

Metro in Wales

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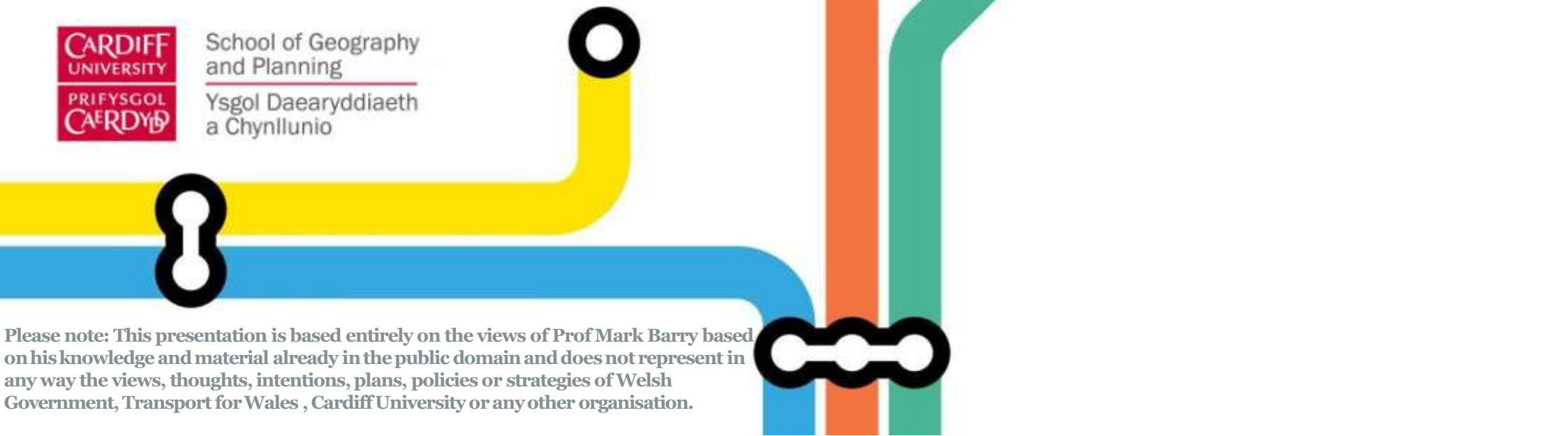
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September 2020



School of Geography
and Planning

Ysgol Daearyddiaeth
a Chynllunio



Please note: This presentation is based entirely on the views of Prof Mark Barry based on his knowledge and material already in the public domain and does not represent in any way the views, thoughts, intentions, plans, policies or strategies of Welsh Government, Transport for Wales, Cardiff University or any other organisation.

What I'll try to cover ...

- > Why Metro
- > But First Climate Change, Cars, Covid & WFH
- > WG Policy and publications
- > Back to Metro....

Why Metro...?



Why Metro...

Used on all my Metro slides since 2011!

- > Connecting more people, to more places
- > Enabling development & regeneration.
- > Modal shift & lower CO₂.

*To address issues of economic inactivity,
deprivation and poverty*

*And deliver a sustainable, economically
dynamic city region of 1.6 M people.*

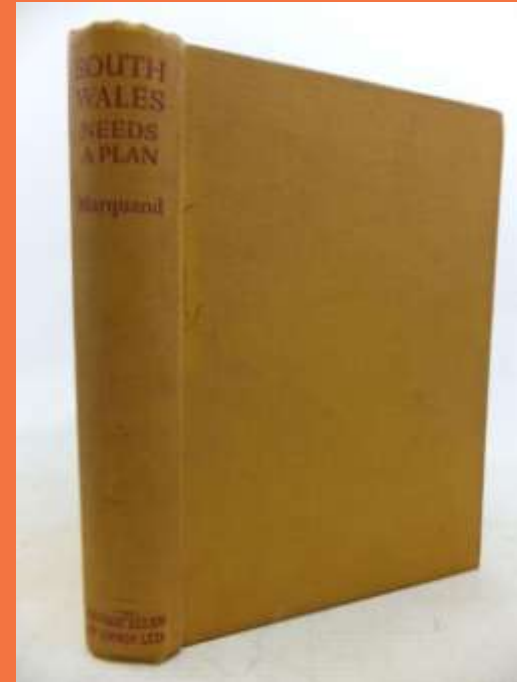
...not a new idea, from, “South Wales Needs a Plan”, by H A Marquand published by George Allen & Unwin Ltd in 1936!

“ ... a more rapid movement of population up and down the valleys must be encouraged, so as to save the inhabitants of the northern towns from economic isolation. How that rapidity of movement can best be secured should be decided by an authority responsible for a co-ordinated transport service throughout the Region. No such authority exists. (p48)

“... perhaps the Ministry of Transport could be asked to report whether it would be best to electrify the railways.”

“With rapid transport, it should be no more difficult for workers from Aberdare or Ebbw Vale to reach Cardiff or Newport than it is for clerks to travel to their daily work in the City of London from Wimbledon or Ealing”

...” political and social institutions have failed to adopt themselves with sufficient rapidity to the economic changes that have taken place. One small symptom of this is the maintenance of local government boundaries which have long lost their significance and of authorities which are inadequate to the larger tasks which need to be undertaken.”(p209)



Climate Change, Cars, Covid & Homeworking....

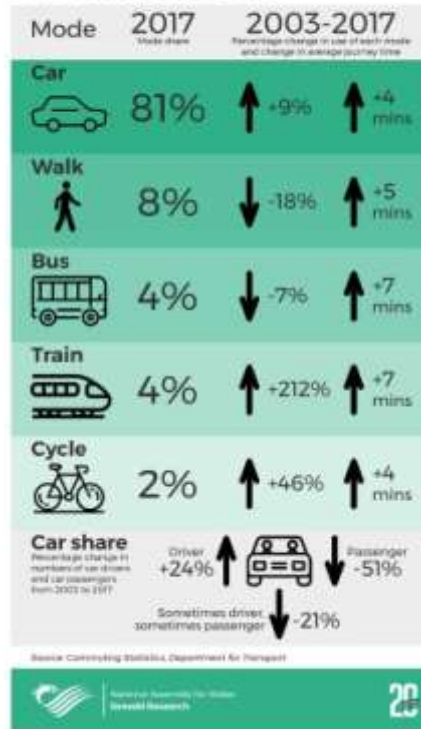


Climate Change

> Existential threat...

Commuting

Changes in commuting mode in Wales, 2003-2017



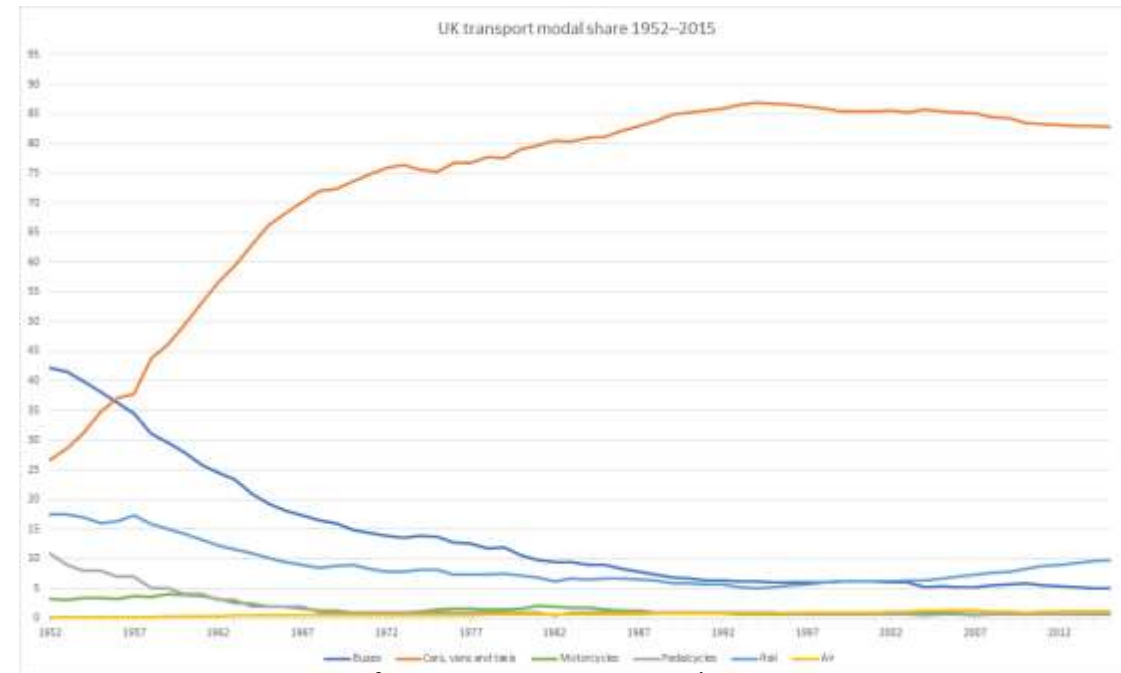
<https://seneddresearch.blog/2019/04/30/devolution-20-travel-in-wales-is-there-a-revolution-still-to-come/>

> The answer is not replacing all our current cars with electric cars, AV, pods, etc....

> But much, much more PT and AT



Source, NASA: <https://climate.nasa.gov/evidence/>



Source, Department of Transport, Transport Stats since 1952
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/482670/tsgb0101.xls

Cars....

> What do you notice?



www.alamy.com - A2JEMX

Cars...

> What do you notice?



> n,000,000's of cars that spend most of their time doing absolutely nothing!

Massive and inefficient use of earth's natural resources

> We have to design cities to accommodate cars when they are not moving

...as well as when they are!

> CO2 emissions

...climate change issues, cars by far the biggest contributor

> **160,00 road accidents each year in UK, 23,000 serious injuries and 1700 fatalities** ~5 per day, including 1 cyclist

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/533293/rregb-main-results-2015.pdf

<https://swalesmetroprof.blog/2020/07/13/a-public-transport-grid-for-the-m4-corridor/>

If the railways did that they would be closed down!!!

> Particulate emissions & air quality issues

...now a major health concern, with 000s of casualties

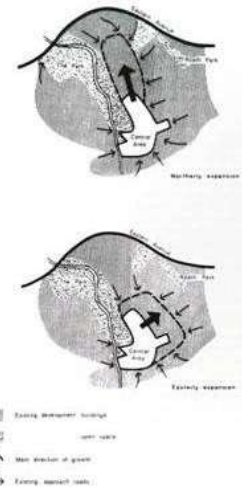
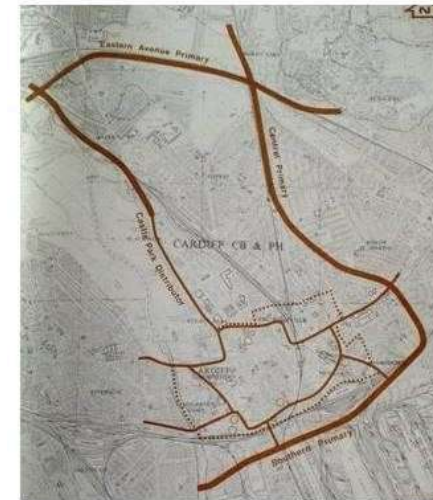
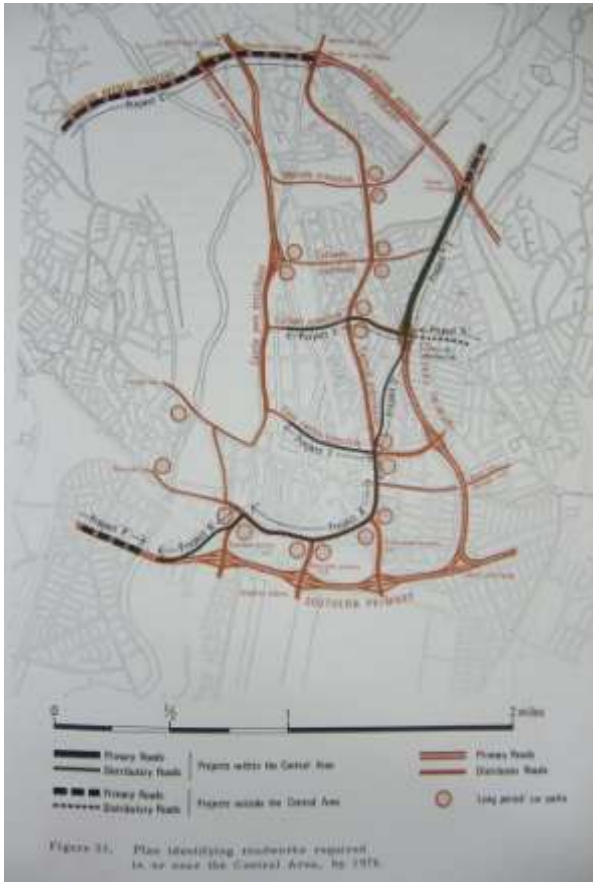
We used to use a lot of Public Transport *Cardiff Tram Network 1929 and South Wales Rail Network 1910!*



History

Cardiff embraced the car in the 1960s/70s

>cars, roads, motorways...

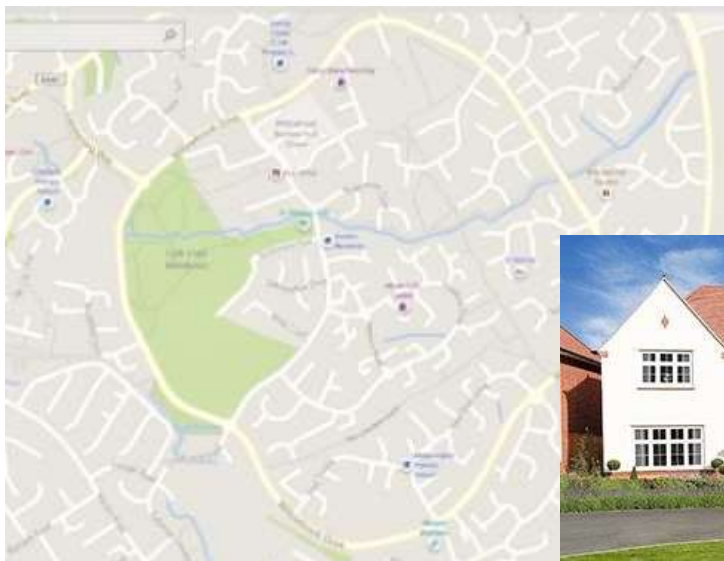


The oil price crisis of the early 1970s helped Cardiff “dodge a bullet”!

Now we have built our lives around cars

This is not sustainable

- > We have "bought" the image of the 3 and 4 bed house & garage
- > Many such developments sited away from jobs, services and depend on car ownership/access
- > Public services, business parks also too often not built near PT
- >Car based sprawl....has an environmental cost!



<https://swalesmetroprof.blog/2019/04/25/transit-oriented-development-in-the-cardiff-capital-region/>
<https://swalesmetroprof.blog/2020/02/11/transit-oriented-development-in-the-cardiff-capital-region-2/>

What sort of future do we want?



> Build roads, get more cars - induced demand

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762976/latest-evidence-on-induced-travel-demand-an-evidence-review.pdf

https://webarchive.nationalarchives.gov.uk/20050304041634/http://www.dft.gov.uk/stellent/groups/dft_econappr/documents/pdf/dft_econappr_pdf_022512.pdf

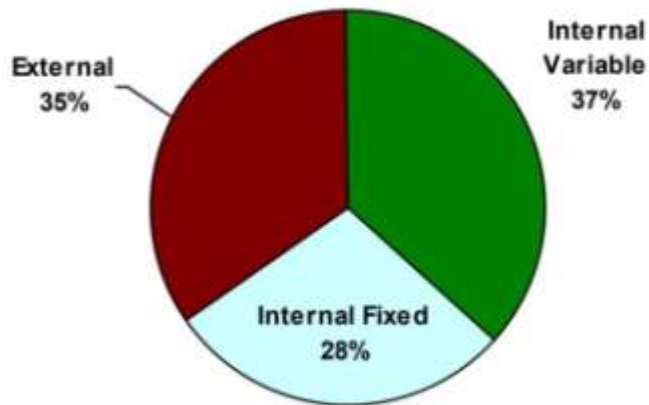
> Remember – its only 10-20% of peak time traffic that causes 100% of the congestion!!!

<https://swalesmetroprof.blog/2020/07/13/a-public-transport-grid-for-the-m4-corridor/>

We need to talk about the External Costs...

Drivers do not pay the full costs of car mobility

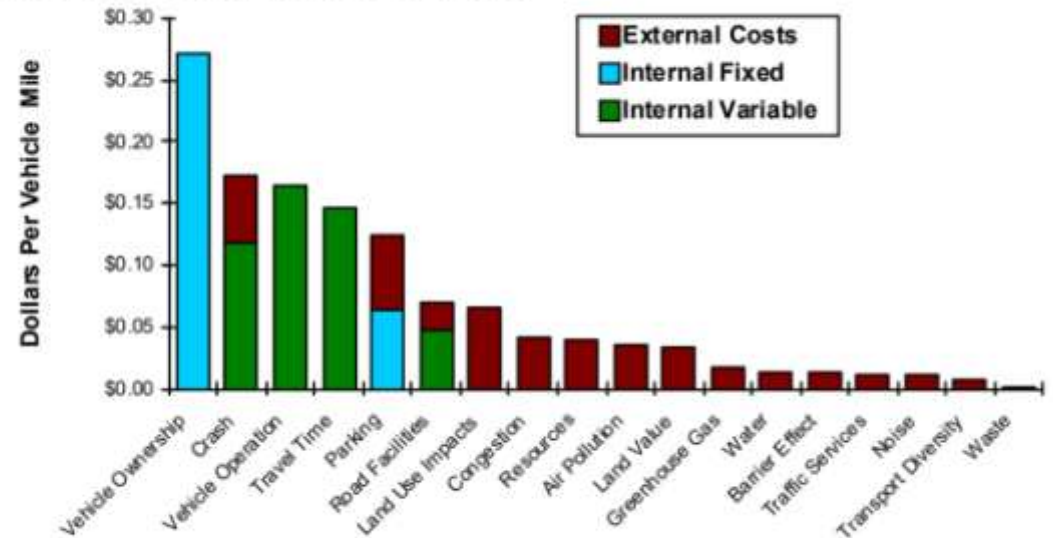
Figure 6.2-3 Average Car Cost Distribution



This figure illustrates the aggregate distribution of costs for an average car. About 60% of total vehicle costs are either External or Internal-Fixed.

Ref Todd Litman and Victoria Transport Policy institute
<https://www.vtpi.org/tca/>

Figure 6.2-2 Costs Ranked by Magnitude



This figure shows Average Car costs per vehicle mile, ranked by magnitude.

- > We need a ubiquitous road user charge to more fairly apportion the external costs of car use!

Are AV and EV an answer...?

<https://swalesmetroprof.blog/2017/06/28/driverless-cars-as-a-service-batteries-and-urban-spaces/>



EV & Batteries...

- > Not very energy efficient to charge 000s of cars from domestic 240V supply
- > *Grid losses, car batteries begin to lose charge immediately, will need much more generation capacity*
- > Maybe there is another model?

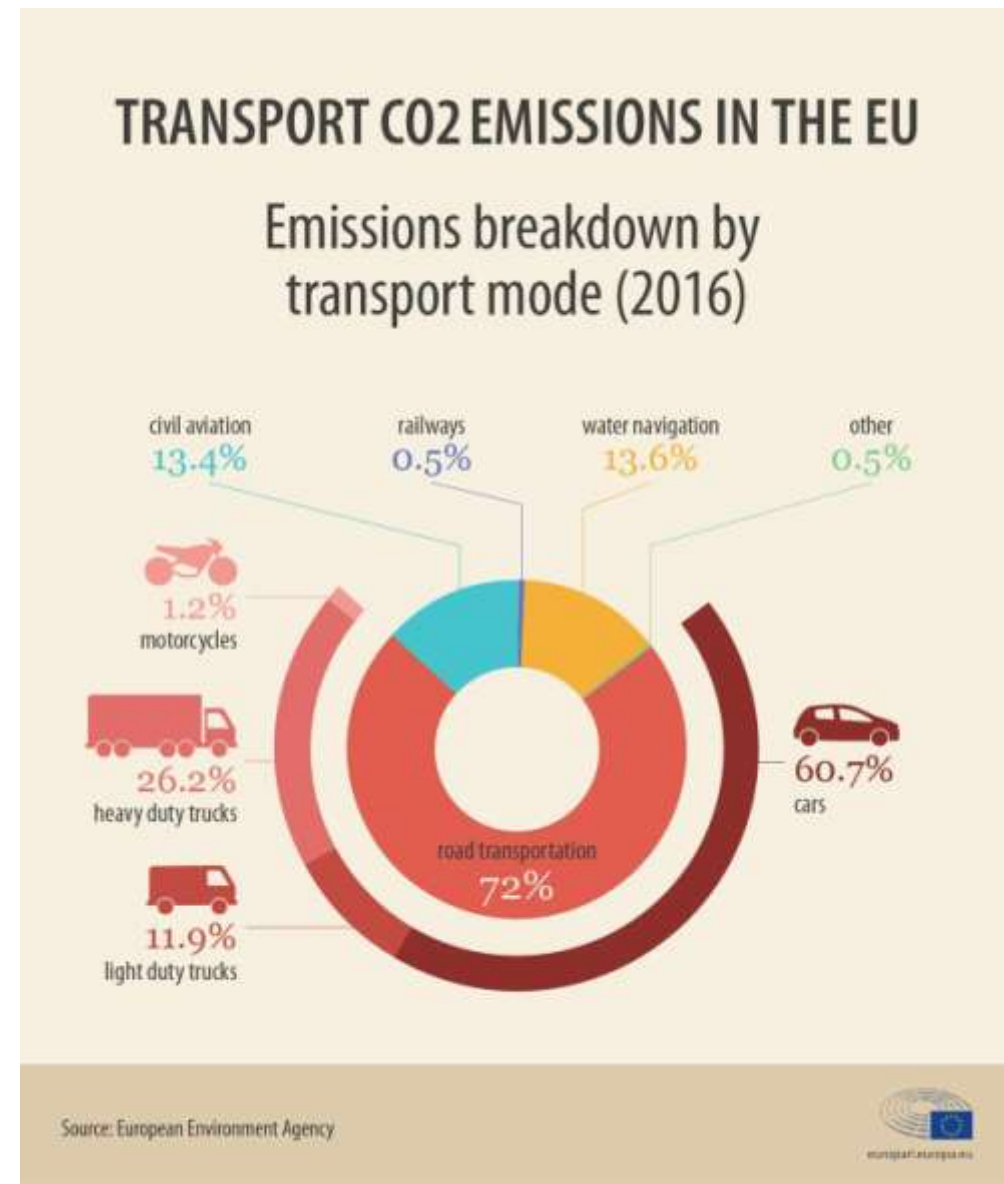
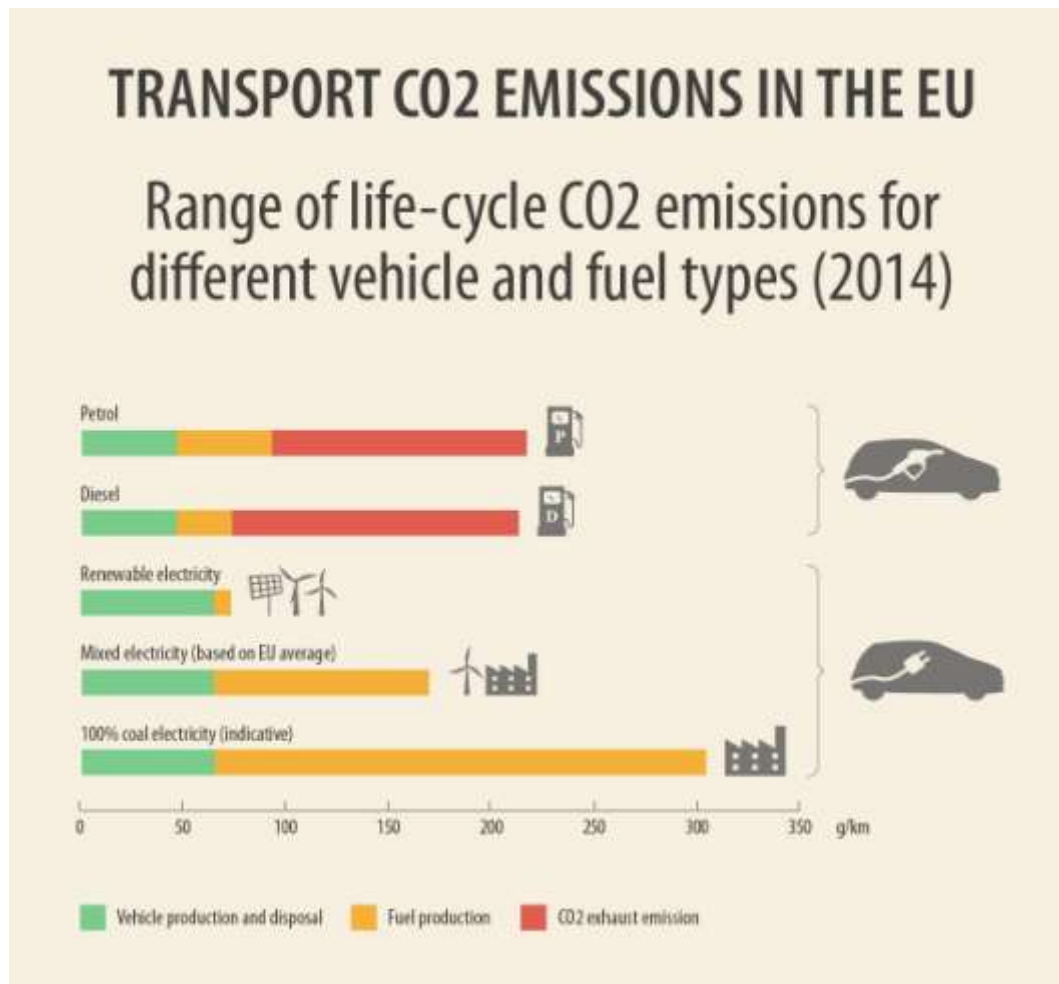


- > Battery stations instead of petrol stations?
- > Depends on development of small modular batteries with higher energy density
- > See India & Chetan Maini's Sun Mobility

<https://factordaily.com/chetan-maini-reva-electric-car-battery-sun-mobility/>
<http://www.sunmobility.co.in/>



Electric Cars are better...esp with more renewable generation ...but still not as good as public transport and activetravel



<https://www.europarl.europa.eu/news/en/headlines/society/20190313STO31218/co2-emissions-from-cars-facts-and-figures-infographics>

Young persons perception of cars ...

- > Car insurance costs an increasing portion of peoples “resources”
- > Car manufacturers are turning cars into “mobile phones with wheels”to sell financial service products wrapped around cars with **built in obsolescence**!!
- > It's the next financial services “mis-selling” bubble!!
<https://www.ft.com/content/8b6607de-6304-11e7-91a7-502f7ee26895>



- > So now, many “happier” with even poor public transport
- > More used to walking and cycling
- > Increasing urbanisation supports PT alternatives to car

What is causing congestion now.....

- > Emerging evidence that services like Uber and Lyft are contributing to an increase in urban congestion!!



Worth a look...

The New Automobility: Lyft, Uber and the Future of American Cities; Schaller Consulting

<http://www.schallerconsult.com/rideservices/automobility.htm>

Do transportation network companies decrease or increase congestion? Gregory D. Erhardt, Sneha Roy, Drew Cooper, Bhargava Sana, Mei Chen and Joe Castiglione; Department of Civil Engineering, University of Kentucky and San Francisco County Transportation Authority,

<https://advances.sciencemag.org/content/5//eaau2670>

Driverless taxis, driverless buses, and the future urban mobility mix; Antonio Lorio / Jarret Walker; Human Transit

<https://humantransit.org/2015/06/guest-post-driverless-taxis-driverless-buses-and-the-future-urban-mobility-mix.html>

So where can MaaS and/or AV work best?

Perhaps Demand Responsive Transport (DRT)



Credit Toyota and Keolis



Where?

- Areas where public subsidy can be reduced
- Areas of low population density, rural
- Where fixed/segregated PT is inefficient
- Integrated with wider PT offer

Covid and “WFH”



Post Covid work patterns...*my assertions!*

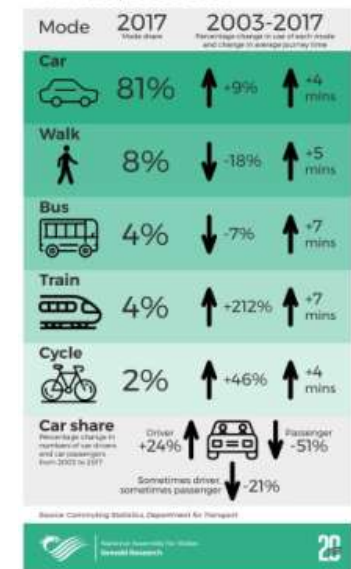
We need to step carefully

<https://swalesmetroprof.blog/2020/04/05/corona-virus-homeworking-and-transport/>

- > Not all of us need to be in an office 9-5 Mon to Friday
- > But, not easy for all of us to work from home all the time, nor do we all want to...
- > Too early to assess productivity impacts of WFH – esp long term mental health
- > Spontaneity, innovation and creativity often better face to face and informal
- > Social interaction is important (esp for younger people)
- > So, some home working & local working is possible AND desirable for those who want to
- > But we will still need “HQ” for many functions & activities

Commuting

Changes in commuting mode in Wales, 2003-2017



The opportunity....

- > Even with a 20-30% reduction in demand for office space we can “backfill” by relocating all the car based out of town office, retail, leisure, etc back to our town and city centres
- > The opportunity is to reduce car use and dependency, enable more flexible working
- > AND grow public transport & active travel; & **encourage Transit Oriented Development TOD**

DRT v Bus v LR v HR



Remember....

We can't escape geometry, maths and physics!

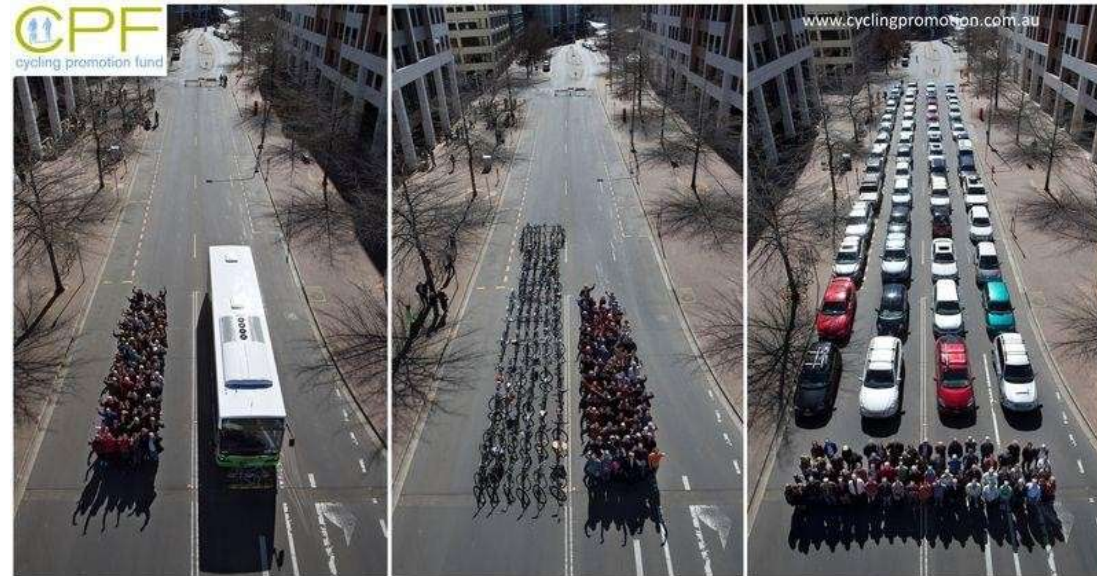
Question...

What is the easiest, least costly and most environmentally friendly way of moving 1000 people an hour between two points...?

- > 1000 cars ?!!
- > 12-15 buses of 70/80 people ?
- > 4 LRVs carrying 200-300 people ?
- > 2-3 trains carrying 400-500 people each ?
- > Demand Response Transit (DRT)?
- > 1000 bikes; *clearly best for short distances... or walking!*

To note the speed, reliability (and so attractiveness) and opex of services is related to the degree of segregation (fixed rail, bus lanes, etc better than mixing with traffic)

This from Jarrett Walker is worth a read <https://humantransit.org/book>

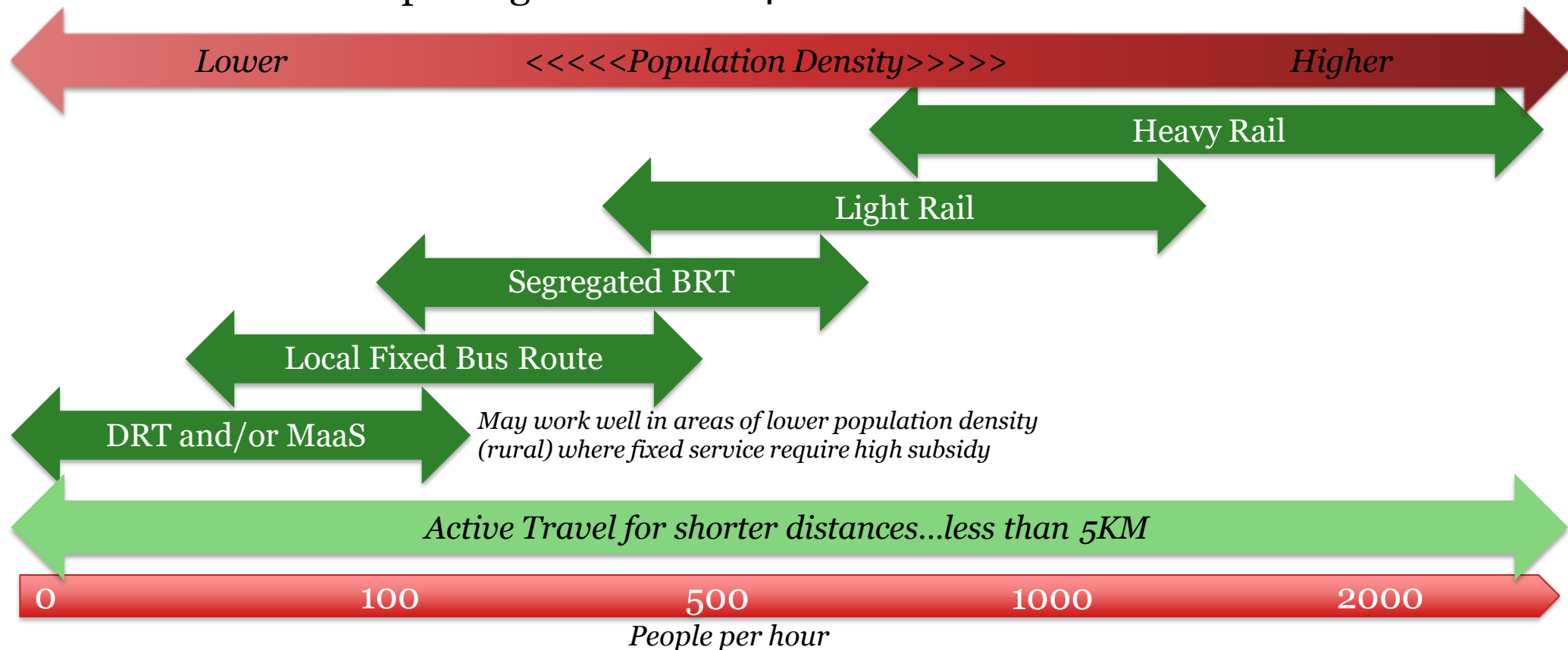


Remember....

We can't escape geometry, maths, physics and affordability!

Q: Demand Responsive Transit (DRT)/MaaS V Bus V Light Rail V Heavy Rail?

- > Biggest considerations: capex, opex and demand
- > Capex to deliver “segregated operations as much as possible” for high demand corridors
- > In urban areas “turn up and go” of at least 4 services an hour



Welsh Government Policy and Statements

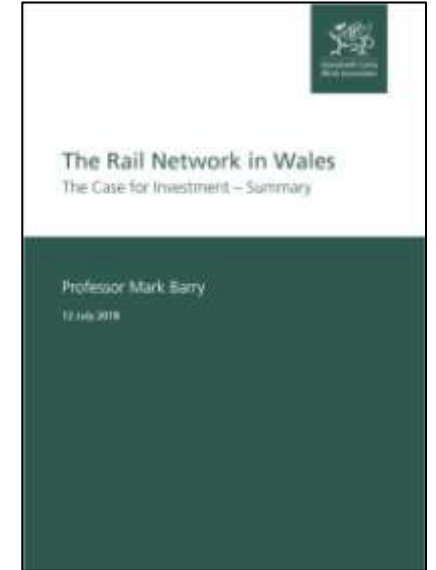


The Case for Investment, 2018

Initial and conservative analysis... (£M)

<https://gov.wales/sites/default/files/publications/2018-12/the-rail-network-in-wales-case-for-investment.pdf>

- > Potential to secure **over £2.5Bn** in Transport User and Agglomeration Effects
- > Further agglomeration benefits to assess
- > Deliberately conservative approach... more benefits to realise as work develops

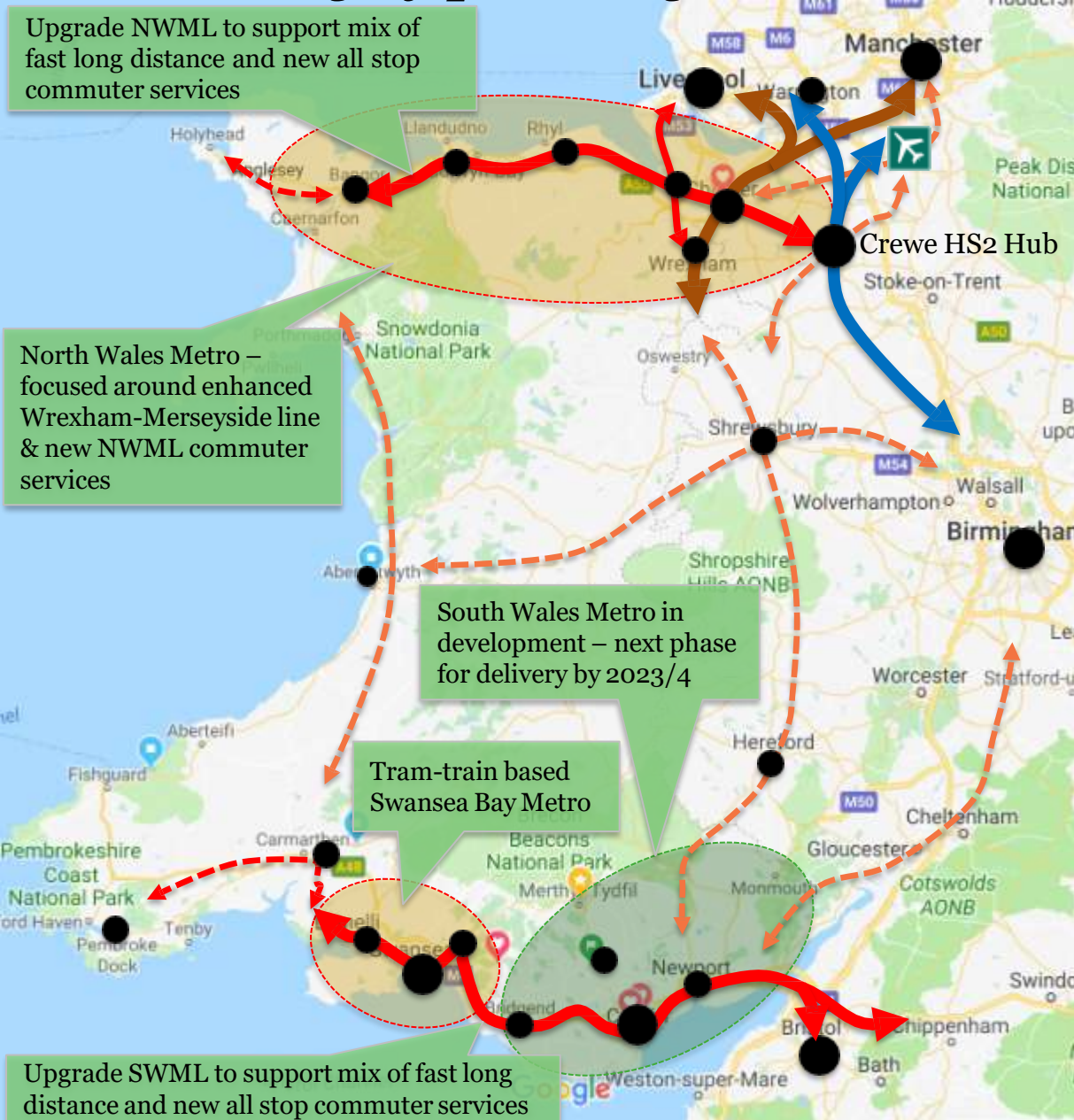


	NWML	Wrexham-Merseyside	SWML	Swansea Bay	Total
Transport User and other L1 Benefits/Disbenefits £m	£840	£110	£770	£190	£1,910
Agglomeration Effects £m	£80	£40	£50	£30	£210
Total	£930*	£150	£820	£220	£2,120
Jobs	435	100	420	190	1,145
Regional GVA (per annum)	£23	£5	£18	£8	£54
Further Potential Level 1 Impacts £m	£20	NA	£490	NA	£510
Further potential agglomeration benefits £m	<£10	NA	£30	NA	£40
Total further benefits possible	£20	NA	£520	NA	£540
Further Jobs	125	NA	165	NA	290
Further Regional GVA	£4	NA	£7	NA	£11

The Case for Investment, 2018

Summary of primary Interventions

(see <https://beta.gov.wales/rail-network-wales>)



- Enhanced main line & services (100mph+ railway)
- Enhanced main lines services to/from NW England
- Key hubs & interchanges
- Upgrade line for local services (part of N Wales Metro)
- Improved services into west & north west Wales
- HS2
- For future development

- Faster journeys to/from north Wales and Chester, Liverpool, Manchester, Manchester Airport, Crewe, London, Birmingham and south Wales. Ambition of:
 - Llandudno to Crewe in 60 minute
 - Holyhead to Chester in 60 minutes
- New integrated local services between north east Wales & Merseyside

Direct transport user benefits of over £2bn
 Wider economic & agglomeration benefits
 More sustainable travel options
 Reduced road congestion & improved air quality
 Reduced CO2 emissions

- More capacity and reduced journey times between Cardiff & Swansea and to/from London, Heathrow & Bristol. Ambition of:
 - Cardiff to Paddington in 90 minutes
 - Swansea to Cardiff in 30 minutes
 - Cardiff to Bristol Temple Meads in 30 minutes
- New local commuter rail network for Swansea Bay

Upgrade NWML to support mix of fast long distance and new all stop commuter services

North Wales Metro – focused around enhanced Wrexham-Merseyside line & new NWML commuter services

South Wales Metro in development – next phase for delivery by 2023/4

Tram-train based Swansea Bay Metro

Upgrade SWML to support mix of fast long distance and new all stop commuter services

A Railway for Wales 2019

Meeting the needs for Future Generations, September 2019

<https://gov.wales/sites/default/files/publications/2019-09/a-railway-for-wales-the-case-for-devolution.pdf>

South West Wales Metro

- The South West Wales Metro including rail, bus, and active travel is currently being developed by the region's local authorities
- Increased South Wales Mainline services (to Carmarthen and Pembroke Dock/ Milford Haven) and a potential strategic West Wales Parkway
- Assessment of the case to reopen older lines and new stations such as Dulais, Amman, Neath and Swansea Valleys

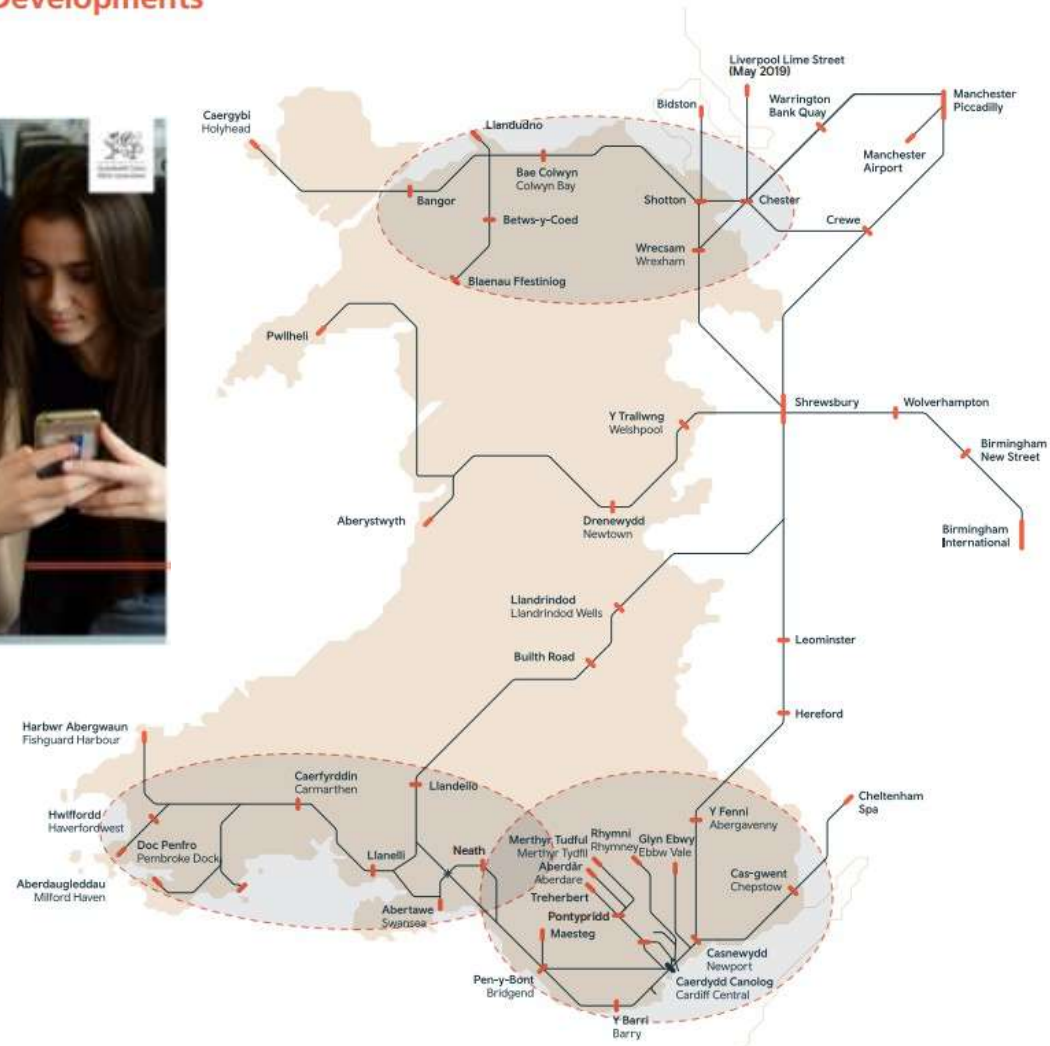
North Wales Metro

- Enhance and integrate rail and bus services across North Wales/Cheshire
- Enhanced Borderlands line with direct and faster services between Wrexham and Liverpool and integration with Merseyrail services
- Additional stations and potential extensions
- Upgrades of Wrexham General and Shotton stations
- Further rail extension and/or re-openings to be considered

South East Wales Metro

- To appraise, develop & deliver major schemes such as Ebbw Valley and Maesteg service frequency enhancements
- Potential M4 corridor measures
- Enhanced services and new stations on the Marches Line
- Additional Metro stations
- Network capacity & resilience measures
- Comprehensive integration with bus services and Active Travel
- Other new transport solutions including reopening and delivering new lines through the emerging Metro Enhancement Framework

Figure 3
Metro Developments



SWML & NWML Corridor Enhancement Priorities, Sep 2020

Prepared by WG Sep 2020

- In September 2020 CabSec Ken Skates wrote to all MSs and MPs following the UK Secretary of Sates for Transport letter to MSs earlier.

<https://gov.wales/wales-transport-minister-critical-westminsters-package-new-investment>

- That letter is accompanied by document setting out the strategic enhancement priorities for the SWML and NWML corridors
- Followed an earlier statement in September re: South East Wales Transport Commission emerging findings

<https://gov.wales/welsh-government-calls-uk-government-play-its-part-it-backs-commissions-emphasis-public-transport>

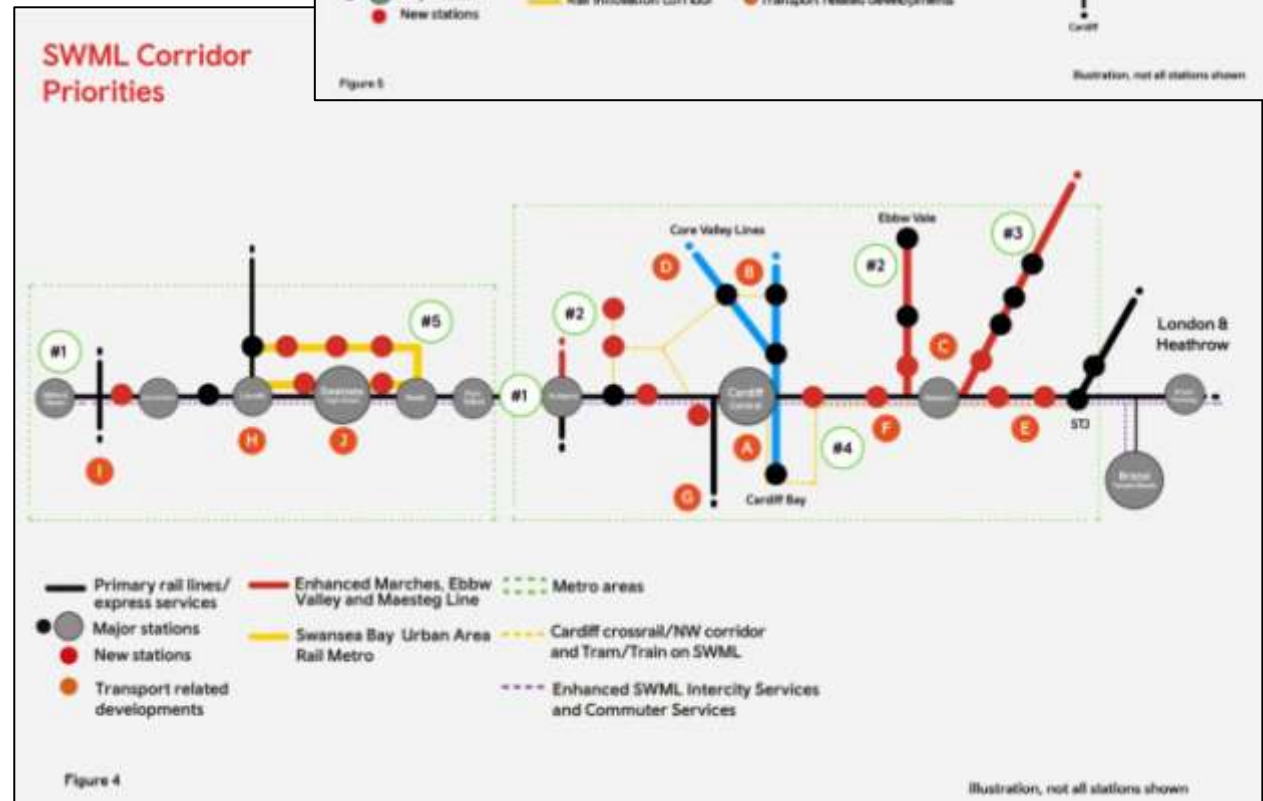
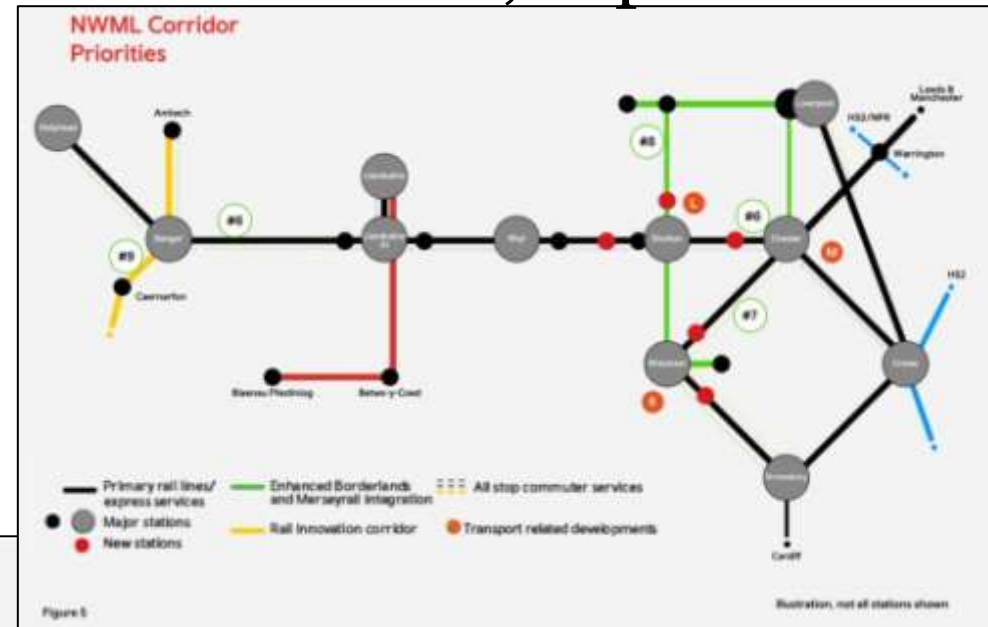


Table 1 Summary of schemes and Economic Development Sites.

Rail Schemes	Economic Development Sites
#1 South Wales Main Line ISWML Upgrade	A Cardiff Central, Central Quay and Cardiff Bay
#2 Ebbw Valley And Maesteg Lines Upgrade	B GE Life Science Innovation Park
#3 Marches Line Upgrade	C Newport Knowledge Quarter
#4 Cardiff Crossrail & NW Corridor	D Nabtgarn/Treforest Industrial Estate
#5 Swansea Bay Urban Area Rail Metro	E Llanwern/Glan Llyn
#6 North Wales Main Line INWML Upgrade	F Hendre Lakes/Cardiff Parkway
#7 Crewe-Chester-Wrexham-Shrewsbury	G Cardiff Airport/St Athan Business Park
#8 Borderlands; Wrexham-Liverpool	H Life Science and Wellbeing Village
#9 Innovation	I Pembroke Dock Marine
	J Swansea City and Waterfront District
	K Wrexham Gateway
	L Deeside Industrial Park and Airbus
	M Chester Station

Metro in Wales



Current Contracted Phase of Metro

Prepared by M Barry, 28th September, DRAFT 1.0

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

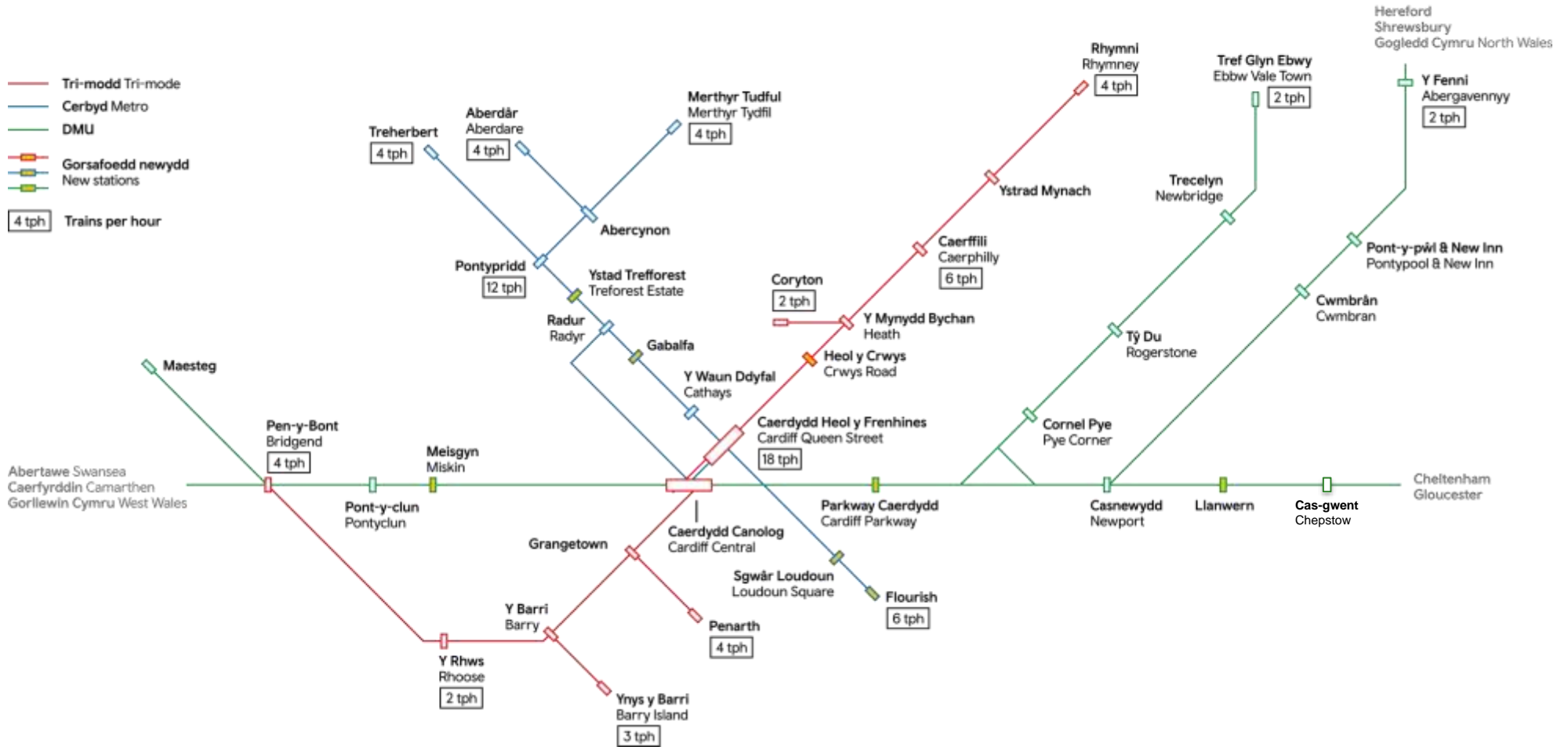
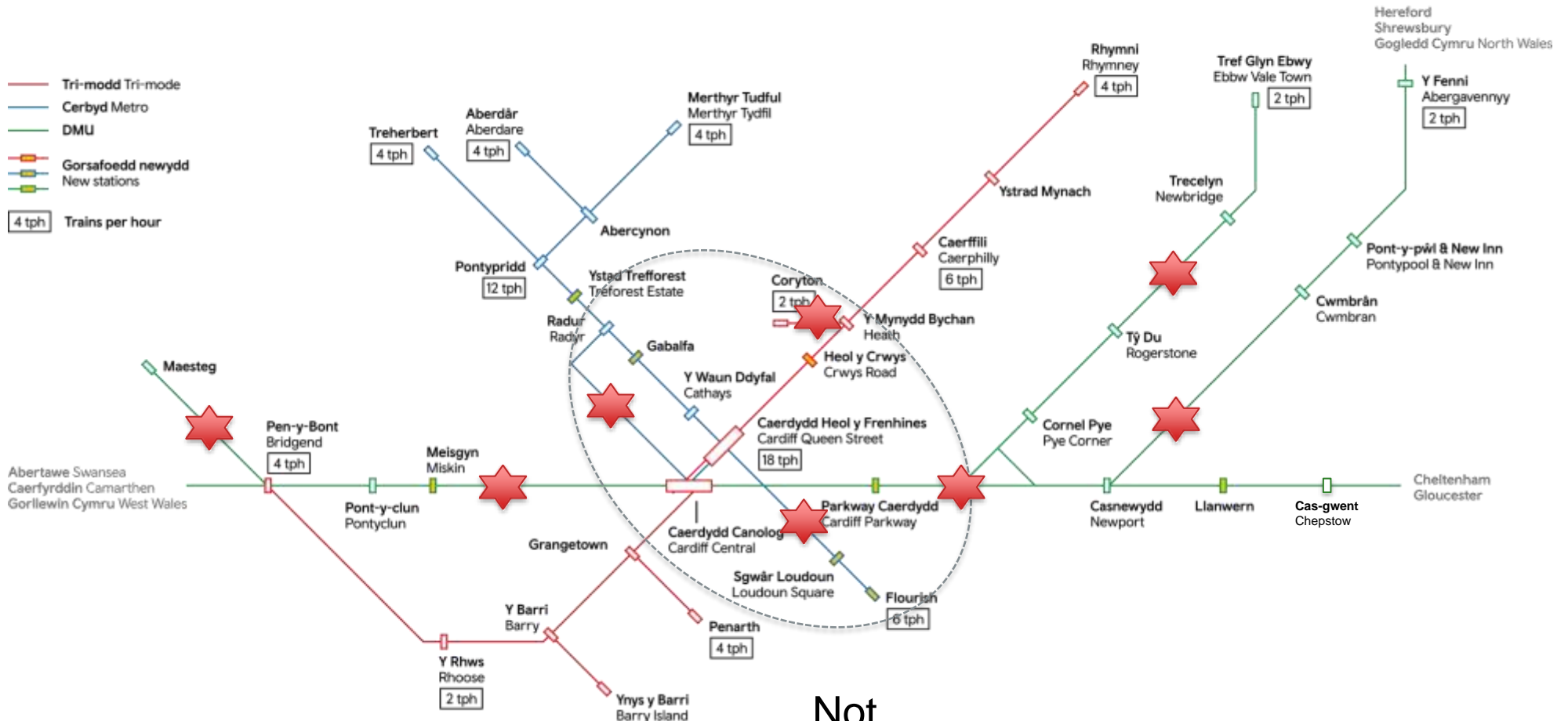


Illustration of potential Metro – not all stations shown

Current Contracted Phase of Metro – but with o/s challenges

Prepared by M Barry, 28th September, DRAFT 1.0

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



Not forgetting
 • Bus networks and integration

• Wider Economic Benefits

Illustration of potential Metro – not all stations shown

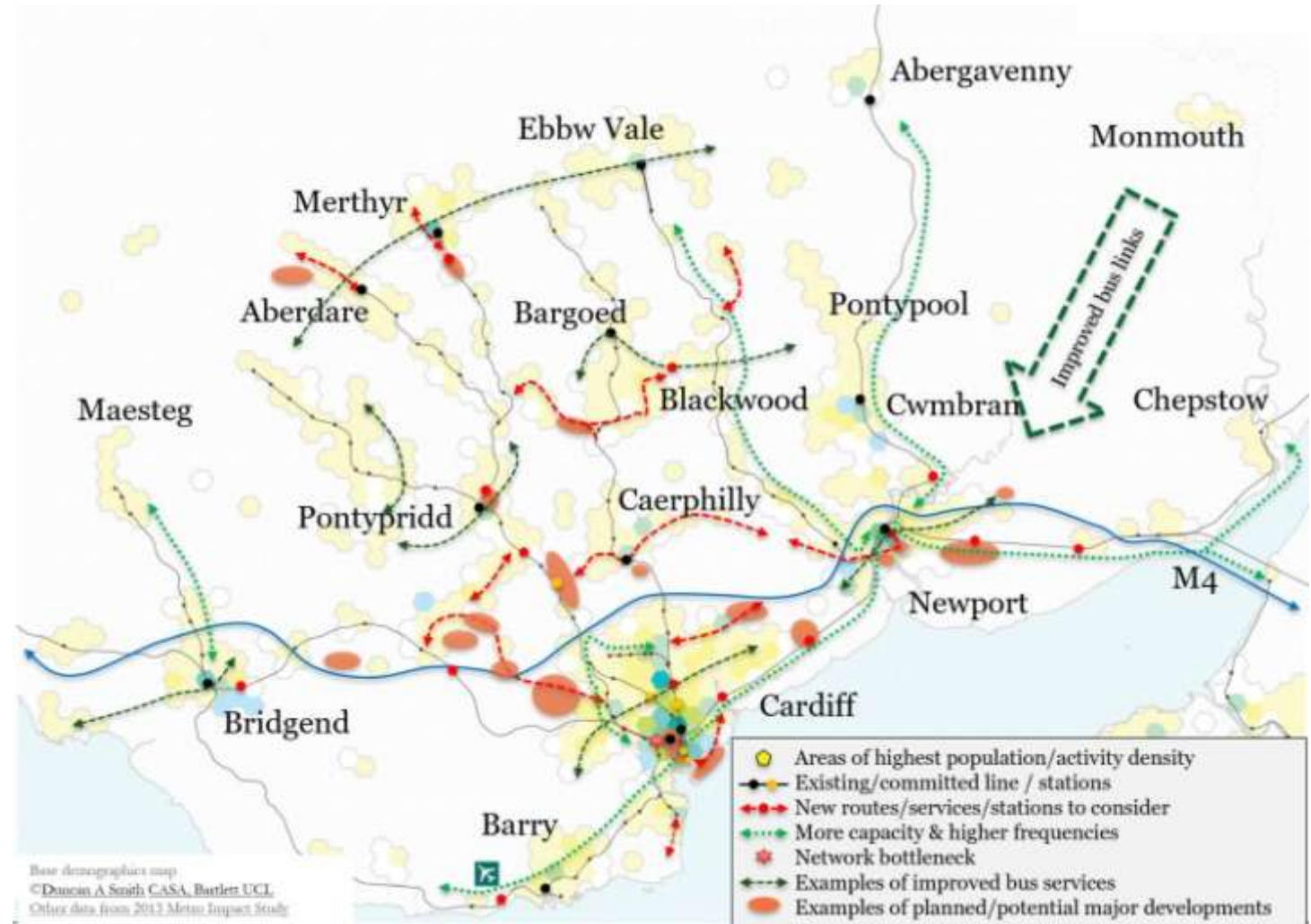
South Wales Metro

Potential Future Phases...?

Rail extensions like cross valley, Hirwaun and Cardiff Crossrail/NW Corridor and further bus integration measures extend reach of Metro network. Major benefits to places like Nelson, Hirwaun, Cardiff west, Cardiff east Newport, Cardiff Bay, Penarth and Barry

- > Further employment accessibility benefits
- > Opens up new sites and locations for development and regeneration
- > Further model shift to Public Transport

Needs to be linked to regional spatial plan...!
(or not?)

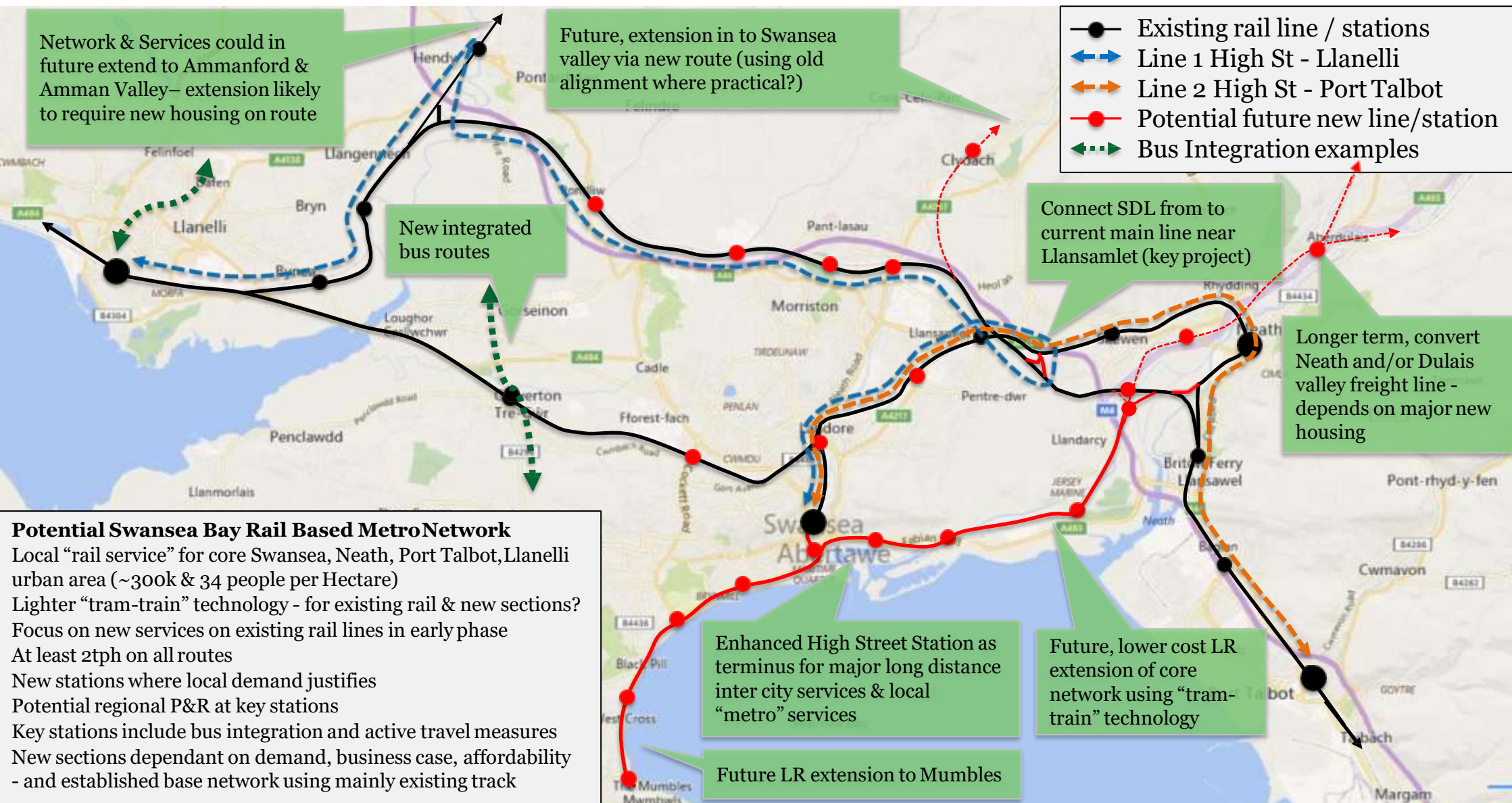


Will also need to reflect South East Wales Transport Commission Findings

<https://gov.wales/south-east-wales-transport-commission>

A Swansea Bay Metro

A commuter network – perhaps tram-train (from 2018 work)?



Potential Swansea Bay Rail Based Metro Network

Local "rail service" for core Swansea, Neath, Port Talbot, Llanelli urban area (~300k & 34 people per Hectare)
 Lighter "tram-train" technology - for existing rail & new sections?
 Focus on new services on existing rail lines in early phase
 At least 2tph on all routes
 New stations where local demand justifies
 Potential regional P&R at key stations
 Key stations include bus integration and active travel measures
 New sections dependant on demand, business case, affordability - and established base network using mainly existing track

Illustration only – more detailed work on potential routes and services ongoing

But very little will progress until we resolve this...

Rail infrastructure & enhancement £ is not devolved to Wales

For the period 2001 - 2029

- > Approx. UK Gov rail enhancement spend ~**£100Bn**
- > Most generous figure for UK Gov investment in Wales is only ~**£2.2Bn**
- > A route based allocation of the £100Bn would be ~£10Bn
- > A population based allocation of the £100Bn would be £5Bn
- > This is not sustainable

Enhancements improve the capability, capacity, reliability of the rail network; the limited share of such investment in Wales has led to relatively less attractive services, attracting fewer passengers, resulting in lower modal share and higher subsidies.

This is different from the Operations, Maintenance and Renewal Spend (OMR) which is about maintaining the network's current capability and reliability; and OMR spend in Wales is only 5-6% of total for UK network despite having ~10% of the network

Finally, Transit Oriented Development... *What is it?*

- > No single definition...
- > But perhaps
 - Mixed use and higher density development around transport corridors and stations
 - Aligning new housing and employment sites with transit
 - Improving safety and quality of urban realm - especially streets
 - Integration with active travel
 - Integration with open/green spaces
 - Community engagement and involvement



Transit
Oriented
Development
Charette
Working Note

November 2019



TOD Can Offer a Wide Range of Benefits Beyond Transit Ridership

Economic development	Fiscal benefits	Household benefits	Environmental benefits
<ul style="list-style-type: none">• Increases productivity and saves time• Encourages concentration of business activity• Increases economic competitiveness and promotes a green economy• Increases property values and development potential	<ul style="list-style-type: none">• Savings on cost to build and maintain highways and roads• Generates stronger tax revenues	<ul style="list-style-type: none">• Savings from reduced cost of driving• Improved access to jobs, schools and other destinations• Promotes health	<ul style="list-style-type: none">• Reduces greenhouse gas emissions• Preserves agricultural land and assists with food security• Promotes energy independence

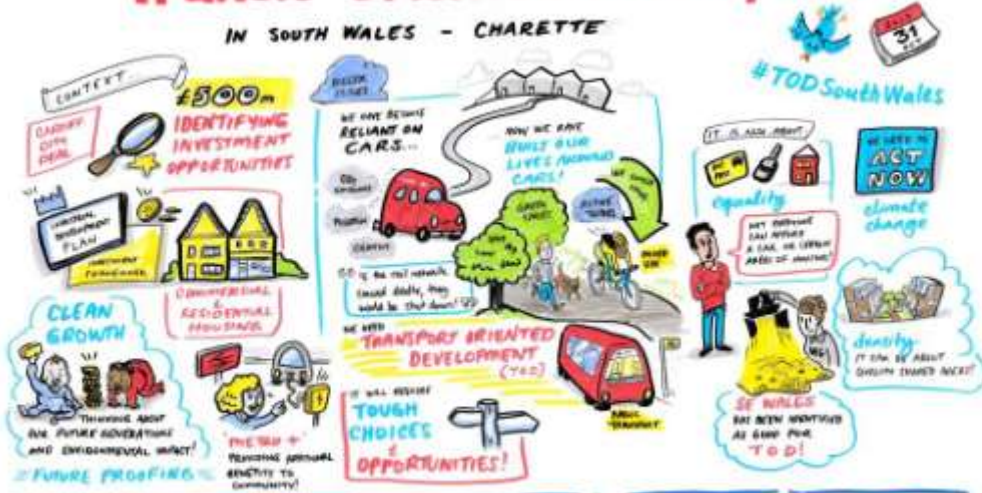
13

Its about people, public spaces and public transport

A good transport plan is a PT/AT based land use plan

Transit Oriented Development

IN SOUTH WALES - CHARETTE



Exploring the Practice



Understanding the theory



Making it a Reality



VIDEOS BY LAURA SURYALA.COM - @_aunlab

Thank You...



School of Geography and Planning
Ysgol Daearyddiaeth a Chynllunio



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