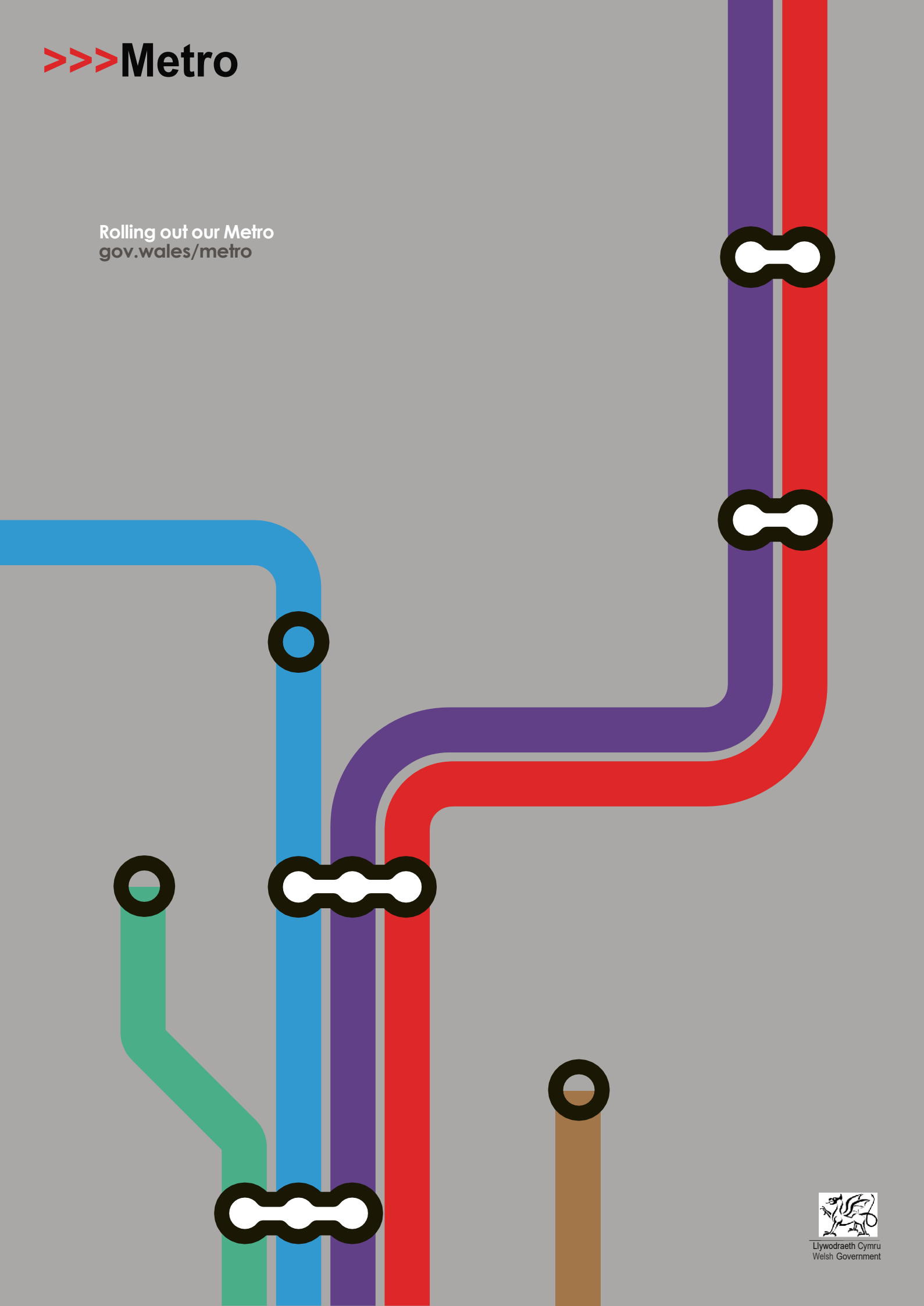
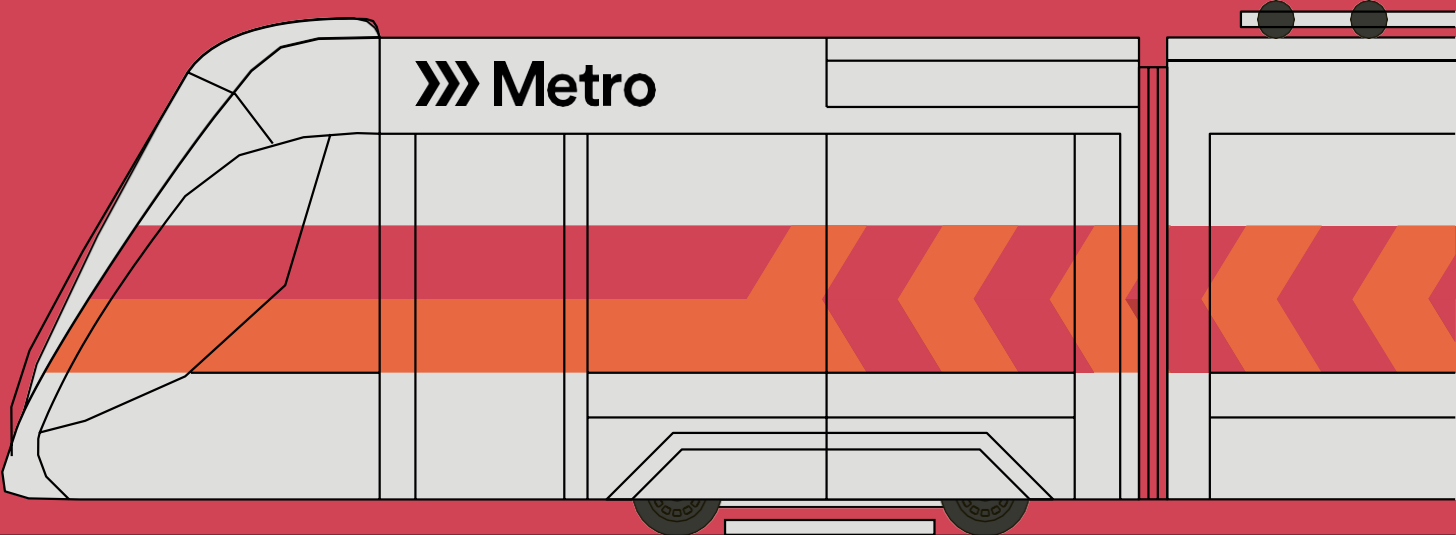


Rolling out our Metro  
[gov.wales/metro](http://gov.wales/metro)



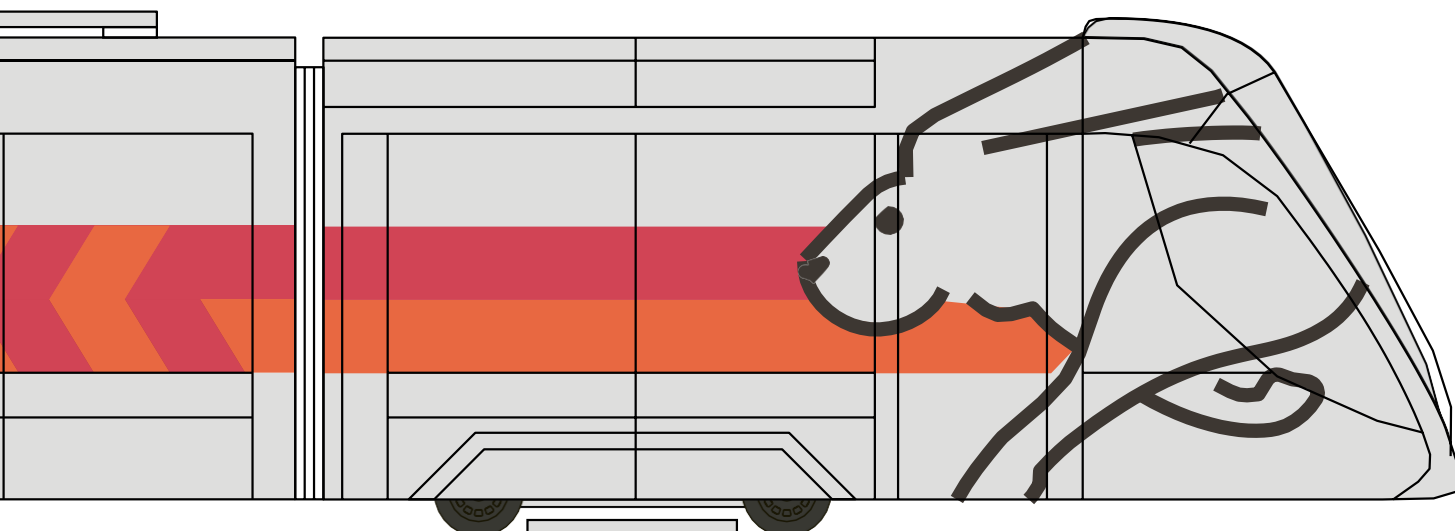
The purpose of this document is to begin a public engagement on our developing Metro proposals. The details presented are illustrative and for public information only. They do not provide confirmation of any specific schemes, nor do they restrict or constrain our procurement strategy or what bidders may propose in any procurement process.

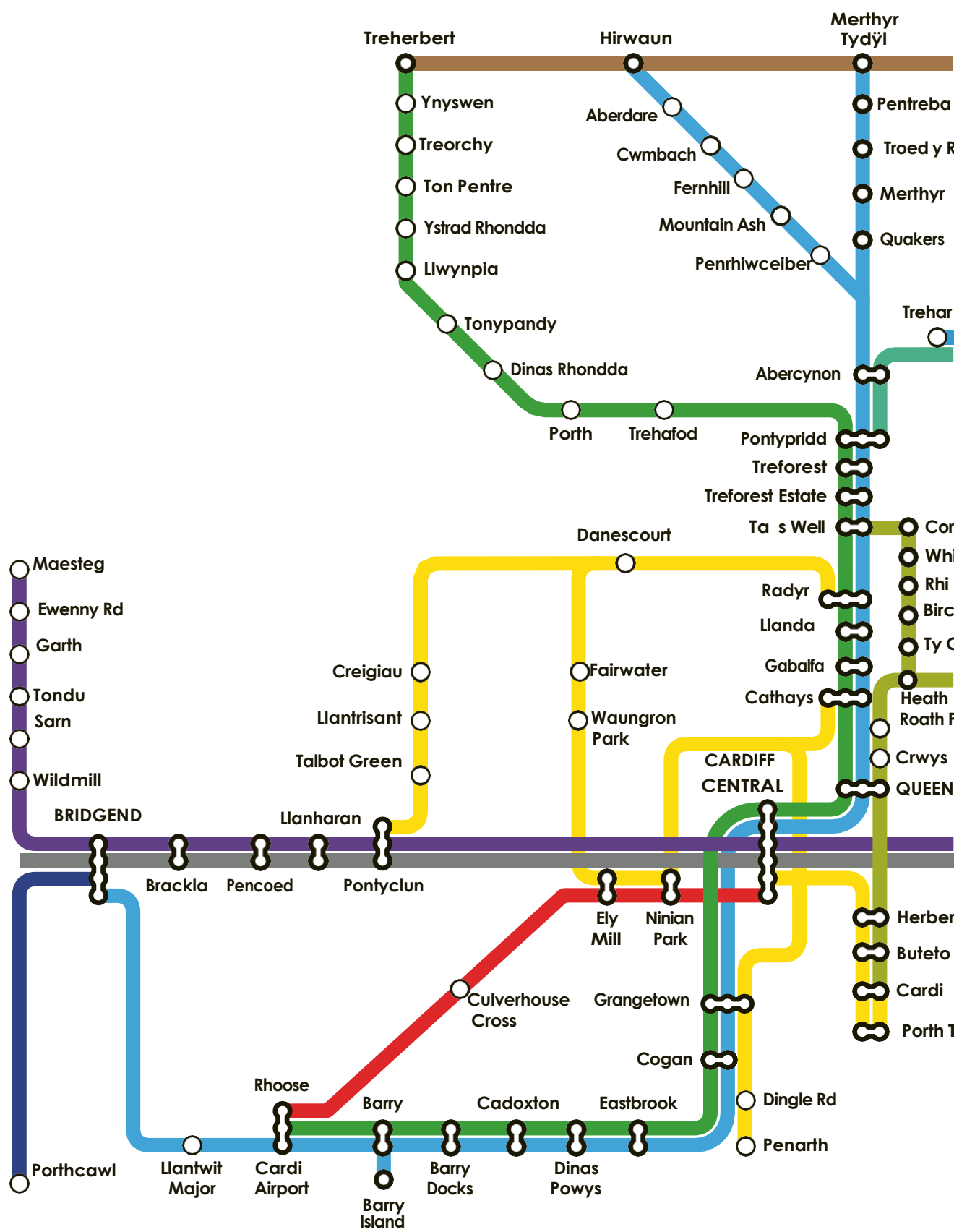


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## Metro branding and transport livery





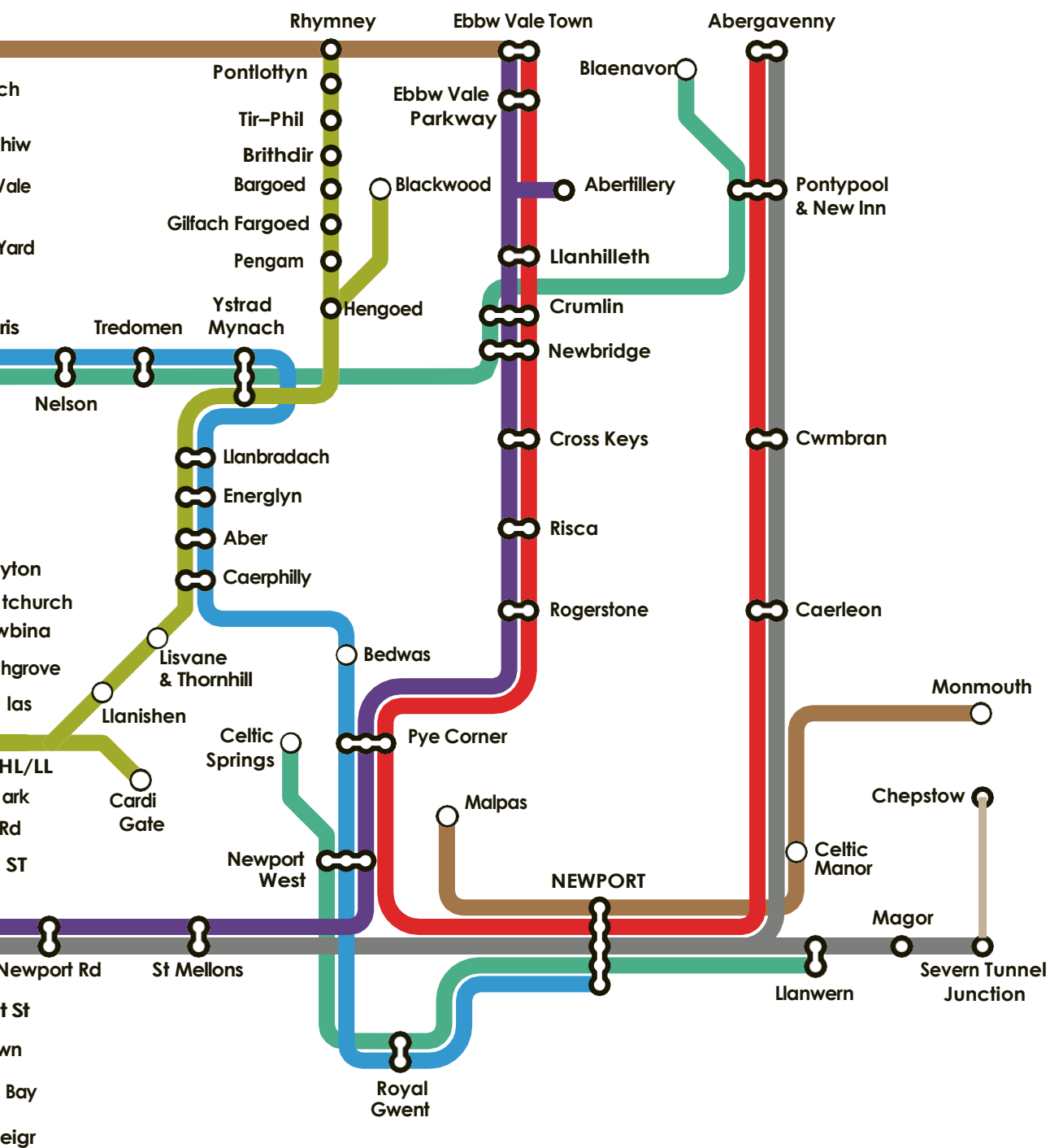
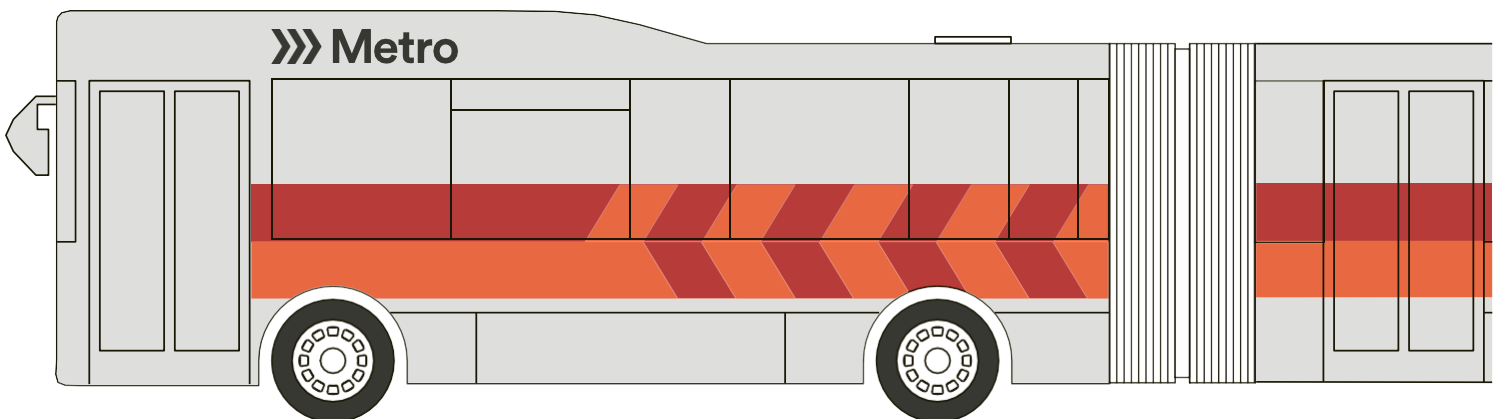
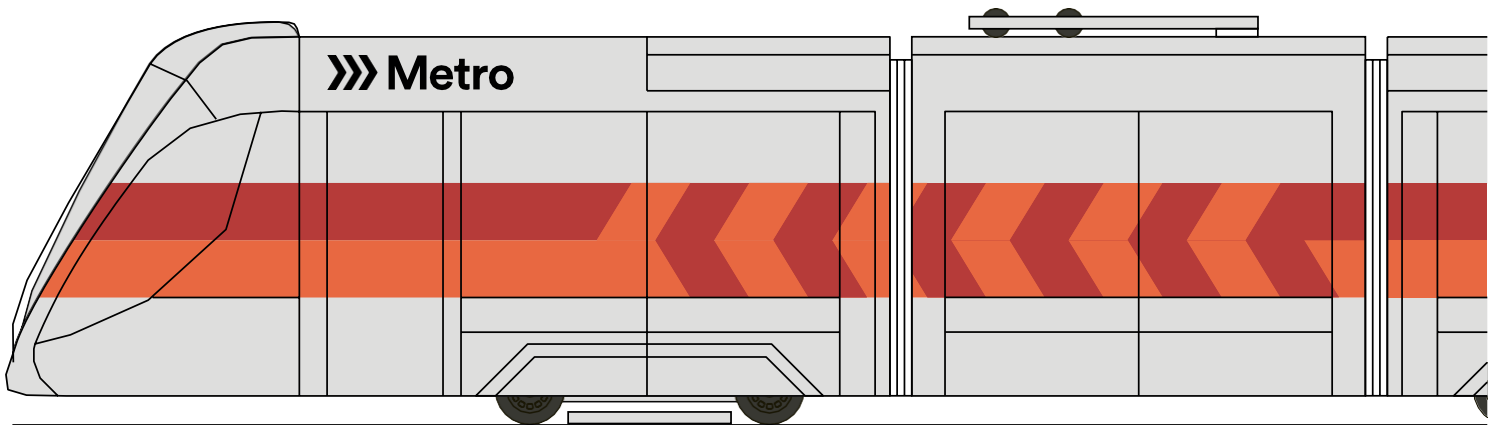
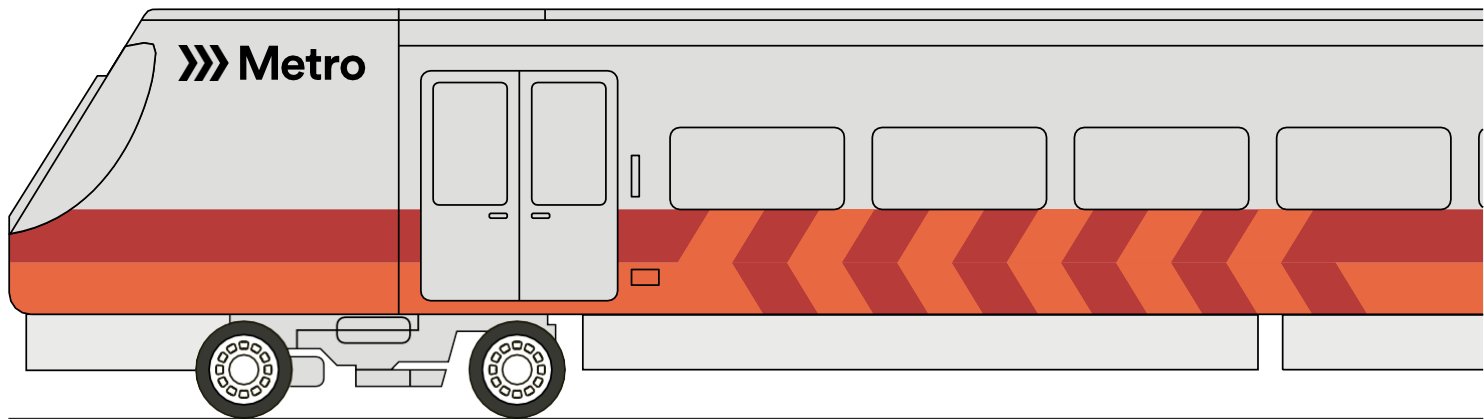


Figure 1 - The potential Metro network

**Metro is a new transport system that will transform the way we travel around the Cardiff Capital Region. It will provide faster, more frequent and joined-up services using trains, buses and light rail.**

**Metro will bring benefits to passengers, link communities together and help transform the economy. It will have a positive social, economic and environmental effect. It will also shape our region's identity.**



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“The Metro will be a catalyst for transforming the economic and social prospects of South East Wales and the country as a whole.”

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The Cardiff Capital Region Metro will deliver real benefits to passengers. The network can grow through new services, routes and stations to connect population centres that are, at present, poorly served by regional public transport. This will boost economic development and regeneration across the region.

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**High frequencies**

Metro will run at least four services an hour across the entire network when needed, and even more at the network core. This gives a ‘turn up and go’ experience for passengers. Metro will also deliver a network where interchange is easy, using vehicles designed for speed and capacity.

**Integration**

Heavy rail, light rail, bus or active travel (cycling and walking) – all of these will be seamlessly joined to give integrated, reliable and frequent services across the region. This transformation in sustainable urban mobility and increased accessibility will have a profound impact. It will have positive social, economic and environmental effects. It will also shape the region’s identity.

---

**An extendable network**

A vital part of the Metro vision is that the network can grow to make it even more accessible. New stations, new routes, greater frequencies — in the future, the network can extend to bring better public transport to more communities and economic centres. It is a truly regional project.

**Enabling development and regeneration**

Metro stations will provide better passenger facilities and become a focal point for their communities. Metro also presents an opportunity for developers and local authorities, in partnership with transport organisations. Together, they can adopt a ‘transit-oriented development’ approach, directing development and regeneration to Metro transport corridors and their key stations and interchanges.



# Economic impact

The Cardiff Capital Region Metro is more than just a transport system. It is a catalyst for transforming the economic and social prospects of South East Wales and the country as a whole. Enhancing connectivity across the region will bring a wide range of benefits.

Some of these benefits were explored in the 2013 Metro Impact Study. They include: direct economic benefits through easier access to employment across the region; agglomerative benefits (ie, clusters of firms interacting with each other); development and regeneration benefits on key corridors and around key stations; environmental and sustainability benefits. Enhanced connectivity is also needed to support population growth and to tackle increasing road congestion, especially in Cardiff.

10 local authority areas of  
the Cardiff Capital Region



## Key components

Metro is likely to comprise some, or all, of these elements:

- An electrified rail system
- Integrated transport hubs
- Park-and-ride facilities
- New (including some on-street) light rail and/or bus rapid transit routes
- Better integration of services across modes and operators
- Active travel interventions

Enhanced services on the Valley Lines are a core part of the project.

This scope of Metro includes all the lines in and north of Cardiff, the Vale of Glamorgan line, the Ebbw Valley and Maesteg branches, the Marches line to Abergavenny and the South Wales mainline.

The Valley Lines Electrification (VLE) project has been integrated into the Metro programme as the Valley Lines Modernisation (VLM) scheme.

Metro is a long-term incremental programme. It will deliver benefits as efficiently as possible. This may mean that on some routes an initial investment in improving capacity and service frequency to achieve Metro objectives will be the priority.

Metro Phase 1 (£77million) has already made improvements, and significant progress has been made on the next phase of the project.

## Project delivery – The Welsh Government Transport Company

We have established the Welsh Government Transport Company, a not-for-dividend company that is wholly owned by the Welsh Government. Known as ‘Transport for Wales’, the company will provide support and expertise to deliver the next Wales and Borders rail franchise, and the next phase of the Metro project.

In June 2015, we began a market-testing exercise on our emerging proposals. This is allowing potential bidders, rolling stock operators, maintenance operators, financiers and interested parties to explore and discuss the new franchise and Metro direct with the Welsh Government. This engagement with industry is an important first step before we start a formal procurement process.

This industry dialogue is helping us to develop our understanding of the most efficient delivery structure. We believe that this approach will yield innovative solutions. There are many different options available, including heavy rail, light rail and bus rapid transit. These may be better value, and deliver better outcomes, than the original concept for Valley Lines electrification.

In June 2015, the Minister for Economy, Science and Transport announced that we intend to award an integrated contract for both the Wales and Borders franchise and Metro, in 2017. This will enable us to maximise reinvestment into the railway and deliver excellent services.

In a statement to Plenary in March 2015, The First Minister said, ‘This is a game-changing project and it cannot be done in a half-hearted way. It’s got to be done properly ... we fully understand this is a once-in-a-lifetime opportunity that could transform the economic prospects of up to one million people in Wales.’

As we develop our procurement strategy, we aim to reflect this ambition. We are taking an ‘outcome and output’ approach: we will tell the industry what we want in terms of better access to jobs and services, long-term transformational economic effects, more frequent and faster services, better quality, and environmental improvements.

This gives bidders the maximum opportunity to innovate, and to propose solutions that may be different to some of those presented here.

This approach also requires innovation in the relationship between Welsh Government, Network Rail and the UK Government, in specifying and delivering rail services in Wales.

## Evidence base

### The Cardiff Capital Region

The Cardiff Capital Region is already a vibrant economic entity with some striking features and capabilities. It houses the largest TV production centre outside London. Its financial services sector is growing rapidly. A major international convention centre is being developed in Newport. It has hosted global events such as the Ryder Cup and NATO conference. Cardiff University now ranks in the top five UK Higher Education institutions for research. We also have in South East Wales a geography and green infrastructure that is unique for an urban environment in the UK.

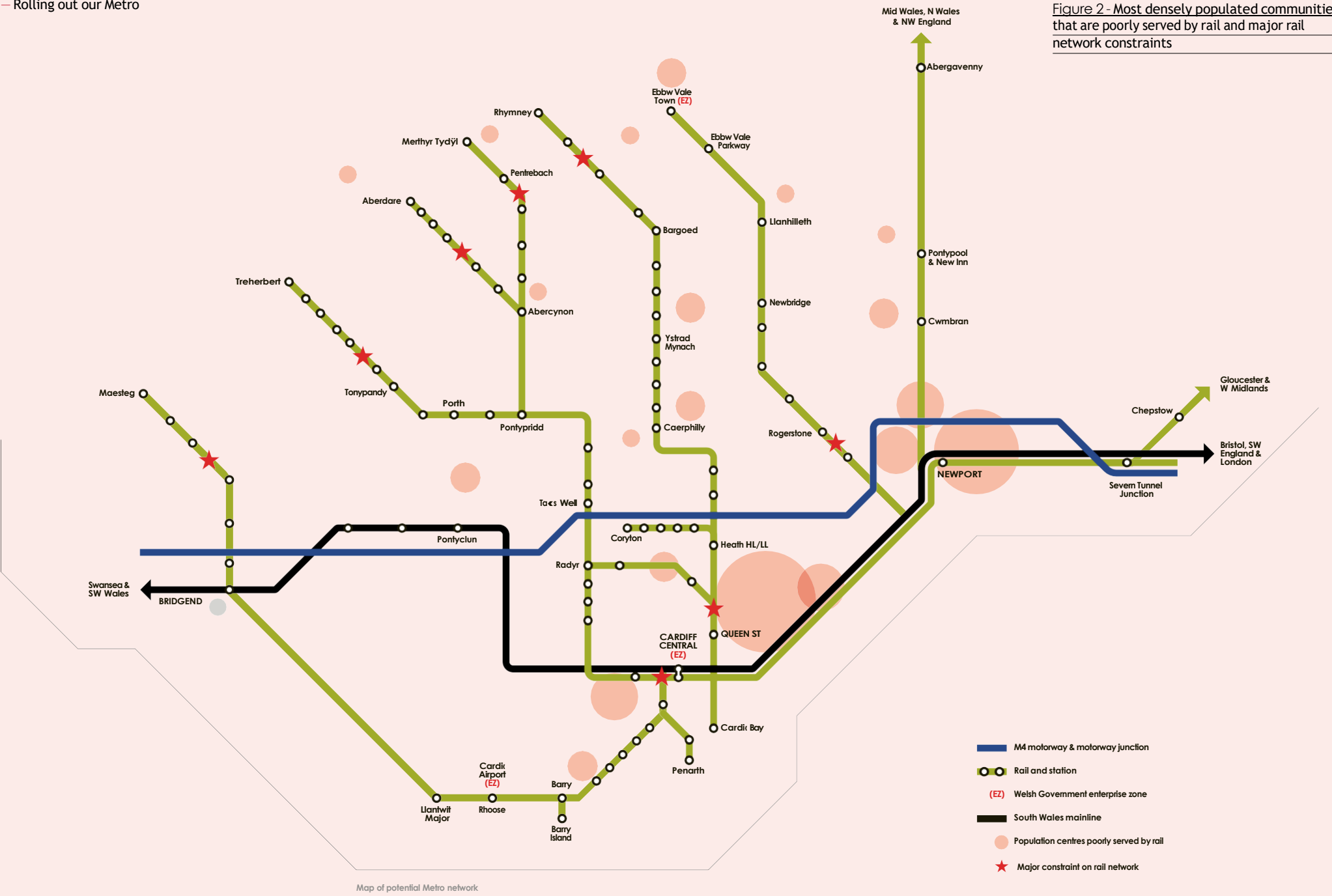
To grow its economy, there is widespread recognition that the Cardiff Capital Region needs major investment in its infrastructure to help it play a bigger role in the UK economy. A regional approach, underpinned by a transformation in public transport, will help to fulfil this ambition, enabling the Cardiff Capital Region to raise its international profile and compete more effectively on the world stage.

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Left to right: Glowworks studios in Cardiff Bay, British Airways Maintenance Cardiff at St Athan  
Cardiff Castle with the Millennium Stadium in the background

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### Economic and demographic profile

The population of the Cardiff Capital Region will grow from 1.5million to more than 1.6million over the next 15 years<sup>1</sup>. Much of this increase will be in Cardiff, which is growing more quickly than any other UK 'core city'. The city's current population is just over 350,000, but is likely to exceed 430,000 by 2030. Overall, Cardiff will have grown by nearly 50% in the first 30 years of this century.

While Cardiff's economic performance is ahead of the wider city region, it is still not performing as well as many other UK cities. For example, its GVA per capita (for Cardiff and the Vale of Glamorgan) of approximately 100% of the UK average is some way below cities like Edinburgh, Bristol, Nottingham and Belfast, whose GVA per capita are greater than 110% of the UK average.

Cardiff's economic performance is generally not replicated across the region. In some Valleys communities, GVA per capita is less than 60% of the UK average. Even when factoring in commuting, a regional figure of approximately 80% of the UK average is still low in UK terms.

This means that the economic challenge isn't just about enhancing Cardiff's economic potential. It is also about addressing economic inactivity in some Valleys communities and helping the wider city region.

We need more and higher value employment across the whole region.

### Transport constraints

Our proposals for Metro reflect some of the current constraints on the regional transport network (Figure 2).

The Metro Impact Study<sup>2</sup> identified that the largest and most densely populated communities, that are also poorly served by rail are in suburban Cardiff and Newport, parts of Cwmbran, Blackwood, east of Caerphilly, upper Blaenau Gwent and lower Rhondda Cynon Taf.

The study also identified that the rail network north of Cardiff is constrained by single-track sections at the network periphery, and that there are signalling and infrastructure limitations at the core of the network. Together, these make it very difficult to run more frequent services, extend lines, or create new stations.

Even without these ambitious Metro proposals, patronage on the rail network is forecast to grow. Network Rail's Route Study<sup>3</sup> for Wales has identified that demand for rail has grown from 20m passenger journeys in 2004/2005 to 30m today and on the valley lines alone, growth of 76% to 2023 is forecast.

The primary points of road congestion in the region are on the M4 around Newport, the M4 to the north west of Cardiff between J32 and J34, and the A470 approaching Cardiff. There is also urban congestion in Cardiff itself (which is likely to increase significantly, based on population projections).

The Metro proposals complement the Welsh Government's M4 'Corridor around Newport' project, which will address the long-standing problems on the motorway gateway to Wales. The M4 project will improve access to international markets and, through carefully planned junctions, link with Metro to provide an efficient integrated transport system that improves our nation's economic competitiveness and encourages jobs and growth.

### Economic opportunities through enhanced connectivity

In October 2013, The Metro Impact Study<sup>4</sup> presented a vision of a dynamic, connected, and liveable city region. A once-in-a-generation Metro programme could bring major economic benefits to the Cardiff Capital Region. It could provide the basis for greater social equality and sustainable economic development. The study estimated that over 30 years the region could benefit from 7,000 more jobs and a further £8bn into its economy.

The study also identified a range of transport-related development opportunities across the region, where better connectivity would enhance the economic impact. This analysis has recently been updated, and is helping to shape the development of Metro.

The findings of this analysis reflect those of the UK Government report by Sir Rod Eddington<sup>5</sup>, which identified a lack of capacity on transport networks, particularly in the UK's principal city regions, as a major impediment to business investment and growth. To tackle these problems, and reduce the cost of congestion and unreliability to the economy, Eddington recommended that central and local government should focus on travel-to-work patterns in urban areas which make the biggest contribution to the economy and are growing most rapidly.

In March 2015, the Cardiff Capital Region Board published its report, Powering the Welsh Economy. It said, 'Successful city regions have high-performing integrated transport systems that allow for the seamless and efficient flow of people and goods, feeding key hubs (employment, residential and recreational) effectively and supporting sustained economic growth.'

The European Union has also highlighted the importance of Urban Mobility<sup>6</sup> to the economy, especially in cities and city regions. It has identified better, smarter and more integrated urban transport as a key policy objective to tackle congestion and pollution, and to help economic growth and employment.

### Implications

An investment in the capacity and reach of the South East Wales transport network could help support not just more employment across the region, but more 'higher value' employment. This is especially true of Cardiff, which is more able to attract and retain these activities.

More importantly, Metro will improve access to employment across the whole of South East Wales. This will make it easier for people across the region (for example, in Pontypridd, Merthyr Tydfil and Ebbw Vale) to access employment opportunities anywhere in the region and for businesses to relocate to the upper valleys. This will enable the whole region to function more effectively as an economic entity.

<sup>1</sup> Stats Wales population projections, Ofce for National Statistics <http://bit.ly/1KTC9Wj>

<sup>2</sup> The Metro Impact Study, October 2013

<sup>3</sup> Network Rail, Wales Route Study 2015

<sup>4</sup> Welsh Government Cardiff Capital Region Metro <http://bit.ly/1N0m7lc>

<sup>5</sup> The Eddington Transport Study, 2006

<sup>6</sup> European Commission, Urban Mobility and Transport <http://bit.ly/1MEaNec>

# Objectives and Outcomes

The following objectives and outcomes have been established for Metro:

## Metro transport objectives




- Deliver a high-quality, reliable, efficient, economically sustainable transport network
- Improve connectivity, linking communities with all major commercial, social and leisure attractors, 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 travel choices
- Cater for increasing demand for public transport
- Reduce the impact of transport on the environment
- Encourage active travel and social inclusion initiatives

## Metro transport outcomes

- Reduced generalised journey times through faster, more frequent services and better interchange
- Increased public transport patronage through provision of more attractive services
- Reduced operating and maintenance costs through greater efficiencies and higher demand
- Capacity to meet demand during peak periods and special events
- Accessibility improvements through coordination of services, Disability Discrimination Act compliance and station design
- Reduced emissions through lower car use and more efficient, cleaner transit vehicles
- Direct services between main residential areas and economic centres to improve connectivity
- Improved quality of service through newer vehicles, better integration and enhanced services
- Better reliability in terms of availability and punctuality of services

These, and specific measures and targets, are being used to develop a more detailed specification for the procurement process.

Table 1 - Key benefits of heavy rail v light rail v bus rapid transit

		
<div>HR</div> Heavy Rail	<div>LR</div> Light Rail	<div>BRT</div> Bus Rapid Transit
Better suited to longer inter-urban routes and large station spacings	Suited to shorter urban and inter-urban routes with close station stops	Suited to shorter routes with close station stops (less than LR)
Suited to serving large population centres	Can support large/medium-sized population centres	Better suited to lower density corridors than HR and LR
Longer trains able to deliver more capacity	Typically lower capital cost than HR for new routes	Can have lower capital cost profile for new routes than HR and LR
Well established industry and delivery capability	More easily extended than HR	More easily extended than HR and LR
	More flexible operations so easier to match capacity to demand	More flexible operations so easier to match capacity to demand

# Modes and technologies

## **Metro – A multi-modal and integrated transport network**

The Welsh Government is committed to delivering best value for the taxpayer by incentivising the market to innovate in its choice of routes, services and technologies. The network will be future-proofed so that it can be expanded in future.

We are considering a number of different modes, including traditional heavy rail (diesel and/or electric), light rail and bus rapid transit (see Table 1).

We have appraised the options, but it will be up to the market to propose the solution that best satisfies our objectives.

## **Traditional diesel and electric heavy rail**

We expect that much of the current Valley Lines network will remain purely heavy rail with electric (EMU) and/or diesel (DMU) rolling stock. This is most likely on the Ebbw Valley, Maesteg and Vale of Glamorgan lines.

Increased capacity and frequency enhancements on these routes, combined with better rolling stock, will significantly improve passenger experience.

Heavy rail innovations, such as battery-powered trains, digital signalling and 'tram-train', may also provide opportunities to deliver more frequent and flexible services towards the end of the Metro programme.

## **Potential for light rail**

Light rail offers a number of unique features in urban and suburban transport. Light rail vehicles (or trams) can carry large numbers of people (200-400) and move easily, either on traditional railway track or on rails placed in streets.

Because of their very fast and frequent services, light rail systems can experience dramatic increases in patronage. Such networks can then be extended more easily and affordably. This is the model so successfully applied in Manchester over the last 25 years with its regional Metrolink light rail network.

A light rail solution could form the basis of an extendable network. In fact, without it, given the constraints of the current heavy rail network, it would be very difficult to extend the rail network to support the urban expansion of Cardiff to the north west and into Rhondda Cynon Taf, or provide new/additional services to places like Nelson, Hirwaun, Heath Hospital and Crwys Road.

However, this analysis will not prejudice the procurement process, which may result in alternative innovations to meet our requirements.

## **Potential for bus rapid transit**

Bus rapid transit (BRT) is a bus-based system that uses dedicated and/or prioritised highway space, similar to European-style segregated busways. BRT uses high-quality stops, of-vehicle ticketing and high-frequency services that are integrated into a wider regional transit network. It is best suited to new routes where population and/or demand are too low to support light rail, or where the capital costs of rail are too high.

Manchester is also implementing BRT services for corridors that are best suited to it. There will be parts of the Cardiff Capital Region, where neither heavy nor light rail is practical in the medium term, where BRT could deliver Metro services.

Potential rail vehicle



## Modes and technologies

We are already exploring the potential for BRT in Newport. As the Metro project evolves, we will explore the potential for BRT elsewhere in the region.

The scope and timing of any BRT services are likely to be constrained by the regulatory framework within which buses operate.

### Integration

The essence of Metro is that it is an integrated network. However, at present, there is limited integration between the various public transport operators in the region. This will be the biggest challenge of the Cardiff Capital Region Metro.

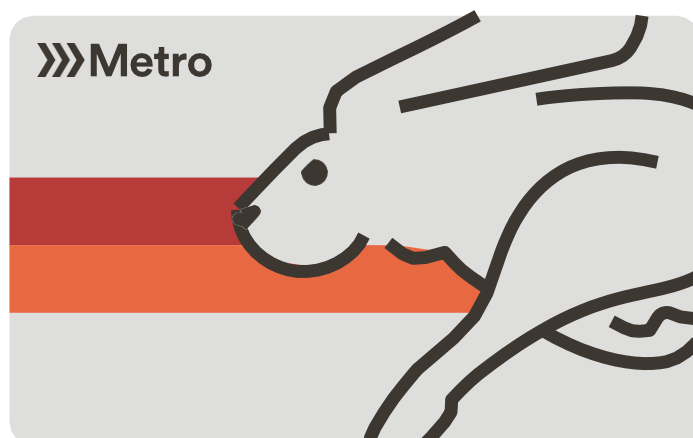
This is a demanding ambition. Only two fully integrated, multi-modal public transport systems have ever existed in the UK: Transport for London, and the Tyne and Wear Metro system between 1980 and 1985, when bus operations outside London were deregulated. Metro will ultimately require a far greater integration of the planning and operation of the region's bus networks.

As stated above, there are statutory, legislative, commercial and institutional barriers to overcome. Where voluntary arrangements cannot deliver a solution, a degree of re-regulation may be needed.

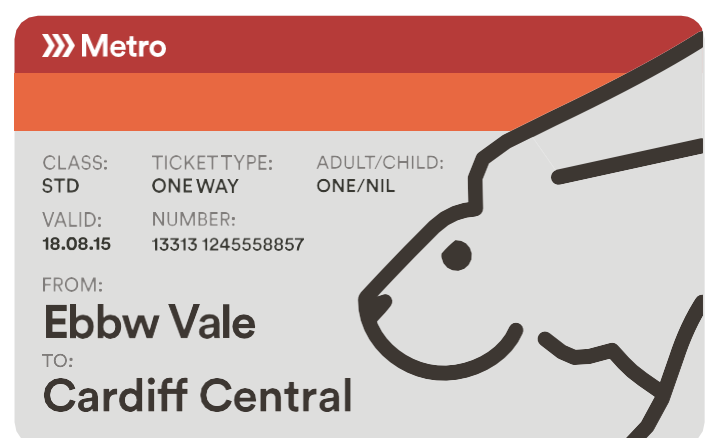
There are very substantial legal and institutional obstacles to achieving this aim in the UK outside London. Despite this, many UK cities have put measures in place (such as Statutory Quality Partnerships) which aim to overcome some of these problems.

The Cardiff Capital Region has the extra feature of two major bus companies which are owned by their municipalities (Cardiff Bus and Newport Bus), as well as a significant private sector presence from major groups (Stagecoach and First Bus), as well as independent bus operators. All these organisations will need to contribute to our integration plans.

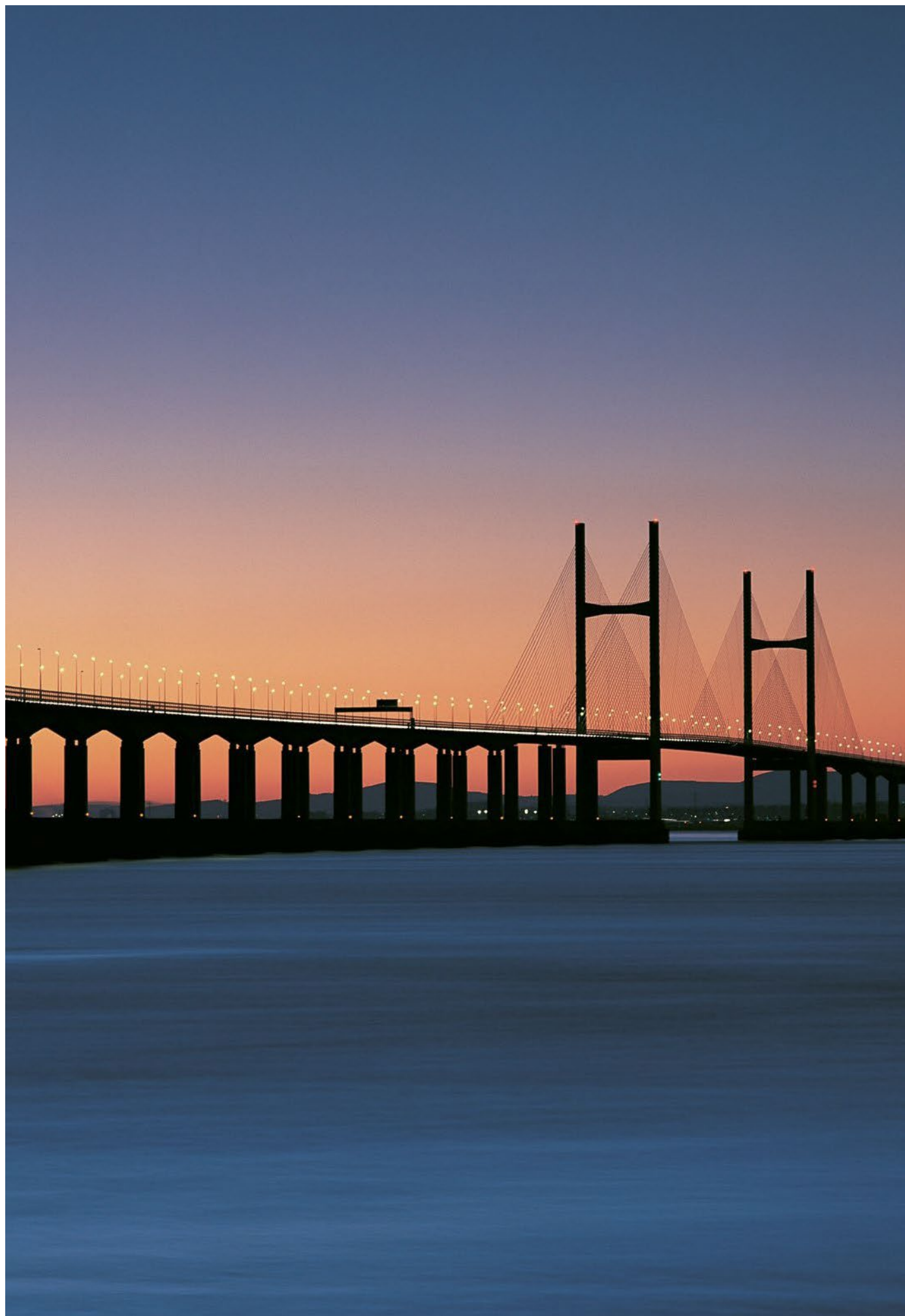
Metro smart card



Metro one-day pass







## What are we doing?

### Metro Phase 1

We are already delivering a £77million investment in a package of Metro Phase 1 infrastructure improvements (Figure 3).

This includes the new Ebbw Vale Town station, which was opened by the First Minister on 11 June.

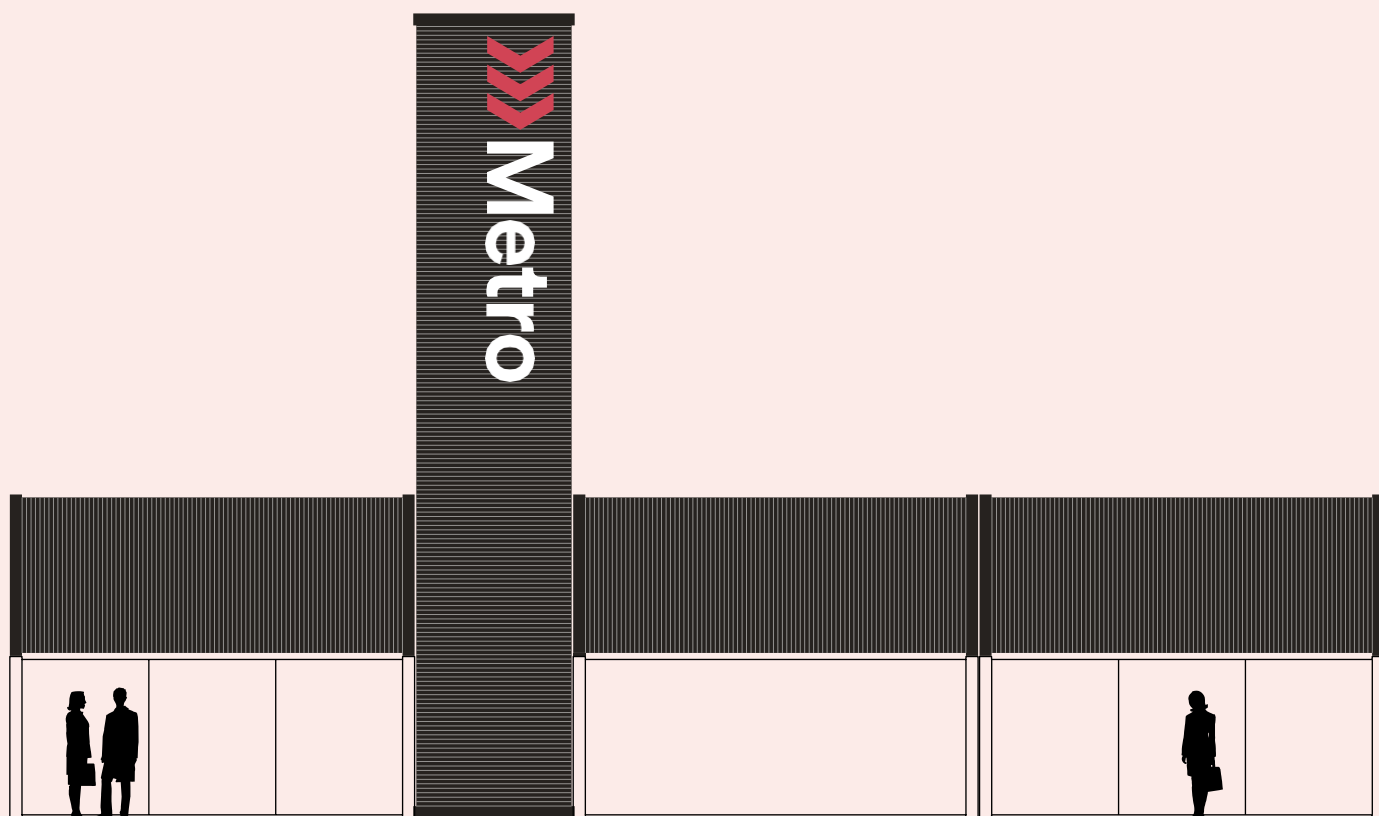
Our £11.5million investment in this project not only provides a new and improved station, but also an extension and speed improvements to the railway track which will allow extra services to be introduced in the future.

The Ebbw Valley line is very popular, with around 800,000 journeys annually. Our investment ensures that even more people can use the service in future.

Other Phase 1 projects have been or will be delivered:

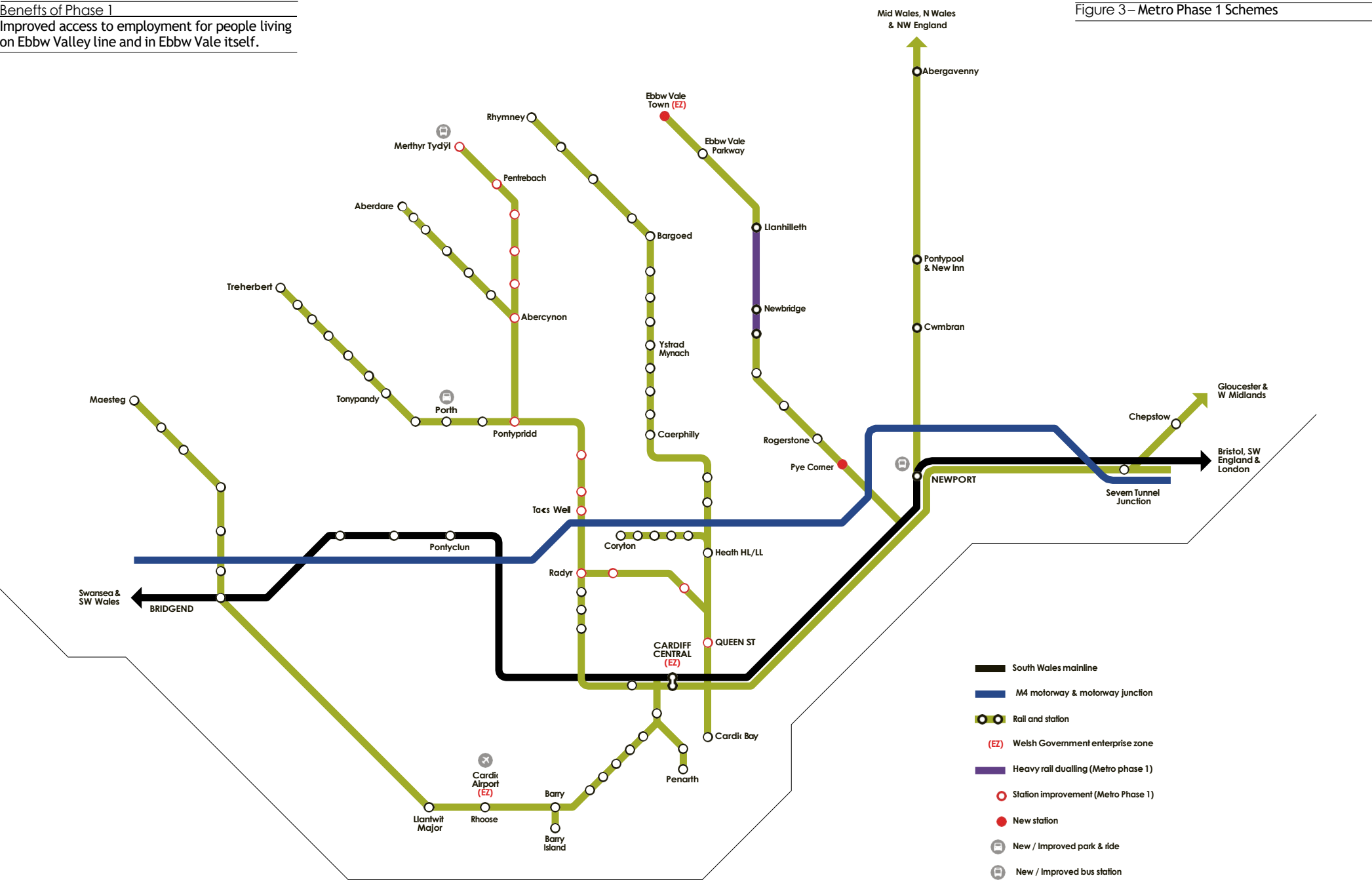
- A new station at Pye Corner
- Rail and bus station improvements across the region (eg Newport)
- Bus corridor schemes focused on the A470 corridor from north Cardiff to Rhondda Cynon Taf
- Active travel and park-and-ride schemes

To develop an effective regional transport network, it is essential to have robust planning/modelling tools to create the right infrastructure. The Welsh Government is already investing significant resources to achieve this. This is a first step towards delivering a truly integrated transport network.



Benefits of Phase 1  
Improved access to employment for people living on Ebbw Valley line and in Ebbw Vale itself.

Figure 3 – Metro Phase 1 Schemes



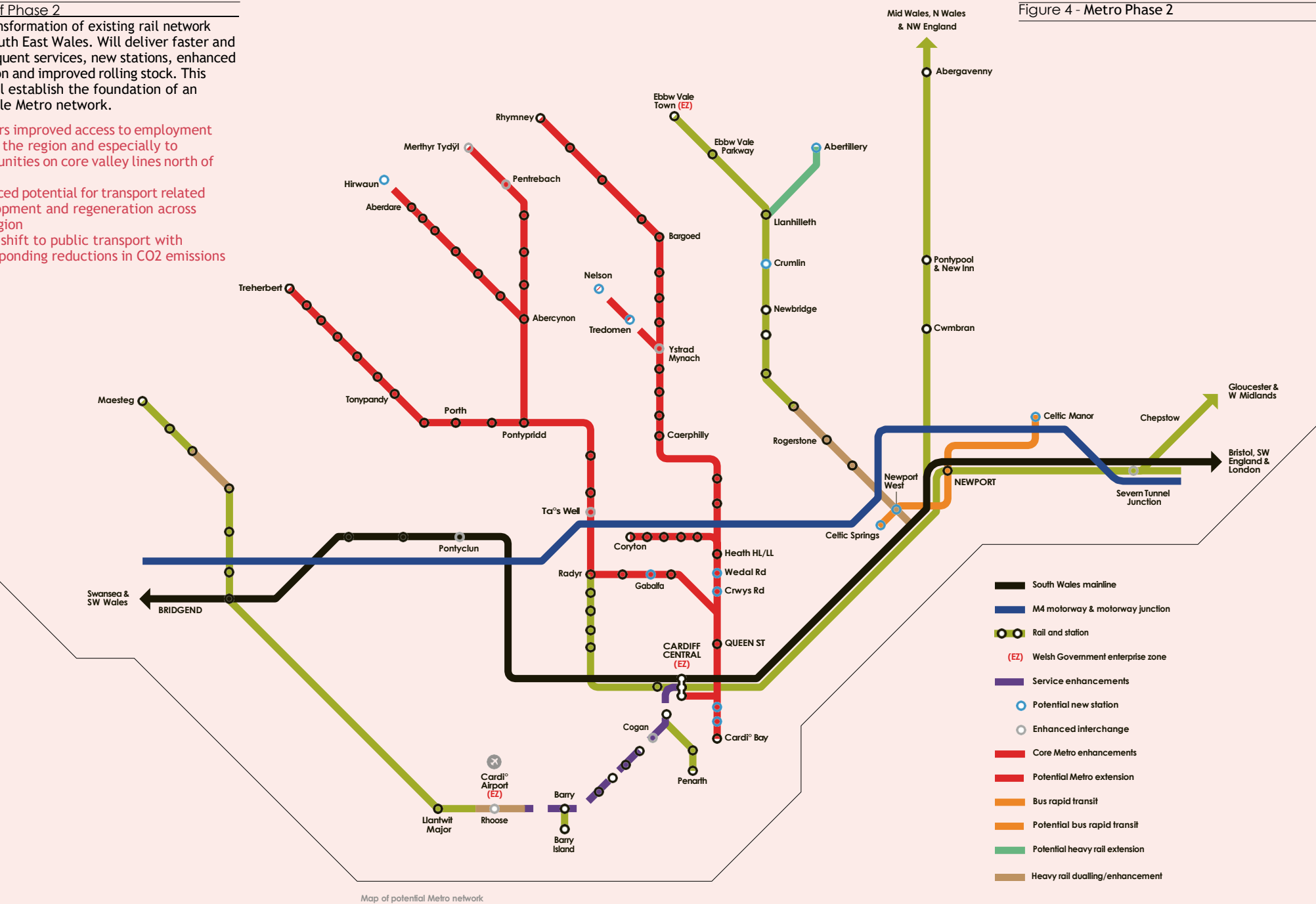
Map of potential Metro network

Benefits of Phase 2

Major transformation of existing rail network across South East Wales. Will deliver faster and more frequent services, enhanced integration and improved rolling stock. This phase will establish the foundation of an extendable Metro network.

- Delivers improved access to employment across the region and especially to communities on core valley lines north of Cardiff
- Enhanced potential for transport related development and regeneration across the region
- Modal shift to public transport with corresponding reductions in CO2 emissions

Figure 4 - Metro Phase 2



# What are we doing?

## Metro Phase 2

We are doing further detailed work to design, develop and evaluate a programme of delivery for Metro Phase 2 (Figure 4).

We will undertake a procurement process to deliver the project as part of the re-letting of the Wales and Borders franchise.

We will use an ‘output-based’ evaluation process for the procurement, which gives bidders the maximum opportunity to innovate. This may result in proposed interventions that may differ from those set out below.

Within Metro Phase 2, based on the analysis we have undertaken, the following projects are proposed:

- Rhymney, Coryton and Bay line infrastructure and operational enhancements to enable more frequent and faster services (Figure 5)
- Treherbert, Aberdare and Merthyr line infrastructure and operational enhancements to enable more frequent and faster services
- In addition, on the core Valleys, we are considering extra stations and conversion of some sections of freight line. For example, this could include Hirwaun, Nelson, Crwys Road, Gabalfa, Wedal Road, Treharris and additional stations on the Bay branch (Figure 6)
- Enhanced intermodal facilities and associated station improvements at key locations across the network
- Ebbw Valley line improvements and Abertillery spur. In this context, direct services to Newport from the Ebbw Valley will be considered in the franchise procurement process. These enhancements could be integrated with potential service improvements on the Marches line to Abergavenny
- Newport Rapid Transit to provide enhanced public transport services across the city, linking with the rail network and key locations such as Celtic Manor, Celtic Springs, etc
- Further enhancements are also anticipated on the Maesteg lines and to services on the Vale of Glamorgan lines to Rhose/Cardiff Airport

This programme could provide the basis of an extendable Metro network and one which would transform the economic potential of the region.

As we go through procurement, it may be possible to establish new stations - for example, along relief lines between Cardiff and Severn Tunnel Junction - as set out in the National Transport Finance Plan.

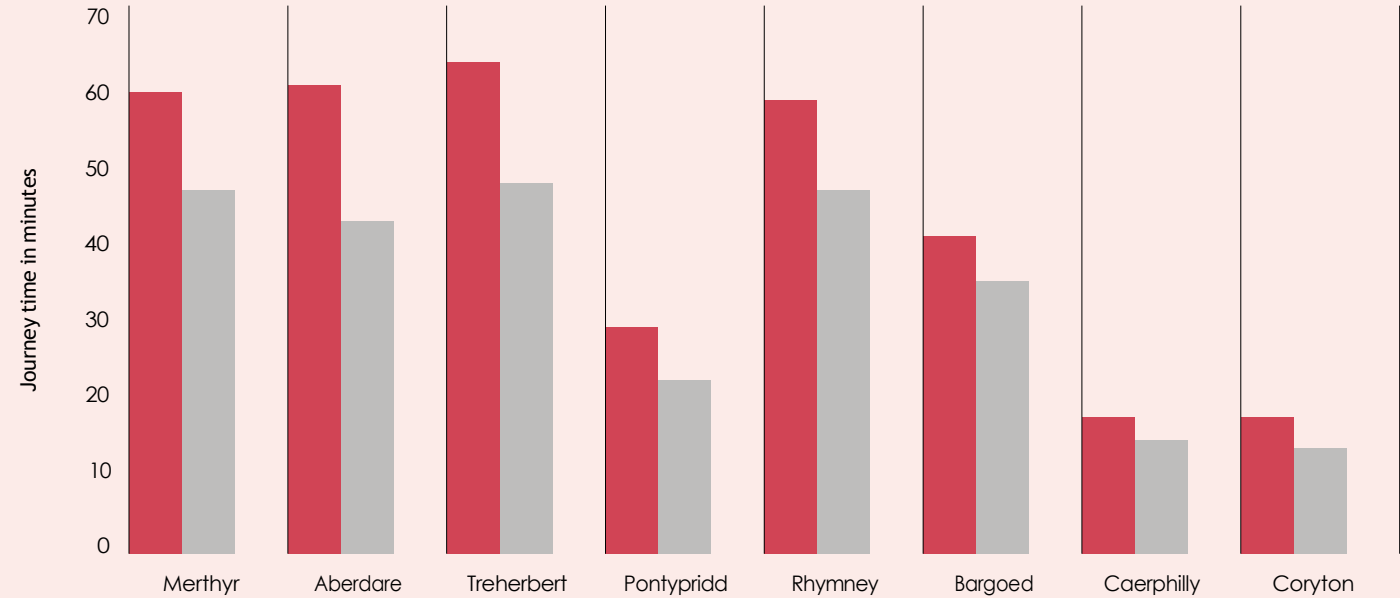
We will also continue to explore how the current municipal and private bus operators can be integrated into the wider network. We will also look at how ticketing and fare integration across all modes and operators can be improved.

Station-based development and regeneration schemes will also be developed, working with industry and regional partners where applicable.

Current
Potential Light Rail

Figure 5 – Illustration of journey times and service frequencies on the core valleys

HR	2 tph	2 tph	2 tph	6/7 tph	2 tph	4 tph	6/7 tph	2 tph
LR	3/4 tph	3/4 tph	3/4 tph	10/12 tph	3/4 tph	4/6 tph	6/8 tph	4/6 tph





## What are we doing?

### Potential future phases

One of the required features of the Metro programme is its ability to be extended. We think a number of rail-based network extensions could, subject to business case and capital funding, be considered. These include:

- On-street operations in Cardiff city centre
- Extension of the Bay branch further into Cardiff Bay
- A direct link from Cardiff Bay to Cardiff Central station

Further interventions have the potential to free up rail capacity on the Vale of Glamorgan line to enable service enhancements on that corridor.

We will also work with rail industry partners to explore capability and capacity enhancements at Cardiff Central station.

If not delivered as part of Phase 2, a range of additional heavy rail stations can also be considered. As set out in the National Transport Finance Plan<sup>1</sup>, these include St Mellons, Newport Road, Llanwern, Newport West, Magor, Caerleon, Ely Mill and Crumlin.

The introduction of additional stations on the relief lines could be incorporated into a line speed upgrade of that route.

Consideration will be given to bus rapid transit (BRT) on the network. Initial work suggests that BRT may be the answer on key corridors of lower demand where rail would be too expensive. This could include urban routes and some cross-valley connectivity. The effectiveness of new BRT will be influenced by the level of regulatory powers we have.

Beyond the schemes that have been explored set out above, a number of other schemes may merit further study. These include (Figure 7 ):

- Corridor from Central Cardiff via North West Cardiff/Creigiau to Rhondda Cynon Taf
- To North East and East Cardiff
- Caerphilly to Newport
- Hengoed to Maesycwmmer to Blackwood
- Coryton to Taffs Wells (or Radyr)
- Further BRT schemes
- Other schemes may emerge as the Metro programme develops

Figure 6 - Potential Butetown Loudon Square Light Rail stop (from 2013 Metro Impact Study)



<sup>1</sup> National Transport Finance Plan <http://bit.ly/1Xeyfyy>

Benefits of future phases

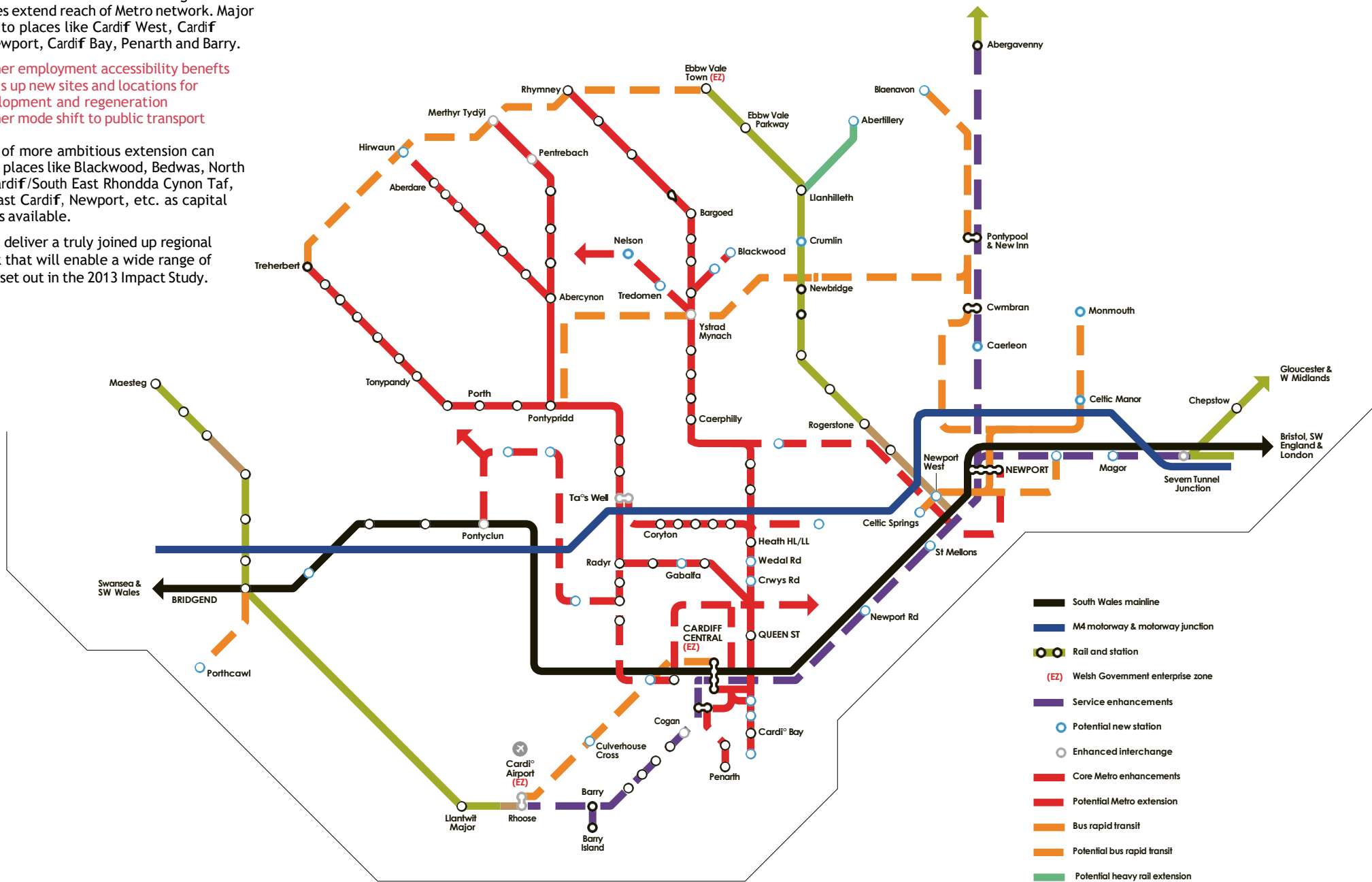
Rail extensions and further bus integration measures extend reach of Metro network. Major benefits to places like Cardiff West, Cardiff East, Newport, Cardiff Bay, Penarth and Barry.

- Further employment accessibility benefits
- Opens up new sites and locations for development and regeneration
- Further mode shift to public transport

A range of more ambitious extension can connect places like Blackwood, Bedwas, North West Cardiff/South East Rhondda Cynon Taf, North East Cardiff, Newport, etc. as capital becomes available.

This will deliver a truly joined up regional network that will enable a wide range of benefits set out in the 2013 Impact Study.

Figure 7 – Possible future Metro extensions



Map of potential Metro network



24

Rolling out ou





**“This is a game-changing project that could transform the economic prospects of up to one million people in Wales.”**







Metro is a long-term programme. It is being developed so that it can be incrementally extended.

## Metro Phase 1 (2016)

Metro Phase 1 is in progress. The extension to Ebbw Vale town and further capacity enhancement on that line, as well as other station enhancements across the network, are already complete or in progress.

## Metro Phase 2 (2023)

Metro Phase 2 will focus on modernising the core Valley Lines and the wider South Wales rail network. This infrastructure work will be integrated with the programme to procure the next Wales and Borders franchise.

This will result in a network that enables high-quality and reliable services which can deliver four vehicles per hour across the entire network when needed, with reduced journey times, and the capacity for additional stations and network extensions.

## Future Phases (beyond 2023)

If Phase 2 contains some form of light rail, then a range of rail-based extensions will be easier to accommodate. This could form the basis of a long-term incremental programme of expansion.

## Potential Bus Rapid Transit





