance provides the guidance for the checks that need to be carried out on the mode share and their changes over time. These comparison tables (Table 6), compare the difference in trip numbers, by mode of travel, and will show a minimal percentage change when there are no induced traffic effects.

5.10 Table 6 below shows the comparison in trip numbers, by time period, that were made on the OSM for 2021 and 2041, both with the Scheme (identified with a ‘B’) and without the Scheme (identified with an ‘A’). These demonstrate that the trip numbers are such that induced traffic effects are not evident in the model, as the percentage variation in traffic flows is negligible, with a difference of less than 0.06% in the peak hours and no change at all for 12-hour flows.

Table 6 - Induced Traffic Mode Comparison Tables by time period

AM (period)	2021 Forecast Year		Difference in trip numbers
	21_OSM_S_B	21_OSM_P_A	
Reg car (veh.)	257,199	256,943	256
P&R (veh.)	2,478	2,472	6
Bus only (pax)	25,085	25,154	-69
Rail (pax)	10,785	10,851	-66
TOTAL (persons)	373,737	373,526	212
Percentage difference in trip numbers with and without the scheme			0.06%

AM (period)	2041 Forecast Year		Difference in trip numbers
	41_OSM_S_B	41_OSM_P_A	
Reg car (veh.)	280,410	280,207	203
P&R (veh.)	2,281	2,277	4
Bus only (pax)	26,647	26,732	-85
Rail (pax)	10,619	10,661	-42
TOTAL (persons)	405,544	405,399	144
Percentage difference in trip numbers with and without the scheme			0.04%

Inter peak (period)	2021 Forecast Year		Difference in trip numbers
	21_OSM_S_B	21_OSM_P_A	
Reg car (veh.)	453,935	454,205	-270
P&R (veh.)	1,960	1,963	-3
Bus only (pax)	47,570	47,655	-85
Rail (pax)	15,482	15,545	-63
TOTAL (persons)	673,494	674,002	-507
Percentage difference in trip numbers with and without the scheme			-0.08%

Inter peak (period)	2041 Forecast Year		Difference in trip numbers
	41_OSM_S_B	41_OSM_P_A	
Reg car (veh.)	504,462	504,736	-275
P&R (veh.)	1,757	1,759	-3
Bus only (pax)	51,045	51,166	-121
Rail (pax)	14,324	14,342	-17
TOTAL (persons)	744,406	744,911	-505
Percentage difference in trip numbers with and without the scheme			-0.07%

PM peak (period)	2021 Forecast Year		Difference in trip numbers
	21_OSM_S_B	21_OSM_P_A	
Reg car (veh.)	329,262	329,007	255
P&R (veh.)	2,048	2,048	0
Bus only (pax)	25,428	25,482	-54
Rail (pax)	12,714	12,768	-54
TOTAL (persons)	463,379	463,121	258
Percentage difference in trip numbers with and without the scheme			0.06%

PM peak (period)	2041 Forecast Year		Difference in trip numbers
	41_OSM_S_B	41_OSM_P_A	
Reg car (veh.)	352,936	352,656	280
P&R (veh.)	1,873	1,873	0
Bus only (pax)	26,838	26,910	-71
Rail (pax)	12,386	12,422	-36
TOTAL (persons)	495,191	494,892	299
Percentage difference in trip numbers with and without the scheme			0.06%

12-hour period	2021 Forecast Year		Difference in trip numbers
	21_OSM_S_B	21_OSM_P_A	
Reg car (veh.)	1,040,397	1,040,155	242
P&R (veh.)	6,486	6,483	3
Bus only (pax)	98,084	98,291	-207
Rail (pax)	38,981	39,165	-184
TOTAL (persons)	1,510,611	1,510,648	-37
Percentage difference in trip numbers with and without the scheme			0.00%

12-hour period	2041 Forecast Year		Difference in trip numbers
	41_OSM_S_B	41_OSM_P_A	
Reg car (veh.)	1,137,808	1,137,599	209
P&R (veh.)	5,911	5,909	2
Bus only (pax)	104,531	104,808	-277
Rail (pax)	37,329	37,424	-95
TOTAL (persons)	1,645,141	1,645,203	-62
Percentage difference in trip numbers with and without the scheme			0.00%

5.11 In summary, the required modelling tests have been carried out and have shown that no further actions need to be undertaken as 'induced traffic' for this Scheme is not evident and is, therefore, not a cause for concern.

Alleged Conflict with the Local Transport and Connectivity Plan using 'Decide and Provide'

5.12 A number of representations allege that the traffic modelling has not followed the 'Decide and Provide' approach required by the Local Transport and Connectivity Plan (LTCP) (CDG.4). These include POETS in its Statement of Case (CDL.7), Councillor Charlie Hicks (CDN.30), Ian Palmer (CDN.14) and the NPC-JC Statement of Case in relation to the called-in Planning Application (CDL.6). The development of the LTCP and the Scheme's compliance with the LTCP is dealt with in the Proof of Evidence of John Disley, who also discusses the policy principles of 'decide and provide'. I address the traffic modelling elements, as detailed in Section 2 above, and both proofs of evidence should be referred to.

5.13 The representations suggest that a 'Predict and Provide' approach was used, with an end result of focusing on highway capacity. This section explains how this is incorrect; the traffic modelling did in fact follow a 'Decide and Provide' approach, even before the LTCP requirement to do so was adopted, thus ensuring that the Scheme forms part of a balanced transport strategy.

5.14 The first paragraph in the Transport Assessment (CDA.7, paragraph 1.1.1) makes it clear that the Scheme does not aim to provide unlimited highway capacity or remove all congestion, but is part of a balanced transport strategy:

> *"This Transport Assessment (TA) has been prepared in support of a planning application for the HIF1 Didcot Garden Town Infrastructure project ('the HIF1 Scheme') on behalf of Oxfordshire County Council (OCC). The Scheme is designed to improve access to future housing and employment growth in the local area,* ***including access by walking, cycling and public transport****. The Scheme is policy backed and is the* ***cornerstone of mitigation for the planned growth in the area****.* ***The Scheme does not aim to provide unlimited highway capacity for cars, or to remove all congestion; it forms part of a balanced transport strategy which also provides high-quality walking and cycling infrastructure, helping to engender modal shift to more sustainable modes."***

5.15 The LTCP, which included Policy 36 concerning 'Decide and Provide', was adopted in July 2022. The Planning Application was submitted in October 2021 and, therefore, the work that fed into the Planning Application submission significantly predates the requirements for 'Decide and Provide' to be used, and for that exact terminology to be used. Notwithstanding this, the transport modelling did clearly utilise a Decide and Provide methodology, and so meets the LTCP and LTCP Policy 36, as explained below.

5.16 Transport Model trip rate assumptions, as detailed in the Transport Assessment (CDA.7), clearly set out how the future year modelling (2034) assumes that the model growth in the 2034 year has 80% demand of vehicular trips (of new housing and employment demand) compared to 'normal'. This is a key element of the 'decide and provide' methodology used in the Planning Application. Conversely, if a 'predict and provide' approach had been taken, a full 100% demand of vehicular trips for future growth would have been included in the model, and the Scheme designed to cater for that full amount of traffic growth. Paragraph 5.3.8 is the most relevant section of the Transport Assessment and is replicated below for ease of reference and Figure 5.2 of the TA has already been presented at Figure 5 of my Proof of Evidence.

> "*For the 2034 scenarios the model assumes 100% demand of existing trips present in the 2017 base, and 80% of demand for new growth. The justification for this approach is set out in SYSTRA Technical Note 'HIF1 Paramics Modelling – Forecasting Note' (September 2021) in Appendix F, and is summarised below (Section 6 of the SYSTRA Technical Note refers):*
> *The model uses a generic trip rate across all development in the area. A demand reduction is required to align the trip generation with trip rates recently accepted by OCC TDC for planning applications sites in Didcot. This accounts for approximately half of the demand reduction. See below paragraph for more information.*
>
> *It is assumed that the Garden Town principles will continue to be enacted in this area over the next 14 years, increasing the usage of sustainable modes. Modal shift from these developments later in the plan period (over a decade away) is more likely as they are coming alongside significantly improved pedestrian / cycle / public transport provisions. The Paramics model is not multi-modal so cannot automatically account for improved NMU infrastructure, therefore a demand reduction is used as a proxy. This and the following point account for approximately half of the demand reduction.*
>
> *The largest new sites follow good spatial strategies and are in more sustainable locations near public transport hubs and / or are located nearer the growing employment areas which will have significantly improved NMU routes."*

5.17 Transport model growth assumptions for the Paramics model have been detailed above (paragraphs 2.46 to 2.50) and this is set out in paragraph 5.3.4 of the Transport Assessment, which is replicated here for ease of reference (Table 5.1 is included in Appendix CC2.4):

"The model includes housing and employment completion trajectories as supplied by the relevant LPAs (VOWHDC and SODC). These were updated in June-August 2020. In preparation for the work to support this planning application. Refer to the SYSTRA reports in Appendix F and G for more information on the trajectories and site accesses in the model. Table 5.1 and Table 5.2 below show the additional residential units and employment floor area assumed to be complete over the 2017 base year for the 2020, 2024 and 2034 scenarios."

5.18 The future year modelling (2034) utilised the housing and employment trajectories provided by the District Councils. In some cases the land will not be fully built out by 2034, such as the land adjacent to Culham Science Centre, which is allocated in the SODC Local Plan 2035 for approximately 3,500 new homes, but has actually been modelled at 1,850 dwellings, being the number that SODC advised would be delivered in that time frame. This is another element of the 'decide and provide' methodology, whereby the Scheme has been assessed against a lower level of growth and therefore accounting for fewer vehicle trips than might otherwise be expected.

5.19 Conversely, if a 'predict and provide' approach had been taken, the full build out of all sites would have been included in the model, and the Scheme designed to cater for that full amount of vehicle growth without accounting for any modal shift and vehicle trip reduction.

5.20 For clarity, it is helpful to briefly summarise what a 'Predict and Provide' methodology might have been, set out in Table 7 below:

Table 7: Possible Predict and Provide Scheme elements

Element of Scheme	How might be dealt with in a 'Predict and Provide' methodology
Trip rates	Assume a high trip rate, based on what people do today, or perhaps a higher trip rate depending on trend lines
Housing and employment growth	Assume full build out of future planned growth, perhaps even assume extra housing or employment comes forward 'just in case'
Junction and link operation	Ensure that spare capacity is left in the future year modelling so that little or no congestion occurs

5.21 In essence, a 'predict and provide' approach would have asked the question *"How big do these junctions need to be to cater for all the growth in a worst-case scenario, and consider an additional tolerance allowance for any possible underestimation of traffic flows?"* This is clearly not how this Scheme has been dealt with in the modelling process.

5.22 It is evidently clear in the TA (CDA.7) that the Scheme has not used a 'predict and provide' methodology, as some of the Scheme junctions in the 2034 future year are operating close to, or in some cases over theoretical capacity in one or both of the AM and PM peak hours.

5.23 Table 6.1 of the TA provides a summary of Scheme junction capacity results for 2024 and 2034 years (replicated in Appendix CC2.4). In the 2034 AM and PM columns, junction results that are above design capacity have been highlighted in Appendix CC2.4.

5.24 The TA also reports overall junction statistics for the network, which help to provide a high-level understanding of the Scheme impact Appendix CC2.4.

5.25 The LPA commissioned Third Party Review, which has been reported in a technical note from Origin Transport Consultants (Origin), dated December 2023 technical note (CDO.2, Annex 1). Origin concludes that:

"4.4 The Decide and Provide [modelling] approach has been taken into account with sustainable travel measures included as key components of the Scheme and this has been reflected in the method used for the junction impact assessment of the Scheme alongside trip reduction assumptions."

5.26 In conclusion, this section on 'Decide and Provide' has confirmed that the Scheme utilised a 'Decide and Provide' methodology in its transport modelling and has summarised how that was done.

Geographic Scope of Modelling

5.27 A number of objectors raise concerns around the geographic scope of the modelling and assessments. Those objectors include, POETS (CDL.7), Councillor Sarah James (CDN.15), Robin Draper (CDN.25), Ian Palmer (CDN.14), Oxfordshire Roads Alliance (CDN.26), Friends of the Earth (CDN.24), Victoria Shepherd (CDN.23), the NPC-JC (CDL.6 and CDE.69), Greg O'Broin on behalf of Appleford Parish Council and the NPC-JC (CDN.21).

5.28 The geographic areas that the various modelling elements cover have been discussed in Section 2 and are shown in Figure 2. The matter of geographic scope is addressed in the Applicant's Technical Note concerning Environmental Statement (CDO.1) with a subject title of 'POETS Request for Regulation 25 Letter Rebuttal', which responds to the POETS 4 November 2023 Regulation 25 request letter. In that Technical Note, all of the geographic scope and extent of the assessments are fully justified and have previously been agreed with the LPA.

5.29 I do not intend to repeat the entire Technical Note, but instead highlight paragraphs 2.0 to 2.31 of that note, which explain:

- the considerations made when determining the geographic scope of the modelling work used to directly inform the Planning Application.
- how the earlier ETI modelling using OSM had already been used to assess wide geographic areas through the Evaluation of Transport Impacts supporting three adopted Local Plans, as set out previously in my Proof of Evidence in section 3.
- how there are other emerging strategies that focus on some of the wider areas such as the 'Abingdon Travel Plan', the future strategy for the Golden Balls roundabout, and the A4074 Corridor Strategy looking into future options for the route including consideration of Nuneham Courtenay.
- that the geographic scope of assessment was agreed with the Local Highway Authority and National Highways (with responsibility for the A34 through Oxfordshire) during pre-application scoping.

5.30 Additionally, the LPA commissioned Origin to review elements of the Scheme, one of which was the geographic scope of the assessments. In the LPA's Technical Note (CDO.2, Annex 1), Origin agreed with the conclusions regarding the geographic scope of the assessments as set out in the Applicant's Technical Note.

Covid / Brexit

5.31 A number of parties raise concerns around the traffic data and assumptions informing the modelling being from 2016/2017 which is before COVID and Brexit, which they purport invalidates the model data and therefore the overall assessment of the Scheme. Those objectors include, Adrian Wear (CDN.22), Ian Palmer (CDN.14), Oxfordshire Roads Action Alliance (CDN.26), Victoria Shepheard (CDN.23), Catherine Small (CDN.1) and POETS (CDL.7).

5.32 The Brexit Vote was in 2016 and the implementation of arrangements withdrawing the UK from the EU began on 31 January 2020, although many were not completed until 31 December 2020. COVID lockdowns were effective in the UK from March 2020 to December 2021, although there were local differences across the UK during this period.

5.33 Across the UK although traffic flow levels had initially been significantly affected by the various Covid lockdowns, they have largely bounced back to pre-2019 levels. At a more regional level, the numbers vary with peak tourist areas seeing a significant increase in flows as ‘staycations’ have become more popular.

5.34 The Applicant’s dataset of Automatic Traffic Counters spread across the County collect traffic data continuously year on year. These have been interrogated to review those counters in the Didcot area which have both historic records from pre-COVID (2017, 2018, and 2019) and post-COVID (2023), to enable traffic flow comparisons to be made. Data from 26 counters (CC2.6), have been analysed to show the change in 24-hour AADT traffic flows where comparable data exists:

5.35 The data shows that in some locations the flows are lower in 2023 than previously, in some locations are higher in 2023 than previously, and some locations stay the same. However, the data shows that overall flows are close and well within acceptable percentage daily variation such that their difference can be considered insignificant. The historic flows can, therefore, be considered to have remained unchanged from the pre-COVID and the pre-Brexit flows when compared to those observed in 2023, as they are not significantly different and do not impact the overall modelling assessments.

5.36 In summary, the flows for the Didcot area of Oxfordshire in 2023 are 5.5% lower than 2018, and 3.4% lower than 2019. Flows in 2023 compared to the average across the three year period 2017-2019 are 4.6% lower. These flows broadly follow the national picture, which shows that 2023 flows are still within industry accepted allowable daily variation tolerances (+/- 5%) and are, therefore, are not unduly suppressed. As this effect would be seen both with and without the Scheme, it would have no impact on the overall decision making process.

5.37 In addition to traffic flow data on the local highway network, traffic data is also available on the Strategic Road Network from the National Highways WebTRIS website (https://webtris.highwaysengland.co.uk/). From the counter located on the A34 just to the west of Didcot (Appendix CC2.6) the data has been analysed for the 24-hour average daily traffic for comparable months in 2018 or 2019, which also had data available for the same months in 2023. For northbound traffic, the flows in 2023 were 2.0% lower than in 2018, and 0.1% lower than in 2019 (for the same calendar month) and for southbound traffic, the flows in 2023 were 5.6% lower than in 2018, but only 4.8% lower than in 2019.

5.38 Therefore, there are no additional modelling tests that need to be carried out for traffic level changes as a direct result of Brexit and/or COVID as there is no long-term lasting effects that need to be considered. There has been no evidence that traffic flows on the highways have seen a significant long-term suppression in volume.

5.39 There is some evidence that the peak levels of traffic have reduced slightly as they now occur over a slightly longer period in both the morning and evening (i.e., peak spreading). There is also evidence that the number of passengers using public transport has still not yet recovered to pre-Covid levels, although this has not noticeably affected vehicle travel by road.

5.40 From investigations that I have previously undertaken on key transport access routes to Ferries between Wales and Ireland in the lead up to, and following, Brexit, the traffic flows have not been shown to change, although on approaches immediately close to the ports increased levels of congestion did initially occur. However, it has been publicly reported that this increased congestion is largely linked to additional paperwork taking longer to process so that there are additional time delays, particularly to freight travel. Therefore, there is no additional sensitivity testing needed on traffic flows as a result of the Brexit changes implemented since December 2020.

6 SUMMARY AND CONCLUSIONS

Introduction and overview

6.1 This Proof of Evidence has demonstrated how the traffic modelling has been appropriately developed, using industry standard modelling software packages and using appropriate methodologies. It has also explained the check and review processes carried out on the output of those models (calibration and validation) which are required to ensure the models are robust and that the decisions made, based on their output information, are sound.

Section 2 - Traffic Modelling Approach

6.2 This section covers the detailed approach to the modelling and explains the nature of the flow of information and output data from one model to another. It confirms the soundness of the models and their use to support the Scheme development from its consideration at the Local Plan stage (policy development) through to the Planning Application.

6.3 This section also includes a summary of the calibration and validation of the models and report on the statistics, which that demonstrate that the methodology used to develop each of the supporting models is robust and that they support the Scheme. Detail modelling statistics are included separately for the Strategic Model in Atkins' Highway Assignment Model Report and for both the Paramics Modelling and Transport Assessment (CDA.7). These key modelling statistics have been summarised in Appendices CC2.1, CC2.2 and CC2.4, respectively, to this Proof of Evidence.

OSM

6.4 The Oxfordshire Strategic Model (OSM), commissioned in 2013, forms the first step of the three-step modelling process used in the development of the Scheme, as shown in Figure 1. The OSM is a strategic transport model that has been developed specifically to assess land use and transport interventions in Oxfordshire, to identify the impact of transport and development in the county, as well as developing a model that could be used to support business cases and planning applications. The model is multi-modal and TAG compliant so can be used to underpin the decision-making process requirements of DfT and other interested parties.

6.5 The OSM has already been successfully used as the evidence base for a number of strategic initiatives in Oxfordshire, including the successful examination and adoption of numerous Local Plans including:

- Vale of White Horse District Council Local Plan 2031 Part 1 (2016) and Part 2 (2019);
- South Oxfordshire District Council Local Plan 2035 (2020)

6.6 The Scheme has been developed over a number of years and its impact has been considered during the development of each of the Local Plans detailed above. This iterative process enables this mitigation solution to be considered in context, and at a number of different levels, to ensure it remains the right Scheme to progress.

6.7 Accordingly, in my opinion the OSM is fit for purpose and has been appropriately used to support the LPA's and relevant District Council's strategic development planning decisions since 2014. It follows the industry standard development process for strategic traffic and meets the required levels of statistical compliance. This enables the traffic flow information to be used in subsequent traffic models with confidence.

PARAMICS

6.8 A Paramics Micro-simulation traffic model was developed by SYSTRA, who are the software developers for Paramics, using output data from the OSM which forms the second step of the three-step modelling process used to develop this Scheme. Where

OSM covers the County of Oxfordshire, the micro-simulation model covers the Didcot area, which enables it to include more local detail within its modelling parameters.

6.9 The housing and employment trajectories incorporated in the forecast years were provided by the Vale of White Horse and South Oxfordshire District Councils. These totalled an additional 15,825 dwellings in the model area from 2017 Base Year to 2034, and 747,446 sqm additional Employment Floor Area across of different use classes. SYSTRA ran the Paramics model for various scenarios and provided model outputs to AECOM, who then used these outputs to inform the Transport Assessment (CDA.7) by using these traffic flows to input into the standalone junction models reported for this development. The Transport Assessment (Appendix E page 44) summarises that *"The Base model is considered fit for the purpose of Reference Case development and Future Year testing",* and the validation data shown in Appendix CC2.2 confirm that the Paramics model is a robust base for use in assessing developments and future infrastructure proposals.

Standalone junction modelling (Junctions 9 and LinSig with Paramics models)

6.10 Detailed junction models were developed from the Paramics Micro-simulation traffic model by AECOM using output data from the Paramics model that has previously been developed from the OSM. This ensures that all the modelling carried out to support this development is consistent and robust. The junction modelling forms the third step of the three-step modelling process used to develop this Scheme.

6.11 The results of the capacity assessments have been presented in the Transport Assessment to demonstrate the impact of the Scheme on existing junctions and the anticipated performance of new and improved junctions in the assumed year of opening (2024) and the future year (2034). The impacts on existing junctions and the capacity of proposed junctions along the Scheme were assessed using industry-standard software tools. Priority junctions and roundabouts were assessed using Junctions 9 software package, developed by TRL Software. Signalised junctions were assessed using LinSig software package, developed by JCT Consultancy.

6.12 As explained in the above sections the validation of each model process is an important step in ensuring that the model used at each level is performing to an acceptable level of accuracy and allows good certainty of the results from the model. Individual junction assessments included in the Transport Assessment use model output flows from the validated Paramics model (Appendix CC2.2). Additionally, the junction models have been verified as part of the Planning Application, such that no highway concerns were raised and, therefore, I am satisfied that the individual junction modelling process is sound and that the information they provide is a realistic assessment of the future operation of the junctions modelled.

Model Interdependency

6.13 The interdependencies of the three traffic modelling techniques detailed above show how the traffic flows derived from OSM and the supporting network information has been cascaded down to the individual junction assessments included in the Transport Assessment for the Scheme, via the Paramics model.

6.14 The geographical areas for each model have also been shown to be appropriately linked with modelling information being passed on at each interface in accordance with good modelling practice.

6.15 The Scheme has been identified through an iterative approach that has been developed through the systematic involvement of a number of experts all of whom have influenced the input data needed to develop the final design through the assessment of their area of expertise. For the traffic movements assessed this has been developed conceptually through the Local Plan process and in more detail for the proposed Scheme in the Transport Assessment**.**

6.16 The traffic modelling has been shown to be robust at all stages and has included the effects of the wider traffic impacts. It has also considered mode shift options and ensured that output information has flowed from OSM through the Paramics modelling and then on to the individual junction model assessment reported in the Transport Assessment.

Section 3 – Local Development Plan Approach

6.17 This section covers the evolution of the Scheme, which has been informed by the strategic modelling for Oxfordshire. The OSM model has been established as a sound model to use in the support strategic planning decisions within Oxfordshire and has been used, consistently, across a number of Local Plans to develop future scenarios.

6.18 The modelling methodology used to support the three Local Plans in the area, shows that the Scheme was required in the earliest of the Local Plans (2016) and so was subsequently required to be retained in later Local Plans which added significantly more growth in the area The modelling showed that the Scheme supports the level of growth at an acceptable level of highway operation across the area, but that some areas of congestion could remain (See CC2.5). This is an element of 'Decide and Provide' whereby the intention has not been to maximise the level of highway intervention by providing excess levels of spare capacity.

Section 4 – The Transport Assessment for the Scheme

6.19 This section covers the Transport Assessment and shows that the Scheme enables the network to operate in 2034 with the Scheme in place in a similar way to 2024 without the Scheme, whilst experiencing ten years of housing and employment growth. This is part of a balanced transport strategy, where the Scheme does not aim to provide unlimited highway capacity for cars or to remove all congestion.

6.20 The modelling has been reviewed by the LPA's Transport Development Control Team as Highway Authority, they found it to be robust and recommended the Planning Application for approval.

Section 5 – Evidence Rebuttals to Points of Concern

6.21 This section covers the evidence base that supports a number of the themed points of concern raised which are summarised below and other: comments outside of the four key themes are addressed in Appendix CC2.7.

Induced traffic considerations completed during the model development

6.22 'To ensure 'induced traffic' effects are considered for all schemes, and not ignored, DfT has set out the principal concepts and methods for the treatment of induced traffic in traffic models. These concepts are now embodied in transport appraisal methodology as prescribed in TAG.

6.23 The required modelling tests have been carried out on OSM and have shown that 'induced traffic' for this Scheme is not evident and is therefore not a cause for concern.

Alleged Conflict with Local Transport and Connectivity Plan using Decide and Provide

6.24 The traffic modelling followed a 'Decide and Provide' approach, even before the LTCP requirement to do so was adopted, thus ensuring that the Scheme forms part of a balanced transport strategy.

6.25 Transport Model trip rate assumptions, as detailed in the Transport Assessment set out how the future year modelling (2034) assumes that the model growth in the 2034 year only allows 80% of the demand for vehicles. A 'Predict and Provide' approach would take the full 100% of future growth.

Geographic Scope of Modelling

6.26 The geographic areas that the various modelling elements cover have been discussed in Section 2, shown in Figure 2 and agreed with the LPA.

6.27 The LPA commissioned Origin Transport Consultants to review elements of the Scheme (CDO.2) and they agreed with the geographic scope of assessments as set out in the Applicant's Technical Note.

Covid / Brexit

6.28 Data collected from the Applicant's dataset of Automatic Traffic Counters shows that there is little difference in traffic flows pre and post COVID/Brexit. Therefore, there are no additional modelling tests that need to be carried.

7 GLOSSARY OF TECHNICAL TERMS

ADM	Area of Detailed Modelling
BRT	Bus Rapid Transit
COTM	Central Oxfordshire Transport Model
DoS	Degree of Saturation
ETI	Evaluation of Transport Impacts
FMA	Fully Modelled Area
HAM	Highway Assignment Model
LTCP	Local Transport and Connectivity Plan
MMQ	Mean Max Queue
NMU	Non-motorised Users
OS	Ordnance Survey
OSM	Oxfordshire Strategic Model
POETS	Planning Oxfordshire's Environment and Transport Sustainably
PT	Public Transport
PTAM	Public Transport Assignment Model
RFC	Ratio of Flow to Capacity
RoSPA	The Royal Society for the Prevention of Accidents
SACTRA	Transport Standing Advisory Committee on Trunk Road Assessment
TA	Transport Assessment
TAG	Transport Appraisal Guidance
VDM	Variable Demand Model

<u>Computer Software Packages (acronym or name)</u>

ARCADY	Assessment of Roundabout Capacity and Delay, included in **JUNCTIONS 9**
PARAMICS	Microsimulation software (also **DISCOVERY PARAMICS**)
EMME	Matrix estimation software
PICADY	Priority Intersection Capacity and Delay, included in **JUNCTIONS 9**
LinSig	Traffic signal optimisation software
SATURN	Simulation and Assignment of Traffic in Urban Road Networks

<u>Open-Source National Traffic Data Sets</u>

WebTRIS

IRIX

TrafficMaster

TomTom

8 STATEMENT OF TRUTH AND DECLARATION

8.1 I confirm that, insofar, as the facts stated in my proof evidence are within my own knowledge, I have made clear which they are and that I believe them to be true and that the opinion I have expressed represent my true and complete professional opinion.

8.2 I confirm that my Proof of Evidence includes all facts that I regard as being relevant to the opinions that I have expressed and that attention has been drawn to any matter which would affect the validity of those opinions.

8.3 I confirm that my duty to the Inquiry as an expert witness overrides any duty to those instructing or paying me, and I have understood this duty and complied with it in giving my evidence impartially and objectively, and I will continue to comply with that duty as required.

8.4 I confirm that, in preparing this Proof of Evidence, I have assumed that same duty that would apply to me when giving my expert opinion in a court of law under oath or affirmation. I confirm that this duty overrides any duty to those instructing or pay me, and I have understood this duty and complied with it in giving my evidence impartially and objectively, and I will continue to comply with that duty as required.

8.5 I confirm that I have no conflicts of interest of any kind other than those already disclosed in this Proof of Evidence.

CLAUDIA LESLEY CURRIE

30 January 2024