



# MetroWest+

## Portishead Branch Line (MetroWest Phase 1)

TR040011

Applicant: North Somerset District Council

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## **Document Purpose**

Part 3 of 3 comprises:

- Appendix B EAST Appraisal
- Appendix C Socio-economic Appraisal Report
- Appendix D Forecasting Report
- Appendix E Wider Impacts Assessment
- Appendix F Portishead Station Options Appraisal Report
- Appendix G Evidence Paper
- Appendix G Signalised Junction/Bridge Drawing
- Appendix G Signalised Junction/Bridge General Arrangement Drawing
- Appendix G Station Location Option 2A Drawing
- Appendix G Station Location Option 2B Drawing
- Appendix G Station Location Option 2C Drawing
- Appendix G Station Location Option 1A Drawing
- Appendix G Station Location Option 1B Drawing
- Appendix G Station Location Option 3 Drawing

The document refers to the promoters business name North Somerset Council, rather than its legal name North Somerset District Council.

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*MetroWest Phase 1*

# MetroWest Phase 1- EAST Appraisal

Prepared for  
**West of England**

July 2014

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# 1 Introduction

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## 1.1 What is MetroWest?

MetroWest (formerly known as the Greater Bristol Metro) is an ambitious programme that will transform the provision of local rail services across the West of England. MetroWest comprises of a range of projects from relatively large schemes - entailing both infrastructure and service enhancement - to smaller scale projects. MetroWest is being jointly promoted and developed by the four West of England councils (Bath & North East Somerset, Bristol City, North Somerset and South Gloucestershire Councils).

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 will deliver an enhanced local rail offer for the sub-region comprising:

- Existing and disused rail corridors feeding into Bristol
- Broadly half-hourly service frequency (but some variations possible pending business case)
- Cross-Bristol service patterns for example, Bath to Severn Beach
- A Metro-type service appropriate for a city region of 1 million population.

The programme includes:

- MetroWest Phase 1 – Half-hourly local service for the Severn Beach line, Bath to Bristol line and a reopened Portishead line with stations at Portishead and Pill
- MetroWest Phase 2 - Half-hourly service for the Yate to Bristol line and an hourly service for a reopened Henbury line, with stations at Henbury, North Filton, and possibly Ashley Down and Horfield
- Further additional station openings, subject to separate business cases
- Other potential enhancements including the feasibility of extending electrification across the West of England network

The MetroWest programme is to be delivered over the next five to ten years during Network Rail Control Period (CP) 5 (CP5 is 2014-2019) and 6 (CP6 is 2019-2024). The MetroWest programme will also extend the benefits of strategic transport interventions that are either in the process of being delivered or have been delivered by the West of England councils. These include the three MetroBus schemes (Ashton Vale to Temple Meads, South Bristol Link and North Fringe to Hengrove Package), Bath Package, Weston Package and the Local Sustainable Travel Fund programme. The delivery of these projects, together with the MetroWest programme, will result in better modal integration between rail, bus and active modes, providing an important step towards seamless modal transfer at key hubs across the West of England.

The MetroWest programme has the full backing of the West of England Local Enterprise Partnership (LEP). The LEP together and the four councils' Executive Members for Transport, who collectively make up the West of England Joint Transport Board, has determined that MetroWest Phase 1 and Phase 2 are its highest priorities for devolved DfT (Department for Transport) funding.

Figure 1.1 provides an overview of the MetroWest Phase 1 proposed train services.

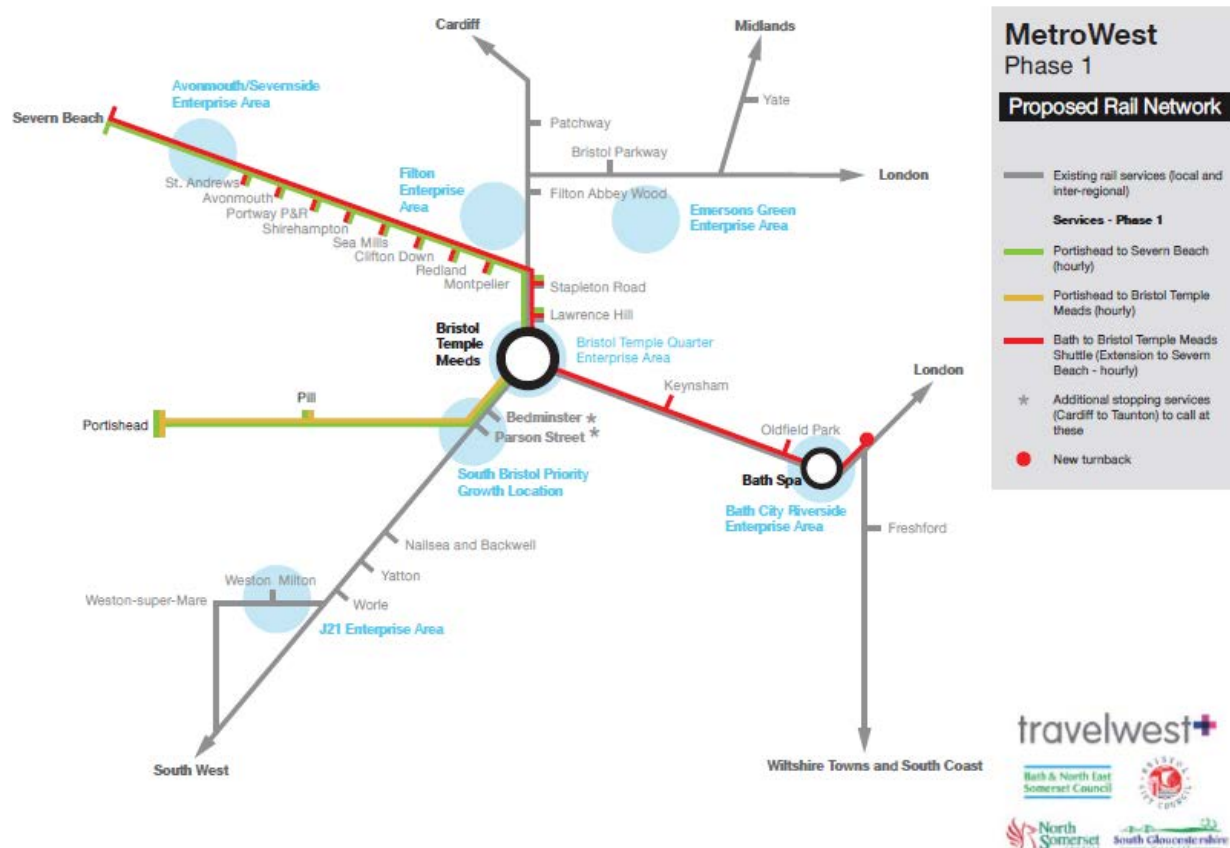


Figure 1.1: Overview of the MetroWest Phase 1 proposed train services

The West of England councils have recognised the strategic importance of the train service network to the local economy for many years. The West of England area enjoys a good network of long-distance train services. However, the local train network is underdeveloped and underutilised, in comparison with other city regions of a similar size. MetroWest fills this strategic gap and will enable the four councils and the West of England LEP to realise the strategic potential for the local rail network to play a bigger role in meeting the transport needs of the sub-region. MetroWest also complements committed investment planned by the rail industry during Control Period 5 (2014 to 2019) including electrification of the Great Western line and the Intercity Express Programme, projects which will address network bottlenecks and renewal projects.

MetroWest (formerly known as the Greater Bristol Metro) is included in the current Joint Local Transport Plan, covering the period 2011-2026 and all of the local authorities' Core Strategies.

The West of England councils and Network Rail have undertaken a considerable number of feasibility studies on MetroWest in its current and former guises. These work-streams are summarised in Figure 2.2.

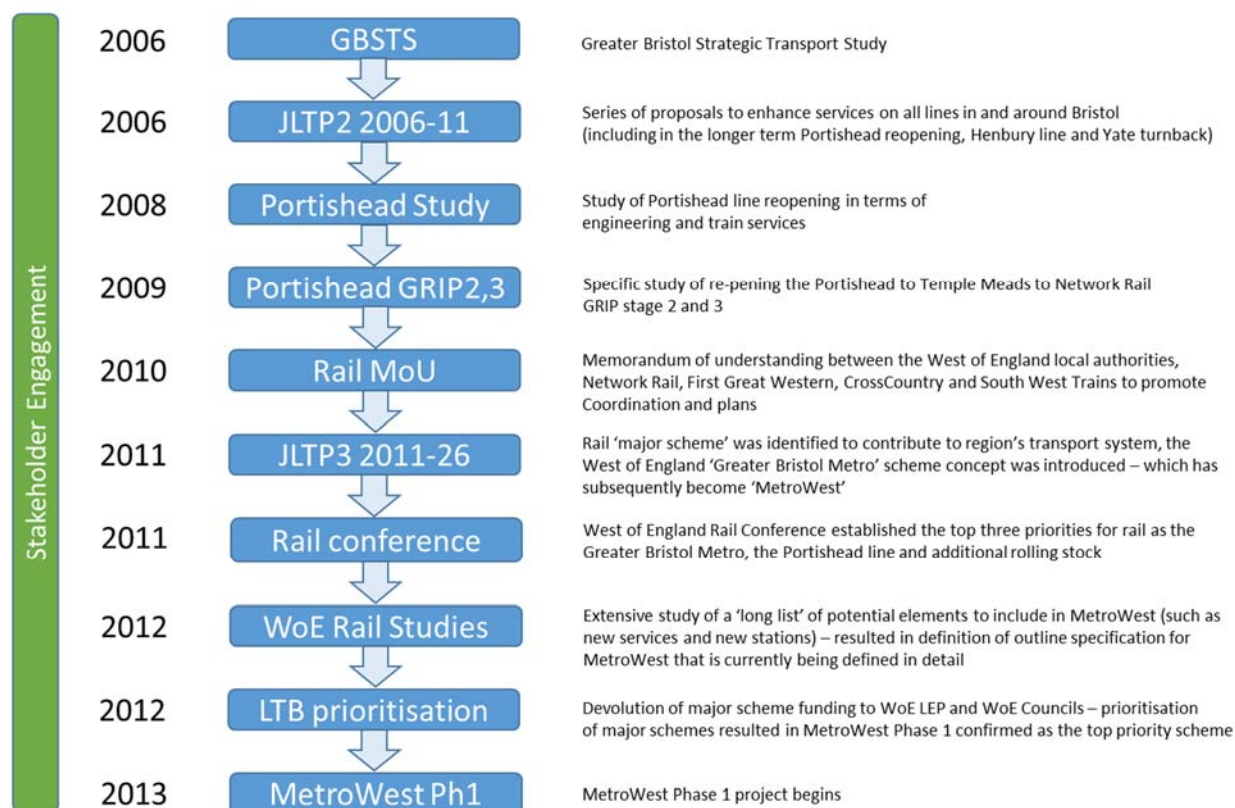


Figure 2.2: Summary of work-streams that have informed the MetroWest Phase 1 project

The outcome of this previous work is that MetroWest Phase 1 is now well-positioned to be taken forward. In summary, MetroWest Phase 1 has:

- Full backing across all four West of England authorities, including funding for project development
- A robust policy context
- A body of feasibility work and evidence
- Full backing of the rail industry to be taken forward alongside committed CP5 schemes
- An agreed output specification
- Endorsement as a priority scheme from the West of England LEP
- Endorsement by the West of England Local Transport Body Board (now the Joint Transport Board) as the top priority scheme for devolved major scheme funding, subject to business case approval

The programme has four key stages:

1. Option development (including GRIP 1-2) - Summer 2013 to Summer 2014
2. Scheme case (including GRIP 3) - Summer 2014 to Winter 2015-16
3. Planning powers and procurement (including GRIP 4-5) - Winter 2015/16 to Autumn 2017
4. Construction and opening (including GRIP 6-8) - Autumn 2017 to Spring 2019

## 1.2 Business case requirements

The Local Transport Body Board, LTBB (now the Joint Transport Board) for the West of England now has responsibility for allocating funds (which are awarded to them by the DfT) for major transport schemes. The delivery of MetroWest will, therefore, rely on funding from the LTBB.

A process to assess schemes has been set out, which includes production of business cases at key points, followed by the LTBB Independent Reviewer<sup>1</sup>'s review.

MetroWest Phase 1 is targeting a project opening date of May 2019. A series of business cases are to be prepared and submitted to the LTBB:

- Preliminary (Strategic Outline) Business Case – to be submitted to the LTBB in September 2014
- Outline Business Case – to be submitted in October 2015
- Full Business Case - to be submitted in October 2017

The assessment process is based on the DfT's WebTAG, drawing on elements of WebTAG that are relevant to the level of detail required by each of the business cases in turn. Successful submission of each business case is required to proceed to subsequent stages of development.

## 1.3 EAST assessment

The DfT's Early Assessment Sifting Tool (EAST) is a defined step in the appraisal process set out in WebTAG. It is a decision support tool that has been developed to 'quickly summarise and present evidence on options in a clear and consistent format'.

Figure 1.3 illustrates the WebTAG appraisal process. The EAST process is the sixth step in the appraisal process and hence builds on the previous five steps:

- Understanding the current situation
- Understanding the future situation
- Establishing the need for intervention
- Identifying objectives and defining geographic area of impact
- Generating options for consideration.

An overview of these five steps is set out in Sections 2 and 3 of this report.

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<sup>1</sup> Steer Davies Gleave (SDG) has been appointed the West of England LTBB's Independent Reviewer for major transport schemes.]



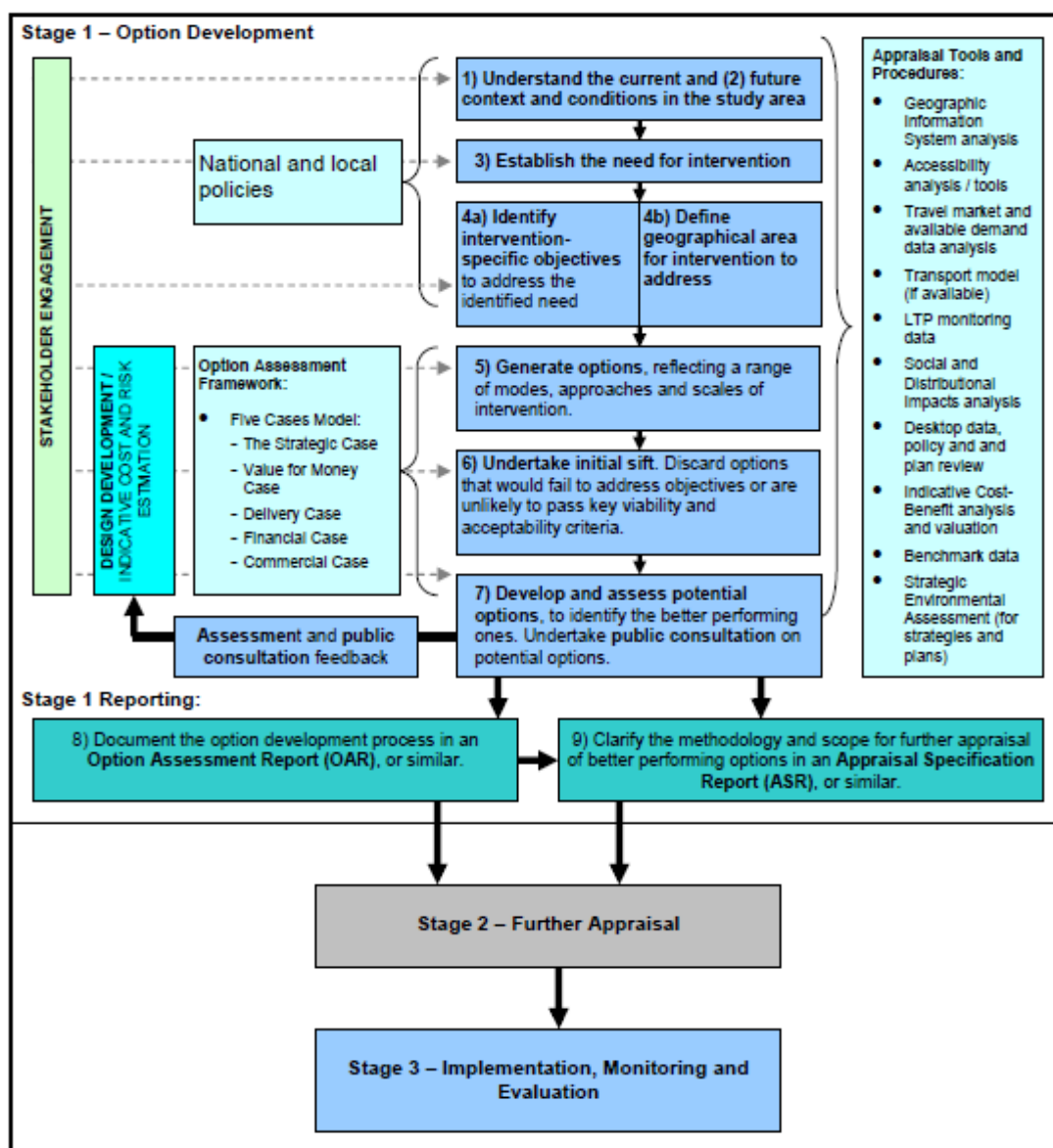


Figure 1.3: Outline of the WebTAG appraisal process

## 1.4 Purpose and structure of this report

The purpose of this report is to document work undertaken to assess MetroWest Phase 1 options EAST framework and provide information of the appraisal and assessment steps prior to the EAST assessment. This report will inform the MetroWest Phase 1 Preliminary (Strategic Outline) Business Case.

The question of the ‘need for the scheme’ has been considered at two levels:

- Macro level - the scheme is compared with other Major Schemes in the West of England (see Section 2)
- Mode-specific level - considering rail matters in more detail (see Section 3)

The EAST assessment is set out in Section 4 of this report.



## 2 The context and need for MetroWest Phase 1

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### 2.1 Introduction

This section sets out the context of the current and future situations and considers the need for the intervention. It considers transport by all modes across the West of England area. More detailed rail issues are reported in section 3.

### 2.2 Understanding the current transport situation

#### 2.2.1 Current transport and other policies

The Joint Local Transport Plan 3 (JLTP3) 2011-2026 is a joint plan which covers Bristol City Council, Bath & North East Somerset, North Somerset and South Gloucestershire Council areas. The principal aims and objectives are to reduce CO<sub>2</sub>, provide support to the economy, and to improve quality of life and environmental conditions. It also includes a number of associated documents on various transport topic areas such as cycling, rural transport and public transport.

The JLTP3 vision is to provide an “affordable, low carbon, accessible, integrated, efficient and reliable transport network to achieve a more competitive economy and better connected, more active and healthy communities.”

The JLTP3 aims to deliver:

- “A transport system that recognises the whole journey. Where cycle routes and footways feed into the public transport network
- A transport system where both bus and rail play their part. Where buses serve the movements around and within towns, cities and rural communities. Where rail serves both short and longer journeys
- Where marketing, through ticketing, timetable coordination and interchanges make public transport more desirable than the private car
- Where customer satisfaction is the driver behind encouraging public transport use
- Whilst recognising the car will still provide personal mobility for many.”

#### 2.2.2 Current travel demand

The West of England city region has a population of over 1 million. Table 2.1, derived from the national and local data sources, gives an indication of how people travel. It shows that the car is by far the dominant mode and just 1.5 per cent of all journeys to work are by rail. However, there has been 44 per cent growth from 2004 to 2008 in rail demand in the West of England.

TABLE 2.1  
2013 Mode Split

Mode	Mode share
Car driver	46.6%
Walk	17.1%
Bus	6.3%
Car passenger	13.1%
Cycle	13.8%
Train	3.2%

An overview of the transport networks is shown in Figure 2.1.

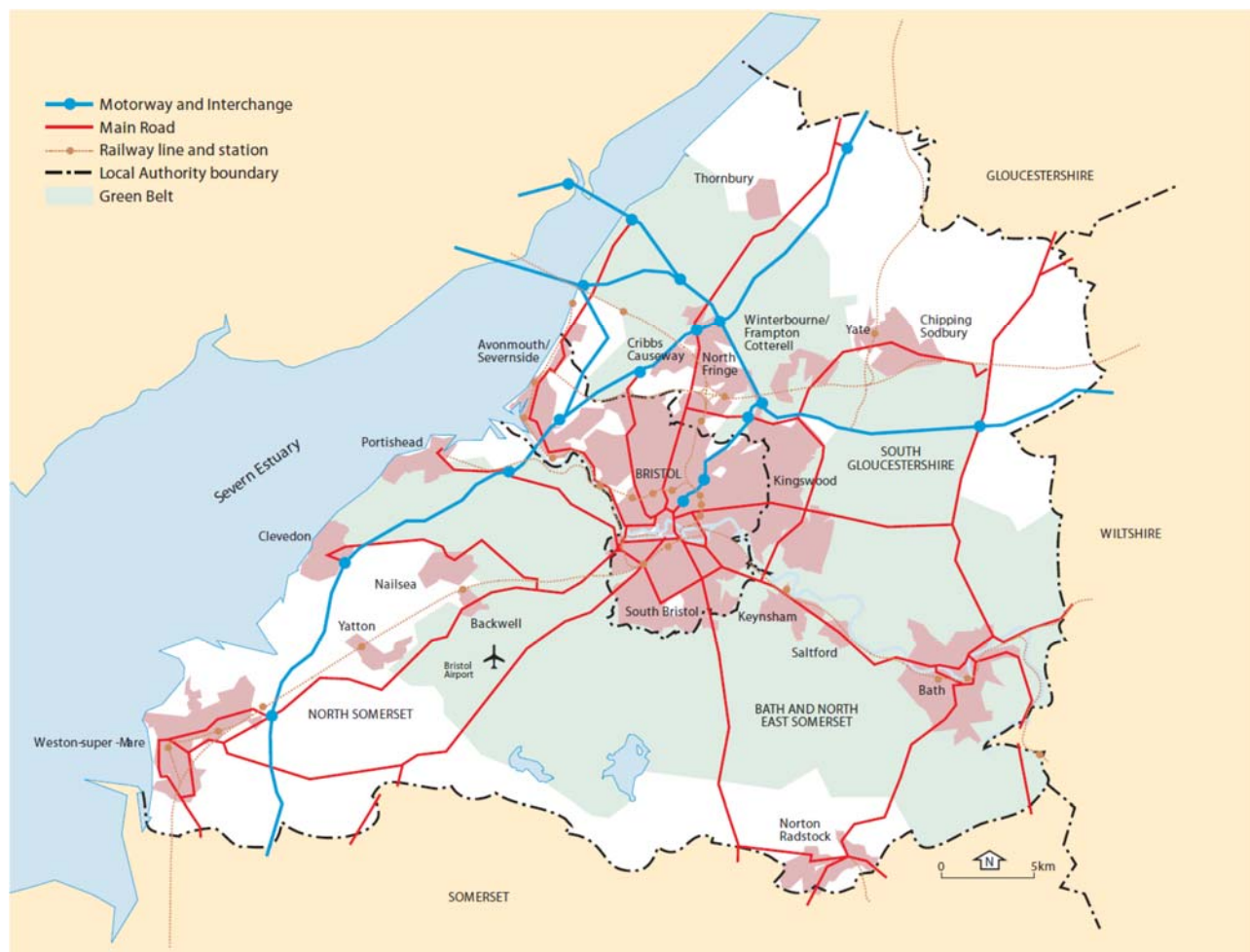


Figure 2.1 - An overview of the transport networks (source: LTP3)

### 2.2.3 Current transport opportunities and constraints

Current transport-related problems include:

- Lack of real alternatives to the car for some residents and businesses in the West of England (for example, Portishead and cross-Bristol trips).

- Areas of multiple deprivation for example, Weston-super-Mare and in north-western parts of Bristol (alongside the Severn Beach line).
- Poor transport network resilience. Incidents and accidents on the national and local highway network can ripple and cause disruption to the normal operation of the network elsewhere. Furthermore, there is a need to provide real alternatives to single occupancy car-based travel to address the long-term reliance on the car, and enable the local economy to continue to grow.
- Poor air quality in areas of Bristol and Bath.
- Congestion on West of England local and strategic road networks.

The transport problems, coupled with the need to encourage economic growth, have been considered by the West of England LTBB, to shape determining proposals to provide medium- to long-term benefits for the people, businesses and residents of the West of England. As part of this, a process of assessing and prioritising major local transport schemes was undertaken in June 2013.

## 2.3 Understanding the future situation

### 2.3.1 Future land uses and policies

Metro Phase 1 forms an important part of the West of England's economic growth agenda, led by the LEP. The West of England LEP's economic development strategy is being driven by its Strategic Economic Plan (SEP), submitted to Government in March 2014. The SEP and the City Region Deal (CRD) provide the framework for unlocking growth across the West of England. The SEP and the CRD will deliver significant growth at the following locations (see section 3.2.1 for more details):

- Bristol Temple Quarter Enterprise Zone and new arena
- Bath City Riverside Enterprise Area
- J21 Enterprise Area (Weston-super-Mare)
- Emersons Green/Science Park Enterprise Area via Bristol Parkway
- Filton Enterprise Area
- Avonmouth Severnside Enterprise Area

### 2.3.2 Changes to the West of England transport system

As part of the JTLP3 transport vision (see Figure 6.1 in the JTLP3), the MetroWest Phase 1 complements and integrates with the West of England transport programme, including:

- MetroBus (bus rapid transit) including Ashton Vale to Temple Meads, South Bristol Link and North Fringe to Hengrove Package)
- Bath package, bus network enhancements
- Weston package, multi-modal package of enhancements including J21 of the M5
- Better Bus Area fund
- Cycle City Ambition Grant
- Local sustainable transport fund
- Local pinch-point fund

### 2.3.3 Future travel demands

The Temple Quarter Enterprise Zone, centred around Bristol Temple Meads station, aims to create 17,000 new jobs with 4,000 by 2017. It is anticipated that a large proportion of employees will come to work by train.

Network Rail is assuming over 40 per cent growth in passengers at Bristol Temple Meads over the 10 years to 2020-21.

Similarly the five Enterprise Areas including Bath City Riverside (9,000 jobs), J21/Weston-super-Mare Gateway (9,000) and Avonmouth Severnside Enterprise Area (6,000 to 12,000,000), are all well located to make use of the rail network. MetroWest Phase 1 will provide a key interface for increasing access to major employment areas. For major employers, it will increase the catchment pool of the skilled workforce within a short (half an hour) journey to work.

## 2.4 The need for transport intervention

The primary highway corridors into and across Bristol, Bath and the surrounding towns are congested and continued traffic growth threatens the future economic prosperity of the sub-region. Over the last 10 years the volume of people using the rail network in the West of England had doubled. As transport demand increases, there is a need to ensure the rail network has sufficient capacity to cater for this demand as part of an integrated approach to managing the transport network. MetroWest Phase 1 will complement the rail industry's substantial programme of investment to the Western Route for Control Period 5 (2014-19).

The West of England's current share of national economic growth (GVA) is the highest of any core city region at 3.1%. The overall vision is to build on this economic growth through a range of interventions including improving access to major employment sites for the skilled workforce. The city region is also set for further population growth which is expected to exceed 1.1 million by 2026. Planning for this growth means the city region needs to make sure its transport infrastructure is not only fit-for-purpose, but has the ability to respond to increasing demand and, therefore, maximise potential for continued economic growth.

Strategic investment in transport infrastructure provides wider economic benefits. A recent West of England study found that every £1 invested in rail generates £2 benefits.

There is a public recognition of the need for intervention from a diverse range of stakeholders, including major employers and the wider business community through to community groups and local interest groups and campaigns.

### 2.4.1 Underlying causes

The underlying cause for the scheme is the excess of travel demand over available capacity which will be exacerbated with development. Without intervention, the local train network's contribution to meeting the transport needs of the sub-region will be limited. Furthermore, the local highway network is already congested in key areas. The overall impact would result in constraints to accessing employment opportunities which would restrict economic growth.

## 2.5 LTP and LEP objectives

From April 2015, the LTBB will manage major scheme funding to deliver high value for money transport schemes. These schemes will support the policies and objectives of the Joint Local Transport Plan 2011-26 and 'place' aspect of the LEP Vision.

The Vision for the West of England LEP is summarised as:

- Supporting growth
- Driving innovation
- Developing people

- Promoting business
- Creating a sense of place

The five key transport goals set out in the West of England Joint Local Transport Plan are:

- Reduce carbon emissions
- Support economic growth
- Promote accessibility
- Contribute to better safety, security and health
- Improve quality of life and a healthy natural environment

## 2.6 Options considered for major schemes

The West of England authorities recently undertook a process of assessment and prioritisation of more than 50 potential major local transport schemes. The outcome was reported to the LTTB in June 2013.

MetroWest Phase 1 was ranked as the highest priority and is now on the Priority Programme for Devolved Major Schemes Funding.





## **3 MetroWest Phase 1 – WebTAG Appraisal Stage 1 – Steps 1 to 5**

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### **3.1 Introduction**

This section provides details of the current rail situation and optioneering relating to the MetroWest Phase 1 scheme options.

### **3.2 Understanding the current rail situation**

#### **3.2.1 Current policy framework**

The MetroWest programme of improvements has been a long-standing aspiration of all of the West of England authorities and is identified in their Core Strategies. It therefore has an established and agreed policy context and complements the overarching development plans for the local area.

The MetroWest Phase 1 is identified in the JLTP3 (referenced as Greater Bristol Metro and Portishead line) as a future priority scheme following delivery of the current three bus rapid transit schemes and the Weston and Bath package.

This policy status is underpinned by technical work including:

- The Great Western Main Line Route Utilisation Strategy, March 2010 – this tested various options for the Greater Bristol Metro
- Portishead Line Reopening – GRIP Stage 2 and 3 – 2009 and 2010

A full review of the relevant local planning policies, as well as the JLTP, is provided in the MetroWest EIA (Environmental Impact Assessment) suite of documents.

#### **3.2.2 Current rail demand and levels of service**

Figure 2.2 shows a plan of the current railway provision in Bristol and surrounding area.



Figure 2.2 A plan of the current railway provision in Bristol and the surrounding area

The local rail network across the West of England is under-developed. Many local rail routes do not have a basic half hourly frequency in the peak and some routes terminate at Bristol Temple Meads rather than operating across the city region. There are some noteworthy deficiencies in the current service patterns. For example, the Bristol/Bath line has a half hourly service to London, yet the service pattern provided for intermediate stations (Keynsham and Oldfield Park) is approximately hourly. The Severn Beach line operates every 40 minutes to Avonmouth and only two hourly to Severn Beach.

Office of Rail Regulator (ORR) station usage information is shown in Table 2.2.

TABLE 2.2  
ORR station usage information

Station Name	2012/13 Entries & Exits
<b>TOTAL (stations in study area - 3)</b>	<b>20,324,156</b>
<b>BRISTOL MAIN STATIONS</b>	
Bristol Temple Meads	9,099,368
Bristol Parkway	2,255,298
<b>TOTAL</b>	<b>11,354,666</b>
<b>SEVERN BEACH LINE STATIONS</b>	
Severn Beach	167,078
St.Andrew's Road	9,910
Avonmouth	97,880
Shirehampton	50,654
Sea Mills	58,310
Clifton Down	522,010

TABLE 2.2  
**ORR station usage information**

Station Name	2012/13 Entries & Exits
Redland	94,984
Montpelier	126,316
<i>TOTAL</i>	<i>1,127,142</i>
<b>OTHER BRISTOL URBAN STATIONS</b>	
Stapleton Road	140,390
Lawrence Hill	124,878
Bedminster	80,262
Parson Street	87,932
<i>TOTAL</i>	<i>433,462</i>
<b>BATH and NE SOMERSET URBAN STATIONS</b>	
Bath Spa	5,757,880
Keynsham	329,274
Oldfield Park	281,622
<i>TOTAL</i>	<i>6,368,776</i>
<b>SOUTH GLOUCESTERSHIRE STATIONS</b>	
Yate	307,148
Patchway	82,198
Filton Abbey Wood	852,250
<i>Pilning</i>	<i>130</i>
<i>TOTAL</i>	<i>1,241,596</i>
<b>NORTH SOMERSET STATIONS</b>	
Nailsea and Backwell	421,892
Yatton	398,530
Worle	253,590
Weston Milton	48,008
Weston-super-Mare	1,037,172
<i>TOTAL</i>	<i>2,159,192</i>

### 3.2.3 Current rail opportunities and constraints

Key factors affecting Bristol rail services include:

- Lack of a standard, 'clock-face' half hourly service pattern across the local rail network
- Bottlenecks at key junctions and sections of the track
- Lack of capacity (particularly short formation rolling stock) and connectivity across the Bristol area
- Ageing signalling equipment
- Congestion at Bristol Temple Meads station

## 3.3 Understanding the future rail situation

### 3.3.1 Future changes to the rail network and operation

Network Rail's plans for Control Period 5 (CP5), which covers the period 2014 -19, includes delivery of £7.5 billion of rail investment via the Western Programme. This will become Europe's largest construction project, covering the London Paddington, Newbury, Oxford and Bristol lines. The CP5 works include a number of rail infrastructure schemes to enhance the capacity and capability of the rail network into Bristol:

- Electrification of the Great Western main line

- Additional platform at Bristol Parkway station
- Additional infrastructure between Bristol Parkway and Bristol Temple Meads (Filton Bank)
- Bristol Temple Meads additional platform and station capacity
- Renewal of Bristol area signalling
- Line speed improvements between Bristol Temple Meads and Taunton

The rail operational challenge needs to take account of:

- The significant growth predicted by the Great Western Route Utilisation Strategy (RUS) in passenger demand around Bristol for both long distance, high speed trains, specifically commuting to London and local, commuter and leisure travel.
- Freight growth predicted for Bristol port.

Electrification of the Great Western main line (expected completion 2017-18) will introduce enhanced services between London and Bristol, with potentially four trains per hour (two via Bath and two via Bristol Parkway). Although not a specific part of current plans, the West of England authorities are investigating extension of electrification to local rail lines.

The DfT Great Western specification consultation is currently being undertaken. The consultation sets out the scope of the new franchise and feedback on the proposals is being sought. The components of MetroWest Phase 1 are listed as potential third party promoted schemes in the report:

- Bristol – Portishead
- Additional half hourly services between Bristol and Bath
- Half hourly services on the Bristol – Severn Beach line

### 3.3.2 MetroWest Phase 2

MetroWest Phase 2 is programmed for delivery within two years of the opening of MetroWest Phase 1. Phase 2 will reintroduce passenger services on the existing Henbury freight line, provide new station(s) on Filton Bank, and increase service frequencies at Yate and Weston Milton. The interaction between Phase 1 and Phase 2 services on the Severn Beach Line is reported in Section 3.6.

### 3.3.3 Future rail demand

Demand for rail travel has grown significantly in recent years. For example, there has been an almost 70 per cent increase in passenger numbers through stations in the West of England area between 2004-05 and 2011-12 (based on ORR figures). There have been even larger increases on specific routes, such as more than a doubling of patronage on the Severn Beach line. Historic growth rates at groups of West of England stations are shown in Table 3.1 and Figure 3.1. Apart from a slight levelling in 2007-08, growth has continued in spite of the economic recession, and seems likely to continue, albeit it is debatable whether rates may not be as high as recent times.

TABLE 3.1  
**ORR historic patronage growth in West of England area**  
*2004-2012 figures*

Station groupings	2010-11 to 2011-12 per annum	2009-10 to 2010-11 per annum	2004-05 to 2011-12 TOTAL	2004-05 to 2011-12 per annum
Bristol main (Temple Meads and Parkway)	5.7%	6.1%	57%	6.6%

TABLE 3.1

**ORR historic patronage growth in West of England area***2004-2012 figures*

Station groupings	2010-11 to 2011-12	2009-10 to 2010-11	2004-05 to 2011-12	2004-05 to 2011-12
	per annum	per annum	TOTAL	per annum
Severn Beach Line	9.8%	18.9%	163%	14.8%
Other Bristol urban	8.7%	13.3%	142%	13.5%
B&NES (including Keynsham)	8.7%	9.3%	54%	6.4%
South Gloucestershire(excluding Parkway)	11.8%	13.2%	115%	11.5%
North Somerset	6.0%	10.9%	56%	6.5%
OVERALL	8.7%	10.9%	69%	7.8% <sup>2</sup>

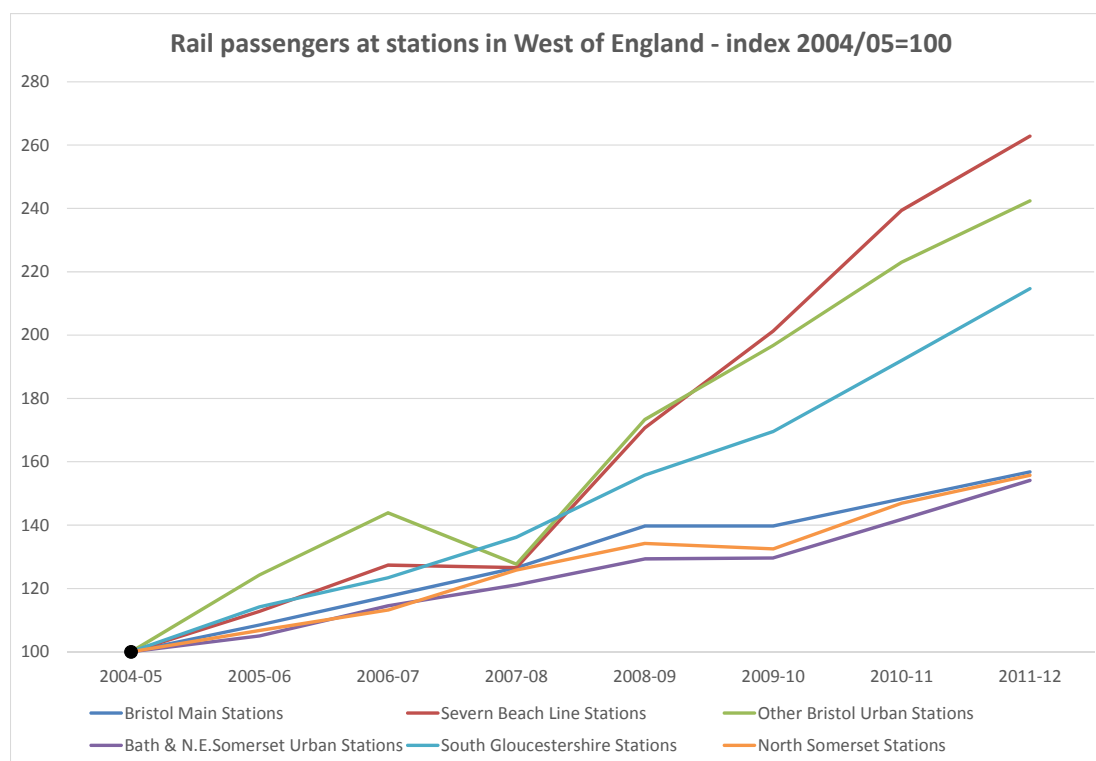


Figure 3-1: ORR historic growth in West of England area

Looking into the future, the Great Western Route Utilisation Strategy (RUS) (published in March 2010) forecasted that demand in the Bristol area would rise by 41 per cent at peak times between 2008 and 2019 (a rate of 3.2 per cent per annum), and 37 per cent off peak (2.9 per cent per annum), with an average growth rate of 3.0 per cent per annum.

The Long Term Planning Process (LTPP) Regional Urban Markets study (published by Network Rail in October 2013) uses a series of wider economic scenarios to frame changes in rail use, and forecasts are presented for rail use in and around key urban centres. The resulting growth rates for the Bristol area vary from 0.6 per cent per annum to 3.9 per cent per annum. More details of the LTPP growth rates are shown in Table 3.2.

<sup>2</sup> As a comparison, the West of England station survey showed a 6.5% per annum increase from 2005 to 2012

TABLE 3.2

**Network Rail LTPP: Regional Urban Markets Study – Bristol area forecast growth**  
*(October 2013)*

Economic scenario	2013-23	2013-23	2023-2043	2023-2043
	total	per annum	total	per annum
'Prosperity in isolation'	14%	1.3%	33%	1.4%
'Global stability'	47%	3.9%	44%	1.8%
'Struggling in isolation'	6%	0.6%	15%	0.7%
'Global turmoil'	35%	3.0%	21%	1.0%
AVERAGE	26%	2.3%	29%	1.3%

In spite of recorded growth in recent years, it is possible that these rates would not continue unabated in the long term. Therefore, a more robust approach is proposed for future year forecasts for West of England stations, based on a combination of decrementing historic rates, RUS and LTPP figures, as follows: <sup>3</sup>

- 2013 to 2017 – taper from recent historic growth rates at West of England stations (7.8% per annum) to RUS average of peak and off peak (3.0 per cent per annum)
- 2018 and 2019 – RUS average rate (3.0 per cent per annum)
- 2020 to 2023 – taper from RUS average rate (3.0 per cent per annum) to an LTPP average rate derived from the four economic scenarios (2.3 per cent per annum)
- 2023 to 2043 – taper from 2023 LTPP average rate (2.3 per cent per annum) to 2043 LTPP average rate (1.3 per cent per annum)

For appraisal purposes, demand would be assumed to level off after a period of growth. The point at which future growth is zero would be determined by opening year and prevailing assumptions surrounding the scenario being tested. WebTAG (revised unit A5-1) suggests 20 years' growth after opening should be assumed, with sensitivities of 10 and 30 years' growth.

### 3.4 The need for rail intervention

As demand on the transport network increases as a result of economic and population growth, further investment is needed to ensure the transport network is accessible and has enough capacity and resilience to continue to meet the sub-region's needs.

MetroWest Phase 1 complements planned CP5 investment through targeted investment in the West of England local rail network, to enhance the Severn Beach line, the Bath to Bristol line and reopen the Portishead to Bristol line. MetroWest Phase 1 will play a key role in enhancing access to major growth areas including Temple Quarter Enterprise Zone and five Enterprise Areas across the sub-region. The project will bring these major employment centres closer to the skilled workforce catchment, by simultaneously enhancing access to the local train network and increasing train service frequency. Major employers will have a larger skilled workforce pool to draw on within a 30 minute commute and this will play a part in removing barriers to inward investment.

The long-term trend of continued traffic growth threatens the West of England's economic prosperity; in response, the four West of England councils have developed the MetroWest programme as a key part of its integrated 'TravelWest' transport strategy. Key highway corridors into and across the city region are at or

<sup>3</sup> Given recent historic rates of growth of rail patronage, the forecast growth rates assumed can be considered comparatively conservative.

near capacity and average vehicle speeds are among the lowest for comparable city regions. The case for intervention to rebalance the transport network, through investment in the local rail network, is compelling.

### 3.5 Scheme-specific objectives and geographical area of impact

The principal business objectives of the MetroWest Phase 1 project are:

- To support economic growth, by enhancing the transport links to the Bristol Temple Quarter Enterprise Zone (TQEZ) and into and across Bristol City Centre, from the Portishead, Bath and Avonmouth/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/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
- To make a positive contribution to social wellbeing, life opportunities and improving quality of life, across the three arterial corridors

The MetroWest Phase 1 supporting objectives are:

- To contribute to reducing traffic congestion on the Portishead, Bath and Avonmouth/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
- To contribute to reducing the overall environmental impact of the transport network

The 2012 report by Atkins 'GVA Impacts of Major Transport Schemes' states that rail schemes (including MetroWest and the new stations package are forecast to unlock 2,550 jobs and will generate £153 million in GVA per annum by 2030. MetroWest will play an important role in bringing these major employment centres closer to the skilled workforce catchment, helping to remove barriers to inward investment. MetroWest is intended to plan for growth and make sure the city region's transport infrastructure has the ability to respond to increasing demand, to realise and maximise continued economic growth.

### 3.6 MetroWest Phase 1 option generation and descriptions

In the early stages of MetroWest Phase 1, the four Councils, Network Rail and the train operating companies held two optioneering workshops. These workshops identified the services and infrastructure required to meet a half hourly service pattern. They also considered current passenger demand characteristics and the known infrastructure constraints across the West of England rail network. This resulted in the identification of the following options:

- Option 1: Shuttles (base case)
- Option 2a and b: Portishead – Bath Spa and Severn Beach shuttle
- Option 3a and b: Portishead – Severn Beach and Bath shuttle
- Option 4a and b: Severn Beach – Bath Spa and Portishead shuttle
- Option 5a and b: Severn Beach to Bath and Severn Beach to Portishead (timetable proposed Halcrow)

- Option 6a and b: Portishead to Bath and Portishead to Severn Beach

These are described in Table 3.3.

TABLE 3.3  
Option descriptions

Option		Service pattern
<b>Option 1:</b> Shuttles (Base Case)		<p>Metro services operate as shuttles:</p> <ul style="list-style-type: none"> <li>2tph (trains per hour) Severn Beach – Bristol Temple Meads (BTM)</li> <li>1tph Bath Spa – BTM</li> <li>2tph Portishead – Bristol Temple Meads (BTM)</li> <li>1tph off peak</li> </ul>
<b>Option 2a:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads		<p>Link Portishead to Bath Spa:</p> <ul style="list-style-type: none"> <li>2tph Severn Beach – BTM</li> <li>1tph Bath Spa – Portishead</li> <li>1tph Portishead – BTM (off peak)</li> </ul>
<b>Option 2b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads		<p>Link Portishead to Bath Spa:</p> <ul style="list-style-type: none"> <li>1tph Severn Beach – BTM</li> <li>1tph Bath Spa – Portishead</li> <li>1tph Portishead – BTM</li> <li>1tph Avonmouth - BTM</li> </ul>
<b>Option 3a:</b> Portishead to Severn Beach and Bath shuttle		<p>Link Portishead to Severn Beach:</p> <ul style="list-style-type: none"> <li>2tph Severn Beach – Portishead (peak)</li> <li>1tph Bath Spa – BTM</li> <li>This option is presented as an all day timetable without a peak variant</li> </ul>



TABLE 3.3  
Option descriptions

Option		Service pattern
<b>Option 3b:</b> Portishead to Severn Beach and Bath shuttle	<p>The diagram shows a vertical line of stations: Portishead at the bottom, followed by Bristol Temple Meads, Avonmouth, and Severn Beach at the top. A horizontal line branches off to the right from the line between Bristol Temple Meads and Avonmouth, leading to Bath Spa. Blue arrows indicate the direction of travel: up the main line from Portishead to Severn Beach, and down the main line from Severn Beach to Portishead. On the branch to Bath Spa, arrows point both towards Bath Spa and back towards the main line.</p>	Link Portishead to Severn Beach: <ul style="list-style-type: none"> <li>• 1tph Severn Beach – Portishead</li> <li>• 1tph Bath Spa – BTM</li> <li>• 1tph Avonmouth – Portishead</li> <li>• This option is presented as an all day timetable without a peak variant</li> </ul>
<b>Option 4a:</b> Severn Beach to Bath Spa and Portishead shuttle	<p>The diagram shows a vertical line of stations: Portishead at the bottom, followed by Bristol Temple Meads, and Severn Beach at the top. A horizontal line branches off to the right from the line between Bristol Temple Meads and Severn Beach, leading to Bath Spa. Blue arrows indicate the direction of travel: up the main line from Portishead to Severn Beach, and down the main line from Severn Beach to Portishead. On the branch to Bath Spa, arrows point both towards Bath Spa and back towards the main line.</p>	Link Severn Beach to Bath Spa <ul style="list-style-type: none"> <li>• 1tph Severn Beach – Bath Spa</li> <li>• 1tph Severn Beach – BTM</li> <li>• 2tph Portishead – BTM (1tph off peak)</li> </ul>
<b>Option 4b:</b> Severn Beach to Bath Spa and Portishead shuttle	<p>The diagram shows a vertical line of stations: Portishead at the bottom, followed by Bristol Temple Meads, Avonmouth, and Severn Beach at the top. A horizontal line branches off to the right from the line between Bristol Temple Meads and Avonmouth, leading to Bath Spa. Blue arrows indicate the direction of travel: up the main line from Portishead to Severn Beach, and down the main line from Severn Beach to Portishead. On the branch to Bath Spa, arrows point both towards Bath Spa and back towards the main line.</p>	Link Severn Beach to Bath Spa <ul style="list-style-type: none"> <li>• 1tph Severn Beach/Avonmouth – Bath Spa</li> <li>• 1tph Severn Beach/Avonmouth – BTM</li> <li>• (total of 1tph on Severn Beach Line)</li> <li>• 2tph Portishead – BTM</li> </ul>
<b>Option 5a:</b> (timetable proposed by Halcrow): Severn Beach to Bath Spa and Portishead	<p>The diagram shows a vertical line of stations: Portishead at the bottom, followed by Bristol Temple Meads, Avonmouth, and Severn Beach at the top. A horizontal line branches off to the right from the line between Bristol Temple Meads and Avonmouth, leading to Bath Spa. Blue arrows indicate the direction of travel: up the main line from Portishead to Severn Beach, and down the main line from Severn Beach to Portishead. On the branch to Bath Spa, arrows point both towards Bath Spa and back towards the main line.</p>	Link Severn Beach – Bath Spa and Portishead <ul style="list-style-type: none"> <li>• 1tph Severn Beach – Bath Spa</li> <li>• 1tph Severn Beach - Portishead</li> <li>• 1tph Portishead - BTM</li> </ul>

TABLE 3.3  
Option descriptions

Option		Service pattern
<b>Option 5b:</b> Severn Beach to Bath Spa and Portishead	<p>The diagram for Option 5b shows a vertical line of stations: Severn Beach at the top, followed by Avonmouth, Bristol Temple Meads, and Portishead at the bottom. A horizontal line extends from Avonmouth to the right, connecting to Bath Spa. Blue arrows indicate the service pattern: a line of arrows points down from Severn Beach to Portishead, and another line of arrows points up from Portishead to Severn Beach. A single arrow points from Avonmouth to Bath Spa.</p>	Link Severn Beach – Bath Spa and Portishead <ul style="list-style-type: none"> <li>• 1tph Severn Beach – Bath Spa</li> <li>• 1tph Portishead - Avonmouth</li> <li>• 1tph Portishead - BTM</li> </ul>
<b>Option 6a:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	<p>The diagram for Option 6a shows a vertical line of stations: Severn Beach at the top, followed by Bristol Temple Meads, and Portishead at the bottom. A horizontal line extends from Bristol Temple Meads to the right, connecting to Bath Spa. Blue arrows indicate the service pattern: a line of arrows points down from Severn Beach to Portishead, and another line of arrows points up from Portishead to Severn Beach. A single arrow points from Bristol Temple Meads to Bath Spa.</p>	Link Portishead – Severn Beach and Bath Spa <ul style="list-style-type: none"> <li>• 1tph Portishead – Bath Spa</li> <li>• 1tph Portishead – Severn Beach</li> <li>• 1tph Severn Beach - BTM</li> </ul>
<b>Option 6b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	<p>The diagram for Option 6b shows a vertical line of stations: Severn Beach at the top, followed by Avonmouth, Bristol Temple Meads, and Portishead at the bottom. A horizontal line extends from Avonmouth to the right, connecting to Bath Spa. Blue arrows indicate the service pattern: a line of arrows points down from Severn Beach to Portishead, and another line of arrows points up from Portishead to Severn Beach. A single arrow points from Avonmouth to Bath Spa.</p>	Link Portishead – Avonmouth and Bath Spa <ul style="list-style-type: none"> <li>• 1tph Portishead – Bath Spa</li> <li>• 1tph Portishead - Avonmouth</li> <li>• 1tph Severn Beach - BTM</li> </ul>

## 4 MetroWest Phase 1 – WebTAG Appraisal Stage 1 – Steps 6 - EAST

### 4.1 Introduction

The DfT's Early Assessment Sifting Tool (EAST) is a defined step in the appraisal process set out in WebTAG. EAST is an early comparison of options and tools under consideration, prior to the more detailed appraisal which will provide recommendations for funding decisions.

DfT sets out that the EAST tool should be used to:

- Help refine options by highlighting adverse impact or unanticipated consequences
- Compare options, for example, within or across modes, geographical areas and networks
- Identify trade-offs between objectives, aiding package development
- Filter the number of options, discounting some options early to ease appraisal process and avoid resources being spent unnecessarily
- Identify key uncertainties in the analysis and areas where further appraisal efforts should focus

When undertaking an EAST appraisal, it is often at a very early stage in the scheme development work and therefore only high-level information is available. In this case, there is already a considerable amount of information for MetroWest Phase 1 (and some of its component parts, such as the reopening of the Portishead line).

Section 4 of this report sets out the results of the MetroWest Phase 1 EAST assessment for the scheme options detailed in Section 3.6, the EAST forms are set out in Appendix B.

### 4.2 Strategic Case

#### 4.2.1 Scale of Impact

Table 4.1 shows the scale of the impact of the scheme options.

TABLE 4.1

**Scale of impact**

Response options are:

- 1 Very small overall impact - Would have a very small positive impact, possibly with undesirable consequences
- 2 Minor impact - Would have a modest overall impact
- 3 Moderate impact - Expected to have a reasonably significant impact on the problem identified
- 4 Significant impact - Expected to significantly alleviate the problem
- 5 Very significant impact - Expected to alleviate the problem

Option	EAST Response	Justification
Option 1: Shuttles (base case)	3 Moderate impact	The option results in benefits for trips to/from Bristol Temple Meads station from the new and enhanced routes. However the scheme option does not include a cross-Bristol service pattern, and this option would have lower demand than the other options. There is potential for an even service pattern on each route, which will result in additional demand (compared to uneven service patterns). This option has the negative impacts of increased passenger interchange at Bristol Temple Meads, which will have a resulting impact on station capacity.

TABLE 4.1

**Scale of impact**

Response options are:

- 1 Very small overall impact - Would have a very small positive impact, possibly with undesirable consequences
- 2 Minor impact - Would have a modest overall impact
- 3 Moderate impact - Expected to have a reasonably significant impact on the problem identified
- 4 Significant impact - Expected to significantly alleviate the problem
- 5 Very significant impact - Expected to alleviate the problem

Option	EAST Response	Justification
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	4 Significant impact	This option has the potential to reduce the rolling stock inefficiencies of the shuttle option, whilst also providing direct connectivity between Portishead and Bath Spa. The option also reduces the number of crossing moves at Bristol East Junction, and therefore may be better supported by the current layout. Of the cross Bristol connections, the Portishead to Bath connection would provide the second highest additional demand from the base case.
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	4 Significant impact	This option has the potential to reduce the inefficient rolling stock usage further (compared to options 1 and 2) by linking both of the 2tph required between Severn Beach and Portishead together. The option does not introduce additional crossing moves at Bristol East Junction. Of the cross Bristol connections, the Portishead to Severn Beach connection would provide the lowest additional demand from the base case (option 1).
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	4 Significant impact	This option would improve the rolling stock inefficiencies of the Bath Spa services operating as a shuttle by linking them to Severn Beach line. The option also potentially allows for the Portishead services to operate with 2tph even shuttles in the peak with the removal of 1tph in the off peak to reduce operational expenditure. This option would potentially have uneven frequencies. This option links the key demand between stations on the route so, of the cross Bristol connections, the Severn Beach to Bath connection would provide the highest additional demand from the base case. The connections to the Portishead line would be constrained by shuttle operations (for example, need to change at BTM).
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	4 Significant impact	MetroWest Phase 1 routes linked, improving cross-Bristol connectivity. This option provides more effective use of rolling stock. Of the cross-Bristol connections, the Severn Beach to Bath connection would provide the highest additional demand from the base case, in addition to the Portishead to Severn Beach demand.
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	4 Significant impact	This option potentially offers a more efficient use of platform capacity at Bristol Temple Meads when compared to option 1, 2 or 3. It also provides additional connectivity for Phase 1 services when compared to options 1-3. The option would result in less conflicting crossings at Bristol East Junction (Bath-Spa Portishead planned to cross at BWJ). Of the cross Bristol connections, the Portishead to Bath connection would provide the second highest additional demand from the base case, in addition to the Portishead to Severn Beach demand.

## 4.2.2 Fit with wider transport and government objectives

The scheme options are all seeking to address the same problems and meet the same objectives. The MetroWest business objectives are set out in section 3.5.

Table 4.2 shows how the scheme options fit with the wider transport and government objectives.

TABLE 4.2

**Fit against wider transport and government objectives**

Option	1. To support economic growth	2. To deliver a more resilient transport offer	3. To improve accessibility	4. To improve quality of life
<b>Option 1:</b> Shuttles (base case)	3 Moderate Fit	3 Moderate Fit	5 High Fit	5 High Fit
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	5 High Fit	5 High Fit	5 High Fit	5 High Fit
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	4 Moderate/High Fit	4 Moderate/High Fit	5 High Fit	5 High Fit
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	5 High Fit	5 High Fit	5 High Fit	5 High Fit
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	5 High Fit	5 High Fit	5 High Fit	5 High Fit
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	5 High Fit	5 High Fit	5 High Fit	5 High Fit

### 4.2.3 Fit with other objectives

The MetroWest Phase 1 supporting objectives are set out in section 3.5. Table 4.3 shows the schemes fit against these objectives.

TABLE 4.3

**Fit against other objectives**

Option	5. Reducing traffic congestion	6. Enhancing the capacity of the local rail network	7. Reducing the overall environmental impact
<b>Option 1:</b> Shuttles (base case)	3 Moderate Fit	4 Moderate/5 High Fit	3 Moderate Fit
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	4 Moderate/5 High Fit	4 Moderate/5 High Fit	4 Moderate/5 High Fit
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	4 Moderate/5 High Fit	4 Moderate/5 High Fit	4 Moderate/5 High Fit
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	4 Moderate/5 High Fit	4 Moderate/5 High Fit	4 Moderate/5 High Fit
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	5 High Fit	4 Moderate/5 High Fit	4 Moderate/5 High Fit
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle-	5 High Fit	4 Moderate/5 High Fit	4 Moderate/5 High Fit

### 4.2.4 Key uncertainties

The key risks for the project are:

- Lack of sufficient devolved major scheme funding in the 4- and 10-year Comprehensive Spending Review allocations from April 2015 (identification of alternative sources of funding and/or reducing scope of the scheme and/or delaying implementation to match available funds)
- Possible lack of capacity in the base year 2019 timetables to accommodate the new MetroWest services

- Lack of sufficient resources to develop the projects through the GRIP (Guide to Rail Investment Process) requiring the identification of alternative sources of funding and/or reducing scope of the scheme and/or delaying implementation to match available funds
- Lack of public support for the preferred options (effective and ongoing public and stakeholder consultation, including sharing results of technical studies to inform all interested parties; provision of a communications officer for the rail programme), although it is noted that there is overall support for the scheme
- The potential need for additional works required at Avon Road, Portishead station and/or additional signal requirements.

Note, subsequent risk analysis has been undertaken as part of the GRIP 1 / 2. This work was not available when this EAST assessment was undertaken.

Key issues for the Business Case are:

- Deriving an acceptable timetable incorporating MetroWest Phase 1
- GRIP 1-2 construction cost estimates which are higher than anticipated
- Estimated train service subsidy – initial works shows this ranges from £400,000 to over £1.0 million per annum. Affordability is a significant issue for the councils
- Up to £44.9 million is available via DfT devolved funding up to 2021. A funding gap is likely but various options are being considered to fill a potential gap

In addition, Table 4.4 shows the option specific key uncertainties.

TABLE 4.4  
Key uncertainties

Option	Key uncertainties
<b>Option 1:</b> Shuttles (base case)	The Network Rail initial 2013 analysis focused firstly on assessing shuttle services to and from Bristol Temple Meads in order to build up a timetable in the context of the updated assumptions. This analysis demonstrated that shuttle services are not preferred because: <ul style="list-style-type: none"> <li>• They are inefficient in the use of the limited platform capacity at Bristol Temple Meads.</li> <li>• They are inefficient in terms of rolling stock unit numbers.</li> <li>• It proves difficult to deliver an even pattern for the MetroWest Phase 1 services.</li> </ul>
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	It may prove difficult to achieve even service intervals on the Portishead and Bath Spa routes of MetroWest.
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	There are challenges to achieving an even service interval on the Severn Beach and Portishead routes. Significant performance risk is also inherent in linking these two routes with single lines.
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	This option increases the likelihood of requiring enhancements to Bristol East Junction, and presents performance risk because of additional crossing moves between the Bath Spa route and the Severn Beach route. It may also result in uneven intervals on the Severn Beach Line, limiting the level of service provision on the Severn Beach Line.
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Increased performance risk to services via Bath Spa if not using Bathampton turn-back (otherwise increases in operational expenditure).
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	This option may result in uneven frequencies across all three routes potentially constraining the Severn Beach line's ability to achieve 2tph to Severn Beach. Also with all three routes linked together the potential impact on performance may be worse than Options 1-3. Option 6b has been developed to reduce the potential impact on performance and the operational costs.

More detailed construction issues are set out in section 4.4.5.

## 4.2.5 Degree of consensus over outcomes

Table 4.5 shows the degree of consensus about the scheme options.

TABLE 4.5

### Degree of consensus over outcomes

Response options are:

- 1 Little or no consultation has taken place yet, or consultation has revealed a high level of disagreement about the scheme's ability to deliver the stated outcomes.
- 2 Little consultation and/or strong reasons to suggest the outcomes are controversial.
- 3 Some consultation has taken place with some agreement.
- 4 Wide consultation and broad agreement on the outcomes, with a possibility that one or two areas of disagreement remain.
- 5 Extensive consultation has taken place with a high degree of consensus on the outcomes.

Option	EAST Response	Justification
<b>Option 1:</b> Shuttles (base case)	3 Some agreement	Known support for rail schemes. The scale impact of this scheme option would mean it is likely to receive less support than other options. Limited connectivity.
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	4 Broad agreement of outcomes	Known support for rail schemes
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	4 Broad agreement of outcomes	Known support for rail schemes
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	4 Broad agreement of outcomes	Known support for rail schemes
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	4 Broad agreement of outcomes	Known support for rail schemes
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	4 Broad agreement of outcomes	Known support for rail schemes

## 4.2.6 Summary of strategic case

In summary, all scheme options are supported by a robust case for change that fits with wider public policy objectives. Thus all options have a 'strategic case'.

## 4.3 Economic Case

### 4.3.1 Economic growth

The West of England has a substantial economic growth agenda which is being developed through the Strategic Economic Plan. The SEP states that the region's current share of national economic growth (GVA) is the highest of any core city region at 3.1%. The overall vision is to build on this economic growth through a range of interventions including improving access to major employment sites for the skilled workforce catchment. The SEP notes that the population is expected to exceed 1.1 million by 2026.

Planning for this growth means the city region needs to make sure its transport infrastructure is not only fit for purpose, but has the ability to respond to increasing demand, and therefore maximise potential for continued economic growth. The modal share for journey to work within the Temple Quay Enterprise Zone is increasing rapidly; the recent TQEZ Transport Report (June 2012, Halcrow/CH2M HILL) forecasts that 15 per cent of trips to the Enterprise Zone will be by rail).

The Enterprise Areas are now becoming established and expected to be major trip generators. Rail will play a significant part in meeting this demand (see Table 4.6).

TABLE 4.6

**Enterprise Zone and Enterprise Areas**

<b>Enterprise Zone/Area</b>	<b>Jobs</b>	<b>Rail Schemes</b>
Bristol Temple Quarter Enterprise Zone and new arena	17,000	MetroWest Phase 1 and 2 New stations package Portway platform
Bath City Riverside Enterprise Area	9,000	MetroWest Phase 1 New stations package
J21 Enterprise Area (Weston-super-Mare)	9,000	MetroWest Phase 1 and 2
Emersons Green/Science Park Enterprise Area via Bristol Parkway	4,000 to 7,000	MetroWest Phase 2
Filton Enterprise Area	7,000 to 12,000	MetroWest Phase 2
Avonmouth Severnside Enterprise Area	6,000 to 12,000	MetroWest Phase 1 and 2
South Bristol priority growth location	10,400	MetroWest Phase 1

Source: West of England Response to the Great Western Franchise, updated using info from the SEP

As Table 4.7 shows, a considerable number of new homes and jobs are planned in the West of England area to 2029. Table 4.8 indicates those major housing areas directly served or with potential for rail links.

TABLE 4.7

**Planned housing and employment growth in the West of England**

<b>Council</b>	<b>Homes</b>	<b>Jobs</b>	<b>Core Strategy Period</b>
Bath & North East Somerset*	13,000	10,300	2011- 2029
Bristol City	32,800	21,900	2011- 2026
North Somerset*	17,130	14,000**	2006- 2026
South Gloucestershire	28,355	18,600-21,870	2006 - 2027
All	91,285	68,070	

Source: West of England Response to the Great Western Franchise, updated using info from the SEP

\*Proposed figures and subject to local plan examinations ongoing 2014.

\*\* Homes updated February 2014 but job figures to be revised.

TABLE 4.8

**Major new housing areas served by rail schemes**

<b>Housing Area</b>	<b>Homes</b>	<b>Rail Schemes</b>
Cribbs Patchway New Neighbourhood	5,700 50 ha employment land	MetroWest Phase 2 (Henbury Line)
North Yate	3,000	MetroWest Phase 2
Somerdale (former Cadbury site at Keynsham)	700	MetroWest Phase 1
Weston-super-Mare	11,000	MetroWest Phase 1 and 2



**Source: Core Strategies. Housing area figures are included in the Core Strategies.**

The Atkins report 'Unlocking Our Potential: The Economic Benefits of Transport Investment in the West of England' November 2012 found that MetroWest would deliver some 2,500 jobs. MetroWest, therefore, has significant benefits in bringing forward private sector investment.

## SECTION 4

TABLE 4.9  
Economic growth

Option	Impact to end-to-end journey time (JT)	Impact to cost of travel (time and money)	Impact to transport reliability and resilience	Impact to accidents	Impact to new housing/ employment development	Wider economic impacts	Accessibility changes	Improved connectivity to central business districts	Overall RAG (red-amber-green)
<b>Option 1:</b> Shuttles (base case)	New rail journey opportunities associated with new stations at Pill/Portishead. Removal of car trips will result in overall JT savings on highway network.	Reduction	Improvement	Reduction, as reduction in highway trips	Scheme supports housing growth	Slight positive impact	New accessibility options provided by enhancing the West of England public transport network	Yes	Amber/Green
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	Same as Option 1 plus JT savings between Portishead and Bath Spa	Significant reduction	Significant improvement						Green
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	Same as Option 1 plus JT savings between Portishead and Severn Beach	Significant reduction	Significant improvement						Green
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	Same as Option 1 plus JT savings between Severn Beach and Bath Spa	Significant reduction	Significant improvement						Green
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Same as Option 3 + Option 4	Significant reduction	Significant improvement						Green
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	Same as Option 2 + Option 4	Significant reduction	Significant improvement						Green

## SECTION 4

### 4.3.2 Carbon emissions

Scheme options will have an impact on carbon emissions but, until detailed transport assessment work is undertaken, it is not possible to fully differentiate between option. The impacts of the scheme options are:

- Reduction in the volume of non-public transport trips, due to mode switch from car to rail
- Increase in public transport services resulting in a reduction in car mileage
- Decongestion benefits
- Shift from low to high occupancy vehicles
- Construction works
- No impact associated with the use of lower carbon fuel
- No impact associated with a change in fuel efficiency, however scheme makes passive provision for electrification
- Reduction in overall emissions, due to an overall reduction in fuel consumption.

The RAG assessment for carbon is Amber/Green- for Option 1 and green for Option 2,3,4,5 and 6.

### 4.3.3 Socio-distributional and regional impacts

Table 4.10 shows the schemes socio-distributional and regional impacts. Information about the social composition of the area is provided in:



- Figure 4.1: Population aged under 16
- Figure 4.2: Population aged 16-25
- Figure 4.3: Population aged 70 and over
- Figure 4.4: Population claiming Disability Living Allowance (DLA)
- Figure 4.5: Population claiming Jobseeker's Allowance (JSA)
- Figure 4.6: Black and minority ethnic (BME) population
- Figure 4.7: Households with no car
- Figure 4.8: Indices of Deprivation – Income
- Figure 4.9: Indices of Deprivation

Data is displayed at Super Output Areas (SOA) level and identifies the top 20 per cent SOAs in the West of England for that data theme.

Figures 4.1-4.8 have been considered in determining the socio-distributional impacts of the scheme options.

TABLE 4.10

**Socio-distributional and regional impacts**

Option	Social distributional impact	Regeneration	Regional imbalance	Overall RAG
<b>option 1:</b> Shuttles (base case)	Potential benefits on the Severn Beach line for those on JSA, and young people in Bath, and older people in Portishead	The scheme links into the Temple Quarter Enterprise Zone. The scheme will increase the catchment of skilled labour in a commutable distance	Not relevant	Green/amber
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	Same as option 1, but greater benefits to Portishead corridor.			Green/amber
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	Similar to option 1			Green/amber
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	Same as Option 1, but greater benefits to Severn Beach corridor.			Green/amber
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Similar to Option 4			Green/amber
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle-	Similar to Option 2			Green/amber
<b>Option 6b:</b> Portishead – Avonmouth and Bath Spa	Similar to Option 2			Green/amber

4-11

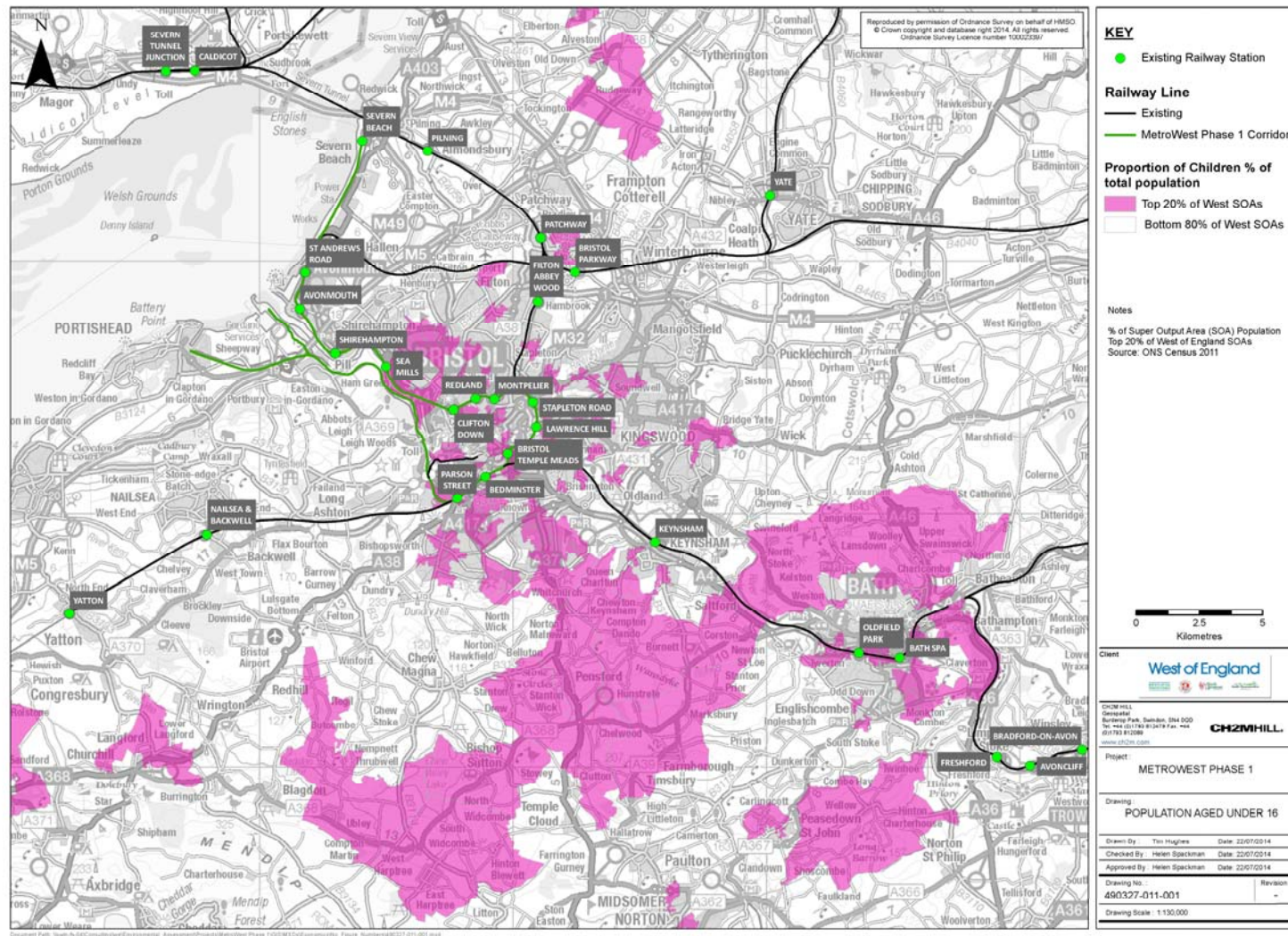




Figure 4.2: Socio-demographics: population aged 16-25

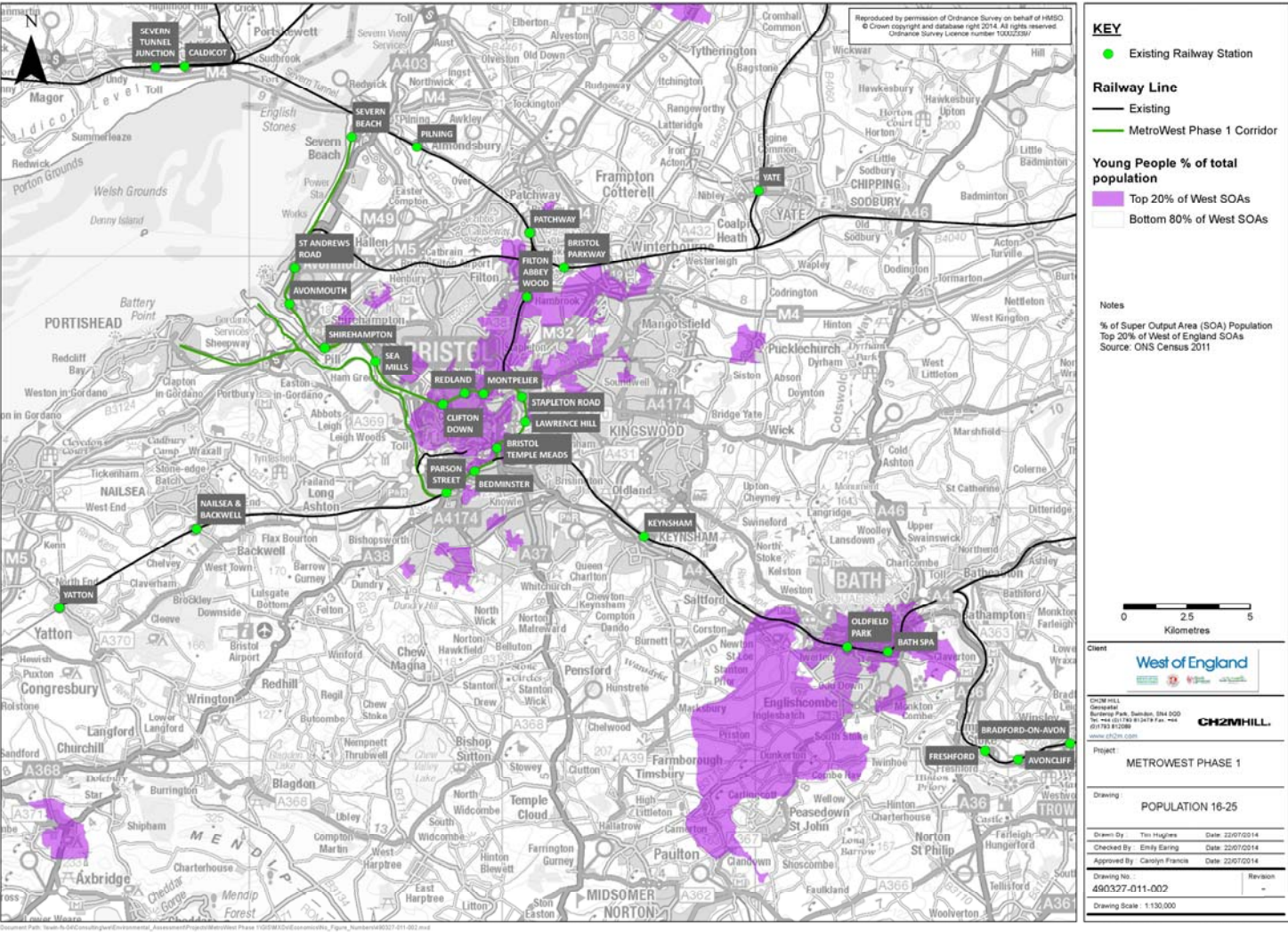


Figure 4.3: Socio-demographics: population over 70

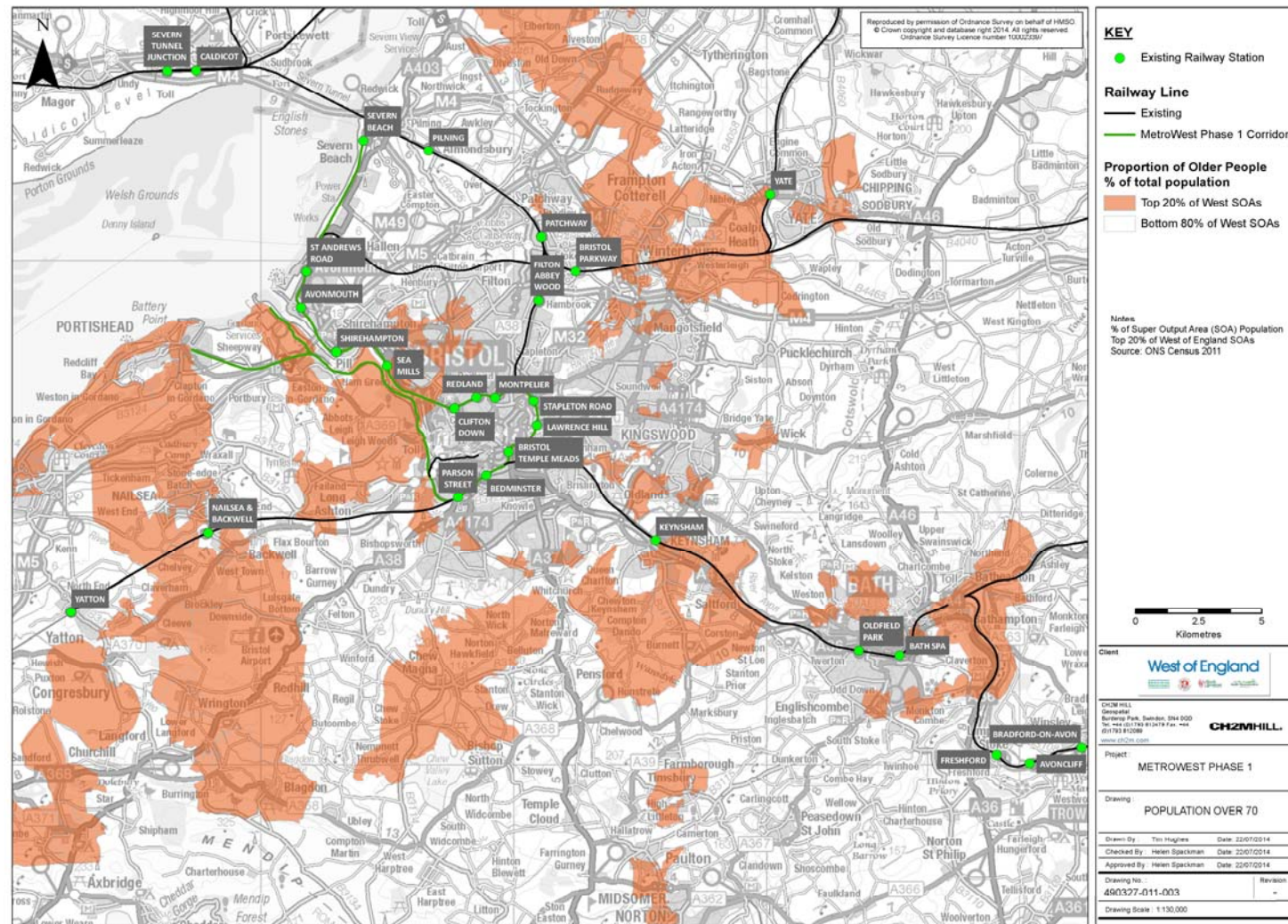




Figure 4.4: Socio-demographics: Disability Living Allowance claimants

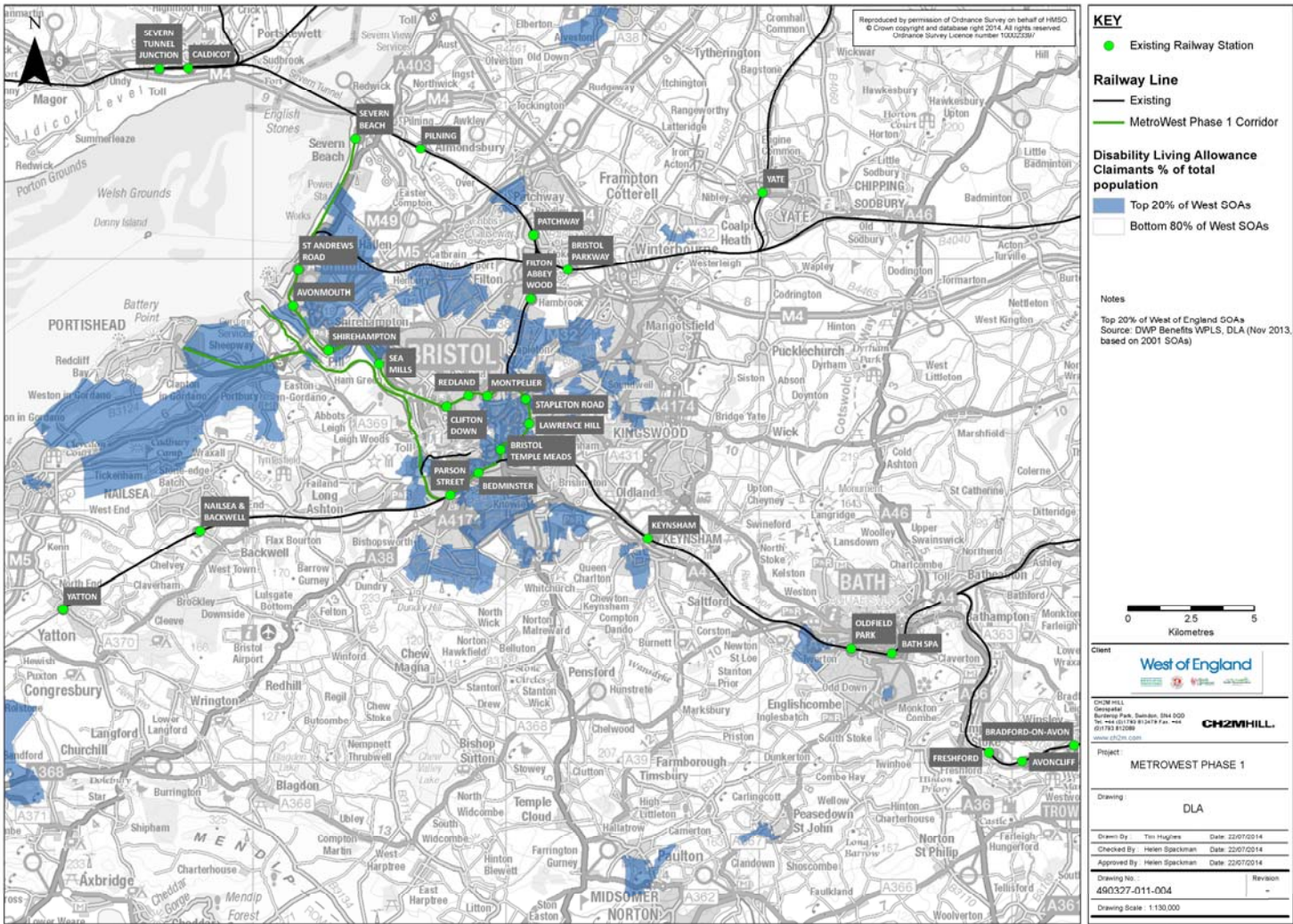




Figure 4.5: Socio-demographics: Job Seeker's Allowance claimants

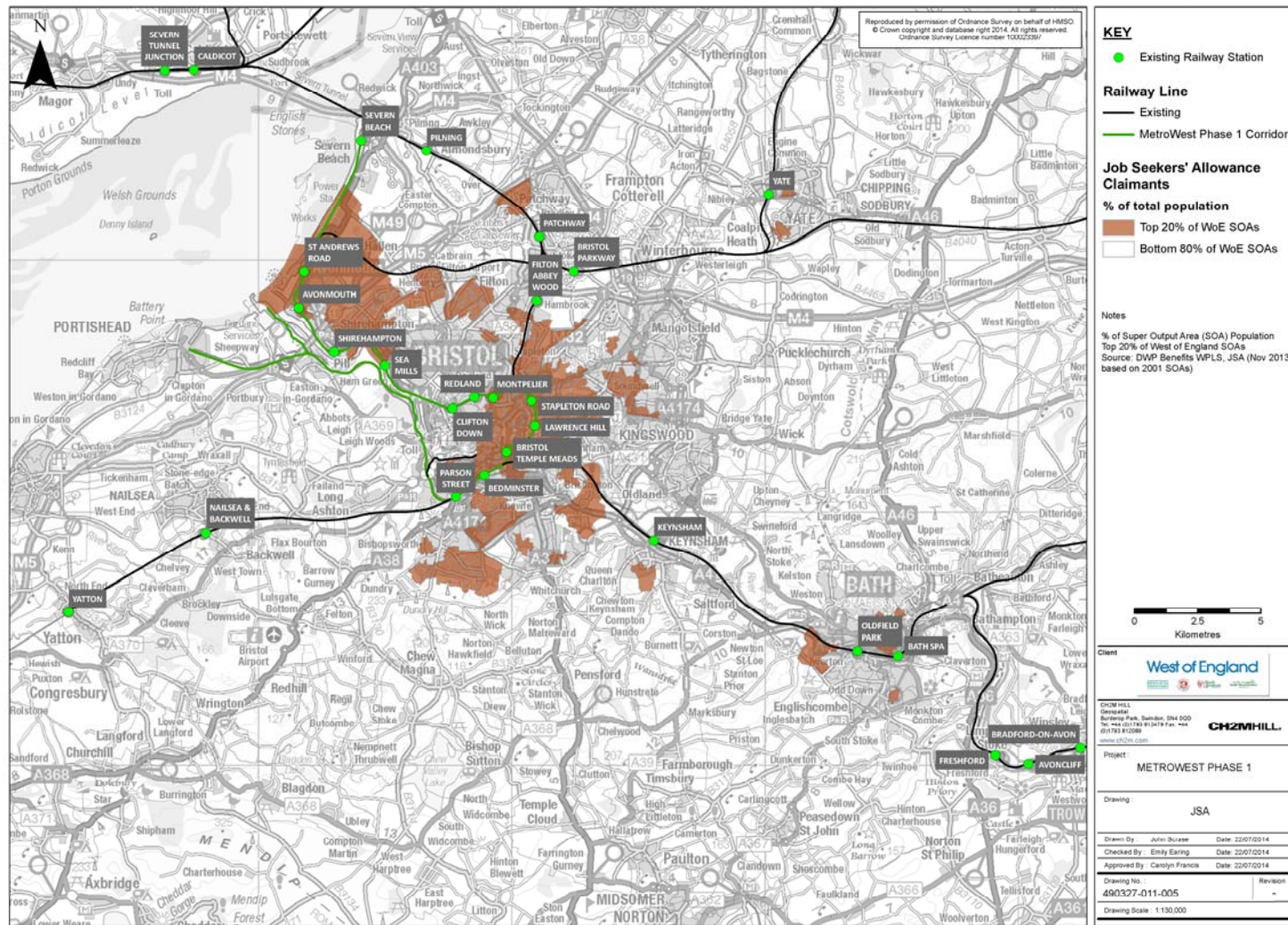


Figure 4.6: Socio-demographics: black and minority ethnic population

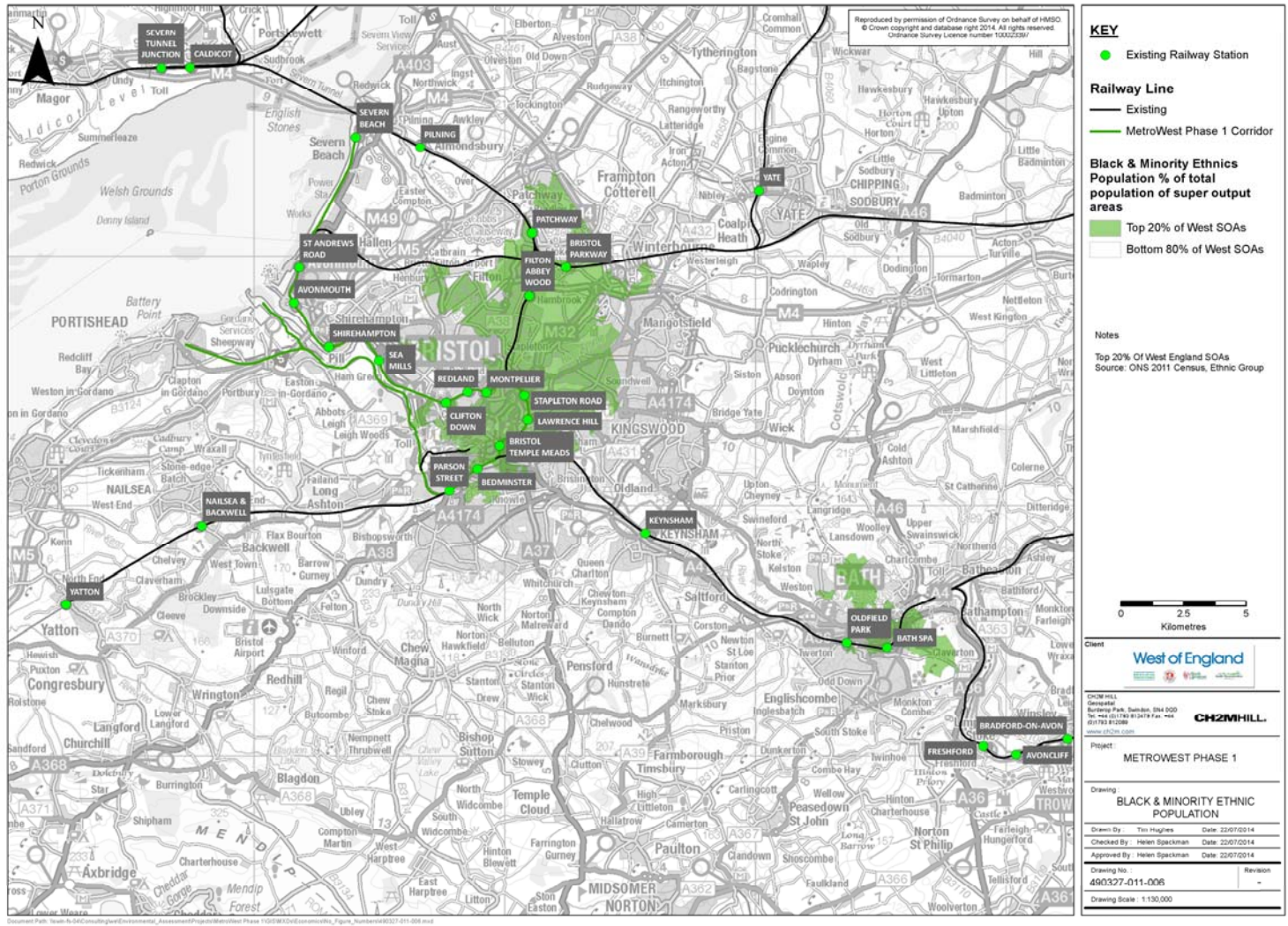




Figure 4.7: Socio-demographics: households with no car

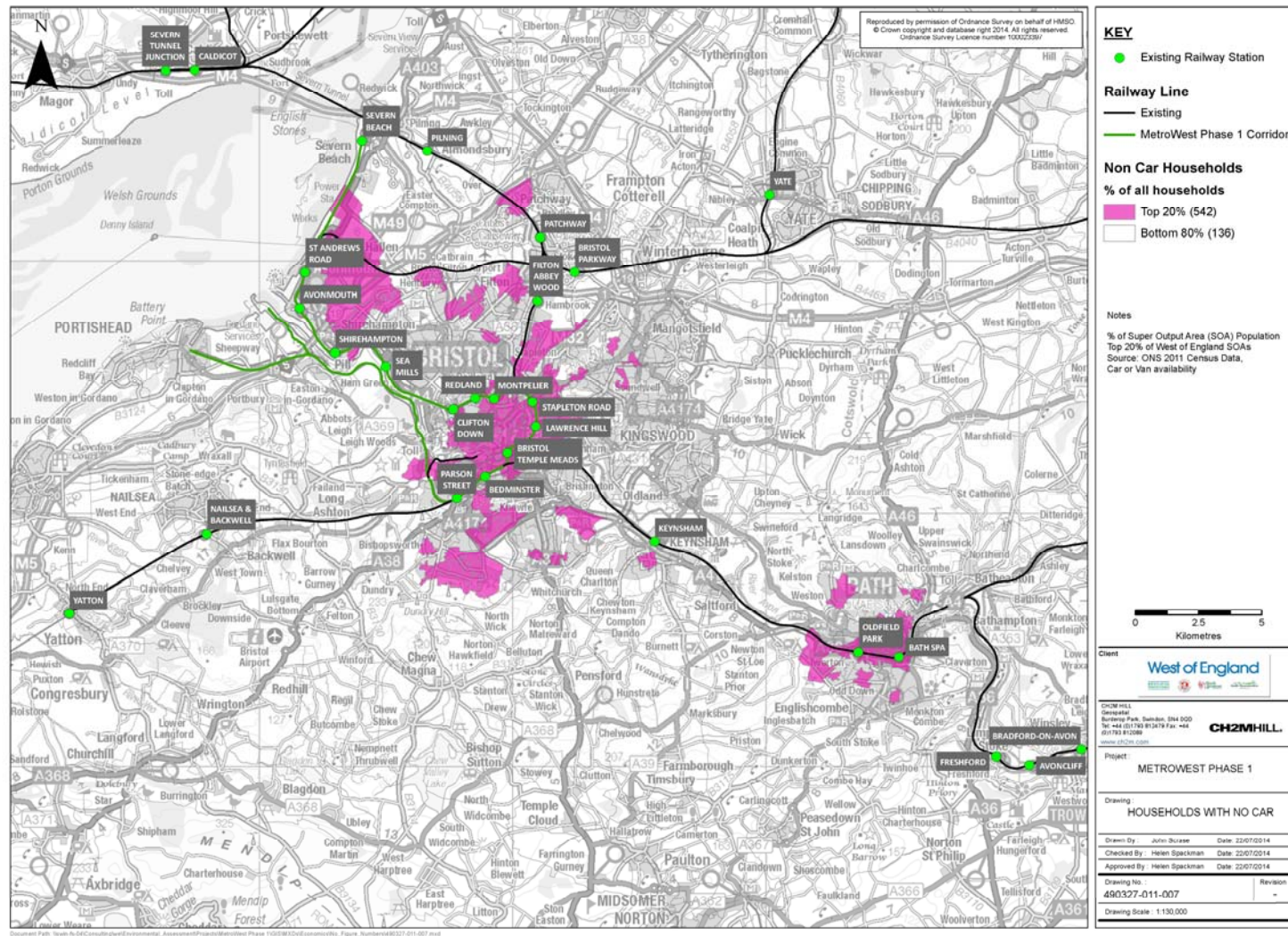


Figure 4.8: Socio-demographics: Income deprivation

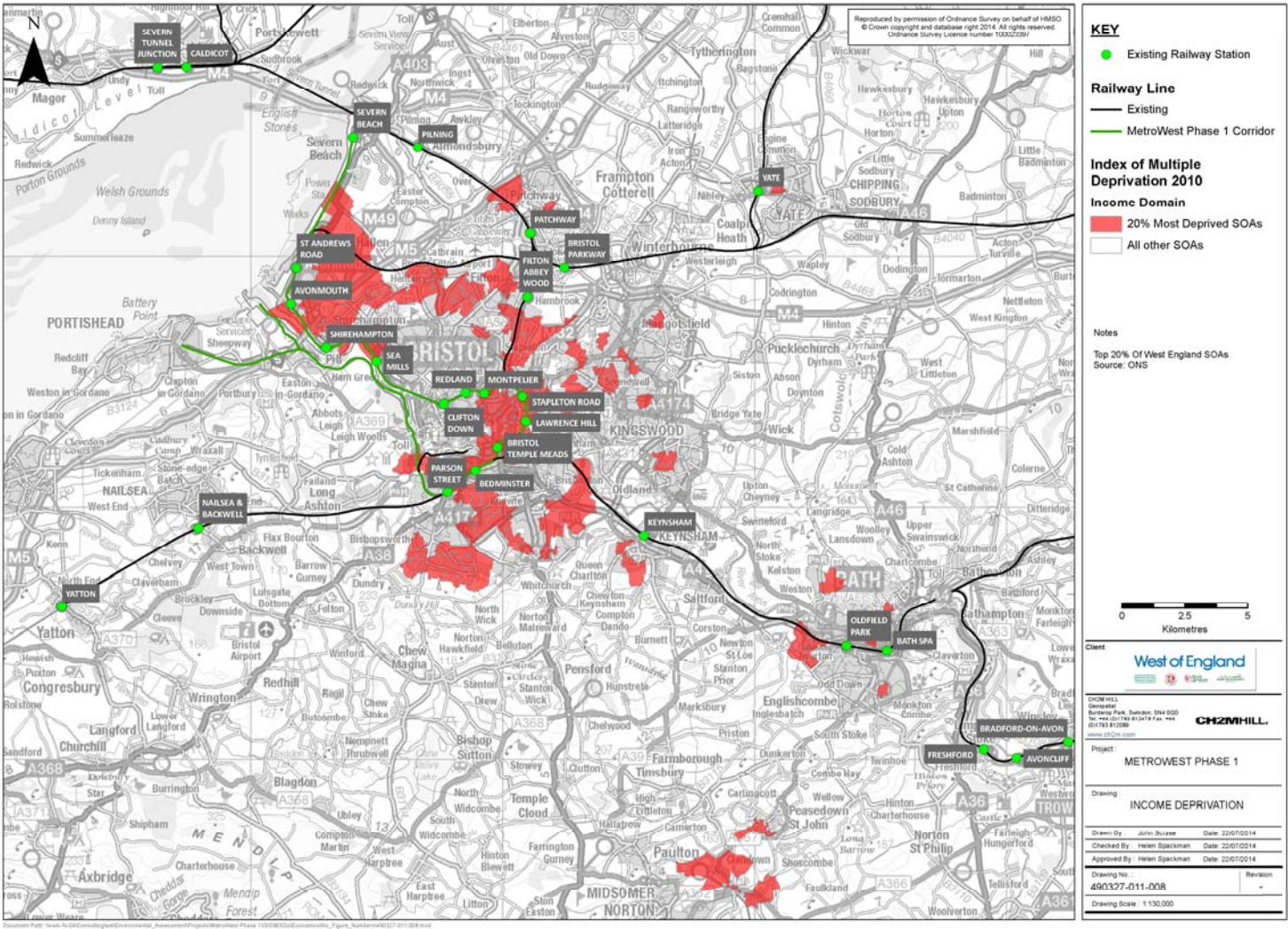
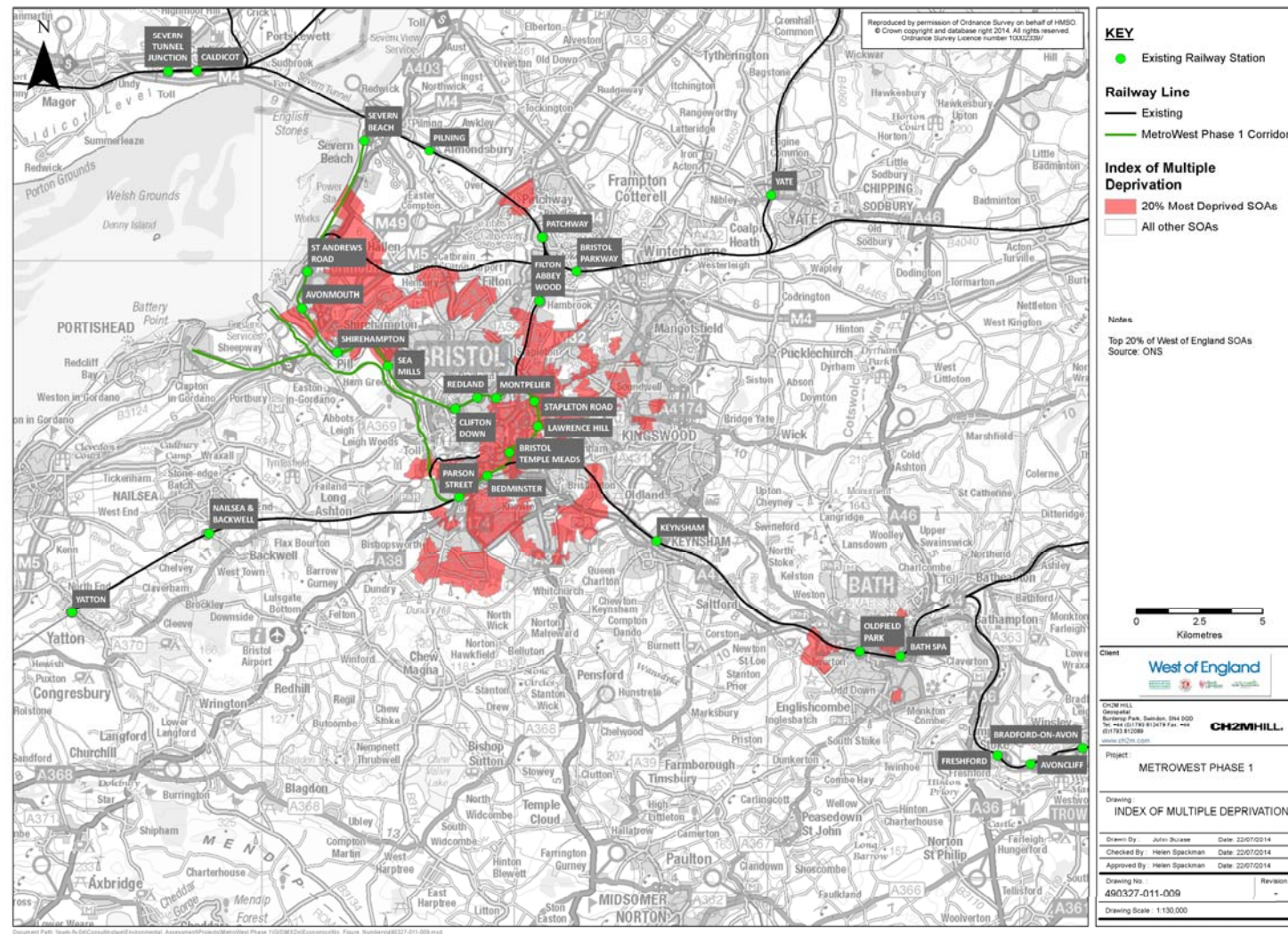




Figure 4.9: Socio-demographics: index of multiple deprivation



## SECTION 4

### 4.3.4 Local environment

Table 4.11 shows the schemes' impact on the local environment. The environmental impacts of the scheme options are broadly similar. More detailed transport modelling would indicate differences in changes in vehicle traffic, with associated variations in noise and air quality impacts.

TABLE 4.11

**Local environmental impacts**

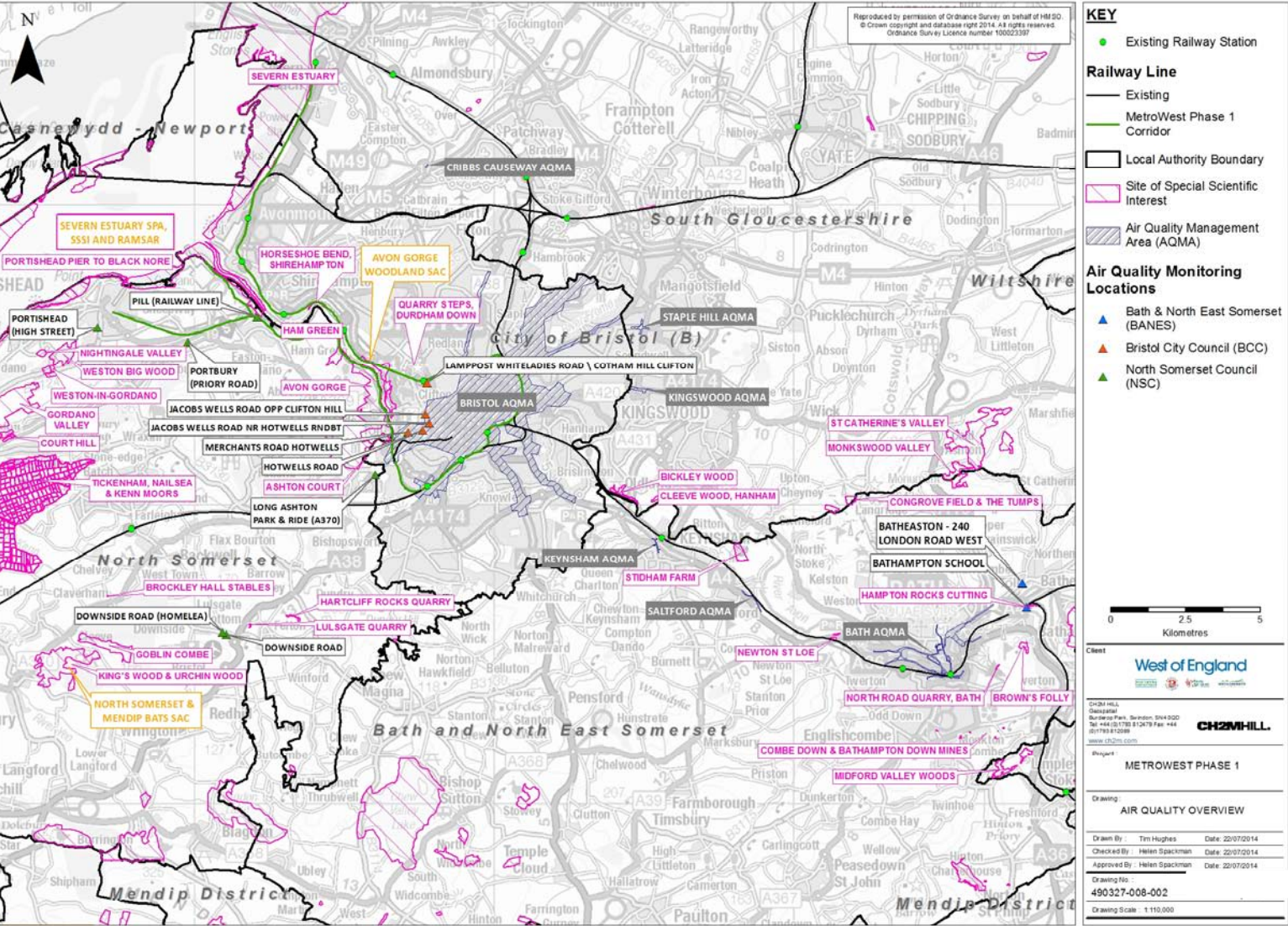
Impact	Comment
Impact on air quality	Adverse local impact, but general reduction in traffic resulting in wider benefits. Work will be required to rebuild the track formation - this could generate dust if undertaken during a dry spell.
Impact on existing AQMA*	No adverse impacts, could remove car trips from Bristol and Bath centres, see Figure 4.1.
Will scheme create an AQMA?	No
Impact on noise	Adverse local impact, but general reduction in traffic resulting in wider benefits.
Impact on natural and urban environment	<p>Some vegetation clearance required including areas sensitive to reptiles (including great crested newts and badgers). The scheme will have a lighting impact in areas near the new stations and it is likely that this cannot be fully mitigated. The scheme will have a visual impact at the new stations and where new structures are built. It will also enhance the street screen and built environments. Some of the Portishead station location options are close to residential properties.</p> <p>The Avon Gorge and Ham Green Sites of Special Scientific Interest (SSSI) may be affected.</p>
Value of land effected	Not relevant as alignment is former railway alignment
Overall RAG	Amber

\* AQMA - Air Quality Management Area



# SECTION 4

Figure 4.10: Air Quality Management Areas (AQMA) and Sites of Special Scientific Interest (SSIs)



## SECTION 4

### 4.3.5 Wellbeing

Table 4.12 shows the schemes' impact on the wellbeing of local residents. The consequences are broadly similar for each option.

TABLE 4.12

#### Wellbeing

Impact	Comment
Severance	Severance impacts associated with reopening the railway line are being mitigated where viable, but may not all be fully mitigated.
Physical activity level	Walking and cycling to/from station will increase physical activity.
Changes in accidents	Possible reduction in road accidents, due to reduced car traffic.
Impact on crime/ fear of crime	Good design and use of natural surveillance, lighting and CCTV will minimise impacts.
Access to goods, services, people and places	Positive impacts. Active rights of way not impacted
Terrorism	Not relevant so not assessed
Overall RAG	Amber/green

### 4.3.6 Value for money

The Greater Bristol Metro - Bristol Area Rail Study – Final Report, for West of England Partnership, February 2013 reported that the Benefit to Cost Ratio (BCR) for Option 5 (for the sensitivity test including 10 per cent increase in optional costs) was 2.38. The BCRs for the other options costs have been estimated by considering the relative difference in costs and benefits reported in this EAST appraisal.

Table 4.13 shows the likely value for money levels of the scheme options.

TABLE 4.13

#### Value for money

Option	Expected value for money	Comments
<b>Option 1:</b> Shuttles (base case)	Medium, BCR 1.5-2	
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	Medium, BCR 1.5-2	The Network Rail Interim Report states that Option 2a has a 13,000 passenger demand incremental increase per annum compared to Option 1. The incremental increase per annum compared to Option 1 in revenue and value of time is £170,000.
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	Medium, BCR 1.5-2	The Network Rail Interim Report states that 3a has a 2,000 demand incremental increase per annum compared to Option 1. The incremental increase per annum compared to Option 1 in revenue and value of time is £20,000.
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	Medium, BCR 1.5-2	The Network Rail Interim Report states that Option 4a has a 30,000 demand incremental increase per annum compared to Option 1. The incremental increase per annum compared to Option 1 in revenue and value of time is £400,000.
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	High, BCR 2-4	The 2013 Halcrow study analysis indicated a BCR of 2.38. PVB = £349,537,000, PVC = £138,993,000, NPV = £210,544,000. Values discounted to 2010.



TABLE 4.13

**Value for money**

Option	Expected value for money	Comments
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	Option a – Medium, BCR 1.5-2 Option b - High, BCR 2-4	

Current appraisal work indicates that the option BCRs are particularly sensitive to additional train resources.

### 4.3.7 Summary of economic case

In summary all scheme options demonstrate value for money and thus all have an 'economic case'.

## 4.4 Managerial case

### 4.4.1 Implementation timetable

All scheme options have the same proposed implementation timetables as follows:

- Stage 1 option development (including GRIP1-2) - Summer 2013 - Summer 2014.
- Stage 2 scheme case (including GRIP 3) - completion Summer 2014 - Winter 2015/16.
- Stage 3 planning powers and procurement (including GRIP 4-5) - Winter 2015/16 - Autumn 2017.
- Stage 4 construction and opening (including GRIP 6-8) - Autumn 2017 to Spring 2019. Project opening is currently scheduled for December 2018.

### 4.4.2 Public acceptability

In general terms, the MetroWest scheme has a good level of public support. Indeed, the West of England Rail Conference on 4 November 2011 established the top three priorities for rail as the Greater Bristol Metro, Portishead line and additional rolling stock. In addition, the TravelWest website has galvanised stakeholder support for MetroWest with over 34,000 hits since its launch in February 2012.

Consultation has not been undertaken on the specific scheme options considered in this EAST assessment. It has been assumed that scheme options would have similar levels of support, but that scheme option 1 would be less supported than other options, as it does not offer the cross-Bristol movements. Assumed public acceptability has been assessment on a scale from '1 - low level of public acceptability' to '5 - high level of public acceptability', as shown in Table 4.14.

TABLE 4.14

**Public acceptability**

Option	Level of public acceptability
<b>Option 1:</b> Shuttles (base case)	3 Moderate level
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	5 High level
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath Shuttle	5 High level
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead Shuttle	5 High level
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	5 High level
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	5 High level

TABLE 4.14

**Public acceptability**

Option	Level of public acceptability
--------	-------------------------------

Overall, all scheme options are at a very comparable level of development and have similar quality of supporting evidence.

Aspirations for rail are high and there is a clear need to explain what is happening, promote understanding and encourage support for proposals across the programme. The Communications Framework for MetroWest is co-ordinated at the Rail Programme level.

The Communications Framework for MetroWest is based on the following principles:

- Specific communication activities are focussed at the right level for particular consultees and stakeholders. Different types of consultees and stakeholders will have different concerns and require either a different level of information or have different interests in the project.
- Projects seek an appropriate level of feedback from consultees and stakeholders to be incorporated into the development of the Metro.
- Concerns of potential objectors are addressed as far as possible.
- The core project team will be responsible for ensuring statutory consultation meets the requirements for the appropriate process.

Key business/industry stakeholders include, but are not limited to:

- DfT
- Office of Rail Regulation (ORR)
- Network Rail
- Train operating companies (existing and potential)
- Freight operating companies
- Bus operators
- Bristol Port Company

Consultees and stakeholders include, but are not limited to:

- Local Members
- West of England Local Enterprise Partnership
- Joint Scrutiny
- Business West and other business organisations
- Local MPs
- Neighbouring authorities
- Parish and town councils affected by the schemes
- Resident and community groups affected by the schemes
- Public transport users and non-users

- Local rail and transport campaign groups

Meetings with local stakeholders and consultees will be held to share technical work where possible; this will help inform a more technical rather than aspirations-based approach and enable better understanding of the projects. The frequency of meetings will depend on the level of involvement needed by different stakeholders and consultees in the project.

It is envisaged that potential objections would be associated with local environmental impacts in Portishead and Pill.

### **4.4.3 Practical feasibility**

#### **4.4.3.1 Local endorsement**

The scheme is endorsed, as follows:

- Joint Transport Executive Committee (JTEC) 7 March 2012 Phase 1 and 2 agreed for franchise consultation
- JTEC 12 December 2012 development costs Phase 1 and 2 agreed
- LTTB 14 June 2013 prioritised Phase 1 for post-2015 major transport scheme funding
- The Councils have identified funding for project development

#### **4.4.3.2 Operational issues**

The scheme options have the same physical feasibility issues, as the options only differ by service pattern.

Network Rail owns and maintains the infrastructure and coordinates track access. The Councils are working with Network Rail on a range of technical and legal matters.

There are some challenges adding MetroWest Phase 1 train services into the existing network due to significant bottlenecks in parts of the network. The large programme of investment led by NR (CP5), including both enhancements and renewals, and four-tracking of Filton Bank will help relieve these.

Network Rails 2012 timetabling analysis indicates that scheme options 1, 2, 3, 4 and 6 would require seven-car units and option 5 would require six-car units. The number of car units has a direct impact on revenue costs.

#### **4.4.3.3 Construction issues**

The scheme alignment has been subject to local planning policies for many years to protect encroachment of development that would prevent the line from being reopened. The only location where development has created an obstacle to the reopening of the line is at Quays Avenue, a new road crossing over the railway alignment. At the time of the master planning of the Portishead Vale development, the design standards for road easements across railway branch lines allowed for level crossings. However, the rail industry design standards have since changed and level crossings are no longer acceptable to the ORR.

In light of this, the project team undertook public consultation on three options for the location of Portishead station in June/July 2014. The consultation feedback is being considered and a decision on the preferred options for the station is anticipated by early 2015.

The disused and down relief lines are free-standing construction sites away from operational railway. Works at Bathampton and Avonmouth stations will require possessions but these are considered achievable. Works on the freight line will require a detailed possession strategy.

#### **4.4.3.4 Summary of practical feasibility**

Other practical feasibility issues include:

- Need for an acceptable timetable solution

- Development consent order is required for some work (other works fall under Network Rail's permitted development rights)
- The new asset is to be transferred to Network Rail and associated negotiation is required
- Governance is agreed and agreements are in place

For these reasons, all the scheme options have been scored between 3 and 5, on a scale of '1 - low level of practical feasibility' to '5 - high level of practical feasibility', see Table 4.15.

TABLE 4.15

**Practical acceptability**

Option	Level of public acceptability
<b>Option 1:</b> Shuttles (base case)	3 Moderate level
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	3 Moderate level
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath Shuttle	3 Moderate level
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead Shuttle	3 Moderate level
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Option a - 3 Moderate level Option b - 5 High level
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	Option a - 3 Moderate level Option b - 5 High level

#### 4.4.4 Quality of supporting evidence

All scheme options have been developed to a relatively high level for this EAST level of assessment. This has been due to a number of studies that have been undertaken in recent years about MetroWest or its components parts. The consideration of the scheme options to date is shown in Table 4.16

TABLE 4.16

**Consideration of scheme options in previous work**

Option	Portishead GRIP 1-3 report	Greater Bristol Metro Bristol Area Rail Study – Final Report	Network Rail – Analysis and Forecasting MetroWest Interim Report
<b>Option 1:</b> Shuttles (base case)	Report of relevance to scheme option		Study considers scheme option as base case
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	Report of relevance to scheme option		Study considers scheme option
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath Shuttle	Report of relevance to scheme option		Study considers scheme option
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead Shuttle	Report of relevance to scheme option		Study considers scheme option
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Report of relevance to scheme option	Study considers scheme option	Study considers scheme option
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	Report of relevance to scheme option		Study considers scheme option

TABLE 4.16

**Consideration of scheme options in previous work**

Option	Portishead GRIP 1-3 report	Greater Bristol Metro Bristol Area Rail Study – Final Report	Network Rail – Analysis and Forecasting MetroWest Interim Report
--------	----------------------------	--	--

Overall, all scheme options are at a very similar level of development and have a comparable quality of supporting evidence. Thus all the scheme options have been scored as 4, on a scale of ‘1 - low quality of supporting evidence’ to ‘5 - high quality of supporting evidence’.

#### 4.4.5 Key risks

General project and operational uncertainties are set out in Section 4.2.4 of this report. This section provides details of the construction-related risks.

As part of the Portishead GRIP 3 work, the following risks were identified:

- Signalling cost estimate uncertainty
- Generic GRIP 4/5 design risks, such as changes resulting from approvals process
- Generic GRIP 6 construction risks, such as late possession, finding contaminated land
- Renewals’ funding
- Delays caused by implementation agreement
- Delays and changes caused by planning requirements
- Environmental risks
- Network changes
- Access issues on six-mile freight section between Parson Street and Pill
- Interface with construction at Baron's Close and construction of Bus Rapid Transit (BRT)
- Signal sighting issues
- Cable from Parson Street to Bristol panel not suitable to use

#### 4.4.6 Summary of management case

In summary, scheme options 5b and 6b are achievable and thus have a ‘management case’. However, scheme options 1, 2a/b, 3a/b, 4a/b, 5a and 6a are not considered achievable because of the operational issues associated with finding an acceptable timetable solution.

### 4.5 Financial Case

#### 4.5.1 Affordability

The scheme capital and revenue costs for the schemes are detailed in section 4.5.2 and 4.5.3. Table 4.17 sets out the scheme affordability, where “5” indicates the scheme is affordable and “1” indicates the scheme is unaffordable. An initial joint promotion agreement is in place to ensure that the shortfall between available major scheme funding and scheme costs can be funded locally.

TABLE 4.17

**Affordability**

Option	Affordability	Justification
<b>Option 1:</b> Shuttles (base case)	3	Revenue funding implications, due to ineffective operations

TABLE 4.17

**Affordability**

Option	Affordability	Justification
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	3	Revenue funding implications, due to ineffective operations
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	3	Revenue funding implications, due to ineffective operations
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	3.	Revenue funding implications, due to ineffective operations
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Option a – 3 Option b - 5 Affordable	Revenue funding implications, due to ineffective operations for Option a
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	Option a – 3 Option b - 5 Affordable	Revenue funding implications, due to ineffective operations for Option a

## 4.5.2 Capital Cost (£m)

For the purpose of this EAST appraisal, the scheme cost estimates have been taken from the Greater Bristol Metro - Bristol Area Rail Study – Final Report, for West of England Partnership, February 2013, allowing consideration of consistent costs and benefits. The capital costs were reported at £42 million.

Table 4.18 presents the capital cost (£m) for the scheme options.

TABLE 4.18

**Capital Cost (£m)**

Option	Capital Cost (£m)	Justification (comments provided from 2013 Network Rail report)
<b>Option 1:</b> Shuttles (base case)	25-50	Likely to require enhancement to BEJ. Likely to require Platforms 0, 1 and 2 at BTM. High capital expenditure/infrastructure requirements.
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	25-50	Likely to require Platforms 0 or 2 at BTM. Moderate Capital Expenditure/ Infrastructure Requirements.
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	25-50	May require Platform 0 at BTM.
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	25-50	Platform 2 and 0 BTM may be required. High capital expenditure/ infrastructure requirements.
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	25-50	Requires platform 1 and 0 at BTM. May also require BEJ enhancements. High capital expenditure/infrastructure requirements.
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach Shuttle	25-50	Platform 0 BTM may be required.

## 4.5.3 Revenue Costs (£m)

Table 4.19 presents the approximate discounted Revenue Cost (£m) for the scheme options, for the 60-year appraisal. The Option 5 cost has been derived from information in Greater Bristol Metro - Bristol Area Rail Study – Final Report, for West of England Partnership, February 2013. The options' costs have been estimated by considering the relative difference in operational cost sets out in the Network Rail – Analysis & Forecasting, MetroWest Interim Report 2013.

The revenue costs quoted below are for the resultant revenue costs. Revenue gained has been estimated and included in the net revenue costs.

TABLE 4.19  
**Revenue Cost (£m)**

Option	Revenue Cost (£m)	Justification
<b>Option 1:</b> Shuttles (base case)	50-100	2013 Network Rail analysis states this option is likely to result in high operational costs due to the inefficient use of rolling stock required to operate a MetroWest Phase 1 service. Option is likely to require several units to operate. High operational expenditure.
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	50-100	A high-level assessment of demand of this option (against the base option) was undertaken. Demand increases as this option provides an opportunity to travel across Bristol without the need to interchange. In this case, the connection between Portishead and Bath Spa provides a medium increase in revenue and value of time improvements, significantly more than Option 3, but less than half of Option 4. Each route would require multiple units to operate, a potential unit reduction from option 1. High operational expenditure. Option 2b (Portishead – Bath Spa 1tph, Portishead shuttle 1tph, Severn Beach shuttle, 1tph Avonmouth shuttle 1tph) may result in some reduction of unit requirements when compared to 2a, thus operational expenditure could be moderate.
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	50-100	A high-level analysis shows that the demand for travel between Portishead and Severn Beach is low and therefore the value of time improvement and revenue impact is significantly less when compared to other connectivity options. Likely to require several units to operate each route, potential unit reduction from option 1. High operational expenditure.
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	50-100	Option 4 provides the largest incremental increase in passenger demand and revenue due to better connections, and is over double that offered by Option 2. Demand increases as this option provides an opportunity to travel across Bristol without the need to interchange and connecting large catchment areas (eg Clifton Down) with the major employment centres (eg Bath and Bristol). Historic demand data shows that a large number of passengers (72,000 in 2012) travel from Clifton Down to Bath Spa. Likely to require several units to operate each route, potential unit reduction from option 1. High operational expenditure. Option 4b: (Severn Beach/Avonmouth – Bath Spa 1tph, Severn Beach/Avonmouth – BTM 1tph, Portishead Shuttle 2tph). This could include potential reduction in unit requirements using Avonmouth to turn-back services, resulting in moderate operational expenditure. Potential reduction in unit requirements (moderate if using Bathampton turn-back).
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Option a - 50-100 Option b - 25-50	Potential reduction in unit requirements (moderate if using Bathampton turn-back). Low operational expenditure.
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	Option a - 50-100 Option b - 25-50	Likely to require several units to operate each route. High operational expenditure.

Emerging timetabling analysis indicates that option 5 is the only option available, requiring six trains, and 6b is the best-performing option, requiring 7 units.

It is assumed that the responsibility for revenue subsidy for the first three years will rest with the West of England councils but, thereafter, this would be transferred to DfT, subject to a detailed funding agreement.

#### 4.5.4 Cost Profile

The capital costs for all scheme options are the same and hence there are no inconsistency issues. The capital cost estimate includes a risk allowance. The revenue costs for the scheme options have all been considered by Network Rail at a high level.

#### 4.5.5 Overall cost risk and other costs

The scheme costs are all affected by the following risks:

- Construction costs are at a GRIP1-2 (feasibility) level and subsequent engineering design work could result in cost increases.
- Revenue costs are to be fully derived following completion of timetabling analysis.
- Parking strategies will affect the station parking charges at Portishead and Pill.
- Funds are to be secured from LTBB, following acceptance of full business case.
- Funding split between the four promoting authorities is to be agreed.

In addition to the risks above, Table 4.20 presents the overall cost risk and other costs for the scheme options.

TABLE 4.20

**Overall cost risk and other costs**

Option	Overall cost risk	Other costs
<b>Option 1:</b> Shuttles (base case)	2. Moderate/High risk	Revenue costs could be unaffordable
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	2. Moderate/High risk	Revenue costs could be unaffordable
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	2. Moderate/High risk	Revenue costs could be unaffordable
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	2. Moderate/High risk	Revenue costs could be unaffordable
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	Option a - 2. Moderate/high risk Option b - 3. Moderate risk	
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	Option a - 2. Moderate/high risk Option b - 3. Moderate risk	

The cost risk assessment is on a scale of '1 high risk' to '5 low risk'.

#### 4.5.6 Summary of financial case

In summary, scheme options 5b and 6b are financially affordable and thus have a 'financial case'. However, scheme options 1, 2, 3, 4, 5a and 6a are not considered affordable because they are likely to require an unaffordable amount of revenue support.



## 4.6 Commercial Case

### 4.6.1 Flexibility of option

All schemes contain the same infrastructure package and a large component of the capital costs is the reopening of Portishead Line between Pill and Portishead. Hence, there is little scope to change the scale of the scheme options. However, there would be opportunities to consider alternative service patterns. There would be potential for medium- to long-term commercial development by the train operator.

Overall, flexibility of the options have been scored as 4, on a scale of ‘1 – Dynamic’ to ‘5 - Static’.

### 4.6.2 Funding sources

In addition to the West of England Local Transport Body – Developed Major Scheme Funding, other potential funding sources include:

- City Region Deal
- Funding associated with the Strategic Economic Plan
- Any new government funding competition
- Developer contributions
- New Homes Bonus (where not already allocated)

These funding sources would be applicable for all scheme options.

### 4.6.3 Income generation

The scheme options will generate revenue via:

- Ticket sales
- Car park charges
- Track access charges.

The approximate scheme income generation values have been incorporated into the revenue totals presented in Section 4.5.3, and currently are not disaggregated.

### 4.6.4 Summary of commercial case

In summary all scheme options are considered commercially viable, thus have a ‘commercial case’.

## 4.7 Summary and EAST forms

Appendix B contains EAST forms, summarising the information in this section.

In summary, the key strengths for the Business Case are:

- Substantial latent passenger demand for a Portishead to Bristol train service. Portishead’s population is approximately 27,000 (2012 estimate) and up to 1600 people live within 1 km of the station (the catchment size is dependent on the station location).
- Continued passenger demand supports the enhancement to the Severn Beach and Bath lines, driven by economic and population growth.
- Enhancing access for the skilled workforce to major employment markets, helping business to expand and deliver economic growth.
- Substantial support from the community and stakeholders for the project.

- Majority of capital funding identified.
- Provides a sound foundation for taking forward the rest of the MetroWest programme and potential for medium-/long-term commercial expansion.

Table 4.21 shows a summary of how the scheme options meet the five cases. The EAST analysis shows that option 5 and 6B are the preferred options to take forward to the Preliminary Business Case.

TABLE 4.21

**Summary of how the scheme options meet the five cases**

Option	Strategic case	Economic case	Management case	Financial case	Commercial case
<b>Option 1:</b> Shuttles (base case)	✓	✓	✓	✓	✓
<b>Option 2a/b:</b> Portishead to Bath Spa and Severn Beach to Bristol Temple Meads	✓	✓	✓	✓	✓
<b>Option 3a/b:</b> Portishead to Severn Beach and Bath shuttle	✓	✓	✓	✓	✓
<b>Option 4a/b:</b> Severn Beach to Bath Spa and Portishead shuttle	✓	✓	✓	✓	✓
<b>Option 5a/b:</b> Severn Beach to Bath Spa and Portishead	✓	✓	Option a ✗ Option b ✓	Option a ✗ Option b ✓	✓
<b>Option 6a/b:</b> Portishead to Severn Beach and Bath Spa and Severn Beach shuttle	✓	✓	Option a ✗ Option b ✓	Option a ✗ Option b ✓	✓

## Appendix A

### LTB Prioritisation

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The West of England Local Transport Body undertook a process of assessment and prioritisation of major local transport schemes in June 2013. The prioritisation process is summarised in Figure A.1.

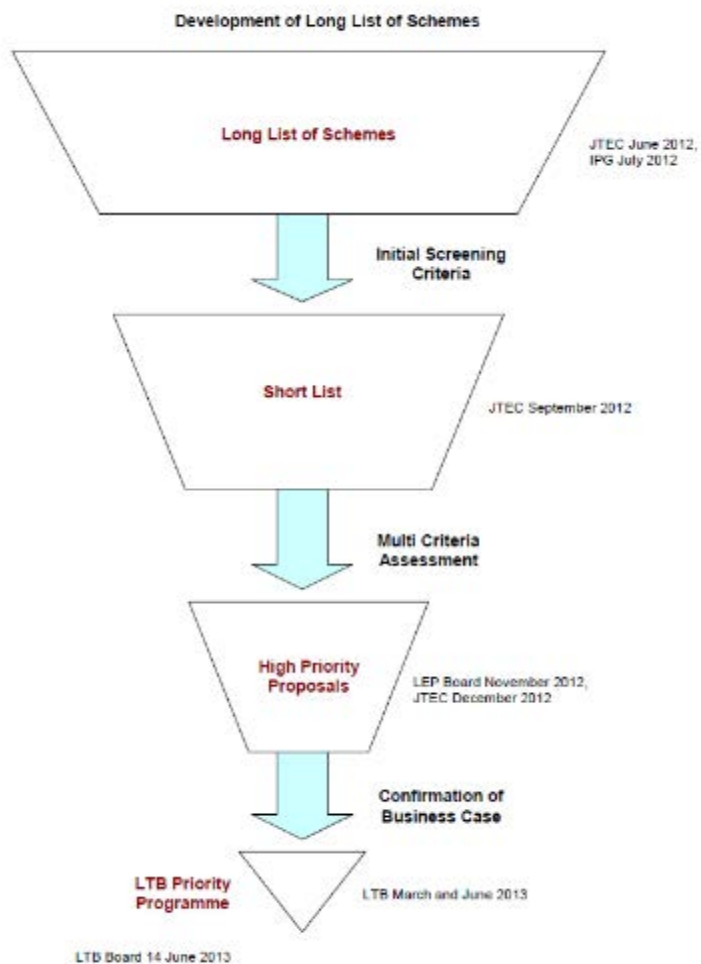


Figure A.1: Overview of prioritisation process

The initial long list of schemes was derived by reviewing the Joint Local Transport Plan 2011-26 (JLTP3), the authorities' Core Strategies and other more detailed infrastructure plans, including those for the Enterprise Zone or Areas. The long list included a comprehensive set of schemes including those expected, or with the potential, to be funded by others, together with those outside of the immediate cost or delivery constraints.

### **The long list**

The long list of schemes was reviewed by officers across the authorities to seek to identify those which fit less well in terms of deliverability or affordability within the likely allocation through the devolved major schemes' funding approach. This process involved the application of three initial screening criteria:

- 1) **Affordability** – schemes which cannot be funded within the likely allocation for the CSR period. Based on guidance at the time, this was expected to be some £38 million in the period 2015/16 to 2018/19, if population based, up to £50 million if using GVA. The criterion was applied, based on the higher GVA-based allocation and assuming a 10 per cent local contribution (schemes over £55 million at 2015/16 prices will be considered unaffordable through the devolved major schemes process).

- 2) Minimum cost threshold – given the requirement for assurance and appraisal, including evidencing value for money, and the associated resource implications, a minimum cost threshold of £2 million was applied.
- 3) Deliverability – schemes must be sufficiently well defined to have the realistic potential to progress through design, consultation and statutory processes to be substantially complete within the review period.

Schemes were excluded from the shortlist where they were:

- Already funded through other sources
- Unable to be delivered through the developed major scheme funding allocation due to:
  - Timescale
  - Affordability
- Below the minimum threshold for developed funding

### **The emerging shortlist**

The short list of schemes, considered affordable and deliverable through the initial assessment process, were subject to a multi-criteria assessment with the aim of identifying a set of high priority proposals for devolved funding. A set of weighted assessment criteria were developed, based on strategic fit, deliverability and outputs. These were refined, scored and weighted, as shown in Figure A.2.

The shortlist assessment was undertaken by a panel of officers from across the West of England authorities. These officers reviewed technical information about each of the schemes - provided through individual summaries prepared by the promoting authority(ies)- and then allocated a score for each criterion. Scores were then averaged and weightings applied to provide an overall score.

Figure A.2: Scoring and Weighting Criteria for Short List Assessment

Criteria	Scoring (1 - 5, Five Highest)	Weighting (Highest 3)
<b>Strategic fit</b>		
Core Strategies	Identified priority scheme = 5 Identified scheme = 4 Part of identified programme = 3 Accords with wider framework = 1	3
Joint Local Transport Plan	Identified priority scheme = 5 Identified scheme = 4 Part of identified programme = 3 Accords with wider framework = 1	3
Enterprise Zone and Area	Strong Links = 5, through to Limited Support = 1	3
Links with wider programmes	eg links with existing major schemes, rail franchise, other funding programmes.	1
Identification in previous technical studies programmes	eg GBSTS, other studies, TIF, RGF, DIIP	1
<b>Deliverability</b>		
Stakeholder Support	Strong and tested support = 5 Likely strong support = 3 Mixed support = 1	2
Construction Start (Note: To have regard to number of statutory powers and consents required)	2015/16 = 5 2016/17 = 4 2017/18 = 3 2018/19 = 2 2019/20+ = 1	3
Reliance on Third Parties eg NR, HA	No reliance = 5 Reliance but strong support = 3 Reliance support uncertain = 1	1
Current State of Development	Outline business case = 5, through to Initial Identification = 1	2
<b>Outputs &amp; Value for Money</b>		
Ability to draw on other funding	Significant local funding (30%+) = 5 20-30% = 4 15-20% = 3 10-15% = 2 Minimal local funding (<10%) = 1	2
Assist in delivery of job growth	Significant Jobs = 5, through to Minimal = 1	3
Assist in delivery of homes	Significant homes = 5, through to Minimal = 1	3
Contribution to congestion reduction	Significant = 5, through to Minimal = 1	2
Contribution to carbon reduction	Significant = 5, through to Minimal = 1	2
Other significant wider benefit: - Noise/Air Quality, Accidents, Natural Resources, Landscape/Townscape, Heritage, Social/Distributional/Equalities	Significant Impact = 5, through to Minimal = 1	2





## Appendix B EAST forms

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## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	1
Date	20/05/2014
Description	Option 1: Shuttles (Base Case)

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	3	No cross Bristol service pattern
Fit with wider transport and government objectives	3	
Fit with other objectives	3	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	3	

### Economic

Economic growth	4. Amber/green	
Carbon emissions	4. Amber/green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VfM Category	3. Medium 1.5-2	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	3	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs      Revenue costs could be unaffordable

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	2
Date	20/05/2014
Description	Option 2a/b: Portishead to Bath Spa and Severn Beach to Bristol Temple Meads

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VfM Category	3. Medium 1.5-2	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs Revenue costs could be unaffordable

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	3
Date	20/05/2014
Description	Option 3a/b: Portishead to Severn Beach and Bath Shuttle

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	4	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VfM Category	3. Medium 1.5-2	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs      Revenue costs could be unaffordable

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	4
Date	20/05/2014
Description	Option 4a/b: Severn Beach to Bath Spa and Portishead Shuttle

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VfM Category	3. Medium 1.5-2	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs Revenue costs could be unaffordable

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	5a
Date	11/06/2014
Description	Option 5a: Severn Beach to Bath Spa & Portishead

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VFM Category	2. High 2-4	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	5b
Date	11/06/2014
Description	Option 5a: Severn Beach to Bath Spa & Portishead

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected Vfm Category	2. High 2-4	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	5. High	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	5. Affordable	
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	05. 25-50	
Cost profile		
Overall cost risk	3	Other costs

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	6a
Date	20/05/2014
Description	Option 6a: Portishead to Severn Beach & Bath Spa and Severn Beach Shuttle

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected VfM Category	3. Medium 1.5-2	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	3	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	3	Possible revenue funding issues
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	06. 50-100	
Cost profile		
Overall cost risk	2	Other costs      Revenue costs could be unaffordable

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know



## Early Assessment and Sifting Tool - *Saved Option*

Option name/no.	6b
Date	20/05/2014
Description	Option 6b: Portishead to Severn Beach & Bath Spa and Severn Beach Shuttle

### Strategic

Identified problems and objectives	To support economic growth, to deliver a more resilient transport offer, to improve accessibility, to improve quality of life.	
Scale of Impact	4	
Fit with wider transport and government objectives	5. High	
Fit with other objectives	4	
Key uncertainties	Funding, timetable capacity, resources, lack of support, may need additional works	
Degree of consensus over	4	

### Economic

Economic growth	5. Green	
Carbon emissions	5. Green	
Socio-distributional impacts and the regions	4. Amber/green	
Local environment	3. Amber	
Well being	4. Amber/green	
Expected Vfm Category	2. High 2-4	

### Managerial

Implementation timetable	5. 2-5 years	Scheme opening planned for Dec 2018
Public acceptability	5. High	
Practical feasibility	5. High	
What is the quality of the supporting evidence?	4	
Key risks	GRIP 1/2 level of design, consents required	

### Financial

Affordability	5. Affordable	
Capital Cost (£m)	05. 25-50	
Revenue Costs (£m)	05. 25-50	
Cost profile		
Overall cost risk	3	Other costs

### Commercial

Flexibility of option	4	
Where is funding coming from?	City Region Deal, SEP, funding competitions, development contributions	
Any income generated (£m)	Yes	Don't know

# **MetroWest Phase One**

## **Socio-economic appraisal report**

At GRIP Stage 2

Draft/Issue No 3.1

July 2014



## Executive Summary

This socio-economic appraisal has been prepared by Network Rail to identify the benefits and costs of the proposed MetroWest Phase One scheme. The appraisal was carried out at GRIP stage Two.

The MetroWest Phase 1 principal business objectives are:

- To support economic growth, through enhancing the transport links to the 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
- To make a positive contribution to social well-being, life opportunities and improving quality of life, across the three arterial corridors

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;
- Broadly half hourly service frequency (but some variations possible pending business case);
- Cross Bristol service patterns i.e. Bath to Seven Beach etc; and
- Providing a Metro type service appropriate for a City Region of 1 million population.

The programme includes MetroWest Phase 1 which comprises half hourly local service for the Severn Beach line, Bath to Bristol line and a re-opened Portishead line with stations at Portishead and Pill.

This appraisal assesses the impact of improving capacity and (generalised) journey time on the Severn Beach line, Portishead line and between Bristol Temple Meads and Bath Spa. It also estimates the benefits associated with improving connectivity across Bristol Temple Meads by linking rail services between these corridors. New stations at Portishead and Pill are proposed to be open in 2019 encouraging modal shift from road to rail, and this is monetised too.

The following options were assessed:

Option 5b

- Severn Beach to Bath Spa 1tph all day (Bath line service tops up existing service giving 2tph);
- Avonmouth to Portishead 1tph all day; and
- Portishead to Bristol Temple Meads 1tph AM and PM peak only

Option 6b

- Portishead to Bath Spa 1 tph peak only (Bath line service tops up existing service giving 2tph);
- Portishead to Avonmouth 1 tph all day;
- Severn Beach to Bristol Temple Meads, 1 tph, all day; and
- Off peak pattern as above but operating Bristol Temple Meads to Bath Spa (short) 1 tph rather than Portishead to Bath

Option 5b enhanced

Same as Option 5b but Portishead to Bristol Temple Meads operates 1tph all day, i.e. Portishead line is half hourly weekday daytime. Also all trains on the Portishead line call at Bedminster.

Option 6b enhanced

Same as Option 6b but Portishead to Bath Spa operates 1tph all day, i.e. Portishead line is half hourly weekday daytime. Also all trains on the Portishead line call at Bedminster.

Two scenarios are tested for each option, giving a total of eight options/scenarios to be assessed.

- Scenario 1: Option 5b with 6 units;
- Scenario 2: Option 5b with 7 units;
- Scenario 3: Option 6b with 6 units;
- Scenario 4: Option 6b with 7 units;
- Scenario 5: Option 5b enhanced with 6 units;
- Scenario 6: Option 5b enhanced with 7 units;
- Scenario 7: Option 6b enhanced with 6 units; and
- Scenario 8: Option 6b enhanced with 7 units.

Sensitivity tests on staff requirement to deliver the service specification have also been undertaken. It examines the impact of a lower number of train managers required to operate each unit.

All central scenarios have a capital cost of £57.26 m in 2013 prices. A socio-economic appraisal for each option was carried out in accordance with the Department for Transport's appraisal guidance. The appraisal assumes the capital cost of the scheme would be funded by the local authorities while the renewal cost is RAB funded. The main benefits are the journey time benefits, non-user benefits and revenue increase. These scenarios are referred to as the "central scenarios".

All central scenarios have a Benefit Cost Ratio (BCR) to Government of above two, except scenario 4 (Option 6b with 7 units) and 8 (Option 6b enhanced with 7 units). When the BCR is above 2, it represents high value for money in accordance with the DfT's Value for Money Assessments guidance. Scenario 4 and 8 have a BCR between 1.5 and 2, which represent medium value for money business case. Scenario 5 (Option 5b with enhanced and 6 units) gives the highest BCR of 4.43 which represents very high value for money and gives a NPV of £161.04.

Sensitivity tests on the number of crews (drivers and train managers) required to operate each unit have been undertaken.

All "central" scenarios require subsidy support throughout the appraisal period, except Scenario 1 (Option 5b with 6 units) and Scenario 5 (Option 5b enhanced with 6 units). In central scenarios 1 and 5, subsidy is not required from year 2033 onwards. In the sensitivity tests, subsidy requirement is lower and it is not required for a shorter period in Scenario 1 and 5, compared to other scenarios.

# 1. Introduction and objectives

This section includes an introduction to the appraisal, a summary of scheme objectives and a description of the contents of this report; these are addressed in turn.

## 1.1 Introduction

This appraisal has been prepared by Network Rail to identify the socio-economic costs and benefits of the proposed MetroWest Phase One scheme.

This appraisal was carried out at GRIP stage two.

The proposed MetroWest Phase One scheme improves capacity and service frequency on the Severn Beach line, Portishead line and between Bristol Temple Meads and Bath Spa. Connectivity is improved by linking services on these corridors, increasing access to Bristol Temple Meads and beyond. Two new stations at Portishead and Pill are proposed and provide direct rail services to Bristol Temple Meads, Avonmouth, Bath Spa and intermediate stations.

The socio-economic appraisal was carried out in accordance with the Department for Transport's (DfT) appraisal guidance, in particular the web-based transport analysis guidance or WebTAG, available at [dft.gov.uk](http://dft.gov.uk).

The appraisal assumptions are discussed in more detail in Sections 3 and in the Appendix (Table A.2).

The appraisal compares the costs and benefits of each option relative to the Do Minimum (see Section 2), in accordance with WebTAG.

In this report, all years refer to financial years (i.e. 2014 = 2014/15) unless stated otherwise.

## 1.2 Scheme objectives

The MetroWest Phase 1 principal business objectives are:

- To support economic growth, through enhancing the transport links to the 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
- To make a positive contribution to social well-being, life opportunities and improving quality of life, across the three arterial corridors

The MetroWest Phase 1 supporting objectives are:

- To contribute to reducing traffic 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.
- To contribute to reducing the overall environmental impact of the transport network.

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;
- Broadly half hourly service frequency (but some variations possible pending business case);
- Cross Bristol service patterns i.e. Bath to Seven Beach etc; and
- Providing a Metro type service appropriate for a City Region of 1 million population.

The programme includes MetroWest Phase 1 which comprises half hourly local service for the Severn Beach line, Bath to Bristol line and a re-opened Portishead line with stations at Portishead and Pill.

This appraisal assesses the impact of improving capacity and (generalised) journey time on the Severn Beach line, Portishead line and between Bristol Temple Meads and Bath Spa. It also estimates the benefits associated with improving connectivity across Bristol Temple Meads by linking rail services between these corridors. New stations at Portishead and Pill are proposed to be open in 2019 encouraging modal shift from road to rail, and this is monetised too.

### **1.3 Structure of the report**

This report includes the following sections:

- Section 2 described the scheme options and Do Minimum;
- Section 3 explains how the costs and benefits were estimated;
- Section 4 presents appraisal results and conclusions; and
- Appendix, including version control (see Table A.1) and further information on assumptions (see Table A.2).

## 2. Scheme options tests and Do Minimum

This section defines the scheme options, scenarios and the do-minimum in turn.

### 2.1 Options assessed

Two main options of service specifications are proposed for business case assessment, which are Option 5b and Option 6b. There are two variants to each option. The service specification of each option is described as follows:

#### Option 5b

- Severn Beach to Bath Spa 1tph all day (Bath line service tops up existing service giving 2tph);
- Avonmouth to Portishead 1tph all day; and
- Portishead to Bristol Temple Meads 1tph AM and PM peak only

#### Option 6b

- Portishead to Bath Spa 1 tph peak only (Bath line service tops up existing service giving 2tph);
- Portishead to Avonmouth 1 tph all day;
- Severn Beach to Bristol Temple Meads, 1 tph, all day; and
- Off peak pattern as above but operating Bristol Temple Meads to Bath Spa (short) 1 tph rather than Portishead to Bath

#### Option 5b enhanced

Same as Option 5b but Portishead to Bristol Temple Meads operates 1tph all day, i.e. Portishead line is half hourly weekday daytime. Also all trains on the Portishead line call at Bedminster.

#### Option 6b enhanced

Same as Option 6b but Portishead to Bath Spa operates 1tph all day, i.e. Portishead line is half hourly weekday daytime. Also all trains on the Portishead line call at Bedminster.



## 2.2 Scenarios

Two scenarios of unit requirement, 6 and 7 units, have been tested for each option. This scenario assessment is requested by the local authorities as the scheme is still at its early development stage and it is uncertain how many units are exactly required for each option. A range of scenario is tested to ensure robustness of the business case.

With the four options of service specification and two scenarios for each option, this gives a total of eight scenarios to be assessed for appraisals which are as follows:

- Scenario 1: Option 5b with 6 units;
- Scenario 2: Option 5b with 7 units;
- Scenario 3: Option 6b with 6 units;
- Scenario 4: Option 6b with 7 units;
- Scenario 5: Option 5b enhanced with 6 units;
- Scenario 6: Option 5b enhanced with 7 units;
- Scenario 7: Option 6b enhanced with 6 units; and
- Scenario 8: Option 6b enhanced with 7 units.

## 2.3 Do Minimum – Base case scenario

The do-minimum is defined as the situation with Great Western Main line electrification and Intercity Express Programme (IEP) delivered in end of Network Rail's Control Period Five (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.

### 3. Costs and benefits

This section of the report defines how the costs and benefits in the appraisal were estimated. The results of the appraisal are shown in Section 4. The costs and benefits comprise the following elements, which are addressed in turn:

- Capital costs;
- Operating costs;
- Generalised journey time benefits (frequency and connectivity); and
- Non-user benefits

#### 3.1 Capital costs

Capital costs consist of initial capital costs and renewal costs, which are addressed in turn.

##### *Initial capital costs*

Initial capital costs are shown in Table 3.1. The table includes the funding sources assumed.

Table 3.1: Capital costs		
Option	Proposed funding source	£m
Scenario 1 to 8	Public funds - local government	37.6
<b>Notes</b>		
Costs are shown as positive.		
The capital cost used for the appraisal, as quoted above, includes the base cost/point estimate but excludes any QRA-based risk allowance and excludes general contingency/generalised risk allowance etc.		
Note that the capital costs for appraisal purposes do not include the QRA-based risk allowance even though a QRA has been carried out. The risk allowance (at P80) is 40%, lower than the optimism bias rate of 50%.		
The above costs are in 2013 factor prices, at GRIP stage 2, are undiscounted and exclude optimism bias. The PVs are shown in Table 4.1 and include optimism bias as shown in Table A.2		
The above costs exclude RAB finance costs; given the proposed funding source and are not included in the PVs - see Table 4.1.		
For appraisal purposes, 50% of the above total costs are assumed to be incurred in 2017 and 50% are assumed to be incurred in 2018.		
No real terms changes in costs are applied to the above costs during the appraisal period, leaving aside the issue of optimism bias.		
Costs are relative to the Base Case. Initial capital costs are shown here only.		
Source: Project Team.		

##### *Renewal costs and / or cost savings*

Renewal costs are shown in Table 3.2. The renewal costs of the new assets are estimated which are as follows:

- New station facilities at Portishead and Pill;

- New signals and S&C equipments on the re-opened Portishead line, around Bathampton area, near Avonmouth and on the Down Relief; and
- New plain line tracks at Portishead, Pill and Parson Street and near Clifton Down.

For appraisal purposes, the above new infrastructure and assets are assumed to be renewed every 30 years except some elements of the new tracks (ballasts which are assumed to be renewed every 20 years.) These assumptions are required to be reviewed further in the next GRIP stage.

The Present Values (PVs) of the total capital costs (initial capital costs and renewal costs) over the appraisal period are shown in Table 4.1 (see Section 4 below).

<b>Table 3.2: Renewal costs</b>	
Option	£m
Scenario 1 to 8	16.1
<p><b>Notes</b></p> <p>Costs are shown as positive; cost savings as negative.</p> <p>The above costs are in 2013 factor prices, at GRIP stage 2, are undiscounted and exclude optimism bias. The PVs are shown in Table 4.1 and include optimism bias (where relevant) as shown in Table A.2.</p> <p>The above costs exclude RAB finance costs; RAB finance costs are included in the PVs - see Table 4.1. The RAB rate is shown in Table A.2.</p> <p>19% of the total costs are assumed to be incurred in 2039, 62% are assumed to be incurred in 2049 and 19% are assumed to be incurred in 2059.</p> <p>No real terms changes in costs are applied to the above costs during the appraisal period, leaving aside the issue of optimism bias.</p> <p>Costs are relative to the Base Case.</p> <p>Source: Project Team.</p>	

### 3.2 Operating costs

This scheme requires ongoing operating and maintenance costs and the key cost components are summarised as follows:

1. Network Rail operating costs: to operate and maintain new assets and infrastructure;
2. Train Operating Company (TOC) staff costs: additional drivers and train managers are required to operate the new and enhanced rail services;
3. TOC vehicle leasing costs for the additional 6 or 7 units of 2-car trains;
4. TOC vehicle mileage related operating costs: includes increased track access charges, fuel costs and vehicle maintenance costs as a result of the additional vehicle mileages; and
5. TOC operating costs (new stations): operating and maintenance costs associated with the new stations at Portishead and Pill.

Table 3.3 summarises the annual operating costs for each scenario. These costs are high level and need to be refined further should the scheme progress to the next GRIP stage.

Table 3.3: Operating costs								
Scenario/option	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Type of cost/cost saving								
NR opex cost	562,100	562,100	562,100	562,100	562,100	562,100	562,100	562,100
TOC staff cost	2,329,576	2,911,970	2,329,576	2,911,970	2,329,576	2,911,970	2,329,576	2,911,970
TOC vehicle leasing cost	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436
TOC vehicle opex cost	1,172,954	1,172,954	1,299,937	1,299,937	1,308,923	1,308,923	1,435,906	1,435,906
TOC opex cost (new stations)	283,094	283,094	283,094	283,094	283,094	283,094	283,094	283,094
Total	5,489,673	6,357,554	5,616,656	6,484,537	5,625,642	6,493,523	5,752,625	6,620,507
Notes Costs are shown as positive; Costs are in 2014 factor prices, at GRIP stage 2 and refer to the first full year of benefits; they are undiscounted and exclude optimism bias. The PVs are shown in Table 4.1 and include optimism bias as shown in Table A.2. Costs are relative to the Base Case. Source: Project Team.								

The assumptions of each cost component are discussed in turn.

### *Network Rail maintenance costs*

High level Network Rail maintenance costs for the new infrastructure are estimated to be as follows:

- 1) Pill to Portishead :£200k per annum;
- 2) Extended loop i.e. Ashton Junction to Clifton Junction: £200k per annum;
- 3) New layout for Parson St Junction: £50k per annum;
- 4) New Down Relief line: £50k per annum;
- 5) New crossover at Bathampton: £30k per annum; and
- 6) Avonmouth: £20k per annum.

These costs are in 2013 factor prices at GRIP stage 2, are undiscounted and exclude optimism bias. The PVs of the costs, along with other operating costs, over the appraisal period are presented in Table 4.1.

### *Vehicle leasing costs and mileage related operating costs.*

To operate six units of DMUs (diesel multiple units) per working day, 36 sets of train crew (drivers and train managers) are required. This is based on the assumptions provided by the train operator, assuming three turns per unit of DMU working all day and each turn requires two drivers and two train managers. Hence each unit requires six drivers and six train managers. Similarly, 42 sets of train crew are required to operate seven units of DMUs per working day.

As agreed with the funders, each train is assumed to be formed of 2-car 15Xs. Standard unit rates of leasing cost, track access charges and fuels costs for 2-car DMU (diesel multiple unit) are assumed.

The appraisal compares the operating costs of each option with those in the dominimum, as defined in Section 2.2. The current base assumes two sets of units are required to operate the existing services on the Severn Beach line. The appraisal therefore considers and monetised the incremental operating costs (and benefits) over and above the base. For example, the operating costs associated with four sets of DMUs are included in the appraisal for the Scenario 1 where a total of six units are required to operate the proposed option.

Sensitivity tests on the number of crews (drivers and train managers) that are required to operate each unit have been undertaken. The sensitivity tests considered the situation where the number of train managers per turn is 1.5 and 1.75 instead, while the number of drivers remains at two per turn. This is to reflect that in some circumstances and routes, the number of train managers required is different to train drivers, and hence the sensitivity tests assess the impact of staff requirement on the appraisal results. Table 3.3a and 3.3b presents the impact on staff leasing costs.

Scenario 1 to 8, with the assumptions of two drivers and train managers are referred to as the “central scenario” in this report. The assessment based on different numbers of train managers are referred to the “sensitivity tests”.

When the scheme is progressed to further GRIP stage, detailed analysis on staff requirement should be undertaken to fine tune the economic appraisal results.

Scenario/option	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Type of cost/cost saving								
NR opex cost	562,100	562,100	562,100	562,100	562,100	562,100	562,100	562,100
TOC staff cost	1,969,862	2,492,304	1,969,862	2,492,304	1,969,862	2,492,304	1,969,862	2,492,304
TOC vehicle leasing cost	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436
TOC vehicle opex cost	1,172,954	1,172,954	1,299,937	1,299,937	1,308,923	1,308,923	1,435,906	1,435,906
TOC opex cost (new stations)	283,094	283,094	283,094	283,094	283,094	283,094	283,094	283,094
<b>Total</b>	<b>5,129,959</b>	<b>5,937,888</b>	<b>5,256,942</b>	<b>6,064,871</b>	<b>5,265,928</b>	<b>6,073,857</b>	<b>5,392,911</b>	<b>6,200,840</b>
<b>Notes</b> Costs are shown as positive; Costs are in 2014 factor prices, at GRIP stage 2 and refer to the first full year of benefits; they are undiscounted and exclude optimism bias. The PVs are shown in Table 4.1 and include optimism bias as shown in Table A.2. Costs are relative to the Base Case. Source: Project Team.								

Scenario/option	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Type of cost/cost saving								
NR opex cost	562,100	562,100	562,100	562,100	562,100	562,100	562,100	562,100
TOC staff cost	2,149,719	2,702,137	2,149,719	2,702,137	2,149,719	2,702,137	2,149,719	2,702,137
TOC vehicle leasing cost	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436	1,141,949	1,427,436
TOC vehicle opex cost	1,172,954	1,172,954	1,299,937	1,299,937	1,308,923	1,308,923	1,435,906	1,435,906
TOC opex cost (new stations)	283,094	283,094	283,094	283,094	283,094	283,094	283,094	283,094
<b>Total</b>	<b>5,309,816</b>	<b>6,147,721</b>	<b>5,436,795</b>	<b>6,274,704</b>	<b>5,445,785</b>	<b>6,283,690</b>	<b>5,572,768</b>	<b>6,410,674</b>
<b>Notes</b> Costs are shown as positive; Costs are in 2014 factor prices, at GRIP stage 2 and refer to the first full year of benefits; they are undiscounted and exclude optimism bias. The PVs are shown in Table 4.1 and include optimism bias as shown in Table A.2. Costs are relative to the Base Case. Source: Project Team.								

### 3.3 Journey time benefits

This section addresses value of time improvement to new and existing passengers. It also discusses revenue benefits and non-user benefits, as well as tax costs. These benefits and costs are addressed in turn.

#### *Journey time saving /value of time benefits*

Improving frequency and connectivity on the Severn Beach line, Portishead line and between Bristol Temple Meads and Bath Spa, as outlined in Section 2.1, will improve the generalised journey time for existing rail passengers. It also encourages modal shift from road and other public transport to rail. Generalised Journey Time (GJT) defined in Passenger Demand Forecasting Handbook 5 (PDFH 5) comprises the following components:

- rail in-vehicle journey time;
- frequency (which is converted into equivalent minutes);and
- interchange penalty (which is converted into equivalent minutes).

The service specification provided by the project team for each option is modelled in MOIRA – a rail industry demand forecasting model that assesses the impact of timetable changes on rail demand and revenue. In the model, WebTAG and Passenger Demand Forecasting Handbook (PDFH5) values and parameters are used to estimate the journey time improvement to passengers on the existing lines. Time improvement varies between Option 5, Option 5 enhanced, Option 6 and Option 6 enhanced while changes in unit requirement do not affect the journey time improvement.

The demand forecasting approach used in MOIRA is based on an elasticity approach as outlined in PDFH 5.1 and it is not capable of predicting demand to and from new stations. In order to estimate the value of time improvement to the new passengers at Portishead and Pill, the new station forecasts provided by the consultants working on behalf of the project team are used.

The demand forecasts for the new stations at Portishead and Pill are presented in Table 3.4.

Table 3.4: New station forecasts, rail journeys in 2019								
Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Portishead	451,406	451,406	451,406	451,406	464,778	464,778	464,778	464,778
Pill	204,829	204,829	204,829	204,829	210,378	210,378	210,378	210,378

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. An average fare of 20p per journey mile is assumed for Portishead and Pill passengers (based on the average revenue accrued per journey mile at local stations, without direct links to London, in the MetroWest area). The generalised cost of travel by car includes in-vehicle journey time in the peak and road costs such as parking cost in Bristol city centre. The generalised costs of travel by rail include the estimated rail fare. These costs are then converted into equivalent generalised journey times using rail passengers' value of time outlined in WebTAG.

The number of passengers on the existing lines (excluding Portishead and Pill stations) that benefits from the scheme is presented in Table 3.5.

Table 3.5: Number of passengers benefiting from journey time saving on the existing lines (excludes new station passengers)		
Scenario	Description	Passenger journeys per annum
Scenario 1	Option 5b, 6 units	381,000
Scenario 2	Option 5b, 7 units	381,000
Scenario 3	Option 6b, 6 units	286,000
Scenario 4	Option 6b, 7 units	286,000
Scenario 5	Option 5b enhanced, 6 units	389,000
Scenario 6	Option 5b enhanced, 7 units	389,000
Scenario 7	Option 6b enhanced, 6 units	292,005
Scenario 8	Option 6b enhanced, 7 units	292,005
Notes		
Passenger numbers are for 2013, are from MOIRA and are rounded.		
The number of passengers benefiting from the scheme is increased during the appraisal period in line with underlying passenger demand growth assumptions - see Table A.2.		

The value of time benefits depend on the following key factors: the benefits per passenger, the number of passengers experiencing these benefits and the characteristics of these passengers.

The total values of time improvement for both new and existing passengers on the existing and re-opened lines are shown in Table 3.6. The PVs of these benefits over the appraisal period is shown in Table 4.1.

<b>Table 3.6: Journey time (value of time) benefits (£ per annum)</b>		
Option	Description	Value of time per annum in 2019
Scenario 1	Option 5b, 6 units	£6,426,279
Scenario 2	Option 5b, 7 units	£6,426,279
Scenario 3	Option 6b, 6 units	£5,481,877
Scenario 4	Option 6b, 7 units	£5,481,877
Scenario 5	Option 5b enhanced, 6 units	£6,645,870
Scenario 6	Option 5b enhanced, 7 units	£6,645,870
Scenario 7	Option 6b enhanced, 6 units	£5,681,248
Scenario 8	Option 6b enhanced, 7 units	£5,681,248
<b>Notes</b> Benefits are undiscounted, in 2014 market prices with VOT growth and demand growth Benefits are based on journey time savings (see above table) and VoTs for business, commuter and other users and VoT growth rates - see Table A.2. Benefits are applied to additional passengers (see table below), based on the "rule of the half" (see Table A.2), as well as to existing users and underlying growth is applied - see Table A.2. Benefits are for Options relative to Do-minimum.		

### *Revenue benefits*

Revenue benefits are based on an estimation of the additional passengers generated by the scheme presented in Tables 3.3 and 3.4. The total revenue predicted in 2019 is presented in Table 3.7. The PVs of these benefits are shown in Table 4.1.

<b>Table 3.7: Revenue benefits associated with journey time savings (£ per year)</b>		
Scenario	Description	2019 revenue per annum
Scenario 1	Option 5b, 6 units	3,553,571
Scenario 2	Option 5b, 7 units	3,553,571
Scenario 3	Option 6b, 6 units	2,832,194
Scenario 4	Option 6b, 7 units	2,832,194
Scenario 5	Option 5b enhanced, 6 units	3,649,768
Scenario 6	Option 5b enhanced, 7 units	3,649,768
Scenario 7	Option 6b enhanced, 6 units	2,911,341
Scenario 8	Option 6b enhanced, 7 units	2,911,341
<b>Notes</b> Additional passengers are shown for first full year of benefits and for selected following years. They are in 2014 factor prices and are undiscounted (discounting is addressed in Section 4). Benefits are based on number of additional passengers (see above table) and average yield and revenue growth assumptions (see Table A.2). Benefits are for options relative to the Do-Minimum.		

### *Non user benefits*

The additional rail journeys result in non-user benefits associated with a reduction in the number of cars on the roads. The PVs of these benefits are shown in Table 4.1.

The assumed benefits per car mile are shown in Table 3.8.

<b>Table 3.8: Non user benefits per mile</b>	
	Pence per car mile in 2019
Benefit type	
Congestion	8.6
Infrastructure	0.1
Accident	2.3
Air pollution	0.0
Noise	0.1
Climate change	1.2
<b>Total</b>	<b>12.4</b>
<b>Notes</b> Benefits are based on the marginal external costs (MEC) of car use from WebTAG (Unit A5.4). Benefits are estimated by year up to 2035. After 2035 benefits are increased in line with GDP per capita growth - see Table A.2. Extra rail passengers resulting from the scheme are assumed to be diverted from roads in the following areas: 100% SW	

#### *Tax costs*

The additional rail journeys result in tax costs associated with a reduction in the number of cars on the roads. These tax costs, both fuel duty and VAT, were estimated in accordance with WebTAG. The PVs of the costs is shown in Table 4.1.



## 4. Appraisal results and conclusions

This section of the report presents economic appraisal results, for each central scenarios and sensitivity tests. A financial analysis comparing the revenue and operating cost (OPEX) is also presented.

### 4.1 Appraisal results

The socio-economic appraisal includes the following costs and socio-economic benefits:

- Capital costs (see Section 3.1);
- Operating costs or cost savings (Section 3.2); and
- Journey time benefits, comprising value of time benefits and associated revenue and non-user benefits and tax costs (Section 3.3);

The results for each central scenario are shown in Table 4.1. The Transport Economic Efficiency (TEE) table(s) and Appraisal Summary Table (AST) are shown in the appendix for the central scenario. The value for money category and the appraisal summary for the two sensitivity tests are presented in Table 4.2 to 4.3, though detailed TEE and AST tables are not included in this report.

### 4.2 Conclusions

All central scenarios have a capital cost of £57.26 m in 2013 prices. A socio-economic appraisal for each option was carried out in accordance with the Department for Transport's appraisal guidance. The appraisal assumes the capital cost of the scheme would be funded by the local authorities while the renewal cost is RAB funded. The main benefits are the journey time benefits, non-user benefits and revenue increase. These scenarios are referred to as the "central scenarios".

All central scenarios have a Benefit Cost Ratio (BCR) to Government of above two, except scenario 4 (Option 6b with 7 units) and 8 (Option 6b enhanced with 7 units). When the BCR is above 2, it represents high value for money in accordance with the DfT's Value for Money Assessments guidance. Scenario 4 and 8 have a BCR between 1.5 and 2, which represent medium value for money business case. Scenario 5 (Option 5b with enhanced and 6 units) gives the highest BCR of 4.43 which represents very high value for money and gives a NPV of £161.04. Table 4.1 summarises the appraisal results for each scenario, outlining the BCRs, NPVs and the PVs of costs and benefits.

### 4.3 Sensitivity tests

Sensitivity tests on the number of crews (drivers and train managers) required to operate each unit have been undertaken. Table 4.2 and 4.3 presents the results based on 1.5 and 1.75 train managers per turn, respectively.

## 4.4 Financial analysis and subsidy requirement

A financial analysis has been undertaken to compare the ongoing operating costs against the revenue forecasts during the appraisal period, as requested by the local authorities. The calculation is different to how values are treated under a socio-economic appraisal. Table 4.4 to 4.6 summarise the subsidy requirement for each scenario and for the sensitivity tests. Values are presented in outturn prices and use the following assumptions:

- Prices are undiscounted, in factor prices and in nominal term<sup>1</sup> (grow by Retail Price Index to reflect inflation);
- Revenue is assumed to increase by RPI+1% until 2033, in nominal term;
- Demand is capped in 2033 (20 years after the appraisal year per DfT guidance);
- Staff related operating costs are assumed to grow by Average Earning Index (which is above RPI). Vehicle leasing costs are assumed to grow by RPI;
- Costs are assumed to grow until end of the appraisal period; and
- The subsidy requirement does not include capital expenditure or renewal cost.

All “central” scenarios require subsidy support throughout the appraisal period, except Scenario 1 (Option 5b with 6 units) and Scenario 5 (Option 5b enhanced with 6 units). In central scenarios 1 and 5, subsidy is not required from year 2033 onwards. In the sensitivity tests, subsidy requirement is lower and it is not required for a shorter period in Scenario 1 and 5, compared to other scenarios.

The yearly revenue, OPEX, and subsidy requirement for the first twenty years after the opening year are presented in the Appendices.

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<sup>1</sup> While in economic appraisal in accordance to WebTAG, prices are presented in 2010 market values, are discounted and in real terms.



	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
<b>Table 4.2: Results of socio-economic appraisal; sensitivity test of 1.5 train managers per turn.</b>	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV
<b>Net benefits to consumers and private sector (plus tax impacts)</b>								
Rail user journey time benefits	202.69	202.69	166.14	166.14	208.71	208.71	171.39	171.39
Non user benefits - road decongestion	34.11	34.11	30.76	30.76	35.02	35.02	31.61	31.61
Non user benefits - noise, air quality, greenhouse gases & accident benefits	9.52	9.52	8.59	8.59	9.78	9.78	8.82	8.82
Rail user and non user disruption disbenefits during possessions	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08
Indirect taxation impact on government	-32.77	-32.77	-26.73	-26.73	-33.65	-33.65	-27.47	-27.47
sub-total (a)	<b>209.46</b>	<b>209.46</b>	<b>174.68</b>	<b>174.68</b>	<b>215.77</b>	<b>215.77</b>	<b>180.26</b>	<b>180.26</b>
<b>Costs to government (broad transport budget)</b>								
Capital costs	57.26	57.26	57.26	57.26	57.26	57.26	57.26	57.26
Non user benefits - road infrastructure cost changes	-0.50	-0.50	-0.45	-0.45	-0.52	-0.52	-0.47	-0.47
Revenue transfer*	-152.76	-152.76	-121.75	-121.75	-156.89	-156.89	-125.15	-125.15
Operating costs transfer**	133.70	155.13	136.67	158.10	136.88	158.31	139.85	161.29
sub-total (b)	<b>37.70</b>	<b>59.13</b>	<b>71.73</b>	<b>93.16</b>	<b>36.73</b>	<b>58.16</b>	<b>71.50</b>	<b>92.93</b>
<b>Net Present Value (NPV) (a-b)</b>	<b>171.77</b>	<b>150.34</b>	<b>102.95</b>	<b>81.52</b>	<b>179.04</b>	<b>157.61</b>	<b>108.77</b>	<b>87.34</b>
<b>Benefit Cost Ratio to Government (BCR) (a/b)</b>	<b>5.56</b>	<b>3.54</b>	<b>2.44</b>	<b>1.88</b>	<b>5.87</b>	<b>3.71</b>	<b>2.52</b>	<b>1.94</b>
Notes:								
*Total revenue benefits = revenue benefits to private sector + revenue transfer to government								
**Total change in operating costs = change in operating costs to private sector + change in operating cost transfer to government								
Present Values (PVs) are in 2010 market prices and are discounted to 2010 using Social Time Preference Rates: see Table A.2. The appraisal is in accordance with the DfT's WebTAG appraisal guidance. Results are for Scenarios 1 to 8 relative to the Base Case. For net benefits etc, benefits are shown as positive. For costs to govt etc, costs are shown as positive.								
This is a summary version of the TEE table.								

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
<b>Table 4.3: Results of socio-economic appraisal; sensitivity test of 1.75 train managers per turn.</b>	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV	£m PV
<b>Net benefits to consumers and private sector (plus tax impacts)</b>								
Rail user journey time benefits	202.69	202.69	166.14	166.14	208.71	208.71	171.39	171.39
Non user benefits - road decongestion	34.11	34.11	30.76	30.76	35.02	35.02	31.61	31.61
Non user benefits - noise, air quality, greenhouse gases & accident benefits	9.52	9.52	8.59	8.59	9.78	9.78	8.82	8.82
Rail user and non user disruption disbenefits during possessions	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08	-4.08
Indirect taxation impact on government	-32.77	-32.77	-26.73	-26.73	-33.65	-33.65	-27.47	-27.47
sub-total (a)	<b>209.46</b>	<b>209.46</b>	<b>174.68</b>	<b>174.68</b>	<b>215.77</b>	<b>215.77</b>	<b>180.26</b>	<b>180.26</b>
<b>Costs to government (broad transport budget)</b>								
Capital costs	57.26	57.26	57.26	57.26	57.26	57.26	57.26	57.26
Non user benefits - road infrastructure cost changes	-0.50	-0.50	-0.45	-0.45	-0.52	-0.52	-0.47	-0.47
Revenue transfer*	-152.76	-152.76	-121.75	-121.75	-156.89	-156.89	-125.15	-125.15
Operating costs transfer**	139.07	161.39	142.04	164.36	142.25	164.57	145.22	167.55
sub-total (b)	<b>43.06</b>	<b>65.39</b>	<b>77.09</b>	<b>99.42</b>	<b>42.10</b>	<b>64.42</b>	<b>76.86</b>	<b>99.19</b>
<b>Net Present Value (NPV) (a-b)</b>	<b>166.40</b>	<b>144.08</b>	<b>97.59</b>	<b>75.26</b>	<b>173.68</b>	<b>151.35</b>	<b>103.40</b>	<b>81.08</b>
<b>Benefit Cost Ratio to Government (BCR) (a/b)</b>	<b>4.86</b>	<b>3.20</b>	<b>2.27</b>	<b>1.76</b>	<b>5.13</b>	<b>3.35</b>	<b>2.35</b>	<b>1.82</b>
Notes:								
*Total revenue benefits = revenue benefits to private sector + revenue transfer to government								
**Total change in operating costs = change in operating costs to private sector + change in operating cost transfer to government								
Present Values (PVs) are in 2010 market prices and are discounted to 2010 using Social Time Preference Rates: see Table A.2. The appraisal is in accordance with the DfT's WebTAG appraisal guidance. Results are for Scenarios 1 to 8 relative to the Base Case. For net benefits etc, benefits are shown as positive. For costs to govt etc, costs are shown as positive.								
This is a summary version of the TEE table.								

<b>Table 4.4 Subsidy requirement (Revenue v.s OPEX only)</b>		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Item	Unit	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Subsidy requirement in 2019 (opening year)	£, Outturn prices	-1,816,789	-2,844,498	-2,956,663	-3,984,372	-1,854,213	-2,881,922	-3,017,310	-4,045,019
The number of years subsidy is required	year	14	60	60	60	14	60	60	60
Breakeven year or when subsidy is not required	year	2033	2079	2079	2079	2033	2079	2079	2079
Total subsidy required from 2019 to 2033		-15,155,586	-36,299,984	-42,606,506	-63,750,905	-15,103,207	-36,247,606	-43,132,138	-64,276,537
Total subsidy required from 2019 to 2039		-14,236,191	-48,094,535	-59,952,100	-93,810,444	-13,761,205	-47,619,550	-60,447,327	-94,305,671

Note: Negative represents subsidy requirement i.e. costs. Prices are presented in outturn prices (in factor prices, in nominal terms with inflation, undiscounted)

<b>Table 4.5 Subsidy requirement: Sensitivity test of 1.5 train managers per turn (Revenue v.s OPEX only)</b>		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Item	Unit	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Subsidy requirement in 2019 (opening year)	£, Outturn prices	-1,400,480	-2,358,804	-2,540,353	-3,498,677	-1,437,903	-2,396,227	-2,601,001	-3,559,325
The number of years subsidy is required	year	11	60	60	60	10	60	60	60
Breakeven year or when subsidy is not required	year	2030	2079	2079	2079	2029	2079	2079	2079
Total subsidy required from 2019 to 2033		-6,256,921	-25,918,209	-33,707,841	-53,369,129	-6,204,542	-25,865,830	-34,233,473	-53,894,761
Total subsidy required from 2019 to 2039		193,699	-31,259,664	-45,522,210	-76,975,573	668,684	-30,784,678	-46,017,437	-77,470,800

Note: Negative represents subsidy requirement i.e. costs. Prices are presented in outturn prices (in factor prices, in nominal terms with inflation, undiscounted)

<b>Table 4.6 Subsidy requirement: Sensitivity test of 1.75 train managers per turn (Revenue v.s OPEX only)</b>		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
Item	Unit	Option 5b, 6 units	Option 5b, 7 units	Option 6b, 6 units	Option 6b, 7 units	Option 5b enhanced, 6 units	Option 5b enhanced, 7 units	Option 6b enhanced, 6 units	Option 6b enhanced, 7 units
Subsidy requirement in 2019 (opening year)	£, Outturn prices	-1,608,635	-2,601,651	-2,748,508	-3,741,525	-1,646,058	-2,639,074	-2,809,156	-3,802,172
The number of years subsidy is required	year	12	60	60	60	12	60	60	60
Breakeven year or when subsidy is not required	year	2031	2079	2079	2079	2031	2079	2079	2079
Total subsidy required from 2019 to 2033		-10,706,253	-31,109,097	-38,157,174	-58,560,017	-10,653,875	-31,056,718	-38,682,806	-59,085,649
Total subsidy required from 2019 to 2039		-7,021,246	-39,677,100	-52,737,155	-85,393,009	-6,546,260	-39,202,114	-53,232,382	-85,888,235

Note: Negative represents subsidy requirement i.e. costs. Prices are presented in outturn prices (in factor prices, in nominal terms with inflation, undiscounted)

## Appendix

This section includes the following further information:

- Table A.1, version control
- Table A.2, further information on appraisal assumptions
- Transport Economic Efficiency (TEE) tables; and
- Appraisal Summary Table (AST).

Table A.1: Version control					
Version	File names	Issue date	Analyst	Reviewed by:	Comments
Version 1	Appraisal report Metro West Phase 1(based on DCF Metro Wesst Phase 1 v1. )	14/07/2014	Ana Chan(Economic Analysis Team, Group Strategy)	Lauren Hargreaves(Economic Analysis Team, Group Strategy)	
Version 2	Appraisal report Metro West Phase 1(based on DCF Metro Wesst Phase 1 v1. )	21/07/2014	Ana Chan(Economic Analysis Team, Group Strategy)	Lauren Hargreaves(Economic Analysis Team, Group Strategy)	Revised new station forecasts and value of time improvement. Correction of OPEX calculation.
Version 3	Appraisal report Metro West Phase 1(based on DCF Metro Wesst Phase 1 v1. )	21/07/2014	Ana Chan(Economic Analysis Team, Group Strategy)	Lauren Hargreaves(Economic Analysis Team, Group Strategy)	Revised value of time improvement to new rail passengers. Include subsidy requirement table

**Table A.2: Further appraisal assumptions**

These assumptions apply to the socio-economic appraisal, unless stated. They apply to the financial appraisal only where stated. Assumptions apply to central scenarios (not sensitivity tests) unless stated. Further assumptions are in tables in main text. All years refer to financial years e.g. 2013 refers to 2013/14 F/Y.

Assumption	Value	Source	Comment
<b>General assumptions:</b>			
Current year	2014	WebTAG	
Model base year	2014	WebTAG	
First year of benefits	2019	Project Team	100% of benefits realised from this year
Benefits profile by year	% of total		
	2019 100%	Project Team	
	2078 100%	Project Team	
Appraisal period (years)	60	Project Team	The maximum is 60 years under WebTAG
Price base year	2010	WebTAG (Unit A1.1, Para 2.6.3)	Values converted from model base year to price base year using GDP deflator
Base year for discounting	2010	WebTAG (Unit A1.1, Para 2.7.6)	
Discount rate (Social Time Preference Rate)	3.5% for 30 years from the current year and 3.0% thereafter	WebTAG (data-book-may-2014, Table A1.1.1) & HM Treasury Green Book	
Financial discount rate for financial appraisal only	4.75% per annum (in real terms)	Network Rail	
Unit of account	Market prices	WebTAG (Unit A1.1, Para 2.5.2)	19% added to convert factor prices to market prices
<b>Capital and operating cost assumptions:</b>			
Changes in capital costs in real terms during appraisal period	Not applied		No increase is applied after demand cap year, following DfT advice
Changes in operating costs costs in real terms during appraisal period	TOC OPEX costs to increase in line with Average Earning Index (AEI).		No increase is applied after demand cap year, following DfT advice
Cost of TOC profit as percentage of any change in operating costs	8%	DfT	
Optimism bias for: Capital costs	50% at GRIP stage 2	WebTAG (Unit A5.3, Table 2)	Optimism bias is not applied to cost savings
Operating costs	2% at GRIP stage 2	WebTAG (Unit A5.3, Table 2)	Optimism bias is not applied to cost savings
RAB finance costs	4.75% per annum (in real terms)	Network Rail	The capital expenditure is not RAB funded. The renewal cost is RAB funded
<b>Passenger benefit-related assumptions</b>			
Passenger demand growth			
Passenger set or all services	4.3% p.a. from 2013 to 2020, 2.2% p.a. from 2021 to 2033, 2.2% p.a. from 2034 to 2034 and 0% thereafter.	Based on growth assumptions agreed with funders (councils). Growth is capped 20 years after the current year, in accordance with WebTAG (Unit A5.3, Para 2.3.1).	Applies to financial & socio-economic appraisals
Year in which underlying demand growth is capped (20 years from current year)	2034	WebTAG (Unit A5.3, 3.3.1)	This cap year also applies to fare increases applied (see below) and any real terms cost increases applied (see above).
Values of time (VoT) by user type:			All data are in market prices
Business (work) users	£31.96 per hour in 2010 prices	WebTAG (data-book-may-2014, Table A1.3.1)	
Commuters	£6.81 per hour in 2010 prices		
Others	£6.04 per hour in 2010 prices		
"Rule of the half"	50%	WebTAG (Unit A.1.3 Para 2.1.6)	Time savings applied to new users at half the rate applied to existing users
VoT growth (per annum) by user type:			
Business (work) users	GDP (real terms) per person	WebTAG (data-book-may-2014, Annual Parameters)	
Non-work	GDP (real terms) per person		
Average fare increases per annum (% per annum above RPI) except for specified year (see below). No increases applied after demand cap year (see above). Revenue growth also takes account of forecast increases in RPI relative to GDP deflator (until demand cap year), since appraisal uses GDP deflator to deflate prices to price base year.	1.0%	DfT advice and OBR forecasts for RPI and GDP deflator.	Applies to financial & socio-economic appraisals.
Average fare increase in 2014	0%	DfT advice	Applies to financial & socio-economic appraisals.
Elasticity of demand with respect to Generalised Journey Time (GJT)	-0.9	PDFH v5.0 & WebTAG (Unit M4, Table 1)	Applies to financial & socio-economic appraisals
Reduction in car kms for 100% increase in rail passenger kms (diversion rate), for external costs of car use	26%	WebTAG (Unit A5.4, Table 1)	Same rate applied across GB
MEC congestion benefits			These allocations are also applied to disruption disbenefits
Proportion allocated to work time	50%	DfT	
Proportion allocated to commuting	25%	DfT	
Proportion allocated to other	25%	DfT	
<b>Other assumptions</b>			
TOC revenue and operating cost transfer:			
During current franchise the following proportion of revenue and operating costs is assumed to be transferred to government	50%	WebTAG (Unit A5.3, Section 3.4)	If the TOC is publicly-owned all revenue is transferred to government during the current franchise. Overall revenue and operating cost transfer assumptions are shown in the TEE tables.
After current franchise expires the following proportion of revenue and operating costs is assumed to be transferred to government	100%	WebTAG (Unit A5.3, Section 3.4)	
Network Rail operating cost transfer:			
During current Control Period the following proportion of operating costs is assumed to be transferred to government	0%	WebTAG (Unit A5.3, Section 3.4)	Overall operating cost transfer assumptions are shown in the TEE tables.
After current Control Period expires the following proportion of operating costs is assumed to be transferred to government:	100%	WebTAG (Unit A5.3, Section 3.4)	
Disruption during construction:			
Schedule 4 costs as a proportion of investment cost	10%	Project Team	
User disbenefits as a proportion of revenue disbenefits (i.e. Schedule 4)	100%	Economic Analysis Team assumption	User & non-user benefits are increased to allow for factor to market price adjustment.
Non user benefits as a proportion of revenue disbenefits	25%	Economic Analysis Team assumption	
Indirect tax costs	Various including current fuel duty rates, resource costs of fuel and average fuel efficiency, and forecast changes in these parameters over the appraisal period	WebTAG (Unit A5.3, 4.7 and data-book-may-2014)	As a simplifying assumption, the share of petrol and diesel in total car miles is assumed to be 50%/50% throughout the appraisal period. No electric car mileage is assumed.



TEE table - Metro West Phase 1  
Scenario 1: Option 5b, 6 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	148,476,380	8,526,362		139,950,019		139,950,019
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>147,455,396</b>	8,322,165	0	139,133,231	0	139,133,231
<b>Non-business other benefits</b>						
Travel time saving	58,228,553	8,526,362		49,702,191		49,702,191
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>57,207,568</b>	8,322,165	0	48,885,403	0	48,885,403
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	30,087,071	17,052,724		13,034,347		13,034,347
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>28,045,103</b>	16,644,330	0	11,400,773	0	
<b>Private sector provider impacts</b>						
Revenue	152,758,373			152,758,373		152,758,373
Opcoast	-144,431,373			-144,431,373	-15,655,614	-128,775,759
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-152,758,373			-152,758,373		-152,758,373
Opcoast transfer (100% to government)	144,431,373			144,431,373	15,655,614	128,775,759
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>28,045,103</b>	16,644,330	0	11,400,773		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>232,708,068</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-152,758,373			-152,758,373
Opcoast transfer (100% to government)	144,431,373			144,431,373
Infrastructure cost savings	-504,301	-504,301		
Net (8)	<b>-579,650</b>	-504,301	0	-75,349
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>32,765,791</b>	32,765,791		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>48,427,589</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>32,765,791</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	402,825	
Local air quality	0	
Greenhouse gases	2,964,549	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	6,155,334	
Consumer users (sub-total 1a+1b, Table 1)	204,662,965	
Business users and providers (sub-total 5, Table 1)	28,045,103	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-32,765,791	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>209,464,985</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>48,427,589</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>48,427,589</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>161,037,395</b>	
<b>BCR (a/b)</b>	<b>4.33</b>	

TEE table - Metro West Phase 1  
Scenario 2: Option 5b, 7 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	148,476,380	8,526,362		139,950,019		139,950,019
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>147,455,396</b>	8,322,165	0	139,133,231	0	139,133,231
<b>Non-business other benefits</b>						
Travel time saving	58,228,553	8,526,362		49,702,191		49,702,191
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>57,207,568</b>	8,322,165	0	48,885,403	0	48,885,403
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	30,087,071	17,052,724		13,034,347		13,034,347
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>28,045,103</b>	16,644,330	0	11,400,773	0	11,400,773
<b>Private sector provider impacts</b>						
Revenue	152,758,373			152,758,373		152,758,373
Opcoast	-167,651,025			-167,651,025	-15,655,614	-151,995,411
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-152,758,373			-152,758,373		-152,758,373
Opcoast transfer (100% to government)	167,651,025			167,651,025	15,655,614	151,995,411
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>28,045,103</b>	16,644,330	0	11,400,773		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>232,708,068</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-152,758,373			-152,758,373
Opcoast transfer (100% to government)	167,651,025			167,651,025
Infrastructure cost savings	-504,301	-504,301		
Net (8)	<b>22,640,002</b>	-504,301	0	23,144,303
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>32,765,791</b>	32,765,791		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>71,647,241</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>32,765,791</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	402,825	
Local air quality	0	
Greenhouse gases	2,964,549	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	6,155,334	
Consumer users (sub-total 1a+1b, Table 1)	204,662,965	
Business users and providers (sub-total 5, Table 1)	28,045,103	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-32,765,791	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>209,464,985</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>71,647,241</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>71,647,241</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>137,817,744</b>	
<b>BCR (a/b)</b>	<b>2.92</b>	

TEE table - Metro West Phase 1  
Scenario 3: Option 6b, 6 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	127,791,399	7,690,246		120,101,153		120,101,153
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>126,770,415</b>	7,486,049	0	119,284,366	0	119,284,366
<b>Non-business other benefits</b>						
Travel time saving	43,351,266	7,690,246		35,661,020		35,661,020
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>42,330,282</b>	7,486,049	0	34,844,232	0	34,844,232
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	25,762,419	15,380,492		10,381,927		10,381,927
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>23,720,451</b>	14,972,099	0	8,748,352	0	8,748,352
<b>Private sector provider impacts</b>						
Revenue	121,748,346			121,748,346		121,748,346
Opcoast	-147,403,318			-147,403,318	-15,655,614	-131,747,704
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-121,748,346			-121,748,346		-121,748,346
Opcoast transfer (100% to government)	147,403,318			147,403,318	15,655,614	131,747,704
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>23,720,451</b>			8,748,352		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>192,821,148</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-121,748,346			-121,748,346
Opcoast transfer (100% to government)	147,403,318			147,403,318
Infrastructure cost savings	-454,848	-454,848		
Net (8)	<b>33,451,775</b>	-454,848	0	33,906,623
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>26,728,818</b>	26,728,818		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>82,459,014</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>26,728,818</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	363,323	
Local air quality	0	
Greenhouse gases	2,673,839	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	5,551,727	
Consumer users (sub-total 1a+1b, Table 1)	169,100,697	
Business users and providers (sub-total 5, Table 1)	23,720,451	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-26,728,818	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>174,681,218</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>82,459,014</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>82,459,014</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>92,222,204</b>	
<b>BCR (a/b)</b>	<b>2.12</b>	

TEE table - Metro West Phase 1  
Scenario 4: Option 6b, 7 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	127,791,399	7,690,246		120,101,153		120,101,153
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>126,770,415</b>	7,486,049	0	119,284,366	0	119,284,366
<b>Non-business other benefits</b>						
Travel time saving	43,351,266	7,690,246		35,661,020		35,661,020
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>42,330,282</b>	7,486,049	0	34,844,232	0	34,844,232
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	25,762,419	15,380,492		10,381,927		10,381,927
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>23,720,451</b>	14,972,099	0	8,748,352	0	8,748,352
<b>Private sector provider impacts</b>						
Revenue	121,748,346			121,748,346		121,748,346
Opcoast	-170,622,970			-170,622,970	-15,655,614	-154,967,356
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-121,748,346			-121,748,346		-121,748,346
Opcoast transfer (100% to government)	170,622,970			170,622,970	15,655,614	154,967,356
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>23,720,451</b>			8,748,352		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>192,821,148</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-121,748,346			-121,748,346
Opcoast transfer (100% to government)	170,622,970			170,622,970
Infrastructure cost savings	-454,848	-454,848		
Net (8)	<b>56,671,427</b>	-454,848	0	57,126,275
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>26,728,818</b>	26,728,818		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>105,678,666</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>26,728,818</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	363,323	
Local air quality	0	
Greenhouse gases	2,673,839	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	5,551,727	
Consumer users (sub-total 1a+1b, Table 1)	169,100,697	
Business users and providers (sub-total 5, Table 1)	23,720,451	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-26,728,818	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>174,681,218</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>105,678,666</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>105,678,666</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>69,002,553</b>	
<b>BCR (a/b)</b>	<b>1.65</b>	

**TEE table - Metro West Phase 1**
**Scenario 5: Option 5b enhanced, 6 units**
**Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)**

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	152,738,126	8,753,795		143,984,331		143,984,331
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>151,717,141</b>	8,549,598	0	143,167,544	0	143,167,544
<b>Non-business other benefits</b>						
Travel time saving	60,036,789	8,753,795		51,282,994		51,282,994
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>59,015,805</b>	8,549,598	0	50,466,207	0	50,466,207
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	30,955,140	17,507,589		13,447,551		13,447,551
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>28,913,172</b>	17,099,196	0	11,813,976	0	11,813,976
<b>Private sector provider impacts</b>						
Revenue	156,893,627			156,893,627		156,893,627
Opcoast	-147,613,634			-147,613,634	-15,655,614	-131,958,020
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-156,893,627			-156,893,627		-156,893,627
Opcoast transfer (100% to government)	147,613,634			147,613,634	15,655,614	131,958,020
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>28,913,172</b>	17,099,196	0	11,813,976		
<b>Total, PV of transport econ eff. benefits (6 = 1a+1b+5)</b>	<b>239,646,118</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

**Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)**

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-156,893,627			-156,893,627
Opcoast transfer (100% to government)	147,613,634			147,613,634
Infrastructure cost savings	-517,753	-517,753		
Net (8)	<b>-1,546,095</b>	-517,753	0	-1,028,343
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>33,650,458</b>	33,650,458		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>47,461,144</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>33,650,458</b>			

**Table 3: Analysis of Monetised Costs and Benefits (AMCB)**

Noise	413,570	
Local air quality	0	
Greenhouse gases	3,043,626	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	6,319,522	
Consumer users (sub-total 1a+1b, Table 1)	210,732,946	
Business users and providers (sub-total 5, Table 1)	28,913,172	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-33,650,458	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>215,772,378</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>47,461,144</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>47,461,144</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>168,311,234</b>	
<b>BCR (a/b)</b>	<b>4.55</b>	

TEE table - Metro West Phase 1  
Scenario 6: Option 5b enhanced, 7 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	152,738,126	8,753,795		143,984,331		143,984,331
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>151,717,141</b>	8,549,598	0	143,167,544	0	143,167,544
<b>Non-business other benefits</b>						
Travel time saving	60,036,789	8,753,795		51,282,994		51,282,994
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>59,015,805</b>	8,549,598	0	50,466,207	0	50,466,207
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	30,955,140	17,507,589		13,447,551		13,447,551
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>28,913,172</b>	17,099,196	0	11,813,976	0	11,813,976
<b>Private sector provider impacts</b>						
Revenue	156,893,627			156,893,627		156,893,627
Opcost	-170,833,286			-170,833,286	-15,655,614	-155,177,672
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-156,893,627			-156,893,627		-156,893,627
Opcoast transfer (100% to government)	170,833,286			170,833,286	15,655,614	155,177,672
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>28,913,172</b>	17,099,196	0	11,813,976		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>239,646,118</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-156,893,627			-156,893,627
Opcoast transfer (100% to government)	170,833,286			170,833,286
Infrastructure cost savings	-517,753	-517,753		
Net (8)	<b>21,673,557</b>	-517,753	0	22,191,309
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>33,650,458</b>	33,650,458		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>70,680,796</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>33,650,458</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	413,570	
Local air quality	0	
Greenhouse gases	3,043,626	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	6,319,522	
Consumer users (sub-total 1a+1b, Table 1)	210,732,946	
Business users and providers (sub-total 5, Table 1)	28,913,172	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-33,650,458	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>215,772,378</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>70,680,796</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>70,680,796</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>145,091,583</b>	
<b>BCR (a/b)</b>	<b>3.05</b>	

TEE table - Metro West Phase 1

Scenario 7: Option 6b enhanced, 6 units

Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	129,138,451	7,901,362		121,237,089		121,237,089
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>128,117,467</b>	7,697,165	0	120,420,302	0	120,420,302
<b>Non-business other benefits</b>						
Travel time saving	47,147,740	7,901,362		39,246,378		39,246,378
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>46,126,756</b>	7,697,165	0	38,429,591	0	38,429,591
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	26,709,287	15,802,724		10,906,563		10,906,563
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>24,667,319</b>	15,394,330	0	9,272,989	0	9,272,989
<b>Private sector provider impacts</b>						
Revenue	125,150,637			125,150,637		125,150,637
Opcoast	-150,585,579			-150,585,579	-15,655,614	-134,929,965
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-125,150,637			-125,150,637		-125,150,637
Opcoast transfer (100% to government)	150,585,579			150,585,579	15,655,614	134,929,965
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>24,667,319</b>	15,394,330	0	9,272,989		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>198,911,541</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-125,150,637			-125,150,637
Opcoast transfer (100% to government)	150,585,579			150,585,579
Infrastructure cost savings	-467,335	-467,335		
Net (8)	<b>33,219,258</b>	-467,335	0	33,686,593
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>27,473,159</b>	27,473,159		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>82,226,497</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>27,473,159</b>			

Table 3: Analysis of Monetised Costs and Benefits (AMCB)

Noise	373,297	
Local air quality	0	
Greenhouse gases	2,747,242	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	5,704,135	
Consumer users (sub-total 1a+1b, Table 1)	174,244,223	
Business users and providers (sub-total 5, Table 1)	24,667,319	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-27,473,159	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>180,263,057</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>82,226,497</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>82,226,497</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>98,036,560</b>	
<b>BCR (a/b)</b>	<b>2.19</b>	

**TEE table - Metro West Phase 1**

Scenario 8: Option 6b enhanced, 7 units

**Table 1: Economic Efficiency of Transport System (All costs & disbenefits are negative, all benefits & savings are positive)**

	Total in 2010 price base £	Cars, LGVs & goods vehicles	Bus & Coach	Rail Total	Rail infra- structure - Network Rail	Rail passengers, TOCs
<b>Non-business commuting benefits</b>						
Travel time saving	129,138,451	7,901,362		121,237,089		121,237,089
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1a)	<b>128,117,467</b>	7,697,165	0	120,420,302	0	120,420,302
<b>Non-business other benefits</b>						
Travel time saving	47,147,740	7,901,362		39,246,378		39,246,378
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-1,020,984	-204,197		-816,787		-816,787
Net (1b)	<b>46,126,756</b>	7,697,165	0	38,429,591	0	38,429,591
<b>Business benefits</b>						
<b>Business user benefits</b>						
Travel time saving	26,709,287	15,802,724		10,906,563		10,906,563
Vehicle operating costs	0			0		
User charges	0			0		
During construction & maintenance	-2,041,968	-408,394		-1,633,575		-1,633,575
Net (2)	<b>24,667,319</b>	15,394,330	0	9,272,989	0	9,272,989
<b>Private sector provider impacts</b>						
Revenue	125,150,637			125,150,637		125,150,637
Opcoast	-173,805,231			-173,805,231	-15,655,614	-158,149,617
Investment cost	-49,007,239			-49,007,239	-49,007,239	
Grant/subsidy: CP5 Settlement	0			0	0	
Grant/subsidy: Network Rail private funding	0			0	0	
Grant/subsidy: Public funds - local government	49,007,239			49,007,239	49,007,239	
Revenue transfer (100% to government)	-125,150,637			-125,150,637		-125,150,637
Opcoast transfer (100% to government)	173,805,231			173,805,231	15,655,614	158,149,617
Sub total (3)	<b>0</b>	0	0	0	0	0
<b>Other business impacts</b>						
Developer contribution (4)	<b>0</b>			0		
<b>Net business impact (5 = 2+3+4)</b>	<b>24,667,319</b>	15,394,330	0	9,272,989		
Total, PV of transport econ eff. benefits (6 = 1a+1b+5)	<b>198,911,541</b>	1(a), 1(b) and (5) flow into the AMCB table, not (6)				

**Table 2 Public Accounts (costs should be recorded as a positive number, surpluses as a negative one)**

	All Modes Total	Road Infrastructure	Bus & Coach	Rail
<b>Local Government funding</b>				
Revenue	0			
Operating costs	0			
Investment costs*	0			
Grant/subsidy: Public funds - local government	49,007,239			49,007,239
Revenue transfer	0			
Net (7)	<b>49,007,239</b>	0	0	49,007,239
<b>General Government funding: transport</b>				
Revenue	0			
Operating costs	0			
Investment costs*	8,251,650			8,251,650
Grant/subsidy: CP5 Settlement	0			0
Revenue transfer (100% to government)	-125,150,637			-125,150,637
Opcoast transfer (100% to government)	173,805,231			173,805,231
Infrastructure cost savings	-467,335	-467,335	0	
Net (8)	<b>56,438,910</b>	-467,335	0	56,906,244
<b>General Government funding: non-transport</b>				
Indirect Tax Revenues (9)	<b>27,473,159</b>	27,473,159		0
<b>Totals</b>				
<b>Broad transport budget (10=7+8)</b>	<b>105,446,149</b>	* These costs exclude developer contributions		
<b>Wider public finances (11=9)</b>	<b>27,473,159</b>			

**Table 3: Analysis of Monetised Costs and Benefits (AMCB)**

Noise	373,297	
Local air quality	0	
Greenhouse gases	2,747,242	
Journey ambience (inc. station amenity and crowding benefits)	0	
Accidents (incl. safety)	5,704,135	
Consumer users (sub-total 1a+1b, Table 1)	174,244,223	
Business users and providers (sub-total 5, Table 1)	24,667,319	
Reliability (including performance)	0	
Option values	0	
Wider public finances (indirect taxation revenues) (sub-total 11)	-27,473,159	Sign changed from Table 2
<b>PV of Benefits (a = sum of all benefits)</b>	<b>180,263,057</b>	
<b>Broad transport budget (sub-total 10)</b>	<b>105,446,149</b>	From Table 2
<b>PV of Costs (b = 10)</b>	<b>105,446,149</b>	
<b>Overall impacts</b>		
<b>NPV (a-b)</b>	<b>74,816,908</b>	
<b>BCR (a/b)</b>	<b>1.71</b>	



Appraisal Summary Table			Date produced: 11/07/2014		Contact:		
Name of scheme:			Metro West Phase 1			Name	Ana Chan
Description of scheme:			Scenario 1:Option 5b, 6 units			Organisation	Network Rail
						Role	Business case analyst
Impacts		Summary of key impacts	Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
			Quantitative	Qualitative			
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes (£)		28,045,103		
			Net journey time changes (£)				
			0 to 2min	2 to 5min			> 5min
			Not available	Not available			Not available
	Reliability impact on Business users	No significant change			0		
	Regeneration	Some impacts					
	Wider Impacts	Some impacts					
Environmental	Noise	Benefits related to modal shift are included.			402,825		
	Air Quality	Benefits related to modal shift are included.			0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)	Not available	2,964,549		
			Change in traded carbon over 60y (CO2e)	Not available			
	Landscape	No significant change					
	Townscape	No significant change					
	Heritage of Historic resources	No significant change					
	Biodiversity	No significant change					
	Water Environment	No significant change					
	Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes (£)		204,662,965	
Net journey time changes (£)							
0 to 2min				2 to 5min	> 5min		
Not available				Not available	Not available		
		Reliability impact on Commuting and Other users	No significant change	Not applicable		0	
		Physical activity	No significant change				
		Journey quality/ambiance	No significant change			0	
		Accidents	Benefits related to modal shift are included.			6,155,334	
		Security	No significant change				
		Access to services	No significant change				
		Affordability	No significant change				
		Severance	No significant change				
		Option values	No significant change				
Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.			-48,427,589		
	Indirect Tax Revenues	Tax costs are included.			-32,765,791		

Appraisal Summary Table			Date produced:		11/07/2014		Contact:	
Name of scheme:			Metro West Phase 1				Name	Ana Chan
Description of scheme:			Scenario 2:Option 5b, 7 units				Organisation	Network Rail
							Role	Business case analyst
Impacts		Summary of key Impacts		Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
				Quantitative				Qualitative
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes (£)			28,045,103		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
	Reliability impact on Business users	No significant change				0		
	Regeneration	Some impacts						
	Wider impacts	Some impacts						
Environmental	Noise	Benefits related to modal shift are included.				402,825		
	Air Quality	Benefits related to modal shift are included.				0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)		Not available	2,964,549		
			Change in traded carbon over 60y (CO2e)		Not available			
	Landscape	No significant change						
	Townscape	No significant change						
	Heritage of Historic resources	No significant change						
	Biodiversity	No significant change						
	Water Environment	No significant change						
	Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes (£)			204,662,965	
Net journey time changes (£)								
0 to 2min				2 to 5min	> 5min			
Not available				Not available	Not available			
Reliability impact on Commuting and Other users		No significant change				0		
Physical activity		No significant change						
Journey quality/ambience		No significant change				0		
Accidents		Benefits related to modal shift are included.				6,155,334		
Security		No significant change						
Access to services		No significant change						
Affordability		No significant change						
Severance		No significant change						
Option values	No significant change							
Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.				-71,647,241		
	Indirect Tax Revenues	Tax costs are included.				-32,765,791		

Appraisal Summary Table			Date produced: 11/07/2014		Contact:		
Name of scheme:			Metro West Phase 1			Name	Ana Chan
Description of scheme:			Scenario 3:Option 6b, 6 units			Organisation	Network Rail
						Role	Business case analyst
Impacts		Summary of key impacts	Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
			Quantitative				Qualitative
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes(£)		23,720,451		
			Net journey time changes (£)				
			0 to 2min	2 to 5min			> 5min
			Not available	Not available			Not available
Environmental	Reliability impact on Business users	No significant change			0		
	Regeneration	Some impacts					
	Wider Impacts	Some impacts					
	Noise	Benefits related to modal shift are included.			363,323		
	Air Quality	Benefits related to modal shift are included.			0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)	Not available	2,673,839		
			Change in traded carbon over 60y (CO2e)	Not available			
	Landscape	No significant change					
	Townscape	No significant change					
	Heritage of Historic resources	No significant change					
Social	Biodiversity	No significant change					
	Water Environment	No significant change					
	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes(£)		169,100,697		
			Net journey time changes (£)				
			0 to 2min	2 to 5min			> 5min
			Not available	Not available			Not available
	Reliability impact on Commuting and Other users	No significant change	Not applicable		0		
	Physical activity	No significant change					
	Journey quality/ambiance	No significant change			0		
	Accidents	Benefits related to modal shift are included.			5,551,727		
	Security	No significant change					
	Access to services	No significant change					
	Affordability	No significant change					
	Severance	No significant change					
	Option values	No significant change					
	Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.			-82,459,014	
Indirect Tax Revenues		Tax costs are included.			-26,728,818		

Appraisal Summary Table			Date produced:		11/07/2014		Contact:	
Name of scheme:			Metro West Phase 1				Name	Ana Chan
Description of scheme:			Scenario 4:Option 6b, 7 units				Organisation	Network Rail
							Role	Business case analyst
Impacts		Summary of key Impacts		Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
				Quantitative				Qualitative
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes(£)			23,720,451		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
	Reliability impact on Business users	No significant change				0		
	Regeneration	Some impacts						
	Wider impacts	Some impacts						
Environmental	Noise	Benefits related to modal shift are included.				363,323		
	Air Quality	Benefits related to modal shift are included.				0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)		Not available	2,673,839		
			Change in traded carbon over 60y (CO2e)		Not available			
	Landscape	No significant change						
	Townscape	No significant change						
	Heritage of Historic resources	No significant change						
	Biodiversity	No significant change						
	Water Environment	No significant change						
	Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes(£)			169,100,697	
		Net journey time changes (£)						
		0 to 2min	2 to 5min	> 5min				
		Not available	Not available	Not available				
Reliability impact on Commuting and Other users		No significant change			Not applicable	0		
Physical activity		No significant change						
Journey quality/ambience		No significant change				0		
Accidents		Benefits related to modal shift are included.				5,551,727		
Security		No significant change						
Access to services		No significant change						
Affordability		No significant change						
Severance		No significant change						
Option values		No significant change						
Public Accounts		Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.				-105,678,666	
		Indirect Tax Revenues	Tax costs are included.				-26,728,818	

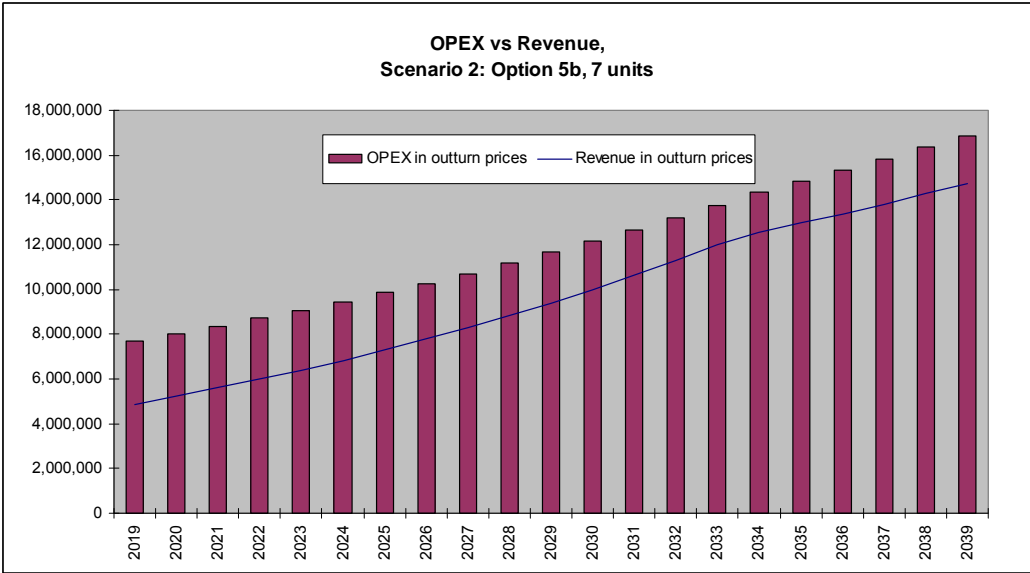
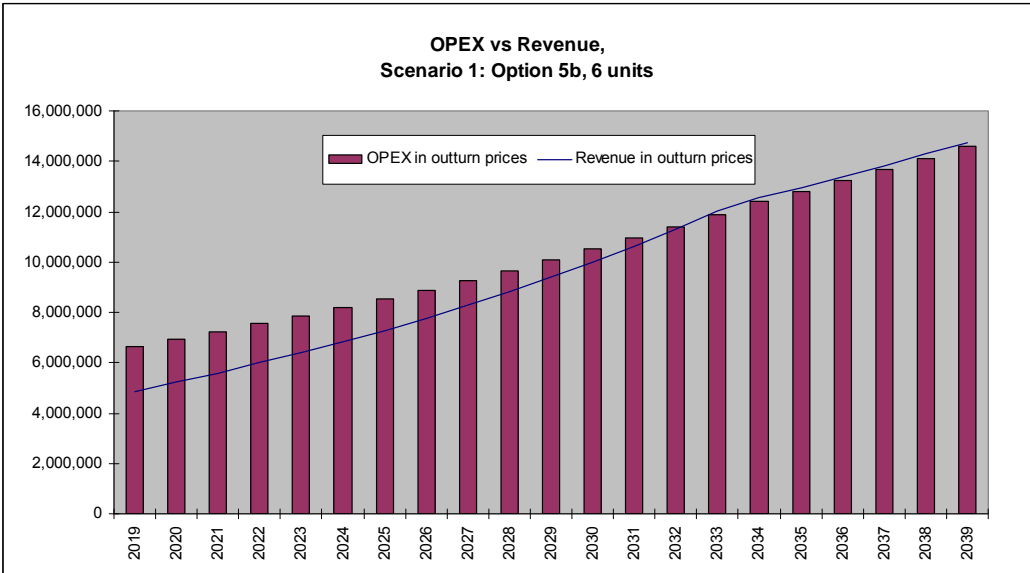
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Name of scheme:			Metro West Phase 1				Name	Ana Chan	
Description of scheme:			Scenario 5:Option 5b enhanced, 6 units				Organisation	Network Rail	
							Role	Business case analyst	
Impacts		Summary of key impacts		Assessment					
				Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes (£)				28,913,172		
			Net journey time changes (£)						
			0 to 2min	2 to 5min	> 5min				
			Not available	Not available	Not available				
	Reliability impact on Business users	No significant change					0		
	Regeneration	Some impacts							
	Wider impacts	Some impacts							
Environmental	Noise	Benefits related to modal shift are included.					413,570		
	Air Quality	Benefits related to modal shift are included.					0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)		Not available	3,043,626			
			Change in traded carbon over 60y (CO2e)		Not available				
	Landscape	No significant change							
	Townscape	No significant change							
	Heritage of Historic resources	No significant change							
	Biodiversity	No significant change							
	Water Environment	No significant change							
	Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes (£)				210,732,946	
Net journey time changes (£)									
0 to 2min				2 to 5min	> 5min				
Not available				Not available	Not available				
		Reliability impact on Commuting and Other users	No significant change	Not applicable				0	
		Physical activity	No significant change						
		Journey quality/ambiance	No significant change					0	
		Accidents	Benefits related to modal shift are included.					6,319,522	
		Security	No significant change						
		Access to services	No significant change						
		Affordability	No significant change						
		Severance	No significant change						
		Option values	No significant change						
Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.					-47,461,144		
	Indirect Tax Revenues	Tax costs are included.					-33,650,458		

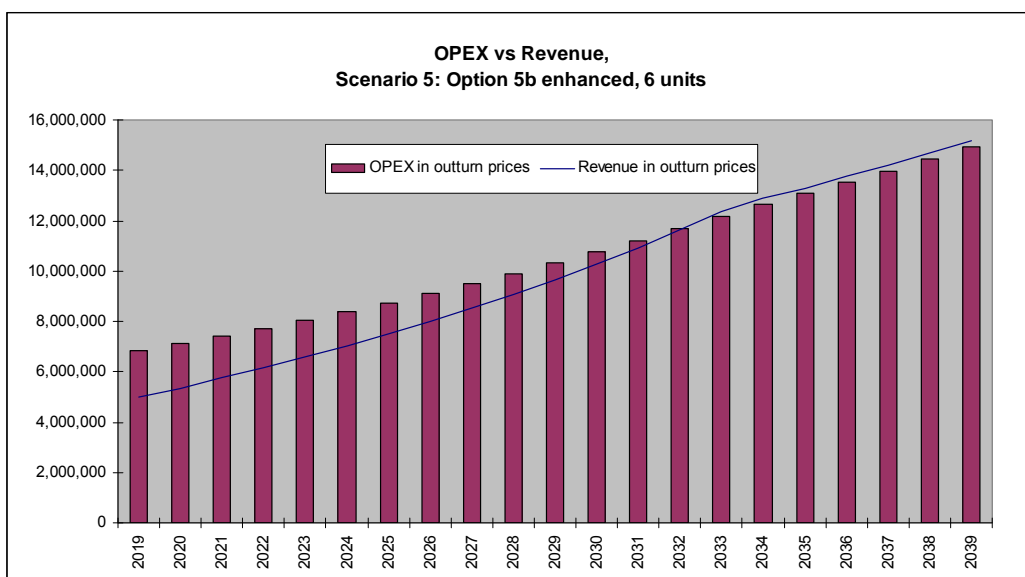
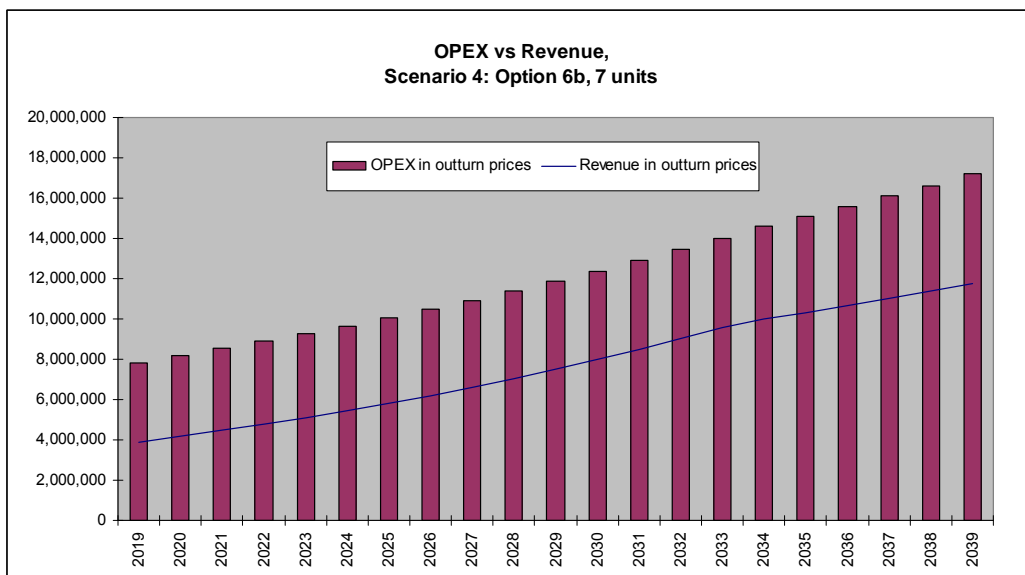
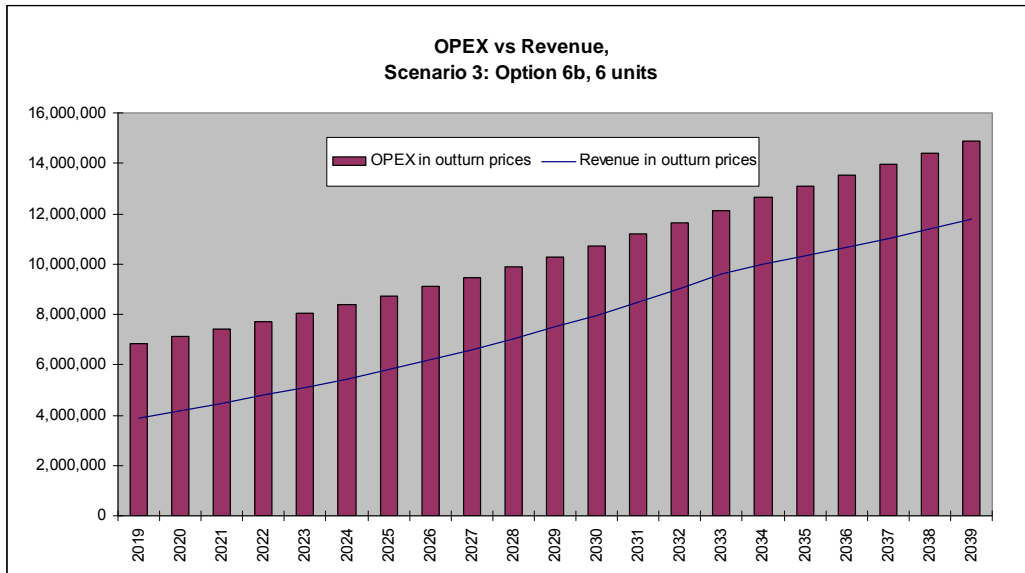
Appraisal Summary Table			Date produced:		11/07/2014		Contact:	
Name of scheme:			Metro West Phase 1				Name	Ana Chan
Description of scheme:			Scenario 6:Option 5b enhanced, 7 units				Organisation	Network Rail
							Role	Business case analyst
Impacts		Summary of key Impacts		Assessment				
				Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes (£)				28,913,172	
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
	Reliability impact on Business users	No significant change					0	
	Regeneration	Some impacts						
	Wider Impacts	Some impacts						
Environmental	Noise	Benefits related to modal shift are included.					413,570	
	Air Quality	Benefits related to modal shift are included.					0	
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)		Not available		3,043,626	
			Change in traded carbon over 60y (CO2e)		Not available			
	Landscape	No significant change						
	Townscape	No significant change						
	Heritage of Historic resources	No significant change						
	Biodiversity	No significant change						
	Water Environment	No significant change						
	Social	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes (£)				210,732,946
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
Reliability impact on Commuting and Other users		No significant change			Not applicable		0	
Physical activity		No significant change						
Journey quality/ambiance		No significant change					0	
Accidents		Benefits related to modal shift are included.					6,319,522	
Security		No significant change						
Access to services		No significant change						
Affordability		No significant change						
Severance		No significant change						
Option values		No significant change						
Public Accounts		Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.					-70,680,796
	Indirect Tax Revenues	Tax costs are included.					-33,650,458	

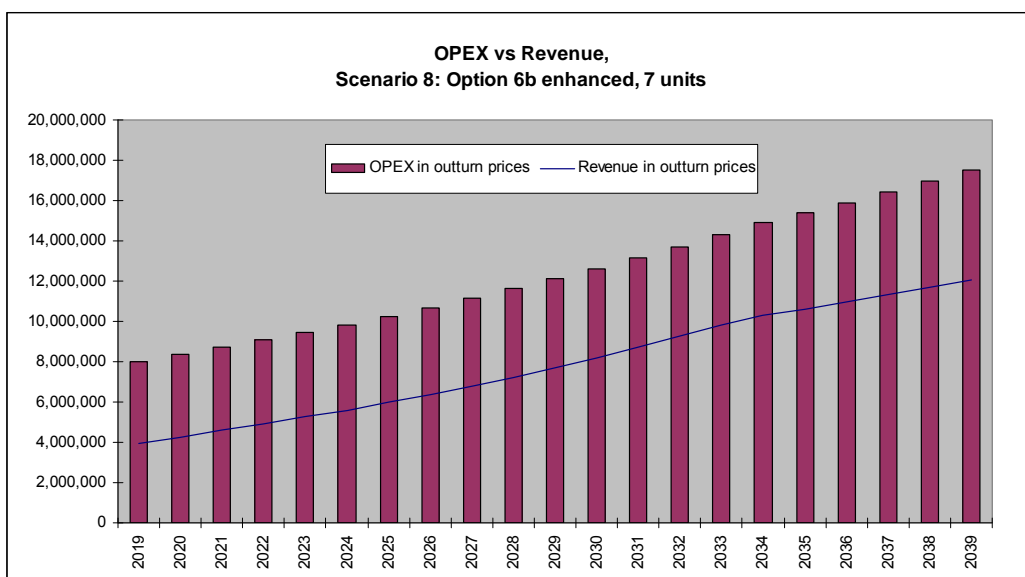
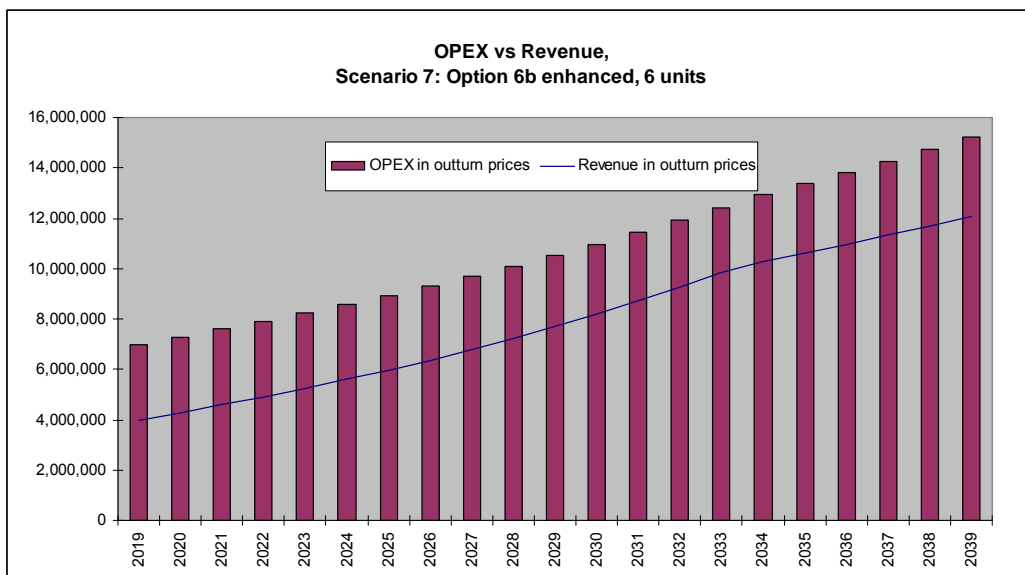
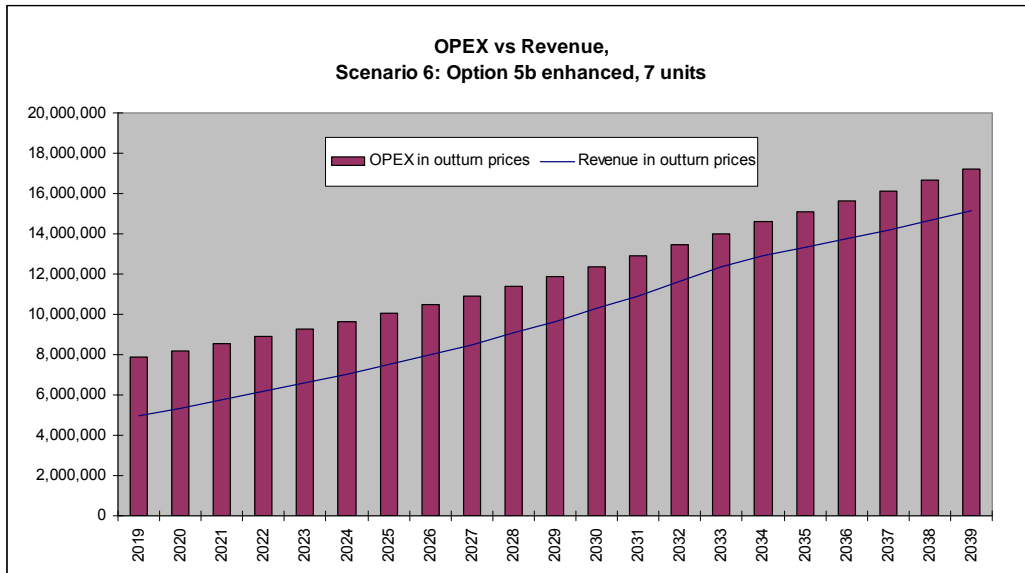
Appraisal Summary Table			Date produced:		11/07/2014		Contact:	
Name of scheme:			Metro West Phase 1				Name	Ana Chan
Description of scheme:			Scenario 7:Option 6b enhanced, 6 units				Organisation	Network Rail
							Role	Business case analyst
Impacts		Summary of key impacts		Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
				Quantitative				Qualitative
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes (£)			24,667,319		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
Environmental	Reliability impact on Business users	No significant change				0		
	Regeneration	Some impacts						
	Wider Impacts	Some impacts						
	Noise	Benefits related to modal shift are included.				373,297		
	Air Quality	Benefits related to modal shift are included.				0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)	Not available	2,747,242			
		Change in traded carbon over 60y (CO2e)	Not available					
	Landscape	No significant change						
	Townscape	No significant change						
	Heritage of Historic resources	No significant change						
Social	Biodiversity	No significant change						
	Water Environment	No significant change						
	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes (£)			174,244,223		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
	Reliability impact on Commuting and Other users	No significant change				0		
	Physical activity	No significant change						
	Journey quality/ambiance	No significant change				0		
	Accidents	Benefits related to modal shift are included.				5,704,135		
	Security	No significant change						
	Access to services	No significant change						
	Affordability	No significant change						
	Severance	No significant change						
	Option values	No significant change						
	Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.				-82,226,497	
Indirect Tax Revenues		Tax costs are included.				-27,473,159		

Appraisal Summary Table			Date produced:		11/07/2014		Contact:	
Name of scheme:			Metro West Phase 1				Name	Ana Chan
Description of scheme:			Scenario 8:Option 6b enhanced, 7 units				Organisation	Network Rail
							Role	Business case analyst
Impacts		Summary of key impacts		Assessment		Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
				Quantitative				Qualitative
Economy	Business users & transport providers	Journey time benefits to work-time rail users, road de-congestion benefits to work time road users and benefits to transport providers are included.	Value of journey time changes(£)			24,667,319		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
Environmental	Reliability impact on Business users	No significant change				0		
	Regeneration	Some impacts						
	Wider Impacts	Some impacts						
	Noise	Benefits related to modal shift are included.				373,297		
	Air Quality	Benefits related to modal shift are included.				0		
	Greenhouse gases	Benefits related to modal shift are included.	Change in non-traded carbon over 60y (CO2e)	Not available	2,747,242			
			Change in traded carbon over 60y (CO2e)	Not available				
	Landscape	No significant change						
	Townscape	No significant change						
	Heritage of Historic resources	No significant change						
Social	Biodiversity	No significant change						
	Water Environment	No significant change						
	Commuting and Other users	Journey time benefits to non work-time rail users and road de-congestion benefits to non work time road users are included.	Value of journey time changes(£)			174,244,223		
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
			Not available	Not available	Not available			
	Reliability impact on Commuting and Other users	No significant change				0		
	Physical activity	No significant change						
	Journey quality/ambience	No significant change				0		
	Accidents	Benefits related to modal shift are included.				5,704,135		
	Security	No significant change						
	Access to services	No significant change						
	Affordability	No significant change						
	Severance	No significant change						
	Option values	No significant change						
	Public Accounts	Cost to Broad Transport Budget	Capital grant costs to government, revenue transferred to government, operating costs transferred to government and road infrastructure cost savings to government (associated with modal shift) are included.				-105,446,149	
Indirect Tax Revenues		Tax costs are included.				-27,473,159		

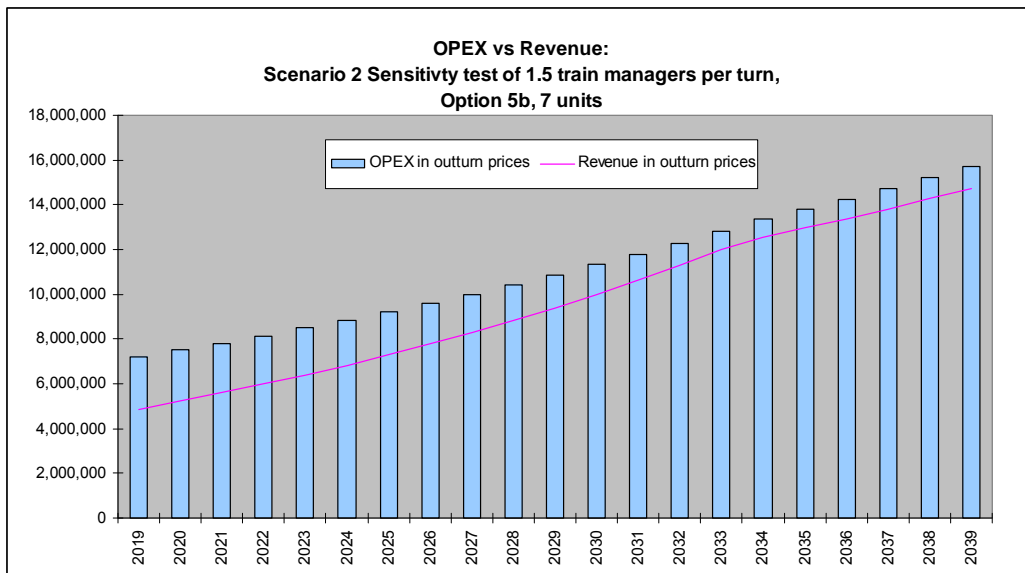
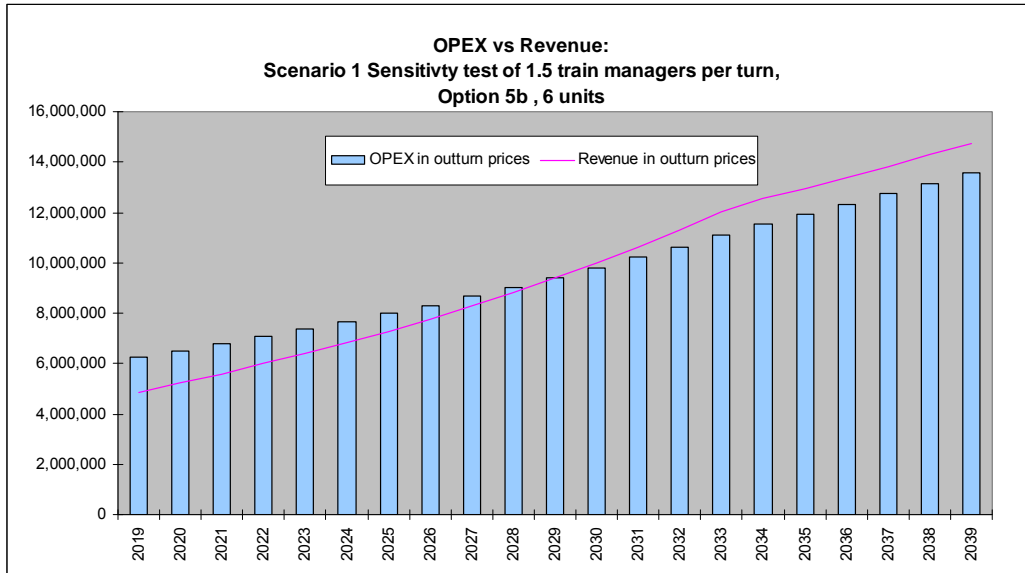
Central Scenario: OPEX versus revenue, in outturn prices, to 2039



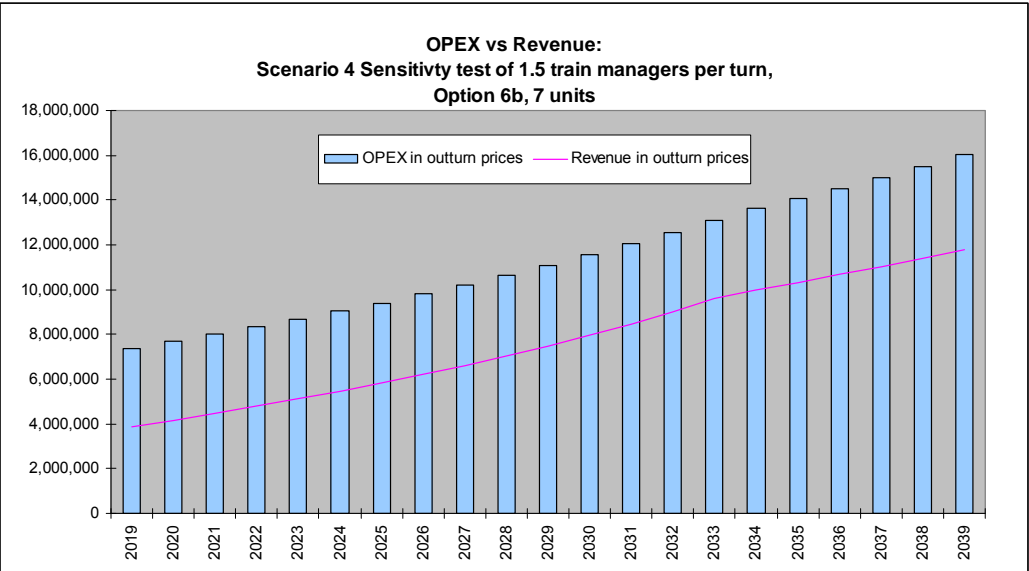
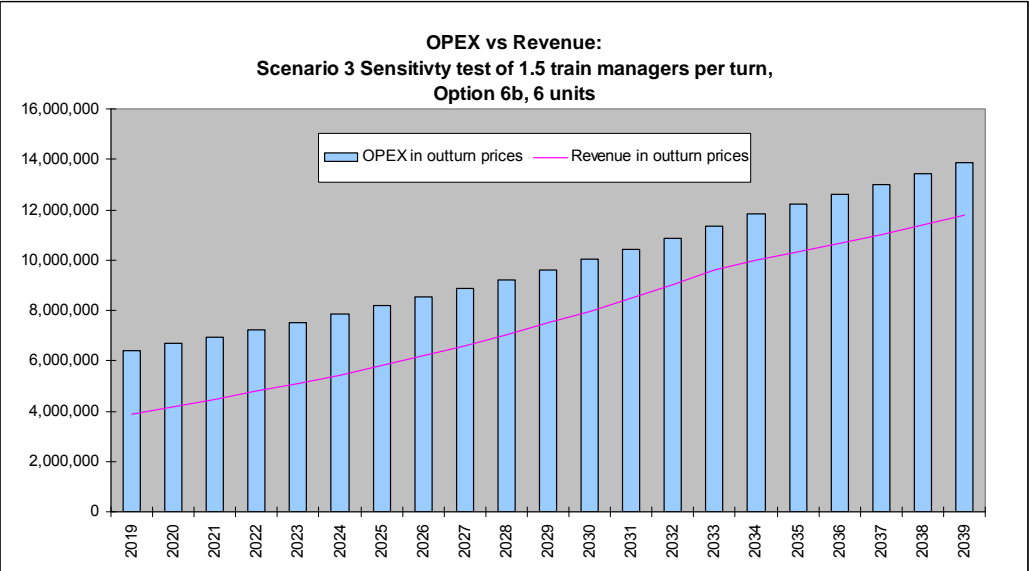


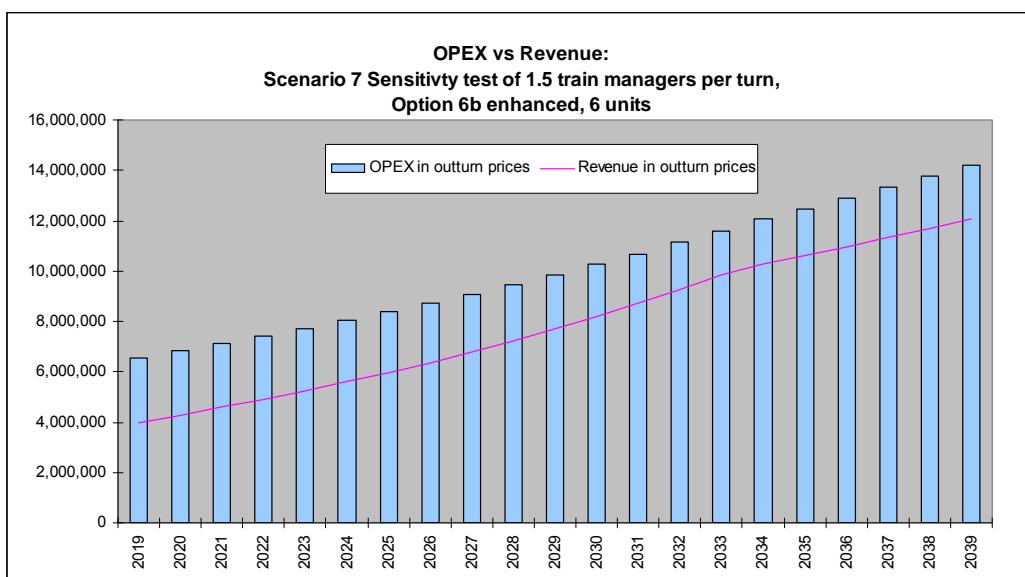
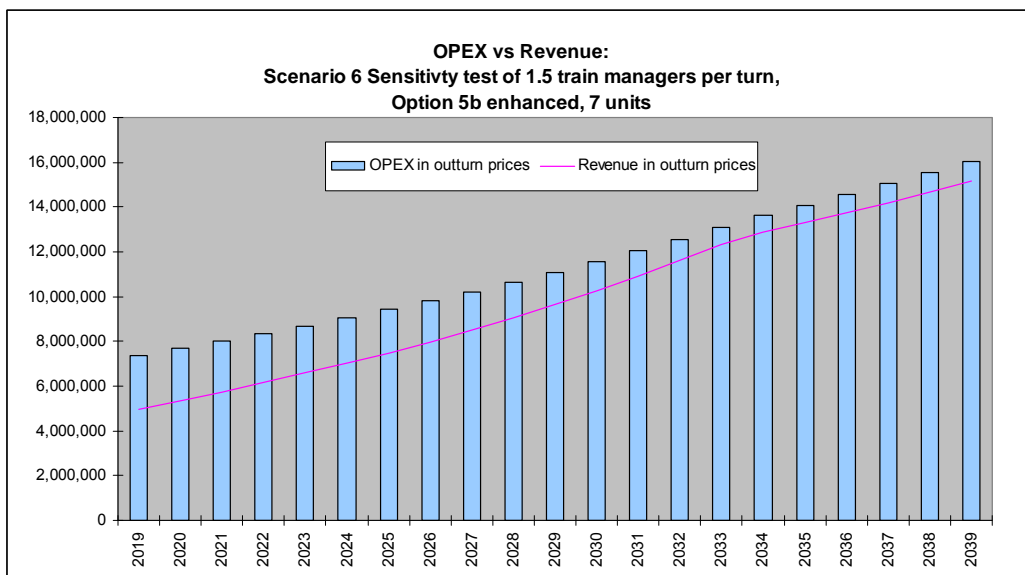
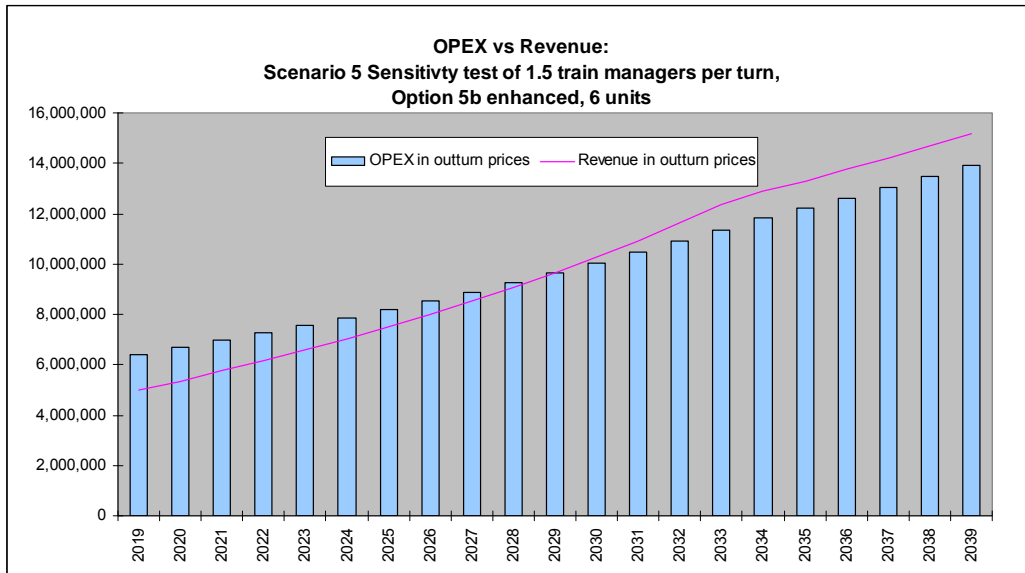


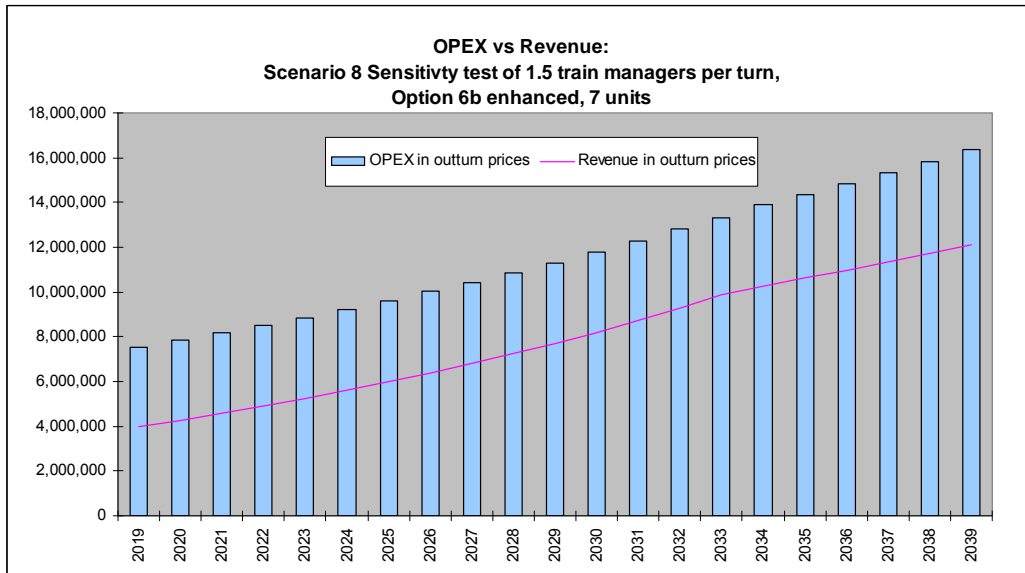
**Sensitivity test 1 (1.5 train managers per turn): OPEX versus revenue, in outturn prices, to 2039**



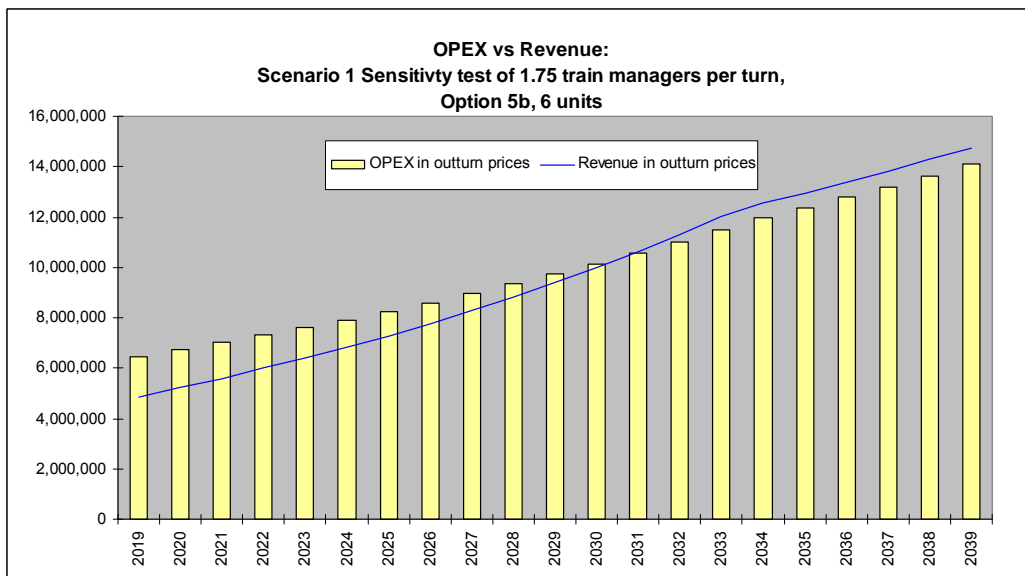


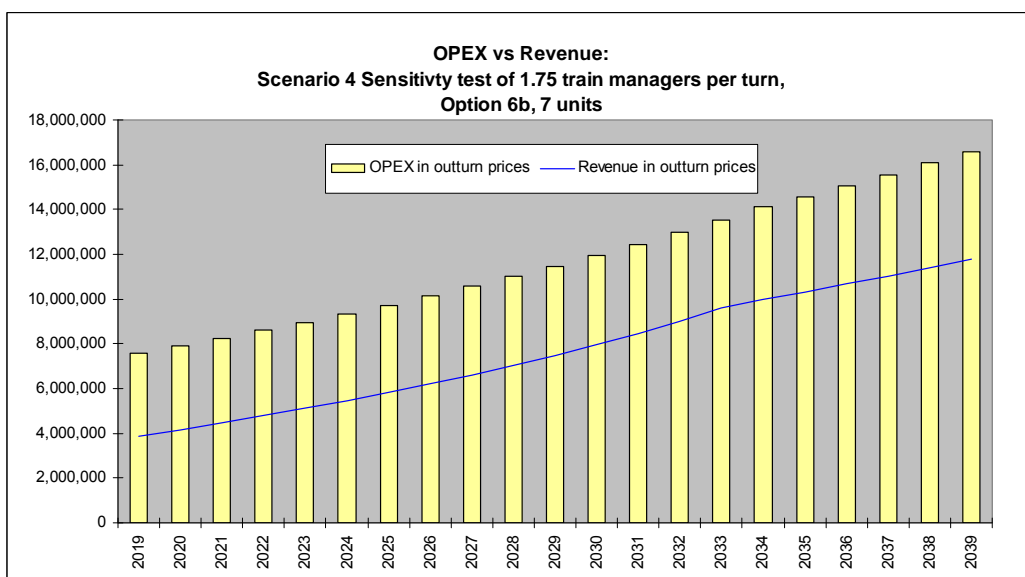
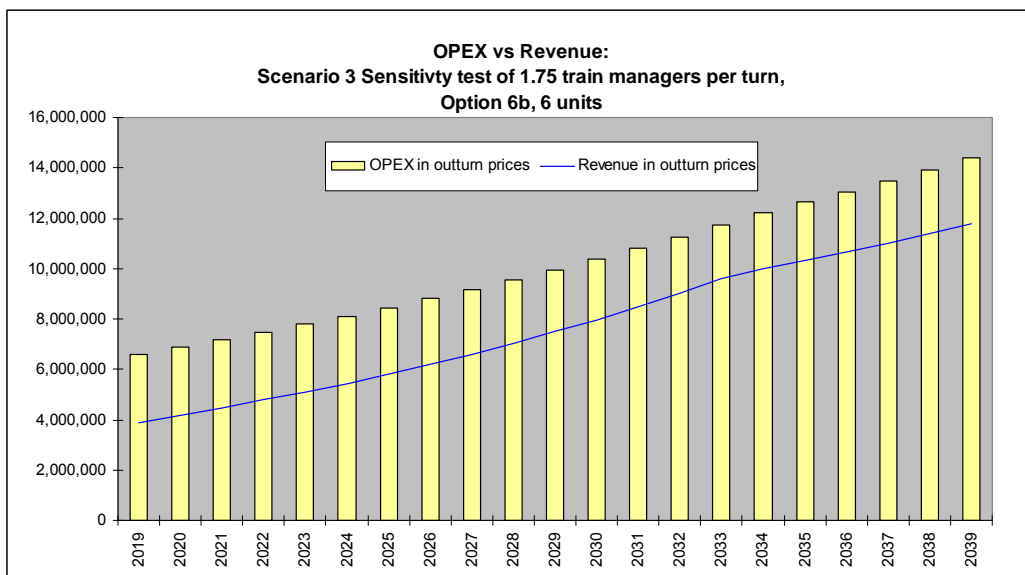
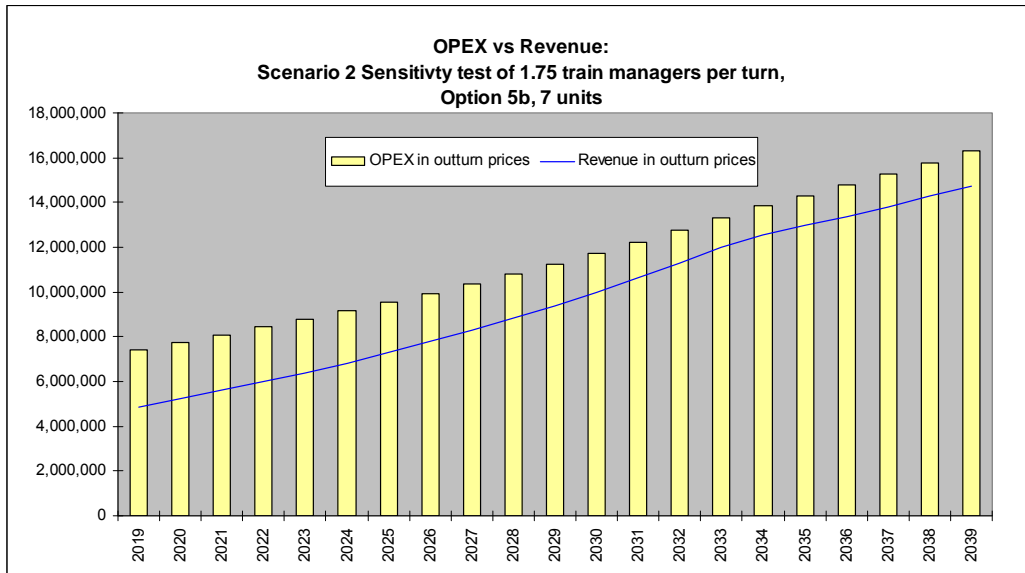


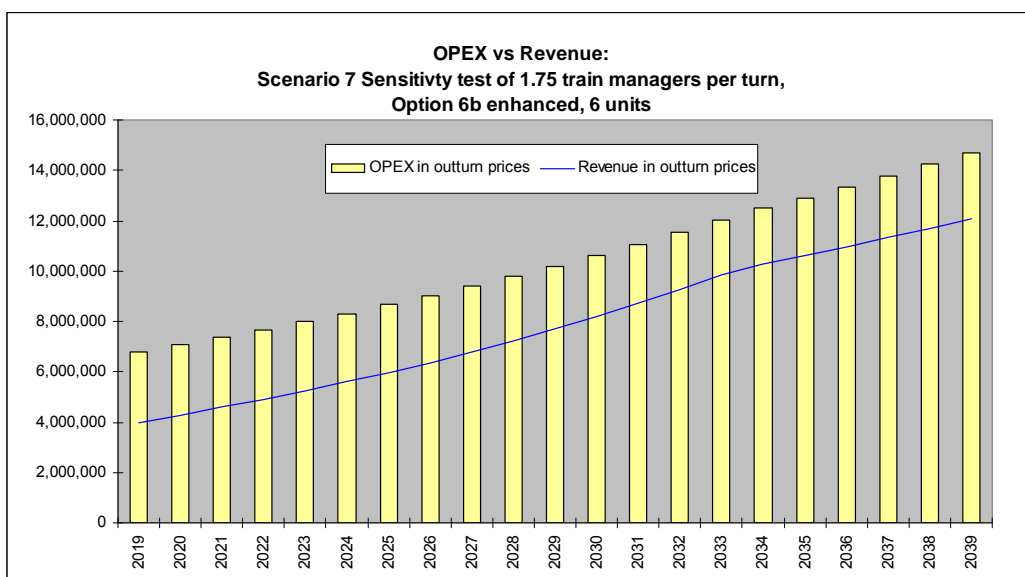
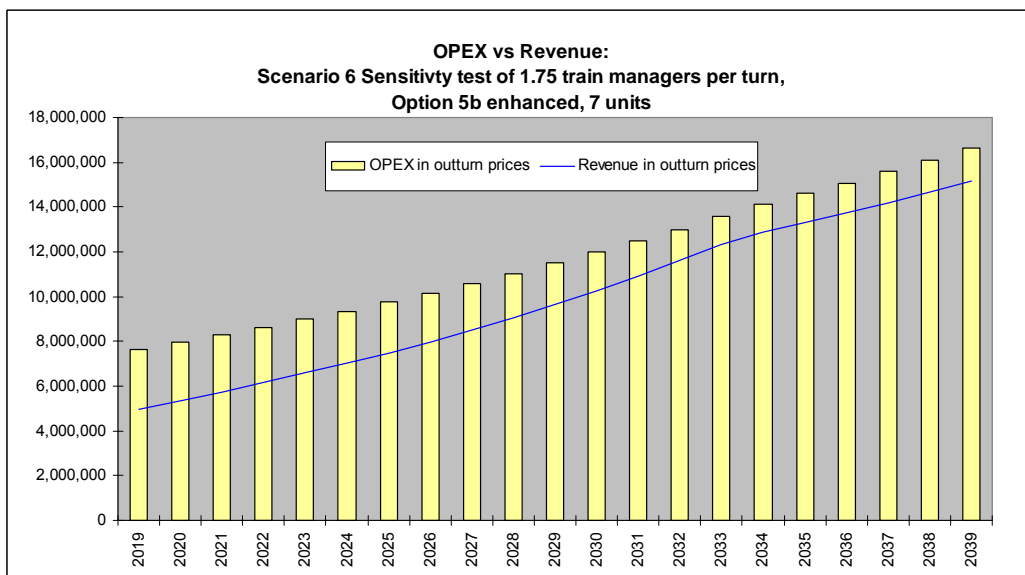
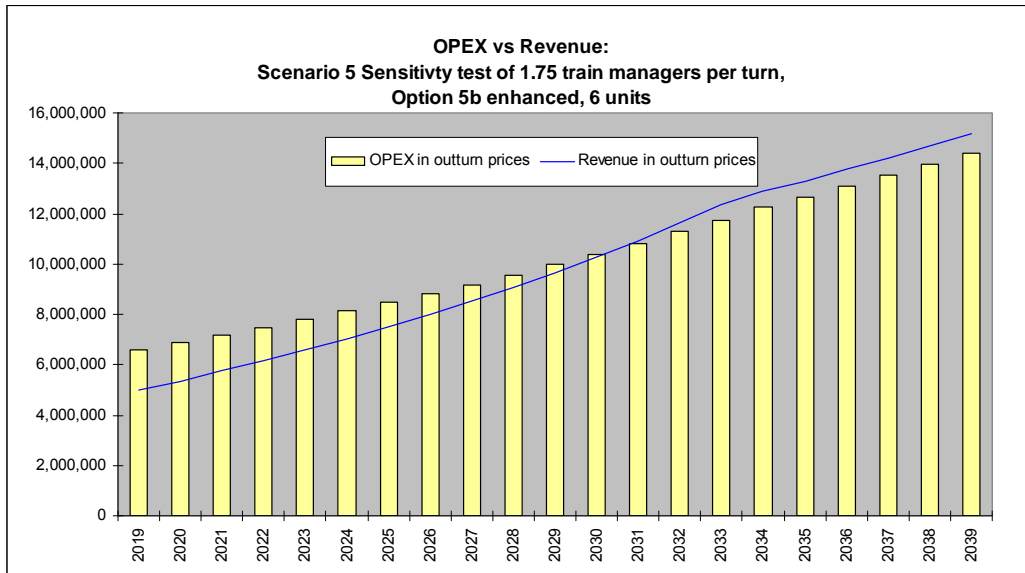


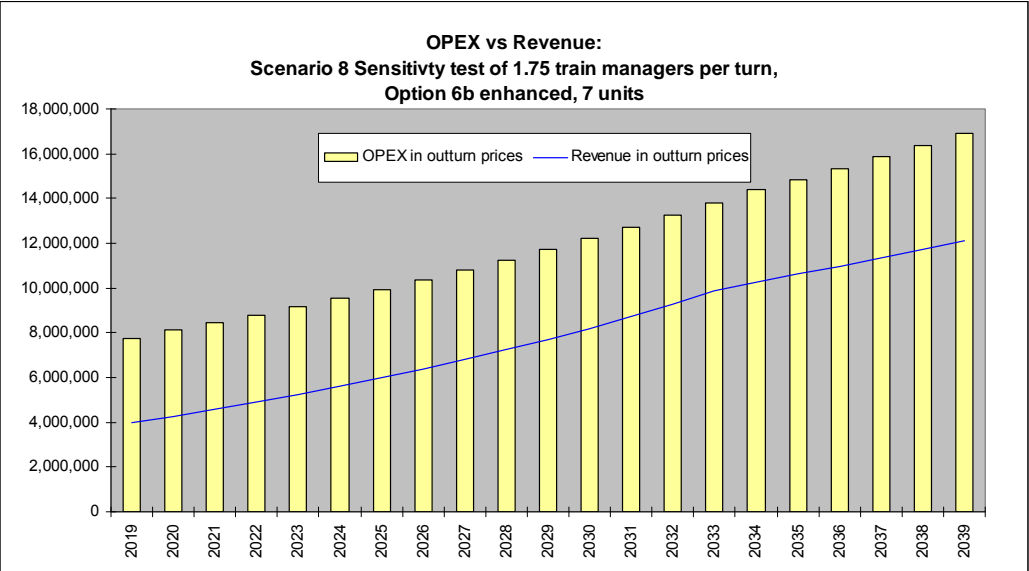


**Sensitivity test 2 (1.75 train managers per turn): OPEX versus revenue, in outturn prices, to 2039**









# **MetroWest Phase 1 Preliminary (Strategic Outline) Business Case**

## **Forecasting Report**

Prepared for  
**North Somerset Council**

23 July 2014

**CH2MHILL®**

1 The Square  
Temple Quay  
Bristol  
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# Document History

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MetroWest Phase 1

Preliminary (Strategic Outline) Business Case  
Forecasting Report

North Somerset Council

This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
1.0	23.7.14	Final Draft Report	Gareth Walters / Sheng Peng	Chris Bushell	David Crockett / Chris Bushell



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Appendix A – TEE Table TUBA Highway Benefits



# 1. Introduction

---

## 1.1 Background

MetroWest (formerly known as the Greater Bristol Metro), is an ambitious programme that will transform the provision of local rail services across the West of England. MetroWest comprises of a range of projects from relatively large major schemes, entailing both infrastructure and service enhancement, to smaller scale projects. MetroWest is being jointly promoted and developed by the four West of England councils (Bath & North East Somerset, Bristol City, North Somerset and South Gloucestershire Councils).

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
- Broadly half-hourly service frequency (with some variations possible, pending business case)
- Cross-Bristol service patterns (i.e Bath to Severn Beach)
- Providing a Metro-type service appropriate for a city region of 1 million population

The programme includes:

- MetroWest Phase 1 – half-hourly local service for the Severn Beach line, Bath to Bristol line and a reopened Portishead line with stations at Portishead and Pill
- MetroWest Phase 2 – half-hourly service for the Yate to Bristol line and an hourly service for a reopened Henbury line, with stations at Henbury, North Filton, and possibly Ashley Down and Horfield
- Further additional station openings subject to separate business cases
- Other potential enhancements including the feasibility of extending electrification across the West of England network.

The purpose of this report is to document the forecasting approach for the assessment of scheme benefits for transport network users.

## 1.2 The Scheme

Figure 1.1 provides an overview of the MetroWest Phases 1 and 2 proposed train services.

Two main options of service specifications are proposed for Phase 1 business case assessment, which are Option 5b and Option 6b. There are two variants to each option. The service specification of each option is described as follows:

### Option 5b

- Severn Beach to Bath Spa: 1 train per hour (tph) all day;
- Avonmouth to Portishead: 1tph all day; and
- Portishead to Bristol Temple Meads: 1tph in the morning and evening three-hour peaks only.

Stopping at: Pill, Parson Street, Bristol Temple Meads, Keynsham, Oldfield Park, St.Andrews Road, Avonmouth, Portway, Shirehampton, Sea Mills, Clifton Down, Redland, Montpelier, Stapleton Road and Lawrence Hill.

### Option 5b enhanced

Same as Option 5b except:

- Portishead to Bristol Temple Meads: 1tph all day

### Option 6b

- Portishead to Bath Spa: 1tph in the morning and evening three-hour peaks only;
- Portishead to Avonmouth: 1tph all day; and
- Severn Beach to Bristol Temple Meads: 1tph all day.

Off peak service pattern is as above but operating 1tph Bristol Temple Meads to Bath Spa rather than Portishead to Bath Spa.

### Option 6b enhanced

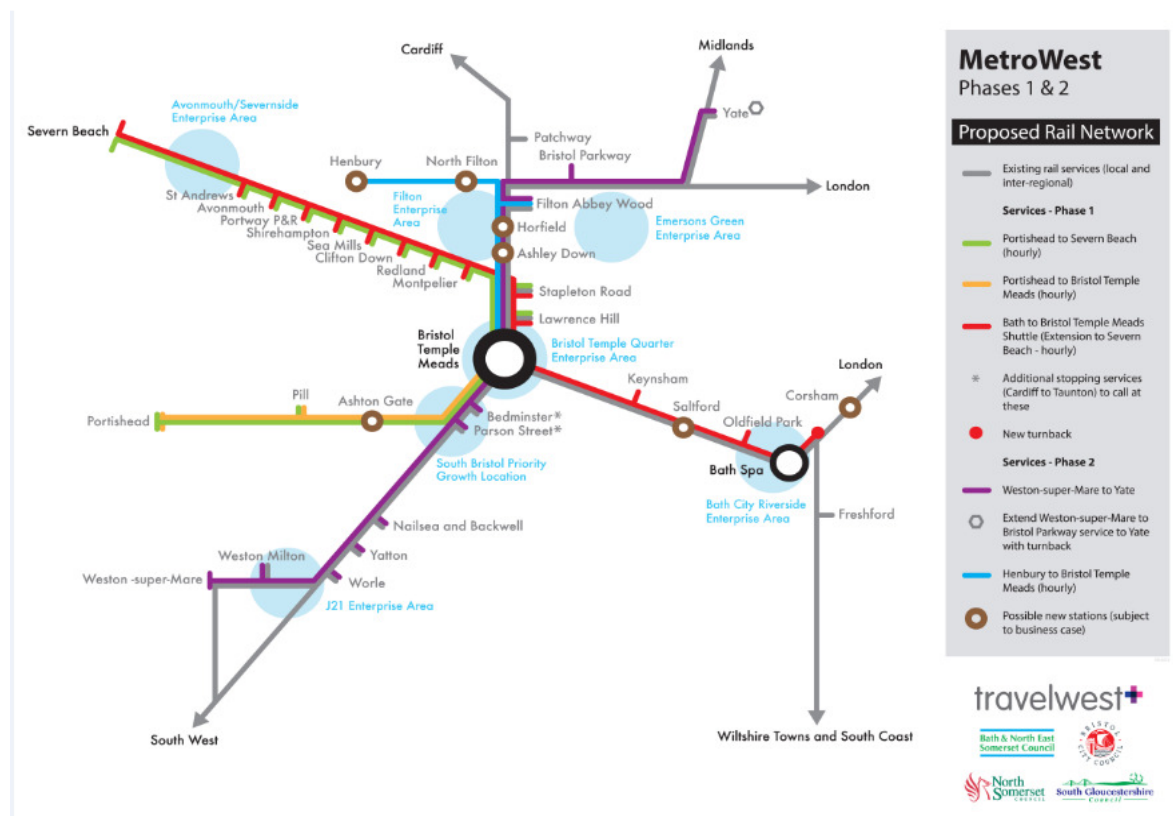
Same as Option 6b except:

- Portishead to Bath Spa operates 1tph all day, i.e. Portishead line has half hourly frequency on weekday.

Stopping at: Pill, Parson Street, Bristol Temple Meads, Keynsham, Oldfield Park, St.Andrews Road, Avonmouth, Portway, Shirehampton, Sea Mills, Clifton Down, Redland, Montpelier, Stapleton Road and Lawrence Hill.

The current MetroWest Phase 1 programme is targeting a project opening year of 2019.

Figure 1.1 MetroWest scheme



## 1.3 Modelling System

The key rationale of the methodology is that it makes best use of available tools. In particular, it utilises tools and approaches accepted by the rail industry and the existing GBATS multi-modal model. The

methodology is in accordance with both WebTAG and Guide to Railway Investment Projects (GRIP) demand forecasting requirements. The Department for Transport's (DfT's) Transport Appraisal Guidance (WebTAG) has recently been restructured, with a major release of new and revised modules in January 2014. The methodology is consistent with the restructured guidance and revised modules.

## 1.4 Structure of Report

Following this introduction Chapter, the report is structured as follows:

- Chapter 2: Forecasting Approach;
- Chapter 3: New Station Demand Forecasting;
- Chapter 4: Highway Network Impacts; and
- Chapter 5: Summary.





## 2. Forecasting Approach

---

### 2.1 Introduction

The assessment approach makes best use of available assessment tools. In particular, it utilises tools and approaches accepted by the rail industry and the existing GBATS multi-modal model, a tool accepted by the DfT as appropriate for (ultimately successful) applications for major schemes.

The methodology used is in accordance with both WebTAG and Guide to Railway Investment Projects (GRIP) demand forecasting requirements.

Advice relating to demand forecasting of rail-based schemes is in TAG Units M1-1 and M4, noting in the first instance that there are two main approaches to modelling rail passenger demand. 'Multi-stage' modelling may be employed, such as making use of an existing multi-modal transport model. Alternatively, an elasticity based approach may be used.

The guidance notes there are advantages and disadvantages to both. In particular though, multi-stage models are cited as often being less accurate (than elasticity approaches) when forecasting rail. This is not necessarily a problem specific to rail but to 'minority modes' (rail accounts for only about 2% of all journeys in the UK). Multi-stage models do not always reflect growth in the demand for travel by modes, as they concentrate on overall demand modelled as a function of demographic characteristics and car ownership trends. For instance, National Travel Survey (NTS) surveys indicate a disconnect between demographic changes and growth in rail use, such that the rate of rail trip making has risen by more than simply population.

Elasticity approaches are therefore commonly used in rail forecasting. Those suggested in TAG Unit M4 (section 8) draw heavily on the Passenger Demand Forecasting Handbook (PDFH), which sets out relationships between rail demand and service related characteristics.

### 2.2 Rail Forecasting

A combination of bespoke spreadsheet models and MOIRA are proposed to assess rail enhancements offered by MetroWest Phase 1. There are three main elements covered:

- Trips at new stations (on existing and re-opened lines);
- Diversions of existing trips to new stations; and
- Changes in demand at existing stations from new or amended services (including suppression of demand by extra station calls).

These tools combine to form a 'rail demand model' (RDM).

The demand forecasting approach for new stations is set out in detail in the next section.

The value for money assessment of the MetroWest will be undertaken using a Discounted Cash Flow (DCF) model developed by Network Rail. The model is used for socio-economic appraisal and developed in accordance with WebTAG. It enables the quantification and monetisation of benefits and costs. The model considers a stream of costs and benefits, which are presented in 2010 present values over the appraisal period. The key outputs of the assessment is the Benefit Cost Ratio (BCR) to the Government, Transport Economic Efficiency (TEE) tables and associated Appraisal Summary Table inputs as required by DfT for enhancement schemes that require Government funding.

The DCF model was used to develop business cases that informed the development of DfT's High Level Output Statement (HLOS) and Network Rail's Business Plan for Control Period Five (CP5). The model has been audited by a number of consultants commissioned by DfT.

The DCF model incorporates the following elements:

- Investment cost (capital expenditure);
- Operating cost;
- Other government impacts (e.g. indirect taxation);
- Revenue impact;
- Rail demand;
- Benefits to rail users;
- Benefits to non-rail users; and
- Disbenefits to rail and non-rail users.

The changes in demand at existing stations and DCF assessment are documented in the Network Rail Metro West Phase One Economic Appraisal Report, July 2014, included as a separate appendix to the Preliminary Business Case.

## 2.3 Highway Network Impacts

Without a network model, benefits to non-users are typically calculated using the External Cost of Car Use (ECCU) model from WebTAG Unit A5-4. The ECCU shows the unit rate of removing one mile of road journey for each road type and congestion level by Government Region. This unit rate comprises of impact on road congestion, greenhouse gases and noise and air pollution. The DCF model estimates the total road mileage removed by incorporating MOIRA rail mileage output and converted to equivalent road mileage following WebTAG. The ECCU unit rate for South West region is then applied to the road mileage to calculate the non-rail user benefits.

Since a multi-modal model, including a highway assignment model, is available, this has been used as a cross check of highway benefits, in particular in assessing the benefits accrued via changes to highway trips. The principal tools used in this assessment are:

- Outputs from the RDM,
- The Greater Bristol multi-modal model (GBATS); and
- TUBA.

### GBATS

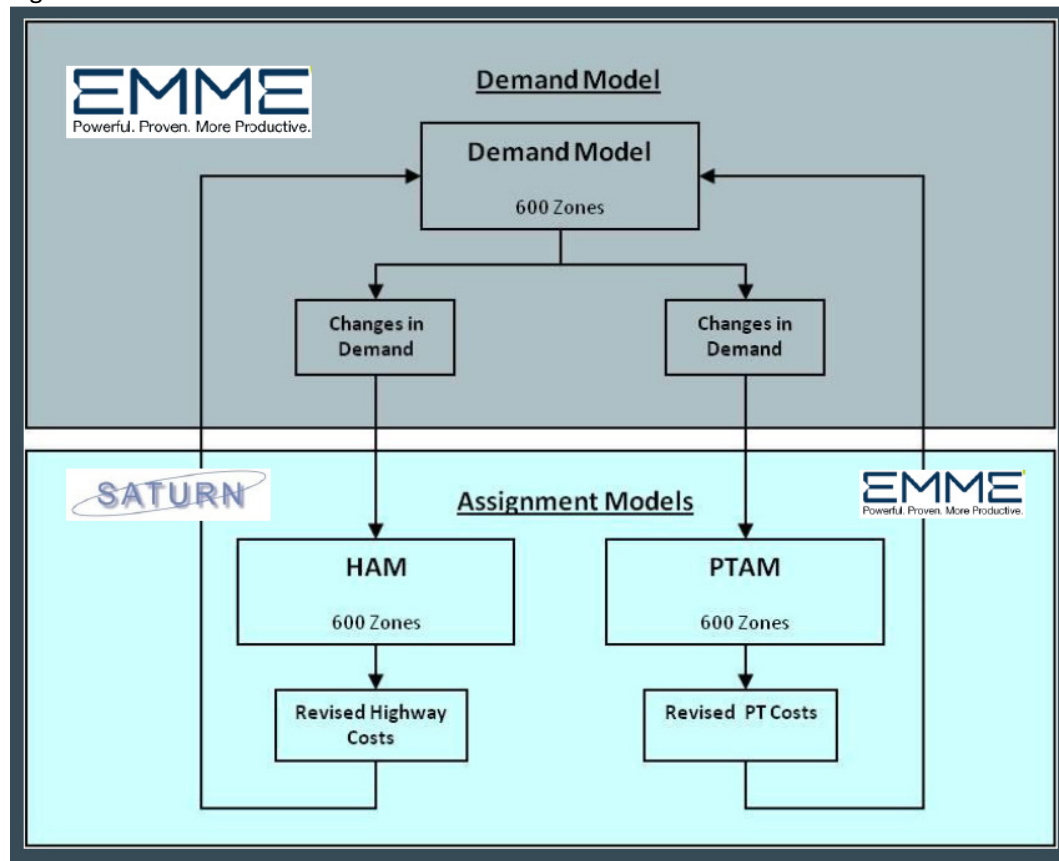
GBATS is the existing multi-modal model for the greater Bristol area which has been developed to be WebTAG compliant and used to assess a number of schemes in the area that have been given funding approval by the DfT<sup>1</sup>. GBATS produces matrices of trips and journey data (time, cost and distance) for three time periods (AM peak, inter-peak and PM peak hours) and several modes (car, bus, rail and BRT), also sub-divided by user class (commuting, other home based trips and business journeys) and income level of travellers.

Figure 2.1 shows the structure of the model in terms of interactions between the demand and assignment models.

---

<sup>1</sup> Ashton Vale to Bristol City Centre Rapid Transit, North Fringe to Hengrove Package, South Bristol Link and Local Sustainable Transport Fund.

Figure 2.1 Demand model structure



GBATS3 has developed in recent years with several slightly different local versions being developed for particular purposes, each with an emphasis on different areas and/or transport schemes. Following discussions with officers of the West of England authorities, the 'SBL' (South Bristol Link) version of GBATS3 has been used for the Preliminary Business Case.

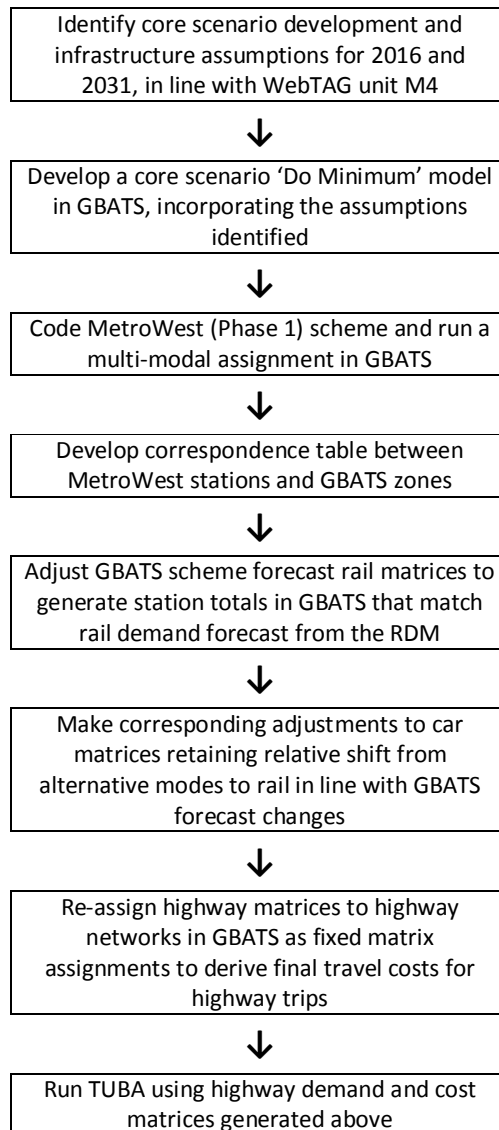
Further information about the GBATS3 SBL model, including further details of forecasting assumptions, can be found in the following reports which are included as supporting documents to the Preliminary Business Case:

- South Bristol Link Data Collection Report, April 2013
- South Bristol Link HAM Validation Report, April 2013
- South Bristol Link PTAM Validation Report, April 2013
- South Bristol Link Demand Model Report, April 2013
- South Bristol Link Forecasting Report, April 2013

GBATS3 has two forecast years, 2016 and 2031. As such, 2016 has been used as the proxy for the scheme opening year of 2019. This results in a conservative estimation of highway benefits.

The methodology for undertaking a cross-check of highway benefits involves taking the results from the RDM and using them to adjust the inputs to GBATS (and hence TUBA) accordingly. The steps in the methodology are shown in Figure 2.2.

Figure 2.2: Highway benefits cross-check – methodology



## 2.4 Modelling Responsibilities

The modelling approach has been carried out jointly by CH2M HILL and Network Rail, with the lead taken on individual elements as appropriate. This is summarised as follows (and illustrated in Table 2.1):

- CH2M HILL lead on developing the new stations model and diversions model, building on models previously developed for the West of England Rail Studies.
- Network Rail take the results of this modelling, incorporating them into the overall demand forecasts the constitute outputs from the RDM.
- Network Rail prepare the socio-economic appraisal (value for money assessment and benefit cost ratio), including the impact on non-user benefits (e.g. carbon and environment) estimated using the external costs of car use assumptions from WebTAG, using the DCF.
- CH2M HILL responsible for the highway benefits cross check, taking outputs from the RDM and utilising GBATS and TUBA to calculate benefits.
- Network Rail finalise the socio-economic assessment prepared using the DCF with GBATS/TUBA results from the highway benefits cross check.

Table 2.1 MetroWest modelling lead for each key element

Models	CH2M HILL	Network Rail
<b>RDM</b>		
New stations model	✓	
Diversions model	✓	
MOIRA		✓
Future year		✓
<b>Socio-Economic Analysis</b>		
DCF		✓
GBATS	✓	
TUBA	✓	



## 3. New Station Demand Forecasting

---

### 3.1 Methodology

Forecasts of demand for the new stations proposed as part of MetroWest Phase 1 have been carried out using a methodology derived from that used for recent studies associated with the original development of MetroWest Phase 1, as well as MetroWest Phase 2 and the 'new stations package'. The methodology makes use of rail industry data and derived techniques to forecast demand at new stations broadly based on relationships at existing stations elsewhere. No data has been specifically collected, forecasts have therefore employed existing data sources.

Note that demand forecasts described and presented in this section of the report are for scheme appraisal purposes, and relate solely to new stations in MetroWest Phase 1. As such, they do not include effects elsewhere on the MetroWest network. Furthermore, sensitivity testing and risk assessments, such as into the likelihood of achieving the demand postulated, has not been carried out. This should be considered in using the forecasts for financial assessments.

#### 3.1.1 Main data sources

##### *National Rail Travel Survey (NRTS)*

The National Rail Travel Survey (NRTS) estimates the number of rail trips at stations on a typical day and includes origins and destinations of trips using the rail network, both the rail journeys themselves (first, intermediate and last stations used) and the 'true' origin and destination of trips (including the locations where the overall journey started and finished, such as home, work or other location and the mode of station access/egress). Other journey characteristics derived from NRTS data includes ticket types, journey purposes and journey frequency. NRTS data is key to developing the model for new stations.

##### *Office of Rail Regulation (ORR) statistics*

Passenger boardings and alightings at stations. The latest ORR station statistics were published in February 2014 covering the annual period 2012-13. ORR station totals are used in conjunction with NRTS and other data to update figures as required.

##### *West of England annual station survey*

Passenger counts at stations. The latest West of England station survey was carried out in November 2013. The survey results are used in conjunction with ORR station statistics where appropriate.

##### *MOIRA*

MOIRA is used by the rail industry to forecast the impact of timetables on passenger revenue, including analysing the effect of changes such as stopping patterns, infrastructure and rolling stock on the passenger numbers carried and the revenue impact. MOIRA1 has been used to assess the impacts of MetroWest Phase 1 on the wider rail network.<sup>2</sup> In addition, generalised journey time, demand and revenue figures have been extracted from MOIRA1 for stations in the MetroWest area to use in the forecasts of the new stations.

##### *Passenger Demand Forecasting Handbook (PDFH)*

The PDFH summarises knowledge of the effects of changes to services, fares and other factors on rail passenger demand, and provides guidance on applying this to forecasts. Values in the PDFH can be used to assess demand responses to timetabling and operating decisions. Various PDFH relationships have been employed to adjust forecasts where the source data is based on different circumstances (for instance, scaling demand from a station with a better frequency of train service).

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<sup>2</sup> MetroWest Phase 1 demand at existing stations has been assessed by Network Rail using MOIRA1

### 3.1.2 New station demand forecasts

A series of approaches have been used to assess different aspects of new stations. These consider three main elements that together enable the net total benefit to the railway to be established, and include:

- Total trips generated by the new station;
- Existing rail trips diverted from existing trips to the new station; and
- Suppression of demand at existing stations by an extra station call by passing services.

#### *Total station demand*

This has employed a simple regression and gravity model technique, which takes into account the relationship between journeys and catchments at a number of similar stations. Regression has been used to identify a series of demand/catchment relationships for several types of movements, including journeys made using full price tickets, reduced price tickets and season tickets, and between 'independent' stations (such as Keynsham), 'regional' stations (such as Bristol Parkway), 'urban' stations (such as Stapleton Road) and London stations, as the characteristics of such trips can differ.

Stations used in the regressions are drawn from the local West of England area locations as much as possible. The specific regression models used to forecast demand at the MetroWest Phase stations have been calibrated using demand quantum and access modes at a combination of Nailsea & Backwell, Bridgwater and Keynsham stations, as these are considered the most reasonable demographic fit as similar 'independent' characteristic stations to the catchments for Portishead and Pill.

#### *Distribution of trips*

Total new station demand has been derived from the regression model. This is distributed to determine the destinations of trips from the new stations using a synthetic gravity model. A gravity model has been set up that makes use of the full catchment of destination stations for rail users in the MetroWest area (derived from local stations to Portishead). Generalised journey times have been derived for each potential movement from MOIRA data, and population catchments extracted from Census data.

Gravity model powers were broadly calibrated with reference to Nailsea & Backwell station's trip distribution, to build in inherent local tendencies to make long or short distance trips. This process doesn't manifestly change the total demand, adjusting it slightly to accentuate or reduce the new stations' propensity for longer trips compared to Nailsea & Backwell (basically reducing, as Nailsea & Backwell is served by direct trains to/from London Paddington). It does though facilitate calculation of revenue based on the mix of short, medium and longer distance trips in the distribution.

#### *Diversions of existing trips to new station*

An estimate of how many trips are new to the railway or transferring from other stations has been made using a station choice logit model, with generalised costs calculated for whole journeys from origin (home in many cases) to destination (for example, work) via the existing station used, compared with a similar trip using the new station. NRTS data identifies true origin and destination of rail users.

This model calculates propensity to change stations based initially on a simple logit approach for trips at stations in the MetroWest area. The difference between the distance from origin to original station and origin to new station is used to calculate a competing generalised journey time for an existing trip, to use the new station instead of the one it actually uses. The initial 'mode shift' calculated in this manner derives the theoretical mode share based purely on generalised cost, which if unadjusted could result in higher transfers than would be realistic. As such, this has been calibrated using behaviour at existing stations, with a broad catchment defined for each new station and the main principle being that unrealistic transfers are eliminated. For example, it is considered highly unlikely that trips using Severn Beach line stations, which are the closest existing stations to both Pill and Portishead (but which are also basically local stations and not railheads), would transfer to either Pill or Portishead. Also, care has been taken to consider longer distance railhead movements from the Pill/Portishead catchment that use major stations such as Bristol Temple Meads.



### *Suppression of demand*

Overlaying the demand of a new station is potential loss of existing rail passengers, where there is potential to affect demand on services passing through (and stopping) at the new station, and lengthening journey times. This could have a significant effect on revenue if the services are fast and/or long distance, where the journey time penalty is greater and/or fares paid are higher than more local journeys. The new stations at Portishead and Pill are not located on an existing passenger rail line, and no existing services would be delayed to stop at them. As such, suppression of demand at existing stations does not explicitly apply to these new stations.

### *Station parking charges*

The demand forecasts implicitly assume that a Portishead station car park would be a pay facility, in the first instance because key stations in the area that have been used to calibrate forecasts have car parks that levy charges. However, the specific level of charge has not been considered at this stage, other than assuming it would be similar to the costs at nearby stations, in particular Nailsea & Backwell (which is currently £1.50 per day for peak users) and Yatton (£2.30 per day). A charging regime will be considered along with car park access and capacity considerations as MetroWest Phase 1 development proceeds.

## **3.1.3 Future demand**

Demand for rail travel has grown significantly in recent years, with, for example, an almost 70% increase in passenger numbers being recorded through stations in the West of England between 2004/05 and 2011/12 (ORR figures). This includes larger increases on specific routes, such as more than doubling of patronage on the Severn Beach line. Historic growth rates at groups of West of England stations are shown in Table 3.1 and Figure 3.1. Apart from a levelling in 2007/08, growth has continued in spite of the recession. It is likely to continue, albeit debatable whether rates will be as high as in recent times.

Looking to the future, the Great Western RUS (published in March 2010) forecast that demand in the Bristol area would rise by 41% at peak times between 2008 and 2019 (a rate of 3.2% per annum), and 37% off peak (2.9% per annum), with an average growth rate of 3.0% per annum. The Network Rail Long Term Planning Process (LTPP) Regional Urban Markets study (published October 2013) uses a series of wider economic scenarios to frame changes in rail use, and forecasts are presented for rail use in/around key urban centres. The resulting growth rates for the Bristol area vary from 0.6% per annum to 3.9% per annum. More details of the LTPP growth rates are shown in Table 3.2.

In spite of recorded growth in recent years, it is possible that these rates would not continue unabated. As such, future year forecasts for West of England stations have been produced using a combination of decrementing historic rates, RUS and LTPP figures, as follows: <sup>3</sup>

- 2013 to 2017 – taper from recent historic growth rates at West of England stations (7.8% per annum) to RUS average of peak and off peak (3.0% per annum);
- 2018 & 2019 – RUS average rate (3.0% per annum);
- 2020 to 2023 – taper from RUS average rate (3.0% per annum) to an LTPP average rate derived from the four economic scenarios (2.3% per annum); and
- 2023 to 2043 – taper from 2023 LTPP average rate (2.3% per annum) to 2043 LTPP average rate (1.3% per annum). Note that for appraisal, growth is capped to 0% per annum after 2034.

TABLE 3.1  
**ORR historic patronage growth in West of England area**  
*2004-2012 figures*

Station groupings	2010/11 to 2011/12	2009/10 to 2010/11	2004/05 to 2011/12	2004/05 to 2011/12
	per annum	per annum	TOTAL	per annum
Bristol main (Temple Meads & Parkway)	5.7%	6.1%	57%	6.6%

<sup>3</sup> Given recent historic rates of growth of rail patronage, the forecast growth rates assumed can be considered comparatively conservative.

TABLE 3.1  
**ORR historic patronage growth in West of England area**  
*2004-2012 figures*

Station groupings	2010/11 to 2011/12	2009/10 to 2010/11	2004/05 to 2011/12	2004/05 to 2011/12
	per annum	per annum	TOTAL	per annum
Severn Beach Line	9.8%	18.9%	163%	14.8%
Other Bristol urban	8.7%	13.3%	142%	13.5%
B&NES (incl. Keynsham)	8.7%	9.3%	54%	6.4%
South Gloucestershire (excl. Parkway)	11.8%	13.2%	115%	11.5%
North Somerset	6.0%	10.9%	56%	6.5%
OVERALL	8.7%	10.9%	69%	7.8% <sup>1</sup>

Note 1: As a comparison, the West of England station survey showed a 6.5% per annum increase from 2005 to 2012

Figure 3.1: ORR historic growth in West of England area

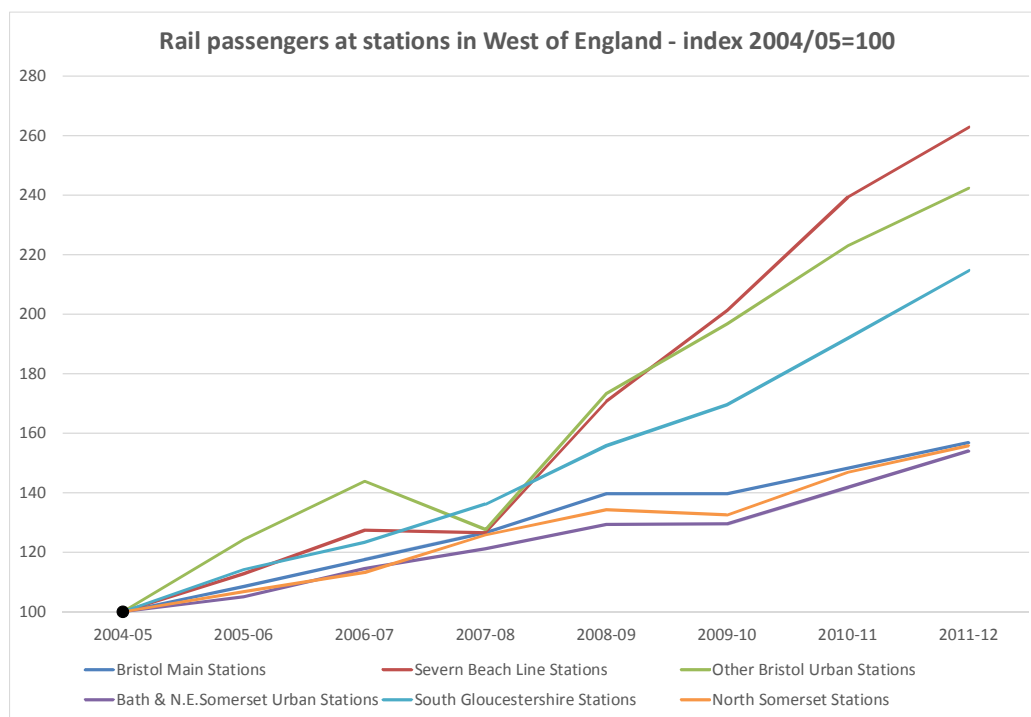


TABLE 3.2  
**Network Rail LTPP: Regional Urban Markets Study – Bristol area forecast growth**  
*October 2013*

Economic scenario	2013-23	2013-23	2023-2043	2023-2043
	total	per annum	total	per annum
'Prosperity in isolation'	14%	1.3%	33%	1.4%
'Global stability'	47%	3.9%	44%	1.8%
'Struggling in isolation'	6%	0.6%	15%	0.7%
'Global turmoil'	35%	3.0%	21%	1.0%
AVERAGE	26%	2.3%	29%	1.3%

## 3.2 Results of forecasts

### 3.2.1 Demand and revenue

There are two basic train service operating options for the stations on the Portishead line, both with enhanced versions. This results in four overall options as briefly described as follows:

- 5B – 1 train per hour all day Severn Beach-Bath, 1 train per hour all day Avonmouth-Portishead and 1 train per hour peak only Portishead-Bristol Temple Meads;
- 5B enhanced – same basic train service as 5B, but with 1 train per hour all day operating Portishead-Bristol Temple Meads;
- 6B – 1 train per hour peak only Portishead-Bath, 1 train per hour all day Avonmouth-Portishead and 1 train per hour all day Severn Beach-Bristol Temple Meads; and
- 6B enhanced – same train service as 6B, but with 1 train per hour all day Portishead-Bath.

The variations shown above only apply to weekday services, and weekend services would be hourly at both stations in all options. Note also that the level of service is the same in train service options 5B and 6B (2 trains per hour in the peaks, 1 train per hour off peak), as well as in options 5B enhanced and 6B enhanced (2 trains per hour all day). Hence, whether option 5B or 6B is considered does not alter demand forecasts for the new stations, as the methodology does not explicitly take into account the benefits (or otherwise) of specific service routings that are the differences between 5B and 6B options. The respective 'baseline' and 'enhanced' service patterns are only different in the inter-peak period, which is reflected in the demand being slightly lower for 'baseline' options.

Headline results of demand forecasts for Portishead and Pill, are shown in the tables for 'baseline' and 'enhanced' service options.<sup>4</sup> Table 3.3 has current year 2013 equivalent demand figures for train service options '5B' & '6B', with 2020 figures in Table 3.4 (which represents the first full year after commencement of MetroWest Phase 1, assuming that MetroWest Phase 2 opens in 2019). Table 3.5 shows equivalent figures for Pill in 2013 for scenarios '5B enhanced' & '6B enhanced', with 2020 figures in Table 3.86.

TABLE 3.3

#### Demand forecasts – MetroWest Phase 1 new stations

2013 figures equivalent (Scenarios 5B & 6B – 2 trains per hour peaks, 1 train per hour off peak)

Demand/revenue	Portishead	Pill
Annual demand	329,526	149,525
Daily demand (average)	1,046	475
Annual revenue (£)	£1,564,152	£354,492

TABLE 3.4

#### Demand forecasts – MetroWest Phase 1 new stations

2020 figures (Scenarios 5B & 6B – 2 trains per hour peaks, 1 train per hour off peak)

Demand/revenue	Portishead	Pill
Annual demand	465,124	211,053
Daily demand (average)	1,477	670
Annual revenue (£)	£2,207,790	£500,363

TABLE 3.5

#### Demand forecasts – MetroWest Phase 1 new stations

2013 equivalent figures (Scenarios 5B enhanced & 6B enhanced – 2 trains per hour all day)

Demand/revenue	Portishead	Pill
Annual demand	339,287	153,576
Daily demand (average)	1,077	488

<sup>4</sup> Revenues are based on the mileage of distributed trips, assuming an overall £0.20 per mile average fare.

TABLE 3.5

**Demand forecasts – MetroWest Phase 1 new stations***2013 equivalent figures (Scenarios 5B enhanced & 6B enhanced – 2 trains per hour all day)*

Demand/revenue	Portishead	Pill
Annual revenue (£)	£1,610,487	£364,096

TABLE 3.6

**Demand forecasts – MetroWest Phase 1 new stations***2020 figures (Scenarios 5B enhanced & 6B enhanced – 2 trains per hour all day)*

Demand/revenue	Portishead	Pill
Annual demand	478,902	216,771
Daily demand (average)	1,520	688
Annual revenue (£)	£2,273,190	£513,919

It should be noted that the daily forecasts represent an ‘average day’, based on a new stations annualisation factor of 315 (in turn based on analysis of data extracted from MOIRA2) and do not take into account daily or weekly fluctuations in demand from, for example, seasonal variation, and incorporate future growth assumptions described earlier.

The majority of trips are forecast to be new to the railway, although 11.2% of demand at Portishead (53,697 journeys in 2020) is derived from existing rail users transferring stations, principally from Nailsea & Backwell (74% of transfers, 39,959 journeys) with the remainder from Yatton (13,738 journeys in 2020). The proportion from Pill is similar, with 12.2% of demand (26,481 journeys) being forecast as station transfer by existing rail users, though reflecting Pill’s status as a more local station than Portishead, all are from Nailsea & Backwell.

Table 3.9 shows future year forecasts from opening in 2019 to 2034, including annual and daily (average day) demand and revenue. Growth assumptions are conservative when compared with recent actual growth in rail use, but still indicate that demand could increase substantially as time passes, in effect increasing by over 40% by 2043. Also shown are year 2013-2018 equivalent demand figures.

### 3.2.2 Catchment and access modes

The total demand forecasts have been further analysed to understand the locations that potential users of the potential new stations could come from, as well as the modes of transport they may use to reach the stations. NRTS data has been used to determine potential patterns of trip distance and mode of access, as this provides an indication of the true origin of trips through a station, as well as the mode of transport used to get there. This has been based on a combination of information from Nailsea & Backwell, Bridgwater and Keynsham stations, with adjustments related to possible availability of access facilities, such as car parking and bus services.

Table 3.7 shows indicative assessment of the potential catchment distance and mode of access for Portishead station, based on the 2020 demand forecasts. In the first instance, almost half of all one-way trips are likely to be outward and return portions of returns, many of which will be day returns, thus suggesting some 763 individuals arrive at the station in order to make 1,520 trips. Table 3.8 shows a similar indicative assessment for the station at Pill (based on 345 individuals arriving at the station, to make 688 trips).

TABLE 3.7

**Rail users accessing Portishead – by origin catchment and access mode**  
 2020 figures (Scenarios 5B enhanced & 6B enhanced – 2 trains per hour all day)

Catchment	Walk	Bus	Car parked	Car drop off	Bicycle	Taxi	ALL
Less than 1 km	150	2	29	9	10	1	200
from 1 to 2 km	209	4	87	47	12	10	369
from 2 to 3 km	10	-	25	16	3	9	62
from 3 to 4 km	-	6	29	14	3	-	52
from 4 to 5 km	-	2	10	12	2	-	25
from 5 to 10 km	-	-	36	7	1	-	44
More than 10 km	-	-	10	1	-	-	11
<b>TOTAL</b>	<b>368</b>	<b>14</b>	<b>225</b>	<b>106</b>	<b>31</b>	<b>19</b>	<b>763</b>

numbers may not add up exactly to totals due to rounding

TABLE 3.8

**Rail users accessing site near Pill – by origin catchment and access mode**  
 2020 figures (Scenarios 5B enhanced & 6B enhanced – 2 trains per hour all day)

Catchment	Walk	Bus	Car parked	Car drop off	Bicycle	Taxi	ALL
Less than 1 km	170	3	-	8	14	1	195
from 1 to 2 km	24	3	11	16	6	13	72
from 2 to 3 km	1	-	7	16	3	8	35
from 3 to 4 km	-	8	6	4	2	-	20
from 4 to 5 km	-	2	1	2	2	-	8
from 5 to 10 km	-	-	7	5	1	-	13
More than 10 km	-	-	3	0	-	-	3
<b>TOTAL</b>	<b>194</b>	<b>16</b>	<b>34</b>	<b>51</b>	<b>28</b>	<b>22</b>	<b>345</b>

numbers may not add up exactly to totals due to rounding

Catchments for users of both stations are considered relatively local, more so for Pill than Portishead, and the rail services are likely to be mostly used for local journeys. However, given the availability of connections at Bristol Temple Meads, this will provide opportunities for some longer journeys on the wider rail network that previously required a trip to another railhead, if made at all. Forecasts indicate that almost 75% of journeys at Portishead are likely to be between Portishead and other stations in the MetroWest area, with almost 50% being to/from central Bristol (mostly Bristol Temple Meads, but also including Stapleton Road, Lawrence Hill, Bedminster and Parson Street). Over 90% of journeys through Pill station are between Pill and other MetroWest stations, with almost 80% to/from central Bristol stations.

Portishead is likely to generate some demand for car parking for both local rail trips (into Bristol) and those further afield. There are, for instance, already journeys recorded for Nailsea & Backwell station that originate from the Portishead and Clevedon areas that could have some benefit in transferring to a Portishead station (as identified in the assessment of transfer demand). As such, while Portishead is not anticipated to become a major railhead, assessment of the distribution of destinations for Portishead station users reflects its greater role as a railhead than Pill, with more journeys to places further afield (than at Pill).

Parking is therefore important at Portishead station. Note though that figures in Table 3.7 are an initial indication of potential car access to the station, and do not specifically represent car park occupancy forecasts. Station access will be further assessed and refined as plans for MetroWest Phase 1 are developed. Pill station is not due to have a station car park, and the figures in Table 3.8 reflect this. As such, less demand for access by car is anticipated for Pill than Portishead. It is likely though there will be some limited demand for on-street parking near Pill station. Although, as for Portishead, this should not

be taken as a definitive forecast of parking demand at this stage, and will be refined as development of MetroWest progresses.

Table 3.9: New station forecasts – demand and revenue by year

Year	Portishead			Portishead			Pill			Pill			
	5B/6B (2 thp peak, 1 tph other)			5B/6B enhanced (2 tph all day)			5B/6B (2 thp peak, 1 tph other)			5B/6B enhanced (2 tph all day)			
	Demand (2013 pop)		Revenue	Demand (2013 pop)		Revenue	Demand		Revenue	Demand		Revenue	
	annual	daily	annual	annual	daily	annual	annual	daily	annual	annual	daily	annual	
2013	329,526	1,046	£1,564,152	339,287	1,077	£1,610,487	149,525	475	£354,492	153,576	488	£364,096	
2014	355,084	1,127	£1,685,469	365,603	1,161	£1,735,397	161,122	511	£381,987	165,487	525	£392,335	
2015	379,275	1,204	£1,800,294	390,510	1,240	£1,853,623	172,099	546	£408,010	176,761	561	£419,064	
2016	401,535	1,275	£1,905,957	413,430	1,312	£1,962,417	182,200	578	£431,957	187,136	594	£443,660	<< electrification PARTIAL
2017	421,314	1,338	£1,999,840	433,795	1,377	£2,059,081	191,175	607	£453,235	196,354	623	£465,513	<< electrification COMPLETE
2018	438,092	1,391	£2,079,481	451,070	1,432	£2,141,081	198,788	631	£471,284	204,173	648	£484,052	
2019	451,406	1,433	£2,142,675	464,778	1,475	£2,206,147	204,829	650	£485,606	210,378	668	£498,762	<< Metro PHASE 1 (assumed)
2020	465,124	1,477	£2,207,790	478,902	1,520	£2,273,190	211,053	670	£500,363	216,771	688	£513,919	
2021	478,396	1,519	£2,270,790	492,567	1,564	£2,338,057	217,076	689	£514,641	222,957	708	£528,584	<< Metro PHASE 2 (assumed)
2022	491,160	1,559	£2,331,378	505,710	1,605	£2,400,439	222,868	708	£528,373	228,906	727	£542,687	
2023	503,355	1,598	£2,389,260	518,265	1,645	£2,460,036	228,401	725	£541,491	234,589	745	£556,161	
2024	514,918	1,635	£2,444,149	530,172	1,683	£2,516,551	233,648	742	£553,931	239,978	762	£568,937	
2025	526,489	1,671	£2,499,072	542,085	1,721	£2,573,101	238,899	758	£566,378	245,371	779	£581,722	
2026	538,055	1,708	£2,553,973	553,994	1,759	£2,629,628	244,147	775	£578,821	250,761	796	£594,502	
2027	549,605	1,745	£2,608,797	565,886	1,796	£2,686,076	249,388	792	£591,246	256,144	813	£607,263	
2028	561,127	1,781	£2,663,487	577,749	1,834	£2,742,386	254,616	808	£603,640	261,514	830	£619,994	
2029	572,608	1,818	£2,717,985	589,571	1,872	£2,798,499	259,825	825	£615,992	266,865	847	£632,680	
2030	584,037	1,854	£2,772,233	601,338	1,909	£2,854,353	265,011	841	£628,286	272,191	864	£645,307	
2031	595,400	1,890	£2,826,170	613,038	1,946	£2,909,888	270,167	858	£640,510	277,487	881	£657,862	
2032	606,685	1,926	£2,879,737	624,657	1,983	£2,965,042	275,288	874	£652,650	282,746	898	£670,331	
2033	617,880	1,962	£2,932,872	636,183	2,020	£3,019,751	280,368	890	£664,693	287,963	914	£682,700	
2034	628,970	1,997	£2,985,514	647,602	2,056	£3,073,953	285,400	906	£676,623	293,132	931	£694,954	





## 4. Highway Network Impacts

### 4.1 Introduction

The West of England highway networks are reaching capacity and congestion is particularly notable at:

- Bristol city centre and approaches to Bristol Temple Meads
- The M5 Junction 19
- The A369 between the M5 and Portishead
- The A4 between Bath and Bristol
- Corridors into Bristol city.

The Portishead to Bristol corridor (A369) suffers congestion and journey time reliability problems. This not only causes delays and lost productivity for car drivers and goods vehicle operators but also presents a major hurdle for an attractive public transport mode along the corridor. The problems and context of the A369 corridor are summarised as:

- The A369 is the only transport corridor directly linking Portishead with Bristol which is just 10 miles to the east.
- The capacity constraints on the A369 are exacerbated by the fact that it crosses junction 19 of the M5. This is one of the busiest parts of the M5 with the Avonmouth Bridge immediately to the north.
- The A369 continually suffers from the knock-on effects of incidents on the M5 with high volumes of traffic using a constrained local road corridor with few alternative route options.

The West of England trend for high rates of private car ownership is magnified in Portishead where only 12% of households (2011 Census) do not have access to a private vehicle. This emphasises the town's over-reliance on private car ownership. These patterns are reflected in the high proportion of residents who travel to work using private vehicles (as car/motorcycle drivers or passengers). At 81 per cent, the proportion of commuters travelling by private vehicle is considerably above both the West of England (69 per cent) and nationwide averages (66 per cent).

Table 4.1 shows free flow vs peak hour journey times on the key corridors served by MetroWest Phase 1. This shows peak hour journey times can be more than twice the corresponding free flow times.

Table 4.1 Free flow vs AM Peak journey times on key routes

Route	Observed AM Peak (Oct 2013)	
	Free Flow JT (mins)	Peak Hour JT (mins)
A4 (Keynsham to Bath Bridge)	11.4	29.5
A4 Portway (Avonmouth to Hotwells)	10.6	21.4
A369 (Portishead to Ashton Gate)	11.8	22.7

Free Flow JT = minimum journey time recorded in the period 06:00-10:00

Observed = Strategis data

## 4.2 Without-Intervention Case

### *Do Minimum infrastructure assumptions*

MetroWest represents a major transport scheme development in the West of England area. In modelling its effects, other key infrastructure developments need to be included in the 'Do Minimum' assumptions prior to MetroWest interventions being included. It is proposed that the Do Minimum should include:

- South Bristol Link (SBL) and other committed schemes identified in the SBL assessment;
- Ashton Vale to Temple Meads (AVTM);
- North Fringe to Hengrove Package (NFHP); and
- Cribbs Patchway New Neighbourhood (CPNN) Off-site Works Package.

The LSTF schemes and 20mph speed limits are also being implemented across the wider Bristol area and a residents parking permit scheme implemented in central Bristol. However it is not proposed to include these schemes in the Preliminary (Strategic Outline) Business Case GBATS modelling since they are area-wide and not expected to favour one MetroWest option over another.

The proposed new station at Portway Park & Ride site has not been included in the Do Minimum situation. It is not specifically a part of MetroWest, and is envisaged as complementary to any of the options. However, its implementation timescales are not yet confirmed.

### *Development assumptions*

Table 4.2 shows a considerable number of new homes and jobs are planned in the West of England area to 2029.

Table 4.2 West of England Planned Growth

Council	Homes	Jobs	Core Strategy Period
Bath & North East Somerset*	13000	10300	2011- 2029
Bristol City	32800	21900	2011- 2026
North Somerset*	17130	14,000**	2006- 2026
South Gloucestershire	28355	18,600-21,870	2006 - 2027
<b>All</b>	<b>91285</b>	<b>68070</b>	

Source: Core Strategies and supporting evidence documents

\* Proposed figures subject to local plan examinations

\*\* Homes updated February 2014 but job figures to be revised.

Table 4.3 underlines this with major housing areas directly served or capable of being served by MetroWest rail.

Table 4.3 Development sites served by MetroWest

Housing Area	Homes	Rail Schemes
Cribbs Patchway New Neighbourhood	5700 50 ha employment	MetroWest Phase 2 (Henbury Line)
North Yate	3000	MetroWest Phase 2
Somerdale (former Cadbury site at Keynsham)	700	MetroWest Phase 1
Weston-super-Mare	11000	MetroWest Phase 1 and 2

Source: Core Strategies. Housing area figures are included in the Core Strategies.

A significant number of jobs are planned to delivered through Enterprise Zones / Areas that will benefit from MetroWest Phase 1, including Bristol Temple Quarter Enterprise Zone, Bath City Riverside Enterprise Area and and Avonmouth Severnside Enterprise Area.

Further details of modelled development assumptions are provided in South Bristol Link Forecasting Report, April 2013.

### Network operation

Table 4.4 shows highway network operation for the 2012 model base year and the forecast years for the Do Minimum scenario. This shows a considerable worsening of network operation in future years resulting in marked increases in queues, associated travel times and reductions in average speed relative to the current levels of congestion.

Table 4.4 Do Minimum highway network operation

	2012 Base year			2016			2031		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)	6768	3906	6801	8513	4791	8583	14193	7010	14141
Total travel time (PCU. HRS/HR)	22690	15743	22176	26503	18217	25984	35702	23924	34928
Travel distance (PCU. KMS/HR)	1030834	783188	1006413	1117977	858587	1095510	1333785	1078829	1310820
Overall average speed (KPH)	45	50	45	42	47	42	37	45	38
Total trips loaded (PCUS/HR)	120133	97165	112211	128165	105367	120346	151692	129160	142075
	2016 vs 2012			2031 vs 2012					
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)	26%	23%	26%	110%	79%	108%			
Total travel time (PCU. HRS/HR)	17%	16%	17%	57%	52%	58%			
Travel distance (PCU. KMS/HR)	8%	10%	9%	29%	38%	30%			
Overall average speed (KPH)	-7%	-5%	-7%	-18%	-9%	-17%			
Total trips loaded (PCUS/HR)	7%	8%	7%	26%	33%	27%			

## 4.3 With-Intervention Case

The highway network operation has been assessed in the With Intervention 'Do Something' scenario using the methodology set out in section 2.

The change in rail and highway trips are shown in Table 4.5, which take into account increased rail demand at both new and existing stations. The proportion of additional rail trips that are forecast to switch from highway have been identified from the GBATS multi-modal assessment results, which vary by time period.

Tables 4.6 and 4.7 show the highway network operation for scenarios 4 (Option 6b) and 5 (Option 5b Enhanced) for 2016 and 2031 respectively. These options are presented as the worst and best performing options respectively.

The highway assignment results indicate improvements in network operating conditions as a result of the MetroWest scheme. Whilst there are highway benefits the results indicate the differences between options are limited in terms of highway network impacts.

Table 4.5 Change in rail and highway trips

Change in rail / car demand (from do minimum)		2016				2031			
		Annual	Average day			Annual	Average day		
			AM	IP	PM		AM	IP	PM
<b>5B baseline</b>	Existing stations	466,023	226	71	181	691,023	335	105	269
	Portishead	401,535	147	67	148	595,400	217	99	219
	Pill	182,200	86	29	68	270,167	128	43	101
	TOTAL	1,049,758	459	167	397	1,556,591	680	248	589
	reduction in car trips		160	81	91		213	114	114
<b>5B enhanced</b>	Existing stations	475,809	230	72	185	705,534	342	107	274
	Portishead	413,430	151	69	152	613,038	224	102	226
	Pill	187,136	89	30	70	277,487	131	44	103
	TOTAL	1,076,375	470	171	407	1,596,058	697	254	603
	reduction in car trips		164	83	93		218	117	117
<b>6B baseline</b>	Existing stations	349,027	166	55	132	517,540	247	81	196
	Portishead	401,535	147	67	148	595,400	217	99	219
	Pill	182,200	86	29	68	270,167	128	43	101
	TOTAL	932,762	399	151	348	1,383,107	592	224	516
	reduction in car trips		138	73	79		184	102	99
<b>6B enhanced</b>	Existing stations	356,356	170	56	135	528,408	252	83	200
	Portishead	413,430	151	69	152	613,038	224	102	226
	Pill	187,136	89	30	70	277,487	131	44	103
	TOTAL	956,922	409	155	357	1,418,932	607	230	529
	reduction in car trips		142	75	81		188	105	101

Table 4.6 2016 MetroWest highway network operation

	Do Minimum			Scenario 4 (Option 6b)			Scenario 5 (Option 5b Enhanced)			
	2016	AM	IP	PM	AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)	8513		4791	8583	8494	4778	8565	8490	4788	8559
Total travel time (PCU. HRS/HR)	26503		18217	25984	26459	18195	25953	26455	18199	25945
Travel distance (PCU. KMS/HR)	1117977		858587	1095510	1116526	858083	1094681	1116584	857613	1094541
Overall average speed (KPH)	42		47	42	42	47	42	42	47	42
Total trips loaded (PCUS/HR)	128165		105367	120346	128061	105315	120285	128046	105310	120277
					AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)					-0.2%	-0.3%	-0.2%	-0.3%	-0.1%	-0.3%
Total travel time (PCU. HRS/HR)					-0.2%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%
Travel distance (PCU. KMS/HR)					-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%
Overall average speed (KPH)					0.0%	0.2%	0.0%	0.0%	0.0%	0.0%
Total trips loaded (PCUS/HR)					-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%

Table 4.7 2031 MetroWest highway network operation

	Do Minimum			Scenario 4 (Option 6b)			Scenario 5 (Option 5b Enhanced)		
2031	AM	IP	PM	AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)	14193	7010	14141	14071	6990	14124	14070	7001	14107
Total travel time (PCU. HRS/HR)	35702	23924	34928	35545	23894	34894	35543	23894	34875
Travel distance (PCU. KMS/HR)	1333785	1078829	1310820	1331978	1078308	1309747	1331786	1077492	1309658
Overall average speed (KPH)	37	45	38	38	45	38	38	45	38
Total trips loaded (PCUS/HR)	151692	129160	142075	151556	129088	141999	151536	129080	141988
				AM	IP	PM	AM	IP	PM
Queues (PCU. HR./HR)				-0.9%	-0.3%	-0.1%	-0.9%	-0.1%	-0.2%
Total travel time (PCU. HRS/HR)				-0.4%	-0.1%	-0.1%	-0.4%	-0.1%	-0.2%
Travel distance (PCU. KMS/HR)				-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%
Overall average speed (KPH)				0.3%	0.0%	0.0%	0.3%	0.0%	0.3%
Total trips loaded (PCUS/HR)				-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%

## 4.4 Highway Benefits Analysis

Highway benefits have been identified through TUBA based on results of the highway modelling reported above. TUBA version 1.9.3 has been used.

Table 4.8 shows annualisation factors employed, which take into account relative congestion levels in peak and 'shoulder' hours rather than purely on traffic counts. These are set out in the NFHP DfT Engagement Annualisation Factors Review, August 2011 supplementary document. This document is available upon request.

Table 4.8 TUBA annualisation factors

Time Period	Modelled Hour to Period Conversion Factor	Number of Occurrences per Year	Annualisation Factors	Comments
AM	2.55	253	645.15	Conversion based on AM peak hour
IP	6	253	1518	Conversion based on IP average hour
PM	2.56	253	647.68	Conversion based on PM peak hour
OP	0.69	253	174.57	Conversion based on IP average hour
WE	6.07	56	339.92	Conversion based on IP average hour

Given the similar level of highway impacts between the options relative to the total level of demand across the model area, average results are presented which are considered representative of the magnitude of benefits for all options.

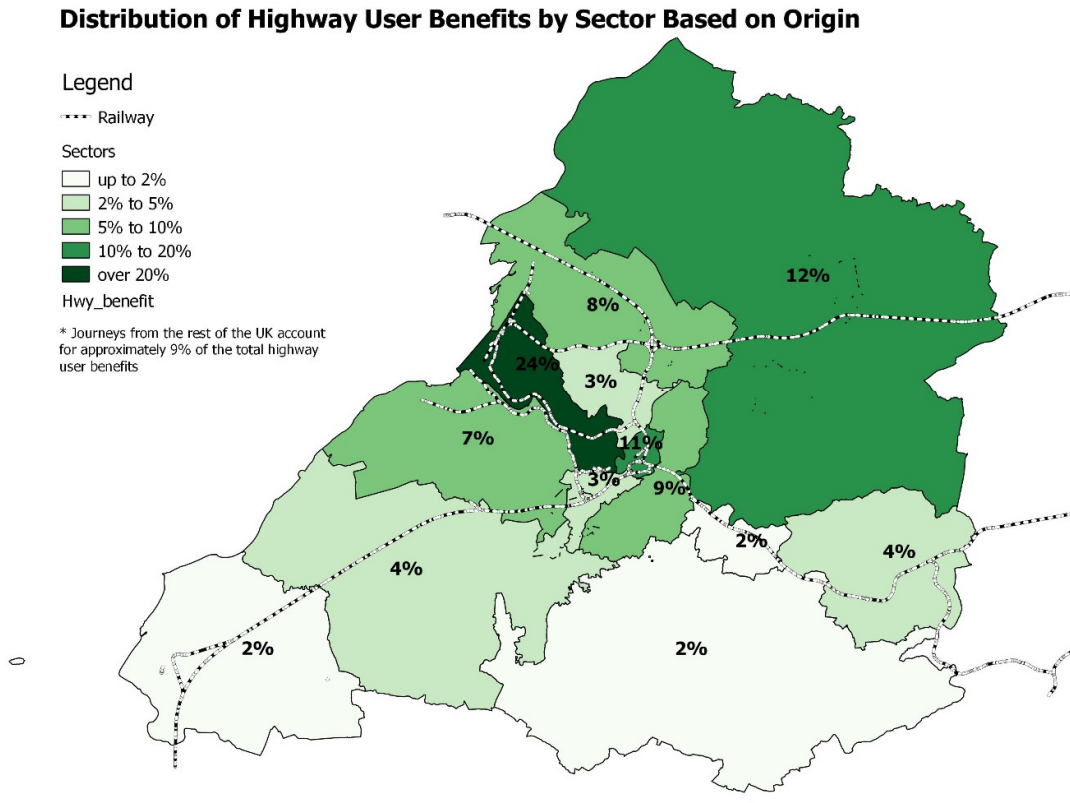
Table 4.9 gives the TUBA highway benefits identified. Appendix A presents the decongestion-related inputs in TEE format.

Table 4.9 TUBA highway benefits

Item	Highway Benefits (£'000)
Commuting / Other User Benefit	15,263
Business User Benefit	8,331
Wider Public Finances (Indirect Taxation Revenues)	-4,215
Greenhouse Gases	1,454

Figure 4.1 presents the spatial distribution of highway benefits from the scheme based on trip origins. This shows the spatial distribution of benefits is consistent with the areas expected to benefit from the MetroWest Phase 1 scheme.

Figure 4.1 Spatial distribution of benefits



## 5. Summary

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### 5.1 Summary

A methodology has been employed that makes best use of approaches accepted by the rail industry, in the form of a rail demand model, and the GBATS multi-modal model. The methodology is in accordance with both WebTAG and Guide to Railway Investment Projects (GRIP) demand forecasting requirements.

This report has presented:

- rail demand forecasts for new stations;
- highway network impacts; and
- highway user benefits.

The new station forecasts indicate passenger numbers in excess of 450,000 for Portishead and 200,000 for Pill in the opening year.

Highway network impacts show a net present value of highway user benefits of around £23.6 million. A net reduction in tax revenues of around £4.2 million is expected due to reduced fuel consumption and reduced greenhouse gases giving benefits of around £1.5 million.

The rail forecasts for existing stations and rail user benefits are presented in the Network Rail Metro West Phase One Economic Appraisal Report, July 2014.

The final combined economic appraisal results are presented in the Preliminary Business Case Report.





Appendix A  
TEE Table TUBA Highway Benefits

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## Economic Efficiency of the Transport System (TEE) £'000 (Highway only)

<b>Non-business: Commuting</b>		<b>ALL MODES</b>	<b>ROAD</b>	<b>BUS and COACH</b>	<b>RAIL</b>	<b>OTHER</b>	
<u>User benefits</u>		<b>TOTAL</b>	<b>Private Cars and LGVs</b>	<b>Passengers</b>	<b>Passengers</b>		
Travel time	8,776		8,776				
Vehicle operating costs	6,509		6,509				
User charges	-22		-21.75				
During Construction & Maintenance	0		0				
<b>NET NON-BUSINESS BENEFITS: COMMUTING</b>	<b>15,263</b>	(1a)	15,263				
<b>Non-business: Other</b>		<b>ALL MODES</b>	<b>ROAD</b>	<b>BUS and COACH</b>	<b>RAIL</b>	<b>OTHER</b>	
<u>User benefits</u>		<b>TOTAL</b>	<b>Private Cars and LGVs</b>	<b>Passengers</b>	<b>Passengers</b>		
Travel time	0		0				
Vehicle operating costs	0		0				
User charges	0		0				
During Construction & Maintenance	0		0				
<b>NET NON-BUSINESS BENEFITS: OTHER</b>	<b>0</b>	(1b)					
<b>Business</b>							
<u>User benefits</u>			<b>Goods Vehicles</b>	<b>Business Cars &amp; LGVs</b>	<b>Passengers</b>	<b>Freight</b>	<b>Passengers</b>
Travel time	7,922		3,852	4,071			
Vehicle operating costs	420		200	220			
User charges	-12		-2	-11			
During Construction & Maintenance	0		0	0			
<b>Subtotal</b>	<b>8,330</b>	(2)	4,050	4,280	0		
<b>Private sector provider impacts</b>			<b>Freight</b>				
Revenue	0		<b>Passengers</b>				
Operating costs	0						
Investment costs	0						
Grant/subsidy	0						
<b>Subtotal</b>	<b>0</b>	(3)					
<b>Other business impacts</b>							
Developer contributions	0	(4)					
<b>NET BUSINESS IMPACT</b>	<b>8,330</b>	(5) = (2) + (3) + (4)					
<b>TOTAL</b>							
Present Value of Transport Economic Efficiency Benefits (TEE)		23,593	(6) = (1a) + (1b) + (5)				
Notes: Benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2010 prices and values							



<b>Project</b>	MetroWest Phase 1 Modelling & Appraisal	<b>Date</b>	23 <sup>rd</sup> July 2014
<b>Subject</b>	MetroWest Phase 1 Wider Impacts Assessment	<b>Ref</b>	467470.AU.02.00
<b>Prepared by</b>	CH2MHILL		

## 1 Purpose of This Document

This document outlines key steps and assumptions in estimating wider impacts of MetroWest Phase 1 and initial findings. The methodology adopted is in line with guidance in WebTAG Unit A2.1 and the process set out in technical note 'Proposal for Assessing Wider Impacts of MetroWest', which was prepared by CH2MHILL on 23<sup>rd</sup> May 2014 in its capacity to provide modelling and appraisal advice for developing Phase 1 of MetroWest.

The remainder of this document is structured as follows:

- Section 2: Basic Assessment Specification;
- Section 3: Agglomeration;
- Section 4: Imperfect Competition;
- Section 5: Tax Revenues from Labour Supply Effects; and
- Section 6: Summary.

## 2 Basic Assessment Specification

### Type of Impacts Assessed

This assessment investigates three types of wider impacts as a result of MetroWest Phase 1 as set out below:

- Agglomeration – By reducing journey times across the West of England region, the relative agglomeration<sup>1</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. As travel costs are reduced, more workers will be attracted to the workplace from either new areas accessible by the scheme or areas that are already connected receiving an improved service.

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<sup>1</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.

Prepared by	Sheng Peng	Date	23/07/2014
Checked by	Helen Spackman	Date	23/07/2014
Approved by	David Crockett	Date	23/07/2014

### Appraisal Period

This assessment captures the aforementioned wider impacts accrued over a 60-year appraisal period from the scheme opening year 2019 to 2078. Two Do-Something scenarios, Enhanced and Baseline timetables, were assessed against the same Do-Minimum. The correspondence between the two scenarios assessed here and full scenarios proposed for MetroWest Phase 1 is presented in Table 3.1, with detailed definition of the latter documented in the Preliminary Business Case (PBC) report.

*Table 2.1*

**Correspondence between Scenarios in Wider Impacts Assessment and Preliminary Business Case**

<b>Wider Impacts Assessment</b>	<b>All Scenarios Proposed as Documented in Preliminary Business Case (PBC)</b>
Baseline timetable	Scenario 1 – Option 5b with 6 units; Scenario 2 – Option 5b with 7 units
	Scenario 3 – Option 6b with 6 units; Scenario 4 – Option 6b with 7 units
Enhanced timetable	Scenario 5 – Option 5b enhanced with 6 units; Scenario 6 – Option 5b enhanced with 7 units
	Scenario 7 – Option 6b enhanced with 6 units; Scenario 8 – Option 6b enhanced with 7 units

### Geographical Detail

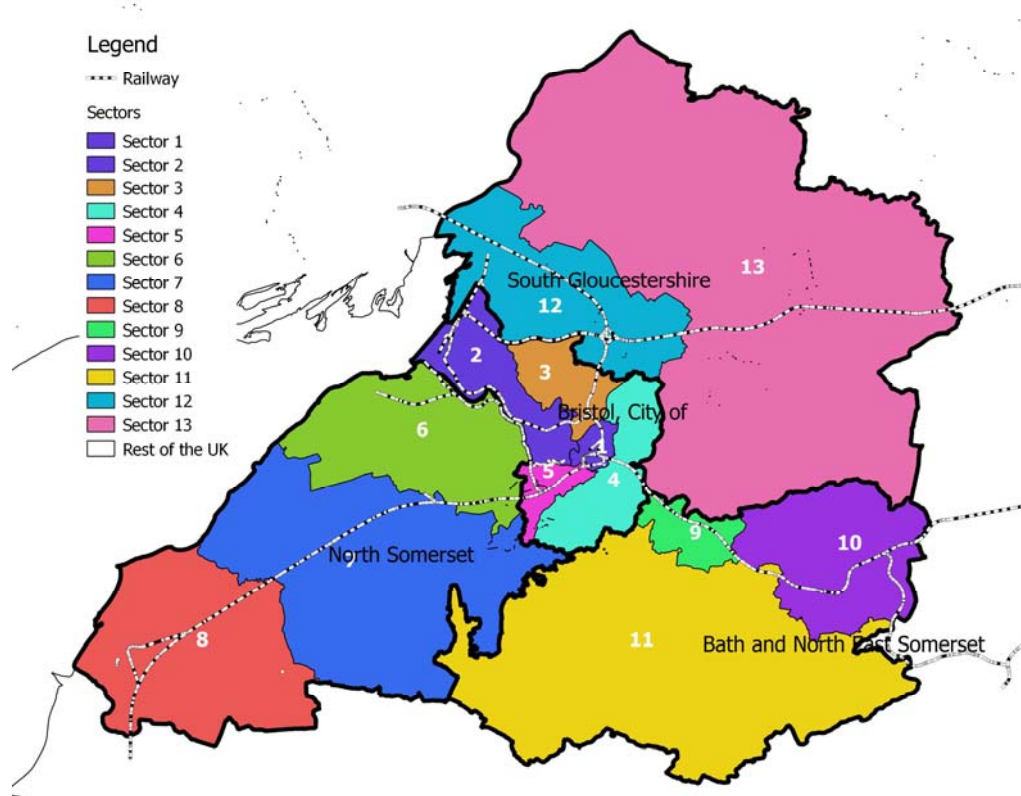
The main input for Wider Impacts Assessment includes DfT's standard economic dataset and outputs from GBATS3<sup>2</sup> models supplemented by other information such as local planning data and demographic information for the study area under investigation. As these data comes with varying geographical detail, a sector system was adopted to reconcile such discrepancy and also provide sufficient detail to enable decision-makers to understand the geographical distribution of wider impacts in West of England and areas further afield. The sector system was defined taking on board the following three aspects:

- Extent of coverage – consideration was given to the extent to which that MetroWest Phase 1 network goes as well as the area for which that GBATS3 modelling suite is capable of producing reasonably detailed output. The extent of coverage was also selected based on individual Local Authority District (LAD) boundary in order to be consistent with the format of the DfT's economic dataset. Four LAD's were included in the area of investigation, namely Bath and North East Somerset, Bristol City, North Somerset and South Gloucestershire;
- Sectoring – each selected LAD was split into sectors for examination of benefit distribution across different parts of the region. Compatibility with different tiers of geographical area definition was the key for defining the sector system in order to facilitate access to other data that is readily available. The formulated sectors are therefore aggregation of traffic zones in GABTS3 and also follow Ward boundaries (or its aggregation) so modelling output and existing demographic information can be taken on board with ease; and
- Fitness for purpose – formulation of sectors also considered significant elements of the proposed MetroWest scheme, e.g. new stations, so the methodology framework is capable for providing insight on how different elements of interventions are likely to contribute to the overall wider impacts, should relevant input data can be made available.

Following the principles set out above, the proposed sectoring system is illustrated in Figure 2.1. The four LADs in West of England are split into 13 different sectors, with the rest of the UK represented by sector no.14.

<sup>2</sup> GBATS is a multi-modal transport model covering West of England. Detail of the model specification, functionality and its validation are available in the PBC and supplementary documents.

**Figure 2.1**  
**An Illustration of the Adopted Sector System**



### 3 Agglomeration

The calculation of agglomeration impacts follows the method set out in Appendix D of WebTAG Unit A2.1, based on demographic data as well as generalised travel demand and costs for business and commuting trips.

Table 3.1 summarises data used for estimating the agglomeration impact including their sources and key assumptions adopted. Further information is set out in subsequent tables.

**Table 3.1**  
**Data Used for Agglomeration Impact Calculation**

Data required	Source & Assumptions
Local GDP per Worker	DfT Sectoral GDP forecasts for individual LAD's were used. Values for 2019 were interpolated based on DfT forecasts for 2016 and 2021. No variation in GDP per worker within individual LAD's was considered.
Sectoral and total employment forecasts	DfT Sectoral and total employment forecasts for individual LAD's were used. Values for 2019 were interpolated based on DfT forecasts for 2016 and 2021. Total employment figures were apportioned to each geographical sector of individual LAD's based on information derived from GBATS3 model and presented in Table 3.2 and Table 3.3.
Agglomeration elasticities by industrial sector	Recommended values from Table 1 at Page 9 of TAG Unit A2.1 were adopted.
Parameter for distance decaying	Recommended values from Table 1 at Page 9 of TAG Unit A2.1 were adopted.

Data required	Source & Assumptions
Public Transport generalised cost matrices weighted across user groups	<p>Journey time skims for Do Minimum scenario were taken from GBATS3 output and used to derive generalised costs based on standard Value of Time (VOT) from DfT's latest TAG Data Book.</p> <p>Journey time saving as a result of MetroWest Phase 1 was derived based on sector-to-sector movements and deducted from the Do Minimum values to derive Do Something travel time. This again was converted generalised travel cost based on TAG compliant VOT.</p> <p>This approach ensures that all benefits derived are directly attributed to the proposed scheme and removes the risk of introducing spurious benefits as a result of potential 'modelling noise'.</p>
Highway generalised cost matrices weighted across user groups	<p>Journey time, distance and road charge skim matrices were taken from GBATS3 output and converted the generalised travel cost following standard approach and parameters for VOT and VOC calculation in the latest TAG Data Book.</p> <p>In order to remove 'modelling noise' in the current GBATS3 model suite, the highway travel cost for Do Something scenario was assumed to be the same as its counterpart in Do Minimum due to the fact that modal shift from road users to rail is very minor. This is a conservative approach as the minor modal shift would generate decongestion benefits and hence reduce travel cost in reality despite the absolute change is small.</p>
Public Transport trip matrices	Travel demand matrices, including all sub-modes (bus, BRT and rail) were taken from GBATS3 output. Business and commuting journeys were extracted separately.
Hwy trip matrices by journey purpose and time period	Travel demand matrices were taken from GBATS3 output. Business and commuting journeys were extracted separately. Highway car trips were converted to person trips using appropriate occupancy values from the latest TAG Data Book.

Information in Table 3.2 is the number of employment in each LAD by employment sector, which is in line with assumptions in TAG Data Book for year 2031. Table 3.3 illustrates how information in Table 3.2 was apportioned to individual geographical sectors based on ratios derived from the number of arriving commuting trips in each sector during the AM peak. The volume of arriving commuting trips in the AM was regarded as a proxy (in relative terms) for number of jobs in this process.

Table 3.2

**2031 Employment by LAD**

Local Authorities	Manufacturing	Construction	Consumer Services	Producer Services	Total
Bath and North East Somerset	5123	3943	24098	19794	52958
Bristol City	11776	9012	48154	97666	166608
North Somerset	6578	3885	28408	21479	60350
South Gloucestershire	14189	11288	47903	46104	119484

Table 3.3

**2031 Employment by Sector**

Local Authorities	Sector	Ratio	Manufacturing	Construction	Consumer Services	Producer Services	Total
Bristol City	1	13%	1584	1212	6477	13137	22410
Bristol City	2	38%	4468	3420	18272	37060	63220
Bristol City	3	17%	2019	1545	8255	16742	28560
Bristol City	4	25%	2895	2215	11837	24008	40956
Bristol City	5	7%	810	620	3313	6719	11461

Local Authorities	Sector	Ratio	Manufacturing	Construction	Consumer Services	Producer Services	Total
North Somerset	6	45%	2941	1737	12699	9602	26978
North Somerset	7	29%	1911	1129	8253	6240	17534
North Somerset	8	26%	1726	1020	7455	5637	15838
Bath and North East Somerset	9	22%	1124	865	5287	4342	11618
Bath and North East Somerset	10	52%	2659	2046	12506	10272	27482
Bath and North East Somerset	11	26%	1341	1032	6306	5180	13858
South Gloucestershire	12	54%	7665	6098	25879	24907	64549
South Gloucestershire	13	46%	6524	5190	22024	21197	54935

Agglomeration impacts were estimated for year 2019 and 2031 and then profiled<sup>3</sup> across the appraisal period between 2019 and 2078, and discounted to 2010 prices and values. Results from this analysis are presented in Table 3.4.

Table 3.4

**Agglomeration Impacts**

Agglomeration Impacts (£000's)	Baseline Scenario	Enhanced Scenario
2019	£1,236	£1,240
2031	£2,051	£2,057
2019 to 2078 (discounted)	£49,099	£49,243

Figure 3.1 illustrates how the estimated agglomeration impacts distribute across different geographic sectors in both options assessed using different shades of green. Darker colour in this figure represents higher percentage of agglomeration impact.

The distribution pattern in Figure 3.1 was 'sense checked' by comparing against information in Table 3.5. Table 3.5 summarises movements in West of England that are anticipated to benefit from different lines of the proposed scheme either through improved journey time or enhanced frequency of rail service.

It can be seen that there is strong correlation in the distribution pattern of agglomeration benefits and where impacts from rail improvement are expected between Figure 3.1 and Table 3.5. The sectors with higher agglomeration impacts are generally aligned with origins from which travel time benefits are expected from one or more rail services where improvements are proposed as part of MetroWest Phase 1. Sector 6 enjoys the highest benefits as a result of the new station and frequency enhancement brought by improvements to Portishead line. Clear benefits to other sectors in Bristol, South Gloucester and Bath and Northeast Somerset are also observed, which can be attributed to impacts from Severn Beach line and Bristol City to Bath line.

<sup>3</sup> Agglomeration impacts were assumed to change over time at the same rate as user VOT.



Figure 3.1

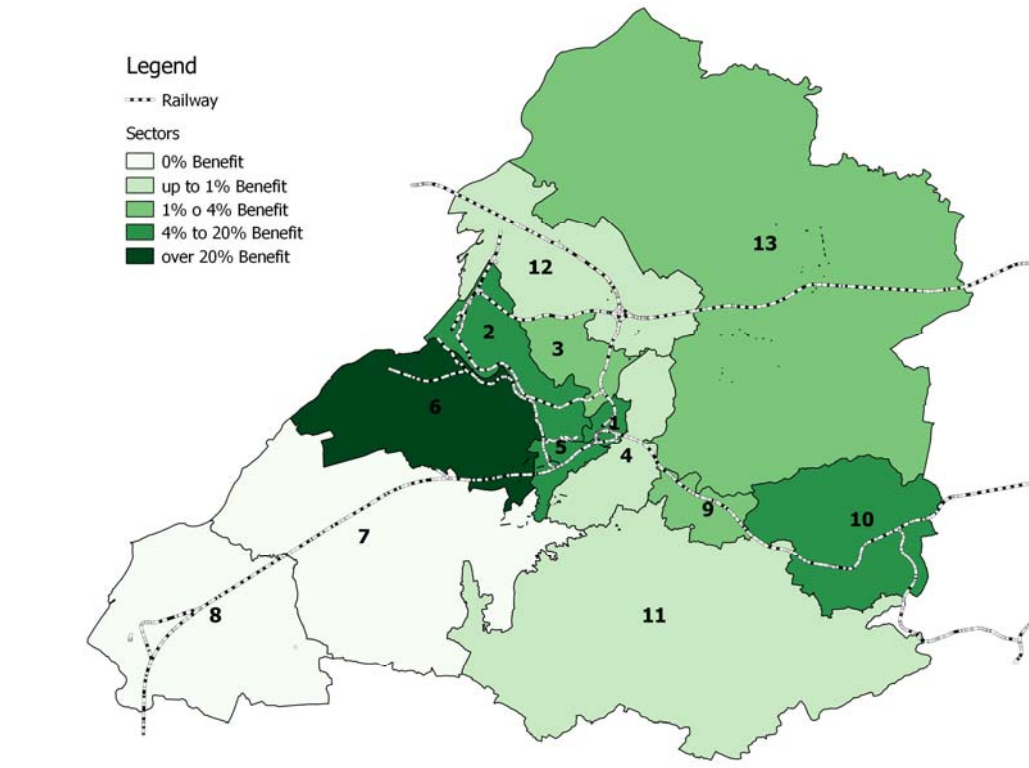
**Distribution of Agglomeration Impacts across the Study Area**

Table 3.5

**An Illustration of Where Impacts from MetroWest Phase 1 are Expected**

Sectors	1	2	3	4	5	6	7	8	9	10	11	12	13
1		C	C		A	A			B	B		C	
2	C	C	C	C	C	A&C			B	B	C	C	C
3	C	C		C	C	A&C			B	B	C	C	
4		C	C			A			B	B		C	
5	A	C	C			A			B	B		C	
6	A	A&C	A&C	A	A				A&B	A&B	A	A	A
7													
8													
9	B	B	B	B	B	A&B				B		B	B
10	B	B	B	B	B	A&B			B			B	B
11		C	C			A						C	
12	C	C	C	C	C	A			B	B	C		
13		C				A			B	B			

\* Line A – Portishead Line (new station and frequency improvement)

\* Line B – Bristol City to Bath Line (frequency improvement)

\* Line C – Severn Beach Line (frequency improvement)

## 4 Imperfect Competition

TAG Unit A2.1 suggests that the imperfect competition impact can be calculated as 10% of business user benefits which will have already been interpolated, extrapolated and discounted over the appraisal period. No further profiling or discounting is required.

Table 4.1 presents the estimated imperfect competition impact, which is 10% of the business user benefits in rail and highway. Overall the total value of benefits is approximately £2m. As the rail user economic appraisal was undertaken at a finer level of detail to differentiate subtle difference between scheme options, this adds an extra dimension in the result (all scenarios split by options 5B and 6B). Detailed definition of these proposed options is available in the PBC report.

Table 4.1

### Imperfect Competition Impacts

(£000's)	Baseline Scenario		Enhanced Scenario	
	Option 5B	Option 6B	Option 5B	Option 6B
Imperfect Competition Impacts	£1,973	£1,708	£2,014	£1,760

## 5 Tax Revenues from Labour Supply Effects

The calculation of labour supply impact also follows the method set out in Appendix D of TAG Unit A2.1, based on inputs similar to what was used for estimating agglomeration impact, as listed in Table 5.1.

Table 5.1

### Labour Supply Impacts Data

Data required	Source / Challenges & Solutions
Elasticity of labour supply with respect to net return from working	DfT economic dataset; Recommended value is 0.1, Table 2 at Page 9 of TAG Unit A2.1
Number of workers living in zone <i>i</i> and working in zone <i>j</i> varying by forecast year	2011 Census data ('KS601EW to KS603EW - Economic activity by sex') was used to derive the total number of workers by LAD (economically active population in employment). The distribution of number of workers (by residence) to the sectors where their workplaces are is based on information derived from the GBATS3 AM commuting trip matrices. The total number of HBW trips in the AM was used as the weighting to apportion total number of workers from one sector to sub-groups by their respective destination sectors.
Mean gross workplace-based earnings by zone	DfT economic dataset
Median wage of marginal worker entering the labour market by zone	Derived from DfT economic dataset
Average tax rate	DfT economic dataset; Recommended value is 0.3, Table 2 at Page 9 of TAG Unit A2.1
Pay of marginal worker compared to average worker	DfT economic dataset; Recommended value is 0.69, Table 2 at Page 9 of TAG Unit A2.1
Round-trip commuting generalised cost	Derived from relevant generalised cost data listed in Table 3.1.
Tax take on increased labour supply parameter	This is equal to 40% in accordance with guidance in WebTAG

Detailed information on the number of workers (by residence) was required for estimating increased tax revenues from Labour Supply Effects. This was derived using a combination of 2011 Census data and information from TEMPRO and presented in Table 5.2. Information in Table 5.2 was disaggregated to individual geographic sectors using the number of home-based work trips from GBATS3 model output for the AM peak hour.

Table 5.2

**Numbers of Workers in Each LAD by Residence**

Numbers of Worker	2011	2019	2031
Bath and North East Somerset	79,491	83,778	86,477
Bristol	197,915	214,391	232,160
North Somerset	94,139	97,432	103,080
South Gloucestershire	131,089	139,431	145,507

\* 2011 values were taken from 2011 Census data ('KS601EW to KS603EW - Economic activity by sex')

\* 2019 and 2031 values were derived based on growth factor for workers derived from TEMPRO dataset 6.2

Values of the estimated increase in tax revenues from Labour Supply Effects for the modelled forecasting years and the entire appraisal period are presented in Table 5.3.

Table 5.3

**Increase in Tax Revenues from Labour Supply Effects**

Agglomeration Impacts (£000's)	Baseline Scenario	Enhanced Scenario
2019	£65	£66
2031	£55	£55
2019 to 2078 (discounted)	£1,451	£1,456

## 6 Summary

This note outlines the methodology for estimating three types of wider impacts arising from the proposed MetroWest Phase 1 scheme. It sets out the overall assessment specification, the proposed geographical detail, data used, key assumptions adopted and initial findings for each of the three impacts.

Over the 60-year appraisal period between 2019 and 2078, assessment results indicate that the agglomeration impact is about £49m with very minor difference between all options considered. Distribution of this impacts across the study area was cross-checked against components of rail improvements in MetroWest Phase 1 and where their impacts are anticipated.

The impact due to output change in imperfectly competitive markets is usually 10% of the business user benefits and is estimated to be approximately £2m across all options. Increase in tax revenues from labour supply effects as a result of the proposed MetroWest Phase 1 scheme is under £2m.

In light of the above findings, the total value of wider impacts for the PBC WEB assessment is in the order of £52m.

**MetroWest Phase 1**

**Portishead Station Options Appraisal Report**

**June 2014**

MetroWest 

DOCUMENT REFERENCE:						
1	First Draft (Version 1_00)	JWk	JWk	CM, RW, DT, MR, RK, GQ		15/01/2014
2	Reported (Version 2_00)	JWk, DT	JWk, GQ, JWh	CM, RW, DT, MR, RK, GQ, JWh		01/05/2014
3	Reported (Version 3_00)	JWk	JWk, GQ, JWh	CM, RW, DT, MR, RK, GQ, JWh	WoE Rail Programme Board	06/06/2014
		Originated	Checked	Reviewed	Authorised	Date

## **MetroWest Phase 1 - Portishead Station Options Appraisal Report**

### **1. Background**

Project Overview  
Portishead Rail Station

### **2. Planning & Transport Policy**

Policy Context  
Local Planning and Transport Policy  
Highways Development Management Policy

### **3. Project Objectives & Timescales**

Objectives  
Timescales

### **4. Portishead Station Site Consultation – February/March 2013**

NSC Sites & Policies Development Plan Document (Consultation Version)  
Consultation Feedback  
Initial Conclusions

### **5. Site Options Appraisal Approach**

Overview  
Area of Search  
Plan of Site Options  
Feasibility of a Level Crossing at Quays Avenue  
Highway Considerations  
Committed and Planned Development  
Proposed Footbridge Adjacent to Trinity Primary School  
Description of Site Options  
Site Options Appraisal Methodology

### **6. Site Options Appraisal Assessment**

Qualitative Assessment  
Overall Assessment Ranking

### **7. Conclusions**

Summary of Results  
Recommendations

### **Appendices**

1. Sites & Policies DPD Evidence Paper – Portishead Rail Station
2. Quays Avenue Road Bridge Concept Design
- 3a. Station Concept Design Option 2A
- 3b. Station Concept Design Option 2B
- 3c. Station Concept Design Option 2C
- 3d. Station Indicative Layout plan Option 1A
- 3e. Station Indicative Layout plan Option 1B
- 3f. Station Indicative Layout plan Option 3

## 1. Background

### Project Overview

- 1.1 The re-opening of the Portishead rail line for passenger train services is part of the MetroWest Phase 1 project, which includes enhancing the local train service for the Severn Beach line and Bath to Bristol line. The project is being jointly promoted by the four West of England councils; North Somerset, Bath & North East Somerset, Bristol City and South Gloucestershire Councils. North Somerset Council is leading the project on behalf the councils. The MetroWest Phase 1 project includes:

*Half hourly train services for the Severn Beach line, local stations between Bristol Temple Meads, Bath Stp and Weston-super-Mare (Bedminster and Parson Street) and the re-opened Portishead line including stations at Portishead and Pill.*

- 1.2 All the works to deliver the train services are within the existing operational railway, with the exception of works to the line from Portishead to Portbury Dock Junction (nr Pill) which is a dis-used line. The Portishead branch originally opened in 1867 and operated passenger train services until 1964 when the line was closed as part of the Beaching cuts. Part of the line, between Bristol and Royal Portbury Dock, was re-opened in 2002 for freight trains. Since the closure of the Portishead line and stations in 1964, there has been considerable development in Portishead, particularly new housing. As a result the population has increased from 6,440 in the 1961 census to 27,048 in 2012 from the North Somerset Council mid year estimate (based on 2011 census plus subsequent house completions).
- 1.3 The project proposes to re-open the remaining 3 miles of dis-used line between Portishead and Portbury Dock junction, with stations at Portishead and Pill. The project is defined as a Nationally Significant Infrastructure Project under the 2008 Planning Act, which means the dis-used line will require a Development Consent Order (DCO). The remaining works can be done using Network Rail's permitted development rights, since they are within the curtailment of the existing operational railway. The DCO process requires considerable evidence base, and is front loaded as the requirements for submission and acceptance of a DCO application are considerable. The DCO process is overseen by the Planning Inspectorate. Upon conclusion of a successful DCO application, an Order is issued, giving the promoter powers to build and operate and if necessary to compulsory purchase of property. The final part of the process is the dis-charging of the Order by the local planning authority.
- 1.4 The project is to be funded from Department for Transport (DfT) devolved major scheme funding and from the council's resources, subject to acceptance of a robust business case, statutory processes, confirmation of powers to build and operate and procurement. The WoE Joint Transport Board, which oversees decision making on DfT devolved funding, determined in 2013 that MetroWest Phase 1 is their number one priority for allocation of funding. Further rail projects are planned as part of the MetroWest programme, these include MetroWest Phase 2 which proposes to re-open the Henbury line to passenger trains and enhance the train service between Yate and Bristol Temple Meads. MetroWest Phase 1 is being taken forward working with Network Rail through the Governance for Railway Investment Projects (GRIP) project governance framework. GRIP stage 1-2 has been commissioned and is due to be completed by June 2014.

Portishead Rail Station

- 1.5 The location of Portishead rail station in 1964 prior to the closure of the line was on land currently owned by Waitrose, on Harbour Road. In February /March 2013 North Somerset Council through the Sites and Policies Plan (Consultation Draft) consulted on this location, plus two other possible station sites. However, there are some deliverability challenges with these sites which renders the need for wider examination of site options to determine the most appropriate and deliverable site for the station. This work has been undertaken through a Site Options Appraisal and is reported in this document.



## 2. Planning and Transport Policy

### Policy Context

- 2.1 The National Planning Policy Framework (NPPF) provides the overarching land use policy context for all development in England. The foremost principle of the NPPF is *a presumption in favour of sustainable development*.
- 2.2 The North Somerset Replacement Local Plan 2007 (policy T/3) safeguarded a site for Portishead station at the rear of Waitrose, close to the former station site in 1964, this is known as site option 1A. Policy T/3 remains a saved Replacement Local Plan and site option 1A is currently the only safeguarded site for the station. The railway alignment has been safeguarded from development by local plan policies for many years and this has largely been successful in preserving the integrity of rail alignment for future re-opening. However, a new highway was built across the rail alignment in 2004 (Quays Avenue), on the presumption that a rail level crossing would be acceptable and deliverable, should the re-opening the rail line be taken forward. Since Quays Avenue was built the design standards for railways have evolved and the formal position of the Office of the Rail Regulation (ORR) is that it does not support the implementation of new level crossings. The ORR is in fact working with Network Rail on a programme to reduce the total number of level crossings in operation on the national rail network, as a result of concerns about the number of accidents and fatalities, each year.
- 2.3 Consequently, this complicates determining the most appropriate site for Portishead rail station, which also needs to be a deliverable site. There are both land use policy and transport policy considerations to take account of, in assessing the station site options. Furthermore the environmental and social impacts of each site also need to be considered. While land use policy informs spatial planning, the deliverability of the station site will also be informed by transport policy particularly in terms of the acceptability of impacts on the local highways network, and the acceptability of the environmental and social impacts. Given the need to reconcile policy objectives and environmental / social impacts, we have undertaken an Options Appraisal consider and assess site options in order to determine the most appropriate and viable site for the station.
- 2.4 Pill rail station is however more straight forward in terms of policy and deliverability. Feasibility work undertaken by Network Rail has identified that the only viable location for the station is to re-use the former westbound platform, in both directions (as the line here is single track). The former Pill station is located within the existing operational railway on the Portbury freight line. The works to re-open Pill station are relatively modest and in summary include a new pedestrian access ramp, appropriate passenger facilities and car parking provision.

### Local Planning and Transport Policy

- 2.5 The North Somerset Core Strategy 2013 is the principle strategic planning document framing the context for all development in North Somerset. The North Somerset Core Strategy was formally adopted on 12<sup>th</sup> April 2012, however the High Court ruled that the part of the document relating to the number of new dwellings required up to 2026, had to be re-examined. The Core Strategy re-examination took place 18<sup>th</sup> to 20<sup>th</sup> March 2014. The Inspectors Report determined that additional housing allocation is needed. Therefore the North Somerset Sites & Policies Development Plan Document is undergoing revision and will be subject to public consultation, in due course before being formally adopted. Consequently, the North

Somerset Core Strategy 2012 and saved policies from the North Somerset Replacement Local Plan 2007, comprise the current planning policies for regulatory purposes.

- 2.6 The North Somerset Core Strategy sets out seven vision statements, vision five relates specifically to Portishead, as follows.

***Vision 5 Portishead Vision***

*By 2026 Portishead will have undertaken an extensive period of consolidation and become an increasingly popular location for new business as well as providing opportunities for existing local businesses to expand and grow. There will be increased opportunities for residents to work locally, reducing an overreliance on commuting to Bristol and its north fringe.*

*Access by public transport within Portishead and between the other towns will be improved. A passenger rail or rapid transit link into central Bristol will have been reinstated, providing a real alternative to residents commuting into Bristol for work.*

*Portishead will continue to be a popular place to live while retaining the existing distinctive character and village atmosphere of the High Street. The new and old communities in Portishead will be integrated and share a joint sense of place and pride in the town. The newly extended High Street will be a thriving and popular place to shop and spend time.*

*Strong maritime links will continue to provide important focus. The marina and surrounding coastal area will continue to attract visitors. The unique setting of the Gordano Valley will be protected with opportunities to enjoy surrounding countryside, and views enhanced around the new development.*

- 2.7 The North Somerset Replacement Local Plan 2007 policy T/3 narrative states:

*The importance of the station as a principal gateway to the town – forming first impressions – should not be under-estimated. The character, quality and local distinctiveness of the town needs to be reflected in the design of the station and its approaches.*

- 2.8 The proposed development is essentially re-opening a dis-used rail corridor between Portishead and Pill (approximately 3 miles), where it is to connect to existing operational railway at Pill and associated rail station development at both Portishead and Pill. The development is class B2 General Industrial.

- 2.9 The Core Strategy policies relevant to the proposed development are:

- CS1 Addressing climate change and carbon reduction
- CS3 Environmental impacts and flood risk management
- CS10 Transport and movement
- CS20 Supporting a successful economy
- CS26 Supporting healthy living and the provision of health care facilities
- CS31 Clevedon, Nailsea and Portishead

2.10 The Replacement Local Plan policies relevant to the proposed development are:

- GDP/1 Preferred locations for development
- GDP/2 Environmental and public protection
- E/4 Proposals for new business development with towns and defined settlements
- T/1 Existing and proposed railway lines
- T/3 Proposed railway stations
- T/10 Safety, traffic and the provision of infrastructure associated with development
- RT/1 Strategy for revitalising the town and district centres

2.11 In respect of the transport policy context the principal document is the West of England Joint Local Transport Plan (JLTP) 2011 to 2026. The document was produced and formally endorsed by the Bath & North East Somerset, Bristol City, North Somerset and South Gloucestershire Councils. It sets out the overarching transport policies for the sub-region and sets out priorities, interventions and specific proposals for all modes of transport, including heavy rail. The JLTP contains five key policy themes to; reduce carbon emissions, support economic growth, promote accessibility, contribute to better safety, security and health and improve quality of life and a healthy natural environment. The JLTP provides the policy framework for investing in our strategic rail corridors to improve accessibility to and service provision of the local rail network. Both the Portishead rail corridor and the Greater Bristol Metro projects (which have since been merged into MetroWest Phase 1 and Phase 2) are supported for early delivery.

Highways Development Management Policy

2.12 NPPF states that development must not have an unacceptable impact on the highway network. Policy T/10 of the RLP states:

*Development giving rise to a significant number of travel movements will only be permitted if it: i) is not likely to lead to an unacceptable degree of traffic congestion or generate traffic that cannot be accommodated without seriously affecting the character of the surrounding area and can readily be integrated with public transport, cycleway and footpath links and bridleways where appropriate.*

2.13 Policy T/10 is relevant to the proposed development in terms of consideration of the sites options for Portishead station. Quays Avenue (which as referred to above is a relatively new road which crosses the rail alignment) is one of two roads feeding onto Phoenix Way. Phoenix Way serves a new development (Portishead Vale) of approximately 1,000 dwellings and population of over 2,500. Harbour Road connects Phoenix Way to Portishead town centre via Cabstand. Quays Avenue connects Phoenix Way to Wyndham Way, which forms part of external facing A369 corridor. The road route enables the residents of Portishead Vale to access the A369 without having to travel via the Cabstand junction in the town centre. Maintaining both the western (Harbour Road) and southern (Quays Avenue) highway link with Phoenix Way is necessary for efficient access and egress for local residents. Furthermore maintaining both links is necessary to maintain efficient traffic circulation both into the town centre and for outbound trips.

2.14 Closing Quays Avenue either side of the rail alignment, without other interventions, such that the only way into Phoenix Way would be via Harbour Road and Cabstand, would not be feasible. This would effectively create a huge cul-de-sac causing severance problems for residents. It would also have an adverse impact on local traffic distribution and increase traffic queuing on Harbour Road and through Cab Stand, resulting an unacceptable severe highway impact. Consequently all the options assessed in the Site Options Appraisal involve maintaining two road routes to and from Phoenix Way.

### 3. Project Objectives & Timescales

#### Objectives

- 3.1 The JLTP policies are translated into delivery, through developing projects and interventions with objectives that are well aligned to JLTP policy. The principal objectives of the Metro Phase 1 project are:
- To support economic growth, through enhancing the transport links to the TQEZ and into and across Bristol City Centre, from the Portishead, Bath & Avonmouth /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 & Avonmouth /Severn Beach.
  - To improve accessibility to the rail network with new and re-opened rail stations and reduce the cost (generalised cost) of travel for commuters, business and residents.
  - To make a positive contribution to social well being, life opportunities and improving quality of life, across the three arterial corridors.
- 3.2 In addition are the following supporting objectives:
- To contribute to reducing traffic congestion on the Portishead, Bath & Avonmouth /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.
  - To contribute to reducing the overall environmental impact of the transport network.

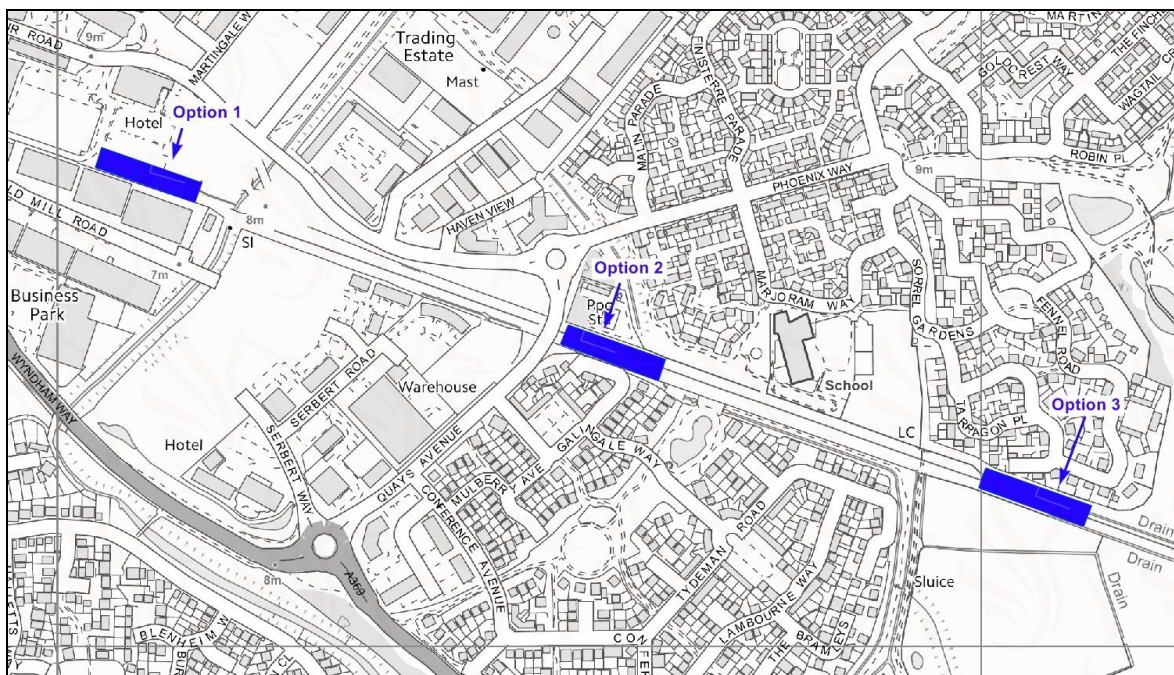
#### Timescales

- 3.3 The indicative timescales for the project are:
- Preliminary Business case submitted to WoE Joint Transport Board Sept 2014
  - Outline Business case submitted to WoE Joint Transport Board Oct 2015
  - Full Business case submitted to WoE Joint Transport Board Oct 2017
  - Construction commencing Nov 2017
  - Project Opens and passenger train services commence May 2019

## 4. Portishead Station Site Consultation – February/March 2013

### NSC Sites & Policies Development Plan Document (Consultation Version)

- 4.1 In February 2013, North Somerset Council undertook public consultation on its Sites & Policies Development Plan Document (Consultation Version). As part of the consultation the council published an evidence paper: Re-opening Portishead Railway Line and Options for the Location of Portishead Railway Station, see appendix 1. The evidence paper sets out the project background and included three potential station location sites, together with qualitative summary tables for each option.
- 4.2 The three station sites were:
- Option 1 – Town Centre location on Harbour Road
  - Option 2 – Peripheral Town Centre location on Quays Avenue
  - Option 3 – Edge of Town location on land north of Moor Farm



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### Consultation Feedback

- 4.3 An on-line consultation was undertaken together with staffed exhibitions held in Portishead. A total of 147 consultation responses were received. In summary there was both support and objections for option 1 and option 2, while for option 3 there was no support and 25 objections. Furthermore there were suggestions for the council to consider other station sites options.
- 4.4 In respect of option 3, the qualitative summary set out in the evidence paper showed that this option had more dis-advantages than the other options and would not fully meet all the project objectives. The consultation responses highlighted local environmental impact concerns and concerns about opening up development in the green belt.
- 4.5 In respect of options 1 and 2, the consultation responses gave a mixed picture, with both receiving both support and objections. While option 1 received the greatest support, it has considerable deliverability challenges. Since the consultation was

undertaken, the council wrote to the Office of the Rail Regulation (ORR) to seek support for a level crossing on Quays Avenue. The response from the ORR was there is no special case for a level crossing. Consequently option 1 would be predicated on the construction of a road over rail bridge. A concept design for a bridge has been undertaken, see appendix 2a & 2b. There is not sufficient space for a standard bridge, therefore some departures from design standards would be necessary in order to fit a bridge into the available space. The design of the bridge has a number of wider implications, including highway impacts, environmental impacts and cost.

- 4.6 Option 2 had both support and objections and requires minimal infrastructure to implement. However, some consultation responses were concerned about localised environmental impacts and were concerned about commercial development (the station) within very close proximity to existing residential properties.

#### Initial Conclusions

- 4.7 Having considered the consultation responses and a number of significant delivery challenges with some of the three station sites options, there was a clear need to take a wider examination of potential sites including examining other potential station sites. This wider examination of options has now been undertaken through a Site Options Appraisal and the findings are reported in this document.

## 5. Site Options Appraisal Approach

### Overview

- 5.1 As outlined in chapter 2, the purpose of the Site Options Appraisal is to assess site options in order to determine the most appropriate and viable site for Portishead station, taking account of relevant policy objectives, project objectives, environmental and social impacts and deliverability considerations. The methodology employed for the Site Options Appraisal is set out below, it essentially comprises of an assessment of site policy fit, an assessment of environmental / social impact and an assessment of site deliverability, resulting in an overall site viability ranking.

### Area of Search

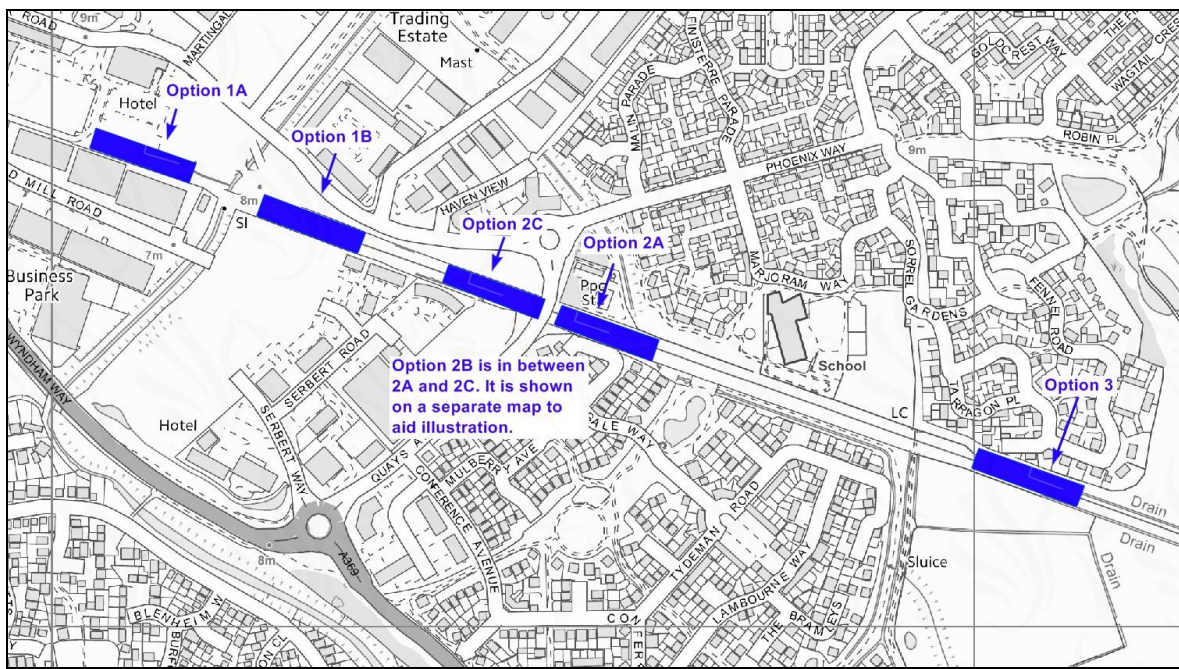
- 5.2 The safeguarded dis-used railway alignment between Portishead to Portbury Dock Junction (nr Pill) provides the only practical alignment for re-connecting Portishead to the national rail network. The alignment width varies through Portishead but is generally 15 to 20 metres wide. The land either side of the alignment has been developed over recent years, mainly as residential, with some commercial development closer to the town centre.

- 5.3 The area of search included in the Site Options Appraisal includes the three station sites previously consulted on, plus three new sites options, giving a total of six site options:

- Site Option 1A - previously labelled option 1
- Site Option 1B - additional option immediately east of option 1A
- Site Option 2A - previously labelled option 2
- Site Option 2B - additional option immediately west of option 2A
- Site Option 2C - additional option immediately west of option 2B
- Site Option 3 - as previously labelled option 3

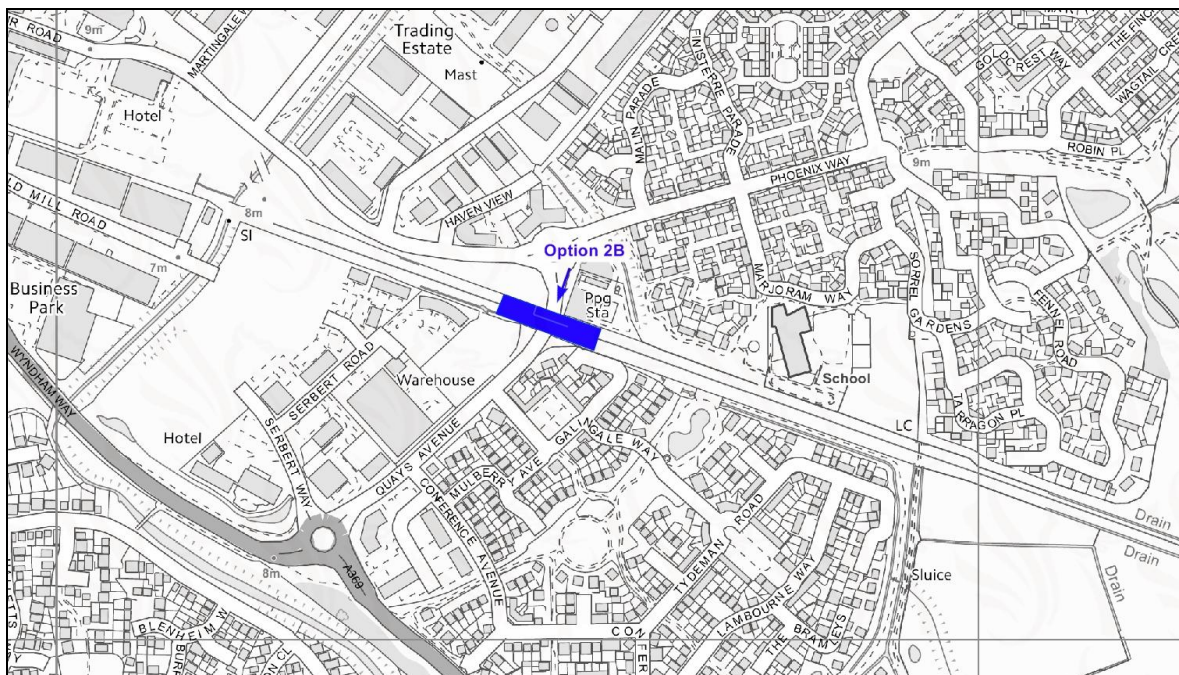


## Plan of Site Options Considered in Site Options Appraisal



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#### Feasibility of a Level Crossing at Quays Avenue

- 5.4 Office of Rail Regulation (ORR) policy position on level crossings is set out in the following documents: “Guide To Level Crossing Order Submissions January 2008”, “Level Crossings: A Guide for Managers, Designers and Operators December 2011” and “Strategy for Regulation of Health & Safety Risks - Level Crossings January 2014”. In respect of new level crossings, paragraph 2.3 of the January 2008 document is states “HM Railway Inspectorate [now subsumed into the Office of the Rail Regulation] **DOES NOT**, in principle, support the creation of any new level crossings, of any type.”
- 5.5 In 2013 North Somerset Council requested a view from the ORR about the possibility of a new level crossing at Quays Avenue. The ORRs’ response was that it did not support a level crossing stating that “Level crossings are the greatest source of risk on the rail network, primarily in terms of risk to individual pedestrians or vehicle users, but also to passengers in trains colliding with vehicles and then derailing.” Furthermore in relation to the volume of traffic using Quays Avenue the regulator stated “...the risk arising from a new level crossing would be high, even at the train speeds prevailing 450 metres from the terminal. ORR would not authorise a new crossing at this point.”
- 5.6 Given the clarity provided by the ORR’s policy position, the specific response from the ORR regarding a level crossing at Quays Avenue and the wider activity by the industry to reduce the number of existing level crossings, it is clear there is no practical mandate for pursuing a level crossing. We have therefore concluded this Site Options Appraisal and all considerations of station sites, is undertaken on the basis that a level crossing at Quays Avenue is not viable.

#### Highway Considerations

- 5.7 All the station sites were identified on the basis of the highway development management policy context (see para 2.12 – 2.14) and the following specific considerations:
- Maintaining both a western and southern highway link with Phoenix Way is necessary for efficient access and egress for local residents of Portishead Vale (with a population of over 2,500). The western highway link (Harbour Road) provides access to the town centre, while the southern highway link (Quays Avenue) provides direct outbound access without having to travel via the busy Cabstand junction. In essence, the station site must not have a severe highway impact.
  - Sufficient highway access must be provided to the station and sufficient space must be available for a car park providing at least 150 car parking spaces.
  - Safe and accessible pedestrian routes to the station must be provided.

#### Committed and Planned Development

- 5.8 There are a number of development sites within close proximity of Portishead town centre and the railway alignment. Some of these sites either have full planning consent or are under construction, including the remaining residential units at Portishead Quays (Newfoundland Way) and Sainsbury’s supermarket on Serbert Way. There are also a range of other commercial planning consents for Serbert Way and Harbour Road. Furthermore the Old Mill Lane industrial estate, has been zoned for a mixed use redevelopment. These development sites are close to some



of the station site options, however they have particular bearing on site option 1B because of the difficulty in forming an alternative highway link, due the need to stop up Quays Avenue.

#### Proposed Footbridge Adjacent to Trinity Primary School

5.9 Trinity Anglican Methodist Primary School is located adjacent to the rail line at an approximate distance of 1km from the town centre (from Cabstand) equidistant between station location option 2A and 3. There are two pedestrian crossings of the rail line here, one permissive crossing and one informal crossing. It will be necessary to close these pedestrian crossings and fence the boundary of the rail line in order to meet rail design standards and safety requirements. To accommodate the existing pedestrian movements to and from the school, the project is proposing to provide a fully accessible footbridge. While the footbridge would not form part of the rail station facilities, it would be located within close proximity to some of the station locations options. Therefore it is appropriate that considerations on the footbridge are made together with considerations on the station location.

5.10 In project engineering feasibility work undertaken in 2010, three options were examined for retaining pedestrian access between Trinity School north of the line (the Village Quarter) and housing south of the line (the Vale), these options were known as:

- Western Route (Quays Avenue) – provide footpaths parallel to the railway linking to Quays Avenue to provide an indirect pedestrian route
- Middle Route (Galingale Way) – footbridge option
- Eastern Route (Moor Lane) – footbridge option

5.11 Since the school was opened in 2008 a permissive pedestrian crossing over the dis-used line was constructed, to accommodate access and egress between the Vale and the Village Quarter (Middle Route). There is sufficient space at this local for a fully accessible footbridge and pedestrian counts undertaken show that this crossing has a higher pedestrian footfall of the two crossings linking to the Primary School. A footbridge at this location would have a visual impact and the design of the bridge would need to be undertaken in consultation with neighbouring property owners to minimise its impact. We refer to this path as Trinity Primary School Middle Route permissive crossing.

#### Trinity Primary School Middle Route permissive crossing



- 5.12 In addition to this permissive crossing, there is an informal crossing further east at the eastern most boundary with Trinity Primary School (Eastern Route). This informal crossing is on the site of a former highway access road (Moor Lane) that used to provide access to a municipal landfill site, via a level crossing over the rail line. The access road has long since been closed (circa 1960's) and part of it now forms an informal path bounded by vegetation. We refer to this path as Trinity Primary School Eastern Route informal crossing.

Trinity Primary School Eastern Route informal crossing



- 5.13 In the February/March 2013 consultation undertaken by the Council, a footbridge was proposed to be located at Trinity Primary School Eastern Route informal crossing. This location was based on project engineering feasibility work undertaken in 2010. The Eastern Route crossing is not surfaced, is not fully accessible and appears to be mainly used by dog walkers. Since the project engineering feasibility work in 2010, new housing (Tarragon Place) has been constructed close to the railway boundary and this has meant that there is insufficient space available to install a fully accessible DDA compliant footbridge at this location. Consequently the only viable location for a footbridge is at the Middle Route crossing. We have shown the indicative location for the footbridge on the station concept designs in appendices 3a, 3b & 3c. Should a footbridge not be acceptable to the local community or not achieve planning consent, the alternative would be to deliver the Western Route footpaths parallel to the railway linking to Quays Avenue. However this would result in reduced accessibility as the pedestrian route from housing in the Vale to Trinity Primary School in the Village Quarter, would be longer and indirect.

Description of Site Options

- 5.14 A summary description of the six site options together with the infrastructure required and other factors is set out in Table 1 below. The population figures shown were calculated using 2011 census data.

**Table 1. Overview of Assessed Site Options**

Option	Location & Population Catchment	New Highway Infrastructure Required	Wider Context
Option 1A	Rear of Travelodge Harbour Road  Location is 300 metres from Cabstand  Population within 1km radius is 15,991	Road over railway bridge at Quays Avenue. A footbridge near to Trinity Primary School. A further 50 space car park, in addition to 100 spaces already secured. Bus stops/lay-bys.	The Office of Rail Regulation has confirmed that a level crossing at Quays Avenue will not be permitted. Consequently this option requires a road over rail bridge. There is not sufficient room for a standard road bridge. The bridge design requires a steeper gradient and this causes reduced line of sight, which means the junction would have to be signal controlled. The overall environmental impact of the bridge is significant due to the highway being raised over 5 metres above the existing highway level, very close to existing residential / commercial property. The cost of the bridge is not within the funding envelope and would compromise the project business case.
Option 1B	Opposite Pure Offices Harbour Road  Location is 400 metres from Cabstand  Population within 1km radius is 15,927	This option requires substantial highway modifications to form a new highway link between Harbour Road and Wyndham Way, as an alternative route to Quays Avenue, which would be stopped up. Alternatively this option would require the road over rail bridge at Quays Avenue (as option 1A). A footbridge near to Trinity Primary School and enhanced footpath links. A 150 space car park. Bus stops/lay-bys.	Requires significant third party land /property, causing impact to commercial business. Requires closure of Quays Avenue (to through traffic) and a new highway link from Harbour Road to Wyndham Way, but this new link be an indirect route and would have a severe highway impact as it would increase pressure on key junctions, causing delays and longer journey times. It is unlikely these highway modifications would be acceptable to North Somerset Council as the highway authority.
Option 2C	Between Serbert Road and Harbour Road  Location is 550 metres from Cabstand  Population within 1km radius is 14,402	Some highway modifications to form a new highway link connecting Harbour Road to Serbert Road as an alternative route to Quays Avenue, which would be stopped up. A westbound pedestrian and cycle link. A pedestrian crossing at Serbert Road. A footbridge near to Trinity Primary School and enhanced footpath links. A 150 space car park. Bus stops/lay-bys.	Requires some third party land /property, including partial demolition of commercial property. Requires some highway modifications to form a new highway link connecting Harbour Road to Serbert Road, as a result of closing Quays Avenue to through traffic. Highway modifications cause some traffic impacts. Car park is located across the road from the station.
Option 2B	Across Quays Avenue  Location is 600 metres from Cabstand  Population within 1km radius is 13,889	Some highway modifications to re-align Quays Avenue and form a new roundabout junction with Haven View, with some modifications to Phoenix Way. A westbound pedestrian and cycle link. A pedestrian crossing at Quays Avenue. A footbridge near to Trinity Primary School and enhanced footpath links. A 100 space main car park and 50 space overflow car park. Bus stops/lay-bys.	Requires some third party land/ property. Requires some highway modifications to re-align Quays Avenue and create a new junction at Haven View.
Option 2A	East of Quays Avenue  700 metres from Cabstand  Population within 1km radius is 12,990	No highway modifications. A westbound pedestrian and cycle link. A pedestrian crossing at Quays Avenue. A footbridge near to Trinity Primary School and enhanced footpath links. A 150 space car park. Bus stops/lay-bys.	No highway modifications. Location is close to existing residential property and would cause some localised environmental impacts. More limited space for station forecourt / facilities. Car park is located across the road from the station.
Option 3	North of Moor Farm Sheepway  Location is 1.3km from Cabstand  Population within 1km radius is 6,975	This location requires a new highway link road 300 metres in length with a new junction at Sheepway. A westbound pedestrian and cycle link. A pedestrian crossing at Quays Avenue. A 150 space car park. Bus stops/lay-bys.	This location is not within easy walking distance of the town centre and has a much lower catchment of households within 1 kilometre. This location requires a new highway link and junction. Location is close to some existing residential property and is in the green belt, however overall has a more limited localised environmental impact.

### Site Options Appraisal Methodology

- 5.15 The Site Options Appraisal methodology encompasses three main elements, assessment of site policy fit, assessment of environmental / social impact and assessment of site deliverability. The methodology is based on the Department for Transport's 'Early Assessment and Sifting Tool (East)', which is a multi-criteria assessment approach. Each element for each station site has been assessed qualitatively and this has resulted in a performance ranking. The results of the three elements were then combined and given equal weighting, to produce an overall site viability ranking for each station site.
- 5.16 The site policy fit assessment entailed a high level review of each site against a range of policy objectives. The policy objectives assessed included, strategic land use policies, strategic transport policies, highways development management policies, as summarised in chapter 2. Furthermore the policy assessment included consideration of Equalities Impact Assessment legislation and fit with project objectives.
- 5.17 The environmental and social impact of each station site has been assessed using the following headings: Carbon emissions, Socio-distributional impacts and the regions, Local environment and Well being. Within each heading are various sub-headings, and each of which were assessed. Further details of the assessment is set out in chapter 6.
- 5.18 The site deliverability assessment entailed a high level review of each site against the transport business case (five case model). The transport five case model is the default approach used by and recommended by the Department for Transport for the development and implementation of major transport projects. The approach is based on the following five cases: the Strategic Case, the Economic Case, the Management Case, the Financial Case and the Commercial Case. Each case is developed in accordance with technical guidance, proportionate to the stage of the project. At key stages the business case (comprising the five cases) is submitted to the local funding body (WoE Joint Transport Board) for consideration and endorsement.

## **6. Site Options Appraisal Assessment**

### **6.1 Qualitative Assessment**

Table 2 sets out the qualitative site policy fit assessment.

Table 3 sets out the qualitative environmental / social impact assessment.

Table 4 sets out the qualitative deliverability assessment.

Concept engineering design drawings have been produced for site option 2A, 2B and 2C, and indicative layout plans have been produced for options, 1A, 1B and 3, see appendix 3.

**Table 2. Site Options Appraisal – Policy Fit Assessment**

Policy	Option 1A	Option 1B	Option 2C	Option 2B	Option 2A	Option 3
<b>Planning &amp; Land Use Policies</b> North Somerset Council Core Strategy and applicable elements of the Replacement Local Plan. Refer to section 2 for list of policies.	Site is in an area zoned as commercial and the use is commercial. Site is located close to the town centre assisting the vitality of the town centre. Good / excellent policy fit.	Site is in an area zoned as commercial and the use is commercial. Site is located fairly close to the town centre assisting the vitality of the town centre. Good / excellent policy fit.	Site is in an area zoned as commercial and the use is commercial. Site is more peripheral to the town centre but pedestrian/cycle promenade link to would provide strong link to the town centre. Good policy fit.	Site is in an area zoned as commercial and the use is commercial. Site is more peripheral to the town centre but pedestrian/cycle promenade link to would provide strong link to the town centre. Good policy fit.	Site is in an area zoned as residential. As the use is commercial and close to existing residential properties, there are policy implications. Site is peripheral to the town but pedestrian/cycle promenade link to would provide strong link to the town centre. Moderate / good policy fit.	Site is in an area zoned as Green Belt and is close to a number of residential properties. Poor policy fit.
<b>WoE Joint Local Transport Plan</b> Relevant policies include 'Support economic growth' and 'Promote Accessibility' etc	300m from the town centre and ample space for station forecourt / facilities. Good / excellent policy fit.	400m from the town centre and ample space for station forecourt / facilities. Good / excellent policy fit.	550m from town centre, ample space for station forecourt / facilities and corner (prominent) site. Good policy fit.	600m from town centre, ample space for station forecourt / facilities and corner (prominent) site. Good policy fit.	700m from town centre, limited space for station forecourt / facilities. Moderate / good policy fit.	1.3km from town centre, space for station forecourt / facilities. Poor policy fit.
<b>Highway Development Management Policy</b> Replacement Local Plan policy T/10 Safety, traffic and the provision of infrastructure associated with development	Quays Avenue link maintained via road over rail bridge, with signalised T junction. Gradient and derogation of design standards causes some issues for some highway users. Overall provides a poor / moderate fit with policy.	Stopping up of Quays Avenue and providing alternative in-direct highway route from Harbour Road to Wyndham Way would cause significant highway impacts resulting in, impacts on key junctions and longer journey times. Overall provides very poor policy fit.	New highway connection from Serbert Road to Harbour Road replaces Quays Avenue link (which is stopped up). New route is reasonably direct, but has narrower carriageway and more junctions. Pedestrian crossing to connect car park with station. Overall provides moderate policy fit.	Re-alignment of Quays Avenue and form a new roundabout junction with Haven View, with some modifications to Phoenix Way. Main station car park is within station grounds. Overall provides a good policy fit.	Quays Avenue link maintained as current arrangement, except a pedestrian crossing is required to link the car park with the rail station. Overall provides a moderate / good policy fit.	A new highway link is needed with new junction from Sheepway. A pedestrian crossing is needed at Quays Avenue. Highway implications are minor. Overall provides a good policy fit.
<b>Equalities Impact Assessment</b> Requirements include race, gender, disability equality, sexual orientation, religion or belief and age	The road over railway bridge would mean the road and pavements would entail gradients that some people may find more difficult. The footbridge near Trinity School would be fully accessible, likewise the station car park and station platform would meet all accessibility standards. Overall poor / moderate policy fit.	The required highway modifications would accord with statutory accessibility standards. The footbridge near Trinity School would be fully accessible, likewise the station car park and station platform would meet all accessibility standards. Overall good policy fit.	The required highway modifications would accord with statutory accessibility standards. The footbridge near Trinity School would be fully accessible, likewise the station car park and station platform would meet all accessibility standards. Overall good policy fit.	The required highway modifications would accord with statutory accessibility standards. The footbridge near Trinity School would be fully accessible, likewise the station car park and station platform would meet all accessibility standards. Overall good policy fit.	No changes are needed to the highway, except new access for the station car park. The footbridge near Trinity School would be fully accessible, likewise the station car park and station platform would meet all accessibility standards. Overall good policy fit.	The required highway modifications would accord with statutory accessibility standards. The station car park and station platform would meet all accessibility standards. Overall good policy fit.
<b>Project Objectives</b> <ul style="list-style-type: none"> <li>support economic growth</li> <li>deliver a more resilient transport offer</li> <li>improve accessibility to the rail network</li> <li>make a positive contribution to social well being</li> <li>contribute to reducing traffic congestion</li> <li>contribute to enhancing the capacity of the local rail network</li> <li>contribute to reducing the overall environmental impact of the transport network</li> </ul>	<ul style="list-style-type: none"> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>moderate policy fit</li> </ul>	<ul style="list-style-type: none"> <li>good policy fit</li> <li>moderate/good policy fit</li> <li>moderate/good policy fit</li> <li>good policy fit</li> <li>moderate policy fit</li> <li>good policy fit</li> <li>good policy fit</li> </ul>	<ul style="list-style-type: none"> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>excellent policy fit</li> </ul>	<ul style="list-style-type: none"> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>excellent policy fit</li> </ul>	<ul style="list-style-type: none"> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>excellent policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> <li>good policy fit</li> </ul>	<ul style="list-style-type: none"> <li>moderate/good policy fit</li> <li>moderate/good policy fit</li> <li>moderate/good policy fit</li> <li>moderate/good policy fit</li> <li>moderate/good policy fit</li> <li>good fit with policy</li> <li>good fit with policy</li> </ul>
<b>Summary</b> Overall policy fit	Overall weaker policy fit. Policy fit ranking 4 <sup>th</sup> best.	Overall weak policy fit. Policy fit ranking 5 <sup>th</sup> best.	Overall strong policy fit. Policy fit ranking 2 <sup>nd</sup> best.	Overall very strong policy fit. Policy fit ranking 1 <sup>st</sup> best.	Overall good policy fit. Policy fit ranking 3 <sup>rd</sup> best.	Overall very weak policy fit. Policy fit ranking 6 <sup>th</sup> best.



**Table 3. Site Options Appraisal – Environmental & Social Impact Assessment**

Environmental & Social Impact	Option 1A	Option 1B	Option 2C	Option 2B	Option 2A	Option 3
<b>Carbon emissions</b> <ul style="list-style-type: none"> <li>Change in total vehicle kilometres</li> <li>Impact on carbon emissions, for construction and when operational</li> <li>Total fuel used and fuel efficiency</li> </ul>	Central location close to the town centre, results in attractive and competitive travel option, resulting in a high level of passenger demand and modal switch. However, the construction of the road bridge requires a large volume of concrete, resulting in carbon emissions.	Central location close to the town centre, results in attractive and competitive travel option, resulting in a high level of passenger demand and modal switch.	While the site is more peripheral to the town centre, it provides an attractive and competitive travel option, resulting in a comparatively high level of passenger demand and modal switch.	While the site is more peripheral to the town centre, it provides an attractive and competitive travel option, resulting in a comparatively high level of passenger demand and modal switch.	While the site is more peripheral to the town centre, it provides an attractive and competitive travel option, resulting in a comparatively high level of passenger demand and modal switch.	The out of town station site means the station is more akin to a park & ride than a conventional station. The limited walking catchment for trip origins and for visitors to Portishead, the lack of easy walking distance to the town centre, results in lower passenger demand and modal switch.
<b>Soicio-distributional impacts and the regions</b>  <b>Socio-distribution</b> Impacts on specific groups and equalities considerations, including impacts from changes to: <ul style="list-style-type: none"> <li>Local environment</li> <li>Well being</li> <li>User benefits</li> <li>Personal affordability</li> </ul> <b>Regeneration</b> <ul style="list-style-type: none"> <li>Impact on targeted regeneration</li> </ul> <b>Regional Imbalance</b> <ul style="list-style-type: none"> <li>Impact on competitiveness of local economy</li> </ul>	The road bridge causes accessibility problems for some people. The road bridge causes environmental impacts for some residents. The impacts are particularly felt by residents with limited mobility and residents close to road bridge.	The highway modifications result in longer and indirect routes particularly between the Village Quarter Wyndham Way resulting in some severance issues. The highway modifications result in some environmental impacts and the traffic impacts could have a long term negative impact on the local economy. Residents of the Village Quarter are particularly affected.	The highway modifications are relatively minor, but some on-street parking will be displaced. Serbert Road and Serbert Way (a commercial area) becomes a through route, however this would increase the prominence of the businesses and as a result would possibly be beneficial to them.	The highway modifications are relatively minor, but would result in some localised environmental impacts.	No changes are needed to the highway, except new access for the station car park. The station site is close to residential properties and causes some localised environmental impacts.	The out of town station site means that most people would need access to a car to use the station. This has a particular impact on young people and older people who generally have more limited access to a car. The station site is close to some residential properties and causes some localised environmental impacts.
<b>Local environment</b> <ul style="list-style-type: none"> <li>Air quality</li> <li>Noise</li> <li>Natural environment*, heritage and landscape</li> <li>Streetscape and urban environment</li> </ul>	The road bridge causes a range of negative environmental impacts for some people.	The highway modifications cause traffic impacts (causing delays and longer journey times), resulting in environmental impacts.	The highway modifications enable the station to be located west of the residential housing. Much of the existing traffic on Quays Avenue would transfer onto Serbert Road and Serbert Way.	The re-alignment of Quays Avenue enables the station to be located west of some the residential housing and provides space for an area of public open space and environmental mitigation.	The proximity of the station to residential properties causes some localised environmental impacts.	The out of town station site reduces the total number of properties close to the station and the rail line, resulting in reduced environmental impact overall. However, there are a small number of properties close to station, resulting in some localised environmental impacts.
<b>Well being</b> <ul style="list-style-type: none"> <li>Physical activity</li> <li>Injury or deaths</li> <li>Crime</li> <li>Terrorism</li> <li>Accessibility</li> <li>Severance</li> </ul>	Moderately good accessibility for active modes (walking and cycling), buses and taxis.	Moderately good accessibility for active modes (walking and cycling), buses and taxis, but severance issues due to indirect highway route	Very good accessibility for active modes (walking and cycling), buses and taxis	Very good accessibility for active modes (walking and cycling), buses and taxis	Moderately good accessibility for active modes (walking and cycling), buses and taxis	More limited accessibility for active modes (walking and cycling), buses and taxis but reduced severance issues compared with some options.
Summary Overall environmental & social Impact	6 <sup>th</sup> best	5 <sup>th</sup> best	Joint 1 <sup>st</sup> best	Joint 1 <sup>st</sup> best	Joint 3 <sup>rd</sup> best	Joint 3 <sup>rd</sup> best

\* includes ecology, biodiversity, habitats, soils, geology, hydrology / drainage and vibration

**Table 4. Sites Options Appraisal – Deliverability Assessment**

Business Case Section	Option 1A	Option 1B	Option 2C	Option 2B	Option 2A	Option 3
Strategic Case	Compelling case & fit with policy objectives. Positive impact on business case.	Case less clearly made and some policy objectives not adequately addressed. Moderately positive impact on business case.	Compelling case & fit with policy objectives. Positive impact on business case.	Compelling case & fit with policy objectives. Positive impact on business case.	Compelling case but some policy objectives slightly less fully addressed. Positive impact on business case.	Case less clearly made and some policy objectives not adequately addressed. Neutral impact on business case.
Economic Case	Substantial additional costs (road bridge) reduces BCR. Estimated cost is approx £8m more than option 2A. Project value for money is marginal (BCR estimated at 1.5 to 2.0). Some localised environmental impacts. Negative impact on business case.	Substantial additional costs (highway and property) reduces BCR. Estimated cost is approx £5m more than option 2A. Project value for money is marginal (BCR estimated at 1.5 to 2.0). More limited environmental impacts. Negative impact on business case.	Moderate additional costs (highway & property) but this doesn't have a significant impact on achieving a good BCR. Project value for money is good (BCR estimated at 2.0 to 2.5). More limited environmental impacts. Moderately positive impact on business case.	Some additional costs (highway & property) but this doesn't have any significant impact on achieving a good BCR. Project value for money is good (BCR estimated at 2.0 to 2.5). More limited environmental impacts. Moderately positive impact on business case.	Low cost option enables good BCR. Project value for money is good (BCR estimated at 2.0 to 2.5). Some localised environmental impacts. Moderately positive impact on business case.	Low cost option enables good BCR. Project value for money is good (BCR estimated at 2.0 to 2.5). More limited localised environmental impacts. Moderately positive impact on business case.
Management Case	Substantial delivery challenges. Predicated on road over rail bridge which is a very tight fit in the available space and has significant environmental impacts. Negative impact on business case.	Substantial delivery challenges. Predicated on significant take of third party land, additional supporting infrastructure and impacts on commercial businesses. Negative impact on business case.	Moderate delivery challenges. Predicated on obtaining part of a third party property (which has full planning consent for conversion from commercial to residential use) and partial demolition. Negative impact on business case.	Some delivery challenges. Predicated on obtaining third party property (commercial). Slightly negative impact on business case.	Some delivery challenges. Predicated on gaining planning approval for the station site which adjoins a residential area. Slightly negative impact on business case.	Some delivery challenges. Predicated on gaining planning approval for the station site which adjoins a residential area and is in the green belt. Slightly negative impact on business case.
Financial Case	Cost is above the available funding envelope. There are major affordability issues with this option. Negative impact on business case.	Cost is above the available funding envelope. There are major affordability issues with this option. Negative impact on business case.	Higher cost than some options but is within the available funding envelope. Slightly negative impact on business case.	Higher cost than some options but is within the available funding envelope. Slightly negative impact on business case.	Cost is within the available funding envelope. Positive impact on business case.	Cost is within the available funding envelope. Positive impact on business case.
Commercial Case	Strong case with some potential for saleability / innovation by train operator. Positive impact on business case.	Strong case with some potential for saleability / innovation by train operator. Positive impact on business case.	Strong case with some potential for saleability / innovation by train operator. Positive impact on business case.	Strong case with some potential for saleability / innovation by train operator. Positive impact on business case.	Strong case with some potential for saleability / innovation by train operator. Positive impact on business case.	Case less certain but due to lower passenger demand because of station site. Neutral impact on business case.
Summary Overall business case viability	Overall business case is not sufficiently robust to take forward to delivery. Deliverability ranking – 5 <sup>th</sup> best.	Overall business case is not sufficiently robust to take forward to delivery. Deliverability ranking – 6 <sup>th</sup> best.	Overall marginal business case, requiring property acquisition and partial demolition of a building. Deliverability ranking – 4 <sup>th</sup> best.	Overall sound business case, but requires some property acquisition. Deliverability ranking – 2 <sup>nd</sup> best.	Overall sound business case, with some localised environmental issues. Deliverability ranking – 1 <sup>st</sup> best	Overall sound business case to take forward to delivery. Deliverability ranking – 3 <sup>rd</sup> best.

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### Overall Assessment Ranking

- 6.2 The overall assessment combining the policy fit, environmental / social impact and deliverability assessment, using an equal weighting to produce an aggregate site option performance ranking, is shown in the table below.

**Table 5. Overall Assessment Ranking Results**

	<b>Option 1A</b>	<b>Option 1B</b>	<b>Option 2C</b>	<b>Option 2B</b>	<b>Option 2A</b>	<b>Option 3</b>
<b>Policy fit Ranking</b>	4 <sup>th</sup>	5 <sup>th</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	6 <sup>th</sup>
<b>Environmental &amp; Social Impact ranking</b>	6 <sup>th</sup>	5 <sup>th</sup>	1 <sup>st</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>
<b>Deliverability Ranking</b>	5 <sup>th</sup>	6 <sup>th</sup>	4 <sup>th</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	3 <sup>rd</sup>
<b>Average ranking Score</b>	<b>5.00</b>	<b>5.33</b>	<b>2.33</b>	<b>1.33</b>	<b>2.33</b>	<b>4.00</b>
<b>Aggregate ranking</b>	<b>5<sup>th</sup> best</b>	<b>6<sup>th</sup> best</b>	<b>Joint 2<sup>nd</sup> best</b>	<b>1<sup>st</sup> best</b>	<b>Joint 2<sup>nd</sup> best</b>	<b>4<sup>th</sup> best</b>

## 7. Conclusions

### Summary of Results

- 7.1 Chapter 6 para 6.1 shows the outcome of the overall assessment combining the policy fit, environmental / social impact and deliverability assessment. In summary site 2B, has the best policy fit ranking, followed by site 2C and 2A, each having a good, strong or very strong policy fit. Site options 1A, 1B and 3 have either a weaker, weak or very weak policy fit. In respect of the Environmental / Social Impact assessment, site 2C and 2B are the joint best performing options, with 2A and 3, joint 3<sup>rd</sup> best. Site options 1B and 1A have the greatest Environmental / Social Impact and are ranked 5<sup>th</sup> and 6<sup>th</sup>. In respect of the deliverability assessment, site 2A has the best deliverability ranking, followed by 2B and 3 with all three having a sound business case. The business case for option 2C is marginal, while the business case for site options, 1A and 1B is not sufficiently robust to take forward. The best overall performing options are 2A, 2B and 2C and these are the only options to achieve at least one ranking of 1<sup>st</sup> in the assessment.

Site Option 2A photograph taken west of the station site, looking east



Site Option 2B photograph taken north of the station site, looking south east



Site Option 2C photograph taken north of the station site, looking south east



### Recommendations

- 7.2 The three overall best performing options 2B, 2A and 2C, should be taken forward for further consideration. The three site options bound each other and comprise a total linear length of approximately 250 metres (excluding car parks), spanning the railway alignment either side of Quays Avenue. Based on the body of evidence set out in this document, consideration should be given to safeguarding site options 2B, 2A and 2C in the North Somerset Sites & Policies Development Plan Document, as an area of search spanning approximately 250 metres, plus space for car parks . As the technical work for MetroWest Phase 1 progresses (project consultation, engineering design, business case development etc), a preferred station site within this relatively contained area of search can be identified to take through a major planning application process (Development Consent Order) and ultimately to construction and opening.

## **Appendices**

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

# **North Somerset Council Local Development Framework**

## **Sites and Policies Development Plan Document**

### **Evidence Paper Re-opening Portishead Railway Line and Options for the Location of Portishead Railway Station**



Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

## **Evidence Paper Policy Reference PH3**

### **Re-opening Portishead Railway Line and Options for the Location of Portishead Railway Station**

#### **1. Overview of the Portishead to Bristol Transport Corridor**

The Portishead to Bristol corridor (A369) suffers congestion and journey time reliability problems. This not only causes delays and lost productivity for car drivers and goods vehicle operators but also presents a major hurdle for providing an attractive public transport mode along the corridor. The problems and context of the A369 corridor are summarised as:

- The A369 is the only transport corridor directly linking Portishead with Bristol which is just 10 miles to the east.
- The capacity constraints on the A369 are exacerbated further by the fact that the A369 crosses junction 19 of the M5. Junction 19 of the M5 is one of the busiest parts of the M5 with the Avonmouth Bridge immediately to the north towards junction 18.
- The A369 continually suffers from the knock on effects of incidents on the M5 with traffic high volumes of traffic over spilling onto a constrained local road corridor with very few alternative route options.

This lack of transport network resilience and limited travel choices could be addressed by utilising the heavy rail corridor between Portishead and Bristol which is a strategic transport network asset and re-instating passenger train services. The objectives of re-opening the Portishead railway line for passenger train services are to:

- Reduce traffic congestion on arterial roads and reduce journey times for commuters and business to and from Bristol, supporting economic growth,
- Improve transport network resilience through the utilisation of a strategic transport alignment, which is independent from the highway network,
- Deliver a sustainable transport corridor and improve air quality

The project will also:

- Assist in the delivery of wider social wellbeing and quality of life objectives,
- Provide through rail services from Portishead to destinations beyond Bristol Temple Meads, across the sub-region, and
- Form the basis of a medium to long term sub-regional programme of rail projects to deliver a major uplift to the local the local rail network offer.

The project would increase the UK's passenger rail network by 10 miles and connect an additional 30,000+ people to the network. There is a great amount of interest and support for the project within the local community, based on the frequency with which the project is raised positively by business, members of the public and community organisations, to the council.

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

## 2. Overview of the Project

The Portishead rail branch line was closed in 1964 as part of the Beeching cuts. In 2002 a major part of the line was reopened between Royal Portbury Dock and Bristol as a freight only line. This project involves re-instating the remaining 4 miles of track between Portishead and Pill and upgrading the branch line infrastructure to meet passenger train standards, and providing sufficient line capacity to enable both passenger and freight train to operate to the required service patterns.

Re-opening the Portishead rail branch line now forms part of a larger sub-regional project known as Greater Western Metro Phase 1. GW Metro Phase 1 includes half hourly train services for the Severn Beach line, local stations between Bristol Temple Meads and Bath Spa and the reopened Portishead line. In addition there is a wider programme of local rail schemes, also being taken forward by the four West of England councils; North Somerset, Bristol City, South Gloucestershire and Bath & North East Somerset. GW Metro Phase 1 is being led by North Somerset Council on behalf of the West of England councils.

## 3. Brief History of the Project

- 1964 Line was closed
- 2002 Line partly re-opened for freight trains only between Parsons Street junction and Portbury Dock
- 2005 Portishead Quays Master plan - identified location for station (option 1)
- 2006 Joint Local Transport Plan 2 - policy basis and stakeholder support for taking project forward
- 2006 North Somerset Replacement Local Plan - safeguarded disused railway alignment between Portishead and Pill
- 2008 Project feasibility study by consultants Halcrow
- 2010 Engineering feasibility by Network Rail GRIP3 Option Selection
- 2011 Joint Local Transport Plan 3 - policy basis, programme prioritisation and stakeholder support for taking project forward
- 2011 Sub-regional rail conference - project selected by over 70 delegates as 2<sup>nd</sup> highest rail priority for delivery
- 2011 Sub-regional rail study recommends combining Portishead rail project into the GW Metro project with it included in GW Metro Phase 1
- 2012 Joint Transport Executive Committee endorse including re-opening Portishead line in GW Metro Phase 1 and response to GW Franchise for its inclusion in franchise specification as a priced option
- 2012 Department for Transport confirm the inclusion of GW Metro Phase 1 as a priced option in GW Franchise
- 2012 Governance and mobilisation of sub-regional rail programme and identification of resources for mobilisation of GW Metro Phase 1 project

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

#### 4. The Safeguarded Alignment

The alignment has been subject to local planning policies for many years to protect encroachment of development that would prevent the line from being re-opened. The only location where development has created an obstacle to the re-opening of the line is at Quays Avenue, which is a new road crossing over the railway alignment. At the time of the master planning of Portishead Vale development, the design standards for road easements across railway branch lines allowed for level crossings. However, the rail industry design standards have since changed and level crossings are no longer acceptable to Her Majesties Railway Inspectorate. Therefore a road over rail bridge will be needed in order for the railway line to serve Portishead town centre (station location option 1 only).

#### 5. Timescales Taking Forward the Project as part of GW Metro Phase 1

late 2012 - 2015	Scheme Case and Powers to Build and Operate
2015 - 2016	Detailed Design and Scheme Procurement
2016 - 2017	Construction
late 2017 / early 2018	Scheme Opening and Commencement of Train Services

#### 6. Options for the Location of Portishead Railway Station

While a site for the Portishead railway station was identified on Harbour Road as part of the Portishead Quays master planning, the delivery of a station at this location has a number of challenges and there is now a need to review the merits of this location and consider options for other locations.

There are a wide range of factors that need to be considered in respect of identifying the best location for a railway station, these include the transport network, the environmental impact, the strategic land uses both current and future use as set out the councils Core Strategy and wider community considerations. Furthermore the site must also be able to meet technical specifications, accessibility regulations and safety requirements of rail industry and national legislation.

We have commenced initial analysis on the merits and impacts of alternative station locations. Further more detailed analysis will be needed, as the project is taken forward. There are broadly eight high level transport criteria relevant to selecting the location for Portishead railway station:

1. walking and cycling catchment and access,
2. highway access,
3. car parking provision and bus interchange facilities,
4. the extent of supporting infrastructure required for each location eg highway bridges, pedestrian bridges, new highway accesses etc
5. likely wider environmental impact
6. fit with project objectives
7. overall cost of station location
8. EQIA considerations

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

We have used the above criteria to identify and compare three short listed locations for Portishead railway station, as follows:

Option 1 - Town Centre location on Harbour Road. Provision for 100 car parking spaces has been made adjacent to the station site. This option requires the construction of a new road bridge over the rail alignment at Quays Avenue. This option also includes provision for a footbridge south east of Trinity Anglican Methodist Primary School. This station site is approximately 0.3 km from the town centre.

Option 2 – Peripheral Town Centre location on Quays Avenue. There is space for at least 200 car parking spaces on land west of Quays Avenue. This option does not require a new road bridge at Quays Avenue. This option also includes provision for a footbridge south east of Trinity Anglican Methodist Primary School. The remaining length of redundant track bed to the town centre would be used to provide a high quality ‘Gateway’ shared use pedestrian/ cycle path. The ‘Gateway’ path would have the effect of extending the western pedestrian entrance of the station closer to the town centre. The rail alignment here is 15 to 20 meters wide, so there is considerable potential to create a very attractive public realm enhancement as well as serving as a functional pedestrian/ cycle ‘Gateway’. A new pedestrian / cycle crossing on Quays Avenue (Toucan crossing or similar) would be provided to give a through route between the station and the ‘Gateway’ path and car park. There is also potential to create a wider station forecourt/frontage using a small parcel of land adjacent to Quays Avenue, which is currently part of the Pumping Station yard. This station site is approximately 0.7 km from the town centre.

Option 3 – Edge of Town location on land north of Moor Farm. There is space for at least 200 car parking spaces on land adjacent to the railway station site, together with a new highway access from Sheepway. This option does not require a new road bridge at Quays Avenue or provision for a footbridge south east of Trinity Anglican Methodist Primary School, however it would require a new highway access and link road from Sheepway. This option would operate more like a ‘Parkway’ station than a conventional station, due to its edge of town location. This station site is approximately 1.3 km from the town centre.

Table 1 below sets out a high level comparison of the three station location options for Portishead Rail station.

Figure 1 below shows a map of the three station location options for Portishead Rail station.

We are seeking feedback as part of our Sites and Policies DPD Consultation Version, on all three station location options, to inform decision making on which location is best overall for Portishead. Please refer to the front of the DPD document on how to provide feedback.

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

Table 1. Comparison of the Three Short Listed Locations for Portishead Railway Station

	<b>Walking &amp; Cycling Catchment and Access</b>	<b>Highway Access</b>	<b>Car Parking Provision &amp; Bus Interchange</b>	<b>Extent of Supporting Infrastructure Required</b>	<b>Likely Wider Environmental Impact</b>	<b>Fit with Project Objectives</b>	<b>Overall Cost of this station location</b>	<b>EQIA considerations</b>
<b>Station Location Option 1</b>  Town Centre location on Harbour Road	Large catchment of housing within 800m radius of station location. Any potential re-development of Old Mill Road Industrial Estate could improve access to town centre from station.  This station site is approximately 0.3 km from the town centre.	Relatively good highway access via Harbour Road, however requires a road bridge at Quays Avenue.	Provision for 100 car parking spaces has been secured as part of the Quays development however this is unlikely to be sufficient to cater for the forecast passenger demand.  Bus stops are located on Harbour Road and there is potential for buses to operate via the station car park.	This location requires a new road over railway bridge at Quays Avenue and one pedestrian bridge east of Trinity school.	The road over railway bridge would entail replacing the existing roundabout at Quays Avenue, Phoenix Way & Harbour Road, with an elevated signal controlled T junction. This would have a visual and environmental impact on a number of residential properties adjacent to Quays Avenue and retirement apartments on Harbour Road.	This option would meet all the project objectives to reduce congestion, improve transport network resilience and deliver a sustainable transport corridor.	The estimated cost of the road bridge is £6m. The estimated cost of the pedestrian bridge ranges from £500k to £1.5m depending upon whether it includes mobility impairment ramps.	The road over railway bridge would mean the roads and pavements would entail gradients that some people may find more difficult than the current layout.

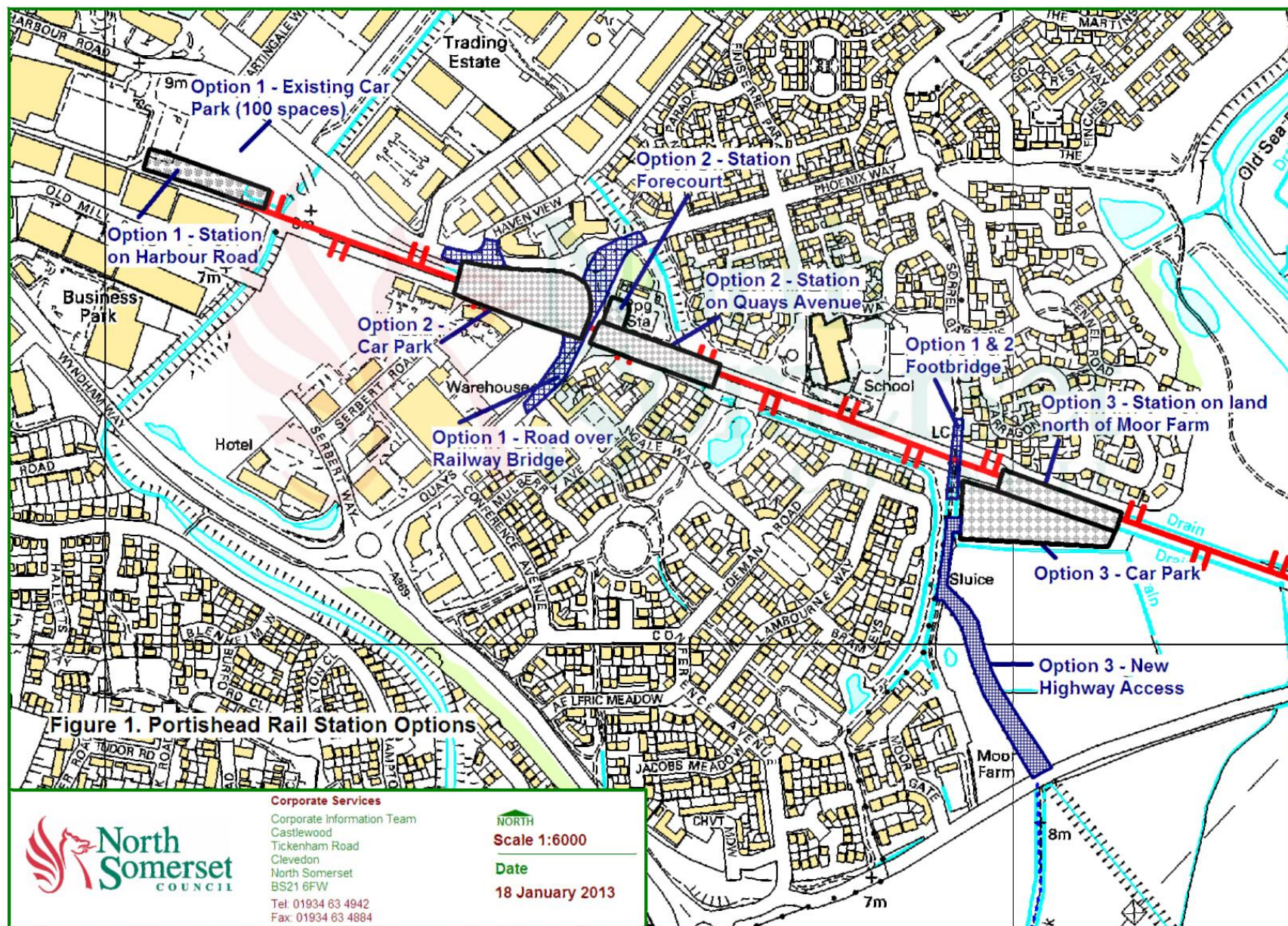
Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

	<b>Walking &amp; Cycling Catchment and Access</b>	<b>Highway Access</b>	<b>Car Parking Provision &amp; Bus Interchange</b>	<b>Extent of Supporting Infrastructure Required</b>	<b>Likely Wider Environmental Impact</b>	<b>Fit with Project Objectives</b>	<b>Overall Cost of this station location</b>	<b>EQIA considerations</b>
<b>Station Location Option 2</b>  Peripheral Town Centre location on Quays Avenue	<p>Large catchment of housing within 800m radius of station location.</p> <p>The remaining length of redundant track bed to the town centre would be used to provide a high quality 'Gateway' shared use pedestrian/ cycle path. The 'Gateway' path would have the effect of extending the western pedestrian entrance of the station closer to the town centre. The rail alignment here is 15 to 20 meters wide, so there is considerable potential to create a very attractive public realm enhancement as well as serving as a functional pedestrian/ cycle 'Gateway'.</p> <p>This station site is approximately 0.7 km from the town centre.</p>	<p>Good highway access via Quays Avenue / Harbour Road, and good access from both directions via Wyndham Way.</p>	<p>There is space for provision of at least 200 car parking spaces. A pedestrian crossing would be needed on Quays Avenue to link the car park with the station.</p> <p>There are bus stops on Quays Avenue and there is potential for buses to operate via the station car park or from new bus stops / lay-bys near to the main station entrance.</p>	<p>This location requires a high quality 'Gateway' shared use pedestrian / cycle path, a new car park on land west of Quays Avenue, a new pedestrian / cycle crossing on Quays Avenue (Toucan crossing or similar) and one pedestrian bridge east of Trinity school.</p>	<p>This option does not require a road over railway bridge, therefore it would have a more limited environmental impact on Quays Avenue, in comparison with option 1.</p> <p>The need for a new 200 space car park would however result in some environmental impact.</p> <p>The proximity of the station to housing could result in some localised environmental impact, however there is potential to design mitigation measures reduce these impacts.</p>	<p>This option would meet all the project objectives to reduce congestion, improve transport network resilience and deliver a sustainable transport corridor. While the station location is not as central as option 1, this option still has a very high walking catchment.</p> <p>Access to the town centre could be enhanced by the provision of a high quality 'Gateway' shared use pedestrian/ cycle path on the remaining length of redundant track bed.</p>	<p>The estimated cost of the 'Gateway' shared use path is £250k. The estimated cost of a new car park is £850k. The estimated cost of the Toucan crossing is £50k. The estimated cost of the pedestrian bridge ranges from £500k to £1.5m depending upon whether it includes mobility impairment ramps.</p>	<p>No major changes are needed to the road layout, other than a new access to a new car park west of Quays Avenue. The station car park and station platform would meet all statutory accessibility standards.</p>

Important Note: The delivery of the rail project has a number of challenges and constraints. These include achieving a positive outcome in relation to a detailed business case, availability of capital funding and funding approval, statutory processes and approvals, confirmation of operational costs in relation the Great Western franchising process and the overall financial position for North Somerset Council in terms of the affordability of both the capital and revenue funding requirement.

	<b>Walking &amp; Cycling Catchment and Access</b>	<b>Highway Access</b>	<b>Car Parking Provision &amp; Bus Interchange</b>	<b>Extent of Supporting Infrastructure Required</b>	<b>Likely Wider Environmental Impact</b>	<b>Fit with Project Objectives</b>	<b>Overall Cost of this station location</b>	<b>EQIA considerations</b>
<b>Station Location Option 3</b>  Edge of Town location on land north of Moor Farm	More limited catchment of housing within 800m radius of station location. Approximately 60% of the 800m radius is green belt - open fields. This station site is approximately 1.3km from the town centre, if the remaining length of track bed is used as a pedestrian path. This distance is beyond a reasonable walking distance for many people.	Highway access could be provided via Quays Avenue using the rail alignment to the station, however this could prevent any future extension of the line into the town centre. A new highway access could be formed off Sheepway.	There is space for provision of at least 200 car parking spaces, either on the rail alignment or on land north of Moor Farm.  Additional bus stops could be provided on Sheepway and there is potential for buses to operate via the station car park.	This location requires a new car park and a new highway access and link road from Sheepway.	This option would entail locating the station, station car park and highway access in the Green Belt and would result in some environmental impact. This option would require a sequential test and robust evidence to support a case for development in the Green Belt  The proximity of the station to housing could result in some localised environmental impact, however there is potential to design mitigation measures reduce these impacts.	This option would not fully meet all the project objectives to reduce congestion, improve transport network resilience and deliver a sustainable transport corridor.  This option does not provide easy access to and from Portishead Town centre. The walking catchment of the station is relatively poor, thereby access for the majority of people would be via a car trip, bus or cycle. This option would operate more like a 'Parkway' station than a conventional station, due to its edge of town location.	The estimated cost of a new car park is £850k. The estimated cost of the new highway access and link road is £1m.	No major changes are needed to the highway layout, other than a new highway access and link road from Sheepway and a new car park. The station car park and station platform would meet all statutory accessibility standards.  The edge of town centre location would limit its accessibility and usability for some people, particularly those with mobility impairments.

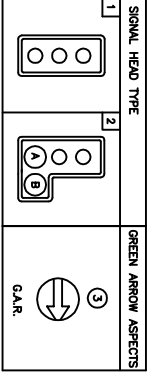
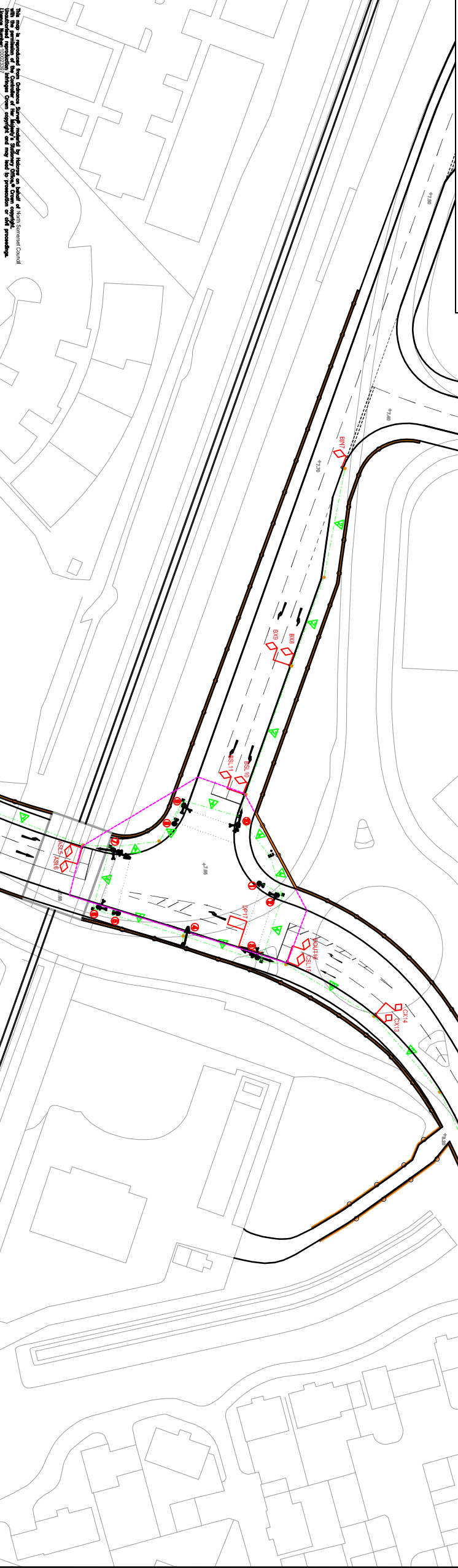
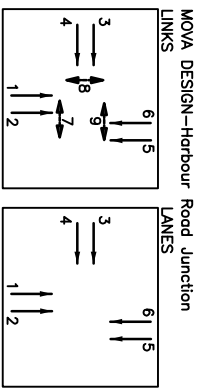
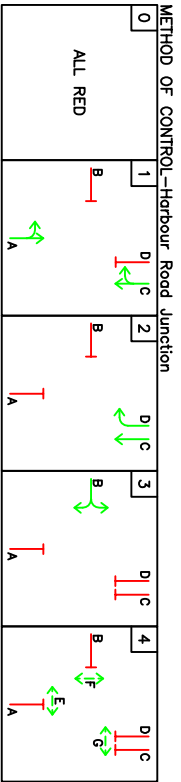




**Fig 1. Map of the Three Station Location Options for Portishead Railway Station**

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POLE NUMBER	POLE TYPE	POLE HEIGHT	SEEN. DISTANCE FROM POLE TO ROAD (m)	SEEN. DISTANCE FROM POLE TO JUNCTION (m)	PHASE(S)	HEAD(S)	DIRECTION, ARROW BOX SIGN ASPECTS	NOTES
1	STANDARD NORMAL	2.0m	750	500	G	PUSHIN display unit	-	-
2	STANDARD NORMAL	4.0m	750	500	G	Push button unit	-	Vehicle & on-coming detectors
3	STANDARD NORMAL	4.0m	750	500	G/D	1	-	Photoelectric cell mounted on pole 3.
4	STANDARD NORMAL	4.0m	750	500	A	PUSHIN display unit	-	Secondary mode
5	STANDARD NORMAL	4.0m	750	500	B	1	-	Vehicle & on-coming detectors
6	STANDARD NORMAL	2.0m	750	500	E	PUSHIN display unit	-	-
7	STANDARD NORMAL	4.0m	750	500	E	Push button unit	-	Vehicle & on-coming detectors
8	STANDARD NORMAL	2.0m	750	500	A	2	-	Secondary mode
9	STANDARD NORMAL	4.0m	750	500	E	PUSHIN display unit	-	Vehicle & on-coming detectors
10	STANDARD NORMAL	4.0m	750	500	F	Push button unit	-	Vehicle & on-coming detectors
11	STANDARD NORMAL	4.0m	750	500	B	1	-	Vehicle & on-coming detectors

Pole / Head Schedule - Harbour Road Junction

SCALE 1:300 (A1)

DETECTOR NUMBER	DETECTOR NAME	DEMAND PHASE	EXTEND PHASE	DISTANCE FROM STOP LINE (m)	DETECTOR TYPE	NOTES
1	AN1	-	-	80.0	Loop	-
2	AN2	-	-	80.0	Loop	-
3	AK3	A	A	35.0	Loop	-
4	AK4	A	A	35.0	Loop	-
5	AS5	A	A	5.0	Loop	-
6	AS6	A	A	5.0	Loop	-
7	BN7	-	-	80.0	Loop	-
8	BN8	B	B	35.0	Loop	-
9	BN9	B	B	35.0	Loop	-
10	BS10	B	B	5.0	Loop	-
11	BS11	B	B	5.0	Loop	-
12	BS12	B	B	5.0	Loop	-
13	CS13	C	C	30.0	Loop	-
14	CS14	C	C	30.0	Loop	-
15	CS15	C	C	5.0	Loop	-
16	DS16	-	-	5.0	Loop	WMA Out Detector
17	PR17	D	-	-	Loop	Col/Control pressure loop

Detector Schedule

- Key:
- Existing Alignment
  - Indicative Alignment
  - Indicative portcullis/safety fence
  - Indicative earth retaining wall
  - Indicative bridge footprint
  - Junction Intervisibility
  - 1x100mm Orange high impact duct
  - 2x100mm Orange high impact duct
  - 4x100mm Orange high impact duct
  - RWS signal head
  - 3 aspect signal with right turn filter
  - On-coming pedestrian/cyclist detector
  - Keyp side pedestrian/cyclist detector
  - Passively safe signal pole
  - Passively safe short signal pole
  - NAL retention socket
  - Controller
  - Toucan display unit with separate push button
  - Push button
  - Composite 600x600mm duct box
  - Composite 450x450mm duct box
  - Carriageway loop box
  - Existing spot levels

Notes:

- All dimensions are in metres unless noted otherwise.
- Layout shown is preliminary and subject to a full topographical survey.
- Layout is based on Design Manual for Roads and Bridges
- 3.1. TD 42 / 95 - Geometric Design of Major/Minor Priority Junctions and Roundabouts.
- 3.2. TD 50/04 The Geometric Layout of Signal Controlled Junctions and Signalised Roundabouts.
- Assumed speed limit is 30mph on Quays Avenue and Harbour Road and 20mph on Phoenix Way.

Rev	By	Chkd	Issued	Date	Description
-	-	-	-	-	-

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Drawing Status

FEASIBILITY

Client



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Project  
Porthsea Rail Corridor  
Feasibility Study

General Arrangement Option B  
Signalised Junction

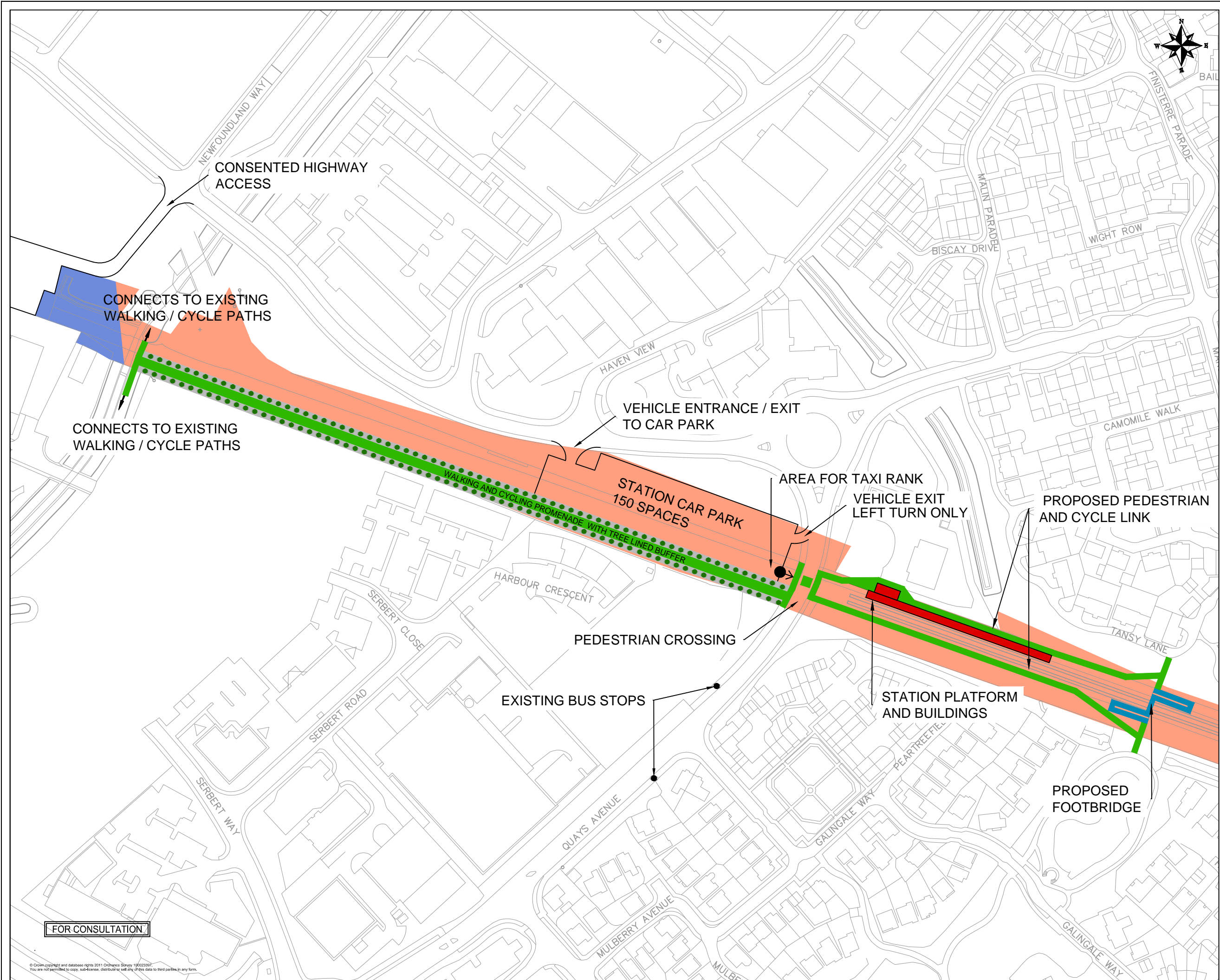
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Checked by: LT	Date: 16, June 10
Approved by: DL	Date: 16, June 10
Drawing No: CT RAEB 210-101	Revision: -

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  4. Land boundaries shown are indicative only.

Key:

- PROPOSED FOOTBRIDGE
- PROPOSED PEDESTRIAN LINK / CYCLEWAY
- PROPOSED PEDESTRIAN CROSSING
- PROPOSED HIGHWAY LINK
- PROPOSED STATION PLATFORM AND BUILDINGS
- NSC RAIL LAND
- PHOTOGRAPH TAKEN FROM THIS POINT

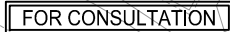
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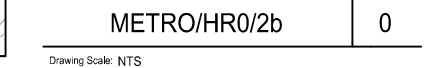
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Project	
METROWEST HIGHWAY REALIGNMENT OPTIONS	
Drawing	
OPTION 2a CONCEPTUAL ARRANGEMENT	
Drawn by: DCF	Date: MAY 2014
Checked by: JW	Date: MAY 2014
Approved by: IW	Date: MAY 2014
Drawing No.	Revision
METRO/HR0/2a	0
Drawing Scale: NTS	





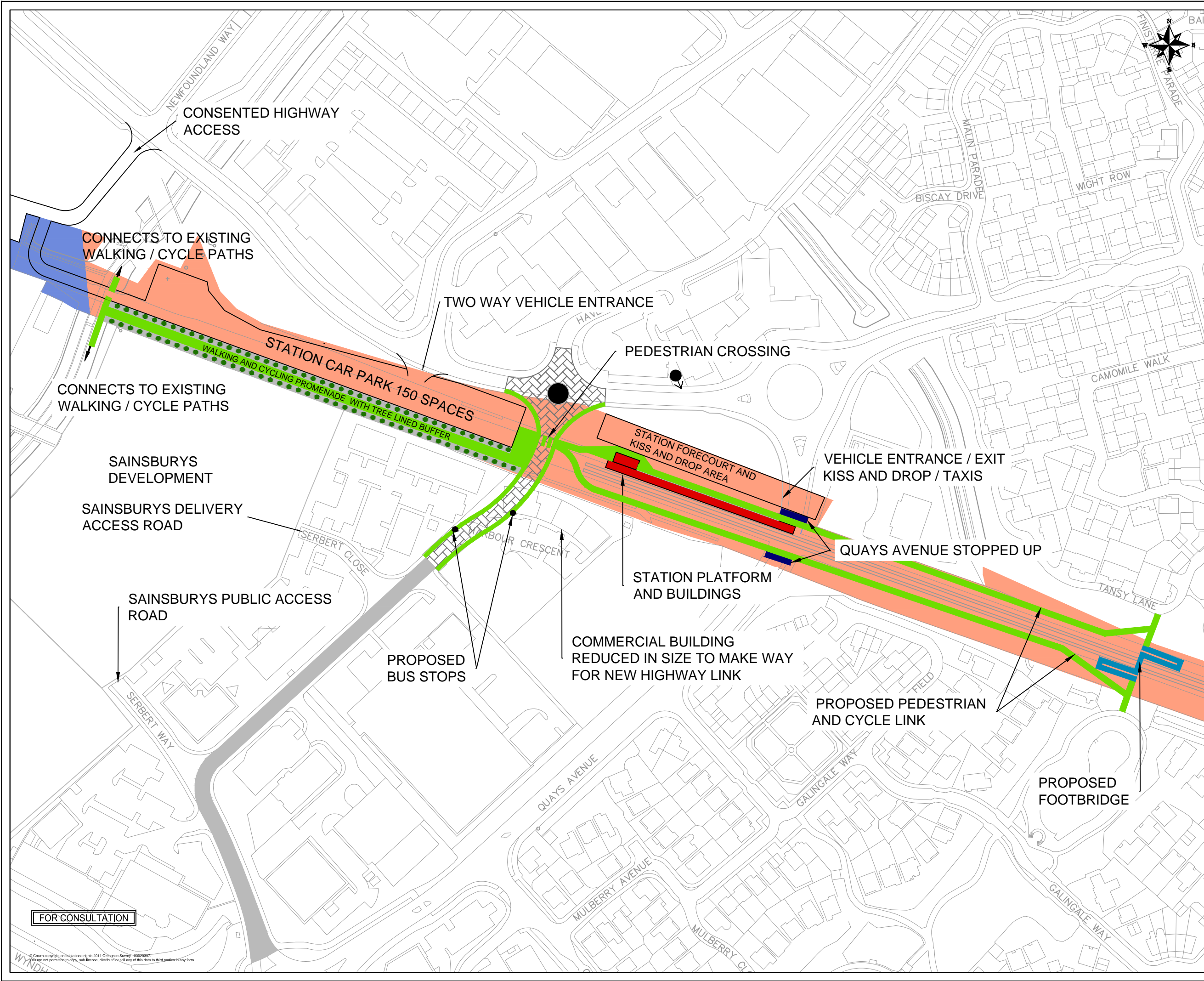
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Rev	By	Chkd	Apprv	Date	Description
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Project  
METROWEST  
HIGHWAY REALIGNMENT OPTIONS

Drawing  
OPTION 2c  
CONCEPTUAL ARRANGEMENT

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Checked by: JW	Date: MAY 2014
Approved by: IW	Date: MAY 2014
Drawing No.	Revision
METRO/HR0/2c	0

Drawing Scale: NTS

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