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M4 Corridor around Newport

Updated Public Transport Overview



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Updated Public Transport
Overview

M4CaN-DJV-HTR-ZG_GEN-RP-TR-0004

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This report takes into account the particular instructions and requirements of our client.

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1 The Project

1.1 Context

1.1.1 Since 1989 there have been various studies to identify the problems on the M4 around Newport and propose possible solutions. The M4 Corridor around Newport WelTAG Stage 1 (Strategy Level) Appraisal concluded that a new section of three-lane motorway to the south of Newport following a protected (TR111) route, in addition to reclassification measures to the existing M4 to the north of Newport, would best achieve the goals and address the problems of the M4 Corridor around Newport and should be progressed for further appraisal. These options have subsequently formed the basis for the development of the draft Plan, which was published in September 2013 and was the subject of public consultation from September to December 2013.

1.1.2 Having taken into account the responses to this participation process, as well as the assessments of the draft Plan, the Welsh Government has decided to publish a Plan for the Scheme. Alongside this Plan, the Welsh Government has published updated strategy-level reports, including a Strategic Environmental Assessment Statement, to demonstrate how the participation process has informed its decision making. It also announced in July 2014 a revised preferred route, which protects a corridor for planning purposes. These documents can be accessed from the website <http://m4newport.com>.

1.1.3 The Welsh Government has since awarded a Professional Services Contract for the next stage of Scheme development and environmental surveys for the M4 Corridor around Newport Project (“the Scheme”) up to publication of draft Orders and an Environmental Statement. The contract has been awarded to a Joint Venture of Costain, Vinci and Taylor Woodrow with consultants Arup and Atkins, supported by sub-consultant RPS. Draft Orders, an Environmental Statement and associated reporting has been published in 2016, in advance of a Public Local Inquiry. The Inquiry process will then inform the next stage of Ministerial decision making.

1.2 Scheme objectives and reason for the scheme

1.2.1 The aims of the Welsh Government for the Scheme are to:

- Make it easier and safer for people to access their homes, workplaces and services by walking, cycling, public transport or road.
- Deliver a more efficient and sustainable transport network supporting and encouraging long-term prosperity in the region, across Wales, and enabling access to international markets.
- To produce positive effects overall on people and the environment, making a positive contribution to the over-arching Welsh Government goals to reduce greenhouse gas emissions and to making Wales more resilient to the effects of climate change.
- The Scheme aims to help to achieve or facilitate these aims as part of a wider transport strategy for South East Wales, as outlined within the Prioritised National Transport Plan.

1.2.2 The Transport Planning Objectives (TPOs), or goals, are:

- TPO 1: Safer, easier and more reliable travel east-west in South Wales.
- TPO 2: Improved transport connections within Wales and to England, the Republic of Ireland and the rest of Europe on all modes on the international transport network.
- TPO 3: More effective and integrated use of alternatives to the M4, including other parts of the transport network and other modes of transport for local and strategic journeys around Newport.
- TPO 4: Best possible use of the existing M4, local road network and other transport networks.
- TPO 5: More reliable journey times along the M4 Corridor.
- TPO 6: Increased level of choice for all people making journeys within the transport Corridor by all modes between Magor and Castleton, commensurate with demand for alternatives.
- TPO 7: Improved safety on the M4 Corridor between Magor and Castleton.
- TPO 8: Improved air quality in areas next to the M4 around Newport.
- TPO 9: Reduced disturbance to people from high noise levels, from all transport modes and traffic within the M4 Corridor.
- TPO 10: Reduced greenhouse gas emissions per vehicle and/or person kilometre.
- TPO 11: Improved travel experience into South Wales along the M4 Corridor.
- TPO 12: An M4 attractive for strategic journeys that discourages local traffic use.
- TPO 13: Improved traffic management in and around Newport on the M4 Corridor.
- TPO 14: Easier access to local key services and residential and commercial centres.
- TPO 15: A cultural shift in travel behaviour towards more sustainable choices.

1.2.3 The scheme-specific environmental objectives (EO), as set out in the Strategic Environmental Assessment of the Plan, are as follows:

- EO1 - Improved air quality in areas next to the existing M4 around Newport;
- EO2a - Reduce greenhouse gas emissions per vehicle and/or person kilometre;
- EO2b - Ensure that effective adaptation measures to climate change are in place;
- EO3 - Reduce disturbance to people from high noise levels, from all transport modes and traffic within the existing M4 Corridor;
- EO4 - Ensure that biodiversity is protected, valued and enhanced;
- EO5 - Improved access to all services and facilities and reduce severance;
- EO6 - Protect and promote everyone's physical and mental wellbeing and safety;

- EO7 - Reduce transport related contamination and safeguard soil function, quality and quantity;
- EO8 - Minimise transport related effects on surface and groundwater quality, flood plains and areas of flood risk;
- EO9 - Ensure the prudent and sustainable use of natural resources and energy;
- EO10 - Ensure that diversity, local distinctiveness and cultural heritage are valued, protected, celebrated and enhanced;
- EO11 - Ensure that landscape and townscape is properly valued, conserved and enhanced;

1.2.4 In addition, the Wales Transport Strategy includes the following environmental outcomes (WTSEO):

- Outcome 11: The sustainability of the transport infrastructure - Increase the use of more sustainable materials in our country's transport assets and infrastructure;
- Outcome 12: Greenhouse gas emissions - Reduce the impact of transport on greenhouse gas emissions;
- Outcome 13: Adapting to climate change - Adapt to the impacts of climate change;
- Outcome 14: Air pollution and other harmful emissions - Reduce the contribution of transport to air pollution and other harmful emissions;
- Outcome 15: The local environment - Improve the positive impact of transport on the local environment;
- Outcome 16: Our heritage - Improve the effect of transport on our heritage;
- Outcome 17: Biodiversity - Improve the impact of transport on biodiversity.

2 Scope of this Report

2.1 Introduction

2.1.1 This study is aimed at understanding the potential effect of a major upgrade in public transport arising from a 'South Wales Metro' on traffic volumes on the M4 Corridor around Newport.

2.1.2 South Wales Metro is the current name given to a broad package of public transport schemes for south east Wales. The development of the Metro proposals is being led by Transport for Wales who are overseeing procurement and delivery. The South Wales Metro can be considered synonymous with the measures referred to in other studies (and hence this report) as 'Metro' and 'Cardiff Capital Region Metro'

2.1.3 This study quantifies the effect of such an upgrade of the public transport network on traffic flows along the M4 Corridor around Newport and on the Transport Planning Objectives set out in Section 1.

2.1.4 The context of the South Wales Metro measures outlined in this Study relate to the easing of the congestion issues on the M4. It is recognised that public transport schemes will have broader aims and benefits than this and that the majority of public transport users will be those not currently using the M4 around Newport. The M4 is predominantly focussed on East/West movements and the Metro on North/South movements. This study is therefore not an appraisal of the success or patronage of the South Wales Metro network, but is focussed on the potential effect that the South Wales Metro schemes may have on M4 traffic volumes around Newport.

2.2 Study Process

2.2.1 The study process has used forecast traffic flows from the M4CaN model and guidance from the Passenger Demand Forecasting Handbook (PDFH) to quantify the potential uplift in public transport that could result from a major upgrade in public transport provision resulting from delivery of the proposed South Wales Metro. Other major upgrades to public transport which are already committed or in the process of being delivered, namely the electrification of the Great Western Mainline from London to Cardiff, are already included directly in M4CaN transport model and are documented in the Forecasting Report (M4CaN-DJV-HTR-ZG_GEN-RP-TR-0003). They are therefore not considered in this report.

2.2.2 The public transport schemes represented here are the schemes in the South Wales Metro proposals which are considered to have the potential to attract trips from the M4 corridor. These schemes have been selected through consultation with Welsh Government and Transport for Wales. The structure of this report is set out below:

- a) Review of existing public transport provision (Section 3)
- b) Review of existing National/Regional Public Transport policy (Section 4)
- c) Review of existing Local Public Transport policy (Section 5)
- d) Review of current South Wales Metro proposals (Section 6)
- e) Development of assessment scenarios (Section 7)

- f) Modelling approach (Section 8)
- g) Summary of results (Section 9)
- h) Summary (Section 10).

3 Existing Public Transport

3.1 Summary of Existing Conditions

3.1.1 The public transport network in South East Wales currently comprises a combination of bus and heavy rail services. Outside the two primary centres of Cardiff and Newport there are radial rail services and express bus services which provide links to other areas of South Wales.

3.2 Newport Bus Services

3.2.1 Newport bus services are predominantly routed radially from the city centre area with most services connecting to the new bus station south-west of Newport Bridge. The higher frequency services (with headway of 20 minutes or less) connect the city centre with High Cross, Bettws, Malpas, St Julian's/Caerleon, Ringland, Corporation Road, and Cardiff Road. There are other low frequency services to areas including Duffryn and Pillgwenlly.

3.2.2 There are currently no cross-city services. Passengers need to transfer between services for cross-city travel (e.g. Malpas to Ringland).

3.2.3 There are a number of express bus services at 10-15 minute headways from communities to the north and to the west including Tredegar, Blackwood, and Blaenavon.

3.3 Cardiff Bus Services

3.3.1 Cardiff has a number of frequent radial bus routes (with headways of every 20 minutes or less) travelling between the city centre and destinations including Ely, Pentreban, Llandaff, Gabalfa, Rhiwbina, Thornhill, Cyncoed, Pentwyn, and Llanrumney. Two services (1/2 inner circle and 64/65 outer circle) follow orbital routes with lower frequency. Whilst attractive for journeys directly on these routes, the frequency of the orbital routes is such that they would not generally be attractive to users wishing to transfer to a radial route to complete a cross city journey. Likewise since the network is dominated by radial routes to the city centre virtually all cross-city journeys require a transfer between services in the city centre. The BayCar (Route 6) connects the northern and southern areas of Cardiff's central business district (Cathays Park to Cardiff Bay).

3.3.2 Within the city centre the anticlockwise 'bus box', which incorporates a range of bus priority measures, has provided benefits to bus journeys in terms of journey time and reliability. The Cardiff interchange project will soon be under construction delivering improved interchange facilities for local and regional bus, coach and train services.

3.4 Cardiff – Newport Bus Services¹

3.4.1 Bus services between Newport and Cardiff are primarily provided by the X30 (Newport Bus) and 30 (Cardiff Bus/Newport Bus). Both services connect the city centre areas, including stops serving the respective train stations.

¹ Timetable details correct as of November 2016

3.4.2 The X30 Service is an express bus service between Cardiff and Newport city centres routed via Gabalfa in Cardiff which travels via the A48(M) and M4, entering Newport at the M4 Junction 26 via Malpas Road with a journey time of around 40 minutes. Service frequency is half-hourly in the morning and evening peak periods decreasing to hourly in the daytime.

3.4.3 The 30 service routes via the A48 through Rumney, Castleton, and Cleppa Park and enters the Newport urban area via the M4 Junction 28 at Tredegar Park with a journey time of around 50 minutes. There are typically three services an hour throughout the day.

3.5 Valley Lines Rail Network

3.5.1 The Valley Lines rail network consists of radial commuter routes serving the densely populated south Wales valleys. Train services are provided by a fleet of diesel rolling stock. The routes converge on Cardiff and provide services to:

- a) Treherbert, Aberdare, Merthyr Tydfil and Rhymney/Caerphilly to the north;
- b) Penarth, Barry and the Vale of Glamorgan to the south-west;
- c) Maesteg to the west; and
- d) Ebbw Vale to the east.

3.5.2 A number of the services operate as through routes but Cardiff Queen Street and Cardiff Central, both located in Cardiff city centre, are key destinations and interchange points for many journeys. To a lesser extent Cardiff Bay and other urban Cardiff stations represent significant destinations.

3.5.3 The Valley Lines network does not currently serve Newport directly² however services to Ebbw Vale call at the suburban Newport stations of Pye Corner and Rogerstone.

3.6 Regional and Mainline Rail Services

3.6.1 The Great Western Mainline (GWML) east-west route carries intercity, local commuter and cross-country passenger services.

3.6.2 Other regional railway routes serving Newport provide east-west services, all of which travel on the main lines and associated relief lines through to Cardiff.

3.6.3 In combination the mainline and regional services provide a typical PM peak period service of approximately nine trains (per hour) between Cardiff and Newport. This consists of two First Great Western (FGW) High Speed Trains, two FGW Cardiff to Bristol (and onwards) 'local' stopping trains, one Arriva Trains Wales (ATW) Ebbw Vale train (which does not call at Newport itself), three longer distance ATW trains to Manchester and Holyhead and Cheltenham and one Cross Country train to Nottingham.

3.6.4 Train services on the GWML are currently operated using diesel rolling stock. Services from London utilise larger High Speed Trains until completion of

² Exceptions to this are those Valley Lines services which, as part of a wider route diagram, serve regional destinations to the east such as Maesteg – Cheltenham services.

electrification works (see Section 4) whilst other services are operated using a variety of smaller trains.

3.7 Rail Freight Services

3.7.1 Rail freight services operate on the Valley Lines. Freight movements are predominantly related to the movement of coal supplies to Aberthaw Power Station via the Vale of Glamorgan, from locations in the South Wales Valleys.

3.7.2 Freight trains also operate on the relief lines alongside the GWML and on a number of freight only routes, mainly serving the docks and industrial activity predominantly to the south of Cardiff and Newport city centres.

4 National/Regional Transport Policy

4.1 Introduction

4.1.1 There are a number of national policy documents and developments relevant to the future provision of public transport in the M4 corridor area. The key points from each of these are summarised in this section.

4.2 Wales Transport Strategy, Welsh Government, 2008

4.2.1 The Wales Transport Strategy sets out the Welsh Government’s aims and outcomes to improve transport across the country. The long-term outcomes of the strategy are outlined below.

Table 1: Wales Transport Strategy Long-term Outcomes

Social	Improve access to healthcare Improve access to education, training and lifelong learning Improve access to shopping and leisure facilities Encourage healthy lifestyles Improve the actual and perceived safety and travel
Economic	Improve access to employment opportunities Improve connectivity with Wales and internationally Improve the efficient, reliable and sustainable movement of people Improve the efficient, reliable and sustainable movement of freight Improve access to visitor attractions
Environmental	Increase the use of more sustainable materials Reduce the contribution of transport to greenhouse gas emissions Adapt to the impacts of climate change Reduce the contribution of transport to air pollution and other harmful emissions Improve the impact of transport on the local environment Improve the impact of transport on our heritage Improve the impact of transport on biodiversity

4.2.2 The long-term outcomes are grouped into strategic priorities that provide direction for focussed work. The priorities cover:

- *Reducing greenhouse gas emissions and other environmental impacts;*
- *Integrating local transport;*
- *Improving access between key settlements and sites;*
- *Enhancing international connectivity; and*
- *Increasing safety and security.*

4.3 Wales National Transport Finance Plan, Welsh Government, 2015

4.3.1 The National Transport Finance Plan takes the policies and decisions made in the Transport Strategy and sets out the priority projects for a five year plan period (currently 2015-2020) and how they will be funded. It also includes medium term projects beyond 2020 that would be started during the current plan period. The key projects for the M4 corridor in South East Wales include:

- M4 Corridor around Newport and complementary measures including the reclassification of the existing M4 between Magor and Castleton;
- Brynglas Tunnels Safety Improvements;
- Eastern Bay Link, Queensgate to Ocean Way, Cardiff;
- M4 Junction 28 Improvements; and
- Cardiff Capital Region Metro – various component projects including Active Travel, rail station improvements, railway line improvements, service frequency enhancements (including Valley Lines Electrification), various bus network and station improvements and integrated ticketing.

4.4 Welsh Route Study, Network Rail, March 2016.

4.4.1 The Welsh Route Study is a key part of Network Rail's long-term planning process (LTPP) for the periods to 2023 and 2043. The study sets out proposals and choices for funders of the railway to sustain economic growth and develop sustainable communities with the key themes of:

- *More seats for passengers;*
- *More frequent services;*
- *Faster journeys;*
- *Improved connectivity;*
- *More journey opportunities; and*
- *Accommodating changes in demand for freight services.*

4.4.2 The Route Study sets out a medium-term vision to the end of 2023 (Network Rail's Control Period 6, CP6, 2019-2024) and long-term to 2043 planning for a much busier railway. The Route Study is underpinned by a number of strategic priorities:

- **Safety** – *ensure all customers, staff and suppliers get home safe every day.*
- **Economic Growth** – *the railway is integral to the economy with a Gross Value Added (GVA) in Wales of 72% of the national average.*
- **Social Value** – *the railway is crucial in providing access to employment, education, retail, tourism and other social infrastructure.*
- **Digital Railway** – *revolutionising train control, ticketing, tariffs and information.*
- **Capacity** – *longer trains and increased frequencies to accommodate the growth in passengers.*

- **Connectivity** – connecting communities, making interchange easier and more reliable, both between trains and trains with other modes.
- **Punctuality** – get customers to the connections/destinations on time with a much busier railway.
- **Weather Resilience** – future proofing the railway from the worst effects of climate change.

4.4.3

The study assumes that all schemes committed during the previous funding period (CP5, 2014-2019) would have been completed by 2022. The Wales Route Utilisation Strategy (RUS) 2013 set out a number of schemes to be developed during the CP5 period. The Welsh Route Study assumes that the following schemes have been completed:

- **Great Western Mainline Electrification** from London to Swansea and the introduction of new trains. London to Cardiff is due to be complete by December 2018 with the Cardiff to Swansea section completed during the CP6 funding period.
- **Cardiff Area Signalling Renewal** providing capacity for up to 16 trains per hour between Cardiff Central and Cardiff Queen Street during peak periods.
- **Valley Lines Electrification** providing greater passenger capacity and more efficient and faster journeys by replacing the existing diesel rolling stock with new electric rolling stock.
- **Maesteg Frequency Enhancement Scheme** delivering infrastructure for two trains per hour to improve local connectivity and access to jobs. Delivered as part of Valley Lines Modernisation and renewal of signalling equipment.
- **Extension of the Ebbw Vale Line to Ebbw Vale Town and a new station at Pye Corner** is completed. The Route Study does not include the enhancement of infrastructure between Ebbw Junction and Ebbw Vale Town to allow two trains per hour that is planned to be delivered during CP5.

4.4.4

Passenger forecasting for commuting into Cardiff undertaken by Network Rail shows a 68% increase in passenger trips between 2013 and 2023 and 144% to 2043 based on the 'Prospering in Global Stability' scenario (PGS) presented in the Route Study. The forecast for freight traffic is varied with some sectors (such as coal) falling along with significant increases in domestic and port intermodal freight, particularly from Cardiff, Newport and Barry Ports.

4.4.5

The study presents 14 'Choices for Funders' in CP6 for all of Wales. The relevant choices for South Wales are:

- More passenger capacity on the Valley Lines through greater frequency and/or longer trains.
- Phased programme of enhancements on Valley Lines linked to Metro proposals.
- Upgrading relief lines between Cardiff and Severn Tunnel Junction to improve capacity, connectivity and line speed resulting in faster journeys.
- Redevelopment of Cardiff Central Square to create a station fit for a capital city.
- Improved frequency on the Ebbw Vale Line with connectivity to Newport and Abertillery.

4.5 Rolling out our Metro, Welsh Government, 2015

4.5.1 South Wales Metro is an initiative proposed by Welsh Government to provide faster, more frequent and joined-up services using trains, buses and light rail in the Cardiff Capital Region³. Investment in South Wales Metro is seen as a catalyst for transforming the economic and social prospects of the region through enhanced connectivity.

4.5.2 The following objectives have been established for the South Wales Metro:

- Deliver a high quality, reliable, efficient, economically sustainable transport network;
- Improve connectivity enabling the region to function as a single coherent economic entity;
- Improve accessibility to public transport within city and town centres;
- Provide comparable journey times across public and private transport modes, offering realistic transport mode choices;
- Cater for increasing demand for public transport;
- Reduce the impact of transport on the environment; and
- Encourage active travel and social inclusion initiatives.

4.5.3 South Wales Metro is a long-term incremental programme designed to address a number of transport constraints and complement improvements to the road network provided by the M4CaN project. Broadly South Wales Metro is likely to include the following components:

- *An electrified rail system;*
- *Integrated transport hubs;*
- *Park and ride facilities;*
- *New light rail and/or bus rapid transit routes;*
- *Better integration of services across modes and operators; and*
- *Active travel interventions.*

4.5.4 The Valley Lines Electrification (VLE) project is now integrated with South Wales Metro as the Valley Lines Modernisation (VLM) scheme. The Valley Lines would have enhanced services as a core part of the South Wales Metro but wider consideration is being given to how this is delivered within a new Wales & Borders Rail Franchise scheduled to commence in 2018.

³ Cardiff Capital Region comprises 10 local authorities: Blaenau Gwent; Bridgend; Caerphilly; Cardiff; Merthyr Tydfil; Monmouthshire; Newport; Rhondda Cynon Taf; Torfaen; and Vale of Glamorgan.

4.6 Welsh Government Announcements on Valley Lines Electrification and Great Western Mainline Electrification

4.6.1 Great Western Mainline Electrification (GWMLE) was approved for funding in July 2011. Electrification will provide benefits for public transport users along the M4 corridor from east to west, with potential service frequency and journey time enhancements. In November 2016 the Department for Transport confirmed that the electrification to Cardiff would be complete by December 2018.

4.6.2 Valley Lines Electrification (VLE) was approved for funding in November 2014 with a £230m investment. VLE proposals include potential service frequency and journey time benefits in conjunction with associated infrastructure improvements. Subsequent to securing the funding for VLE, the Welsh Government have reviewed the appropriate options for implementation as part of the wider South Wales Metro initiative. The investment will now be used to complete Valley Lines Modernisation (VLM) by 2023 as Phase 2 of the South Wales Metro and will be delivered in conjunction with a new Wales & Borders franchise.

5 Local Transport Policy

5.1 Introduction

5.1.1 There are a number of local policy documents that are relevant to the future provision of public transport in the M4 Corridor around Newport. The key points from each of these are summarised in this section.

5.2 Newport Local Development Plan, Newport City Council, Adopted January 2015

5.2.1 The Newport Local Development Plan (LDP) vision is for Newport to be a centre of regeneration and varied economic growth that will '*strengthen its contribution to the region*'. The plan identifies a number of existing issues including: economic decline, poor image, redundant sites, climate change and high energy consumption all of which transport can help to alleviate.

5.2.2 Newport City Council has five corporate objectives that the LDP is targeted to help deliver. Of these, four objectives have transport implications for the city:

- **Caring City** – *deliver sustainable developments where people want to live.*
- **Fairer City** – *reduce social exclusion by promoting accessibility to key services.*
- **Learning and Working City** – *provide new and improve current transport to existing/new employment and housing areas and education facilities.*
- **Greener and Healthier City** – *development and protection of green spaces providing for walking and cycling opportunities. Development of brownfield sites and the encouragement of non-car transport to access them.*

5.2.3 Using these objectives the council have developed ten LDP objectives. Those with clear transport implications are:

- **Climate Change** – influence travel behaviour by minimising the need to travel, enabling the use of public transport (aided by Newport's compact form and radial bus routes) and the concentrated development of housing in the Eastern Expansion Area being of sufficient size (including a railway station and Park & Ride facility) to enable efficient and attractive public transport.
- **Economic Growth** – Newport has aspirations to enhance its role as a major economic hub through an increase in jobs and providing new employment land. Transport will play a key role in enabling access to new employment sites for residents and those commuting to the city.
- **Culture and Accessibility** – ensure that development proposals are socially and physically accessible to all by a choice of transport modes, particularly alternatives to the private car.
- **Health and Well-being** – transport can play a key role in the health and well-being of a population by providing active travel choices, access to green spaces and the natural environment, sustainable travel routes and improvements in air quality.

5.2.4 One of the key strategic policies of the LDP is the need for Integrated Transport, both locally within the city and in the wider context of Newport's position as a gateway to south east Wales. The LDP states that Integrated Transport would be a '*major way of encouraging a more effective use of the transport system*'.

5.2.5 The LDP identifies three major road schemes that will be safeguarded:

- M4 Junction 28 Tredgar Park improvements;
- Western extension of the Southern Distributor Road (SDR) between Maesglas and Coedkernew; and
- The North South Link between Llanwern Village and the former steel works regeneration site.

5.2.6 The council would also support proposals for new railway stations at:

- Llanwern (steel works regeneration site);
- Coedkernew (major employment area and identified as a location for a station as far back as 1990 by the Gwent Rail Study); and
- Caerleon (also identified in the Gwent Rail Study).

5.2.7 Beyond those stations, the council supports safeguarding disused railway lines, providing rail access to industrial developments and the reopening of the link to the Ebbw Valley Railway.

5.2.8 The LDP states that other transport proposals will be supported where they:

- *Provide for traffic-free walking and cycling;*
- *Encourage the use of modes that reduce energy consumption and pollution;*
- *Improve road safety;*
- *Improve the quality of life of residents;*
- *Assist the local economy;*
- *Assist urban regeneration;*
- *Provide access to new development areas and incorporate sustainable transport modes;*
- *Relieve traffic congestion in the long term; and*
- *Result in other environmental improvements including air quality, noise reduction, sustainable drainage and enhanced biodiversity.*

5.3 Newport Local Transport Plan, Newport City Council, January 2015

5.3.1 The Newport Local Transport Plan (LTP) sets out a number of long-term objectives:

- **Safety and Security** – reduce number and severity of road casualties and improve perceived personal security when travelling.
- **Connectivity and Accessibility** – improve access for all to employment, services, healthcare, education, tourism and leisure facilities. Improve connectivity to the wider region, Wales, the rest of the UK and Europe.

- **Quality and Efficiency** – improve transport interchange within and between modes; improve the quality, efficiency and reliability of the transport system; and reduce traffic growth, traffic congestion and make better use of the road network.
- **Environment** – modal shift towards more sustainable transport modes for people and freight; reduce greenhouse gas emissions from transport; reduce the impact of transport on the local street scene; promote the effects of sustainable travel on health, the environment and climate change.
- **Land Use and Regeneration** – ensure developments are accessible by sustainable transport and make sustainable transport and travel planning an integral part of regeneration schemes.

5.3.2 The LTP states that Newport City Council will work with the Welsh Government to implement regional aspirations including the new M4 route, Great Western Mainline Electrification and Cardiff Capital Region Metro.

5.3.3 During the LTP plan period (2015-2020) a number of schemes have been identified to help meet the objectives of the plan. These include:

- *Bus corridor improvements across the city including potential rapid transit to Bristol;*
- *Active travel corridors;*
- *Road safety improvements;*
- *Park & Ride at Llanwern steel works regeneration site, Malpas/Caerleon and Coedkernew;*
- *Several junction improvement schemes; and*
- *Air quality improvement.*

5.4 Cardiff Local Development Plan, Cardiff Council, Adopted January 2016

5.4.1 The Cardiff LDP provides the framework to provide for the significant growth in new homes and employment required to meet the demands of a growing city at the centre of a wider city-region. Cardiff is an important source of jobs and services for the whole of South East Wales.

5.4.2 The LDP identifies that nearly 78,000 people commute into Cardiff every day (of which 80% travel by car). Traffic on the cities roads is increasing, as are rail and cycle use, whilst bus use is decreasing slightly.

5.4.3 A number of key priorities set out in the LDP have transport implications for the city. These include:

- **Clean, attractive and sustainable environment** – establish Cardiff as a sustainable, ‘Carbon Lite’ city and a sustainable travel city.
- **Thriving and prosperous economy** – transport helps to create an environment that develops, attracts and retains skilled workers, businesses and entrepreneurs.
- **People in Cardiff achieve their full potential** – transport helps to provide access to appropriate learning and training provision, allows vulnerable

families/individuals to achieve and maintain their independence and participate in all aspects of life.

5.4.4 The LDP has a number of objectives under four main headings which transport will play a key role in delivering:

- *Respond to evidenced economic needs and provide necessary infrastructure to deliver development.*
- *Respond to evidenced social needs.*
- *Deliver economic and social needs in a co-ordinated way that respects and enhances Cardiff's environment.*
- *Create sustainable neighbourhoods that form part of a sustainable city.*

5.4.5 The LDP identifies eight Strategic Sites to help meet the need for new dwellings and jobs. The scale of the identified sites enables *'more comprehensive solutions to be delivered which can bring about significant infrastructure improvements for the wider city and city-region.'* One of these sites is the 'Cardiff Central Enterprise Zone and Regional Transport Hub'. The transport hub comprises Cardiff Central Station, Cardiff Central Square and the proposed new Bus Station and will provide *'access to and interchange between the rail network, rapid transit and strategic bus corridors... the city-wide bus network and the strategic cycle network.'* The LDP also includes aspirations for the following key transport projects:

- New rail station at St. Fagans in the west of the city;
- New rail station and Park & Ride at St. Mellons in the east of the city;
- New Park & Ride in the vicinity of the Cardiff West services on the M4 to the north west of the city – part of one of the Strategic Sites identified in the plan;
- Eastern Bay Link to complete a peripheral distributor between M4 Junction 33 in North West Cardiff and Llanederyn Interchange in the east of the city running through Cardiff Bay;
- Enhancements of Strategic Bus Corridors – predominantly radial routes connecting the city centre; and
- Reductions to traffic flow entering the city by working with neighbouring authorities.

5.5 Cardiff Local Transport Plan, Cardiff Council, 2015

5.5.1 The Cardiff LTP identifies the key transport issues, the high level interventions needed to address them in during the plan period (2015-2020) and longer term goals/objectives to 2030. The proposed programme includes:

- Walking and cycling infrastructure;
- Bus network and junction improvements;
- Cardiff Capital Region Metro;
- 20 mph speed limits; and
- Road safety schemes.

5.5.2 The programme is aimed at addressing the existing network pressures caused by the number of people commuting into Cardiff from other areas (80% by car) and from within Cardiff (57% by car). Cardiff is forecast to grow significantly with a net increase in traffic of 32% as a result of 40,000 new jobs and 30,000 new homes. Investment in the regional transport network, particularly public transport, will be key in supporting this growth. The LTP recognises that Cardiff cannot solve these issues in isolation and must work with neighbouring authorities to provide new transport capacity and improve intra-regional connectivity whilst reducing journey times.

5.5.3 The plan outlines that the following interventions will be prioritised:

- *Schemes that support and complement Metro;*
- *Bus corridor developments that improve journey times and reliability;*
- *Attractive, convenient and comfortable passenger facilities;*
- *Schemes which facilitate interchange between transport modes and services;*
- *Development of active travel networks; and*
- *Schemes which reduce road casualties and make travel by active modes easier, safer and more attractive.*

6 South Wales Metro Overview

6.1 Introduction

6.1.1 South Wales Metro, as set out in Section 5, is a proposed major upgrade to regional public transport in the Cardiff Capital Region led by Transport for Wales on behalf of Welsh Government. The Cardiff Capital Region covers the ten local authorities of south east Wales.

6.1.2 This umbrella initiative is currently the subject of rapid development and whilst not yet established in a policy, the document 'Rolling out our Metro' issued by Welsh Government in autumn 2015 sets out the vision, and objectives for the project, as well as the scope and nature of likely component schemes.

6.1.3 It is considered likely that South Wales Metro schemes will define the future public transport direction for the region. As currently conceived South Wales Metro comprises of three phases summarised in the following sections.

6.2 South Wales Metro Phase One

6.2.1 Phase one comprises a number of schemes which are either complete, underway or at a detailed planning stage. The schemes include new stations, station upgrades, new facilities at stations and a limited number of rail and bus infrastructure upgrades.

6.2.2 Completion of South Wales Metro Phase One schemes is expected in 2018. These are shown in Figure 6.1 which is an extract from 'Rolling Out Our Metro'.

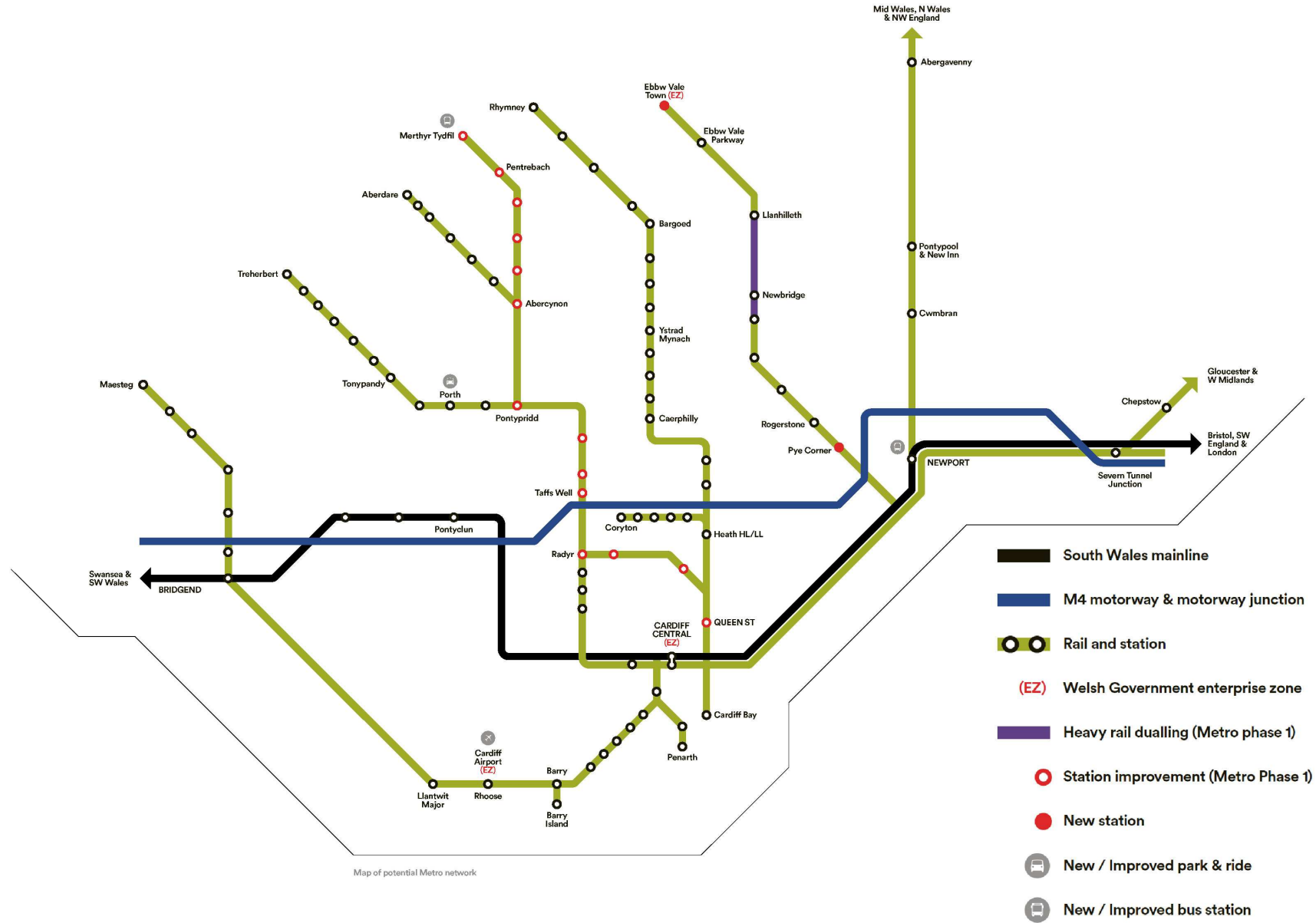


Figure 6.1: South Wales Metro Phase One schemes

6.3 South Wales Metro Phase Two

- 6.3.1** Phase two comprises the modernisation of the Valley Lines infrastructure and services described in Section 3.5.
- 6.3.2** The South Wales Metro vision sets out the improved Valley Lines network as the backbone of future public transport provision. The objectives of the modernisation will be to deliver more frequent, faster and more reliable services with improved passenger facilities and lower operating costs.
- 6.3.3** Welsh Government has recently launched a procurement process for the future Wales and Borders Rail Service and South Wales Metro. This franchise will encompass Metro Phase Two and interested parties have been invited to propose solutions for Phase Two based on an output specification that calls for a significant improvement in service frequency, journey time and operating costs.
- 6.3.4** Notwithstanding that the franchise bidding process will encourage rail operator innovation and refinement, the Welsh Government has already undertaken initial Business Case work in relation to potential solutions. The work undertaken has reviewed alternatives for the Valley Lines including consideration of new diesel, heavy rail electric, light rail and combined options.
- 6.3.5** Delivery of Metro Phase two schemes is expected to be primarily in the period 2018-2023. These schemes are shown in Figure 6.2 which is an extract from 'Rolling Out Our Metro'.

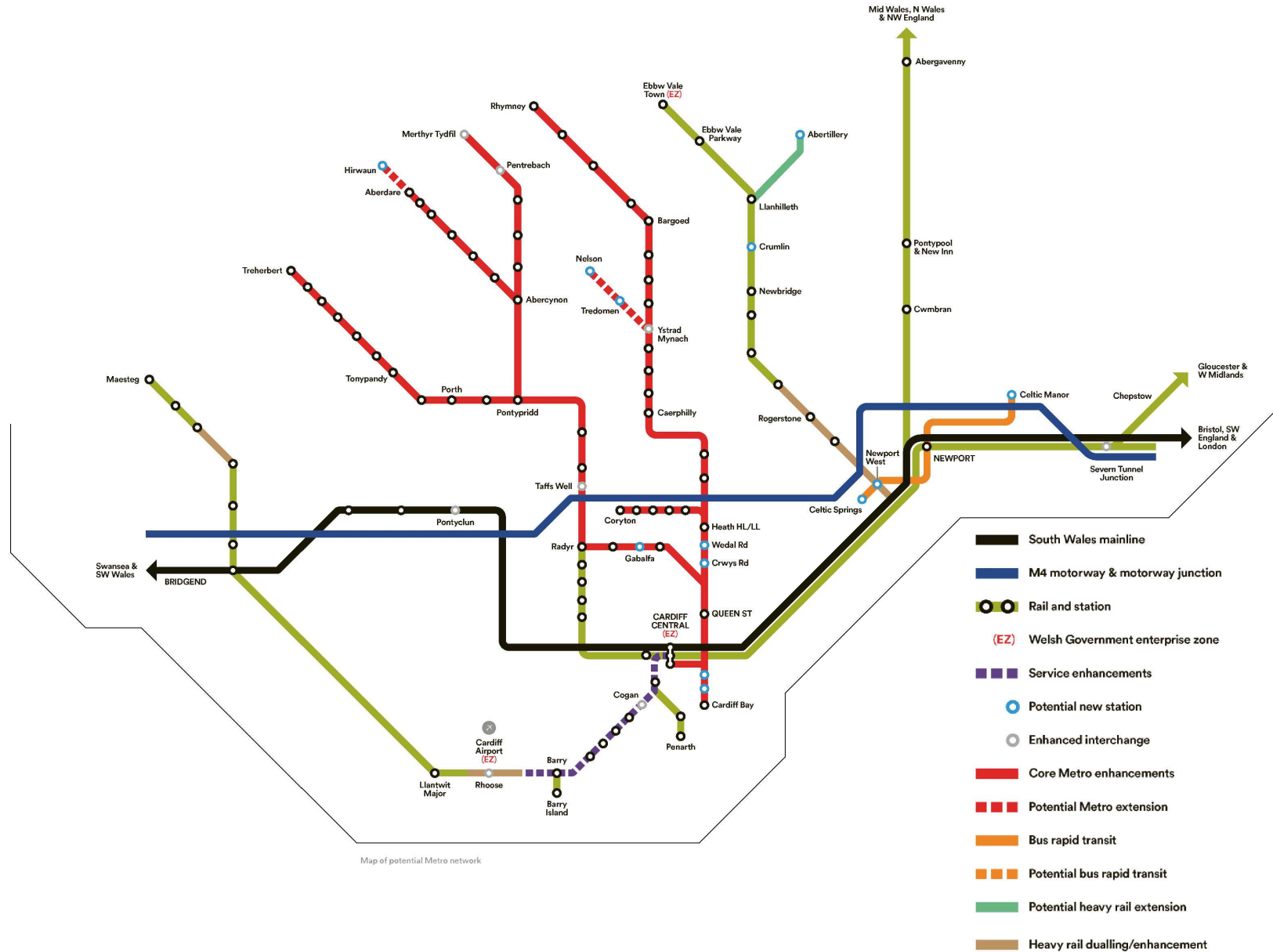


Figure 6.2: South Wales Metro Phase Two schemes

6.4 South Wales Metro Phase Three

- 6.4.1** South Wales Metro Phase three is less well defined than Phases one and two since this phase is related to the outcomes of preceding phases and the availability of future funding.
- 6.4.2** The Welsh Government has appraised a significant inventory of potential phase three schemes. It is anticipated that Phase three schemes will comprise of extensions/additions to the existing network and also wholly new routes connecting to the network.
- 6.4.3** Whilst acknowledging the overall network effect of the South Wales Metro it is likely that many Phase three schemes will have only a marginal effect on movement in the M4 corridor. Potential Phase Three schemes and associated benefits are shown in Figure 6.3 which an extract from 'Rolling Out Our Metro'.

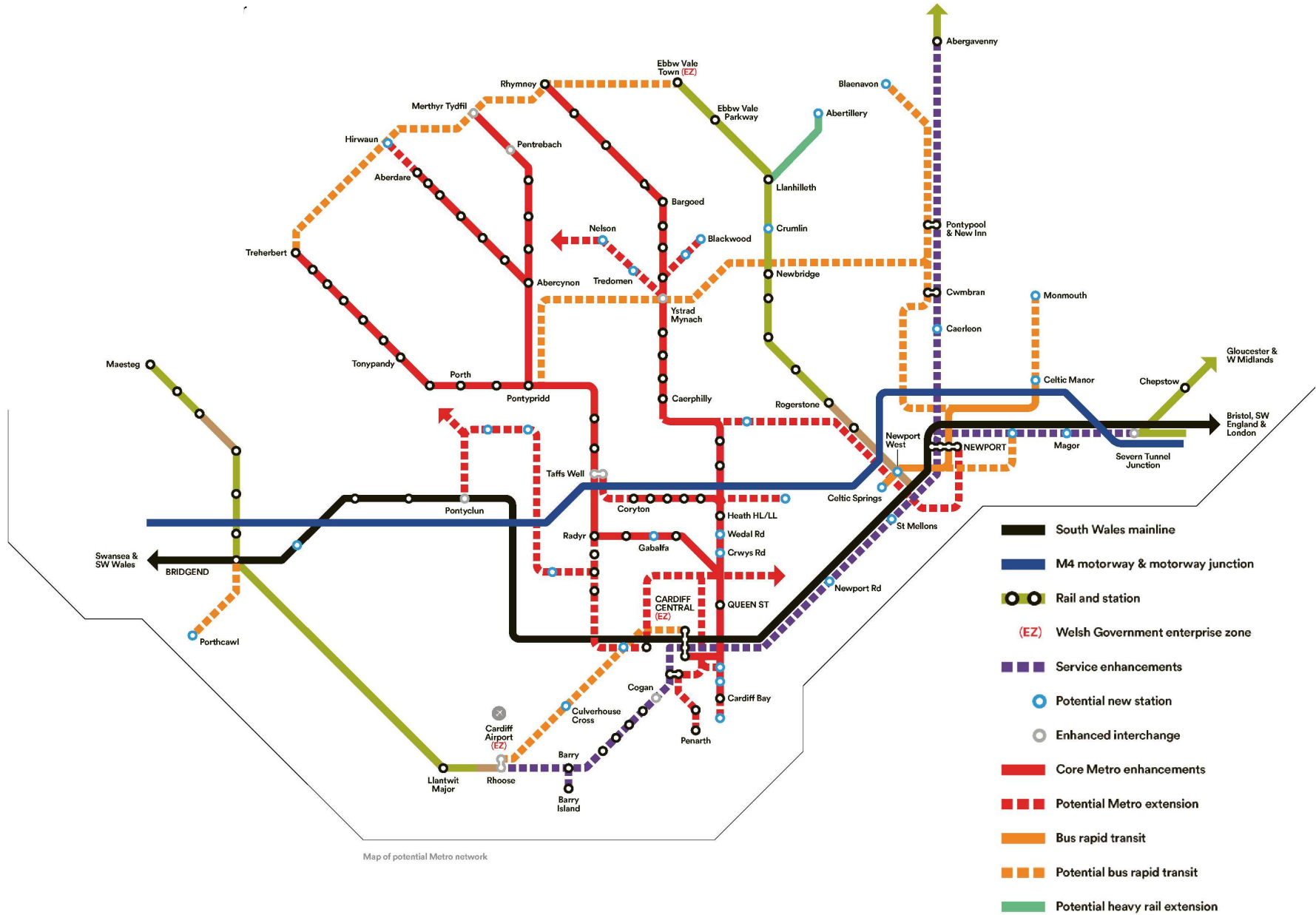


Figure 6.3: Potential South Wales Metro Phase Three schemes

7 Public Transport Scenario Development

7.1 Introduction

7.1.1 In order to test the potential impact of upgrades to public transport on demand for travel on the M4, a definition of the future public transport network is required. To test the maximum impact of public transport the scenario to be tested will comprise the following:



7.1.2 This scenario represents a major upgrade in public transport and an ambitious target in terms of what is likely to be delivered by 2037 (the M4CaN model design year) both in terms of delivery and required funding and significantly exceeds the schemes currently committed in policy.

7.1.3 The current M4CaN transport model includes two key public transport upgrades in comparison to the existing situation:

- a) Great Western Route Modernisation; and
- b) Valley Lines electrification.

7.1.4 The public transport scenario tested includes Great Western Route Modernisation (as set out below) but with Metro Phase 2 included to supersede Valley Lines Electrification as it offers a higher level of service provision.

7.1.5 The following sections 7.2-7.6 describe the component schemes used to represent the scenario.

7.1.6 A number of Metro schemes, particularly in Phase 3, are remote from the M4 corridor and offer transport connections for which the M4 is not a valid alternative, these are therefore not included in the model. A set of agreed schemes has been defined for inclusion in the scenario through consultation with Transport for Wales and Welsh Government as described in the following sections. As a result of the modelling methodology used only the effects of rail and strategic Park and Ride schemes will be considered.

7.2 Great Western Route Modernisation

7.2.1 The Great Western Route Modernisation (GWRM) includes the electrification of the Great Western Mainline from London Paddington to Cardiff by 2017⁴.

7.2.2 The electrification of the railway will reduce the journey time between London Paddington and Cardiff by 17 minutes⁵.

7.2.3 New bimodal (electric and diesel traction power) rolling stock will operate on the line replacing the current Class 43 HST diesel rolling stock.

⁴ Statement by the Secretary of State for Transport: Railway investment on the Great Western Main Line and in Wales, 2011

⁵ Statement by the Secretary of State for Transport: Railway investment on the Great Western Main Line and in Wales - 1 March 2011

7.2.4 Improved journey times have been represented in the model using data from the Great Western electrification Business Case.

7.3 South Wales Metro Phase One Schemes

7.3.1 The majority of Phase One Metro schemes are related to station facilities and improvements. Two Metro Phase One station schemes (both of which are already operational) have been included:

- a) Pye Corner Station: The station was opened in December 2014 and is situated on the Ebbw Vale Line to the north of Newport.
- b) Ebbw Vale Town Station: The station was opened in May 2015 and is situated on the Ebbw Vale Line. The station is the new terminus of the line and the scheme incorporated works to extend the line from Ebbw Vale Parkway.

7.4 South Wales Metro Phase Two Schemes

7.4.1 Metro Phase two comprises the Valley Lines Modernisation. The final specification will be established through the award of the Wales and Borders Franchise to be determined in 2017 but for the purpose of this study the scheme will be represented as a light rail network to the north of Cardiff Central with heavy rail services retained on the City Line, Vale of Glamorgan, Maesteg, Ebbw Vale and Penarth Lines.

7.4.2 The 'Core Valley Lines' service pattern (plus additional local routes) represented in the model is illustrated in Figure 7.1 with additional routes in the Cardiff Capital Region represented in Figure 7.2. In the figures each line indicates an hourly service with blue lines representing light rail services and green lines representing heavy rail services.

7.4.3 These service patterns are as considered by Welsh Government in feasibility stage work but it is likely that the final solution delivered by the successful franchise bidder will differ.

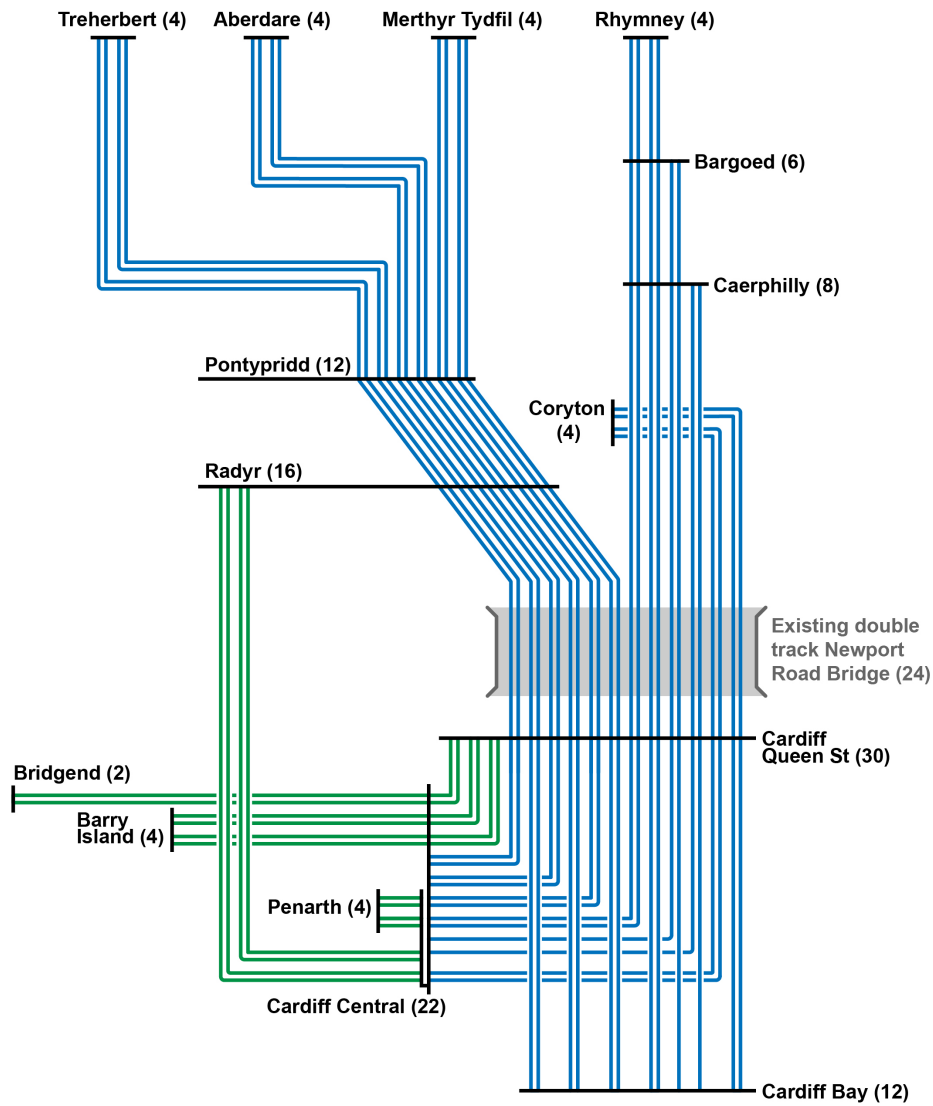


Figure 7.1: South Wales Metro Phase 2 – Assumed Core Valley Lines Service Pattern

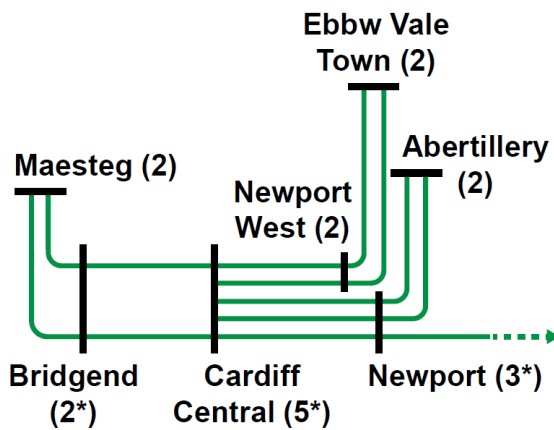


Figure 7.2: South Wales Metro Phase 2 – Assumed non core lines Metro Service Pattern

Table 7.1 sets out the service frequency and estimated journey times from key termini to Cardiff Central station associated with this service pattern compared with those of the current service pattern.

Table 7.1: Assumed effects of Valley Lines Modernisation on services and journey times

Destination	Current Service		Metro Phase 2 Service	
	Services/hour	Journey time to CDF	Services/hour	Journey time to CDF
Treherbert	2	60	4	52
Aberdare	2	62	4	48
Merthyr Tydfil	2	60	4	50
Rhymney	1	61	4	47
Coryton	2	19	4	18
Barry	4	25	6	24
Penarth	4	13	4	12

7.5 Metro Phase Three Schemes

Welsh Marches Line

7.5.1 Improvements to the Welsh Marches line are included in the scenario in terms of additional services and journey times but excluding any new stations.

7.5.2 As for Valley Lines modernisation the delivery and detail of these routes will be dependent on the procurement and delivery of a new Wales and Borders franchise.

7.5.3 In comparison to the existing provision the tested scenario comprises of the following;

- a) Existing hourly Manchester – Cardiff Central service to call only at Abergavenny, Newport and Cardiff resulting in a reduced journey time of 35 minutes.
- b) Introduction of a second hourly Abergavenny – Cardiff service calling at Abergavenny, Pontypool & New Inn, Cwmbran, Caerleon, Newport, St Mellons, Newport Road and Cardiff Central with a journey time of 46-49 minutes varying by direction. Of these, the stations at Caerleon, St Mellons and Newport Road are new stations and associated new demand has not been included but journey time effects have been accounted for.

Great Western Main Line Relief Lines Services

7.5.4 A number of existing train services, such as those to Ebbw Vale, already make use of the relief lines running parallel to the Great Western Mainline. However proposed improvements to line speed and the provision of new stations will enable greater use to be made of these routes in the future.

- 7.5.5** As for Valley Lines modernisation, the delivery and detail of these routes will be dependent on the procurement and delivery of a new Wales and Borders franchise.
- 7.5.6** New stations are proposed at Llanwern, St Mellons and Newport Road but the feasibility of delivering all of these stations in operational terms has yet to be fully determined. New station demand at St Mellons and Newport Road has not been accounted for but at Llanwern, where a major residential development is under construction, demand related to the provision of a strategic 1,000 space⁶ Park and Ride has been considered separately as described in section 8. A new station at Llanwern could provide a Parkway style facility for journeys to Cardiff, Newport and Bristol.
- 7.5.7** The relief lines could be served by a combination of new and existing services. In addition to the Abergavenny service described in section 7.6.4 one additional service and two altered service are proposed:
- a) New Severn Tunnel Junction - Cardiff service calling at Severn Tunnel Junction, Llanwern, Newport, St Mellons, Newport Road and Cardiff Central with a journey time of 32 minutes.
 - b) Altered Bristol - Swansea service. This service is included as part of the Great Western electrification scheme but has been altered to reflect availability of new stations calling at Bristol Temple Meads, Llanwern, Newport, Cardiff Central and stops to Swansea. The additional stations are forecast to have no impact on journey times because there will also be compensating line speed improvements.
 - c) Altered Cheltenham - Cardiff Central service calling at Cheltenham, Gloucester, Chepstow, Llanwern, Newport and Cardiff Central. The additional stations are forecast to have no impact on journey time because there will also be compensating line speed improvements.
- 7.5.8** This service pattern provides a good level of service at each of the stations without significantly disadvantaging existing passengers because there will also be compensating line speed improvements on the Relief Lines.

⁶ From Section 106 agreement for Land formerly known as Llanwern Steelworks, Queensway, Llanwern, Newport, NP19 4QZ dated 31 March 2010.

8 Modelling Approach

8.1 Introduction

8.1.1 This section sets out the approach used to test the likely effect on traffic volumes on the M4 as a result of implementing the set of measures set out in Section 7.

8.2 Approach Overview: Metro Rail Demand

8.2.1 The approach used for forecasting the changes in rail demand is based on the principles set out in the Passenger Demand Forecasting Handbook (PDFH) which is produced by the rail industry's Passenger Demand Forecasting Council. The relevant rail journey time elasticities (which represent how changes in service provision affect travel demand) quoted in PDFH are based on changes in Generalised Journey Time (GJT). GJT is a measure which combines rail journey time, intervals between trains and the need to interchange into a single value for the overall public transport journey.

8.2.2 The relevant formula taken from PDFH is:

$$I_j = \left(\frac{GJT_{new}}{GJT_{base}} \right)^g$$

Where:

I_j is the index for the change in volume due to journey time related factors;

g is the generalised journey time elasticity; and

GJT_{base} and GJT_{new} are the base and new generalised journey times.

8.2.3 Using this method a spreadsheet model was created to compare the GJT of the public transport provision assumed in the M4CaN base year to a scenario, in which the implementation of South Wales Metro rail schemes (as detailed in Section 7) are assumed to be completed.

8.2.4 According to PDFH, rail journey time elasticities differ depending on trip length and origin/destination. The relevant categories identified, for which separate elasticities have been applied in the model, are:

- Journeys to or from the London Travel Card Area;
- Non-London journeys up to 20 miles; and
- Non-London journeys exceeding 20 miles.

8.2.5 PDFH does not propose variation in elasticities by trip purpose or ticket type. As a result the model has been based on total demand by time period for a 2037 forecast year to coincide with the design year of the M4CaN scheme. Changes in demand have been calculated based on a matrix of origin-destination movements between stations rather than the detailed zoning system employed by the M4CaN traffic model.

8.2.6 The public transport demand matrix used in the M4CaN work does not capture all trips within South East Wales. In light of this 2014 station-to-station demand extracted from MOIRA for the South East Wales regional multi-modal model has

been used. MOIRA is a software package used by the rail industry to predict how changes in the timetable will affect passenger demand. This demand has been grown to the 2037 forecast year used for the M4CaN using TEMPro 7 Wales rail growth factors. The data represents all station-to-station demand within South East Wales, including any journeys which pass through or have only one trip end in the study area.

- 8.2.7** To reduce the size of the matrix, external zones were created to represent rail demand entering the study area from areas outside South East Wales. Demand entering/exiting the study area from/to stations outside of South East Wales has been allocated to one of the external zones on the basis of which line such trips are most likely to use to enter the study area. The external zones used for this grouping are:
- West Wales Line (all stations west of Swansea including Heart of Wales Line stations south of Builth Road);
 - Marches Line (all stations north of Abergavenny including Heart of Wales Line stations north of Builth Road);
 - Gloucester to Newport Line (all stations north of Cheltenham);
 - South Wales Main Line (all stations east of the Severn Tunnel excluding the London Travel Card Area); and
 - London Travel Card Area.
- 8.2.8** Using the calculated increase in rail patronage two methods have been used to indicate how changes in rail demand might affect traffic volumes on the M4 motorway around Newport. These differing methods have been used to create a range of potential impact which is considered to represent upper and low bounds of the likely impact.
- 8.2.9** Method 1 – Upper Bound. This method assumes that any increase in rail demand results from a switch from highway demand. By applying standard vehicle occupancy rates from WebTAG the demand is converted from person trips on rail to vehicle trips.
- 8.2.10** Method 2 – Lower Bound. The second option is based on WebTAG unit A5.4 (Marginal External Costs), which is typically used to calculate the diversion of demand from other travel modes in rail appraisals. The WebTAG guidance indicates that a 100km increase in rail travel could be expected to result in a 26km decrease in car drivers. Using this information it has been assumed that 26% of additional rail trips are abstracted from current vehicle trips.
- 8.2.11** Using these methods, matrices of the reduction in highway demand were created and subsequently used to quantify the number of vehicles likely to be taken off the M4 motorway around Newport. This enables a percentage reduction in traffic on the M4 motorway to be calculated for the 2037 Do Minimum scenario representing the impact of South Wales Metro rail schemes.

8.3 Approach Overview: Llanwern Park and Ride

- 8.3.1** The effect of the Llanwern Park and Ride has been considered separately as the effects of new stations cannot be accounted for using the PDFH approach outlined in section 8.2. The Llanwern station and associated Park and Ride facility is located such that it would be expected to reduce traffic volumes using the M4.
- 8.3.2** The delivery of the Park and Ride site is related to the Glan Llyn redevelopment on the former Llanwern Steelworks site. The Section 106 agreement in relation to the Glan Llyn development includes a condition to deliver a 1,000 space Park and Ride. The station and Park and Ride will be situated close to over 5,000 planned residential units allocated in the Newport LDP (Glan Llyn, Llanwern Village, Hartridge High School and the Jigsaw Site) and significant use of the station by new residents would be anticipated.
- 8.3.3** The use of Park and Ride facilities is influenced by a range of factors including location, surrounding highway conditions, comparative journey times, service frequency and car park pricing. Users of a Park and Ride will also differ in journey purpose including commuters, shoppers and event related demand each of which results in differing daily demand profiles. Such factors are interrelated which can lead to complex, and potentially inaccurate, demand forecasting.
- 8.3.4** In order to produce a simplified understanding of the maximum impact that a Llanwern Park and Ride could have on M4 traffic volumes a robust scenario has been used that considers the effect of the Park and Ride site reaching the 1,000 space capacity limit during the day i.e. use of the Park and Ride will have maximum abstraction from the M4 junctions 23a to 28. In addition to passengers arriving by car it is also considered that the station would attract additional users arriving by bus and active travel modes particularly from the new developments surrounding the station.
- 8.3.5** The daily demand profile of Park and Ride has been taken from recent survey data collected for Welsh Government studies of rail Park and Ride sites and is formed from an amalgamation of observed demand at Newport, Abercynon and Bridgend stations. This approach has been used in recognition that each of these stations has similarities and differences from the proposal for Llanwern; the approach therefore creates a more general profile than would result from using a single site. Each arrival and departure from a Park and Ride site can be considered to represent a trip that has been removed from the highway network. As a result of vehicle occupancy the number of resulting rail trips would be expected to be proportionately greater.
- 8.3.6** The survey data indicates that there are often a significant number of vehicles that arrive or depart from Park and Ride that remain parked outside the surveyed data period of 0600-1900. This occupancy outside the surveyed period is likely to result from a combination of overnight trips, early morning journeys and use of the car park by local residents. As a result, and derived from the survey data, an initial daily occupancy of 15.7% equating to 157 spaces has been assumed at the Llanwern Park and Ride with the remaining capacity accumulating according to the daily demand profile calculated from the survey data.

8.3.7 Using this arrival/departure profile the level of demand associated with a 1,000 space Park and Ride site would be:

- In the AM peak period (0800-0900) 203 arrivals/departures might be expected;
- In an inter peak hour (taken as 1300-1400) 130 arrivals/departures might be expected; and
- In the PM peak period (1700-1800) 339 arrivals/departures might be expected.

8.3.8 Figure 8.1 illustrates the key destinations for Park and Ride journeys and also the most likely origins and access routes of Park and Ride users. These will be strongly influenced by the train services calling at the station as set out in 7.6.7.



Figure 8.1: Key origins, destinations and routes of Llanwern Park and Ride users

8.3.9 For trips to the west (Newport/Cardiff/Swansea) a Park and Ride at Llanwern is most likely to be attractive to residents of Monmouthshire, eastern Newport and the Llanwern development itself.

8.3.10 For trips to the east (Monmouthshire/Bristol and destinations towards London) a Park and Ride at Llanwern is most likely to be attractive to residents of western Cardiff, eastern Newport and the Llanwern development itself.

8.3.11 As a result of the differing origins of Park and Ride users not all trips would have otherwise used the M4 around Newport – for instance trips from east Cardiff would be more likely to access the site via the A48 and the Steelworks Access Road and so not all Park and Ride users can be assumed to be abstracted from the M4. Conversely some Park and Ride users may use the M4 to access the station when their direct car trip to final destination would not have used the M4; for instance journeys to/from Monmouthshire to Bristol using the Llanwern Park and Ride may now use a section of the M4 that they did not previously.

8.3.12 In light of such route considerations, and to develop upper and lower bounds, calculations have been made assuming that 80% and 60% of Park and Ride users would have otherwise used the M4 corridor around Newport.

9 Results

9.1 Metro Rail Demand Upper Bound

9.1.1 Table 9.1 sets out the calculated increase in rail demand and corresponding upper bound (8.2.10, Method 1) percentage of M4 trips that would be abstracted by South Wales Metro rail schemes measured on the Junction 28-29 section of the M4.

Table 9.1: Upper bound effect of South Wales Metro Rail schemes on M4 J28-29 traffic flow

Time Period	Rail Demand Increase ⁷	Two-way M4 Traffic Flows ⁹	Vehicles per hour ⁷	% M4 Trips Abstracted
AM Peak Hour	319	11,670	218	1.9%
Inter Peak Hour	139	8,663	87	1.0%
PM Peak Hour	297	11,793	194	1.6%

9.2 Metro Rail Demand Lower Bound

9.2.1 Table 9.2 sets out the calculated increase in rail demand and corresponding lower bound (8.2.11, Method 2) percentage of M4 trips that would be abstracted by South Wales Metro rail schemes measured on the Junction 28-29 section of the M4.

Table 9.2: Lower bound effect of South Wales Metro Rail schemes on M4 J28-29 traffic flow

Time Period	Rail Demand Increase ⁸	Two-way M4 Traffic Flows ⁹	Vehicles per hour ¹⁰	% M4 Trips Abstracted
AM Peak Hour	319	11,670	83	0.7%
Inter Peak Hour	139	8,663	36	0.4%
PM Peak Hour	297	11,793	77	0.7%

⁷ Calculated using WebTAG Marginal External Cost Factor – decrease in car driver distance travelled of 26% of rail passenger km increase.

⁸ Person trips that are in scope to use the M4 J29-29.

⁹ Flows take from M4CaN Traffic Model 2037 do minimum scenario.

¹⁰ Based on standard vehicle occupancy rates extracted from WebTAG databook. Assumes all new rail trips transfer from car modes.

9.3 Llanwern Park and Ride Demand Upper Bound

9.3.1 Table 9.3 sets out the effect of calculated increase in rail demand and corresponding upper bound percentage of M4 trips that could be abstracted by a 1,000 space Llanwern Park and Ride site measured on the Junction 28-29 section of the M4.

Table 9.3: Upper bound effect of Llanwern Park and ride on M4 J28-29 traffic flow

Time Period	Park and Ride Arrivals/Departures	Two-way M4 Traffic Flows ⁹	80% upper bound abstraction	% of M4 trips abstracted
AM Peak Hour	203	11,670	163	1.4%
Inter Peak Hour	130	8,663	104	1.2%
PM Peak Hour	339	11,793	271	2.3%

9.4 Llanwern Park and Ride Demand Lower Bound

9.4.1 Table 9.4 sets out the effect of calculated increase in rail demand and corresponding lower bound percentage of M4 trips that could be abstracted by a 1,000 space Llanwern Park and Ride site measured on the Junction 28-29 section of the M4.

Table 9.4: Lower bound effect of Llanwern Park and ride on M4 J28-29 traffic flow

Time Period	Park and Ride Arrivals/Departures	Two-way M4 Traffic Flows ⁹	60% lower bound abstraction	% of M4 trips abstracted
AM Peak Hour	203	11,670	122	1.0%
Inter Peak Hour	130	8,663	78	0.9%
PM Peak Hour	339	11,793	203	1.7%

9.5 Combined Effect of Measures

9.5.1 Table 9.5 summarises the compound effect (summation of lower and upper bounds from tables 9.1-9.4) of the Metro schemes tested on forecast 2037 M4 traffic flow measured on the Junction 28-29 section of the M4.

Table 9.5: Compound effects of public transport scenario on M4 traffic flows Junction 28-29

Time Period	Two-way M4 J28-29 traffic flow	M4 trips abstracted			
		Upper Bound		Lower Bound	
		Vehicles	Percentage	Vehicles	Percentage
AM Peak Hour	11,670	381	3.3%	205	1.7%
Inter Peak Hour	8,663	191	2.2%	114	1.3%
PM Peak Hour	11,793	465	3.9%	280	2.4%

10 Summary and M4 Objectives Appraisal

- 10.1.1** A set of measures representing the delivery of all rail elements of the South Wales Metro and a strategic Park and Ride site at Llanwern has been used to estimate the potential effect on traffic flows on the existing M4 corridor in a 2037 forecast year.
- 10.1.2** The schemes represented are liable to change as a result of the Wales and Borders rail franchise bid process and further development of the South Wales Metro initiative.
- 10.1.3** Considering traffic volumes on the Junction 28-29 section of the existing M4 it is anticipated that implementation of the tested measures might be expected to result in:
- 1.7 – 3.3% decrease in two-way traffic volumes in the AM peak hour,
 - 1.3 – 2.2% decrease in two-way traffic volumes in an Inter Peak hour; and
 - 2.4 – 3.9% decrease in two-way traffic volumes in the PM peak hour.
- 10.1.4** This mode transfer represents a significant increase in public transport patronage and it is recognised that the South Wales Metro will impact a wide range of movements in the region, many of which will be north-south rather than east-west oriented. Table 10.1 overleaf presents a qualitative assessment of the Metro Schemes against M4CaN objectives. The qualitative appraisal indicates that the Metro can significantly advance many of the objectives without any adverse effects on the objectives in other areas. This assessment is consistent with the Welsh Government position that the M4CaN and the Metro schemes should be considered as complimentary.
- 10.1.5** Whilst achieving increased patronage and other benefits, the results indicate that the South Wales Metro would provide relatively minor reduction in motorway traffic volumes and therefore do not markedly alter the case for the M4 Corridor around Newport project.

Table 10.1 Assessment of Metro Schemes on M4CaN objectives

	Significant adverse	Moderate adverse	Slight adverse	Neutral	Slight beneficial	Moderate beneficial	Significant beneficial
TPO 1: Safer, easier and more reliable travel east-west in South Wales.						✓	
TPO 2: Improved transport connections within Wales and to England, the Republic of Ireland and the rest of Europe on all modes on the international transport network.					✓		
TPO 3: More effective and integrated use of alternatives to the M4, including other parts of the transport network and other modes of transport for local and strategic journeys around Newport.							✓
TPO 4: Best possible use of the existing M4, local road network and other transport networks.					✓		
TPO 5: More reliable journey times along the M4 Corridor.					✓		
TPO 6: Increased level of choice for all people making journeys within the transport Corridor by all modes between Magor and Castleton, commensurate with demand for alternatives.						✓	
TPO 7: Improved safety on the M4 Corridor between Magor and Castleton.				✓			
TPO 8: Improved air quality in areas next to the M4 around Newport.					✓		
TPO 9: Reduced disturbance to people from high noise levels, from all transport modes and traffic within the M4 Corridor.					✓		
TPO 10: Reduced greenhouse gas emissions per vehicle and/or person kilometre.					✓		
TPO 11: Improved travel experience into South Wales along the M4 Corridor.					✓		
TPO 12: An M4 attractive for strategic journeys that discourages local traffic use.					✓		
TPO 13: Improved traffic management in and around Newport on the M4 Corridor.					✓		
TPO 14: Easier access to local key services and residential and commercial centres.					✓		
TPO 15: A cultural shift in travel behaviour towards more sustainable choices.							✓