MetroWest

METROWEST PHASE 1

OUTLINE BUSINESS CASE

# Chapter 2 Economic Case

travelwest

Bath & North East Somerset, Bristol, North Somerset and South Gloucestershire councils working together to improve your local transport

December 2017

# Chapter 2: Economic Case

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CHAPTER 2

# Economic Case

## 2.1 Introduction

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

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

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

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

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

### 2.1.1 Structure of this chapter

Following this introductory section, this chapter contains:

- Section 2.2 Scheme appraised
- Section 2.3 Transport modelling overview
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## 2.2 Scheme appraised

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

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

Enhancements to services on the Severn Beach line will open in 2020 and re-opening of the Portishead line will follow in 2021.

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

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

Note though that, while the 'hourly service plus' is a realistic aspiration for the Portishead line, as the infrastructure required to deliver this level of service is identical to that required for an hourly service, it has not been appraised as part of the OBC. Only the hourly service has been considered at this stage.

Figure 2.1 shows the proposed MetroWest Phase 1 passenger network with a more harmonised service frequency, providing the foundation for 'Metro' local rail network.

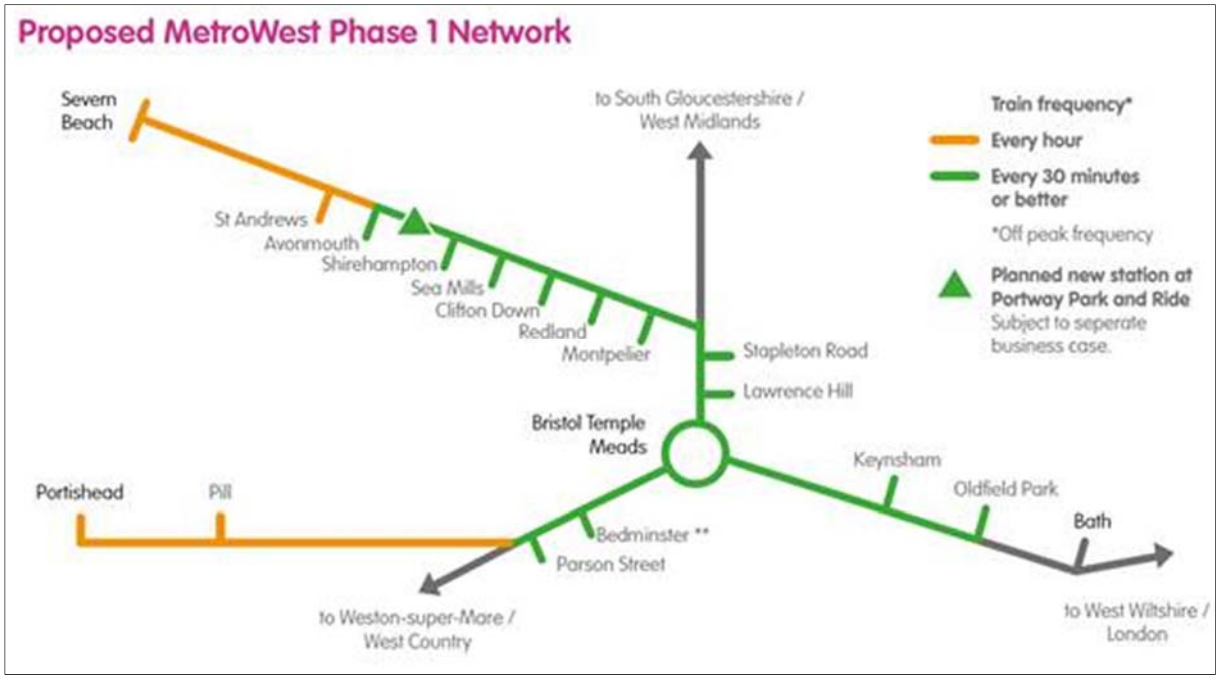


Figure 2-1: MetroWest Phase 1 network

## 2.3 Transport modelling overview

The key rationale of the transport modelling methodology is that it makes best use of available tools. In particular, the approach utilises tools and approaches accepted by the rail industry such as MOIRA and the West of England's GBATS4 multi-modal demand model, a WebTAG compliant demand model. The methodology is in accordance with both WebTAG and Governance of 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' in general (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, the National Travel Survey (NTS) indicates 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, and are enshrined in MOIRA.

A combination of bespoke spreadsheet models and MOIRA were used to assess rail enhancements offered by MetroWest Phase 1, before bringing the results together in an aggregate forecast for use in subsequent analyses. There are two main elements covered:

- Changes in demand at existing stations from new or amended services (including suppression of demand by extra station calls); and
- Demand at newly opened stations (including assessment of the number of trips that are made by people who are already rail users, albeit using other stations).

A full explanation of the transport modelling approach and modelled impacts is set out in the MetroWest Phase 1 Forecasting Report contained in Appendix 2.1 to the Outline Business Case.

## 2.4 Summary of modelled scheme impacts

### 2.4.1 Rail demand

Demand forecasts for the new stations Portishead and Pill are shown in Table 2.1, showing initial 2016 forecasts of demand and revenue, as well as opening year 2021 and future year 2036 figures. For illustration of the potential for increased demand, this table also includes an assessment of the demand at the new stations for a 45 minute interval peak time only infill service at Portishead and Pill, based on 45 minute interval services during the morning and evening peaks.[1]

Future year figures were derived using the growth profile discussed in chapter 2. Note that these figures also include uplifts to demand assumed to take into account an enhanced tourism market on the line compared to other local stations (5%) and an uplift to account for the potential for greater demand from local stations to take advantage of enhanced London services with the introduction of

[1] The methodology of building the 45 minute peak infill demand and revenue assumes that demand for the 3 hour morning and 3 hour evening peak periods is taken from the 45 minute interval forecasts for Portishead and Pill, with the remainder of the day being based on the 60 minute interval service forecasts.

IEPs (2.6%). The uplifts were derived from investigation of demand and revenue information from MOIRA base data and do minimum forecasts (including IEP).

Table 2.1: New stations demand forecasts

*All forecasts assume shuttle services between Bristol Temple Meads and Portishead*
*Two-way journeys, annual totals for the years indicated*

| | **OBC scheme** | | **'Hourly service plus'** | |
|---|---|---|---|---|
| | Severn Beach & Bath Spa local services and 1tph Portishead | | Severn Beach & Bath Spa local service & 45 min peak Portishead | |
| | Journeys | Revenue | Journeys | Revenue |
| **PORTISHEAD** | | | | |
| 2016 initial | 242,945 | £1,488,680 | 284,816 | £1,697,215 |
| 2016 | 261,725 | £1,603,755 | 306,832 | £1,828,410 |
| 2021 | 321,014 | £1,967,057 | 376,340 | £2,242,604 |
| 2036 | 433,529 | £2,656,511 | 508,247 | £3,028,637 |
| **PILL** | | | | |
| 2016 initial | 40,497 | £196,667 | 47,791 | £224,880 |
| 2016 | 43,628 | £211,869 | 51,485 | £242,263 |
| 2021 | 53,511 | £259,864 | 63,148 | £297,143 |
| 2036 | 72,266 | £350,947 | 85,281 | £401,292 |

Except for '2016 initial', demand and revenue shown include uplifts of 5% for tourism effects and 2.6% for an IEP effect.

Early years ramp-up is not factored into the figures in this table.

The effects of service enhancements at existing stations has been modelled using MOIRA. This used the latest available update of MOIRA at the time (December 2016) to test MetroWest Phase 1 services. By far the greater majority of the effects modelled in MOIRA are as a result of improved services on the Severn Beach Line and to Bath Spa local stations. New services to the re-opened Portishead line only provide minimal enhancements at existing stations, specifically only at Bedminster and Parson Street stations. The total number of new journeys forecast by MOIRA are shown in Table 2.2.[2]

Table 2.2: MOIRA demand forecasts – new journeys per annum

| **Year** | **OBC scheme** | **'Hourly service plus'** |
|---|---|---|
| | Severn Beach & Bath Spa local services and 1tph Portishead | Severn Beach & Bath Spa local service & 45 min peak Portishead |
| 2016 | 492,694 | 497,126 |
| 2021 | 604,305 | 609,742 |
| 2036 | 816,114 | 823,456 |

Note: Early years' ramp-up is not factored into the figures in this table.

Table 2.3 illustrates the number of new journeys that MetroWest Phase 1 generates on the rail network, for each of the scenarios being considered in this technical note. The figures in this table

[2] Note that no specific MOIRA analysis has been carried out to determine the effects of 45 minute interval infill peak time services on the Portishead line. The greater proportion of the effects of this service are already captured by the new stations forecasts. As such, the effects at existing stations are based on interpolation between the 60 and 30 minute interval service tests.

show the total of new journeys at existing stations and new stations, net of those journeys at the new stations that previously travelled by rail via an existing station.

Table 2.3: MetroWest Phase 1 demand forecasts – net annual new journeys on the rail network

| Year | OBC scheme | 'Hourly service plus' |
|---|---|---|
| | Severn Beach & Bath Spa local services and 1tph Portishead | Severn Beach & Bath Spa local service & 45 min peak Portishead |
| 2016 | 781,863 | 836,469 |
| 2021 | 958,980 | 1,025,957 |
| 2036 | 1,295,103 | 1,385,555 |

Notes:

Net of transfers from existing rail users to new stations. New stations demand forecasts considered the amount of potential transfer from existing stations. At Portishead, some 6.1% of demand was modelled to have come from existing rail users transferring to Portishead from existing stations. At Pill the figure was much lower, reflecting the more local nature of the catchment of Pill, at 0.5%

Early years' ramp-up of demand is not factored into the figures in this table.

### 2.4.2 Highway impacts

The proportion of additional rail trips that are forecast to switch from highway have been identified from the GBATS4 multi-modal assessment results, which vary by time period. These have been applied to the AM peak, inter-peak and PM peak rail demand figures (the resulting changes in highway trips are also shown in Table 2.4).

Table 2.4: Change in rail and highway trips

| Change in rail/car demand (from do minimum) | 2021 | | | | 2036 | | | |
|---|---|---|---|---|---|---|---|---|
| | Annual | Average day | | | Annual | Average day | | |
| | | AM | IP | PM | | AM | IP | PM |
| Existing stations | 492,700 | 370 | 60 | 370 | 816,100 | 610 | 100 | 610 |
| Portishead | 321,000 | 240 | 40 | 240 | 433,500 | 330 | 50 | 320 |
| Pill | 53,500 | 40 | 10 | 40 | 72,300 | 50 | 10 | 50 |
| TOTAL | 781,900 | 650 | 110 | 650 | 1,295,100 | 990 | 160 | 990 |
| Approx. reduction in car trips | | 380 | 20 | 180 | | 580 | 30 | 280 |

Table 2.5 shows model summary statistics from across the model area of GBATS4, with changes from 2021 and 2036 do minimum scenarios to MetroWest Phase 1 scheme in Table 2.6. Whereas changes from the 2013 base to the 2021 do minimum and 2036 do minimum are generally reflective of worsening traffic conditions, particularly in the 2036 do minimum, Table 2.6 indicates that changes as a result of MetroWest Phase 1 are mostly improvements to traffic. However, the scale of impact is much lower than that modelled between the base and do minima, with reductions in highway trips of around 0.5% feeding through to similar order changes in the other metrics (around 1% improvements in peak period travel times and average vehicle speeds being the most notable).

Table 2.5: MetroWest Phase 1 scheme effects – GBATS4 model statistics

| Network Statistics | | 2021 OBC scheme | | | 2036 OBC scheme | | |
|---|---|---|---|---|---|---|---|
| | units | AM | IP | PM | AM | IP | PM |
| **TOTALS – all modelled area, for hour modelled** | | | | | | | |
| Delay | pcu.hrs/hr | 582 | 325 | 567 | 823 | 538 | 838 |
| Travel time | pcu.hrs/hr | 27,957 | 19,777 | 27,921 | 32,790 | 23,399 | 32,401 |
| Travel distance | pcu.kms/hr | 1.193m | 0.958m | 1.221m | 1.331m | 1.116m | 1.359m |
| Trips loaded | pcu/hr | 129,583 | 111,493 | 128,517 | 146,360 | 129,251 | 144,266 |
| **AVERAGES – per modelled vehicle** | | | | | | | |
| Travel time | mins | 12.9 | 10.6 | 13.0 | 13.4 | 10.9 | 13.5 |
| Distance | kms | 9.2 | 8.6 | 9.5 | 9.1 | 8.6 | 9.4 |
| Speed | kph | 42.6 | 48.4 | 43.7 | 40.6 | 47.7 | 41.9 |

Table 2.6: MetroWest Phase 1 scheme effects – GBATS4 model statistics - % CHANGES

| Network Statistics | | 2021 Do Min to OBC scheme | | | 2036 Do Min to OBC scheme | | |
|---|---|---|---|---|---|---|---|
| | units | AM | IP | PM | AM | IP | PM |
| **TOTALS – all modelled area, for hour modelled** | | | | | | | |
| Delay | pcu.hrs/hr | -1.3% | -0.2% | -1.0% | -0.5% | - | -0.3% |
| Travel time | pcu.hrs/hr | -0.8% | -0.1% | -0.4% | -1.3% | -0.1% | -1.2% |
| Travel distance | pcu.kms/hr | -0.5% | -0.1% | -0.3% | -0.3% | -0.0% | -0.1% |
| Trips loaded | pcu/hr | -0.4% | - | -0.2% | -0.3% | -0.0% | -0.1% |
| **AVERAGES – per modelled vehicle** | | | | | | | |
| Travel time | mins | -0.4% | -0.1% | -0.2% | -1.0% | -0.1% | -1.1% |
| Distance | kms | -0.1% | -0.03% | -0.1% | -0.0% | - | -0.0% |
| Speed | kph | 0.5% | - | 0.2% | 1.0% | 0.2% | 1.0% |

Note: Negative changes to travel times, travel distances and trips loaded reflect improvements in conditions on the highway network. Similarly, positive changes to speeds are also an improvement

## 2.5 Key economic assumptions

The main non-project specific economic appraisal parameters and assumptions are drawn from the requisite units of the DfT's appraisal guidance contained in various WebTAG guidance units and the WebTAG databook. These are also enshrined in the Network Rail DCF model used for scheme appraisal, as well as TUBA, used for highway benefits assessments. Key assumptions made for the economic assessment are as follows.

*General assumptions*

- Opening year 2021, preparation and construction profile from 2017-2021
- Appraisal period = 60 years
- Network Rail Discounted Cash Flow model = current model year 2017, first year of benefits 2021
- Price base year and base year for discounting = 2010

- Discount rate = 3.5% for 30 years from current year then 3% thereafter
- The appraisal approach identifies cost items that will be inflated above the prevailing inflation rate

*Cost assumptions*

- Train operating staff costs to increase in line with average earnings index (AEI)
- Cost of train operating company profit as a percentage of any change in operating costs = 8%
- Optimism bias level for capital costs = 18% (GRIP3)
- Optimism bias level for operating costs = 1% per annum (GRIP3)
- Capital expenditure is assumed to be funded by devolved major scheme funding, Local Growth Fund and the four Authorities
- Future renewal expenditure is assumed to be Regulatory Asset Base (RAB) funded
- The new infrastructure and assets are to be renewed every 30 years except some elements of the new tracks (ballast is assumed to be renewed every 20 years)
- Each train is assumed to be formed of 3-car 165/166 diesel multiple units (currently being cascaded into the area for used for local services in the area)
- TOC revenue and operating cost transfer = 100% after expiry of the franchise that is operating at the time of opening
- Network Rail operating cost transfer = 0% during current control period, 100% after current control period

*Transport demand assumptions*

- Values of time in the DCF model are £11.50 per hour for business users, £9.95 per hour for commuters and £4.54 for other users (all in 2010 prices) – WebTAG Databook, July 2017
- Value of time is assumed to grow in line with GDP
- The 'Rule of a Half' is applied to time savings for new users in calculating benefits
- Average fare increases (above RPI) = 1% up to 2013 and after 2021, and 0% between 2014 and 2020 inclusive (based on current Government policy for regulated rail fares)
- Highway network growth has been forecast using the GBATS4 multi-modal model, which is in turn based on local development assumptions controlled to DfT's Tempro7 forecasts
- Growth in background rail demand is assumed to initially carry on from historic trends, tending towards future year forecast rates over time. As such, background rail demand growth in 2016 is assumed at 5.6% per annum, declining to 1.6% per annum by 2036. From 2036, no further growth is assumed.

## 2.6 Economy impacts

Further details of the economic assessment process and results are set out in the MetroWest Phase 1 Economic Assessment Report contained in Appendix 2.2 of the OBC, as well as in the WebTAG workbooks included in Appendix 2.5.

### 2.6.1 Business users and transport providers (TEE)

The Economic Efficiency of the Transport System (TEE table) for the MetroWest Phase 1 OBC scheme is shown in Table 2.7. Note that, in addition to impacts for business users, the TEE table also shows impacts for commuting and other users.

Table 2.7: MetroWest Phase 1 OBC Scheme, Economic Efficiency of the Transport System (TEE)

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

Notes:

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

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

## 2.6.2 Reliability impacts on business users

The overall reduction in congestion on the highway network set out in Section 2.6.1 will have some positive impact on journey time reliability. Highway reliability has also been specifically considered, with reference to WebTAG unit A1.3 section 6, based on variation in journey times caused by events unpredictable by the users such as incidents or recurring congestion in certain days (day-to-day variability). Predictable elements like varying levels of demand by time of day, day of week or seasonal effects are excluded, as travellers are assumed to be aware of them.

Results of the analysis indicate that highway reliability benefits of £1.82m could be realised as a result of MetroWest Phase 1. This does not distinguish between business users and commuting or other users.

More information about the assessment of reliability impacts is discussed in the MetroWest Phase 1 Economic Assessment Report.

## 2.6.3 Regeneration and wider impacts

Transport infrastructure can play a key role in regeneration and making an area's economy more productive. Improved infrastructure can lead to improved access to markets and customers, higher mobility and flexibility of the labour market and more reliable supply of goods and services. There is

a clear role for transport infrastructure, including public transport services, in driving regeneration and enhancing the economic output of an area.

This assessment adopts a bespoke methodology to estimate the economic development and wider regeneration impacts of the scheme. The methodology reconciles the West of England LEP's economic impact guidance with DfT's emerging Wider Economic Impact guidance and labour market modelling. The assessment uses a labour market balance sheet model, and was considered appropriate because if provides consistency with previous stages of assessment, as well as direct comparison to earlier results. It also adheres to many of the principles outlined in the emerging DfT Wider Economic Impacts guidance.

Key inputs to the balance sheets include labour supply by sector and employment demand across the labour market. These were adjusted to 2036 values to reflect growth forecasts and planning data. Based on these adjustments, changes in accessibility between labour supply and labour demand zones, leading to the facilitation of employment opportunities within the labour market, could be quantified.

The labour supply, labour demand and GBATS4 modelling outputs combine to forecast between 600 and 2,300 additional full time equivalent jobs in the West of England. However, this reflects labour supply and demand changes across all modes of transport. Where only changes in rail users are considered (27.4% of mode share for commuting trips to these zones), the scale of employment generated as a result of the scheme falls to between 150 and 650. This does not account for the operation of the additional train services and stations, which will generate some additional employment.

This level of employment facilitated by the scheme options can be translated to GVA uplift through the application of best practice GVA per benchmark figures. Applying these estimates outlined above results in GVA uplift forecasts of between £11m and £43m per annum (2017 prices and values).

The economic development and regeneration analysis outlined above demonstrates that the various schemes have the potential to facilitate significant positive economic impacts across the West of England, in the operational phase.

## 2.7 Environment

The environmental surveys and assessment have been used to inform a Preliminary Environmental Information Report (PEIR) for the scheme. Information is presented for the following technical areas:

- Noise;
- Air Quality;
- Greenhouse Gases;
- Landscape and Townscape;
- Heritage of Historic Resources;
- Biodiversity; and
- Water Environment.

This work is documented in full in the PEIR for the OBC. In addition to the PEIR, TAG assessments have been undertaken and the workbooks are presented in Appendix 2.5.

The Environmental Impact Assessment (EIA) procedures in European Union member states are based on the European Community Directive, 'The Assessment of the Effects of Certain Public and Private Projects on the Environment' (85/337/EEC) as amended by Council Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC (subsequently replaced in 2011 by a new Codified EIA

Directive 2011/92/EU) – collectively termed the 'EIA Directive'. This has since been amended and superseded in 2014 by Directive 2014/52/EU and was transposed into UK law on 16 May 2017.

The Directive was implemented in the UK through the Town and Country Planning Assessment of Environmental Effects) Regulations 1988 (SI No 1199). This has subsequently been superseded by the Town & Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017 SI No 571) (hereafter referred to as the EIA Regulations).

Schedule 1 of the EIA Regulations identifies those developments for which environmental assessment is mandatory. The scheme for this application site does not fall in this category.

Schedule 2 of the EIA Regulations lists developments which require environmental assessment if the proposed scheme is likely to have significant effects on the environment 'by virtue of its nature, size or location'. The process of determining whether a Schedule 2 development requires an environmental impact assessment is referred to as "screening". Under Regulation 5 of the EIA Regulations, the applicant may request a Screening Opinion from the relevant Planning Authority to determine whether the proposed development requires an EIA. Alternatively, the applicant can voluntarily prepare an EIA normally following consultation with the relevant planning authority/ies.

The Local Planning Authorities (LPA) North Somerset and Bristol City Council have been consulted with regards to the Environmental Impact Assessment (EIA). Following consultation with the LPAs, a Screening Opinion was not sought because the scheme is located within the immediate vicinity of numerous environmentally sensitive sites and it was considered that there was potential for likely significant effects. In particular the scheme crosses the European designation Avon Gorge Woodlands Special Area of Conservation and the nationally designated Avon Gorge Site of Special Scientific Interest (SSSI) and Leigh Woods National Nature Reserve (NNR). The scheme also passes close to: the Severn Estuary Special Area of Conservation (SAC), SPA and Ramsar Site; the Severn Estuary SSSI and Ham Green SSSI; and potentially affects rare and protected species of flora and fauna. Figure 2.1 shows the key designations in the vicinity of the scheme. A scoping report was submitted to the Planning Inspectorate in June 2015 detailing the proposed scope of the EIA and contents of the ES. The Planning Inspectorate consulted with a large number of stakeholders and issued their Scoping Opinion in August 2015. An Environmental Statement (ES) will be prepared to accompany the Development Consent Order Application for the proposed scheme.

To inform both the scoping and the Environmental Statement, surveys have been undertaken at appropriate times of the year, including: ecological surveys; noise monitoring surveys; and air quality surveys.

As the scheme passes through a European designated site, a Habitats Regulations Assessment will also be undertaken.

Note that most of the environmental impacts for MetroWest Phase 1 are related to the Portishead line reinstatement works. Where this is the case, the term 'DCO Scheme' is used.

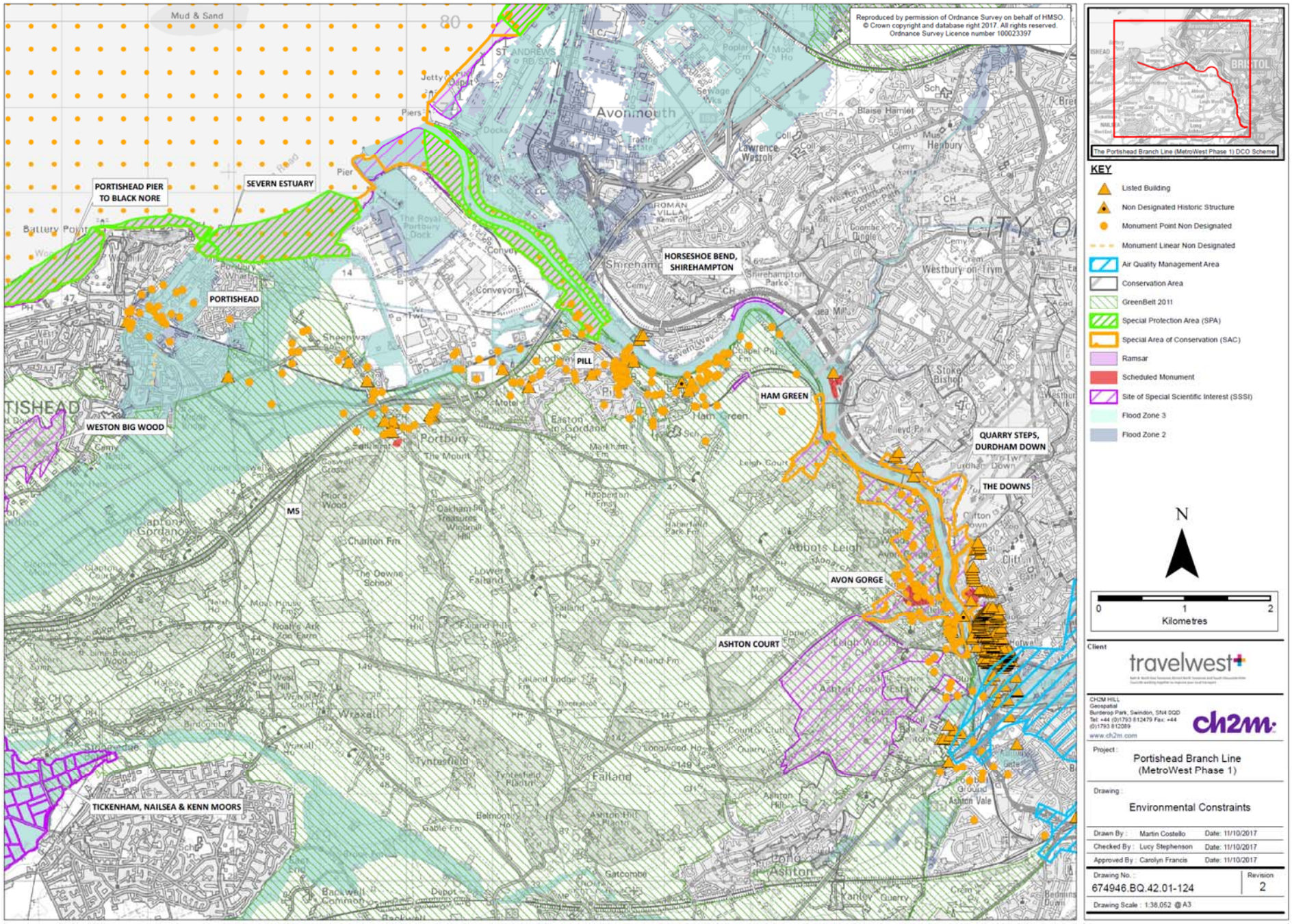


Figure 2.2: Key designations in the vicinity of the scheme

### 2.7.1 Noise

The Scheme has the potential to generate noise and vibration from operation as a result of the associated traffic and rail movements. In addition, the existing noise climate needs to be considered to ensure that noise sensitive receptors are protected.

The methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance was used, with a 'Noise Workbook' being completed and a summary provided within the Appraisal Summary Table (AST). The appraisal is based on the assessment in Chapter 13, Noise and Vibration, of the Preliminary Environmental Information Report (PEIR) for the scheme.

The noise appraisal has been undertaken using a combination of measured baseline noise levels the results from the noise model that was used for the completion of the PEIR. Inputs for the noise model are a combination of estimated MetroWest Phase 1 trains and traffic data from the GBATS4 model. The measured noise levels are from surveys undertaken in 2015 and 2016 and are assumed to provide an accurate representation of the noise levels on scheme opening. The noise model includes agreed and embedded mitigation.

The negative monetised score of -£511,247 is due to minor increases in noise at many locations along the route. These are mainly at locations close to the proposed route in Portishead and Pill, where there is currently no passenger railway and background noise is low. There are 523 households predicted to experience an increase in daytime noise. For the majority of these locations the change is less than 1dB, which is negligible, but in some cases sufficient enough to move a band within the WebTAG noise workbook. Some households have changes more than 1 dB, but none of these are significant impacts. For the majority of households within 600m of the route there is predicted to be no change in noise.

At the Trinity Primary School in Portishead there is predicted to be a **slight adverse** impact due to the noise from the railway. Within the Avon Gorge SSSI there are not predicted to be any impacts from noise. This is due to the background noise levels in the Avon Gorge already being high because to the presence of the A4.

There are not expected to be any impacts at night due to the service not operating during the night. The impacts from vibration in Portishead are expected to be **negligible** as the receptors are a sufficient distance from the railway line. In Pill, any levels of vibration would be no worse than those already experienced from the existing freight trains.

### 2.7.2 Air Quality

During operation, potential air quality impacts will be due to changes in traffic and rail movements on the roads and tracks. This will give rise to a change in the nature and location of vehicle and train emissions, with consequent impacts on local air quality.

The air quality appraisal has been undertaken using the methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance and relevant workbooks completed. Impacts relating to the scheme on both local and regional air quality were assessed.

The appraisal has been undertaken using the total predicted NO2 and PM10 concentrations for the Base Year (2013), Do-Minimum (2021) and Do-Something (2021) scenarios, that were used for the completion of the PEIR. Inputs for the air quality assessment refer only to the addition of diesel locomotives to the rail network, and exclude associated impacts on the surrounding road network.

Under the Local Air Quality Management regime, Local Authorities have a duty to make periodic reviews of local air quality against the air quality objectives. Where this indicates that the objectives are not expected to be achieved, they are required to designate an Air Quality Management Area (AQMA). An Air Quality Action Plan (AQAP) must then be formulated, outlining a plan of action to meet the air quality objectives in the AQMA.

A short section of the DCO Scheme crosses the Bristol Air Quality Management Area (AQMA) and the new passenger services between Portishead and Bristol will pass through the Bristol AQMA from Parson Street Station to Bristol Temple Meads. Air quality monitoring data suggest that AQS objectives are being met within the scheme extent. The scheme crosses one ecological designated site, the Avon Gorge Woodlands SAC, where baseline NOx levels are close to the critical level.

The regional assessment assumed NOx and PM10 concentrations, with and without the scheme, will be the same between the opening year and forecast year. Based on the DMRB criteria, no road links were screened into the assessment. Therefore, only rail links have been considered in WebTAG.

The negative monetised values are attributed to additional diesel locomotives, which are expected to lead to an increase in NOx and PM10 emissions. These changes are likely to lead to **adverse impacts** at receptors closest to the railway line, however the scheme is not predicted to result in any exceedances of the annual mean AQS objective.

It is expected that the increased rail emissions would be offset by a reduction in road emissions as a result of the scheme, however this is not possible to conclude at this stage based on the available information.

The montised impacts are as follows:

- Value of change in PM10 concentrations: NPV: £-0.0m
- Value of change in NOx emissions: NPV: £-0.5m
- Total value of change in air quality: £-0.5m

### 2.7.3 Greenhouse Gases

The Project is expected to lead to a decrease in vehicle kilometers travelled across the road network which will result in a decrease in $CO_2$ emissions. However, this benefit is expected to be partially impacted on by an increase in rail emissions associated with the Project that is expected to contribute to an increase in $CO_2$ emissions.

Monetised impacts on greenhouse gases have been calculated using the GBATS4 SATURN model and TUBA. At this stage $CO_2$ emissions for only the non-traded sector for the opening year (2021) was available. Based on the information available, a generated benefit of £548 is anticipated. The incorporated reduction in traded emissions as a result of the project, is expected to further increase the benefit.

### 2.7.4 Landscape

The landscape was divided into three key environmental resources for this assessment, generally derived from the North Somerset Local Authority Character Areas (Land Use Consultants, 2005. North Somerset Landscape Character Assessment Supplementary Planning Document), as shown in the Table 2.8. It was considered that the Natural England national character areas are too coarse for this assessment.

Table 2.8: North Somerset Local Authority Character Areas

| Key environmental resources assessed | North Somerset Local Planning Authority Landscape Character Areas |
|---|---|
| Area north of Avon Gorge | • A2 Clapton Moor<br>• C2 Portbury Settled Coastal Edge<br>• J6 Avon Rolling Valley Farmland |
| Avon Gorge | • D1 Avon Gorge |

Table 2.8: North Somerset Local Authority Character Areas

| | |
|---|---|
| Area south of Avon Gorge | • E5 Tickenham Ridge<br>• G2 Failand Settled Limestone Plateau<br>• B1 Yeo and Kenn River Floodplain<br>• J5 Land Yeo and Kenn Rolling Valley Farmland |

The methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance was used and a 'Landscape Worksheet' has been completed. Each key environmental resource was assessed separately, then an overall score was given and included in the Appraisal Summary Table.

The appraisal was based on the assessment of the North Somerset Local Authority Character Areas in the Landscape and Visual Impact Assessment, Chapter 11 of the Preliminary Environmental Information Report for the scheme. Visual amenity was taken into account in the assessment of the 'Summary of Character' feature, as recommended in the guidance.

The DCO Scheme is likely to have a neutral/slight adverse effect on the landscape character of the area north of the Avon Gorge. In Portishead, the operational railway would increase the sense of urbanisation with the new station building and car park, and there will be an increased movement of trains in close proximity to people at Pill. However, existing features in this area already dilute the sense of tranquility, such as views towards the Royal Portbury Dock, the M5 and the edge of Bristol. Removal of larger trees alongside the disused line may open up views from the M5 and Junction 19 northwards to the factories at Portbury Docks, however the replacement mitigation planting associated with the DCO Scheme would re-establish hedgerows and tree belts and reinstate the screening effect.

The DCO Scheme is likely to have a slight adverse effect on the landscape character of the Avon Gorge itself due to vegetation clearance creating more open views of the railway primarily in the form of moving trains within the landscape when the scheme is in operation.

The DCO Scheme is likely to have a neutral effect on the landscape character of the area south of the Avon Gorge. Vegetation clearance alongside the track may also occur in this area, but the existing landscape is already dominated by urban landcover and transport infrastructure, including the existing operational railway so the DCO will fit in with the surrounding landscape.

Overall, the DCO Scheme is likely to have a **slight adverse effect** on landscape. It will affect areas of recognised landscape quality and will impact on certain views across the area.

### 2.7.5 Townscape

This townscape appraisal focused on the main urban area along the DCO Scheme this is the Ashton Gate/Ashton Vale area on the edge of Bristol. Townscape features along the rest of the DCO Scheme route were assessed as part of the landscape appraisal.

The methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance was used and a 'Townscape Worksheet' has been completed.

The appraisal was based on the assessment of the Site-Specific Character Areas of Ashton Gate and Ashton Vale in the Landscape and Visual Impact Assessment, Chapter 11 of the Preliminary Environmental Information Report for the scheme.

The DCO Scheme is likely to have a **neutral effect** on the townscape of the Ashton Gate/Ashton Vale area. This is due to transport infrastructure (including the existing operational railway) being an existing feature in the townscape. Many views are restricted by commercial/industrial buildings so the townscape character would not change with the DCO Scheme. Future trends in the area are likely to include increased development and expansion outwards into the urban/rural fringe, and increased traffic volumes, so the DCO Scheme would fit this trend.

### 2.7.6 Heritage of historic resources

The appraisal was based on the assessment methodology, which followed the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 2, HA 208/07 including Annexes 5 (Archaeological Remains), 6 (Historic Buildings) and 7 (Historic Landscape).

The methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance was used and a 'Heritage Worksheet' has been completed. Each key environmental resource was assessed separately, then an overall score was given (included in the Summary Table). The appraisal was based on the assessment in the Cultural Heritage, Chapter 8 of the Preliminary Environmental Information Report for the scheme.

The effect of the DCO Scheme on the setting of the designated cultural heritage assets along the route during operation is generally **Slight adverse/neutral** and **not significant** in regard to the EIA Regulations. This results largely from the lack of inter-visibility between the DCO Scheme and heritage assets.

### 2.7.7 Biodiversity

The biodiversity appraisal has been undertaken using the methodology outlined in TAG Unit A3: Environmental Impact Appraisal guidance and relevant workbooks completed. Each key environmental resource was assessed separately for potential impacts that may arise from the operational phase of the scheme. The appraisal was informed by the Ecology and Biodiversity chapter (chapter 9) of the Preliminary Environmental Information Report for the scheme.

During operation, potential biodiversity impacts will arise from routine maintenance of the railway corridor which will involve the removal of vegetation within 4 m of the track as well the risk of disturbance and/or collision of the trains with protected species and the fragmentation of habitats.

The Portishead to Pill line will have **slight adverse** effects on Field east of M5 Motorway, Lodway Wildlife Site due to loss of habitat. **Slight adverse** effects are also considered possible on protected species such as great crested newts, other amphibian species, badgers, otter and bats through the fragmentation of habitats and disturbance and death/injury from direct collision with trains. The operational maintenance of the railway corridor may also cause **slight adverse** effects on habitats such as woodland, trees and scrub due to direct loss, as well as Japanese knotweed due to the potential of facilitating the spread of this invasive species. The impact on North Somerset and Mendips Bats SAC is **to be assessed** following further bat survey in 2018.

The Freight Line section of the DCO is assessed to have a **slight adverse** effect on internationally and nationally important sites/species such as the Avon Gorge and Woodlands SAC/SSSI, Leigh Woods NNR and Ancient Woodland and the notable and the important plant species these sites support, these impacts are likely to arise through the routine maintenance and clearance of the railway corridor, however they will be mitigated through the implementation of a Site Vegetation Management Statement which will be developed in consultation with Natural England. A **slight adverse** effect is also anticipated on the internationally important site Bath and Bradford on Avon Bats SAC, however this assessment is ongoing due to further assessment on the use and value of the tunnels to bats. A number of Local Wildlife Sites are also predicted to have potentially **slight adverse** effects on the Freight Line section of the scheme. These include Bower Ashton BWNS, River Avon NSWS and River Avon SNCI, effects on these sites will arise due to habitat loss. A **slight adverse** effect may also occur on protected species such as badger, otters and bats through the fragmentation of habitats, disturbance and death/injury from direct collision with trains. Habitats that may be subject to a **slight adverse** impact includes ephemeral/short perennials which may be effected due to the routine maintenance and clearance of the railway corridor. In addition, a **slight adverse** effect may occur due to the potential spread of invasive plant species during routine maintenance and clearance.

### 2.7.8 Water environment

The key environmental resources have been identified from Appendix 17.3 of the Preliminary Environmental Information Report for the scheme. The water environment comprises mostly of small watercourses, primarily serving a drainage function (some man-made) of low to medium value / importance discharging directly into the tidal River (Bristol) Avon which is of High value due to its Good status under the Water Framework Directive (WFD). Also of high value/importance is the Easton-in-Gordano Stream due to its good potential under WFD. The three groundwater receptors are of medium or High value/importance based upon their WFD status and aquifer classification.

The methodology outlined in the TAG Unit A3: Environmental Impact Appraisal guidance was used and a 'Water Worksheet' has been completed. Each key environmental resource was assessed separately, then an overall score was given (included in the Summary Table). The appraisal was based on the assessment in the Water Resources, Drainage and Flood Risk, Chapter 17 of the Preliminary Environmental Information Report for the scheme. The draft Flood Risk Assessment has also been used to identify impacts and mitigation.

Given the proposals for ballast renewal, track and station drainage, and the appropriate management of wastewater from trains the impacts associated with the potential for pollutants to enter the surface water environment will be mitigated to acceptable levels resulting in a negligible magnitude of impact upon water quality during operation and a **neutral** significance effect on receptors.

Impacts upon groundwater quality during operation of the railway line are considered to be negligible due to the small quantities of pollutants produced, the localised nature of any contaminants and the presence of the ballast which will aid in the removal contaminants as well as the underlying geology. The effect of the DCO scheme upon groundwater quality is anticipated to be **neutral**.

Physical impacts upon water features through drainage from the track, stations, car parks and highways during the operational phase are anticipated to be of either **slight adverse** or **neutral** effect.

Impacts upon water quantity through drainage during the operational phase are anticipated to be of **neutral** effect. Runoff rates from the railway line would be no higher than from the existing footprint of the DCO Scheme, as there would be no increase in impermeable area. Runoff rates from the site of Portishead station and Pill station will increase as a result of the increase in impermeable areas for the new stations and car parks. For Portishead this is negligible and no mitigation is required. For Pill the design will include measures to minimise any potential increase in discharge.

A slight adverse impact relating to the increased flood risk to the railway line from the River (Bristol) Avon, which will worsen over time due to climate change has been identified in the assessment. This results in the flood risk to the railway to be of **low** significance. Areas where flood flow routes will be affected will be mitigated by providing alternative routes (through enlarged culverts). Floodplain compensation is not required as the scheme only encroaches upon the floodplain in two locations and these are **negligible**.

## 2.8 Social impacts

Social assessments have been undertaken to support the development of the scheme. A summary of the assessment outcomes is provided in the following sections:

- Commuting and other users
- Reliability impacts on commuting and other users
- Physical activity

- Journey quality
- Accidents
- Affordability
- Security
- Access to Services
- Severance
- Option values
- Distributional impacts

Further details of the economic assessment process and results are set out in the MetroWest Phase 1 Social Impact Appraisal Report contained in Appendix 2.3 of the OBC, as well as in the WebTAG workbooks included in Appendix 2.5.

### 2.8.1 Commuting and other users (TEE)

See section 2.6.1

The Economic Efficiency of the Transport System (TEE table) for the MetroWest Phase 1 OBC scheme is shown in Table 2.7. This TEE table shows impacts for commuting and other users, in addition to business users.

### 2.8.2 Reliability impacts on commuting and other users

See section 2.6.2

Assessment of highway reliability impacts have been carried out. This does not distinguish between business users and commuting or other users.

### 2.8.3 Physical activity

There is increasing recognition of the interrelation between transport, the environment and health. Transport can affect levels of physical activity, which has an important role to play in preventing weight gain and obesity and improving mental health.

Health implications of transport proposals can be identified by assessing changes in the opportunities for increased physical activity through cycling and walking. More cycling and walking can also give benefits by improving the physical environment within communities, in turn helping to foster community spirit, with implications for health.

The proposed scheme accounts for cyclists, pedestrians and equestrians by delivering and planning for measures to minimise the interaction between these modes and motorised traffic (including trains). The measures provided for Non-Motorised Users (NMUs) that will be delivered as part of the scheme ensures that the opportunity to undertake trips through active modes will be enhanced.

The assessment has been undertaken by combining the number of active mode users affected (number of persons, based on NMU surveys in three different locations) with how much they are affected (in minutes). This is sufficient information to formulate an overall assessment score (in person 'minutes') for transport economic efficiency impacts on active mode users. This approach has involved developing a schedule, for each important route, of changes in typical journey lengths (times and distances) and likely changes in travel patterns, with an estimate of the number of people affected in each case.

Based on the work undertaken, the assessment suggests that the scheme will have an **overall slight beneficial impact** on physical activity.

### 2.8.4 Journey quality

TAG Unit A4.1 'Social Impact Appraisal' defines journey quality as "a measure of the real and perceived physical and social environment experienced while travelling", noting that this includes various factors related to peoples' experience on journeys such as information provision and the perception of safety. Note though that 'journey quality' considered in this assessment do not include those covered elsewhere in the appraisal (such as severance, security, accidents, journey times, journey reliability, etc).

There are three key elements to journey quality impacts:

- Traveller care – such as cleanliness, facilities, information and the general environment related to public transport
- Travellers' views – pleasantness of surroundings, such as views of both the townscape and landscape during the journey
- Traveller stress – convenience of the journey, including the ease of using the route and frustration

Journey quality is a measure of the physical and social environment that is experienced when travelling. The number of factors can be wide ranging such as the level of crowding on trains, the provision of information, perceptions of personal safety and the ease/convenience of using the route by that mode.

Journey quality can have an important influence on travel choices. Poor quality may dissuade users from using specific modes but conversely users may be willing to pay extra for certain elements of a journey. This can all impact on the overall generalised cost of journeys.

The assessment undertaken suggests that overall, the scheme has a moderate beneficial impact to journey quality. Improved frequencies on the Severn Beach line and local stations to Bath will help reduce the extent of overcrowding and lower traveller stress by improved ease and convenience. The analysis also suggests that there will be neutral impacts on other factors such as cleanliness, facilities, information and traveller's views.

With the introduction of passenger rail services to Pill and Portishead, there will be larger beneficial impacts such as new facilities at the railway stations, smoothness of ride, traveller views and integration into existing national railway information portals.

Based on the evidence, it is concluded in the AST that MetroWest Phase 1 will result in a **moderate beneficial impact** in respect of journey quality.

### 2.8.5 Highway Accidents

The highway accident assessment has been carried out using the DfT's Cost and Benefit to Accidents – Light Touch (COBA-LT) software, which compares the accidents and costs associated with them between the Do-Minimum (DM) and Do-Something (DS) scenarios, based on road network details (road type, speed limit etc.), forecasted traffic volume, accident rates and economical parameters, which monetise and discount the accidents' costs.

As foundation for extracting the forecast traffic volume for different scenarios, as well as road characteristics, the strategic transport model representing road traffic movement around the West of England Area (WoE) – GBATS4 – was utilised. Additionally, speed limit and accidents data (2012-2016) for the WoE region was processed and used as the remaining part of the COBA-LT input.

A full assessment of the likely impacts of the scheme was undertaken, and this suggests that as MetroWest is a rail scheme, with minimal changes on other parts of the network, it is likely to have a **neutral impact** on highway accidents in the West of England area.

### 2.8.6 Affordability

Relative affordability has been assessed by looking at the Index of Multiple Deprivation (IMD). The most recent measure of IMD across England was undertaken in 2015.

The analysis indicates that personal affordability is less of an issue in Portishead and Pill where MetroWest Phase 1 is likely to have its greatest impact. The assessment indicates personal affordability and deprivation are greater in areas where the Scheme will have the least impact.

The assessment against several factors indicates there will be beneficial affordability impacts from reduced fuel costs, shorter journeys and reduced congestion. However, this needs to be set against the additional costs of rail fares and car parking charges (if travelling to the stations by car).

Improved frequencies are expected to increase the numbers travelling by rail, but there may be some extraction from existing public transport provision which could impact on affordability. Based on the evidence, it is concluded in the AST that MetroWest Phase 1 will result in a **neutral impact** in respect of personal affordability.

### 2.8.7 Security

TAG unit A4.1 notes that changes brought about in the implementation of a transport scheme may affect the security of users. This is especially so in the case of public transport schemes, where guidelines exist in relation to bus and rail operations, especially at stops and stations.

The security assessment has been undertaken in accordance with WebTAG guidance and assesses how the Scheme will impact the level of security for transport users. The impacts on the security of road users, public transport passengers and freight has been assessed. For public transport passengers, guidelines for railway stations and public transport operators (DETR, 1998) raises key security issues and gives guidance on design and management practices. These are broad ranging and those relevant to the Scheme have been included in the security indicator list, which has formed the basis of the assessment.

The scheme elements have been designed to ensure that there are no adverse impacts upon the security of transport users. Overall, the provision of better lighting, footways, and route continuity will all help to reduce levels of transport related crime and affect a range of social groups across a vast geographical area. The investment in the existing transport network will help to enhance public perceptions of security.

The scheme will not alter the existing alignment of the line which is relatively straight with good sight lines and no ‘hidden’ sections for pedestrians or stopped vehicles. Although the addition of rail stations can enhance security of an area by providing formal and natural surveillance, these benefits are tempered by the reality that rail stations can also attract criminality regardless of the measures to prevent this.

Overall the analysis indicates that the scheme will have a **neutral impact** on security. The new rail stations will enhance the security of both locations by providing additional footfall, CCTV, emergency contact points and improved lighting. However, while there will be a general improvement in security of the area, rail stations can also attract crime. The scheme is therefore envisaged to have a ‘neutral’ impact on security.

### 2.8.8 Access to services

The area served by MetroWest Phase 1 covers much of the WoE, and improves services at 15 existing stations, as well as introducing two new stations to the rail network. The rail network provides linkages to key services and facilities across the WoE, including employment (in particular Bristol and Bath city centres, Temple Quarter Enterprise Zone and Avonmouth/Severnside), health facilities (notably the hospitals in central Bristol), education (several stations are located near schools, and

existing Severn Beach line trains are already well-used by scholars) and retail areas (Clifton Down, Portishead, central Bristol).

MetroWest Phase 1 will improve accessibility across the WoE area through generalised journey time improvements from enhanced services at existing stations. This has not been quantified or monetised, as the improvements are relatively small, widespread, and not specific to particular movements or journey opportunities. The opening of two new stations represents a more specific benefit to two communities, with more than 40,000 people in and around Portishead and Pill being brought into the catchment of the rail network.

In summary, MetroWest Phase 1 will generally enhance the public transport offer in area served, particularly around locations near existing stations, thus improving links to key services. There is a more substantial enhancement to the public transport offer in Portishead and Pill. Overall, MetroWest Phase 1 is assessed to have a slight beneficial on access to services.

More information on access to service assessments can be found in the MetroWest Phase 1 'Social Impact Appraisal Report', provided in Appendix 2.3 of the OBC.

### 2.8.9 Severance

Community severance is defined in TAG Unit A4.1 as the separation of residents from facilities and services they use within their community, caused by substantial changes in transport infrastructure or by changes in traffic flows. Severance will be an issue where either vehicle flows significantly impede pedestrian movement, or where infrastructure presents a physical barrier to movement.

The reinstatement of the disused railway between Portishead and Pill has potential to cause severance to existing farm operations and influence planning developments. Severance impacts should be mitigated during the construction phase, in such a way as to mitigate the effects during both construction and operational stages of the Scheme.

The improvement works proposed along the Portbury Freight Line between Pill and Parson Street Junction are associated with operational railways, so there will be no new severance. This is with the exception of the Barons Close crossing closure. However, some land will be required for emergency access to the tunnels, which includes agricultural land at Pill.

Overall the scheme has a **slight negative impact** on severance. Negative impacts are expected at the various at-grade crossing points affected by the Scheme. The negative impact is a result of increased journey times opposed to safety. It is expected that the overall safety of pedestrians and cyclists will be improved, particularly at Ashton Vale.

### 2.8.10 Option values

Option value is the willingness to pay to preserve the option of using a transport service, which is new or not currently used, over and above the expected value of any future use. In the context of this scheme, it is the additional benefit of a rail service being added to existing buses.

An assessment of option values has been undertaken as the scheme includes new rail stations and the reopening of a disused passenger rail line. This will change the availability of transport services in the West of England area, by adding a new mode (local rail) to the existing public transport offer, and supplementing existing bus services. Option values are particularly apposite in the appraisal of new services and infrastructure, especially if the scheme being appraised is introducing services where there were none before. In the context of MetroWest Phase 1, option values are relevant through the Portishead line's reopening introducing a new mode.

The option values calculations are based on WebTAG, with parameters drawn from Table A4.1.8 from the WebTAG databook (July 2017). Details of the monetised benefits of option values are in the Economic Assessment Report. In essence, the methodology follows the calculations based on

monetising the reopening of a local rail station, in a location with an existing bus service. Monetised option value calculations have taken into account the comparative levels of train and bus services.

Whilst recognising that the values assessment is very sensitive to the size of the population affected by the proposals, the calculations suggest that the nature of the change in service will have a **beneficial impact** on the population of the area.

### 2.8.11 Distributional impacts

The distributional impacts of the scheme has been assessed and is reported in the MetroWest Phase 1 Distributional Impact Assessment Report provided in Appendix 2.4 of the OBC.

## 2.9 Public Accounts

### 2.9.1 Broad transport budget

Table 2.9 shows the Public Accounts (PA) table for the MetroWest Phase 1 OBC scheme.

Table 2.9: MetroWest Phase 1 OBC Scheme, Public Accounts (PA)

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

Notes:

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

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

### 2.9.2 Indirect tax revenue

The additional rail journeys generated by MetroWest Phase 1 result in a reduction in tax costs associated with the commensurate reduction in the number of cars on the roads. These tax costs, both fuel duty and VAT, were estimated along with highway benefits, as described in the MetroWest Phase 1 OBC Forecasting Report and Economic Assessment Report, and are presented in the Public Accounts table in Table 2.9.

# 2.10 Performance of option variants

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

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

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

Table 2.10 sets out summary socio-economic appraisal results for the six sensitivity tests, alongside the core MetroWest Phase 1 OBC scheme. The table indicates that the scheme BCR could drop to just under 2 if the worst-case sensitivity tests for growth and operating costs are achieved, though in all of these cases the adjusted BCRs (including wider economic impacts and option values) are still nearer to 3 than 2.

Table 2.10: Results of socio-economic appraisal – sensitivity tests

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

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

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

# 2.11 Summary of impacts

## 2.11.1 Value for money statement

Table 2.11 sets out the Value for Money Statement for the MetroWest Phase 1 OBC scheme.

Table 2.11: MetroWest Phase 1 OBC Scheme, Value for Money Statement

| Criteria | Description |
|---|---|
| Value for Money/Value for Money when Wider impacts are included | High/High |
| NPV | £145.25 million |
| Initial BCR | 2.55 |
| Adjusted BCR (With Wider Impacts) | 3.61 |
| Summary of the benefits and costs | • Rail transport user benefits (around 82% of the total benefits excluding wider impacts)<br>• Highway transport user benefits (21% of total excluding benefits excluding wider impacts)<br>• Wider Economic Impacts £74.0 million<br>• Option Values £25.5m<br>Operating costs are more significant than capital costs in the economic case, though not by much (56% operating cost versus 44% capital cost). |
| Significant non-monetised impacts | No significant non-monetised impacts. The most significant non-monetised impact is a moderate beneficial impact on journey quality. Other impacts are either slight beneficial (physical activity, access to services), slight adverse (historic environment, biodiversity, severance) or neutral. |
| Key risks, sensitivities and uncertainties underlying the appraisal | • Operating cost assumptions - potential scope for greater synergies with existing services to reduce staffing and maintenance costs<br>• Rail demand forecasts, in particular future year growth in demand at new and existing stations<br>• Future year fare assumptions |
| Significant social distributional impacts | Analysis indicates that scheme impacts are relatively evenly distributed across income, social and user groups. User benefit distributional impact is moderate beneficial, noise and air quality are minor adverse, other impacts are all neutral. |

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

## 2.11.2 Analysis of monetised costs and benefits (AMCB)

Table 2.12 shows the Analysis of Monetised Costs and Benefits (AMCB) Table for the MetroWest Phase 1 OBC scheme.

Table 2.12: MetroWest Phase 1 OBC Scheme, Analysis of Monetised Costs and Benefits (AMCB) [3]

| | |
|---|---|
| Noise, air quality & greenhouse gases | 6,286 |
| Economic Efficiency: Consumer Users (Commuting) | 144,444 |
| Economic Efficiency: Consumer Users (Other) | 54,398 |
| Economic Efficiency: Business Users and Providers | 46,447 |
| Wider Public Finances (Indirect Taxation Revenues) | -12,678 |
| **Present Value of Benefits (PVB)** | **238,897** |

| | |
|---|---|
| Broad Transport Budget | 93,643 |
| **Present Value of Costs (PVC)** | **93,643** |

| | |
|---|---|
| **OVERALL IMPACTS** | |
| **Net Present Value (NPV)** | **145,254** |
| **Benefit to Cost Ratio (BCR)** | **2.55** |

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

Table 2.13 shows the MetroWest Phase 1 OBC scheme AMCB Table including wider economic impacts and option values.

Table 2.13: MetroWest Phase 1 OBC Scheme, Analysis of Monetised Costs and Benefits (AMCB) [3]

| | |
|---|---|
| Accidents, noise, air quality & greenhouse gases | 6,286 |
| Reliability | 1,823 |
| Wider Impacts | 74,025 |
| Option values | 25,481 |
| **including Wider Impacts & Option Values** | |
| PVB | 338,403 |
| PVC | 93,643 |
| NPV | 244,760 |
| **BCR** | **3.61** |

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

## 2.11.3 Appraisal summary table (AST)

The Appraisal Summary Table is set out in Table 2.14.

[3] The AMCB table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

## Table 2.14: MetroWest Phase 1 OBC Scheme, Appraisal Summary Table (AST)

**Appraisal Summary Table**

| | | | | | |
|---|---|---|---|---|---|
| **Name of scheme:** | MetroWest Phase 1 | **Date produced:** | 20/12/2017 | **Contact:** | |
| **Description of scheme:** | Infrastructure and passenger train operations to provide a half-hourly service for the Severn Beach Line (to Avonmouth, hourly to Severn Beach); half hourly service for local stations on the Bath Spa Line; and hourly service for a reopened Portishead Line (new stations at Portishead and Pill). | | | **Name** | James Willcock |
| | | | | **Organisation** | North Somerset Council |
| | | | | **Role** | Project Manager |

| Impacts | | Summary of key impacts | Assessment: Quantitative | Qualitative | Monetary £(NPV) | Distributional 7-pt scale/ vulnerable grp |
|---|---|---|---|---|---|---|
| Economy | Business users & transport providers | Journey time savings are significant in geographical areas where impacts are anticipated. This covers savings for public transport users as a result of the new stations at Portishead/Pill and frequency improvement, and for highway users as a result of decongestion in the highway network where modal shift to rail occurs. (NOTE - benefit split by journey times for highway only) | **Value of journey time changes(£)**<br>**Net journey time changes (£)**<br>0 to 2min: £18,545,216; 2 to 5min: £3,736,568; > 5min: £19,227 | Not required | £46,438,407 | Large beneficial distributional impact |
| | Reliability impact on Business users | Some reduction in highway traffic will result in small changes in journey time, and quantifiable reliability benefits for all users. Rail reliability has not been modelled. | NOTE - impact is highway only and total for all users | Not required | £1,823,385 | |
| | Regeneration | The scheme links a number of regeneration and enterprise zones, and has the potential to generate new jobs, both during construction and operational stages. | 1400 jobs & £57m GVA - construction stage<br>500 permanent jobs & £32m GVA per annum - operational | Not required | £264,781,565 | |
| | Wider Impacts | The scheme improves productivity of local economy through improving transport provision, bringing businesses closer to each other and to the labour market. | £68.4m agglomeration benefits, £4.6m imperfect competition and £1.0m labour supply | Not required | £74,025,119 | |
| Environmental | Noise | The increases in noise are due to the operation of the new rail service. These are not significant increases but the change in noise is sufficient to move a band in the noise worksheet. There would be a minor adverse impact at the Trinity Primary School in Portishead. Negligible impacts are expected within the Avon Gorge Woodlands SAC and SSSI and other designated areas along the route. No dwellings are expected to be eligible under the Noise Insulation Regulations. There are predicted to be no impacts are night due to the service only being operational during the day. | Households experiencing increased daytime noise in forecast year: 523<br>Households experiencing reduced daytime noise in forecast year: 0<br>Households experiencing increased night time noise in forecast year: 0<br>Households experiencing reduced night time noise in forecast year: 0 | Not required | -£511,257 | Minor adverse distributional impact |
| | Air Quality | The physical works for the Project cross a short section of the Bristol Air Quality Management Area (AQMA) and during operation passenger services from the scheme would extend from Portishead to Bristol passing through the AQMA from Parson Street Junction into Bristol. Air quality monitoring data suggest that AQS objectives are being met within the Project extent in North Somerset. The Project crosses one ecological designated site (Avon Gorge Woodlands SAC and SSSI) where baseline NOx levels are close to the critical level. The Project offers an alternative travel mode that promotes a Modal shift which leads to some beneficial air quality impacts in the surrounding area. These benefits are however offset by the additional diesel locomotives on the Portishead Branch Line which are expected to lead to an increase in NOx and PM10 emissions. These changes are likely to lead to adverse impacts at receptors nearest to the rail line. The Project is not predicted to result in any exceedances of the annual mean AQS objective for traffic pollutants. | **Assessment Score:**<br>PM10: 586.09<br>NO2: 8,216.57<br>**Emissions:**<br>PM10: +1 tonnes<br>NOx: +936 tonnes | Not required | **AIR QUALITY VALUATION:**<br>Value of change in PM10 concentrations: NPV: £-0.0m<br>Value of change in NOx emissions: NPV: £-0.5m<br>Total value of change in air quality: £-0.5m<br>**MAIN-SENSITIVITY:**<br>Value of change in PM10 concentrations: NPV: £-0.0m<br>Value of change in NOx emissions: NPV: £-9.6m<br>Total value of | Minor adverse distributional impact |
| | Greenhouse gases | The Project is expected to result in decrease in vehicle kilometers travelled across the road network which has the potential to result in a decrease in CO2 emissions. However, rail emissions associated with the Project are expected to contribute to an increase in CO2 emissions. | Change in non-traded carbon over 60y (CO2e): N/A<br>Change in traded carbon over 60y (CO2e): N/A | Not required | £250,774 | |
| | Landscape | Area north of Avon Gorge and Avon Gorge itself: **slight adverse effect** due to vegetation clearance creating more open views of construction activities and of the railway when the DCO Scheme is in operation.<br><br>Area south of Avon Gorge: **neutral/slight adverse effect** due to opening up of views in the landscape, although existing landscape already has dominant transport infrastructure features and urban land cover.<br><br>Overall **slight adverse effect** due to the reasons set out above. DCO Scheme will affect areas of recognised landscape quality and will impact on certain views across the area. | N/A | Slight adverse | N/A | |
| | Townscape | **Neutral effect** on the townscape of the Ashton Gate/Ashton Vale area due to the fact that transport infrastructure (including the existing Portbury Freight Line) is already a dominant feature in the landscape, and many views are restricted by commercial/industrial buildings so would not change significantly with the DCO Scheme. Future trends in the area are likely to include increased development and expansion outwards into the urban/rural fringe, and increased traffic volumes, so the DCO Scheme would fit this trend. | N/A | Neutral | N/A | |
| | Historic Environment | The DCO Scheme is assessed to have a direct **slight adverse/neutral** effect on non-designated cultural heritage assets during the enabling works and construction through the removal of known and hitherto unknown archaeological remains along the railway corridor. The adverse effects arising from these direct impacts on this resource can be adequately mitigated through preservation by record and the significance effect of the residual impact is assessed to be neutral and not significant in regards to the EIA Regulations. The effect of the DCO Scheme on the setting of the designated cultural heritage assets along the route during construction and operation is generally neutral and not significant in regards to the EIA Regulations. This results largely from the lack of inter-visibility between the DCO Scheme and heritage assets. | N/A | Slight adverse/Neutral | N/A | |
| | Biodiversity | The Portishead to Pill line will have **slight adverse** effects on Field east of M5 Motorway, Lodway Wildlife Site due to loss of habitat, however this impact is considered to be negligible in magnitude due to the minor loss of habitat anticipated. **Slight adverse** effects are also considered possible on protected species such as great crested newts, other amphibian species, badgers, otter and bats through the fragmentation of habitats and disturbance and death/injury from direct collision with trains. The operational maintenance of the railway corridor may also cause **slight adverse** effects on habitats such as woodland, trees and scrub due to direct loss, as well as Japanese knotweed due to the potential of facilitating the spread of this invasive species. The impact on North Somerset and Mendips Bats SAC is **to be assessed** following further bat survey in 2018.<br><br>The Freight Line section of the DCO is assessed to have a **slight adverse** effect on internationally and nationally important sites/species such as the Avon Gorge and Woodlands SAC/SSSI, Leigh Woods NNR and Ancient Woodland and the notable and the important plant species these sites support, these impacts are likely to arise through the routine maintenance and clearance of the railway corridor, however they will be mitigated through the implementation of a Site Vegetation Management Statement which will be developed in consultation with Natural England. A slight adverse effect is also anticipated on the internationally important site Bath and Bradford on Avon Bats SAC, however this assessment is ongoing due to further assessment on the use and value of the tunnels to bats. A number of Local Wildlife Sites are also predicted to have potentially **slight adverse** effects due to the Freight Line section of the scheme. These include Bower Ashton BWNS, River Avon NSWS and River Avon SNCI, effects on these sites will arise due to habitat loss. A **slight adverse** effect may also occur on protected species such as badger, otters and bats through the fragmentation of habitats, disturbance and death/injury from direct collision with trains. Habitats that may be subject to a slight adverse impact includes ephemeral/short perennials which may be effected due to the routine maintenance and clearance of the railway corridor. In addition a slight adverse effect may occur due to the potential spread of invasive plant species during this routine maintenance and clearance. | N/A | Slight adverse | N/A | |
| | Water Environment | The water environment is typical of the locality with watercourses mostly comprising small watercourse with primarily a drainage function (some man-made) of low to medium importance discharging directly into the tidal River (Bristol) Avon which is of Very High importance. Groundwater is of Medium to High importance on a local to regional scale. The larger watercourses - Severn Estuary, River (Bristol) Avon and Easton-in-Gordano Stream are of High quality, whereas the smaller watercourses are of medium to low quality. Most are important on a local scale, with on the River (Bristol) Avon being important at a regional scale and the Severn Estuary at a national scale due to its size and ecological designations. There will be little impact upon the water environment as the scheme involves minimal additional impermeable surfaces (mostly relating to the stations and associated car parking areas) and results in little change in water quality, with some improvement in some areas through the removal of contaminated old sleepers and renewal of ballast. As the scheme involves very little change from the existing situation the magnitude of all the impacts is considered to be negligible, except for a slight adverse impact relating to the increased flood risk to the railway line from the River (Bristol) Avon, which will worsen over time. This results in a significance score of "Insignificant" for all of the impacts, apart from two exceptions for which the significance score is "Low Significance". The first exception is the flood risk to the railway from the River (Bristol) | N/A | Neutral | N/A | |
| Social | Commuting and Other users | Journey time savings are significant in geographical areas where impacts are anticipated. This covers savings for public transport users as a result of the new stations at Portishead/Pill and frequency improvement, and for highway users as a result of decongestion in the highway network where modal shift to rail occurs. (NOTE - benefit split by journey times for highway only) | **Value of journey time changes(£)**<br>**Net journey time changes (£)**<br>0 to 2min: £23,997,886; 2 to 5min: £3,821,405; > 5min: £37,577 | Not required | £198,842,893 | Evenly spread across vulnerability |
| | Reliability impact on Commuting and Other users | Some reduction in highway traffic will result in small changes in journey time, and quantifiable reliability benefits for all users. Rail reliability has not been modelled. | NOTE - impact is highway only and total for all users | Not required | £1,823,385 | |
| | Physical activity | The proposed scheme accounts for cyclists, pedestrians and equestrians by delivering and planning for measures to minimise the interaction between these modes and motorised traffic (including trains). The measures provided for Non-Motorised Users (NMUs) that will be delivered as part of the scheme ensures that the opportunity to undertake trips through active modes will be enhanced. Based on the work undertaken, the assessment suggests that the scheme will have an overall slight beneficial impact on physical activity. | N/A | Slight beneficial | N/A | |
| | Journey quality | Improved frequencies on the Severn Beach line and local stations to Bath will help reduce the extent of overcrowding and lower traveller stress by improved ease and convenience. The analysis also suggests that there will be neutral impacts on other factors such as cleanliness, facilities, information and traveller's views. With the introduction of passenger rail services to Pill and Portishead, there will be larger beneficial impacts such as new facilities at the railway stations, smoothness of ride, traveller views and integration into existing national railway information portals. Based on the evidence, it is concluded that there will be a moderate beneficial impact. | N/A | Moderate beneficial | N/A | |
| | Accidents | A full assessment of the likely impacts of the scheme was undertaken, and this suggests that as MetroWest is a rail scheme, with minimal changes on other parts of the network. | A saving of 130 accidents | Not required | £5,845,450 | |
| | Security | The new rail stations will enhance the security of both locations by providing additional footfall, CCTV, emergency contact points and improved lighting. However, while there will be a general improvement in security of the area, rail stations can also attract crime. The scheme is therefore envisaged to have a neutral impact on security. | N/A | Neutral | N/A | |
| | Access to services | MetroWest Phase 1 will generally enhance the public transport offer in area served, thus improving links to key services. There is a more substantial enhancement to the public transport offer in Portishead and Pill. Overall, MetroWest Phase 1 is assessed to have a slight beneficial on access to services. | N/A | Slight beneficial | N/A | Evenly spread across vulnerability |
| | Affordability | The assessment indicates there will be beneficial affordability impacts from reduced fuel costs, shorter journeys and reduced congestion. However, this needs to be set against the additional costs of rail fares and car parking charges (if travelling to the stations by car).Improved frequencies are expected to increase the numbers travelling by rail, but there may be some extraction from existing public transport provision which could impact on affordability. Based on the evidence, it is concluded that MetroWest Phase 1 will result in a neutral impact. | N/A | Neutral | N/A | |
| | Severance | Negative impacts are expected at the various at-grade crossing points affected by the Scheme. The negative impact is a result of increased journey times opposed to safety. It is expected that the overall safety of pedestrians and cyclists will be improved, particularly at Ashton Vale.Overall the scheme has a slight adverse impact on severance. | N/A | Slight adverse | N/A | |
| | Option and non-use values | The scheme will add a rail option to a public transport offer that currently only includes bus, and a bus service that is adversely affected by traffic congestion | 26,235 population within 2km of new rail station | Not required | £25,480,590 | |
| Public Accounts | Cost to Broad Transport Budget | Public sector costs associated with investments for scheme implementation and ongoing support/maintenance, such as capital investment, operating costs and revenue income. | N/A | Not required | £93,642,672 | |
| | Indirect Tax Revenues | The impact on tax and fuel duty loss as a result of reduction in fuel consumption. | N/A | Not required | -£12,677,961 | |