



# A Cardiff Capital Region Metro:

## Impact Study: Metro Interventions Appraisal Report

October 2013





## Metro Interventions Appraisal Report

FINAL Report | September 2013



Project No: CS/060195

Doc Ref: CS/060195

Rev:

Client: Welsh Government  
Issue Date: September 2013

Metro Interventions Appraisal Report:  
FINAL Report



	Name	Signature	Date
Author	Michelle North-Jones	<i>M. North-Jones</i>	30/09/2013
Checker	David McCallum	<i>D. McCallum</i>	30/09/2013
Approver	David McCallum	<i>D. McCallum</i>	30/09/2013

## Issue Record

Rev	Date	Description/Comments	Author/Prepared by:	Approved for Issue by:

"The report shall be for the private and confidential use of the clients for whom the report is undertaken and should not be reproduced in whole or in part or relied upon by third parties for any use whatsoever without the express written authority of the Consultant"

## **CONTENTS**

<b>1. Introduction</b>	<b>1</b>
1.1 Context	
1.2 Report Purpose and Structure	
<b>2. Appraisal Methodology</b>	<b>3</b>
2.1. Modal Interventions	
2.2 Appraisal Criteria	
2.3 Intervention Assessment	
<b>3. Appraisal Results and Recommended Interventions Packages</b>	<b>10</b>
3.1 Appraisal Results by Intervention Category	
3.2 Intervention Packages	
3.3 Quick Wins	
<b>4. Conclusion</b>	<b>29</b>

## **Appendix**

- Appendix A - Intervention Category Results Tables
- Appendix B - Intervention Packages

## **EXECUTIVE SUMMARY**

It is the view of the Metro Consortium that the production of an overall Strategic Regional Economic Plan that presents a clear vision integrating economic development, regeneration and transport is essential. In developing this plan, work was required to identify and quantify the potential wider economic benefits of a Metro via a Metro Regional Economic Impact Study. This study included the assessment of strategic development and regeneration opportunities, and the role / impact of other government interventions.

To achieve key project objectives, tasks were divided between the Metro Consortia, with Capita Symonds having responsibility for delivering one of the main work streams in recommendation of metro interventions. This work task has been achieved through the identification and formation of potential interventions, their appraisal and packaging to provide recommended interventions. This sits alongside the other key tasks that Capita Symonds has undertaken in this project which included the production of a multimodal corridor study and the production of a spatial model to provide many of the data inputs which have been used in the appraisal of the Metro interventions.

This report forms part of the Metro Regional Economic Impact Study providing an outline of the methodology used to appraise the metro interventions, the results of the appraisal process and outlines the packages of recommended interventions.

Using an appraisal methodology focused around the metro priorities of regenerate, connect and transform, categorised schemes were assessed to produce a list of recommended intervention packages. Long term interventions as well as quick wins were identified.

The recommended intervention packages are as follows:

- (1) Make Better Use of Existing Network post CASR (Cardiff Area Signalling Renewal) / VLE (Valleys Line Electrification);
- (2) Ebbw Vale – Newport Enhancements;
- (3) North West corridor: Rapid Transit line from Cardiff Bay to Rhondda Cynon Taf;
- (4) Relief line / Tidal sidings to Newport and Severn Tunnel Junction;
- (5) Other Rapid Transit in Cardiff;
- (6) Rapid Transit in Newport (Bus Rapid Transit and/ or tram-train);
- (7) Newport-Caerleon-Pontypool-Abergavenny corridor;
- (8) Regional Bus Rapid Transit (inc Cross Valleys);
- (9) Cardiff Airport;
- (10) Nelson – Newport;
- (11) Ruled Out or Very Long Term.

## 1. Introduction

### 1.1 Context

- 1.1.1 South East Wales currently faces some serious economic challenges with a wide range of economic prosperity levels existing across the region.
- 1.1.2 It has been identified by the Metro Consortium ( a group of stakeholders who have come together with the common aim of promoting the Metro concept as a regional regeneration project consisting of Capita Symonds, Cardiff Business Partnership, M&G Barry Consulting, Powell Dobson Urbanists, Institute of Welsh Affairs, Jones Lang LaSalle, British Gas, Admiral, Cardiff Business School, Capita Architects, Curzon Real Estate, Paramount Office Interiors, Wardell Armstrong and J.R. Smart) that the area needs a coherent vision to 2030 that fully integrates economic development and transport. A key part to developing and delivering this vision is a Cardiff City Region Metro and more widely interventions to improve connectivity within the region.
- 1.1.3 A number of studies have been produced in recent years which have looked at the Metro concept, the most recent of these being the South East Wales Integrated Task Force Report to the Minister for Economy, Science and Transport, in March 2013. This report produced a two phase list of potential interventions, with Phase 1 representing a list of accelerated schemes identified within the National Transport Plan and Regional Transport Plan and Phase 2 a list of longer term interventions for the area.
- 1.1.4 The Metro Consortium have also recently published their report 'A Cardiff City Region Metro: transform/regenerate/connect', which sets out a vision for a Cardiff City Region Metro focussed on economic development and regeneration within the context of a strategic plan for the region to 2030.
- 1.1.5 It is the view of the Metro Consortium that the production of an overall Strategic Regional Economic Plan that presents a clear vision integrating economic development, regeneration and transport is essential. In developing this plan, work was required to identify and quantify the potential wider economic benefits of a Metro via a Metro Regional Economic Impact Study. This study included the assessment of strategic development and regeneration opportunities, and the role / impact of other government interventions.
- 1.1.6 The overall objectives of this project were:
- To provide a more comprehensive spatial and regional economic context for Metro development;
  - To inform a strategic region wide economic plan;
  - To provide guidelines / context for the regions local authorities as regards Metro development;
  - To provide input to the Wales and Borders franchise specification and Network Rail route planning;
  - To assess a range of transit modes (from cascaded EMU's through to tram-train, light rail and Bus Rapid Transit (BRT) that could be utilised;
  - To provide details and data for further and more detailed Metro planning (network, mode, stations, engineering feasibility etc);
  - To selectively assess (high level) engineering feasibility of some interventions;

- To identify a number of quick wins for implementation at the same time as or before Valleys Line Electrification (VLE).

1.1.7 To achieve these project objectives, tasks for the project were divided between the Metro Consortia, with Capita Symonds having responsibility for delivering one of the main work streams in recommendation of metro interventions. This work task has been achieved through the identification and formation of potential interventions, their appraisal and packaging to provide recommended interventions. This sits alongside the other key tasks that Capita Symonds has undertaken in this project which included the production of a multimodal corridor study and the production of a spatial model to provide many of the data inputs which have been used in the appraisal of the Metro interventions.

1.1.8 This report feeds into the main Metro Regional Economic Impact Study and should be read alongside this study along with the other following constitute reports:

- Metro Multi-Modal Corridor Study, September 2013 - Capita Symonds;
- Metro Spatial Model Report, September 2013 – Capita Symonds.

## **1.2 Report Purpose and Structure**

1.2.1 The purpose of this report is to provide a summary of the appraisal process undertaken presenting a list of recommended Metro intervention packages. The report is structured as follows:

- Chapter 2 provides a detailed overview of the methodology used to produce the list of Metro intervention schemes and the appraisal process undertaken to produce a list of recommended intervention packages;
- Chapter 3 outlines and describes the recommended Metro intervention packages;
- Chapter 4 provides a summary and conclusion.



## **2. Appraisal Methodology**

### **2.1. Modal Interventions**

- 2.1.1. In order to form packages of Metro interventions, individual schemes needed to be identified. The initial long list of schemes was produced from a range of existing sources including:
- The South East Wales Transport Alliance (Sewta) Regional Transport Plan (RTP);
  - The Sewta Rail Strategy;
  - The Sewta Bus Strategy;
  - Local Authority Local Transport Plans, Unitary Development Plans and Local Development Plans;
  - The South East Wales Integrated Task Force Report;
  - Metro Consortium Report - A Cardiff City Region Metro: transform/regenerate/connect.
- 2.1.2 After an initial sifting exercise of the long list of schemes all non-strategic schemes were removed from the list e.g. bus stop upgrade programmes, small packages of work to provide station improvements etc. The long list of existing proposed schemes produced focused purely on strategic and large scale interventions and therefore did not including any measures relating to elements such as walking and cycling.
- 2.1.3 After the sifting exercise the list of existing proposed schemes were mapped in the spatial model, where clear geographical gaps in potential interventions corridors and areas could be identified. Using this data, and the input of stakeholders from the wider Metro Economic Impact Study Group, further potential new schemes were identified.
- 2.1.4 This resulted in the formation of a complete list of proposed schemes, containing new proposed schemes and those that had already been proposed in various existing documents.
- 2.1.5 Within this long list, it was important that a number of 'quick win schemes' that could be implemented prior or alongside VLE or Cardiff Area Signalling Renewal (CASR) be identified. This was completed via a workshop held on the 16<sup>th</sup> July 2013, facilitated by Capita Symonds and attended by stakeholders of the wider Metro Economic Impact Study Group (including Welsh Government, Network Rail and Arriva Trains Wales). 'Quick Win' schemes were identified as those that could be completed alongside VLE or CASR, had few major issues to implementation and would provide an important transport link to existing major development sites, providing economic and regeneration benefits.
- 2.1.6 Both the 'quick win' list of schemes and the long list of schemes where taken forward for appraisal and consideration for inclusion within the recommended Metro Interventions packages.

## 2.2 Appraisal Criteria

2.2.1 To appraise each individual scheme, clear and concise appraisal criteria needed to be formed. Although the appraisal process was performed at a strategic level, with many of the schemes being developed to varying levels (meaning that varying degrees of information was available for assessment of schemes), the use of standardised agreed appraisal criteria allowed for a structured approach to be taken.

2.2.2 Initial appraisal criteria was formed using the Metro priorities of regenerate, connect and transform and the key Welsh Government priorities of tackling poverty and creating jobs as the focus. Alongside these key areas was a need to consider aspects such as complexity of scheme delivery, cost per capita and value for money.

2.2.3 The initial set of appraisal criteria developed was revised following comments from stakeholders, with the agreed set of appraisal criteria as follows:

- **Regenerate:**

- **Creating Job Opportunities/ Access to Jobs**

This was assessed using the spatial model data looking at how close interventions are to providing better access to existing and potential employment opportunities. For the purposes of the assessment, facilities such as **hospitals and retail centres were included** due to their employment opportunities (education facilities were excluded to avoid double counting with 'transform' scores).

Existing Employment or Development within 1200m:

Employment/Development Areas	Classification
0	0
1 - 2	1
3 or more	2

- **Potential to attract/ facilitate development (residential)**

This was assessed using the spatial model data looking at how close interventions were to development opportunities.

Development within 1200m:

Residential Areas	Classification
0	0
1 - 2	1
3 or more	2

- **Connect**

- **Connectivity/ Reduction in Journey Time to Employment**

An objective of the Metro is to provide better connectivity to employment hubs in the south and provide quicker access to these hubs. Interventions were assessed as to whether they would improve journey times to employment hubs. Qualitative assessment was used as no quantitative data was available (no transport model was available to extract journey time

savings data). Alongside the score awarded for each scheme, a one sentence comment was made on the likely time saving and reason for score.

Generalised Journey time saving (including interchange):

Generalised Journey Time Saving	Classification
None (0 points)	0
Some (1 point)	1
Yes – Significant (2 points)	2

**- Integration with Other Modes**

If an intervention helps provide better integration with another mode by increasing user modal choice this will allow maximum benefit to be achieved through investment in an intervention. Assessment of this criteria was undertaken by the link to the existing network e.g. if a new train station included a park and ride element and was also connected into the existing bus network (with a service frequency of 4 or more per hour) then integration with other modes was scored as 2, as the scheme would be facilitating car to train and bus to train integration. Information on existing bus network connectivity was gained from the Traveline Cymru website.

Integration

Links to other modes	Classification
Integration with no other mode e.g. frequency enhancement = 0 points	0
Link to dedicated rail bus service / local bus route with 4 or more services per hour OR link to park and ride = 1	1
Link to dedicated bus service / local bus route with 4 or more services per hour AND park and ride = 2 points	2

**- Network/ Strategic Role**

Better integration with another route (network effect) will provide a more strategic role for a scheme and allow maximum benefit to be achieved through investment in an intervention. This criterion was assessed using the spatial model looking at the connection of the intervention to the surrounding existing network.

Network/ Strategic Role

Links to other routes	Classification
New Station	1
Spur	2
2 or more connections to existing rail	3

**• Transform**

**- Population Served**

The size of the new population served by an intervention was an important criterion to assess to ensure that the interventions chosen serve a critical mass of population and are therefore focussed on serving locations with sufficient density of demand to support the

Metro. This was measured using the spatial model outputs. In general the population within 2km was considered, however, where an intervention had a wider catchment area e.g. rail head station or strategic Park & Ride then a judgement was made as to the size of catchment (>2km). Scoring was split to consider population within 800m and 800m-2km to reflect demand decay with distance from the node.

Population <800m

Number of LSOA within 2km with improved access	Classification
0	0
1 - 2	1
3 or more	2

Population <1.2km

Number of LSOA within 2km with improved access	Classification
0	0
1 - 2	1
3 or more	2

- **Social Benefits**

The Welsh Index of Multiple Deprivation (WIMD) was used as a guide to scoring social benefits, with those interventions that were based in areas of poverty (lowest 10% of areas) scoring a higher mark. Under this criteria access to education (FTE) was also be considered in order to ensure that access to training and education is provided to ensure individuals are skilled for work.

WIMD: number of LSOA within bottom 10% provided with better access within 1.2km:

Number of LSOA (bottom 10% WIMD)	Classification
0	0
1 - 2	1
3 or more	2

Education: number additional tertiary education facilities within 2km with improved access:

Number Additional Educational Facilities	Classification
none	0
1	1
2 or more	2

• **Other**

- **Complexity**

A high level assessment was made as to how complex an intervention might be to implement. As previously stated in this report, there was varying degrees of information available for each of the interventions, so a very simple assessment matrix of complex, moderate and easy was utilised, with the following guidelines:

	<b>Classification</b>
Frequency enhancements requiring additional infrastructure (complex schemes in congested locations e.g. capacity improvements in central Cardiff etc) / Any scheme requiring a Transport and Works Act Order including reopening closed lines, new green field routes, Tram running on street / Any scheme requiring residential or active commercial property demolition	Complex
BRT off highway works / New station with significant permanent way works (Cardiff – Newport Relief Lines) / Re-opening a current freight line to passenger services including stations (no TWA) / Frequency enhancement requiring additional infrastructure (simple schemes e.g. loop on single track line) / Conversion of existing heavy rail line to light rail on existing route	Moderate
BRT on highway works / Frequency enhancement with no infrastructure works / New station with no significant permanent way works / Park and Ride schemes	Easy

#### - **Per Capita Cost**

A per capita cost of the intervention was also presented (total capital cost of intervention divided by catchment population estimate). The level of information on costing of schemes varied considerably from costs produced from detail feasibility studies, to high level estimates and therefore all cost information should be treated with caution. Where possible existing cost information was utilised, however, where it was not present, a standard rate per KM was used to provide a best guess, or past examples of costs with percentage increases applied to factor in risk. Cost information should be revisited for all intervention measures when further feasibility work is undertaken on the recommended intervention packages, to ensure that a common approach is taken to the base year and the risk and optimism bias factors applied.

Catchment within 1200m of intervention.

	<b>Classification</b>
> £1,500	0
£500 – £1,500	1
< £500	2

#### - **Overall Score**

The total score was presented for each intervention based on the aggregated value of all the assessment components. Interventions were then ranked by their total score.

## **2.3 Intervention Assessment**

2.3.1 Each of the scheme interventions listed in the long list of schemes and the quick wins was categorised for appraisal into one of the following:

- New stations existing lines;
- New lines with new stations,
- Bus Rapid Transit or Transit lines;
- Strategic Bus and Bus Rapid Transit;
- Frequency improvements to existing lines / New services existing lines;
- Interchange schemes; and
- Park and ride schemes.

- 2.3.2 This enabled a like for like assessment to be made between scheme interventions. Left unclassified it would be difficult to assess for example a new station against a frequency enhancement, as the two interventions address a different need and therefore perform differently against the appraisal criteria. Furthermore, there were instances when scores awarded for interventions in each classification needed to be amended to ensure the appraisal criteria was correctly applied. This included the following:
- For the interchange schemes, enhanced frequency and Park and Ride schemes the per capita cost scoring bandings were altered to >£200=0, £100-£200=1, <£100=2;
  - For the Park and Ride schemes the scoring bandings for the size of population served were altered to 0 if =5 or less; 1 if 6 - 10; 2 if >10 for the 1.2 to 2km distance and to 0 if =5 or less; 1 if 6 - 20; 2 if >20 for 1.2km to 5km;
  - For Bus Rapid Transport the scoring bandings for the size of population served were altered to 0 for less than 15; 1 for 16-50; 2 for >50 for the within 1.2km distance;
  - For the Enhanced frequency options the scoring bandings for the size of population served were altered to <50=0, 50-100=1, >100=2 for the within 1.2km distance.
- 2.3.3 The assessment criteria was tested using the quick win list of new stations on existing lines and the results provided to a stakeholder workshop on the 16<sup>th</sup> and 20<sup>th</sup> August 2013.
- 2.3.4 Once the appraisal methodology had been tested and approved, all remaining schemes were assessed against each of the criteria listed in section 2.2.3 with raw data being collated, before scores being awarded and results under each intervention category ranked.
- 2.3.5 Once a ranked list of schemes was produced for each intervention category area, it was possible to pick the prioritised schemes for recommendation. Those with top scores were chosen as the prioritised schemes and those with lower scores dropped out of the appraisal process. A qualitative process to review the merits of each option was also applied as a check on the total scores awarded. This resulted in some schemes that were ranked lower than others being promoted due to their known qualitative benefits. The boundary chosen for the top group (highest scoring interventions), middle group (mid range scoring) and the bottom group (lowest scoring interventions) varied for each category depending on the range of scores that resulted. Those interventions within the top group were chosen to go forward into the intervention packages. Those in the bottom group were disregarded from any further appraisal (intervention package 11). Those that fell into the middle group were added into relevant intervention package as a long term scheme.
- 2.3.6 Each of the prioritised interventions were then placed into one of 11 intervention packages, agreed by stakeholders:
- (1) Make Better Use of Existing Network post CASR / VLE;
  - (2) Ebbw Vale – Newport Enhancements;
  - (3) North West corridor: Rapid Transit line from Cardiff Bay to Rhondda Cynon Taf;
  - (4) Relief line / Tidal sidings to Newport and Severn Tunnel Junction;
  - (5) Other Rapid Transit in Cardiff;
  - (6) Rapid Transit in Newport (Bus Rapid Transit and/ or tram-train);

- (7) Newport-Caerleon-Pontypool-Abergavenny corridor;
- (8) Regional Bus Rapid Transit (inc Cross Valleys);
- (9) Cardiff Airport;
- (10) Nelson - Newport
- (11) Ruled Out or Very Long Term

N.B A package (12) Network wide measures was also identified to include aspects such as ticketing and integration and design / place making principles. This is not covered as part of this report.

2.3.7 A package of quick wins was also identified.

### 3. Appraisal Results and Recommended Interventions Packages

#### 3.1 Appraisal Results by Intervention Category

- 3.1.1 Appendix A provides detailed results tables showing the score for each intervention by category along with which group (top, middle, and bottom) schemes fell into. Some schemes with lower scores were 'promoted' into a higher group based on further consideration of some of the specific circumstances or merits of an intervention. For example, Llanwern station was promoted to be included within the top group of the new stations on existing lines category as this station had a low score in some categories based on an assessment of the population that currently exists within that area. However, the future population of that area is likely to grow significantly with a strategic residential development. Therefore, in the timescale of when this station is likely to be built the population of the surrounding area will be significantly greater and the benefits of the intervention higher.
- 3.1.2 Within the Park and Ride category, certain assessment criteria were not included in the total score as these would not have been relevant to the intervention. Those criteria excluded were creating jobs / access to jobs (the Park and Ride itself does not need to be assessed in terms of its proximity to existing and future employment as it is an intervention to improve access to employment in other areas) and social benefits (proximity to tertiary education is not a relevant assessment criteria, or is WIMD when those in more deprived areas have lower car ownership levels and the intervention is targeted at modal change for part of a car journey).
- 3.1.3 A summary of the results of the grouping of the schemes in each intervention category is provided in Tables 3.1 to 3.6. Interventions within categories are not shown in any priority order.

**Table 3.1 – New Stations on Existing Lines**

Group	Intervention	Key Benefits / Rationale
Top Group	Rumney Station	Good connectivity and potential reduction in journey time to centre of Cardiff and Newport, good integration with other modes, large population within 1.2km, good social benefits.
	Maindy (Cardiff) New Station	Near existing employment opportunities, good connectivity, large population within 800m, good social benefits.
	Ely Mill/Victoria Park/Ely Bridge New Station	Good connectivity, large population within 1.2km, close to major new development
	Caerleon New Station	Near existing employment opportunities, good connectivity and integration with other modes, large population within 1.2km, near to Tertiary education.
	Crwys Road New Station	Near existing employment opportunities, good connectivity and integration with other modes, large population with 800m, near to tertiary education.
	Roath Park (Wedal Road) New Station	Good connectivity, large population within 800m, near tertiary education and Heath Hospital
	Gabalfa New Station	Good connectivity, large population within 800m, near tertiary education.
	Brackla New Station	Large population within 1.2km, near tertiary education and some existing and future employment.
	Bridgend College New Station	Large population within 1.2km, near tertiary education and some existing and future employment.



	St Mellons New Station	Good connectivity and social benefits, near existing and proposed employment estates.
	Sebastopol New Station	Large population within 1.2km, near existing and future employment.
	Sarn Park New Station	Large population within 1.2km, near existing employment although access is unlikely to be DDA compliant.
	Coedkernew New Station	Promoted to top group as potential to link with future strategic development proposal.
	Upper Boat New Station	Promoted to top group as potential to link to existing and proposed new strategic development site at Treforest. Further study to be undertaken to provide clarity around location of a new railway station to link to the development, Upper Boat could be the location.
	Llanwern New Station	Promoted to top group due to potential to link into future strategic residential and employment to provided in the Llanwern area.
Middle group	Cwmbach North New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	Crumlin New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	Glyncoch New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	Hopkinstown New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	St Fagans New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	Magor New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
	Mamhilad New Station	Scheme has some benefits and is to be included into the relevant intervention package as a long term intervention.
Bottom group	Ynysboeth/ Tyntetown New Station	Scheme has limited benefits, intervention not to be taken any further in appraisal process.
	Llangynwyd New Station	Scheme has limited benefits, intervention not to be taken any further in appraisal process.
	St Athan New Station	Scheme has limited benefits, intervention not to be taken any further in appraisal process.
	M4, J34 New Station	Scheme has limited benefits, intervention not to be taken any further in appraisal process.

**Table 3.2 – New Lines and Stations**

Group	Intervention	Key Benefits / Rationale
Top Group	Central Station to Taffs Well (Heavy to light rail conversion)	Assist access to existing and potential employment, good integration with other modes, links with other networks, large population catchment, social benefits.
	Cardiff - Newport Tram Train	Assist access to existing and potential employment, good integration with other modes, links with other networks, large population catchment, social benefits.
	Light Rail Cardiff Queen Street – Callaghan Square – Cardiff Bay – Cardiff EZ – Cardiff Central (with Bute Street, Cardiff new station)	Assist access to existing and potential employment, good integration with other modes, links with other networks, large population catchment, social benefits.
	Cardiff Bay-Rover Way/Newport Road with new stations at Bute Place, Roath Dock, Splott Park and Pengam (Rover Way)	Assist access to existing and potential employment, good integration with other modes, links with other networks, large population catchment, social benefits.
	Caerphilly – Newport, new rail line on disused rail corridor with	Assist access to existing employment, good integration with other modes, help reduce journey times into

	new stations at Bassaleg, Machen, Trethomas, Caerphilly	Newport and connectivity along corridor, links with other networks, large population catchment, social benefits and potential to attract / facilitate residential development.
	Ystrad Mynach – Trelewis/Treharris with new stations at Nelson and Trelewis / Treharris	Assist access to some existing employment, good integration with other modes and the network, good population within 1.2km of scheme.
	Cardiff Western Corridor to Ely/Culverhouse Cross	Assist access to some existing employment, good connectivity, improvement in journey times into Cardiff, integration with other modes, good integration with other networks, large population catchment.
	Newport Road to Rumney/St Mellons	Assist access to some existing employment, good connectivity improvement in journey times into Cardiff, integration with other modes, good integration with other networks large population catchment.
	Rail to Urban Extension, NW Cardiff, J32 RCT (Danescourt to Beddau or Pontyclun) with new stations at Cregiau, A4119, M4 J33, new housing development sites and fairwater west.	Assist access to some existing employment, potential to attract / facilitate residential development, good connectivity and integration with other modes, links with other networks, large population catchment.
	Aberdare – Hirwaun with new stations at Trecynon, Hirwaun and Freight Head, Hirwaun.	Large population catchment, social benefits, good integration with other modes and other networks.
	Cardiff Airport Spur with new station at airport.	Promoted to top group due to strategic importance in Wales future economic development.
	Abertillery – Llanhilleth, new rail line on disused rail corridor with new station at Abertillery	Promoted to top group due to station having high score as serves significant community and promotes 4 tph on EVR.
Middle group	Proposed Maesteg Line Extension with new stations at Nantyfflon and Caerau.	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	New line towards Pontprennau.	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Garw Valley New Line with new stations at Pontycymer, Blaengarw and Brynmenyn	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Penarth Line extension with new station at Forrest Road	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	City Circle loop A: extension of Coryton line from Coryton to new station near J32.	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	City Circle loop B: Further extension of Coryton line from new station at J32 for interchange with Taff Vale Line.	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	On Street Tram-Train in Cardiff	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
Bottom group	Freight Head, Hirwaun New Station (inc route extension)	Scheme has limited benefits, intervention not to be taken any further in appraisal process.
	Pontyclun - Beddau, new rail line on disused rail corridor	Falls into Package 11 as duplicates the N W Corridor preferred scheme, which has greater regeneration and development benefits.

**Table 3.3** - Interchange Improvements

Group	Intervention	Key Benefits / Rationale
Top Group	Barry Docks Station Bus/Rail Interchange	All schemes strategic in nature and will provide benefits. All schemes to be included in relevant intervention package.
	Cardiff Central Bus/ Rail Interchange Redevelopment	
	Merthyr Bus/Rail Interchange	
	Rail/Bus Interchange Improvements at Porth	
	Pontypridd Bus/Rail Interchange	
	Newport Station Bus/Rail Interchange	
	Bridgend Rail Station Interchange	
	Pontyclun Station Bus/Rail Interchange	
	Abercynon Bus/Rail Station Interchange	
	Pengam Bus/Rail Station Interchange	
	Pontypool & New Inn Bus/Rail Interchange	
	Taffs Well Bus/Rail Station Interchange	
	Chepstow Bus station co-location with Rail station	
	Abergavenny Bus/Rail Station Interchange	

**Table 3.4 – Park and Ride**

Group	Intervention	Key Benefits / Rationale
Top Group	P&R Bargoed	All schemes strategic in nature and will provide benefits. All schemes to be included in relevant intervention package.
	P&R . Treforest Train Station;	
	Pontypool & New Inn Park and Ride / Share Facility	
	Further park and ride facilities at Pencoed station	
	Improvements to Chepstow (P&R)	
	P&R Taffs Well Station.	
	Porth P&R (93 spaces)	
	Pyle P&R extension	
	P&R Llanbradach	
	Improvements to STJ (P&R)	
	P&R . Pontyclun Train Station	
	Pentrebach P&R	
	Improvements to Abergavenny (P&R)	
Middle Group	Further park and ride facilities at Wildmill	Classed as long term scheme due to station not in strategic location, proximity of station to Bridgend station and low frequency on line that serves station.

**Table 3.5 - Strategic Bus / Bus Rapid Transit (BRT)**

Group	Intervention	Key Benefits / Rationale
Top Group	Cardiff – Newport Bus Priority Corridor	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and networks, large population catchment and social benefits.
	Cross Valleys Express Service (Abergavenny/Brynmawr/Ebbw Vale/Tredegar/Merthyr/Aberdare)	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and networks, large population catchment and social benefits.

	Cross Valleys (Pontypridd – Ystrad Mynach – Cwmbran) Strategic/ Express Service	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and networks, large population catchment and social benefits.
	Blaenavon - Sebastopol - Pontypool & New Inn/Cwmbran	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and networks, moderate population catchment and social benefits.
	Bridgend - Porthcawl	Assist access to existing employment, some potential to attract / facilitate residential development, good integration with other modes and networks, moderate catchment, social benefits (access to tertiary education)
Middle group	Newport – Monmouth Strategic Express Service	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Abergavenny Station – Raglan – Monmouth Strategic/ Express Service	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Brynmawr – Abertillery	Scheme has some benefits and is to be included into the relevant package as a long term intervention.

**Table 3.6 – Frequency Enhancements**

Group	Intervention	Key Benefits / Rationale
Top Group	Cardiff Airport/Barry 4tph Metro Service	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and networks, moderate catchment population and good social benefits.
	Frequency Enhancements: Abergavenny – Newport – Cardiff	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other modes and particularly good integration to other networks, moderate catchment population and good social benefits.
	Vale of Glamorgan +1tph	Assist access to existing and potential employment, potential to attract / facilitate residential development, particularly good integration to other networks, moderate catchment population and good social benefits.
	Use of Cardiff – Newport Relief Lines with New Stations	Assist access to existing and potential employment, good integration with other modes and networks, good social benefits.
	Ebbw Valley #3rd/4th Train Abertillery - Cardiff	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other networks, large catchment population, good social benefits.
	Maesteg – Cardiff (via SWML) +1tph	Assist access to existing and potential employment, potential to attract / facilitate residential development, good social benefits.
	Frequency Enhancements: Chepstow – Newport – Cardiff	Assist access to existing and potential employment and some potential to attract / facilitate residential development, good integration with other networks, good social benefits.
	Aberdare +4tph Metro Service	Assist access to existing and potential employment, potential to attract / facilitate residential development, good connectivity and integration with other networks. Good social benefits.
	Merthyr 4tph Metro Service	Assist access to existing and potential employment,

		potential to attract / facilitate residential development, good connectivity and integration with other networks. Good social benefits.
	Electrified Llanhilleth Passing Loop, Ebbw Vale Line, +2tph	Assist access to existing and potential employment, potential to attract / facilitate residential development, good integration with other networks, social benefits.
	Coryton 4tph Metro Service	Current cost assume heavy rail, tram train option may reduce capital costs.
	Marches line electrification (Newport to Abergavenny)	
Middle group	Treherbert 4tph Metro Service	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Ebbw Valley #3rd/4th Train Abertillery - Newport	Scheme has some benefits and is to be included into the relevant package as a long term intervention.
	Bridgend to Maesteg +2tph	Scheme has some benefits and is to be included into the relevant package as a long term intervention.

## 3.2 Intervention Packages

3.2.1 Once appraised and ranked interventions were placed into packages.

3.2.2 The recommended packages of interventions are detailed in Appendix B and are summarised below as follows (interventions are not listed in any priority order within an intervention package, however, more long term interventions within a package are identified):

**(1) Make Better Use of Existing Network Post CASR / VLE – Total Estimated Capital Cost = £470,000,000**

Interventions within package:

- Ely Mill/Victoria Park/Ely Bridge New Station
- Caerleon New Station
- Crwys Road New Station
- Roath Park (Wedal Road) New Station
- Sarn Park New Station
- Brackla New Station
- Gabalfa New Station
- Maindy (Cardiff) New Station
- Upper Boat New Station
- Bridgend College New Station
- Aberdare – Hirwaun, with new stations at Trecynon and Hirwaun
- Use of Cardiff – Newport Relief Lines with New Stations
- Maesteg – Cardiff (via SWML) +1tph
- Frequency Enhancements: Chepstow – Newport – Cardiff
- Vale of Glamorgan +1tph
- Aberdare +4tph Metro Service
- Merthyr 4tph Metro Service
- Further park and ride facilities at Pencoed station
- Park & Ride Bargoed
- Park & Ride Llanbradach
- Improvements to Chepstow (P&R)
- Improvements to Abergavenny (P&R)
- Improvements to STJ (P&R)

- Park & Ride Treforest Train Station;
- Park & Ride . Pontyclun Train Station
- Park & Ride Taffs Well Station.
- Pontypool & New Inn Park and Ride / Share Facility
- Pentrebach Park & Ride
- Porth Park & Ride (93 spaces)
- Pyle Park & Ride extension
- Barry Docks Station Bus/Rail Interchange
- Cardiff Central Bus/ Rail Interchange Redevelopment
- Merthyr Bus/Rail Interchange
- Rail/Bus Interchange Improvements at Porth
- Pontypridd Bus/Rail Interchange
- Newport Station Bus/Rail Interchange
- Bridgend Rail Station Interchange
- Pontyclun Station Bus/Rail Interchange
- Abercynon Bus/Rail Station Interchange
- Pengam Bus/Rail Station Interchange
- Pontypool & New Inn Bus/Rail Interchange
- Taffs Well Bus/Rail Station Interchange
- Chepstow Bus station co-location with Rail station
- Abergavenny Bus/Rail Station Interchange

Long term interventions:

- Cwmbach North New Station
- Glyncoch New Station
- St Fagans New Station
- Hopkinstown New Station
- Further park and ride facilities at Wildmill station
- Garw Valley New Line with new stations at Pontycymer New Station, Blaengarw New Station, Brynmenyn New Station,
- Penarth Line extension, Forrest Road New Station;
- Proposed Maesteg Line Extension with new stations at Nantyfflon and Caerau
- Bridgend to Maesteg +2tph
- Treherbert 4tph Metro Service

**Feasibility:**

These proposals are subject to feasibility study and business case development.

The majority of new Stations proposals are simple 2 platform stations on a 2 track railway line. The main engineering considerations are suitable track geometry, space for platforms, access, DDA compliance and parking (where required). Planning consent would be required in all cases. The main programming constraint is land acquisition (where required), accommodating the stops within the existing (or a revised) timetable and service capacity to accommodate additional passengers. The time savings from the electrification proposals may help provide additional capacity for stops without impacting on the timetable and stock requirements to operate services.

Provision of 4tph on the Merthyr and Aberdare lines & Treherbert lines will require significant double tracking including provision of two platform stations at most stations. Indicative costs for Aberdare & Treherbert presently assume double tracking throughout and for Merthyr as far as Troed Y Rhiw and need detailed investigation. The frequency proposals will also increase operating costs and are subject to demand. Track redoubling of an existing line is likely to be within existing powers but planning consent may be required for some works.

The operational impacts to the south need to be considered in detail, 4tph on each branch would equate to 12tph south of Pontypridd. It may be more efficient to operate Treherbert services as a self contained route with interchange at Pontypridd. This may provide increased frequency on the branch at a lower cost albeit imposing an interchange penalty and may lend itself to Tram Train operation. To maintain the balance for journey times for longer distance passengers with more stops in Cardiff may mean splitting services into fast and stopping e.g. Running Merthyr (or Aberdare) non-stop south of Taffs Well.

The Park & Ride schemes are at varying stages of design development. Key constraints are land availability, ownership and access arrangements. Planning permission will be required in most cases.

Bus/Rail Interchanges schemes are largely illustrative at this stage and detailed proposals to provide physical interchange at these locations need to be developed. This includes ensuring the improvements are integrated with service improvements. Locations with good existing interchange e.g. Caerphilly are not included in proposals.

Extension of the line and passenger services from Aberdare to Hirwaun has been developed to GRIP 3. At present it is recommended the extension is to Hirwaun only and includes a station at Trecynon. For 2tph this will require the provision of a passing loop. Planning consent would be required for the stations and land may need to be acquired. The main operational constraint is accommodating the freight services to Tower Colliery loading point. This scheme is a medium term to longer term priority.

The Penarth Line extension would provide a new station at Forrest Road to serve the southern expansion of the urban area and would be a relatively simple extension of the existing route. It is assumed this would be tram train operation and this should enable retention of a parallel cycle/walking route. Powers would be required for the extension.

For 2 tph to Maesteg an additional passing loop is required. For frequencies > 2tph to Maesteg it is assumed significant double tracking is required. Operationally the key decision is whether to split existing operations at Bridgend and operate the branch as a shuttle with interchange at Bridgend. This would lend itself to tram train operation and may reduce the double tracking required and make a potential extension to Caerau more economic. This needs detailed consideration.

There is also the possibility of re-opening to passenger services of the Garw Valley to serve Pontycymner, Blaengarw and Brynmenyn. This makes use of former freight line (partially lifted beyond the current headshunt) which joins the Maesteg line at Tondy which is currently being developed as a heritage railway. Passenger services would require capacity improvement on the Maesteg branch above and overall costs and managing heritage interests will be a key issue in generating a positive business case for the level of likely demand.

**Operating Costs:** Park and Ride and new stations low, frequency enhancements high.

**(2) Ebbw Vale – Newport Enhancements** - Total Estimated Capital Cost = £64,000,000

Interventions within package:

- Abertillery – Llanhilleth, new rail line on disused rail corridor
- Abertillery New Station
- Electrified Llanhilleth Passing Loop, Ebbw Vale Line, +2tph

- Ebbw Valley #3rd Train Abertillery – Cardiff
- Long term interventions:
- Crumlin new station
  - Ebbw Valley 4<sup>th</sup> Train Abertillery - Newport

### **Feasibility:**

To support an hourly service from Ebbw vale to Newport a second loop is required on the route circa LLanhilleth together with a 2 platform station. These are relatively straight forward works as would be further double tracking (including connecting the 2 loops) required to support additional services of up to 4tph to Aberbeeg. The loop works would be most economically accomplished at the same time to avoid abortive work at each stage. Rather than terminate additional serves at Aberbeeg a short spur to Abertillery would link in the town and Ebbw Fach valley into the Metro. Whilst the double tracking could be undertaken within existing powers plus possible planning consent, the extension to Abertillery would require new powers. A new station at Crumlin would require planning consent and is linked to potential regeneration of the Navigation Colliery site.

A significantly longer term aspiration may be increased frequencies to Ebbw Vale, however, this is complicated by a number of restrictions on the rail corridor width beyond Cwm and therefore requires detailed investigation.

**Operating Costs:** Frequency enhancements high, low for new stations.

### **(3) North West corridor: Rapid Transit line from Cardiff Bay to Rhondda Cynon Taff - 3a – Cardiff Central to RCT: Total Estimated Capital Cost = £249,000,000**

Interventions within package:

- Rail to Urban Extension, NW Cardiff, J32 RCT (Danescourt to Beddau or Pontyclun) with new stations at Cowbridge Road, Cardiff Road (Llantrisant), Llantrisant Road, Gwaun, Parish Road, Tyn-y-Nant, Creigiau, New Housing development/A4119, M4 Jct 33 (Capel Llanilltern), New Housing development #1, New Housing development #2 and Fairwater West;
- Central Station to Taffs Well (Heavy to light rail conversion)

### **Feasibility:**

The existing City line is relatively underutilised with low frequencies (2tph) and an opportunity has been identified to convert the route to a high frequency Tram train operation as a largely segregated route from the existing heavy rail network linking to Cardiff Central and Cardiff Bay. If total segregation could be achieved then tram operation would be an alternative. The main infrastructure constraint is Cardiff West junction and higher frequencies may require grade separation or on street operation to reach Cardiff Central avoiding the junction. These options require detailed study. At the northern end of the route it is proposed to maintain segregation and construct a parallel alignment to using the redundant trackbed to Taffs Well to serve development proposals and a major P&R. There may be potential to extend north from towards Treforest here in the longer term.

Proposals to serve Talbot Green/Beddau have been previously considered as heavy rail extensions from the west (Pontyclun) using the old freight line or South from City line via Creigiau using an former track bed albeit this would also involve crossing of the M4. The latter route provides access to the North West expansion area of Cardiff and major



development sites of Plymouth estates and North of Junction 33 which is just off route but on a second former alignment which joins the first north of Creigiau. To effectively service these settlements, development areas and provide for a potential Park & Ride at Junction 33 this has been considered as a new tram train route with 8 intermediate stations due to the greater flexibility in alignment and significantly lower costs than heavy rail which would be a development of the City line (above) to the centre of Cardiff and Bay. The route from the City Line would use the former trackbed to the M4, before developing a new alignment prior to crossing the M4, (potentially using an existing underbridge) to connect into the second alignment at Junction 33 for a major Park & Ride and the development site up to Creigiau.

North of Creigiau, the priority route would extend to Talbot Green and Pontyclun to provide connections to the west which would capture a wider range of journeys including commuting into Bridgend/Swansea. A spur with 2 stations would serve Beddau, although this needs further consideration regards longer term options to potentially extend to Church Village. Powers (Transport & Works Act) would be required to re-open the former route and land and some property will need to be acquired. The majority of the infrastructure works are straightforward with existing alignments largely intact, the main challenge being the link between routes and crossing of the M4. There is a real opportunity to construct the new residential developments in a sustainable manner focussed around the route. Timing of the infrastructure with the build out phase is key to developing sustainable travel patterns. The existing settlements and an M4 Park & Ride would provide immediate demand. BRT is a further option but would not offer as competitive journey times into Cardiff and would not offer significant cost savings compared to Tram train for a similar level of operational segregation.

**Operating Costs:** High for new line as running new services, low for new stations.

**3b –Phase 1 of NW Corridor Line – Bay / Queen St/ Central Tram-Train:** Total Estimated Capital Cost = £140,000,000

Interventions within package:

- Light Rail Cardiff Queen Street – Callaghan Square – Cardiff Bay – Cardiff EZ – Cardiff Central with new stations at Bute Street, Cardiff
- Coryton 4tph Metro Service

Long term interventions:

- City Circle loop A: extension of Coryton line from Coryton to new station near J32;
- City Circle loop B: Further extension of Coryton line from new station at J32 for interchange with Taff Vale Line

### **Feasibility:**

A number of studies have considered light rail proposals between Cardiff Central/Queen Street and Cardiff Bay including an on street route down LLOYD George Avenue. Links to Central station are key for rail journeys to the Bay originating East or West of Cardiff. The proposal uses the existing line with an intermediate station a southwards on street extension to the Oval basin/Wales Millennium Centre and an on street spur to Cardiff Central. The on street sections would require a Transport & Works Act and the associated impact on statutory undertakers apparatus is a significant cost risk. As a stand alone project without any commitment to further expansion this is a high cost scheme due to short route over which to spread the initial fixed cost e.g. depot, fleet size, powers and therefore integration with a larger project, the conversion of either the City line to tram train, the NW corridor and or Coryton line is likely to be critical to make a financial case for the bay link as part of a 'Line 1' project. Electrification would be 750v dc overhead which needs consideration in

terms of current electrification proposals (25kv AC) for the existing branch. A further issue to be addressed for tram train proposals are the infrastructure ownership and operational arrangements for new and converted routes.

Increasing frequency on the Coryton Branch to at least 4tph would involve provision of additional double tracking, for operation reliability ideally over the entire route with 2 platforms at all stations. Tram –train operation would significantly reduce infrastructure costs compared to heavy rail particularly at stations including lower electrification costs (750v dc). A current constraint will be pathing on the Rhymney line which may limit potential frequencies without further signalling improvements. Two further extensions to the route are proposed, to Coryton (M4) Park & Ride and to link the Coryton line with the Taff Vale line. The former poses no significant engineering obstacles. The latter would involve crossing the Taff and creating a new junction with the Taff Vale line. This is likely to impact on operational reliability and a lower cost option is to provide a station east of the Taff with a footbridge to a new station at Morganstown served on the proposed tram train extension of the city line to Taffs Well. The extension proposals would require a Transport & Works Act Order and land would need to be acquired.

**Operating Costs:** High for new line as running new services, low for new stations.

**(4) Relief line / Tidal sidings to Newport and Severn Tunnel Junction – Total Estimated Capital Cost = £248,000,000**

Interventions within package:

- Cardiff Bay-Rover Way/Newport Road, with new stations at Bute Place New Station, Roath Dock New Station, Splott Park New Station, Pengam (Rover Way) New Station,
- Cardiff - Newport Tram Train
- Rumney New Station
- St Mellons New Station
- Coedkernew New Station
- Llanwern New Station
- Use of Cardiff- Newport Relief Lines with New Stations

Long term interventions:

- Newport Maindee New Station
- Newport West Station
- Magor New Station

### **Feasibility:**

This package is aimed at improving local accessibility between Cardiff, Cardiff Bay, Newport and Severn Tunnel Junction/Chepstow/Bristol through the provision of a new stopping services on the existing relief lines. There are two related proposals and further work is required to develop demand forecasts, business case and engineering feasibility and operations to determine the optimal solution.

The simplest scheme would involve the provision of 4 new stations on the relief lines served by new stopping heavy rail services between Cardiff and Newport to Severn Tunnel Junction potentially extended to Chepstow (subject to electrification) or Bristol. Given the scale of the development area, Llanwern station in particular would ideally be served by Bristol services. The stations are relatively expensive to construct due to the need to slew the down relief to accommodate island platforms.

There is also the opportunity to connect the Bay tram train proposals via tidal sidings to the relief lines. Again at its simplest this would involve a further station on the relief lines south of Rover way providing interchange between tram train services to the bay and heavy rail services. The bay spur may encompass 2 intermediate stations joining the earlier proposal at Oval Basin/Bute place. Future development may also include a spur to Porth Teigr.

A more expansive tram train proposal would operate the relief line proposal as a tram train route. At Newport there is scope to take the former docks alignment towards Pill with either a loop around to the river front and then to the Station or more directly via Cardiff Road. The former would require property acquisition. Risks additionally include statutory undertakers apparatus, managing the interface with Newport docks freight operations and providing competitive journey times. This route would however permit access to new housing development at Maesglas, assist with the regeneration of Pill and link to the Royal Gwent Hospital site.

Longer term potential relief line stations include Newport West (Maesglas/Cardiff road) Newport East (Maindee) and Magor. There are significant engineering issues with accommodating the stations in Newport due to the proximity of the docks branch/Alexandra dock junction sidings and Usk branch/Yard, which limited scope to accommodate platforms without impacting on existing rail & freight operations. No suitable sites have been identified at this stage and detailed feasibility studies are required. The station at Magor is relatively straightforward but the business case may be reliant on further housing development at Magor.

**Operating Costs:** High for new line as running new services, low for new stations.

#### **(5) Other Rapid Transit in Cardiff – Total Estimated Capital Cost = £450,000,000**

Interventions within package:

- Cardiff Western Corridor to Ely/Culverhouse Cross
- Newport Road to Rumney/St Mellons

Long term interventions:

- New line towards Pontprennau
- On Street tram train – 2-4km of on street tram / train in Cardiff

#### **Feasibility:**

In addition to existing rail lines and the North West corridor and City/Coryton and Cardiff Bay tram train proposals described above, three further new Rapid transit corridors have been identified in Cardiff, covering Western Corridor to Culverhouse Cross, Newport Road to Rumney/St Mellons and Pontprennau/Cardiff Gate including NE Cardiff expansion area. Modal options in each case are Tram/Tram-Train or BRT/enhanced bus and further work is needed to identify viable route alignments for each mode and develop demand forecasts and business cases including impact on existing bus services. Estimates are based on km rates for rapid transit.

The Western Corridor to Culverhouse Cross is currently a key bus route but could also be served by a tram –train extension from the city line with the main route the A48 Cowbridge Road and Grand Avenue/Michaelston Road. The retail park at Culverhouse cross is the logical termination point with a P&R site. To be attractive the route will need to offer

competitive journey times by maximising segregation opportunities potentially at expense of highway capacity.

The NE corridor is probably the most difficult from a routing perspective with limited route options though Pontprennau. The main rail option would be new Greenfield tram train spur from the Rhymney line crossing the former Llanishen Reservoir across the north side of Pontprennau to Cardiff gate. This would provide good access to the new expansion area but be of limited benefit for areas to the south. Alternatively BRT/enhanced bus might be developed as an extension of the existing Park & Ride route to Pentwyn but again this would provide little benefit for areas to the south and Pentwyn Drive may be a better alignment.

The Newport Road corridor is also part of the Cardiff – Newport BRT route proposal (see package 6). Alternatively it would also be possible to project the Tram – Train route from Cardiff Bay from Rover Way across the Mainline and along Newport Road to St Mellons. The main engineering risk for a Tram/Tram - Train alignment will be crossing the mainline and statutory undertakers apparatus in the highway. However the generous highway widths give plenty of scope for increased segregation albeit at some loss of highway capacity.

A cost allowance has been made for further on street tram in Cardiff centre. This may include an on street route to avoid Cardiff West junction.

**Operating Costs:** High for new line as running new services.

**(6) Rapid Transit in Newport (Bus Rapid Transit and/ or tram-train) – Total Estimated Capital Cost = £14,000,000**

Interventions within package:

- Cardiff – Newport Bus Priority Corridor

### **Feasibility:**

Cardiff – Newport is a key transport corridor with sufficient demand to support both strategic rail and bus services. The main bus corridor is along the A48 serving a number of key health and employment sites including Royal Gwent hospital, Statistics Office and Celtic Lakes in Newport, retail and office development in Cardiff and a large residential catchment including the B4487 Rumney/St Mellons in Cardiff.

BRT proposals along the corridor would aim to build on existing significant bus priority measures along Cardiff Road, Newport and Newport Road, Cardiff with further targeted priority measures, the potential for a new segregated link through Duffryn avoiding Tredegar Park interchange, the provision of faster limited stopping services serving the main points of demand with higher specification stops and vehicles.

There are no significant engineering constraints with costs subject to the degree of segregation provided. The main risks associated with this proposal are land and heritage issues associated with a new route through Duffryn and the ability to manage the provision of new BRT services in the current deregulated bus environment together with difficulties of serving existing (car orientated) development successfully. Journey time competitiveness is a key demand driver and more radical measures to improve times and reliability would involve increasing segregation along the route at the expense of highway capacity.

Longer term development of BRT in Newport might include extension further east towards LLanwern Village linking back to LLanwern Rail Station, development areas along the river and the extension of Blaenavon – Cwmbran proposals described in package 8 to Newport.

**Operating Costs:** Medium.

**(7) Newport-Caerleon-Pontypool-Abergavenny corridor** – Total Estimated Capital Cost = £ 62,000,000

Interventions within package:

- Sebastopol New Station
- Frequency Enhancements: Abergavenny – Newport – Cardiff
- Marches Line Electrification (Newport to Abergavenny)
- Llantarnam new station
- Mamhilad new station

**Feasibility:**

This package of measures covers the Marches line, albeit Caerleon Station was identified as a quick win and is in Package 1 together with Park & Ride proposals at Pontypool & New Inn and Abergavenny.

New Stations are all 2 platform stations on a two track railway although provision at Sebastopol is complicated by the existing freight loops. No suitable site is currently available for a station at LLantarnam. Mahmilad is proposed to link with the development site and abstraction from Pontypool & New Inn would need to be considered as part of the business case.

The proposal for additional local services to Abergavenny is both to increase frequencies and to enable new stations to be provided. Current train services are provided by longer distance services to north Wales and Manchester which have limited capacity to accommodate new stations. The provision of local services may also enable longer distance services to reduce existing stopping pattern and improve journey times with interchange at Abergavenny & Newport with local services.

The new stations would require planning and land acquisition. Local services would require additional rolling stock and a turnback at Abergavenny. Line signalling spacing and capacity may be a risk to implementation of higher frequencies which current re-signalling proposals may only partially address.

Electrification of the route, the main route in South East Wales not included in the current scheme is proposed alignment with the provision of local stopping services however these could remain diesel hauled until future electrification of the whole Marches line route.

**Operating Costs:** High for frequency enhancements and low for new stations.

**(8) Regional Bus Rapid Transit (inc Cross Valleys)** - Total Estimated Capital Cost = £37,000,000

Interventions within package:

- Cross Valleys Express Service (Abergavenny/Brynmawr/Ebbw Vale/Tredegar/Merthyr/Aberdare)
- Cross Valleys (Pontypridd – Ystrad Mynach – Cwmbran) Strategic/ Express Service

- Blaenavon - Sebastopol - Pontypool & New Inn/Cwmbran
- Bridgend – Porthcawl

Long term interventions:

- Brynmawr – Abertillery
- Newport – Monmouth Strategic Express Service
- Abergavenny Station – Raglan – Monmouth Strategic / Express Service

### **Feasibility:**

This package contains a number of key strategic bus routes which would be progressively developed as BRT corridors. The proposals include:

- Provision of Strategic routes with limited stops in main settlements and train stations to achieve journey times similar to train;
- Complementing existing north south rail network with east west links;
- Common ticketing and branding with the rail network.

The key corridors are Cross valley routes in the Heads of Valleys corridor, Mid Valleys corridor and Blaenavon – Cwmbran and Bridgend –Porthcawl. Together with the Cardiff – Newport corridor (package 7) and other possible BRT measures in Cardiff (Package 6) and other rail and tram train proposals this provides a strategic public transport network connecting the majority of the densely populated areas of SE Wales. Following completion of the spatial mapping work, consideration should also be given to extending the Blaenavon corridor to Newport to take in the north Newport urban area.

The mid valley corridor would cover Abercynon – Pontypool & New Inn as a minimum but it is recommended this is extended to Pontypridd and Cwmbran for interchange purposes. Immediate infrastructure investment may be limited to upgrading the strategic stops to provide a higher quality environment with the localised measures to improve priority either through conventional priority measures or limited segregation (rather than whole route measures) to improve journey times and bypass congestion. This may include providing 'loop in/out' strategic bus access to key settlements bypassed by the main road network.

The routes to Monmouth from Newport and Abergavenny are of strategic interest from a highway perspective (as the main route to the M5 midlands) but lack the population to support BRT and are therefore best served by long distance coach services.

There are no significant engineering constraints with costs subject to the degree of segregation provided. The main risks are the cost of providing sufficient segregation to achieve competitive journey times, achieving sufficient differentiation from existing bus services, public and political acceptance of limited stop bus services and the ability to manage the provision of new BRT services in the current deregulated bus environment and ensuring integration with existing bus services. Business case assessment will need to consider impact on existing bus operations and if the services are procured as part of the rail franchise how concessionary fares would be managed.

**Operating Costs:** Medium.

**(9) Cardiff Airport - Total Estimated Capital Cost = £55,000,000**

Interventions within package:

- Cardiff Airport Spur (with new station on existing line or spur)
- Cardiff Airport/Barry 4tph Metro Service

### **Feasibility:**

There is a requirement to improve transport connections to Cardiff Airport as a strategic priority. For rail based options, key to this would be a significantly higher frequency (at least 3-4tph) than the current hourly rail service with interchange at Rhoose and a more direct connection to the terminal.

There are two possible options to serve the terminal, either a new spur from the current rail line to the Airport Terminal or a new station on the existing line with a fixed link to the terminal. These have advantages and disadvantages. A new east (circa 1.8 km) facing spur would be entirely new green field construction and is high cost but has the advantage of direct services potentially an extension of existing Barry services (in place of Barry Island). However, it would not be served by any increase in frequency of services on the Vale of Glamorgan line unless a west facing connection is also made and trains diverted. The last few hundred metres to the terminal involves crossing a number of roads which would require grade separation unless the station is short of the terminal with a moving walkway link or similar. A Transport & Works Act would be required and land acquired.

An alternative would be a new station on the Vale of Glamorgan line close to the end of the Runway with a provision of a fixed link of 1.4km to the terminal. This has the advantage it could be served by both through and terminating rail services albeit requiring interchange. Fixed link options using an automated people mover system (e.g. Heathrow Ultra) or possibly a cableway offer more flexibility in construction and operation with less land take including serving future airport expansion. This is potentially lower cost option principally due to reduced engineering constraints compared to heavy rail construction. Powers and land would need to be acquired. A more detailed operational, demand and engineering analysis is needed to determine a preferred solution.

**Operating Costs:** High for frequency enhancement (metro service), low for new station.

**(10) Nelson - Newport** - Total Estimated Capital Cost = £109,000,000

Interventions within package:

- Caerphilly – Newport, new rail line on disused rail corridor with new stations at Bassaleg New Station, Machen New Station, Trethomas New Station, Caerphilly East New Station.
- Ystrad Mynach – Trelewis/Treharris with new at Nelson and Trelewis/Treharris

### **Feasibility:**

This comprises of two longer term independent projects, Newport – Caerphilly and Ystrad Mynach – Nelson which together would help improve eastward links from Caerphilly and the Rhymney Valley and increase the population catchment of Newport. The Newport - Caerphilly line comprises an existing and former heavy rail alignment from the Ebbw Valley line at Park Junction, which is currently operated for stone traffic as far as Machen Quarry. The remainder of the route has been lifted but the alignment (7.5km) is largely intact with the exception of Machen where property would need to be acquired. It is proposed to provide 4 intermediate stations.

The line has previously been considered as a heavy rail extension but would also lend itself to tram train operation which may reduce construction costs, improve penetration of housing areas and make it easier to maintain parallel cycle track use. A Transport & Works Act and land acquisition and some property acquisition would be needed for the route. The main

risks relate to demand and economic viability and would be improved by further rail accessible development in the corridor. Operationally the main constraint would be rail freight operation and paths from the Ebbw Valley line into Newport Station. The corridor for the line needs protection from further development

Consideration has been given to the preferred mode for the cross mid valley corridor linking the Rhymney and Taff Vale lines between Ystrad Mynach and Quakers Yard. The preferred short term intervention for this corridor is Bus rapid Transit between Abercynon and Ystrad Mynach serving Nelson as part of a longer cross valley route to Pontypool & New Inn.

However, there is a longer term aspiration to introduce passenger services over part of the Cwmbargoed Branch from Ystrad Mynach which passes through Nelson and Trelewis and is currently used for coal traffic from ffos-y-fran. Previous studies have looked at potential passenger use as far as Bedlinog, although practically the main passenger demand would be from Nelson and Trelewis/Treharris and it may be worth developing a spur from Ystrad Mynach to serve these communities in the medium to longer term, which could also support further development in the corridor as well as investigate further the practicality re-establishing the former link to Quakers Yard and hence to Merthyr.

**Operating Costs:** High, as introducing new railway line with new service costs.

## (11) Ruled Out Schemes

Interventions within package:

- Ynysboeth/ Tyntetown New Station
- M4, J34 New Station
- Llangynwyd New Station
- St Athan New Station
- Freight head, Hirwaun New Station (inc route extension)

### 3.3 Quick Wins

3.3.1 The following section outlines the quick win schemes (from the packages listed in section 3.2)

3.3.2 A quick win was defined as:

- Infrastructure works can be completed prior to completion of VLE (2019)
- Operation commences before VLE or at the same time as the commencement of Electric services

#### New Station Quick Wins

3.3.3 The following 8 new station sites were considered as having high potential as quick win interventions:

Location	Route	Comments
Roath Park (Wedal Road), Cardiff	Rhymney Line	Serves Heath Hospital, Roath Park & Lakeside residential; potential for bus integration; potential for small scale development in/around station
Gabalfa Station, Cardiff	Taff Vale Line	Serves Gabalfa/Mynachdy residential, University halls, Western Avenue retail ( and potential



Location	Route	Comments
		redevelopment) and Cardiff Metropolitan Campus on Western Avenue
Caerleon Station, Newport	Marches Line	Services Caerleon residential, University and St Cadoc Hospital
Ely Mill/Victoria Park, Cardiff	City Line	Serves Paper mill development site and with bridge across main line Victoria Park & Cowbridge rd residential; potential for bus integration
St Mellons Station, Cardiff	S W Main Line (Relief Line)	Serves St Mellons residential and business park/St Mellons development site. Issue of calling existing services e.g. Cardiff – Bristol/Cheltenham and need to link into Cardiff Bus Services
LLanwern Station, Newport	S W Main Line (Relief Line)	Serve Llanwen development site (commercial and residential). Issue of calling existing services e.g. Cardiff – Bristol/Cheltenham
Cardiff Airport Station, Vale of Glamorgan	Vale of Glamorgan	Either new station on Vale of Glamorgan Line with People mover or similar link or new spur to terminal This will require a more detailed study to explore options
Crwys Road Station	Rhymney Line	Serves Crwys Rd/Albany Rd/City Rd retail and residential. Roath Park was considered a higher priority, in the event that only one station can be implemented in the quick win timeframe.

3.3.4 All the above will need to be subject to more detailed investigation and where appropriate considered in VLE planning.

### Frequency Enhancements

3.3.5 The Ebbw Valley and Maesteg line frequency enhancements were identified as quick wins and will be easier to implement prior to VLE.

Location	Route	Comments
Ebbw Vale Frequency Enhancements	Ebbw Valley	Implementation of double tracking to allow 2tph over full route and 4 tph between Park Jn and Aberbeeg.
Maesteg Line	Maesteg	Implementation of passing loop to permit 2tph.

### Park & Ride

3.3.6 It was identified that Park & Ride Improvements were quick wins and should be progressed at the following locations:

- Bargoed;
- Treforest Train Station;
- Pontypool & New Inn;
- Pencoed station;
- Chepstow;
- Taffs Well Station;
- Porth;
- Pyle;
- Llanbradach;
- Improvements to STJ;
- Pontyclun;

- Pentrebach;
- Abergavenny.

### **Bus Integration**

3.3.7 It was identified that bus integration improvements were quick wins and should be progressed at the following locations:

- Barry Docks Station;
- Cardiff Central;
- Merthyr Bus;
- Porth;
- Pontypridd;
- Newport Station;
- Bridgend Rail Station;
- Pontyclun Station;
- Abercynon;
- Pengam;
- Pontypool & New Inn;
- Taffs Well;
- Chepstow;
- Abergavenny.

#### **4. Conclusion**

- 4.1 This report has provided an outline of the methodology used to appraise the metro interventions, the results of the appraisal process and summarised the packages of recommended interventions.
- 4.2 This report will form part of the Metro Regional Economic Impact Study which will be provided to Welsh Government for consideration.
- 4.3 It is recommended that further appraisal work (particularly in relation to feasibility and cost) is undertaken on all interventions listed within recommended intervention packages, especially those identified as quick wins where timescales before possible implementation will be shorter.

**APPENDIX A**

Intervention Category Results Tables

**APPENDIX B**

Intervention Packages

successful people, projects and performance

[www.capitasymonds.co.uk](http://www.capitasymonds.co.uk)





## Supporting documents:

- Appendices to Main Report
- Metro Modal Study
- Metro Spatial Map
- Regeneration and The Metro
- Station Design Guidelines (Ebbw Vale)
- Metro Funding and Financing Independent Advice
- Metro Economic Impacts

Study led by Mark Barry of M&G Barry Consulting and included Capita, Powell Dobson Urbanists, Jones Lang LaSalle and Steer Davies Gleave



[www.metroconsortium.co.uk](http://www.metroconsortium.co.uk)