Cheshire East Council

Cheshire East Lane Rental Scheme Cost Benefit Analysis

CONSULTATION VERSION

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EXECUTIVE SUMMARY

Cheshire East Council is a major investor of public resources and as such, should ensure that new developments or services 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.

Cheshire East Council's Highways Team has been working on just such a new service and this CBA supports its introduction by demonstrating the positive financial outcome delivering its objectives will provide.

Minimising disruption is a key transport challenge for any Council and especially for a busy area like Cheshire East.

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

The proposed Cheshire East Lane Rental Scheme tackles head-on one the major causes of disruption, developer, road and street works, collectively known as activities, in a robust and positive way and is a major opportunity to positively reduce disruption on the highway network.

The proposed Cheshire East Lane Rental Scheme is designed to reduce the busy period volume and durations of activities and generally reduce the amount of activities 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 Cheshire East 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	£19,647,746
Set-up and operating costs	£1,911,407
Financial benefit to the local economy from introducing the Scheme	£17,736,339
Benefit to Cost Ratio	**10.28**

INTRODUCTION

LANE RENTAL SCHEME OBJECTIVES

In 2023 Cheshire East Council (CEC) began to develop a road works Lane Rental Scheme known as the Cheshire East Lane Rental Scheme (CELRS), part of which includes the development of a detailed Cost Benefit Analysis (CBA).

The primary objective of the proposed Cheshire East Lane Rental Scheme is to incentivise activities on the most critical roads 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 daily charges to access the road when carrying out activities on the busiest roads at the busiest times.

Lane rental encourages promoters of activities to:

- Reduce the length of time taken to carry out the activities
- Improve planning, co-ordination and working methods
- Carry out more activities outside of peak times, for example, making greater use of weekend and out of hours working where the local environmental impact is acceptable
- Complete activities to the required standard first time reducing the need for the promoters of activities 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) with 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 activities are greatest. This will ensure new schemes succeed in reducing disruption caused by activities whilst, at the same time, avoiding excessive costs being passed onto 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 critical access points, critical routes such as bus routes and cycle lanes, junctions, pinch-points and heavily trafficked streets or parts of streets.

The DfT has said that it expects lane rental schemes to apply to up to 10% of the highway authority's network. Cheshire East Council has identified and is proposing that 281 streets (2.67% of the network) 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 Highway works, Utility works and Developers, against the value of the benefits it will deliver to the wider area of Cheshire East.

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 STRUCURE

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 Cheshire East Lane Rental Scheme CBA Results

ANALYSIS AND CONTEXT

INTRODUCTION

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

LEGISLATIVE CONTEXT

The legislative guidance used for this study is contained within:

- Guidance. Lane rental schemes: guidance for English highway authorities, Updated 17 March 2024
- 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. Surrey County Council and West Sussex County Council have been operating lane rental schemes since 2021/22. Information on the trial 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 Cheshire East Lane Rental Scheme

Using the DfT sanctioned report, it is possible to get an idea for the likely implication of the Cheshire East 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. 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 £13.1bn in 2013 prices or £11.7bn in 2010 prices.

From a top down perspective, with an estimated 1.79% of utility road works occurring in Cheshire East 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 £1.73m in 2002 prices or £2.03 million in 2010 prices. Shown in Table 2 below.

Table 2 Forecast Benefits – Top Down approach

Halcrow Study	£	
Annual UK cost of roadworks (£bn)	£	13.10
Proportion of roadworks in Cheshire East		1.79%
Annual Cheshire East cost of roadworks (£m)	£	234.68
Annual Cheshire East cost of Lane Rental roadworks (£m)	£	6.91
Roadwork Reduction from Lane Rental Scheme		25%
Estimated Lane Rental Scheme saving (2002 prices) (£m)	**£**	**1.73**
Estimated Lane Rental Scheme saving (2010 prices) (£m)	**£**	**2.03**

However, working up from the actual number of Works in Cheshire East 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 £0.51m in 2002 prices or £0.61m in 2010 prices.

Table 3 Forecast Benefits – Bottom up approach

Annual Number of Road Works	Total	
Pre-scheme Number of Road Works		21,497
Pre-scheme Number of Lane Rental Works		572
Lane Rental Road Works after 25% reduction		429
Average Days Duration from Halcrow Study		6
Number of road work days saved		858
Total Cost at £600 per works per day (£ m) (2002 prices)	**£**	**0.51**
Total Cost at £600 per works per day (£ m) (2010 prices)	**£**	**0.61**

The figures above give an estimate of the upper and lower expectations from the CELRS of between £0.61m and £2.03m in 2010 prices. 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.

INPUT DATA

INTRODUCTION

This section outlines the information sources and assumptions used in the Cheshire East 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 Cheshire East Lane Rental Scheme is a reduction in the disruption caused by activities through reduced busy time working and/or reduced works durations.

The central assumptions of the analysis is that the introduction of the Lane Rental Scheme will encourage works to be undertaken in off-peak times where there is less disruption on the most congested 2.67% of the network in the first year. This is based on the number of streets within Cheshire East and the number of traffic-sensitive streets and the number of road works, the top 5.46% of critical streets that have 2.67% of overall works undertaken on them. The various assumptions are based on the evaluation of other Lane Rental Schemes are detailed further in the CBA.

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 Cheshire East 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 Cheshire East Council contained both the number of permits by type, traffic sensitive streets and specific information on the proposed Cheshire East 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 Table 4. An Optimism Bias of 30% has been applied to operational costs due to uncertainty for modelling purposes.

Table 4 Discount and Risk Factors

CBA modelled variable	Rate
Discount Rate	3.5%

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 5 below.

Table 5 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 Daily Charge	£2,500

CHESHIRE EAST COUNCIL DATA

Cheshire East 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 6 below were obtained from Cheshire East Council.

Table 6 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

Cheshire East Council provided the information on the number of road works and shown on Table 7 below.

Table 7 Roadwork Totals

Cheshire East Estimated Lane Rental Volumes		
Work Type	**Number**	**%**
Major	57	10%
Standard	87	15%
Minor	313	55%
Urgent	115	20%
Totals	572	

The table has been extracted from Cheshire East Permit Scheme Year 4 Evaluation RC 0-2 prorated to the percentage of Lane Rental streets.

Cheshire East Council provided the information on the duration of works and shown on Table 8 below.

Table 8 Cheshire East Average Duration of Works

Cheshire Year 3 Permit Evaluation Average duration of works by permit type by Promoter by Activity Type	
Work Type	**Total**
Major	22
Standard	11
Minor	2
Urgent	6

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

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

Figure 1 Cheshire East Traffic Sensitive Network

Please see attached.

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 9 below.

Table 9 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 10 below for different road types.

Table 10 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 11 and 12 below.

Table 11 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 12 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. 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 in Figure 2 below for Cheshire East. The data shows a number of hotspots within Cheshire East including Macclesfield and Crewe and is consistent with Lane Rental Streets in Figure 1.

Cheshire East 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 281 streets (2.76%) to geographically cover the most congested routes on the network. A list of streets is attached in Appendix C.

Traffic data was obtained from the DfT who monitor annual traffic flows for all authorities in the UK, Local 'A' road traffic data representing the most congested streets in Cheshire East has been used and is listed in Table 13 to 22 below.

Figure 2 Cheshire East Local 'A' Road Delay

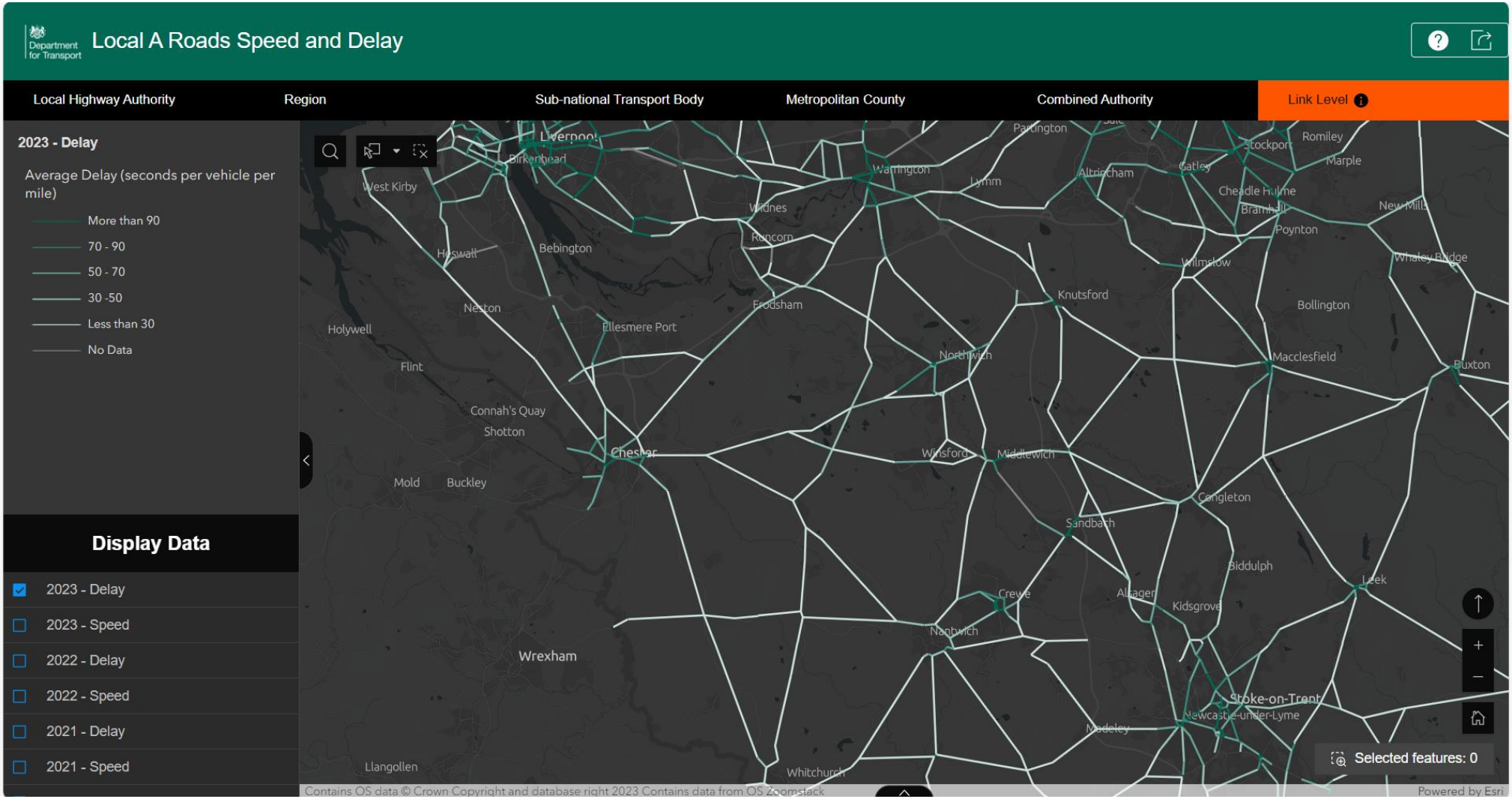

Table 13 DfT Traffic Flow Site Data 2023 (Sheet 1 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 1 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
1	A34	LA Boundary	A50	9016	0.958	0.042	0.814	0.138	0.022	0.020	0.001	URBAN
2	A50	A534	A533	6191	0.918	0.082	0.718	0.190	0.039	0.043	0.002	RURAL
3	A523	A5149	First Avenue	10582	0.951	0.049	0.788	0.154	0.028	0.020	0.002	RURAL
4	A533	Heath Rd, Sandbach	Heath Ave, Alsager	4316	0.981	0.019	0.821	0.145	0.013	0.005	0.007	RURAL
5	A534	A532	A533W	24107	0.944	0.056	0.772	0.166	0.023	0.033	0.002	RURAL
6	A537	Ecton Ave, Macclesfield	LA Boundary	4403	0.925	0.075	0.775	0.121	0.013	0.061	0.007	RURAL
7	A5102	A538	B5358 Dean Row Rd	6472	0.989	0.011	0.840	0.146	0.008	0.002	0.000	RURAL
8	A523	A537E	A523	28062	0.964	0.036	0.831	0.125	0.017	0.019	0.003	URBAN
9	A50	A535	A54	10072	0.975	0.025	0.827	0.138	0.019	0.006	0.005	URBAN
10	A534	A533	Congleton Rd	16476	0.919	0.081	0.752	0.163	0.031	0.050	0.001	URBAN
11	A5019	A5078	A532	18055	0.995	0.005	0.898	0.091	0.004	0.001	0.000	URBAN
12	A51	A51	A530	18233	0.938	0.062	0.784	0.142	0.017	0.045	0.003	URBAN
13	A536	A523(T)	A538	12521	0.984	0.016	0.847	0.124	0.010	0.006	0.009	URBAN
14	A50	A5034	Sugar Pit Lane, Knutsford	12939	0.973	0.027	0.813	0.153	0.013	0.014	0.002	RURAL
15	A50	A5011	A34	7104	0.981	0.019	0.807	0.159	0.012	0.008	0.007	URBAN
16	A51	A534	A500	14631	0.916	0.084	0.735	0.172	0.030	0.054	0.003	RURAL
17	A54	St John's Rd, Congleton	A523	6017	0.930	0.070	0.756	0.160	0.051	0.020	0.003	RURAL
18	A534	A5022	A50	13584	0.931	0.069	0.722	0.197	0.025	0.044	0.007	RURAL
19	A537	A535	A34	15862	0.969	0.031	0.795	0.161	0.016	0.015	0.003	RURAL
20	A538	Withinlee Rd, Greendale	A537	7391	0.992	0.008	0.875	0.114	0.007	0.001	0.002	URBAN
21	A5011	A50	Linley Rd	9270	0.971	0.029	0.791	0.174	0.012	0.017	0.002	RURAL
22	A5022	A534	A50	7330	0.962	0.038	0.792	0.164	0.022	0.016	0.003	RURAL
23	A523	B5358	B5091	23742	0.973	0.027	0.830	0.136	0.012	0.015	0.001	RURAL

24	A523	B5091	A537 W	24944	0.972	0.028	0.818	0.145	0.015	0.013	0.000	RURAL
25	A523	A5149	LA Boundary	14852	0.965	0.035	0.803	0.152	0.022	0.013	0.003	URBAN
26	A530	A525	Stonebridge Rd, Nantwich	5797	0.919	0.081	0.730	0.178	0.022	0.059	0.004	RURAL
27	A533	Moss Lane	A534	13940	0.957	0.043	0.815	0.131	0.022	0.021	0.006	URBAN
28	A534	A5020	A532	14439	0.957	0.043	0.795	0.147	0.017	0.026	0.009	URBAN
29	A556	A559	A5033	23131	0.926	0.074	0.763	0.158	0.020	0.054	0.001	RURAL
30	A532	feeder road to Third & Fourth Avenues	A5020	13747	0.918	0.082	0.784	0.123	0.025	0.057	0.004	URBAN
31	A537	B5087	A538	25235	0.981	0.019	0.864	0.113	0.009	0.009	0.002	URBAN
32	A49	A534	A534 mid-junction	8147	0.907	0.093	0.654	0.222	0.024	0.069	0.000	RURAL
33	A50	A5033	A537	25408	0.971	0.029	0.824	0.140	0.013	0.016	0.002	URBAN
34	A500	A5020	M6	32611	0.918	0.082	0.737	0.175	0.020	0.062	0.002	RURAL
35	A34	A54	A536	20121	0.984	0.016	0.819	0.154	0.008	0.008	0.005	URBAN

Table 14 DfT Traffic Flow Site Data 2023 (Sheet 2 of 10)

Cheshire East	**DfT Traffic Flow Site Data 2023 (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	A34	LA Boundary	A50	S2AP	2-way	30	10	3
2	A50	A534	A533	S2AP	2-way	50	1	3
3	A523	A5149	First Avenue	S2AP	2-way	50	1	2
4	A533	Heath Rd, Sandbach	Heath Ave, Alsager	S2AP	2-way	60	1	4
5	A534	A532	A533W	S2AP	2-way	60	1	1
6	A537	Ecton Ave, Macclesfield	LA Boundary	S2AP	2-way	60	1	4
7	A5102	A538	B5358 Dean Row Rd	S2AP	2-way	60	1	3
8	A523	A537E	A523	D2AP	2-way	40	11	1
9	A50	A535	A54	S2AP	2-way	30	7	3

10	A534	A533	Congleton Rd	S2AP	2-way	60	10	2
11	A5019	A5078	A532	S2AP	2-way	30	7	2
12	A51	A51	A530	S2AP	2-way	40	10	2
13	A536	A523(T)	A538	S2AP	2-way	30	7	3
14	A50	A5034	Sugar Pit Lane, Knutsford	S2AP	2-way	60	1	2
15	A50	A5011	A34	S2AP	2-way	30	10	4
16	A51	A534	A500	S2AP	2-way	60	1	1
17	A54	St John's Rd, Congleton	A523	S2AP	2-way	50	1	3
18	A534	A5022	A50	S2AP	2-way	50	1	2
19	A537	A535	A34	S2AP	2-way	60	1	1
20	A538	Withinlee Rd, Greendale	A537	S2AP	2-way	30	10	4
21	A5011	A50	Linley Rd	S2AP	2-way	60	1	3
22	A5022	A534	A50	S2AP	2-way	60	1	3
23	A523	B5358	B5091	S2AP	2-way	40	1	1
24	A523	B5091	A537 W	D2AP	2-way	70	2	1
25	A523	A5149	LA Boundary	S2AP	2-way	40	10	2
26	A530	A525	Stonebridge Rd, Nantwich	S2AP	2-way	60	1	4
27	A533	Moss Lane	A534	S2AP	2-way	30	7	2
28	A534	A5020	A532	D2AP	2-way	40	7	2
29	A556	A559	A5033	D2AP	2-way	60	2	1
30	A532	feeder road to Third & Fourth Avenues	A5020	S2AP	2-way	30	7	2
31	A537	B5087	A538	S2AP	2-way	30	7	1
32	A49	A534	A534 mid-junction	S2AP	2-way	60	1	3
33	A50	A5033	A537	D2AP	2-way	30	7	1
34	A500	A5020	M6	S2AP	2-way	60	1	0
35	A34	A54	A536	S2AP	2-way	30	7	1

Table 15 DfT Traffic Flow Site Data 2023 (Sheet 3 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 3 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
36	A50	A54	A5022	11033	0.972	0.028	0.788	0.175	0.012	0.016	0.003	RURAL
37	A50	A5011	A533	10016	0.944	0.056	0.754	0.178	0.026	0.030	0.003	RURAL
38	A54	A530	A533	15862	0.941	0.059	0.784	0.149	0.023	0.036	0.004	URBAN
39	A54	A34	A527	24125	0.973	0.027	0.826	0.136	0.012	0.014	0.005	URBAN
40	A534	A51	A49	4501	0.902	0.098	0.690	0.202	0.036	0.062	0.005	RURAL
41	A534	A5019	A5020	18013	0.971	0.029	0.799	0.158	0.017	0.012	0.007	URBAN
42	A537	Gough's Lane, Knutsford	A535	9706	0.958	0.042	0.800	0.146	0.018	0.023	0.002	RURAL
43	A525	A529N	LA Boundary	1809	0.964	0.036	0.769	0.179	0.018	0.018	0.001	RURAL
44	A51	A530	A534	20291	0.928	0.072	0.787	0.134	0.019	0.053	0.001	RURAL
45	A523	A536	Winterton Way, Macclesfield	10503	0.962	0.038	0.788	0.158	0.023	0.015	0.006	RURAL
46	A54	M6	A50	14706	0.934	0.066	0.775	0.150	0.031	0.035	0.002	RURAL
47	A54	A523(T)	LA Boundary	1539	0.925	0.075	0.669	0.186	0.029	0.047	0.001	RURAL
48	A529	A525	Road to Hawksey Drive, Nantwich	3762	0.965	0.035	0.764	0.193	0.010	0.025	0.003	RURAL
49	A534	A500	A5078	13532	0.985	0.015	0.859	0.110	0.011	0.004	0.008	URBAN
50	A537	Whirley Rd	B5087	14705	0.948	0.052	0.809	0.129	0.021	0.030	0.003	URBAN
51	A5019	A5078	A534	10620	0.980	0.020	0.864	0.103	0.015	0.005	0.004	URBAN
52	A5033	A556(T)	Lilac Ave, Knutsford	10454	0.949	0.051	0.792	0.151	0.024	0.026	0.002	RURAL
53	A5078	A534	A5078 Oak St	6074	0.993	0.007	0.830	0.096	0.007	0.000	0.056	URBAN
54	A51	A534	Newcastle Road roundabout	17760	0.922	0.078	0.760	0.155	0.023	0.056	0.001	RURAL
55	A523	A54	LA Boundary	7871	0.942	0.058	0.787	0.141	0.022	0.037	0.004	RURAL
56	A34	Barber Drive	Fol Hollow, Congleton	13321	0.978	0.022	0.809	0.158	0.010	0.012	0.002	RURAL
57	A50	A5022	A534	5238	0.961	0.039	0.786	0.167	0.021	0.018	0.002	RURAL

58	A34	A54	A54	19789	0.968	0.032	0.841	0.118	0.014	0.019	0.002	URBAN
59	A531	LA Boundary	A500	8137	0.982	0.018	0.852	0.121	0.008	0.010	0.003	RURAL
60	A537	A50	B5085	18462	0.970	0.030	0.814	0.145	0.014	0.017	0.004	URBAN
61	A532	A5019	A5078	8222	0.991	0.009	0.860	0.105	0.006	0.002	0.012	URBAN
62	A525	A530	A529S	2768	0.950	0.050	0.725	0.213	0.022	0.028	0.006	RURAL
63	A535	B5308	A537	8033	0.941	0.059	0.775	0.160	0.030	0.029	0.002	RURAL
64	A556	A5003	M6	25209	0.923	0.077	0.740	0.179	0.024	0.053	0.001	RURAL
65	A537	A538	A523(T)	26454	0.972	0.028	0.841	0.124	0.011	0.017	0.002	URBAN
66	A5034	A50	A556	3789	0.979	0.021	0.817	0.155	0.011	0.011	0.004	RURAL
67	A534	M6	A5022	20043	0.924	0.076	0.750	0.168	0.029	0.048	0.003	RURAL
68	A531	A531	A5020	4547	0.934	0.066	0.757	0.168	0.028	0.037	0.002	RURAL
69	A523	A537E	A536	15134	0.949	0.051	0.780	0.161	0.022	0.028	0.004	URBAN
70	A527	Leek Rd	A54	12789	0.983	0.017	0.842	0.134	0.008	0.008	0.004	URBAN

Table 16 DfT Traffic Flow Site Data 2023 (Sheet 4 of 10)

Cheshire East	**DfT Traffic Flow Site Data 2023 (Sheet 4 of 10)**							
Ref No	**Road**	**Start Junction**	**End Junction**	**Type**	**2-way/1-way/bus lane**	**Speed Limit (mph)**	**Road Class**	**RC**
36	A50	A54	A5022	S2AP	2-way	60	1	2
37	A50	A5011	A533	S2AP	2-way	40	1	2
38	A54	A530	A533	D2AP	2-way	30	7	2
39	A54	A34	A527	D2AP	2-way	30	7	1
40	A534	A51	A49	S2AP	2-way	40	1	4
41	A534	A5019	A5020	S2AP	2-way	30	8	2
42	A537	Gough's Lane, Knutsford	A535	S2AP	2-WAY	50	1	3
43	A525	A529N	LA Boundary	S2AP	2-way	40	1	4
44	A51	A530	A534	S2AP	2-way	60	1	1
45	A523	A536	Winterton Way, Macclesfield	S2AP	2-way	60	1	2

46	A54	M6	A50	S2AP	2-way	40	1	1
47	A54	A523(T)	LA Boundary	S2AP	2-way	60	1	4
48	A529	A525	Road to Hawksey Drive, Nantwich	S2AP	2-way	60	1	4
49	A534	A500	A5078	S2AP	2-way	30	7	2
50	A537	Whirley Rd	B5087	S2AP	2-way	30	7	2
51	A5019	A5078	A534	S2AP	2-way	30	7	3
52	A5033	A556(T)	Lilac Ave, Knutsford	S2AP	2-way	60	1	2
53	A5078	A534	A5078 Oak St	S2AP	2-way	30	8	4
54	A51	A534	Newcastle Road roundabout	S2AP	2-way	60	1	1
55	A523	A54	LA Boundary	S2AP	2-way	40	1	3
56	A34	Barber Drive	Fol Hollow, Congleton	S2AP	2-way	60	1	2
57	A50	A5022	A534	S2AP	2-way	60	1	4
58	A34	A54	A54	S2AP	2-way	40	7	2
59	A531	LA Boundary	A500	S2AP	2-way	60	1	3
60	A537	A50	B5085	S2AP	2-way	30	8	2
61	A532	A5019	A5078	S2AP	2-way	30	8	3
62	A525	A530	A529S	S2AP	2-way	60	1	4
63	A535	B5308	A537	S2AP	2-way	30	1	3
64	A556	A5003	M6	D2AP	2-way	60	2	1
65	A537	A538	A523(T)	D2AP	2-way	30	8	1
66	A5034	A50	A556	S2AP	2-way	30	1	4
67	A534	M6	A5022	S2AP	2-way	60	1	1
68	A531	A531	A5020	S2AP	2-way	60	1	4
69	A523	A537E	A536	WS2+1	2-way	40	7	2
70	A527	Leek Rd	A54	S2AP	2-way	30	8	3

Table 17 DfT Traffic Flow Site Data 2023 (Sheet 5 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 5 of 10)											
Ref No	Road	Start Junction	End Junction	All Motor Vehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Data Type
71	A537	A538ring	A538N	27457	0.967	0.033	0.833	0.126	0.014	0.018	0.003	URBAN
72	A34	A34	A538	30715	0.983	0.017	0.847	0.131	0.009	0.008	0.001	RURAL
73	A50	A34	LA Boundary	11317	0.990	0.010	0.831	0.145	0.008	0.003	0.008	RURAL
74	A6	A6015	LA Boundary	12997	0.898	0.102	0.734	0.156	0.027	0.075	0.004	URBAN
75	A5149	LA Boundary	A523	13696	0.963	0.037	0.836	0.122	0.013	0.023	0.002	URBAN
76	A555	LA Boundary	LA Boundary	54781	0.962	0.038	0.824	0.133	0.013	0.025	0.001	RURAL
77	A56	M56	LA Boundary	14101	0.959	0.041	0.836	0.118	0.019	0.022	0.002	RURAL
78	A56	LA Boundary	M56	8961	0.977	0.023	0.833	0.135	0.016	0.007	0.003	RURAL
79	A525	LA Boundary	A530	7509	0.878	0.122	0.665	0.200	0.038	0.085	0.002	RURAL
80	A534	A5078	A5019	12314	0.987	0.013	0.821	0.136	0.010	0.004	0.023	URBAN
81	A34	A534	A54	13627	0.977	0.023	0.798	0.172	0.011	0.013	0.000	URBAN
82	A5078	A532 West St	A5078 Edleston Rd	9093	0.991	0.009	0.893	0.089	0.005	0.004	0.002	URBAN
83	A5078	A5078 Edleston Rd	A5019	11510	0.988	0.012	0.893	0.087	0.007	0.005	0.003	URBAN
84	A532	A530	A5078	9866	0.977	0.023	0.843	0.124	0.017	0.007	0.002	URBAN
85	A5011	Linley Lane	LA Boundary	8436	0.971	0.029	0.791	0.174	0.012	0.017	0.002	RURAL
86	A533	Heath Avenue	A50	4791	0.981	0.019	0.821	0.145	0.013	0.005	0.007	URBAN

87	A527	LA Boundary	Leek Rd	10589	0.977	0.023	0.840	0.129	0.015	0.009	0.004	URBAN
88	A34	Fol Hollow	A54	13627	0.977	0.023	0.798	0.172	0.011	0.013	0.000	URBAN
89	A54	A527	St John's Rd	9062	0.944	0.056	0.802	0.133	0.019	0.037	0.006	URBAN
90	A530	Stonebridge Rd	A529	6435	0.919	0.081	0.730	0.177	0.022	0.059	0.004	URBAN
91	A530	road to Hawksey Drive	A530	4176	0.965	0.035	0.764	0.193	0.010	0.025	0.003	URBAN
92	A50	A537	Beggarman's Lane	9422	0.981	0.019	0.877	0.094	0.010	0.010	0.003	URBAN
93	A537	B5085	Gough's Lane	9949	0.951	0.049	0.798	0.146	0.019	0.030	0.001	URBAN
94	A5033	Lilac Ave	A50	11603	0.949	0.051	0.792	0.151	0.024	0.026	0.002	URBAN
95	A50	Sugar Pit Lane	A5033	14362	0.973	0.027	0.813	0.153	0.013	0.014	0.002	URBAN
96	A523	Winterton Way	A54	18068	0.970	0.030	0.809	0.153	0.016	0.014	0.004	URBAN
97	A537	A523(T)	Ecton Ave, Macclesfield	9492	0.958	0.042	0.833	0.117	0.011	0.031	0.001	URBAN
98	A537	A34	Whirley Rd, Macclesfield	13372	0.958	0.042	0.799	0.142	0.032	0.010	0.006	RURAL
99	A538	A5102	Withinlee Rd, Greendale	7403	0.984	0.016	0.783	0.195	0.010	0.006	0.000	RURAL
100	A532	A534	feeder road to Third & Fourth Avenues	15259	0.917	0.083	0.784	0.123	0.025	0.057	0.004	URBAN
101	A5102	B5358 Dean Row Rd	LA Boundary	12567	0.980	0.020	0.847	0.129	0.013	0.007	0.001	RURAL
102	A34	roundabout leading to Dean Row Rd	roundabout leading to Coppice Way	44841	0.981	0.019	0.855	0.123	0.009	0.010	0.001	RURAL
103	A34	roundabout leading to Coppice Way	A555	49774	0.981	0.019	0.855	0.123	0.009	0.010	0.001	RURAL
104	A523	First Avenue	B5358	15780	0.959	0.041	0.798	0.153	0.022	0.020	0.001	URBAN
105	A533	A534	Heath Rd	11654	0.981	0.019	0.821	0.145	0.013	0.005	0.007	URBAN
106	A534	Congleton Rd	M6	14994	0.919	0.081	0.752	0.163	0.031	0.050	0.001	RURAL

107	A532	Vernon Way	Hungerford Road	21649	0.993	0.007	0.874	0.109	0.004	0.003	0.002	URBAN
108	A532	Hungerford Road	A534	11833	0.987	0.013	0.852	0.128	0.008	0.005	0.001	URBAN

Table 18 DfT Traffic Flow Site Data 2023 (Sheet 6 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 6 of 10)							
Ref No	**Road**	**Start Junction**	**End Junction**	**Type**	**2-way/1-way/bus lane**	**Speed Limit (mph)**	**Road Class**	**RC**
71	A537	A538ring	A538N	D2AP	2-way	30	7	1
72	A34	A34	A538	D2AP	2-way	60	1	1
73	A50	A34	LA Boundary	S2AP	2-way	40	1	2
74	A6	A6015	LA Boundary	S2AP	2-way	30	7	3
75	A5149	LA Boundary	A523	S2AP	2-way	30	10	2
76	A555	LA Boundary	LA Boundary	D2AP	1-way	70	2	0
77	A56	M56	LA Boundary	D2AP	2-way	60	2	1
78	A56	LA Boundary	M56	S2AP	2-way	60	1	3
79	A525	LA Boundary	A530	S2AP	2-way	60	1	3
80	A534	A5078	A5019	S2AP	2-way	30	8	3
81	A34	A534	A54	S2AP	1-way	30	8	2
82	A5078	A532 West St	A5078 Edleston Rd	S2AP	2-way	30	8	3
83	A5078	A5078 Edleston Rd	A5019	S2AP	2-way	30	7	3
84	A532	A530	A5078	S2AP	2-way	30	10	3
85	A5011	Linley Lane	LA Boundary	S2AP	2-way	60	1	3
86	A533	Heath Avenue	A50	S2AP	2-way	30	10	4
87	A527	LA Boundary	Leek Rd	S2AP	2-way	30	8	3
88	A34	Fol Hollow	A54	S2AP	2-way	30	7	2
89	A54	A527	St John's Rd	S2AP	2-way	30	7	3
90	A530	Stonebridge Rd	A529	S2AP	2-way	30	7	4
91	A530	road to Hawksey Drive	A530	S2AP	2-way	30	7	4
92	A50	A537	Beggarman's Lane	S2AP	2-way	30	10	3
93	A537	B5085	Gough's Lane	S2AP	2-way	30	10	3
94	A5033	Lilac Ave	A50	S2AP	2-way	30	7	3

95	A50	Sugar Pit Lane	A5033	S2AP	2-way	30	7	2
96	A523	Winterton Way	A54	S2AP	2-way	30	10	2
97	A537	A523(T)	Ecton Ave, Macclesfield	S2AP	2-way	30	10	3
98	A537	A34	Whirley Rd, Macclesfield	S2AP	2-way	40	1	2
99	A538	A5102	Withinlee Rd, Greendale	S2AP	2-WAY	60	1	3
100	A532	A534	feeder road to Third & Fourth Avenues	S2AP	2-WAY	30	7	2
101	A5102	B5358 Dean Row Rd	LA Boundary	S2AP	2-WAY	40	1	2
102	A34	roundabout leading to Dean Row Rd	roundabout leading to Coppice Way	D2AP	2-WAY	70	2	0
103	A34	roundabout leading to Coppice Way	A555	D2AP	2-WAY	70	2	0
104	A523	First Avenue	B5358	S2AP	2-WAY	30	7	2
105	A533	A534	Heath Rd	S2AP	2-WAY	30	7	3
106	A534	Congleton Rd	M6	S2AP	2-WAY	60	1	1
107	A532	Vernon Way	Hungerford Road	S2AP	2-WAY	30	8	1
108	A532	Hungerford Road	A534	S2AP	2-WAY	30	7	3

Table 19 DfT Traffic Flow Site Data 2023 (Sheet 7 of 10)

Cheshire East	**DfT Traffic Flow Site Data 2023 (Sheet 7 of 10)**											
Ref No	**Road**	**Start Junction**	**End Junction**	**All Motor Vehicles**	**%Lights**	**%Heavy**	**% Car**	**% LGV**	**%OGV1**	**%OGV2**	**%PSV**	**Data Type**
109	A5020	A534	A532	7618	0.933	0.067	0.775	0.149	0.030	0.037	0.003	URBAN
110	A530	Brynlow Drive	A54	10250	0.988	0.012	0.819	0.163	0.007	0.005	0.000	URBAN
111	A533	A54	Cleaford Crescent	12447	0.955	0.045	0.808	0.138	0.021	0.025	0.005	URBAN
112	A34	A50	Barber Drive	9836	0.958	0.042	0.794	0.156	0.022	0.021	0.002	RURAL
113	A51	A5301	LA Boundary	4640	0.969	0.031	0.824	0.138	0.011	0.020	0.001	RURAL

114	A530	A529	A51	11209	0.964	0.036	0.820	0.135	0.013	0.023	0.005	URBAN
115	A51	A5301	A500	15418	0.956	0.044	0.814	0.136	0.015	0.030	0.002	URBAN
116	A51	A51	A500	21576	0.969	0.031	0.828	0.136	0.011	0.020	0.001	RURAL
117	A50	Beggar Man's Lane / A50 Knutsford	LA boundary	12030	0.976	0.024	0.837	0.129	0.010	0.014	0.003	RURAL
118	A54	A533	LA boundary (B5309)	15631	0.843	0.157	0.627	0.209	0.042	0.115	0.002	URBAN
119	A54	LA boundary	A530	14633	0.930	0.070	0.732	0.186	0.026	0.043	0.005	URBAN
120	A51	A49	A534	11403	0.909	0.091	0.727	0.170	0.030	0.061	0.003	RURAL
121	A530	A532	LA boundary at Newfield Hall	13979	0.974	0.026	0.817	0.139	0.014	0.012	0.003	RURAL
122	A530	A54	B5309	6735	0.984	0.016	0.841	0.139	0.010	0.006	0.001	RURAL
123	A50	New Platt Lane	A535	12030	0.976	0.024	0.837	0.129	0.010	0.014	0.003	RURAL
124	A49	A534	LA boundary / Bunbury Common	7835	0.935	0.065	0.741	0.187	0.025	0.040	0.002	RURAL
125	A534	LA boundary	A49	5756	0.926	0.074	0.696	0.222	0.022	0.052	0.002	RURAL
126	A49	LA Boundary	A534	4326	0.908	0.092	0.695	0.189	0.027	0.065	0.003	RURAL
127	A49	LA boundary	LA boundary	4326	0.908	0.092	0.695	0.189	0.027	0.065	0.003	RURAL
128	A50	LA Boundary	A556(T)	7395	0.967	0.033	0.808	0.152	0.011	0.022	0.000	RURAL
129	A50	A556(T)	A5034	10376	0.972	0.028	0.819	0.146	0.013	0.015	0.001	RURAL
130	A538	A537E	A536	10490	0.987	0.013	0.870	0.100	0.011	0.002	0.012	URBAN
131	A5020	A5020	A500	5308	0.969	0.031	0.843	0.118	0.012	0.019	0.005	RURAL

132	A500	A500 Newcastle Road roundabout	A531	20758	0.907	0.093	0.673	0.229	0.030	0.063	0.000	RURAL
133	A500	A500 Newcastle Road roundabout	A531	21983	0.904	0.096	0.700	0.199	0.020	0.076	0.001	RURAL
134	A34	A537	Whitebarn Rd	17184	0.964	0.036	0.773	0.184	0.018	0.018	0.001	RURAL
135	A555	LA Boundary with Stockport and Cheshire East	LA Boundary with Cheshire East and Stockport	23145	0.937	0.063	0.755	0.175	0.018	0.045	0.002	RURAL
136	A555	LA Boundary with Stockport and Cheshire East	LA Boundary with Cheshire East and Stockport	21491	0.943	0.057	0.792	0.146	0.014	0.043	0.001	RURAL
137	A533	Cleaford Crescent	Moss Lane, Sandbach	7633	0.934	0.066	0.756	0.170	0.035	0.032	0.005	RURAL
138	A54	Westway	Radnor (A54/A536 Roundabout)	8185	0.954	0.046	0.771	0.171	0.020	0.026	0.005	RURAL
139	A536	Roundabout A536/A34	Radnor (A54/A536 Roundabout)	10731	0.963	0.037	0.815	0.141	0.015	0.022	0.001	RURAL
140	A534	A50 Newcastle Road	A536, just west of West Heath	11205	0.934	0.066	0.751	0.168	0.022	0.044	0.005	RURAL
141	A536	A534/A536 Roundabout	A54/A536 Roundabout	7531	0.929	0.071	0.779	0.145	0.040	0.031	0.002	RURAL
142	A34	Near Manchester Road, Lower Heath, Congleton	Quarry Roundabout (A34/A536)	8561	0.965	0.035	0.796	0.159	0.017	0.017	0.002	URBAN
143	A536	Quarry Roundabout (A34/A536)	Eaton Bank Roundabout (A536)	6326	0.966	0.034	0.819	0.134	0.016	0.017	0.002	RURAL
144	A536	Eaton Bank Roundabout (A536)	Near Manchester Road, Lower Heath, Congleton	8500	0.982	0.018	0.846	0.126	0.010	0.008	0.005	URBAN
145	A34	Roundabout A536/A34	Monk's Heath, Chelford Road	11278	0.966	0.034	0.818	0.140	0.015	0.018	0.001	RURAL
146	A536	Eaton Bank Roundabout (A536)	Churchill Way, Macclesfield	10306	0.970	0.030	0.821	0.139	0.015	0.015	0.005	RURAL
147	A534	Whetstone Edge Farm	A34 West Road	6550	0.961	0.039	0.809	0.135	0.016	0.023	0.008	URBAN
148	A54	Loach Brook Roundabout (A54/A536)	A34 West Road	7185	0.978	0.022	0.812	0.156	0.010	0.012	0.007	URBAN
149	A538	LA Boundary	A34 Birrell Way	15154	0.985	0.015	0.858	0.125	0.008	0.007	0.000	URBAN

Table 20 DfT Traffic Flow Site Data 2023 (Sheet 8 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 8 of 10)							
Ref No	**Road**	**Start Junction**	**End Junction**	**Type**	**2-way/1-way/bus lane**	**Speed Limit (mph)**	**Road Class**	**RC**
109	A5020	A534	A532	S2AP	2-WAY	40	10	4
110	A530	Brynlow Drive	A54	S2AP	2-WAY	50	10	3
111	A533	A54	Cleaford Crescent	S2AP	2-WAY	30	10	3
112	A34	A50	Barber Drive	S2AP	2-WAY	30	1	3
113	A51	A5301	LA Boundary	S2AP	2-WAY	60	1	4
114	A530	A529	A51	S2AP	2-way	40	10	3
115	A51	A5301	A500	S2AP	2-way	40	10	2
116	A51	A51	A500	S2AP	2-way	40	1	1
117	A50	Beggar Man's Lane / A50 Knutsford	LA boundary	S2AP	2-way	50	1	2
118	A54	A533	LA boundary (B5309)	S2AP	2-way	60	10	2
119	A54	LA boundary	A530	S2AP	2-way	30	10	2
120	A51	A49	A534	S2AP	2-way	40	1	2
121	A530	A532	LA boundary at Newfield Hall	S2AP	2-way	50	1	2
122	A530	A54	B5309	S2AP	2-way	60	1	3
123	A50	New Platt Lane	A535	S2AP	2-way	50	1	2
124	A49	A534	LA boundary / Bunbury Common	S2AP	2-way	40	1	3
125	A534	LA boundary	A49	S2AP	2-way	40	1	4
126	A49	LA Boundary	A534	S2AP	2-way	60	1	4
127	A49	LA boundary	LA boundary	S2AP	2-way	60	1	4
128	A50	LA Boundary	A556(T)	S2AP	2-way	40	1	3
129	A50	A556(T)	A5034	S2AP	2-way	30	1	2
130	A538	A537E	A536	S2AP	2-way	30	8	3
131	A5020	A5020	A500	D2AP	2-way	50	2	4
132	A500	A500 Newcastle Road roundabout	A531	D2AP	2-way	70	2	1

133	A500	A500 Newcastle Road roundabout	A531	D2AP	2-way	70	2	1
134	A34	A537	Whitebarn Rd	S2AP	2-way	50	1	1
135	A555	LA Boundary with Stockport and Cheshire East	LA Boundary with Cheshire East and Stockport	D2AP	2-way	70	2	1
136	A555	LA Boundary with Stockport and Cheshire East	LA Boundary with Cheshire East and Stockport	D2AP	2-way	70	2	1
137	A533	Cleaford Crescent	Moss Lane, Sandbach	S2AP	2-way	60	1	3
138	A54	Westway	Radnor (A54/A536 Roundabout)	S2AP	2-way	60	1	3
139	A536	Roundabout A536/A34	Radnor (A54/A536 Roundabout)	S2AP	2-way	60	1	2
140	A534	A50 Newcastle Road	A536, just west of West Heath	S2AP	2-way	60	1	2
141	A536	A534/A536 Roundabout	A54/A536 Roundabout	S2AP	2-way	60	1	3
142	A34	Near Manchester Road, Lower Heath, Congleton	Quarry Roundabout (A34/A536)	S2AP	2-way	40	10	3
143	A536	Quarry Roundabout (A34/A536)	Eaton Bank Roundabout (A536)	S2AP	2-way	60	1	3
144	A536	Eaton Bank Roundabout (A536)	Near Manchester Road, Lower Heath, Congleton	S2AP	2-way	50	10	3
145	A34	Roundabout A536/A34	Monk's Heath, Chelford Road	S2AP	2-way	60	1	2
146	A536	Eaton Bank Roundabout (A536)	Churchill Way, Macclesfield	S2AP	2-way	60	1	2
147	A534	Whetstone Edge Farm	A34 West Road	S2AP	2-way	40	10	4
148	A54	Loach Brook Roundabout (A54/A536)	A34 West Road	S2AP	2-way	40	10	4
149	A538	LA Boundary	A34 Birrell Way	S2AP	2-way	30	10	2

Table 21 DfT Traffic Flow Site Data 2023 (Sheet 9 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 9 of 10)											
Ref No	**Road**	**Start Junction**	**End Junction**	**All Motor Vehicles**	**%Lights**	**%Heavy**	**% Car**	**% LGV**	**%OGV1**	**%OGV2**	**%PSV**	**URBAN**
150	A530	A500	A532	22012	0.976	0.024	0.836	0.134	0.013	0.011	0.002	URBAN
151	A529	LA Boundary	A525	2133	0.951	0.049	0.739	0.198	0.025	0.023	0.006	RURAL
152	A34	A538	roundabout leading to Dean Row Rd	38747	0.984	0.016	0.853	0.126	0.009	0.007	0.001	RURAL
153	A538	A34	A5102	9722	0.981	0.019	0.816	0.160	0.009	0.011	0.001	RURAL
154	A34	A538	A538	34636	0.977	0.023	0.842	0.129	0.013	0.011	0.002	RURAL
155	A533	A533W	A533E	21779	0.942	0.058	0.786	0.150	0.022	0.036	0.002	URBAN
156	A525	A529S	A529N	5020	0.971	0.029	0.762	0.190	0.010	0.019	0.004	URBAN

Table 22 DfT Traffic Flow Site Data 2023 (Sheet 10 of 10)

Cheshire East	DfT Traffic Flow Site Data 2023 (Sheet 10 of 10)							
Ref No	**Road**	**Start Junction**	**End Junction**	**S2AP**	**2-way/1-way/bus lane**	**50**	**Road Class**	**RC**
150	A530	A500	A532	S2AP	2-way	30	10	1
151	A529	LA Boundary	A525	S2AP	2-way	60	1	4
152	A34	A538	roundabout leading to Dean Row Rd	D2AP	2-way	70	2	0
153	A538	A34	A5102	S2AP	2-way	60	1	3
154	A34	A538	A538	D2AP	2-way	70	2	0
155	A533	A533W	A533E	S2AP	2-way	30	10	1
156	A525	A529S	A529N	S2AP	2-way	30	8	4

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 23 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 24 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		**Weekday**					**Weekend**	**All Week**
	Journey Purpose	**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	Work	15.90	16.23	17.01	16.99	16.37	14.87	16.00
(Occupants)	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 25 to 27 below.

Values for 2010 VOC are shown in Table 28 below.

Carbon emissions are considered in terms of the change in the equivalent tonnes of carbon Table 29 and estimated from fuel consumption Table 30 below.

Table 25 Taxation Rates Base

TAXATION RATES (%)					
FUEL	**AVERAGE**	**FUEL**		**NON-FUEL**	
TYPE	**FINAL**	**FINAL**	**INTER**	**FINAL**	**INTER**
PETROL	19	339.7	274.2	20	0
DIESEL	19	310.1	249.1	20	0

Table 26 Changes to Taxation Rates % Petrol

CHANGES TO TAXATION RATES (%) PETROL						
AVERAGE	FUEL		NON-FUEL		FROM	TO
FINAL	FINAL	INTER	FINAL	INTER	YEAR	YEAR
0	-9.87	-10.41	0	0	2002	2003
0	-9.73	-10.32	0	0	2003	2004
0	-19.56	-20.88	0	0	2004	2005
0	-11	-11.94	0	0	2005	2006
0	0.63	0.69	0	0	2006	2007
0	-18.64	-20.19	0	0	2007	2008
0	29.04	36.78	0	0	2008	2009
0	-16.11	-20.38	0	0	2009	2010
0	-13.72	-18.56	0	0	2009	2010
0	-3.34	-3.85	0	0	2010	2011
0	-1.94	-2.24	0	0	2011	2012
0	-1.6	-1.85	0	0	2012	2013
0	0.53	0.62	0	0	2013	2014
0	0.81	0.95	0	0	2014	2015
0	1.19	1.39	0	0	2015	2016
0	0.98	1.14	0	0	2016	2017
0	0.79	0.92	0	0	2017	2018
0	0.61	0.71	0	0	2018	2019
0	0.43	0.49	0	0	2019	2020
0	0.25	0.29	0	0	2020	2021
0	0.25	0.28	0	0	2021	2022
0	0.29	0.34	0	0	2022	2023
0	0.35	0.4	0	0	2023	2024
0	0.31	0.36	0	0	2024	2025
0	0.36	0.42	0	0	2025	2026
0	0.31	0.35	0	0	2026	2027
0	0.32	0.36	0	0	2027	2028
0	0.32	0.37	0	0	2028	2029
0	0	0	0	0	2030	2099

Table 27 Changes to Taxation Rates % Diesel

CHANGES TO TAXATION RATES (%) DIESEL						
AVERAGE FINAL	FUEL		NON-FUEL		FROM YEAR	TO YEAR
	FINAL	INTER	FINAL	INTER		
0	-7.7	-8.16	0	0	2002	2003
0	-8.4	-8.95	0	0	2003	2004
0	-23.5	-25.18	0	0	2004	2005
0	-9.53	-10.44	0	0	2005	2006
0	3.85	4.26	0	0	2006	2007
0	-27.29	-29.85	0	0	2007	2008
0	37.84	48.13	0	0	2008	2009
0	-10.45	-14.64	0	0	2009	2010
0	-16.24	-21.43	0	0	2009	2010
0	-4.42	-5.14	0	0	2010	2011
0	-3.49	-4.09	0	0	2011	2012
0	-1.56	-1.84	0	0	2012	2013
0	0.54	0.64	0	0	2013	2014
0	0.81	0.96	0	0	2014	2015
0	1.2	1.41	0	0	2015	2016
0	0.98	1.15	0	0	2016	2017
0	0.79	0.93	0	0	2017	2018
0	0.62	0.73	0	0	2018	2019
0	0.45	0.53	0	0	2019	2020
0	0.26	0.3	0	0	2020	2021
0	0.26	0.3	0	0	2021	2022
0	0.31	0.36	0	0	2022	2023
0	0.35	0.41	0	0	2023	2024
0	0.32	0.38	0	0	2024	2025
0	0.35	0.41	0	0	2025	2026
0	0.34	0.39	0	0	2026	2027
0	0.32	0.37	0	0	2027	2028
0	0.32	0.38	0	0	2028	2029
0	0	0	0	0	2030	2099

Table 28 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 29 WebTAG – Carbon dioxide emissions per litre of fuel burnt / kWh used

Table A 3.4: Carbon Values, £ per Tonne of CO2e (2010 prices)			
Year	**Low**	**Central**	**High**
2010	83.64	167.28	250.92
2011	84.91	169.83	254.74
2012	86.21	172.41	258.62
2013	87.52	175.04	262.56
2014	88.85	177.71	266.56
2015	90.21	180.41	270.62
2016	91.58	183.16	274.74
2017	92.97	185.95	278.92
2018	94.39	188.78	283.17
2019	95.83	191.65	287.48
2020	97.29	194.57	291.86
2021	99.11	198.22	297.33
2022	100.62	201.24	301.86
2023	102.15	204.30	306.46
2024	103.71	207.41	311.12
2025	105.29	210.57	315.86
2026	106.89	213.78	320.67
2027	108.52	217.04	325.55
2028	110.17	220.34	330.51
2029	111.85	223.70	335.54
2030	113.55	227.10	340.65
2031	115.28	230.56	345.84
2032	117.04	234.07	351.11
2033	118.82	237.64	356.46
2034	120.63	241.26	361.88
2035	122.46	244.93	367.39
2036	124.33	248.66	372.99
2037	126.22	252.45	378.67
2038	128.15	256.29	384.44
2039	130.10	260.19	390.29
2040	132.08	264.16	396.23
2041	134.06	268.12	402.18
2042	136.07	272.14	408.21
2043	138.11	276.22	414.33
2044	140.18	280.37	420.55
2045	142.29	284.57	426.86
2046	144.42	288.84	433.26

Table 30 WebTAG – Fuel consumption parameter values

Table A 1.3.8: Fuel consumption parameter values (litres per km, 2015)				
	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	0.219			
Electric LGV	0.233			
Electric OGV1				
Electric OGV2				
Electric PSV				

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 31 below. Accident values increase in line with GDP as shown in Table 33 below. Accident rates are calculated with and without works, combined link and junction rates are used in QUADRO,

Table 34 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 35 shows the number of casualties per accident.

Table 31 WebTAG – Cost per Casualty

Cost per Casualty	
Severity	**Cost £**
Fatal	1,647,558
Serious	184,053
Slight	14,160

Table 32 WebTAG – Cost per Accident

Cost per Accident							
Severity	Insurance Admin	Damage to Property			Police Cost		
		Urban	Rural	Motorway	Urban	Rural	Motorway
Fatal	288	7,519	12,753	16,222	16,762	17,213	17,414
Serious	179	4,030	5,814	13,842	1,851	2,311	2,440
Slight	109	2,377	3,854	7,003	479	656	547
Damage	52	1,700	2,541	2,442	35	20	17

Table 33 WebTAG – Accident Growth Rates

Annual Rates of Growth of Accident Values	
Range of Years	Growth Rate (% p.a.)
2010 - 2011	0.61
2011 - 2012	0.80
2012 - 2013	1.25
2013 - 2014	2.21
2014 - 2015	1.81
2015 - 2016	1.43
2016 - 2017	1.53
2017 - 2018	1.05
2018 - 2019	1.12
2019 - 2020	0.11
2020 - 2021	0.11
2021 - 2022	1.50
2022 - 2023	1.50
2023 - 2024	1.50
2024 - 2025	1.50
2025 - 2026	1.50
2026 - 2027	1.50
2027 - 2028	1.50
2028 - 2029	1.50
2029 - 2030	1.50
2030 - 2031	1.50
2031 - 2032	1.50
2032 - 2033	1.50
2033 - 2034	1.50
2034 - 2035	1.50
2035 - 2036	1.50

2036 - 2037	1.50
2037 - 2038	1.50
2038 - 2039	1.50
2039 - 2040	1.50
2040 - 2041	1.50
2041 - 2042	1.50
2042 - 2043	1.50
2043 - 2044	1.50
2044 - 2045	1.50
2045 - 2046	1.50
2046 - 2047	1.50

Table 34 WebTAG – Accident Without Works

Combined Link / Junction: Accident Rates and Change Factors 2009 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 35 WebTAG – Casualties per Personal Injury Accident (PIA)

Combined Link / Junction: Casualty Rates					
Road Type	Speed Limit (mph)	Casualties per PIA			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 36 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 36 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 37 below. Accident Rates were tabled earlier in Section 4.2.

Table 37 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 38 below to calculate a speed/flow relationship with default values shown on Table 39 and 40.

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 41 below. The work site type is defined by the number of lanes open or shuttle working as shown on Table 42 below that selects a default capacity.

QUADRO contains values for average duration of incidents and are shown on Table 43 below.

Table 38 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 39 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 40 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 41 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 42 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 43 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 VEHICLES OCCUPANCIAES

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 44 below.

Table 44 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 Cheshire East DfT traffic count data 156 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 281 (2.67%) lane rental streets is shown on Tables 13 to 22.

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.

Data for hourly traffic flows was obtained from Cheshire East with 156 sites identified with daily flows in neutral months that were summarised for peak and off peak hours.

In total 2,340 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 45 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 46 below with the percentages matching the proportions of actual works shown in Table 7. 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 47 below.

The sample sites average duration for each work type was matched to the Cheshire East 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 45 Cheshire East Delay Modelling Daily Cost of Works

Cheshire East							
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	13,354	2,586	3,583	4,222	5,612	7,022
Urban	26,667	13,703	3,585	3,591	5,618	8,648	12,248
Average	23,334	13,529	3,086	3,587	4,920	7,130	9,635

Table 46 Cheshire East Work Samples

Cheshire East	Street Work Samples	
Work Type	**Sample Size**	**%**
Major	23	10%
Standard	35	15%
Minor with Exc	126	55%
Urgent	46	20%
Totals	**230**	

Table 47 Cheshire East Delay Modelling Percentage of Works by RC and Excavation Length

Cheshire East	CBA Percentages of Works by RC and Excavation Length					
	10m	**30m**	**50m**	**100m**	**200m**	**Total Samples**
Sample Nos	194	2	12	13	16	230
Sample %	84.3%	0.9%	5.2%	5.7%	7.0%	
Halcrow Study %	84.7%	0.7%	5.2%	4.2%	5.2%	

MONETIZED COSTS AND BENEFITS

The socio-economic benefits shown for the opening year in summary on Table 48.

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. With a slight increase in durations with shorter days at off-peak times there is a minor increase in accidents but this is a very low level and will not impact on casualties.

Table 48 Cheshire East Monetized Costs and Benefits

Cheshire East	Sample Sites QUADRO Results Summary		
Delay Modelling Totals			
	Total Impact	**Consumer Vehicle Operating Cost**	**Consumer Travel Time Cost**
High	£1,763,938	£77,259	£835,211
Low	£961,291	£43,073	£460,397
Average	£1,362,614	£60,166	£647,804
	Business Vehicle Operating Cost	**Business Travel Time Total**	**PSP Bus & Coach Operating Cost**
High	£119,034	£621,953	£38,970
Low	£61,630	£335,261	£21,104
Average	£90,332	£478,607	£30,037
	Total Business	**Accident Cost**	**Carbon**
High	£819,537	-£29	£80,009
Low	£439,579	-£13	£43,220
Average	£629,558	-£21	£ 61,615

LANE RENTAL SCHEME OPERATION

INTRODUCTION

This section assesses the process tasks required to establish and operate the Cheshire East 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 extracted from Cheshire East Permit Scheme Year 4 Evaluation RC 0-2 Total Permits prorated to the percentage of Lane Rental streets and is shown on Table 49 below.

Table 49 Lane Rental Work Volumes

Cheshire East Lane Rental Work Volumes		
Work Type	**Number**	**%**
Major	57	10%
Standard	87	15%
Minor with Exc	313	55%
Urgent	115	20%
Totals	572	0%

The volumes with costings are based upon statutory maximum charges outlined in Table 5.

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 50 below.

Table 50 Scheme Ongoing costs

Ongoing Costs	
Start-up Cost Centre	Year 1 +
Totals	£150,000

The operational policy outlined in Table 6 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 Cheshire East Permit Scheme staff will continue to be applied to the activities 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 activities 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 activities on lane rental streets has been identified using the same DfT methodology employed by the Cheshire East Permit Scheme.

The overall staffing costs of Lane Rental Scheme operation are based on information from Cheshire East Council and statutory rates and are outlined in Table 51. This is an initial estimate for the purpose of the CBA.

Table 51 Staff Costing

Staff Costing			
Personnel Type	**Annual Salary**	**Final Hourly Rate**	**Total Annual Cost**
Street Works Officer	£25,000	£35.48	£58,050
Street Works Coordinator	£35,000	£49.68	£81,270.00
Traffic Manager	£55,000	£80.48	£131,670.00

National Insurance (%)	10
Pension (superannuation) (%)	19
Working hours/annum	1636
Employee Overhead Rate	1.8

The breakdown of costing per task for each of the three grades of Lane Rental Scheme workers is shown in Table 52 below.

Table 52 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	1.23	1.65	0.91	0.52	0.46	4.78
Total Permits	57.47	57.47	87.08	313.49	114.96	630.48
Total Hours	70.88	94.82	79.54	163.54	52.96	3013.05
No. of Posts Required	0.04	0.06	0.05	0.10	0.03	0.28
Employee Costs	£2,515	£3,365	£2,822	£5,803	£1,879	£16,384
Street Works Coordinators						
	PAA	**Major**	**Standard**	**Minor**	**Immediate**	**TOTAL**
Hours per Permit	3.15	0.95	1.98	0.65	0.17	3.71
Total Permits	57.47	57.47	87.08	313.49	114.96	630.48
Total Hours	181.22	54.60	172.28	202.20	19.16	2340.12
No. of Posts Required	0.11	0.03	0.11	0.12	0.01	0.24
Employee Costs	£9,002	£10,392	£8,558	£10,045	£3,684	£41,680
Traffic Managers						
	PAA	**Major**	**Standard**	**Minor**	**Immediate**	**TOTAL**
Hours per Permit	1.49	0.95	0.49	0.62	0.17	3.71
Total Permits	57.47	57.47	87.08	313.49	114.96	630.48
Total Hours	85.44	54.60	42.82	193.32	19.16	2340.12
No. of Posts Required	0.05	0.03	0.03	0.12	0.01	0.24
Employee Costs	£6,876	£4,394	£3,446	£15,559	£1,542	£31,817

The overall costs associated with the operation of the Lane Rental Scheme are summarised in Table 53 below.

Table 53 Staff costing summary

Total Number of Employees and Costs		
Personnel Type	**No.**	**Salaries**
Street Works Officers	0.28	£16,384
Street Works Coordinators	0.51	£41,680
Traffic Managers	0.24	£31,817
TOTAL	**1.04**	**£89,881**

The final Lane Rental Scheme cost is shown in Table 54.

Table 54 Lane Rental Scheme costing summary

Lane Rental Scheme Cost Breakdown	
Cost Type	**Cost**
LR Application Employee Costs	£89,881
LR Application Operational Factor Costs	£150,000
Total LR Application Costs	£239,881

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 6.

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 is shown below on Tables 55 and potential behavioural changes in Table 56 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 Lane Rental Implementation Outputs are shown on Table 57 below.

The Operational Costs for Year 1-10 are shown on Table 58 below and imply a discount rate of 3.5% as shown in Table 4 above.

Financial calculations for year 2 to 25 are shown on Table 59 to 63 below.

Table 55 Cheshire East Lane Rental Scheme Anticipated Volumes, Impacts and Revenue

Current Permit Regime Volumes (2.67% of Network)		Estimated Lane Rental Volumes per Year						
Works Category	**Volume of Works Anticipated to be on Lane Rental Streets**	**Proposed Charge per day**	**Ave Durations of Works Before Lane Rental**	**Total Pre Lane Rental Works Days**	**Anticipated additional days due to reduced efficiency. Extra out of hours working**	**Total Immediate + Urgent Work Days Completed without Charge**	**Total Immediate + Urgent Work Days Charged**	**Total Work Days Moved Outside Charge Periods**
Major	57	2,500	22	1,264	126	-	-	506
Standard	87	2,500	11	958	96	-	-	383
Minor	313	2,500	2	627	63	-	-	251
Urgent	115	2,500	6	690	-	621	69	-
Sub Total	**573**			**3,539**		**621**	**69**	**1,140**

Works Category	Estimated Lane Rental Revenue per Year						
	Total Work Days Potentially Charged	**Total Days Triggering a Waiver**	**Revenue cost of waivers**	**Total Work Days triggering a discount (min 50%)**	**Revenue cost of discounts**	**Final Anticipated Chargeable Days**	**Final Anticipated Revenue**
Major	759	303	£ 758,588	152	£ 189,647	303	£ 758,588
Standard	575	230	£ 574,747	115	£ 143,687	230	£ 574,747
Minor	376	150	£ 376,191	75	£ 94,048	150	£ 376,191
Urgent	69	-	-	-	-	69	£ 172,446
Sub Total	**1,779**	**684**	**1,709,526**	**342**	**427,381**	**753**	**1,881,972**

Table 56 Potential Behavioural Changes

Potential Behavioural Changes	Assumptions / Anticipated Behavioural Changes	Assumption Source
Anticipated additional days due to reduced efficiency (shorter days etc)	10%	West Sussex
Percentage of Immediate works being completed before charge periods apply	90%	West Sussex
Works being undertaken outside the Lane Rental Charge periods, such as out of hours (not charged)	40%	West Sussex
Works being undertaken in a way that triggers a waiver, such as the use of new technology	40%	Estimate
Works being undertaken in a way that triggers a discount, such as collaborative working	20%	Estimate

Table 57 Lane Rental Implementation Outputs

Lane Rental Scheme Implementation Outputs	
Total Average TSS Works Days on Lane Rental Streets	**3,539**
Increase in Days Charged Worked (reduced efficiency)	**285**
Post Behavioural Change Days Worked on Lane Rental Streets	**3,824**
Total Immediate Works Days Charged After Behavioural Change	**69**
Percentage of Works on Lane Rental Streets Charged	**21%**
Potential Volume of Works on Lane Rental Streets	**573**
Percentage of Network Lane Rental	**2.67%**
Pre Behavioural Change Immediate Days Worked	**690**
Post Behavioural Change Immediate Days Worked	**69**
Total Number of Days Worked at Lane Rental Times	**1,779**
Potential Immediate Days saved due to 48 hour FOC period	**414**
Potential Cost of Waivers issued	**1,709,526**
Potential Cost of Discounts issued	**427,381**
Anticipated Total Revenue	**1,881,972**
Anticipated Net Revenue after Operational Costs	**1,642,091**
Operational Costs as a % of Revenue	**12.75%**
Total Operational Costs	**239,881**
Total Additional Staff Required	**1.04**
Total Staff Costs (Inc internal operating factors)	**89,881**
Total Operating Factors (External Cost (Evaluation))	**150,000**
Set-up Costs including Consultancy and internal time	**150,000**
Optimism Bias. Estimate from Management	**30%**

Authority Volume and Costs		
Works done by Utilities	418	
Works done by Authority	155	
Potential Revenue from Utilities	1,373,840	
Potential Revenue (cost) from the Authority	508,133	

Optimism Bias	**30%**
Reduction	**£564,591.69**
Management Figure	**£1,317,380.62**

Optimism Bias	**30%**
Reduction	**£1,229,972.19**
Management Figure	**£2,869,935.11**

Table 58 Financial Calculations Annual Cost

Cheshire East Financial Calculations											
	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	239,881	239,881	231,485	223,089	214,694	206,298	197,902	189,506	181,110	172,714	164,319
Set-up Costs	150,000	150,000									
Lane Rental Fee Charges for Highway Authorities	508,133	355,693	343,244	330,794	318,345	305,896	293,447	280,997	268,548	256,099	243,650
Annual Cost For Recovery		745,574	574,729	553,884	533,039	512,194	491,348	470,503	449,658	428,813	407,968
Cost Recovery Price Lane Rental charge		389,881	389,881	231,485	223,089	214,694	206,298	197,902	189,506	181,110	172,714
Cost Recovery Price Lane Rental charge (prior year data)		2,520	4,819	2,691	3,526	3,391	3,256	3,122	2,987	2,852	2,717
(Over) / under-recovery £		355,693	184,848	322,398	309,949	297,500	285,051	272,601	260,152	247,703	235,254
(Over) / under-recovery £ (prior year)		355,693	184,848	322,398	309,949	297,500	285,051	272,601	260,152	247,703	235,254
Annual Income Max Charges	1,317,381	1,317,381	1,271,272	1,225,164	1,179,056	1,132,947	1,086,839	1,040,731	994,622	948,514	902,406
Overall Scheme Cost	389,881	745,574	416,333	545,488	524,643	503,798	482,953	462,107	441,262	420,417	399,572
Profit/Loss	927,500	571,807	854,939	679,676	654,413	629,150	603,886	578,623	553,360	528,097	502,833

Table 59 Financial Calculations First Year Cost

Financial Calculations	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	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990	19,990
Lane Rental Volumes	155	13	13	13	13	13	13	13	13	13	13	13	13
Cost Recovery Price Lane Rental income		2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04	2,520.04
Multiplied by number of Works		32,490	32,490	32,490	32,490	32,490	32,490	32,490	32,490	32,490	32,490	32,490	32,490
Income derived on Cost recovery basis													
Income derived from Max Charges	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782	109,782
Lane Rental Scheme - Operational Costs		-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990	-19,990

Table 60 Financial Calculations Second Year Cost (Year 2)

Financial Calculations	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**
Lane Rental Costs	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290	19,290
Lane Rental Volumes		13	13	13	13	13	13	13	13	13	13	13	13
Cost Recovery Price Lane Rental income		4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10	4,819.10
Multiplied by number of Works		62,131	62,131	62,131	62,131	62,131	62,131	62,131	62,131	62,131	62,131	62,131	62,131
Income derived on Cost recovery basis													
Income derived from Max Charges	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939	105,939
Lane Rental Scheme - Operational Costs		-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290	-19,290

Table 61 Financial Calculations Third Year Cost (Year 3)

Financial Calculations	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**
Lane Rental Costs	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591	18,591
Lane Rental Volumes		13	13	13	13	13	13	13	13	13	13	13	13
Cost Recovery Price Lane Rental income		2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01	2,691.01
Multiplied by number of Works		34,694	34,694	34,694	34,694	34,694	34,694	34,694	34,694	34,694	34,694	34,694	34,694
Income derived on Cost recovery basis													
Income derived from Max Charges	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097	102,097
Lane Rental Scheme - Operational Costs		-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591	-18,591

Table 62 Financial Calculations 4-14 Year Cost

Financial Calculations	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 Costs		214,694	206,298	197,902	189,506	181,110	172,714	164,319	109,146	103,269	97,392	91,515
Lane Rental Volumes		155	155	155	155	155	155	155	155	155	155	155
Cost Recovery Price Lane Rental income		3,525.82	3,391.09	3,256.35	3,121.62	2,986.88	2,852.15	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41
Multiplied by number of Works		545,488	524,643	503,798	482,953	462,107	441,262	420,417	420,417	420,417	420,417	420,417
Income derived on Cost recovery basis												
Income derived from Max Charges		1,179,056	1,132,947	1,086,839	1,040,731	994,622	948,514	902,406	902,406	902,406	902,406	902,406
Lane Rental Scheme - Operational Costs		-214,694	-206,298	-197,902	-189,506	-181,110	-172,714	-164,319	-109,146	-103,269	-97,392	-91,515

Table 63 Financial Calculations 15-25 Year Cost

Financial Calculations	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 Costs		85,638	79,760	73,883	68,006	62,129	56,252	50,375	44,498	38,621	32,744	26,867
Lane Rental Volumes		155	155	155	155	155	155	155	155	155	155	155
Cost Recovery Price Lane Rental income		2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41	2,717.41
Multiplied by number of Works		420,417	420,417	420,417	420,417	420,417	420,417	420,417	420,417	420,417	420,417	420,417
Income derived on Cost recovery basis												
Income derived from Max Charges		671,864	625,756	579,647	533,539	487,431	441,323	395,214	349,106	302,998	256,889	210,781
Lane Rental Scheme - Operational Costs		-85,638	-79,760	-73,883	-68,006	-62,129	-56,252	-50,375	-44,498	-38,621	-32,744	-26,867

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 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:

- **Error! Reference source not found.**
- OPERATING COSTS
- **Error! Reference source not found.**
- **Error! Reference source not found.**
- **Error! Reference source not found.**
- 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.

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 Cheshire East 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 calculation basis of each category has been presented in Sections 5, 6 and 0.

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 64 and 65.

PUBLIC ACCOUNTS

The Public Accounts tables show the net impact to Local and Central Government and are below on Tables 66 and 67.

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 68 and 69 are below.

STATUTORY COST BENEFIT ANALYSIS

This study has addressed all aspects of the implementation of the Cheshire East 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 10.28 and Net Present Value of £17.7m in 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 64 TEE Table Year 1

Transport Economic Efficiency (TEE) Table Year 1

Consumers	**ALL MODES**		**ROAD**		**Bus & Coach**	**RAIL**	**Other**
User benefits	**TOTAL**		**Private Cars and LGVs**		**Passengers**	**Passengers**	
Travel time	647,804		635,038		12,766	-	-
Vehicle operating costs	60,166		60,166				-
User charges	-		-		-	-	-
During Construction & Maintenance	-		-		-	-	-
NET CONSUMER BENEFITS	707,970	*-1*	695,204		12,766	-	-
Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	502,569		293,249	189,788	19,532	-	-	-
Vehicle operating costs	90,332		83,181	7,151				-
User charges	-		-	-	-	-	-	-
During Construction & Maintenance				-	-	-	-	-
Subtotal	592,901	*-2*	376,430	196,939	19,532	-	-	-
Private sector provider impacts						**Freight**	**Passengers**	
Revenue	-				-	-	-	-
Operating costs	30,037				30,037	-	-	-
Investment costs	-				-	-	-	-
Grant/subsidy	-				-	-	-	-
Subtotal	30,037	*-3*			30,037	-		-
Other business impacts								
Developer contributions	-	*-4*	-		-	-	-	-
NET BUSINESS IMPACT	622,938	*(5) = (2) + (3) + (4)*						
TOTAL								
Present Value of Transport Economic Efficiency Benefits	1,330,908	*(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 65 TEE Table 25 Years

Transport Economic Efficiency (TEE) Table 25 Years

Consumers	**ALL MODES**		**ROAD**		**Bus & Coach**	**RAIL**	**Other**
User benefits	**TOTAL**		**Private Cars and LGVs**		**Passengers**	**Passengers**	
Travel time	9,393,163		9,208,057		185,106	-	-
Vehicle operating costs	872,404		872,404				-
User charges	-		-		-	-	-
During Construction & Maintenance	-		-		-	-	-
NET CONSUMER BENEFITS	10,265,567	*-1*	10,080,461		185,106	-	-
Business							
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	7,287,248		4,252,106	2,751,923	283,219	-	-	-
Vehicle operating costs	1,309,816		1,206,130	103,687				-
User charges	-		-	-	-	-	-	-
During Construction & Maintenance	-		-	-	-	-	-	-
Subtotal	8,597,065	*-2*	5,458,236	2,855,609	283,219	-	-	-
						Freight	**Passengers**	
Revenue	-				-	-	-	-
Operating costs	435,536				435,536	-	-	-
Investment costs					-	-	-	-
Grant/subsidy					-	-	-	-
Subtotal	435,536	*-3*			435,536	-	-	-
Developer contributions	-	*-4*	-		-	-	-	-
NET BUSINESS IMPACT	9,032,601	*(5) = (2) + (3) + (4)*						
TOTAL								
Present Value of Transport Economic Efficiency Benefits	19,298,168	*(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 66 PA Table Year 1

Public Accounts (PA) Table Year 1

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	789,087		-			789,087
Operating Costs	233,532		-			233,532
Investment Costs	-789,087		-			-789,087
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	233,532	*-7*	-	-	-	233,532
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	233,532	*(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 67 PA Table 25 Years

Public Accounts (PA) Table 25 Year

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	11,717,947		-			11,717,947
Operating Costs	1,911,407		-			1,911,407
Investment Costs	-11,717,947		-			-11,717,947
Developer and Other Contributions	-		-	-	-	-
Grant/Subsidy Payments	-		-	-	-	-
NET IMPACT	1,911,407	*-7*	-	-	-	1,911,407
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*	-	-	-	-
TOTALS						
Broad Transport Budget	1,911,407	*(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 AMCB Year 1

Analysis of Monetised Costs and Benefits Year 1

Noise	-		*-12*
Local Air Quality	-		*-13*
Greenhouse Gases	61,615		*-14*
Journey Quality	-		*-15*
Physical Activity	-		*-16*
Accidents	-21		*-17*
Economic Efficiency: Consumer Users (Commuting)	707,970	*(1a)*	
Economic Efficiency: Consumer Users (Other)	-	*(1b)*	
Economic Efficiency: Business Users and Providers	622,938		*-5*
Wider Public Finances (Indirect Taxation Revenues)	36,507	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*	
Present Value of Benefits (see notes) (PVB)	1,355,994	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*	
Broad Transport Budget	233,532		
Present Value of Costs (see notes) (PVC)	233,532		
OVERALL IMPACTS			
Net Present Value (NPV)	1,122,463		
Benefit to Cost Ratio (BCR)	5.81		

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 69 AMCB 25 Years

Analysis of Monetised Costs and Benefits 25 Years

Noise	-	*-12*
Local Air Quality	-	*-13*
Greenhouse Gases	879,239	*-14*
Journey Quality	-	*-15*
Physical Activity	-	*-16*
Accidents	-311	*-17*
Economic Efficiency: Consumer Users (Commuting)	10,265,567	*(1a)*
Economic Efficiency: Consumer Users (Other)	-	*(1b)*
Economic Efficiency: Business Users and Providers	9,032,601	*-5*
Wider Public Finances (Indirect Taxation Revenues)	529,350	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	19,647,746	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	1,911,407	*-10*
Present Value of Costs (see notes) (PVC)	1,911,407	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	17,736,339	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	10.28	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.

CHESHIRE EAST LANE RENTAL SCHEME CBA RESULTS

INTRODUCTION

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

CHESHIRE EAST 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 70), which includes the cost recovery from Lane Rental charges and includes the effect of indirect taxation. The summary of benefits is presented in Table 71.

Table 70 Highway Authority Cheshire East Cost Benefit results

Highway Authority Assessment	Opening Year	25 Year
Net Present Value of Benefits	£1,355,994	£19,647,746
Net Present Value of Costs	£233,532	£1,911,407
Net Present Value of Permit Scheme	£1,122,463	£17,736,339
Benefit to Cost Ratio	**5.81**	**10.28**

Table 71 Benefits Summary Values and Percentage impact 25 Years

Benefits	Value	Percentage of Total Benefit
Consumer Travel Time	£9,393,163	48%
Consumer Vehicle Operating Costs	£872,404	4%
Business Travel Time	£7,287,248	37%
Business Vehicle Operating Costs	£1,309,816	7%
Private Sector Provider Operating Costs	£435,536	2%
Reduction in Fuel Revenue	£529,350	3%
Greenhouse Gases	£879,239	4%
Accidents	-£311	0%
Net Present Value of Benefits	**£19,647,746**	

The Scheme has a Benefit Cost Ratio of 10.28 and Net Present Value of £17.7m 2010 prices which suggest the Cheshire East Lane Rental Scheme would be both viable and beneficial for the Highway Authority and the population of Cheshire East.

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 £1.35m includes a reliability adjustment of 20% for urban roads and has been assessed at a local level. This is an increase in the estimated suggested benefit in the DfT report in Section 3.7 however this is using local not national data.

APPENDIX A

Traffic Sensitive Network. See attached.

APPENDIX B

Lane Rental 2.76% Streets. See attached.

APPENDIX C

QUADRO outputs. See attached.

APPENDIX D

Sample Sites QUADRO Results Summary. See attached.

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