Evaluation of South Wales Metro Phase 2

Final Evaluation Report

On behalf of Transport for Wales

TRAFNIDIAETH CYMRU
TRANSPORT FOR WALES

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Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: 3rd Floor, Capital Square, 58 Morrison Street, Edinburgh EH3 8BP
T: +44 (0)131 335 4200 E: info.Edinburgh@stantec.com

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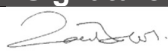
	Name	Position	Signature	Date
Prepared by:	Rachel Thomas	Associate		30/08/23
Reviewed by:	Stephen Canning	Senior Associate		31/08/23
Approved by:	Stephen Canning	Senior Associate		06/09/23
For and on behalf of Stantec UK Limited				

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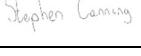
V3.0	11/04/24	Final Completed draft			

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1.2.1 The public transport network – and in particular the railway network – in the Cardiff Capital Region[1] (CCR) has suffered long-term under-investment. This 'steady state' philosophy was most clearly encapsulated in the 2003-18 Wales and Borders rail franchise[2], which was based on an assumption of zero passenger growth. The Wales and Borders franchise, and in particular the Core Valleys Lines[3] (CVL) (shown in Figure 1.1), therefore approached the end of the 2003-18 Wales and 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 stock).

Figure 1-1: Core Valleys Lines and surrounding railway network

[1] The Cardiff Capital Region is a partnership of ten local authorities in South-East Wales incorporating: Blaenau Gwent; Bridgend; Caerphilly; Cardiff; Merthyr Tydfil; Monmouthshire; Newport; Rhondda Cynon Taf; Torfaen; and Vale of Glamorgan.

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

[3] In the context of this report, the Core Valleys Lines are those to Aberdare, Merthyr Tydfil, Rhymney and Treherbert. More generally however, the CVL can be used as a term to include the Coryton branch and City Line, and on occasions the Vale of Glamorgan lines to Penarth, Barry Island and Bridgend via Llantwit Major.

1.2.2 The public transport connections between Cardiff and its surrounding areas are significantly poorer than other UK cities of a similar population (e.g., Bristol, Newcastle, Edinburgh etc). As was detailed in the *South Wales Metro Phase 2 – Interim Evaluation Report*[4], poor connectivity is constraining the economic potential of the CCR through limiting the effective size of the labour market, dampening productivity and locking in longer-term socio-economic disparities which have contributed to high levels of inequality and multiple deprivation in the South-East Wales Valleys.

1.2.3 There has been a long-term recognition of this problem in Welsh Government and amongst the business community, with 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.

1.2.4 Phase 1 of the Metro involved new stations at Pye Corner and Ebbw Vale Town and 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 – this investment of circa £1.05 billion is being funded by partners including the Welsh Government, the European Regional Development Fund, the UK Government, and Cardiff Capital Region Local Authorities and 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
- A new train stabling facility at Taff's Well

1.2.5 In addition to the 'transformation budget', Welsh Government is separately investing circa **£800m** in new rolling stock to operate on the enhanced network. This will be a mix of heavy rail and TramTrain vehicles[5]. 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.

[4] https://tfw.wales/projects/monitoring-and-evaluation/south-wales-metro-phase-2-interim-evaluation

[5] 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.

1.3 South Wales Metro Evaluation

Overview

1.3.1 In line with the conditions of the ERDF grant funding and in keeping with best practice, Welsh Government commissioned Stantec UK Ltd, in partnership with Loxley Consultancy and Beaufort Research, to undertake an evaluation of both the ERDF funded works and SWMP2 overall in 2020. The contract was subsequently novated to TfW in 2021 as the 'Lead Beneficiary' of the ERDF funding.

1.3.2 This evaluation is catered to two audiences, and thus it consists of two components:

- The **ERDF funding** was specifically allocated to the delivery of **nine discrete and distinct rail improvement projects, hereafter referred to as 'Operations'** (see Section 3.2 for a full description of these Operations). As part of the funding agreement, TfW as Lead Beneficiary must produce an **evaluation assessing the delivery and performance of these Operations against the aims and objectives set out in their business plans**.

- Separately, **TfW and Welsh Government are seeking a wider evaluation of the overall Metro programme** (i.e., infrastructure, rolling stock and services) in accordance with the Welsh Transport Appraisal Guidance (WelTAG Stage 5).

1.3.3 The evaluation has been delivered in two phases:

- **Interim Evaluation**: a pre-opening baselining stage in which all of the necessary baseline data against which both the ERDF funded Operations and SWMP2 overall can be evaluated were collated and assessed. This stage included both an interim process[6] and Cross Cutting Themes[7] (CCT) evaluation.

- **Final Evaluation**: a post ERDF evaluation stage which provides: (i) individual evaluations of each of the nine Operations in a *pro forma* format; and (ii) a wider evaluation of SWMP2 from the TfW and Welsh Government perspective.

[6] 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. The Interim Evaluation was undertaken prior to project delivery and therefore focused on how SWMP2 was selected, funded, and procured.

[7] A range of social, economic, environmental and wellbeing outcomes associated with the delivery of SWMP2 were identified. These are expressed and measured via a series of Cross Cutting Themes (CCT) which focus on equal opportunities and gender mainstreaming, including Welsh language; sustainable development; and tackling poverty and social exclusion.

The *Interim Evaluation Report* was published in October 2022 and is available here: https://tfw.wales/projects/monitoring-and-evaluation/south-wales-metro-phase-2-interim-evaluation.

1.3.4 **This report sets out the findings from the Final Evaluation stage**, with cross-references to the *Interim Evaluation Report* where appropriate.

1.4 This Report

1.4.1 This report consists of a further **17** chapters – **Chapters 3-14** are focused solely on the nine ERDF funded Operations, whilst **Chapter 15** onward considers SWMP2 overall:

- **Chapter 2** recaps on the rationale for investment in SWMP2 and defines the outputs, outcomes and societal impacts which can be expected to emerge from it
- **Chapter 3** provides the background and context to the ERDF funded programme and the nine Operations therein
- **Chapter 4** records the performance of the nine Operations with respect to the Output and Result Indicators defined in their business plans
- **Chapter 5** reviews the delivery of Cross Cutting Themes (CCTs) at a programme level (i.e., it takes an aggregate view across all nine Operations)
- **Chapters 6-14** provide the nine Operation *pro formas*
- **Chapter 15** sets out an updated post-COVID-19 baseline covering public transport supply and demand for several key datasets
- **Chapter 16** sets out the outputs which have been delivered by SWMP2 in terms of the change on the transport supply-side and the improvement in connectivity
- **Chapter 17** sets out the findings of the final process evaluation, an objective review of how SWMP2 overall has been delivered, with a view to identifying good practice and lessons learned for future projects of this nature
- **Chapter 18** provides a summary of the key findings and recommended next steps

2 South Wales Metro Phase 2

2.2 Overview

2.2.1 The *South Wales Metro Phase 2 – Interim Evaluation Report* provided a detailed review of the **rationale for investment** in SWMP2 from both a policy and appraisal perspective. The investment case is briefly summarised below and the fit with policy reassessed to account for the passage of time since the completion of the Interim Evaluation stage.

2.2.2 The SWMP2 'theory of change' is then set out in the form of a logic map, which details the outputs, outcomes and impacts that the investment programme can be expected to deliver.

2.3 What is the rationale for investment in SWMP2?

2.3.1 Chapter 1 established the genesis of the Metro concept. To briefly recap, the rationale for investment was rooted in decades of under-investment in the Cardiff Capital Region's railway network. As the region entered the second decade of the 21st century, long journeys, infrequent services, poor reliability, limited resilience, insufficient capacity and poor station environments combined to make travel by rail unattractive to many and difficult and / or unpleasant for those that did choose to travel by train. It was recognised that only a transformational programme of investment could resolve this situation and this formed the basis of the case for the Metro.

Policy Framework

2.3.2 The *Interim Evaluation Report* reviewed prevailing national, regional and local policy and the strategic fit of the Metro 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

2.3.3 The Metro is integral to delivering these policy outcomes through the provision of a **high-quality, reliable, efficient and economically sustainable transport network**. It is anticipated that it will significantly **improve connectivity**; **reduce journey times**; **increase capacity**; **reduce CO_2 and other emissions** associated with poor air quality; and improve the **accessibility of the** railway network.

2.3.4 Given the level of investment and the transformative nature of the Metro proposals, regional and local policy and strategy have been built around its delivery.

2.3.5 Since the publication of the *Interim Evaluation Report*, this policy focus has continued to strengthen. There have been several recent measures implemented to further support the realisation of these policy goals, including:

- **Roads Review:** In June 2021, the Deputy Minister for Climate Change announced a review of new road schemes funded by the Welsh Government. Following this review, the Welsh Government announced that, whilst it will consider further road investment, it will only do so in the following circumstances: (i) to support modal shift and reduce carbon emissions; (ii) to improve safety through small scale changes; (iii) to adapt to the impacts of climate change; and (iv) to provide access and connectivity to jobs and centres of economic activity in a way that supports modal shift. On this basis, many aspirant road projects will not be taken forward. This may lead to an increase in journey times / a poorer quality experience for drivers and may support a shift to sustainable modes, such as the Metro.

- **National 20mph speed limits programme:** In July 2021, the Welsh Government announced that it would be introducing a default 20mph speed limit on 'restricted' roads[8] across Wales from September 2023. As above, this has led to an increase in journey times for drivers. Whilst primarily focused on improving road safety, the policy is also intended to support a shift to more sustainable modes of transport such as rail. This is likely to be particularly the case where journeys

[8] Part VI of the Road Traffic Regulation Act 1984 (RTRA 1984), Section 82(1)(a) defines a restricted road in England and Wales as a road on which there is provided "a system of street lighting furnished by means of lamps placed not more than 200 yards apart".

involve travel through multiple settlements as with some routes through the Valleys communities.

2.3.6 There therefore continues to be a **clear and indeed strengthening strategic fit between the Metro and national policy priorities**, with recent policy measures likely to further support and encourage use of sustainable modes of transport.

2.4 What are the anticipated benefits of SWMP2?

2.4.1 The means by which SWMP2 (and the individual ERDF funded Operations therein) will feed through to positive transport outcomes and societal impacts is complex and multi-faceted – there is therefore benefit in presenting these chains of 'cause and effect' graphically through a logic map. Logic maps are diagrams that show the inter-relationships between different aspects of an intervention or programme of interventions. They graphically represent the underlying mechanisms through which an action leads to a certain result, by showing the logical steps along an anticipated route from inputs to outputs to outcomes to impacts. Logic maps define different chains of causality that help the appraiser to scope and assess the benefits which could emerge from an investment.

2.4.2 During the Scoping and Interim Evaluation stages, a set of logic maps was developed which provide the overall structure for the evaluation. These logic maps were accompanied by a detailed Monitoring Framework setting out the data which should be analysed when assessing the extent to which each statement in the logic map has been realised.

2.4.3 **Logic maps** were produced for SWMP2 overall and for each individual Operation. The overall SWMP2 logic map is shown in Figure 2.2 and contextualises the nine ERDF Operations within the wider SWMP2 programme showing how, when delivered alongside wider investments in infrastructure, rolling stock and service improvements, they support positive transport outcomes and societal impacts.

2.4.4 The individual Operation logic maps are presented in the Operation *pro formas* in **Chapters 6-14**.

2.4.5 The main logic map components are set out in Figure 2.1 and include:

- **Context:** The problems and opportunities which SWMP2 / the Operation(s) is seeking to address. This effectively forms the rationale for proceeding with the intervention i.e., the 'case for change' or 'strategic need', which underpins the business plan. In the logic maps, the problems have been categorised into **transport problems** (user perspective and supply-side issues) and **societal problems**.

- **Input:** The **investment and processes required to deliver SWMP2 / the Operation(s)**. To satisfy ERDF requirements, the evaluation must report separately on only those aspects for which ERDF funding was provided. Where appropriate therefore, the inputs have been divided between those funded and delivered by the ERDF (i.e., the nine Operations) and those funded separately by TfW 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. These include intended outcomes (such as modal switch from car to rail) and unintended outcomes (such as modal switch from bus to rail resulting in reduced bus patronage).

- **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.

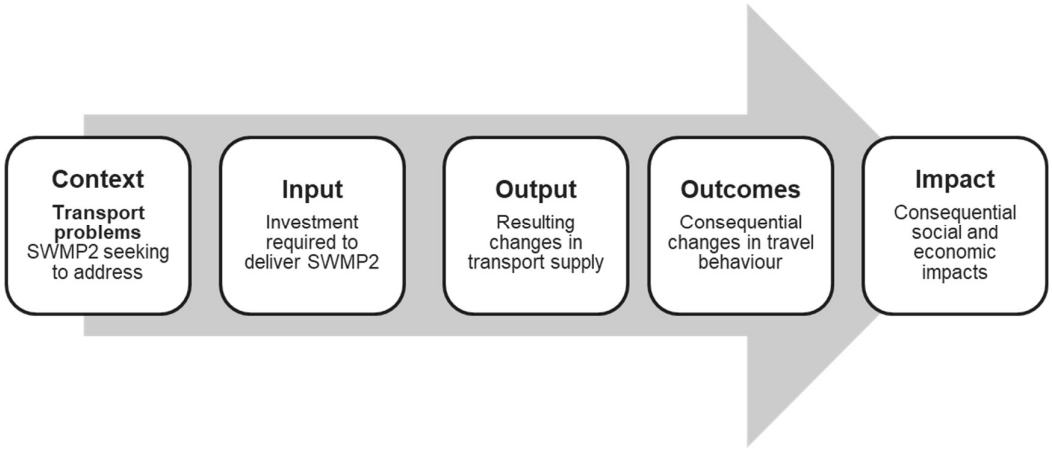


Figure 2-1: Logic Map Components

2.4.6 In the logic maps, second and third order outcomes 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.

2.4.7 As will be explained in **Chapter 3**, a requirement of the ERDF funded Operations is that the investment must deliver agreed Output and Result Indicators. These indicators are shown in blue in the logic maps and include a mix of outputs, outcomes, and impacts.

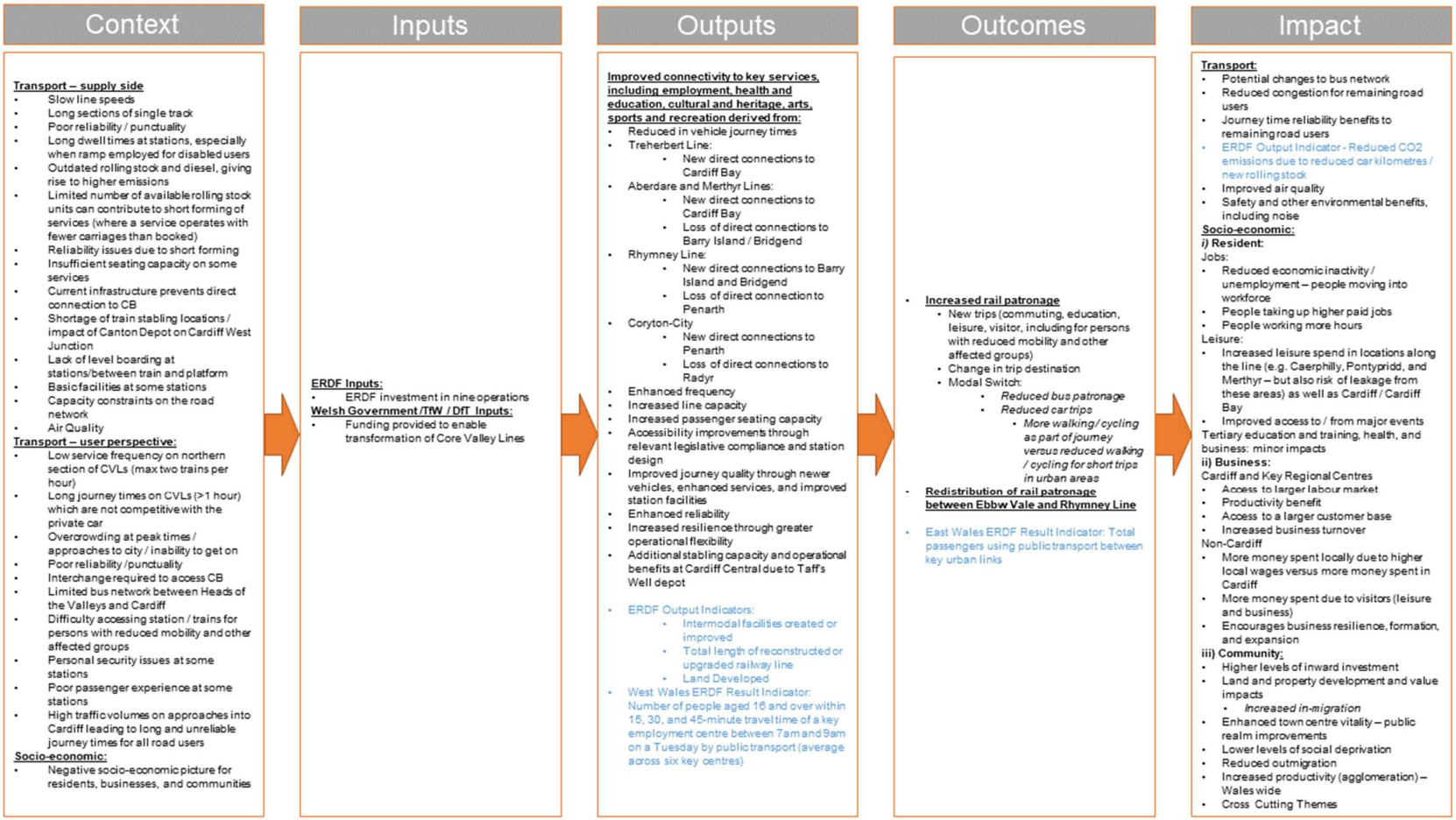


Figure 2-2: South Wales Metro Phase 2 - overall logic map

2.4.8 **Chapters 6-14** of this report focus specifically on the **evaluation of the nine discreet ERDF funded Operations**, adopting the logic mapping approach outlined above. This evaluation is relatively narrowly defined, focusing principally on whether the agreed commitments have been delivered and how each Operation has performed with respect to its Output and Result Indicators.

2.4.9 From the perspective of TfW and Welsh Government, there is value in adopting a **more wide-ranging approach than that required by ERDF** focusing on the **outputs, outcomes and impacts of SWMP2** overall, in accordance with WelTAG Stage 5. It is however important to recognise that, whilst outputs are delivered upon project completion or once the investment is operational, **outcomes and impacts take longer to materialise**, with some longer-term impacts taking 10-15 years to become apparent. In addition, there is a **time-lag** in the availability of some secondary data sources for measuring outcomes and impacts with, for example, some datasets only produced every ten years in line with Census reporting periods. This acts to further extend the period between the investment being delivered and the time when it is possible to report on its full impacts.

2.4.10 Due to the ERDF funding requirement to complete the evaluation by 31st March 2024 and the longer timeframe needed for outcomes and impacts to materialise; it is not possible to fully consider outcomes and impacts at this point. However, in keeping with best practice, the final chapter of this report sets out **a framework which can be used to guide the delivery of a longer-term evaluation of SWMP2**.

3 Background to the ERDF funded Operations

3.2 Overview

3.2.1 This chapter focuses on the background to the nine ERDF Operations, outlining the details of each in terms of:

- Each Operation's scope of works
- Output and Result Indicators
- Cross Cutting Themes

3.3 ERDF Funding

3.3.1 WEFO negotiated the current ERDF programme with the European Commission (EC). Public transport was a central theme of this programme and WEFO therefore advanced the concept of funding the Metro.

3.3.2 WEFO worked closely with the Joint Assistance to Support Projects in European Regions (JASPER) to scope the prospective bid. It was identified early in this scoping process that, due to the stage of development of the Metro, progressing it as a single 'major project' was unrealistic. Moreover, it was explicitly recognised that the Metro is actually a combination of individual projects being brought together under a single umbrella. It was therefore advised by EC Officials that the focus should be on progressing **nine discreet 'Operations'**.

3.3.3 The scope of these Operations, as set out in the final business plans for each Operation, is summarised in Table 3.1 (Operations which received funding from the *ERDF East Wales Operational Programme*[9]) and Table 3.2 below (Operations which received funding from the *ERDF West Wales and Valleys Operational Programme*[10]):

Table 3.1: East Wales Operational Programme Operations - scope of works

ERDF 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 Tydfil) to Cardiff Bay.

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

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

ERDF Operation	Scope of Works
	The new Cardiff Bay extension will be developed over two stages. Stage 1 comprises track doubling and pre-electrification works on the Cardiff Bay branch to provide the capacity required for rapid transit services to commence. This will involve significant improvements to the existing single platform Cardiff Bay Station. In addition to the works at Cardiff Bay a new station will be constructed at Butetown which will service both of the newly doubled lines as well as enabling significant improvements to passenger accessibility both from Bute Street and towards Lloyd George Avenue. Construction of a new platform at Lloyd George Avenue, forming part of the new Butetown station will be ERDF funded. 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 Cardiff Bay Station.
Cardiff Queen Street	Track improvements to facilitate increased trains per hour and direct access to Cardiff Bay through platforms 4 and 5. Works include: ▪ 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
East Wales Stations Improvements	Upgrades to station infrastructure on the CVL, namely: ▪ Cardiff Queen Street (station facility upgrades) ▪ Llandaf, Radyr (on the Taff Vale Line) ▪ Llanishen, Lisvane and Thornhill (on the Rhymney Line) ▪ Heath Low Level, Birchgrove, Rhiwbina, Whitchurch, Coryton (on the Coryton Line) ▪ Danesourt, Fairwater, Waun-Gron Park, Ninian Park (on the City Line) The improvements aim to provide enhanced accessible boarding and enhanced inter-modal 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, shelters and customer information systems will be provided and station access will be improved where necessary.

Table 3.2: West Wales Operational Programme Operations scope of works

ERDF 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[11] between Ynyswen and Treherbert; Ystrad Rhondda and 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
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 the Aberdare dynamic passing loop and extension of the Mountain Ash loop ▪ 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 Tydfil 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 Abercynon, including installation and extension of passing loops ▪ clearance works of existing vegetation and obstructions, line speed improvements, track realignment and upgrades with the latter including localised lowering under bridges

[11] 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.

ERDF Operation	Scope of Works
	▪ improvements to lineside fencing and route works, track access points and prevention of trespass 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 ▪ 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 and preparation of 3.6ha of serviced land ready for a rail rolling stock depot ▪ extension of the existing Taff's Well Station on the from Cardiff (Up Line) platform ▪ 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 accessible boarding and / or enhanced inter-modal facilities (facilities which improve the experience of transferring from one mode of transport to another) at 37 stations in order to improve access for PRM, reduce dwell times at stops and therefore improve journey times for all users.

3.3.4 The scope of works for each Operation was gradually refined over time as more information on the specific requirements was developed. As a result, the scope of works included in the final business plans as articulated above differs from the scope of works in the original business plans. A high-level overview of the scope of work included in the original business plan for each Operation (i.e. the Output Indicators which it was envisaged would be delivered) is set out in the *pro formas* in **Chapters 6-14**, along with a brief description of the material changes made.

3.3.5 As the 'Lead Beneficiary', Welsh Government was initially responsible for developing the business plans. Following the novation, the responsibility for updating and submitting the plans to WEFO passed to TfW. WEFO reviewed each business plan to ensure that they aligned with programme commitments and agreed the allocation of funding, together with any financial reprofiling where required.

3.3.6 It should be noted that, whilst the Operations include improvement works in preparation for electrification of the lines (e.g., foundations, masts, and support structures), overhead electrification and wiring was not provided via the ERDF funding.

3.4 ERDF Output and Result Indicators

3.4.1 Both the East Wales Operational Programme and West Wales and Valleys Operational Programme 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**".

3.4.2 One of the requirements associated with the ERDF funding is that the investment must deliver against an agreed set of predetermined criteria (defined as **'Output' and 'Result' Indicators**), which provide a means of determining value for money. **Output Indicators** are effectively a statement of the change in the supply-side, measuring what has physically been delivered through the funding. **Result Indicators** provide a measure of the change in connectivity and demand enabled by the supply-side change.

3.4.3 The established Output and Result indicators for Operations receiving funding under the *East Wales* and *West Wales and the Valleys Operational Programmes* are set out in full in Table 3.3 and Table 3.4.

Table 3.3: East Wales and West Wales and the Valleys Operational Programme – **Output** Indicators

		Output Indicators			
	Operation	**Inter-modal facilities created or improved**	**Total length of reconstructed or upgraded railway line (including TEN-T)**	**Reduction in CO_2 equivalent emissions**	**Land Developed**
East Wales Operational Programme	Cardiff Bay Stage 1	2	1.3km	n/a – target set at programme level only.	n/a
	Cardiff Queen Street	0	0.5km		n/a
	East Wales Stations Improvements	14	1.8km		n/a
	Programme Target	5	3km	1,800 Tco_2e[12]	n/a
West Wales and the Valleys Operational Programme	Treherbert Line	0	5.5km	n/a – target set at programme level only	n/a
	Aberdare Line	0	5.7km		n/a
	Merthyr Line	0	6.3km		n/a
	Rhymney Line	0	6.5km		n/a
	Taff's Well Depot	1	n/a		3.6 hectares of serviced land ready for a new depot to be delivered

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

		Output Indicators			
	Operation	**Inter-modal facilities created or improved**	**Total length of reconstructed or upgraded railway line (including TEN-T)**	**Reduction in CO_2 equivalent emissions**	**Land Developed**
West Wales and the Valleys Operational Programme	West Wales and Valleys station improvements	37	n/a		n/a
	Programme Target	38	24km	10,700 Tco_2e[13]	3.6 hectares

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

Table 3.4: East Wales and West Wales and the Valleys Operational Programme – **Result** Indicators

Programme	Result Indicator	Approach	Baseline value	Baseline year	Target value (2023)	Source of data
East Wales Operational Programme	Total passengers using public transport between key urban links	Total passengers using public transport between Cardiff Queen Street and Cardiff Bay	869,000	2012/13	10% increase	Initially based on South-East Wales Transport Model (SEWTM) forecast of post-opening patronage on the Cardiff Queen Street – Cardiff Bay section of line
West Wales and the Valleys Operational Programme	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	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.	<15 minutes – 41,695 15 to 30 minutes – 96,268 30 to 45 minutes – 150,376	2015	An increase of 5% in each time band, calculated as an average across the 6 key centres, with population data fixed at 2015 levels	Both the baseline and forecast assessment will be undertaken using modelled outputs from TRACC accessibility software

3.4.4 The performance of the Operations with regard to the Output and Result Indicators is summarised in **Chapter 4**. Key points are repeated in the individual Operation *pro formas* in **Chapters 6-14** (because any single Operation could be selected for an audit in isolation).

3.5 Cross Cutting Themes

3.5.1 The ERDF 2014-2020 programme included a number of CCTs to be embedded in the design and delivery of the Operations. The aim of the CCTs is to improve the quality and the legacy from each of the Operations supported by the EU Structural Funds and to add value to programmes as a whole. They help to ensure that the benefits of the EU funds are shared inclusively by people and communities in Wales and positively contribute to the development of marginalised and excluded groups, improve living conditions, and contribute to improving the quality of the environment.

3.5.2 For the nine ERDF funded Operations, the CCTs were as follows:

- Sustainable Development
- Equal Opportunities and Gender Mainstreaming, including the Welsh Language

3.5.3 GeneralCCTs are delivered at an Operation level, and a summary of CCT achievements in relation to each Operation is provided in the respective *pro formas* **(Chapters 6-14)**.

3.5.4 There is also value however in assessing CCT delivery in aggregate across all of the Operations, summarising what worked well or otherwise and outlining how the project contributed to both the promotion of the Welsh language and the goals of the Well Being of Future Generations Act. This summary analysis is set out in **Chapter 5**.

3.5.5 It should be noted that TfW intends to publish a booklet of its CCT achievements on the TfW website as a best practice exemplar for future public sector projects.

4 ERDF Output and Result Indicators

4.2.1 The agreed set of Output and Result Indicators against which the Operations should deliver were summarised in the previous chapter. This section sets out:

- the means by which it was agreed that the Output and Result Indicators would be assessed
- where possible / required, an update on delivery of the ERDF Output and Result Indicators since the Interim Evaluation Report[14]

4.2.2 As noted above, key points are repeated in the individual Operation *pro formas* in **Chapters 6-14** (because any single Operation could be selected for an audit in isolation).

4.1 Reporting on the Output and Result Indicators

4.1.1 The means by which it was agreed that the Output and Result Indicators would be assessed is either based upon modelled or outturn (post-delivery) data. Some of the indicators were previously reported upon using modelled data at the Interim Evaluation stage.[15]

4.1.2 Table 4.1 summarises:

- how each Output and Result Indicator is defined within the logic map set out in **Chapter 2**
- whether the assessment of the indicator is based upon modelled or outturn (post-delivery) data
- whether the indicator was reported upon using modelled data at the Interim Evaluation stage
- a commentary on whether an update on the reporting of the indicator is possible / required at the current time
- whether an update of the indicator is provided in the sections which follow

[14] See South Wales Metro Phase 2 Interim Evaluation | Transport for Wales (tfw.wales)

[15] See South Wales Metro Phase 2 Interim Evaluation | Transport for Wales (tfw.wales)

Table 4.1: ERDF 'Output' and 'Result' Indicator Reporting Status

ERDF Output and Result Indicator	Definition within the logic map	Assessment based on modelled or outturn (post-delivery) data	Reported upon using modelled data in the Interim **Report**	Commentary	Update below
Output Indicator –Inter-modal facilities created or improved; total length of railway line; land developed.	Output	Outturn (post-delivery) data	No	This Output Indicator relates to the delivery of infrastructure. An update on what has been delivered as a result of the ERDF funding is set out in the section below and the individual Operation *pro formas*.	Yes
Output Indicator – Programme level reduction in carbon dioxide emissions	Impact	Modelled data	Yes	This indicator can only be estimated using modelled data. At the Interim Evaluation stage, the indicator was reported upon in full in Section 7.3 of the *Interim Evaluation Report.*[16] This analysis was partly based on passenger forecasts taken from the South-East Wales Transport Model (SEWTM) which used the post-opening rail timetables which it was envisaged at that time would be introduced following the delivery of SWMP2 (the March 2021 timetable revision). The modelled analysis indicated that SWMP2 will lead to a reduction in carbon dioxide 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. Since the Interim Evaluation, the post-opening rail timetables which it is envisaged will be introduced following the delivery of SWMP2 have been updated. An assessment of the updated timetables (the June 2023 timetable revision) was undertaken to determine if the changes warranted a re-run of SEWTM and the development of updated passenger forecasts. This assessment (which is set out in more detail in Appendix A) indicated that the timetable changes are too small to make a material difference to the outcome and therefore the passenger and carbon dioxide forecasts used in the *Interim Evaluation Report* remain valid and should continue to be used.	No

[16] See South Wales Metro Phase 2 Interim Evaluation | Transport for Wales (tfw.wales)

ERDF Output and Result Indicator	Definition within the logic map	Assessment based on modelled or outturn (post-delivery) data	Reported upon using modelled data in the Interim **Report**	Commentary	Update below
				The analysis presented in the *Interim Evaluation Report* therefore represents the most appropriate forecast of delivery against this indicator and, as such, this metric is not considered further here, although it is summarised in the Operation *pro formas.*	
Result Indicator – West Wales: 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	Output	Modelled data	Yes	The assessment of this indicator is based upon modelled outputs from the TRACC public transport connectivity software programme. TRACC calculates the shortest journey time between sets of origins and destinations based upon public transport timetable data and a range of user-defined parameters. At the Interim Evaluation stage, an analysis using TRACC was undertaken, and the overall results showed 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' would be met. However, **due to the impact of COVID-19, it was reasoned that this analysis needed to be updated to reflect wider structural changes in both transport supply and demand. Further information on the rationale for this update and the updated analysis is set out below (and is also summarised in the individual Operation *pro formas*).**	Yes
Result Indicator – East Wales: Total passengers using public transport between key urban links	Outcome	Outturn (post-delivery) data	Yes	At the Interim Evaluation stage, given that **Cardiff Bay Stage 1** was not yet complete, this indicator was reported upon using modelled data (passenger forecasts taken from SEWTM which used the March 2021 timetable revision). These modelled data indicated that there would be a **27%** increase in passenger numbers on the link once the new timetables become operational. It was anticipated that the Final Evaluation (this report) would update this analysis with actual post-opening ticket sales data taken from the LENNON database. However, the delay to completion means that it is only possible to report modelled data at the current time. As set out above, since the Interim Evaluation, the post-opening rail timetables which were used to generate the forecasts (the March 2021 timetable revision) have been updated. However, the comparison of the former and	No

ERDF Output and Result Indicator	Definition within the logic map	Assessment based on modelled or outturn (post-delivery) data	Reported upon using modelled data in the Interim **Report**	**Commentary**	Update below
				updated timetables (the June 2023 timetable revision), as set out in Appendix A indicated that the changes are too small to make any material difference to the forecasts. As such, **in the absence of outturn data, the modelled data presented in the *Interim Evaluation Report* continue to provide the most appropriate forecast of delivery against this indicator and, as such, this metric is not considered further here (although it is summarised in the Cardiff Bay Stage 1 *pro forma*).** However, whilst not examined in this report, it is recommended that LENNON ticket sales data be reviewed six months after the new services become operational to determine if the 10% target has been achieved. This could subsequently be reported upon both independently and within any future outcome evaluation of SWMP2. It should be noted that post-opening ticket sales data may be affected by structural changes to passenger demand post-COVID-19 and that the impact of this should be considered in the analysis and reporting.	

4.1.3 In summary, in this report, it is only possible to provide updates on the ERDF Output and Result Indicators which are classed as 'outputs' within the overall SWMP2 logic model. Updates on these ERDF Indicators are provided in the sections below and in the individual Operations *pro formas*. For all other indicators, the analysis presented in the *Interim Evaluation Report* remains current and these indicators are therefore not considered further here (although they are summarised in the individual Operations *pro formas* for completeness).

4.2 Output Indicators – Infrastructure Delivery

4.2.1 The tables below summarise performance against the **East Wales** and **West Wales Output Indicators** which relate to the delivery of infrastructure, namely:

- inter-modal facilities created or improved – tables providing further information on the inter-modal facilities which have been provided as part of SWMP2 are included in Appendix B
- total length of reconstructed or upgraded railway line
- land developed

Table 4.2: East Wales ERDF Output Indicators (Source: Operation business plans)

	Target		Delivered by the end of ERDF Operation		Target achieved			
	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Explanation for difference	Source of evidence
Cardiff Bay Stage 1	2	1.3km	2	1.1km	✓	×	Shortfall is due to scope being deferred which will fall outside of the ERDF delivery dates. This is because temporary track was used to enable the line to remain operational while double tracking was progressed. This led to delays, with the temporary track to be replaced outside the ERDF delivery period. The temporary track has not been claimed.	Completion certificates and sectional completion certificates
Queen Street	n/a	0.5km	n/a	0.27km	n/a	×	Shortfall is due to scope being deferred which will fall outside of the ERDF delivery dates. This is because of delays in obtaining a possession to undertake the works.	Completion certificates and sectional completion certificates
East Wales Stations Improvements	14	1.8km	14	4.11km	✓	✓	Additional track improvements incorporated within the ERDF programme to fully utilise the ERDF budget[17].	Photo evidence, completion certificates
Programme Target	5	3.km	16	5.48km	✓	✓	-	

[17] It is noted that in 2021, the number of intermodal facilities was increased from 14 to 18 with the addition of intermodal facilities at Crwys Road, Cathays, Heath High Level and Ty Glas. This is articulated in the Business Case for the Operation produced on 11th August 2021. However, the number of Intermodal facilities was subsequently revised back down to 14 due to delays and it not being possible to deliver these works within the ERDF timescales.

Table 4.3: West Wales ERDF Output Indicators (Source: Operation business plans)

	Target			Delivered by end of ERDF Operation			Target achieved			Explanation for any differences	Source of evidence
	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed		
Treherbert Line	n/a	5.5km	n/a	n/a	9.55km	n/a	n/a	✓	n/a	Following the extension to the ERDF timeframe and the successful completion of service diversions, the Treherbert Line was closed for 6 months. Additional track works were required following the service diversions and detailed surveys. Access to all parts of the line, with the efficiencies generated from continuous working, enabled an increase in track delivered.	Completion certificates and sectional completion certificates
Aberdare Line	n/a	5.7km	n/a	n/a	6.44 km	n/a	n/a	✓	n/a		Completion certificates and sectional completion certificates
Merthyr Line	n/a	6.3km	n/a	n/a	5.96km	n/a	n/a	×	n/a	Value engineering exercises amended the length of passing loops required to deliver the revised timetable.	Completion certificates and sectional completion certificates
Rhymney Line	n/a	6.5km	n/a	n/a	6.38	n/a	n/a	×	n/a	Planning delays at Rhymney station resulted in track works being delayed outside the ERDF delivery window.	Completion certificates and sectional completion certificates
Taff's Well Depot	1	n/a	3.6 hectares	1	n/a	3.6 hectares	✓	n/a	✓	-	Photo evidence, completion certificates, demolition certificates, e-mail acknowledgement of handing back the asset.
West Wales and Valleys station improvements	37	n/a	n/a	33	n/a	n/a	×	n/a	n/a	Four stations (Caerphilly; Rhymney; Tonypandy; and Ynyswen) deferred to be delivered past June 2023	Photo evidence, completion certificates

	Target			Delivered by end of ERDF Operation			Target achieved			Explanation for any differences	Source of evidence
	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed	Inter-modal facilities created or improved	Length of reconstructed / upgraded railway (including TEN-T)	Land developed		
Programme target	38	24km	3.6 hectares	34	28.33km	3.6 hectares	×	✓	✓	-	

4.3 Update to the West Wales and Valleys Result Indicator

Overview

4.3.1 **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

4.3.2 As discussed above, the assessment of this indicator is based on outputs from TRACC connectivity software and an analysis using this software was undertaken and reported upon at the Interim Evaluation stage. This analysis was based on the comparison of two scenarios, as follows:

- **Baseline Scenario:** 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 network to reflect the March 2021 timetable revision once SWMP2 is complete.

4.3.3 To calculate the total population within each time band, 2015 population data were used in both the Baseline Scenario and Scenario 1a. The public transport network (Q1 2017) and the population data (2015) were therefore consistently applied across both scenarios. This was done to help isolate the impact of SWMP2 and to ensure that: (i) any wider changes in the public transport network; and (ii) any increase / decrease in population had no impact on the results.

4.3.4 Whilst the above analysis was appropriate at the time, the impact of COVID-19 means that several updates to the analysis were required. These updates, as well as the rationale for each change, are set out in the bullet points below:

- **post COVID-19 public transport timetables** – the previous analysis used Q1 2017 public transport timetables. However, there have been some COVID-19 related changes to bus service provision within the study area since this time and it was therefore reasoned that the analysis should be repeated using post-COVID-19 public transport timetables.
- **2021 population data** – the previous analysis used 2015 population data. Given both the time which has elapsed since 2015 and the fact that, as set out above, the updated analysis uses a public transport network which reflects the post-COVID-19 situation, it was reasoned that the population data should be updated from 2015 to 2021.
- **CVL network and post-delivery rail timetables** – as set out above, since the Interim Evaluation stage, the post-opening rail timetables which were used within the original TRACC analysis (the March 2021 timetable revision) have been updated. Whilst the changes are relatively minor, given the updates above and the need therefore to repeat the TRACC

analysis in any case, it was considered appropriate to use the updated timetables (the June 2023 timetable revision).

Updated Analysis

4.3.5 In summary, the updated analysis was based on the following scenarios:

- **Base:** which used Q3 2023 public transport timetables with no CVL enhancements
- **Scenario 1a:** which used Q3 2023 public transport timetables with amendments made to the CVL to reflect the June 2023 timetable revision

4.3.6 In each case, the TRACC calculation was undertaken between 07:00 and 09:00 on a Tuesday, as per the requirement of the Result Indicator. As with the previous analysis, population data and public transport timetable data was kept consistent in both the Baseline Scenario and Scenario 1a[18].

4.3.7 The percentage difference in the population in each time band for each 'key centre' between the Baseline Scenario 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).

4.3.8 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.

4.3.9 The overall results are set out in Table 4.4. The target was a 5% increase in the population within each time band of a 'key centre'. As shown, this minimum threshold is met in each case, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

[18] Using the same public transport timetables in the baseline and outcome scenarios means that any changes to the bus network as a result of SWMP2 will not be captured in the outputs (e.g., withdrawal / the reduction in frequency / reduced operating hours of services in direct competition with the rail lines and / or the establishment of new bus routes providing feeder services to rail stations). Given that SWMP2 is not yet operational and these changes (if they were to occur) would take place following the implementation of the post-SWMP2 rail timetables, it is appropriate, at the current time, to maintain the public transport timetables across both scenarios. However, in any future post-opening evaluation of SWMP2, there would be merit in using a post-COVID-19 / pre-SWMP2 public transport timetable in the Baseline Scenario and a post-SWMP2 public transport network in the outcome scenario to help identify changes to the bus network as a result of SWMP2. In interpreting this analysis, consideration would need to be given to the extent to which any changes identified were a result of SWMP2 or a result of wider trends.

Table 4.4: Overall results: Scenario 1a average percentage difference

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[19]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

Key Point: The overall results show that, based upon the most up-to-date population and public transport information as well as the June 2023 CVL timetable revision, the minimum threshold of a 5% increase in the proportion of the population aged 16 or over within a 15, 30 and 45-minute travel time of a 'key centre' has been met.

[19] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

5 Cross Cutting Themes

5.2 Overview

5.2.1 In accordance with ERDF requirements and Welsh Government policy, each Operation integrates a range of social, economic, environmental and well-being outcomes through attention to CCT actions. These focus on:

- Sustainable Development
- Equal Opportunities and Gender Mainstreaming, including the Welsh Language
- General CCT delivery

5.2.2 As part of the commitment to deliver the CCT objectives, each Operation had identified **Case Level CCT indicators**. These are specified in Table 5.1 but are not all applicable to every Operation.

Table 5.1: Case Level CCT Indicators (Source: Operation business plans)

CCT Indicator	Case Level Indicators
Equal Opportunities and Gender Mainstreaming, including the Welsh Language	▪ disability Access Group engagement ▪ activity supporting speakers of the Welsh language ▪ positive action measure – disabled people ▪ positive action measure – older people ▪ positive action measure – other
Sustainable Development	▪ Development of an organisational travel plan and sustainable transport initiative use of Sustainable Urban Drainage Systems where applicable ▪ site environmental management plans ▪ integration of Green infrastructure ▪ Resource efficiency measures
	▪
CCT general	▪ stakeholder engagement good practice activity ▪ integration of social clauses / community benefits ▪ developing / engaging CCT Champions

5.2.3 This chapter covers the CCT Evaluation at the SWMP2 level, setting out how closely the objectives and indicators in the Operation business plans reflect the guidance in the WEFO CCT-matrix documentation and noting the specific requirements and interests of WEFO to maximise CCT delivery opportunities. Specific consideration of CCTs at the **Operation-level** are included in the Operation *Pro Formas* in **Chapters 6-14**.

5.3 Approach to Cross Cutting Themes Assessment

5.3.1 An overarching Monitoring and Evaluation 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?).

5.3.2 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 therein, and to confirm how closely the objectives and indicators reflect the guidance recommended in the WEFO CCT Matrix documentation.

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

- what worked well / what did not work, any problems identified and how were these addressed
- how, and to what extent, the Operations provided opportunities to promote the Welsh language
- how the contributed to the goals of the Well-being of Future Generations Act

5.3.4 Within that framework, we particularly sought to understand:

- if CCT activity was delivered in the way it was anticipated and if not, why and how was this the case
- 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

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

5.4 Cross Cutting Themes Findings

General Observations

5.4.1 It is clear that, collectively, the nine Operations 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 etc). It is also evident that TfW understands the importance of activities to support CCT objectives and the goals of the Well-being of Future Generations Act.

5.4.2 CCT activity was not allocated a specific budget. Whilst it would have been appropriate to have identified resources to undertake CCT work, there has been no detrimental effect from not having a dedicated budget. CCT costs have been built into works contracts, and many activities were undertaken as voluntary work, or simply required adaptations to procedures (e.g., through inclusion of social clauses in contracts).

5.4.3 The approach to CCT delivery was well established from the outset, but did evolve as the Operations progressed (e.g., the way in which case studies were used to evidence delivery through using a PowerPoint template and creation of a portfolio). Throughout delivery, there was an ongoing dialogue between TfW and WEFO regarding CCTs, with additional CCTs identified and categorised throughout project development and delivery.

5.4.4 TfW established a CCT approach to stakeholder consultation that was applied across the contractors and their supply-chains. This addressed:

- **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 and 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 regards 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

5.4.5 To further promote the uptake of the CCT strategy, TfW appointed two CCT Champions. Although junior level staff, these Champions energetically delivered the advice, guidance and data collection required to facilitate effective realisation of CCTs. Supervision and coordination were appropriately ensured at managerial level.

5.4.6 The CCT Champions provided an ideal focal point to collect material for varied case studies to illustrate the range of CCT actions and their benefits. These exemplar studies have been compiled in a portfolio using a PowerPoint visualisation. Table 5.2 to Table 5.4 provide lists of CCT Case Studies supplied as evidence to WEFO grouped under the relevant programme CCT. Selected examples are also provided in Appendix C .

Table 5.2: Equal Opportunities and Gender Mainstreaming Case Studies

Cross Cutting Theme	Case Study	Description
Disability Access Group Engagement	Improved Accessible Boarding Accessibility Meeting	Balfour Beatty Workshop (Dec 2019) to discuss introduction of step free access from platform to train.
	Accessibility and Inclusion Panel	Quarterly panel meetings and workshop (March 2021) as input to feasibility stage of design for Bute and Cardiff stations.
	Access and Inclusion Panel Meeting	Consideration of Wayfinding Strategy as part of the East Wales Stations improvements (Oct 2022).
	Building Passenger Trust in Public Transport Post Covid	Consideration of the impact of COVID-19 on the various disability groups and solutions provided.
	Wayfinding, Hazard & Guidance, and PRM marking AI meeting	Example of need to consider wayfinding and hazard guidance to assist individuals with reduced mobility.
	Accessibility Station Workshop	Individuals with various disability levels gave feedback on the different issues they had encountered when using station facilities. The experience provided an excellent learning opportunity to influence current projects.
Activity Supporting Speakers of the Welsh Language	Learn Welsh/Dysgu Cymru	Siemens commitment to part-funding employee training courses in Welsh.
	Weekly Welsh Phrases	Siemens incorporate Welsh phrases into their working week and email examples out to the whole workforce.
Positive action measures – Disabled People	TfW brought together an accessibility and inclusion panel to provide feedback and concerns about Covid-19 restrictions (e.g., face masks and social distancing).	TfW accessibility and inclusion panel workshop

Cross Cutting Theme	Case Study	Description
Positive action measures – Older people	The TfW panel also considered improved accessible boarding and wayfinding issues.	TfW accessibility and inclusion panel workshop.
Positive action measures – Other	Ex offenders programme called Pathways	TfW and the Infrastructure Delivery Partners (IDPs) developed an ex-offenders pathway to employment which has resulted in a number of ex-offenders being employed.

Table 5.3: Sustainable Development Case Studies

Cross Cutting Theme	Case Study	Description
Development of Sustainable Transport Initiatives	TfW Office Travel Plan	Following a staff survey TfW introduced a Travel Plan to help decarbonise the transport networks by encouraging staff to make healthier, more sustainable and more active travel choices when commuting, or travelling for work to improve their health and well-being.
Environmental Management Plan	Aberdare Environmental Site Management Plan	Alun Griffiths created an environmental site management plan (ESMP) to help manage environmental social issues during works on the Aberdare Station.
	Canal Feeder and Pentrebach Environmental Site Management Plan	Alun Griffiths implementation of an ESMP that covers Pentrebach loop and Canal Feeder which form part of the Merthyr Operation.
	East Wales Stations Environmental Site Management Plan	Siemens implemented environmental and social management plans for their construction works across the Core Valley Lines.
	Quakers Yard Environmental Site Management Plan	Alun Griffiths implementation of an ESMP that covers platform extensions at the Quakers Yard and Aberdare station which form part of the West Wales and Valleys Operation.

Cross Cutting Theme	Case Study	Description
	Rhymney Station Site Management Plan	Alun Griffiths implementation of an ESMP that covers platform extensions at the Rhymney station, which form part of the Rhymney Operation.
	Treherbert Environmental Site Management Plan	An ESMP was created to manage environmental social issues during construction of a new platform.
Integration of Green Infrastructure	Green Routes Project	As part of the Green Routes Project, TfW have introduced green features at 25 stations and in 5 community areas across the Core Valley Lines.
Resource Efficiency Measures	Working Wardrobe	TfW joined a clothing donations scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
	Modular Building	In the on-going fight against climate change a new energy efficient modular building has been proposed based on a mix of anti-vandal units and modular units. It also includes energy efficient battery storage units.
	Re-using Materials	Alun Griffiths demonstrated the potential of re-using excavated materials from ground remediation works.
	Solar Powered CCTV	TfW and Alun Griffiths demonstrated use of solar powered CCTV at the Taff's Well site to lower CO_2 output.
	Recycled Concrete	To lower impacts on the environment Alun Griffiths demonstrated reuse of materials for ground remediation.
	Solar Powered Lighting Saving CO_2 and Fuel Costs	Balfour Beatty organised a trial of solar powered lighting at Taff's Well that demonstrated significant benefits in CO_2 and costs.

Cross Cutting Theme	Case Study	Description
Use of Sustainable Urban Drainage Systems (SUDs) where applicable	Detailed drainage design and SAB application for a proposed platform extension in Butetown Station	Amey Consulting (Rail) appointed Burroughs to undertake the detailed drainage design and SAB application for a proposed platform extension in Butetown Station as part of Transport for Wales Valley Lines Transformation programme. A SUDs Management Plan has also been created.

Table 5.4: CCT General Case Studies

Cross Cutting Theme	Case Study	Description
Developing Engaging Cross Cutting Theme Champions	Cross Cutting Theme Champions	Two Project Management Assistants at TfW were appointed as CCT Champions to support the 9 ERDF Operations. They integrate economic, social and environmental outcomes into CCT case studies for each ERDF Operation. The Champions liaised closely with contractors to gather evidence and transfer it into an agreed format of PowerPoint slides together with the evidence to show the CCT has been delivered in accordance with WEFO guidance. Each slide was offered to the WEFO CCT team for approval before being claimed as a completed activity.
Integration of Social Clauses Community Benefits	Apprentice Recognition	Alun Griffiths had five Apprentices and Graduates shortlisted for awards from the Civil Engineering Contractors Association Wales, with one female apprentice winning.
	Cancer Research Donation	Amey Rail asked staff and contractors for cash or toy donations for Action for Children.

Cross Cutting Theme	Case Study	Description
	Taff's Well Community Outreach	Alun Griffiths and TfW staff from the Taff's Well site worked together to renovate allotment space and improve accessibility.
	Hafan's Home for Young Men	In collaboration with Keep Wales Tidy, the Traction Power Team on the Core Valleys Project worked on the garden at Hafan's home for young men, to provide a safe, peaceful space to enjoy.
	Volunteering After Storm Dennis	TfW sent a team of volunteers to help clean up Ynysangharad Park following the devastation caused by the storm in 2020.
	Charity Auction	Support to fundraising for Cerebral Palsy Cymru, The Trussell Trust Newport and Cancer Research UK.
	Ex-Offender Pathway to Work	Balfour Beaty and TfW created an innovative pathway to work for ex-offenders: 'Building Futures – On the right track' that includes training, sustainable employment and support within the construction sector.
	Feel Good Factory	Contractors on the Operation helped to repair the collapsed stone wall, step covers, memorial tiles and cleaning up the outside area at the Feel-good factory, ready for the local community to enjoy again.
	Football Club	Balfour Beatty donated a 10ft container freshly painted to a local football team Abertillery Excelsiors, to store their kit.
	Ground Works at Caradog Primary School	Alun Griffiths assisted Caradog Primary School with the refurbishment of the allotment space at the Grove Allotments in

Cross Cutting Theme	Case Study	Description
		Aberdare. The new open space allows more children to develop skills in a friendly and safe environment.
	Men's Shed at Cwm Clydach Healthy living project	Griffiths undertook works to construct a "men's shed" at the healthy living project.
	Mental Health Awareness	Balfour Beaty organised a "Fireside Chat" with the Samaritans to raise awareness of mental health across the company.
	Site Visit for 14-Year-Old Boy	Alun Griffiths facilitated a site visit for an autistic boy fascinated by diggers.
	Station Adopters	Through TfW's 'Adopt a Station' programme, more than 250 volunteers are working to enhance and maintain 151 stations in their local communities across Wales.
	Well-being / Work-Life Balance	TfW and the delivery partners have committed to simple strategies that maintain a better work-life balance.
Stakeholder Engagement	Business Drop In	Stakeholder engagement event to ensure local businesses were aware of works at the new Butetown railway station.
	Cancer Research Donation	Amey Rail donated the fees from filming a BBC TV show at Taff's Well to Cancer Research UK.
	Cardiff Bay Drop-in Session	TfW organised engagement events for the Bay Line Transformation project.

Cross Cutting Theme	Case Study	Description
	Memorial Garden – Treorchy Comprehensive School	Balfour Beatty with the support of Mikerry Rail Limited developed and improved an area within Treorchy Comprehensive School, which is going to be used as a memorial garden.
	Metro Open Day with Merthyr CBC	TfW presented information on various packages of work associated with the Core Valley Lines.
	Young Rail Professional Wales' Events for Rail Week 2022	TfW presented an update on the new Butetown station and upgrades to Cardiff Bay station.
	Open Your Eyes Week	Balfour Beatty and Transport for Wales spoke with Cardiff school pupils in English and in Welsh about the Metro project and the incredible career opportunities in Rail.

Key Challenges

5.4.7 TfW identified two key challenges in delivering the CCTs, both of which were successfully overcome:

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

5.4.8 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 plans (2018) show a universally high / medium assessment of compliance. Our assessment, based on desk-based research and discussions with the delivery team, reconfirms how well each CCT has been addressed within the respective business plans and that CCT activity has shown positive outcomes.

5.4.9 At the start of the programme, 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 CCTs. 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 was established with the responsible Project Managers for each Operation and the CCT Coordinator. The process has worked well, enabling relevant information to be collected in a timely manner.

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

Challenges of COVID-19 restrictions

5.4.11 In general, the challenges presented by COVID-19 restrictions were not overly significant for TfW staff. Much of the CCT work was office-based and staff successfully managed this remotely. However, COVID-19 restrictions introduced challenges for community engagement activities, such as the 'Station Adopters' scheme, which involves around 250 volunteers working with TfW to enhance and sustain some 150 stations. Nevertheless, such actions have come back to life and continue to have high value.

Welsh Language

5.4.12 Provisions for Welsh Language CCT actions were appropriately addressed within the Operations' business plans in conjunction with Equal Opportunities and

Gender Mainstreaming. The Welsh Language Implementation Plan demonstrates the commitments to the incorporation of the Welsh language and ensures that all Operations contribute to positive outcomes for the use of the Welsh language.

5.4.13 Evidence of the proactive promotion and inclusion of the Welsh language within the Operations and across the delivery organisations can be seen from the CCT case studies. Examples 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)
- bilingual job descriptions and employment application process

Equal Opportunities and Gender Mainstreaming

5.4.14 Overall, the Operations have taken appropriate actions to address Equal Opportunities and Gender Mainstreaming requirements. An appropriate Equalities Impact Assessment (EIA) was conducted in 2017 covering the whole SWM initiative.

5.4.15 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 liaised with their Accessibility and Inclusions Panel on a quarterly basis to provide input on issues such as footbridge access provisions, lifts or ramps, and provision of improved accessible boarding.

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

- **the way schools were encouraged to interact with the Operation** - a good case is the 'Alumni Project for Schools' where the Valleys Task Force has partnered with Careers Wales 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.
- **TfW's 'Access for All' scheme led by the Disability Access Group** - which aims to influence accessibility policies and gives 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

- the way apprentice engineers at delivery partner Alun Griffiths were shortlisted for the Institution of Civil Engineers Cymru - Apprentice of the Year Award - this is reported in a case study in Appendix C .

Sustainable Development

5.4.17 There is a sense of strong social values and sustainability throughout all of the Operations. This is supported by TfW's Sustainability Development Plan and the Low Carbon Impact Strategy.[20]

5.4.18 Several case studies have been developed. 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 eight-week period).

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

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

5.4.21 The implementation of sustainable waste management procedures has led to significant benefits. These are recorded in a case study on recycled concrete in Appendix C Appendix C that demonstrates how concrete waste materials were crushed and recycled on site as part of the construction process (e.g., using 555m^3 of material as filler to build hard standing, saving 2,856 tonnes of landfill).

5.4.22 In a community related action, the Taff's Well Operation put 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.

General CCT

5.4.23 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.

[20] See Sustainable Development Plan 2022-27 | Transport for Wales (tfw.wales) and Low carbon impact strategy | Transport for Wales (tfw.wales)

5.4.24 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

5.4.25 The Community Ambassadors have been a key resource in helping engage with stakeholder and community groups to identify barriers to active travel.

5.4.26 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 C
- providing equipment and helping the local community clear damage from Storm Dennis that occurred along the CVL

5.4.27 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'.

5.4.28 Through a working group, TfW has also engaged with Mental Health Awareness Week (May 2021) focusing on events that support the workforce. Other examples of activity in this area can be found in the case studies listed in Appendix C.

5.4.29 A further example of the delivery of community benefits that leave a lasting legacy was seen in the good links developed with Caerphilly County Borough Council 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.

Well-being being of Future Generations Act

5.4.30 The evaluation has considered the contribution that the Operations have made towards the seven goals of the Well-being being of Future Generations Act:

- **A Prosperous Wales** – the Operations, by offering a means of transport that produces fewer carbon emissions per traveller than cars, make a meaningful contribution towards a low carbon society and provide a more accessible and faster public transport service for those along the CVL seeking and accessing employment. This in turn will support the development of a skilled and well-being educated population.

- **A Resilient Wales** – whilst developing the new service, the Operations have sought to maintain the biodiverse natural environment and minimise disruption to ecosystems. Several initiatives undertaken during the course of the Operations' delivery have contributed to improving the biodiversity, including the introduction of green features at 25 stations and in five communities across the CVL area.

- **A Healthier Wales** – by supporting active travel to and from stations, several of the Operations contribute to improving the physical and mental well-being of passengers. Several initiatives undertaken by the delivery partners, particularly during and after the COVID-19 pandemic, have made a valuable contribution to the well-being of their staff and, in some cases, the wider community.

- **A More Equal Wales** – it is anticipated that several of the Operations will enable people without access to a car and those with reduced mobility to access employment and services, thus enabling them to fulfil their potential. Accessibility and Inclusions Panel meetings were held at various times where feedback from passengers with mobility issues proved to be an excellent learning opportunity to influence current projects.

- **Wales of Cohesive Communities** – at the heart of the ERDF funded Operations has been the aim of improving connectivity between communities across the Valleys, thereby making them more attractive, safe, viable and well-being connected.

- **A Wales of vibrant culture and thriving Welsh language** – the Operations have improved access for all to cultural and sporting events that take place in the region, which will encourage people to participate in these activities. This in turn will help to protect the culture and heritage of Wales and the Welsh language.

- **A globally responsible Wales** – the Operations will support a reduction in carbon emissions per journey compared to car travel and, by encouraging increased use of public transport, reduce the use of finite resources in private transport. This in turn will contribute to mitigating the effects of climate change, which will ultimately make a positive contribution to global well-being.

5.5 Conclusions

5.5.1 Our assessment of how CCT delivery has been carried out reconfirms the high rating WEFO expressed in its initial assessment in 2018. We find CCT requirements to have been fully met.

5.5.2 Whilst there are no CCT programme indicators for the priority in which the Operations are funded, a selection of CCT case level indicators were identified. Our assessment is that these case level CCT were appropriate and of a high quality.

5.5.3 Our assessment of CCT planning across the nine ERDF funded Operations is that the requirement was well understood. The TfW team was well motivated and have delivered appropriate and diverse activities. The CCT Champions, supported by an experienced Project Manager, have been effective in monitoring the work and successfully encouraged take-up within the organisations involved.

5.5.4 The enthusiasm for delivering the CCTs was passed down to the many contractors involved in the individual Operations and the clear chain of communication for delivery and reporting of CCT has been exemplary. The process, agreed with WEFO, for gathering and reporting key CCT activities utilised a template to create a portfolio of case studies that can be used as an exemplar for future Welsh Government initiatives.

5.5.5 Provisions for **Welsh Language** CCT actions have been appropriately addressed within the Operations. The Welsh Language Implementation Plan demonstrates a commitment to ensure positive outcomes for the Welsh language.

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

5.5.7 There is a sense of strong **social values and sustainability** throughout all of the Operations.

5.5.8

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

6 Cardiff Bay Stage 1 Operation

6.2 Overview

6.2.1 Despite the economic importance of the Cardiff Bay area, the branch line is entirely single track from where it departs the mainline at Queen Street South Junction and is operated as a self-contained shuttle service. This introduces an interchange for passengers making an onward connection on the CVL.

6.2.2 The Cardiff Bay Operation forms a key component of South Wales Metro Phase 2 – in tandem with the Cardiff Queen Street Operation, it will deliver the infrastructure required to allow high frequency through services from Treherbert, Aberdare and Merthyr Tydfil to Cardiff Bay (and enhanced interchange at Cardiff Queen Street for those arriving from Rhymney or the south.

6.2.3 The Operation comprises infrastructure enhancements to the railway line between Cardiff Queen Street and Cardiff Bay including:

- track doubling
- pre-electrification works to the doubled track
- significant improvements to the existing single platform Bay station terminus
- new platform and infrastructure to facilitate the new Butetown Station
- site clearance and vegetation works

6.3 Initial scope of works and changes made

A high-level overview of the original scope of works for the Cardiff Bay Stage 1 Operation as set out in the original business plan[21] is summarised in the table below.

Table 6.1: Cardiff Bay Stage 1 Operation – original scope of works

Operation	Scope of works
Cardiff Bay Stage 1	This Operation (Cardiff Bay Stage 1) comprises infrastructure enhancements to the rail 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 and enhanced interchange at Queen Street for other connections to Cardiff Bay. Works include the reconstruction/ upgrade of 1.3km of railway line.

[21] Cardiff Bay Stage 1 (Metro Phase 2) Business Case, 18th April 2019

6.3.1 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023).

6.3.2 Since the original sign-off of the original business plan, the following changes were made to the scope of works:

- the inclusion of two inter-modal facilities created or improved

6.3.3 This change was a result of additional ERDF funding being made available and the scope of the Operation expanding to include work on Cardiff Bay Station and enabling works for the new Butetown Station.

6.4 Operation logic map

6.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

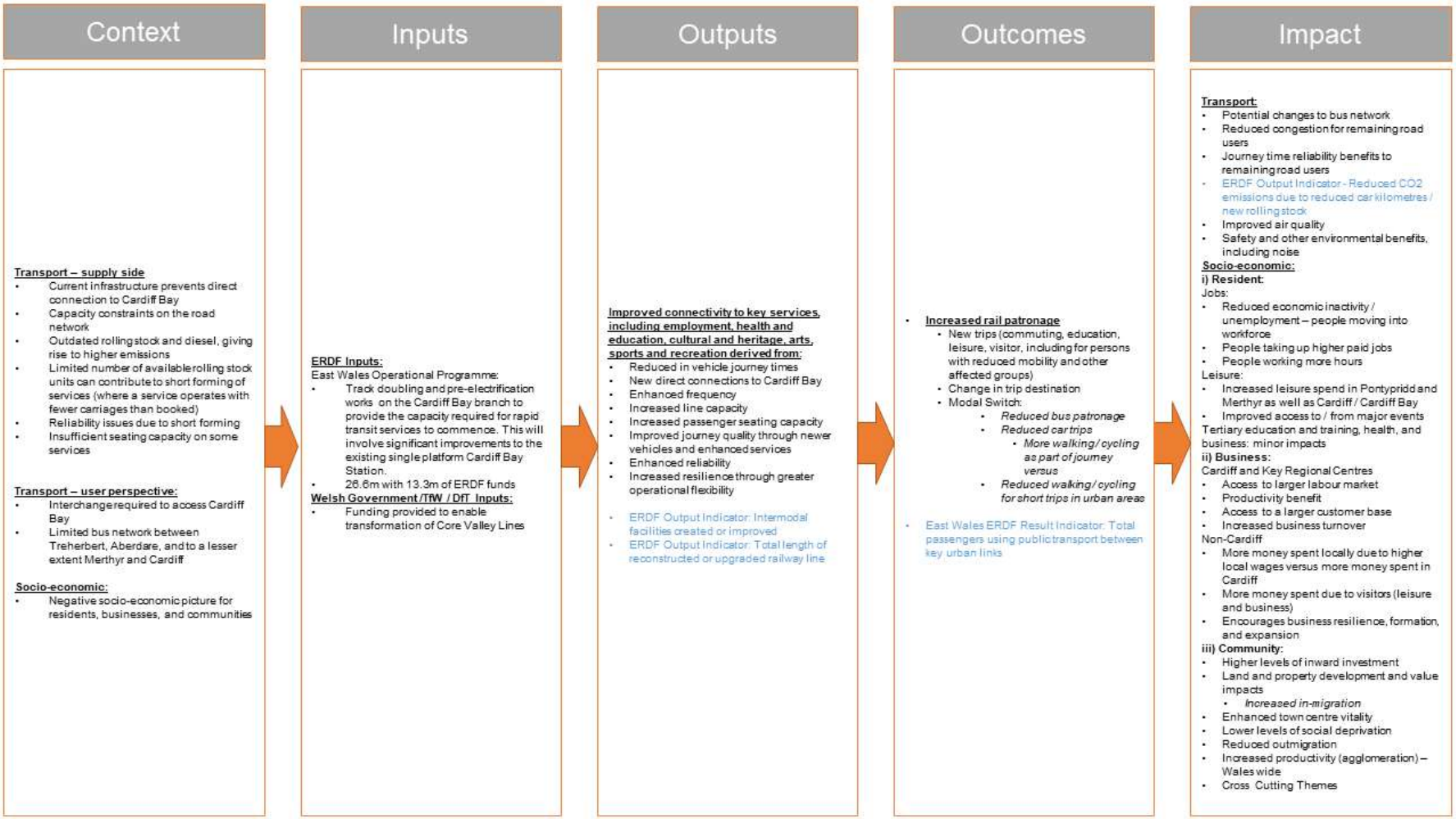


Figure 6-1: Logic map for Cardiff Bay Stage 1 Operation

6.5 Operation delivery

6.5.1 The Operation was completed in December 2023. It was necessary to reprofile the Operation timescale during delivery. In addition, the incorporation of two inter-modal facilities led to a change in scope. The re-profiling and scope change took place at the following times:

- September 2021: end date extended by two months from May to July 2023 and two Inter-modal facilities Indicators were added to the Operation
- February/March 2024: end date was extended by five months to December 2023. An additional £600k of costs were added with an ERDF contribution of £300k.

6.6 Process Evaluation

6.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.
- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality.
- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of Quantitative Cost Risk Assessment (QCRA), was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit. TfW worked particularly closely with the Butetown community to engage them in the new station.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regard to CCTs – the number of CCTs achieved during the delivery of the Cardiff Bay Stage 1 Operation significantly surpassed targets and resulted in a range of wider benefits (see section 6.10). It was noted that having CCT Champions integrated into the Operation from the outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised. On this particular Operation, as noted above, additional ERDF funding was made available to include improvements to Cardiff Bay Station and delivery of components of the new Butetown Station.

Lessons learned

- The requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work, and thus cost escalation - the scope of work had to be regularly refined to reflect the outcomes of asset surveys and detailed design work. For example, on this Operation, the stability of the

retaining wall in the area of the new Butetown Station was not known until the later stages of design, which meant that funding had to be adjusted to deliver a slightly different scope. It was specifically recommended that, on future rail projects of this nature, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation evolving, it was noted that it was difficult to allocate funding and agree objectives and targets. There was also an administratively burdensome process of routinely updating the business plans. The allocation of funding prior to a detailed scope is a reflection of the constraint in terms of the fixed project end date which was faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. This is a cost reimbursable contract where works are paid on an open book basis, where the client takes the cost risk. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should have been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to

each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

6.7 Budget and out-turn costs

6.7.1 The table below shows the approved eligible expenditure of the Cardiff Bay Stage 1 Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[22] and the final business plan[23].

Table 6.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£9,388,030	£4,000,000	42.61%
Final business plan	£26,667,482	£ 13,333,741	50.00%
Difference	*+£17,279,452*	*+£9,333,741*	*+7.39%*

6.7.2 As shown in the table above, the approved eligible expenditure for the Cardiff Bay Stage 1 Operation increased by circa £17.2m to approximately £26.1m.

6.7.3 The majority of this increase reflected the inclusion of the additional station works (two inter-modal facilities).

6.7.4 There were also additional works identified during design development after conducting more detailed surveys (including the retaining wall at Butetown) and an increase in construction costs following the COVID-19 pandemic. These aspects resulted in an increase in the approved eligible expenditure of £0.6m (with an additional £0.3m of ERDF funding).

6.8 Output Indicators

6.8.1 The table below sets out the target and outturn Output Indicators for the Cardiff Bay Stage 1 Operation.

[22] Cardiff Bay Stage 1 (Metro Phase 2) Business Case, 18th April 2019

[23] Cardiff Bay Stage 1 (Metro Phase 2) Business Case, 13th December 2023

Table 6.3: Cardiff Bay Stage 1 Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Inter-modal facilities created or improved	2	2	✓
Length of reconstructed / upgraded railway (including TEN-T)	1.30km	1.10km	×
Reduction in carbon dioxide equivalent emissions	n/a – target set at programme level only.		

6.8.2 The two inter-modal facilities consist of one improvement (Cardiff Bay) and one new facility (Butetown) as previously described.

6.8.3 The marginal shortfall on track kilometres was due to the use of temporary track to enable the line to remain operational while double tracking works were undertaken. The temporary track will be replaced outside of the ERDF delivery period and the cost associated with the temporary track have not been claimed.

Length of reconstructed / upgraded railway

6.8.4 The 1.1km of track improvements include re-doubling of the Bay branch and the installation of crossovers to facilitate the required train movements through Cardiff Queen Street Station. The track improvements also incorporate line speed improvements, the installation of stop blocks and the raising of the track for circa 200m at the Cardiff Bay end to the line to accommodate future extensions. Strengthening of bridge structures to support the new double track and frequency of train service into Cardiff Bay have been delivered.

6.8.5 Images of the track works adjacent to Lloyd George Avenue are shown in the figures below.

Figure 6-2: Cardiff Bay Stage 1 – track works adjacent to Lloyd George Avenue

6.8.6 In addition to the new track laying, advanced preparatory works were undertaken to facilitate the electrification of the Bay branch. These works, from the north of Butetown to the enhanced station at Cardiff Bay, included the digging of foundations and the installation of masts and support structures to enable electrification, as shown in the image below.

Figure 6-3: Cardiff Bay Stage 1 – preparatory works for electrification

6.8.7 Clearance works of existing vegetation and obstruction on the Cardiff Bay route section were also included in this Operation.

Figure 6-4: Cardiff Bay Stage 1 – vegetation clearance

Inter-modal facilities created or improved

6.8.8 The works associated with the improvement of the Cardiff Bay inter-modal facility are shown in the figure below.

Figure 6-5: Cardiff Bay Stage 1 – Cardiff Bay Station inter-modal facility improvement

6.8.9 The works associated with the development of the Butetown Station inter-modal facility are shown in the figure below.

Figure 6-6: Cardiff Bay Stage 1 – Butetown Station, inter-modal facility created

Reduction in carbon dioxide equivalent emissions

6.8.10 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

6.8.11 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

6.9 Result Indicator

6.9.1 The Result Indicator relevant to this Operation was set at the East Wales Operational Programme but is reported here for completeness.

Table 6.4: Cardiff Bay Stage 1 – East Wales Result Indicator

Indicator	Total passengers using public transport between Cardiff Queen Street and Cardiff Bay.
Target value	An increase of 10% between the baseline year of 2012/13 and 2023 when Cardiff Bay Stage 1 is anticipated to be complete and operational.

6.9.2 Given that SWMP2 is not yet operational, this Indicator was reported upon in the South Wales Metro Phase 2 Interim Evaluation Report[24] using **modelled data** (passenger forecasts) taken from the South-East Wales Transport Model (SEWTM) which used the March 2021 timetable revision.

6.9.3 The forecasts are based on comparing two modelled scenarios:

[24] https://tfw.wales/projects/monitoring-and-evaluation/south-wales-metro-phase-2-interim-evaluation

- **without SWMP2**, assuming 2026 CVL service frequencies and journey times are retained with no further substantial improvements
- **with SWMP2**, where CVL services are recast with increased service frequencies, reduced journey times and rearranged routes

6.9.4 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 become more attractive and therefore additional rail journeys are forecast to be undertaken.

6.9.5 Comparing the 'with SWMP2' 2026 scenario to the 'without SWMP2' 2026 scenario, it was found that the number of passengers travelling on rail services between Cardiff Queen Street and Cardiff Bay is expected to increase by 27%.

6.9.6 The target value of 10% is therefore forecast to be surpassed.

6.10 Cross Cutting Themes

6.10.1 The table below summarises the number of CCTs achieved by the Cardiff Bay Stage 1 Operation set against the original and final targets:

Table 6.5: Cardiff Bay Stage 1 – outturn CCT targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	3	6
Sustainable Development	3	5	5
CCT General	2	3	5
Total	**6**	**11**	**16**

6.10.2 As shown, the **number of CCTs delivered as part of this Operation has exceeded the initial and final targets**. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 6.6: Cardiff Bay Stage 1 Operation – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	TfW held an Access and Inclusion Panel meeting. The meeting covered discussions on the new Butetown / improved Cardiff Bay Station and also the Wayfinding Strategy at Cardiff Central, which is part of the East Wales Stations Improvements Operation.
	Positive action measure – Other	✓	Balfour Beatty worked with Transport for Wales, to create an innovative pathway to work for ex-offenders: 'Building Futures – On the right track'
	Activity supporting speakers of the Welsh Language	✓	As part of Siemens' commitment to promoting the Welsh language on CVL, they offered a discount on course fees to employees who would like to learn Welsh.
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	All contractors created ESMP for all of their stations.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
	Resource Efficiency measures	✓	Cardiff Bay Site Manager and Nixon proposed a new energy efficient modular building. The modular building is a mix of Anti-Vandal Units and Modular Units used to create a comfortable, energy-efficient working environment. AiW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
	Integration of green infrastructure.	✓	As part of TfW's Green Routes Project, many people have seen enhancements to the station environment and a boost to biodiversity in the local area. This has been done using various methods, e.g., replacing existing shrubs with planters for improved biodiversity and pollinators, as well as sensory plants to increase passengers' well-being.
	Use of Sustainable Urban Drainage Systems (SUDs) where applicable	✓	Amey Consulting (Rail) appointed Burroughs to undertake the detailed drainage design and SuDS Approval Body (SAB) application for the proposed platform at Butetown. A Suds Management Plan has also been created.
General	Stakeholder engagement good practice activity	✓	TfW held a drop-in session in Cardiff Bay. This was for local businesses to find out more about the new Butetown Railway Station. This was a key stakeholder engagement event ensuring that local stakeholders were kept up-to-date with the project and works going on in their local area. TfW's Stakeholder and Community Engagement Team held a drop-in session at Butetown Pavilion for members of the public to drop-in and ask questions about the project. This was the second session held for the Cardiff Bay Operation. Previously a

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
			session was held at the Makers Guild which was mainly focused on meeting with local businesses. TfW's Community Engagement Officer presented an update on the new Butetown Station and upgrades to Cardiff Bay station. This was a virtual event for TfW as part of the Young Rail Professionals Wales' events for Rail Week 2022.
	Integration of social clauses into an activity	✓	Amey was nominated for a Well-being Hero's Award reflecting the success that the team has had in embedding the core value of health and well-being into their relationships. Across the project, the team implemented several well-being initiatives to ensure health and well-being was at the forefront of everyday activities.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

6.11 Conclusion

6.11.1 The Cardiff Bay Stage 1 Operation will, alongside other improvements, support high frequency through services from Treherbert, Aberdare and Methyr Tydfil to Cardiff Bay, together with enhanced interchange at Cardiff Queen Street for those arriving on the Rhymney line or from the south. The Operation also incorporated enabling works that will facilitate the future electrification of the line, allowing the introduction of the new high-quality and low carbon TramTrain fleet on services to Cardiff Bay.

6.11.2 Through this Operation, the inter-modal facility at Cardiff Bay was improved and a new inter-modal facility created as part of the overall Butetown Station project.

6.11.3 The CCTs achieved significantly exceeded the original and final business plan targets.

7 Cardiff Queen Street Operation

7.2 Overview

7.2.1 Cardiff Queen Street is in many respects the hub of the CVL network as all services pass through and, in the case of the 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 in these platforms. The TAM lines can 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 platform 1 (the bay platform 2 and 3).

7.2.2 The Cardiff Queen Street Operation therefore forms a key element of the South Wales Metro (Phase 2) programme, comprising a package of works that will facilitate increased train frequency (20+ tph in each direction) and direct services between the Treherbert, Aberdare and Merthyr Tydfil lines and Cardiff Bay.

7.3 Initial scope of works and changes made

7.3.1 A high-level overview of the original scope of works for the Cardiff Queen Street Operation as set out in the original business plan[25] is summarised in the table below.

Table 7.1: Cardiff Queen Street Operation – original scope of works

Operation	Scope of works
Cardiff Queen Street	This operation comprises track and signalling improvements at Cardiff Queen Street station (Queen Street North and Queen Street South junctions) to facilitate increased trains per hour (20+ in each direction) and direct access to Cardiff Bay through platforms 4 and 5. Works include the creation or

[25] Cardiff Queen Street (Metro Phase 2) Business Case, 22nd November 2018

Operation	Scope of works
	improvement of one inter-modal facility and 0.5km total length of reconstructed or upgraded railway line.

7.3.2 Since the original sign-off of the original business plan, the following changes were made to the scope of works:

- due to a delay in achieving the necessary track blockade to commence the works, it was recognised that the Operation as originally scoped could not be delivered within the ERDF timescales and therefore the Operation was re-scoped to focus on preparatory works
- the inter-modal facility for Queen Street was moved to the East Wales Station Operation

7.4 Operation logic map

7.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**. It should be noted that while the Operation as originally conceived could not be completed in the ERDF timescales, the Operation will be completed in its entirety outside of the ERDF timescales and the logic map reflects the final completed position.

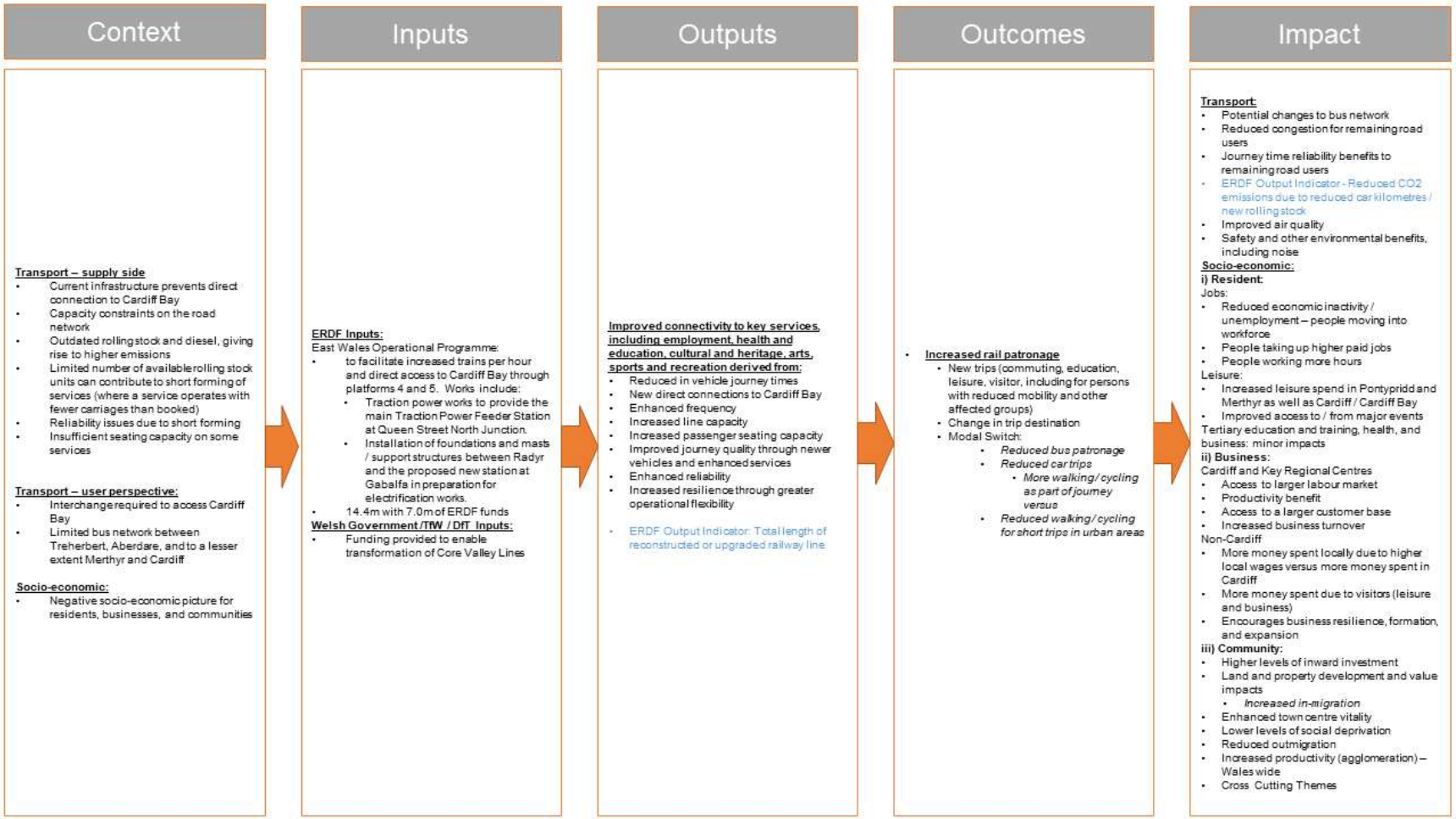


Figure 7-1: Logic map for Cardiff Queen Street Operation

7.5 Operation delivery

7.5.1 As noted above, the Operation as originally scoped could not be completed within the ERDF timescales due to a delay in achieving the necessary blockade. As such, the original scope of works was rescoped to focus on preparatory works. The re-scoped Operation was completed in September 2023.

7.6 Process Evaluation

7.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.

- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. An example of this was the requirement to reprofile the Operation due to being unable to secure the necessary blockade at Cardiff Queen Street to undertake the works, leading to some items being removed from the ERDF scope.

- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. Working with one main

contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Cardiff Queen Street Operation significantly surpassed targets (see Section 7.9) and resulted in a range of wider benefits, despite the scope of the Operation being reduced. It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. As previously described, a particular challenge on this Operation was securing a blockade to undertake the engineering works as the blockade would have led to a suspension of all services through Cardiff Queen Street for its duration. A pragmatic, flexible and realistic approach was maintained throughout, with elements of the scope being deferred until after the ERDF window and the funding being reallocated elsewhere.

Lessons learned

- the requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work, and thus cost escalation - the scope of work had to be regularly refined to reflect the outcomes of asset surveys and detailed design work.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation regularly evolving (and reducing), it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the business plans. This again however reflects the specific programme constraint faced by all nine Operations, although the significant reduction in the scope (in the short-term at least) was a particular feature of this Operation.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. This is a cost reimbursable contract where works are paid on an open book basis, where the client takes the cost risk. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective. This was a bigger issue on the track-based Operations than this more locally focused Operation.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge on this Operation was managing the **potential stakeholder issues** around a total blockade of Cardiff Queen Street to undertake the required engineering works. Cardiff Queen Street is the confluence point of the CVL and any disruptions to services associated with the delivery of the remainder of this Operation post-ERDF will have to be carefully communicated to stakeholders and the public.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

7.7 Budget and out-turn costs

7.7.1 The table below shows the total approved eligible expenditure of the Cardiff Queen Street Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[26] and the final business plan[27].

Table 7.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£26,711,906	£13,355,953	50.00%
Final business plan	£14,032,454	£7,016,227	50.00%
Difference	*-£12,679,452*	*-£6,339,726*	*0*

7.7.2 As shown in the table above, the total approved eligible expenditure of this operation reduced by almost half (47%), with the ERDF grant reducing by a corresponding percentage thus maintaining the 50% intervention rate. As explained above, the delay in achieving the necessary blockade meant that the original scope of works included as part of this Operation could not be delivered within ERDF timescales, and it was thus rescoped to focus on preparatory works.

7.8 Output Indicators

7.8.1 The table below sets out the target and outturn Output Indicators for the Cardiff Queen Street Operation.

Table 7.3: Cardiff Queen Street Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Length of reconstructed / upgraded railway (including TEN-T)	0.50km	0.27km	×
Reduction in carbon dioxide equivalent emissions	n/a – target set at programme level only.		

7.8.2 As shown 0.27km track have been delivered rather than 0.5km. This is because of the delay in obtaining the necessary blockade to complete the works and only one component of track works being undertaken as part of the preparation works, equating to 0.27km (a shortfall of 0.23km). This was clarified during the detailed survey stage of the operation.

7.8.3 Further information on the Output Indicators delivered is provided below.

[26] Cardiff Queen Street (Metro Phase 2) Business Case, 22nd November 2018

[27] Cardiff Queen Street (Metro Phase 2) Business Case, 24th October 2023

Length of reconstructed / upgraded railway

7.8.4 The 0.27km of track improvements consisted of a track lower at Old College Road in the wider Queen Street area. Other works included clearance of obstructions, cutting back of vegetation, line speed improvements and track realignment, including localised lowering under a bridge. This track improvement is important to delivering the timetable and journey time improvements.

7.8.5 Advanced works in preparation for the electrification works between Radyr and Cardiff Queen Street were also undertaken and included the installation of foundations and masts / support structures, as shown in the images below.

Figure 7-2: Installation of foundations and masts/support structures in preparation for the electrification works

7.8.6 Clearance works of existing vegetation and obstruction on the route were also included in this Operation, as shown by the before (left) and after (right) photographs below.

Figure 7-3: Vegetation clearance to support the Cardiff Queen Street Operation.

Reduction in carbon dioxide equivalent emissions

7.8.7 The reduction in carbon dioxide equivalent emissions Output Indicator is set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

7.8.8 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

7.9 Cross Cutting Themes

7.9.1 The table below summarises the number of CCTs achieved by the Cardiff Queen Street Operation set against the original and final targets:

Table 7.4: Cardiff Queen Street – outturn CCT targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	3	5
Sustainable Development	1	3	3
CCT General	2	3	3
Total	**4**	**9**	**11**

7.9.2 As shown, the **number of CCTs delivered as part of this Operation has exceeded the initial and final targets**, despite the overall reduced scope of the

Operation. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 7.5: Cardiff Queen Street Operation – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	TfW held an Access and Inclusion Panel meeting. The meeting covered discussions on the new Butetown / improved Cardiff Bay Station and also the Wayfinding Strategy at Cardiff Central, which is part of the East Wales Stations Improvements Operation. General topics covering all stations included toilet accessibility, use of furniture, use of correct wayfinding and signage and the use of technology such as the REACT guidance system. TfW brought together an accessibility and inclusion panel to provide feedback and concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered level boarding and wayfinding issues.
	Positive action measure – Other	✓	TfW and the IDPs have developed an ex-offenders' pathway to employment, which has resulted in a number of ex-offenders being employed.
	Activity supporting speakers of the Welsh Language	✓	Every week, Siemens incorporate a new Welsh phrase into their working week. This e-mail is to all CVL team members and gets plenty of use throughout the whole workforce. Some of the phrases which have previously been used are "Mae'n Boeth" and "Mae'n Oer" meaning "It's hot" and "It's cold" and "Diolch" and "Diolch yn fawr" meaning "Thank you" and "Thank you very much.
Sustainable Development	Development of an organisation Travel Plan and sustainable	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
	transport initiative		
	Environmental Site Management Plan	✓	All contractors created ESMPs for all of their stations.
	Resource Efficiency measures	✓	AiW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
General	Stakeholder engagement good practice activity	✓	The 'Adopt a Station' programme had more than 250 volunteers working to enhance and maintain 151 stations in their local communities across Wales.
	Integration of social clauses into an activity	✓	Amey was nominated for a Well-being Hero's Award reflecting the success that the team has had in embedding the core value of health and well-being into their relationships. Across the project, the team implemented several well-being initiatives to ensure health and well-being was at the forefront of everyday activities.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF operation.

7.10 Conclusion

7.10.1 The Cardiff Queen Street Operation incorporated a range of essential preparatory works that will facilitate a major increase in frequency through the station and direct connections from Treherbert, Aberdare and Merthyr Tydfil to Cardiff Bay.

7.10.2 A delay in achieving the necessary blockade required to deliver the full scope of works meant that the scope of the ERDF funded Operation was reduced, with a commensurate 47% reduction in funding. The full scheme will however be delivered following the conclusion of the ERDF funding period.

7.10.3 Despite the reduced scope, this Operation delivered almost three times the CCT target set in the original business plan and two more than in the final business plan.

8 East Wales Stations Improvements Operation

8.2 Overview

8.2.1 A contributory factor to the relatively long journey times and, on occasions, poor performance, on the CVLs is **extended station dwell times**. The Timetable Planning Rules for the CVL stations work on the basis of a 30-second dwell time for DMU stock.[28] This is the elapsed time from the train stopping to its restarting after the completion of station duties. Most CVL stations however do not have **accessible boarding**, which can delay the departure of services – this can affect all passengers (e.g., those with luggage, pushchairs etc) but it specifically impacts on **PRM**, who currently require deployment of a ramp to get onto the train.

8.2.2 Where ramp-based access is required, the guard must find the ramp; deploy it; assist the passenger to board; stow the ramp; and then commence the door closure sequence, a process which can take 2-4 minutes and which is influenced by a number of factors (e.g., how busy the train is, where the passenger is located on the platform etc). The irregularity of ramp use means that it cannot be included in the core train plan and thus it will consume any performance time allowance in the timetable. In a network where there are long sections of single track and where all four of the CVLs converge on Cardiff, even small delays can have significant knock-on impacts on reliability.

8.2.3 Moreover, like the infrastructure more generally, many of the **CVL stations have suffered from an extended period of underinvestment**. Several stations on the network are unattractive to passengers either due to poor facilities and / or security concerns, whilst some stations are either **partially or entirely inaccessible to PRM**.

8.2.4 The **East Wales Stations Improvement Operation** has therefore delivered a major package of investment across 14 stations on the CVL. The stations within the East Wales Operation include Cardiff Queen Street and several stations on the Rhymney, City and Coryton lines. The Operation consists of upgrades to station platform infrastructure to allow for accessible boarding and improvements to inter-modal facilities, improving access for PRM, reducing dwell times at stations and therefore reducing journey times and improving reliability for all users.

8.1 Initial scope of works and changes made

8.1.1 A high-level overview of the original scope of works for the East Wales Stations Improvements Operation as set out in the original business plan[29] is summarised in the table below.

[28] Commentary on the Western & Wales Timetable Planning Rules 2022 version 1.0 (Network Rail, 2020), p. 99.

[29] Stations Improvements East Wales (Metro Phase 2) Business Case, 21st November 2018

Table 8.1: East Wales Stations Improvements – original scope of works

Operation	Scope of works
East Wales Stations Improvements	Platform adjustments to enable a faster and more accessible public transport service by providing level boarding between platform and vehicle. Works include the creation or improvement of 13 inter-modal facilities.

8.1.2 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023). Since the original sign-off of the original business plan, the following changes were made to the scope of works:

- at least 1.80km of track improvements added
- one inter-modal facility added[30]

8.1.3 Other changes included:

- the term **'level boarding'** was used in the original business plans to describe accessibility improvements at stations. As the Operations developed, it was necessary to review and refine the definition of works to be carried out at each station and a review of the terminology in the business plans was undertaken. With greater clarity on the works to be delivered, the term 'level boarding' was considered to be too restrictive given the spectrum of works that would be involved. The term was therefore updated to the broader 'improved accessible boarding'.

8.2 Operation logic map

8.2.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

[30] It is noted that in 2021, the number of intermodal facilities was increased from 14 to 18 with the addition of intermodal facilities at Crwys Road, Cathays, Heath High Level and Ty Glas. This is articulated in the Business Case for the Operation produced on 11th August 2021. However, the number of Intermodal facilities was subsequently revised back down to 14 due to delays and it not being possible to deliver these works within the ERDF timescales.

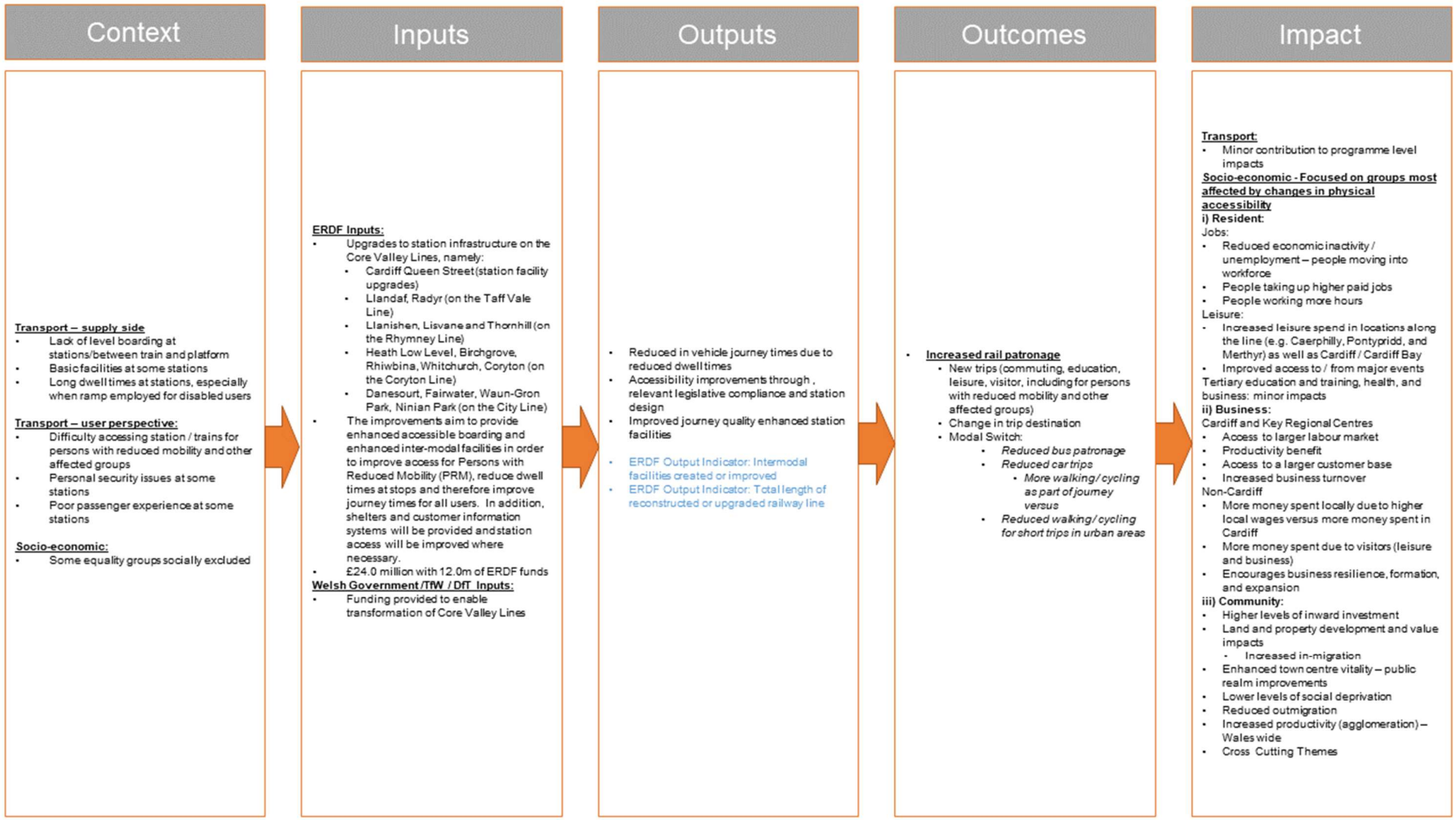


Figure 8-1: Logic map for East Wales Stations Improvements Operation

8.3 Operation delivery

8.3.1 The Operation was completed in November 2023. It was necessary to reprofile the Operation timescale during delivery. The end date was initially extended by two months to July 2023 in September 2021. A subsequent reprofile extended this further to November 2023.

8.4 Process Evaluation

8.4.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that, across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.

- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. Specifically in relation to this Operation, one stakeholder noted that the delivery of this Operation has been 'remarkable' given that design work did not commence until May 2018. It was noted that the improvements to station infrastructure will benefit local communities now and in the future.

- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. Working with one main

contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of this Operation significantly exceeded targets and resulted in a range of wider benefits (a success prominently stressed by a stakeholder in relation to this Operation). It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised, consents were granted (or otherwise) and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. A pragmatic, flexible and realistic approach to scope and budget was maintained throughout with the decision to accept a reduction in the number of stations with accessible boarding improvements for the provision of additional track kilometres.

Lessons learned

- it was necessary to reprofile the Operation timescale during delivery due to COVID-19 related delays and other challenges - one issue which was identified as having contributed to some delays was obtaining planning permission, which led to the proposed Crwys Road Station being withdrawn from the scope. Indeed, stakeholders noted that interactions with non-rail industry stakeholders could prove challenging and were a source of delay.

- a specific issue on this Operation was the means by which the Output Indicator 'Inter-modal facilities created or improved' was defined – originally, there was an expectation that multiple 'inter-modal' facilities could be claimed per station. However, after work on the Operations began WEFO clarified that one inter-modal facility per station could be claimed. This provided clarity to all parties in relating to achieving the indicators with the terminology in the Operation business plans subsequently updated to reflect this. Similarly, with greater clarity on the works to be delivered, as discussed above, the term 'level boarding', which was used in the original business plans to describe accessibility improvements at stations, was considered to be too restrictive given the spectrum of works that would be involved. The term was therefore updated to the broader 'improved accessible boarding'.

- the need to **clearly define the scope and key terminology** at the outset is therefore an important lesson emerging from this Operation.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation regularly evolving (as described above), it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the Operation Business Plan. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should have been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- different inter-modal facilities were being delivered by different teams, which made achieving consistency in the reporting process complex. This could

potentially be improved by defining reporting arrangements in advance, appointing one body to coordinate all deliverables, or allocating all works at each station to one contractor.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous..

8.5 Budget and out-turn costs

8.5.1 The table below shows the total approved eligible expenditure of the East Wales Station Improvement Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[31] and the final business plan[32].

Table 8.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£24,027,780	£12,013,890	50.00%
Final business plan	£24,027,780	£12,013,890	50.00%
Difference	*£0*	*£0*	*0%*

8.5.2 At least an additional 1.8km of track was added to this Operation associated with track improvements on the City Line. These additional works ensured the ERDF grant was fully utilised.

8.6 Output Indicators

8.6.1 The table below sets out the target and outturn Output Indicators for the East Wales Stations Improvements Operation.

Table 8.3: East Wales Stations Improvement Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Inter-modal facilities created or improved	14	14	✓
Length of reconstructed / upgraded railway (including TEN-T)	1.80km	4.11km	✓

[31] Stations Improvements East Wales (Metro Phase 2) Business Case, 21st November 2018

[32] Stations Improvements East Wales (Metro Phase 2) Business Case, 30 January 2024

Output Indicator	Target	Outturn	Fulfilled
Reduction in carbon dioxide equivalent emissions	N/A – target set at programme level only		

8.6.2 The Operation has fulfilled its target in terms of intermodal facilities and has surpassed the length of reconstructed / upgraded railway target by over 2.0km as a result of the additional track improvements on the City Line which were incorporated.

Inter-modal facilities created or improved

8.6.3 The inter-modal facilities created or improved include provision of accessible boarding, shelters, bicycle hoops, wayfinding, customer information help points and a footbridge. An example of one such improvement, the installation of a new footbridge at Lanks Hill to improve access to Danescourt Station, is shown in the photographs below.

Figure 8-2: New footbridge at Lanks Hill, improving access to Danescourt Station

Length of reconstructed / upgraded railway

8.6.4 As noted above, 4.11km of track improvements have been delivered as part of this Operation which is above the original target as a result of the incorporation of additional track improvements on the City Line.

Reduction in carbon dioxide equivalent emissions

8.6.5 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

8.6.6 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

8.7 Cross Cutting Themes

8.7.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets.

Table 8.4: East Wales Stations Improvements – outturn CCT targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	4	9
Sustainable Development	1	3	3
CCT General	2	2	4
Total	**4**	**9**	**16**

8.7.2 As shown, the **number of CCTs delivered as part of the East Wales Stations Improvements Operation has exceeded the initial and final targets**. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 8.5: East Wales Stations Improvements – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	Step free access will be realised through the introduction of two new types of train, the Stadler FLIRT and Stadler MV. The Stadler FLIRT will be used on the Rhymney Line with the Stadler MV being used on the other CVL. Both units offer specific wheelchair spaces and an increase in seats and will also display accessibility points on the outside of the train to allow passengers to locate where they should board. TfW held an Access and Inclusion Panel meeting. The meeting covered discussions on the new Butetown / improved Cardiff Bay stations and also the Wayfinding Strategy at Cardiff Central which is part of the EW station improvements operation.
	Positive action measure – Other	✓	Balfour Beatty worked with Transport for Wales, to create an innovative pathway to work for ex-offenders: 'Building Futures – On the right track'
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	All contractors created ESMPs for all of their stations.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
General	Integration of social clauses into an activity	✓	Each year, AIW hold an online charity auction - Cerebral Palsy Cymru, The Trussell Trust Newport and Cancer Research UK were the three beneficiaries receiving over £3,300 each.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
			The Planning and Resources Team at AIW have partnered with Age Connects Cardiff and The Vale to deliver three garden projects to elderly residents across the Cardiff area.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF operation.

8.8 Conclusion

8.8.1 The East Wales Stations Improvement Operation has delivered a transformational programme of investment for 14 CVL stations, improving accessibility to trains for PRM and providing a wider programme of enhancements, such as improving active travel facilities. This investment has significantly improved the quality of the CVL station estate and will make using the railway both easier and more attractive for passengers.

8.8.2 The Operation fulfilled its target in terms of intermodal facilities and surpassed the length of reconstructed / upgraded railway target by over 2.0km, delivering a total of 4.11km of track improvements.

8.8.3 With respect to CCTs, this Operation was particularly successful. The **16** CCTs delivered was four times the original target and exceeded the final target by seven.

9 Treherbert Line Operation

9.2 Overview

9.2.1 This Treherbert Line – which in this context can be thought of as the branch from Pontypridd Junction to the terminus at Treherbert – serves several communities including Porth, Tonypandy, Treorchy and Treherbert itself. It is a highly constrained section of the network as the route is single track between Porth and Treherbert, with the exception of a short loop at Ystrad Rhondda. As well as imposing a limitation on frequency, the single-track formation increases performance risks, particularly given that Treherbert services operate to Cardiff Central.

9.2.2 The Treherbert Line Operation consists of a package of work to extend the double track formation of the route (through the installation of dynamic passing loops) and undertake preparatory works for electrification. These works will facilitate the introduction of a four tph service along the length of the line once the full package of SWMP2 works is completed. The 4tph frequency, effectively offering a 'turn-up-and-go' service is one of the key SWMP2 outcomes envisaged.

9.3 Initial scope of works and changes made

9.3.1 A high-level overview of the original scope of works for the Treherbert Operation as set out in the original business plan[33] is summarised in the table below.

Table 9.1: Treherbert Line – original scope of works

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 8.0km of reconstructed or upgraded railway line (including TEN-T) and the creation or improvement of six inter-modal facilities.

9.3.2 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023).

9.3.3 Since the sign-off of the original business plan, the following changes were made to the scope of works:

- all inter-modal facilities were removed from this Operation and included in the West Wales and the Valleys Stations (WW&V) Improvement Operation.

[33] Treherbert Line Operation (Metro Phase 2) Business Case, 24th July 2018

- the length of track improvements was reduced from **8.0km** to **5.5km**

9.4 Operation logic map

9.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

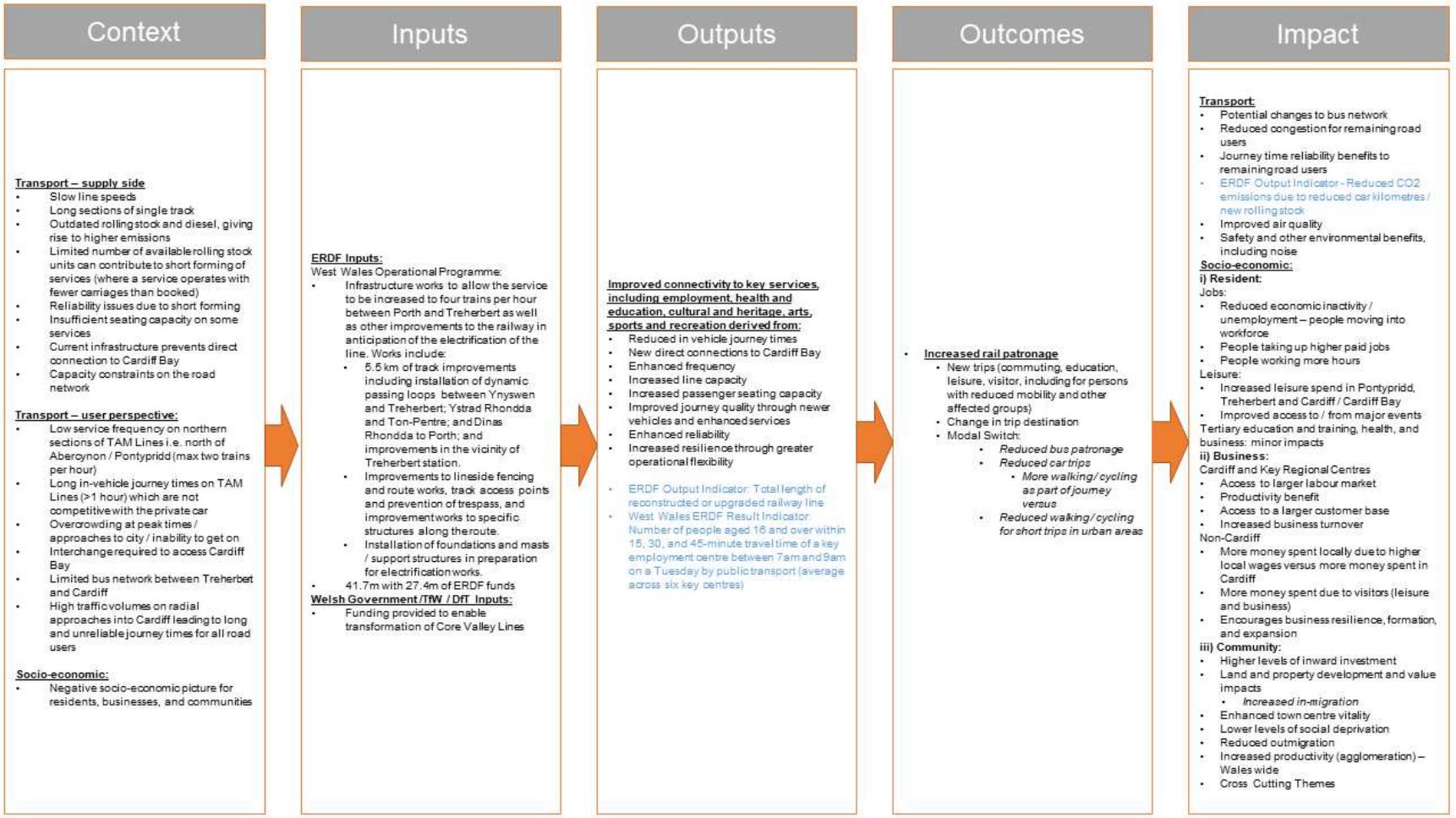


Figure 9-1: Logic map for Treherbert Line Operation

9.5 Operation delivery

9.5.1 The Operation was completed in December 2023. It was necessary to reprofile the Operation timescale during delivery. The re-profiling took place at the following times:

- September 2021 - end date extended by 2 months from August 2022 to October 2022
- February 2022 - end date extended by 10 months to August 2023
- January 2023 - end date extended to December 2023

9.6 Process Evaluation

9.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.
- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. An example of this was the requirement to reprofile the Operation due to an unexpected requirement to undertake utility diversions (gas and water). TfW and WEFO worked closely together to devise a solution which in fact successfully allowed for additional track kilometres to be claimed in terms of the Output Indicators.
- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any

emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. For example, on the track-based Operations (of which this was one), innovative solutions put forward during the competitive dialogue procedure included permanently earthed sections to reduce the need for costly structures work as part of the electrification programme. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Treherbert Line Operation significantly surpassed targets (see Section 9.10) and resulted in a range of wider benefits. It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. A particular issue in this Operation was the requirement for unanticipated utilities diversions which led to significant programme delays and threatened the overall delivery of the works within the ERDF funding period. A pragmatic, flexible and realistic

approach to scope and budget was maintained throughout and the initial ERDF deadline extended to support the completion of the Operation.

Lessons learned

- on the Treherbert Line Operation, and indeed the track-based Operations more generally, the requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work, and thus cost escalation - The scope of work had to be regularly refined to reflect the outcomes of asset surveys and detailed design work. Indeed, the need for the aforementioned utilities diversions only became apparent when detailed surveys took place and led to a requirement for significant change. It was specifically recommended that, on future rail projects of this nature, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - With the scope of this Operation regularly evolving, it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the business plans. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. This is a cost reimbursable contract where works are paid on an open book basis, where the client takes the cost risk. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to

this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

9.7 Budget and out-turn costs

9.7.1 The table below shows the total approved eligible expenditure of the Treherbert Line Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[34] and the final business plan[35].

Table 9.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£41,729,784	£27,399,776	65.66%
Final business plan	£41,729,784	£27,399,776	65.66%
Difference	*£0*	*£0*	*£0*

9.7.2 As shown, the approved eligible expenditure has not changed between the date of the original business plan (July 2018) and the final business plan (January 2024). However, it is noted that, whilst the costs have remained the same, there were changes to the scope of works as referenced above.

[34] Treherbert Line Operation (Metro Phase 2) Business Case, 24th July 2018

[35] Treherbert Line Operation (Metro Phase 2) Business Case, 10th January 2024

9.8 Output Indicators

9.8.1 The table below sets out the target and outturn Output Indicators for the Treherbert Line Operation.

Table 9.3: Treherbert Line Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Length of reconstructed / upgraded railway (including TEN-T)	5.50km	9.55km	✓
Reduction in carbon dioxide equivalent emissions	n/a – target set at programme level only		

Length of reconstructed / upgraded railway

9.8.2 Following the extension to the ERDF timeframe and the successful completion of service diversions, the Treherbert Line was closed for six months as part of a complete blockade. Additional track works were required following the service diversions and detailed surveys. Access to all parts of the line, with the efficiencies generated from continuous working in a blockade, enabled an increase length of track kilometres to be delivered within the ERDF funding window.

9.8.3 In total 9.55km of track improvements have been delivered on the Treherbert Line Operation compared to the committed figure of 5.5km. This included the installation of dynamic passing loops between Ynyswen and Treherbert, Ystrad Rhondda and Ton-Pentre and Dinas Rhondda and Porth, effectively expanding the double track section of the line. A photograph of the track works is shown below:

Figure 9-2: Treherbert Operation track works

9.8.4 In addition to the track works, advanced works in preparation for the electrification of the line were undertaken incorporating the installation of foundations and masts / support structures. A dedicated power feed at

Pontypridd was also installed to feed the Treherbert Line. A photograph of these works is shown below:

Figure 9-3: Overhead line equipment foundation installation on the Treherbert Line

9.8.5 The Operation also included clearance of vegetation and obstructions on the route section.

Reduction in carbon dioxide equivalent emissions

9.8.6 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

9.8.7 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

9.9 Result Indicator

9.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 9.4: Treherbert Line – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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.
Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres.

9.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold is met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 9.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[36]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

9.10 Cross Cutting Themes

9.10.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets:

[36] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

Table 9.6: Treherbert Line Operation – outturn CCT targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	2	3
Sustainable Development	1	3	3
CCT General	2	3	6
Total	**4**	**8**	**12**

9.10.2 As shown, the **number of CCTs delivered as part of the Treherbert Line Operation has exceeded the initial and final targets**. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 9.7: Treherbert Line – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Positive action measure – Other	✓	TfW and the IDPs developed an ex-offenders' pathway to employment that includes training, sustainable employment and support within the construction sector and which has resulted in a number of ex-offenders being employed.
	Disability Access Group Engagement	✓	. TfW brought together an accessibility and inclusion panel to provide feedback and concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered level boarding and wayfinding issues.
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	An ESMPs was created to manage the environmental and social issues on this Operation.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
General	Stakeholder engagement good practice activity	✓	The 'Adopt a Station' programme had more than 250 volunteers working to enhance and maintain 151 stations in their local communities across Wales.
	Integration of social clauses into an activity	✓	Balfour Beatty, with the support of Mikerry Rail Limited, developed and improved an area within Treorchy Comprehensive School which is going to be further developed and used as a memorial garden The Traction Power Team on the Core Valleys Project were out on a Hafan Cymru community project in Tonypandy. This project involved clearing a garden of rubbish, building a rockery and moving soil to make an elevated flower bed, with plants and habitat resource. This was undertaken in collaboration with Keep Wales Tidy, who supplied the plants and materials to enhance biodiversity and appeal to bugs and insects.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW have been appointed as CCT Champions to support the nine ERDF operations. They integrate economic, social and environmental outcomes into a CCT case study for each ERDF operation.

9.11 Conclusion

9.11.1 The Treherbert Operation was highly successful in delivering against its business plan commitments, including exceeding the Output Indicators and CCT commitments. Indeed, with respect to CCTs, this Operation delivered three times its original target, and one-and-a-half times its final target.

9.11.2 Crucially, this Operation will be a key enabler of the introduction of a 4tph service on the Treherbert Line, a key outcome of the overall SWMP2 programme. Moreover, it incorporated enabling works that will allow the future electrification of the line, allowing the introduction of the new high-quality and low carbon TramTrain fleet.

10 Aberdare Line Operation

10.2 Overview

10.2.1 The Aberdare Line – which in the context of this project can be thought of as the branch from Abercynon Junction to the terminus at Aberdare – serves several communities including Penrhiwceiber, Mountain Ash and Aberdare itself. It is a highly constrained section of the network as the route is single track along its entire length, with the exception of short loops at Abercwmboi and Mountain Ash. As well as imposing a limitation on frequency, the single-track formation increases performance risks, particularly given that Aberdare services operate to and through Cardiff Central.

10.2.2 The Aberdare Line Operation consists of a package of work to extend the double track formation of the route and undertake preparatory works for electrification. These works will facilitate the introduction of a four tph service along the length of the line once the full package of SWMP2 works is completed. The 4tph frequency, effectively offering a 'turn-up-and-go' service is one of the key SWMP2 outcomes envisaged.

10.3 Initial scope of works and changes made

10.3.1 A high-level overview of the original scope of works for the Aberdare Line Operation as set out in its original business plan[37] is summarised in the table below.

Table 10.1: Aberdare Line – original scope of works

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: ▪ 6km of track improvements ▪ three inter-modal facilities

10.3.2 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023).

10.3.3 Since the original sign-off of the original business plan, a number of changes were made to the scope of works, namely:

[37] Aberdare line (Metro Phase 2) Business Case, 24th July 2018, approved 30th July 2018 (offer letter date)

- all inter-modal facilities were removed from this Operation and included in the WW&V Improvement Operation
- a reduction in the length of track improvements from **6km** to **5.7km**

10.4 Operation logic map

10.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

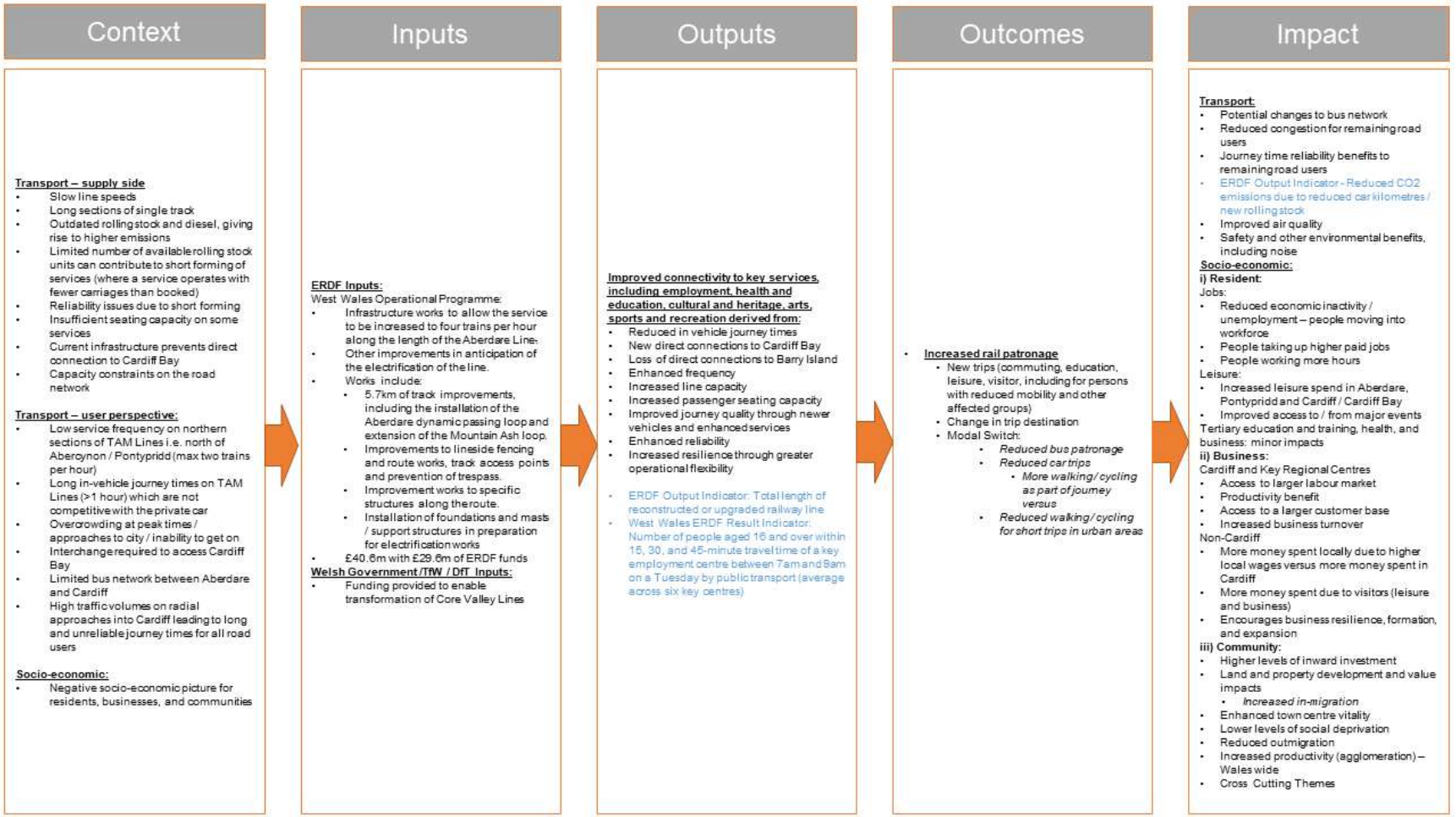


Figure 10-1: Logic map for Aberdare Line Operation

10.5 Operation delivery

10.5.1 The Operation was completed in July 2023. It was necessary to reprofile the Operation timescale during delivery due to COVID-19 related delays and associated challenges such as labour and material shortages. The re-profiling took place at the following times:

- **September 2021:** the Operation end date was extended to May 2022.
- **September 2022:** the Operation end date was extended to April 2023.
- **June 2023:** the Operation end date was extended to July 2023.

10.6 Process Evaluation

10.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.
- **the strong relationship between WEFO and TfW** – There was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. Specifically in relation to the Aberdare Line Operation, the two organisations worked closely together to: (i) develop and finalise the scope; (ii) allocate additional ERDF funding to deliver the Operation; and (iii) extend the Operation closure date to reflect the challenges posed by delivering the works during the COVID-19 pandemic.
- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any

emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. For example, on the track-based Operations (of which this was one), innovative solutions put forward during the competitive dialogue procedure included permanently earthed sections to reduce the need for costly structures work as part of the electrification programme. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit. On this Operation, stakeholders highlighted the particularly strong relationship with the local community created by contractor Alun Griffiths.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Aberdare Line Operation surpassed targets (see Section 10.10) and resulted in a range of wider benefits. It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be ‘claimed’ throughout the Operation delivery. In addition to the CCTs, the contractor supported the local school and fire station.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. A pragmatic, flexible and realistic approach to scope and budget was maintained throughout.

Lessons learned

- on the Aberdare Line Operation, and indeed the track-based Operations more generally, the requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work, and thus cost escalation - the scope of work had to be regularly refined to reflect the outcomes of asset surveys and detailed design work. It was specifically recommended that, on future rail projects of this nature, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation regularly evolving, it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the business plans. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. This is a cost reimbursable contract where works are paid on an open book basis, where the client takes the cost risk. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should been**, and consequently were not

given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

10.7 Budget and out-turn costs

10.7.1 The table below shows the total approved eligible expenditure of the Aberdare Line Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[38] and the final business plan[39].

Table 10.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£36,115,639	£23,713,528	65.66%
Final business plan	£40,607,934	£29,675,191	73.08%
Difference	*+£4,492,295*	*+£5,961,663*	*+7.42%*

10.7.2 As shown in the table above, the approved eligible expenditure of the Aberdare Line Operation increased by circa £4.5m, reflecting the greater price certainty which emerged as asset surveys were undertaken and detailed design work progressed. All of the additional works identified through the design, including Aberdare embankment widening works and additional drainage works between Aberdare and Cwmbach to prevent flooding, were additional to the original scope and thereby led to an increase in the approved eligible expenditure.

[38] Aberdare line (Metro Phase 2) Business Case, 24th July 2018, approved 30th July 2018 (offer letter date)

[39] Aberdare line (Metro Phase 2) Business Case, 20th June 2023

10.7.3 Outside of these very specific improvements, there was a general requirement to reprofile expenditure due to COVID-19 delays and value engineering of the initial solution.

10.7.4 The ERDF grant contribution increased by circa **£6m** in absolute terms, and from **66% to 73%** of the total Operation costs. The ERDF contribution as a proportion of the total eligible expenditure therefore increased. This was because additional grant was provided which was decommitted from other ERDF areas in the programme and offered to a small number of Operations (and other projects) with escalating costs. This supported budgetary pressures for the beneficiary and successful completion of the Operation.

10.8 Output Indicators

10.8.1 The table below sets out the target and outturn Output Indicators for the Aberdare Line Operation.

Table 10.3: Aberdare Line Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Length of reconstructed / upgraded railway (including TEN-T)	5.70km	6.44	✓
Reduction in carbon dioxide equivalent emissions	N/A – target set at programme level only		

Length of reconstructed / upgraded railway

10.8.2 As shown in the table above, the Operation **achieved the Output Indicator target for length of reconstructed / upgraded railway**.

10.8.3 In total **6.44km** of track improvements were delivered on the Aberdare Operation. This included the installation of a passing loop between Aberdare and Cwmbach and extension of the loop between Mountain Ash and Fernhill, line speed improvements, track realignment and upgrades. The track works also included localised lowering under bridges. An image of the track works is shown opposite.

10.8.4 The Operation also delivered the installation of foundations and masts / support structures as preparatory work which will enable the subsequent electrification of the line. This consisted of the installation of:

- 572 foundations

- 742 main part steel (masts)
- 1,190 pieces of small part steel

10.8.5 ERDF funds have contributed to the costs of trial holes and piled foundations, along the entire route section, examples of which are shown below.

Figure 10-2: Overhead line equipment foundation installation at Aberdare

10.8.6 The Operation also included clearance of vegetation and obstructions on the route section (shown in figure 10-3 below), as well as improvements to lineside fencing.

Figure 10-3: Masts on the Aberdare line. This image also shows that vegetation has been cleared to make way for the overhead line equipment.

Reduction in carbon dioxide equivalent emissions

10.8.7 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

10.8.8 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

10.9 Result Indicator

10.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 10.4: Aberdare Line – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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
Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres

10.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold Will be met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 10.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[40]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

[40] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

10.10 Cross Cutting Themes

10.10.1 The table below summarises the number of CCTs achieved by the Aberdare Line Operation set against the original and final targets:

Table 10.6: Aberdare Line Operation – outturn CCT targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	2	3
Sustainable Development	1	3	3
CCT General	2	3	5
Total	**4**	**8**	**11**

10.10.2 As shown, the number of CCTs delivered as part of the Operation has exceeded the initial and final targets. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 10.7: Aberdare Line Operation – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	TfW brought together an accessibility and inclusion panel to provide feedback and concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered improved accessible boarding and wayfinding issues.
	Positive action measure – Other	✓	TfW and the IDPs developed an ex-offenders' pathway to employment that includes training, sustainable employment and support within the construction sector and which has resulted in a number of ex-offenders being employed. One of the IDPs held a deaf awareness course to improve communication across the team and better include a team member with hearing loss.
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	Contractor Alun Griffiths created an ESMP to help manage the environmental social issues during works on Aberdare Station.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing for jobseekers in South Wales who would otherwise be unable to access this type of clothing. This support also created volunteering opportunities, relieving financial burdens on jobseekers and providing people with confidence in interviews. AIW and TfW employees donated clothing in November 2022.
General	Stakeholder engagement good practice activity	✓	The 'Adopt a Station' programme' had more than 250 volunteers working to enhance and maintain 151 stations in their local communities across Wales.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
	Integration of social clauses into an activity	✓	Balfour Beatty, Excell Rail, Ngage ad Protech teamed up together to volunteer their time to support community partner organisation, Bryncynon Strategy located at the Feelgood factory. The team helped to repair the collapsed stone wall, step covers, memorial tiles and cleaned up the outside area ready for the local community to enjoy again.
			Alun Griffiths assisted Caradog Primary School with the refurbishment of the allotment space at the Grove Allotments in Aberdare. These allotment spaces are used to enhance the younger children's development and education. The new open space allows more children to develop skills in a friendly and safe environment. It also increased understanding between contractors and the community for mutual benefit.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

10.11 Conclusion

10.11.1 The Aberdare Operation was highly successful in delivering against its business plan commitments, including exceeding the Output Indicators and CCT commitments. Indeed, with respect to CCTs, this Operation delivered more than double its original target.

10.11.2 Crucially, this Operation will be a key enabler of the introduction of a 4tph service on the Aberdare Line, a key outcome of the overall SWMP2 programme. Moreover, it incorporated enabling works that will allow the future electrification of the line, allowing the introduction of the new high-quality and low carbon TramTrain fleet.

11 Merthyr Tydfil Line Operation

11.2 Overview

11.2.1 The Merthyr Tydfil Line – which in the context of this project can be thought of as the branch from Abercynon Junction to the terminus at Merthyr Tydfil Station – is circa 13km long. It is a highly constrained section of the network as the route is single track along its entire length, with the exception of a short loop at Merthyr Vale. As well as imposing a limitation on frequency, the single-track formation increases performance risks, particularly given that Merthyr Tydfil services operate to and through Cardiff Central.

11.2.2 The Merthyr Tydfil Line Operation consisted of a package of work to extend double track formation on the route, increase line speeds and undertake preparatory works for electrification. These works will facilitate the introduction of a four tph service along the length of the line once the full package of SWMP2 works is completed. The 4tph frequency, effectively offering a 'turn-up-and-go' service is one of the key SWMP2 outcomes envisaged.

11.3 Initial Scope of works and changes made

11.3.1 A high-level overview of the original scope of works for the Merthyr Tydfil Line Operation as set out in the original business plan[41] is summarised in the table below.

Table 11.1: Merthyr Line – original scope of works

Operation	Scope of 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 Tydfil as well as other improvements to the railway in anticipation of the electrification of the line. Works include: ▪ 6.0km of track improvements and four inter-modal facilities created or improved.

11.3.2 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023).

11.3.3 Since the original sign-off of the original business plan, a number of changes were made to the scope of works, namely:

- all inter-modal facilities were removed from this Operation and included in the WW&V Improvement Operation

[41] Merthyr Line (Metro Phase 2) Business Case, Welsh Government, 24th July 2018

- an increase in the length of track improvements from **6.0km** to **6.3km**

11.4 Operation logic map

11.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

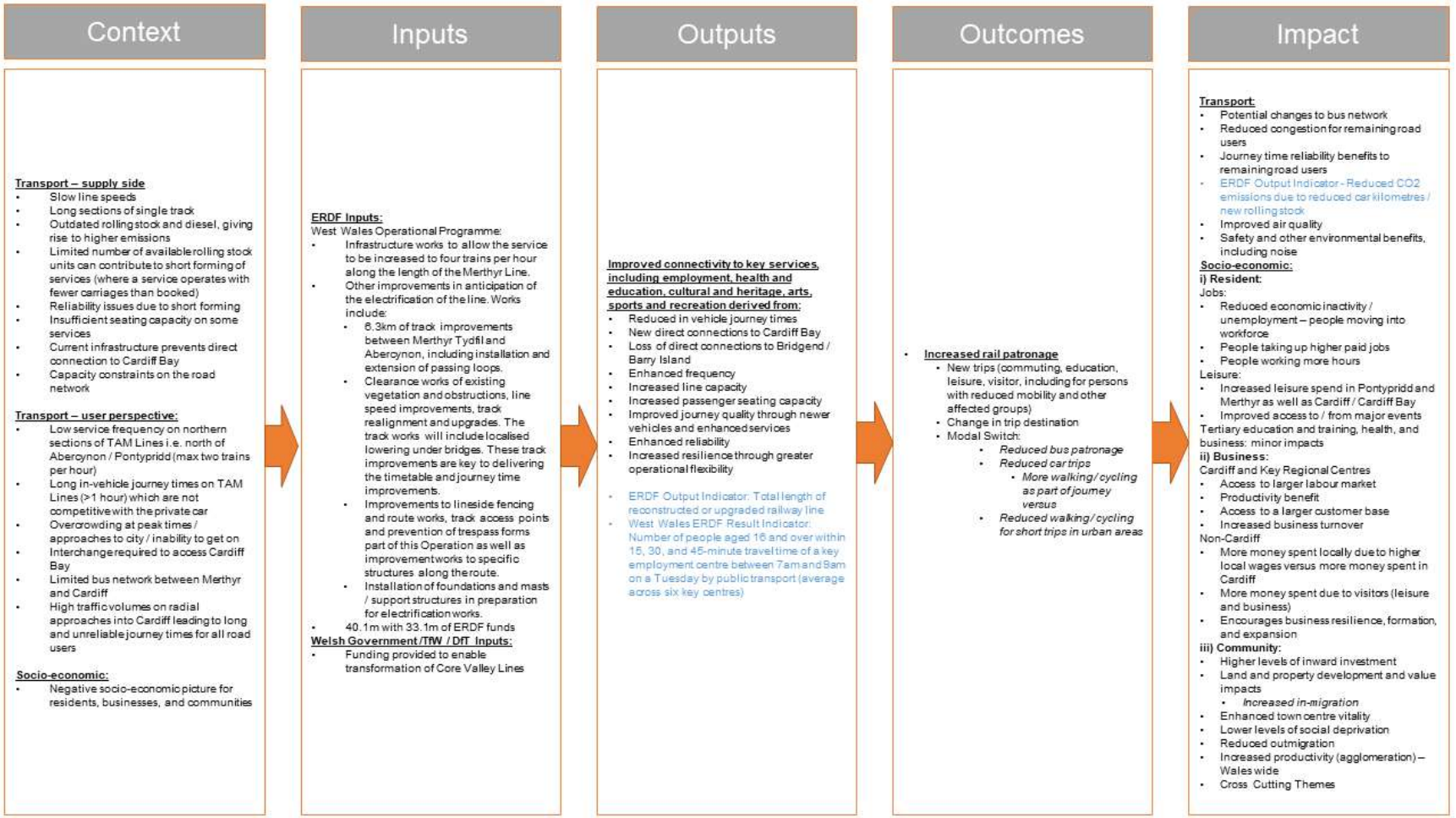


Figure 11-1: Logic map for Merthyr Tydfil Line Operation

11.5 Operation delivery

11.5.1 The Operation was completed in July 2023. It was necessary to reprofile the Operation timescale during delivery. The re-profiling took place at the following times:

- September 2021: the end date was extended to October 2022
- November 2022: the end date was extended to July 2023
- June 2023: the end date was extended to July 2023

11.6 Process Evaluation

11.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that, across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.

- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. Specifically in relation to the Merthyr Tydfil Line Operation, the two organisations worked closely together to: (i) develop and finalise the scope; (ii) allocate additional ERDF funding to reflect the additional works required to deliver this Operation; and (iii) extend the Operation closure date to reflect the challenges posed by delivering the works during the COVID-19 pandemic.

- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc. This ensured that policy officials and ultimately Ministers were suitably briefed on progress and any

emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. For example, on the track-based Operations (of which this was one), innovative solutions put forward during the competitive dialogue procedure included permanently earthed sections to reduce the need for costly structures work as part of the electrification programme. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- community and societal benefits were specified in the contracts and were delivered through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Merthyr Tydfil Line Operation surpassed targets (see Section 11.10) and resulted in a range of wider benefits. It was noted that having CCT Champions integrated into the Operation from the outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. For example, the detailed design work identified the requirement for additional works such as embankment widening at Pentrebach and highlighted the increased complexity of delivering the scoped line speed improvements. Additional ERDF funding of circa £4.3m was allocated for the whole operation, with all

additional works and costs falling within the scope of the Operation. A pragmatic, flexible and realistic approach to scope and budget was maintained throughout.

Lessons learned

- on the Merthyr Tydfil Line Operation, and indeed the track-based Operations more generally, the requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work, and thus cost escalation - The scope of work had to be regularly refined to reflect the outcomes of asset surveys and detailed design work. It was specifically recommended that, on future rail projects of this nature, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation regularly evolving, it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the business plan. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous..

11.7 Budget and out-turn costs

11.7.1 The table below shows the total cost of the Merthyr Tydfil Line Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[42] and the final business plan[43].

Table 11.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£32,176,684	£21,127,210	65.66%
Final business plan	£40,176,684	£33,160,610	82.54%
Difference	*+£8,000,000*	*+£12,033,400*	*+16.88%*

11.7.2 As shown in the table above, the approved eligible expenditure of the Merthyr Tydfil Line Operation increased by circa **£8m**, reflecting the greater price certainty which emerged as asset surveys were undertaken and the detailed design work progressed. As noted above, through the design, the scope of works increased reflecting the additional embankment widening required at Pentrebach and the greater than anticipated complexity of delivering line speed improvements as well as the installation of guard rail systems. These changes led to a consequential increase in the approved eligible expenditure.

[42] Merthyr Line (Metro Phase 2) Business Case, Welsh Government, 24th July 2018

[43] Merthyr Line (Metro Phase 2) Business Case, Welsh Government, 23rd June 2023

11.7.3 Outside of these very specific improvements, there was a general requirement to reprofile expenditure due to COVID-19 delays and value engineering of the initial solution.

11.7.4 The ERDF grant contribution increased by circa **£12m** in absolute terms, and from **66% to 83%** of the total Operation costs. The ERDF contribution as a proportion of the total cost therefore increased. This was because additional grant was provided which was decommitted from other ERDF areas in the programme and offered to a small number of Operations (and other projects) with escalating costs. This supported budgetary pressures for the beneficiary and successful completion of the Operation from beneficiary budgets.

11.8 Output Indicators

11.8.1 The table below sets out the target and outturn Output Indicators for the Merthyr Tydfil Line Operation.

Table 11.3: Merthyr Tydfil Line Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Length of reconstructed / upgraded railway (including TEN-T)	6.30km	5.96km	✗
Reduction in carbon dioxide equivalent emissions	N/A – target set at programme level only		

Length of reconstructed / upgraded railway

11.8.2 As shown in the table above, this Operation has not **achieved the Output Indicator target for 'length of reconstructed / upgraded' railway**.

11.8.3 In total **5.96km** of track improvements have been delivered on the Merthyr Tydfil Line Operation, compared to the output target of **6.3km**. This is because value engineering exercises amended the length of passing loops required to deliver the revised timetable.

11.8.4 The track improvements delivered include new track construction between Merthyr Tydfil and Pentrebach, installation of a passing loop at Quakers Yard and line speed improvements at Troed-y-Rhiw and between Merthyr Vales and North of Quakers Yard. An image of the track works is shown inset.

11.8.5 The Operation also delivered the installation of foundations and masts / support structures as preparatory work which will enable the subsequent electrification of the line. This consisted of the installation of:

- 365 foundations
- 363 main part steel (masts)
- 325 pieces of small part steel

11.8.6 ERDF funds have contributed to the costs of trial holes and piled foundations, along the entire route section, examples of which are pictured below.

Figure 11-2: Overhead Line Equipment (OLE) foundations on the Merthyr Tydfil Line

11.8.7 The Operation also included clearance of vegetation and obstructions on the route section, as well as improvements to lineside fencing.

Reduction in carbon dioxide equivalent emissions

11.8.8 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. Analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

11.8.9 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

11.9 Result Indicator

11.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 11.4: Merthyr Tydfil Line – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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.
Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres.

11.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold will be met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 11.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[44]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

11.10 Cross Cutting Themes

11.10.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets.

Table 11.6: Merthyr Line – outturn Cross Cutting Theme targets versus original and final CCT targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	2	3
Sustainable Development	1	3	3
CCT General	2	3	4

[44] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

	Original Target	Final Target	Achieved
Total	**4**	**8**	**10**

11.10.2 As shown, the **number of CCTs delivered as part of the Merthyr Tydfil Line Operation has exceeded the initial and final targets**. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 11.7: Merthyr Tydfil Line Operation –Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	TfW brought together an accessibility and inclusion panel to provide feedback and concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered improved accessible boarding and wayfinding issues.
	Positive action measure – Other	✓	TfW and the Infrastructure Delivery Partners (IDPs) developed an ex-offenders' pathway to employment that includes training, sustainable employment and support within the construction sector and which has resulted in a number of ex-offenders being employed. One of the IDPs held a deaf awareness course to improve communication across the team and better include a team member with hearing loss.
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new Travel Plan to help decarbonise their transport networks by encouraging staff to make healthier, more sustainable and more active.
	Environmental Site Management Plan	✓	Alun Griffiths has implemented ESMPs for their construction works at Pentrebach.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing for jobseekers in South Wales who would otherwise be unable to access this type of clothing. This support also created volunteering opportunities, relieving financial burdens on jobseekers and providing people with confidence in interviews. AIW and TfW employees donated clothing in November 2022.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
General	Stakeholder engagement good practice activity	✓	TfW Held an Open Day for Merthyr Tydfil County Borough Council and presented several slides on the different packages of works which were ongoing on the CVL. TfW also presented what work was upcoming to ensure that the Council was suitably informed. The 'Adopt a Station' programme, had more than 250 volunteers working to enhance and maintain 151 stations in their local communities across Wales.
	Integration of Social Clauses into an activity	✓	AMEY was nominated for a Well-being Hero's award reflecting the success that the project team have had in embedding the core value of health and well-being into their relationships with each other - showing care, kindness, and compassion.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

11.11 Conclusion

11.11.1 The Merthyr Line Operation was broadly successful in delivering against its business plan commitments. There was a marginal shortfall with respect to the 'length of reconstructed / upgraded railway' Output Indicator.

11.11.2 With respect to CCTs, this Operation was highly successful, delivering double the number of CCTs than envisaged in the original business plan.

11.11.3 Crucially, this Operation has been a key enabler of the introduction of a 4tph service on the Merthyr Tydfil Line, a key outcome of the overall SWMP2 programme. Moreover, it incorporated enabling works that will allow the future electrification of the line, allowing the introduction of the new high-quality and low carbon TramTrain fleet.

12 Rhymney Line Operation

12.2 Overview

12.2.1 The Rhymney Line – which in the context of this project can be thought of as the branch from Cardiff Queen Street to the terminus at Rhymney – serves several communities including Caerphilly, Ystrad Mynach, Bargoed and Rhymney itself. As with the other CVL, it is a highly constrained section of the network as the line is single track north of Bargoed, with the exception a short loop at Tir-phil. As well as imposing a limitation on frequency, the single-track formation increases performance risks, particularly given that Rhymney services operate to and through Cardiff Central.

12.2.2 The Rhymney Line Operation consists of a package of work to extend the double track formation of the route (by lengthening the Tir-phil loop) and undertake preparatory works for electrification. These works will facilitate the introduction of a 4tph service along the length of the line once the full package of SWMP2 works is completed. The 4tph frequency, effectively offering a 'turn-up-and-go' service is one of the key SWMP2 outcomes envisaged.

12.3 Initial scope of works and changes made

12.3.1 A high-level overview of the original scope of works for the Rhymney Line Operation as set out in the original business plan[45] is summarised in the table below.

Table 12.1: Rhymney Line Operation – original scope of works

Operation	Scope of works
Rhymney Line	Infrastructure works to allow the service to be increased to 4tph 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: ■ 4.0km of reconstructed or upgraded railway line (including TEN-T) and ■ one Inter-modal facilities created or improved.

12.3.2 As with all nine Operations, the business plan was progressively updated to reflect the ongoing design work and the impact of external events (e.g., COVID-19) and macroeconomic factors (e.g., prevailing high inflation from 2022 into 2023).

12.3.3 Since the original sign-off of the original business plan, a number of changes were made to the scope of works, namely:

[45] Rhymney Line (Metro Phase 2) Business Case, Welsh Government, 24th July 2018

- all inter-modal facilities were removed from this Operation and included in the WW&V Improvement Operation
- an increase in the length of track improvements from **4.0km** to **6.5km**

12.4 Operation logic map

12.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

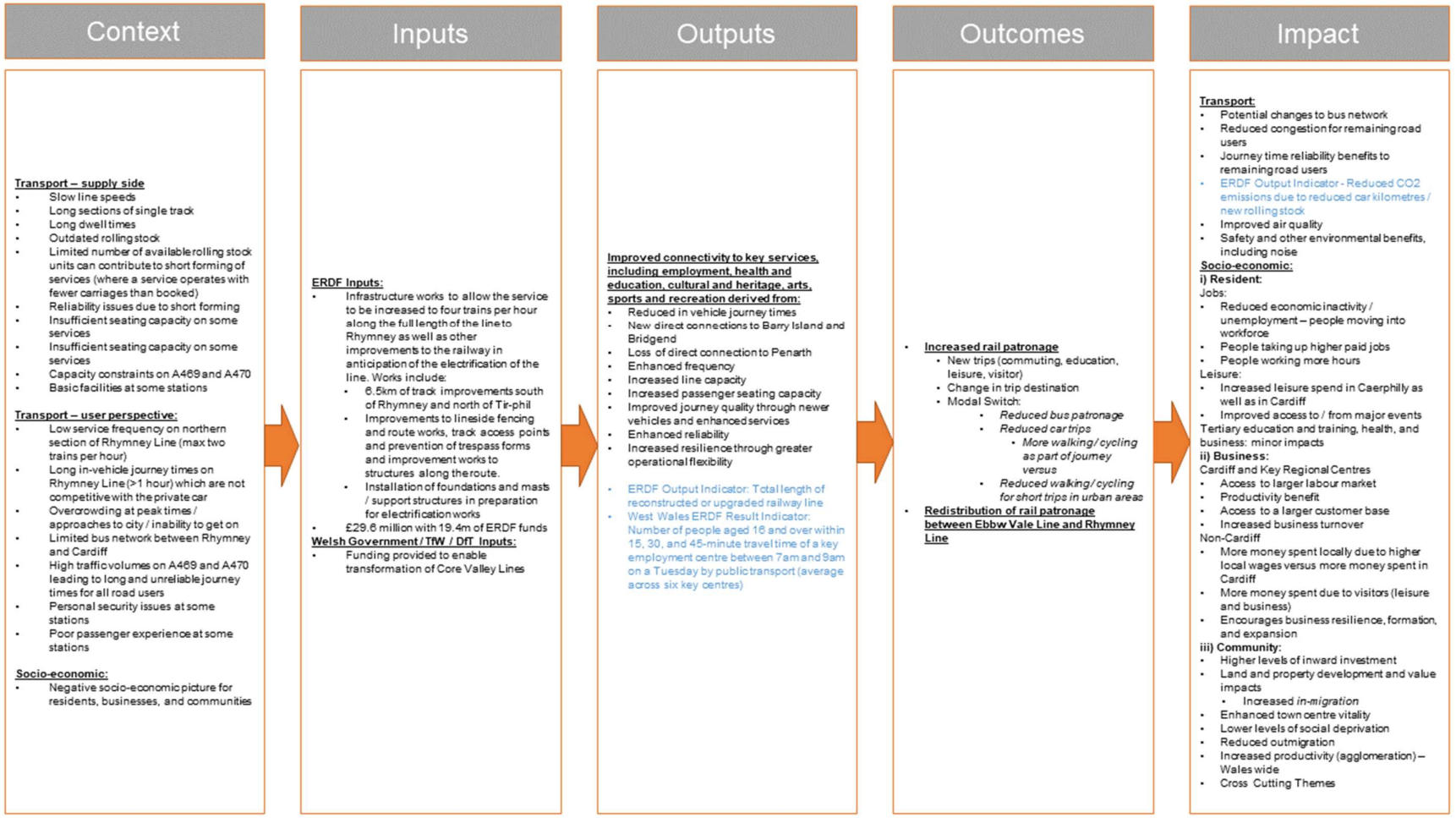


Figure 12-1: Logic map for Rhymney Line Operation

12.5 Operation delivery

12.5.1 The Operation was completed in November 2023. It was necessary to reprofile the Operation timescale during delivery. The re-profiling took place at the following times:

- June 2021: the end date was extended to February 2023
- June 2023: the end date was extended to November 2023

12.6 Process Evaluation

12.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.

- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality.

- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. For example, on the track-

based Operations (of which this was one), innovative solutions put forward during the competitive dialogue procedure which included permanently earthed sections to reduce the need for costly structures work as part of the electrification programme. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Rhymney Line Operation surpassed targets (see Section 12.10) and resulted in a range of wider benefits. It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be 'claimed' throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. Programme delays resulted in works on the Rhymney Line proceeding late than planned and the original completion date had to be extended. A pragmatic, flexible and realistic approach to scope and budget was maintained throughout.

Lessons learned

- on the Rhymney Line Operation, and indeed the track-based Operations more generally, the requirement to deliver activities in parallel to maintain the programme increased the risk of abortive work and potential cost escalation - the scope of work had to be regularly refined to reflect the outcomes of asset

surveys and detailed design work. It was specifically recommended that, on future rail projects of this nature, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - with the scope of this Operation regularly evolving, it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the business plans. For example, it was initially unclear whether Caerphilly tunnel was to be included in the line speed improvements or otherwise. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. This is a cost reimbursable contract where works are paid on an open book basis, where the client takes the cost risk. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- **the milestone-based payment mechanism definition was disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW. This, at times, led to inefficient working, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility. It was noted with respect to this Operation that this process led to additional complexity and work when allocating and evidencing expenditure for the ERDF claims. It was pointed out that the requirements of funders in the financial claims process should be integral to the future procurement of projects of this nature.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each

Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- More generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

12.7 Budget and out-turn costs

12.7.1 The table below shows the total approved eligible expenditure of the Rhymney Line Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[46] and the final business plan[47].

Table 12.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£29,635,310	£19,458,545	65.66%
Final business plan	£29,635,310	£19,458,545	65.66%
Difference	*£0*	*£0*	*£0*

12.7.2 As shown, the approved eligible expenditure has not changed between the date of the original business plan (July 2018) and the final business plan (June 2023). However, it is noted that, whilst the approved eligible expenditure remained the same, there were changes to the scope of works as referenced above.

12.8 Output Indicators

12.8.1 The table below sets out the target and outturn Output Indicators for the Rhymney Line Operation.

Table 12.3: Rhymney Line Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Length of reconstructed / upgraded railway (including TEN-T)	6.50km	6.38km	✗

[46] Rhymney Line (Metro Phase 2) Business Case, Welsh Government, 24th July 2018

[47] Rhymney Line (Metro Phase 2) Business Case, Welsh Government, 22nd June 2023

Output Indicator	Target	Outturn	Fulfilled
Reduction in carbon dioxide equivalent emissions	n/a – target set at programme level only		

12.8.2 Further information on each of the above is set out below.

Length of reconstructed / upgraded railway

12.8.3 As shown in the table above, in total 6.38km of track improvements have been delivered on the Rhymney Line Operation, compared to the committed figure of 6.5km. This is because planning delays at Rhymney Station resulted in the track works being deferred until after the closure of the ERDF delivery window.

12.8.4 The line works delivered included line speed improvements at Caerphilly Tunnel and Llanbradach and an extension to the passing loop at Tir-Phil. These track improvements are key to delivering the timetable and journey time improvements. The figure below shows the Caerphilly Tunnel works.

Figure 12-2: Caerphilly Tunnel works line speed improvements

12.8.5 In addition to the track works, advanced works in preparation for the electrification of the line were undertaken incorporating the installation of foundations and masts / support structures (see Figure 12-3).

Figure 12-3: Overhead line equipment foundation installation on the Rhymney Line

12.8.6 The Operation also included clearance of vegetation and obstructions on the route section.

Reduction in carbon dioxide equivalent emissions

12.8.7 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

12.8.8 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

12.9 Result Indicator

12.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 12.4: Rhymney Line – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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.

Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres.

12.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold will be met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 12.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[48]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

12.10 Cross Cutting Themes

12.10.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets:

Table 12.6: Rhymney Line Operation – outturn Cross Cutting Theme targets versus original and final Cross Cutting Theme targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	2	3
Sustainable Development	1	3	3
CCT General	2	3	3
Total	**4**	**8**	**9**

12.10.2 As shown, the **number of CCTs delivered as part of the Rhymney Line Operation has exceeded the initial and final targets**. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

[48] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

Table 12.7: Rhymney Line Operation – Cross Cutting Theme Case Level Indicators Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	TfW brought together an accessibility and inclusion panel to provide feedback and concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered improved accessible boarding and wayfinding issues.
	Positive action measure – Other	✓	Balfour Beatty worked with Transport for Wales, to create an innovative pathway to work for ex-offenders: 'Building Futures – On the right track'
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging their staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	Alun Griffiths implemented an ESMP for their construction works at Rhymney Station.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
General	Stakeholder engagement good practice activity	✓	The ‘Adopt a Station’ programme, had more than 250 volunteers working to enhance and maintain 151 stations in their local communities across Wales.

Table 12.7: Rhymney Line Operation – Cross Cutting Theme Case Level Indicators Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
	Integration of social clauses into an activity	✓	In October 2019, Transport for Wales launched their partnership with Cadw to offer 2-for-1 entry at any of their sites. By presenting their train ticket at any of Cadw's paid heritage sites, customers are able to take advantage of this exciting offer and gain free entry when accompanied by another person paying the full entry charge.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

12.11 Conclusion

12.11.1 The Rhymney Line Operation has supported significant improvements to the line, including the extension of the Tir-phil passing loop to create a longer section of double track. Whilst the length of new track kilometres delivered was marginally less than the target, this was related to a local planning issue at Rhymney and the works will still be delivered post-ERDF. This Operation also delivered its CCT targets.

12.11.2 Crucially, this Operation will be a key enabler of the introduction of a 4tph service on the Rhymney Line, a key outcome of the overall SWMP2 programme. Moreover, it incorporated enabling works that will allow the future electrification of the line, allowing the introduction of the new high-quality rolling stock.

13 Taff's Well Depot Site Preparation Operation

13.2 Overview

13.2.1 The Taff's Well Depot Site Preparation Operation (hereafter referred to as the "Taff's Well Operation") is a key enabler of SWMP2 overall, providing serviced land on which a rolling stock Traction Maintenance Depot (TMD) has been constructed to service the new CVL TramTrain fleet. A new depot was required because of constraints with the existing rail depot facility at Cardiff Canton, namely:

- Cardiff Canton TMD is located to the west of Cardiff Central, adjacent to Cardiff West Junction, which is operating close to capacity – the reliability of services on the CVL would be affected negatively if the new rolling stock was housed in this facility
- Cardiff Canton TMD has insufficient space and a lack of facilities[49] to house and maintain the new rolling stock for the CVL

13.3 Initial scope of work and changes made

13.3.1 A high-level overview of the original scope of works for the Taff's Well Depot Line Operation as set out in the original business plan[50] is summarised in the table below.

Table 13.1: Taff's Well Depot – original scope of works

Operation	Scope of works
Taff's Well	Enabling works to help deliver a new rolling stock depot at Taff's Well in order to provide facilities to house and maintain the new rolling stock for the CVL. Works comprise 3.6ha of serviced land ready for a new depot to be delivered and the creation or improvement of one inter-modal facility.

13.4 Operation logic map

13.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

13.4.2 Given the nature of this Operation, no outcomes and impacts which are specific to it are identified (beyond direct employment at the depot), rather the Operation was an enabler of the new depot and, by extension, the delivery of the outcomes and impacts associated with SWMP2 overall.

[49] Canton is a Diesel Multiple Unit TMD, so is not suited to the maintenance of Electric Multiple Units.

[50] Taff's Well Depot Site Preparation Business Plan, 26th July 2018. Contract letter dates 30th July 2018

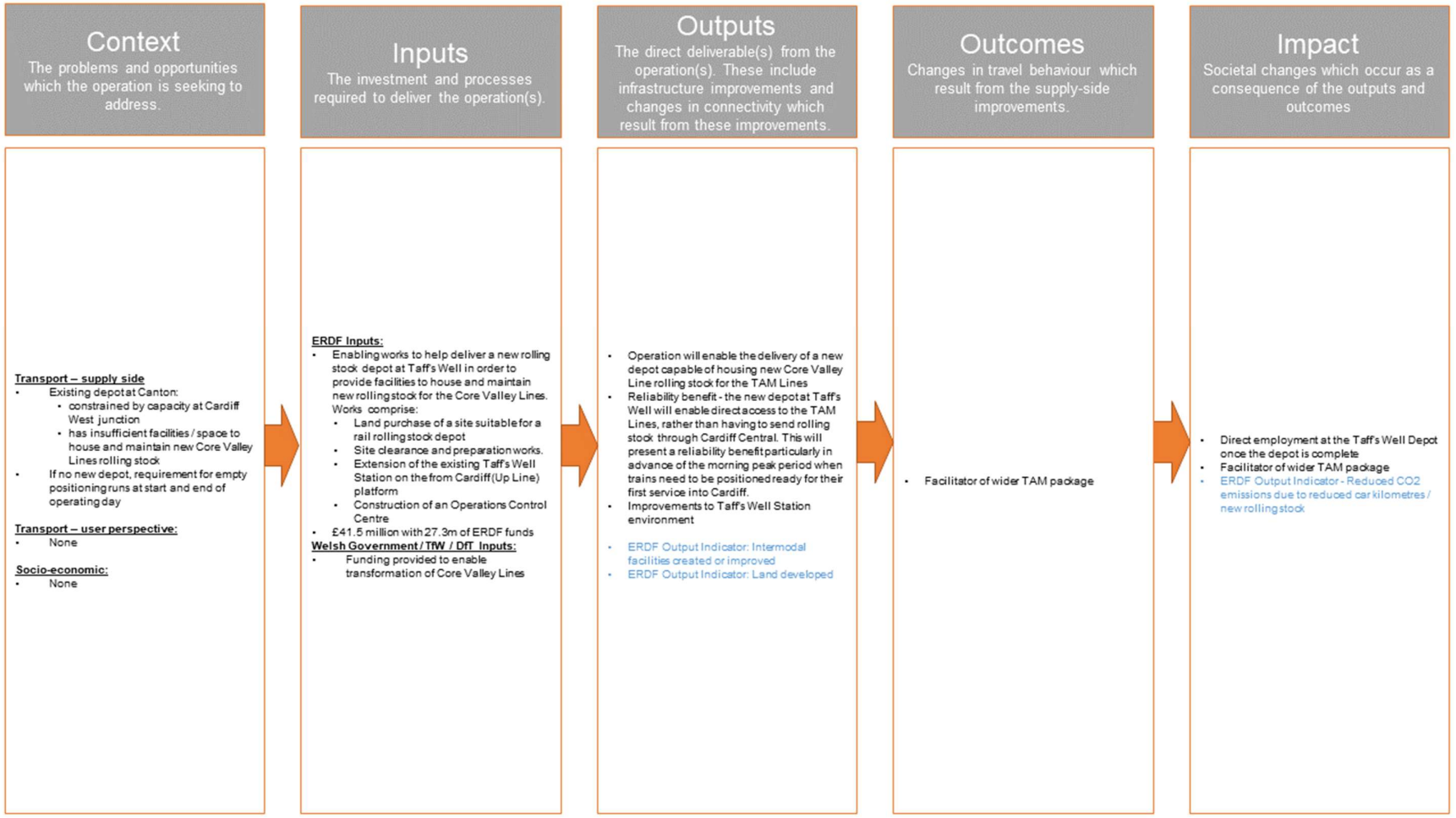


Figure 13-1: Logic map for Taff's Well Depot Operation

13.5 Operation Delivery

13.5.1 The Operation was completed in February 2023. It was necessary to reprofile the Operation timescale during delivery due to COVID-19 related delays and value engineering exercises. The re-profiling took place at the following times:

- **June 2021:** the Operation end date was extended to November 2022.
- **November 2022:** the Operation end date was extended by a further two months to January 2023.
- **May 2023:** Operation Outputs clarified and the end date extended to January 2023.

13.5.2 There were a number of problems which needed to be resolved during the delivery of the Taff's Well Operation. These included:

- underground **river terrace deposits and soft spots** identified during the ground remediation phase - to resolve this, an intense testing regime was implemented along with increased excavation and replacement of the deposits.
- **asbestos** was identified which caused a delay to the building demolition works - this was resolved by tendering for a specialist contractor to remove the asbestos.
- **Japanese knotweed** was discovered on site – this was remediated by a specialist contractor during the ground remediation phase.
- the new road access and footbridge which were initially included in the ERDF scope of works could no longer be completed within the ERDF timeframe due to delays in project delivery and were therefore removed from the ERDF funded scope. These aspects will however now be funded by monies independent of those provided through ERDF.

13.6 Process evaluation

13.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework.

- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. Specifically in relation to the Taff's Well Operation, WEFO highlighted that TfW considered the possibility of selling and leasing back the new rolling stock depot on completion. However, they realised early that this approach may not have complied with funding conditions, and proactively sought WEFO's advice on the matter.

- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of the Taff's Well Operation surpassed targets (see Section 13.10) and resulted in a range of wider benefits. These included the use solar powered CCTV and lights as a pilot energy saving measure, resulting in cost and CO_2 savings. This approach was subsequently adopted during the delivery of other Operations.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. At Taff's Well, this included the removal of the access road and footbridge from the ERDF Scope of Works due to being unable to deliver this aspect within the ERDF timescales (this is now being funded independently of ERDF). However, in place of this, the new Operational Control Centre was brought into scope. This approach highlights the benefit of WEFO having the flexibility to reallocate funding across its portfolio, although always within the context of delivering the agreed benefits and value for money. Similarly, the site clearance for Taff's Well was delivered below the initial budget allocation and a proportion of the ERDF funds which had been allocated to this aspect was transferred to the Operation Control Centre construction costs as well as works for the feeder station.

- **the successful adherence to COVID-19 guidelines** during the construction, phase, including additional welfare and hand washing facilities and use of face masks - the adoption of these practices enabled construction to continue during large parts of the COVID-19 pandemic and therefore prevented additional delays to the programme.

Learned learned

- **increased risk of abortive work and cost escalation due to tight delivery schedule** - the requirement to deliver design and construction activities in parallel, driven by the 'hard' programme end date[51], increased the risk of abortive work and thus cost escalation. One of the stakeholders interviewed in relation to Taff's Well specifically noted that there is "merit in going when you are ready".

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

[51] This was in part driven by the United Kingdom's departure from the European Union, which removed the opportunity to roll-over any unfinished works into the next Structural Funds period.

- **milestone-based payment mechanism definition disadvantageous** - whilst a milestone-based payment mechanism was potentially appropriate, there was a shared client and IDP view that its definition in the contract was too rigid and was disadvantageous to both TfW and AIW.
- **engagement with local authority** - whilst engagement with the local community was identified as a key success, it was specifically noted in relation to this Operation that engagement with the local authority, Rhondda Cynon Taff, could have been improved. One specific example was provided where a change to the construction method was not clearly communicated to the Council, although this issue was subsequently rectified.

13.7 Budget and out-turn costs

13.7.1 The table below shows the total approved eligible expenditure of the Taff's Well Operation and the ERDF grant contribution and intervention rate as recorded within the original Taff's Well business plan[52] and the final business plan[53].

Table 13.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£41,589,947	£27,307,959	65.66%
Final business plan	£41,589,947	£27,307,959	65.66%
Difference	*£0*	*£0*	*0%*

13.7.2 As shown, the approved eligible expenditure has not changed between the date of the original business plan (July 2018) and the final business plan (June 2023). However, it is noted that, whilst the eligible expenditure remained the same, there were revisions in design from what was original envisaged as a result of more information becoming available during site surveys. This included the delivery of an Operation Control Centre which was facilitated by the deferral of a road bridge which was originally proposed but was removed from the Operation scope and funded independently.

13.8 Output Indicators

13.8.1 The table below sets out the target and outturn Output Indicators for the Taff's Well Operation. In the case of the Taff's Well Operation, the target Output Indicators did not change during the course of the project from those included in the original business plan.

[52] Taff's Well Depot Site Preparation, 26th July 2018. Contract letter dates 30th July 2018

[53] Taff's Well Depot Site Preparation, 16th May 2023. Contract letter dates 8th June 2023

Table 13.3: Taff's Well Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Land Developed	3.6 hectares of serviced land ready for a new depot to be delivered	3.6 hectares of serviced land ready for a new depot to be delivered	✓
Inter-modal facilities created or improved	1	1	✓
Reduction in carbon dioxide equivalent emissions	N/A – target set at programme level only		

13.8.2 As shown, this Operation has achieved the Output Indicator target for land developed and inter-modal facilities created or improved. Further information on these aspects is set out below.

Land developed and inter-modal facilities created or improved

13.8.3 Welsh Government acquired the former Forgemasters building and associated land at Garth Works Industrial Estate in Taff's Well, Rhondda Cynon Taf, for the delivery of this Operation. The photographs below show the development of the land at the acquired site. Prior to the site clearance, the original site contained industrial buildings which contained asbestos (Figure 13-2). These were demolished (see Figure 13-3) and the ground prepared prior to infrastructure works. The site is shown in Figure 13-4 post site clearance and preparation, with the new Operation Control Centre building shown in the top right of the photograph.

Figure 13-2: Taff's Well land developed – prior to site clearance

Figure 13-3: Taff's Well land developed – during demolition of site

Figure 13-4: Taff's Well land developed – post site clearance and preparation

13.8.4 Rail access and egress to the site was achieved by the installation of a complex switch and crossing track section which will divert trains from the mainline into the new depot at Taff's Well. To achieve this, significant works were undertaken to the Taff's Well 'from Cardiff' (Up Main) platform including improvements to enable accessible boarding. This delivered the Output Indicator of 'one inter-modal facility created or improved'.

13.8.5 This is a key enabler of enhanced services on the Treherbert, Aberdare and Merthyr Tydfil lines, which will be operated by rolling stock stabled at Taff's Well Depot. The new depot will enable direct access to the mainline in both directions, rather than having to send rolling stock through Cardiff Central. This will present a reliability benefit particularly in advance of the morning peak period when trains need to be positioned ready for their first service into Cardiff.

13.8.6 The redevelopment of the site also represents a regeneration opportunity for Taff's Well, with the potential for the completed site to bring further investment and jobs to the area. Whilst the site is complete, the depot is not yet operational. Once operational, it is envisaged that in the region of 170 staff will be employed at the new depot, comprising 80 drivers / conductors, 40 maintenance staff, 35 office / support staff and 15 cleaning staff. This is an **increase of around 10% in total headcount** in comparison to the current depot arrangements associated with the CVL.

Reduction in carbon dioxide equivalent emissions

13.8.7 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. The analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a reduction in carbon dioxide emissions of **177,900 tonnes within the**

CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.

13.8.8 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall.

13.9 Result Indicator

13.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 13.4: Taff's Well Depot – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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
Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres

13.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold will be met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 13.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[54]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

13.10 Cross Cutting Themes

13.10.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets:

[54] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

Table 13.6: Taff's Well Depot – outturn Cross Cutting Theme targets versus original and final Cross Cutting Theme targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	1	3
Sustainable Development	1	3	5
CCT General	3	3	7
Total	**5**	**7**	**15**

13.10.2 As shown, the number of CCTs delivered as part of the Taff's Well Operation has exceeded the initial and final targets. The delivery of CCTs has resulted in a range of benefits, including for example:

- the use of solar powered CCTV and lights led to a saving of 3,213kg of CO_2 compared to a standard diesel-powered light and a cost saving of £1,019. There were also wider benefits of this pilot as the approach was subsequently adopted during the delivery of other Operations.

- the renovation and improvement of allotment plots created good relations between staff working on the Taff's Well Operation and an allotment society and demonstrated TfW and the contractor's commitment to the local community.

13.10.3 The table below maps the case level CCTs for Taff's Well and provides detail on the achievement of each element.

Table 13.7: Taff's Well Depot –Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Positive action measure – Other	✓	TfW and the IDPs developed an ex-offenders' pathway to employment which has resulted in a number of ex-offenders being employed. One of the IDPs held a deaf awareness course to improve communication across the team and better include a team member with hearing loss. A local charity called 'Calon Hearts' carried out defibrillator training at the Taff's Well site in November 2022. This resulted in 14 people learning / updating their knowledge on how to use a defibrillator.
	Disability Access Group engagement	✓	TfW brought together an accessibility and inclusion panel focused on the railway network to provide feedback and express concerns about COVID-19 restrictions (e.g., face masks and social distancing). The panel also considered improved accessible boarding and wayfinding issues.
Sustainable Development	Development of an organisation travel plan and sustainable transport initiative	✓	A survey of all staff was undertaken and an organisation travel plan and associated sustainable transport initiatives were developed. Having moved to its new home at Llys Cadwyn in the heart of Pontypridd, TfW developed a new travel plan to help decarbonise their transport networks by encouraging people to make healthier, more sustainable and more active travel choices when travelling to work.
	Environmental Site Management Plan	✓	Taff's Well Design and construction ESMP was prepared and followed.
	Resource efficiency measures	✓	Waste material was used to build up the hard standing at Taff's Well and the excess was used on other sites.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
			Solar powered CCTV and lighting were used at the Taff's Well site to reduce CO_2 emissions. Over an 8-week period, the light saved 3,213kg of CO_2 in comparison to a standard diesel-powered light and saved £1,019 in costs. AiW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing to jobseekers in South Wales who would otherwise be unable to access this type of clothing.
General	Stakeholder engagement good practice activity	✓	A £2,500 donation was made to Cancer Research UK from Tidy Productions on behalf of Amey Rail, which is one of Amey's chosen charities. Station Adopters were recruited who monitor the condition of stations and make aesthetic improvements, such as floral displays for example.
	Integration of social clauses into an activity	✓	Renovation and improvement of allotment plots undertaken by contractor Alun Griffiths. This project has created good relations between the staff working in Taff's Well and an allotment society and has demonstrated TfW and Alun Griffiths' commitment to the local community. Apprentice recognition – apprentices were recommended for awards for their work during the pandemic. Action for Children – money was raised to provide toys for disadvantaged children / donations were made to Cancer Research. A local 14-year-old was taken on a site visit by the Taff's Well Team.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW have been appointed as CCT Champions to support the nine ERDF Operations. They integrate economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

13.11 Conclusion

13.11.1 The Taff's Well Operation was highly successful in delivering against its business plan commitments, including the Output Indicators and CCT commitments. Indeed, with respect to the latter, the number of CCTs achieved by this Operation was more than double its final target and three times its original target. A further success was the delivery of the Operation Control Centre which was facilitated by the deferral of the proposed road bridge until after the ERDF funding period.

13.11.2 Strong partnership working between WEFO and TfW was an important element of this success ensuring that the scope and funding profile reflected what could be delivered within the timescale. This maximised the leverage of the ERDF funds and thus overall value for money.

13.11.3 The Taff's Well Operation has acted as an important enabler for wider depot project, which in-turn is crucial to the ultimate delivery of enhanced services on the Treherbert, Aberdare and Merthyr Tydfil lines.

14 West Wales and the Valleys Station Improvements Operation

14.2 Overview

14.2.1 A contributory factor to the relatively long journey times and, on occasions, poor performance, on the CVLs is **extended station dwell times**. The Timetable Planning Rules for the CVL stations work on the basis of a 30-second dwell time for DMU stock.[55] This is the elapsed time from the train stopping to its restarting after the completion of station duties. Most CVL stations however do not have **accessible boarding**, which can delay the departure of services – this can affect all passengers (e.g., those with luggage, pushchairs etc) but it specifically impacts on **PRM**, who currently require deployment of a ramp to get onto the train.

14.2.2 Where ramp-based access is required, the guard must find the ramp; deploy it; assist the passenger to board; stow the ramp; and then commence the door closure sequence, a process which can take 2-4 minutes and which is influenced by a number of factors (e.g., how busy the train is, where the passenger is located on the platform etc). The irregularity of ramp use means that it cannot be included in the core train plan and thus it will consume any performance time allowance in the timetable. In a network where there are long sections of single track and where all four of the CVLs converge on Cardiff, even small delays can have significant knock-on impacts on reliability.

14.2.3 Moreover, like the infrastructure more generally, many of the **CVL stations have suffered from an extended period of underinvestment**. Several stations on the network are unattractive to passengers either due to poor facilities and / or security concerns, whilst some stations are either **partially or entirely inaccessible to PRM**.

14.2.4 The **WW&V Stations Improvement Operation** has therefore delivered a major package of investment across stations on the CVL. The stations within the WW&V programme are those on the Treherbert, Aberdare and Merthyr Tydfil lines north of Taff's Well, and on the Rhymney line north of Caerphilly tunnel. The Operation itself consists of upgrades to station platform infrastructure to allow for accessible boarding and improvements to inter-modal facilities, improving access for PRM, reducing dwell times at stations and therefore reducing journey times and improving reliability for all users as well as the delivery of other inter-modal facilities.

14.3 Initial Scope of works and changes made

14.3.1 A high-level overview of the original scope of works for the WW&V Station Improvements Operation as set out in the original business plan[56] is summarised in the table below.

[55] Commentary on the Western & Wales Timetable Planning Rules 2022 version 1.0 (Network Rail, 2020), p. 99.

[56] Core Valley Lines Station Improvements, West Wales and the Valleys, Welsh Government, 30th June 2020, emailed 27th August 2021

Table 14.1: West Wales and the Valleys Station Improvement Operation – original scope of works

Operation	Scope of works
West Wales and the Valleys Station Improvements	38 stations in the West Wales and the Valleys Operational Programme considered for accessible boarding improvements and 30 inter-modal facilities created or improved.

14.3.2 Initially, this Operation included all the inter-modal facilities for all the line-based Operations in WW&V excluding some more extensive works at Aberdare, Quakers Yard, and Rhymney Stations[57]. The latter were originally costed into the Aberdare, Merthyr, and Rhymney Operations as they were seen as linked to track / line improvements. However, this was updated in 2023 to bring these costs into this operation.

14.3.3 Other changes to the scope included:

- the term **'level boarding'** was used in the initial business plans to describe accessibility improvements at stations. As the Operations developed, it was necessary to review and refine the definition of works to be carried out at each station and a review of the terminology in the business plans was undertaken. With greater clarity on the works to be delivered, the term 'level boarding' was considered to be too restrictive given the spectrum of works that would be involved. The term was therefore updated to the broader 'improved accessible boarding'.

14.4 Operation logic map

14.4.1 To inform the evaluation of this Operation, a logic map has been developed which sets out the outputs, outcomes, and impacts which are expected to result from its delivery. This is displayed overleaf and is based on the description of the logic map headings set out in **Chapter 2**.

[57] With the exception of the more extensive works at Aberdare, Quakers Yard and Rhymney Stations, the intermodal indicators for all the West Wales and the Valleys line based operations were included in this operation from the outset but were also included in the line based operations. During the course of delivery, the intermodal indicators were taken out of the West Wales and the Valleys line-based operations so that there was no risk of duplicate counting of indicators

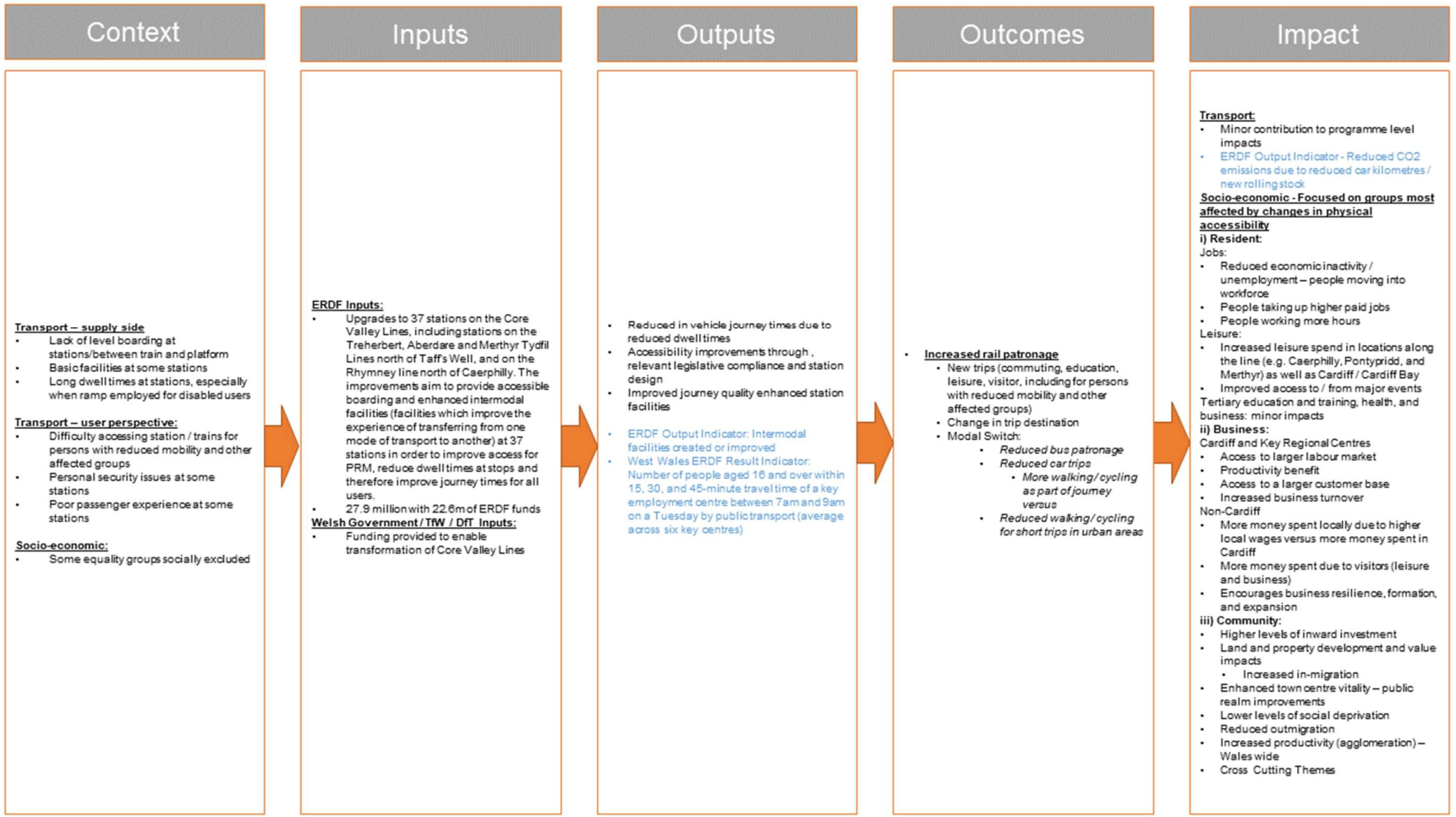


Figure 14-1: Logic map for West Wales and Valleys Stations Improvement Operation

14.5 Operation delivery

14.5.1 The Operation was completed in August 2023. It was necessary to reprofile the Operation timescale during delivery due to COVID-19 related delays and other challenges. The re-profiling took place at the following times:

- **August 2021:** the Operation end date was extended to October 2022.
- **November 2022:** the Operation end date was extended by six months to April 2023.
- **August 2023:** the Operation end date was extended to August 2023.

14.6 Process Evaluation

14.6.1 A process evaluation covering SWMP2 overall is included in Chapter 17. This identifies the key successes and lessons learned in terms of delivery, some of which reflect the overall approach taken in delivering the nine Operations collectively and some of which relate more specifically to individual Operations. The discussion provides a summary of the findings from the process evaluation with reference to this specific Operation.

Successes

- **the establishment of TfW in 2016, and the transfer of responsibility for the Wales and Borders Franchise to TfW in 2018** - this established clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework. Whilst a success overall, it should be noted that, across the Operations, there was considered to be a **slight loss of continuity when the project was handed over from Welsh Government to TfW**. Whilst a wholesale transfer of responsibility of this nature on projects is uncommon, it is an important lesson in terms of ensuring a smooth and coordinated handover when such circumstances do arise.
- **the strong relationship between WEFO and TfW** – there was a clear line of responsibility between WEFO and TfW, with close partnership working to realise shared outcomes. WEFO noted that TfW was particularly responsive to information requests to inform audits and the information provided was of a high quality. Specifically in relation to this Operation, the two organisations worked closely together to: (i) develop and finalise the scope; (ii) allocate additional ERDF funding to reflect the additional works required to deliver station improvement works at Aberdare and Quakers Yard; and (iii) extend the Operation closure date to reflect the challenges posed both by delivering the works during the COVID-19 pandemic and more conventional project challenges such as land acquisition and securing planning permission (e.g., at Quakers Yard).
- **communication between WEFO and Welsh Government** – WEFO proactively briefed Welsh Government and advised on when they were

reallocating funding, reprofiling Operations etc - this ensured that policy officials and ultimately Ministers were suitably briefed on progress and any emerging issues, recognising that SWMP2 overall contained locally funded elements.

- **the competitive dialogue procedure** - from a procurement perspective, there was broad stakeholder agreement that the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution which may not otherwise have emerged. Working with one main contractor also simplified the funding process in terms of enabling the attribution of costs to ERDF.

- **robust governance and assurance framework** - from a standing start, TfW developed and implemented a robust project governance and assurance framework across the nine Operations and SWMP2 as a whole. Whilst this may require refinement in future, it is a framework which could be replicated on future large scale infrastructure projects.

- **robust approach to risk management** - the approach to risk management, and in particular the adoption of QCRA, was robust and in line with best practice.

- **managing engagement with the local community / the general public** - TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early to the local community in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit.

- the specification of community and societal benefits in the contracts and their delivery through those contracts, particularly with regards to CCTs – the number of CCTs achieved during the delivery of this Operation significantly exceeded targets (see Section 14.10) and resulted in a range of wider benefits. It was noted that having CCT Champions integrated into the Operation from outset smoothed the process of compiling evidence and completing the CCT reporting, whilst also allowing CCTs to be ‘claimed’ throughout the Operation delivery.

- **WEFO flexibility in terms of the reallocation of funding** - there were a number of changes in Operation budgets and scope as the design work crystalised, consents were granted (or otherwise) and as a result of wider influences on project timescales, such as COVID-19 and the impact of the war in Ukraine. A pragmatic, flexible and realistic approach to scope and budget was maintained throughout to ensure that the station improvements at Aberdare, Quakers Yard and Rhymney could be delivered.

Lessons learned

- it was necessary to reprofile the Operation timescale during delivery due to COVID-19 related delays and other challenges - one issue which was identified as having contributed to some delays to starting work on site was the outsourcing of some routine station improvement works to a third-party contractor. In future schemes, delays could be avoided by involving contractors earlier in the process and / or providing detailed guidance on expectations in terms of reporting.

- a specific issue on this Operation was the means by which the Output Indicator 'Inter-modal facilities created or improved' was defined – originally, there was an expectation that multiple 'inter-modal' facilities could be claimed per station. However, after work on the Operations began WEFO clarified that one inter-modal facility per station could be claimed. This provided clarity to all parties in relating to achieving the indicators with the terminology in the Operation Business Plan subsequently updated to reflect this. Similarly, with greater clarity on the works to be delivered, the term 'level boarding', which was used in the original Business Plans to describe accessibility improvements at stations, was considered to be too restrictive given the spectrum of works that would be involved. The term was therefore updated to the broader 'improved accessible boarding'. .

- the need to **clearly define the scope and key terminology** at the outset is therefore an important lesson emerging from this Operation.

- allied to the above point, it was noted that a **funding allocation should not be made until the scope is fully detailed** - With the scope of this Operation regularly evolving (as described above), it was noted that it was difficult to allocate funding and agree objectives and targets, whilst there was an administratively burdensome process of routinely updating the Operation Business Plan. This again however reflects the specific programme constraint faced by all nine Operations.

- **adoption of NEC4 Option E contracts** - a consequence of the hard programme deadline and limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering – this was a further consequence of the fixed project end date, and thus there is a key theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- a key challenge recorded by stakeholders was that **ERDF objectives were not as well understood as they should been**, and consequently were not given the prominence in the programme that they required. It was explained that this was **in part due to staff turnover**. To address this issue, it was suggested that **'ERDF Champions'** should have been allocated to each Operation to facilitate the overall process and to work with the Principal Project Manager and train / brief new team members on the delivery side.

- different inter-modal facilities were being delivered by different teams, which made achieving consistency in the reporting process complex. This could potentially be improved by defining reporting arrangements in advance, appointing one body to coordinate all deliverables or allocating all works at each station to one contractor.

- more generally, it was recommended that **improved communication between WEFO and the Operation delivery team** would have been advantageous on this Operation, supporting finance teams to make the correct assessments and forecasts for current and future claims. Monthly meetings were suggested and in the latter stages of the programme period, WEFO and TfW moved to monthly meetings which was advantageous.

14.7 Budget and out-turn costs

14.7.1 The table below shows the total approved eligible expenditure for the WW&V Stations Improvement Operation and the ERDF grant contribution and intervention rate as recorded within the original business plan[58] and the final business plan[59].

Table 14.2: Operation approved eligible expenditure and ERDF intervention rate – original business plan versus final business plan

	Approved Eligible Expenditure	ERDF grant	Intervention Rate for European Funds
Original business plan	£22,974,549	£15,085,089	65.66%
Final business plan	£27,974,549	£22,668,088	81.03%
Difference	*+£5,000,000*	*+£7,582,999*	*+15.37%*

14.7.2 As shown in the table above, the approved eligible expenditure of the WW&V Stations Improvement Operation increased by circa £5m, reflecting the greater price certainty which emerged as asset surveys were undertaken and detailed design work progressed. Additional works which emerged included embankment

[58] Core Valley Lines Station Improvements, West Wales and the Valleys, Welsh Government, 30th June 2020, emailed 27th August 2021

[59] Core Valley Lines Station Improvements, West Wales and the Valleys, Welsh Government, 3rd August 2023

works at Quakers Yard and the platform extension and improvement work at Aberdare.

14.7.3 Outside of these very specific improvements, there was a general requirement to reprofile expenditure due to COVID-19 delays and value engineering of the initial solution.

14.7.4 The ERDF grant contribution increased by circa **£7.6m** in absolute terms, and from **66% to 81%** of the total Operation costs. The ERDF contribution as a proportion of the total cost therefore increased. This was because additional grant was provided which was decommitted from other ERDF areas in the programme and offered to a small number of metro operations (and other projects) with escalating costs. This supported budgetary pressures for the beneficiary and successful completion of the operation from beneficiary budgets.

14.8 Output Indicators

14.8.1 The table below sets out the target and outturn Output Indicators for the WW&V Stations Improvement Operation.

Table 14.3: WW&V Stations Improvement Operation - Output Indicators

Output Indicator	Target	Outturn	Fulfilled
Inter-modal facilities created or improved	37	33	× - see below
Reduction in carbon dioxide equivalent emissions	N/A – target set at programme level only		

14.8.2 As shown, the inter-modal facilities created or improved target was not achieved. This is because improvements at four stations were not achieved as follows:

- **Caerphilly Station** - plans with Caerphilly County Borough Council to develop a more extensive scheme have resulted in deferring the scope of CVL works, although a more extensive scheme is expected to be delivered as a result.
- **Rhymney Station** - planning delays due to the requirement to move a staff building within the station complex have resulted in works being delivered outside the ERDF timeframe.
- **Tonypandy and Ynyswen Stations** - these stations, on the Treherbert line, have been affected by service diversions required on this line. This has delayed design work meaning, works will be delivered outside the ERDF envelope.

Inter-modal facilities created or improved

14.8.3 In total, 33 stations have received inter-modal facility improvements. Of these, platform adjustments for improved accessible boarding were made at 17 stations

and inter-modal facilities were created or improved at 28 stations. The Output Indicator overall has therefore not been delivered within the ERDF funding. This is because the creation or improvement of inter-modal facilities at the following stations was not achieved:

- **Caerphilly Station** - there was an aspiration to develop a more extensive station improvement scheme. This could not be delivered within the ERDF programme timelines but will be progressed independently. Whilst this inter-modal facility cannot be claimed within this Operation, there will ultimately be a higher quality station delivered at Caerphilly in the longer-term.

- **Ynyswen, and Tonypandy Stations** – proposed works at these stations were delayed by unanticipated service diversions which had to be undertaken as part of the Treherbert Line Operation. This delayed design work meaning that these works could not be delivered within the ERDF timescales. The works at these stations will again be progressed independently.

14.8.4 By way of example, the below photographs show platform adjustments at Aberdare Station.

Figure 14-2: Improved accessible boarding opportunities at Aberdare Station

14.8.5 As a further example, the images below show the works undertaken at Quakers Yard to enhance the embankment and create a new platform at the station.

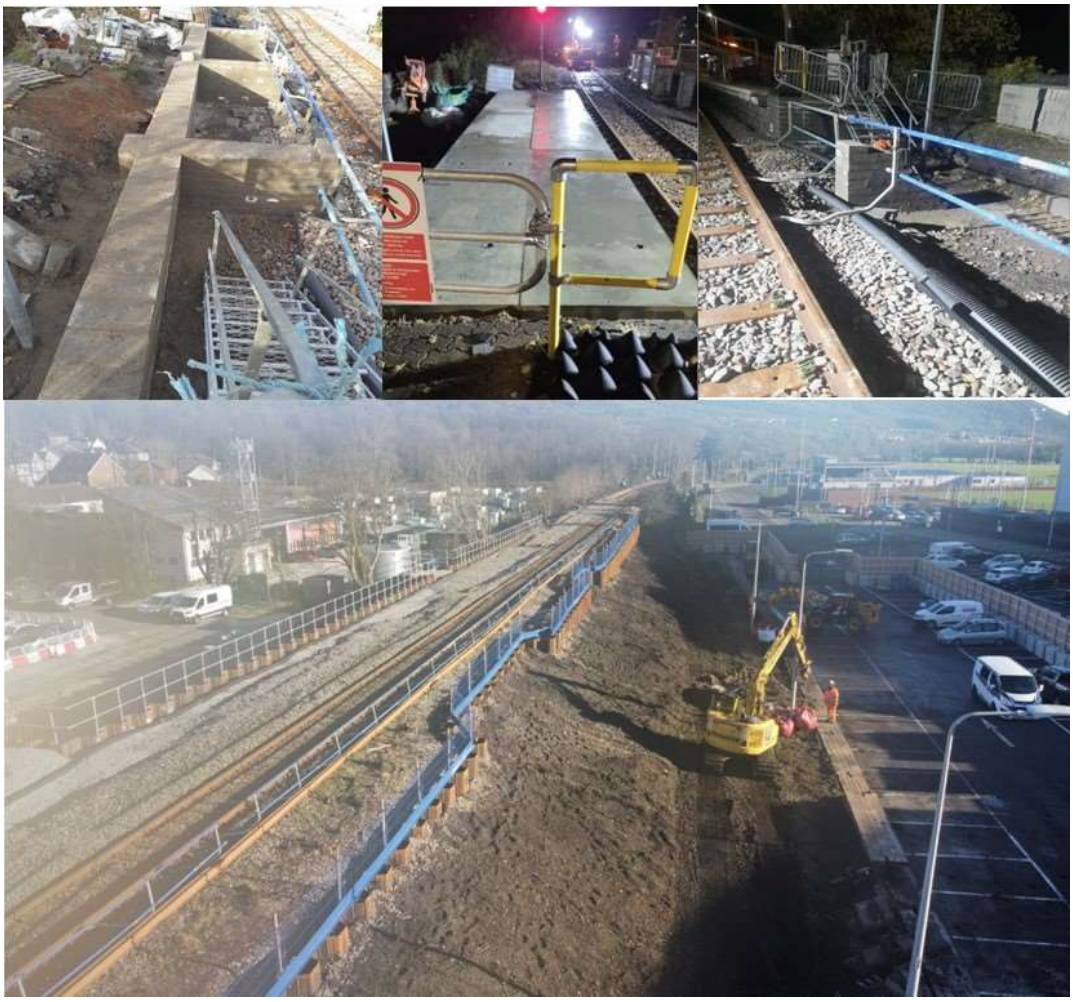


Figure 14-3: Embankment works and new platform creation in progress at Quakers Yard

14.8.6 A new footbridge has also been installed at Quakers Yard and other stations have received improvements such as shelters, bicycle hoops, wayfinding, and Customer Information Systems including help points. These have been installed at 28 stations with examples shown in the figures below.

Figure 14-4: Accessible footbridge, shelter and wayfinding at Quakers Yard

Figure 14-5: Bicycle hoops and customer information screens at Quakers Yard

Reduction in carbon dioxide equivalent emissions

14.8.7 The reduction in carbon dioxide equivalent emissions Output Indicator was set at the collective SWMP2 level only but is reported here for completeness. Analysis of modelled data suggests that the delivery of SWMP2 as a whole will lead to a

reduction in carbon dioxide emissions of **177,900 tonnes within the CVL area over the 15-year period to 2040. The majority of this reduction (92%) will result from rolling stock replacement and 8% will be a result of modal shift from car to rail.**

14.8.8 This Operation is one of several enabling measures which will support the realisation of this Output Indicator at the level of SWMP2 overall. Improved accessibility and higher quality facilities will be key to attracting passengers onto the railway, promoting modal shift from the car to the train.

14.9 Result Indicator

14.9.1 The relevant Result Indicator was set at the West Wales and the Valleys Operational Programme level but is reported here for completeness.

Table 14.4: West Wales and the Valleys Station Improvements – West Wales and Valleys Result Indicator

Indicator	Number of people aged 16 and over within 15, 30, and 45-minute travel time 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
Target value (2023)	An increase of 5% in each time band (compared to 2015 levels), calculated as an average across the 6 key centres

14.9.2 The assessment of this indicator is based on modelled outputs from TRACC connectivity software, comparing a base 'no CVL enhancements' scenario with 'Scenario 1a', which included the CVL enhancements. **The 5% minimum threshold will be met for each time banding**, with a **7%** increase in population within 15 minutes, a **22%** increase in the population within 30 minutes, and a **48%** increase in the population within 45 minutes.

Table 14.5: West Wales and Valleys Result Indicator - Outcomes

Journey Time	Percentage change in population within specific journey time bands of a key centre between base and Scenario 1a[60]
0 -15 minutes	7%
15-30 minutes	22%
30-45 minutes	48%

[60] Averaged across six key centres along the Core Valley Lines network – Aberdare, Caerphilly, Cardiff Bay, Cardiff city centre, Merthyr Tydfil, Pontypridd

14.10 Cross Cutting Themes

14.10.1 The table below summarises the number of CCTs achieved by this Operation set against the original and final targets:

Table 14.6: West Wales Stations Improvement Operation – outturn Cross Cutting Theme targets versus original and final Cross Cutting Theme targets

	Original Target	Final Target	Achieved
Equal Opportunities and Gender Mainstreaming	1	4	7
Sustainable Development	1	3	3
CCT General	2	2	4
Total	**4**	**9**	**14**

14.10.2 As shown, the number of CCTs delivered as part of the WW&V Stations Improvements Operation has significantly exceeded the initial and final targets. The table below maps the case level CCTs for this Operation and provides detail on the achievement of each element.

Table 14.7: West Wales and Valleys Stations Improvement Operation – Cross Cutting Theme Case Level Indicators

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
Equal Opportunities, Gender Mainstreaming and the Welsh language	Disability Access Group Engagement	✓	In March and July 2022, two separate Accessibility and Inclusion (AI) panel meetings took place to discuss wayfinding, hazard and guidance tactiles, and personal accessibility at upgraded CVL stations.
			The improved accessible boarding improvements delivered through this Operation.
	Positive Action Measures – Other	✓	Balfour Beatty worked with Transport for Wales, to create an innovative pathway to work for ex-offenders: 'Building Futures – On the right track'
	Positive action measure-older people	✓	On the 18th of December 2019, an accessibility meeting took place. This workshop discussed the transformation proposal for many stations that have had little to no previous accessibility with the aim of providing step free access from road to platform.
	Positive action measure – disabled people	✓	
Sustainable Development	Development of an organisation Travel Plan and sustainable transport initiative	✓	Having moved to Llys Cadwyn in the heart of Pontypridd, TfW developed a new Travel Plan to help decarbonise their transport networks by encouraging staff to make healthier, more sustainable and more active travel choices.
	Environmental Site Management Plan	✓	Alun Griffiths implemented ESMPs for their construction works at Quakers Yard station.
	Resource Efficiency measures	✓	AIW worked with Working Wardrobe, a scheme to provide good quality interview and work clothing for jobseekers in South Wales who would otherwise be unable to access this type of clothing. This support also created volunteering opportunities, relieving financial burdens on jobseekers and providing people with confidence in interviews. AIW and TfW employees donated clothing in November 2022.

Cross Cutting Theme	Case Level Indicator	Fulfilled	CCT Examples
General	Integration of Social Clauses	✓	Each year AIW hold an online charity auction. This is done through Microsoft Teams, where suppliers and contractors donate items which are then open to email bids and 'live auctioned'. Items are donated and communications to employees share what has been donated so as to gain as much interest as possible. Cerebral Palsy Cymru, The Trussell Trust Newport and Cancer Research UK were the three beneficiaries receiving over £3,300 each.
	Developing / engaging CCT champions	✓	Two Project Management Assistants at TfW were appointed as CCT Champions to support the nine ERDF operations. They integrated economic, social and environmental outcomes into a CCT case study for each ERDF Operation.

14.11 Conclusion

14.11.1 The WW&V Operation has delivered a transformational programme of investment at 33 CVL stations, improving accessibility to trains for PRM and providing a wider programme of enhancements. This investment has significantly improved the quality of the CVL station estate and will make using the railway both easier and more attractive for passengers.

14.11.2 There was a marginal shortfall with respect to the 'inter-modal facilities created or improved' Output Indicator. This was because the creation or improvement of inter-modal facilities at four stations (Caerphilly, Dinas Rhondda, Ynyswen, and Tonypandy) was not achieved within the ERDF funding. These station works will still however be undertaken after the completion of the ERDF programme, so there will be no overall diminution in the Metro services ultimately provided.

14.11.3 With respect to CCTs, this Operation was particularly successful. The **14** CCTs delivered was more than treble the original target and nearly one and a half times the final target.

15 Updated Post-COVID-19 Baseline

15.2 Overview

15.2.1 As set out in Chapter 1, having assessed the delivery and performance of each individual Operation, the remainder of this report focuses on providing a wider evaluation of the overall Metro programme in accordance with WelTAG Stage 5. To help inform this wider evaluation, this chapter sets out an updated post-COVID-19 pre-SWMP2 baseline with respect to public transport supply and demand in the study area.

15.2.2 When undertaking a wider evaluation, it is important that there is a robust *ex ante* baseline against which to compare the *ex post* position. A detailed pre-SWMP2 baseline was set out within the SWMP2 Interim Evaluation Report.[61] However, the baseline established within the Interim Evaluation Report reflects the pre-COVID-19 position in terms of 2019 service levels, demand, and travel behaviour. This was the most appropriate approach at the time given that a settled post-COVID-19 position in terms of travel behaviour had not been reached. However, with respect to a future outcome and impact evaluation, working from a pre-COVID-19 baseline presents a challenge. This is because comparing the **post-SWMP2 opening position against a pre-COVID-19 baseline will capture changes as a result of both SWMP2 and COVID-19, and it will not therefore be possible to isolate their respective impacts**.

15.2.3 To this end, this chapter sets out an **updated post-COVID-19 baseline with respect to public transport supply and demand**. It examines available national and local authority level data on travel patterns since COVID-19 to provide aggregate insights into the impact of the pandemic on travel, before setting out an update with respect to rail demand and bus service provision within the study area.

Resident Survey

15.2.4 It is important to note that an update to the **resident survey** undertaken as part of the Interim Evaluation to inform pre-SWMP2 travel behaviour has not been undertaken. This survey is the only source of detailed information on travel behaviour in the study area prior to the delivery of SWMP2. However, the survey asked respondents about their travel during the year 2019 and therefore reflects pre-COVID-19 travel patterns. This will present a challenge for any future evaluation as it will be difficult to isolate the impacts of SWMP2 and COVID-19 on travel behaviour in the study area. It is also noted that the survey was undertaken prior to the introduction of the default 20mph speed limit on 'restricted' roads (from September 2023) and therefore does not reflect this change.

[61] see: https://tfw.wales/projects/monitoring-and-evaluation/south-wales-metro-phase-2-interim-evaluation.

15.3 COVID-19 and travel behaviour

15.3.1 COVID-19 has had a significant impact on travel patterns and has resulted in longer-term changes in travel behaviour, including an increase in hybrid working. Whilst some time has passed since the pandemic, the extent and permanency of these changes remains somewhat unclear. In part, this is because travel patterns are yet to fully reach a settled post-COVID-19 position and in part, it is because of the time lag between changes occurring and relevant data becoming available. Data are also relatively limited, particularly at the sub-national level.

15.3.2 In advance of examining available data at the study area level, this section summarises changes in transport behaviour at the Great Britain level since COVID-19 in order to provide an aggregate insight into overall trends.

Daily domestic transport use by mode

15.3.3 The Department for Transport (DfT) has published data covering transport demand by mode at the national level since COVID-19, with usage shown as a percentage of a pre-COVID-19 baseline.

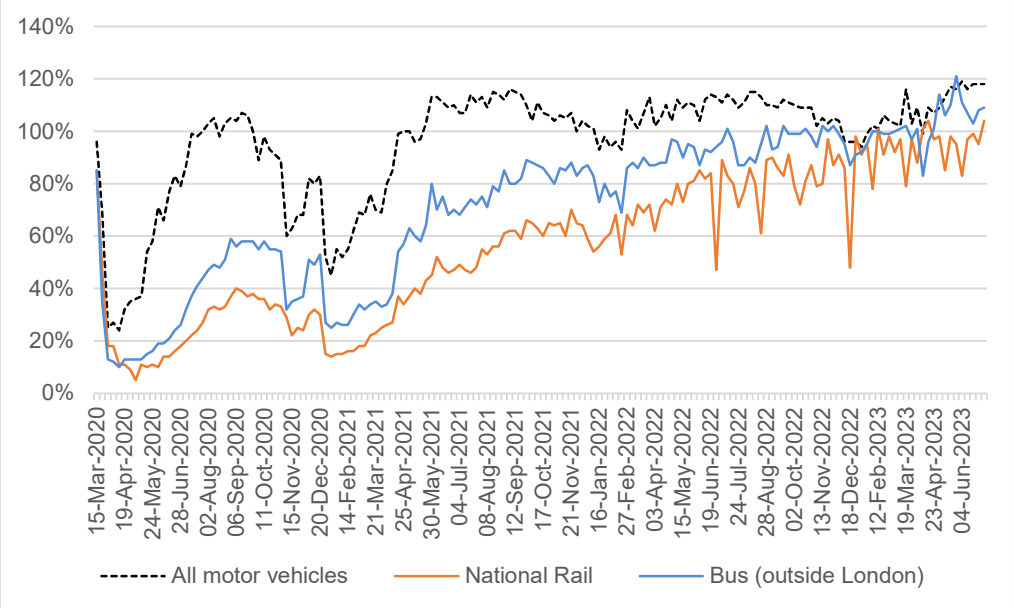


Figure 15-1: Domestic transport usage by mode, March 2020 – June 2023 (Department for Transport[62])

15.3.4 As shown, motor vehicle usage (as recorded via the DfT's automatic traffic count site network) demonstrated the quickest recovery to pre-

[62] https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic/domestic-transport-usage-by-mode. It is noted that for all modes, usage fluctuates day to day and bus use outside of London is heavily impacted by school holidays throughout the year.

COVID-19 levels, as would perhaps be expected given prevailing health concerns around the use of public transport.

15.3.5 Public transport usage increased at a slower rate and has generally remained below pre-COVID-19 levels until mid-2023. Rail use declined the furthest and took the longest to recover which is likely a product of rail's strong market share for commuting. At the start of the pandemic, rail patronage dropped to 5% of its pre-COVID-19 level, rising to **34%** in early April 2021, **62%** in early April 2022 and **101%** in early April 2023.

15.3.6 Whilst the data suggest that overall rail use has now reached pre-COVID-19 levels, there has been changes in the profile of demand, with wider UK data suggesting that much of the growth in rail demand has been driven by a rebound in off-peak travel, with commuting still lagging behind pre-COVID-19 levels.

15.4 Updated baseline data

Rail demand

Station usage

15.4.1 The most recent estimates of station usage at each station on the CVL network produced by the Office of Rail and Road (ORR) have been reviewed to help identify how rail demand in the study area has changed since the pandemic. Figure 15-2 shows the change in total station usage between 2005/06 and 2021/22 and Table 15.1 shows the percentage change in total station usage and compound growth between: (i) 2005/6 and 2019/20 (as set out in the Interim Report); and between (ii) 2019/20 and 2021/22.

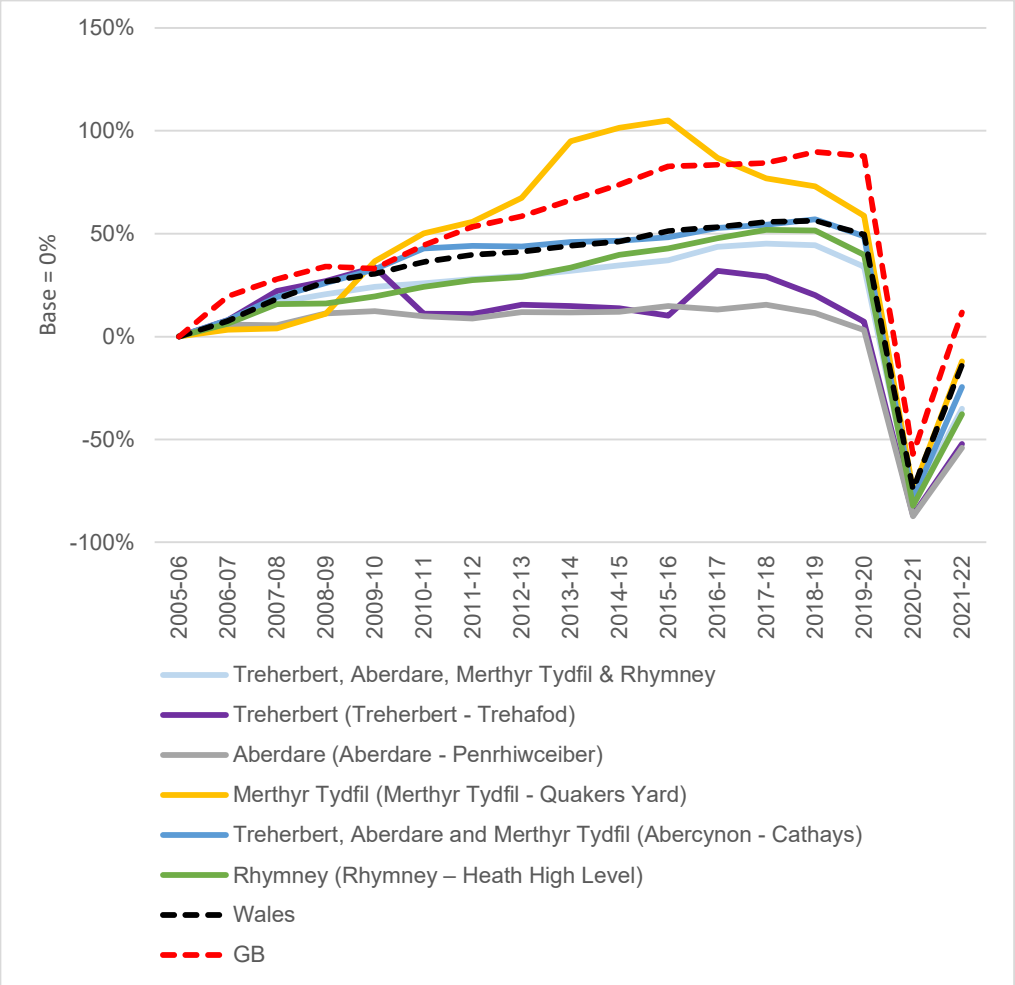


Figure 15-2: Change in total station usage 2005/6 to 2021/22

Table 15.1: ORR station usage 2005-06 to 2021-22

Line (Section)	Section	Station Usage			Percentage Change	
		2005-06	2019-20	2021-22	2005/06 to 2019/20	2019/20 to 2021/22
Treherbert, Aberdare, Merthyr Tydfil & Rhymney[63]	From Cardiff Queen Street along the length of all lines	9,472,787[64]	12,688,106[65]	6,145,396	*34%*[66]	*-52%*
Treherbert	Treherbert – Trehafod	1,099,869	1,179,256	526,308	*7%*	*-55%*
Aberdare	Aberdare – Penrhiwceiber	666,287	687,990	306,224	*3%*	*-55%*
Merthyr Tydfil	Merthyr Tydfil – Quakers Yard	392,116	622,938	345,488	*59%*	*-45%*
Treherbert, Aberdare and Merthyr Tydfil	Abercynon – Cathays	2,805,090	4,170,908	2,115,296	*49%*	*-49%*
Rhymney	Rhymney – Heath High Level	2,382,944	3,332,930	1,486,012	*40%*	*-55%*
Wales		**33,716,363**	**50,416,200**	**29,031,826**	***50%***	*-42%*
Great Britain		**1,601,297,692**	**3,007,144,054**	**1,788,478,136**	***88%***	*-41%*

[63] Excluding the City and Coryton Lines stations

[64] This figure differs from that included in the *Interim Evaluation Report* as the data in that report did not include the Rhymney Line.

[65] This figure differs from that included in the *Interim Evaluation Report* as the data in that report did not include the Rhymney Line.

[66] This figure differs from that included in the *Interim Evaluation Report* as the data in that report did not include the Rhymney Line.

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

- passenger volumes reduced dramatically during 2020/21 as a result of the COVID-19 pandemic but started to recover during the following year.
- the speed of this recovery has varied across lines and individual line sections on the CVL, with the Merthyr Tydfil Line returning to **55%** of pre-COVID-19 demand, but the Treherbert, Aberdare and Rhymney lines only returning to **45%** of pre-COVID-19 demand over the year up to March 2022. Across Great Britain, station usage was approximately **60%** of pre-COVID-19 levels over the same period. The return to rail travel has therefore been slower on the CVL network. However, this is likely to be in part a result of closures on the CVLs due to works associated with the delivery of SWMP2. Available information on closures on the CVL network associated with SWMP2 works (see Appendix D) suggests that there were at least **40 days** in 2021/22 during which there was some level of disruption on the network.
- whilst ORR estimate are only available up to March 2022, further increases in rail demand have occurred since this period. Data from the DfT indicates that, at the UK level, rail usage returned to pre-COVID-19 volumes in April 2023. In addition, analysis of emerging LENNON data suggests that there has been a continued recovery.

Station-to-station origin destination pairs

15.4.3 The station-to-station origin-destination pairs further develop the volumetric station usage data by providing insights into the end-to-end journeys being made by passengers. Table 15.2 provides a breakdown of the proportion of two-way trips in the year up to March 2023 between selected stations on each CVL and:

- Cardiff – including Cardiff Central and Cardiff Queen Street
- Cardiff Bay
- Other stations on the CVLs outside of the central Cardiff stations listed above
- other stations in Cardiff Local Authority which are not on the CVLs (e.g., Coryton)
- other stations in Cardiff Capital Region which do not fall into any of the categories above (e.g., Cwmbran and Maesteg)
- stations beyond the Cardiff Capital Region

15.4.4 Table 15.2 shows the percentage change in the above two-way trips between: (i) the year up to September 2019; and (ii) the year up to March 2023.

15.4.5 It should be noted that these relatively aggregated levels of spatial definition are used because of the commercial confidentiality issues around LENNON data, particularly in terms of reporting individual station-to-station flows.

Table 15.2: Proportion of two-way trips between selected stations on the CVL network in the year up to March 2023

	Cardiff BR[67]/Queen Street/ Central	Cardiff Bay	Other Stations on CVLs	Other Stations in Cardiff LA	Other Cardiff Capital Region	Beyond Cardiff and the CVLs
Treherbert	41%	1%	46%	2%	8%	2%
Aberdare	46%	1%	37%	2%	10%	4%
Merthyr Tydfil	37%	1%	47%	1%	8%	5%
Rhymney	57%	2%	30%	1%	9%	2%
Abercynon	45%	2%	46%	2%	4%	2%
Pontypridd	37%	2%	47%	3%	8%	3%
Bargoed	60%	1%	29%	1%	5%	2%
Caerphilly	59%	2%	27%	1%	6%	4%

15.4.6 As was the case during the Interim Evaluation stage, for each of the stations listed, the key origin / destinations are Cardiff BR / Queen Street / Central and other stations on the CVLs, with flows to / from Cardiff Bay and beyond Cardiff negligible.

[67] 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.

Table 15.3: Percentage change in two-way trips for selected stations on the CVL network – year up to September 2019 versus year up to March 2023

Station	Cardiff BR[68]/Queen Street/Central	Cardiff Bay	Other Stations on CVLs	Other Stations in Cardiff LA	Other Cardiff Capital Region	Beyond Cardiff and the CVLs
Treherbert	-78%	-93%	-69%	-81%	-48%	-51%
Aberdare	-65%	-88%	-56%	-66%	-46%	-44%
Merthyr Tydfil	-50%	-79%	-43%	-64%	-27%	-33%
Rhymney	-43%	-77%	-59%	-65%	-50%	-18%
Abercynon	-69%	-90%	-42%	-56%	-65%	-37%
Pontypridd	-49%	-79%	-31%	-28%	-41%	-19%
Bargoed	-33%	-74%	-37%	2%	-54%	-19%
Caerphilly	-36%	-70%	-34%	-38%	-40%	-22%

[68] 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.

15.4.7 In comparison to the year up to September 2019, flows during the year up to March 2023 are considerably lower, with the total number of two-way trips included in the matrix reducing by half since the pre-COVID-19 period. In general, the largest reductions both in terms of absolute and percentage terms are between the CVL stations and Cardiff BR and Cardiff Bay which likely reflects the changes in working patterns since COVID-19. As discussed above, the reduced demand across the network is also likely to be in part a result of closures on the CVLs due to works associated with the delivery of SWMP2.

Bus network

Bus services and frequency

15.4.8 The bus network in the Valleys provides both end-to-end (e.g., Heads of the Valleys to Cardiff) and local connections between settlements. During the stakeholder engagement undertaken to inform the Interim Evaluation, seven bus routes were identified as the strategic routes which run alongside the relevant railway corridors. Given the impact of COVID-19 on bus service demand and provision across the UK, a review of these services was undertaken to determine if there has been any major changes since the Interim Evaluation. Table 15.4 lists the seven routes identified in the *Interim Evaluation Report* along with a brief update on their status. It is our understanding that the seven routes are operated commercially.

Table 15.4: Current status of bus services identified in the *Interim Evaluation Report*

Bus Service	Operator	Route	Status
C8	Adventure Travel	Taff's Well – Cardiff Bay	Discontinued
T4	Stagecoach	Cardiff – Merthyr Tydfil	X4 amalgamated with the T4 service. Service frequency on the T4 route has been increased accordingly, so there has been no change in service levels
X4	Stagecoach	Cardiff – Merthyr Tydfil	
60/61	Stagecoach	Pontypridd – Aberdare	No significant change
120	Stagecoach	Caerphilly – Blaencwm, providing a connection between Treherbert	Weekday service frequencies increased to approximately half hourly

Bus Service	Operator	Route	Status
		and Treforest / Pontypridd	
130	Stagecoach	Blaencwm – Caerphilly, providing a connection between Treherbert and Pontypridd	Weekday service frequencies increased to approximately half hourly
132	Stagecoach	Maerdy – Cardiff, providing a connection between Pontypridd / Porth and Cardiff	No significant change

15.4.9 Updated information on the number of bus services per day for each of the services which continue to operate is provided in Table 15.5.

Table 15.5: Number of bus services per day – I*nterim Evaluation Report* versus 2023

			Interim Evaluation Report (2021)			June 2023 update		
Service	Route	Days	Mon	Sat	Sun	Mon	Sat	Sun
T4 / X4	Merthyr Tydfil – Cardiff	Mon – Sun	26	26	6	26	25	11
60/61	Aberdare – Pontypridd	Mon – Sat	45	45	-	45	45	-
120	Treherbert – Treforest	Mon – Sat	12	12	5	20	20	-
130	Treherbert – Pontypridd	Mon – Sat	15	15	6	20	20	-
132	Porth – Cardiff	Mon – Sun	45	45	10	47	47	9

15.4.10 Overall, there have been relatively few changes to the strategic bus routes in the area, with only service C8 being withdrawn since the *Interim Evaluation Report* was published. Indeed, the number of services per day has actually increased on services 120, 130, and 132. In part, this likely reflects the post-COVID-19 recovery of bus services, with the figures in the *Interim Evaluation Report* likely directly impacted by COVID-19.

15.4.11 Beyond the strategic routes, there have been some changes on the supported networks elsewhere in the region. These changes may potentially impact some feeder services linking more outlying areas into rail-served towns. To capture these changes and provide an accurate picture of public transport connectivity across the region prior to SWMP2, the connectivity baseline has been updated to reflect the post-COVID-19 bus network – this is discussed further in **Chapter 16**.

15.4.12 Bus Journey Times Table 15.6 compares bus journey times for the above noted route sections in 2023 with those from the *Interim Evaluation Report* in 2021.

Table 15.6: Bus journey time comparison – 2021 versus 2023

Bus Service	Route Section	Journey time (minutes)					
		2021		2023		Change	
		AM	PM	AM	PM	AM	PM
T4	Merthyr Tydfil – Cardiff	65	65	62	59	-3	-6
60/61	Aberdare – Pontypridd	60	60	52	49	-8	-11
120	Treherbert – Treforest	95	95	73	73	-22	-22
130	Treherbert – Pontypridd	75	75	66	66	-9	-9
132	Porth – Cardiff	75	85	74	69	-1	-16

15.4.13 Since the *Interim Evaluation Report* was produced, bus journey times have improved across all services, most notably:

- on the 120, during both the AM and PM peak, where journey times have reduced by 23% / 22 minutes. This time saving partially results from a reduction in waiting time at Pontypridd Bus Station (average wait reduced from 10 minutes to 3 minutes)
- on the 60 / 61 and 132 during the PM peak where journey times have reduced by approximately 18%

15.4.14 Table 15.7 shows the journey times by bus and rail between selected CVL railway stations. This information is taken from the timetables as of 2023.

Table 15.7: Journey time comparison – bus versus rail

Bus Service	Rail line in competition	Origin Rail Stations	Destination Rail Stations	Journey time (minutes, 2023)					
				AM			PM		
				Rail	Bus	Rail minus bus	Rail	Bus	Rail minus bus
T4	Merthyr Line	Merthyr Tydfil	Cardiff Central	62	62	0	62	59	3
60/61	Aberdare Line	Aberdare	Pontypridd	32	52	-20	32	49	-17
120	Treherbert Line	Treherbert	Trefforest	36	73	-37	36	73	-37
130	Treherbert Line	Treherbert	Pontypridd	33	66	-33	33	66	-33
132	Treherbert Line	Porth Station	Cardiff Central	23	74	-51	23	69	-46

15.4.15 Whilst bus journey times have improved since 2021, rail remains **15-50** minutes faster than bus across all competing routes, except for Merthyr Tydfil to Cardiff Central where journey times are comparable due to the express service operated by Stagecoach.

15.5 Conclusion

15.5.1 Drawing on available secondary datasets, this chapter has set out an updated post-COVID-19 baseline with respect to rail demand and bus service provision within the study area.

15.5.2 Key points are as follows:

- a review of national level rail demand data covering the period up to June 2023 suggests that **rail use has returned to pre-COVID-19 levels for Great Britain** as a whole. However, it is understood that the **profile of demand** has changed with daily commuting trips still lagging pre-COVID-19 rates, compensated by higher levels of off-peak travel.

- available data for the study area suggests that COVID-19 led to a considerable fall in rail demand, particularly between the CVLs and Cardiff Central / Cardiff Queen Street and Cardiff Bay, likely reflecting the above changes with respect to commuting patterns.

- ORR data covering the period up to **March 2022** suggests that **rail demand on the CVLs had returned to around 45-55% of pre-COVID levels** by this time, compared to a **national level** return of approximately **60%**. Whilst emerging data covering the subsequent period suggests that there has been a further increase, the recovery in the study area has been slower than that nationally. This is likely to be a result of closures due to works associated with the delivery of SWMP2 which have led to a direct reduction in demand.

- given the changes in travel patterns since COVID-19, including the higher rates of off-peak travel, it will be important to compare outturn rail demand figures following the completion of SWMP2 to a post-COVID-19 baseline rather than focusing on the pre-COVID-19 analysis established during the Interim Evaluation stage. Further consideration of the potential impact of line closures due to SWMP2 works should also be given during any subsequent post-opening evaluation.

- a **review of the strategic bus network suggests that there have relatively few changes to routes and / or journey times since 2021**, with only service C8 removed and the frequency increased on a number of services. Beyond the strategic routes however, there have been some changes on the supported networks elsewhere in the region which could potentially impact some feeder services to CVL stations. Reflecting this, the West Wales Output Indicator and the wider connectivity analysis have

been updated so that they now use a post-COVID-19 public transport network. This is discussed further in **Chapter 16**.

16 Output Evaluation

16.2 Overview

16.2.1 This chapter provides a summary of the emerging outputs from the delivery of SWMP2 overall.

16.2.2 As set out in Chapter 2, during the Interim Evaluation Stage, an overall SWMP2 logic map was developed which identifies the potential outputs, outcomes, and impacts of SWMP2 and during a wider evaluation of SWMP2, the extent to which these outputs, outcomes, and impacts have been delivered would typically be explored. However, as indicated in Chapter 2, given the ERDF funding requirement to complete the evaluation by 31st March 2024 and the fact that outcomes and impacts take longer to materialise, rather than outputs, outcomes, and impacts, this wider evaluation as outlined in this chapter necessarily focuses only on the extent to which the **outputs** have been delivered.

16.2.3 The outputs identified in the logic map can broadly be divided into two categories:

- the change in **connectivity** offered by SWMP2
- **other outputs**, including the number of direct connections, line speeds, journey times, service frequency and accessibility improvements

16.2.4 Each of these is discussed further below.

16.3 Connectivity Analysis

16.3.1 The West Wales and Valleys Result Indicator introduced in **Chapter 3** is intended to provide a proxy for the change in connectivity to education, employment, leisure opportunities etc. However, it is a fairly rudimentary measure. As expressed in the logic maps, SWMP2 is predominantly about tackling transport problems, which will result in improved travel behaviour outcomes which in-turn will generate positive societal and economic impacts.

16.3.2 To help evidence these aspects, in the *Interim Evaluation Report*, a baseline for the study area was established which set out:

- public transport access to employment (i.e., connectivity to jobs)
- **public transport access to 'population'** (i.e., connectivity to the labour market for businesses)
- **correlations between deprivation** for a subset of 'domains'[69] in the Welsh Index of Multiple Deprivation (WIMD) **and poor public transport**

[69] WIMD is currently made up of eight separate domains (or types) of deprivation namely: Income, Employment, Health, Education, Access to Services, Housing, Community Safety, and Physical Environment

connectivity to the 'source' of their deprivation (e.g., employment-related deprivation and poor public transport connectivity to jobs)

16.3.3 As with the West Wales and Valleys Result Indicator, the above analysis was based upon Q1 2017 public transport timetable data and 2015 population data. Again, due to the impact of COVID-19 on public transport networks, there is a need to update the baseline analysis using more recent data as previously described.

16.3.4 With this in mind, this section updates the baseline set out in the *Interim Evaluation Report* for each of the above bullets. In addition, this section also establishes the outturn position which will be realised once SWMP2 is delivered and operational through the use of the June 2023 CVL timetable revision, as previously described.

Public transport access to employment and population

16.3.5 To develop a detailed picture of levels of connectivity within the study area prior to and post the delivery of SWMP2, a series of 'Hansen' connectivity indicators were developed.

16.3.6 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 the Hansen methodology and process is provided in 280Appendix E

16.3.7 The weightings were developed from analysis of the England National Travel Survey journey purpose by distance data[70]. Each calculation produces a single value 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 (as was done for the West Wales and Valleys Result Indicator).

16.3.8 Details of the journey time calculations undertaken to inform the development of the Hansen Indicators are provided in Table 16.1.

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

Table 16.1: Journey time calculations completed to inform Hansen Indicators

Origin	Destination	Period
Lower super output areas[71] (LSOAs) in Cardiff, Merthyr Tydfil, Caerphilly, Rhondda Cynon Taf, Bridgend, Vale of Glamorgan[72], and Blaenau Gwent	LSOAs in Cardiff Capital Region	Average across three time periods: 07:00 – 09:00

Two scenarios were compared as follows:

- **baseline Scenario:** which used Q3 2023 public transport timetables with no CVL enhancements
- **scenario 1a:** which used Q3 2023 public transport timetables with amendments made to the CVL to reflect the June 2023 timetable revision

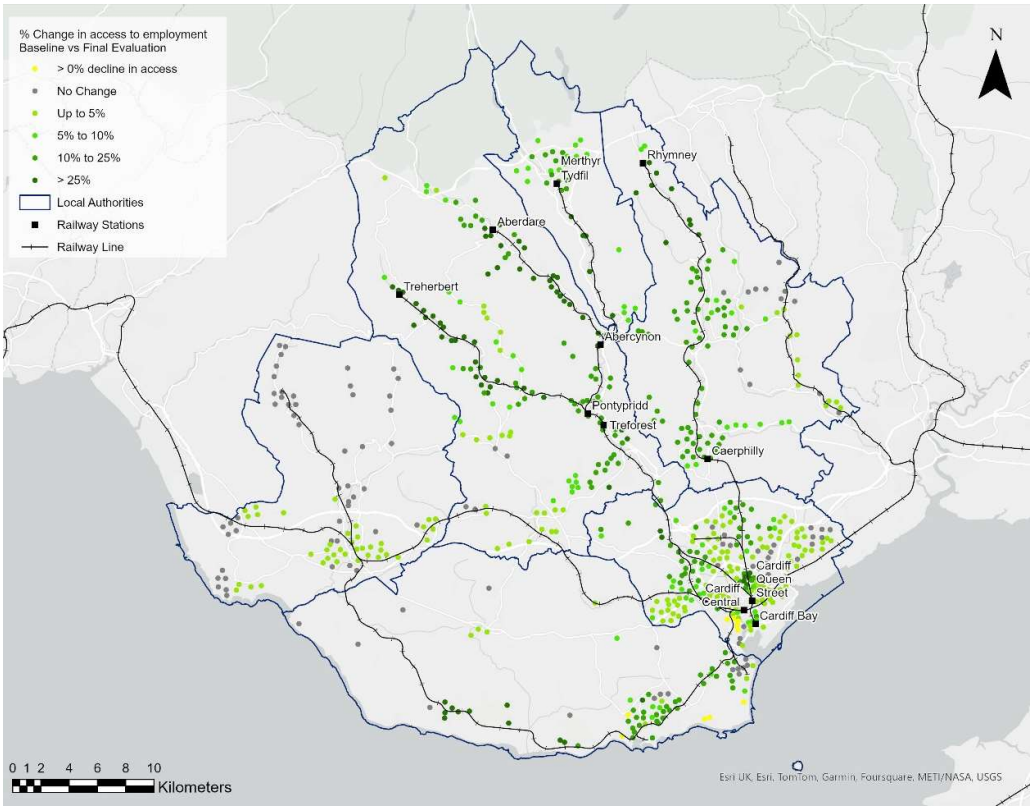
16.3.9 Using the results from the above journey time calculations, the following connectivity indicators were then developed for each scenario:

- **connectivity 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 'criterion'. Employment data to inform this analysis was taken from the Business Register and Employment Survey (BRES) 2021. 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) and business-to-business connectivity** in the study area.
- **connectivity 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 'criterion'. Population data to inform this analysis was taken from ONS Mid-Year Population Estimates 2020. 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**.

[71] Lower Super Output Areas are a standard Census Geography. They are made up of groups of Output Areas, usually four or five and comprise between 400 and 1,200 households and have a usually resident population of between 1,000 and 3,000 persons.

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

Connectivity to employment (jobs)



16.3.10 Figure 16-1 shows the change in Hansen connectivity to employment by public transport between the Baseline Scenario and Scenario 1a.

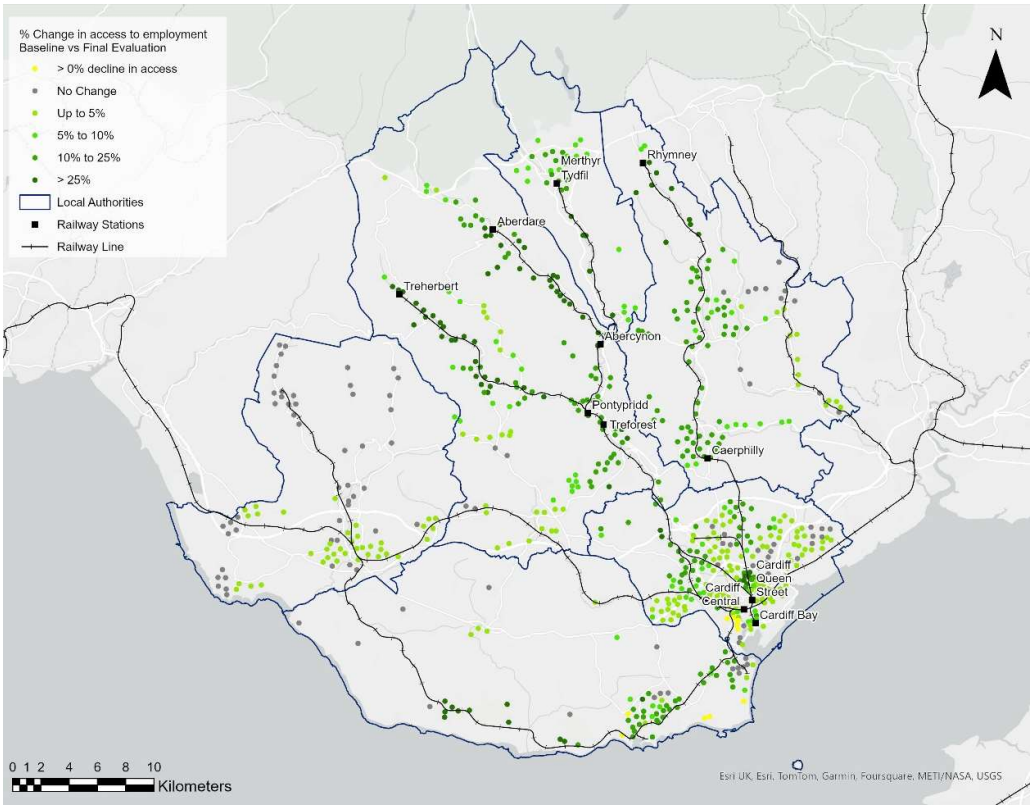


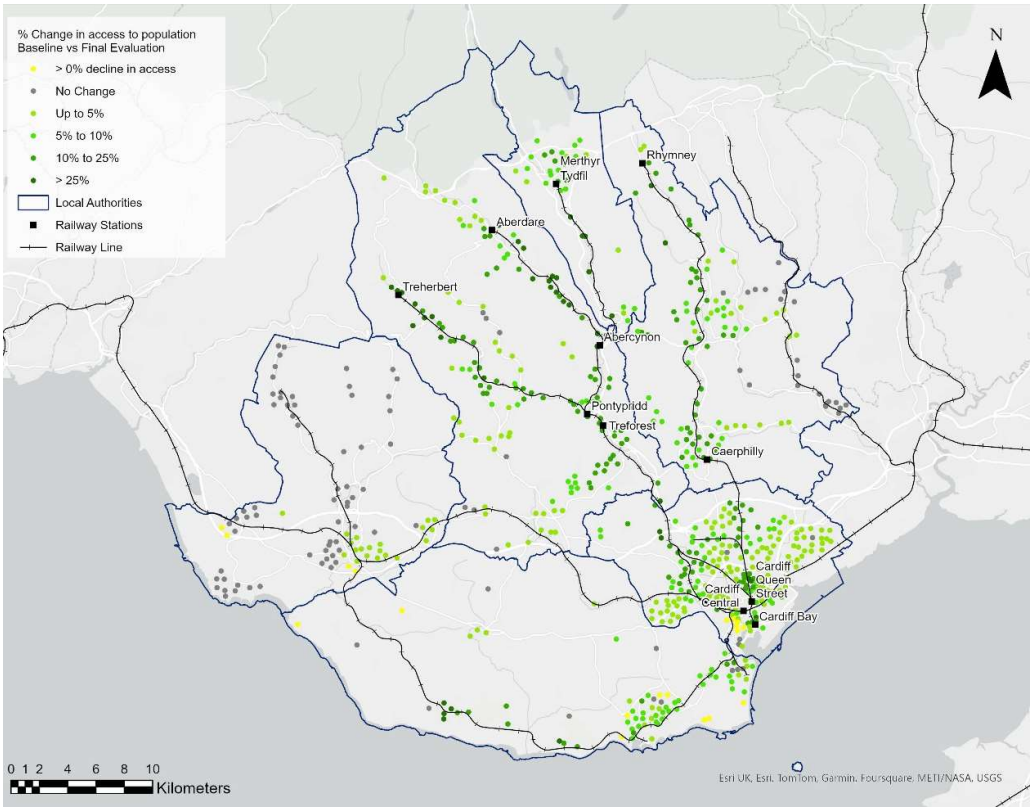
Figure 16-1: Change in Hansen public transport access to employment – Baseline versus Scenario 1a

16.3.11 The above figure highlights that the delivery of SWMP2 will result in a **major improvement in connectivity to employment** across the study area. As would be expected, the largest increases occur in the Heads of the Valleys where Hansen access to employment figures improve by **25%** or more. The level of improvement progressively reduces for settlements closer to Cardiff. This is to be expected given that public transport journey times from the areas further south on the CVL to the employment centres in the capital were shorter in the Baseline Scenario and the improvement in journey time benefits provided by SWMP2 is therefore smaller for these locations.

16.3.12 There are also benefits in terms of connectivity to employment for settlements not adjacent to the CVLs although, as would be expected, these benefits are smaller than those for the locations directly alongside the CVL network.

16.3.13 There are a small number of locations in south-east Cardiff and the Vale of Glamorgan where the analysis indicates that there has been a decline in access to employment. These declines are minor and are likely a result of infrequent bus services in the area which operate on a non-clockface timetable being more poorly connected to the arrival and departure times in the Scenario 1a rail timetables than those used in the Baseline Scenario.

Connectivity to population (labour market)



16.3.14 Figure 16-2 shows the change in Hansen access to population by public transport between the Baseline Scenario and Scenario 1a. This is a measure of business-to-people connectivity in the study area i.e., the potential labour market catchment from each employment location.

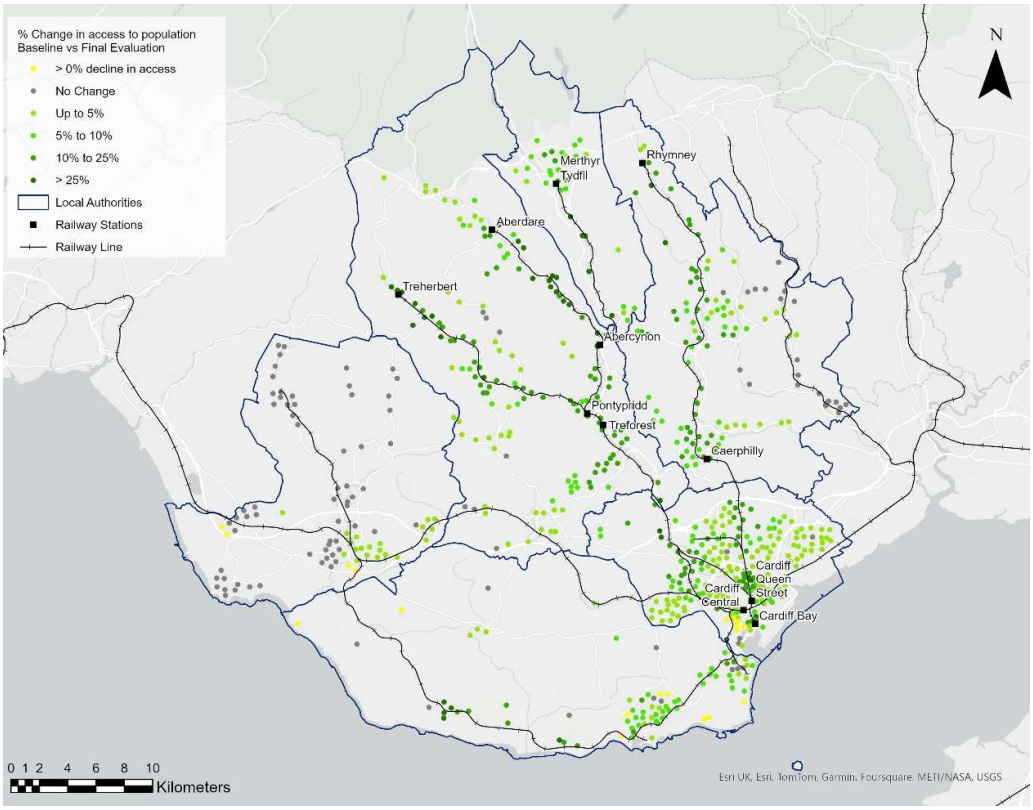


Figure 16-2: Change in Hansen public transport access to population – Baseline versus Scenario 1a

16.3.15 The benefits in terms of connectivity are again apparent in this figure, with the largest benefits accruing to communities in the Heads of the Valleys and progressive reductions for settlements closer to Cardiff.

16.3.16 Enhancements in connectivity to labour could bring a range of benefits for local businesses in these locations, including reduced vacancies, better matching of skills to jobs and overall improvements in productivity. Given the ongoing tightness of the Welsh and UK labour market more generally, it is essential that the transport network maximises the labour pool from which businesses can draw.

16.3.17 With connectivity to labour being a key determinant of business location, improved transport connectivity will also be an important factor in attracting inward investment into the Valleys' communities.

Connectivity and Deprivation

16.3.18 A key driver of SWMP2 is the desire to enhance socio-economic prosperity and reduce entrenched and generational deprivation in the Valleys communities. To understand the relationship between transport connectivity and deprivation in the study area in more detail during the Interim Evaluation stage, Stantec's Connectivity and Deprivation Audit (CDAT) tool was applied.

16.3.19 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)
- 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)

16.3.20 The tool therefore enables the identification of areas where poor public transport connectivity may be a contributory factor to deprivation.

16.3.21 CDAT classifies each location (in this case, Lower Super Output Areas) into three tiers based upon a 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

16.3.22 The analysis undertaken examined levels of deprivation in terms of, and connectivity to employment, education (colleges), education (universities), and hospitals.

16.3.23 Overall, the analysis found that the areas with the greatest correlation between deprivation and poor public transport connectivity were in the north of the Valleys, suggesting that poor connectivity to / from these areas contributes to higher levels of deprivation.

16.3.24 At the Final Evaluation stage, the above analysis was repeated using the updated rail timetables to determine the extent to which SWMP2 reduces this correlation.

16.3.25 The figures below show at each origin location the relative impact of SWMP2 on journey times to employment (Figure 16-3), further education colleges (Figure 16-4), universities (Figure 16-5) and hospitals (Figure 16-6). Information on the education and health sites used to inform these maps is included in Appendix F

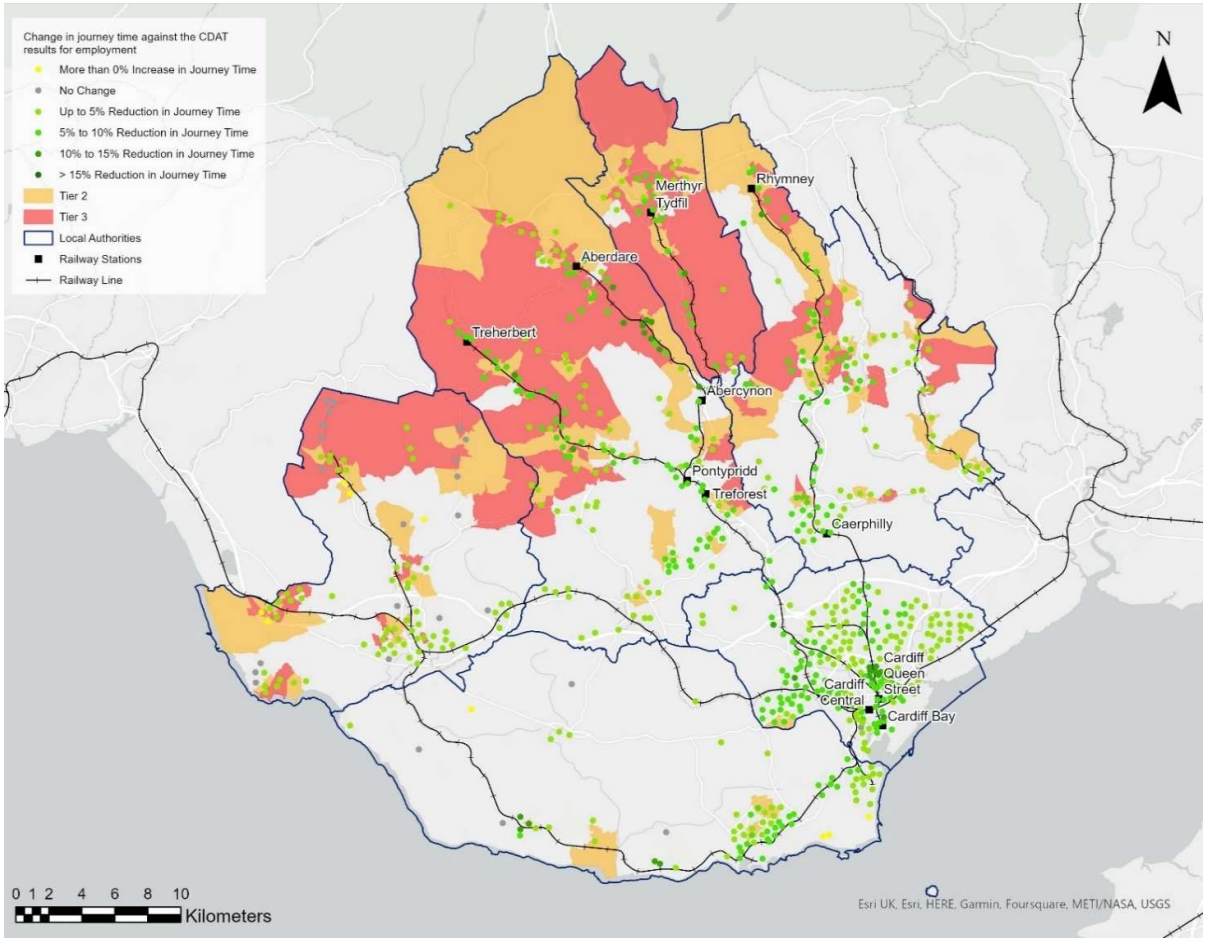


Figure 16-3: Relative impact of SWMP2 on journey times to employment at each origin point

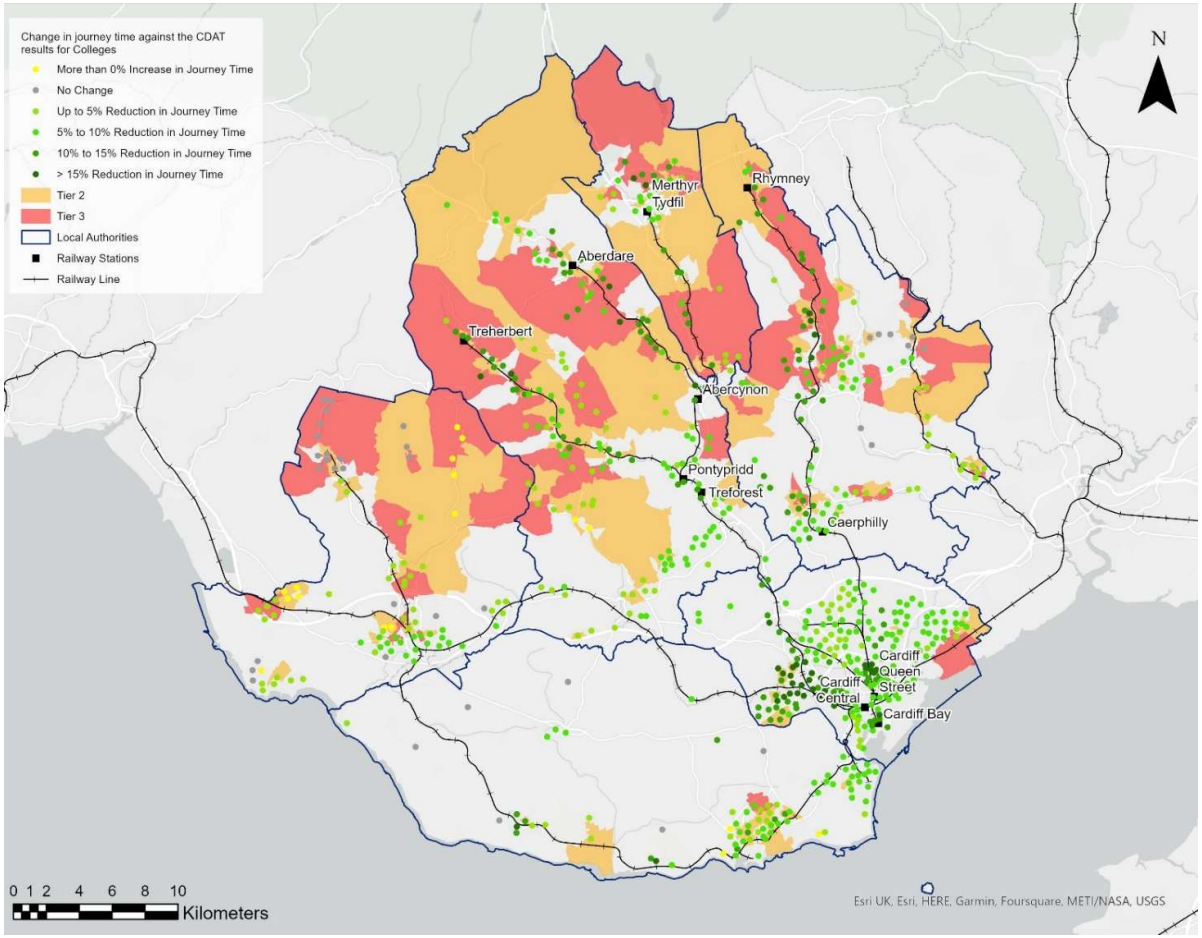


Figure 16-4: Relative impact of SWMP2 on journey times to higher education collages at each origin point

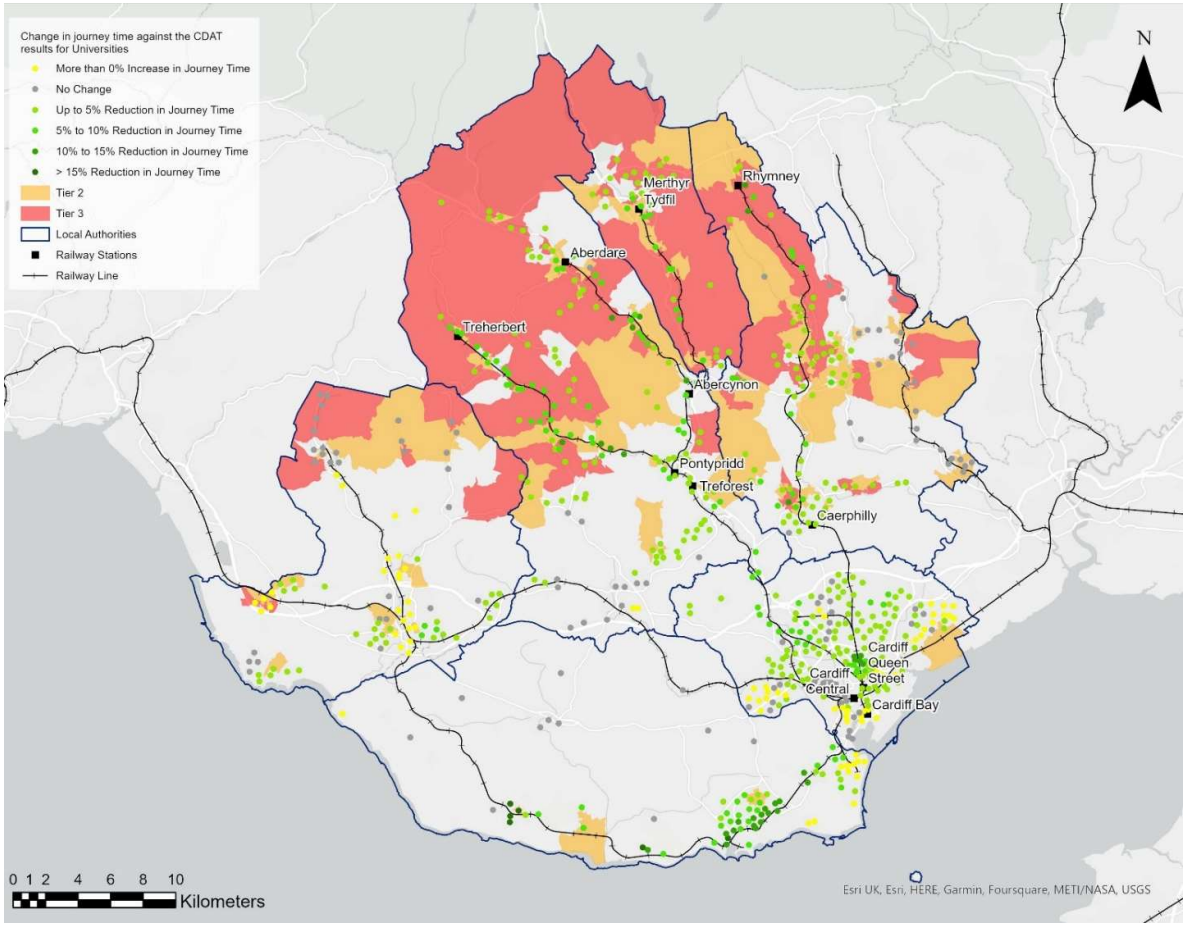


Figure 16-5: Relative impact of SWMP2 on journey times to universities at each origin point

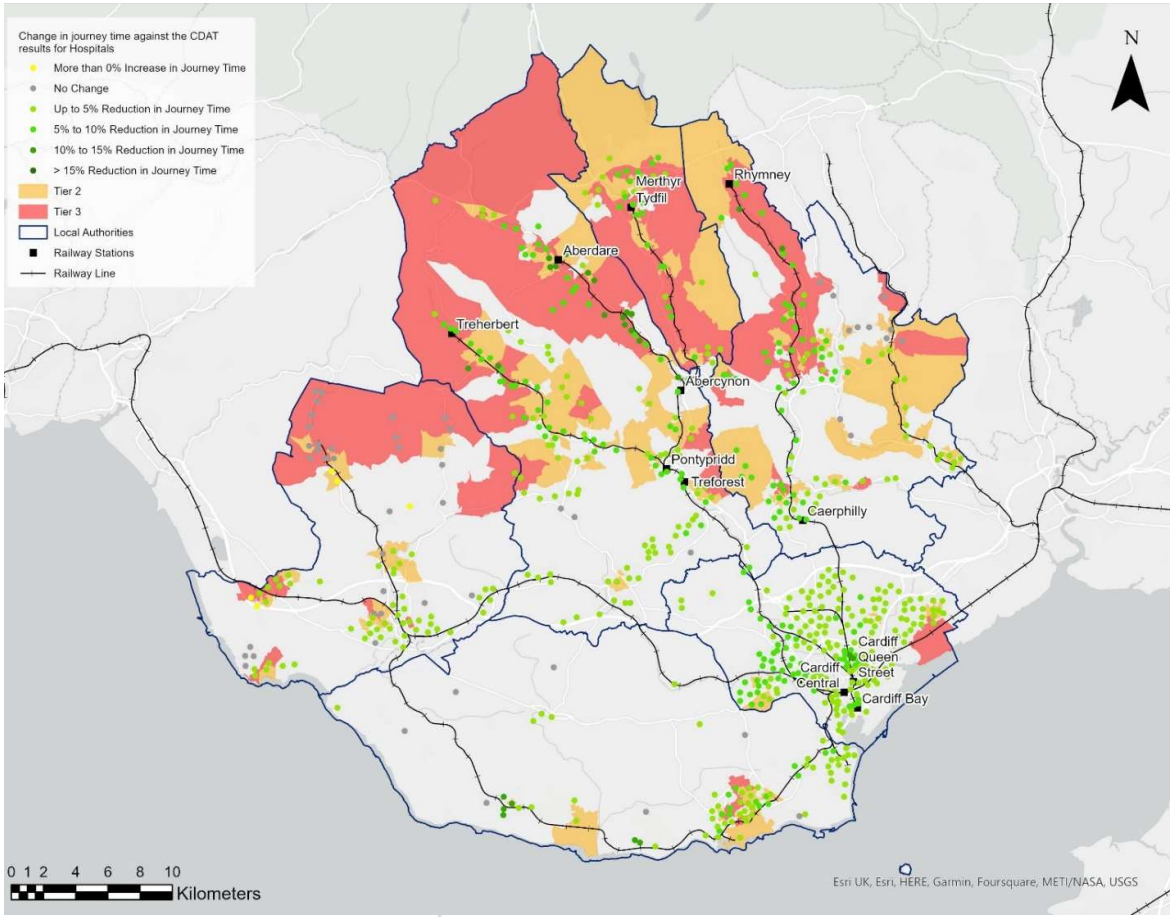


Figure 16-6: Relative impact of SWMP2 on journey times to hospitals at each origin point

16.3.26 Overall, the analysis indicates that SWMP2 will lead to a considerable improvement in journey times to employment, education, and health locations. As with the Hansen analysis, the greatest benefits accrue to the Heads of the Valleys communities, with diminishing benefits for settlements closer to Cardiff. Given the relationship between transport connectivity and deprivation as established via the CDAT analysis, these changes in journey times and the enhanced connectivity provided, may act to reduce deprivation in these communities. Recognising that deprivation is a complex and multi-faceted topic, the extent to which this materialises in practice should be more fully explored as part of any longer-term evaluation of SWMP2.

Key Point: The analysis indicates that SWMP2 will lead to a considerable improvement in journey times to employment, education and health locations which could help reduce overall levels of deprivation in Valleys communities.

16.4 Outputs identified within the SWMP2 Logic Map

16.4.1 In addition to the Operation level Output and Result Indicators discussed earlier in this report, a much wider range of **outputs** from SWMP2 were identified in the logic map in **Chapter 2**. These are discussed further below.

Direct connections

16.4.2 At the Interim Evaluation stage, pre-SWMP2 CVL timetables (December 2019) were compared with the most recent SWMP2 post-opening timetables available at that time (the March 2021 timetable revision) to determine the extent of the anticipated change in the number of connections. Since the *Interim Evaluation Report* was published, an updated set of post-opening rail timetables has been produced (the June 2023 timetable revision). Table 16.2 compares the terminating / origin station pairs prior to the delivery of SWMP2 (December 2019 timetable) and with those set out in the updated June 2023 timetables.

Table 16.2: Terminating / origin stations in December 2019 and June 2023 timetable revision

Line	Terminating / Origin Station in December 2019	Terminating / Origin Station once SWMP2 complete (June 2023 timetable revision)
Treherbert	Cardiff Central via Llandaf	Alternative Cardiff Central and Cardiff Bay
Aberdare	Barry Island via Llandaf	Alternative Cardiff Central and Cardiff Bay via Danescourt (City Line) when going to Cardiff Central

Line	Terminating / Origin Station in December 2019	Terminating / Origin Station once SWMP2 complete (June 2023 timetable revision)
Merthyr Tydfil	Barry Island or Bridgend via Llandaf	Alternative Cardiff Central and Cardiff Bay
Rhymney	Penarth	Rhymney to Barry Island and Bridgend (4tph) Caerphilly to Penarth (2tph)
Coryton-City	Coryton to Radyr via Danescourt	Coryton to Penarth (2tph)

16.4.3 Overall, the service pattern proposed in the June 2023 timetable revision is consistent with that in the March 2021 timetable and therefore the conclusions drawn in the *Interim Evaluation Report* remain valid.

16.4.4 Key points are as follows:

- prior to the delivery of SWMP2, all of the CVLs operated across Cardiff Central onto the Vale of Glamorgan Line (to either Penarth, Barry Island or Bridgend), with a shuttle service operating between Coryton and Radyr using the City Line. It is understood that part of the reason for these cross-city services was 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 platform availability (with CVL trains working from Platforms 6, 7 and 8 only).

- following the delivery of SWMP2, the TAM lines will benefit from direct connections to Cardiff Bay, relieving pressure on Cardiff Central and Cardiff Queen Street. However, 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. Given the introduction of a 6tph service on the Rhymney Line plus Coryton Line services (2tph), however, interchange times at Cardiff Queen Street for onward services to the Vale of Glamorgan will be minimal.

- the service which currently runs from Coryton to Radyr via the City Line will instead run from Coryton to Penarth and 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. This will result in **improved connectivity from the City Line towards Pontypridd** and other TAM lines locations. This means that the **City Line will become more widely connected into the region rather than serving Cardiff only**.

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 the Vale of Glamorgan on these lines, the high frequency service offered at Cardiff Central and Cardiff Queen Street will make interchange almost seamless.

Line speeds

16.4.5 The Interim Evaluation highlighted how the network capacity issues on the CVL are exacerbated by low line speeds across that part of the network. When completed, SWMP2 will deliver **30 kilometres of line speed improvements at 37 sites**.[73]

16.4.6 Allied with the programme of double tracking and the introduction of new electric rolling stock, the line speed improvements will reduce journey times on the CVL, as explained in the next section.

Key Point: SWMP2 will deliver 30 kilometres of line speed improvements at 37 sites. Line speed improvements are one of an overall package of measures that will contribute to reduced journey times on the CVL.

Journey times

16.4.7 The delivery of SWMP2 will result in reductions in end-to-end journey times along each of the CVLs to Cardiff Central as well as improved journey times from the TAM lines to Cardiff Bay through the provision of a direct connection.

16.4.8 Table 16.3 provides a summary of the in-vehicle journey times from the Heads of the Valleys stations on the CVLs to Cardiff Central prior to the delivery of SWMP2 (December 2019) and the anticipated in-vehicle journey times post the delivery of SWMP2 (as indicated in the June 2023 timetable revision).[74]

[73] https://www.railengineer.co.uk/welsh-rail-transformation/

[74] As was the case across the country, during COVID-19, due to reduced levels of demand, changes were made to the frequency of services on the CVL. This would have resulted in an increase in generalised journey times when travelling on the network. However, the in-vehicle journey times did not materially change during this period and therefore only the December 2019 data is reported here

Table 16.3: Typical in-vehicle journey times in December 2019 and June 2023 timetable revision

Route	Typical in-vehicle journey times (minutes)		Difference (minutes)	Percentage difference
	Pre-SWMP2 (December 2019 timetable)	Post-SWMP2 (June 2023 timetable revision)		
Treherbert – Cardiff Central	63	50	-13	-21%
Aberdare – Cardiff Central	62	49	-13	-19%
Merthyr Tydfil – Cardiff Central	63	50	-13	-21%
Rhymney – Cardiff Central	65	50	-15	-23%

16.4.9 Overall, SWMP2 will provide a considerable reduction in journey times between Valleys communities and Cardiff Central with a reduction of between 13 and 15 minutes between the Heads of the Valleys stations and the capital. Coupled with an at least doubling of the service frequency at most stations, such improvements will fundamentally alter transport connectivity in the region, with resulting benefits in terms of access to employment and labour as well as personal business and leisure opportunities.

16.4.10 Table 16.4 summarises the change in journey times to Cardiff Bay from Rhymney, Treherbert, Aberdare and Merthyr during the AM peak period (07:00-09:00). This includes both end-to-end journey times (including wait times) and interchange / wait time at Cardiff Queen Street (as all current connections to Cardiff Bay require a change at this station).

Table 16.4: Average journey time to Cardiff Bay in the weekday AM peak (07:00-09:00), including wait time at Cardiff Queen Street (where relevant) in December 2019 and June 2023 timetable revision.

	2019		2023		Diff-average journey time
	Average wait time at Cardiff QS	Average journey time[75]	Average wait time at Cardiff QS	Average journey time[76]	
Rhymney	6	69	5	56	-13
Treherbert	6	69	-	53	-16
Aberdare	6	69	-	50	-19
Merthyr Tydfil	6	71	-	51	-20

16.4.11 Once SWMP2 is operational, the TAM lines will benefit from direct services to Cardiff Bay, resulting in reductions in journey times from the Heads of the Valleys stations – these time savings range from between **16** and **20** minutes in the AM peak.

16.4.12 Whilst passengers travelling to Cardiff Bay on the Rhymney line will still need to change at Cardiff Queen Street for onward services to the Bay, they will still benefit from significant journey time savings as a result of quicker in-vehicle journey times and lower average wait times.

Key Point: SWMP2 will deliver a considerable improvement in end-to-end journey times between the Heads of the Valleys stations and Cardiff Central, with a reduction of between 13-15 minutes across the four lines. Journey times to Cardiff Bay will also be improved, with particular enhancements for the TAM lines due to the establishment of direct connections.

Service frequency

16.4.13 Table 16.5 and Table 16.6 compare the typical weekday and Saturday service frequencies from the Heads of the Valleys stations and junction stations (Abercynon and Pontypridd) to Cardiff Central pre-SWMP2 (December 2019 timetable) and post-SWMP2 (June 2023 timetable revision). It is noted that in addition to Cardiff Central, the TAM lines also benefit from an additional two trains per hour direct to Cardiff Bay, resulting in an overall frequency to Cardiff of 4tph across the TAM routes.

[75] Including wait time

[76] Including wait time for Rhymney connections

16.4.14 Sunday timetables were not available at the time of writing. However, it is understood that service frequencies on a Sunday will reduce by half, with a later start (~08:30) and an earlier finish (~22:30) compared to the Monday – Saturday service. This is consistent with Sunday timetabling practice across the UK, where there are longer 'no service' periods on Saturday into Sunday and Sunday into Monday to reflect demand and to allow for longer engineering possessions.

Table 16.5: Typical service frequency to Cardiff Central and length of operating day – December 2019 timetable versus June 2023 timetable revision – weekday

Origin Station	Pre-SWMP2 (December 2019 timetable)				Post-SWMP2 (June 2023 timetable)				Difference – length of operating day	Difference – 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		
Treherbert	05:42	23:51	18:09	2	05:25	00:41	19:16	2	01:07	0
Aberdare	05:51	23:43	17:52	1 to 2	05:38	00:55	19:16	2	01:24	0 to 1
Merthyr	06:08	23:30	17:22	2	05:16	00:19	19:03	2	01:41	0
Rhymney	06:10	23:39	17:29	1	05:21	00:51	19:30	4	02:01	3
Abercynon	06:16	23:18	17:02	4	05:33	00:46	19:13	4	02:11	0
Pontypridd	05:18	23:58	18:40	6	05:40	00:47	19:07	6	00:27	0

Table 16.6: Typical service frequency to Cardiff Central and length of operating day – December 2019 timetable versus June 2023 timetable revision – Saturday

Origin Station	Pre-SWMP2 (December 2019 timetable)				Post-SWMP2 (June 2023 timetable)				Difference – length of operating day	Difference – 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		
Treherbert	05:47	23:52	18:05	2	05:25	00:41	19:16	2	01:41	0
Aberdare	06:22	23:43	17:21	1 to 2	05:38	00:55	19:16	2	01:55	0 to 1
Merthyr	06:38	23:30	16:52	2	05:16	00:19	19:03	2	02:11	0
Rhymney	06:08	22:36	16:28	1	05:21	00:51	19:30	4	03:02	3
Abercynon	06:45	23:18	16:33	4	05:33	00:46	19:13	4	02:40	0
Pontypridd	05:18	23:58	18:40	6	05:40	00:47	19:07	6	00:27	0

16.4.15 The main points of note from the above tables are as follows:

- the delivery of SWMP2 will result in a **more consistent and more frequent service to Cardiff across all lines**. The Rhymney line will see an increase in service frequency to Cardiff Central from 1tph to 4tph, transforming the route from a relatively infrequent connection to a 'turn up and go' service.

- **service frequency to Cardiff on the TAM lines will also increase**. Whilst the typical pre-SWMP2 frequency to Cardiff Central on the TAM lines was 2tph due to operational challenges[77], frequency varies across the day and services did not operate on a 'clockface' timetable (i.e., running at the same time every hour). In contrast, in the June 2023 timetable, there are two services per hour running consistently across the day from Treherbert, Aberdare, and Merthyr Tydfil to Cardiff Central.

- in addition, as noted above, the TAM lines also benefit from an additional two trains per hour direct to Cardiff Bay, delivering an overall frequency to Cardiff of 4tph across the TAM routes.

- as junction stations, Abercynon and Pontypridd continue to benefit from a higher frequency service to Cardiff Central. As with the other stations on the TAM lines, **Abercynon and Pontypridd also benefit from additional direct services to Cardiff Bay (4tph from Abercynon and 6tph from Pontypridd)**.

- the **length of the Monday – Saturday operating day has also been extended, with both earlier departures and later arrivals**. This will be particularly beneficial for those undertaking shift work as well as residents of the Valleys undertaking leisure activities in Cardiff, with the last weekday departure from Cardiff extending from 22:46 to 00:21 (Treherbert), 22:41 to 00:07 (Aberdare), 22:26 to 23:30 (Merthyr Tydfil), and 22:35 to 00:00 (Rhymney) between the pre- and post-SWMP2 timetables.

- whilst the Sunday service will operate at a reduced frequency compared to the Monday- Saturday service, it will still **improve upon the pre-SWMP2 Sunday service frequency and will deliver an extended operating day**.

[77] Including the challenges around single line working and maintaining suitable junction margins at Abercynon and Pontypridd, as well as the need to slot into paths into Cardiff Central

Key Point: The delivery of SWMP2 will result in a 'turn up and go' Monday – Saturday service, with 4tph into Cardiff from the head of each of the CVLs and an enhanced service on a Sunday. In contrast to the pre-SWMP2 timetables, services will also run consistently across the day and operate on a clockface timetable (i.e., they will run at the same time every hour).

Rolling stock and passenger capacity

16.4.16 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, pre-COVID-19 at least. In an effort to reduce these issues, since the Metro project was conceived, the CVL fleet has undergone some interim improvements ahead of the arrival of the new SWMP2 stock. This has included the retirement of the Class 14x Pacers, the cascade of Class 153 trains and the increased use of the Class 150, which is well suited to high volume urban operation. As such, as of May 2021, every service on the CVL was diagrammed as a Class 150, which provides 111 seats and 96 standing capacity (with two sets of double doors in each carriage to speed-up loading and unloading).

16.4.17 Once complete, the CVL will be operated using new rolling stock with a mix of heavy rail and TramTrain vehicles. Table 16.7 sets out the vehicle classes which will be used, the capacity of each of these, and the lines on which they will operate and Table 16.8 compares the approximate hourly seating capacity on each line pre- and post- the delivery of SWMP2 once the enhanced service frequency (4tph on each line) is taken into account.

Table 16.7: Capacity of Class 398 and Class 756 rolling stock

Line	Class	Seating Capacity			Standing Capacity
		Seats	Tip-up seats[78]	Total Seats	
Treherbert	Class 398[79]	96	31	127	128
Aberdare					
Merthyr					
Rhymney	Class 756 (4 car)	159	30	186	234
Coryton-City	Class 756 (3 car)	119	22	141	176

Table 16.8: Approximate hourly seating capacity pre and post SWMP2

	Pre-SWMP2 (May 2021)			Post-SWMP2			Difference	Percentage difference
	Typical trains per hour	Seating capacity	Approximate hourly seating capacity	Typical trains per hour	Seating capacity	Approximate hourly seating capacity		
Treherbert	2	111	222	4	127	508	+286	129%
Aberdare	1 to 2	111	167	4	127	508	+342	205%
Merthyr	2	111	222	4	127	508	+286	129%

[78] Tip up seats must be folded down by passengers.

[79] It should be noted that nine of the Class 398 units will be configured as four car sets (two units) to strengthen peak services. This will replicate the current approach of strengthening seating capacity on services in peak hours.

	Pre-SWMP2 (May 2021)			Post-SWMP2			Difference	Percentage difference
	Typical trains per hour	Seating capacity	Approximate hourly seating capacity	Typical trains per hour	Seating capacity	Approximate hourly seating capacity		
Rhymney	1	111	111	4	186	744	+633	570%

16.4.18 Overall, capacity will increase significantly across all lines, with hourly seating capacity more than doubling on the Treherbert and Merthyr Lines, with threefold and sevenfold increases on the Aberdare and Rhymney lines respectively.

16.4.19 As well as increasing capacity, the delivery of new rolling stock will also likely result in reduced instances of the following, both of which were common on the CVL prior to the delivery of SWMP2:

- **'short-formed' services** – a short-formed service is one operating with fewer carriages than booked. Short-forming can lead to overcrowding and was an issue on the CVL prior to the delivery of SWMP2 due to an overall shortage of units to run the routes.

- **extended station dwell times** – where trains are at or near capacity, station dwell times can be extended as it takes longer for passengers to board and alight. This can lead to delays, longer journey times and reliability issues, particularly in single track sections where trains cross at station loops.

16.4.20 The extent to which the above problems are addressed should be examined in any subsequent post-delivery evaluation of SWMP2. This is discussed further in **Chapter 18**.

Key Point: The delivery of SWMP2 will result in a considerable increase on the pre-SWMP2 baseline capacity (seated and standing) across all lines.

Accessibility improvements

16.4.21 SWMP2 includes a range of improvements to 'inter-modal facilities' at stations on the CVLs and indeed the ERDF Output Indicators include specific targets for the overall number of inter-modal facilities which should be delivered.

16.4.22 The improvements include a range of adjustments to provide more accessible boarding as well as the provision of footbridges (at Danescourt and Quakers Yard Stations[80]), bike hoops, wayfinding information, smart card validation, customer information systems, help points and shelters.

16.4.23 Such enhancements will result in an improved journey experience for passengers, particularly for those with reduced personal mobility and / or other disabilities which can make travel by train more challenging. In turn, this could result in people using the CVLs who currently are unable to do so, with associated reductions in inequalities and social exclusion. In addition, providing more accessible boarding opportunities could help to reduce dwell

[80] The footbridge at Quakers Yard will have ramps on each side. The footbridge at Danescourt will be installed with a ramp on one side and passive provision for a future ramp. This is because of a need to secure land and reach agreement with Cardiff Council regarding active travel routes

times at stops and therefore contribute to improved journey time reliability for all users. These aspects should be examined further in any subsequent post-delivery evaluation of SWMP2.

Key Point: SWMP2 includes a range of improvements to inter-modal facilities, including additional stations with accessible boarding and various improvements to the facilities within the station environment. These enhancements may result in improved customer satisfaction and could potentially lead to higher rates of use amongst groups with a protected characteristic, with resultant equalities benefits. The latter should be examined further as part of any future post-delivery evaluation of SWMP2.

Stabling Capacity

16.4.24 The CVL rolling stock was formerly stabled at Cardiff Canton Depot, which lies immediately to the west of Cardiff Central Station. Whilst Canton Depot met requirements prior to the delivery of SWMP2, there were a number of constraints which meant that the depot was not suitable to accommodate the new Class 398 fleet associated with SWMP2, namely:

- the depot was operating close to capacity and did not have sufficient stabling capacity to accommodate additional units without significant development and expansion, the scope for which is limited given its constrained location.
- it is also predominantly a diesel traction maintenance depot and does not have the additional tooling, facilities and parts storage that would be required to maintain the electric Class 398 units.
- movement out of Canton towards the CVL relies upon capacity at Cardiff West Junction, which is operating close to capacity and therefore expansion at the current site could negatively affect the reliability of services on the CVL.

Given these constraints, as part of the delivery of SWMP2, a new purpose-built depot specifically designed to stable the new fleet was developed at Taff's Well.

16.4.25 Figure 16-7 figure below shows the 'steady state' stabling situation at Canton Depot once all of the current works are complete, all new fleets are in place and all planned legacy fleets have been removed.

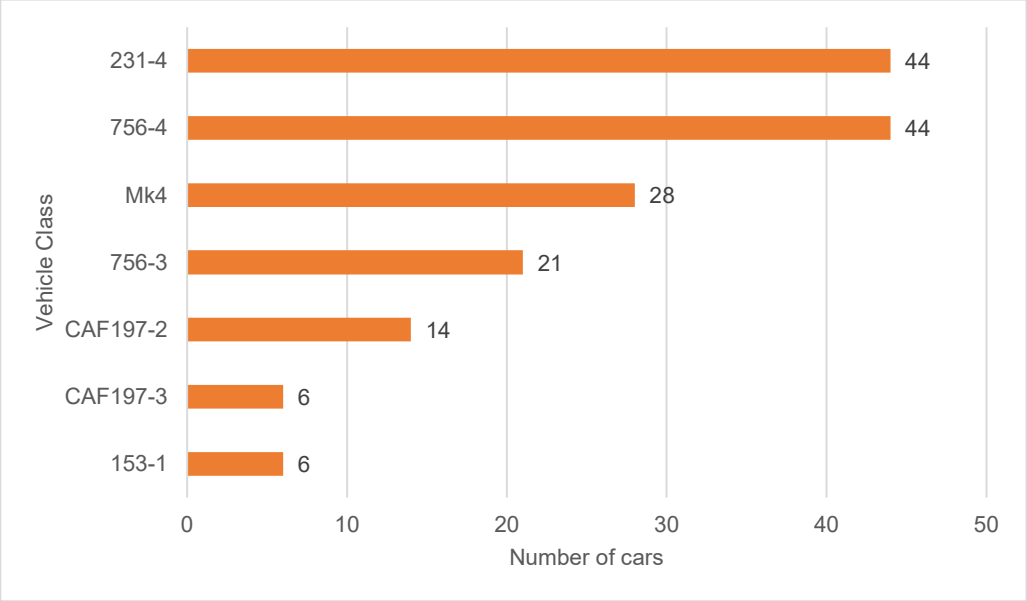


Figure 16-7: Number of cars by type stabled at Canton Depot on a weekday once SWMP2 complete

16.4.26 In total, **163 cars** will be stabled nightly at Canton Depot against a normal operating capacity of **156 cars** and an absolute maximum of **172 cars**. There is thus simply no space to accommodate the entirety of the new Metro fleet, and thus the TramTrains for the TAM lines will be stabled at Taff's Well.

16.4.27 The new **Taff's Well Depot will house 25 Class 398** units, with a further **nine Class 398 units stabled at Treherbert**. The Class 398 units are 3-car meaning that there will be 75 vehicles stabled at Taff's Well each night. The depot at Taff's Well will also carry out all maintenance activities for the Class 398 fleet.

Key Point: Cardiff Canton Depot met the previous needs of the CVLs. However, the forthcoming introduction of new rolling stock will expand the fleet beyond that which can be accommodated at Canton and will also require different maintenance capabilities. The new Class 398 TramTrain units for the TAM lines will therefore be stabled at a new purpose-built depot at Taff's Well.

17 Process Evaluation

17.2 Overview

17.2.1 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 transport infrastructure projects in Wales. **The process evaluation has been undertaken at an overall SWMP2-level**, although any successes and / or lessons learned relating specifically to the nine ERDF-funded Operations are summarised both here within the relevant *pro formas* in **Chapters 6-14**.

17.2.2 There are two components to the SWMP2 process evaluation:

- the **Interim Process Evaluation** (published in the *Interim Evaluation Report*) focused on how SWMP2 was identified, funded and procured. This can be found at the following link- https://tfw.wales/projects/monitoring-and-evaluation/south-wales-metro-phase-2-interim-evaluation. The key findings from this are summarised below.

- this report sets out the **Final Process Evaluation**, which assesses the actual delivery of SWMP2 from the perspective of Welsh Government, WEFO, TfW, and their delivery partners.

17.2.3 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 Audit Wales) 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.

17.3 Approach to the process evaluation

17.3.1 The process evaluation was structured around five depth interviews with the key organisations involved in specifying, funding and delivering SWMP2 as follows:

- **Welsh Government**, as the organisation which set the policy direction for SWMP2 and undertook the early development work before the formation of TfW.

- **Welsh European Funding Office (WEFO)**, which negotiated the ERDF programme with the European Commission and which is the managing authority responsible for allocating funding in accordance with what has been agreed in that programme

- **Transport for Wales**, with a view to obtaining views on delivery from the Project Sponsor.

- **Amey Infrastructure Wales (AIW)**, as the Infrastructure Delivery Partner (IDP) for SWMP2.
- **Alun Griffiths**, the contractor for the delivery of the Taff's Well Operation.

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

17.4 South Wales Metro Phase 2

17.4.1 In advance of setting out the findings of the Final Process Evaluation, there is merit in recapping on the origins of SWMP2, which provides context for the narrative which follows.

Origins of SWMP2

17.4.2 The first Wales and Borders rail franchise[81] 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 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.[82] The Wales and 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 diesel rolling stock.

17.4.3 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.[83] 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.

17.4.4 The 2011 report was supplemented by the 2013 study *A Cardiff City Region Metro: Transform, Regenerate and Connect.*[84] This report updated and restated the Metro concept, highlighting the economic, land-use development

[81] 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.

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

[83] iwa-metroreport.pdf

[84] Metro-Consortium-WEB-REDUCED.pdf (iwa.wales)

and regeneration opportunities which could be delivered by improved transport connectivity. This piece of work was undertaken at the same time as a Welsh Government 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*[85] 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.

17.4.5 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 four trains per hour service from the head of each CVL, which was equated to a 'turn-up and go' frequency.

Procurement

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

17.4.7 The successful bidder, Keolis-Amey, signed the Operator and Development Partner (ODP) Grant Agreement with TfW in June 2018 following finalisation of the contract. It commenced operation of the Wales and Borders franchise on 14th October 2018, although the rail operator element of the franchise operated by Keolis was later brought in-house by TfW.

17.5 Final Process Evaluation - Key Themes

17.5.1 The following narrative sets out the key themes emerging from the process evaluation interviews.

Transport for Wales interface with Welsh Government

17.5.2 Welsh Government recognised that the 2018 franchise presented a major opportunity to address the historic shortfall in investment and the poor services on the CVLs. In addition, there was a strong ministerial desire to modernise the railway in South-East Wales, enabling a 'turn-up and go' service which would drive public transport use in the region and better integrate the city of Cardiff with its regional hinterland. Welsh Government however quickly realised that its rail and indeed wider transport team was

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

relatively small and would not therefore have the capacity to deliver a project of the scale of SWMP2 independently.

17.5.3 Critical to the delivery of SWMP2 therefore was the formation of TfW in 2016. TfW was initially set-up as an 'expert adviser' to help design and procure the new Wales and Borders franchise, and SWMP2 therein. Recognising the scale of the delivery challenge, Welsh Government transferred overall responsibility for the franchise and SWMP2 to TfW in 2018. This was considered to be a highly successful strategic approach by stakeholders, permitting Welsh Government to focus on developing and shaping the policy environment within which SWMP2 would be nested, whilst allowing TfW to focus solely on delivery.

The role of WEFO

17.5.4 Of the circa **£1.05 billion** 'transformation budget' allocated to deliver the SWMP2 infrastructure works (rolling stock was funded separately), **a proportion of the total transformation budget** was provided through ERDF and administered by WEFO on their behalf.

17.5.5 Initially, the proposal was to apply for funding for Metro as a 'major project'. However, it became apparent that this was not a realistic proposition. The EC would only award funding if there was a fully developed, deliverable and compliant project – e.g., with full designs, planning permission, required environmental consents, regulatory compliance etc. This could not realistically be delivered within the timescale.

17.5.6 WEFO therefore worked closely and successfully with the Joint Assistance to Support Projects in European Regions (JASPER) team to scope how a bid could be put together. They confirmed the view that the 'major project' approach was not realistic and indeed highlighted that Metro is a combination of individual projects being brought together under a single umbrella. It was therefore advised that the focus should be on nine individual Operations (although care had to be taken in the Pontypridd area, where the Treherbert line meets the Aberdare and Merthyr Tydfil lines to ensure clear dividing lines between the Operations). Whilst there were similar activities across different Operations which are procured collectively (e.g., track laying), each of the nine Operations remained distinct projects in their own right.

17.5.7 Funding of the nine Operations was based on their respective business plans – these were initially developed by Welsh Government but responsibility for them was novated to TfW as part of the overall transfer of responsibility for the delivery of SWMP2 described above. WEFO reviewed each business plan and agreed any financial reprofiling or the allocation of additional funds where required.

17.5.8 In terms of money flows, all monies were provided to TfW as the 'Lead Beneficiary'. TfW defrayed funding and made claims in arrears through the

WEFO system. Each claim was audited by the WEFO Management Verification Team and payment sent to TfW on approval. In addition to these direct approvals, there is a robust and comprehensive audit structure, as follows:

- WEFO and Lead Beneficiaries are audited by the European Financial Audit Team (EFAT), who are the 'eyes of the Commission' in Wales and select items to review. This is an ongoing audit process and any individual Operation can be selected for review on multiple occasions. EFAT submits a report to the EC to determine whether WEFO is managing its funds well, with the level of correction needing to be below 2%.

- EFAT are then audited by the European Auditors. The EA will undertake a 'mission' to Wales and state what projects they will examine. WEFO need to prepare all of the necessary evidence for such an audit and may also need to attend a site visit with the EA and the Lead Beneficiary.

- in turn the European Auditors are audited by the European Court of Auditors taking their sample from the Operations selected for audit by the European Auditors. Again, they will conduct a 'mission' and will require the examination of papers and site visits.

17.5.9 WEFO played a key role in managing the disbursement of ERDF funds in accordance with the programme agreed with the EC, whilst also supporting TfW to realise value for money across the nine Operations.

Funding

17.5.10 As was highlighted in the Interim Evaluation, having multiple sources of funding brought its own challenges, although the project may not have been deliverable without the contributions of the various partners. These challenges can be summarised as follows:

- TfW's budget is currently set by Welsh Government on an annual basis which, whilst appropriate for day-to-day rail operations, makes it more difficult to plan long-term capital investment projects. It was noted that there would be a general benefit from TfW having a multi-year funding settlement, providing budget flexibility in any given year.

- each of the funding partners had their own assurance frameworks, funding profiles and deadlines. Management and disbursement of these contributions had to be skilfully coordinated to ensure that the requirements of individual funders were realised through project delivery.

- a particular challenge was the requirement to deliver against the hard end deadline defined in relation to the ERDF funding (December 2023) for the nine discreet Operations (although Operation level alterations were made to account for COVID-19, but still working to the fixed end date). The constraint imposed by this deadline was exacerbated by Brexit, with the United Kingdom's exit from the EU meaning that there was no potential to

extend the project into the next Structural Funds as there had been with previous ERDF funded projects. This meant that it was never possible to pause the programme, a key issue when the implications of the COVID-19 pandemic became apparent. This, at times, affected optimisation of the delivery of works, with certain programme milestones acting as a constraint that required a given outcome to be delivered by a specified date with no flexibility.

- the above said, WEFO played a key role in maximising the value for money and leverage of the ERDF funds. There were significant changes in Operation budgets as the design work crystallised and also a result of COVID-19, Brexit and the impact of the war in Ukraine on the availability and cost of materials. WEFO facilitated the reprofiling of Operations to reflects this – for example, at Taff's Well, a road connection into the new depot was removed from the scope and will now be funded by monies outside ERDF. This allowed the released budget to be used within the Operation for other appropriate works. WEFO has the authority to reallocate funding across its portfolio and was able to effectively support increasing costs by reallocating grant to certain Operations from elsewhere in the portfolio, without asking TfW to source match funding at the same rate. This assisted the delivery of the nine Operations and, by extension, SWMP2 overall.

- finally, whilst there were multiple funders, Welsh Government ultimately bore the risk of any cost over-runs. This created a programme challenge, as highly detailed scrutiny of spending was required to ensure that the requirements of all funders were met within the fixed budget.

Procurement

17.5.11 Whilst a very intensive exercise, it was recognised by stakeholders that the competitive dialogue process was collaborative and allowed for an innovative approach to be brought to market that may not otherwise have materialised. For example, the solution proposed by AIW included permanently earthed sections to reduce the need for costly structures work as part of the electrification programme. Similarly, innovative new electric and tri-mode rolling stock formed part of the solution. It is possible that a more conventional procurement procedure may not have delivered such innovation as bidders would have had to focus on delivering the client specification rather than suggesting their own solutions.

17.5.12 It was however noted that there was an 'eggs all in one basket' risk associated with appointing a single Infrastructure Delivery Partner (IDP). Had there been an error in procurement or the IDP experienced financial failure, the programme would have been unachievable. However, these risks have not materialised and the high-quality working relationship between TfW and AIW was highlighted in the interviews.

Form of contract

17.5.13 AIW was procured under an NEC4 Option E contract – this is a cost reimbursable contract typically applied to projects where the scope cannot be properly defined at the outset.

17.5.14 Under an NEC4 contract, the client carries most of the financial risk. To mitigate this to some degree, there was an aspiration to include a 'pain-gain' mechanism within the contract, but this was never enacted for a number of reasons, namely there was very little pre-construction information, few surveys and only a high-level concept design, which made defining a realistic target cost challenging. Indeed, TfW did not have access to the asset at the outset of the programme (as it was still owned by Network Rail) and information that they should have been provided with upon transfer was six months late. Assumptions therefore had to be made on the condition of largely Victorian infrastructure, which was ultimately in much worse condition than first anticipated. For example, whilst there was a commitment to the redoubling of several lines that had previously been singled, practical challenges such as the stability of embankments and the load bearing capacity of bridges soon emerged. Evidently, a Public Limited Company such as AIW could not expose itself to the risk of a 'pain-gain' mechanism without a much greater degree of certainty with respect to what they were costing.

17.5.15 Ideally, if there was greater certainty around asset condition and design, TfW would have preferred to enter an Option A (priced contract with activity schedule) or Option C (target price with activity schedule) contract, but this was simply not a viable option given programme constraints. TfW therefore had to commission external support and undertake audits of the pricing schedule to ensure that value for money was being maintained throughout the programme.

Payment mechanisms

17.5.16 The AIW contract was based around the delivery of twelve milestones. There was an incentive of up to £2 million for delivering on-schedule, with a set of penalties for late delivery (the aforementioned 'pain-gain' mechanism). This was a logical approach on a project of this nature, particularly given the fixed end date. However, there was stakeholder agreement that the milestones were too rigidly defined and did not provide the required level of flexibility for such a complex programme of work.

17.5.17 The application of the milestone-based approach in an absolutist manner put AIW in a challenging position. It provided an incentive at the margin to focus on fully delivering a milestone to trigger payment rather than focus on what may be another higher priority task. The stakeholder interviews therefore found that this approach never worked particularly well for either TfW or AIW.

17.5.18 It was also noted that, on several occasions, there were very valid external reasons as to why a milestone could not be achieved by the agreed date. However, the contract did not recognise this and it was noted that there were times when it was trying to penalise AIW for not delivering a milestone which they could not realistically meet.

Budget and Financial Management

17.5.19 As noted above, SWMP2 had to be delivered within a fixed budget. This would have been challenging at the best of times, but intense financial pressures emerged as a result of a range of macroeconomic factors external to the project. These included:

- the impact of COVID-19 on the programme and working practices, and in particular the implications of social distancing
- material shortages, cost increases and labour shortages associated with the implications of Brexit and COVID-19 on the supply-side of the economy
- prevailing high inflation in 2022-23, which was circa five times the Bank of England's target inflation rate of 2%

17.5.20 The budget was monitored, reviewed and updated by the Programme Board, which had representatives from the client and each of the 'Delivery Boards' including, AIW, Balfour Beatty and Siemens. Where emerging costs were higher than forecast, value engineering was pursued where this was a realistic option. The project governance framework incorporated strict controls around budget approval, which were signed-off by a budget panel. It was agreed by stakeholders that this process was slightly cumbersome and bureaucratic when first introduced but gradually settled down into a robust and valuable approach to budgetary management.

17.5.21 Whilst macroeconomic factors did influence project cost, there were several programme level issues (and in particular those related to the hard completion date) that also had an impact:

- the funding deadlines meant that there was a strong emphasis on finalising the cost of the project as soon as possible, which meant that many elements of the work were only at a fairly early design stage when costs were developed. This did lead to some early cost escalation as the design process progressed. A key lesson here is that trying to get to a fixed price too early is not necessarily the most efficient approach. Indeed, it was noted that many of the key opportunities for value engineering are early in the design process and it is important that these opportunities are not lost in the rush to meet a fixed deadline.
- SWMP2 was also a multi-disciplinary project but TfW had established a set of mono-discipline frameworks (e.g., civil engineering, track works etc). This significantly increased the interface risk between contractors, a

risk that only TfW could hold given that there was no contractual relationship between the contractors (the alternative would have been a labyrinthine contract governing all contractor interfaces on a large and complex programme). The NEC4 contract helped mitigate this issue to some degree as it placed an obligation on contractors to work together and AIW to work collaboratively to manage the interfaces, but it nonetheless presented a risk to TfW.

- the extremely tight project timescales, driven as they were by funding deadlines and penalty clauses attached to the late introduction of the rolling stock, meant that each project element had to be delivered in parallel, a major challenge on a multi-disciplinary contract of this nature. Whilst an uncommon approach, it offered a significant programme benefit. However, it also increased the risk of abortive work – in particular, it was noted that, in future, all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

Project Governance

17.5.22 Transferring delivery responsibility to TfW did require the development of a robust governance structure around the project. The SWMP2 programme commenced when TfW was still in its infancy and thus its team was fairly lean at that stage, with only 3-4 staff administering the contract when it was first signed. TfW latterly entered into a formal agreement with all partners under ISO:44001, an internationally recognised standard around collaborative business relationship management systems. This provided a framework under which the growing TfW team could manage the project in collaboration with its IDP, AIW.

17.5.23 TfW undertook a regular programme of reporting and progress meetings with Welsh Government on all elements of progress. The regular programme of TfW reporting was supplemented where necessary by additional risk mitigation and change management meetings. For example, following the introduction of the initial COVID-19 lockdown in March 2023, TfW set out its proposals for managing the programme in a manner which was both safe and legally compliant. These proposals were submitted to Welsh Government and used as the basis of establishing a supplementary governance framework around managing the safety and programme risks of COVID-19

17.5.24 From a process perspective, the contract was managed in Sypro, a widely recognised and used online tool for managing NEC contracts. Every contract package had its own Package Manager, who had a level of authority to sign-off change in relation to an agreed compensation event. Any such changes were agreed by the Programme Board and signed-off in Sypro.

17.5.25 Whilst the governance procedures were robust, a key issue identified with programming activities is that AIW, as the client's IDP, never had the opportunity to get different contractors working in the same environment.

Rather than a single planning entity, there was an 'Integrated Master Schedule' that combined individual programmes developed in proprietary systems. This reduced opportunities to more fully understand programme dependencies etc.

Project governance associated with the ERDF Operations

17.5.26 The governance framework in relation to the nine ERDF funded Operations evolved as responsibility for their delivery was novated from Welsh Government to TfW. The Operations were initially developed by Welsh Government but were then novated to TfW, who became the 'Lead Beneficiary' with Welsh Government as joint beneficiary. Construction activity could not progress until ownership of the assets was transferred from Network Rail to TfW, otherwise the funding would have supported a party other than the 'Lead Beneficiary'.

17.5.27 In terms of overall governance:

- WEFO was the managing authority and had the responsibility for allocating funding in accordance with what had been negotiated with the EC in the programme. It should be noted that WEFO is an entirely self-contained and independent body tasked with delivering the programmes negotiated with the EC. Welsh Ministers only have assurance and sign-off responsibility for any match funding provided.

- TfW was the 'Lead Beneficiary' and was responsible for delivering the nine Operations and realising their benefits

- Welsh Government established the policy framework for Metro and TfW was answerable to Ministers through Welsh Government

17.5.28 WEFO initially held quarterly meetings with TfW to assess spend, progress and the implications of any delays on an Operation-by-Operation basis. These meetings were supplemented by quarterly financial profiling. This became a monthly meeting as the Operations progressed towards completion (although financial profiling remained a quarterly activity).

17.5.29 TfW also regularly approached WEFO on an *ad hoc* basis for advice on whether certain activities complied with the funding conditions. For example, at Taff's Well, TfW considered the possibility of a sale and lease back of the new rolling stock depot and had to seek WEFO advice on whether this would be compliant.

17.5.30 WEFO highlighted the very strong relationship that they had with both TfW and Welsh Government, which was identified as a key project success. This was aided by having long-term relationships across a stable team and an understanding that a partnership approach was required to deliver the Operations. WEFO specifically highlighted that TfW reported any emerging issues early, was very responsive and provided high quality information for

audits. For their part, WEFO noted that there had been a 'learning curve' on Structural Funds for TfW, and WEFO therefore worked closely with them on this (and TfW accepted that advice sometimes took time to be prepared).

17.5.31 WEFO also explained that they held review meetings with TfW and that a representative from the Transport Department in Welsh Government attended these meetings. Where any changes to funding etc were made, WEFO would also notify the Transport Department in Welsh Government directly. There was no statutory or formal requirement for Welsh Government sign-off, but this approach was intended to ensure that all partners were fully briefed on progress and that a collaborative approach was adopted.

17.5.32 WEFO supported the views of other stakeholders that the establishment of TfW was a major success, providing a dedicated vehicle through which: (i) the Operations could be delivered in line with WEFO requirements; and (ii) the wider Metro programme could be delivered in accordance with Welsh Government policy.

Risk Identification, Management and Mitigation

17.5.33 As part of the process of converting the Final Target Price (FTP) into a Final Funded Price (FFP), quantified cost risk assessment (QCRA) was undertaken by TfW and AIW on a partnership basis. Each risk had a monetary value attached to it and was reviewed with TfW on a monthly basis until contractors were appointed across the various disciplines. When contracts were awarded, discipline-specific risks were then identified. For each project element, AIW compared the cost against the 2019 Final Target Price and, where this was higher, drew down funds from a specific risk / optimism bias pot, set at £140m on the basis of the QCRA. This sat side-by-side with the governance process in terms of providing the authority to spend.

17.5.34 More generally, stakeholders reported a degree of risk aversion on both sides around departure from Network Rail standards on the CVL, which could have offered cost savings through targeted departures from standards where appropriate. It is possible that more could have been made of this opportunity had the time pressures around the requirement to arrive at a final price early in the process not been paramount.

17.5.35 Whilst there was an intense focus on risk management, it was noted that there was perhaps less of a focus on opportunity management.

Stakeholder Management

17.5.36 There was broad agreement amongst interviewees that stakeholder engagement and management was a major project success. In particular, TfW recognised very early in the process that managing the stakeholder landscape (and indeed the media) at a strategic level (i.e., above the level of individual projects / Operations) was a key role for the organisation.

17.5.37 The Stakeholder Plan identified all of the key stakeholders who had to be communicated with and when and also mapped the role, power and influence of each. This included the Leaders of the Capital Region and its constituent local authorities, as well as Network Rail and the numerous statutory undertakers such as BT and Dŵr Cymru. Two logs were developed for engagement activities, one for stakeholder management and the other for external communications. Bespoke communication approaches were developed with respect to engaging different groups.

17.5.38 At the outset of the project, TfW produced brochures summarising what SWMP2 was about and these were given to community members and politicians. This communications campaign was aimed at increasing upfront project knowledge and also outlining the benefits that would be realised from the project. This proactive approach effectively 'rolled the pitch' and provided a more receptive audience for when communications around project and service disruption were necessary – i.e., stakeholders and the public understood the rationale for disruption and 'what they were getting' as a result of this.

17.5.39 The biggest negative from a stakeholder perspective was the length of track possessions, and thus the replacement of trains with bus services. It was noted that perhaps too many trains were cancelled and the possessions were too long at certain points.

Lineside engagement

17.5.40 There were some early project concerns that the topography and geography of the Valleys meant that all works would be in close proximity to communities, which could prompt complaints, particularly in relation to noise.

17.5.41 A bespoke approach to 'lineside engagement' was developed, i.e., for communities living close the CVL that would be affected by the works. TfW initially triangulated where noisy construction works would take place and identified a zone of influence around this. In areas where noisy works were programmed for long periods, TfW held community engagement events / drop-ins for members of the public to talk about the project and the scope of the works.

17.5.42 Complaints were also monitored to identify 'hotspots', which were then collated into a 'hotspots map'. Through this exercise, it became evident that there were specific people who complained frequently and that the communication methods TfW were using were in fact highly successful in managing community concerns.

17.5.43 TfW also adopted other innovative measures – for example, in response to community feedback, they appointed 'Behaviour Officers' to monitor site management and practices.

17.5.44 TfW used various methods of engagement depending on the urgency of the message to be communicated. This ranged from: individual letter drops; physically posting letters; community drop-in centres / hubs; local authority newsletters (in some locations); media campaigns via social media channels; and local and national press coverage for certain activities. For example, in terms of the electrification programme, TfW developed a media campaign highlighting the safety risks associated with overhead catenary. This was subsequently rolled-out in schools as well as to other stakeholders such as the Welsh Air Ambulance.

Benefits Realisation

17.5.45 The delivery of community and societal benefits is considered a major project success, particularly with regards to Cross Cutting Themes in the nine ERDF funded Operations. All of the contracts included requirements for the IDP and ODPs to deliver community benefits geared around equalities, safety and sustainability.

17.5.46 Longer term, it is important that TfW carries out a comprehensive outcome and impact evaluation of SWMP2 (see **Chapter 18**) to fully understand the extent to which benefits outlined in the business plan are realised in practice.

17.6 Successes and Lessons Learned

17.6.1 This section summarises the main successes and lessons learned as identified by stakeholders through the depth interviews.

Successes

- the **establishment of TfW** in 2016, and the transfer of responsibility for the Wales and Borders Franchise and SWMP2 overall to TfW in 2018, **was an important project success**. It reflected the immediate recognition of Welsh Government that a major ramp-up in resource and expertise would be required to deliver the programme. It also helped to create clear lines of responsibility, with Welsh Government focused on policy and TfW on delivery, with the latter reporting to the former within a robust assurance framework.
- Welsh Government and TfW skilfully coordinated the funding requirements of different partners, often meeting external deadlines whilst keeping the overall programme largely on track
- from a procurement perspective, there was broad stakeholder agreement that **the competitive dialogue procedure, whilst very intense, produced a collaborative and innovative solution** which may not otherwise have emerged.
- from a standing start, TfW developed and implemented a **robust project governance and assurance framework**. Whilst this may require

refinement in future, it could be largely replicated on future large scale infrastructure projects.

- the approach to risk management, and in particular the **adoption of QCRA**, was robust and in line with best practice
- TfW recognised early on in the programme that they were the organisation best placed to manage stakeholder relationships and communications with affected communities and the general public. A key success was getting the message out early in terms of what was happening and the benefits of the project, thus allowing communities to understand that construction and service-related disruption had a major end benefit. The stakeholder engagement approach used on SWMP2 is a model that could be adopted for other major infrastructure projects in Wales.
- the specification of community and societal benefits in the contracts and their delivery through those contracts is considered a major project success, particularly with regards to Cross Cutting Themes in the nine ERDF funded Operations
- with specific regard to the nine ERDF funded Operations
- there was a **very strong relationship between TfW and WEFO** which supported the delivery of ERDF programme and audit requirements
- WEFO also proactively engaged with Welsh Government Officials and Ministers when they were reallocating funding, reprofiling Operations etc.
- working with **one main contractor** simplified the funding process in terms of enabling the attribution of costs to ERDF
- **WEFO skilfully managed the allocation of ERDF funding** in a manner which delivered the ERDF programme requirements and value for money at the Operations level, whilst maximising the leverage of those funds

Lessons Learned

- for transformational projects of this nature, **TfW would benefit from a multi-year funding settlement**. This would provide greater flexibility and support more efficient forward planning.
- whilst born of necessity, the **varied requirements of different funders presented a management and administrative challenge**, and in some instances led to **inefficient engineering approaches** having to be adopted to meet funding deadlines / milestones. This challenge was heightened by the fact that it sat within the twin project imperatives of a

hard delivery deadline exacerbated by Brexit and a fixed budget envelope.

- the hard programme deadline combined with very limited information on asset condition meant that TfW had to adopt a financially risky NEC4 Option E contract. Mitigation measures were implemented to manage this risk but, in any future scheme without equivalent time pressures, an NEC4 Option C or Option E contract would be lower risk from a TfW perspective.

- whilst a milestone-based payment mechanism was potentially appropriate for a project of this nature, its definition in the contract was too rigid and was disadvantageous to both TfW and AIW

- the requirement to finalise the cost of the project when designs were at a relatively early stage contributed to cost escalation and potentially reduced opportunities for value engineering. This is a further consequence of the fixed project end date (caused by Brexit, as there was no opportunity to roll over funding into a future Structural Fund programme as there would have been if the UK had remained in the European Union), and thus there is an emerging theme around the importance of flexibility in project delivery, although within a framework that prevents project drift.

- the procurement by TfW of several mono-discipline frameworks to deliver a multi-disciplinary project created **extra contractor interfaces**, **a risk which rested with TfW**. There would be benefit in considering the procurement or use of multi-disciplinary frameworks in future projects of this nature.

- the requirement to deliver activities in parallel increased the risk of abortive work and thus cost escalation. On future rail projects, it is recommended that all aspects of track design should proceed first, as other workstreams have a dependency on the track solution adopted.

- on future projects of this nature, there should be an **integrated planning entity formed of all contractors building a single programme** from which to communally work

- whilst robust risk management was a feature of the project, there was perhaps **less focus on opportunity management**, which could perhaps play a more prominent role in future projects

- longer term, it is important that TfW carries out a comprehensive outcome and impact evaluation of SWMP2 (see Chapter 18) to fully understand the extent to which benefits outlined in the business plan are realised in practice

18 Conclusions and Next Steps

18.1 Overview

18.1.1 This report has evaluated the nine ERDF funded Operations, satisfying the requirement as part of the ERDF grant funding to provide an evaluation of investment in 2024. It also incorporates an initial evaluation of the outputs emerging from SWMP2 overall, including the improvement in connectivity that will be offered for Valleys communities.

18.1.2 With respect to the ERDF Output and Result Indicators:

- **Output Indicator: inter-modal facilities created or improved; total length of railway line; land developed** - these Output Indicators relate to the delivery of infrastructure. This report has provided an update as to their status, setting out what has been delivered. A combination of unavoidable programme delays caused by COVID-19 and agreed scope changes has meant that Output Indicator targets for some individual Operations have not been met. However upon completion, **SWMP2 will meet all programme level targets[86].**

- **Result Indicator: West Wales and the Valleys** - the overall results show that, based upon the most up-to-date population and public transport information as well as the June 2023 CVL timetable revision, the minimum threshold of a 5% increase in the proportion of the population aged 16 or over within a 15, 30 and 45-minute travel time of a 'key centre' will be met and indeed exceeded.

18.1.3 For all other indicators, the analysis presented in the Interim Evaluation Report, which used modelled data, continues to provide the most appropriate indication of delivery. These model data suggests that the indicators specified will be met.

18.1.4 The assessment of CCTs confirmed the high rating WEFO expressed in its initial assessment in 2018, with all CCT requirements found to have been fully met. Overall, the Operations have taken appropriate actions to address each of the Case Level CCT Indicators and have provided case study and portfolio evidence to confirm the extent of this success. Indeed, the process, agreed with WEFO, for gathering and reporting key CCT activities utilised a template to create a portfolio of case studies that can be used as an exemplar for future Welsh Government projects and programmes.

18.1.5 Beyond the ERDF funded Operations, the emerging evidence suggests that SWMP2 will deliver a transformative change in transport connectivity built around an increase in frequency to four trains per hour on the CVL, reduced

[86] While the programme target for the West Wales Inter-modal facilities will not be delivered in the ERDF timescales, the works will be delivered outside of the ERDF window.

rail journey times, improved seating capacity and the provision of direct connections from the TAM lines to Cardiff Bay.

18.1.6 The process evaluation has identified a range of successes which have aided project delivery, including: the use of the competitive dialogue procedure in procuring SWMP2; the development and application of a robust project governance and assurance framework; the adoption of a robust QRA; and the highly successful management of stakeholder relationships and communications. A range of lessons learned were also identified, the most important of which is the requirement for flexibility in project delivery, and in particular the need to avoid a 'hard' funding deadline where possible. This presented a range of programme, management, risks and financial challenges for SWMP2.

18.2 Next Steps

18.2.1 Given the significant investment in SWMP2 and its status as one of the biggest ever transport projects delivered in Wales, it is recommended that a more detailed evaluation which fully considers the outcomes and impacts arising from investment should be undertaken after SWMP2 becomes operational. This would be in keeping with WelTAG Stage 5. Whilst not a commitment to undertake such an evaluation, the below discussion sets out a series of recommendations as to how such an evaluation could be progressed.

18.2.2 As set out in Chapter 2, outputs, outcomes, and impacts materialise at different points following the completion of a project. As a result of these differential timing issues, rather than evaluating a scheme at a single point in time, it is beneficial to undertake post-opening evaluation in a number of stages. Drawing on the SWMP2 logic map (as set out in Chapter 2) and the accompanying Monitoring Framework (as set out in the Interim Evaluation Report), three distinct stages for the SWMP2 evaluation are recommended and are summarised in Table 18.1.

18.2.3 A range of activities are recommended in the table for each stage of the evaluation. In summary, during each stage, the logic statements set out in the logic maps should be reviewed and a view taken as to whether they remain appropriate. Where a change is both likely and evidence of this change is available, the relevant data as set out in the Monitoring Framework should be reviewed and the findings reported as required.

18.2.4 As noted in Table 18.1, during Stage 2, it is recommended that primary research is undertaken, and the results compared with the equivalent results identified in the baseline telephone survey undertaken as part of the Interim Evaluation Report. As previously noted, the baseline telephone survey was undertaken at the Interim Evaluation stage and is the only detailed dataset available covering satisfaction with rail services and travel patterns in the study area. However, the telephone survey asked respondents about their

travel behaviour and views during the year 2019 and therefore reflects a pre-COVID-19 position. As such, if this baseline survey is compared with outturn primary data, it will be difficult to isolate the impacts of SWMP2 from those of COVID-19, with the result that the benefits of SWMP2 may not adequately be captured. It is also noted that the pre-SWMP2 travel behaviour survey was undertaken prior to the introduction of the default 20mph speed limit on 'restricted' roads (from September 2023) and therefore does not reflect this change. While less robust than a separate baseline survey, there would be merit in including questions on how people travelled prior to the delivery of SWMP2 in any post-opening survey in order to establish a pre-scheme post COVID-19 baseline.

Table 18.1: Recommendations regarding the purpose, timing, and type of metrics which could be examined as part of future stages of evaluation

Stage	Purpose	Timing	Data type	Scope
Stage 1	High level assessment of the extent to which project is on track to meet requirements	Approximately one year following the project becoming operational	Secondary data	Confirm outputs assessed in this report have been delivered and account for any changes in comparison to the original scope. Assess remaining outputs identified within the programme logic map using outturn (post-delivery) data. Review secondary data covering outcomes and impacts, including available data on rail patronage[87] and bus patronage; and provide a commentary on any changes in transport supply (e.g., bus network provision).
Stage 2	More comprehensive assessment carried out when SWMP2 has sufficient time to bed in	Typically, 3-5 years after project becoming operational	Secondary data, primary data, and stakeholder engagement	Review available datasets examined during Stage 1 to identify changes since Stage 1 Evaluation. Compare the above data against equivalent data for the counterfactual locations (Bridgend County Borough Council and Torfaen County Borough Council) where relevant. Undertake primary research to help understand outcomes and impacts for which secondary data are unavailable (satisfaction with SWMP2, changes in travel behaviour and changes in employment / place of

[87] raw LENNON data should be available to TfW almost immediately. if you're looking for complete annual data (e.g. the processed MOIRA journeys-revenues dataset) then that would typically be available around 3-6 months later, e.g. data for the year ending March-23 was available in June

Stage	Purpose	Timing	Data type	Scope
				residence) – given that the telephone survey conducted as part of the Interim Evaluation was pre-COVID 19, this primary research could include questions on pre SWMP2 travel as well as post SWMP2 travel. Update the connectivity analysis using outturn public transport data to provide a high-level indication of potential socio-economic impacts. Review available secondary data to identify potential impacts, including socio-economic changes, although note the time-lag in impacts materialising and the availability of some datasets. Engagement with relevant stakeholders to help inform the above tasks
Stage 3	Assessment of changes in land use and wider impacts since delivery of project	Typically, 10-15 years after project becoming operational	Secondary data and stakeholder engagement	Review available secondary data to identify potential impacts, including socio-economic changes. Comparison of baseline and outturn (post-delivery) GIS mapping and review of Local Development Plans to identify changes in land-use. Engagement with relevant stakeholders to help inform the above.

Appendix A March 2021 and June 2023 rail timetable comparison

A.1.1 At the Interim Evaluation stage, the South-East Wales Transport Model (SEWTM) was used to generate passenger forecasts and levels of modal shift from car to rail. These were subsequently used to inform the estimated reduction in carbon dioxide provided by SWMP2 (one of the established Output Indicators under both the East Wales and West Wales and the Valleys Operational Programmes – see Table 4.2).

A.1.2 Since the Interim Evaluation, the post-opening rail timetables used in this analysis (the March 2021 timetable revision) have been updated and an assessment of the updated timetables (the June 2023 timetable revision) was undertaken to determine if the changes warranted a re-run of SEWTM and the development of updated forecasts.

A.1.3 The comparison of the March 2021 timetable revision and the June 2023 timetable revision found that:

- there is no change to the service pattern proposed. TAM services are expected to terminate alternately at Cardiff Central and Cardiff Bay, with the Aberdare to Cardiff Central services routeing via the City Line. Coryton line services terminate at Penarth, while Rhymney line services terminate at Barry Island or Bridgend (via Rhoose).
- there is no change to the service frequency proposed with 4 trains per hour to each head of the valleys termini, 2 trains per hour on the City Line and 2 trains per hour on the Coryton line
- there is very little change to the proposed journey times on the route sections where the investment is taking place, as shown in Table A-1

Table A-1: Comparison of rail journey times by route section in the March 2021 timetable revision and the June 2023 timetable revision

Core Valley Line Route	Journey time – March 2021 timetable revision (minutes)	Journey time – June 2023 timetable revision (minutes)	Difference
Treherbert-Cardiff Central	51	50	-1
Treherbert-Cardiff Bay	52	54	2
Aberdare-Cardiff Central	49	49	0
Aberdare-Cardiff Bay	48	50	2

Core Valley Line Route	Journey time – March 2021 timetable revision (minutes)	Journey time – June 2023 timetable revision (minutes)	Difference
Merthyr Tydfil-Cardiff Central	47	49	2
Merthyr Tydfil-Cardiff Bay	49	51	2
Coryton-Cardiff Central	16	19	3
Rhymney-Cardiff Central	50	50	0
Caerphilly-Cardiff Central	16	17	1

A.1.4 This assessment indicates that the timetable changes are too small to make any material difference to the forecasts and therefore the forecasts used in the *Interim Evaluation Report* remain valid and should continue to be used.

Appendix B Inter-modal Facilities

B.1.1 The tables below shows the inter-modal facilities and improved accessible boarding provided at each station as part of the East Wales and West Wales Operational programmes. Those stations shown in red are no longer part of the ERDF deliverables and those shown in green are where the Inter-modal facilities target has been achieved.

Station	Location	Intermodal Facility Delivered	Copers	Track adjusted	Tactiles	Platform extension		Footbridge	Bike hoops	Wayfinding	CIS
ERDF - Stations			Improved accessible Boarding					Intermodal Facilities			
Birchgrove	East Wales								Y		Y
Butetown	Cardiff Bay		Y	Y	Y						
Cardiff Bay	Cardiff Bay		Y	Y	Y	Y					
Cardiff Queen St	East Wales								Y	Y	Y
Cathays	East Wales										
Coryton	East Wales								Y	Y	
Crwys road	East Wales										
Danes Court	East Wales		Y	Y		Y		Lanks Hill			
Fairwater	East Wales		Y	Y		Y					
Heath High Level	East Wales										
Heath Low Level	East Wales									Y	
Lisvane & Thornhill	East Wales								Y	Y	
Llandaff	East Wales										Y
Llanishen	East Wales									Y	
Ninian Park	East Wales								Y		Y
Radyr	East Wales			Y							Y
rhiwbina	East Wales								Y		Y
Ty Glas	East Wales										
Waun-Gron	East Wales		Y	Y		Y					
Whitchurch	East Wales										Y

B.1.2 The table below shows the inter-modal facilities and improved accessible boarding provided at each station as part of the West Wales Station Improvements Operation

Station	Route	Location	Intermodal Facility Delivered	Copers	Track adjusted	Tactiles	Platform extension or New Platform	Footbridge	Bike hoops	Wayfinding	CIS	shelters
ERDF - Stations				Improved accessible Boarding				Intermodal Facilities				
Aber	CAR	West Wales	Yes	Y		Y						
Abercynon	CAM	West Wales	Yes	Y	Y							Y
Aberdare	VON	West Wales	Yes	Y	Y		Y					
Bargoed	CAR	West Wales	Yes						Y	Y		
Brithdir	CAR	West Wales	Yes								Y	
Caerphilly	CAR	West Wales										
Cwmbach	VON	West Wales	Yes	Y	Y					Y	Y	
Dinas Rhondda	THT	West Wales	Yes	Y		Y	Y					Y
Energlyn & Churchill Park	CAR	West Wales	Yes								Y	
Fernhill	ABD	West Wales	Yes									Y
Gilfach Fargoed	CAR	West Wales	Yes								Y	
Hengoed	CAR	West Wales	Yes		Y						Y	Y
Llanbradach	CAR	West Wales	Yes		Y				Y		Y	
Llwynpia	THT	West Wales	Yes						Y		Y	
Merthyr Vale	MER	West Wales	Yes	Y	Y					Y	Y	
Merthyr-Tydfil	MER	West Wales	Yes		Y							
Mountain Ash	ABD	West Wales	Yes	Y	Y						Y	Y
Pengam	CAR	West Wales	Yes							Y		
Penrhiwceiber	ABD	West Wales	Yes								Y	
Pentre-Bach	CAM	West Wales	Yes		Y						Y	
Pontlottyn	CAR	West Wales	Yes								Y	
Pontypridd	CAM	West Wales	Yes								Y	
Porth	THT	West Wales	Yes						Y		Y	
Quaker's Yard	CAM	West Wales	Yes	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rhymney	CAR	West Wales										
Taff's Well		WW Taffs Well	Yes	Y	Y	Y photo	Y			Y		
Tir-Phil	CAR	West Wales	Yes						Y	Y	Y	
Ton Pentre	THT	West Wales	Yes						Y photo		Y	Y photo
Tonypandy	THT	West Wales										
Treforest estate	CAM	West Wales	Yes		Y						Y	
Treforest	CAM	West Wales	Yes		Y							
Trehafod	THT	West Wales	Yes		Y					Y	Y	
Treherbert	THT	West Wales	Yes	Y		Y	Y					
Treorchy	THT	West Wales	Yes								Y	Y photo
Troed-Y-Rhiw	CAM	West Wales	Yes		Y				Y		Y	
Ynyswen	THT	West Wales										
Ystrad Mynach	CAR	West Wales	Yes						Y	Y		
Ystrad Rhondda	THT	West Wales	Yes						Y		Y	

Appendix C Cross Cutting Themes Case Study

C.1 Equal Opportunities and Gender Mainstreaming

CCT Theme: Equal Opportunities, Gender Mainstreaming and the Welsh language
CCT Indicator: Disability access group engagement
ERDF Operation: EW station Improvements

CASE STUDY – Accessibility Station Workshop

The accessibility station workshop was undertaken in order to influence the designs for the station transformation projects at an early stage with a view to identifying some potential design principles.

A number of individuals had visited two stations – Radyr and Llandaff. Individuals with various disability levels gave feedback on the different issues they had encountered when using station facilities. Some of the design features which were further explored were :

* Stairs and bridges
* Level boarding
* Lift access options
* Emergency call out buttons
* Seating areas
* Help points
* Signage and wayfinding

Feedback on the workshop has been very positive. Many of the design professionals commented that the experience provided an excellent learning opportunity to influence their current projects, understand more about inclusive design and the see the importance of user involvement first-hand.

CCT Theme: Equal Opportunities, Gender Mainstreaming and the Welsh language
CCT Indicator: Disability access group engagement
ERDF Operation: ALL

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CASE STUDY – Building Passenger Trust In Public Transport Post Covid

In February of 2021, an AI meeting was held after a very successful survey conducted by TFW, allowing passengers to raise concerns or suggestion about using public transport after the COVID 19 pandemic. The survey has been live since August 2020. The survey allows personalised responses for customers to share their experiences whilst rating elements of services. This provides a more detailed overall picture of the positives and negatives of using public transport.

Some points which were raised during the A&I meeting included:

- Many customers are concerned for wheelchair users who comfortably move if someone sits next to them, not abiding by the social distance rules, this is due to only have one seated area for wheelchair users.
- Others' concerns included partially deaf users struggling to hear with staff wearing face masks, seat markers being removed
- examples of correct staff and other passenger behaviour with regards to social distancing is needed.

The meeting then went on to discuss how and what we can do to help users return to public transport in the future, what measures need implementing and accessibility apps currently used to assist accessibility across the country.

CCT Theme: Equal opportunities, Gender mainstreaming and the Welsh Language
CCT Indicator: Positive action measure- older people
ERDF Operation: EW SI and WW&V SI

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CASE STUDY – Garden Clearing with Age Connect

The Planning & Resources Team at AIW (Amey Infrastructure Wales) have partnered with Age Connects Cardiff and The Vale to deliver three garden projects to elderly residents across the Cardiff area with a hope to deliver many more in the future.

During one of the social impact days, AIW assisted an elderly Cardiff Resident with the clean-up of their garden. Mrs W, who was delighted at the hard work and new look of her garden, made sure staff was well hydrated throughout the day.

Working closely with **Age Connects Cardiff & the Vale,** this is one of several days organised to assist and support elderly residents in the area.

CCT Indicator:
Equal Opportunities, Gender Mainstreaming & Welsh Language
CCT Theme: Disability Access Group Engagement
ERDF Operation: EW station improvements and Cardiff Bay

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CASE STUDY – ACCESS AND INCLUSION PANEL MEETING

On the 6th of October 2022, Transport For Wales held an Access and Inclusion Panel meeting. The meeting covered discussions on the new Butetown/Cardiff Bay station and also the Wayfinding Strategy at Cardiff Central which is part of the EW station improvements operation. The wayfinding strategy discussed at Cardiff Central will also benefit remaining stations in the East Wales region as well as the West.

Some of the topics discussed in this workshop were:

* station improvements at both Cardiff bay and Cardiff Central
* access requirements – toilet accessibility
* use of furniture to maximise space
* accessible parking
* using correct wayfinding and signage to inform
* use of technology such as REACT guidance system

Aside from liaising with the panel, we are in constant engagement with the Accessibility and Inclusions lead for Rail Services, Rob Gravelle. Rob is assisting in scrutinising designs through reviews and IDC's, and is assisting us in developing and reviewing the DIA's for the Transformation project.

Trafnidiaeth Cymru/Transport for Wales
Panel Hygyrchedd a Chynhwysiad
Access and Inclusion Panel Meeting
6 Hydref 2022
6 October 2022

Ymddiheuriadau
Apologies
Rob Gravelle
Dave Thomas
Meinir Collyer
Kate Murray

Cyflwyniadau
Introductions
Alun Thomas
Amanda Say
Barry Lloyd
Guiseppe Bufalini
Gareth Paget
Kelsy Carcenilla
Kierran James
Mark Jones
Robert Mann
Zandra Ling (Chair)
Agata Gmerek
Margaret Buchanan-Geddes
Trevor Nunn
Luke Curtis
Felix Lammert
Mike Morgan

Metro

CCT Theme: Equal Opportunities, Gender mainstreaming & the Welsh language
CCT Indicator: Activity supporting speakers of the Welsh Language
ERDF Operation: All

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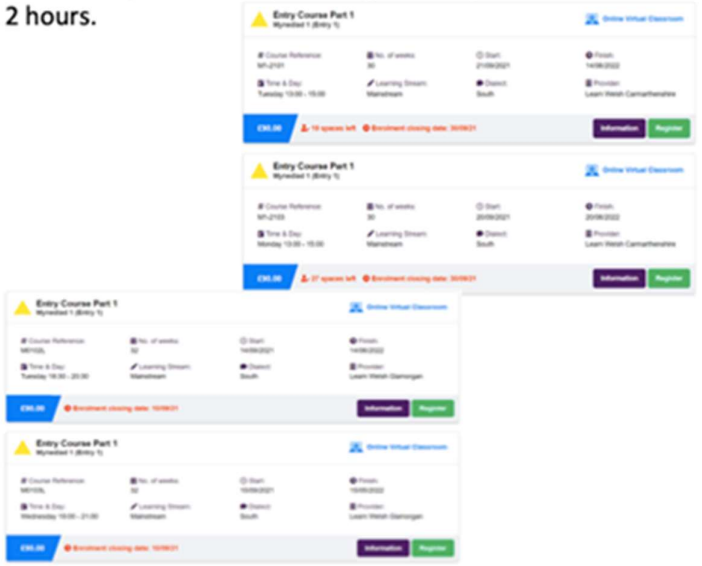
CASE STUDY – Learn Welsh/Dysgu Cymru

As part of Siemens' commitment to promoting the Welsh language on CVL, they are offering a discount on course fees to employees who would like to learn Welsh.
They offered this back in January and had some uptake but more classes are starting throughout September.

The classes are mainly ran online via virtual classrooms (other options available) by Garth Olwg Lifelong Learning Centre, in Church Village. Courses are for all abilities and fees are £90. However, Siemens will commit to paying 50% of fees **(£45 in total)**. The courses run weekly from September to June (some dates and times shown below).

At the moment **beginner/entry classes are 50% off using the code 'WELSH21'** when you sign up and pay, Siemens will still offer the **50% off making these classes only £22.50**.
See below the link -
https://learnwelsh.cymru/learning/welsh-courses-for-beginners/

Some examples - Entry Course Part 1 on Monday, Tuesday or Thursday afternoons 13:00-15:00 or Monday, Tuesday, Wednesday or Thursday evenings starting at varied times for 2 hours.



C.2 Tackling Poverty and Social Exclusion

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CASE STUDY – Bowel Cancer Awareness

As a part of Tackling Poverty and Social Inclusion, Griffiths has consulted a Clinical Nurse Specialist from the Department of Gastroenterology at Llandough hospital. It is so important to raise awareness of illnesses to tackle social inclusion. Griffiths has conducted an open forum on the topic of Bowel Cancer Awareness. They have recently donated some digital radios to the hospital unit to be used by patients receiving treatment. They have also consulted a sun protection specialist nurse who attended site during June and discussed the protection of workforce on site during the summer months.

GRIFFITHS
civil engineering and construction

CANCER UK
#STOPbowelcancer

C.3 Sustainable Development

CCT Theme – Sustainable Development
CCT Indicator - Development of an organisational travel plan and sustainable transport initiative
ERDF Operation – All

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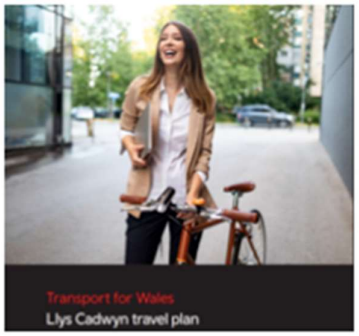
CASE STUDY – TfW Office Travel Plan

In late 2020, Transport for Wales moved to its new home at Llys Cadwyn in the heart of Pontypridd within the South Wales valleys. The new office building will initially be home to around 300 TfW colleagues, with more people set to move in as the organisation continues to grow over the next few years. In addition, colleagues from TfW Rail Services who will also cohabit the building. As a result, it was important to understand some of the travel issues likely to be experienced and to consider opportunities that could help TfW to encourage more sustainable travel behaviours.

To help us develop this travel plan, we undertook a survey of all colleagues, asking a range of questions about their travel choices and their reasons for those choices. A copy of the survey is included at Appendix A. The online survey was promoted via our internal communications channels and ran from the 3rd to the 28th February. A total of 78 people, out of the 267 employed by TfW at the time, responded with the majority of those based in Southgate House, Cardiff, although colleagues based in Wrexham, Treforest, Carmarthen and Shrewsbury also took part.

The Travel Plan was introduced to help decarbonise our transport networks by encouraging our people to make healthier, more sustainable and more active travel choices when commuting or travelling for work and improving their health and well-being. This was planned utilising the origin locations for existing commuting journeys, we can determine whether a significant portion of colleagues live within reasonable distances from Llys Cadwyn, that they may consider these active travel modes without any further measures or incentives being implemented in order to meet five key objectives:



1. To minimise the number of Single Occupancy Vehicle (SOV) journeys made by colleagues travelling to work;
2. To encourage modal shift and reduce the carbon footprint of our people when travelling for TfW business purposes;
3. To increase active and sustainable transport options for colleagues commuting and undertaking business travel;
4. To raise awareness of active and sustainable travel options available to our people and promote the positive impact of our actions
5. To improve the health and wellbeing of our colleagues by promoting use of active and sustainable modes of transport.

CCT Theme: Sustainable Development
CCT Indicator: Site Management Plan
ERDF Operation: EW Stations

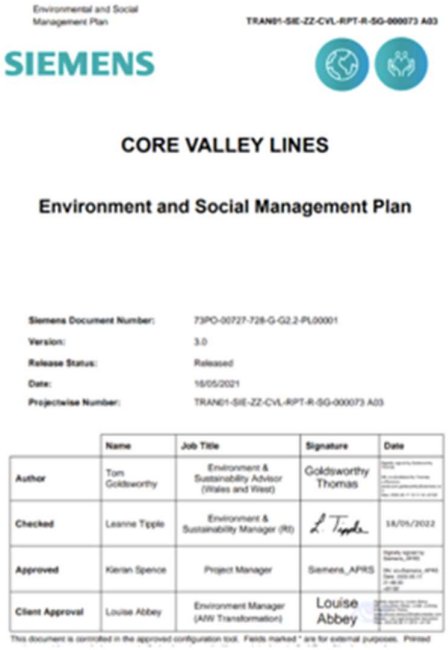
CASE STUDY – EW Stations Environmental Site Management Plan

Siemens have implemented Environmental and Social Management Plans for their construction work across the CVL.

This Environmental and Social Management Plan (ESMP) provides a framework for the management environmental social issues on the project to ensure legal, contractual, and procedural requirements are met as well as social obligations are achieved.

The EMP has been developed in general accordance with the following:
- Siemens ISO14001:2015 certified Environmental Management System (EMS)
- Network Rail Contract Requirements Environment (NR/L2/ENV/015)
- AIW Environmental Management Plan (P01.2)

The EMP has been produced to summarise key environmental risks and associated control measures. The overall objectives of the EMP are to:
- Outline roles and responsibilities, objectives and targets, requirements and consents and competence and training.
- Detail communication requirements including internal and external communication methods; and
- Summarise environmental conditions on the project, identify control measures (as required) and establish the residual risk.



Environmental and Social Management Plan

TRAN01-SIE-ZZ-CVL-RPT-R-SG-000073 A03

SIEMENS

CORE VALLEY LINES

Environment and Social Management Plan

Siemens Document Number:	73PO-00727-728-G-G2.2-PL00001
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	Name	Job Title	Signature	Date
Author	Tom Goldsworthy	Environment & Sustainability Advisor (Wales and West)	Goldsworthy Thomas	
Checked	Leanne Tipple	Environment & Sustainability Manager (RI)	L Tipple	18/01/2022
Approved	Kieran Spence	Project Manager	Siemens_APRS	
Client Approval	Louise Abbey	Environment Manager (AIW Transformation)	Louise Abbey	

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CCT Theme: Sustainable Development
CCT Indicator: Integration of green Infrastructure
ERDF Operation: Cardiff Bay, WW&V SI

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CASE STUDY – Green Routes Project

As part of TFW's Green Routes Project, many stations across the CVL such as Cardiff Bay, Pontypridd and Treherbet have seen enhancements to their station's environment and a boost to biodiversity in the local area. This has been done using various methods i.e. replacing existing shrubs with planters for improved biodiversity and pollinators, as well as sensory plants to increase passengers' well-being.

As part of the Green Routes Project, TFW will introduce green features at 25 stations and in 5 community areas.

Enhancements will include planters and wildlife boxes to boost local biodiversity across the network.

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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

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SHARE WITH

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

C.4 CCT General

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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.

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CCT Theme: General

CCT Indicator: Integration of social clauses into activity

ERDF Operation: All

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CASE STUDY – Ex-Offender Pathway to work

Balfour Beatty are working with their Client Transport for Wales, to create an innovative pathway to work for ex-offenders: 'Building Futures – On the right track'. Balfour Beatty had the pleasure of being hosted at Cilwrgi Farm, HMP Prescoed, for a working group facilitated by Kate Carr of Arc: making the difference. Cilwrgi Farm is the last remaining active and profitable dairy farm within the justice system, throughout the UK. It was fascinating to look at their operation, of which, besides the main purpose of being there, there are other great opportunities to work together. The Infrastructure Delivery Partners are working together to develop our thinking about how we will achieve our aim - to create a pathway for ex-offenders that includes training, sustainable employment and support within the construction sector, by exploiting the opportunities that CVL and the South Wales Metro presents us.

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CCT Theme: General
CCT Indicator: Integration of Social Clauses into an Activity
ERDF Operation: Aberdare

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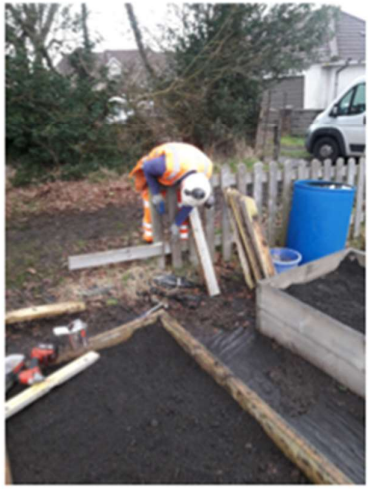
CASE STUDY – Ground Works at Caradog Primary School

Alun Griffiths assisted Caradog Primary School with the refurbishment of the allotment space at the Grove Allotments in Aberdare. These allotment spaces are used to enhance the younger children's development and education. The new open space allows more children to develop skills in a friendly and safe environment.



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CASE STUDY - Wellbeing / Work-Life Balance

At TfW, we recognise the importance of our staffs well-being and encouraging a healthy work-life balance. We also encourage our partner companies to follow our lead on improving staffs well-being and work-life balance.

Our Infrastructure Delivery Partners (IDP's) have recognised the importance of wellbeing and a work-life balance especially as we work from home due to the Pandemic. One of our IDP's Alun Griffiths implemented a policy to blocked out 12.30-1.30 on every employees calendar so no meetings can be scheduled over this lunch period. This encourages people to step away and have time off their screens.

Balfour Beatty has implemented a policy which no emails are to be sent outside of normal working hours. They have used the delayed send function for any emails sent out of hours. These promote a healthy work-life balance and ensure employees are taking breaks from their screens.

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Balfour Beatty

CCT Theme: General
CCT Indicator: Stakeholder Engagement
Good Practice Activity
Operation: Cardiff Bay

CASE STUDY – Cardiff Bay Drop-in Session

As part of Transport for Wales engagement on the Bay Line Transformation project, The Stakeholder and Community engagement team held a drop in session on the 19th October at Butetown Pavilion for members of the public and local community to drop in and ask questions about the project. This was the second session held for the Cardiff Bay operation. Previously a session was held at the Makers Guild which was mainly an opportunity to meet local businesses.

The total number of overall attendees who engaged with the drop-in sessions was 35. The overall feedback was a positive outlook on the project with the following concerns raised and addressed:

- Loss of bus services, and new locations of bus stops during construction
- Parking issues and location of contractors parking and potential litter left from site
- Security (CCTC)
- Noise and light pollution

All issues and concerns were addressed by TFW staff including demonstration videos, and detailed explanation of systems such as the CCTV.
There are a number of drop in sessions already booked for the future which will take place on the following dates: Tuesday 11th October 2022 12-4pm – Butetown Community Centre
Wednesday 19th October - 12-4pm – Butetown Pavilion
Wednesday 16th November – 12-4pm – Makers Guild in Wales
Saturday 5th November – 2-4pm - Cathays Community Centre

CCT Theme: General
CCT Indicator: Stakeholder engagement good practice activity
ERDF Operation: Cardiff Bay

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CASE STUDY – Business Drop In

On the 12th of August, 12pm-3pm Transport For Wales held a drop in session in Cardiff Bay. This was for local businesses to find out more about the new Butetown railway station.
This was a key Stakeholder Engagement event ensuring local Stakeholders are kept up to date with the project and works going on in their local area!

CCT Theme: General
CCT Indicator: Stakeholder engagement good practice activity
ERDF Operation: Cardiff Bay

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This was a key Stakeholder Engagement event ensuring local Stakeholders are kept up to date with the project and works going on in their local area!

CCT Theme - General
CCT Indicator - Integration of social clauses into an activity
ERDF Operation – Taffs Well Depot

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CASE STUDY – APPRENTICE RECOGNITION

One of TfW partners working on the Taff's Well Depot - Alun Griffiths has had their apprentice engineers shortlisted for the Institution of Civil Engineers (ICE) Wales Cymru Apprentice of the Year Award in recognition for their hard work and adaptability during the pandemic. The ICE Wales Cymru Apprentice of the Year Award is considered by a Review Board and is awarded based on an overall assessment of the Apprentices including professional academic study.

The Civil Engineering Contractors Association (CECA) Wales announced an award winner each day. Griffiths were represented in every category with a total of five Apprentices and Graduates shortlisted.

Lauren is an aspiring Civil engineer who is currently in her second year of studying BTEC Construction and the Built Environment at Cardiff and Vale College. She took the apprenticeship to get highly valued experience in her chosen field. She started a week before national lockdown due to COVID-19 but after a brief period of self-isolation and working from home she was back on site and shadowing one of the site civil engineers.

On winning her award Lauren said: "I am delighted to receive the award after pushing myself in work and college over the last year. It is such a nice feeling to see all my hard effort has paid off and that I've been recognised. My colleagues have been amazing and so supportive of my application. I have thoroughly enjoyed my experience so far and hope to continue to progress in the future."

Lauren is currently working on the ground remediation works and will be transferred to the Core Valley Lines integrated control center (CVLICC).

ice

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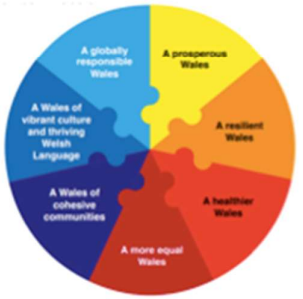
Prentisiaethau Apprenticeships



Appendix D Line closures due to SWMP2 works

D.1.1 The table below summarises the main blockades[88] on the CVLs network due to works associated with SWMP2.

ID	Date from	Date to	Approximate length of disruption (days)	Line details	Details
1	01/04/2021	06/04/2021	5	Pontypridd to Cardiff	CVL engineering work blockade - no trains between Pontypridd and Cardiff
2	28/05/2021	31/05/2021	3	Taff's Well	Taff's Well engineering work
3	28/08/2021	13/09/2021	16	Aberdare	Major CVL possession - Aberdare blockade
4	22/10/2021	28/10/2021	6	Merthyr Tydfil	Merthyr blockade
5	27/12/2021	06/01/2022	10	Pontypridd to Aberdare	Christmas Blockade - Ponty to Merthyr and Aberdare
6	27/12/2021	06/01/2022	10	Abercynon to Merthyr Tydfil	Christmas Blockade - Ponty to Merthyr and Aberdare
7	25/12/2021	27/12/2021	2	Cardiff Queen Street to Treherbert	
8	25/12/2021	27/12/2021	2	Pontypridd to Aberdare	
9	25/12/2021	27/12/2021	2	Abercynon to Merthyr Tydfil	

[88] A blockade in rail refers to the closure of a route for an extended period, typically more than a weekend, usually to allow engineering works

ID	Date from	Date to	Approximate length of disruption (days)	Line details	Details
10	19/03/2022			Abercynon	Abercynon Line Piling works
11	28/03/2022			Bus Service Blockade. Radyr North, including Cardiff Central & City Line.	
12	28/03/2022			Pontypridd to Cardiff Central	Sun-Thur Evening Services
13	04/04/2023			City Line Services	Mon-Thur Evening Services (City Line Services in Cardiff area)
14	01/04/2022	03/04/2022	2	Pontypridd to Radyr	
15	15/04/2022	17/04/2022	2		
16	17/04/2022	13/05/2022	26	Aberdare to Abercynon	
17	10/05/2022			Cwmbach to Aberdare	Piling
18	15/05/2022			Cambrian Line	Blockade
19	02/07/2022	08/07/2022	6	CTL and R2P Lines	Small blockade across CTL and R2P lines
20	01/08/2022	11/09/2022	41	Rhymney Line	Rhymney Line Possession - mid week possessions
21	27/08/2022	30/08/2022	3	Pontypridd to Aberdare	Ponty North to ABD & MER possession

ID	Date from	Date to	Approximate length of disruption (days)	Line details	Details
22	27/08/2022	30/08/2022	3	Abercynon to Merthyr Tydfil	Ponty North to ABD & MER possession
23	11/10/2022	03/11/2022	23	Abercynon to Merthyr Tydfil	
24	06/11/2022	12/11/2022	6	Pontypridd to Treherbert	3 x 6 week possessions for Treherbert
25	19/11/2022	25/11/2022	6		
26	April	May		Cardiff Bay to Cardiff Queen Street	Butetown Station works
27	04/11/2022	19/11/2022	15		
28	24/12/2022	31/12/2022	7	Cardiff Queen Street to Treherbert	
29	24/12/2022	31/12/2022	7	Pontypridd to Aberdare	
30	24/12/2022	31/12/2022	7	Abercynon to Merthyr Tydfil	
31	02/01/2023	06/01/2023	4	Pontypridd to Merthyr Tydfil	
32	02/01/2023	24/01/2023	22	Abercynon to Aberdare	
33	08/04/2023	09/04/2023	1	Pontypridd to Cardiff Central	
34	09/04/2023	13/04/2023	4	Pontypridd to Treherbert	
35	10/04/2023	13/04/2023	3	Ystrad Mynach to Rhymney	

ID	Date from	Date to	Approximate length of disruption (days)	Line details	Details
36	30/04/2023	Early 2024		Pontypridd to Treherbert	Closure of Rhymney Line to Cardiff Central, including Coryton branch
37	21/05/2023			Rhymney to Cardiff Central	Closure of Rhymney Line to Cardiff Central, including Coryton branch
38	21/05/2023			Coryton to Cardiff Queen Street	Closure of Rhymney Line to Cardiff Central, including Coryton branch
39	04/01/2021	22/01/2021	18	Radyr to Treherbert	
40	04/01/2021	22/01/2021	18	Pontypridd to Aberdare	
41	04/01/2021	22/01/2021	18	Abercynon to Merthyr Tydfil	
42	19/03/2023	03/04/2023	15	Abercynon to Merthyr Tydfil	
43	25/04/2023	28/04/2023	3	Pontypridd to Ninian Park	
44	25/04/2023	28/04/2023	3	Radyr to Cardiff Central	
45	16/04/2023	30/04/2023	14	Cardiff Queen Street to Cardiff Bay	
46	25/04/2023	02/05/2023	7	Cardiff Central to Radyr (via Cathays)	
47	17/04/2023	21/04/2023	4	Cardiff Central to Radyr	
48	24/04/2023	02/05/2023	8	Cardiff Central to Radyr (via City Line)	

ID	Date from	Date to	Approximate length of disruption (days)	Line details	Details
49	29/04/2023			Cardiff Queen Street to Treherbert	
50	29/04/2023	02/05/2023	3	Pontypridd to Aberdare	
51	29/04/2023	02/05/2023	3	Abercynon to Merthyr Tydfil	
52	30/04/2023			Cardiff Central to Rhymney	
53	11/06/2023	26/06/2023	15	Cardiff Queen Street to Cardiff Bay	
54	31/07/2023	03/08/2023	3	Radyr to Treherbert	After 9pm
55	31/07/2023	03/08/2023	3	Pontypridd to Aberdare	After 9pm
56	31/07/2023	03/08/2023	3	Abercynon to Merthyr Tydfil	After 9pm
57	06/08/2023	07/08/2023	1	Pontypridd to Merthyr Tydfil	
58	13/08/2023	16/08/2023	3	Pontypridd to Merthyr Tydfil	
59	16/04/2023	12/05/2023	26	Pontypridd to Aberdare	
Total			~412		

Appendix E Hansen Analysis

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

Step 1: Calculate Journey Times

E.1.2 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.

Step 2: 'Destination' criteria

E.1.3 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.

Step 3: Apply Hansen Formula

E.1.4 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.

Step 4: Sum the results over all origin zones

E.1.5 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

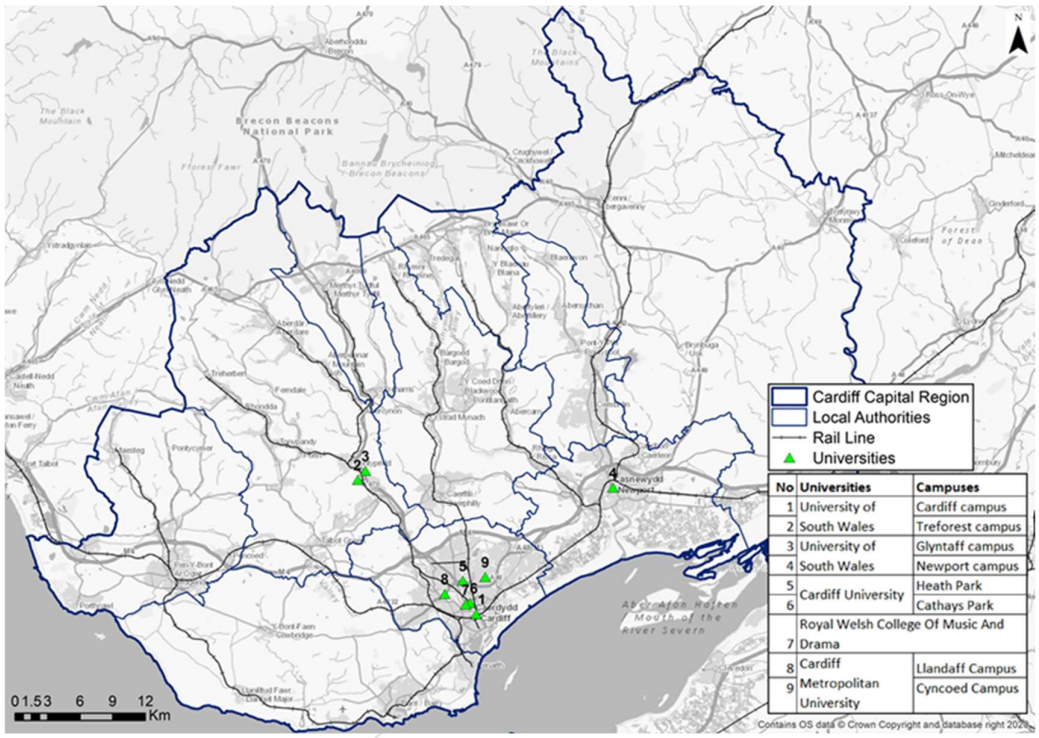
[90] https://statswales.gov.wales/Catalogue/Education-and-Skills/Post-16-Education-and-Training/Further-Education-and-Work-Based-Learning/Learners/Further-Education/providerlearnersenrolledfurthereducationinstitutions-by-programme

[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

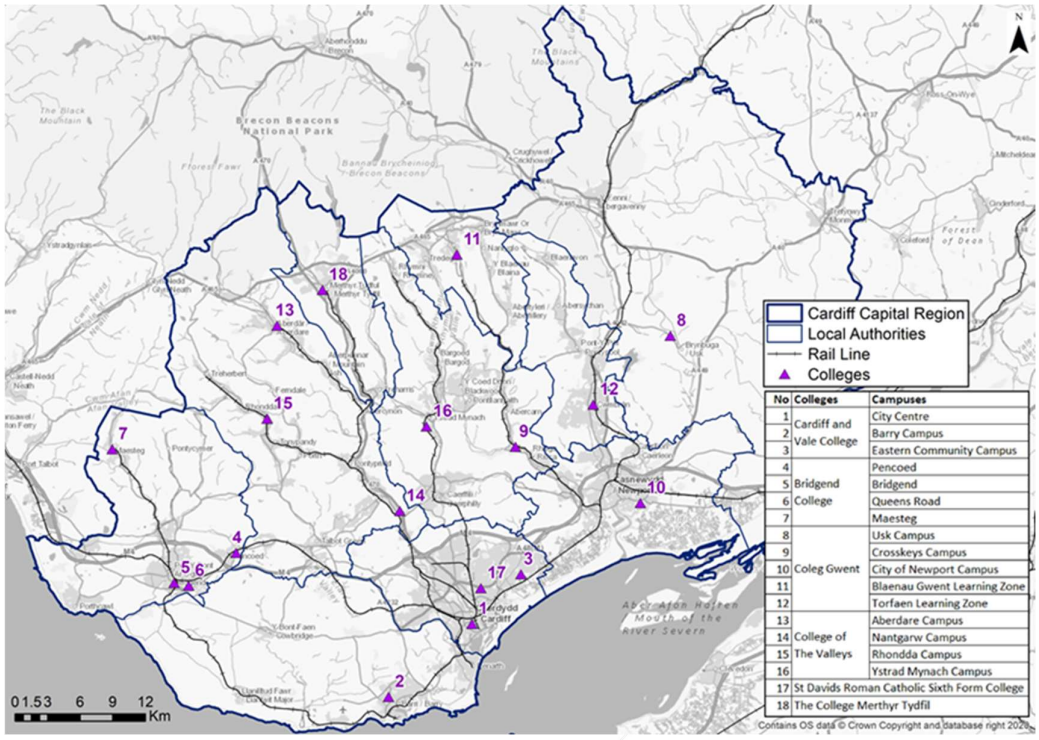
F.2.1 The location of the universities, colleges and health facilities included in the analysis are shown in Figures E1-E3.



No	Universities	Campuses
1	University of South Wales	Cardiff campus
2		Treforest campus
3	University of South Wales	Glyntaff campus
4		Newport campus
5	Cardiff University	Heath Park
6		Cathays Park
7	Royal Welsh College Of Music And Drama	
8	Cardiff Metropolitan University	Llandaff Campus
9		Cyncoed Campus

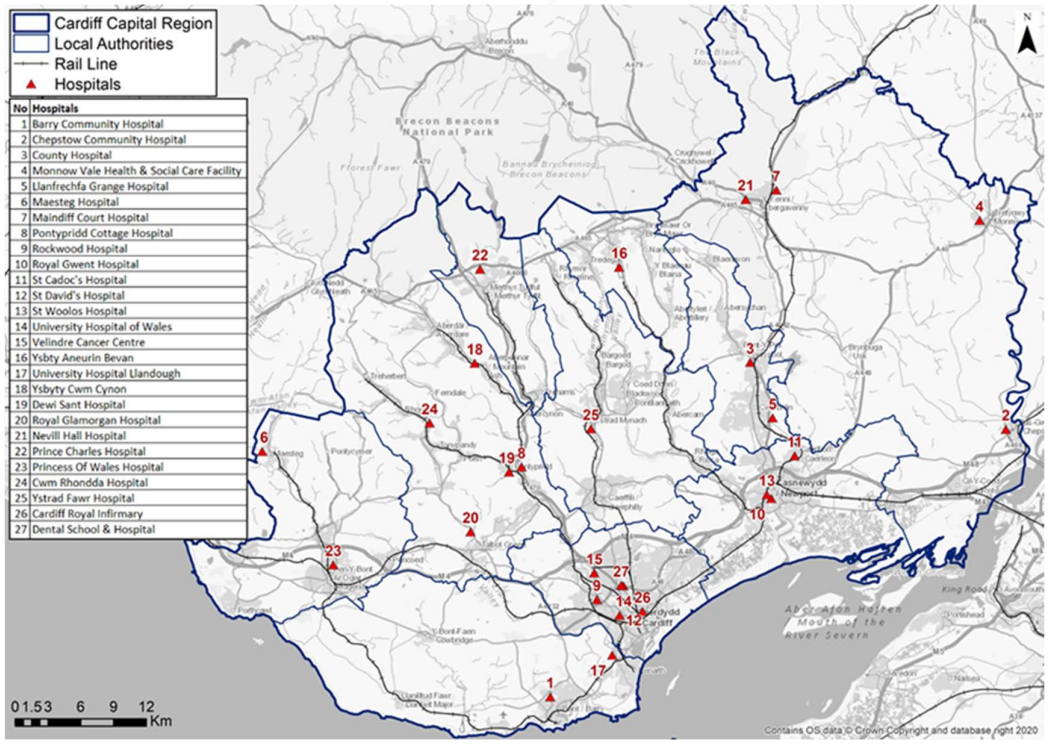
Figure F-1: Location of Universities considered within the CDAT analysis

[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	Coleg Gwent	Maesteg
8		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 F-2: 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 F-3: Location of hospitals considered within the CDAT analysis