

APPENDIX 5

Valley Lines Electrification

Technical Note on Wider Economic Benefits and Social Impacts

December 2011

Welsh Government

Valley Lines Electrification

**Technical Note on Wider Economic
Benefits and Social Impacts**

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1 Introduction

1.1 Background

The electrification of the Valley Lines will deliver a range of benefits to the communities served. These include:

- Reduced journey times;
- Relief of overcrowding in the train (more carriages being provided);
- Superior ride quality and interior ambiance of the new trains; and
- Relief of congestion on the road network resulting from mode switch to rail.

These are the traditional ‘direct’ economic benefits of a transport project and are quantified and reported in the Transport Economic Efficiency (TEE) table in the OBC (Table 4.11) for both consumers and businesses.

In this technical note, an account is provided of the wider benefits of the project that have not been included in the TEE table. The analysis is based on a comparison of the electrification option (cascaded or new EMU rolling stock) compared against the Do-minimum.

1.2 Wider Economic Benefits

Wider economic benefits (or WEBs) are the indirect, or second order, benefits to the local economy arising from reduced travel times and consequent improvements in accessibility.

The WEBs are described and quantified in this technical note. A framework for their calculations has been established by DfT, as set out in guidance note TAG unit 3.5.14 ‘The Wider Impacts Sub-Objective’. The guidance has been followed for this study.

The three main aspects of WEBs are:

- **Agglomeration** – the concentration of economic activity. Investment in rail allows businesses to better link with each other and with their workers. Higher levels of agglomeration are empirically linked with higher levels of productivity and GDP
- **Output change in imperfectly competitive markets** – lower production costs (following from reduced travel costs) can result in an increase in output. The welfare gain will be higher than the initial value of the user benefits shown in the TEE table
- **Labour market impacts** – reduced commuting time means access more and better employment opportunities, allowing people to switch to more productive and/or better paid jobs, and increasing total employment in the region.

The WEBs analysis is set out in Chapter 2.

1.3 Social inclusion & distribution of benefits

It is established in the OBC that the electrification of the Valley Lines will bring considerable net benefits to the UK economy and, for the lines referred to in the Security of State for Transport's 1 March 2011 announcement, at no net cost to the UK government. This, while impressive, does not give the full picture of the value of the project. The benefits must also be considered in the context of the communities served, which in the case of the Valley Lines includes some of the most deprived communities in the UK.

To illustrate this point, the benefits have been disaggregated by IMD¹ band, in accordance with DfT advice in TAG unit 3.5.3. This analysis is set out in Chapter 3.

1.4 Review of project objectives

In Chapter 2 of the OBC, six project objectives are set out:

- to deliver a more efficient and sustainable transport network supporting long-term prosperity by enabling South East Wales to function as a single coherent economic region;
- to provide for increasing rail travel demand in South East Wales;
- to provide a catalyst for mode shift in South East Wales from car to rail transport;
- to produce positive effects overall on people and the environment, contributing to the overarching Welsh Government goals to reduce greenhouse gas emissions;
- to support the creation of significantly improved employment links for parts of South East Wales Valleys in the convergence funding areas; and
- to strengthen the role of the key economic centres in South Wales as the drivers of economic growth in South Wales.

Evidence of the success in meeting these objectives is provided in Chapter 4.

1.5 Tools

Extensive use has been made of the SE Wales accessibility model in the analyses presented in this technical note. It is a multi-modal accessibility model of the core study area at a lower super output area (LSOA) level of zoning detail, and at a Ward level beyond this: to Carmarthen, Hereford, Gloucester and Bristol. It is linked to census, employment and deprivation zonal data for accessibility and other analyses.

The model has been used in this study for:

- estimation of with- and without-scheme public transport generalised costs, and highway generalised costs;
- weighting of the highway and public generalised costs for multi-modal calculations (e.g. WEBs);

¹ Index of Multiple Deprivation

- visualisation of rail demand flows from the MOIRA (rail demand forecasting) model;
- distribution of rail demand from MOIRA rail stations to LSOA zones (to relate with deprivation data);
- identification of where traffic reduction will occur following mode switch;
- calculation and mapping of accessibility benefits, such as growth in labour market catchment.

2 Wider Economic Benefits

2.1 Agglomeration

Agglomeration effects (or economies of agglomeration) describe the productivity benefits that accrue to businesses from locating close together. These economies are derived from better skills matching, technology and knowledge spill-over between businesses, and better access to well matched suppliers. It explains why businesses concentrate in urban areas.

2.2 South Wales agglomeration

The Per Capita Gross Value Added (GVA) of the Welsh economy was just 72% of the UK average in 2008². In part, the longstanding ‘GDP gap’ can be explained by lower levels of employment, but is also determined by lower productivity³. There are also very significant differences in GDP within Wales. The West Wales and the Valleys Convergence Programme area has a GVA per capita of 62% of the UK average (2007)⁴, whilst Cardiff and the Vale of Glamorgan, and Newport and Monmouthshire are close to the UK average.

On a European scale, Wales is a peripheral region. One of the contributory factors to lower productivity is Wales’ inability to benefit from ‘agglomeration effects’, determined by the absence of a major conurbation and physical dislocation from key economic centres elsewhere.

This factor is highlighted in the analysis of challenges and opportunities in the Economic Renewal strategy⁵:

‘The absence of a major conurbation (by European standards) is associated with wages and productivity levels that are lower than would otherwise be the case (the “agglomeration effect”)’

The relationship between agglomeration and productivity for some sectors of the economy has an empirical basis. Research undertaken by Imperial College, London⁶ for the Department for Transport finds that for the economy as a whole a ‘doubling’ of agglomeration (effective density) is associated with a 12% increase

² Office of National Statistics:Regional Gross Value Added (GVA)

³ Productivity refers here to labour productivity – output per worker

⁴ Office of National Statistics:Regional Gross Value Added (GVA)

⁵ Economic Renewal: a new direction, Welsh Assembly Government, July 2010

⁶ ‘Investigating the link between productivity and agglomeration for UK industries’, Centre for Transport Studies, Imperial College, London, December 2006

in productivity. The relationship differs significantly for different sectors with service sectors exhibiting the greatest sensitivity to agglomeration, manufacturing being more weakly influenced and primary sectors unaffected.

Recent research undertaken for the Welsh Government attempts to better understand the impact of spatial factors on productivity⁷. The study finds that accessibility at a regional scale – more closely related to ‘internal’ density – has a positive statistically significant relationship with labour productivity⁸. Peripherality on a wider scale⁹ is also found to be significant in explaining differences in economic performance at a UK level, but small differences in peripherality within Wales have an insignificant effect on labour productivity. The conclusion of the study is that small changes in accessibility delivered by transport improvements are most likely to deliver productivity improvements by increasing agglomeration at a regional, rather than national level.

The Valley Lines electrification scheme will reduce travel times on rail services in the area, reducing perceived and actual peripherality of the area. It will further act to reduce travel times between much of South Wales and the Midlands of England and beyond. Improving the Valley Lines will foster agglomeration effects in South Wales by reducing the effective (transport cost adjusted) distance between Wales and the rest of Europe, but also by deepening economic concentration within Wales.

2.3 Approach

The effect of increased agglomeration is an increase in the level of productivity (output per worker) of an economy either through improved interaction between businesses and more efficient labour market interaction.

The approach to estimating agglomeration effects is a two stage process. The first stage is to measure the change in the level of ‘agglomeration’ resulting from the scheme. The second stage is to apply an ‘elasticity’ of productivity with respect to agglomeration to reach the change in the level of productivity. This process is undertaken for four distinct sectors¹⁰ which are sensitive to agglomeration, and thus have differing elasticities of productivity, reflecting the varying relationships between agglomeration and productivity.

There are many ways in which agglomeration can be interpreted and measured. Applying the DfT approach, the level of agglomeration of an area is known as its ‘effective density’. Effective density is a measure of access between firms and workers weighted by transport costs. The assessment focuses on the effect of the scheme on the south Wales economy.

All local authorities in the core area affected by the project (see Figure 1) are included: Blaenau Gwent, Bridgend, Caerphilly, Cardiff, Merthyr Tydfil,

⁷ ‘Productivity in Wales: the impacts of peripherality on spatial patterns of productivity’. University of the West of England report to the Economic Research Advisory Panel, Welsh Assembly Government 2010

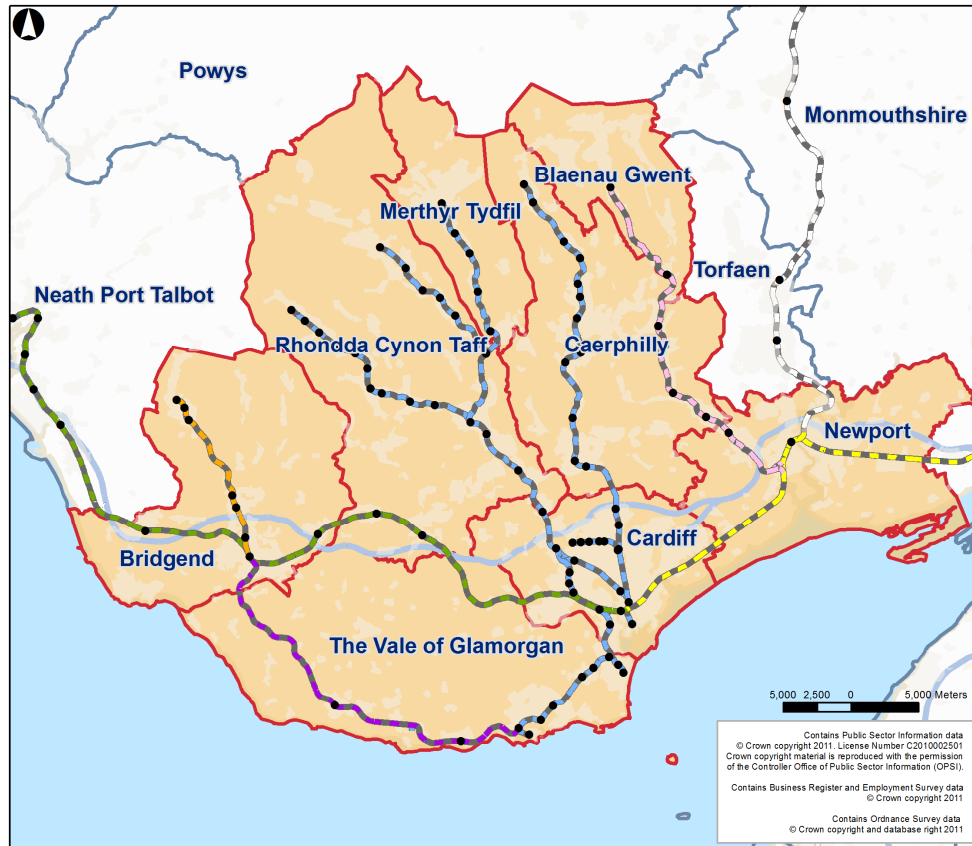
⁸ Although termed ‘internal’, this definition of accessibility still covers a relatively wide area and cuts across regional boundaries. It is based on a measure of accessibility to/from towns within 0.5 hours and cities within 2 hours

⁹ Measured by the distance to/from all local authorities in the UK weighted by population

¹⁰ Manufacturing, construction, consumer services and producer services

Monmouthshire, Newport, Rhondda Cynon Taff, Vale of Glamorgan; *plus* the adjacent authorities of Swansea, Neath Port Talbot, and Torfaen.

Figure 1: Agglomeration effects - core area



Legend

- | | |
|--|--------------------------|
| Ebbw Vale Line | Railway Stations |
| Great Western Mainline (Electrification Committed) | Motorway |
| Vale of Glamorgan Line | Study Area |
| Maesteg Line | Local Authority Boundary |
| Cardiff Ebbw Vale Line | |
| Cardiff Bridgend Line | |
| Great Western Mainline | |
| Valley Lines | |
| Other Railway Network | |

Employment data has been collected for each of the above areas by sub-sector using data from the Annual Business Inquiry. Gross Domestic Product per worker (productivity) estimates using sub-regional Gross Value Added data are taken from the Office of National Statistics.¹¹

¹¹ Note: All monetary values in wider economic benefits analysis are given in 2002 prices

2.4 Change in travel times

The effects of changes in journey times are given a monetary value by means of calculating the average generalised cost which takes into account the value of time¹², thus taking into account time savings. The average generalised cost calculated does not include fares as the electrification of the Valley Lines should not affect ticket prices and thus time savings are the sole benefit. The average generalised cost is calculated using an accessibility model which calculates the quickest route between locations in the study area¹³ and then averages them at a local authority level weighted by the population in the location and number of jobs in the destination. These generalised costs are calculated for commuters using public transport and commuters using cars. For public transport, the average generalised cost was given for the fastest mode of transport for workers to get from their home to their place of work (i.e. bus, train or both) taking into account factors including station access time, wait time, interchange penalties and onward journey time to place a value on total commute cost. This was calculated for a do minimum scenario versus electrification train timetables.

2.5 Effective Density

Effective density measures proximity to employment based on generalised costs of travel within and between areas weighted by a 'distance decay parameter' which reflects the relative importance of distance in agglomeration effects for each sector. To illustrate, the changes in effective density in south Wales resulting from the Valley Lines electrification are given in Table 1, for each sector.

Table 1: Change in Effective Density

	Manufacturing	Construction	Consumer Services	Producer Services
<i>Decay Parameter</i>	<i>1.097</i>	<i>1.562</i>	<i>1.818</i>	<i>1.746</i>
Blaenau Gwent	0.05%	0.03%	0.02%	0.02%
Bridgend	0.10%	0.07%	0.05%	0.05%
Caerphilly	0.16%	0.12%	0.09%	0.10%
Cardiff	0.06%	0.04%	0.03%	0.03%
Merthyr Tydfil	0.47%	0.30%	0.21%	0.23%
Monmouthshire	0.03%	0.02%	0.01%	0.02%
Neath Port Talbot	0.03%	0.02%	0.02%	0.02%
Newport	0.03%	0.02%	0.01%	0.01%
Rhondda, Cynon, Taff	0.31%	0.23%	0.18%	0.19%
Swansea	0.02%	0.01%	0.01%	0.01%
Torfaen	0.02%	0.01%	0.01%	0.01%
Vale of Glamorgan	0.08%	0.06%	0.05%	0.05%

All areas experience increases in effective density as a result of the time savings and lower transport costs that result from the scheme. This means that level of

¹² Based on WebTAG Unit 3.5.6 the value of time for commuting is £5.04/hour in 2002 prices

¹³ At a lower super output area level

accessibility between firms and workers would improve as a result of the electrification of the Valley Lines though the magnitude of the change is relatively small and does vary across local authority areas and sectors. The effects are most significant in Rhondda, Cynon, Taff and Merthyr Tydfil.

2.6 Effects on Productivity

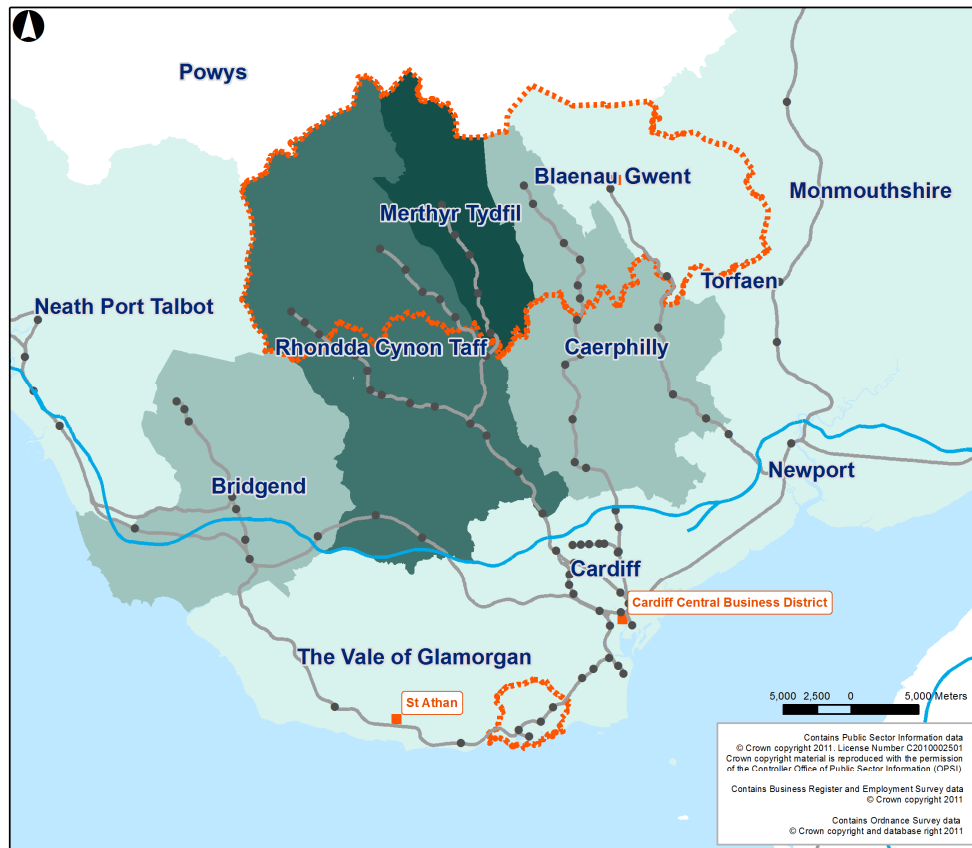
Changes in effective density can be translated into productivity effects by applying the elasticity of productivity for four sectors in the UK. The elasticities¹⁴, which reflect the relative importance of agglomeration effects for each sector, are as follows:

- Manufacturing: 0.021
- Construction 0.034
- Consumer Services 0.024
- Producer Services 0.083

Based on these parameters, applied to the changes in effective density, changes in productivity for each modelled year have been estimated in terms of GDP per worker. The economic effect is illustrated by Figure 2. The productivity benefits are greatest in Caerphilly, Merthyr Tydfil, Rhondda, Cynon, Taff and the Vale of Glamorgan. These productivity benefits should be put in perspective with these benefits equating to around a 0.01% increase in productivity.

¹⁴ Coefficients from Graham D.J., Gibbons S. and Martin R. (2009) “Transport Investment and the Distance Decay of Agglomeration Benefits”, Centre for Transport Studies, Imperial College, mimeo. As per Transport Analysis Guidance, The Wider Impacts Sub-Objective, TAG Unit 3.5.14C, Department for Transport, September 2009

Figure 2: Agglomeration Effects & Productivity in 2019 (£ change per worker - average change across all sectors)



2.7 Agglomeration result

Agglomeration effects in each modelled year have been profiled over the 60 year period and discounted back to 2002. **The value of agglomeration effects is £10.538m PVB.**

2.8 Increased output result

Due to the presence of imperfect competition, reductions in travel costs can lead to higher economic output by firms, which is a net benefit to consumers. Estimates vary in the degree to which reduced transport costs lead to higher

output and the resultant benefit that this confers. However, DfT guidance¹⁵ recommends that this value is set at 10% of business user benefits. Therefore, **the value of benefits due to increased output is £0.45m PVB.**

2.9 Labour Supply Impacts

The electrification of the Valley Lines would be expected to impact on the employment decisions of individuals across South Wales. A factor when making employment decisions is the commuting costs (including travel time) which should be weighed up with the wage of the job. Time savings associated with the electrification of the Valley Lines could make positions in a wider catchment area economically viable for individuals. This is considered further in Chapter 4. This may increase the overall level of labour supplied which would increase the level of economic activity and tax revenue to the government.

The process for placing a value on the labour supply impacts is that the total commuting cost saving arising from the Valley Lines electrification is found by means of the average change in generalised cost by local authority area being multiplied by the number of commuting trips between local authority areas. The number of commuting trips is based on 2001 census data, the most recent dataset available with the relevant information. This figure is then multiplied by the labour supply ('return to work') elasticity, based on WebTAG guidance. This converts the total commuting saving into the change in labour supply that arises from these commuting time savings.

2.10 Labour Supply Result

The labour supply impacts in each modelled year have been profiled over the 60 year period and discounted back to 2002. The value of the labour supply impacts is **£1.588m PVB.**

2.11 Conclusions

The results of the assessment of the wider economic benefits associated with the Valley Lines electrification scheme are summarised in Table 2. This shows that the scheme would produce predicted benefits of £12.576m over the 60-year assessment period associated with agglomeration effects and increased output. Wider economic benefits represent xx% of total scheme benefits which is broadly equivalent to estimates produced for transport schemes in other parts of the UK.

Table 2: Wider Economic Benefits

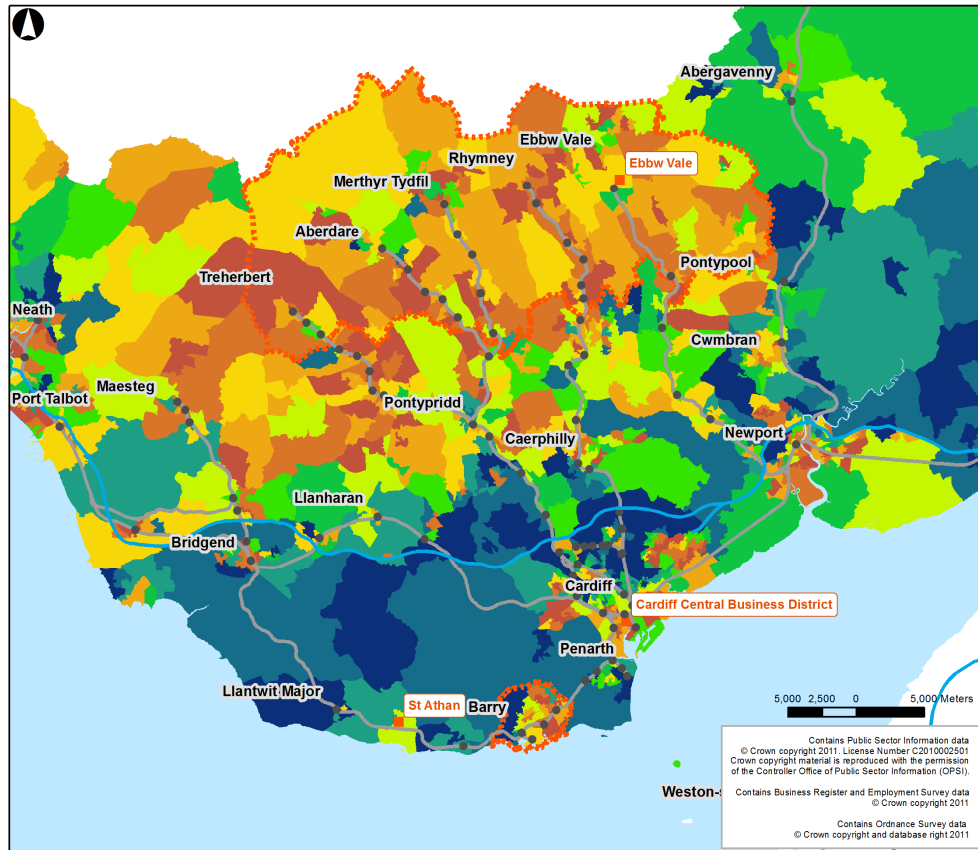
	Benefits (£000, 2002 prices)
Agglomeration Effects	10,538
Imperfectly Competitive Markets	450
Labour Supply Impacts	1,588
Total Wider Economic Benefits	12.576

¹⁵ Transport Analysis Guidance, The Wider Impacts Sub-Objective, TAG Unit 3.5.14C, Department for Transport, September 2009

3 Social inclusion & distribution of benefit

The categorisation by Welsh Index of Multiple Deprivation for areas is shown in Figure 3 for SE Wales. It is immediately apparent that Valley Lines serve areas high in deprivation (marked in red and orange). The upper valleys, north of Pontypridd, and parts of Caerphilly are among the most deprived areas in Wales and the UK as a whole. Bottom decile (most deprived 10% of) IMDs are numerous along the rail corridors to Treherbert, Aberdare, Merthyr Tydfil, Rhymney, Ebbw Vale and Maesteg.

Figure 3: Welsh Index of Multiple Deprivation (WIMD) indices in SE Wales



Legend

Motorway	Welsh IMD Decile	6
Rail Station	1 (Poorest)	7
Railway	2	8
Enterprise Zones	3	9
Strategic Regeneration Areas	4	10 (Best)
	5	

A key advantage of investment in the Valley Line Electrification project is that the project benefits largely accrue to communities with high levels of deprivation, communities that have most to gain from any public investment. Table 3 shows a breakdown of the user benefits by WIMD decile, and Table 4 shows the same information in percentages of total benefit. This table was calculated by taking

user benefits from the MOIRA model (at station to station level) and distributing the movements to individual LSOAs in the station catchments.

Table 4 indicates that:

- one-third of benefits accrue to residents of LSOAs among the most deprived 20%
- two-thirds of benefits accrue to the most deprived 50%.

Three-quarters of all benefits accrue to residents of Caerphilly, Merthyr Tydfil and Rhondda Cynon Taff local authorities; and over one-third of all benefit is to the communities within the Heads of the Valleys Strategic Regeneration Area (SRA). The distribution of benefits is plotted in Figure 4.

This evidence strongly supports towards VLE as a socially inclusive project, with benefits targeted at the communities in greatest need.

Table 3: User benefits by IMD band

(net benefits, including any negatives)

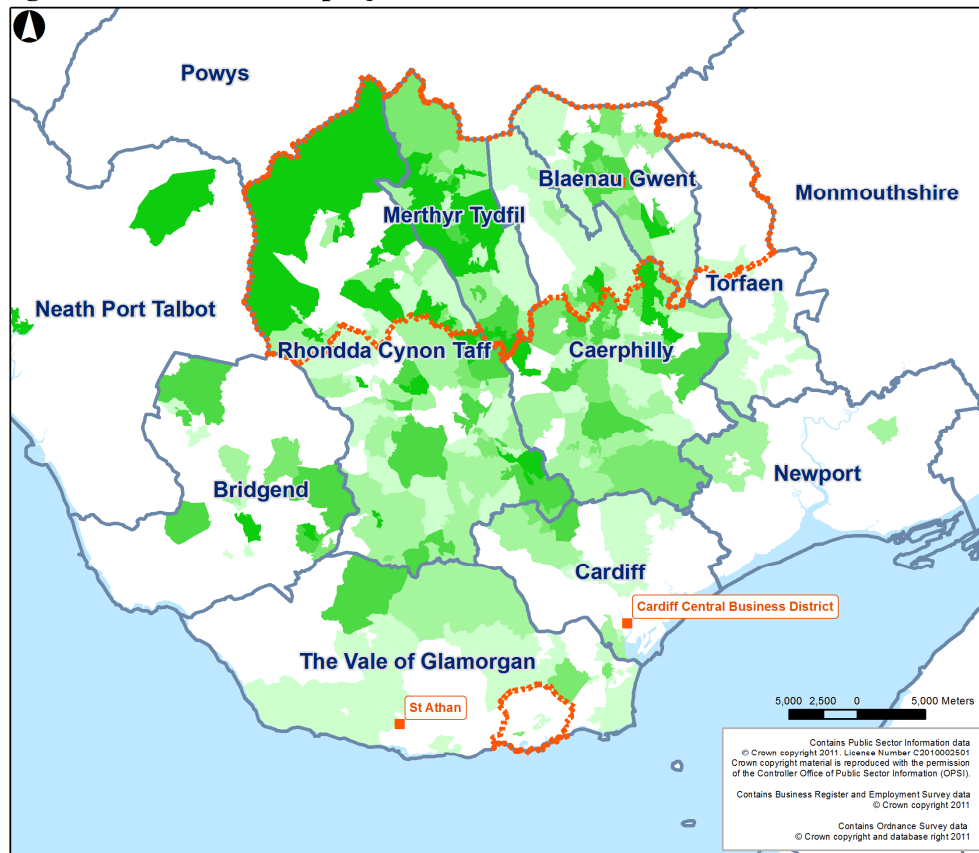
£m PV user time benefits 2002 prices	WIMD Deciles										All
	1	2	3	4	5	6	7	8	9	10	
Local authority of residence											
Blaenau Gwent	1.4	0.7	1.2	0.6	0.3	0.6	0.4	0.0	0.0	0.0	5.2
Bridgend	0.7	1.2	0.2	0.8	0.3	0.0	0.4	-0.1	0.2	0.3	4.0
Caerphilly	1.7	1.5	2.1	0.9	1.6	2.4	1.4	0.7	2.0	0.5	15.0
Cardiff	0.3	0.3	0.3	0.2	0.2	0.4	0.4	0.4	0.5	1.4	4.4
Merthyr Tydfil	2.7	1.4	1.4	0.6	0.4	1.5	0.4	0.4	0.4	0.0	9.2
Monmouthshire	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
Neath Port Talbot	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Newport	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.3	0.2	1.1
Rhondda, Cynon, Taff	4.6	8.0	3.5	4.3	4.2	1.9	0.8	1.2	1.2	1.0	30.6
The Vale of Glamorgan	0.0	0.1	0.0	0.0	0.1	0.0	0.4	0.3	0.4	0.8	2.2
Torfaen	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.5
Total	11.5	13.9	9.3	7.6	7.0	7.1	4.3	3.1	5.3	4.4	73.5
Strategic Regeneration Areas											
Heads of the Valleys	5.5	4.2	3.6	4.4	3.3	3.2	0.8	0.0	0.5	0.0	25.4
Barry	0.0	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.4
Total	5.5	4.3	3.6	4.4	3.4	3.2	1.0	0.0	0.5	0.0	25.9

Note: an additional £1.4m PV benefit accrues to residents of other local authorities, not shown in this table.

Table 4: User benefits by IMD band (% of total)

(net benefits, including any negatives)

% of total	WIMD Decile										All
	1	2	3	4	5	6	7	8	9	10	
Local authority of residence											
Blaenau Gwent	2	1	2	1	0	1	1	0	0	0	7
Bridgend	1	2	0	1	0	0	1	0	0	0	5
Caerphilly	2	2	3	1	2	3	2	1	3	1	20
Cardiff	0	0	0	0	0	1	1	1	1	2	6
Merthyr Tydfil	4	2	2	1	0	2	1	1	1	0	12
Monmouthshire	0	0	0	0	0	0	0	0	0	0	0
Neath Port Talbot	0	1	0	0	0	0	0	0	0	0	2
Newport	0	0	0	0	0	0	0	0	0	0	1
Rhondda, Cynon, Taff	6	11	5	6	6	3	1	2	2	1	42
The Vale of Glamorgan	0	0	0	0	0	0	0	0	1	1	3
Torfaen	0	0	0	0	0	0	0	0	0	0	1
Total	16	19	13	10	10	10	6	4	7	6	100
Strategic Regeneration Areas											
Heads of the Valleys	7	6	5	6	5	4	1	0	1	0	35
Barry	0	0	0	0	0	0	0	0	0	0	1
Total	7	6	5	6	5	4	1	0	1	0	35

Figure 4: Distribution of project benefits**Legend**

■ Enterprise Zones	Benefits (£ pa)
▤ Strategic Regeneration Areas	£500 - £2,500
▭ Local Authority Boundary	£2,500 - £5,000
	£5,000 - £7,500
	£7,500 - £10,000
	over £10,000

4 Review of project objectives

In this chapter, accessibility model outputs are used to illustrate the impacts under the project objective headings.

4.1 Objective 1: Support prosperity in SE Wales

4.1.1 GDP per head

The improved journey times offered by the electrified network will result in agglomeration benefits to business and a GDP per head increase of the order of £1-5, the greatest uplift being in the authority of Merthyr Tydfil which will benefit

from a 10-13 minute reduction in journey time to Cardiff. The distribution of GDP benefit is shown in Chapter 2 (Figure 2).

4.2 Objective 2: Provide for increasing rail travel demand

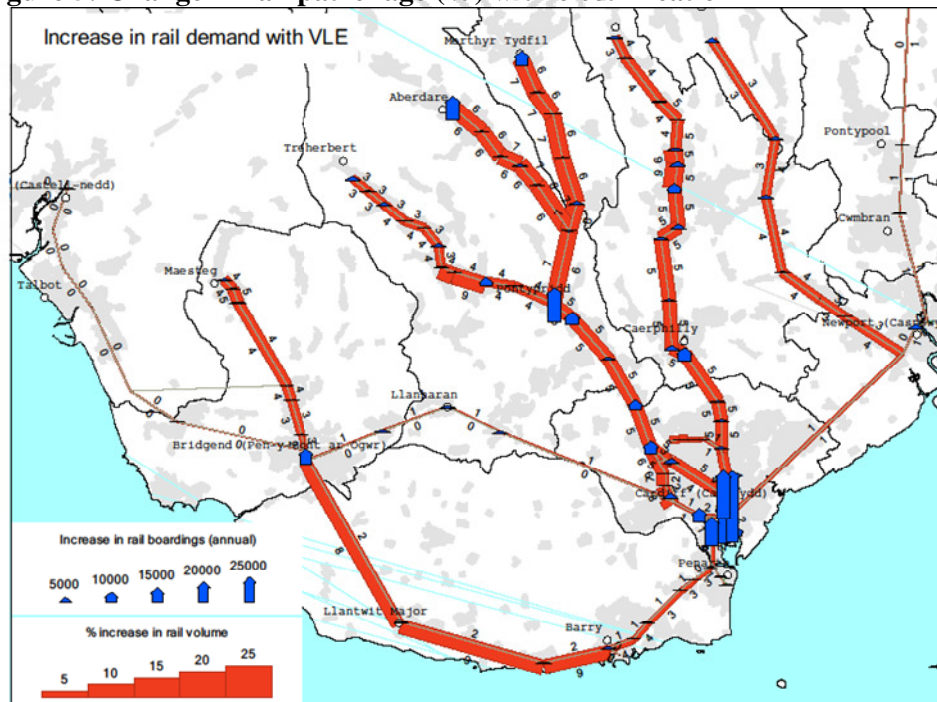
4.2.1 Rail demand uplift

The reductions in travel time are forecast to boost rail patronage. This was tested using the MOIRA model. Figure 5 shows the forecast uplifts of 3-8% by line (red bars). These uplifts exclude any extra patronage that may result from crowding relief and rolling stock quality improvement.

The annual footfall increases are also shown (blue arrows): Aberdare, Merthyr Tydfil and Pontypridd are prominent, as are Cardiff Central, Queen St and Cathays.

With forecast increases in demand of 1.7% a year (constrained) to 2.7% a year (continued growth), the overall picture is of a system with great growth potential, but growth which can only be achieved with provision of extra capacity and ongoing upgrade to rolling stock and systems in line with customer expectations for a reliable, fast and comfortable train service.

Figure 5: Change in rail patronage (%) with electrification

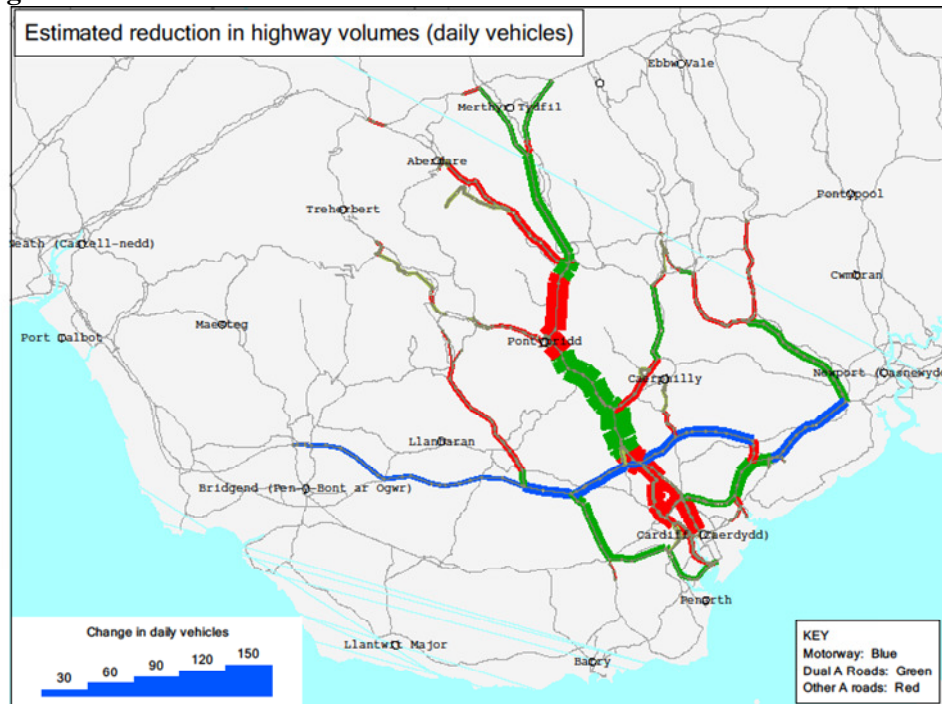


4.3 Objective 3: Provide a catalyst for mode shift

4.3.1 Reduction in car travel

The extra demand shown in Figure 5 may come from existing rail users travelling more frequently, new users who didn't make the trip previously, from mode switch or various other changes in behaviour. Figure 6 shows the assignment to the road network of the trips that are deemed to switch from car to train. The bars show which roads they used and therefore where the traffic reductions are expected.

Figure 6: Reduction in traffic with electrification



The wider the bar, the greater is the traffic reduction. The A470 corridor between Pontypridd and Cardiff is where the greatest traffic reductions, of 120-150 vehicles a day, are forecast. While this is not a very large number, it will be concentrated in the peaks when congestion is greatest.

These estimates were based on DfT advice that an additional 1 mile travelled by rail is associated with a reduction in car travel of 0.26 miles (Tag unit 3.13.2, Table 1). This can be interpreted, for example, as 30% of new rail travel being switch from car with an average car occupancy of 1.2 people.

4.4 Objective 4: Positive effects on people and the environment

4.4.1 Social inclusion

The assessment against the social inclusion objective is given in Chapter 3. The environmental assessment (abatement of CO₂ emissions) is quantified in the TEE table of the OBC.

4.5 Objective 5: Creation of employment in the SE Wales valleys

4.5.1 Reduced unemployment in Strategic Regeneration Areas

The economic geography of SE Wales has changed in the last 25 years. The jobs in heavy industry and mining that were lost in upper and mid-valleys have not been replaced locally to the extent required. The pattern that has emerged is one of employment growth further south: in Cardiff and the M4 corridor; these new and expanded businesses look to the middle and upper valleys for their employees. Commuting between the Valleys and Cardiff has increased substantially as a result and continues to do so.

Improvement to train services are required to provide sufficient peak capacity for the growing commuting flows; and if train journey times can be reduced at the same time, this will lead to an expansion in catchment areas for employers, and in the number of jobs available within a given journey time of each household doorstep, which will increase commuter demand further.

All five Valley Lines penetrate the Heads of the Valleys Strategic Regeneration Area (SRA), a target area for Welsh Government. The Valley Lines provide the link between residents who live in a area of high unemployment and employment positions in Cardiff and M4 corridor. There is also a smaller SRA at Barry, and served by the Barry line.

Figures 7 and 8 shows the effect that increased accessibility will have (following electrification) on the number of people employed and the number of new jobs created, in the SRAs. Each dot represents one additional person in work, or one new job created.

We have estimated that unemployment in the Heads of the Valleys SRA could be reduced by around 640 and that around 100 jobs could be created locally. The results are shown in Tables 5 and 6. Little impact is seen on the Ebbw Valley line where a low service frequency (hourly) limits the accessibility.

The displacement of other jobs/employees has not been estimated. Relative improvements in accessibility in the middle and upper valleys may lead to greater competition for jobs located south of the M4, with potential for some displacement. However we would note that a job created in an SRA has potentially more value in regeneration terms than a job displacement in a more prosperous area.

Figure 7: Potential new employees

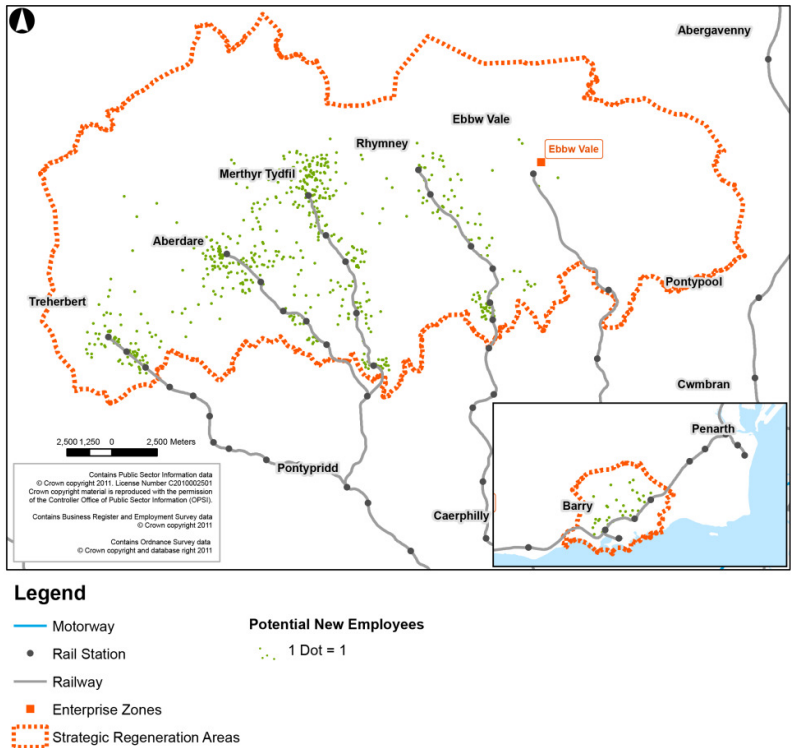


Figure 8: Potential new jobs

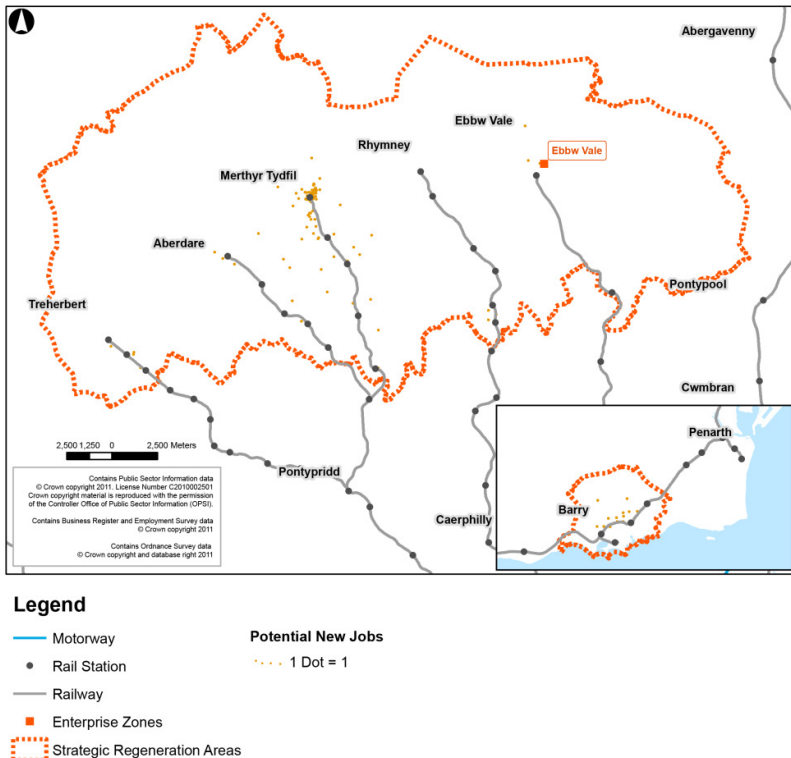


Table 5: Potential reduction in unemployment

	WIMD Deciles										All
	1	2	3	4	5	6	7	8	9	10	
Strategic Regeneration Areas											
Heads of the Valleys	98	119	132	110	39	99	19	0	20	1	636
Barry	3	5	4	4	8	0	2	0	2	4	33
Total	101	124	136	115	48	99	21	0	22	4	668

Table 6: Potential job creation

	WIMD Decile										All
	1	2	3	4	5	6	7	8	9	10	
Strategic Regeneration Areas											
Heads of the Valleys	2	46	16	21	2	6	1	0	0	0	95
Barry	1	6	1	2	5	0	0	0	0	1	16
Total	3	52	17	23	7	6	1	0	1	1	111

The calculation methodology followed is in TAG unit 3.5.8, paragraphs 7.3.3 and 7.4.4.

4.6 Objective 6: Strengthen key economic centres

4.6.1 Accessibility

The importance of creating good links between residential areas and employment areas was introduced under the previous heading. In addition, better rail services connecting businesses with each other results in agglomeration benefits as described in Chapter 2. The railway also offers access to other activities including leisure, shopping, and cultural and sporting events, which are not necessarily available in the valleys and trips to key economic centres are needed to fulfil these needs.

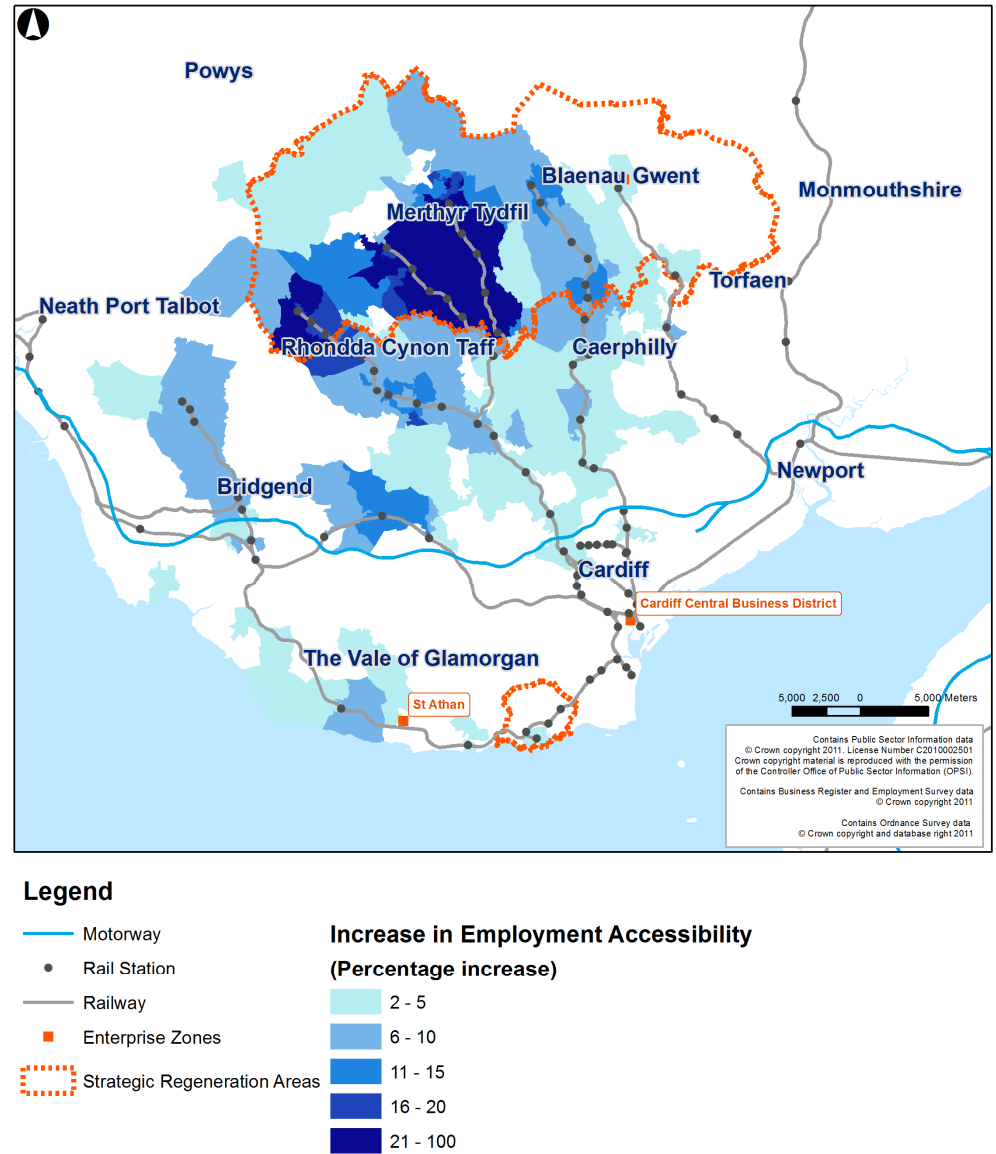
Table 7 shows how labour markets expand within catchment of the key economic centres (by public transport). Maesteg tops the table with an 8% increase in catchment. The 3% reduction at Rhymney is attributable to an extension of dwell time at Tir Phil loop in the electrification case.

Table 7: Labour market within catchment by Public Transport

Location	Do-Min	With project	Change	% Change
Maesteg	42,400	45,700	3,300	8%
Merthyr Tydfil	42,600	45,600	3,000	7%
Caerphilly	109,100	114,300	5,200	5%
Treherbert	19,300	20,200	900	5%
Bridgend	109,600	114,600	5,000	5%
Blackwood	65,100	67,600	2,500	4%
Treforest Ind Estate	98,500	101,300	2,800	3%
Aberdare	40,300	41,400	1,100	3%
Pontypridd	60,500	61,900	1,400	2%
Cardiff	172,600	175,700	3,100	2%
Ebbw Vale	29,600	30,000	400	1%
Newport	149,600	150,900	1,300	1%
Rhymney	30,800	29,900	-900	-3%

The growth in jobs in catchment is shown in Figure 9. Some upper valleys communities at Treherbert and along the Aberdare and Merthyr lines will benefit from a greater than 20% expansion in jobs in reach. This is driven by journey time reductions to Cardiff of 10-13 minutes.

Figure 9: Total jobs in catchment (% increase)



The growth in labour (residents of working age) in catchment is shown in Figure 10.

Figure 10: Total labour market in catchment (% increase)

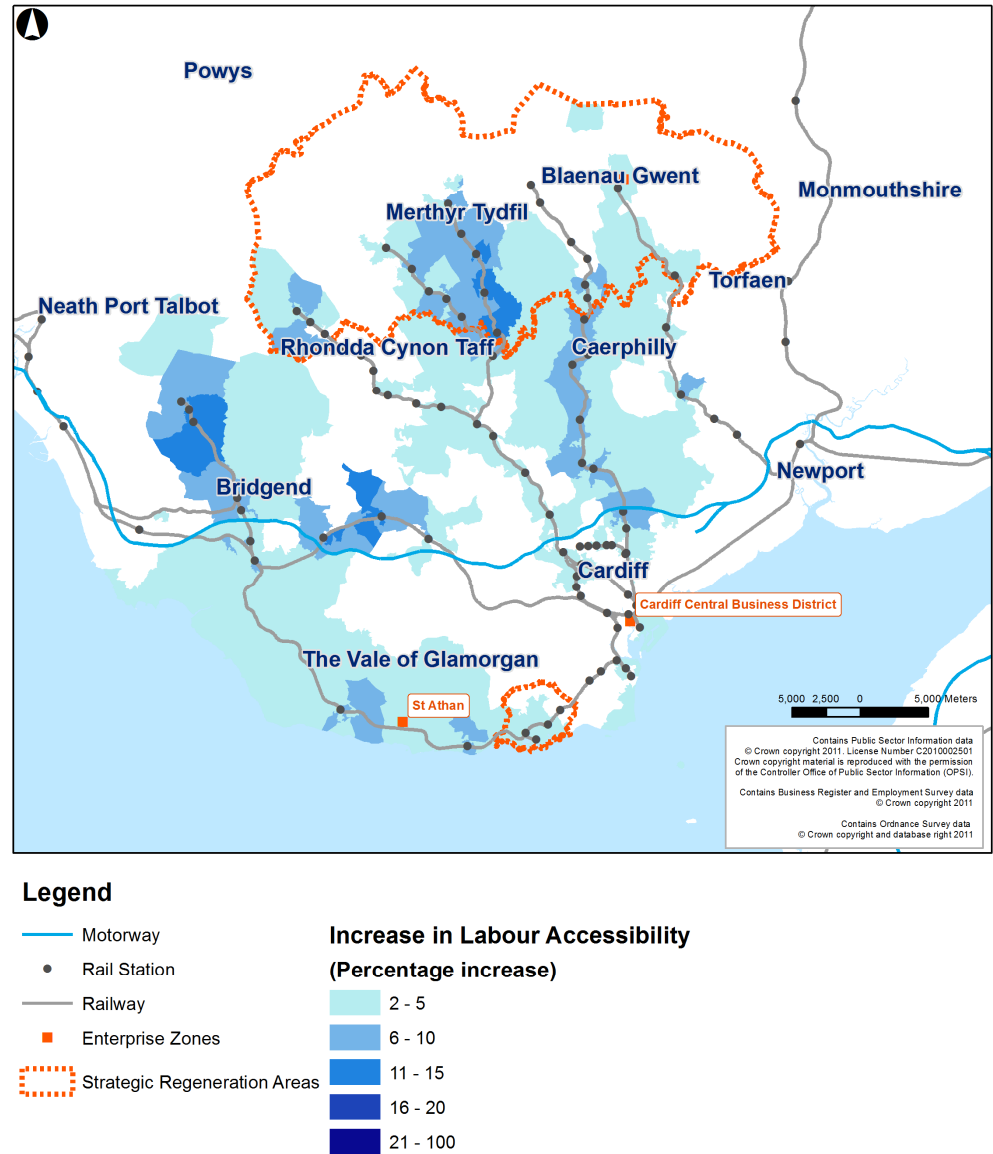


Figure 10 shows that businesses in parts of Maesteg, Llanharan and sections of the Merthyr line will benefit from expansions in their labour and customer catchments by up to 15%.

5 Conclusions

The analyses set out in this technical note support the case for electrification of the Valleys Lines by illustrating, in various different forms, how reductions in journey time associated with electrification may be expected to stimulate growth in rail demand, mode switch from car, will pave the way for reductions in unemployment and job creation – notably in the Heads of the Valleys SRA in strategic regeneration area, and will deliver benefits to businesses through greater agglomeration and access to more employees and customers.

The expansion of Valleys Lines capacity to meet peak demands is a key requirement to allow these potential benefits to be realised in practice.

A summary of the wider impacts of electrification, and described in this note, are given below:

- Quantified WEBs of £12.6m in 2002 prices, or £17m in current (2011) prices
- Increases in GDP/capita of £2-5 (highest in Merthyr Tydfil local authority)
- One-third of benefits accruing to residents of in the 20% most deprived LSOAs
- Two-thirds of benefits accruing to residents of in the 50% most deprived LSOAs
- Journey time benefits of £25m (in 2002 prices) accruing to the Heads of the Valleys SRA
- Up to an 8% boost in annual rail line loadings, driven by journey time reductions
- 120-150 vehicles per day removed from the southern end of the A470
- Potential for 650 unemployed residents of the Heads of Valleys SRA to get work
- Potential for around 100 new jobs created in the Heads of Valleys SRA
- Up to 20% more jobs in catchment for upper valleys communities
- Up to 15% more employees and customers in catchment.