

COST BENEFIT ANALYSIS

Brighton & Hove Permit Scheme

for road and street works

Traffic Management Act 2004



Brighton & Hove Permit Scheme – Cost Benefit Analysis

Document Information	
Date:	July 2014
Project Name:	Brighton & Hove Permit Scheme (B&HPS)
Service Area:	Brighton & Hove City Council Highway Network
Directorate:	Highways and Transport
Authors:	Richard Pelham, Technical Consultant Jason Setford-Smith, Scheme Consultant
Project Lead:	Jeff Elliott, Highway and Traffic Manager
SRO:	Christina Liassides, Head of Highway Operations
Version:	V3 Final

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Contents

1	EXECUTIVE SUMMARY	5
2	INTRODUCTION.....	6
2.1	Permit Scheme objectives	6
2.2	Scope of work	6
2.3	Report Structure	6
3	ANALYSIS AND CONTEXT	7
3.1	Introduction.....	7
3.2	Legislative context	7
3.3	Traffic Management Act 2004.....	7
3.4	WebTAG.....	7
3.5	Research.....	7
3.6	Halcrow Study.....	7
3.7	Implications for Brighton & Hove Permit Scheme	8
4	INPUT DATA	8
4.1	Introduction.....	8
4.2	Cost Benefit Assumption.....	8
4.3	Data sources	9
4.4	Discount and Risk Factors	9
4.5	Model Variable specification	10
4.6	Statutory information associated with Permit Schemes	10
4.7	Brighton & Hove City Council data.....	10
4.8	Policy data.....	11
4.9	Road works Data.....	11
4.10	DfT data.....	11
4.11	Works Data	11
4.12	Traffic Data	13
5	DELAY MODELLING	19
5.1	Delay Modelling Methodology	19
5.2	The valuation of costs in quadro	19
5.3	DELAY MODELLING IN QUADRO	28
5.4	TRAFFIC input.....	29
5.5	Site specific quadro input data	34
5.6	Monetized Costs and Benefits.....	35
6	PERMIT SCHEME OPERATION.....	38
6.1	Introduction.....	38
6.2	Fees Matrix	38
6.3	Scheme Costs	39
7	FINANCIAL CALCULATIONS	42
7.1	Introduction.....	42
7.2	Public Accounts - Local Government Funding	42

Brighton & Hove Permit Scheme – Cost Benefit Analysis

7.3	Public Accounts - Central Government Funding	56
7.4	Transport Economic Efficiency.....	56
8	STATUTORY OUTPUTS.....	57
8.1	Introduction.....	57
8.2	Transport Economic Efficiency (TEE)	57
8.3	Public Accounts.....	57
8.4	Cost Benefit Analysis.....	57
8.5	Statutory Cost Benefit Analysis	57
9	BRIGHTON & HOVE PERMIT SCHEME CBA RESULTS	70
9.1	Introduction.....	70
9.2	Brighton & Hove Highway Authority Cost Benefit Analysis	70
9.3	Sensitivity Analysis	71
10	APPENDIX A	73
11	APPENDIX B	73
12	APPENDIX C	73

Brighton & Hove Permit Scheme – Cost Benefit Analysis

1 EXECUTIVE SUMMARY

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

Any new proposal should always answer these two basic questions:

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

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.

Brighton & Hove City Council's Highways Team has been working on just such a new development and this CBA supports its introduction by demonstrating the positive financial outcome delivering its objectives will provide.

Minimising congestion is a key transport challenge for any Council and especially for a busy City like Brighton & Hove.

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

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

The proposed Brighton & Hove Permit Scheme is designed to deliver effective coordination and management of essential road works by introducing a new Permit Authority in Brighton & Hove.

The new Permit Authority 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 make available the necessary resources to achieve an appropriate balance between the interests of the various parties and where possible, bring about effective coordination between all the different competing interests.

Summary findings of the Brighton & Hove Permit Scheme Cost Benefit Analysis

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

Value of benefits to economy and society	£190,138,864
Set-up and operating costs	£15,591,604
Financial benefit to the local economy from introducing the Scheme	£174,547,260
Benefit to Cost Ratio	12.19

Brighton & Hove Permit Scheme – Cost Benefit Analysis

2 INTRODUCTION

2.1 PERMIT SCHEME OBJECTIVES

Swift Argent Ltd was commissioned by Brighton & Hove City Council (B&HCC) in 2013 to develop a road works Permit Scheme known as the Brighton & Hove Permit Scheme (BHPS), part of which includes the development of a detailed Cost Benefit Analysis (CBA).

The principal objective of the Brighton & Hove Permit Scheme is to improve the strategic and operational management of the highway network through better planning, scheduling and management of activities to minimise disruption to road users.

The Brighton & Hove Permit Scheme will enable better coordination of activities throughout the highway network, ensuring those competing for space or time in the street, including traffic, to be resolved in a positive and constructive way.

The objectives and benefits of the Brighton & Hove Permit Scheme are:

- Reduced congestion on the road network
- Improvements to overall network management
- A reduction in delays to the travelling public
- A reduction in costs to businesses caused by delays
- Promotion of a safer environment
- Reduced carbon emissions

2.2 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 Permit Scheme.

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

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

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

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

This report will identify the additional costs of operating the Scheme, which are to be met by the Permit fees charged to Utility companies and from the Brighton & Hove Council existing budget, against the value of the benefits it will deliver to the wider City of Brighton & Hove.

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.

2.3 REPORT STRUCTURE

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

- Section 3 Analysis and Context;
- Section 4 Input Data;
- Section 5 Delay Modelling;
- Section 6 Permit Scheme Operation;
- Section 7 Financial Calculations;

Brighton & Hove Permit Scheme – Cost Benefit Analysis

- Section 8 Statutory Outputs; and
- Section 9 Brighton & Hove Permit Scheme CBA Results

3 ANALYSIS AND CONTEXT

3.1 INTRODUCTION

This section presents the legislative and research context for the Brighton & Hove Permit Scheme Cost Benefit Analysis.

3.2 LEGISLATIVE CONTEXT

The legislative guidance used for this study is contained within:

- Traffic Management Act 2004, Permit Schemes, Decision-making and development (2nd Edition), November 2010;
- Traffic Management Act 2004, Code of Practice for Permits, March 2006; and
- WebTAG guidance Values of Time and Operating Costs (TAG Unit 3.5.6 October 2013).
- 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
- Design Manual for Roads and Bridges Volume 14 Economic Assessment of Road Maintenance

3.3 TRAFFIC MANAGEMENT ACT 2004

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.

3.4 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 recently updated in October 2013 including changes in value of time and operating costs, accident costs, carbon emissions and traffic growth forecasts as described in Road Transport Forecasts 2013.

3.5 RESEARCH

The benchmark study for Permit Scheme appraisal was produced by the Halcrow Consultancy at the time of the TMA in 2004.

3.6 HALCROW STUDY

In July 2004, Halcrow produced a report for the DfT on the impact of road works. The results (Table 1) 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	£4.38

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

3.7 IMPLICATIONS FOR BRIGHTON & HOVE PERMIT SCHEME

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

From a top down perspective, with an estimated 1.33% of utility road works occurring in Brighton & Hove and a 5% reduction in road works associated with the Permit Scheme, it may be expected to produce annual savings of £2.9m in 2002 prices, (£4.8 million in 2010 prices).(Table 2)

Table 2 Forecast Benefits – Top Down approach

Halcrow Study	£
Annual UK cost of roadworks (£bn)	£ 4.36bn
Proportion of roadworks in Brighton & Hove	1.33%
Annual Brighton & Hove cost of roadworks (£m)	£ 7.99m
Roadwork Reduction from Permit Scheme	5%
Estimated Permit Scheme saving (2002 prices) (£m)	£ 2.90m
Estimated Permit Scheme saving (2010 prices) (£m)	£ 4.85m

However, working up from the actual number of Noticed Works in Brighton & Hove and using the ‘rule of thumb’ estimate from the DfT report of £600 per works per day and an average 6 days, the projected annual savings would be £2.47m in 2002 prices (£4.13 million in 2010 prices). (Table 3)

Table 3 Forecast Benefits – Bottom up approach

Annual Number of Utility Works	Total
Pre-scheme Number of Utility Works	13,715
Utility Works after 5% reduction	13,029
Total Utility Permit reduction	686
Average Days Duration from Halcrow Study	6
Number of road work days saved	4,115
Total Cost at £600 per works per day (£ m) (2002 prices)	£ 2.47
Total Cost at £600 per works per day (£ m) (2010 prices)	£ 4.13

The figures above give an estimate of the upper and lower expectations from the Brighton & Hove Permit Scheme of between £4.13m and £4.85m in 2010 prices. As the two methods are within 15% this is considered a reasonably reliable estimate. Both methods do have a degree of uncertainty as they are based on sample national data which may not be a correct representation at a local level.

4 INPUT DATA

4.1 INTRODUCTION

This section outlines the information sources and assumptions used in the Brighton & Hove Permit 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.

4.2 COST BENEFIT ASSUMPTION

The objective of the Brighton & Hove Permit Scheme is a reduction in the disruption caused by road works through improved control and coordination.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

The central assumption of the analysis is that the introduction of the Permit Scheme will cause a 5% fall in Permit applications, and have a commensurate effect on roadwork activity and all associated aspects of the analysis. This 5% reduction is known as the Permit Scheme reduction factor.

Table 4 Central Assumptions

CBA modelled variable	Rate
Permit Scheme Reduction Factor	5%
Target year for reduction in works	1
Ratio of Utility permits to overall permits	50%

The analysis worked on the operating assumption that the effects of the Permit Scheme will start on Scheme opening with reductions occurring after operational lead-time in the second month. The breakdown of annual Permit numbers are presented in Table 5 below.

Table 5 Annual Permit Summary

Annual Permits	Total
Number of Utility Permits	15,964
Utility Permits after 5% reduction	15,166

4.3 DATA SOURCES

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

- Government guidance;
- A completed Permit Fees Matrix in a format provided by the DfT;
- Local data provided by Brighton & Hove City Council; and
- 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 Brighton & Hove City Council contained both the number of permits by type and specific information on Scheme operation and costs.

4.4 DISCOUNT AND RISK FACTORS

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

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

Table 6 Discount and Risk Factors

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

4.5 MODEL VARIABLE SPECIFICATION

This section identifies the treatment of costs in the period after Scheme implementation. All values used are standard values taken from Annex C of TMA 2004 Decision-making and development (2nd edition) and shown in Table 7.

Table 7 Model Variable specification

CBA modelled variable	Rate
Cost reduction based on permit reduction	50%
Reliability benefit factor	20%
Allowance for Phased Works	20%
Proportion of Annually recurring set up costs	0%

The introduction of the Permit Scheme will bring about a reduction in Permit applications, which in turn will mean lower Scheme costs. The TMA 2004 suggested 50% proportion used means that the reduction in Permit numbers of 5% will produce a 2.5% reduction in Scheme costs.

The reliability benefit factor is an approved standard uplift to the time benefit attributed to the reduction of road works on urban roads. The allowance for phased works is a factor applied to the number of Permits applications to get a total number of Permits upon which the calculations are based.

No costs associated with the establishment of the Permit Scheme are projected to extend beyond the Scheme opening.

4.6 STATUTORY INFORMATION ASSOCIATED WITH PERMIT SCHEMES

This study uses the guidance outlined in the TMA 2004 at the time of the study. The maximum charge per Permit type is shown in Table 8 below.

Table 8 Statutory Permit Fee rates

Revised maximum fee structure for each category of works and for a hierarchy of main and minor roads - Road category refers to the reinstatement category of the street under the New Roads and Street Works Act 1991		
Work Type	Road Category 0-2 or Traffic-sensitive	Road Category 3-4 and non traffic-sensitive
Provisional Advance	£105	£75
Major works – over 10 days <u>and</u> all major works requiring a traffic regulation order.	£240	£150
Major works – 4 to 10 days	£130	£75
Major works – up to 3 days	£65	£45
Activity Standard	£130	£75
Activity Minor	£65	£45
Immediate Activity	£60	£40
Permit Variation	£45	£35

4.7 BRIGHTON & HOVE CITY COUNCIL DATA

Brighton & Hove City Council supplied the following data and policy decisions:

- Policy data; and
- Road works Data.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

4.8 POLICY DATA

The policy decisions related to Permit Scheme operation outlined in Table 9 were obtained from Brighton & Hove City Council.

Table 9 Operational Variables

CBA modelled variable	Period
Number of months to establish Permit Scheme	1
Number of months to implement Permit Scheme	1
Recovery period for set-up costs (Years)	3
Debtor days	30

4.9 ROAD WORKS DATA

Brighton & Hove City council provided the information on the number of road works and shown on Table 10 below.

Table 10 Roadwork Totals

Brighton & Hove Permit Volumes						
Work Type	RC 0-2		RC 3-4		Total Volume	
	Number	%	Number	%	Number	%
Major	35	2%	102	1%	137	1%
Standard	213	9%	639	6%	852	6%
Minor with Exc	1,323	59%	8,248	72%	9,571	70%
Minor without Exc	215	10%	739	6%	954	7%
Urgent	296	13%	1,159	10%	1,455	11%
Special Urgent	-	0%	-	0%	-	0%
Emergency	168	7%	578	5%	746	5%
Totals	2,250	16%	11,465	84%	13,715	

The table expresses work type by two types RC 0-2 Traffic Sensitive Streets and RC 3-4 Non Traffic Sensitive Streets. RC is an abbreviation of Reinstatement Category which is a function of Commercial Vehicles (CV) traffic volumes.

4.10 DFT DATA

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

4.11 WORKS DATA

The Halcrow Study found that the average size of carriageway works is 2 metres width by 20 metres length. Data was collected from 25 authorities across the whole of England on permit notices and the percentages of notices by reinstatement category and excavation length is summarised on Table 11 below. This shows that there is a very high proportion of works on minor roads RC 3-4.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 11 Percentage of Notices by Reinstatement Category and Excavation Length

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

The study also reported the average duration by work type and utility. The average for each utility was proportioned by the number of notices to derive an average duration by work type and is summarised in Table 12 below. It was noted that there was a high percentage of water utility works.

Table 12 Average duration by work type by utility

DfT Study Average duration by work type by utility					
Work Type	Elec	Gas	Telecom	Water	Avg Duration All Utilities
Major	41	40	23	30	33
Standard	7	7	9	15	9
Minor with Exc	3	4	2	2	2
Minor without Exc	3	4	6	2	3
Urgent	6	5	3	3	4
Special	3	3	3	2	2
Emergency	6	7	2	3	7

Works require traffic management to keep workers safe and the requirements are detailed in Chapter 8 of the Traffic Signs Manual DfT 2009 and is summarised in Table 13 below for different road types.

Table 13 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 14 and 15 below.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 14 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 15 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

4.12 TRAFFIC DATA

Traffic data was obtained from the DfT who monitor annual traffic flows for all authorities in the UK,

For Brighton & Hove City there are 42 site locations on 'A' principal roads for Annual Average Daily Flow (AADF) classified by vehicle type and 21 site locations on minor roads.

The latest data for 2012 is shown on Tables 16 to 19 below and location plan shown on Figure 1.

The RC has been derived from the typical AADT flows as shown in Table 14 and 15.

Table 16 DfT Traffic Flow Site Data 2012 (Sheet 1 of 4)

Brighton and Hove DfT Traffic Flow Site Data 2012 (Sheet 1 of 4)												
Ref No	Road	StartJunction	EndJunction	AllMotorVehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Type
1	A23	A23 Old Steine roundabout	A23 Gloucester Place/Grand Parade	19575	0.977931	0.022069	0.7382375	0.1545338	0.0186973	0.0033206	0.0852107	D2AP
2	A2010	A259	A270	10217	0.9904081	0.0095919	0.7937751	0.1593423	0.0092004	0.0003915	0.0372908	S2AP
3	A2023	A259 KINGSWAY	A270	8274	0.9827169	0.0172831	0.8100073	0.1456369	0.0140198	0.0032632	0.0270728	S2AP
4	A270	A2010	A270	15753	0.9795594	0.0204406	0.7634736	0.2104361	0.0184727	0.0019679	0.0056497	S2AP
5	A270	A293	A2038	28387	0.9877409	0.0122591	0.8385176	0.1352732	0.0083841	0.0038398	0.0139853	D2AP
6	A259	B2194	A2023	20143	0.9746314	0.0253686	0.825448	0.1409919	0.0180211	0.0073475	0.0081914	D2AP
7	A2038	A270	A2023	11580	0.9865285	0.0134715	0.8278066	0.151468	0.0125216	0.0008636	0.0073402	S2AP
8	A270	A23	A270 Lewes Road	6310	0.9844691	0.0155309	0.7977813	0.1825674	0.0131537	0.0023772	0.0041204	S2AP
9	A270	A2023	A2010	15001	0.9896007	0.0103993	0.8277448	0.1585228	0.0097993	0.0006	0.0033331	S2AP
10	A2023	A270	A2038	7231	0.9713733	0.0286267	0.8206334	0.1486655	0.0217121	0.0069147	0.0020744	S2AP
11	A259	A2023	A2010	25416	0.9851275	0.0148725	0.8358908	0.1450268	0.0109773	0.0038952	0.0042099	D2AP
12	A2038	A2023	A27	21915	0.982204	0.017796	0.8251426	0.1551449	0.0134611	0.0043349	0.0019165	S2AP
13	A293	A270	Hangleton Lane	23106	0.9662858	0.0337142	0.8374015	0.1188436	0.0144984	0.0191725	0.010084	S2AP
14	A270	A2038	A2023	22025	0.990193	0.009807	0.8342792	0.1471056	0.0076731	0.0021793	0.0087628	D2AP
15	A259	A2010	A23	31484	0.9852306	0.0147694	0.849225	0.1315906	0.0125143	0.0022869	0.0043832	D2AP
16	A23	Church Hill	A27 spur	24397	0.9821699	0.0178301	0.8357175	0.1374349	0.0133213	0.0044678	0.0090585	D3AP
17	A270	A270 Fork	A27	20601	0.9834474	0.0165526	0.7843309	0.1633901	0.0126207	0.0039318	0.0357264	D2AP
18	A23	A23 St Peter's Place	A270	10598	0.9790527	0.0209473	0.7601434	0.1726741	0.0178336	0.0032082	0.0461408	D2AP
19	A270	A270 Upper Lewes Road	A23 St. Peters Place	14454	0.9843642	0.0156358	0.7523177	0.1823025	0.0146672	0.0009686	0.049744	S2AP
20	A23	A270	A23	11549	0.9786129	0.0213871	0.7967789	0.1603602	0.0162785	0.0051953	0.0213871	S2AP
21	A23	A270	A23	14275	0.9819965	0.0180035	0.808056	0.1536252	0.014711	0.0032925	0.0203152	S2AP
22	A259	A23	B2137	19951	0.9899253	0.0100747	0.8405092	0.1290662	0.0085209	0.0015037	0.0204	S2AP
23	A259	LA Boundary	B2194	17367	0.9657396	0.0342604	0.7752634	0.1778661	0.0279841	0.0062763	0.0126101	S2AP
24	A23	A259	A23 merge	9685	0.9712958	0.0287042	0.7368095	0.179556	0.0255034	0.0032008	0.0549303	S2AP
25	A23	A259	A23 merge	9685	0.9712958	0.0287042	0.7368095	0.179556	0.0255034	0.0032008	0.0549303	D2AP
26	A23	A23 Marlborough Place	A23 St Georges Place	12903	0.9786096	0.0213904	0.7358754	0.1362474	0.0170503	0.0042626	0.1065644	D2AP
27	A23	A23 Marlborough Place	A23 Richmond Place	13581	0.9792357	0.0207643	0.7842574	0.1909285	0.0170827	0.0036816	0.0040498	S2AP
28	A23	A23 St George's Place	A23 Richmond Place	12004	0.9775075	0.0224925	0.772076	0.1454515	0.0179107	0.0045818	0.05998	S2AP
29	A23	A23 Gloucester Place	A23 St Peter's Place	7912	0.9766178	0.0233822	0.6916077	0.1315723	0.0182002	0.0050556	0.1535642	D2AP
30	A23	A23 Grand Parade	A270 Lewes Road	19021	0.9801798	0.0198202	0.7999579	0.161716	0.0161926	0.003575	0.0185584	D2AP
31	A23	A23 York Place	A23 Richmond Place	10790	0.9849861	0.0150139	0.8392956	0.1273401	0.0119555	0.0029657	0.018443	D2AP

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 17 DfT Traffic Flow Site Data 2012 (Sheet 2 of 4)

Brighton and Hove DfT Traffic Flow Site Data 2012 (Sheet 2 of 4)								
Ref No	Road	StartJunction	EndJunction	2-way/1-way/bus lane	Data Type	Road Class	RC	Speed Limit (mph)
1	A23	A23 Old Steine roundabout	A23 Gloucester Place/Grand Parade	2-way	URBAN	8	2	30
2	A2010	A259	A270	2-way	URBAN	8	3	30
3	A2023	A259 KINGSWAY	A270	2-way	URBAN	7	3	30
4	A270	A2010	A270	2-way	URBAN	7	2	30
5	A270	A293	A2038	2-way	URBAN	7	1	30
6	A259	B2194	A2023	2-way	URBAN	7	1	30
7	A2038	A270	A2023	2-way	URBAN	7	3	30
8	A270	A23	A270 Lewes Road	2-way	URBAN	8	4	30
9	A270	A2023	A2010	2-way	URBAN	7	2	30
10	A2023	A270	A2038	2-way	URBAN	7	4	30
11	A259	A2023	A2010	2-way	URBAN	7	1	30
12	A2038	A2023	A27	2-way	RURAL	1	1	40
13	A293	A270	Hangleton Lane	2-way	URBAN	7	1	50
14	A270	A2038	A2023	2-way	URBAN	7	1	30
15	A259	A2010	A23	2-way	URBAN	8	0	30
16	A23	Church Hill	A27 spur	2-way	RURAL	3	1	50
17	A270	A270 Fork	A27	2-way	URBAN	7	1	30
18	A23	A23 St Peter's Place	A270	2-way	URBAN	8	3	30
19	A270	A270 Upper Lewes Road	A23 St. Peters Place	2-way	URBAN	8	2	30
20	A23	A270	A23	1 way	URBAN	8	3	30
21	A23	A270	A23	1 way	URBAN	8	2	30
22	A259	A23	B2137	2-way	URBAN	7	1	30
23	A259	LA Boundary	B2194	2-way	URBAN	7	2	30
24	A23	A259	A23 merge	1 way	URBAN	8	3	30
25	A23	A259	A23 merge	1 way	URBAN	8	3	30
26	A23	A23 Marlborough Place	A23 St Georges Place	2-way	URBAN	8	2	30
27	A23	A23 Marlborough Place	A23 Richmond Place	1 way	URBAN	8	2	30
28	A23	A23 St George's Place	A23 Richmond Place	1 way	URBAN	8	3	30
29	A23	A23 Gloucester Place	A23 St Peter's Place	2-way	URBAN	8	3	30
30	A23	A23 Grand Parade	A270 Lewes Road	2-way	URBAN	8	1	30
31	A23	A23 York Place	A23 Richmond Place	2-way	URBAN	8	3	30

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 18 DfT Traffic Flow Site Data 2012 (Sheet 3 of 4)

Brighton and Hove DfT Traffic Flow Site Data 2012 (Sheet 3 of 4)												
	Road	StartJunction	EndJunction	AllMotorVehicles	%Lights	%Heavy	% Car	% LGV	%OGV1	%OGV2	%PSV	Type
32	A259	B2137 Arundel Rd, Brighton	B2123 High Dt, Rottingdean	24327	0.9847906	0.0152094	0.8407942	0.1257451	0.0118387	0.0033707	0.0182513	D2AP
33	A259	B2123 High St, Rottingdean	LA Boundary	24378	0.9810895	0.0189105	0.8202067	0.1436951	0.0127164	0.0062351	0.0171466	WS2+1
34	A23	Stanford Avenue	Church Hill	23195	0.9827118	0.0172882	0.8221599	0.144557	0.0117698	0.0054322	0.0160811	WS2+1
35	A293	Hangleton Lane	A27	21025	0.9662782	0.0337218	0.8374316	0.1188109	0.0145065	0.0191677	0.0100832	S2AP
36	A270	A270-New England Road	A23 London Road	9020	0.9797118	0.0202882	0.7956763	0.1797118	0.0157428	0.0045455	0.0043237	S2AP
37	A23	A270-Upper Lewes Road	A270	9681	0.9792377	0.0207623	0.8109699	0.1591778	0.0179733	0.002789	0.00909	WS2+1
38	A270	A23	A270	13897	0.9832338	0.0167662	0.7926891	0.1863712	0.0138879	0.0028783	0.0041736	S2AP
39	A270	A270	A23	14831	0.9834131	0.0165869	0.7905064	0.1902771	0.0149012	0.0016857	0.0026296	S2AP
40	A270	A293	A293	26739	0.9746812	0.0253188	0.8373911	0.1287258	0.0154456	0.0098358	0.0086017	D2AP
41	A270	LA Boundary	A293	22625	0.9820552	0.0179448	0.8483536	0.128663	0.0119337	0.0059669	0.0050829	D2AP
42	A293	A270	A259	18679	0.9672359	0.0327641	0.8290058	0.1264522	0.0161144	0.0165962	0.0118315	S2AP
43	B2066 (Western Road)	The Drive	Montpelier Road	10251	0.9922934	0.0077066	0.7426593	0.1437908	0.0068286	0.0009755	0.1057458	S2AP
44	C (Warren Road)	A270	Bear Road	7757	0.9883976	0.0116024	0.8411757	0.1242748	0.0105711	0.0009024	0.0230759	S2AP
45	C (Dyke Road Avenue)	A2038	A270	21754	0.988324	0.011676	0.8409028	0.1437896	0.0100211	0.0017008	0.0035855	S2AP
46	C (Stanford Avenue)	A23	Ditchling Road	2932	0.9890859	0.0109141	0.813779	0.1678035	0.0102319	0.0006821	0.0075034	S2AP
47	U (Hythe Road)	Lowther Road	Ditchling Road	725	0.9958621	0.0041379	0.8275862	0.1668966	0.0041379	0	0.0013793	S2AP
48	U (Brownleaf Road)	B2123 Falmer Road	Broad Green	293	0.996587	0.003413	0.8737201	0.1228669	0.003413	0	0	S2AP
49	U (Elrington Road)	Hove Park Road	The Droeway	486	0.9958848	0.0041152	0.9135802	0.0823045	0.0041152	0	0	S2AP
50	U (Saltdean Park Road)	A259	Arundel Drive West	1218	0.9934319	0.0065681	0.8448276	0.1313629	0.0073892	0	0.0164204	S2AP
51	U (Barrhill Avenue)	Warmdene Avenue	Craignair Avenue	753	0.9907039	0.0092961	0.7051793	0.2018592	0.0092961	0.001328	0.0823373	S2AP
52	U (Ladies Mile Road)	Warmdene Road	Dale Crescent	1799	0.9977765	0.0022235	0.8610339	0.1245136	0.0022235	0	0.012229	S2AP
53	U (Channel View Road)	Warren Road	Warren Rise	575	0.9826087	0.0173913	0.8173913	0.1652174	0.0173913	0	0	S2AP
54	U (Gladstone Road)	Gardner Road	B2193 Church Road	2069	0.9927501	0.0072499	0.8308362	0.1594973	0.0072499	0	0.0024166	S2AP
55	U (Stafford Road)	Port Hall Road	Buxton Road	286	1	0	0.7762238	0.2237762	0	0	0	S2AP
56	U (Lenham Avenue)	Chorley Avenue	Saltdean Drive	821	0.9975639	0.0024361	0.8416565	0.1559074	0.0024361	0	0	S2AP
57	U (Second Avenue)	A259 KINGSWAY	Western Road	2004	0.993014	0.006986	0.8053892	0.1871257	0.006986	0.000499	0	S2AP
58	U (Northeast Drive)	Hangleton Way	Poplar Avenue	1968	0.9933943	0.0066057	0.8206301	0.1072154	0.0066057	0	0.0655488	S2AP
59	U (Chalfont Drive)	Dyke Road Avenue	Dyke Road Avenue	132	1	0	0.9848485	0.0151515	0	0	0	S2AP
60	U (Crescent Drive South)	Downs Valley Road	Cowley Drive	1174	0.9948893	0.0051107	0.8875639	0.1056218	0.0051107	0	0.0017036	S2AP
61	U (Buckingham Road)	Leopold Road	Albert Road	1307	0.9961744	0.0038256	0.8439174	0.1484315	0.0045907	0	0.0030604	S2AP
62	U (Old London Road)	Ladies Mile Road	A23 London Road	2590	0.9965251	0.0034749	0.8544402	0.1409266	0.0030888	0.0003861	0.0011583	S2AP
63	U (Danehill Road)	Wilson Avenue	Ticehurst Road	248	0.9879032	0.0120968	0.7782258	0.2016129	0.0120968	0	0.0080645	S2AP

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 19 DfT Traffic Flow Site Data 2012 (Sheet 4 of 4)

Brighton and Hove DfT Traffic Flow Site Data 2012 (Sheet 4 of 4)								
Ref No	Road	StartJunction	EndJunction	2-way/1-way/bus lane	Data Type	Road Class	RC	Speed Limit (mph)
32	A259	B2137 Arundel Rd, Brighton	B2123 High Dt, Rottingdean	2-way	RURAL	2	1	50
33	A259	B2123 High St, Rottingdean	LA Boundary	2-way with Bus Lane WB	URBAN	7	1	30
34	A23	Stanford Avenue	Church Hill	2-way with Bus Lane SB	URBAN	7	1	40
35	A293	Hangleton Lane	A27	2-way	RURAL	1	1	NS
36	A270	A270-New England Road	A23 London Road	2-way	URBAN	8	3	30
37	A23	A270-Upper Lewes Road	A270	2-way, 1 lane N	URBAN	8	3	30
38	A270	A23	A270	1 way	URBAN	8	2	30
39	A270	A270	A23	2-way	URBAN	8	2	30
40	A270	A293	A293	2-way	URBAN	7	1	30
41	A270	LA Boundary	A293	2-way	URBAN	7	1	40
42	A293	A270	A259	2-way	URBAN	7	1	20
43	B2066 (Western Road)	The Drive	Montpelier Road	2-way	URBAN	8	3	30
44	C (Warren Road)	A270	Bear Road	2-way	RURAL	1	3	40
45	C (Dyke Road Avenue)	A2038	A270	2-way	URBAN	7	1	30
46	C (Stanford Avenue)	A23	Ditchling Road	2-way	URBAN	7	4	30
47	U (Hythe Road)	Lowther Road	Ditchling Road	2-way	URBAN	7	4	30
48	U (Brownleaf Road)	B2123 Falmer Road	Broad Green	2-way	URBAN	7	4	30
49	U (Elrington Road)	Hove Park Road	The Drove	2-way	URBAN	7	4	30
50	U (Saltdean Park Road)	A259	Arundel Drive West	2-way	URBAN	7	4	30
51	U (Barrhill Avenue)	Warmdene Avenue	Craignair Avenue	2-way	URBAN	7	4	30
52	U (Ladies Mile Road)	Warmdene Road	Dale Crescent	2-way	URBAN	7	4	30
53	U (Channel View Road)	Warren Road	Warren Rise	2-way	URBAN	7	4	30
54	U (Gladstone Road)	Gardner Road	B2193 Church Road	2-way	URBAN	7	4	30
55	U (Stafford Road)	Port Hall Road	Buxton Road	2-way	URBAN	7	4	30
56	U (Lenham Avenue)	Chorley Avenue	Saltdean Drive	2-way	URBAN	7	4	30
57	U (Second Avenue)	A259 KINGSWAY	Western Road	2-way	URBAN	7	4	30
58	U (Northeast Drive)	Hangleton Way	Poplar Avenue	2-way	URBAN	7	4	30
59	U (Chalfont Drive)	Dyke Road Avenue	Dyke Road Avenue	2-way	URBAN	7	4	30
60	U (Crescent Drive South)	Downs Valley Road	Cowley Drive	2-way	URBAN	7	4	30
61	U (Buckingham Road)	Leopold Road	Albert Road	2-way	URBAN	7	4	30
62	U (Old London Road)	Ladies Mile Road	A23 London Road	2-way	URBAN	7	4	30
63	U (Danehill Road)	Wilson Avenue	Ticehurst Road	2-way	URBAN	7	4	30

Brighton & Hove Permit Scheme – Cost Benefit Analysis

5 DELAY MODELLING

5.1 DELAY MODELLING METHODOLOGY

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

- (a) live site measured method; and
- (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;

and 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 in to 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 released in January 2014 Version 4 release 12 will be used for the CBA. The QUADRO Manual is included in the Design Manual for Roads and Bridges Volume 14 Economic Assessment of Road Maintenance DfT 2002.

5.2 THE VALUATION OF COSTS IN QUADRO

5.2.1 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 3.5.6 and is shown in Table 20 and 21 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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 20 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	Perceived	Market
	Cost	Cost	Price
Car driver	22.74	22.74	27.06
Car passenger	17.25	17.25	20.52
LGV (driver or passenger)	10.24	10.24	12.18
OGV (driver or passenger)	12.06	12.06	14.35
PSV driver	12.32	12.32	14.66
PSV passenger	13.97	13.97	16.63
Taxi driver	10.89	10.89	12.96
Taxi / Minicab passenger	21.96	21.96	26.13
Rail passenger	26.86	26.86	31.96
Underground passenger	22.08	22.08	26.28
Walker	17.54	17.54	20.88
Cyclist	17.47	17.47	20.78
Motorcyclist	19.42	19.42	23.11
Average of all working persons	22.75	22.75	27.07

Values of Non-Working Time by Trip Purpose (£ per hour, 2010 prices, 2010 values)			
Trip Purpose	Resource	Perceived	Market
	Cost	Cost	Price
Commuting	5.72	6.81	6.81
Other	5.08	6.04	6.04

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 21 WebTAG - Value of Time per Vehicle per hour

Table A 1.3.5: Market Price Values of Time per Vehicle based on distance travelled (£ per hour, 2010 prices and 2010 values)								
Vehicle Type	Journey Purpose	Weekday					Weekend	All Week
		7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average		
Car	Work	31.56	30.81	30.34	30.58	30.99	32.54	30.99
	Commuting	7.83	7.77	7.65	7.66	7.71	7.72	7.71
	Other	10.06	10.46	10.74	10.48	10.49	11.61	10.90
	Average Car	12.92	14.20	12.03	11.93	12.98	11.95	12.73
LGV	Work (freight)	14.62	14.62	14.62	14.62	14.62	15.35	14.62
	Commuting & Other	9.15	9.15	9.15	9.15	9.15	12.72	9.15
	Average LGV	13.96	13.96	13.96	13.96	13.96	15.03	13.96
OGV1	Working	14.35	14.35	14.35	14.35	14.35	14.35	14.35
OGV2	Working	14.35	14.35	14.35	14.35	14.35	14.35	14.35
PSV (Occupants)	Work	22.57	18.72	22.57	26.22	21.56	17.70	22.57
	Commuting	24.93	9.22	30.41	31.66	21.19	5.32	24.93
	Other	48.74	64.08	43.88	41.44	52.43	67.84	48.74
	Total	96.24	92.02	96.86	99.32	95.18	90.86	94.06

5.2.2 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 22 and 23 below.

Values for 2010 VOC are shown in Table 24 below.

Carbon emissions are considered in terms of the change in the equivalent tonnes of carbon Table 25 and estimated from fuel consumption Table 26 below.

Table 22 Taxation Rates Base

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 23 Changes to Taxation Rates % Petrol

CHANGES TO TAXATION RATES (%) PETROL						
AVERAGE FINAL	FUEL		NON-FUEL		FROM YEAR	TO YEAR
	FINAL	INTER	FINAL	INTER		
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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 24 Changes to Taxation Rates % Diesel

CHANGES TO TAXATION RATES (%) DIESEL						
AVERAGE	FUEL		NON-FUEL		FROM	TO
	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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 25 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
	Non-Work	7.213	0.000
	Average	7.213	41.458
OGV1	Work	6.714	263.817
OGV2	Work	13.061	508.525
PSV	Work	30.461	694.547

Table 26 WebTAG – Carbon dioxide emissions per litre of fuel burnt / kWh used

Table A 3.4: Non Traded Values, £ per Tonne of CO2e (2010 prices)			
Year	Low	Central	High
2010	27.06	54.12	81.18
2011	27.46	54.93	82.39
2012	27.88	55.75	83.63
2013	28.29	56.59	84.88
2014	28.72	57.44	86.16
2015	29.15	58.30	87.45
2016	29.59	59.17	88.76
2017	30.03	60.06	90.09
2018	30.48	60.96	91.44
2019	30.94	61.88	92.82
2020	31.40	62.81	94.21

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 27 WebTAG – Fuel consumption parameter values

Table A 1.3.8: Fuel consumption parameter values (litres per km, 2010)				
Parameters				
Vehicle Category	a	b	c	d
Petrol Car	0.96402	0.04145	0.00005	2.01346E-06
Diesel Car	0.43709	0.05862	0.00052	4.12709E-06
Petrol LGV	1.55646	0.06425	0.00074	1.00552E-05
Diesel LGV	1.04527	0.05790	0.00043	8.02520E-06
OGV1	1.47737	0.24562	0.00357	3.06380E-05
OGV2	3.39070	0.39438	0.00464	3.59224E-05
PSV	4.11560	0.30646	0.00421	3.65263E-05
Energy consumption parameter values (kWh per km, 2011)				
Electric Car	0.12564			
Electric LGV				
Electric OGV1				
Electric OGV2				
Electric PSV				

5.2.3 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 28 and 29 below. Accident values increase in line with GDP as shown in Table 30 below. Accident rates are calculated with and without works, combined link and junction rates are used in QUADRO,

Table 31 shows accident rates for 15 road types without works and Table 32 shows accident rates for each type and traffic management layout. Local data can be used only if available for both the without and with works in this CBA these default values are used.

Table 33 shows the number of casualties per accident.

Table 28 WebTAG – Cost per Casualty

Cost per Casualty	
Severity	Cost £
Fatal	1,645,822
Serious	184,944
Slight	14,257

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 29 WebTAG – Cost per Accident

Cost per Accident							
Severity	Insurance Administration	Damage to Property			Police Cost		
		Urban	Rural	Motorway	Urban	Rural	Motorway
Fatal	302	7,870	13,347	16,978	16,977	17,433	17,636
Serious	188	4,218	6,085	14,487	1,875	2,341	2,472
Slight	114	2,488	4,033	7,329	485	665	554
Damage	54	1,779	2,660	2,556	36	20	17

Table 30 WebTAG – Accident Growth Rates

Annual Rates of Growth of Accident Values	
Range of Years	Growth Rate (% p.a.)
2002 - 2003	3.54
2003 - 2004	2.67
2004 - 2005	2.56
2005 - 2006	2.16
2006 - 2007	2.75
2007 - 2008	-1.44
2008 - 2009	-5.77
2009 - 2010	0.89

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 31 WebTAG – Accident Without Works

Combined Link / Junction: Accident Rates and Change Factors 2000 Base				
Road Type	Speed Limit (mph)	Accident Rate	Beta Factor	Road Description
1	50/60/70	0.098	1.001	Motorways
2	50/60/70	0.098	1.001	Motorways
3	50/60/70	0.098	1.001	Motorways
4	30/40	0.844	0.984	Modern S2 Roads
4	>40	0.293	0.973	Modern S2 Roads
5	30/40	0.844	0.984	Modern S2 Roads with HS
5	>40	0.232	0.973	Modern S2 Roads with HS
6	30/40	0.844	0.984	Modern WS2 Roads
6	>40	0.190	0.973	Modern WS2 Roads
7	30/40	0.844	0.984	Modern WS2 Roads w. HS
7	>40	0.171	0.973	Modern WS2 Roads w. HS
8	30/40	0.844	0.984	Older S2 A Roads
8	>40	0.381	0.973	Older S2 A Roads
9	30/40	0.844	0.983	Other S2 Roads
9	>40	0.404	0.998	Other S2 Roads
10	30/40	1.004	0.984	Modern D2 Roads
10	>40	0.174	0.973	Modern D2 Roads
11	30/40	1.004	0.984	Modern D2 Roads with HS
11	>40	0.131	0.973	Modern D2 Roads with HS
12	30/40	1.004	0.984	Older D2 Roads
12	>40	0.226	0.973	Older D2 Roads
13	30/40	1.004	0.984	Modern D3+ Roads
13	>40	0.174	0.973	Modern D3+ Roads
14	30/40	1.004	0.984	Modern D3+ Roads w. HS
14	>40	0.131	0.973	Modern D3+ Roads w. HS
15	30/40	1.004	0.984	Older D3+ Roads
15	>40	0.226	0.973	Older D3+ Roads

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 32 WebTAG – Accident With Works

Combined Link / Junction: Accident Rates and Change Factors 2000 Base				
Road Type	Speed Limit (mph)	Accident Rate	Beta Factor	Road Description
16	direction with crossovers	0.130	1.001	D2M
17	direction with lane closure only	0.150	1.001	D2M
18	direction with crossovers	0.130	1.001	D3M
19	direction with lane closure only	0.150	1.001	D3M
20	direction with crossovers	0.130	1.001	D4M
21	direction with lane closure only	0.150	1.001	D4M
22	shuttle working	2.296	0.984	S2 Roads 30/40
22		1.036	0.973	S2 Roads >40
23	lane closure	2.296	0.984	S2 Roads 30/40
23		1.036	0.973	S2 Roads >40
24	shuttle working	2.296	0.984	WS2 Roads 30/40
24		1.036	0.973	WS2 Roads >40
25	lane closure	2.296	0.984	WS2 Roads 30/40
25		1.036	0.973	WS2 Roads >40
28	direction with crossovers	1.788	0.984	D2 Roads 30/40
28		0.31	0.973	D2 Roads >40
29	direction with lane closure only	1.255	0.984	D2 Roads 30/40
29		0.217	0.973	D2 Roads >40
32	direction with crossovers	1.788	0.984	D3+ Roads 30/40
32		0.31	0.973	D3+ Roads >40
33	direction with lane closure only	1.255	0.984	D3+ Roads 30/40
33		0.217	0.973	D3+ Roads >40

Table 33 WebTAG – Casualties per P.I.A.

Combined Link / Junction: Casualty Rates					
Road Type	Speed Limit (mph)	Casualties per P.I.A.			Road Description
		Fatal	Serious	Slight	
1 – 3	50 / 60 / 70	0.022	0.1520	1.462	Motorways
4 – 8	30 / 40	0.0092	0.1392	1.157	S2 A Roads
4 – 8	>40	0.0436	0.2855	1.286	S2 A Roads
9	30 / 40	0.0075	0.1379	1.124	Other S2 Roads
9	>40	0.0262	0.2513	1.245	Other S2 Roads
10 – 15	30 / 40	0.0093	0.1253	1.222	Dual Carriageways
10 – 15	>40	0.0286	0.1861	1.314	Dual Carriageways

5.3 DELAY MODELLING IN QUADRO

5.3.1 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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

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.

5.3.2 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 34 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 34 Max-Q-Delay

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

5.3.3 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 35 below. Accident Rates were tabled earlier in Section 4.2.

Table 35 Breakdown Rates

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

5.4 TRAFFIC INPUT

5.4.1 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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

The main route is considered to be consistent along its length and no flow variations. A road class is specified as shown on Table 36 below to calculate a speed/flow relationship with default values shown on Table 37 and 38.

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 39 below. The work site type is defined by the number of lanes open or shuttle working as shown on Table 40 below that selects a default capacity.

QUADRO contains values for average duration of incidents and are shown on Table 41 below.

Table 36 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 37 Minimum Speeds

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 38 Speed/Flow

Default Speed/flow Parameters QUADRO									
CLASS	LIGHT-V (kph)	GRAD-A	GRAD-B	HEAVY-V	GRAD-A	GRAD-B	CHANGE	MINS	Qc
	kph	reduction (kph) per 1000 veh	reduction (kph) per 1000 veh	Kph	reduction (kph) per 1000 veh	reduction (kph) per 1000 veh	Factor or vph per lane	kph	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

Table 39 Geometric Parameters

Default Geometric Parameters QUADRO												
CLASS	TYPE	DESCRIPTION	CWID	HILLS	DEVEL	INT	BEND	MAXS	SWID	VWID	JUNC	VIS
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						

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 40 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
add 10	if layout features contra-flow working

Table 41 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

5.4.2 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.

5.4.3 Vehicles in Work Time and Vehicle Occupancies

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

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

Averages for weekdays and weekends, vehicles and journey types are shown on Table 42 below.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 42 WebTAG – Trip Proportions

Table A 1.3.4:		Proportion of travel in work and non-work time							Proportion of trips made in work and non-work time						
		Weekday					Weekend Average	All Week Average	Weekday					Weekend Average	All Week Average
Mode / Vehicle Type & Journey Purpose		7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average			7am – 10am	10am – 4pm	4pm – 7pm	7pm – 7am	Average		
		Percentage of Distance Travelled by Vehicles							Percentage of Vehicle Trips						
Car	Work	18.1	19.9	13.0	12.3	16.4	3.2	13.1	6.8	8.3	5.5	3.6	6.5	1.7	5.0
	Commuting	46.0	11.4	40.8	36.2	31.0	8.5	25.3	40.6	11.6	32.3	26.4	25.4	9.1	20.3
	Other	35.9	68.7	46.2	51.5	52.5	88.3	61.6	52.7	80.1	62.2	70.0	68.1	89.3	74.7
LGV	Work (freight)	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0
	Non – Work	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
OGV1	Work	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OGV2	Work	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Percentage of Distance Travelled by Occupants							Percentage of Person Trips						
Car	Work	15.4	13.8	10.2	9.9	12.6	2.0	9.2	5.2	2.2	4.1	1.2	4.7	1.1	3.4
	Commuting	38.3	8.1	32.2	29.1	23.9	5.1	18.0	33.3	15.6	25.8	10.9	20.0	6.4	15.2
	Other	46.4	78.1	57.6	61.0	63.5	92.9	72.7	61.5	82.2	70.1	87.9	75.3	92.5	81.4
PSV	Work	3.9	2.0	3.9	5.7	3.4	1.5	2.9	1.5	1.2	1.8	2.6	1.5	1.0	1.4
	Commuting	30.0	11.1	36.6	38.1	25.5	6.4	20.5	41.7	10.6	43.0	47.4	26.9	12.4	24.3
	Other	66.1	86.9	59.5	56.2	71.1	92.0	76.6	56.8	88.2	55.2	50.0	71.5	86.6	74.3

Brighton & Hove Permit Scheme – Cost Benefit Analysis

5.5 SITE SPECIFIC QUADRO INPUT DATA

5.5.1 Sample Site Data

The 63 sites shown on Tables 16 and 18 showed a good spread of data over the Brighton & Hove network.

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

In total 315 outputs were created and are provided in Appendix A. The Daily Cost of all sites was averaged for Rural and Urban roads by RC and excavation length and is shown on Table 43 and 44 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 45 below with the percentages matching the proportions of actual works shown in Table 10. This has been statistically verified at a 95% confidence level with a confidence interval of 4.86 for RC 0-2 and 4.95 for RC 3-4. A confidence interval within +/- 5% is considered to be reliable.

The samples used for the CBA were selected by ranking the 63 sites by impact and making the average cost of sites selected equal the mean. For example, for RC 0-2 Major Works 7 samples were required and 29 sites available, the mean cost was £68,009 for 7 days with a 10 metre site length. Ranking sites 2nd, 6th, 12th, 14th, 18th, 22nd, and 23rd were used with an average cost of £65,497. The sample sites were also proportioned by excavation length so that the percentages match the Halcrow study and are shown on Table 46 below.

The sample sites average duration for each work type was matched to the Halcrow Study as shown in Table 11. For example, for Major Works the average duration was 33 days, duration were run between 40 and 25 days and compares to values in the Halcrow Study. 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. For example for RC 0-2 Major Works a High forecast was derived by applying a duration of 40 days to 2nd, 6th and 12th ranking site and a Low forecast 40 days to 18th, 22nd and 23rd. The average of the two forecasts was used to obtain the Total Delay of Works. Summarised impacts are provided in Appendix B.

Table 43 Brighton & Hove Delay Modelling Daily Cost of Rural Works

Brighton & Hove							
Daily Cost of Rural Works (£) by Reinstatement Category and Length							
Reinstatement Category	Typical AADT	Average AADT	10m	30m	50m	100m	200m
0	<32,000	No Data					
1	16,000	22,916	24,653	24,659	38,844	57,561	68,409
2	12,000	No Data					
3	8,000	7,757	220	220	364	715	1,378
4	4,000	No Data					

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 44 Brighton & Hove Delay Modelling Daily Cost of Urban Works

Brighton & Hove							
Daily Cost of Urban Works (£) by Reinstatement Category and Length							
Reinstatement Category	Typical AADT	Average AADT	10m	30m	50m	100m	200m
0	40,000	31,484	570	645	720	974	1,369
1	24,000	22,290	12,001	12,052	17,212	26,191	33,913
2	16,000	14,538	1,455	1,494	2,432	4,949	9,466
3	10,000	10,117	201	238	344	605	1,132
4	6,000	1,746	34	34	56	111	214

Table 45 Brighton & Hove Work Samples

Brighton & Hove Work Samples				
Work Type	RC 0-2		RC 3-4	
	Sample Size	%	Sample Size	%
Major	7	2%	4	1%
Standard	31	9%	23	6%
Minor with Exc	203	59%	272	72%
Minor without Exc	34	10%	23	6%
Urgent	45	13%	38	10%
Special Urgent	0	0%	0	0%
Emergency	24	7%	19	5%
Totals	344		379	

Table 46 Brighton & Hove Delay Modelling Percentage of Works by RC and Excavation Length

Brighton & Hove CBA Percentages of Works by RC and Excavation Length							
RC		10m	30m	50m	100m	200m	Total Samples
RC 0-2	Sample Nos	293	5	16	14	16	344
	Sample %	85.2%	1.5%	4.7%	4.1%	4.7%	
	Halcrow Study %	84.7%	0.7%	5.2%	4.2%	5.2%	
RC 3-4	Sample Nos	323	20	13	13	9	379
	Sample %	85.2%	5.3%	3.4%	3.4%	2.4%	
	Halcrow Study %	86.8%	5.2%	3.2%	2.6%	2.1%	

5.6 MONETIZED COSTS AND BENEFITS

The socio-economic benefits derived from a 5% and 10% Permit Scheme reduction are shown for the opening year in summary on Table 47.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

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

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

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

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 47 Brighton & Hove Monetized Costs and Benefits

Brighton and Hove Sample Sites QUADRO Results Summary			
Delay Modelling Totals			
	Total Impact	Consumer Vehicle Operating Cost	Consumer Travel Time Cost
High	£ 157,130,156	£ 6,420,214	£ 91,443,363
Low	£ 118,248,999	£ 4,773,238	£ 70,679,651
Average	£ 137,689,577	£ 5,596,726	£ 81,061,507
Cost Saving 5%	£ 6,884,479	£ 279,836	£ 4,053,075
Cost Saving 10%	£ 13,768,958	£ 559,673	£ 8,106,151
	Business Vehicle Operating Cost	Business Travel Time Total	PSP Bus & Coach Operating Cost
High	£ 2,535,020	£ 69,872,490	£ 794,313
Low	£ 1,782,743	£ 52,745,383	£ 708,860
Average	£ 2,158,882	£ 61,308,936	£ 751,586
Cost Saving 5%	£ 107,944	£ 3,065,447	£ 37,579
Cost Saving 10%	£ 215,888	£ 6,130,894	£ 75,159
	Total Business	Accident Cost	Carbon
High	£ 73,201,823	£ 1,053,019	£ 1,110,542
Low	£ 55,236,985	£ 987,847	£ 827,543
Average	£ 64,219,404	£ 1,020,433	£ 969,043
Cost Saving 5%	£ 3,210,970	£ 51,022	£ 48,452
Cost Saving 10%	£ 6,421,940	£ 102,043	£ 96,904

Brighton & Hove Permit Scheme – Cost Benefit Analysis

6 PERMIT SCHEME OPERATION

6.1 INTRODUCTION

This section assesses the process tasks required to establish and operate the Brighton & Hove Permit Scheme. It will consist of the following sections:

- Fees Matrix, presentation of anticipated Permit applications by type
- Scheme Costs, presentation of staff costs associated with the level of Permit variations

6.2 FEES MATRIX

The fees matrix is a DfT prescribed format for presenting the volume and type of Permit applications and anticipated variations. The estimated number of Permits by type was provided by Brighton & Hove City Council and is shown on Table 48 below. The Fees Matrix is attached in Appendix C.

Table 48 Utility Permit Volume before Scheme opening

Brighton & Hove Permit Volumes						
Work Type	RC 0-2		RC 3-4		Total Volume	
	Number	%	Number	%	Number	%
Major	35	2%	102	1%	137	1%
Standard	213	9%	639	6%	852	6%
Minor with Exc	1,323	59%	8,248	72%	9,571	70%
Minor without Exc	215	10%	739	6%	954	7%
Urgent	296	13%	1,159	10%	1,455	11%
Special Urgent	-	0%	-	0%	-	0%
Emergency	168	7%	578	5%	746	5%
Totals	2,250	16%	11,465	84%	13,715	

The Utility Permit volumes by road categories are shown in Table 49 and Table 50 and with costings based upon statutory fee rates outlined in Table 8.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 49 Permit Volume on Category 0-2 roads

Category 0-2 and Traffic Sensitive Streets					
Activity Type	Estimated No. of Permits	Cost per Permit	Estimated No. of Permit Variations	Cost per Permit Variation	Total Cost per Activity Type
Provisional Advance Authorisation	42	156	N/A	N/A	6,554
Major	41	316	8	45	13,254
Standard	241	183	24	45	45,165
Minor	1,742	88	87	45	157,960
Immediate	526	63	26	45	34,363
Sub Total	2,592	N/A	146	45	257,297

Table 50 Permit Volume on Category 3-4 roads

Category 3-4 Non-Traffic Sensitive Streets					
Activity Type	Estimated No. of Permits	Cost per Permit	Estimated No. of Permit Variations	Cost per Permit Variation	Total Cost per Activity Type
Provisional Advance Authorisation	122	89	N/A	N/A	10,852
Major	115	157	23	35	18,937
Standard	740	71	74	35	55,528
Minor	10,384	34	519	35	374,754
Immediate	2,010	40	101	35	83,261
Sub Total	13,372	N/A	717	35	543,333

Permit fees are excluded from Public Accounts reporting in line with the DfT guidance. The volume of Utility Permit by road type will fall by 5% across all road types.

6.3 SCHEME COSTS

There are two elements to the Permit Scheme costs:

- Start-up costs; and
- Ongoing costs.

6.3.1 Start-up costs

The one-off costs required to establish the Permit Scheme were set at £112,600 by Brighton & Hove City Council. See Table 51 below.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 51 Scheme set up costs

Scheme Set-up Costs		
Start up Cost Centre	Set-up (recovered from future fees)	Year 1 +
Consultancy	£45,000	
KPI Production		£25,000
Invoicing		£65,000
IT system	£20,000	
IT support		£25,000
Unauthorised / Abandoned works		£60,000
Management Overhead		£40,000
Training	£20,000	
Staff	£20,000	£580,000
Set-up costs recovery		£37,500
IT Capital Expenditure Adjustment	£7,600	
Totals	£112,600	£832,500

The 'IT Capital expenditure adjustment' is a provision calculated by applying the 'risk bias factor' outlined in section 4.4 to the purchase of the IT system. The operational policy outlined in Table 9 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 Permit Scheme becomes operational.

1.1.1 Operational costs

The Permit Scheme required three specific job roles:

- Street Works Officers;
- Street Works Co-ordinators; and
- Traffic Managers.

The overall staffing costs of Permit Scheme operation are based on information from Brighton & Hove City Council and statutory rates and are outlined in Table 52.

Table 52 Staff Costing

Staff Costing			
Personnel Type	Annual Salary	Final Hourly Rate	Total Annual Cost
Street Works Officer	£ 24,793	£ 31.77	£ 48,633.95
Street Works Coordinator	£ 31,074	£ 39.81	£ 60,954.76
Traffic Manager	£ 44,610	£ 57.16	£ 87,506.98

National Insurance (%)	7.7
Pension (superannuation) (%)	14.9
Working hours/annum	1531
Employee Overhead Rate	1.6

Brighton & Hove Permit Scheme – Cost Benefit Analysis

The breakdown of costing per task for each of the three grades of Permit Scheme workers is shown in Table 53 below.

Table 53 Breakdown of Employer Costing per Permit Task

Employee Costing per Permit Task						
Category 0-2 and Traffic Sensitive Streets						
Street Works Officers						
	PAA	Major	Standard	Minor	Immediate	TOTAL
Hours per Permit	0.63	1.82	1.21	0.66	0.38	4.70
Total Permits	42	41	241	1742	526	2592
Total Hours	26	74	291	1150	202	12178
No. of Posts Required	0.02	0.05	0.19	0.75	0.13	1.14
Employee Costs	£838	£2,358	£9,245	£36,531	£6,414	£55,386
Street Works Coordinators						
	PAA	Major	Standard	Minor	Immediate	TOTAL
Hours per Permit	1.41	2.60	1.54	0.67	0.67	6.89
Total Permits	42	41	241	1742	526	2592
Total Hours	59	106	372	1160	350	17848
No. of Posts Required	0.04	0.07	0.24	0.76	0.23	1.34
Employee Costs	£2,359	£4,227	£14,797	£46,190	£13,933	£81,506
Traffic Managers						
	PAA	Major	Standard	Minor	Immediate	TOTAL
Hours per Permit	1	1	1	0	0	3
Total Permits	42.00	40.80	241.20	1742.40	525.60	2592.00
Total Hours	£29	£52	£151	£358	£74	£7,597
No. of Posts Required	0.02	0.03	0.10	0.23	0.05	0.43
Employee Costs	£1,657	£2,960	£8,609	£20,457	£4,230	£37,915
Category 3-4 Non-Traffic Sensitive Streets						
Street Works Officers						
	PAA	Major	Standard	Minor	Immediate	TOTAL
Hours per Permit	0.60	0.91	0.57	0.39	0.44	2.91
Total Permits	122	115	740	10384	2010	13372
Total Hours	74	105	420	4006	879	38844
No. of Posts Required	0.05	0.07	0.27	2.62	0.57	3.58
Employee Costs	£2,346	£3,336	£13,328	£127,266	£27,934	£174,210

The overall costs associated with the operation of the Permit Scheme are summarised in Table 54 below.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 54 Staff costing summary

Total Number of Employees and Costs		
Personnel Type	No.	Salaries
Street Works Officers	2.68	£229,596
Street Works Coordinators	2.09	£238,898
Traffic Managers	0.90	£90,200
TOTAL	5.68	£558,695

With the addition of a provision for the cost of Permit variations, the final Permit Scheme cost is shown in Table 55.

Table 55 Permit Scheme costing summary

Permit Scheme Cost Breakdown	
Cost Type	Cost
Permit Application Employee Costs	£ 558,695
Permit Application Operational Factor Costs	£ 195,543
Total Permit Application Costs	£ 754,238

Permit Variation Employee Costs	£ 20,567
Permit Variation Operational Factor Costs	£ 11,075
Total Permit Variation Application Costs	£ 31,642

TOTAL PERMIT SCHEME COSTS	£785,880
----------------------------------	-----------------

7 FINANCIAL CALCULATIONS

7.1 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.

7.2 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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

7.2.1 Revenue

For the purposes of this Cost Benefit Analysis, the Permit fee income is calculated by the multiplication of the estimated Permit fee volume and the average Permit fee, which is derived using the maximum permit fee structure as shown on Table 8. The full cost of the Scheme in the opening year is comprised of the set up costs and the Scheme operating costs summarized in Tables 56 and 62. The average cost-recovery price of Permits is generated by dividing the total cost in the opening year by the estimated number of Permit volumes at the start of the year. The number of Permits in the opening month is a monthly pro-rata value based upon the estimated number of Permits in the opening year along with the 20% uplift for phased works. The Permit Scheme is scheduled to become fully operational in the opening month of the opening year of the assessment and from the second and subsequent months, the 5% reduction in Permit volume will come into effect.

7.2.2 Operating costs

The operating costs for the Scheme are comprised of:

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

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

The Operational Costs of £67,792 (5%) and £67,656 (10%) in the first month are a pro-rata apportionment of the opening year total of £806,593 (5%) and £798,041 (10%) contained within Tables 57 and 63.

It has been assumed (Table 7 Model Variable specification) that half of the percentage reduction in Permit volume would be applied to the Scheme costs giving a 2.5% reduction. The full reduction is applied for costs starting in the second year, with a pro-rata increase throughout the opening year.

Non recoverable costs for Highway permits for the Council's on schemes has been included as an administration charge and is carried out by a Highway Administrative Officer based on approximately 5 minute extra administrative time for each work requiring a permit:

Salary - £18,500 per annum and 1,628 hours worked per year.

With pensions and overheads etc this equates to £22 per hour.

$£22 / 60\text{mins} \times 5\text{mins} = £1.83$ of cost per Permit Application.

Financial calculations for year 2 to 25 are shown on Table 58 to 61 (5% saving) and 64 to 67 (10% saving).

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 56 Financial Calculations 5% Reduction in Works Annual Cost

Brighton and Hove Financial Calculations 5% Reduction in Street Works											
	Opening	Closing Values									
Annual Cost of Permit 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
Reduction Factor less Permit flex		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Permit Costs	785,880	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Recovery of set-up costs	112,600	37,533	37,533	37,533	-	-	-	-	-	-	-
Annual Cost For Recovery	-	814,860	803,766	803,766	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Cost Recovery Price Permit fee income	-	1,087,719	764,078	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Cost Recovery Price Permit fee income (prior year data)	-	51.06	23.16	38.00	37.90	36.13	36.13	36.13	36.13	36.13	36.13
(Over) / under-recovery £	-	272,858	39,688	37,533	-	-	-	-	-	-	-
(Over) / under-recovery £ (prior year)	-	272,858	39,688	37,533	-	-	-	-	-	-	-
Annual Cost Highway permits (non recoverable)	29,267	29,267	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803
Annual Income Max Permit Fee	851,644	832,127	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353
Overall Scheme Cost	815,146	493,374	805,921	803,766	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Profit/Loss	36,498	338,753	24,433	26,587	64,120	64,120	64,120	64,120	64,120	64,120	64,120

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 57 Financial Calculations 5% Reduction in Works First Year Cost

Financial Calculations 5% Reduction in Street Works	Year	Year-1											
	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
Permit Cost	65,490	65,354	65,228	65,114	65,009	64,912	64,824	64,743	64,669	64,601	64,539	64,481	63,853
Permit Volumes	-	1,860	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	51.06	51.06	51.06	51.06	51.06	51.06	51.06	51.06	51.06	51.06	51.06	51.06
Multiplied by number of Permits	-	94,997	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247
Income derived on Cost recovery basis	-	94,997	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247	90,247
Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	70,970	70,970	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196
Permit Scheme - Operational Costs	-	67,792	67,667	67,553	67,448	67,351	67,263	67,182	67,108	67,040	66,977	66,920	66,292

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 58 Financial Calculations 5% Reduction in Works Second Year Cost

Financial Calculations 5% Reduction in Street Works	Year	Year-2											
	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
Annual Cost of Permit Scheme - Closing Values													
Permit Cost	-	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853
Permit Volumes	-	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	23	23	23	23	23	23	23	23	23	23	23	23
Multiplied by number of Permits	-	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935
Income derived on Cost recovery basis	-	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935	40,935
Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	-	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196
Permit Scheme - Operational Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
		66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 59 Financial Calculations 5% Reduction in Works Third Year Cost

Financial Calculations 5% Reduction in Street Works	Year	Year-3											
	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
Permit Cost	-	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853	63,853
Permit Volumes	-	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767	1,767
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	38	38	38	38	38	38	38	38	38	38	38	38
Multiplied by number of Permits	-	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160
Income derived on Cost recovery basis	-	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160	67,160
Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	-	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196	69,196
Permit Scheme - Operational Costs	-	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292	66,292

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 60 Financial Calculations 5% Reduction in Works 4-14 Year Cost

Financial Calculations 5% Reduction in Street Works	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 Permit Scheme - Closing Values												
Permit Cost	-	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Permit Volumes	-	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209
Cost Recovery Price Permit fee income	-	38	36	36	36	36	36	36	36	36	36	36
Multiplied by number of Permits	-	803,766	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Income derived on Cost recovery basis	-	803,766	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Cost Highway permits (non recoverable)	-	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803
Income derived from Max Permit Fee	-	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353
Permit Scheme - Operational Costs	-	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036	-794,036

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 61 Financial Calculations 5% Reduction in Works 15-25 Year Cost

Financial Calculations 5% Reduction in Street Works	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 Permit Scheme - Closing Values												
Permit Cost	-	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Permit Volumes	-	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209	21,209
Cost Recovery Price Permit fee income	-	36	36	36	36	36	36	36	36	36	36	36
Multiplied by number of Permits	-	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Income derived on Cost recovery basis	-	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233	766,233
Cost Highway permits (non recoverable)	-	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803	27,803
Income derived from Max Permit Fee	-	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353	830,353
Permit Scheme - Operational Costs	-	794,036	794,036	794,036	794,036	794,036	794,036	794,036	794,036	794,036	794,036	794,036

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 62 Financial Calculations 10% Reduction in Works Annual Cost

Brighton and Hove Financial Calculations 10% Reduction in Street Works											
	Opening	Closing Values									
Annual Cost of Permit 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
Reduction Factor less Permit flex	-	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Permit Costs	785,880	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Recovery of set-up costs	112,600	37,533	37,533	37,533	-	-	-	-	-	-	-
Annual Cost For Recovery	-	806,307	784,119	784,119	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Cost Recovery Price Permit fee income	-	1,035,470	741,839	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Cost Recovery Price Permit fee income (prior year data)	-	51.06	25.52	39.26	39.03	37.16	37.16	37.16	37.16	37.16	37.16
(Over) / under-recovery £	-	-	229,163	42,280	37,533	-	-	-	-	-	-
(Over) / under-recovery £ (prior year)	-	-	229,163	42,280	37,533	-	-	-	-	-	-
Annual Cost Highway permits (non recoverable)	29,267	29,267	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340
Annual Income Max Permit Fee	851,644	812,611	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062
Overall Scheme Cost	815,146	517,423	788,866	784,119	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Profit/Loss	36,498	295,188	20,196	24,943	62,476	62,476	62,476	62,476	62,476	62,476	62,476

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 63 Financial Calculations 10% Reduction in Works First Year Cost

Financial Calculations 10% Reduction in Street Works	Year	Year-1											
	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
Permit Cost	65,490	65,217	64,967	64,738	64,527	64,335	64,158	63,996	63,848	63,712	63,587	63,473	62,215
Permit Volumes	-	1,860	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	51	51	51	51	51	51	51	51	51	51	51	51
Multiplied by number of Permits	-	94,997	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498
Income derived on Cost recovery basis	-	94,997	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498	85,498
Annual Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	70,970	70,970	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422
Permit Scheme - Operational Costs	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	67,656	67,406	67,177	66,966	66,774	66,597	66,435	66,287	66,151	66,026	65,912	64,654

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 64 Financial Calculations 10% Reduction in Works Second Year Cost

Financial Calculations 10% Reduction in Street Works	Year	Year-2											
	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
Permit Cost	-	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215
Permit Volumes	-	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	26	26	26	26	26	26	26	26	26	26	26	26
Multiplied by number of Permits	-	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723
Income derived on Cost recovery basis	-	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723	42,723
Annual Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	-	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422
Permit Scheme - Operational Costs	-	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 65 Financial Calculations 10% Reduction in Works Third Year Cost

Financial Calculations 10% Reduction in Street Works	Year	Year-3											
	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
Permit Cost	-	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215	62,215
Permit Volumes	-	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674	1,674
Recovery of set-up costs	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128
Cost Recovery Price Permit fee income	-	39	39	39	39	39	39	39	39	39	39	39	39
Multiplied by number of Permits	-	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739
Income derived on Cost recovery basis	-	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739	65,739
Annual Cost Highway permits (non recoverable)	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439	2,439
Income derived from Max Permit Fee	-	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422	67,422
Permit Scheme - Operational Costs	-	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654	64,654

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 66 Financial Calculations 10% Reduction in Works 4-14 Year Cost

Financial Calculations 10% Reduction in Street Works	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 Permit Scheme - Closing Values												
Permit Cost	-	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Permit Volumes	-	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092
Cost Recovery Price Permit fee income	-	39	37	37	37	37	37	37	37	37	37	37
Multiplied by number of Permits	-	784,119	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Income derived on Cost recovery basis	-	784,119	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Annual Cost Highway permits (non recoverable)	-	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340
Income derived from Max Permit Fee	-	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062
Permit Scheme - Operational Costs	-	-	-	-	-	-	-	-	-	-	-	-
		772,926	772,926	772,926	772,926	772,926	772,926	772,926	772,926	772,926	772,926	772,926

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 67 Financial Calculations 10% Reduction in Works 5-25 Year Cost

Financial Calculations 10% Reduction in Street Works	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 Permit Scheme - Closing Values												
Permit Cost	-	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Permit Volumes	-	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092	20,092
Cost Recovery Price Permit fee income	-	37	37	37	37	37	37	37	37	37	37	37
Multiplied by number of Permits	-	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Income derived on Cost recovery basis	-	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586	746,586
Annual Cost Highway permits (non recoverable)	-	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340	26,340
Income derived from Max Permit Fee	-	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062	809,062
Permit Scheme - Operational Costs	-	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926	-772,926

Brighton & Hove Permit Scheme – Cost Benefit Analysis

7.2.3 Investment costs

The investment costs of £112,600 are incurred in the month before the Permit Scheme opening and recovered over the first three years of the Permit Scheme from income. The detailed breakdown of costs is presented in Table 51.

7.2.4 Developer and other contributions

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

7.2.5 Grant / subsidy payments

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

7.3 PUBLIC ACCOUNTS - CENTRAL GOVERNMENT FUNDING

The Central Government public account reporting has the following categories:

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

7.3.1 Revenue

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

7.3.2 Operating costs

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

7.3.3 Investment costs

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

7.3.4 Developer and other contributions

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

7.3.5 Grant / subsidy payments

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

7.3.6 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.

7.4 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.

7.4.1 Consumer User Benefits

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

7.4.2 Business User Benefits

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

Brighton & Hove Permit Scheme – Cost Benefit Analysis

8 STATUTORY OUTPUTS

8.1 INTRODUCTION

This section presents the statutory outputs required for the Brighton & Hove Permit 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 7.

The statutory outputs consist of three categories:

8.2 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 68 to 71.

8.3 PUBLIC ACCOUNTS

The Public Accounts tables show the net impact to Local and Central Government and are below on Tables 72 to 75.

8.4 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) 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 Permit Fees has been assumed to be reinvested in the authority and therefore offset in the economic appraisal as a capital cost.

Tables 76 to 79 are below.

8.5 STATUTORY COST BENEFIT ANALYSIS

The study has addressed all aspects of the implementation of the Brighton & Hove Permit 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 and Net Present Value of in current prices (2010 prices). The appraisal results demonstrate that the introduction of the Permit Scheme will have a net positive economic benefit.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 68 TEE Table 5% Work Saving Year 1

Transport Economic Efficiency (TEE) Table (5% Work Saving) Year 1

Consumers	ALL MODES	ROAD	Bus & Coach	RAIL	Other
<i>User benefits</i>	TOTAL	Private Cars and LGVs	Passenger s	Passengers	
Travel time	£ 4,053,075	£ 3,629,975	£ 423,100	£ -	£ -
Vehicle operating costs	£ 279,836	£ 279,836			£ -
User charges	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -
NET CONSUMER BENEFITS	£ 4,332,912 (1)	£ 3,909,811	£ 423,100	£ -	£ -

Business

<i>User benefits</i>		Goods Vehicles	Business Cars & LGVs	Passenger s	Freight	Passengers	
Travel time	£ 3,065,447	£ 1,183,805	£ 1,764,596	£ 117,045	£ -	£ -	£ -
Vehicle operating costs	£ 107,944	£ 73,008	£ 34,936				£ -
User charges	£ -	£ -	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 3,173,391 (2)	£ 1,256,813	£ 1,799,532	£ 117,045	£ -	£ -	£ -

Private sector provider impacts

		Freight	Passengers	
Revenue	£ -	£ -	£ -	£ -
Operating costs	£ 37,579	£ 37,579	£ -	£ -
Investment costs	£ -	£ -	£ -	£ -
Grant/subsidy	£ -	£ -	£ -	£ -
Subtotal	£ 37,579 (3)	£ 37,579	£ -	£ -

Other business impacts

Developer contributions	£ -	£ -	£ -	£ -	£ -
-------------------------	--------	--------	--------	--------	--------

NET BUSINESS IMPACT

	£	(5) =
	3,210,970	(2) +
		(3) +
		(4)

TOTAL

Present Value of Transport Economic Efficiency Benefits	£ 7,543,882	(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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 69 TEE Table 10% Work Saving Year 1

Transport Economic Efficiency (TEE) Table (10% Work Saving) Year 1

Consumers	ALL MODES	ROAD	Bus & Coach	RAIL	Other
<i>User benefits</i>	TOTAL	Private Cars and LGVs	Passenger s	Passengers	
Travel time	£ 8,106,151	£ 7,259,950	£ 846,200	£ -	£ -
Vehicle operating costs	£ 146,016	£ 146,016			£ -
User charges	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -
NET CONSUMER BENEFITS	£ 8,525,166 (1)	£ 7,405,966	£ 846,200	£ -	£ -

Business

<i>User benefits</i>		Goods Vehicles	Business Cars & LGVs	Passenger s	Freight	Passengers	
Travel time	£ 6,130,894	£ 2,367,611	£ 3,592,192	£ 234,091	£ -	£ -	£ -
Vehicle operating costs	£ 215,888	£ 146,016	£ 69,873				£ -
User charges	£ -	£ -	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 6,346,782 (2)	£ 2,513,626	£ 3,599,065	£ 234,091	£ -	£ -	£ -

Private sector provider impacts

		Freight	Passengers		
Revenue	£ -	£ -	£ -	£ -	£ -
Operating costs	£ 75,159	£ 75,159	£ -	£ -	£ -
Investment costs	£ -	£ -	£ -	£ -	£ -
Grant/subsidy	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 75,159 (3)	£ 75,159	£ -	£ -	£ -

Other business impacts

Developer contributions	£ -	£ -	£ -	£ -	£ -
-------------------------	--------	--------	--------	--------	--------

NET BUSINESS IMPACT

£6,421,940 (5) = (2) + (3) + (4)

TOTAL

Present Value of Transport Economic Efficiency Benefits £ 14,674,107 (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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 70 TEE Table 5% Work Saving 25 Years

Transport Economic Efficiency (TEE) Table (5% Work Saving) 25 Years

Consumers	ALL MODES	ROAD	Bus & Coach	RAIL	Other
<i>User benefits</i>	TOTAL	Private Cars and LGVs	Passenger s	Passengers	
Travel time	£ 101,326,884	£ 90,749,380	£ 10,577,504	£ -	£ -
Vehicle operating costs	£ 6,995,907	£ 6,995,907			£ -
User charges	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -
NET CONSUMER BENEFITS	£ 108,322,791 (1)	£ 97,745,287	£ 10,577,504	£ -	£ -

Business

<i>User benefits</i>		Goods Vehicles	Business Cars & LGVs	Passenger s	Freight	Passengers	
Travel time	£ 76,636,170	£ 29,595,135	£ 44,144,903	£ 2,926,132	£ -	£ -	£ -
Vehicle operating costs	£ 2,698,602	£ 1,825,195	£ 873,407				£ -
User charges	£ -	£ -	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 79,334,772 (2)	£ 31,420,330	£ 44,988,310	£ 2,926,132	£ -	£ -	£ -

Private sector provider impacts

		Freight	Passengers		
Revenue	£ -	£ -	£ -	£ -	£ -
Operating costs	£ 939,483	£ 939,483	£ -	£ -	£ -
Investment costs	£ -	£ -	£ -	£ -	£ -
Grant/subsidy	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 939,483 (3)	£ 939,483	£ -	£ -	£ -

Other business impacts

Developer contributions	£ -	£ -	£ -	£ -	£ -	£ -
NET BUSINESS IMPACT	£80,274,256 (5) = (2) + (3) + (4)					

TOTAL

Present Value of Transport Economic Efficiency Benefits	£188,597,046 (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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 71 TEE Table 10% Work Saving 25 Years

Transport Economic Efficiency (TEE) Table (10% Work Saving) 25 Years

Consumers	ALL MODES	ROAD	Bus & Coach	RAIL	Other
<i>User benefits</i>	TOTAL	Private Cars and LGVs	Passengers	Passengers	
Travel time	£ 202,653,767	£ 181,498,760	£ 21,155,007	£ -	£ -
Vehicle operating costs	£ 3,650,391	£ 3,650,391			£ -
User charges	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -
NET CONSUMER BENEFITS	£ 206,304,158 (1)	£ 185,149,151	£ 21,155,007	£ -	£ -

Business

<i>User benefits</i>		Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	£ 153,272,340	£ 59,190,270	£ 88,229,807	£ 5,852,263	£ -	£ -	£ -
Vehicle operating costs	£ 5,397,205	£ 3,650,391	£ 1,746,814				£ -
User charges	£ -	£ -	£ -	£ -	£ -	£ -	£ -
During Construction & Maintenance	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 158,669,545 (2)	£ 62,840,661	£ 89,976,621	£ 5,852,263	£ -	£ -	£ -

Private sector provider impacts

		Freight	Passengers		
Revenue	£ -	£ -	£ -	£ -	£ -
Operating costs	£ 1,878,966	£ 1,878,966	£ -	£ -	£ -
Investment costs	£ -	£ -	£ -	£ -	£ -
Grant/subsidy	£ -	£ -	£ -	£ -	£ -
Subtotal	£ 1,878,966 (3)	£ 1,878,966	£ -	£ -	£ -

Other business impacts

Developer contributions	£ -	£ -	£ -	£ -	£ -	£ -
-------------------------	--------	--------	--------	--------	--------	--------

NET BUSINESS IMPACT

£160,548,511 (5) = (2) + (3) + (4)

TOTAL

Present Value of Transport Economic Efficiency Benefits £366,852,669 (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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 72 PA Table 5% Work Saving Year 1

Public Accounts (PA) Table (5% Work Saving) Year 1

	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL	INFRASTRUCTURE			
Revenue	-£743,957	£			-£743,957
Operating Costs	£721,129	£			£721,129
Investment Costs	£777,514	£			£777,514
Developer and Other Contributions	£	£	£	£	£
Grant/Subsidy Payments	-	-	-	-	-
NET IMPACT	£754,685	(7)	£	£	£754,685
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	£-	(9)	£	£	£
TOTALS					
Broad Transport Budget	£754,685	(10) = (7) + (8)			
Wider Public Finances	£	(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.					

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 73 PA Table 10% Work Saving Year 1

Public Accounts (PA) Table (10% Work Saving) Year 1

	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL	INFRASTRUCTURE			
Revenue	-£726,508	£			-£726,508
Operating Costs	£713,482	£			£713,482
Investment Costs	£760,065	£			£760,065
Developer and Other Contributions	£	£	£	£	£-
Grant/Subsidy Payments	-	£	£	£	£-
NET IMPACT	£747,038	(7)	£	£	£747,038
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	£-	(9)	£-	£	£
TOTALS					
Broad Transport Budget	£747,038	(10) = (7) + (8)			
Wider Public Finances	£-	(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.					

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 74 PA Table 5% Work Saving 25 Years

Public Accounts (PA) Table (5% Work Saving) 25 Year

	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL	INFRASTRUCTURE			
Revenue	-£18,560,858	£			-£18,560,858
Operating Costs	£17,761,391	£			£17,761,391
Investment Costs	£16,391,071	£			£16,391,071
Developer and Other Contributions	£-	£	£	£	£-
Grant/Subsidy Payments	£-	£	£	£	£-
NET IMPACT	£15,591,604	(7)	£	£	£15,591,604
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	£-	(9)	£	£	£
TOTALS					
Broad Transport Budget	£15,591,604	(10) = (7) + (8)			
Wider Public Finances	£-	(11) = (9)			
<p>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.</p>					

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 75 PA Table 10% Work Saving 25 Years

Public Accounts (PA) Table (10% Work Saving) 25 Year

	ALL MODES	ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL	INFRASTRUCTURE			
Revenue	-£18,086,565	£			-£18,086,565
Operating Costs	£17,320,961	£			£17,320,961
Investment Costs	£16,023,818	£			£16,023,818
Developer and Other Contributions	£	£	£	£	£-
Grant/Subsidy Payments	-	-	-	-	-
NET IMPACT	£15,258,214	(7) -	£ -	£ -	£15,258,214
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	£	(9) £	£	£	£
TOTALS					
Broad Transport Budget	£ 15,258,214	(10) = (7) + (8)			
Wider Public Finances	£-	(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.					

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 76 AMCB 5% Work Saving Year 1

Analysis of Monetised Costs and Benefits (5% Work Saving) Year 1

Noise	£ -	(12)
Local Air Quality	£ -	(13)
Greenhouse Gases	£ 48,452	(14)
Journey Quality	£ -	(15)
Physical Activity	£ -	(16)
Accidents	£ 51,022	(17)
Economic Efficiency: Consumer Users (Commuting)	£ 4,332,912	(1a)
Economic Efficiency: Consumer Users (Other)	£ -	(1b)
Economic Efficiency: Business Users and Providers	£ 3,210,970	(5)
Wider Public Finances (Indirect Taxation Revenues)	£ 37,801	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	£ 7,605,555	$(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)$
Broad Transport Budget	£ 754,685	(10)
Present Value of Costs (see notes) (PVC)	£ 754,685	$(PVC) = (10)$
OVERALL IMPACTS		
Net Present Value (NPV)	£ 6,850,869	$NPV = PVB - PVC$
Benefit to Cost Ratio (BCR)	10.08	$BCR = PVB / PVC$

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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 77 AMCB 10% Work Saving Year 1

Analysis of Monetised Costs and Benefits (10% Work Saving) Year 1

Noise	£ -	(12)
Local Air Quality	£ -	(13)
Greenhouse Gases	£ 96,904	(14)
Journey Quality	£ -	(15)
Physical Activity	£ -	(16)
Accidents	£ 102,043	(17)
Economic Efficiency: Consumer Users (Commuting)	£ 8,252,166	(1a)
Economic Efficiency: Consumer Users (Other)	£ -	(1b)
Economic Efficiency: Business Users and Providers	£ 6,421,940	(5)
Wider Public Finances (Indirect Taxation Revenues)	£ 75,602	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	£ 14,797,452	(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)
Broad Transport Budget	£ 747,038	(10)
Present Value of Costs (see notes) (PVC)	£ 747,038	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	£ 14,050,414	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	19.81	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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 78 AMCB 5% Work Saving 25 Years

Analysis of Monetised Costs and Benefits (5% Work Saving) 25 Years

Noise	£ -	(12)
Local Air Quality	£ -	(13)
Greenhouse Gases	£ 1,211,303	(14)
Journey Quality	£ -	(15)
Physical Activity	£ -	(16)
Accidents	£ 1,275,541	(17)
Economic Efficiency: Consumer Users (Commuting)	£ 108,322,791	(1a)
Economic Efficiency: Consumer Users (Other)	£ -	(1b)
Economic Efficiency: Business Users and Providers	£80,274,256	(5)
Wider Public Finances (Indirect Taxation Revenues)	£ 945,027	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	£ 190,138,864	(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)
Broad Transport Budget	£ 15,591,604	(10)
Present Value of Costs (see notes) (PVC)	£ 15,591,604	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	£ 174,547,260	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	12.19	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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 79 AMCB 10% Work Saving 25 Years

Analysis of Monetised Costs and Benefits (10% Work Saving) 25 Years

Noise	£ -	(12)
Local Air Quality	£ -	(13)
Greenhouse Gases	£ 2,422,607	(14)
Journey Quality	£ -	(15)
Physical Activity	£ -	(16)
Accidents	£ 2,551,082	(17)
Economic Efficiency: Consumer Users (Commuting)	£ 206,304,158	(1a)
Economic Efficiency: Consumer Users (Other)	£ -	(1b)
Economic Efficiency: Business Users and Providers	£ 160,548,511	(5)
Wider Public Finances (Indirect Taxation Revenues)	£ 1,890,054	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Present Value of Benefits (see notes) (PVB)	£ 369,936,304	$(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)$
Broad Transport Budget	£ 15,258,214	(10)
Present Value of Costs (see notes) (PVC)	£ 15,258,214	$(PVC) = (10)$
OVERALL IMPACTS		
Net Present Value (NPV)	£ 354,678,090	$NPV = PVB - PVC$
Benefit to Cost Ratio (BCR)	24.25	$BCR = PVB / PVC$

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.

Brighton & Hove Permit Scheme – Cost Benefit Analysis

9 BRIGHTON & HOVE PERMIT SCHEME CBA RESULTS

9.1 INTRODUCTION

This section will summarises the findings of the Brighton & Hove Permit Scheme Cost Benefit Analysis and consider the impact on the Highway Authority.

9.2 BRIGHTON & HOVE 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 80), which includes the cost recovery from Permit Fee income and includes the effect of indirect taxation. The summary of benefits is presented in Table 81.

Table 80 Highway Authority Brighton & Hove Cost Benefit results

Highway Authority Assessment	Opening Year	25 Year
5% reduction in works impact		
Net Present Value of Benefits	£7,605,555	£190,138,864
Net Present Value of Costs	£754,685	£15,591,604
Net Present Value of Permit Scheme	£6,850,869	£174,547,260
Benefit to Cost Ratio	10.08	12.19

Highway Authority Assessment	Opening Year	25 Year
10% reduction in works impact		
Net Present Value of Benefits	£14,797,452	£369,936,304
Net Present Value of Costs	£747,038	£15,258,214
Net Present Value of Permit Scheme	£14,050,414	£354,678,090
Benefit to Cost Ratio	19.81	24.25

Table 81 Benefits Summary Values and Percentage 5% reduction in works impact 25 Years

Benefits	Value	Percentage of Total Benefit
Consumer Travel Time	£101,326,884	53%
Consumer Vehicle Operating Costs	£6,995,907	4%
Business Travel Time	£76,636,170	40%
Business Vehicle Operating Costs	£2,698,602	1%
Private Sector Provider Operating Costs	£939,483	0%
Reduction in Fuel Revenue	£945,027	0%
Greenhouse Gases	£1,211,303	1%
Accidents	£1,275,541	1%
Net Present Value of Benefits	£190,138,864	

The Scheme has a Benefit Cost Ratio of 12.19 and Net Present Value of £174.5m 2010 prices at 5% reduction in works which suggest the Brighton & Hove Permit Scheme would

Brighton & Hove Permit Scheme – Cost Benefit Analysis

be both viable and beneficial for the Highway Authority and the population of Brighton & Hove.

The higher BCR and NPV are attributable to the net benefit of adding Permit Fee income and indirect taxation to the assessment and the difference in opening year and overall assessment BCR is due to the changing relationship of costs and benefits over the assessment period.

The projected discounted benefits in the opening year of £7.6m is an increase in the estimated suggested benefit in the DfT report in Section 3.7. There are fluctuations in roadwork sites that influence congestion, for this CBA sites selected are shown in Appendix B with total impacts. Sites with high traffic flow on single carriageway roads are subject to shuttle working that can increase the overall roadwork delay. This can be seen for site 13 that has a high traffic flow and single carriageway, by removing this site from the dataset reduces the 5% scheme benefits from £7.6m to £6.8m.

9.3 SENSITIVITY ANALYSIS

A series of sensitivity tests have been performed on the 25-year appraisal to further understand the economic performance of the Scheme and its effects at different policy levels. The Highway Authority central case assumption of a 5% reduction in works activity produced a BCR of 12.19.

The results in Table 81 below shows the standard sensitivity test of the level of works reduction required to produce a BCR of 2.0 and a BCR of 1.0.

Table 81 Standard Sensitivity

Standard Sensitivity		
BCR	1%	2%
Works Reduction	0.37%	0.74%

Table 82 below presents the BCR achieved based upon the level of works reduction achieved.

Table 82 Works Reduction Sensitivity

Works Reduction Sensitivity	
Works Reduction	BCR
1% Saving	2.71
2% Saving	5.42
3% Saving	8.12
4% Saving	10.82
5% Saving	13.5
6% Saving	16.19
7% Saving	18.86
8% Saving	21.53
9% Saving	24.2
10% Saving	26.86

Brighton & Hove Permit Scheme – Cost Benefit Analysis

Table 83 shows the level of roadwork reduction achieved at different BCR levels.

Table 83 BCR Sensitivity

BCR Sensitivity	
BCR	Works Reduction
1	0.37%
2	0.74%
3	1.11%
4	1.48%
5	1.84%
6	2.22%
7	2.58%
8	2.96%
9	3.33%
10	3.70%

Brighton & Hove Permit Scheme – Cost Benefit Analysis

10 APPENDIX A

QUADRO Data

See Attached

11 APPENDIX B

Sample Sites QUADRO Results Summary

See attached

12 APPENDIX C

Permit Fees Matrix

See attached