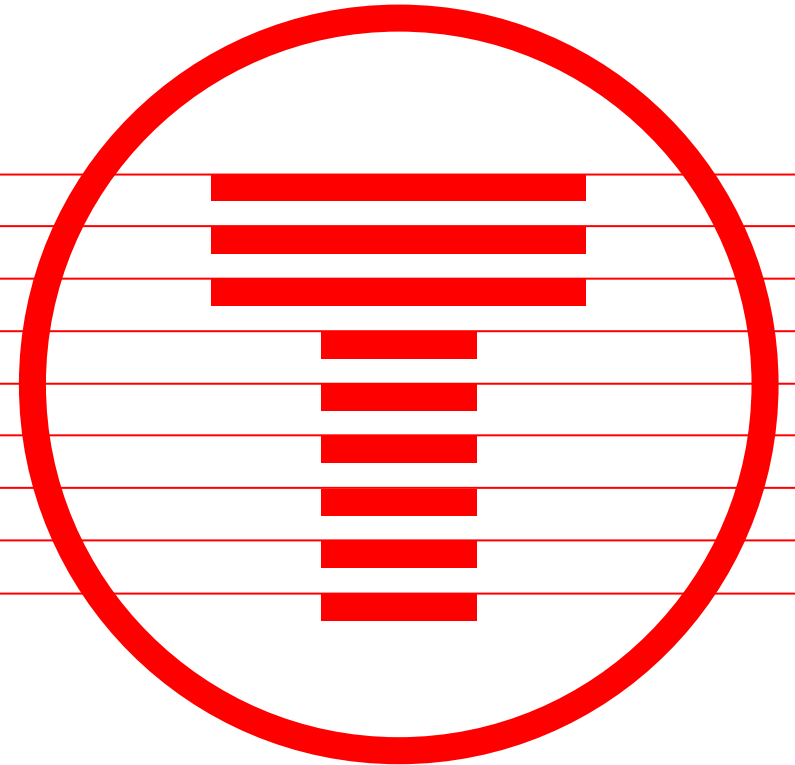
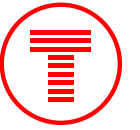


South Wales Metro: The Transformation of the Core Valley Lines
Richard Briggs, Authority Engineering Manager



Email: richard.briggs@tfw.wales

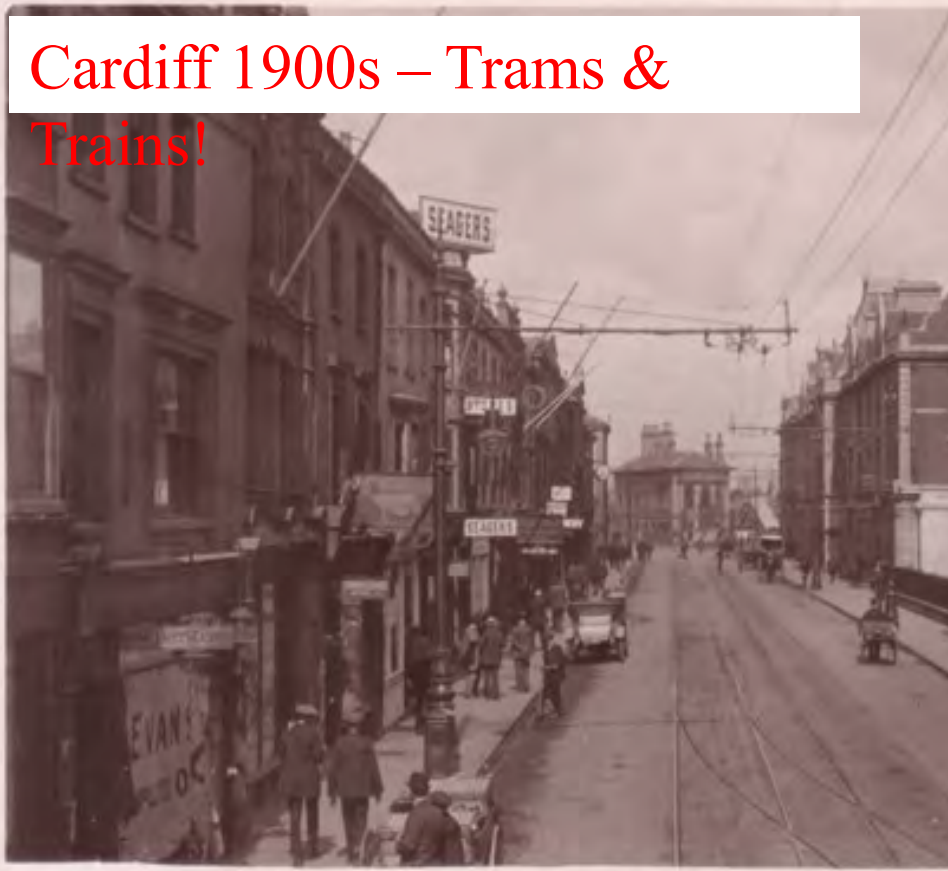
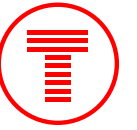
Contents – South Wales Metro



- Core Valley Lines
- Who are TfW?
- Procurement
- South Wales Metro
- Timescales
- Infrastructure Interfaces
- Vertical Integration



Cardiff 1900s – Trams & Trains!



BUTE ST., (No. 3) CARDIFF.

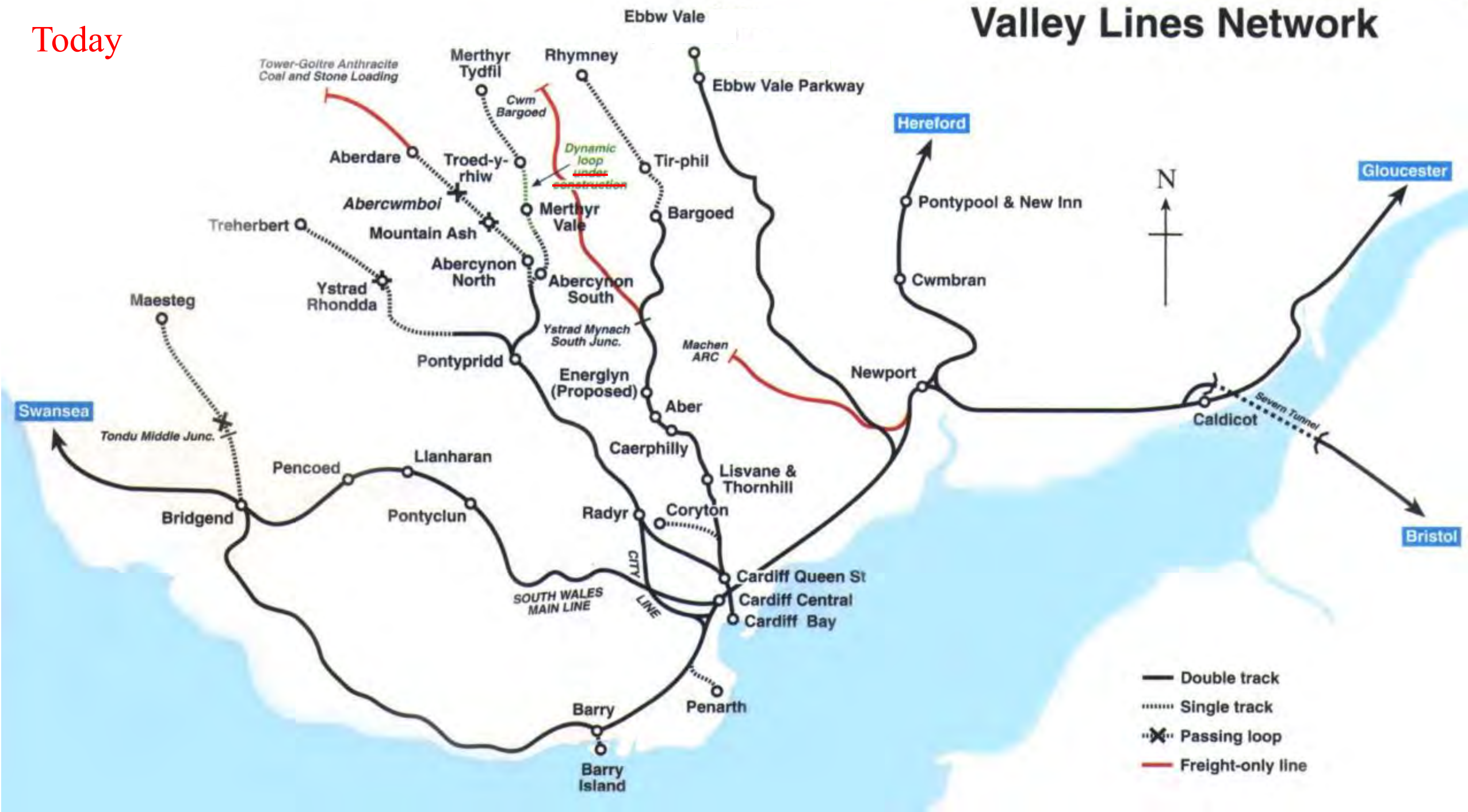


Cardiff Valley Railways



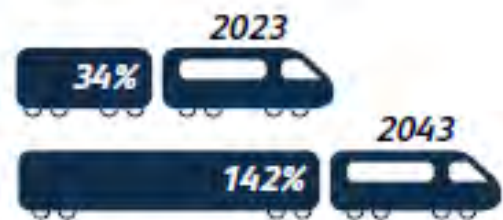
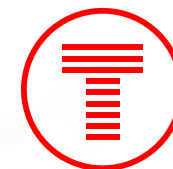
Today

Valley Lines Network

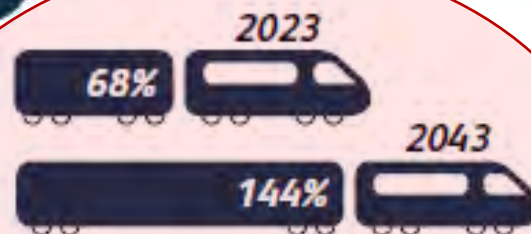


Passenger demand continues to grow

Mae'r galw gan deithwyr yn parhau i gynyddu



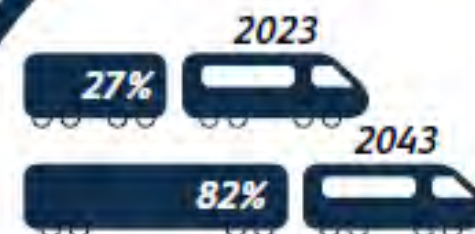
FORECAST GROWTH FOR JOURNEYS BETWEEN CARDIFF AND LONDON
Y TWF A RAGWELIR MEWN TEITHIAU RHWNG CAERDYDD A LLUNDAIN



FORECAST GROWTH FOR COMMUTING INTO CARDIFF CITY REGION
Y TWF A RAGWELIR MEWN CYMUDO I RANBARTH DINAS CAERDYDD

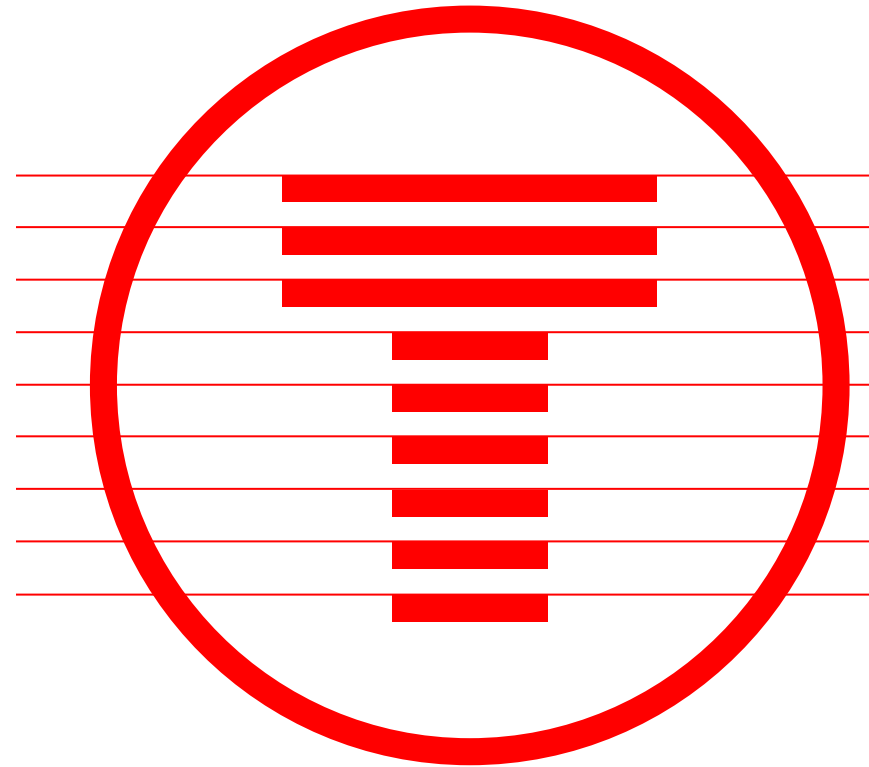


FORECAST GROWTH FOR JOURNEYS BETWEEN NORTH WALES AND LONDON
Y TWF A RAGWELIR MEWN TEITHIAU RHWNG GOGLEDD CYMRU A LLUNDAIN

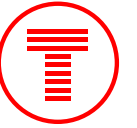


FORECAST GROWTH FOR JOURNEYS BETWEEN WREXHAM AND LIVERPOOL
Y TWF A RAGWELIR MEWN TEITHIAU RHWNG WRECSAM A LERPWL

See short video in
PWI Technical Hub

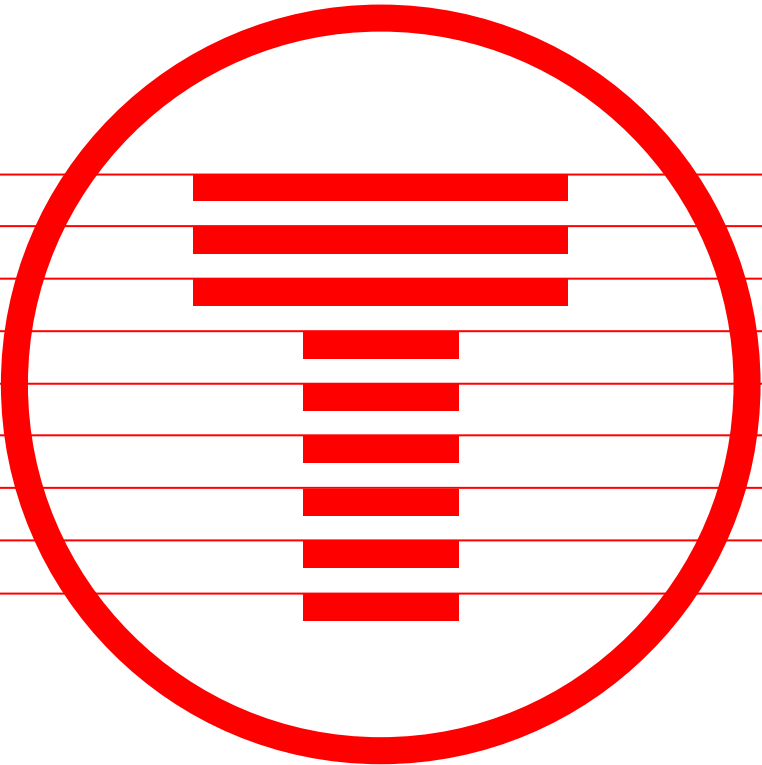


Transport for Wales (TfW)

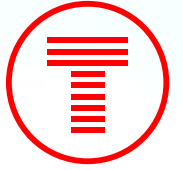


- It provides technical advice and expertise to help the Welsh Government to develop policy
- It's an expert transport delivery organisation for the Welsh Government
- Everything TfW does supports Welsh Government policies

Wales & Borders Rail Service Procurement



Rail Industry: Typical Contractual Relationship



**Department for
Transport
Train Operating Company
(TOC)**

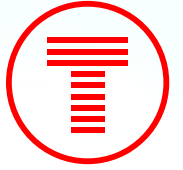
Franchise Agreement

**Trains leased from
Rolling Stock
Company**

**Track Access
Agreement
with Network Rail**

**Stations & Depots leased
from Network Rail**

Wales & Borders Procurement

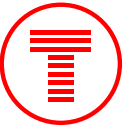


Approach

- Rail franchising powers transferred from Secretary of State to Welsh Ministers in 2014.
- 4 years of research to consider alternatives to UK rail franchising and infrastructure delivery.
- Competitive dialogue approach devised.
- Focus on quality and innovation.
- Outcome-based approach – based upon policy priorities.
- New service requirements – exceeding previous franchise.
- Avoid unsustainable bids – funding envelope.
- Bidders incentivised to go even further with their investment proposals.
- 4 credible global railway consortiums – helped refine our requirements and brought innovative ideas.

Vision

- Put passengers' key priorities at the centre.
- Focus on improving seat capacity, journey times and service frequency.
- Ensure fair, affordable fares and quality, clean trains.
- Procure a Partner to deliver a ground-breaking transformation of transport across Wales and England.
- **A £738m transformation of the Core Valley Lines into South Wales Metro by 2024.**



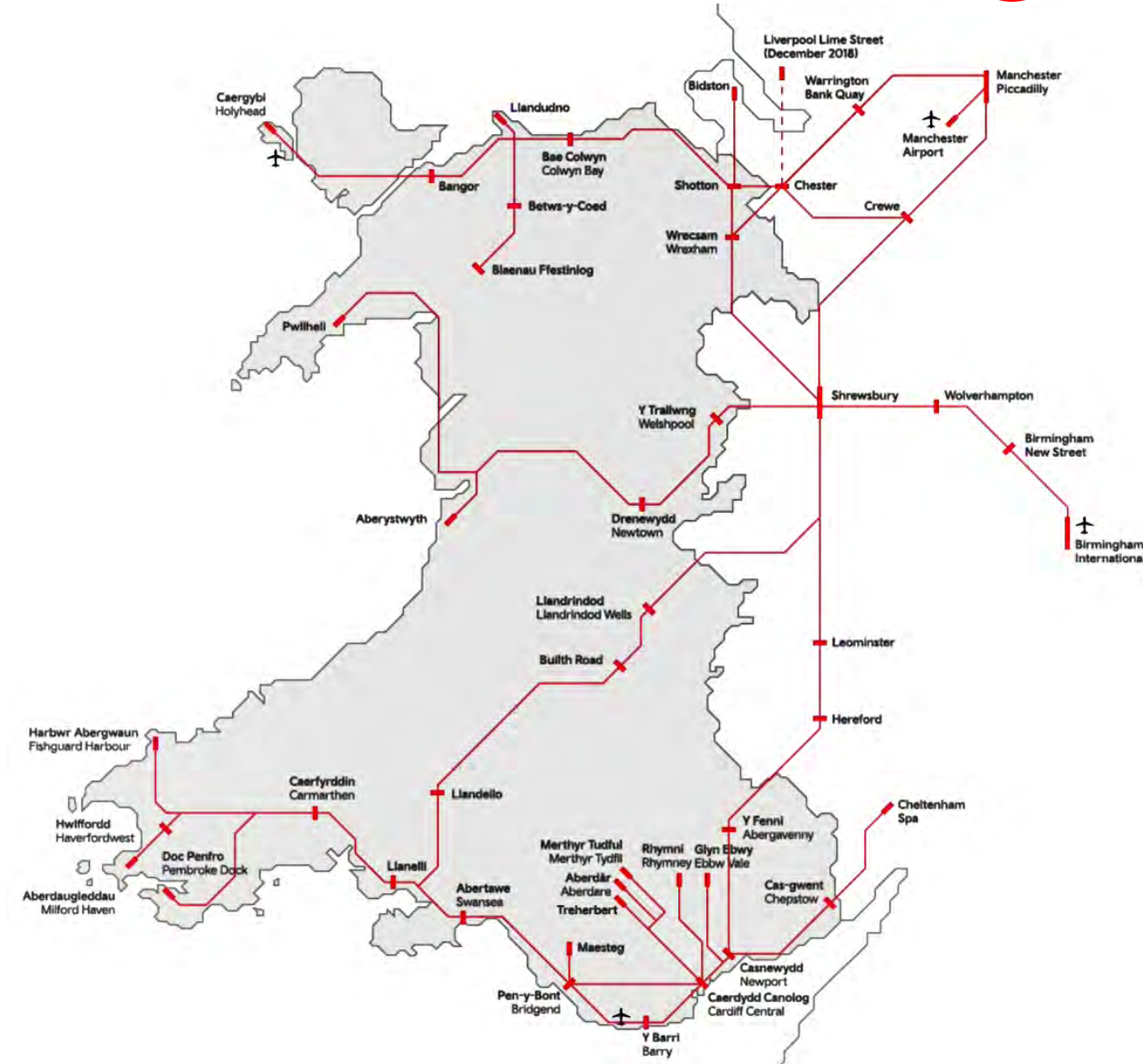
What has TfW procured:

Operator and Development Partner (ODP)

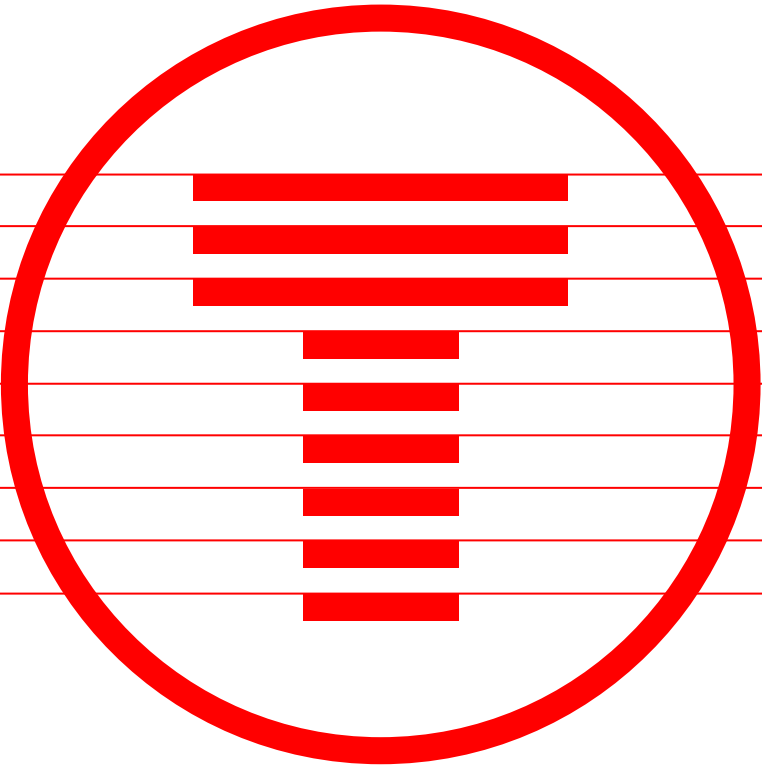
- **Operator:** KA as TfW Rail Services became the Train Operating Company (TOC) on the 14th October responsible for all rail services across the Wales and Borders region.
- **Development Partner:** KA are developing and managing the implementation of the South Wales Metro with responsibility for the Infrastructure Maintenance on the 'Core Valley Lines' from Asset Transfer.

STriDe framework

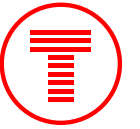
- Infrastructure Delivery Partners (IDPs)
- Civil & Systems Engineering Contractors with skills to transform the Core Valley Lines
- Opportunities for SMEs via Sell2Wales



South Wales Metro



What is Metro?



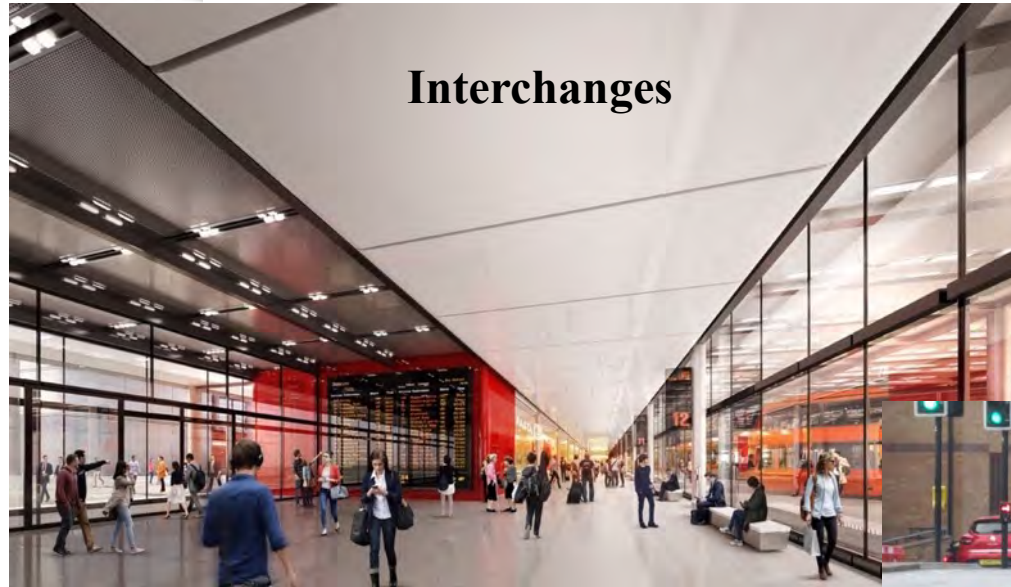
Heavy Rail



Bus



Interchanges



Light Rail



Bus Rapid Transit

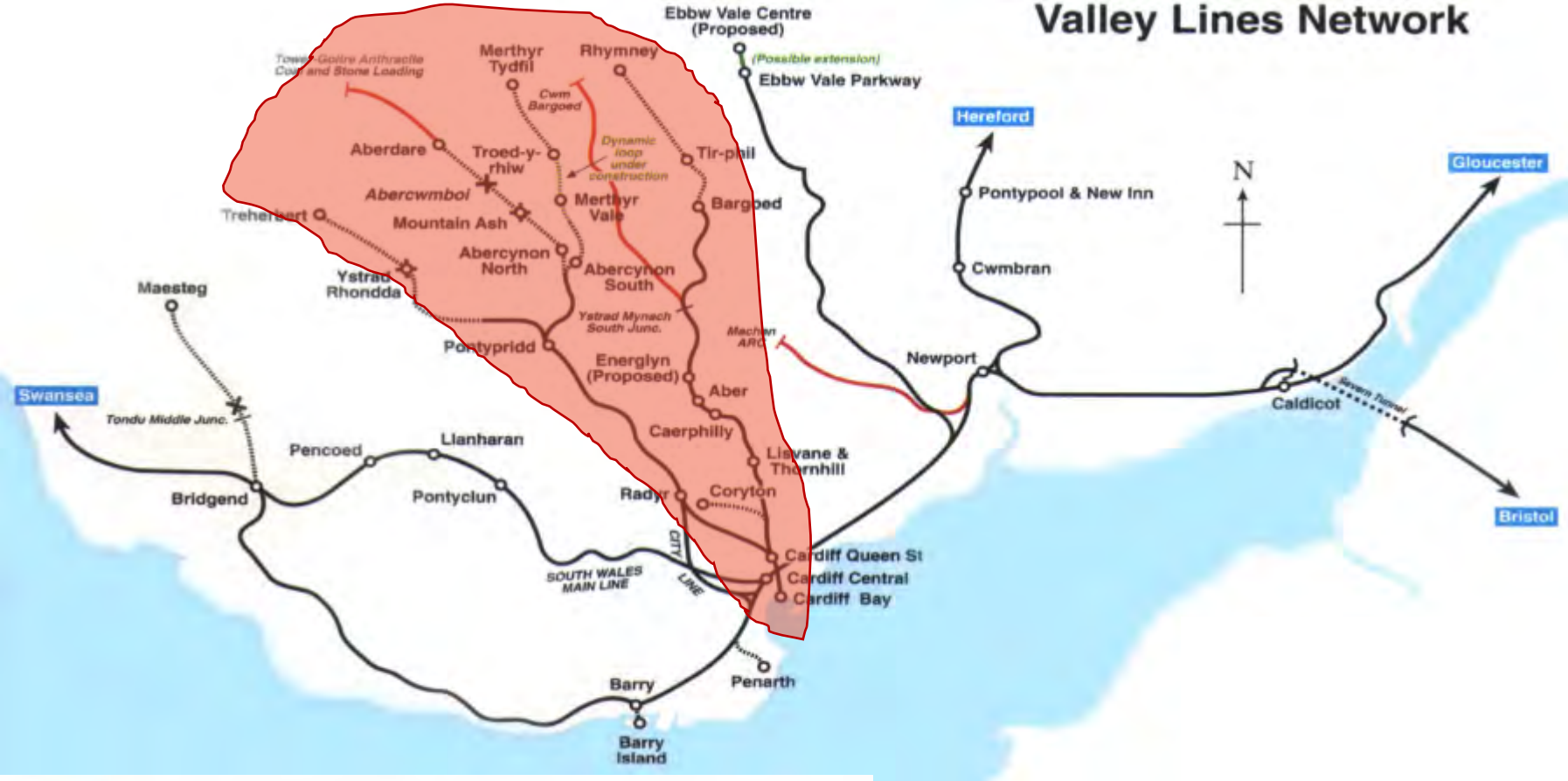
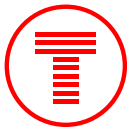


Active Travel



What's changing ?

This Week 19

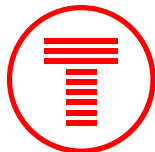
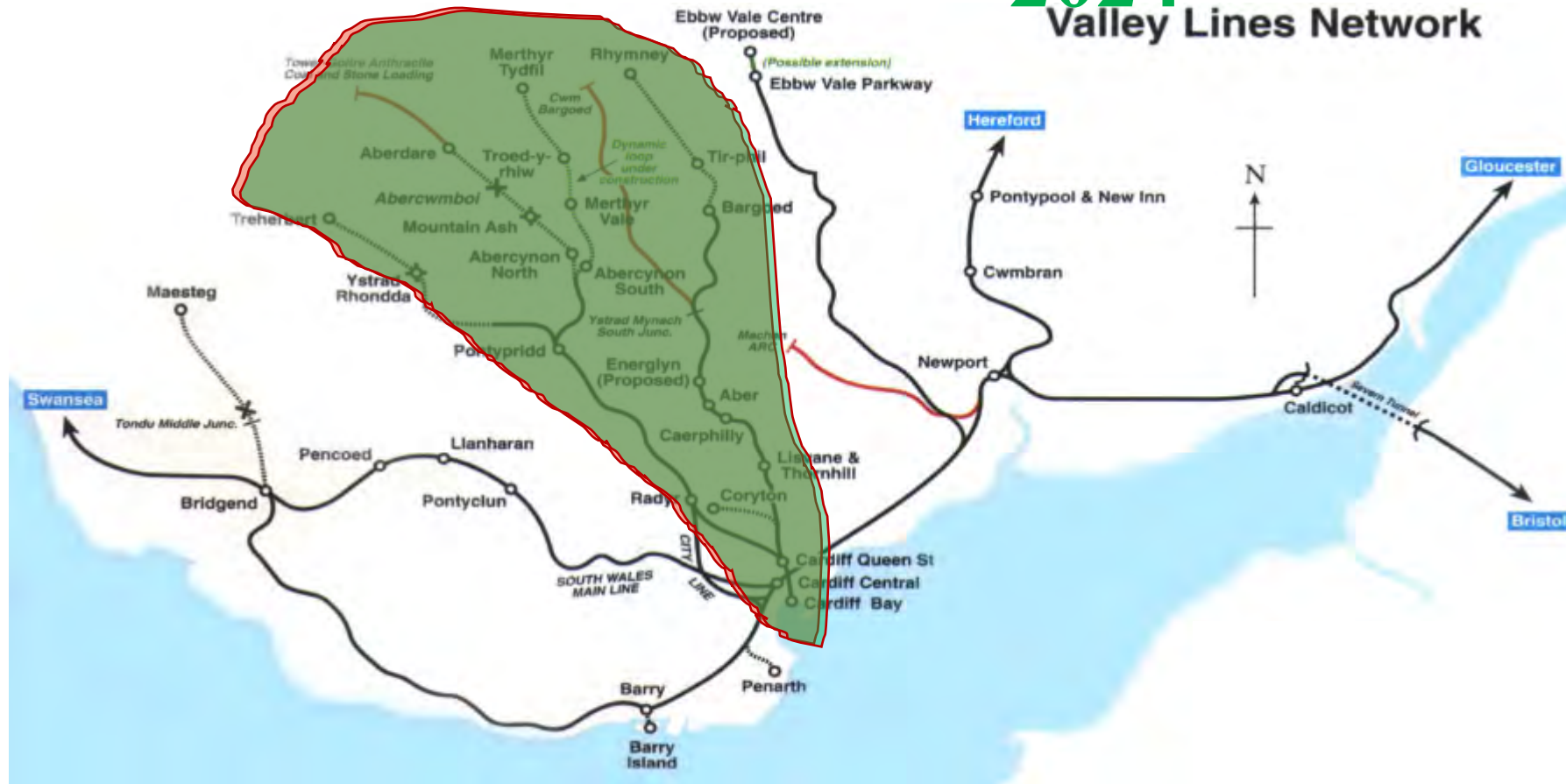
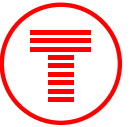


ARRIVA CYMRU
TRANSPORT FOR WALES



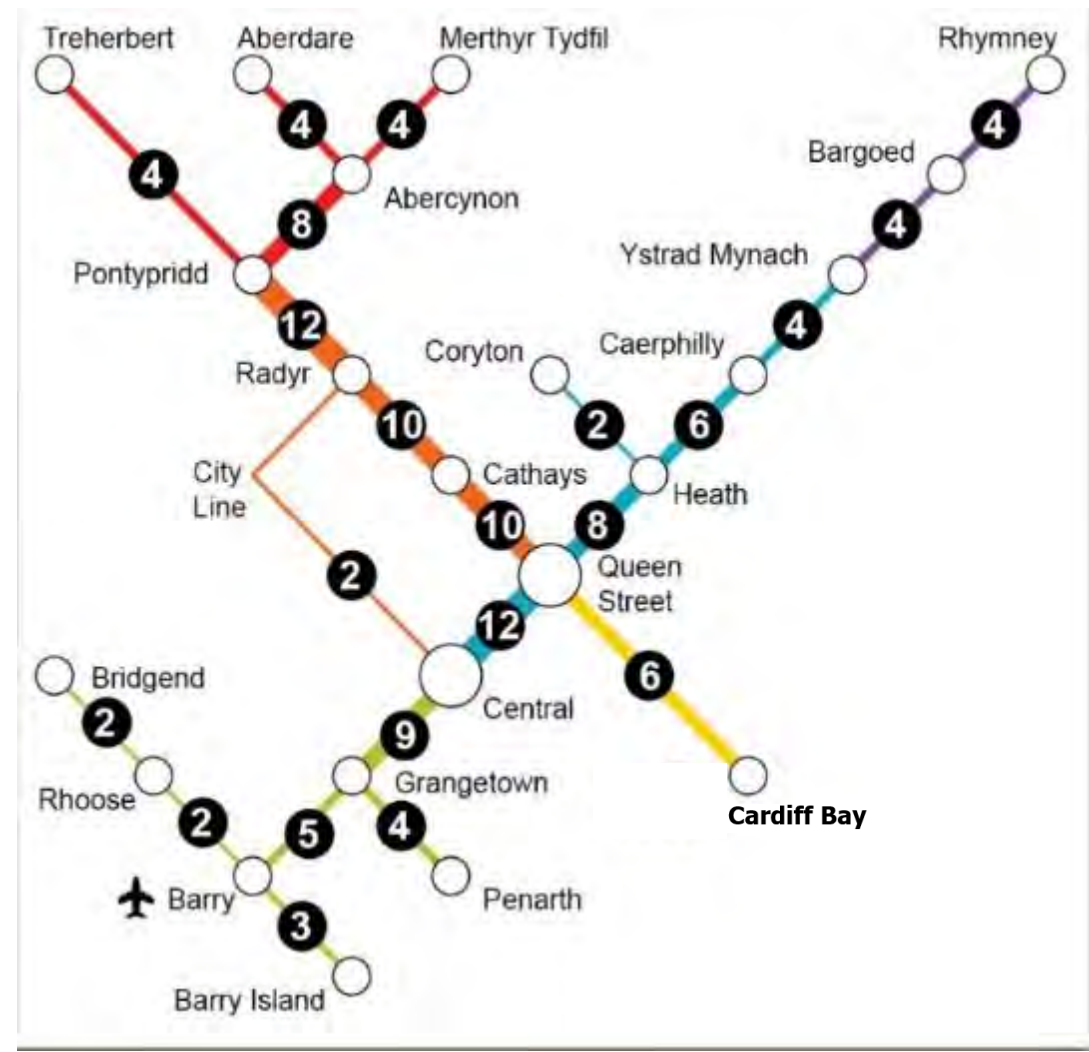
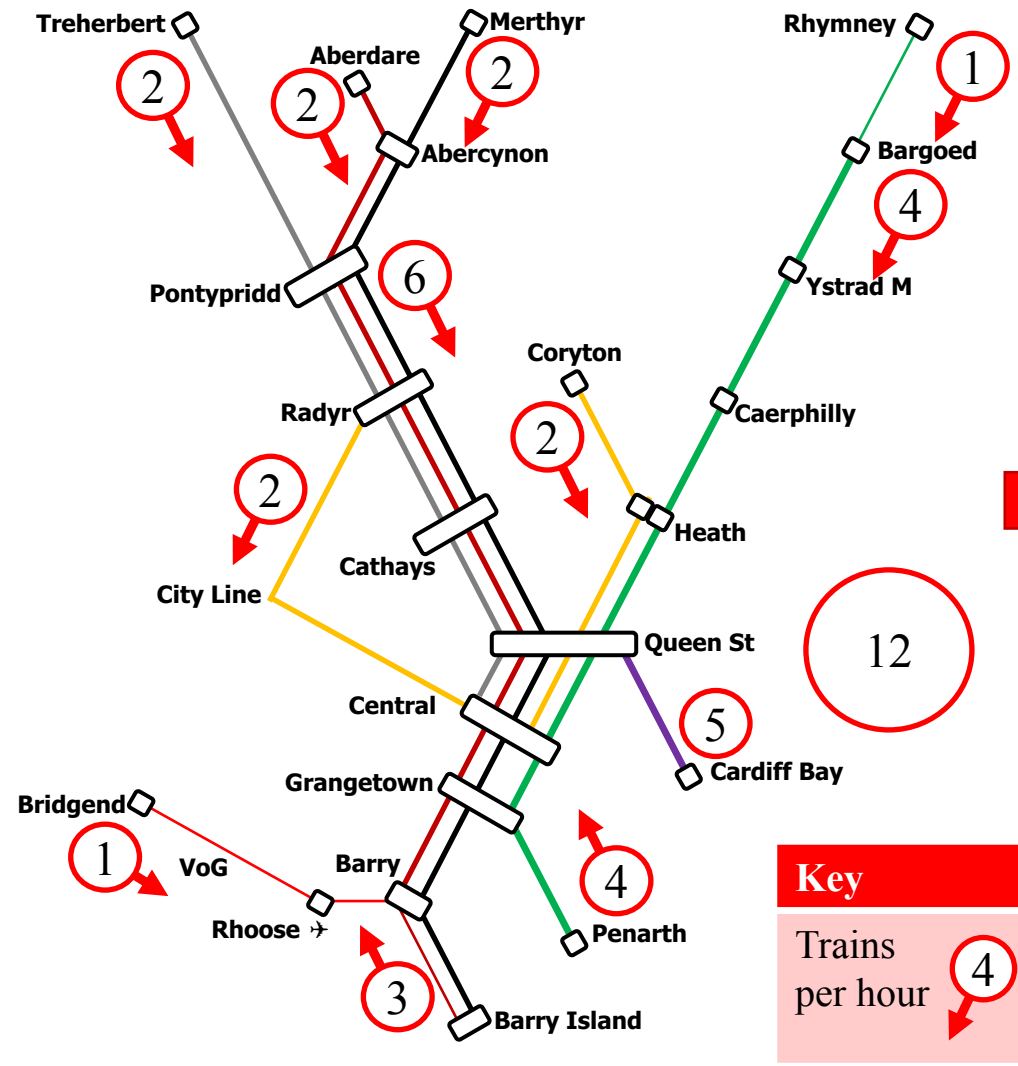
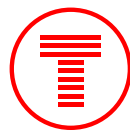
What's changing ?

Transformed by 2024



TRAFNIDIAETH CYMRU
TRANSPORT FOR WALES

Branchline to Rapid Transit



South Wales Metro

What this means for passengers - A really big change in frequency, journey time and capacity



Journey	Trains per hour now	2023 Trains per hour	Journey time now (mins)	2023 Journey time (mins)	2019 AM peak capacity	2023 AM peak capacity	Capacity change %
Treherbert > Queen St	2	4	57	46	1206	2570	+113%
Aberdare > Queen St	2	4	57	43	1516	2056	+36%
Merthyr Tydfil > Queen St	2	4	56	44	1326	2313	+74%
Treherbert > Bay	-	2	72 inc. change	50 (direct)	-	-	-
Aberdare > Bay	-	2	72 inc. change	47 (direct)	-	-	-
Merthyr Tydfil > Bay	-	2	71 inc. change	48 (direct)	-	-	-
Pontypridd > Queen St	6	12	26	22	4048	6939	+71%
Rhymney > Central	1	4	61	48	2542	3495	+37%
Caerphilly > Central	4	6	19	16	2542	4452	+75%
Coryton > Central	2	2	18	20 (extra stop)	603	957	+59%
Penarth > Central	4	4	12	11	1856	1914	+3%
Barry > Central	4	5	24	23	2094	2857	+36%

TRAINS PER HOUR IS THE STANDARD WEEKDAY DAYTIME PATTERN. AM PEAK MEASURED 07:30 – 08:59.

South Wales Metro

What's Changing?

£738M Transformation of the Core Valley Lines

Track:

- 15 sites where track is re-doubled
- Queen Street junction remodelled
- Numerous line speed improvements
- Extension into Cardiff Bay.

Smart Electrification

Vehicle Maintenance Facilities

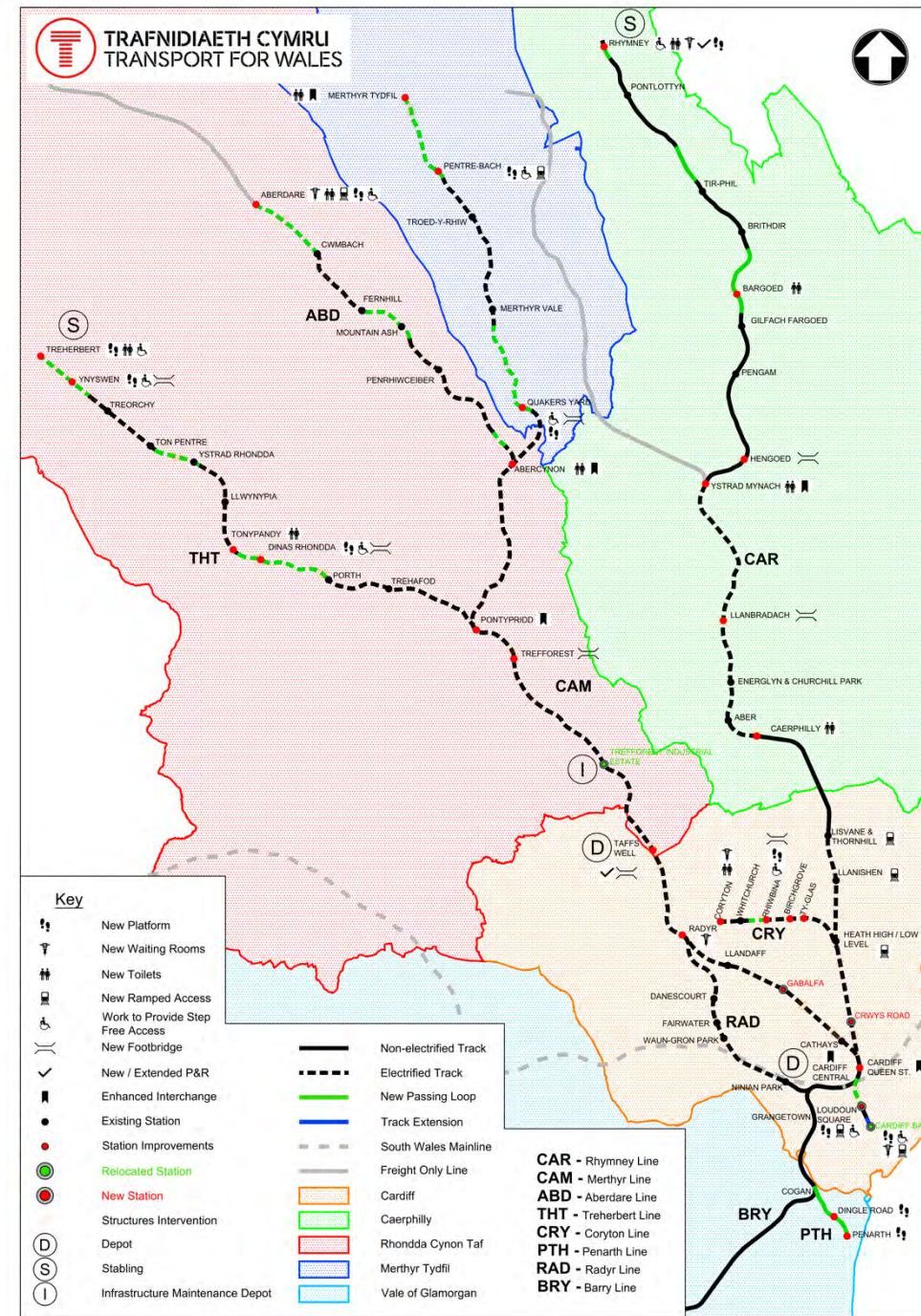
- New Depot
- Upgraded Depot & Stabling Points

Station Improvements

- New stations & platforms
- Work at all stations to improve facilities

Bridges

- 10 New station footbridges
- 3 new road over rail bridges
- Replace 'high risk' level crossings

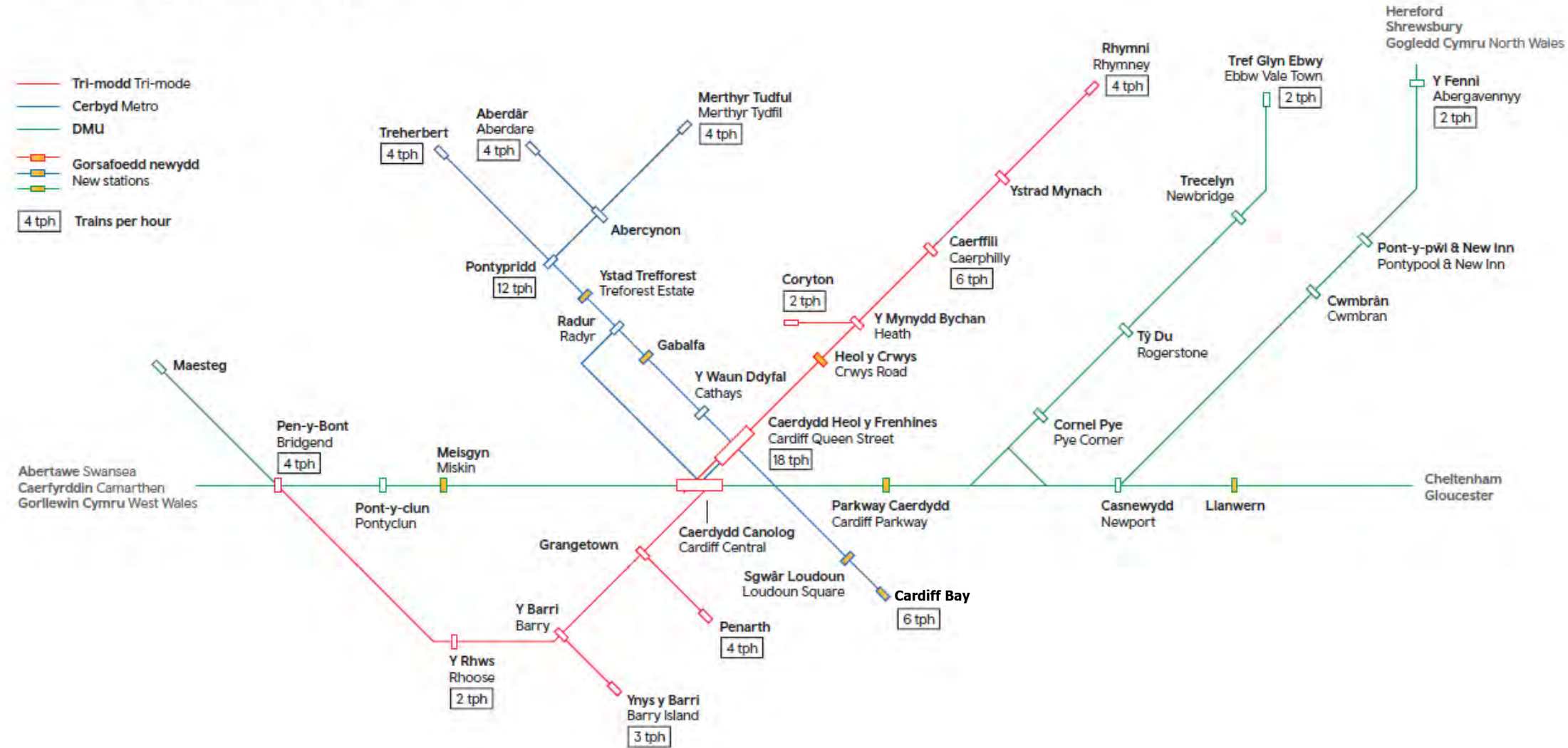


South Wales Metro

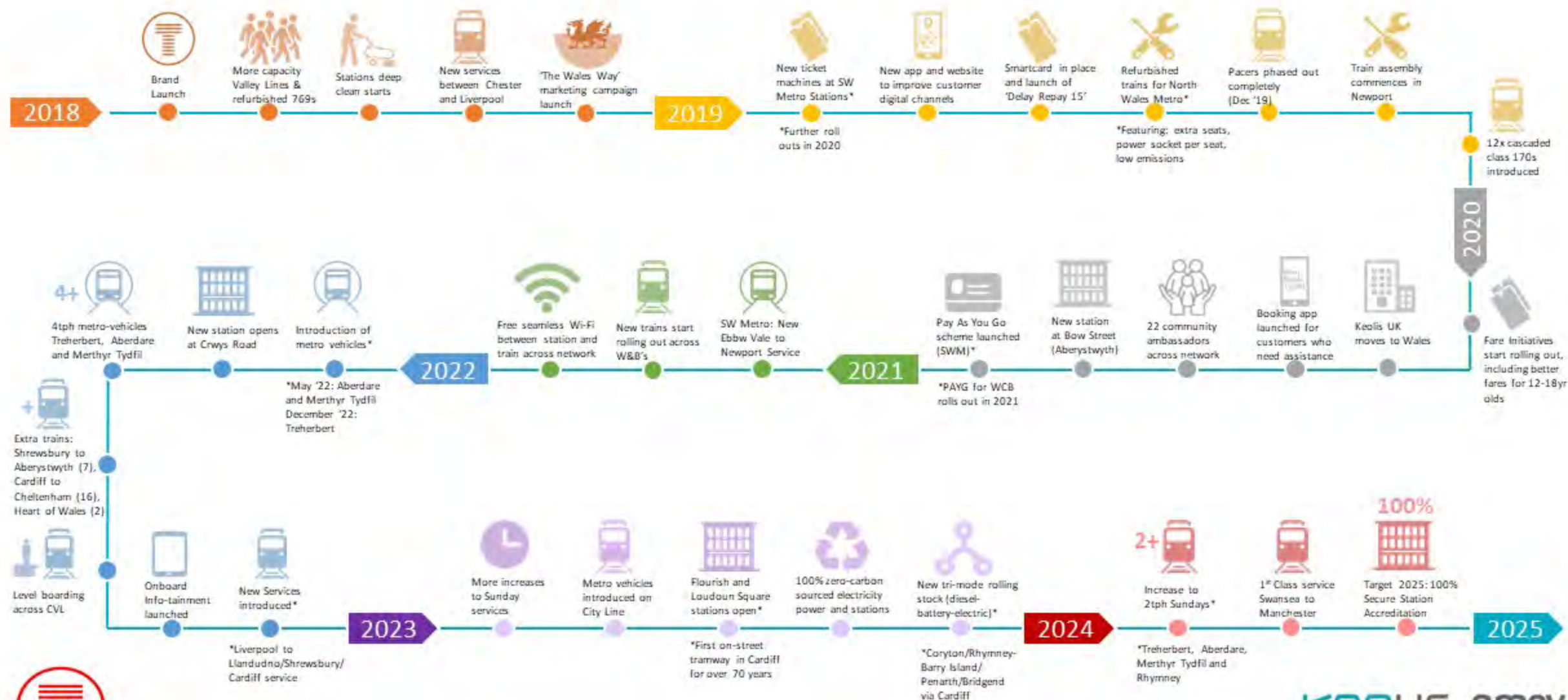
Network by the end of 2023



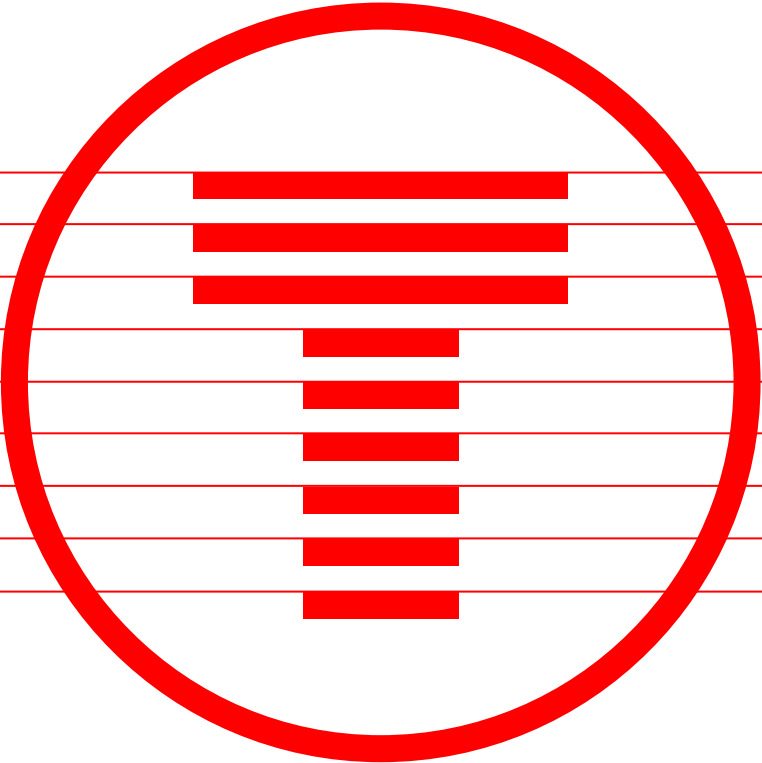
Metro De Cymru (rheilffordd) erbyn 2023
South Wales Metro (rail) by 2023



Wales and Borders Key Deliverables Timeline



Rolling Stock



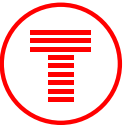


Legacy Diesel Rolling
Stock



Metro-Vehicles

Bi-mode Electric Tram Trains LRVs for Treherbert/Aberdare/Merthyr Tydfil services to Cardiff Central & Cardiff Bay

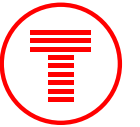


- 36 no. Stadler Citylink Tram - Train vehicles.
- High floor (915mm) to suit legacy heavy rail stations.
- Main power source 25kV overhead line but also operates from battery.
- Capable of on-street line-of-sight 'tramway' operation.

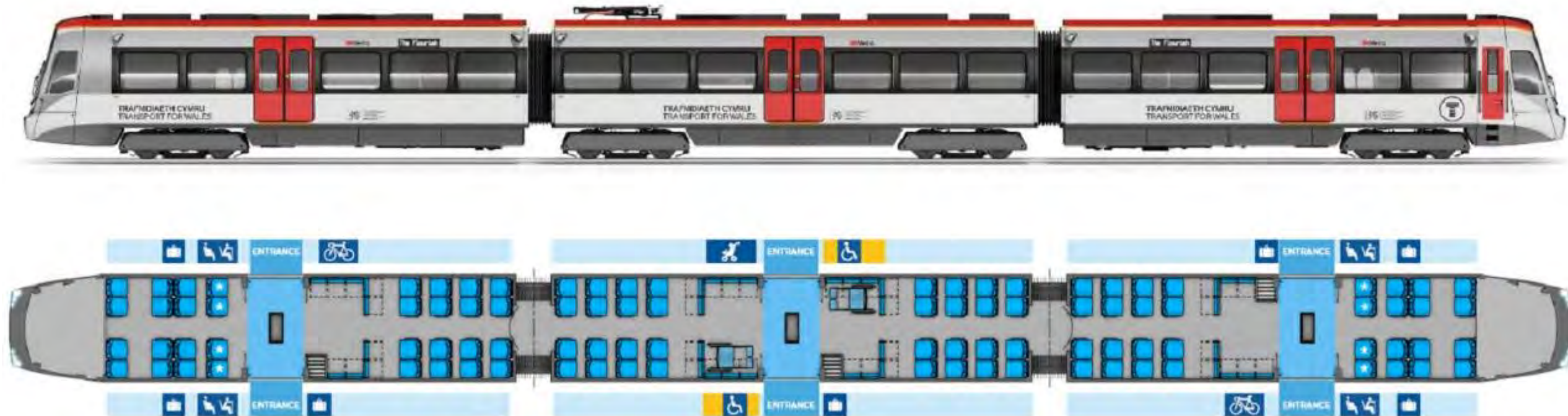


Metro-Vehicles

Bi-mode Electric Tram Trains LRVs for Treherbert/Aberdare/Merthyr Tydfil services to Cardiff Central & Cardiff Bay



- 40m long articulated units (can work in multiple).
- Capacity of 257 (129 seated).
- Max Speed 100km/h.
- Enhanced Crashworthiness (C-III EN 15227).
- 25m minimum curve radius

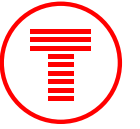




Tram – Train interior

Metro-Vehicles

Tri-mode Electric Heavy Rail Trains for Rhymney to Bridgend and Coryton to Penarth Services via Cardiff Central

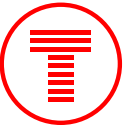


- 24 no. Stadler FLIRT heavy rail high floor trains.
- Vehicles will share tracks with freight.
- Main power source 25kV overhead line with battery and diesel engine.
- Allow 100% electric operation on Core Valley Lines.



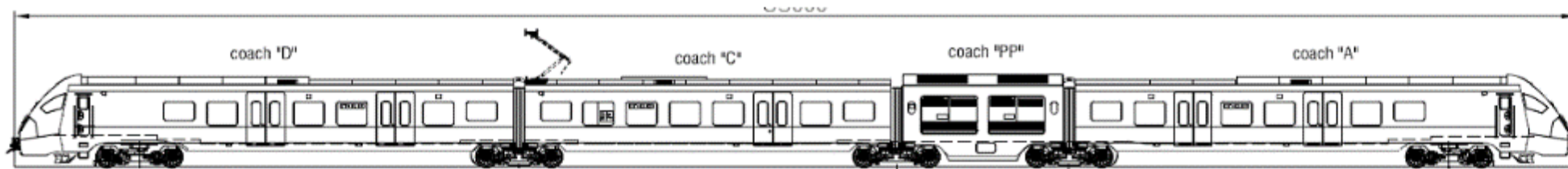
Metro-Vehicles

Tri-mode Electric Heavy Rail Trains for Rhymney to Bridgend and Coryton to Penarth Services via Cardiff Central

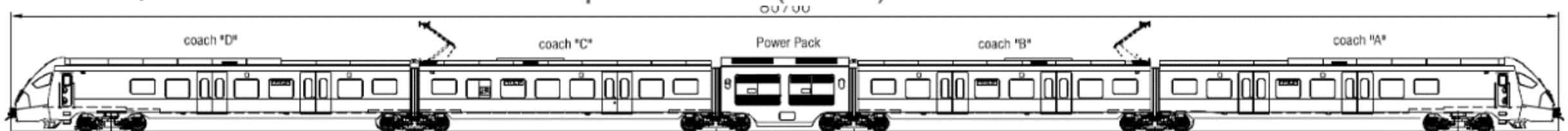


- 65m and 81m long articulated trains with diesel power pack.
- 3 car units for Coryton Services and 4 car units for Rhymney Services.
- Total capacity of 265 (3 car) and 369 (4 car).
- Max Speed 75 mph.

Lot 4a, FLIRT^{UK} Trimodal Multiple Unit 3 (TMU)



Lot 4b, FLIRT^{UK} Trimodal Multiple Unit 4 (TMU)





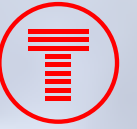
Level boarding on Core Valley
Lines



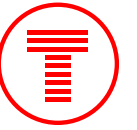
New CAF DMU trains assembled in Newport,
Wales



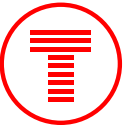
An ageing Depot estate



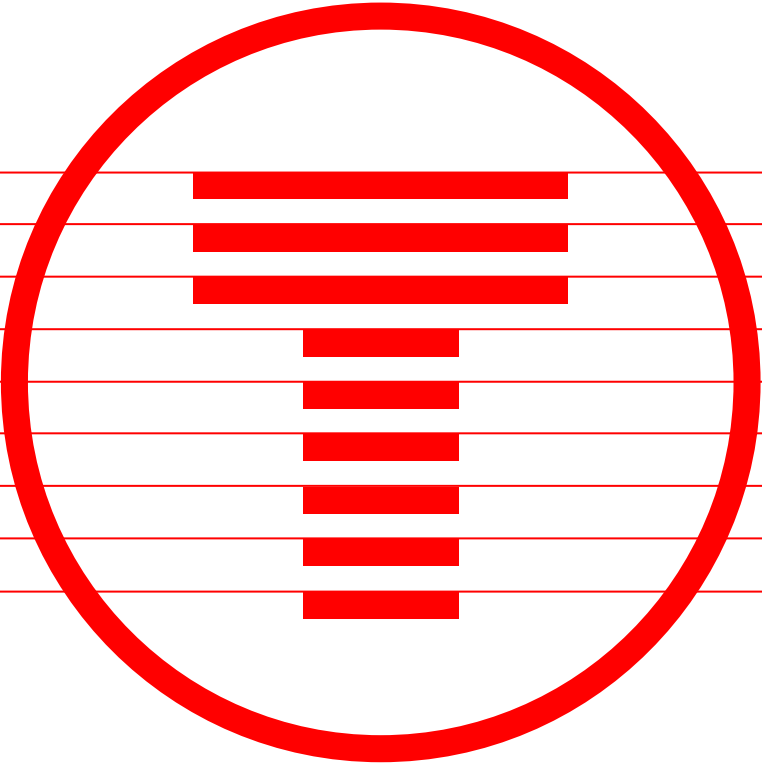
New Taffs Well Depot

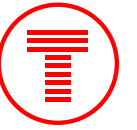


Upgraded Cardiff Canton Depot

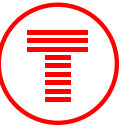


Infrastructure Interfaces

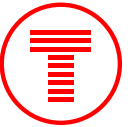




Interchange Stations



Regional & Rural Stations



Station Investment

New Stations

- Gabalfa
- Loudon Square
- Crwys Road

Relocated stations

- Cardiff Bay
- Treforest Estate

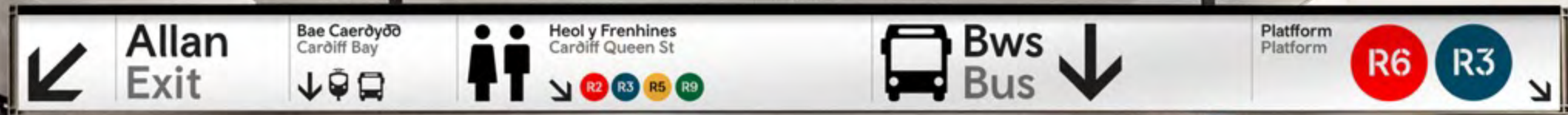
Upgrades

- 13 new platforms
- 10 new station footbridges
- 6 station accessibility schemes
- All stations improved



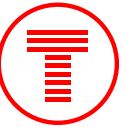
Non CVL: Cardiff Central Interchange Plan





TfW branding and easy to understand, integrated transport signage rolled out network-wide

Longest Station Name!





De-Vegetation & Track
Widening



Electrification of the Core Valley Lines



Overbridges & Victorian Structures

Great Western Gauge Clearance Works



Beresford Road



Bridge Street

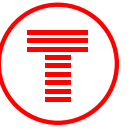


Hawse Lane & Green Lane



Lime Kiln

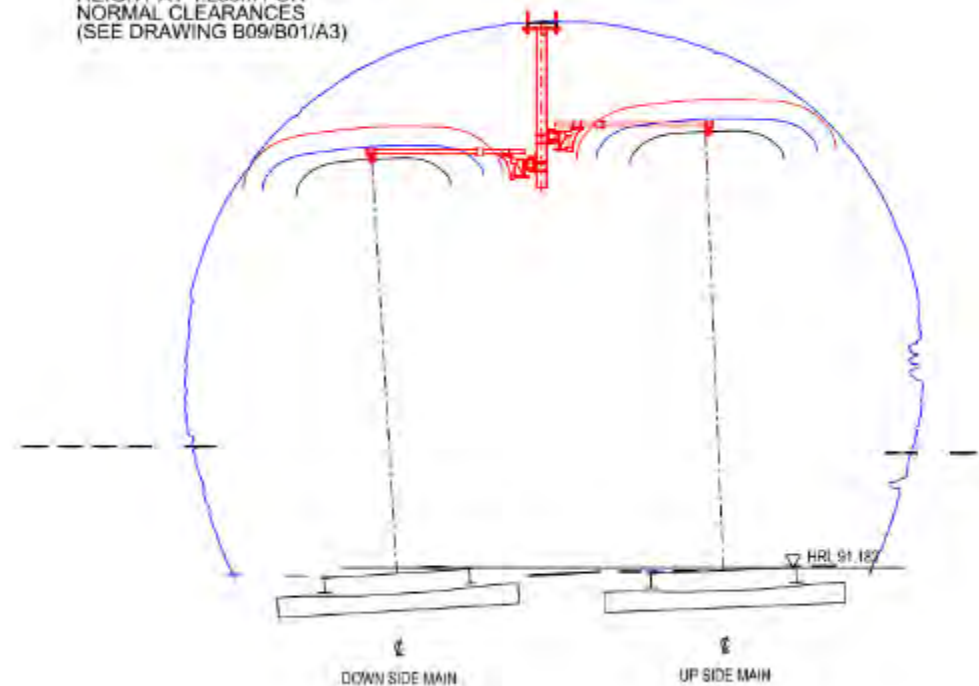




Safe Electrical
Clearance!



MINIMUM CONTACT WIRE
HEIGHT AT 4.255m FOR
NORMAL CLEARANCES
(SEE DRAWING B09/B01/A3)



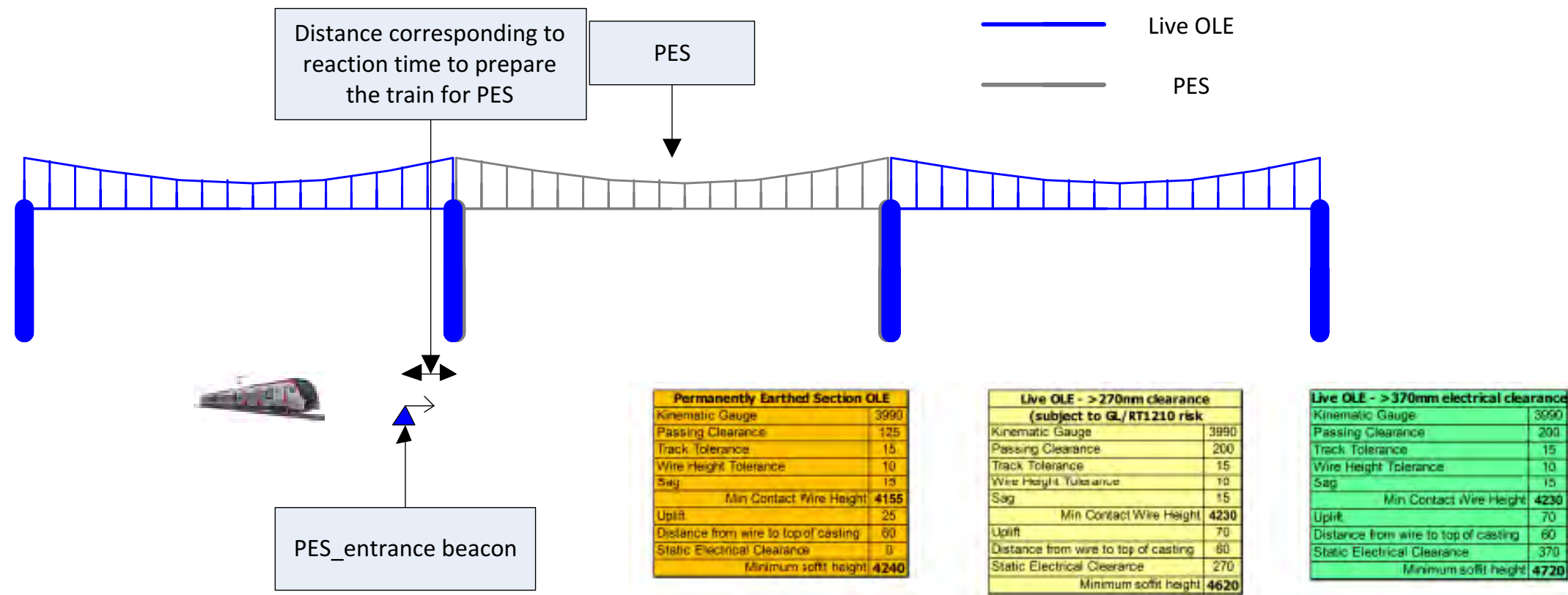
Caerphilly
Tunnel

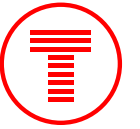




Permanently Earthed Section

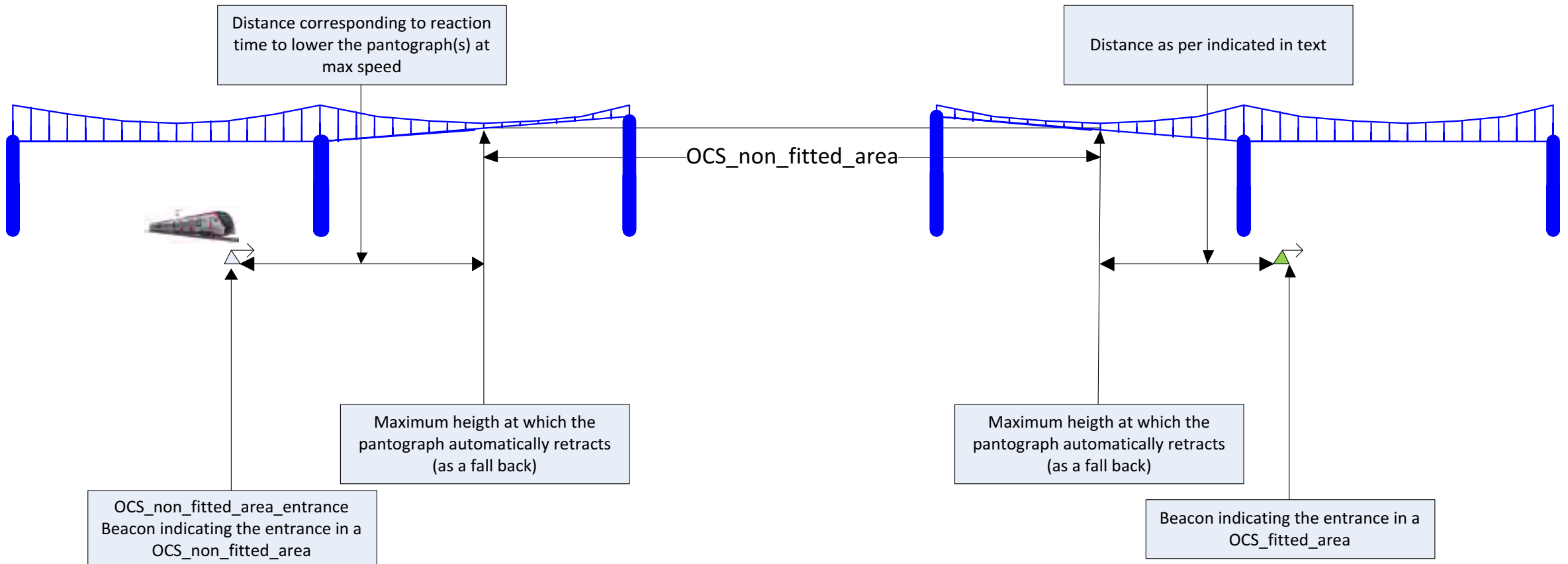
- 1. Vehicle is operating under live catenary, where trains can draw power from the OCS.
- 2. PES beacon prepares the train prepare to cross between live OLE and PES sections, (circuit breaker opened).
- 3. Vehicle is operating under PES, where trains draw power from the on-board batteries.
- 4. Vehicle will automatically detect live 25kV supply and will switch from Battery to Pantograph current collection.





Catenary Free Section

1. A beacon sends a message to the vehicle to automatically drop the pantograph.
2. Start transition (catenary raises from nominal height to above maximum pantograph height).
3. End transition (catenary lowers from above maximum pantograph to nominal operating height).
4. A beacon sends a message to each vehicle to automatically raise when the pantograph is under catenary.





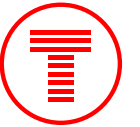
Network Rail - Wales Regional Operations Centre
(WROC)

Single Line Token Signalling



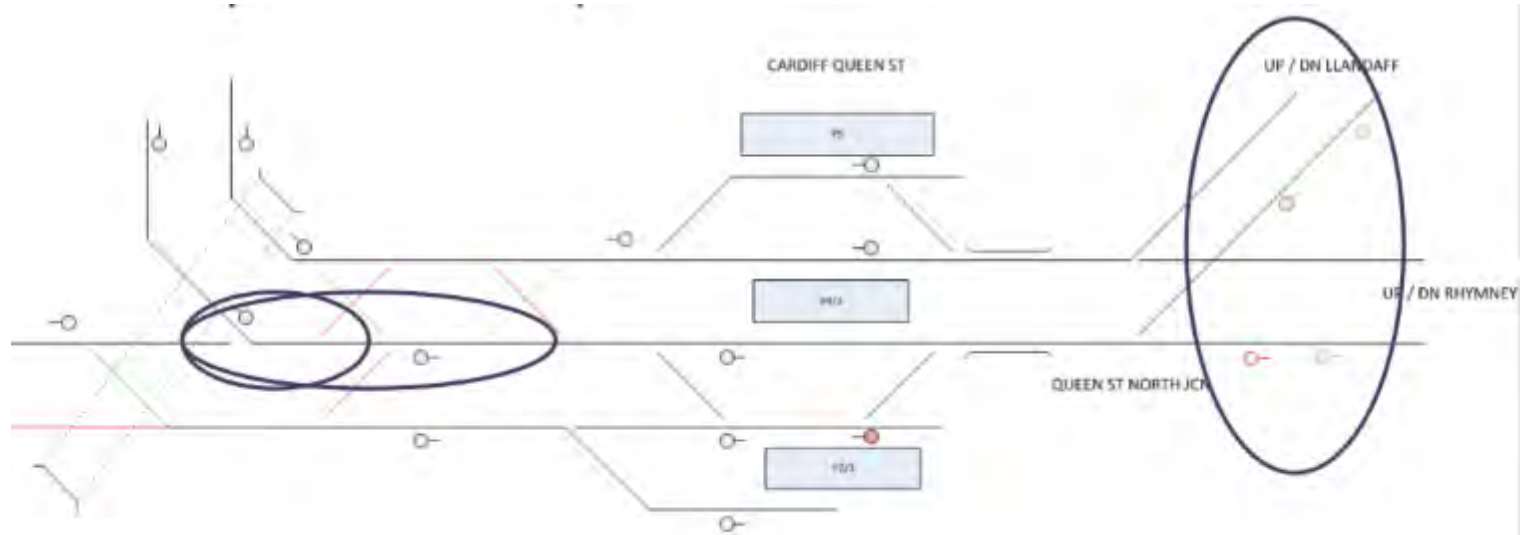


Core Valley Lines Integrated Control Centre (CVLICC)

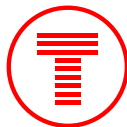


Multiple Aspect Signalling

- 3 light Multiple Aspect Signalling.
- Existing signalling interlocking systems retained at the WROC, Radyr and Abercynon.
- Signalling control systems at Radyr, Abercynon and WROC to be migrated to the CVLICC.
- Life extension works replacement of the token system on the Treherbert line.
- Remodelling of Queen Street Station to reduce overlaps & improve platform reoccupation.
- Commissioning of the new systems (passing loops, signals and immunisation works).



South Wales Metro
Level Crossings



Public Footpath
Crossings



Private User Worked
Crossings

Project Name	South Wales Metro - Task Order 028-B Capital Asset Development Level Crossings Review Location Plan
Project Number	367590-MMD-28B-XX-DR-C-0001
Project Manager	NTS
Project Engineer	PRE
Project Designer	P1
Project Checker	STD
Project Approver	
Project Status	
Project Date	
Project Version	
Project Revision	
Project Change	
Project Approval	
Project Sign-off	
Project Completion	
Project Handover	
Project Closeout	
Project Archiving	
Project Retention	
Project Disposal	
Project Archiving	
Project Retention	
Project Disposal	

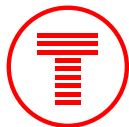


Upgrade high risk level
crossings

Tram-Train vehicles terminating at a new Cardiff Bay station



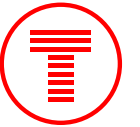
South Wales Metro
Batteries & Recharging



M
MOTT
MACDONALD

 Transport for
West Midlands

CAF



Line of Sight Operation

A driver should be able to stop before a reasonably visible stationary obstruction ahead from the intended speed of operation, by using the service brake. Drivers need to consider the conditions:

- a) the available sighting distance
- b) the intended speed of operation
- c) the braking performance of the vehicle
- d) light and illumination levels
- e) the visibility and clarity of signals and points indicators;
- g) the topography and urban interaction
- h) the geometry of the tramway alignment

Control the movement of vehicles, prevent collisions and prevent possible derailment on points and crossings, and at other high risk locations.



**DON'T
PROCEED**



**PROCEED
AHEAD**



**PROCEED
LEFT**



**PROCEED
RIGHT**



CLUSTER

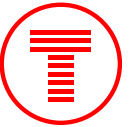


**MAX
SPEED**



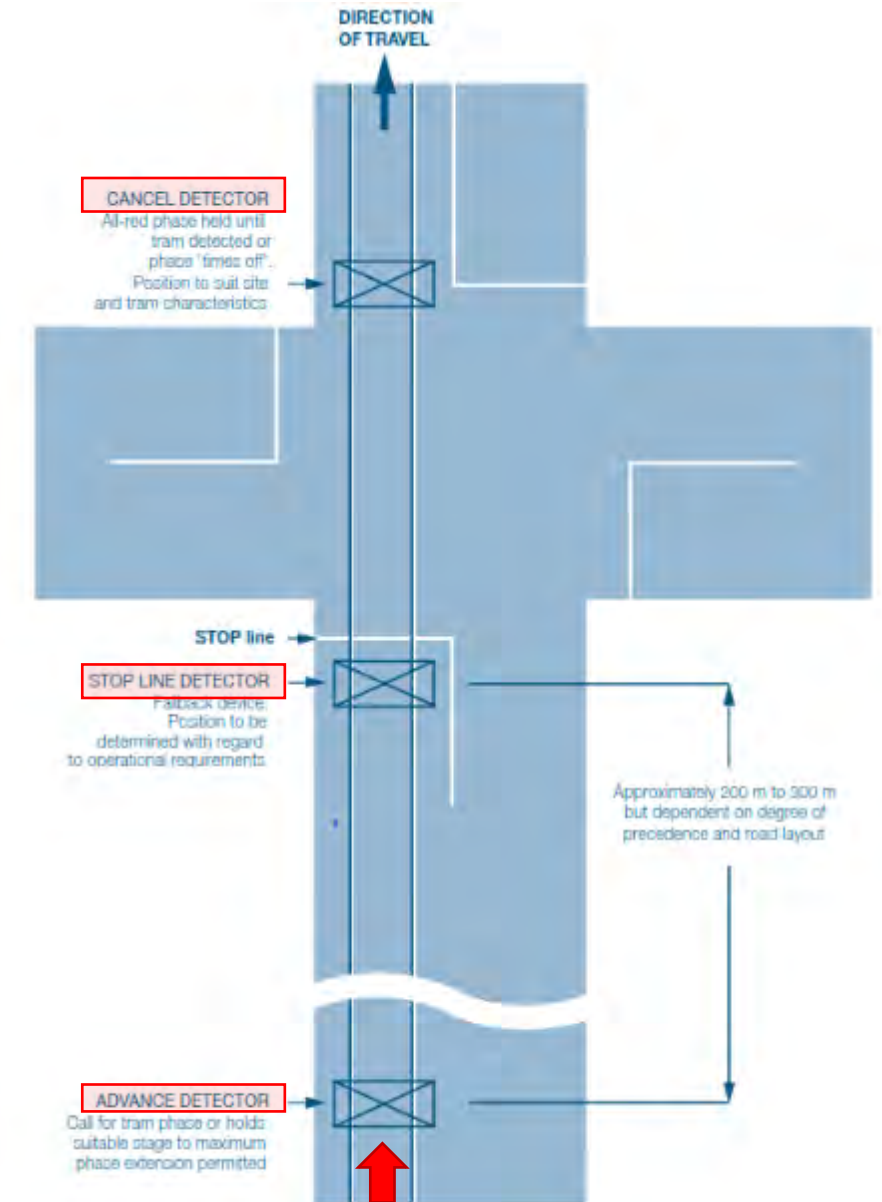
**GIVE
WAY**





Line of Sight Operation

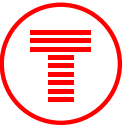
- Points Position Indicators show the direction of movement.
- Loops provide the position of vehicles back to the control room.
- Loops are used to put in demand to signalised junctions.



Line of Sight Operation

- New at-grade crossings can be opened across the route without the need for visually intrusive ramped footbridges.
- Opportunities to reduce costs by removing costly to maintain structures.
- New crossings can reduced segregation created by traditional heavy rail corridors.





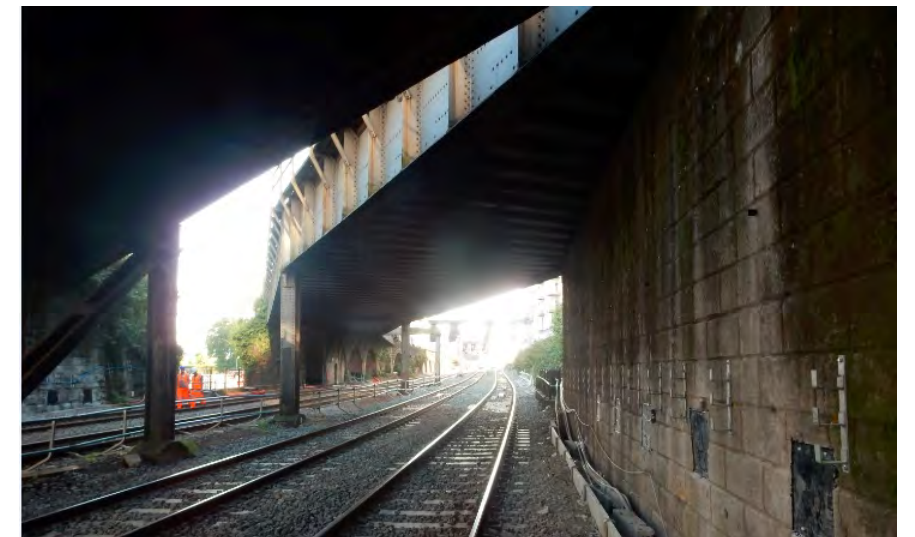
Asset Transfer

- Core Valley Lines and City Line assets will be transferred to Welsh Government (WG).
- Connection Agreements required with Network Rail; maintenance and operational boundaries will vary.
- Discovery phase allows the ODP to investigate, survey and refine its understanding of condition and cost prior to Asset Transfer.
- Risk based approach to Assets – not time to investigate all assets.
- Principles of the Transfer are enshrined in the Transfer Framework Agreement.

Infrastructure Maintenance

- ODP responsible for Operations and Maintenance.
- Independent Reporter appointed by both parties.
- Renewals will be identified by ODP and funded by WG.
- Renewals subject to review by TfW and Independent Reporter.
- WG bears the risk of significant infrastructure failures

*IMAGES TAKEN FROM NETWORK RAIL INTERSECTION BRIDGE PRESENTATION TO PWI (MAY 2018)

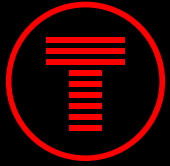


Cardiff
2024



 Metro





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Thank you for listening



Mae Trafnidiaeth Cymru yn eiddo i
Lywodraeth Cymru
Transport for Wales is owned by the
Welsh Government