Evaluation of South Wales Metro Phase 2

Interim Evaluation Report

On behalf of Transport for Wales

TRAFNIDIAETH CYMRU
TRANSPORT FOR WALES

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Glossary

AADT	Average Annual Daily Traffic
AQMA	Air Quality Management Area
ASHE	Annual Survey of Hours and Earnings
Block section	The section of line between one stop signal (i.e., capable of showing a red aspect) and the next. Only one train can occupy a block section at any given time.
BRES	Business Register and Employment Survey
CBC	County Borough Council
CCR	Cardiff Capital Region
CCT	Cross Cutting Theme
CDAT	Connectivity and Deprivation Audit Tool
CVL	Core Valley Lines
Diesel multiple unit (DMU)	A DMU is a diesel-powered train with onboard diesel engines, meaning there is no requirement for a separate locomotive as the engines are built into the carriages.
Down Line	The down line is typically that which leads away from the major destination, typically London in the context of UK railways.
Dynamic Loop	A dynamic loop provides the opportunity for two passing trains on a single line to pass on the move and not just in the station. This reduces the risk with a static loop of a delayed train in one direction causing delay to the train arriving from the opposite direction and, depending on its length, can provide flexibility in creating the timetable. It also reduces journey times compared with a static loop and is, in effect, a section of double track on a generally single-track route.
Electric Multiple Unit (EMU)	An EMU is an electric powered train consisting of self-propelled carriages using electricity as the motive power, collected from overhead wires or a conductor rail, meaning that there is no requirement for a separate locomotive as the engines are built into the carriages.
ERDF	European Regional Development Fund
GVA	Gross Value Added
Headway	The interval of time between following trains.
InfraCo	Infrastructure Company
INRIX	Inrix is a traffic dataset which is based on floating vehicle data from a variety of sources, including in-car GPS and driver and passenger smartphones.
ODP	Operating and Development Partner
ONS	Office National Statistics
OpCo	Operating Company
ORR	Office of Rail and Road

Passing loop	A passing loop is a section of double track on an otherwise single-track line which allows trains in opposite directions to pass each other.
PRM	Persons with reduced mobility
Reactionary delay	A reactionary delay is a knock-on delay to a train from the late running of another service.
Ruling line speed	The maximum speed along the line, below which there will be other permanent speed restrictions.
Static Loop	A static loop is a type of passing loop where trains in the opposite direction can cross but given its short length, requires both trains to be stationary at the crossing point. Passing loops are typically incorporated into stations and are used widely on long single-track lines such as the West Highland, Far North and Heart of Wales Lines.
SWM	South Wales Metro
SWMP2	South Wales Metro Phase 2
TAM Lines	Treherbert, Aberdare, and Merthyr Rail Lines
TfW	Transport for Wales
TRACC	A type of public transport connectivity software used to analyse public transport journey times
Train Planning Rules (TPRs)	Train Planning Rules, or Operational Rules, are all the rules which inform the construction of the timetable, primarily around the time separation of trains, but include other important information required to link the SRTs into a workable timetable.
Up Line	The up line is typically that which travels towards the major destination, typically London in the context of UK railways.
WEFO	Welsh European Funding Office

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1 Introduction

1.1 South Wales Metro

1.1.1 Figure 1.1), therefore approached the end of the 2003-18 Wales & Borders franchise much as it had started it, with low line speeds and frequencies, limited on-train capacity, poor station environments and 1980s diesel multiple unit (DMU) rolling stock, including the much maligned ‘Pacers’ (Class 14x).

Figure 1.1: Core Valley Line Rail Network

1.1.2 The public transport connections between Cardiff and its surrounding areas are significantly poorer than other cities of a similar population (e.g., Bristol, Newcastle etc) and Edinburgh and Belfast, the two other UK devolved capital cities. Poor connectivity is considered to be acting as a limitation on the economic potential of the CCR through limiting the effective size of the labour market, dampening productivity and locking in longer-term socio-economic trends which have contributed to high levels of inequality and multiple deprivation in the South-East Wales Valleys.

1.1.3 There has been a long-term recognition of this problem in Welsh Government and the private sector and joint aspirations to radically overhaul the public transport network in the CCR. The case for investment was first made through an influential report commissioned in 2011 by the Cardiff Business Partnership and authored by Professor Mark Barry entitled *A Metro for Wales' Capital City Region*. This report outlined a transformational programme of investment in integrated public transport across the CCR and was the first expression of the 'Metro' concept, which was then developed over several further studies.

1.1.4 Phase 1 of the Metro involved new stations at Pye Corner and Ebbw Vale Town, upgrades to railway stations and bus corridor improvements. However, it is Phase 2 (SWMP2), which is the substantive component of the delivery of the Metro and the focus of this report. The **£738m** investment will deliver station upgrades; electrification of the CVL; double tracking of selected route sections; a direct connection from the Treherbert, Aberdare and Merthyr Tydfil lines to Cardiff Bay; and a new train stabling facility at Taff's Well. In addition to the transformation budget, Welsh Government is separately investing £800m in the new rolling stock to operate on the Metro network. This will be a mix of heavy rail and TramTrain vehicles[1]. The ultimate aim is to deliver a 'turn-up and go' rail service, with a target of a four trains per hour (4tph) on each of the CVL.

1.1.5 SWMP2 is being jointly funded by the Welsh Government, the European Regional Development Fund (ERDF), the UK Government and the CCR local authorities. Further detail on SWMP2 is provided in Chapter 2.

1.2 SWMP2 Evaluation

1.2.1 The conditions of the ERDF grant funding require an evaluation of the ERDF funded operations under SWMP2 to be undertaken following completion. This will be a relatively focused exercise concentrated largely on confirming completion of the agreed deliverables and identifying their impact on connectivity – i.e., it does not require consideration of travel behaviour outcomes and wider societal impacts. However, in keeping with best practice and in line with the H.M. Treasury *Green Book*[2], Transport for Wales (TfW) wishes to (ultimately) undertake a wider evaluation considering how the delivery of the whole of SWMP2 will impact on **travel behaviour** and in-turn identifying the 'transmission mechanisms' by which this will feed through into **societal and economic impacts**.

[1] Heavy rail vehicles are traditional trains such as those used on the Wales and Borders service at present. TramTrains are rolling stock that can operate both on the heavy rail network and on on-street as per a traditional tram.

[2] The Green Book: appraisal ad evaluation in central government, 2013, https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

1.2.2 To this end, in late 2020, the Welsh Government commissioned Stantec UK Ltd, in partnership with Loxley Consultancy and Beaufort Research, to undertake this evaluation of SWMP2, with specific reference to it's nine ERDF funded operations within SWMP2, (which will be introduced in Chapter 2). The contract has since been novated to TfW as the 'lead beneficiary' of the ERDF funding. The evaluation is split into two phases:

- **Interim Evaluation (this report):** a pre-opening baselining stage in which all of the necessary baseline data against which the ERDF funded operations within SWMP2 can be evaluated are collated and assessed. This stage includes both an interim process and Cross Cutting Themes (CCT) evaluation.
- **Final Evaluation:** an evaluation stage in which the *outputs* (as identified in the logic maps below) (of the ERDF funded works are evaluated and a structure to facilitate the evaluation of the longer-term outcomes and impacts of SWMP2 is established. This stage includes the final process evaluation and CCT evaluation.

1.2.3 It should be noted that an evaluation of the outcomes and impacts of SWMP2 is beyond the scope of this study, but a key objective of this work is to provide the framework for such an evaluation.

1.2.4 This report is the output of the **Interim Evaluation Stage** – it covers the following main components:

- **Chapter 2** provides a more detailed **introduction to SWMP2** and the nine ERDF funded operations which sit within SWMP2. **Chapter 3** sets out the national, regional and local **policy context** for SWMP2 and the Metro overall, establishing the rationale for investment and the framework within which SWMP2 will be delivered.
- **Chapter 4** details a set of **logic maps** which coherently express the **SWMP2 investment logic**, highlighting the causal linkages from initial problem to ultimate economic and societal impacts. These logic maps form the foundation for the transport and socio-economic baselining analysis which follows.
- **Chapters 5 and 6** establish the *baseline* position in relation to the **transport supply, transport demand, and socio-economics of the study area**. This is the substantive component of the baseline against which the post-scheme opening will be compared in any future outcome evaluation.
- **Chapter 7** reports the **baseline for each ERDF Result and Output Indicator**. While reported separately in a standalone chapter, these metrics form part of and complete the above baseline against which the post-scheme opening will be compared.
- **Chapter 8** outlines the findings of the **interim process evaluation**, an objective review of how SWMP2 was identified and is being delivered, with a view to identifying good practice / lessons learned for future projects of this nature.
- **Chapter 9** sets out the interim **Cross-Cutting Themes (CCTs)** evaluation.

1.2.5 The study has been informed by a range of primary and secondary data sources, including:

- a **telephone-based household survey** of over 1,000 residents to obtain travel behaviour information for residents of the CVL corridors;
- **stakeholder depth interviews** (18 in total) with e.g., local authorities, TfW etc to develop evidence / views on: the current transport and socio-economic problems in the study area; expectations of the impacts of SWMP2; and the delivery of CCTs;
- **public transport supply-side data** (e.g., timetables, rolling stock types etc), which have been used to establish the baseline service levels in the study area;
- **rail demand data** (Office of Rail and Road (ORR)station entries and exits and LENNON[3] ticket sales data), which have been used to establish baseline demand in each CVL corridor
- application of **TRACC public transport connectivity software** to highlight the change in connectivity which will be delivered by SWMP2;
- **socio-economic datasets** including Census, the Business Register and Employment Survey (BRES) and the Annual Population Survey / Labour Market Survey to develop a socio-economic baseline of the study area; and
- stakeholder depth interviews with Welsh Government, TfW, the Welsh European Funding Office (WEFO) and Amey Infrastructure Wales amongst others to develop the **process evaluation**.

1.2.6 The telephone survey methodology note is provided in **Appendix A**, whilst a list of organisations consulted for both the stakeholder engagement and process evaluation exercises is included in **Appendix B**.

1.2.7 In order to ensure a comprehensive repository of baseline data is available at the *ex post* evaluation stage, baseline datasets have also been collated and supplied in a separate Excel Workbook entitled 'Baseline Data'. Information on the metrics included within this workbook are set out in **Appendix C** .

1.2.8 In addition, to assist in developing a counterfactual, baseline socio-economic data for the control areas of **Bridgend County Borough Council (CBC) and Torfaen CBC** have also been supplied in a second Excel Workbook called 'Counterfactual Data'. Information on the metrics included within this workbook as well as the rationale for selecting these locations is set out in Appendix D .

1.3 COVID-19

1.3.1 It is important to note that the demand and revenue forecasts and business cases for SWMP2 are based on the pre-COVID-19 position. This remains the most appropriate approach at present given the ongoing uncertainty over future travel demand.

1.3.2 To this end, the baseline established in this report is similarly focused on 2019 service levels, demand and travel behaviour. In particular, the telephone survey asked respondents about their typical travel behaviour **before** the onset of COVID-

[3] Latest Earnings Networked Nationally Overnight (LENNON) is the rail industry's tool for allocating ticket sales between Train Operating Companies (TOCs) and thus provides origin-destination details for each ticket sold.

19. Given that long-term travel behaviour is not yet settled, working on the basis of the pre-COVID-19 position was the only practical approach.

1.3.3 However, it should be noted that this will present a challenge in terms of any future long-term outcome evaluation of SWMP2. An evaluation of this nature, comparing the post-SWMP2 opening position against the baseline, will capture changes as a result of **both SWMP2 and COVID-19, and it will not be possible to isolate their respective impacts**. To this end, it is strongly recommended that TfW repeat the telephone survey when a settled post-COVID-19 travel behaviour position is established – this is anticipated to be in summer / autumn 2022, but the emergence of new variants of Coronavirus could delay this further and indeed it is possible that SWMP2 could be completed before a settled travel behaviour position ultimately emerges.

2 Background

2.1 Overview

2.1.1 Section 1.1 provided a brief introduction to the Metro concept overall and SWMP2 specifically. This chapter provides further background detail on SWMP2, with a particular focus on the structure of the ERDF funding, the ultimate deliverables from the investment and the delivery model adopted.

2.2 Funding

2.2.1 The total 'transformation budget' for SWMP2 is approximately **£738 million**, of which:

- £445m is from Welsh Government
- £158m is from the European Regional Development Fund
- The ERDF funding was not specifically allocated for SWMP2, rather a sum of £175m was provided to WEFO for public transport projects. It is the responsibility of WEFO to approve applications that fit the criteria within the operational programme agreed with the European Commission.
- £125m is from the UK Government
- £10m is from the Cardiff Capital Region local authorities

2.2.2 In addition to the transformation budget, Welsh Government is separately investing **£800m** in the new rolling stock to operate on the Metro network[4].

2.3 SWMP2 and the ERDF Operations

2.3.1 Welsh Government initially investigated the possibility of SWMP2 being taken forward as a single major project. However, the agreed deliverables relating to the ERDF funding must be complete by the end of 2023, otherwise unspent funding would be withheld and lost to Welsh Government ERDF and SWMP2. Given the high level of potential risks attached to this, SWMP2 works were reviewed, in consultation with EC colleagues and EC JASPERS experts to identify component works which could apply for ERDF funding in their own right, and meet timescales and funding regulations at an ERDF Operation level.

2.3.2 This approach has resulted in nine ERDF operations being included within SWMP2, with individual operation targets and outcomes, and with staggered, progressing operation end dates, linking to construction and pre-electrification works moving through the WW&V and EW geographical areas of SWMP2. The nine operations are as follows:

- Cardiff Bay Stage 1
- Cardiff Queen Street

[4] South Wales Metro, Transport for Wales, https://tfw.wales/projects/metro/south-wales-metro

- East Wales Station Improvements
- West Wales Station Improvements
- Aberdare Line
- Merthyr Tydfil Line
- Treherbert Line
- Rhymney Line
- Taff's Well Depot

2.3.3 The first three operations listed above are receiving funding from the *ERDF East Wales Operational Programme*, with the other six receiving funding from the *ERDF West Wales and Valleys Operational Programme*. The scope of works for each of the ERDF operations is set out in the table below. It should be noted that while the operations include improvement works in preparation for electrification of the lines (e.g., foundations, masts, and support structures), overhead electrification and wiring is not being provided via the ERDF funding and therefore this element is not included within the below ERDF scope of works set out below.

Table 2:1: East Wales Operational Programme Operations

Operation	Scope of Works
Cardiff Bay Stage 1	Infrastructure enhancements to the railway line between Cardiff Queen Street and Cardiff Bay to provide increased line capacity, allowing direct services from TAM (Treherbert, Aberdare and Merthyr) to Cardiff Bay. The new Cardiff Bay extension will be developed over two stages. Stage 1 comprises: ▪ Track doubling and pre- electrification works to the doubled track on the Cardiff Bay branch to allow the capacity required for rapid transit services to commence. This will involve significant improvements to the existing single platform Bay Station terminus. ▪ Construction of a new station at Butetown which will service both the newly doubled lines as well as enabling significant improvements to passenger accessibility both from Bute Street and towards Lloyd George Avenue. Stage 2 is not included in this operation but will include the construction of an additional platform and extensions of both lines south beyond the current Bay footprint.
Queen Street	Track improvements to facilitate increased trains per hour (20+ in each direction) and direct access to Cardiff Bay through platforms 4 and 5. Works include: ▪ 0.5km of track improvements between Cardiff Queen Street North and South Junctions.

	▪ Traction power works to provide the main Traction Power Feeder Station at Queen Street North Junction. ▪ Installation of foundations, and masts / support structures between Radyr and the proposed new station at Gabalfa in preparation for electrification works (but the overhead electrification and wiring is excluded from this operation).
East Wales Station Improvements	Upgrades to station infrastructure at 18 stations on the CVL, namely: ▪ Cardiff Queen Street (station facility upgrades) ▪ Crwys Road (provision of new station and facilities) ▪ Cathays, Llandaf, Radyr (on the Taff Vale Line) ▪ Heath High Level, Llanishen, Lisvane and Thornhill (on the Rhymney line) ▪ Heath Low Level, Tŷ Glas, Birchgrove, Rhiwbina, Whitchurch, Coryton (on the Coryton line) ▪ Danesourt, Fairwater, Waun-Gron Park, Ninian Park (on the City line) The improvements aim to provide level boarding and enhanced intermodal facilities in order to improve access for persons with reduced mobility (PRM), reduce dwell times at stops and therefore improve journey times for all users. In addition, new seating, shelters, customer information systems and help points will be provided and station access will be improved where necessary.

Table 2:2: West Wales Operational Programme Operations

Operation	Scope of Works
Treherbert Line	Infrastructure works to allow the service to be increased to four trains per hour between Porth and Treherbert as well as other improvements to the railway in anticipation of the electrification of the line. Works include: ▪ 5.5 km of track improvements including installation of dynamic passing loops[5] between Ynyswen and Treherbert, Ystrad Rhondda to Ton-Pentre, and Dinas Rhondda to Porth; and improvements in the vicinity of Treherbert station. ▪ Improvements to lineside fencing and route works, track access points and prevention of trespass, and improvement works to specific structures along the route. ▪ Installation of foundations, and masts / support structures in preparation for electrification works.

[5] A dynamic passing loop is a short section of double track on a single track railway which allows trains to safely pass each other whilst on the move.

Operation	Scope of Works
Aberdare Line	Infrastructure works to allow the service to be increased to four trains per hour along the full length of the line to Aberdare, as well as other improvements to the railway in anticipation of the electrification of the line. Works include: ▪ 5.7km of track improvements, including the installation of Aberdare dynamic passing loops and extension of the Mountain Ash loop. ▪ Advanced works to improve platform accessibility for passengers, ▪ Improvements to lineside fencing and route works, track access points and prevention of trespass, ▪ Improvement works to specific structures along the route, ▪ Installation of foundations, and masts / support structures in preparation for electrification works,
Merthyr Line	Infrastructure works to allow the service to be increased to four trains per hour along the full length of the line to Merthyr as well as other improvements to the railway in anticipation of the electrification of the line. Works include: ▪ 6.3km of track improvements between Merthyr Tydfil and north of Pentrebach, south of Merthyr Vale and south of Troed-Y-Rhiw and at Quakers Yard, including installation and extension of dynamic passing loops. ▪ A new platform and footbridge at Quakers Yard are also included to support the new passing loop installation as well as improvements to accessibility for passengers at this location. ▪ Improvements to lineside fencing and route works, track access points and prevention of trespass forms part of this operation as well as improvement works to specific structures along the route. ▪ Installation of foundations, and masts / support structures in preparation for electrification works.
Rhymney Line	Infrastructure works to allow the service to be increased to four trains per hour along the full length of the line to Rhymney as well as other improvements to the railway in anticipation of the electrification of the line. Works include: ▪ 6.5km of track improvements south of Rhymney and north of Tir-phil including extension to the Tir-phil dynamic passing loop, track improvements and associated platform alterations in the vicinity of Rhymney Station, including a new connection to Rhymney sidings.

Operation	Scope of Works
	▪ Improvements to lineside fencing and route works, track access points and prevention of trespass forms and improvement works to structures along the route. ▪ Installation of foundations, and masts / support structures in preparation for electrification works.
Taff's Well Depot	Enabling works to help deliver a new rolling stock depot at Taff's Well in order to provide facilities to house and maintain new rolling stock for the CVL. Works comprise: ▪ Land purchase of a site suitable for a rail rolling stock depot. ▪ Site clearance and preparation works. ▪ Rail and road access / egress at Taff's Well, which will require relocation of the existing Taff's Well station platforms and footbridge. ▪ Construction of an Operations Control Centre.
West Wales and Valleys Station Improvements	Upgrades to 37 stations on the CVL, including stations on the Treherbert, Aberdare and Merthyr Tydfil lines north of Taff's Well, and on the Rhymney line north of Caerphilly. The improvements aim to provide level boarding and enhanced intermodal facilities in order to improve access for persons with reduced mobility (PRM), reduce dwell times at stops and therefore improve journey times for all users.

ERDF Result and Output Indicators

2.3.4 Both the *East Wales Operational Programme*[6] and *West Wales and Valleys Operational Programme*[7] funding was provided under *Priority Axis 4 – Connectivity and the Specific Objectives (SO) 4.1 and 4.2*: **"To increase urban and labour mobility to and from key urban and employment centres".**

2.3.5 One of the requirements associated with the ERDF funding is that the investment must deliver against an agreed set of predetermined criteria (defined as 'Result' and 'Output' Indicators) and an evaluation must be undertaken to ensure that these indicators are met or exceeded. These criteria are defined through a set of 'Output' indicators (which focus on the deliverable) and 'Result' indicators (which focus on the benefits provided by the deliverable[8]. Further information on the defined 'Result' and 'Output Indicators' for the *East Wales Operational Programme* and *West Wales Operational Programme* are set out in the section below and have been incorporated into the logic mapping used to frame this evaluation (see Chapter 4).

[6] Operational Programme: West Wales and the Valleys ERDF, https://gov.wales/sites/default/files/publications/2019-06/west-wales-valleys-erdf-operational-programme.pdf

[7] Operational Programme: East Wales ERDF, https://gov.wales/sites/default/files/publications/2019-06/east-wales-erdf-operational-programme.pdf

[8] Guidance on Indicator Definitions, Data, and Evidence Requirements, ERDF: Priority Axis 4: Connectivity and Urban Development, 2019, https://gov.wales/sites/default/files/publications/2020-08/european-regional-development-fund-connectivity-and-urban-development-performance-indicators.pdf, p7

East Wales Operational Programme: Result and Output Indicators

2.3.6 The established 'result' and 'output' indicators for operations receiving funding under the East Wales Operational Programme are set out in

2.3.7 Table 2:3 and Table 2:4.

Table 2:3: East Wales Output Indicators

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Cardiff Bay Stage 1	2	1.3km	n/a – target set at programme level only.	n/a
Queen Street	0	0.5km		n/a
East Wales Station Improvements	18	N/A – already covered by a separate operation		n/a
Programme Target	5	3km	1,800 tCO_2e[9]	n/a

Table 2:4: East Wales Result Indicator

	East Wales (Specific Objective 4.1)
Indicator	Total passengers using public transport between key urban links
Approach	Total passengers using public transport between Cardiff Queen Street and Cardiff Bay
Baseline value (2012/13)	869,000
Target value (2023)	10% increase
Source of data	Initially based on South-East Wales Transport Model (SEWTM) forecast of post-opening patronage on the Cardiff Queen Street – Cardiff Bay section of line. Ex-post evaluation to be based on LENNON ticket sales data 6 months after new rail service timetable becomes operational.

West Wales and Valleys Operational Programme: Result and Output Indicators

2.3.8 The established result and output indicators for the operations receiving funding from the West Wales and Valleys Operational Programme are set out in .

[9] It is assumed that the target is to achieve this reduction over a 15-year timeframe i.e., by 2040

2.3.9 Table 2:5 and Table 2:6.

Table 2:5: West Wales Output Indicators

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Treherbert Line	0	5.5km	n/a – target set at programme level only	n/a
Aberdare Line	0	5.7km		
Merthyr Line	0	6.3km		
Rhymney Line	0	6.5km		
Taff's Well Depot	1			3.6 hectares of serviced land ready for a new depot to be delivered
West Wales and Valleys station improvements	37	n/a		
Programme Target	38	24km	10,700 tCO_2e[10]	3.6 hectares

Table 2:6: West Wales Result Indicator

	West Wales (Specific Objective 4.2)
Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time of a 'key centre' between 7am and 9am on a Tuesday by public transport
Approach	Population within the 15, 30, and 45-minute time bands of a 'key centre' (averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd) between 7am and 9am on a Tuesday by public transport.
Baseline value	<15 minutes – 41,695 15 to 30 minutes – 96,268 30 to 45 minutes – 150,376
Baseline year	2015

[10] It is assumed that the target is to achieve this reduction over a 15-year timeframe i.e., by 2040

	West Wales (Specific Objective 4.2)
Target value (2023)	An increase of 5% in each time band, calculated as an average across the 6 key centres, with population data fixed at 2015 levels
Source of data	Both the baseline and forecast assessment will be undertaken using the TRACC accessibility software program.

Cross Cutting Themes

2.3.10 The ERDF 2014-2020 programme also includes a number of Cross Cutting Themes which should be embedded in the design and delivery of the operations. These are as follows:

- Sustainable development
- Equal opportunities and gender mainstreaming (in Wales includes the Welsh Language)
- Tackling poverty and social exclusion

2.3.11 This report contains an evaluation of the extent to which the work undertaken to date on each operation has supported the delivery of the CCTs (Chapter 9).

2.4 Delivering SWMP2

2.4.1 This section briefly summarises the procurement and delivery approach to SWMP2, with further detail and analysis provided in the Interim Process Evaluation in Chapter 8. The key points of note are as follows:

- The provision and maintenance of railway infrastructure in Wales is a reserved matter. However, a decision was taken early in the SWMP2 process to seek a transfer of the CVL assets to TfW (which is wholly owned by Welsh Government), with this transfer being completed on 28th March 2020. This ensured that Welsh Government had ownership of the delivery of SWMP2 rather than only acting as a third-party funder.
- The procurement of SWMP2 was the first major rail infrastructure project to be secured by Welsh Government. In preparing for the project and given the requirement for the Wales & Borders franchise to be renewed in 2018, Welsh Government established TfW on 1st April 2016. TfW was tasked with procuring the new Wales & Borders franchise, which involved securing an operator as per a traditional franchise and an 'Operator and Development Partner' to deliver SWMP2. In short, Welsh Government was seeking to procure both the operation of the next franchise and the infrastructure and operation of SWMP2 through a single procurement.
- Through first a 'Competitive Dialogue' and then an 'Invitation to Submit a Final Tender', TfW identified a preferred bidder (Keolis-Amey) to deliver SWMP2 and run the Wales & Borders franchise services. The preferred bidder and preferred option identified in the September 2017 Outline Business Case (OBC) were confirmed through a Full Business Case (FBC) in mid-2018, with Keolis-Amey Wales Cymru Limited (the Operating and Development Partner -ODP) entering

into a franchise agreement with Welsh Ministers in June 2018 (the 'ODP Grant Agreement) and taking over the franchise on 14th October 2018. The ODP in turn entered into subcontracts with:

- a) Keolis Amey Operations/Gweithrediadau Keolis Amey Limited ("OpCo") in respect of the Rail Services (the "OpCo Subcontract"); and
- b) Amey Keolis Infrastructure/Seilwaith Amey Keolis Limited ("InfraCo") in respect of infrastructure management and transformation of the CVL (the "InfraCo Subcontract").

- As a result of the impacts of COVID-19 on passenger numbers, with effect from 7 February 2021 (the "Novation Time"):
  - 1. the ODP Grant Agreement and the OpCo Subcontract terminated.
  - 2. responsibility for the provision of day-to-day Rail Services transferred from OpCo, via ODP, to TfW Rail Limited (a wholly owned subsidiary of Transport for Wales).
  - 3. TfW Rail Limited is now the train operator for the Wales & Borders franchise under an agreement between [The Welsh Ministers/Transport for Wales] and TfW Rail Limited.
  - 4. the InfraCo Subcontract novated from the ODP to be between TfW and InfraCo and is now referred to as the "Infrastructure Agreement"[; and
  - 5. Keolis and Amey will continue to provide project support and innovation through a joint venture with Transport for Wales]
- Following the Novation Time, Amey Rail Limited purchased Keolis (UK) Limited's shares in AKI and on 10 February 2021 changed its name to Seilwaith Amey Cymru/Amey Infrastructure Wales Limited (but remains the same legal entity.

2.4.2 Having summarised the specifics of SWMP2, the next chapter considers the policy context within which it is being delivered.

3 Policy Review

3.1 Overview

3.1.1 The South Wales Metro concept and SWMP2 specifically has emerged from, is rooted in and supports transport, economic and development policy in South-East Wales. In order to inform the evaluation, this chapter reviews the 'objectives' for the Metro within the context of the main national, regional and local policies, demonstrating the strategic fit between the Metro and the prevailing policy environment. This exercise will inform the overall strategic case for both SWMP2 and the individual operations and the logic mapping exercise (see Chapter 4).

3.1.2 This chapter is not intended to be an exhaustive review of policy documents, rather a succinct summary of the policy landscape and the role of the Metro within it. It should also be noted that policy documents refer to the South Wales Metro in totality rather than individual stages of it – the narrative in this chapter reflects this approach.

3.2 South Wales Metro

3.2.1 The detail of the South Wales Metro concept was originally outlined in a paper published on 26th February 2016. This document set the policy context for SWM through a set of **objectives** together with a series of high-level outcomes and an illustrative description of what would be delivered through the Metro.[11] The **objectives** for SWM define what Welsh Government is trying to achieve through the Metro, and thus it is these objectives which must map across to the wider policy landscape. The SWM objectives are as follows:

- **Deliver a high-quality, reliable, efficient, economically sustainable transport network**.
- **Improve connectivity**, linking communities with all major commercial, social and leisure attractors, enabling the region to function as a single coherent economic entity.
- **Improve accessibility** to public transport within city and town centres.
- Provide **comparable journey times across public and private transport modes**, offering realistic travel choices.
- **Cater for increasing demand** for public transport.
    - It should be noted that this objective may ultimately prove to be less relevant in the post-COVID-19 world, but this remains to be seen.
- **Reduce the impact of transport on the environment**.
- **Encourage active travel and social inclusion** initiatives.

3.3 National, Regional and Local Policy

3.3.1 This section summarises the national, regional and local policy and strategy documents relevant to SWM and its fit with them.

[11] Rolling out our Metro

National Policy

3.3.2 National transport, economic and development planning policy has undergone a significant refresh in recent years, including the publication of a new *Wales Transport Strategy (2021)*; a national strategy – *Prosperity for All* (2018) – which provides a long-term focus for the delivery of public services in Wales; and *Future Wales: The National Plan 2040*, which will guide spatial development in the country over the next 20-years. Underpinning this strategic approach is the *Wellbeing of Future Generations (Wales) Act 2015*, a world-first piece of legislation which adopts the **sustainable development principle**, ensuring that decisions made by public bodies now do not compromises the ability of future generations to meet their own needs.[12]

It is against this backdrop that SWM is being delivered and it is therefore essential to confirm that the Metro concept is appropriately aligned with prevailing national policy.

Regional Policy

3.3.3 The signing of the Cardiff Capital Region City Deal on 15th March 2016[13] and its subsequent ratification on 1st March 2017[14] brought into being the Cardiff Capital Region, a formal partnership of ten local authorities.[15] Integral to the City Region Deal was the SWM concept, for which there is a ring-fenced delivery fund of £734m, almost three quarters of the value of the entire Deal[16]. To this end, the SWM has been integral to regional transport, economic and development planning.

Local Policy

3.3.4 At the local level, policy is focused on realising the benefits of Metro, particularly in terms of economic regeneration and the delivery of transit-orientated developments through the Local Development Plan process.

3.3.5 The tables which follow introduce the primary national, regional and local policy and strategy documents and highlight the extent to which the SWM aligns with them. It should be noted that there were several policy and strategy documents listed in the brief – Cymraeg 2050 for example – which are not reported below. This is because these documents are not part of the core rationale for the Metro, rather they set out priorities which should be incorporated within its delivery.

[12] Well-being of future generations act: the essentials, Welsh Government, 2015, Well-being of Future Generations (Wales) Act 2015: the essentials [HTML] | GOV.WALES, accessed February 2022

[13]Cardiff Capital Region City Deal Policy Paper, HM Treasury, 2016, https://www.gov.uk/government/publications/city-deal-cardiff-capital-region, accessed February 2022

[14]Cardiff Capital Region City Deal, Rhondda Cynon Taf Council, https://www.rctcbc.gov.uk/EN/Council/Partnerships/Workingwithothers/CardiffCapitalRegionCityDeal.aspx, accessed February 2022

[15] Cardiff, Rhondda Cynon Taf, Caerphilly, Newport, Bridgend, Vale of Glamorgan, Monmouthshire, Torfaen, Blaenau Gwent and Merthyr Tydfil.

[16]City Deal, Newport City Council, https://www.newport.gov.uk/en/Council-Democracy/City-Deal.aspx, accessed February 2022

Table 3:1: Summary of relevant national policies and strategies

Policy / Strategy	Summary	South Wales Metro – alignment with policy / strategy
Wellbeing of Future Generations (Wales) Act 2015	The Wellbeing of Future Generations Act (Wales) Act 2015 (WFGA) is a seminal piece of legislation focused on improving the social, economic, environmental and cultural wellbeing of Wales. The Act is built around seven wellbeing goals: (i) a prosperous Wales; (ii) a resilient Wales; (iii) a healthier Wales; (iv) a more equal Wales; (v) a Wales of cohesive communities; (vi) a Wales of vibrant culture and thriving Welsh language; and (vii) a globally responsible Wales.[17]	In the long-term, the SWM is intended to embed **sustainable travel** across South-East Wales, supporting aspirations to be a **'globally responsible Wales'** and 'a '**healthier Wales'.** Through improving transport connectivity, reliability and quality, SWM will: support **improved prosperity** by better connecting people to jobs and businesses to labour; **reduce inequalities** (particularly transport inequalities), thus promoting a more **equal Wales** of **cohesive communities**; and improve the **resilience** of South-East Wales in terms of supporting population and economic growth in the Cardiff Capital Region.
Prosperity for All: The National Strategy 2018	Welsh Government published its *Programme for Government, Taking Wales Forward 2016-21*, in 2016 and set out headline commitments to be delivered by 2021. In parallel, *Prosperity for All* takes these commitments, places them in a long-term context, and sets out how they fit with the work of the wider Welsh public sector to lay the foundations for achieving prosperity for all. This is done within the parameters of the WFGA. *Prosperity for All* is based around four themes: (i) prosperous and secure; (ii) healthy and active; (iii) ambitious and learning; and (iv) united and connected.[18]	Under the 'united and connected' theme, *Prosperity for All: The National Strategy* specifically cites the aspiration to "**deliver the South Wales Metro**, underpinning the region's economic development and spreading jobs and prosperity through more rapid transport, and ensuring that all new and significant developments in the region are sited within easy reach of a station"[19]. SWM therefore directly aligns with this policy. *Prosperity for All* is underpinned by an *Economic Action Plan* which defines the measures by which the overall Strategy will

[17] Well-being of Future Generations (Wales) Act 2015: the essentials [HTML] | GOV.WALES

[18] https://gov.wales/prosperity-all-economic-action-plan

[19] *Prosperity for All – The National Strategy* (Welsh Government, 2018), p. 21, accessed February 2022

Policy / Strategy	Summary	South Wales Metro – alignment with policy / strategy
		be delivered. The 'deliver modern and connected infrastructure' theme restates the commitment to **delivering the South-Wales Metro**.
Prosperity for All: A Low Carbon Wales 2019	*Prosperity for All: The National Strategy* identifies decarbonisation as one of the top six cross-government priorities. This child document highlights the requirement for early intervention to reduce emissions so as to support the well-being objectives.[20] Welsh Government has a target of reducing transport sector emissions by 43% from baseline levels by the year 2030.[21] This target will be delivered through a number of measures, including: (i) Proposal 12: working to achieve a modal shift from car dependency to sustainable forms of transport; (ii) Policy 47: Increasing rail travel; and (iii) Policy 54: Reduce transport emissions.[22]	The SWM will have an essential role to play in supporting the overall objective of decarbonisation and the specific target for reducing transport sector emissions by 43% by 2030. As well as significantly improving the **frequency, reliability and capacity of the public transport network** in South-East Wales, it will also **replace elderly DMU rolling stock with modern electric multiple units and TramTrains**.
Llwybr Newydd: The Wales Transport Strategy 2021	The Wales Transport Strategy 2021 sets as its vision: "An accessible, sustainable and efficient transport system". The Vision is underpinned by three 'Priorities': (i) Bring services to people in order to reduce the need to travel; (ii) allow people and goods to move easily from door-to-door by accessible, sustainable transport; and (iii) encourage people to make the change to more sustainable transport[23]. In summary, the	Where a journey has to be made and **cannot easily be undertaken using active modes**, the priority of Welsh Government is that that journey is **made by public transport**. The SWM represents a **major upgrade in public transport options across the Cardiff Capital Region**, providing a fast, frequent, accessible and sustainable alternative to the private car for journeys which have to be made.

[20] Prosperity for All: A Low Carbon Wales (Welsh Government, 2019), https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf, p. 21, accessed February 2022

[21] Prosperity for All: A Low Carbon Wales (Welsh Government, 2019), https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf, , p. 99, accessed February 2022.

[22] Prosperity for All: A Low Carbon Wales (Welsh Government, 2019), https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf, , pp. 100-108, accessed February 2022.

[23] Llwybr Newydd: A New Wales Transport Strategy 2021 (Welsh Government, 2021), https://gov.wales/sites/default/files/publications/2021-03/llwybr-newydd-wales-transport-strategy-2021-full-strategy_0.pdf, pp. 11-22, accessed February 2022

Policy / Strategy	Summary	South Wales Metro – alignment with policy / strategy
	Strategy aims to reduce the need to travel and, where a journey does have to be made, the objective is that it is made by sustainable modes in line with the 'Sustainable Transport Hierarchy'.	The Strategy 'mini-plan' for rail specifically states that **Welsh Government will "deliver our public transport Metro** systems in all parts of Wales to improve services and better integrate other public transport and active travel with the rail system".[24]
Future Wales: The National Plan 2040	The National Plan 2040 provides a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate resilience, developing strong eco-systems and improving the health and wellbeing of communities. It is also a spatial plan setting the direction for investment in development and infrastructure.[25]	**Policy 12** of the Plan specifically highlights the need to **deliver the South Wales Metro** and requires planning authorities **to plan and maximise opportunities arising from investment in the public transport network**, including identifying opportunities for higher density, mixed-use and car free developments around Metro stations – this is termed **transit-orientated development**.[26] **Policy 36** specifically supports the development of the 'South- Wales Metro'.

[24] Llwybr Newydd: A New Wales Transport Strategy 2021 (Welsh Government, 2021),), https://gov.wales/sites/default/files/publications/2021-03/llwybr-newydd-wales-transport-strategy-2021-full-strategy_0.pdf, p. 65, accessed February 2022

[25] Future Wales: The National Plan 2040 (Welsh Government, 2021), https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf, p. 6, accessed February 2022

[26] Future Wales: The National Plan 2040 (Welsh Government, 2021), https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf. p. 83, accessed February 2022

Table 3:2: Summary of relevant regional policies and strategies

Policy / Strategy	Summary	South Wales Metro – alignment with policy / strategy
Cardiff Capital Region City Deal (Powering the Welsh Economy: Cardiff Bay and the region beyond), 2015	Published in 2015, this document underpins both the Cardiff Capital Region City Deal and the South-Wales Metro proposals. Connectivity was one of the four themes identified, with the document highlighting the pressing need to better align transport with land-use planning due to its ability to act as a catalyst for economic growth as well as providing social and environmental benefits. The emphasis placed on connectivity provided an initial rationale for the SWM.	This document formalised the case for the SWM as part of the Cardiff Capital Region City Deal.
South-East Wales Regional Strategic Framework, 2013	Delivered in 2013, this framework for economic development identified the high priority investments the ten local authorities in the Capital Region wish to see implemented in order to secure sustained prosperity in the region.[27]	Whilst this Strategy predates the formalisation of the Metro concept and Capital Region, it highlights the importance of the then emerging Metro concept under 'Strategic Priority 1 – Place'.[28]
Our Valleys, Our Future 2016-21, Final Report (The Valleys Taskforce)	The Valleys Taskforce was a cross-governmental body set-up to coordinate policy and interventions in the South Wales Valleys. It was intended to tackle the deep-rooted socio-economic challenges in the area. The Taskforce identified three priorities: (i) good quality jobs and the skills to do them; (ii) better public services (including transport); and (iii) my local community.[29]	Whilst the work of the Taskforce is now complete, SWM will build on its success and continue to support its priorities both directly (provision of **improved transport**) and indirectly through **improving access to employment, education and services**.

[27] South-East Wales Regional Strategic Framework – Delivering a Future with Prosperity (South-East Wales Regional Partnership, 2013), https://democracy.merthyr.gov.uk/documents/s20998/Background%20Paper.pdf?LLL=0, pp. 2-4, accessed February 2022

[28] South-East Wales Regional Strategic Framework – Delivering a Future with Prosperity (South-East Wales Regional Partnership, 2013), https://democracy.merthyr.gov.uk/documents/s20998/Background%20Paper.pdf?LLL=0 , p. 4, accessed February 2022

[29] The Valleys Taskforce, 2016-2021: A Final Report (Welsh Government, 2021), https://gov.wales/sites/default/files/publications/2021-03/the-valleys-taskforce-2016-2021-a-final-report.pdf , pp. 1-6, accessed February 2022

Policy / Strategy	Summary	South Wales Metro – alignment with policy / strategy
South-East Wales Valleys Local Transport Plan, 2015	Published in January 2015, this document brings together the five South East Wales Valleys local authorities of Blaenau Gwent, Caerphilly, Merthyr Tydfil, Rhondda Cynon Taf and Torfaen, identifying the problems and opportunities for transport in this area. This joint approach is due to the area as a whole being faced with challenges of regeneration in the north and development in the south with transport having a key role to play in achieving economic, social and environmental objectives as well as reducing socio-economic disparities in the area. The vision for this Local Transport Plan (LTP) is to provide an integrated and sustainable transport system which increases opportunity, promotes prosperity for all and protects the environment, with active travel and public transport providing real travel alternatives.[30]	This Plan was published as the 'Metro' concept was beginning to gain momentum. It highlights at the outset that **realising Welsh Government's Metro vision for a multi-modal rapid transit network in the Capital Region is vital to delivering the aspirations of the area.** It commits all of the local authorities in the area to the delivery of the Metro vision and working in tandem with Welsh Government and the Capital Region Board to support the delivery of the Metro.[31] Many of the individual projects listed in the Plan are subsumed within or dependent on the Metro for their realisation.

[30] South-East Wales Valleys Local Transport Plan 2015 (Torfaen CBC, 2015), https://www.torfaen.gov.uk/en/Related-Documents/Roads-Highways-and-Pavements/Local-Transport-Plan/South-East-Wales-Valleys-Local-Transport-Plan.pdf, p. 19, accessed February 2022.

[31] South-East Wales Valleys Local Transport Plan 2015 (Torfaen CBC, 2015), https://www.torfaen.gov.uk/en/Related-Documents/Roads-Highways-and-Pavements/Local-Transport-Plan/South-East-Wales-Valleys-Local-Transport-Plan.pdf, p. 2, accessed February 2022.

Table 3:3: Summary of relevant local policies and strategies

Policy / Strategy	Summary	South Wales Metro – Alignment with policy / strategy
Cardiff Capital Ambition	The *Cardiff Capital Ambition* report sets out the actions the Council will take in delivering their aspirations for the city. The report focuses on four themes (Working for Cardiff; Working for Wales; Working for the Future and Working for Public Services), with transport identified as having a cross-cutting role across these areas, particularly in terms of development planning and environmental outcomes.[32] The key transport issues cited in the report which are currently affecting Cardiff include: (i) the dominance of the private car; (ii) congestion, particularly on radial routes into the city; (iii) air quality; and (iv) limited active travel participation.[33]	The *Cardiff Capital Ambition* report specifically **cites the importance of SWM and commits to support Welsh Government and Capital Region partners in its delivery**. The Metro will play a particularly important role in reducing the dominance of the private car and reducing congestion on radial corridors[34] into the city by providing a high frequency and reliable public transport option for much of the Cardiff travel-to-work market.
Cardiff Council Local Transport Plan 2015-2020	Whilst now expired, the Cardiff Council LTP set the framework for transport planning in Cardiff at the point the Metro was being developed. The LTP identified two transport challenges facing the city: (i) network pressures and congestion; and (ii) future growth pressures, which it sets out a strategic approach to resolving.[35]	The LTP reco**gnises the delivery of the SWM as a means of tackling the twin problems of current network pressure and accommodating future growth**. It highlights the need to deliver complementary improvements which will build on the opportunities offered by Metro.

[32] *Cardiff Capital Ambition: Our Commitments for Cardiff* (Cardiff City Council, 2017), https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/capital-ambition/Documents/Capital%20Ambition%20Final%20(double%20page%20spread).pdf, p. 3, accessed February 2022.

[33] *Cardiff Capital Ambition: Our Commitments for Cardiff* (Cardiff City Council, 2017), https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/capital-ambition/Documents/Capital%20Ambition%20Final%20(double%20page%20spread).pdf, p. 23, accessed February 2022.

[34] A radial corridor is a route linking a central point in a city or town with a suburb (or satellite) of that city or town

[35] *Cardiff Local Transport Plan 2015-2020* (Cardiff City Council, 2015), https://www.cardiff.gov.uk/ENG/resident/Parking-roads-and-travel/transport-projects/Documents/FINALLTP.pdf, p. 5, accessed February 2022.

Policy / Strategy	Summary	South Wales Metro – Alignment with policy / strategy
Local Development Plans – Blaenau Gwent, Caerphilly; Cardiff, Merthyr Tydfil and Rhondda Cynon Taf	Several of the Local Development Plans (LDPs) expire in 2021 or the years immediately after and thus are currently being reviewed and replaced by an LDP2.	The review of the LDPs will ensure that they reflect the objectives of *Future Wales: The National Plan 2040*, in particular supporting transit-orientated development around the SWM.

3.4 Summary

3.4.1 This chapter has reviewed prevailing national, regional and local policy and the strategic fit of the SWM concept with it. Transport, economic development and land-use planning in Wales has recently been or is currently being refreshed to reflect the challenges facing the country. These include the decarbonisation of the transport sector, recovery from the COVID-19 pandemic, tackling inequalities and adapting the transport network and services to account for emerging behavioural and technological changes. Key policy outcomes envisaged include:

- Reducing the need to travel and, where a journey does have to be made, **ensuring that active travel and then public transport are the choice of mode** for that journey.
- Encouraging **transit-orientated developments**, ensuring that all new development has access to good quality public transport to major destinations, Cardiff and regional centres such as Pontypridd and Caerphilly in this context.
- **Tackling inequalities** such as high unemployment, poor health outcomes and low educational attainment etc through improving public transport connectivity to e.g., jobs, health care, further and higher education establishments etc.
- Supporting the **economic development of Wales** through improving productivity by better connecting labour to jobs and businesses to businesses.

3.4.2 This review has highlighted that SWM is integral to delivering these policy outcomes through the provision of a **high-quality, reliable, efficient and economically sustainable transport network**. SWM will significantly **improve connectivity**; **reduce journey times**; **increase capacity**; **reduce CO_2 and other emissions** associated with poor air quality; and provide a fully accessible railway network.

3.4.3 Given the level of investment and the transformative nature of the SWM proposals, regional and local policy and strategy has been built around its delivery and it is therefore integrated with wider project delivery across South-East Wales.

3.4.4 Overall, SWM demonstrates a clear strategic fit with national, regional, and local policy and indeed has become integral to its delivery.

4 Logic Maps and Monitoring Framework

4.1 Overview

4.1.1 The development of logic maps is central to the evaluation process as they provide the logic-chain from initial transport problems to eventual societal impacts and offer a means to help identify the required data to inform the evaluation. Drawing on the strategic policy context as set out in Chapter 3 and to help frame the evaluation and inform the baselining process, this section sets out a series of logic maps for both SWMP2 overall and the individual / groups of operations along with an accompanying monitoring framework. These aspects provide the overall framework for both the baseline as set out in this report and the subsequent evaluation.

4.1.2 The logic maps also provide an appropriate home for the ERDF 'Output' and 'Result' indicators.

4.2 Logic Maps

4.2.1 Following a review of the SWMP2 and the individual operation business cases, a 'parent' logic map covering SWMP2 overall, and a set of 'child' logic maps which sit below the overall SWMP2 logic map and cover how the individual operations were developed (see Figure 4.2-4.6). Due to the similarity of some of the operations and in order to avoid repetition, rather than producing a separate logic map for each operation, the operations were grouped together where there was significant overlap in the logic chain. This resulted in four 'child' logic maps which cover the following operation groupings:

- **Cardiff Bay, Cardiff Queen Street, and the Treherbert, Aberdare, and Merthyr Tydfil (TAM) Lines:** the line operations were grouped with the Cardiff Bay and Queen Street Operations because the TAM lines will benefit from direct access to Cardiff Bay due to the improvements brought about by the Cardiff Bay and Cardiff Queen Street Operations, which can effectively be thought of as enabling interventions.
- **Rhymney Line:** a single logic map was developed for the Rhymney Line because there will be no direct through running service to Cardiff Bay on the Rhymney Line, with this route instead running onto Barry Island / Bridgend.
- **East and West Wales Station Improvements**: one logic map was developed for these operations as both involve delivering upgrades to station infrastructure.
- **Taff's Well Depot**: a single logic map was produced for this operation as it involves enabling works to help deliver a new rolling stock depot and is therefore different in character to the other operations with resultant differences in the anticipated outputs, outcomes, and impacts.

4.2.2 The main components of the logic maps are set out in Figure 4.1 and include:

- **Context:** The problems and opportunities which SWMP2 is / the operation(s) are seeking to address. This effectively forms the rationale for proceeding with the intervention i.e., the case for change which underpins the business case. In the

logic maps, the problems have been categorised into transport problems (user perspective and supply-side issues) and socio-economic problems.

- **Input:** The investment and processes required to deliver SWMP2 / the operation(s). To satisfy ERDF requirements, the evaluation must report on only those aspects for which ERDF funding was provided. The inputs have therefore been divided between those funded and delivered by the ERDF and those funded by Welsh Government and other parties.
- **Outputs:** The direct deliverable(s) from SWMP2 / the operation(s). These include the immediate infrastructure improvements delivered via the investment (e.g., x kilometres of upgraded railway) and any changes in connectivity which result from these improvements e.g., reduced vehicle journey times, provision of new / loss of direct connections, enhanced frequency, etc.
- **Outcomes:** Changes in travel behaviour which result from the supply-side improvements. The outcomes include intended outcomes (such as modal switch from car to rail) which SWMP2 is aiming to achieve and unintended outcomes (such as modal switch from bus to rail resulting in reduced bus patronage) which is not part of the aim of SWMP2 but which it is recognised may happen in some locations. In the logic maps, the outcomes have been split between: (i) increase in rail patronage brought about by people making new trips, people changing the destination of their current trips, and modal switch from car, bus, or active travel; and (ii) the redistribution of rail patronage as a consequence of people switching lines to take advantage of the enhanced service provided. Due to the geography of the study area, it is anticipated that the latter is only likely to occur with respect to the Ebbw Vale Line, where there may be a degree of displacement onto the Rhymney Line.
- **Impacts:** Societal changes which occur as a consequence of the changes in connectivity (outputs) and the changes in travel behaviour (outcomes) which stem from the intervention, e.g., reduced economic inactivity / unemployment, higher productivity, land-value uplift etc. In the logic maps, the impacts have been categorised into transport impacts and socio-economic impacts, with the latter divided between impacts which affect: (i) residents; (ii) businesses; and (iii) the wider community.

4.2.3 In the logic maps, second and third order impacts e.g., an increase in the number of people walking / cycling as part of their journey because they have switched from driving to travelling by rail are shown in italics.

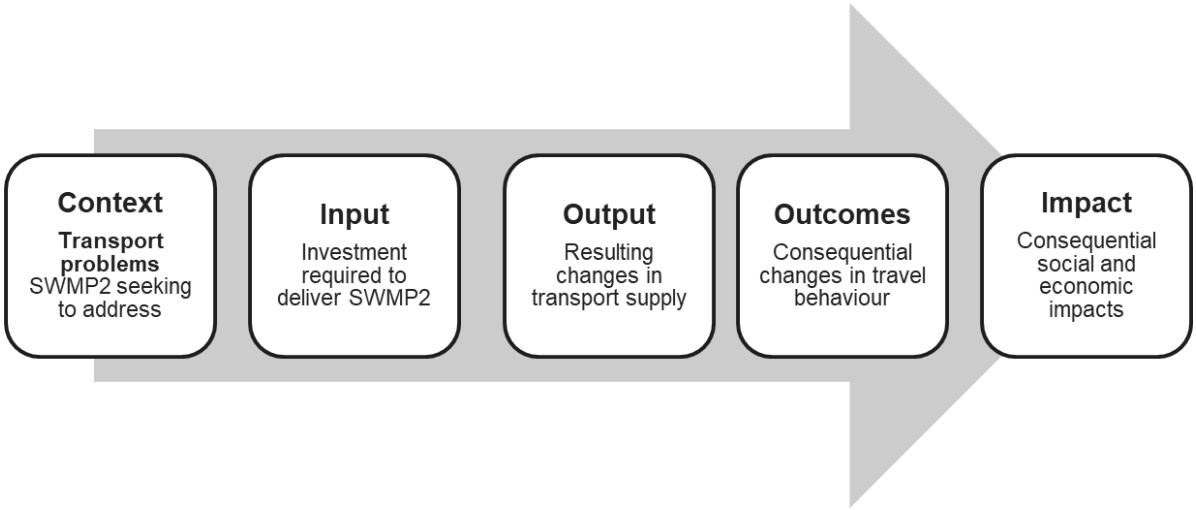


Figure 4.1: Logic Map Components 1

4.2.4 As set out in Chapter 2, one of the requirements associated with the ERDF funding is that the investment must deliver to an agreed set of predetermined 'Result' and 'Output' Indicators. These are shown in the Logic Maps in blue for clarity. It is noted that both the East and West Wales Result Indicators and the Output Indicator 'Reduction in CO_2 equivalent emissions' are set at the programme level only and are therefore only included on the 'parent' SWMP2 Logic Map.

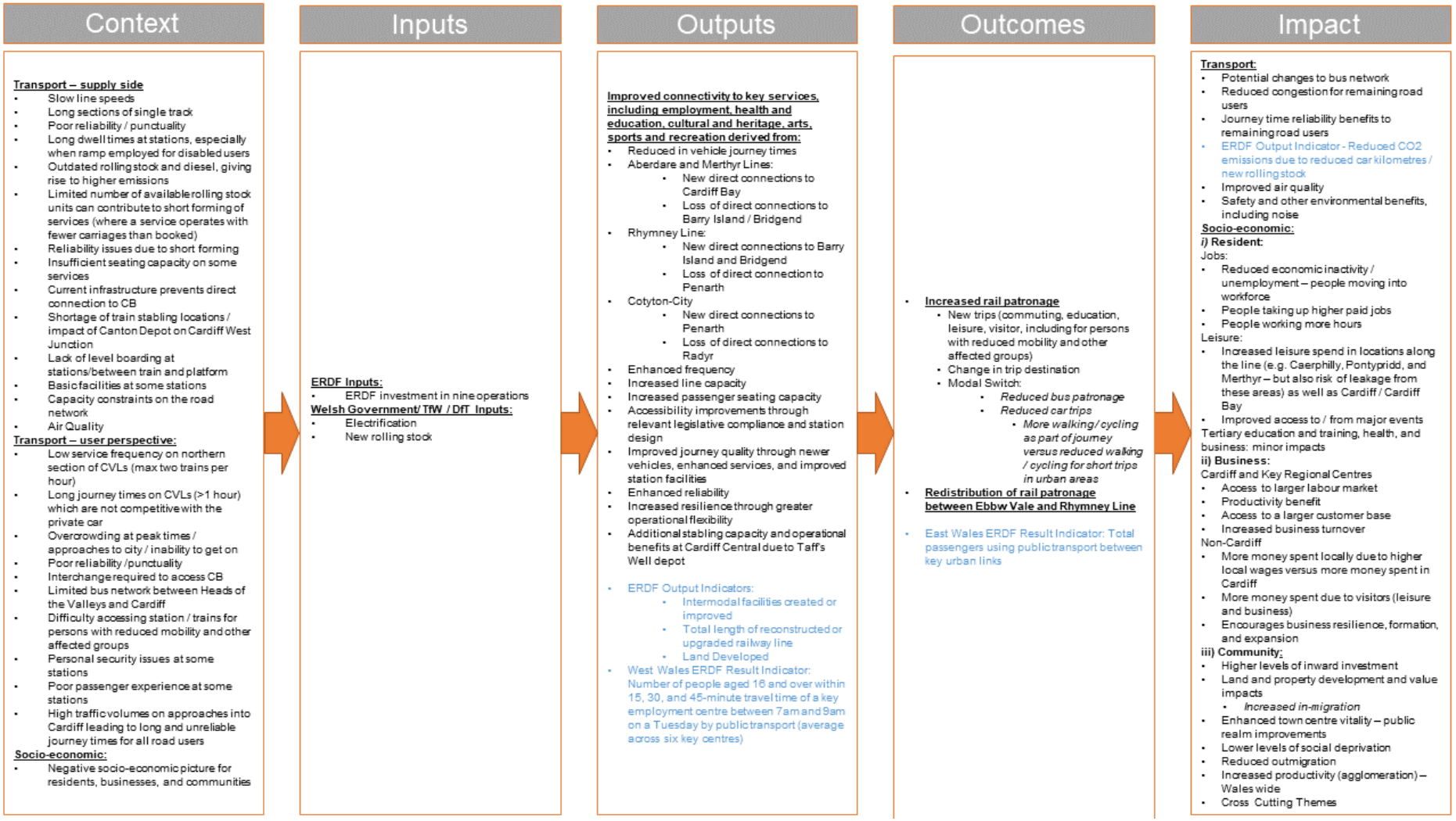


Figure 4.2: Logic Map: South Wales Metro Phase 2

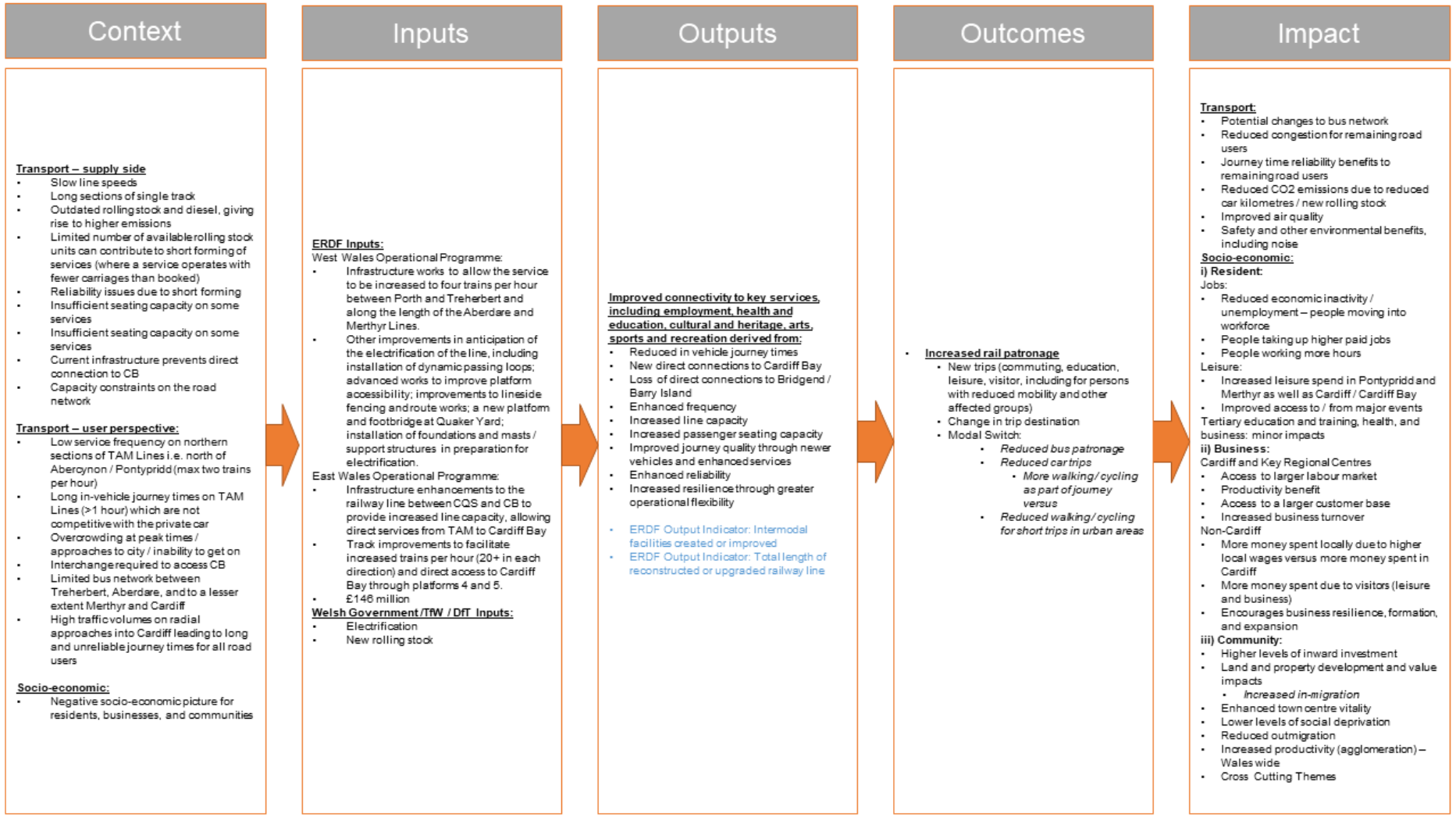


Figure 4.3: Cardiff Bay, Cardiff Queen Street, and the Treherbert, Aberdare, and Merthyr (TAM) Lines

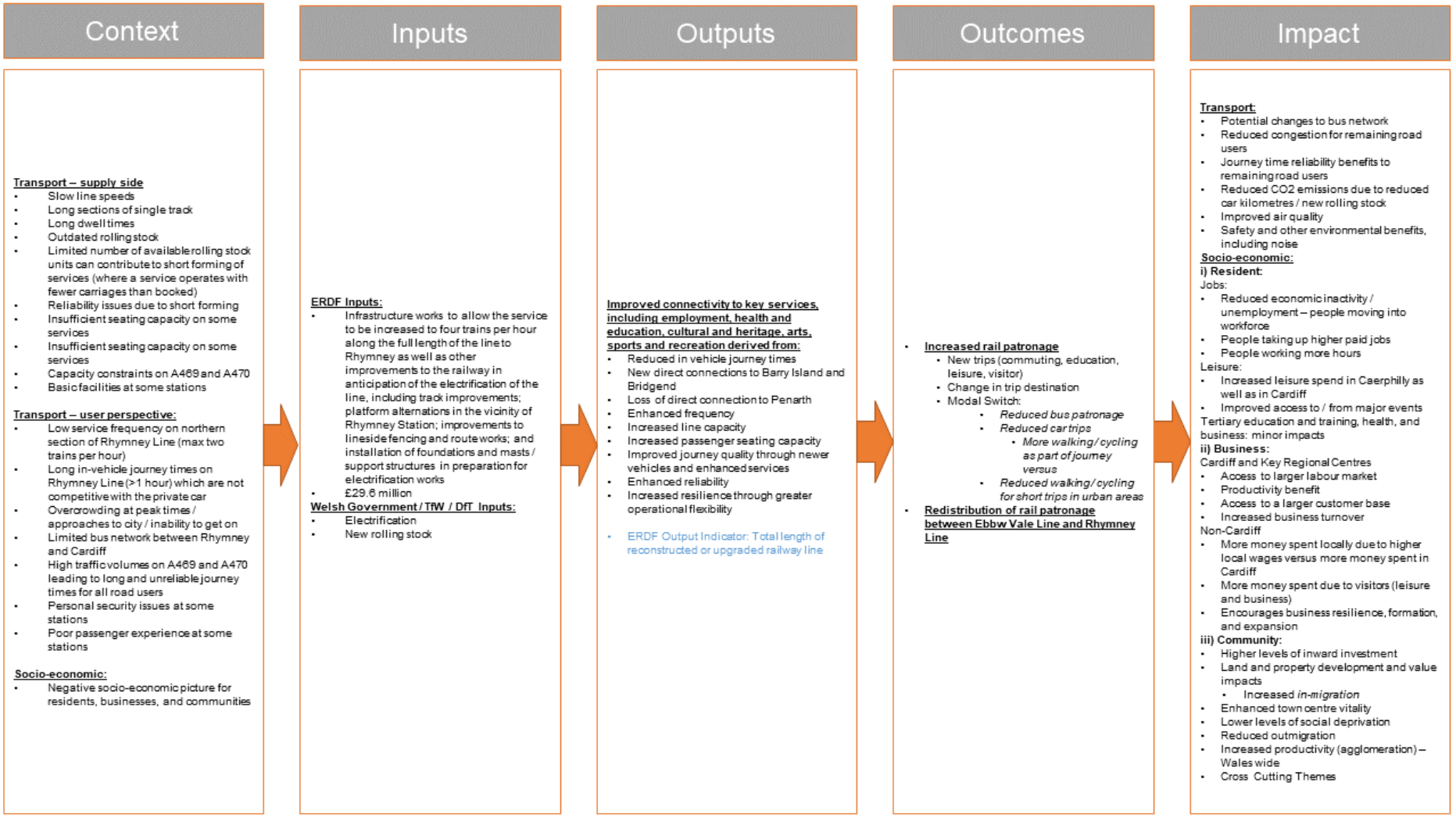


Figure 4.4: Logic Map: Rhymney Line

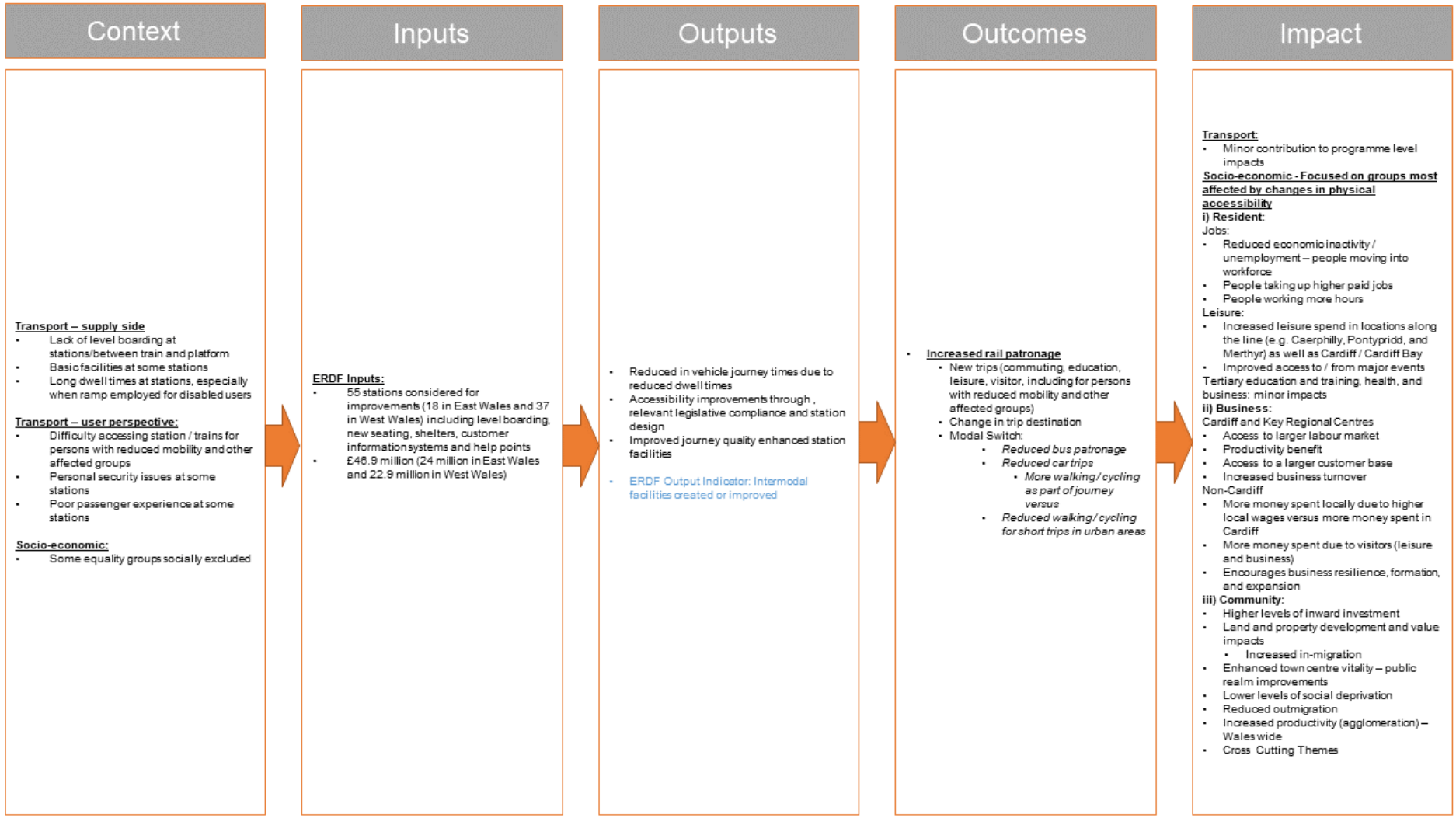


Figure 4.5: East and West Wales Station Improvements

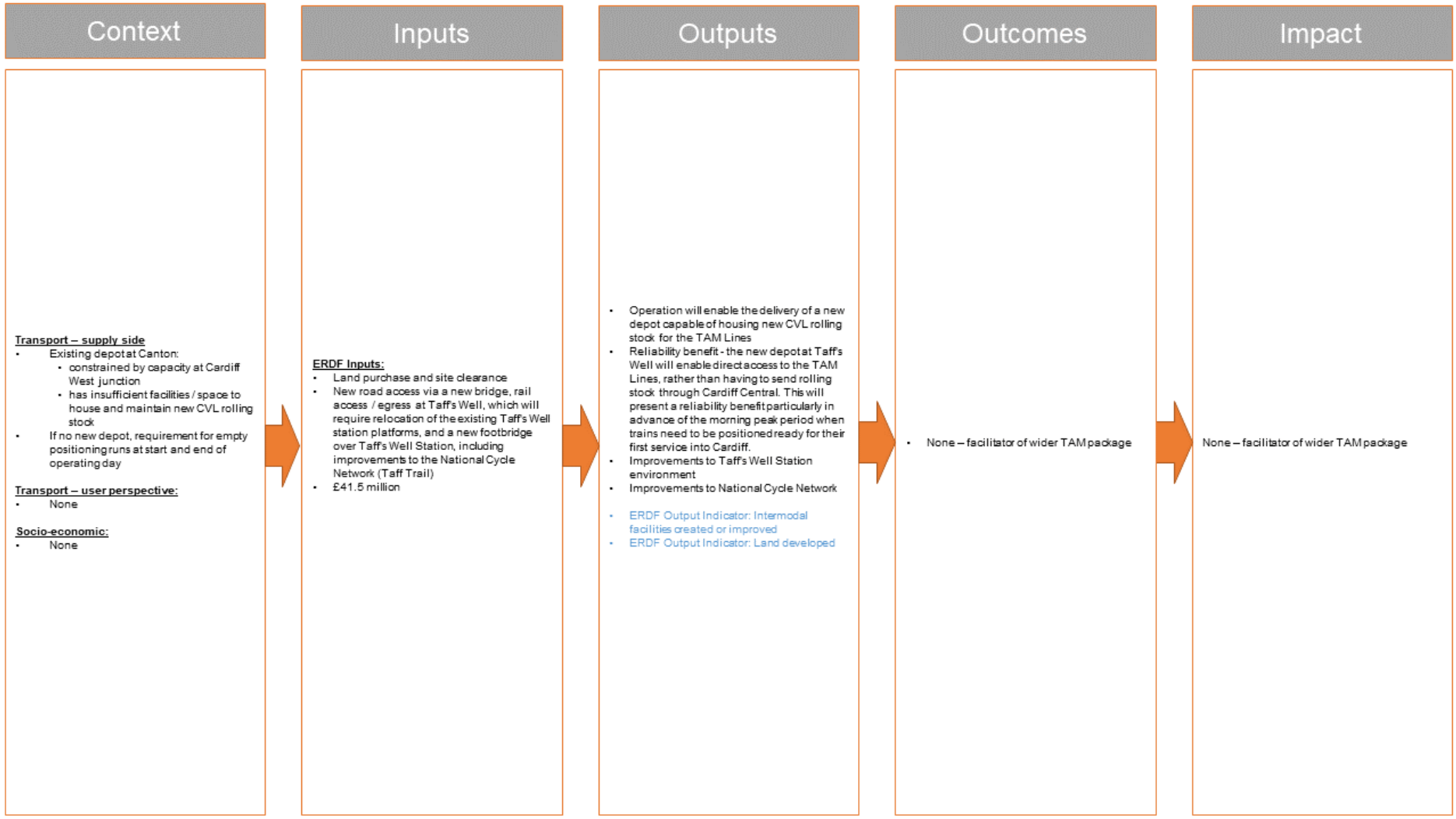


Figure 4.6: Logic Map: Taff's Well Depot

4.3 Monitoring Framework

4.3.1 Having developed the logic maps, Table 4:1 to Table 4:5 set out the information required to evidence each logic statement. These tables form the overall monitoring framework for SWMP2 setting out the metrics against which the investment will be evaluated. As with the logic maps, the ERDF Result Indicators are shown in blue for clarity.

4.3.2 It should be noted that, in some cases, the evidence is not readily available or would be expensive to collect. In such instances, a value for money judgement may suggest that a qualitative assessment is satisfactory and this is highlighted where appropriate in the tables which follow.

4.3.3 For ease of reference links to the sections of this report containing each piece of analysis have been included in the final column of the tables. While the tables covering outputs, outcomes, and impacts have been included below, given that this report is focused on setting out the baseline, these aspects are not covered here with only the ERDF Result and Output Indicators cross-referenced at this stage.

Table 4:1: Evidence to Support Logic Maps - Context

	Logic Statement	Evidence	Section of Report
Supply Side	Slow line speeds	Network Rail Wales Route Specification schematic map and review of Network Rail Sectional Appendices.	Section 5.2.19
	Long sections of single track	Schematic map showing single track sections	Section 5.2.9
	Poor reliability / punctuality	Available data on cancellations and punctuality	Section 5.2.26
	Long dwell times at stations, especially when ramp deployed for disabled users	Engagement with TfW	Section 5.2.23
	Outdated diesel rolling stock and giving rise to higher emissions	List of current rolling stock used on CVL and commentary on features	Section 5.2.15
	Reliability issues due to short forming	Data on short-formed services (TfW)	Section 5.4.15
	Limited number of available rolling stock units can contribute to short forming of services (where a service operates with fewer carriages than booked)	List of current rolling stock used on CVL and commentary	Section 5.2.18

	Logic Statement	Evidence	Section of Report
	Insufficient seating capacity on some services	Daily total seat miles by route (TfW) – i.e., services multiplied by rolling stock seating capacity. Can be analysed for peak, off-peak, weekend, full day etc. *Qualitative commentary provided as dataset unavailable*	Section 5.2.18
	Current infrastructure prevents direct connection from CVL to Cardiff Bay	No data required – commentary only	Section 5.2.12
	Shortage of train stabling locations	Stabling capacity (TfW) and key implications identified through engagement with TfW. *Qualitative commentary provided.*	Section 5.2.13
	Lack of level boarding at stations/between train and platform	Data on facilities at stations from TfW and engagement with TfW, local authorities, and Disability Wales	Section 5.2.25
	Capacity constraints on the road network	Commentary on key routes into Cardiff from the Valleys communities	Section 5.3.13

	Logic Statement	Evidence	Section of Report
	Air Quality	List of Air Quality Management Areas (AQMAs) most likely to be affected by SWMP2	Section 5.4.35
Transport User	Low service frequency on northern section of the CVL to the Heads of the Valleys (max two trains per hour to the Heads of the Valleys)	December 2019 timetables	Section 5.4.2
	Long journey times on CVL (>1 hour) which are not competitive with the private car	December 2019 timetables compared to INRIX journey time data	Section 5.4.5
	Overcrowding at peak times / approaches to city / inability to get on the train	Available rail count data and data from Telephone Survey – it is noted that this data is limited	Section 5.4.7
	Poor reliability / punctuality	Telephone survey and stakeholder consultation	Section 5.4.11
	Interchange required at Cardiff Queen Street to access Cardiff Bay	No data required – commentary only	Section 5.4.5
	Limited bus network between Heads of the Valleys and Cardiff	Pre-COVID-19 bus timetables – review of bus frequency and journey times	Section 5.3.8
	Difficulty accessing stations / trains for persons with reduced mobility and other affected groups	Data on facilities at stations from TfW and engagement	Section 5.4.23

	Logic Statement	Evidence	Section of Report
		with TfW and other stakeholders	
	Personal security issues at some stations	Telephone Survey and stakeholder consultation	Section 5.4.23
	Poor passenger experience at some stations	Telephone Survey and stakeholder consultation	Section 5.4.23
	High traffic volumes on radial approaches into Cardiff leading to long and unreliable journey times for all road users	Department for Transport traffic count data INRIX journey time data	Section 5.4.32
Socio-economic: resident	High rates of economic inactivity / unemployment in Valleys communities compared to Cardiff	Annual Population Survey Economic Activity Rates in the Baseline Claimant Count Data	Section 6.3
	Lower income levels in Valleys communities compared to Cardiff	BRES Workplace Employment by Industry Annual Population Survey Occupation Data Income data from the Annual Survey of Hours and Earnings (ASHE)	Section 6.5
	Poor access to employment	Baseline Hansen analysis	Section 7.6
Socio-economic: Business	Sub-optimal access to labour / customers for businesses	Baseline Hansen analysis	Section 7.6
	Lower levels of productivity	ONS Gross Value Added (GVA)	Section 6.7

	Logic Statement	Evidence	Section of Report
		UK local authority competitiveness index	
	Impact on visitor numbers and visitor spend	STEAM Tourism Data Stakeholder engagement	Section 6.10
Socio-economic: Community:	Lower levels of inward investment	Data on inward investment where available *Available data generally very limited and dated*	
	Land and property development and value impacts	Engagement with local authority planning departments and property agents. ONS data on number of new dwellings and house prices	Section 6.9
	Increased in-migration / reduced outmigration	ONS migration data	Appendix C
	Higher levels of social deprivation	Baseline Welsh Index Multiple Deprivation (WIMD) and Connectivity Audit Deprivation Tool (CDAT) analysis	Sections 6.8 and 7.6

Table 4:2: Evidence to Support Logic Maps - Inputs

	Logic Statement	Evidence	Section of Report
ERDF Inputs	The ERDF funding to deliver the operations and the delivery of the operations	Operation Business Cases	Chapter 2
Welsh Government / TfW Inputs	Electrification and new rolling stock	Business case plus wider SWM documentation	Chapter 2

Table 4:3: Evidence to Support Logic Maps – Outputs

	Logic Statement	Evidence	Section of Report
Improved connectivity to key services, including health and education, cultural and heritage, arts, sports and recreation derived from:	Reduced in vehicle journey times	Matrix of station OD times in baseline rail timetables versus post opening rail timetables Connectivity analysis	-
	Treherbert Line: New direct connections to Cardiff Bay	Matrix of daily connections in baseline versus post-opening Connectivity analysis	-
	Aberdare Line: New direct connections to Cardiff Bay and loss of direct connections to Barry Island	Matrix of daily connections in baseline versus post-opening Connectivity analysis	-
	Merthyr Tydfil Line: New direct connections to Cardiff Bay and loss of direct connections to Barry Island / Bridgend	Matrix of daily connections in baseline versus post-opening Connectivity analysis	-
	Rhymney Line: New direct connections to Barry Island and Bridgend and loss of direct connection to Penarth	Matrix of daily connections in baseline versus post-opening Connectivity analysis	-
	Coryton-City Line: New direct connections to Penarth		-

	Logic Statement	Evidence	Section of Report
	and the loss of direct connections to Radyr		
	Enhanced frequency	Trains per day in baseline versus post opening Connectivity analysis	-
	Increased line capacity	Trains per day in baseline versus post opening	-
	Increased passenger seating capacity	Daily total seat miles by route multiplied by rolling stock seating capacity in baseline versus post opening	-
	Accessibility improvements through relevant legislative compliance and station design	Business cases and engagement with TfW	-
	Improved journey quality through newer vehicles, better integration, enhanced services, and improved station facilities	Telephone Survey baseline versus public Telephone Survey post-opening Post-opening on-train survey Commentary on improvements made	-
	Enhanced reliability / punctuality	Available data on cancellations and punctuality baseline and post-opening	-
	Increased resilience through greater operational flexibility	Commentary on improvements and engagement with TfW	-

	Logic Statement	Evidence	Section of Report
	Additional stabling capacity and operational benefits at Cardiff Central due to Taff's Well depot	Baseline stabling capacity versus post opening stabling capacity Commentary on improvements and engagement with TfW	-
	ERDF West Wales Result Indicator: Number of people aged 16 and over within 15, 30, and 45-minute travel time of a key employment centre between 7am and 9am on a Tuesday by public transport (average across six key centres)	TfW TRACC Outputs comparing baseline versus post-opening position (TfW analysis).	Section 7.5

Table 4:4: Evidence to Support Logic Maps – Outcomes

	Logic Statement	Evidence	Section of Report
Increased rail patronage	New trips (commuting, education, leisure, visitor, including for persons with reduced mobility and other affected groups)	Post opening household and on-train surveys[36] ORR stations entries and exits data comparing baseline versus post opening data MOIRA data for station pairs comparing baseline versus post opening	-
	Change in trip destination	Post opening household and on-train surveys	-
	Modal Switch: Reduced bus patronage	Post opening household and on-train surveys Bus patronage data, including boarding (ticket) data (if available)	-
	Modal Switch: Reduced car trips	Post opening household and on-train surveys Road counts from TfW / local authorities	-
	Modal Switch: More walking / cycling as part of journey	Post opening household and on-train surveys Walking and cycling counts where available comparing baseline versus post opening (TfW and local authorities)	-
	Reduced walking / cycling for short trips in urban areas	Post opening household and on-train surveys Walking and cycling counts (where available from TfW and / or local authorities) comparing baseline versus post opening	-

[36] The post opening household and on-train surveys do not form part of this commission but are included in the Monitoring and Evaluation Plan for SWMP2. We would anticipate both the post opening household and post-opening on train surveys being undertaken as part of a subsequent longer-term evaluation.

	Logic Statement	Evidence	Section of Report
	Redistribution of rail patronage from Ebbw Vale Line to Rhymney Line	Post opening household and on-train surveys ORR stations entries and exits data comparing baseline versus post opening MOIRA data for station pairs comparing baseline versus post opening It is noted that the frequency of services on the southern section of the Ebbw Vale Line (from Crosskeys to Newport) has been increased to 2tph and there are plans to extend this to Ebbw Vale. There could also therefore be redistribution of rail patronage from the Rhymney Line to the Ebbw Vale Line due to improved frequency of connections to Newport / Bristol etc. This potential outcome would be reviewed via the ORR and LENNON data analysis.	-
	ERDF East Wales Result Indicator: Total passengers using public transport between key urban links	Initial, reporting of this metric to ERDF will be based on a South-East Wales Transport Model (SEWTM) forecast of post-opening patronage on the Cardiff Queen Street – Cardiff Bay section of line. This is due to the requirements to deliver the ERDF evaluation by June 2023. If TfW elect to commission a longer-term outcome evaluation of SWMP2, this indicator would be assessed using LENNON ticket sales data 6 months after new rail service timetable becomes operational (TfW analysis)	Section 7.4

Table 4:5: Evidence to Support Logic Maps – Impacts

	Logic Statement	Evidence	
Transport	Potential changes to bus network	Baseline bus timetables versus post opening bus timetables Mapped outputs showing bus network extent and frequency and any change	-
	Reduced congestion for remaining road users	INRIX baseline versus post opening	-
	Journey time reliability benefits to remaining road users	INRIX baseline versus post opening	-
	Reduced CO_2 emissions due to reduced car kilometres / new rolling stock (ERDF Priority Output Indicator)	Assessed in two ways: i) resulting from mode shift from private car to rail following improvements and ii) resulting from use of more fuel and energy efficient rolling stock (TfW analysis)	Section 7.3
	Improved air quality	Qualitative statement – while air quality datasets are available, identifying a causal relationship between SWMP2 and AQ levels will be difficult.	-
	Safety and other environmental benefits, including noise	Telephone Survey baseline versus Telephone Survey post-opening - estimate reduction in vehicle km's and use to monetise safety and environmental impacts based on WebTAG parameters	-
Socio-economic: Resident - Jobs	Reduced economic inactivity / unemployment – people moving into workforce	Telephone Survey baseline versus Telephone Survey post-opening Annual population survey - economic activity rates Claimant count data	-

	Logic Statement	Evidence	
	People taking up higher paid jobs	Telephone Survey baseline versus Telephone Survey post-opening BRES Workplace Employment by Industry Annual Population Survey Occupation Data Income data from the Annual Survey of Hours and Earnings (ASHE)	-
	People working more hours	Telephone Survey baseline versus Telephone Survey post-opening Data on hours worked from the ASHE	-
Socio-economic: Resident - Leisure	Increased leisure spend in places along the line (e.g. Caerphilly, Pontypridd, and Merthyr – but also risk of leakage from these areas) in Cardiff / Cardiff Bay	Telephone Survey baseline versus Telephone Survey post-opening	-
	Improved access to / from major events	Telephone Survey baseline versus Telephone Survey post-opening	-
Socio-economic: Resident - Tertiary education and training, health, and business:		Telephone Survey baseline versus Telephone Survey post-opening	-
Business: Cardiff and Key Regional Centres	Access to larger labour market	Baseline Hansen labour market connectivity analysis and post-opening Hansen labour market connectivity analysis	-

	Logic Statement	Evidence	
	Productivity benefit	Commentary on how above effects may impact productivity ONS Gross Value Added (GVA) UK local authority competitiveness index	-
	Access to a larger customer base	Baseline Hansen connectivity analysis and post-opening Hansen connectivity analysis	-
	Increased business turnover	Post-opening stakeholder engagement	-
Business: Non-Cardiff	More money spent locally due to higher local wages versus more money spent in Cardiff	Telephone Survey baseline versus Telephone Survey post-opening	-
	More money spent due to visitors (leisure and business)	Telephone Survey baseline versus Telephone Survey post-opening. Tourist visitor and spend data where available (e.g., local authority STEAM data) Post-opening stakeholder engagement	-
	Encourages business resilience, formation, and expansion	Commentary and post-opening stakeholder engagement	-
Community	Higher levels of inward investment	Engagement with local authorities Data on inward investment (where available, although generally very limited and dated)	-
	Land and property development and value impacts	Engagement with local authority planning departments and property agents. ONS data on number of new dwellings and house prices Local authority employment land reviews	-

	Logic Statement	Evidence	
		Telephone Survey baseline versus Telephone Survey post-opening	
	Increased in-migration	Post opening stakeholder engagement Telephone Survey post-opening ONS Local area migration indicators	-
	Enhanced town centre vitality – public realm improvements	Post-opening stakeholder engagement	-
	Lower levels of social deprivation	Baseline WIMD V's post-opening WIMD Connectivity and Deprivation Audit Tool (CDAT)	-
	Reduced outmigration	Post-opening stakeholder engagement Telephone Survey post-opening Office National Statistics (ONS) Local area migration indicators	-
	Increased productivity (agglomeration) – Wales wide	Commentary based on evidence of the above	-
	Cross Cutting Themes	See Chapter 9	-

5 Transport Baseline

5.1.1 Chapters 5-7 establish the baseline against which the 'outcomes' and 'impacts' of SWMP2 will ultimately be delivered. The approach taken is to provide a narrative on the key data, with the underlying information provided in Excel workbooks as noted.

5.1.2 This chapter sets out the operation and use of the transport network from the perspective of both users of the CVL services and the organisations which deliver them.

5.1.3 It should be noted that all timetable analysis is based on pre-COVID-19 (i.e., December 2019 timetables).

5.2 Supply-Side

5.2.1 This section provides a baseline profile of the key characteristics and issues with the CVL from the perspective of the operator. The focus is on the rail network only as SWMP2 will not make significant direct supply-side changes to the road or bus network (albeit there may be indirect impacts in terms of bus services, which are picked-up in the next section).

CVL Network

5.2.2 The 'Core Valleys Lines' is a term used to describe the suburban network that radiates out from Cardiff Central through Cardiff Queen Street to the Heads of the Valleys (Treherbert, Aberdare, Merthyr Tydfil and Rhymney) plus the branch to Coryton and Radyr via the City Line). This is shown in the map below.

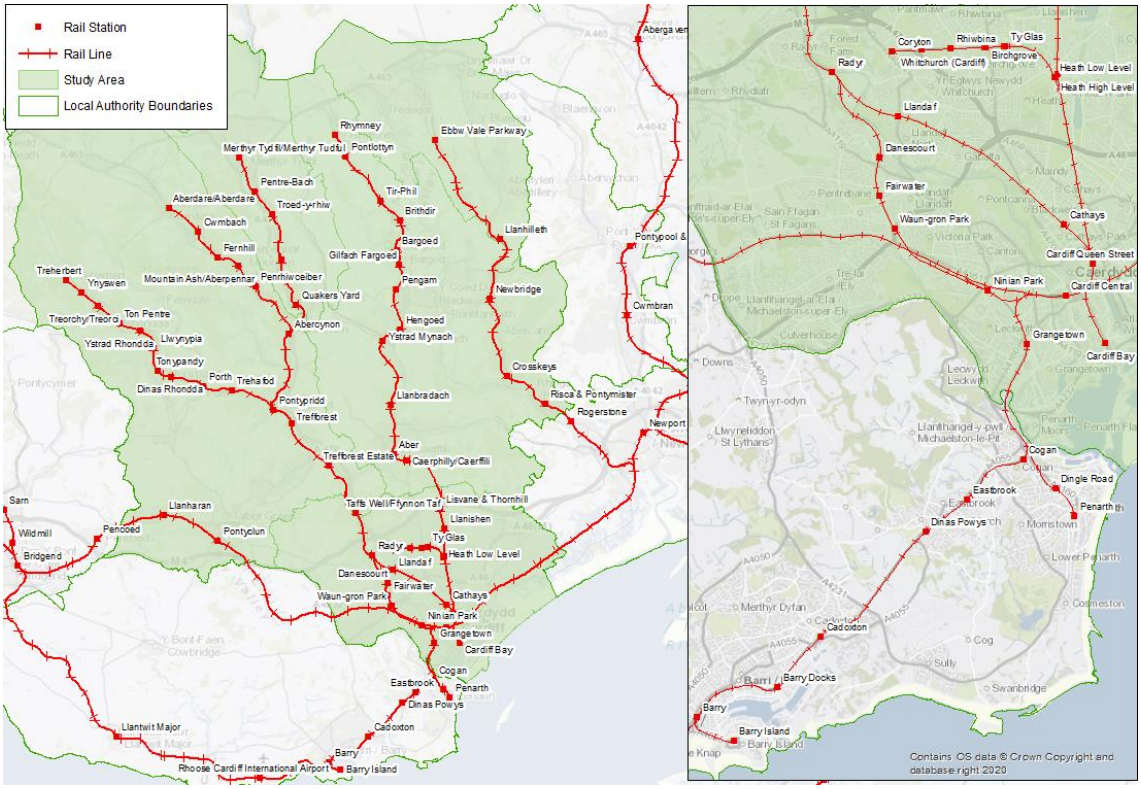


Figure 5.1: Rail Network in the Study Area

5.2.3 All of the CVLs operate across Cardiff onto the Vale of Glamorgan Line (to either Penarth, Barry Island or Bridgend), whilst a shuttle service operates between Coryton and Radyr using the City Line.[37]

5.2.4 It is understood that part of the reason for these cross-city services is to maximise available capacity at Cardiff Central. Terminating and restarting services in Cardiff Central would increase station dwell time, reducing the number of paths and available platform capacity (with CVL trains working from Platforms 6, 7 and 8 only).

5.2.5 The SWMP2 enabling works will facilitate direct services from Treherbert, Aberdare and Merthyr Tydfil to Cardiff Bay, relieving pressure on Cardiff Central and facilitating a recasting of current services, as shown in the table below:

Table 5:1: Terminating / Origin Stations in December 2019 and once SWMP2 complete

Line	Terminating / Origin Station in December 2019	Terminating / Origin Station once SWMP2 complete
Treherbert	Cardiff Central via Llandaf	Alternative Cardiff Central and Cardiff Bay

[37] Note: In the current timetable, Coryton services are operating to Cardiff Bay, whilst Radyr (City Line) services are terminating in Cardiff Central.

Line	Terminating / Origin Station in December 2019	Terminating / Origin Station once SWMP2 complete
Aberdare	Barry Island via Llandaf	Alternative Cardiff Central and Cardiff Bay via Danescourt (City Line) when going to Cardiff Central
Merthyr Tydfil	Barry Island or Bridgend via Llandaf	Alternative Cardiff Central and Cardiff Bay
Rhymney	Penarth	Barry Island and Bridgend
Coryton-City	Coryton to Radyr via Danescourt	Coryton to Penarth

5.2.6 The key points of note from the above table are as follows:

- The TAM lines will benefit from direct connections to Cardiff Bay but there will also be a loss of the existing direct connections to Barry Island for the Aberdare Line and Barry Island / Bridgend for the Merthyr Tydfil Line. However, given the introduction of a 4tph service on the Rhymney Line plus Coryton Line services, interchange times at Cardiff Queen Street for onward services to the Vale of Glamorgan will be minimal. It is likely that the number of passengers travelling from the TAM lines to Cardiff Bay is higher than those travelling to the Vale of Glamorgan.
- The service which currently runs from Coryton to Radyr via the City Line will instead run from Coryton to Penarth and the selected Aberdare line services will instead run via Danescourt when on route to Cardiff Central, resulting in no diminution of frequency between Cardiff Central and Radyr.

5.2.7 It is important that the evaluation fully captures these changes and any potential outcomes and impacts which may result. To help inform the baseline, more detailed information on the terminating and origin stations in 2019 is set out in the accompanying Baseline Excel Workbook as set out in Appendix C .

Key Point: SWMP2 will result in a fundamental recasting of CVL services, with a key benefit being new direct TramTrain services from Treherbert, Aberdare and Merthyr Tydfil to Cardiff Bay. Whilst there will be a loss of direct through services to Cardiff Central and the Vale of Glamorgan on these lines, the high frequency service offered at Cardiff Queen Street will make interchange almost seamless.

Operational Constraints

5.2.8 There are several operational constraints in the delivery of services on the CVL.

Single Track Sections

5.2.9 Unusually for a rail network operating at least 2tph, the CVL has several long sections of single track. As only one train can occupy each single-track block section at any given time, this imposes a constraint on the number of trains which can be operated, particularly where such services are inter-working with other lines and major junction or city centre stations such as Pontypridd, Cardiff Queen Street and Cardiff Central. These single sections are summarised by line in the table below based on the Network Rail Sectional Appendices:

Table 5:2: CVL single track sections (Source: Network Rail Sectional Appendices)

Line	Section	Distance (m,ch)[38]	Comment
Treherbert	Treherbert – Ystrad Rhondda loop	3m,44ch	From Treherbert station to the junction with the passing loop north of Ystrad Rhondda station
	Ystrad Rhondda – north of Porth	3m,62ch	From south of passing loop junction at Ystrad Rhondda to junction with double track section between Dinas Rhondda and Porth.
Aberdare	Aberdare – Abercwmboi loop	1m,12ch	Abercwmboi is a down passenger loop (DPL), but the timetable suggests it is not regularly used.
	Abercwmboi loop – Mountain Ash loop	0m,92ch	From Abercwmboi loop exit to junction with passing loop north of Mountain Ash station.
	Mountain Ash loop – Abercynon Junction	3m,25ch	From south of passing loop junction at Mountain Ash to Abercynon Junction
Merthyr Tydfil	Merthyr Tydfil – Merthyr Vale loop	2m,80ch	From Merthyr Tydfil station to junction with the passing loop north of Merthyr Vale station.
	Merthyr Vale loop – Abercynon Junction	3m,22ch	From south of passing loop junction at Merthyr Vale station to Abercynon Junction

[38] Distances are presented as per the Network Rail Sectional Appendices in miles and chains. A chain is a distance of 22 yards and there are 80 chains in a mile.

Line	Section	Distance (m,ch)[38]	Comment
Rhymney	Rhymey – Tir-Phill loop	3m,5ch	From Rhymey staton to junction with the passing loop north of Tir-Phil station
	Tir-Phil loop – north of Bargoed	2m,4ch	From south of passing loop junction at Tir-Phil station to junction with double track section north of Bargoed.

5.2.10 It is beneficial to provide a simple example from 'Real Time Trains' of how the single-track sections limit capacity and hence frequency by considering the Ystrad Rhondda to Treherbert single track section.

- The **12:05** departure from Cardiff Central to Treherbert arrives into Ystrad Rhondda at **12:55**.
- It stands at the platform until **12:59** to allow the **12:46** departure from Treherbert to pass in the opposite direction (which arrives into Ystrad Rhondda at **12:57**).
- Upon departure from Ystrad Rhondda, the train enters the single-track section to Treherbert, with the journey taking a further 12 minutes, arriving into Treherbert at **13:11**.
- This train is immediately turned around, departing Treherbert for Cardiff Central at **13:16** (the five-minute turnaround is only marginally greater than the minimum recommended four-minute turnaround).
- This train then arrives back into Ystrad Rhondda at **13:26**.
- This means that the single line section between Ystrad Rhondda and Treherbert is occupied for a total of **27 minutes**, which limits the frequency to half-hourly in either direction.

5.2.11 The challenges posed by the single-track sections are amplified by the majority of the passing loops (e.g., Ystrad Rhondda, Mountain Ash, Tir-Phil etc) being short static loops. A static loop is a type of loop where trains in the opposite direction can cross but given its short length, requires both trains to be stationary at the crossing point. Passing loops are typically incorporated into stations and are used widely on long single-track lines such as the West Highland, Far North and Heart of Wales Lines where frequency is low but are less common on busy suburban lines. The implication of these static loops is that delays to multiple services (known as reactionary delay) can occur from a single late running service, ultimately leading to cancellations or the termination of services short of their destination to restore compliance with timetable. In the example above, if the **12:05** departure from Cardiff Central was to be delayed by more than 3 minutes arriving into Treherbert, it would in-turn delay the **12:35** from Cardiff Central to Treherbert. This would then delay the next train and so forth.

Key Point: There are several long single-track sections on the CVL. These impose a hard constraint on frequency, but also give rise to reliability issues, particularly given the use of short static loops in many places to break-up single track sections.

Cardiff Queen Street and Cardiff Bay Connection

5.2.12 Cardiff Queen Street is in many respects the hub of the CVL network as all services pass through it, and in the case of Cardiff Bay shuttle services, terminate at it. It therefore requires the ability to handle a high-volume of trains in both directions. However, the current track and signalling layout at Cardiff Queen Street North and Cardiff Queen Street South junctions limits both the scope to increase the frequency of services and provide through services from the Heads of the Valleys to Cardiff Bay. Key constraints are as follows:

- The TAM northbound (up Llandaf) services use platforms 4 and 5 (on the west side of the station). The current signalling does not facilitate a movement from the Cardiff Bay branch into these platforms. The TAM lines could only therefore be accessed through a long period of 'wrong-direction running' on the 'down Llandaf' line through platform 3, which is an impractical proposition at such a busy part of the network.
- The path into Cardiff Queen Street for southbound TAM trains (down Llandaf) involves crossing the Rhymney / Coryton northbound line at Cardiff Queen Street North Junction to access platform 3. This imposes limitations on the number of trains that can be pathed through the station.
- The Cardiff Bay branch is single track and can only be accessed directly from platforms 1 (which is a bay platform), 2 and 3.

Key Point: The current track layout and signalling at Cardiff Queen Street acts as a constraint on the number of services that can be pathed through the station and on the movements which can be made. In particular, it is not currently possible for TAM services to start in Cardiff Bay, as the signalling does not permit the necessary crossover onto platforms 4 and 5. The Cardiff Bay branch is also entirely single track.

Stabling

5.2.13 The CVL rolling stock is currently stabled at Cardiff Canton Depot, which lies immediately to the west of Cardiff Central station. Movement out of Canton towards the CVL relies upon capacity at Cardiff West Junction, which is currently operating close to capacity.

5.2.14 Canton is also predominantly a diesel traction maintenance depot and serves both the TfW fleet and some Cross Country Class 170 stock. Whilst the depot is understood to meet current requirements, SWMP2 will lead to a significant expansion of the fleet and thus requires additional stabling capacity, which is being built at Taff's Well.

Key Point: Whilst Cardiff Canton Depot meets the current needs of the CVL fleet, movements of CVL trains into and out of the depot can impact on the adjacent Cardiff West Junction, which is currently operating close to capacity. Moreover, there would be insufficient capacity at Canton to cater for the new CVL fleet.

Rolling Stock

5.2.15 The quality of rolling stock on the CVL has been a long-term problem. There has been no significant investment in the network, with much of it served by 1980s built Class 15x DMU stock (with the Class 14x Pacer stock only having been only recently retired). Moreover, there has been a shortage of units overall, which has contributed to significant capacity problems and put pressure on network resilience, a problem most clearly highlighted in the aftermath in Storm Callum in 2018 when several units were damaged.

5.2.16 The table below sets out the rolling stock currently used on the CVLs. It should be noted that not all of the units in each class will operate on the CVL, the Class 153 sets, for example, operate on the Hearts of Wales line:

Table 5:3: Rolling Stock used on the Core Valley Lines – December 2021

Class	Type	Top Speed (mph)	Number	Routes operated	Built
150	Diesel multiple unit	75	36	Valley Lines	1986-87
153	Diesel multiple unit	75	24	Valley Lines	1987-88
769	Bi mode multiple unit	100	3	Valley Lines	1987[39]

5.2.17 The CVL fleet has undergone recent improvement with the retirement of Pacers, the cascade of Class 156 trains and the arrival of the Class 150, which is well-suited to high volume urban operation. The Class 769 was also added to the fleet in 2019-20 – these are converted Electric Multiple Unit (EMU) units designed to address a wider shortage of DMU rolling stock. However, recent stock cascades represent something of a holding position ahead of the arrival of the new SWMP2 stock in 2023.

5.2.18 The limitations with the current rolling stock give rise to a number of issues:

- Given the limited number of available units, there is a risk of services being **'short-formed'** – i.e., a service operating with fewer carriages than booked – or **cancelled**. This can lead to **capacity** issues, both in terms of being

[39] Originally built as Class 319 in 1987.

unable to get a seat or get on the train at all, an issue widely reported pre-pandemic.

- Trains at or near capacity can suffer from **extended station dwell times**, as it takes longer for passengers to board and alight. This can lead to delays, longer journey times and reliability issues. It is likely that the acquisition of Class 150 stock will assist to some extent as these units were designed for high-volume urban operations.

Key Point: The current rolling stock used on the CVL is relatively old and there are insufficient units to deliver the required levels of service, leading to occasional short-forming and cancellations. Whilst additional units have been leased recently, the fleet overall is of a lower standard than that used for other suburban networks around the UK in e.g., Glasgow, Manchester, Birmingham etc.

Line Speeds

5.2.19 The network capacity issues on the CVL are exacerbated by low line speeds across the network. The figure below shows the line speeds across the railway network in Wales.

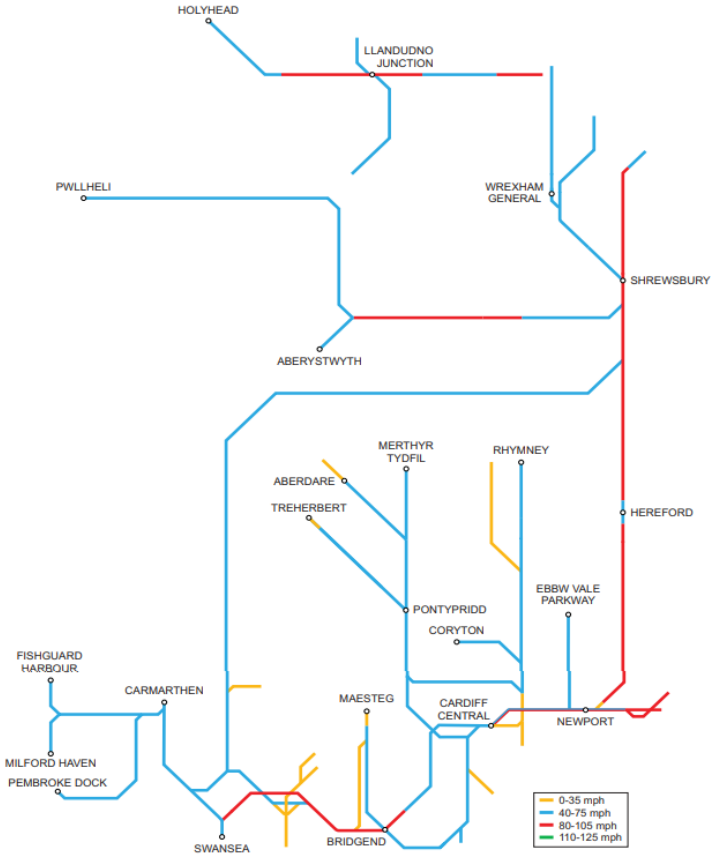


Figure 5.2: Line Speeds (Source: Delivering a better railway for a better Britain: Network Specification 2017 Wales)

5.2.20 It is understood that the above figure shows the 'ruling line speed', the maximum speed along the line below which there will be other permanent speed restrictions. At face value, the 40mph-75mph speed on the TAM and Rhymney lines is reasonable on a route on which there is an intensive stopping pattern and where line speed can rarely be achieved for any length of time.

5.2.21 In practice however, the actual line speeds are typically much lower. The table below shows the average speed on each line based on overall route length divided by typical journey times as set out in the December 2019 timetables:

Table 5:4: Average speeds on CVL

Line	Total Mileage	Journey Time	Average Speed (mph)
Aberdare – Cardiff Central	22.5	1 hour 3 minutes	21
Merthyr Tydfil – Cardiff Central	24.6	1 hour 2 minutes	24
Rhymney – Cardiff Central	23.8	1 hour 3 minutes	23
Treherbert – Cardiff Central	23.7	1 hour 5 minutes	22

5.2.22 As shown, average line speeds on the CVL are currently very low, ranging from 21mph-24mph. This is in part due to:

- the requirement for frequent stops - for example Cardiff Central to Rhymney has 17 stops, roughly a stop every 1.5 miles;
- the use of elderly DMU rolling stock which has relatively slow acceleration and deceleration characteristics; and
- the requirement to build in time at static passing loops.

Key Point: Average line speeds on the CVL are very low, caused by a combination of stopping patterns, the rolling stock in use and infrastructure constraints.

Service Frequency

5.2.23 The table below sets out the typical weekday, Saturday and Sunday service frequencies from the Heads of the Valleys stations and junction stations to Cardiff Central, based on the December 2019 timetable:

Table 5:5: Typical trains frequency to Cardiff Central and length of operating day per day (Source: December 2019 timetable)

Origin Station	Weekday				Saturday				Sunday			
	Typical trains per hour	*First Dep.*	*Last Arr.*	*Length of operating day (hh:mm)*	*Typical trains per hour*	*First Dep.*	*Last Arr.*	*Length of operating day (hh:mm)*	*Typical trains per hour*	*First Dep.*	*Last Arr.*	*Length of operating day (hh:mm)*
Treherbert	2	05:42	23:51	*18:09*	2	05:47	23:52	*18:05*	1	08:17	23:13	*14:56*
Aberdare	1-2	05:51	23:43	*17:52*	1-2	06:22	23:43	*17:21*	1	09:53	20:43	*10:50*
Merthyr Tydfil	2	06:08	23:30	*17:22*	2	06:38	23:30	*16:52*	0.5	09:38	21:30	*11:52*
Rhymney	1	06:10	23:39	*17:29*	1	06:08	22:36	*16:28*	1	09:00	22:19	*13:19*
Abercynon	4	06:16	23:18	*17:02*	4	06:45	23:18	*16:33*	1-2	10:00	21:05	*11:05*
Pontypridd	6	05:18	23:58	*18:40*	6	05:18	23:58	*18:40*	2	08:49	22:36	*13:47*

5.2.24 The main points from the above table are as follows:

- The operational constraints on the CVL mean that the timetable is complex, particularly on the TAM lines where the challenges around single line working is combined with maintaining suitable junction margins at Abercynon and Pontypridd, as well as slotting into paths into Cardiff Central. For this reason, several of the timetables – particularly Aberdare – do not operate on a clockface timetable (i.e., the same times every hour).
- The typical frequency on the TAM lines is 2tph, although this can vary across the day. Abercynon and Pontypridd are junction stations and thus frequency is high and these stations will likely act as railheads.
- Whilst the frequency from Rhymney is typically hourly, there is a 4tph service from Bargoed (7 miles to the south of Rhymney), which is at the northern extent of the double track section.
- The length of the operating day Monday – Saturday is reasonable and in line with most urban rail services in the UK. It meets the needs of regular commuters and supports shift work to some degree. It also allows for Valleys residents to undertake leisure activities in Cardiff, albeit the time of the last departure from Cardiff Central (circa 22:30-23:00) is slightly early for those attending events in Cardiff.
- The Sunday service does however diminish significantly. Frequency is generally half or less of a typical weekday and Merthyr Tydfil reduces to 0.5tph (i.e., one train every two hours). The length of the operating day is also short, and in particular limits evening leisure opportunities in Cardiff.

5.2.25 Data from the baseline telephone survey suggests that while, as a whole, the majority of users of the rail service (74%) were satisfied with service frequency in 2019, satisfaction levels were lower for those whose most frequently used station was further north on the lines. For example, the proportion who were dissatisfied with service frequency amongst those whose most frequently used station was a Heads of the Valleys terminating station were as follows:

- Treherbert – 18% (n=2)
- Aberdare - 24% (n=12)
- Merthyr Tydfil - 32% (n=9)
- Rhymney - 25% (n=2)

Key Point: The operational complexities of the CVL network mean that the timetable is relatively complex. The TAM lines typically have a service frequency of 2tph, although this is not to a clockface timetable in all cases. There is 1tph from Rhymney, although frequency increases significantly (4tph) at Bargoed seven miles to the south. The length of operating day is generally satisfactory and in line with other UK suburban services. However, Sunday frequency and length of operating day diminishes significantly.

Station Dwell Times

5.2.26 As has been alluded to throughout this section, station dwell times can be excessive on the CVL, leading to delays and reliability issues. The analysis suggests that there are three reasons for this:

- **timetabled dwell times** at passing loops on single track sections;
- **on-train capacity issues** which can lead to longer than scheduled stops at stations; and
- lack of **level boarding** between the platform and the train.

5.2.27 The level boarding issue is considered from the perspective of the passenger in the next section. However, it is important to reflect on its significance from the perspective of the operator. There are currently **50 stations** on the CVL network where there is a step between the platform and the train, which it was estimated in the brief leads to an average dwell time of more than one minute per station.

5.2.28 The absence of level boarding can affect all passengers (e.g., those with luggage, pushchairs), but it specifically impacts on **persons of reduced mobility (PRM)**, who will require the deployment of a ramp to get onto the train. The implications for the operator are as follows:

- The Train Planning Rules for the CVL stations work on the basis of a 30-second dwell time for all DMU stock.[40] This is the elapsed time from the train stopping to its restarting after completion of station duties.
- Where ramp-based access is required, the guard must find the ramp; deploy the ramp, assist the passenger to board; stow the ramp; and then commence the door closure sequence. This process can add 2-4 minutes, which will vary depending on a number of factors.
- Ramp deployment is clearly uncertain and thus no specific allowance is made for it in the core train plan. It will however consume any performance time allowance and thus increase the scope for delay, and subsequent reactionary delay.
- The introduction of level boarding will reduce this time lost, reduce the spread of station dwell times and so improve reliability.

[40] Commentary on the Western & Wales Timetable Planning Rules 2022 version 1.0 (Network Rail, 202o), p. 99.

Key Point: Station dwell times on the CVL are often in excess of that allowed for in the Train Planning Rules, particularly when boarding and alighting PRM on busy services. This can cause direct and reactionary delays to services.

Reliability

5.2.29 The cumulative impacts of the problems and constraints with the current CVL impacts on the reliability of services. These reliability issues are explored in more detail in the next section from the perspective of the passenger, but it is important to acknowledge that such issues will have performance implications for the operator in terms of the number of services operated and 'on time at destination' arrival.

5.3 How do people travel in the study area?

5.3.1 Ahead of presenting the baseline evidence to support the 'transport problems' identified in the logic map, this section sets out in more detail how people travel within the Valleys and to / from the Valleys to / from Cardiff and further afield.

How are the CVLs used?

5.3.2 The railway industry publishes annual estimates of station usage and also records ticket sales between origin-destination pairs for the purpose of revenue allocation. These data provide valuable insights into how the CVL is used.

Passenger Entries and Exits

5.3.3 The estimates of entries and exists at each station produced by ORR have been analysed for the CVL overall and for individual line sections. The table below shows the percentage change in the total number of passenger entries and exits and compound growth between 2005/6 and 2019/20.

Table 5:6: ORR Passenger Exits and Entries 2005-06 to 2019-20

Line(s)	Line Section	2005-06	2019-20	% Change 2005-06 to 2019-20
Treherbert, Aberdare, Merthyr Tydfil and Rhymney[41]	Cardiff Queen Street along the length of all lines	7,089,843	9,355,176	32%
Treherbert	Treherbert - Trehafod	1,099,869	1,179,256	7%

[41] Excluding the City and Coryton Lines stations

Line(s)	Line Section	2005-06	2019-20	% Change 2005-06 to 2019-20
Aberdare	Aberdare - Penrhiwceiber	666,287	687,990	3%
Merthyr Tydfil	Merthyr Tydfil - Quakers Yard	392,116	622,938	59%
Treherbert, Aberdare and Merthyr Tydfil	Abercynon - Cathays[42]	2,805,090	4,170,908	49%
Rhymney	Rhymney – Heath High Level	2,382,944	3,332,930	40%
Wales		33,716,363	50,416,200	50%
Great Britain		1,601,297,692	3,007,144,054	88%

5.3.4 The main points of note from the above table are as follows:

- Passenger numbers on the CVL network as a whole grew strongly between 2005/6 and the start of the COVID-19 Pandemic in March 2019, with **overall passenger numbers growing by 32%**.
- The northern sections of the Treherbert and Aberdare Lines saw only modest growth, with passenger numbers increasing by just 7% and 3% respectively.
- In contrast, passenger numbers on the northern section of the Merthyr Line grew by nearly 60%, albeit from a lower base, while those on the Rhymney line grew by 40%.

[42] Between 2005/6 and 2008/9 data for Abercynon Station was spilt into two stations, Abercynon North and Abercynon South

Key Point: Passenger numbers on the CVL network grew strongly in the 15-years prior to the pandemic, growing by 32% overall. This one-third growth was despite a largely static supply-side and known problems around seat capacity and reliability. Growth rates on each line and indeed individual sections of each line differed, with the highest overall growth on the southern section of the TAM lines (Abercynon to Cathays) which already benefits from a higher frequency service.

Station-to-Station Origin Destination Pairs

5.3.5 The station-to-station origin-destination pairs further develops the volumetric passenger entries and exits data by providing insights into the end-to-end journeys being made by passengers. The table below provides a breakdown of the proportion of two-way trips for selected stations on each CVL to Cardiff, other stations on the CVL, and stations beyond the Cardiff Capital Region.[43]

[43] It should be noted that these relatively aggregate levels of spatial definition are used because there are commercial confidentiality issues around LENNON data, particularly in terms of reporting individual station- -to-station flows.

Table 5:7: Station-to-station origin-destination pairs for destination sectors

	Cardiff BR[44]/Queen Street/ City Centre	Cardiff Bay	Other stations in Cardiff Local Authority area	Other Stations on CVLs	Stations beyond Cardiff Capital Region
Treherbert	50%	4%	4%	37%	1%
Aberdare	52%	4%	5%	29%	3%
Merthyr Tydfil	40%	3%	5%	41%	4%
Rhymney	50%	4%	7%	30%	1%
Abercynon	56%	6%	7%	25%	2%
Pontypridd	42%	5%	7%	35%	3%
Bargoed	57%	4%	6%	25%	3%
Caerphilly	58%	3%	9%	17%	4%

5.3.6 The main points of note from the above table are as follows:

- For each of the stations listed, Cardiff BR / Queen Street / Central is by some distance the most popular single origin / destination, highlighting the city's role as the main employment, service and leisure centre for Valleys communities. Outbound flows to Cardiff are significantly greater than inbound flows (not shown).
- However, there is also significant local traffic on the line, with the majority of these trips to / from regional service / administrative centres such as Merthyr Tydfil or Pontypridd for example.
- Despite its role as a major employment and leisure centre, flows to / from Cardiff Bay are relatively small, which may in part reflect the requirement to interchange for onward travel to the Bay (and vice versa).
- It is also notable that flows beyond Cardiff are negligible – the CVL network is therefore a largely self-contained entity. This may in part be due to the relatively long journey times for travelling into Cardiff to make a connection, which could make road-based travel preferable (either all the way to the destination or to a station such as Bristol Parkway).

[44] In the ticketing system of the British railway network, tickets are normally issued from individual stations. However, it is recognised that for groups of some stations which are close together, it would be unduly restrictive to limit the ticket to a single station. For this reason, station groups are defined in the national fares manual - these groups combine a number of stations which are close together under a single ticket name (in this context, 'Cardiff BR'), which is used by some ticket issuing authorities. Where tickets are sold to Cardiff BR, it is not possible to split out which station the journey was ultimately travelling to or from.

Key Point: Travel on the CVL network is dominated by travel to Cardiff and, to a lesser degree, local-to-line travel. There is very little travel to destinations further afield.

5.3.7 In summary, pre-pandemic rail demand was growing strongly despite the well-documented problems on the CVL network. LENNON data suggest that this demand has been heavily concentrated in the Capital Region.

Valleys Bus Network

5.3.8 The bus network in the Valleys provides both end-to-end (Heads of Valleys to Cardiff) and local connections between settlements. A summary of the main bus services which compete with the railway network is provided in this section. Information is provided on all bus routes which connect at least two of the communities served by the railway line and local bus services are not included.

5.3.9 The majority of bus services listed connect a small number of communities along the railway network. During the stakeholder engagement undertaken to inform the baseline, the services below were identified as the strategic routes which run along the relevant railway corridors. It is our understanding that these routes are commercially operated.

- Service X4/T4 – operated by Stagecoach which provides a connection between Merthyr and Cardiff
- C8 – operated by Adventure Travel which provides a connection between Taff's Well and Cardiff Bay
- Service 60/61 – operated by Stagecoach which provides a connection between Aberdare and Pontypridd
- Service 120 – operated by Stagecoach which provides a connection between Treherbert and Trefforest
- Service 130 – operated by Stagecoach which provides a connection between Treherbert and Pontypridd
- Service 132 – operated by Stagecoach which provides a connection between Porth / Pontypridd and Cardiff

5.3.10 Information on the frequency of each of these services is provided in the table below.

Table 5:8: Bus Services: Service Frequency

Bus Service	Route	Operation	Frequency (services/day)		
			Mon-Fri	Sat	Sun
C8	Taff's Well – Cardiff Bay	Mon – Sun	29	29	25
T4	Cardiff – Merthyr Tydfil	Mon – Sun	13	13	6
X4	Cardiff - Merthyr Tydfil	Mon – Sat	13	13	-
60/61	Pontypridd – Aberdare	Mon – Sat	45	45	-
120	Caerphilly – Blaencwm	Mon – Sun	12	12	5
130	Pontypridd – Blaencwm	Mon – Sun	15	15	6
132	Cardiff – Maerdy	Mon – Sun	45	45	10

5.3.11 A number of routes are reasonably frequent, namely the 60/61 (which operates Monday-Saturday with approximately four buses per hour), and service 132 (which operates Monday-Sunday with approximately four buses per hour). However, outside of these routes, service frequency is relatively low. In addition, Sunday connectivity is very limited and, on some routes, there is no Sunday service.

Bus Journey Times

5.3.12 Table 5.8 compares the journey times between relevant origin and destination rail stations when travelling via the above bus services compared to travelling by rail. This information is taken from the timetables.

Table 5:9: Journey Time Comparison – Bus versus Rail

Bus Service	Rail line in competition	Origin Rail Stations	Destination Rail Stations	Journey time (minutes)					
				AM			PM		
				Bus	Rail	Diff	Bus	Rail	Diff
C8	Treherbert, Aberdare, Merthyr and Cardiff Bay Line	Taff's Well	Cardiff Bay	53	57	+4	53	57	+4
X4/T4	Merthyr Line	Merthyr Tydfil	Cardiff Central	65	62	-3	65	62	-3
60/61	Aberdare Line	Aberdare	Pontypridd	60	32	-28	60	32	-28
120	Treherbert Line	Treherbert	Trefforest	95	36	-59	95	36	-59
130	Treherbert Line	Treherbert	Pontypridd	75	33	-42	75	33	-42
132	Treherbert Line	Porth Station	Cardiff Central	75	23	-52	85	23	-62

Key Point: Despite the relatively long journey times on the CVL, the train generally offers a higher service frequency and lower journey times than the bus when the timetables are compared. More generally, the only end-to-end connection is the circa hourly service between Merthyr Tydfil and Cardiff Central, highlighting that bus operators do not see competition on 'to Cardiff' routes as a viable proposition in most cases.

Valleys Road Network

5.3.13 The figure below shows the road network in the study area.

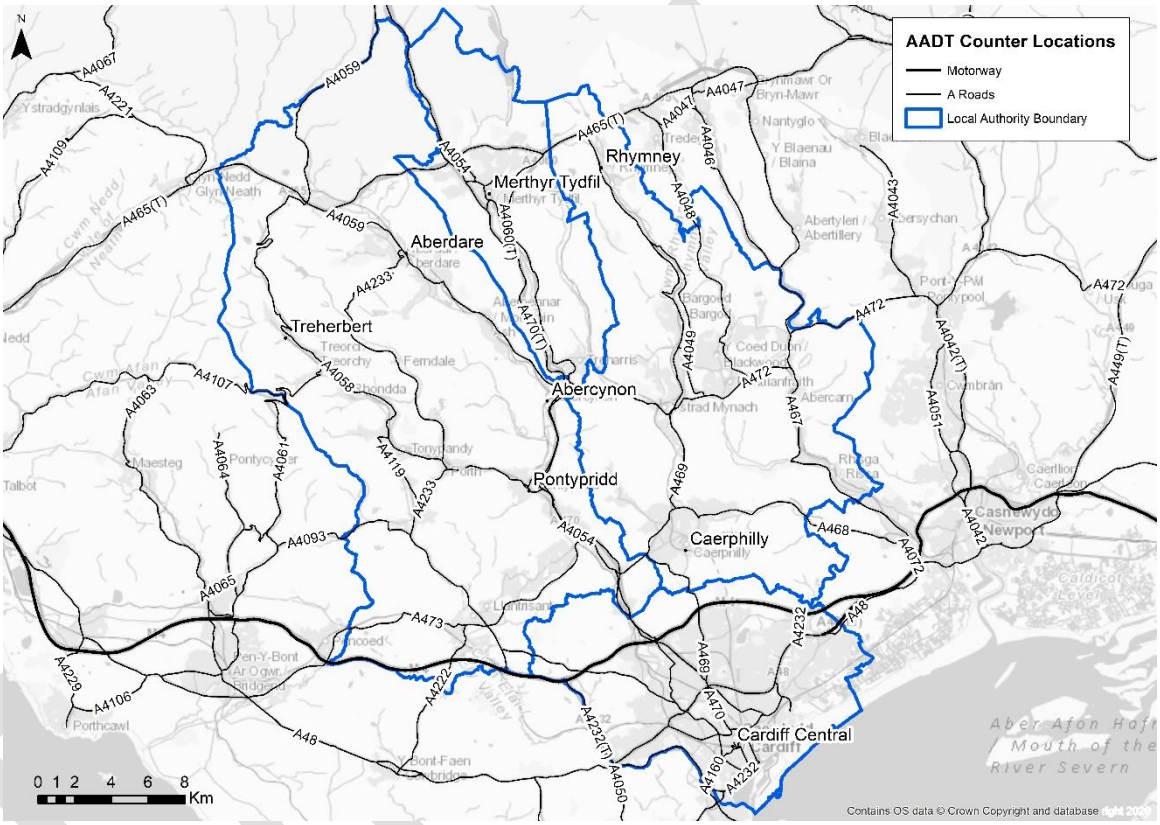


Figure 5.3: Study Area Road Network

5.3.14 The key road links from the Valleys into Cardiff and Cardiff Bay are:

- A470 – connects Merthyr Tydfil to Cardiff City Centre via Abercynon and Pontypridd. It is the primary north-south trunk road in the Valleys and connects into the M4 at Junction 32 (Coryton) and the A465 Heads of the Valleys Road, which is currently being upgraded.
- A4058 – connects Treherbert to Pontypridd
- A4059 – connects Aberdare to Abercynon
- A4049 and the A469 – which route through the Caerphilly local authority

- A4119 – connects Tonypandy and the M4 at Junction 34 (Miskin Interchange)
- A4232 – the Cardiff Bay link road connecting Junction 33 of the M4 to Cardiff West and Cardiff Bay

5.3.15 The A470 is the primary route into Cardiff City Centre for much of the Valleys, with the A4058, A4059, A4049 and the A469 all feeding into this trunk road.

5.3.16 The A4119 and the A4232 provide the quickest route to Cardiff Bay for some in the west of Rhondda Cynon Taf, although travel to Cardiff is generally via the A470, joining at Pontypridd.

Traffic Count Data

5.3.17 Table 5:10 shows the average annual daily traffic (AADT) recorded at DfT count sites on the above links in 2009 and 2019 as well as the percentage change over this period. A review of the longer time series demonstrates that these years were not outliers. These data are based on traffic recorded at nine count sites, the location of which are shown in the table below.

Table 5:10: AADT Traffic Volumes 2009-2019 (Source: Department for Transport)

Count ID	Location	Traffic Volume		% Change Traffic Volume 2009-2019
		2009	2019	
50541	A470 between the A469 and the M4	34,418	33,082	-4%
20547	A470 between Pontypridd and the M4	63,189	65,514	4%
30547	A470 between Abercynon and Pontypridd	48,432	51,400	6%
99588	A470 between Merthyr and Abercynon	30,184	25,196	-17%
78472	A4059 between Aberdare and Abercynon	19,375	20,881	8%
20627	A4058 between Treherbert and Pontypridd	13,341	12,371	-7%
50509	A4232 between M4 and Cardiff Bay	53,919	63,879	18%
78486	A4119 between Tonypandy and the M4	27,237	30,522	12%

Count ID	Location	Traffic Volume		% Change Traffic Volume 2009-2019
		2009	2019	
70096	A469 to south of Caerphilly	16,185	16,480	2%

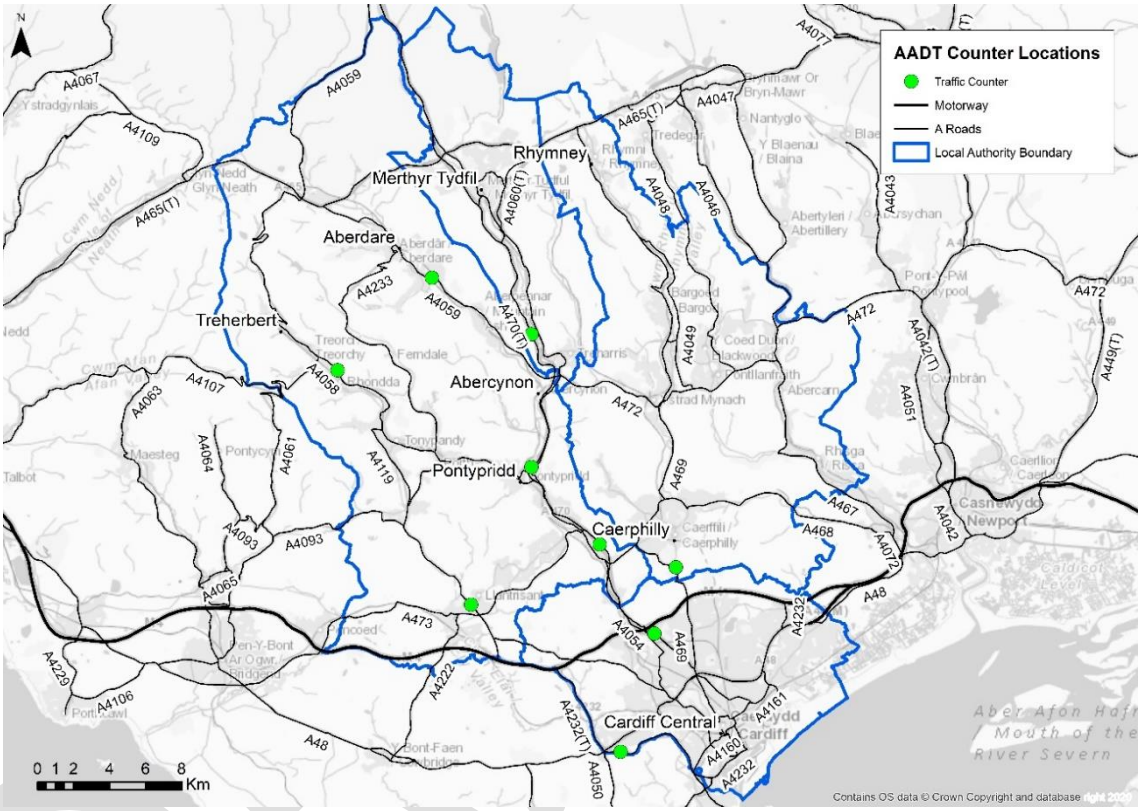


Figure 5.4: AADT Traffic Count Locations (Source: Department for Transport)

5.3.18 The above data suggests that, overall, AADT flows on the primary Valleys routes have been increasing, with some exceptions. It is notable that several of the most significant increases have occurred in the areas closest to Cardiff and the M4 corridor. This could potentially reflect the use of the car over the train due to capacity / reliability concerns with the latter, although there is no direct evidence to support this point.

Key Point: Overall, there was strong growth in both rail and road travel between the Valleys and Cardiff over the 10-15 year pre-pandemic period. This likely reflects the economic success of Cardiff, its growing job market and its expanded leisure offer.

Active Travel

5.3.19 As identified within the logic maps, improvements to the railway network have the potential to lead to:

- more walking / cycling as part of a journey as people transfer from car travel to rail travel and walk or cycle to / from the station; and
- reduced walking / cycling for short trips in urban areas as people switch their main mode from walking or cycling to travelling by rail.

5.3.20 There is no systematic recording of active travel journeys in the study area. To this end, in the baseline telephone survey, respondents were asked to indicate their typical main mode used in 2019 to:

- access the station they used most frequently (rail users only)
- access their workplace and place of education
- travel to Cardiff City Centre or Cardiff Bay for leisure purposes
- travel to other Valley towns / villages for leisure purposes

5.3.21 The figure below shows the proportion of people in each case who walked / wheeled[45] / run or cycled.

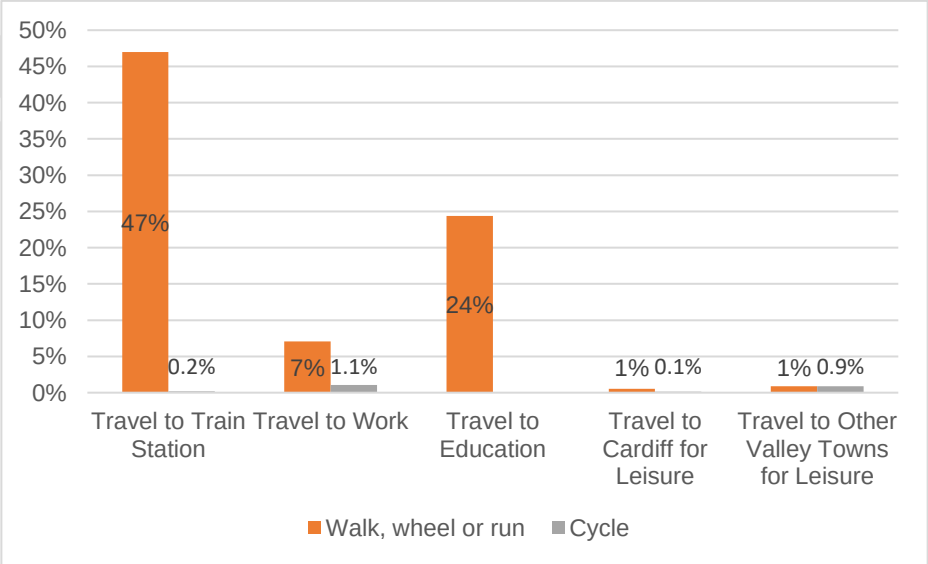


Figure 5.5: Baseline Telephone Survey: Levels of walking / wheeling / running and cycling in 2019 (n=584)

[45] Wheeled is typically used to describe wheelchair use and other wheeled transport such as scooters

5.3.22 The main points of note from the above figure are:

- cycling levels amongst Valleys communities for each of the above purposes are very low;
- almost 50% (n=301) of people who currently use the railway network walk to their most used station, highlighting that most stations have a relatively local catchment;
- almost a quarter of respondents walk / wheel / run as their main mode to their place of education and 7% (n=33) walk / wheel / run as their main mode to their place of employment; and
- as would be expected given the distances involved, fewer than 1% walk / wheel / run or cycle as their main mode of travel to Cardiff and the other Valleys settlements for leisure purposes.

Key Point: The Telephone Survey found that almost half of all journeys to the local station are made by walking, wheeling or running, highlighting the local catchment of most Valleys stations. Cycling penetration is however much lower, with only 0.2% of respondents cycling to the station.

Travel-to-Work

5.3.23 The final section of this brief profile of Valleys travel behaviour is consideration of travel-to-work patterns. These data are based on the 2011 Census. While this is the most recent dataset on this topic available, it should be noted that:

- the data are now over ten years old and should therefore be interpreted with a degree of caution, particularly given the likely long-term increase in home-working as a result of the pandemic (which will emerge from the 2021 Census and will be picked-up in any future evaluation); and
- this dataset only considers those who travel to work (i.e., commuters). It does not include those who work mainly at or from home.

Origins and Destinations

5.3.24 Table 5:11 **Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**shows the percentage of people resident in each study area local authority who travel elsewhere in the Cardiff Capital Region or beyond for work, with the ‘top three’ destinations for each highlighted in red.

Table 5:11: Percentage of people resident in each study area local authority who travel to elsewhere in Cardiff Capital Region for work (Source: Census 2011)

To: / From:	Blaenau Gwent	Bridgend	Caerphilly	Cardiff	Merthyr Tydfil	Monmouth-shire	Newport	Rhondda Cynon Taf	Vale of Glamorgan	Torfaen	Rest of UK
Caerphilly	2%	1%	48%	18%	3%	1%	11%	5%	1%	4%	5%
Cardiff	0%	2%	2%	76%	1%	1%	4%	4%	4%	1%	6%
Merthyr Tydfil	2%	1%	8%	9%	59%	1%	1%	10%	1%	1%	6%
Rhondda Cynon Taf	0%	5%	4%	19%	4%	0%	2%	57%	3%	1%	6%

5.3.25 The main points of note from the above table are as follows:

- Intra-local authority movements are dominant in all cases, with highly self-contained travel-to-work markets. As would be expected, this is particularly the case in Cardiff, where three quarters of residents of the city work within its boundaries.
- Cardiff is the most common external destination for residents of Caerphilly and Rhondda Cynon Taf accounting for around one fifth of travel-to-work movements (11,992 people in Caerphilly and 16,086 RCT).
- It is notable however that for Merthyr Tydfil, this flow is much lower at 9%. Whilst this local authority area is geographically more distant from Cardiff, the settlement of Merthyr Tydfil is only 23 miles from the city, so travel-to-work flows could reasonably be expected to be stronger. This likely reflects the relatively long journey times by road and public transport and poor journey time reliability for road.
- Movements from the Valleys local authorities to neighbouring areas for work purposes are minimal, with only Merthyr Tydfil -> RCT accounting for more than 10% of total travel-to-work movements.

5.3.26 To provide further context, Figure 5.6 shows the percentage of people living in each area who travelled to work in Cardiff Local Authority area and Figure 5.7 shows the percentage of people living in each area who travelled to work in Cardiff City Centre and Cardiff Bay

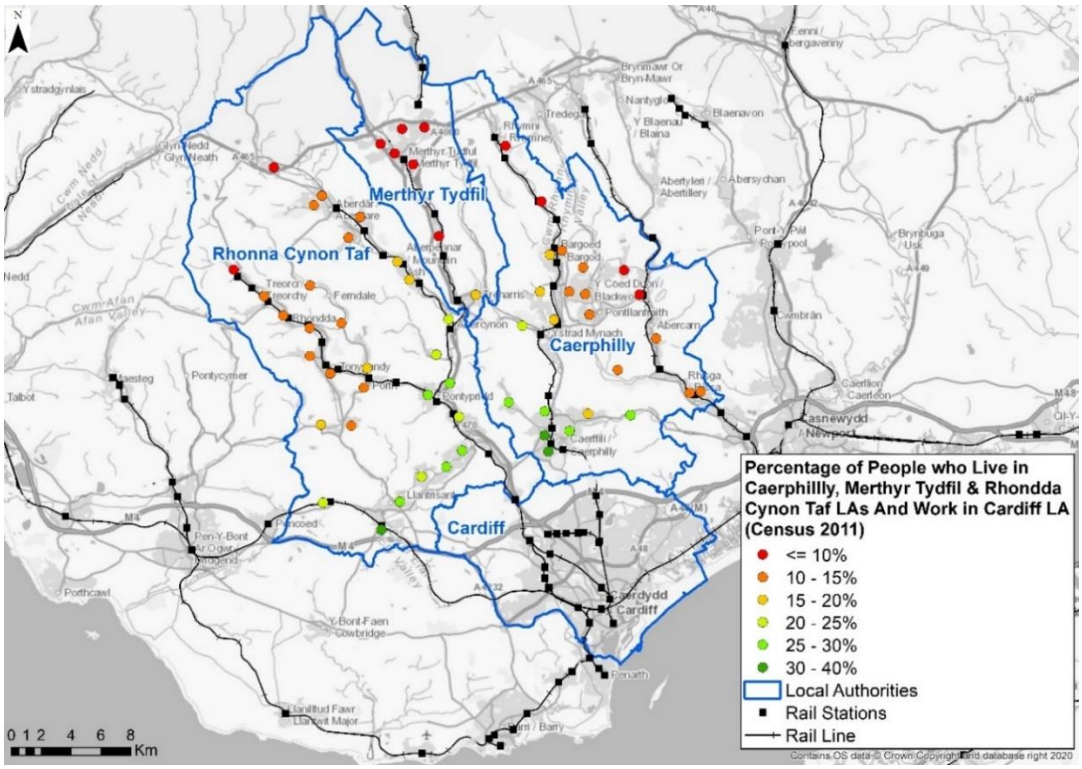


Figure 5.6: Percentage of people who live in Caerphilly, Merthyr Tydfil and Rhondda Cynon Taf who work in Cardiff Local Authority (Source: Census 2011)

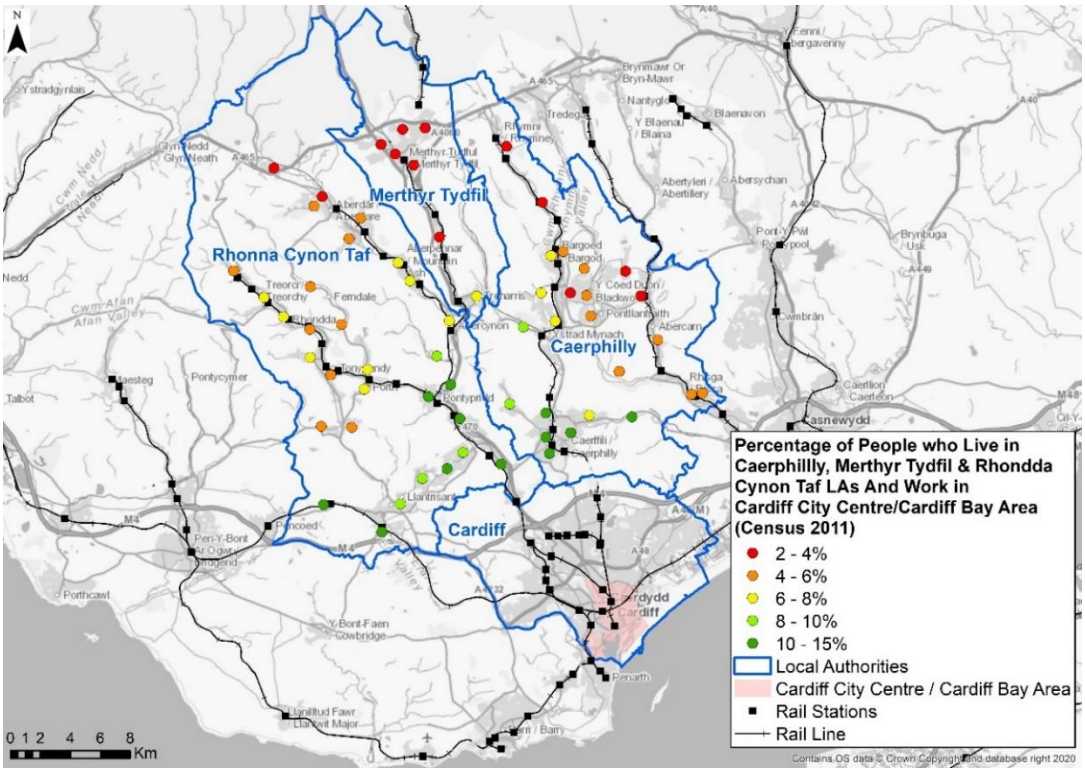


Figure 5.7: Percentage of people who live in Caerphilly, Merthyr Tydfil, and Rhondda Cynon Taf who work in Cardiff City Centre / Cardiff Bay (Source: Census 2011)

5.3.27 The above figures starkly highlight the rapid drop-off in influence of the Cardiff travel-to-work market. The majority of people travelling into the Cardiff local authority area and the city centre / Cardiff Bay live south of Abercynon and Pontypridd, with much smaller percentages of people travelling from the Heads of the Valleys.

5.3.28 Whilst in the southern end of the Valleys, there are relatively high proportions (25-40%) travelling into the Cardiff local authority area, the proportion travelling into Cardiff City Centre and the Bay – the locations for which rail travel provides the greatest comparative benefit in terms of journey times compared to car or bus – is far smaller (8-15%).

Key Point: The travel-to-work market in the study area local authorities is largely self-contained. There are significant flows to Cardiff from Caerphilly and Rhondda Cynon Taf, although the Valleys -> Cardiff movement diminishes sharply in Merthyr Tydfil. This is likely a reflection of long journey times and poor journey time reliability despite the relatively short distances in question.

Mode Share

5.3.29 Figure 5.8 shows the travel-to-work mode share of those living in Caerphilly, Merthyr Tydfil, and Rhondda Cynon Taf who travel to work in Cardiff Local Authority Area and Figure 5.9 shows the travel-to-work mode share of those living in these areas who travel-to-work in Cardiff City Centre / Cardiff Bay. It is noted that a small percentage of respondents in the latter are recorded as walking – as is recorded in the dataset and may be a result of respondent error and / or changes to the dataset which are made prior to publication in order to protect against disclosure of personal information[46].

[46] On the latter point, a note in the original dataset states *"It is noted that in order to protect disclosure of personal information, records have been swapped between different geographic areas. Some counts will be affected, particularly small counts at the lowest geographies".*

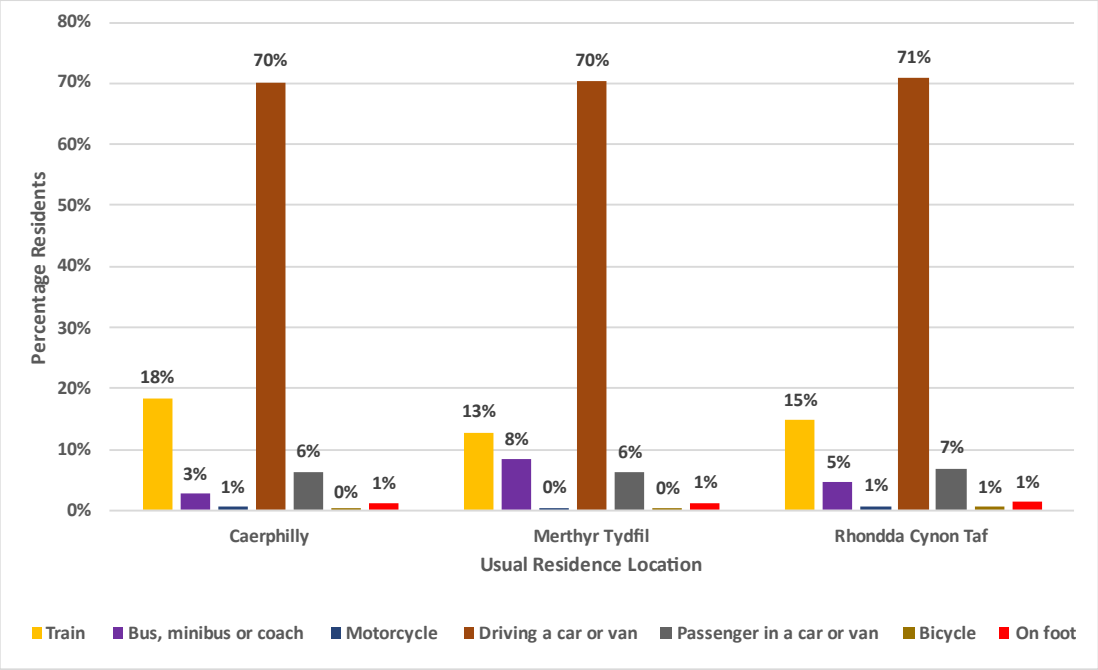


Figure 5.8: Travel to Work Mode Share of people living in Caerphilly, Merthyr Tydfil, and Rhondda Cynon Taf Local Authorities who work in Cardiff Local Authority Area (including Cardiff City Centre and Cardiff Bay) (Source: Census 2011)[47]

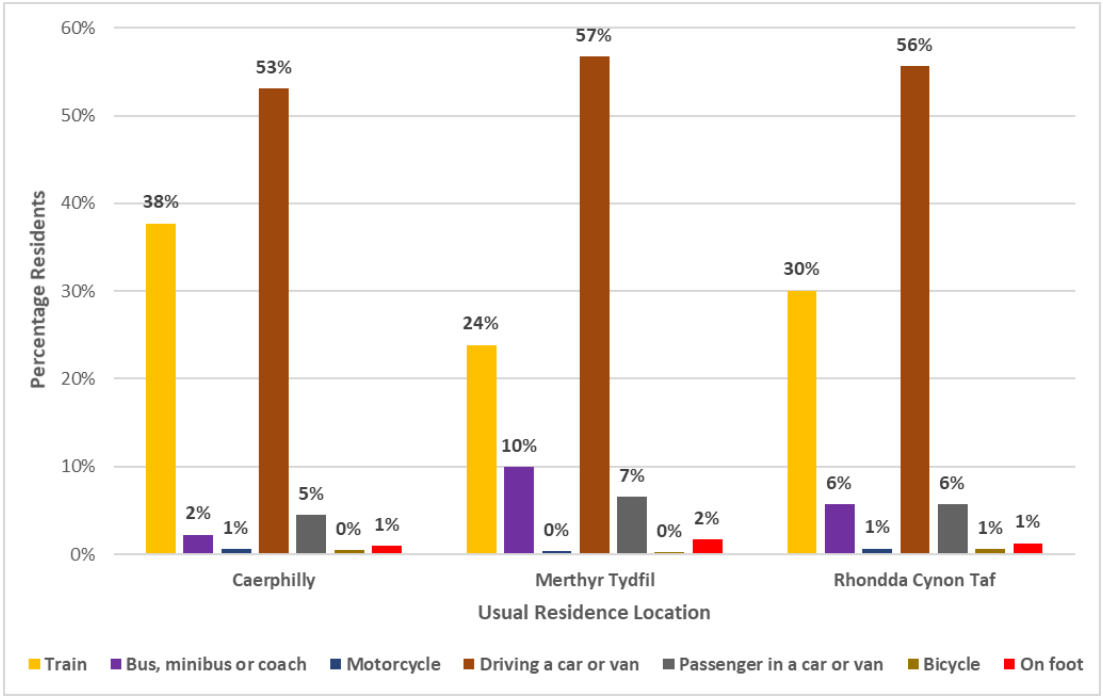


Figure 5.9: Travel to Work Mode Share of people living in Caerphilly, Merthyr Tydfil, and Rhondda Cynon Taf Local Authorities who work in Cardiff City Centre / Cardiff Bay (Source: Census 2011)

[47] Note – the 'on foot' proportions have been drawn directly from the data but appear unlikely given the distances.

5.3.30 The main points of note from the above figures are as follows:

- Over three quarters of all travel-to-work trips to the Cardiff local authority area are made by car, either as a driver or passenger. Rail mode share (Caerphilly 18%; Merthyr Tydfil 13%; and Rhondda Cynon Taf 15%) is significantly greater than bus mode share, highlighting the limited bus network in the study area.
- Car is also the dominant mode for travel into Cardiff itself, with 58% in Caerphilly, 64% in Merthyr Tydfil and 62% in Rhondda Cynon Taf of journeys made as a car van or passenger. Rail does however account for a greater proportion of journeys to Cardiff City Centre / Bay, particularly for Caerphilly (38%) and Rhondda Cynon Taf (30%).
- Rail mode share from Merthyr Tydfil is smaller (24%), partly due to higher levels of car-based travel but also greater bus mode share given the hourly direct bus service to Cardiff.

Key Point: Travel by car, either as a driver or passenger, is the dominant mode of travel-to-work for journeys both to the Cardiff local authority area overall and for the city centre and Cardiff Bay. Rail mode share is higher for journeys to the city centre and Bay (as would be expected), but significantly lags car-based travel. Bus-based travel is only of any prominence in Merthyr Tydfil, with its direct hourly connection to Cardiff.

5.4 Demand-Side

5.4.1 This section provides evidence to support the stated transport problems for users of the Valleys transport network, as set out in the 'Transport User' section in the 'Context' stage of the logic maps. Unlike the supply-side analysis, which was concentrated on the CVL only, this analysis is multi-modal given that people weigh-up the benefits and disbenefits of the different means of travel before embarking on their journey.

Journey Times

5.4.2 As was highlighted in the previous section, car-based travel is dominant for travel between the Valleys and Cardiff, at least for travel-to-work. This is in-part because rail journey times, particularly from the Heads of the Valleys are very slow, with average speeds around 25mph noted in the previous section.

5.4.3 By way of context, Table 5.12 shows typical journey times between selected origins and destinations within the study area by rail and road during the AM peak and inter-peak period. Rail journey times are based on those within the December 2019 timetable. Road journey times are taken from Inrix[48] and represent the average weekday journey time (excluding Friday) between March and November 2019[49].

[48] Inrix is a traffic dataset which is based on floating vehicle data from a variety of sources, including in-car GPS and driver and passenger smartphones.

[49] Due to gaps in the data, the month of August was excluded from the analysis

Journeys where road is quicker than rail are highlighted in red and journeys where rail is quicker than road are highlighted in green.

Table 5:12: AM and IP Road and Rail Journey Times

		AM (07:00-09:00)			IP (11:00-13:00)		
Origin	**Destination**	**Rail**	**Road**	**Diff**	**Rail**	**Road**	**Diff**
Treherbert	Pontypridd	33	32	-1	33	29	-4
	Cardiff Central	65	61	-4	65	55	-10
	Cardiff Bay[50]	69	59	-10	69	52	-17
Aberdare	Pontypridd	32	25	-7	32	22	-10
	Cardiff Central	62	58	-4	62	47	-15
	Cardiff Bay	68	56	-12	68	48	-20
Merthyr	Pontypridd	30	19	-11	30	17	-13
	Cardiff Central	62	54	-8	62	44	-18
	Cardiff Bay	67	52	-15	67	44	-23
Rhymney	Caerphilly	40	35	-5	43	34	-9
	Cardiff Central (via A470)	57	60	+3	63	50	-13
	Cardiff Bay	63	62	-1	68	53	-15

Key Point: Travel by rail to Cardiff and regional centres is generally uncompetitive with road, particularly in the inter-peak period where road congestion is less prominent. This is particularly the case with Cardiff Bay, where the requirement to interchange adds to an already slow journey time.

Rail Crowding

5.4.4 A number of consultees noted that there was significant crowding on the AM peak services into Cardiff City Centre prior to COVID-19, with some consultees reporting that people were frequently left on the platform at Cardiff stations due to being unable to board the train. Indeed, this is understood to be a long-term problem where the operational constraints on the network mean that the service regularly cannot meet the demand placed on it.

[50] Rail journeys on the CVL to Cardiff Bay require interchange at Cardiff Queen Street. The convention in transport modelling is to assume that the wait time is half the headway (the interval between trains). In 2019, there were 5tph between Cardiff Queen Street and Cardiff Bay, which gives a headway of 12 minutes and a wait time of 6 minutes. This wait time has been incorporated into all rail journey times to Cardiff Bay.

5.4.5 Available data on crowding is limited. TfW completed a sample of rail counts on services on each of the CVLs between 19/05/2019 and 08/12/2019. This dataset includes the seating and standing capacity as well as an average count of passengers taken as the train departed different stations. However, several caveats with these data should be noted including:

- the counts were collected manually by conductors and therefore the data may underestimate levels of crowding due to the difficulties (and time commitment on busy lines with multiple stops) involved in undertaking manual counts on overcrowded services.
- several of the services were only surveyed once and there are no notes as to external factors which may have affected them e.g., a rugby match in Cardiff.
- The data was collected between May and December which includes the school holiday period when the number of passengers is likely to be lower.

5.4.6 Tables 5.13-5.15 show the total number of passengers recorded via this dataset and the proportion of these who were seated or standing. Where '-' is shown this indicates that there are no counts covering this service / time period. Overall, the majority of people recorded were seated, however, there were reasonable proportions standing on each route. This data has been included as there may be benefit in undertaking a repeat analysis in the outcome evaluation. However, the above limitations should be noted.

Table 5:13: Proportion of passengers seated / standing from the sample – Weekday

Line	Total Count	Seated	Standing
Aberdare to Cardiff	25,452	95.6%	6.1%
Merthyr Tydfil to Cardiff	42,016	97.4%	3.5%
Treherbert to Cardiff	24,221	96.7%	2.5%
Rhymney to Cardiff	56,360	96.4%	3.9%

Table 5:14: Proportion of passengers seated / standing from the sample – Saturday

Line	Total Count	Seated	Standing
Aberdare to Cardiff	6,066	100.0%	0.0%
Merthyr Tydfil to Cardiff	14,208	93.8%	6.2%
Treherbert to Cardiff	8,389	88.4%	11.6%
Rhymney to Cardiff	12,590	93.5%	6.5%

Table 5:15: Proportion of passengers seated / standing from the sample – Sunday

Line	Total Count	Seated	Standing
Aberdare to Cardiff	-	-	-

Line	Total Count	Seated	Standing
Merthyr Tydfil to Cardiff	-	-	-
Treherbert to Cardiff	2,829	100.0%	0.0%
Rhymney to Cardiff	3,059	80.9%	19.1%

5.4.7 Data from the baseline telephone survey suggests that a quarter of rail users (n=129) were dissatisfied with the ability to get a seat on the train and 24% (n=101) were dissatisfied with the ability to get on the train at all (i.e., the train not being too overcrowded). This is somewhat inconsistent with the data above and underlines the above point regarding the limitations of the above dataset. In addition, in terms of non-users, 31% (n=138) identified 'it is too difficult to get a seat on the train' and 34% (n=149) identified 'the train is too overcrowded when I want to travel' as reasons for their limited use of the network. It should be noted that perceptions of capacity can be skewed by occasions when an individual has been unable to get on a train.

Key Point: Lack of capacity – the ability to get a seat on the train and in some cases the ability to get on the train at all – has been a long-term problem on the CVL. This will particularly impact the approaches to Cardiff, where the trains will be at their busiest. However, capacity utilisation data are not consistently and systematically collected and thus the problem is not fully understood. The telephone survey does however provide strong evidence of capacity concerns amongst CVL users and highlights that the perceptions of a lack of capacity are a factor in non-use.

Reliability

5.4.8 As noted in the supply-side baseline, the current operational constraints on the CVL can make it challenging to maintain a reliable service. There are two components to reliability - cancellations and punctuality – each of which are explored in more detail below.

Cancellations

5.4.9 A cancellation is where a booked service does not complete all or part of its journey. The figure below shows the percentage of cancellations on the CVL between April 2019 and February 2020.

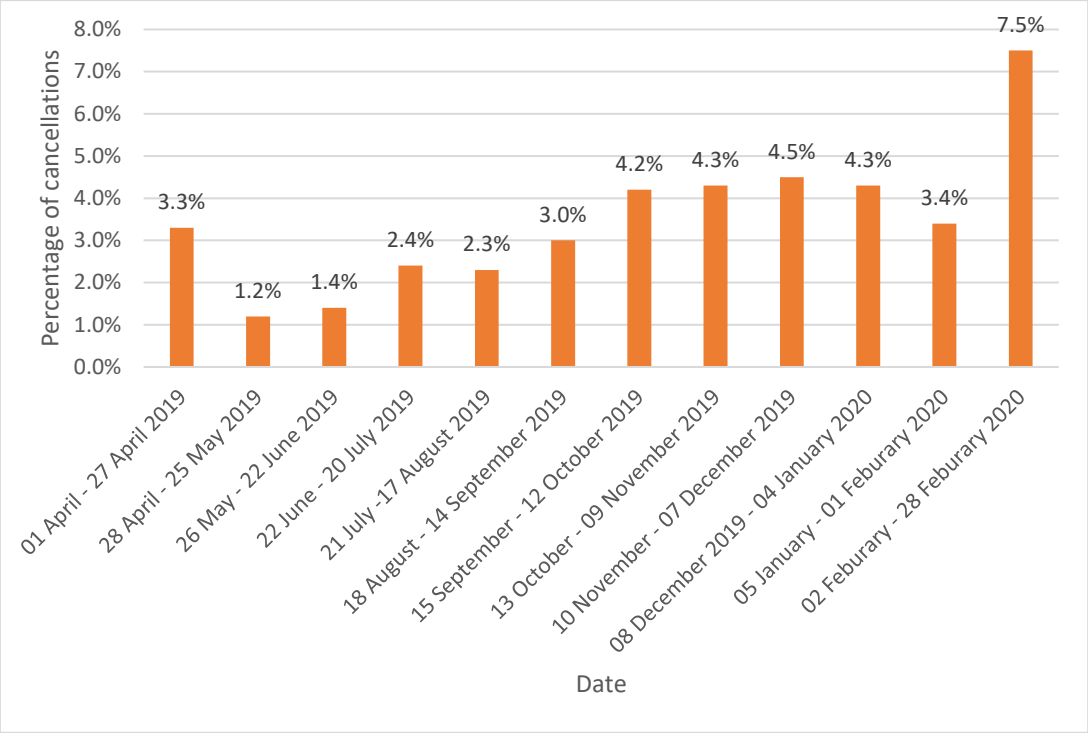


Figure 5.10 Percentage of Cancellations from 1st April 2019 – 28th February 2020 (Source: Transport for Wales)

5.4.10 The main points of note from the above graph are as follows:

- Overall, the proportion of cancellations on the CVL is broadly in step with those on the other TfW networks (not shown)
- The number of cancellations on the CVL broadly increased over the period. However, cancellations are in part seasonal with a higher proportion during the Winter months when weather is typically poorer.
- The peak in February 2020 relates to Storm Dennis which resulted in widespread flooding across the South Wales Valleys and resulted in lengthy closures to the Aberdare, Treherbert and Ebbw Vale Lines.

5.4.11 Data from the baseline telephone survey suggests that, whilst the majority of users of the rail service were satisfied with reliability in 2019, a reasonable proportion (13%, n=74) were dissatisfied. In addition, in terms of non-users, 28% (n=131) identified 'the train being unreliable' as a reason for their limited use of the network suggesting that there is a perception of unreliability.

Short-Forming

5.4.12 Short-forming is a situation where a service operates with fewer carriages than are booked. In the context of the CVL, this is typically Class 150 stock operating as two rather than four car sets. Short-forming is a frequent complaint for passengers across the UK and TfW is unique amongst Train Operating Companies in that they actually maintain a record of short-formed services. The figure below shows the

percentage of short formations on the Valley Lines between April 2019 and February 2020.

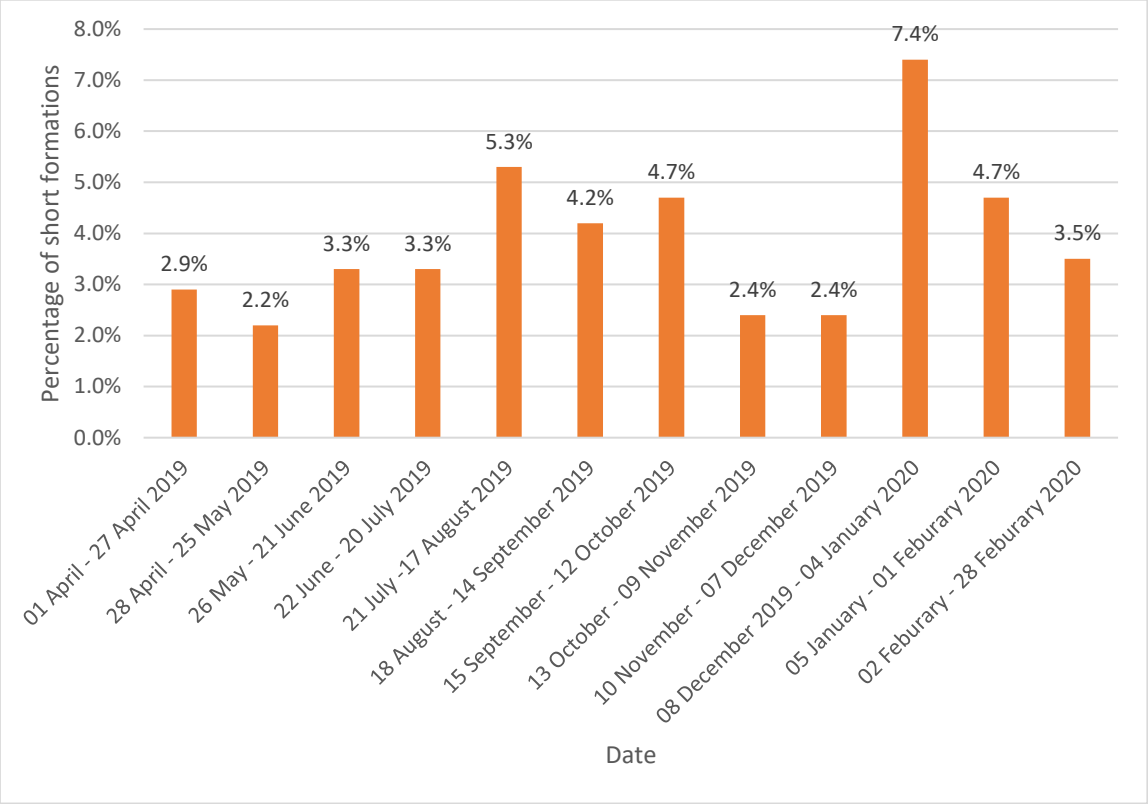


Figure 5.11 Percentage of Short Formations from 1st April 2019 – 28th February 2020 (Source: Transport for Wales)

5.4.13 The main points of note from the above graph are as follows:

- The proportion of short-formed services over this period ranged from a low of just over 2% in April / May 2019 to a high of nearly 7.5% in December / January 2020.
- Whilst comparable data are not available for other UK suburban networks, short-forming does appear to be an issue at times on the CVL. This is significant as train formations on the CVL are already relatively short (2-car, max 4-car), compared to other UK suburban networks where 6, 8 and 12 (largely in South-East England) car formations typically operate, and often at much higher frequencies.

Punctuality

5.4.14 The figure below shows the proportion of station calls that were arrived at early, on time, or up to three minutes late on each of the lines which will be impacted by the improvements. It is noted that TfW took over the operation of the services in October 2018.

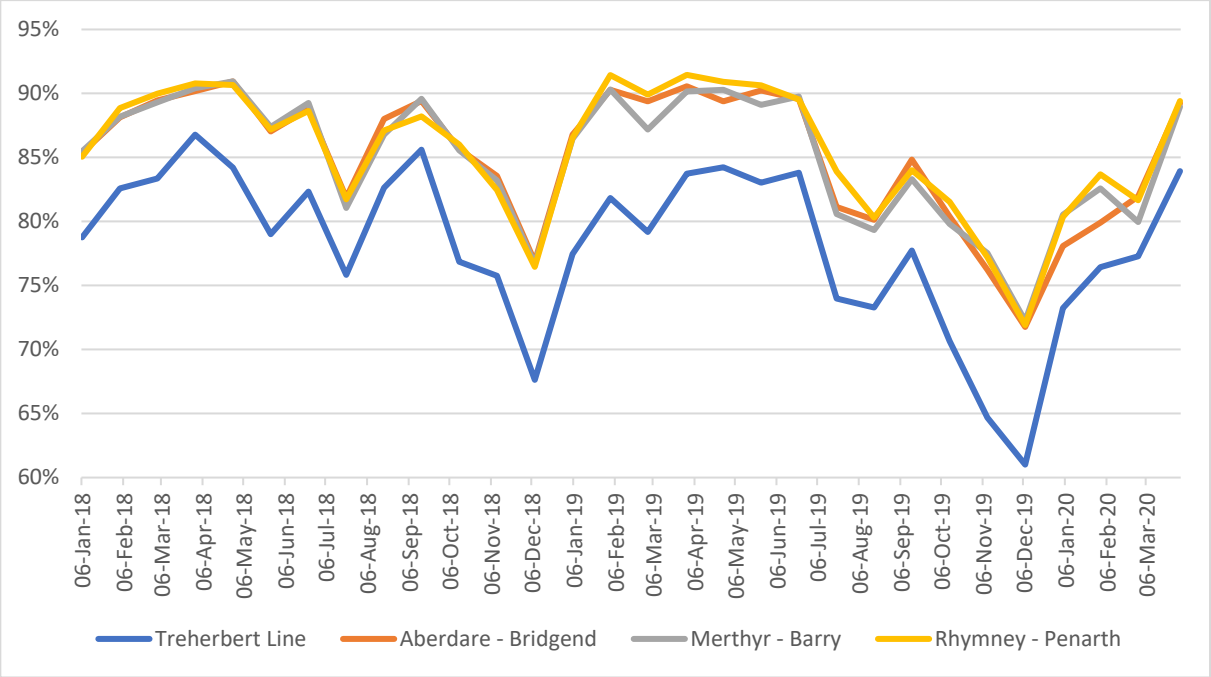


Figure 5.12: Proportion of station calls that were arrived at early, on time, or up to 3 minutes late (Source: TfW Rail Performance Data)

5.4.15 The main points of note from the above figure are as follows:

- As is common across the UK, there is a seasonal pattern to performance, with autumn and winter performance tending to be poorer than spring and summer.
- Overall, the Treherbert Line consistently performs less well than the other lines. During 2019, on average 87% of station calls on the Rhymney Line and 86% of station calls on the Aberdare and Merthyr Tydfil Lines were early, on time, or up to three minutes late compared to just 79% on the Treherbert Line. A large part of this delay is likely to be caused by the long single-track section between Treherbert and Porth, with just a single static passing loop at Ystrad Rhondda.
- With the exception of the Treherbert Line, the CVL tend to perform relatively well when compared to the TfW 2019-20 average (79%).[51]

5.4.16 Data from the baseline telephone survey suggests that, whilst the majority of users of the rail service were satisfied with punctuality in 2019, a reasonable proportion (10%, n=61) were dissatisfied. In addition, in terms of non-users, 22% (n=107) identified 'the train often running late' as reasons for their limited use of the network.

[51] https://dataportal.orr.gov.uk/statistics/performance/passenger-rail-performance/ - figures for TfW period 2019/20 for arrival at station within three minute of published time.

Key Point: Reliability is an issue for passengers across the CVL. As well as service cancellations and short-forming, punctuality can be a problem. Around 85% of station calls on the Aberdare, Merthyr Tydfil and Rhymney lines arrived early, on-time or within three minutes of their published arrival time in 2019, although the figure for Treherbert line is 79%. Whilst broadly in line with the TfW average, this does still imply that 1-2 trains in every ten run late. There is some evidence of dissatisfaction with punctuality amongst CVL users (10% of survey respondents), whilst around one fifth of non-users cite punctuality as a reason for not travelling on the CVL. Reliability generally was expressed as an issue of concern through the survey.

Passenger Experience

5.4.17 The lack of investment in the CVL over a long period has led to a poor passenger experience in many respects. The issues of reliability and crowding have already been outlined and this section therefore focuses on the actual journey in terms of rolling stock and stations.

Rolling Stock

5.4.18 Data from the baseline telephone survey suggests that 22% (n=105) of rail users were dissatisfied with the facilities on the train and 33% (n=137) were dissatisfied with the availability of toilets on board the train / at the station.

5.4.19 Several issues with the existing rolling stock were also raised during the consultation. These include:

- A lack of priority seating during peak times – this was identified as a particular deterrent for disabled users.
- Insufficient space for wheelchair users – there is only space for one wheelchair per carriage and the space available is small. It was noted that the lack of space means that when wheelchair users are travelling together, they have to sit in different carriages / separate from other members of their party.
- Onboard toilets are inaccessible / too small – it was noted that most disabled users do not use onboard facilities and will instead disembark at specific stations during their journey in order to use accessible toilets. This has implications in terms of journey time and more important widens inequalities faced by this group.

Key Point: The survey has highlighted that one fifth of users are dissatisfied with the current rolling stock.

Level Boarding and Station Facilities

5.4.20 The East Wales and West Wales Station Improvements Operations will include upgrades to station platform infrastructure at 55 stations on the CVLs. The improvements aim to provide level boarding and enhanced intermodal facilities in order to improve access for people with reduced mobility (PRM), reduce dwell times at stops and therefore improve journey times for all users. In addition, at some

stations new seating, shelters, customer information systems and help points will be provided and station access will be improved where necessary.

5.4.21 Baseline information on the existing provision at the stations within the study area is included in a separate Excel Workbook as set out in Appendix C . This shows that across the network, there are a number of stations which are inaccessible from the public highway[52]. There are also a number of stations with limited facilities e.g., no shelters, waiting facilities, platform seating, toilets, lighting, help points etc. Overall, the station experience is poorer than that which would be encountered on suburban networks elsewhere in the UK.

5.4.22 A range of questions on facilities at stations and the availability of level boarding were included within the baseline telephone survey. Amongst users of the rail service, there were relatively high levels of dissatisfaction with these aspects, as shown in the figure below Figure 5.13.

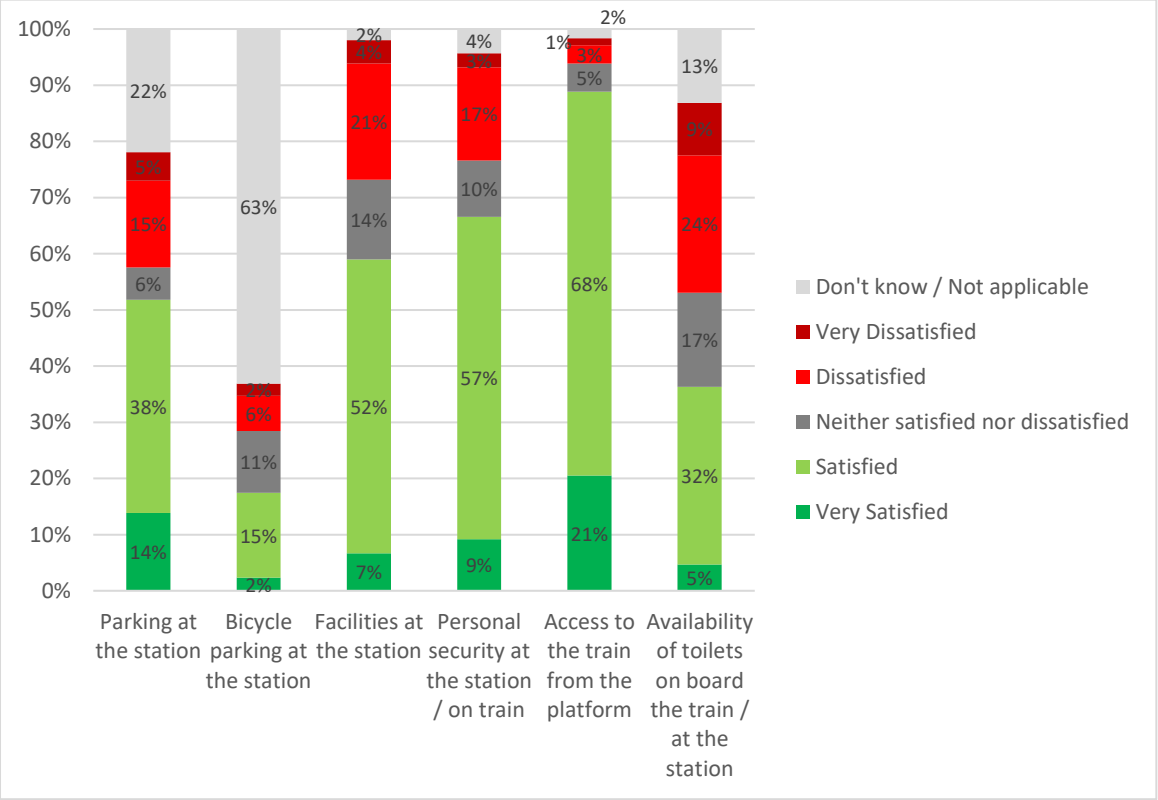


Figure 5.13: Baseline Telephone Survey: User satisfaction with facilities at stations and level boarding

5.4.23 It can be seen from the figure that:

- a third of users (n=137) were dissatisfied with the **availability of toilets** on board the train / at the station,

[52] A station is defined as inaccessible where a lone mobility impaired passenger is unable to access all platforms via a suitable means

- a quarter (n=130) were dissatisfied with **facilities at the station** (including waiting areas, travel information etc), and
- a fifth (n=87) were dissatisfied with **personal security at the station**. In total, 4% (n=17) were dissatisfied with access to the train from the platform.

5.4.24 Amongst non-users, these aspects were also identified as issues, as shown in the figure below:

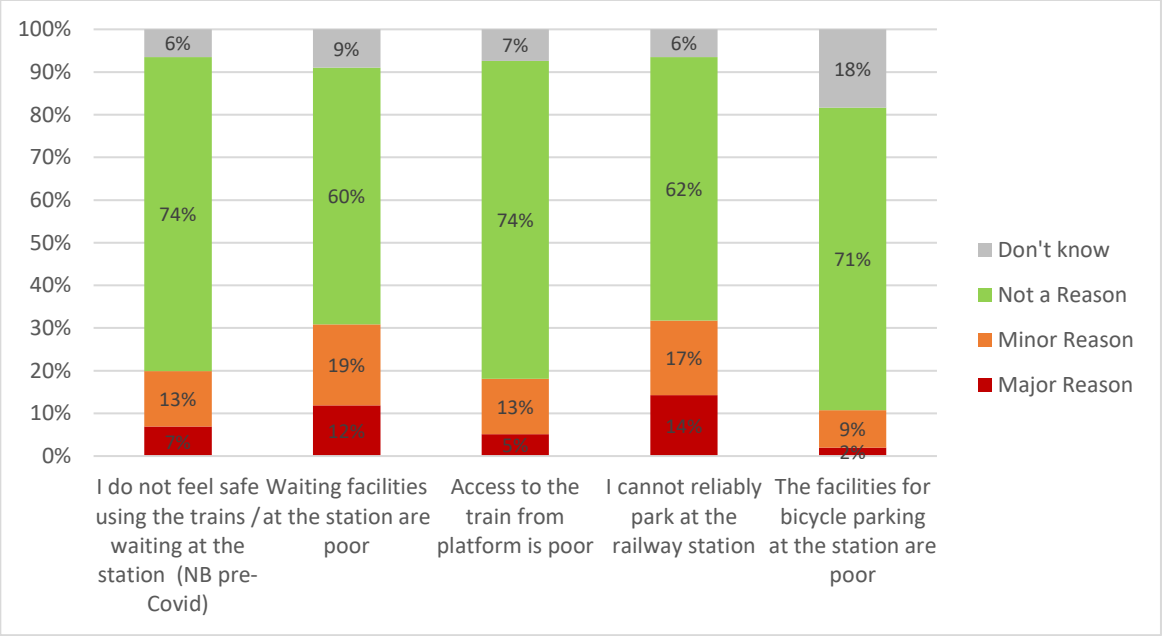


Figure 5.14: Baseline Telephone Survey: Non-user reasons for limited use

5.4.25 The following reasons were amongst those cited for non-use of the CVL in the survey:

- poor standard of waiting facilities at the station 31% (n=126)
- lack of personal security 20% (n=85)
- whilst just 4% (n=17) of users were dissatisfied with access to the train from the platform, 18% (n=77) of non-users identified this as a reason for their limited use, suggesting that poor access is preventing a segment of the market from using rail.

5.4.26 The lack of facilities at some stations and poor access for the mobility impaired was also identified as an issue during the stakeholder engagement. Key points raised by consultees included:

- Insufficient disabled parking / accessible pick-up and drop-off locations at some smaller stations.
- Too little seating or seating not provided at some stations.
- Poor personal security of stations, particularly those with lower frequency services and therefore lower patronage - this was identified as a particular problem for female disabled users.

- A lack of toilets at some stations and a general lack of changing toilets i.e., toilets which have hoists etc and are sufficiently large to accommodate carers as well as the individual.
- A lack of information on where help points are located / how to access help at some stations.
- A lack of level boarding - while those using a wheelchair can book assistance / ramped access, this must be pre-booked and on some of the older trains, users have to be in certain carriages to access it. Issues with boarding and alighting for disabled users were identified as particularly problematic during periods of high demand (e.g., on a rugby match day or during AM and PM peaks). It was noted that some disabled users avoid using the train during these periods (borne out by the Telephone Survey) which constrains people's access to opportunities / contributes to increased societal inequalities.
- Difficulties booking assistance due to stations being unmanned / unmanned at certain times of the day – it was noted that the hours during which stations are manned do not appear to be consistent which makes it difficult for disabled users to make casual trips when requiring assistance.
- Text on signage too small / unclear – it was noted that text on signage should be made bigger, with a clear font and contrasting colours to aid those with visual impairments / disabilities such as dyslexia.
- A lack of information on delays / cancellations which is a particular issue for those with autism or sensory issues.

5.4.27 It is noted that there was broad consensus amongst stakeholders that the need to interchange at Cardiff Queen Street for services to Cardiff Bay was not problematic. Wait times are short and those travelling from Rhymney need only walk across from Platform 2 to Platform 1 which requires no use of the stairs or lift. A platform change using the stairs or lift is required, however, for those travelling on the TAM lines, it was also noted that a high proportion of disabled users drive to Cardiff Bay as the Cardiff Council owned parking is free for disabled users and therefore would be less likely to use the train.

5.4.28 Following the completion of SWMP2, it will be important to compare the baseline information provided as set out above with the equivalent outturn information to determine what improvements have been made and the extent to which these have resulted in an improved experience for passengers.

Key Point: The resident telephone survey and the stakeholder engagement suggested that poor / no facilities and the absence of level boarding at certain stations is contributing to lower levels of use of the railway network and, in some cases, social exclusion / increased inequality.

Congestion and Road Journey Time Variability

5.4.29 One of the drivers of SWMP2 is to help alleviate congestion on the road network into Cardiff. Anecdotal evidence from the consultations suggests that congestion on the

north / south links into the city, particularly during the AM and PM peaks, causes considerable delays and leads to unreliable journey times. Through the provision of a 'turn up and go' rail service with improved journey times, it is hoped that SWMP2 will lead to more people transferring from car to rail, which will result in reduced congestion and journey time reliability benefits for remaining road users.

5.4.30 In order to evidence this point and provide a baseline against which the post opening road journey time data could be compared during any subsequent outcome / impact evaluation, a review of 2019 road journey time data from INRIX was undertaken. Figures 5.15-5.20 show average journey times (represented by the line) on selected parts of the network based on these data. It is noted that weekday data are shown in blue and weekend data are shown in orange.

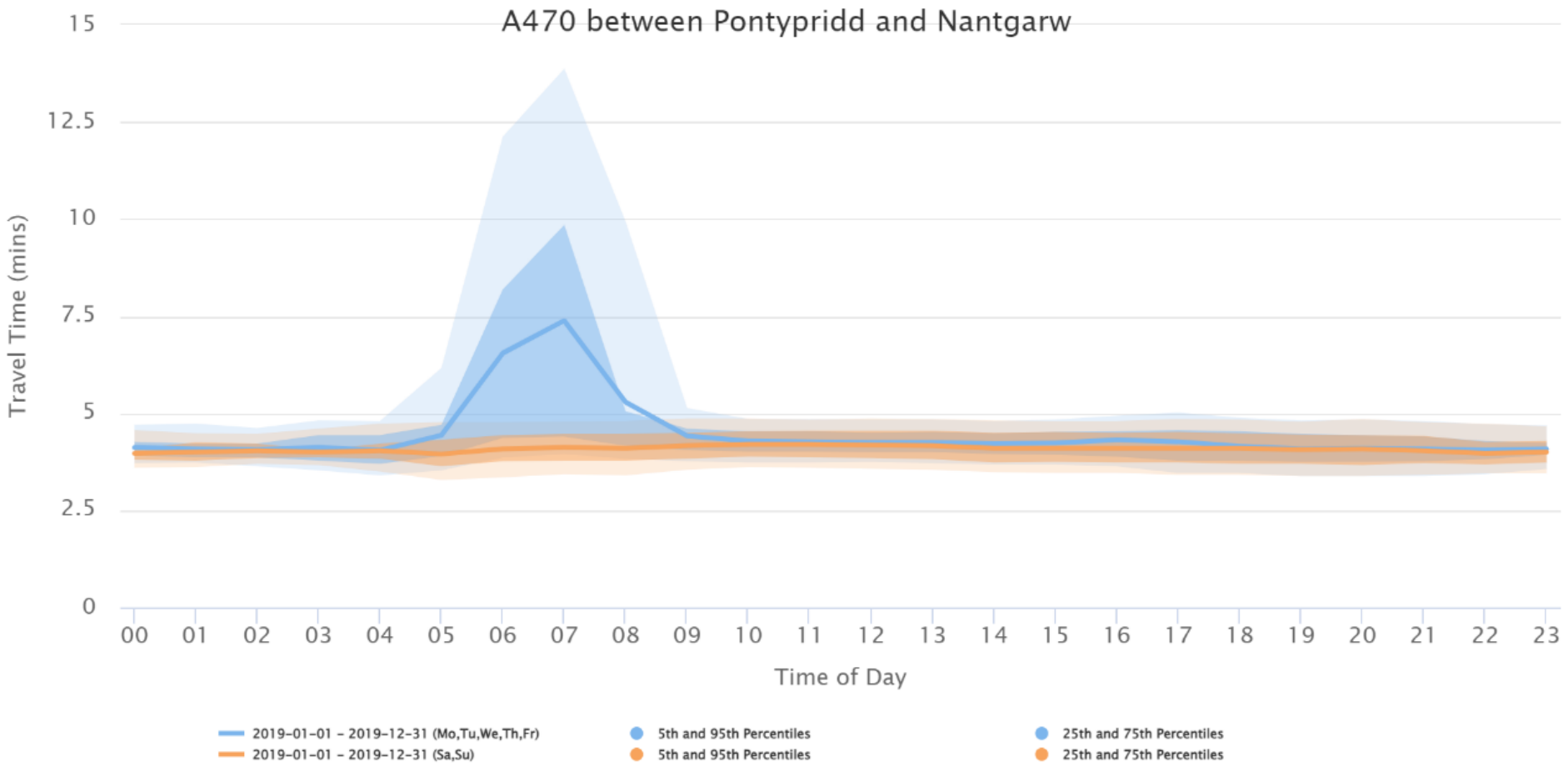


Figure 5.15: Road Journey Times on the A470 between Pontypridd and Nantgarw (southbound)

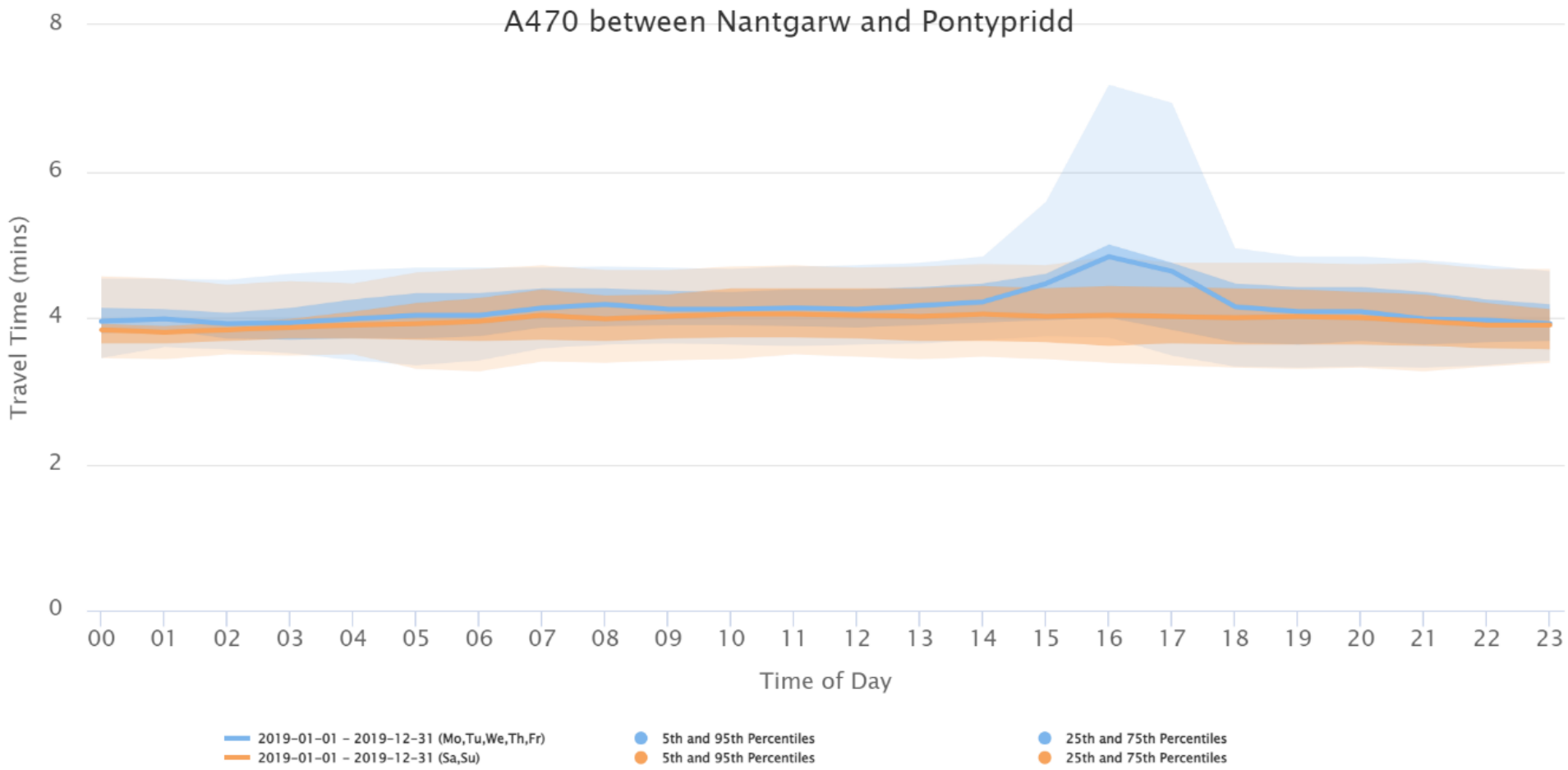


Figure 5.16: Road Journey times on the A470 between Nantgarw and Pontypridd (northbound)

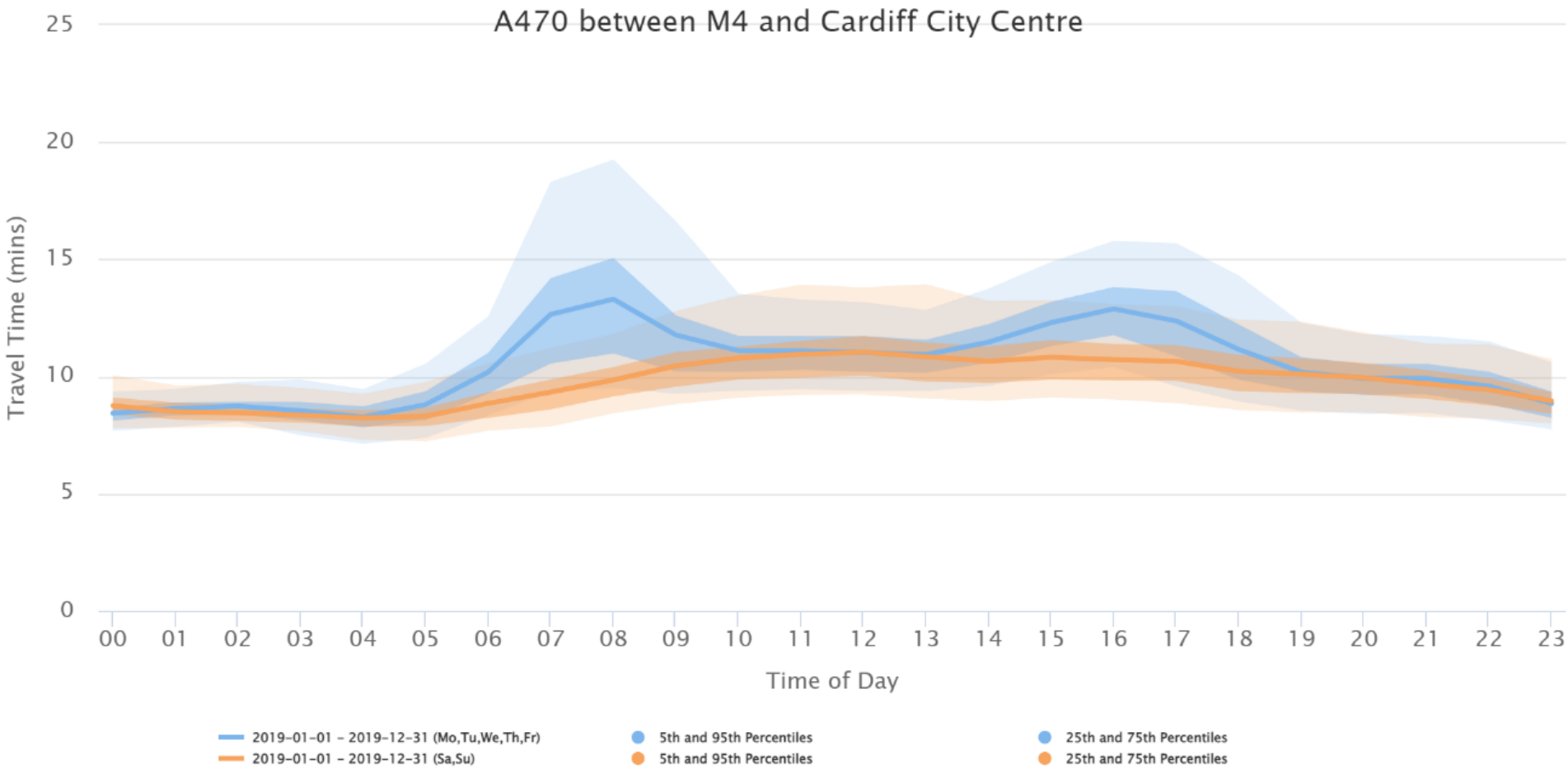


Figure 5.17: Road Journey times on the A470 between M4 and Cardiff City Centre (southbound)

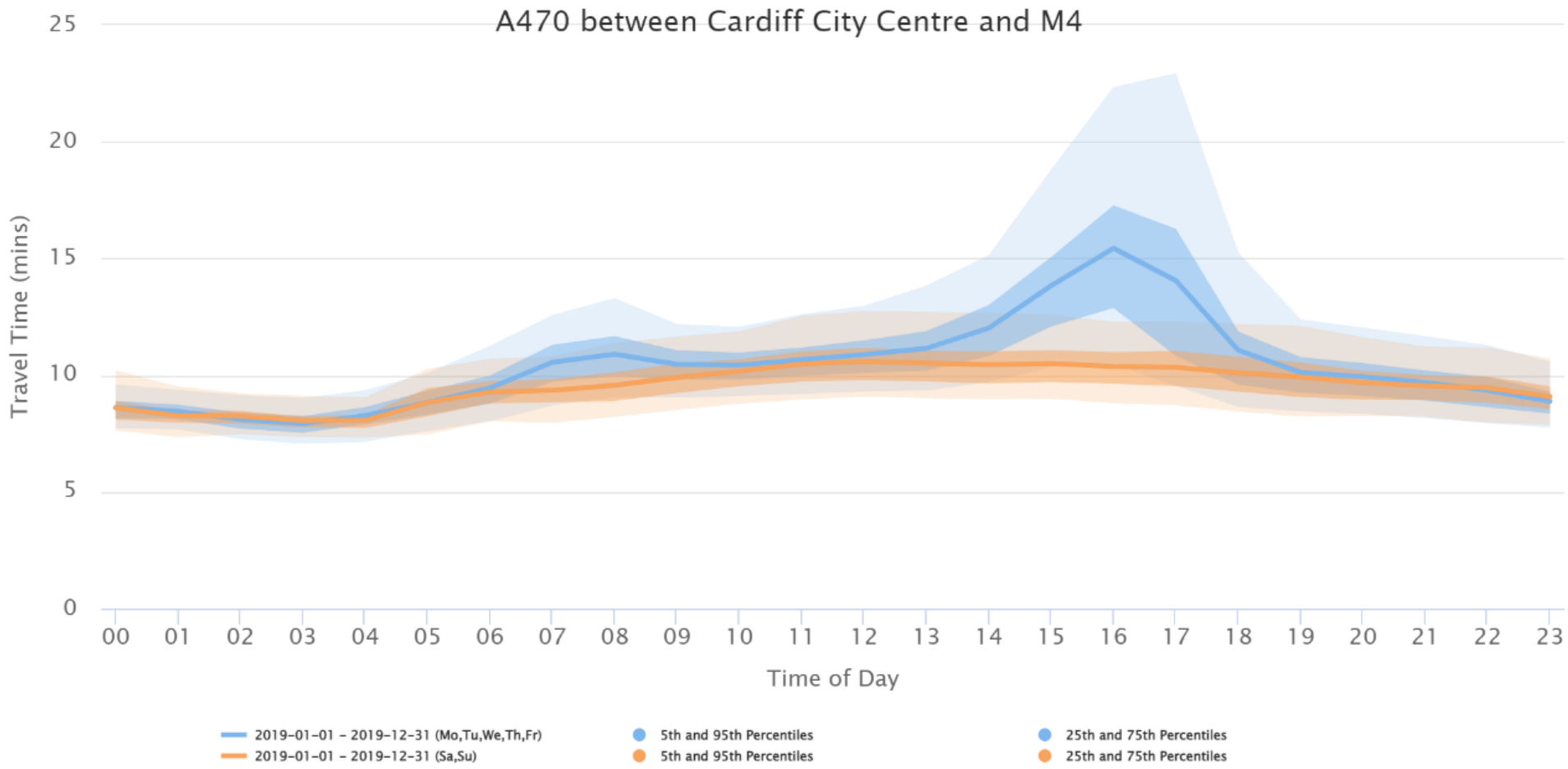


Figure 5.18: Road Journey Times on the A470 between Cardiff City Centre and M4 (Northbound)

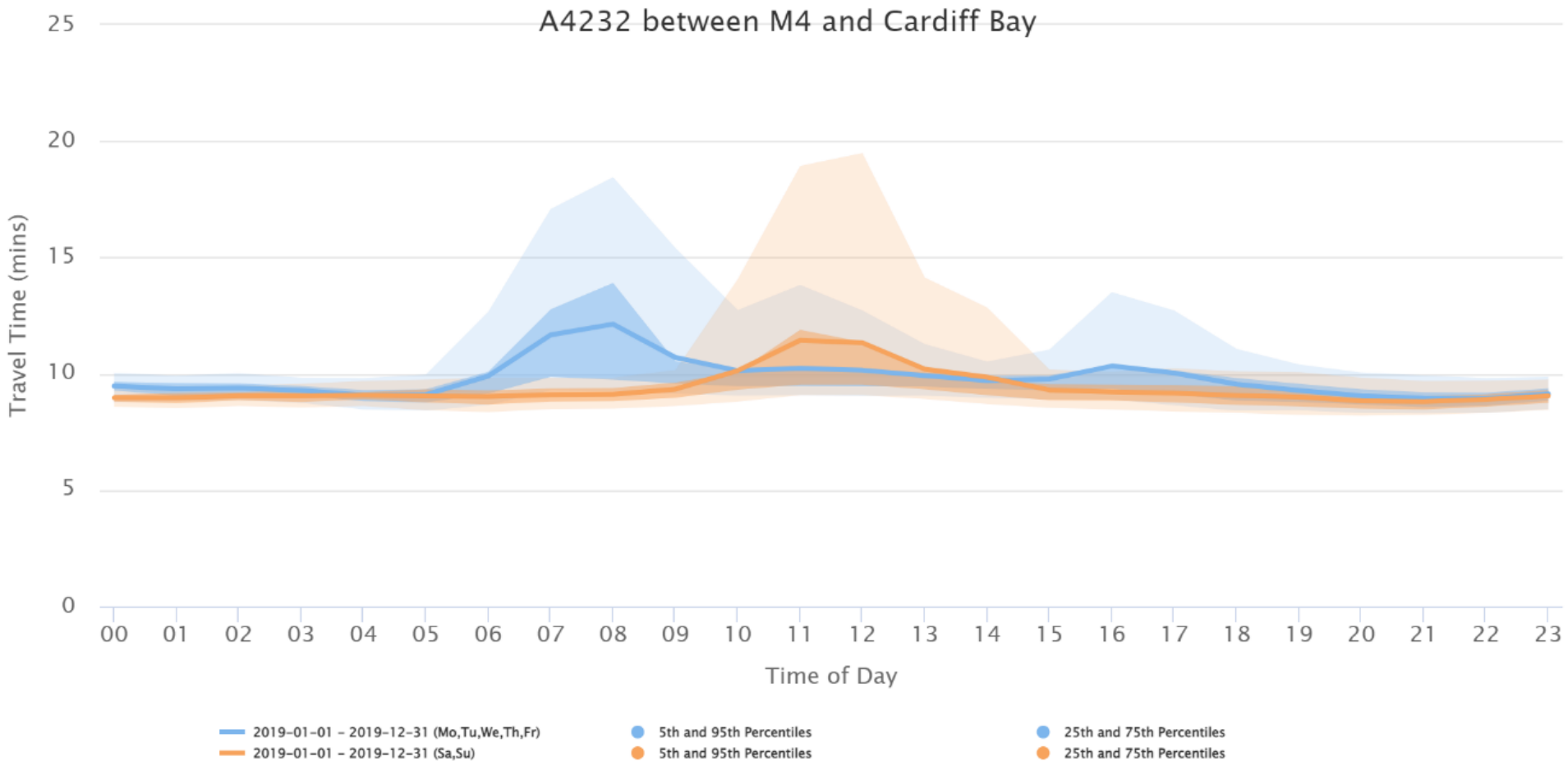


Figure 5.19: Road Journey Times (mins) on the A4232 between the M4 and Cardiff Bay (Southbound)

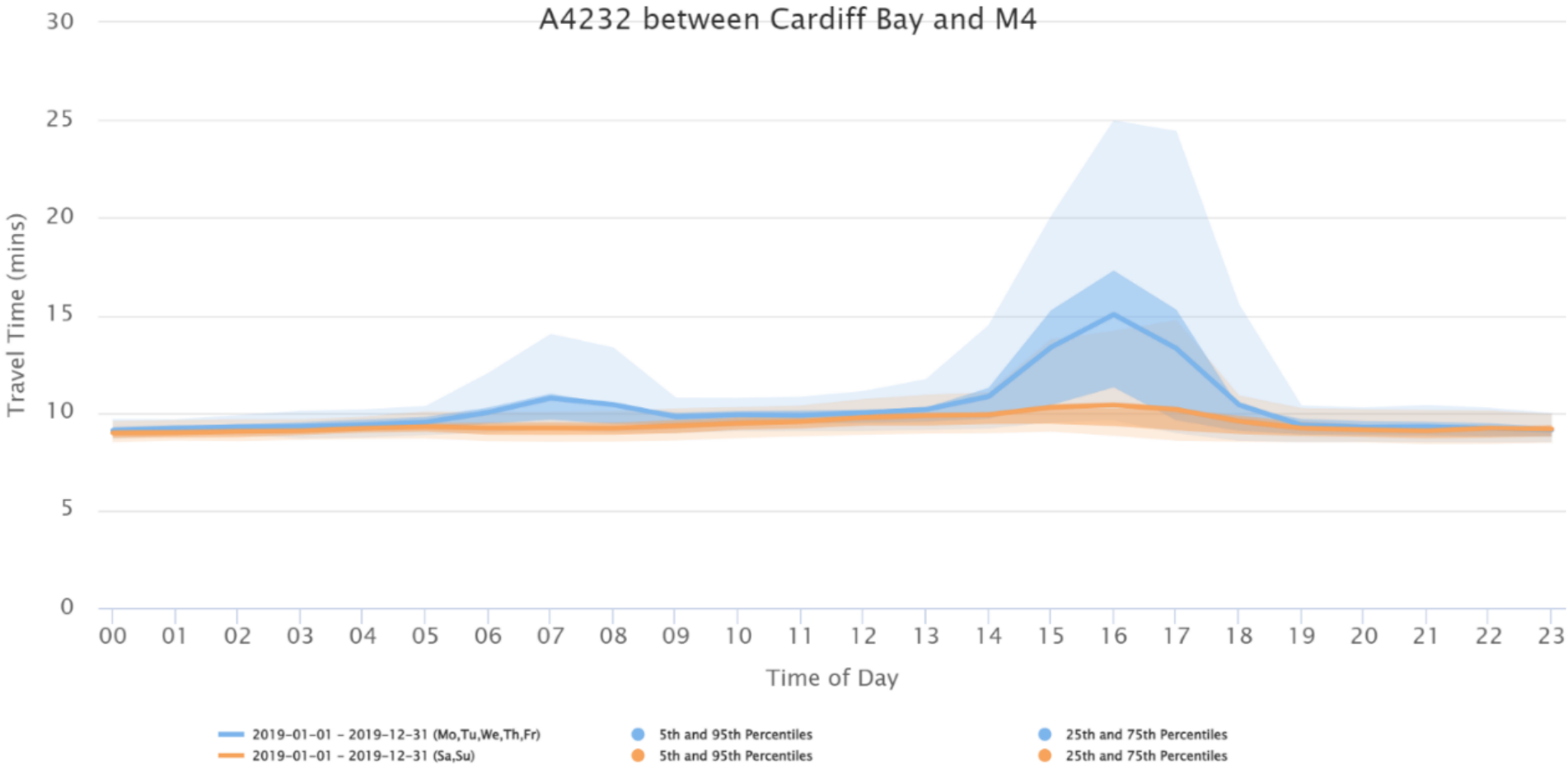


Figure 5.20: Road Journey Times (mins) on the A4232 between Cardiff Bay and the M4 (Northbound)

5.4.31 These figures illustrate that:

- There are significant peaks during weekday mornings in the southbound direction and weekday afternoons in the northbound direction – i.e., peak commuter flows. During these times, average journey times are longer, at which times rail journey times become more competitive with the car.
- The large shaded areas on the graphs suggests that there is a high degree of journey time variability, with significant variation around the mean. Therefore, whilst the car may be quicker than the train on average, this may not always be the case.
- Journey times at the weekend are generally more reliable with no significant peaks in traffic and therefore more consistent journey times across the day. They are more reflective of a weekday inter-peak and thus the train will typically be less competitive with the car.

Key Point: The main road approaches into Cardiff are subject to traffic congestion and significant variations in journey times in the AM and PM peaks. During these periods, car and rail journey times are more closely matched. However, there are fewer journey time reliability issues out with these periods and thus the car will generally offer lower journey times than the train.

Air Quality

5.4.32 The dominance of the private car for travel in the study area can contribute towards air quality issues. There are several Air Quality Management Areas (AQMAs) in Cardiff, Rhondda Cynon Taf, Merthyr Tydfil, and Caerphilly. Those which are most likely to be affected by SWMP2 are set out in the Baseline Data Excel Workbook as set out in Appendix C . While establishing a causal link between SWMP2 and any improvements in air quality will be challenging, it will be important to examine the AQMAs and compare against the baseline data during the post-opening outcome and impacts evaluation.

6 Socio-Economic Baseline

6.1 Overview

6.1.1 Having set out the transport network from the perspective of both the users of the service and the organisations which deliver them, this section baselines the socio-economic situation within the study area prior to the implementation of SWMP2. The baseline focuses on the four local authorities which will be directly impacted by SWMP2, namely:

- Cardiff Council
- Caerphilly CBC
- Merthyr Tydfil CBC
- Rhondda Cynon Taf CBC

6.1.2 In order to provide context when interpreting the data, comparisons are made with the Wales national average.

6.1.3 It should be noted that this chapter is not intended to be an exhaustive profile of the above locations, rather it is intended to highlight the socio-economic characteristics which could be affected by SWMP2 (as expressed in the logic map 'impacts').

6.2 Demographics

6.2.1 Population is often seen as a barometer of the economic health and attractiveness of an area. Locations with a stable or growing working age population are generally considered to be in better economic health than those with a declining and / or ageing populace.

Total Population

6.2.2 Table 6:1 provides details on the population change between 2009 and 2019 for each local authority area and Wales as a whole and, Figure 6.1 shows the percentage change over this period.

Table 6:1 Population Change 2009 – 2019 (Source: ONS 2019)

Location	2009	2019	Percentage Change
Cardiff	337,656	366,903	8.7%
Caerphilly	177,159	181,075	2.2%
Merthyr Tydfil	58,156	60,326	3.7%
Rhondda Cynon Taf	234,743	241,264	2.8%
Wales	*3,038,872*	*3,152,879*	*3.8%*

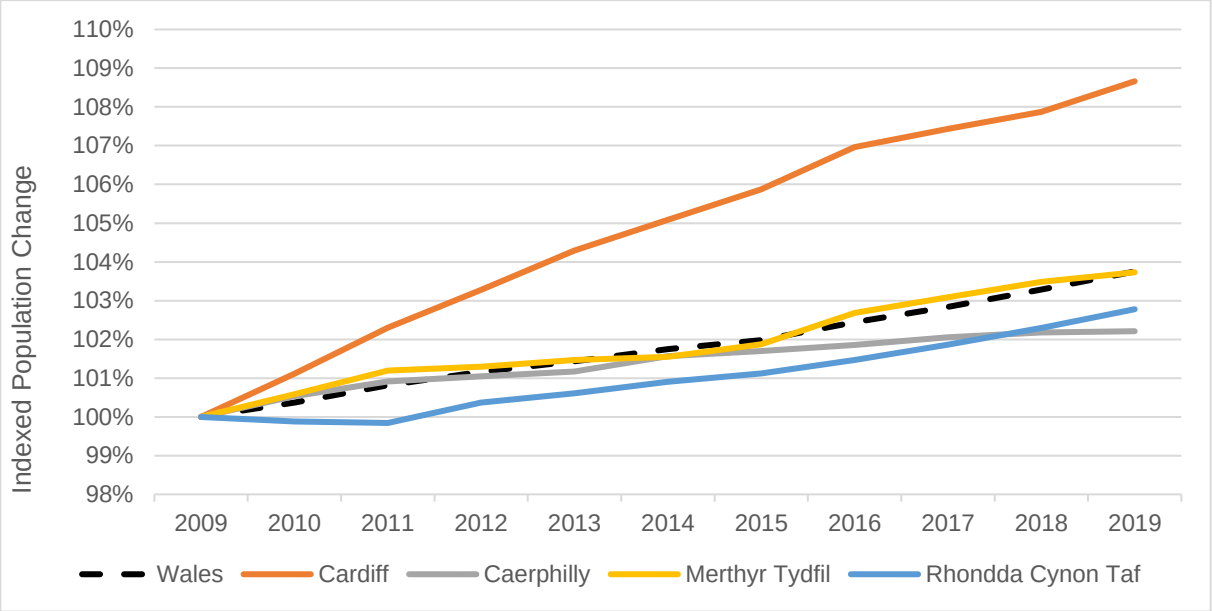


Figure 6.1: Population Change (Source: ONS 2019)

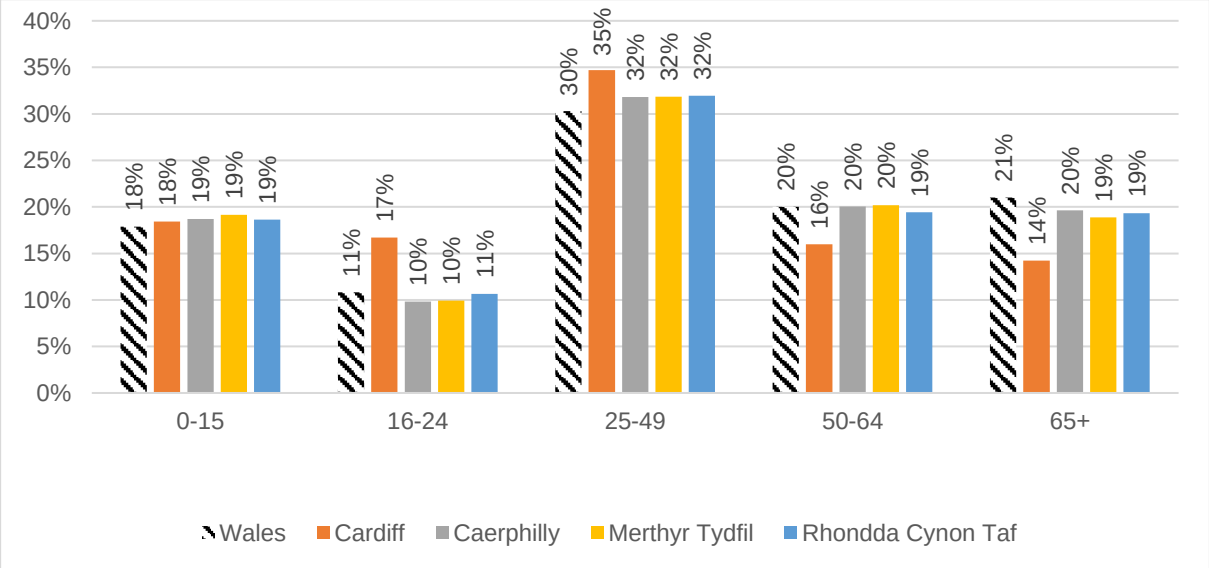
6.2.3 All areas have experienced population growth in the ten years between 2009-19. However, Cardiff's population has grown at a significantly faster rate than both Wales as a whole and all other locations in the study area, reflecting the economic vibrancy of the city. A challenge this rate of growth will pose for Cardiff is providing the right number and mix of homes to accommodate its expanding population. This could ultimately overspill into neighbouring authorities, particularly Caerphilly, Rhondda Cynon Taf, the Vale of Glamorgan and Newport, making high quality public transport connections into Cardiff essential if car kilometres are to be reduced.

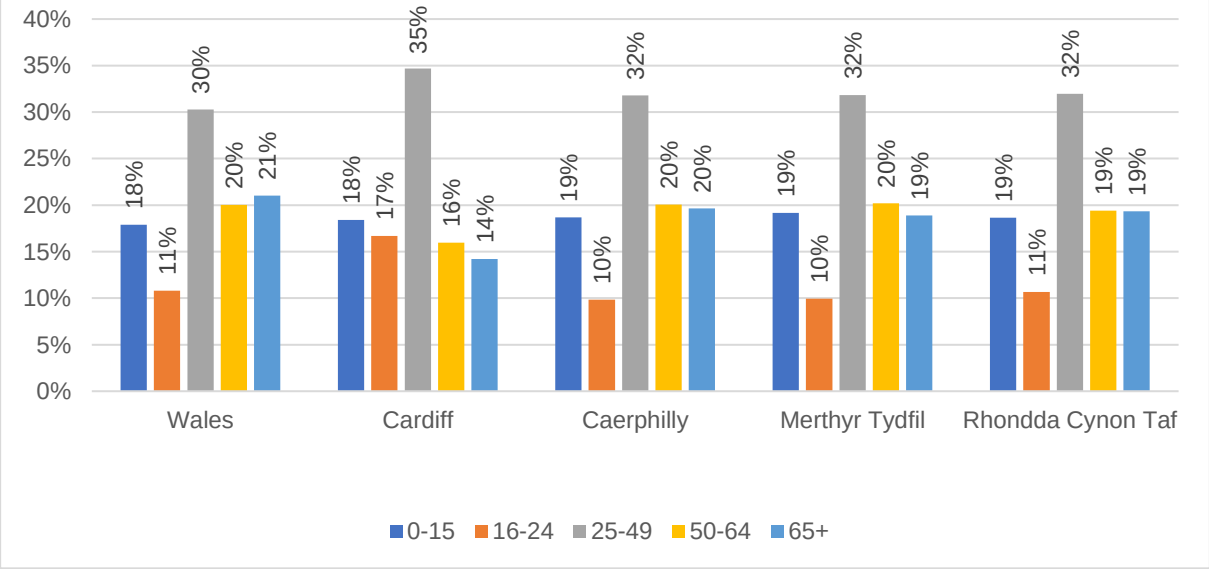
6.2.4 Whilst the three Valleys authorities have witnessed a growth in population, this has tracked much more closely to the national average. Nonetheless, this growth must be catered for in terms of public transport connectivity to employment, leisure and services, both to Cardiff and within the Valleys.

Key Point: The population of Cardiff grew strongly over the 2009-2019 period, exceeding the Wales average. Whilst the populations of the Valleys communities have also grown, the rate of expansion has been much closer to the national average. This growth in population must nonetheless be catered for and indeed it is possible that current connectivity is acting as a constraint on such growth.

Population by Age Group

6.2.5 The age profile of an area's population is also an important indicator of its economic wellbeing. Whilst an aging population is not in itself a bad thing, it can increase the pressure on locally delivered services and also in time will impose a limitation on the size of the local labour market.





6.2.6

6.2.7 Figure 6.2 illustrates the population by age group in each area. The same data is shown grouped by age group and by local authority.

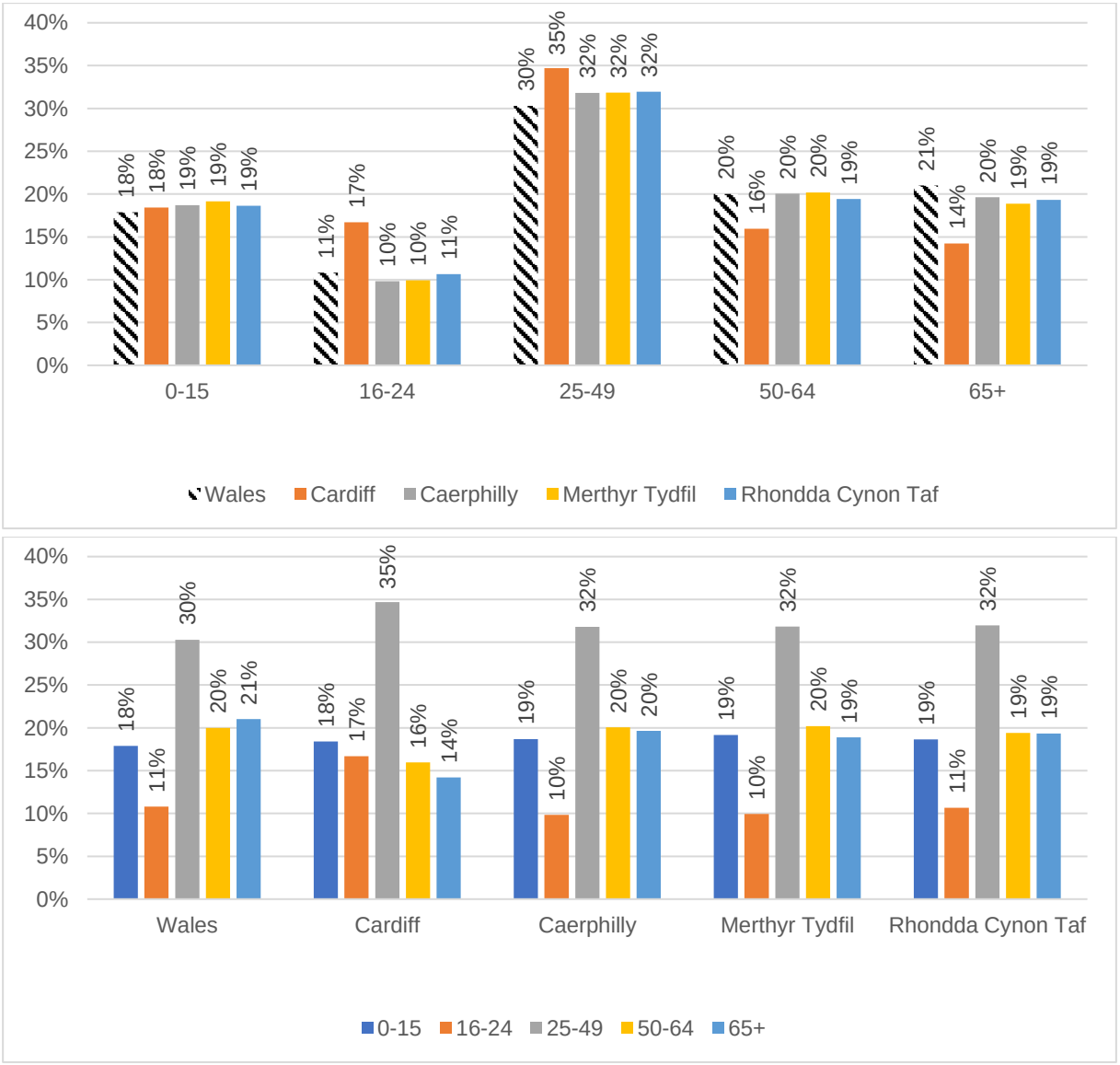


Figure 6.2: Population by age group (Source ONS 2019)

6.2.8 As would be expected, Cardiff has a much younger population than the Valleys communities with a higher proportion of people in the 16-24 and 25-49 age categories and correspondingly smaller numbers in the 50-64 and 65+ age categories. This is in part a result of Cardiff's large student population, which comprises 13% of the city's residents, and its extensive and diversified employment base.

6.2.9 The three Valleys local authorities largely track the national average, with a majority of their populations under the age of 50.

Key Point: 70% of Cardiff's population is aged under 50, reflecting the city's large student population and its extensive and diversified employment base. The Valleys communities largely track the Wales average in terms of population age profile and thus there are no significant differentiators in this respect.

6.3 Labour Market

Economic Activity

6.3.1 The economic activity rate is a critical indicator of the economic wellbeing of an area from a residents' perspective, with areas of comparatively lower rates of economic activity tending to perform less well. The economically active are those defined as in work or unemployed but actively looking for work, whilst the economically inactive are defined as those neither in work nor seeking employment (e.g., students, those looking after the family / home, temporary / long-term sick, retired people, etc.). Table 6:2 presents the proportion of the population in each area who are economically active (employed), economically active (unemployed), and inactive.

Table 6:2: Economic Activity and Inactivity Rates (Source: ONS Annual Population Survey, January 2019 - December 2019)

Location	Economically Active: in Employment	Economically Active: Unemployed	Economically Inactive
Cardiff	187,400 (76%)	6,500 (3%)	52,800 (21%)
Caerphilly	78,200 (70%)	4,800 (4%)	28,700 (26%)
Merthyr Tydfil	26,200 (71%)	1,200 (3%)	9,400 (25%)
Rhondda Cynon Taff	101,400 (68%)	6,600 (4%)	41,400 (28%)
Wales	1,397,400 (73%)	61,300 (3%)	450,800 (24%)

Source: ONS Annual Population Survey, Jan 2019 – Dec 2019

6.3.2 The main points of note from the above table are as follows:

- Economic activity rates in Caerphilly, Rhondda Cynon Taf, and Merthyr Tydfil tend to lag both the Wales and Cardiff averages.
- Of those who are economically inactive, the largest proportion in the Valleys communities are classified as long-term sick (for example 35% of those who are economically inactive in Caerphilly and Merthyr Tydfil and 33% in Rhondda Cynon Taf are classified as such, compared to 23% in Cardiff and 28% in Wales as a whole). In contrast in Cardiff, amongst the economically inactive, students account for the largest proportion (39% compared to between 17% and 24% in the Valleys Communities).

- Unemployment also tends to be higher in the Valleys. Furthermore, much of this unemployment (and indeed economic inactivity) is also likely to be 'structural' whereby the profile of the employment market has changed to such an extent that there is a skills mismatch between labour and jobs. This in turn has fostered a concentration of employment in low paid and insecure jobs, a direct product of the decline of dominant industries, such as coal mining and iron and steel and the lack of a comparable replacement.
- The economic activity data point to an uneven pattern of growth between Cardiff and the more deprived Valleys communities. Dualism of this nature is problematic for the South Wales economy as a whole, likely acting as a drag on productivity, investment and competitiveness at the regional level and the development of Cardiff at a local level.

Key Point: Economic activity rates in the Valleys communities tend to lag both the Wales average and Cardiff suggesting that these locations are not benefitting from the overall growth in prosperity within the capital. Cardiff is forecast to continue to grow in the medium-term, providing an opportunity to tackle the above issues. However, maximising these opportunities and ensuring an equitable share of this growth across the capital region will, in part, be dependent on the provision of transport infrastructure and services which connect labour to jobs and businesses to businesses.

Claimant Count Unemployment

6.3.3 Claimant Count replaced the measure of Job Seekers Allowance (JSA) in 2013 as the main measure of the number of people claiming benefits for being unemployed. It includes those claiming Job Seekers Allowance and those claiming Universal Credit who are out of work. Figure 6.3 presents the change in percentage of claimants from 2013-2019 along with the 2019 figures.

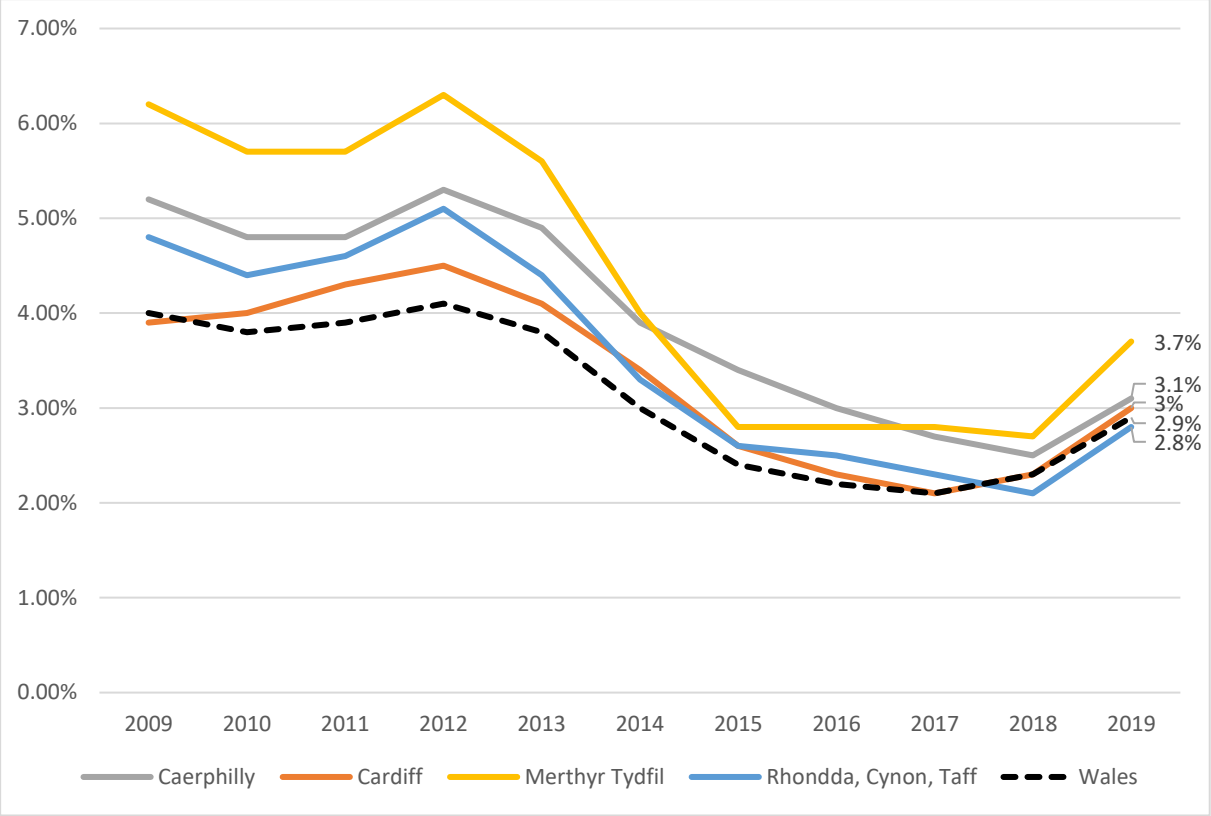


Figure 6.3 Change in Percentage of Claimants, 2009-2019 (Source: ONS Claimant Count (not seasonally adjusted), 2019

6.3.4 Overall, the number of claimants across the study area and Wales overall has reduced over the ten years from 2009-19, reflecting the recovery of the economy following the 2008 financial crash, although there was a small growth in claimants between 2018 and 2019.

Key Point: The claimant rate across the study area does not differ significantly. However, it should be borne in mind that the Valleys communities have a higher rate of economic inactivity, so unemployment is additive to this.

Occupations

6.3.5 It is useful to examine occupational categories as they provide an indication of the main sectors of the economy and the broad skills base of an area. For instance, those employed within the occupational categories of 'managers, and senior officials'; 'professional occupations' and 'associate professional and technical occupations' are typically higher skilled (and generally have a higher income), whereas those employed within the occupational categories of 'elementary occupations' and 'process, plant and machine operatives' are typically lower paid.

Resident Occupations

6.3.6 Figure 6.4 presents the employment by occupation based on the **resident population** in each location (i.e., those living in the area, but who may or may not work in that area).

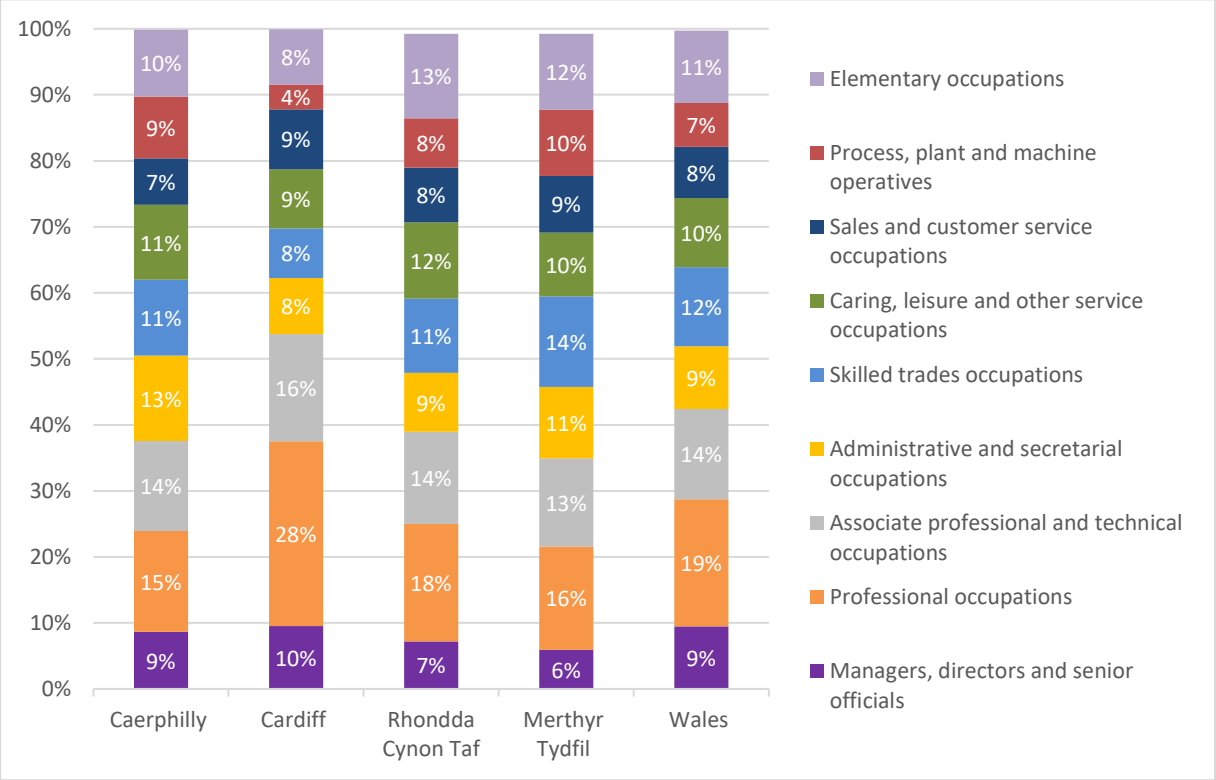


Figure 6.4 Total Employment by Occupation, Population Analysis, 2019 (Source: ONS Annual Population Survey, 2019)

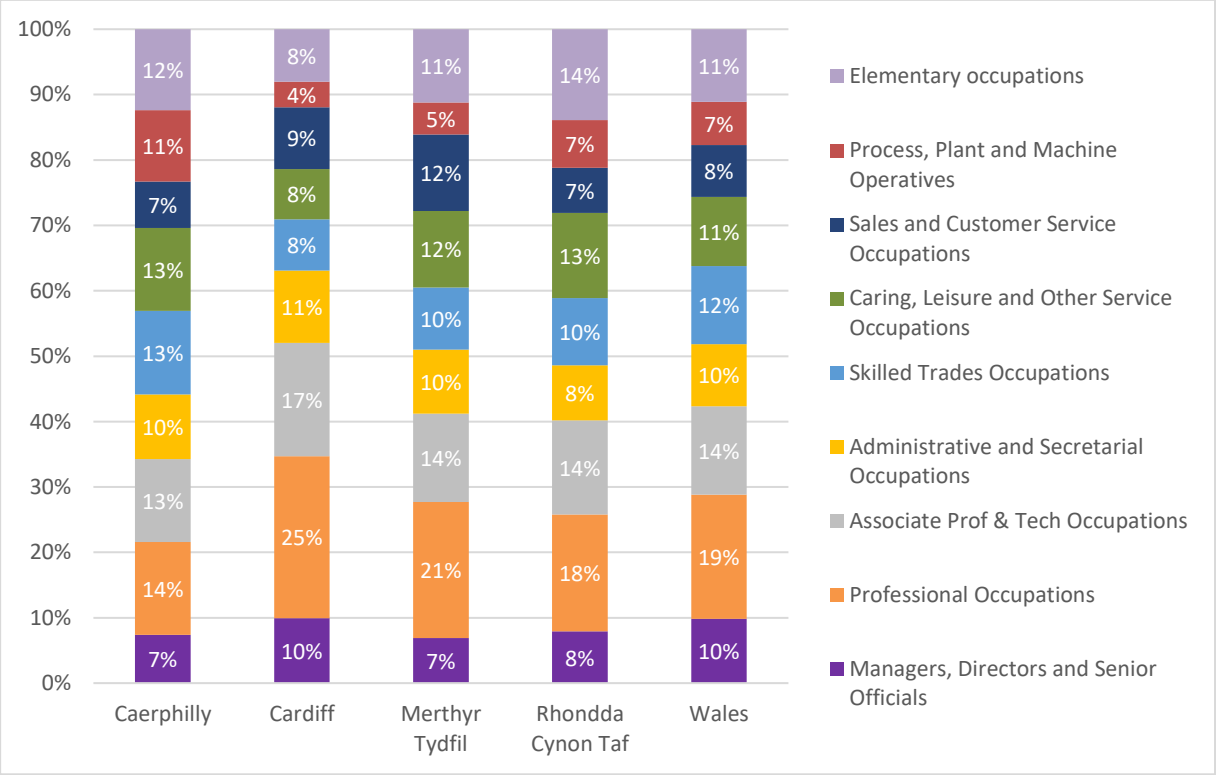
6.3.7 The main points of note from a **resident occupation** perspective are as follows:

- As would be expected, Cardiff has a high concentration of employment in the three highest occupational categories, with some 54% of all residents employed as / in 'managers, directors and senior officials', 'professional occupations' and 'associate professional and technical occupations'.
- However, despite the close proximity of the Valleys authorities to Cardiff, the concentration of resident employment in these occupation classifications is much lower (Caerphilly 38%, Merthyr Tydfil 35% and Rhondda Cynon Taf 39%), each lagging the Wales average of 42%. This highlights that Valleys residents are not fully benefitting from the opportunities in Cardiff, which may in part be due to poor transport connectivity.
- This pattern repeats in the lowest three occupational categories ('sales and customer service occupations', 'process, plant and machine operatives'

and 'elementary occupations[53]', with Cardiff having only 21% employed in these categories compared to Caerphilly (28%), Merthyr Tydfil (31%) and Rhondda Cynon Taf (29%).

Workplace Occupations

6.3.8 Figure 6.5 presents the employment by occupation based on those working in each location (i.e., these are the jobs located in each area irrespective of whether the employees who fill those jobs are from that area or not).



Source: ONS Annual Population Survey, 2019

Figure 6.5 Total Employment by Occupation, Workplace-based Analysis, 2019 (Source: ONS Annual Population Survey, 2019)

6.3.9 The main points of note from a **workplace occupation** perspective are as follows:

- The distribution of workplace employment is similar to resident employment, with the profile of occupational classifications in Cardiff towards the higher end of the scale and the Valleys authorities towards the lower end of the scale. The differential is however not quite as large, which

[53] Occupations classified as 'elementary' will usually require a minimum general level of education (that is, that which is acquired by the end of the period of compulsory education). Some occupations at this level will also have short periods of work-related training in areas such as health and safety, food hygiene, and customer service requirements. For further information on the classifications see https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc/soc2010/soc2010volume1structureanddescriptionsofunitgroups

will in part be due to the significant public sector employment in the three Valleys authorities, e.g., jobs with the respective local authorities.

- It is notable that Merthyr Tydfil in particular has significantly more workplace jobs in the top three occupational categories than resident jobs (35% resident, 42% workplace). This implies that there are too few local residents with the skills to fill these jobs and thus labour is 'imported' from elsewhere.

Key Point: Despite their close proximity to Cardiff, the three Valleys authorities do not fully benefit from this proximity from an employment perspective. Almost one third of all residents are employed in the lowest category occupational categories, whilst there are also fewer residents employed in the higher occupational categories compared to Cardiff and Wales overall. The pattern is broadly similar for workplace jobs.

Employment Density

6.3.10 Table 6:3 shows the jobs density across the study area as recorded in 2019.

Table 6:3: Job Density in 2019 (Source: ONS 2019)

Local Authority	Jobs Density
Cardiff	0.98
Caerphilly	0.58
Merthyr Tydfil	0.67
Rhondda Cynon Taff	0.56

6.3.11 Jobs density is a measure of the ratio of jobs to the resident population aged 16-64 in an area – a jobs density of greater than 1 means that there is more than one job per resident and thus net in-commuting is required to fill these roles. It can be seen from the table that while Cardiff has marginally fewer jobs than residents, all other locations have considerably fewer jobs meaning net out-commuting is required. High quality transport connections are therefore important in connecting labour in the Heads of the Valleys to employment.

6.3.12 Jobs density is of course only one measure, and it does not account for the fact that not all jobs and labour are homogenous. An area can have both unemployed labour and high vacancy rates meaning that significant in-commuting can still be required to an area with a low jobs density. For example, the evidence in the previous section highlights that the Valleys communities, and Merthyr Tydfil in particular, are importers of labour in some categories despite a very low jobs density.

Key Point: Overall, the Valleys communities have far fewer jobs than residents meaning that out-commuting is required, although in some sectors they are net importers of labour. High quality transport connections are therefore important in maximising the connections between jobs and labour.

6.4 Industrial Structure

Workplace Employment by Industry

6.4.1 This section considers employment by industry based on those working in each location (i.e., these are the jobs located in each area irrespective of whether the employees who fill those jobs live in that area or otherwise). Table 6:4 shows the workplace employment by industry across the local authority areas. The top three values in each column are shown in red.

Table 6:4: Workplace Employment by Industry (Source: BRES 2019)

Industry	Cardiff	Caerphilly	Merthyr Tydfil	Rhondda Cynon Taf	Wales
1: Agriculture, forestry & fishing (A)	0.1	0.4	0.3	0.4	1.2
2: Mining, quarrying & utilities (B, D and E)	2.8	2.6	0.9	2.7	1.8
3: Manufacturing (C)	4.2	21.1	13.6	13.3	11.2
4: Construction (F)	3.8	4.4	4.1	6.7	4.6
5: Motor trades (Part G)	1.9	1.8	2.7	2.3	2.4
6: Wholesale (Part G)	2.8	4.4	2.7	3.0	3.4
7: Retail (Part G)	8.5	7.9	11.4	10.7	9.5
8: Transport & storage (inc postal) (H)	2.1	3.9	2.7	4.0	3.4
9: Accommodation & food services (I)	7.5	6.1	6.8	6.7	9.3
10: Information & communication (J)	4.2	1.1	5.7	1.2	2.1
11: Financial & insurance (K)	6.6	1.6	0.8	1.2	2.5
12: Property (L)	1.9	0.8	1.6	1.2	1.3

Industry	Cardiff	Caerphilly	Merthyr Tydfil	Rhondda Cynon Taf	Wales
13: Professional, scientific & technical (M)	8.0	5.3	2.3	3.3	5.0
14: Business administration & support services (N)	9.4	7.0	4.5	5.3	6.5
15: Public administration & defence (O)	8.5	5.3	6.8	5.3	7.6
16: Education (P)	10.3	8.8	8.0	10.7	9.0
17: Health (Q)	14.1	12.3	20.5	18.7	15.6
18: Arts, entertainment, recreation & other services (R, S,T and U)	4.2	3.1	3.2	3.3	3.6

6.4.2 The main points of note from the above table are as follows:

- Despite declines over the recent decades, 'manufacturing' still accounts for a significant proportion of employment within all three Valleys local authorities. Indeed, one fifth of all employee jobs in Caerphilly are in this sector.
- Over one third of jobs (35%) in Merthyr Tydfil and Rhondda Cynon Taf are in the public sector, which exceeds the Wales average of 32%. This will in part be due to local authority employment and health which accounts for almost one fifth of jobs. It is also noted that Welsh Government have offices in Merthyr.
- Whilst the public sector also accounts for a large proportion of employment in Cardiff (as with Wales as a whole), the capital also has higher than average concentrations in high value occupations such as 'financial and insurance', 'professional, scientific and technical' and 'arts, entertainment, recreation & other services'. Indeed, financial and professional services have been identified as a key growth sector for Cardiff and are the primary focus of the Central Cardiff Enterprise Zone, a major development area centred around Cardiff Central Station, which includes the Capital Quarter, Callaghan Square and Central Square.
- In contrast, the three Valleys authorities have a lower concentration of employment in these higher skilled sectors, which broadly reflects the workplace occupational categories.

Key Point: There are distinct differences in the industrial base of the Valleys communities and Cardiff with manufacturing and the public sector dominating within the Valleys and Cardiff benefitting from higher proportions of 'white collar' professions as well as tourism and the arts.

6.5 Income

6.5.1 Average income is clearly an indicator of the economic well-being of an area. Larger incomes are evidently directly beneficial to residents of an area, but they also offer direct, indirect and induced economic multiplier effects associated with spend in the local area.

6.5.2 Figure 6.6 presents the change in median weekly gross pay for residents living in each location between 2009 and 2019.

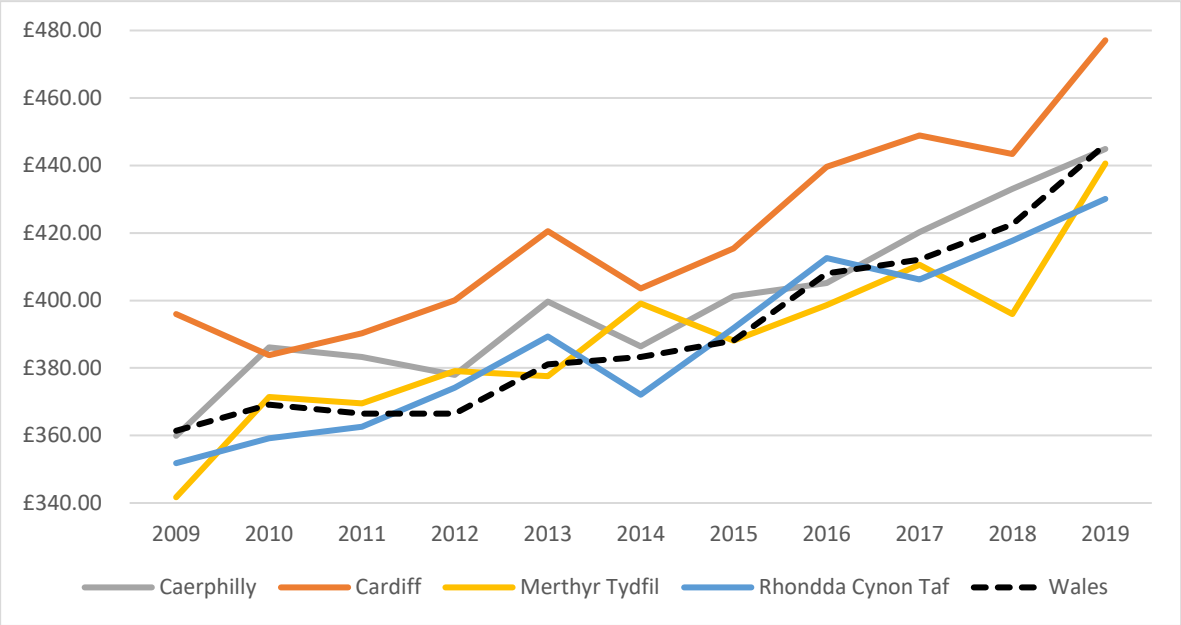


Figure 6.6 Change in Weekly Gross Pay – Resident Analysis, 2009-2019 (Source: ONS Annual Survey of Hours and Earnings, 2019)

6.5.3 Overall, resident incomes across the study area have been growing since 2009, with the three Valleys local authorities largely tracking the Wales average and Cardiff significantly outperforming it. Again, despite the close proximity of Caerphilly, Merthyr Tydfil and Rhondda Cynon Taf to Cardiff, they have not fully shared in the recent success of the city.

6.5.4 Indeed, there is significant income inequality across the study area. The levels of weekly pay demonstrate a strong correlation with the analysis of occupational categories presented above. Cardiff, which has the largest concentration of residents in the top three occupational categories, has the highest levels of income whilst the Valleys communities tend to have lower income levels.

6.5.5 Figure 6.7 shows the weekly gross pay in 2019 for those residing in each location and those working in each location.

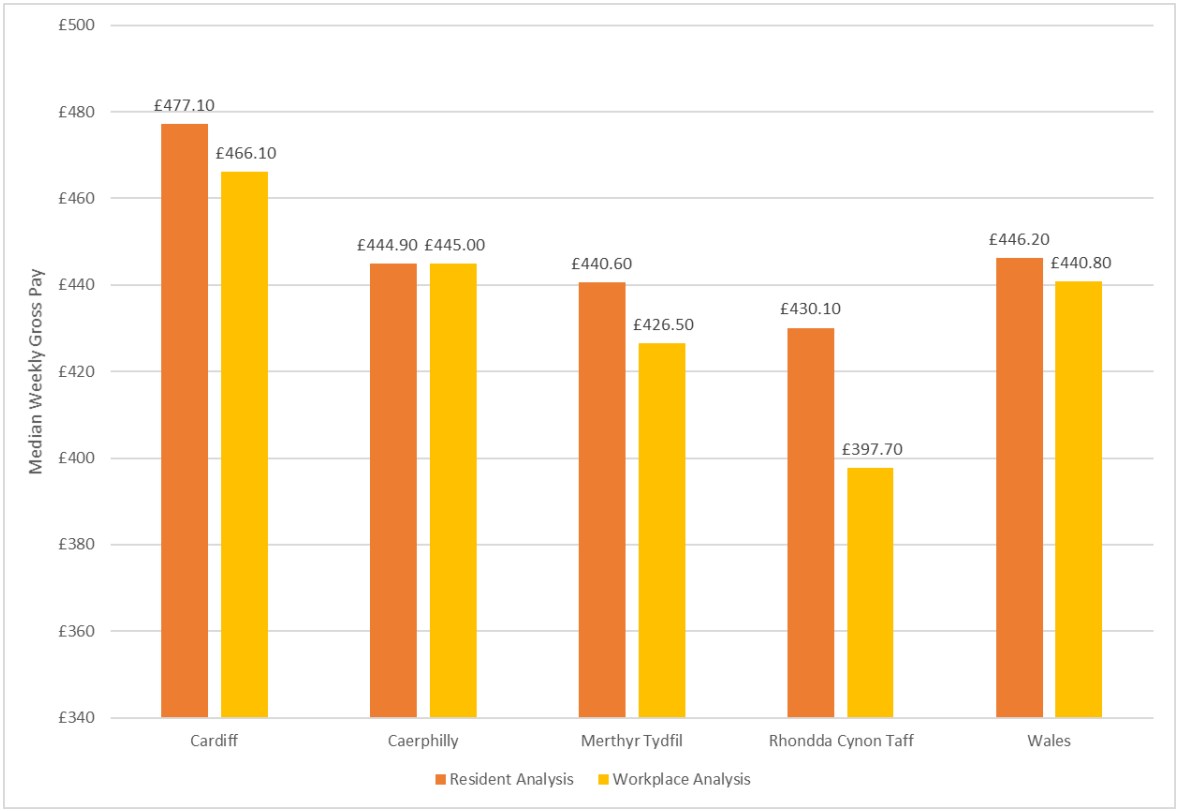


Figure 6.7 Weekly Gross Pay – Resident and Workplace Analysis, 2019 (Source: ONS Annual Survey of Hours and Earnings, 2019)

6.5.6 The graph again demonstrates the above pattern, with higher resident and workplace income levels in Cardiff compared to the Valleys communities.

6.5.7 While the income levels of those living and working in Caerphilly are comparable, in Merthyr Tydfil and Rhondda Cynon Taf, there is a clear gap between the income of those living in the area and the income of those working in the area. In short, jobs outside each of these local authority areas pay better and thus require travel.

Key Point: There is marked income inequality across the study area, with the neighbouring Valleys communities not fully sharing in the recent success of Cardiff. Moreover, in Merthyr Tydfil and Rhondda Cynon Taf, resident earnings significantly outstrip workplace earnings, highlighting the choice of residents of these areas to travel for employment.

6.6 Productivity

6.6.1 Much of the analysis in this chapter has focused on residents and the labour market. The other side of the coin is business productivity which, when considered in aggregate, defines the economic performance of the study area,

and makes a major contribution to the economic performance of Wales overall.

Gross Value Added

6.6.2 Gross Value Added (GVA) is the value generated by any unit engaged in the production of goods and services and is a measure of economic activity in a region. It is measured at current basic prices, which includes the effect of inflation, excluding taxes (less subsidies). GVA estimates are on a workplace basis, allocated to the location where the economic activity takes place. Figure 6.8 presents the change in regional GVA (balanced) for all industries in each location between 2014 and 2019.

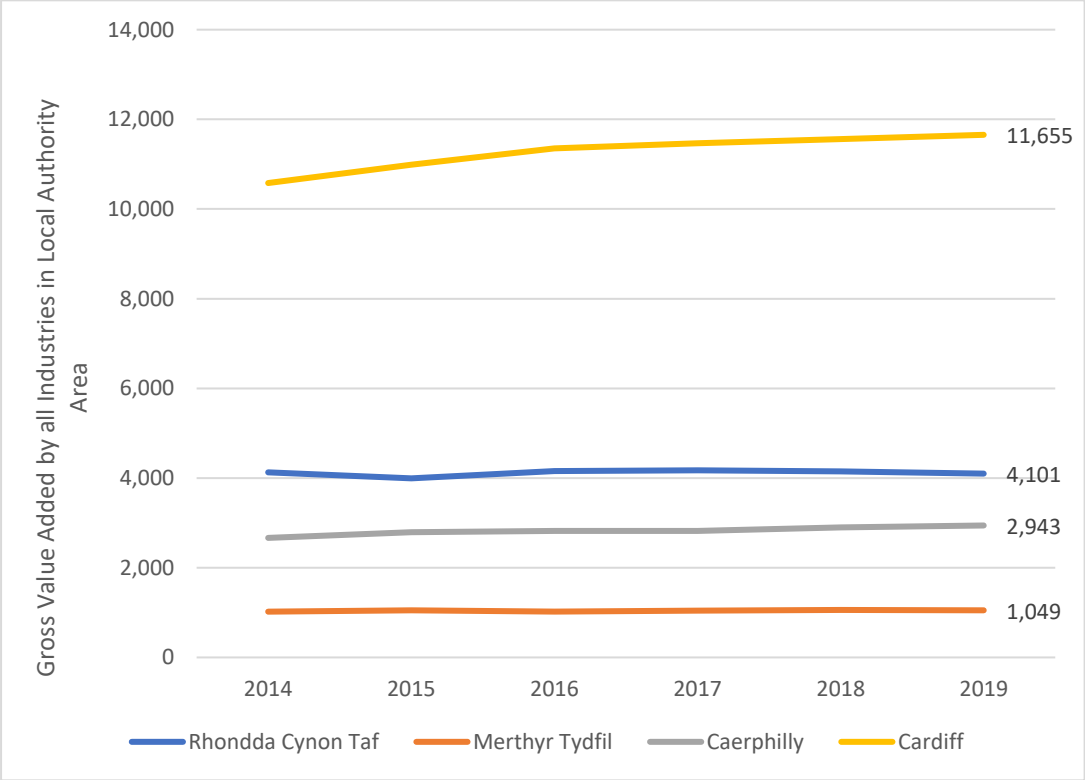


Figure 6.8 Change in Balanced UK Regional GVA 2014-2019 (Source: ONS annual estimates of balanced UK regional Gross Value Added (GVA(B)), 2021)

6.6.3 The main points of note from the above graph are as follows:

- Reflecting its capital city role and economic and labour market structure, Cardiff has a consistently high GVA, and indeed one which grew by 14% between 2009 (not shown) and 2019.
- By contrast, the three Valleys local authorities have much lower GVA, with Merthyr Tydfil a particular outlier in this respect. All three authorities have also largely flatlined in terms of growth over the period 2009-19

Key Point: There is a significant GVA disparity in the study area, with Cardiff displaying far higher GVA than the Valleys communities, lending weight to the argument of a two-speed economy. Caerphilly, Merthyr Tydfil and Rhondda Cynon Taf have low GVA and demonstrated virtually zero GVA growth over the period 2009-19.

Business Competitiveness

6.6.4 The most consistent and commonly used measure of business competitiveness is the UK Competitiveness Index, which defines competitiveness as "*the ability for an economy to attract and maintain firms with stable or rising market shares in an activity, while maintaining stable or increasing standards of living for those who participate in it*".

6.6.5 The Index takes into account a number of factors in terms of inputs, outputs and outcomes:

- Input factors include economic activity rates; business start-up rates; number of businesses per 1,000 people; NVQ Level 4 and qualifications; and proportion of knowledge-based businesses.
- Output factors include GVA per head, output per hour worked (i.e., productivity) and employment rates.
- Outcome factors include gross weekly pay and unemployment rates.

6.6.6 Table 6:5 displays the Competitive Index Rank for each of the local authorities in the study area along with the change in rank between 2015 and 2019.

Table 6:5: Study Area Competitiveness Rank, 2015 and 2019 (ordered by 2019 Rank, out of 379) (Source: UK Competitiveness Survey, 2019)

Location	2015 Rank	2019 Rank	2015-2019 Change in Rank
Cardiff	144	141	+3
Rhondda Cynon Taf	343	323	+20
Caerphilly	376	369	+7
Methyr Tydfil	378	375	+3

6.6.7 Overall, within the index, Wales is deemed to be the least competitive region in the UK and of the 45 Local Enterprise Partnerships (LEP) / City Regions in the UK, Cardiff is ranked 33rd in terms of competitiveness.

6.6.8 Within the study area itself, both Caerphilly and Merthyr Tydfil were ranked in the 'bottom 20' for the whole of the UK in 2019. Rhondda Cynon Taf performs slightly better and has moved up the rankings between 2015 and 2019. However, it remains within the bottom 10% for the whole of the UK.

6.6.9 It is clear from the above table that the study area faces a challenge in terms of its overall competitiveness. Connecting the Valleys Communities to Cardiff can therefore be seen as essential in raising productivity by ensuring an appropriate matching of labour to jobs and in reducing the time and costs of business-to-business interactions.

Key Point: The study area faces clearly evidenced challenges in terms of productivity and business competitiveness. Connecting the Valleys communities to Cardiff can therefore be seen as essential in raising productivity by ensuring an appropriate matching of labour to jobs and in reducing the time and costs of business-to-business interactions.

6.7 Welsh Index of Multiple Deprivation

6.7.1 Welsh Government produces the Welsh Index of Multiple Deprivation (WIMD) which is the official measure of relative deprivation for small areas in Wales. The WIMD is made up of eight separate domains (or types) of deprivation namely; income, employment; health, education, access to services, community safety, physical environment, and housing. The generally accepted point at which an area is defined as deprived is when it is classified in the '20% most deprived' quintile.

6.7.2 Figure 6.9Figure 6.9 shows the level of deprivation in the study area in 2019.

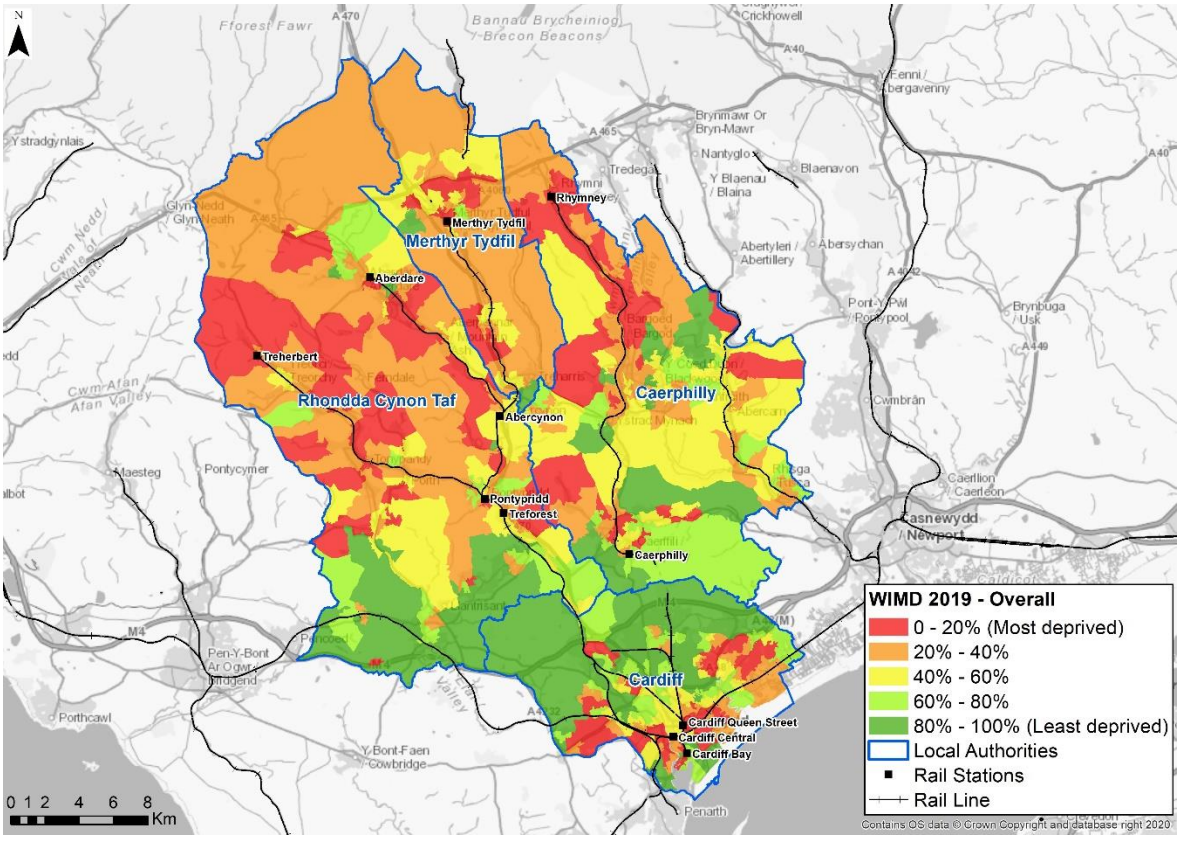


Figure 6.9 WIMD, 2019

6.7.3 The above figure clearly demonstrates the socio-economic analysis brought out in the above sections. There are several concentrated areas of deprivation across the Valleys, particularly in the Heads of the Valleys.

6.7.4 This emphasises the importance of ensuring that the transport system facilitates reliable access to employment and education opportunities within the Cardiff City Centre and Cardiff Bay.

Key Point: The WIMD data clearly summarises the disparities in overall deprivation within the study area. There is a high concentration of deprivation in the Heads of the Valleys in particular, reflecting the below average economic metrics of the area in terms of e.g., employment, income, occupational categories etc.

6.8 Land-Use

6.8.1 In the long-term, SWMP2 is likely to fundamentally change the pattern of development and land-use in the Valleys, particularly given its focus on created transit orientated developments. Such changes will occur gradually over a long-period and it will be difficult to prove direct causality to SWMP2 except through survey work. Nonetheless, it is worth setting out basic land-use data in this baseline report

House Prices

6.8.2 House prices are a reflection of the supply and quality of housing in an area and the demand for that housing. In theory, SWMP2 may give rise to increased house prices and land-value uplift (unless the growth in supply outstrips demand although this is unlikely given the commercial focus of developers) through making the Valleys a more attractive place to live and invest

6.8.3 Figure 6.10 shows the change in median residential house prices between 2009 and 2019 in each location.

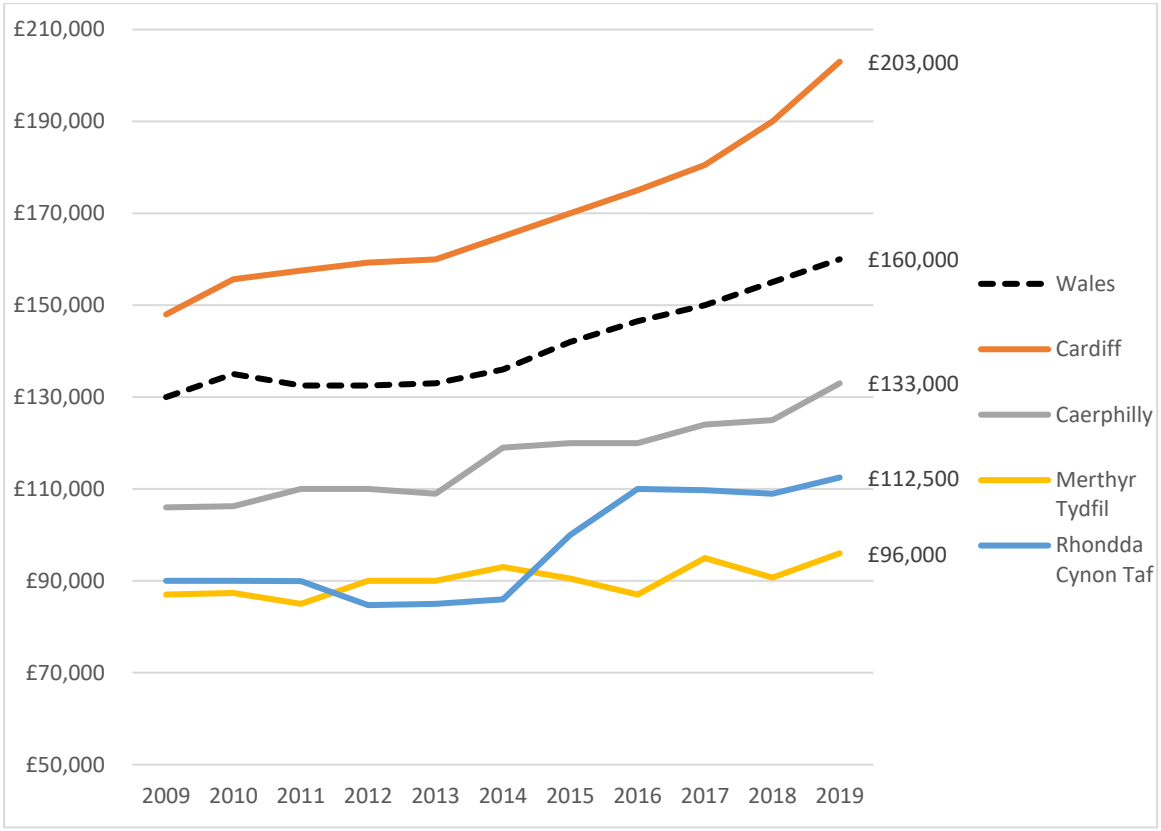


Figure 6.10 Residential Property Prices by Local Authority 2009-19 (Source: ONS House Price Statistics for Small Areas)

6.8.4 The main points of note from the above figure are as follows:

- Median house prices in Cardiff are considerably higher than those in Caerphilly, Rhondda Cynon Taf and Merthyr Tydfil which all fall well below the average for Wales as a whole. This partly reflects the lesser attractiveness of these areas as places to live due to poorer employment opportunities, lower wages etc. It should though also be noted that much of the housing stock in these areas is relatively small and old.
- In the last decade, house prices in Cardiff have risen considerably (growing by 37% between 2009 and 2019) which consultation with the Council found is in part a result of an under provision of homes in the capital and a particular shortage of family homes. In comparison, prices in the Valleys have risen less sharply, with those in Caerphilly increasing by 25% and Rhondda Cynon Taf and Merthyr Tydfil seeing just a 10% increase over the same period. This compares to a 23% increase across Wales as a whole.
- The lower value of properties in the Valleys Communities and the slower rate of growth, despite the high demand for housing within Cardiff, may in part be a reflection of the constrained transport connectivity from these locations into the city. The delivery of SWMP2 will better connect these communities to the employment and other opportunities within the capital

which may result in higher demand for properties and resultant increases in property values.

Key Point: Median residential property prices are significantly lower in the Valleys communities than the Wales average and have grown at a much slower rate over the last decade. The delivery of SWMP2 and the improved connectivity provided may result in higher demand for properties within the Valleys and thus increased property and land values.

Future Planned Development

6.8.5 Transport investment is often key to unlocking regeneration and land-use development opportunities, and indeed this is a core premise of the Metro concept. By facilitating improved access to both employment and labour, enhanced transport connectivity can act to support the commercial viability of development sites which had otherwise been unviable.

6.8.6 Across the study area, a transit orientated approach to development is being adopted in response to the requirement within *Future Wales: The National Plan 2040*[54] (see Chapter 3) to maximise opportunities arising from investment in the public transport network. In response to this document, Rhondda Cynon Taf and Caerphilly CBCs are currently preparing revised Local Development Plans (LDPs) which will likely focus development around the Metro Stations.

6.8.7 Merthyr Tydfil CBC adopted its current LDP in January 2020 and this document reflects this approach. For example, the spatial strategy focuses on development around the Hoover Strategic Regeneration Area, which is a large development site to the north of Pentrebach Station. This site has been largely vacant for the last ten years and the delivery of SWMP2 is seen as a catalyst for its development by the Council. It is anticipated the area will provide:

- 440 new homes (20% of the total housing requirement)
- Local retail provision of 400 sqm
- New employment development on 1.5 hectares of land
- Pentrebach Station Park and Ride
- Provision of a new footbridge / cycle bridge to Abercanaid
- Safeguarded land for a new Metro station at the north of the site

6.8.8 The approach at the Hoover site is likely to be common across the Valleys as the Metro becomes established. Any future outcome evaluation should, in the long-term assess planned and consented developments in and around the Metro network.

[54] Future Wales: The National Plan 2040 (Welsh Government, 2021), https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf, accessed February 2022

6.8.9 Cardiff Council is also in the process of updating its LDP, which will also focus on transit orientated development, i.e., focusing development in areas which are within walking distance of public transport. The capital has significant aspirations to develop the Cardiff Central Enterprise Zone which is centred around Cardiff Central Station. There are also aspirations to further develop Cardiff Bay, including the delivery of a 15,000-capacity indoor arena which will replace the existing Red Dragon Centre, up to 1,100 new homes, 150,000 sq. ft of office space, and a new transport hub with further Metro connections. The delivery of the direct rail connection to the Bay area from the Valley Lines and the improved connectivity between Cardiff City Centre and Valleys is seen as vital for the delivery of these aspirations. Indeed, SWMP2 will widen both the labour market and leisure catchment of Cardiff.

Key Point: Across the study area, a transit orientated approach to development is being adopted in response to the requirements within *Future Wales: The National Plan 2040*. This will see development targeted around the Metro Stations in order to capitalise on the enhanced connectivity provided by SWMP2.

6.9 Tourism

6.9.1 Robust estimates of tourism numbers and spend are typically very difficult to obtain. The most widely used dataset is STEAM, a modelled dataset based upon the Cambridge Economic Impact Model[55]. The table below provides key STEAM tourism data for each local authority.

Table 6:6: Key Tourism Statistics for 2018 (Source: STEAM)

Local Authority	Total visitor numbers (000s)	Total Tourism Value (£ million)	Full Time Equivalent Jobs
Cardiff	22,166	1,379.32	14,250
Caerphilly	1,771	128.95	1,559
Merthyr Tydfil	1,495	100.75	1,204
Rhondda Cynon Taf	2,127	171.79	1,984

6.9.2 The data suggests that Cardiff received 22.1 million visitors in 2018 which is estimated to have generated £1.3 billion of tourism value and supported 14,250 jobs. This reflects Cardiff's growing popularity as a tourist destination and its increasing role as a host for major international sporting and cultural events at venues such as the Millennium Stadium, the Wales Millennium Centre and Cardiff Bay more generally. The city's economic leisure and

[55] The Cambridge Economic Impact Model examines the volume and value of tourism and the impact of that expenditure on the local economy. It works from national level surveys regionally based data and distributes regional activity as measured in those surveys to local areas using 'drivers' such as the accommodation stock and occupancy which influence the distribution of tourism activity at local level. The results of the model should therefore be regarded as indicative estimates of the scale and importance of visitor activity in the local area, rather than a definitive measure.

tourism sector generates significant economic benefits both for the city and the wider region and, as discussed above, there are aspirations to further develop the leisure and tourism offering, particularly at Cardiff Bay.

6.9.3 Whilst the tourism market is far smaller in the Valleys Communities, there are a number of significant attractors (e.g., Bike Park Wales, Zip World, the Brecon Beacons, Cyfarthfa Castle) and tourism still generates considerable value at the local level. There are also aspirations to grow and develop the tourism market in these locations and capitalise on the improved public transport connectivity provided by SWMP2, including through the design and delivery of both public transport and active travel connections between the Metro stations and key tourism sites. Whilst the dominant direction of travel in terms of leisure trips will undoubtedly be towards the capital given its extensive tourism offering, the delivery of SWMP2 as well as the associated improvements at a local level, could also result in an increase in tourism trips into the Valleys communities.

Key Point: Cardiff attracts a significant volume of both domestic and international visitors and generates considerable value for the Welsh economy. The delivery of SWMP2 and the provision of a direct connection to Cardiff Bay will further support Cardiff's tourism and local leisure market. There is also potential for the improved public transport connectivity to lead to an increase in tourism trips to the Valleys communities.

6.10 Summary

6.10.1 The purpose of developing this baseline is to provide an overview of the key socio-economic metrics in the Rhondda Cynon Taf, Merthyr Tydfil, Caerphilly and Cardiff local authority areas ahead of the introduction of SWMP2. The investment case for SWMP2 together with the logic maps in this report highlight the ultimate aspiration for the Metro overall to be a driver of socio-economic transformation, and it is only by understanding the current position and that of the control areas that this change can be fully mapped over time.

6.10.2 The CCR generally has an economic geography that has prevailed uninterrupted since the onset of rapid deindustrialisation in the 1980s. It is one of economic dualism and a two-speed economy, with a generally affluent and productive core in Cardiff and its immediate surrounds bounded by areas of intense multiple deprivation to the north, particularly in the Heads of the Valleys. In the industrial era, the Valleys communities were largely self-contained, with most people working in their local area. However, the demise of heavy industry, particularly coal mining, and later light industry such as the Hoover factory in Pentrebach, led to a sharp decline in locally available jobs. This meant that the need to travel for work became more prominent, particularly to Cardiff, but also to regional centres.

6.10.3 As highlighted in the transport baseline, connectivity from the Valleys, and in particular the Heads of the Valleys, to Cardiff is poor and has not allowed these areas to share in the growing economic prosperity being created by

Wales' capital city. Low rates of economic activity, high rates of unemployment, low productivity and limited inward investment characterise the area.

6.10.4 SWMP2 will effectively bring the Heads of the Valleys and all intermediate points 'closer' to Cardiff (and vice versa). This will increase the range of job opportunities for residents, expand the labour pool for businesses, increase productivity and facilitate residential and commercial development. These 'impacts' are set out in the logic maps and are the ultimate expression of the benefit of SWMP2, and thus demonstrating the extent to which they materialise will be the primary objective of any long-term outcome evaluation.

7 ERDF Output and Result Indicators

7.1 Overview

7.1.1 The requirement for an evaluation of SWMP2 initially stemmed from its receipt of £158m of ERDF funding. A condition of the grant is the delivery of a set of targets known as:

- **'Output Indicators':** these provide a statement of the required outputs from the investment in SWMP2 and broadly map to the 'outputs' identified in the operation logic maps in Chapter 4.
- **'Result Indicators'**: these are a statement of the results which the ERDF requires SWMP2 to deliver for those ERDF funded operations. In the context of the operation logic maps presented in Chapter 4, the ERDF 'Results Indicators' map to the outputs (West Wales ERDF Result Indicator) and outcomes (East Wales ERDF Result Indicator).

7.1.2 Given the importance of these indicators in terms of the ERDF funding commitment, we took the decision to specifically report the baseline for each indicator in a standalone chapter. However, **it is important to note that the analysis presented below should form part of the wider baseline in any subsequent outcome evaluation commissioned after the ERDF inputs have been closed out.**

7.2 ERDF Output and Result Indicators

Outputs Indicators

7.2.1 Table 7.1 and Table 7.2 set out the 'Output Indicators' and provides a cross-reference to the appropriate baseline evidence.

Table 7:1: East Wales ERDF Output Indicators (Source: Operation Business Cases)

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Cardiff Bay Stage 1	2	1.3km	n/a – target set at programme level only.	n/a
Queen Street	0	0.5km		n/a
East Wales Station Improvements	18	N/A – already covered by a separate operation		n/a

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Programme Target	5	3km	1,800 tCO_2e[56]	n/a
Baseline Indicator	Not reported – basic 'before and after' comparison	Not reported – basic 'before and after' comparison	Section 7.3	Not reported – basic 'before and after' comparison

Table 7.2: West Wales ERDF Output Indicators (Source: Operation Business Cases)

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Treherbert Line	0	5.5km	n/a – target set at programme level only	n/a
Aberdare Line	0	5.7km		
Merthyr Line	0	6.3km		
Rhymney Line	0	6.5km		
Taff's Well Depot	1			3.6 hectares of serviced land ready for a new depot to be delivered
West Wales and Valleys station improvements	37	n/a		
Programme Target	38	24km	10,700 tCO_2e[57]	3.6 hectares

[56] It is assumed that the target is to achieve this reduction over a 15-year timeframe i.e. by 2040

[57] It is assumed that the target is to achieve this reduction over a 15-year timeframe i.e. by 2040

	Intermodal facilities created or improved	Total length of reconstructed or upgraded railway line (including TEN-T)	Reduction in CO_2 equivalent emissions	Land Developed
Baseline Indicator	Not reported – basic 'before and after' comparison	Not reported – basic 'before and after' comparison	Section 7.3	Not reported – basic 'before and after' comparison

Result Indicators

7.2.2 Table 7: sets out the 'Result Indicators' and provides a cross-reference to the appropriate baseline evidence.

Table 7:3 ERDF Result Indicators (Source: Operation Business Cases)

Operational Programme	Indicator	Measurement Unit	Baseline Value	Baseline Year	Target Value (2023)	Baseline Data
East Wales	Total passengers using public transport between key urban links	Number	869,000	2012/13	10% increase	Section 7.4
West Wales and Valleys	Proportion of people aged 16 and over within 15, 30 and 45 minutes travel-time thresholds of a 'Key Centre' between 07:00-09:00 on a Tuesday by	Number	<15 mins =41,695 15-30 mins = 96,268 30-45 mins = 150,376	2015	5% increase in each time band	Section 7.5

Operational Programme	Indicator	Measurement Unit	Baseline Value	Baseline Year	Target Value (2023)	Baseline Data
	public transport.					

7.3 Output Indicator – Reduction in CO_2 equivalent emissions

7.3.1 Reductions in CO_2 emissions as a result of SWMP2 are expected due to:

- mode shift from car to rail; and
- use of new electric rolling stock, which will replace the elderly DMUs currently used on the CVLs.

7.3.2 Separate methods have been used to forecast the CO_2 emissions reductions from each of the above and these are described below.

Modal shift from car to rail

7.3.3 Emissions reductions from modal shift have been forecast using a combination of the South-East Wales Transport Model (SEWTM)[58] and the DfT's Transport User Benefits Appraisal (TUBA) software.

7.3.4 Forecasts are based on comparing two modelled scenarios in both the 2026 and 2036 forecast years, with results interpolated linearly for intermediate years and extrapolated linearly beyond 2036 for a further four years. This provides an assessment over 15 years. The two modelled scenarios are:

- Without SWMP2, assuming existing CVL service frequencies and journey times are retained with no further substantial improvements; and
- With SWMP2, where CVL services are recast with increased service frequencies, reduced journey times and rearranged routes.

7.3.5 The variable demand modelling capability of SEWTM allows for the number of people using each mode of transport (demand) to change as a result of modes becoming comparably more or less attractive. For SWMP2, rail services on the CVL become more attractive and therefore additional rail journeys are forecast to be undertaken, some of which would be transfers from car. The total reduction in car-kms as a result of mode shift to rail is estimated from the car trip volume and car trip distance matrices extracted from SEWTM for the two modelled scenarios and for the entire modelled area. The reduction in car-kms is converted to tonnes of CO_2 emissions in the non-traded carbon sector using the Transport User Benefit Appraisal (TUBA) software[59].

[58] https://tfw.wales/sites/default/files/inline-files/transport%20models%20eng.pdf – see page 18.

[59] https://www.gov.uk/government/publications/tuba-downloads-and-user-manuals

7.3.6 Comparing the 'with SWMP2' scenario to the 'without SMWP2' scenario over 15 years (2026 to 2040 inclusive), the reduction in CO_2 emissions resulting from mode shift is estimated as **14,400** tCO_2e, or **40,700** tCO_2e over a conventional 60-year appraisal period.

Rolling stock replacement

7.3.7 'Tailpipe' emissions reductions due to replacing ageing diesel rolling stock with new bi-mode and tri-mode rolling stock (which will operate in electric mode on the CVL) have been estimated. The calculation does not take account of the current carbon intensity of electricity generation and transmission in the UK, which would offset some of the estimated reductions. It also does not take account of the carbon emissions generated during diesel production and transportation. The calculation therefore deals solely with CO_2 emissions generated by rolling stock within the CVL area.

7.3.8 The calculation is based on annualising the following data:

- May 2019 timetable data from the rail industry's MOIRA software – this provides the number of rail services operating on each of the SWMP2 corridors.
- Station-to-station rail distances from MOIRA which, combined with the number of rail services, provides an estimate of passenger train-kms operated. The calculation does not include 'dead' mileage associated with ECS (empty coaching stock) moves.
- An estimated emissions factor (3,202g CO_2/km)[60] for a Class 150 DMU train operating with an average of 3 passenger carriages. The Class 150 train is currently the most commonly used train on the CVL.

7.3.9 Rolling stock replacement will lead to an estimated **reduction of 10,900** tCO_2e **per annum** on the CVL **(163,500** tCO_2e **over 15 years)**.

Key Point: It is estimated that SWMP2 will lead to a **reduction in CO_2 emissions of 177,900** tonnes within the CVL area over the 15-year period to 2040, with the majority of this reduction (92%) stemming from rolling stock replacement and 8% a result of modal shift from car to rail.

7.4 East Wales Result Indicator

7.4.1 As set out in Table 7.2, the 'Result Indicator' for East Wales sets a target of a 10% increase in total passenger numbers using the rail link between Cardiff Queen Street and Cardiff Bay between the baseline year of 2012/13 and 2023 when Cardiff Bay Stage 1 is anticipated to be complete and operational.

7.4.2 Any future outcome evaluation of this metric will be based on LENNON ticket sales data on the Cardiff Queen Street – Cardiff Bay section of line six months

[60] Emissions factor source: 2009 report 'Carbon Footprinting of Policies, Programmes and Projects', produced by the AEA Group for PTEG.

after the new rail timetable becomes operational. However, it was agreed with TfW that, for this baseline, initial reporting of the metric would be based on SEWTM forecasts of post-opening patronage on this section.

7.4.3 Forecasts for changes in passenger numbers as a result of SWMP2 are based on the same scenarios referenced in Section 7.2. The 'With SWMP2' scenario contains the following assumed changes to transport supply:

- Four trains per hour operating between Cardiff and the Heads of the Valleys (Treherbert, Aberdare, Merthyr Tydfil and Rhymney), which represents a service frequency doubling.
- End-to-end journey time reductions for rail services between Cardiff and the Heads of the Valleys
- Direct rail services between Treherbert, Aberdare, Merthyr Tydfil and Cardiff Bay
- Service rearrangements with services from Treherbert, Aberdare and Merthyr Tydfil terminating in Cardiff and services from Rhymney and Coryton continuing south to Penarth, Barry Island, or Bridgend via Rhoose.

7.4.4 The variable demand modelling capability of SEWTM allows for the number of people using each mode of transport (demand) to change as a result of modes becoming comparably more or less attractive. For SWMP2, rail services on the CVL will become more attractive and therefore additional rail journeys are forecast to be undertaken, some of which would be transfers from car.

7.4.5 Comparing the 'with SWMP2' 2026 scenario to the 'without SWMP2' 2026 scenario, the **number of passengers travelling on rail services between Cardiff Queen Street and Cardiff Bay is expected to increase by 27%.** It should however be noted that forecasts in SEWTM do not take account of the potential structural changes to passenger demand that could occur as a result of COVID-19.

Key Point: The East Wales Result Indicator sets a target of a 10% increase in total 2012/13 passenger numbers using the rail link between Cardiff Queen Street and Cardiff Bay by 2023. It was agreed that initial reporting of this metric would be based on SEWTM forecasts which suggest that there will be a **27% increase in passenger numbers on the link**. During any *future outcome* evaluation, LENNON ticket sales data will be reviewed six months after the new rail service timetables become operational to determine if the 10% target has been achieved, although it should be noted that structural changes to passenger demand post-COVID-19 could affect this.

7.5 West Wales and Valleys Result Indicator

7.5.1 In order to undertake the assessment for this 'Result' indicator, TRACC public transport connectivity software[61] was used. TRACC calculates the shortest

[61] https://www.basemap.co.uk/tracc/

journey time between sets of origins and destinations based upon public transport timetable data and a range of user-defined parameters.

7.5.2 In this case, the origin area covered the South-East Wales region and parts of Mid-Wales and South-West England. Six key centres were used as destinations (Aberdare, Caerphilly, Cardiff Bay, Cardiff City Centre, Merthyr Tydfil and Pontypridd).

7.5.3 The analysis was undertaken using two scenarios, as follows:

- **Base:** which used Q1 2017 public transport timetables with no CVL enhancements.
- **Scenario 1a:** which used Q1 2017 public transport timetables with amendments made to the CVL to reflect a 'max frequency timetable' once SWMP2 is complete.

7.5.4 In each case, the calculation was undertaken between 7am and 9am on a Tuesday, as per the requirement of the indicator

7.5.5 To calculate the total population within each time band, 2015 population data was used in both the base and Scenario 1a in order to ensure any increase / decrease in population had no impact on the results.

7.5.6 The percentage difference in the population in each time band for each 'key centre' between the base and Scenario 1a was then calculated. The overall Scenario 1a result was then calculated by taking an average of the percentage differences from each of the key centres, for each time period threshold (e.g., the average of all 0-15 minute percentage differences, the average of all 15-30 minute percentage differences etc).

7.5.7 The percentage differences were calculated separately for each key centre in the first instance and then averaged to avoid results being skewed heavily by Cardiff City Centre / Cardiff Bay. Cardiff has a high population density and a dense bus network, which means that changes in rail provision often have little impact on the 0-15- and 15-30-minute bands. By averaging the percentages, each key centre was given equal importance / weighting.

7.5.8 The overall results are set out in the table below. As shown, the minimum threshold of a 5% increase in each time band is met.

Table 7:4 Overall Results: Scenario 1a Average Percentage Difference

Journey Time	Scenario 1a – Average Percentage Difference across Six Centres
0 -15 minutes	8.0%
15-30 minutes	21.2%
30-45 minutes	39.5%

Key Point: The overall results show that, based upon a full SWMP2 timetable, the minimum threshold of a 5% increase in the proportion of the population aged 16 over within a 15, 30 and 45-minute travel time of a 'key centre' will be met.

7.6 Connectivity Analysis

7.6.1 The West Wales and Valleys 'Result' indicator' is intended to provide a proxy for the change in connectivity to education, employment, leisure opportunities etc. However, it is a fairly rudimentary measure and, in our view, any future outcome evaluation should expand the focus of this indicator. As expressed in the logic maps, SWMP2 is predominantly about tackling transport problems, which will result in different **travel behaviour outcomes** which will generate **positive societal and economic impacts.**

7.6.2 To this end, we have developed a baseline for the study area which sets out:

- **public transport access to employment** (i.e., access to jobs)
- **public transport access to 'population'** (i.e., the size of the labour market for businesses); and
- **correlations between deprivation** for a subset of 'domains' in the Welsh Index of Multiple deprivation **and poor public transport connectivity** to the 'source' of their deprivation (e.g., employment-related deprivation and poor public transport connectivity to jobs).

7.6.3 SWMP2 will fundamentally change the economic geography of South-East Wales and it is therefore essential that a clear 'before and after' comparison can be undertaken if its economic and societal impacts are to be truly understood. This is set out in the next sections.

Public Transport access to employment and population

7.6.4 To develop a detailed picture of levels of connectivity within the study prior to the delivery of SWMP2, a series of 'Hansen' Connectivity Indicators were developed. Hansen indicators provide a measure of the relative connectivity (based on travel times) of a set of 'origins' to all possible 'destinations' in a defined study area, weighted by a chosen destination 'criteria' (typically employment or population), with resulting high scores indicating good connectivity and low scores suggesting poorer connectivity. A decay-function is applied in the calculation such that opportunities at more distant locations (i.e., with a longer travel time) are 'valued' less than opportunities closer by. Further information on Hansen is provided in Appendix E

7.6.5 The weightings were developed from analysis of National Travel Survey journey purpose by distance data[62]. Each calculation produces a single value

62 https://webarchive.nationalarchives.gov.uk/ukgwa/+/http:/www.dft.gov.uk/pgr/regional/ltp/accessibility/guidance/gap/technicalappendix6informatio3639

for each location reflecting its connectivity to all other locations (the so called 'Hansen' value). These values are unitless and are primarily intended to show the connectivity of locations relative to one another, rather than in any absolute sense (which is presented above for the West Wales and Valleys 'Result' indicator).

7.6.6 Details of the journey time calculations undertaken to inform the development of the Hansen Indicators are provided in Table 7:.

Table 7:5 Journey Time Calculations completed to inform Hansen Indicators

Origin	Destination	Period
Lower super output areas (LSOAs) in Cardiff, Merthyr Tydfil, Caerphilly, Rhondda Cynon Taf, Bridgend, Vale of Glamorgan[63], and Blaenau Gwent	LSOAs in Cardiff Capital Region	Average across three time periods: 05:00 – 09:00 06:00 – 10:00 07:00 – 11:00[64]

7.6.7 Using the results from the above journey time calculations, two connectivity indicators were then developed as follows:

- **Access to employment within the study area** – the average AM journey times between each pair of origins and destinations was weighted by the number of jobs at the destination zones as the 'criteria'. Employment data to inform this analysis was taken from BRES 2019 data. The results for each origin-destination pair were then summed over all origin zones. This measure provides a representation of **people-to-business connectivity (i.e., to jobs)** or **business-to-business connectivity** in the study area.
- **Access to population within the study area** – the average AM journey times between each pair of origins and destinations was weighted by the number of people at the destination zones as the 'criteria'. Population data to inform this analysis was taken from ONS Mid-Year Population Estimates 2019. The results for each origin-destination pair were then summed over all origin zones. This measure provides a representation of **business to people connectivity** in the study area i.e., **the potential labour market catchment from each employment location**.

[63] Bridgend and the Vale of Glamorgan were selected because some CVL services connect through to these locations

[64] These time periods were selected to ensure good coverage across the AM peak period and to enable sufficient time to complete a journey from one end of the study area to another.

Access to employment

7.6.8 Figure 7.1 shows the Hansen indicators for access to employment by public transport. All origins are split into 10 equal groups based on their Hansen score, representing best (dark green) to poorest (red) connectivity.

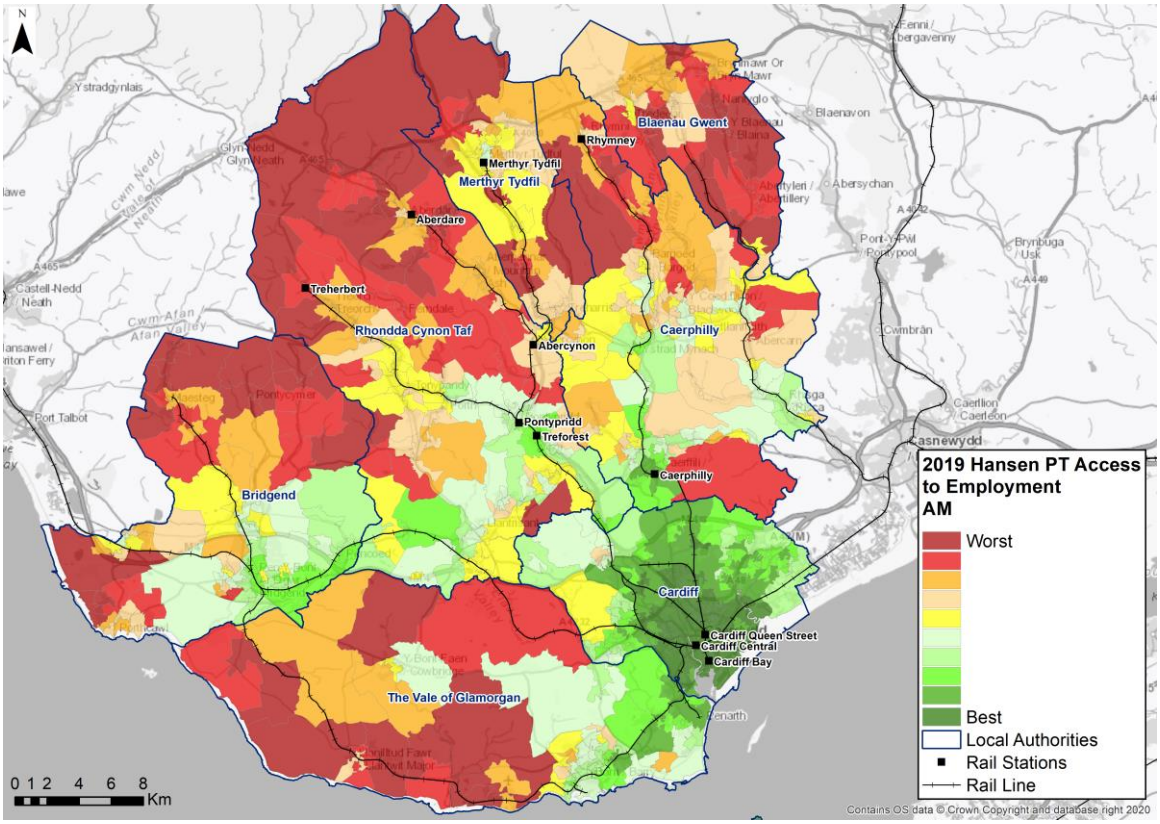


Figure 7.1 Hansen PT Access to Employment – AM Period

7.6.9 The above figure highlights the relatively poor access to employment from the Heads of the Valleys, with large areas in the northern sections of Caerphilly, Merthyr Tydfil, and Rhondda Cynon Taff (as well as Blaenau Gwent) falling in the bottom 30% in terms of public transport access. It is notable that areas further south in each local authority area which are close to the rail network perform better. For example, there is relatively high connectivity to employment from Pontypridd and Caerphilly. These locations already benefit from higher frequency rail services and shorter public transport journey times to key employment centres in the capital.

7.6.10 SWMP2 will significantly improve rail services throughout the area, but particularly for the Heads of the Valleys where journey times are long and frequencies lower. Reproducing this analysis during the output evaluation would likely show a significant improvement in the Hansen score for these areas.

Key Point: The Hansen analysis shows that residents in the Heads of the Valleys have relatively poor access to employment when compared to residents further south who benefit from higher frequency rail services and shorter public transport journey times

Access to population (labour market)

7.6.11 Figure 7.2 shows the Hansen indicators for access to population by public transport. This is a measure of **business-to-people** connectivity in the study area i.e., the potential **labour market catchment** from each employment location. As explained in Chapter 5, maximising the size of the labour market is essential in matching skills to jobs and thus maximising productivity.

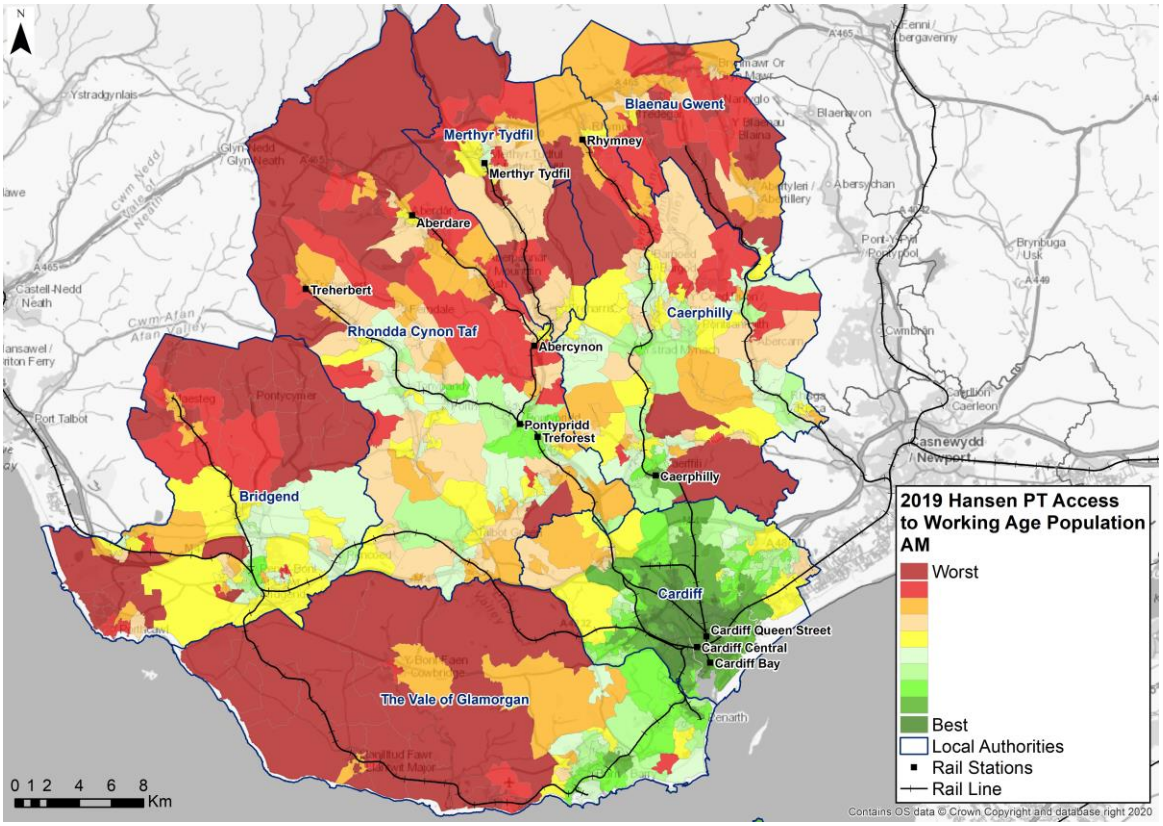


Figure 7.2 Hansen PT Access to Working Age Population – AM period

7.6.12 The issues with poor connectivity are again apparent in this figure which highlights that there is poor connectivity to labour for businesses operating in the Heads of the Valleys. Similarly, Cardiff-based firms have a smaller labour pool to draw upon than they otherwise would.

7.6.13 This comparatively poor connectivity may make it harder for businesses in these locations to recruit employees, leading to either unfilled jobs or a mismatch in skills and thus lower productivity, which ultimately translates through into poorer economic performance for Wales overall. Perhaps more importantly, transport connectivity is one of the key factors which determines business location and investment decisions. In this respect, the communities

in the north of the valleys lag those further south which benefit from higher frequency rail services and shorter public transport journey times. Without improved public transport connectivity, there is a risk that existing economic weakness and societal inequalities will be exacerbated.

7.6.14 This analysis should again be repeated for a 'with SWMP2' scenario so as to highlight the impact of the investment on the depth of the labour market and hence productivity.

Key Point: Businesses operating in the north of the Valleys have comparatively poor public transport access to labour. Similarly, Cardiff-based firms have a smaller labour pool to draw upon than they otherwise would. Good transport connectivity is essential in matching skills to jobs, thus maximising productivity. The size of the labour market in an area will be one factor which influences business location and investment decisions. Without improved public transport connectivity, there is a risk that existing economic weaknesses and societal inequalities will be exacerbated.

Connectivity and Deprivation

7.6.15 A key driver of SWMP2 is the desire to enhance socio-economic prosperity and reduce entrenched deprivation in the Valleys communities. To understand the relationship between transport connectivity and deprivation in the study area in more detail, Stantec's Connectivity and Deprivation Audit (CDAT) tool has been used.

7.6.16 The CDAT tool identifies areas which:

- are **classed as 'deprived'** from one or more socio-economic perspectives (e.g., high unemployment, poor further / higher educational attainment); and
- suffer from **poor public transport connectivity** (relative to the rest of the study area) to the 'source' of their deprivation (e.g., jobs, further / higher education opportunities).

7.6.17 The tool therefore enables the **identification of areas where poor public transport connectivity may be contributing to deprivation**.

7.6.18 CDAT classifies each location (in this case, Lower Super Output Areas) into three tiers based upon the combination of their deprivation and public transport connectivity. The tiers are defined as follows:

- **Tier 1**: areas with the least deprivation and public transport connectivity problems;
- **Tier 2**: areas where there is a potential correlation between deprivation and public transport connectivity, and which are classed as being 'at risk';
- **Tier 3**: areas with the highest correlation between deprivation and public transport connectivity suggesting a causal relationship exists.

7.6.19 The analysis undertaken in this instance examined levels of deprivation in terms of, and connectivity to:

- employment;
- education (colleges);
- education (universities); and
- health.

7.6.20 Further information on the data sources used in developing the CDAT analysis as well as more detailed result tables which provide a breakdown using the urban-rural classification are included in Appendix F

7.6.21 The table below shows the proportion of the population in each local authority area which falls within each tier in each of the four categories assessed and Figures 7.3-7.6 show the location of the Tier 2 and Tier 3 areas in each case.

Table 7:6 Population falling within each CDAT tier for employment, education (college), education (university), and healthcare

Category	Local Authority	Tier 1	Tier 2	Tier 3	Total
Employment	Cardiff	98.5%	1.5%	0.0%	366,903
	Caerphilly	53.1%	23.4%	23.5%	181,075
	Merthyr Tydfil	13.1%	37.0%	49.9%	60,326
	Rhondda Cynon Taf	40.7%	23.5%	35.8%	241,264
Education (colleges)	Cardiff	87.8%	8.9%	3.4%	366,903
	Caerphilly	49.8%	21.1%	29.1%	181,075
	Merthyr Tydfil	42.0%	29.0%	29.0%	60,326
	Rhondda Cynon Taf	54.3%	22.3%	23.4%	241,264
Education (universities)	Cardiff	97.8%	2.2%	0.0%	366,903
	Caerphilly	41.8%	26.6%	31.6%	181,075
	Merthyr Tydfil	21.3%	28.0%	50.7%	60,326
	Rhondda Cynon Taf	46.4%	19.4%	34.2%	241,264
Healthcare	Cardiff	87.8%	9.3%	2.8%	366,903
	Caerphilly	45.6%	24.0%	30.4%	181,075
	Merthyr Tydfil	21.6%	38.4%	40.1%	60,326

Category	Local Authority	Tier 1	Tier 2	Tier 3	Total
	Rhondda Cynon Taf	52.8%	25.8%	21.4%	241,264

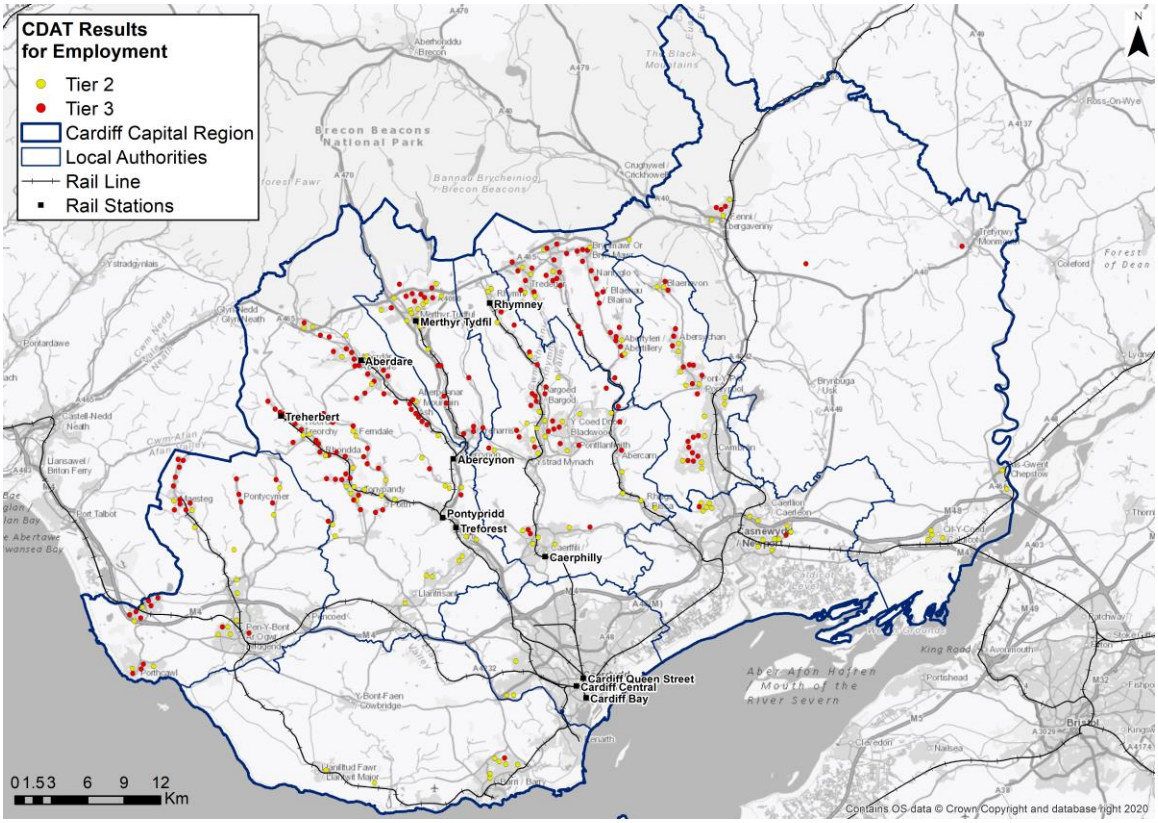


Figure 7.3 CDAT Connectivity to Employment

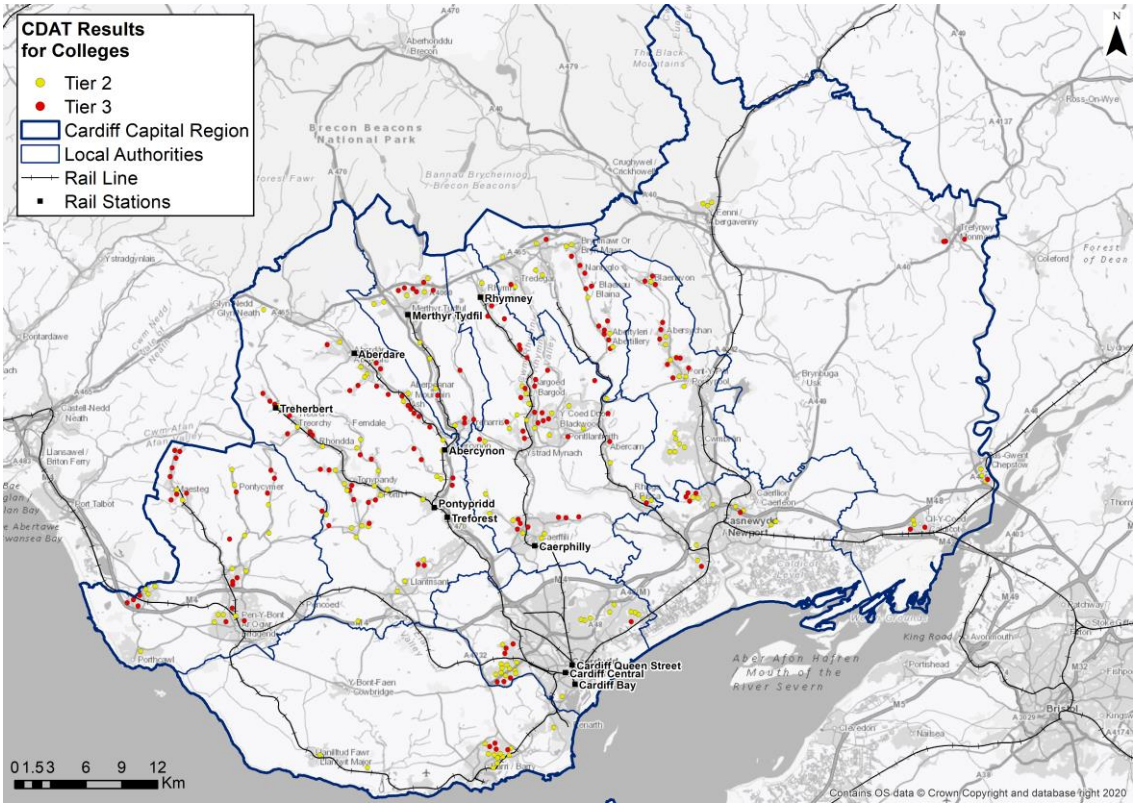


Figure 7.4 CDAT Connectivity to Colleges

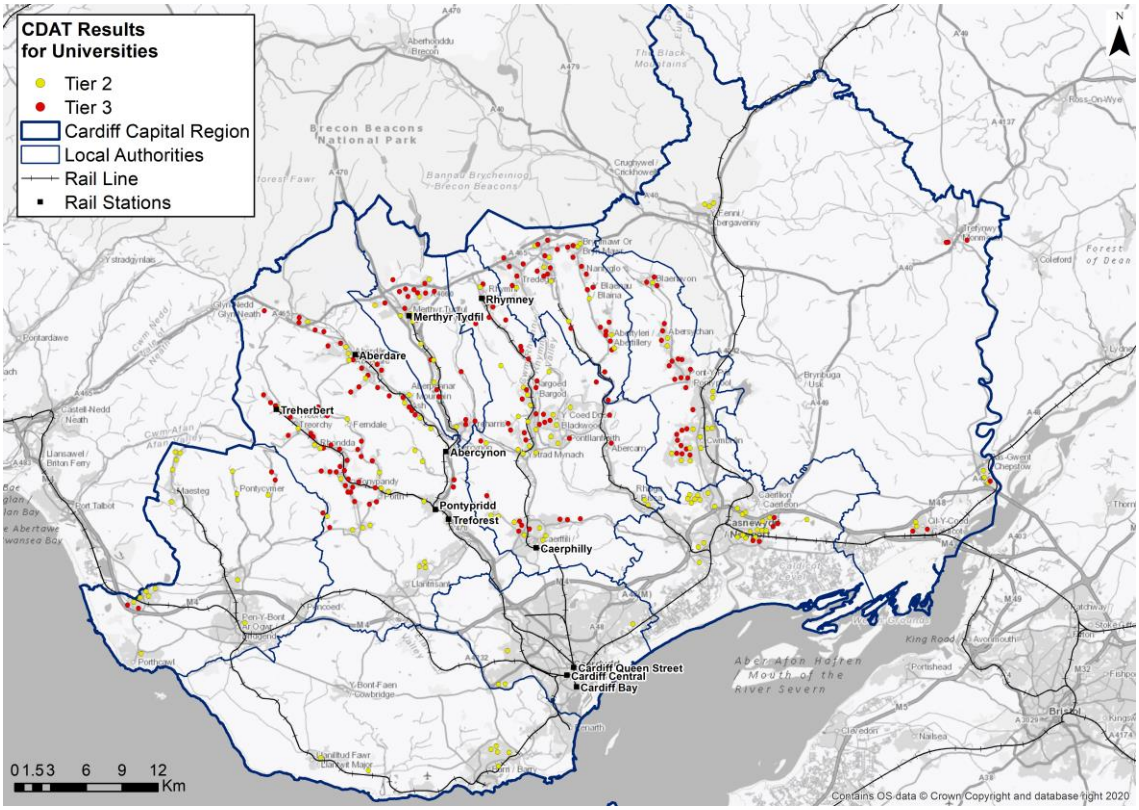


Figure 7.5 CDAT Connectivity to Universities

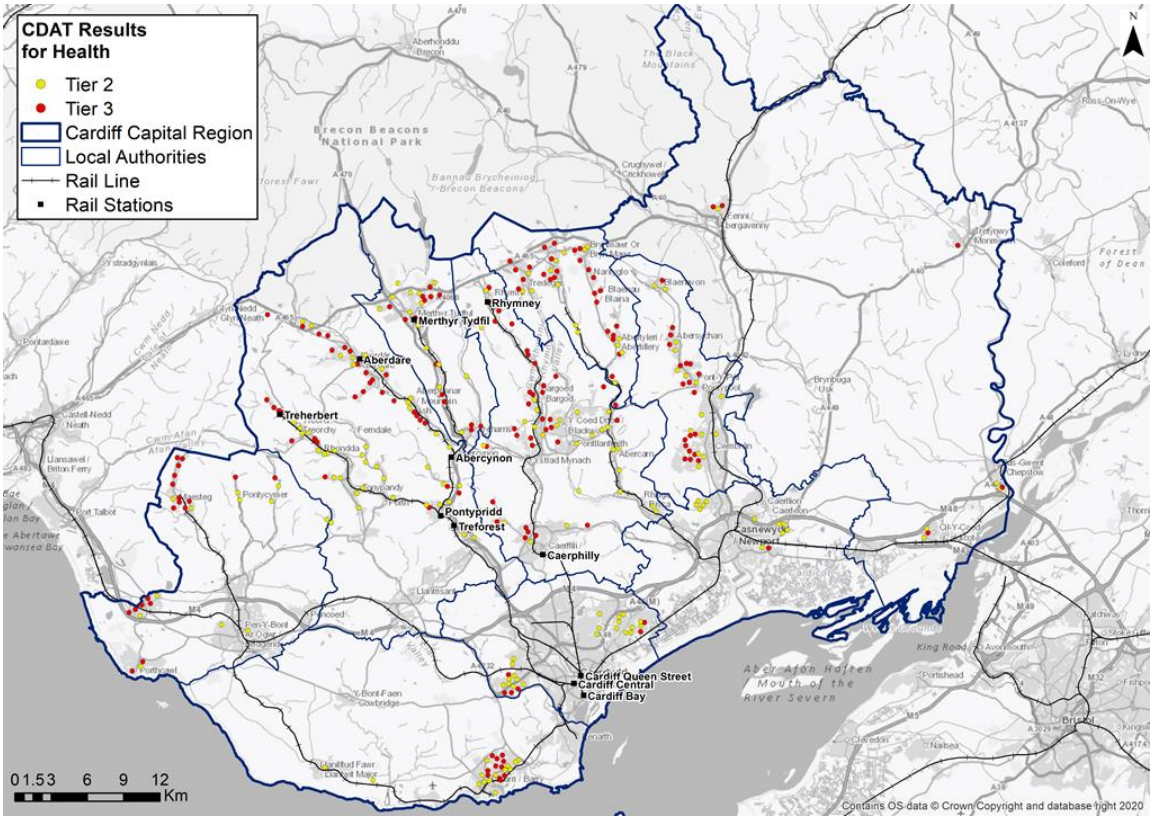


Figure 7.6 CDAT Connectivity to Health

7.6.22 The CDAT analysis very much reflects the Hansen analysis, in that the areas with the greatest correlation between deprivation and poor public transport connectivity to the source of the deprivation are in the north of the Valleys. This suggests that poor connectivity to / from these locations is contributing to higher levels of deprivation in these areas. The scale of improvement offered by SWMP2 will therefore be transformational for these areas, reducing journey times and improving frequency, reliability and capacity.

7.6.23 To help determine the extent to which SWMP2 contributes to improved connectivity and lower levels of deprivation, this baseline analysis should be repeated in the future as part of a longer-term outcome evaluation and the outturn results compared against this baseline analysis.

Key Point: The CDAT analysis clearly demonstrates a correlation between deprivation (in several domains) and public transport connectivity to the source of that domain across much of the study area. The picture is particularly stark across the north of the Valleys, which highlights the transformational potential of SWMP2.

8 Interim Process Evaluation

8.1 Overview

8.1.1 A process evaluation is an evaluation of how a scheme has been selected, funded, procured, managed and delivered, with the aim of identifying lessons that could be learned for delivering similar schemes in future, in this context other Metro and major infrastructure schemes in Wales. It should be noted that a process evaluation is not intended to be a detailed issue-by-issue audit of scheme performance (which would be undertaken by the Wales Audit Office) or a review of the technical solution adopted, rather it is an open, inclusive and '360º review' designed to improve future approaches to scheme identification and delivery.

8.1.2 There are two components to the process evaluation in relation to SWMP2:

- The **Interim Process Evaluation** (this chapter), which focuses on how SWMP2 was identified, funded and procured.
- The **Final Process Evaluation** – this is the more substantive exercise which will assess the actual delivery of the nine ERDF funded operations and SWMP2 overall and will be included in the Final Evaluation report in 2023.

Interim Process Evaluation

8.1.3 The Interim Process Evaluation has been drawn together through a document review and seven one-to-one and group interviews with the parties involved in specifying and delivering the Metro overall, including:

- Welsh Government and its supporting consultants
- Transport for Wales[65]
- Welsh European Funding Office
- Amey Infrastructure Wales[66]

8.1.4 The outputs from these discussions are summarised in the sections that follow but comments have been anonymised.

8.2 Origins of SWMP2

8.2.1 The first Wales & Borders rail franchise[67] was awarded to Arriva Trains Wales in December 2003 and provided a 15-year contract to operate services to 2018. Rail was not a devolved area at this point in time and thus the contract was awarded by the Strategic Rail Authority. The contract was based on an

[65] It should be noted that the SWM concept pre-dates TfW. TfW has only been operating since 2015.

[66] It should be noted that AIW has only existed since 2018

[67] Post-privatisation, Welsh services were part of wider franchises such as 'Wales & West' and it was only in 2003 that single 'all-Wales' franchise was procured.

assumption of zero-growth, which deprived those served by the franchise of many of the improvements that could have typically been expected in a 15-year franchise agreement, a point acknowledged by the Welsh Affairs Select Committee in 2017.[68] The Wales & Borders franchise, and in particular the CVL, therefore approached the end of the franchise much as it had started it, with low line speeds and frequencies, limited capacity, poor station environments and 1980s DMU rolling stock, including the much maligned 'Pacers' (Class 14x stock).

8.2.2 The poor quality of the Cardiff suburban railway network was increasingly seen as a barrier to realising the economic potential of the Cardiff Capital Region and a factor in locking-in many of the endemic social and economic challenges associated with post-industrial decline in the Welsh Valleys. Recognising this, a report was commissioned in 2011 by the Cardiff Business Partnership and authored by Professor Mark Barry entitled *A Metro for Wales' Capital City Region*, which represented the first comprehensive expression of the 'Metro' concept.[69] The report attempted to move beyond the incremental nature of public transport enhancements proposed in the prevailing strategy and delivery documents of the time, setting out a more holistic Capital Region wide set of proposals.

8.2.3 The 2011 report was supplemented by the 2013 study *A Cardiff City Region Metro: Transform, Regenerate and Connect.*[70] This report updated and restated the Metro concept, highlighting the economic, land-use development and regeneration opportunities which could be delivered by improved transport connectivity. This piece of work was undertaken at the same time as a WG-led and local authority supported 'Integrated Transport Task Force Review'. These two pieces of work complemented each other and created further momentum behind the Metro concept, leading to the commissioning of the *Metro Impact Study*[71] in 2013. This study examined the potential of developing a Metro in the Cardiff Capital Region in terms of employment, regeneration, Gross Value Added and community perception. Whilst it considered a range of transport options, it was strategic in nature and focused more on the potential economic and regeneration impact of the proposed Metro.

8.2.4 Cumulatively, these pieces of work created the outline concept which secured political buy-in and a commitment by Welsh Government to further develop the concept of what ultimately became SWMP2. At the heart of this proposition was the provision of a 4tph service, which was equated to a 'turn-up and go' frequency.

8.2.5 From a process evaluation perspective, the following points can be made:

[68] https://publications.parliament.uk/pa/cm201617/cmselect/cmwelaf/589/58908.htm

[69] iwa-metroreport.pdf

[70] https://mgbarryconsulting-my.sharepoint.com/:b:/p/mark/EY1j9X-dO8VGjqlj7PLD2GMB_aHXgKeFI4mOD-4H2cLLwA?e=YG8K97

[71] https://beta.gov.wales/south-wales-metro-impact-study

- The speed with which the Metro concept has been developed, appraised and committed is almost unparalleled in the context of UK transport infrastructure investment. Even relatively small schemes can often be well in excess of a decade in the planning and delivery, yet SWM will have gone from outline concept in 2011 to the delivery of Phase 2 (the most significant part of the project) by the end of 2023. This success highlights the attractiveness of the concept, early stakeholder buy-in (government and private sector) and a strong focus on outcomes and deliverables. SWMP2 will transform a railway network which has been stagnant, starved of investment and which has failed to meet the needs of its customers for some time.
- Whilst a significant body of work exists on the South Wales Metro concept, with studies dating back to 2011, there does not appear to be a formal *WelTAG*[72] *Stage 1: Strategic Outline Case. However* early studies together contain many of the elements that would be expected by a WelTAG Stage 1 study. There is evidence, particularly within the 2013 Impact Study, that the early stage work followed most of the principles set out in WelTAG[1], such as identifying problems and issues that need to be addressed, considering a range of options and prioritising those options. Later stages of work brought the development work more closely in line with WelTAG, culminating in a Full Business Case (equivalent to WelTAG Stage 3) in 2018.
- Given the significant potential that SWMP2 has to transform public transport in South Wales and the fact that such investment will be undeniably positive for the area, the decision on the most appropriate solution seems to have been arrived at quickly for an investment of this size. The early stage documentation would have benefited from greater clarity on the reasons why SWMP2 was prioritised.
- Linked to the above, there is to some degree a conflation of transport, economic and societal problems, which would have benefitted from being split out as per the logic maps in this report.
- Changes in staffing at Welsh Government, Transport for Wales and partner organisations has made it challenging to obtain detailed knowledge and overview of the full history and development of the Metro project. Piecing together all the relevant documentation has been difficult due to these staff changes and obtaining some further key decision papers would have been useful in this process. Transport for Wales and the Welsh Government have acknowledged that it would be beneficial if all of this material was housed in a single document repository together with a description of what key decisions were made and when.

[72] Welsh Transport Appraisal Guidance (WelTAG) is the Welsh Government's appraisal framework for the assessment of proposed transport investment. See https://gov.wales/welsh-transport=appraisal-guidance-weltag

8.3 Funding and Transfer of Assets

8.3.1 SWMP2 is being delivered within a complex funding and governance structure which has shaped many of the decisions taken to date. There is therefore value here in setting out how this structure has been developed and any lessons which could be learned.

Funding

8.3.2 The Metro had an original ring-fenced budget of £738m, of which:

- £445m was from WG
- £158m was from the ERDF
  - The ERDF funding was not specifically allocated for SWMP2, rather a sum of £175m was provided to WEFO for public transport projects. It is the responsibility of WEFO to approve applications that fit the criteria within the operational programme agreed with the European Commission.
- £125m was from the UK Government
- £10m was from the Cardiff Capital Region local authorities

8.3.3 ERDF funding comes with particular requirements, for example, EC regulations, which have influenced the means by which the project is being delivered. Key constraints have included:

- The agreed deliverables ('outputs') from the ERDF funding must be complete by the end of 2023, otherwise the funding can be withheld or reclaimed. These funding deadlines therefore determined what would be applied for from the ERDF, as the works and indicators would need to be complete and achieved to this timeframe.
- Each ERDF operation is required to fulfil WEFO reporting requirements, which means that these operations generate nine review reports and nine claim submissions at each co-ordinated review and submission point. This is a substantial undertaking for the SWMP2 delivery management team and it has increased the volume of reporting and coordination complexity across these operations.
- Applications for ERDF funding for the 2014-2020 programme of works was required within a set window for review and agreement with the EC. At the time of having to make this application, full details of exact works for each of the operations were not yet available, therefore ongoing work has had to be undertaken to update these operations, as the detail of works has been fully confirmed. Updating ERDF operations is a formal process, referred to as re-profiling, requiring review of delivery and business plans etc. It is a significant management and administrative undertaking across nine operations, which has added to coordination complexity in respect of the ERDF operations.

- Each ERDF funded operation has an approved eligible operation cost, which is subject to a total eligible cost cap of €50m. The eligible costs were projected and agreed early on in these operations, due to the constraints relating to the timeframes of applying for ERDF funding. As work has been finalised and commenced on the operations, these costs have had to be reviewed, with risk management carried out for operations with cost increases, to ensure upper cost thresholds are not breached, and movement of funding between operations to ensure no loss of funds to SWMP2 where works have been reduced within an individual ERDF-funded operation. Updating the project costs and delivery profiles of ERDF operations is a formal process, known as re-profiling, requiring review of delivery and business plans etc. It is a significant management and administrative undertaking across any effected operations, which has added to coordination complexity in respect of the ERDF operations.

8.3.4 The other funding sources were less complex and had fewer conditions attached to delivery timescales. Through the interviews, various stakeholders noted that their preference would be to manage the delivery of any future Metro schemes as a single project as this would remove the financial and management complexities that have been associated with including the coordinating of multiple separate ERDF funded operations within SWMP2.

8.3.5 The ERDF funding application was submitted before the form of SWMP2 became clear (in order to meet the funding deadlines), but the main conditional outputs were clear, and a budget envelope had been created for the delivery of SWMP2 overall within which the bidders could work.

Transfer of Assets

8.3.6 Railway infrastructure in Wales is a reserved matter and thus an immediate challenge for SWMP2 was marrying the aims of Welsh Government and the UK Government. It was noted through the consultation that Welsh Government had previously invested in rail infrastructure via Network Rail as a third-party funder, an example of this being the 'North-South Wales Journey Improvement Scheme' which involved improvements in the Chester – Wrexham corridor. Experiences of this nature convinced Welsh Government of the need to have control of the SWMP2 enhancement programme if it was to obtain value for money.

8.3.7 A decision was made by Welsh Government to pursue the transfer of the CVL infrastructure in 2015/16, with the infrastructure transferred from Network Rail to TfW on 28th March 2020. The stakeholder interviews highlighted the importance of the CVL being devolved from Network Rail to Welsh Government in the successful planning and commissioning of SWMP2.

- At the strategic level, assuming control of the assets meant that Welsh Government / TfW was no longer acting as a third party, but rather as the decision-making body for the CVL. This removed the risk of a change of policy at UK Government level and the requirement for a third party (Network Rail) to oversee the governance and delivery of SWMP2.

- The transfer of assets also allowed for targeted departures from Network Rail standards. The approach taken was to define an Infrastructure Management Agreement (IMA) with Amey Infrastructure Wales (AIW) – explained in more detail below – which set out common standards for the safe delivery and operation of the railway but permitted relaxations on Network Rail standards where appropriate. It was widely reported across the stakeholder engagement that this approach maximised value for money and ensured a focus on local requirements when designing the infrastructure.
- There had previously been deliverability issues when ERDF funding was used to make improvements to assets owned by others. If Network Rail had retained the asset, they would have become the 'lead beneficiary', which could have made scheme delivery more difficult. The transfer of assets to Welsh Government therefore simplified the funding arrangements.

8.3.8 It was universally agreed in the stakeholder interviews that the transfer of assets was one of the major successes of SWMP2, ensuring the destiny of the project was in the hands of Welsh Government / TfW. Whilst, this an important lesson for future rail investment projects in Wales – and particularly other Metro schemes – it is important to acknowledge that the CVL is a largely self-contained entity with the only interaction with the wider national rail network at Cardiff Central and, even there, the services are largely contained to platforms 6, 7 and 8. An equivalent transfer of assets may be more difficult to achieve in other areas of Wales where the interactions with other services are more significant.

8.3.9 It should also be noted that the transfer of assets means that Welsh Government / TfW now carries the CVL maintenance and renewal costs and may not benefit from the economies of scale within Network Rail.

8.4 Procuring SWMP2

8.4.1 The procurement of SWMP2 was the first major rail infrastructure project to be secured by WG. In preparing for that project and given the requirement for the Wales & Borders franchise to be renewed in 2018, Welsh Government established TfW on 1st April 2016. TfW was tasked with procuring the new Wales & Borders franchise, which involved securing an operator as per a traditional franchise and a 'development partner' to deliver SWMP2.

Procurement

8.4.2 Welsh Government produced a Programme Business Case (PBC) in March 2016 which made the case for a procurement to commence for the appointment of an 'Operator and Development Partner' (ODP) to:

- Modernise and operate the Wales & Borders rail franchise from October 2018.

- Manage the implementation of SWMP2, delivering 'turn-up and go' services across the CVL[73].

8.4.3 In short, Welsh Government was seeking to procure both the operation of the next franchise and the infrastructure and operation of SWMP2 through a single procurement.

8.4.4 An output specification was adopted, whereby Welsh Government set 'Policy Priorities for the Wales & Borders Franchise'[74], conditional outputs (most importantly a 4tph service on the CVL) and the budget envelope within which bidders were requested to develop their proposed solutions. This was known as the 'Invitation to Submit Outline Solution' (ISOS) stage. Bidders were invited to develop high-level concepts without any authority engagement and with only the conditional outputs as a guide. Costs were indicative and no detailed drawings / designs or engagement with the supply-chain took place.

8.4.5 It became clear early in the PBC process that the project would be budget constrained and therefore a budget ceiling of circa £800m for the delivery of SWMP2 (excluding rolling stock) was included as a parameter within the procurement.

8.4.6 A 'Competitive Dialogue' procedure was adopted, through which TfW invited the four prospective bidders[75] to participate in a staged dialogue around solutions under seven separate workstreams. This process lasted several months and optimised solutions in line with funding availability and established a more consistent approach to unit costings for infrastructure solutions (including optimism bias), ensuring a 'level playing field' for bidders.

8.4.7 Once TfW was satisfied that it had secured prospective solutions to meet its needs and requirements, it closed the dialogue phase and invited final tenders from the remaining bidders. An Outline Business Case (OBC) was prepared in September 2017 to seek formal approval to issue an 'Invitation to Submit a Final Tender' (ITSFT) to the four bidders. This was approved, although Arriva Rail Wales and Abellio Rail Cymru withdrew from the competition during this stage, leaving two bidders in the process.[76]

8.4.8 The two-year process concluded with the identification of a preferred bidder in 2018. At that point, TfW prepared a Full Business Case (FBC) using the H.M. Treasury *Five Case Model*, the standard approach to business case development in the UK. Key items in the FBC included, but were not limited to:

[73] Wales & Borders Rail Service and South Wales Metro Full Business Case (TfW, 2018), p. 5.

[74] https://gov.wales/rail-franchise-and-metro-policy-priorities

[75] Abellio Rail Cymru Ltd, Arriva Rail Wales Ltd, KeolisAmey and MTR Corporation (Cymru) Ltd.

[76] Wales & Borders Rail Service and South Wales Metro Full Business Case (TfW, 2018), pp. 5-6.

- providing a recommendation that the contract was awarded to the successful bidder, together with details of the management arrangements to deliver the contract;
- confirming that the preferred option in the OBC remained valid and updating the assumptions and modelling to reflect the prevailing position;
  - it should be noted that this was a significant exercise and included application of the newly-developed South-East Wales Transport Model (SEWTM) in the preparation of an updated net present value and benefit cost ratio; and
- providing information on the successful bidder's solution, costs and other information developed through competitive dialogue and included in their final tender submission.[77]

8.4.9 The successful bidder, Keolis-Amey, signed the ODP Grant Agreement with TfW in June 2018 following finalisation of the contract and commenced operation of the Wales & Borders franchise on 14th October 2018.

8.4.10 It is not the place of this process evaluation to take a view on the procurement process and its value for money, as this would be subject to any later audit of the process. Overall, however, the process was viewed very positively by those involved, with the following feedback / main lessons learned identified:

- The decision to group together the new franchise and the delivery of SWM was bold, ambitious and a significant undertaking, particularly given that TfW was in its infancy when the process commenced. However, the procurement approach has been integral to the rapid delivery of SWMP2. This was essential given the ERDF funding deadlines and has made a major contribution to its success in this regard.
- It was acknowledged that the approach to the procurement was very intensive for bidders and required them to invest significant resource in the process, with only one company ultimately having the potential ability to recoup its expenditure. Indeed, a standard franchise bid in itself is a major undertaking without the added complication of delivering a transformative network investment.
- The above said, the tendering process also provided bidders with significant scope for innovation, allowing them to bring their own solutions and commercial arrangements to the table, but within the overall ceiling imposed by the stated budget. This also added value for TfW as it shifted the human resource requirement and the cost of the solution / design work onto bidders and allowed them to benefit from industry expertise that would not have been available in-house, particularly given that TfW was a start-up operation at that point.
- Moreover, including the delivery of SWMP2 within the procurement means that the successful bidder is ultimately taking forward their own solution.

[77] Wales & Borders Rail Service and South Wales Metro Full Business Case (TfW, 2018), pp. 3-4.

This means that they effectively 'own' the solution and reduces the risks associated with contractor interface.

Operation's Business Cases

8.4.11 As previously noted, the ERDF related works within SWMP2 are covered by nine separate operations, each of which required a business case. These were produced in partnership with WEFO, which acted as the conduit between Welsh Government and the European Commission.

8.4.12 These documents were produced to align with the ERDF Programme (e.g., ERDF West Wales and the Valleys Operational Programme), Priority (e.g., Priority Axis 4: Connectivity and Urban Development) and the 'Specific Objectives' within this (SO 4.1 and 4.2). The business plans set out what Welsh Government / TfW will deliver and the indicators that it will be judged against. To this end, a set of 'Result' and 'Output' indicators were developed for each 'Priority Objective' as a means of measuring the success of the investment. It was noted in the stakeholder interviews that significant work was undertaken to identify the journey time benefits associated with the operations to feed into the development of the result and output indicators.

8.4.13 The initial business cases were submitted when the SWMP2 concept remained under development and are being progressively developed as the solutions are refined. WEFO manage and monitor project progress and spend via four-monthly claim reports. These set out the expenditure and income for each given period, which is monitored against the agreed spend profile.

8.4.14 As would be expected, the operations' business cases are aligned around the requirements of the ERDF as funder. However, it is worth noting that this does depart from the standard *Five Case Model*[78] used for the preparation of business cases in the UK (and enshrined within WelTAG). That said, it can be argued that this requirement is met to some degree through the Full Business Case (FBC) for the Wales & Borders Rail Service and South Wales Metro.

8.5 Delivering SWMP2

8.5.1 At the time of writing, all nine ERDF related operations are under construction, but none are as yet fully complete. For this reason, the Interim Process Evaluation will not consider the approach to delivery in any detail, rather this will be a matter for the Final Process Evaluation, which will be undertaken in early 2023 and reported in the Final Evaluation Report. Nonetheless, there is benefit in very briefly setting out at a high-level the delivery approach adopted for SWMP2.

8.5.2 SWMP2 is being delivered via an Infrastructure Management Agreement (IMA) with Amey Infrastructure Wales (AIW). The IMA was originally with the

[78] Guide to Developing Project Business Cases, Hm Treasury, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749086/Project_Business_Case_2018.pdf

Keolis-Amey joint venture but was novated to AIW when Keolis relinquished its share of the design and management element of the contract[79].

8.5.3 AIW is not the contractor but rather the Designer and Managing Agent working on behalf of TfW, effectively working as a system integrator, i.e., AIW is coordinating a wide range of contractors in the delivery of SWMP2. Under the contract, AIW is permitted to self-deliver up to a maximum of 20% of the scope. They then manage other contractors in the delivery of the remaining 80%.

8.5.4 The preliminary design stages were undertaken on a time-based contract (NEC4, Option E – a cost reimbursable contract in which the contractor is re-imbursed the actual cost they incur in carrying out the works plus an additional fee with the financial risk largely taken by the client). This phase was termed a Preliminary Design and Discovery (PDD). AIW defined their option selection and developed early designs. They also brought Infrastructure Delivery Partners (IDPs) onboard under contract to TfW. Work was divided into individual packages by discipline.

8.5.5 By November 2019, the contract moved to Final Target Price (FTP, as per NEC4 Option C- a cost plus contact which is subject to a pain / gain share mechanism by reference to an agreed target cost built up from an activity schedule) with AIW obligated to create a final target price for the scheme cost. Inputs were also provided from the four delivery partners contracted to TfW with AIW as the overall project manager. FTP provides a costed estimate with a quantified risk assessment which provides a proportion of funding for risk and optimum bias. Any cost over-runs will need to be covered by this risk allocation as well as value engineering. However, opportunities for the latter are more limited given 'Cross-Cutting Themes' (see Chapter 9) and contractual obligations. Ultimately, any cost over runs not covered by the above would fall to Welsh Government / TfW.

8.6 Successes and Lessons Learned

8.6.1 This section summarises the main successes and lessons learned as identified by stakeholders through the interviews and the desk-based review undertaken as part of this process evaluation.

Successes

- First and foremost, the progression of the Metro from concept to delivery in just over 10-years is a remarkable achievement. Many much smaller schemes around the UK have taken significantly longer to deliver. The deadlines around ERDF funding sharpened the focus on delivery.
- The procurement approach was complex and onerous for bidders, but highly successful in accelerating the project, securing solutions from the private sector and ensuring that the winning bidder 'owns' the solution.

[79] Following the fall in passenger numbers on the Wales and Borders services as a result of COVID-19.

- A recurring theme underpinning this success has been the establishment of a strong and coherent vision for Metro and securing early buy-in from a wide range of public and private sector stakeholders. Indeed, this approach was said to have 'galvanised' stakeholders. By treating the CVL as a single entity and selling the idea of 'changing the region' with transport as the enabler, strong senior political and business support was secured, which filtered down creating momentum for the scheme in a way a 'process-led' programme may not have.
- In addition, 'pragmatism' was a frequently cited term, where stakeholders and delivery partners readily agreed to compromises and a degree of risk taking to keep the project moving (in-part due to ERDF funding deadlines) and within budget. An example of this was agreed relaxations to Network Rail standards where this was safe, appropriate and represented value for money, compared to standard Network Rail practice. Similarly, Welsh Government set out and committed to a delivery model in both the franchise and the funding bid, but this was dependent on taking ownership of the asset which carried a lot of risk.
- Early engagement with prospective funders was highlighted as a major success of the process. SWMP2 featured as part of the ERDF programme, ensuring that there was good alignment between the two. Similarly, the Capital Region local authorities and H.M. Treasury were engaged early in the process and good cross-government support was achieved. This early engagement with prospective funders accelerated the process of securing funding.
- There was consensus amongst the stakeholders that the transfer of the CVL from Network Rail to Welsh Government was integral to the delivery of SWMP2. It was widely acknowledged that delivering SWMP2 in its current form would not have been possible with Welsh Government acting as a third-party funder only (not to mention complications with ERDF lead beneficiary status). A similar transfer of assets for future Metro and rail investment schemes would be beneficial, but it was also acknowledged that this will be more difficult in networks that are less self-contained.
- It was noted that, for future Metro schemes, the objective should be to make best use of existing infrastructure and to ensure SWMP2 could be easily extended in future for whichever solution is progressed. Indeed, the forward-thinking approach to procurement from TfW future-proofed the potential extension of the Metro, which was a key part of the ITT specification. There was also 'passive provision[80]' made in several places for future improvements such as further twin-tracking[81] and junction improvements.

[80] Passive Provision is where the works were done in such a way that allowances are made for future development. For example, passive provision for future electrification would mean ensuring that all bridge and structural works were undertaken so as to be able to accommodate future catenary.

[81] Two tracks running in parallel

Lessons Learned

- It was noted that several decisions had to be taken in a climate of uncertainty so as to meet the ERDF funding deadlines, with full details of the work covered being finalised at a later point than the investment was agreed. This introduced potentially avoidable risk to the processes.
- The procurement and development of SWMP2 took place in parallel to the formation of TfW. This understandably led to some organisational challenges in terms of role definition, staff turnover, getting the right people into post etc. These are simply growing pains associated with a new organisation but it was noted that a more consistent management and delivery structure on the client side would be beneficial in future Metro and other rail-based investment projects.
- . The case making for any future Metro scheme, any sub-operations therein and indeed all transport schemes should be aligned to WelTAG and the *Five Case Model* throughout scheme development. Within this, it is important to identify the causal logic chain between transport problem -> supply-side cause -> travel behaviour outcome -> societal impact. Future projects, in line with WelTAG, would be expected to start from a statement of transport problems and opportunities and the setting of objectives, which can be used to appraise options. Even where there is potentially a 'preferred' outcome in mind, this approach would ensure all key assumptions can be properly challenged at an early stage and that there is a clear audit trail in terms of decision making.
- From an audit perspective, it would be beneficial to collate all project documents into a document library on a public facing website or a TfW SharePoint Site. This would assist in understanding the chronology of the project, how and when key decisions were taken etc – a good example of this is that compiled by Transport Scotland for the Forth Replacement Crossing – Scottish Government | Forth Replacement Crossing
- As part of any WelTAG, a clearly defined and consistently developed monitoring and evaluation framework based on a scheme logic map should be developed (as per this evaluation report). This framework should identify the intended outputs, outcomes and impacts of the investment and identify the primary and secondary data required to inform the evaluation. The outcomes of any evaluation should be communicated to relevant individuals within TfW, Welsh Government and other partners and feed into subsequent WelTAG studies.

9 Interim Cross Cutting Themes Evaluation

9.1 Overview

9.1.1 In accordance with ERDF requirements and Welsh Government policy, each operation integrates a range of social, economic, environmental and wellbeing outcomes through attention to Cross Cutting Theme (CCT) actions. These focus on:

- equal opportunities and gender mainstreaming (in Wales includes the Welsh language);
- sustainable development;
- tackling poverty and social exclusion;

9.1.2 In addition, to the programme CCT indicators, each operation has identified a range of Case Level CCT Indicators. These are specified in Table 9.1.

Table 9:1 Case Level CCT Indicators (Source: Operation Business Plans)

CCT Indicator	Case Level Indicators
Equal opportunities and gender mainstreaming	• Disability Access Group engagement • Activity supporting speakers of the Welsh Language • Positive action measure – Disabled people • Positive action measure – Older people
Sustainable development	• Development of sustainable transport initiatives • Use of Sustainable Urban Drainage Systems where applicable
Tackling poverty and social exclusion	• No additional indicators identified
CCT general	• Stakeholder engagement good practice activity • Integration of Social Clauses / Community Benefits • Developing / engaging CCT Champions

9.1.3 This section sets out the Cross Cutting Themes (CCT) Interim Evaluation, setting out how closely the objectives and indicators in the Operation Business Cases reflect the guidance in the WEFO CCTs matrix documentation and noting the specific requirements and interests of the WEFO to maximise CCT delivery opportunities.

9.2 Approach to CCT assessment

9.2.1 An overarching Monitoring and Evaluation (M&E) plan covering all ERDF Transport operations was created by TfW reflecting the commonality between the schemes and their implementation timescales. Whilst this provides the background and approach for individual operation assessments, it contains limited guidance on CCT aspects of the evaluation (e.g., simply focusing on the question – did the scheme maximise the potential benefits and mitigate any negative effects?).

9.2.2 Our assessment used desk-based research to examine the business plans for each of the nine operations to identify the precise CCT objectives and indicators incorporated there, and to confirm how closely the objectives and indicators reflect the guidance recommended in the WEFO CCT Matrix documentation.

9.2.3 Discussion with the WEFO CCT team has established specific interest in identifying findings that address the following key questions:

- What worked well / what did not work, any problems identified and how these were addressed?
- How and to what extent the operations provided opportunities to promote the Welsh language?
- How the operations contributed to the goals of the Wellbeing of Future Generations Act.

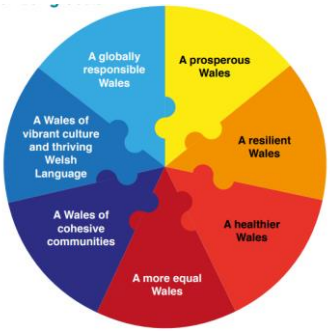
9.2.4 Within that framework, we particularly sought to understand:

- If CCT activity was delivered in the way it was anticipated, if not why and how?
- If CCT activity met budgetary expectations and were there any unforeseen costs?
- What experience did staff / contractors have in delivering the CCTs and how did they feel about the delivery?
- How might the approach to implementing the CCTs be improved or refined?

9.2.5 Evidence gathering to address these questions combined examination of progress reports and the draft case study portfolio, supplemented by semi-structured interviews with the core CCT delivery team and contractors (i.e., at TfW, AIW, Balfour Beatty etc).

9.3 CCT Findings

General Observations



9.3.1 It is clear that collectively the nine operations within SWMP2 involve actions that complement key CCT objectives of the ERDF programmes (e.g., through improved access to jobs, removal of mobility barriers for disabled groups, and better health outcomes from lower emissions and active travel). It is also evident that TfW understand the importance of activities to support CCT objectives and the goals of the Wellbeing of Future Generations Act.

9.3.2 TfW has established a CCT approach to stakeholder consultation that is applied across the contractors and their supply chains. For example, it addresses:

- Ethical resourcing – using sustainable construction products, methods of construction, and waste treatment.
- Ethical employment – following Welsh Government Code of Practice, equal opportunities and gender mainstreaming, living wage, health and wellbeing.
- Skills initiatives – that include training, apprenticeships and graduate schemes.
- Environmental management – compliance with Environment (Wales) Act 2016, natural environment and biodiversity, waste management and recycling, carbon reduction.
- Renewable energy – particularly electricity use and generation.
- Local supply – meeting Sell2Wales obligations.
- Welsh Language – with activities that follow the Cymraeg 2050 strategy, particularly with regard to increasing the use of Welsh in the workforce and increasing the range of services offered to Welsh speakers.
- Local engagement – with local authorities, representative bodies (e.g., disability groups) and the general public.

9.3.3 To further promote the take up of the CCT strategy, TfW appointed two CCT champions. Although junior level staff, these ‘champions’ are energetically delivering the advice, guidance and data collection required to facilitate effective realisation of CCTs. Supervision and coordination are appropriately ensured at managerial level.

9.3.4 The CCT champions provide an ideal focal point to collect material for varied case studies that can illustrate the range of CCT actions and their benefits. These exemplar studies are being compiled in a portfolio using a PowerPoint visualisation. Some early examples are offered in Appendix G .

Key Challenges

9.3.5 TfW has identified two key challenges:

- selection of appropriate case level indicators from the large number of potential CCTs; and
- communicating to a large number of contractors the importance of identifying what components of the operation are ERDF funded to ensure adequate collection of evidence to demonstrate CCT activity and its outcomes.

9.3.6 Productive discussions between TfW and WEFO at the 'Grant Award' stage helped shape the selection of case level CCT. This process ensured TfW made sufficient preparation to undertake CCT actions. The initial WEFO ratings of CCT plans set out in the business cases (2018) show a universally high / medium assessment of compliance. Our assessment, based on desk research and discussions with the delivery team, reconfirms how well each CCT is addressed within the respective business cases and that CCT activity to date is already showing positive outcomes.

9.3.7 At the start of the operation, there was some confusion around communication and promotion of the CCT strategy to contractors. It is our experience that this type of confusion is common at the start of projects where a range of companies have to 'buy in' to the idea of delivering CCT. This issue was effectively addressed by the CCT team through a presentation for all contractors about the importance of CCT and what they have to deliver. To further support delivery a clear communication process has been established with the responsible Project Managers for each operation and the CCT coordinator. The process is working well, enabling relevant information to be collected in a timely manner.

9.3.8 Many CCT actions are already embedded in contractor actions. It has therefore not been difficult to encourage take up of a diverse set of CCT activities, or to develop wider uptake of CCT actions.

Challenges of COVID-19 restrictions

9.3.9 In general, the challenges presented by COVID-19 restrictions have not been too great for TfW staff. Much of the CCT work has been design office based and staff have successfully managed this remotely. However, it has been more challenging for community engagement activities, such as the 'Station Adopters' scheme, which involves around 200 volunteers working with TfW to enhance and sustain some 150 stations. Such actions are only now coming back to life.

Welsh Language

9.3.10 Provisions for **Welsh Language** CCT actions are appropriately addressed within the Operation Business Cases in conjunction with Equal Opportunities

and Gender Mainstreaming. The Welsh language implementation plan demonstrates the commitments to the incorporation of the language in this operation and ensures that all operations contribute to positive outcomes for the Welsh language.

9.3.11 Examples of the proactive promotion and inclusion of the Welsh language within the operation and across the delivery organisations include:

- teaming up with 'Siarad Cymraeg' to offer introductory Welsh language training courses to employees lasting 12 weeks;
- setting up a 'Coffi a Chlonc' network to encourage Welsh speaking;
- communications with the public in both English and Welsh (e.g., letter informing local community about the progress of the Taff's Well operation);
- bilingual signage at stations (e.g., a 'protocol' has been agreed with the office of the Welsh Language Commissioner to consult on station signage); and
- bilingual job descriptions and employment application process.

Equal Opportunities and Gender Mainstreaming

9.3.12 Overall, the SWMP2 operations have taken appropriate actions to address Equal Opportunities and Gender Mainstreaming requirements. An appropriate Equality Impact Assessment[82] was conducted in 2017 covering the whole SWM initiative.

9.3.13 Consultations with the general public and key stakeholder groups are coordinated with TfW Community Engagement Officers (e.g., disability access groups have played an active role). TfW liaise with their Accessibility and Inclusions Panel[83] on a quarterly basis to provide input on issues such as footbridge access provisions, lifts or ramps, and provision of level boarding.

9.3.14 Further examples of effective community engagement can be seen in:

- The way schools are encouraged to interact with the operation. A good case is the 'Alumni Project for Schools' where the Valleys Task Force[84] has partnered with Careers Wales[85] to raise the aspirations of young people and motivate them in relation to career opportunities. The event delivered videos showcasing employment in the industry as part of the TfW educational outreach programme.

[82] South Wales Metro - Equality Impact Assessment, Mott MacDonald, 8 December 2017

[83] https://tfw.wales/info-for/passengers/accessible-travel/accessibility-panel

[84] The Valleys Taskforce is a cross-governmental body that was set up to coordinate policy and interventions in the south Wales Valleys, increasing the impact of current resources. See: https://gov.wales/our-valleys-our-future

[85] Link to Careers Wales: https://careerswales.gov.wales/

- TfW's 'Access for All' scheme led by the disability access group which aims to influence accessibility policies and giving advice on how to support disabled, Deaf and older customers to use train services effectively
- The involvement of delivery partner Alun Griffiths in the online 'Bridge to Schools Project' which was an online adaption of the Institution of Civil Engineers' Bridge to Schools project aimed at giving young children the opportunity to experience bridge building at first-hand[86].
- The way apprentice engineers at delivery partner Alun Griffiths were shortlisted for the Institution of Civil Engineers Cymru Apprentice of the Year Award.

9.3.15 Case studies are being developed to illustrate equal opportunities actions (e.g., TfW's graduate scheme and passenger assistance at stations).

Sustainable Development

9.3.16 There is a sense of strong social values and sustainability throughout all the SWMP2 operations. This is supported by TfW's sustainability development plan and the low carbon impact strategy[87].

9.3.17 The most developed aspect of SWMP2 is seen in the Taff's Well operation, which has furnished strong evidence of sustainable development being practised. Several case studies have been developed from the Taff's Well operation (see Appendix G). Of particular note is the use of temporary solar powered lighting, resulting in a reduction on diesel reliance. This initiative shows measurable benefits (e.g., saving 3,213kg of CO_2 compared to a standard diesel-powered light and £1,019 in fuel costs over an 8-week period).

9.3.18 The success of solar power is also being demonstrated through a test on CCTV cameras at Taff's Well, where contractor Alun Griffiths has deployed OnGarde Duo solar cameras. This has saved an estimated 400kg of CO_2 a week.

9.3.19 The success of solar powered equipment is leading to a greater emphasis on this energy source.

9.3.20 A further move towards supporting sustainable transport is seen in the installation of electric vehicle (car) charging points at Taff's Well.

9.3.21 The implementation of sustainable waste management procedures has led to significant benefits. These are recorded in the case study on recycled concrete in Appendix G that demonstrates how concrete waste materials could be crushed and recycled on site as part of the construction process

[86] https://www.railengineer.co.uk/virtual-bridge-to-schools-events-across-south-wales-hosted-by-transport-for-wales-and-alun-griffiths/

[87] https://tfw.wales/sites/default/files/inline-files/Low%20impact%20carbon4%20english.pdf

(e.g., using 555m^3 of material as filler to build hard standing, saving 2,856 tonnes of landfill).

9.3.22 In a community related action, the operation has an agreement in place to donate old concrete sleepers to a local charitable trust that was seeking a solution to the provision of a safe fordable river crossing for cows.

Tackling Poverty and Social Exclusion

9.3.23 TfW is clearly taking community and stakeholder engagement seriously. This is demonstrated in the development of an appropriate CVL stakeholder engagement strategy and appointment of Community Ambassadors to build links with local residents.

9.3.24 The strategy has included collaboration and connection with young people and schools that has demonstrated the value of having a science, technology, engineering and mathematics (STEM) Ambassador. Examples of the success of the school focused strategy is evident in:

- The online 'Spotlight on Metro' event (February 2021) for teachers that highlighted community apprenticeship opportunities and attracted over 60 attendees.
- The 'Open your Eyes' initiative for primary schools to raise awareness of Metro.

9.3.25 The Community Ambassadors are potentially a key resource in helping the operation engage with stakeholder and community groups to identify barriers to active travel.

9.3.26 Around the Taff's Well operation, community engagement has seen TfW and contractor staff undertaking volunteer actions that have included:

- assisting a local allotment association with the restoration of allotments through vegetation clearance and construction of paths to improve access. This initiative is documented in the Taff's Well Community Outreach Case Study; in Appendix G and;
- providing equipment and helping the local community clear damage from Storm Dennis that occurred along the CVL route.

9.3.27 Wider outreach activities have included development of a partnership with the Business Disability Forum (LEXXIE) to access expertise to facilitate activities around autism based on tapping into people with 'lived experience'.

9.3.28 Through a working group, the operation is also engaging with Mental Health Awareness Week (May 2021) focusing on events that support the workforce.

9.3.29 A further example of the delivery of community benefits that leave a lasting legacy is seen in the operations' good links with Caerphilly CBC to support individuals with learning disabilities at a local residential home. The specific project enabled reuse of concrete slabs to build a much-needed safe path connecting the home with its garden polytunnels.

9.4 Conclusions

9.4.1 Our assessment of how well preparations for CCT delivery is being addressed reconfirms the high rating WEFO expressed in its initial assessment in 2018.

9.4.2 While there are no CCT programme indicators for the priority in which the operation is funded, a selection of CCT case level indicators were identified, as listed in Table 9:1. Our assessment is that these case level CCTs are appropriate, and evidence to confirm the extent of success can be realised through qualitative judgements (e.g., of case studies).

9.4.3 Our assessment of CCT planning across the SWMP2 operations is that the requirements are well understood. The TfW team are well motivated to deliver appropriate activities and have identified CCT Champions supported by an experienced project manager who are now monitoring the work and encouraging take-up within the organisations involved.

9.4.4 Provisions for **Welsh Language** CCT actions are appropriately addressed within the operations. The Welsh Language Implementation Plan demonstrates a commitment to ensure positive outcomes for the Welsh language.

9.4.5 Overall, the operations have taken appropriate actions to address **Equal Opportunities and Gender Mainstreaming** requirements.

9.4.6 There is a sense of strong **social values and sustainability** throughout all the operations.

9.4.7 **Tackling Poverty and Social Exclusion** is being addressed with good community and stakeholder engagement activities.

9.4.8 The enthusiasm for delivering the CCT has been passed down to the many contractors involved in the operations and a clear chain of communication for delivery and reporting of CCT has been established. This process, for gathering and reporting key CCT activities, has been agreed with WEFO utilising a portfolio of case studies that can be used as exemplars for future Welsh Government initiatives.

9.4.9 It is clear that the experience of delivering CCT activity has enhanced the capabilities of not only of the CCT Champions, but also of the wider CCT delivery team.

9.5 Recommendations

9.5.1 At this **Interim Stage** we should like to draw the delivery team's attention to the following recommendations as potential ways of building a CCT evidence base:

- **Recommendation 1** – that TfW create more focused monitoring and evaluation plans to document CCT actions for each of the nine operations, as these are not explicitly covered in the business plans.
- **Recommendation 2** – that the CCT Champions continue to be supported in gathering CCT evidence and preparing case studies, thus ensuring that the good work on CCT actions remain embedded in TfW's culture.
- **Recommendations 3** – that the contractors responsible for reporting community benefits monitor these in a quantified way.

Appendix A Telephone Survey Methodology

A.1 Overview

A.1.1 To obtain travel behaviour information for residents of the CVLs, a telephone-based Telephone Survey was undertaken. This appendix provides a detailed account of the purpose of this survey; sets out the overall approach to delivery; and provides a high-level summary of the response received.

A.2 Survey Purpose

A.2.1 The purpose of the survey was to develop a baseline situation showing how people travel and their satisfaction with the rail service prior to the delivery of SMWP2. The survey included questions covering the following:

- Awareness of South Wales Metro
- Household car ownership
- Use of the rail service prior to the COVID-19 i.e., in calendar year 2019
- Satisfaction with the rail service (users)
- Reasons for non-use (non-users)
- For those in employment in 2019, place of employment, method of travel to work, and frequency of travel to work
- For those in higher or further education in 2019, place of education, method of travel to education, and frequency of travel to education
- Frequency of travel to Cardiff City Centre / Cardiff Bay for all other purposes during 2019 and main mode of travel used
- Frequency of travel to other Valley towns / villages for all other purposes during 2019 and main mode of travel used

A.3 Approach

A.3.1 The survey was undertaken by telephone using a Random Digit Dial (RDD) sample of landline numbers and a supplementary sample of mobile only households. The survey was aimed at those living in Cardiff, Rhondda Cynon Taf, Merthyr Tydfil, and Caerphilly who are served by the Treherbert, Aberdare, Merthyr Tydfil (TAM), and Rhymney Lines. In order to ensure the survey only captured this group, a public survey catchment area was defined which consisted of the postcode areas in the above local authority areas for which the nearest station was on the TAM or Rhymney Lines. This area is shown in the figure below.

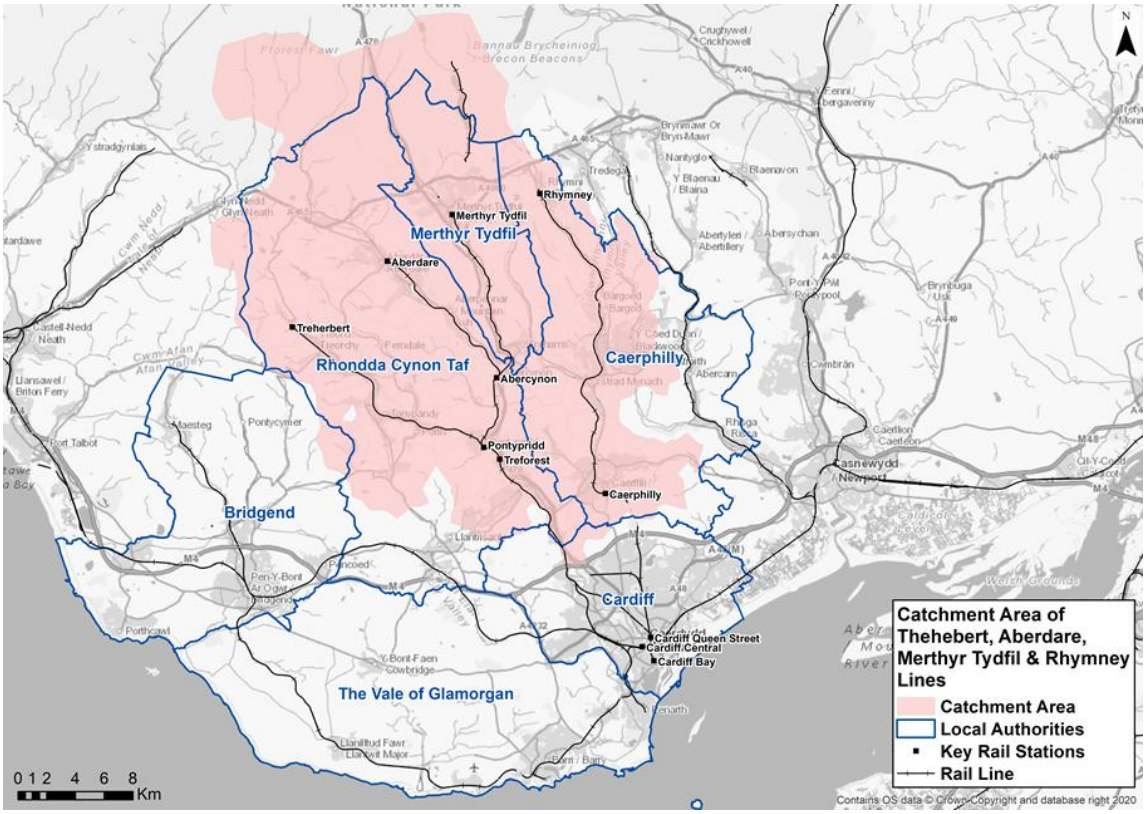


Figure A1: Public Survey Catchment Area

A.4 Response Rate

A.4.1 Overall, a total of 1,003 responses were received to the survey. To achieve this sample, 80,000 telephone calls had to be made, albeit this included multiple calls to the same households. Telephone surveys for baseline research are becoming increasingly difficult as there is little incentive for people to participate. This is a long-term trend but has been accelerated by COVID-19.

A.4.2 A weighting was applied to the results of the survey to correct for response bias and bring the survey sample in line with universe proportions. This weighting was based on a number of factors including broad age category and gender (taken from 2020 mid-year population estimates) and working status (taken from Labour Force Survey figures) for the combined local authorities of Merthyr, Rhondda Cynon Taf, and Caerphilly.

A.4.3 A detailed breakdown of responses to the survey is set out within a separate PowerBI analysis and relevant outputs from the surveys have been incorporated into sections of this report. As such, rather than a question-by-question breakdown, this section focuses on the overall response numbers. Tables A1 and A2 provide a breakdown of responses by gender, age, and employment status and user and non-user categories and Table A3 shows the proportion of respondents from each local authority area.

Table A1: Demographic Profile of the survey sample

		Unweighted Sample	Weighted Sample
Gender	Male	431	488
	Female	572	515
Age	16-34	113	289
	35-54	287	309
	55+	591	393
Employment Status	Working	462	509
	Not Working	536	489

Table A2: Proportion of rail users and non-users within the survey sample

	Unweighted Sample	Weighted Sample
Rail user	447	419
Non-user	556	584
	1,003	1,003

Table A3: Proportion of Respondents by Local Authority

	Unweighted Sample	Weighted Sample
Cardiff	21	18
Rhondda Cynon Taf	414	412
Merthyr Tydfil	92	85
Caerphilly	311	306
Other	165	182
	1,003	1,003

Appendix B Stakeholder Engagement Methodology

B.1 Overview

B.1.1 In order to capture stakeholder views and gather information on the transport and socio-economic problems in the study area as well as the process of delivery for SWMP2, stakeholder depth interviews were undertaken with a range of stakeholders. This appendix sets out the approach taken in delivering this aspect of the research.

B.2 Approach

B.2.1 A stakeholder list was developed at the outset of the project in partnership with the Welsh Government.

B.2.2 Local authorities, TfW etc to develop evidence / views on; the current transport and socio-economic problems in the study area; expectations of the impacts of SWMP2; and the delivery of CCTs;

B.2.3 WG, TfW, the Welsh European Funding Office (WEFO) and Amey Infrastructure Wales amongst others to develop the process evaluation

B.2.4 Email invitations to stakeholders were issued to all stakeholders. In total, 18 depth interviews were undertaken with the following organisations:

- Adventure Travel
- Caerphilly CBC
- Cardiff Bus
- Cardiff Capital Region
- Cardiff City Council
- Disability Wales
- Merthyr Tydfil CBC
- Rhondda Cynon Taf CBC
- Stagecoach
- Sustrans
- Transport for Wales
- Welsh Government
- Welsh European Funding Office (WEFO)
- Amey Infrastructure Wales
- Professor Mark Barry

B.2.5 All consultations were undertaken via Microsoft Teams. The meetings were loosely structured around a pre-prepared topic guide which was tailored towards each individual consultee.

B.2.6 The key points from each meeting were documented in a note and sent individually to each consultee for amendment and approval. The outputs from this engagement were used to inform the context stage of the Logic Maps (see Chapter 4); the development of the baseline (see Chapters 57); and the Interim Process Evaluation (see Chapter 8).

Appendix C Additional Baseline Data

C.1 Additional Baseline Data

C.1.1 To ensure a comprehensive repository of baseline data is available at the ex-post evaluation stage, additional baseline datasets have been supplied in a separate Excel Workbook.

C.1.2 The data includes:

- Pre-scheme baseline of the terminating and origin stations for northbound and southbound services on the Treherbert, Aberdare, Merthyr, and Rhymney Lines based on the December 2019 timetable
- A comprehensive baseline of station facilities at each station in the network
- Baseline of bus services operating within the study area. Information is provided on all bus routes which connect at least two of the communities served by the rail line; local bus services are not included as these are unlikely to be significantly affected by SWMP2
- AQMAs within Cardiff, Rhondda Cynon Taf, Merthyr Tydfil, and Caerphilly which are most likely to be affected by SWMP2
- Socio-economic metrics as set out in the below table.

Table C1: Additional baseline data

Metric	Data Set	Time Period	Source
Migration Flows	Local Area Migration Indicators	2009/10 – 2018/19	ONS
Household Economic Status	Annual Population Survey	2019	ONS
Hours Worked: Workplace Analysis	Annual Survey of Hours and Earnings	2019	ONS
Hours Worked: Resident Analysis	Annual Survey of Hours and Earnings	2019	ONS
UK Business Count: Local Units by Industry and Employment Band Size	UK Business Counts	2015-2019	ONS
Car/Van Availability	Car/Van Availability	2011	2011 Census

Appendix D Counterfactual Locations

D.1 Counterfactual Data

D.1.1 For the purpose of subsequent post-opening evaluation(s), in addition to setting out baseline socio-economic data for the area directly impacted by SWMP2, it is also important to develop a baseline of a comparator or control area (an area with similar characteristics to the study area but which is unaffected by the investment). This is important as it enables the 'outcomes' and 'impacts' of the intervention to be isolated somewhat from other influences (albeit there are practical challenges in isolating such influences, proving causality, and demonstrating the net 'additionality' of an investment, particularly with schemes of this scale).

D.1.2 In this case the counterfactual locations of Bridgend County Borough and Torfaen County Borough were selected. These areas were chosen because they have similar characteristics to the study area but will be largely unaffected by SWMP2. Both Bridgend and Torfaen fall within the Cardiff Capital Region and benefit from a rail line connecting their communities to the urban centres in the south (Bridgend / Cardiff and Newport / Cardiff respectively)[88]. However, they are outside of the catchment area for the CVLs and are therefore likely to be less affected by SWMP2.

D.1.3 The datasets have been included in a separate Excel Workbook. Details of the metrics included within this workbook are set out in the below table.

Table D1: Counterfactual data

Metric	Data Set	Time Period	Source
Population	Mid-Year Population Estimates	2010-2019	ONS
Migration Flows	Local Area Migration Indicators	2009/10 – 2018/19	ONS
Economic Activity of Population	Annual Population Survey	2019	ONS
Household Economic Status	Annual Population Survey	2019	ONS
Claimant Count	Claimant Count by sex and age	2009-2019	ONS
Resident Employment	Annual Population Survey	2019	ONS
Workplace Employment	Annual Population Survey	2019	ONS

[88] although it is noted that the rail line in the latter only extends as far as Pontypool with the northern part of the borough (Abersychan north to Blaenavon) not served by rail

Metric	Data Set	Time Period	Source
Workplace employment by industry across the area	Annual Population Survey	2019	ONS
UK Business Count: Local Units by Industry and Employment Band Size	UK Business Counts	2015-2019	ONS
Income: Workplace Analysis	Annual Survey of Hours and Earnings	2009-2019	ONS
Income: Resident Analysis	Annual Survey of Hours and Earnings	2019	ONS
Hours Worked: Workplace Analysis	Annual Survey of Hours and Earnings	2019	ONS
Hours Worked: Resident Analysis	Annual Survey of Hours and Earnings	2019	ONS
Regional gross value added (balanced) by industry	Annal Estimates of Balanced UK Regional Gross Value Added	1998-2019	ONS
Businesses Competitiveness	UK Competitiveness Index	2015 & 2019	Cardiff University, Nottingham Business School
Welsh Index Multiple Deprivation	Welsh Index Multiple Deprivation	2019	Welsh Government
House Prices	Average residential property price	2019	Rightmove
	Median House Price	2015 & 2019	ONS
New Dwellings	The number if new dwellings which have started and completed in each location	2018-19	Welsh Government

Metric	Data Set	Time Period	Source
Car/Van Availability	Car/Van Availability	2011	2011 Census
Rail Station Entry and Exists	Rail Station Entry and Exists	2005-2019	Office Rail and Road
Road Traffic Counts	Annual Average Daily Traffic Counts	2000-2019	Department for Transport

Appendix E Hansen Analysis

E.1.1 The following provides an overview of the steps involved in calculating Hansen Indicators.

E.2 Step 1: Calculate Journey Times

E.2.1 The first step in developing Hansen indicators is to calculate journey times between a set of origins and destinations within a study area. In this case, public transport journey time calculations were calculated using TRACC connectivity software.

E.3 Step 2: 'Destination' criteria

E.3.1 Step 2 involves determining and calculating the destination criteria. In this case, the destination criteria was employment. The total number of jobs at each destination zone was taken from the Business Register and Employment Survey (BRES) for 2019.

E.4 Step 3: Apply Hansen Formula

E.4.1 For each origin / destination combination, the jobs in the destination zone were multiplied by the exponential of the travel time to that destination zone times the lambda value (decay function). The decay-function is applied so that opportunities at more distant locations (i.e., with a longer travel time) are 'valued' less than opportunities closer by.

E.5 Step 4: Sum the results over all origin zones

E.5.1 The results for each origin-destination pair are then summed over all origin zones. A high value therefore indicates good access from that origin zone across the full range of destinations. These are the values which are subsequently mapped.

Appendix F CDAT Analysis

F.1 Approach and Data Sources

F.1.1 The CDAT tool classifies each location (in this case, Lower Super Output Area – LSOA) into three tiers based upon the combination of their deprivation and public transport connectivity. The tiers are defined as follows:

- **Tier 1:** these show the lease deprivation and public transport connectivity problems
- **Tier 2:** these show a potential correlation between deprivation and public transport connectivity and are classed as being at risk
- **Tier 3:** these show the greatest correlation between deprivation and public transport connectivity suggesting a relationship exists

F.1.2 The analysis examined levels of deprivation with respect to, and connectivity to, employment, education (colleges and universities), and health. In order to ensure a cross section of areas were included in the analysis, the LSOAs were first classified into one of the following three categories based upon the Government's urban-rural classification:

- Urban City and Town
- Rural Town and Fringe
- Rural village and dispersed

F.1.3 The relative level of deprivation at the origin zone was then calculated within each category. These used the following datasets:

- Welsh Index of Multiple Deprivation (WIMD) 2019, domains of Employment, Health and Education

F.1.4 Hansen measures of connectivity were then produced based on access to:

- employment, weighted by the number of jobs at the destination[89]
- education (colleges and universities), weighted by the number of enrolled learners at each college for the academic year 2019/20[90] and by the satisfaction score as resulted from the 2020 National Student Survey for each university[91]

[89] BRES/number of jobs data obtained from NOMIS website, in LSOA level, 2019

[90] https://statswales.gov.wales/Catalogue/Education-and-Skills/Post-16-Education-and-Training/Further-Education-and-Work-Based-Learning/Learners/Further-Education/providerlearnersenrolledfurthereducationinstitutions-by-programme

[91] https://www.officeforstudents.org.uk/advice-and-guidance/student-information-and-data/national-student-survey-nss/nss-2020-results/ - Question 27 (overall satisfaction)

- health care facilities, weighted by the total attendances per hospital during the year 2018-2019[92].

F.2 Location of Education and Healthcare Facilities

F.2.1 The location of the universities, colleges and health facilities included in the analysis are shown in Figures E1-E3.

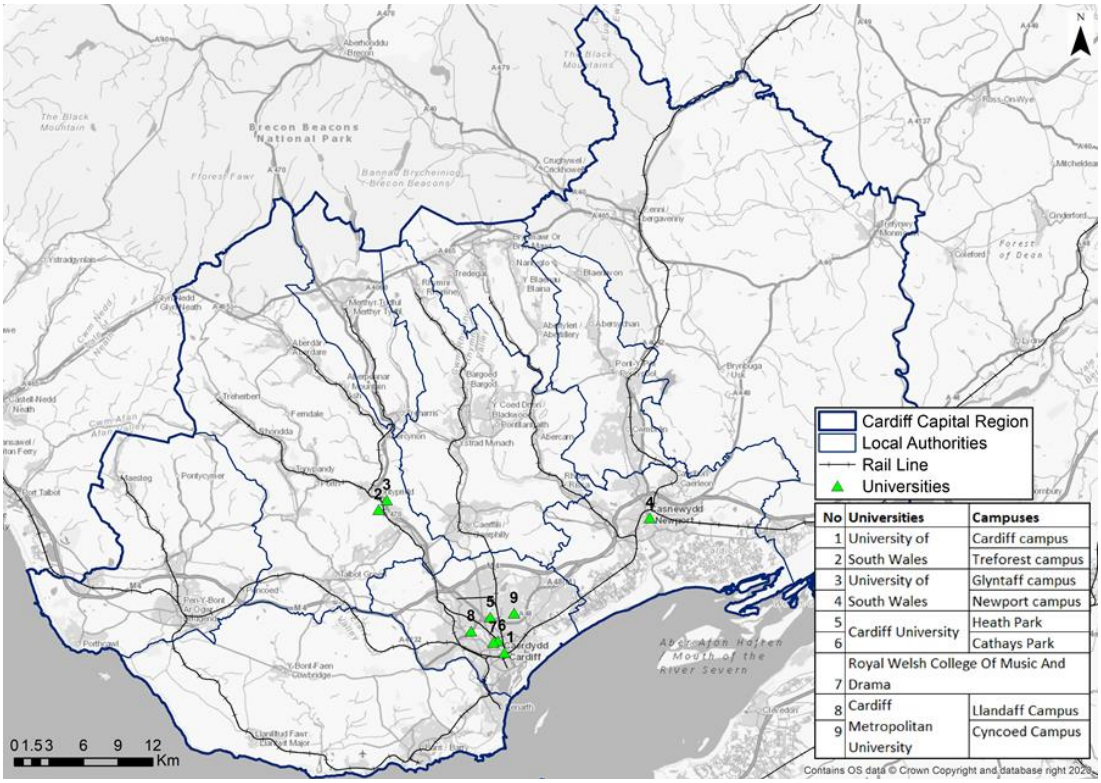
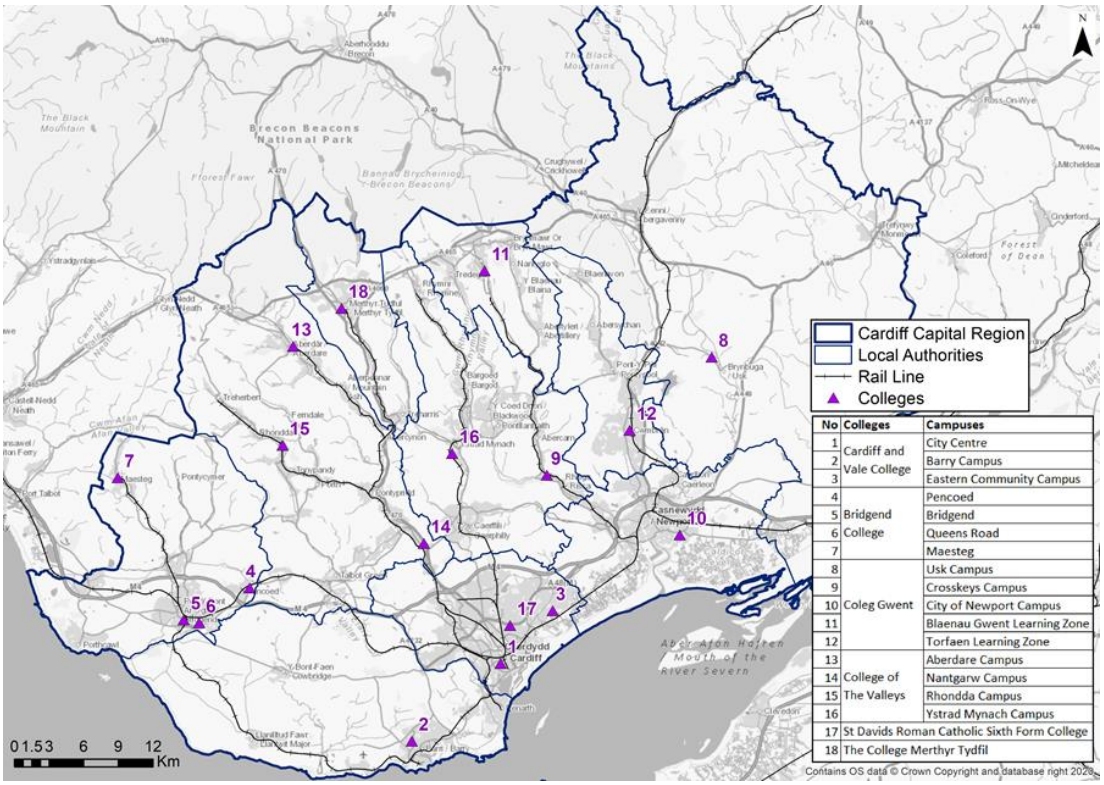


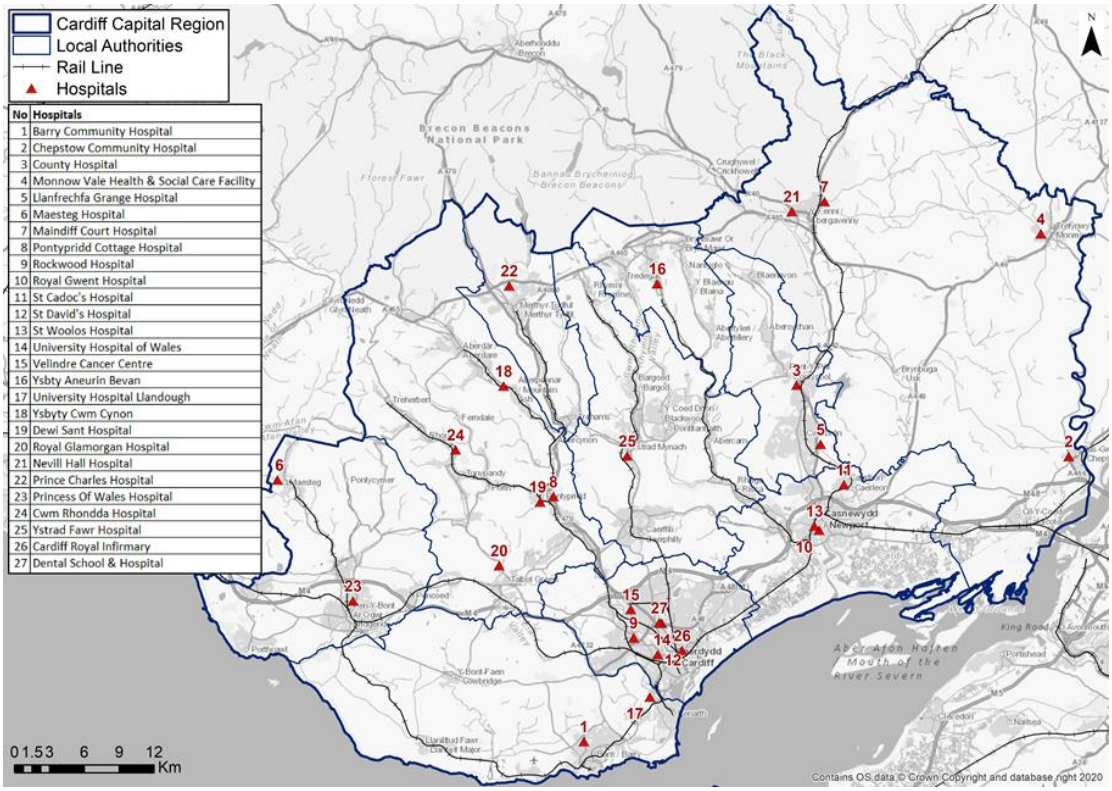
Figure E1: Location of Universities considered within the CDAT analysis

[92] https://statswales.gov.wales/Catalogue/Health-and-Social-Care/NHS-Hospital-Activity/Outpatient-Activity/outpatient-attendances-by-organisation-site



No	Colleges	Campuses
1	Cardiff and Vale College	City Centre
2		Barry Campus
3		Eastern Community Campus
4	Bridgend College	Pencoed
5		Bridgend
6		Queens Road
7		Maesteg
8	Coleg Gwent	Usk Campus
9		Crosskeys Campus
10		City of Newport Campus
11		Blaenau Gwent Learning Zone
12		Torfaen Learning Zone
13	College of The Valleys	Aberdare Campus
14		Nantgarw Campus
15		Rhondda Campus
16		Ystrad Mynach Campus
17	St Davids Roman Catholic Sixth Form College	
18	The College Merthyr Tydfil	

Figure E2: Location of colleges considered within the CDAT analysis



No	Hospitals
1	Barry Community Hospital
2	Chepstow Community Hospital
3	County Hospital
4	Monnow Vale Health & Social Care Facility
5	Llanfrechfa Grange Hospital
6	Maesteg Hospital
7	Maindiff Court Hospital
8	Pontypridd Cottage Hospital
9	Rockwood Hospital
10	Royal Gwent Hospital
11	St Cadoc's Hospital
12	St David's Hospital
13	St Woolos Hospital
14	University Hospital of Wales
15	Velindre Cancer Centre
16	Ysbty Aneurin Bevan
17	University Hospital Llandough
18	Ysbyty Cwm Cynon
19	Dewi Sant Hospital
20	Royal Glamorgan Hospital
21	Nevill Hall Hospital
22	Prince Charles Hospital
23	Princess Of Wales Hospital
24	Cwm Rhondda Hospital
25	Ystrad Fawr Hospital
26	Cardiff Royal Infirmary
27	Dental School & Hospital

Figure E3: Location of hospitals considered within the CDAT analysis

F.3 Urban-Rural Classification Result Tables

F.3.1 Tables E1-E4 show the proportion of the population in each local authority area in each CDAT tier and in each category within the government's urban-rural classification[93].

Table E1: Population falling within each employment CDAT tier by urban / rural classification

		Tier 1	Tier 2	Tier 3	Total
Cardiff	Urban City and Town	98.4%	1.6%	0.0%	362,018
	Rural Town and Fringe	100.0%	0.0%	0.0%	4,885
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	98.5%	1.5%	0.0%	366,903
Caerphilly	Urban City and Town	50.5%	24.8%	24.7%	140,957
	Rural Town and Fringe	54%	23%	23%	33,121
	Rural village and dispersed	100%	0%	0%	6,997
	Total	53.1%	23.4%	23.5%	181,075
Merthyr Tydfil	Urban City and Town	12.0%	41.4%	46.6%	53,845
	Rural Town and Fringe	22.5%	0.0%	77.5%	6,481
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	13.1%	37.0%	49.9%	60,326
Rhondda Cynon Taf	Urban City and Town	35.8%	22.7%	41.5%	181,842
	Rural Town and Fringe	54.2%	26.8%	18.9%	57,678
	Rural village and dispersed	100.0%	0.0%	0.0%	1,744
	Total	40.7%	23.5%	35.8%	241,264

Table E2: Population falling within each Education Colleges CDAT tier by urban / rural classification

		Tier 1	Tier 2	Tier 3	Total
Cardiff	Urban City and Town	87.6%	9.0%	3.4%	362,018

[93] Rural Urban Classification (2011) of Lower Layer Super Output Areas in England and Wales - data.gov.uk

		Tier 1	Tier 2	Tier 3	Total
	Rural Town and Fringe	100.0%	0.0%	0.0%	4,885
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	87.8%	8.9%	3.4%	366,903
Caerphilly	Urban City and Town	50.3%	21.3%	28.4%	140,957
	Rural Town and Fringe	37.1%	24.4%	38.5%	33,121
	Rural village and dispersed	100.0%	0.0%	0.0%	6,997
	Total	49.8%	21.1%	29.1%	181,075
Merthyr Tydfil	Urban City and Town	41.6%	30.3%	28.1%	53,845
	Rural Town and Fringe	45.4%	18.0%	36.6%	6,481
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	42.0%	29.0%	29.0%	60,326
Rhondda Cynon Taf	Urban City and Town	53.7%	19.9%	26.4%	181,842
	Rural Town and Fringe	57.8%	27.4%	14.8%	57,678
	Rural village and dispersed	0.0%	100.0%	0.0%	1,744
	Total	54.3%	22.3%	23.4%	241,264

Table E3: Population falling within each Education Universities CDAT tier by urban / rural classification

		Tier 1	Tier 2	Tier 3	Total
Cardiff	Urban City and Town	97.8%	2.2%	0.0%	362,018
	Rural Town and Fringe	100.0%	0.0%	0.0%	4,885
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	97.8%	2.2%	0.0%	366,903
Caerphilly	Urban City and Town	43.7%	27.9%	28.4%	140,957
	Rural Town and Fringe	29.1%	22.5%	48.3%	33,121

		Tier 1	Tier 2	Tier 3	Total
	Rural village and dispersed	63.7%	19.4%	17.0%	6,997
	Total	41.8%	26.6%	31.6%	181,075
Merthyr Tydfil	Urban City and Town	23.9%	28.6%	47.5%	53,845
	Rural Town and Fringe	0.0%	22.5%	77.5%	6,481
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	21.3%	28.0%	50.7%	60,326
Rhondda Cynon Taf	Urban City and Town	43.9%	17.6%	38.5%	181,842
	Rural Town and Fringe	56.0%	25.5%	18.5%	57,678
	Rural village and dispersed	0.0%	0.0%	100.0%	1,744
	Total	46.4%	19.4%	34.2%	241,264

Table E4: Population falling within each Health CDAT tier by urban / rural classification

		Tier 1	Tier 2	Tier 3	Total
Cardiff	Urban City and Town	87.6%	9.5%	2.9%	362,018
	Rural Town and Fringe	100.0%	0.0%	0.0%	4,885
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	87.8%	9.3%	2.8%	366,903
Caerphilly	Urban City and Town	49.4%	26.4%	24.3%	140,957
	Rural Town and Fringe	21.5%	15.6%	62.9%	33,121
	Rural village and dispersed	83.0%	17.0%	0.0%	6,997
	Total	45.6%	24.0%	30.4%	181,075
Merthyr Tydfil	Urban City and Town	24.2%	35.0%	40.8%	53,845
	Rural Town and Fringe	0.0%	66.4%	33.6%	6,481
	Rural village and dispersed	0.0%	0.0%	0.0%	0
	Total	21.6%	38.4%	40.1%	60,326

		Tier 1	Tier 2	Tier 3	Total
Rhondda Cynon Taf	Urban City and Town	48.0%	27.8%	24.2%	181,842
	Rural Town and Fringe	69.3%	20.4%	10.3%	57,678
	Rural village and dispersed	0.0%	0.0%	100.0%	1,744
	Total	52.8%	25.8%	21.4%	241,264

Appendix G Cross Cutting Themes Case Study Examples

TRAFNIDIAETH CYMRU
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Ariennir yn Rhannol gan **Lywodraeth Cymru**
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GRIFFITHS
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Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

CASE STUDY – RECYCLED CONCRETE

At Transport for Wales we are committed to sustainability lowering our impact on the environment through a variety of measures. To helping us toward this we look to reuse and recycle material where we can be it on our sites or in the office. A good example of this is the reuse of waster and recycled material from ground remediation at our Taff's Well site. There our partner Alun Griffiths are using **555m^3**of material as filler to help build up the hard standing required on site for office cabins and for the haul road. Also some of the removed material was transported to another Alun Griffiths site to be using to build the site up to level saving it from the land fill.

The material that is being reused and crushed was from the Demolition Phase of the site and the Phase 1 of Ground Remediation for the Core Valley Lines Integrated Control Centre. Both of theses phases created a large amount of arisings and rubble that was then stockpiled on site. A crusher was the brough onto site and the material was crushed into 6F2. This is now being stored on site ready to be used during future phase of work.

This has meant that not having to procure extra materials and not needing to transport the waste material for disposal we had saved around **2856 tonnes** from landfill this equates to just shy of **130 lorry loads**. With Taff's Well being one of our first sites to start construction this should act as a model for our future projects and as an example for our partners to follow. While also showing significant savings and limit environmental impact over the projects life.

Above: Crusher in use producing 6F2 from concrete slab

Right: Arisings being saved from land fill to be put to good use elsewhere

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CASE STUDY – SOLAR POWERED CCTV

In line with our Sustainability plan Transport for Wales is committed to lowering our C02 output across all our operations. To help achieve this we are looking to use greener energy sources where possible, one of which is our use of solar powered CCTV cameras at our Taff's Well site. OnGarde have supplied Alun Griffiths with 3 of their OnGarde Duo Solar cameras to the site which have been in operation since the start of the works without out fault. They have also been able to alert our security out of hours on the few occasions we have had incidents on site.

During the ECI phase of the project ahead of construction at Taff's Well, there has been a huge emphasis on collaboration between the principle contractor Alun Griffiths and Transport for Wales. As Taff's Well is the first major part of the proposed Core Valley Line (CVL) Scheme its is important to set the precedence for the future projects.

The cameras have provided great coverage of the site and provide a valuable service during hours of darkness. They have a long battery life allowing them to continue operating even when sunlight isn't available.

The use of hybrid cameras instead of those powered by diesel alone has meant that we have been able to save around **£100** a week in diesel as well as keeping around **400kg** of CO_2 a week out of the atmospheres. As Taff's Well is one of our first sites to start construction this should act as a model for future sites.

Metro

Balfour Beatty TRAFNIDIAETH CYMRU TRANSPORT FOR WALES keolis amey WALES | CYMRU SHARE WITH PRIDE

CASE STUDY – SOLAR POWERED LIGHTING SAVING C02 AND FUEL COSTS

In line with our Sustainability Plan, Balfour Beatty aim to reduce diesel reliance on our sites. To help achieve this the team have been looking at alternatives to fuel powered tower lights. Contact was made with Prolectric who provided a solar light for trial on site to understand how the light performs and to see the benefits first hand.

During the ECI phase of the project ahead of construction on the CVL project, there has been a huge emphasis on collaboration between the client, Transport for Wales, the project manager KeolisAmey and the other contractors currently engaged on the project.

As Balfour Beatty are in the ECI phase of the Core Valley Lines (CVL) Project they do not have an active site to be able to trial the light. With the support of TfW and KeolisAmey, Balfour Beatty arranged for an Alun Griffith site to trial the light as they are in construction building the depot in Taff's Well as part of the CVL project.

The solar powered light was used during night works at the site with feedback provided that the light was 'excellent and ran without fault'. The light provided more than enough illumination, ran silently for the duration and reduced the need for fuel.

*Diesel savings will be evident from the first week of use but over an 8 week period the light will save **3,213kg of C02** comparable to a standard diesel powered light as well as a saving of **£1019 in diesel costs.***

£1000 Saved and zero emissions over 8 weeks

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CASE STUDY – TAFF'S WELL COMMUNITY OUTREACH

The project team was approached in Summer 2019 during a community council event by the chairs of the allotment association. As many plots had been abandoned, become dilapidated and overgrown they were keen to renovate and improve them.

As a result of the discussion, it was agreed that Alun Griffiths Construction (AGC) and Transport for Wales (TfW) will be collaborating and working together to deliver renovated allotment space and improved accessibility.

This project saw volunteers from TfW's project management and engineering staff working alongside AGC with ACG provided a plant operative, a banksman, general operative as well as equipment for the clearing of vegetation. While the TfW volunteers providing the extra manpower that got the project completed in a quick and timely manner.

The project was very successful with the team clearing a large amount of space on the western side of the allotments allowing for multiple new allotment plots. On the eastern side they completed the resurfacing of affected walkways as well as extending the hardstanding allowing for a new car park area to be created giving the allotments greater accessibility. The project has created good relations better the staff working in Taff's Well and those of the allotment society. It has served well as an outreach to the local community to show that TfW and AGC are commitment to the betterment of the local communities in which they work.

Metro