A6 to Manchester Airport Relief Road

Economic Assessment Report

SEMMMS

December 2014

ATKINS

Plan Design Enable

Notice

This document and its contents have been prepared and are intended solely for the A6MARR project team (Stockport Metropolitan Borough Council, Manchester City Council, Manchester Airport Group and Cheshire East Council) for information and use in relation to the Major Scheme Business Case for the A6 to Manchester Airport Relief Road.

Atkins Highways and Transportation assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 41 pages including the cover.

Document history

Job number:			**Document ref:**			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Draft for A6MARR Project Team/Client Comments	PM	RK	GR/NM	NM	Dec 14

Client signoff

Client	Stockport Metropolitan Borough Council
Project	A6 to Manchester Airport Relief Road
Document title	Economic Assessment Report
Job no.	5125516
Copy no.	V1
Document reference	5125516 A6 to Manchester Airport Relief Road EAR_Dec2014.docx

Table of contents

Tables

Figures

1. Introduction

1.1. Purpose of this document

This document is an Annex to the Application for Full Approval and details the economic appraisal of the A6 to Manchester Airport Relief Road (A6MARR) scheme.

1.2. Overview

The A6 to Manchester Airport (A6MARR) scheme has been identified by Central Government as one of a number of nationally important infrastructure projects, which are required to revitalise the economy and provide congestion relief to local communities.

The A6MARR scheme will improve surface access to Manchester Airport and provide better connectivity along the south Manchester corridor, to assist Greater Manchester and Cheshire East in meeting their aspirations for economic growth. It directly supports the Government's objective to provide major transport infrastructure that will deliver economic growth, a fact acknowledged by the announcement on prioritisation for funding in the Chancellor's Autumn Statement in November 2011. The scheme will provide congestion relief to local communities and generate wider benefits to business through improved journey time reliability on the local and strategic highway network.

The A6MARR scheme is an integral component of the wider South East Manchester Multi-Modal Strategy (SEMMMS), which has delivered benefits to local communities across south-east Manchester through a range of public transport and sustainable transport measures over the past ten years. It is widely recognised that the A6MARR scheme is critical to delivering the long-term objectives of the SEMMMS strategy, and to meet national objectives for growth, employment and connectivity.

1.3. About the Scheme

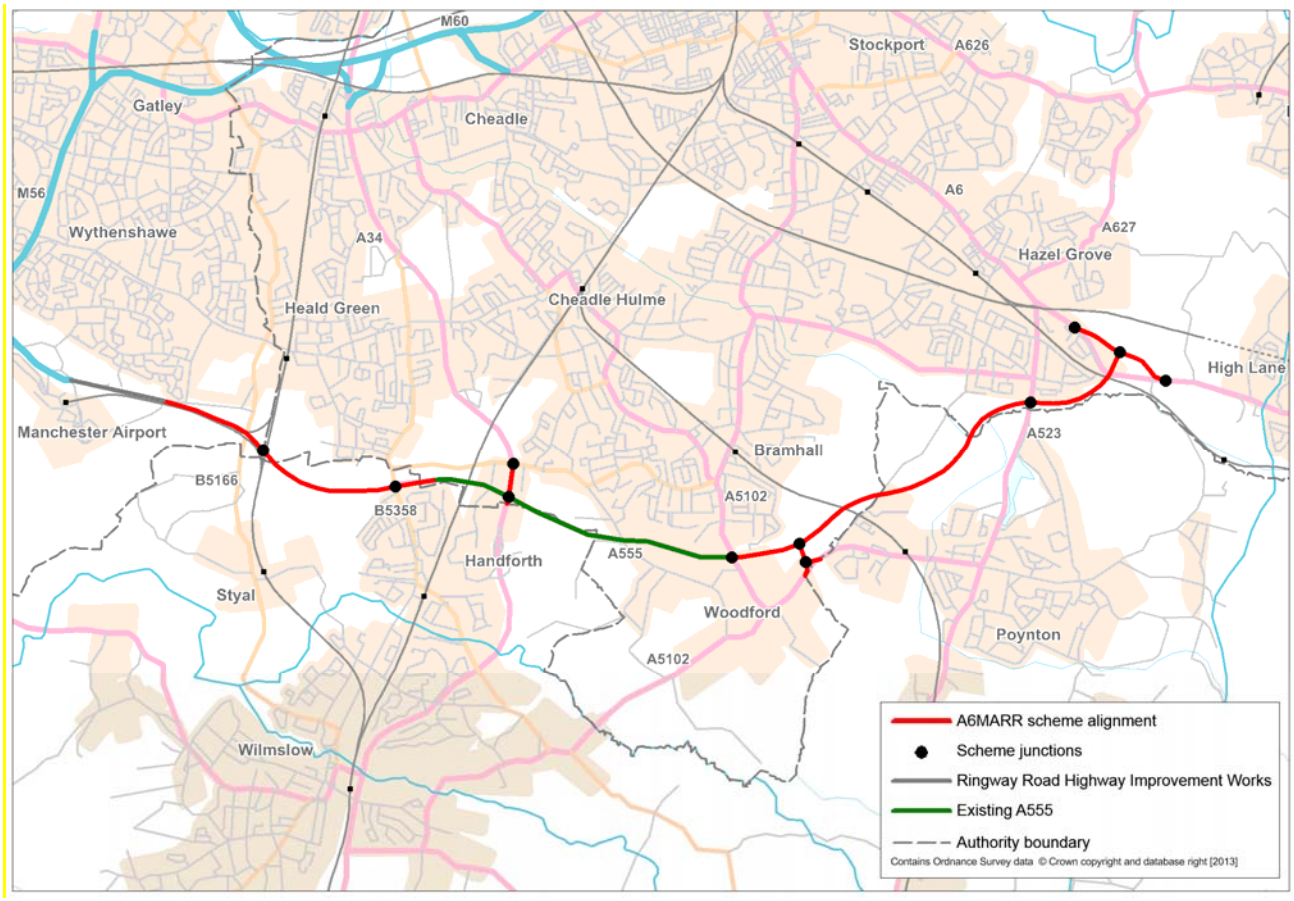
The A6MARR scheme will provide 10 kilometres of predominantly new 2-lane dual carriageway running east-to-west from the A6 near Hazel Grove (south-east Stockport), via the 4 kilometres of existing A555 to Manchester Airport and the link road to the M56 spur.

The A6MARR scheme bypasses heavily-congested district and local centres, including; Bramhall, Cheadle Hulme, Hazel Grove, Handforth, Poynton, Wythenshawe, Gatley and Heald Green. It will provide much-needed connectivity for key strategic routes into the North West and to Manchester Airport, including traffic from the A6, A523 and A34 – all of which are key routes for business, leisure travel and freight from Cheshire, Derbyshire, Staffordshire, Yorkshire and beyond. The A6MARR scheme incorporates seven new and four improved junctions, four railway crossings and a parallel shared cycle/ pedestrian path.

1.4. Scheme Location

Figure 1.1 shows the location of the proposed scheme. The specific components of the scheme are presented in more detail below.

Figure 1-1 Location of the SEMMMS A6 to Manchester Airport Relief Road Scheme



1.5. Scheme Description

The scheme is a new 2-lane dual carriageway with a shared use cycle/ footway constructed to urban standards, orientated on an east-west route from the A6 near Hazel Grove (south east Stockport), via the 4 kilometres of existing A555 to Manchester Airport. It passes through three local authority areas Cheshire East, Stockport and Manchester City Councils.

The proposed development comprises three sections. The first section is approximately 5.1km in length, starting from a new realigned section (approximately 1km long) of the A6 at Hazel Grove, and extending west to the existing A555 at Woodford Road, Bramhall. The second section is the new shared use cycle and footpath/ bridleway adjacent to the existing A555. The third new section is approximately 3.2 km in length and is an extension of the existing A555 that currently terminates at Wilmslow Road. The route continues in a westerly direction crossing Styal Road and heading towards Manchester Airport to the junction at Ringway Road and Ringway Road West. The proposed development also incorporates remodelling works at Stanley Green roundabout and highway improvements on the A34 from Stanley Green roundabout to the A34/ A555 junction. The route utilises the existing A555 which is approximately 4.0km in length.

The proposed development incorporates seven new and four improved highway junctions, including at-grade, grade separated, signalised controlled and priority junctions, roundabout, T-Junction and cross road arrangements. The route of the proposed road crosses four railway lines, one of which is the West Coast Mainline (WCML). Provision for pedestrians and cyclists has been included along the entire length of the proposed development through a segregated multi-user cycle/pedestrian route adjacent to the new road and existing length of the A555 and within the design of every junction.

The development will also be accompanied by a package of complementary and mitigation measures which are closely associated with the successful scheme delivery and which have been identified to improve the local road network and off-set the potential localised traffic impact of the new road. These measures have

been proposed to address the predicted change in traffic flow on the local highway network following completion and opening of the A6MARR scheme. The measures aim to ameliorate the scheme's impact on local communities where there are predicted to be traffic increases, and seek opportunities to encourage walking, cycling and support to local centres where there are predicted to be reductions in traffic flow.

Cheshire East Council, Derbyshire County Council, Manchester City Council and Stockport Council being mindful to ensure that the programme for commencement of the Relief Road is achieved at the earliest opportunity and completed by Summer 2017 have in their separate capacities as local highway authorities agreed to enter into a Delivery Agreement to try to ensure that there are no planning obstacles that might otherwise fetter or frustrate completion of the A6MARR.

1.6. Structure of the Report

The development of the base and forecast year traffic models on which this economic assessment is based are discussed in the Model Development Report and the Model Forecasting Report. This Economic Assessment Report presents the methodology and assumptions adopted for the economic assessment, and the results provided thereof. Following this introduction, the remainder of the report is structured as follows:

- Chapter 2 describes the Methodology & Assumptions underpinning the economic assessment;
- Chapter 3 presents the Economic Assessment Results for the proposed A6MARR scheme.
- Appendix A contains the Transport Economic Efficiency (TEE) Tables;
- Appendix B provides details of the Derivation of Annualisation Factors, which are used to extrapolate modelled economic benefits across the year;
- Appendix C contains Figures and Matrices of Sectored Benefits, which provides a detailed breakdown of the time savings, vehicle operating cost savings and total present value of benefits generated between different sectors of the traffic model, for all modelled time periods and years.

2. Assessment Methodology & Assumptions

2.1. Overview

The economic assessment has primarily been conducted using the Department for Transport's (DfT) TUBA[1] software, which calculates monetised benefits and costs relating to travel time, vehicle operating costs, indirect tax revenue and user charges. TUBA produces a summary of these results in the form of a Transport Economic Efficiency (TEE) Table, copies of which are presented for each scenario in Appendix A of this report. The current version of TUBA is 1.9.4, which has been used for this assessment.

Cost savings resulting from reduced accident levels following the implementation of the scheme, have been assessed using principles derived from the DfT's COBA[2] software. Accident rates are attributed to different link types and the forecast changes in traffic flows are used to estimate the changes in accident numbers and the severity of the accidents.

2.2. Methodology

2.2.1. Traffic modelling

A robust approach to scheme assessment has been undertaken, using a variable demand modelling framework originally developed for the Greater Manchester Transport Innovation Fund (TIF) work, but updated specifically for the SEMMMS A6 to Manchester Airport Relief Road scheme. The modelling suite was developed jointly by Transport for Greater Manchester (TfGM formerly the Greater Manchester Transportation Unit – GMTU) and the SYSTRA Consultancy (formerly MVA Consultancy). Additional modelling input and a formal reviewing role was provided by Atkins.

The model captures origin-destination trip and cost data across the extent of the UK, with detailed simulation modelling across Greater Manchester, Cheshire and the surrounding environs.

Models were created to represent three time periods:

- Morning peak (0700-1000);
- Inter-peak average hour (1000-1600); and
- Evening peak hour (1600-1900).

The model developed for GMTIF work had a base year of 2007. The A6 to Manchester Airport Relief Road model has been updated with a base year of 2009. The model was calibrated and validated in accordance with DfT criteria using observed traffic count and journey time data collected in neutral months throughout 2009. Full details of the data used to develop, calibrate and validate the base year transport model are presented in the ***A6MARR Data Collection and Traffic Surveys Report***.

All modelled time periods pass the calibration and validation criteria and are deemed to provide a good representation of observed traffic conditions across the study area. Full details of the calibration and validation methodology and outputs are provided in the ***A6MARR Local Model Validation Report***. Full details of the demand model are provided in the ***A6MARR Model Development Report***.

Model forecasts were prepared for two future years: 2017 and 2032. The transport network and public transport services have been updated to reflect schemes under construction and committed transport options anticipated to be in place by 2017 and 2032 respectively.

Future year forecast models were produced for the following scenarios:

1 TUBA - Transport User Benefit Appraisal (Economic Appraisal Software developed by Mott MacDonald on behalf of the Department for Transport)
2 COBA - Cost Benefit Analysis (Department for Transport sponsored program maintained and distributed by TRL)

- A Do-Minimum (DM), which contains all committed developments and committed transport schemes (highway and public transport) across the study area to 2032; and
- A Do-Something Preferred Option (PO), which includes all developments and schemes from the DM, plus the A6MARR scheme.

Assumptions on population and employment growth used to derive the Core forecasts are based on a variety of sources, namely:

- Relevant planning departments in High Peak, Cheshire East, Manchester, Stockport, Trafford for specific developments included in their Local Development Frameworks;
- Manchester Airport Group (MAG) for passenger and employee growth and development at and around Manchester Airport;
- Local Development Framework datasets for developments elsewhere in Greater Manchester;
- National Trip End Model (NTEM) dataset 6.2 forecasts; and
- National Transport Model forecasts (for freight traffic).

The methodology used to derive the Core forecasts involves:

- Extracting population and employment forecasts from the work undertaken to assess the transport impacts of the Greater Manchester Local Development Frameworks;
- Replacing the GM LDF forecasts for Manchester, Stockport and Trafford with revised forecasts based on the District planning data;
- Overwriting NTEM forecasts for High Peak and Cheshire East with revised forecasts based on local planning data;
- Constraining the population and employment growth forecasts to the overall growth level implied by NTEM 6.2 at the district level within Greater Manchester the pre-2009 district level for Cheshire East and at the county level elsewhere; and
- Applying the External Forecasting Model to produce forecasts of the future year travel demand for input to SEMMMS VDM from the population and employment forecasts.

The demand model was run for the DM and PO scenarios, to enable any variation in traffic due to the scheme (induced traffic) to be reflected in the appraisal.

Whilst the core scenario represents the most unbiased and realistic set of assumptions that form the central case, sensitivity tests have been undertaken to confirm the robustness of the business case and reflect potential risks around benefits.

High and low growth alternative scenarios have been undertaken to test the impact of the scheme to high and low background traffic growth, based on national WebTAG guidance. Additionally these include local assumptions about demand where:

- The high growth scenario includes some of the most likely sources of growth (development that is considered to be reasonably foreseeable) and which have not been included in the core scenario (i.e. development that is considered to be either near certain or more than likely); and
- The low growth scenario excludes some of the less likely sources of growth (development that is considered to be more than likely) and which were included in the core scenario.

Further details of the development of the future year forecast models, and the impact of the PO relative to the DM, are presented in the ***A6MARR Model Forecasting Report***.

2.2.2. Appraisal Periods

Economic benefits of the scheme have been quantified using the DfT's Transport User Benefit Appraisal (TUBA v1.9.4) software.

Outputs from the SATURN[3] traffic models were provided, giving details of demand, journey times, trip distances and charges or fares applicable to those trips. These were generated as matrices with average figures for each origin-destination pair and were provided for both modelled years, 2017 and 2032, and for three time periods, AM, inter-peak and PM in each year.

Economic benefits are calculated for five modelled time periods. In order to establish the 'true' impact of the proposed scheme, it is necessary to extrapolate these benefits across a whole year, using appropriate annualisation factors. This follows the standard assumption that the travel patterns and scheme benefits observed in a modelled hour are an accurate representation of similar time periods on different days throughout the year. That is, the traffic model does not represent any one specific day in the year, but can be taken as representative of any day throughout the year.

Annualisation factors for expanding modelled benefits across the year can be based on default values as recommended in the TUBA guidance, or on locally-observed traffic data. In cases where AM, inter-peak and PM peak models represent an average hour during each time period, default factors are easy to justify. The AM and PM peak periods are assumed to represent the periods 0700-1000 and 1600-1900 respectively, that is, three hours in each peak period. A factor of three would be applied to an AM/PM average hour model, to reflect the fact that average conditions occur on three hours of the day. Assuming 253 working days across the year (365 days less 104 weekend days and 8 Bank Holidays), an annualisation factor of 759 would be adopted for the AM and PM models (253 days x 3 peak hours).

The inter-peak is represented by the period 1000-1600, that is, a six-hour period, so total daily inter-peak benefits would be derived by applying a factor of 6 to the inter-peak modelled hour benefits. Assuming the same 253 working days across the year, a factor of 1518 would be adopted for the inter-peak (253 x 6 inter-peak hours).

For the A6 to Manchester Airport Relief Road Scheme, default values would be potentially misleading for the AM peak traffic model, as they represent the single peak hour, rather than average morning peak traffic conditions. In such instances, the benefits generated by the scheme proposals are likely to be overestimated, as peak hour conditions are unlikely to be replicated for all three hours of the AM peak period. The factor used to annualise peak hour modelled benefits, therefore, is lower than the default factors one would apply to 'average hour' models, as it takes into account the higher than average proportion of traffic in the peak hour relative to the respective three-hour peak periods.

For the inter-peak and PM Peak average hour models, however, the default factor of 1518 and 759 respectively are valid as they are based on an average of inter-peak and PM peak hours and have therefore been adopted for this assessment.

Annualisation factors for a Saturday and an off peak week day period of 19:00 – 07:00 have also been calculated and used as part of the TUBA assessment.

The annualisation factors used for each time period are as follows:

- Weekday AM Peak: 672;
- Weekday PM Peak: 759;
- Weekday Inter-Peak:1518;
- Off Peak: 633: and
- Weekend: 520.

A description into the calculation of the annualisation factors used in this assessment is provided in Appendix B of this report. A detailed examination of the observed traffic flow profiles at various locations throughout the A6 to Manchester Airport Relief Route study area has been undertaken by Transport for Greater

3. Simulation and Assignment of Traffic in Urban Road Networks (Institute for Transport Studies, The University of Leeds)

Manchester and the conclusion is that the annualisation factors used for this Economic Assessment are valid.

Using the above methodology, benefits were calculated to show time benefits for highway and public transport users. Benefits were disaggregated by user type, with separate figures for business and non-business users.

Benefits reported included time savings, reductions in vehicle operating costs, savings in charges, such as public transport fares, changes in revenue to private operators and local government and reductions in carbon emissions.

These benefits were all monetised so that, based on values of time, the benefits of time savings could be added to the already monetised benefits of reduced operating costs and savings on fares.

TUBA calculates benefits over a 60-year period, discounted to a particular base year of prices. The current base as defined in the DfT's WebTAG guidance is 2010.

Similarly, both the accident analysis calculates costs and benefits over a 60 year assessment period, discounted to a price base year of 2010.

2.2.3. Terminology

The sum total of the aforementioned benefits is represented by the Present Value of **Benefits (PVB).**

Scheme costs have been calculated for each 'Do Something' option, based on capital costs and the impact of the scheme on indirect tax revenues recouped by the government. The sum total of these scheme costs, over and above the corresponding 'Do Minimum' costs, is represented by the **Present Value of Costs (PVC).**

The difference between the PVB and the PVC represents the **Net Present Value (NPV)** of the scheme.

The ratio of PVB to PVC produces the **Benefit-Cost Ratio (BCR).** The BCR provides an indication of the value for money of a particular scheme. The DfT 'Guidance on Value for Money' states that a project will generally be:

- Poor value for money if the BCR is below 1.0;
- Low value for money if it has a BCR of between 1.0 and 1.5;
- Medium value for money if it has a BCR of between 1.5 and 2.0;
- High value for money if it has a BCR of between 2.0 and 4.0; and,
- Very High value for money if the BCR is greater than 4.0

2.3. Underlying Assumptions

2.3.1. Economic Parameters

The default economic parameters contained in the TUBA software have been used as the basis for the assessment. These parameters are based on DfT guidance as set out in TAG Unit A1.1 of WebTAG, and include data on the following:

- Values of time and value of time growth;
- Fuel costs, rates of fuel consumption and changes in vehicle efficiency over time;
- Vehicle occupancies;
- Journey purpose splits;
- Rates of taxation; and
- Carbon values for assessing the impact of the scheme on CO2 emissions.

2.3.2. Discount Rate

Discounting is the technique of comparing costs and benefits that occur in different years and involves the conversion to present values, so that they can be compared. It is based on the principle that, generally, society prefers to receive goods and services now, rather than later, and to defer costs to future generations - this is known as 'social time reference'.

The DfT's current standard rate of discount has been applied to scheme costs and benefits for this appraisal. The current guidance suggests the following rates of discount:

- 3.5% for the first 30 years of the appraisal period;
- 3% for years 31-75 of the appraisal period; and
- 2.5% beyond year 75.

The standard appraisal period for a scheme of this nature is 60 years, so only the first two discount rates apply in this instance.

3. Economic Assessment Results

3.1. Overview

This chapter presents the results of the economic assessment for the proposed A6MARR scheme for all scenarios.

A summary of the economic statistics for each forecast scenario is provided in Table 3.1, with full details provided in the TEE Tables in **Appendix A**. The summary statistics are consistent with the TEE Tables and therefore include accident benefits calculated outside of TUBA.

Table 3-1 Economic Summary Statistics for the Proposed Scheme

Economic Benefits & Costs by Forecast Scenario			
Economic Summary Statistic	Preferred Option	Low Growth Scenario	High Growth Scenario
PVB	£943.5m	£852.4m	£2,020.2m
PVC	£207.1m	£207.1m	£207.1m
NPV	£736.3m	£645.2m	£1,813.1m
BCR	4.55	4.12	9.75

From the summary statistics above it is clear that the Preferred Option, as well as the Low and High Growth scenarios would all bring substantial benefits and value for money. The value is reflected most clearly by the BCRs, with the preferred option exceeding a BCR of 4.0, offering 'very high' value for money, the Low Growth scenario achieves a BCR slightly exceeding 4.0, whilst the High Growth scenario substantially exceeds a BCR of 4.00, both sensitivity test scenarios achieve BCR's which represent 'very high' value for money against DfT guidelines.

Detailed discussion of the scheme costs and benefits is provided in this chapter. The scheme costs included in the assessment are set out in the following section, including an explanation of how the nominal scheme investment costs are adjusted to allow for future inflation, risk and optimism bias. Also included in the discussion on scheme costs are the potential indirect tax revenue (dis) benefits arising from the scheme, which contribute to the overall Present Value of Costs (PVC), reported in Table 3.1 and in the TEE Tables in **Appendix A**.

Following the discussion on scheme costs, the scheme benefits are presented for each forecast scenario. This includes discussion on the relative contribution of benefits relating to travel time and vehicle operating costs, as well as any reduction in accidents that may arise as a result of the scheme, which contribute towards the overall Present Value of Benefits (PVB) reported above.

3.2. Scheme Costs

3.2.1. Overview

For the purposes of economic appraisal, total scheme costs include the discounted cost of investment (and operating/maintenance costs, if applicable) and the impact of the scheme on indirect tax revenues. These elements are discussed in more detail below, with specific reference to derivation of scheme PVC for each of the proposed schemes.

There are three main elements of a scheme cost estimate:

- **Base costs**, which are the basic costs of the scheme before allowing for risks, but allowing for realistic assumptions of changes in real costs over time, such as cost increases above growth in the retail price index (RPI);

- **Adjustment for risk**, which should cover all the risks that can be identified, the majority of which then need to be assessed and quantified through a Quantified Risk Assessment (QRA). This results in the risk-adjusted cost estimate; and
- **Adjustment for optimism bias** to reflect the well-established and continuing systematic bias for estimated scheme costs and delivery times to be too low and too short respectively. This results in the risk and optimism bias-adjusted cost estimate.

3.2.2. Investment Costs

The base cost represents the basic costs of the scheme for a given price base, made up of base investment (or capital cost) and base operating costs (including all maintenance costs). It is a detailed estimate of the cost of the project, taking into account the amount by which any of the elements of the scheme's cost are expected to increase at a different rate to the general level of inflation across the economy. That is, the base cost represents scheme capital and operating costs expressed in real prices.

The inflation rates relevant to the delivery of transport schemes are currently higher than general inflation rates across the economy. This has a knock-on effect on the overall scheme cost and ultimately the value for money of the scheme.

3.2.3. Estimation of Scheme Costs

The Final Target Cost for the main Key Stage 6 contract is £92,475,083 and is based on a commencement date of 25 March 2015. The detailed cost estimate and QRA are attached as **Annex 3** and **Annex 4** to the Application for Full Approval respectively.

The following paragraphs give the details of how the scheme costs used in the economic analysis have been in applied in TUBA.

Tag Unit A1.2 states: Only the costs which will be incurred subsequent to the economic appraisal and the decision to go ahead should be considered. 'Sunk' costs, which represent expenditure incurred prior to the scheme appraisal and which cannot be retrieved, should not be included. The costs of land or property purchased prior to an appraisal should be treated as sunk costs, unless the purchase costs could be recovered by the re-sale of the land or property if the scheme were not to go ahead. These should be based on current market values and not those incurred at the time of their acquisition, the value of expenditure prior to scheme appraisal classed as 'sunk' costs is £13.1 million.

The total capital cost of the scheme, including all land, preparation, maintenance, and supervision costs but excluding any future inflation, is £211.0 million at Q2 2014 prices.

Inflation has been applied to capital costs at 5.2% per annum, based upon long run RPI assumptions in government tender documentation of 2.5%, plus a 2.7% premium, based upon the Royal Institute of Chartered Surveyors (RICS) Building Cost Information Services (BCIS) Civil Engineering Index. These assumptions are in line with the assumptions used within the Greater Manchester Transport Fund (GMTF) financial strategy. The difference between land / construction sector inflation and economy-wide inflation has been applied to scheme costs for the purposes of economic appraisal.

Accordingly an allowance of £4.4 million for future inflation on construction and land prices has been made[4], which produces a base cost valued at £215.3 million. In addition, we have included an allowance of £16.2 million for an increase in future maintenance costs associated with the new road as well as a cost profile for Street Lighting costs and renewals over the scheme assessment period.

Optimism bias has been applied to the preparation, supervision, construction and land costs. Based on the advanced stage of project development & design it is considered that the appropriate level of optimism bias is 3%, representing the upper bound limit for full approval. The total adjustment for optimism bias applied in the appraisal is £6.4 million.

The total cost used in the economic appraisal amounts to £221.8 million. This value has been input to TUBA to reflect the allocation of expenditure between Local and Central Government. The Local and Central

4. The difference between land / construction sector inflation and economy-wide inflation has been applied to scheme costs for the purposes of economic appraisal. This is different to the inflation that is applied for the calculation of scheme capital costs as part of The Financial Case, which include absolute inflation (i.e. including RPI).

Government costs, once converted to 2010 prices and values using the default rates included in TUBA, produce a PVC of investment of £207.1 million.

A breakdown of the Preferred Option scheme costs is given in Table 3.2 below. This provides detailed information on the final capital cost element of the scheme (Construction, Land Costs, Preparation, Maintenance and Supervision) and estimated scheme cost spend profile (from 2010 to 2076).

Table 3-2 Preferred Option Scheme: Components of Investment Cost (Q2 2014 Prices)

Year	Capital Costs (£m)					
	Construction	Land	Preparation	Maintenance	Supervision	Total
2010	-	-	-	-	-	**0**
2011	-	-	-	-	-	**0**
2012	-	0.04	-	-	-	**0.04**
2013	-	0.2	-	-	-	**0.2**
2014	48.5	9.8	0.3	-	0.1	**58.7**
2015	43.5	5.2	0.3	-	1.2	**50.2**
2016	62.7	2.2	0.2	-	1.2	**66.3**
2017	19.4	1.7	0.1	-	0.3	**21.5**
2018	1.6	22.4	0.6	-	-	**24.6**
2019 to 2076	-	-	-	14.2	-	**14.2**
Total	**175.7**	**41.5**	**1.5**	**14.2**	**2.8**	**235.7**

3.2.4. Present Value of Costs (PVC)

The individual components of the Present Value of Costs for the preferred option is shown in Table 3.3.

Table 3-3 Present Value of Costs (£000s)

Cost Type	Core
Operating Costs	1,277
Investment Costs	205,861
Total PVC	207,138

3.3. Scheme Benefits

3.3.1. Accident Benefits

The results of the accident analysis for the core scheme are presented in Table 3.4. For comparison, the number of accidents and casualties and the overall accident cost is summarised for the two model years and the for the whole 60-year appraisal period.

The A6MARR scheme (preferred option) will see a decrease of 556 accidents across the 60-year appraisal period, resulting in the following:

- 3 additional fatalities;
- A reduction of 17 serious casualties; and
- A reduction of 728 slight casualties.

In monetised terms, this produces a benefit of £23 million over the 60-year appraisal period.

Table 3-4 Accident Costs and Benefits for A6MARR Scheme Table

Do – Minimum			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents	1,736	1,445	89,043
Casualties Fatal	19	15	918
Serious	243	197	12,180
Slight	2,055	1,714	105,557
Total Costs (£ms discounted to 2010 prices)	142	92	5,120
Do–Something			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents	1,718	1,437	88,487
Casualties Fatal	19	15	921
Serious	241	197	12,163
Slight	2,032	1,703	104,829
Total Costs (£ms discounted to 2010 prices)	140	92	5,097
Benefits (Do-Something – Do-Minimum)			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents	-18	-8	-556
Casualties Fatal	0	0	3
Serious	-2	0	-17
Slight	-23	-11	-728
Total Costs (£ms discounted to 2010 prices)	-2	0	-23

3.4. Scheme User Benefits

The following section details the economic benefits arising from the introduction of the Preferred Option, Low Growth and High Growth Scenarios of the A6MARR scheme.

3.4.1. Overview

A breakdown of the benefits generated by the proposed scheme is summarised in Table 3.5 below. As expected for a scheme of this nature, the majority of scheme benefits are generated in the form of time savings to highway users, accounting for up to 99% of total PVB.

Table 3-5 Proposed Scheme Total Economic Benefits by Forecast Scenario

Benefit	Economic Benefits by Forecast Scenario (£m)		
	Preferred Option	Low Growth	High Growth
Travel Time Savings	895.1	809.4	1,901.4
'VOC' Savings	7.2	11.9	88.0
Carbon Emission Savings	-10.7	-4.3	-2.7
Accident Savings	23	23	23
Indirect Tax	28.8	12.5	10.6
Net Present Value of Benefits (PVB)	943.3	852.5	2,020.3

It should be noted that the benefits presented in Table 3.1 relate to 'transport economic efficiency' TUBA based benefits alone (i.e. time savings and vehicle operating cost savings), so the total PVB figures are lower than those presented in the Table 3.5 above, as the latter include benefits relating to reductions in accidents and carbon emissions.

Table 3.6 gives the breakdown of benefits by journey purpose, the majority of benefits are accrued by 'business' travellers and 'other' users

Table 3-6 Distribution of TUBA Based Benefits Across User Types (£m)

Journey Purpose	PVB (£m)		
	Preferred Option	Low Growth	High Growth
Time Savings			
Business	317.1	302.3	686.1
Commuting	218.1	177.0	427.9
Other	359.9	330.1	787.3
Total	**895.1**	**809.4**	**1,901.3**
VOC Savings			
Business	37.9	31.2	90.3
Commuting	-2.1	-2.4	10.7
Other	-28.6	-16.9	-13.1
Total	**7.2**	**11.9**	**88.0**
Total PVB			
Business	354.9	333.5	776.5
Commuting	216.0	174.6	438.6
Other	331.3	313.2	774.2
Total	**902.3**	**821.3**	**1,989.4**

3.4.2. Temporal Distribution of Benefits

Table 3.7 provides a summary of the TUBA based PVB (excluding accidents and carbon emissions benefits) by time period, and the relative contribution of benefits from each time period to the total scheme benefits, over the 60-year appraisal period.

Table 3-7 Proposed Scheme TUBA Based PVB by Time Period

Time Period	Core Scheme		Low Growth Scenario		High Growth Scenario	
	£m	% of Total	£m	% of Total	£m	% of Total
AM Peak	312.0	35%	262.9	32%	585.9	31%
PM Peak	351.1	39%	285.3	35%	718.0	38%
Inter Peak	130.0	15%	146.3	18%	334.4	18%
Off Peak	54.4	6%	61.3	8%	.140.2	7%
Weekend	47.6	5%	53.6	7%	122.8	6%
Total PVB	**895.1**	**100%**	**809.4**	**100%**	**1,901.3**	**100%**

Considering the 'preferred option' analysis then the PM peak period provides the largest element of benefit generated with 39%. The AM peak follows closely behind as the next largest contributor; accounting for 35% of total PVB and the inter peak generating 15%.

This temporal pattern of benefits is broadly followed by the A6MARR Low and High Growth scenarios, with the PM Peak period generating the largest element of scheme benefit varying from 35% for the Low Growth scenario and 38% for the High Growth scenario.

3.4.3. Public Transport Benefits

Based on a proportionate approach to scheme appraisal, benefits in terms of public transport user travel time savings have not been monetised as these are considered to represent a relatively small percentage of the overall benefits of the A6MARR scheme.

It is anticipated however that the new road will provide an opportunity for new bus routes to be considered to complement those that currently operate in the corridor.

As an example of benefits to bus users, the current bus services X69 and 369 have been analysed. Both these services run between Stockport town centre and Manchester Airport and would directly benefit from construction of the Relief Road. The two diagrams below show the current bus route for these services along with a proposed route following the opening of the Relief Road. Because of the changed local road configuration with the scheme, the proposed bus route is approximately 230m longer than the current route.

The DM and DS journey times have been extracted from the traffic models and are shown below in Table 3.8. The data shows that the journey time saving for this bus route is between 6% and 23% with the new Relief Road in place, representing a reduction in journey time of between one minute in the inter-peak period and up to seven minutes in the AM peak period. This analysis demonstrates that the Relief Road will, in reality, deliver significant benefits to public transport users in the scheme corridor.

Table 3-8 Bus Journey Time Savings

	AM				IP				PM			
	2017		2032		2017		2032		2017		2032	
	DM	DS	DM	DS	DM	DS	DM	DS	DM	DS	DM	DS
Westbound												
Time (secs)	1808	1488	1975	1641	1398	1253	1492	1326	1735	1492	1825	1527
Time (mins)	30.1	25.2	33.3	27.3	23.3	21.2	24.8	22.1	28.9	24.9	30.4	25.4
Time Saving		17.7%		16.9%		10.4%		11.1%		14.0%		16.3%
Eastbound												
Time (secs)	1605	1487	1812	1608	1267	1211	1341	1258	1626	1405	1936	1513
Time (mins)	27.1	25.2	30.2	27.2	21.1	20.1	22.3	20.9	27.1	23.4	32.2	25.2
Time Saving		7.4%		11.3%		4.4%		6.2%		13.6%		21.8%

As mentioned above, the relief road will open up the prospect of new bus services along the corridor utilising the new road. As no specific services are planned, no account has been taken of these potential services within the transport models or in scheme appraisal. There is however a real possibility that bus operators would seek to capitalise upon this new route corridor and operate commercial services between the town centres and the Airport. Typical bus services could include the following:

- Stockport town centre to Manchester Airport (via Hazel Grove and Bramhall). Currently a park and ride site at Hazel Grove is being promoted by one of the bus operators.
- Stockport town centre to Wilmslow and Handforth
- Macclesfield to Manchester Airport (via Poynton)

Any such new bus services would add to the economic benefit to public transport, reduce travel by private car and contribute to reducing the carbon impact of the new relief road. This will directly address one of the scheme's second tier objectives, which is to:

Support lower carbon travel:

- Improve public transport accessibility (reduced journey times for buses) and increase bus usage between Stockport town centre and Manchester Airport

3.4.4. Spatial Distribution of Benefits

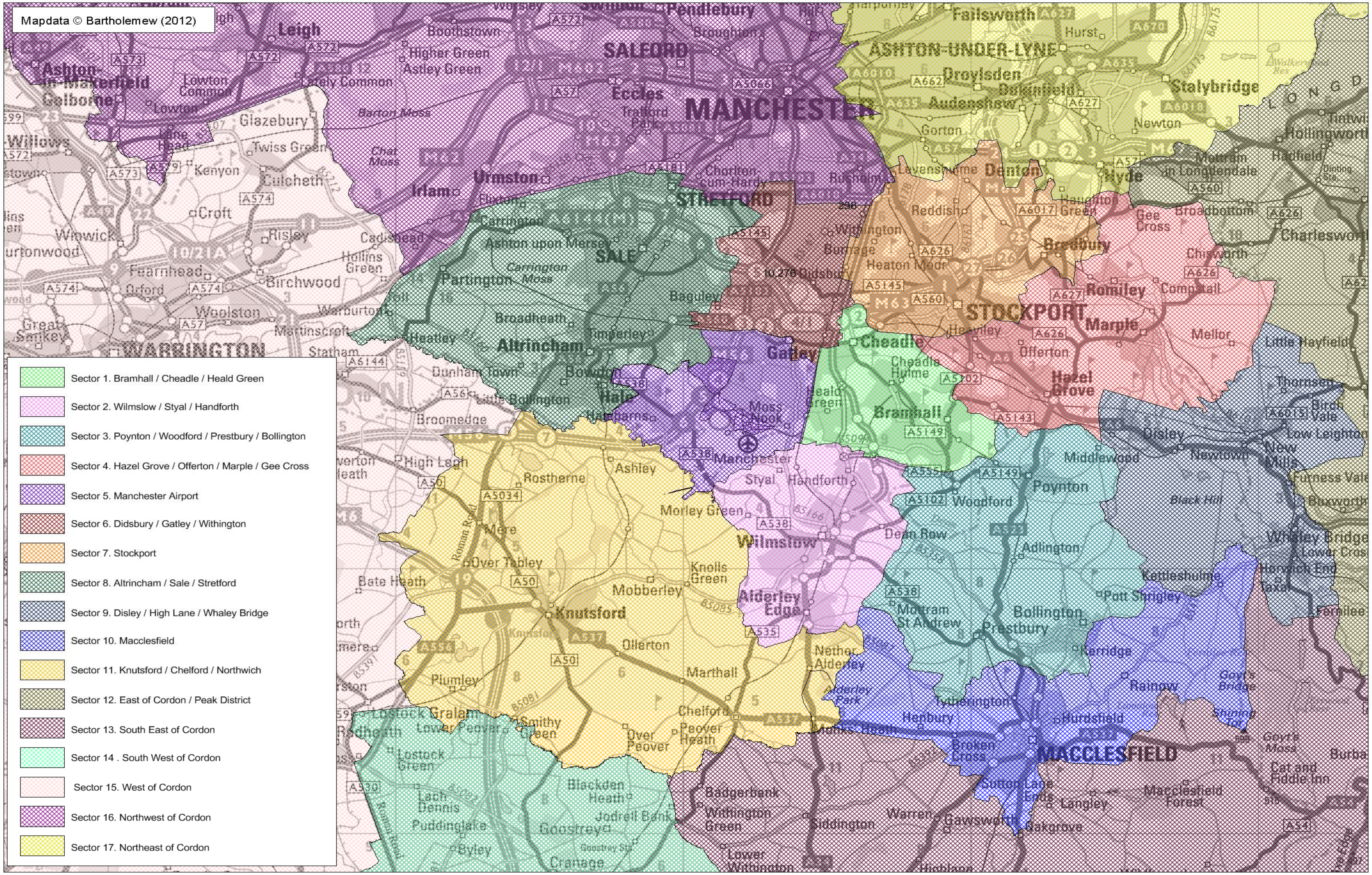
The economic assessment is concerned primarily with the overall economic summary statistics, culminating in a BCR that reflects the value for money of the scheme proposals. However, it is important to understand from where these benefits have been derived. One way of doing this is to compare the benefits generated by different geographical areas across the study area.

This 'sector analysis' has been undertaken using the following 'geographical' areas (and shown graphically in Figure 3.1 below).

- Sector 1 - Bramhall / Cheadle / Heald Green;
- Sector 2 - Wilmslow / Styal / Handforth;
- Sector 3 – Poynton / Woodford / Prestbury / Bollington;
- Sector 4 – Hazel Grove / Offerton / Marple / Gee Cross;
- Sector 5 – Manchester Airport;
- Sector 6 – Didsbury / Gatley / Withington;
- Sector 7 – Stockport;
- Sector 8 – Altrincham / Sale / Stretford;

- Sector 9 – Disley / High Lane / Whaley Bridge;
- Sector 10 – Macclesfield;
- Sector 11 – Knutsford / Chelford / Northwich;
- Sector 12 – East of ‘Cordon’ / Peak District;
- Sector 13 – South East of ‘Cordon’;
- Sector 14 – South West of ‘Cordon’;
- Sector 15– West of ‘Cordon’;
- Sector 16 – North West of ‘Cordon’; and;
- Sector 17 – North East of ‘Cordon’

Figure 3-1 A6MARR Traffic Model - TUBA 'Sector' Boundaries



Tables 3.9, 3.10, 3.11 & 3.12 provide a summary of the total benefits generated by trips from and to each of the above sectors at 2017 and 2032 (the scheme 'opening' and 'design' years).

Benefits from the proposed A6MARR scheme are shown to be greatest for traffic travelling to/from local centres adjacent to the route of the scheme such as Bramhall, Cheadle, Hazel Grove, Marple, Wilmslow, Styal and Handforth among others. Significant benefits are also observed for trips originating and destined for the central Stockport area. These benefits are accrued due to traffic using the proposed SEMMMS scheme as an attractive and viable alternative for access to these local centres and enabling longer distance through trips to re-route away from these local centres and the existing congested local road network.

This pattern of benefits is the same for both the opening year of 2017 and the design year of 2032. The distribution of benefits is also broadly similar across both the Low Growth and High Growth scenarios.

Detailed sector-to-sector result tables are provided in Appendix C.

Table 3-9 Scheme Origin Trip TUBA Based PVB (£000s) at Sector Level - 2017

Sector	Preferred Option	Low Growth	High Growth
Bramhall / Cheadle / Heald Green	1481	932	2117
Wilmslow / Styal / Handforth	1231	828	1089
Poynton / Woodford / Prestbury / Bollington	1035	986	1278
Hazel Grove / Offerton / Marple / Gee Cross	1685	1057	2336
Manchester Airport	1183	924	1499
Didsbury / Gatley / Withington	229	326	-83
Stockport	1096	891	855
Altrincham / Sale / Stretford	668	596	447
Disley / High Lane / Whaley Bridge	320	492	1014
Macclesfield	167	180	116
Knutsford / Chelford / Northwich	199	58	51
East of Cordon / Peak District	620	389	876
South East of Cordon	1502	1041	1761
South West of Cordon	265	9	-172
West of Cordon	1124	939	1195
Northwest of Cordon	1040	1020	836
Northeast of Cordon	1791	1568	1771
Total	15642	12237	16986

Table 3-10 Scheme Destination Trip TUBA Based PVB (£000s) at Sector Level 2017

Sector	Preferred Option	Low Growth	High Growth
Bramhall / Cheadle / Heald Green	1659	828	2561
Wilmslow / Styal / Handforth	1464	1089	-695
Poynton / Woodford / Prestbury / Bollington	14220	1194	1523
Hazel Grove / Offerton / Marple / Gee Cross	1789	1075	2742
Manchester Airport	611	483	610
Didsbury / Gatley / Withington	209	245	141
Stockport	781	609	623
Altrincham / Sale / Stretford	634	619	670
Disley / High Lane / Whaley Bridge	1065	1041	1627
Macclesfield	227	129	336
Knutsford / Chelford / Northwich	199	210	307
East of Cordon / Peak District	681	764	864
South East of Cordon	1138	1078	1224
South West of Cordon	188	147	349
West of Cordon	1004	635	1240
Northwest of Cordon	834	719	742
Northeast of Cordon	1739	1369	2119
Total	15642	12237	16986

Table 3-11 Scheme Origin Trip TUBA Based PVB (£000s) at Sector Level - 2032

Sector	Preferred Option	Low Growth	High Growth
Bramhall / Cheadle / Heald Green	2064	1200	6698
Wilmslow / Styal / Handforth	1169	865	5405
Poynton / Woodford / Prestbury / Bollington	1491	1293	2418
Hazel Grove / Offerton / Marple / Gee Cross	2876	1808	4862
Manchester Airport	2195	1174	3300
Didsbury / Gatley / Withington	214	213	810
Stockport	2440	1586	4156
Altrincham / Sale / Stretford	1043	678	1990
Disley / High Lane / Whaley Bridge	556	968	1879
Macclesfield	212	323	634
Knutsford / Chelford / Northwich	-112	214	284
East of Cordon / Peak District	532	851	1012
South East of Cordon	651	1983	2942
South West of Cordon	-203	364	758
West of Cordon	1097	925	1860
Northwest of Cordon	977	792	1720
Northeast of Cordon	1347	2022	2550
Total	18479	17259	43279

Table 3-12 Scheme Destination Trip TUBA Based PVB (£000s) at Sector Level - 2032

Sector	Preferred Option	Low Growth	High Growth
Bramhall / Cheadle / Heald Green	2287	1413	5688
Wilmslow / Styal / Handforth	1941	949	3740
Poynton / Woodford / Prestbury / Bollington	1995	1557	3753
Hazel Grove / Offerton / Marple / Gee Cross	2710	1850	5508
Manchester Airport	817	666	1734
Didsbury / Gatley / Withington	296	368	953
Stockport	2505	1732	4409
Altrincham / Sale / Stretford	925	513	1873
Disley / High Lane / Whaley Bridge	550	1949	2917
Macclesfield	160	159	978
Knutsford / Chelford / Northwich	168	163	782
East of Cordon / Peak District	574	458	572

South East of Cordon	374	1136	1632
South West of Cordon	-50	230	988
West of Cordon	1055	1008	1796
Northwest of Cordon	828	908	2564
Northeast of Cordon	1345	2200	3394
Total	18479	17259	43279

The main benefits are shown to accrue to users travelling to and from the local centres around the proposed scheme. This is intuitive, as the scheme provides drivers with an alternative option to their normal route and hence, some vehicles will be taken off existing roads, reducing travel time for those who continue to use these existing roads as part of their route.

Table 3.13 provides a summary of the combined total benefits generated by trips from and to each of the 17 sectors for 2017 and 2032 (the scheme 'opening' and 'design' years).

Table 3-13 Combined Origin/Destination Trip TUBA Based PVB (£000s) at Sector Level

Sector	Preferred Option		Low Growth		High Growth	
	2017	2032	2017	2032	2017	2032
Bramhall / Cheadle / Heald Green	3146	4351	1760	2613	4678	12386
Wilmslow / Styal / Handforth	2695	3111	1917	1814	394	9144
Poynton / Woodford / Prestbury / Bollington	2455	3486	2181	2850	2802	6171
Hazel Grove / Offerton / Marple / Gee Cross	3474	5586	2132	3658	5078	10370
Manchester Airport	1794	3012	1407	1841	2109	5034
Didsbury / Gatley / Withington	439	510	571	581	59	1763
Stockport	1876	4945	1500	3318	1478	8565
Altrincham / Sale / Stretford	1302	1967	1215	1191	1117	3863
Disley / High Lane / Whaley Bridge	1385	1106	1533	2916	2642	4796
Macclesfield	1322	2600	1020	1744	1191	5134
Knutsford / Chelford / Northwich	398	56	268	377	358	1066
East of Cordon / Peak District	1301	1106	1153	1310	1739	1584
South East of Cordon	2641	1025	2119	3119	2986	4574
South West of Cordon	453	-254	156	594	177	1746
West of Cordon	2128	2083	1574	1933	2435	3556
Northwest of Cordon	1874	1804	1740	1700	1579	4284
Northeast of Cordon	3531	2692	2938	4222	3890	5944
Total	32213	39186	25184	35781	34712	90081

4. Conclusions

4.1. Overview

A series of traffic models have been developed to assess proposals for the potential A6MARR scheme. Two sensitivity tests assessing a Low and High Growth scenario have also been undertaken. The future year traffic models have been used to generate demand and cost data, which forms the basis of an economic assessment described in this report.

4.2. Scheme Benefits

The preferred option scheme produces a PVB of £943 million. Taking into account the total scheme costs, it produces a scheme NPV of £736 million and a **BCR of 4.55**. This represents '**very high' value for money** against DfT guidance.

The scheme is forecast to reduce the number of accidents on the highway network across the study area, resulting in 556 fewer personal injury accidents and generating £23 million of accident savings benefits as a consequence.

This economic assessment has shown that the A6MARR scheme provides very good value for money, exceeding the DfT criterion for 'very high' value for money.

Appendices

Appendix A. TEE Tables

Table A-1 TEE Table – Preferred Option

Table 1: Transport Economic Efficiency Benefits

Consumers - Commuting User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	218086		218086			
Vehicle Operating Costs	-2051		-2051			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	216035	(1a)	216035	0	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	359959		359959			
Vehicle Operating Costs	-28638		-28638			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	331321	(1b)	331321	0	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	317076		165750	151326				
Vehicle Operating Costs	37857		7745	30112				
User Charges	0		0	0				
During Construction & Maintenance	0		0	0				
Subtotal	354933	(2)	173495	181438	0	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	0	(3)	0	0	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	354933	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	902289	(6) = (1a) + (1b) + (5)

Notes: **Benefits** appear as **positive** numbers, while **costs** appear as **negative** numbers

Table 2: Public Accounts

Local Government Funding	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Revenue	0		0			
Operating Costs	1277		1277			
Investment Costs	57641		57641			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	58918	(7)	58918			

Central Government Funding: Transport						
Revenue	0		0			
Operating costs	0		0			
Investment Costs	148220		148220			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	148220	(8)	148220			

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-28833	(9)	-28833			

TOTALS		
Broad Transport Budget	207138	(10) = (7) + (8)
Wider Public Finances	-28833	(11) = (9)

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

Table 3: Analysis of Monetised Costs and Benefits

Noise		(12)
Local Air Quality		(13)
Greenhouse Gases	-10669	(14)
Journey Ambience		(15)
Accidents	23000	(16)
Economic Efficiency: Consumer Users (Commuting)	216035	(1a)
Economic Efficiency: Consumer Users (Other)	331321	(1b)
Economic Efficiency: Business Users and Providers	354933	(5)
Wider Public Finances (Indirect Taxation Revenues)	-28833	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	943453	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	207138	(10)
Present Value of Costs (see notes) (PVC)	207138	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	736315	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.55	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.

Table A-2 TEE Table - Low Growth Scenario

Table 1: Transport Economic Efficiency Benefits

Consumers - Commuting User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	176980		176980			
Vehicle Operating Costs	-2435		-2435			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	174545	(1a)	174545	0	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	330103		330103			
Vehicle Operating Costs	-16923		-16923			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	313180	(1b)	313180	0	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	302286		156764	145522				
Vehicle Operating Costs	31214		6395	24819				
User Charges	0		0	0				
During Construction & Maintenance	0		0	0				
Subtotal	333500	(2)	163159	170341	0	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	0	(3)	0	0	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	333500	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	821225	(6) = (1a) + (1b) + (5)

Notes: **Benefits** appear as **positive** numbers, while **costs** appear as **negative** numbers

Table 2: Public Accounts

Local Government Funding	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Revenue	0		0			
Operating Costs	1277		1277			
Investment Costs	57641		57641			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	58918	(7)	58918			

Central Government Funding: Transport						
Revenue	0		0			
Operating costs	0		0			
Investment Costs	148220		148220			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	148220	(8)	148220			

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-12457	(9)	-12457			

TOTALS		
Broad Transport Budget	207138	(10) = (7) + (8)
Wider Public Finances	-12457	(11) = (9)

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

Table 3: Analysis of Monetised Costs and Benefits

Noise		(12)
Local Air Quality		(13)
Greenhouse Gases	-4297	(14)
Journey Ambience		(15)
Accidents	23000	(16)
Economic Efficiency: Consumer Users (Commuting)	174545	(1a)
Economic Efficiency: Consumer Users (Other)	313180	(1b)
Economic Efficiency: Business Users and Providers	333500	(5)
Wider Public Finances (Indirect Taxation Revenues)	-12457	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	852385	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	207138	(10)
Present Value of Costs (see notes) (PVC)	207138	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	645247	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.12	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.

Table A-3 TEE Table – High Growth Scenario

Table 1: Transport Economic Efficiency Benefits

Consumers - Commuting User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	427980		427980			
Vehicle Operating Costs	10672		10672			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	438652	(1a)	438652	0	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	787324		787324			
Vehicle Operating Costs	-13028		-13028			
User Charges	0		0			
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	774296	(1b)	774296	0	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	686158		331429	354729				
Vehicle Operating Costs	90256		15895	74361				
User Charges	0		0	0				
During Construction & Maintenance	0		0	0				
Subtotal	776414	(2)	347324	429090	0	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	0	(3)	0	0	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	776414	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	1989362	(6) = (1a) + (1b) + (5)

Notes: **Benefits** appear as **positive** numbers, while **costs** appear as **negative** numbers

Table 2: Public Accounts

Local Government Funding	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Revenue	0		0			
Operating Costs	1277		1277			
Investment Costs	57641		57641			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	58918	*(7)*	58918			

Central Government Funding: Transport						
Revenue	0		0			
Operating costs	0		0			
Investment Costs	148220		148220			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	148220	*(8)*	148220			

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-10572	*(9)*	-10572			

TOTALS		
Broad Transport Budget	207138	*(10) = (7) + (8)*
Wider Public Finances	-10572	*(11) = (9)*

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

Table 3: Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	-2695	*(14)*
Journey Ambience		*(15)*
Accidents	23000	*(16)*
Economic Efficiency: Consumer Users (Commuting)	438652	*(1a)*
Economic Efficiency: Consumer Users (Other)	774296	*(1b)*
Economic Efficiency: Business Users and Providers	776414	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-10572	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Option Values		*(17)*
Present Value of Benefits (see notes) (PVB)	2020239	*(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)*
Broad Transport Budget	207138	*(10)*
Present Value of Costs (see notes) (PVC)	207138	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	1813101	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	9.75	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.

Appendix B. Derivation of Annualisation Factors

Annualisation factors for expanding modelled benefits across the year can be based on default values as recommended in the TUBA guidance, or on locally-observed traffic data. In cases where AM, inter-peak and PM peak models represent an average hour during each time period, default factors are easy to justify. The AM and PM peak periods are assumed to represent the periods 0700-1000 and 1600-1900 respectively, that is, three hours in each peak period. A factor of three would be applied to an AM/PM average hour model, to reflect the fact that average conditions occur on three hours of the day. Assuming 253 working days across the year (365 days less 104 weekend days and 8 Bank Holidays), an annualisation factor of 759 would be adopted for the AM and PM models (253 days x 3 peak hours).

The inter-peak is represented by the period 1000-1600, that is, a six-hour period, so total daily inter-peak benefits would be derived by applying a factor of 6 to the inter-peak modelled hour benefits. Assuming the same 253 working days across the year, a factor of 1518 would be adopted for the inter-peak (253 x 6 inter-peak hours).

For the SEMMMS A6 to Manchester Airport Relief Road Scheme, default values would be potentially misleading for the AM peak traffic model, as they represent the single peak hour, rather than average morning peak traffic conditions. In such instances, the benefits generated by the scheme proposals are likely to be overestimated, as peak hour conditions are unlikely to be replicated for all three hours of the AM peak period. The factor used to annualise peak hour modelled benefits, therefore, is lower than the default factors one would apply to 'average hour' models, as it takes into account the higher than average proportion of traffic in the peak hour relative to the respective three-hour peak periods.

For the inter-peak and PM Peak average hour models, however, the default factor of 1518 and 759 respectively are valid as they are based on an average of inter-peak and PM peak hours and have therefore been adopted for this assessment.

Annualisation factors for a Saturday and an off peak week day period of 19:00 – 07:00 have also been calculated and used as part of the TUBA assessment.

The annualisation factors used for each time period are as follows:

- Weekday AM Peak: 672;
- Weekday PM Peak: 759;
- Weekday Inter-Peak:1518;
- Off Peak: 633: and
- Weekend: 520.

The off peak and Weekend annualisation factors have been specifically adjusted for this study. TRADS data was collated for 21 sites within the area of interest, most notably on the M56, M60 South and the A5103. The TRADS data enabled analysis of full 24 hour flow profiles for both weekday and weekend traffic.

Both an average weekday off peak (19:00 – 07:00) hourly flow and an average weekend hourly flow was calculated. These were compared to an average inter-peak hour flow to obtain an 'inter-peak to respective hour' factor. This factor was 0.319 for off-peak and 0.561 for weekend. The factors were then multiplied by the number of hours in the day, days in the week and weeks in the year for each respective time period. The resulting annualisation factors were 994 for off-peak and 1401 for weekend. Table B.1 below summaries the derivation of 'off-peak' and 'weekend' annualisation factors.

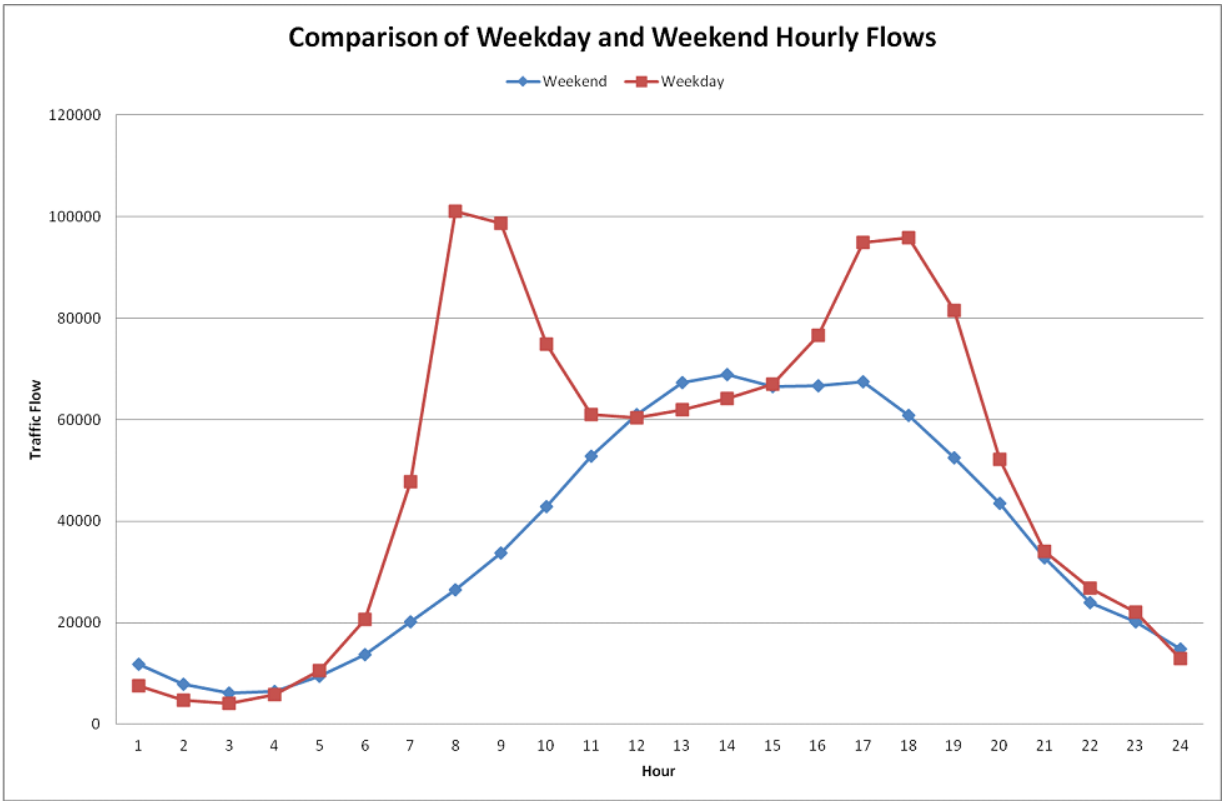
Table B-1 Derivation of Off-Peak and Weekend Annualisation Factors Table

Factor Variable	Off-peak	Weekend
IP hour to respective hour	0.319	0.561
Hours in day	12	24
Days in week	5	2
Weeks in year	52	52
Annual Factor	**994**	**1401**

An analysis of a typical weekend traffic flow profile revealed that 'inter-peak' traffic conditions are met for approximately 5 hours (for the period 1200 to 1700 as shown in the figure below). It was therefore it was felt that an annualisation factor of 1401 hours would dramatically over-estimate the numbers of weekend hours and as such distort the level of scheme benefit generated for the Weekend period. For the purposes of this appraisal it was decided to use the following assumptions to generate the weekend annualisation factor – 5 hours (of inter peak travel volume conditions) x 2 weekend days x 52 weeks = 520.

A similar assumption was made to generate the off-peak annualisation factor, as again it was felt that a figure of 994 was too high and distort an scheme benefit profile. An analysis of TRADS data showed that there were approximately 2.5 hours in the off peak period that match a typical inter peak flow profile. This was then multiplied by 253 (off peak week days in a year) to generate an off peak annualisation factor of 633.

Figure B.1 Comparison of Weekday and Weekend Traffic Volumes (TRADS Data)



Appendix C. Sector Benefits

Table C-1 Preferred Option Core Scenario - 2017 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	108	-42	80	422	241	9	105	167	141	-5	6	70	2	-14	123	12	31	1455
2	131	-109	146	252	186	42	41	235	110	-26	-23	3	-1	-19	103	109	85	1264
3	93	223	103	-158	243	23	-21	109	32	39	44	-3	6	5	201	92	-10	1020
4	285	161	91	494	193	32	290	69	-164	-34	44	-51	-21	-8	163	79	80	1702
5	378	386	287	238	0	-52	16	-140	184	14	-2	27	31	-10	-163	-199	28	1024
6	26	26	51	67	-66	10	41	19	40	8	-1	2	2	3	-77	29	26	206
7	182	26	53	456	27	25	145	50	-93	6	8	9	-1	12	-7	95	52	1045
8	116	250	127	129	-186	-11	64	7	66	15	8	33	7	15	-35	-4	52	654
9	50	148	44	-294	187	52	-91	110	-59	25	41	-63	-28	9	302	128	-98	462
10	8	-29	23	-52	40	14	26	30	-9	36	10	-3	34	-1	20	45	27	220
11	13	5	12	34	-13	5	17	1	34	19	2	1	10	-6	32	17	60	243
12	-48	5	2	-83	28	21	62	47	39	7	3	0	2	1	165	267	50	568
13	2	2	4	-37	32	5	1	14	196	33	8	-1	37	8	32	64	961	1362
14	12	-5	4	3	0	7	34	7	4	12	-2	1	7	0	95	13	81	274
15	185	225	150	230	-184	-35	13	-55	204	32	44	168	38	100	-16	-34	33	1098
16	24	83	115	157	-164	34	112	-37	174	18	17	262	46	14	-39	12	27	855
17	67	12	32	99	31	13	34	49	239	-34	16	72	824	40	-4	16	67	1573
Total	1633	1367	1321	###	593	194	887	683	1139	165	222	529	995	149	895	742	1553	15024

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	14	15	7	19	14	1	12	8	7	-1	0	-1	0	4	6	10	0	115
2	-5	-13	5	4	30	1	1	17	16	0	0	0	0	1	12	11	0	80
3	14	17	9	-30	29	2	-24	11	16	4	-3	0	0	-1	31	12	0	87
4	16	7	4	45	13	-1	19	1	-20	-6	3	-21	-3	1	8	9	54	128
5	29	48	40	18	0	-8	2	-2	28	10	-1	6	7	3	-4	1	43	222
6	2	1	4	-2	-6	0	3	-1	3	0	0	0	2	0	5	1	43	56
7	15	3	-9	36	5	1	12	7	-21	-3	0	-8	-4	1	0	5	6	47
8	10	34	14	7	-13	3	6	3	9	4	3	11	3	4	1	2	5	105
9	1	26	17	-39	27	2	-45	10	-4	7	7	-4	2	2	77	6	-38	55
10	-2	-4	2	-12	2	3	-8	2	3	2	1	0	2	0	-1	3	-30	-38
11	6	-10	-1	-2	0	1	1	0	4	1	0	0	1	0	2	2	1	6
12	-7	1	0	-31	4	0	-13	8	3	0	0	0	0	0	31	29	17	43
13	-2	0	0	-3	6	3	-6	3	14	1	0	0	2	0	3	2	47	72
14	-1	-3	0	-11	1	0	-2	0	1	0	-1	0	0	0	-3	5	10	-3
15	13	21	24	18	-12	6	0	-2	44	1	0	54	4	-2	1	0	4	173
16	4	25	28	4	2	2	4	-4	18	-1	2	33	18	2	-1	0	1	138
17	6	8	2	13	5	0	-1	1	13	-7	0	25	51	1	3	-1	2	120
Total	111	177	147	34	106	18	-40	63	136	13	12	94	85	15	172	99	166	1407

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	12	25	1	-34	-28	2	5	-19	-26	1	1	-4	1	6	-48	17	5	-84
2	-8	4	-15	-38	-1	-1	0	-31	-48	10	6	-5	3	8	1	3	-1	-113
3	7	-7	3	2	-22	-1	-10	-24	11	1	-8	0	-1	0	-50	31	-4	-73
4	-19	-32	15	2	-31	-6	-8	-30	27	27	-17	-10	5	-1	-67	3	-2	-145
5	-25	5	-12	-32	0	-1	1	22	-29	4	2	-1	-7	16	39	-31	-13	-63
6	1	-1	-2	-13	1	0	-2	-3	-14	0	1	-1	-4	2	27	-14	-10	-32
7	6	3	2	-10	3	-2	1	-3	0	4	-1	5	-4	-3	24	-22	0	3
8	-16	-24	-22	-30	13	4	-4	16	-38	-2	4	5	-3	5	12	5	-16	-91
9	-17	-44	15	24	-32	-14	-14	-40	20	7	-19	4	11	-1	-79	-21	3	-197
10	-1	4	0	21	-6	1	-5	-6	5	-2	-4	2	-12	-11	-6	-5	9	-14
11	4	-8	-3	-18	3	1	-2	1	-22	-5	1	0	-4	1	4	4	-6	-49
12	-7	-1	0	-14	-1	-6	-16	1	0	8	-1	0	2	1	7	22	13	8
13	1	1	-1	7	-5	0	1	-5	11	-14	-2	7	-8	1	15	1	61	69
14	-6	3	1	-14	7	1	-1	1	-5	-13	2	2	4	-1	6	9	-2	-6
15	-31	-27	-68	-50	11	39	6	16	-98	-6	-1	9	25	-3	19	16	-4	-147
16	13	19	33	-16	14	-11	-10	0	-45	2	9	24	-3	13	17	-6	-6	47
17	-1	2	4	10	-12	-7	-7	-8	42	25	-8	23	55	-10	17	-19	-7	98
Total	-84	-78	-45	-198	-83	3	-60	-104	-201	58	-24	70	72	38	-48	9	38	-636

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	134	-2	87	407	227	11	122	156	122	-5	8	65	3	-5	80	39	36	1487	10%	4
2	118	-118	136	218	214	42	42	221	78	-16	-18	-1	1	-10	116	123	84	1231	8%	5
3	114	233	115	-185	250	24	-56	96	59	44	32	-3	5	4	182	135	-13	1035	7%	10
4	282	135	110	541	174	25	301	40	-158	-13	30	-82	-19	-8	105	91	132	1685	11%	2
5	382	439	315	225	0	-61	18	-120	184	28	-1	33	31	9	-128	-230	59	1183	8%	6
6	29	26	53	52	-71	10	41	16	28	7	1	1	0	5	-45	15	60	229	1%	15
7	204	31	46	482	35	24	157	54	-113	7	7	6	-9	10	17	79	58	1096	7%	8
8	110	260	119	105	-186	-4	67	25	37	18	15	49	7	24	-23	4	41	668	4%	11
9	34	130	76	-309	182	40	-151	81	-43	40	29	-64	-16	10	300	113	-133	320	2%	13
10	5	-28	26	-43	36	18	12	25	0	36	6	-1	24	-12	13	44	6	167	1%	17
11	22	-13	8	14	-10	7	16	2	16	15	3	1	7	-5	38	24	55	199	1%	16
12	-61	5	2	-128	31	14	34	57	42	15	2	0	5	1	203	319	80	620	4%	12
13	1	3	4	-33	32	8	-4	13	221	20	6	6	31	9	49	67	1069	1502	10%	3
14	5	-4	5	-22	8	8	31	9	0	-1	-1	3	11	-1	99	27	88	265	2%	14
15	167	219	105	197	-185	10	19	-42	150	27	43	231	66	95	5	-17	32	1124	7%	7
16	42	127	176	145	-149	25	106	-41	148	19	29	318	61	29	-23	6	22	1040	7%	9
17	72	22	37	121	23	6	26	43	294	-15	7	120	930	31	16	-3	62	1791	11%	1
Total	1659	1464	1420	1789	611	209	781	634	1065	227	199	681	1138	188	1004	834	1739	15642	100%	
Percentage	11%	9%	9%	11%	4%	1%	5%	4%	7%	1%	1%	4%	7%	1%	6%	5%	11%	100%		
Rank	3	4	5	1	13	15	10	12	7	14	16	11	6	17	8	9	2			

Origin	PVB	%
17	1791	11%
4	1685	11%
13	1502	10%
1	1487	10%
2	1231	8%
5	1183	8%
15	1124	7%
7	1096	7%
16	1040	7%
3	1035	7%
8	668	4%
12	620	4%
9	320	2%
14	265	2%
6	229	1%
11	199	1%
10	167	1%

Destination	PVB	%
4	1789	11%
17	1739	11%
1	1659	11%
2	1464	9%
3	1420	9%
13	1138	7%
9	1065	7%
15	1004	6%
16	834	5%
7	781	5%
12	681	4%
8	634	4%
5	611	4%
10	227	1%
6	209	1%
11	199	1%
14	188	1%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Table C-2 Preferred Option Core Scenario - 2032 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	175	-5	93	473	407	29	223	210	130	3	6	73	17	-42	135	56	98	2081
2	42	-118	74	286	272	68	45	284	118	-91	-64	6	-14	-98	188	167	64	1231
3	143	349	113	-11	313	28	15	127	42	-18	50	0	-3	-7	234	120	-14	1482
4	433	201	354	622	250	52	639	76	-187	8	41	-58	-18	-5	172	139	130	2851
5	749	605	367	321	0	-6	83	-142	232	40	12	41	49	-7	-238	-142	141	2107
6	50	19	54	81	-57	19	82	7	38	-1	-1	5	3	-2	-111	-19	51	218
7	264	27	115	674	61	65	775	83	-100	16	11	-10	-5	7	5	162	168	2318
8	174	316	167	141	-253	15	104	143	67	13	7	34	10	39	-43	18	87	1039
9	62	181	142	-278	235	46	-98	111	-161	29	37	-77	-14	10	296	135	-61	595
10	5	-3	111	-15	40	5	16	25	-54	43	21	4	19	-20	39	21	3	259
11	-16	-84	4	23	-28	-11	7	-22	18	15	-4	3	16	-21	49	-18	15	-55
12	-46	11	8	-75	43	17	41	38	18	13	5	0	18	4	121	224	71	513
13	3	19	19	-41	38	8	-4	16	38	98	23	2	56	13	72	31	188	579
14	-45	-52	4	-22	-49	-11	-3	9	-8	-19	-17	4	14	1	145	-16	-23	-88
15	228	292	181	275	-352	-86	18	-91	213	46	58	150	54	116	-18	-60	39	1063
16	26	59	94	219	-196	28	203	30	156	6	1	249	18	-2	-56	3	53	892
17	72	23	40	164	54	36	300	61	53	-25	18	43	144	4	-3	30	260	1275
Total	2318	1842	1941	###	778	303	2446	968	613	176	204	468	363	-10	988	852	1270	18358

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	195	-16	93	460	398	32	258	202	112	0	-5	70	15	-46	105	81	111	2064	11%	4
2	-32	-90	58	255	297	65	36	262	98	-83	-50	4	-12	-73	212	175	48	1169	6%	7
3	159	355	128	-41	316	28	-5	109	55	-13	45	-1	-4	-2	231	146	-15	1491	8%	5
4	445	179	356	674	237	50	681	57	-174	1	33	-76	-8	-10	127	146	159	2876	16%	1
5	771	654	381	310	0	-3	86	-129	224	40	13	48	42	6	-204	-177	133	2195	12%	3
6	52	16	53	68	-58	23	83	9	29	-5	-5	2	-2	-11	-107	-23	92	214	1%	14
7	303	25	121	709	68	68	836	79	-110	14	4	-19	1	-7	12	155	183	2440	13%	2
8	167	313	157	120	-243	21	107	166	45	8	6	45	4	36	-23	23	88	1043	6%	8
9	44	170	170	-281	225	36	-126	84	-152	46	34	-77	-3	17	310	115	-56	556	3%	12
10	-1	20	123	-23	42	4	7	17	-48	45	17	5	-3	-16	30	9	-15	212	1%	15
11	-34	-57	4	8	-24	-15	-3	-24	8	11	-2	4	8	-10	52	-31	-7	-112	-1%	16
12	-55	9	8	-91	47	13	17	40	9	14	5	0	20	4	150	255	87	532	3%	13
13	2	23	19	-45	38	10	-1	19	71	83	19	11	42	20	89	31	222	651	4%	11
14	-64	-32	10	-46	-46	-18	-15	1	-7	-17	-2	7	28	4	101	-50	-57	-203	-1%	17
15	197	276	130	245	-332	-71	18	-73	177	39	57	185	84	89	21	-51	35	1027	6%	9
16	51	77	136	205	-193	18	207	45	135	-5	-4	299	4	-6	-44	-3	54	977	5%	10
17	86	19	50	181	45	37	320	61	77	-19	4	68	159	-45	-6	28	284	1347	7%	6
Total	2287	1941	1995	2710	817	296	2505	925	550	160	168	574	374	-50	1055	828	1345	18479	100%	
Percentage	12%	11%	11%	15%	4%	2%	14%	5%	3%	1%	1%	3%	2%	0%	6%	4%	7%	100%		
Rank	3	5	4	1	10	14	2	8	12	16	15	11	13	17	7	9	6			

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	12	9	5	15	18	2	18	8	3	1	0	0	0	2	7	10	0	109
2	-13	-6	1	8	29	3	2	13	13	-9	-8	1	-2	-5	27	11	0	66
3	14	16	7	-12	25	1	-12	7	8	-1	-1	0	0	-1	30	12	0	95
4	22	10	13	36	14	1	32	2	-18	-3	3	-19	-1	0	8	10	23	134
5	40	44	31	19	-34	-1	4	-4	23	4	0	8	2	2	-5	-26	14	122
6	2	1	1	-1	-3	2	3	1	2	0	0	0	0	-2	-7	1	49	49
7	20	3	3	36	6	4	45	3	-15	3	0	-12	-1	-1	0	8	10	113
8	9	22	10	5	-9	3	9	8	6	2	1	10	1	2	-1	2	8	87
9	-2	18	15	-28	23	1	-26	5	-10	8	6	-5	-1	3	64	6	-15	62
10	0	2	7	-5	5	1	-1	1	0	2	1	0	1	-1	0	1	-12	0
11	-2	-2	0	-1	0	0	0	0	2	1	0	0	1	-1	2	1	-1	1
12	-6	1	0	-24	5	1	-14	6	0	0	0	0	0	0	28	19	4	23
13	-1	1	1	-3	6	2	-3	3	2	3	1	0	2	0	6	4	5	29
14	-2	-3	0	-5	-1	-1	-4	1	0	0	1	0	1	0	3	-1	-8	-20
15	13	20	19	16	-13	3	1	-1	37	2	3	43	4	3	0	-2	3	153
16	3	10	19	3	-1	2	13	6	13	-1	1	35	1	-2	-3	-1	1	97
17	7	5	6	11	6	2	15	7	-3	1	1	1	3	1	4	2	21	89
Total	117	153	139	69	75	27	83	66	64	11	8	61	11	3	164	57	102	1208

Origin	PVB	%
4	2876	16%
7	2440	13%
5	2195	12%
1	2064	11%
3	1491	8%
17	1347	7%
2	1169	6%
8	1043	6%
15	1027	6%
16	977	5%
13	651	4%
9	556	3%
12	532	3%
6	214	1%
10	212	1%
11	-112	-1%
14	-203	-1%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	8	-20	-5	-29	-26	2	17	-15	-21	-4	-11	-3	-1	-5	-38	14	13	-126
2	-61	33	-17	-39	-4	-6	-11	-36	-33	17	22	-2	3	29	-3	-4	-15	-128
3	2	-11	7	-18	-22	-2	-9	-25	5	6	-4	-1	0	6	-34	14	-1	-86
4	-9	-32	-11	16	-27	-4	10	-22	31	-4	-11	1	11	-5	-53	-4	6	-108
5	-18	5	-16	-30	-13	3	-1	17	-31	-4	2	-1	-10	10	39	-9	-22	-80
6	1	-4	-3	-13	2	2	-2	0	-11	-3	-4	-3	-5	-8	11	-5	-9	-53
7	19	-6	3	-1	1	0	16	-7	5	-4	-8	2	7	-13	6	-15	5	9
8	-15	-26	-20	-26	19	3	-5	14	-28	-7	-1	2	-6	-5	22	3	-7	-83
9	-16	-30	13	26	-32	-12	-2	-32	19	10	-9	5	11	5	-50	-26	20	-100
10	-6	21	6	-3	-3	-3	-8	-9	7	0	-4	0	-22	4	-8	-13	-6	-47
11	-15	29	0	-14	3	-4	-10	-2	-12	-6	3	1	-9	12	1	-14	-21	-58
12	-4	-3	-1	8	-1	-5	-9	-4	-10	1	-1	0	2	0	0	11	12	-3
13	-1	3	-1	-2	-5	0	6	0	31	-18	-5	9	-16	7	11	-4	28	43
14	-16	23	6	-18	4	-6	-8	-9	1	2	14	3	13	3	-47	-34	-26	-96
15	-45	-37	-71	-46	33	12	-1	19	-73	-9	-4	-7	25	-30	39	11	-7	-188
16	22	8	23	-16	5	-12	-10	9	-34	-10	-6	15	-15	-2	15	-5	0	-13
17	6	-10	3	6	-14	-1	5	-7	27	5	-15	25	12	-50	-7	-4	3	-18
Total	-148	-54	-84	-197	-83	-34	-24	-110	-127	-27	-43	45	0	-44	-96	-81	-27	-1134

Destination	PVB	%
4	2710	15%
7	2505	14%
1	2287	12%
3	1995	11%
2	1941	11%
17	1345	7%
15	1055	6%
8	925	5%
16	828	4%
5	817	4%
12	574	3%
9	550	3%
13	374	2%
6	296	2%
11	168	1%
10	160	1%
14	-50	0%

Table C-3 Low Growth Scenario - 2017 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	-11	-111	56	291	187	7	111	153	119	-11	4	63	-3	-13	107	7	30	985
2	-39	-109	131	204	163	21	14	185	103	-14	-12	1	-2	-8	81	135	51	906
3	92	231	98	-155	225	18	-22	99	48	23	50	-2	6	4	183	91	-9	982
4	166	142	62	298	171	22	177	54	-154	-16	39	-45	-13	-3	137	54	49	1139
5	292	331	255	206	0	-61	3	-167	172	27	3	28	31	3	-139	-201	22	807
6	14	21	40	53	-61	20	42	43	34	4	3	3	1	5	-62	42	56	258
7	96	2	32	298	13	38	127	59	-84	-2	7	19	-2	8	-12	100	152	853
8	92	217	117	104	-155	13	51	21	59	16	10	31	6	19	-28	-43	62	591
9	32	136	58	-284	173	47	-116	91	22	9	39	-11	6	8	263	92	22	584
10	-4	-27	26	-14	46	10	19	21	17	17	4	0	22	-2	16	30	31	211
11	-4	-8	11	29	-14	-1	8	-1	36	6	2	2	8	-2	9	-2	33	112
12	-46	3	1	-65	24	16	53	41	25	2	2	0	2	0	141	235	-26	409
13	-3	-1	4	-30	32	4	2	12	142	16	5	3	35	3	14	49	645	932
14	-4	-7	4	0	-13	-3	9	0	14	6	3	1	8	0	2	-25	42	36
15	147	207	140	190	-187	-39	-2	-29	175	15	36	185	29	74	-14	-48	19	897
16	16	56	95	114	-137	70	95	17	145	12	12	250	27	-43	-44	19	31	734
17	55	-5	18	53	9	42	93	26	258	-3	12	92	782	13	-27	0	-13	1405
Total	892	1081	1147	###	475	224	663	624	1130	109	219	619	944	66	624	534	1198	11841

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	3	3	0	8	9	0	12	6	5	-5	0	-3	-2	4	3	10	0	51
2	-26	-14	3	2	25	0	-2	13	15	0	1	1	0	2	9	11	0	40
3	12	17	4	-27	26	2	-24	10	15	2	-4	0	-1	-1	25	12	0	67
4	7	4	-2	29	11	-1	11	0	-23	-4	3	-26	-2	0	7	9	54	76
5	23	41	32	16	0	-8	1	-7	26	4	-1	6	6	3	-3	1	43	186
6	-1	1	2	-3	-7	2	4	4	2	0	0	0	2	1	6	1	43	57
7	5	-1	-8	22	4	2	7	8	-29	0	0	-8	-3	2	-1	6	20	28
8	9	30	11	6	-11	3	9	1	8	2	4	9	4	4	0	-2	3	90
9	-3	23	16	-38	25	1	-42	10	2	4	6	-1	3	2	71	4	-17	66
10	-3	-3	1	-5	0	2	-5	0	4	1	0	0	1	0	-2	2	-12	-20
11	4	-12	-2	-2	0	1	0	1	4	0	0	0	0	0	2	1	0	-4
12	-9	1	0	-31	3	0	-13	7	2	0	0	0	0	0	23	14	6	3
13	-2	0	0	-3	5	3	-4	1	11	1	0	0	2	0	1	-3	30	43
14	-2	-4	0	-8	3	0	-2	0	2	0	0	0	0	0	1	2	5	-1
15	9	16	19	12	-3	7	-1	0	38	0	-1	50	2	4	1	0	0	156
16	1	16	25	0	4	5	2	3	13	-1	8	24	14	41	16	1	0	171
17	3	-4	2	5	5	3	5	3	13	-2	-1	27	46	4	0	-1	-7	102
Total	32	114	102	-16	99	21	-40	61	108	1	16	79	74	64	158	67	169	1111

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	9	17	-4	-34	-28	1	5	-17	-22	-4	2	-6	3	1	-59	30	2	-105
2	-16	-1	-16	-35	-3	0	-1	-27	-43	5	3	-4	3	5	-13	25	0	-117
3	5	-7	-2	4	-22	-1	-10	-21	11	1	-8	0	-2	0	-52	43	-2	-63
4	-18	-31	9	-2	-31	-5	-4	-26	21	18	-15	-14	8	-3	-63	5	-5	-157
5	-22	3	-15	-30	0	0	1	17	-27	-2	1	-1	-3	13	21	-15	-10	-69
6	0	1	-2	-12	0	1	-1	3	-12	-1	1	-1	-3	3	24	-4	15	11
7	1	2	3	-16	2	-1	-4	0	-13	4	-1	3	-2	-6	8	19	11	10
8	-12	-18	-20	-26	12	7	3	6	-34	-2	4	4	-1	2	8	0	-17	-85
9	-15	-38	16	22	-30	-13	-12	-33	17	4	-17	5	10	-1	-73	-7	7	-158
10	-2	2	-1	16	-7	0	-1	-7	4	-1	-2	4	-13	-9	-6	-4	15	-11
11	3	-13	-3	-16	3	1	-1	1	-19	-3	1	0	-3	0	3	2	-5	-51
12	-9	-1	0	-16	-1	-9	-11	1	-3	0	-1	0	3	0	0	15	7	-24
13	-2	0	-1	10	-7	0	6	-7	11	-7	-2	6	-10	0	13	-2	56	66
14	-1	-1	1	-9	9	0	-2	1	-1	-7	3	1	-1	0	-16	5	-8	-26
15	-26	-22	-59	-46	12	19	0	18	-84	-4	-3	16	22	20	24	10	-8	-113
16	15	15	38	-8	13	-9	0	23	-34	2	16	20	-3	22	26	6	-28	115
17	-7	-12	0	0	-12	10	19	2	30	15	-7	33	51	-31	8	-10	-26	62
Total	-94	-104	-53	-195	-85	6	-6	-59	-189	29	-13	78	72	30	-132	134	19	-562

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	1	-91	53	265	167	8	127	141	103	-20	5	54	-2	-9	51	47	32	932	8%	7
2	-80	-124	118	171	185	20	11	171	75	-8	-8	-2	1	-1	77	172	51	828	7%	10
3	108	241	100	-178	229	19	-55	88	75	25	37	-2	4	4	157	145	-11	986	8%	5
4	155	114	69	325	151	16	184	28	-156	-2	26	-86	-7	-6	80	68	98	1057	9%	2
5	293	375	273	192	0	-68	5	-156	171	29	4	33	35	19	-122	-215	56	924	8%	8
6	14	23	41	38	-68	22	45	50	24	3	3	2	-1	9	-33	39	115	326	3%	14
7	102	3	27	305	18	39	130	67	-126	3	7	14	-6	5	-5	125	183	891	7%	9
8	90	229	108	83	-153	22	63	28	33	16	18	45	9	25	-20	-46	47	596	5%	11
9	14	120	90	-301	167	35	-171	68	41	18	28	-7	19	9	260	89	12	492	4%	12
10	-9	-28	26	-3	39	12	13	14	24	17	2	4	10	-11	8	28	34	180	1%	15
11	3	-33	6	11	-11	0	7	1	20	4	3	1	6	-2	13	1	28	58	0%	16
12	-64	3	1	-112	27	8	29	48	24	3	1	0	5	1	164	264	-12	389	3%	13
13	-6	-1	3	-23	30	7	5	7	164	10	4	8	28	3	29	43	732	1041	9%	3
14	-7	-11	5	-17	-1	-3	5	1	15	-1	7	3	7	0	-14	-19	39	9	0%	17
15	130	200	99	156	-178	-13	-4	-11	129	11	32	252	53	98	10	-38	11	939	8%	6
16	33	87	158	106	-121	67	98	43	124	13	36	294	37	20	-2	26	3	1020	8%	4
17	51	-20	19	58	2	54	117	31	302	9	4	151	880	-14	-19	-11	-46	1568	13%	1
Total	828	1089	1194	1075	483	245	609	619	1041	129	210	764	1078	147	635	719	1369	12237	100%	
Percentage	7%	9%	10%	9%	4%	2%	5%	5%	9%	1%	2%	6%	9%	1%	5%	6%	11%	100%		
Rank	7	3	2	5	13	14	12	11	6	17	15	8	4	16	10	9	1			

Origin	PVB	%
17	1568	13%
4	1057	9%
13	1041	9%
16	1020	8%
3	986	8%
15	939	8%
1	932	8%
5	924	8%
7	891	7%
2	828	7%
8	596	5%
9	492	4%
12	389	3%
6	326	3%
10	180	1%
11	58	0%
14	9	0%

Destination	PVB	%
17	1369	11%
3	1194	10%
2	1089	9%
13	1078	9%
4	1075	9%
9	1041	9%
1	828	7%
12	764	6%
16	719	6%
15	635	5%
8	619	5%
7	609	5%
5	483	4%
6	245	2%
11	210	2%
14	147	1%
10	129	1%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Table C-4 Low Growth Scenario - 2032 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	91	-47	42	301	221	6	139	149	116	0	10	58	6	-6	93	10	35	1223
2	120	-78	105	206	153	35	37	162	78	-34	-44	5	-1	-40	68	96	58	925
3	93	209	104	-5	252	21	19	112	80	26	43	4	11	5	206	106	0	1289
4	214	108	228	410	198	31	379	57	-114	-2	30	-40	-7	0	139	85	102	1821
5	375	320	294	238	0	-43	39	-108	201	31	11	35	40	0	-161	-145	32	1160
6	25	17	42	57	-62	6	42	-16	39	4	3	5	4	4	-58	28	23	164
7	139	20	56	423	34	57	427	30	-61	6	10	11	3	21	12	114	226	1527
8	98	162	145	100	-156	25	74	52	66	14	8	30	12	12	-27	40	42	697
9	52	104	142	-205	207	44	-54	96	239	22	33	-66	-22	12	257	114	16	989
10	7	-27	37	-3	41	14	29	28	38	15	3	9	62	5	19	41	36	355
11	19	-19	10	24	-5	8	22	19	36	5	2	2	10	14	34	34	48	263
12	-38	7	10	-53	38	24	87	43	180	17	5	0	14	5	139	220	67	764
13	1	1	8	-29	35	7	10	21	373	31	15	-4	60	24	60	63	1131	1810
14	11	-23	2	3	7	16	37	32	25	-9	-21	-1	5	0	168	57	92	403
15	172	169	173	220	-215	-33	33	-40	195	26	33	133	51	50	-15	-25	25	954
16	16	36	98	149	-142	93	160	-122	152	12	17	205	51	7	-34	0	9	707
17	65	-1	31	126	58	44	216	62	311	-10	21	25	703	56	36	32	74	1850
Total	1462	958	1528	###	662	357	1696	578	1955	153	180	411	1004	171	935	870	2015	16901

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	100	-44	42	290	206	10	157	142	104	-6	5	57	6	-6	54	41	42	1200	7%	6
2	89	-106	90	187	176	35	36	151	62	-30	-42	3	0	-22	75	108	54	865	5%	10
3	106	214	107	-23	253	22	2	95	94	29	36	2	11	7	198	136	4	1293	7%	5
4	217	99	238	442	178	28	398	38	-106	4	26	-61	1	-2	94	94	119	1808	10%	3
5	371	351	303	222	0	-46	39	-98	194	31	11	39	38	13	-133	-189	26	1174	7%	7
6	28	17	43	46	-66	8	40	-21	31	3	2	3	4	4	-37	27	78	213	1%	17
7	153	15	52	439	37	59	456	22	-82	8	8	4	7	15	19	129	244	1586	9%	4
8	92	163	140	81	-152	30	76	59	46	14	10	40	11	15	-14	41	26	678	4%	13
9	39	98	168	-207	198	37	-85	76	268	29	33	-65	-11	18	266	94	12	968	6%	8
10	2	-24	38	-1	36	15	26	22	45	15	2	8	50	4	14	39	31	323	2%	15
11	12	-31	6	14	-1	7	19	18	28	3	3	2	5	18	33	35	41	214	1%	16
12	-50	5	9	-77	41	20	80	45	190	17	5	0	15	7	179	247	119	851	5%	11
13	-3	1	8	-23	28	8	17	20	420	20	12	3	53	26	59	66	1267	1983	11%	2
14	1	-17	4	-8	13	12	38	27	25	-11	-16	1	6	0	164	45	79	364	2%	14
15	146	167	122	190	-198	-21	34	-20	161	18	33	160	88	45	12	-24	13	925	5%	9
16	36	48	146	142	-135	96	162	-127	127	12	18	223	61	24	-18	-4	-18	792	5%	12
17	73	-9	41	138	50	47	238	64	341	0	17	39	790	65	44	21	62	2022	12%	1
Total	1413	949	1557	1850	666	368	1732	513	1949	159	163	458	1136	230	1008	908	2200	17259	100%	
Percentage	8%	5%	9%	11%	4%	2%	10%	3%	11%	1%	1%	3%	7%	1%	6%	5%	13%	100%		
Rank	6	9	5	3	11	14	4	12	2	17	16	13	7	15	8	10	1			

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	5	6	1	8	8	1	10	5	2	-3	0	0	-1	2	2	10	0	55
2	-6	-18	-1	2	21	1	1	7	6	-2	-5	0	0	0	8	11	0	25
3	9	9	2	-10	19	1	-12	5	10	1	-2	0	0	0	22	12	0	67
4	10	5	8	24	7	0	16	1	-15	-1	3	-20	-1	0	5	8	19	71
5	15	25	23	12	-33	-3	1	-2	19	3	0	6	4	2	-4	-23	6	51
6	1	1	1	-1	-4	1	2	-3	1	0	0	0	1	0	4	1	49	55
7	8	-1	-4	20	3	3	24	-1	-18	1	0	-9	-1	1	1	5	14	45
8	4	14	9	2	-6	3	6	3	5	1	1	8	2	2	0	3	-2	56
9	-2	13	15	-23	19	2	-26	6	11	4	6	-3	-1	4	54	4	-18	65
10	-2	-2	1	-2	1	1	-1	-1	4	1	0	0	2	0	-1	1	-8	-6
11	0	-10	-1	0	1	1	1	0	3	0	0	0	0	0	1	3	0	-2
12	-7	1	0	-22	4	1	-6	5	9	1	0	0	0	0	23	19	20	51
13	-2	0	0	-2	3	1	-2	1	21	1	0	0	2	1	3	2	64	93
14	-2	-3	0	-4	1	0	1	1	3	0	0	0	0	0	1	0	6	3
15	6	12	15	10	-7	4	-1	0	30	-1	1	38	4	3	1	-1	-2	112
16	3	9	19	2	1	3	7	-9	9	0	1	17	11	1	-1	0	-1	70
17	5	-2	4	9	4	2	9	5	5	0	0	6	34	3	3	2	-8	80
Total	45	57	92	25	41	21	32	23	105	5	6	43	58	19	120	57	140	891

Origin	PVB	%
17	2022	12%
13	1983	11%
4	1808	10%
7	1586	9%
3	1293	7%
1	1200	7%
5	1174	7%
9	968	6%
15	925	5%
2	865	5%
12	851	5%
16	792	5%
8	678	4%
14	364	2%
10	323	2%
11	214	1%
6	213	1%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	5	-3	-2	-20	-22	3	8	-12	-14	-3	-4	-1	2	-2	-40	21	7	-78
2	-25	-10	-14	-21	3	-1	-2	-18	-23	7	7	-2	0	18	0	1	-4	-85
3	3	-5	1	-8	-19	0	-6	-22	4	2	-5	-2	0	2	-31	18	3	-63
4	-8	-14	2	7	-27	-4	3	-20	24	6	-7	-1	9	-2	-50	1	-2	-84
5	-20	6	-14	-27	-18	0	-2	12	-26	-2	1	-2	-6	10	32	-21	-12	-88
6	2	-1	-1	-9	1	1	-4	-3	-9	-1	-1	-2	-2	0	17	-2	6	-6
7	6	-3	1	-5	1	-1	5	-7	-3	2	-2	2	5	-7	6	10	3	13
8	-11	-12	-14	-22	11	3	-3	4	-25	-2	1	2	-3	1	13	-2	-15	-74
9	-10	-18	11	20	-28	-9	-5	-26	19	4	-6	4	12	2	-46	-24	15	-87
10	-3	4	1	4	-6	0	-2	-6	3	0	-2	-1	-14	-1	-4	-4	3	-26
11	-7	-1	-3	-10	3	-1	-4	-1	-10	-2	1	0	-5	4	-3	-2	-6	-48
12	-6	-3	-1	-2	-1	-5	-2	-3	1	-1	-1	0	1	2	17	9	32	36
13	-2	0	-1	7	-9	0	10	-2	26	-11	-3	6	-9	1	-4	0	72	80
14	-8	9	3	-7	5	-4	0	-6	-3	-2	5	2	0	0	-4	-12	-19	-42
15	-32	-14	-66	-40	24	8	1	19	-65	-7	-1	-11	33	-8	27	3	-10	-141
16	17	3	29	-8	7	0	-5	4	-35	-1	0	2	-2	15	17	-3	-25	14
17	3	-5	6	3	-12	1	13	-3	25	11	-5	8	53	5	5	-12	-4	93
Total	-95	-67	-63	-138	-88	-10	4	-88	-111	1	-23	4	74	39	-47	-19	45	-583

Destination	PVB	%
17	2200	13%
9	1949	11%
4	1850	11%
7	1732	10%
3	1557	9%
1	1413	8%
13	1136	7%
15	1008	6%
2	949	5%
16	908	5%
5	666	4%
8	513	3%
12	458	3%
6	368	2%
14	230	1%
11	163	1%
10	159	1%

Table C-5 High Growth Scenario – 2017 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	489	-489	87	600	325	41	194	228	178	5	12	94	4	-13	153	62	80	2052
2	-3	-534	149	303	272	68	37	336	182	-68	-21	7	-9	-52	232	161	92	1154
3	156	220	90	-103	272	32	14	126	36	33	48	0	6	5	225	116	-5	1271
4	461	70	154	685	226	47	420	80	-152	-8	46	-48	-17	1	188	104	98	2354
5	573	423	304	287	0	-46	3	-156	200	17	-3	28	39	-6	-162	-216	32	1319
6	21	-70	53	87	-91	-16	-5	-25	48	9	-1	2	4	9	-87	-16	11	-67
7	236	-209	77	688	13	7	1	57	-56	25	10	18	10	6	-12	98	-63	905
8	155	249	137	155	-289	-19	19	-31	69	16	17	39	11	39	-29	-107	62	492
9	82	204	45	-296	203	57	-82	116	151	42	46	-19	-11	10	318	144	11	1021
10	-12	-145	39	-28	37	4	9	30	21	54	16	6	39	8	24	21	14	137
11	14	-160	11	32	-17	1	17	11	40	24	4	2	13	9	46	18	65	132
12	-29	7	3	-73	29	18	61	51	58	13	4	0	6	2	182	323	94	748
13	-1	-15	7	-35	31	4	7	14	224	58	19	-7	66	15	39	13	1135	1572
14	6	-49	8	-16	-22	-13	10	-17	12	26	4	-1	13	0	-53	-64	38	-117
15	233	249	153	262	-251	-58	-23	-58	206	33	65	169	28	181	-13	-50	6	1132
16	44	-117	112	214	-218	-3	28	-91	183	24	31	305	62	52	-29	21	25	643
17	70	-170	30	120	27	15	67	39	221	-24	16	71	804	44	6	33	187	1556
Total	2496	-536	1458	###	548	140	777	712	1620	280	314	666	1067	310	1025	661	1884	16305

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	55	-6	5	34	23	5	22	15	7	-1	3	-2	-1	6	9	10	0	185
2	-12	-36	8	18	39	6	5	30	28	-2	0	1	-1	-3	37	11	0	129
3	21	7	3	-26	36	3	-27	14	15	3	-2	0	0	0	41	12	0	101
4	33	6	8	62	16	1	31	2	-24	-5	4	-27	-3	1	12	9	54	179
5	52	51	45	24	0	-6	2	-4	33	11	-1	6	6	3	-4	1	43	262
6	0	-9	3	-2	-7	-1	1	-2	4	1	0	0	2	0	7	1	43	44
7	22	-18	-9	49	4	0	-1	4	-29	-2	0	-8	-4	2	-2	9	-5	13
8	14	38	15	9	-16	-2	3	1	9	6	4	13	4	7	2	-13	2	96
9	1	35	17	-41	29	3	-46	12	11	9	8	-2	2	3	85	11	-27	111
10	0	-7	2	-9	6	2	-3	2	12	4	1	0	2	0	2	1	-18	-4
11	1	-23	0	0	1	2	1	2	5	2	0	0	1	0	3	4	2	3
12	-8	2	0	-32	3	2	-10	9	4	1	0	0	0	0	36	46	25	78
13	0	0	1	-4	7	3	-6	4	18	3	1	0	3	1	4	2	68	104
14	-1	-5	0	-8	5	2	-1	2	3	1	0	0	0	0	16	10	9	33
15	22	30	25	22	-10	9	0	2	47	4	2	58	14	5	1	1	7	238
16	6	8	27	8	2	0	-1	1	22	1	4	45	22	5	-2	1	1	147
17	7	-11	3	15	4	0	-1	6	8	-7	0	28	51	4	3	2	21	134
Total	211	62	154	120	144	27	-30	101	172	26	26	111	98	35	252	118	226	1853

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	26	-7	-7	-39	-32	3	12	-18	-29	-1	-8	-6	-6	8	-41	19	5	-120
2	-57	40	-25	-55	-14	-9	-15	-58	-55	30	31	-4	9	20	-9	-11	-12	-194
3	4	-28	-4	-2	-22	-3	-13	-28	19	1	-8	1	-1	2	-32	28	-7	-94
4	-21	-53	10	6	-37	-9	-10	-38	33	18	-19	-14	10	-2	-69	-2	-2	-197
5	-25	-12	-15	-39	0	3	-1	30	-28	3	3	-1	-3	4	49	-36	-12	-81
6	0	-14	-5	-18	3	1	-2	-3	-13	-3	-2	-1	-5	1	29	-20	-10	-59
7	13	-19	1	-20	1	-3	-8	-10	-8	-3	-5	16	-12	-9	22	-17	-2	-63
8	-19	-48	-26	-41	25	-1	-10	21	-38	-4	1	7	-3	-5	17	5	-20	-140
9	-18	-47	25	34	-32	-13	-12	-36	23	8	-16	7	15	1	-52	-16	12	-118
10	0	23	-2	13	-3	-3	-5	-11	13	-2	-7	-1	-14	-5	-7	-9	2	-17
11	-15	9	-3	-19	4	-4	-10	-4	-19	-7	2	-1	-5	7	-3	-2	-15	-84
12	-7	-2	0	-11	-1	-7	-10	3	6	0	0	0	2	0	16	36	24	50
13	1	6	-1	9	-5	0	2	-5	18	-13	-5	2	-12	3	12	-5	78	86
14	-15	20	3	-11	10	-5	-20	-8	-4	-4	11	1	-1	0	-32	-5	-29	-89
15	-36	-66	-67	-54	21	33	-1	22	-79	-6	-7	11	33	-19	30	12	-2	-176
16	22	8	30	-28	15	-10	-19	1	-41	-4	6	33	-3	25	22	0	-10	46
17	-1	-29	-1	15	-16	-2	-2	0	38	17	-11	38	55	-26	11	-12	8	81
Total	-146	-219	-86	-256	-77	-19	-117	-135	-155	39	-22	99	73	18	-21	-21	26	-1018

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	571	-501	85	595	316	49	228	225	157	3	8	85	-2	1	121	91	85	2117	12%	2
2	-72	-531	132	266	297	65	27	309	155	-40	11	4	-1	-35	260	160	81	1089	6%	8
3	182	199	88	-131	286	32	-26	112	70	37	39	1	5	7	234	156	-12	1278	8%	6
4	474	23	173	753	205	39	441	44	-144	5	32	-88	-10	0	131	111	149	2336	14%	1
5	600	462	334	272	0	-48	5	-130	204	31	-1	33	42	1	-117	-251	64	1499	9%	5
6	21	-92	51	67	-94	-15	-6	-30	39	7	-3	2	1	10	-51	-35	45	-83	0%	16
7	272	-247	69	717	18	4	-8	52	-93	20	5	25	-7	-1	7	90	-69	855	5%	11
8	150	239	126	123	-280	-22	12	-9	40	18	22	59	11	41	-11	-115	44	447	3%	13
9	65	192	87	-303	201	47	-139	92	184	59	39	-15	5	14	351	140	-4	1014	6%	9
10	-12	-129	39	-24	40	3	0	22	46	55	11	5	28	2	19	13	-2	116	1%	14
11	0	-174	8	14	-12	0	9	9	26	19	6	1	10	17	47	20	53	51	0%	15
12	-45	6	2	-116	32	13	41	63	68	13	4	0	8	2	234	405	144	876	5%	10
13	0	-10	6	-31	34	7	3	13	260	47	15	-5	57	19	55	10	1281	1761	10%	4
14	-11	-34	11	-34	-6	-16	-11	-24	12	23	16	0	12	0	-68	-59	18	-172	-1%	17
15	219	214	112	230	-240	-16	-24	-34	174	31	60	237	74	167	18	-37	11	1195	7%	7
16	72	-101	169	195	-202	-13	7	-89	164	21	40	383	81	82	-9	22	15	836	5%	12
17	75	-210	32	149	15	13	64	45	266	-14	5	137	910	23	20	23	216	1771	10%	3
Total	2561	-695	1523	2742	610	141	623	670	1627	336	307	864	1224	349	1240	742	2119	16986	100%	
Percentage	15%	-4%	9%	16%	4%	1%	4%	4%	10%	2%	2%	5%	7%	2%	7%	4%	12%	100%		
Rank	2	17	5	1	12	16	11	10	4	14	15	8	7	13	6	9	3			

Origin	PVB	%
4	2336	14%
1	2117	12%
17	1771	10%
13	1761	10%
5	1499	9%
3	1278	8%
15	1195	7%
2	1089	6%
9	1014	6%
12	876	5%
7	855	5%
16	836	5%
8	447	3%
10	116	1%
11	51	0%
6	-83	0%
14	-172	-1%

Destination	PVB	%
4	2742	16%
1	2561	15%
17	2119	12%
9	1627	10%
3	1523	9%
15	1240	7%
13	1224	7%
12	864	5%
16	742	4%
8	670	4%
7	623	4%
5	610	4%
14	349	2%
10	336	2%
11	307	2%
6	141	1%
2	-695	-4%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Table C-6 High Growth Scenario - 2032 Sectored Benefits - All Time Periods

Time Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	1130	865	377	888	627	125	510	433	199	141	75	121	67	151	182	238	244	6372
2	1128	-401	514	842	511	258	347	610	267	-36	36	11	6	-123	312	559	309	5151
3	260	493	127	135	378	45	100	161	96	22	69	4	1	-10	277	165	22	2345
4	557	546	618	971	293	73	959	97	-134	103	72	-46	26	38	192	178	207	4750
5	963	814	452	389	0	67	109	-50	266	85	41	43	77	39	-256	-52	143	3132
6	99	86	92	126	-20	47	123	-1	48	21	19	3	11	43	-79	93	53	765
7	338	147	276	###	98	83	992	87	7	95	43	10	31	110	62	212	181	3910
8	242	473	213	190	-279	54	140	221	72	50	40	40	25	107	-19	297	83	1949
9	96	281	191	-182	262	55	2	118	381	84	44	-123	-6	14	318	147	106	1787
10	29	-109	135	22	112	21	47	74	34	45	21	20	51	-69	56	50	80	618
11	70	-241	15	44	-2	25	63	34	39	9	5	0	-7	-70	80	86	134	284
12	0	18	15	-49	39	20	83	43	237	45	11	0	55	12	128	287	-78	864
13	11	10	27	-8	67	15	38	36	494	119	28	-22	103	11	96	75	1513	2613
14	61	-104	5	22	12	29	100	51	21	-38	-30	-5	-4	1	234	93	292	739
15	306	424	209	332	-359	-63	50	-65	216	84	160	165	91	253	1	-43	63	1824
16	77	139	160	332	-222	29	215	-34	180	52	72	279	101	168	-27	-12	0	1510
17	108	64	86	291	96	30	360	38	359	23	68	-35	812	248	59	21	-260	2366
Total	5474	3502	3511	###	###	915	4239	1853	2781	902	772	463	1441	924	1616	2395	3094	40978

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	68	61	34	37	37	7	34	31	6	10	4	0	3	13	13	10	0	368
2	56	6	32	46	57	16	21	34	24	3	0	1	0	-3	32	11	0	335
3	20	33	3	-6	27	2	-8	10	10	0	3	0	0	-1	37	12	0	143
4	30	26	34	54	16	2	49	3	-17	3	6	-22	4	2	10	9	26	236
5	52	64	37	23	-30	3	6	2	26	8	2	6	5	7	-8	-24	15	193
6	4	9	4	1	-2	4	6	-3	3	1	1	0	1	1	-2	1	49	78
7	25	14	16	57	8	5	56	5	-11	7	3	-11	5	5	9	13	13	220
8	12	39	15	6	-8	5	10	6	6	6	3	10	4	5	-1	11	6	136
9	0	30	17	-22	24	2	-25	6	24	11	7	-5	1	5	70	8	-14	138
10	1	2	8	-3	5	3	2	5	7	2	2	0	2	-3	1	6	-6	36
11	8	-8	0	2	1	3	4	3	4	1	0	0	-1	-3	3	9	9	37
12	-5	2	1	-19	5	1	-4	7	14	2	0	0	1	0	34	48	11	99
13	0	3	1	-2	6	2	-1	7	35	4	2	-1	5	0	8	14	112	197
14	5	-3	1	-2	1	1	2	2	2	0	0	0	0	0	8	6	31	54
15	19	30	28	20	-15	3	2	-3	41	2	9	48	8	14	1	-3	4	210
16	8	12	29	8	-3	2	14	4	16	4	3	40	20	12	-1	0	-1	167
17	13	10	11	22	8	4	23	0	5	9	3	3	49	27	15	1	-22	181
Total	318	329	271	224	140	64	192	121	193	72	48	71	108	83	230	132	234	2829

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	38	-42	4	-26	-22	5	31	-4	-23	-5	-13	-6	3	-3	-36	30	26	-43
2	-69	70	-17	-52	5	-6	-22	-45	-38	33	29	-2	6	47	-10	4	-15	-81
3	-4	-10	4	-21	-27	-2	-10	-27	14	7	-2	0	1	8	-27	23	5	-69
4	-7	-59	-1	26	-32	-6	14	-27	35	-7	-10	-3	17	-4	-53	-11	7	-124
5	-24	6	-18	-36	-7	4	-2	29	-31	-3	3	-3	-5	12	46	-8	-23	-61
6	2	-9	-2	-16	4	4	-3	-4	-10	0	-4	-2	-1	-7	19	-6	-1	-33
7	30	-24	10	2	1	-1	22	-10	2	-2	-8	-1	20	-20	11	-15	10	27
8	-17	-37	-21	-32	29	2	-9	14	-29	-4	-3	3	-2	-6	27	-1	-9	-95
9	-19	-31	21	31	-34	-11	-9	-29	30	16	-2	10	17	5	-31	-25	17	-45
10	-9	32	8	-6	-6	1	-6	-7	18	0	-7	3	-33	9	-19	-4	5	-20
11	-11	34	-2	-13	3	-3	-12	-4	-7	-9	3	0	-10	17	-6	4	-22	-37
12	-6	-2	0	11	-1	-6	-4	-2	-3	3	-1	0	2	0	5	34	19	49
13	-5	7	0	-2	-4	1	5	3	44	-31	-7	8	-12	11	13	2	98	132
14	-5	38	7	-10	4	-7	-14	-16	2	8	15	0	12	-3	-47	-4	-18	-35
15	-46	-37	-64	-47	41	9	-3	23	-55	-20	-9	-2	26	-41	45	16	-10	-173
16	34	-8	31	-23	12	-9	-9	15	-28	0	-5	23	1	-10	16	4	-1	43
17	11	-20	9	14	-21	0	8	-10	22	19	-15	9	42	-35	-3	-7	-22	3
Total	-104	-92	-29	-200	-55	-26	-23	-100	-57	5	-38	38	83	-20	-50	38	66	-564

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	1236	884	415	899	643	137	575	460	181	146	67	115	74	161	159	278	270	6698	15%	1
2	1116	-325	530	836	573	267	346	599	253	-1	65	10	12	-79	334	575	294	5405	12%	2
3	276	517	135	107	378	46	82	143	120	29	69	4	2	-3	286	200	27	2418	6%	8
4	580	513	652	1050	278	69	1022	72	-116	98	68	-70	47	36	149	176	240	4862	11%	3
5	990	884	470	376	0	74	114	-18	262	89	46	47	76	58	-218	-83	135	3300	8%	5
6	105	85	94	111	-17	54	126	-7	41	23	16	1	11	38	-62	88	102	810	2%	14
7	393	137	302	1197	107	87	1071	83	-3	99	37	-2	56	95	82	211	204	4156	10%	4
8	238	475	208	165	-258	61	141	241	48	52	40	53	26	107	7	306	80	1990	5%	9
9	78	280	228	-173	252	46	-32	95	435	111	49	-119	12	23	357	130	109	1879	4%	10
10	21	-75	152	13	112	24	43	72	59	47	16	23	20	-63	39	53	79	634	1%	16
11	67	-215	13	33	2	26	55	33	36	2	8	0	-18	-55	78	99	121	284	1%	17
12	-10	17	15	-57	43	16	74	48	248	50	10	0	58	13	167	368	-48	1012	2%	13
13	6	20	29	-12	69	18	43	47	574	91	22	-15	96	23	117	91	1724	2942	7%	6
14	61	-69	13	11	17	23	89	37	25	-30	-15	-5	8	-2	196	95	306	758	2%	15
15	279	417	172	305	-333	-51	50	-45	202	67	159	211	126	227	47	-30	58	1860	4%	11
16	119	142	220	317	-213	22	220	-15	168	56	71	343	122	170	-12	-7	-2	1720	4%	12
17	133	54	106	328	82	34	390	29	385	51	56	-23	904	240	71	14	-305	2550	6%	7
Total	5688	3740	3753	5508	1734	953	4409	1873	2917	978	782	572	1632	988	1796	2564	3394	43279	100%	
Percentage	13%	9%	9%	13%	4%	2%	10%	4%	7%	2%	2%	1%	4%	2%	4%	6%	8%	100%		
Rank	1	5	4	2	11	15	3	9	7	14	16	17	12	13	10	8	6			

Origin	PVB	%
1	6698	15%
2	5405	12%
4	4862	11%
7	4156	10%
5	3300	8%
13	2942	7%
17	2550	6%
3	2418	6%
8	1990	5%
9	1879	4%
15	1860	4%
16	1720	4%
12	1012	2%
6	810	2%
14	758	2%
10	634	1%
11	284	1%

Destination	PVB	%
1	5688	13%
4	5508	13%
7	4409	10%
3	3753	9%
2	3740	9%
17	3394	8%
9	2917	7%
16	2564	6%
8	1873	4%
15	1796	4%
5	1734	4%
13	1632	4%
14	988	2%
10	978	2%
6	953	2%
11	782	2%
12	572	1%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
2	Wilmslow / Styal / Handforth
3	Poynton / Woodford / Prestbury / Bollington
4	Hazel Grove / Offerton / Marple / Gee Cross
5	Manchester Airport
6	Didsbury / Gatley / Withington
7	Stockport
8	Altrincham / Sale / Stretford
9	Disley / High Lane / Whaley Bridge
10	Macclesfield
11	Knutsford / Chelford / Northwich
12	East of Cordon / Peak District
13	South East of Cordon
14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon

Paul Melia
Atkins
Bank Chambers
1 Faulkner Street
Manchester
M1 4EH

Paul.melia@atkinsglobal.com
0161 245 3400
0161 245 3425
0161 245 3500