Oxfordshire County Council

Highways and Operations

The Oxfordshire Lane Rental Scheme Cost Benefit Analysis

Version 2

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EXECUTIVE SUMMARY

Oxfordshire County Council is a major investor of public resources and as such, should ensure that new developments make a positive contribution to the local economy and society.

Any new proposal should always answer these two basic questions:

- What are the specific outcomes sought?
- Will these outcomes deliver a positive benefit to the local economy and society?

A Cost Benefit Analysis (CBA) is a decision-making tool that helps provide assurance around these questions by quantifying all costs and benefits in monetary terms.

Oxfordshire County Council's Network and Asset Management Team has been working on just such a new development and this CBA supports its introduction by demonstrating the positive financial outcome delivering its objectives will provide.

Minimising congestion is a key transport challenge for any Council and especially for a busy County like Oxfordshire.

The ability of people and goods to move freely around the County, meeting the needs of business, accessing essential services and for social and leisure purposes depends largely on the County's highway network operating effectively.

The proposed Oxfordshire Lane Rental Scheme tackles head-on one the major causes of congestion, road and street works disruption, in a robust and positive way and is a major opportunity to positively reduce disruption and the congestion it causes on the highway network.

The proposed Oxfordshire Lane Rental Scheme is designed to reduce the busy period volume and durations of road works and generally reduce the amount of works undertaken at traffic sensitive times by introducing a new Lane Rental Daily Charge.

The new Lane Rental Scheme is not intended to prevent activities necessary for the maintenance or improvement of the road network or the services running underneath it.

It is designed to introduce financial incentives to work at less disruptive times and more efficiently, completing works faster and delivering network operational effectiveness improvements.

Summary findings of the Oxfordshire Lane Rental Scheme Cost Benefit Analysis

Values based on 25 Year Operation of the proposed Scheme (2010 prices)

Value of benefits to economy and society	£438,894,839
Set-up and operating costs	£7,091,006
Financial benefit to the local economy from introducing the Scheme	£431,803,834
Benefit to Cost Ratio	**61.89**

INTRODUCTION

LANE RENTAL SCHEME OBJECTIVES

Swift Argent Ltd was commissioned by Oxfordshire County Council (OCC) in early 2023 to develop a road works Lane Rental Scheme known as the Oxfordshire Lane Rental Scheme (OSLRS), part of which includes the development of a detailed Cost Benefit Analysis (CBA).

The primary objective of the Oxfordshire Lane Rental Scheme is to incentivise road works on the most critical roads of the road network to be undertaken outside of traffic-sensitive times or reduce the duration of works if they are carried out during traffic sensitive times.

Under a lane rental scheme, work promoters must pay charges to access the road when carrying out street works on the busiest roads at the busiest times.

Lane rental encourages works promoters to:

- Reduce the length of time taken to carry out the works
- Improve planning, co-ordination and working methods
- Carry out more works outside of peak times, for example, making greater use of weekend and evening working where the local environmental impact is acceptable
- Complete works to the required standard first time reducing the need for the works promoter to return to the site to carry out remedial work

SCOPE OF WORK

The development of a detailed Cost Benefit Analysis is a requirement of the formal application to the Secretary of State for a Lane Rental Scheme.

The analysis assesses the impact of daily lane rental charges over the full range of required social and economic variables that have been specifically agreed in consultation with the UK Department for Transport (DfT).

An effective Cost Benefit Analysis is a mechanism to assess the benefits and costs of an investment both in terms of its overall viability and in relation to other options.

In this analysis, all benefits and costs are quantified in monetary terms and discounted over the length of the proposal to allow comparison on a common basis.

The output of the Cost Benefit Analysis is the presentation of a Benefit to Cost Ratio (BCR) which presents a scale of the Scheme benefits over costs and a Net Present Value (NPV) that is the sum total of the discounted benefits and costs.

The Government considers that schemes must focus specifically on those critical parts of the highway network where the costs of disruption caused by works are greatest. This will ensure new schemes succeed in reducing disruption caused by works whilst, at the same time, avoiding excessive costs being passed onto works promotors. Authorities proposing lane rental schemes will need to show that they have taken an evidence-based approach to identify these critical parts of the network, which might include certain junctions, pinch-points and heavily trafficked streets or parts of streets that are already operating close to, or beyond, their intended capacity.

The DfT has said that it expects lane rental schemes to apply to 5% of the highway authority's network but it can be more with justification. Oxfordshire County Council has identified and is proposing 652 streets (4.73%) are lane rental.

This report will identify the additional costs of operating the Scheme, which are to be met by the lane rental charges to Utility and Highway contractor companies, developers and from the Oxfordshire County Council existing budget, against the value of the benefits it will deliver to the wider County of Oxfordshire.

It will identify the data used and the methodology undertaken to prepare the Cost Benefit Analysis and present the statutory outputs including the BCR and NPV of the Scheme.

REPORT STRUCTURE

After this introduction, the report is set out as follows:

- Section 3 Analysis and Context
- Section 4 Input Data
- Section 5 Delay Modelling
- Section 6 Lane Rental Scheme Operation
- Section 7 Financial Calculations
- Section 8 Statutory Outputs
- Section 8 Oxfordshire Lane Rental Scheme CBA Results

ANALYSIS AND CONTEXT

INTRODUCTION

This section presents the legislative and research context for the Oxfordshire Lane Rental Scheme Cost Benefit Analysis.

LEGISLATIVE CONTEXT

The legislative guidance used for this study is contained within:

- Lane Rental Schemes Guidance for English Local Highway Authorities DfT July 2021
- WebTAG user and provider impacts (TAG Unit A1-3 May 2022)
- Department of Transport's (DfT) Halcrow study "Assessing the Extent of Streetworks and Monitoring Effectiveness of Section 74 in Reducing Disruption Volume 3 – Estimation of Cost of the Delay from Utilities' Street Works, June 2004"
- Chapter 8 of the Traffic Signs Manual DfT 2009
- Quadro User Manual July 2021
- Street Works (Charges for Occupation of the Highway) (England) Regulations 2012 ("the Regulations") made under Section 74A of NRSWA

Traffic Management Act 2004 and new roads and street works act 1991

The Traffic Management Act 2004 (TMA 2004) establishes the guidelines for street works. It has been in operation since April 2008 throughout the United Kingdom. The second edition states that any parties wishing to work on a road will require a Permit from the Highway Authority, who in turn will have additional powers to refuse or specify conditions associated with Permit permission for the overall efficiency of the operation of the road network.

The New Roads and Street Works Act 1991 (NRSWA) provides for financial incentives to reduce the disruption caused by street works. Authorities can levy "overrun charges" under section 74 of NRSWA where street works are not completed within an agreed, reasonable period. While these charges provide a strong incentive to avoid works overrunning beyond the end of the reasonable

period, they do not provide a similar incentive to reduce durations or disruption to road users within the agreed reasonable period.

NRSWA also provides the legal basis for lane rental charges to be applied to street works but does not require lane rental schemes to impose charges in relation to highway works. However, highway works typically account for around 20% to 30% of all works in the street, also cause disruption and road users do not distinguish between different types of works. Therefore, the Government has decided to implement a clear principle of parity and will require lane rental charges to be applied to highway works on the same terms as to street works to maximise the overall benefits. This approach will also help local highway authorities deliver their network management duty.

WebTAG

WebTAG was first issued by the UK Department for Transport in 2003. It is based upon the 'New Approach to Appraisal' developed in the late 1990s and is an internet based multimodal guidance on appraising transport projects. WebTAG was updated in May 2022 to take into account the latest evidence for use in the economic case and value for money assessment of transport business cases. A list of the changes are below:

- TAG data book updated to March 2021 OBR long-term growth for use in appraisal and annual values for use in modelling
- Updates to Transport Business Case guidance to be published subsequent to this update; further review of TAG units planned
- TAG Unit A1.1 to be updated alongside new OBR forecasts that fixes the growth rate used to uprate appraisal values linked to GDP to the OBR long-term rate
- TAG Unit A1.1 updated to provide guidance on how analysts may look beyond 60 years to provide indicative analysis of potential impacts, for inclusion in business cases and value for money statements as sensitivity tests. Guidance is expanded to describe what uncertainties need to be taken into account
- Updated TAG data book with new OB values for use in appraisal at different stages in scheme development. The data set is also expanded in terms of dimensions to allow a more thorough analysis of costs
- Further research is mapped out on agglomeration, to be undertaken in 2021, leading to potential guidance changes thereafter
- Uncertainty toolkit published, allowing a more structured and thorough understanding of uncertainty presented in appraisal. This will continue to be developed through collaboration with stakeholders and TAG users
- Common analytical scenarios as part of a major update to the National Trip End Model (NTEM) data set, and its presentation in TEMPRO, is programmed for Autumn 2021. This will come with updated guidance in TAG Unit M4 on how scenario analysis, particularly using the common analytical scenarios, should be used to support appraisal
- Common analytical scenarios account for uncertainties brought about by COVID-19. Ahead of publication, sensitivity testing and explicit consideration of the impact of COVID-19 should continue to be reflected in appraisal
- Carbon values will be published in the TAG data book as a forthcoming change notification soon after these values are officially published
- Different fleet mix assumptions will be developed as part of the ongoing enhancements to environmental (carbon) appraisal in support of the Transport Decarbonisation Plan to be

published soon after this route map documentation. They will be included in guidance through the common analytical scenarios

RESEARCH

Transport for London (TfL) and Kent County Council have been operating trial lane rental schemes successfully on parts of their road network since 2012 and 2013. Information on these schemes and the benefits they have delivered can be found here;

The Transport for London Lane Rental Scheme information web page.

https://tfl.gov.uk/info-for/urban-planning-and-construction/lane-rental-scheme#onthis-page-0

The Kent County Council Lane Rental Scheme information web page.

https://www.kent.gov.uk/roads-and-travel/highway-permits-and-licences/kent-lane-rental-scheme

HALCROW STUDY

In July 2004, Halcrow produced a report for the DfT on the impact of road works. The results shown in Table 1 below estimate an overall cost of disruption caused by Utility works in England in 2002/03 at £4.36 billion.

Table 1 Halcrow study results summary

Impact of Roadworks	Electric	Gas	Telco	Water	Total
Number of Roadworks (000s)	234	223	244	499	1200
Average cost (£000) per Roadworks	£5.30	£5.40	£2.20	£2.80	£15.70
Annual Roadwork Disruption cost (£bn)	£1.24	£1.20	£0.54	£1.40	£4.36

Source: Halcrow Group, quoted in DfT draft Permit Schemes Regulatory Impact Assessment (RIA), July 2007

IMPLICATIONS FOR THE OXFORDSHIRE LANE RENTAL SCHEME

Using the DfT sanctioned report, it is possible to get an idea for the likely implication of the Oxfordshire Lane Rental Scheme either using a ‘top down’ approach from the overall saving or a ‘bottom up’ calculation based upon the implied rate per road works.

From a top down perspective, with an estimated 1.62% of utility road works occurring in Oxfordshire and a 25% reduction in durations of works on streets associated with the Lane Rental Scheme, it may be expected to produce annual savings of £2.31m in 2002 prices or £3.04 million in 2010 prices. Shown in

Table 2 below.

Table 2 Forecast Benefits – Top Down approach

Halcrow Study	
Annual UK cost of roadworks (£bn)	£4.36
Proportion of roadworks in Oxfordshire	1.62%
Annual Oxfordshire cost of roadworks (£m)	£70.54
Annual Oxfordshire cost of Lane Rental roadworks (£m)	£9.24
Roadwork Reduction from Lane Rental Scheme	25%
Estimated Lane Rental Scheme saving (2002 prices) (£m)	**£2.31**
Estimated Lane Rental Scheme saving (2010 prices) (£m)	**£3.04**

However, working up from the actual number of Works in Oxfordshire and using the 'rule of thumb' estimate from the DfT report of £600 per works per day and an average duration of 6 days, the projected annual savings would be £1.80m in 2002 prices or £3.01 million in 2010 prices.

Table 3 Forecast Benefits – Bottom up approach

Annual Number of Road Works	Total
Pre-scheme Number of Road Works	7,765
Pre-scheme Number of Lane Rental Works	1,999
Lane Rental Road Works after 25% reduction	500
Average Days Duration from Halcrow Study	6
Number of road work days saved	2,998
Total Cost at £600 per works per day (£ m) (2002 prices)	**£1.80**
Total Cost at £600 per works per day (£ m) (2010 prices)	**£3.01**

The figures above give an estimate of the upper and lower expectations from the OLRS of between £3.04m and £3.01m in 2010 prices. As the two methods are within 5% this is considered a reliable estimate. Both methods do have a degree of uncertainty as they are based on sample national data which may not be a correct representation at a local level as this is dependent on the level of congestion.

On a heavily congested network this can increase exponentially.

Since the study was carried out, INRIX, a leading international provider of real-time traffic information, transportation analytics and connected driver services estimated the level of congestion in the UK as £13.1 billion in 2013 prices or £11.7bn in 2010 prices, giving a value in Oxfordshire of £9.13m at a 25% reduction in durations.

INPUT DATA

INTRODUCTION

This section outlines the information sources and assumptions used in the Oxfordshire Lane Rental Scheme Cost Benefit Analysis. The Cost Benefit Analysis has been prepared with 2010 as the price base year for presentation values as set out in WebTAG.

COST BENEFIT ASSUMPTION

The objective of the Oxfordshire Lane Rental Scheme is a reduction in the disruption caused by road works through reduced busy time working and/or reduced works durations.

The central assumption of the analysis is that the introduction of the Lane Rental Scheme will cause a 25% reduction in works durations on the most congested 4.73% of the network in the first year. This 25% reduction is known as the Lane Rental Scheme reduction factor. This is based on the number of streets within Oxfordshire and the number of traffic sensitive streets and the number of road works, the top 4.73% of congested streets that have 26% of overall works undertaken on them.

Table 4 Central Assumptions

CBA modelled variable	Rate
Lane Rental Scheme Reduction Factor	25%
Target year for reduction in works	1
Ratio of Lane Rental charges to overall works volume	26%

The analysis works on the operating assumption that the effects of the Lane Rental Scheme will start on Scheme Opening with reductions occurring after operational lead-time in the second month.

The breakdown of annual Permit numbers is presented in Table 5 below. Works that fall under the Lane Rental Scheme will not generate a permit fees so there will be a reduction in permit fee revenue.

Table 5 Annual Permit Summary

Annual Permits Generating a Permit Fee	Total
Number of granted permits generating a fee	7,765
Number of granted permits generating a fee after Lane Rental Reduction	6,965

DATA SOURCES

The Cost Benefit Analysis has been produced from four sources of information:

- Government guidance
- A completed Cost Matrix in a format provided by the DfT
- Local data provided by Oxfordshire County Council
- DfT Traffic Flow Data

Standard Cost Benefit Analysis assumptions and sensitivity factors have been used in line with recommendations in DfT's Annex C of TMA 2004 Decision-making and development (2nd edition).

The Local data provided by Oxfordshire County Council contained both the number of permits by type, traffic sensitive streets and specific information on the proposed Lane Rental Scheme operations and costs.

DISCOUNT AND RISK FACTORS

The study uses the DfT recommended discount rate for assessment periods under 30 years of 3.5%.

The risk factors are applied to capital expenditure costs and are taken from standard values in Annex C of TMA 2004 Decision-making and development (2nd Edition) and shown in 6.

Table 6 Discount and Risk Factors

CBA modelled variable	Rate
Discount Rate	3.5%
Risk Bias Factor	20%
Optimism Bias Factor	15%
Combined Risk-Optimism Bias Factor	38%

STATUTORY INFORMATION ASSOCIATED WITH LANE RENTAL SCHEMES

This study uses the guidance outlined in the Lane Rental Schemes Guidance for English Local Highway Authorities. The maximum charge per Lane Rental at traffic sensitive times is shown in Table 7 below.

Table 7 Maximum Lane Rental Charge

Maximum Lane Rental Charge Section 74A New Roads and Streetworks Act	
Work Type	**Works on Traffic Sensitive Streets**
Maximum Lane Rental Charge	£2,500

OXFORDSHIRE COUNTY COUNCIL DATA

Oxfordshire County Council supplied the following data and policy decisions:

- Policy data
- Road works Data

POLICY DATA

The policy decisions related to Lane Rental Scheme operation outlined in Table 8 below were obtained from Oxfordshire County Council.

Table 8 Operational Variables

CBA modelled variable	Period
Number of months to establish Lane Rental Scheme	1
Number of months to implement Lane Rental Scheme	1
Debtor days	30

ROAD WORKS DATA

Oxfordshire County council provided the information on the number of road works and shown on Table 9 below.

Table 9 Roadwork Totals

Oxfordshire Estimated Lane Rental Volumes		
Work Type	**Number**	**%**
Major	262	13%
Standard	304	15%
Minor	882	44%
Urgent	552	28%
Totals	2,000	

Oxfordshire County Council provided the information on the duration of works and shown on Table 10 below.

Table 10 Oxfordshire Average Duration of Works

Average duration of works by Activity Type	
Work Type	**Total Days**
Major	18
Standard	7
Minor	3
Urgent	5

Oxfordshire County Council provided a list of Traffic Sensitive Streets, and a full list is attached in Appendix A.

A map of the Oxfordshire Traffic Sensitive streets is shown below on Figure 1 below.

Figure 1 Oxfordshire Traffic Sensitive Network

DFT DATA

The following data was obtained from the Halcrow Study, traffic management requirements and published traffic count data.

WORKS DATA

The Halcrow Study found that the average size of carriageway works is 2 metres width by 20 metres length. Data was collected from 25 authorities across the whole of England on permit notices and the percentages of notices by reinstatement category and excavation length is summarised on Table 11 below.

Table 11 Percentage of Notices by Reinstatement Category and Excavation Length

DfT Study Table 2 - Percentages of Notices by RC and Excavation Length Vol 3: Extents of Works and Monitoring Disruption						
RC		**10m**	**30m**	**50m**	**100m**	**200m**
RC 0-2	% of all works	16.3%	0.1%	1.0%	0.8%	1.0%
	% of RC 0-2	85%	1%	5%	4%	5%
RC 3-4	% of all works	70.0%	4.2%	2.6%	2.1%	1.7%
	% of RC 3-4	87%	5%	3%	3%	2%

Works require traffic management to keep workers safe and the requirements are detailed in Chapter 8 of the Traffic Signs Manual 2009 and is summarised in Table 12 below for different road types.

Table 12 Traffic Management for Street works

Traffic Management for Street works Traffic Signs Manual Chapter 8							
Road Type	**Single 30mph or less (m)**	**Single 40mph (m)**	**Single 50mph or more (m)**	**Dual 40mph or less (m)**	**Dual 50mph or 60mph (m)**	**Dual NS (m)**	**Dual NS Congested (m)**
Taper	50	80	100	100	150	200	200
Approach signs	45	110	450	300	800	1609	3218
Min vis to sign	60	60	75	60	75	120	120
End of works sign from end	30	45	45	45	90	90	90
Totals excl works	185	295	670	505	1115	2019	3628

The Halcrow study reported the daily cost of street works by road type and excavation length and is summarised in Tables 13 and 14 below.

Table 13 Daily Cost of Rural Works

DfT Study Table 4 Daily Cost of Rural Works (£) by Reinstatement Category and Length					
Reinstatement Category	**Typical AADT**	**10m**	**50m**	**100m**	**200m**
0	<32,000	2,500	3,000	3,300	4,000
1	16000	7,850	9,050	10,250	11,000
2	12000	1,610	2,100	2,600	3,530
3	8000	780	970	1,200	1,625
4	4000	335	415	515	700

Table 14 Daily Cost of Urban Works

DfT Study Table 5 Daily Cost of Urban Works (£) by Reinstatement Category and Length					
Reinstatement Category	**Typical AADT**	**10m**	**50m**	**100m**	**200m**
0	40000	25,000	25,000	25,000	25,000
1	24000	9,000	12,000	15,000	17,000
2	16000	3,450	5,150	7,000	8,800
3	10000	385	535	710	1,025
4	6000	200	280	375	550

TRAFFIC DATA

Travel time is estimated using GPS data. The current service provider is CTrack/Inrix.

This data is generated through in-vehicle GPS units as part of the satellite navigation and stolen vehicle tracking services. The specific raw data used to derive the Department's journey time statistics consists of 10-second GPS location reports for these vehicles for the period during which their ignition is on.

As part of the service provided to the Department, CTrack/Inrix map these GPS location reports to the Ordnance Survey Integrated Transport Network, now the OS MasterMap Highways Network, and they use this information to reconstruct the routes taken by their customers as they move through the road network.

These reconstructed journeys, combined with the time stamps on the associated GPS location reports, allow CTrack/Inrix to estimate the time taken by these vehicles to traverse each ITN link. The data also allows journey times to be associated with a particular link direction if the ITN link in question can be traversed in either direction. Where the 10-second GPS location reports don't fall exactly on the start and end of each link, interpolation is used to estimate the time taken by the vehicles to complete each link.

The complete network for England consists of around 3.4 million separate 'links' and gives an extremely accurate dataset. In Oxfordshire there are over 154,000 links with live data collected continuously. Due to the huge amount of data collected the data is aggregated to every 15 minutes AGPS (Aggregated Global Positioning System Data).

The DfT have made available mapped data on the highway network for A roads and this is shown for 2022 in Figure 2 below for Oxfordshire. The data shows a number of hotspots within Oxfordshire including Oxford, Abingdon, Banbury, Bicester and these are shown in more detail in Figures 2a-d below.

Oxfordshire County Council have used this data and local knowledge of traffic flow and produced a list of the most congested streets on the network that represents 652 streets (4.73%) to geographically cover the most congested routes on the network. A list of streets is attached in Appendix A.

Traffic data was obtained from the DfT who monitor annual traffic flows for all authorities in the UK, Local ‘A’ road traffic data for 2022 representing the most congested streets in Oxfordshire has been used and is listed in Table 15 to 24 below.

Figure 2 Oxfordshire Local 'A' Road Delay 2022

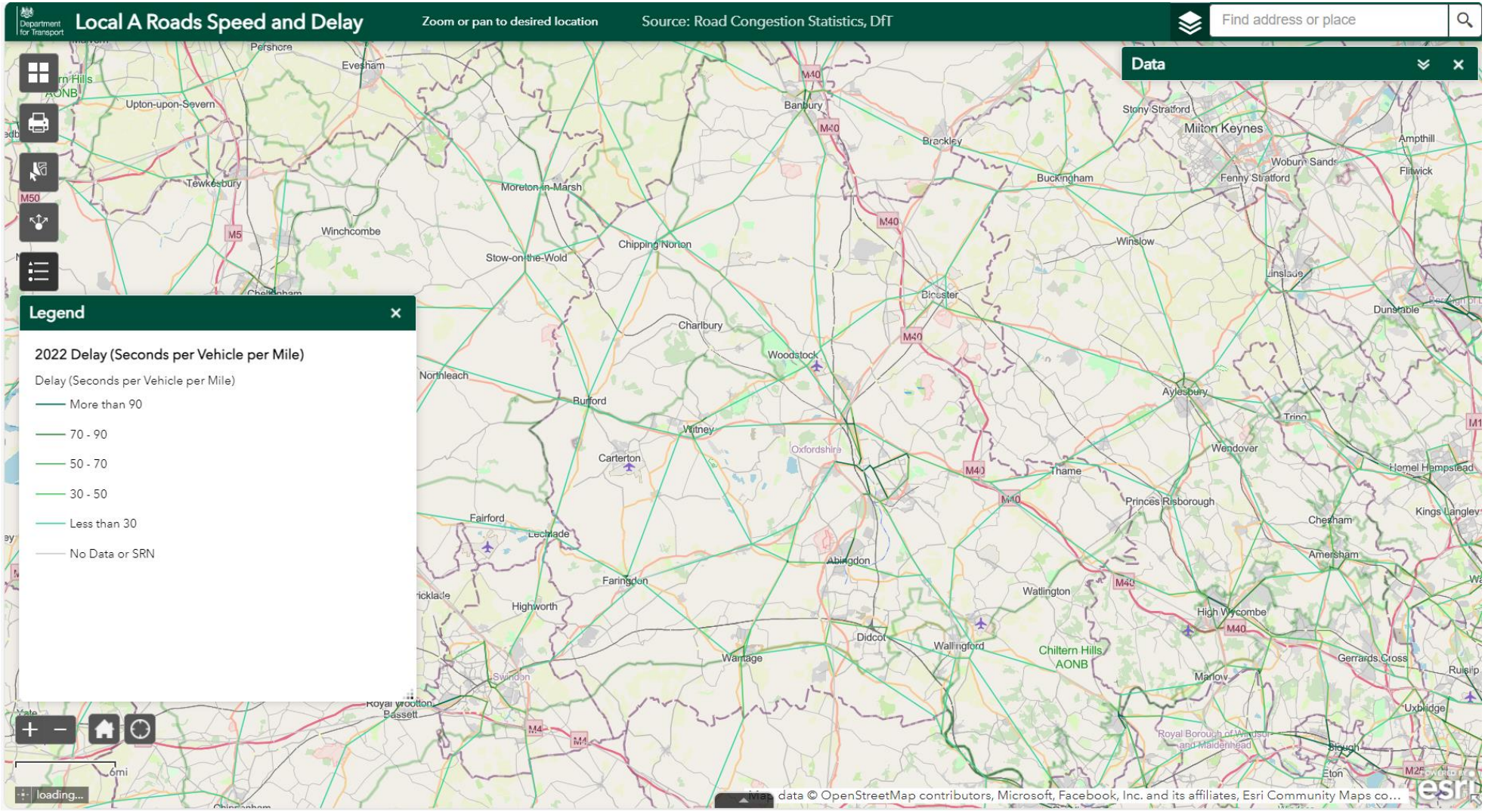

Figure 2a Oxfordshire Oxford Local 'A' Road Delay 2022

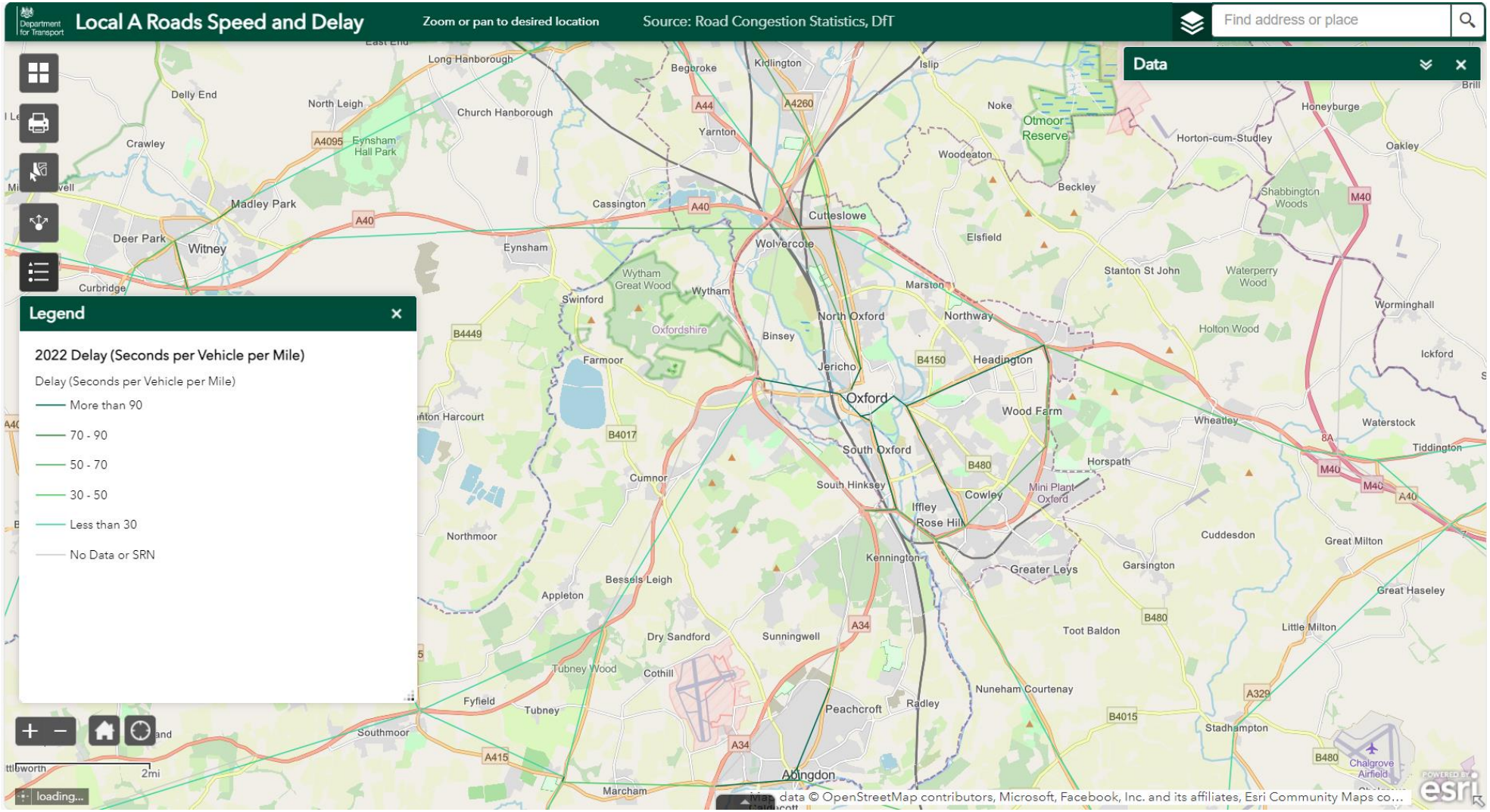

Figure 2b Oxfordshire Abingdon Local 'A' Road Delay 2022

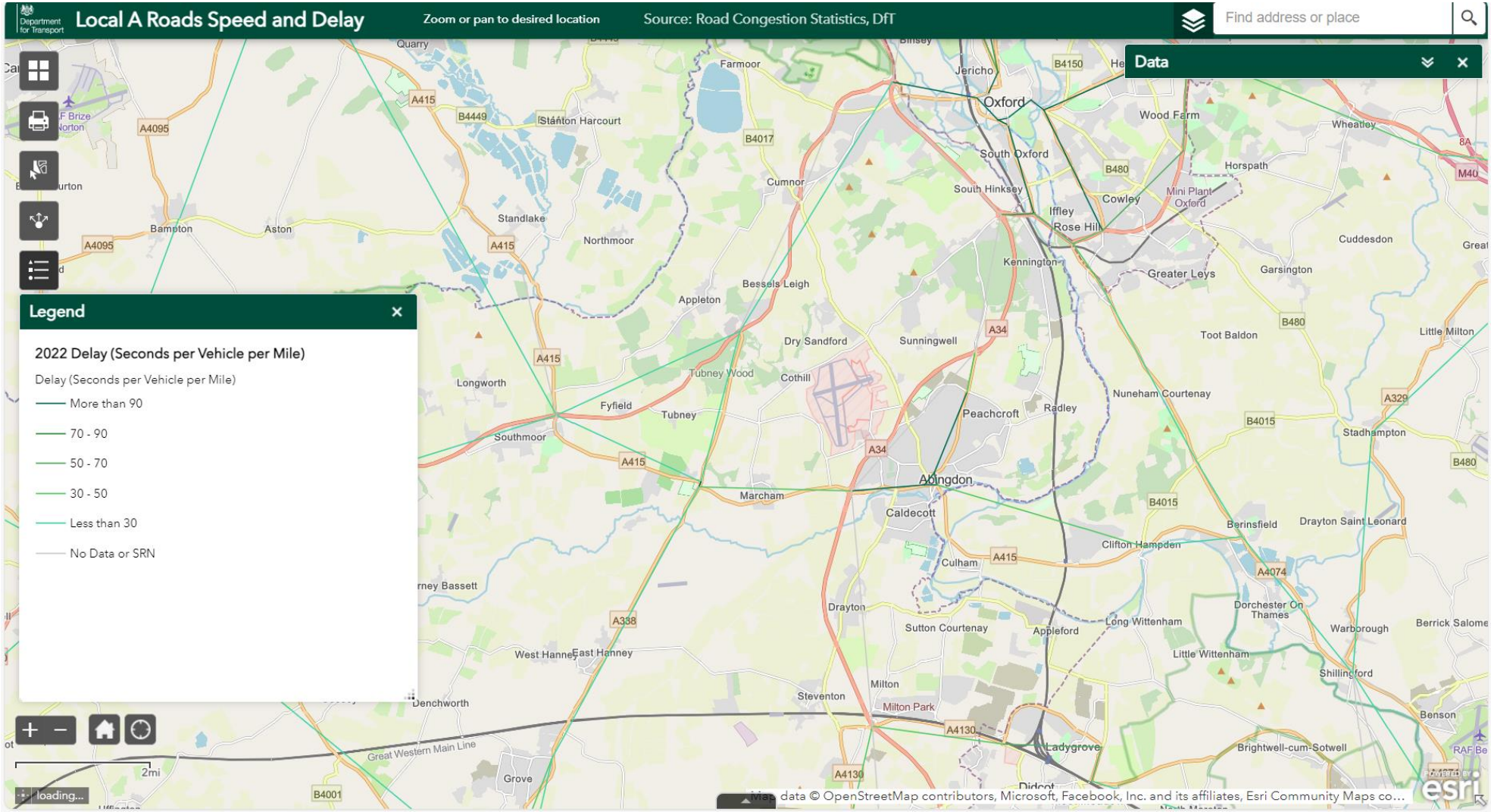

Figure 2c Oxfordshire Banbury Local 'A' Road Delay 2020

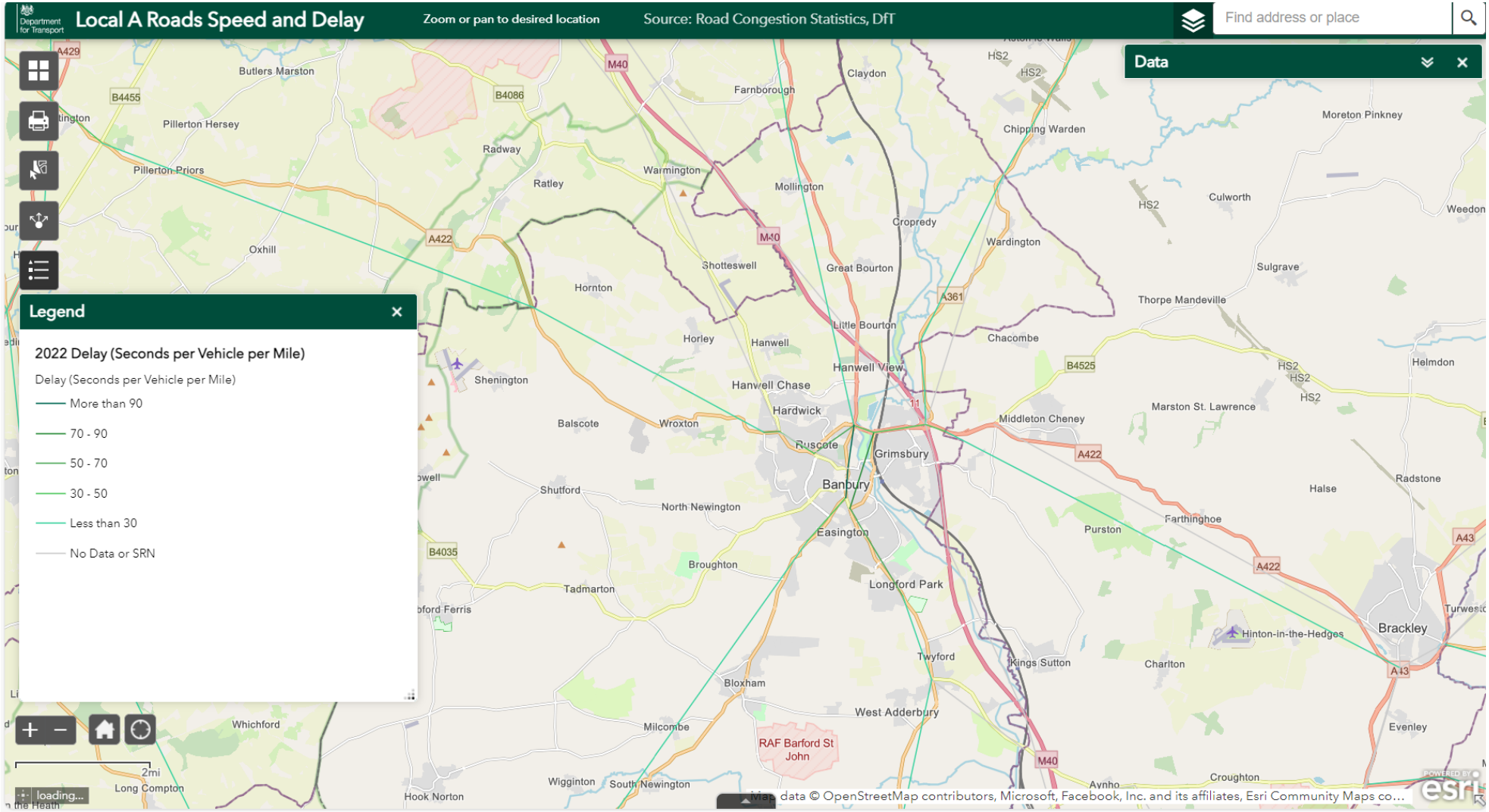

Figure 2d Oxfordshire Bicester Local 'A' Road Delay 2022

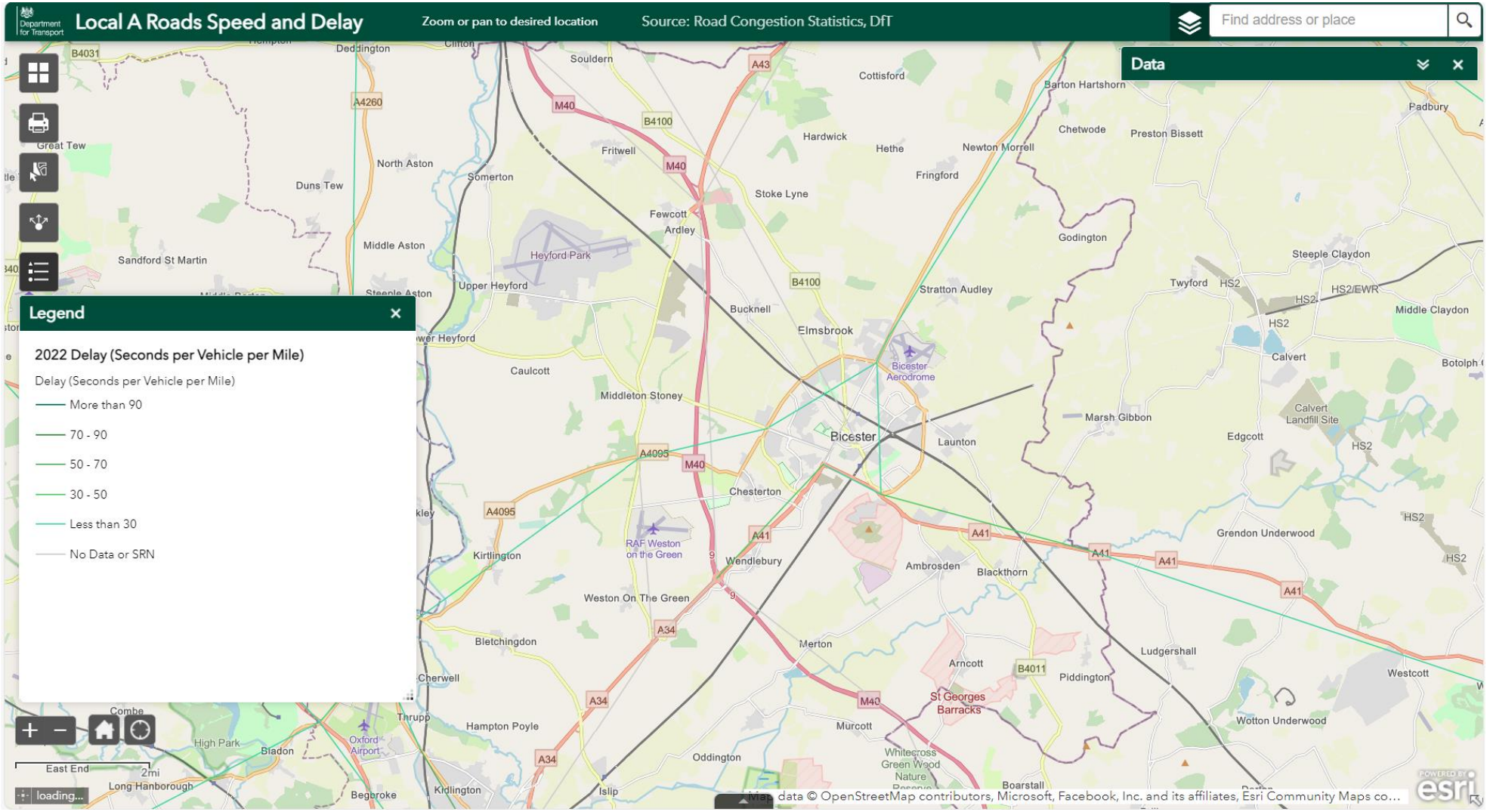

Table 15 DfT Traffic Flow Site Data 2022 (Sheet 1 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 1 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
1	A423	A34(T)	Abingdon Rd	51907	0.956	0.044	0.786	0.156	0.024	0.021	0.006	RURAL
2	A4095	A417	Deer Park Rd, Witney	2992	0.989	0.011	0.783	0.198	0.006	0.005	0.000	RURAL
3	A4155	LA Boundary	B478	15784	0.986	0.014	0.789	0.183	0.008	0.006	0.006	URBAN
4	A361	LA Boundary	LA Boundary	6351	0.944	0.056	0.755	0.175	0.021	0.034	0.004	RURAL
5	A361	M40	LA Boundary	8208	0.951	0.049	0.784	0.157	0.022	0.027	0.005	RURAL
6	A361	B4022	B4031	7970	0.947	0.053	0.778	0.160	0.031	0.021	0.002	RURAL
7	A422	B4100 Warwick Rd	A423	22634	0.979	0.021	0.847	0.124	0.016	0.005	0.002	URBAN
8	A3400	A44	LA Boundary	4959	0.965	0.035	0.776	0.178	0.018	0.017	0.005	URBAN
9	A417	A417 Gravel Walk/Marlborough St	A420	10812	0.973	0.027	0.818	0.138	0.012	0.015	0.009	URBAN
10	A4074	slip to Grenoble Rd	A4142/A423	21066	0.962	0.038	0.789	0.159	0.022	0.016	0.005	RURAL
11	A361	B4031	Waller Drive, Banbury	5125	0.962	0.038	0.769	0.183	0.023	0.015	0.002	RURAL
12	A329	A4074	B480	3146	0.969	0.031	0.716	0.229	0.025	0.005	0.003	RURAL
13	A4260	A44	A4165 roundabout	11210	0.981	0.019	0.817	0.155	0.012	0.007	0.002	RURAL
14	A4130	A4074 Junction Wallingford	B 481 Junction Nettlebed	9345	0.956	0.044	0.763	0.166	0.027	0.017	0.004	RURAL
15	A4142	Horspath Driftway	Beaumont Rd	31792	0.957	0.043	0.796	0.149	0.024	0.020	0.003	RURAL
16	A417	LA Boundary	A417 Gloucester St	2721	0.914	0.086	0.690	0.207	0.049	0.037	0.000	RURAL
17	A44	A34(T)	A4260	26706	0.946	0.054	0.766	0.168	0.019	0.035	0.003	RURAL
18	A420	Speedwell St	Longwall St	3407	0.986	0.014	0.504	0.153	0.013	0.001	0.315	URBAN
19	A44	High St	A44	8631	0.962	0.038	0.809	0.144	0.022	0.016	0.002	URBAN
20	A361	A3400	B 4022	6569	0.953	0.047	0.762	0.181	0.023	0.024	0.002	RURAL
21	A361	A424	A44	4316	0.965	0.035	0.768	0.189	0.024	0.011	0.001	RURAL
22	A4095	A4260 Bunkers hill	B 430 North of weston on the Green	6425	0.970	0.030	0.783	0.176	0.019	0.011	0.006	URBAN
23	A420	A415 Rnbt Kingston Bagpuize	A417 Junction FARINGDON	17197	0.904	0.096	0.719	0.175	0.035	0.060	0.003	RURAL
24	A4130	A34 Milton Heights	B4493	22250	0.903	0.097	0.684	0.209	0.029	0.067	0.005	RURAL
25	A4130	A4130 / A4155 Rnbt	New St / Bell St Junction	13974	0.968	0.032	0.783	0.163	0.021	0.011	0.009	URBAN
26	A44	B4022	A4095	12708	0.959	0.041	0.793	0.139	0.024	0.018	0.017	URBAN
27	A4130	A329	A4074	17133	0.962	0.038	0.804	0.145	0.025	0.014	0.006	RURAL
28	A338	A415	A420	5732	0.939	0.061	0.762	0.163	0.028	0.033	0.009	RURAL
29	A417	A338	A338	7674	0.989	0.011	0.805	0.153	0.010	0.001	0.024	URBAN
30	A338	A415	A415	14727	0.964	0.036	0.767	0.182	0.024	0.012	0.003	RURAL
31	A361	LA Boundary	A40	5570	0.943	0.057	0.715	0.220	0.031	0.026	0.002	RURAL
32	A4074	A4130W	A4130E	19794	0.956	0.044	0.757	0.187	0.028	0.016	0.003	RURAL
33	A422	LA Boundary	Bretch Hill, Banbury	4103	0.934	0.066	0.771	0.153	0.026	0.039	0.003	RURAL
34	A418	A329	LA Boundary	16822	0.931	0.069	0.740	0.181	0.038	0.032	0.003	RURAL
35	A4095	A44	A4260	9019	0.921	0.079	0.760	0.152	0.037	0.042	0.003	RURAL
36	A4421	A4095	A41(T)	11509	0.934	0.066	0.756	0.168	0.030	0.036	0.003	RURAL
37	A4421	A4095	Thompson Drive	13300	0.944	0.056	0.793	0.138	0.025	0.031	0.005	RURAL
38	A329	M40	A418	9259	0.950	0.050	0.719	0.224	0.033	0.017	0.002	RURAL

Table 16 DfT Traffic Flow Site Data 2022 (Sheet 2 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 2 of 10)							
Ref No	Road	Start Junction	End Junction	Type	2-way/1-way/bus lane	Speed Limit (mph)	Road Class	RC
1	A423	A34(T)	Abingdon Rd	D2AP	2-WAY	70	2	0
2	A4095	A417	Deer Park Rd, Witney	S2AP	2-WAY	60	1	4
3	A4155	LA Boundary	B478	S2AP	2-WAY	30	7	2
4	A361	LA Boundary	LA Boundary	S2AP	2-WAY	60	1	3
5	A361	M40	LA Boundary	S2AP	2-WAY	40	1	3
6	A361	B4022	B4031	S2AP	2-WAY	60	1	3
7	A422	B4100 Warwick Rd	A423	S2AP	2-WAY	30	7	1
8	A3400	A44	LA Boundary	D2AP	2-WAY	70	8	4
9	A417	A417 Gravel Walk/Marlborough St	A420	S2AP	2-WAY	30	7	3
10	A4074	slip to Grenoble Rd	A4142/A423	D2AP	2-WAY	50	2	1
11	A361	B4031	Waller Drive, Banbury	S2AP	2-WAY	60	1	4
12	A329	A4074	B480	S2AP	2-WAY	60	1	4
13	A4260	A44	A4165 roundabout	D2AP	2-WAY	70	2	2
14	A4130	A4074 Junction Wallingford	B 481 Junction Nettlebed	S2AP	2-WAY	30	1	3
15	A4142	Horspath Driftway	Beaumont Rd	D2AP	2-WAY	70	2	1
16	A417	LA Boundary	A417 Gloucester St	S2AP	2-WAY	60	1	4
17	A44	A34(T)	A4260	D2AP	2-WAY	60	2	1
18	A420	Speedwell St	Longwall St	S2AP	2-WAY	30	7	4
19	A44	High St	A44	S2AP	2-WAY	40	10	3
20	A361	A3400	B 4022	S2AP	2-WAY	60	1	3
21	A361	A424	A44	S2AP	2-WAY	60	1	4
22	A4095	A4260 Bunkers hill	B 430 North of weston on the Green	S2AP	2-WAY	20	8	4
23	A420	A415 Rnbt Kingston Bagpuize	A417 Junction FARINGDON	D2AP	2-WAY	70	2	1
24	A4130	A34 Milton Heights	B4493	D2AP	2-WAY	70	2	1
25	A4130	A4130 / A4155 Rnbt	New St / Bell St Junction	S2AP	2-WAY	30	7	2
26	A44	B4022	A4095	S2AP	2-WAY	30	8	3
27	A4130	A329	A4074	S2AP	2-WAY	60	1	1
28	A338	A415	A420	S2AP	2-WAY	60	1	4
29	A417	A338	A338	S2AP	2-WAY	30	7	4
30	A338	A415	A415	D2AP	2-WAY	60	2	1
31	A361	LA Boundary	A40	S2AP	2-WAY	60	1	4
32	A4074	A4130W	A4130E	S2AP	2-WAY	60	1	1
33	A422	LA Boundary	Bretch Hill, Banbury	S2AP	2-WAY	60	1	4
34	A418	A329	LA Boundary	S2AP	2-WAY	50	1	1
35	A4095	A44	A4260	S2AP	2-WAY	60	1	3
36	A4421	A4095	A41(T)	S2AP	2-WAY	40	1	2
37	A4421	A4095	Thompson Drive	S2AP	2-WAY	40	1	2
38	A329	M40	A418	S2AP	2-WAY	50	1	3

Table 17 DfT Traffic Flow Site Data 2022 (Sheet 3 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 3 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
39	A417	Lechlade Road	Station Rd	7512	0.971	0.029	0.774	0.172	0.021	0.009	0.013	URBAN
40	A415	A4183	A415 Bridge St/High St	7671	0.978	0.022	0.812	0.139	0.019	0.004	0.017	URBAN
41	A4142	A4158	Horspath Driftway	42472	0.961	0.039	0.796	0.150	0.021	0.018	0.007	RURAL
42	A338	A415	Oxford Lane	9651	0.969	0.031	0.788	0.165	0.018	0.013	0.007	RURAL
43	A422	A361	A4260	37115	0.951	0.049	0.782	0.162	0.022	0.027	0.002	URBAN
44	A4155	Mill Lane	A4130	12061	0.978	0.022	0.825	0.140	0.019	0.003	0.006	URBAN
45	A4155	B478	Mill Lane, Henley	8831	0.981	0.019	0.819	0.145	0.012	0.007	0.010	RURAL
46	A417	Station Rd	A4095	3186	0.987	0.013	0.765	0.192	0.006	0.008	0.022	URBAN
47	A421	LA Boundary	A4421	10666	0.910	0.090	0.736	0.169	0.033	0.057	0.001	RURAL
48	A420	Thames St	St Aldgates	3746	0.985	0.015	0.500	0.160	0.015	0.000	0.309	URBAN
49	A418	A4129	LA Boundary	21183	0.972	0.028	0.780	0.177	0.015	0.013	0.008	RURAL
50	A417	Warmans Close	A338	8293	0.972	0.028	0.816	0.151	0.014	0.014	0.003	URBAN
51	A361	Waller Drive	B4100	11945	0.977	0.023	0.838	0.133	0.013	0.010	0.002	URBAN
52	A417	Charlton Village Road	Wantage Ormond Road	9664	0.963	0.037	0.826	0.126	0.019	0.018	0.007	URBAN
53	A4183	A415	Twelve Acre Drive roundabout	9030	0.984	0.016	0.845	0.111	0.014	0.002	0.019	URBAN
54	A420	A4144 St Aldgates	Speedwell St	8979	0.989	0.011	0.803	0.153	0.008	0.002	0.022	URBAN
55	A338	LA Boundary	A417	2028	0.959	0.041	0.729	0.219	0.027	0.015	0.001	RURAL
56	A4421	Thompson Drive, Bicester	LA Boundary	11982	0.944	0.056	0.793	0.138	0.025	0.031	0.005	RURAL
57	A4130	B4016 Broadway	B4016 Lady Grove	10876	0.949	0.051	0.783	0.158	0.032	0.019	0.001	URBAN
58	A4074	LA Boundary	A4130	7461	0.957	0.043	0.775	0.168	0.021	0.022	0.004	RURAL
59	A418	M40	A40	15015	0.936	0.064	0.758	0.169	0.033	0.032	0.006	RURAL
60	A415	B4015	A4074	5763	0.946	0.054	0.749	0.170	0.037	0.017	0.012	RURAL
61	A4260	Weeping Cross	Upper Windsor St	17328	0.976	0.024	0.844	0.123	0.014	0.010	0.002	URBAN
62	A420	LA Boundary	A 417 Junction SOUTH Faringdon	17476	0.898	0.102	0.720	0.172	0.038	0.064	0.000	RURAL
63	A420	Longwall St	A4158 Iffley Road roundabout	13655	0.989	0.011	0.670	0.171	0.010	0.001	0.110	URBAN
64	A415	A338	A34	12962	0.966	0.034	0.795	0.160	0.025	0.009	0.004	RURAL
65	A417	A4130	LA Boundary	6510	0.977	0.023	0.810	0.157	0.017	0.006	0.000	RURAL
66	A4142	Beaumont Rd	A40	29505	0.955	0.045	0.776	0.170	0.024	0.022	0.002	URBAN
67	A4185	A34 bridge	A417	5562	0.950	0.050	0.775	0.160	0.029	0.020	0.005	RURAL
68	A4260	B4100 OXFORD RD	A 422 HENNEF WAY	16606	0.965	0.035	0.846	0.113	0.020	0.015	0.001	RURAL
69	A4129	LA Boundary	A418	7911	0.961	0.039	0.775	0.171	0.023	0.017	0.002	RURAL
70	A338	A417	Oxford Lane	12267	0.971	0.029	0.808	0.150	0.022	0.007	0.005	URBAN
71	A422	Wildmere Rd	M40	38734	0.946	0.054	0.803	0.136	0.022	0.032	0.002	URBAN
72	A4095	A4095	A4421	12568	0.985	0.015	0.838	0.141	0.011	0.004	0.002	RURAL
73	A4144	A423	Thames Street	11757	0.969	0.031	0.754	0.167	0.013	0.018	0.039	URBAN
74	A4165	A40(T)	A4144	12473	0.986	0.014	0.798	0.141	0.011	0.003	0.034	URBAN
75	A40	M40 spur/A40	M40	17131	0.931	0.069	0.765	0.156	0.032	0.036	0.006	RURAL
76	A44	A44 London Rd	B4030	8478	0.949	0.051	0.765	0.168	0.026	0.025	0.006	RURAL

Table 18 DfT Traffic Flow Site Data 2022 (Sheet 4 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 4 of 10)							
Ref No	Road	Start Junction	End Junction	Type	2-way/1-way/bus lane	Speed Limit (mph)	Road Class	RC
39	A417	Lechlade Road	Station Rd	S2AP	2-WAY	30	8	4
40	A415	A4183	A415 Bridge St/High St	S2AP	1-WAY	30	7	4
41	A4142	A4158	Horspath Driftway	D2AP	2-WAY	50	2	0
42	A338	A415	Oxford Lane	S2AP	2-WAY	20	1	3
43	A422	A361	A4260	D2AP	2-WAY	70	8	1
44	A4155	Mill Lane	A4130	S2AP	2-WAY	30	8	3
45	A4155	B478	Mill Lane, Henley	S2AP	2-WAY	50	1	3
46	A417	Station Rd	A4095	S2AP	2-WAY	20	7	4
47	A421	LA Boundary	A4421	S2AP	2-WAY	50	1	2
48	A420	Thames St	St Aldgates	S2AP	2-WAY	30	7	4
49	A418	A4129	LA Boundary	S2AP	2-WAY	60	1	1
50	A417	Warmans Close	A338	S2AP	2-WAY	30	7	3
51	A361	Waller Drive	B4100	S2AP	2-WAY	30	8	3
52	A417	Charlton Village Road	Wantage Ormond Road	S2AP	2-WAY	30	8	3
53	A4183	A415	Twelve Acre Drive roundabout	S2AP	2-WAY	30	8	3
54	A420	A4144 St Aldgates	Speedwell St	S2AP	2-WAY	30	7	3
55	A338	LA Boundary	A417	S2AP	2-WAY	60	1	4
56	A4421	Thompson Drive, Bicester	LA Boundary	S2AP	2-WAY	60	1	2
57	A4130	B4016 Broadway	B4016 Lady Grove	S2AP	2-WAY	30	8	3
58	A4074	LA Boundary	A4130	S2AP	2-WAY	60	1	3
59	A418	M40	A40	S2AP	2-WAY	60	1	1
60	A415	B4015	A4074	S2AP	2-WAY	30	1	4
61	A4260	Weeping Cross	Upper Windsor St	S2AP	2-WAY	30	8	2
62	A420	LA Boundary	A 417 Junction SOUTH Faringdon	S2AP	2-WAY	60	1	1
63	A420	Longwall St	A4158 Iffley Road roundabout	S2AP	2-WAY	30	7	2
64	A415	A338	A34	S2AP	2-WAY	50	1	2
65	A417	A4130	LA Boundary	S2AP	2-WAY	50	1	3
66	A4142	Beaumont Rd	A40	S2AP	2-WAY	30	8	1
67	A4185	A34 bridge	A417	S2AP	2-WAY	40	1	4
68	A4260	B4100 OXFORD RD	A 422 HENNEF WAY	S2AP	2-WAY	50	1	1
69	A4129	LA Boundary	A418	S2AP	2-WAY	40	1	3
70	A338	A417	Oxford Lane	S2AP	2-WAY	30	8	3
71	A422	Wildmere Rd	M40	D2AP	2-WAY	60	8	1
72	A4095	A4095	A4421	S2AP	2-WAY	40	1	2
73	A4144	A423	Thames Street	S2AP	2-WAY	30	8	3
74	A4165	A40(T)	A4144	WS2+1	2-WAY	30	8	3
75	A40	M40 spur/A40	M40	S2AP	2-WAY	50	1	1
76	A44	A44 London Rd	B4030	S2AP	2-WAY	60	1	3

Table 19 DfT Traffic Flow Site Data 2022 (Sheet 5 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 5 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
77	A329	B480	M40	8298	0.973	0.027	0.755	0.203	0.018	0.009	0.002	RURAL
78	A415	A415 Stratton Way	A415 Stert St	9408	0.986	0.014	0.814	0.143	0.011	0.004	0.014	URBAN
79	A422	Bretch Hill	B4100	4554	0.934	0.066	0.771	0.153	0.026	0.039	0.003	URBAN
80	A4260	Langford Lane, Kidlington	A 4165	8466	0.973	0.027	0.785	0.174	0.014	0.013	0.005	RURAL
81	A4130	B481 Nettlebed	Lambridge Wood Rd, Henley	8796	0.961	0.039	0.783	0.170	0.022	0.017	0.004	RURAL
82	A420	Botley Road	Thames St/Speedwell St	13621	0.983	0.017	0.799	0.156	0.013	0.004	0.015	URBAN
83	A361	B4100	B4100	17905	0.974	0.026	0.835	0.126	0.015	0.011	0.006	URBAN
84	A417	Lechlade Rd	A4095 Church St	2978	0.992	0.008	0.796	0.171	0.007	0.001	0.019	URBAN
85	A4165	Jordan Hill	A40 0xford northern by-pass	17525	0.978	0.022	0.805	0.133	0.011	0.011	0.032	URBAN
86	A40	A4165	A420	39481	0.950	0.050	0.777	0.166	0.026	0.024	0.001	RURAL
87	A44	High St	A3400	6527	0.962	0.038	0.812	0.135	0.021	0.016	0.010	RURAL
88	A4155	A4130	LA Boundary	6437	0.988	0.012	0.809	0.162	0.009	0.003	0.010	URBAN
89	A4260	A4095	A4095	14181	0.948	0.052	0.760	0.172	0.020	0.032	0.004	RURAL
90	A40	A418	M40/A329	3159	0.941	0.059	0.691	0.236	0.028	0.031	0.004	RURAL
91	A44	LA Boundary/ A436	A361 New Street	6252	0.951	0.049	0.770	0.167	0.023	0.026	0.004	RURAL
92	A4130	Hart St	New St	6560	0.965	0.035	0.773	0.161	0.023	0.011	0.019	URBAN
93	A40	A4142 Oxford Green Road Rnbt	A418	32590	0.926	0.074	0.741	0.175	0.033	0.041	0.004	RURAL
94	A44	A 4095 BLADON	A4260 Rnbt WEST OF PEARTREE	21567	0.954	0.046	0.803	0.134	0.022	0.024	0.007	RURAL
95	A4095	Deer Park Rd	A415	6178	0.992	0.008	0.847	0.139	0.006	0.001	0.001	URBAN
96	A4130	B4016 Broadway	A329	9798	0.949	0.051	0.783	0.157	0.032	0.019	0.001	RURAL
97	A418	A329	A40	10910	0.941	0.059	0.760	0.168	0.026	0.034	0.007	RURAL
98	A329	LA Boundary	A4130	7540	0.987	0.013	0.812	0.167	0.011	0.002	0.005	RURAL
99	A44	New St	London Rd	12324	0.961	0.039	0.774	0.174	0.021	0.018	0.005	URBAN
100	A40	A4144	A4165	23588	0.951	0.049	0.788	0.150	0.019	0.030	0.003	RURAL
101	A4260	A4095	Langford Lane	13668	0.973	0.027	0.767	0.193	0.014	0.013	0.006	URBAN
102	A420	A417	A417	22512	0.904	0.096	0.721	0.169	0.039	0.058	0.007	URBAN
103	A44	B4030	B4022	7628	0.956	0.044	0.783	0.154	0.022	0.022	0.006	RURAL
104	A4260	B4030	B4031	9990	0.967	0.033	0.795	0.158	0.018	0.015	0.004	RURAL
105	A40	LA Boundary	A361 Roundabout BURFORD	12573	0.921	0.079	0.723	0.187	0.033	0.046	0.002	RURAL
106	A40	A415 WITNEY	B4022 Junction WITNEY	26462	0.930	0.070	0.770	0.151	0.027	0.043	0.002	RURAL
107	A40	A361	B4047 roundabout	19924	0.932	0.068	0.746	0.174	0.037	0.031	0.006	RURAL
108	A44	A44	A361	4717	0.951	0.049	0.790	0.154	0.026	0.023	0.003	RURAL
109	A417	A420(T)	Warmans Close	7748	0.940	0.060	0.720	0.208	0.024	0.037	0.004	RURAL
110	A4130	A4130 Thames Side	A4155	10000	0.975	0.026	0.803	0.159	0.016	0.010	0.006	URBAN
111	A4144	A4165	A40(T)	12309	0.985	0.015	0.813	0.138	0.013	0.002	0.024	URBAN
112	A4074	B4015	slip to Grenoble Rd	16516	0.958	0.042	0.783	0.157	0.025	0.017	0.008	RURAL
113	A4095	Early Rd, Witney	A44	7994	0.975	0.025	0.813	0.149	0.018	0.007	0.007	RURAL
114	A415	A4095	A40	11590	0.982	0.018	0.836	0.134	0.012	0.006	0.005	URBAN
115	A4260	B4100 Adderbury	Weeping Cross, Banbury	17563	0.971	0.029	0.828	0.130	0.017	0.012	0.003	RURAL

Table 20 DfT Traffic Flow Site Data 2022 (Sheet 6 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 6 of 10)							
Ref No	Road	Start Junction	End Junction	Type	2-way/1-way/bus lane	Speed Limit (mph)	Road Class	RC
77	A329	B480	M40	S2AP	2-WAY	50	1	3
78	A415	A415 Stratton Way	A415 Stert St	S2AP	2-WAY	30	7	3
79	A422	Bretch Hill	B4100	S2AP	2-WAY	20	8	4
80	A4260	Langford Lane, Kidlington	A 4165	S2AP	2-WAY	50	1	3
81	A4130	B481 Nettlebed	Lambridge Wood Rd, Henley	S2AP	2-WAY	60	1	3
82	A420	Botley Road	Thames St/Speedwell St	S2AP	2-WAY	30	7	2
83	A361	B4100	B4100	D2AP	2-WAY	30	7	2
84	A417	Lechlade Rd	A4095 Church St	S2AP	1-WAY	30	7	4
85	A4165	Jordan Hill	A40 0xford northern by-pass	S2AP	2-WAY	30	10	2
86	A40	A4165	A420	D2AP	2-WAY	70	2	0
87	A44	High St	A3400	S2AP	2-WAY	60	1	3
88	A4155	A4130	LA Boundary	S2AP	2-WAY	30	10	4
89	A4260	A4095	A4095	S2AP	2-WAY	60	1	1
90	A40	A418	M40/A329	S2AP	2-WAY	40	1	4
91	A44	LA Boundary/ A436	A361 New Street	S2AP	2-WAY	60	1	3
92	A4130	Hart St	New St	S2AP	1-WAY	30	7	4
93	A40	A4142 Oxford Green Road Rnbt	A418	D2AP	2-WAY	70	2	0
94	A44	A 4095 BLADON	A4260 Rnbt WEST OF PEARTREE	D2AP	2-WAY	60	1	1
95	A4095	Deer Park Rd	A415	S2AP	2-WAY	30	8	4
96	A4130	B4016 Broadway	A329	S2AP	2-WAY	40	1	3
97	A418	A329	A40	S2AP	2-WAY	50	1	2
98	A329	LA Boundary	A4130	S2AP	2-WAY	40	1	3
99	A44	New St	London Rd	S2AP	2-WAY	30	8	3
100	A40	A4144	A4165	D2AP	2-WAY	40	2	1
101	A4260	A4095	Langford Lane	S2AP	2-WAY	30	8	2
102	A420	A417	A417	S2AP	2-WAY	30	8	1
103	A44	B4030	B4022	S2AP	2-WAY	30	1	3
104	A4260	B4030	B4031	S2AP	2-WAY	60	1	3
105	A40	LA Boundary	A361 Roundabout BURFORD	S2AP	2-WAY	60	1	2
106	A40	A415 WITNEY	B4022 Junction WITNEY	D2AP	2-WAY	70	2	1
107	A40	A361	B4047 roundabout	S2AP	2-WAY	30	1	1
108	A44	A44	A361	S2AP	2-WAY	60	1	4
109	A417	A420(T)	Warmans Close	S2AP	2-WAY	60	1	3
110	A4130	A4130 Thames Side	A4155	S2AP	2-WAY	30	7	3
111	A4144	A4165	A40(T)	WS2+1	2-WAY	30	8	3
112	A4074	B4015	slip to Grenoble Rd	S2AP	2-WAY	30	1	1
113	A4095	Early Rd, Witney	A44	S2AP	2-WAY	50	1	3
114	A415	A4095	A40	S2AP	2-WAY	30	8	3
115	A4260	B4100 Adderbury	Weeping Cross, Banbury	S2AP	2-WAY	60	1	1

Table 21 DfT Traffic Flow Site Data 2022 (Sheet 7 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 7 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
116	A423	A4142 / A4074 Heyford hill	A4144	53107	0.961	0.039	0.809	0.138	0.020	0.019	0.004	RURAL
117	A422	B4100	B4100	12228	0.975	0.025	0.833	0.134	0.012	0.013	0.004	URBAN
118	A4165	A4260	Jordan Hill	15788	0.978	0.022	0.805	0.133	0.011	0.011	0.032	URBAN
119	A40	A329 MILTON COMMON	LA Boundary	4969	0.967	0.033	0.775	0.174	0.023	0.009	0.003	RURAL
120	A4074	A329	A415	14451	0.960	0.040	0.767	0.171	0.024	0.016	0.008	RURAL
121	A4074	A415	B4015	12519	0.948	0.052	0.778	0.152	0.031	0.021	0.007	RURAL
122	A361	A422	Castle St	11906	0.963	0.037	0.810	0.148	0.020	0.017	0.002	URBAN
123	A4074	A4130 Crowmarsh gifford Rnbt	B 4009 Junction BENSON	16265	0.959	0.041	0.773	0.174	0.023	0.018	0.006	RURAL
124	A415	A34(T)	A415 Stratton Way	27514	0.964	0.036	0.811	0.140	0.022	0.015	0.004	URBAN
125	A4130	Bell St	Hart St	8292	0.968	0.032	0.777	0.168	0.023	0.010	0.013	URBAN
126	A423	A422	LA Boundary	6079	0.938	0.062	0.750	0.172	0.024	0.038	0.004	RURAL
127	A420	A338 Tobney Wood	A34 Botley	20672	0.915	0.085	0.744	0.160	0.032	0.053	0.004	RURAL
128	A4130	B4493	B4016 Lady Grove	7160	0.945	0.055	0.780	0.152	0.025	0.031	0.003	RURAL
129	A4144	A420 Botley Rd	A4144 Worcester St	9579	0.984	0.016	0.750	0.197	0.013	0.003	0.024	URBAN
130	A41	B4100	B4030	19620	0.907	0.093	0.728	0.170	0.031	0.062	0.002	RURAL
131	A4260	A4095	B4030	9847	0.969	0.031	0.789	0.173	0.015	0.015	0.001	RURAL
132	A4130	Lambridge Wood Rd	A4155 Marlow Rd	11859	0.967	0.033	0.793	0.163	0.016	0.017	0.003	URBAN
133	A40	B4449	A44	22822	0.914	0.086	0.742	0.159	0.038	0.047	0.004	RURAL
134	A41	M40 Junction 9	BICESTER BP	33104	0.936	0.064	0.777	0.149	0.029	0.035	0.005	RURAL
135	A40	B4047	A415	14212	0.930	0.070	0.773	0.146	0.032	0.038	0.002	RURAL
136	A420	A34(T)	Hollybush Row	15907	0.983	0.017	0.779	0.164	0.013	0.004	0.022	URBAN
137	A44	A 40	A34 PEARTREE	27270	0.942	0.058	0.739	0.181	0.023	0.035	0.011	RURAL
138	A417	A4130 Rowstock	Charlton Village Road	10866	0.969	0.031	0.802	0.155	0.018	0.013	0.005	RURAL
139	A415	A415 Ock St	A4183	16172	0.988	0.012	0.842	0.121	0.008	0.004	0.012	URBAN
140	A415	A420 Kingston Bagpuize	A338	9728	0.956	0.044	0.773	0.169	0.025	0.019	0.003	RURAL
141	A424	A361	LA Boundary	6165	0.961	0.039	0.768	0.180	0.023	0.017	0.005	RURAL
142	A4142	A423	A4158	43909	0.959	0.041	0.801	0.142	0.022	0.019	0.004	RURAL
143	A41	LA Boundary	B4100	29430	0.907	0.093	0.728	0.170	0.031	0.062	0.002	RURAL
144	A4095	B430	B4030	2972	0.980	0.020	0.763	0.204	0.013	0.006	0.001	RURAL
145	A338	A417	A417	15018	0.982	0.018	0.850	0.121	0.012	0.006	0.004	URBAN
146	A361	A40(T)	A424	12267	0.972	0.028	0.794	0.163	0.024	0.005	0.005	URBAN
147	A4095	B4022	Early Rd	8874	0.975	0.025	0.813	0.149	0.018	0.007	0.007	URBAN
148	A436	LA Boundary	A44	4725	0.946	0.054	0.762	0.170	0.033	0.021	0.000	RURAL
149	A4144	Hythe Bridge St/Wocester St	A4165 St Giles	8466	0.975	0.025	0.789	0.145	0.023	0.002	0.005	URBAN
150	A4130	A4130 Thames Side	LA Boundary	15249	0.966	0.034	0.800	0.147	0.024	0.010	0.005	URBAN
151	A44	LA Boundary	LA Boundary	6269	0.946	0.054	0.797	0.136	0.029	0.025	0.004	RURAL
152	A4130	A34 Milton	A417	8841	0.959	0.041	0.787	0.158	0.023	0.017	0.004	RURAL

Table 22 DfT Traffic Flow Site Data 2022 (Sheet 8 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 8 of 10)							
Ref No	Road	Start Junction	End Junction	Type	2-way/1-way/bus lane	Speed Limit (mph)	Road Class	RC
116	A423	A4142 / A4074 Heyford hill	A4144	D2AP	2-WAY	60	2	0
117	A422	B4100	B4100	S2AP	2-WAY	30	8	3
118	A4165	A4260	Jordan Hill	WS2+1	2-WAY	40	10	2
119	A40	A329 MILTON COMMON	LA Boundary	S2AP	2-WAY	60	1	4
120	A4074	A329	A415	S2AP	2-WAY	40	1	1
121	A4074	A415	B4015	S2AP	2-WAY	60	1	2
122	A361	A422	Castle St	S2AP	2-WAY	30	8	3
123	A4074	A4130 Crowmarsh gifford Rnbt	B 4009 Junction BENSON	S2AP	2-WAY	60	1	1
124	A415	A34(T)	A415 Stratton Way	S2AP	2-WAY	30	8	1
125	A4130	Bell St	Hart St	S2AP	1-WAY	30	7	3
126	A423	A422	LA Boundary	S2AP	2-WAY	60	1	3
127	A420	A338 Tobney Wood	A34 Botley	D2AP	2-WAY	70	2	1
128	A4130	B4493	B4016 Lady Grove	S2AP	2-WAY	50	1	3
129	A4144	A420 Botley Rd	A4144 Worcester St	S2AP	2-WAY	30	7	3
130	A41	B4100	B4030	S2AP	2-WAY	60	1	1
131	A4260	A4095	B4030	S2AP	2-WAY	60	1	3
132	A4130	Lambridge Wood Rd	A4155 Marlow Rd	S2AP	2-WAY	30	8	3
133	A40	B4449	A44	S2AP	2-WAY	60	1	1
134	A41	M40 Junction 9	BICESTER BP	S2AP	2-WAY	60	1	0
135	A40	B4047	A415	D2AP	2-WAY	70	1	1
136	A420	A34(T)	Hollybush Row	S2AP	2-WAY	30	8	2
137	A44	A 40	A34 PEARTREE	D2AP	2-WAY	70	2	1
138	A417	A4130 Rowstock	Charlton Village Road	S2AP	2-WAY	60	1	2
139	A415	A415 Ock St	A4183	S2AP	2-WAY	30	7	2
140	A415	A420 Kingston Bagpuize	A338	S2AP	2-WAY	40	1	3
141	A424	A361	LA Boundary	S2AP	2-WAY	50	1	3
142	A4142	A423	A4158	S2AP	2-WAY	60	1	0
143	A41	LA Boundary	B4100	S2AP	2-WAY	40	1	1
144	A4095	B430	B4030	S2AP	2-WAY	60	1	4
145	A338	A417	A417	S2AP	2-WAY	30	8	2
146	A361	A40(T)	A424	S2AP	2-WAY	30	8	3
147	A4095	B4022	Early Rd	S2AP	2-WAY	30	8	3
148	A436	LA Boundary	A44	S2AP	2-WAY	60	1	4
149	A4144	Hythe Bridge St/Wocester St	A4165 St Giles	S2AP	2-WAY	30	7	3
150	A4130	A4130 Thames Side	LA Boundary	S2AP	2-WAY	30	7	2
151	A44	LA Boundary	LA Boundary	S2AP	2-WAY	60	1	3
152	A4130	A34 Milton	A417	S2AP	2-WAY	60	1	3

Table 23 DfT Traffic Flow Site Data 2022 (Sheet 9 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 9 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
153	A4185	A34 bridge	roundabout at end of A4185	5562	0.950	0.050	0.775	0.160	0.029	0.020	0.005	RURAL
154	A422	A4260	Wildmere Rd	42565	0.945	0.055	0.803	0.136	0.022	0.032	0.002	URBAN
155	A4095	A415	B4022	5708	0.979	0.021	0.805	0.160	0.013	0.008	0.005	URBAN
156	A420	The Plain	A420 London Rd	11046	0.989	0.011	0.810	0.124	0.009	0.002	0.046	URBAN
157	A4183	Twelve Acre Drive roundabout	A34	15679	0.974	0.026	0.824	0.132	0.015	0.011	0.011	RURAL
158	A415	Abingdon Stert St	B 4015 Clifton Hampden	8893	0.965	0.035	0.799	0.146	0.023	0.012	0.008	URBAN
159	A40	B4022	B4449	26874	0.938	0.062	0.736	0.186	0.025	0.038	0.004	RURAL
160	A415	A40	A420	9384	0.986	0.014	0.759	0.211	0.013	0.001	0.004	RURAL
161	A420	A415 Junction Kingston Bagpuize	A 338 Junction	16590	0.910	0.090	0.730	0.168	0.032	0.058	0.005	RURAL
162	A4158	A4142	A420	11129	0.990	0.010	0.795	0.153	0.009	0.002	0.020	URBAN
163	A422	M40	LA Boundary	22776	0.962	0.038	0.792	0.161	0.014	0.023	0.003	RURAL
164	A418	LA Boundary	A4129	16822	0.931	0.069	0.740	0.181	0.038	0.032	0.003	RURAL
165	A4260	B4100 Junction Adderbury	B 4031 Junction Deddington	9112	0.965	0.035	0.821	0.133	0.020	0.015	0.003	RURAL

Table 24 DfT Traffic Flow Site Data 2022 (Sheet 10 of 10)

Oxfordshire	DfT Traffic Flow Site Data 2018 (Sheet 10 of 10)							
Ref No	Road	Start Junction	End Junction	Type	2-way/1-way/bus lane	Speed Limit (mph)	Road Class	RC
153	A4185	A34 bridge	roundabout at end of A4185	S2AP	2-WAY	60	1	4
154	A422	A4260	Wildmere Rd	D2AP	2-WAY	50	11	0
155	A4095	A415	B4022	S2AP	2-WAY	30	8	4
156	A420	The Plain	A420 London Rd	S2AP	2-WAY	30	8	3
157	A4183	Twelve Acre Drive roundabout	A34	S2AP	2-WAY	50	1	1
158	A415	Abingdon Stert St	B 4015 Clifton Hampden	S2AP	2-WAY	30	8	3
159	A40	B4022	B4449	S2AP	2-WAY	60	1	1
160	A415	A40	A420	S2AP	2-WAY	50	1	3
161	A420	A415 Junction Kingston Bagpuize	A 338 Junction	S2AP	2-WAY	50	1	1
162	A4158	A4142	A420	S2AP	2-WAY	30	8	3
163	A422	M40	LA Boundary	D2AP	2-WAY	70	1	1
164	A418	LA Boundary	A4129	S2AP	2-WAY	60	1	1
165	A4260	B4100 Junction Adderbury	B 4031 Junction Deddington	S2AP	2-WAY	40	1	3

INPUT DATA

DELAY MODELLING METHODOLOGY

The estimation of delay is detailed in the Halcrow study. Two methods of measurement are listed

- (a) live site measured method
- (b) modelling techniques to replicate works on the ground

The measured method is described as a restricted illustrative example of the impact at works and a general model is more industry recognised as the more robust technique that can be audited and validated.

There are three types of modelling software that can be used to model delay at works namely;

- QUADRO – models queues and delays at road works
- SATURN – macro assignment
- VISSIM – micro simulation

The Halcrow study stated in Section 2.1 that on evaluation there were inconsistencies with the latter two types and that QUADRO would give the most consistent results although it is suited more to rural locations with little diversion routes but it is able to model the additional delay on diversion routes when the maximum queuing delay on the main route is exceeded.

QUADRO is able to appraise individual works that are planned in the future on different types of road by modelling the delay experienced by road users, quantify the delay and estimate the cost of the delay.

The software is able to calculate and convert delays into monetary figures as detailed in WebTAG Unit 3.5.6. with assumptions in regard to valuation of time, operating costs and accidents.

Users are required to input base link specific details including network classification, traffic flows, road type characteristics and any diversion routes. Works details including site length, works type such as lane closures and shuttle working. The latest version QUADRO 2021 version 4 release July 2021 has been used for this CBA.

THE VALUATION OF COSTS IN QUADRO

THE VALUATION OF TIME

QUADRO calculates the delays at works and translates these into monetary figures using standard values of time.

The latest values are provided in WebTAG Unit A1.3 and is shown in Table 23 and 24 below. QUADRO converts the resource cost to market price to be consistent with the Economic Efficiency of the Transport System (TEE) table. The market price is calculated by multiplying the resource value by (1 + *t*) where *t* is the average rate of indirect taxation in the economy.

Table 25 WebTAG - Value of Time by Mode and Trip Purpose

Table A 1.3.1: Values of Working (Employers' Business) Time by Mode (£ per hour, 2010 prices, 2010 values)			
Mode	**Resource Cost**	**Perceived Cost**	**Market Price**
Car driver	14.86	14.86	17.69
Car passenger	14.86	14.86	17.69
LGV (driver or passenger)	10.52	10.52	12.52
OGV (driver or passenger)	12.13	12.13	14.43
PSV driver	11.94	11.94	14.21
PSV passenger	8.42	8.42	10.02
Taxi driver	11.50	11.50	13.68
Taxi / Minicab passenger	14.86	14.86	17.69
Rail passenger	24.52	24.52	29.18
Underground passenger	8.42	8.42	10.02
Walker	8.42	8.42	10.02
Cyclist	8.42	8.42	10.02
Motorcyclist	14.86	14.86	17.69
Average of all working persons	16.19	16.19	19.27
Values of Non-Working Time by Trip Purpose (£ per hour, 2010 prices, 2010 values)			
Trip Purpose	**Resource Cost**	**Perceived Cost**	**Market Price**
Commuting	8.36	9.95	9.95
Other	3.82	4.54	4.54

Table 26 WebTAG - Value of Time per Vehicle per hour

Table A 1.3.5: Market Price Values of Time per Vehicle based on distance travelled (£ per hour, 2010 prices and 2010 values)								
Vehicle Type	Journey Purpose	Weekday					Weekend	All Week
		7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average		
Car	Work	20.00	20.49	20.29	20.67	20.32	23.23	20.53
	Commuting	11.27	11.45	11.31	11.48	11.35	12.01	11.40
	Other	7.78	8.28	8.14	8.11	8.13	9.63	8.66
	Average Car	11.33	10.67	10.88	11.03	10.95	10.29	10.79
LGV	Work (freight)	15.02	15.02	15.02	15.02	15.02	15.77	15.02
	Commuting & Other	8.92	8.92	8.92	8.92	8.92	12.41	9.72
	Average LGV	14.29	14.29	14.29	14.29	14.29	15.37	14.39
OGV1	Working	14.43	14.43	14.43	14.43	14.43	14.43	14.43
OGV2	Working	14.43	14.43	14.43	14.43	14.43	14.43	14.43
PSV (Occupants)	Work	15.90	16.23	17.01	16.99	16.37	14.87	16.00
	Commuting	22.39	7.85	31.48	43.04	19.43	7.36	16.45
	Other	44.44	50.92	39.78	34.52	45.58	51.76	47.10
	Total	82.72	75.00	88.27	94.55	81.37	73.99	79.55

THE VALUATION OF VEHICLE OPERATING COSTS

QUADRO calculates the vehicle operating costs (VOC) incurred by traffic with and without works.

VOC may increase during works if speeds are reduced or a long diversion route. The effects of temporary blockages caused by accidents are solely assessed on journey time and operating costs are not calculated. As the resource cost of fuel, fuel efficiency and fleet composition change independently, the relationship of resource cost (per kilometre) to market prices changes annually.

The programme is informed of changes in tax rates over time and are shown in Tables 27 to 29 below.

Values for 2010 VOC are shown in Table 30 below.

Carbon emissions are considered in terms of the change in the equivalent tonnes of carbon Table 31 and estimated from fuel consumption Table 32 below.

Table 27 Taxation Rates Base

TAXATION RATES (%)					
FUEL TYPE	AVERAGE FINAL	FUEL		NON-FUEL	
		FINAL	INTER	FINAL	INTER
PETROL	17.9	381	324.1	17.5	0
DIESEL	18.7	372.7	317	17.5	0

Table 28 Changes to Taxation Rates % Petrol

CHANGES TO TAXATION RATES (%) PETROL						
AVERAGE	FUEL		NON-FUEL		FROM	TO
FINAL	FINAL	INTER	FINAL	INTER	YEAR	YEAR
0	-16.16	-16.9	0	0	2002	2003
0	-16.55	-17.47	0	0	2003	2004
0	-19.55	-20.85	0	0	2004	2005
0	-11.18	-12.12	0	0	2005	2006
0	0.86	0.94	0	0	2006	2007
0	-20.19	-21.87	0	0	2007	2008
0	27.45	35.01	0	0	2008	2009
0	-14.18	-18.4	0	0	2009	2010
0	-13.6	-18.43	0	0	2009	2010
0	-3.48	-4.01	0	0	2010	2011
0	1.52	1.76	0	0	2011	2012
0	9.87	11.41	0	0	2012	2013
0	34.2	38.97	0	0	2013	2014
0	5.14	5.66	0	0	2014	2015
0	-16.51	-18.08	0	0	2015	2016
0	-10.62	-11.86	0	0	2016	2017
0	3.5	3.96	0	0	2017	2018
0	0.34	0.38	0	0	2018	2019
0	-0.17	-0.2	0	0	2019	2020
0	-1.16	-1.31	0	0	2020	2021
0	-0.68	-0.77	0	0	2021	2022
0	-0.29	-0.32	0	0	2022	2023
0	-0.27	-0.3	0	0	2023	2024
0	-1.1	-1.24	0	0	2024	2025
0	-0.25	-0.28	0	0	2025	2026
0	-0.25	-0.28	0	0	2026	2027
0	-1.06	-1.2	0	0	2027	2028
0	-0.24	-0.27	0	0	2028	2029
0	0.07	0.11	0	0	2029	2100

Table 29 Changes to Taxation Rates % Diesel

CHANGES TO TAXATION RATES (%) DIESEL						
AVERAGE	FUEL		NON-FUEL		FROM	TO
FINAL	FINAL	INTER	FINAL	INTER	YEAR	YEAR
0	-14.17	-14.84	0	0	2002	2003
0	-21.65	-22.54	0	0	2003	2004
0	-23.51	-25.19	0	0	2004	2005
0	-9.53	-10.44	0	0	2005	2006
0	3.85	4.26	0	0	2006	2007
0	-27.95	-30.56	0	0	2007	2008
0	36.18	46.25	0	0	2008	2009
0	-8.52	-12.64	0	0	2009	2010
0	-16.25	-21.44	0	0	2010	2011
0	-4.41	-5.13	0	0	2011	2012
0	1.71	2.01	0	0	2012	2013
0	9.29	10.87	0	0	2013	2014
0	35.48	40.91	0	0	2014	2015
0	10.63	11.79	0	0	2015	2016
0	-18.05	-19.81	0	0	2016	2017
0	-13.87	-15.55	0	0	2017	2018
0	3.64	4.16	0	0	2018	2019
0	0.34	0.39	0	0	2019	2020
0	-0.17	-0.19	0	0	2020	2021
0	-1.2	-1.36	0	0	2021	2022
0	-0.72	-0.83	0	0	2022	2023
0	-0.33	-0.38	0	0	2023	2024
0	-0.31	-0.36	0	0	2024	2025
0	-1.17	-1.34	0	0	2025	2026
0	-0.29	-0.33	0	0	2026	2027
0	-0.29	-0.33	0	0	2027	2028
0	-1.13	-1.29	0	0	2028	2029
0	-0.27	-0.31	0	0	2029	2030
0	0.53	0.59	0	0	2030	2100

Table 30 WebTAG – Non-Fuel Resource Vehicle Operating Costs

Table A 1.3.14: Non-Fuel Resource Vehicle Operating Costs (2010 prices and 2010 values)			
Vehicle Category		**Parameter Values**	
		a1 p / km	**b1 p / hr**
Car	Work Petrol	4.966	135.946
	Work Diesel	4.966	135.946
	Work Electric	1.157	135.946
	Non-Work Petrol	3.846	0.000
	Non-Work Diesel	3.846	0.000
	Non-Work Electric	1.157	0.000
LGV	Work	7.213	47.113
	Work Electric	2.170	47.113
	Non-Work	7.213	0.000
	Non-Work Electric	2.170	0.000
OGV1	Work	6.714	263.817
OGV2	Work	13.061	508.525
PSV	Work	30.461	694.547

Table 31 WebTAG – Carbon dioxide emissions per litre of fuel burnt / kWh used

Table A 3.4: Non Traded Values, £ per Tonne of CO2e (2010 prices)			
Year	**Low**	**Central**	**High**
2010	83.57	167.13	250.70
2011	84.84	169.68	254.51
2012	86.13	172.26	258.39
2013	87.44	174.88	262.33
2014	88.77	177.55	266.32
2015	90.13	180.25	270.38
2016	91.50	183.00	274.49
2017	92.89	185.78	278.67
2018	94.31	188.61	282.92
2019	95.74	191.48	287.23
2020	97.20	194.40	291.60
2021	99.02	198.40	297.07
2022	100.53	201.06	301.59

Table 32 WebTAG – Fuel consumption parameter values

Table A 1.3.8:	Fuel consumption parameter values (litres per km, 2010)			
	Parameters			
Vehicle Category	**a**	**b**	**c**	**d**
Petrol Car	0.45195	0.09605	-0.00109	7.24599E-06
Diesel Car	0.48191	0.06909	-0.00066	5.23793E-06
Petrol LGV	0.34435	0.19309	-0.00303	1.95736E-05
Diesel LGV	0.46348	0.11328	-0.00163	1.38355E-05
OGV1	2.69628	0.14306	-0.00103	1.12932E-05
OGV2	5.66560	0.29422	-0.00195	1.16192E-05
PSV	3.36019	0.29525	-0.00321	2.35400E-05
	Energy consumption parameter values (kWh per km, 2015)			
Electric Car	0.221			
Electric LGV	0.259			
Electric OGV1				
Electric OGV2				
Electric PSV	1.180			

THE VALUATION OF ACCIDENTS

Additional accidents may be expected in works and there are two types of cost incurred the cost of delay and the direct cost.

The direct cost includes the casualty, damage to property, insurance administration, police time and an allowance to damage only accidents. QUADRO calculates these values on the network using DfT standard values for average personal injury accidents on various types of road.

Values of most elements are proportional to national income and for 2010 are shown in Table 33 and 34 below. Accident values increase in line with GDP as shown in Table 35 below. Accident rates are calculated with and without works, combined link and junction rates are used in QUADRO,

Table 36 shows accident rates for 15 road types without works. Local data can be used only if available for both the without and with works in this CBA these default values are used.

Table 37 shows the number of casualties per accident.

Table 33 WebTAG – Cost per Casualty

Cost per Casualty	
Severity	**Cost £**
Fatal	1,646,800
Serious	183,950
Slight	14,152

Table 34 WebTAG – Cost per Accident

Cost per Accident							
Severity	Insurance Administration	Damage to Property			Police Cost		
		Urban	Rural	Motorway	Urban	Rural	Motorway
Fatal	288	7,510	12,736	16,201	16,821	17,274	17,475
Serious	179	4,025	5,806	13,824	1,857	2,319	2,449
Slight	109	2,374	3,849	6,994	480	659	549
Damage	52	1,698	2,538	2,439	35	20	17

Table 35 WebTAG – Accident Growth Rates

Annual Rates of Growth of Accident Values	
Range of Years	Growth Rate (% p.a.)
2010 - 2011	0.23
2011 - 2012	0.78
2012 - 2013	1.18
2013 - 2014	2.42
2014 - 2015	1.59
2015 - 2016	1.33
2016 - 2017	1.84
2017 - 2018	1.10
2018 - 2019	1.05
2019 - 2020	-0.44
2020 - 2021	-0.44
2021 - 2022	1.50

Table 36 WebTAG – Accident Without Works

Combined Link / Junction: Accident Rates and Change Factors 2000 Base				
Road Type	**Speed Limit (mph)**	**Accident Rate**	**Beta Factor**	**Road Description**
1	50/60/70	0.08	0.956	Motorways
2	50/60/70	0.067	0.956	Motorways
3	50/60/70	0.079	0.956	Motorways
4	30/40	0.532	0.959	Modern S2 Roads
4	>40	0.244	0.955	Modern S2 Roads
5	30/40	0.532	0.959	Modern S2 Roads with HS
5	>40	0.244	0.955	Modern S2 Roads with HS
6	30/40	0.863	0.959	Modern WS2 Roads
6	>40	0.163	0.955	Modern WS2 Roads
7	30/40	0.863	0.959	Modern WS2 Roads w. HS
7	>40	0.163	0.955	Modern WS2 Roads w. HS
8	30/40	0.863	0.959	Older S2 A Roads
8	>40	0.244	0.955	Older S2 A Roads
9	30/40	0.559	0.951	Other S2 Roads
9	>40	0.233	0.933	Other S2 Roads
10	30/40	0.553	0.967	Modern D2 Roads
10	>40	0.107	0.956	Modern D2 Roads
11	30/40	0.599	0.967	Modern D2 Roads with HS
11	>40	0.072	0.956	Modern D2 Roads with HS
12	30/40	0.599	0.967	Older D2 Roads
12	>40	0.107	0.956	Older D2 Roads
13	30/40	0.62	0.951	Modern D3+ Roads
13	>40	0.123	0.946	Modern D3+ Roads
14	30/40	0.62	0.951	Modern D3+ Roads w. HS
14	>40	0.123	0.946	Modern D3+ Roads w. HS
15	30/40	0.62	0.951	Older D3+ Roads
15	>40	0.123	0.946	Older D3+ Roads

Table 37 WebTAG – Casualties per Personal Injury Accident (PIA)

Combined Link / Junction: Casualty Rates					
Road Type	**Speed Limit (mph)**	**Casualties per P.I.A.**			**Road Description**
		Fatal	**Serious**	**Slight**	
1 - 3	50 / 60 / 70	0.020	0.1230	1.455	Motorways
4 - 8	30 / 40	0.009	0.132	1.176	S2 A Roads
4 - 8	>40	0.038	0.238	1.3	S2 A Roads
9	30 / 40	0.007	0.134	1.132	Other S2 Roads
9	>40	0.026	0.222	1.218	Other S2 Roads
10 - 15	30 / 40	0.009	0.112	1.238	Dual Carriageways
10 - 15	>40	0.025	0.151	1.297	Dual Carriageways

DELAY MODELLING IN QUADRO

ELEMENTS OF DELAY

The delay at works are made up of a number of elements that include the reduce running speeds through the site, traffic signal control for shuttle working, insufficient capacity causing queuing and diversion and are calculated by the General Delay Sub-Model.

Accidents and breakdowns can cause further delay and will depend on location, amount of width and time of day and if alternative routes are available and are calculated by the Incident Delay Sub-Model.

THE GENERAL DELAY SUB-MODEL

This model is run in each direction and for the four day types Monday to Thursday, Friday, Saturday and Sunday for each hour, the remaining queue is added to the following hour.

The assumption is that regular drivers would travel on the route that minimises the journey time. A driver may minimise journey time by diverting to an alternative before the work site and re-join past the site or divert the route completely.

If traffic is not expected to divert at a particular site and instead queue this implies there are unattractive routes. It can be found that a specification of a diversion route can be particularly difficult and QUADRO is able to be run with a maximum queuing delay.

For the purpose of the CBA this has been used, sample run data is included in the QUADRO manual for different types of road for maximum queuing delay and shown on Table 38 below. Once the maximum queue time is exceeded drivers will divert to a route and assumed that this would equal the journey time through the work site.

Table 38 Max-Q-Delay

Typical Max-Q-Delay QUADRO	
Type of Road	**Max-Q-Delay (mins)**
S2	5
WS2	5
D2AP	10
D3AP	15

THE INCIDENT DELAY SUB-MODEL

If a breakdown or accident occurs within the site length this will restrict the capacity further.

Unlike the General Model drivers will not divert as this would not be a common event. This model is not run for shuttle working sites as it is assumed that the obstruction would be speedily removed.

This sub model is run twice once for breakdown and once for accidents. The sub model assumes that breakdowns occur at a rate shown in Table 39 below. Accident Rates were tabled earlier in Section 4.2.

Table 39 Breakdown Rates

Default Breakdown Rates QUADRO	
Vehicle Type	**Rate (vkm)**
Light	10 per 10^6
Heavy	5 per 10^6

TRAFFIC INPUT

NETWORK AND ROUTE TYPE DESCRIPTION

For each of the work sites certain characteristics are required by QUADRO including the length of the works site, adjoining sections up and downstream of the site (both directions) and the diversion route.

For the purpose of this CBA the diversion length is not modelled as the maximum queue delay method has been used.

The main route is considered to be consistent along its length and no flow variations. A road class is specified as shown on Table 40 below to calculate a speed/flow relationship with default values shown on Table 41 and 42.

For each road class the user is able to input geometric parameters such as road width, hilliness, accesses along route, visibility, for the purpose of this CBA, typical values have been applied as set out in Table 43 below. The work site type is defined by the number of lanes open or shuttle working as shown on Table 44 below that selects a default capacity.

QUADRO contains values for average duration of incidents and are shown on Table 45 below.

Table 40 Road Classes

QUADRO Road Classes	
Road Class	**Description**
Class 1	Rural single carriageway
Class 2	Rural all-purpose dual 2 lane carriageway
Class 3	Rural all-purpose dual 3 or more lane carriageway
Class 4	Motorway (urban or rural), dual 2 lanes
Class 5	Motorway (urban or rural), dual 4 or more lanes
Class 6	Motorway (urban or rural), dual 3 lanes
Class 7	Urban road, Central, single or dual carriageway
Class 8	Urban road, Non-central, single or dual carriageway
Class 9	Small town road, single or dual carriageway
Class 10	Suburban Main Road, single carriageway
Class 11	Suburban Main Road, dual carriageway

Table 41 Default minimum speeds QUADRO

Road Class	Minimum speed (kph)
Classes 1 to 6	45
Class 7	25
Class 8	15
Class 9	30
Class 10	25
Class 11	35

Table 42 Default Speed/flow Parameters QUADRO

CLASS	LIGHT-V kph	GRAD-A reduction (kph) per 1000 veh	GRAD-B reduction (kph) per 1000 veh	HEAVY-V kph	GRAD-A reduction (kph) per 1000 veh	GRAD-B reduction (kph) per 1000 veh	CHANGE Factor or vph per lane	MINS Kph	Qc vph per lane
1	72.1	15	50	78.2	5.2	5.2	1920	45	2400
2	108	6	33	86	0	0	1080	45	2100
3	115	6	33	86	0	0	1080	45	2100
7	64.5	30	30	64.5	30	30		25	800
8	39.5	30	30	39.5	30	30		15	800
10	70	10	45	64	10	45	1200	25	1500
11	80	10	45	74	10	45	1200	35	1500

Table 43 Default Geometric Parameters QUADRO

CLASS	TYPE	DESCRIPTION	CWID	HILLS	DEVEL	INT	BEND	MAXS	SWID	VWID	JUNC	VIS	AXS
1	RURAL	Single Carriageway	7.3	15			75	96	0	1	0.6	200	
2	RURAL	Dual 2 lanes	14.6	15			30	113					
3	RURAL	Dual 3 lanes	22	15			30	113					
7	URBAN	Non-central	10	15	70								
8	URBAN	Central	11	15		4.5							
10	URBAN	Suburban Single	10	15		0.8		64					30
11	URBAN	Suburban Dual	14.6	15		0.8		64					30

Table 44 Work Types

QUADRO Work Types	
Works Type	**Description**
0	No lanes open in this direction
1	One lane open in this direction
2	Two lanes open in this direction
3	Three lanes open in this direction
4	Four lanes open in this direction
5	Five lanes open in this direction
9	Shuttle working
10	If layout features contra-flow working

Table 45 Incident Duration

Default Breakdown and Accident Durations in QUADRO		
Type of Road	**Breakdown Duration (mins)**	**Accident Duration (mins)**
Motorway	25	30
Single and Dual AP	40	45

VARIATION IN TRAFFIC FLOW

Traffic flows vary by hour, day, week and month and different type of vehicles.

QUADRO calculates user costs daily and normally for a 7 day week using the four day types. For the purpose of this CBA AADT flows have been used and QUADRO converts this to Annual Average Hourly Traffic (AAHT) to generate an hourly flow profile.

The QUADRO model uses directional flow as each direction is modelled separately.

Two-way input flows are split by tidal behaviour for example the direction into town in the morning peak and the direction is specified by the user.

VEHICLES IN WORK TIME AND VEHICLE OCCUPANCIES

QUADRO considers the disaggregation of time spent in work and non-work mode for each vehicle type.

The National Travel Survey (NTS) showed the average car mileage in work mode, commuting mode and non-working mode and are further disaggregated by average hourly percentages.

Averages for weekdays and weekends, vehicles and journey types are shown on Table 46 below.

Table 46 WebTAG – Trip Proportions

Table A 1.3.4:		Proportion of travel in work and non-work time						
Mode / Vehicle Type & Journey Purpose		Weekday					Weekend	All Week
		7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average	Average	Average
		Percentage of Distance Travelled by Vehicles						
Car	Work	16.5	16.5	11.8	12.9	14.8	3.5	12.1
	Commuting	44.1	11.8	41.3	38.5	31.2	7.9	25.5
	Other	39.5	71.7	46.9	48.6	53.9	88.6	62.5
LGV	Work (freight)	88	88	88	88	88	88	88
	Non – Work	12	12	12	12	12	12	12
OGV1	Work	100	100	100	100	100	100	100
OGV2	Work	100	100	100	100	100	100	100
		Percentage of Distance Travelled by Occupants						
Car	Work	13.7	11.7	9.4	10.4	11.5	2.2	8.6
	Commuting	36.1	8.1	32.1	30.1	23.5	4.4	17.7
	Other	50.2	80.2	58.5	59.5	65	93.4	73.7
PSV	Work	1.4	1.7	2.3	2.3	1.8	0.5	1.5
	Commuting	18.4	6.5	25.9	35.4	16	6.1	13.5
	Other	80.2	91.9	71.8	62.3	82.2	93.4	85

Table A 1.3.4:		Proportion of trips made in work and non-work time						
Mode / Vehicle Type & Journey Purpose		Weekday					Weekend	All Week
		7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average	Average	Average
		Percentage of Vehicle Trips						
Car	Work	7	7.2	5.1	4.3	6.2	2	5.3
	Commuting	38.3	11.3	32.6	28.8	25.2	8.4	21.3
	Other	54.7	81.5	62.3	66.9	68.6	89.6	73.4
LGV	Work (freight)	88	88	88	88	88	88	88
	Non – Work	12	12	12	12	12	12	12
OGV1	Work	100	100	100	100	100	100	100
OGV2	Work	100	100	100	100	100	100	100
		Percentage of Person Trips						
Car	Work	5.3	5.1	3.9	3.4	4.7	1.3	3.8
	Commuting	31	8.4	25.8	23.7	19.7	6	16.1
	Other	63.6	86.5	70.3	72.8	75.6	92.7	80.1
PSV	Work	2.1	1.7	2.6	3.1	2	1	1.9
	Commuting	25.6	7.2	33.5	46.3	19.6	10.6	18
	Other	72.3	91.1	64	50.6	78.4	88.4	80.1

SITE SPECIFIC QUADRO INPUT DATA

SAMPLE SITE DATA

From the Oxfordshire DfT traffic count data 165 sites were selected as locations that represent lane rental site traffic flows. Some DfT sites represent a number of lane rental streets, traffic data for each of the 652 (4.73%) lane rental streets is shown on Tables 15 to 24.

For each site, data files were created and works were run for the site lengths carried out with the Halcrow Study 10, 30, 50, 100 and 200 metres.

In total 825 outputs were created and are provided in Appendix C. The Daily Cost of all sites was averaged for Rural and Urban roads by RC and excavation length and is shown on Table 46 below.

The number of samples used for the CBA is required to be proportioned to the actual number of works and statistically confident in the data.

The number of samples used for each work type are shown on Table 47 below with the percentages matching the proportions of actual works shown in Table 9. This has been statistically verified at a 95% confidence level with a confidence interval of 5%. A confidence interval within +/- 5% is considered to be reliable.

The samples used for the CBA were selected by ranking the sites by impact and making the average cost of sites selected close to the mean. The sample sites were also proportioned by excavation length so that the percentages match the Halcrow study and are shown on Table 48 below.

The sample sites average duration for each work type was matched to the Oxfordshire predicted behavioural change in duration discussed later in the report. High and Low cost forecasts were derived, for High the highest duration of days was applied to the highest ranking site by impact, for Low the highest duration of days was applied to the lowest ranking site by impact. The average of the two forecasts was used to obtain the Total Delay of Works. Summarised impacts are provided in Appendix D.

Table 47 Oxfordshire Delay Modelling Daily Cost of Works

Oxfordshire Daily Cost of Lane Rental Street Works (£) by Data Type and Length							
Data Type	Typical AADT	Average AADT	10m	30m	50m	100m	200m
Rural	20,000	14,178	9,331	8,087	11,475	13,288	13,981
Urban	26,667	12,839	5,147	5,148	6,174	7,731	9,621
Average	23,334	13,509	7,239	6,618	8,825	10,509	11,801

Table 48 Oxfordshire Work Samples

Oxfordshire	Street Work Samples	
Work Type	Sample Size	%
Major	48	13%
Standard	56	15%
Minor with Exc	163	44%
Urgent	102	28%
Totals	**369**	

Table 49 Oxfordshire Delay Modelling Percentage of Works by RC and Excavation Length

Oxfordshire	CBA Percentages of Works by RC and Excavation Length					
	10m	30m	50m	100m	200m	Total Samples
Sample Nos	313	3	19	15	19	369
Sample %	84.8%	0.8%	5.1%	4.1%	5.1%	
Halcrow Study %	84.7%	0.7%	5.2%	4.2%	5.2%	

MONETIZED COSTS AND BENEFITS

The socio-economic benefits derived from a 25% Lane Rental Scheme duration reduction are shown for the opening year in summary on Table 50.

The statutory guidance on reliability benefits achieved from a reduction in the variability in travel times for road users is provided by WebTAG Unit 3.5.7, which recommends a mark-up on travel time-savings for urban roads of between 10% to 20%.

Recent research from Transport for London (TfL) GPS data for inner and central London estimated an uplift figure of 22% for changes in the mean journey time (Modelling journey time variability to assist in designing a journey time variability performance indicator for the transport for London Road Network, Jonathan Turner 2008). This supports the use of the upper end value of 20% for this study and is included as a reliability adjustment in the monetized costs and benefits.

The User Benefits are proportioned between consumer and business users for Vehicle Operating Cost and Travel Time Cost.

The QUADRO rates demonstrate much higher incidents of accidents within road works. The introduction of the Lane Rental Scheme will bring about a proportionate reduction in road work durations, which will lead to accident cost savings.

Lane Rental charges apply to the most congested roads where there is already a traffic issue due to high traffic flows. On these roads the stop/start effect of vehicles is already apparent and the cause higher carbon emissions.

The Quadro modelling shows on some sample sites, where there is already a traffic issue and low speeds identified, temporary traffic signals for roadworks would have a positive effect on carbon emissions. This is before applying any increase in durations for working at off-peak times.

At the worst locations, at the peak congestion times with no activities (works) present, vehicles are already travelling at low speeds, below 10 mph, especially queuing at junctions and would be performing numerous stop/starts and idling with the foot repeatedly on/off the accelerator.

When works are planned on single carriageway roads with shuttle working, the traffic is managed and in theory improves the traffic flow as vehicles will stop at a red signal but will then be in free flow through the works.

If works are carried out at off-peak times there is lower traffic flow and less congestion so there should already be less carbon emissions and less delay compared to peak times. However, this is offset against the normal (no activities present) increase in carbon emissions at peak times due to the stop/start of traffic. This causes a negative carbon emissions impact. In some

modelling scenarios carbon emissions rise when activities (works) are moved to less congested times.

Table 50 Oxfordshire Monetized Costs and Benefits

Oxfordshire Sample Sites QUADRO Results Summary			
Delay Modelling Totals			
	Total Impact	**Consumer Vehicle Operating Cost**	**Consumer Travel Time Cost**
High	£ 29,065,682	£ 1,407,014	£ 14,888,006
Low	£ 6,045,905	£ 292,421	£ 3,107,986
Average	£ 17,555,794	£ 849,717	£ 8,997,996
	Business Vehicle Operating Cost	**Business Travel Time Total**	**PSP Bus & Coach Operating Cost**
High	£ 1,735,940	£ 11,832,064	£ 103,959
Low	£ 355,897	£ 2,452,022	£ 23,546
Average	£ 1,045,918	£ 7,142,043	£ 63,752
	Total Business	**Accident Cost**	**Carbon**
High	£ 13,671,962	£ 3,071	-£ 6,661
Low	£ 2,831,465	£ 707	-£ 1,622
Average	£ 8,251,714	£ 1,889	-£ 4,142

LANE RENTAL SCHEME OPERATION

INTRODUCTION

This section assesses the process tasks required to establish and operate the Oxfordshire Lane Rental Scheme. It will consist of the following sections:

- Volumes and Charges, presentation of anticipated Lane Rental applications by work type
- Scheme Costs, presentation of staff costs associated with the Lane Rental Scheme

VOLUMES AND CHARGES

The estimated number of works for Lane Rental by type was provided by the Oxfordshire Permit Scheme, prorated to the percentage of Lane Rental streets and is shown on Table 51 below.

Table 51 Lane Rental Work Volumes

Oxfordshire Lane Rental Work Volumes		
Work Type	**Number**	**%**
Major	262	13%
Standard	304	15%
Minor with Exc	882	44%
Urgent	552	28%
Totals	2,000	0%

The volumes with costings are based upon statutory maximum charges outlined in Table 7.

Lane Rental Charges are excluded from Public Accounts reporting in line with the DfT guidance.

SCHEME COSTS

There are two elements to the Lane Rental Scheme costs:

- Start-up costs
- Ongoing costs

START-UP COSTS

There are no one-off costs required to establish the Lane Rental Scheme.

ONGOING COSTS

The ongoing costs throughout the Lane Rental Scheme duration are set out on Table 52 below.

Table 52 Scheme Ongoing costs

Ongoing Costs	
Start-up Cost Centre	**Year 1 +**
KPI Production	£30,000
Invoicing	£100,000
IT support	£25,000
Unauthorised / Abandoned works	£30,000
Management Overhead	£105,000
Staff	£141,676
Totals	**£431,676**

The operational policy outlined in Table 8 that proposed that no costs associated with the implementation of the Scheme will be carried on to future years and that that all set up costs are incurred in the month before the Lane Rental Scheme becomes operational.

OPERATIONAL COSTS

The activities and functions of the Oxfordshire Permit Scheme staff will continue to be applied to the works undertaken on lane rental streets, such as coordination and application assessments.

The DfT state that 'The permit scheme will continue to play a crucial role alongside lane rental charges, not least because of the need to ensure that works taking place on the busiest streets and properly co-ordinated.'

However, the cost of the staff time will be met from lane rental charges instead of permit fees.

There will also be a slight increase as Section 50 works are included in the Lane Rental Scheme. Section 50 works not Utility or Highway works but usually housing or industrial developer works.

To ensure consistency of approach the cost of staff time relative to the anticipated volume of works on lane rental streets has been identified using the same DfT methodology employed by the Oxfordshire Permit Scheme.

The overall staffing costs of Lane Rental Scheme operation are based on information from Oxfordshire County Council and statutory rates and are outlined in Table 53.

Table 53 Staff Costing

Staff Costing			
Personnel Type	**Annual Salary**	**Final Hourly Rate**	**Total Annual Cost**
Street Works Officer	£22,067	£42.98	£70,312.08
Street Works Coordinator	£28,400	£55.31	£90,490.92
Traffic Manager	£61,905	£124.31	£203,364.12

National Insurance (%)	10
Pension (superannuation) (%)	19
Working hours/annum	1636
Employee Overhead Rate	2.47

The breakdown of costing per task for each of the three grades of Lane Rental Scheme workers is shown in Table 54 below.

Table 54 Breakdown of Employer Costing per Lane Rental Task

Employee Costing per Permit Task						
Street Works Officers						
	PAA	**Major**	**Standard**	**Minor**	**Immediate**	**TOTAL**
Hours per Permit	0.70	0.91	0.45	0.32	0.31	2.69
Total Permits	0.00	262	303	881	552	1999
Total Hours	0.00	239	136	286	172	5386
No. of Posts Required	0.00	0.15	0.08	0.17	0.11	0.51
Employee Costs	£-	£10,276	£5,858	£12,295	£7,392	£35,821
Street Works Coordinators						
	PAA	**Major**	**Standard**	**Minor**	**Immediate**	**TOTAL**
Hours per Permit	1.71	1.70	0.63	0.40	0.40	4.84
Total Permits	0	262	303	881	552	1999
Total Hours	0	446	191	349	219	9671
No. of Posts Required	0.00	0.27	0.12	0.21	0.13	0.74
Employee Costs	£-	£24,664	£10,561	£19,317	£12,101	£66,643
Traffic Managers						
	PAA	**Major**	**Standard**	**Minor**	**Immediate**	**TOTAL**
Hours per Permit	0.86	0.59	0.23	0.08	0.03	1.80
Total Permits	0	262	303	881	552	1999
Total Hours	0	155	68	73	18	3591
No. of Posts Required	0.00	0.09	0.04	0.04	0.01	0.19
Employee Costs	£-	£19,307	£8,488	£9,130	£2,288	£ 39,213

The overall costs associated with the operation of the Lane Rental Scheme are summarised in Table 55 below.

Table 55 Staff costing summary

Total Number of Employees and Costs		
Personnel Type	**No.**	**Salaries**
Street Works Officers	0.51	£35,821
Street Works Coordinators	0.74	£66,643
Traffic Managers	0.19	£39,213
TOTAL	**1.44**	**£141,676**

The final Lane Rental Scheme cost is shown in Table 56.

Table 56 Lane Rental Scheme costing summary

Lane Rental Scheme Cost Breakdown	
Cost Type	**Cost**
LR Application Employee Costs	£141,676
LR Application Operational Factor Costs	£290,000
Total LR Application Costs	£431,676

FINANCIAL CALCULATIONS

INTRODUCTION

This section will present the calculation of financial benefits for the statutory outputs:

- Public Accounts - Local Government Funding
- Public Accounts - Central Government Funding
- Transport Economic Efficiency
- Monetized Costs and Benefits

The calculations will be presented for the opening year and for the 25-year Scheme horizon and will be discounted where required.

PUBLIC ACCOUNTS - LOCAL GOVERNMENT FUNDING

The Local Government public account reporting has the following categories:

- Revenue
- Operating Costs
- Investment Costs
- Developer and other contributions
- Grant / subsidy payments

REVENUE

For the purposes of this Cost Benefit Analysis, the Lane Rental charge income is calculated by the multiplication of the estimated Lane Rental works volume and the maximum charge as shown on Table 8. The Lane Rental Scheme is scheduled to become fully operational in the opening month of the opening year of the assessment and from the second and subsequent months, the 25% reduction in work durations will come into effect.

OPERATING COSTS

The operating costs for the Scheme are comprised of:

- Staff and operation costs
- Asset maintenance costs
- Unrecoverable fees
- Income

No provision has been made for on-going asset maintenance of the Lane Rental Scheme.

Estimated Volumes and Charges for a 25% reduction in duration of work is shown below on Tables 57 and potential behavioural changes in Table 58 below. Table 57 calculates the number of chargeable days based on the assumption of the increase in duration of works due to reduced efficiency for Major, Standard and Minor work categories and the assumption of a decrease in duration of works to avoid charge periods for Immediate works. A calculation is then made on the revenue generated from the daily lane rental charge and with assumptions of waivers and discounts to give a final anticipated annual revenue of the Lane Rental Scheme.

The Operational Costs for Year 1-10 are shown on Table 59 below. The operational costs of £35,973 in the first month are a pro-rata apportionment of the opening year total of £431,676 contained within Table 60.

Financial calculations for year 2 to 25 are shown on Table 61 to 63 below.

Table 57 Estimated Lane Rental Volumes 25% Duration Reduction on 4.73% of the network

Lane Rental Streets 4.73%								
Current Permit Regime Volumes (4.73% = 26% of TSS)		Estimated Lane Rental Volumes per Year						
Works Category	Average No. of Permitted Works	Proposed Charge per day	Ave Durations of Works Before Lane Rental	Total Pre Lane Rental Works Days	Anticipated increase / decrease in average durations due to Lane Rental	Total Post Lane Rental Implementation Works Days	Pre Lane Rental Works moved outside charge periods	Remaining total chargeable days
Major	1017	2,500	18	4,712	4.50	5,890	2,356	2,356
Standard	1179	2,500	7	2,124	1.75	2,655	1,062	1,062
Minor	3424	2,500	3	2,644	0.75	3,305	1,322	1,322
Urgent	2145	2500	5	2,761	2.50	1,380	1,242	138
Sub Total	**7765**			**12,241**		**13,231**	**5,982**	**4,878**

Lane Rental Streets 4.73%						
Works Category	Estimated Lane Rental Revenue per Year					
	Anticipated revenue before waivers or discounts	Percentage triggering a waiver	Revenue cost of waivers	Percentage triggering a discount (min 50%)	Revenue cost of discounts	Final Anticipated Revenue
Major	5,890,008	1,178	2,945,004	589	736,251	2,208,753
Standard	2,655,426	531	1,327,713	266	331,928	995,785
Minor	3,305,045	661	1,652,523	331	413,131	1,239,392
Urgent	345,080	28	69,016	28	34,508	241,556
Sub Total	**12,195,560**	**2,398**	**5,994,256**	**1,213**	**1,515,818**	**4,685,486**

Table 58 Potential Behavioural Changes

Potential Behavioural Changes	Assumptions / Anticipated Behavioural Changes	Assumption Source
Increase in the overall duration of works on Lane Rental Streets due to reduced efficiency (shorter days etc)	25%	Kent County Council + DfT
Decrease in the overall duration of Immediate works on Lane Rental Streets to avoid charge periods	50%	Kent County Council + Surrey County Council
Percentage of Immediate works being completed before charge periods apply	90%	Kent County Council + Surrey County Council
Works being undertaken outside the Lane Rental Charge periods, such as out of hours (not charged)	50%	Kent County Council + DfT
Works being undertaken in a way that triggers a waiver, such as the use of new technology	20%	Estimate
Works being undertaken in a way that triggers a discount, such as collaborative working	10%	Estimate

Table 59 Financial Calculations 25% Reduction in Work Durations Annual Cost

Oxfordshire Financial Calculations 25% Reduction in Durations											
	Opening	Closing Values									
Annual Cost of Lane Rental Scheme - Closing Values	Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Lane Rental Costs	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Annual Cost For Recovery		431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Cost Recovery Price Lane Rental charge		332,750	417,335	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Cost Recovery Price Lane Rental charge (prior year data)		216	344	297	288	288	288	288	288	288	288
(Over) / under-recovery £		98,926	14,341	-	-	-	-	-	-	-	-
(Over) / under-recovery £ (prior year)	-	98,926	14,341	-	-	-	-	-	-	-	-
Annual Income Max Charges	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486
Overall Scheme Cost	431,676	530,602	446,017	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Profit/Loss	4,253,810	4,154,884	4,239,469	4,253,810	4,253,810	4,253,810	4,253,810	4,253,810	4,253,810	4,253,810	4,253,810

Table 60 Financial Calculations 25% Reduction in Work Durations First Year Cost

Financial Calculations 25% Reduction in Durations	Year	Year-1											
Annual Cost of Lane Rental Scheme - Closing Values	Month	Month-1	Month-2	Month-3	Month-4	Month-5	Month-6	Month-7	Month-8	Month-9	Month-10	Month-11	Month-12
Lane Rental Costs	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973
Lane Rental Volumes	-	167	125	125	125	125	125	125	125	125	125	125	125
Cost Recovery Price Lane Rental income	-	215.84	215.84	215.84	215.84	215.84	215.84	215.84	215.84	215.84	215.84	215.84	215.84
Multiplied by number of Works	-	35,973	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980
Income derived on Cost recovery basis	-	35,973	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980	26,980
Income derived from Max Charges	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457
Lane Rental Scheme - Operational Costs		-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973

Table 61 Financial Calculations 25% Reduction in Work Durations Second Year Cost (Year 2)

Financial Calculations 25% Reduction in Durations	Year	Year-2											
Annual Cost of Lane Rental Scheme - Closing Values	Month	Month-1	Month-2	Month-3	Month-4	Month-5	Month-6	Month-7	Month-8	Month-9	Month-10	Month-11	Month-12
Cost Recovery Price Lane Rental income	-	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973
Multiplied by number of Works	-	125	125	125	125	125	125	125	125	125	125	125	125
Income derived on Cost recovery basis	-	344.18	344.18	344.18	344.18	344.18	344.18	344.18	344.18	344.18	344.18	344.18	344.18
Income derived from Max Charges	-	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022
Lane Rental Scheme - Operational Costs	-	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022	43,022
Financial Calculations 25% Reduction in Durations	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457
Annual Cost of Lane Rental Scheme - Closing Values	-	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973

Table 62 Financial Calculations 25% Reduction in Work Durations Third Year Cost (Year 3)

Financial Calculations 25% Reduction in Durations	Year	Year-3											
Annual Cost of Lane Rental Scheme - Closing Values	**Month**	**Month-1**	**Month-2**	**Month-3**	**Month-4**	**Month-5**	**Month-6**	**Month-7**	**Month-8**	**Month-9**	**Month-10**	**Month-11**	**Month-12**
Income derived on Cost recovery basis	-	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973	35,973
Income derived from Max Charges	-	125	125	125	125	125	125	125	125	125	125	125	125
Lane Rental Scheme - Operational Costs	-	297.35	297.35	297.35	297.35	297.35	297.35	297.35	297.35	297.35	297.35	297.35	297.35
Financial Calculations 25% Reduction in Durations	-	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168
Annual Cost of Lane Rental Scheme - Closing Values	-	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168	37,168
Lane Rental Costs	-	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457	390,457
Lane Rental Volumes	-	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973	-35,973

Table 63 Financial Calculations 25% Reduction in Work Durations 4-14 Year Cost

Financial Calculations 25% Reduction in Durations	Year	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10	Year-11	Year-12	Year-13	Year-14
Annual Cost of Lane Rental Scheme - Closing Values												
Lane Rental Scheme - Operational Costs	-	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Financial Calculations 25% Reduction in Durations	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Annual Cost of Lane Rental Scheme - Closing Values	-	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79
Lane Rental Costs	-	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Lane Rental Volumes	-	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Cost Recovery Price Lane Rental income	-	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486
Multiplied by number of Works		-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676

Table 64 Financial Calculations 25% Reduction in Work Durations 15-25 Year Cost

Financial Calculations 25% Reduction in Durations	Year	Year-15	Year-16	Year-17	Year-18	Year-19	Year-20	Year-21	Year-22	Year-23	Year-24	Year-25
Annual Cost of Lane Rental Scheme - Closing Values												
Lane Rental Scheme - Operational Costs	-	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Financial Calculations 25% Reduction in Durations		1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Annual Cost of Lane Rental Scheme - Closing Values		287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79	287.79
Lane Rental Costs		431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Lane Rental Volumes		431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676	431,676
Cost Recovery Price Lane Rental income		4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486	4,685,486
Multiplied by number of Works		-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676	-431,676

INVESTMENT COSTS

There are no investment costs incurred.

DEVELOPER AND OTHER CONTRIBUTIONS

There are no developer or other contributions in the Local Government Public accounts reporting.

GRANT / SUBSIDY PAYMENTS

There are no grant or subsidy payments in the Local Government Public accounts reporting.

PUBLIC ACCOUNTS - CENTRAL GOVERNMENT FUNDING

The Central Government public account reporting has the following categories:

- Revenue
- Operating costs
- Investment costs
- Developer and other contributions
- Grant / subsidy payments
- Indirect tax revenues

REVENUE

There is no revenue in the Central Government Public accounts reporting.

OPERATING COSTS

There are no operating costs in the Central Government Public accounts reporting.

INVESTMENT COSTS

There are no investment costs in the Central Government Public accounts reporting.

DEVELOPER AND OTHER CONTRIBUTIONS

There are no developer or other contributions in the Central Government Public accounts reporting.

GRANT / SUBSIDY PAYMENTS

There are no developer or other contributions in the Central Government Public accounts reporting.

INDIRECT TAX REVENUES

The indirect tax revenue calculation is based upon the loss of fuel taxation revenues to Central Government from the more efficient functioning of the highway network from the reduction in road works.

TRANSPORT ECONOMIC EFFICIENCY

The Transport Economic Efficiency (TEE) table reports on user benefits by consumer and business sections for time, fuel and non-fuel vehicle operating impacts.

CONSUMER USER BENEFITS

The consumer user benefit consists of private car and bus travel time, and vehicle operating costs.

BUSINESS USER BENEFITS

The business user benefits are for commercial car travel and private sector providers for Travel time and vehicle operating costs.

STATUTORY OUTPUTS

INTRODUCTION

This section presents the statutory outputs required for the Oxfordshire Lane Rental Scheme Cost Benefit analysis.

The results are presented in the opening year and over the 25-year horizon in 2010 prices as advised in WebTAG.

The discounted totals are presented at the bottom of each table.

The statutory outputs consist of three categories:

- Transport Economic Efficiency (TEE)
- Public Accounts
- Cost Benefit Analysis

TRANSPORT ECONOMIC EFFICIENCY (TEE)

The TEE table presents the net user benefits of travel time, fuel and non-fuel vehicle operating costs disaggregated by trip purpose between non-business consumers and business users, including transport operators and are below on Tables 65 and 66.

PUBLIC ACCOUNTS

The Public Accounts tables show the net impact to Local and Central Government and are below on Tables 67 and 68.

COST BENEFIT ANALYSIS

The items for inclusion in the central case Cost Benefit Analysis BCR and NPV are based upon the guidance specified in Annex C of TMA 2004 Decision-making and development (2nd edition) for permit schemes which specifies:

- Permit Fees are excluded from the Public Accounts table;
- Indirect Taxation is excluded from the Public Accounts table; and
- Permit Fees are not treated as a dis-benefit to business.

Revenue received from Lane Rental has been assumed to be reinvested in the authority and therefore offset in the economic appraisal as a capital cost.

Tables 67 and 68 are below.

STATUTORY COST BENEFIT ANALYSIS

This study has addressed all aspects of the implementation of the Oxfordshire Lane Rental Scheme through both the direct financial and socio-economic criteria to quantify the overall economic merit of the Scheme.

The Scheme has a Benefit Cost Ratio of 61.89 and Net Present Value of £431,803,834in current prices which are 2010 prices.

The appraisal results demonstrate that the introduction of the Lane Rental Scheme will have a net positive economic benefit.

Table 65 TEE Table 25% Work Duration Saving Year 1

Transport Economic Efficiency (TEE) Table (25% Duration Saving) Year 1

Consumers	**ALL MODES**		**ROAD**	**Bus & Coach**	**RAIL**	**Other**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	8,997,996		8,604,247	393,749	-	-
Vehicle operating costs	849,717		849,717			-
User charges	-		-	-	-	-
During Construction & Maintenance	-		-	-	-	-
NET CONSUMER BENEFITS	9,847,713	*-1*	9,453,964	393,749	-	-

Business								
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	7,142,043		4,077,947	2,960,546	103,550	-	-	-
Vehicle operating costs	1,045,918		945,862	100,056				-
User charges	-		-	-	-	-	-	-
During Construction & Maintenance	-		-	-	-	-	-	-
Subtotal	8,187,961	*-2*	5,023,809	3,060,602	103,550	-	-	-
Private sector provider impacts						**Freight**	**Passengers**	
Revenue	-				-	-	-	-
Operating costs	63,752				63,752	-	-	-
Investment costs	-				-	-	-	-
Grant/subsidy	-				-	-	-	-
Subtotal	63,752	*-3*			63,752	-		-
Other business impacts								
Developer contributions	-	*-4*	-		-	-	-	-
NET BUSINESS IMPACT	8,251,714	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits	18,099,427	*(6) = (1) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2010 prices and values. All values £s.

Table 66 TEE Table 25% Work Duration Saving 25 Years

Transport Economic Efficiency (TEE) Table (25% Duration Saving) 25 Years

Consumers	**ALL MODES**		**ROAD**	**Bus & Coach**	**RAIL**	**Other**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	224,949,894		215,106,167	9,843,727	-	-
Vehicle operating costs	21,242,937		21,242,937			-
User charges	-		-	-	-	-
During Construction & Maintenance	-		-	-	-	-
NET CONSUMER BENEFITS	246,192,831	*-1*	236,349,104	9,843,727	-	-

Business								
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	178,551,073		101,948,675	74,013,638	2,588,759	-	-	-
Vehicle operating costs	26,147,960		23,646,550	2,501,410				-
User charges	-		-	-	-	-	-	-
During Construction & Maintenance	-		-	-	-	-	-	-
Subtotal	204,699,033	*-2*	125,595,226	76,515,049	2,588,759	-	-	-
						Freight	**Passengers**	
Revenue	-				-	-	-	-
Operating costs	1,593,808				1,593,808	-	-	-
Investment costs					-	-	-	-
Grant/subsidy					-	-	-	-
Subtotal	1,593,808	*-3*			1,593,808	-	-	-
Developer contributions	-	*-4*	-		-	-	-	-
NET BUSINESS IMPACT	206,292,841	*(5) = (2) + (3) + (4)*						
TOTAL								
Present Value of Transport Economic Efficiency Benefits	452,485,672	*(6) = (1) + (5)*						

Notes: Benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2010 prices and values. All values in £s.

Table 67 PA Table 25% Work Duration Saving Year 1

Public Accounts (PA) Table (25% Duration Saving) Year 1

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	-3,078,679		-			-3,078,679
Operating Costs	283,640		-			283,640
Investment Costs	3,078,679		-			3,078,679
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	283,640	*-7*	-	-	-	283,640
Central Government Funding: Transport						
Revenue	-		-			-
Operating costs	-		-			-
Investment Costs	-		-			-
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	-	*-8*	-	-	-	-
Central Government Funding: Non-Transport						
Indirect Tax Revenues	0	*-9*	0	-	-	-

TOTALS

Broad Transport Budget	283,640	*(10) = (7) + (8)*
Wider Public Finances	0	*(11) = (9)*

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values. All values in £s.

Table 68 PA Table 25% Work Duration Saving 25 Years

Public Accounts (PA) Table (25% Duration Saving) 25 Year

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	-76,966,987		-			-76,966,987
Operating Costs	7,091,006		-			7,091,006
Investment Costs	76,966,987		-			76,966,987
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	7,091,006	*-7*	-	-	-	7,091,006
Central Government Funding: Transport						
Revenue	-		-			-
Operating costs	-		-			-
Investment Costs	-		-			-
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	-	*-8*	-	-	-	-
Central Government Funding: Non-Transport						
Indirect Tax Revenues	0	*-9*	#NAME?	-	-	-
TOTALS						
Broad Transport Budget	7,091,006	*(10) = (7) + (8)*				
Wider Public Finances	0	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values. All values in £s.

Table 69 AMCB 25% Work Duration Saving Year 1

Analysis of Monetised Costs and Benefits (25% Duration Saving) Year 1

Noise	-		*-12*
Local Air Quality	-		*-13*
Greenhouse Gases	-4,142		*-14*
Journey Quality	-		*-15*
Physical Activity	-		*-16*
Accidents	1,889		*-17*
Economic Efficiency: Consumer Users (Commuting)	9,847,713	*(1a)*	
Economic Efficiency: Consumer Users (Other)	-	*(1b)*	
Economic Efficiency: Business Users and Providers	8,251,714		*-5*
Wider Public Finances (Indirect Taxation Revenues)	541,380	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*	
Present Value of Benefits (see notes) (PVB)	17,555,794	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*	
Broad Transport Budget	283,640		
Present Value of Costs (see notes) (PVC)	283,640		
OVERALL IMPACTS			
Net Present Value (NPV)	17,272,153		
Benefit to Cost Ratio (BCR)	61.89		

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions. All values in £s.

Table 70 AMCB 25% Work Duration Saving 25 Years

Analysis of Monetised Costs and Benefits (25% Duration Saving) 25 Years

Noise	-		*-12*
Local Air Quality	-		*-13*
Greenhouse Gases	-103,545		*-14*
Journey Quality	-		*-15*
Physical Activity	-		*-16*
Accidents	47,216		*-17*
Economic Efficiency: Consumer Users (Commuting)	246,192,831	*(1a)*	
Economic Efficiency: Consumer Users (Other)	-	*(1b)*	
Economic Efficiency: Business Users and Providers	206,292,841		*-5*
Wider Public Finances (Indirect Taxation Revenues)	13,534,503	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*	
Present Value of Benefits (see notes) (PVB)	438,894,839	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*	
Broad Transport Budget	7,091,006		*-10*
Present Value of Costs (see notes) (PVC)	7,091,006	*(PVC) = (10)*	
OVERALL IMPACTS			
Net Present Value (NPV)	431,803,834	NPV=PVB-PVC	
Benefit to Cost Ratio (BCR)	61.89	BCR=PVB/PVC	

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions. All values in £s.

OXFORDSHIRE LANE RENTAL SCHEME CBA RESULTS

INTRODUCTION

This section summarises the findings of the Oxfordshire Lane Rental Scheme Cost Benefit Analysis and consider the impact on the Highway Authority.

OXFORDSHIRE HIGHWAY AUTHORITY COST BENEFIT ANALYSIS

In addition to the statutory results presentation, an additional BCR and NPV is presented from the perspective of the Highways Authority (Table 71), which includes the cost recovery from Lane Rental charges and includes the effect of indirect taxation. The summary of benefits is presented in Table 72.

Table 71 Highway Authority Cost Benefit results

Highway Authority Assessment 25% reduction in durations impact	Opening Year	25 Year
Net Present Value of Benefits	£17,555,794	£438,894,839
Net Present Value of Costs	£283,640	£7,091,006
Net Present Value of Permit Scheme	£17,272,153	£431,803,834
Benefit to Cost Ratio	**61.89**	**61.89**

Table 72 Benefits Summary Values and Percentage 25% reduction in work durations impact 25 Years

Benefits	Value	Percentage of Total Benefit
Consumer Travel Time	£224,949,894	51%
Consumer Vehicle Operating Costs	£21,242,937	5%
Business Travel Time	£178,551,073	41%
Business Vehicle Operating Costs	£26,147,960	6%
Private Sector Provider Operating Costs	£1,593,808	0%
Reduction in Fuel Revenue	£13,534,503	3%
Greenhouse Gases	-£103,545	0%
Accidents	£47,216	0%
Net Present Value of Benefits	**£438,894,839**	

The Scheme has a Benefit Cost Ratio of 61.89 and Net Present Value of £431.8m 2010 prices and 25% reduction in work durations which suggest the Oxfordshire Lane Rental Scheme would be both viable and beneficial for the Highway Authority and the population of Oxfordshire.

The higher BCR and NPV are attributable to the net benefit of adding Lane Rental charges and indirect taxation to the assessment and the difference in opening year.

The projected discounted benefits in the opening year of £17.6m includes a reliability adjustment of 20% for urban roads and has been assessed at a local level. This is a large increase in the estimated suggested benefit in the DfT report in Section 3.7 however this is using local not national data.

SENSITIVITY ANALYSIS

A series of sensitivity tests have been performed on the 25-year appraisal to further understand the economic performance of the Scheme and its effects at different policy levels. The Highway

Authority central case assumption of a 25% reduction in work durations activity produced a BCR of 61.89.

Table 73 Works Duration Reduction Sensitivity

Works Duration Reduction Sensitivity	
Works Reduction	**BCR**
5% Saving	35.17
10% Saving	41.85
15% Saving	48.53
20% Saving	55.21
25% Saving	61.89
30% Saving	68.57
35% Saving	75.25
40% Saving	81.93
45% Saving	88.61
50% Saving	95.29

Works Reduction Sensitivity	
Works Reduction	**BCR**
5% Saving	2.34
10% Saving	4.81
15% Saving	7.41
20% Saving	10.15
25% Saving	13.04
30% Saving	16.09
35% Saving	19.33
40% Saving	22.76
45% Saving	26.40
50% Saving	30.27

APPENDIX A

Traffic Sensitive Network. See attached.

APPENDIX B

Lane Rental 4.73% Congested Streets. See attached.

APPENDIX C

QUADRO outputs. See attached.

APPENDIX D

Sample Sites QUADRO Results Summary. See attached.

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