A6 to Manchester Airport Relief Road

Economic Assessment Report

November 2012

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Executive Summary

Overview

The South East Manchester Multi Modal Strategy (SEMMMS) A6 to Manchester Airport Relief Road 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 scheme is an integral component of the wider SEMMMS strategy, 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 A6 to Manchester Airport Relief Road is critical to delivering the long-term objectives of the SEMMMS strategy, and to meet national objectives for growth, employment and connectivity.

Scheme description

The A6 to Manchester Airport Relief Road Scheme will provide 10 kilometres of new 2-lane dual carriageway on an east-west route 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. The 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 scheme incorporates eight new and five improved junctions, 4 railway crossings, a parallel shared cycle/pedestrian path and priority for public transport, and will provide a step-change in the allocation of existing road space in favour of sustainable modes of transport, thereby improving access for public transport, pedestrians and cyclists, and improving the quality of life in residential areas along the south Manchester corridor.

The majority of benefits will accrue to road users and local residents through improved access to centres of employment, commerce and leisure facilities. A package of complementary measures will maximise the scope of potential benefits by making the most efficient use of road space where there are forecast reductions in car traffic. These measures will prevent available road space from simply filling up with more cars. Similarly, a package of mitigation measures will contribute to overall value for money by limiting any negative impacts resulting from the scheme. Together, the complementary and mitigation measures will help secure substantial environmental, safety and social benefits.

This **Economic Assessment Report** (EAR) provides details of the methodology adopted, and findings produced for the appraisal of the A6 to Manchester Airport Relief Road scheme, setting out the scheme costs and benefits and producing an overall assessment of the relative value for money of each of the schemes, set against the guidance as specified in the Department for Transport's (DfT) WebTAG.

The economic analysis is based primarily on the interpretation of changes in traffic flows for the without scheme ('Do Minimum') and with scheme ('Do Something') scenarios as produced from the pertinent SATURN outputs. The DfT software which has been used in the analysis includes:

- TUBA for predicting the travel time benefits and scheme costs and
- COBA for predicting the accident benefits

The economic assessment found that the proposed scheme achieves a benefit cost ratio (BCR) of 5.06 (with optimism bias at 44%) representing 'high' value for money. A lower BCR was demonstrated for the low-cost alternative; however, this scheme also represents high value for money.

This economic assessment has shown that the A6 to Manchester Airport Relief Road scheme provides excellent value for money, significantly exceeding the DfT criterion for high value for money. It has also demonstrated that the proposed option provides a greater level of benefit than the lower-cost alternative. It is the recommendation of this report, therefore, the proposed alignment of the A6 to Manchester Airport Relief Road scheme should be accepted for programme entry.

1. Introduction

Overview

1.1 This section provides a physical description of the A6 to Manchester Airport Relief Road Scheme. The scheme has been developed over a long period, taking account of previous public and stakeholder engagement. Final amendments may occur based on future public consultation, but the underlying philosophy and design of the scheme will remain as described in this chapter.

1.2 The scheme details as described in this chapter have been developed by the SEMMMS project team, taking into consideration the developing outputs from the transport modelling, environmental and value for money aspects. The final scheme details will not be fully determined until the further consultation with the public, stakeholders and other interested parties, such as landowners, has been completed. The outcome of the consultation will subsequently be considered by each of the promoting local authorities in order for them to approve the final scheme layout.

1.3 The location, components and physical characteristics of the scheme are provided. In accordance with the guidance on MSBCs, and given the nature of the scheme, details are provided of specific junction types and locations, scheme length and alignment, and link standard. Also included are details of the segregated cycle/pedestrian route and the complementary and mitigation measures that form part of the overall scheme proposals. The priority areas and measures described in this chapter have been developed by the SEMMMS project team, taking into consideration the developing outputs from the transportation modelling. The final package of complementary and mitigation measures will not be fully determined until agreement is reached with Cheshire East Council, Manchester City Council and other stakeholders. The outcome of the consultation will subsequently be considered by each of the promoting local authorities in order for them to approve the final package of measures.

Scheme Location

1.4 ***Figure 1.1(overleaf)*** shows the location of the proposed scheme. The specific components of the scheme are presented in more detail below.

Components of the Preferred Scheme

1.5 The A6 to Manchester Airport Relief Road Scheme comprises the following:

- **The Relief Road**, which is a broadly east-west route from the A6 near Hazel Grove (south east from Stockport) to Manchester Airport and the link road to the M56, incorporating seventeen new and improved junctions and four railway crossings;
- **Provision of a segregated cycle/pedestrian route** adjacent to the new road and the existing length of the A555, providing a new orbital link for the Strategic Cycle /Pedestrian Network;
- **A package of complementary measures** in accordance with the SEMMMS Strategy that will maximise the scope of benefits by making the most efficient use of road space where there are forecast reductions in car traffic. These measures will prevent available road space from simply filling up with more cars; and
- **A package of mitigation measures** will contribute to overall value for money by limiting any negative impacts resulting from the scheme, including environmental and construction engineering mitigation to minimise the effect of the road on local communities and surrounding habitats.

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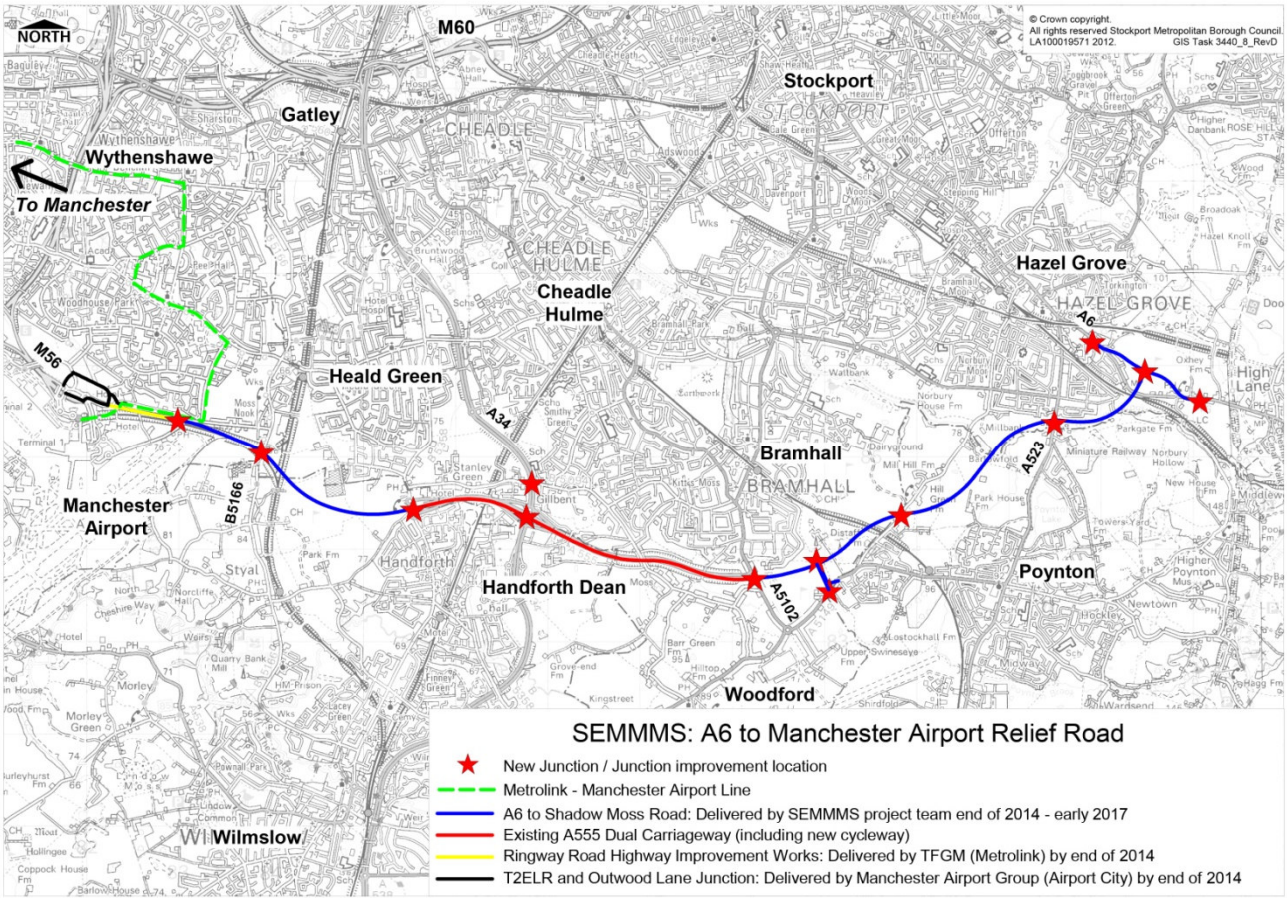
Figure 1.1 – Location of the A6 to Manchester Airport Relief Road Scheme



Physical Description of the A6 to Manchester Airport Relief Road

Overview

1.6 The proposed A6 to Manchester Airport Relief Road scheme includes a new 2-lane dual carriageway connecting the A6 to Manchester Airport. The scheme bypasses Bramhall, Cheadle Hulme, Hazel Grove, Handforth, Poynton and Wythenshawe District Centres and Gatley and Heald Green Local Centres (as shown in ***Figure 1.1***, above).

1.7 The scheme improves access to / from Manchester Airport and its employment areas as well as Hazel Grove, Newby Road, Bramhall Moor Lane, Poynton and Stanley Green employment areas. Access to a number of regeneration areas is also improved by the scheme, including Stockport Town Centre and Wythenshawe. The junction providing access to the A5149 Chester Road also provides the entry point to the proposed Poynton Relief Road.

1.8 The scheme will provide a high quality route for freight vehicles to access the strategic road network (i.e. M56) and Manchester Airport from the south east Manchester and Cheshire East / Derbyshire area, and as an alternative route to using existing residential streets.

1.9 The new road is approximately 10 kilometres long, of predominantly dual 2-lane carriageway standard and will include eight new and five improved junctions. It also incorporates a further 4 kilometres of existing A555 dual carriageway to the south of Bramhall. There are four rail crossings in the new sections, one of which is over the West Coast Main Line. A pedestrian and cycle route is proposed for the whole length of the scheme, including retrofitting it to the 4 kilometre existing section of A555

Structure of the Report

1.10 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 A6 to Manchester Airport Relief Road;
- Chapter 4 provides our Conclusions & Recommendations on the basis of the economic assessments undertaken;
- 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

Overview

2.1 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 1.8, which has been used for this assessment.

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

Methodology

Scope of the Assessment

2.3 The evolution of the A6 to Manchester Airport Relief Road scheme and the wide range of options considered in arriving at the preferred scheme have been presented in detail within ***the Major Scheme Business Case document***. The preferred option included in this economic appraisal is the result of a number of years of analysis and consultation, resulting in a scheme that will deliver substantial benefits at the same time as being affordable and maximising value for money.

2.4 Additional future year options have also been developed as part of scenario and sensitivity tests aimed at confirming the robustness of the modelling framework and the overall economic case. This includes scenario tests aimed to establish the impact of changes in the underlying level and distribution of demand, with a particular focus on traffic forecasts for Manchester Airport. The 'optimistic' and 'pessimistic' scenarios assess the impact on the economic case resulting from higher and lower levels of underlying traffic respectively.

2.5 Other scenario tests have been assessed to confirm that the preferred scheme represents the optimum design and of appropriate highway standard. This includes a 'low cost' alternative that examines the impact on the economic case of mixed single- and dual-carriageway design standards, and alternative junction design options.

Traffic modelling

2.6 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 A6 to Manchester Airport Relief Road scheme. The modelling suite was developed jointly by Transport for Greater Manchester

[1] TUBA - **T**ransport **U**ser **B**enefit **A**ppraisal (Economic Appraisal Software developed by Mott MacDonald on behalf of the Department for Transport)

[2] COBA - **CO**st **B**enefit **A**nalysis (Department for Transport sponsored program maintained and distributed by TRL)

(TfGM formerly the Greater Manchester Transportation Unit – GMTU) and the MVA Consultancy. Additional modelling input and a formal reviewing role was provided by Atkins.

2.7 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.

2.8 Models were created to represent three time periods:

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

2.9 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 ***SEMMMS Data Collection and Traffic Surveys Report.***

2.10 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 ***SEMMMS Local Model Validation Report***. Full details of the demand model are provided in the ***SEMMMS Model Development Report.***

2.11 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.

2.12 Future year forecast models were produced for the following scenarios:

- 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 (DS) 'Core' scenario, which includes all developments and schemes from the DM, plus the A6 to Manchester Airport Relief Road scheme.

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

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

Appraisal Periods

2.15 Economic benefits of the scheme have been quantified using the DfT's Transport User Benefit Appraisal (TUBA v1.8) software.

2.16 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

[3] **S**imulation and **A**ssignment of **T**raffic in **U**rban **R**oad **N**etworks (Institute for Transport Studies, The University of Leeds)

modelled years, 2017 and 2032, and for three time periods, AM, inter-peak and PM in each year.

2.17 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.

2.18 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).

2.19 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).

2.20 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.

2.21 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.

2.22 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.

2.23 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.

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

2.25 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.

2.26 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.

2.27 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.

2.28 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 2002.

2.29 Similarly, both the accident analysis calculates costs and benefits over a 60 year assessment period, discounted to a price base year of 2002.

Terminology

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

2.31 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)**.

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

2.33 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 it has a BCR of less than 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; and
- High value for money if it has a BCR of over 2.0.

Underlying Assumptions

Economic Parameters

2.34 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 Unit 3.5.6 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 CO_2 emissions.

Discount Rate

2.35 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'.

2.36 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 30-75 of the appraisal period; and
- 2.5% beyond year 75.

2.37 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

Overview

3.1 This chapter presents the results of the economic assessment for the proposed A6 to Manchester Airport Relief Road for all scenarios.

3.2 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	**Core Scenario**	**Low Cost Alternative[4]**	**Optimistic**	**Pessimistic**
PVB	£879.7m	£721.4m	£976.1m	£871.6m
PVC	£173.9m	£161.9m	£173.9m	£173.9
NPV	£705.8m	£559.5m	£801.3m	£696.7m
BCR	**5.06**	**4.46**	**5.61**	**5.01**

3.3 From the summary statistics above it is clear that the proposed scheme and the lower-cost alternative would both bring substantial benefits and value for money. The value is reflected most clearly by the BCRs; substantially greater than 2.00, which represents 'high' value for money against DfT guidelines.

3.4 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**.

3.5 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.

Scheme Costs

Overview

3.6 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.

3.7 There are three main elements of a scheme cost estimate:

[4] The Low Cost Alternative scenario was assessed on the previous version on the SEMMMS traffic model (June 2012). For comparison purposes the BCR result obtained for the 'Core' scenario was 4.55.

- **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.

Investment Costs

3.8 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.

3.9 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.

Estimation of Scheme Costs

3.10 A robust approach to the estimation of scheme costs has been undertaken using specialist advice from Corduroy, with an independent review of costs by EC Harris, and a review of buildability by Balfour Beatty. The costs have also been subject to value management exercises involving specialists from SMBC, URS and Atkins. The estimation of costs is described in detail in ***Chapter 5 (The Financial Case) of the SEMMMS MSBC document***, although a breakdown of the base costs, allowance for risk and optimism bias is described below.

3.11 The total capital cost of the scheme, including all land, preparation maintenance, and supervision costs but excluding any future inflation, is £165.80 million at Q2 2010 prices. An allowance of £30.12m for future inflation on construction and land prices has been made[5], along with a quantified estimate for known risks (including inflation) amounting to £34.44m, which produces a base cost valued at £230.36 million. In addition, we have included an allowance of £14.2m 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.

3.12 The recommended level of optimism bias for highway schemes at Programme Entry is 44%. There is an opportunity for the A6 to Manchester Airport Relief Road scheme to proceed directly to Conditional Approval, based on the advanced stage of project development and design, the value management exercises and risk management undertaken to date. There is, therefore, a strong case for reducing the level of optimism bias applied to scheme costs. Until this is confirmed, however, 44% optimism bias has been adopted for the economic appraisal.

3.13 Optimism bias has been applied to the preparation, supervision, construction and land costs prior to any adjustment for future inflation. The total adjustment for optimism bias applied in the appraisal is £85.6[6].

[5] 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).

[6] This represents 53% optimism bias when considered in a WebTAG context (i.e. a total scheme cost of £297.5 million, compared to an inflation and risk-adjusted base cost of £194.6m)

3.14 The total cost used in the economic appraisal amounts to £283.2 million. This value has been input to TUBA to reflect the allocation of expenditure between Local and Central Government. The Local and Central Government costs, once converted to 2002 prices and values using the default rates included in TUBA, produce a PVC of investment of £173.9 million.

3.15 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 2010 Prices)

Year	Capital Costs (£m)					
	Construction	Land	Preparation	Maintenance	Supervision	Total
2010	-	-	-	-	-	**0**
2011	-	-	-	-	-	**0**
2012	-	3.2	2.9	-	-	**6.1**
2013	10.2	4.3	2.1	-	0.3	**16.9**
2014	47.5	22.6	0.7	-	1.2	**72.0**
2015	91.6	1.8	-	-	2.3	**95.8**
2016	58.5	1.8	-	-	1.5	**61.8**
2017	-	29.5	-	-	-	**29.5**
2018	-	1.2	-	-	-	**1.2**
2019 to 2076	-	-	-	14.2	-	**14.2**
Total	**207.9**	**64.4**	**5.7**	**14.2**	**5.3**	**297.5**

3.16 For comparison purposes the equivalent detailed cost breakdown of the A6 to Manchester Airport Relief Road 'low-cost' alternative is provided in table 3.3.

Table 3.3 - Low-Cost Alternative: Components of Investment Cost (Q2 2010 Prices)

Year	Capital Costs (£m)					
	Construction	Land	Preparation	Maintenance	Supervision	Total
2010	-	-	-	-	-	**0**
2011	-	5.0	-	-	0.1	**5.1**
2012	14.0	17.8	2.3	-	0.1	**34.2**
2013	7.8	8.3	2.3	-	0.1	**18.5**
2014	25.1	13.0	0.7	-	0.5	**39.3**
2015	60.7	1.6	-	-	1.3	**63.6**
2016	58.4	1.6	-	-	1.3	**61.3**
2017	34.1	2.6	-	-	0.7	**37.4**
2018	-	2.5	-	-	-	**2.5**

2019 to 2076	-	-	-	15.2	-	**15.2**
Total	**200.1**	**52.4**	**5.3**	**15.2**	**4.1**	**277.1**

Present Value of Costs (PVC)

3.17 The individual components of the Present Value of Costs for each option are shown in Table 3.4.

Table 3.4 - Present Value of Costs (£000s)

Cost Type	Core	Low Cost	Optimistic	Pessimistic
Operating Costs	780	776	780	780
Investment Costs	173,102	161,140	173,102	173,102
Total PVC	**173,882**	**161,916**	**173,882**	**173,882**

Scheme Benefits

Accident Benefits

3.18 The results of the accident analysis for the core scheme are presented in Table 3.5. For comparison, the number of accidents and casualties and the overall accident cost is summarised for two model years and the for the whole 60-year appraisal period.

3.19 The A6 to Manchester Airport Relief Road (core scenario) will see a decrease of 1032 personal injury accidents across the 60-year appraisal period, resulting in the following:

- 13 additional fatalities;
- 56 additional 'serious' casualties; and
- A reduction of 1,387 'slight' casualties.

3.20 In monetised terms, this produces an accident benefit of £16m over the 60-year appraisal period.

Table 3.5 – Accident Costs and Benefits for the A6 to Manchester Airport Relief Road

Do-Minimum (no scheme) Accident Results			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents	2,560	2,873	169,888
Casualties Fatal	26	30	1,768
Serious	292	330	19,518
Slight	3,320	3,726	220,325
Total Costs (£ms discounted to 2002 prices)	149	129	6,666
Do–Something (with scheme) Accident Results			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents	2,540	2,856	168,856
Casualties Fatal	27	30	1,781
Serious	292	331	19,574
Slight	3,293	3,704	218,938
Total Costs (£ms discounted to 2002 prices)	149	129	6,650
Comparison of Accident Results from Do-Minimum and Do-Something Scenarios			
	2017	2032	Total 60 year Appraisal Period
Number of Personal Injury Accidents Saved	20	17	1032
Casualties Fatal	-1	0	-13
Serious	0	-1	-56
Slight	27	22	1,387
Total Accident Cost Saving (£ms discounted to 2002 prices)	0	0	16

Scheme User Benefits

3.21 The following section details the economic benefits arising from the introduction of the Core, Low-Cost, Optimistic and Pessimistic scenarios of the A6 to Manchester Airport Relief Road scheme.

Overview

3.22 A breakdown of the benefits generated by the proposed scheme is summarised in Table 3.6 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 95% of total PVB. The remaining 4-5% of benefits is generated largely from accident savings and savings in Vehicle Operating Costs (VOC). Carbon emission accounts for only small percentages of the total PVB.

Table 3.6 – Proposed Scheme Total Economic Benefits by Forecast Scenario

Benefit	Economic Benefits by Forecast Scenario (£m)			
	Core	Low Cost	Optimistic	Pessimistic
Travel Time Savings	832.5	692.5	927.2	824.6
'VOC' Savings	47.5	25.6	49.0	42.9
Carbon Emission Savings	-1.1	-3.9	-1.3	-1.2
Accident Savings	16	9	16	16
Indirect Tax	4.4	12.7	4.9	8.9
Net Present Value of Benefits (PVB)	**899.4**	**721.4**	**995.8**	**891.3**

3.23 As shown in Table 3.7, almost half of these benefits are generated by business travellers, that is, journeys carried out on behalf of work. This is to be expected, given the significantly higher value of time of business users compared to commuters and 'other' users[7]. 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 3.1 above, as the latter include benefits relating to reductions in accidents and carbon emissions.

Table 3.7 – Distribution of TUBA Based Benefits Across User Types (£m) – Proposed Scheme

Journey Purpose	PVB (£m) for each Forecast Scenario			
	Core	Low Cost	Optimistic	Pessimistic
Time Savings				
Business	379.7	302.6	432.9	379.9
Commuting	169.2	144.8	178.9	159.4
Other	283.6	245.1	315.4	285.3
Total	832.5	692.5	927.2	824.6
VOC Savings				
Business	47.8	33.2	33.1	34.0
Commuting	4.3	2.9	-1.9	1.9
Other	-4.6	-10.4	-22.8	-10.4
Total	47.5	25.6	8.5	25.6
Total PVB				
Business	427.6	320.6	485.1	427.3
Commuting	173.5	147.9	181.9	160.8
Other	279.0	235.0	309.2	279.4
Total	880.1	721.4	976.2	867.5

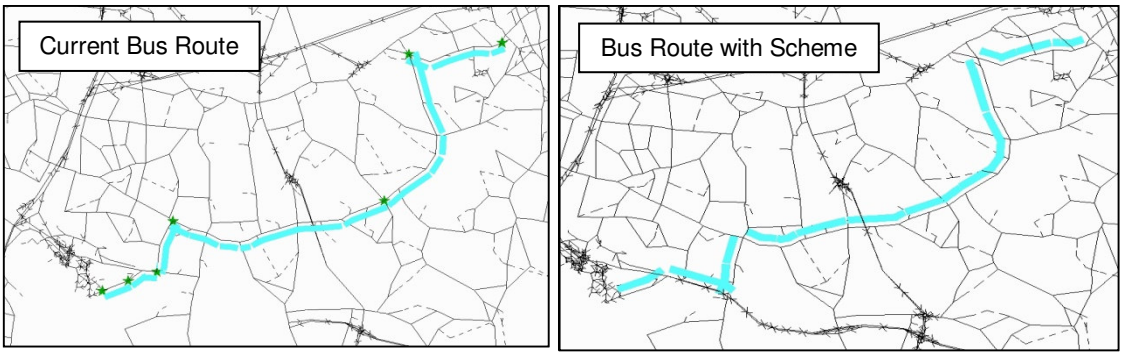
[7] Business users value time at £21.06 per hour (at 2002 prices), compared to the valuations of £5.04 per hour and £4.46 per hour placed upon time by commuters and 'other' users.

Public Transport Benefits

3.24 An analysis of benefits to PT (Bus) users / operators was undertaken using TUBA with the input taken from the Variable Demand Model. This analysis assumes that the current bus services remain and that no new services are developed to use the new Relief Road or additional bus frequency to take advantage of improved travel conditions for buses. The results incorporated in the TEE Table (Appendix A), indicate a small PT disbenefit largely as a result of loss of fare box revenue due to mode shift from bus to car. The TUBA results are subject to model noise from the Highway SATURN Model and should therefore be interpreted as indicating that the PT user time impacts will be small and within the margins of error of the highway modelling.

3.25 Whilst the TUBA analysis indicates a disbenefit to buses through mode shift to car, the reality however is, that the completion of the relief road will relieve existing east-west routes from congestion which in turn will provide journey time benefits for buses using those routes. The VDM model predicts that this improvement in journey time will lead to a mode shift from bus to car. In reality, this is considered to be unlikely since those currently using the bus will achieve a journey time saving with the scheme in place and whilst this is also true for the car user, bus journey times are slower than car journey times in both scenarios and so there is little likelihood of travellers changing mode of travel in favour of the car when bus journey times are improving. In addition, the new road will provide an opportunity for new bus routes to be considered to complement those that currently operate in the corridor. In both cases, the improvements in bus journey times will deliver PT benefits that would be in addition to those benefits captured in the TEE Table.

3.26 As an example of benefits to bus users, we have looked at the current bus services X69 and 369. 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.



3.27 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)	1940	1492	2110	1666	1400	1238	1482	1296	1796	1492	1925	1586

Time (mins)	32.3	24.9	35.2	27.8	23.3	20.6	24.7	21.6	29.9	24.9	32.1	26.4
Time Saving		23.1%		21.0%		11.6%		12.6%		16.9%		17.6%
Eastbound												
Time (secs)	1824	1572	2154	1695	1314	1233	1386	1284	1682	1467	1921	1588
Time (mins)	30.4	26.2	35.9	28.3	21.9	20.6	23.1	21.4	28.0	24.5	32.0	26.5
Time Saving		13.8%		21.3%		6.2%		7.4%		12.8%		17.3%

3.28 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)

3.29 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

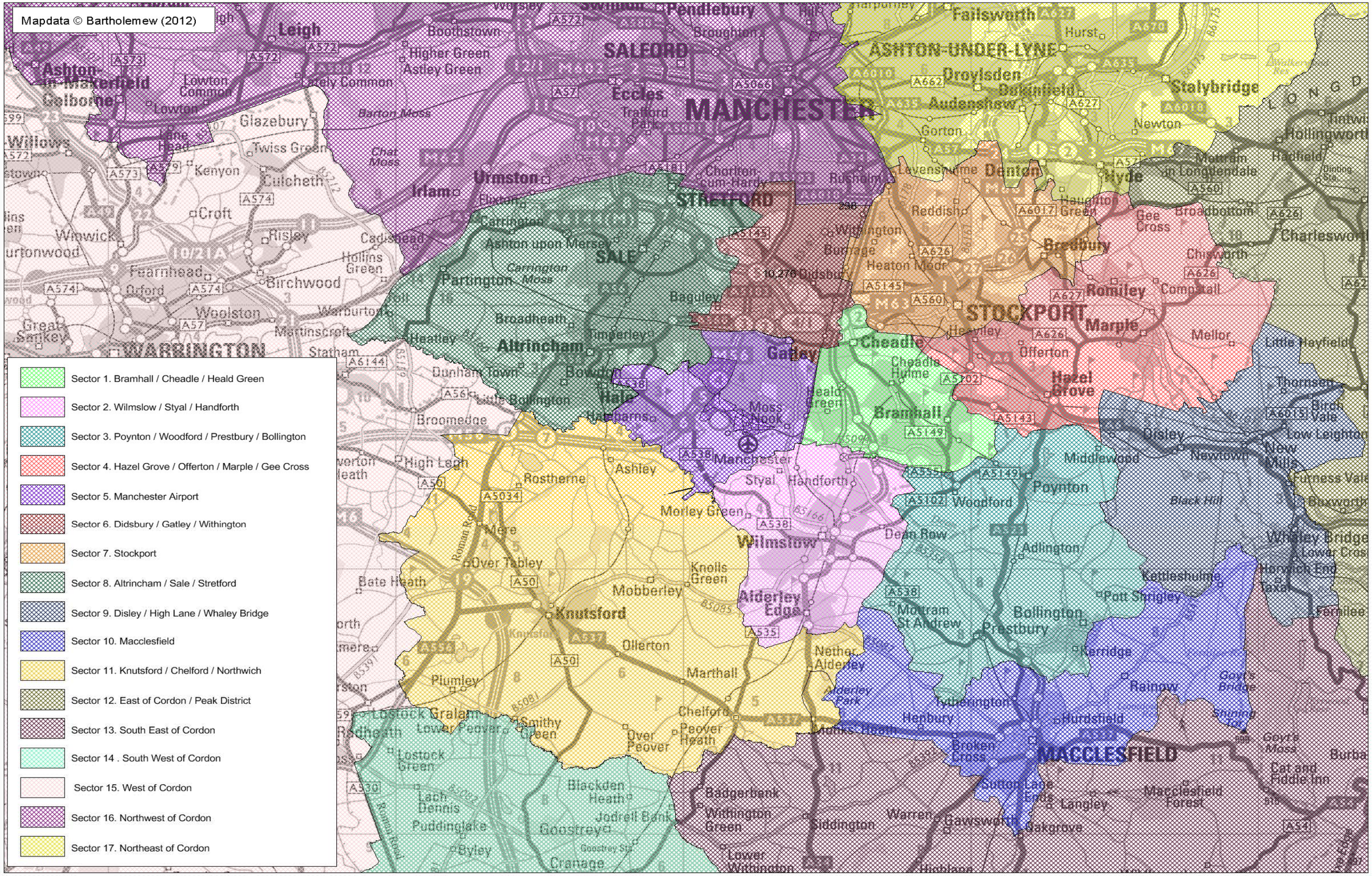
Spatial Distribution of Benefits

3.30 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.

3.31 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 – A6 to Manchester Airport Relief Road Traffic Model – TUBA 'Sector' Boundaries



3.32 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).

3.33 Benefits from the proposed A6 to Manchester Airport Relief Road 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 A6 to Manchester Airport Relief Road 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.

3.34 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 all four of the options tested.

3.35 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	Core	Low Cost	Optimistic	Pessimistic
Bramhall / Cheadle / Heald Green	1481	1113	1692	1225
Wilmslow / Styal / Handforth	971	1029	1763	811
Poynton / Woodford / Prestbury / Bollington	782	694	691	586
Hazel Grove / Offerton / Marple / Gee Cross	2288	1976	2219	1733
Manchester Airport	814	547	1099	493
Didsbury / Gatley / Withington	375	447	429	-72
Stockport	1860	1405	1672	1101
Altrincham / Sale / Stretford	988	818	845	230
Disley / High Lane / Whaley Bridge	637	314	588	529
Macclesfield	118	217	261	-358
Knutsford / Chelford / Northwich	161	167	147	90
East of Cordon / Peak District	510	246	510	445
South East of Cordon	343	177	370	145
South West of Cordon	443	453	542	21
West of Cordon	1391	770	1220	1077
Northwest of Cordon	1173	712	1171	232
Northeast of Cordon	775	504	750	393
Total	**15050**	**11590**	**15971**	**8680**

Table 3.10 –Scheme Destination Trip TUBA Based PVB (£000s) at Sector Level – 2017

Sector	Core	Low Cost	Optimistic	Pessimistic
Bramhall / Cheadle / Heald Green	1539	1403	2002	1327
Wilmslow / Styal / Handforth	1448	1262	1304	1183
Poynton / Woodford / Prestbury / Bollington	810	490	844	626
Hazel Grove / Offerton / Marple / Gee Cross	1804	1571	2068	1331
Manchester Airport	649	191	713	361
Didsbury / Gatley / Withington	221	311	369	-121
Stockport	1565	1330	1679	1037
Altrincham / Sale / Stretford	775	702	759	-222
Disley / High Lane / Whaley Bridge	768	466	798	696
Macclesfield	264	226	290	-173
Knutsford / Chelford / Northwich	263	194	220	151
East of Cordon / Peak District	764	209	809	700
South East of Cordon	561	254	582	280
South West of Cordon	1748	1025	1744	993
West of Cordon	-3	6	-43	49
Northwest of Cordon	750	728	888	-116
Northeast of Cordon	1125	1212	946	576
Total	**15050**	**11590**	**15971**	**8680**

Table 3.11 –Scheme Origin Trip TUBA Based PVB (£000s) at Sector Level – 2032

Sector	Core	Low Cost	Optimistic	Pessimistic
Bramhall / Cheadle / Heald Green	2108	1502	2601	2273
Wilmslow / Styal / Handforth	1932	1588	2145	2209
Poynton / Woodford / Prestbury / Bollington	1009	1007	1150	976
Hazel Grove / Offerton / Marple / Gee Cross	2709	2197	3113	2725
Manchester Airport	1828	1650	1945	1797
Didsbury / Gatley / Withington	626	529	730	659
Stockport	2144	1842	2486	2214
Altrincham / Sale / Stretford	1390	1225	833	1291
Disley / High Lane / Whaley Bridge	169	2	89	205
Macclesfield	301	328	1297	271
Knutsford / Chelford / Northwich	353	313	248	385
East of Cordon / Peak District	276	119	257	287
South East of Cordon	299	176	350	353
South West of Cordon	1183	1126	961	1186
West of Cordon	1095	945	1517	1277
Northwest of Cordon	1278	966	1202	1342
Northeast of Cordon	1006	789	995	1065
Total	**19707**	**16304**	**21920**	**20515**

Table 3.12 –Scheme Destination Trip TUBA Based PVB (£000s) at Sector Level – 2032

Sector	Core	Low Cost	Optimistic	Pessimistic
Bramhall / Cheadle / Heald Green	2649	2551	3042	2875
Wilmslow / Styal / Handforth	1621	1712	1275	1965
Poynton / Woodford / Prestbury / Bollington	1240	665	1251	1346
Hazel Grove / Offerton / Marple / Gee Cross	2484	1631	3180	2464
Manchester Airport	793	285	911	807
Didsbury / Gatley / Withington	473	630	590	504
Stockport	2224	2101	2722	2204
Altrincham / Sale / Stretford	840	930	806	916
Disley / High Lane / Whaley Bridge	577	238	630	600
Macclesfield	564	44	784	515
Knutsford / Chelford / Northwich	401	528	231	400
East of Cordon / Peak District	656	254	789	640
South East of Cordon	513	190	617	479
South West of Cordon	1875	1699	1879	1965
West of Cordon	-42	17	-45	5
Northwest of Cordon	1185	1082	1472	1237
Northeast of Cordon	1656	1349	1787	1594
Total	**19707**	**16304**	**21920**	**20515**

3.36 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.

3.37 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	Core		Optimistic		Pessimistic	
	2017	2032	2017	2032	2017	2032
Bramhall / Cheadle / Heald Green	3020	4757	3695	5642	2552	5148
Wilmslow / Styal / Handforth	2419	3552	3067	3420	1994	4174
Poynton / Woodford / Prestbury / Bollington	1592	2249	1536	2401	1212	2321
Hazel Grove / Offerton / Marple / Gee Cross	4032	5192	4287	6293	3065	5189
Manchester Airport	1464	2621	1812	2856	854	2604
Didsbury / Gatley / Withington	597	1099	798	1320	-193	1163
Stockport	3425	4368	3351	5207	2138	4418
Altrincham / Sale / Stretford	1762	2230	1604	1640	9	2207
Disley / High Lane / Whaley Bridge	1405	746	1387	719	1225	805
Macclesfield	382	865	551	2081	-531	786
Knutsford / Chelford / Northwich	424	754	367	478	241	784
East of Cordon / Peak District	1274	932	1319	1046	1145	928
South East of Cordon	904	812	952	966	425	832
South West of Cordon	2191	3058	2286	2840	1014	3152
West of Cordon	1388	1053	1177	1472	1126	1281
Northwest of Cordon	1923	2462	2059	2675	115	2579
Northeast of Cordon	1899	2663	1696	2782	969	2660
Total	**30099**	**39415**	**31941**	**43839**	**17360**	**41031**

Temporal Distribution of Benefits

3.38 Table 3.14 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 3.14 - Proposed Scheme TUBA Based PVB by Time Period

Time Period	Core		Low Cost Alternative		Optimistic		Pessimistic	
	£m	% of Total	£m	% of Total	£m	% of Total	£m	% of Total
AM Peak	300.8	36%	257.1	37%	284.0	31%	269.8	33%
PM Peak	265.9	32%	230.8	33%	282.2	30%	258.5	31%
Inter Peak	149.2	18%	119.1	17%	202.6	22%	166.3	20%
Off Peak	62.4	7%	49.8	7%	84.7	9%	69.5	9%
Weekend	54.3	7%	43.5	6%	73.6	8%	60.5	7%
Total PVB	**832.6**	**100%**	**700.2**	**100%**	**863.7**	**100%**	**824.6**	**100%**

3.39 The results obtained form the Core scenario analysis show that the AM peak period provides the largest element of benefit generated with £300.8m (or 36%). The PM peak is the next largest contributor; accounting for 32% of total PVB and the inter peak generating 18%.

3.40 This temporal pattern of benefits is broadly followed by the low-cost and Optimistic / Pessimistic scenario tests undertaken, with the AM Peak period generating the most significant element of scheme benefit, varying between 31 and 37%.

3.41 The pattern of benefits being achieved by the A6 to Manchester Airport Relief Road is considered to be appropriate and highlights the nature of traffic volumes / congestion within the study area. The AM and PM peak hours currently exhibit the largest volumes of traffic across the SEMMMS Area of Influence. In the future year Do-Minimum scenarios, the level of traffic is further amplified (due to factors such as 'background' traffic growth and the inclusion of specific land-use / development sites), which manifests itself as increased network congestion / journey times. The inclusion of the A6 to Manchester Airport Relief Road scheme provides the greatest amount of travel time benefit for traffic within these time periods and helps to explain why the AM and PM peak hours offer the largest proportions of monetary benefits.

4. Conclusions

Overview

4.1 A series of traffic models have been developed to assess proposals for the potential A6 to Manchester Airport Relief Road, testing two alternative options: the Core Scenario and a Low-Cost Alternative. A series of sensitivity tests looking at Optimistic and Pessimistic scenarios has 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.

Scheme Costs

The Core Scenario

4.2 A robust approach to the estimation of scheme costs has been undertaken using specialist advice from Corduroy, with an independent review of costs by EC Harris, and a review of buildability by Balfour Beatty. The costs have also been subject to value management exercises involving specialists from SMBC, URS and Atkins.

4.3 The total cost used in the economic appraisal of the DS Core Scenario amounts to £297.5million (at Q2 2010 prices) which is inclusive of maintenance, inflation, risk and optimism bias elements.

The Low-Cost Alternative

4.4 The total cost used in the economic appraisal of the low-cost option amounts to £277.1 million (at Q2 2010 prices) which is inclusive of inflation, risk and optimism bias elements.

Scheme Benefits

The Core Scenario

4.5 The DS Core Scenario scheme produces a PVB of £880m. Taking into account the total scheme costs, it produces a scheme NPV of £706m and a **BCR of 5.06**. This represents **high value for money** against DfT guidance.

4.6 Almost 95% of the benefits are generated in the form of travel time savings, with the remaining 5% of benefits generated from vehicle operating cost savings and reductions in accidents and indirect tax revenues.

4.7 The scheme is forecast to reduce the number of accidents on the highway network across the study area, resulting in 1032 fewer personal injury accidents and generating £16m of benefits as a consequence.

The Low-Cost Alternative

4.8 The lower-cost alternative produces a PVB of £721m. Taking into account the total costs of the option, it produces a net present value of £559m and a **BCR of 4.46**. This represents **high value for money** against DfT guidance.

4.9 Almost 96% of the benefits are generated in the form of travel time savings, with the remaining benefits generated from vehicle operating cost savings and reductions in accidents and indirect tax revenues.

4.10 This economic assessment has shown that the A6 to Manchester Airport Relief Road significantly exceeds the DfT criterion for high value for money. It has also demonstrated that the DS Core scenario provides a greater level of benefit than the lower-cost alternative. It is the recommendation of this report, therefore, that the Core Scenario alignment of the A6 to Manchester Airport Relief Road scheme should be accepted for programme entry

Appendix A – TEE Tables

Table A.1 - TEE Table – Core Scheme

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	166504		169183	-2679		
Vehicle Operating Costs	4310		4310			
User Charges	259		0	259		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	171073	(1a)	173493	-2420	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	278498		283614	-5116		
Vehicle Operating Costs	-4616		-4616			
User Charges	363		0	363		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	274245	(1b)	278998	-4753	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	379864		199392	180354	118			
Vehicle Operating Costs	47845		8212	39633				
User Charges	21		0	0	21			
During Construction & Maintenance	0		0	0				
Subtotal	427730	(2)	207604	219987	139	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	-15228			-15228		
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	-15228	(3)	0	-15228	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	412502	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	857820	(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	780		780			
Investment Costs	39254		39254			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	40034	(7)	40034			

Central Government Funding: Transport						
Revenue	0					
Operating costs	0					
Investment Costs	133848		133848			
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	133848	(8)				

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-6956	(9)	-4404	-2552		

TOTALS		
Broad Transport Budget	173882	(10) = (7) + (8)
Wider Public Finances	-6956	(11) = (9)

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2002 prices and values.

Table 3: Analysis of Monetised Costs and Benefits

Noise		(12)
Local Air Quality		(13)
Greenhouse Gases	-1077	(14)
Journey Ambience		(15)
Accidents	16000	(16)
Economic Efficiency: Consumer Users (Commuting)	171073	(1a)
Economic Efficiency: Consumer Users (Other)	274245	(1b)
Economic Efficiency: Business Users and Providers	412502	(5)
Wider Public Finances (Indirect Taxation Revenues)	-6956	- (11) - sign changed from PA table, as PA table represents costs, not benefits
Option Values		(17)
Present Value of Benefits (see notes) (PVB)	879699	(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)
Broad Transport Budget	173882	(10)
Present Value of Costs (see notes) (PVC)	173882	(PVC) = (10)
OVERALL IMPACTS		
Net Present Value (NPV)	705817	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	5.06	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 Cost Alternative Scheme

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	144804		147483	-2679		
Vehicle Operating Costs	2868		2868			
User Charges	259		0	259		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	147931	(1a)	150351	-2420	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	245098		250214	-5116		
Vehicle Operating Costs	-10447		-10447			
User Charges	363		0	363		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	235014	(1b)	239767	-4753	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	302648		159686	142844	118			
Vehicle Operating Costs	33225		7234	25991				
User Charges	21		0	0	21			
During Construction & Maintenance	0		0	0				
Subtotal	335894	(2)	166920	168835	139	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	-15228			-15228		
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	-15228	(3)	0	-15228	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	320666	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	703611	(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	776		776			
Investment Costs	33335		33335			
Developer and Other Contributions	-6043		-6043			
Grant/Subsidy Payments	0		0			
NET IMPACT	28068	*(7)*	28068			

Central Government Funding: Transport						
Revenue	0					
Operating costs	0					
Investment Costs	133848		133848			
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	133848	*(8)*				

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-12667	*(9)*	-10115	-2552		

TOTALS		
Broad Transport Budget	161916	*(10) = (7) + (8)*
Wider Public Finances	-12667	*(11) = (9)*

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2002 prices and values.

Table 3: Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	-3856	*(14)*
Journey Ambience		*(15)*
Accidents	9000	*(16)*
Economic Efficiency: Consumer Users (Commuting)	147931	*(1a)*
Economic Efficiency: Consumer Users (Other)	235014	*(1b)*
Economic Efficiency: Business Users and Providers	320666	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-12667	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Option Values		*(17)*
Present Value of Benefits (see notes) (PVB)	721422	*(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)*
Broad Transport Budget	161916	*(10)*
Present Value of Costs (see notes) (PVC)	161916	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	559506	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.46	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 – Optimistic Scheme

Table 1: Transport Economic Efficiency Benefits

Consumers - Commuting	ALL MODES		ROAD	BUS & COACH	RAIL	OTHER
User Benefits	TOTAL		Private Cars & LGVs	Passengers	Passengers	
Travel Time	176253		178932	-2679		
Vehicle Operating Costs	3009		3009			
User Charges	259		0	259		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	179521	(1a)	181941	-2420	0	0

Consumers - Other Users	ALL MODES		ROAD	BUS & COACH	RAIL	OTHER
User Benefits	TOTAL		Private Cars & LGVs	Passengers	Passengers	
Travel Time	310242		315358	-5116		
Vehicle Operating Costs	-6176		-6176			
User Charges	363		0	363		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	304429	(1b)	309182	-4753	0	0

Business								
User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	433029		232351	200560	118			
Vehicle Operating Costs	52207		8832	43375				
User Charges	21		0	0	21			
During Construction & Maintenance	0		0	0				
Subtotal	485257	(2)	241183	243935	139	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	-15228			-15228		
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	-15228	(3)	0	-15228	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	470029	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	953979	(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	780		780			
Investment Costs	39254		39254			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	40034	*(7)*	40034			

Central Government Funding: Transport						
Revenue	0		0			
Operating costs	0		0			
Investment Costs	133848		133848			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	133848	*(8)*				

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-7406	*(9)*	-4854	-2552		

TOTALS		
Broad Transport Budget	173882	*(10) = (7) + (8)*
Wider Public Finances	-7406	*(11) = (9)*

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2002 prices and values.

Table 3: Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	-1252	*(14)*
Journey Ambience		*(15)*
Accidents	16000	*(16)*
Economic Efficiency: Consumer Users (Commuting)	179521	*(1a)*
Economic Efficiency: Consumer Users (Other)	304429	*(1b)*
Economic Efficiency: Business Users and Providers	470029	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-7406	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Option Values		*(17)*
Present Value of Benefits (see notes) (PVB)	976133	*(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)*
Broad Transport Budget	173882	*(10)*
Present Value of Costs (see notes) (PVC)	173882	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	802251	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	5.61	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.4 - TEE Table – Pessimistic Scheme

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	156724		159403	-2679		
Vehicle Operating Costs	1444		1444			
User Charges	259		0	259		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (COMMUTING)	158427	(1a)	160847	-2420	0	0

Consumers - Other Users User Benefits	ALL MODES TOTAL		ROAD Private Cars & LGVs	BUS & COACH Passengers	RAIL Passengers	OTHER
Travel Time	280218		285334	-5116		
Vehicle Operating Costs	-5922		-5922			
User Charges	363		0	363		
During Construction & Maintenance	0		0			
NET CONSUMER BENEFITS (OTHERS)	274659	(1b)	279412	-4753	0	0

Business User Benefits			Personal	Freight	Passengers	Passengers	Freight	
Travel Time	379981		197816	182047	118			
Vehicle Operating Costs	47401		7951	39450				
User Charges	21		0	0	21			
During Construction & Maintenance	0		0	0				
Subtotal	427403	(2)	205767	221497	139	0	0	0

Private Sector Provider Impacts				Passengers	Passengers	
Revenue	-15228			-15228		
Operating Costs	0					
Investment Costs	0					
Grant/Subsidy	0					
Subtotal	-15228	(3)	0	-15228	0	0

Other Business Impacts						
Developer Contributions	0	(4)				
NET BUSINESS IMPACT	412175	(5) = (2) + (3) + (4)				

TOTAL		
Present Value of Transport Economic Efficiency Benefits	845261	(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	780		780			
Investment Costs	39254		39254			
Developer and Other Contributions	0		0			
Grant/Subsidy Payments	0		0			
NET IMPACT	40034	*(7)*	40034			

Central Government Funding: Transport						
Revenue	0					
Operating costs	0					
Investment Costs	133848		133848			
Developer and Other Contributions	0					
Grant/Subsidy Payments	0					
NET IMPACT	133848	*(8)*				

Central Government Funding: Non-Transport						
Indirect Tax Revenues	-11478	*(9)*	-8926	-2552		

TOTALS		
Broad Transport Budget	173882	*(10) = (7) + (8)*
Wider Public Finances	-11478	*(11) = (9)*

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2002 prices and values.

Table 3: Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	-1168	*(14)*
Journey Ambience		*(15)*
Accidents	16000	*(16)*
Economic Efficiency: Consumer Users (Commuting)	158427	*(1a)*
Economic Efficiency: Consumer Users (Other)	274659	*(1b)*
Economic Efficiency: Business Users and Providers	412175	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-11478	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Option Values		*(17)*
Present Value of Benefits (see notes) (PVB)	871571	*(PVB) = (12) + (13) + (14) + (15) + (16) + (1a) + (1b) + (5) + (17) - (11)*
Broad Transport Budget	173882	*(10)*
Present Value of Costs (see notes) (PVC)	173882	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	697689	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	5.01	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 Weekend & Off Peak Annualisation Factors

B.1.1 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).

B.1.2 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).

B.1.3 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.

B.1.4 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.

B.1.5 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.

B.1.6 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.

B.1.7 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.

B.1.8 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.

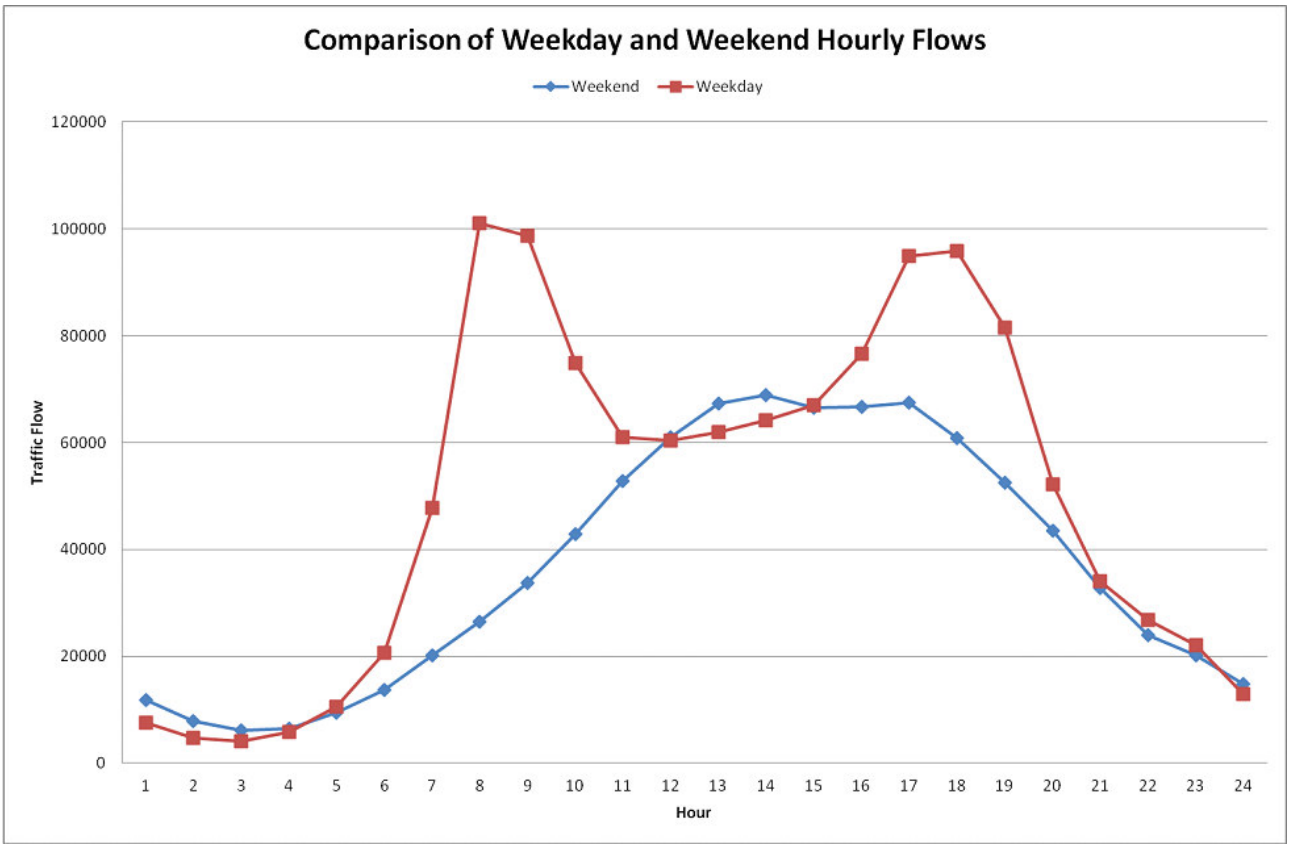
Table B.1 – Derivation of Off-Peak and Weekend Annualisation Factors

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**

B.1.9 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.

B.1.10 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

Preferred Option Scheme 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	61	130	16	218	189	13	134	141	85	15	16	82	18	155	3	27	78	1381
2	28	-54	23	160	149	36	32	197	127	-30	-4	31	-1	90	2	110	46	941
3	15	100	38	-14	140	22	13	78	55	37	33	6	15	157	13	43	-10	739
4	297	146	74	360	143	35	521	73	-127	6	34	-24	-14	228	3	111	152	2017
5	310	186	109	176	0	-25	39	-82	66	8	3	65	53	-106	-3	-117	51	735
6	31	38	36	61	-29	-3	59	0	42	18	3	29	22	-36	-3	-5	56	319
7	204	69	31	427	44	48	244	57	66	33	19	5	11	129	1	98	235	1719
8	143	165	100	130	-80	21	84	93	54	13	16	27	43	-1	-14	35	86	915
9	19	121	22	-152	49	29	34	64	-19	3	36	-10	-7	251	5	125	16	586
10	0	-20	19	-18	19	9	12	18	4	7	2	5	14	20	0	28	-1	118
11	9	12	5	19	-5	1	9	3	38	4	5	6	2	38	0	7	28	182
12	14	53	9	-32	81	13	16	31	-8	6	6	0	0	233	3	72	4	500
13	3	3	13	-37	30	12	15	28	-1	32	2	1	0	78	0	128	7	314
14	9	12	11	44	-18	-2	29	-13	37	24	45	10	15	108	0	0	82	393
15	215	161	151	230	-129	-29	31	-8	193	0	0	343	117	0	0	-23	63	1314
16	18	143	65	136	-78	9	140	16	153	42	21	94	200	22	-1	-25	37	992
17	91	37	11	102	54	27	46	53	3	5	26	0	5	146	2	13	0	620
Total	1468	1301	734	###	558	215	1456	750	768	223	260	671	493	1512	11	626	930	13786

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	8	15	1	10	13	1	14	6	8	2	1	1	2	9	0	10	0	101
2	-5	-5	-2	7	24	1	2	16	16	-4	-5	2	0	13	0	11	0	70
3	0	7	3	-7	17	2	-4	8	9	3	1	1	1	20	8	12	0	80
4	24	16	9	33	16	1	45	5	-10	0	5	-1	-1	20	0	9	54	224
5	20	20	15	12	0	-4	2	-4	8	3	-1	9	4	-5	0	1	43	124
6	2	2	4	0	-2	0	5	0	5	1	0	1	2	2	-1	1	43	65
7	21	8	1	32	5	2	22	3	-12	3	1	-2	-2	8	0	7	18	116
8	9	18	10	6	-3	2	11	9	7	3	3	6	10	2	-1	2	6	98
9	-2	23	8	-26	8	2	-30	5	-1	0	6	0	0	76	2	11	2	84
10	0	0	1	-6	2	1	1	1	0	0	0	0	1	0	0	1	-5	-2
11	-2	-9	0	0	0	0	1	0	4	0	0	1	0	2	0	2	2	3
12	-1	7	0	-4	18	0	0	5	0	0	0	0	0	54	1	9	0	90
13	-1	0	1	-6	2	1	-4	5	0	1	0	0	0	2	0	12	-1	14
14	-2	-6	-1	-2	-1	0	1	-1	1	1	3	0	2	-1	0	1	7	3
15	13	20	24	25	-10	3	1	1	27	0	0	77	1	0	0	-1	-1	182
16	2	28	15	5	0	1	11	9	11	1	2	10	24	8	0	-2	-1	123
17	9	5	0	14	4	1	4	4	-1	0	1	0	2	6	1	0	0	49
Total	98	150	89	91	94	15	83	71	72	14	17	105	44	215	10	87	169	1423

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	16	4	-17	-13	2	5	-17	-3	3	2	-6	0	-14	-3	17	14	-1
2	0	12	-7	-20	5	0	-1	-17	-18	5	0	-13	0	2	-2	5	7	-41
3	3	-4	2	4	-5	0	1	-16	6	0	-5	0	0	-31	4	7	-3	-37
4	-4	-13	13	8	-9	-4	9	-18	14	10	-6	9	7	-41	-3	10	6	-14
5	-18	0	-4	-17	0	1	1	12	-5	3	1	-25	-2	22	-4	-3	-9	-45
6	2	0	1	-8	3	0	0	1	-8	1	1	-2	-1	6	-3	0	-1	-8
7	10	4	7	0	3	-1	9	-5	-11	6	0	0	-2	16	-4	-10	3	25
8	-13	-13	-10	-20	12	2	12	10	-12	0	3	-1	2	25	-6	3	-19	-25
9	-6	-11	7	1	-4	-6	-24	-11	1	0	-6	3	3	12	1	-10	16	-33
10	2	8	-1	3	1	0	4	-3	0	1	-1	0	-5	-6	0	-5	3	2
11	-2	-7	-3	-8	2	1	0	1	-8	-1	0	-9	0	0	0	4	6	-24
12	-4	-31	-2	8	-42	-4	0	-4	1	2	-6	0	-1	-4	-1	5	1	-80
13	0	1	-2	15	-4	0	5	-2	0	-6	-1	2	0	-6	0	8	5	16
14	-1	8	10	-19	7	1	-7	2	-6	8	0	-4	39	7	0	2	-2	47
15	-22	-14	-53	-34	8	6	10	16	-21	-12	0	30	-41	0	0	10	13	-104
16	16	17	20	0	18	-3	3	9	-30	0	2	1	7	16	0	-4	-13	58
17	2	22	4	8	15	-3	-2	-5	27	6	1	2	19	15	-3	-1	0	105
Total	-26	-1	-10	-91	2	-3	33	-38	-64	37	-4	0	37	35	-10	54	42	-7

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	78	161	21	211	189	16	153	130	90	20	18	77	20	150	1	53	92	1481	10%	3
2	23	-48	14	147	178	38	33	197	125	-29	-10	20	-1	105	0	126	53	971	6%	7
3	17	104	42	-18	152	24	9	69	70	40	29	7	16	146	24	61	-13	782	5%	9
4	317	148	97	400	150	32	575	60	-123	15	32	-17	-9	207	0	130	212	2228	15%	1
5	313	206	120	171	0	-28	43	-74	69	15	3	50	56	-89	-7	-119	86	814	5%	8
6	35	40	41	53	-27	-3	63	1	39	20	4	28	23	-28	-7	-4	98	375	2%	14
7	235	81	38	459	52	49	274	56	43	41	21	3	6	153	-3	95	255	1860	12%	2
8	139	170	100	116	-71	25	107	113	49	15	22	32	54	25	-21	40	73	988	7%	6
9	12	133	37	-177	53	24	-19	58	-19	3	35	-7	-4	340	8	127	33	637	4%	11
10	2	-12	19	-21	21	10	17	16	5	8	1	6	10	14	0	25	-3	118	1%	17
11	5	-4	2	12	-3	2	10	5	33	4	5	-2	2	40	0	14	36	161	1%	16
12	9	29	7	-28	57	9	16	33	-6	8	0	0	-1	283	3	85	5	510	3%	12
13	2	4	12	-29	28	13	17	31	0	28	2	3	0	74	0	148	11	343	2%	15
14	7	15	21	23	-11	-1	23	-12	32	33	48	6	55	114	0	4	88	443	3%	13
15	206	168	122	221	-131	-21	42	9	199	-12	0	450	77	0	0	-14	75	1391	9%	4
16	36	188	101	140	-60	6	153	33	134	43	25	105	231	46	-1	-31	24	1173	8%	5
17	102	64	15	123	73	25	48	52	29	11	27	2	25	167	0	11	0	775	5%	10
Total	1539	1448	810	1804	649	221	1565	775	768	264	263	764	561	1748	-3	750	1125	15050	100%	
Percentage	10%	10%	5%	12%	4%	1%	10%	5%	5%	2%	2%	5%	4%	12%	0%	5%	7%	100%		
Rank	4	5	7	1	12	16	3	8	9	14	15	10	13	2	17	11	6			

Origin	PVB	%
4	2228	15%
7	1860	12%
1	1481	10%
15	1391	9%
16	1173	8%
8	988	7%
2	971	6%
5	814	5%
3	782	5%
17	775	5%
9	637	4%
12	510	3%
14	443	3%
6	375	2%
13	343	2%
11	161	1%
10	118	1%

Destination	PVB	%
4	1804	12%
14	1748	12%
7	1565	10%
1	1539	10%
2	1448	10%
17	1125	7%
3	810	5%
8	775	5%
9	768	5%
12	764	5%
16	750	5%
5	649	4%
13	561	4%
10	264	2%
11	263	2%
6	221	1%
15	-3	0%

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

ATKINS

Preferred Option Scheme 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	206	226	102	314	271	31	173	135	66	65	23	71	28	168	5	35	69	1987
2	354	10	103	259	190	76	85	198	105	-11	-5	38	12	109	3	174	100	1799
3	62	117	47	87	138	24	77	66	36	31	29	11	15	123	9	58	14	944
4	347	196	191	376	193	42	632	75	-115	32	40	-32	-19	237	5	133	206	2539
5	677	272	159	240	0	21	91	-50	74	33	14	132	60	-149	-7	-3	188	1752
6	81	48	49	77	-2	25	89	22	34	28	11	23	19	-38	-4	36	67	565
7	182	85	100	542	74	61	333	67	45	84	30	-7	3	164	2	132	128	2027
8	205	160	101	160	-91	49	133	152	45	28	31	28	39	45	-40	122	149	1316
9	-16	74	-17	-193	42	15	-17	42	-23	1	24	-24	-18	188	3	85	-2	164
10	22	-43	31	-10	17	14	32	18	10	14	8	21	54	36	0	48	21	294
11	32	-3	12	28	0	10	24	23	26	13	6	8	5	50	0	37	66	337
12	-6	39	5	-79	86	8	-4	21	-16	7	8	-1	0	165	3	42	-6	271
13	1	3	13	-46	25	9	10	23	-5	55	4	2	0	49	0	113	22	278
14	56	13	22	69	-8	21	84	28	41	70	95	11	31	224	0	104	221	1082
15	255	124	144	259	-219	-33	58	-97	132	1	0	260	80	0	0	-37	135	1063
16	14	138	72	178	-93	46	193	25	110	70	36	65	156	102	-4	-6	49	1152
17	75	40	14	171	90	32	100	57	4	13	38	0	3	192	2	11	4	846
Total	2544	1499	1146	###	715	453	2093	806	568	533	393	605	470	1666	-23	1084	1432	18414

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	14	13	7	13	15	2	13	5	4	4	1	1	3	9	0	10	0	114
2	11	2	6	12	21	4	6	14	9	0	1	3	1	17	0	11	0	117
3	4	5	3	3	13	1	2	5	4	1	1	0	1	18	3	12	0	76
4	17	11	13	24	13	1	35	4	-7	1	3	-1	-1	14	0	11	28	167
5	35	19	13	13	-19	0	5	-1	6	3	0	10	3	-4	0	-17	11	77
6	4	2	3	1	-1	2	4	2	2	4	1	1	2	-7	-1	1	49	69
7	15	6	4	27	6	2	19	4	-8	2	1	-1	-6	10	0	9	9	98
8	10	11	7	5	-3	3	14	8	4	3	2	5	7	3	-2	4	9	88
9	-4	10	2	-23	5	0	-20	2	-1	0	3	0	0	51	1	5	0	31
10	1	1	2	-4	2	2	3	3	1	0	0	1	2	2	0	5	-7	15
11	1	0	1	1	1	1	1	1	2	1	0	0	0	2	0	5	7	24
12	-1	4	-1	-5	15	0	-1	3	0	0	1	0	0	41	0	3	0	59
13	0	0	1	-5	2	0	-3	3	0	2	0	0	0	3	0	8	3	16
14	1	-1	1	1	0	1	4	1	2	3	5	1	5	6	0	8	21	56
15	12	11	20	23	-13	-1	4	-4	16	0	0	61	1	0	0	-2	9	136
16	1	13	12	8	-2	2	17	5	6	3	2	5	16	8	0	-1	1	97
17	7	4	3	14	4	1	8	4	0	-1	2	0	2	13	0	0	0	60
Total	125	110	94	109	59	22	110	59	41	27	24	85	34	184	2	72	140	1299

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	14	0	5	-11	-9	2	11	-11	-2	-1	0	-5	0	-10	-2	12	14	7
2	-12	15	-1	-13	8	0	-1	-8	-7	12	6	-6	2	12	-2	6	5	16
3	3	-3	3	0	-1	0	1	-10	5	0	-2	0	1	-19	0	9	2	-10
4	-4	-12	7	15	-7	-3	14	-15	11	8	-5	9	12	-38	-3	9	4	3
5	-8	4	-2	-12	-5	1	1	10	-3	3	2	-49	-4	28	-4	-2	17	-24
6	2	-1	0	-6	2	2	-1	3	-5	3	0	-3	-2	4	-3	1	-4	-8
7	15	0	3	2	3	-1	8	-2	-9	-3	-1	2	-3	10	-3	-11	8	19
8	-9	-9	-7	-17	11	2	4	9	-6	-1	0	-2	-1	13	0	3	-2	-13
9	-6	-4	4	-3	-2	-3	-22	-6	1	0	-2	3	2	9	0	-5	8	-26
10	-3	12	-1	2	2	1	0	-1	0	0	-1	7	-10	-10	0	-1	-4	-8
11	-2	4	-1	-5	2	0	-2	-1	-3	-1	0	-2	0	1	0	3	0	-8
12	-2	-6	0	10	-58	-2	6	-4	3	0	-9	2	2	8	-2	-6	4	-54
13	0	0	-1	15	-3	-1	3	-2	3	-6	-8	4	0	-10	0	4	9	6
14	-5	8	4	-17	5	1	-7	-4	0	-3	4	5	36	10	0	1	9	45
15	-27	-8	-36	-26	9	8	5	13	-21	-4	0	5	-46	0	0	10	16	-103
16	19	9	19	1	8	-5	-2	7	-14	-6	0	-7	-9	12	0	-2	-1	29
17	5	3	4	8	30	-2	2	-3	15	4	1	2	30	5	-2	-2	0	100
Total	-21	12	-1	-57	-5	-2	20	-25	-33	5	-16	-33	9	24	-21	29	84	-30

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	234	239	114	316	277	35	197	129	68	68	24	67	31	167	3	56	83	2108	11%	3
2	352	27	108	259	219	80	90	203	107	1	2	35	15	138	1	190	105	1932	10%	4
3	68	119	52	90	150	26	80	61	46	32	28	12	17	122	12	78	16	1009	5%	10
4	360	195	211	414	199	41	681	64	-111	41	39	-23	-9	213	3	153	239	2709	14%	1
5	703	295	170	241	0	22	97	-41	76	39	16	93	59	-124	-12	-21	216	1828	9%	5
6	87	49	52	73	-1	29	93	28	31	34	11	20	18	-41	-7	38	112	626	3%	12
7	212	91	107	571	83	62	360	70	28	83	31	-6	-6	184	0	131	145	2144	11%	2
8	205	161	101	149	-84	54	150	169	42	29	33	31	45	60	-43	128	157	1390	7%	6
9	-27	80	-12	-219	46	13	-59	39	-23	1	25	-21	-16	248	4	86	6	169	1%	17
10	20	-29	31	-12	22	17	35	20	11	15	7	28	46	28	0	52	9	301	2%	14
11	31	2	12	23	3	10	23	23	25	12	6	7	5	53	0	44	73	353	2%	13
12	-10	37	4	-74	44	6	0	20	-13	7	0	1	2	215	1	38	-2	276	1%	16
13	0	3	13	-37	25	9	10	24	-2	52	-4	6	0	42	0	126	34	299	2%	15
14	52	19	26	53	-3	23	81	24	42	70	104	17	72	240	0	113	251	1183	6%	8
15	240	127	128	256	-223	-27	67	-88	128	-3	0	325	36	0	0	-29	160	1095	6%	9
16	35	159	102	187	-87	44	208	38	102	66	38	63	163	122	-4	-8	49	1278	6%	7
17	86	46	20	193	124	31	110	59	19	15	41	2	35	210	0	10	4	1006	5%	11
Total	2649	1621	1240	2484	793	473	2224	840	577	564	401	656	513	1875	-42	1185	1656	19707	100%	
Percentage	13%	8%	6%	13%	4%	2%	11%	4%	3%	3%	2%	3%	3%	10%	0%	6%	8%	100%		
Rank	1	6	7	2	10	15	3	9	12	13	16	11	14	4	17	8	5			

Origin	PVB	%
4	2709	14%
7	2144	11%
1	2108	11%
2	1932	10%
5	1828	9%
8	1390	7%
16	1278	6%
14	1183	6%
15	1095	6%
3	1009	5%
17	1006	5%
6	626	3%
11	353	2%
10	301	2%
13	299	2%
12	276	1%
9	169	1%

Destination	PVB	%
1	2649	13%
4	2484	13%
7	2224	11%
14	1875	10%
17	1656	8%
2	1621	8%
3	1240	6%
16	1185	6%
8	840	4%
5	793	4%
12	656	3%
9	577	3%
10	564	3%
13	513	3%
6	473	2%
11	401	2%
15	-42	0%

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

ATKINS

Low Cost Alternative 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	82	160	5	155	148	6	113	118	23	18	14	28	12	109	6	3	60	1059
2	165	-20	5	134	128	45	54	191	58	-37	-13	25	-3	80	4	125	70	1008
3	18	109	29	4	111	22	28	84	10	33	25	0	12	133	14	38	-1	669
4	228	132	-2	343	120	36	434	87	-20	-1	26	-14	-16	197	6	110	165	1830
5	287	128	88	162	0	-38	53	-92	50	0	-8	27	49	-129	-6	-128	55	501
6	31	34	42	58	-54	19	66	21	40	15	3	12	50	-46	-1	51	65	405
7	117	60	8	372	29	42	151	76	56	28	16	9	14	69	1	142	140	1329
8	123	120	101	139	-143	23	92	10	82	44	15	13	101	-13	-12	32	98	827
9	-18	68	-8	-121	43	24	-3	74	-9	2	18	-10	-11	170	4	64	31	317
10	9	-11	9	-15	2	22	20	68	2	7	2	4	15	13	0	60	16	224
11	18	16	4	14	-11	4	13	5	14	3	4	5	2	25	0	17	36	171
12	-3	42	3	-32	30	5	9	16	-6	4	5	0	0	110	3	36	3	224
13	0	2	8	-36	35	29	10	69	-7	24	2	1	0	10	0	83	15	246
14	30	15	9	34	-35	6	40	-16	21	21	44	2	14	77	0	21	130	412
15	202	124	137	195	-151	-25	29	-70	138	1	0	85	38	0	0	-21	86	767
16	-29	141	61	106	-128	48	137	44	54	53	20	9	51	5	-1	-2	50	618
17	48	27	0	102	17	32	29	59	9	0	21	0	-1	73	1	21	2	439
Total	1308	1147	497	###	141	302	1276	745	514	214	196	194	325	883	18	653	1021	11049

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	9	12	-4	9	8	0	12	0	3	-1	1	1	0	7	1	10	0	68
2	10	0	-6	4	18	2	3	12	9	-5	-4	1	0	12	1	11	0	68
3	1	3	1	-3	12	2	-2	7	5	2	0	0	1	20	4	12	0	66
4	18	14	0	30	13	0	34	5	-3	-3	5	-1	-2	15	0	9	54	190
5	21	16	11	9	0	-3	6	3	6	0	-3	5	3	-9	0	1	43	110
6	2	2	3	1	-3	2	5	3	4	1	0	1	4	4	0	1	43	73
7	13	5	-4	25	4	2	13	5	-7	0	1	0	-2	5	0	7	12	80
8	7	13	10	5	-2	7	13	3	9	6	2	4	11	2	-1	2	8	98
9	-1	16	5	-20	6	1	-29	7	0	0	4	0	0	61	1	1	3	55
10	1	0	1	-4	0	4	1	10	1	0	0	0	1	1	0	6	-10	11
11	0	0	0	0	0	0	1	1	2	0	0	0	0	1	0	3	3	12
12	0	6	-1	-3	9	0	0	3	0	0	0	0	0	36	1	-1	0	51
13	0	0	1	-6	1	2	-5	9	0	1	0	0	0	1	0	0	1	7
14	1	-2	-1	-3	1	0	2	-1	0	1	2	0	2	-1	0	4	13	19
15	16	18	20	15	-2	2	1	-5	23	0	0	23	1	0	0	-1	2	111
16	-2	25	6	6	3	5	11	8	4	1	2	1	-1	8	0	0	1	80
17	5	1	-1	12	1	1	4	4	0	-2	1	0	1	2	0	0	0	29
Total	102	130	43	79	70	28	69	74	55	3	13	37	17	165	7	65	174	1130

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	3	-1	-15	-13	2	5	-17	-1	-1	1	-5	2	-14	-3	19	11	-15
2	-1	15	-12	-24	0	-1	-2	-16	-14	6	2	-14	1	2	-2	7	4	-47
3	2	-11	-2	10	-7	0	2	-17	7	0	-4	0	0	-28	0	9	-2	-42
4	-8	-17	13	6	-10	-5	5	-22	13	5	-6	8	10	-42	-3	7	3	-44
5	-13	-3	-7	-20	0	2	-2	22	-10	2	0	-13	-14	9	-5	-13	0	-63
6	3	0	-1	-7	1	1	-2	5	-13	3	1	-1	-17	3	1	1	-8	-32
7	9	-1	2	-4	-1	-2	4	-4	-5	2	-1	3	-1	9	-3	-14	3	-4
8	-9	-10	-13	-27	21	9	1	16	-40	-3	2	1	-57	10	1	1	-7	-107
9	1	-8	8	3	-9	-9	-22	-31	1	0	-4	1	4	5	-1	-3	6	-58
10	2	8	-1	2	1	-1	2	-11	0	0	-1	0	-6	-5	0	-7	-1	-18
11	-2	3	-2	-9	2	0	-2	1	-6	-1	0	-9	-1	1	0	3	4	-16
12	-3	-16	-1	8	-11	-3	2	-3	1	1	-3	0	0	-1	-2	1	0	-29
13	0	1	-3	14	-15	-12	0	-48	0	-6	-1	1	0	-1	0	-6	1	-76
14	-1	16	6	-18	5	1	-4	-1	-3	-2	2	1	7	9	0	3	0	21
15	-18	-16	-50	-41	6	6	3	11	-22	-2	-3	5	-2	0	0	8	7	-109
16	17	18	13	2	9	-4	-3	6	-19	1	2	0	-32	13	1	-3	-6	14
17	1	4	2	4	1	-3	-1	-8	10	5	-3	0	20	7	-2	-2	0	35
Total	-6	-14	-46	-111	-15	-13	-9	-108	-93	19	-4	-9	-75	-9	-4	26	34	-436

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	103	174	0	149	143	9	130	102	25	16	16	23	14	102	4	33	71	1113	10%	3
2	175	-5	-12	114	146	46	54	187	52	-36	-15	12	-3	94	3	142	74	1029	9%	4
3	21	102	28	11	116	25	29	73	22	34	22	1	13	125	18	60	-3	694	6%	8
4	238	129	11	379	123	31	472	70	-10	1	26	-6	-8	170	3	126	222	1976	17%	1
5	296	141	93	152	0	-38	57	-67	46	2	-10	20	38	-128	-12	-139	98	547	5%	9
6	36	36	45	52	-56	23	69	30	30	18	4	11	36	-40	-1	53	100	447	4%	12
7	139	64	6	393	32	42	168	77	43	30	16	12	11	83	-2	135	155	1405	12%	2
8	121	123	97	117	-124	38	106	29	51	47	20	19	54	-1	-12	35	99	818	7%	5
9	-18	76	5	-138	39	16	-54	50	-9	2	19	-9	-7	235	5	61	40	314	3%	13
10	12	-3	9	-17	4	25	23	67	2	8	1	4	9	9	0	59	6	217	2%	15
11	16	19	2	5	-8	5	13	7	10	3	4	-4	2	27	0	23	44	167	1%	17
12	-6	33	1	-28	29	2	10	16	-5	5	3	0	0	145	1	36	4	246	2%	14
13	0	3	5	-27	20	19	5	30	-6	19	1	2	0	10	0	77	17	177	2%	16
14	31	29	14	14	-29	7	39	-18	18	20	48	4	23	85	0	28	142	453	4%	11
15	200	125	106	170	-147	-16	34	-65	139	-2	-3	112	36	0	0	-13	95	770	7%	6
16	-14	184	80	115	-115	49	144	58	39	56	24	9	17	26	-1	-6	45	712	6%	7
17	54	32	1	119	19	30	32	54	19	3	18	0	19	83	-1	19	2	504	4%	10
Total	1403	1262	490	1581	191	311	1330	702	466	226	194	209	254	1025	6	728	1212	11590	100%	
Percentage	12%	11%	4%	14%	2%	3%	11%	6%	4%	2%	2%	2%	2%	9%	0%	6%	10%	100%		
Rank	2	4	9	1	16	11	3	8	10	13	15	14	12	6	17	7	5			

Origin	PVB	%
4	1976	17%
7	1405	12%
1	1113	10%
2	1029	9%
8	818	7%
15	770	7%
16	712	6%
3	694	6%
5	547	5%
17	504	4%
14	453	4%
6	447	4%
9	314	3%
12	246	2%
10	217	2%
13	177	2%
11	167	1%

Destination	PVB	%
4	1581	14%
1	1403	12%
7	1330	11%
2	1262	11%
17	1212	10%
14	1025	9%
16	728	6%
8	702	6%
3	490	4%
9	466	4%
6	311	3%
13	254	2%
10	226	2%
12	209	2%
11	194	2%
5	191	2%
15	6	0%

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

ATKINS

Low Cost Alternative 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	161	320	37	127	170	31	125	122	15	45	27	18	18	156	7	14	35	1426
2	426	37	22	136	136	83	71	181	37	-34	-13	20	1	89	6	205	80	1484
3	95	101	48	96	118	33	94	114	10	29	16	6	14	128	20	36	19	975
4	304	136	19	336	123	44	557	84	-49	4	31	-28	-32	183	16	125	225	2078
5	547	223	125	169	-109	46	138	30	43	26	26	47	41	13	-6	29	101	1488
6	80	57	56	50	-40	29	80	-4	25	32	27	17	35	-25	-4	18	42	476
7	162	119	22	353	89	84	322	115	-7	56	39	-15	-10	163	4	193	72	1763
8	206	158	144	139	-133	51	145	-4	53	87	69	41	90	49	-7	24	96	1208
9	-35	29	-50	-137	28	12	-1	45	-12	-1	5	-25	-24	119	6	37	31	27
10	34	-21	19	-10	2	34	36	64	5	10	5	14	31	25	0	67	22	335
11	36	6	4	11	-17	27	30	34	5	5	6	4	3	50	0	53	53	311
12	-17	26	-4	-55	34	7	5	26	-10	0	6	-1	-2	81	6	24	0	128
13	2	2	10	-42	15	23	9	44	-10	39	3	4	0	21	0	62	44	226
14	72	23	16	40	-17	30	90	20	19	54	143	7	37	179	0	116	218	1046
15	276	140	163	210	-164	-17	59	-65	102	1	0	127	4	0	0	-20	102	919
16	33	190	31	96	-126	67	149	55	36	91	73	14	49	81	5	7	25	875
17	61	59	6	120	43	31	87	53	5	-3	38	-1	-24	164	3	14	4	659
Total	2444	1604	668	###	152	615	1996	915	265	440	501	250	230	1475	57	1003	1169	15425

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	10	16	1	7	8	2	9	3	0	3	1	0	1	9	0	10	0	81
2	20	2	0	9	15	4	5	11	4	-2	1	1	0	15	1	11	0	98
3	4	4	1	3	8	1	3	6	3	1	1	0	0	12	6	12	0	66
4	16	10	1	21	7	1	32	4	-7	-2	3	-1	-3	11	1	12	30	136
5	28	16	9	8	-7	3	8	6	3	2	1	5	1	3	0	-15	10	80
6	3	2	3	1	-2	3	4	2	2	4	2	1	3	-4	0	1	49	73
7	11	6	-3	19	7	4	16	8	-8	0	2	-2	-9	10	0	12	4	78
8	8	10	11	4	-1	4	12	1	5	7	3	5	9	3	-1	3	6	88
9	-3	8	0	-23	3	0	-19	3	0	0	2	0	0	38	2	-3	2	10
10	1	0	1	-3	2	3	3	8	0	0	0	0	1	1	0	8	-5	22
11	1	0	0	0	0	1	2	2	0	0	0	0	0	3	0	5	6	20
12	-1	4	-1	-4	7	0	0	3	0	0	0	0	0	23	2	-2	0	30
13	0	0	0	-6	2	0	-3	5	0	1	0	1	0	3	0	-6	6	3
14	2	0	0	-1	0	1	3	1	0	3	9	1	5	5	0	7	20	55
15	15	11	16	16	-8	-1	4	-3	14	0	0	37	0	0	0	-2	9	109
16	2	16	4	6	-2	4	14	9	1	4	4	-1	-3	11	0	0	1	72
17	5	5	0	11	2	1	7	4	-1	0	2	0	-1	13	0	0	0	49
Total	124	110	43	68	40	31	99	74	17	21	33	47	4	156	13	54	136	1070

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	15	-5	-3	-12	-11	3	10	-9	-2	-2	-1	-4	0	-2	-6	14	10	-6
2	-8	11	-6	-13	2	0	-1	-6	-6	7	6	-6	0	20	-7	9	2	6
3	-2	-6	-1	2	-8	-2	-1	-16	5	0	-1	1	-3	-16	-3	12	3	-35
4	-6	-12	5	10	-11	-3	13	-15	8	1	-5	8	10	-29	-6	8	6	-17
5	-9	1	-8	-16	3	4	-2	19	-6	1	3	-23	-11	23	-7	-1	-3	-32
6	1	-2	-2	-5	2	2	-1	3	-7	1	0	-6	-11	13	-8	1	-2	-20
7	12	-2	-5	2	-2	-2	7	-3	-6	-4	-2	4	-2	16	-9	-10	5	1
8	-8	-7	-12	-19	20	3	2	11	-16	-7	0	-16	-32	0	8	7	-3	-71
9	-3	-1	5	-6	-5	-5	-22	-14	1	0	0	3	3	9	-2	-2	3	-35
10	-4	7	-1	0	2	-3	-1	-9	-1	-1	-1	1	-5	-4	0	-5	-4	-29
11	-3	4	-1	-6	1	-1	-3	-3	-2	-1	0	-2	-1	1	0	2	-4	-18
12	-3	-7	1	7	-28	-4	3	-13	3	0	-7	1	2	6	-1	-2	3	-39
13	-1	0	-1	8	-9	-12	0	-28	1	-7	-1	2	0	-6	0	-9	10	-53
14	-4	15	16	-11	2	0	-4	-1	1	-6	1	7	4	1	0	-2	8	25
15	-17	-10	-51	-27	5	10	4	13	-15	-1	0	-6	-7	0	0	5	14	-82
16	18	8	17	3	7	-5	-4	13	-8	-9	0	-7	-30	19	0	1	-4	18
17	4	3	0	4	10	-1	5	-1	6	5	2	3	38	17	-11	-3	0	81
Total	-17	-2	-46	-78	-21	-15	6	-59	-43	-21	-6	-42	-45	68	-53	25	43	-305

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	186	331	35	122	166	36	144	116	13	46	28	14	18	163	1	38	46	1502	9%	5
2	439	50	16	132	153	87	74	187	35	-29	-6	15	1	125	1	226	82	1588	10%	4
3	97	98	49	102	118	32	96	104	18	30	16	7	11	124	22	60	22	1007	6%	8
4	314	134	25	366	119	43	602	73	-48	3	29	-21	-26	165	12	145	261	2197	13%	1
5	566	240	126	161	0	52	145	54	39	29	31	29	32	39	-13	13	107	1650	10%	3
6	84	58	57	46	-40	35	84	1	19	38	28	11	27	-16	-13	20	88	529	3%	12
7	186	123	15	373	94	86	345	119	-21	52	40	-13	-21	190	-5	195	82	1842	11%	2
8	206	160	143	124	-114	58	159	8	42	86	73	29	68	52	0	34	99	1225	8%	6
9	-41	36	-45	-165	26	6	-42	34	-11	-1	8	-22	-21	167	7	32	35	2	0%	17
10	31	-13	19	-13	5	34	38	64	4	9	4	15	26	21	0	70	13	328	2%	13
11	34	11	3	6	-16	28	29	34	3	4	6	3	2	53	0	60	55	313	2%	14
12	-20	23	-3	-52	13	3	7	16	-6	1	-2	1	0	110	8	19	3	119	1%	16
13	1	2	9	-40	8	11	7	21	-8	33	2	6	0	17	0	47	60	176	1%	15
14	70	38	33	28	-15	30	88	20	20	51	153	14	45	185	0	120	247	1126	7%	7
15	275	141	128	200	-166	-8	67	-56	101	0	0	158	-2	0	0	-16	124	945	6%	10
16	53	214	51	106	-121	67	159	77	29	86	77	6	16	111	5	7	22	966	6%	9
17	70	67	6	135	54	31	100	57	9	2	41	2	13	194	-7	12	3	789	5%	11
Total	2551	1712	665	1631	285	630	2101	930	238	440	528	254	190	1699	17	1082	1349	16304	100%	
Percentage	16%	10%	4%	10%	2%	4%	13%	6%	1%	3%	3%	2%	1%	10%	0%	7%	8%	100%		
Rank	1	3	9	5	13	10	2	8	15	12	11	14	16	4	17	7	6			

Origin	PVB	%
4	2197	13%
7	1842	11%
5	1650	10%
2	1588	10%
1	1502	9%
8	1225	8%
14	1126	7%
3	1007	6%
16	966	6%
15	945	6%
17	789	5%
6	529	3%
10	328	2%
11	313	2%
13	176	1%
12	119	1%
9	2	0%

Destination	PVB	%
1	2551	16%
7	2101	13%
2	1712	10%
14	1699	10%
4	1631	10%
17	1349	8%
16	1082	7%
8	930	6%
3	665	4%
6	630	4%
11	528	3%
10	440	3%
5	285	2%
12	254	2%
9	238	1%
13	190	1%
15	17	0%

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

Preferred Option Scheme 'Optimistic' 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	192	108	31	239	226	18	164	143	80	21	14	85	15	138	2	29	48	1553
2	269	-90	70	275	214	76	105	248	148	-40	-20	46	6	133	1	165	88	1694
3	14	103	27	-16	141	20	0	67	44	26	24	7	11	140	11	36	-15	640
4	245	167	61	351	163	41	554	71	-110	-6	27	-26	-18	235	2	112	140	2008
5	383	223	123	211	0	-22	42	-40	80	13	2	86	63	-126	-2	-94	55	998
6	41	27	33	74	-33	13	59	2	47	18	4	30	26	-30	-4	35	39	380
7	192	42	30	464	44	38	225	48	72	41	17	15	12	107	0	92	118	1557
8	143	164	87	122	-106	26	86	60	51	15	14	28	43	3	-38	9	68	775
9	16	130	17	-150	55	28	17	59	-18	4	31	-11	-9	241	5	116	12	543
10	16	-31	41	-13	19	18	26	24	9	12	5	11	35	28	0	56	16	272
11	17	-1	7	17	-6	3	12	-6	32	6	5	6	2	31	0	10	25	159
12	13	58	7	-37	92	13	13	29	-9	7	5	0	0	227	2	69	3	493
13	3	3	16	-35	34	14	18	30	-3	40	3	1	0	80	0	135	8	348
14	33	8	13	56	-21	6	42	-46	37	32	47	13	16	123	0	26	94	479
15	219	169	136	238	-178	-34	24	-43	182	1	0	334	117	0	0	-23	39	1182
16	19	105	54	142	-99	71	138	64	135	49	21	87	193	33	-3	-11	22	1017
17	86	19	9	122	55	26	57	44	12	7	21	0	2	133	1	12	0	605
Total	1901	1203	760	###	602	354	1583	754	790	245	219	710	514	1498	-23	774	759	14704

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	21	13	3	13	17	1	18	6	8	2	1	2	2	9	0	10	0	128
2	10	-10	3	14	31	4	8	14	18	-5	-1	3	0	16	0	11	0	117
3	1	4	3	-5	19	2	-4	5	8	2	0	1	1	21	7	12	0	79
4	21	15	7	31	19	1	46	5	-9	-1	4	-1	-2	21	0	9	54	220
5	28	24	17	16	0	-3	3	-3	10	3	-1	11	5	-3	0	1	43	152
6	2	2	3	0	-2	1	4	-1	5	1	0	1	2	2	-2	1	43	64
7	21	6	0	34	5	2	16	4	-10	0	1	-1	-3	7	0	8	10	101
8	6	12	6	5	-4	3	12	6	5	2	2	5	7	3	-3	1	7	75
9	-2	21	6	-26	9	1	-28	4	-1	1	5	0	0	76	2	10	1	79
10	0	0	4	-7	3	1	-1	2	1	0	0	1	2	2	0	1	-14	-4
11	0	-7	0	1	1	1	1	0	4	0	0	1	0	1	0	3	2	7
12	-1	7	0	-4	19	0	-1	4	0	0	0	0	0	54	1	9	0	90
13	-1	0	1	-6	3	1	-5	5	0	2	0	0	0	3	0	12	-1	15
14	-1	-3	0	-3	-1	0	2	-5	1	2	2	0	2	-1	0	3	9	6
15	13	22	23	24	-13	1	0	-2	25	0	0	75	1	0	0	-1	-1	167
16	3	23	14	7	0	7	11	9	12	2	1	11	24	7	0	-1	-1	130
17	9	2	1	13	4	0	5	5	0	-2	1	0	1	4	0	0	0	44
Total	130	132	93	107	112	25	90	58	77	10	16	109	42	221	6	89	154	1472

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	7	6	-14	-11	3	8	-13	-3	2	0	-5	5	-21	-2	23	14	11
2	-12	17	-6	-25	4	0	-2	-21	-19	12	5	-15	2	-1	-1	8	7	-48
3	4	-6	2	4	-5	1	4	-14	6	-2	-4	0	1	-25	4	6	-3	-28
4	-4	-18	11	8	-9	-5	9	-17	13	16	-5	11	7	-42	-2	11	8	-9
5	-14	-1	-4	-19	0	2	1	10	-6	4	1	-31	-3	24	-1	-11	-2	-51
6	2	0	1	-10	3	1	-1	0	-8	1	0	-3	-1	12	-2	-1	-8	-14
7	11	2	8	-2	3	-2	2	-4	-8	3	-1	3	-2	13	-3	-11	1	14
8	-12	-17	-11	-20	17	5	12	13	-11	0	2	-2	0	38	-17	-1	-4	-6
9	-6	-14	6	1	-5	-7	-20	-10	1	1	-5	3	3	12	1	-7	13	-34
10	-1	12	-2	8	2	-1	1	-3	1	1	-2	0	-5	-6	0	-12	0	-7
11	-3	-2	-2	-7	3	0	-1	1	-7	-1	0	-7	0	0	0	2	4	-19
12	-4	-32	-1	10	-46	-4	3	-4	2	2	-5	0	0	1	0	5	2	-72
13	-1	1	-4	20	-5	-2	2	-3	5	-4	-5	1	0	-7	0	4	5	7
14	-3	44	9	-25	7	0	-9	4	-9	-3	1	-1	36	6	0	3	-4	56
15	-18	-57	-44	-34	11	7	5	10	-20	-2	1	33	-41	0	0	10	11	-129
16	16	18	20	0	14	-3	-8	1	-31	-3	1	1	3	7	-1	-1	-12	23
17	4	17	2	4	13	-5	0	-3	26	9	-1	1	23	15	-2	-2	1	101
Total	-28	-29	-6	-96	3	-4	13	-44	-60	45	-4	1	39	39	-12	42	49	-53

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	225	128	40	238	233	22	191	136	86	24	15	81	22	126	0	62	63	1692	11%	3
2	266	-84	67	265	249	79	111	242	148	-34	-16	35	7	148	0	184	95	1763	11%	2
3	20	101	31	-18	156	23	0	58	58	26	20	8	12	137	22	54	-19	691	4%	10
4	262	164	79	390	173	37	610	58	-107	10	26	-17	-14	214	0	132	202	2219	14%	1
5	397	246	137	208	0	-23	46	-33	84	20	2	66	65	-105	-4	-105	97	1099	7%	7
6	45	28	36	65	-32	15	62	2	43	20	4	29	26	-16	-8	35	75	429	3%	14
7	224	50	38	496	53	39	243	48	54	44	17	17	7	126	-3	89	129	1672	10%	4
8	137	159	81	107	-92	34	110	80	46	17	18	31	50	45	-58	9	70	845	5%	8
9	8	137	30	-176	60	22	-31	52	-18	6	31	-8	-6	329	8	119	27	588	4%	11
10	15	-19	43	-12	24	18	27	24	11	13	4	11	32	24	0	46	1	261	2%	16
11	14	-11	5	11	-2	4	11	-5	29	5	5	-1	2	33	0	16	31	147	1%	17
12	8	33	7	-32	66	9	15	30	-7	10	0	0	1	282	3	83	5	510	3%	13
13	2	4	13	-21	32	12	15	31	2	38	-2	3	0	76	0	151	12	370	2%	15
14	29	48	22	29	-15	6	36	-47	29	31	50	12	54	128	0	31	99	542	3%	12
15	213	134	115	229	-179	-25	30	-35	186	-2	0	442	76	0	0	-14	49	1220	8%	5
16	37	146	88	150	-85	75	141	74	115	47	24	99	221	46	-4	-13	9	1171	7%	6
17	98	39	12	139	73	21	62	45	38	14	21	1	26	152	-1	10	1	750	5%	9
Total	2002	1304	844	2068	713	369	1679	759	798	290	220	809	582	1744	-43	888	946	15971	100%	
Percentage	13%	8%	5%	13%	4%	2%	11%	5%	5%	2%	1%	5%	4%	11%	0%	6%	6%	100%		
Rank	2	5	8	1	12	14	4	11	10	15	16	9	13	3	17	7	6			

Origin	PVB	%
4	2219	14%
2	1763	11%
1	1692	11%
7	1672	10%
15	1220	8%
16	1171	7%
5	1099	7%
8	845	5%
17	750	5%
3	691	4%
9	588	4%
14	542	3%
12	510	3%
6	429	3%
13	370	2%
10	261	2%
11	147	1%

Destination	PVB	%
4	2068	13%
1	2002	13%
14	1744	11%
7	1679	11%
2	1304	8%
17	946	6%
16	888	6%
3	844	5%
12	809	5%
9	798	5%
8	759	5%
5	713	4%
13	582	4%
6	369	2%
10	290	2%
11	220	1%
15	-43	0%

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

ATKINS

Preferred Option Scheme 'Optimistic' 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	412	182	84	424	289	45	233	166	72	64	19	80	26	164	4	79	82	2425
2	484	-37	119	338	208	90	140	184	102	-51	-16	39	13	92	2	189	127	2023
3	81	123	43	115	158	30	93	68	33	65	14	13	15	130	9	70	19	1081
4	393	211	162	485	213	55	746	83	-99	41	29	-28	-20	274	5	159	232	2942
5	639	232	160	267	0	38	97	-1	86	36	5	150	74	-144	-5	57	192	1882
6	72	31	40	95	-4	34	106	15	36	43	6	24	22	-13	-4	86	68	659
7	173	60	77	696	72	66	402	71	70	141	19	3	1	151	1	167	167	2338
8	188	121	79	166	-121	30	124	-30	43	51	13	27	44	10	-47	-10	118	805
9	-14	65	-15	-209	48	14	-26	37	-26	-2	20	-28	-24	181	3	74	-7	89
10	85	-78	180	61	29	64	151	63	35	27	19	72	116	111	0	226	131	1291
11	24	-21	10	27	-5	3	17	17	23	16	4	7	3	40	0	25	44	233
12	-6	36	0	-89	103	7	-10	18	-20	11	6	-1	0	170	2	35	-8	255
13	11	4	20	-44	35	13	15	36	-7	38	3	-1	0	55	0	140	22	341
14	58	-19	18	81	-47	9	77	24	35	119	40	18	17	182	0	70	187	867
15	282	126	127	294	-119	-8	86	-24	120	5	0	290	114	0	1	-7	159	1445
16	-4	100	53	193	-118	50	190	-2	99	138	24	67	173	77	-4	10	34	1080
17	60	26	7	186	80	26	126	47	10	45	26	-1	2	186	0	6	4	838
Total	2938	1160	1164	###	822	565	2568	771	612	788	231	734	576	1663	-31	1376	1571	20593

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	28	13	9	20	17	3	17	11	5	3	1	1	3	8	0	10	0	148
2	14	-1	7	18	22	5	8	9	9	-2	0	3	1	12	0	11	0	116
3	4	6	2	5	14	1	2	4	4	1	0	0	1	17	3	12	0	76
4	20	8	11	30	15	1	40	4	-6	-1	2	-1	-2	17	0	11	29	180
5	31	16	12	15	-20	0	5	0	6	3	-1	11	4	-4	0	-13	12	76
6	3	1	2	3	0	2	5	2	3	4	0	1	2	-3	-1	1	49	74
7	15	5	4	36	5	3	22	5	-5	0	1	-1	-5	8	0	11	11	115
8	7	7	4	4	-4	2	13	-2	3	3	1	4	6	2	-2	-2	8	54
9	-4	7	1	-23	6	0	-17	2	-1	0	2	-1	0	51	1	4	0	28
10	4	5	9	-2	2	3	5	3	2	1	1	2	5	4	0	8	-11	41
11	1	0	1	1	1	0	1	1	2	1	0	0	0	2	0	3	4	19
12	-1	3	-1	-6	15	0	-2	2	0	0	0	0	0	44	0	2	0	56
13	0	1	1	-5	2	0	-2	4	0	2	0	0	0	4	0	10	4	23
14	0	-1	0	1	-2	0	3	2	1	4	2	1	3	4	0	5	20	44
15	12	12	18	26	-8	2	6	-1	16	0	0	67	3	0	0	1	14	167
16	0	12	9	9	-2	3	16	3	8	3	1	6	21	5	0	0	1	94
17	6	1	2	16	4	1	10	3	1	-3	1	0	1	15	0	0	0	58
Total	141	97	91	147	65	28	134	52	47	19	12	95	40	186	2	73	143	1371

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	21	0	7	-9	-7	4	14	-4	-3	-9	-1	-5	-3	-8	-3	15	19	28
2	-18	14	-3	-11	7	1	-1	-7	-6	12	4	-6	2	9	-1	7	4	6
3	3	-2	1	-2	-3	0	2	-9	4	-5	-2	0	2	-11	0	10	3	-7
4	-3	-16	4	18	-9	-4	15	-16	11	5	-4	11	12	-43	-2	6	5	-8
5	-13	4	-4	-15	-6	1	1	9	-5	4	0	-51	-4	27	-2	2	13	-40
6	3	-1	1	-6	3	1	-1	2	-4	1	0	-3	-1	8	-3	1	-2	-2
7	17	0	5	7	3	0	10	0	-5	-9	-1	3	-3	10	-3	-7	7	32
8	-11	-9	-8	-20	11	2	4	5	-6	-2	-1	-3	-2	12	2	2	-2	-26
9	-6	-6	3	-1	-3	-4	-18	-6	1	0	-2	4	3	5	0	-5	8	-27
10	-11	24	-4	2	4	-2	-12	-4	1	0	1	4	-6	-1	0	-13	-17	-35
11	-1	4	-1	-4	2	0	-1	-1	-2	0	0	-1	0	0	0	3	0	-4
12	-3	-7	0	11	-60	-2	8	-3	3	-1	-7	2	0	5	-2	-4	4	-55
13	-2	1	0	4	-2	-2	-2	-3	3	-4	-1	2	0	-15	0	-1	8	-14
14	-7	14	5	-8	6	1	-4	1	-5	-4	1	2	32	5	0	5	7	49
15	-26	-14	-28	-28	13	8	5	13	-18	-3	0	10	-49	0	0	5	17	-95
16	18	10	15	0	10	-5	-1	7	-13	-10	-2	-11	-5	13	1	-1	1	28
17	4	1	3	9	30	-1	2	-3	14	0	1	3	25	14	-3	-1	0	98
Total	-37	18	-3	-53	-2	-2	20	-18	-30	-24	-13	-40	1	30	-16	23	74	-71

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	461	195	101	435	299	52	264	173	74	58	19	76	25	163	1	103	101	2601	12%	2
2	479	-25	122	345	237	96	146	186	105	-40	-12	36	15	114	1	207	131	2145	10%	4
3	88	126	46	118	169	32	96	63	41	62	13	14	18	136	13	92	23	1150	5%	9
4	410	204	176	534	219	53	801	72	-95	46	28	-17	-10	248	3	176	266	3113	14%	1
5	656	252	169	267	0	39	103	8	87	44	4	110	73	-122	-6	46	217	1945	9%	5
6	78	32	43	92	-2	37	111	19	35	48	6	22	22	-8	-8	89	115	730	3%	13
7	204	65	86	739	79	68	435	75	60	132	19	5	-7	169	-2	172	185	2486	11%	3
8	184	119	75	150	-114	34	141	-27	40	52	13	29	48	24	-47	-11	124	833	4%	12
9	-25	66	-11	-234	50	11	-61	32	-26	-2	20	-24	-21	236	4	73	1	89	0%	17
10	78	-49	185	60	36	64	145	62	38	29	21	77	114	114	0	220	103	1297	6%	7
11	24	-17	10	23	-2	3	17	17	22	17	3	6	3	42	0	31	48	248	1%	16
12	-10	32	-1	-84	57	4	-3	18	-17	10	0	1	0	218	1	33	-4	257	1%	15
13	10	6	22	-45	35	12	11	37	-4	35	2	1	0	44	0	149	35	350	2%	14
14	51	-6	23	74	-43	10	76	27	31	118	44	21	52	191	0	79	213	961	4%	11
15	268	123	118	292	-114	2	98	-12	118	2	0	366	67	0	1	-2	191	1517	7%	6
16	14	122	76	201	-110	48	205	9	94	132	23	63	189	94	-3	10	35	1202	5%	8
17	70	28	12	211	114	26	138	46	25	43	29	3	28	216	-3	5	4	995	5%	10
Total	3042	1275	1251	3180	911	590	2722	806	630	784	231	789	617	1879	-45	1472	1787	21920	100%	
Percentage	14%	6%	6%	15%	4%	3%	12%	4%	3%	4%	1%	4%	3%	9%	0%	7%	8%	100%		
Rank	2	7	8	1	9	15	3	10	13	12	16	11	14	4	17	6	5			

Origin	PVB	%
4	3113	14%
1	2601	12%
7	2486	11%
2	2145	10%
5	1945	9%
15	1517	7%
10	1297	6%
16	1202	5%
3	1150	5%
17	995	5%
14	961	4%
8	833	4%
6	730	3%
13	350	2%
12	257	1%
11	248	1%
9	89	0%

Destination	PVB	%
4	3180	15%
1	3042	14%
7	2722	12%
14	1879	9%
17	1787	8%
16	1472	7%
2	1275	6%
3	1251	6%
5	911	4%
8	806	4%
12	789	4%
10	784	4%
9	630	3%
13	617	3%
6	590	3%
11	231	1%
15	-45	0%

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

ATKINS

Preferred Option Scheme 'Pessimistic' 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	36	86	6	191	182	6	114	131	81	2	11	77	13	119	3	-3	56	1113
2	41	-81	8	148	139	35	30	183	114	-48	-12	25	-8	66	2	95	37	775
3	2	85	23	-40	130	19	-4	71	51	13	28	3	-9	142	12	31	-19	537
4	238	124	38	294	133	31	446	60	-135	-8	25	-30	-19	201	3	93	133	1626
5	302	167	100	161	0	-32	34	-88	60	7	1	61	51	-137	-3	-180	28	532
6	16	30	32	52	-49	-19	14	-27	39	8	-1	27	21	-87	-7	-96	13	-35
7	170	48	17	338	32	-3	162	38	52	14	12	-2	6	56	0	7	118	1065
8	122	149	91	115	-100	-17	54	-120	48	10	11	24	38	-41	54	-146	29	320
9	12	103	17	-169	43	24	26	52	-20	1	31	-11	-9	223	5	116	10	455
10	-2	-29	6	-21	16	8	5	16	2	-5	-2	1	-89	10	0	22	-7	-69
11	8	10	4	17	-6	-1	7	-13	34	3	4	5	0	29	0	-7	15	110
12	12	45	7	-35	77	10	11	28	-8	3	5	0	-1	227	3	68	3	455
13	1	0	-2	-42	26	11	11	25	-4	-29	-1	0	0	68	0	119	4	186
14	9	4	9	42	-27	-10	15	-72	32	18	33	10	11	19	0	-60	32	62
15	204	155	143	208	-136	-40	21	-199	177	0	0	355	110	0	0	-55	25	967
16	-8	120	56	112	-142	-55	78	-197	142	22	2	94	191	-97	-6	-41	4	274
17	80	26	4	76	39	1	-21	30	-4	-1	18	0	-3	69	1	4	0	318
Total	1243	1042	558	###	356	-34	1004	-83	661	9	164	638	303	869	67	-34	479	8689

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	6	11	-1	7	13	0	12	3	7	1	1	1	1	7	0	10	0	79
2	-9	-9	-4	6	23	1	1	15	14	-6	-6	2	-1	10	0	11	0	49
3	-1	6	2	-11	16	2	-6	7	8	1	0	1	0	18	7	12	0	64
4	19	13	6	27	14	0	37	4	-10	-1	4	-2	-2	17	0	9	54	190
5	18	18	14	10	0	-5	2	-4	7	3	-1	8	4	-5	0	1	43	114
6	1	2	3	-1	-3	-2	0	-1	4	0	0	1	2	-2	-3	1	43	44
7	17	6	-2	22	3	-3	13	-1	-14	1	1	-2	-3	2	0	-4	9	45
8	5	16	8	4	-4	-1	7	-4	6	2	2	6	9	1	5	-9	0	54
9	-2	19	7	-26	7	1	-32	4	-1	0	5	0	0	73	2	10	0	70
10	-1	0	1	-6	1	1	0	1	0	0	0	0	-4	-1	0	1	-6	-13
11	-2	-10	0	0	0	0	1	-1	4	0	0	1	0	1	0	1	1	-3
12	-1	6	0	-4	17	0	-1	5	0	0	0	0	0	53	1	8	0	85
13	-1	0	0	-7	2	1	-4	4	0	-1	0	0	0	1	0	10	-2	4
14	-3	-7	-1	-3	-1	-1	0	-5	1	1	2	0	1	0	0	-2	4	-13
15	11	19	23	23	-11	2	0	-12	26	0	0	78	1	0	0	-4	-3	153
16	0	25	14	2	-3	-4	5	-4	10	0	1	10	22	2	-2	-3	-1	74
17	8	3	-1	10	3	-1	-1	3	-2	-1	1	0	0	-1	0	0	0	21
Total	65	118	69	55	78	-7	35	16	61	0	10	102	31	177	10	52	143	1016

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	7	0	-10	-3	1	21	-8	0	-4	1	-6	0	-9	-2	16	17	33
2	-9	-2	-5	-5	11	-1	1	-5	4	-13	-4	-4	-2	11	-1	4	6	-12
3	-1	2	1	-11	0	1	-1	-6	6	-9	-1	-4	4	-2	4	6	-5	-15
4	-1	4	3	-10	-3	-7	-3	-8	-4	-6	0	-5	0	-26	-2	-8	-6	-82
5	-7	8	4	-9	0	-6	-2	-17	2	-3	-2	-21	-1	-31	-2	-40	-25	-152
6	2	-2	0	-12	-3	-4	1	-4	-2	-5	-1	-1	0	-12	-3	-29	-8	-82
7	25	4	3	-10	1	-4	11	6	-14	-4	1	-3	-1	12	-2	-37	2	-9
8	-3	-1	1	-14	-11	-7	15	-104	-2	-4	-2	1	3	31	-16	-10	-19	-143
9	-4	9	7	-15	0	-2	-33	-1	-1	-5	3	-5	-1	41	1	-3	12	4
10	-9	-14	-17	-16	-4	-7	-9	-11	-9	-15	-10	-15	-74	-35	0	-21	-10	-276
11	-1	-8	0	-3	1	0	1	-3	0	-7	0	-7	0	4	0	-2	7	-17
12	-5	-21	-4	-4	-39	-2	-1	-2	-5	-8	-5	0	-1	-3	-1	3	2	-95
13	-1	-1	1	8	-3	1	6	-1	-3	-57	0	1	0	-5	0	5	4	-46
14	0	5	14	-19	-5	-3	-5	-7	3	-11	-1	-5	38	-11	0	-14	-7	-28
15	-3	-4	-26	-12	-11	-2	9	13	-1	-12	0	32	-38	0	0	7	5	-42
16	16	14	16	-19	-5	-32	-14	3	-26	-14	-4	-1	3	-18	-3	-9	-23	-116
17	7	20	2	-9	1	-5	1	1	25	-4	2	1	17	1	-1	-3	0	53
Total	20	24	3	-166	-68	-74	4	-147	-17	-172	-12	-28	-40	-39	-14	-118	-29	-873

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	54	104	5	189	192	8	147	127	88	-1	13	71	13	118	2	23	73	1225	14%	2
2	24	-91	-1	148	174	36	32	193	132	-67	-22	22	-11	87	1	110	43	811	9%	5
3	0	93	26	-61	146	21	-11	72	66	5	28	0	-6	158	24	49	-24	586	7%	6
4	255	142	47	311	143	23	480	56	-149	-15	29	-37	-21	192	1	94	182	1733	20%	1
5	313	193	117	161	0	-43	34	-108	68	8	-2	48	54	-173	-6	-219	47	493	6%	8
6	19	30	36	39	-55	-26	15	-32	41	4	-2	26	23	-101	-13	-124	49	-72	-1%	16
7	212	59	17	350	36	-10	187	43	24	10	14	-7	1	70	-3	-34	129	1101	13%	3
8	124	164	101	105	-115	-26	75	-228	52	8	11	31	50	-9	43	-165	10	230	3%	12
9	6	132	30	-210	51	24	-38	55	-22	-4	39	-16	-9	337	8	123	23	529	6%	7
10	-12	-43	-10	-44	14	2	-5	5	-6	-20	-12	-13	-167	-26	0	2	-23	-358	-4%	17
11	6	-8	4	14	-6	-1	9	-17	39	-4	5	-1	0	34	0	-8	23	90	1%	14
12	6	30	2	-43	55	8	9	32	-13	-5	0	0	-2	277	3	80	5	445	5%	9
13	0	-1	0	-41	25	12	13	29	-6	-87	-1	1	0	64	0	133	5	145	2%	13
14	6	2	22	21	-33	-14	10	-84	35	8	34	5	50	8	0	-76	28	21	0%	15
15	212	169	140	219	-158	-40	30	-198	202	-12	-1	465	72	0	0	-52	27	1077	12%	4
16	8	159	85	95	-150	-91	70	-198	127	7	-2	103	217	-113	-12	-53	-20	232	3%	11
17	94	48	5	77	44	-5	-21	33	19	-7	21	1	14	70	0	0	-1	393	5%	10
Total	1327	1183	626	1331	361	-121	1037	-222	696	-173	151	700	280	993	49	-116	576	8680	100%	
Percentage	15%	14%	7%	15%	4%	-1%	12%	-3%	8%	-2%	2%	8%	3%	11%	1%	-1%	7%	100%		
Rank	2	3	8	1	10	15	4	17	7	16	12	6	11	5	13	14	9			

Origin	PVB	%
4	1733	20%
1	1225	14%
7	1101	13%
15	1077	12%
2	811	9%
3	586	7%
9	529	6%
5	493	6%
12	445	5%
17	393	5%
16	232	3%
8	230	3%
13	145	2%
11	90	1%
14	21	0%
6	-72	-1%
10	-358	-4%

Destination	PVB	%
4	1331	15%
1	1327	15%
2	1183	14%
7	1037	12%
14	993	11%
12	700	8%
9	696	8%
3	626	7%
17	576	7%
5	361	4%
13	280	3%
11	151	2%
15	49	1%
16	-116	-1%
6	-121	-1%
10	-173	-2%
8	-222	-3%

Sectors

No.	Location
1	Bramhall / Cheadle / Heald Green
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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

ATKINS

Preferred Option Scheme 'Pessimistic' 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	236	314	109	328	263	32	167	148	67	58	24	71	26	184	4	45	65	2141
2	429	60	111	281	198	88	97	232	112	-11	-4	40	10	121	3	204	105	2076
3	64	130	51	73	131	25	67	70	33	21	28	11	9	133	9	57	5	918
4	385	230	196	376	179	42	598	74	-117	29	40	-34	-18	233	5	133	201	2553
5	682	277	153	225	0	20	89	-38	68	24	9	116	52	-147	-6	6	174	1702
6	86	54	52	78	-8	23	93	19	35	30	12	22	18	-32	-4	43	65	586
7	196	101	112	531	80	56	342	75	56	82	32	-7	-3	179	3	145	108	2086
8	217	178	109	158	-96	46	135	70	44	22	27	28	37	29	-6	85	135	1219
9	-11	83	-15	-195	40	17	-14	43	-24	2	24	-24	-15	192	3	88	-5	190
10	20	-31	43	-7	18	13	28	20	6	11	7	15	22	33	0	41	18	258
11	32	10	14	26	1	13	26	27	24	10	7	8	5	55	0	41	67	365
12	-4	43	7	-75	76	8	-6	21	-15	7	8	-1	0	169	3	42	-10	274
13	3	5	23	-45	25	10	11	26	-3	53	5	2	0	56	0	118	25	315
14	66	18	22	60	-10	24	91	37	39	59	91	10	35	202	0	104	236	1083
15	275	141	158	259	-193	-28	67	-39	136	0	0	267	81	0	0	-30	141	1235
16	10	155	75	169	-82	57	198	26	110	72	34	64	159	108	2	-1	41	1199
17	73	54	19	175	92	31	95	57	9	14	41	0	8	216	2	13	5	902
Total	2761	1821	1238	###	713	476	2082	868	581	482	386	589	427	1730	19	1134	1376	19101

Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	16	17	8	13	14	2	12	6	4	4	1	1	3	9	0	10	0	120
2	12	4	6	12	21	5	6	15	10	0	1	3	1	18	0	11	0	124
3	3	5	3	2	12	1	1	5	4	1	1	0	0	18	3	12	0	72
4	19	11	15	25	12	1	33	4	-7	1	3	-1	-1	14	0	11	28	169
5	36	19	12	13	-16	0	5	0	5	3	0	9	3	-4	0	-17	11	78
6	4	3	3	1	-1	2	5	2	2	4	1	1	2	-4	-1	1	49	74
7	16	7	4	26	6	2	18	6	-7	3	2	-1	-6	10	0	9	6	101
8	10	12	8	5	-3	3	13	4	4	2	2	5	7	2	0	2	9	84
9	-4	11	2	-22	5	1	-20	2	-1	0	3	0	0	52	1	6	0	36
10	1	1	3	-3	2	2	3	3	0	0	0	0	1	2	0	6	-5	15
11	2	0	1	1	1	1	2	1	3	0	0	0	0	2	0	5	7	26
12	-1	5	0	-5	14	0	-1	3	0	0	1	0	0	43	0	3	0	60
13	0	0	1	-6	2	1	-3	4	0	2	0	0	0	4	0	9	4	18
14	1	0	1	0	0	1	4	1	2	3	5	1	5	5	0	6	22	56
15	13	12	21	23	-12	-1	5	-1	17	0	0	61	1	0	0	-2	9	145
16	1	14	12	8	-2	3	16	4	7	4	1	6	20	7	0	0	0	103
17	7	5	3	14	4	1	7	5	0	0	2	0	2	15	0	0	0	65
Total	135	126	102	106	59	25	105	64	45	25	24	85	37	193	5	72	139	1346

Non-Fuel VOC Benefits, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1	15	0	7	-11	-8	2	10	-11	-2	0	0	-5	2	-10	-2	12	13	12
2	-16	17	-1	-15	7	0	-1	-9	-7	10	6	-6	2	13	-2	6	3	8
3	3	-3	3	-1	-2	0	1	-10	5	-1	-2	0	2	-20	0	9	1	-14
4	-3	-14	9	16	-7	-3	15	-14	11	5	-4	10	8	-34	-2	7	4	4
5	-6	4	-3	-11	0	2	2	14	-3	2	2	-41	-4	30	-4	-1	19	1
6	2	-1	1	-6	3	2	0	3	-5	4	0	-3	-1	5	-2	2	-4	-1
7	15	1	5	2	4	-1	8	0	-8	-1	-1	2	-5	11	-2	-11	6	27
8	-8	-10	-7	-16	13	3	3	9	-6	-1	0	-2	0	13	1	1	-5	-11
9	-6	-4	5	-1	-2	-3	-22	-6	1	0	-1	3	1	11	0	-5	9	-21
10	-1	12	-1	1	2	1	1	0	0	0	-1	0	-4	-7	0	1	-4	-2
11	-2	5	-1	-5	2	0	-2	0	-1	-1	0	-2	-1	0	0	3	0	-6
12	-3	-7	0	10	-52	-3	6	-4	3	0	-9	2	-1	11	-2	-6	4	-47
13	-1	1	-1	13	-2	0	4	-2	0	-5	-1	2	0	-9	0	10	11	20
14	-5	10	4	-16	7	0	-9	-3	7	-5	1	6	39	8	0	-3	7	47
15	-30	-8	-36	-27	12	9	4	17	-23	0	0	4	-48	0	-2	8	17	-103
16	21	9	19	2	12	-5	-4	2	-12	-3	0	-6	-4	13	0	-1	-2	41
17	4	3	4	7	28	-2	2	-2	14	3	1	2	28	8	-2	-1	0	99
Total	-22	17	6	-60	19	3	17	-16	-26	8	-10	-33	15	43	-19	31	79	52

PVB, £m	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Percentage	Rank
1	266	332	124	329	269	36	188	144	69	62	25	67	30	183	3	67	78	2273	11%	2
2	425	81	116	278	226	93	102	237	115	-2	3	37	14	153	1	221	108	2209	11%	4
3	71	132	57	74	141	26	68	65	42	21	28	12	11	132	12	77	7	976	5%	11
4	401	228	220	417	184	41	646	63	-113	34	39	-24	-11	213	3	151	233	2725	13%	1
5	711	300	162	227	0	22	96	-24	70	28	10	83	51	-122	-11	-12	205	1797	9%	5
6	93	56	56	73	-6	27	97	24	33	37	12	19	19	-31	-7	46	110	659	3%	12
7	227	110	121	559	90	58	367	81	41	84	32	-6	-14	199	1	143	120	2214	11%	3
8	219	180	110	147	-86	52	152	83	42	24	29	31	45	44	-6	87	139	1291	6%	7
9	-20	91	-9	-219	43	14	-56	40	-24	2	26	-20	-14	255	4	89	4	205	1%	17
10	20	-18	45	-9	22	16	31	22	7	11	6	16	18	28	0	47	8	271	1%	16
11	32	14	13	22	4	13	25	28	26	10	7	7	5	57	0	49	73	385	2%	13
12	-8	41	7	-70	39	6	-1	20	-12	8	0	1	0	223	2	39	-6	287	1%	15
13	2	6	23	-38	24	10	12	28	-3	50	4	4	0	51	0	138	39	353	2%	14
14	61	27	27	44	-3	24	86	35	48	57	98	16	78	215	0	108	265	1186	6%	9
15	258	144	143	255	-193	-21	76	-24	130	0	0	332	34	0	-2	-23	167	1277	6%	8
16	32	179	105	179	-72	56	211	33	105	72	35	64	176	128	3	-2	39	1342	7%	6
17	84	62	26	195	125	30	105	60	23	16	44	2	38	238	1	12	5	1065	5%	10
Total	2875	1965	1346	2464	807	504	2204	916	600	515	400	640	479	1965	5	1237	1594	20515	100%	
Percentage	14%	10%	7%	12%	4%	2%	11%	4%	3%	3%	2%	3%	2%	10%	0%	6%	8%	100%		
Rank	1	5	7	2	10	14	3	9	12	13	16	11	15	4	17	8	6			

Origin	PVB	%
4	2725	13%
1	2273	11%
7	2214	11%
2	2209	11%
5	1797	9%
16	1342	7%
8	1291	6%
15	1277	6%
14	1186	6%
17	1065	5%
3	976	5%
6	659	3%
11	385	2%
13	353	2%
12	287	1%
10	271	1%
9	205	1%

Destination	PVB	%
1	2875	14%
4	2464	12%
7	2204	11%
14	1965	10%
2	1965	10%
17	1594	8%
3	1346	7%
16	1237	6%
8	916	4%
5	807	4%
12	640	3%
9	600	3%
10	515	3%
6	504	2%
13	479	2%
11	400	2%
15	5	0%

Sectors

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1	Bramhall / Cheadle / Heald Green
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14	South West of Cordon
15	West of Cordon
16	Northwest of Cordon
17	Northeast of Cordon