Inquiry into the investment of Commonwealth and State funds in public passenger transport infrastructure and services

Public Hearing – Perth 23 March 2009

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Governance and Management of Urban Transport

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- The state of public transport
  - Measurement
  - Car dependency
  - Importance of land use transport integration
- Commonwealth action
  - Investment in transport (not modes)
  - City building
  - A transport task not a welfare task
  - Sound evaluation to target investment

The terms of this Standing Committee are wide and appropriate to the task. During the course of these hearings I note that you will hear from a wide range of people, including my colleagues around the country. On this basis I'm assuming that others will cover very well other aspects of the terms of reference, my intent is to complement this and to focus on what I consider to be a missing aspect. Therefore I will talk to 'the state of public transport' – drawing out ways of measuring this and implications for city building and future investment. I will finish by recommending areas for Commonwealth action.

The state of public transport: How do we measure this - I

- Car dependent people or car dependent places?

If we are to understand the 'state of public transport' we need to consider how it might be measured. Clearly there are many ways of measuring, my interest is in two key measurements.

The first, drawing on the work of UK Professor Phil Goodwin and his team (Goodwin et al, 1995, Car Dependence, RAC Foundation for Motoring and the Environment, London), focuses on understanding car dependency. The basis for this is that there is plenty of evidence that people living in Australian cities are among the highest proportions of car owners and users in the world. Newman and Kenworthy's work attests to this. Certainly the average figures would confirm this – around 80% of travel in Perth is by private car and around 7% by public transport. There is then a leap made to suggest that Australian's are car dependent, and worse that there is no role for public transport in these circumstances.

Goodwin argues that we must distinguish between car dependent people and car dependent places. He argues that car dependent people include - some disabled people, those managing travel with young children, those needing to carry heavy/bulky goods (and indeed those travelling with dogs as I note from one of the submissions). So clearly those defined as 'car dependent' will not be so all of the time. It is, Goodwin asserts, place that determines car dependency. A more in-depth analysis of travel statistics demonstrates that for some journey purposes to some places within the city there is a reduction in the mode share by car with an increase in public transport use. So for journeys to work based in the Perth CBD the mode share by public transport is around 40-50%. So car dependent places are those where there is no public transport service, or where it is uncompetitive with the car. This latter point is important, note that by far the majority of Australian's living in cities own a car (although there are of course some who do not own a car), even the less well off own cars– this means that if they use public transport they do so by choice.

The state of public transport: How do we measure this - II

- Through the mind of the traveller

– the individual decision to chose public transport over car

This leads me on to the next way that we need to measure public transport – that is through the mind of the individual traveller. Given that most own a car then any decision to take public transport for a journey is weighed against the possibility of using the car. So here the state of the public transport system is critical if we are to reduce car use, to increase transport sustainability and so on.

What assists a person to chose public transport over car – this picture from Utrecht in the Netherlands depicts many of the factors quite well:

- Is there a public transport service?
- How frequent is it?
- How long will it take me to get there (from door to door)?
- How legible is my journey – will I be able to find my way (note signage, clock etc), will I understand easily how to use the system?
- Can I arrive by bicycle/car/bus …ie. How well do the modes integrate to enable me to have a seamless and stress free journey?
- Is the journey comfortable (place to sit, toilets, snack bars, light, heat and other amenities)?

This list in part responds to your question – measures to improve public transport - but I'm only going to focus on the first three measures to demonstrate the current state of public transport in Perth.

…new planning tool SNAMUTS

- Spatial Network Analysis of Multi-modal Urban Transport networks (Scheurer & Curtis)

  to develop an interactive decision tool to assist in examining scenarios for activity centres framed around:

  - the accessibility of the transport network, and
  - the accessibility of place.

I'm drawing on the work we call SNAMUTS – (acknowledging my colleague Dr Jan Schuerer and the research funding from the Australian Research Council (LP562422), the WA Department of Planning and Infrastructure and the Volvo Research and Education Fund who fund my Research Centre).

We have developed this new planning tool in order to improve decisions for both:

i) future investment in public transport – considering both infrastructure and service patterns;

ii) future development of activity centres based on good integration with the public transport network.

The tool not only enables us to report on the current state of public transport, but also to model scenarios for the future network and urban development pattern.

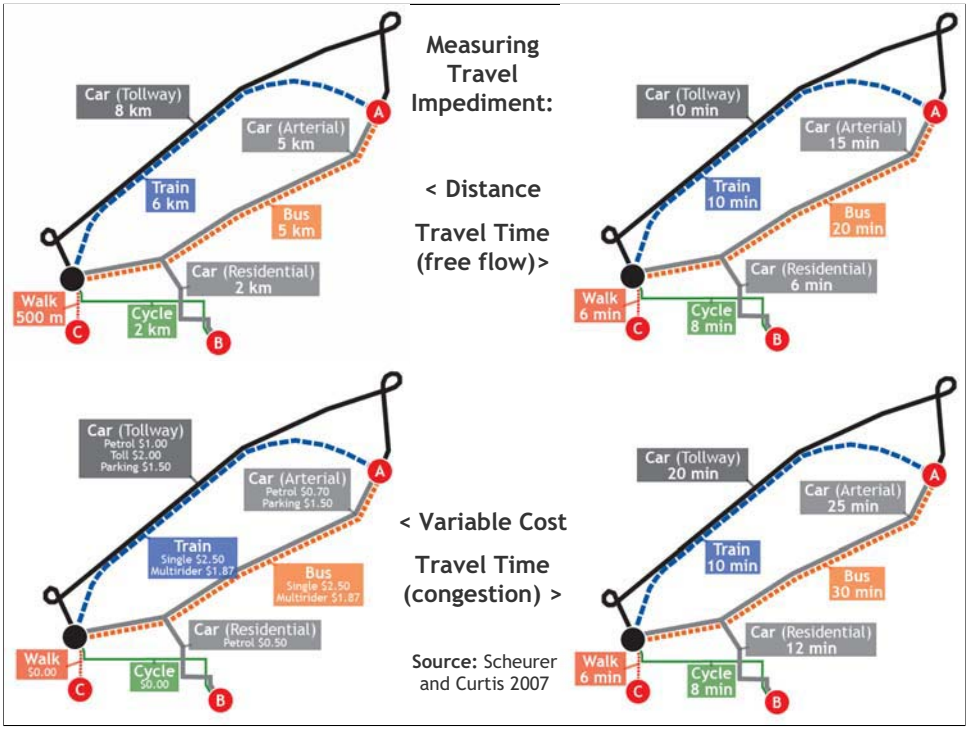
We argue (after Bertolini, Le Clercq and Kapoen (2005) Sustainable Accessibility: A Conceptual Framework to Integrate Transport and Land Use Plan-Making. Two Test- Applications in the Netherlands and a Reflection on the Way Forward. Transport Policy, Vol 12, pp 207-220) that you need to measure not only the network - but also the place – both are required if accessibility by public transport is to be understood and alternatives to car travel offered.

This tool will enable…

- the quantification of the effect of transport infrastructure improvements and modifications, and of land use intensification,
- on the accessibility of activity centres and corridors by different modes of transport.

This tool will enable both: the quantification of the effect of transport infrastructure improvements and modifications, and of land use intensification, on the accessibility of activity centres and corridors by different modes of transport.

…



Measuring accessibility is not new. We have reviewed the many conventional approaches (Scheurer and Curtis, 2007) – most measure this by travel impediment (how long will my journey take or how far is it), and this impediment can be considered by time of day or mode, and a dollar value can be assigned.

Public Transport Accessibility is different!

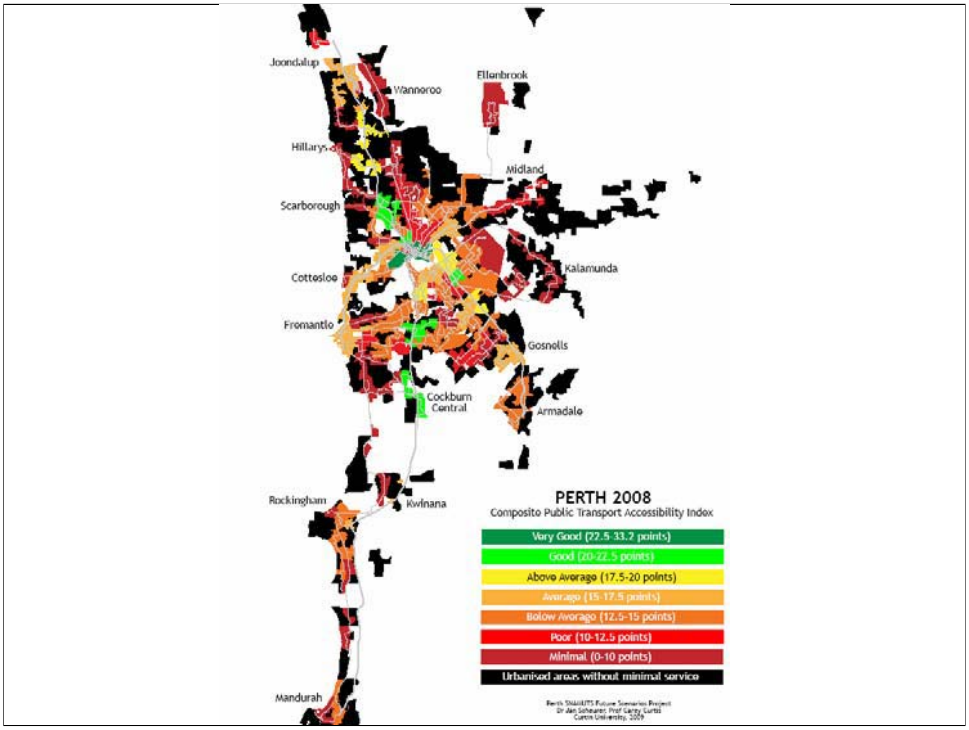
- Assessed from the experience of the individual traveller
  - Time
  - Frequency
  - Destination possibilities

Measuring public transport accessibility is different. Of course time is a factor, and you need to include transfer times between modes, but frequency of service is also important to the decision to chose public transport. As well the number of destination possibilities is important. For the most part in Australian cities it is possible to travel everywhere by car – so to cater for a person's daily activity pattern requires the same possibility by public transport if it is to compete. This means providing a public transport system that does more than simply caters for journeys into the CBD.

SNAMUTS indicators

- Impediment: what is the ease *of movement between adjacent network nodes expressed by time and frequency?*
- *Degree centrality: How many transfers separate a node from the rest of the network?*
- *Closeness centrality: What is the ease of movement between a node and the rest of the network?*
- *Efficiency centrality: By how much does ease of movement across the network improve?*
- *Catchment size of 30-minute travel time contour: How many residents and jobs are accessible within half an hour?*
- *Straightness centrality: How competitive is public transport travel with road travel?*
- *Betweenness centrality: How are travel opportunities geographically distributed across the network?*
- *Connectivity Index: How well integrated is a node within the web of travel opportunities?*

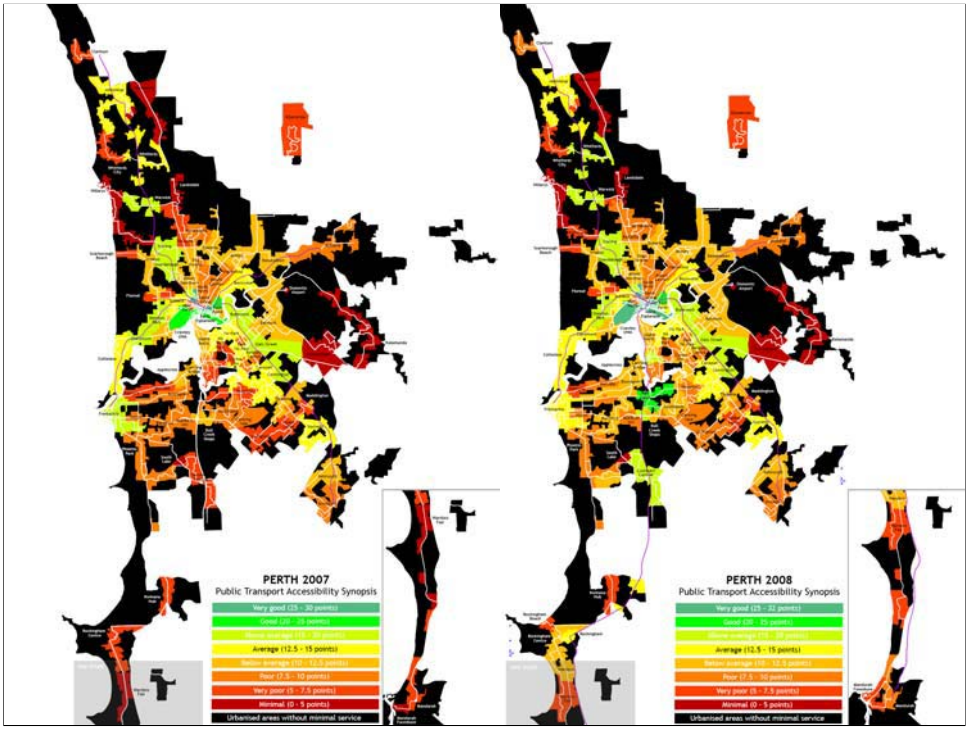
The SNAMUTS tool uses 7 indicators (listed here) to capture the various attributes of the travel decision – picking up impediment, transfers, accessibility across the network, the accessibility of place (in terms of catchments of residents and jobs within a 30 minute travel contour), competitiveness with car and so on. Some measures are more useful in comparing different scenarios or services, others a snapshot of the current situation.



So for example – this slide shows the state of the current public transport network in Perth in terms of potential public transport accessibility. It is a composite of those earlier indicators. So it shows how accessible all activity centres across Perth are in the off-peak period (the rationale for this is, remember, that it is necessary to compete with the car – so for those making journeys outside the peak (say business trips, education, shopping and so on) there must be a competitive public transport possibility).

It is evident that many urban areas within Perth actually have very poor accessibility by public transport. Note that some of these are actually quite central. You have heard from my colleagues Jago Dodson and Neil Sipe, about VAMPIRE – the oil vulnerability index. For the most part that analysis shows that outer urban areas are very vulnerable in the context of rising fuel prices. Our work adds to this by showing that that vulnerability is compounded by poor public transport services.

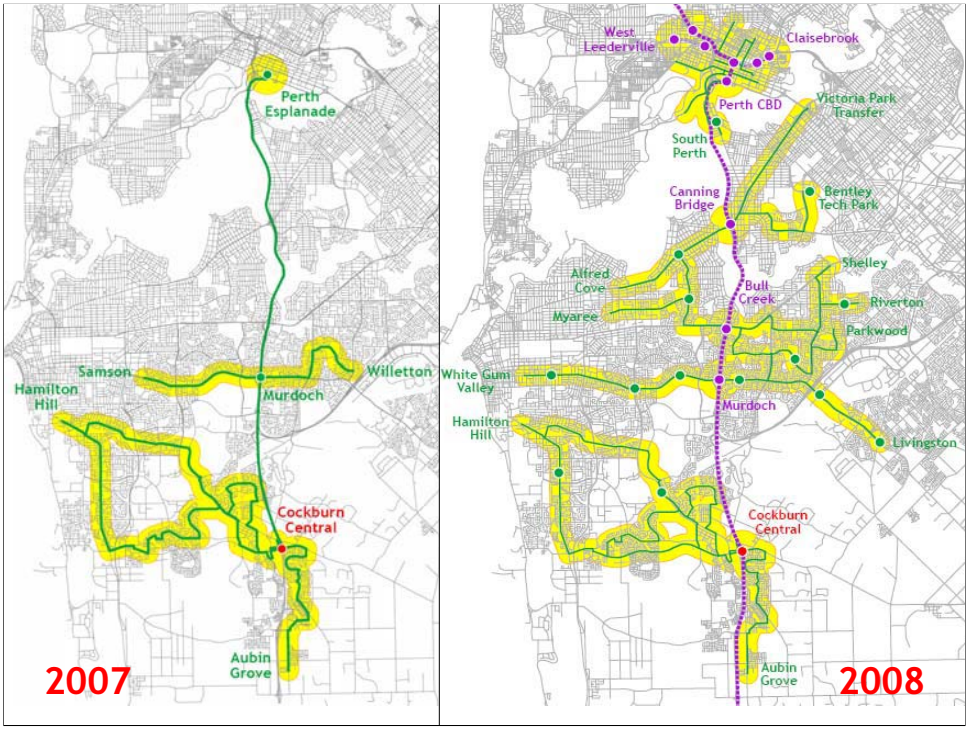
I'm sure too that you will hear that Perth is a leader in public transport provision. In my experience there are many reasons why this is true - including factors around the governance of the system, the forward planning which provided additions to the network, the integration with other modes, the legibility of the system and its ease of use (including integrated ticketing) - especially when compared to other Australian cities. Notwithstanding these factors, our analysis shows that there remains much to be done in investing in public transport both the make it competitive with the car and to provide equity of access.



This slide shows how effective investment in public transport networks can be. The slide on the left shows public transport accessibility for Perth before the new Perth-Mandurah railway line opened, the right after opening. Note the way in which some centres see a dramatic improvement in accessibility – mainly along the rail corridors.

This brings me to another important point about measurement. Note Bull Creek and Cockburn Central (south of the river) – both centres with new stations – both have dramatically improved. Just as well given the level of financial investment. But the 'accessibility of place' dimension is not such a good outcome. At Bull Creek there have been no plans to capture the value of this improvement in accessibility – the station is simply a transport interchange surrounded by a large car park. So nothing for patrons to come to. Cockburn Central is a better outcome – but only by virtue of public investment. Here Landcorp have been developing land around the station to deliver higher density housing, civic functions and the creation of a shopping street. My argument is that if you invest in public transport you must also invest in land use – to integrate the two – in order the really capture the benefit.

This slide shows one of the important reasons that accessibility improved after the railway opened – good integration between bus and rail. For example at Murdoch station, 60% of rail patrons arrive at the station by bus, this despite it also having one of the largest car parks (1100 bays were planned). There is also good bicycle/rail integration.



This slide demonstrates how accessibility by public transport has improved from Cockburn Central following the opening of the railway.

Using the tool to make decisions about Urban Structure and Rail Investment: A demonstration of changed practice → Land use transport integration

…places with high quality public transport access

Activity Centres	Walkable Catchment Population 2008	Walkable Catchment Employment 2008	Walkable Catchment Activities 2008	30 min Catchment Population 2008	30 min Catchment Employment 2008	Composite Public Transport Accessibility Value	Rank	
High Accessibility								
Perth Central-Northbridge	9,992	50,987	60,979	352,512	245,786	31.3	1	*(could do with more housing)*
Perth Esplanade	4,011	30,589	34,600	328,179	233,050	27.9	2	*(could do with more housing)*
Bull Creek	14,462	2,019	16,481	215,569	182,530	20.4	3	*(could do with more jobs)*
Claisebrook-East Perth	5,305	6,514	11,819	215,102	194,974	20.0	4	*(could do with more housing)*
Murdoch-Bull Creek Shops	5,984	798	6,782	203,628	172,704	20.0	5	Unbalanced Node: Intensify Land Use
Glendalough	2,921	15,003	17,924	196,558	181,418	19.9	6	*(could do with more housing)*
Stirling	11,713	2,826	14,539	171,472	180,623	19.8	7	Unbalanced Node: Intensify Land Use
Leederville	2,483	3,004	5,487	212,182	182,420	19.2	8	Unbalanced Node: Intensify Land Use
Oats Street	5,825	12,430	18,255	176,996	177,829	18.7	9	*(could do with more housing)*
Canning Bridge	8,353	1,653	10,006	227,962	190,196	17.8	10	Unbalanced Node: Intensify Land Use
Cockburn Central	7,030	1,287	8,317	163,164	142,245	17.8	11	Unbalanced Node: Intensify Land Use
Warwick-Warwick Grove	12,497	1,205	13,702	142,927	157,303	17.2	12	*(could do with more jobs)*
Burswood	9,094	5,165	14,259	203,250	182,214	16.8	13	*(could do with more housing)*
Cannington	6,687	1,219	7,906	161,131	164,651	16.6	14	Unbalanced Node: Intensify Land Use
Whitfords	8,599	568	9,167	85,145	120,916	15.4	15	Unbalanced Node: Intensify Land Use
Shenton Park-Churchlands	11,355	4,073	15,428	145,324	178,868	15.1	16	*(could do with more housing)*
Claremont	10,413	3,539	13,952	116,154	161,009	14.7	17	
Bayswater	16,828	1,803	18,631	131,001	164,672	14.5	18	*(could do with more jobs)*
Fremantle-South Fremantle	14,505	13,190	27,695	147,934	129,693	14.3	19	
Joondalup	21,104	6,896	28,000	70,725	93,765	13.9	20	

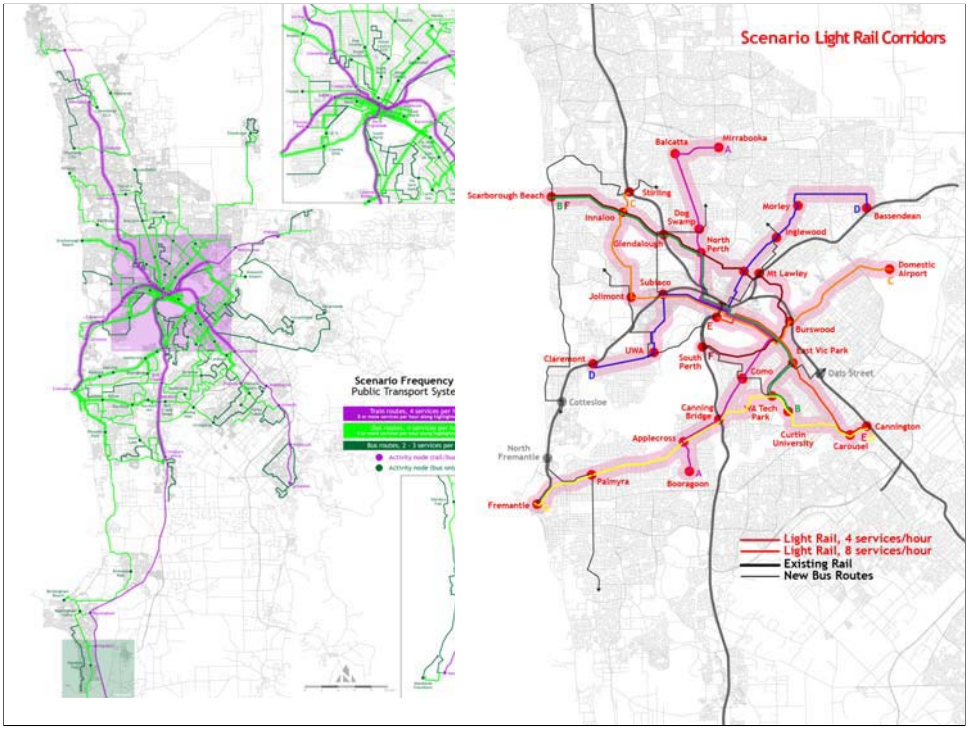
These next two slides demonstrate some of the land use transport integration issues which will need to be resolved. This slide list those activity centres with high public transport accessibility, their catchments within walking distance and public transport distance – the last column identifies those places we consider unbalanced – those that really need improvements to land use to provide more residents or jobs in the centre – to capitalise on that accessibility.

…places with poor public transport accessibility

Activity Centres	Walkable Catchment Population 2008	Walkable Catchment Employment 2008	Walkable Catchment Activities 2008	30 min Catchment Population 2008	30 min Catchment Employment 2008	Composite Public Transport Accessibility		
Low Accessibility								
Balcatta	9,240	1,591	10,831	40,235	63,592	7.6	62	Unbalanced Place: Improve Accessibility
Melville	7,510	1,168	8,678	74,315	90,678	7.6	63	Unbalanced Place: Improve Accessibility
Riverton	8,826	1,271	10,097	51,750	67,354	7.6	64	Unbalanced Place: Improve Accessibility
Palmyra	5,963	1,017	6,980	75,808	28,955	6.5	65	Unbalanced Place: Improve Accessibility
Mandurah Foreshore	1,548	1,799	3,347	5,691	3,491	5.8	66	*(could do with more housing)*
Whitfords City	8,952	2,339	11,291	31,170	15,727	5.8	67	Unbalanced Place: Improve Accessibility
Floreat	2,471	847	3,318	15,070	65,881	5.7	68	
Scarborough Beach	4,944	1,504	6,448	33,497	26,187	5.7	69	Unbalanced Place: Improve Accessibility
Rockingham Beach	2,029	844	2,873	20,817	6,922	5.7	70	Dependent Location: Improve Accessibility and Inte
Forest Lakes	3,302	441	3,743	24,851	11,574	5.4	71	Dependent Location: Improve Accessibility and Inte
Kwinana Hub	6,429	1,402	7,831	25,390	9,395	5.4	72	Unbalanced Place: Improve Accessibility
Ellenbrook	10,091	145	10,236	24,782	5,813	5.2	73	*(could do with more jobs)*
Karrinyup	5,034	1,783	6,817	24,118	3,999	5.1	74	
Hillarys	12,300	1,302	13,602	25,907	4,054	4.9	75	Unbalanced Place: Improve Accessibility
Wanneroo	9,240	930	10,170	19,226	6,397	4.8	76	*(could do with more jobs)*
South Lake	1,157	402	1,559	17,143	12,208	4.6	77	Dependent Location: Improve Accessibility and Inte
Kalamunda	12,323	1,848	14,171	16,776	8,284	4.6	78	Unbalanced Place: Improve Accessibility
Kingsway City	6,365	1,045	7,410	22,368	3,151	4.4	79	Unbalanced Place: Improve Accessibility
Domestic Airport	-	479	479	11,918	8,614	4.4	80	Dependent Location: Improve Accessibility and Inte
Forrestfield	9,934	1,292	11,226	12,277	6,019	3.9	81	Unbalanced Place: Improve Accessibility

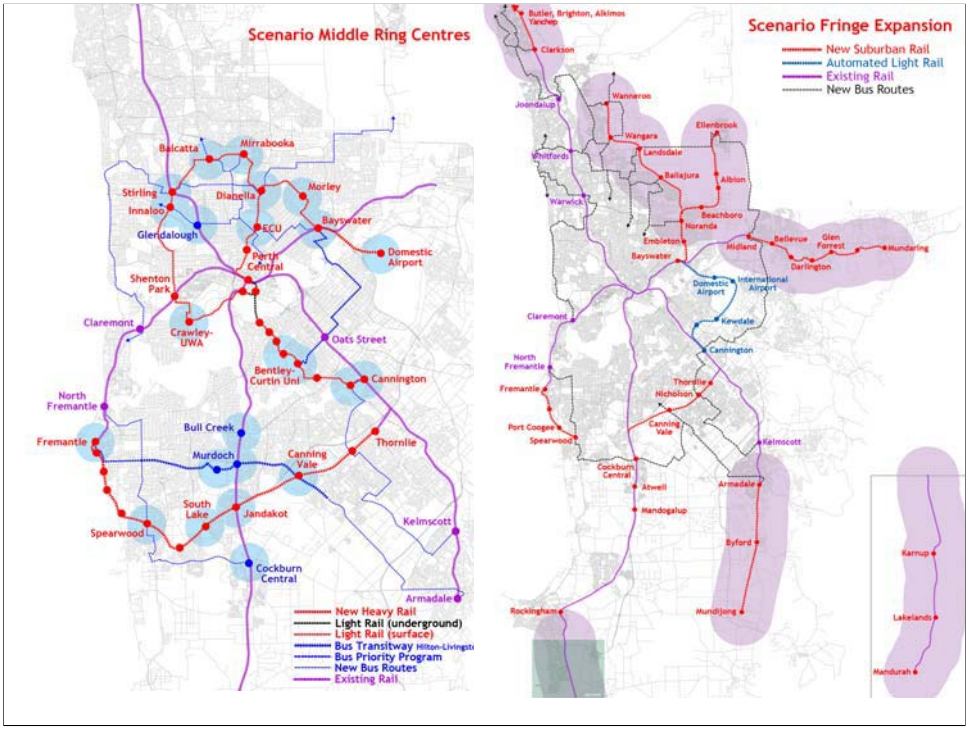
This slide shows the other end of the table – places with poor public transport accessibility – and some also with poor land use.

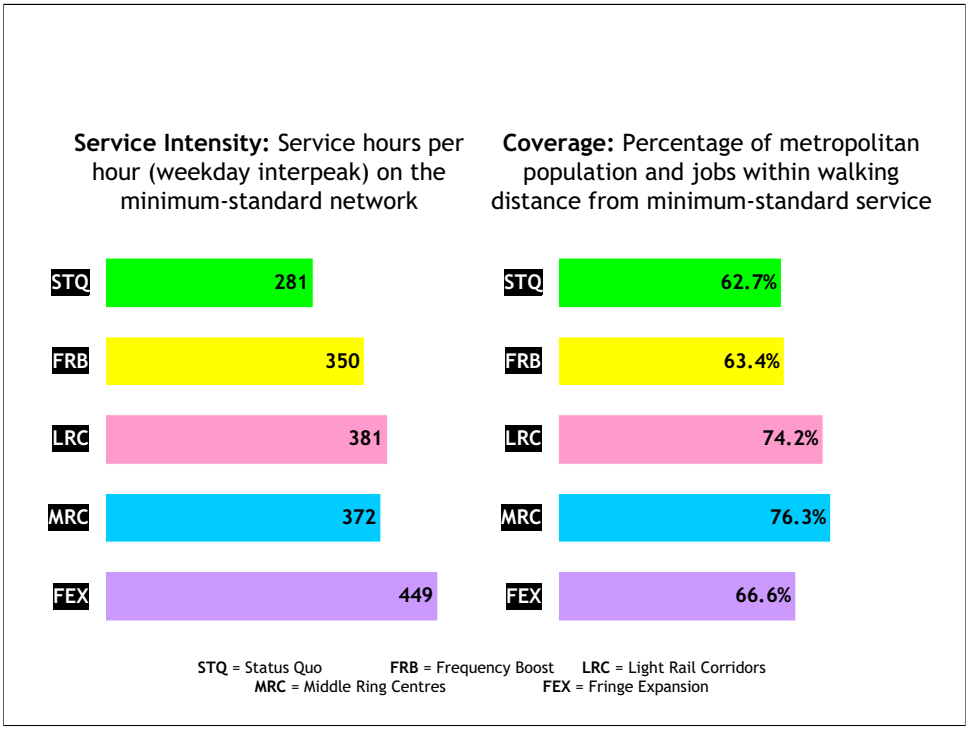
A question for government will be – if there is so little money to invest, which places should be improved first? Those with poorest accessibility – or those where accessibility is reasonably good but land use lags. One cannot assume that the private sector development industry will necessarily invest in higher density or intensity uses where accessibility has improved, or even invest at all. Another piece of research I am working on is comparing town planning intentions for land use around stations with actual land use (I hope to publish this soon). The initial results show that while town planning schemes have the best of intentions (of the 69 stations in the metropolitan area 63 propose net residential densities greater than 15 dwellings per ha) the actual residential density was much lower (in 2001 only 9 stations had actual net densities greater than 15 dwellings per ha) – this despite a 20 year old state planning policy requiring higher densities. This underlines the importance of tying investments in transport to integrated outcomes. There appears to be a case for encouraging the development industry to invest in highly accessible places beyond the central area and in some cases the state capturing some of the value that accessibility improvements provide. Strong car parking controls may provide a mechanism in this respect, along with other considerations.



One final component of the SNAMUTS tool is the way in which it can compare different broad scenarios for future investment and development. We are currently testing 4 scenarios – measuring how different packages of infrastructure, service levels and land use concentration improve potential public transport accessibility:

- Service Frequency boost (SFB)
- Investment in Light rail and central city development (plus SFB)
- Investment in a mix of light rail and heavy rail and middle ring development (plus SFB)
- Investment in heavy rail and continued outer urban spread (plus SFB)


Scenario Middle Ring Centres
Balcatta
Mirrabooka
Stirling
Innaloo
Dianella
Morley
ECU
Bayswater
Glendalough
Perth Central
Domestic Airport
Shenton Park
Claremont
Crawley-UWA
Oats Street
Bentley-Curtin Uni
Cannington
North Fremantle
Fremantle
Bull Creek
Murdoch
Canning Vale
Thornlie
South Lake
Jandakot
Spearwood
Kelmscott
Cockburn Central
Armadale
New Heavy Rail
Light Rail (underground)
Light Rail (surface)
Bus Transitway
Bus Priority Program
New Bus Routes
Existing Rail
Scenario Fringe Expansion
New Suburban Rail
Automated Light Rail
Existing Rail
New Bus Routes
Butler, Brighton, Alkimos
Yanchep
Clarkson
Joondalup
Wanneroo
Ellenbrook
Wangara
Whitfords
Landsdale
Ballajura
Albion
Warwick
Beachboro
Noranda
Embleton
Bayswater
Midland
Bellevue
Glen Forrest
Mundaring
Darlington
Domestic Airport
International Airport
Claremont
Kewdale
Cannington
North Fremantle
Fremantle
Thornlie
Nicholson
Canning Vale
Port Coogee
Spearwood
Kelmscott
Cockburn Central
Atwell
Armadale
Mandogalup
Byford
Rockingham
Mundijong
Karnup
Lakelands
Mandurah



The analysis is almost finalised – this slide shows one small component… comparing how many service hours would be required to serve the given scenario networks with how many residents and jobs would be served.

The status quo (STQ) is with no improvements to the current service and shows that potentially 63% are within walking distance of a minimum level service. Boosting the level of service results in only a small gain. Continued growth of the city at the fringe with the need to serve this with heavy infrastructure does not fare much better. The biggest 'reach' is achieved by the central city-light rail scenario and by the middle ring investment.

Commonwealth action

- Investment in transport (not modes)
- City building
- A transport task not a welfare task
- Sound evaluation to target investment
  - SNAMUTS for all Australian Cities

Finally I'd like to comment on where Commonwealth action would be helpful in improving urban public transport.

A change in approach to transport planning is needed in any Commonwealth decision about financing transport infrastructure. Rather than fund roads separately to public transport, to bicycle infrastructure, to road safety (ie. Roads to Recovery/Accident Black spot etc) – it should be transport as a whole that is funded… the decision task should be framed around achieving the best value for investment measured against sustainability criteria (least cost to emissions, fuel use, safest to most vulnerable users, most robust in the medium to longer term and so on).

Any investment in urban transport should be measured against its ability to build a sustainable city. Where choices between investment in transport modes are to be made they should be measured by their ability to offer improved sustainable accessibility for as many as possible. Where road based solutions are offered it should be on the basis that they offer priority should be for public transport, walking and cycling.

Decision making about transport must re-focus to view public transport provision as a 'transport task' rather than a 'welfare task'. What I mean here is that we need to dispense with the mentality that public transport is only to be provided for non-choice travellers (those without cars).

Finally I would urge that the Commonwealth invest in funding our SNAMUTS work – we would like to apply it to all Australian cities. In this way we can benchmark the current state of public transport by each city and highlight a rationale for investment decisions.

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