ITEM 12

REPORT TO: WEST OF ENGLAND JOINT COMMITTEE

DATE: 30th OCTOBER 2017

REPORT TITLE: WEST OF ENGLAND JOINT TRANSPORT STUDY

AUTHOR: ELAINE SEAGRIFF, INTERIM HEAD OF TRANSPORT, WEST OF ENGLAND COMBINED AUTHORITY

1 Purpose

1.1 To present the Final Report of the West of England Joint Transport Study, to enable the consideration of its schemes, strategy and recommendations in the forthcoming replacement to the Joint Local Transport Plan for public consultation from Spring 2018.

2 Issues for Consideration

Background

2.1 The Joint Transport Study (JTS), commissioned and funded by the four West of England Unitary Authorities and part-funded by Highways England, commenced in March 2015. The study was intended to set out a programme of transport schemes and interventions which would both address current challenges on the network and mitigate the impact of future development up to 2036. The JTS is now being presented to the Board as a completed study. The study sets out a Transport Vision which comprises a programme of interventions across all travel modes to achieve a significant mode shift from the car and ensure a more efficient, resilient network, to address the scale of existing challenges and future growth.

2.2 The JTS has also been carried out to ensure that the West of England authorities are prepared for future rounds of funding opportunities for transport investment, and to provide a timely review of transport requirements and policy to inform the next Joint Local Transport Plan. The JTS work-stream has been undertaken alongside that of the draft Joint Spatial Plan (JSP), and both work-streams have had complementary milestones; each work-stream informing the other.

Key Issues

2.3 The JTS Executive Summary and final report are attached at Appendix A and Appendix B respectively to this report. The JTS sets out a programme of interventions which represents a level of investment substantially greater than that delivered to date, demonstrating the scale of intervention needed on the network to restrict the overall number of car commuting trips to broadly current levels, reduce carbon emissions and deliver a major shift in mode share towards public transport, walking and cycling. This is a particular challenge given the forecast growth in demand to travel on the highway network. Consequently, car mode share for (single occupant) commuting is forecast to fall from 59% of all trips (as recorded by the 2011 census) to 45% in 2036 if the Transport Vision is delivered.

2.4 The overall package includes strategic cycling corridors, improvements to local bus services, extensions to MetroBus corridors, a new `Mass Transit' public transport network (using a light rail and/or Metro mode), a ring of park and ride sites around Bath and Bristol, new railway stations and complementary highway investment, including new motorway

junctions and orbital links, and the extension of dynamic motorway management on the M4 and M5. The investment is grouped into multi-modal corridor packages, demonstrating how highway and public transport schemes can work together to effectively maintain accessibility whilst delivering mode shift onto sustainable transport modes.

2.5 The suggested investment package is estimated as a minimum of £8.9 billion, (effectively at least £450 million per year) which is considerably higher than the current level of transport investment in the West of England. There is a clear emphasis on the prioritisation of sustainable modes – at least £5.8 billion of the overall package is for public transport, cycling, walking and behavioural change programmes.

2.6 As noted above, a key role of the JTS has been to provide supporting analysis to the JSP and clarification of the schemes and interventions necessary to address the transport impact of the suggested development locations set out in the JSP Emerging Spatial Strategy. The successful delivery of the JSP is dependent on the realisation of significant elements of the JTS, and a significant number of schemes in the overall package have been identified to address the transport impact of the suggested development locations (although helpfully most of these schemes also have a role in addressing current challenges as well).

2.7 The JTS includes some radical principles around the management of through traffic movements. Where orbital highway investment is suggested, relieving traffic on radial routes, restrictions on through traffic and the prioritisation of highway space on those radial routes is proposed for public transport, walking and cycling.

2.8 Two major consultations have been undertaken on the JTS alongside those for the JSP. Further details are provided in section 3 below.

2.9 Identifying funding to deliver the transport vision will be challenging and it will be necessary to consider different ways to raise revenue to meet this requirement. The JTS has also considered the potential for financial restraint measures on general traffic movements in order to raise revenue for improvements in the transport network.

2.10 The JTS is a technical study, which sets out a programme of suggested infrastructure and interventions, to address the impact of current challenges on the network and accommodate future growth in demand to travel. It does not form council transport policy. However, endorsement of the study findings will enable their consideration in the forthcoming update to the Joint Local Transport Plan, where (following further public consultation) the process of updating council transport policy will be undertaken including the endorsement of a revised transport major scheme programme.

3 Consultation:

3.1 Two public consultations have been undertaken on the JTS. The first consultation was undertaken between November 2015 and January 2016, and requested views on the performance of the current transport network, study objectives and suggested transport concepts for interventions, with findings reported to members of the Joint Transport Board on 17th June 2016.

3.2 The second consultation was undertaken in December 2016, and a comprehensive consultation report was presented to members of the Planning, Housing and Communities Board and Joint Transport Executive Committee on 17th March 2017. A copy of the consultation report (and covering officer report) as presented to the 17th March meeting is available at the following web-link: http://westofenglandlep.co.uk/meetings/planning-housing-and-communities-board. The public and stakeholders were asked for their views on a proposed (at that time £7.5 billion) Transport Vision, including the overall level of ambition, the balance of investment across different interventions, and key principles such as management of road-space. There was strong support for the themes of intervention

suggested in the Vision (although with localised objection to some specific schemes) and an overall desire to be more ambitious.

3.3 A Transport Steering Group including designated representatives of the business community has met a number of times during the JTS work programme, and has been updated on the outcomes and recommendations of the study. Business West have since provided further feedback setting out their overall support for the Vision, as well as specific areas of support for individual schemes (as well as some concern where certain schemes are not included), and their comments have been taken into account in the final version of the report attached as Appendix 2. Feedback has also been received from health sector colleagues and Highways England.

3.4 Members of the WECA Overview and Scrutiny Committee discussed a draft JTS Final Report on 22nd September 2017. Members noted concerns around the report's lack of coverage of air quality and emerging technologies. They suggested the need to improve public transport access to rail stations, passenger rail frequencies, and interchanges (including links between Park & Ride and rail stations). Also, they commented on the balance of highway investment across the region and the need to understand the potential revenue implications of the suggested package. The Final Report has had some further amendments in response to these concerns.

3.5 The study findings have also been presented to Members of the Infrastructure Advisory Board on 25th September, who agreed to recommend the draft final report to this committee, for the consideration of its schemes and interventions in the forthcoming, draft update to the West of England's Joint Local Transport Plan.

3.6 The Final Report has also been updated to include commentary on the impact of the proposed removal of tolls on the Severn Crossings, as well as the provision of additional scheme proformas as an appendix.

3.7 Consequently, the core themes in the consultation Transport Vision remain. There has been an increase in the overall cost of the Vision due to more robust estimation of scheme costs following completion of the consultation.

3.8 As noted above, consultation will be undertaken on the forthcoming refresh to the Joint Local Transport Plan from Spring 2018.

3.9 Reflecting the report recommendation, the recommended infrastructure packages arising from the JTS are expected to inform the forthcoming update to the Joint Local Transport Plan. Milestones for the JTS endorsement and JLTP development are as follows:

- December 2017 – West of England Combined Authority/Joint Committee sign off for a consultation plan for Joint Local Transport Plan (JLTP);
- From Spring 2018 - Consultation on JLTP including an updated major scheme programme.

4 Other Options Considered:

4.1 The alternative to endorsing the JTS is not to endorse it. This would complicate the formulation of updated transport policy and prioritisation of the major scheme programme for incorporation in the updated JLTP, with further risks to the draft JSP in terms of a programme of schemes to address the transport impacts of the suggested development locations.

5 Risk Management/Assessment:

5.1 The Transport Vision is a first step in the development of the future transport programme for the West of England. Significant further work will be required to assess the business cases of projects and develop the forward programme. Key risks for the ambitious level of investment include those around financing the Vision in its entirety, gaining public acceptability for specific proposals, and risks around resourcing its development and delivery. Whilst there are no direct financial implications arising from this report, funding for schemes will need to be appropriately identified before any final approval.

6 Public Sector Equality Duties:

6.1 Feedback will be sought from affected communities and statutory consultees to meet the authorities' duties under the Equality Act 2010 on the emerging major scheme programme as the JLTP and its daughter documents are developed. This includes a three month consultation period; the results of which will be used in an equality impact assessment.

7 Economic Impact Assessment:

7.1 The JTS forecasts substantial costs of congestion (in terms of the value of time of vehicle delay) if the Transport Vision is not implemented. This will act as a significant constraint on the productivity of the local economy and constrain future growth.

8 Finance Implications:

8.1 The JTS is a completed piece of work. There will be a financial impact resulting from additional staff resources required to deliver the subsequent Joint Local Transport Plan, a report on which was considered by the West of England Joint Committee on 28th June 2017.

Advice given by: Tim Richens, Interim Section 151 Officer

9 Legal Implications:

9.1 None arising from this report.

10 Land/Property Implications:

10.1 None arising from this report.

11 Human Resource Implications:

11.1 The JTS is a completed piece of work. Work is currently underway to identify the amount of resource and type of skills required for timely delivery of the Joint Local Transport Plan, a report on which was considered by the West of England Joint Committee on 28th June 2017.

Advice given by: Sue Evans, Interim HR Director

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12 Recommendation:

12.1 The voting on the following recommendations will be as follows the 4UAs and the West of England Combined Authority Mayor.

12.2 **The Committee is asked to endorse the Joint Transport Study Final Report to enable the consideration of its schemes and interventions in the forthcoming, draft update to the West of England's Joint Local Transport Plan for consultation from Spring 2018.**

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Background Papers

JSP&TS consultation report to the Planning, Housing and Communities Board and Joint Transport Executive Committee on 17th March 2017. http://westofenglandlep.co.uk/meetings/planning-housing-and-communities-board.

APPENDIX A – WEST OF ENGLAND TRANSPORT STUDY – EXECUTIVE SUMMARY

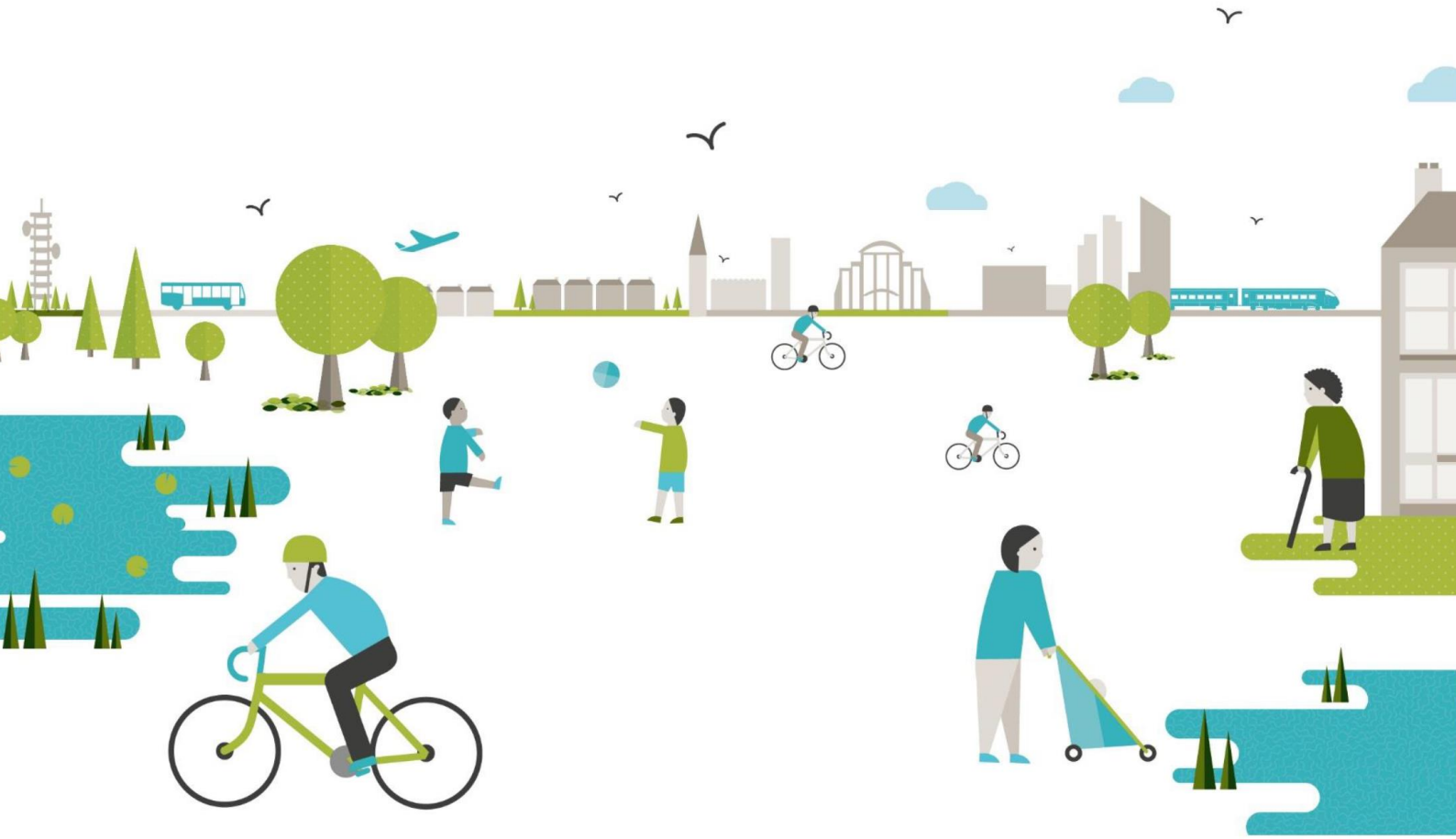
APPENDIX B – WEST OF ENGLAND JOINT TRANSPORT STUDY FINAL REPORT

WEST OF ENGLAND
BUILDING OUR FUTURE

West of England Joint Transport Study

Executive Summary

October 2017



Bath & North East Somerset Council

Bristol City Council

North Somerset Council

South Gloucestershire Council

West of England Joint Transport Study

Final Report Executive Summary

October 2017

1. Introduction

This is the Executive Summary for the Final Report of the West of England Joint Transport Study. It has drawn on extensive evidence and stakeholder engagement to develop a long-term Transport Vision for the West of England, which includes Bristol, Bath & North East Somerset, North Somerset and South Gloucestershire.

The purpose of the Joint Transport Study was to provide a clear direction for the long-term development of the transport system in the West of England to 2036 and beyond. The study was required to address the combined impact of current challenges on the network, growth from committed development in Local Plans and additional longer term growth up to 2036.

The outputs from the Joint Transport Study, including the Transport Vision, will assist the authorities in developing the next Joint Local Transport Plan (JLTP) and future transport investment programme.

A Joint Spatial Plan has been developed in parallel with the Joint Transport Study. The Joint Spatial Plan has considered options for delivering new housing and employment to meet future needs to 2036. Work on the Joint Spatial Plan is ongoing, with consultation on the Draft Plan scheduled from Autumn 2017 and an Examination in Public programmed to take place in 2018.

Transport evidence from the Joint Transport Study was used to inform the assessment of potential locations for housing and employment growth. The proposed growth strategy within the Joint Spatial Plan was then used in forecasts of future travel demand and to help shape the development of the long-term Transport Vision.

West of England Transport Vision

The technical work in the Joint Transport Study was used to develop the Transport Vision for the West of England. The Transport Vision includes all modes of travel and comprises a programme of complementary schemes that are designed to achieve a significant mode shift from the car and ensure a more efficient, resilient transport network. The Transport Vision is designed to address existing transport problems and respond to the challenges associated with the high levels of forecast growth in the West of England.

The principles of the Transport Vision can be summarised in the following mission statement.

Mission Statement for the Transport Vision

Transport in the West of England will be transformed over the next 20 years through a programme of complementary measures designed to address underlying challenges and to enable the sustainable delivery of new housing and employment growth.

Study Goals

The Transport Vision has been designed to expand travel choices and improve the performance of the transport network to support the five study goals:

Figure 1 Study Goals

The Vision has been developed to address current problems and issues associated with future growth, looking ahead to 2036 and beyond.

Building on the current investment programme

The Transport Vision will build on the recent and current transport investment programme in the area:

- Programmes to facilitate travel behaviour change and increase cycle and bus use delivered under the Local Sustainable Transport Fund, Access Fund, Better Bus Area Fund and Cycling Ambition Grant.
- The Weston Package, completed in 2015, is already delivering benefits: this has included improvements to the local transport network and M5 Junction 21.
- The Bath Transport Package has expanded the capacity of Park & Ride, delivered improvements to the city's bus network and reconfigured parts of the city's road network. This has substantially improved travel conditions and created more capacity to support the city's dynamic economy.
- Construction of the MetroBus network is well advanced and on opening is expected to substantially improve connectivity between the North Fringe and South Bristol.
- The Great Western Electrification Programme is underway[1]. On completion, this will provide a new fleet of diesel-electric trains connecting to Cardiff, the Thames Valley and London, with faster journeys and more frequent trains.
- Preparations for MetroWest Phases 1 and 2 continue to progress[2], which will significantly improve future rail travel across the area.
- Significant works are taking place to improve access to Temple Quarter Enterprise Zone, including a new bridge to provide access to Arena Island and reconfiguration of the road layout at Temple Gate, and work is progressing on investment in Temple Meads station.
- Highways England is planning the delivery of a new M49 junction to improve access to Severnside.
- Projects funded by the West of England Growth Deal are improving access to key growth sites, for example new infrastructure to support growth in the Filton area.

[1] The Government recently announced that, following significant escalation of costs of the GWEP, electrification works would terminate at Thingley Junction between Bath and Chippenham, with the new trains running under diesel traction to Bath Spa and Bristol Temple Meads. Full electrification has been deferred.

[2] Network Rail has recently reported significant cost escalations for the reopening of the Portishead line to passenger services. Work is taking place to consider the implications and re-programme the works on the Portishead line.

2. Transport Vision

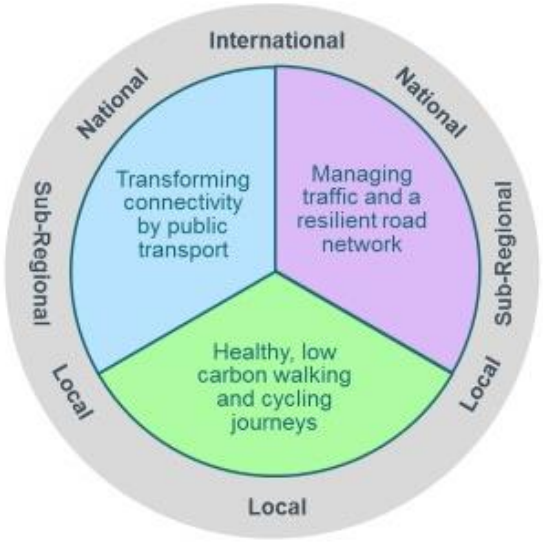
The Transport Vision will build on the current investment programme, with a continued strong focus on shifting travel behaviour towards sustainable modes and tackling congestion on the road network. If implemented, it will significantly accelerate investment to transform the ways that people travel in future in the West of England. It will more than double the trips made by cycling and public transport, resulting in a significant reduction in the mode split for journeys by car.

It sets a target for no overall increase in the number of trips by car across the sub-region in the context of 105,000 new homes being delivered by 2036. The Vision is required to unlock the delivery of new homes and jobs, improve economic performance and competitiveness, tackle health and inequality challenges and support the delivery of ambitious CO_2 reduction targets.

The Vision has a strong emphasis on integration of different modes, with complementary roles for walking, cycling, different forms of public transport, travel by car and freight. It includes a series of complementary measures designed to improve travel choices and support mode shift to active forms of travel and public transport. This will help to reduce car traffic and respond to the growth in travel with more people living and working in the area. It also considers the different needs of local, sub-regional, national and international travel demands.

The concept of the Transport Vision is shown in Figure 2.

Figure 2 Concept of the Transport Vision



A step change in the number of healthy, low carbon walking and cycling journeys

Active travel will be promoted for shorter and intermediate-length journeys, with roadspace reallocation to improve conditions for walking and provide safe, direct routes for cycling. This will have multiple benefits in helping to tackle congestion by removing car trips and encouraging more efficient use of limited roadspace, reducing carbon emissions from intermediate trips and promoting higher levels of physical activity.

Transforming connectivity by public transport

A fully integrated public transport network will be developed, with significant improvements to the bus network to cater for most journey needs, complemented by an expanded MetroBus network, a new mass transit network, Park & Ride and enhanced rail services catering for the full range of journey needs in the West of England. This will also deliver significant reductions in congestion and reductions in carbon emissions by reducing a wide range of car journeys, many of which are currently made by car because of the lack of public transport alternatives.

Managing traffic demand and a more resilient road network

Significant investment in the road network will support the ambitions for changing people's travel behaviour, through enabling reallocation of roadspace to walking, cycling and public transport on congested urban corridors and directing traffic to more appropriate corridors. New and improved road infrastructure will be designed to support the needs of pedestrians, cyclists and public transport users, including multi-modal transport corridors to support the ambitious growth proposals in the area and to unlock the economic potential of areas including South Bristol.

It will be necessary to consider how to more proactively manage traffic demand, particularly in congested centres and corridors. A combination of a Workplace Parking Levy and Road User Charging would help to encourage mode shift and improve the performance of the transport system. There will also be a more proactive approach to the management of freight, to tackle the challenges of increased goods vehicles in urban areas, with an increased emphasis on rail freight and new approaches to urban logistics.

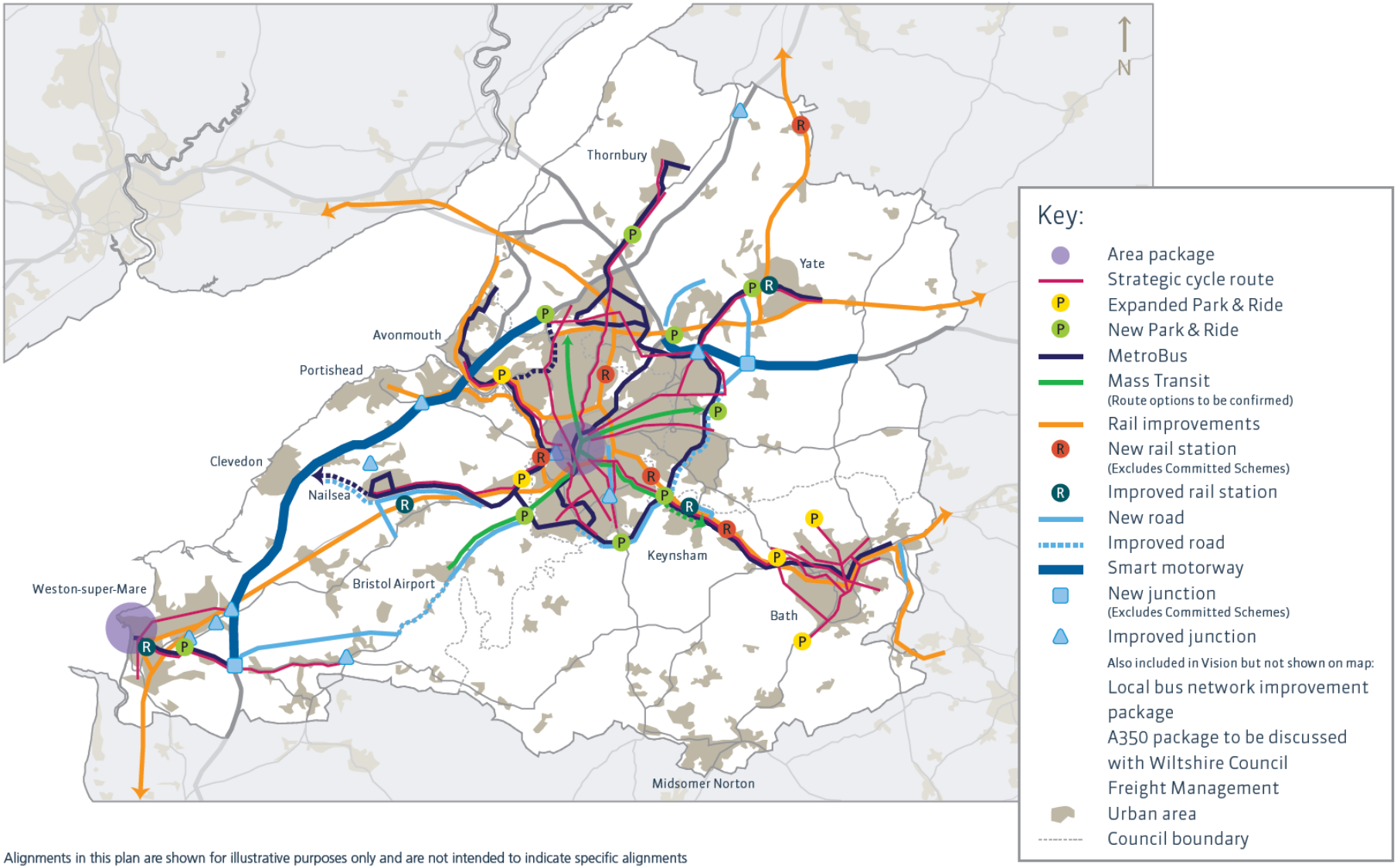
Effective connectivity at the local, sub-regional, national and international scales

The Transport Vision has a strong emphasis on local, sub-regional, national and international connectivity, with analysis of connectivity needs at different geographic scales. It has considered connectivity to Bristol Port and Bristol Airport, the national road and rail networks serving the West of England, and the complex local transport networks serving the area. Integrated multi-modal packages of measures have been developed to meet the needs of different parts of the West of England. This will ensure a seamless approach to future travel, with a strong focus on the needs of the different groups of customers using the network.

Central to the Transport Vision will be changing travel behaviour, in which people become less habitualised in using cars, effective travel choices are provided and people understand the choices that are available. This will require significant investment in new infrastructure to provide these choices, and marketing, communications and technology to facilitate this change in behaviour.

Figure 3 shows the schemes in the Transport Vision.

Figure 3 **West of England Transport Vision**



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments

Areas covered by the Transport Vision

The Transport Vision can be considered in terms of four quadrants with interrelated issues and integrated solutions: south west, south east, north east and north west. Bristol is then considered separately because the city is at the heart of the network.

South West: Weston-super-Mare to Bristol

This corridor includes Weston-super-Mare, other parts of North Somerset, Bristol Airport, Portbury Dock and routes into Bristol from the South West. The proposals in this area focus on improved connectivity to/from North Somerset, including a package for Weston-super-Mare to support existing growth commitments, a new strategic corridor from the M5 to the Airport and Bristol, a new mass transit route from Bristol to the Airport, a new multi-modal transport corridor (including MetroBus) connecting Clevedon, Nailsea and Bristol, and improved orbital connectivity around south Bristol.

Extension of the Smart Motorway on the M5 from Cribbs Causeway to Weston-super-Mare will improve regional connectivity. New and expanded Park & Ride sites are proposed as an integral part of the future public transport network, including a new Park & Ride site for Weston-super-Mare.

The international gateways – Bristol Airport and Bristol Port – also create wider travel demands. Bristol Airport has a catchment that extends across the South West and into South Wales, whilst Bristol Port generates freight traffic to/from other parts of the UK. A comprehensive package is proposed to improve access to the Airport both by public transport and by road. Access to Royal Portbury Dock will be improved through extension of the Smart Motorway and significant improvements to M5 Junction 19.

South East: Bath to Bristol

This corridor includes Bath, Keynsham and other parts of Bath & North East Somerset and routes into Bristol from the south east. The main proposals focus on addressing issues in Bath, the Bristol – Bath corridor and orbital movements around South Bristol. The proposals in Bath include further expansion of Park & Ride to intercept trips into the city and a package of strategic cycle routes to encourage active travel. A new East of Bath Link will help to take traffic out of the city and facilitate reallocation of roadspace.

A mass transit route between Bristol and Bath will transform travel choices along this corridor, which would be delivered in conjunction with the Callington Road Link to facilitate roadspace reallocation on the A4 into Bristol. New and expanded Park & Ride sites are proposed as an integral part of the future public transport network, including a new Park & Ride site at Hicks Gate.

Improved road infrastructure connecting the A4 at Hicks Gate with the A37 at Whitchurch and Hengrove will significantly improve orbital connectivity around the south of Bristol and relieve radial routes. This will also help tackle the impacts of traffic ‘rat-running’ on rural lanes around the edge of the urban area and enable public transport improvements to be delivered.

North East: Yate to Bristol

This corridor includes Yate, Chipping Sodbury, Frampton Cotterell, the East Fringe of Bristol, other parts of the eastern side of South Gloucestershire and routes into Bristol from the east and north east. The proposals focus on improving connectivity to the East Fringe and Yate. The Enterprise Area at Emersons Green will enhance the attractiveness of this area for inward investment, which will necessitate improved connectivity to the M4 and local transport networks.

A new mass transit corridor, between the East Fringe and Bristol city centre, is proposed to tackle the connectivity problems in this part of the conurbation. A new motorway junction on the M4 (Junction 18A), with connections to the Ring Road and Yate, will help to tackle traffic issues at M32 Junction 1 and provide improved connections to Yate.

A new Park & Ride site on the M32 is also recommended. A new Winterbourne Bypass will unlock highway capacity for MetroBus improvements on the A432 corridor between Yate and Bristol, complemented by Park & Ride on the A432, and interchanging with improved facilities at Yate railway station. It will also connect into the North Fringe to Hengrove Package infrastructure which would also be further upgraded. Orbital MetroBus connections will also improve access to employment from south Bristol to Emersons Green.

North West: Thornbury to Bristol

This corridor includes Thornbury, the Bristol North Fringe, Avonmouth / Severnside, rural parts of South Gloucestershire and routes into Bristol from the north. The proposals focus on improving connectivity from Thornbury, Avonmouth / Severnside and North Fringe to the city centre. The Great Western Electrification Programme will enhance the competitiveness of the area, which will necessitate investment in improved local connectivity. The motorway network is under pressure and the Transport Vision proposes extension of Smart Motorway running east to M4 Junction 18 and on the M5 south across the Avonmouth Bridge.

A new mass transit corridor, between the North Fringe, North Bristol and Bristol city centre, is proposed to transform connectivity in this part of the conurbation. A new MetroBus and strategic cycling route on the A38 corridor will improve connectivity to Thornbury, which will extend services from the MetroBus corridor in the North Fringe. Improvements to M5 Junction 14 will accommodate growth in the area.

A new MetroBus route will serve Severnside and an expanded Portway Park & Ride, and a network of new Park & Ride sites will intercept traffic on the edge of the Bristol urban area on the A38, A4018 and M32. These will be complemented by reopening of railway stations, further improvements to local rail services and better rail connections between Bristol and South Wales.

Bristol

Bristol is at the centre of the West of England transport network and transport issues in the city have consequences for the rest of the West of England and the wider South West region. Many of the major routes in the Bristol urban area are also high streets and there is limited space available to provide additional capacity.

Transport schemes must focus on improvements that move the most people in the limited space available, improving the comfort, speed and reliability of sustainable modes of transport. Many of the major components of the Transport Vision, described in the four quadrants, are required to address these challenges in Bristol.

The primary focus in Bristol will be significant investment in active travel and public transport to secure substantial mode shift from the car, which will tackle the problems caused by poor accessibility, congestion, poor air quality and physical inactivity. This will also be needed to accommodate the growing numbers of people living and working in the city.

Strategic cycle routes will help to tackle barriers to cycling on the city's busiest traffic routes and will form a key part of the city's wider cycling network. The network of Park & Ride sites in the Transport Vision will intercept traffic heading into the city and will help reduce traffic on radial routes and the city centre, contributing to a reduction in congestion, air pollution and collisions.

A new mass transit network will comprise high-capacity, segregated corridors connecting major destinations and integrating with other modes to transform public transport across the Bristol urban area. This includes routes to Bristol Airport, North Bristol and the North Fringe, East Bristol and East Fringe, and Hicks Gate and potentially Keynsham. In some sections, underground running may need to be considered due to streetspace constraints.

Large infrastructure schemes are only part of the solution and, in many cases, more localised schemes and revenue funding are most effective and provide the greatest return on investment. In addition to the JLTP, a more detailed Bristol Transport Plan is being developed by the Bristol Congestion Task Group, with the intention to consult on the plan in mid-2018. The Plan will be informed by the Joint Transport Study and will seek to create better places and help people move around by continuing to improve sustainable transport provision.

Bristol City Council is developing a City Centre Movement Strategy (or City Centre Framework) as part of the Bristol Transport Plan. This will tackle challenges of high volumes of traffic heading to city centre destinations and traffic passing through the city centre because of limited orbital connections. The City Centre Movement Strategy aims to create better places and improve the reliability and resilience of the transport network in central Bristol. It proposes a range of measures including enhanced traffic management, increased bus priority, continuous safe cycle routes, and enhanced public realm.

3. Components of the Transport Vision

The components of the Transport Vision are described by mode: technology and smarter choices, active travel, public transport, the road network and freight. Major schemes in the Transport Vision are highlighted under each mode.

Technology and Smarter Choices

Behaviour change will be critical to ensure that people consider more sustainable forms of travel: walking, cycling, public transport and car-sharing. New technologies, including on-demand information and smart-ticketing, will also support the shift to more sustainable travel choices. Connected and Autonomous Vehicles could change the way that people use cars, and the transport network needs to be future-proofed to accommodate these changes.

Active Travel

Walking and cycling are the healthiest forms of travel and should play the primary role in catering for short trips. The Transport Vision includes major investment in modifying the use of urban roadspace to create new strategic cycling routes across the Bristol urban area, Bath and Weston-super-Mare, together with connections along major corridors to Thornbury, Yate, Keynsham and Nailsea.

Greater Bristol Cycle Network	New strategic cycling routes across the Bristol urban area, with routes extending to Nailsea, Thornbury, Yate and Bath. The package will include reallocation of roadspace on major arterial routes and traffic management measures, complementing investment in quiet routes and off-road network, to create a comprehensive, easy to use network for journeys across the urban area.
Bath Cycle Network and City Centre Package	Focus on east-west corridors through the city, with reallocation of roadspace and off-road network, to create a high-quality network through the city, complemented by improved permeability and investment in public realm in the city centre.
Weston Cycle Network	Focus on east-west routes from Worle and Weston Villages to the town centre, with reallocation of roadspace in Worle and provision of segregated routes in Weston Villages.

Buses

Local bus services form the backbone of the public transport network in the area. Further investment in the local bus network will support continued mode shift to buses, in the urban areas and on key corridors connecting towns. The Vision includes a Bristol city centre movement strategy, Weston Bus Network and the next generation Greater Bristol Bus Network.

Greater Bristol Bus Network 2	Further enhancements to the sub-regional bus network, including improved vehicle specification, upgraded stops (consistent with MetroBus standard), ticketing and bus priority. Enhanced interchange facilities across the network.
Bristol City Centre Movement Strategy (City Centre Framework)	Reconfiguration of road network in city centre to give greater priority to walking, cycling and buses and redefined traffic routings, with improved journey reliability by all modes. Significant reconfiguration of bus routings to improve journey speeds and reliability.
Weston-super-Mare Bus Network	Redesign of bus network to accommodate the requirements of Weston Villages, support regeneration in the town centre and ensure effective connectivity to key destinations, including stations, Weston College and Junction 21 Enterprise Area.

MetroBus

The Vision will build on the recent investment in MetroBus, with further enhancement to the existing routes and extensions to the growing communities of Nailsea, Yate and Thornbury, together with investment on the corridors to Severnside and Bath and development of new orbital connections, to create a comprehensive rapid transit system serving the area.

MetroBus in Weston-super-Mare	Route connecting Weston Villages, Junction 21 Enterprise Area and proposed Park & Ride site at A370 / A371 junction.
MetroBus to Clevedon and Nailsea	Route from Clevedon and Nailsea to Bristol, supporting new growth at Nailsea, using Long Ashton Bypass and a new transport link from Long Ashton to Nailsea.
MetroBus to Severnside	Route following A4 Portway to city centre, serving Portway Park & Ride and expanded employment areas in Avonmouth/Severnside. This could be used by a feeder service from the A4018 Park & Ride, running via Canford Lane / Sylvan Way.
MetroBus to Thornbury	Route via A38, serving new development on the A38 corridor and new Park & Ride site north of Almondsbury, connecting into the North Fringe to Hengrove route at Aztec West to city centre.
MetroBus to Yate	Route via A432, serving new development west of Yate, and serving new Park & Ride site at Nibley, connecting into the North Fringe to Hengrove route west of Emersons Green.
MetroBus to Keynsham, Saltford and Bath	Route via A4, connecting from Hicks Gate, with the option to run along the Keynsham Bypass, through Saltford Village and then running through Bath to the east of the city.
Orbital MetroBus	Route connecting South Bristol to Emersons Green via Ring Road, serving new development at Whitchurch and new Park & Ride sites at Whitchurch, Hicks Gate and Warmley.

Mass Transit

On some corridors in the Bristol urban area there will be a limit to which the bus system can accommodate more demand, and new transit options will be needed to meet growing travel demand. On major corridors, rail-based mass transit should be considered to accommodate future demand (through higher operational capacity than bus-based options) and to provide the quality of service to maximise mode shift from car-based trips. The priority focus will be the corridors to Bristol Airport, North Fringe, East Fringe and towards the Hicks Gate / Keynsham area. Constraints imposed by the road network mean that underground running will need to be considered in places.

Mass Transit Bristol to Airport	Fully segregated mass transit connecting Bristol Airport and South Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to North Fringe	Fully segregated mass transit connecting Cribbs Causeway and North Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to East Fringe	Fully segregated mass transit connecting East Fringe and East Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to Bath	Initial priority for MetroBus corridor to Bath, with longer-term ambition for light rail between the Hicks Gate / Keynsham area and Bristol city centre, to serve Hicks Gate Park & Ride (and potentially beyond) and Temple Meads.

Interchange and Park & Ride

The public transport networks, in the future, will operate as a more integrated system. Effective interchange between all modes (bus, MetroBus, mass transit and rail) will be essential. Park & Ride facilities will also intercept traffic at the edges of the urban areas to facilitate reallocation of roadspace to active modes and public transport on radial routes.

The Park & Ride sites will help to significantly reduce congestion in the urban areas, freeing road capacity for walking, cycling and public transport. This will be important in supporting the urban living component of the Joint Spatial Plan by freeing roadspace for sustainable travel modes in the urban areas. The performance of Park & Ride sites will be dependent on restricting parking provision in central areas and managing the cost of parking, to ensure that Park & Ride is the more attractive option compared to driving into the central areas. It will also be important to plan Park & Ride so that traffic impacts are adequately managed around each site, and demand is not abstracted from existing bus services.

Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. Includes sites on M32, A370, A38(S), A37, A4(E), A420, A432, A38(N) and A4018.
Park & Ride for Bath	Further expansion and improvement of sites at Newbridge, Lansdown and Odd Down and consideration of options for Park & Ride to serve the east of the city.
Park & Ride for Weston-super-Mare	A new Park & Ride site east of the town centre, potentially located near to the A370 / A371 junction and served by Weston MetroBus services.

Rail

The rail network is playing an increasingly important role for travel in the area and the Vision proposes continued investment beyond the current MetroWest programme. It will be necessary to consider the needs of local and longer-distance rail services in future network planning. Bristol Temple Meads will be a critical transport hub for Bristol, the West of England and the wider region.

New Stations Package	New stations proposed at Constable Road, Ashton Gate, St Annes, Charfield and Saltford, with supporting infrastructure including waiting facilities, real time information, cycle parking, bus stops and car parking.
Service Improvements and Station Upgrades	Target for all stations to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding.

Road Network

The Vision would facilitate substantial mode shift from the car to other modes, but there will still be large numbers of cars on the network given the planned growth in the area. Significant investment will be required to unlock new development, tackle congestion blackspots and re-route traffic onto new transport links to facilitate reallocation of roadspace to sustainable modes in the urban areas.

East of Bath Link	New highway link connecting the A36 (south of Bathampton) to the A363 (near Bathford, south of A4 roundabout) or the A4, to provide a high-quality north-south route connecting the A36 and A46 to the east of Bath, either single or dual carriageway. This route will enable north-south traffic to avoid passing through Bath.
Winterbourne Frampton Cotterell Bypass	New transport corridor to bypass Winterbourne and Frampton Cotterell on the B4058, to improve traffic routing from Yate and to relieve congestion in the villages.
M4 Junction 18A to Ring Road	New motorway junction and road connection to the A4174 Ring Road to improve resilience of the network and unlock economic growth in the East Fringe.
M4 Junction 18A to Yate	A new transport link from the proposed M4 Junction 18A to the A432 near Yate will help unlock economic growth in the town. This is dependent on prior delivery of the new Junction 18A motorway junction with a connection to A4174 Ring Road.
South Bristol Orbital Corridor	New multi-modal transport corridor (highway, MetroBus, cycle route) connecting the A4 at Hicks Gate, A37 south of Whitchurch and A4174 Hengrove Roundabout to improve accessibility to South Bristol and unlock growth in the south of the city.
M5 Junction 21A to A38 Corridor	New multi-modal corridor connecting a new M5 Junction 21A at Weston-super-Mare with the A38, together with major improvements to A38 between Langford and South Bristol, to improve connectivity to Bristol Airport and South Bristol and overall network resilience.
Nailsea Corridor Improvement	Multi-modal corridor improvement (highway, MetroBus, strategic cycling route) between Bristol / A370, Nailsea and connecting to Clevedon / M5. Focus to the east of Nailsea, joining the A370 west of Long Ashton, with a new crossing of the railway line west of Backwell to join the A370. This will help to unlock growth at Nailsea and improve connectivity and travel choices between Nailsea and Bristol.

Smart Motorway: M4 Junction 18 – Junction 19	Smart motorway to accommodate future traffic flows between M4 Junctions 18 and 19 and to facilitate new traffic movements generated by new Junction 18A in South Gloucestershire.
Smart Motorway: M5 Junction 17 – Junction 21A	Smart motorway to accommodate future traffic flows and to facilitate improved management of incidents, to be integrated with new links from M5 Junction 20 and Junction 21A in North Somerset.
M5 Junction 14 Improvements	Capacity improvements at M5 Junction 14 to address existing problems and issues caused by growth in Stroud and the Joint Spatial Plan. Significant improvements are identified to tackle the problems of queueing on the slip roads.
M5 Junction 19 Improvements	Capacity improvements at M5 Junction 19 to address problems of queuing traffic on the M5 southbound slip road (to reduce disruption to traffic on the Avonmouth Bridge) and delays for traffic joining the M5 northbound.
A4 to Avon Mill Lane Link	New highway link from the A4, east of Keynsham, crossing railway to connect to Avon Mill Lane and A4175 north of Keynsham. This will improve traffic routing around the east of the town and will facilitate access to new development north of Keynsham,

Freight

The West of England is a major freight origin as home to Bristol Port and major logistics activity at Avonmouth / Severnside and in servicing the needs of residents and businesses in the area. The Vision strengthens the approach to managing freight into the urban areas, particularly given the importance of tackling air quality problems. This would need to give renewed focus to consolidation of freight, with support for the existing centre at Avonmouth and exploring options to reduce the number of lorries entering Bath.

There is potential for a new rail-based rail freight facility at Avonmouth, which could form part of a multi-modal interchange with good access to both the motorways and long-distance rail networks. At present, loading gauges in the West of England are a constraint to the movement of more rail freight: improved loading gauges have the potential to increase rail freight capacity in the area. There is also the opportunity to transport smaller items from outside the West of England to Bristol Temple Meads, from where they could be transported to destinations in the city centre and beyond using low carbon freight options.

Financial Measures and Other Controls

There is an important role for financial measures to both help to manage travel demand and to generate new sources of funding to help deliver the Transport Vision. The two main options are a Workplace Parking Levy and Road User Charging. Road User Charging is likely to have a more significant beneficial impact in reducing general traffic movements and generating larger amounts of revenue to be reinvested back into funding the Transport Vision.

The availability of parking plays a major role in influencing the choices that people make. Large areas of free parking result in people continuing in habitual use of cars and present a relatively inefficient use of space. On the road network, this results in space being used that could otherwise have been used for active travel, buses or essential loading requirements. On-street parking requirements will need to be considered at the corridor level but there is a strong case for more effective management of the limited space that is available.

4. Strategic Case and Outcomes

Supporting the Transport Goals

The Transport Vision will play a critical role in delivering the goals and objectives that were defined through the study. Table 1 describes these impacts.

Table 1 Impacts of Transport Vision on Transport Goals

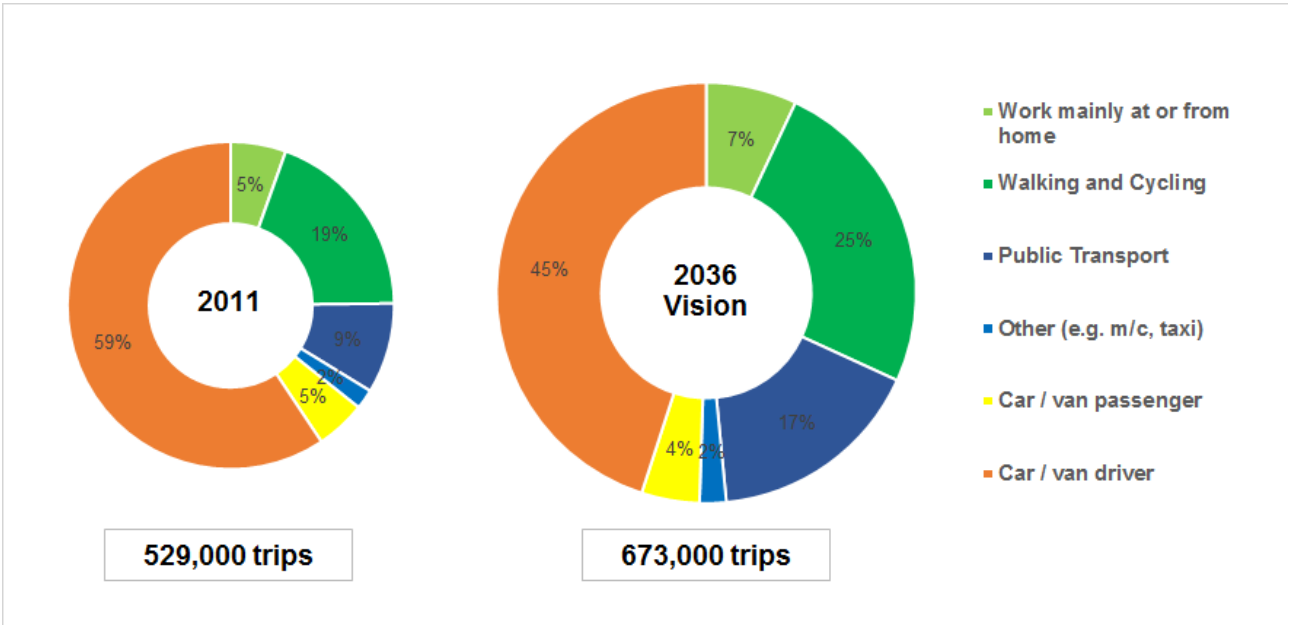
Goals	Impacts of Transport Vision
Support economic growth	The Transport Vision will support growth by significantly improving connectivity to strategic economic assets. Improved access to Bristol Airport will support growth at this major gateway, which will in turn help improve connectivity to international markets and supply chains. Improved access to Bristol Port will maintain its national competitiveness and facilitate efficient movement of goods to and from the rest of the UK. Improved transport capacity and connectivity will enhance the competitiveness of Bristol and Bath city centres, the Enterprise Zones and Enterprise Areas across the West of England.
Reduce carbon emissions	Improved travel choices will encourage mode shift and help manage future car use, contributing to reductions in emissions. Increased levels of active travel will help to reduce car use for short urban trips. Improved public transport will reduce the need to travel by car within and into urban areas. Continued investment in Ultra Low Emission Vehicles will play an important complementary role in reducing emissions in the vehicle fleet.
Improve quality of life and a healthy natural environment	Improved facilities for active travel, improved connectivity by public transport, reduced traffic flows and improved public realm will significantly improve quality of life in the urban areas. These will also support the Urban Living component of the Joint Spatial Plan. Effective masterplanning to incorporate a range of travel choices will enhance quality of life in other parts of the West of England with development in the Joint Spatial Plan. Measures will be taken to mitigate the impacts of new transport infrastructure on the rural environment, including application of appropriate design standards and landscaping.
Contribute to better safety, health and security	Investment in strategic cycle routes will facilitate more active travel, promoting more exercise and healthier lifestyles. Reductions in traffic flows and better management of traffic will help to reduce the effects of severance, reduce road safety problems and tackle poor air quality and its health impacts. More people travelling by public transport and improved waiting facilities will improve people's perceptions of security in using the transport system.
Promote accessibility	Investment in strategic cycle routes will improve active travel connections for short urban trips. Continued investment in the bus network will help to expand the reach of commercially viable bus services, improving connectivity to employment destinations, shops and social facilities. Measures to reduce traffic will help tackle severance and facilitate movement within local communities.

Impacts on travel behaviour

The West of England will experience significant growth in the next two decades. This will result in significant increases in the volume of future travel. There are also changes taking place in the ways that people travel, with strong growth in the numbers of people cycling and travelling by bus and rail for everyday journeys. The evidence also indicates that new technologies could reduce the need to travel, including faster, more reliable broadband enabling more people to work from home. The gradual adoption of Connected and Autonomous Vehicles could also mean that, in the future, people could summon driverless cars, with fewer people owning their own vehicles.

It is estimated that there will be a 28% rise in people trips by all modes in the West of England, due to the increased numbers of people living and working in the area and reflecting delivery of the Emerging Spatial Strategy. Figure 4 shows the forecast differences in commuting by West of England residents between 2011 and 2036. Two charts are shown: the first shows the shares of commuting trips in 2011 and the second shows the estimated shares of commuting trips with the Transport Vision in 2036.

Figure 4 Current and Future Commuting in the West of England



The major investments in active travel and public transport are forecast to result in a significant reduction in mode split by car. In addition, measures such as Workplace Parking Levies and/or Road User Charging could have a further impact on the demand for travel by car, and would further complement and help lock-in the benefits of the measures proposed in the Transport Vision. A demand management scheme would also raise revenue that could be used to help fund major transport schemes in the Transport Vision.

Transport modelling forecasts that there will be a large increase in goods traffic (>40%) between 2013 and 2036 in the Do Minimum scenario. This reflects growth in the economy and increased consumption of goods. Increased internet home shopping and home deliveries will be a key factor in driving this growth. It will be challenging to manage this impact, because much of this goods traffic will be to destinations across the West of England. Measures including Freight Consolidation and including use of rail for distribution could significantly reduce the need for goods vehicles to enter the city centre. Demand management tools, including Road User Charging, should also be considered to help encourage mode shift.

Impacts on network performance

If no action is taken, the transport modelling indicates a 26% forecast increase in trips on the road network between 2013 and 2036. This is estimated to result in an increase in average delay per vehicle of almost 40% in the Do Minimum scenario. Traffic delays will increase much more significantly at major hotspots, including Bristol city centre, Bath, Weston-super-Mare, the North and East Fringes and South Bristol. This will act as a significant barrier to growth – both new jobs and new housing – in these areas.

With the Transport Vision in place, it will be possible to significantly reduce traffic delays, but the impact will be dependent on several factors. It will require high levels of mode shift in the urban areas, enabling reductions in flow on the urban network. It will also require significant improvements to the road network, to re-route orbital traffic out of the road network in South Bristol, enhance connectivity to the East Fringe from the M4 and improve connections between North Somerset and Bristol. It will also require careful consideration of options for the future management of roadspace in the urban areas.

The analyses demonstrate that the Transport Vision has the potential to significantly improve the performance of the transport network in the West of England, compared to the scenario without the JTS Vision. It is estimated that the time spent queuing in 2036 would increase by around 4% from the 2013 base year, compared to 40% in the Do Minimum scenario. The analyses should be treated with caution because the performance of the network will depend on routing options of the mass transit system, but these show that the Transport Vision has the potential to significantly reduce congestion in the West of England.

The introduction of demand management measures would be expected to have a further significant impact on congestion by targeting trips in the most congested parts of the network, over and above the benefits that would be achieved in the Transport Vision without demand management being in place.

Summary of Impacts of the Transport Vision

The Transport Vision will play a critical role in tackling the current and future transport challenges in the West of England and in helping to ensure that future growth will be sustainable. The Transport Vision has identified challenging but achievable targets for changing travel behaviour, with a large increase in active travel and use of public transport, which will help to control growth in the volume of traffic on the road network. The implementation of demand management measures, for example Road User Charging, would help encourage further mode shift and manage traffic volumes. The measures in the Transport Vision are forecast to result in significant benefits to transport users and improve resilience in the transport system.

These changes in travel behaviour and improved connectivity will have significant wider benefits for the economic, social and environmental future of the West of England. Poor connectivity has been cited by many stakeholders as a barrier to the competitiveness of the city region. The major improvements in connectivity in the Transport Vision will improve travel choices for commuting, reduce business costs and enhance business productivity, which will significantly enhance the competitiveness of the city region, attract new jobs and unlock the delivery of new housing.

The Transport Vision will help to deal with some of the most critical social challenges facing the sub-region, including lack of physical activity and health problems caused by poor air quality. The strong focus on active travel, including reallocation of roadspace to support walking and cycling, will play a key role in enabling people to incorporate physical activity into their daily lives. Providing better travel choices and controlling the volumes of traffic entering urban areas will be critical in helping to improve air quality.

The Transport Vision will directly address the critical challenge of delivering deep reductions in CO_2 emissions, through a combination of large-scale mode shift and supporting the uptake of Ultra Low Emission Vehicles (ULEVs). The analyses demonstrate that more will need to be done, at the national level, to ensure a sustained uptake of ULEVs over the next 20 years if ambitious targets are to be met. The analyses also demonstrate that there is a potential role for Road User Charging in encouraging mode shift and reducing vehicle trips, particularly in the most congested areas, in helping to meet ambitious CO_2 reduction targets.

5. Delivering the Transport Vision

This Transport Vision is intentionally ambitious. It will require an unprecedented level of funding, with a large acceleration of spending from current levels.

The total capital cost of the Transport Vision is estimated to be upwards of £8.9 billion in future outturn prices. The breakdown of costs is shown in Table 2 below.

Table 2 Estimated Costs of Components of Transport Vision

Component of Vision	Estimated Outturn Cost
Behaviour Change	£0.65 billion
Strategic Cycle Routes	£0.4 billion
Bus Network	£0.35 billion
MetroBus	£0.63 billion
Mass Transit	£2.6 billion +
Park & Ride	£0.2 billion
Rail	£1.0 billion
Road Network	£3.1 billion
Total	**£8.9 billion +**

The proposals described in this report will be subject to further study and development work after completion of the Joint Transport Study. The components of the Transport Vision will require significant further work to develop business cases and, if they have a clear case, further consultation and statutory planning processes. There are also significant engineering challenges: in the future management of roadspace and in the delivery of a mass transit system. Finally, there will be very significant challenges in building these schemes. In order to minimise disruption, it will be critical to carefully plan the delivery programme to minimise delays to users of the transport network.

This technical study has established that there is a transport case for considering these proposals, but further work will be required to establish detailed forecasts of demand, benefits, costs, business case and sources of funding. The delivery of schemes will be subject to the availability of funding and, in most cases, completion of statutory processes.

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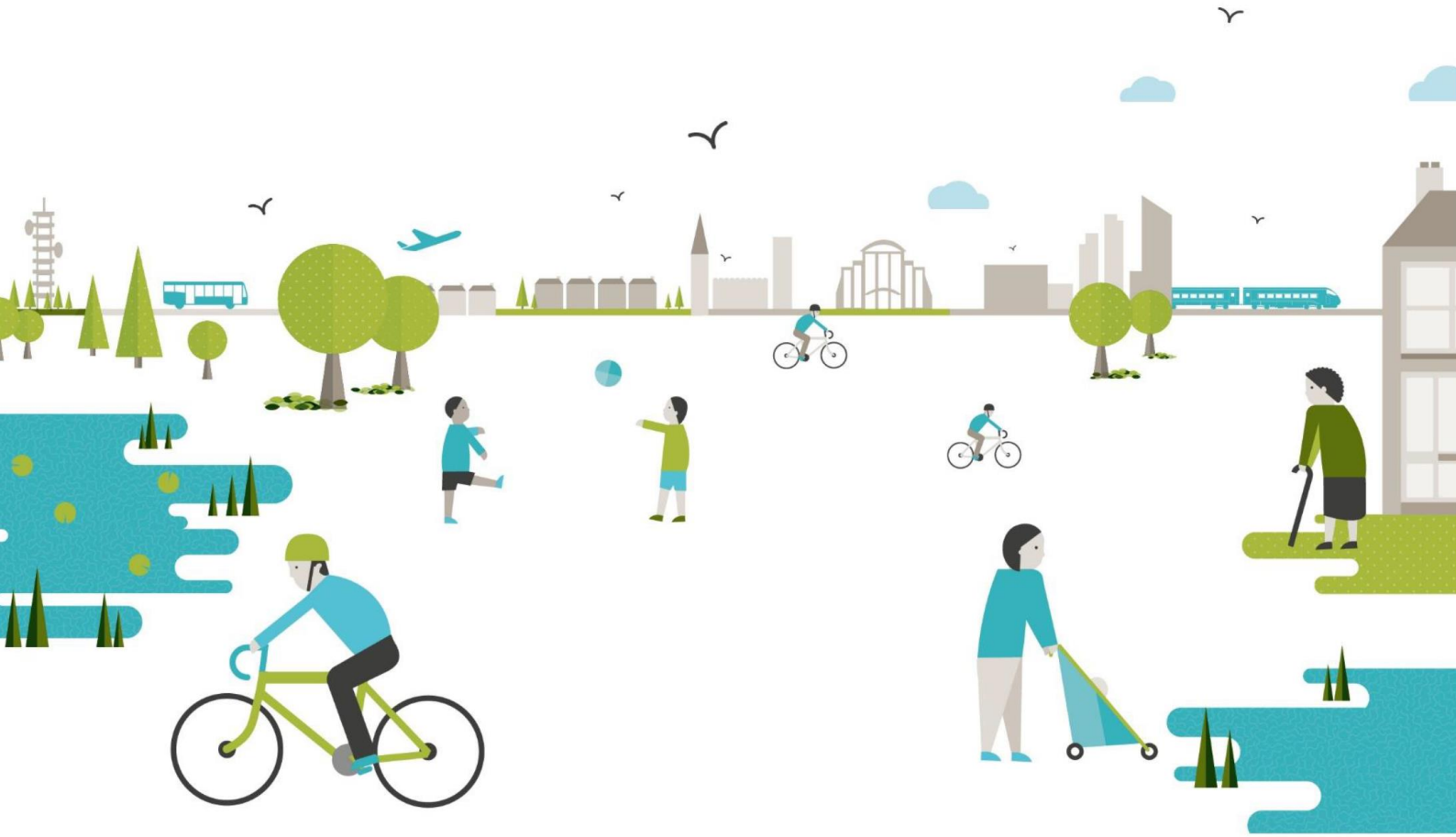
WEST OF ENGLAND
BUILDING OUR FUTURE

West of England Joint Transport Study

Final Report

October 2017



Bath & North East Somerset Council

Bristol City Council

North Somerset Council

South Gloucestershire Council

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1. Introduction

1.1. Role of the Joint Transport Study

This is the Final Report of the West of England Joint Transport Study. It is a technical report that has drawn on extensive evidence and stakeholder engagement to develop a long-term Transport Vision for the West of England, which includes Bristol, Bath & North East Somerset, North Somerset and South Gloucestershire. A separate Executive Summary provides a non-technical summary of the findings of the study.

The purpose of the Joint Transport Study was to provide a clear direction for the long-term development of the transport system in the West of England to 2036 and beyond. The study was required to address the combined impact of current challenges on the network, growth from committed development in Local Plans and longer-term growth up to 2036.

A Joint Spatial Plan is being developed in parallel with the Joint Transport Study. The Joint Spatial Plan has considered options for delivering new housing and employment to meet future needs to 2036. Work on the Joint Spatial Plan is ongoing, with consultation on the Draft Plan scheduled from Autumn 2017 and an Examination in Public anticipated to take place in 2018.

Transport evidence from the Joint Transport Study was used to inform the assessment of potential locations for housing and employment growth. The proposed growth strategy within the Joint Spatial Plan was then used in forecasts of future travel demand and to shape the development of the long-term Transport Vision.

West of England Transport Vision

The technical work in the Joint Transport Study was used to develop the Transport Vision for the West of England. The Transport Vision includes all modes of travel and comprises a programme of complementary schemes that are designed to achieve a significant mode shift from the car and ensure a more efficient, resilient transport network. The Transport Vision is designed to address existing transport problems and respond to the challenges associated with the high levels of forecast growth in the West of England.

The Transport Vision would support a transformation in travel behaviour in the West of England, including more than doubling the trips made by cycling and public transport, resulting in a significant reduction in the mode split for journeys by car. The Transport Vision sets a target for no overall increase in the number of trips by car across the sub-region set against the backdrop of delivering 105,000 new homes. This Vision is required to unlock the delivery of new homes and jobs, improve economic performance and competitiveness, tackle health and inequality challenges and support the delivery of ambitious CO_2 reduction targets.

The principles of the Transport Vision can be summarised in the following mission statement.

Mission Statement for the Transport Vision

Transport in the West of England will be transformed over the next 20 years through a programme of complementary measures designed to address underlying challenges and to enable the sustainable delivery of new housing and employment growth.

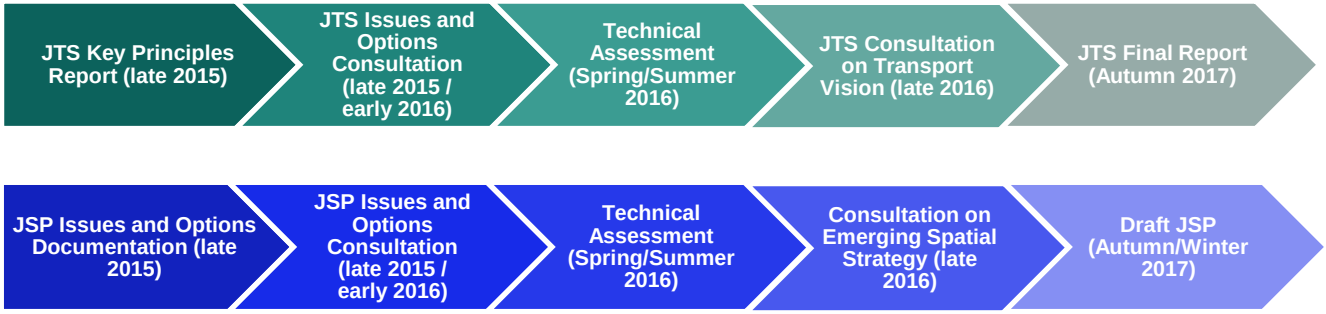
It is intended that the outputs from the Joint Transport Study, including the Transport Vision, will assist the authorities in developing the next Joint Local Transport Plan and transport investment programme.

1.2. Process

The Joint Transport Study was undertaken by Atkins on behalf of the West of England authorities and Highways England. It took an objective-led approach, focusing on the future economic, social and environmental needs of the region. The study took a structured approach to analysis of evidence, description of the transport challenges and identification of goals and objectives. Options were then identified, assessed and shortlisted to develop a potential programme of investments in the West of England transport system.

This was undertaken in parallel with the Joint Spatial Plan. Technical work between the two workstreams was aligned and consultation took place on the two workstreams at the same time. Figure 1-1 shows the timelines for key phases of the Joint Transport Study and work to date on the Joint Spatial Plan.

Figure 1-1 Timelines for Joint Transport Study and Joint Spatial Plan



The process included consultation with stakeholders and the public. People were invited to give their views on the key challenges, objectives and initial ideas for options in late 2015 and early 2016. This feedback was used to enhance understanding of the critical issues, to inform identification and assessment of options and development of the Transport Vision during 2016. People were then asked to give their feedback on the Transport Vision in late 2016; this feedback was used to help inform this Final Report.

The proposals described in this report will be subject to further study and development work after completion of the Joint Transport Study. This technical study has established that there is a transport case for considering these proposals, but further work will be required to establish detailed forecasts of demand, benefits, costs, business case and sources of funding. The delivery of schemes will be subject to the availability of funding and, in most cases, completion of statutory processes.

Future-proofing the Transport Vision

The transport sector is experiencing unprecedented change. New technologies are changing the ways that people access transport services, including instantly available information on travel options via smartphones, the arrival of new mobility providers (such as *Uber*) and app-based bike hire schemes. Widespread innovations are influencing how people choose to travel and these will impact on future mobility choices. The West of England is pioneering research into connected and autonomous vehicles (CAVs) and many industry commentators have highlighted that, in future, many people could eventually move from owning cars to summoning autonomous vehicles for their journeys.

These changes, in which there is an evolution from owning vehicles to accessing different options, are collectively called 'Mobility as a Service'[1] and could mean fundamental changes in the ways that people travel in the future. At this point in time, given the early stage of these technologies, it is difficult to predict these impacts. The progressive move to mobility as a service could mean that more people are able to choose walking, cycling and public transport. It could also mean that fewer people ***own*** cars but more people are able to ***access*** cars for journeys, potentially increasing the number of vehicles on the road.

Despite these uncertainties, there is likely to be more travel, which will place increased pressures on the transport system. The transition to new forms of mobility will itself present more challenges, for example the gradual entry onto the road network of CAVs could cause increased congestion in the medium term due to the technology seeking to minimise collision risks. Failure to act in the meantime is likely to cause major problems on the transport network and it is therefore critical to proactively plan for the future.

This means that effective travel choices will need to be in place, including public transport services to connect people to their destinations and infrastructure to facilitate direct, reliable and safe journeys. The Joint Transport Study has considered the challenges facing the transport system in the West of England, now and in the future, and identified a potential investment programme to tackle these challenges.

[1] 'Mobility as a Service' can be described as a shift away from ownership of personal forms of transport (e.g. cars) towards mobility solutions that are consumed as a service.

1.3. Structure of this Report

The remainder of this report is structured as follows:

Chapter 2 describes the current economic conditions and the factors driving growth in the West of England. It describes current planned growth and the emerging proposals in the Joint Spatial Plan, which will be significant factors in influencing future travel demand in the area.

Chapter 3 sets out the issues that have been important in shaping the Transport Vision. It first describes the transport challenges – both direct issues on the transport network and the implications for the economic, environmental and social wellbeing of the area. It then explains how this evidence has been used to inform the development of goals for the study and in considering potential options.

Chapter 4 describes the Transport Vision. It provides an overview of the Transport Vision and then describes the components by mode: smarter choices, active travel, public transport, the road network and freight. The report moves on to provide more detail at different geographic detail in the next chapters: international gateways, national and regional connections, and different parts of the West of England.

Chapters 5 to 9 describe the components of the Transport Vision relating to different parts of the West of England. The area has been presented as four geographic quadrants with interrelated issues and integrated solutions: south west, south east, north east and north west. Bristol is then considered in a specific chapter because the city is at the heart of the network.

Chapter 10 explains the role of the two international gateways – Bristol Port and Bristol Airport – and the issues faced with surface access on the road and rail networks. The chapter then explains the proposals in the Transport Vision relating to the Port and Airport.

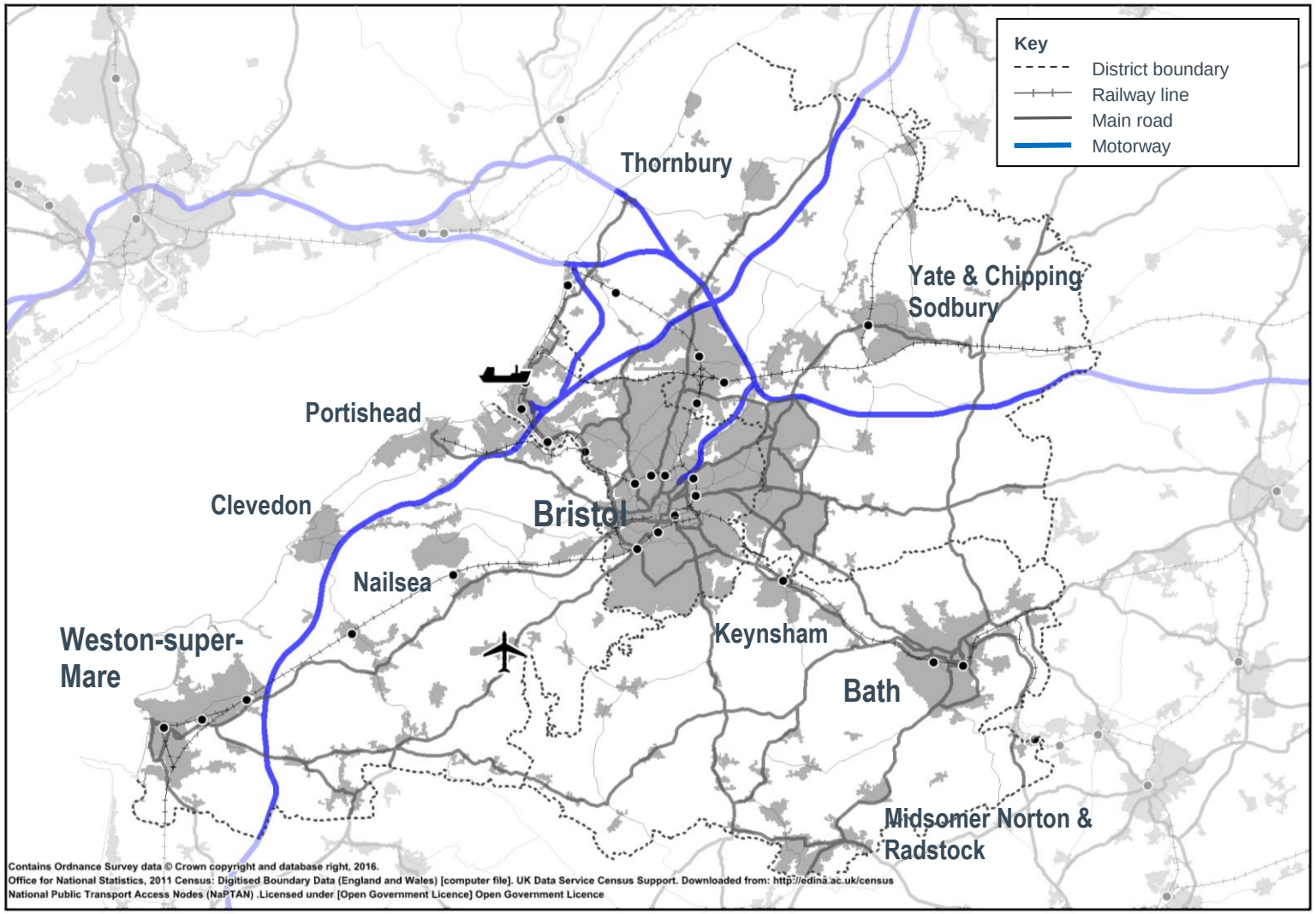
Chapter 11 explains the role of the national and regional networks – both rail and the strategic road network. It describes the current connectivity and capacity challenges, long-term constraints caused by the networks and proposals in the Transport Vision.

Chapter 12 describes the Strategic Case and outcomes of the Transport Vision. It explains how it addresses the challenges and supports the goals, and provides evidence on how it would deliver changes in travel behaviour and improved connectivity.

Chapter 13 sets out the issues in delivering the Transport Vision. It sets out the costs of delivering each component of the Vision, and considers potential funding sources and mechanisms for delivering the Vision.

Appendix A contains the assessment of the major schemes included in the Transport Vision.

Figure 1-2 The West of England



2. A Growing City Region

2.1. Introduction

The West of England has a well-defined transport strategy and policies within the current Joint Local Transport Plan (2011-2026)[2], which sets out the current 15-year Transport Vision. This has delivered significant investment during the last five years, including investment in improved cycling facilities in Bristol and multi-modal packages in Bath and Weston-super-Mare. The MetroBus programme is currently being delivered with completion expected in 2017/18. A high priority has been given to investment in the rail network, with MetroWest proposed to introduce new and improved rail services across the area by the early 2020s.

However, the West of England faces serious transport challenges and these will become more acute with the anticipated scale of growth in the area. The forecast numbers of people living and working in the area will increase demands on the transport system, which will have significant economic, social and environmental impacts. It is therefore essential to develop a new strategy and investment programme to enable the area to respond to these challenges.

This chapter explains the issues associated with growth in the area:

- **Section 2.2** provides an overview of the existing economic conditions of the area, including economic strengths and issues that are constraining the competitiveness of the area.
- **Section 2.3** sets out the assumptions about current planned growth to the late 2020s, which reflects the area's strong economic growth potential.
- **Section 2.4** describes the current proposals in the Draft Joint Spatial Plan[3], which will set the direction for growth into the mid-2030s and beyond.
- **Section 2.5** highlights the strong economic interactions between the West of England and the wider region, which includes Gloucestershire, Swindon, Wiltshire, Somerset and South Wales, which means that there is a need for effective cross-boundary planning.

This chapter focuses on describing the issues associated with growth, and potential implications for transport. Detailed evidence on the transport issues is provided in Chapter 3.

2.2. Existing Conditions

The West of England is a dynamic city region, with a population of more than 1 million people, over 43,000 businesses and an economy worth over £31 billion a year. It is a highly productive economy, with GVA per capita higher than the national average. The city region is one of the few areas of the UK that is a net contributor to the Treasury. The area is home to world-leading businesses, a growing visitor economy and a rising population attracted by the high quality of life on offer. For example, Bristol is regularly cited as one of the best places to live in the UK, Bath is the only destination in the UK to have the whole city designated as a World Heritage Site by UNESCO and Weston-super-Mare is the gateway to the coast of the South West.

Recent economic growth has been driven by a diverse sectoral base with strengths in aerospace, creative and environmental industries, IT and microelectronics, finance and tourism. A high proportion of local employment is, therefore, in high-value knowledge intensive industries. The area is also home to four universities producing cutting-edge research. Economic growth over the last decade has been driven by these sector strengths and the availability of high quality business space with good access to the transport networks, particularly in the North Fringe area close to the M4 and M5. There has also been rapid growth recently seen in Bristol city centre as businesses are attracted by the large skilled workforce, dynamic local business community and availability of appropriate workspaces.

[2] West of England Joint Local Transport Plan 2011-2026, March 2011, https://travelwest.info/projects/joint-local-transport-plan
[3] The Joint Spatial Plan is currently under development and has not yet been adopted, refer to Section 2.4.

The West of England Local Enterprise Partnership has developed a Strategic Economic Plan[4] that draws on these sectoral and locational strengths, with strong ambitions for growth. Temple Quarter is one of the UK's strongest performing Enterprise Zones, and new Enterprise Zones were designated in Bath Riverside and the Somer Valley in 2017. Enterprise Areas have also been allocated at Weston-super-Mare, Filton, Emersons Green and Avonmouth / Severnside. South Bristol is also a priority for urban regeneration.

Issues for the Joint Transport Study

Whilst the area has a strong economy, there are major challenges with significant implications for the transport system. There are high levels of inequality, where individuals and communities have not benefited from the wider prosperity of the area, and the high costs of living in the West of England further exacerbate the social divide. Transport is cited by many people as one of the most critical challenges facing the area, with relatively limited travel choices resulting in high car use and congestion.

There are significant environmental problems, including poor public realm in some areas, as well as severance and noise caused by motorised traffic. Poor air quality, caused by traffic, is a major challenge, causing ill health and premature deaths. The growing economy has meant an increase in the volume of travel, resulting in congestion, delays and accessibility challenges. There is a risk that these problems could reduce the productivity and competitiveness of the region and constrain future growth.

The Joint Transport Study has analysed the existing challenges on the transport network; addressing these challenges has been a priority in the study. These are considered in detail in Chapter 3.

2.3. Current Planned Growth

The growth potential of the West of England is reflected in the high levels of housing and employment growth that is already identified in the local authorities' existing Local Plans ([5] [6] [7] [8]). Table 2-1 summarises these commitments for each authority. These are being reviewed through the Draft Joint Spatial Plan and Local Plan reviews.

Table 2-1 Proposed Development in Core Strategies

Area	Homes	Employment
Bath & North East Somerset (2011-2029)	**12,960**	**10,300 jobs**
Bath	7,020	6,950 jobs
Keynsham	2,150	1,600 jobs
Somer Valley	2,470	900 jobs
Rural areas and Whitchurch	1,120 rural areas, 200 Whitchurch	700 jobs
Bristol (2006-2026)	**30,600 (min 26,400)**	**21,900 jobs**
City centre	7,400	150,000 m^2 office in city centre, 10 ha industry + 60,000 m^2 office in S. Bristol, 26,000 m^2 office in centres across the city
South Bristol	8,000	
Inner East	2,000	
Northern Arc	3,000	
Rest of city	6,000	
Smaller sites	4,200	
North Somerset (2006-2026)	**20,985**	**10,100 jobs**
Weston urban area	6,300	Employment focus is town centre regeneration in Weston and mixed use employment in Weston Villages
Weston Villages	6,500	
Clevedon, Nailsea and Portishead	5,100	
Service Villages	2,100	
Rural Areas	985	

[4] West of England Strategic Economic Plan 2015-2030, March 2014, http://www.westofenglandlep.co.uk/about-us/strategicplan
[5] Bath & North East Somerset Core Strategy, Adopted July 2014
[6] Bristol Core Strategy, Adopted June 2011
[7] North Somerset Core Strategy, Adopted January 2017
[8] South Gloucestershire Core Strategy, Adopted December 2013

Area	Homes	Employment
South Gloucestershire (2013-2027)	**22,545**	
Existing Local Plan allocations	7,060	Focus on Enterprise Areas in Filton and Science Park in the East Fringe
Cribbs Patchway New Neighbourhood	5,700	
East of Harry Stoke New Neighbourhood	2,000	
North Yate New Neighbourhood	2,700	
Thornbury	800	
Other areas and small windfall sites	965 other areas, 2,100 windfall	

The Local Plans have all been subject to Examinations in Public and have been adopted by the local authorities. The growth proposals in the Local Plans should therefore be treated as committed.

Issues for the Joint Transport Study

Current planned development in the area is directed towards existing towns and cities, which will help to support the needs of the economy and respond to housing needs. The most significant areas for growth will include Bristol City Centre, South Bristol, North Fringe, Bath and Weston-super-Mare. This will help to bring jobs and housing closer together but will increase the amount of travel in these areas. Without action to improve travel choices, this will result in increased motorised traffic, congestion and continued problems of poor air quality. The Local Plans include transport programmes to help mitigate the impacts of this growth but some of the programmes are not funded and it is necessary to restate the case for investment to tackle these impacts.

The Joint Transport Study has analysed the impacts of this planned growth on the performance of the transport network and has identified measures to tackle the effects of this growth.

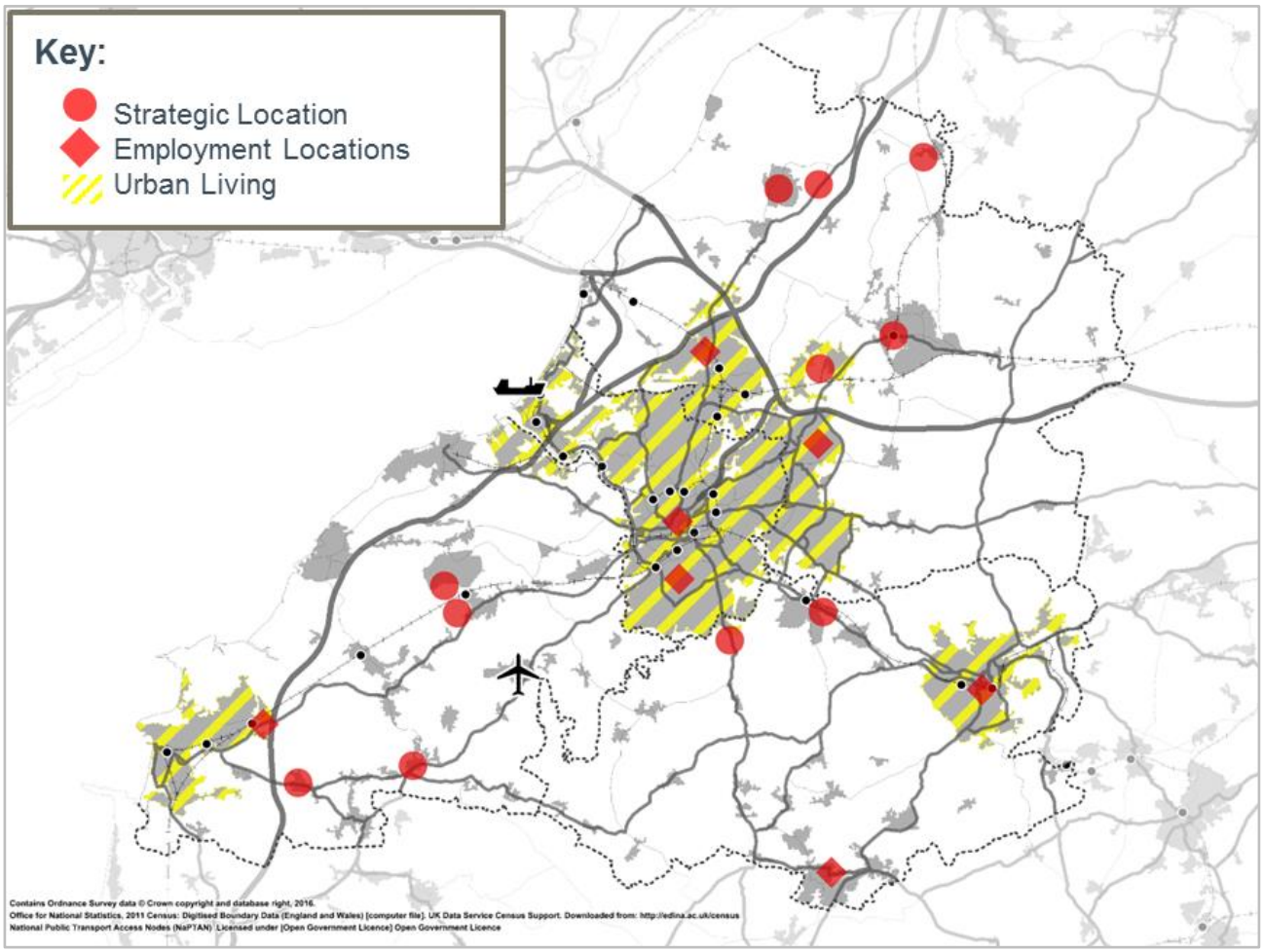
2.4. Longer Term Growth

The Joint Spatial Plan is intended to meet the needs arising from both the Bristol and Bath Housing Market Areas to 2036, and the Plan will provide a framework to deliver up to 105,000 net additional new homes between 2016 and 2036, including the committed growth within the four Core Strategies as set out in Table 2-1 above. The four authorities' existing Core Strategies currently make provision for around 66,800 dwellings. This means that there is a requirement for up to 39,000 additional dwellings (to 2036) that need to be accommodated in the JSP spatial strategy.

Overall, the requirement for 105,000 dwellings is equivalent to an increase of more than 20% on current housing provision and represents major growth in the sub-region. This will pose significant challenges in terms of ensuring that the locations for new development maximise opportunities for walking, cycling and public transport. There will also be significant challenges in ensuring the deliverability of new infrastructure (including transport) to support the requirements of this new housing.

Figure 2-1 presents the locations of proposed growth in the Joint Spatial Plan.

Figure 2-1 Proposed Development Locations in Joint Spatial Plan (2026-2036) [9]



The Joint Spatial Plan has a strong focus on delivering new development within existing urban areas. It has identified the capacity for development within the urban areas, including making best use of brownfield land, which is termed 'urban living'. It is currently assumed that 14,600 dwellings could be delivered through the urban living component. This would comprise 12,000 in Bristol, 1,300 in the Bristol Urban Fringe (North and East), 1,000 in Weston-super-Mare and 300 dwellings in Bath.

The Plan has also identified a series of strategic locations for growth outside the Bristol, Bath and Weston urban areas. In South Gloucestershire, the Plan identifies development at settlements to the north of the M4 at Yate, Coalpit Heath, Charfield, Thornbury and the Buckover Garden Village to the east of Thornbury. In North Somerset, development would be focused on the A38/A368 corridor (Banwell and Churchill) and A370 corridor (Nailsea and Backwell). In Bath & North East Somerset, development would be focused to the south east of Bristol at Whitchurch and Keynsham.

The Joint Spatial Plan is still under preparation. Consultation on the proposed locations described above took place during late 2016 and the authorities have reviewed public feedback on the proposals in the development of the Draft Plan, which will be subject to consultation from Autumn/Winter 2017. The Plan will then be finalised and subject to an Examination in Public in 2018. The development proposals therefore have a lower level of certainty than the current Local Plans, but nevertheless represent one potential development vision for the sub-region to the mid-2030s and beyond.

[9] Source: Atkins representation of potential Strategic Development Locations in Joint Spatial Plan

Issues for the Joint Transport Study

Development in the locations in the Joint Spatial Plan will have implications for the transport system in the West of England. There will be growth in travel demand in the Bristol urban area[10], with relatively short distances between homes, workplaces and services. This will increase the potential for more journeys to be made by walking, cycling and public transport and help contain growth in demand for further travel by cars.

There will be increased demand for travel from the new communities in Bath & North East Somerset, North Somerset and South Gloucestershire towards Bristol, Bath and the North Fringe, with the distribution of trips depending on the location of development. In some cases, it will be more challenging to accommodate these movements by walking, cycling and public transport.

The Joint Transport Study has analysed the effects of this growth on the future performance of the transport network and has developed a package of measures to mitigate the impacts of this growth. These have been integrated into the Transport Vision for the transport system in the sub-region[11].

2.5. Growth in Adjacent Areas

The West of England does not stand in isolation. The area has strong connections with Gloucestershire, Swindon and Wiltshire, Somerset and South Wales. Research[12] has demonstrated that the West of England forms part of an economic area within the wider South West region, comprising Bristol, Gloucester, Cheltenham and Swindon, extending across Wiltshire and northern Somerset. There are also strong economic linkages along the M5 corridor between Bristol and Exeter, and along the M4 into South Wales.

There are significant commuting flows from Sedgemoor and Mendip into North Somerset and Bristol, Mendip and western Wiltshire into Bath, and Stroud and Cotswold Districts into the North Fringe and Bristol. There is also evidence of increased commuting from South Wales (particularly Monmouthshire) into the North Fringe and Bristol, taking account of the relative ease of crossing the Severn. The planned removal of the tolls on the Severn Crossings from the end of 2018 is also likely to encourage increased commuting from Monmouthshire to the North Fringe and Bristol[13].

There are business linkages between the West of England and adjacent areas, driven by key sectors including nuclear, energy, aerospace, digital, food and the visitor economy.

Gloucestershire has growth potential in the nuclear and renewable energy, aerospace and high value manufacturing. The growth of the nuclear sector is being driven by development at Hinkley Point C (in Somerset) and future development at Oldbury (in South Gloucestershire), which has been supported by the opening of a Skills Centre at Berkeley near Stroud. There is also a cluster of aerospace and precision equipment activity around Gloucester, and the visitor economy plays a central role to the economy of the Cotswolds. The main spatial focus for growth is around Gloucester and Cheltenham, but also within the Stroud area.

Swindon and Wiltshire are home to businesses in health and life sciences, pharmaceuticals, telecoms, digital and high-value manufacturing. There is strong representation of the military sector, including in Corsham, where the public and private sectors have invested heavily in secure data storage, and the town is home to a growing number of digital industries. The visitor economy is again important, particularly around Stonehenge and Salisbury. There is a spatial focus on the M4 corridor, A350 north-south corridor and A303/Salisbury corridor, with strong growth potential in Corsham and Chippenham, adjacent to Bath & North East Somerset.

Somerset also has growth potential in the nuclear and aerospace sectors. The economy will be impacted by the construction of Hinkley Point C, which will require skilled engineers and construction workers, and

[10] The Bristol urban area includes the city, North Fringe (including Filton, Bradley Stoke and Patchway) and East Fringe (including Kingswood, Oldland Common, Mangotsfield and Downend).
[11] The final Joint Spatial Plan could differ from the assumptions taken at the time of completing the Joint Transport Study: the proposals emerging from the Joint Transport Study would therefore need to be reviewed.
[12] Functional Economic Market Areas and Economic Linkages in the South West, SQW, July 2010, http://www.sqw.co.uk/files/5813/8712/7397/39.pdf
[13] In July 2017 the Government made a commitment to remove the Severn Tolls by the end of 2018. This is expected to result in increased traffic on the M4 and M5 on the West of England side of the Severn estuary.

partners are working together in the southern hub of the National College for Nuclear. There is also an aerospace and advanced manufacturing cluster around Yeovil, forming part of the wider cluster covering Gloucestershire, the West of England and Dorset. There are also strengths in tourism and the local food and drink sector. The spatial focus for growth is in Yeovil, Taunton and Bridgwater, which interact with North Somerset.

The West of England a strong economic relationship with **South Wales**. Newport, Cardiff and Bristol play complementary roles in one of the UK's most important economic clusters. The Cardiff Capital Region has strong potential for growth: it generates 50% of the total output of the Welsh economy and Cardiff is forecast to have the highest population growth rate of any city in the UK[14]. There are clusters in financial services, creative and digital, advanced manufacturing, life sciences and energy. Monmouthshire, adjacent to the Severn Estuary, is attracting a growing number of digital businesses and the area has strong food and drink and tourism sectors. These economic interactions are likely to grow with the removal of the Severn Tolls in 2018, with increased commuting and business interaction between the two areas.

Issues for the Joint Transport Study

The ambitions for growth of the areas adjacent to the West of England will have implications for the future transport system. Effective road and rail connections will be required across the Severn, to support the needs of South Wales and future interactions with the West of England. Good connections will also be required to Gloucester and Cheltenham, Taunton and Bridgwater, and Corsham, Chippenham, Trowbridge and other parts of Wiltshire.

2.6. National economic growth and connectivity

There are also strong connections between the West of England and London and other UK city regions, facilitated by motorway and rail connections. There are strong business, professional and financial services connections with London and professional services connections with Birmingham. In addition, other sectors generate strong linkages with other cities, for example connections between the North Fringe and the aerospace and advanced manufacturing cluster in Derby.

The location of the West of England at the intersection of the M4 and M5 and as a major hub on the rail network means that is one of the UK's most important gateways, to both South Wales and the South West peninsula. In addition to the economic interactions with the adjacent areas, the transport networks are critical in providing strategic connectivity from South Wales and the South West to the rest of the UK and to international markets.

The Welsh Government highlighted the impacts of the Severn Tolls on the South Wales economy[15] and the Government has responded with the announcement that the Tolls will be removed before the end of 2018 following the completion of the concession. This will significantly reduce travel costs for commuting, business journeys and freight, and is forecast to unlock economic growth in South Wales. However, it is also forecast to result in a significant increase in traffic using the Severn Crossings. On the Welsh side, there would be increased delays around Newport but will be mitigated by the proposed new M4 corridor south of the city. On the West of England side, there are currently no proposals to mitigate the effects of this extra traffic.

The South West of England faces distinct economic challenges and numerous studies have highlighted a strong relationship between the peripherality of the region and low GVA per capita, low workplace earnings and relatively high deprivation, particularly in the west of the peninsula. This is due mainly to the types of employment in large parts of the region, with a high dependence on tourism, but the long distances from markets also result in challenges in attracting higher-value activities to the region. This effect is exacerbated by slow journeys on the rail network, particularly west of Exeter, and delays on the road network, particularly during the peak summer period.

[14] Cardiff Capital Region City Deal, March 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508268/Cardiff_Capital_Region_City_Deal.pdf

[15] The Impact of the Severn Tolls on the Welsh Economy, Arup for Welsh Government, May 2012, http://www.senedd.assembly.wales/documents/s12952/30.05.12%20-%20Executive%20Summary%20The%20Impact%20of%20the%20Severn%20Tolls%20on%20the%20Welsh%20Economy.pdf

Highways England launched its Strategic Economic Growth Plan in March 2017[16]. This highlights the role of the Strategic Road Network in supporting the economy of the UK, through meeting the business needs of SRN-dependent sectors, enabling access to international gateways and helping to unlock new housing and employment space. The evidence highlights the low GVA and high levels of deprivation in parts of the South West caused by peripherality, but it also forecasts high levels of growth in population, employment and productivity along the M5 corridor. It is therefore important that the SRN operates effectively to facilitate this growth in the South West peninsula.

The rail network is also critical to the economy of the wider South West region. The Peninsula Rail Task Force launched its report[17] in November 2016, which highlighted the importance of rail to businesses, within the region and to airports, London and the Midlands and North. It also demonstrated the problems caused by poor resilience (particularly west of Exeter) and long journey times to the rest of the UK. It highlights evidence showing that, on average, productivity reduces by 6% for every 100 minutes from London, due to the lack of access to high value clusters and markets. From this, it demonstrates the case for investment to improve the speed and resilience of rail services to unlock growth across the peninsula.

There are, therefore, strong economic linkages between the West of England, adjacent areas and other parts of the UK. It is crucial that effective connectivity is in place to enable these linkages to continue to strengthen to grow the economy of the wider region.

Issues for the Joint Transport Study

The ambitions for growth will drive the need for high quality rail connections to London, Birmingham and Cardiff to enable the West of England to contribute to the UK's network of city regions. Effective road and rail connections will be required across the Severn, to support the needs of South Wales, and from the south, to support the economies of Somerset, Devon and Cornwall.

2.7. Summary

This chapter has demonstrated that the West of England is a growing city region but there are significant challenges in planning for this growth:

- Existing challenges constraining the economic, social and environmental sustainability of the West of England;
- Current planned development in the Local Plans will increase travel demand, which will be primarily focused in areas with the most significant current transport pressures;
- Longer-term growth (to the mid-2030s and beyond) will further increase travel demand, with potential challenges in providing effective travel choices to cater for this growth in demand; and
- Growth across the wider region will result in increased economic interaction with the West of England, for which it will be necessary to consider the implications for the strategic road and rail networks.

The next chapter presents evidence on these challenges and explains how the evidence was used to inform goals and objectives to shape the Transport Vision developed through the Joint Transport Study.

[16] Road to Growth: Our Strategic Economic Growth Plan, Highways England, March 2017, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/600275/m160503_the_road_to_growth_Our_strategic_economic_growth_plan.pdf
[17] Closing the Gap: The South West Peninsula strategic rail blueprint, November 2016, https://peninsularailtaskforce.co.uk/closing-the-gap-the-south-west-peninsula-strategic-rail-blueprint/

3. Shaping the Transport Vision

3.1. Introduction

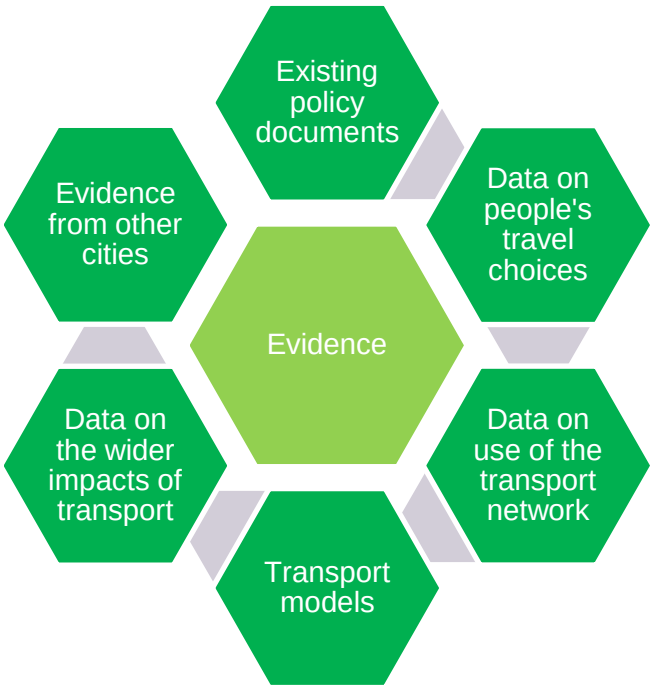
This chapter sets out the evidence that was used in shaping the Transport Vision. It presents the evidence on transport challenges, which was used to inform the development of the goals and objectives for the transport system. This objective-led approach, in turn, informed the identification and assessment of potential options and the development of the Transport Vision.

- **Section 3.2** explains the sources of evidence used in analysing current and future patterns of travel and the wider economic, social and environmental impacts.
- **Section 3.3** explains the stages of consultation with stakeholders and the public and how feedback from consultation fed into the process of developing the Transport Vision.
- **Section 3.4** explains the critical challenges facing the West of England, both direct transport issues and the wider economic, social and environmental impacts.
- **Section 3.5** sets out the goals and objectives that were used in developing the Transport Vision.
- **Section 3.6** sets out the approach to early identification of options and the subsequent approach to assessment, sifting and development of the Vision.

3.2. Evidence

A wide range of evidence was used to help identify the most critical issues and to inform the assessment of options and the Transport Vision.

Figure 3-1 Sources of Evidence



This included:

- Existing policy documents, including the current Joint Local Transport Plan, Strategic Economic Plan and Core Strategies of the local authorities (as discussed in Chapter 2);
- Data relating to people's travel choices, including Census data on travel to work, the National Travel Survey and specific data sources in different areas;
- Data relating to the use of different parts of the transport network, including walking and cycling, bus and rail use, traffic flows and congestion;
- Transport models for the Bristol urban area and wider sub-region, Bath and Weston-super-Mare;

- Data on the wider impacts of traffic and travel, including carbon emissions, noise, air quality and road safety; and
- Evidence from other cities and city regions, including benchmarking best practice in walking, cycling and public transport, with the application of potential lessons learned to the West of England.

Transport models have played an important role in quantifying and understanding current and future travel demands. Three strategic models have been developed by the local authorities:

- G-BATS4 covering the Bristol urban area and wider sub-region;
- G-BATH covering Bath and the adjacent parts of Wiltshire; and
- The Weston model covering Weston-super-Mare.

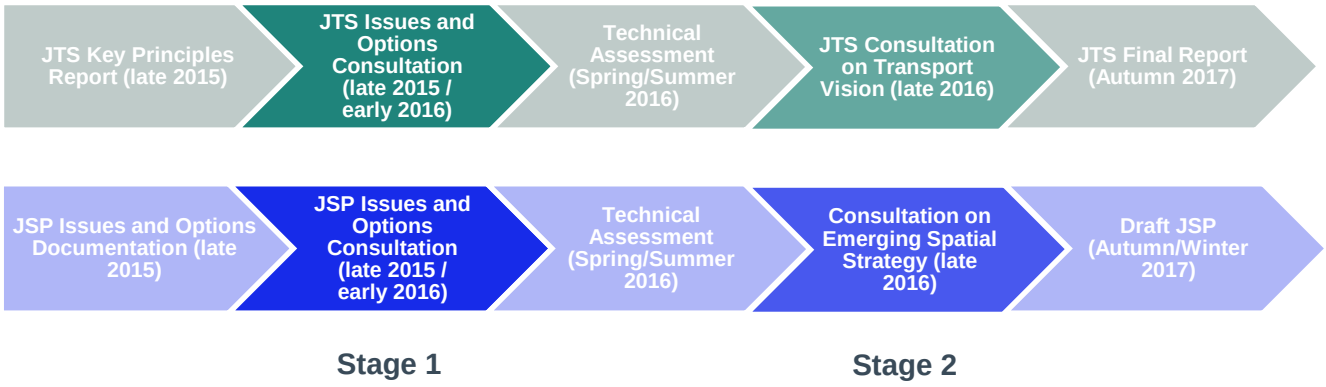
The G-BATS4 model has played the most important role, because it has enabled analysis of issues at the sub-regional level. The G-BATS4 model was developed to assist in the assessment of major schemes, including MetroWest, and has been an important tool in the forecasting of future travel behaviour and sub-regional schemes. It has been used to help inform analysis of the potential for mode shift from the private car and in the analysis of the performance of the transport network. The G-BATH and Weston models were also used to interrogate specific issues in Bath and Weston-super-Mare.

This evidence has helped to ensure that the Transport Vision is based on robust understanding of the critical issues and has informed the analysis of the potential impacts of the Transport Vision. Key items of evidence are in shaded light blue boxes in this chapter.

3.3. Engagement

Engagement with stakeholders and the public played a critical role in the development of the Transport Vision. There were two major stages of engagement, with both taking place in parallel with consultation on major steps in developing the Joint Spatial Plan, as shown in Figure 3-2.

Figure 3-2 Engagement on the Joint Transport Study and Joint Spatial Plan



- **Stage 1: Issues and Options**, which took place in late 2015 and early 2016. This used different engagement channels, including a dedicated website, social media, exhibitions and workshops. Stakeholders and the public were invited to give feedback on the critical challenges, goals and objectives, and initial thoughts about potential options. This feedback is provided later in this chapter.
- **Stage 2: Draft Vision**, which took place at the end of 2016. This again used a wide range of engagement channels, and stakeholders and the public were invited to give feedback on each of the components of the draft Transport Vision. The feedback on the draft Vision is discussed in Chapter 4.

Stage 1 took place at the same time as consultation on the issues and options for the Joint Spatial Plan. This included discussion on the scale of housing need in the area and potential options for strategic development across the area. This process enabled stakeholders and the public to consider the interactions between planning for growth and the future needs of the transport system.

Stage 2 took place at the same time as consultation on an Emerging Spatial Strategy for the Joint Spatial Plan. This presented the case for the Emerging Spatial Strategy, with supporting technical evidence

including proposals for transport mitigation developed by the Joint Transport Study team. This process enabled stakeholders and the public to consider the interactions between the ambitions for growth and the draft Transport Vision for the area.

The two stages of consultation ensured that priorities identified by stakeholders and the public fed through into the process of developing the Transport Vision, and lessons learned are in shaded light green boxes.

3.4. Transport challenges

Major improvements to the transport network have already been delivered in recent years, including the Greater Bristol Bus Network, Bath Package, Weston Package and Local Sustainable Transport Fund (LSTF) programmes. The numbers of people travelling by bus, train and cycling have grown substantially since 2008 and a higher proportion of people walk and cycle than in equivalent city regions such as Birmingham, Leeds and Manchester.

However, travel choices are relatively limited in parts of the West of England area and there are significant challenges in the performance of the transport system, with negative economic, social and environmental consequences. This section sets out the critical challenges on the transport network, in terms of:

- The quality of travel choices that people have available to make their journeys; the quality of travel choices is a root cause in the preference for travel by car for many journeys;
- Congestion on the road network, which impacts on the efficiency and reliability of journeys;
- The costs of congestion to the economy and the barriers to growth caused by a poor-performing transport network;
- Social impacts of deprivation, physical inactivity and poor air quality in urban areas; and
- Environmental impacts of motorised traffic on local communities and carbon emissions.

In each case consideration is first given to the existing conditions and then to the impacts of future growth on the transport system.

Technology and predicting the future

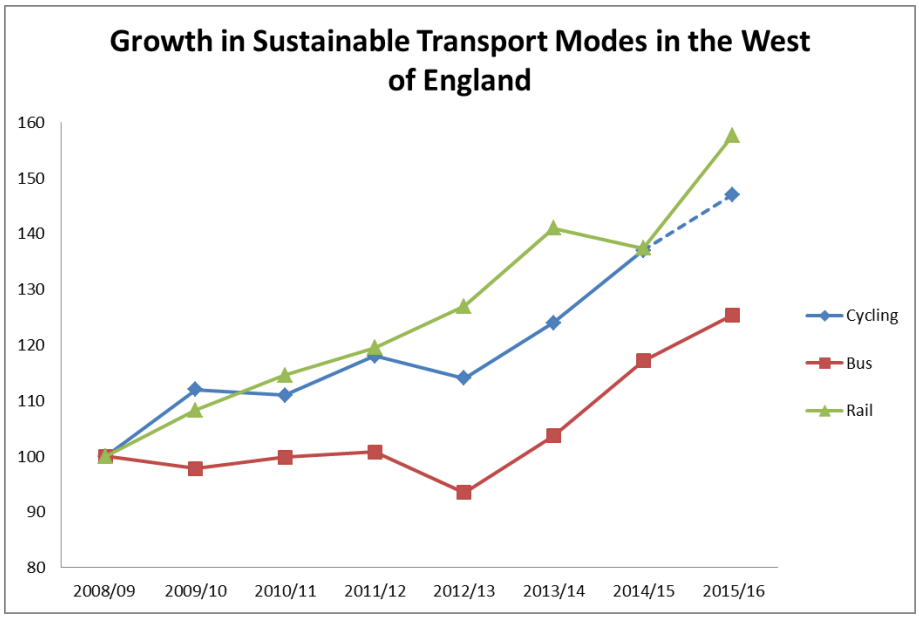
As already highlighted in Chapter 1, the transport sector is experiencing unprecedented change. New technologies are changing the ways that people access transport services, including instantly available information on travel options via smartphones, the arrival of new mobility providers (such as *Uber*) and app-based bike hire schemes. This could mean fundamental changes in the ways that people travel in the future but at present it is difficult to predict these impacts. Despite these uncertainties, there is likely to be more travel, which will place increased pressures on the transport system. Failure to act in the meantime is likely to cause major problems on the transport network and it is therefore critical to proactively plan for the future.

3.4.1. Travel choices

The West of England has made significant progress in improving options for travel by active modes, bus and rail, with substantial growth in the numbers of trips made by cycling, bus and rail during the last decade (60% by rail, 30% by bus and 50% by cycling between 2008/09 and 2015/16)[18]. Figure 3-3 shows these changes.

[18] Source: Joint Local Transport Plan monitoring, West of England Office.

Figure 3-3 Changes in trips by cycling, bus and rail between 2008/09 and 2015/16



However, there remain significant challenges. Although walking and cycling are relatively popular compared with other UK cities, many parts of the network have limited infrastructure facilities, with cyclists exposed to the risks posed by motorised traffic. Public transport use, both road and rail, is significantly lower than other major UK cities.

Table 3-1 shows the mode split for travel to work for residents living in the four authorities and West of England, based on data from the 2011 Census.

Table 3-1 Mode of Travel to Work in the West of England[19]

Mode of travel to work	B&NES	Bristol	North Somerset	South Gloucs	West of England
Work mainly at or from home	7.7%	4.6%	6.6%	4.7%	**5.5%**
On foot	17.2%	19.3%	9.5%	8.2%	**14.3%**
Bicycle	3.0%	7.7%	2.8%	3.9%	**5.1%**
Bus, minibus or coach	6.4%	9.6%	3.0%	4.9%	**6.7%**
Train	3.6%	2.0%	2.4%	1.3%	**2.1%**
Motorcycle, scooter or moped	1.0%	1.1%	1.0%	1.4%	**1.2%**
Other (including taxi)	1.0%	1.0%	1.0%	0.7%	**0.9%**
Passenger in a car or van	4.6%	4.9%	5.2%	5.1%	**5.0%**
Driving a car or van	55.4%	49.9%	68.5%	69.8%	**59.3%**

These proportions vary significantly, with relatively high levels of walking, cycling and bus use by residents of Bristol and Bath, but much lower levels by people living in the more rural areas. Levels of car use are particularly high in the rural areas, reflecting the limited travel choices in many areas.

Bristol and Bath have high (and growing) numbers of residents walking and cycling compared to other major cities, but they are concentrated in the inner urban areas that are closer to destinations. In many areas, there are lower levels of walking and cycling. However, there has been a strong rise in cycling in Bristol reflecting concerted investment in new facilities, as demonstrated in Figure 3-3.

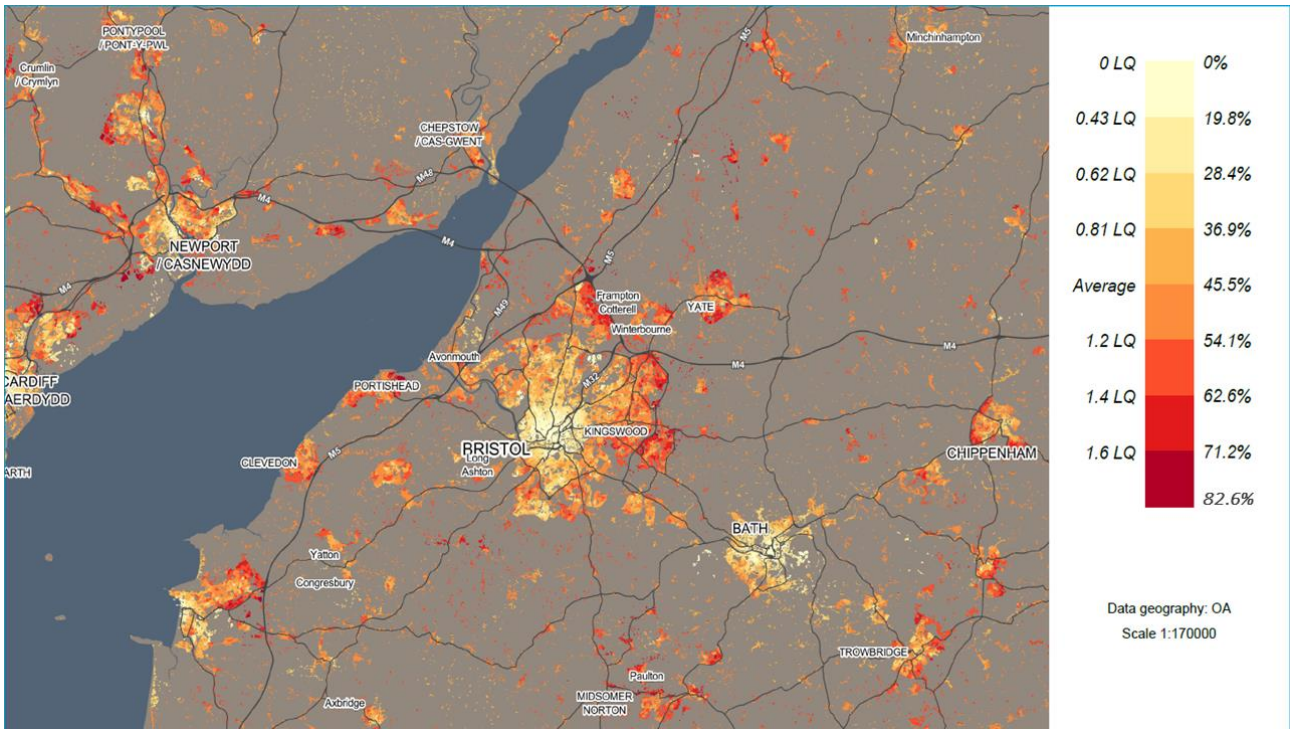
In Bristol, which is one of the UK's Core Cities, the 2011 Census indicated that fewer than 10% of workers living in Bristol commute to work by bus and 2% by rail. This compared with 22% commuting by public

[19] Source: 2011 Census, Table QS701EW (based on residents aged 16-74 in each District).

transport in other English core cities[20]. However, bus use has recently been rising, which could reflect the introduction of Residents Parking Schemes, reductions in fares and improvements to the network. In Bristol, overall bus use (measured in terms of journeys per head) rose significantly between 2010/11 and 2015/16 (against the national trend of decline) and is now the tenth highest in England[21]. Bus use also rose in Bath & North East Somerset, South Gloucestershire and North Somerset during this period. Train use is modest, reflecting the limited coverage of the network, but has grown in recent years.

Overall, there are high levels of car use in large parts of the West of England. Figure 3-4 shows, for people living in different parts of the West of England, the proportions of workers commuting to work by private transport (including cars, vans and motorbikes). It also shows the differences against the national average, which is 45.5%. Car use is very high in many of the rural areas, towns and in the outer parts of the Bristol urban area.

Figure 3-4 Travel to Work by Private Transport



Source: 2011 Census (as visualised at www.datashine.org.uk). LQ = Location Quotient, which is the ratio of private transport use in each location compared to the national average (national average = 45.5%). Areas with a higher LQ have higher use of private transport and areas with a lower LQ have lower use of private transport.

It is also important to understand travel behaviour for other journey purposes, including travelling to school and college, shopping, leisure and business journeys. Data from the National Travel Survey (2014) shows that 16% of trips are for commuting, compared with 30% for leisure, 19% for shopping and 12% for education. The Census is the most comprehensive snapshot of people's patterns of travel, but it concentrates on the journey to work and there are large volumes of travel that are not captured. The National Travel Survey and other sources of data can also be used to estimate the numbers of trips made by different modes for different journey purposes. These sources of data reinforce the importance of walking, cycling and bus use for many local journeys in the West of England.

There are several factors that influence mode choice. These include distance, car ownership, ease of parking and the ease and cost of travel by other modes. Choices are more limited for longer journeys but walking is a practical option for many people for journeys under one mile and cycling can cater for slightly longer journeys. Public transport can be a viable option where there is an attractive service frequency, fares are reasonable and direct journeys can be made. Whilst people readily consider interchange between different rail services, most people would not consider interchange between bus services due to lack of

[20] Source: Bristol Transport Statistics, March 2016
[21] Source: Annual Bus Statistics: England 2015/16 (Department for Transport, October 2016)

confidence in the ease of changing onto connecting services. Car ownership is also a critical factor. Once people have access to a car, it opens access to new destinations and opportunities, including places of work, shopping and leisure, and this significantly affects how people choose to travel.

People's travel behaviour is often habitual but mode choices also change in response to changes in their circumstances. These include moving home, changing jobs, starting families or the transition to secondary school, which also change household car ownership. In many cases, people acquire cars to meet their new travel needs, for example travelling to a new job. Conversely, there is the opportunity to break habitualised car use when life changes occur, through effective communication of the choices that exist, for example when people move house, change jobs or start school.

The West of England authorities have undertaken several smarter choices programmes in recent years to seek to change people's travel behaviour. These include the Local Sustainable Transport Fund (2011-2015), Sustainable Travel Transition Year (2016/17) and the recently commenced Access Fund project. All of these projects have had a strong focus on marketing and communications to improve people's understanding of the alternatives to the car to encourage behaviour change. These programmes, together with investment in cycling infrastructure, improvements to bus services and increased parking controls, have played a key role in changing travel behaviour in different parts of the West of England.

3.4.1.1. Future travel choices

Travel demand is forecast to grow with the increased numbers of people living and working in the West of England. MetroBus, which is currently under construction, is forecast to result in a further shift to travel by bus, and the planned MetroWest project will result in a significant increase in the volume of travel by rail in specific areas. Table 3-2 shows the estimated numbers of trips by road, bus and rail, over a 12-hour weekday period, in 2013 and for 2036 with MetroBus and MetroWest. It also shows growth from the 2013 base year.

Table 3-2 Forecast trips by car, bus and rail

	2013 Base Year	2036 including MetroBus	2036 including MetroBus and MetroWest
Car	966,000	1,144,000 (+18%)	1,133,000 (+17%)
LGV / HGV	298,000	418,000 (+40%)	418,000 (+40%)
Total Road	**1,265,000**	**1,562,000 (+24%)**	**1,551,000 (+23%)**
Bus	118,000	167,000 (+41%)	162,000 (+37%)
Rail	68,000	93,000 (+37%)	108,000 (+59%)
Total Bus + Rail	**186,000**	**260,000 (+40%)**	**271,000 (+45%)**

Source: MetroWest Do Minimum Forecasting Report, further Atkins analysis using G-BATS4 Model. This represents initial testing of the schemes assuming existing growth commitments. It does not include growth associated with the Joint Spatial Plan.

This shows that the number of trips made by car are significantly higher than those by bus and rail. The investment in MetroBus, together with background growth, will result in a large increase in bus use by 2036. This will be significantly higher than the increase in car use, demonstrating the mode shift that will take place with the implementation of MetroBus. The investment in MetroWest is forecast to result in a significant increase in the amount of travel by rail, although some of this will be transferred from bus services. Nevertheless, it would also reduce car trips, as drivers switch to instead using train services.

Despite the impacts of these schemes, it is still clear that cars will continue to be the dominant form of travel without further major intervention. The **increase** in the volume of car travel is forecast to be greater than the **total** number of people of travelling by bus. This will pose major problems to the future operation of the transport network.

Over the longer term, the onset of technological changes including driverless vehicles and new models of 'Mobility as a Service' will mean greater uncertainties in forecasting people's travel behaviour. For example, the new mobility opportunities resulting from driverless cars could result in more people using cars, with greater numbers of vehicles on the road network.

Longer-term growth in housing and jobs, to be delivered through the Joint Spatial Plan, will introduce further uncertainties in future travel demand. Walking, cycling and public transport have potential to be viable travel options within the Bristol urban area. It has been necessary to develop a package of mitigation measures for the development locations outside the Bristol urban area, with a strong focus on high quality public transport corridors to provide effective travel choices for strategic movements.

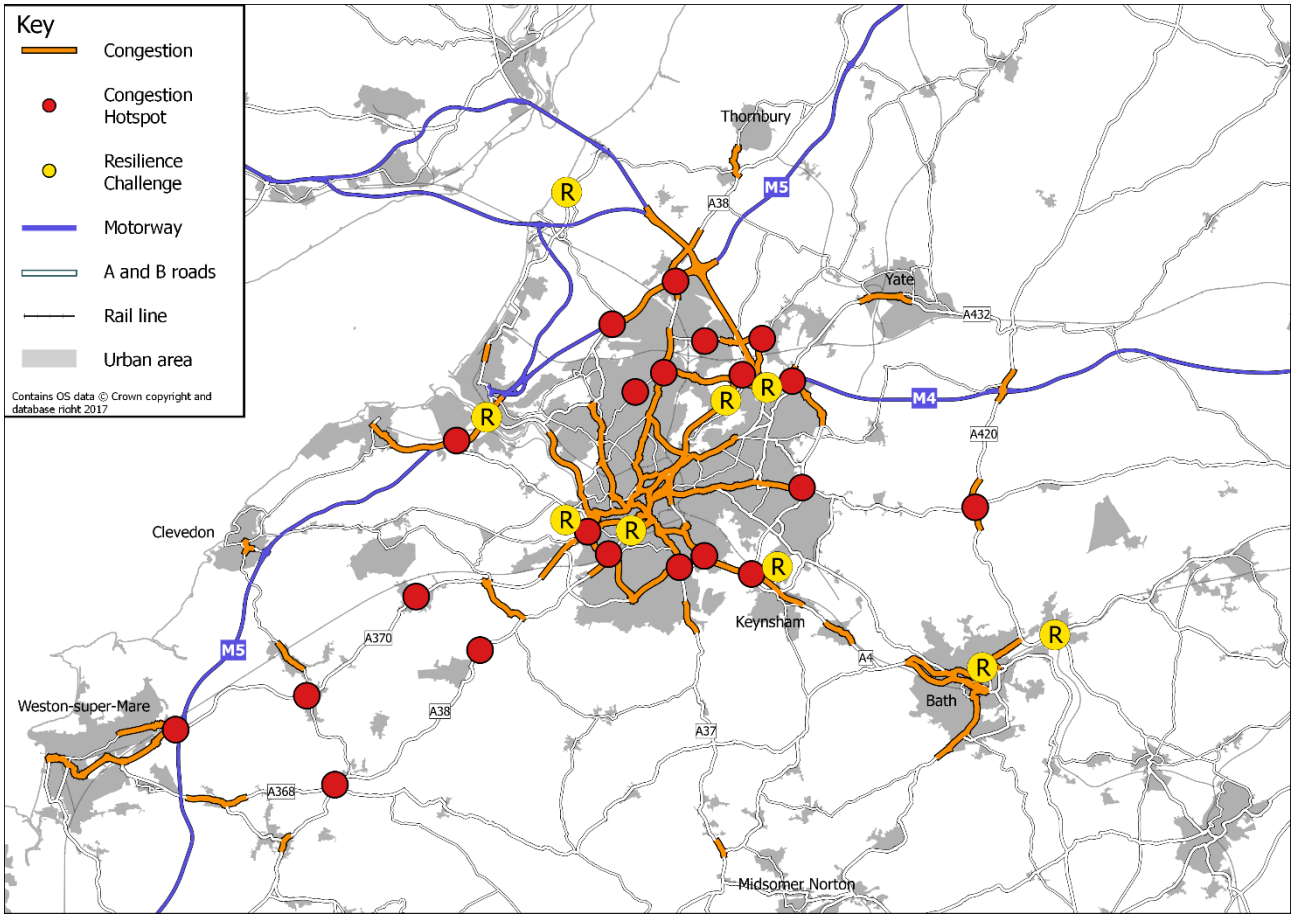
This growth, with more people living and working in the area, will be accompanied by people moving into the area or moving house, new jobs being created and more children travelling to school. There will clearly be significant risks if effective travel choices are not provided and people continue in habitual use of cars (including future use of driverless vehicles). Conversely, these changes present significant opportunities to encourage greater walking, cycling and public transport use. Investment in new infrastructure will be required to improve the quality of these choices, and effective marketing and communications will be required for people to understand the choices that are available.

3.4.2. Congestion on the road network

There are heavy traffic flows on the M4 and M5 motorways, due to longer distance through traffic and more local movements within the area. There is also heavy traffic on the M32, reflecting heavy commuting into Central Bristol, other radial routes (A4 Bath Road, A4 Portway, Cumberland Basin, A37 and A420), the A4174 Ring Road, the A4 and A36 in Bath and roads in Weston-super-Mare. There are also heavy flows on roads connecting towns across the sub-region, including the A370, A38, A36, A46 and A432.

Figure 3-5 shows the problems of road congestion across the West of England. This is sourced from transport model data and observed conditions on the road network. It also shows key locations where the resilience of the network is a problem. These locations tend to be particularly vulnerable when traffic accidents or other incidents occur, causing widespread disruption across the wider network.

Figure 3-5 Congestion in the West of England



The heavy traffic volumes reflect high levels of economic activity, the relatively limited travel choices and high levels of car ownership and dependence for many people living in the area. This results in significant

problems with traffic congestion in many parts of the sub-region affecting both the local and strategic road networks. DfT data (2013/14) shows that Bristol has particularly slow traffic, averaging less than 15mph during the morning peak, slower than other Core Cities outside London.

Traffic congestion causes longer and less reliable journey times, reduced resilience in the event of incidents, worsened reliability of bus services, rat-running of traffic through residential areas and idling traffic causing air quality problems. Slow journeys also reduce accessibility to jobs and businesses and act as a barrier to the competitiveness of the city region.

3.4.2.1. Network resilience

There are currently significant challenges with the resilience of the road network. For example, there have been several instances during 2017 when the M5 motorway has been closed following incidents, with traffic diverted onto local roads. This has caused widespread congestion and long traffic delays across the West of England due to a lack of suitable alternative routes. In future, with increasing traffic demand and congestion on the network, testing indicates that incidents will have increasingly serious impacts on the network. For example, testing using the G-BATS4 model indicates that a full closure of the M5 motorway would result in a doubling of delay on the road network compared with normal day-to-day conditions, with serious implications for both strategic and local connectivity.

3.4.2.2. Future congestion

The forecast growth in travel demand will result in more cars, vans and goods traffic using the road network in the West of England. Table 3-2 demonstrated that relative traffic growth is forecast to be slightly lower than the increase in overall travel due to more people using buses and trains following the completion of the current MetroBus and MetroWest programmes.

Over the longer term, changes resulting from driverless vehicles, connected vehicles and Mobility as a Service could result in efficiencies in the operation of the road network. However, the introduction of driverless vehicles could result more vehicles on the network and the management of streets will need to consider the needs of pedestrians and cyclists, who do not conform to automated systems. There is, therefore, no guarantee that congestion will be reduced with new technologies.

Evidence: future growth in traffic delay

The model forecasts indicate that there will be an estimated 16% increase in trips on the road network between 2013 and 2026, with an increase in average delay of 17%[22]. This analysis accounts for planned growth in the Core Strategies and is based on modelling using the G-BATS4 model, which focuses on the Bristol urban area. The relatively modest increase in delay reflects the improvements to the transport network that will have been completed since 2013, including the MetroBus schemes, South Bristol Link and Stoke Gifford Transport Link.

The growth in numbers of people living and working in the area in the longer term to 2036 will result in a forecast 26% increase in trips between 2013 and 2036, with an increase in average delay of almost 40%. This indicates that the network will be under increasing strain, with new parts of the network experiencing high levels of congestion resulting from longer-term growth.

The removal of tolls on the Severn Crossings from the end of 2018 is forecast to result in a large increase in traffic using the crossings due to increased economic activity and greater commuting between the two sides of the estuary. A report for the Welsh Government in 2012[23] forecast that the removal of tolls would result in a 12% overall increase in traffic using the crossings. More recent evidence published by DfT in January 2017[24] indicated that a 50% reduction in tolls would result in a 17% increase in traffic using the crossings. The different forecasts indicate the uncertainty about the future implications of the removal of the tolls in 2018 and this issue will require further analysis by Highways England.

[22] Source: Analyses by Atkins using G-BATS4 model.
[23] The Impact of the Severn Tolls on the Welsh Economy, Arup for Welsh Government, May 2012, http://www.senedd.assembly.wales/documents/s12952/30.05.12%20-%20Executive%20Summary%20The%20Impact%20of%20the%20Severn%20Tolls%20on%20the%20Welsh%20Economy.pdf
[24] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/582087/severn-crossing-tolls-consultation.pdf

Testing using the G-BATS4 model indicates that, following the removal of tolls, there would be increases in both long-distance and local traffic between South Wales and the West of England. This would result in significant increases in delays on the M4 at Almondsbury, the A4 Portway into Bristol and locations in the North Fringe and North Bristol. Overall, this is forecast to result in a further increase in delay across the wider network, which would impact on both local and long-distance traffic.

3.4.3. Economic impacts

The problems caused by limited travel choices and increased congestion impact on the labour market and place extra costs on businesses due to increased operating costs of vehicles, more non-productive time spent travelling and wider productivity impacts from the reduction in the potential for business clustering.

- **Ability to find suitably skilled staff** – people choose their area of search for a job based on the time and cost of travel to the job. Employers offering higher-paid jobs can attract staff from a wide area, but lower-paid jobs are only able to attract applicants from a relatively narrowly defined area. The balance between the labour market and recruitment and retention of staff is particularly challenging in areas with relatively strong economic performance such as the West of England.

- **Business operating costs** – transport costs are significant for certain sectors including logistics and (to a lesser extent) manufacturing. Logistics activity therefore tends to cluster in places such as Avonmouth/Severnside on the M5. Other sectors are reliant on staff travelling as part of their role, including meeting with clients and colleagues, and it is frequently not possible to work during the journey. This non-productive time is a direct cost to the business.

- **Wider productivity impacts** – businesses tend to cluster together to facilitate knowledge sharing, innovation and tapping into deep, skilled labour markets. This is collectively termed ‘agglomeration’ and there are strong clusters in several sectors in the West of England, including aerospace, creative industries and professional services. Problems caused by poor connectivity and congestion hold back the economic potential of these sectors and act as a productivity drag on the wider economy.

There are economic costs of poor connectivity in the West of England. Most business-related travel in the area is by road. The large amount of delay on the road network adds costs to journeys, both in terms of the value of drivers’ time and the increased costs of operating vehicles on the network.

3.4.3.1. Future economic impacts

The increase in congestion on the road network will have direct economic impacts. Analyses using the G-BATS4 network indicate that the cost of congestion is forecast to rise to over £500 million per annum in 2026 and £800 million per annum in 2036 if there is no further investment in strategic transport improvements to improve travel conditions[25].

Evidence: impacts of removal of Severn Tolls

The report produced for the Welsh Government in 2012 estimated that the total cost to businesses and commuters from paying tolls to use the Severn Crossings was over £80 million in 2010. It highlighted that the actual cost to users is even higher, due to delays at the toll booths and drivers taking alternative routes to avoid the tolls. The removal of tolls would therefore result in direct benefits to users of at least £80 million per annum. Econometric modelling was also undertaken to estimate the GVA benefits of reduced peripherality in South Wales from the removal of tolls, with estimated GVA benefits of almost £110 million per annum.

However, the increased traffic using the Severn Crossings will cause increased congestion on the network in the West of England. It is estimated that the costs of congestion would increase by a further £60 to £100 million per annum (2036 impacts, in 2010 prices). The evidence therefore indicates that the economic benefits of removing the tolls would be at least partially offset by the disbenefits of increased congestion in the West of England. This would impact on both local traffic and longer-distance traffic to/from South Wales. There is, therefore, a strong case for intervention in the West of England to tackle the impacts of congestion, including longer-distance traffic to and from South Wales.

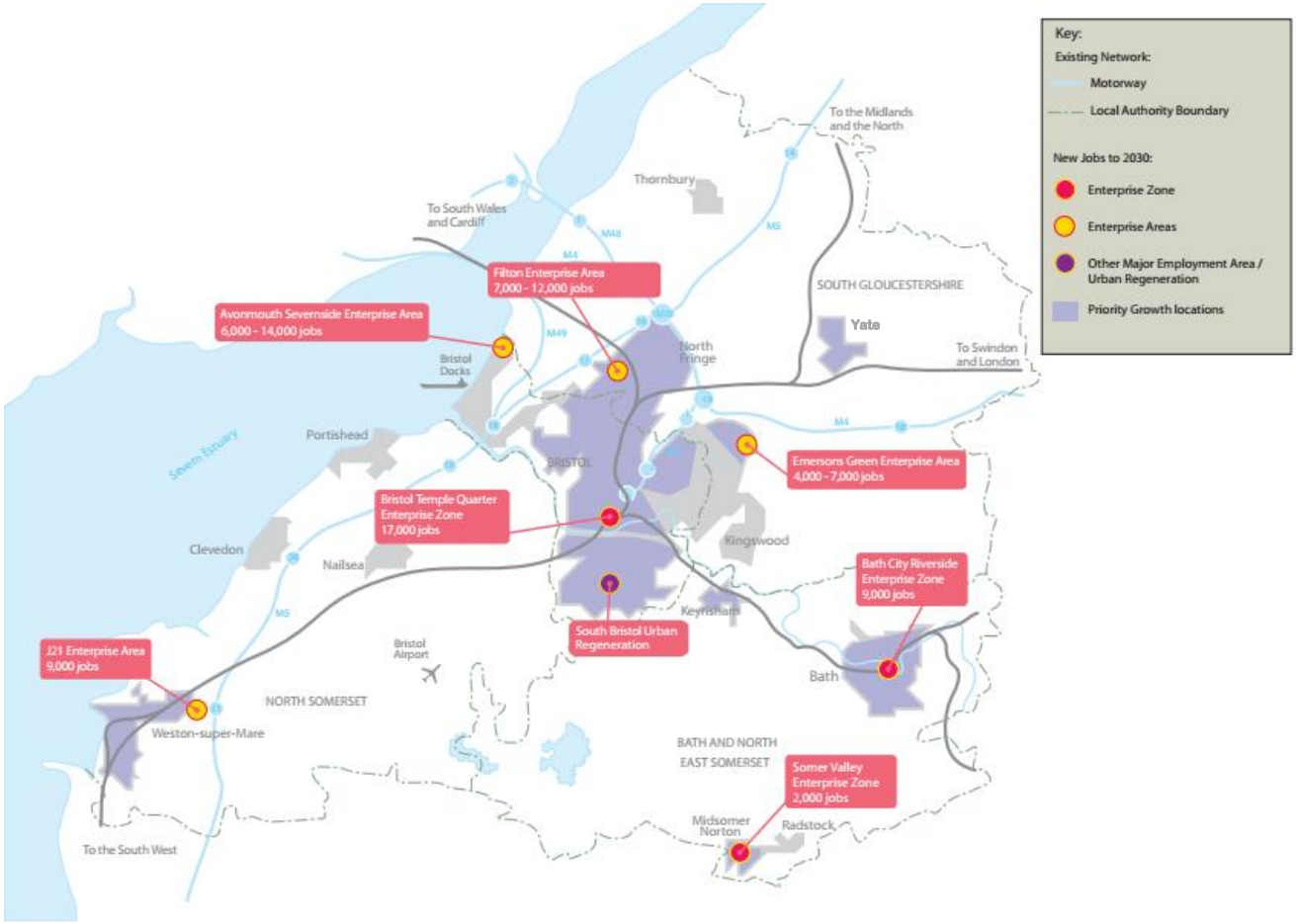
The increasing costs of congestion will directly impact on businesses through lost productive staff time and increased costs of moving goods. This will also have wider impacts on the economy through constraining the

[25] Source: Analyses by Atkins using G-BATS4 model. Costs of congestion are based on calculation of the total vehicle delays in the network and application of values of time for business travel, commuting and other journey purposes.

operation of the labour market and constraining potential business agglomeration, which will reduce productivity and competitiveness of businesses in the region.

This is also likely to impact on the ability of the region to attract new businesses and create new jobs. The West of England Strategic Economic Plan (SEP) sets out the ambition for sustainable growth across the area, which includes planning for 95,000 new jobs by 2030[26]. This is equivalent to approximately 18% growth in the total number of jobs in the West of England between 2013 and 2030. Central to the Plan will be the delivery of the Bristol and Bath Enterprise Zone, Enterprise Areas and the priority regeneration area in South Bristol, which are shown in Figure 3-6. This shows that the Enterprise Zones and Enterprise Areas together have the potential to deliver around 70,000 new jobs by 2030. The Unitary Authorities are reviewing these SEP job aspirations in the JSP and subsequent local plan reviews.

Figure 3-6 Economic Growth Areas in the West of England[27]



(Note that these figures were derived from the Strategic Economic Plan (2014) and have since been revised by the West of England UAs to reflect updated jobs forecasts and trajectories.)

Recent research[28] has estimated that only around 14,000 of the 70,000 target jobs would be likely to be created without improved transport connectivity. The research estimated that the additional connectivity delivered by the current transport investment programme would help unlock a further 20,000 jobs. The ability to unlock the remaining 36,000 jobs would be constrained unless additional infrastructure is provided to further improve transport connectivity to meet the needs of the priority employment growth areas. It is also important that regeneration in South Bristol and Weston-super-Mare is supported by growth and investment to re-balance the economy across the area.

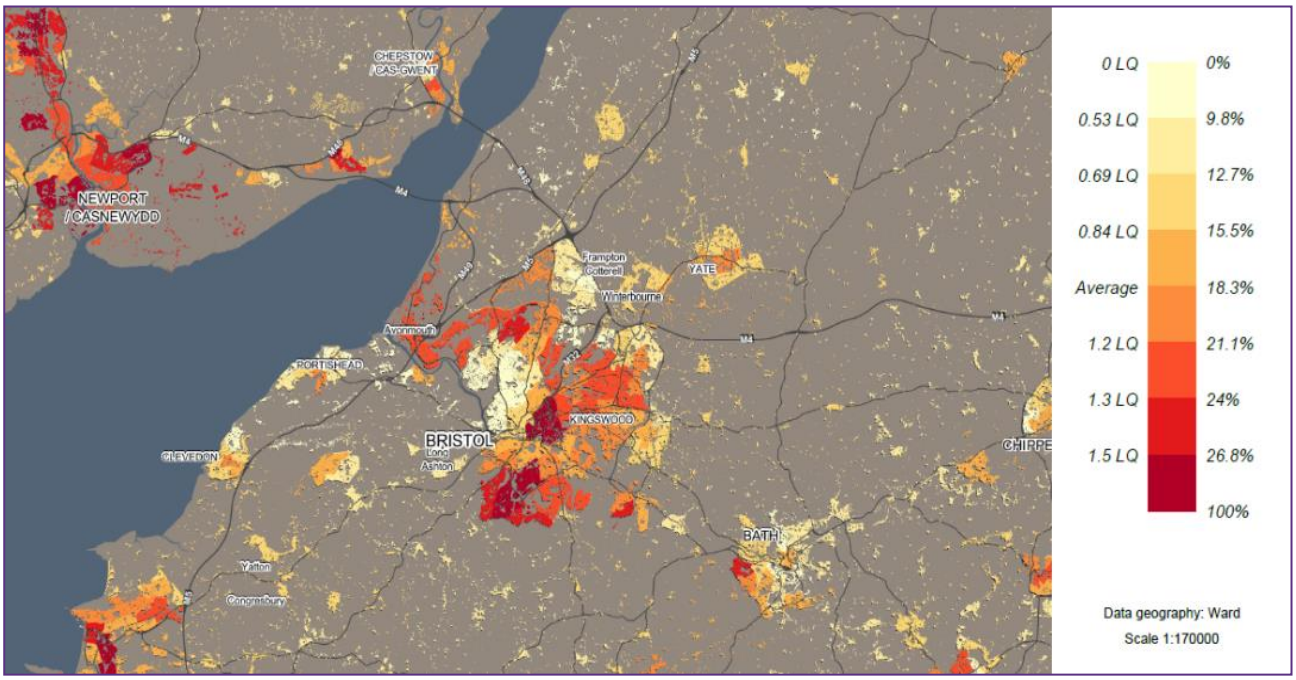
[26] West of England Strategic Economic Plan 2015-2030, located at http://www.westofenglandlep.co.uk/about-us/strategicplan
[27] Source: West of England Local Enterprise Partnership
[28] GVA impacts of major transport schemes, Atkins for West of England Authorities, December 2012, located at http://www.westofenglandlep.co.uk/place/transport-investment

3.4.4. Social impacts

In some communities, a high proportion of people face multiple challenges of deprivation, health problems and poor basic skills. Bristol faces the most significant challenges, and a greater proportion of Bristol residents lived in the most deprived areas in 2015 than in 2010[29]. The greatest increase in deprivation was in the 'Living Environment' domain, which is related to housing, air quality and traffic accidents. The increase in deprivation was despite the strong underlying performance of the economy.

Figure 3-7 presents the proportions of households facing deprivation in two or more dimensions, which demonstrates the major challenges faced in some parts of Bristol.

Figure 3-7 Deprivation in the West of England (households deprived in two dimensions)



Note: this shows the proportions of households facing deprivation in two or more dimensions, for example, income deprivation, worklessness, poor health or no qualifications. Source: 2011 Census (as visualised at www.datashine.org.uk). LQ = Location Quotient, which is the ratio of households deprived in each location compared to the national average. Areas with a higher LQ have higher proportions of households deprived and areas with a lower LQ have lower proportions of households deprived.

There are also areas of deprivation in parts of Weston-super-Mare, parts of Bath (including Twerton) and parts of Keynsham. The issues causing deprivation are complex: in many cases, deprived areas are close to job opportunities, but people's skills are not well matched to the requirements of employers. However, in some cases, poor accessibility to jobs is a significant barrier to being able to take-up employment opportunities.

Obesity is a rapidly growing problem, due both to diet and sedentary lifestyles associated with insufficient levels of physical activity including walking. It is estimated that around one in six deaths in the UK are caused by physical inactivity[30]. Walking more is a practical way to exercise and improve health, which can be readily incorporated into people's daily routine.

Road safety is also an important issue, although good progress is being made in reducing the numbers of people killed and seriously injured on the road network. However, road safety is a broader issue than the numbers of people who are killed or injured on the roads. Many people perceive roads to be dangerous places and feel intimidated by traffic. This significantly affects the level of interaction within communities located along main roads and the extent to which parents allow their children to walk in the local area.

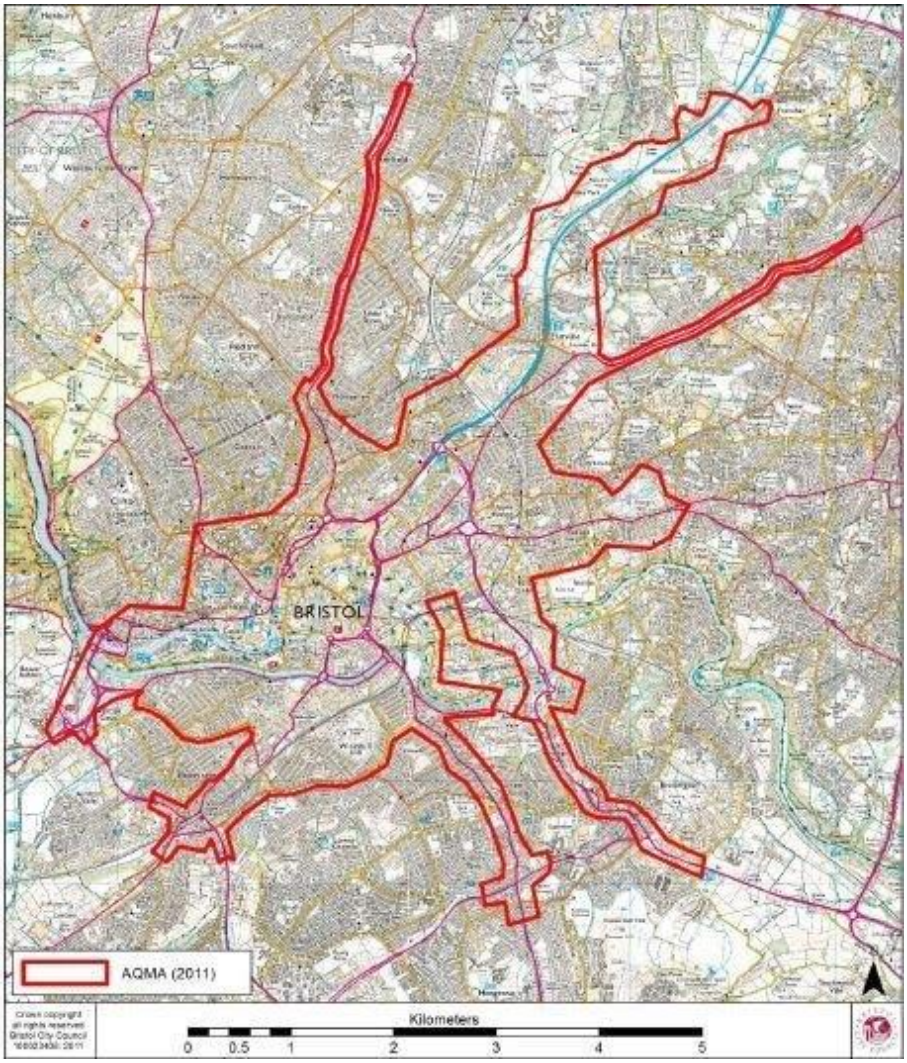
[29] Source: Deprivation in Bristol 2015, Bristol City Council, November 2015, located at https://www.bristol.gov.uk/documents/20182/32951/Deprivation+in+Bristol+2015/429b2004-eeff-44c5-8044-9e7dcd002faf

[30] http://www.sustrans.org.uk/policy-evidence/the-impact-of-our-work/related-academic-research-and-statistics/physical-activity

Perceptions of danger are also a major factor in attitudes to cycling, with many people hesitant to cycle because of the fear of cycling in heavy traffic.

Poor air quality is, however, an increasing concern for policymakers. Air Quality Management Areas (AQMAs) have been declared in Bristol, Bath, Saltford, Keynsham, Kingswood, Staple Hill, Cribbs Causeway and on the edges of the M4, M5, M32 and M49 motorways[31]. In all cases, the AQMAs have been declared in areas with heavy flows of slow-moving traffic. The AQMA in Bristol is extensive and includes many of the radial routes into the city, as shown in Figure 3-8.

Figure 3-8 Air Quality Management Area in Bristol



Source: DEFRA

There are also air quality problems in Bath, with the AQMA covering main routes in the city centre, Lower and Upper Bristol Roads, Wells Road, Warminster Road and London Road.

Evidence: health impacts of poor air quality

Poor air quality is harmful to everyone, but people with health conditions are particularly vulnerable. Research by the Royal College of Physicians has examined the lifelong impact of air pollution[32]. It estimates that around 40,000 deaths per year in the UK are attributable to exposure to outdoor air pollution, and the annual costs of pollution are estimated at more than £20 billion per annum.

[31] Source: DEFRA, https://uk-air.defra.gov.uk/aqma/
[32] Every breath we take: the lifelong impact of air pollution, Royal College of Physicians, February 2016, located at https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

Air Quality Management Areas cover radial traffic routes and the centres of Bath and Bristol. Poor air quality is a critical issue that is contributing to ill health and earlier mortality. In Bristol, it is estimated that 300 deaths per year in the city (8.5% of all deaths) are attributable to poor air quality, with the highest proportions identified in wards in the city centre and adjacent to major road corridors[33].

3.4.4.1. Future social impacts

Many communities have suffered from deprivation over a long period, with challenges in South Bristol, inner east Bristol and parts of the northern arc of the city. This is despite these areas being close to some of the wealthiest parts of the city. There are also significant challenges in parts of Bath and Weston-super-Mare. These communities have faced deep challenges with poor quality housing, ill health, low skills and poor connectivity to appropriate jobs. Many of the people living in these areas continue to face significant problems of deprivation despite the economic growth of the sub-region. It will be challenging to improve people's prospects in future without comprehensive intervention to improve skills, health and connections to employment (which are beyond the scope of transport interventions).

Health is a major challenge: high levels of inactivity and lifestyle choices are resulting in increased levels of obesity and related disease including diabetes, which will be a critical challenge to health services over the medium to long term. The costs of ill-health relating to physical inactivity, including medical treatment, missed days from work and loss of productivity in the economy, will become a major challenge for the whole of the UK, including the West of England. Increasing physical activity, through incorporating active travel into day-to-day travel, will be a critical priority for transport policy.

Air quality is likely to improve over the longer term with continued improvements in vehicle emissions standards and the scrappage of older vehicles. The future uptake of electric vehicles and other types of low emission vehicles will also help to drive reductions in harmful emissions. This will, however, be offset by growth in the volume of motorised traffic and increases in congestion and stop-start conditions. There will be an imperative to tackle the problems of poor air quality: emissions are likely to remain high in the short to medium term, with continued harmful exposure and resulting high levels of ill health and early mortality.

3.4.5. Environmental impacts

Poor air quality, increased noise and the severance effects of motorised traffic have a negative effect on the quality and experience of the urban environment across the area. These effects are particularly acute in Bath, Bristol urban neighbourhoods and parts of Weston-super-Mare. The dominance of traffic – including on-street parking – is a major challenge in reallocating roadspace to other modes and improved public realm.

Figure 3-9 shows the environmental assets in the West of England. This shows that the area is home to several assets of national and international significance, including the Severn Estuary, Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty (AONBs) in the Cotswolds and Mendips and the Bath World Heritage Site.

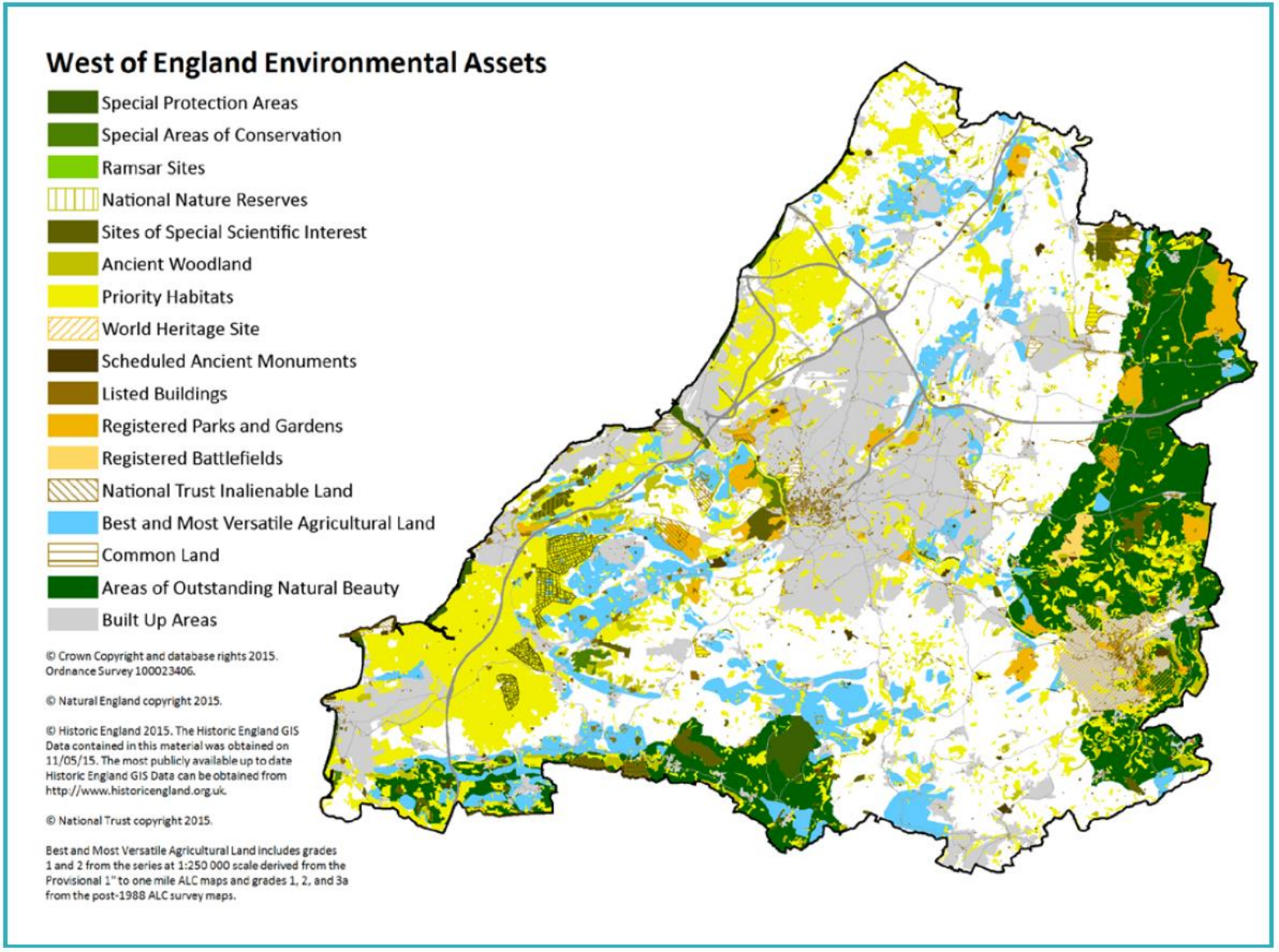
There are adverse environmental impacts of traffic in rural areas, where the tranquillity of areas such as the Cotswolds and Mendip AONBs is affected by traffic in some places, for example in the area to the north of Bath and in parts of North Somerset. However, there are also important opportunities to encourage access to the countryside, by sustainable modes of travel, to support the rural economy and to enhance quality of life for people living in the West of England.

Road traffic is one of the most important sources of carbon dioxide (CO_2) emissions, which are contributing to climate change. Transport produces 29% of total carbon emissions in the West of England[34] or around 1,408 kilotonnes per year (kt/yr). There has been an 8% reduction in transport emissions between 2005 and 2014 which closely reflects national progress. This reflects mode shift to cycling and public transport and improved fuel efficiency. However, with more people living and working in the area, leading to significant increases in traffic, it will become progressively more challenging to reduce the overall carbon footprint.

[33] Health Impacts of Air Pollution in Bristol, Air Quality Consultants for Bristol City Council, February 2017, located at https://www.bristol.gov.uk/documents/20182/32675/Health+Impacts+of+Air+Pollution+in+Bristol+-+April+2014/4df2fce5-e2fc-4c22-b5c7-5e7a5ae56701

[34] 2014 data, includes industrial, commercial, domestic and surface transport sources (excluding motorways). Source: UK local authority and regional carbon dioxide emissions national statistics: 2005-2014, National Statistics

Figure 3-9 Environmental Assets in the West of England



Source: West of England Joint Spatial Plan Issues and Options consultation document

3.4.5.1. Future environmental impacts

Increasing volumes of traffic will also create wider environmental problems, including increased noise and severance in cities, towns and villages and further loss of tranquillity in rural areas. There is the opportunity to contain growth in traffic in Bristol and Bath, with a greater focus on movement by walking, cycling and public transport, but it will require action to reallocate roadspace towards these modes. There is likely to be increased traffic in parts of the North and East Fringes and towns and villages across the West of England. This will be a challenge in the Strategic Development Locations identified in the Joint Spatial Plan and measures will be required to maximise travel by non-car modes.

The Climate Change Act is a legally binding commitment by the UK Government to achieve an 80% reduction in carbon dioxide (CO_2) emissions by 2050 from a 1990 baseline. Local authorities in the West of England have adopted targets that are in line with or more ambitious than the national targets in the Climate Change Act. Taken in total, these targets[35] require carbon emissions in the West of England to be reduced by 50% by 2035 and by 83% by 2050 on a 2014 baseline. Transport (excluding motorways) is responsible for 29% of the West of England's CO_2 emissions.

Evidence: transport carbon emissions

Transport emissions fell by 8% between 2005 and 2014. Assuming that transport retains its 29% share of total emissions, a further 50% reduction will be required by 2035, a reduction from 1,408 kilotonnes in 2014 to 704 kilotonnes in 2035. Progress will therefore need to be accelerated from the trajectory over the last decade. The delivery of the new homes being planned in the West of England to 2036 could result in an additional 310 kilotonnes of transport emissions per year, or a 22% increase from 2014 transport emissions[36]. This will significantly increase the challenge of reducing transport emissions in the West of England in line with the target trajectory.

3.4.6. Consultation on the transport challenges

Stakeholders and the public were invited to provide their views on the transport challenges during the Issues and Options consultation held in late 2015 and early 2016.

People's views on the transport challenges

There was generally strong agreement with the challenges that had been identified. At least two thirds of survey respondents agreed with the challenges, with particularly high levels of agreement with challenges relating to limited travel options and congestion, reliability, resilience and connectivity. Many people commented on the poor quality of travel choices in the sub-region, including buses, rail and cycling.

The responses revealed a consistent view amongst respondents on the importance of the challenges in both level of agreement and ranking. Travel choices and congestion, reliability, resilience and connectivity were identified as the most important challenges, followed by environmental challenges, then housing and employment growth, and finally the social challenges. The evidence and the high level of agreement from consultees provides a strong case for action to address the significant challenges that are faced, both existing and forecast.

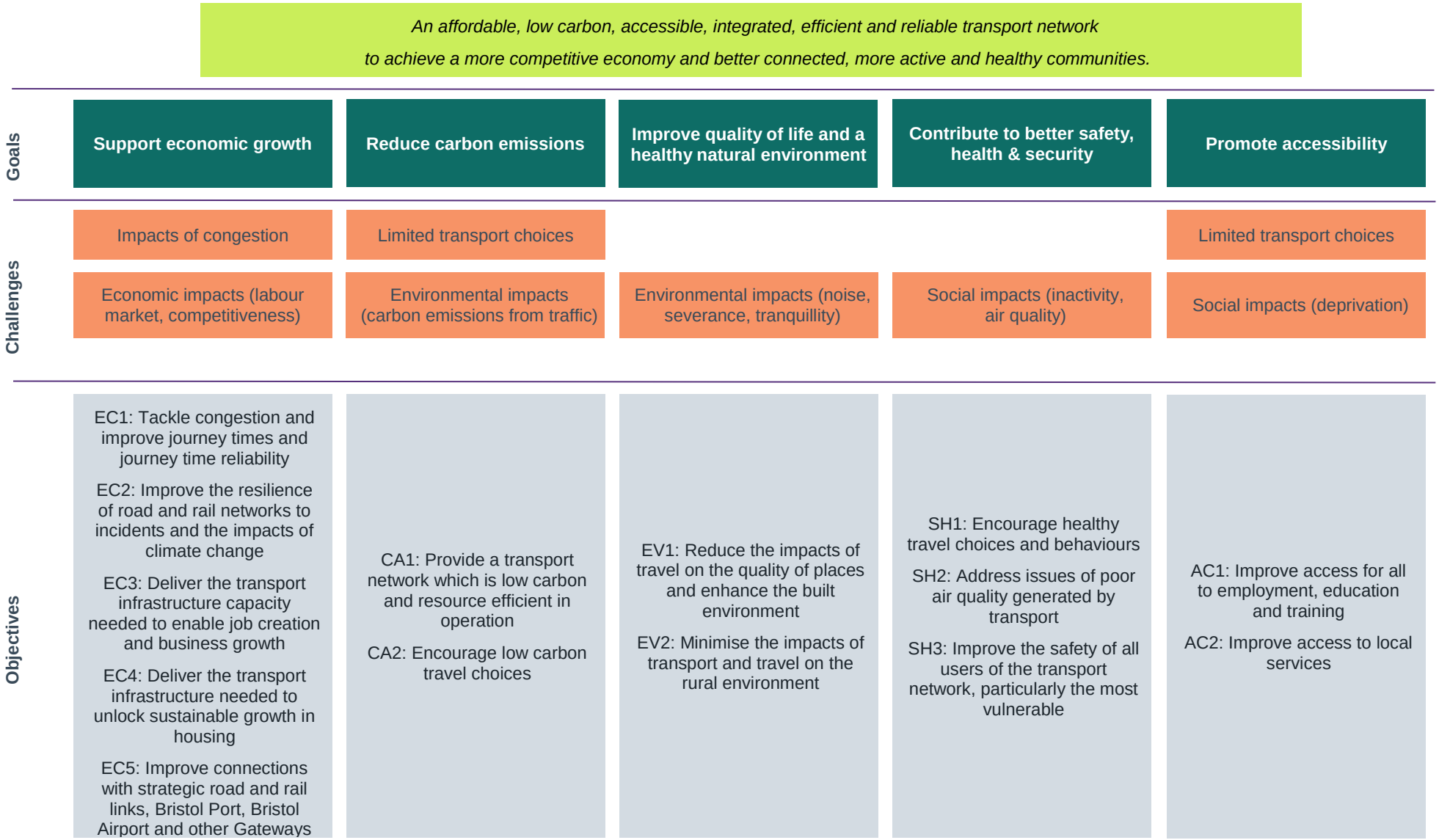
3.5. Goals and objectives

A series of goals and objectives was developed to respond to the critical challenges described above. The five goals are consistent with those already adopted in the current Joint Local Transport Plan but the supporting objectives provide a more detailed framework for the shaping of the Transport Vision and the assessment of potential options. Figure 3-10 shows the goals and objectives, together with the challenges described in this chapter.

[35] Using adopted carbon reduction targets for Bath and North East Somerset, South Gloucestershire and Bristol, and using the UK target on a pro rata basis for North Somerset

[36] Assuming 2.3 people per home (UK average from 2011 census) and current per capita transport emissions of 1.28 tonnes (2014 data using subset ie excluding motorways). The actual impact of new development on transport emissions will be influenced by where the development is located, with the location of development driving the extent of mobility needed and the primary modes of travel.

Figure 3-10 Framework for shaping the Transport Vision



3.5.1. Consultation on the goals and objectives

People were also given the opportunity to comment on the goals and objectives as part of the Issues and Options consultation.

People's views on the goals and objectives

Respondents considered that the most important goals are improving quality of life and a healthy natural environment, reducing carbon emissions and promoting accessibility. These three goals were strongly related by respondents to the priority challenges of tackling congestion, improving travel options and reducing impacts on the environment. People made strong links between problems caused by poor travel choices and congestion impacting on their own quality of life.

Whilst the goal to support economic growth was not identified as the highest priority, three quarters of respondents strongly agreed or tended to agree with the goal. Some respondents suggested that the focus should be on *sustainable* economic growth, which benefits all members of society and avoids adverse environmental impacts. In the case of 'contribute to better safety, health and security', some people questioned if these should be grouped. They highlighted that delivering better *health* outcomes through the transport system requires different forms of intervention to improving road *safety*. These different issues are addressed in the specific objectives developed for this goal.

The responses to the consultation demonstrated the importance of all five goals. People have a strong understanding of the importance of improving travel choices and reducing congestion in meeting all five goals, with a particularly strong focus on improving quality of life, tackling carbon emissions, reducing the impacts of transport on the environment and in supporting sustainable economic growth.

3.6. Potential options

A number of future transport concepts were identified at an early stage in the process as potential options for meeting the transport goals and objectives. They were identified during the Issues and Options stage to help stimulate debate during the consultation. These options included:

- Smarter choices – specific funding for new projects to encourage travel behaviour change;
- Walking and cycling superhighways – reallocation of roadspace on the most popular corridors;
- Strengthen and enhance public transport corridors, including further bus priority and improved services;
- Corridor packages – multi-modal packages to encourage cycling and bus use on key corridors;
- Extend the MetroBus network, including new routes and further enhancements to existing corridors;
- Extend MetroWest, with further improvements to existing services, new stations and new services;
- MetroWest next generation – major investment in new heavy and/or light rail corridors;
- Pinch points programme – improving the road network to tackle key capacity bottlenecks;
- Regional connectivity – better connectivity by road and rail to the rest of the region and wider UK;
- Freight – better meeting the needs of the logistics industry and managing the impact of HGVs;
- Demand management – using a range of tools, including charging options, to manage demand; and
- Working better together – new governance structures to improve the planning and delivery of projects.

These future transport concepts played an important role in shaping the Transport Vision. They helped to ensure that a wide range of options were considered, and helped to identify where trade-offs needed to be considered, for example in places where roadspace is limited and where choices between different modes of travel were required.

3.6.1. Consultation on the options

People were given the opportunity to comment on the future transport concepts in the Issues and Options consultation and to consider how these would help tackle the challenges and meet the aims of the goals and objectives.

People's views on the Future Transport Concepts

The most important priorities from respondents to the consultation were improving public transport corridors, creating walking and cycling superhighways, adding new and improved rail services (both light rail and heavy rail) and tackling bottlenecks. They also identified the importance of transport authorities and operators working better together, which will be critical in delivering a better transport system for the West of England.

They identified freight as being least important, although written responses highlighted the importance of reducing the impacts of freight on the road network.

Respondents identified the importance of improving orbital connectivity around Bristol, including completion of the Bristol Ring Road, as well as improving connections to the M4 and M5. They also identified the importance of improving the public realm and considered that more clarification is needed on the walking and cycling superhighways concept. They highlighted that Park & Ride should be considered as part of improving public transport corridors, and the role of MetroBus should be considered alongside other forms of rapid transit, for example light rail. This feedback has been particularly important in helping to shape the Transport Vision.

The responses to the consultation demonstrate the importance of transforming the way that people travel in the West of England, with strong support for encouraging active travel and transforming public transport. This reflects the strength of support for improving travel choices and promoting alternatives to the car to reduce traffic congestion, and strongly supports the goals to improve quality of life, reduce carbon emissions and support sustainable economic growth. These principles have strongly shaped the Transport Vision.

The responses to the consultation on the draft Transport Vision itself are discussed in Chapter 4.

3.7. Summary

This chapter has highlighted the following issues that needed to be considered in developing the Transport Vision.

- The poor quality of travel choices is the underlying cause of the other transport problems in the West of England. The perceived lack of travel choices by many people results in high car use, congestion and severe pressures on the road network in some places. This results in high travel costs, poor air quality and a degraded environment.
- Growth in the numbers of people living and working in the West of England will exacerbate these challenges if action is not taken. The current investment programme will help mitigate the challenges to 2026 but forecasts indicate a steep rise in car trips and congestion beyond 2026 if action is not taken.
- The five goals in the current Local Transport Plan provide a strong framework for addressing these challenges, but more specific objectives have been developed to guide the identification and assessment of schemes within the Transport Vision. For example, specific objectives are required to focus on air quality and encouraging healthy travel choices and behaviours.
- There must be a strong focus in the Transport Vision on improving travel choices to drive mode shift from car use to walking, cycling and public transport. This will be critical in providing a coordinated response to the challenges faced in the area.
- There is a need for targeted investment in the road network to enable improved management of traffic and roadspace to enable the shift to walking, cycling and public transport.
- The Issues and Options consultation showed that people have a strong understanding of the problems. People understand the relationships between high levels of car use and congestion, poor air quality and impacts on quality of life.
- People have a strong desire for investment in active modes and public transport to enable positive changes to be made. There is also a recognition that investment in the road network will be needed to tackle the current congestion hotspots and provide a more resilient transport system.

The next chapter explains the principles of the Transport Vision.

4. Transport Vision

4.1. Introduction

Chapter 3 demonstrated that there is a clear case for action, with a need to improve travel choices and tackle congestion given the forecast growth in the numbers of people living and working in the West of England. This is critical to enable the area to meet its full potential, improving quality of life, protecting the environment and improving people's life chances. This chapter describes the Transport Vision and is structured as follows:

- **Section 4.2** summarises the current West of England transport investment programme.
- **Section 4.3** presents an overview of the Transport Vision.
- **Section 4.4** provides more detail on the key components of the Transport Vision, including major investment proposals; and
- **Section 4.5** discusses the responses to the consultation on the draft Transport Vision, and how these have been used to inform this final report.

4.2. Current West of England Investment Programme

The Transport Vision builds on the recent and current transport investment programme in the area:

- Programmes to facilitate travel behaviour change and increase cycle and bus use delivered under the Local Sustainable Transport Fund, Access Fund, Better Bus Area Fund and Cycling Ambition Grant.

- The Weston Package, completed in 2015, is already delivering benefits: this has included improvements to the local transport network and M5 Junction 21.

- The Bath Transport Package has expanded the capacity of Park & Ride, delivered improvements to the city's bus network and reconfigured parts of the city's road network. This has substantially improved travel conditions and created more capacity to support the city's dynamic economy.

- Construction of the MetroBus network is well advanced and on opening is expected to substantially improve connectivity between the North Fringe and South Bristol.

- The Great Western Electrification Programme is underway[37]. On completion, this will provide a new fleet of diesel-electric trains connecting to Cardiff, the Thames Valley and London, with faster journeys and more frequent trains.

- Preparations for MetroWest Phases 1 and 2 continue to progress[38], which will significantly improve future rail travel across the area.

- Significant works are taking place to improve access to Temple Quarter Enterprise Zone, including a new bridge to provide access to Arena Island and reconfiguration of the road layout at Temple Gate, and work is progressing on investment in Temple Meads station.

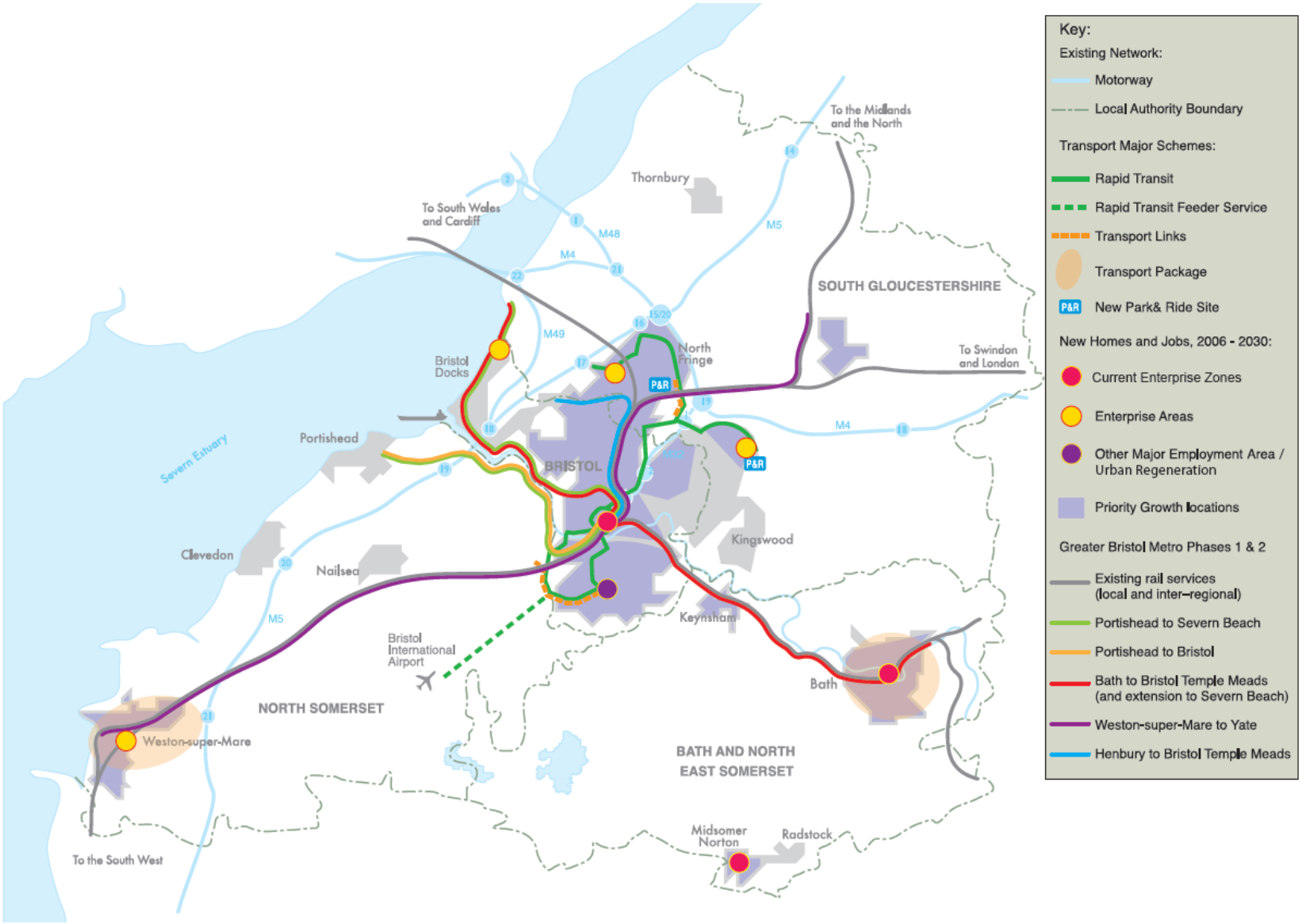
- Highways England is planning the delivery of a new M49 junction to improve access to Severnside.

- Projects funded by the West of England Growth Deal are improving access to key growth sites, for example new infrastructure to support growth in the Filton area.

Key projects, including the Weston and Bath Packages, MetroBus and MetroWest, are shown in Figure 4-1.

[37] The Government recently announced that, following significant escalation of costs of the GWEP, electrification works would terminate at Thingley Junction between Bath and Chippenham, with the new trains running under diesel traction to Bath Spa and Bristol Temple Meads. Full electrification has been deferred.
[38] Network Rail has recently reported significant cost escalations for the reopening of the Portishead line to passenger services. Work is taking place to consider the implications and re-programme the works on the Portishead line.

Figure 4-1 Existing Investment Programme



Source: West of England Local Enterprise Partnership

4.3. Overview of the Transport Vision

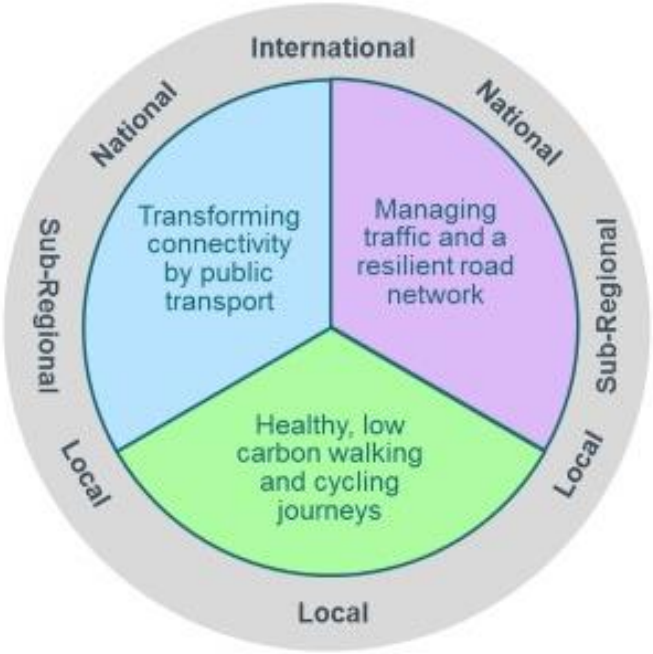
The Transport Vision will build on the current investment programme with a continued strong focus on shifting travel behaviour towards sustainable modes and tackling congestion on the road network. It will significantly accelerate investment to transform the ways that people travel in future in the West of England. It will more than double the trips made by cycling and public transport, resulting in a significant reduction in the mode split for journeys by car: mode split targets are presented in Chapter 12.

It sets a target for no overall increase in the number of trips by car across the sub-region in the context of 105,000 new homes being delivered by 2036. The Vision is required to unlock the delivery of new homes and jobs, improve economic performance and competitiveness, tackle health and inequality challenges and support the delivery of ambitious CO_2 reduction targets.

The Vision has a strong emphasis on integration of different modes, with complementary roles for walking, cycling, different forms of public transport, travel by car and freight. It comprises a series of complementary measures that are designed to improve travel choices and support mode shift to active forms of travel and public transport. This will help to reduce car traffic and respond to the growth in travel with more people living and working in the area. It also considers the different needs of local, sub-regional, national and international travel demands.

The concept is shown in Figure 4-2.

Figure 4-2 Concept of Transport Vision



A step change in the number of healthy, low carbon walking and cycling journeys

Active travel will be promoted for shorter and intermediate-length journeys, with roadspace reallocation to improve conditions for walking and provide safe, direct routes for cycling. This will have multiple benefits in helping to tackle congestion by removing car trips and encouraging more efficient use of limited roadspace, reducing carbon emissions from intermediate trips and promoting higher levels of physical activity.

Transforming connectivity by public transport

A fully integrated public transport network will be developed, with significant improvements to the bus network to cater for most journey needs, complemented by an expanded MetroBus network, a new mass transit network, Park & Ride and enhanced rail services catering for the full range of journey needs in the West of England. This will also deliver significant reductions in congestion and reductions in carbon emissions by reducing a wide range of car journeys, many of which are currently made by car because of the lack of public transport alternatives.

Managing traffic demand and a more resilient road network

Significant investment in the road network will support the ambitions for changing people's travel behaviour, through enabling reallocation of roadspace to walking, cycling and public transport on congested urban corridors and directing traffic to more appropriate corridors. New and improved road infrastructure will be designed to support the needs of pedestrians, cyclists and public transport users, including multi-modal transport corridors to support the ambitious growth proposals in the area and to unlock the economic potential of areas including South Bristol.

It will be necessary to consider how to more proactively manage traffic demand, particularly in congested centres and corridors. A combination of a Workplace Parking Levy and Road User Charging would help to encourage mode shift and improve the performance of the transport system. There will also be a more proactive approach to the management of freight, to tackle the challenges of increased goods vehicles in urban areas, with an increased emphasis on rail freight and new approaches to urban logistics.

Effective connectivity at the local, sub-regional, national and international scales

The Transport Vision has a strong emphasis on local, sub-regional, national and international connectivity, with analysis of connectivity needs at different geographic scales. It has considered connectivity to Bristol Port and Bristol Airport, the national road and rail networks serving the West of England, and the complex local transport networks serving the area. Integrated multi-modal packages of measures have been developed to meet the needs of different parts of the West of England. This will ensure a seamless approach to future travel, with a strong focus on the needs of the different groups of customers using the network.

Central to the Transport Vision will be changing travel behaviour, in which people become less habitualised in using cars, effective travel choices are provided and people understand the choices that are available. This will require significant investment in new infrastructure to provide these choices, and marketing, communications and technology to facilitate this change in behaviour.

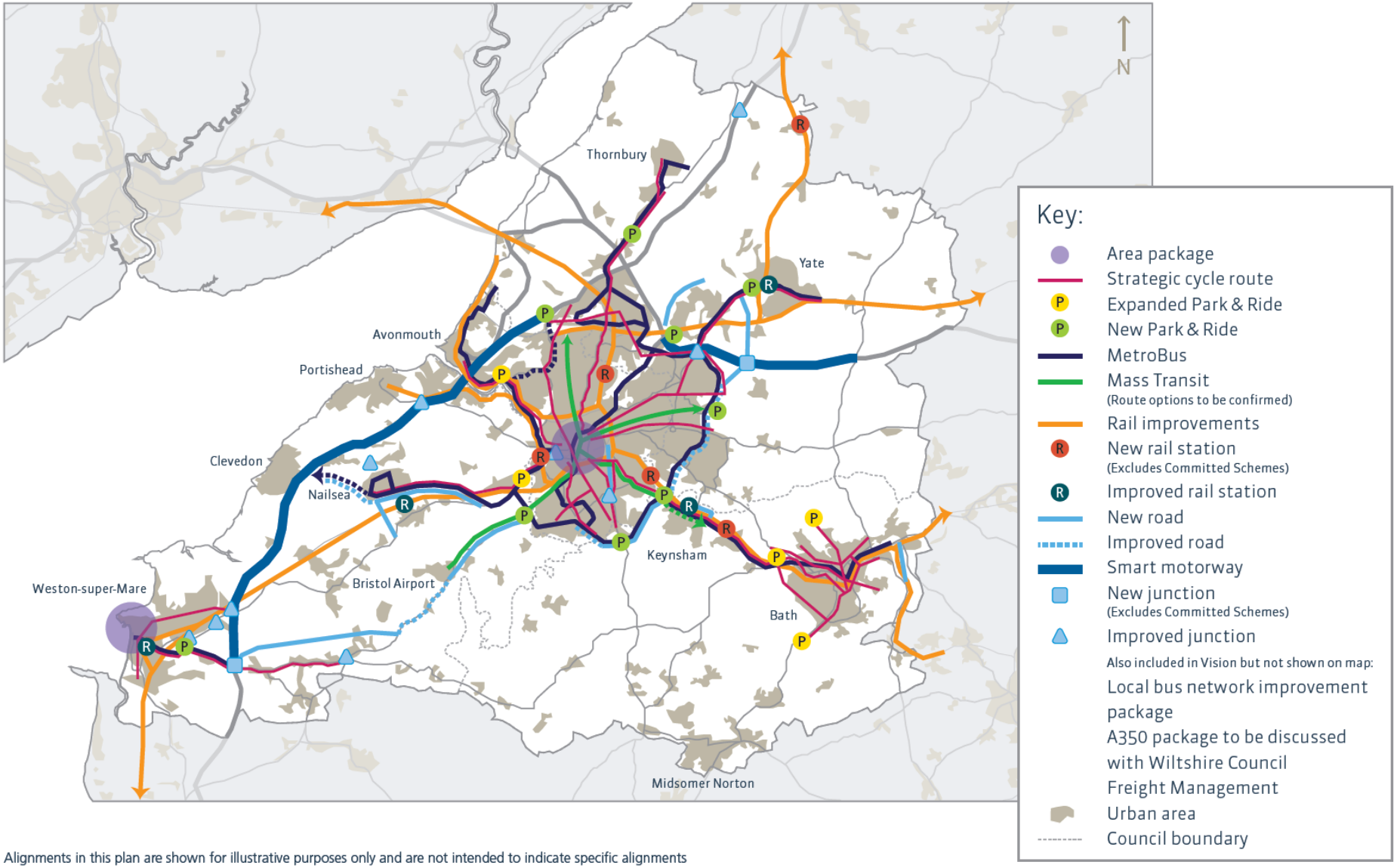
Table 4-1 provides an overview of the Transport Vision.

Table 4-1 Overview of the West of England Transport Vision

Component	Description
Technology and Smarter Choices	Behaviour change will be critical to ensure that people consider more sustainable forms of travel: walking, cycling, public transport and car-sharing. Effective marketing and communications will be crucial in influencing people's travel behaviour. New technologies, including on-demand information and smart-ticketing, will also support the shift to more sustainable travel choices. Connected and Autonomous Vehicles could change the way that people use cars.
Active Travel	Walking and cycling are the healthiest forms of travel and should play the primary role in catering for short trips. The Transport Vision includes major investment in modifying the use of urban roadspace to create new strategic cycling routes across the Bristol urban area, Bath and Weston-super-Mare.
Buses	Local bus services form the backbone of the public transport network in the area. Further investment in the bus network will support continued mode shift to buses, in the urban areas and on key corridors connecting towns. The Vision includes a Bristol city centre movement strategy, Weston Bus Network and the next generation Greater Bristol Bus Network.
MetroBus	The Vision will build on the recent investment in MetroBus, with further enhancement to the existing routes and extensions to the growing communities of Nailsea, Yate and Thornbury, together with investment on the corridors to Severnside and Bath and development of new orbital connections, to create a comprehensive rapid transit system serving the area. These will be limited stop services with an emphasis on segregation from general traffic.
Mass Transit	There is a strong ambition for a higher-capacity mass transit system to serve key corridors, including Bristol city centre to the North Fringe, East Fringe and South Bristol / Airport. It is likely that a form of rail-based system would most effectively meet future needs. Constraints on the road network mean that underground running should be considered in places.
Interchange and Park & Ride	The public transport networks will in future operate as a more integrated system. Effective interchange between all modes (bus, MetroBus, mass transit and rail) will be essential. Park & Ride facilities will also intercept traffic at the edges of the urban areas to facilitate reallocation of roadspace to active modes and public transport on radial routes.
Rail	The rail network is playing an increasingly important role for travel in the area and the Vision proposes continued investment beyond the current MetroWest programme. It will be necessary to consider the needs of local and longer-distance rail services in future network planning. Bristol Temple Meads will be a critical transport hub for Bristol, the West of England and the wider region.
Road Network	The Vision would facilitate substantial mode shift from the car to other modes, but there will still be large numbers of cars on the network given the planned growth in the area. Significant investment will be required to unlock new development, tackle congestion blackspots and re-route traffic onto new transport links to facilitate reallocation of roadspace to sustainable modes in the urban areas.
Freight	The West of England is a major freight origin as home to Bristol Port and major logistics activity at Avonmouth / Severnside and in servicing the needs of residents and businesses in the area. Measures to tackle congestion will assist the logistics industry and measures will be taken to improve the routing of freight traffic, support freight consolidation and control lorries within the urban areas.
Financial Measures	There is an important role for financial measures to both help to manage travel demand and to generate new sources of funding to help deliver the Transport Vision. The two main options are a Workplace Parking Levy and Road User Charging. Road User Charging is likely to have a more significant beneficial impact in reducing general traffic movements and generating larger amounts of revenue to be reinvested back into funding the Transport Vision.

Figure 4-3 shows a map of the schemes in the Transport Vision. Table 4-2 illustrates how the elements of the Vision support the five goals, with strong areas of support for the goals highlighted in the table.

Figure 4-3 West of England Transport Vision



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments

Table 4-2 Strength of Support for the Goals

Component:	Support economic growth	Reduce carbon emissions	Improve quality of life & natural environment	Contribute to better safety, health & security	Promote accessibility
Technology and Smarter Choices	✓✓	✓✓	-	✓	✓✓
Active Travel	✓✓	✓✓	✓✓	✓✓✓	✓✓
Buses	✓✓	✓✓	✓	✓	✓✓✓
MetroBus	✓✓	✓✓	-	✓	✓✓
Mass Transit	✓✓✓	✓✓	✓	✓✓	✓✓
Interchange / Park & Ride	✓✓	✓✓	-	✓	✓✓
Rail	✓✓	✓✓	✓	✓	✓✓
Road Network	✓✓✓	✓	×	✓✓	-
Freight	✓✓	✓✓	✓	✓✓	-
Financial Measures	✓	✓✓	✓✓	✓✓	-
Overall Impact	✓✓	✓✓	✓	✓✓	✓✓

✓✓✓	Large positive impact
✓✓	Moderate positive impact
✓	Slight positive impact
-	Neutral
×	Slight negative impact
××	Moderate negative impact
×××	Large negative impact

4.4. Components of the Transport Vision

This section describes the components of the Transport Vision described in Table 4-1 and identifies the major investment proposals in the Transport Vision. Further information is provided throughout the report to describe the geographic elements and the specific components of the Vision:

- Chapters 5 to 9 describe the components of the Transport Vision in terms of four geographic quadrants (south west, south east, north east and north west) and Bristol at the heart of the network;
- Chapter 10 discusses the international gateways: Bristol Port and Bristol Airport;
- Chapter 11 discusses national and regional connections by rail and road; and
- Appendix A describes in more detail the major investment proposals. The major investment proposals are highlighted as shaded boxes throughout the text.

4.4.1. Technology and Smarter Choices

The Joint Transport Study considered the potential impacts of evolving transport technology on travel behaviour. This includes recent and new developments such as electric vehicles and alternative fuel sources, connected and autonomous (driverless) vehicles (CAVs), on-demand public transport and 'Mobility as a Service'[39].

The availability of the internet and faster broadband services have had an impact on the need to travel for journey purposes such as commuting and shopping. The 2011 Census showed that 5.5% of workers in the West of England work from home, which increased in the decade between 2001 and 2011. The highest proportions of people working from home tend to be in more rural areas, reflecting more home-based businesses. The largest increases in home-working over this period also tended to be in more rural areas.

ONS data indicates that working from home is strongly associated with certain sectors, including technology and professional services. Working from home is less common where face-to-face contact with customers forms an integral part of the job role, including retail, health and education. It is generally more common in more senior roles, in which managers and professionals have greater autonomy over their work.

In the West of England, there are higher levels of home-working in the more rural areas, and in parts of Bristol and Bath where there are higher numbers of professionals and managers. In future, technological advances will mean that many functions can be performed without the need to be present in a physical workplace. However, there will still be practical constraints to the potential scale of home-working, including the requirement for face-to-face contact in many job roles and the extent to which managers are prepared to give autonomy to their staff. The scope for increasing home-working in the future will therefore depend, in a large part, on the future nature of work itself.

The internet has had major impacts on shopping patterns. However, these impacts are complex: internet shopping has resulted in large increases in home deliveries and van traffic is consequently forecast to increase rapidly in the future.

There are significant differences in broadband coverage between different parts of the West of England. The limitations of broadband coverage in some rural areas are a constraint to promoting greater home working from these areas. Improved broadband coverage will help facilitate greater home working and help relieve pressures on the transport network, particularly by avoiding the need to make journeys during peak periods.

New technologies are resulting in increased uncertainties about future patterns of travel behaviour. Whilst some technologies could reduce the need to travel for some journey purposes, other technologies could result in more vehicle traffic, for example new groups of people having access to autonomous vehicles. This will mean increasing uncertainty about the implications for travel demand. However, the evidence indicates that the growth in the numbers of people living and working in the area will result in significant growth in demand for travel, including car traffic.

[39] 'Mobility as a Service' can be described as a shift away from ownership of personal forms of transport (e.g. cars) towards mobility solutions that are consumed as a service.

Smarter Choices

New technologies offer the opportunity to significantly shift travel behaviour, from single-occupancy car use to car-sharing, public transport and walking and cycling. This will include new media for providing information on travel choices, with continued development of app-based platforms, helping people to make informed choices based on real-time travel conditions. It will also include new payment and ticketing technologies, with a focus on smartcards and mobile ticketing (which has already been introduced by First Group).

More generally, there is clear evidence that programmes to influence travel behaviour have the potential to deliver large benefits in terms of congestion impacts, improved air quality and health benefits from increased active travel. These campaigns are particularly effective when people are making significant transitions in life – moving from primary to secondary school, starting university, starting new jobs and moving home – when they are open to considering new travel choices. Workplace Travel Plans will also continue to be important in influencing travel behaviour for commuting during peak periods. This will need to move beyond major employers, to improve engagement with smaller businesses, to help influence behaviour of larger numbers of commuters during the peak periods.

The Transport Vision confirms the need for long-term sustained funding of smarter choices programmes to drive behaviour change. These will be important in influencing people's travel choices and will be essential in complementing the investment in new infrastructure for active travel and public transport.

Connected and Autonomous Vehicles

The advent of connected and autonomous vehicles (CAVs) could mean major changes in the management of the road network. It could mean a progressive reduction in the need for parking at people's destinations, as shared vehicles then drive away and are used by other people. City centre car parks could instead be redeveloped for commercial or residential uses. On-street parking could be removed or reduced significantly and reallocated for public realm, cycling routes or public transport priority lanes. CAVs would be expected to communicate with each other to enable greater efficiency in how the road network is used. However, the systems would need to take account of the needs of pedestrians and cyclists, and there would be a continued presumption in favour of prioritising public transport.

These questions are already being considered with the ground-breaking VENTURER[40] and FLOURISH[41] projects, with the ambition for the West of England to become a European leader in the progressive roll-out of new technologies and new forms of mobility. The Transport Vision has considered these major changes in mobility, including changes in future trip rates reflecting the impacts of technology on demand for travel.

There are major uncertainties about how new technologies will impact on future travel behaviour. CAVs could extend the benefits of car access to new groups of potential users, including older people, increasing the pressures caused by increased numbers of cars on the network. However, a future move to *shared* mobility will change models of car ownership, particularly in the urban areas, which will strongly support a shift to active travel and public transport. This has been taken into account in estimating future trips by mode.

4.4.2. Active Travel

Walking is the most sustainable form of travel, requiring no vehicle, with physical activity being the main feature of the journey. It is arguably the most viable form of travel for short journeys within communities and can be an attractive option for most journeys of at least one mile. Within the main urban areas, particularly Bath and inner Bristol, it is already highly popular for commuting and other day-to-day travel needs. Walking will become even more important with the emphasis on Urban Living in the Joint Spatial Plan. This focus on intensification of development in the Bristol urban area, Weston-super-Mare and Bath will result in shorter journeys for which walking should be an attractive option. However, this will require continued investment to improve the attractiveness of walking, including local traffic management schemes, improved wayfinding, pedestrian crossings and effective maintenance of footways.

The popularity of cycling has increased significantly in recent years, particularly within Bristol, due to people's desire to incorporate cycling into their daily lives and in response to significant investment in cycling facilities. It can be an attractive option for journeys up to five miles, but encouraging more cycling is dependent on several factors. Significant progress has been made in providing more cycle parking at destinations, together with changing facilities at several major employers. However, more is needed to

[40] For further information refer to http://www.venturer-cars.com/
[41] For further information refer to http://www.flourishmobility.com/

create safer, more attractive facilities on the road network, including providing segregated lanes and adequate facilities at junctions.

There is a strong case for improving facilities where there are already large numbers of cyclists (e.g. Gloucester Road in Bristol). In addition, measures are required to improve the attractiveness of cycling where it is currently less popular but there is potential to encourage mode shift. It is important to recognise the constraints caused by steep hills, particularly Bath and parts of Bristol. This will constrain the ability to encourage large volumes of cycling in places with more hilly terrain. However, future adoption of electric bikes (e-bikes) could help to mitigate the effects of slopes in some cases.

There was strong support in the Issues and Options consultation for walking and cycling investment. The Vision has a strong focus on active travel – both walking and cycling – particularly within the urban areas. This will build on the recent success of Cycling City and other programmes in increasing active travel. It also makes provision for strategic cycling routes connecting to key towns, together with major radial and orbital routes in the urban areas. The delivery of improved cycling routes on some corridors will require reallocation of roadspace and/or traffic restrictions, which will require some difficult decisions by the local authorities.

The Transport Vision proposes transformational investment in the cycle networks in the Bristol urban area, Bath and Weston-super-Mare.

Greater Bristol Cycle Network	New strategic cycling routes across the Bristol urban area, with routes extending to Nailsea, Thornbury, Yate and Bath. The package includes reallocation of roadspace on major arterial routes and traffic management measures, complementing investment in quiet routes and off-road network, to create a comprehensive, easy to use network for journeys across the urban area.
Bath Cycle Network and City Centre Package	Focus on east-west corridors through the city, with reallocation of roadspace and off-road network, to create a high-quality network through the city, complemented by improved permeability and investment in public realm in the city centre.
Weston Cycle Network	Focus on east-west routes from Worle and Weston Villages to town centre, with reallocation of roadspace in Worle and provision of segregated routes in Weston Villages.

4.4.3. Public Transport

At present, public transport has a relatively limited capacity in catering for the travel needs of much of the West of England. The public transport mode share for travelling to work is lower than most other comparable city regions, with relatively low levels of use of buses and trains. There have been major improvements in bus services in the last decade, including the Greater Bristol Bus Network, and further recent investments by operators. In responses to these improvements there has been a significant increase in bus travel (as shown in Figure 3-3 in Chapter 3). However, the overall mode split for travel by bus is still lower than many other core city regions. Rail demand has also increased reflecting a wider national trend although the Severn Beach Line has recorded the second highest growth in the country.

There was strong support in the Issues and Options consultation for improved public transport – both bus and rail. The Vision will build on the current MetroBus and MetroWest programmes and develop an integrated public transport system, which will enable much easier movement around the West of England (and to/from neighbouring areas) using a combination of public transport modes. This will incorporate a combination of bus, MetroBus, new forms of mass transit and heavy rail together with improved integration between the different modes.

Bus Network

There will be continued investment in the bus network, with faster, more frequent, more reliable and more convenient journeys, modern bus fleets and high quality waiting facilities. On-demand information will enable users to make informed choices and improved interchange will enable more journeys to be made by bus. The focus on Urban Living in the Joint Spatial Plan is likely to significantly increase demand for travel on the bus networks in Bath, Weston-super-Mare and Bristol. The extension of Bristol city centre into the Temple Quarter Enterprise Zone will require significant changes to the bus network in the city centre. This will be addressed through a Bristol city centre movement strategy as part of the Transport Vision.

A local bus network package is proposed, to build on the success of the Greater Bristol Bus Network (GBBN) by further raising the quality of the local bus network, focusing on improvements to vehicle specification, stops, traffic management, smart and integrated ticketing, and bus priority. This will include a focus on the designation and improvement of interchanges between radial and orbital local bus services. In most cases these will be on the road network, and in many cases the stops will not be in the same places (for example on separate arms of junctions between roads). It will therefore be necessary to ensure that stops are within very short walking distance, with good wayfinding (including maps and local signage) and easy crossing facilities at junctions. These should be designed for people with diverse needs to ensure that the interchange facilities are accessible to all.

The Transport Vision proposes major investment in the bus networks, building on the success of previous investment in the GBBN, together with the City Centre Movement Strategy and a new Weston Bus Network.

Greater Bristol Bus Network 2	Further enhancements to the sub-regional bus network, including improved vehicle specification, upgraded stops (consistent with MetroBus standard), ticketing and bus priority. Enhanced interchange facilities across the network.
Bristol City Centre Movement Strategy (City Centre Framework)	Reconfiguration of road network in city centre to give greater priority to walking, cycling and buses and redefined traffic routings, with improved journey reliability by all modes. Significant reconfiguration of bus routings to improve journey speeds and reliability.
Weston-super-Mare Bus Network	Redesign of bus network to accommodate the requirements of Weston Villages, support regeneration in the town centre and ensure effective connectivity to key destinations, including stations, Weston College and Junction 21 Enterprise Area.

MetroBus

Building on this will be continued investment in the MetroBus system. A programme of measures to further enhance the first MetroBus routes is proposed, to add further bus priorities in places where these have not been included during the current works. In addition, further work is required to renew signalised junctions to ensure that they provide effective priority to MetroBus services, particularly through the city centre.

Extensions are proposed to serve the growing communities outside the Bristol Urban Area, together with an orbital route and routes to Severnside and Bath. These will have a high level of segregation, including bus lanes and bus-only sections, high quality stops, real time information and high quality vehicles. Ticketing is a vital consideration: cash payments on buses cause significant boarding delays, which impact on service reliability. As for the first MetroBus routes, off-board and smart ticketing will therefore continue to play a key role to ensure rapid boarding of MetroBus vehicles.

MetroBus in Weston-super-Mare	Route connecting Weston Villages, Junction 21 Enterprise Area and proposed Park & Ride site at A370 / A371 junction.
MetroBus to Clevedon and Nailsea	Route from Clevedon and Nailsea to Bristol, supporting new growth at Nailsea, using Long Ashton Bypass and new transport link (see Section 4.4.5) from Long Ashton to Nailsea.
MetroBus to Severnside	Route following A4 Portway to city centre, serving Portway Park & Ride and expanded employment areas in Avonmouth/Severnside. This could also be used by a feeder service from the A4018 Park & Ride site, running via Canford Lane and Sylvan Way.
MetroBus to Thornbury	Route via A38, serving Thornbury, new development on the A38 corridor and new Park & Ride site north of Almondsbury, connecting into the North Fringe to Hengrove route at Aztec West to city centre.
MetroBus to Yate	Route via A432, serving new development west of Yate, and serving new Park & Ride site at Nibley, connecting into the North Fringe to Hengrove route west of Emersons Green.
MetroBus to Keynsham, Saltford and Bath	Route via A4, connecting from Hicks Gate, with the option to run along the Keynsham Bypass, through Saltford Village (with bus priority on the approaches to the village) and then running through Bath to the east of the city. This scheme is incorporated into the Mass Transit route to Bath, described below.

Orbital MetroBus	Route connecting South Bristol to Emersons Green via Ring Road, serving new development at Whitchurch and new Park & Ride sites at Whitchurch, Hicks Gate and Warmley.

Mass Transit

Whilst rapid transit can be delivered in the form of a bus-based mode, the ambition is for new forms of mass transit (e.g. light rail or light metro) where the potential is greatest for high passenger flows. Furthermore, on some corridors in the Bristol urban area there will be a limit to which the bus system can accommodate more demand, and new transit options will be needed to meet growing travel demand. On major corridors, rail-based mass transit should be considered to accommodate future demand (through higher operational capacity than bus-based options) and to provide the quality of service to maximise mode shift from car-based trips.

These corridors would connect the East Fringe, North West Bristol and Airport with Central Bristol. In addition, a combination of light rail and MetroBus is likely to be the most appropriate solution to meet long-term needs on the Bristol – Bath corridor. There are already a strong public transport demands on the corridors from the East Fringe, North West Bristol and Brislington. There is currently lower public transport demand on the corridor from the Airport, but this has potential to grow strongly during the next 20 years.

The mass transit proposals would be configured to complement MetroBus routes and to integrate with the existing passenger rail network. New light rail services could be introduced on some corridors by diverting through traffic onto other new or improved roads. For example, on the A4 Bristol – Bath corridor through Brislington, roadspace could be reallocated to accommodate transit services by diverting through traffic onto the Callington Road Link.

In some locations, it will be very challenging to achieve on-street running. The study has identified that it will be very difficult to achieve on-street running on the routes through East Bristol, North Bristol and through some parts of South Bristol. In these cases, some underground sections may be required, subject to consideration of costs and business case. It may therefore be appropriate to consider more innovative options, with segregated running and underground running in some sections. These would require substantial further feasibility work to identify the most appropriate options and develop business cases.

A mass transit network would form an integral part of the future public transport system and it will be critical to plan for effective interchange with the bus network, MetroBus, rail network and Park & Ride. This will be critical in enabling a much higher proportion of journeys to be made by public transport and in encouraging mode shift from cars on the most congested corridors in the Bristol urban area.

Mass Transit Bristol to Airport	Fully segregated mass transit connecting Bristol Airport and South Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to North Fringe	Fully segregated mass transit connecting Cribbs Causeway and North Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to East Fringe	Fully segregated mass transit connecting East Fringe and East Bristol to city centre, with options to be considered for underground running.
Mass Transit Bristol to Bath	Initial priority for MetroBus corridor to Bath, with longer-term ambition for light rail between the Hicks Gate / Keynsham area and Bristol city centre, to serve Hicks Gate Park & Ride and potentially beyond and Temple Meads.

Interchange and Park & Ride

Major improvements to public transport interchange within the urban areas will enable seamless transfer between the different parts of the public transport system: bus, MetroBus, mass transit and heavy rail. Interchanges should include, as a minimum, clear wayfinding between stops and platforms, sheltered waiting facilities and real time information. More comprehensive interchange facilities will be required at rail stations, mass transit stops and MetroBus stops.

This should include consideration of opportunities for developing coherent branding of the different components of the public transport network, to emphasise the connectivity options that are available. This will be particularly important as technologies continue to develop, including App-based journey planners, which highlight the opportunities for multi-modal journeys. Effective interchange will therefore play a key role

in developing an integrated public transport system for the West of England, in which the components work together seamlessly to meet the connectivity needs of the sub-region.

Bristol Temple Meads is recognised as requiring improvement to interchange between public transport modes. The future development of mass transit services, including surface-running trams along the A4 and mass transit routes from North Bristol, East Bristol and the Airport, will require effective interchange at Temple Meads. Consideration should be given in all cases of how trams and mass transit services could penetrate Temple Meads station, including capturing opportunities from underground running.

On the edges of the urban areas, Park & Ride sites will play an important role in catering for people living outside of the urban areas who do not have easy access to public transport near to where they live. It is recognised that they will need to drive for part of their journey, but Park & Ride would give them the opportunity to transfer to public transport for their onward journey into the urban areas. The Park & Ride sites will also facilitate interchange between new radial and orbital bus and MetroBus services, allowing people to easily transfer between services for journeys in different directions.

The Park & Ride sites will help to significantly reduce congestion in the urban areas, freeing road capacity for walking, cycling and public transport. This will be important in supporting the urban living component of the Joint Spatial Plan by freeing roadspace for sustainable travel modes in the urban areas. The performance of Park & Ride sites will be dependent on restricting parking provision in central areas and managing the cost of parking, to ensure that Park & Ride is the more attractive option compared to driving into the central areas. It will also be important to plan Park & Ride so that traffic impacts are adequately managed around each site, and demand is not abstracted from existing bus services.

A series of new sites around the edge of the Bristol urban area will complement the existing sites. A site near M32 Junction 1 is required to intercept traffic on the strategic road network; however it is recognised that this would be very challenging to deliver. This would require provision of a suitable site with sufficient land (to accommodate at least 1,000 cars) and new access arrangements to and from the M32. Other sites will intercept more local trips into the Bristol urban area. Options for a new Park & Ride site to the east of Bath should be considered, which would complement the three existing sites serving the city, and a new site to the east of Weston-super-Mare will intercept trips entering the town from the east on the A370 and A371.

In addition, a network of smaller sites to cater for ‘Park & Share’ demand should be considered. Park & Share is where drivers meet at key places on the road network, one of the vehicles is parked and people continue the journey to the destination in one car. At present, some Park & Share activity takes place in places including Tormarton (M4 J18), Falfield (M5 J14) and on the A466 outside Chepstow. In some cases, there is inappropriate parking causing problems in some local areas. Park & Share facilities could therefore be formalised, to encourage car sharing whilst better managing the impacts in local areas. These Park & Share facilities will be located further away from the main urban areas.

Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. Includes sites on M32, A370, A38(S), A37, A4(E), A420, A432, A38(N) and A4018.
Park & Ride for Bath	Further expansion and improvement of sites at Newbridge, Lansdown and Odd Down, and consideration of options for Park & Ride to serve the east of the city.
Park & Ride for Weston-super-Mare	A new Park & Ride site east of the town centre, potentially located near to the A370 / A371 junction and served by Weston MetroBus services.

4.4.4. Rail

Around 2% of commuting trips in the West of England are currently made by train. Over the last eight years, rail passenger numbers in the West of England have risen by around 60%, which is broadly in line with national trends. The councils are currently progressing an ambitious existing package of improvements to the rail network through MetroWest Phases 1 and 2.

The Transport Vision includes a next stage of improvements to local rail services and new stations on the network. However, the future business case for further improvements would need to take account of the high costs of rail infrastructure, existing capacity constraints on the network and the relatively low base (2% mode share for commuting) for growth. The business case for major investment in providing new capacity is therefore likely to be challenging.

There is a strong case for improvements to be made to existing stations, to provide good quality waiting facilities and real-time information, ensure access to all, and improve personal security through lighting and good design. There will be a requirement for a comprehensive audit of the access by all modes to railway stations, which would address local walking links, cycle parking facilities and interchange with local bus (and MetroBus and rapid transit) services.

All stations in the West of England – both new and existing – should be provided with highly visible signage and branding consistent with the ambitions for a much higher-profile for the rail network serving the city region. This branding, which should also be used on future rolling stock, would be independent of the Train Operating Company and should be included in future franchise requirements.

It is important to recognise the constraints in the capacity of the rail network and the needs of both local and longer-distance train services in the area. The Great Western Electrification Programme will improve journey times to London, Thames Valley and South Wales, but it is also important to recognise the importance of effective rail connectivity to the Midlands, the South West Peninsula and the South Coast. There are significant capacity constraints on the rail network and difficult decisions will be required about how limited track space is used for rail freight and local and longer-distance passenger trains. It is therefore recommended that a wider operational review is undertaken of the timetabling of local services, to improve network efficiency and to assess the effectiveness of services in meeting future connectivity needs.

The redevelopment of Temple Meads station will primarily promote sustainable transport choices for trips to and from the station and surrounding area. There is a longer-term aspiration for the return of rail services into the ‘Passenger Shed’ to increase platform capacity, which would also facilitate some improvements in local frequencies further afield. The Vision also has a strong focus on Temple Meads as a critical transport hub for central Bristol, West of England and wider region, providing interchange with the mass transit and MetroBus networks.

The area is a major hub for Great Western and CrossCountry rail services as well as a limited number of South West Trains services. However, limitations of track capacity will pose constraints to future enhancements to the rail network beyond the current MetroWest programme. Careful consideration of future priorities will therefore be required. The West of England authorities will need to work with Network Rail to consider the case for better rail services to different locations including Oxford, Birmingham and the South West, with a focus on improved connectivity to better meet the needs of business users to more easily connect with other growing cities. Chapter 11 considers in more detail the issues and interventions on the rail network. Rail freight is considered in Section 4.4.6 below.

New Stations Package	New stations proposed at Constable Road, Ashton Gate, St Annes, Charfield and Saltford, with supporting infrastructure including waiting facilities, real time information, cycle parking, bus stops and car parking.
Service Improvements and Station Upgrades	Target for all stations to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding.

4.4.5. Road Network

The Transport Vision has the ambition to support a substantial mode shift to active travel and public transport, but it is likely that a large proportion of journeys will continue to be made by car. The Vision seeks to reduce the dominance of cars in the main urban areas, to build a ‘virtuous circle’ in which walking, cycling and public transport are increasingly attractive. It will therefore be necessary to carefully manage traffic in the urban areas, including avoiding ‘pushing’ traffic from radial routes into local neighbourhoods.

It will also be necessary to better manage traffic across the sub-region to tackle congestion, reduce the impacts of traffic on local communities and provide greater resilience in the network. The approach to future network management should consider the needs of all road users, with an appropriate balance identified between different users based on the function of each road. This should include pedestrians, cyclists, other non-motorised users (including equestrians in some places), mopeds and motorcycles, buses, cars and goods vehicles.

Effective maintenance of the road network will play a critical role. This should be underpinned by long-term asset management planning, in which maintenance is planned, with intervention to keep road surfaces,

pavements and structures in good condition before failures (such as potholes) occur. This will ensure an effective spending programme, reducing the requirement for major maintenance of failed assets. It will also ensure a good level of services for different users, including more vulnerable users such as pedestrians (avoiding trips and falls) and cyclists (loss of control over potholes). Maintenance programmes should, where possible, also incorporate measures to reallocate roadspace towards active modes and public transport.

4.4.5.1. Radial capacity in urban areas

Highway capacity on radial routes into the centres of Bristol, Bath and Weston-super-Mare is constrained and in most cases in Bristol and Bath there is no space for road widening. It is necessary to consider the different needs of pedestrians, cyclists, buses, on-street parking, deliveries and general traffic. 'Quick wins' for reallocating local road space to sustainable modes have already been delivered through schemes such as the GBBN. Further substantial improvements to public transport and cycling corridors will be increasingly dependent on complementary restrictions on through traffic movement.

Improved orbital highway links, enabling traffic to divert around the Bristol urban area, will provide the opportunity to deliver improvements to cycling and public transport by re-routing through traffic away from the most congested urban radial routes. The A4 Bath Road corridor has the strongest potential for this approach, with the ability to divert through traffic onto the Callington Road Link.

However, this approach will not be possible on other routes, such as A420 Church Road in East Bristol and A38 Gloucester Road in North Bristol. These two corridors both carry a high proportion of local car trips and there is less potential to reduce through traffic movements. Modelling work has shown that the introduction of traffic restrictions on these two corridors could result in diversion of traffic through residential streets, causing a large rise in overall journey times and significant increases in severance and other problems in the affected areas.

Analyses indicate that it will necessary to introduce new options (such as road user charging) to effectively manage future demand, particularly in the inner parts of the Bristol urban area. This is discussed in Section 4.4.7.

4.4.5.2. Sub-regional and strategic road connections

The West of England is at the gateway to the South West and South Wales and the motorway network plays a critical role in meeting the needs of both local and long-distance trips. Bristol Airport is the main gateway for air travel in the South West and South Wales, but suffers from poor strategic road connections. The Transport Vision therefore proposes major improvements to road (and rail) access to the Airport. Bristol Port is one of the UK's most important ports. It benefits from direct access to the M5 at Junctions 18 (Avonmouth) and 19 (Portbury), which provide high quality connections to/from the rest of the UK for transport of imports and exports. However, there are issues with traffic queues at Junction 19 and regular congestion on the Avonmouth Bridge.

The M4 and Severn Crossings are critical to the economy of South Wales and the M5 is the only motorway serving the South West peninsula, with particularly heavy traffic heading towards Devon and Cornwall during holiday periods. There is severe recurrent congestion on the M4 between Junctions 19 and 20 and the M5 from Junctions 14 to 17, which impacts on both local and long-distance journeys, and is forecast to worsen in future. Traffic from South Wales is forecast to grow rapidly following the planned removal (before the end of 2018) of tolls on the Severn Crossings[42] and traffic being 'released' by the new M4 south of Newport.

As highlighted in Section 3.4, the economic impacts of increased congestion resulting from more traffic using the Severn Crossings could offset the benefits of the removal of the Severn Tolls. There is, therefore, a strong case for intervention in the West of England to tackle the effects of this increased congestion and secure the full benefits of the removal of the tolls, for both sides of the Severn.

The M4 / M5 interchange is a critical point in the network of the whole region, with limited options for further improvement. It will be necessary to encourage a significant shift onto alternative modes: rail for longer distance trips from South Wales, Gloucestershire and Somerset and mass transit and MetroBus for more local travel.

[42] The Government announced in July 2017 that tolls would be removed by the end of 2018, which is forecast to result in increased traffic flows on the crossings and onto the M4 and M5 on the West of England side of the estuary.

There are also shortcomings in road connections to other destinations, especially north-south connections through the area. The West of England is working with neighbouring authorities to develop the case for improved connections to the south coast, including the A36 and A350 corridors passing through or near the area. In addition, the Vision will support improved connectivity to Hinkley Point C. As one of the UK's largest infrastructure projects, this will require a large labour force, and the West of England will play a key role in meeting these needs. Chapter 11 addresses in more detail the issues associated with strategic road connections.

The Transport Vision is based on an ambitious agenda of changing travel behaviour to reduce dependence on the car. The greatest opportunities to secure behaviour change will be in and around the urban areas, but the geography of the area means that there will continue to be high levels of car use in the more rural areas and on the main road network. Growing demand will mean that there will continue to be challenges with traffic congestion and resilience in the network. A series of targeted highway improvements has therefore been identified to tackle specific congestion problems and to significantly improve the future resilience of the road network.

The analyses in the study have also identified the requirement for significant improvements to connections across the sub-region. Improved connections will be required in North Somerset, to tackle existing problems of poor access to Bristol and the Airport from the south, and to facilitate growth in the Nailsea area. Growth in the Yate area will necessitate improved transport connections to the North Fringe, including a bypass for Winterbourne and Frampton Cotterell. Improved connections will also be required around the south of the Bristol urban area, to reduce traffic passing through the urban area, facilitate reallocation of roadspace and to support growth in the area.

East of Bath Link	New highway link connecting the A36 (south of Bathampton) to A363 (near Bathford, south of A4 roundabout) or the A4, to provide a high-quality north-south route connecting the A36 and A46 to the east of Bath, either single or dual carriageway. This route will enable north-south traffic to avoid passing through Bath.
Winterbourne Frampton Cotterell Bypass	New transport corridor to bypass Winterbourne and Frampton Cotterell on B4058, to improve traffic routing from Yate and to relieve congestion in the villages.
M4 Junction 18A to Ring Road	New motorway junction and road connection to A4174 Ring Road to improve resilience of the network and unlock economic growth in the East Fringe.
M4 Junction 18A to Yate	A new transport link from the proposed M4 J18A to A432 near Yate will help unlock economic growth in the town. This is dependent on prior delivery of the new J18A motorway junction with a connection to A4174 Ring Road.
South Bristol Orbital Corridor	New multi-modal transport corridor (highway, MetroBus, cycle route) connecting A4 Hicks Gate, A37 south of Whitchurch and A4174 Hengrove Roundabout to improve accessibility to South Bristol and unlock growth in the south of the city.
M5 Junction 21A to A38 Corridor	New multi-modal corridor connecting new J21A at Weston with A38, together with major improvements to A38 between Langford and South Bristol, to improve connectivity to Bristol Airport and South Bristol and overall network resilience.
Nailsea Corridor Improvement	Multi-modal corridor improvement (highway, MetroBus, strategic cycling route) between Bristol / A370, Nailsea and connecting to Clevedon / M5. Focus to the east of Nailsea, joining the A370 west of Long Ashton, with a new crossing of the railway line west of Backwell to join the A370. This will help to unlock growth at Nailsea and improve connectivity and travel choices between Nailsea and Bristol.
Smart Motorway: M4 Junction 18 – Junction 19	Smart Motorway to accommodate future traffic flows between J18 and J19 and to facilitate traffic movements generated by new J18A.
Smart Motorway: M5 Junction 17 – Junction 21A	Smart Motorway to accommodate future traffic flows and to facilitate improved management of incidents, to be integrated with new J20 and J21A links.

M5 Junction 14 Improvements	Capacity improvements at M5 J14 to address existing problems and issues caused by growth in Stroud and the Joint Spatial Plan. Significant improvements are identified to tackle the problems of queueing on the slip roads.
M5 Junction 19 Improvements	Capacity improvements at M5 J19 to address problems of queuing traffic on the M5 southbound slip road (to reduce disruption to traffic on the Avonmouth Bridge) and delays for traffic joining the M5 northbound.
A4 to Avon Mill Lane Link	New highway link from the A4, east of Keynsham, crossing railway to connect to Avon Mill Lane and A4175 north of Keynsham. This will improve traffic routing around the east of the town and will facilitate access to new development north of Keynsham.

4.4.6. Freight

The West of England is a major freight origin and destination. Bristol Port is a major international gateway and Avonmouth / Severnside is an important logistics hub, which benefits from proximity to the Port and direct access to the motorway network. This area is forecast to grow significantly, which will be assisted by the planned opening of a new junction on the M49, resulting in increased goods traffic in this area. There are also high volumes of through traffic on other major roads, many of which pass through the Bristol and Bath urban areas. Significant increases in light goods traffic are also forecast, servicing the needs of both households and businesses.

The Transport Vision includes schemes to tackle road congestion, which will also benefit freight movements, particularly to and from Bristol Port. It also supports the provision of capacity improvements to help facilitate rail freight movements on the strategic network, including those enabled through electrification.

The Vision makes provision for improved routing of freight traffic and strengthens the approach to managing freight into the urban areas, particularly given the importance of tackling air quality problems through future implementation of Clean Air Zones. This would need to give renewed focus to consolidation of freight, with support for the existing centre at Avonmouth and exploring options to reduce the number of goods vehicles entering Bath.

4.4.6.1. Rail Freight

There are significant opportunities to reduce the dependence on lorries for movement of freight to and from the West of England, which will help to tackle congestion and improve air quality and road safety. There is potential for a new rail-based rail freight facility at Avonmouth, which could form part of a multi-modal interchange with good access to both the motorways and long-distance rail networks. At present, loading gauges in the West of England are a constraint to the movement of more rail freight: improved loading gauges have the potential to increase rail freight capacity in the area by enabling more containers to be transported within the same train path without the need for additional trains. In addition, there is also the opportunity to transport smaller items from outside the West of England to Bristol Temple Meads, from where they could be transported to destinations in the city centre and beyond using cargo bikes and other low carbon freight options.

4.4.7. Financial Measures and Other Controls

There is clear evidence that increasing numbers of cars and goods traffic will have detrimental impacts on the economy, environment and people's wellbeing. The components described above will facilitate significant mode shift, tackle congestion and improve resilience on the transport network, but there is also an important role for financial and demand management measures within the Transport Vision. These measures will help both in managing travel demand and in generating a new source of funding for the Transport Vision.

The availability of parking plays a major role in influencing the choices that people make. Many workplaces have plentiful free parking, which strongly influences people's decision to drive to work. Free parking at supermarkets and retail parks has significantly shaped the retail landscape in the last few decades, with people valuing the convenience that this brings for shopping trips. However, large areas of free parking result in people continuing in habitual use of cars and present a relatively inefficient use of space. On the road network, this results in space being used that could otherwise have been used for active travel, buses or essential loading requirements. On-street parking requirements will need to be considered at the corridor level but there is a strong case for more effective management of the limited space that is available. The

recent introduction of Residents Parking Zones in Bristol has resulted in residents' needs being more effectively met and has encouraged people to consider using other modes of travel.

Different options have been considered for financial tools in managing demand, including a Workplace Parking Levy and Road User Charging, which would focus on trips in the urban areas. A Workplace Parking Levy has the advantage of being relatively easy to implement and it is targeted at commuting traffic in congested areas. However, it only targets a relatively small proportion of trips and the impact on traffic demand is likely to be modest. The amount of funding that would be generated (for reinvestment in the transport network) would depend on the size of the scheme. The scheme would need to cover a large area to generate sufficient funding to make a meaningful contribution to the delivery of the Transport Vision.

Road User Charging schemes are much more complex to implement but can target a greater proportion of trips, with a much more significant impact on traffic flows and congestion. The larger number of transactions with Road User Charging also means that there would be larger amounts of new funding for reinvestment in the transport network. It is therefore likely that Road User Charging Schemes, to cover significant parts of the Bristol urban area and Bath, would have the most beneficial impacts, both in terms of impacting on demand and congestion, and in generating significant funding to support the delivery of the Transport Vision.

4.5. Consultation on the Transport Vision

Consultation took place on the draft Transport Vision in November 2016 and there were important issues raised that have shaped the components described above.

People's views on the Draft Transport Vision

The extensive consultation process provided important insights about people's views on the draft Transport Vision. It was clear that the consultation drew many responses from areas that would be affected by significant new transport schemes (and from locations identified as potential locations for new development in the Emerging Spatial Strategy). A relatively large number of responses were received from places such as east of Bath, Saltford, Nailsea, Charfield, Thornbury and Whitchurch. In some cases, strong views were expressed on schemes by people living in some of these areas. This significantly influenced people's opinions on the level of ambition in the Transport Vision and the balance of public transport investment.

The analyses indicated that almost 50% of respondents considered that the level of ambition was too low, and almost 60% did not agree with the balance of public transport investment. However, more detailed analyses indicate that there are high levels of support for the components of the Vision. This shows that people's concerns about specific projects have significantly influenced support for the Vision. Through addressing concerns about specific schemes, it is considered that it should be possible to build a high level of public and stakeholder support for the future Transport Vision.

Table 4-3 Feedback on the Draft Transport Vision

Component	Feedback
Technology and Smarter Choices	Over 70% of respondents supported marketing and education to change travel behaviour. Respondents highlighted that they wish to see an increased focus on public transport pricing, integrated ticketing for public transport (bus, mass transit and rail), support for electric vehicles and consideration of the needs of motorcyclists.
Active Travel	Over 80% of respondents supported cycle schemes and improvements to public realm to encourage more active travel and to help reduce carbon emissions. There is therefore strong support for the proposed cycling networks in the Bristol urban area, Bath and Weston-super-Mare.
Buses	Over 80% supported improvements to the bus network and area packages of improvements to walking, cycling and bus facilities. There is therefore strong support for the proposals for the Greater Bristol Bus Network 2, City Centre Movement Strategy and Weston Bus Network.
MetroBus	Over 60% supported the principle of expansion of the MetroBus network, but issues were identified with the proposals for new MetroBus routes to Clevedon/Nailsea and Thornbury. These routes will be important in supporting growth at the Strategic Development Locations in these areas and there should be engagement with local communities in the development of the proposals for these corridors.
Mass Transit	Around 70% of respondents supported the concept of light rail on key corridors connecting to Bristol city centre. However, there are significant sensitivities on the corridors to the East Fringe and Bath. These issues will need to be carefully considered in developing future options along these corridors.

Interchange and Park & Ride	Around 60% of respondents supported the concept of Park & Ride. In many cases, there were not significant numbers of comments, but there were some significant issues raised in relation to certain sites proposed in the package for the Bristol urban area, and there were high levels of opposition to the proposals for a new site to the east of Bath and some opposition to further expansion of existing sites. Following further review, a specific site in the Batheaston area would not be promoted within the Transport Vision. Further work will therefore be required to assess future options in this area.
Rail	Around 90% of respondents agreed with the principle of improving rail services and facilities, and over 80% agreed with the principle of opening new railway stations. A relatively small number of comments were received about schemes that were not included in the Transport Vision, for example re-introduction of services on the Strawberry Line and between Radstock and Frome.
Road Network	Around 70% of respondents supported the principle of improving roads and tackling bottlenecks and just over 50% supported new road connections. Comments were received about specific proposals. There were concerns raised about the East of Bath Link, Saltford Bypass, M5 J21A connection to the A38 and Nailsea Corridor Improvement. Following further review the Saltford Bypass is not being proposed as an output in the Transport Vision. The issues raised by respondents will need to be carefully considered in further developing the other proposals.
Freight	Over 50% of respondents supported the principle of freight management. The lower level of support (compared to other components) appears to reflect people having a less direct understanding of the role of freight compared to movement of people. Significant issues were raised about a potential freight consolidation centre to serve Bath. It will therefore be necessary to carefully consider different options to tackle the impacts of freight traffic in Bath and the Bristol urban area.
Financial Measures	Respondents were asked to consider if they agree with the principle of using financial incentives and financial demand management to raise funds to help pay for the Transport Vision. 40% of respondents agreed, 30% were neutral and 30% disagreed. More detailed responses were also provided by some stakeholders, and in most cases the responses were supportive.

4.6. Summary

The Transport Vision is a package of complementary schemes that will expand travel choices and improve the performance of the transport network. The Transport Vision has been developed to address current and future transport challenges towards the mid-2030s and it will support the aims of all five transport goals.

- **Smarter Choices** – new technology and travel behaviour programmes to significantly shift travel behaviour from single-occupancy car use to car-sharing, public transport and walking and cycling;
- **Active Travel –** improved facilities to improve the attractiveness of walking and cycling, including local traffic management schemes, wayfinding, increased permeability and new strategic cycling routes;
- **Bus –** improvements to local bus networks, to build on the success of the GBBN, including improvements to vehicle specification, stops, ticketing and extension of bus priorities;
- **MetroBus –** new routes, building on the current programme, and a consolidation package will ‘lock in’ the benefits through upgrading bus priorities and renewing signalised junctions;
- **Mass Transit –** focusing on the corridors with the highest potential passenger flows, the ambition is for new forms of mass transit (e.g. light rail), with facilities to interchange with MetroBus and rail services;
- **Interchange and Park & Ride** – a network of sites on the edges of the urban areas will enable interchange between radial and orbital services and intercept traffic on the edges of the urban areas;
- **Rail –** improvements to local rail services and new stations on the network, building on the ambitious MetroWest Phases 1 and 2 package of rail network improvements;
- **Road Network –** re-routing of traffic onto new transport links to facilitate reallocation of roadspace in the urban areas, to build a ‘virtuous circle’ in which sustainable modes are increasingly attractive;
- **Freight –** schemes to tackle road congestion will benefit freight movements, particularly to and from Bristol Port, to be complemented by management of freight routing into the urban area; and
- **Financial measures** – which will be needed to effectively manage future demand on the road network and generate revenue to be reinvested in delivering the Transport Vision.

The next chapters describe the Transport Vision and major investment proposals in more detail.

- **Chapters 5 to 9** describe the issues and proposals in **five different areas** of the West of England, focusing on four ‘quadrants’ and Bristol at the heart of the network;
- **Chapter 10** describes the proposals for improving access to the **international gateways**; and
- **Chapter 11** describes the issues and proposals on the **national and regional** transport networks.

5. South West: Weston-super-Mare to Bristol

5.1. Introduction

This corridor includes Weston-super-Mare, other parts of North Somerset, Bristol Airport, Portbury Dock and routes into Bristol from the south west. The evidence indicates that the priorities on this corridor are to:

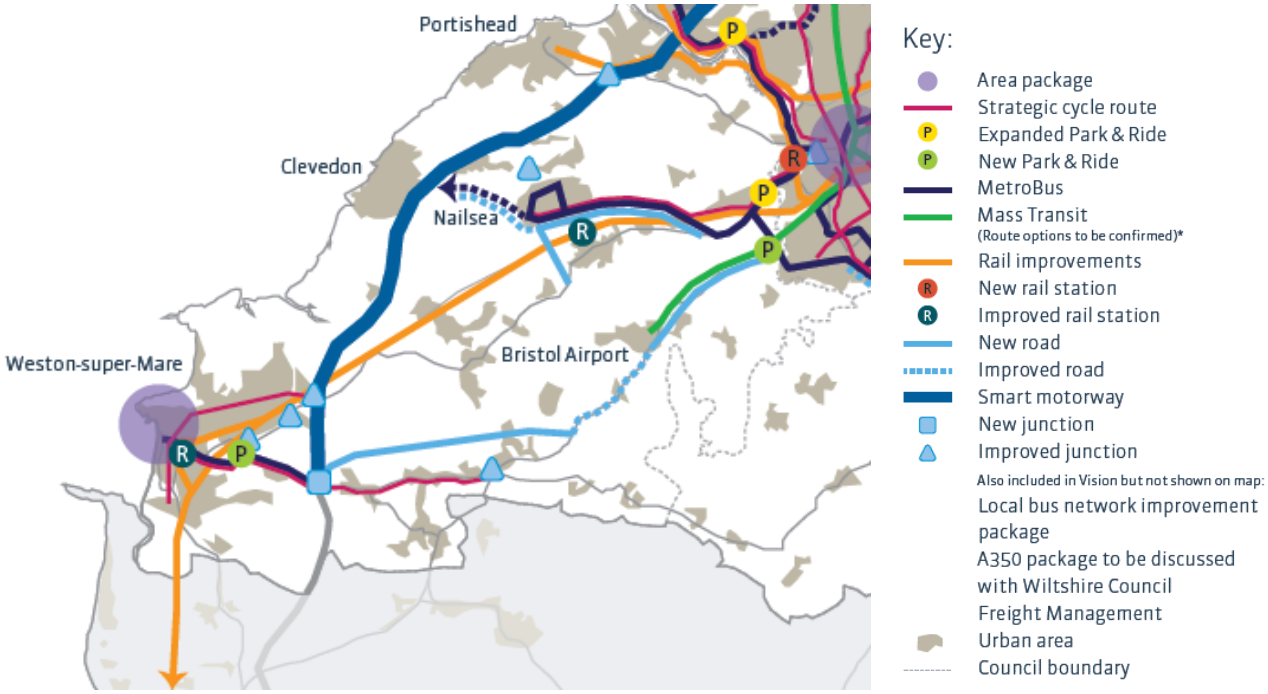
- Improve connectivity to Weston-super-Mare and key settlements in North Somerset.
- Improve strategic connectivity to Bristol Port and Bristol Airport.
- Improve regional connectivity to London, the Midlands and the South West.

The proposals in this area focus on improved connectivity to/from North Somerset, including a package for Weston-super-Mare to support existing growth commitments, a new strategic corridor from the M5 to the Airport and Bristol, a new mass transit route from Bristol to the Airport, a multi-modal transport corridor (including MetroBus) connecting Clevedon, Nailsea and Bristol, and improved orbital connectivity around South Bristol, as shown in Figure 5-1.

Extension of the Smart Motorway on the M5 from Cribbs Causeway to Weston-super-Mare will improve regional connectivity. New and expanded Park & Ride sites are proposed as an integral part of the future public transport network, including a new Park & Ride site for Weston-super-Mare.

The international gateways – Bristol Airport and Bristol Port – also create wider travel demands. Bristol Airport has a catchment that extends across the South West and into South Wales, whilst Bristol Port generates freight traffic to/from other parts of the UK. A comprehensive package is proposed to improve access to the airport both by public transport and by road. Access to Royal Portbury Dock will be improved through extension of the Smart Motorway and significant improvements to M5 Junction 19.

Figure 5-1 South West Area



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments.

5.2. Access to Bristol Airport and A38 Corridor

5.2.1. Overview

The A38 is the primary route connecting Central Bristol to the Airport and Somerset, with the A370 running parallel from M5 Junction 21. The lack of a motorway junction where the A371 (which leads to the A38) crosses the M5 results in traffic using the A370 to access the M5, or traffic using country lanes to access the motorway further north, impacting on the communities on these routes. A package is proposed for the A38 (and A368 / A371), which will provide a comprehensive solution to addressing the issues on this corridor.

There are also high traffic flows on the A370 through villages in North Somerset, and on minor routes in Bath & North East Somerset such as the B3130 through Chew Magna, creating both congestion and environmental problems in these communities. Barrow Gurney historically suffered high traffic flows between the A370 and A38. The recent completion of the South Bristol Link has significantly improved connections between these routes and is forecast to result in large reductions in traffic through the village. The additional capacity provided by the South Bristol Link will also help to accommodate some of the traffic growth associated with the expanding Bristol Airport.

However, there are significant challenges in connecting to Bristol Airport along the A38 corridor. Bristol Airport is the largest regional airport with no direct access to the Strategic Road Network (SRN). Other major airports (Stansted, Manchester, Birmingham, East Midlands) are all directly served by the SRN, and there is a focus in national roads policy on effective access to airports as international gateways. Most major (and several smaller) airports are also served by direct heavy or light rail links, which play an important role in meeting connectivity needs. To meet the future needs of the Airport it will be necessary to both improve road capacity on the A38 and transform the quality of public transport connections to the Airport.

5.2.2. Junction 21A and A38 Corridor

Forecasts indicate that congestion will increase on the A38 between the South Bristol Link and the Airport, and on the A371/A368 through Banwell. There is a strong case for investment on both the A38 and A371/A368 to tackle congestion along this route and to improve strategic connectivity from the M5 to Bristol Airport and South Bristol.

M5 Junction 21A to A38 Corridor	New multi-modal corridor connecting new J21A at Weston with A38, together with major improvements to A38 between Langford and South Bristol, to improve connectivity to Bristol Airport and South Bristol and overall network resilience. Detail is provided in scheme **Road 6** in Appendix A.

This package of highway schemes comprises a new strategic road connection between the M5 at a new Junction 21A and Langford, improvements on the route between Langford and Bristol Airport, and a major upgrade to the route between the Airport and South Bristol. The significant improvement to road connectivity between Junction 21A and Langford will also create significant capacity for new development along this corridor proposed in the Joint Spatial Plan. This will also facilitate improved facilities for active travel along the existing road corridor through Banwell, Sandford and Churchill.

The provision of a new strategic route between the M5 and South Bristol would also help to reduce through traffic on the A370 and unlock capacity for growth in Nailsea and Backwell. There will be significant benefits in reducing traffic on inappropriate routes and improving road connectivity to the south.

This route has the potential to form part of an improved road corridor, running around the south and east of Bristol, which would help to improve the resilience of the transport network in the event of major incidents. At present, in the event of incidents on the M5, drivers tend to take different routes through Bristol, which results in major problems across the city. The new route will provide the opportunity to take a much more proactive approach to future traffic management, by diverting traffic onto a more clearly defined corridor, with clearer guidance for drivers and less rat-running on unsuitable roads.

5.2.3. Public Transport to Bristol Airport

High quality public transport infrastructure, with segregation from general traffic, is needed to connect this key gateway to Bristol and the wider South West. The existing Airport Flyer bus service is currently delayed by high traffic volumes and low speeds on the A38 corridor resulting in unreliable journey times. Increasing

traffic in the future will result in a further deterioration in journey times and reliability. Bristol Airport has identified the potential for growth beyond the current 10 mppa capacity limit, which would require major improvements to public transport to provide effective access options and reduce pressure on the road network. The Transport Vision in response makes provision for longer-term investment in a mass transit connection from Bristol city centre to the Airport.

Mass Transit to Bristol Airport	Fully segregated mass transit connecting Bristol Airport and South Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 1** in Appendix A.

This concept is still at a very early stage of thinking and several factors will need to be considered in the further development of the concept. This will include work by Bristol Airport to develop robust forecasts of future potential demand and masterplanning to identify how the Airport could grow sustainably to accommodate this demand. North Somerset Council and partners in the West of England Combined Authority will then need to work together to study in more detail future surface access issues and develop an appropriate multi-modal surface access strategy.

However, at this stage, it is considered that a form of mass transit, connecting between the Airport and Bristol city centre, including Temple Meads station, will be required to provide adequate public transport access to the Airport. This mass transit line will form a key part of the wider public transport network (including other mass transit lines in the urban area) and will connect with rail services at Temple Meads.

5.3. Weston-super-Mare

There are existing congestion problems within Weston-super-Mare, with queuing along the A370, A371 and at M5 Junction 21. The current levels of planned growth in the town will mean that these problems will continue to worsen. Higher planned levels of new local employment will help to reduce the need to commute out of the town, but there will continue to be high levels of commuting towards Bristol, which will continue to place pressure on the local and strategic road network. Tackling congestion on the A370 in Weston-super-Mare should increase the attractiveness of the town to businesses seeking to relocate – this is key to reducing out commuting from Weston-super-Mare in the longer term.

The Transport Vision includes schemes that are already in North Somerset's Core Strategy, which are key to addressing challenges to 2026. It also includes an area package for the town centre (to improve public realm, walking and cycling and bus connections), strategic cycle routes to improve local connections, a MetroBus route between Junction 21 and the town centre and a Park & Ride site near to Junction 21 to intercept trips into the town. In addition, the delivery of Junction 21A will help to relieve traffic at Junction 21 and will facilitate improved connections into the town from the east.

Weston Cycling Network	Focus on east-west routes from Worle and Weston Villages to town centre, with reallocation of roadspace in Worle and segregated routes in Weston Villages. Detail is provided in scheme **Cycling 3** in Appendix A.
Weston-super-Mare Bus Network	Redesign of bus network to accommodate the requirements of Weston Villages, support regeneration in the town centre and ensure effective connectivity to key destinations, including stations, Weston College and Junction 21 Enterprise Area. Detail is provided in scheme **Bus 3** in Appendix A.
MetroBus in Weston-super-Mare	Route connecting Weston Villages, Junction 21 Enterprise Area and proposed Park & Ride site at A370 / A371 junction. Detail is provided in scheme **MetroBus 1** in Appendix A.
Park & Ride for Weston-super-Mare	A new Park & Ride site east of the town centre, potentially located near to the A370 / A371 junction and served by Weston MetroBus services. Detail is provided in scheme **Park & Ride 3** in Appendix A.
Weston A370 Package	Package of highway connectivity measures to support development in Weston-super-Mare and at Weston Villages, comprising the Airfield Bridge Link and targeted junction improvements on the A370. Detail is provided in scheme **Road 8** in Appendix A.

The Transport Vision proposes continued improvements to rail services to Bristol, which will help to improve travel choices to the Bristol conurbation and reduce dependence on the M5. In addition, there is an ambition for more direct train services from Weston-super-Mare to London via Bristol. Furthermore, there could be scope to re-brand Worle station as 'Weston Parkway'. Through the provision of effective interchange with local bus services, this could further improve the number of trains serving the Weston-super-Mare area.

Service Improvements and Station Upgrades	Target for all stations to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding. This will include major improvements to the stations at Nailsea & Backwell and Weston-super-Mare, and upgrades to Yatton, Worle ('Weston Parkway') and Weston Milton to a consistent MetroWest standard. Detail is provided in scheme **Rail 2** in Appendix A.

5.4. Nailsea and the A370, Clevedon and Portishead

From Clevedon and Nailsea there are relatively long journey times by bus to Bristol and other parts of the West of England. There are also significant problems with traffic delays on key routes, including the A370 at Flax Bourton, Backwell and Congresbury and routes through Tickenham, Wraxall and Long Ashton, which also impact on bus services. The Joint Spatial Plan proposes significant growth at Nailsea and Backwell, which will further increase travel demand in this area.

It will be necessary to substantially improve public transport connections in this area. These will include enhancements to Nailsea and Backwell station to include better integration with the local bus network and creation of a new MetroBus route to serve Clevedon and Nailsea, which will connect onto the A370 Long Ashton Bypass and the existing MetroBus network.

This will require new infrastructure in the Nailsea to Bristol corridor, to significantly improve travel choices and tackle the problems caused by delays at the traffic signals in Backwell and other roads from Nailsea joining the A370. This will include a multi-modal transport corridor, incorporating a strategic cycle route, MetroBus and new road link, connecting Nailsea to the Long Ashton bypass, and a connection from Nailsea to the A370 west of Backwell.

It will also be necessary to consider how to address the impacts of travel from Nailsea to the north and west. Traffic currently uses roads through Portbury, Tickenham and other villages, which will increase with new development at Nailsea and Backwell. A package of measures will be developed to address these impacts, with options to address the pinchpoint at Stone-edge Batch (B3128 / B3130 junction), measures to manage impacts in Tickenham and improved connections to Clevedon and M5 Junction 20.

Careful consideration should be given to the potential impacts on the M5 to avoid compromising the role of the motorway in serving strategic traffic. It will be important to ensure that opportunities are maximised for encouraging people to use public transport for journeys from Nailsea, and avoid creating short trips using the motorway. Consideration should be given to innovative techniques such as peak hour access restrictions onto the motorway to encourage use of other modes and to manage congestion.

Options should be developed in further detail, but this package has the potential to help to address problems on the A370 and at M5 Junction 19 by enabling diversion of traffic onto the new multi-modal corridor.

Nailsea Corridor Improvement	Multi-modal corridor improvement (highway, MetroBus, strategic cycling route) between Bristol / A370, Nailsea and connecting to Clevedon / M5. Focus to the east of Nailsea, joining the A370 west of Long Ashton, with a new crossing of the railway line west of Backwell to join the A370. This will help to unlock growth at Nailsea and improve connectivity and travel choices between Nailsea and Bristol. Detail is provided in scheme **Road 7** in Appendix A.
MetroBus to Clevedon and Nailsea	Route from Clevedon and Nailsea to Bristol, supporting new growth at Nailsea, using Long Ashton Bypass and new transport link from Long Ashton to Nailsea. This is considered as a specific scheme within the Nailsea corridor improvement described above. Detail is provided in scheme **MetroBus 2** in Appendix A.

In the case of Portishead, there are high levels of out-commuting to the Bristol area, and access from Portishead is via a single road, with no rail access. MetroWest Phase 1, which is committed and planned to open in 2021, will re-open the Portishead rail line, which will improve travel choices and connectivity from the town.

5.5. M5 from Bristol to the South West

The operation of the M5 between Junctions 15/16 and 21 will become an increasing challenge due to increasing volumes of traffic, both longer-distance and regional between Weston-super-Mare and the Bristol urban area. Flows are particularly high between Junctions 19 (Portbury) and 20 (Clevedon): climbing lanes have been added during the last few years but there remains a significant constraint on the split-level section by Clapton-on-Gordano where the motorway curves around the side of the hill.

In response to growing traffic and increasing levels of congestion on the motorway between Bristol and Weston-super-Mare, the Transport Vision proposes the extension of the existing Smart Motorway from Junction 17 to Weston-super-Mare. This will involve the use of technology to detect slow traffic and introduction of lower speed limits to help stabilise traffic flows. Other Smart Motorways elsewhere in England have included widening or conversion of the hard shoulder to 'all lane running'. There are likely to be major constraints to this type of operation on certain parts of the M5 – namely the Avonmouth Bridge and the split-level section. The length of treatment would be around 20 miles, which is equivalent to major Smart Motorway schemes that are currently being delivered in other parts of England, and the costs could be substantial. Careful consideration of the available options will therefore be required.

Smart Motorway: M5 Junction 17 - Junction 21A	Smart Motorway to accommodate future traffic flows and to facilitate improved management of incidents, to be integrated with new J20 and J21A links. Detail is provided in scheme **Road 10** in Appendix A.

In addition, the proposed M5 Junction 21A and A38 corridor will create a new route to Bristol and the Airport. At present, there is poor connectivity to Bristol from the south, which means that traffic uses several routes (A38 via Junction 22, A370 via Junction 21, A369 via Junction 19, and the A4 Portway). The creation of a high-quality route via Junction 21A and the A38 will reduce the need to use the M5 north of Weston-super-Mare. In addition, improved connections from Clevedon to Bristol (via the Nailsea multi-modal corridor) will help to reduce dependence on the M5 between Junctions 19 and 20. These measures will collectively help to release capacity for longer-distance movements and improve resilience of the wider network in this area.

5.5.1. Junction 19 and Royal Portbury Dock

Junction 19 provides access to Portishead and Royal Portbury Dock and significant operational problems impact on access to this part of Bristol Port. Southbound traffic leaving the motorway queues back in the nearside lane over the Avonmouth Bridge, which causes both a safety hazard and impacts on the operation of the main carriageway. This will progressively worsen as traffic increases on both the motorway and at the junction. In addition, traffic modelling indicates that traffic joining the northbound carriageway from Junction 19 will be delayed due to a bottleneck on the slip road. It will be necessary to increase capacity on this slip road, whilst also paying attention to traffic capacity on the Avonmouth Bridge. A comprehensive solution will therefore be needed to address the long-term needs of this junction.

Options for improvements should ensure efficient connections to and from Royal Portbury Dock. Traffic leaving the Dock needs to easily access the northbound slip road to the Avonmouth Bridge. This could include measures to control the flow of traffic from the A369 into Junction 19 and onto the M5, to avoid overloading the motorway. Options should include consideration of express buses from Portishead, to improve travel choices from the town, together with an eastbound bus lane towards Junction 19. This would enable buses to bypass traffic queues and make rapid journeys into Bristol city centre via the A4 Portway.

M5 Junction 19 Improvements	Capacity improvements at M5 J19 to address problems of queuing traffic on the M5 southbound slip road (to reduce disruption to traffic on the Avonmouth Bridge) and delays for traffic joining the M5 northbound. Detail is provided in scheme **Road 12** in Appendix A.

5.6. Schemes not included in the Transport Vision

The Study has considered other schemes and has concluded that they do not have a sufficiently strong business case to include in the Transport Vision. Examples of such schemes are discussed below.

5.6.1. Second Avon Crossing

Options were considered for introducing a new Second Avon Crossing, to connect the A4 on the Portway on the north side of the river with the A369 / Royal Portbury Dock on the south side. This would be a high-cost scheme and would need to take account of the needs of vessels passing along the river.

The G-BATS4 model was used to forecast traffic demand for the scheme. It demonstrated that traffic flows using the crossing would be relatively modest, and the benefits to the network would be relatively low. This would be due in part to the congestion at Junction 19, which would constrain access from the new crossing to Portishead and Royal Portbury Dock. The current Avonmouth Bridge would therefore remain the most attractive route for most traffic. The crossing would also have limited resilience benefits during periods of disruption, for example during any closure of the Avonmouth Bridge. A new crossing would help with rapid diversion of motorway traffic (without a lengthy detour via the Cumberland Basin) but other options are considered to offer greater resilience benefits, including the new road connections to Junction 20 and Junction 21A.

Future climate change will mean rising sea levels and increased risk of flooding in the Avon valley, and flood mitigation measures will be required. However, more detailed work undertaken within other studies has demonstrated that a new road crossing of the Avon would not effectively integrate with flood mitigation works.

6. South East: Bath to Bristol

6.1. Introduction

This corridor includes Bath, Keynsham and other parts of Bath & North East Somerset and routes into Bristol from the south east. The priorities on this corridor are to:

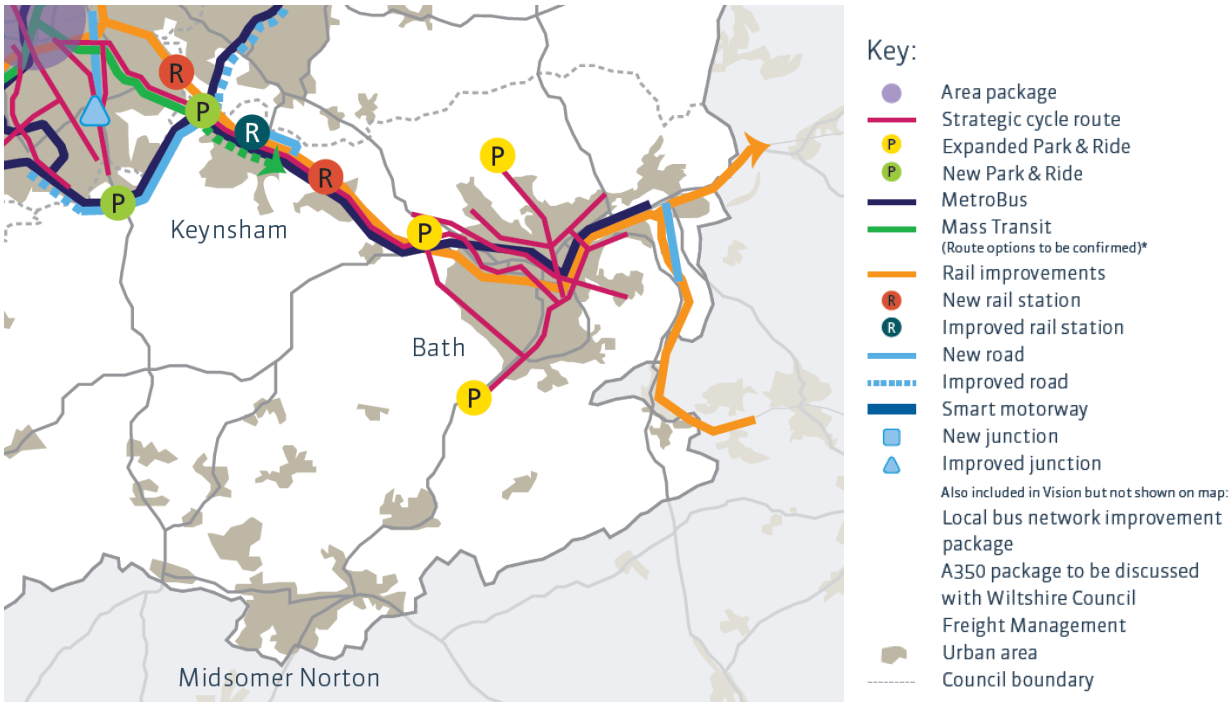
- Improve orbital connectivity in South Bristol.
- Improve connectivity in the Bristol – Bath corridor.
- Reduce impacts of through traffic in Bath.
- Improve regional connectivity to the South Coast.

The proposals in this area are shown in Figure 6-1 and focus on addressing future travel needs in Bath, the Bristol – Bath corridor and orbital movements around South Bristol. In Bath, these include further expansion of Park & Ride to intercept trips into the city and a package of strategic cycle routes to encourage active travel. A new East of Bath Link will help to take traffic out of the city and facilitate reallocation of roadspace.

A mass transit route between Bristol and Bath will transform travel choices along this corridor, which would be delivered in conjunction with the Callington Road Link to facilitate roadspace reallocation on the A4 into Bristol. This would be to MetroBus standard but with the expectation of light rail between Bristol city centre and Hicks Gate and potentially beyond. New and expanded Park & Ride sites are proposed as an integral part of the future public transport network, including a new site at Hicks Gate.

Improved road infrastructure connecting the A4 at Hicks Gate with the A37 at Whitchurch and the Ring Road at Hengrove will significantly improve orbital connectivity around the south of Bristol and relieve radial routes. This will also help tackle the impacts of traffic 'rat-running' on rural lanes around the edge of the urban area and enable public transport improvements to be delivered.

Figure 6-1 South East Area



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments.

6.2. Bath Transport Strategy

It is recognised that large infrastructure schemes, as set out in the Transport Vision, are only part of the solution. For many transport issues more localised schemes and revenue funding are most effective and provide the greatest return on investment.

The major investment included in the Transport Vision for Bath is outlined in the following Section 6.3. Complementary to this, more details of localised transport problems and potential solutions have been set out in the Bath Transport Strategy, which was adopted by Bath & North East Somerset Council in November 2014. This identified a long-term vision that:

Bath will enhance its unique status by adopting measures that promote sustainable transport and reduce the intrusion of vehicles, particularly in the historic core.

This will enable more economic activity and growth while enhancing the city's special character and environment and improving the quality of life for local people.

In support of the long-term vision, the following objectives were identified:

- Support and enable economic growth, competitiveness and jobs;
- Promote sustainable mobility;
- Widen travel choice;
- Widen access to opportunities: jobs / learning / training;
- Improve air quality & health, reducing vehicle carbon emissions;
- Safeguard and enhance the unique historic environment and World Heritage Site status; and
- Improve the quality of life in the city.

Walking was identified as the highest priority in the strategy, on the basis that it creates a healthier population and reduces the number of local car journeys, to the benefit of the environment.

Actions included the need to follow the principles of the Public Realm and Movement Strategy to guide improvements for individual streets. This strategy for Bath City Centre, entitled 'Creating the Canvas for Public Life in Bath', was approved as Council policy in March 2010.

The Public Realm and Movement Strategy for Bath identifies rebalancing access and movement in the central core by the use of further access restrictions, public transport priorities, traffic diversions and associated enhancements of the public realm. This is similar to the approach described in section nine for the Bristol City Centre Movement Strategy, and is also consistent with adopted B&NES policies including the Bath Transport Strategy and Placemaking Plan.

The Transport Vision therefore includes an area package for Bath City Centre, focusing on pedestrian and public realm improvements, designed to complement related investment such as the Bath Cycle Network.

6.3. Major investment in Bath

In Bath, the Transport Vision includes further expansion of Park & Ride to provide effective travel choices for the large numbers of people travelling into the city for work, shopping and tourism. Further expansion of existing sites will be considered over the longer term, but there is also a need to address the problems caused by large volumes of travel into the city from the east, including consideration of options for Park & Ride to the east of the city.

At present, the only choices for people travelling to the city from the east are to route northwards to the site at Lansdown, or southwards to the site at Odd Down. These options are not attractive and many people therefore choose to drive into the city centre. Following review of the options that have been considered for Park & Ride to the east of the city, a site will not be promoted at Batheaston. However, options need to be considered to intercept traffic from the east and help tackle the traffic and air quality problems in the city generally and more specifically on the A4 corridor east of Bath.

A review of Park & Ride options will help to inform the measures being considered to reduce nitrogen dioxide around the A4 London Road corridor. Bath has been identified as an area where nitrogen dioxide levels are

projected to exceed national air quality objectives beyond 2021. An initial plan for the A4 corridor is required by the end of March 2018, followed by a final draft by the end of 2018.

The performance of Park & Ride sites in Bath is dependent on restricting parking provision in central areas and managing the cost of parking, to ensure that Park & Ride is the more attractive option compared to driving into the city centre. Furthermore, reduced demand for parking should also unlock development opportunities at existing off-street city centre car parks in Bath.

Park & Ride for Bath	Further expansion and improvement of sites at Newbridge, Lansdown and Odd Down, and consideration of options for Park & Ride to serve the east of the city. Detail is provided in scheme **Park & Ride 2** in Appendix A.

Significant residential and employment development is taking place in the Bath Western Riverside area, which will substantially increase the numbers of people living and working in this part of the city. It will also include new sustainable transport infrastructure, including new river bridges, walking and cycling routes and new bus connections. This sustainable transport infrastructure will become increasingly important to the whole city due to the need to increase walking, cycling and bus use to combat congestion.

A transit corridor, connecting Bath with Bristol, will follow an east-west axis through the city, and options will need to be considered to provide sufficient roadspace to enable this to work effectively. A preliminary route corridor has been identified from the A4 west of Bath to the city centre via Lower Bristol Road, Windsor Bridge Road, Bath Western Riverside, Pines Way, Green Park and James Street West. This could use the route for sustainable transport through Bath Western Riverside that has been safeguarded through the Bath & North East Somerset Placemaking Plan, dated November 2016.

Mass Transit to Bath	Initial priority for MetroBus corridor to Bath, with longer-term ambition for light rail between the Hicks Gate / Keynsham area and Bristol city centre, to serve Hicks Gate Park & Ride and potentially beyond and Temple Meads. Detail is provided in scheme **Mass Transit 4** in Appendix A.

The Transport Vision also includes a series of strategic cycle routes connecting different parts of the city. The city is in a ‘bowl’ and is surrounded by steep terrain to both the north and south, which constrain the attractiveness of cycling, but major destinations including Bath Royal United Hospital (on the north side) and University of Bath (on the south side of the city) mean that there are significant sources of travel demand.

Bath Cycle Network and City Centre Package	Focus on east-west corridors through the city, with reallocation of roadspace and off-road network, to create a high-quality network through the city, complemented by improved permeability and investment in public realm in the city centre. Detail is provided in scheme **Cycling 2** in Appendix A.

Bath has historically been the meeting point of several major roads: the A4 to London and Bristol, A46 to the Cotswolds and A36 to Salisbury and Southampton. North-south through traffic, between the A46 and A36, still passes through the middle of the city, which includes large volumes of goods vehicles. There are no adequate alternatives to the route: an ancient toll bridge allows cars to cross the river at Bathampton, but heavy goods vehicles are banned, and the only alternative route is the A363 through the centre of historic Bradford-on-Avon.

A new road is therefore required, which will remove traffic currently routing through the city centre between the A36 and A46, and will also improve the routing of east-west movements through the city. Further work is being undertaken to establish the most suitable alignment for this key link. At the same time, B&NES Council is working with partners including Wiltshire Council to examine the complementary role of the A350 corridor in providing for north-south movements.

East of Bath Link	New highway link connecting the A36 (south of Bathampton) to A363 (near Bathford, south of A4 roundabout) or the A4, to provide a high-quality north-south route connecting the A36 and A46 to the east of Bath, either single or dual carriageway. This route will enable north-south traffic to avoid passing through Bath. Detail is provided in scheme **Road 1** in Appendix A.

Bath faces significant problems with the volumes of goods vehicles in the city, both passing through and serving the needs of residents and businesses in the city. Forecasts indicate that goods traffic will grow rapidly during the next two decades due to increased consumption and new forms of distribution. The East of Bath Link will help in the management of goods traffic passing through the city. However, further measures will be needed to tackle the effects of lorries accessing Bath, which should include consideration of measures to reduce the number of lorry movements in the city. Measures should reduce vehicle mileage and reduce emissions, whilst reducing costs to operators. There should be minimal net costs to the local authority in operating any future scheme, therefore ensuring that a scheme is financially sustainable.

6.4. A4 corridor via Keynsham and Saltford

There are high levels of traffic demand between Bristol and Bath resulting in congestion and long journey times. The A4 through Saltford and routes to the south of Bath (avoiding the city centre) are already a significant problem, and most of Bath experiences high levels of peak hour traffic congestion. The Joint Spatial Plan proposes strategic allocations at Whitchurch and Keynsham, in addition to the high levels of growth in the current Local Plan, which will further increase travel demand in this area.

Mass transit between Bristol and Bath is proposed to complement an improved rail corridor and better accommodate a wider range of trip patterns. Bus priority on the approaches to Saltford would improve bus journey times and punctuality through the village. It is therefore recommended that further work should be undertaken to assess options to provide bus priority on the approaches to Saltford before a decision on a Saltford Bypass is made. As part of this further work, consideration should be given to the potential conversion of bus priority measures in future to accommodate other forms of mass transit, such as light rail.

Options would need to be considered for the best mode for this corridor: this could initially be a MetroBus standard route, but the longer-term ambition would be for a light rail solution extending from Bristol city centre to Hicks Gate and potentially beyond.

In addition, a new highway connection is proposed from the A4, near Broadmead Roundabout, to the A4175 at Avon Mill Lane. This will provide access to the North Keynsham Strategic Development Location and will also provide traffic relief in Keynsham town centre.

Bath Cycle Network and Greater Bristol Cycle Network – Bristol-Bath Route	A Strategic Cycle Route between Bristol and Bath forms part of the Greater Bristol Cycle Network and Bath Cycle Network schemes. These include reallocation of roadspace on arterial routes and traffic management measures, complementing investment in quiet routes and off-road facilities, to create an easy to use network. Detail is provided in scheme **Cycling 1 and Cycling 2** in Appendix A.
Mass Transit to Bath	Initial priority for MetroBus corridor to Bath, with longer-term ambition for light rail between the Hicks Gate / Keynsham area and Bristol city centre, to serve Hicks Gate Park & Ride and beyond and Temple Meads. Detail is provided in scheme **Mass Transit 4** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. This includes the provision of a site on the A4 at Hicks Gate, which would replace the existing site at Brislington. Information on the network of sites is provided in scheme **Park & Ride 1** in Appendix A.
A4 to Avon Mill Lane Link	New highway link from the A4, east of Keynsham, crossing railway to connect to Avon Mill Lane and A4175 north of Keynsham. This will improve traffic routing around the east of the town and will facilitate access to new development north of Keynsham. Detail is provided in scheme **Road 13** in Appendix A.

This package of schemes would require major re-engineering of the road network along the whole corridor, including at Bath, Saltford and Keynsham. The mass transit route would serve a new Park & Ride site at Hicks Gate, to replace the existing site at Brislington, which will enable people to access services towards both Bristol and Keynsham. It would then follow the A4 through Brislington to Temple Meads and Bristol city

centre. A key benefit of relocating Park & Ride from Brislington to Hicks Gate will be to enable traffic to be intercepted further upstream on the A4 corridor, reducing congestion on the constricted section of the A4 between Hicks Gate and Stockwood Road. The traffic lane providing access to the current Brislington Park & Ride site could be converted to a lane for the mass transit service.

Mass transit from Keynsham to Bristol would necessitate completion of the Callington Road Link, a new road link between A4320 St Philips Causeway and A4174 Callington Road, which would enable diversion of through traffic from the A4 onto St Philips Causeway. This would provide several benefits: it would reduce the volumes of traffic through the heavily congested A4/A4174 West Town Lane junction and would allow major re-engineering of the current A4 through Brislington to allow the creation of the new transit route, together with other improvements to sustainable transport and public realm.

The mass transit route would be complementary to further improvements in passenger rail services. Consideration would be given to the case for expanding access to the rail network by re-opening stations at Saltford and St Annes Park. However, these need to be assessed in the context of limited track capacity between Bristol and Bath, and the impacts on longer-distance services from Bristol to London. Existing stations will also be improved, including Keynsham.

New Stations Package	New stations proposed at Saltford and St Annes Park (as part of a programme also including Constable Road, Ashton Gate and Charfield), with supporting infrastructure including waiting facilities, real time information, cycle parking, bus stops and car parking. Detail is provided in scheme **Rail 1** in Appendix A.
Service Improvements and Station Upgrades	Target for all stations across West of England to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding. This will include upgrades to the stations at Oldfield Park and Keynsham to a consistent MetroWest standard. Detail is provided in scheme **Rail 2** in Appendix A.

6.5. South East Bristol (Whitchurch and Keynsham)

The south east of Bristol suffers from high levels of congestion and poor access to the wider transport network. The completion of the Callington Road Link will help to reduce congestion at the most serious blackspot – A4 / A4174 West Town Lane traffic signals – but other parts of the network will continue to be under strain. There are large numbers of vehicles making orbital movements around the south of the city, which travel into the congested Bristol road network, resulting in high flows and congestion on the Bath Road, A4174 West Town Lane, A37 Wells Road and other routes. This also results in significant volumes of traffic on rural lanes between Whitchurch (on the A37), Hicks Gate and Keynsham.

The Joint Spatial Plan proposes a strategic allocation at Whitchurch, which will increase these traffic pressures. There is therefore a strong case for a new or improved highway connection between the A4 and the A37 at Whitchurch, to accommodate movements to/from the strategic highway network (A4 and A4174) from new housing and South Bristol. Improved transport connections on to the A4174 at Hengrove Roundabout would significantly relieve these pressures and provide new capacity for sustainable forms of travel in this area.

This will be complemented by Park & Ride to the south of Whitchurch and a new Orbital MetroBus route, which would connect with the North Fringe to Hengrove route (at Hengrove Park) and A4 transit corridor (at Hicks Gate). A key risk for orbital services is the potential level of subsidy required and whether there would be sufficient patronage to justify orbital services.

There is potential to integrate new transport infrastructure with new development in these areas, which will help to both mitigate the impacts of this development and tackle the underlying transport problems in this area. The combination of Park & Ride and improvements to orbital connectivity will enable a transfer of road capacity to public transport and cycling, particularly along the A4 Bath Road.

South Bristol Orbital Corridor	New multi-modal transport corridor (highway, MetroBus, cycle route) connecting A4 Hicks Gate, A37 south of Whitchurch and A4174 Hengrove Roundabout to improve accessibility to South Bristol and unlock growth in the south of the city. Detail is provided in scheme **Road 5** in Appendix A.
Orbital MetroBus	Route connecting South Bristol to Emersons Green via Ring Road, serving new development at Whitchurch and new Park & Ride sites at Whitchurch, Hicks Gate and Warmley. The section between South Bristol and Hicks Gate is incorporated into the South Bristol orbital corridor described above. Detail is provided in scheme **MetroBus 6** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. This includes the provision of a site on the A37 at Whitchurch. Information on the network of sites is provided in scheme **Park & Ride 1** in Appendix A.

6.6. Midsomer Norton and Radstock

At present, there are high traffic levels of out-commuting from Midsomer Norton and Radstock to Bath and Bristol, which reflects relatively limited numbers of jobs in the area. The focus in the Joint Spatial Plan is on increasing employment to improve the economic vitality of this area, which will also be important in helping to reduce the need to commute to jobs outside.

There are high levels of car use for journeys from this area to Bristol and Bath, with significant traffic on the A37 towards Whitchurch and Bristol, the A39 / B3116 towards Keynsham and A367 towards Bath. Analyses have shown that there is not a strong case for major transport improvements on these corridors: the major focus will instead be on managing traffic demand on the approaches to the cities. In Bath, Odd Down Park & Ride has recently been expanded; further expansion could be considered in future to intercept travel demand from the A367. At Whitchurch, Park & Ride will intercept travel demand before entering Bristol, while improved orbital connections to Hicks Gate and the Ring Road will improve access from the south.

Analyses indicate that there is not a strong case for significant transport investment on the transport corridors in this area. Although there are problems caused by traffic on the A37 through Pensford, Temple Cloud and Clutton, the business cases for bypasses are not likely to be strong. However, it is recognised that measures are required to better manage the impacts of traffic through these communities. This could include reviewing the status of the A37 as a Primary Route between Yeovil and Bristol, and identification of alternative routes for goods vehicles from Somerset to the north.

The focus will be in the development of the bus network to improve bus services within the Somer Valley and key routes to Bath and Bristol, as part of the bus network package described in Section 4.4.3. This will include improvements to bus stops, real time information, service frequencies and vehicle specifications. In addition, there will be a requirement for junction improvements at key hotspots in the area, including locations on the A37 and A39 to mitigate the impacts of growth in traffic to Bristol and Bath.

Greater Bristol Bus Network 2	Further enhancements to the sub-regional bus network, including improved vehicle specification, upgraded stops (consistent with MetroBus standard), ticketing and bus priority. Enhanced interchange facilities across the network. Detail is provided in scheme **Bus 1** in Appendix A.

6.7. Schemes not included in the Transport Vision

The Study has considered other schemes and has concluded that they do not have a sufficiently strong business case to include in the Transport Vision. Examples of such schemes are discussed below.

6.7.1. Radstock – Frome Rail Opening

It was concluded at an early stage of the study that there is not a strong business case for re-opening the railway from Radstock to Frome to passenger services. The strongest demands from Radstock and Midsomer Norton are towards Bath and, to a lesser extent, Bristol. Travel demand towards Frome is

relatively low, which means that the numbers of passengers using a new service between Radstock and Frome would be low. Furthermore, the current railway line does not serve Frome station; it would be necessary to construct a new chord or reverse trains back to the station.

It is highly unlikely that a new direct train service from Radstock to Bath and Bristol, via Frome and Westbury, would be attractive to potential users. The journey time from Frome to Bath is around 40 minutes, with one train (or less) per hour. The journey time from Radstock to Bath would therefore be likely to be greater than one hour. In contrast, the journey time by car and bus is around 30-40 minutes. This scheme has therefore been discounted because it would fail to provide an attractive alternative option for the most important movements from Radstock and Midsomer Norton, which are focused towards Bath and Bristol.

6.7.2. Orbital Connections around Bath

Options were considered for new highway connections around the north and south of Bath, connecting the A4 west of Newbridge with the A46 and the A36. The option for a new route to the north of Bath was discounted because there was no evidence to indicate that there are significant movements between the A46 from the north and the A4 to the west. Furthermore, there are steep slopes and the area has very high landscape value. The construction of new road infrastructure would therefore be very damaging.

The new route to the south of Bath was also discounted. In this case, there are significant flows of traffic on the route between Newton St Loe and Odd Down and then onwards through Midford towards the A36. However, there are again very significant topographic constraints and the area has very high landscape value. Again, the construction of new road infrastructure would be very damaging to the landscape. It is therefore proposed that travel demands from the A36 corridor towards Bristol would be better addressed by improved rail services on the Westbury to Bristol corridor.

6.7.3. A37 Bypasses

Analyses have shown that there is not a strong case for major transport improvements on the A37 corridor between Midsomer Norton and Bristol. There are problems caused by traffic on the A37 through Pensford, Temple Cloud and Clutton, but the issues are mostly related to community severance and environmental quality in the villages. There are not significant congestion or delay problems in the villages. This means that bypasses for the villages would be unlikely to generate significant user benefits on the road network. Furthermore, the costs of the schemes would be high, particularly in Pensford, where it would be necessary to cross the valley of the River Chew. This therefore means that there are unlikely to be strong business cases for each scheme.

However, it is recognised that measures are required to better manage the impacts of traffic through these communities. This could include reviewing the status of the A37 as a Primary Route between Yeovil and Bristol, and identification of alternative routes for goods vehicles from Somerset to the north. The focus will be on the development of the bus network to improve bus services within the Somer Valley and key routes to Bath and Bristol, with measures to encourage mode shift on these corridors.

6.7.4. Saltford Bypass

A bypass for Saltford was considered as a potential option for reducing traffic flows through the village and freeing roadspace for mass transit between Bath and Bristol. The bypass would need to take a relatively long route to the south of the village, which would result in an increase in distance travelled compared to the existing route. The increase in distance travelled would partially offset the benefits of reduced congestion, reducing user benefits. The scheme would also enable through traffic to be diverted from the village, helping to improve journey times for buses through the village. However, other lower-cost options, including bus lanes on the approaches to the village, could play a more direct role in helping to reduce bus journey times, although these would need to be investigated in more detail.

The bypass would cross difficult terrain, with steep slopes south east of the village. It would be necessary to create a significant cut in the hillside, with a relatively steep gradient and potential requirement for a climbing lane in the westbound direction. These issues would collectively result in landscape impacts, major earthworks and relatively high scheme costs. It is therefore recommended that further work should be undertaken to assess options to provide bus priority on the approaches to Saltford before a decision on a Saltford Bypass is made. As part of this further work, consideration should be given to the future potential conversion of bus priority measures to accommodate other forms of mass transit, such as light rail.

7. North East: Yate to Bristol

7.1. Introduction

This corridor includes Yate, Chipping Sodbury, Frampton Cotterell, the East Fringe of Bristol, other parts of the eastern side of South Gloucestershire and routes into Bristol from the east and north east. The evidence indicates that the priorities on this corridor are to:

Improve connectivity to towns in South Gloucestershire.

Improve connectivity and travel choices in the East Fringe and East Bristol.

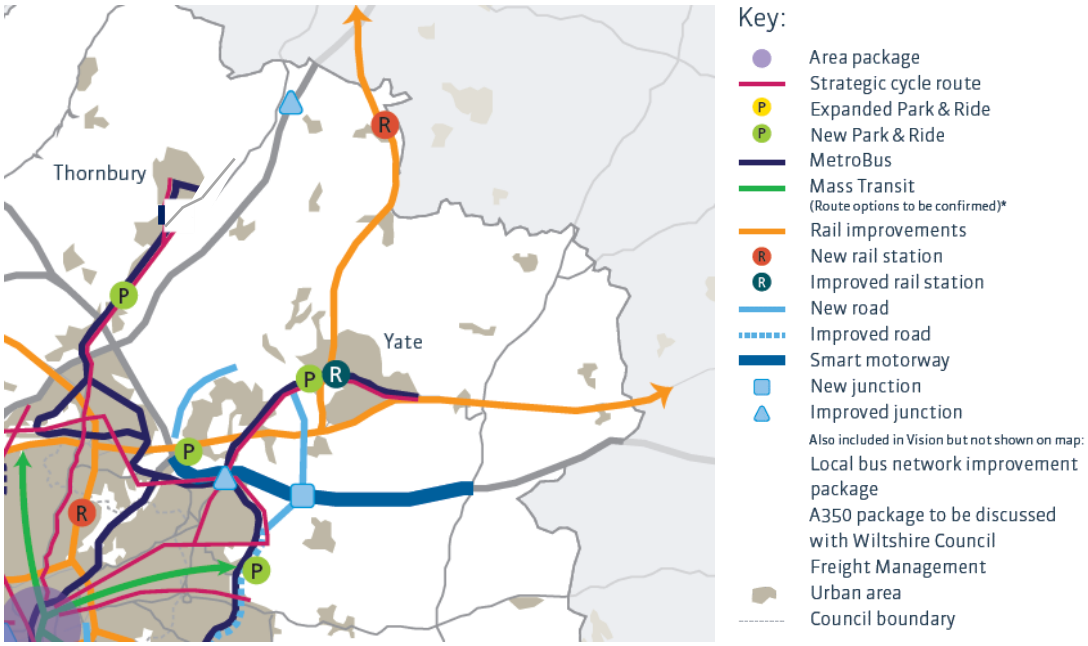
Improve regional connectivity to London, Thames Valley, South Wales and the Midlands.

This area already benefits from links to the motorway and rail networks. This will be further enhanced with the Great Western Electrification Programme (GWEP), which will increase train frequencies and reduce rail journey times to Cardiff, Swindon, Reading and London. This is likely to further enhance the attractiveness of this area for inward investment and business growth, including the Enterprise Area at Emersons Green, which will also require improved connectivity to the M4 and on the local transport network. The MetroWest project will also significantly improve train services to Yate.

The proposals in this area are shown in Figure 7-1 and focus on improving public transport and highway connectivity to the East Fringe and Yate. A new mass transit corridor, between the East Fringe and Bristol city centre, is proposed to tackle the connectivity problems in this part of the conurbation. A new junction on the M4 (Junction 18A), with connections to the Ring Road and Yate, will help to tackle traffic issues at M32 Junction 1 and provide a high-quality route to Yate. A new Park & Ride site on the M32 is also proposed.

A new Winterbourne Bypass will unlock highway capacity for MetroBus improvements on the A432 corridor between Yate and Bristol, complemented by Park & Ride on the A432, and interchanging with improved facilities at Yate railway station. It will connect into the North Fringe to Hengrove Package infrastructure which would also be further upgraded. Orbital MetroBus connections will also improve access to employment from South Bristol to Emersons Green.

Figure 7-1 North East Area



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments.

7.2. East Bristol and East Fringe

7.2.1. East Fringe Mass Transit

The sector of the urban area between the East Fringe and Bristol city centre is not well connected by public transport and experiences substantial traffic congestion and consequent noise and air pollution problems. The delivery of MetroBus to Emersons Green and the continuing popularity of the Bristol to Bath railway path for cycling and walking will play a role but this part of the Bristol urban area has been identified by the study as needing further significant investment in sustainable transport options.

The consultation on the Transport Vision sought people's views on the potential solutions to the transport problems in this area. Respondents identified a wide range of potential solutions, but there was a strong focus on mass transit options. There were a wide range of views expressed on potential route options, including the advantages and disadvantages of different road corridors and alongside the Bristol to Bath railway path.

Further consideration of this scheme has concluded that it will be very difficult to achieve significant public transport improvements along the existing road corridors. Investment in rapid transit in this area should therefore consider options for segregated alignments, which could include options for underground running along parts of the corridor.

Mass Transit to East Fringe	Fully segregated mass transit connecting East Fringe and East Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 3** in Appendix A.

7.2.2. Orbital MetroBus

There are significant challenges in connecting between South Bristol and employment opportunities in the East (and North) Fringe of Bristol, by both bus and by car. The North Fringe to Hengrove Package component of MetroBus will significantly improve journey times but people will still face long journeys to the Emersons Green area. A new orbital MetroBus service, following a route along or close to the A4174 Ring Road, would connect into the North Fringe to Hengrove Package infrastructure at Emersons Green. This would improve access to jobs for residents in South Bristol and connectivity to the strategic allocation at Whitchurch in the Joint Spatial Plan. A key risk for orbital services is the potential level of subsidy required and whether there would be sufficient patronage to justify them.

Orbital MetroBus	Route connecting South Bristol to Emersons Green via Ring Road, serving new development at Whitchurch and new Park & Ride sites at Whitchurch, Hicks Gate and Warmley. Detail is provided in scheme **MetroBus 6** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. This includes the provision of new sites on the A4 at Hicks Gate and, in the longer term, a new site on the Ring Road between the A420 and Emersons Green, which would also serve the proposed East Fringe mass transit route. Information on the network of Park & Ride sites is provided in scheme **Park & Ride 1** in Appendix A.

This would also improve connectivity from Oldland Common and Kingswood to Emersons Green, Bristol Parkway station and the North Fringe, which would help to reduce dependence on the car for journeys around the Ring Road, potentially providing significant congestion relief on this critical transport corridor. Consideration would also be given to expanded or new Park & Ride facilities in the Emersons Green area and/or a new Park & Ride site at a location along the corridor (assumed to be near the A420 junction, east of Kingswood) to enable interchange with bus services heading towards Kingswood and the city centre.

7.2.3. M4 Junction 18A to Ring Road

There is severe congestion on the north side of Bristol, which impacts on the strategic road network (M32, M4 and M5). This impacts on resilience: small incidents have major impacts on the whole network due to multiple conflicting movements at critical points in the network. The construction of a new M4 Junction 18A and a new link to the A4174 Ring Road will provide additional capacity and significantly improve routings for traffic movements in the north-east part of the Bristol urban area.

M4 Junction 18A to Ring Road	New motorway junction and connections to A4174 Ring Road to improve resilience of the network and unlock economic growth in the East Fringe. Detail is provided in scheme **Road 3** in Appendix A.

Improved road connectivity will unlock growth potential at the Emersons Green Enterprise Area. The scheme will significantly improve the choice of routes around the east side of Bristol. From the west, it will reduce traffic at M4 Junction 19, M32 Junction 1 and on the A4174 Ring Road. From the east, it will help to reduce rat-running of traffic through villages between Junction 18 and the East Fringe. Traffic modelling forecasts that there will be significant reductions in traffic flows on the Ring Road between M32 Junction 1 and Emersons Green. This will support the existing priorities on the Ring Road and give the opportunity to reallocate further roadspace to MetroBus services, including the new Orbital services and services from Yate.

7.3. Connections to Yate

7.3.1. M4 Junction 18A Link to Yate

There are heavy flows of traffic between Yate and the North Fringe and Bristol, which reflect the relatively limited travel choices that are available: train services are currently only hourly (but will be increased to two trains per hour with MetroWest) and bus journey times are long. The heavy traffic flows result in congestion along the A432 corridor, with significant delays at the junction with the Ring Road, and on the B4058 through Winterbourne. This also results in rat-running of traffic on lanes through nearby villages. The congestion on the A432 and B4058 causes delays to bus services, reducing the attractiveness of buses and entrenching car dependence for travel on this corridor.

The Transport Vision proposes a new road link from Yate to the new Junction 18A, which will enable traffic to Yate to directly access Emersons Green and the east of Bristol. It will also improve connectivity from Yate to the M4, significantly improving the attractiveness of the town for inward investment and promoting local economic growth. The new road link will connect to the A432 at Nibley and will also provide the opportunity to connect to the B4058, west of Yate, and serve potential development in Yate proposed as part of the Joint Spatial Plan.

M4 Junction 18A to Yate	A new transport link from the proposed M4 J18A to A432 near Yate will help unlock economic growth in the town. This is dependent on prior delivery of the new J18A motorway junction with a connection to A4174 Ring Road. Detail is provided in scheme **Road 4** in Appendix A.

7.3.2. Sustainable Travel between Yate and North Fringe

The completion of a new transport link from Junction 18A to Yate will result in a diversion of traffic from the A432 and unlock capacity for improved public transport and cycling along the corridor.

The Transport Vision proposes significant improvements to the A432 to create a new MetroBus corridor between Chipping Sodbury, Yate and the Ring Road. This will include improved interchange in Yate town centre and at Yate station. together with new bus priority measures. This package includes major improvements to the A432/A4174 Ring Road junction and a segregated bridge over the M4 for MetroBus. It will also make provision for effective interchange between MetroBus and Yate rail station, together with improved walking and cycling access to Yate station.

A new Park & Ride site on the A432 corridor will also help to intercept trips from the wider area around Yate and Chipping Sodbury and encourage a transfer of trips onto the MetroBus services to the North Fringe and Bristol. A Park & Ride site has already been safeguarded at Nibley but other options for a site between Yate and Coalpit Heath could also be explored.

Greater Bristol Cycle Network – Yate Route	A Strategic Cycle Route from Yate to the North Fringe and Bristol - part of the Greater Bristol Cycle Network scheme. This includes reallocation of roadspace on major arterial routes and traffic management measures, complementing investment in quiet routes and off-road facilities, to create an easy to use network. Detail is provided in scheme **Cycling 1** in Appendix A.

MetroBus to Yate	Route via A432, serving new development west of Yate, and serving new Park & Ride site at Nibley, connecting into North Fringe to Hengrove route west of Emersons Green. Detail is provided in scheme **MetroBus 5** in Appendix A.
Park & Ride Package for Bristol urban area	New Park & Ride site on A432, as part of a network of new and expanded sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. Detail is provided in scheme **Park & Ride 1** in Appendix A.
Service Improvements and Station Upgrades	Target for all stations across West of England to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding. This will include improvements to the station at Yate to a consistent MetroWest standard, including interchange with the MetroBus corridor. Detail is provided in scheme **Rail 2** in Appendix A.

Bus lanes (and cycling infrastructure) will be provided along the A432 between Nibley and Coalpit Heath. Management of roadspace in Coalpit Heath will be challenging, with limited opportunity to create new bus lanes, and there will be a need to provide effective access to the new development proposed in the Joint Spatial Plan. Further bus lanes will then be provided between Coalpit Heath and the Ring Road, with a major improvement (including a new bridge over the M4) at the junction with the Ring Road. MetroBus services would then connect with the infrastructure currently being constructed as part of the North Fringe to Hengrove Package. This is expected to result in significant improvements to bus journey times between Yate and the North Fringe.

There will still be a need to accommodate traffic flows from Yate and Chipping Sodbury to the North Fringe, with significant increases in traffic resulting from development at Yate and Coalpit Heath in the Joint Spatial Plan. The B4058 will be under increasing pressure, with significant delays in Winterbourne village, and there will be a requirement for a bypass around the village to mitigate the impacts of these additional flows. In addition, there will be a need for targeted improvements to junctions in the corridor, including routes between Yate and Thornbury.

Winterbourne Frampton Cotterell Bypass	New transport corridor to bypass Winterbourne and Frampton Cotterell on B4058, to improve traffic routing from Yate and to relieve congestion in the villages. Detail is provided in scheme **Road 2** in Appendix A.

7.4. M32 and M4 from Bristol to London

The M32 is, by far, the busiest road corridor into Bristol. Large volumes of traffic use the motorway to access central Bristol during peak periods, resulting in significant traffic delays in the central area. The North Fringe to Hengrove Package will help to encourage mode shift from the North Fringe to Bristol, but at present there is no means of intercepting longer-distance traffic approaching from the motorway network. Traffic from the M5 is signed to Park & Ride on the A4 Portway, to the west of the city, but many drivers continue into the city via the M32. There are currently no Park & Ride facilities to intercept traffic on the M4 from the east.

A new strategic Park & Ride site on the M32 corridor, near to M4 Junction 19 or M32 Junction 1 would enable the interception of traffic entering the city from the motorway network. This could potentially attract large numbers of trips, and a large site would need to be considered. However, this would require significant re-modelling of the road network in this area; this would be facilitated by traffic to/from the East Fringe re-routing to a new Junction 18A to the east. There is a potential need to restrict the ability of local traffic to access the site, to ensure that it is predominantly used by longer distance traffic. This could include the use of parking charges consistent with (but lower than) the costs of all-day parking in Central Bristol.

Park & Ride Package for Bristol urban area	A major new Park & Ride site on the M32, as part of a network of new and expanded sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. Detail is provided in scheme **Park & Ride 1** in Appendix A.

The new M4 Junction 18A will result in changes in traffic flows on the M4 around the north of Bristol between Almondsbury (Junction 20) and Junction 18 at Tormarton. At present, traffic on the motorway from both the east and the west uses Junction 19: heavy conflicting flows at the junction cause long delays on the slip

roads, impacting on the capacity of the main carriageway. There are then heavy flows leaving the M32 at Junction 1, with congestion in the Hambrook area.

The new Junction 18A would result in significant re-routing of traffic in the area. Traffic from the M4 west, heading towards the East Fringe, would continue on the motorway to Junction 18A, resulting in large reductions in queueing traffic at Junction 19. Traffic from the east currently uses several routes to reach the East Fringe, including Junction 19 and minor country lanes from Junction 18 at Tormarton. In future, this traffic will instead exit at Junction 18A, significantly reducing traffic using the other routes.

Overall, the rationalisation of traffic flows in this area will result in major benefits, although there will be increased traffic on the motorway. Modelling indicates that this could draw more traffic from the M5 to the south onto the M4 to access the East Fringe at Junction 18A. The M4 and M5 will already be under acute pressure in this area, and action will therefore be taken to mitigate this effect by encouraging mode shift on key movements, with high quality MetroBus and mass transit options from North Somerset connecting with the North Fringe and East Fringe.

It has been assumed that this would necessitate the extension of the Smart Motorway from Junction 19 to Junction 18, to help manage the effects of changes in traffic flows on this section. This is considered to reflect an appropriate balance between the need to improve connectivity into the east of the Greater Bristol conurbation and the strategic function of the M4 itself. The extension of the Smart Motorway from Junction 19 to Junction 18 will also improve journey time reliability on the M4 between Junction18 (Tormarton) and Junction 20 (Almondsbury), and improve road safety and reduce impacts of incidents on this route.

Smart Motorway: M4 Junction 18 – Junction 19	Smart Motorway to accommodate future traffic flows between M4 J18 and J19 and to facilitate new traffic movements generated by new J18A. Detail is provided in scheme **Road 9** in Appendix A.

7.5. Schemes not included in the Transport Vision

The Study has considered other schemes and has concluded that they do not have a sufficiently strong business case to include in the Transport Vision. Examples of such schemes are discussed below.

7.5.1. A46 Dualling north of Bath

The A46 between Bath and M4 Junction 18 is a busy route with slow-moving traffic during peak periods. It caters for a range of different traffic movements, including movement into Bath from the north and Bristol from the east. The A46 / A420 junction at Cold Ashton is a significant pinch-point with congestion during peak periods. There are significant topographic constraints on the climb from Bath to Cold Ashton and the corridor is within the Cotswolds Area of Outstanding Natural Beauty (AONB).

The G-BATS4 transport model was used to test the potential impacts of creating a new dual carriageway along the alignment of the A46 between the Batheaston Bypass and M4 Junction 18. This indicated that this would result in a re-routing of traffic onto the A46, towards Bath and the A36. The East of Bath Link (see Section 6.2) would help to address through movements towards the A36, but the A36 would not be able to accommodate a significant increase in traffic flows. Furthermore, the creation of a dual carriageway along the A46 to the north of Bath could create significant landscape damage in the AONB.

There are challenges with congestion on this corridor but the creation of a dual carriageway would create a series of negative consequences. It is instead preferable to develop a package of measures that is better targeted at the underlying causes. One of the major problems is the volume of traffic using the A46 and minor roads to enter the Bristol urban area from the east. The proposal for the new M4 Junction 18A, including east-facing slips, will enable traffic from the east to instead use the new junction and join the A4174 Ring Road at Emersons Green. This will result in reassignment of traffic away from the A46 and minor roads, delivering significant relief to the A46 corridor.

8. North West: Thornbury to Bristol

8.1. Introduction

This corridor includes Thornbury, the Bristol North Fringe, Avonmouth / Severnside, rural parts of South Gloucestershire and routes into Bristol from the north. The evidence indicates that the priorities on this corridor are to:

Improve connectivity to towns in South Gloucestershire.

Improve connectivity across North Bristol, the North Fringe and Avonmouth-Severnside.

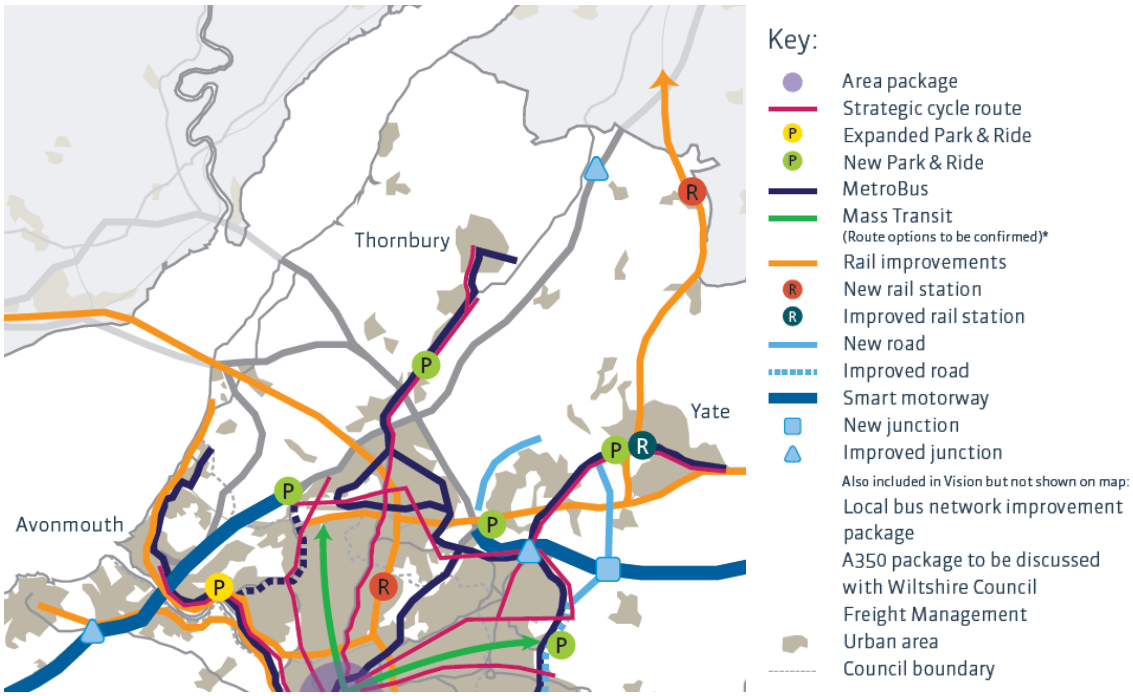
Improve regional connectivity to London, the Midlands, South Wales and the South West.

The proposals in this area are shown in Figure 8-1 and focus on improving connectivity from Thornbury, Avonmouth / Severnside and the North Fringe to the city centre. The area benefits from good strategic road and rail links; the Great Western Electrification Programme will improve connectivity to London and enhance the competitiveness of the area, which will necessitate improved local connectivity. The motorway network is under pressure from high levels of traffic and the Transport Vision proposes extension of Smart Motorway running east to M4 Junction 18 and on the M5 south across the Avonmouth Bridge.

A new mass transit corridor, between the North Fringe, North Bristol and Bristol city centre, is proposed to transform connectivity in this part of the conurbation. A new MetroBus and strategic cycling route on the A38 corridor will improve connectivity to Thornbury, which will extend services from the MetroBus corridor in the North Fringe. Improvements to M5 Junction 14 will accommodate growth in the area.

A new MetroBus route will serve Severnside and an expanded Portway Park & Ride, and a network of new Park & Ride sites will intercept traffic on the edge of the Bristol urban area on the A38, A4018 and M32. These will be complemented by reopening of railway stations, further improvements to local rail services and better rail connections between Bristol and South Wales.

Figure 8-1 North West Area



Alignments in this plan are shown for illustrative purposes only and are not intended to indicate specific alignments.

8.2. North Bristol and North Fringe

The North Fringe already experiences significant problems, with a complex mix of radial, orbital and local movements. These are forecast to worsen in future, although the MetroBus North Fringe to Hengrove Package will help to mitigate some problems by providing new infrastructure and improving travel choices. The Cribbs Patchway MetroBus Extension (CPME) will provide a new MetroBus route between Cribbs Causeway and Bristol Parkway station, serving the new Filton Airfield development, which will significantly improve orbital public transport connections through the North Fringe, including the replacement of the Gypsy Patch Lane railway bridge which will address a major pinchpoint in the area.

The A38 between M5 Junction 16 and Bristol city centre is a major challenge. In the North Fringe, it is a key route serving the employment clusters at Aztec West, Airbus and Rolls Royce and it will be a major point of access into the new Filton Airfield development. Southmead Hospital is a major destination, generating significant traffic but also acting as a hub in the city's bus network. As the route enters Bristol, it becomes an urban radial road, with retail activity, on-street parking and deliveries and a mix of heavy flows of cyclists, buses, cars and goods vehicles.

Growth in travel demand and the future focus on Urban Living in the Joint Spatial Plan will require a new approach to the management of this corridor. There is already high demand for cycling at the southern end of the corridor but there is much less cycling in the outer parts of North Bristol. This is due in part to the poor conditions for cycling across the network. On much of the A38, conditions are very poor, with cyclists forced to share roadspace with cars, buses and lorries. The Transport Vision therefore proposes a strategic cycle route along the A38, which will require further roadspace reallocation and measures to reduce traffic at the most critical points of the network.

Greater Bristol Cycling Network – North Fringe	Reallocation of roadspace on major arterial routes and traffic management measures to complement investment in quiet routes and off-road network, to create a comprehensive, easy to use network for journeys across the urban area. Detail is provided in scheme **Cycling 1** in Appendix A.

This is also an important public transport corridor, with buses serving both Bristol and the North Fringe. The Transport Vision proposes a mass transit corridor connecting Cribbs Causeway with the city centre. However, the road network is very constrained on the A38 (and A4018) meaning that it would be highly challenging to deliver the level of priority and roadspace reallocation required for successful delivery of a fast and reliable service. A range of options – including underground running in places – should therefore be considered to meet the long-term needs of the radial corridors from the North Fringe into Bristol.

The A4018 corridor between Cribbs Causeway and Bristol carries significant volumes of traffic into different parts of North Bristol, with the route playing different functions as it approaches the city centre. The high volumes of inbound traffic result in significant congestion on the approach to Westbury-on-Trym, whilst high numbers of buses converge on the route from the Downs towards the Centre. The Vision proposes Park & Ride near to M5 Junction 17, at a location to be determined, to intercept trips into North Bristol, reduce traffic and facilitate reallocation of roadspace for a new strategic cycle route connecting to the city centre.

Mass Transit to North Fringe	Fully segregated mass transit connecting Cribbs Causeway and North Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 2** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. This includes the provision of a new site on the A4018 in the Cribbs Causeway area. Information on the network of sites is provided in scheme **Park & Ride 1** in Appendix A.

8.3. Bristol Port and Avonmouth/Severnside

Bristol Port, at Avonmouth, benefits from direct access to the M5 and M49 at Junction 18/18A. However, there are significant operational issues on the M5, particularly on the Avonmouth Bridge heading towards the South West. The Transport Vision proposes extension of the M5 Smart Motorway from Junction 17 to

Weston-super-Mare, which will help to improve operational resilience on the Avonmouth Bridge and maintain efficient access to the Port.

The extension of the Smart Motorway from M5 Junction 17 to Weston-super-Mare would improve journey time reliability on the M5 between Junction 21/21A (Weston-super-Mare) and Junction 17 (Cribbs Causeway), and reduce incidents along the route and subsequent impacts on network resilience. It would unlock capacity on the M5 to cater for an increased number of journeys due to planned growth.

Smart Motorway: M5 Junction 17 - Junction 21A	Smart Motorway from J17 (Cribbs Causeway) to J21A (new junction at Weston) to accommodate future traffic flows and to facilitate improved management of incidents. Detail is provided in scheme **Road 10** in Appendix A.

Bristol Port is a major source of freight, both road and rail. There could be scope for developing a strategic rail freight interchange in the area, taking advantage of access to the port, good motorway connectivity and freight capacity on the rail network at this point. This provides the opportunity to develop multi-modal logistics capability in the area. This would require consideration of the ability of the rail network in this area, which is already under major pressure, to accommodate more rail freight traffic. It is recommended that discussions take place with Network Rail to explore the options and trade-offs that would need to take place.

In terms of more general freight issues, there is a need to address the rapid growth in goods vehicles on the road network. Forecasting indicates that there could be growth of around 40% in goods vehicles between 2013 and 2036, which is due to several factors including changes in the logistics industry and increased numbers of home deliveries. This will create significant congestion and air quality problems, particularly within Bristol. Action will need to be taken to reduce the number of lorries in Bristol, particularly the city centre, and a new approach to freight management will be required. The Transport Vision therefore proposes continued support for the Freight Consolidation Centre at Avonmouth.

8.3.1. Severnside

Much of Severnside suffers from relatively poor connections to the strategic road network. This is vital, because Severnside is the most important logistics location in the West of England, but logistics operators are constrained by poor accessibility. A new junction on the M49 is currently programmed for delivery by Highways England, which will significantly improve accessibility into the area and improve its attractiveness for logistics operators.

However, the area also has poor accessibility to other areas, which impacts on the ability of businesses to recruit staff and people to take jobs. Given the planned growth in the Avonmouth / Severnside Enterprise Area, this will become a progressively more important issue. The Transport Vision includes a new MetroBus route to the city centre, which would serve the Portway Park & Ride site.

MetroBus to Severnside	Route following A4 Portway to city centre, serving Portway Park & Ride and expanded employment areas in Avonmouth/Severnside. To be utilised by a feeder service from an A4018 Park & Ride site, running via Canford Lane and Sylvan Way. Detail is provided in scheme **MetroBus 3** in Appendix A.

8.4. A38 to Thornbury and Beyond

There are high volumes of commuting from Thornbury, other parts of South Gloucestershire and Stroud on the A38 corridor towards the North Fringe. There are high levels of car dependence for most movements, resulting in congestion on the A38, particularly on the approach to M5 Junction 16 at Almondsbury. Journey times by bus from Thornbury to the North Fringe and Bristol city centre are long, further exacerbating car dependence for these movements. The Transport Vision proposes a MetroBus corridor to Thornbury and the Buckover Garden Village proposed in the Joint Spatial Plan. This would extend from Aztec West the infrastructure that is currently being delivered as part of the North Fringe to Hengrove Package.

This would be complemented by a Park & Ride site on the A38, north of Almondsbury, which would intercept car trips from places in the wider A38 corridor, and encourage a shift to the new MetroBus services. Significant bus priority on the A38 southbound approach to Junction 16 would be required to enable fast and reliable bus services. Improvements will be required to junctions along the A38 to mitigate the effects of increased traffic flows and provide effective priority for the MetroBus services. In addition, a new strategic

cycle route would be delivered as part of the MetroBus infrastructure, to cater for shorter-distance trips along the corridor, particularly from the southern end into the Aztec West area.

Greater Bristol Cycling Network – Thornbury Route	A Strategic Cycle Route between Thornbury to the North Fringe and Bristol - part of the Greater Bristol Cycle Network scheme. The package includes reallocation of roadspace on major arterial routes and traffic management measures, complementing investment in quiet routes and off-road network, to create a comprehensive, easy to use network for journeys across the urban area. Detail is provided in scheme **Cycling 1** in Appendix A.
MetroBus to Thornbury	Route via A38, serving new development at Buckover and new Park & Ride site north of Almondsbury, connecting into North Fringe to Hengrove route at Aztec West to city centre. Detail is provided in scheme **MetroBus 4** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. This includes the provision of a new site on the A38 north of Almondsbury. Information on the network of sites is provided in scheme **Park & Ride 1** in Appendix A.

In addition, there is the potential for future development of a new reactor at the Oldbury Nuclear Power Station, located on the Severn Estuary north west of Thornbury. This would generate significant traffic demand, particularly during the construction period, on local roads, including through Thornbury and Morton. This would require measures to mitigate the effects of this traffic, which could include temporary Park & Ride and local highway improvement measures. However, at this time, there are not yet confirmed development proposals. Transport mitigation measures should be planned if development proposals come forward, but these are not included in this Transport Vision.

Charfield has been identified as a potential strategic location in the Joint Spatial Plan. At present, this area has high levels of car dependence, with infrequent and long journey times by bus to Yate and North Bristol. A re-opened station at Charfield could be served by trains extending from Yate to Gloucester, which would provide rapid access to the North Fringe and Bristol. This should be planned alongside improved rail services from Gloucestershire to Bristol.

New Stations Package	New station proposed at Charfield (as part of a programme also including Constable Road, Ashton Gate, St Annes and Saltford), with supporting infrastructure including waiting facilities, real time information, cycle parking, bus stops and car parking. Detail is provided in scheme **Rail 1** in Appendix A.
Rail Service Improvements and Station Upgrades	Target for all stations to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding. Detail is provided in scheme **Rail 2** in Appendix A.

8.5. M4 and M48 Severn Crossings

The M4 and M48 Severn Crossings play a critical role in connecting South Wales to the rest of the UK, and Ireland with Continental Europe. There are also significant commuting flows from South Wales into the West of England, with journey times by car of less than 20 minutes from Chepstow to the North Fringe. The proposed New M4 to the south of Newport will improve connectivity between South Wales and the West of England. Tolls on the Severn Crossings are also due to be removed before the end of 2018[43]. These changes are likely to increase the levels of commuting between South East Wales and the West of England, with increased traffic on the Severn Crossings.

This will have significant impacts on the M4/M5 Almondsbury Interchange, M4 and M5 around the north and west of Bristol. This will create additional delays for traffic using the Strategic Road Network within England, but will also impact on traffic to/from Wales. As highlighted in Section 4.4, the economic impacts of this increased congestion could offset the benefits of the removal of the tolls. There is, therefore, a strong case

[43] In July 2017 the Government announced that the tolls would be removed by the end of 2018.

for intervention in the West of England to tackle the effects of this increased congestion and secure the full benefits of the removal of the tolls, for both sides of the Severn.

Measures to mitigate these impacts should primarily focus on mode shift for movements across the Severn. This should include improved service frequencies and capacity on trains between Cardiff, Bristol and Newport, and consideration of opportunities for strategic Park & Ride on the M48 in the Chepstow area. It is recommended that the West of England Combined Authority works with Highways England, the Welsh Government and Cardiff Capital Region to address this shared challenge.

8.6. M5 to the Midlands

The M5 plays a critical role in connecting the West of England and wider South West with the Midlands and North of England. It also facilitates connections between Gloucester and Cheltenham and the West of England and supports commuting from Stroud and Gloucester into the North Fringe and Bristol. The M4 / M5 Interchange will be under increasing pressure in future due to increased traffic from South Wales and increased commuting into the North Fringe. This will increase delays on the M5 southbound approach to the Almondsbury Interchange, which will impact on both long-distance flows and commuting traffic.

The completion of the Smart Motorway between M4 Junction 19 and M5 Junction 17 has improved operating conditions on this part of the motorway network. However, there is very limited potential to further improve Almondsbury Interchange to accommodate significant increases in flow. Consideration should therefore be given to improving public transport options for movement into Bristol and the North Fringe from the north, including improved rail services from Gloucestershire as discussed above.

M5 Junction 14, to the north of Thornbury, provides access into the south of Stroud District and will be subject to significant pressures with growth in Stroud. The junction is already at capacity and there are safety issues due to queuing back onto the M5 main carriageway. This will require significant improvement – both to tackle existing challenges and to help accommodate growth from Thornbury, Buckover and Charfield in the Joint Spatial Plan. Junction 16 is also a challenge, but in this case, the focus in the Transport Vision is on Park & Ride and bus priority on the A38 corridor to encourage mode shift and manage the flow of traffic into the North Fringe.

M5 Junction 14 Improvements	Capacity improvements at M5 J14 to address existing problems and issues caused by growth in Stroud and the Joint Spatial Plan. Significant improvements are identified to tackle the problems of queueing on the slip roads. Detail is provided in scheme **Road 11** in Appendix A.

8.7. Schemes not included in the Transport Vision

The Study has considered other schemes and has concluded that they do not have a sufficiently strong business case to include in the Transport Vision. Examples of such schemes are discussed below.

8.7.1. Henbury Loop

There are ambitions from many stakeholders to connect the Severn Beach line with the main line at Filton, using the freight line from the port, to create an orbital train service around the North of Bristol. However, feasibility work already undertaken suggests that there are several challenges with the proposal. First, the forecast demand for the service is very low, reflecting current low demand for travel between Avonmouth and the North Fringe, potentially due to the dispersed nature of employment sites and the shift patterns of many employees in the Avonmouth area. This means that the benefits of introducing the service are currently likely to be low. Second, increasing the frequency of trains along the Severn Beach line between Avonmouth and St Andrew's Road would result in more crossings of the port access road, increasing delays to traffic accessing the port. One option would be to construct a bridge, but the cost would result in a very poor business case.

Bristol City Council intends to explore these issues in more detail through a wider rail study to better understand the feasibility of operating a loop service. Future more intensive development in the Severnside area could generate additional demand and this may offset future operating costs, but it will still not address the significant problem of crossing the port access road. Given the challenges already identified with this

scheme, it is not included in the Transport Vision but could come forward in the future subject to the outcome of further feasibility work.

8.7.2. Severnside to Bristol Rapid Transit

This scheme was included in the consultation on the Transport Vision. However, further consideration concluded that the scheme duplicates the proposed MetroBus to Severnside scheme. The MetroBus option is more cost effective, as it builds upon the extensive existing bus priority from Portway Park & Ride on the A4. It is cost effective to upgrade this section of the A4 to MetroBus standard and extend to Severnside.

8.7.3. Rail link to Thornbury

Suggestions have also been raised to introduce new rail services to Thornbury, making use of the line serving Tytherington Quarry. However, there would be several challenges in delivering this proposal. The former rail alignment into Thornbury is now occupied by an industrial estate and there is no practical routing into the town. The station would therefore need to be located on the edge of Thornbury, a significant distance from the town centre, which would constrain the potential catchment area within walking distance. This would significantly constrain the potential number of passengers from a new station at Thornbury.

The Grovesend tunnel would also need to be reopened, and its current condition is unknown. Experience with the Portishead Line demonstrates that this is a major risk for rail projects. It would also be necessary to upgrade the whole line from Yate to cater for passenger services. There are also capacity constraints at Westerleigh Junction. There is only capacity for one more rail service through the junction, and this is currently proposed to serve Yate and stations to Gloucester.

Comparison of potential demand demonstrates that there is a much stronger case for the additional train to serve Charfield and the stations to Gloucester. There is, therefore, no realistic prospect of introducing new rail services to Thornbury and this is not included in the Transport Vision. It is considered that the proposed introduction of MetroBus will be a far more effective means of connecting Thornbury to the North Fringe and Bristol.

8.7.4. Severnside to North Fringe Transport Link

The study considered the potential role of new road connections between the M5 at Junction 17 and the new M49 junction at Severnside. The model testing indicated that the benefits would be relatively low compared to the potential costs, meaning that the scheme would be likely to have a poor business case. One of the main challenges would be in addressing the impacts at M5 Junction 17. This junction is already heavily congested and the introduction of additional traffic would exacerbate the problems. The capacity constraints at the junction mean that, in practice, the traffic using the new link would be relatively modest. Furthermore, there are significant environmental constraints and it would be difficult to mitigate the impacts of a new link.

The study also considered scope for a MetroBus link connecting Severnside with the North Fringe. However, it is considered that demand is not sufficiently large to justify construction of full MetroBus infrastructure. It would be difficult to achieve a full MetroBus standard service without significant measures to improve the road network in the Easter Compton area, and this is considered to not have a strong business case.

8.7.5. Improved orbital road connections around North Bristol

At present, there are long delays on the road network in Southmead, associated with strong commuting between the city and the North Fringe. The study considered potential improved road connections around the north of Bristol, including upgrading of the road network through Southmead and Westbury-on-Trym to accommodate orbital movements. The analyses indicated that the benefits would be relatively low, because the scale of impacts would be limited by the constraints on the network elsewhere in North Bristol. This means that the business case for a large scheme would be likely to be poor. However, there remains scope for targeted measures to improve capacity at junctions with a demonstrable need, for example the junction of Greystoke Avenue and Falcondale Road in Westbury-on-Trym.

9. Bristol

9.1. Introduction

Bristol has a strong national and international reputation, which has been a strong factor in encouraging inward investment in the city. For the city to remain an attractive place to work, live and visit, it needs a transport network that not only supports the local economy and keeps the city moving, but also enhances the urban environment and contributes to high-quality, people friendly places.

Bristol is the centre of the West of England transport network and the operation of the network in the city has consequences for the rest of the West of England and the wider South West region. Most congestion and delay in the region occurs in the Bristol urban area, with the city consistently ranked as one of the most congested places in the country, which is adding to business costs and damaging the competitiveness of the city and the region. In the case of Bristol, the priorities in the previous chapters apply, but there are also further priorities to:

Improve travel choices for movements within Bristol.

Reduce impacts of traffic in Inner Bristol.

In recent years, the city has taken positive steps to improve sustainable transport provision and tackle congestion. Sustained investment has resulted in large increases in active travel across the city, with more people now cycling to work in Bristol than in Sheffield, Nottingham, Newcastle and Liverpool added together. Although public transport patronage is low compared with other core cities, it is rising rapidly and bucks the national trend for declining bus patronage. Major investment is already taking place to further improve travel choices, including MetroBus, MetroWest and Cycle Ambition Fund programmes. However, the previous chapters have demonstrated that there will be major pressures in the transport network and there is a strong case for major investment in the Transport Vision.

9.2. Components in Bristol

The major components of the Transport Vision in Bristol are described in the previous chapters and include:

- Strategic cycle routes along radial routes;
- A package of improvements to local bus services building on the Greater Bristol Bus Network, including integrated smart ticketing;
- A ring of new and enhanced Park & Ride hubs around the city, served by high quality bus, MetroBus or mass transit services;
- New mass transit and enhanced MetroBus routes. Significant constraints would need to be addressed, particularly roadspace and the ability to successfully achieve fast and reliable journey times;
- Callington Road Link, which will remove through traffic from the city centre and create the space to provide an improved transit route on A4 Bath Road;
- Rail improvements including new stations and the regeneration of Temple Meads Station, which will provide improved sustainable transport links to unlock growth at the Temple Quarter Enterprise Zone; and
- Orbital highway improvements to mitigate congestion and unlock road space to provide sustainable transport options.

Greater Bristol Cycling Network	Reallocation of roadspace on major arterial routes and traffic management measures to complement investment in quiet routes and off-road network, to create a comprehensive, easy to use network for journeys across the urban area. Detail is provided in scheme **Cycling 1** in Appendix A.
Greater Bristol Bus Network 2	Further enhancements to the sub-regional bus network, including improved vehicle specification, upgraded stops (consistent with MetroBus standard), ticketing and bus priority. Enhanced interchange facilities across the network. Detail is provided in scheme **Bus 1** in Appendix A.
Bristol City Centre Movement Strategy	Reconfiguration of road network in city centre to give greater priority to walking, cycling and buses and redefined traffic routings. Significant reconfiguration of bus routings to improve journey speeds and reliability. Detail is provided in scheme **Bus 2** in Appendix A.
Mass Transit to Bristol Airport	Fully segregated mass transit connecting Bristol Airport and South Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 1** in Appendix A.
Mass Transit to North Fringe	Fully segregated mass transit connecting Cribbs Causeway and North Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 2** in Appendix A.
Mass Transit to East Fringe	Fully segregated mass transit connecting East Fringe and East Bristol to city centre, with options to be considered for underground running. Detail is provided in scheme **Mass Transit 3** in Appendix A.
Mass Transit to Bath	Initial priority for MetroBus corridor to Bath, with longer-term ambition for light rail between the Hicks Gate / Keynsham area and Bristol city centre, to serve Hicks Gate Park & Ride (and beyond) and Temple Meads. This incorporates the Callington Road Link within Bristol. Detail is provided in scheme **Mass Transit 4** in Appendix A.
Park & Ride Package for Bristol urban area	A network of new and expanded Park & Ride sites on the edge of the Bristol urban area, enabling traffic to be intercepted and facilitating multi-modal interchange. Includes sites on M32, A370, A38(S), A37, A4(E), A420, A432, A38(N) and A4018. Detail is provided in scheme **Park & Ride 1** in Appendix A.
New Stations Package	New stations proposed at Constable Road, Ashton Gate and St Annes Park within the city (together with other new stations at Charfield and Saltford), with supporting infrastructure including waiting facilities, real time information, cycle parking, bus stops and car parking. Detail is provided in scheme **Rail 1** in Appendix A.
Service Improvements and Station Upgrades	Target for all stations to be served by at least two trains per hour in each direction, with increased capacity rolling stock to accommodate demand. Improved waiting facilities and interchange at stations, with consistent MetroWest branding, including Parson Street, Bedminster, Lawrence Hill and Stapleton Road. Detail is provided in scheme **Rail 2** in Appendix A.
South Bristol Orbital Corridor	New multi-modal transport corridor (highway, MetroBus, cycle route) connecting A4 Hicks Gate, A37 south of Whitchurch and A4174 Hengrove Roundabout to improve accessibility to South Bristol and unlock growth in the south of the city. Detail is provided in scheme **Road 5** in Appendix A.

In addition, most of the transport schemes described elsewhere in this report will benefit Bristol by improving transport provision and reducing journey times for trips across the region, including the large numbers of cross boundary trips. Around 60,000 people drive to work in Bristol from other local authorities, and 60% of those driving to work in the city centre do so from other local authorities. Conversely, around 40,000 Bristol residents drive to work in other local authorities. Joint-working will be crucial to tackling congestion problems in the city. For example, improving transport provision to the south west and the Airport will strengthen and enhance Bristol's role as an international gateway. In the south east, improved links to Bath will support the economies of both cities, and in the north east, the highway improvements and new motorway junction will

relieve congestion across this section of Bristol. In the north west, the new Park & Ride transport hubs on the M32 and elsewhere will reduce congestion on key corridors into the city.

In the Bristol urban area, many of the major routes into the city are also high streets and there is limited space available to provide additional capacity. Transport schemes must focus on improvements that move the most people in the limited space available, improving the comfort, speed and reliability of sustainable modes of transport. While adding more road capacity could solve local issues in the short term, it has the potential to encourage more car travel. In some cases, such as the Callington Road Link, additional road capacity can be used to free up capacity on surrounding routes including the A4 Bath Road to enable delivery of improved cycling and transit schemes. However, in the remainder of Bristol there are very limited possibilities to add either mass transit or alternative road space due to the limited space available in the city's streets and lack of alternative alignments. As such, on many corridors the only remaining option is to consider the viability of running public transport services underground, which while expensive, would be more deliverable than services that run at ground level.

Goods traffic is a significant challenge in the urban area. Forecasting indicates that there could be growth of around 40% in goods vehicles between 2013 and 2036, which has the potential to create significant congestion and air quality problems in the city. Chapter 8 highlighted the role of the Freight Consolidation Centre at Avonmouth in helping in the management of lorries in the city centre. In addition, there is potential for significantly enhancing the role of the railway in bringing goods into the city. For example, there could be a role for transport of goods into Temple Meads, from where goods could be transported by smaller vehicles to destinations in the city centre.

9.3. Bristol Transport Plan

It is recognised that large infrastructure schemes, as set out in the Transport Vision, are only part of the solution and for many transport issues more localised schemes and revenue funding are most effective and provide the greatest return on investment.

As announced in the Bristol City Council Corporate Strategy, and in addition to the new Joint Local Transport (JLTP), a more detailed Bristol Transport Plan is being developed by Bristol's Congestion Task Group, with the intention to consult on the Plan in mid-2018. The Plan will be informed by the Joint Transport Study and will seek to create better places and help people move around by continuing to improve sustainable transport provision. The city needs to make a transition from being a largely car dependent, fossil-fuelled city into a place that serves the wider needs of its citizens and businesses and protects the environment.

As noted previously, fiscal measures (such as congestion charging, as implemented in London, or workplace parking charges) have not to date been implemented in the West of England. However, the Joint Transport Study has demonstrated that there is a strong case for measures to better manage traffic demand in the city and wider urban area.

9.4. City Centre Movement Strategy

Bristol city centre is the largest employment cluster and one of the largest shopping centres in the South West. Significant expansion is taking place with the development of Temple Quarter Enterprise Zone, with capacity for up to 17,000 new jobs. This will expand the city centre to the east, focusing around Temple Meads station. The city also has a rapidly growing visitor economy, with large numbers of people attracted to the city's heritage, waterfront and creative reputation. These factors are driving large volumes of travel demand, which will grow significantly in the future, and are placing significant pressures on the city's transport network.

There are high volumes of traffic to city centre destinations, generated by large shopping car parks and parking provided by employers across the city centre. There is also traffic passing through the city centre because of limited orbital connections, particularly to/from the A37. This causes major congestion problems, particularly during peak periods but increasingly throughout the day and during weekends. This also causes delays and unreliable bus services, and worsens conditions for walking and cycling.

To tackle these challenges, Bristol City Council is developing a City Centre Movement Strategy (or City Centre Framework) as part of the Bristol Transport Plan. The strategy aims to create better places and improve the reliability and resilience of the transport network in central Bristol. It proposes a range of

measures including enhanced traffic management, increased bus priority, continuous safe cycle routes, and enhanced public realm. This will improve connectivity and reliability of journey times by all modes of transport – walking, cycling, public transport, essential journeys by car and freight.

Bristol City Centre Movement Strategy (City Centre Framework)	Reconfiguration of road network in city centre to give greater priority to walking, cycling and buses and redefined traffic routings, with improved journey reliability by all modes. Significant reconfiguration of bus routings to improve journey speeds and reliability. Detail is provided in scheme **Bus 2** in Appendix A.

10. International Gateways

10.1. Introduction

The UK, as an island nation, depends on international gateways for global trade. With the UK's departure from the European Union, the role of international gateways in connecting to the world will become even more important. Ports are central to the import and export of bulk goods. Airports are important for movement of high-value goods, connecting to business destinations and catering for leisure travel, both into and from the UK.

The West of England is home to two major international gateways: Bristol Port and Bristol Airport. This chapter sets out the importance of the Port and Airport to the regional and national economy and is structured as follows:

- **Section 10.2** describes the current role of Bristol Port, planned growth with a new Deep Sea Container Terminal and surface access issues by road and rail.
- **Section 10.3** describes the current role of Bristol Airport, the potential for future expansion, surface access issues and components of the Transport Vision that will improve access to the Airport.

10.2. Bristol Port

The UK ports sector handles 95% of UK trade by volume and 75% by value. It generates £9.9 billion in direct GVA and directly supports almost 140,000 jobs (£19 billion GVA and 470,000 jobs including indirect and induced effects)[44].

10.2.1. Role and Impact of Bristol Port

Bristol Port was the 10th busiest port by tonnage in England in 2015. It experienced very rapid growth from 2010 (7.3 million tonnes) to 2014 (11.4 million tonnes), although volumes fell back in 2015 (8.9 million tonnes). Port traffic grew overall by 22% between 2010 and 2015, which was significantly more than other major ports in England. In 2015, 54% of tonnage was dry bulk goods, 23% was liquid bulk, 12% was roll-on / roll-off traffic and 9% was container traffic[45]. Bristol is one of the UK's leading ports for the import and export of motor vehicles[46].

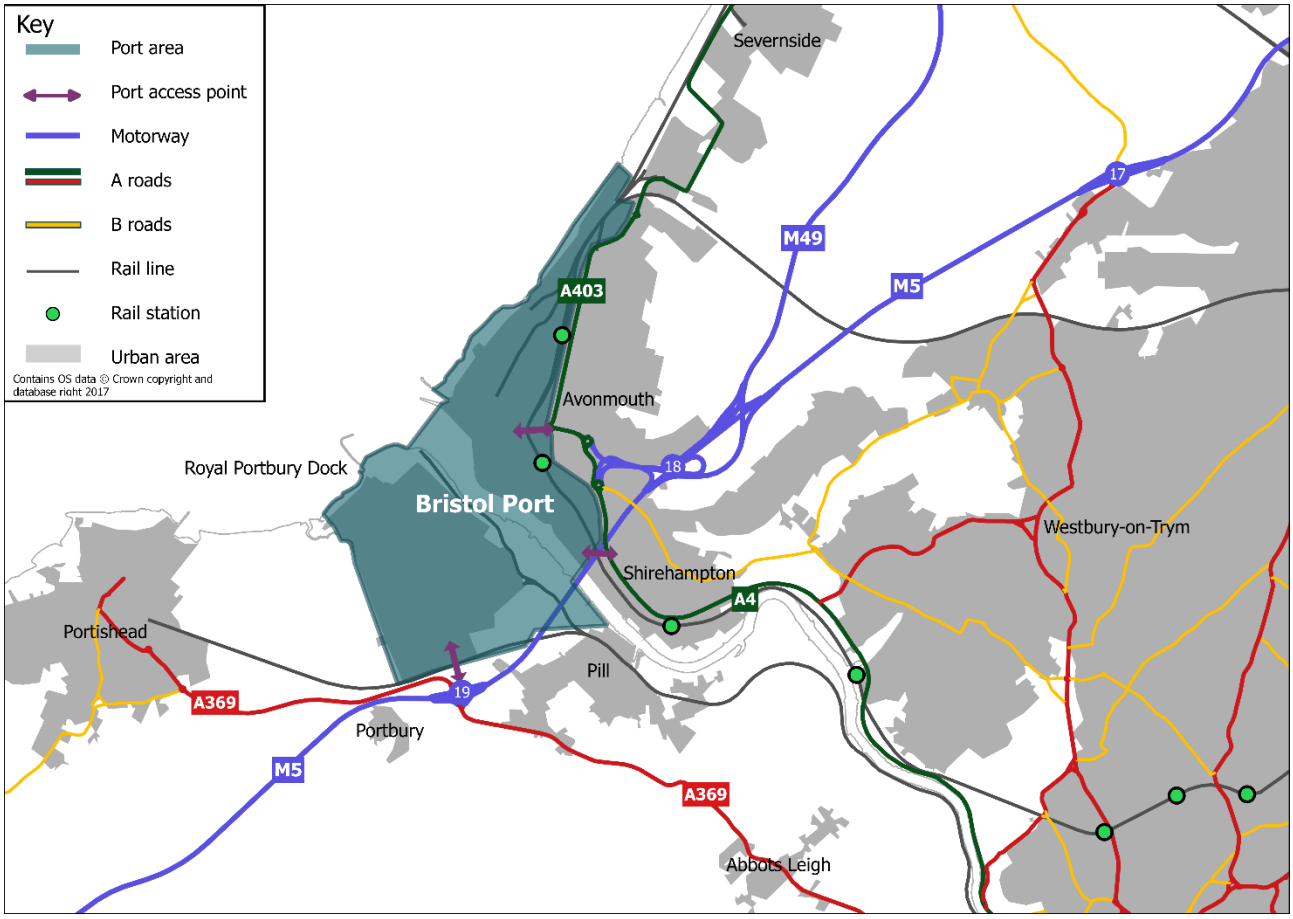
The port comprises two parts: Avonmouth – north of the River Avon, where the Avon enters the River Severn – and Royal Portbury Dock (RPD), south of the Avon. Both sides of the port can be accessed from the M5 motorway and both have direct rail freight links. The two parts of the port are connected under the River Avon by an underground coal conveyor belt. Figure 10-1 (overleaf) shows the location of the port.

The location of Bristol Port, with easy access to the M5 and M4 motorways, means that over 63% of the UK's population lives within 250 kilometres of the Port. The large business and consumer market within this area includes the urban centres of the Midlands and London. The Port directly employs 575 people and there are also over 10,000 jobs in the South West that indirectly depend on the Port. It also contributes more than £1 billion per annum to UK GDP.

The area is also a major hub for the logistics sector. The Avonmouth / Severnside Enterprise Area is immediately adjacent to the Avonmouth side of the port and covers 1,800 ha alongside the Severn Estuary[47]. Approximately 14,000 people are employed in the area in logistics and manufacturing, and the area is attractive for large-scale industrial, warehousing, energy and waste processing, as well as activities relating to the Port.

[44] Oxford Economics Report for Maritime UK, January 2015
[45] Source: DfT Port Freight Statistics
[46] Bristol Port Website: https://www.bristolport.co.uk/about-us/bristol-port-company-today
[47] West of England LEP website: http://www.westofenglandlep.co.uk/place/enterprise-zone-and-areas/ea-avonmouth-severnside

Figure 10-1 Location of Bristol Port



10.2.2. Port Growth and Expansion

Bristol Port has identified an imbalance between the locations of UK container ports and container destinations. The distance travelled overland (and resulting transport cost) to the ultimate destination is becoming increasingly important for cargo movements. Studies have shown that Bristol Port is closer to a higher proportion of the UK's container market than ports in the east and south of England. Bristol is therefore in a strong competitive position to attract container traffic and there is scope for expansion of the port's container market.

The port has an aspiration for expansion through the development of a Deep Sea Container Terminal (DSCT), which will bring the largest container vessels closer to UK markets by building three 400m berths with a depth of 18m. The expansion will generate almost 1,800 new jobs: 1,500 by direct employment and 300 through economic multiplier effects[48]. Studies by Bristol Port estimate that the proposed terminal will generate over £114 million per year in the local economy through employment and multiplier linkages. The Port previously delayed this expansion following the downturn in global shipping after the 2009 recession but it remains an ambition and the Port intends that it will be operational by 2030.

10.2.3. Surface Access to the Port

Bristol is the only deep sea port in the UK with direct motorway and rail access from all directions. There is direct access to the M5, M49 and M4 and the Port is connected to the national rail network at Avonmouth and Royal Portbury Docks.

10.2.3.1. Access by Road

Road access to Avonmouth is provided via M5 Junction 18/18A, which also connects to the M49. The M5 spur from Junction 18 then joins the A4 for a short section before the port access road, which crosses the Severn Beach railway line on a level crossing. There are controlled closures of the access road (with

[48] Bristol Port Website: https://www.bristolport.co.uk/trades/containers/deep-sea-container-terminal

barriers) to allow the passage of trains on the line. Severnside currently has relatively poor accessibility to the Strategic Road Network, but this will be improved with the planned construction of a new junction on the M49[49], which will provide direct access and enable realignment of the A403 Spine Road through the area.

Road access to Royal Portbury Dock is provided via M5 Junction 19 on the south side of the Avonmouth Bridge. This junction also provides access to Bristol and Portishead via the A369. There are significant problems at the junction, with heavy queuing and delays on the southbound exit slip road from the M5 and on the A369 from Portishead. The queuing on the M5 southbound exit slip is a significant safety concern and adds delay to freight traffic accessing Royal Portbury Dock. Highways England has committed to short-term investment and a study to examine longer-term options for the junction.

The two sides of the Port are connected via the Avonmouth Bridge, which also carries long-distance traffic to the South West. The Bridge is heavily trafficked and incidents and congestion on the Bridge have significant implications for the operation of the Port itself.

10.2.3.2. Access by Rail

Both sides of the Port are connected to the rail network and the Port generates significant rail freight demands. Avonmouth is connected by a freight line through Hallen, Henbury and Filton to Filton West Junction (west of Bristol Parkway), from which there are mainline connections to London and Birmingham. Freight trains head to/from various quarries across Somerset, South Wales (coal), the Midlands (automotive), and the South East (cars, containers).

The Royal Portbury Dock is connected by the freight line on the south side of the Avon Gorge and through Ashton Vale, where it joins the main line just west of Parson Street station. The line carries freight to/from the South East (containers, automotive) and South Wales (coal). The first phase of the MetroWest programme is planning the reintroduction of passenger services from Portishead. The future service pattern will take account of current and future freight services using the line.

10.2.4. Proposals in the Transport Vision

The Transport Vision includes schemes that will impact on access to Bristol Port. These include improvements to M5 Junction 19, which will improve access to Royal Portbury Dock. This scheme is described in more detail in Chapter 5. There is potential to develop railfreight capabilities in Avonmouth to capitalise on the potential for port-oriented growth in the logistics sector. This scheme is described in more detail in Chapter 8.

Some potential schemes have not been included in the Transport Vision. Proposals for a new Second Avon Crossing, connecting the A4 Portway on the north of the river with Junction 19 on the south side, have not been progressed because the business case is relatively poor. This is discussed in Chapter 5.

10.3. Bristol Airport

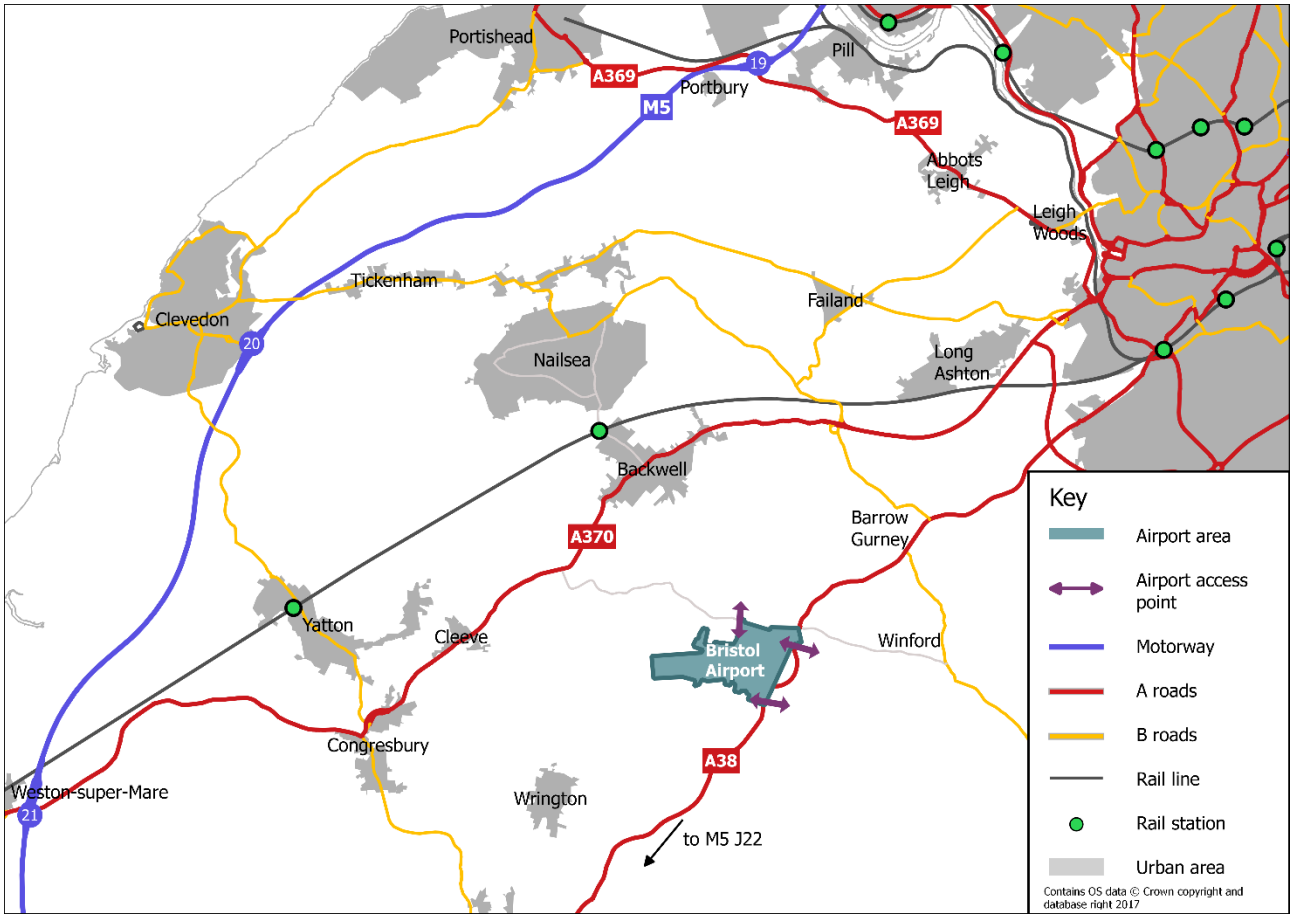
The aviation sector provides a significant benefit to the UK economy. It has been estimated that the sector supports 920,000 jobs and contributes almost £50 billion to the economy (3.6% of UK GDP) and £8 billion tax revenues[50]. Effective air connectivity is critical for business in serving global destinations and for the transport of high value freight. In addition, millions of people use airports every year for holidays and to visit friends, supporting the visitor economy, which contributes 9% of UK GDP.

10.3.1. Role and Impact of Bristol Airport

Bristol Airport is England's third busiest regional airport and the ninth busiest airport in the UK, carrying 7.5 million passengers per annum (mppa) in 2016. It serves 116 destinations in 30 countries, including 17 capital cities, with multiple daily services to international hubs. It is home to the UK's two largest tour operators and 10 scheduled airlines operate year-round services. The airport is regularly ranked best in the UK for on-time performance of services. Figure 10-2 shows the location of the airport on the A38, eight miles south-west of Bristol city centre.

[49] The new M49 Junction is a committed investment in RIS1. Refer to Section 6.3.1 for detail.
[50] Economic Benefits from Air Transport in the UK, Oxford Economics, 2011

Figure 10-2 Location of Bristol Airport



Until the 1990s there were a limited range of international destinations and relatively low passenger numbers (<1 mppa). A new terminal opened in 2000, after which passenger demand grew substantially from 2.9 mppa in 2001 to 6.2 mppa in 2008. The recession resulted in a fall in demand in 2009 (as with most UK airports) but the Airport has experienced continual growth since then, climbing from 5.6 mppa in 2009 to 7.5 mppa in 2016.

There has been sustained growth in activity at the Airport during the last decade, with development to accommodate 10 mppa approved in 2011, which includes a comprehensive programme of planning controls and mitigation of the impacts of increased demand on the road network. Recent development has included new aircraft stands, the east terminal extension in 2015 and the west terminal extension was completed in 2016.

The Airport is a critical economic asset for the West of England: 3,000 people are employed on-site and airport operations result in around 4,200 direct, indirect and induced jobs. Visitors using the Airport spend around £350 million in the local economy and the Airport generates around £390 million GVA. A Business West survey has indicated that the presence of Bristol Airport was a factor in the location decision of one in five businesses in the West of England[51].

There is a strong relationship between good international connectivity and the economic performance of regions. Data provided by Bristol Airport[52] indicates that a 10% increase in air connectivity stimulates GDP per capita by 0.5% and a 10% increase in intercontinental flights induces a 4% increase in the headquarters of large firms. It is therefore vital to recognise the importance of Bristol Airport to the West of England economy, both in terms of direct employment and in supporting the competitiveness of the sub-region.

[51] Source: Bristol Airport
[52] The Economic Impact of European Airports (Intervistas)

10.3.2. Airport Growth and Expansion

Bristol Airport is expecting to increase passenger traffic to 8 mppa in 2017, with demand anticipated to grow to 10 mppa (the current capacity limit) in the next 4-6 years[53]. Forecasts from the Airport indicate that this could rise substantially over the next 20 years. Bristol Airport has therefore highlighted that additional capacity, beyond the existing 10 mppa planning limit, will be required to support the regional economy and meet the forecast demand for travel over the next 20 years.

The Government's Aviation Strategy consultation is due to be published in 2017 and will assist in developing potential growth scenarios to 2036 and beyond. However, it is currently forecast that passenger numbers could increase to between 15 and 20 mppa by 2036, equivalent to more than doubling from current demand. The Airport forecasts that this could result in 8,900 new full time equivalent jobs and £1.8 billion additional GVA in the regional economy.

10.3.3. Surface Access to the Airport

The Airport serves a wide catchment, with passengers drawn from across the South West and South Wales. The largest markets are from Bristol (25%), South Wales (19%), Devon (13%) and Somerset (9%). Other markets include Wiltshire (6.3%), Gloucestershire (5.2%), Bath & North East Somerset (5%), North Somerset (4.5%), Dorset (2.3%) and South Gloucestershire (1.7%).

66% of passengers come from areas north and east of the Airport (including Bristol, South Wales, Gloucestershire, B&NES and Wiltshire). 34% of passengers come from places to the south (Cornwall, Devon, Dorset, Somerset and North Somerset). The limited public transport connections to the Airport mean that most passengers drive to the Airport, although a 14% public transport mode split has been achieved for airport passengers. The highest public transport mode shares are achieved from Bristol and Bath, reflecting the provision of direct bus services from the two cities.

Bristol Airport has relatively poor surface access, with no direct motorway or rail connections, which results in traffic using different local routes to access the Airport. The poor surface access will increasingly act as a constraint to the potential for growing the Airport and supporting growth in the wider West of England economy.

10.3.3.1. Access by Road

Bristol Airport is located on the A38, 8 miles to the south west of Bristol. The A38 is a single carriageway road connecting Bristol to the South West, with no direct motorway or dual carriageway access. Passengers travelling from Wales are signed to access the Airport from M5 Junction 18 and follow the A4 Portway, Cumberland Basin, South Bristol Link and the A38. The recent opening of the South Bristol Link has resulted in significant improvements to the journey, enabling traffic to avoid the congested Winterstoke Road and Parson Street area of the city. However, traffic on the A38 between the South Bristol Link and the Airport has increased in recent years, and delays are experienced at key junctions along the route.

Passengers travelling from the South West can either leave at M5 Junction 22 (signed for Bristol and the Airport), with a slow journey along the A38 through North Somerset, or at Junction 21, with a slow journey along the A370 and via Brockley Combe. This significantly increases journey times from the South West and is a further factor exacerbating the peripherality challenges of the South West peninsula. Traffic to the Airport also uses other routes, many of which are not appropriate for heavy traffic flows. These include routes through the Chew Valley from the east and minor roads through North Somerset from the north and south.

Forecast growth in travel demand on the A38 corridor – from the Airport itself, new housing and background growth – will exacerbate these problems. Significant congestion and delays are forecast on the A38, which will extend journey times and increase traffic on other roads in the area. A comprehensive solution is therefore required to improve access to the Airport, which is described below.

10.3.3.2. Access by Public Transport

There are no rail services to the Airport. Public transport connections are available through the Airport Flyer (operating at 8 to 10-minute service intervals from Bristol city centre), bus services from Bath and Weston and longer-distance bus and coach services from Devon and South Wales. The Airport has made significant investment in the Airport Flyer, which has resulted in a comparatively strong 14% public transport mode split

[53] Source: Bristol Airport

for passenger journeys to the Airport. The completion of the Ashton Vale to Temple Meads MetroBus route in late 2017 will include provision for feeder services to/from the Airport, which will further improve journey times to/from the Airport. The new hourly Airport Flyer service from Weston-super-Mare will further improve public transport options.

However, it will be necessary to achieve a large increase in public transport mode split to sustainably accommodate future growth at the Airport. The primary focus in the future will be on improving public transport connectivity to the Bristol urban area as the major economic driver and public transport hub in the region.

10.3.4. Proposals in the Transport Vision

There is a strong case for action to significantly improve surface connectivity to the Airport, both by public transport and road. The road network in this area is already under significant strain and the problems will become acute with forecast growth in travel demand. It will be critical to achieve a significant increase in public transport mode split, particularly for movements from the Bristol urban area, which will help to manage the scale of future growth in traffic demand on the corridor.

In response, the Transport Vision contains two major investment proposals. The first is for a new mass transit route between the Airport and Bristol, to form part of a mass transit network for the urban area. The purpose will be to significantly improve public transport access to the Airport from Bristol, the wider urban area and the wider regional catchment. It will therefore ensure effective connectivity with public transport across the urban area and from other parts of the South West and South Wales. This scheme is described in more detail in Chapter 5.

The second proposal is for major improvements to the A38 between Bristol and Weston-super-Mare, which will improve access to the Airport from both directions. This would include a new M5 Junction 21A at Weston-super-Mare, a new highway link connecting from the M5 to the A38 at Langford and improvements on the A38 between Langford and the Airport, which would improve access from the south. Options for connections to Bristol would include improvements to the existing A38 or a new off-line route. It is likely that this would need to be dual carriageway standard, and a new off-line route is likely to be more feasible. This scheme is described in more detail in Chapter 5.

10.4. Summary

The West of England is home to two important and growing international gateways. Bristol Port is in a highly competitive location, with good access to the motorway and rail freight networks giving easy access to the rest of the country, and is well positioned to cater for future growth in container markets. The development of the Deep Sea Container Terminal at Avonmouth will have significant impacts on the local and regional economies and it will be important to ensure reliable access to the strategic road and rail networks to cater for these strategic freight movements.

Bristol Airport plays a critical role in the competitiveness of the region, enabling businesses to connect with clients and partners in major cities across Europe and supporting inbound tourism. The Airport shows strong potential for growth over the next two decades. However, it is due to reach its capacity limit in the next 4-6 years; it has therefore highlighted that additional capacity, beyond the existing 10 mppa planning limit, will be required to support the regional economy and meet the forecast demand for travel over the next 20 years.

Surface access to the airport is a major problem, increasing journey times for travellers from both Bristol and the wider region, and constraining the potential catchment area. The roads serving the Airport are forecast to become increasingly congested, which will further increase journey times from the catchment area, for both cars and buses using the access routes. Strategic investment is required to improve access to the Airport, as described in Chapter 5.

11. National and Regional Connections

11.1. Introduction

The UK depends on effective national and regional transport connections to enable the economy to function and people to travel to work, shop and visit friends and families. The Strategic Road Network is critical for the movement of freight, caters for most business travel and supports the needs of the visitor economy in the South West. The rail network also carries freight, connects cities, supports the needs of the knowledge economy and is increasingly important in catering for travel to work movements.

The West of England forms a critical node on both the road and rail networks, reflecting its role as gateway to South Wales and the South West peninsula. Effective road and rail connections are vital for connecting to the international gateways, other UK cities and the wider region. This chapter sets out the importance of the national and regional road and rail networks and is structured as follows:

- **Section 11.2** discusses the issues on the rail network, including the current investment programme, connectivity and capacity challenges, future aspirations and network constraints, and proposals within the Transport Vision.
- **Section 11.3** discusses the issues on the Strategic Road Network, including the current investment programme, connectivity challenges and the proposals in the Transport Vision.

11.2. Rail Network

Network Rail manages the nation's rail infrastructure and is funded through a series of five-year Control Periods within which it plans and delivers priorities for rail investment. Planning for Control Period 6 (2019 – 2024) is well advanced. By May / June 2017, the Secretary of State is expected to inform Network Rail of the Statement of Funds Available (SoFA) and the expected High Level Output Specification (HLOS) for CP6. Network Rail will then develop its Strategic Business Plan, to be reviewed and determined by the Office of Road and Rail prior to the publication of the Network Rail CP6 Delivery Plan in March 2019.

Future priorities will be informed by the Route Studies that were completed in 2015. The Western Route Study[54] describes the issues and strategic vision for the rail network across the South West over the next 30 years. It considers future travel demands and pressures on the network to 2043, develops long-term Conditional Outputs and identifies prioritised investments for Control Period 6.

11.2.1. Current investment programme

The Route Study assumes that the following schemes are included within the baseline:

- Great Western Main Line electrification: from Maidenhead to Bristol Temple Meads via Bath Spa and to Cardiff and Swansea via Bristol Parkway[55];
- Intercity Express Programme: a new fleet of trains to replace the current High Speed Train fleet, which will operate on the Great Western routes, including the newly electrified routes;
- Greater Bristol Programme: to facilitate the IEP train service between Bristol and London Paddington, provide capacity for local growth and reduce journey times from the South West to Birmingham, including an additional platform at Bristol Parkway, Filton Bank four-tracking, Bristol East junction remodelling and Bristol Temple Meads station capacity and masterplan;
- Two additional trains per hour between London Paddington and Temple Meads via Bristol Parkway (with two trains via Bath continuing as at present), giving 4 trains per hour to London; and
- MetroWest Phases 1 and 2.

[54] Western Route Study, Network Rail, August 2015
[55] The Government reviewed the electrification programme in 2016 and opted to cut back the programme. The line to Temple Meads will be electrified as far as Thingley Junction, between Chippenham and Bath. The section between Thingley Junction and Temple Meads has been deferred.

Significant investment is therefore planned in the rail network over the next decade but significant challenges will remain in delivering journey times to meet the needs of the future economy and providing enough capacity to meet future demand.

11.2.2. Rail connectivity challenges

The West of England has frequent rail links to London, the Midlands, South Wales and the South West but journey speeds and frequencies are lower than connections between many other cities. Table 11-1 provides typical comparisons for travel from Bristol Temple Meads (as the main hub station for the West of England) and Bristol Parkway compared to other major Core Cities in England.

Table 11-1 Current rail journey times, speeds and frequencies between UK cities[56]

	Distance (miles)	Journey Time (hr: min)	Speed (mph)	Frequency (trains/hr, tph)
Bristol TM – London	119	1:42	70	2 tph
Bristol TM – Birmingham	88	1:26	61	2 tph
Bristol TM – Cardiff	44	0:54	49	3 tph
Bristol TM – Plymouth	120	2:11	55	2 tph
Bristol TM – Southampton	73	1:42	43	1 tph
Parkway – London	115	1:25	81	2 tph
Parkway – Birmingham	84	1:15	67	2 tph
Parkway – Cardiff	39	0:38	62	2 tph
Leeds – London	192	2:17	84	3 tph
Manchester – London	199	2:11	91	3 tph
Birmingham – London	118	1:21	87	3 tph
Birmingham – Manchester	88	1:28	60	2 tph
Leeds – Manchester	42	0:52	48	4 tph

Note: Bristol TM = Bristol Temple Meads, Parkway = Bristol Parkway

Average journey speeds between Bristol Temple Meads and London Paddington are around 70 mph, compared to 91 mph from Manchester, 87 mph from Birmingham and 84 mph from Leeds. Journey speeds from Bristol to other cities are lower, reflecting service patterns and infrastructure constraints on the routes. Average journey speeds (and service frequencies) from Bristol to Cardiff are slower than connections between comparable cities: for example, for journeys from Leeds to Manchester.

Bristol Parkway benefits from higher journey speeds to London, Birmingham and Cardiff. Journeys to London are faster because Bristol Parkway is on the main section of the Great Western Main Line, with higher line speeds and fewer intermediate stops. Journeys from Bristol to Birmingham are faster because there are fewer constraints caused by stopping services.

Although the electrification of the Great Western Main Line is now being scaled back, it is likely that the programme will result in reduced journey times to the capital. It is forecast to result in a typical 16 minute reduction in journey times from Bristol Temple Meads to Paddington[57]. This would result in an increase in journey speed from 70 to 83 mph, broadly equivalent to speeds currently achieved on journeys from Birmingham and Leeds to London. This will be a significant improvement in connectivity to/from London, which will further enhance the economic attractiveness of the West of England area.

However, High Speed 2 will significantly reduce future journey times from Birmingham, Manchester and Leeds to London. The journey time from Birmingham to London will be significantly lower than the corresponding time from Bristol, and journey times from Manchester and Leeds will be similar to those from

[56] Source: National Rail, based on journeys departing after 07:00 on weekdays in May 2017.
[57] Source: Figure 5.69, Western Route Study, Network Rail, August 2015.

Bristol. This will mean that other UK cities will benefit from closer rail proximity to London, which will enhance their future competitiveness and could pose a relative challenge to the West of England.

Other parts of the UK are developing proposals for improved connectivity between regional cities. Transport for the North is developing proposals to significantly reduce journey times between Leeds and Manchester, and Midlands Connect has identified the need to improve connectivity between Birmingham and Nottingham. Connectivity between the West of England and other cities will also be important to the future competitiveness of the region. Reducing journey times from Devon and Cornwall will be important to improving the economic performance of the South West peninsula, and this is being addressed through the work of the Peninsula Rail Task Force. Reducing journey times to Cardiff will help drive increased productivity in both South-East Wales and the West of England.

There are also rail connectivity challenges within and from other parts of the West of England. Many stations (e.g. Yate) only have hourly services, which constrain the attractiveness of rail for travelling in the sub-region. Weston-super-Mare has direct trains to London Paddington during the morning peak, but interchange is required at Temple Meads for journeys later in the day. This interchange adds a time (and inconvenience) penalty and stakeholders have identified a need for direct services to London throughout the day.

11.2.3. Rail capacity challenges

There has been rapid growth in demand on the rail network in the West of England during the last decade and there are now challenges with crowding on some services, particularly during the peak periods. Demand forecasts developed through the Network Rail Market Studies forecast that there will be significant growth in rail demand in the West of England over the next 20-30 years.

Table 11-2 shows Network Rail's forecasts for key markets. However, it should be noted that the West of England has long expressed concerns about Network Rail's passenger forecasts not reflecting historic or current trends.

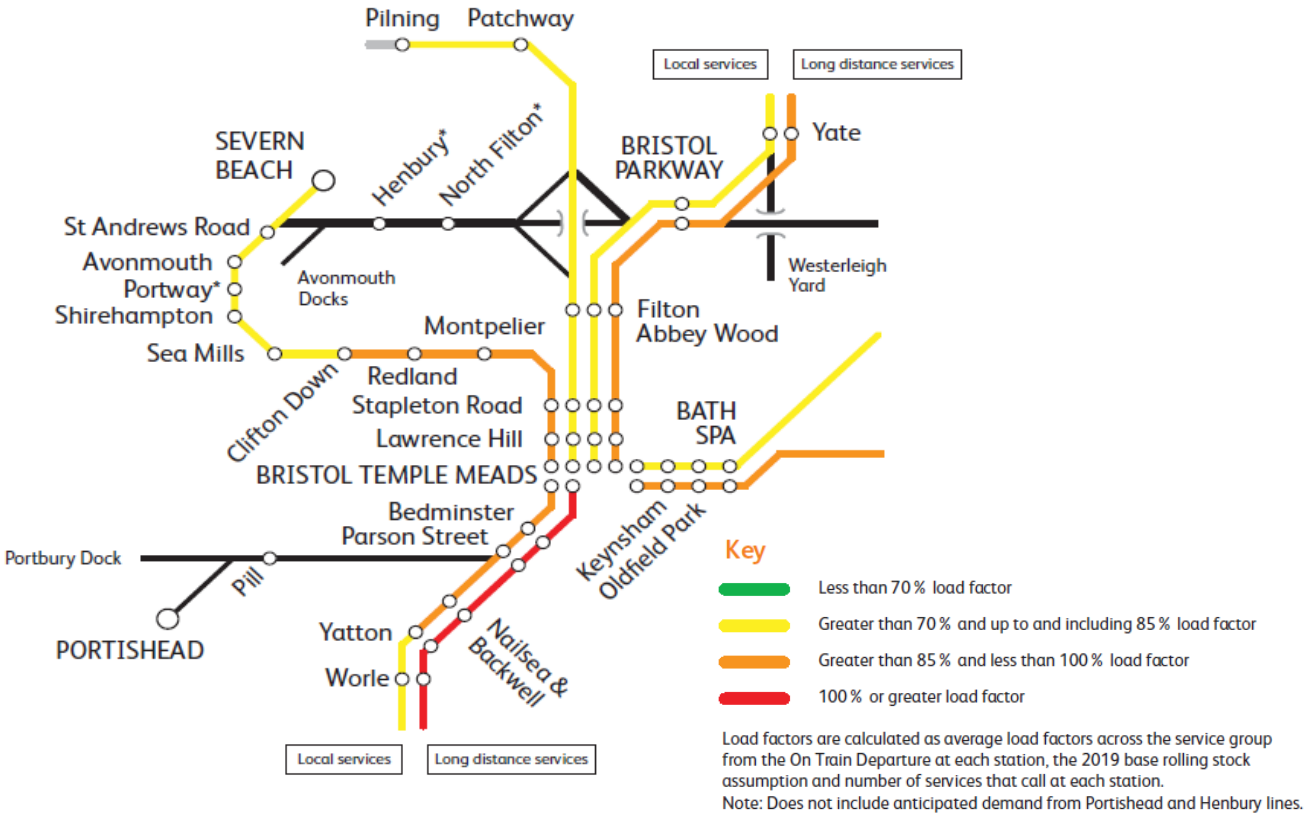
Table 11-2 Forecast Growth in Demand for Rail Travel, 2012-2043[58]

Market	Growth in Demand
Bristol Area	+121%
Bristol – London	+118%
Bristol – Birmingham	+97%
Bristol – Manchester	+123%

This growth in demand is forecast to result in increased crowding on train services in the West of England. Figure 11-1 shows the forecast load factors on trains in 2043, based on the 2019 indicative train service specification assumed in the Western Route Study.

[58] Source: Figures 3.1 and 3.18, Western Route Study, Network Rail, August 2015

Figure 11-1 Average load forecasts on morning peak train services into Bristol in 2043[59]



(Note: black lines show new services that were not subject to load factor analysis (services on Portishead line and Henbury Spur), or other services considered elsewhere in the Route Study (mainline services east of Westerleigh Junction).

This indicates that there will be crowding on long-distance services between Bristol and Birmingham and between Bristol and Exeter, as well as on local services on the Severn Beach line and Bristol – Bath – Westbury line.

11.2.4. Long term aspirations and constraints

The Route Study has identified a series of Conditional Outputs based on benchmarking of service frequencies for key movements. From this, it has developed an indicative train service specification for 2043, which includes increased frequencies on both longer-distance and local services, over and above those currently proposed. The additional services include:

- 1 tph Bristol – Gloucester calling at Yate;
- 2 tph Cardiff – Birmingham calling at Bristol Parkway;
- 1 tph Bristol – Exeter;
- 1 tph Bristol – South Coast;
- 2 tph Bristol – Cardiff;
- 1 tph for freight; and
- Additional services following implementation of MetroWest Phase 2.

However, there will be significant constraints to delivering the future aspirational level of service, including (but not limited to):

- Capacity at Bristol Temple Meads (both train movements and passenger flows through the busiest station in the region);

[59] Source: Figure 3.19, Western Route Study, Network Rail, August 2015

- Capacity at Bristol East Junction (diverse train movements interacting on the busiest approach into Temple Meads);
- Single line sections, including parts of the route between Weston and Worle, the junction with the Severn Beach line and sections of the Severn Beach line itself;
- Line capacity between Westerleigh Junction and Stoke Gifford Junction, including crossing movements at the two junctions (train movements on the Great Western Main Line and to/from the Midlands); and
- Track capacity on the CrossCountry route from Westerleigh Junction through Gloucestershire towards Birmingham.

In response to the challenges, the Route Study identifies options for consideration within CP6 (2019-2024) and longer-term options (from 2025 onwards). CP6 options include Temple Meads capacity improvements, Bristol East Junction and capacity improvements at Bristol Parkway station. Longer term options include capacity improvements from Westerleigh Junction to Stoke Gifford Junction, and from Charfield to Ashchurch. The Route Study highlights that there will need to be trade-offs between journey times, service frequencies and performance in the Bristol area; there are practical limits on the ability of the rail network to accommodate more trains, particularly on the approaches to Temple Meads.

11.2.5. Proposals in the Transport Vision

The Transport Vision recognises the challenges in catering for the competing demands on the rail network. Subject to the constraints of the CP6 Delivery Plan, the initial priorities should be:

- The investments necessary to deliver MetroWest Phases 1 and 2, which are committed schemes;
- Operational review of the timetabling of local services, including MetroWest Phases 1 and 2, to improve network efficiency and to ensure that services meet future connectivity needs;
- Capacity improvements and delivery of the Masterplan for Temple Meads;
- Tackling the capacity constraints at Bristol East Junction;
- Capacity improvements to enable the provision of one train per hour from Weston-super-Mare to London throughout the day;
- Other interventions to enable the delivery of new local stations (Constable Road, Ashton Gate, St Annes, Charfield and Saltford) whilst maintaining longer-distance connectivity, with no increases in long-distance journey times;
- Station upgrades with a focus on developing Interchange Hubs (interchange with MetroBus, mass transit, bus services and cycle parking provision);
- Schemes to improve access to all existing rail stations by sustainable modes across the West of England. Stations should meet minimum accessibility and integration standards, branded under MetroWest; and
- Ensuring that the network is prepared for future completion of electrification from Thingley Junction to Temple Meads.

Over the longer term the focus should be on provision of major improvements to unlock capacity for more long-distance and local train services, including:

- Further interventions to enable delivery of more frequent local train services, to a minimum of 2 tph;
- Longer rolling stock to cater for increased demand, in conjunction with longer platforms where required (including Weston-super-Mare, Nailsea & Backwell and Yatton), with higher quality rolling stock from all stations;
- Major improvements between the Stoke Gifford and Westerleigh Junctions, including potential grade separation, to enable more local and long-distance services towards Gloucestershire and Birmingham;
- Capacity improvements on the CrossCountry route between Westerleigh Junction and Ashchurch to enable effective operation of more frequent local and longer-distance services to Gloucestershire and the Midlands;
- Capacity improvements to enable faster, more frequent services between Bristol and Cardiff;
- Capacity improvements to support increased service improvements from Weston-super-Mare including double tracks on the loop line between Weston Station, reinstating the southern chord at Weston-super-Mare, and the Herluin Way to Locking Road Link (bridge replacement to enable widening for double tracking); and
- Improvements between Bristol and Taunton to enable improved journey speeds from Devon and Somerset to the West of England.

11.3. Strategic Road Network

Highways England is the government company charged with operating, maintaining and improving England's Strategic Road Network (SRN). It is funded through the Road Investment Strategy and is currently midway through the first roads period 2015-2020 (RP1). It is now undertaking the work to inform the second Road Investment Strategy (RIS2) for roads period 2 from 2020 to 2025. RIS2, to be produced by the Department for Transport, will include a vision for the SRN to 2040 and beyond, a multi-year investment plan, performance specification and Statement of Funds Available (SoFA). Highways England will then produce its next Strategic Business Plan for scrutiny by the Office of Rail and Road prior to the publication of the Highways England RIS2 Delivery Plan in March 2020.

Future investment priorities will be informed by the Route Strategies that are currently being prepared by Highways England. This work is currently at a relatively early stage and has, to date, focused on an assessment of the evidence base. The West of England is covered by three routes: London to South Wales, Birmingham to Exeter and South West Peninsula, for which Highways England produced Route Strategies in March 2017[60].

- London to Wales includes the M4, M32, M48 and M49;
- Birmingham to Exeter includes the M5; and
- The South West Peninsula includes the A46 and A36 from the M4 to Southampton.

In common with all the Route Strategies, these include an analysis of current constraints and challenges, an overview of investment plans and growth potential, and future challenges and opportunities.

11.3.1. Current investment programme

Within the West of England, one major scheme is committed for investment during RIS1 (with construction due to commence before April 2020). The new M49 Avonmouth junction will significantly improve access to Avonmouth and Severnside. No other schemes are currently programmed within the area.

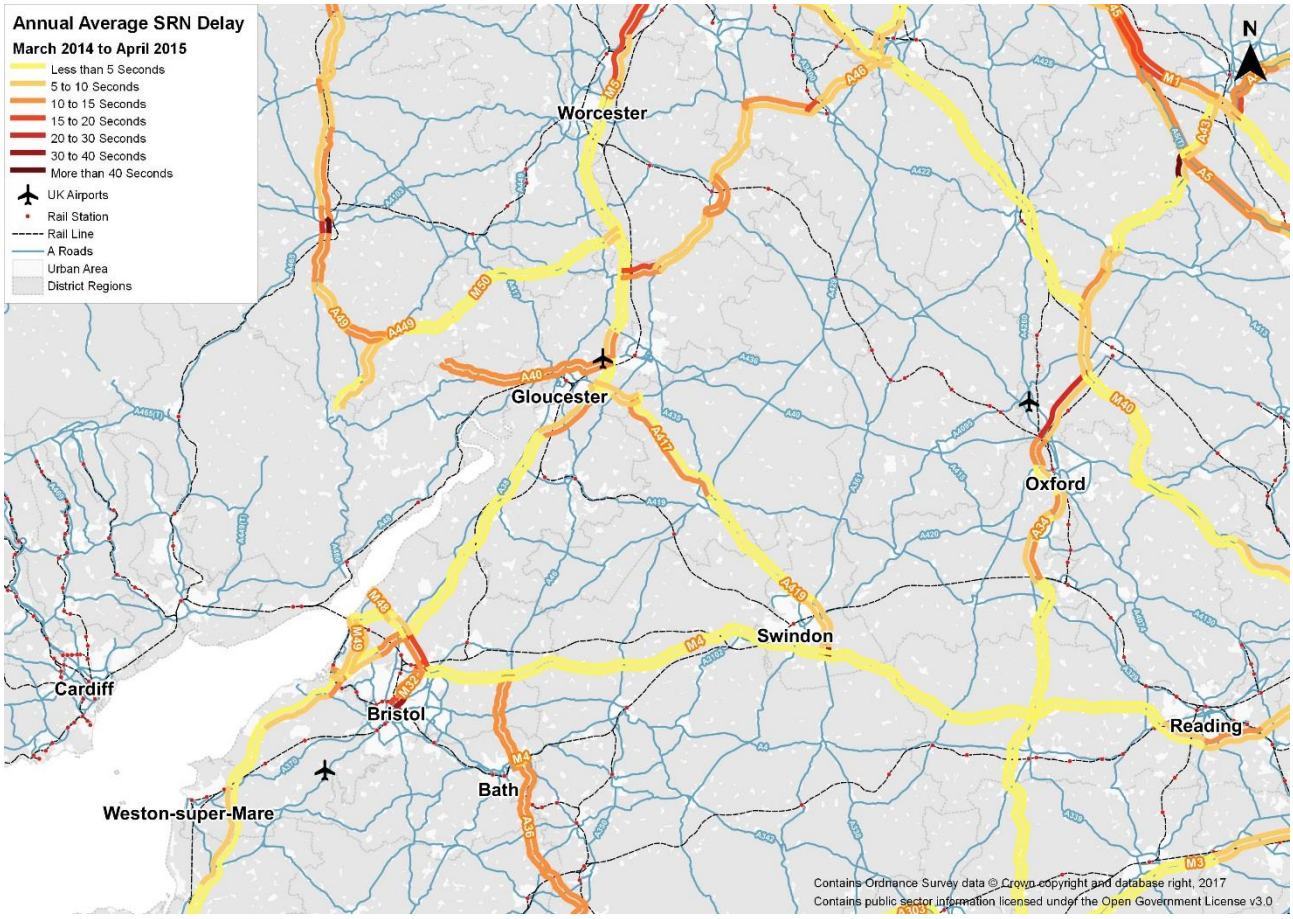
However, other schemes in the wider South West region could have implications for the routing of traffic on the network in the West of England. The upgrade of the A303 / A358 to expressway standard through Wiltshire and Somerset will create a new strategic route and could help to reduce pressure on the M4 and M5 for movement between London and the South West peninsula, particularly during the peak summer holiday period. The construction of the A417 missing link south east of Gloucester will improve connections between the Midlands and Wessex but this is likely to have a relatively modest impact on the M4 and M5 in the West of England.

11.3.2. Road connectivity challenges

The West of England benefits from its location on the UK's motorway network and its role as gateway to the South West and South Wales. However, there are heavy traffic flows caused by the interaction of local and longer-distance movements, which cause congestion and delays. Figure 11-2 illustrates delay on the network in the West of England and connections towards the Midlands (via the M5) and South East (via the M4).

[60] London to Wales Route Strategy, Birmingham to Exeter Route Strategy, South West Peninsula Route Strategy, Highways England, March 2017

Figure 11-2 Average Annual SRN Delay, April 2014 - March 2015[61]



This shows delay hotspots on the M5 between Junctions 18 and 19 (Avonmouth Bridge) and Junctions 15 and 17 (Almondsbury Interchange to Cribbs Causeway), M4 between Junctions 22 and 19 (approaches to Almondsbury Interchange and M32) and the M32 into Bristol. The M4 and M5 are otherwise relatively free-flowing towards London and the Midlands, although roadworks at Gloucester and Worcester resulted in traffic delays during 2015. Strategic road connectivity to London, the Midlands, South Wales and South West is therefore relatively good; the primary challenges are the heavy traffic flows and congestion on the motorway network around the north and west of Bristol.

The A46 / A36 route is different. Although this route forms part of the Strategic Road Network, it is a much lower standard than most trunk roads. Most of the route is single carriageway and there is a missing link at Bath, where traffic is required to pass through the city and the A4 and A36 are operated by Bath & North East Somerset Council. This results in traffic delays, severance, noise and high levels of air pollution in the city.

Although not shown in the figure above, there are also distinct challenges resulting from the role of the West of England as gateway to the South West. There are heavy traffic flows on the M5 during the holiday periods and at weekends, which result in long delays along the route, particularly between Junctions 15 and 19. There are also significant challenges with the resilience of the network. Incidents on the M5 often cause widespread disruption, particularly as the motorway passes through the West of England, with traffic required to divert through Bristol.

The forecast rapid growth in population and economic activity in the West of England will exacerbate these challenges if action is not taken. Work to develop Highways England's Strategic Economic Growth Plan has

[61] Source: Figure A-14, International Gateways and the SRN, Highways England, March 2017

demonstrated that the West of England will be amongst the fastest-growing areas of England over the next 20 years, with a strong focus on sectors that are heavily dependent on the Strategic Road Network[62].

Forecasts developed for the Joint Transport Study indicate that congestion will rise significantly over the next 20 years. The G-BATS4 model estimates that the costs of congestion on the road network in the West of England will rise from an estimated £300 million per annum in 2013 to £800 million per annum in 2036[63]. A significant component of this congestion will be experienced on the Strategic Road Network, which will impact on both local and longer-distance movements in the area.

11.3.3. Long term aspirations and constraints

The Route Strategies identify a series of Economic Opportunity Areas, which are likely to form the focus for economic growth and will be dependent on the effective operation of the Strategic Road Network. These include the Bristol urban area (urban growth, housing and mixed use), Bath (urban growth), Avonmouth and Portbury (port activity and logistics) and Weston-super-Mare (housing and mixed use). Economic growth will, however, be constrained if the Strategic Road Network does not operate effectively.

In response to these challenges, the London to Wales Route Strategy will include further work to analyse the issues and develop proposals for the M4 between Junctions 18 and 22, M32 and M49. The Birmingham to Exeter Strategy will include work on the M5 between Junctions 9 and 15 (Ashchurch to Almondsbury), 15 to 18 (Almondsbury to Avonmouth) and 18 to 22 (Avonmouth to Tiverton). This work is scheduled to be completed in late 2017 and evidence from the Joint Transport Study will be used to help inform this work.

The Joint Transport Study has identified a series of critical issues on the Strategic Road Network in terms of congestion worsening at existing hotspots and emerging new challenges:

- Continued environmental problems in Bath caused by through traffic on the A46 / A36 corridor;
- M4 between Junctions 19 and 22, caused by heavy volumes of traffic entering the North and East Fringes and Bristol;
- M5 Junction 14, with queuing on the slip roads worsening with forecast growth in South Gloucestershire and Stroud;
- M5 between Junctions 15 and 17, caused by traffic entering the North Fringe;
- M5 between Junctions 18 and 19, caused by local and long-distance traffic and traffic queuing back from the southbound exit slip road to Portishead and Royal Portbury Dock; and
- M5 between Junctions 19 and 21: increasing traffic caused by growth in North Somerset resulting in increasing congestion on this part of the route.

In addition, the Government announced in July 2017 the plan to remove tolls on the Severn Crossings before the end of 2018. As discussed in Section 3.4, this is forecast to result in a significant increase in flows on the two crossings, which will increase pressure on sections of the Strategic Road Network in England that are already highly congested, including the M4 between Junctions 22 and 19. Testing using G-BATS4 has indicated that the increased network delays in the West of England could offset the economic benefits of the removal of the tolls, and there is therefore a clear case for action to address this issue.

11.3.4. Proposals in the Transport Vision

The Transport Vision recognises the challenges in catering for the competing demands on the road network. The first principle is to achieve a significant mode shift from the car for many journeys in the West of England. However, the scope for mode shift is greatest in the urban areas and along the corridors that are well served by public transport. There are many movements to, from, within and through the West of England that will continue to be made by car.

Road freight is also forecast to rapidly rise over the next 20 years, which is being driven by increased consumer demands and complex logistics supply chains. There is scope to increase the role of rail freight for longer-distance movements, including port traffic, but there will still be rapidly growing demand from light and heavy goods vehicles on the road network.

[62] Source: Socio economic analysis, future forecasts and the strategic road network, Highways England, March 2017
[63] Refer to Section 3.4 of this report.

Significant investment will therefore be required in the road network during the next 20 years to tackle problems caused by growing demand and to unlock new growth areas. The Transport Vision includes ambitions to unlock growth and improve resilience through improvements to existing junctions, construction of new junctions and connections to the sub-regional road network:

- M49 Avonmouth Junction (already committed), which will unlock growth in Avonmouth and Severnside;
- East of Bath Link, to address problems caused by through traffic on the north-south corridor through Bath;
- New M4 Junction 18A, connecting the A4174 Ring Road and A432, which will help address problems at Junction 19 and unlock economic growth in the East Fringe and Yate;
- M5 Junctions 14, 19 and 21: measures to improve capacity to cater for existing problems and unlock growth;
- New M5 Junction 21A, connecting to the A38 via a new road to the north of Banwell and Churchill, which will provide a new direct route to North Somerset and Bristol and unlock growth at Bristol Airport; and
- M5 Junction 20, at which options are being considered to improve access to Nailsea to unlock sustainable growth in the town.

The Transport Vision pays attention to the interaction between the Strategic Road Network and the sub-regional network, which play important complementary roles. There is a strong case for holistic consideration of the two networks to meet the connectivity needs of local areas, the West of England and the wider region, including connections to both the South West and South Wales.

The Strategic Road Network will maintain its primary role in catering for national and connectivity needs, whilst supporting growth in the West of England as one of the UK's largest economic clusters. It will also be necessary to invest in the sub-regional network, to support growth, enable reallocation of roadspace in the urban areas and provide greater resilience to the whole transport system.

At present, there are major problems with the resilience of the road network. Incidents on the motorway network or the busiest sections of the sub-regional network (e.g. A4174 Ring Road in the North Fringe) cause widespread disruption, with heavy traffic re-routing onto unsuitable roads and causing delays across large parts of the urban area. This is caused in part by a lack of real time information, but there are also significant problems due to the lack of capacity in the network.

The M5 between the North Fringe and Weston-super-Mare is a notable problem. Existing diversion routes are not well-defined; they are on slow local roads (including through villages) and they all converge through South Bristol and the Cumberland Basin. The M4 and Ring Road in the North Fringe are also a major problem, with incidents causing widespread disruption, and no practical means of response.

The Transport Vision aims to address these problems with a more proactive response to the resilience challenges. Investment in the sub-regional network would help to improve connectivity during day-to-day traffic conditions and would provide improved diversionary routes in the event of incidents. The improved highway corridor from M5 Junction 21A to the A38 would enable effective diversion of traffic from the M5 towards Bristol. Improved orbital connections around South Bristol would then provide improved choices for traffic heading further afield. Traffic towards the north could use the Cumberland Basin and traffic to the east could then connect more easily with the Ring Road around the south and east of the city. M4 Junction 18A will provide a means for traffic to divert from the heavily congested network in the North Fringe.

It is important to recognise the importance of the Highways England Licence[64], in which the company has a number of responsibilities in the management of the network. These include ensuring the effective operation of the network, protecting and improving the safety of the network, cooperating with others in operations and long term planning, and conforming to the principles of sustainable development. The Joint Transport Study has been undertaken with these principles in mind, but it will be important to ensure that these principles are also followed in the subsequent development of schemes outlined in the Transport Vision.

[64] Highways England: Licence, located at http://qna.files.parliament.uk/ws-attachments/226922/original/150312%20-%20Highways%20England%20Licence%20(%20Implementation%20of%20the%20Strategic%20Highways%20Company).pdf

11.4. Summary

The West of England forms a major node on both the strategic rail and strategic road networks. The Bristol area is the hub of the Great Western Main Line, CrossCountry route, rail freight terminals and local train services. Significant investments are planned or are already taking place, including electrification of the Great Western Main Line and MetroWest programme. There are current connectivity challenges, with relatively low journey speeds and frequencies to many destinations (both local and long-distance) and there are aspirations for improved services.

Despite these problems, rail demand is forecast to grow strongly over the next 20-30 years, which will place increased crowding pressure on both local and long-distance services. There will be significant challenges in accommodating future demand without major investment to tackle the constraints on the network. Failure to invest to accommodate demand could result in journeys transferring to other modes (including car) or journeys not being made, which could constrain the economic potential of the area, particularly in Bristol city centre. Future investment should therefore focus on new infrastructure to meet the needs of both long-distance and local rail demand, although trade-offs will need to be made. Further detail of proposals on specific parts of the rail network was provided in Chapters 5 to 9.

The West of England is also one of the most important national hubs on the Strategic Road Network, with motorways connecting to London, the Midlands, South Wales and the South West. This means competing pressures from national, regional and local traffic, resulting in congestion and delays. There are also distinct challenges in managing the impact of heavy flows towards Devon and Cornwall during the holiday periods and resilience problems caused by closures of the Avonmouth Bridge and M5 in North Somerset.

Demand on the road network is forecast to grow less rapidly than the rail network, due to changing travel habits and the impacts of the MetroBus and MetroWest programmes in helping to alter travel choices. However, traffic will continue to grow, with rapid growth on the Strategic Road Network. Failure to act will result in increased delays, less reliable journey times and increased costs to the economy of the West of England and wider region. The Transport Vision therefore proposes major investment in the strategic and sub-regional road networks to improve network capability and resilience.

12. Strategic Case and Outcomes

12.1. Introduction

The previous chapters have set out an ambitious Transport Vision that is designed to address the transport challenges to the mid-2030s and beyond. This chapter sets out the impacts of the Transport Vision, potential changes in how people could travel in the future and the implications for the economic, social and environmental future of the West of England.

- **Section 12.2** provides an overview of how the Transport Vision will help tackle the transport challenges and goals that were identified earlier in this report.
- **Section 12.3** presents evidence on how the Transport Vision will influence future travel behaviour, which is fundamental to tackling the future problems on the transport network.
- **Section 12.4** considers the impacts on congestion and performance of the transport network.
- **Section 12.5** discusses the broader economic, social and environmental impacts of the Transport Vision.

12.2. Strategic Case

The Transport Vision has been developed to respond to the challenges, goals and objectives identified in Chapter 3 of this report. It has the principle of improving travel choices, and in so doing, helping to reduce car dependence, tackle congestion and improve resilience on the transport network. In some cases, it is necessary to invest in the road network to better manage traffic movements, reduce traffic flows on key parts of the network and unlock capacity for walking, cycling and public transport. In some other cases, targeted investment on the road network is needed to improve strategic connections, support the delivery of the Emerging Spatial Strategy and support economic growth.

12.2.1. Addressing the transport challenges

The Transport Vision will help tackle the challenges facing the area, which were discussed in Chapter 3, as shown in Table 12-1.

Table 12-1 Impacts of Transport Vision on Transport Challenges

Challenge	Impacts of Transport Vision
Travel choices	Significant improvements to facilities on corridors served by strategic cycle routes and measures to reduce traffic in urban areas will help to improve conditions for both walking and cycling. Continued investment in the bus network, new MetroBus routes, mass transit corridors, improved rail services and Park & Ride will significantly improve travel choices in both urban and more rural areas.
Congestion	Improved travel choices will encourage mode shift and mitigate increases in car use to 2036. Improvements to orbital transport connections will help to reduce the need for traffic to pass through urban areas. Targeted improvements will help tackle pinchpoints on the network. New road connections will significantly improve connectivity and reduce delays on the most congested parts of the network.
Economic impacts	The Transport Vision will improve connectivity to the most important economic drivers of the West of England: the city centres, Enterprise Zone and Enterprise Areas. By improving travel choices and journey reliability, the Transport Vision will tackle barriers to accessing the labour market and enable businesses to better connect with customers and supply chains in the West of England and beyond, helping to improve productivity and create new jobs.
Social impacts	Investment in strategic cycle routes will encourage more physical activity to help tackle problems caused by lack of exercise. Continued investment in the bus network will help to expand the reach of commercially viable bus services, tackling problems caused by poor accessibility to jobs and services. Measures to reduce traffic on busy radial routes will improve air quality and tackle severance of local communities.

Challenge	Impacts of Transport Vision
Environmental impacts	The Transport Vision will reduce the forecast increase in traffic across the West of England, contributing to cuts in carbon emissions. Reductions in traffic in urban streets will cut noise, improve air quality and enhance public realm in the urban environment. Some transport schemes (e.g. improved roads and MetroBus corridors) could impact on landscape in some rural areas but impacts will be carefully mitigated. The Transport Vision avoids, wherever possible, areas with outstanding environmental value, but trade-offs will be required where the issues are most challenging.

12.2.2. Supporting the transport goals

The Transport Vision will also play a critical role in delivering the goals and objectives that were defined through the study. Table 4-2 in Chapter 4 summarised the contribution of components of the Transport Vision to the goals; Table 12-2 describes these impacts in more detail.

Table 12-2 Impacts of Transport Vision on Transport Goals

Goals	Impacts of Transport Vision
Support economic growth	The Transport Vision will support growth by significantly improving connectivity to strategic economic assets. Improved access to Bristol Airport will support growth at this major gateway, which will in turn help improve connectivity to international markets and supply chains. Improved access to Bristol Port will maintain its national competitiveness and facilitate efficient movement of goods to and from the rest of the UK. Improved transport capacity and connectivity will enhance the competitiveness of Bristol and Bath city centres, the Enterprise Zone and Enterprise Areas across the West of England.
Reduce carbon emissions	Improved travel choices will encourage mode shift and help manage future car use, contributing to reductions in emissions. Increased levels of active travel will help to reduce car use for short urban trips. Improved public transport will reduce the need to travel by car within and into urban areas. Continued investment in Ultra Low Emission Vehicles will play an important complementary role in reducing emissions in the vehicle fleet.
Improve quality of life and a healthy natural environment	Improved facilities for active travel, better connectivity by public transport, reduced traffic flows and enhanced public realm will significantly improve quality of life in the urban areas. These will also support the Urban Living component of the Joint Spatial Plan. Effective masterplanning to incorporate a range of travel choices will enhance quality of life in other parts of the West of England with development in the Joint Spatial Plan. Measures will be taken to mitigate the impacts of new transport infrastructure on the rural environment, including application of appropriate design standards and landscaping.
Contribute to better safety, health and security	Investment in strategic cycle routes will facilitate more active travel, promoting more exercise and healthier lifestyles. Reductions in traffic flows and better management of traffic will help to reduce the effects of severance, reduce road safety problems and tackle poor air quality and its health impacts. More people travelling by public transport and improved waiting facilities will improve people's perceptions of security in using the transport system.
Promote accessibility	Investment in strategic cycle routes will improve active travel connections for short urban trips. Continued investment in the bus network will help to expand the reach of commercially viable bus services, improving connectivity to employment destinations, shops and social facilities. Measures to reduce traffic will help tackle severance and facilitate movement within local communities.

12.3. Impacts on travel behaviour

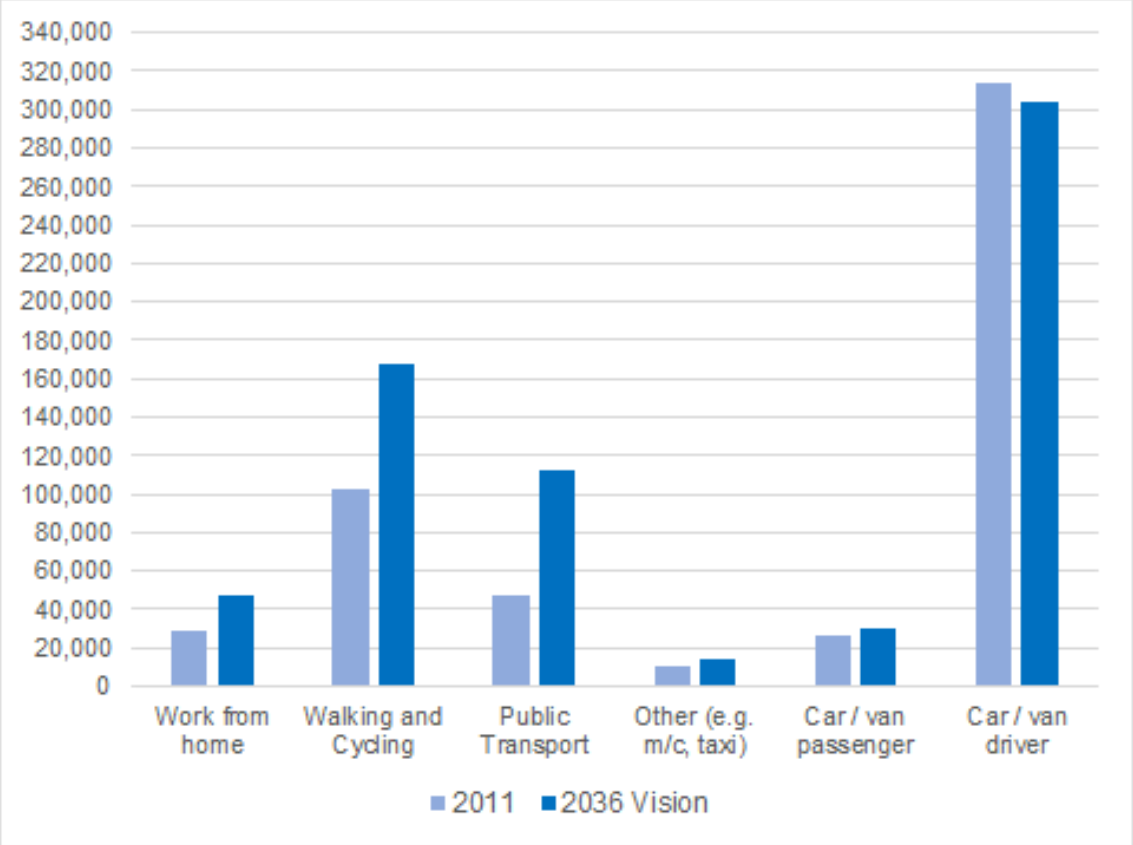
This section provides evidence on how the components of the Transport Vision will help to encourage a shift to walking, cycling and public transport away from use of the private car. This will be critical in controlling growth in car use, managing the effects of congestion and delivering the goals for the Transport Vision.

The West of England will experience significant growth in the next two decades. This will result in significant increases in the volume of future travel. There are also changes taking place in the ways that people travel, with strong growth in the numbers of people cycling and travelling by bus and rail for everyday journeys. The gradual adoption of Connected and Autonomous Vehicles could also mean that, in the future, people could summon driverless cars, with fewer people therefore owning their own vehicles.

This means that it is increasingly difficult to predict the future, particularly in terms of the relative numbers of people walking and cycling, using public transport and driving. However, as a guide, the Department for Transport produces forecasts of future travel demand, based on forecasts of population and jobs and estimated growth in people's tendency to travel with increasing incomes. Using the DfT forecasts, transport models and other sources of evidence have been used to forecast changes in the numbers of trips by different modes and the implications for future travel choices.

It is estimated that there will be a 28% rise in people trips by all modes in the West of England, due to the increased numbers of people living and working in the area and reflecting delivery of the Emerging Spatial Strategy. To provide a snapshot of the potential impacts of the Transport Vision, Figure 12-1 shows the forecast differences in the number of commuting trips by West of England residents between 2011 and 2036. This is based on data derived from the 2011 census and 2036 forecasts developed for the Transport Vision.

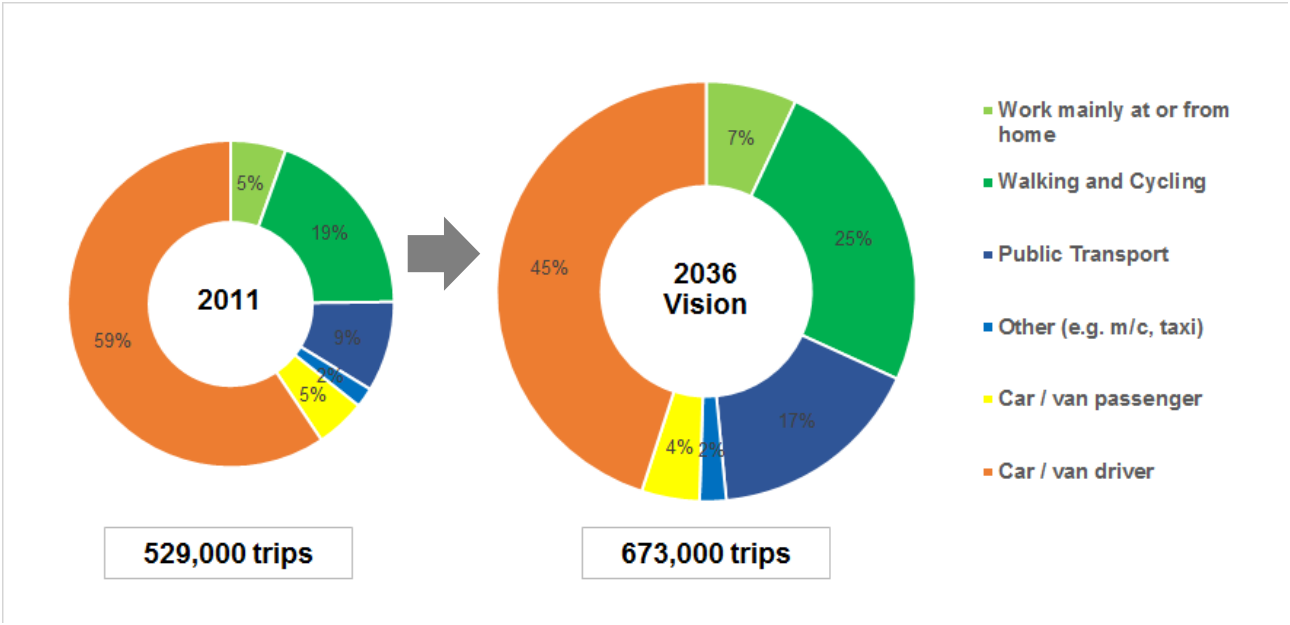
Figure 12-1 Commuting in the West of England in 2011 and 2036 (person trips)



The Transport Vision forecasts large increases in the numbers of people working from home and commuting by walking, cycling and public transport. It also forecasts a small reduction in the numbers of people living in the West of England who drive to work, even though there is a forecast 28% increase in the overall number of people trips. This reflects the level of ambition in the Transport Vision to achieve substantial mode shift from the car to active travel and public transport.

Figure 12-2 illustrates the changes between 2011 and the 2036 Transport Vision, expressed as mode share. The first pie chart shows the shares of commuting trips in 2011, derived from the 2011 Census, and the second shows the estimated shares of commuting trips with the Transport Vision in 2036.

Figure 12-2 Commuting in the West of England in 2011 and 2036 (mode split)



Note: all percentages are rounded to the nearest integer.

This section describes the approach to forecasting potential demand in the Transport Vision: active travel (walking and cycling), public transport (bus, MetroBus, mass transit and rail) and trips on the road network.

12.3.1. Reducing the need to travel

Reducing the need to travel is an important part of the Transport Vision. New digital technologies will mean that people can access services and connect with people without needing to travel. One of the most significant opportunities will be reducing the need to travel to work, so that more people will be able to work from home. However, it will also be important that increased home-working does not work against the objective of increased physical activity, a large part of which can be achieved through active commuting.

Within the West of England, just over 5% of workers work mainly at or from home. There is evidence that home-working is becoming more popular, particularly as enhanced technology and improved broadband provides workers with access to networks and data without being present in the office. It is difficult to predict how home-working will increase in the future, but it is likely that this will become increasingly common.

Section 4.4.1 highlighted that that home-working is most common in rural areas and for people with greater autonomy in their working patterns. Advances in technology will support the creation of new home-based businesses and will enable more people to work from home for at least part of the working week. A large proportion of jobs will still need people to be based in workplaces, particularly those in customer service roles, but it is likely that there will be a continued increase in home-working over the next 20 years.

As discussed in Chapter 3, the increase in the numbers of people living and working in the area, and people's future choices about homes, jobs and schools, present the opportunity to change mode choices. People are most likely to change their travel behaviour when they move house, change job or face other life transitions. At these points, people should be presented with sufficient information about the options that are available, including options for home-working and other lifestyle choices that can reduce the need to travel.

The forecast below takes into account a continued evolution and increasing uptake of home-working, and investment in smarter choices in the Transport Vision will help to encourage more widespread adoption of home-working to reduce the need to travel.

Working Mainly from Home		
Existing (2011 Census)	5.5%	Generally higher levels of home-working in the more rural areas, although there are also high proportions in parts of Bath and North Bristol.
Forecast (2036 With Transport Vision)	7.0%	Estimate based on potential growth in home-working activity with increased focus on smarter choices

12.3.2. Demand for walking and cycling

The transport models do not consider walking and cycling and a different approach to forecasting demand is required. A range of different datasets are available to measure existing demand, including the 2011 Census (which provides information on travel to work patterns), the National Travel Survey and local surveys.

12.3.2.1. Walking

There is national evidence of declining numbers of people walking in recent decades, including a large reduction in the number of children walking to school. However, walking is a critical means of travel for relatively short journeys, within local neighbourhoods, and in accessing public transport. Most trips by walking are for journeys to schools, local shops and for personal business, with relatively few people walking to work.

The immediate challenge will be to reverse the decline in walking in many areas and to build the conditions in which walking is an attractive option for short journeys. The focus on Urban Living in the Joint Spatial Plan will increase the opportunities for short trips within the urban areas. The Transport Vision has a strong focus on managing traffic demand on urban road networks and the reallocation of roadspace to active modes. This will help create the conditions for making walking more attractive. However, there will need to be sustained investment in smarter choices programmes to continue to drive behavioural change towards walking.

At present, the highest amounts of walking are in areas that are close to jobs and services, with relatively high proportions of people walking to work from inner Bristol and Bath. There is potential to further increase walking in these areas but measures will also be needed to increase walking (from much lower levels) in the outer parts of the Bristol urban area and in towns across the West of England. Future potential increases in walking trips need to be considered in the context of overall growing demand for travel. This means that there is likely to be a relatively modest increase in the mode split for walking, although this should be seen in the context of the existing high mode split by walking for many journey purposes. Whilst the growth in mode share for walking is modest, the total numbers of walking trips are forecast to grow significantly.

Walking is also a key component of bus journeys: increasing bus travel is a practical way of increasing physical activity through walking to and from bus stops.

Walking: Mode Split for Travel to Work by West of England residents		
Existing (2011 Census)	14.3%	Significant differences across the West of England, varying from <3% to >35%
Forecast (2036 With Transport Vision)	15.4%	Estimate, based on increased attractiveness of walking with improvements to urban networks

12.3.2.2. Cycling

In the case of cycling, the West of England is working from a strong base, with 50% growth in the numbers of cycling trips between 2008/09 and 2015/16[65]. The focus on Urban Living in the Joint Spatial Plan will increase the number of journeys that can potentially be cycled, particularly within the Bristol urban area. The Transport Vision has a strong emphasis on controlling traffic on the urban road networks and reallocation of roadspace for active modes. This includes development of strategic cycle routes along arterial roads, which will be critical in creating a comprehensive network that is attractive to the widest range of possible users.

[65] Source: Joint Local Transport Plan monitoring, West of England Office.

The Government has set a target for doubling the number of cycling trips made each year in England between 2013 and 2025[66]. However, there are already relatively high levels of cycling in the West of England and it is necessary to consider in more detail the scope for further increasing cycling in the area. The Propensity for Cycling Tool is an interactive tool to examine existing cycling flows and for forecasting potential levels of future cycling[67]. It enables interactive analysis for four different scenarios:

- Government Target: future mode split in the scenario where there is a doubling of cycling at the national level;
- Gender Equality: illustrating the increase in cycling that would result if women were as likely as men to cycle a given trip;
- 'Go Dutch': what would happen if people in England were as likely as people in the Netherlands to cycle a trip on equivalent terrain (steeper slopes act as a deterrent to cycling); and
- Ebikes: the additional increase in cycling that could be achieved if there were to be widespread uptake of electric bicycles[68].

The 'Government Target' and 'Gender Equality' scenarios are relatively modest, reflecting the low numbers of cycling trips in the UK compared to Denmark and the Netherlands. The 'Go Dutch' scenario is a more transformational shift that would reflect levels of cycling (and conditions for cycling) equivalent to those seen in the Netherlands. The 'Ebikes' scenario assumes that there would be widespread ownership of electric bikes which would enable people to travel further and to climb steeper slopes.

At present, Oxford and Cambridge have the highest proportions of people cycling in the UK and therefore serve as a potential benchmark. The cycling mode split in the West of England is currently higher than London but lower than Oxfordshire and Cambridgeshire. Under the 2025 Government target, those areas with a low current mode split would need to deliver the largest increases. This includes London, where levels of cycling in Outer London are relatively low. In the West of England, Oxfordshire and Cambridgeshire, where cycling is already relatively high, the gap between the current mode split and 2025 Government target would be lower.

The Go Dutch scenario would be transformational. However, the future mode split in the West of England would be lower than comparator areas because of the relatively long journeys for many people and the hilliness of terrain in some areas, notably Bath and parts of Bristol. The Ebikes scenario would help to tackle these constraints by increasing the potential length of journeys and enhancing the ability of users to climb steeper gradients. This would, however, require widespread adoption of Ebikes amongst the general population. It is likely that some form of financial support would be needed to enable people to purchase Ebikes.

Investment in cycling infrastructure, through the Transport Vision, has the potential to unlock significant increases in cycling in the area. It would take a long time to achieve a 'Go Dutch' scenario, in which people in the West of England have a similar propensity to cycle to that seen in the Netherlands. Roads in Bristol and Bath are relatively narrow, which will constrain opportunities to deliver the conditions on the road network that are equivalent to those seen in the Netherlands. However, the proposed scale of investment in the cycling network, together with ongoing smarter choices programmes, would be important in helping the West of England work towards this aspiration.

Cycling: Mode Split for Travel to Work by West of England residents		
Existing (2011 Census)	5.1%	Significant variations across West of England, varying from <1% to 14%
Forecast (2036 Without Transport Vision)	6.2%	Estimate, based on focus on Urban Living and forecasts of demand across West of England
Forecast (2036 With Transport Vision)	9.4%	Estimate, based on increased attractiveness of cycling and major investment through the Transport Vision

[66] Cycling and Walking Investment Strategy, DfT, March 2016
[67] http://pct.bike/, with Paper cited at https://www.jtlu.org/index.php/jtlu/article/view/862
[68] Ebikes can be pedalled by the user, power assistance stops at a maximum speed and they are legally classified as bicycles and not mopeds.

12.3.3. Demand for public transport

There has been strong growth in public transport demand in the West of England during the last decade, with an increase of 60% by rail and 30% by bus between 2008/09 and 2015/16)[69]. The growth in bus use reflects the introduction of new buses, wider service improvements, changes in fare structures and the introduction of Residents Parking Zones in Bristol. The growth in rail use reflects wider growth in the use of rail across England, together with growing numbers of jobs in Bristol and people choosing rail as an alternative to driving on congested roads.

Modelling using the G-BATS4 model has shown that, in the Do Minimum scenario, demand will grow significantly for bus and rail over the next 20 years. Following the introduction of the current MetroBus schemes, demand for bus use is forecast to grow by 42% between 2013 and 2036. Demand is forecast to grow strongly by 2021 following the introduction of the current MetroBus schemes, but will then grow much more slowly between 2021 and 2036. This is because, without improvements to public transport facilities, traffic congestion will make travelling by bus less competitive.

The bus, MetroBus, Park & Ride and mass transit components of the Transport Vision have the potential to transform the numbers of people travelling by public transport:

- The high quality, frequent and fast services in the mass transit system would provide a highly attractive alternative to the car in the corridors served;
- Park & Ride will play an important role in intercepting trips at the edge of the urban areas and transferring to bus, MetroBus and mass transit to key destinations. This will be critical in controlling the numbers of car trips entering the urban areas and managing congestion on the main radial routes; and
- Outside the main urban areas, MetroBus will provide high quality rapid transit services connecting growing communities in Nailsea, Yate and Thornbury to Bristol. Upgraded bus services will connect other towns, including Radstock and Midsomer Norton to Bath and Bristol.

12.3.3.1. MetroBus

The MetroBus proposals will play an important role in helping to influence travel demand in the corridors that are served. Initial mode choice modelling using the transport model indicated that passenger demand on the Nailsea, Yate and Thornbury corridors would be low, with most passengers transferring from existing bus services. However, it will be essential to achieve mode shift on these corridors to manage the impacts of increased travel demand from new development in the Joint Spatial Plan. A range of measures will therefore be required to influence travel demand, within the new communities and existing communities served by the corridors. These will include smarter choices programmes to encourage behaviour change. Parking policy and other demand management tools will also need to be considered in the main destinations.

It has been assumed that these initiatives could encourage 5% of people making movements by car in the areas served to transfer to the MetroBus services. This is forecast to result in a 0.8% reduction in car trips in the network in 2036. This is a relatively modest impact at the West of England level but there would be significant impacts in the areas that are served by the corridors. In addition, the MetroBus consolidation package, with further bus priorities on the existing MetroBus corridors, will contribute to further mode shift.

12.3.4. Park & Ride

Park & Ride will play an important role in catering for those trips that cannot easily be made for the whole journey. The approach to forecasting potential demand has been to identify the trips passing each site and intercept trips to the central areas that could be served by Park & Ride. It has been estimated that 10% of these trips could transfer to Park & Ride services, based on demand observed at other sites in the UK.

The actual demand would depend on several factors including the frequency and speed of bus services, road congestion and the cost of parking in the central areas. Experience has shown that Park & Ride must always be considered as part of an integrated approach to managing demand in urban areas. The proposed reallocation of roadspace in the urban areas, together with parking policies in the centres of Bristol, Bath and Weston-super-Mare, will strongly influence the demand for Park & Ride. It will also be important to plan Park & Ride so that traffic impacts are adequately managed around each site, and demand is not abstracted from existing bus services.

[69] Source: Joint Local Transport Plan monitoring, West of England Office.

12.3.5. Mass Transit

Mass transit proposals would have the most significant impacts on travel demand and mode choice in the West of England. The demand for mass transit services will depend on several factors:

- The demand for travel between origins and destinations served by the system;
- Service frequencies, speeds, reliability and quality of the system (reflecting differences in user perceptions of bus and rail-based systems);
- Other travel options for making the journey (walking, cycling, bus and car). Bus services would need to be reorganised following the introduction of a mass transit line to avoid competition between services; and
- Other factors influencing travel choices, including the costs of parking in central areas and other potential measures to influence demand, for example Road User Charging.

Mass transit options with on-street services would operate with slower speeds and could be subject to greater punctuality issues associated with congestion. Options with segregated (including underground) running could operate with higher speeds and with greater punctuality, which would be expected to result in higher demand.

Tests using the G-BATS4 transport model indicate that the model has limitations in the forecasting of demand for new mass transit services, which would deliver transformational changes (rather than incremental improvements) in the network. It is therefore necessary to adopt different approaches to the forecasting of demand.

The first approach is the benchmarking of potential demand based on typical levels of patronage that have been achieved on other mass transit systems elsewhere in the UK and Europe. Table 12-3 presents data from a sample of existing mass transit (metro) systems across Europe, including Tyne & Wear in the UK.

Table 12-3 Demand for selected metro systems in Europe[70]

	Turin	Rennes	Toulouse	Lille	Bilbao	Tyne & Wear
Population (million)	1.7 m	0.7 m	1.3 m	1.0 m	0.9 m	1.1 m
Length of system (km)	13km	9km	28km	45km	43km	78 km
No of stations	21	15	37	60	40	60
Average station spacing (km)	0.6 km	0.6 km	0.8 km	0.8 km	1.1 km	1.3 km
Annual Patronage	35 m	33 m	70 m	99 m	44 m	40 m
Patronage per km	2.7	3.5	2.5	2.2	1.0	0.5
Patronage per station	1.7	2.2	1.9	1.7	1.1	0.7
Patronage per capita	20.8	47.1	54.0	98.0	49.7	36.4

These are diverse systems, which are reflected in the estimates in the table. The wide range of patronage reflects the extent of systems in different cities, from a relative short system in Turin to a comprehensive system in Lille. The Tyne & Wear Metro comprises converted railways in the suburbs and tunnels in central Newcastle / Gateshead. This is reflected in the lower patronage per station, with relatively low density catchment areas for the stations. The systems in continental Europe, which serve much denser populations, achieve much higher levels of patronage per station.

The three lines of the mass transit system proposed in the Transport Vision would be approximately 36km long, with around 30 stations. If it is assumed that each station could attract between 1.0 and 1.8 million people, this would be equivalent to 30-48 million trips per annum in the 2036 forecast year.

The second approach is to examine mode split in the areas served by existing mass transit systems in the UK and use this evidence to estimate potential travel demand for the new mass transit system. In the case of the Tyne & West Metro, mode split for travel to work is approximately 10-15% in the areas served by stations. By taking this approach and extrapolating to include other journey purposes it is estimated that the system in the West of England could carry 39-76 million trips per annum.

[70] Source: information on metro systems in public domain

Further work will be required to undertake more detailed forecasting of potential demand for the system, but it is estimated that demand could range between 30 and 50 million trips per annum. This compares with 33 million trips per year using buses in Bristol. A significant proportion of trips would be transferred from bus services, which would need to be reorganised to integrate with the system. However, a large proportion of trips would be transferred from cars. If it assumed that 50% of trips are transferred by car, it is estimated that this could result in a reduction of up to 80,000 cars per day on the network.

Drawing on these forecasts it is then possible to estimate the potential mode split for bus, MetroBus and mass transit in the Transport Vision.

Bus, MetroBus and Mass Transit: Mode Split for Travel to Work by West of England residents		
Existing (2011 Census)	6.7%	Significant variations across West of England, ranging from <1% to >15%
Forecast (2036 Without Transport Vision)	7.4%	Estimate based on forecasts including committed MetroBus schemes
Forecast (2036 With Transport Vision)	12.7%	Estimate based on potential impacts of bus, MetroBus and mass transit schemes

12.3.5.1. Rail

Table 11-2 in Chapter 11 provided an overview of forecasts by Network Rail for growth in rail passenger demand between 2012 and 2043. This showed that demand is forecast to grow by 121% in the Bristol area in the absence of any network constraints, for example with no crowding on train services. This is equivalent to annual growth of 4% per annum. In comparison, 60% growth took place between 2008/09 and 2015/16 (8.6% per annum). The actual growth that took place since 2008/09 reflects a period of strong growth in the rail market; the Network Rail forecasts take a long-term view on the growth of the economy and change in the rail market.

Forecasting using G-BATS4 indicates that growth in rail demand could increase by 37% between 2013 and 2036 without any intervention to improve rail services. The delivery of MetroWest Phases 1 and 2 is forecast to result in an increase of around 59% from 2013 to 2036. This increase is mainly due to new areas (including Portishead and Henbury) being connected to the rail network.

Chapter 11 highlighted that further improvements to rail services will be required to accommodate forecast demand on the network. Improved rail services will themselves require major capacity enhancements, which will be considered beyond Control Period 6 (which covers 2019 to 2024). Failure to deliver these capacity enhancements will mean that new services cannot be delivered and it will not be possible for the network to accommodate the forecast demand. However, it is important to note that these forecasts are based on forecast growth from the existing railway. This means that potential demand will be constrained by rail infrastructure and future mode split at the West of England will therefore remain modest.

Rail: Mode Split for Travel to Work by West of England residents		
Existing (2011 Census)	2.1%	Significant variations across West of England, ranging from <1% to >12%
Forecast (2036 Without Transport Vision)	2.8%	Estimate based on forecasts including committed MetroWest schemes
Forecast (2036 With Transport Vision)	3.9%	Forecast dependent on delivery of major rail infrastructure schemes

12.3.6. Other forms of travel

The ‘other’ category in Figure 12-1 includes motorcycles, mopeds and taxis. Motorcycles and mopeds (‘Powered Two Wheelers’) are used for 1.2% of journeys to work and therefore form a relatively small proportion of trips. National data shows that motorcycles are mainly used for travelling to work and for leisure journeys, rather than for large numbers of day-to-day business and personal journeys. However, there is a role for powered two wheelers in helping to reduce car dependency for journeys where it is more difficult to

walk and cycle and public transport alternatives are limited[71]. It has been assumed that the mode split for journeys by powered two wheelers will not significantly change in the future from the current low base, but it will be important to consider the needs of these road users in planning the management of roadspace.

Powered Two Wheelers will benefit from much of the infrastructure set out in the Vision to improve the public transport network. In particular, they can use the majority of bus lanes and priority measures giving users quicker and more reliable journey times, and may be exempt from restrictions on through traffic movements on core radial routes where priority for public transport movements is being considered. Improved parking for Powered Two Wheelers will also be delivered by the local authorities as part of their policies to deliver mode shift towards sustainable transport. They may also be exempt from fiscal restraint measures on general traffic discussed in section 12.3.7 below.

Taxis account for just under 0.9% of journeys to work but they are used for a wide range of journey purposes, including shopping, personal business, travel to school, business journeys and, in particular, leisure. Taxis play a critical role in supporting the night-time economy and ensuring safe mobility, particularly when other public transport options are not available. It has been assumed that taxi use will grow proportionately with the increase in the number of people living and working in the area and that mode split will be broadly similar to that seen at present.

The arrival of new forms of mobility, such as Uber and Lyft, could be a potential 'disruptor' to future travel demand. Emerging research[72] on the impacts of new platforms suggests that a high proportion of these journeys are made for leisure and social journeys. These tend to replace journeys that were previously made by a mix of modes, including public transport and driving, but mainly taxis. The future role in the West of England for these new models should be strongly influenced by the overall mobility vision, which is to significantly increase active forms of travel and public transport. Ridesource platforms will play a role in meeting mobility needs but they should play a specific role that is secondary to the primary focus on active travel and public transport.

12.3.7. Travel by car

The major investments in active travel and public transport are forecast to result in a significant reduction in mode split by car. In addition, measures such as Workplace Parking Levies and/or Road User Charging could have a significant impact on the demand for travel by car. The West of England has undertaken studies in the past to assess the potential impacts of fiscal measures on highway demand. These include the following:

- A Workplace Parking Levy, in which employers would pay a charge based on the number of parking spaces on their premises. This is a relatively simple tool to target commuting trips, but the impact would depend on whether employers pass on the charge to employees using the spaces; and
- Road User Charging, in which all vehicles passing a cordon or travelling within a specific area would be required to pay to use the road network. This is a more sophisticated tool that targets all journeys in a defined geographic area and during specified time periods.

These studies have been reviewed and different options for fiscal measures have been considered. The assessments have concluded that:

- A Workplace Parking Levy (WPL) is unlikely to have a significant impact on travel demand, because it would target a relatively small number of road users. Many employers would not pass on the charge to employees, so there is relatively limited incentive for employees to change their travel choices.
- However, a WPL would encourage employers to consider how they manage their parking stock, to reduce their potential charge under the Levy scheme. This encourages them to engage with their employees in relation to their travel choices, which would have an indirect effect on travel demand.
- The most significant impacts would be delivered with an area-wide Road User Charging scheme. It is estimated that this could result in a 6-8% reduction of in-scope trips. A proportion of these trips would divert onto roads outside the charging area but a proportion would be likely to shift to alternative modes.

[71] See previous footnote in Section 12.3.2.2: powered two-wheelers (motorcycles and mopeds) do not include electric bikes (Ebikes), which are legally classified as bicycles and not mopeds.
[72] An example of recent research includes 'Impacts of Lyft and Uber on Transportation' (Alejandro Henao, University of Denver Colorado, https://www.westernite.org/annualmeetings/16_Albuquerque/Presentations/6C_Henao.pdf

- This is forecast to result in an overall 1.4-2.2% reduction in the number of vehicle trips in the G-BATS4 model. This appears to be relatively modest in the context of the 21% forecast rise in vehicle trips to 2036. However, the impacts would be focused on the most congested corridors and urban centres, which would significantly reduce congestion.

It is therefore likely that a demand management scheme (including Road User Charging) would further complement and help lock-in the benefits of the measures proposed in the Transport Vision. A demand management scheme would also raise revenue that could be used to help fund major transport schemes in the Transport Vision, as discussed in Chapter 13.

As discussed in Chapter 3, there will also be a key role for the management of parking in managing future traffic demand. This should include parking policies for on-street parking, off-street parking and the numbers of spaces provided in new developments.

From the analyses above it is possible to forecast the potential mode split for travel by car in the area. The forecasts below do not include the effects of a demand management scheme. The introduction of area-wide Road User Charging would help to further reduce the mode split for driving.

Car (Driver + Passenger): Mode Split for Travel to Work by West of England residents		
Existing (2011 Census)	59.3% driver 5.0% passenger	Significant variations across West of England, ranging from <10% (in Central Bristol) to >60% (in most rural areas) for car drivers
Forecast (2036 Without Transport Vision)	55.9% driver 4.6% passenger	Estimate based on forecast shift to other modes with existing or proposed investments, including MetroBus and MetroWest
Forecast (2036 With Transport Vision)	45.0% driver 4.5% passenger	Forecast dependent on delivery of substantial shift to other modes

12.3.8. Freight

The transport modelling forecasts that there will be a large increase in goods traffic (>40%) between 2013 and 2036 in the Do Minimum scenario. This reflects growth in the economy and increased consumption of goods. Increased internet home shopping and home deliveries will be a key factor in driving this growth. It will be very challenging to manage this impact, because much of this goods traffic will be to destinations across the West of England. There will be a need to identify funding sources for the Freight Consolidation Centres that will help to rationalise this goods traffic, improve utilisation of vehicles, reduce freight mileage and manage the impact of deliveries on the urban road networks.

An increased focus on rail freight will help to reduce lorry movements and congestion on the Strategic Road Network. At present, loading gauges in the West of England are a constraint to the movement of more rail freight: improved loading gauges have the potential to increase rail freight capacity in the area by enabling more containers to be transported within the same train path without the need for additional trains. Future development of an intermodal terminal at Avonmouth could help to enable movement of bulk goods by rail, with transfers to vans or lorries for the final leg of the journey. In addition, a pilot scheme at Bristol Temple Meads has the potential to enable significant volumes of goods to be transported into the city by rail, with cycle cargo facilities transferring the goods to users across the city centre.

These measures could collectively have the potential to significantly reduce the need for goods vehicles to enter the city centre. However, there is currently insufficient evidence to estimate the extent to which these interventions could reduce goods traffic, and it is recommended that further work is undertaken to assess in more detail how freight demand in the West of England will evolve in the future.

12.4. Impacts on congestion

Chapter 3 demonstrated that there is a significant problem with congestion on the road network and this will become significantly worse in the future. The 26% increase in trips on the road network between 2013 and 2036 is forecast to result in a rise in average delay per vehicle of almost 40% in the Do Minimum scenario. This is the average for the whole network: delay will increase much more significantly at key hotspots,

including Bristol city centre, Bath, Weston-super-Mare, the North and East Fringes and South Bristol. This will act as a significant barrier to growth – both new jobs and new housing – in these areas.

With the Transport Vision in place, it would be possible to significantly reduce traffic delays, but the impact would be dependent on several factors. It would require high levels of mode shift in the urban areas, enabling reductions in flow on the urban network. It would also require significant improvements to the road network, to re-route orbital traffic out of the road network in South Bristol, enhance connectivity to the East Fringe from the M4 and improve connections between North Somerset and Bristol. It would also require careful consideration of options for the future management of roadspace in the urban areas.

Table 12-4 summarises key performance statistics from analysis of the potential impacts of the components of the Transport Vision, excluding the effects of a demand management scheme such as Road User Charging.

Table 12-4 Estimated impacts of Transport Vision on trips and performance of road network

Changes from 2013 Model Base Year	2036 Do Minimum	2036 Transport Vision
1. All trips (non-car, car, goods vehicles)	+30%	+30%
2. Trips by walking, cycling and public transport	+38%	+66%
3. Trips by car	+20%	+0%
4. Trips by goods vehicles	+44%	+40%
5. Trips by car + goods vehicles	+26%	+10%
6. Total time spent by traffic on road network	+37%	+12%
7. Change in total time spent queueing	+74%	+14%
8. Change in average delay per trip	+38%	+4%
9. Change in average journey time per trip	+9%	+2%

The analyses demonstrate that the Transport Vision has the potential to significantly improve the performance of the transport network in the West of England, compared to the scenario without the JTS Vision. The overall 10% increase in traffic on the network from the 2013 base would be caused by the forecast increase in goods vehicles. Benchmarking of network performance indicates that this would result in an estimated 14% increase in the total time spent queueing. This means that the average delay per vehicle (time spent queueing) is estimated to rise by around 4% from the 2013 base year.

These increases with the Transport Vision can be compared with the 2036 Do Minimum scenario, in which traffic is forecast to increase by 26%, total time spent queueing would rise by 74% and the average delay per vehicle would increase by almost 40% from the base year. The analyses should be treated with caution because the performance of the network will depend on routing options of the mass transit system, but these show that the Transport Vision has the potential to significantly reduce congestion in the West of England.

The introduction of demand management measures would be expected to have a further significant impact on congestion by targeting trips in the most congested parts of the network. Analyses indicate that an area-wide Road User Charging scheme could result in a 1.4% - 2.2% reduction in trips in the network, and a 1.0-1.8% reduction in average journey times across the network. The reductions in journey times would be significantly higher in the areas covered by (and corridors leading into) the Road User Charging scheme. This therefore has the potential to deliver significant benefits to the operation of the network, over and above the benefits that would be achieved in the Transport Vision without demand management being in place.

12.5. Economic, social and economic impacts

The forecast changes in travel behaviour and the improved operation of the transport network will have significant wider economic, social and environmental impacts.

12.5.1. Economic impacts

The combined effect of increased numbers of trips, increased delays and increased values of time mean that the costs of congestion are forecast to rise to around £800 million per annum (in 2036 prices) in the 2036 Do Minimum scenario. This will act as a significant constraint on the productivity of the West of England

economy and will constrain future growth potential. As discussed in Chapter 3, previous research indicated that future job creation could be reduced by around 36,000 jobs in the Do Minimum scenario.

The Transport Vision is forecast to have a significant impact on the future costs of congestion, both by encouraging mode shift in the most congested areas and through targeted intervention to improve connectivity on the road network. This is forecast to deliver substantial annual benefits through reduced direct costs of congestion, increased potential for agglomeration of business activity and improved accessibility in the labour market. In turn, this will also significantly improve connectivity for the major employment growth areas, which will help to unlock new job creation.

Using the forecasts of changes in traffic delays shown in Table 12-4, analyses show that the direct costs of congestion in 2036 could be substantially reduced. In addition, there would be benefits to public transport users and wider economic benefits from enhanced agglomeration caused by improved connectivity in the area.

There would also be large benefits from improved cycling infrastructure and major improvements to public transport connectivity, resulting from the improved bus networks, new MetroBus routes, the mass transit network and enhanced rail network. It is recommended that further work is undertaken at a later date to investigate the potential connectivity benefits of mass transit options to inform the assessment of the business case.

12.5.2. Social impacts

The increased numbers of trips on the road network in the Do Minimum scenario would have a detrimental effect on communities affected by traffic. Although improvements to vehicle emissions and the uptake of electric vehicles will reduce harmful pollutants from exhaust pipes, growth in traffic and increased stop-start conditions will offset these improvements. Furthermore, significant growth in the number of goods vehicles, which cause high levels of emissions, will be a major challenge. High levels of traffic also cause severance of communities, increased risk of accidents and worse conditions for walking and cycling, which will act against the public health priority of encouraging more physical activity.

The Transport Vision will significantly reduce numbers of car trips within areas with the highest levels of pollution, particularly in Bristol and Bath. The proposed measures will assist by reducing the volume of traffic (both cars and goods vehicles) and the effects of stop-start conditions. The introduction of charging measures, particularly Road User Charging, would further help to encourage mode shift and help reduce traffic. Together with improved vehicle efficiency, and the uptake of Ultra Low Emission Vehicles (ULEVs), these will play a critical role in improving air quality.

However, the task of improving air quality is urgent and there is a clear case for rapid action to tackle the causes of air pollution. There is a strong business case, on public health grounds, for improving air quality and reducing the number of early deaths and wider health problems caused by pollution. The Transport Vision, and the mode shift target, is a long-term blueprint for the transport system, but action is required in the short term to address the primary causes of air pollution, particularly in Bristol and Bath. Bristol City Council and South Gloucestershire Council are currently exploring measures that could help tackle pollution in the short term as part of a Clean Air Zone.

It is also necessary to rapidly the tackle the problems caused by physical inactivity, which is a critical issue for the health of the UK population over the next 20 years. It is estimated that around one in six deaths in the UK are caused by physical inactivity[73]. The Transport Vision identifies the potential for a 50% increase in the number of people cycling compared to the Do Minimum, which itself is forecast to grow by over 50% in the next 20 years. This rise in the volume of active travel will deliver significant health benefits. This will require action to control and, in some cases, reduce traffic flows to improve conditions for walking and cycling, and will require rapid delivery of the active travel components of the Transport Vision.

12.5.3. Environmental impacts

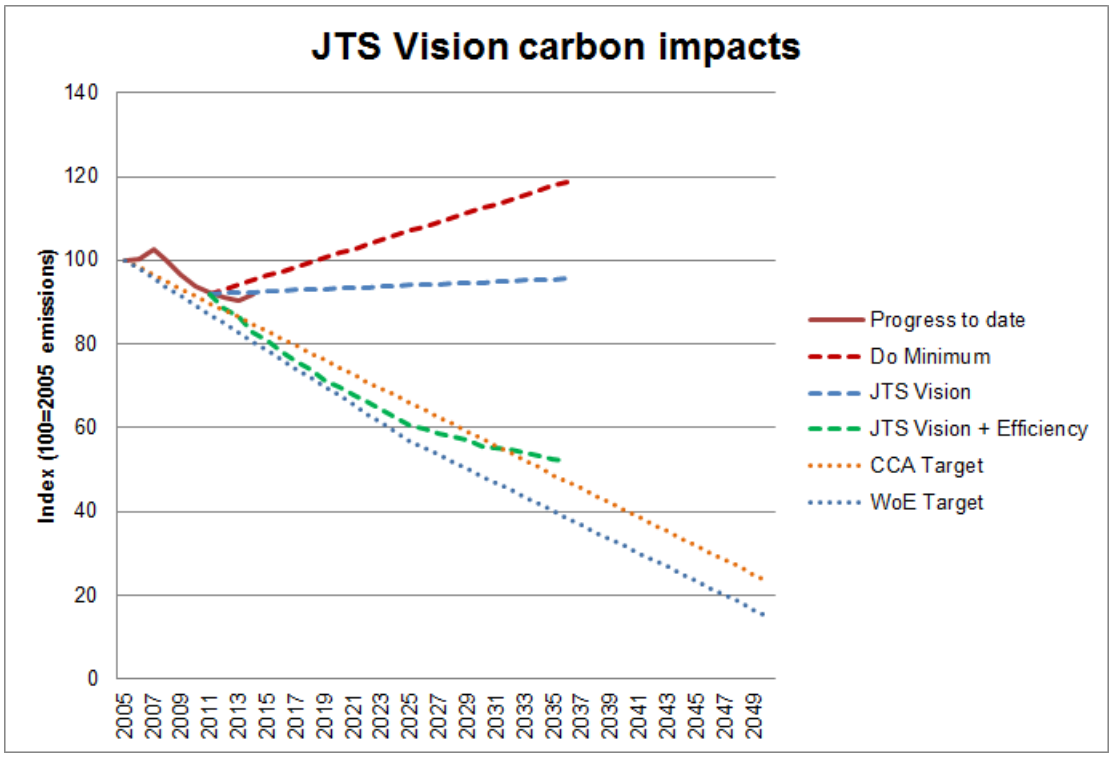
The increased number of trips in the Do Minimum scenario would counteract efforts to reduce transport carbon emissions. Chapter 3 demonstrated that the increase in the number of people living and working in the West of England would be equivalent to a 22% increase from 2014 transport carbon emissions. It will be

[73] http://www.sustrans.org.uk/policy-evidence/the-impact-of-our-work/related-academic-research-and-statistics/physical-activity

extremely challenging to deliver a steep reduction in carbon emissions at the same time as a significant increase in trips.

The Transport Vision is forecast to deliver a large reduction in transport carbon dioxide emissions over the period to 2036. Figure 12-3 shows the forecast changes in CO_2 emissions for different scenarios.

Figure 12-3 Forecast changes in carbon emissions



This shows the scale of the challenge in delivering deep cuts in carbon emissions at the same time as accommodating significant population growth in the West of England.

The two dotted lines show the changes in emissions required by the Climate Change Act (shown as CCA Target) and the target adopted by the West of England (WoE target). The solid line shows progress to date in reducing emissions; this shows that the future rate of reduction will need to be accelerated.

The dashed lines show the future potential scenarios. In the case of the Do Minimum, and assuming no improvement to vehicle efficiency in the future, the forecast growth in traffic would cause emissions to significantly rise. The introduction of the Transport Vision, in which there is a substantial mode shift to active travel and public transport, would mean that growth in traffic would be much lower (with the overall growth caused by increases in goods traffic). However, failure to deliver efficiency improvements to the vehicle fleet would mean that carbon emissions continue to grow.

Major improvements to vehicle efficiency and widespread introduction of Ultra Low Emission Vehicles (ULEVs) will be critical in delivering the steep reductions in carbon emissions required by the Climate Change Act and the West of England's own target. The forecast impact shown in the green dashed line is based on the DfT's forecasts[74] of the national changes in vehicle efficiency and the introduction of ULEVs, with enhancements to reflect the early progress that has been made in the West of England. This demonstrates the transformative effect of new technologies, but challenges will remain.

It will be possible to match the CCA target until the 2030s, but progress will not completely meet the West of England's target. Furthermore, the DfT's data shows that efficiency improvements and the uptake of ULEVs will slow-down after 2030, resulting in the trajectory beginning to flatten after 2030. This appears to reflect

[74] DfT WebTAG Databook: refer to https://www.gov.uk/government/publications/webtag-tag-data-book-march-2017

limitations in the assumptions made in the DfT forecasts following 2030, but this clearly demonstrates the imperative of accelerating the uptake of low emission vehicles.

This analysis does not include the effects of road pricing. A comprehensive Road User Charging scheme could deliver further reductions in the numbers of trips by road, and the scale of reduction would depend on the charging regime, including the areas covered, times of coverage, charges applied and exemptions.

It is evident from these analyses that significant mode shift will be critical in reducing future transport carbon emissions in the West of England. The forecasts described in this chapter should be considered as a minimum level of ambition but these will be dependent on transformational investment in the alternatives to driving. At the same time, action will be required to accelerate the uptake of Ultra Low Emission Vehicles, faster than the forecasts assumed by DfT. Consideration should also be given to the role of Road User Charging in helping to facilitate mode shift and achieve the CO_2 targets for the area.

It is recognised that there is the potential for significant environmental impacts resulting from construction of the schemes in the Transport Vision. These impacts are described in the proformas in Appendix A, but it is considered that mitigation measures will help to reduce these impacts. Environmental Impact Assessments will be undertaken during the future development of each scheme.

12.6. Summary

The Transport Vision will play a critical role in tackling the current and future transport challenges in the West of England and in helping to ensure that future growth will be sustainable. The Transport Vision has identified challenging but achievable targets for changing travel behaviour, with a large increase in active travel and use of public transport, which will help to control growth in the volume of traffic on the road network. The implementation of demand management measures, for example Road User Charging, would help encourage further mode shift and manage traffic volumes. The measures in the Transport Vision are forecast to result in significant benefits to transport users and improve resilience in the transport system.

These changes in travel behaviour and improved connectivity will have significant wider benefits for the economic, social and environmental future of the West of England. Poor connectivity has been cited by many stakeholders as a barrier to the competitiveness of the city region. The major improvements in connectivity in the Transport Vision will improve travel choices for commuting, reduce business costs and enhance business productivity, which will significantly enhance the competitiveness of the city region, attract new jobs and unlock the delivery of new housing.

The Transport Vision will help to deal with some of the most critical social challenges facing the sub-region, including lack of physical activity and health problems caused by poor air quality. The strong focus on active travel, including reallocation of roadspace to support walking and cycling, will play a key role in enabling people to incorporate physical activity into their daily lives. Providing better travel choices and controlling the volumes of traffic entering urban areas will be critical in helping to improve air quality.

The Transport Vision will directly address the critical challenge of delivering deep reductions in CO_2 emissions, through a combination of large-scale mode shift and supporting the uptake of Ultra Low Emission Vehicles (ULEVs). The analyses demonstrate that more will need to be done, at the national level, to ensure a sustained uptake of ULEVs over the next 20 years if these ambitious targets are to be met. The analyses also demonstrate that there is a potential role for Road User Charging in encouraging mode shift and reducing vehicle trips, particularly in the most congested areas, in helping to meet these ambitious CO_2 reduction targets.

13. Delivering the Transport Vision

13.1. Introduction

This chapter sets out the issues that will need to be considered in delivering the Transport Vision. It sets out the estimated costs of the Transport Vision and demonstrates the strong case for investment.

- **Section 13.2** provides estimated costs for the delivery of the Transport Vision;
- **Section 13.3** identifies the challenges that will need to be addressed in delivering the Transport Vision; and
- **Section 13.4** sets out the next steps.

13.2. Estimated Costs of the Transport Vision

The capital costs of each component of the Transport Vision have been estimated using data from benchmarking from similar schemes and unit rates for equivalent types of infrastructure. The costs have been estimated using a 2016 price base from existing rates. Many of the schemes would be delivered at a point significantly in the future, and it is therefore necessary to take account of future price inflation. The larger, more complex schemes in the Vision would be likely to be delivered at a later date and would therefore be subject to higher levels of construction inflation. Table 13-1 (on the next page) shows the estimated costs of the components of the Transport Vision.

This study highlights the extent of investment required to hold general traffic movements below current levels by 2036. The total capital cost of the Transport Vision is estimated to be upwards of £8.9 billion in future outturn prices. These estimated costs are higher than the estimates provided in the consultation document for the draft version of the Transport Vision. This is because the costs for the road components have increased following more detailed scoping of alignment options, and because more conservative assumptions have been taken on the costs of mass transit options.

These cost estimates include significant risk allowances: 25% for cycling and bus priority schemes, 40% for MetroBus, new stations, Park & Ride and road schemes, and 60% for mass transit and rail.

The most significant uncertainty in the total cost of the Transport Vision relates to the mass transit component. The cost range provided in Table 13-1 reflects the potential range in costs of options for surface running and underground options. In the case of surface running options, costs have been benchmarked against light rail schemes recently completed in the UK and drawing on best practice in light rail in Europe. In the case of underground running, there are no comparable benchmark costs from the UK because there have been no underground rail projects built in the UK outside London since the Tyne and Wear Metro in the early 1980s. It is therefore necessary to draw on experience elsewhere in Europe, and examples have been drawn from the light metro systems built in France and Italy.

The proposals in the Transport Vision are conceptual, with assumptions made about route length and potential specification, and the costs shown above reflect the status of these conceptual proposals. These costs should therefore be reviewed as the schemes are developed.

In addition, it will be necessary to consider in more detail the potential operating costs of the public transport schemes and the extent to which these will be met by revenues from passengers. The Transport Vision identifies the potential for substantial growth in public transport demand, including for the new MetroBus and mass transit routes, but further work will be required to analyse the balance of operating costs and revenues.

It will also be important to take into account ongoing maintenance costs of new infrastructure. These should be included in the whole life costs used to assess the business cases of schemes, and the estimated annual maintenance costs should be assessed as part of the Financial Case before future investment commitments are made.

Table 13-1 Estimated costs of schemes in Transport Vision

Component of Transport Vision	2016 costs, including risk allowance (£m)	Estimated future outturn costs (£m)	Assumptions
Behaviour Change and Future Proofing Programme			
Smarter Choices Programme	£400	£500	Assumes £20 spend per resident for next 20 years
Electric Vehicles Programme	£50	£75	Nominal allowance
Connected and Autonomous Vehicles Programme	£50	£75	Nominal allowance
Behaviour Change and Future Proofing Total	**£500**	**£650**	
Strategic Cycle Routes			
Greater Bristol Cycle Network	£200	£300	Assumes 120km new strategic routes
Bath Cycle Network	£30	£50	Assumes 20km new strategic routes
Weston Cycle Network	£30	£50	Assumes 20km new strategic routes
Strategic Cycle Routes Total	**£260**	**£400**	
Bus Network			
Greater Bristol Bus Network II (including Bath)	£150	£200	Assumes total of 60km upgraded routes
Bristol City Centre Movement Strategy	£60	£100	Assumes works to 10km of carriageway
Weston Bus Network	£30	£50	Assumes 10km upgraded routes
Bus Network Sub-total	**£240**	**£350**	
MetroBus			
Weston-super-Mare	£35	£50	Assumes 8km route length including bus lanes
Clevedon and Nailsea to Bristol	£60	£85	Assumes 11km major infrastructure works required
Severnside to City Centre	£30	£45	Assumes 9km of minor infrastructure works
Thornbury and Buckover to Bristol	£70	£100	Assumes 11km of minor and major works
Yate to Bristol	£60	£80	Assumes 5km of major works, incl new M4 bridge
Orbital MetroBus (Whitchurch - Hicks Gate - Emersons Green)	£90	£130	Assumes 4km new corridor + 8km works to Ring Road
Hicks Gate - Bath (extension of Mass Transit Corridor)	£100	£140	Assumes 14 km of major and minor works
MetroBus consolidation	£50	£75	Assumes 10 km of major and minor works
MetroBus Sub-total	**£495**	**£705**	
Mass Transit			
Bristol to Airport (surface / underground running)	£600 - £1,200	£900 - £1,800	15km from city centre to Airport
Bristol to North Fringe (surface / underground running)	£400 - £1,400	£600 - £2,100	10km from city centre to Cribbs Causeway
Bristol to East Fringe (surface / underground running)	£480 - £1,600	£720 - £2,400	12km from city centre to Emersons Green
Bristol to Hicks Gate (surface running)	£240	£360	6km from city centre to Hicks Gate
Mass Transit Sub-total	**£1,720 - £4,440**	**£2,580 - £6,660**	
Park & Ride - expansion and new sites			
Greater Bristol Park & Ride Package - major site at M32	£50	£75	Assumes 2000 spaces + major access works
Greater Bristol Park & Ride Package - other new sites + expanded sites	£50	£75	Assumes up to 5000 new spaces
Bath Park & Ride Package	£20	£30	Assumes up to 1500 new spaces + access works
Weston Park & Ride	£10	£15	Assumes up to 600 new spaces + access works
Park & Ride Sub-total	**£130**	**£195**	
Rail			
New stations	£80	£120	Assumes 5 new stations
Improvements to existing stations	£80	£120	Assumes 15 stations: improved access, interchange
Upgrades to rail network (network capacity, electrification)	£500	£750	
Rail Sub-total	**£660**	**£990**	
Road Network			
East of Bath Link	£75	£100	Assumes 2.5km single carriageway
Winterbourne and Frampton Cotterell Bypass *(supporting Yate SDL)*	£70	£95	Assumes 4.8km single carriageway
M4 J18A and links to Ring Road	£195	£265	New junction + provision for up to 6km new link + widening
Link from M4 J18A to Yate	£95	£140	5km single carriageway link
Connections between A4 and South Bristol (excl Orbital MetroBus)	£125	£185	Assumes 8km of new corridor
Whitchurch Distributor Road *(supporting Whitchurch SDL)*	£25	£40	Assumes 1km single carriageway
Avon Mill Lane - A4 Link, Keynsham *(supporting Keynsham SDL)*	£40	£55	1.6km single carriageway + rail bridge
Callington Road Link *(supporting Mass Transit to Hicks Gate)*	£35	£45	1.8km single carriageway
M5 J21A and Banwell, Sandford and Churchill Bypass	£300	£440	New J21A + 10km dual carriageway
Upgrade of A38 between Airport and Langford	£55	£85	Assumes 7.5km route upgrade
Dualling of A38 between SBL and Bristol Airport	£220	£320	Assumes 7km dual carriageway
Nailsea Corridor Improvement (excl Nailsea MetroBus, see above)	£265	£380	13km single carriageway + 2 rail bridges
Weston Area Package (incl M5 Junction Improvements)	£40	£60	Junction improvements + new rail crossings
M4 Smart Motorway M4 J18-J19	£100	£150	Assumes 12km of works to M4
M5 Smart Motorway M5 J17-J21A	£350	£500	Assumes 28km of works to M5
M5 Junction 14 Improvements	£65	£90	Rebuild of junction + realignment of B4509
M5 Junction 19 Improvements	£25	£35	Assumes works to slip roads and A369
Improvements to local road networks	£30	£50	Allowance for other junctions on network
Road Network Sub-total	**£2,110**	**£3,035**	
All Components - Total	**£6,115 - £8,835**	**£8,905 - £12,985**	
All Components - Total (assuming surface light rail)	**£6,115**	**£8,905**	
All Components - Total (assuming light metro)	**£8,835**	**£12,985**	

Note: all costs are indicative and are based on estimated lengths of infrastructure and the application of unit rates. In all cases the schemes are conceptual and will need to be developed in greater detail to inform business cases and planning processes. A study has recently been taking place to assess options for a connection from M4 J18A to the Ring Road: the JTS has assumed a general route alignment with no preference for any specific alignment option. The J18A study will report in March 2018.

13.3. Delivery of the Transport Vision

This Transport Vision is intentionally ambitious. It will require an unprecedented level of funding, with a large acceleration in spending from current levels. The components of the Transport Vision will require significant further work to develop business cases and, if they have a clear case, further consultation and completion of statutory planning processes. It will be particularly important to ensure that the programme is aligned with the delivery of new homes and employment space, particularly new infrastructure to support the Strategic Delivery Locations proposed in the Joint Spatial Plan.

There are significant engineering challenges: particularly in the future management of roadspace and in the delivery of a mass transit system. There will also be significant challenges in building these schemes. In order to minimise disruption, it will be critical to carefully plan the delivery programme to minimise delays to users of the transport network.

13.3.1. Funding

The programme is equivalent to expenditure of £450 million - £600 million per annum, which is a step-change from historic and current programmes. This funding requirement will need further definition following more detailed work to assess the specification of the mass transit system, but there could be significant challenges in securing this level of funding for transport investment.

There is an increasingly strong case for infrastructure investment to improve society and support economic growth, but the government is facing competing demands from different parts of the UK. It will be critical for the West of England to make a compelling case for investment in this part of the country.

Evidence shows that investment in the West of England is lower than in other parts of England. The National Infrastructure Pipeline shows that £18.0 billion was programmed to be spent on transport in the UK in 2016/17, equivalent to 1.0% of UK GDP. If this benchmark is applied to the South West of England, this would be equivalent to around £1.4 billion per annum. However, analyses show that spending in the South West was around £390 million in 2015/16, dropping to around £300 million per annum between 2015/16 and 2020/21 (or £540 million per annum including improvements to Stonehenge and the A303). This is less than half the expenditure that could be expected in the region if the national 1% benchmark were to be applied.

The Government has also made a commitment to increase the proportion of national GDP spent on economic infrastructure to prepare the country for the future. The West of England is the most productive part of the South West and is one of the UK's best-performing city regions. There is, therefore, a strong case for increased investment in the West of England to support the growth of the area.

A range of sources of funding should be considered, including the current Devolution Deal, and future enhanced Devolution Deals, together with DfT major schemes funding, future Growth Deals and contributions from developers. In the case of the mass transit system, consideration should be given to how construction costs could be covered, at least in part, through future fare revenues, which should be considered in a more detailed mass transit feasibility study.

It is also important to make a strong case for funding of improvements to the national road and rail networks. The West of England is the gateway to the South West peninsula and South Wales and problems on the network in the West of England impact on connectivity to both regions. There is a strong case for investment in the road and the rail networks to support the connectivity needs of the wider regions. In the case of the road network, this is required to mitigate the impacts of growth and improve journey reliability on the M4, M5 and other strategic corridors, including improved north-south links through the area. It is therefore important to provide a strong evidence base to inform the current and future Road Investment Strategies.

In the case of the rail network, investment is needed to both improve strategic connectivity across the South West and accommodate rapidly growing passenger demand. It is therefore important for partners across the South West to make the case for investment in improved rail infrastructure to help deliver faster, more frequent and faster services.

Consideration should be given to the potential role of Workplace Parking Levies and Road User Charging in generating a significant new source of revenue that could be used for investment in the transport network. Analyses indicate that an area-wide package of Road User Charging (covering the Bristol Urban Area and Bath) would have the potential to generate around £160 million net revenue per annum. This is based on a

modest charge of £3 per movement within the charging area: periodic increases in charges would generate higher revenues.

13.3.2. Programme Development

The Transport Vision is only a first step in the development of a future transport programme for the West of England. Significant further work will be required to assess the business cases of projects and develop the forward programme. The West of England Combined Authority has now commenced work on the prioritisation of schemes and development of an initial programme, which will be based on the potential economic impacts of each scheme. This process will inform the development of a short-, medium- and long-term implementation programme.

It will also be important to use this information to inform the development of the Infrastructure Delivery Plan to support the Joint Spatial Plan (JSP). Alongside the strong focus on Urban Living, the JSP has identified a series of Strategic Development Locations, which will play a critical role in meeting the forecast housing needs of the sub-region. These will require significant new transport infrastructure (that has been included in the Transport Vision), which will need to be programmed alongside the planning of new housing.

Other components of the Transport Vision are expected to be programmed through the new Joint Local Transport Plan, which will be prepared from Autumn 2017 after the completion of the Joint Transport Study. It will be critical to ensure a consistent approach to programming of all components of the Transport Vision, with a clear understanding of the roles of the schemes progressed as part of the JSP Infrastructure Delivery Plan and the other schemes identified in the Transport Vision.

As the programme is developed, further consultation will be required with stakeholders and communities through the Joint Local Transport Plan as well as in relation to specific schemes. In many cases, statutory processes will also be necessary, and significant resource will be needed to develop business cases. It will be particularly important to ensure effective alignment of the delivery of the Strategic Development Locations, with new infrastructure required to ensure that effective travel choices are in place from an early stage of development being occupied.

13.3.3. Engineering Challenges

The Transport Vision has sought a high level of ambition in terms of the scale of the investment programme and the proposed interventions on the transport network. In the case of new transport corridors, there will be a need for careful consideration of alternative route options and design of appropriate mitigation to minimise environmental impacts. It will be necessary to design route alignments to minimise landscape impacts and avoid, where possible, areas of important ecological value.

There will be significant challenges in re-engineering large parts of the road network in the main urban areas, particularly Bristol and Bath, to better accommodate the needs of pedestrians and cyclists, and in ensuring priority for buses. This will require the progressive reallocation of roadspace, including making difficult decisions about reducing space for general traffic and management of on-street parking and servicing.

The introduction of new mass transit routes in the Bristol urban area will be particularly challenging. Initial assessments of the corridors indicate that a surface-based option could be delivered along the A4 between Bristol city centre and Hicks Gate, and a large part of a new route to the Airport could be delivered on the surface. However, surface-based options will be very difficult to deliver on the approach to the city centre from South Bristol, and along the routes to East Bristol and North Bristol. These would require major reallocation of roadspace and, potentially, closure of certain routes to general traffic. Analyses indicate that there could be significant impacts on general traffic, with increased congestion, and re-routing within local communities.

The study has considered the potential role of underground options in some cases to overcome these challenges, but there would also be major challenges in creating new tunnels to accommodate a mass transit system. Future study work will be required to assess in more detail the geotechnical feasibility of creating new bored tunnels and stations, a potential construction methodology and implications for the costs of construction.

The Transport Vision proposes comprehensive investment in most parts of the West of England, including improvements to busy road and rail corridors. It will be important to effectively plan future programmes of work on each corridor to avoid abortive works and minimise disruption to users. Wherever possible, there

should be a clear blueprint for each corridor, with a clear programme of improvement to achieve the future blueprint, avoiding repeated upgrading and abortive work.

13.4. Next Steps

This report describes the key findings from the Joint Transport Study and the recommendations for the long-term Transport Vision for the West of England. This work has been based on analysis of the issues and challenges at the West of England level and more detailed analysis of the key issues in different parts of the sub-region. It has used evidence to identify integrated solutions, with consideration of the roles of active travel, public transport and improved road connectivity to address key challenges in different areas. It has used evidence to assess the effectiveness of different options and make recommendations about the components that should be incorporated into the Transport Vision.

The study has been based on consideration of the issues at the strategy level. A significant amount of work will be required to develop in more detail the components of the Transport Vision. These tasks will include:

- Development of the new Joint Local Transport Plan, which will consider the recommendations from this study and develop the new transport strategy for the West of England on a formal basis;
- Development of the Infrastructure Delivery Plan to support the Joint Spatial Plan, which will include the components of the Transport Vision needed to support the delivery of new homes and employment floorspace across the sub-region;
- Prioritisation and programming of potential schemes for potential delivery within the current Devolution Deal – whilst this will focus on schemes with the potential to be delivered in the short-medium term, this should ensure that preparation work takes place for longer-term proposals to ensure that they are ready to be delivered at the right time in future;
- Further study work to consider in more detail the options for delivering mass transit within the Bristol urban area, including assessment of surface-running and underground running where this would deliver significant connectivity advantages;
- Further feasibility work to assess other public transport components of the Transport Vision, including new MetroBus routes and Park & Ride sites;
- Investigation of options to deliver roadspace reallocation for strategic cycle routes along the main transport corridors, including trade-offs in reducing traffic flows and changes to the management of on-street parking facilities to accommodate the needs of cyclists;
- Further work to assess the feasibility of the new and improved road corridors, including integration of walking, cycling and public transport facilities, further modelling of benefits and more detailed environmental assessment;
- Assessment of the scope for options for reducing goods traffic entering Bristol and Bath, including more detailed review of the scope for freight consolidation, transport of freight by train into the city centres, and the scope for new intermodal freight facilities at Avonmouth; and
- Consideration of the scope for a combination of a Workplace Parking Levy and Road User Charging to help support the delivery of the mode shift targets and generate a new source of funding for delivery of the Transport Vision.

Appendix A: Scheme Assessments

The scheme assessments for major components of the Transport Vision are in a separate document.

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West of England Joint Transport Study

Final Report
Appendix A - Scheme Assessments

October 2017

Table of Contents

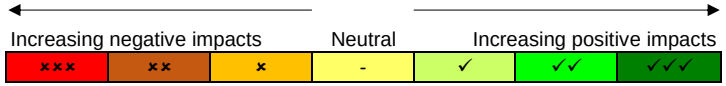
A.1 Introduction

This appendix sets out the detailed assessment of 34 major schemes included in the Transport Vision. Each scheme is presented in a 2-3 page proforma, which builds on the Department for Transport's Early Assessment and Sifting Tool (EAST).

Each proforma sets out:

- Current and future policy context;
- Need for Intervention (specific to the area under consideration);
- Objectives (tailored to respond to the need for intervention);
- Options considered and selected; and
- Any dependencies on other Transport Vision schemes or committed schemes.

The next step is assessment of the Strategic Case. This is based on strength of alignment with local policies and strength of support for scheme-specific objectives, on a 7 point scale.



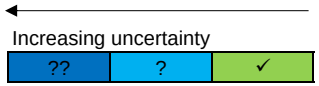
The Economic Case is also assessed on the same 7-point scale, with specific criteria that sit under the JTS goals, together with costs and initial qualitative assessment of potential Value for Money.

- Support Economic Growth;
- Reduce Carbon Emissions;
- Quality of Life and the Natural Environment;
- Improve Health, Safety and Security;
- Promote Accessibility;
- Costs to Public Accounts; and
- Value for Money.

The Financial, Delivery and Commercial Cases consider the deliverability of the project, focusing on:

- Estimated Cost - excluding and including risk allowances;
- Potential funding sources and affordability;
- Delivery agencies;
- Key project risks;
- Public Support; and
- Commercial Case including procurement issues and revenue funding requirements.

Assessment of the Financial, Delivery and Commercial Cases is on a 3-point scale, reflecting potential levels of certainty at this early stage of scheme development.



A.2 Summary Table

WEST OF ENGLAND JTS: SCHEME ASSESSMENTS		Cycling			Bus			MetroBus						Mass Transit			
		Greater Bristol Cycle Network	Bath Cycle Network and City Centre Package	Weston Cycle Network	Greater Bristol Bus Network 2 (GBBN 2)	Bristol City Centre Movement Strategy	Weston Bus Network	MetroBus for Weston-super-Mare	MetroBus from Clevedon and Nailsea to Bristol	MetroBus from Sevenside to Bristol	MetroBus from Thornbury to Bristol City Centre	MetroBus from Yate to Bristol City Centre	Orbital MetroBus	Mass Transit - Bristol to Bristol Airport	Mass Transit - Bristol to North Fringe	Mass Transit - Bristol to East Fringe	Mass Transit - Bristol to Bath
Strategic Case: based on strength of alignment with local policies and strength of support for objectives																	
Overall Policy Alignment		✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓
Overall Strength of Support for Objectives		✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓
Economic Case: based on balance of benefits (as expressed through JTS goals) and costs																	
Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs)**	✓✓	✓	✓	✓✓	✓✓	✓	✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
	Impacts on National Networks:	-	-	-	-	-	-	-	-	-	✓	-	-	-	✓	-	-
	Resilience:	✓	✓	-	-	✓	✓	-	-	-	-	-	✓	✓✓✓	✓✓	✓✓	✓
	Unlock new growth in jobs and housing:	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓	✓✓✓	✓✓	✓✓	✓
	Connections to Gateways:	✓	-	-	✓	✓	-	✓	-	✓✓	-	-	-	✓✓✓	✓✓	✓✓	✓
Reduce Carbon Emissions	**Resource efficiency:**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	-
	Low carbon choices:	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓
Quality of Life and the Natural	**Built environment:**	✓	✓	✓	✓	✓✓	✓	✓	✓	✓	-	-	✓	✓✓	✓✓	✓✓	-
	Natural environment:	-	-	-	-	-	-	-	××	-	×	×	××	××	-	-	×
Improve Health, Safety and Security	**Healthy travel choices:**	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Air quality:	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓	✓
	Safety for transport users:	✓✓	✓✓	✓	-	✓	-	-	✓	-	✓	✓	✓	✓✓	✓	✓	✓
Promote Accessibility	**Access to jobs & training:**	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓	✓✓	✓	✓	✓✓✓	✓✓	✓✓	✓
	Access to local services:	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓	✓	✓	-	✓✓	✓✓	✓✓	✓
Costs to Public Accounts	**Cost to Transport Budget:** (PVC, incl Optimism Bias).	£216	£32	£32	£162	£65	£32	£38	£65	£32	£76	£65	£97	£648	£432	£518	£405
	Impact of Tax Revenues:	-	-	-	-	-	-	-	-	-	-	-	-	×	×	×	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs	(Est) High	(Est) High	(Est) High	(Est) Medium	(Est) High	(Est) High	(Est) High	(Est) Medium	(Est) Medium	(Est) High	(Est) High	(Est) Low	(Est) Medium	(Est) Medium	(Est) Medium	(Est) Low
Financial, Delivery and Commercial Cases: considering the deliverability of the project																	
Estimated Cost	Estimated capital cost (£ million, 2016 prices), excl. risk allowance, (£million)	£160	£24	£24	£120	£48	£24	£25	£43	£21	£50	£43	£64	£375	£250	£300	£246
	Estimated capital cost (£ million, 2016 prices), incl. risk allowance (£million)	£200	£30	£30	£150	£60	£30	£35	£60	£30	£70	£60	£90	£600	£400	£480	£375
Potential Funding Sources		?	✓	✓	✓	?	✓	✓	✓	✓	✓	✓	✓	??	??	??	??
Affordability		?	?	✓	?	?	✓	✓	✓	?	✓	?	✓	??	??	??	??
Delivery Agencies		?	?	✓	✓	?	✓	✓	✓	?	✓	✓	✓	??	✓	✓	?
Key Project Risks		?	?	?	??	?	✓	?	?	?	?	?	??	??	??	??	??
Public Support		✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓	?	✓✓	?	✓✓	✓✓	✓✓	✓	✓	??
Commercial Case		✓	✓	✓	✓	✓	✓	?	✓	?	✓	✓	?	??	??	??	??

A.2 Summary Table

WEST OF ENGLAND JTS: SCHEME ASSESSMENTS		Park & Ride			Rail		Highway												
		Park & Ride Package for Bristol urban area	Park & Ride Package for Bath	Park & Ride for Weston-super-Mare	New Stations Package	Service Improvements and Station Upgrades	East of Bath Link	Winterbourne and Frampton Cotterell Bypass	JM4 Junction 18A to Ring Road	M4 Junction 18A to Yate	South Bristol Orbital Corridor	M5 Junction 21A to A38 Corridor	Weston-super-Mare Package	Nailsea Corridor	Smart Motorway: M5 J17-J21A	Smart Motorway: M4 J18-J19	M5 Junction 14	M5 Junction 19	A4 to Avon Mill Lane, Keynsham
Strategic Case: based on strength of alignment with local policies and strength of suppor																			
Overall Policy Alignment		✓✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Overall Strength of Support for Objectives		✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Economic Case: based on balance of benefits (as expressed through JTS goals) and co																			
Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs)**	✓✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓	✓✓✓	✓✓	✓✓	✓	✓✓	✓✓
	Impacts on National Networks:	-	-	-	-	✓	✓✓	-	✓	✓	✓	✓✓	-	×	✓✓	✓✓	✓✓	✓✓	-
	Resilience:	✓	✓	-	✓	-	✓✓	✓✓	✓✓✓	✓	✓✓✓	✓✓✓	✓	✓✓	✓✓	✓✓	✓	✓✓	✓
	Unlock new growth in jobs and housing:	✓✓	✓	✓✓	✓	✓	-	✓✓	✓✓✓	✓	✓✓✓	✓✓✓	✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓
	Connections to Gateways:	-	-	-	✓	✓	-	-	✓✓✓	✓✓	✓	✓✓✓	-	✓	✓✓	✓✓	-	✓✓	-
Reduce Carbon Emissions	**Resource efficiency:**	✓	✓	✓	✓	✓	-	✓	-	-	✓✓	✓	✓	✓	-	-	✓	✓	✓
	Low carbon choices:	✓	-	✓	✓	✓	-	-	-	-	-	-	✓	✓	-	-	-	-	✓
Quality of Life and the Natural	**Built environment:**	✓	✓	✓	-	✓	✓	✓	-	✓	✓	-	-	-	-	-	-	-	-
	Natural environment:	×	×	-	-	-	×××	××	×	××	××	×××	-	×××	××	××	×	×	×
Improve Health, Safety and Security	**Healthy travel choices:**	-	-	✓	✓	✓	✓	-	-	-	-	✓	✓✓	✓	-	-	-	-	-
	Air quality:	✓	✓	✓	✓	✓	✓	✓	-	✓	✓✓	✓	✓	✓	×	×	-	-	✓
	Safety for transport users:	✓	-	-	-	-	-	✓	✓✓	✓	✓✓	✓	✓	✓	✓	✓	✓	✓	✓
Promote Accessibility	**Access to jobs & training:**	✓	-	-	✓	✓	-	✓	-	-	✓	✓	✓✓	✓	-	-	-	✓	✓
	Access to local services:	✓	-	-	✓	✓	-	✓	-	-	✓	✓	✓✓	✓	-	-	-	-	-
Costs to Public Accounts	**Cost to Transport Budget:** (PVC, incl Optimism Bias).	£113	£24	£11	£65	£626	£81	£76	£211	£103	£135	£621	£43	£286	£378	£108	£70	£27	£43
	Impact of Tax Revenues:	-	-	-	×	×	-	-	-	-	-	-	-	-	-	-	-	-	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs	(Est) High	(Est) Medium	(Est) High	(Est) Low	(Est) Low	(Est) Medium	(Est) High	(Est) High	(Est) Medium	(Est) High	(Est) High	(Est) High	(Est) High	(Est) Medium	(Est) Medium	(Est) Medium	(Est) High	(Est) High
Financial, Delivery and Commercial Cases: considering the deliverability of the project																			
Estimated Cost	Estimated capital cost (£ million, 2016 prices), excl. risk allowance, (£million)	£75	£16	£7	£50	£370	£54	£50	£140	£68	£90	£410	£30	£189	£250	£70	£46	£18	£30
	Estimated capital cost (£ million, 2016 prices), incl. risk allowance (£million)	£105	£22	£10	£80	£580	£75	£70	£195	£95	£125	£575	£40	£265	£350	£100	£65	£25	£40
Potential Funding Sources		✓	✓	✓	✓	✓	?	✓	✓	✓	✓	✓	✓	✓	?	?	?	?	✓
Affordability		✓	ü	✓	?	?	?	✓	?	?	✓	?	✓	?	?	?	?	?	✓
Delivery Agencies		?	ü	✓	✓	?	?	✓	✓	✓	✓	✓	✓	✓	?	?	✓	✓	✓
Key Project Risks		?	?	✓	??	?	??	??	?	?	✓	?	✓	??	?	?	?	?	?
Public Support		✓	??	✓	✓✓✓	✓✓✓	?	✓	✓	✓	?	?	✓	?	✓✓	✓✓	✓	✓	✓
Commercial Case		?	?	?	?	?	✓	✓	✓	✓	✓	✓	✓	✓	?	?	✓	✓	✓

Part 1 - Cycling Schemes

Name of Project:	**Greater Bristol Cycle Network**
Reference:	**Cycling 1**

Scheme Description	Provide a continuous and integrated network of strategic cycle routes through segregation of cyclists from general traffic and/or significant reduction in through traffic movements. Strategic cycle routes to comprise key corridors, orbital and cross city routes as outlined in Bristol Cycle Strategy. This integrated strategic cycle network will connect key destinations across, and adjacent to, the Bristol urban area, including North and East Fringes, connections to Whitchurch and Long Ashton. Quietways and local routes will be improved and integrated into the strategic network as part of ongoing improvement and maintenance programmes.
Current and Future Policy Context	The future economic success of Bristol will require the delivery of residential and employment development within the urban area (BCS5, BCS8). High quality transport connections for all modes of transport will be essential to deliver this growth and accommodate the associated increase in travel demand (BCS10). Demands on an increasingly constrained highway network are forecast to increase (BCS10). Therefore the provision of high quality cycling infrastructure which is safe and convenient to use is essential to maximise the efficiency of the transport network by facilitating mode shift (BCS10). Increased numbers of people cycling can provide health and air quality benefits (BCS10, BCS23). Development is planned in Bristol as part of the JSP urban living component.
Need for Intervention *(specific to the area under consideration)*	(1) The existing routes do not form an integrated network of strategic cycle routes connecting major locations in the urban area. (2) Many strategic routes do not provide a continuous level of service along their length e.g. a route may consist of segregated, on-road and un-marked sections. (3) Without providing convenient and safe options to travelling by car the highway network will not be able to accommodate future demand. (4) Cycling is not always considered a safe and convenient option for all people, because of the constraints of the current network. This limits the uptake of cycling and reduces the potential benefits of more active travel amongst the wider population.
Objectives *(tailored to respond to the need for intervention)*	(a) Encourage greater volumes of cycling for all journey purposes across the Bristol urban area. (b) Provide continuous level of service along strategic cycle routes. (c) Provide a safe and convenient cycle network that all users can access. (d) Facilitate mode shift from the car to cycling and improve the efficiency of the transport network (e) Increase number of people who can access health benefits of cycling.
Options Considered	A. Do Nothing - no improvements to strategic cycle network across Bristol urban area. B. Business as usual improvements to existing cycle network - incremental improvements to strategic routes, Quietways and local routes. C. Completion of a continuous and integrated network of strategic cycle routes with roadspace allocated to cycles connecting key destinations in the Bristol urban area.
Option Selected *(and rationale)*	Option A is not an option because the highway network in the urban area is at capacity and other options for travel must be provided. Option B will not help deliver the step-change in cycling connectivity required to increase the number of people cycling. Option C provides the greatest strategic benefit by improving the provision for cycling on a core network of strategic routes which are continuous and integrated.
Dependencies	The following schemes will be key to securing longer term benefits of the Greater Bristol Cycle Network: Fiscal measures to reduce number of peak hour car trips into central Bristol. South Bristol Orbital Corridor to release highway capacity in urban area. Park & Ride to reduce car trips into the urban area. Dependant on the management of through traffic movements (including traffic restrictions), kerbside parking and servicing.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Supports planned development (BCS5, BCS8) and future economic success by maximising efficiency of transport network (BCS10).	✓✓
	- Facilitates mode shift and increases use of cycling which has health benefits (BCS10).	✓✓
Performance against Objectives	(a) Encourage greater volumes of cycling for all journey purposes across the Bristol urban area.	✓✓
	(b) Provide continuous level of service along strategic cycle routes.	✓✓
	(c) Provide a safe and convenient cycle network that all users can access.	✓✓
	(d) Facilitate mode shift from the car to cycling and improve the efficiency of the transport network	✓✓
	(e) Increase number of people who can access health benefits of cycling.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no impact on national networks.	-	
	Resilience: mode shift resulting in increased efficiency of the transport network would support improved increase network resilience.	✓	
	Unlock new growth in jobs and housing: facilitate increased demand for travel generated by new growth in jobs and housing.	✓	
	Connections to Gateways: strategic routes will connect to national transport gateways (Bristol Temple Meads, Parkway stations).	✓	
Reduce Carbon Emissions	**Resource efficiency:** likely to have a minor impact on mode shift (at WoE level) and reduce number of car trips.	✓	
	Low carbon choices: will increase the convenience and safety of low carbon travel by facilitating mode shift to bicycle.	✓✓	
Quality of Life and the Natural Environment	**Built environment:** will improve the quality of public realm, reduce severance and help contribute to reducing traffic noise by reducing traffic volumes as a result of the higher mode shift from the car in the urban areas (mode shift will be lower outside the urban area).	✓	
	Natural environment: most of the network will be within the urban environment, so the impact on the natural environment is judged to be neutral.	-	
Improve Health, Safety and Security	**Healthy travel choices:** positive impact on improving conditions for cycling as a healthy travel choice and facilitating modal shift.	✓✓	
	Air quality: facilitating mode shift from car to bicycle is expected to provide some benefit to air quality.	✓✓	
	Safety for transport users: providing continuous strategic cycle routes will help improve safety for cyclists.	✓✓	
Promote Accessibility	**Access to jobs & training:** improved cycle access to employment and training opportunities.	✓	
	Access to local services: improved cycle access to services in the Bristol urban area.	✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£216 million	
	Impact of Tax Revenues: reduction in fuel tax revenues due to reduced vehicle travel. Overall considered to be small impact.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£160 million	
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£200 million	
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	?	
Affordability	This scheme would be expected to represent a step-change in level of investment compared with the current improvement and maintenance programme. However, the delivery of the programme could be phased based on availability of funding.	?	
Delivery Agencies	West of England Local Authorities. Developers would be expected to deliver improvements related to specific development sites within the urban area.	?	
Key Project Risks	(1) Securing the necessary highway capacity required to re-allocate road space to cycle infrastructure. (2) A major programme of improvements will require continued investment over a five to ten year period, (3) Third party land may be required at some locations.	?	
Public Support	JTS consultation revealed strong public and stakeholder support for cycle schemes, encouraging active travel and reducing carbon emissions.	✓✓✓	
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified. Bristol City Council has extensive experience of delivering cycling infrastructure and working jointly with West of England Authorities.	✓	

Name of Project:	**Bath Cycle Network and City Centre Package**
Reference:	**Cycling 2**

Scheme Description	Completion of a continuous and integrated network of strategic cycle routes, comprising key corridors and cross city routes, complemented by improved permeability and investment in public realm in the city centre. This network will connect key destinations across the Bath urban area. Local routes will be improved and integrated into the strategic network as part of ongoing programmes. Bath city centre is in a natural 'bowl' with steep slopes into the city centre from the north and south. This is likely to constrain the attractiveness of cycling from the north and south, and the primary opportunities will be on east-west corridors in the city.
Current and Future Policy Context	The Bath and North East Somerset Core Strategy Policy 2g aims to reduce the use of cars travelling to and within the city through delivering improvements to public transport, walking and cycling. Policy B1 outlines the planned delivery of 7,000 new homes and a 7,000 net increase in jobs in Bath over the plan period. Implementing improvements to walking and cycling will assist in delivering planned economic and residential growth of Bath by helping to reduce congestion and improve connectivity between housing, employment and neighbourhood centres (CSB10). Alongside this, increased numbers of people cycling can provide health and air quality benefits (Bath Transport Strategy).
Need for Intervention *(specific to the area under consideration)*	(1) Current cycle routes do not form an integrated network of strategic cycle routes connecting major locations in Bath City Centre. (2) Many strategic routes do not provide a continuous level of service along their length e.g. a route may consist of segregated, on-road and un-marked sections. (3) Without providing convenient and safe alternatives to travel by car, the road network will not be able to accommodate future demand. (4) Cycling is not always considered a safe and convenient option for people in Bath, because of the constraints of the current network. This limits the uptake of cycling and reduces the potential benefits of more active travel amongst the wider population.
Objectives *(tailored to respond to the need for intervention)*	(a) Encourage greater use of cycling for all journey purposes across the Bath urban area. (b) Provide continuous level of service along strategic cycle routes. (c) Provide a safe and convenient cycle network that all users can access. (d) Facilitate mode shift from the car to walking and cycling and improve the efficiency of the transport network. (e) Increase number of people who can access health benefits of cycling.
Options Considered	A. Do Nothing - no improvements to city centre permeability and strategic cycle network across the Bath urban area. B. Business as usual improvements to city centre and existing cycle network - strategic routes and local routes. C. Completion of a city centre permeability programme and integrated network of strategic cycle routes connecting key destinations in the Bath urban area.
Option Selected *(and rationale)*	Option A is not an option because the road network in the urban area is at capacity and other options for travel must be provided. Option B will not help to deliver the step-change in connectivity required to facilitate active travel and increase the number of people cycling. Option C provides the greatest strategic benefit by improving city centre permeability and provision for cycling on a core network of continuous strategic routes.
Dependencies	Complements the Bath Park & Ride package which could facilitate Park & Cycle options.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports planned development (CSB1) and future economic success by providing key infrastructure (CS2g).	✓✓
	- Facilitates mode shift and increases use of cycling which has health benefits (Bath Transport Strategy).	✓✓
Performance against Objectives	(a) Encourage greater use of cycling for all journey purposes across the Bath urban area.	✓✓
	(b) Provide continuous level of service along strategic cycle routes.	✓✓
	(c) Provide a safe and convenient cycle network that all users can access.	✓✓
	(d) Facilitate mode shift from the car to walking and cycling and improve the efficiency of the transport network.	✓
	(e) Increase number of people who can access health benefits of cycling.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓
	Impacts on National Networks: no direct impact.		-
	Resilience: mode shift resulting in increased efficiency of the transport network would support improved network resilience.		✓
	Unlock new growth in jobs and housing: provides sustainable option for travel generated by growth in jobs and housing.		✓
	Connections to Gateways: no direct impact.		-
Reduce Carbon Emissions	**Resource efficiency:** likely to have a slight impact on mode shift (at WoE level) and reduce number of car trips.		✓
	Low carbon choices: will increase the convenience and safety of low carbon travel by cycling.		✓
Quality of Life and the Natural Environment	**Built environment:** network will be carefully integrated into existing urban environment and improve urban environment for all users.		✓
	Natural environment: most of the network will be within the urban environment, so there will be no impact on the natural environment.		-
Improve Health, Safety and Security	**Healthy travel choices:** positive impact on improving conditions for cycling as a healthy travel choice.		✓✓
	Air quality: modest mode shift from car to bicycle is expected to provide some benefit to air quality.		✓
	Safety for transport users: providing continuous strategic cycle routes will help improve safety for cyclists.		✓✓
Promote Accessibility	**Access to jobs & training:** improved cycle access to employment and training opportunities.		✓
	Access to local services: improved cycle access to services in the Bath urban area.		✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£32 million
	Impact of Tax Revenues: to be confirmed during scheme development.		-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£24 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£30 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓
Affordability	Scheme represents a step-change in level of investment compared with the current improvement and maintenance programme.	?
Delivery Agencies	Bath and North East Somerset Council.	?
Key Project Risks	(1) Securing the necessary highway capacity required to re-allocate road space to cycle infrastructure, (2) A programme of improvements will require sustained investment over a five to ten year period, (3) Third party land may be required at some locations.	?
Public Support	JTS consultation revealed strong public and stakeholder support for cycle schemes, encouraging active travel and reducing carbon emissions.	✓✓✓
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified. Bath and North East Somerset Council has experience of delivering cycling infrastructure.	✓

Name of Project:	**Weston Cycle Network**
Reference:	**Cycling 3**

Scheme Description	Completion of a network of legible, attractive and safe strategic cycle routes in Weston-super-Mare, with a focus on east-west routes from Worle and Weston Villages into the town centre. Within the town centre this would reflect proposals in the Weston Town Centre Regeneration (adopted 2017). The Weston Villages SPD (June 2012) sets out proposals in this area. This strategic cycle network will connect key destinations across the town, including the J21 Enterprise Area, Weston Hospital and Weston College. Quietways and local routes will be improved and integrated into the strategic network as part of ongoing improvement and maintenance programmes. The short-medium term focus is to address weak links in the existing cycle network (in particular routes which stop short of the town centre), signage and cycle parking
Current and Future Policy Context	Core Strategy Policy CS28 includes a minimum of 12,800 dwellings to be delivered in Weston-super-Mare over the plan period, together with approximately 10,500 jobs, to deliver improved self-containment and reduced out-commuting. Core Strategy Policy CS30 on Weston Villages includes two mixed-use, employment-led, sustainable new communities to the east of the town. This will include at least 6,500 homes and 37.7ha of B Use Class employment land over the plan period. Further development is planned at Weston-super-Mare as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport), particularly at Weston-super Mare.
Need for Intervention *(specific to the area under consideration)*	(1) Existing cycle links end prior to the town centre which does not encourage people within a short ride to cycle to the town centre. Some parts of the town are well served, and other areas have limited or no provision. (2) Some routes do not provide continuous level of service, e.g. a route may consist of segregated, on-road and un-marked sections. (3) Cycling is not always considered a safe and convenient option for all people. This limits the number of people who could benefit from the health benefits of cycling. (4) High levels of housing growth (committed within the current Core Strategy and proposed growth with the JSP Emerging Spatial Strategy) will increase travel demand. Cycle infrastructure will encourage short to medium length journeys within the town to be made by cycle.
Objectives *(tailored to respond to the need for intervention)*	(a) Promote and increase cycling trips for short to medium length journeys within Weston-super-Mare, encouraging mode shift. (b) Provide continuous level of service along strategic cycle routes. (c) Provide a safe and convenient cycle network that all users can access. (d) Increase number of people who can access health benefits of cycling.
Options Considered	A. Do Nothing - no improvements to strategic cycle network in Weston-super-Mare. B. Ad-hoc improvements to existing cycle network. C. Completion of a continuous and integrated network of well-signed strategic cycle routes connecting key destinations in the Weston-super-Mare area, linking to cycle infrastructure within new developments.
Option Selected *(and rationale)*	Improvements to the cycle network are required to provide an alternative to the car for short-medium journeys in the town: Option A fails to meet this requirement. Option B will not deliver the step-change in connectivity required to increase number of people cycling. Option C provides the greatest benefit by improving the provision for cycling on a core network of continuous and integrated strategic routes.
Dependencies	Linked to Weston Area Package. Proposals will need to take into account of potential options for MetroBus in Weston-super-Mare, which could be competing for the same roadspace, and interation with Weston Bus Network improvements.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports programmed housing growth in Weston - Core Strategy and JSP	✓
	- New development should maximise the use of sustainable travel including cycling.	✓✓
Performance against Objectives	(a) Promote and increase cycling trips for short to medium length journeys within Weston-super-Mare, encouraging mode shift.	✓
	(b) Provide continuous level of service along strategic cycle routes.	✓✓
	(c) Provide a safe and convenient cycle network that all users can access.	✓✓
	(d) Increase number of people who can access health benefits of cycling.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓	
	Impacts on National Networks: no impact.		-	
	Resilience: no impact.		-	
	Unlock new growth in jobs and housing: facilitate increased demand for travel generated by new growth in jobs and housing, for journeys within the town. However it is likely that most journeys will be made by car to/from the town.		✓	
	Connections to Gateways: no impact.		-	
Reduce Carbon Emissions	**Resource efficiency:** likely to have a minor impact on mode shift (at WoE level) and reduce number of car trips.		✓	
	Low carbon choices: will increase the convenience and safety of low carbon travel by bicycle.		✓	
Quality of Life and the Natural Environment	**Built environment:** cycle schemes would incorporate public realm improvements in key locations.		✓	
	Natural environment: schemes are assumed to be largely within the highway boundary. Any local environmental issues would be identified at feasibility study stage on a scheme-by-scheme basis, and taken into account in the scheme design process.		-	
Improve Health, Safety and Security	**Healthy travel choices:** positive impact on improving conditions for cycling as a healthy travel choice.		✓✓	
	Air quality: facilitating mode shift from car to bicycle is expected to provide some benefit to air quality.		✓	
	Safety for transport users: providing continuous strategic cycle routes will help improve safety for cyclists.		✓	
Promote Accessibility	**Access to jobs & training:** improved cycle access to employment and training opportunities in Weston-super-Mare, for example Weston College.		✓	
	Access to local services: improved cycle access to services within Weston-super-Mare.		✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£32	million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)		-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£24	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£30	million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓	
Affordability	The scale of this package is broadly consistent with previous major schemes delivered by the West of England authorities. The delivery of the programme could be phased based on availability of funding.	✓	
Delivery Agencies	North Somerset Council. Developers could deliver improvements related to specific development sites within the urban area.	✓	
Key Project Risks	(1) Securing the necessary highway capacity required to re-allocate road space to cycle infrastructure, (2) Detail of specific measures is yet to be developed - unforeseen risks in relation to key locations, (3) Third party land may be required at some locations.	?	
Public Support	JTS consultation revealed strong public and stakeholder support for cycle schemes, encouraging active travel and reducing carbon emissions.	✓✓	
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified. North Somerset Council has extensive experience of delivering cycling infrastructure.	✓	

Part 2 - Bus Improvement Schemes

Name of Project:	**Greater Bristol Bus Network 2**
Reference:	**Bus 1**

Scheme Description	This will build on the success of the Greater Bristol Bus Network (GBBN) by delivering further targeted enhancements to the bus network. The scheme will improve passenger experience by providing improved bus services, targeted bus priority measures, traffic signal upgrades, interchange upgrades, enhanced passenger information and integrated ticketing on inter-urban bus corridors: A369 Portishead - Bristol, A38 Weston-super-Mare - Bristol, A37 Bristol - Wells, A362 Farrington Gurney - Radstock, A367 Radstock - Bath, A4 Bath - Corsham, A420 Kingswood - Bristol, Thornbury - Charfield - Yate, A4018 Cribbs Causeway - Bristol, and A38 Patchway - Bristol. Routes selected to complement proposed MetroBus and mass transit routes.
Current and Future Policy Context	The West of England authorities have policies stating the need to make travel by bus more attractive (BCS10, B&NES 6f, NS CS10), whilst SGC CS7 identifies completion of the GBBN as a key strategic transport infrastructure project. Planned growth across the region and in central Bristol (BCS2) will place increasing pressures on the highway network. Alternative options to travelling by car will be needed to facilitate mode shift and increase the capacity of the transport network. Development is planned in Bristol as part of the JSP urban living component.
Need for Intervention *(specific to the area under consideration)*	(1) Unreliable and long journey times by bus on key corridors into central Bristol and between urban centres in the West of England caused by delays and high traffic volumes. (2) GBBN 1 delivered a number of improvements at key pinch points; however delays to bus services continue to occur at other key pinch points. (3) Increasing passenger demand in past five years has resulted in peak hour capacity issues at bus stops. Long boarding times also occur due to on-board ticket purchasing. (4) Delays to bus services increase costs for operators and passengers and result in some routes not being viable to operate.
Objectives *(tailored to respond to the need for intervention)*	(a) Reduce delays to bus services and improve reliability and punctuality of bus services and reduce journey times. (b) Accommodate increased demand for travel by providing additional capacity at bus stops for passengers and services and improved interchange opportunities. (c) Facilitate mode shift from travel by car to travelling by public transport. (d) Address increased demand for travel by improving the efficiency of the transport network. (e) Build on success of GBBN 1 by further increasing the number of people travelling by bus in the West of England.
Options Considered	A. Do-Nothing - no further investment in bus infrastructure. B. Upgrade bus stop infrastructure, facilities, enhanced information provision and more effective integrated ticketing. C. GBBN 2 - further targeted enhancements to improve passenger experience, including targeted bus priority measures, improved bus stop infrastructure, enhanced passenger information and integrated ticketing on key corridors across West of England.
Option Selected *(and rationale)*	Option A does not address the identified need for intervention, whilst Option B only addresses a proportion of the challenges. Option C provides an integrated approach to addressing the identified need for intervention.
Dependencies	Initiatives delivered by bus operators - upgraded vehicle fleet, enhanced information provision and more effective integrated ticketing. Highway infrastructure to release highway capacity in Bristol urban area to re-allocate roadspace to bus priority measures.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Completion of the GBBN strongly supports transport related core strategy policies: BCS10, B&NES 6f, NS CS10, SGC CS7.	✓✓
	- The scheme will help deliver residential and employment growth planned across the wider area and in Bristol (BCS2).	✓✓
Performance against Objectives	(a) Reduce delays to bus services and improve reliability and punctuality of bus services and reduce journey times.	✓✓
	(b) Accommodate increased demand for travel by providing additional capacity at bus stops for passengers and services and improved interchange opportunities.	✓✓
	(c) Facilitate mode shift from travel by car to travelling by public transport.	✓✓
	(d) Address increased demand for travel by improving the efficiency of the transport network.	✓✓
	(e) Build on success of GBBN 1 by further increasing the number of people travelling by bus in the West of England.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no direct impact on national networks: scheme is focused on local bus network.	-	
	Resilience: neutral impact.	-	
	Unlock new growth in jobs and housing: slight beneficial: improved public transport capacity and level of service on key corridors.	✓	
	Connections to Gateways: slight beneficial by improving connectivity by bus to transport interchanges.	✓	
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact on reducing delays to bus services and improving the efficiency of operation.	✓	
	Low carbon choices: slight beneficial impact in facilitating increased use of public transport and reducing car use.	✓	
Quality of Life and the Natural Environment	**Built environment:** scheme will help reduce traffic noise by reducing traffic volumes as a result of mode shift from the car; opportunity to integrate infrastructure measures with public realm improvements, potential reduction in traffic severance. Impacts to be addressed through design.	✓	
	Natural environment: Based on preliminary screening of environmental designations: schemes fall within proximity of Green Belt, Listed buildings, Registered Park and Gardens, Priority Habitats, Flood Zones 2 & 3 and AQMA. Schemes also within 500m of SSSI, SAMs, SAC and SPA. Impacts to be mitigated by design.	-	
Improve Health, Safety and Security	**Healthy travel choices:** potential increase in cycling on corridors where cycling provision is included in improved infrastructure, but likely to be modest (early gains have already been achieved on urban corridors in Bristol, likely to be more limited in rural corridors). Increased physical activity from encouraging walking to stops.	✓	
	Air quality: slight beneficial impact by increasing efficient operation of bus services and facilitating mode shift.	✓	
	Safety for transport users: potential benefits of incorporating safety measures into scheme design, but impacts would depend on local context.	-	
Promote Accessibility	**Access to jobs & training:** reduced delays and journey times by bus result in beneficial impact on access to jobs and training.	✓	
	Access to local services: reduced delays and journey times by bus result in beneficial impact on access to local services.	✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£162	million
	Impact of Tax Revenues: reduction in fuel tax revenues due to reduced vehicle travel. Overall considered to be small impact.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£120	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£150	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL). Investment from bus operators is also required.	✓	
Affordability	Scheme represents a step-change in level of investment compared with the current improvement and maintenance programme, but it comprises a series of components that could be delivered as a programme.	?	
Delivery Agencies	West of England Local Authorities to deliver infrastructure measures, bus operators to invest in upgraded vehicles and ticketing measures.	✓	
Key Project Risks	(1) Securing the necessary highway capacity required to re-allocate road space to bus infrastructure, (2) A major programme of improvements will require continued investment over a five to ten year period, (3) Third party land may be required at some locations, which can take a long time to secure, (4) Investment by commercial bus operators in upgraded vehicles and ticketing measures, (5) Some schemes not delivered in GBBN will be difficult to deliver (hence were not delivered under GBBN).	??	
Public Support	JTS consultation indicated that improvements to public transport are the most important priorities for people living in the West of England. Bus network improvements and area packages for walking, cycling and public transport were highlighted as being particularly important for respondents to the consultation.	✓✓✓	
Commercial Case	Project would be delivered by local authority and commercial procurement models to deliver different elements of the project. Both parties have experience of successfully collaborating to deliver GBBN 1.	✓	

Name of Project:	**Bristol City Centre Movement Strategy**
Reference:	**Bus 2**

Scheme Description	Bristol City Centre Movement Strategy - public realm enhancements, improvements to the pedestrian network, continuous and integrated cycle network in Bristol city centre and link with the wider strategic improvements to be delivered by the Greater Bristol Cycle Network. Supported by re-configuration of the road layout to improve the operation of bus services in central Bristol and reduce traffic flows.
Current and Future Policy Context	Bristol city centre is the hub of the West of England, providing employment, social, training, leisure and cultural opportunities. It is also subject to heavy traffic demand, with significant air quality problems and it is therefore an Air Quality Management Area (AQMA). A thriving Bristol city centre created by improving the urban environment and transport links will help unlock and support economic growth (BCS8) whilst creating a higher quality environment for employment, social, leisure and cultural activities (BCS2, BCS8 & BCS21). Improved access to the city centre by walking, cycling and public transport will help facilitate mode shift, whilst providing benefits to air quality, health and equality of access (BCS10). Development is planned in Bristol as part of the JSP urban living proposals.
Need for Intervention *(specific to the area under consideration)*	(1) City centre congestion and unreliable journey times for bus services caused by high traffic volumes, particularly in peak hours. (2) Deteriorating quality of public realm and public spaces due to dominance of cars and lorries. (3) Lack of continuous bus lanes results in extended and unreliable journey times for bus services. (4) Incomplete network of segregated cycle routes in central Bristol to enable safe and convenient cycling through the city.
Objectives *(tailored to respond to the need for intervention)*	(a) Reduce delays to bus services and increase reliability of bus journey times. (b) Enhance public realm to create high quality spaces to accommodate social, leisure and cultural activities. (c) Provide a continuous and segregated network of cycle routes across central Bristol to connect strategic routes. (d) Improve pedestrian and cycle networks in central Bristol to make walking, cycling and travel by public transport safer and more convenient than travelling by car. (e) Reduce the volume of motor traffic (both cars and lorries) travelling through and within the city centre.
Options Considered	A. Do Nothing - no further investment beyond current programme. B. Improvements to public realm, bus network and pedestrian and cycle networks but no measures to reduce traffic volumes in city centre. C. City Centre Movement Strategy - package of public realm enhancements, improvements to pedestrian and cycle networks and road layout re-configuration to improve operation of bus services.
Option Selected *(and rationale)*	Option A will not address the outstanding challenges that have not been addressed by the current programme of investment. Option B will not address all of the challenges and will undermine potential longer term benefits by failing to address the fundamental problems caused by traffic in the city centre. Option C will provide a comprehensive package of complementary measures to address the challenges and lock-in the longer term benefits of investment.
Dependencies	The following schemes will be key to securing longer term benefits of the movement strategy: Park & Ride Package; Greater Bristol Cycle Network; improved management of through traffic, including improved orbital capacity in South Bristol. In the longer term, there will be a strong synergy with the mass transit network, which will have major interchange points in the city centre, and fiscal measures will help to reduce peak hour car trips into central Bristol.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Supports policies to develop the city centre (BCS2) and the city into a thriving economy (BCS8).	✓✓
	- Improve access to the city centre by walking, cycling and public transport and facilitate mode shift BCS10).	✓✓
Performance against Objectives	(a) Reduce delays to bus services and increase reliability of bus journey times.	✓✓
	(b) Enhance public realm to create high quality spaces to accommodate social, leisure and cultural activities.	✓✓✓
	(c) Provide a continuous and segregated network of cycle routes across central Bristol to connect strategic routes.	✓✓✓
	(d) Improve pedestrian and cycle networks in central Bristol to make walking, cycling and travel by public transport safer and more convenient than travelling by car.	✓✓✓
	(e) Reduce the volume of motor traffic (both cars and lorries) travelling through and within the city centre.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no direct impact on national networks.	-	
	Resilience: significant benefit to the reliability of Bristol's bus network, slight overall resilience benefit to general traffic.	✓	
	Unlock new growth in jobs and housing: package will help unlock new development and creation of new jobs in central Bristol.	✓✓	
	Connections to Gateways: improve connectivity between Bristol Temple Meads railway station and central Bristol.	✓	
Reduce Carbon Emissions	**Resource efficiency:** likely to reduce traffic movements through central Bristol and encourage mode shift.	✓	
	Low carbon choices: will help facilitate travel by low carbon modes - walking and cycling to and within central Bristol.	✓	
Quality of Life and the Natural Environment	**Built environment:** scheme will improve the quality of public realm and reduce severance whilst helping contribute to reducing traffic noise by limiting traffic volumes in the city centre.	✓✓	
	Natural environment: no direct impact.	-	
Improve Health, Safety and Security	**Healthy travel choices:** will support increased number of people travelling by active modes of transport (walking and cycling).	✓	
	Air quality: central Bristol is an AQMA. Reducing traffic movements in central Bristol will help contribute towards improving air quality.	✓	
	Safety for transport users: an integrated and continuous network of cycle and pedestrian routes through central Bristol will help make walking and cycling safer and more convenient.	✓	
Promote Accessibility	**Access to jobs & training:** the city centre is a hub of employment and training opportunities. Improving the pedestrian, cycle and public transport links to central Bristol will increase access to these opportunities.	✓	
	Access to local services: the scheme will improve access to services available in central Bristol.	✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£65	million
	Impact of Tax Revenues: reduction in fuel tax revenues due to reduced vehicle travel. Overall considered to be small impact.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£48	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£60	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL)	?	
Affordability	The cost of the strategy is to be developed in more detail, but it comprises a series of modular components that could be delivered in phases.	?	
Delivery Agencies	Bristol City Council. Developers could deliver improvements related to specific development sites within central Bristol.	?	
Key Project Risks	(1) Securing the necessary highway capacity required to re-allocate road space to bus infrastructure. (2) A major programme of improvements will require continued investment over a five to ten year period, (3) Third party land may be required at some locations, which can take a long time to secure, (4) Investment by commercial bus operators in upgraded vehicles and ticketing measures, (5) Some schemes not delivered in GBBN will be difficult to deliver (hence were not delivered under GBBN).	?	
Public Support	JTS consultations have revealed strong public and stakeholder support for improving pedestrian, cycle and public transport corridors and the public realm. There was also strong support for encouraging active travel and reducing carbon emissions.	✓✓✓	
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified. Bristol City Council has experience of delivering similar schemes.	✓	

Name of Project:	**Weston-super-Mare Bus Network**
Reference:	**Bus 3**

Scheme Description	Comprehensive upgrade of bus network in Weston-super-Mare. In the town centre this would reflect the proposed bus network in the Weston Town Centre Regeneration Draft SPD (October 2016), which shows which routes buses will be able to use. This will include re-design of the bus network with a minimum target service specification, new services to penetrate new development areas, bus priority measures, high quality stops (to MetroBus standard), public transport information points (using the latest digital technology) and interchanges at key destinations. Includes development of a high quality bus interchange at Alexandra Parade to provide a central hub for access and information, as per the Weston Town Centre Regeneration SPD (2017).
Current and Future Policy Context	Core Strategy Policy CS28 includes a minimum of 12,800 dwellings to be delivered in Weston-super-Mare over the plan period, together with approximately 10,500 jobs, to deliver improved self-containment and reduced out-commuting. Core Strategy Policy CS30 on Weston Villages includes two mixed-use, employment-led, sustainable new communities to the east of the town. This will include at least 6,500 homes and 37.7ha of B Use Class employment land over the plan period. Further development is planned at Weston-super-Mare as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport), particularly at Weston-super Mare.
Need for Intervention *(specific to the area under consideration)*	(1) Low use of buses in many parts of the town. Some areas (e.g. Worle) have higher use of buses, but most areas (including the recently developed Weston villages on the eastern edge) have very low bus use. This is due to poor service provision in many areas. (2) Very high levels of car use in many areas, particularly the more recent developments. Car use rapidly rises in places further from the town centre (except Worle). (3) High levels of congestion caused by traffic both within the town and outward commuting to the Bristol area. (4) High levels of housing growth (committed within the current Core Strategy and proposed growth with the JSP Emerging Spatial Strategy) will increase travel demand, which will be largely car-based if travel choices are not improved.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve local bus services connecting to Weston town centre and other key destinations, including new employment at the J21 Enterprise Area and interchange hubs including Worle Parkway and Weston Milton railway stations. (b) Deliver mode shift, including Weston-super-Mare and Weston villages, to reduce car use and tackle congestion. (c) Improve infrastructure to provide priority for buses on congested corridors. (d) Ensure high levels of penetration by high frequency bus services in new development. (e) Support sustainable travel choices for Core Strategy and JSP development in Weston-super-Mare.
Options Considered	A. Minor incremental improvements to bus services, including improved shelters and increased service frequencies. B. Comprehensive upgrade of Weston bus network, including new services, bus priority infrastructure, bus stops, and improved information. C. Comprehensive upgrade of Weston bus network, plus one east-west MetroBus route crossing the town. D. Weston Bus Rapid Transit network, comprising grid of very high quality routes crossing the town.
Option Selected *(and rationale)*	Option A is discounted because it is unlikely to address the significant challenges facing the town. Option D could be a longer-term aspiration but is unlikely to be cost-effective in the short term. Option C (which is a hybrid of Options B and D) is considered to offer an appropriate balance of transformational change and cost-effectiveness.
Dependencies	Weston MetroBus corridor and Park & Ride would be complementary to this project. Interchange hubs are dependent on rail service improvements. Bus interchange at Alexandra Parade is dependant on altering the town centre gyratory system.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports significant programmed housing growth in Weston	✓
	- Supports regeneration of Weston town centre and employment growth at J21 Enterprise Area	✓
Performance against Objectives	(a) Improve local bus services connecting to Weston town centre and other key destinations, including new employment at the J21 Enterprise Area and interchange hubs including Worle Parkway and Weston Milton railway stations.	✓✓✓
	(b) Deliver mode shift, including Weston-super-Mare and Weston villages, to reduce car use and tackle congestion.	✓✓
	(c) Improve infrastructure to provide priority for buses on congested corridors.	✓✓
	(d) Ensure high levels of penetration by high frequency bus services in new development.	✓✓✓
	(e) Support sustainable travel choices for Core Strategy and JSP development in Weston-super-Mare.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓
	Impacts on National Networks: no impact.		-
	Resilience: mode shift from car, plus dedicated infrastructure for buses, will help mitigate impacts of incidents.		✓
	Unlock new growth in jobs and housing: helps unlock committed growth in Core Strategy and new development in the JSP.		✓✓
	Connections to Gateways: no impact on access to national corridors or international gateways.		-
Reduce Carbon Emissions	**Resource efficiency:** likely to have a minor impact on efficiency of traffic movements and distance travelled.		✓
	Low carbon choices: will help encourage mode shift and reduce car travel within Weston.		✓
Quality of Life and the Natural Environment	**Built environment:** improved public realm through the Alexandra Parade improvements.		✓
	Natural environment: no impact.		-
Improve Health, Safety and Security	**Healthy travel choices:** potential benefit from encouraging more walking to bus stops.		✓
	Air quality: reduces traffic on congested urban roads.		✓
	Safety for transport users: potential benefits of incorporating safety measures into scheme design, but impacts would depend on specific local context.		-
Promote Accessibility	**Access to jobs & training:** significant improvement in accessibility to Weston town centre, rail stations and J21 employment area.		✓✓
	Access to local services: significant improvement in accessibility to local services, including services within new development areas, and district centres and retail parks on the A370 and B3440 (e.g. Queensway District Centre, Worle District Centre).		✓✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£32 million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)		-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£24 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 25%)	£30 million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL), investment by bus operators in vehicle fleet.	✓
Affordability	Significant investment, but broadly equivalent to major projects currently / recently delivered. Assumption that enhanced bus services will be delivered by operators and will not require revenue support.	✓
Delivery Agencies	Local Authority (North Somerset Council). This could form part of a wider bus network package to be delivered by the four authorities. This model is already proven through the existing Greater Bristol Bus Network.	✓
Key Project Risks	(1) Ensure adequate provision for buses in new development areas, (2) Reallocation of roadspace to provide effective bus priority, (3) Ensuring effective partnership working with bus operators to deliver upgraded services.	✓
Public Support	JTS consultation indicated that improvements to public transport are the most important priorities for people living in the West of England. Bus network improvements and area packages for walking, cycling and public transport were highlighted as particularly important for respondents to the consultation.	✓

Part 3 - MetroBus Schemes

Name of Project:	**MetroBus in Weston-super-Mare**
Reference:	**MetroBus 1**

Scheme Description	MetroBus for Weston-super-Mare - a fast, highly segregated limited stop service, with provision of MetroBus stops at key locations on the route, with pedestrian links to employment opportunities. Potential routes could include the following: (1) Alexandra Parade - Airfield Bridge Link - Cross Airfield Link - A371 - A371 to Churchlands Link - A370 - Cross Airfield Link - Airfield Bridge Link - Town Centre (6BPH). (2) Alexandra Parade - A370 Flowerdown Bridge - Weston P&R - A370 - A371 to Churchlands Link - A371 - Weston P&R - A370 Flowerdown Bridge - Town Centre (6BPH). The Weston Town Centre Regeneration SPD (2017) Vision for 2036 includes MetroBus provision for Weston-super-Mare (route undefined).
Current and Future Policy Context	Core Strategy Policy CS28 includes a minimum of 12,800 dwellings to be delivered in Weston-super-Mare over the plan period, together with approximately 10,500 jobs, to deliver improved self-containment and reduced out-commuting. Core Strategy Policy CS30 on Weston Villages includes two mixed-use, employment-led, sustainable new communities to the east of the town. This will include at least 6,500 homes and 37.7ha of B Use Class employment land over the plan period. Further development is planned at Weston-super-Mare as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport), particularly at Weston-super Mare. Policy CS10 requires investigation of bus rapid transit for Weston.
Need for Intervention *(specific to the area under consideration)*	(1) Lack of direct public transport from residential areas in Weston to employment opportunities along the A370, which encourages car use. (2) Low use of buses in many parts of the town. Some areas (e.g. Worle) have higher use of buses, but most areas (including the recently developed Weston villages on the eastern edge) have very low bus use. This is due to poor service provision in many areas. (3) Very high levels of car use in many parts of the town, particularly the more recent developments. Car use is much lower by residents living closer to the town centre but rapidly rises in places further from the town centre (with the exception of Worle). (4) High levels of housing growth (committed within the current Core Strategy and proposed growth with the JSP Emerging Spatial Strategy) will increase travel demand, which will be largely car based if travel choices are not improved.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve public transport connectivity within Weston-super-Mare. (b) Improve reliability of services within Weston-super-Mare, to ensure consistent waiting and journey times for passengers. (c) Facilitate improved bus services from outside of Weston-super-Mare (e.g. North Somerset villages). (d) Facilitate improved bus services to key destinations from Weston-super-Mare (e.g. Bristol Airport). (e) Support high public transport mode split from new communities in the Core Strategy (including Weston Villages) and the JSP.
Options Considered	A. MetroBus for Weston-super-Mare. B. Comprehensive upgrade of Weston bus network, including new services, improved information and improved infrastructure. C. Minor incremental improvements to bus services on the A370, including improved shelters and increased service frequencies.
Option Selected *(and rationale)*	Option A is the preferred longer-term option, with Option B being the preferred short/medium term option (see Weston Bus Network). Option C is discounted because it is unlikely to address the significant challenges facing the town.
Dependencies	Proposed routes are dependant on completion of the Airfield Bridge Link. Without the Airfield Bridge Link other options would need to consider substantial reallocation of roadspace.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Fully segregate A370 bus services in Weston from general traffic to improve the reliability of bus services and reduce journey times.	✓✓
	- Support delivery of growth in the Weston area by providing a step-change in public transport provision	✓✓
Performance against Objectives	(a) Improve public transport connectivity within Weston-super-Mare.	✓✓
	(b) Improve reliability of services within Weston-super-Mare, to ensure consistent waiting and journey times for passengers.	✓✓
	(c) Facilitate improved bus services from outside of Weston-super-Mare (e.g. North Somerset villages).	✓
	(d) Facilitate improved bus services to key destinations from Weston-super-Mare (e.g. Bristol Airport).	✓
	(e) Support high public transport mode split from new communities in the Core Strategy (including Weston Villages) and the JSP.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓	
	Impacts on National Networks: no impact.	-	
	Resilience: no impact.	-	
	Unlock new growth in jobs and housing: supports Core Strategy and JSP development in Weston-super-Mare by improving travel choices and encouraging mode shift for short journeys within the town.	✓✓	
	Connections to Gateways: potential for feeder services between Weston-super-Mare and Bristol Airport, which would utilise MetroBus infrastructure in Weston-super-Mare. Improved access to major railway interchanges via Weston-super-Mare rail station.	✓	
Reduce Carbon Emissions	**Resource efficiency:** likely to have a minor impact on efficiency of traffic movements.	✓	
	Low carbon choices: will help encourage mode shift and reduce car travel within Weston.	✓	
Quality of Life and the Natural Environment	**Built environment:** MetroBus infrastructure will incorporate public realm improvements where required, in particular improved quality of pedestrian routes between the A370 and employment areas.	✓	
	Natural environment: no impact - infrastructure confined to the A370 /A371 corridors within Weston-super-Mare. At this stage it is assumed that the scheme would not require land take outside the existing highway boundary.	-	
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, and an opportunity to increase walking to stops.	✓	
	Air quality: reduces traffic on congested urban roads.	✓	
	Safety for transport users: potential benefits of incorporating safety measures into scheme design, but impacts would depend on specific local context.	-	
Promote Accessibility	**Access to jobs & training:** improved public transport access to Weston College from within the town. Potential for feeder services from outside the town to use the MetroBus infrastructure.	✓✓	
	Access to local services: improvement in accessibility to local services, including services within new development areas.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£38	million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£25	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£35	million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓	
Affordability	Broadly equivalent to major projects currently/recently delivered in the West of England. There will need to be a balance between serving key locations for patronage, whilst maintaining journey speeds.	✓	
Delivery Agencies	North Somerset Council (infrastructure), bus operators (MetroBus services).	✓	
Key Project Risks	(1) Potential for feeder services from outside the town to use the MetroBus infrastructure - these would need to be of an appropriate standard, (2) Potential land ownership issues providing pedestrian access from the A370 into employment areas, (3) Dependant on service providers interest in running specific MetroBus services, (4) Level of subsidy required and availability of revenue funding - commercial viability risk.	?	
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of the MetroBus network.	✓✓	
Commercial Case	Commercial viability of services may be a challenge: subsidies may be required. Commercial viability would be dependent on revising the existing bus network to avoid competition with the MetroBus services.	?	

Name of Project:	**MetroBus to Clevedon and Nailsea**
Reference:	**MetroBus 2**

Scheme Description	MetroBus route from Clevedon and Nailsea to Bristol City Centre, a rapid transit limited stop service with an emphasis on segregation from general traffic with bus lanes. The proposed route would use a new transport corridor from Nailsea to Long Ashton (part of a separate JTS scheme, see Road 7), or alternatively follow a route via Tickenham, Nailsea, Wraxall and Long Ashton Bypass to Bristol. The section within Bristol would use the infrastructure for the Ashton Vale to Temple Meads route, which is currently under construction.
Current and Future Policy Context	North Somerset Core Strategy Policy CS31 includes a minimum of 1,100 dwellings for Nailsea, and 700 for Clevedon. These towns will maintain and enhance their roles in providing facilities, employment opportunities and services for their populations and local catchments. Nailsea in particular has suffered from being planned as a dormitory town in the 1960s. Nailsea and Clevedon have high levels of out-commuting and the emphasis will be on discouraging development which would reinforce this. Further development is planned at Nailsea and Backwell as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport).
Need for Intervention *(specific to the area under consideration)*	(1) Long journey times by public transport from Clevedon to Bristol. (2) Significant problems with traffic delays on key routes, including the A370 at Flax Bourton, Backwell and Congresbury and routes through Tickenham, Wraxall and Long Ashton, which impacts on bus services. (3) Congestion on the A370 causes delays and unreliable services, increasing costs for operators and passengers. (4) Development at Nailsea and Backwell will further increase congestion along the A370 without a high quality, fast public transport offer to encourage sustainable travel.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve public transport connectivity between Clevedon, Nailsea and Bristol, reducing journey times and increasing service frequencies. (c) Improve the reliability of bus services between Nailsea and Bristol, to ensure consistent waiting and journey times for passengers. (c) Increase bus patronage along the corridor, reducing volumes of car travel from Nailsea to Bristol City Centre. (d) Support high public transport mode split from new communities in Nailsea & Backwell, with easy access to new MetroBus services.
Options Considered	A. MetroBus route from Clevedon and Nailsea to Bristol (via new transport corridor from Long Ashton to Nailsea, then via the B3130 or a new transport link to Clevedon). B. MetroBus route from Clevedon and Nailsea to Bristol City Centre (via Long Ashton Bypass, Wraxall and Tickenham). C. A370 and B3128 corridor package (bus priority and junction improvements).
Option Selected *(and rationale)*	Option A is recommended as it would avoid congested locations on the A370, and provide a more direct route from Long Ashton to Nailsea (required as part of the mitigation of JSP development at Nailsea and Backwell). In the absence of the transport link from Long Ashton to Nailsea, which is linked to JSP development at Nailsea and Backwell, Option B would be recommended. Option C is discounted because a small-scale corridor package would not provide the necessary step-change in speed or journey quality.
Dependencies	Option A (via a new transport corridor from Long Ashton to Nailsea) is dependent on the delivery of the multi-modal transport corridor to Nailsea (see Road 7).

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Provide an attractive public transport option for travel between Clevedon and Nailsea to Bristol, by providing a faster and direct route.	✓✓
	- Support delivery of development at strategic location at Nailsea and Backwell by encouraging sustainable travel.	✓
Performance against Objectives	(a) Improve public transport connectivity between Clevedon, Nailsea and Bristol, reducing journey times and increasing service frequencies.	✓✓✓
	(c) Improve the reliability of bus services between Nailsea and Bristol, to ensure consistent waiting and journey times for passengers.	✓
	(c) Increase bus patronage along the corridor, reducing volumes of car travel from Nailsea to Bristol City Centre.	✓✓
	(d) Support high public transport mode split from new communities in Nailsea & Backwell, with easy access to new MetroBus services.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no direct impact.	-	
	Resilience: limited impact.	-	
	Unlock new growth in jobs and housing: supports JSP development at Nailsea / Backwell.	✓✓	
	Connections to Gateways: no impact.	-	
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve efficiency of the A370 corridor, reducing fuel consumption.	✓	
	Low carbon choices: mode shift will result in reduction in car trips and carbon emissions.	✓	
Quality of Life and the Natural Environment	**Built environment:** high quality design within new development areas, integration of new infrastructure into existing road corridors through Nailsea and Clevedon.	✓	
	Natural environment: based on screening of environmental designations, the corridor could lie within or near to Green Belt, Priority Habitats, Registered Park and Garden, Flood Zones 2 & 3 and AQMA. Scheme adjacent to (within 500m) Listed Buildings, Severn Estuary SSSI, SAC and SPA, SAMs. The alignment of the route will be optimised to minimise environmental impact.	××	
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, opportunity to increase walking to stops.	✓	
	Air quality: reduces traffic on congested urban roads.	✓	
	Safety for transport users: mode shift will reduce traffic on A370 and B3128 and rat-running traffic on rural lanes.	✓	
Promote Accessibility	**Access to jobs & training:** improvement in connectivity between Clevedon and Nailsea to employment and training opportunities in Bristol.	✓✓	
	Access to local services: improvement in accessibility to local services, including services within new development at Nailsea and Backwell.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£65 million	
	Impact of Tax Revenues: reduction in indirect tax revenues by encouraging mode shift from car. Overall impact considered modest.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance: additional to the basic cost of constructing the transport corridor from Long Ashton to Nailsea.	£43 million	
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£60 million	
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓	
Affordability	MetroBus options would be a significant investment, but broadly equivalent to major projects that are currently being delivered. Increased service frequencies would be supported through demand from new development, but further work will be required to confirm that revenue from fare-paying passengers will offset increased operating costs from higher frequency services on the route.	✓	
Delivery Agencies	North Somerset Council. The section within Bristol will use the infrastructure for the Ashton Vale to Temple Meads route, which is currently under construction.	✓	
Key Project Risks	(1) New MetroBus route dependent on delivery of Long Ashton to Nailsea transport corridor (2) MetroBus patronage will be sensitive to relative competitiveness of highway connectivity (3) Length of route between Clevedon and Bristol could affect commercial viability, (4) Dependant on service providers interest in running specific MetroBus services, (5) Level of subsidy required and availability of revenue funding - commercial viability risk.	?	
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of MetroBus. However, consultation indicates specific potential concerns in relation to the new transport corridor.	?	
Commercial Case	Capital works: MetroBus options could be delivered through a range of procurement models. Delivery of services: options could include Quality Partnership Scheme or franchising. The longer MetroBus routes will require a large number of buses and drivers to maintain a high frequency with significant operating costs.	✓	

Name of Project:	**MetroBus to Severnside**
Reference:	**MetroBus 3**

Scheme Description	MetroBus route from Severnside to Bristol City Centre via the A403 and A4 Portway, connecting into existing MetroBus infrastructure in Central Bristol. The route would connect the logistics cluster at Severnside and Avonmouth with Bristol City Centre via the Portway Park & Ride site. This would improve travel options and connectivity for employees and businesses in accessing Severnside and Avonmouth. The scheme builds on the extensive existing bus priority on the A4 Portway, with extended bus priority, enhanced stops and upgraded MetroBus services. In particular, further bus priorities including potential bus-only links would be needed into Severnside. The infrastructure will also be used by a feeder service from the proposed A4018 Park & Ride site, running via Canford Lane and Sylvan Way.
Current and Future Policy Context	South Gloucestershire Core Strategy Policy CS5 outlines that the economic potential of Severnside will be realised as a strategic location for a range of employment uses. Land at Severnside is safeguarded with an existing and historic planning permission. The Bristol City Council Core Strategy Policy BCS4 identifies Avonmouth as a priority area for industrial and warehousing development, and the JSP outlines the importance of the Port as a strategic employment location.
Need for Intervention *(specific to the area under consideration)*	(1) Bus connections between Severnside/Avonmouth and the centre of Bristol are currently poor and journey times are often long and unreliable. (2) High levels of car use on A4 Portway causing long and unreliable journeys, including journeys to South Bristol and Bristol Airport. (3) Large parts of Severnside are not served by public transport. (4) High levels of car use in accessing Severnside and its surrounding areas, with associated low levels of public transport use.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve public transport connectivity between Severnside and central Bristol, reducing journey times and increasing service frequencies. (b) Enhance service frequencies, speeds and quality of journey by public transport on A4 Portway corridor, including P&R services. (c) Significantly increase public transport mode share for journeys to Avonmouth and Severnside. (d) Encourage mode shift from car on A4 Portway corridor, reducing traffic and reducing congestion for strategic journeys.
Options Considered	A. Minor improvements to bus routes along the corridor, including enhanced bus stop facilities and improved information. B. Increase frequency and number of bus services between Bristol City Centre and Severnside on the A4 Portway. C. MetroBus scheme between Bristol City Centre and Severnside.
Option Selected *(and rationale)*	Option A has been discounted as the scheme would not tackle the fundamental problem of slow, unattractive journeys between Severnside / Avonmouth and Bristol. Option B has been discounted as buses would be constrained by a lack of priority at key pinch points. Option C is selected as it delivers a comprehensive scheme delivering both service improvements and journey time reductions.
Dependencies	Scheme would have a strong synergy with the proposal to expand Portway P&R, to accommodate increased public transport demand.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of planned growth at Avonmouth and Severnside.	✓✓
	- Provides an attractive public transport option for travel between Severnside/Avonmouth and Bristol, by providing a more frequent faster and direct route.	✓
Performance against Objectives	(a) Improve public transport connectivity between Severnside and central Bristol, reducing journey times and increasing service frequencies.	✓
	(b) Enhance service frequencies, speeds and quality of journey by public transport on A4 Portway corridor, including P&R services.	✓
	(c) Significantly increase public transport mode share for journeys to Avonmouth and Severnside.	✓
	(d) Encourage mode shift from car on A4 Portway corridor, reducing traffic and reducing congestion for strategic journeys.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓
	Impacts on National Networks: no direct impact.	-
	Resilience: no direct impact.	-
	Unlock new growth in jobs and housing: assists in unlocking growth at the Severnside/Avonmouth Enterprise Area.	✓
	Connections to Gateways: improved access between Bristol Port and City Centre; reduced congestion on key route to Bristol Airport.	✓✓
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve the efficiency of the A4 corridor, reducing fuel consumption	✓
	Low carbon choices: mode shift will result in reduction in car trips and carbon emissions.	✓
Quality of Life and the Natural Environment	**Built environment:** increased priority will be given to public transport and active modes; potential slight benefits due to reduced noise and severance, localised improvements to public realm.	✓
	Natural environment: based on screening of environmental designations, scheme is located within Priority Habitat. Scheme adjacent to (within 500m) Severn Estuary, Avon Gorge Woodlands and Avon Gorge SSSI, SAC and SPA, Listed Buildings, SAMs, Registered Parks and Gardens, Flood Zone 2 & 3 and AQMA. Works would be within or adjacent to the highway boundary, so there will be no impact.	-
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, opportunity to increase walking to stops.	✓
	Air quality: scheme will contribute to a minor improvement in air quality at localised hotspots by reducing traffic volumes.	✓
	Safety for transport users: overall neutral, but opportunity will be taken to integrate road safety measures based on local need.	-
Promote Accessibility	**Access to jobs & training:** scheme will reduce public transport journey times for access to employment at Severnside.	✓
	Access to local services: scheme will improve connections from Severnside and Avonmouth to services in Bristol City Centre.	✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£32 million
	Impact of Tax Revenues: reduction in indirect tax revenues by encouraging mode shift from the car.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£21 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£30 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Bristol Port, Developers.	✓
Affordability	MetroBus options would be a significant investment, but broadly equivalent to major projects that are currently being delivered.	?
Delivery Agencies	Local Authorities (South Gloucestershire Council and Bristol City Council). Local authorities are experienced in delivering MetroBus schemes.	?
Key Project Risks	(1) Continuous segregated bus and cycle provision would require acquisition of adjoining land, (2) Key pinchpoints along the route may limit opportunities for carriageway widening (e.g. near M5 J18), (3) New M49 junction will improve ease of access by car to Severnside and could constrain the attractiveness of MetroBus services, (4) Services to Severnside may require financial support, (5) Dependant on service providers interest in running specific MetroBus services, (5) Level of subsidy required and availability of revenue funding - commercial viability risk.	?
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of the MetroBus network.	✓✓
Commercial Case	Capital works: MetroBus options could be delivered through a range of procurement models. Delivery of services: options could include Quality Partnership Scheme or franchising.	?

Name of Project:	MetroBus to Thornbury
Reference:	MetroBus 4

Scheme Description	MetroBus route from Thornbury and new development on the A38 corridor, via the A38, connecting with North Fringe to Hengrove Package infrastructure. This will be a rapid transit limited stop service with high levels of bus priority. From the A38, potential route options could be via Thornbury Road (B4061) or via a new link between the A38 and Midland Way. The route would serve Thornbury town centre, via Rock Street, and then continue onto Grovesend Road to serve the east of the town. This package includes targeted junction improvements to benefit MetroBus services and bus priority on the approaches to M5 Junction 16 to enable MetroBus to bypass queueing vehicles. This route will also serve the Park & Ride site, proposed as part of the Transport Vision, on the A38 corridor north of Junction 16.
Current and Future Policy Context	The SGC Core Strategy makes provision for up to 800 dwellings on two sites north of Thornbury (Park Farm and Morton Way). Policy CS8 requires that all new development proposals of sufficient scale will be required to contribute to schemes in Policy CS7 and states that new developments must provide sustainable transport options. Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility by modes other than private car. The JSP also proposes strategic development on the edges of Thornbury and at a new garden village, Buckover, to the east of Thornbury.
Need for Intervention *(specific to the area under consideration)*	(1) Bus connections between Thornbury and the centre of Bristol are currently poor and journey times are often long and unreliable. (2) High levels of delays on the A38 which cause long and unreliable journey times for buses and general traffic. (3) Delays and unreliable services increase costs for operators and passengers. (4) High levels of car use and low levels of public transport use in Thornbury and the surrounding area.
Objectives *(tailored to respond to need for intervention)*	(a) Improve public transport connectivity between Thornbury and Bristol, reducing journey times and increasing service frequencies. (b) Improve reliability of services on the A38 between Thornbury and M5 Junction 16 to ensure consistent waiting and journey times for passengers. (c) Increase bus patronage along the corridor, reducing volumes of car travel from Thornbury to North Fringe and City Centre. (d) Support high public transport mode split from new communities in Thornbury and Buckover.
Options Considered	A. MetroBus route from Thornbury to Bristol City Centre (via A38 to Aztec West and North Fringe to Hengrove alignment, via Bradley Stoke and M32). B. MetroBus route from Thornbury to Bristol City Centre (direct via A38 through Filton and North Horfield). C. A38 corridor package (bus priority and junction improvements).
Option Selected *(and rationale)*	Option A is selected as it connects into existing infrastructure, which will reduce costs whilst still delivering journey time benefits. Option B and C are discounted as there is limited available space on the A38, south of the M5, so the potential for roadspace reallocation and bus priority is low, and it will be difficult to deliver the required journey time improvements. Local bus services will, however, be required to provide connectivity to the North Fringe and North Bristol.
Dependencies	This route will serve the proposed A38(N) Park & Ride. It will connect with North Fringe to Hengrove Package infrastructure, which is currently under construction.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of growth in strategic locations at Thornbury and Buckover by encouraging sustainable travel.	✓
	- Provide an attractive public transport option for travel between Thornbury and Bristol, by providing a more frequent and faster route.	✓✓
Performance against Objectives	(a) Improve public transport connectivity between Thornbury and Bristol, reducing journey times and increasing service frequencies.	✓✓
	(b) Improve reliability of services on the A38 between Thornbury and M5 Junction 16 to ensure consistent waiting and journey times for passengers.	✓✓
	(c) Increase bus patronage along the corridor, reducing volumes of car travel from Thornbury to North Fringe and City Centre.	✓✓
	(d) Support high public transport mode split from new communities in Thornbury and Buckover.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓
	Impacts on National Networks: scheme would reduce A38 traffic through M5 Junction 16, improving its operation.	✓
	Resilience: no significant impact.	-
	Unlock new growth in jobs and housing: delivery will unlock more sustainable housing development in and around Thornbury.	✓✓
	Connections to Gateways: no impact.	-
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve efficiency on the A38 corridor, reducing fuel consumption.	✓
	Low carbon choices: mode shift will result in reduction in car use and carbon emissions.	✓
Quality of Life and the Natural Environment	**Built environment:** most of the new MetroBus route will be through rural areas, although it will include Thornbury could potentially serve the new strategic location at Buckover. Infrastructure will be designed to minimise impact on the public realm in these areas.	-
	Natural environment: based on screening of environmental designations, the scheme is located within or near to: Green Belt, Registered Park and Garden, Ancient Woodland, Priority Habitats, Flood Zones 2 & 3 and AQMA. Scheme is adjacent to (within 500m) Listed Buildings. Most works would be within or adjacent to the highway boundary, and is is assumed that these can be taken into account in the scheme design process.	×
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, opportunity to increase walking to stops.	✓
	Air quality: mode shift will reduce congestion and improve air quality at localised hotspots.	✓
	Safety for transport users: mode shift will reduce traffic on northern section of A38 and improve safety for non-motorised users.	✓
Promote Accessibility	**Access to jobs & training:** improves access to North Fringe and City Centre jobs and educational facilities from Thornbury, for those without access to a car.	✓✓
	Access to local services: improves access to services in Bristol city centre and North Fringe.	✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£76 million
	Impact of Tax Revenues: reduction in indirect tax revenues by encouraging mode shift from the car. Impact assumed to be modest.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* — High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£50 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£70 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓
Affordability	MetroBus options would be a significant investment, but broadly equivalent to major projects currently / recently delivered. Increased service frequencies would be stimulated through demand from new development, but further work will be required to confirm that revenue from fare-paying passengers will offset increased operating costs from higher frequency services on the route.	✓
Delivery Agencies	South Gloucestershire Council.	✓
Key Project Risks	(1) Require agreement with HE re scope of works to M5 Junction 16, (2) Continuous bus and cycle provision would require the purchase of adjoining land (scheme will therefore be optimised to reduce land requirements), (3) Key pinchpoints along the route may limit opportunities for carriageway widening, (4) Dependant on service providers interest in running specific MetroBus services, (5) Level of subsidy required and availability of revenue funding - commercial viability risk.	?
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of MetroBus. However, consultation indicates potential specific concerns on this corridor.	?
Commercial Case	Capital works: MetroBus options could be delivered through a range of procurement models. Delivery of services: options could include Quality Partnership Scheme or franchising. The longer MetroBus routes will require a large number of buses and drivers to maintain a high frequency wih significant operating costs.	✓

Name of Project:	**MetroBus to Yate**
Reference:	**MetroBus 5**

Scheme Description	MetroBus route from Yate to Bristol City Centre via the A432 to the A4174 Ring Road, connecting into the North Fringe to Hengrove route at the Ring Road. This will be a rapid transit limited stop service with high levels of bus priority between Yate and the Ring Road. Localised bus priorities will be provided in Yate and Chipping Sodbury, it will serve the transport interchange in Yate town centre, and interchange facilities will also be provided at Yate railway station. It will also serve the Park & Ride site to the west of Yate that is also proposed in the Transport Vision. This package includes major improvements to the A432/A4174 Ring Road junction and a new bridge over the M4 for MetroBus.
Current and Future Policy Context	The SGC Core Strategy makes provision for up to 3,000 dwellings at North Yate (2,700 within plan period) in Policy CS31, together with the Yate and Chipping Sodbury Package (Policy CS7). Policy CS8 requires that all new development proposals of sufficient scale will be required to contribute to schemes in Policy CS7 and states that new developments must provide sustainable transport options. Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility by modes other than private car. The JSP also proposes strategic development on the Yate Strategic Corridor and Coalpit Heath in addition to Core Strategy commitments.
Need for Intervention *(specific to the area under consideration)*	(1) Bus connections between Yate and the centre of Bristol are currently poor and journey times are often long and unreliable. (2) Delays on the A432 (especially at the A4174 junction) which cause long and unreliable journey times for buses and general traffic. (3) Delays and unreliable services on the A432 increase costs for operators and passengers. (4) High levels of car use and low levels of public transport use in Yate, Chipping Sodbury and the surrounding area.
Objectives *(tailored to respond to need for intervention)*	(a) Improve public transport connectivity between Yate and Bristol, reducing journey times and increasing service frequencies. (b) Improve reliability of services along the A432, to ensure consistent waiting and journey times for passengers. (c) Increase bus patronage along the corridor, reducing volumes of car travel from Yate and Chipping Sodbury to North Fringe and City Centre. (d) Support high public transport mode split from new communities in Yate and Chipping Sodbury.
Options Considered	A. MetroBus from Yate to Bristol City Centre via A432 + A4174 (in conjunction with Winterbourne and Frampton Cotterell Bypass). B. MetroBus Link from Yate to Bristol City Centre via A432 + A4174 (excluding Winterbourne and Frampton Cotterell Bypass). C. A432 corridor package (bus priority and junction improvements), building upon GBBN.
Option Selected *(and rationale)*	Option A is selected: complementary measures are required to divert traffic to enable reallocation of roadspace on the A432 from Yate. Option B fails to divert traffic from the A432 to enable reallocation of roadspace and is therefore rejected. Option C would provide a short-term solution but will not provide the step-change in speed or journey quality required to change travel choices on the corridor.
Dependencies	Dependant on delivery of Winterbourne and Frampton Cotterell Bypass (or M4 link to Yate) to facilitate reallocation of roadspace to MetroBus on the A432. To connect with North Fringe to Hengrove route at the Ring Road. This route will serve the A432 Park & Ride site that is also proposed in the Transport Vision.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of housing growth on the Yate corridor.	✓
	- Provide an attractive public transport option for travel between Yate and Bristol, by providing a more frequent faster and direct route.	✓✓
Performance against Objectives	(a) Improve public transport connectivity between Yate and Bristol, reducing journey times and increasing service frequencies.	✓✓
	(b) Improve reliability of services along the A432, to ensure consistent waiting and journey times for passengers.	✓✓
	(c) Increase bus patronage along the corridor, reducing volumes of car travel from Yate and Chipping Sodbury to North Fringe and City Centre.	✓✓
	(d) Support high public transport mode split from new communities in Yate and Chipping Sodbury.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no impact.	-	
	Resilience: limited impact.	-	
	Unlock new growth in jobs and housing: delivery will unlock more sustainable housing development in Yate and Chipping Sodbury.	✓✓	
	Connections to Gateways: no impact.	-	
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve efficiency on the A432 corridor, reducing fuel consumption.	✓	
	Low carbon choices: mode shift will result in reduction in car trips and carbon emissions.	✓	
Quality of Life and the Natural Environment	**Built environment:** no significant impact. Priority measures would be delivered within the existing highway boundary.	-	
	Natural environment: based on screening of environmental designations, the scheme is located within or near to Green Belt, Registered Park and Garden, Flood Zones 2 & 3 and AQMA. Scheme is adjacent to (within 500m) Listed Buildings and SAMs. Most of the works would be within or adjacent to the highway boundary (except new M4 bridge), and it is assumed that these can be taken into account in the scheme design process.	×	
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, opportunity to increase walking to stops.	✓	
	Air quality: mode shift will reduce congestion and improve air quality at localised hotspots.	✓	
	Safety for transport users: mode shift will reduce traffic on A432 including in urban areas and improve safety.	✓	
Promote Accessibility	**Access to jobs & training:** improves access to jobs and educational facilities in city centre and North Fringe from Yate for people without access to a car.	✓	
	Access to local services: improves access to services in Chipping Sodbury, Yate and Coalpit Heath.	✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£65	million
	Impact of Tax Revenues: reduction in indirect tax revenues by encouraging mode shift from the car.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£43	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£60	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓	
Affordability	MetroBus options would be a significant investment, but broadly equivalent to major projects currently / recently delivered. However, the cost of the M4 Bridge could be significant.	?	
Delivery Agencies	South Gloucestershire Council.	✓	
Key Project Risks	(1) Delivering a high level of segregation is dependant on delivery of Winterbourne and Frampton Cotterell Bypass (2) Continuous segregated bus and cycle provision would require the purchase of adjoining land, (3) A432 Bridge over M4: construction challenges and requirement to close the M4 to lower bridge deck into place. (4) Significant remodelling of A4174/A432, (5) Dependant on service providers interest in running specific MetroBus services, (6) Level of subsidy required and availability of revenue funding - commercial viability risk.	?	
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of MetroBus.	✓✓	
Commercial Case	Capital works: MetroBus options could be delivered through a range of procurement models. Delivery of services: options could include Quality Partnership Scheme or franchising. The longer MetroBus routes will require a large number of buses and drivers to maintain a high frequency with significant operating costs.	✓	

Name of Project:	Orbital MetroBus
Reference:	MetroBus 6

Scheme Description	MetroBus route connecting South Bristol to Emerson's Green via Ring Road, serving new development at Whitchurch and new Park & Ride sites at Whitchurch, Hicks Gate and Warmley. There would be the opportunity for a number of Interchange Hubs on this corridor, facilitating interchange (e.g. at Hicks Gate for rapid transit to Bristol and Bath).
Current and Future Policy Context	The SGC Core Strategy includes major mixed-use development on 177ha of land at Emersons Green East comprising ~2,400 dwellings, a Science Park (25ha) and 19ha of employment land. SGC Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility by modes other than private car. Bath & North East Somerset Core Strategy Policy RA5 covers Land at Whitchurch Strategic Site Allocation, comprising around 200 dwellings. Transport requirements include integration into neighbouring developments, links to existing bus routes and contributing to improved local bus services. The JSP also proposes strategic development in the Whitchurch area. Bristol Policy BCS1 includes South Bristol as a priority focus for development and comprehensive regeneration, comprising around 8,000 new homes, around 60,000m² of net additional office floorspace, and up to 10 hectares of new industrial and warehousing land.
Need for Intervention *(specific to the area under consideration)*	(1) Orbital bus connections between the south and east of Bristol are currently poor. Journey times are often long and unreliable, with the need to change services. (2) Delays on existing routes between South Bristol and the East Fringe cause long and unreliable journey times for buses and cars. (3) High levels of deprivation in parts of South Bristol, with poor public transport links to jobs in the North and East Fringe. (4) High levels of car use and low levels of public transport use in East Fringe and parts of South Bristol.
Objectives *(tailored to respond to need for intervention)*	(a) Improve public transport connectivity between South Bristol and the East Fringe, reducing journey times and the need for interchange for orbital journeys. (b) Provide reliable services on the corridor between South Bristol and the East Fringe, to ensure consistent waiting and journey times. (c) Increase bus patronage along the corridor, reducing volumes of car travel for journeys using the A4174 Avon Ring Road. (d) Support high public transport mode split from the new community at Whitchurch for journeys to the East and North Fringe.
Options Considered	A. MetroBus route from Emersons Green to Whitchurch and beyond, connecting to existing MetroBus infrastructure (via new transport link around South East Bristol). B. MetroBus route from Emersons Green to Whitchurch and beyond, connecting to existing MetroBus infrastructure (on existing roads, e.g. Whitchurch Lane/Stockwood Ln). C. Improvements to city centre interchange between South Bristol and East Fringe bus services.
Option Selected *(and rationale)*	Option A has been selected as this provides for direct orbital services. Option B has been discounted as using existing roads will increase journey times. Option C has been discounted as interchanging in the city centre is not an attractive option.
Dependencies	Dependant on delivery of the multi-modal transport link from Hicks Gate to Hengrove Roundabout. Potential dependance on M4 Junction 18A to improve traffic conditions on sections of the A4174 Ring Road. Orbital MetroBus services could serve Park & Ride sites at Whitchurch, Hicks Gate, A420 and Emersons Green. There is potential to extend the Orbital MetroBus route to link into North Fringe to Hengrove services in South Bristol. Services could utilise NFHP infrastructure to serve the North Fringe.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of strategic location at Whitchurch by encouraging sustainable travel.	✓✓
	- Provide an attractive public transport option for travel between South Bristol and the East Fringe, by providing a faster and direct route.	✓✓
Performance against Objectives	(a) Improve public transport connectivity between South Bristol and the East Fringe, reducing journey times and the need for interchange for orbital journeys.	✓✓
	(b) Provide reliable services on the corridor between South Bristol and the East Fringe, to ensure consistent waiting and journey times.	✓✓
	(c) Increase bus patronage along the corridor, reducing volumes of car travel for journeys using the A4174 Avon Ring Road.	✓
	(d) Support high public transport mode split from the new community at Whitchurch for journeys to the East and North Fringe.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓
	Impacts on National Networks: no impact.	-
	Resilience: reduced reliance on radial bus routes for orbital travel needs, provides an alternative for orbital car movements	✓
	Unlock new growth in jobs and housing: delivery will unlock more sustainable housing development at Whitchurch.	✓
	Connections to Gateways: no impact.	-
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve efficiency of this key orbital route, reducing fuel consumption.	✓
	Low carbon choices: mode shift will reduce car trips and carbon emissions.	✓
Quality of Life and the Natural Environment	**Built environment:** no significant impact. Priority measures would generally be delivered within the existing highway boundary. MetroBus infrastructure within/adjacent to the Whitchurch development will incorporate high quality public realm.	✓
	Natural environment: based on preliminary screening of environmental designations, the scheme is located within Green Belt, SSSI, Ancient Woodland, Priority Habitats, Flood Zones 2 & 3 and AQMA. Site is adjacent to (within 500m) Listed Buildings and Registered Parks and Gardens. Most of the works north of Hicks Gate would be within or adjacent to the highway boundary. South of Hicks Gate, Orbital MetroBus would follow the line of the South Bristol Orbital Corridor (Road 5): this would have impacts on landscape and other aspects of the natural environment.	××
Improve Health, Safety and Security	**Healthy travel choices:** potential opportunity to reallocate roadspace for active travel, opportunity to increase walking to stops.	✓
	Air quality: mode shift will reduce congestion and improve air quality at localised hotspots on the A4174 Ring Road corridor.	✓
	Safety for transport users: mode shift will reduce traffic on the A4174 Ring Road and reduce rat running on rural roads.	✓
Promote Accessibility	**Access to jobs & training:** improves access to East Fringe employment from South Bristol for those without access to a car.	✓
	Access to local services: neutral impact assumed.	-
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£97 million
	Impact of Tax Revenues: reduction in indirect tax revenues by encouraging mode shift from the car.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Low (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£64 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£90 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓
Affordability	MetroBus options would be a significant investment, but broadly equivalent to major projects currently being delivered. Increased service frequencies would be stimulated through demand from new development, but further work will be required to confirm that revenue from fare-paying passengers will offset increased operating costs from higher frequency services on the route.	✓
Delivery Agencies	Bath & North East Somerset Council, Bristol City Council and South Gloucestershire Council.	✓
Key Project Risks	(1) Dependant on multi-modal transport link from Hicks Gate to Hengrove Roundabout, (2) Continuous segregated bus and cycle provision would require purchase of adjoining land, (3) Key pinchpoints along the route may limit opportunities for carriageway widening, (4) Level of subsidy required and availability of revenue funding - commercial viability risk with insufficient patronage to justify orbital services, (5) Dependant on service providers interest in running specific MetroBus services.	??
Public Support	JTS consultation demonstrated that people strongly support bus network improvements. Support for MetroBus appears to be slightly lower, but >60% of respondents agreed with the principle of expansion of MetroBus.	✓✓
Commercial Case	Capital works: MetroBus options could be delivered through a range of procurement models. Delivery of services: options could include Quality Partnership Scheme or franchising. The longer MetroBus routes will require a large number of buses and drivers to maintain a high frequency with significant operating costs.	?

Part 4 - Mass Transit Schemes

Name of Project:	Mass Transit Bristol to Airport
Reference:	Mass Transit 1

Scheme Description	Fully segregated mass transit route connecting Bristol Airport and South Bristol to city centre, with options to be considered for underground running. Route to be determined balancing maximising patronage against engineering costs (options comprise via Ashton Vale, via Hartcliffe Way, via Parson Street/Bedminster, or a segregated route via South Bristol).
Current and Future Policy Context	Bristol Airport is an important international gateway that plays an important role in meeting the international connectivity needs of the West of England and a wider area including South Wales and the rest of the South West. It has shown strong growth in recent years and shows strong potential for growth beyond the current 10 mppa capacity limit. It could play a key role in reducing leakage to the South East airports and help further enhance the economic competitiveness of the West of England.
Need for Intervention *(specific to the area under consideration)*	(1) Poor public transport connectivity to Bristol Airport from most parts of the city: long journey times by bus and poor interchange with the Bristol Flyer in Bristol city centre. (2) Poor public transport connectivity from other parts of the Airport catchment area, including North Somerset and Somerset. (3) High levels of car traffic to the Airport, both passengers and employees, due to poor public transport options, causing traffic delays. (4) Airport is forecast to grow significantly: failure to transform public transport connections would result in higher volumes of car traffic and worse journeys on access routes.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve public transport connectivity between the Bristol urban area and Bristol Airport. (b) Improve public transport connectivity from the wider catchment area. (c) Support development of Bristol Airport as a major international gateway, which plays a key role in meeting economic needs. (d) Support sustainable growth at Bristol Airport, including securing increased market share. (e) Deliver significant mode shift from the private car, particularly for journeys from the Bristol urban area to Bristol Airport.
Options Considered	A: New bus link from Nailsea & Backwell station to the Airport. B: MetroBus extension from South Bristol to the Airport. C: Mass transit route from Bristol to the Airport. D: Heavy rail route from Bristol to the Airport. E: Heavy rail route from Yatton to the Airport from the west.
Option Selected *(and rationale)*	Option A was discounted because it would fail to address the objectives. Options D and E are considered to be very challenging to deliver given topographic constraints. Options B and C are considered to deliver the strongest performance against the objectives and are most likely to be deliverable. Option C is preferred as being most likely to support the future growth ambitions of the Airport. Option C is the preferred option, with Option B as the lower cost option.
Dependencies	Integration with wider MetroBus and Mass Transit systems for the Bristol urban area, Park & Ride on A370 and A38 corridors.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Support for sustainable growth at Bristol Airport	✓✓✓
	- Support for regeneration of South Bristol	✓✓✓
Performance against Objectives	(a) Improve public transport connectivity between the Bristol urban area and Bristol Airport.	✓✓✓
	(b) Improve public transport connectivity from the wider catchment area.	✓✓
	(c) Support development of Bristol Airport as a major international gateway, which plays a key role in meeting economic needs.	✓✓✓
	(d) Support sustainable growth at Bristol Airport, including securing increased market share.	✓✓✓
	(e) Deliver significant mode shift from the private car, particularly for journeys from the Bristol urban area to Bristol Airport.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓	
	Impacts on National Networks: no impact.	-	
	Resilience: options will open new options for travel in this corridor, reducing dependence on A38 and congested urban routes.	✓✓✓	
	Unlock new growth in jobs and housing: unlock new employment growth in South Bristol and at Airport.	✓✓✓	
	Connections to Gateways: significant improvement in connectivity to Bristol Airport from the city.	✓✓✓	
Reduce Carbon Emissions	**Resource efficiency:** mode shift will reduce delays and improve efficiency of parallel A38 corridor, reducing fuel consumption.	✓✓	
	Low carbon choices: mode shift will result in significant reduction in car trips and carbon emissions.	✓✓	
Quality of Life and the Natural Environment	**Built environment:** mode shift will help to reduce traffic on urban network in South Bristol and facilitate prioritisation of public transport and active modes.	✓✓	
	Natural environment: direct impacts of new infrastructure, but this will help to mitigate the effects of traffic on A38. Opportunity to design high quality new infrastructure to Airport as a key gateway to region. Mitigation would need to be considered in sensitive areas. The majority of works would be within or adjacent to the highway boundary (and potentially undergound), and it is assumed that these can be taken into account in the scheme design process.	××	
Improve Health, Safety and Security	**Healthy travel choices:** opportunity to reallocate roadspace for active travel, opportunity to encourage walking to mass transit stops.	✓	
	Air quality: reduces traffic on congested urban roads.	✓✓	
	Safety for transport users: mode shift will reduce traffic on A38 and rat-running traffic on rural lanes.	✓✓	
Promote Accessibility	**Access to jobs & training:** major improvement in connectivity between South Bristol and Bristol Airport. Certain options will transform connectivity to South Bristol from across the city.	✓✓✓	
	Access to local services: varying levels of improvement to connectivity in South Bristol for accessing local services.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£648	million
	Impact of Tax Revenues: small reduction in tax revenues from fuel consumption (small, larger impacts for Option C schemes)	×	
Value for Money	Initial assessment of Value for Money, based on benefits and costs	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£375	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 60%) *(surface-running option, underground option would be higher)*	£600	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Bristol Airport, Developers, system operators. Due to the significant costs involved, other funding sources should be considered including options such as Road User Charging or Workplace Parking Levy.	??	
Affordability	Scheme represents a significant step-change in level of investment compared with recent transport schemes which is likely to be challenging to fund. Due to the significant costs involved, funding may be required through measures such as Road User Charging or Workplace Parking Levy.	??	
Delivery Agencies	Local Authorities (North Somerset, Bristol City Council). Local authorities are experienced in delivering MetroBus schemes but not mass transit. It would be necessary to build delivery capability.	??	
Key Project Risks	(1) Potential opposition to alignment of route through rural area, (2) High cost of tunnelling works, (3) Engineering of route through through urban area if delivered on the surface, (4) Would require integration into wider public transport to maximise demand.	??	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the concept of light rail on key corridors. The consultation demonstrated a high level of support for light rail on this corridor. Impacts on local communities will need to be addressed in the future development of a scheme.	✓✓	
Commercial Case	Models for operation of services would need to be considered. Significant work would be needed to develop the commercial case for mass transit options.	??	

Name of Project:	**Mass Transit Bristol to North Fringe**
Reference:	**Mass Transit 2**

Scheme Description	A dedicated, fully segregated mass transit route providing high frequency, higher capacity and faster public transport services between central Bristol, North Bristol and the North Fringe with associated infrastructure to provide a high quality passenger experience. Constraints on the A38 Gloucester Road and other corridors mean that an underground alignment should be considered as one of the options to fully achieve the scheme objectives. This scheme would be complementary to the North Fringe - Hengrove MetroBus scheme currently being delivered and the planned MetroWest programme.
Current and Future Policy Context	A rapid transit network serving North Bristol and the North Fringe is included in Policy BCS 10 in the Bristol Core Strategy and South Gloucestershire policy as key strategic transport infrastructure (SGC CS7), via the North Fringe to Hengrove Package. SGC CS7 also includes a proposed extension into Cribbs Patchway New Neighbourhood. Providing a rapid transit route will help accommodate future travel demand generated by planned growth in Core Strategies (BCS2, BCS3 and SGC CS29) and in the longer term the Joint Spatial Plan.
Need for Intervention *(specific to the area under consideration)*	(1) Journeys by bus along the A38 Gloucester Road are slow and unreliable as a result of slow-moving traffic along the route. This limits the potential to achieve modal shift from the car as public transport is not an attractive option for many journeys. (2) Highway constraints on the A38 Gloucester Road corridors limit the ability to increase public transport capacity with additional bus services. (3) A number of key destinations and activities on this corridor do not have high quality public transport connections. Destinations include Gloucestershire County Cricket Club, Memorial Ground, Southmead Hospital, major employment destinations and Cribbs Causeway. (4) Forecast increases in overall travel demand and highway constraints mean that increasing highway capacity is not an option.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journey times. (b) Encourage modal shift to public transport for journeys made by car. (c) Improve public transport connectivity along the A38 corridor between central Bristol, North Bristol and North Fringe. (d) Provide additional capacity on the public transport network to accommodate the forecast increase in travel demand. (e) Support planned residential and employment growth in central Bristol, North Bristol and the North Fringe.
Options Considered	A. Additional bus priority measures (where practical and publicly acceptable) on the A38 Gloucester Road corridor serving central Bristol, North Bristol and North Fringe. B. Increase frequency and number of bus services between central Bristol, North Bristol and North Fringe on A38 Gloucester Road. C. Dedicated rapid transit route between central Bristol, North Bristol and North Fringe.
Option Selected *(and rationale)*	Option A would not comprehensively address the issues: there are no further practical options to provide additional bus priority measures. Option B is not achievable: highway capacity limitations constrain the capability to provide more services. Option C will comprehensively address the challenges and best meet the objectives by providing a dedicated and high quality rapid transit route.
Dependencies	The scheme could be delivered in isolation (subject to funding). However benefits would be increased by connecting into a network of rapid transit routes to the Airport, Emersons Green and the Bristol - Bath corridors (considered as separate schemes), and with comprehensive interchange in the wider public transport system. The scheme would be complemented by the Bristol Park & Ride Package and fiscal measures to encourage mode shift to the system.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- BCS10 and SGC CS7 - provide a fast, frequent and reliable public transport service with a high quality passenger experience.	✓✓✓
	- BCS2, BCS3 and SGC CS29 - support planned growth in Bristol and the North Fringe.	✓✓
Performance against Objectives	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journey times.	✓✓✓
	(b) Encourage modal shift to public transport for journeys made by car.	✓✓✓
	(c) Improve public transport connectivity along the A38 corridor between central Bristol, North Bristol and North Fringe.	✓✓✓
	(d) Provide additional capacity on the public transport network to accommodate the forecast increase in travel demand.	✓✓✓
	(e) Support planned residential and employment growth in central Bristol, North Bristol and the North Fringe.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓	
	Impacts on National Networks: potential mode shift from M32 to access central Bristol, North Bristol and North Fringe. Potential positive impacts on M4 and M5.	✓	
	Resilience: moderate beneficial: significant increase in public transport capacity with greater ability to respond to network disruption.	✓✓	
	Unlock new growth in jobs and housing: provides additional transport capacity on congested urban corridor into city centre.	✓✓	
	Connections to Gateways: moderate beneficial impact by providing improved connectivity to Bristol Temple Meads.	✓✓	
Reduce Carbon Emissions	**Resource efficiency:** moderate beneficial impact by reducing number of car trips, reducing congestion and fuel consumption.	✓✓	
	Low carbon choices: beneficial impact by providing high quality alternative to the car, delivering mode shift and reducing car trips.	✓✓	
Quality of Life and the Natural Environment	**Built environment:** impacts will depend upon route alignment and configuration of the system. Moderate beneficial impact expected on public realm and traffic flows. Impacts on noise and severance to be confirmed when further feasibility work is completed.	✓✓	
	Natural environment: impacts will depend upon route alignment and configuration of the system which will be confirmed when further feasibility work is completed. The majority of works would be within or adjacent to the highway boundary, and assumed that these can be taken into account in the scheme design process.	-	
Improve Health, Safety and Security	**Healthy travel choices:** opportunity to reallocate roadspace for active travel, opportunity to encourage walking to mass transit stops.	✓	
	Air quality: moderate beneficial impact on air quality by reducing traffic flows and contributing to modal shift.	✓✓	
	Safety for transport users: potential slight benefit in reducing traffic flows on busy urban corridors and facilitating reallocation of roadspace.	✓	
Promote Accessibility	**Access to jobs & training:** moderate beneficial impact by providing high quality public transport service to access employment and training opportunities.	✓✓	
	Access to local services: moderate beneficial impact by providing high quality public transport service to access to local services.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£432	million
	Impact of Tax Revenues: significant potential impact on fuel tax revenues due to significant transfer from car to rapid transit.	×	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£250	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 60%) *(surface-running option, underground option would be higher)*	£400	million
Potential Funding Sources	West of England Devolution Deal, Local Growth Fund, arrangement with commercial operators. Due to the significant costs involved, other funding sources should be considered including options such as Road User Charging or Workplace Parking Levy.	??	
Affordability	Scheme represents a significant step-change in level of investment compared with recent transport schemes which is likely to be challenging to fund. Due to the significant costs involved, funding may be required through measures such as Road User Charging or Workplace Parking Levy.	??	
Delivery Agencies	Bristol City Council and South Gloucestershire Council. Both have jointly delivered the recent North Fringe - Hengrove MetroBus Package.	✓	
Key Project Risks	(1) System configuration and future configuration of bus network, (2) Identify a segregated route alignment to maximise maximum rapid transit journey time benefits, (3) Securing capital and revenue funding, (4) Engineering feasibility of route needs to be further explored, (5) Planned developments may be delivered before this scheme, limiting the ability to impact on mode shift.	??	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the concept of light rail on key corridors. However, the consultation did not provide a high level of feedback on people's views on light rail on this corridor. Impacts on local communities will need to be addressed in the future development of a scheme.	✓	
Commercial Case	Procurement models to deliver the project require further investigation, alongside future commercial operating model of the route.	??	

Name of Project:	Mass Transit Bristol to East Fringe
Reference:	Mass Transit 3

Scheme Description	A dedicated, fully segregated mass transit route providing high frequency, higher capacity and faster public transport services connecting central Bristol and the East Fringe and associated infrastructure to provide a high quality passenger experience. Sections of the dedicated route would probably need to be delivered below surface due to highway capacity constraints on the A420 and A432 corridors and environmental constraints on the Bristol-Bath Railway Path.
Current and Future Policy Context	A rapid transit route to Emerson's Green is included in policy BCS 10 in the Bristol Core Strategy, and identified in South Gloucestershire policy as key strategic transport infrastructure (SGC CS7). Providing a rapid transit route will help accommodate future travel demand generated by planned growth in Core Strategies (BCS2, BCS3 and SGC CS29) and in the longer term the Joint Spatial Plan.
Need for Intervention *(specific to the area under consideration)*	(1) Bus journeys are currently unreliable and lengthy due to congestion and local service stopping pattern. This limits the potential to achieve modal shift from the car as travel by public transport is not an attractive option. (2) Highway constraints on these corridors limit the ability to provide additional public transport capacity by adding further bus services. (3) A number of key destinations and activities on this corridor do not have high quality public transport connections. The MetroBus route to Emersons Green (currently under construction) will not serve large parts of the urban area. (4) Forecast increases in travel demand, together with existing highway constraints, mean that widening of existing corridors is not an option.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journey times. (b) Encourage modal shift to public transport for journeys currently made by car. (c) Improve public transport connectivity between central Bristol and the East Fringe. (d) Provide additional capacity on the public transport network to accommodate the forecast increase in travel demand. (e) Support planned residential and employment growth in central Bristol and the East Fringe.
Options Considered	A. Additional bus priority measures (where possible) along A432 and A420 corridors between central Bristol and East Fringe. B. Increase frequency and number of bus services between central Bristol and East Fringe on A432 and A420 corridors. C. Further improvements to the MetroBus Ring Road corridor (extending the Emersons Green MetroBus route). D. Dedicated rapid transit route between central Bristol and East Fringe (potentially the Emerson's Green area).
Option Selected *(and rationale)*	Option A would not comprehensively address the issues, whilst the options to provide additional bus priority measures are severely limited. Option B is not achievable - highway capacity limitations constrain the capability to provide more services. Option C is discounted as it would not provide a direct route into Bristol. Option D is selected because it comprehensively addresses the challenges and meets the identified objectives by providing a dedicated and high quality rapid transit route.
Dependencies	The scheme could be delivered in isolation. However greater benefits would be derived by connecting with an integrated network of rapid transit routes to the Airport, North Fringe and the Bristol - Bath corridors which are considered as separate schemes, and with comprehensive interchange in the wider public transport system. The scheme would be complemented by the Bristol Park & Ride Package and fiscal measures to encourage mode shift to the system.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- BCS10 and SGC CS7 - provide a fast, frequent and reliable public transport service with a high quality passenger experience.	✓✓✓
	- BCS2, BCS3 and SGC CS29 - support planned growth in Bristol and the East Fringe.	✓✓
Performance against Objectives	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journey times.	✓✓✓
	(b) Encourage modal shift to public transport for journeys currently made by car.	✓✓
	(c) Improve public transport connectivity between central Bristol and the East Fringe.	✓✓✓
	(d) Provide additional capacity on the public transport network to accommodate the forecast increase in travel demand.	✓✓
	(e) Support planned residential and employment growth in central Bristol and the East Fringe.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓	
	Impacts on National Networks: no direct impact on national networks.	-	
	Resilience: beneficial by providing step-change in capacity on the public transport network and ability to respond to network disruption in this area.	✓✓	
	Unlock new growth in jobs and housing: provides additional transport capacity on congested urban corridor into city centre.	✓✓	
	Connections to Gateways: moderate beneficial impact by providing improved connectivity to Bristol Temple Meads.	✓✓	
Reduce Carbon Emissions	**Resource efficiency:** moderate beneficial impact by reducing number of car trips, reducing congestion and fuel consumption.	✓✓	
	Low carbon choices: beneficial impact by providing high quality alternative to the car, delivering mode shift and reducing car trips.	✓✓	
Quality of Life and the Natural Environment	**Built environment:** impacts will depend upon route alignment and configuration of the system. Beneficial impact expected on public realm and traffic flows. Impacts on noise and severance to be confirmed when further feasibility work is completed.	✓✓	
	Natural environment: impacts will depend upon route alignment (some of the route could be on the edge of the urban area) and configuration of the system which will be confirmed when further feasibility work is completed.	-	
Improve Health, Safety and Security	**Healthy travel choices:** opportunity to reallocate roadspace for active travel, opportunity to encourage walking to mass transit stops.	✓	
	Air quality: significant reduction in traffic flows and reduced congestion through sensitive areas, resulting in air quality benefits.	✓	
	Safety for transport users: potential slight benefit in reducing traffic flows on busy urban corridors.	✓	
Promote Accessibility	**Access to jobs & training:** moderate beneficial impact by providing high quality public transport service to access employment and training opportunities in city centre.	✓✓	
	Access to local services: moderate beneficial impact by providing high quality public transport service to access to local services.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£518	million
	Impact of Tax Revenues: significant potential impact on fuel tax revenues due to significant transfer from car to rapid transit.	×	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£300	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 60%) *(surface-running option, underground option would be higher)*	£480	million
Potential Funding Sources	West of England Devolution Deal, Local Growth Fund, arrangement with commercial operators. Due to the significant costs involved, other funding sources should be considered including options such as Road User Charging or Workplace Parking Levy.	??	
Affordability	Scheme represents a significant step-change in level of investment compared with recent transport schemes which is likely to be challenging to fund. Due to the significant costs involved, funding may be required through measures such as Road User Charging or Workplace Parking Levy.	??	
Delivery Agencies	Bristol City Council and South Gloucestershire Council. Both have jointly delivered the recent North Fringe - Hengrove MetroBus Package.	✓	
Key Project Risks	(1) Identification of a segregated route alignment which provides maximum journey time benefits for rapid transit, (2) System configuration and future redesign of bus network, (3) Securing capital and revenue funding for this significant investment, (4) Engineering feasibility route options need to be further explored.	??	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the concept of light rail on key corridors. A significant proportion of respondents identified rapid transit as an option to improve sustainable travel between the East Fringe and city centre. However, careful consideration of route options will be required.	✓	
Commercial Case	Project could be delivered through a range of procurement models. Future commercial operating model of the route requires further investigation.	??	

Name of Project:	**Mass Transit Bristol to Bath**
Reference:	**Mass Transit 4**

Scheme Description	A rapid transit route providing high frequency, higher capacity and faster public transport services between Bristol and Bath. This will be facilitated by diversion of traffic onto the Callington Road Link to enable reallocation of roadspace from car to public transport within Bristol. Careful consideration of routing options through Keynsham, and future management of roadspace between Keynsham and Bath, will be required. In the short term MetroBus would provide rapid transit along the corridor from Bristol to Bath, and in the longer term there is an ambition for Light Rapid Transit between the Hicks Gate / Keynsham area and central Bristol, with Bath continuing to be served by MetroBus.
Current and Future Policy Context	The need for improvements to public transport provision in B&NES is outlined in CS Policy 6f. The Callington Road Link is listed in BCS10. Providing a rapid transit route will help accommodate future travel demand generated by planned growth in Core Strategies (BCS2, BCS5, B&NES 1b) and in the longer term the Joint Spatial Plan.
Need for Intervention *(specific to the area under consideration)*	(1) The A4 between Bath and Bristol is a strategic public transport corridor with local bus and rail services providing for different journeys on the corridor. However, the express X39 suffers from delay due to congestion. The development of local rail services is constrained by route capacity. (2) The A4 is heavily congested on the section between Hicks Gate and Bristol city centre. Traffic from south Bristol travels via Callington Road and A4 to the north and east. This results in delays at the West Town Lane/A4174/A4 Bath Road and A4/A4320 junctions. (3) There are inconsistent route standards along the A4 corridor between Hicks Gate and Bath. The section of road through Saltford is characterised by a mix of local movements within the village and through traffic. The A4 through Saltford is an AQMA. (4) Growth planned in the Core Strategies and at Keynsham in the JSP will increase travel demand along the A4 corridor.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journeys on the A4 between Bristol and Bath. (b) Encourage modal shift to public transport for journeys along the A4 corridor. (c) Address congestion pinch-points to unlock capacity for major public transport improvements along the A4 corridor. (d) Provide additional transport network capacity on the A4 corridor to accommodate forecast increase in travel demand for all modes. (e) Support planned residential and employment growth along the A4 corridor and in Keynsham.
Options Considered	A. Highway only improvements - Callington Road Link and bypass for Saltford village. B. Public transport improvements - rapid transit route between Bristol and Bath serving Keynsham and Saltford, with no highway infrastructure. C. Rapid transit route between Bristol and Bath + Callington Road Link + traffic management through Saltford village.
Option Selected *(and rationale)*	Option A would provide additional highway capacity, but it would not provide public transport improvements and fails to meet the objectives. Option B is not achievable without diverting traffic to enable reallocation of roadspace to the rapid transit route. Option C tackles the most critical congestion pinchpoints and enables reallocation of roadspace to deliver the rapid transit route between Bristol and Bath.
Dependencies	The South Bristol Orbital Corridor (Road 5) will enable reallocation of roadspace on the A4 between Hicks Gate and West Town Lane. The scheme should be considered as part of a network of rapid transit routes to the Airport, North Fringe and East Fringe, and with comprehensive interchange in the wider public transport system. The scheme would be complemented by the Bristol Park & Ride Package and fiscal measures to encourage mode shift to the system.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- B&NES 6f - improvements in public transport provision and address the need for studies to assess the Saltford bypass.	✓✓
	- BCS10 - delivery of Callington Road Link. BCS2, BCS5 - support planned growth on the A4 corridor.	✓✓
Performance against Objectives	(a) Provide high quality, convenient, frequent and reliable public transport services with shorter and more reliable journeys on the A4 between Bristol and Bath.	✓✓
	(b) Encourage modal shift to public transport for journeys along the A4 corridor.	✓
	(c) Address congestion pinch-points to unlock capacity for major public transport improvements along the A4 corridor.	✓
	(d) Provide additional transport network capacity on the A4 corridor to accommodate forecast increase in travel demand for all modes.	✓✓
	(e) Support planned residential and employment growth along the A4 corridor and in Keynsham.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓✓✓
	Impacts on National Networks: neutral impact, no direct impact on national networks.		-
	Resilience: slight beneficial, the scheme will provide additional capacity on the transport network.		✓
	Unlock new growth in jobs and housing: provides additional transport capacity on congested urban corridor.		✓
	Connections to Gateways: slight beneficial impact by providing improved access to major railway interchanges via Temple Meads and Bath Spa.		✓
Reduce Carbon Emissions	**Resource efficiency:** Callington Road Link would reduce distance travelled and fuel consumed due to improved traffic efficiency.		-
	Low carbon choices: Callington Road Link will facilitate delivery of rapid transit which will help encourage modal shift to public transport for some journeys on this corridor. Capacity would need to be carefully managed to avoid inducing additional traffic as delays are reduced.		✓
Quality of Life and the Natural Environment	**Built environment:** impacts will depend upon route alignments and configuration of rapid transit system. A4 rapid transit corridor: benefits to public realm and reduced traffic flows. Callington Road Link: slight negative impact as new road link moves traffic closer to residential properties.		-
	Natural environment: based on preliminary screening of environmental designations. Impacts will depend upon route alignment and configuration of the rapid transit system; to be confirmed when further feasibility work is completed. Callington Road Link lies in Flood Zones 2 & 3 and AQMA, and within 500m of Listed Buildings, Priority Habitat and Arnos Vale Cemetery Registered Park and Garden. Potential slight negative impact, which could be mitigated. Rapid transit route lies within Flood Zones 2 & 3 and AQMA and within 500m of Listed Buildings, Priority Habitat and Arnos Vale Cemetery Registered Park and Garden. Potential slight negative impact, which would be taken into account in the scheme design process.		×
Improve Health, Safety and Security	**Healthy travel choices:** The scheme could facilitate wider improvements to the public realm, it could enable reallocation of roadspace along sections of the corridor to active modes and significant numbers of new users could be encouraged to walk to stops.		✓
	Air quality: Callington Road Link: significant reduction in traffic and emissions on A4 and West Town Lane (partially offset by increases in traffic on new transport link). Rapid Transit: encourages mode shift and reduces traffic flows (offset by impacts caused by reallocation of roadspace to rapid transit on the corridor).		✓
	Safety for transport users: benefits from reducing flows in sensitive areas and slight reduction in flows on the corridor.		✓
Promote Accessibility	**Access to jobs & training:** slight beneficial impact by providing connectivity to employment and training opportunities.		✓
	Access to local services: slight beneficial impact by providing connectivity to local services.		✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£405 million
	Impact of Tax Revenues: potential reduction in tax revenues due to reduced fuel consumption. Overall relatively small scale of impact.		-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance (including tram, MetroBus and Callington Road Link)	£246	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40% for road and MetroBus, 60% for mass transit)	£375	million
Potential Funding Sources	West of England Devolution Deal, Local Growth Fund, operational and financial arrangement with public transport operators. Due to the significant costs involved, other funding sources should be considered including options such as Road User Charging or Workplace Parking Levy.	??	
Affordability	Scheme represents a significant step-change in level of investment compared with recent transport schemes which is likely to be challenging to fund. Due to the significant costs involved, funding may be required through measures such as Road User Charging or Workplace Parking Levy.	??	
Delivery Agencies	Bath and North East Somerset Council and Bristol City Council. Public transport operators.	?	
Key Project Risks	(1) Managing competing public transport routes along the corridor, ensuring they do not undermine each other. (2) Securing capital and revenue funding. (3) Engineering feasibility of the new road links, Light Rapid Transit and MetroBus route need to be further explored. (4) Requirement to minimise induced traffic (which could impact on the network). (5) Upgrading the east of Keynsham to Bristol section to light rail may result in the need for interchange for some passengers (at Hicks Gate Park & Ride), but it is assumed that passengers travelling the entire route between Bristol and Bath would travel by rail.	??	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the concept of light rail on key corridors. However, some level of opposition has been identified on this corridor. In addition, a high level of opposition was identified for the Saltford Bypass.	??	
Commercial Case	Callington Road Link could be delivered through a range of procurement models. Future commercial operating model of the rapid transit route requires further investigation.	??	

Part 5 - Park & Ride Schemes

Name of Project:	Park & Ride Package for Bristol Urban Area
Reference:	Park & Ride 1

Scheme Description	A series of new and expanded existing Park & Ride sites for Bristol located in South Gloucestershire, Bath & North East Somerset and North Somerset: ● M32 corridor (new); ● A432 between Ring Road and Yate (new); ● A420 / Ring Road in the Warmley area (new); ● A4 Hicks Gate (new, replacing the existing site at Brislington); ● A37 at Whitchurch (new); ● A38 / A4174 South Bristol Link (new); ● A370 Long Ashton (expansion); ● A4 Portway (expansion); ● A4018 near Cribbs Causeway (new); and ● A38 between M5 Junction 16 and Thornbury (new). Note that locations will be dependant on options appraisals for each site, to identify a preferred location for each corridor.
Current and Future Policy Context	• Bristol Core Strategy (Policy BCS10) identifies new and expanded Park & Ride sites as key transport infrastructure improvements to reduce traffic flows into central Bristol. • South Gloucestershire Core Strategy (Policy SGC CS7) identifies Nibley Park & Ride and park and share sites as strategic infrastructure to reduce traffic flows into Bristol. • The expansion of the Park & Ride site at Long Ashton is identified in North Somerset Core Strategy (Policy NS CS10). • The South Gloucestershire, North Somerset and Bath and North East Somerset Core Strategies and the emerging Joint Spatial Plan identify the scope for growth around Bristol which will generate travel demand into central Bristol for employment, education and leisure purposes.
Need for Intervention *(specific to the area under consideration)*	(1) Heavy flows of traffic into central Bristol from a wide catchment for commuting, business and leisure journeys. (2) This traffic causes congestion, impacting on travel conditions for all users of the network, and results in negative impacts on the urban environment and limits the scope to reallocate roadspace for sustainable modes. (3) Significant growth in travel demand planned within the existing Core Strategies will lead to increased traffic travelling into the urban area. (4) The emerging Joint Spatial Plan will further increase travel demand within and on key routes into Bristol. Limited travel choices from developments outside central Bristol could mean that a large proportion of journeys into central Bristol would be by car, exacerbating existing problems.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve travel choices for movements into central Bristol from surrounding towns and rural areas, facilitating park and bus, park and cycle, and interchange. (b) Reduce traffic on radial routes into central Bristol by intercepting traffic at the edge of the urban area. (c) Reduce congestion on the road network in the Bristol urban area. (d) Create scope for reallocation of roadspace to active modes and public transport. (e) Unlock capacity for sustainable urban growth and new job creation in the Bristol urban area.
Options Considered	A. Increase the capacity of existing sites only. B. Provide enhanced bus services on key corridors from large catchment area into central Bristol (no new or expanded sites). C. Provide new and expanded Park & Ride sites on key radial routes into the Bristol urban area.
Option Selected *(and rationale)*	Option A will not capture journeys on all of the corridors where issues have been identified. Option B is not a cost effective approach to capturing the full scope of journeys into the urban area originating from large catchment areas. Option C provides a cost effective approach to capturing journeys from a wide catchment area on the key corridors into central Bristol, and helps to address 'honeypot' effects of Park & Ride by providing sites on the main radial routes. Potential sites have been identified based on analysis of potential in-scope trips from catchment areas heading towards central Bristol.
Dependencies	Dependence on strengthening central area parking policy, particularly for commuting trips. The long term success will depend on the implementation of access restraints to reduce car travel into central Bristol.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Supports policies BCS10, SGC CS7 and NS CS10 by providing new and expanded Park & Ride sites.	✓✓✓
	- Strongly supports planned growth identified in Core Strategies and emerging Joint Spatial Plan.	✓✓
Performance against Objectives	(a) Improve travel choices for movements into central Bristol from surrounding towns and rural areas, facilitating park and bus, park and cycle, and interchange.	✓✓
	(b) Reduce traffic on radial routes into central Bristol by intercepting traffic at the edge of the urban area.	✓✓
	(c) Reduce congestion on the road network in the Bristol urban area.	✓
	(d) Create scope for reallocation of roadspace to active modes and public transport.	✓✓
	(e) Unlock capacity for sustainable urban growth and new job creation in the Bristol urban area.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓
	Impacts on National Networks: M32 site will intercept journeys using the M32 to travel into central Bristol; potential impact on M32 and M4 J19 due to traffic accessing the site. Other sites are expected to have neutral impact.	-
	Resilience: slight beneficial impact by reducing traffic flows on key corridors.	✓
	Unlock new growth in jobs and housing: increased capacity for travel into Bristol, unlocking capacity for growth in city and mitigating impacts of growth outside city.	✓✓
	Connections to Gateways: neutral impact expected on connections to gateways.	-
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact by reducing single occupancy car travel, resuting in decongestion benefits and reduced fuel consumption.	✓
	Low carbon choices: slight beneficial impact expected by increasing low carbon choices to travel to central Bristol.	✓
Quality of Life and the Natural Environment	**Built environment:** the location of new sites would be subject to further feasibility assessment. The P&R network would help reduce traffic flows and reduce noise, benefit the public realm and reduce severance. Potential impacts in the vicinity of sites themselves.	✓
	Natural environment: a number of sites would be located within Green Belt. The locations of new sites would be subject to further feasibility assessment. Potential landscape impacts, but options for locations would be identified to minimise environmental impacts.	×
Improve Health, Safety and Security	**Healthy travel choices:** neutral: no significant direct impact on active travel choices.	-
	Air quality: slight beneficial impact by reducing car trips into central Bristol.	✓
	Safety for transport users: potential slight reduction in accidents by reducing traffic flows into Bristol.	✓
Promote Accessibility	**Access to jobs & training:** P&R network will improve access to employment and training destinations for residents from outside Bristol urban area, with the opportunity for interchange with feeder bus services from surrounding areas.	✓
	Access to local services: P&R network will improve access to services for residents from outside Bristol urban area, with the opportunity for interchange with feeder bus services from surrounding areas.	✓
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs. Operating costs assumed to be covered by farebox revenue (will require detailed assessment)	£113 million
	Impact of Tax Revenues: reduction in fuel tax revenues due to reduced vehicle travel. Overall considered to be small impact.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance	£75	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£105	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL). Investment from commercial bus operators is also required.	✓	
Affordability	This represents a step-change in level of investment compared with current Park & Ride provision. However, this is scaleable, and delivery of the sites could be phased within the overall funding profile.	✓	
Delivery Agencies	West of England Local Authorities to deliver infrastructure measures, operation of services to be confirmed.	?	
Key Project Risks	(1) Identifying and securing suitable site and access arrangements - dependant on detailed site options appraisals, (2) Securing a financially sustainable operating model for services, (3) Delivering bus priority measures to provide fast, reliable and convenient services to ensure people will use Park & Ride services, (4) Delivering supporting schemes, such as fiscal measures, to lock in the benefits, (5) Availability of land for site expansions.	?	
Public Support	JTS consultation demonstrated that around 60% of respondents supported the concept of Park & Ride. There is a mixed level of support for specific sites, and it is possible that there could be some opposition to specific proposals. Impacts on local areas will need to be carefully managed and mitigated.	✓	
Commercial Case	Project would be delivered by local authority and commercial procurement models to deliver different elements of the project. Local authorities and bus operators have experience of successfully collaborating to deliver current Park & Ride services. MetroBus services serving the Park & Ride sites further away from the City Centre will require a large number of buses and drivers to maintain a high frequency, with higher operating costs.	?	

Name of Project:	**Park & Ride for Bath**
Reference:	**Park & Ride 2**

Scheme Description	A Park & Ride package comprising future expansion of three existing sites at Odd Down, Lansdown and Newbridge to address future demand for travel and to facilitate further mode shift from cars for travel into the city.
Current and Future Policy Context	The B&NES Core Strategy Policy 2g aims to reduce the use of cars travelling to and within the city by delivering improvements to public transport, walking and cycling. Expanded Park & Ride sites are identified as helping achieve Policy 2g. Policy B1 outlines the planned delivery of new homes and employment in Bath and surrounding rural area over the plan period, whilst growth is also planned in the Wiltshire Core Strategy, particularly within the commuting catchment for Bath (increasing travel from the east). The Joint Spatial Plan also identifies scope for further growth in Keynsham (increasing travel from the west).
Need for Intervention *(specific to the area under consideration)*	(1) High levels of traffic into central Bath from a large catchment for commuting, business and leisure journeys. (2) This traffic causes congestion, impacting on travel conditions for all users of the network, resulting in negative impacts on the urban environment and limits the scope to reallocate roadspace for sustainable modes. (3) Travel demand will increase as growth outlined in the Bath and North East Somerset Core Strategy is delivered. (4) The emerging Joint Spatial Plan will further increase travel demand into and within Bath. Limited travel choices for development outside central Bath will mean that the majority of journeys into Bath city centre would be by car, exacerbating existing problems.
Objectives *(tailored to respond to the need for intervention)*	(a) Support economic development in Bath, including its Enterprise Area, through improving connectivity. (b) Reduce traffic on radial routes into the city centre by increasing the proportion of journeys made by public transport. (c) Create scope for reallocation of roadspace to improve Bath's built environment. (d) Reduce carbon emissions from transport through encouraging a shift towards sustainable modes of transport. (e) Unlock development opportunities at existing off-street city centre car parks through reducing demand for parking in the city centre.
Options Considered	A. Provide enhanced bus services on key corridors from the wider catchment area into central Bath. B. Park & Ride Package for Bath, focused on expansionn of existing sites. C. Park & Ride Package for Bath, including a new site to east of Bath.
Option Selected *(and rationale)*	Option A will play a complementary role but is not able to capture all of the trips from a wide rural catchment area. Option C would provide the opportunity to intercept trips from the east of Bath but, to date, no suitable sites have been identified that are acceptable to stakeholders. Further consideration of options to intercept traffic from the east will be required. In the meantime, **Option B** is recommended.
Dependencies	No dependencies.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports Policy CS2g by providing expanded Park & Ride sites.	✓✓
	- Supports planned growth identified in Bath and North East Somerset Core Strategy and emerging Joint Spatial Plan. Development is located on corridors that serve existing Park & Ride sites.	✓✓
Performance against Objectives	(a) Support economic development in Bath, including its Enterprise Area, through improving connectivity.	✓
	(b) Reduce traffic on radial routes into the city centre by increasing the proportion of journeys made by public transport.	✓
	(c) Create scope for reallocation of roadspace to improve Bath's built environment.	✓
	(d) Reduce carbon emissions from transport through encouraging a shift towards sustainable modes of transport.	✓
	(e) Unlock development opportunities at existing off-street city centre car parks through reducing demand for parking in the city centre.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: no impacts.	-	
	Resilience: slight beneficial impact by reducing traffic flows on key corridors.	✓	
	Unlock new growth in jobs and housing: slight beneficial by providing additional capacity for increased demand to travel into central Bath.	✓	
	Connections to Gateways: no impact.	-	
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact by reducing single occupancy car travel into Bath.	✓	
	Low carbon choices: neutral impact expected.	-	
Quality of Life and the Natural Environment	**Built environment:** expanded P&R capacity would help reduce traffic flows and reduce noise, benefit the public realm and reduce severance caused by traffic.	✓	
	Natural environment: sites are located within the Green Belt. Design and landscaping will be used to mitigate impacts, but there will remain residual challenges, particularly at Newbridge and Lansdown.	×	
Improve Health, Safety and Security	**Healthy travel choices:** no direct impact on active travel choices.	-	
	Air quality: slight beneficial impact by reducing car trips into central Bath which is subject to an AQMA.	✓	
	Safety for transport users: small impact resulting from reduced car trips, but considered significant.	-	
Promote Accessibility	**Access to jobs & training:** no impact: the scheme will not provide new or improved links to jobs and training.	-	
	Access to local services: no impact: the scheme will not provide new and improved links to local services.	-	
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs. Operating costs assumed to be covered by farebox revenue (will require detailed assessment)	£24	million
	Impact of Tax Revenues: to be confirmed during scheme development.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£16	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£22	million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL). Investment from commercial bus operators is also required.	✓	
Affordability	The programme builds on the recently delivered Bath Transport Package and represents a relatively modest scale of investment.	✓	
Delivery Agencies	Site delivery: Bath & North East Somerset Council. It is assumed that operation of services could be continued under ongoing contractual arrangements.	✓	
Key Project Risks	(1) Identifying and securing suitable options for site expansion, (2) Securing a financially sustainable operating model for enhanced services, (3) Delivering further bus priority measures to provide fast, reliable and convenient services to ensure that people will use Park & Ride services. (4) Public and stakeholder support is likely to vary by site.	?	
Public Support	JTS consultation demonstrated that around 60% of respondents supported the concept of Park & Ride. The consultation highlighted significant challenges in the delivery of the East of Bath site and some opposition to further expansion of existing sites.	??	
Commercial Case	Project would be delivered by local authority commercial procurement models to deliver different elements of the project. Local authorities and bus operators have experience of successfully collaborating to deliver current Park & Ride services.	?	

Name of Project:	**Park & Ride for Weston-super-Mare**
Reference:	**Park & Ride 3**

Scheme Description	A new site to the east of Weston-super-Mare to intercept trips entering the town from the east, near Airport Roundabout. It is proposed that this could be served by one of the proposed Weston MetroBus routes from Alexandra Parade - A370 Flowerdown Bridge - Weston Park & Ride - A370 - A371 to Churchlands Link - A371 - Weston Park & Ride - A370 Flowerdown Bridge - Town Centre. Note that the proposed location is dependant on a detailed site options appraisal and assessment of the scope for integration with MetroBus services.
Current and Future Policy Context	Core Strategy Policy CS28 includes a minimum of 12,800 dwellings to be delivered in Weston-super-Mare over the plan period, together with approximately 10,500 jobs, to deliver improved self-containment and reduced out-commuting. Core Strategy Policy CS30 on Weston Villages includes two mixed-use, employment-led, sustainable new communities to the east of the town. This will include at least 6,500 homes and 37.7ha of B Use Class employment land over the plan period. Further development is planned at Weston-super-Mare as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport), particularly at Weston-super Mare. Policy CS10 requires a new Park & Ride at Weston-super-Mare. The A370/A371 site is safeguarded in the Core Strategy.
Need for Intervention *(specific to the area under consideration)*	(1) Heavy flows of traffic into Weston-super-Mare from a wide catchment for commuting, shopping and leisure, from locations with high car dependency. Due to the distances involved, it is not commercially viable to serve these locations with high frequency bus services. (2) This traffic causes congestion on the A370 into Weston-super-Mare, impacting on travel conditions for all users of the network. (3) Significant growth in travel demand with the existing Core Strategy will lead to increased traffic travelling into the urban area. (4) The emerging Joint Spatial Plan will further increase travel demand into Weston-super-Mare. Limited travel choices from development outside Weston-super-Mare could mean that most journeys into the town would be by car, exacerbating existing problems, particularly during the peaks and on event days.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve travel choices for movements into Weston-super-Mare (including the A370 corridor) from surrounding villages. (b) Reduce traffic on the A370 into Weston-super-Mare by intercepting traffic at the edge of the town. (c) Improve journey times for all traffic into Weston-super-Mare in the AM Peak (and out of Weston-super-Mare in the PM Peak). (d) Create scope for reallocation of roadspace to active modes and public transport on the A370. (e) Mitigate the impact of JSP development at Banwell/Churchill and Nailsea/Backwell, a proportion of which will travel into Weston-super-Mare.
Options Considered	A. New Park & Ride site on the A370, near Airport Roundabout. C. New Park & Ride site to the east of M5 Junction 21. B. New Park & Ride site near the proposed M5 Junction 21A including Banwell and Churchill Bypass.
Option Selected *(and rationale)*	Option A is selected, as it will intercept trips from both the A370 and A371. Option B would be attractive for trips from the M5 North and A370, whilst Option C would be attractive for trips from the M5 South and A38 (in conjunction with a new M5 Junction 21A). Both Options B and C are discounted as Weston-super-Mare has a wide catchment and Option A would maximise the catchment area.
Dependencies	It is assumed that the service would integrate with Weston MetroBus to provide the infrastructure for a fast service into Weston-super-Mare. Enhanced parking controls in the town centre would be required to encourage a shift to Park & Ride. Delivery of Weston Cycle Network will facilitate Park & Cycling options.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Delivery of a new Park & Ride site at Weston-super-Mare.	✓✓✓
	- Support delivery of growth in the Weston area by providing a step-change in public transport provision	✓
Performance against Objectives	(a) Improve travel choices for movements into Weston-super-Mare (including the A370 corridor) from surrounding villages.	✓✓
	(b) Reduce traffic on the A370 into Weston-super-Mare by intercepting traffic at the edge of the town.	✓✓
	(c) Improve journey times for all traffic into Weston-super-Mare in the AM Peak (and out of Weston-super-Mare in the PM Peak).	✓✓
	(d) Create scope for reallocation of roadspace to active modes and public transport on the A370.	✓✓
	(e) Mitigate the impact of JSP development at Banwell/Churchill and Nailsea/Backwell, a proportion of which will travel into Weston-super-Mare.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓
	Impacts on National Networks: no impact on the motorway network.	-
	Resilience: no impact.	-
	Unlock new growth in jobs and housing: provides increased capacity for travel into Weston-super-Mare. Potential to unlock land currently used for car parking for redevelopment in the town centre.	✓✓
	Connections to Gateways: neutral impact expected on connections to gateways.	-
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact by reducing single occupancy car travel, congestion and fuel consumption.	✓
	Low carbon choices: reduction by intercepting traffic into Weston-super-Mare, enabling mode shift, reducing car trips and carbon emissions.	✓
Quality of Life and the Natural Environment	**Built environment:** the location of the proposed site would be subject to further feasibility assessment. It is expected that the scheme will help reduce traffic flows and reduce noise, whilst benefiting the public realm and reducing severance effects of traffic.	✓
	Natural environment: the location of new sites would be subject to further feasibility assessment. The current proposed site is located on brownfield land next to the former airfield and is therefore forecast to have a neutral impact.	-
Improve Health, Safety and Security	**Healthy travel choices:** assumed to be neutral, although the site could faciliate Park & Cycle provision for journeys into the town.	-
	Air quality: slight beneficial impact by reducing car trips into Weston-super-Mare.	✓
	Safety for transport users: no significant direct impact expected.	-
Promote Accessibility	**Access to jobs & training:** neutral impact expected, the scheme will not provide new connections. However, it could help facilitate further schemes to improve links to jobs and training by releasing highway capacity to be allocated to other modes of travel.	-
	Access to local services: neutral impact expected, the scheme will not provide new and improved links. However, it could help facilitate further schemes to improve links to jobs and training by releasing highway capacity to be allocated to other modes of travel.	-
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs. Operating costs assumed to be covered by farebox revenue (will require detailed assessment)	£11 million
	Impact of Tax Revenues: scheme is expected to reduce distance travelled and fuel consumption by cars. Overall modest impact.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* — High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 600 space site. Excludes cost of Weston MetroBus.	£7 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£10 million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL). Investment from commercial bus operators is also required.	✓
Affordability	The cost of a new Park & Ride site is relatively low compared to schemes in the current West of England Major Schemes programme.	✓
Delivery Agencies	North Somerset Council. Operation of services to be confirmed.	✓
Key Project Risks	(1) Identifying and securing suitable site and access arrangements, (2) Securing a financially sustainable operating model for services, (3) Delivering bus priority measures to provide fast, reliable and convenient services to ensure that people will use Park & Ride services, (4) Future management of town centre parking stock.	✓
Public Support	JTS consultation demonstrated that around 60% of respondents supported the concept of Park & Ride. There is limited evidence on the level of support for Park & Ride in Weston, but there is no evidence of opposition to the proposal.	✓
Commercial Case	Viability of the service will depend on the cost of parking in the town - changing parking charges is likely to be a sensitive local issue.	?

Part 6 - Rail Schemes

Name of Project:	New Stations Package
Reference:	Rail 1

Scheme Description	New railway stations at the following locations: ● Constable Road, Bristol; ● Ashton Gate, Bristol; ● St Annes, Brislington, Bristol; ● Charfield, South Gloucestershire; ● Saltford, Bath & North East Somerset. Stations to be delivered with associated infrastructure: passenger waiting facilities, bus stops, cycle stands, car parking, real-time information and be fully Equality Act compliant.
Current and Future Policy Context	Bristol Core Strategy (Policy BCS10) supports the MetroWest programme including the reintroduction of a local rail passenger service along the Henbury line, a new station at Ashley Down and, in the longer term, new rail stations, for example at Ashton Vale, Ashley Hill and other passenger rail stations where appropriate. SGC CS7 outlines a commitment to improving rail services, the Greater Bristol Metro Project and re-introduction of passenger services on the Hallen Line / Henbury Loop (subject to a satisfactory business case). Land for stations at Henbury, Filton and Charfield are safeguarded. Bath and North East Somerset Core Strategy, Infrastructure and Delivery Policy (2g) outlines the importance of the Greater Bristol Metro Project. Policy BI.4 aims to deliver improvements to Bath Spa rail station and enhanced service frequency from Bath and Oldfield Park to Bristol, while Policy K1.5 outlines the aim to improve Keynsham rail station, enhancing frequencies to Bristol and Bath. North Somerset Policy CS10 makes provision for double tracks on the loop line between Weston Railway Station and Worle and reopening of the Portishead to Bristol line.
Need for Intervention *(specific to the area under consideration)*	(1) Congestion on the highway network means that travel times into urban centres by bus or car are currently lengthy and journeys are costly. (2) Traffic congestion impacts on reliability and length of journey times to access existing stations by bus and car. (3) Access constraints (congestion, public transport connections and walk distances) to existing stations make rail travel less convenient. (4) Car trips to local / regional destinations which could otherwise be travelled by rail contribute towards congestion on key routes.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve accessibility to the rail network and increase travel choices. (b) Contribute to reducing congestion on key corridors by facilitating modal shift. (c) Deliver a more resilient transport network, with shorter and more reliable journey times for commuters, business and residents. (d) Enhance transport links to the Filton Enterprise Area, North Fringe, Yate, Temple Quay Enterprise Zone and Bristol City Centre. (e) Make a positive contribution to social wellbeing, life opportunities and improving quality of life along the affected corridors.
Options Considered	A. Increase frequency of rail services at existing stations. B. Improve access by all modes of transport to existing and committed stations. C. Railway Stations Package - South Gloucestershire, Bristol and Bath & North East Somerset.
Option Selected *(and rationale)*	Option A improves services at existing stations but does not address the problem of limited access to the rail network. Option B provides improvements to access existing stations but does not increase the population that can access rail services (which would be achieved by providing new stations). Option C addresses the issues and meets the objectives by providing new stations and improving access to rail services for a wider population. Options A and B are however addressed as other components of the Vision.
Dependencies	Charfield and Constable Road are dependent on MetroWest Phase 2; Ashton Gate and St Annes depend on Phase 1 (and other network capacity improvements).

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Supports BCS10, SGC CS7 and B&NES CS 2g - builds on the principles of MetroWest, which is a priority in current policies.	✓✓
	- Supports planned growth in Bristol, South Gloucestershire and Bath & North East Somerset as outlined in respective Core Strategies and the emerging Joint Spatial Plan.	✓✓
Performance against Objectives	(a) Improve accessibility to the rail network and increase travel choices.	✓✓
	(b) Contribute to reducing congestion on key corridors by facilitating modal shift.	✓✓
	(c) Deliver a more resilient transport network, with shorter and more reliable journey times for commuters, business and residents.	✓✓
	(d) Enhance transport links to the Filton Enterprise Area, North Fringe, Yate, Temple Quay Enterprise Zone and Bristol City Centre.	✓✓
	(e) Make a positive contribution to social wellbeing, life opportunities and improving quality of life along the affected corridors.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓
	Impacts on National Networks: assumed that timetable impacts on longer-distance services would be minimised.		-
	Resilience: slight beneficial impact by facilitating modal shift on key corridors with resilience issues.		✓
	Unlock new growth in jobs and housing: slight beneficial impact by supporting increased travel demand at locations of growth.		✓
	Connections to Gateways: beneficial impact by providing improved access to major railway interchanges.		✓
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact by facilitating mode shift and reducing number of car trips.		✓
	Low carbon choices: beneficial impact by providing improved access to rail services.		✓
Quality of Life and the Natural Environment	**Built environment:** potential slight negative impact on local environment due to construction of new rail infrastructure in the urban environment. However, there would be benefits from reduced traffic including reduced noise.		-
	Natural environment: issues to be considered in terms of landscape, heritage, biodiversity and flooding, which could be mitigated through effective design.		-
Improve Health, Safety and Security	**Healthy travel choices:** stations have significant walking catchments: opportunity to encourage walking to stations from local communities that are served.		✓
	Air quality: slight beneficial impact by facilitating modal shift on key corridors.		✓
	Safety for transport users: no overall impact assumed. Mode shift from car unlikely to have significant impact on accident rates.		-
Promote Accessibility	**Access to jobs & training:** slight beneficial impact by increasing access to rail services which can provide access to employment and training opportunities.		✓
	Access to local services: slight beneficial impact by increasing access to rail services which provide access to local services.		✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£65 million
	Impact of Tax Revenues: slight impact by facilitating modal shift from the car.		×
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment) - Note that business case will vary for each station.*	Low	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on construction of five new stations		£50 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 60%)		£80 million
Potential Funding Sources	West of England Devolution Deal, Local Growth Fund, Network Rail, Train Operating Companies.		✓
Affordability	Significant work will be needed to develop the evidence to incorporate into future Network Rail programmes.		?
Delivery Agencies	Bristol City Council, South Gloucestershire Council and Bath & North Somerset Council. Network Rail. Train Operating Companies. A clear governance structure for the delivery of the stations would be required.		✓
Key Project Risks	(1) Significant deliverability and cost risks, (2) Engineering feasibility of delivering railway stations and securing appropriate access at these locations, (3) Network Rail approval and planning periods could impact the programme, (4) Securing timetabling and funding for train services to serve the stations, (5) the business case/benefits will vary from station to station.		??
Public Support	JTS consultation indicated that improvements to public transport are the most important priorities for people living in the West of England. Over 80% of respondents agreed with the principle of opening new railway stations.		✓✓✓
Commercial Case	The railway stations could be delivered through a range of procurement models. Options would have to be explored with Network Rail. The West of England authorities have experience of delivering similar schemes.		?

Name of Project:	Service Improvements and Station Upgrades
Reference:	Rail 2

Scheme Description	Package of rail improvement measures: - Rail service improvements, bringing the frequency of local rail services up to a minimum of 2 tph, plus hourly rail services from Weston-super-Mare to London. - Infrastructure to support service improvements including double tracks on the loop line between Weston Railway Station, reinstating the southern chord at Weston-super-Mare, and the Herluin Way to Locking Road Link (bridge replacement to enable width for double tracking). - Longer rolling stock to cater for increased demand, in conjunction with longer platforms where required (including Weston-super-Mare, Nailsea & Backwell and Yatton), with higher quality rolling stock from all stations. - Station upgrades for existing rail stations with a focus on developing Interchange Hubs (interchange with MetroBus, Mass Transit, bus services and cycle parking provision), in conjunction with schemes to improve access to existing rail stations by sustainable modes on key routes to stations across the West of England.
Current and Future Policy Context	Bristol Core Strategy (Policy BCS10) supports the MetroWest programme including the reintroduction of a local rail passenger service along the Henbury line, a new station at Ashley Down and, in the longer term, new rail stations, for example at Ashton Vale, Ashley Hill and other passenger rail stations where appropriate. SGC CS7 outlines a commitment to improving rail services, the Greater Bristol Metro Project and re-introduction of passenger services on the Hallen Line / Henbury Loop (subject to a satisfactory business case). Land for stations sites at Henbury, Filton and Charfield are safeguarded. Bath and North East Somerset Core Strategy, Infrastructure and Delivery Policy (2g) outlines the importance of the Greater Bristol Metro Project. Policy BI.4 aims to deliver improvements to Bath Spa rail station and enhanced service frequency from Bath and Oldfield Park to Bristol, while Policy K1.5 outlines the aim to improve Keynsham rail station, enhancing frequencies to Bristol and Bath. North Somerset Policy CS10 makes provision for double tracks on the loop line between Weston Railway Station and Worle and reopening of the Portishead to Bristol line.
Need for Intervention *(specific to the area under consideration)*	(1) Current low frequencies on the local rail network and infrequent stations, compared to other core cities, resulting in a failure to provide an attractive alternative to the car. (2) Long journey times by rail due to low frequencies and long wait times when interchanging between services. (3) Overcrowding on local rail services at peak times. (4) Direct services from Weston-super-Mare to London are only at peak times.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve accessibility to the rail network and increase travel choices. (b) Contribute to reducing congestion on key corridors by facilitating modal shift to rail. (c) Deliver shorter and more reliable journey times for commuters, business and residents, reducing interchange times. (d) Enhance transport links to the Filton Enterprise Area, North Fringe, Yate, Bath, Bristol Temple Quarter and Bristol City Centre. (e) Improve rail connectivity from Weston-super-Mare to London.
Options Considered	A. Further incremental upgrades to local rail services in the West of England area. B. Increase all local rail services in the West of England area to 2 tph. C. Increase all local rail services in the West of England area to 4 tph.
Option Selected *(and rationale)*	Option A has been discounted as this will not provide a consistent level of service across the West of England area. Option C has been discounted due to capacity constraints on the existing rail network which would require significant, and costly, capacity upgrades. Option B is the preferred option, which aims to bring a consistent minimum level of local rail service across the West of England area.
Dependencies	Complemented by proposals for new rail stations (St Annes, Constable Road, Ashton Gate, Saltford) being served at a proposed 2tph. Assumes delivery of MetroWest Phases 1 and 2. Complemented by improvements to cycling networks to serve stations. Improved rail service will form part of the wider public transport network, with improvements to bus services and new MetroBus and mass transit routes and improved interchange between modes.

Strategic Case: based on strength of alignment with local policies and performance against objectives

Policy Alignment	- Supports BCS10, SGC CS7 and B&NES CS 2g - importance of the Greater Bristol Metro Project (MetroWest Phases 1 and 2).	✓✓
	- Supports planned growth in Bristol, South Gloucestershire and Bath & North East Somerset as outlined in respective Core Strategies and the emerging JSP.	✓✓
Performance against Objectives	(a) Improve accessibility to the rail network and increase travel choices.	✓
	(b) Contribute to reducing congestion on key corridors by facilitating modal shift to rail.	✓
	(c) Deliver shorter and more reliable journey times for commuters, business and residents, reducing interchange times.	✓✓
	(d) Enhance transport links to the Filton Enterprise Area, North Fringe, Yate, Bath, Bristol Temple Quarter and Bristol City Centre.	✓✓
	(e) Improve rail connectivity from Weston-super-Mare to London.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓
	Impacts on National Networks: improved rail connectivity to London from Weston-super-Mare.	✓
	Resilience: no impact.	-
	Unlock new growth in jobs and housing: slight beneficial impact by supporting increased travel demand at locations of growth.	✓
	Connections to Gateways: slight beneficial impact by providing improved access to major railway interchanges.	✓
Reduce Carbon Emissions	**Resource efficiency:** slight beneficial impact by facilitating mode shift and reducing number of car trips.	✓
	Low carbon choices: slight beneficial impact by providing improved access to rail stations by sustainable modes.	✓
Quality of Life and the Natural Environment	**Built environment:** station upgrades (e.g. forecourt improvements, station buildings) could incorporate public realm improvements.	✓
	Natural environment: assumes no significant upgrades to rail infrastructure, with work taking place within existing line/signalling capacities.	-
Improve Health, Safety and Security	**Healthy travel choices:** increase in walking and cycling to stations through improvements on routes to stations.	✓
	Air quality: slight beneficial impact by facilitating modal shift on key corridors.	✓
	Safety for transport users: no overall impact assumed. Mode shift from car unlikely to have significant impact on accident rates.	-
Promote Accessibility	**Access to jobs & training:** slight beneficial impact by reducing overall journey times, which can provide access to employment and training opportunities.	✓
	Access to local services: slight beneficial impact by reducing overall journey times by rail, which would improve access to local services.	✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£626 million
	Impact of Tax Revenues: slight impact by facilitating modal shift from the car, overall impact likely to be modest.	×
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* - Note that business cases for each component will vary.	Low (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£370	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40% for station improvements, 60% for capacity improvements)	£580	million
Potential Funding Sources	West of England Devolution Deal, Local Growth Fund, Network Rail, Train Operating Companies.	✓	
Affordability	The programme is not yet developed and not in the pipeline for the next Network Rail Control Period. Significant work will be needed to develop the evidence to incorporate into future Network Rail programmes.	?	
Delivery Agencies	West of England Combined Authority, plus four Unitary Authorities. Network Rail. Train Operating Companies. A clear governance structure for the delivery of the programme would be required.	?	
Key Project Risks	(1) Need to avoid compromising longer distance services when increasing the frequency of local stopping services, (2) Constraints include capacity through Bristol East Junction and Westerleigh Junction, and between Bristol and Bath, (3) Based on current MetroWest project delivery, this scheme will be challenging, (4) Cost of new rolling stock and/or quality and availability of rolling stock cascaded to local service.	?	
Public Support	JTS consultation indicated that improvements to public transport are the most important priorities for people living in the West of England. Almost 90% of respondents agreed with the principle of improving rail services and facilities.	✓✓✓	
Commercial Case	Options would have to be explored with Network Rail and the Train Operating Companies. The West of England authorities have experience of delivering similar schemes. Based on lessons from the MetroWest programme, service improvements will be challenging to deliver.	?	

Part 7 - Highway Schemes

Name of Project:	East of Bath Link
Reference:	Road 1

Scheme Description	A new road connecting A36 (south of Bathampton) to A363 (near Bathford, south of A4 roundabout) or the A4, to provide a high quality north-south route connecting the A36 and A46 to the east of Bath. This route will enable north-south traffic to avoid passing through Bath.
Current and Future Policy Context	B&NES CS Policy 6f Well Connected sets out the need to assess a new transport link between the A36 and A4 to the east of Bath. Studies have recently taken place to identify potential options to tackle the transport problems caused by through traffic in Bath, and emerging shortlisted options have been identified.
Need for Intervention *(specific to the area under consideration)*	(1) Delays and congestion on A4 (London Road), A36 (Cleveland Bridge/Bathwick Street and Warminster Road). (2) A proportion of traffic on these routes is through traffic making north-south journeys, a high proportion of which are HGVs. (3) The A4 London Road and A36 Bathwick Street and Warminster Road are Air Quality Management Areas (AQMAs). (4) High traffic volumes cause congestion in Bath. This also causes severance, noise and poor air quality, which damages the setting of the World Heritage Site.
Objectives *(tailored to respond to the need for intervention)*	(a) Reduce traffic flows on A36, A4 and key routes in central Bath. (b) Release highway capacity on these routes to enable roadspace to be re-allocated to sustainable modes of travel and facilitate mode shift from the car. (c) Reduce numbers of HGVs in central Bath. (d) Improve connectivity on the north-south A36 / A46 corridor. (e) Improve air quality and environmental conditions in Bath, to enable the city to capitalise on its status as a World Heritage Site.
Options Considered	A. On-line improvements to A36 and A4 and in central Bath. B. Improvements to the parallel A350 north-south route. C. East of Bath Link connecting the A36 and A4 / A46. A number of alternative alignments are under consideration.
Option Selected *(and rationale)*	Option A fails to address the identified problems. Option B could play a complementary role but does not address the specific problems faced in Bath. Option C would more directly address the problems of through traffic, help to reduce congestion and deliver significant environmental benefits in central Bath. Other options to promote mode shift for north-south movements are unlikely to have a significant impact on traffic movements.
Dependencies	This scheme is not dependent upon the delivery of other schemes.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Work to assess this scheme has been taking place in accordance with B&NES CS Policy 6f.	✓
	- Reducing traffic in Bath will help delivery of wider sustainable travel objectives set out in Policy 2g.	✓
Performance against Objectives	(a) Reduce traffic flows on A36, A4 and key routes in central Bath.	✓✓
	(b) Release highway capacity on these routes to enable roadspace to be re-allocated to sustainable modes of travel and facilitate mode shift from the car.	✓✓
	(c) Reduce numbers of HGVs in central Bath.	✓✓
	(d) Improve connectivity on the north-south A36 / A46 corridor.	✓✓
	(e) Improve air quality and environmental conditions in Bath, to enable the city to capitalise on its status as a World Heritage Site.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: moderate beneficial impact expected by improving journey times for north-south journeys in A46/A36.	✓✓	
	Resilience: moderate beneficial impact expected by providing a new north-south route which avoids central Bath.	✓✓	
	Unlock new growth in jobs and housing: no direct impact; does not directly unlock new jobs or housing.	-	
	Connections to Gateways: no direct impact; does not directly improve links to gateways.	-	
Reduce Carbon Emissions	**Resource efficiency:** new link will reduce distance travelled but could potentially induce new traffic without reallocation of roadspace.	-	
	Low carbon choices: no direct impact; scheme will not directly increase availability of low carbon choices.	-	
Quality of Life and the Natural Environment	**Built environment:** slight beneficial impact expected in central Bath. Reduced traffic in central Bath will help to reduce severance and noise. Slight negative impact in settlements on A36 if the scheme induces additional traffic, but potential benefits from reduced traffic on other routes, including Bradford-on-Avon.	✓	
	Natural environment: based on preliminary screening of environmental designations: Scheme falls within: AONB, Green Belt, Priority Habitats and Flood Zones 2 & 3 and within 500m of SSSI and Listed Buildings. The scheme is likely to have a significant negative impact on natural environment that will be challenging to mitigate, but will be taken into account in the scheme design process.	×××	
Improve Health, Safety and Security	**Healthy travel choices:** scheme will not directly increase options for healthy travel choices but could facilitate roadspace reallocation in the city.	-	
	Air quality: slight beneficial impact expected on the AQMA on the A4 and A36 in central Bath.	✓	
	Safety for transport users: reduce traffic volumes in central Bath, overall neutral impact expected on safety.	-	
Promote Accessibility	**Access to jobs & training:** neutral impact expected, scheme does not directly improve access to jobs & training.	-	
	Access to local services: neutral impact expected, scheme does not directly improve access to local services.	-	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£81	million
	Impact of Tax Revenues: reduction in distance travelled will contribute towards reduced fuel consumption. Small impact expected.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 2.5km of new carriageway	£54	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£75	million
Potential Funding Sources	Highways England, with a local contribution.	?	
Affordability	Scheme represents a step-change in investment level compared with the current West of England major scheme programme.	?	
Delivery Agencies	Highways England would be the lead agency, with B&NES in a supporting role. The scheme impacts the strategic road network, therefore partnership working with Highways England would be required.	?	
Key Project Risks	(1) The existing topography is steep, close vicinity of the existing A4 carriageway and the Great Western Main Line (GWML) are constraints on the alignment, (2) Environmental constraints, the scheme is located in or within 500m of a number of environmental designations, (3) Public and stakeholder support is likely to be varied, (4) Potential for induced traffic with negative impacts on settlements along the A36 and A4 outside Bath, (5) Further work is required to establish link specification and if the route will join the A363 or A4, (6) Scheme would need to progressed by Highways England as part of a future RIS programme.	??	
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. However, the consultation identified significant levels of opposition to this specific proposal. Environmental impacts and impacts on local communities will need to be carefully managed and mitigated.	?	
Commercial Case	Project could be delivered through a range of procurement models.	✓	

Name of Project:	Winterbourne and Frampton Cotterell Bypass
Reference:	Road 2

Scheme Description	New multi-modal corridor (road, cycle route) to bypass Frampton Cotterell and Winterbourne. The Winterbourne Bypass creates an improved corridor between Yate and the North Fringe of Bristol. This would include a new single carriageway highway between the western end of the B4058 Iron Acton Bypass to the B4057 Beacon Lane, and to the south of Beacon Lane to form a junction with the existing B4058 north of Pye Corner. Note that the route is conceptual and further development will be required.
Current and Future Policy Context	The SGC Core Strategy makes provision for up to 3,000 dwellings at North Yate (2,700 within the Plan period) in Policy CS31, together with the Yate and Chipping Sodbury Package (Policy CS7). Policy CS8 requires that all new development proposals of sufficient scale will be required to contribute to schemes in Policy CS7, and other physical off-site local transport improvements may be necessary to make the scheme acceptable. Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility. The JSP also proposes strategic development in the Yate Strategic Corridor and at Coalpit Heath.
Need for Intervention *(specific to the area under consideration)*	(1) Without significant highway intervention, JSP development (Yate Strategic Corridor and Coalpit Heath) will worsen traffic conditions on this corridor. (2) Delays at A432/A4174 roundabout causes people travelling from Yate/Chipping Sodbury to North Fringe to avoid this junction. Instead they travel on the B4057 (Beacon Lane) and B4058 (Bristol Road). (3) High traffic volumes using the B4057 and B4058 as an alternative route causes delays at Bristol Road / Beacon Lane crossroads. (4) Without additional road capacity, there is insufficient roadspace to MetroBus services, including the services from Yate.
Objectives *(tailored to respond to the need for intervention)*	(a) Reduce traffic flows on the existing B4057 and B4058 through Winterbourne and Frampton Cotterell. (b) Improve journey times between Winterbourne/Frampton Cotterell/Yate/Chipping Sodbury and North Fringe. (c) Enable diversion of traffic from A432 onto the B4058 corridor and Winterbourne and Frampton Cotterell Bypass. (d) Facilitate delivery of new MetroBus Services from Yate through enabling reallocation of roadspace on A432 corridor. (e) Support delivery of JSP development at Yate Strategic Corridor and Coalpit Heath.
Options Considered	A. Winterbourne and Frampton Cotterell Bypass. B. A432 junction improvement package. C. B4058 junction improvement package.
Option Selected *(and rationale)*	Options B and C would not facilitate the rerouting required to alleviate JSP development traffic. Option A was selected as it both relieves Winterbourne Village and addresses the delays at the Bristol Road/Beacon Lane junction. It results in a significant proportion of traffic from Yate using this route, enabling reallocation of roadspace on the A432. Targeted junction improvements would be required to reflect changes in flows.
Dependencies	Enables MetroBus extension to Yate.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of strategic location at Yate Strategic Corridor and Coalpit Heath by providing additional transport capacity.	✓✓✓
	- Implementation of strategic infrastructure which reduces congestion and improves accessibility. Support public transport investment.	✓✓
Performance against Objectives	(a) Reduce traffic flows on the existing B4057 and B4058 through Winterbourne and Frampton Cotterell.	✓✓✓
	(b) Improve journey times between Winterbourne/Frampton Cotterell/Yate/Chipping Sodbury and North Fringe.	✓✓
	(c) Enable diversion of traffic from A432 onto the B4058 corridor and Winterbourne and Frampton Cotterell Bypass.	✓✓
	(d) Facilitate delivery of new MetroBus Services from Yate through enabling reallocation of roadspace on A432 corridor.	✓✓
	(e) Support delivery of JSP development at Yate Strategic Corridor and Coalpit Heath.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓
	Impacts on National Networks: no impact.	-
	Resilience: moderate contribution to improving resilience bypassing Winterbourne village.	✓✓
	Unlock new growth in jobs and housing: unlocks JSP development at Yate Strategic Corridor and Coalpit Heath. Supports the Core Strategy.	✓✓
	Connections to Gateways: no impact on access to national corridors or international gateways.	-
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements and reduce distance travelled.	✓
	Low carbon choices: risk of new road encouraging car based travel in isolation, but will enable diversion of traffic from A432 to facilitate Yate MetroBus corridor.	-
Quality of Life and the Natural Environment	**Built environment:** reallocation of roadspace within Winterbourne village would significantly improve quality of the village.	✓
	Natural environment: based on preliminary screening of environmental designations: Scheme falls within Green Belt. Scheme is adjacent to (within 500m): Listed Buildings and Flood Zone 2 & 3. Due to the environmental constraints identified it will have an overall moderate negative impact, which will be taken into account in the scheme design process.	××
Improve Health, Safety and Security	**Healthy travel choices:** may slightly encourage car use. However it would facilitate facilitate the proposed strategic cycle route from Yate.	-
	Air quality: reduced traffic through Winterbourne village and along the A432.	✓
	Safety for transport users: less rat-running of traffic on rural lanes between Yate and the North Fringe.	✓
Promote Accessibility	**Access to jobs & training:** neutral in isolation but will facilitate the proposed MetroBus from Yate, providing a more direct route to the North Fringe and Bristol.	✓
	Access to local services: neutral in isolation but will facilitate the proposed MetroBus from Yate, providing a more direct route to the North Fringe and Bristol.	✓
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs (Present Value of Costs, incl 44% Optimism Bias).	£76 million
	Impact of Tax Revenues: assume no change in tax revenues.	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs — High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 3.6km of new carriageway	£50 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£70 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL)	✓
Affordability	Significant investment, but broadly equivalent to major projects currently / recently delivered.	✓
Delivery Agencies	South Gloucestershire Council.	✓
Key Project Risks	(1) Initial BCR of under 2 unlikely to secure major scheme funding from the LEP (2) Scheme is very conceptual, alignment options need to be developed, (3) This is a JSP mitigation scheme, further optioneering required to ascertain if scheme is required if the M4 Junction 18A to Yate is implemented (which is in the JTS Vision).	??
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. There is limited evidence on the level of support for this specific proposal but no clear evidence of opposition. Localised impacts will need to be addressed.	✓
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified.	✓

Name of Project:	**M4 Junction 18A to Avon Ring Road**
Reference:	**Road 3**

Scheme Description	New motorway junction on the M4 (Junction 18A) between Junction 19 for Bristol and Junction 18 for Bath, providing a new highway link between the M4 and the A4174 Ring Road near the Emersons Green Enterprise Area. It is assumed that it would be an all-movements junction, at a location to be confirmed at a later date. It would necessitate improvements to the M4 between Junction 19 and the new Junction 18A, plus improvements to all junctions on the Ring Road from Dramway to the A4 Hicks Gate junction. The scheme is being considered in more detail by a feasibility study to examine potential options, which is due to report in March 2018.
Current and Future Policy Context	The SGC Core Strategy includes major mixed-use development on 177ha of land at Emersons Green East comprising ~2,400 dwellings, a Science Park (25ha) and 19ha of employment land. Policy CS7 includes a Ring Road Package. Reducing the traffic on the A4174 Ring Road is a monitoring indicator. Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility. Policy CS8 requires that all new development proposals of sufficient scale will be required to contribute to schemes in Policy CS7 and other physical off-site local transport improvements may be necessary to make the scheme acceptable.
Need for Intervention *(specific to the area under consideration)*	(1) There is severe congestion in the North Fringe of Bristol, which impacts on the strategic road network (M32, M4 and M5). (2) This congestion impacts on resilience; small incidents have major impacts on the whole network due to multiple conflicting movements. (3) Poor connectivity to the Emersons Green Enterprise Zone. Access to M4 from East Fringe is currently only possible via M32 J1 and M4 J19. (4) Without additional road capacity, there is unlikely to be sufficient roadspace to deliver MetroBus services, including the new Orbital service.
Objectives *(tailored to respond to the need for intervention)*	(a) From the west, reduce traffic volumes and severe congestion at M4 Junction 19, M32 Junction 1 and on the A4174 Ring Road. (b) From the east, reduce rat-running of traffic through villages between Junction 18 and the East Fringe. (c) Facilitate delivery of new Orbital MetroBus services and MetroBus Services from Yate by diverting traffic from congested networks. (d) Increase resilience of transport networks in North Bristol and North and East Fringes. (e) Unlock growth potential at the Emersons Green Enterprise Zone. Support delivery of Core Strategy and JSP development locations.
Options Considered	A. M4 Junction 18A to Ring Road (western location for J18A, north of Lyde Green development area). B. M4 Junction 18A to Ring Road (central location for J18A, NE of Lyde Green, near Westerleigh Rail Head) C. M4 Junction 18A to Ring Road (eastern location for J18A, to the north of Pucklechurch). D. A4174 junction improvement package.
Option Selected *(and rationale)*	Option D was discounted - whilst junction improvements are required it would not facilitate the rerouting required to alleviate M32 J1 and M4 J19. Options A-C comprise options for locating a new M4 J18A, which will be assessed by an ongoing feasibility study. The JTS has assumed a general route alignment with no preference for any specific alignment option. The J18A feasibility study is expected to report in March 2018.
Dependencies	M4 Junction 18A and connection to the Ring Road is a pre-requisite for providing a connection from M4 Junction 18A to Yate (Road 4). Potential dependence on Smart Motorway M4 J18-19 (Road 9).

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Support Core Strategy development in the East Fringe, North Fringe and Yate area.	✓✓
	- Implementation of strategic infrastructure will reduce congestion and improve accessibility.	✓✓
Performance against Objectives	(a) From the west, reduce traffic volumes and severe congestion at M4 Junction 19, M32 Junction 1 and on the A4174 Ring Road.	✓✓✓
	(b) From the east, reduce rat-running of traffic through villages between Junction 18 and the East Fringe.	✓✓
	(c) Facilitate delivery of new Orbital MetroBus services and MetroBus Services from Yate by diverting traffic from congested networks.	✓✓
	(d) Increase resilience of transport networks in North Bristol and North and East Fringes.	✓✓✓
	(e) Unlock growth potential at the Emersons Green Enterprise Zone. Support delivery of Core Strategy and JSP development locations.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓
	Impacts on National Networks: overall benefit to SRN, but increased traffic on J20-J19 in response to large reduction in delay at J19.	✓
	Resilience: improved operating conditions for strategic movements increasing resilience. New connection to the A4174 from the M4. Reduces congestion related collisions on M4 J19 and M32 J1, and on the A4174 corridor	✓✓✓
	Unlock new growth in jobs and housing: unlocks growth potential at Emersons Green Enterprise Zone and support Core Strategy.	✓✓✓
	Connections to Gateways: improved access to national corridor (M4) for the Emersons Green Enterprise Zone.	✓✓✓
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements, reduce congestion and fuel consumption, but overall neutral impact is assumed.	-
	Low carbon choices: risk of encouraging car based travel if measures are not in place to manage demand. However it would facilitate the proposed Yate and Orbital MetroBus routes.	-
Quality of Life and the Natural Environment	**Built environment:** neutral.	-
	Natural environment: based on preliminary screening of environmental designations: Scheme lies within Priority Habitat and Flood Zones 2 & 3. Scheme adjacent to (within 500m): Listed Buildings. Due to the environmental constraints identified it will have an overall minor negative impact, which will be taken into account in the scheme design process.	x
Improve Health, Safety and Security	**Healthy travel choices:** potential to encourage car use if measures are not in place to manage demand, but would facilitate improvements to strategic cycle routes on the Ring Road.	-
	Air quality: will improve air quality by reducing traffic levels on the A4174, but potential for worsened air quality between J20 and J19.	-
	Safety for transport users: reduced rat-running of traffic through villages between J18 and the East Fringe. Safety implications for weaving between J18, J18A and J19 to be considered when selecting a preferred location for the junction.	✓✓
Promote Accessibility	**Access to jobs & training:** neutral in isolation.	-
	Access to local services: neutral in isolation.	-
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs (Present Value of Costs, incl 44% Optimism Bias).	£211 million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs — High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance (based on general route alignment with no preference for any specific alignment option)	£140 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£195 million
Potential Funding Sources	Highways England Route Improvement Programme, West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓
Affordability	Scheme represents a step-change in investment level compared with the current West of England major scheme programme. Expected High BCR will contribute to the scheme's business case.	?
Delivery Agencies	Highways England and South Gloucestershire Council - as a scheme which directly affects the strategic road network (including a new motorway junction) this will involve joint working. Lead delivery agency would need to be agreed. Feasibility study is underway.	✓
Key Project Risks	(1) Selection of preferred location for J18A (constraints include existing development, environmental designations, proximity to J19 and J18, levels of traffic reassignment), (2) Scheme is not currently in the Road Investment Strategy: work required to demonstrate case to include in future RIS.	?
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. There is limited evidence on the level of public support for this specific proposal but no clear evidence of opposition. Localised impacts will need to be addressed.	✓
Commercial Case	Project could be delivered through a range of procurement models.	✓

Name of Project:	**M4 Junction 18A to Yate**
Reference:	**Road 4**

Scheme Description	A new single carriageway road link from Yate to the new M4 Junction 18A, to enable traffic from Yate to directly access Emersons Green and the east of Bristol. The new road link would connect from the A432 (in the Nibley area) to M4 Junction 18A. Delivery of M4 Junction 18A and a new connection to the Ring Road (scheme *Road 3*) would be a pre-requisite. Where there is sufficient road width available southbound bus lanes could be provided, and where there is insufficient width, bus gates could be considered (e.g. on Station Road).
Current and Future Policy Context	The SGC Core Strategy makes provision for up to 3,000 dwellings at North Yate (2,700 within plan period) in Policy CS31, together with the Yate and Chipping Sodbury Package (Policy CS7). Policy CS8 requires that all new development proposals of sufficient scale will be required to contribute to schemes in Policy CS7 and other physical off-site local transport improvements may be necessary to make the scheme acceptable. Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility. The JSP also proposes strategic development in the Yate Strategic Corridor and at Coalpit Heath.
Need for Intervention *(specific to the area under consideration)*	(1) Heavy traffic flows between Yate and the North Fringe and Bristol, resulting in heavy traffic flows on the A432 corridor, with significant delays at the junction with the Ring Road, and on the B4058 through Winterbourne. Delays on the A432 result in rat running through nearby villages. (2) Access between M4 and Yate is from M4 J18 or J19, both of which have high volumes of traffic causing delays and unreliable journey times. (3) Congestion on the A432 and B4058 causes delays to bus services, increasing car dependency. (4) Without additional road capacity, there is unlikely to be sufficient roadspace to deliver MetroBus services, including the services from Yate.
Objectives *(tailored to respond to the need for intervention)*	(a) Reduce traffic flows and delays on the A432 and B4058 corridors. (b) Reduce rat running through villages near the A432. (c) Improve bus journey times on the A432 and B4058 by improving general traffic conditions. (d) Facilitate delivery of MetroBus from Yate, by enabling reallocation of roadspace on the A432 to MetroBus. (e) Improve highway access between Yate and the M4.
Options Considered	A. M4 Junction 18A to Yate (with M4 J18A Link to Ring Road as a pre-requisite). B. M4 Junction 18A to Yate (without prior delivery of the M4 J18A Link to Ring Road). C. A432 junction improvement package.
Option Selected *(and rationale)*	Option B was discounted as it would not provide a link from Yate to employment at Emerson's Green - without a link from J18A to the Ring Road it would worsen conditions on the Ring Road. Option C was discounted - it would not facilitate the rerouting required to alleviate the A432. Option A was selected - as a second scheme linking to J18A it would facilitate a direct link to Emersons Green from Yate. It would be single carriageway standard between Yate and M4 J18A.
Dependencies	Enables MetroBus extension to Yate. M4 Junction 18A to Ring Road is a pre-requisite for the M4 Junction 18A Link to Yate scheme. Potential to serve potential development in Yate proposed as part of the JSP, but not part of the mitigation package.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Implementation of strategic infrastructure which reduces congestion and improves accessibility. Support public transport investment.	✓✓
	- Supports delivery of Core Strategy (and longer term growth in Yate area) by providing additional capacity.	✓✓
Strength of Support for Objectives	(a) Reduce traffic flows and delays on the A432 and B4058 corridors.	✓✓✓
	(b) Reduce rat running through villages near the A432.	✓✓
	(c) Improve bus journey times on the A432 and B4058 by improving general traffic conditions.	✓✓
	(d) Facilitate delivery of MetroBus from Yate, by enabling reallocation of roadspace on the A432 to MetroBus.	✓✓
	(e) Improve highway access between Yate and the M4.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: overall benefit to SRN, but increased traffic on J20-J19 in response to large reduction in delay at J19.	✓	
	Resilience: provides an alternative route between the M4 and Yate in the event of incidents on the M4.	✓	
	Unlock new growth in jobs and housing: support delivery of Core Strategy and JSP development sites, although not a pre-requisite.	✓	
	Connections to Gateways: improved access to national corridor (M4 motorway).	✓✓	
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements and reduce distance travelled - however it may generate traffic on the M4.	-	
	Low carbon choices: risk of new road encouraging car based travel in isolation, but capacity will be reduced on parallel A432 to facilitate Yate MetroBus corridor.	-	
Quality of Life and the Natural Environment	**Built environment:** reduced traffic will allow reallocation of roadspace on the A432 to active modes and public realm improvements.	✓	
	Natural environment: based on preliminary screening of environmental designations: Scheme lies within: Green Belt and Flood Zones 2 & 3. Adjacent to (within 500m): Listed Buildings and Priority Habitats. Due to environmental constraints identified it will have an overall moderate negative impact, which will be taken into account in the scheme design process.	××	
Improve Health, Safety and Security	**Healthy travel choices:** potential to slightly encourage car use. However it would facilitate facilitate the proposed strategic cycle route from Yate.	-	
	Air quality: reduced traffic along the A432.	✓	
	Safety for transport users: less rat-running of traffic on rural lanes near the A432 between Yate and the North Fringe.	✓	
Promote Accessibility	**Access to jobs & training:** neutral in isolation.	-	
	Access to local services: neutral in isolation.	-	
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs (Present Value of Costs, incl 44% Optimism Bias).	£103	million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs — Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 7.0km of new carriageway	£68	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£95	million
Potential Funding Sources	Highways England Route Improvement Programme, West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL)	✓	
Affordability	Scheme represents a step-change in investment level compared with the current West of England major scheme programme.	?	
Delivery Agencies	Highways England and South Gloucestershire Council - as a scheme which directly affects the strategic road network (linking to a new motorway junction) this will involve joint working. Lead delivery agency would need to be agreed.	✓	
Key Project Risks	(1) Dependent on delivery of M4 Junction 18A to the Ring Road, (2) Selected location for Junction 18A may impact on attractiveness of a link between Junction 18A and Yate (3) Potential location for crossing of railway line.	?	
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. There is limited evidence on the level of public support for this specific proposal but no clear evidence of opposition. Localised impacts will need to be addressed.	✓	
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified.	✓	

Name of Project:	South Bristol Orbital Corridor
Reference:	Road 5

Scheme Description	Multi-modal transport link from Hicks Gate to Hengrove Roundabout. Route will incorporate both new links and improvements to existing roads. To comprise a new corridor between Hicks Gate and A37 south of Whitchurch and a combination of new links and improvements to existing roads from A37 to Hengrove Roundabout. Orbital MetroBus would deliver bus lanes in both directions (refer to the Orbital MetroBus Scheme Summary) and four lanes in total would be provided.
Current and Future Policy Context	The SGC Core Strategy includes major mixed-use development on 177ha of land at Emersons Green East comprising ~2,400 dwellings, a Science Park (25ha) and 19ha of employment land. SGC Policy CS7 gives priority to implementation of strategic infrastructure which reduces congestion and improves accessibility by modes other than private car. Bath & North East Somerset Core Strategy Policy RA5 covers Land at Whitchurch, comprising ~200 dwellings. Transport requirements include integration into neighbouring developments, links to existing bus routes and contributing to improved local bus services. The JSP also proposes strategic development in the Whitchurch area. Bristol Policy BCS1 includes South Bristol as a priority focus for development and comprehensive regeneration, comprising around 8,000 new homes, around 60,000m² of net additional office floorspace, and up to 10 hectares of new industrial and warehousing land.
Need for Intervention *(specific to the area under consideration)*	(1) Poor strategic transport links to/from South Bristol: long journey times are impacting on business performance and constraining inward investment. (2) High levels of orbital movement using urban roads due to lack of adequate alternatives. Congestion and slow journeys caused by pinchpoints on the network. High levels of use of unsuitable minor roads. (3) Heavy traffic and congestion constrain the ability to reallocate roadspace for walking, cycling and public transport. (4) High level of growth due to urban living and proposed strategic location at Whitchurch. Current transport network limits opportunities to reallocate roadspace and improve options for active travel and public transport.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve strategic connectivity to South Bristol to improve business competitiveness and attractiveness for future business investment; (b) Reduce traffic flows on busy urban roads to improve environmental conditions and enable roadspace reallocation; (c) Improve resilience in the wider transport network by enabling proactive management of traffic; (d) Mitigate the effects of traffic generated by additional development; (e) Support sustainable travel choices for new development in the JSP by reducing traffic entering the urban area and enabling reallocation of roadspace.
Options Considered	A. On-line widening of existing route via A4 Bath Rd, A4174 Callington Rd, Airport Rd. B. New orbital corridor between Hicks Gate Roundabout and Hengrove Roundabout. C. New orbital corridor between Hicks Gate Roundabout and A38 at Barrow Common.
Option Selected *(and rationale)*	Option A was discounted because it would fail to address the objectives. Option C would require major engineering works in the Dundry Hill, with significant potential environmental impacts, and high costs. Option B is considered to deliver the strongest performance against the objectives.
Dependencies	Orbital MetroBus and improved public transport links would be dependent on this project.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports regeneration in Hengrove and South Bristol by providing additional transport capacity to unlock new development	✓✓
	- Supports delivery of strategic location at Whitchurch by providing additional transport capacity	✓✓
Performance against Objectives	(a) Improve strategic connectivity to South Bristol: direct connection to Ring Road at Hicks Gate	✓✓✓
	(b) Reduce traffic flows on busy urban roads: benefits on A4, A37, Airport Road	✓✓
	(c) Improve resilience in the wider network: benefits in helping respond to incidents on network	✓✓✓
	(d) Mitigate effects of traffic generated by development: new link will provide transport capacity for growth	✓✓✓
	(e) Support travel choices for new development: new link will facilitate active travel and new bus connections	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓
	Impacts on National Networks: improved highway connectivity from South Bristol to the M32 (via the A4174). Secondary role as a diversionary route in conjunction with M4 J18A and M5 J21A proposals.	✓
	Resilience: new link will be a key component in improving network resilience in the sub-region.	✓✓✓
	Unlock new growth in jobs and housing: unlocks employment and homes in South Bristol, 3,500 homes at Whitchurch.	✓✓✓
	Connections to Gateways: slight improvement to connectivity to Bristol Airport from the east.	✓
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements and reduce distance travelled.	✓✓
	Low carbon choices: neutral in isolation, but will be a key component in enabling roadspace reallocation for low-carbon modes.	-
Quality of Life and the Natural Environment	**Built environment:** reduced traffic will enable modest reallocation of roadspace on A4. However, more traffic on other urban roads would need to be addressed as part of a whole corridor package.	✓
	Natural environment: based on preliminary screening of environmental designations: Scheme lies within: Green Belt. Scheme adjacent to (within 500m): Flood Zones 2 & 3, Priority Habitats, Registered Park and Garden and Listed Buildings. New transport corridor will pass through countryside on edge of city. Due to the environmental constraints identified it will have an overall moderate negative impact, which will be taken into account in the scheme design process.	××
Improve Health, Safety and Security	**Healthy travel choices:** neutral (in isolation) but will facilitate reallocation of roadspace for increased active travel in urban area.	-
	Air quality: reduces traffic on congested urban roads.	✓✓
	Safety for transport users: less rat-running of traffic on narrow rural lanes and through residential areas.	✓✓
Promote Accessibility	**Access to jobs & training:** neutral in isolation but will support improved public transport to Hengrove Park and new employment opportunities.	✓
	Access to local services: neutral in isolation but will will form key component of access strategy at Whitchurch.	✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£135 million
	Impact of Tax Revenues: small reduction in tax revenues from fuel consumption (small, assume neutral)	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs	High (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 8km of new carriageway	£90 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£125 million
Potential Funding Sources	West of England Devolution Deal, Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL)	✓
Affordability	Significant investment, but broadly equivalent to major projects currently / recently delivered.	✓
Delivery Agencies	Local Authorities (Bath & North East Somerset, Bristol City Council). As a cross-boundary scheme, this will joint-working by the local authorities. This model is already proven.	✓
Key Project Risks	(1) Public opposition to alignment of link, (2) Integration of new link with strategic development at Whitchurch, (3) Ability to mitigate increases in traffic flows on new transport corridor in urban area.	✓
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. However, the consultation identified significant levels of opposition to this specific proposal. Environmental impacts and impacts on local communities will need to be carefully managed and mitigated.	?
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified.	✓

Name of Project:	M5 Junction 21A to A38 Corridor
Reference:	Road 6

Scheme Description	This is a multi-modal package of schemes comprising: - A new motorway junction on the M5 for Weston-super-Mare and the A371 (M5 J21A), which will connect to the A371, A368 and A38. - A strategic link from M5 J21A to the A38, running parallel to the A371 and A368, incorporating Banwell and Churchill Bypasses. - An upgrade of the A38 between Langford and Bristol Airport and dualling of the A38 between Bristol Airport and South Bristol Link (SBL). - Strategic cycle route connections towards Weston-super-Mare and Bristol Airport to be incorporated into highway proposals.
Current and Future Policy Context	North Somerset Core Strategy Policy CS23 highlights that the 2003 Air Transport White Paper supports development of Bristol Airport to accommodate up to 12 million passengers per annum (mppa) by 2030. The Core Strategy highlights that surface access issues need to be addressed. Policy CS28 states that Weston-super-Mare will be the primary focus for development within North Somerset, with a minimum of 12,800 dwellings and 10,500 jobs in Weston-super-Mare as part of an employment-led strategy. Policy CS30 on Weston Villages recognises the need to improve M5 Junction 21 requiring a Junction 21 Bypass or alternative. Strategic development is proposed by the JSP at Banwell and Churchill in the M5 to A38 Transport Corridor.
Need for Intervention *(specific to the area under consideration)*	(1) Poor highway connectivity to Bristol Airport from the north and south. Direct access from M5 to Bristol Airport is currently only possible from M5 J21 (via A370), or significantly further south (J22, via A38), with unreliable and lengthy journey times. (2) Severe congestion at M5 J21, with major problems for movements into and out of Weston. This will worsen with Core Strategy and JSP development. (3) High traffic volumes on A370 through villages including Congresbury, and villages on A368 including Banwell and Churchill. Traffic will increase with forecast growth. (4) Delays and unreliable journey times by car and public transport along A38 south of Bristol. Pinchpoints at Lulsgate Bottom and Barrow Gurney signalised junctions. (5) Poor cycle connectivity through Banwell, Sandford and Churchill villages.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve highway access and reduce journey times between the M5 and Bristol Airport. (b) Improve journey times into and out of Weston-super-Mare via M5 Junction 21. (c) Reduce traffic volumes on A370 through villages such as Congresbury and Brockley to deliver wider network benefits. (d) Reduce traffic volumes on A368 through villages, including Banwell and Churchill. (e) Improve journey times and reliability along A38 corridor for journey by car, public transport and cycling.
Options Considered	A. Improvements along A38 from Langford to Bristol Airport and dualling from Bristol Airport to South Bristol Link. B. M5 Junction 21 Bypass - a scheme that bypasses the A370 away from the J21 roundabout to a separate alignment to the south, using the existing Wolvershill Road bridge over the M5. C. Banwell & Churchill Bypass (different alignment options but providing a comprehensive solution from Weston-super Mare to A38 at Langford). D. M5 Junction 21A (positioned to align with Banwell Bypass, with different junction options, including all movements junction or south-facing slip roads only). E. Comprehensive route upgrade, comprising (A) A38 improvements, (C) Banwell & Churchill Bypass and (D) M5 Junction 21A.
Option Selected *(and rationale)*	Option A: discounted in isolation (fails to tackle problems at Banwell and Weston). Option B: discounted (fails to tackle problems at Banwell & Churchill and would not achieve the high level of traffic reassignment needed from the A370 onto the A38/A371), Option C: discounted in isolation (increases traffic on A371/A370 towards Weston). Option D: discounted in isolation (increases traffic through Banwell and Churchill, worsening current problems). Option E (combining A, C and D) will significantly reduce traffic volumes passing through J21 by diverting longer-distance movements between the M5 south and Bristol away from the junction. J21A, together with local access connections, is therefore considered to offer the optimal long-term solution.
Dependencies	A new M5 J21A is dependent on delivery of a Banwell & Churchill Bypass.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Addresses traffic issues at M5 Junction 21, to improve access to/from Weston-super-Mare and Bristol Airport by car and bus.	✓✓✓
	- Supports delivery of growth in the Weston area by providing additional transport capacity for cars, bus and cycle.	✓✓✓
Performance against Objectives	(a) Improve highway access and reduce journey times between the M5 (south) and Bristol Airport.	✓✓✓
	(b) Improve journey times into and out of Weston via M5 Junction 21.	✓✓✓
	(c) Reduce traffic volumes on A370 through villages such as Congresbury and Brockley.	✓✓
	(d) Reduce traffic volumes on A368 through villages, including Banwell and Churchill.	✓✓✓
	(e) Improve journey times and reliability along A38 corridor for journey by car and public transport.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓
	Impacts on National Networks: reduced traffic flows and decongestion benefits on M5 between Weston and Bristol.	✓✓
	Resilience: wider benefit of increased network resilience from improved diversionary route towards and around Bristol.	✓✓✓
	Unlock new growth in jobs and housing: unlocks JSP development on the M5 to A38 Transport Corridor. Supports Core Strategy and unlocks employment growth at Bristol Airport.	✓✓✓
	Connections to Gateways: M5 J21A and new route will significantly improve connectivity from the M5 to the Airport.	✓✓✓
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements. M5 J21A will reduce distance travelled.	✓
	Low carbon choices: potential risk of encouraging car travel, however package will facilitate significant improvements to cycling infrastructure through villages.	-
Quality of Life and the Natural Environment	**Built environment:** no direct impact (scheme located outside of the urban environment), although there will be changes in traffic flows on routes into Weston town centre. Overall impact is judged to be neutral.	-
	Natural environment: based on preliminary screening of environmental designations: Scheme would be located in Green Belt, Priority Habitats and Flood Zones 2 & 3. Adjacent (within 500m) to a number of other environmental designations, including Mendips AONB and SAMs, SSSI, SAC and Listed Buildings. Due to the environmental constraints identified it will have an overall significant negative impact, which will be difficult to mitigate, but will be taken into account in the scheme design process.	×××
Improve Health, Safety and Security	**Healthy travel choices:** new road may slightly encourage car use for shorter trips. Strategic cycle improvements and reducing traffic within Banwell and Churchill will help to encourage walking and cycling for short trips.	✓
	Air quality: improved air quality in Banwell and Churchill villages by diverting traffic around the villages.	✓
	Safety for transport users: moderate contribution to improving safety. Less rat-running of traffic on narrow rural lanes, e.g. Stock Lane.	✓
Promote Accessibility	**Access to jobs & training:** slight improvement in journey times for bus services on the A38/A368 corridor, improving access to jobs at Bristol Airport and Weston College. Similar benefits for A370 bus services into Weston with improved traffic conditions at J21.	✓
	Access to local services: slight improvement in journey times for bus services on the A38/A368 corridor, improving access to services in Weston, for villages along this route. Similar benefits for A370 bus services into Weston with improved traffic conditions at J21.	✓
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£621 million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral).	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs	High (Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 17km of new carriageway + 7.5km improvements	£410	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£575	million
Potential Funding Sources	West of England Devolution Deal (will require protocol with North Somerset), Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓	
Affordability	Scheme represents a step-change in investment compared with the current West of England major scheme programme. Assume development on the M5 to A38 Transport Corridor could only part fund this based on indicative cost per dwelling.	?	
Delivery Agencies	Local Authorities (North Somerset, Bristol City Council) and Highways England. As a cross-boundary scheme, this will require joint-working by the local authorities. This model is already proven through the current major scheme programme.	✓	
Key Project Risks	(1) Public opposition to alignment of link (2) Integration of link with JSP development at Banwell and Churchill, (3) Selection of preferred option must avoid creating weaving between J21 and J21A, (4) Scheme is not in current HE Road Investment Strategy to 2025.	?	
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. However, the consultation identified significant levels of opposition to these specific proposals. Environmental impacts and impacts on local communities will need to be carefully managed and mitigated.	?	
Commercial Case	Project could be delivered through a range of procurement models. There would be a need to agree with developer whether it would build certain sections or make financial contributions to the Council.	✓	

Name of Project:	**Nailsea Corridor Improvement**
Reference:	**Road 7**

Scheme Description	Multi-modal corridor improvement (highway, MetroBus, strategic cycling route) between Bristol / A370, Nailsea and connecting to Clevedon / M5. The primary focus will be to the east of Nailsea, joining the A370 to the west of Long Ashton, with a new crossing of the railway line west of Backwell to join the A370. This will help to support growth at Nailsea and Backwell and improve connectivity and travel choices between Nailsea and Bristol. This will include provision of infrastructure to support delivery of MetroBus between Nailsea and Bristol (scheme MetroBus 2).
Current and Future Policy Context	North Somerset Core Strategy Policy CS31 includes a minimum of 1,100 dwellings for Nailsea, and 700 for Clevedon. These towns will maintain and enhance their roles in providing facilities, employment opportunities and services for their populations and local catchments. Nailsea in particular has suffered from being planned as a dormitory town in the 1960s, and Nailsea and Clevedon have high levels of out-commuting. The potential for further development has been identified at Nailsea and Backwell as part of the JSP Emerging Spatial Strategy, although this is not adopted policy.
Need for Intervention *(specific to the area under consideration)*	(1) Need for effective connectivity from Nailsea and Backwell development by all modes. Development at Nailsea and Backwell will further increase congestion problems along the A370 without major connectivity improvements. (2) Long journey times by public transport from Clevedon and Nailsea to Bristol due to constraints on existing road network. (3) High levels of traffic through villages on A370 (e.g. Flax Bourton, Backwell and Congresbury) and on B3130 through Tickenham. (4) Slow and unreliable journey times on A370 between J21 and South Bristol (with significant hotspots at Congresbury and Backwell). (5) Long and unreliable journey times from the M5 to South Bristol, with poor quality connectivity on all routes, including A38, A370 and A369.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide a more direct and faster route for the proposed MetroBus route from Clevedon and Nailsea to Bristol, and strategic cycle route, encouraging mode shift. (b) Address congestion pinch points at Congresbury and Backwell traffic lights, and improve access to Nailsea. (c) Reduce traffic through villages on A370 (Congresbury, Backwell, etc) and B3130 (Tickenham). (d) Improve access and reduce journey times between the M5 and South Bristol. (e) Mitigate the traffic impacts of JSP development at Nailsea and Backwell, on the A370 and the B3130 through Tickenham.
Options Considered	A. New corridor, from A370 Long Ashton Bypass to the south of Nailsea, with connection to A370 west of Backwell, and improved transport connections to Clevedon / J20. B. New corridor, from A370 Long Ashton Bypass to the north of Nailsea, with connection to A370 west of Backwell, and improved transport connections to Clevedon / J20. C. A370 corridor highway improvements (package of junction improvements).
Option Selected *(and rationale)*	Option C: discounted because there is insufficient space to improve congested junctions on the A370 corridor (e.g. Backwell signals). Option B: discounted because it would not serve the JSP locations at Nailsea and Backwell, which would otherwise impact on Backwell signals. Option A would provide the most appropriate means of improving local connectivity in the Nailsea corridor and mitigating the impacts of additional traffic generated by growth in the area. Further consideration of options to connect to Clevedon will be needed, including potential peak hour access controls for connecting to J20.
Dependencies	The link would support the delivery of the new MetroBus corridor between Clevedon, Nailsea and Bristol.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Supports delivery of planned growth in Clevedon and Nailsea.	✓✓
	- Supports future potential growth in North Somerset.	✓✓
Performance against Objectives	(a) Provide a more direct and faster route for the proposed MetroBus route from Clevedon and Nailsea to Bristol, and strategic cycle route, encouraging mode shift.	✓✓
	(b) Address congestion pinch points at Congresbury and Backwell traffic lights, and improve access to Nailsea.	✓✓
	(c) Reduce traffic through villages on A370 (Congresbury, Backwell, etc) and B3130 (Tickenham).	✓✓
	(d) Improve access and reduce journey times between the M5 and South Bristol.	✓✓
	(e) Mitigate the traffic impacts of JSP development at Nailsea and Backwell, on the A370 and the B3130 through Tickenham.	✓✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓✓
	Impacts on National Networks: depending on form of link from Nailsea to Clevedon, there could be changes in use of M5 for trips to Weston and North Fringe.	×
	Resilience: wider benefit of increased network resilience for the M5 in event of incident between J20 and North Fringe.	✓✓
	Unlock new growth in jobs and housing: unlocks JSP development at Nailsea / Backwell.	✓✓
	Connections to Gateways: slight improvement to connectivity to Bristol Airport from Clevedon/Portishead, from M5 to A370.	✓
Reduce Carbon Emissions	**Resource efficiency:** new link will improve efficiency of traffic movements. J20 Link will reduce distance travelled.	✓
	Low carbon choices: risk of new road encouraging car based travel. However it would improve the proposed MetroBus from Clevedon and Nailsea to Bristol, by making the Clevedon to Nailsea route more direct, and provision of strategic cycling connections.	✓
Quality of Life and the Natural Environment	**Built environment:** no impact - scheme is located outside of the urban environment.	-
	Natural environment: based on preliminary screening of environmental designations: Scheme falls within: Greenbelt, SSSI, Ancient Woodland, Priority Habitats, SAM and Flood Zone 3. Scheme is also adjacent to (within 500m) of Listed Buildings and Registered Park and Garden. Due to the environmental constraints identified it will have an overall significant negative impact, which will be difficult to mitigate, but will be taken into account in the scheme design process.	×××
Improve Health, Safety and Security	**Healthy travel choices:** scheme will incorporate a strategic cycle route, opportunity to encourage active travel in Nailsea - Long Ashton corridor.	✓
	Air quality: reduced traffic through the A370 and B3130 villages. Note slight increase in traffic forecast to the east of Nailsea.	✓
	Safety for transport users: less rat-running of traffic on rural lanes between Nailsea and Clevedon and through residential areas.	✓
Promote Accessibility	**Access to jobs & training:** neutral in isolation but will strongly complement the proposed MetroBus from Clevedon and Nailsea to Bristol, providing a more direct route.	✓
	Access to local services: neutral in isolation but will strongly complement the proposed MetroBus from Clevedon and Nailsea to Bristol, providing a more direct route.	✓
Costs to Public Accounts	**Cost to Transport Budget:** high-level estimate of construction costs (Present Value of Costs, incl 44% Optimism Bias).	£286 million
	Impact of Tax Revenues: small reduction in tax revenues from reduction in fuel consumption (small, assume neutral)	-
Value for Money	Initial assessment of Value for Money, based on benefits and costs — High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance, based on 13km of new carriageway	£189 million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£265 million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).	✓
Affordability	Scheme represents a step-change in investment level compared with the current West of England major scheme programme. Assume development at Nailsea / Backwell could only part fund this based on indicative cost per dwelling.	?
Delivery Agencies	North Somerset Council and Highways England - as a scheme which directly affects the strategic road network (including modifications to M5 Junction 20) this will involve joint working. Lead delivery agency would need to be agreed.	✓
Key Project Risks	(1) Crossing flood plain between Clevedon and Nailsea (network of drainage ditches) (2) Mitigation of significant environmental impacts (3) Ability to mitigate increased traffic flows to the east of Nailsea (3) Scheme is not in Highways England's Road Investment Strategy.	??
Public Support	JTS consultation demonstrated that just over 50% of respondents supported the principle of new roads. However, the consultation identified significant levels of opposition to this specific proposal. Environmental impacts and impacts on local communities will need to be carefully managed and mitigated.	?
Commercial Case	Project could be delivered through a range of procurement models. NSC has previously worked with Highways England.	✓

Name of Project:	Weston-super-Mare Package
Reference:	Road 8

Scheme Description	Package of highway connectivity measures to support development in Weston-super-Mare and at Weston Villages, comprising the Airfield Bridge Link and targeted junction improvements on the A370. Junction improvements focus on locations under most pressure (Airport Roundabout and West Wick Roundabout, plus works to other junctions), reflecting current and future travel patterns. To be complemented by Weston Bus Network, Weston MetroBus and Weston Cycle Network to provide sustainable travel options for travel within the town. Weston Park & Ride will intercept trips into the town, and rail for longer distance journeys to/from the town (see separate Scheme Summaries).
Current and Future Policy Context	Core Strategy Policy CS28 includes a minimum of 12,800 dwellings to be delivered in Weston-super-Mare over the plan period, together with approximately 10,500 jobs, to deliver improved self-containment and reduced out-commuting. Core Strategy Policy CS30 on Weston Villages includes two mixed-use, employment-led, sustainable new communities to the east of the town. This will include at least 6,500 homes and 37.7ha of B Use Class employment land over the plan period. Further development is planned at Weston-super-Mare as part of the JSP. Policy CS10 requires developments of 10 or more dwellings to commit to maximise sustainable transport solutions (walking, cycling and public transport), particularly at Weston-super Mare.
Need for Intervention *(specific to the area under consideration)*	(1) The main railway line is a barrier to movement between the existing town and the regeneration area. (2) Travel demand from Weston-super-Mare to employment opportunities outside of the town contributes to congestion on the A370. (3) Travel demand from outside of Weston-super-Mare contributes to congestion on the A370 within the town. (4) Additional travel demand generated by planned residential and employment development will impact on the existing transport network.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve connectivity for all modes across the railway line between the town centre and Weston Villages. (b) Improve journey time reliability on the A370 corridor in Weston-super-Mare. (c) Improve access to/from key destinations in the town. (d) Mitigate the effects of traffic generated by additional development.
Options Considered	A. West Wick Roundabout improvements. B. West Wick Roundabout improvements + Airport Roundabout improvements. C. West Wick Roundabout improvements + Airport Roundabout improvements + Airfield Bridge Link.
Option Selected *(and rationale)*	Option C is selected as it will improve the operation of two key junctions on the A370, and improve connectivity across the railway line for all modes, in particular the proposed MetroBus route. Options A and B would not provide connectivity across the railway line, and both junctions will need upgrading taking into account current flows and future development proposals.
Dependencies	Complementary to delivery of M5 Junction 21A and Banwell & Churchill Bypass, and improvements to M5 Junction 21. Also cmplemented by Weston Park & Ride, Weston Bus Network, Weston MetroBus, and Weston Cycle Network.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	- Support delivery of growth in the Weston area.	✓✓
	- Improve efficiency of the A370 (Weston-super-Mare) without encouraging out-commuting.	✓✓
Performance against Objectives	(a) Improve connectivity for all modes across the railway line between the town centre and Weston Villages.	✓✓
	(b) Improve journey time reliability on the A370 corridor in Weston-super-Mare.	✓✓
	(c) Improve access to/from key destinations in the town.	✓
	(d) Mitigate the effects of traffic generated by additional development.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓	
	Impacts on National Networks: no impact.	-	
	Resilience: the Airfield Bridge Link will provide a new route between the Airfield, the wider regeneration area and the town centre, addressing severance caused by the railway line.	✓	
	Unlock new growth in jobs and housing: infrastructure required to support development in Weston-super-Mare and Weston Villages.	✓✓	
	Connections to Gateways: no impact.	-	
Reduce Carbon Emissions	**Resource efficiency:** airfield Bridge Link will improve penetration of sustainable transport schemes into Weston Villages.	✓	
	Low carbon choices: airfield Bridge Link will encourage use of sustainable modes, in particular active modes.	✓	
Quality of Life and the Natural Environment	**Built environment:** no impact.	-	
	Natural environment: scheme is assumed to be largely within the highway boundary. Any local environmental issues would be identified at feasibility study stage on a scheme-by-scheme basis, and taken into account in the scheme design process.	-	
Improve Health, Safety and Security	**Healthy travel choices:** positive impact on improving conditions for walking and cycling as a healthy travel choice.	✓✓	
	Air quality: facilitating mode shift from car to sustainable modes is expected to provide some benefit to air quality.	✓	
	Safety for transport users: pedestrian and cycle improvements will help improve safety.	✓	
Promote Accessibility	**Access to jobs & training:** the Airfield Bridge Link would improve the effectiveness of bus services between the regeneration sites and Weston College by avoiding the existing, longer and congested routes and providing a direct route towards the town centre.	✓✓	
	Access to local services: the Airfield Bridge Link would improve the effectiveness of bus services between the town and the regeneration sites by avoiding the existing, longer and congested routes and providing a very direct route towards the town centre.	✓✓	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£43	million
	Impact of Tax Revenues: negligible impact on tax revenues assumed.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£30	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£40	million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL). The A371 to Wolvershill Link is a requirement of the Parklands Village development as set out in the Weston Villages Supplementary Planning Document Consultation Draft June 2011.	✓	
Affordability	Package can be delivered in a phased approach to maximise affordability.	✓	
Delivery Agencies	North Somerset Council.	✓	
Key Project Risks	(1) Airfield Bridge Link not currently being progressed by the developer - risk of land being developed for other uses, (2) Detail of specific measures is yet to be developed - unforeseen risks.	✓	
Public Support	JTS consultation demonstrated that over 70% of respondents supported the concept of area packages for walking, cycling and buses, and over 70% support road improvements. There is limited evidence of the level of support for this package, but no clear evidence of opposition.	✓	
Commercial Case	Project could be delivered through a range of procurement models depending on how the area package is phased.	✓	

Name of Project:	Smart Motorway: M4 Junction 18 - Junction 19
Reference:	Road 9

Scheme Description	Smart Motorway scheme on the M4 from J18 (A46, Tormarton) to J19 (M32). This will complement the recently delivered M4 J19-20 and M5 J15-17 Smart Motorway to provide an extensive system of motorway management on the most congested parts of the network. The M4 J18-19 scheme will deliver increased capacity and enhanced reliability to complement the delivery of the new M4 J18A (to provide direct access to the Bristol East Fringe).
Current and Future Policy Context	Highways England's London to Wales Route Strategy (March 2017) highlights a number of challenges on the route, including safety issues at J19, between J19 and J20, and along the M32. There are also capacity issues between J19 and J20 and along the M32, and major development pressures associated with growth in Emersons Green, Filton and Severnside. Both Bristol and Bath are identified as Economic Opportunity Areas. The M4 between Junctions 18 and 22 will be assessed further by Highways England in development work for RIS2.
Need for Intervention *(specific to the area under consideration)*	(1) High levels of traffic on the M4 between Swindon (J15) and Bristol (J20), particularly between J18 and J20. (2) Congestion and queueing traffic between J20 and J19, and on slip roads at J19 (M32) and at M32 J1. (3) Planned growth in West of England will increase demand on network, particularly the critical junction at J19. (4) Changes in traffic flows associated with a new J18A will increased demand and potential pressures between J18 and J19. (5) Plans to reduce the Severn Bridge Tolls are expected to increase flows on the M4 around Bristol.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve journey time reliability on the M4 between J18 (Tormarton) and J20 (Almondsbury). (b) Improve road safety and reduce impacts of incidents on route between J18 and J20. (c) Provide sufficient capacity to accommodate flows resulting from proposed J18A connecting to Bristol East Fringe and Yate. (d) Reduce congestion on the strategic road network around the north of Bristol.
Options Considered	A. Do nothing - no improvements to the M4 between Junctions 18 and 19. B. Extend Smart Motorway on the M4 between Junctions 18 and 19. C. Full widening (to four lanes) on the M4 between Junctions 18 and 19.
Option Selected *(and rationale)*	Option A will fail to address the current problems and will fail to address the future challenges on the route. Option C would draw extra traffic onto the route and result in worsened conditions between J19 and J20. It would also have significant environmental impacts on the edge of the Cotswolds AONB. Option B is preferred: it will provide enhanced capacity and reliability benefits, whilst enabling proactive management of traffic. Careful consideration should be given to the visual environmental impacts of the new infrastructure on the Cotswold AONB. The scope of the scheme should be confirmed following completion of the M4 J18A study.
Dependencies	Strong relationship with M4 J18A Link to Emersons Green.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	Scheme will help improve resilience, including better management of incidents at J19, and improve reliability of strategic journeys.	✓✓
	Scheme will help support growth in Economic Opportunity Areas in Bath and Bristol.	✓✓
Performance against Objectives	(a) Improve journey time reliability on the M4 between J18 (Tormarton) and J20 (Almondsbury).	✓✓
	(b) Improve road safety and reduce impacts of incidents on route between J18 and J20.	✓
	(c) Provide sufficient capacity to accommodate flows resulting from proposed J18A connecting to Bristol East Fringe and Yate.	✓✓
	(d) Reduce congestion on the strategic road network around the north of Bristol.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: scheme will enhance journey time reliability and safety along the M4.	✓✓	
	Resilience: improved ability to manage incidents and greater control of traffic will reduce frequency of flow breakdown on M4.	✓✓	
	Unlock new growth in jobs and housing: scheme will increase road capacity, catering for increased demand for travel generated by growth in jobs and housing.	✓	
	Connections to Gateways: no direct impact.	✓✓	
Reduce Carbon Emissions	**Resource efficiency:** scheme could help to reduce congestion and fuel consumption. Capacity to be managed to avoid generating additional car trips.	-	
	Low carbon choices: capacity to be managed to avoid encouraging greater numbers of car trips.	-	
Quality of Life and the Natural Environment	**Built environment:** no direct impact.	-	
	Natural environment: based on preliminary screening of environmental designations: Scheme falls within Cotswold AONB, Priority Habitat and Flood Zones 2 & 3. Scheme adjacent to (within 500m): Listed Buildings. The scheme will have a moderate negative impact, which can be taken into account in the scheme design process.	××	
Improve Health, Safety and Security	**Healthy travel choices:** the scheme will not impact on healthy travel choices.	-	
	Air quality: no direct impact.	×	
	Safety for transport users: the scheme can deliver safety benefits for vehicle users in terms of lower collision rates.	✓	
Promote Accessibility	**Access to jobs & training:** the scheme is likely to reduce journey times, but there will be minimal impacts on non-car users.	-	
	Access to local services: minimal impact on access to local services.	-	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£108	million
	Impact of Tax Revenues: no significant impact.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£70	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£100	million
Potential Funding Sources	Funding could be identified in a future Highways England Road Investment Strategy (RIS).	?	
Affordability	Affordability would be dependent on securing funding in a future round of the Road Investment Strategy.	?	
Delivery Agencies	Highways England.	?	
Key Project Risks	(1) Implementation of Smart Motorway within existing highway boundary, (2) Potential constraints caused by existing structures, (3) Third party land may be required at some locations, (4) Impact on the performance of the M4 as a result of sustained period of roadworks and potential lane closures.	?	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the principle of improving roads and tackling bottlenecks. There is limited evidence on the level of support for this specific proposal but no clear evidence of opposition. Visual impacts of smart motorway infrastructure will need to be addressed.	✓✓	
Commercial Case	Highways England have recently delivered a number of Smart Motorway projects including the M4/M5 interchange north of Bristol. Project could be delivered through a range of procurement models.	?	

Name of Project:	**Smart Motorway: M5 Junction 17 - Junction 21A**
Reference:	**Road 10**

Scheme Description	Smart Motorway scheme on the M5 from J21/21a (Weston-super-Mare) to J17 (Cribbs Causeway). This will complement the recently delivered M4 J19-20 and M5 J15-17 Smart Motorway, to provide an extensive system of motorway management on the most congested parts of the network. The scheme will deliver increased capacity and enhanced reliability through a potential combination of controlled motorway, all lane running and dynamic hard shoulder running, enabling improved journey times and regional connectivity.
Current and Future Policy Context	Highways England's Birmingham to Exeter Route Strategy (March 2017) highlights a number of problems on the route, including operational resilience around Bristol (especially the Avonmouth Bridge) and between Junctions 19 and 20 (including the viaducts through the Gordano cutting). There are severe queueing and associated safety problems at J19 and congestion and safety issues at J21. There is currently congestion around Bristol and Weston-super-Mare and significant development pressures to the west of Bristol. Avonmouth and Portbury are identified as an Economic Opportunity Area, which will be taken into account in Highways England's future investment plans.
Need for Intervention *(specific to the area under consideration)*	(1) High levels of traffic on the M5 between Weston-super-Mare and Bristol, especially high seasonal flows during holiday periods. (2) This traffic causes congestion, impacting on travel conditions for drivers using the Strategic Road Network. (3) Travel demand will increase with delivery of planned growth in the South Gloucestershire, Bristol and North Somerset Core Strategies. (4) Growth outlined in the Joint Spatial Plan will further increase travel demand on the M5. (5) Plans to reduce the Severn Bridge Tolls are expected to increase flows on the M5 around Bristol.
Objectives *(tailored to respond to the need for intervention)*	(a) Improve journey time reliability on the M5 between J21/21a (Weston-super-Mare) and J17 (Cribbs Causeway). (b) Reduce collision rates along the route and subsequent impacts on network resilience. (c) Unlock capacity on the M5 to cater for an increased number of journeys due to planned growth. (d) Reduce congestion on the strategic road network around Weston-super-Mare and Bristol.
Options Considered	A. Do nothing - no improvements to the M5 between Weston-super-Mare and M5 Junction 17. B. Implement Smart Motorway on the M5 between Weston-super-Mare and M5 Junction 17. C. Widening of the M5 between Weston-super-Mare and M5 Junction 17.
Option Selected *(and rationale)*	Option A will exacerbate current traffic congestion on the M5 and will not cater for additional future travel demand. Option C would have a number of challenges: it is highly unlikely that the Gordano viaducts could be cost-effectively widened, there would be high environmental impacs and other major deliverability risks. Option B provides the greatest strategic benefit through delivering enhanced capacity and reliability and safety benefits associated with Smart Motorway schemes.
Dependencies	No direct dependencies. Strong interactions with J21A to A38 Link and J20 to Nailsea Link.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	Scheme will help improve resilience, including better management of incidents on Avonmouth Bridge and on Gordano Viaducts.	✓✓
	Scheme will help unlock growth in Economic Opportunity Area at Avonmouth and Portbury.	✓✓
Performance against Objectives	(a) Improve journey time reliability on the M5 between J21/21a (Weston-super-Mare) and J17 (Cribbs Causeway).	✓✓
	(b) Reduce collision rates along the route and subsequent impacts on network resilience.	✓
	(c) Unlock capacity on the M5 to cater for an increased number of journeys due to planned growth.	✓✓
	(d) Reduce congestion on the strategic road network around Weston-super-Mare and Bristol.	✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*	✓✓	
	Impacts on National Networks: scheme will enhance journey time reliability and safety along the M5.	✓✓	
	Resilience: improved ability to manage incidents and greater control of traffic will reduce frequency of flow breakdown on M5.	✓✓	
	Unlock new growth in jobs and housing: scheme will increase road capacity, catering for increased demand for travel generated by growth in jobs and housing.	✓	
	Connections to Gateways: the scheme will improve access to Bristol Port and Bristol Airport via the M5.	✓✓	
Reduce Carbon Emissions	**Resource efficiency:** scheme could help to reduce congestion and fuel consumption. Capacity to be managed to avoid generating additional car trips.	-	
	Low carbon choices: capacity to be managed to avoid encouraging greater numbers of car trips.	-	
Quality of Life and the Natural Environment	**Built environment:** no direct impact.	-	
	Rural environment: based on preliminary screening of environmental designations: Scheme falls within: Green Belt, Severn Estuary (under Avonmouth Bridge) SAC, SSSI and SPA, Priority Habitats and Flood Zones 2 & 3. Scheme adjacent to (within 500m): Listed Buildings, Ancient Woodland and Registered Parks and Gardens. The scheme will have a moderate environmental impact, which can be taken into account in the scheme design process.	××	
Improve Health, Safety and Security	**Healthy travel choices:** the scheme will not impact on healthy travel choices.	-	
	Air quality: impact on air quality is likely to be negative if the scheme generates increased levels of traffic in adjacent urban areas.	×	
	Safety for transport users: the scheme can deliver safety benefits for vehicle users in terms of lower collision rates.	✓	
Promote Accessibility	**Access to jobs & training:** the scheme is likely to reduce journey times, but there will be minimal impacts on non-car users.	-	
	Access to local services: minimal impact on access to local services.	-	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£378	million
	Impact of Tax Revenues: potential increase in traffic with increased fuel consumption. Small impact on tax receipts (assumed zero).	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)* — Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£250	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£350	million
Potential Funding Sources	Funding could be identified in a future Highways England Road Investment Strategy (RIS).	?	
Affordability	Affordability would be dependent on securing funding in a future round of the Road Investment Strategy.	?	
Delivery Agencies	Highways England.	?	
Key Project Risks	(1) Implementation of Smart Motorway within existing highway boundary, (2) Constraints to delivery of Smart Motorway on Avonmouth Bridge and Gordano Viaducts, (3) Third party land may be required at some locations, (4) Impact on the performance of the M5 as a result of sustained period of roadworks and potential lane closures.	?	
Public Support	JTS consultation demonstrated that around 70% of respondents supported the principle of improving roads and tackling bottlenecks. There is limited evidence on the level of support for this specific proposal but no clear evidence of opposition. Visual impacts of smart motorway infrastructure will need to be addressed.	✓✓	
Commercial Case	Highways England have recently delivered a number of Smart Motorway projects including the M4/M5 interchange north of Bristol. Project could be delivered through a range of procurement models.	?	

Name of Project:	**M5 Junction 14 improvements**
Reference:	**Road 11**

Scheme Description	Delivery of improvements to Junction 14 of the M5 in order to accommodate future traffic growth generated by planned housing and employment growth in the area. The scheme will increase capacity at the junction in order to reduce the impact of growth, whilst enabling enhanced access to national networks.
Current and Future Policy Context	The Stroud Local Plan outlines growth at Hunts Grove, Quedgeley Business Park, Draycott, Sharpness, Stroud and Stonehouse which will affect the demand for access to the M5, including J14. South Gloucestershire's Core Strategy secures 19 hectares in Thornbury for economic development, with up to 800 houses planned for in the town. Alongside this, allowances for development in rural areas is planned. The JSP outlines potential growth at Buckover Garden Village, Thornbury and Charfield.
Need for Intervention *(specific to the area under consideration)*	(1) Peak period queueing on slip roads and B4509 overbridge at Junction 14, with associated safety problems. (2) Forecast traffic growth with Stroud Local Plan will exacerbate challenges, with forecast queueing onto M5 main carriageway. (3) Queueing will also impact on the B4509 / A38 junction at Falfield. (3) Further JSP growth at Thornbury, Buckover and Charfield will further exacerbate problems.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide sufficient highway capacity to accommodate increased flows resulting from planned growth in the area to M5 J14. (b) Improve road safety and reduce the impacts of incidents on the M5 and the B4509. (c) Improve journey time reliability between the M5 and the B4509.
Options Considered	A. Do nothing - no improvements at Junction 14 of the M5. B. Retain existing J14 alignment, widening the overbridge to deliver increased queuing capacity and revising signals. C. Reconstruction of M5 J14, with a new bridge to create a full grade-separated roundabout, with realignment of slip roads and approaches.
Option Selected *(and rationale)*	Option A will fail to address the future challenges on the route associated with planned growth in the area. Option B will deliver a relatively low-cost solution, ensuring enhanced capacity at the junction. However, Option B may not provide the required capacity enhancement to cater for considerable planned growth in the area. Option C is preferred as it will provide enhance capacity and reliability benefits, improving access to the M5. Delivering significantly enhanced capacity will provide a long-term solution, although it will be high cost.
Dependencies	No dependencies identified.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	Scheme will help support existing committed growth in Stroud Local Plan and at Thornbury.	✓✓
	Scheme will support growth identified at Thornbury, Buckover and Charfield in draft JSP.	✓✓
Performance against Objectives	(a) Provide sufficient highway capacity to accommodate increased flows resulting from planned growth in the area to M5 J14.	✓✓
	(b) Improve road safety and reduce the impacts of incidents on the M5 and the B4509.	✓
	(c) Improve journey time reliability between the M5 and the B4509.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓	
	Impacts on National Networks: scheme will address queueing on slip roads and reduce risk of flow breakdown on main carriageway.		✓✓	
	Resilience: scheme could enhance resilience through improving safety at J14.		✓	
	Unlock new growth in jobs and housing: scheme will increase road capacity, catering for increased demand for travel generated by growth in jobs and housing.		✓✓	
	Connections to Gateways: no direct impact.		-	
Reduce Carbon Emissions	**Resource efficiency:** scheme could help to reduce congestion and fuel consumption for vehicles using Junction 14.		✓	
	Low carbon choices: no impact.		-	
Quality of Life and the Natural Environment	**Built environment:** no direct impact.		-	
	Natural environment: sections of the M5 between junctions 11 and 14 are defined as high flood risk. An AONB extends along the east side of the M5 from J8 to J14.		×	
Improve Health, Safety and Security	**Healthy travel choices:** the scheme will not impact on healthy travel choices.		-	
	Air quality: no direct impact.		-	
	Safety for transport users: the scheme is likely to have safety benefits by reducing risk of queueing onto main carriageway of M5.		✓	
Promote Accessibility	**Access to jobs & training:** the scheme is likely to reduce journey times, but there will be minimal impacts on non-car users.		-	
	Access to local services: minimal impact on access to local services.		-	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£70	million
	Impact of Tax Revenues: no significant impact.		-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	Medium	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£46	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£65	million
Potential Funding Sources	Funding could be identified in a future Highways England Road Investment Strategy (RIS).	?	
Affordability	Affordability would be dependent on securing funding in a future round of the Road Investment Strategy.	?	
Delivery Agencies	Highways England (with South Gloucestershire Council)	✓	
Key Project Risks	(1) Third party land is likely to be required, (2) Potential constraints caused by existing structures, (3) Impact on the performance of the M5 as a result of sustained period of roadworks and potential lane closures.	?	
Public Support	Consultation on the JTS revealed that the majority of people support the delivery of improved road infrastructure.	✓	
Commercial Case	Highways England have considerable experience in the delivery of a number of junction upgrade projects. Project could be delivered through a range of procurement models.	✓	

Name of Project:	**M5 Junction 19 improvements**
Reference:	**Road 12**

Scheme Description	Improvements to M5 Junction 19 to improve access between the M5 and the Royal Portbury Dock, Portishead, Portbury and Pill. The scheme will provide enhanced capacity to improve the efficiency of movements for freight using the Royal Portbury Dock, enhancing connectivity to national road networks. The scheme will also assist in accommodating future traffic growth generated by planned housing and employment growth in the area.
Current and Future Policy Context	North Somerset Core Strategy Policy CS24 outlines that land will continue to be safeguarded for development at Royal Portbury Dock. Policy CS31 outlines the delivery of a minimum of 3,300 dwellings in Portishead, with an indicative employment land allocation of 3.17 hectares.
Need for Intervention *(specific to the area under consideration)*	(1) Long traffic queues on M5 southbound off-slip, due to volume of traffic turning towards Gordano services, Portishead and Royal Portbury Dock, causing serious safety risks on M5 southbound carriageway over Avonmouth Bridge. (2) Forecast growth will exacerbate problems on southbound off-slip, impacting on safety and reliability of M5 southbound carriageway. (3) Queueing on A369 Portbury Hundred due to heavy traffic demand into and from Portishead, impacting on operation of J19. (4) Underlying problem of high car mode share for journeys from Portishead due to long bus journey times to Bristol urban area. (5) Growth in traffic demand (from Portishead and Dock) will result in flow breakdown on northbound on-slip, with capacity limited by entry onto Avonmouth Bridge structure and operational capacity of Avonmouth Bridge.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide sufficient junction capacity to reduce queueing traffic on J19 southbound slip road and reduce impacts on M5 southbound. (b) Ensure efficient access and minimise delays for access to/from Royal Portbury Dock as a major international gateway. (c) Provide a comprehensive solution to improve connectivity (focusing on improved bus access) to and from Portishead to address current problems and support future growth in the town.
Options Considered	A. Do nothing - no improvements at M5 J19. B. Capacity enhancements at M5 J19 C. Capacity enhancements at M5 J19 + bus priority along the A369 and signal priority measures for freight traffic.
Option Selected *(and rationale)*	Option A will fail to address existing issues associated with constrained capacity, as well as future challenges associated with planned growth in the area. Option B will deliver enhanced capacity at the junction, although it would not provide benefits to the wider road network. Option C is preferred as it will provide capacity enhancements as well as a comprehensive approach to providing improved connections to Royal Portbury Dock and reduced bus journey times between Portishead and Bristol.
Dependencies	M5 Smart Motorway Junction 17-21a

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	Scheme will help support residential and employment growth in the area.	✓✓
	Scheme will enhance connectivity to national networks.	✓✓
Performance against Objectives	(a) Provide sufficient junction capacity to reduce queueing traffic on J19 southbound slip road and reduce impacts on M5 southbound.	✓✓
	(b) Ensure efficient access and minimise delays for access to/from Royal Portbury Dock as a major international gateway.	✓✓
	(c) Provide a comprehensive solution to improve connectivity (focusing on improved bus access) to and from Portishead to address current problems and support future growth in the town.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓✓	
	Impacts on National Networks: scheme will enhance journey time reliability for journeys accessing the M5 at Junction 19.		✓✓	
	Resilience: scheme could enhance resilience through improving safety at J19.		✓✓	
	Unlock new growth in jobs and housing: scheme will assist in improving accessibility to the Royal Portbury Dock, unlocking potential employment growth, and will provide a sustainable approach to unlocking future growth in Portishead.		✓✓	
	Connections to Gateways: scheme will enhance access to the Royal Portbury Dock.		✓✓	
Reduce Carbon Emissions	**Resource efficiency:** scheme could help to reduce congestion and fuel consumption for vehicles using Junction 19.		✓	
	Low carbon choices: could provide faster, more reliable access for bus services from Portishead.		-	
Quality of Life and the Natural Environment	**Built environment:** no direct impact.		-	
	Natural environment: scheme falls within: Green Belt, Priority Habitats and Flood Zone 3. Scheme adjacent to Listed Buildings (within 500 metres).		×	
Improve Health, Safety and Security	**Healthy travel choices:** the scheme will not impact on healthy travel choices.		-	
	Air quality: no direct impact.		-	
	Safety for transport users: the scheme can deliver safety benefits for vehicle users in terms of lower collision rates.		✓	
Promote Accessibility	**Access to jobs & training:** the scheme is likely to reduce journey times, improving access to employment at Royal Portbury Dock.		✓	
	Access to local services: minimal impact on access to local services.		-	
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs		£27	million
	Impact of Tax Revenues: no significant impact.		-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)	

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£18	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£25	million
Potential Funding Sources	Funding could be identified in a future Highways England Road Investment Strategy (RIS).	?	
Affordability	Affordability would be dependent on securing funding in a future round of the Road Investment Strategy.	?	
Delivery Agencies	Highways England.	✓	
Key Project Risks	(1) Third party land may be required, (2) Potential constraints caused by existing structures, (3) Impact on the performance of the M5 as a result of sustained period of roadworks and potential lane closures.	?	
Public Support	Consultation on the JTS revealed that the majority of people support the delivery of improved road infrastructure. The scheme is likely to command support from stakeholders and residents in Portishead.	✓	
Commercial Case	Highways England has considerable experience in the delivery of a number of junction upgrade projects. Project could be delivered through a range of procurement models.	✓	

Name of Project:	**A4 to Avon Mill Lane Link, Keynsham**
Reference:	**Road 13**

Scheme Description	New highway link between A4 (east of Keynsham) and Avon Mill Lane, connecting to A4175 north of Keynsham. This will include a new bridge over the Great Western mainline railway, east of Pixash Lane, with the route enabling traffic to divert around Keynsham town centre and providing access to the proposed strategic development at North Keynsham.
Current and Future Policy Context	Significant growth is planned at Keynsham in the existing Bath & North East Somerset Core Strategy. The Placemaking Plan for Keynsham includes provision for a new highway link between the A4 and A4175 via Avon Mill Lane, to ease congestion in the town and to provide access to development. The JSP also proposes strategic development at North Keynsham, which would require access via this route.
Need for Intervention *(specific to the area under consideration)*	(1) Limited number of crossings of railway line between north of Keynsham (A4175) and the rest of the town. Traffic is concentrated through a limited number of crossings, many of which have limited headroom. (2) This results in heavy traffic flows, including goods vehicles, through Keynsham town centre, causing congestion and poor air quality. (3) New housing development and economic growth in Keynsham will exacerbate these problems. (4) Poor access to the Broadmead area, via substandard bridges, constraining potential for development in this area.
Objectives *(tailored to respond to the need for intervention)*	(a) Provide effective access to new development area in North Keynsham. (b) Reduce traffic flows and relieve traffic pressures on routes through Keynsham. (c) Deliver improved facilities for pedestrians, cyclists and effective public transport in North Keynsham.
Options Considered	A. Widen existing structure under railway at Broadmead Lane, to create new route between Broadmead Roundabout and A4175. B. Build new bridge over railway at Pixash Lane (adjacent to existing bridge) to create new route from A4 at Pixash Lane to A4175. C. Build new road and bridge over railway east of Pixash Lane, to create new route from A4 west of Saltford to A4175.
Option Selected *(and rationale)*	Option A would not provide adequate access to the proposed development site in North Keynsham, because the road link would be >1km from the east of the site. Option B would provide improved access to the site, although it is likely that there would still be a need for access via Broadmead Lane. Option C would perform better in supporting the objectives and would have fewer engineering, environmental and construction challenges.
Dependencies	No direct dependencies, but will support MetroBus provision on the A4.

Strategic Case: based on strength of alignment with local policies and strength of support for objectives

Policy Alignment	Scheme will help support delivery of the existing Keynsham Placemaking Plan.	✓✓
	Scheme will unlock development at North Keynsham.	✓✓
Performance against Objectives	(a) Provide effective access to new development area in North Keynsham.	✓✓
	(b) Reduce traffic flows and relieve traffic pressures on routes through Keynsham.	✓✓
	(c) Deliver improved facilities for pedestrians, cyclists and effective public transport in North Keynsham.	✓✓

Economic Case: based on balance of benefits (as expressed through JTS goals) and costs

Support Economic Growth	**Transport User Benefits (journey time & vehicle operating costs):** *(qualitative assessment)*		✓✓
	Impacts on National Networks: no impact.		-
	Resilience: scheme provides alternative route across Keynsham in the event of incidents.		✓
	Unlock new growth in jobs and housing: scheme will be essential in unlocking development in North Keynsham.		✓✓
	Connections to Gateways: no impact.		-
Reduce Carbon Emissions	**Resource efficiency:** scheme could help to reduce congestion and fuel consumption for vehicles in Keynsham.		✓
	Low carbon choices: scheme will be essential in enabling bus access to North Keynsham		✓
Quality of Life and the Natural Environment	**Built environment:** reductions in traffic on some roads in urban area, but reduction in congestion will result in additional traffic on some roads in town centre. Overall neutral impact assumed.		-
	Natural environment: scheme falls within Green Belt, Priority Habitat and Flood Zones 2 & 3, and scheme is near to Listed Buildings. The area is just outside (but visible to) the Cotswold AONB. The route option has been selected to minimise impacts.		×
Improve Health, Safety and Security	**Healthy travel choices:** no impact on travel choices for existing town, but important in facilitating active travel from new development.		-
	Air quality: scheme will help to reduce congestion in Keynsham town centre, reducing pollutants.		✓
	Safety for transport users: the scheme can deliver safety benefits for vehicle users in terms of lower collision rates.		✓
Promote Accessibility	**Access to jobs & training:** modest impact on access to jobs and training and Keynsham.		✓
	Access to local services: minimal impact on access to local services.		-
Costs to Public Accounts	**Cost to Transport Budget:** based on assessment of construction costs, Present Value of Costs	£43	million
	Impact of Tax Revenues: no significant impact.	-	
Value for Money	Initial assessment of Value for Money, based on benefits and costs *(qualitative assessment)*	High	(Est)

Financial, Delivery and Commercial Cases: considering the deliverability of the project

Estimated Cost	Estimated capital cost (£ million, 2016 prices), excluding risk allowance.	£30	million
	Estimated capital cost (£ million, 2016 prices), including risk allowance (assumed @ 40%)	£40	million
Potential Funding Sources	Local Majors Funding, Local Growth Fund, Developers (via S106 Agreements and/or CIL).		✓
Affordability	Significant investment, but broadly equivalent to major projects currently / recently delivered.		✓
Delivery Agencies	Bath & North East Somerset Council, Developers of land at North Keynsham, Network Rail		✓
Key Project Risks	(1) Third party land will be required, (2) Requirement for crossing railway line: consents will be required, (3) Construction in Flood Zones 2 & 3: flood mitigation will be required.		?
Public Support	Consultation on the JTS revealed that the majority of people support the delivery of improved road infrastructure. The scheme is likely to command support from stakeholders and residents in Keynsham.		✓
Commercial Case	Project could be delivered through a range of procurement models. No significant commercial barriers identified. Mechanism for construction of bridge over railway line would need to be agreed with Network Rail.		✓

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??	Arial

Very High	BCR
High	BCR
Medium	BCR
Low	BCR
Poor	BCR