

# MetroWest Phase 1 Economic Assessment Report

*Prepared for*

West of England Councils

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# Document History

## MetroWest Phase 1 Outline Business Case – Economic Case Economic Assessment Report

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# Acronyms and Abbreviations

AQMA	Air Quality Management Area
B&NES	Bath and North-East Somerset Council
BCC	Bristol City Council
BRITES	Bristol Integrated Transport and Environment Study
CP5	Control Period 5
CRD	City Region Deal
DCO	Development Consent Order
DfT	Department for Transport
EAST	Early Assessment Summary Tool
GLT	Guided Light Transit
GRIP	Governance for Railway Infrastructure Projects
GVA	Gross Value Added
GWR	Great Western Railway
GWML	Great Western Main Line
IEP	Intercity Express Programme
JLTP	Joint Local Transport Plan
JSP	Joint Spatial Plan
JTB	Joint Transport Board
JTS	Joint Transport Study
LEP	Local Enterprise Partnership
LTPP	Long Term Planning Process
NCN	National Cycle Network
NMU	Non-Motorised User
NR	Network Rail
NSC	North Somerset Council
OAR	Option Assessment Report
OBC	Outline Business Case
PBC	Preliminary Business Case
PEIR	Preliminary Environmental Impact Report
RUS	Route Utilisation Strategy
SEP	Strategic Economic Plan
SGC	South Gloucestershire Council
TAG	Transport Appraisal Guidance
TQEZ	Temple Quay Enterprise Zone
WoE	West of England

# Introduction

## 1.1 Background

CH2M has been appointed to prepare an Economic Assessment Report (EAR) for MetroWest Phase 1. This forms part of the Department for Transport's (DfT) Transport Appraisal Process, as part of the development of an Outline Business Case (OBC). The OBC is being prepared in support of a submission to the Large Major Scheme fund in December 2017.

## 1.2 The MetroWest Programme

The West of England (WoE) councils are progressing plans to invest in the local rail network over the next ten years through the MetroWest programme. The MetroWest programme comprises:

- The MetroWest Phase 1 project;
- The MetroWest Phase 2 project;
- A range of station re-opening/new station projects; and
- Smaller scale enhancements projects for the WoE local rail network.

MetroWest is being jointly promoted and developed by the four WoE councils: Bath & North-East Somerset Council (B&NES), Bristol City Council (BCC), North Somerset Council (NSC) and South Gloucestershire Council (SGC). The MetroWest programme will address the core issue of transport network resilience, through targeted investment to increase both the capacity and accessibility of the local rail network. The MetroWest concept is to deliver an enhanced local rail offer for the sub-region comprising:

- Existing and disused rail corridors feeding into Bristol;
- Increased service frequency; cross-Bristol service patterns (e.g. Bath to Severn Beach); and
- A Metro-type service appropriate for a city region.

The MetroWest programme will complement the investment being made by Network Rail (NR) and extend the benefits of projects such as the electrification of the Great Western main line. The programme is to be delivered over the next five to ten years during Network Rail Control Period 5 (2014 to 2019) and Control Period 6 (2019 to 2024).

## 1.3 MetroWest Phase 1

The MetroWest Phase 1 project includes the delivery of infrastructure and passenger train operations to provide:

- Half hourly service for the Severn Beach Line as far as Avonmouth (hourly for St. Andrews Road and Severn Beach stations);
- Half hourly service for the Keynsham and Oldfield Park local stations on the Bath Spa to Bristol Line; and
- Hourly service (or an hourly service plus) for a reopened Portishead Line, with new stations at Portishead and Pill.

The whole of MetroWest Phase 1 will be operational in 2021. Enhanced services on the Severn Beach line could begin in 2020 and re-opening of the Portishead line will follow in 2021.

For the Portishead Line either an hourly or an hourly plus passenger train service is proposed. The difference between an hourly service and an hourly service plus is:

- Hourly service – Passenger trains operating hourly all day between Portishead and Bristol Temple Meads, calling at Pill, Parson Street, and Bedminster. Providing up to 18 trains in each direction per day (Mon-Sat), and up to 10 trains on Sundays, utilising one train set all day.
- Hourly service plus – trains operating every 45 minutes during the am and pm peak and hourly off peak, between Portishead and Bristol Temple Meads, calling at Pill, Parson Street, and Bedminster. Providing up to 20 trains in each direction per day (Mon-Sat), and up to 10 trains on Sundays, utilising one train set all day and an additional set during the am and pm peaks.

Note though that, while the infrastructure required to deliver the ‘hourly service plus’ on the Portishead line is identical to that required for an hourly service, it has not been appraised as part of the OBC. Only the hourly service has been considered at this stage, because analysis to confirm the shape of an ‘hourly service plus’ is still on-going. Note also that, although infrastructure for an hourly service (or hourly service plus) is being provided at this stage, it remains the aspiration of the promoting authorities to develop a 30 minute service in the future.

Figure 1.1 shows the proposed MetroWest Phase 1 passenger network with a more harmonised service frequency, providing the foundation for ‘Metro’ local rail network.

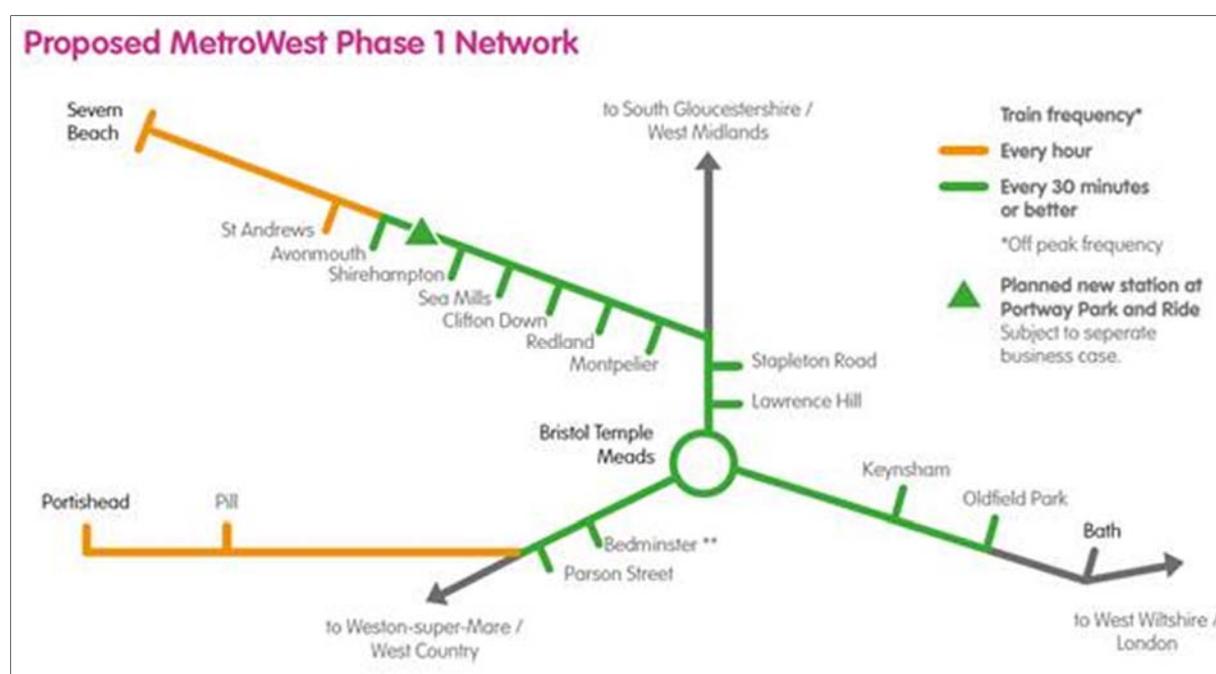


Figure 1-1: MetroWest Phase 1 network

## 1.4 Scheme Objectives

The MetroWest Phase 1 principal business objectives are:

- To support economic growth, through enhancing the transport links to the Temple Quarter Enterprise Zone (TQEZ) and into and across Bristol city centre, from the Portishead, Bath and Avonmouth and Severn Beach arterial corridors;
- To deliver a more resilient transport offer, providing more attractive and guaranteed (future-proofed) journey times for commuters, business and residents into and across Bristol, through better utilisation of strategic heavy rail corridors from Portishead, Bath and Avonmouth, and Severn Beach;
- To improve accessibility to the rail network with new and reopened rail stations and reduce the cost (generalised cost) of travel for commuters, business and residents; and
- To make a positive contribution to social well-being, life opportunities and improving quality of life, across the three arterial corridors.

In addition, the MetroWest Phase 1 supporting objectives are:

- To contribute to reducing traffic congestion relative to a ‘Do Minimum’ scenario (as opposed to current levels of congestion) on the Portishead, Bath and Avonmouth, and Severn Beach arterial corridors;
- To contribute to enhancing the capacity of the local rail network, in terms of seats per hour in the AM and PM peak; and
- To contribute to reducing the overall environmental impact of the transport network.

## 1.5 Summary of Scheme Impacts

MetroWest Phase 1 will deliver the following benefits:

- Increase the local economy by generating £264M of Gross Value Added (GVA) in first ten years from opening) and creating 514 net new permanent jobs;
- Enhance rail capacity by delivering over 600 additional seats per hour for the local rail network, which in turn will extend the benefits of Network Rail’s Western Route Modernisation Programme;
- Deliver a reliable and more frequent public transport service, directly benefitting 180,000 people within 1km of 16 existing stations, with enhanced train service frequency;
- Increase the number of people living within 30 minutes travel time of key employment areas, such as TQEZ;
- Reduce highway congestion on arterial corridors, including A369 between Portishead and Bristol, significantly improving network resilience;
- Provide competitive journey times from Portishead and Pill to Bristol Temple Meads;
- Improve accessibility to sites for new homes and employment development in proximity to the rail corridors and bring an additional 50,000+ people within the immediate catchment of the rail network with new stations at Portishead and Pill;
- Reduce overall environmental impact, resulting in improved air quality, on key arterial highway routes;
- Provide attractive mode choice and capacity for journeys to work (alternatives to single occupancy car-based travel) addressing long-term car dependency; and
- Provide wide ranging social/health benefits.

In summary, the MetroWest Phase 1 scheme could add a net total of over 950,000 new rail journeys to the network in 2021 (rising to almost 1.3m in 2036). Service improvements at existing stations are forecast to generate over 600,000 new rail trips in 2021 (over 800,000 in 2036). New stations demand forecasts indicate that around 320,000 passengers would use the proposed station at Portishead in 2021, rising to over 430,000 by 2036. Pill station generates over 53,000 users in 2021, and over 72,000 in 2036. Benchmarking indicates that the demand forecast for Portishead and Pill is in line with expectations for stations of their size and catchment, with the services provide. With an hourly service, while initially there is sufficient capacity, there is however scope for crowding from 2030 onwards. This could be alleviated though if proposals to run ‘infill’ peak time services are achieved.

The MetroWest Phase 1 OBC Forecasting Report provides details of forecasting and modelling work undertaken to assess the proposed MetroWest Phase 1 OBC scheme.

## 1.6 Structure of this Economic Assessment Report

After this introductory chapter, the remainder of the economic assessment report is structured as follows:

- Chapter 2 describes the overall economic assessment approach, including identifying the models used and scenarios assessed;
- Chapter 3 goes on to outline the scheme's costs, capital and operating costs;
- Chapter 4 sets out the scheme benefits that have been identified and appraised;
- Chapter 5 brings together the result so the assessment, including monetised results where available, and presenting the Transport Economic Efficiency (TEE) tables, Public Accounts (PA) and Analysis of Monetised Costs and Benefits (AMCB);
- Chapter 6 summarises the assessment, including the Appraisal Summary Table (AST).

# Economic Assessment Approach

## 2.1 Overall process

The overall economic assessment approach makes best use of available assessment tools. In particular, it uses approaches accepted by the rail industry such as MOIRA and the existing GBATS4 multi-modal model, as well as TUBA and a Network Rail appraisal model. The methodology used is in accordance with both WebTAG and Governance of Railway Investment Projects (GRIP) demand forecasting requirements. Rail demand forecasts provide the framework for other assessments.

Elements included in the assessment of monetised impacts include:

- Costs:
  - Scheme investment costs
  - Operating costs
- Benefits:
  - Passenger revenue
  - Travel time saving, vehicle operating costs & taxes
  - Reliability
  - Accident benefits
  - Environmental benefits
  - Option values
  - Wider economic impacts
  - Regeneration and GVA impacts

Where appropriate, these elements are included in Economic Efficiency of the Transport System (TEE table), Analysis of Monetised Costs and Benefits (AMCB) and Public Accounts (PA) tables.

## 2.2 Transport models used

A combination of bespoke spreadsheet models and MOIRA were used to assess demand for rail enhancements offered by MetroWest Phase 1, before bringing the results together in an aggregate forecast for use in subsequent analyses. Collectively, the results of rail demand forecasting are referred to as the Rail Demand Model (RDM), and consists of separate elements to assess demand at existing and new station.

MOIRA has been used to assess the impacts of MetroWest Phase a on existing stations in the WoE as well as the wider rail network. In addition, generalised journey time, demand and revenue figures have been extracted from MOIRA for stations in the MetroWest area to use in the forecasts of the new stations.<sup>1</sup>

Forecasts of demand for the new stations proposed as part of MetroWest Phase 1 have been carried out using a methodology derived previous studies associated with the development of MetroWest Phase 1, as well as work to assess MetroWest Phase 2 and other potential new stations in the WoE area. The methodology makes use of rail industry data (from MOIRA, ORR station usage information

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<sup>1</sup> MOIRA is updated several times a year, based on ticket sales. MetroWest Phase 1 demand at existing stations has been assessed by Network Rail using MOIRA containing 2015-16 annual figures. MOIRA1 has been used; an augmented version with greater functionality, (MOIRA2) is only just coming into regular use, after a significant period of testing.

and WoE surveys) and derived techniques to forecast demand at new stations broadly based on relationships at existing stations elsewhere.

A Discounted Cash Flow (DCF) model developed by Network Rail provides the main rail appraisal results. This model is used for socio-economic appraisal and was developed in accordance with WebTAG. More information about the DCF assessment is contained in the Network Rail technical note, 'MetroWest Phase 1, Socio-economic impacts for rail users', in Appendix A of this report.

The GBATS4 multi-modal demand model of the WoE area has been used to assess highway impacts of MetroWest Phase 1. This is a hybrid approach where rail demand forecasts (RDM) are used to calibrate the inputs to GBATS4 modelling, to ensure that changes in highway demand adequately reflect anticipated rail demand. Subsequently, TUBA has been utilised as the mechanism for calculating highway benefits.<sup>2</sup>

More details of the models used and the processes involved, including analysis and results, is contained in the MetroWest Phase 1 OBC Economic Case 'Forecasting Report'.

## 2.3 Modelled scenarios

The core scenario, as the basis for the analysis, represents the best basis for decision-making given current evidence. It is based on published plans that have been approved/adopted and includes a do minimum and single do something option. Sensitivity testing is also included in the appraisal.

### 2.3.1 Do minimum

The do minimum scenario in railway terms is defined as the situation with Great Western Main Line (GWML) electrification and Intercity Express Programme (IEP) delivered in end of Network Rail's Control Period 5 (CP5). The service specification of these programmes includes providing two additional trains per hour (each way) from London Paddington to Bristol Temple Meads via Bristol Parkway. The Do Minimum includes CP5 committed schemes. The do minimum does not include the proposed enhanced Bristol East Junction.

The GBATS4 model includes all modes, so reflects changes in the rail network as noted above. It also reflects anticipated changes to bus services and the highway network. Full details of the future year do minimum GBATS4M model can be found in the 'GBATS4M Future Year Do Minimum Model Report', February 2016, appended to the MetroWest Phase 1 OBC.

### 2.3.2 Do something – MetroWest Phase 1

The MetroWest Phase 1 project comprises the delivery of infrastructure and passenger train operations to provide:

- Half hourly service for the Severn Beach line (hourly for St.Andrews Road and Severn Beach stations), by enhancing the current approximately 40 minute interval service on the line (2 hourly to Severn Beach);
- Half hourly service for Keynsham and Oldfield Park stations on the Bath Spa to Bristol line (through an additional local stopping service per hour); and
- Hourly service for a reopened Portishead Branch Line with stations at Portishead and Pill (shuttle service from Bristol Temple Meads).

There are no significant elements of highway infrastructure included in MetroWest Phase 1, only local changes around Portishead and Pill stations, and amendments to the operation of the signal junction incorporating Ashton Vale Road level crossing.

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<sup>2</sup> TUBA is the DfT's appraisal software, that takes output trips, time and cost matrices from local/regional models and calculates benefits. It can be used to assess any mode (or modes) but has only been used to assess highway impacts for MetroWest Phase 1. TUBA version 1.9.9 has been used, which incorporates the latest advice into the use of values of time that vary with trip distance.

## 2.4 Appraisal period and opening year

The overall opening year for MetroWest Phase 1 is 2021. It is likely that enhancements to services on the Severn Beach line will open in 2020 and the re-opening of the Portishead line will follow in 2021. This has been reflected in the appraisal process.

A 60-year appraisal period has been used, in line with WebTAG guidelines for infrastructure projects, starting with the first year of benefits in 2021. The standard price base and base year of 2010 has been assumed, with discounting at 3.5% for the first 30 years and 3.0% thereafter

In the calculation of benefits, rail demand growth based on the profile of future year growth is assumed to continue for 20 years from the current day. Sensitivity tests (discussed below) adjust the levels and horizons of growth.

## 2.5 Sensitivity testing

Sensitivity testing has been carried out to consider the socio-economic performance of MetroWest Phase 1 in the event that some of the key assumptions vary. Drawing on WebTAG unit M4, these are mostly based future year growth, and include:

- High demand – an increase growth profile assumptions in line with WebTAG recommendations (TAG unit M4);<sup>3</sup>
- Low demand – decrease growth profile assumptions in line with WebTAG recommendations (methodology as per footnote alongside ‘high demand’);
- Fare/demand growth cap at 10 years (instead of 20 years);
- Fare/demand growth cap at 30 years (instead of 20 years); and
- Operating cost risk – include all risk elements identified (by GWR) –operating costs are described further in the next chapter of this report.

The high and low demand sensitivity tests include some changes to forecast models in order to assess highway related benefits. The other tests are directly related to assumptions that feed into the appraisal process.

In addition, a further sensitivity test has been conducted to specifically consider the benefits that could be generated by the changes to Ashton Vale Road junction with Winterstoke Road, associated with the level crossing at Ashton Vale Road. This has not been included in the core scheme assessment, because the modelling work carried out is very localised and only considers the current year in detail. As such, it does not take into account the potential for wider area impacts that would be associated with this scheme, some of which may be disbenefits, or temporal changes in demand that are reflected in the business case more generally.

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<sup>3</sup> A proportion of base year demand is added to the growth profile assumed for the core scenario. The proportion to be added is based on a parameter  $p$  which varies by mode. The parameter ' $p$ ' for rail schemes is +2.0% for high demand sensitivity and -2.0% for low demand. For 1 year after the base year, proportion  $p$  of base year demand added to the core scenario. For 36 or more years after the base year, proportion  $6*p$  of base year demand added to the core scenario. Between 1 and 36 years after the base year, the proportion of base year demand should rise from  $p$  to  $6*p$  in proportion with the square root of the years.



## Scheme Costs

This chapter briefly sets out the investment/capital and operating costs used in the economic appraisal of MetroWest Phase 1. Further details of the derivation and allocation of investment costs can be found in the financial case in the OBC document.

### 3.1 Investment costs

Network Rail has issued GRIP3 capital costs for MetroWest Phase 1. Initially based on taking forward the PBC scheme for the provision of infrastructure for a 2 train per hour service on the Portishead line, subsequent changes in requirements (and costs) for infrastructure needed to support a 1 train per hour service to Portishead have been prepared. Table 3.1 sets out the capital costs of the scheme, including identification of risk elements; total scheme out-turn cost of a 1 train per hour to Portishead is £106m. This identification of risk elements is important in the cost benefit appraisal, as optimism bias has to be applied to capital costs. This is applied to GRIP3 cost estimates to the 'point estimate' of cost, which does not include risk elements or inflation. Optimism bias of 18% is applied over and above cost including quantified risks and/or general contingency.

**Table 3.1: Capital costs MetroWest Phase 1**

*Source: Network Rail; all costs £m; 2017 prices (except inflation and final total, which are 2021 prices)*

Cost (£m)	OBC scheme
	Severn Beach & Bath Spa local services and 1tph Portishead
Preparation Costs	£12.75
Railway construction costs	£53.60
Risk & Fee fund <sup>4</sup>	£2.00
Highway construction costs	£6.98
Land costs	£3.18
Mitigation works & Misc costs	£2.58
Sub-total	£81.09
Risk	£20.22
Inflation (to 2021)	£4.81
Total (2021 prices)	£106.12

Source: MetroWest Phase 1 OBC Finance Case; initial costs based on GRIP stage 3 Option Selection Approval in Principle (AIP) design, and subject to independent review via Mott MacDonald appointed by the WoE authorities as Independent Cost Estimation Reviewer. Inflation based on Building Cost Information Service (BCIS) central forecast to 2021 Q2, based on the BCIS Price Adjustment Formulae Indices, from the Royal Institute of Chartered Surveyors (RICS).

#### 3.1.1 Renewal costs

MetroWest Phase 1 will effectively bring forward renewal that is planned for the Portbury freight-only line, and lower the overall unit renewal costs in the future. However, the proportion of these renewal costs that should attribute to MetroWest Phase 1 project is unclear. As such, only costs known to be attributable to the project (at present) are included in the appraisal.

<sup>4</sup> All third party funded rail projects are subjected to a Network Rail Risk & Industry Fee, payable to Network Rail as an insurance cover. For MetroWest phase 1, this cost is estimated at £2m in 2017 prices. However, on-going discussion between North Somerset Council and Network Rail means that the final value is subject to change.

## 3.2 Operating and maintenance costs

The key elements of operating and maintenance costs included in the assessment include:

- Network Rail operating costs to operate and maintain new assets and infrastructure; and
- Train Operating Company (TOC) costs, including staff costs, vehicle leasing costs, vehicle mileage related operating costs and new stations' operating costs (at Portishead and Pill).

GRIP 3 optimism bias of 1% has been applied to all maintenance and operating costs when estimating the present value over the appraisal period.

### 3.2.1 Network Rail maintenance costs

High level Network Rail maintenance costs for the new infrastructure are estimated as below, these costs are in 2015 factor prices at GRIP stage 3:

- New crossover at Bathampton: £30k per annum (from 2020);
- Avonmouth: £20k per annum (from 2020); and
- Pill to Portishead: £200k per annum (from 2021).

Maintenance costs will initially be low, and increases as the infrastructure ages; more detailed costs will become available as the project progress.

### 3.2.2 Train operating costs

The train operational costs comprise two main elements:

- Pre-opening mobilisation costs, leading up to the start of the train services; and
- Post opening train service costs, during the first three years of operation;

#### 3.2.2.1 Pre-opening mobilisation costs

Prior to scheme opening there will be some train operator costs (pre-opening mobilisation costs) comprising of recruitment and training of train drivers and train managers, training of additional staff (depot pool) operational commissioning and testing cost (new rail infrastructure, stations, ticketing etc). The initial estimate for these mobilisation costs is £1.74m, with costs commencing T-18 months to T-0 scheme opening. GWR provisionally estimate that mobilisation costs could be 20% of staff costs two years before opening (opening year -2) and 50% of staff costs in the year before opening (opening year -1), plus 25% each of train leasing and mileage costs in the year before opening. This is used in financial profiles.

#### 3.2.2.2 Post opening train service costs

Enhancement of the Severn Beach Line service and the Bath Spa to Bristol service requires two additional train sets (based on Railsys modelling to date). Reopening of the Portishead Line with an hourly service requires one train set.<sup>5</sup> Table 3.2 sets out a summary of the composition of train operator costs, provided by GWR. Table 3.2 also shows the costs estimated for the 2014 Preliminary Business Case option 5B (previous central case), for comparative purposes.

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<sup>5</sup> Note that an hourly plus option (basic hourly service with additional services in peak periods) needs an additional train set in the peak.

**Table 3.2: Annual operating costs***Source: GWR estimates; all costs £m; 2017 prices*

Operational expenditure	OBC scheme Severn Beach & Bath Spa local services and 1tph Portishead 9 x Cl165	Original PBC scheme (Option 5B) 12 x Cl165
<b>Mileage costs</b>		
Fuel	£0.636	£0.855
Light maintenance	£0.200	£0.270
Track access	£0.070	£0.093
Capacity charge	£0.223	-
Sub-total	£1.129	£1.218
<b>Lease costs</b>		
Base capital	£1.019	£1.358
Non-capital maint. reserve	£0.463	£0.618
Sub-total	£1.482	£1.976
<b>Staff costs</b>		
Train crew	£1.548	£2.064
Station staff	tbc	tbc
Depot staff	tbc	tbc
Sub-total	£1.548	£2.064
<b>Station costs</b>		
Long term access charge	£0.151	£0.151
Operations & maintenance	£0.120	£0.120
Sub-total	£0.271	£0.271
<b>BASE ESTIMATE TOTAL</b>	<b>£4.430</b>	<b>£5.529</b>
Mobilisation <sup>1</sup>	£1.74	2
<b>Risks</b>		
Fuel price (+50%)	£0.319	£0.427
Spare unit (maintenance)	-	£0.494
More conductors per turn	£0.162	£0.216
Gate-line staff (Portishead)	-	£0.241
Depot staff	£0.379	tbc
Sub-total	£0.860	£1.378
<b>RISK ADJUSTED TOTAL</b>	<b>£5.290</b>	<b>£6.907</b>
Mobilisation <sup>1</sup>	£2.19	2

Notes:

- 1: Mobilisation costs shown in this table are totals for the two years prior to opening
- 2: Mobilisation costs were not calculated for estimates of operating cost in the PBC

### 3.2.2.3 Potential constraints – train crew

There are number of potential constraints in resourcing additional train crew:

- Shifts for members of train crew including rest periods and booking on and off may only last eight hours. Therefore, to cover an eighteen hour service, three shifts are typically required.

- Opportunities may present to create efficient diagrams by integration with existing. However, this cannot be assumed at present, as there may be no savings, and additional interworking creates inherent performance risks.
- Each member of train crew works four days in seven, so, allowing for leave and sickness, two heads are required to cover each driver turn and 1.5 to cover each conductor turn. Across a large train crew pool there may be minor efficiencies available but these will be limited.

Therefore, it can be assumed that the likely net additional train crew requirement is effectively 18 train drivers (3 trains x 3 shifts x 2 heads) and 13.5 conductors (3 trains x 3 shifts x 1.5 heads).

#### 3.2.2.4 Potential constraints – rolling stock

It should also be noted that there are potential constraints in respect of rolling stock:

- The train path modelling (Railsys) indicates that MetroWest Phase 1 requires three additional train sets in three car formations (nine train units in total), however the large number of enhancement and renewal schemes currently being delivered in a relatively short period in late control period 5 and early control period 6, is causing a degree of uncertainty in the modelling undertaken to date. This will be clarified by further Railsys modelling based on the final December 2018, which is expected to be available around Easter 2018.
- The commercial rolling stock market via the rolling stock operating companies (ROSCOs) can fluctuate in accordance with demand, therefore the costs set out in Table 3.2 should be considered indicative.

# Scheme Benefits

## 4.1 Introduction

A series of monetised benefits have been assessed for the scheme, that are subsequently reported in the transport economic efficiency (TEE), public accounts (PA) and analysis of monetised costs and benefits (AMCB) tables, as well as reflected in the appraisal summary table (AST).

Included in the calculations are:

- Travel time saving, vehicle operating costs & taxes (which are the main transport economic impacts driven directly by changes in trip making, both by rail and by road, so includes benefits generated by new rail users and reductions in highway traffic);
- Reliability (as a result of reductions in highway traffic);
- Accident benefits (as a result of reductions in highway traffic);
- Selected monetised environmental benefits (as a result of reductions in highway traffic impacts);
- Passenger revenue (from new rail journeys at existing stations as well as new rail journeys at the new stations of Portishead and Pill);
- Option and non-use values (reflecting that the scheme will introduce a step change in public transport provision in Portishead and Pill);
- Wider impacts assessment (economic impacts that are not specifically based on the transport impacts of the scheme, including agglomeration, imperfect markets and labour supply); and
- Economic development and regeneration (understanding the potential for the scheme to promote regeneration and job creation across the WoE).

This chapter discusses the derivation of monetised impacts, drawing on work reported in more detail in the MetroWest Phase 1 OBC Forecasting Report. Sensitivity testing has also been carried; this is discussed in the next chapter of this report.

## 4.2 Travel time saving, vehicle operating costs & taxes

### 4.2.1 Rail users

The journey time improvement to the new rail passengers at Portishead and Pill stations are estimated by comparing the generalised costs of travel by car and by rail. Average fares are applied to demand forecasts to determine generalised journey time and revenue. MOIRA has been used to calculate rail users' journey time benefits, for passengers using existing stations.

The values of time benefits for both new and existing passengers, on the existing and re-opened lines are shown in Table 4.1, for opening years. Note that a build-up profile has been applied to new passengers benefits which considers only 90% at year 1, 95% at year 2 and full benefits at year 3 from opening.

**Table 4.1: Value of time benefits for new and existing rail passengers**

*Source: Network Rail calculations (£m, 2010 prices and values)*

Value of time benefits	2020	2021
Existing passengers	£3.35	£3.49m
New passengers		£0.42m

Note: For new passengers, full benefits are assumed from year 3 after opening, building-up

Table 4.2 shows total rail user benefits for the 60-year appraisal period, present values discounted to 2010. The table includes the OBC scheme, as well as four of the sensitivity tests that affect rail demand; high demand growth, low demand growth, 10-year growth cap and 30-year growth cap.

**Table 4.2: Value of time benefits for new and existing rail passengers**

*Source: Network Rail calculations (£m, 2010 present values)*

Value of time benefits (£m PV)	OBC scheme	Sensitivity tests			
		High demand growth	Low demand growth	10-year growth cap	30-year growth cap
Rail user journey time benefits	£195.56	£209.28	£179.06	£169.84	£218.41

More information about the assessment of rail benefits is contained in the Network Rail technical note, 'MetroWest Phase 1, Socio-economic impacts for rail users', in Appendix A of this report.

## 4.2.2 Highway related impacts

Highway benefits (including travel time saving, vehicle operating costs & taxes) have been calculated using GBATS4 and TUBA, using a hybrid approach to fully reflect rail demand forecasts that are the principal driver of the travel effects of MetroWest Phase 1.

Total highway (non-user) benefits for the core OBC scheme were calculated at £50.16m over the 60-year appraisal period, with some 55% being attributed to commuting/other users. Indirect tax effects were calculated at a reduction of £12.68m. Sensitivity tests for high and low demand growth were also run through the same GBATS4/TUBA assessment of highway impacts, generating total benefits of £50.06m and £48.57m for high and low demand respectively.

Table 4.3 shows the total TUBA highway benefits identified.

**Table 4.3: TUBA highway benefits**

Highway benefits (£'000s)	OBC scheme	High demand sensitivity	Low demand sensitivity
Commuting / Other user benefit	£27,857	£26,572	£26,857
Business user benefit	£22,301	£26,488	£21,713
Total user (highway) benefit	£50,158	£53,060	£48,569
Wider public finances (Indirect taxation revenues)	-£12,678	-£12,031	£11,567

More details of the models used and the processes involved, including analysis and results, is contained in the MetroWest Phase 1 OBC Economic Case 'Forecasting Report'.

## 4.3 Reliability

The overall reduction in congestion on the highway network is likely to have a positive impact on journey time reliability, so highway reliability has therefore been considered. This makes reference to WebTAG unit A1.3 section 6, based on variation in journey times caused by events unpredictable by the users such as incidents or recurring congestion in certain days (day-to-day variability). Predictable elements like varying levels of demand by time of day, day of week or seasonal effects are excluded, as travellers are assumed to be aware of them.

The variability of journey times can be measured by standard deviation of the journey time – the bigger the spread of values around the mean, the less reliable the transport system is. Evidence in WebTAG (Unit A1.3, section 6.3.2) suggests that it is possible to derive the change in the standard deviation delivered by the scheme inside urban areas with using modelled time and distance values as in the formula:

$$\Delta\sigma_{ij} = 0.0018 \cdot (t_{ij2}^{2.02} - t_{ij1}^{2.02}) \cdot d_{ij}^{-1.41}$$

where:

- $\Delta\sigma_{ij}$  – the change in standard deviation of journey time between i and j [seconds];
- $t_{ij1}$  and  $t_{ij2}$  – the journey times between i and j, prior (1) and post (2) scheme introduction [seconds]; and
- $d_{ij}$  – the journey distance between i and j [kilometres].

To measure the potential savings or costs of the scheme impact on the journey time variability, reference from time to money values is needed. Section 6.3.4 of WebTAG unit A1.3, introduces a benefit formula, similar to the rule of half used in economical assessment of transport schemes:

$$Benefit = - \sum_{ij} \Delta\sigma_{ij} \cdot \left( \frac{T_{ij2} + T_{ij1}}{2} \right) \cdot VOR$$

where:

- $T_{ij2}$  and  $T_{ij1}$  – number of trips between i and j in the Do-Minimum (1) and Do-Something (2) scenarios; and
- VOR – Value of Reliability – product of Value of Time (VoT) and reliability ratio (0.8).

Combining two of above mentioned equations leads to the following final formulation:

$$Benefit = - \sum_{ij} (C_{ij2} - C_{ij1}) \cdot \left( \frac{T_{ij2} + T_{ij1}}{2} \right) \cdot VOT$$

where:

$$C_{ijX} = 0.000144 d_{ij}^{-1.41} \cdot t_{ijX}^{2.02}$$

The benefit is calculated using rule of half, so TUBA can be used, thus employing standard values of time, discount rates, etc. The only elements that need to be calculated prior to TUBA analysis are the  $C_{ij2}$  and  $C_{ij1}$  values. Extracts were taken from GBATS4 to estimate the change in standard deviation of journey time using the above formula. Highway trip matrices for all time periods (AM, IP and PM), analysis years (2021 and 2036), and scenarios (do minimum and do something) incorporating rail demand forecasts (as for highway benefits calculations) were used. Post assignment time and distance skim matrices were extracted and fit appropriately into the formula above to receive the  $C_{ijX}$  values. These values, along with trip and other skim matrices, were fed into TUBA, with the following general assumptions:

- Benefits are analysed for five time periods (AM peak, Inter-peak, PM peak, off peak and weekends & bank holidays, the latter two periods using Inter-peak skim matrices);
- Annualisation factors used for each time period are the same as used in highway benefits calculations in TUBA (AM peak, 645; Inter peak, 1518; PM peak, 648; off peak, 175; and weekends & bank holidays, 340); and
- Four car user classes were considered including; one business user class (employer's business) and three combined 'commuting and other' trips user classes (low, medium and high income).

The reliability benefits for all time periods extracted from TUBA were adjusted using the same methodology as highway benefits from TUBA, to eliminate inappropriate benefits from the results, and align figures with anticipated changes from MetroWest Phase 1 rail demand.

Results of the analysis indicate that highway reliability benefits of £1.823m could be realised. This does not distinguish between business users and commuting or other users. Sensitivity tests for high and low demand growth were also run through the reliability assessment process, generating benefits of £1.936m and £1.763m for high and low demand respectively.

## 4.4 Accident benefits

Assessment of accident benefits has been carried out using the DfT’s Cost and Benefit to Accidents – Light Touch (COBA-LT) software, drawing on outputs from the GBATS4 model used to generate highway benefits (as described earlier). Additionally, speed limit and accident data (2012-2016) for the WoE region was incorporated.

Overall, COBA-LT analysis indicates that some 130 accidents could be saved by the scheme over the 60-year appraisal period, generating some £5.846m of accident benefits. Further discussion of the calculation of accident benefits can be found in the MetroWest Phase 1 OBC ‘Social Impacts Assessment Report’.

## 4.5 Monetised environmental benefits

Monetised impacts on greenhouse gases have been calculated using the GBATS4 Saturn model and TUBA, as part of the highway impacts assessments (section 4.1). As a result in the overall decrease in vehicle kilometers travelled across the road network, there is a reduction in CO2 emissions, that generates a benefit of £251,000. However, this benefit is offset by an increase in rail emissions, and noise impacts.

More details of the models used and the processes involved in highway benefits assessment, including analysis and results, is contained in the MetroWest Phase 1 OBC ‘Forecasting Report’.

## 4.6 Passenger revenue

The revenue benefits for both new and existing passengers, on the existing and re-opened lines are shown in Table 4.4, for opening years. Note that a build-up profile has been applied to new passengers benefits which considers only 90% at year 1, 95% at year 2 and full benefits at year 3 from opening. <sup>6</sup>

**Table 4.4: Revenue benefits for new and existing rail passengers**

*Source: Network Rail calculations (£m, 2010 prices and values)*

Revenue benefits	2020	2021
Existing passengers	£1.33	£1.39m
New passengers		£1.72m

Note: For new passengers, full benefits are assumed from year 3 after opening, building-up

Table 4.5 shows total rail user benefits for the 60-year appraisal period, present values discounted to 2010. The table includes the OBC scheme, as well as four of the sensitivity tests that affect rail demand; high demand growth, low demand growth, 10-year growth cap and 30-year growth cap.

**Table 4.5: Value of time benefits for new and existing rail passengers**

*Source: Network Rail calculations (£m, 2010 present values)*

Revenue benefits (£m PV)	OBC scheme	Sensitivity tests			
		High demand growth	Low demand growth	10-year growth cap	30-year growth cap
Revenue benefits	£126.77	£135.44	£116.31	£111.30	£139.06

<sup>6</sup> Revenue at new stations is calculated from the total number of journeys and potential geographical distribution of trips, generating a total passenger mile figure. An effective average revenue per passenger mile of 26.5p is applied, which takes into account the mix of ticket types (full price, reduced and seasons). This is based on a local comparison of revenue and demand, and does not include Severn Beach line fares, as these are out of step with surrounding fares (much cheaper).

More information about the assessment of revenue is contained in the MetroWest Phase 1 OBC 'Forecasting Report', as well as the Network Rail technical note, 'MetroWest Phase 1, Socio-economic impacts for rail users', in Appendix A of this report.

## 4.7 Option Values

The calculation of monetised option values is based on WebTAG Unit A4.1 section 7, using parameters from Table A4.1.8 from the WebTAG databook (July 2017). The methodology follows the calculations based on monetising the reopening of a local rail station, in a location with an existing bus service. This uses the difference between the 'train' and 'bus' values excluding non-use.

The total MetroWest Phase 1 option value calculated is £25.48m over a 60-year appraisal period. This is not included in the AMCB table for the scheme, but is reflected in the adjusted BCR.

More information about the assessment of option values is discussed in the MetroWest Phase 1 OBC 'Social Impact Appraisal Report'.

## 4.8 Wider impacts assessment

The methodology adopted in assessing wider economic impacts is in line with guidance in WebTAG Unit A2.1 and follows a similar process used in the Preliminary Business Cases (PBC) of both MetroWest Phases 1 and 2. The Wider Impacts Assessment is focused on the following three areas:

- Agglomeration – By reducing journey times across the West of England (WoE), the relative agglomeration<sup>7</sup> of business in this area will increase. This will have a direct impact on the productivity and GDP of the UK and is a central element to the estimation of Wider Impacts;
- Output change in imperfectly competitive markets – A reduction in the costs of transport allows businesses to operate more efficiently, improves their output and intensity of business practices, and hence allows for benefits; and
- Labour supply impacts – This captures tax revenues arising from the welfare effects to the UK economy of having a wider human resource pool.

This assessment captures the wider impacts accrued over a 60-year appraisal period from the scheme opening year 2021 to 2081. Separate analysis has been carried out for the high and low demand sensitivity tests, in addition to the central OBC scheme case.

Table 4.14 shows summary and total values of wider impacts for the Wider Impact Assessment for the Preliminary Business Case of MetroWest Phase 1. More details of the methodology and results of the wider economic impacts assessment are contained in Appendix B of this report.

**Table 4.6: Summary total Wider Impacts (2021-80)**

*Source: CH2M calculations*

(£000s)	OBC Scheme	HIGH demand sensitivity	LOW demand sensitivity
Agglomeration impacts	£68.44m	£71.42m	£57.73m
Imperfect competition impacts	£4.56m	£5.00m	£4.53m
Labour supply impacts	£1.03m	£1.09m	£0.75m
<b>TOTAL Wider Impacts</b>	<b>£74.03m</b>	<b>£77.49m</b>	<b>£63.01m</b>

<sup>7</sup> Agglomeration is a term used to infer the ability of an economy to act through the density of companies to interact with one another.

## 4.9 Economic Development and Regeneration

The assessment adopts a bespoke methodology to estimate the economic development and wider regeneration impacts of the Scheme. The methodology attempts to reconcile the West of England LEP's economic impact guidance with DfT's emerging Wider Economic Impact guidance and labour market modelling that is consistent with previous analysis undertaken for previous stages of the MetroWest project.

In particular, the West of England LEP's economic impact guidance was utilised to inform construction stage job creation and GVA uplift, as well as providing the overall framework for analysis encompassing treatment of wider 'operational stage' impacts and treatment of additionality. The DfT's emerging Wider Economic Impact guidance was consulted to establish the narrative linking transport investment to economic externalities. Existing labour market modelling, in the form of spatial labour market balance sheets that were used extensively on the MetroWest project, was retained as the primary model driving analysis of wider economic development impacts.

The economic development and regeneration analysis outlined above demonstrates that the scheme has the potential to facilitate significant positive economic impacts across the West of England, in both the construction and operational phases. The analysis is consolidated and summarised in the table below, which suggests that the Scheme could generate more than 1,400 jobs and £57m in GVA during the construction stage as well as more than 500 permanent jobs and £32m in GVA per annum during the operational stage, as shown in Table 4.7.

**Table 4.7: Economic Development and Regeneration benefits**

*Source: CH2M calculations*

Economic Indicator	Value
GVA £M temporary impact during construction	£57,122,715
No of additional temporary new jobs during construction	1,441
GVA £M permanent impact per annum	£31,862,915
No of additional permanent new jobs	514
GVA £M Temporary (during construction) and permanent impact during first 10 years post scheme opening (discounted)	£264,781,565

Note that all monetised figures in the table above reflect 2017 prices and values. Also note that the results in the table above reflect the following calculations:

- 'GVA £m temporary impact during construction' – discounted values based on direct and indirect GVA;
- 'No of additional temporary new jobs during construction' – direct and indirect employment;
- 'GVA £m permanent impact per annum' – gross direct GVA per annum in 2036, from operational and wider job creation; and
- 'GVA £m Temporary (during construction) and permanent impact during first 10 years post scheme opening (discounted)' – assumes construction GVA plus ten years of annual permanent GVA from operational and wider sources.

More details of the economic development and regeneration assessment methodology can be found in the MetroWest Phase 1 OBC 'Economic Development/Regeneration Assessment' technical note in Appendix C of this report.

# Economic Assessment

## 5.1 Overview

The overall economic assessment methodology used is in accordance with both WebTAG and Governance of Railway Investment Projects (GRIP) requirements. Elements included in the assessment of monetised impacts include:

- Costs – scheme investment costs and operating costs; and
- Benefits – passenger revenue, travel time saving, vehicle operating costs & taxes, reliability, accident benefits, some environmental benefits, option values, wider economic impacts, and regeneration and GVA impacts.

Where appropriate, these elements are included in Economic Efficiency of the Transport System (TEE table), Analysis of Monetised Costs and Benefits (AMCB) and Public Accounts (PA) tables.

## 5.2 Transport Economic Efficiency (TEE)

The Economic Efficiency of the Transport System (TEE table) for the MetroWest Phase 1 OBC scheme is shown in Table 5.1.

Table 5.1: MetroWest Phase 1 OBC Scheme, Economic Efficiency of the Transport System (TEE)

<b>Consumer - Commuting user benefits</b>	<b>All Modes</b>	<b>Road</b>		<b>Rail</b>	
Travel Time	143,130	18,809		124,321	
Vehicle operating costs	1,420	1,420		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>144,444</b>	<b>20,229</b>		<b>124,215</b>	
<b>Consumer - Other user benefits</b>	<b>All Modes</b>	<b>Road</b>		<b>Rail</b>	
Travel Time	53,969	7,092		46,877	
Vehicle operating costs	536	536		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>54,398</b>	<b>7,628</b>		<b>46,771</b>	
<b>Business</b>	<b>All Modes</b>	<b>Personal</b>	<b>Freight</b>	<b>Personal</b>	<b>Freight</b>
Travel Time	43,662	3,678	15,626	24,358	0
Vehicle operating costs	2,996	706	2,290	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>46,447</b>	<b>4,385</b>	<b>17,916</b>	<b>24,146</b>	<b>0</b>
<b>Private Sector Provider Impacts</b>					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
<b>Other business Impacts</b>					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>46,447</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>245,290</b>				

Notes:

Benefits appear as positive numbers, while costs appear as negative numbers.

All entries are £'000s present values discounted to 2010, in 2010 prices

## 5.3 Public Accounts (PA)

Table 5.2 shows the Public Accounts (PA) table for the MetroWest Phase 1 OBC scheme.

Table 5.2: MetroWest Phase 1 OBC Scheme, Public Accounts (PA)

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-126,770	0	-126,770
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>-549</b>	<b>0</b>	<b>-549</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	12,678	12,678	0
<b>TOTALS</b>			
Broad Transport Budget	93,643	-177	93,820
Wider Public Finances	12,678	12,678	0

Notes:

Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

All entries are £'000s present values discounted to 2010, in 2010 prices

## 5.4 Analysis of Monetised Costs and Benefits (AMCB)

Table 5.3 shows the Analysis of Monetised Costs and Benefits (AMCB) Table for the MetroWest Phase 1 OBC scheme, including summary information; total present values of costs (PVC) and benefits (PVB), net present value (NPV) and benefit-cost ratio (BCR) for both the initial appraisal and adjusted appraisal including monetised wider economic impacts and option values. In summary, the MetroWest Phase 1 OBC scheme generates a BCR of 2.55, which represents high value for money. If wider economic impacts and option values are included in the calculations, the BCR rises to 3.61, also representing high value for money.

Table 5.3: MetroWest Phase 1 OBC Scheme, Analysis of Monetised Costs and Benefits (AMCB)

Accidents, noise, air quality & greenhouse gases	6,286		
Economic Efficiency: Consumer Users (Commuting)	144,444		
Economic Efficiency: Consumer Users (Other)	54,398		
Economic Efficiency: Business Users and Providers	46,447		
Wider Public Finances (Indirect Taxation Revenues)	-12,678		
<b>Present Value of Benefits (PVB)</b>	<b>238,897</b>		
<hr/>			
Broad Transport Budget	93,643		
<b>Present Value of Costs (PVC)</b>	<b>93,643</b>		
<hr/>			
<b>OVERALL IMPACTS</b>			
<b>Net Present Value (NPV)</b>	<b>145,254</b>		
<b>Benefit to Cost Ratio (BCR)</b>	<b>2.55</b>		
<hr/>			
Accidents, noise, air quality & greenhouse gases	6,286		
Reliability	1,823		
Wider Impacts	74,025		
Option values	25,481		
<b>including Wider Impacts &amp; Option Values</b>			
PVB	338,403		
PVC	93,643		
NPV	244,760		
<b>BCR</b>	<b>3.61</b>		

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.

Costs and benefits are £'000s, present values discounted to 2010, in 2010 prices

## 5.5 Sensitivity testing

Sensitivity testing has been carried out to consider the socio-economic performance of MetroWest Phase 1 in the event that some of the key assumptions vary. Drawing on WebTAG unit M4, these are mostly based future year growth assumptions, and include:

- Sensitivity 1 – High demand growth, an increase growth profile assumptions;
- Sensitivity 2 – Low demand growth, a decrease growth profile assumptions;
- Sensitivity 3 – Fare/demand growth cap at 10 years (instead of 20 years);
- Sensitivity 4 – Fare/demand growth cap at 30 years (instead of 20 years);
- Sensitivity 5 – Operating cost risk, including all risk elements identified by GWR; and
- Sensitivity 6 – Ashton Vale Road junction effects added to highway benefits.

The high and low demand sensitivity tests include some changes to forecast models in order to assess highway related benefits. The other tests are directly related to assumptions that feed into the appraisal process.

Table 5.4 sets out summary socio-economic appraisal results for the six sensitivity tests, alongside the core MetroWest Phase 1 OBC scheme, with more detailed results in Table 5.5. Appendix D contains TEE, PA and AMCB tables for all of the sensitivity tests (as well as the OBC scheme).

**Table 5.4: Results of socio-economic appraisal – sensitivity tests**

Scheme scenario		Present Values			BCR
capital costs	Benefits & BCR	Costs (PVC)	Benefits (PVB)	Net Present Value (NPV)	benefit/cost ratio
OBC scheme	main	93.64	238.90	145.25	2.55
	adjusted	93.64	338.40	244.76	3.61
Sensitivity 1	main	84.98	256.53	171.56	3.02
	adjusted	84.98	359.50	274.53	4.23
Sensitivity 2	main	104.11	222.06	117.95	2.13
	adjusted	104.11	310.55	206.44	2.98
Sensitivity 3	main	109.11	212.83	103.72	1.95
	adjusted	109.11	301.32	192.21	2.76
Sensitivity 4	main	81.35	265.67	184.32	3.27
	adjusted	81.35	368.64	287.29	4.53
Sensitivity 5	main	120.20	238.90	118.70	1.99
	adjusted	120.20	338.40	218.20	2.82
Sensitivity 6	main	93.64	247.69	154.05	2.65
	adjusted	93.64	347.20	253.55	3.71

Costs and benefits are £m; present values discounted to 2010, in 2010 prices

'Adjusted' benefits and BCR includes monetised wider economic impacts and option values

The tables indicate that the scheme BCR could drop to just under 2 if the worst-case sensitivity tests for growth and operating costs are achieved, though in all of these cases the adjusted BCRs (including wider economic impacts and option values) are still nearer to 3 than 2.

It is worth considering alongside the sensitivity test results shown that the basic growth profile derived for and used in OBC appraisal is based on historic trends and future projections in rail

industry planning documents. There are, however, competing features and challenges that link with these key drivers, that could mean the basic profile is potentially pessimistic.

For instance, the potential specification of the new GWR franchise is unknown at present, and indeed elements of the next franchise are currently out for consultation, but it is arguable that there is scope for a new franchise to increase generic demand for rail in the Bristol area through the operating regime of the new operator (such as new services and trains, and ticketing initiatives, etc). Ticketing initiatives may be more widely applicable than just the local franchise, but are typically boosted through franchise commitments. For instance, smart ticketing is becoming the norm, and this can drive demand up, especially off-peak (evidence in TfL suggests off-peak demand increases have been around 20% as a result of the Oyster system). Linked to this, new sales channels are very effective at revenue management and passenger choice, again potential factors for extra revenue. These are all unknowns that have the potential to be upside effects on future demand.

However, while historic demand growth rates have been high, there is some evidence that this is slowing down, and indeed rail demand growth stagnating in some areas (ORR station usage figures). Hence, the growth profile follows a decremting path from current (recent) local growth rates, to (lower) future industry projected rates. The local WoE area has hitherto though resisted this slow-down, and local surveys indicated demand may be more than recorded in industry data such as ORR station usage figures.

Overall therefore, the forecast growth rates assumed can be considered comparatively conservative, and it is arguable that growth in demand closer to the 'high demand growth' (sensitivity 1) could be achieved.

Table 5.5: Detailed results of socio-economic appraisal – sensitivity tests

Element	MetroWest Phase 1 OBC Scheme	Sensitivity 1 High demand growth	Sensitivity 2 Low demand growth	Sensitivity 3 10-year fare/growth cap	Sensitivity 4 30-year fare/growth cap	Sensitivity 5 Operating cost risk elements	Sensitivity 6 Ashton Vale Road junction benefits
<i>Net benefits to consumers and private sector (plus tax impacts)</i>							
Rail user journey time benefits	195.56	209.28	179.06	169.84	218.41	195.56	195.56
Non-user benefits – road decongestion	50.16	53.06	48.57	48.57	53.06	50.16	58.95
Non-user– noise, air quality, greenhouse gases & accidents	6.29	6.65	6.42	6.41	6.66	6.29	6.29
Rail user and non-user disruption dis-benefits during possessions	-0.42	-0.42	-0.42	-0.42	-0.42	-0.42	-0.42
Indirect taxation impact on government	-12.68	-12.03	-11.57	-11.57	-12.03	-12.68	-12.68
<b>BENEFITS sub-total (a)</b>	<b>238.90</b>	<b>256.53</b>	<b>222.06</b>	<b>212.83</b>	<b>265.67</b>	<b>238.90</b>	<b>247.69</b>
Wider economic impacts (WI)	74.03	77.49	63.01	63.01	77.49	74.03	74.03
Option values (OV)	25.48	25.48	25.48	25.48	25.48	25.48	25.48
<b>BENEFITS sub-total (b)</b>	<b>338.40</b>	<b>359.50</b>	<b>310.55</b>	<b>301.32</b>	<b>368.64</b>	<b>338.40</b>	<b>347.20</b>
<i>Costs to government (broad transport budget)</i>							
Capital costs	94.37	94.37	94.37	94.37	94.37	94.37	94.37
Non-user benefits – road infrastructure cost changes	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
Revenue transfer	-126.77	-135.44	-116.31	-111.30	-139.06	-126.77	-126.77
Operating costs transfer	126.22	126.22	126.22	126.22	126.22	152.78	126.22
<b>COSTS sub-total (c)</b>	<b>93.64</b>	<b>84.98</b>	<b>104.11</b>	<b>109.11</b>	<b>81.35</b>	<b>120.20</b>	<b>93.64</b>
Net Present Value (NPV) (a-c)	145.25	171.56	117.95	103.72	184.32	118.70	154.05
<b>Benefit Cost Ratio to Government (BCR) (a/c)</b>	<b>2.55</b>	<b>3.02</b>	<b>2.13</b>	<b>1.95</b>	<b>3.27</b>	<b>1.99</b>	<b>2.62</b>
Net Present Value (NPV) (b-c)	Adjusted 244.76	274.53	206.44	192.21	287.29	218.20	253.55
<b>Benefit Cost Ratio to Government (BCR) (b/c)</b>	<b>3.61</b>	<b>4.23</b>	<b>2.98</b>	<b>2.76</b>	<b>4.53</b>	<b>2.82</b>	<b>3.71</b>

Costs and benefits are £m; present values discounted to 2010, in 2010 prices



# Summary and Conclusions

## 6.1 Summary of economic assessment

Table 6.1 sets out the Value for Money Statement for the MetroWest Phase 1 OBC scheme.

Table 6.1: MetroWest Phase 1 OBC Scheme, Value for Money Statement

Criteria	Description
Value for Money/Value for Money when wider impacts are included	High/High
NPV	£145.25 million
Initial BCR	2.55
Adjusted BCR (With Wider Impacts)	3.61
Summary of the benefits and costs	<ul style="list-style-type: none"> <li>• Rail transport user benefits (around 82% of the total benefits excluding wider impacts)</li> <li>• Highway transport user benefits (21% of total excluding benefits excluding wider impacts)</li> <li>• Wider Economic Impacts £74.0 million</li> <li>• Option Values £25.5m</li> </ul> <p>Operating costs are more significant than capital costs in the economic case, though not by much (56% operating cost versus 44% capital cost).</p>
Significant non-monetised impacts	No significant non-monetised impacts. The most significant non-monetised impact is a moderate beneficial impact on journey quality. Other impacts are either slight beneficial (physical activity, access to services), slight adverse (historic environment, biodiversity, severance) or neutral.
Key risks, sensitivities and uncertainties underlying the appraisal	<ul style="list-style-type: none"> <li>• Operating cost assumptions - potential scope for greater synergies with existing services to reduce staffing and maintenance costs</li> <li>• Rail demand forecasts, in particular future year growth in demand at new and existing stations</li> <li>• Future year fare assumptions</li> </ul>
Significant social distributional impacts	Analysis indicates that scheme impacts are relatively evenly distributed across income, social and user groups. User benefit distributional impact is moderate beneficial, noise and air quality are minor adverse, other impacts are all neutral.

The assessment work presented in the economic case shows that there is a clear case for the MetroWest Phase 1 OBC scheme. The scheme demonstrates **high value for money**, largely due to the rail user benefits of the scheme. When wider impacts and option values are included, the scheme also offers **high value for money**.

As noted in the value for money statement, the scheme has clear merit, in that it generates benefits that more than outweigh the costs to an extent that the value for money assessment of the scheme is high. It is worth considering that most of the benefits are generated by improving the journeys of rail users, either through new journey opportunities or by changes to existing services that offer improvements in terms of journey time and frequency. The sensitivity tests surrounding demand growth are key to the scheme's potential. Discussion of sensitivity tests in the previous chapter of this report highlighted that growth projections could be considered pessimistic, for a variety of reasons relating to changes in the way that rail services will operate in the WoE area, in particular as

a result of new franchise bidding and negotiations delivering changes to services across the wider franchise area, as well as (perhaps more importantly) innovative ticketing initiatives that have the potential to generate demand, potentially significant at off-peak times. As such, higher demand growth could be considered a reasonably high probability.

The scheme will have a targeted effect on highway use, attracting some current car trips to rail. While rail will still remain a ‘minority mode’ in the WoE area, a number of benefit elements are generated by a reduction in car traffic, accounting for over 20% of total benefits (albeit this is slightly off-set by indirect tax impacts). Highway benefits are aligned with the likely rail trip distribution.

Operating costs are a significant feature of the overall stream of present values, though these are more or less cancelled out by revenue benefits generated from new rail trips. There is some risk inherent in operating cost assessments, which could result in decreasing the project’s value for money. However, it is considered that, while this is illustrated as such in the sensitivity tests, extra demand (as also illustrated in the sensitivity tests) could have a restorative effect on the calculated value for money.

## 6.2 Appraisal Summary Table (AST)

The Appraisal Summary Table is set out in Appendix E. As well as economic impacts, this includes results of environmental impact, social impact and distributional impact appraisal, reported in the MetroWest Phase 1 OBC Chapter 2 ‘Economic Case’, MetroWest Phase 1 OBC ‘Social Impacts Appraisal Report’ and MetroWest Phase 1 OBC ‘Distributional Impacts Assessment Report’ respectively.

Appendix A  
Network Rail technical note:  
Socio-economic Impacts for Rail Users

Appendix B  
Wider Economic Impacts Assessment

# Appendix C

## Regeneration and GVA

## Appendix D

### TEE, PA and AMCB tables

## TEE, PA & AMCB – OBC scheme

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	143,130	18,809		124,321	
Vehicle operating costs	1,420	1,420		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>144,444</b>	<b>20,229</b>		<b>124,215</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	53,969	7,092		46,877	
Vehicle operating costs	536	536		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>54,398</b>	<b>7,628</b>		<b>46,771</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	43,662	3,678	15,626	24,358	0
Vehicle operating costs	2,996	706	2,290	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>46,447</b>	<b>4,385</b>	<b>17,916</b>	<b>24,146</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>46,447</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>245,290</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-126,770	0	-126,770
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>-549</b>	<b>0</b>	<b>-549</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	12,678	12,678	0
<b>TOTALS</b>			
Broad Transport Budget	93,643	-177	93,820
Wider Public Finances	12,678	12,678	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,286
Economic Efficiency: Consumer Users (Commuting)	144,444
Economic Efficiency: Consumer Users (Other)	54,398
Economic Efficiency: Business Users and Providers	46,447
Wider Public Finances (Indirect Taxation Revenues)	-12,678
<b>Present Value of Benefits (PVB)</b>	<b>238,897</b>
Broad Transport Budget	93,643
<b>Present Value of Costs (PVC)</b>	<b>93,643</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>145,254</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>2.55</b>

Accidents, noise, air quality & greenhouse gases	6,286
Reliability	1,823
Wider Impacts	74,025
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	338,403
PVC	93,643
NPV	244,760
<b>BCR</b>	<b>3.61</b>

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.

## TEE, PA & AMCB – sensitivity 1; High demand growth

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	151,250	18,205		133,045	
Vehicle operating costs	1,091	1,091		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>152,235</b>	<b>19,296</b>		<b>132,939</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	57,029	6,864		50,165	
Vehicle operating costs	411	411		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>57,334</b>	<b>7,276</b>		<b>50,059</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	49,580	5,167	18,346	26,067	0
Vehicle operating costs	2,975	876	2,099	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>52,343</b>	<b>6,043</b>	<b>20,445</b>	<b>25,855</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>52,343</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>261,912</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-135,436	0	-135,436
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>-9,215</b>	<b>0</b>	<b>-9,215</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	12,031	12,031	0
<b>TOTALS</b>			
Broad Transport Budget	84,977	-177	85,154
Wider Public Finances	12,031	12,031	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,652
Economic Efficiency: Consumer Users (Commuting)	152,235
Economic Efficiency: Consumer Users (Other)	57,334
Economic Efficiency: Business Users and Providers	52,343
Wider Public Finances (Indirect Taxation Revenues)	-12,031
<b>Present Value of Benefits (PVB)</b>	<b>256,533</b>
Broad Transport Budget	84,977
<b>Present Value of Costs (PVC)</b>	<b>84,977</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>171,556</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>3.02</b>

Accidents, noise, air quality & greenhouse gases	6,652
Reliability	1,929
Wider Impacts	77,490
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	359,503
PVC	84,977
NPV	274,527
<b>BCR</b>	<b>4.23</b>

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.

## TEE, PA & AMCB – sensitivity 2; Low demand growth

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	131,800	17,966		113,834	
Vehicle operating costs	1,537	1,537		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>133,231</b>	<b>19,503</b>		<b>113,728</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	49,698	6,774		42,924	
Vehicle operating costs	580	580		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>50,172</b>	<b>7,354</b>		<b>42,818</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	41,265	3,712	15,249	22,303	0
Vehicle operating costs	2,751	578	2,173	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>43,804</b>	<b>4,290</b>	<b>17,422</b>	<b>22,091</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>43,804</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>227,207</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-116,307	0	-116,307
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>9,914</b>	<b>0</b>	<b>9,914</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	11,567	11,567	0
<b>TOTALS</b>			
Broad Transport Budget	104,105	-177	104,282
Wider Public Finances	11,567	11,567	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,418
Economic Efficiency: Consumer Users (Commuting)	133,231
Economic Efficiency: Consumer Users (Other)	50,172
Economic Efficiency: Business Users and Providers	43,804
Wider Public Finances (Indirect Taxation Revenues)	-11,567
<b>Present Value of Benefits (PVB)</b>	<b>227,058</b>
Broad Transport Budget	104,105
<b>Present Value of Costs (PVC)</b>	<b>104,105</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>117,953</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>2.13</b>

Accidents, noise, air quality & greenhouse gases	6,418
Reliability	1,766
Wider Impacts	63,009
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	310,548
PVC	104,105
NPV	206,443
<b>BCR</b>	<b>2.98</b>

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.

## TEE, PA & AMCB – sensitivity 3; Fare/growth cap at 10 years

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	125,934	17,965		107,969	
Vehicle operating costs	1,537	1,537		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>127,365</b>	<b>19,502</b>		<b>107,863</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	47,497	6,776		40,721	
Vehicle operating costs	580	580		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>47,971</b>	<b>7,355</b>		<b>40,615</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	40,115	3,712	15,249	21,153	0
Vehicle operating costs	2,751	578	2,173	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>42,654</b>	<b>4,290</b>	<b>17,422</b>	<b>20,941</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>42,654</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>217,989</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-111,302	0	-111,302
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>14,919</b>	<b>0</b>	<b>14,919</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	11,567	11,567	0
<b>TOTALS</b>			
Broad Transport Budget	109,111	-177	109,288
Wider Public Finances	11,567	11,567	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,409
Economic Efficiency: Consumer Users (Commuting)	127,365
Economic Efficiency: Consumer Users (Other)	47,971
Economic Efficiency: Business Users and Providers	42,654
Wider Public Finances (Indirect Taxation Revenues)	-11,567
<b>Present Value of Benefits (PVB)</b>	<b>212,831</b>
Broad Transport Budget	109,111
<b>Present Value of Costs (PVC)</b>	<b>109,111</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>103,720</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>1.95</b>

Accidents, noise, air quality & greenhouse gases	6,409
Reliability	1,766
Wider Impacts	63,009
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	301,321
PVC	109,111
NPV	192,210
<b>BCR</b>	<b>2.76</b>

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.

## TEE, PA & AMCB – sensitivity 4; Fare/growth cap at 30 years

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	157,074	18,208		138,867	
Vehicle operating costs	1,091	1,091		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>158,060</b>	<b>19,299</b>		<b>138,761</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	59,192	6,861		52,331	
Vehicle operating costs	411	411		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>59,497</b>	<b>7,273</b>		<b>52,225</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	50,723	5,167	18,346	27,209	0
Vehicle operating costs	2,975	876	2,099	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>53,486</b>	<b>6,043</b>	<b>20,445</b>	<b>26,997</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>53,486</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>271,043</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-139,062	0	-139,062
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>-12,841</b>	<b>0</b>	<b>-12,841</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	12,031	12,031	0
<b>TOTALS</b>			
Broad Transport Budget	81,351	-177	81,528
Wider Public Finances	12,031	12,031	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,661
Economic Efficiency: Consumer Users (Commuting)	158,060
Economic Efficiency: Consumer Users (Other)	59,497
Economic Efficiency: Business Users and Providers	53,486
Wider Public Finances (Indirect Taxation Revenues)	-12,031
<b>Present Value of Benefits (PVB)</b>	<b>265,672</b>
Broad Transport Budget	81,351
<b>Present Value of Costs (PVC)</b>	<b>81,351</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>184,321</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>3.27</b>

Accidents, noise, air quality & greenhouse gases	6,661
Reliability	1,929
Wider Impacts	77,490
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	368,643
PVC	81,351
NPV	287,292
<b>BCR</b>	<b>4.53</b>

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.

## TEE, PA & AMCB – sensitivity 5; Operating cost risk elements included

### Economy: Economic Efficiency of the Transport System (TEE)

<b>Consumer - Commuting user benefits</b>	<b>All Modes</b>	<b>Road</b>		<b>Rail</b>	
Travel Time	143,130	18,809		124,321	
Vehicle operating costs	1,420	1,420		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>144,444</b>	<b>20,229</b>		<b>124,215</b>	
<b>Consumer - Other user benefits</b>	<b>All Modes</b>	<b>Road</b>		<b>Rail</b>	
Travel Time	53,969	7,092		46,877	
Vehicle operating costs	536	536		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>54,398</b>	<b>7,628</b>		<b>46,771</b>	
<b>Business</b>	<b>All Modes</b>	<b>Personal</b>	<b>Freight</b>	<b>Personal</b>	<b>Freight</b>
Travel Time	43,662	3,678	15,626	24,358	0
Vehicle operating costs	2,996	706	2,290	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>46,447</b>	<b>4,385</b>	<b>17,916</b>	<b>24,146</b>	<b>0</b>
<b>Private Sector Provider Impacts</b>					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
<b>Other business Impacts</b>					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>46,447</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>245,290</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

<b>Local Government Funding</b>	<b>ALL MODES</b>	<b>Road</b>	<b>Rail</b>
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
<b>Central Government Funding: Transport</b>	<b>ALL MODES</b>	<b>Road</b>	<b>Rail</b>
Revenue	-126,770	0	-126,770
Operating costs	152,779	0	152,779
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>26,009</b>	<b>0</b>	<b>26,009</b>
<b>Central Government Funding: Non-Transport</b>			
Indirect Tax Revenues	12,678	12,678	0
<b>TOTALS</b>			
Broad Transport Budget	120,200	-177	120,377
Wider Public Finances	12,678	12,678	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,286
Economic Efficiency: Consumer Users (Commuting)	144,444
Economic Efficiency: Consumer Users (Other)	54,398
Economic Efficiency: Business Users and Providers	46,447
Wider Public Finances (Indirect Taxation Revenues)	-12,678
<b>Present Value of Benefits (PVB)</b>	<b>238,897</b>
<b>Broad Transport Budget</b>	<b>120,200</b>
<b>Present Value of Costs (PVC)</b>	<b>120,200</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>118,697</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>1.99</b>

Accidents, noise, air quality & greenhouse gases	6,286
Reliability	1,823
Wider Impacts	74,025
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	338,403
PVC	120,200
NPV	218,203
<b>BCR</b>	<b>2.82</b>

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.

## TEE, PA & AMCB – sensitivity 6; Ashton Vale Road junction benefits included

### Economy: Economic Efficiency of the Transport System (TEE)

Consumer - Commuting user benefits	All Modes	Road		Rail	
Travel Time	148,343	24,022		124,321	
Vehicle operating costs	1,421	1,421		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - COMMUTING BENEFITS</b>	<b>149,658</b>	<b>25,443</b>		<b>124,215</b>	
Consumer - Other user benefits	All Modes	Road		Rail	
Travel Time	55,935	9,058		46,877	
Vehicle operating costs	536	536		0	
User charges	0	0		0	
During Construction & Maintenance	-106	0		-106	
<b>NET CONSUMER - OTHER BENEFITS</b>	<b>56,364</b>	<b>9,594</b>		<b>46,771</b>	
Business	All Modes	Personal	Freight	Personal	Freight
Travel Time	45,275	3,986	16,932	24,358	0
Vehicle operating costs	2,997	706	2,290	0	0
User charges	0	0	0	0	0
During Construction & Maintenance	-212	0	0	-212	0
<b>Subtotal</b>	<b>48,060</b>	<b>4,692</b>	<b>19,222</b>	<b>24,146</b>	<b>0</b>
Private Sector Provider Impacts					
Revenue	0	0		0	
Operating costs	0	0		0	
Investment costs	0	0		0	
Grant/subsidy	0	0		0	
<b>Subtotal</b>	<b>0</b>	<b>0</b>		<b>0</b>	
Other business Impacts					
Developer contributions	0	0		0	
<b>NET BUSINESS IMPACT</b>	<b>48,060</b>				
<b>TOTAL</b>					
Present Value of Transport Economic Efficiency Benefits (TEE)	<b>254,083</b>				

Note: Benefits appear as positive numbers, while costs appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Public Accounts

Local Government Funding	ALL MODES	Road	Rail
Revenue	0	0	0
Operating Costs	-177	-177	0
Investment Costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	94,369	0	94,369
<b>NET IMPACT</b>	<b>94,192</b>	<b>-177</b>	<b>94,369</b>
Central Government Funding: Transport	ALL MODES	Road	Rail
Revenue	-126,770	0	-126,770
Operating costs	126,221	0	126,221
Investment costs	0	0	0
Developer Contributions	0	0	0
Grant/Subsidy Payments	0	0	0
<b>NET IMPACT</b>	<b>-549</b>	<b>0</b>	<b>-549</b>
Central Government Funding: Non-Transport			
Indirect Tax Revenues	12,678	12,678	0
<b>TOTALS</b>			
Broad Transport Budget	93,643	-177	93,820
Wider Public Finances	12,678	12,678	0

Note: Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

Note: All entries are present values discounted to 2010, in 2010 prices

### Analysis of Monetised Costs and Benefits

Accidents, noise, air quality & greenhouse gases	6,286
Economic Efficiency: Consumer Users (Commuting)	149,658
Economic Efficiency: Consumer Users (Other)	56,364
Economic Efficiency: Business Users and Providers	48,060
Wider Public Finances (Indirect Taxation Revenues)	-12,678
<b>Present Value of Benefits (PVB)</b>	<b>247,690</b>
Broad Transport Budget	93,643
<b>Present Value of Costs (PVC)</b>	<b>93,643</b>
<b>OVERALL IMPACTS</b>	
<b>Net Present Value (NPV)</b>	<b>154,047</b>
<b>Benefit to Cost Ratio (BCR)</b>	<b>2.65</b>

Accidents, noise, air quality & greenhouse gases	6,286
Reliability	1,823
Wider Impacts	74,025
Option values	25,481
<b>including Wider Impacts &amp; Option Values</b>	
PVB	347,196
PVC	93,643
NPV	253,553
<b>BCR</b>	<b>3.71</b>

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 E  
Appraisal Summary Table (AST)

# MetroWest Phase 1 OBC – Appraisal Summary Table (AST)

Appraisal Summary Table		Date produced:	20/12/2017		Contact:		
Name of scheme:		MetroWest Phase 1			Name	James Wilcock	
Description of scheme:		Infrastructure and passenger train operations to provide a half-hourly service for the Severn Beach Line (to Avonmouth, hourly to Severn Beach); half hourly service for local stations on the Bath Spa Line; and hourly service for a reopened Portishead Line (new stations at Portishead and Pill).			Organisation	North Somerset Council	
Impacts		Summary of key impacts		Assessment			
				Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Journey time savings are significant in geographical areas where impacts are anticipated. This covers savings for public transport users as a result of the new stations at Portishead/Pill and frequency improvement, and for highway users as a result of decongestion in the highway network where modal shift to rail occurs. (NOTE - benefit split by journey times for highway only)	Value of journey time changes (£) Not required	£46,438,407	Large beneficial distributional impact		
	Reliability impact on Business users	Some reduction in highway traffic will result in small changes in journey time, and quantifiable reliability benefits for all users. Rail reliability has not been modelled.	NOTE - impact is highway only and total for all users	£1,823,385			
	Regeneration	The scheme links a number of regeneration and enterprise zones, and has the potential to generate new jobs, both during construction and operational stages.	1400 jobs & £57m GVA - construction stage 500 permanent jobs & £32m GVA per annum - operational	£264,781,565			
	Wider impacts	The scheme improves productivity of local economy through improving transport provision, bringing businesses closer to each other and to the labour market.	£68.4m agglomeration benefits, £4.6m imperfect competition and £1.0m labour supply	£74,025,119			
Environmental	Noise	The increases in noise are due to the operation of the new rail service. These are not significant increases but the change in noise is sufficient to move a band in the noise worksheet. There would be a minor adverse impact at the Trinity Primary School in Portishead. Negligible impacts are expected within the Avon Gorge Woodlands SAC and SSSI and other designated areas along the route. No dwellings are expected to be eligible under the Noise Insulation Regulations. There are predicted to be no impacts are night due to the service only being operational during the day.	Households experiencing increased daytime noise in forecast year: 523 Households experiencing reduced daytime noise in forecast year: 0 Households experiencing increased night time noise in forecast year: 0 Households experiencing reduced night time noise in forecast year: 0	Not required	Minor adverse distributional impact		
	Air Quality	The physical works for the Project cross a short section of the Bristol Air Quality Management Area (AQMA) and during operation passenger services from the scheme would extend from Portishead to Bristol passing through the AQMA from Parson Street Junction into Bristol. Air quality monitoring data suggest that AQSO objectives are being met within the Project extent in North Somerset. The Project crosses one ecological designated site (Avon Gorge Woodlands SAC and SSSI) where baseline NOx levels are close to the critical level. The Project offers an alternative travel mode that promotes a modal shift which leads to some beneficial air quality impacts in the surrounding area. These benefits are however offset by the additional diesel locomotives on the Portishead Branch Line which are expected to lead to an increase in NOx and PM10 emissions. These changes are likely to lead to adverse impacts at receptors nearest to the rail line. The Project is not predicted to result in any exceedances of the annual mean AQSO objective for traffic pollutants.	Assessment Score: PM10: 586.09 NO2: 8,216.57 Emissions: PM10: +1 tonnes NOx: +936 tonnes	Not required	Minor adverse distributional impact		
	Greenhouse gases	The Project is expected to result in decrease in vehicle kilometers travelled across the road network which has the potential to result in a decrease in CO2 emissions. However, rail emissions associated with the Project are expected to contribute to an increase in CO2 emissions.	Change in non-traded carbon over 60y (CO2e) N/A Change in traded carbon over 60y (CO2e) N/A	Not required	£250,774		
	Landscape	Area north of Avon Gorge and Avon Gorge itself: slight adverse effect due to vegetation clearance creating more open views of construction activities and of the railway when the DCO Scheme is in operation. Area south of Avon Gorge: neutral/slight adverse effect due to opening up of views in the landscape, although existing landscape already has dominant transport infrastructure features and urban land cover. Overall slight adverse effect due to the reasons set out above. DCO Scheme will affect areas of recognised landscape quality and will impact on certain views across the area.	NA	Slight adverse	NA		
Social	Townscape	Neutral effect on the townscape of the Ashton Gate/Ashton Vale area due to the fact that transport infrastructure (including the existing Portbury Freight Line) is already a dominant feature in the landscape, and many views are restricted by commercial/industrial buildings so would not change significantly with the DCO Scheme. Future trends in the area are likely to include increased development and expansion outwards into the urban/rural fringe, and increased traffic volumes, so the DCO Scheme would fit this trend.	NA	Neutral	NA		
	Historic Environment	The DCO Scheme is assessed to have a direct slight adverse/neutral effect on non-designated cultural heritage assets during the enabling works and construction through the removal of known and hitherto unknown archaeological remains along the railway corridor. The adverse effects arising from these direct impacts on this resource can be adequately mitigated through preservation by record and the significance effect of the residual impact is assessed to be neutral and not significant in regards to the EA Regulations. The effect of the DCO Scheme on the setting of the designated cultural heritage assets along the route during construction and operation is generally neutral and not significant in regards to the EA Regulations. This results largely from the lack of inter-visibility between the DCO Scheme and heritage assets.	NA	Slight adverse/Neutral	NA		
	Biodiversity	The Portishead to Pill line will have slight adverse effects on Field east of M5 Motorway, Lodge Wildlife Site due to loss of habitat, however this impact is considered to be negligible in magnitude due to the minor loss of habitat anticipated. Slight adverse effects are also considered possible on protected species such as great crested newts, other amphibian species, badgers, otter and bats through the fragmentation of habitats and disturbance and death/injury from direct collision with trains. The operational maintenance of the railway corridor may also cause slight adverse effects on habitats such as woodland, trees and scrub due to direct loss, as well as Japanese knotweed due to the potential of facilitating the spread of this invasive species. The impact on North Somerset and Mendips Bats SAC is to be assessed following further bat survey in 2018. The Freight Line section of the DCO is assessed to have a slight adverse effect on internationally and nationally important sites/species such as the Avon Gorge and Woodlands SAC/SSSI, Legh Woods MNR and Ancient Woodland and the notable and important plant species these sites support, these impacts are likely to arise through the routine maintenance and clearance of the railway corridor, however they will be mitigated through the implementation of a Site Vegetation Management Statement which will be developed in consultation with Natural England. A slight adverse effect is also anticipated on the internationally important site Bath and Bradford on Avon Bats SAC, however this assessment is ongoing due to further assessment on the use and value of the tunnels to bats. A number of Local Wildlife Sites are also predicted to have potentially slight adverse effects due to the Freight Line section of the scheme. These include Bower Ashton BWNS, River Avon NSWS and River Avon SNQ. Effects on these sites will arise due to habitat loss. A slight adverse effect may also occur on protected species such as badger, otters and bats through the fragmentation of habitats, disturbance and death/injury from direct collision with trains. Habitats that may be subject to a slight adverse impact includes ephemeral/short perennials which may be effected due to the routine maintenance and clearance of the railway corridor. In addition a slight adverse effect may occur due to the potential spread of invasive plant species during this routine maintenance and clearance.	NA	Slight adverse	NA		
	Water Environment	The water environment is typical of the locality with watercourses mostly comprising small watercourse with primarily a drainage function (some man-made) of low to medium importance discharging directly into the tidal River (Bristol) Avon which is of Very High importance. Groundwater is of Medium to High importance on a local to regional scale. The larger watercourses - Severn Estuary, River (Bristol) Avon and Easton-in-Gordano Stream are of High quality, whereas the smaller watercourses are of medium to low quality. Most are important on a local scale, with on the River (Bristol) Avon being important at a regional scale and the Severn Estuary at a national scale due to its size and ecological designations. There will be little impact upon the water environment as the scheme involves minimal additional impermeable surfaces (mostly relating to the stations and associated car parking areas) and results in little change in water quality, with some improvement in some areas through the removal of contaminated old sleepers and renewal of ballast. As the scheme involves very little change from the existing situation the magnitude of all impacts is considered to be negligible, except for a slight adverse impact relating to the increased flood risk to the railway line from the River (Bristol) Avon, which will worsen over time. This results in a significance score of "insignificant" for all of the impacts, apart from two exceptions for which the significance score is "Low Significant". The first exception is the flood risk to the railway from the River (Bristol) Avon.	NA	Neutral	NA		
Public Accounts	Commuting and Other users	Journey time savings are significant in geographical areas where impacts are anticipated. This covers savings for public transport users as a result of the new stations at Portishead/Pill and frequency improvement, and for highway users as a result of decongestion in the highway network where modal shift to rail occurs. (NOTE - benefit split by journey times for highway only)	Value of journey time changes (£) Not required	£198,842,893	Evenly spread across vulnerability		
	Reliability impact on Commuting and Other users	Some reduction in highway traffic will result in small changes in journey time, and quantifiable reliability benefits for all users. Rail reliability has not been modelled.	NOTE - impact is highway only and total for all users	£1,823,385			
	Physical activity	The proposed scheme accounts for cyclists, pedestrians and equestrians by delivering and planning for measures to minimise the interaction between these modes and motorised traffic (including trains). The measures provided for Non-Motorised Users (NMUs) that will be delivered as part of the scheme ensures that the opportunity to undertake trips through active modes will be enhanced. Based on the work undertaken, the assessment suggests that the scheme will have an overall slight beneficial impact on physical activity.	NA	Slight beneficial	NA		
	Journey quality	Improved frequencies on the Severn Beach line and local stations to Bath will help reduce the extent of overcrowding and lower traveller stress by improved ease and convenience. The analysis also suggests that there will be neutral impacts on other factors such as cleanliness, facilities, information and traveller's views. With the introduction of passenger rail services to Pill and Portishead, there will be larger beneficial impacts such as new facilities at the railway stations, smoothness of ride, traveller views and integration into existing national railway information portals. Based on the evidence, it is concluded that there will be a moderate beneficial impact.	NA	Moderate beneficial	NA		
	Accidents	A full assessment of the likely impacts of the scheme was undertaken, and this suggests that as MetroWest is a rail scheme, with minimal changes on other parts of the network.	A saving of 130 accidents	Not required	£5,845,450		
	Security	The new rail stations will enhance the security of both locations by providing additional footfall, CCTV, emergency contact points and improved lighting. However, while there will be a general improvement in security of the area, rail stations can also attract crime. The scheme is therefore envisaged to have a neutral impact on security.	NA	Neutral	NA		
	Access to services	MetroWest Phase 1 will generally enhance the public transport offer in an area served, thus improving links to key services. There is a more substantial enhancement to the public transport offer in Portishead and Pill. Overall, MetroWest Phase 1 is assessed to have a slight beneficial on access to services.	NA	Slight beneficial	NA		
	Affordability	The assessment indicates there will be beneficial affordability impacts from reduced fuel costs, shorter journeys and reduced congestion. However, this needs to be set against the additional costs of rail fares and car parking charges (if travelling to the stations by car). Improved frequencies are expected to increase the numbers travelling by rail, but there may be some extraction from existing public transport provision which could impact on affordability. Based on the evidence, it is concluded that MetroWest Phase 1 will result in a neutral impact.	NA	Neutral	NA		
Severance	Negative impacts are expected at the various at-grade crossing points affected by the Scheme. The negative impact is a result of increased journey times opposed to safety. It is expected that the overall safety of pedestrians and cyclists will be improved, particularly at Ashton Vale. Overall the scheme has a slight adverse impact on severance.	NA	Slight adverse	NA			
Option and non-use values	The scheme will add a rail option to a public transport offer that currently only includes bus, and a bus service that is adversely affected by traffic congestion	26,235 population within 2km of new rail station	Not required	£25,480,590			
Cost to Broad Transport Budget	Public sector costs associated with investments for scheme implementation and ongoing support/maintenance, such as capital investment, operating costs and revenue income.	NA	Not required	£93,642,672			
Indirect Tax Revenues	The impact on tax and fuel duty loss as a result of reduction in fuel consumption.	NA	Not required	-£12,677,961			