Funding Of Public Transport Infrastructure And Services

Peter Mills

1 Introduction

It's been said many times that provision of better public transport can help to make Australia's urban areas more sustainable, and that Commonwealth Government involvement in this provision is necessary.

Sustainability includes the usual triple bottom line of social, economic and ecological costs, more recent concerns about resilience to external shocks such as oil supply and credit availability, and containing average travel time budgets.

However, there are many impediments to good and worthwhile outcomes being achieved, and without these being addressed there is a danger of a cargo cult mentality developing with respect to Commonwealth funding for public transport.

This submission covers:

- The above impediments with particular reference to Sydney;
- Transport planning and project possibilities that I have previously suggested to the NSW Government; and
- Conclusions and observations relating to the emerging circumstances of financial, energy and carbon constraints.

2 Background

Sydney is presently the largest city in Australia, and covers a large area with relatively low densities and an off-centre CBD that make it both difficult and expensive to serve by both public and private transport. The main task for public transport at present is for peak period travel to and from the Sydney CBD where it enjoys a modal share of about 75%. However, the overall modal share for all travel over each day is only around 15%. These modal shares are higher than other cities in Australia, but the gap has been closing in recent years.

The NSW Government provides extensive financial support for the operation of public transport to help limit road congestion and emissions, and to lessen the disadvantage to those without access to a car. Most of the support goes to the rail operator (CityRail), but this seems to be due to its larger share of the total public transport task (in passenger-km) and the lower average fare/km charged for its longer average distance journeys, rather than any inherently higher unit operating cost per passenger/km.

Sydney presently suffers from high car dependency, extensive road congestion, considerable noise and air pollution, widespread peak period overcrowding on public transport and a per capita average travel time budget of well over the tolerable limit of about one hour (reportedly 79 minutes). These all seem set to worsen, along with greenhouse emissions, pointing to an increasingly adverse impact on the quality of life in Sydney, and it's future sustainability. Accordingly, there appears to be an overwhelming case for better public transport to address these issues, for example by aiming to double its modal share of passenger-km, but the previously mentioned impediments to achieving good and worthwhile outcomes must be addressed.

3 Impediments

The impediments considered in this section fall into three broad areas; policy, coordination and operations.

3.1 Policy

The Commonwealth Government continues to provide extensive support for the local car industry. Reasons for doing so include employment, skills base maintenance and balance of payments advantages. Operational benefits to business vehicles, including private use of these vehicles, are also provided through FBT concessions. There is no matching benefit for public transport use, and it is reasonable to believe that some of the operational support for public transport being provided by state governments is due to these policy settings.

Australia's governance structure, and the current financial orthodoxy, tend to limit the size of the public sector in which public transport, particularly rail, has traditionally resided. Further, the states appear to be in a weaker position than the Commonwealth with respect to capital availability. In principle, private capital can be employed to help overcome this, but the resulting need for revenue streams and the possibility of business failure generally need to be backed with government guarantees.

3.2 Coordination between land use and transport planning

As previously mentioned, Sydney's large area, low density and offset CBD make it difficult and expensive to serve by public and private transport. The NSW Government has responded to this increasingly unsustainable position with a new metropolitan strategy (City of Cities-A plan for Sydney's Future) being announced in early 2006 to cover the next 25 years. It proposed a vision of five waterfront cities (Sydney, North Sydney, Parramatta, Liverpool and Penrith) with "jobs, transport, services, entertainment and recreation close to everyone".

However there seems to be little evidence that this enlightened strategy is being implemented. Rail clearway and metro investment is mainly focused on journeys to the Sydney CBD, and developments like the bulking-out of Barrangaroo, which benefit from this infrastructure, are not being matched by similar plans for the other regional cities. There seems to be a self-perpetuating cycle, where developer interest is based on accessibility and access is planned on the bases of development interest. Without serious implementation of the metropolitan strategy to also grow other centres, and to provide the necessary high profile (much better than the current strategic bus corridor plans) public transport corridors, services and interchanges to support this growth, the more sustainable outcome being sought will remain elusive.

3.3 Coordination between transport modes

The NSW Government seems to have emphasised individual services over the provision of a fully integrated, easy to understand and stable public transport network. While some regular users have learned to tolerate the situation for peak period work journeys, there is less tolerance for learning about and making journeys to other locations, at other times, and/or by other users. This reinforces the preference for car use and the perception of road congestion as a roads, rather than a transport, problem.

Managing congestion and limiting other external traffic impacts is an inherently conflicted exercise. Expanding road capacity is an "obvious" way to ease congestion, but is known to induce new road use. This is because elasticities with respect to time can be quite high for some users, as indicated at Annex 1. Private commuting elasticities are high for several reasons, covering flexibility with respect to work location, time of travel and mode of travel. However, commercial vehicles are less flexible in these regards and exhibit lower elasticity. There are also differences between short term and long-term elasticities.

The tollway model both exploits and moderates these conflicts. Limited access roads provide useful benefits for commercial vehicles, but induce more private commuting. A toll serves to moderate the amount of induced travel, but the requirement for financial viability has required some traffic to be induced for internal project optimisation. The M4 and M5 are both known to have caused a modal shift from rail to car. The NSW Government's Richmond Report has found that this internal optimisation is not necessarily the optimum for the broader interests of the whole community. There have also been examples of poor implementation; the M5 East was built without a growth-moderating toll, whereas the (unnecessarily long) Cross City Tunnel would have been more effective in its main task of reducing CBD traffic if the moderating toll had not been introduced.

Better public transport can also help moderate congestion, but it needs to be time competitive to be effective, otherwise fares need to be quite low to attract significant patronage. At present, public transport is generally only time competitive for rail travel to the Sydney CBD during peak periods. At other times, for other modes and in other directions, this is less so, so the impact on overall road traffic, and the opportunities for road pricing to support a modal shift, may be more limited.

3.4 Operational coverage

Public transport would be more effective if it was faster and provided more two-dimensional coverage instead of services being mainly radial to the Sydney CBD. That each mode in Sydney seems to be run separately with its own fare structure is also a disadvantage, and new metro lines, with yet another fare structure, have the potential to make the situation even worse!

To be more effective requires the development of a multi-centred metropolis and matching high profile public transport network as noted above, better meshing of corridor and local services to form an integrated system, information and interchange services to help present a user-friendly network, and a multi-modal fare plan to match. While the concentric zone fare plans used in other Australian cities do not seem suited to a multi-centred city such as Sydney, a cellular zone fare plan as used in Germany, Austria and Switzerland is one means by which the twin goals of fare equity and penalty free interchange can be pursued. A possible cellular zone arrangement for Sydney is presented at Annex 2.

There are also problems with many interchanges, such as long walks from bus to rail, terminating rather than through (pendulum) bus services and inadequate service frequencies. The lack of pendulum services can be due to interchange design, such as at Liverpool and/or bus contract area boundary issues, such as at Parramatta.

3.5 Operational speed and frequency

CityRail trains are slow compared with other rail operators when normalised for the average distance between service stops. Rolling stock design and legacy infrastructure both contribute to the problem, and it seems unlikely that the CSIP (customer service improvement plan) will address this issue in any significant way. It is perhaps understandable that speed may not be a priority for CityRail because the main competition for its primary task of carrying peak period passengers to and from the Sydney CBD is an already highly congested road network. However a more network-oriented outlook would reach a different conclusion.

Double deck rolling stock, with its long dwell times and traction constraints, has helped make the rail system slow and difficult to manage. The reaction to these difficulties has been to slow the system further in the interests of better safety and consistency. Long dwell times also limit the frequency of services that can be provided. This slowness and infrequency reduces the perceived value to users, and consequently reduces the internal and external benefits that can be generated. Accordingly, there are cost and revenue benefits to be gained from higher speeds. On the cost side, faster trains can mean less rolling stock being required for a given task. On the revenue side, faster trains can be more attractive to car users whose primary consideration tends to be journey time, and hence higher fares can be charged. Closing the gap between costs and revenue means that a more extensive network can be operated with the same level of government support.

Many rail operators employ double deck trains, but most usually on long commuter runs to a terminal station where internal train flows are mostly unidirectional at each stop and the terminal dwell time on a dedicated track is not important. Sydney's trains are a compromise, having end vestibules and platform level doors to facilitate a mix of a metro and a commuting style of operation. However, with Sydney evolving into a multi-centred city and with more transport interchange points, the metro (simultaneous loading and unloading) component of the mix has increased, and is likely to do so further. Running full double deck trains at maximum track capacity over parts of a complex network simply adds to the ongoing management difficulties of this legacy system.

CityRail seem to realise the limitations of double deck rolling stock, the existing infrastructure and partly related work practices. It advised the NSW Legislative Council budget estimates Committee that single deck operation with improved signalling was planned for middle distance routes as a means of providing more capacity to accommodate current growth trends. In effect, faster and more frequent services would provide about the same number of seats per hour but considerably more standees. Presumably, driver only operation would be possible for such trains in line with international practice, whereas guards are presently considered mandatory for double deck trains in NSW. The metro announcements also suggest a keen awareness of present rail limitations.

4 Transport planning and project possibilities

The following three papers have been submitted to the NSW Government in the past with no official acknowledgement about their content.

4.1 A Long-Term Rail Network Plan for Sydney

I asked myself in 2004 what a multi-centred structure could mean for the rail network and my answer is presented in this paper. It documents the guiding principles (a grid network of rail lines to and between major centres, including the five cities) and the specific route and technology assumptions made in preparing the plan.

Although potentially very expensive, there were then valid reasons for basing the multi-centred network on heavy rail technology as follows.

- It was similar in overall scope, but less Sydney CBD-centric than the CityRail generated Christie Report;
- It built upon spare capacity in parts of the existing rail network for non-Sydney CBD movements, particularly through stations serving key centres; and
- It replicated the already demonstrated CBD shaping power of Sydney's "Bradfield Legacy" rail network without which the present Sydney CBD would not have been possible.

The plan also envisaged faster and more frequent services through, inter alia, more use of single deck trains and better route segregation, and presumes that an overall reduction of average journey length and time can be achieved through the goal of "jobs, transport, services, entertainment and recreation close to everyone". There is also some spare capacity on the rail network between Strathfield and Central, but additional works beyond these points, as discussed in the rail plan, would be needed to utilise this.

The plan envisages that land use densities would be built up along the new rail corridors, and in the regional cities, with the spaces between and beyond retaining their present lower density lifestyle. There would correspondingly be less expansion of the Sydney CBD core.

4.2 Liverpool and Parramatta

This paper was written in response to the city centre visions for Liverpool and Penrith that were released in late 2006. It proposes that light rail be considered for these two cities to provide better transport links in the "off rail" axis and support a transit mall in the local CBD environment. This arrangement appears to be optimum for light rail, and has been adopted for many US cities and also for some in Europe, such as Manchester and Karlsruhe. The concept could be extended to other major centres with a single rail axis, including Wollongong, Gosford and (the proposed) North Warnervale.

This paper also expands on the need for transport planning to be better aligned with the (city of cities) metropolitan strategy. Subsequent to this paper being written, the NSW Government's Urban Transport Statement that described the inadequate transport proposals at that time has been withdrawn.

4.3 Sydney metro observations

This paper is an amalgamation of two separate submissions, one before and one after the announcement of a West Metro. Although supporting metro technology per se, the paper is inconclusive about whether improvements to land use and transport coordination would be achieved. It really appears now that the main driver for metro technology is to avoid further expansion of the CityRail network with its legacy infrastructure, technology and work practices. The current interest in the West Metro and the CBD Metro suggest that providing more Sydney CBD-centric rail capacity to overcome present rail congestion and support further Sydney CBD development remains the primary focus of transport planning by the NSW Government. It is anyone's guess where this leaves transport support for other centres in the (city of cities) metropolitan strategy.

The CityRail avoidance seems particularly directed at the previously proposed north-south Sydney CBD and sub-harbour heavy rail tunnel envisioned to support the North West Rail Link (Epping to Rouse Hill) and other possible rail works north of the harbour. This is understandable considering the depth, grades, additional route length and project risks associated with such a sub-harbour tunnel being designed to accommodate existing CityRail double deck rolling stock. The Epping to Chatswood link (unnecessarily) passing under the Lane cove River at Fullers Bridge provides a smaller scale illustration of potential difficulties for a sub-harbour heavy rail tunnel project.

This paper, in covering the need for public transport to provide two-dimensional coverage, also proposes an addition to the long-term rail plan for Sydney discussed above. This is to redirect the West Metro from Five Dock to serve interchanges at Burwood, Campsie, Bexley North and Kogarah before reaching Brighton-le-sands. The Strathfield to Parramatta section, if needed, would then be provided by extending the (converted to metro) inner west line instead. There are other changes to the long-term plan in that Prairiewood, rather than Bonnyrigg, should be shown as the end destination of the Bankstown Line extension through Fairfield, and that the allocation of double deck and single deck services to various routes could be altered.

It has also emerged that the NSW Government envisage five car trains with three doors per side for the metro. This configuration would seemingly preclude any possible integration with converted CityRail routes due to the many stations with curved platforms presenting an excessive gap to the central door of the 22 metre carriages. I have suggested a more compatible articulated configuration instead.

5 Emerging circumstances

The world is in the midst of a financial crisis that could limit the availability of capital to fund new public transport infrastructure for many years. Additionally, the emerging constraints on energy supply and carbon emissions point to an urgency for such infrastructure to be provided quickly and the consequent need to allocate the

available funding towards the most sustainable outcomes. Under these circumstances, extensive tunnelling for metro rail projects could be too expensive, take too long to realise benefits and consume too much energy. As a result, metro rail tunnelling would seem to be a last resort rather than a first priority measure for improving public transport.

The lowest cost form of public transport is bus on public roads, but this has generally not been an effective alternative to car use and would still be dependent on oil or gas supplies. Bus transport can be improved by segmentation into local and higher capacity trunk services, and allocating dedicated road space for the latter such that trunk buses can avoid traffic congestion and red traffic lights to only stop for loading and unloading at interchanges and other key stops. However fewer, rather than more, buses are needed in the Sydney CBD due to the already extensive congestion caused in part by too many low capacity buses being used. There are also arguments for using light rail instead of trunk buses to attract patronage and help ease congestion. Tunnelling can be used to provide additional transport capacity through settled areas, but generally rail based modes can use this more effectively than buses.

If additional rail tunnelling through the Sydney CBD were to be undertaken, then a north-south alignment connecting to the two eastern Bridge lanes would minimise the amount of tunnelling needed. However, the need for coordination with the road and bus agencies to retrieve that capacity for rail would make this difficult to achieve, despite the large potential community benefit. Metro style single deck trains could be used for this additional capacity, in keeping with less emphasis on catering for long distance commuting in the future, and parts of the existing CityRail network could be converted and/or extended to match.

A multi-centred development strategy also allows for flexibility as to which centres are developed. As noted earlier, there is already spare rail capacity for non-Sydney CBD movements through stations serving key centres, so that rail expansion, or an initial mix of rail and bus expansion through appropriate interchanges, that builds on this spare capacity to serve these centres should be much more sustainable than expanding very high cost underground capacity to the Sydney CBD. Accordingly, future growth for other centres should logically now have an even greater priority than that for the Sydney CBD.

6 Final observation

It seems to me that transport profession has been assuming apparently limitless energy supplies to engineer (through the use of information) the relentless pursuit of time savings and that the emerging circumstances require a much more fundamental respect for energy, its efficient use and its conservation.

The Spreng triangle, after the Swiss energy physicist Daniel Spreng, postulates a relationship between the three quantities of energy, information and time needed to achieve a task. A change in any one of these three quantities is equivalent to a combination of changes in the other two. Accordingly, a greater respect for energy suggests the need for a much more careful consideration of how, and to what extent, time savings are engineered in the future.

Annex 1-VKT Elasticities

Elasticities as extracted from “Saving Oil in a Hurry” a draft paper by the IEA

Note that elasticities with respect to time are more significant than those with respect to price. They are particularly high for commuting.

TRACE, 1999, The Elasticity Handbook: Elasticities for prototypical contexts (deliverable 5), Costs of private road travel and their effects on demand, including short and longer term elasticities, contract no. RO-97-SC.2035, Prepared for the European Commission Directorate-General for Transport.

Table 2-3: Key Results from TRACE Project

Trip purpose	VKT with respect to		VKT with respect to parking charge				
Short term:	fuel price	travel time	average	distances 0-5 km	distances 5-30 km	distances 30-100 km	distances over 100 km
Commuting	-0.15	-0.48	-0.02	-0.10	-0.02	-0.01	-0.01
Business	-0.02	-0.05	0	0	0	0	0
Education	-0.06	-0.05	-0.01	-0.12	-0.02	0	-0.00
Other	-0.22	-0.19	-0.08	-0.30	-0.06	-0.01	-0.02
Total	-0.15	-0.28	-0.03	-0.18	-0.03	-0.01	0
Long term:							
Commuting	-0.25	-1.04	-0.04	-0.13	-0.06	-0.02	0
Business	-0.22	-0.15	-0.03	-0.02	-0.02	-0.03	-0.03
Education	-0.38	-0.84	-0.03	-0.17	-0.06	-0.01	0
Other	-0.47	-0.86	-0.16	-0.36	-0.18	-0.05	-0.00
Total	-0.31	-0.80	-0.07	-0.22	-0.10	-0.03	-0.02

VKT: vehicle kilometres travelled.

Annex 2

Diagram showing possible public transport fare zone centres for the Sydney Metropolitan Region

Solid line ring:

22 zones, each including a major centre,
with separations of approximately 10-15km.

Heavy line ring:

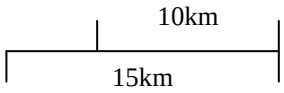
9 Zone alternative based on 20-30km separations.

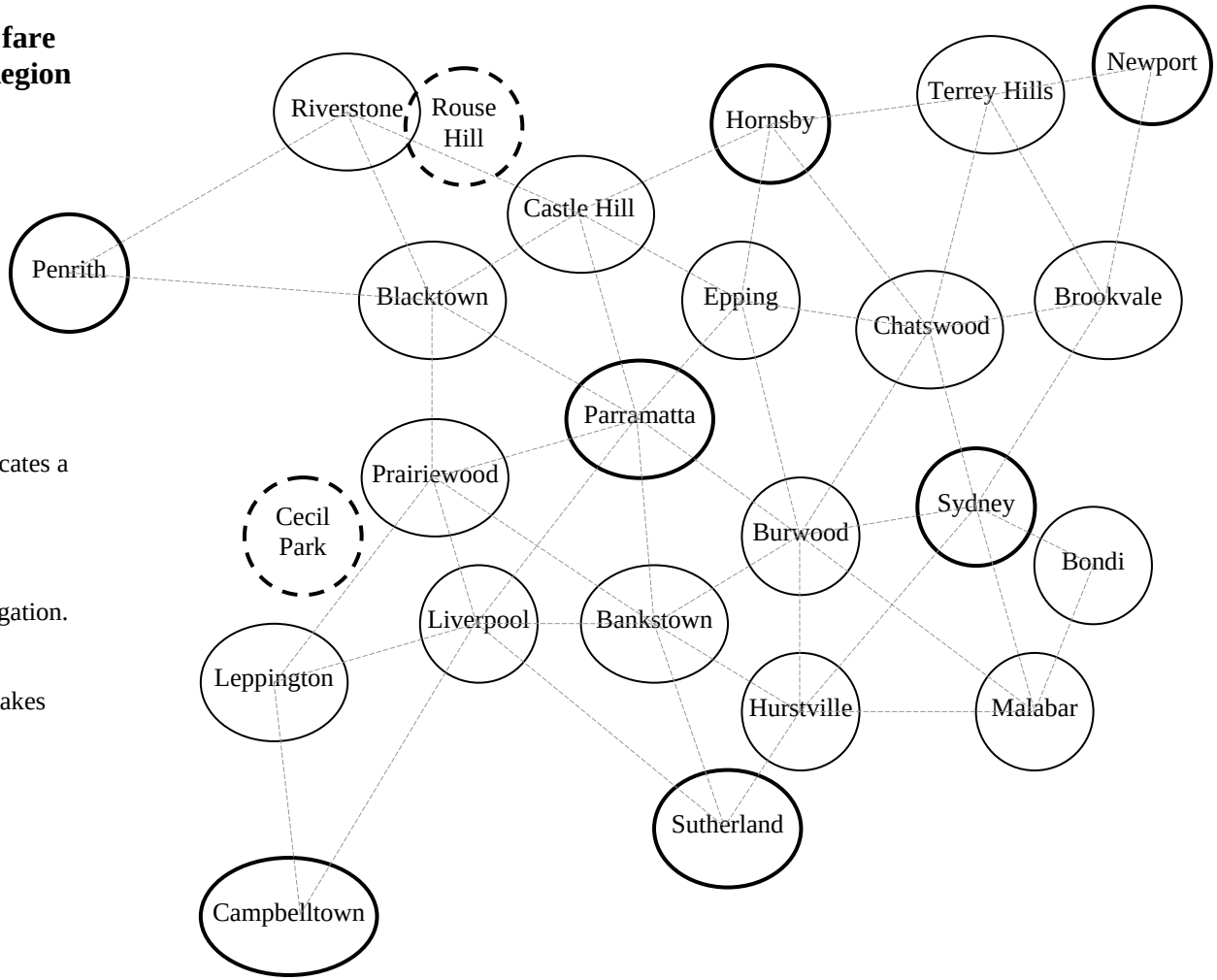
Dotted grey line:

Indicates zone adjacency. Intersection of two lines indicates a point where four zones touch.

Notes:

1. Zone boundary details would be subject to investigation.
2 Diagram is approximately to the scale below.
3 Bondi includes Bondi Junction
4 Malabar includes Maroubra Junction and Eastlakes





A Long-Term Rail Network Plan for Sydney

1 Introduction

This document presents a long-term rail network plan (Network Plan) for Sydney that considers both track layouts and service arrangements. The purpose of its preparation was to road test a number of previously suggested ideas, and some other new possibilities, in the environment of a total network. Being heavily and unashamedly influenced by the Christie (Long Term Strategic Plan for Rail) Report, the points of difference from that Report that have emerged during the preparation of this document have also been noted. A network map is provided at the end of this Plan.

The underlying thrust of the Network Plan is to optimise the speed, frequency, reliability and coverage of the rail network in order to attract and accommodate a significant increase in patronage and market share as the population of Sydney grows. The support for regional centres is also intended to help contain travel distances.

2 Some Fundamentals

The basis requirement of each potential customer is to travel from his origin to his destination when he desires, rapidly, reliability, conveniently (covering a range of issues) and at an acceptable price. In practice, many customers embark on more complex journeys, seeking "outside" access at intermediate locations and/or a circular completion.

Private cars or taxis potentially best match the above requirements, but can be limited in their ability to do so by vehicle availability, congestion, parking availability and cost. Public transport, except for the taxi service, does not seek to match the travel requirements of every individual directly but applies the properties of aggregation and networking in striving to provide a competitive alternative. Concentrated centres of activity and corridor development are helpful in achieving such aggregation.

Public transport operators meet the totality of individual customer's requirements, which is a two-dimensional demand array, through the provision of a number of interconnected links that form a network. Each link is usually one-dimensional from point to point, although circular services can also be provided. The reasons for such operational simplicity are to achieve the required aggregation and to ease the task of management. Customers' individual requirements are met by using one or more of the interconnected links to complete a journey. In general, interconnection in a complex network is better facilitated by service frequency than by coordination.

A network of individual rail links alone cannot meet the totality of the above requirements, due to the relatively high volume usage required by rail for an acceptable level of economic performance to be achieved. Walking, cycling, bus and light rail are means of supplementing rail to improve and to "mesh out" public transport into a full two-dimensional coverage. Although the running of individual rail and bus services can and should be separated, the customer should be presented with an integrated whole network with respect to information, fares and interchange. In this regard there may be merit in interposing a retail service layer between the customer and the (wholesale) rail provider, as this may be more easily integrated with other modes than the task of operating trains.

3 Key Features

3.1 Metro Conversion

Rail services in inner areas have deteriorated in recent years along with population shifts due to the need to provide more pathways for outer suburban services, and the conversion to an all double deck fleet with its extended dwell times, within the constraints of limited track capacity. The construction of a Chatswood-CBD-Eveleigh link to create additional capacity and a new operating sector provides, inter alia, an opportunity to reverse this deterioration.

Metro conversion of inner area services should allow more frequent, fast and reliable performance to be offered from single deck trains. The better performance will, in turn, allow more feeder and cross-linking bus arrangements to be established to help reduce the present problem of bus clutter, such as in the CBD. More motorised axles, more doors and an articulated design to match legacy platforms will be needed for these trains. A dual height pantograph design would need to be considered for these trains also to operate on new metro lines or extensions with lower profile tunnels.

3.2 Orientation

The CityRail network has an historic orientation towards the CBD. While the Network Plan continues, and augments, this historic orientation, this is less pronounced than in the Christie Report. Further, with the expansion of major centres, such as Parramatta, Liverpool and Olympic Park, as well as a number of smaller regional centres, the opportunity has been taken to propose cross regional services that support these centres while minimising the additional rail build required.

3.3 Warringah

There has been considerable discussion of the relative benefits of North Sydney or Chatswood as being the better branching point for a new railway to serve the Warringah peninsula. St Leonards and the former freeway corridor have also received some consideration. Such rail options are relevant in considering viable alternatives to the local urging for a long road tunnel to bypass Military Road.

The Network Plan recognises that there is merit in providing two links to maximise the overall benefit, and has adopted a configuration in which these two links intersect at Brookvale.

3.4 Castlereagh

The Christie Report adoption of the Castlereagh Freeway corridor for new rail capacity has not been pursued in the Network Plan due to the lack of any known information to support such an adoption.

However the development of both Marsden Park and the former ADI site, and the possible release of the Airservices Australia transmitter site between them, has led to an alternative proposal in the Network Plan for this region. This proposal is to divert the planned North West Rail Link at Box Hill to serve Riverstone and these new areas before joining the Western Line at the University of Western Sydney for Penrith.

3.5 Sectorisation

The push towards sectorisation associated with the current "clearways" program has been pursued with the Network Plan, particularly with respect to CBD oriented services. As such, this aspect is probably more strongly addressed than in the Christie Report, which predates the sectorisation announcement.

4 Network Overview

The Network Plan is built up from nine basic lines with multiple branches, comprising a mix of Suburban, Link and Metro Lines. These are designated S1-S3, L1-L3 and M1-M3. M1 is formed from a conversion of existing inner area services while M2 and M3 are similar to the River and Central Lines proposed in the Christie Report. The needs of InterCity services are also considered.

A description of each of the nine lines follows, with the order of presentation influenced by their relationship to the key features described above.

5 Metro Line 1 (M1)

Metro operation is envisaged for the City Circle and the four inner area lines that connect to it to form Metro Line 1. These are the lines to Homebush, Bankstown, Revesby via International and Hurstville. There are then choices to be made about metro operation beyond Homebush and Bankstown.

The Liverpool via Granville service, and ongoing access to Campbelltown or Bringelly, is long haul and well loaded and therefore merits double deck suburban operation. Accordingly, these services need to be reallocated to another line east of Homebush, with Suburban Line 3 (the present North Shore and Suburban Lines) being the most obvious choice. This leads to the present Local Line being a stub terminal, and simplified track arrangements being provided to provide direct connections between Suburban and South, and Main and West, at Homebush. This decision also impacts on the service allocations to other lines as developed below.

The Bankstown Line extensions to Liverpool and Lidcombe are not heavily loaded and need to be accessed from Bankstown. Accordingly, metro operation has been adopted for these lines, but with the Lidcombe branch ultimately becoming part of Link Line 2. Occupancy of the busy Cabramatta to Liverpool segment has been avoided by diverting the former Liverpool via Bankstown service at Villawood, and extending it to serve Fairfield and Bonnyrigg. Some synergy with the western freight bypass may be possible with this diversion. The new station at Fairfield supports the development of a proposed regional centre at this location and provides one-change access to both Liverpool and Parramatta. The planned "clearways" turn-back at Liverpool will not be required for M1, but could be useful for Suburban Line 3.

Metro operation could also be provided south of Hurstville if separate tracks are provided to Mortdale or Oatley. It is assumed that the Hurstville operation will share tracks with freight during off peak periods, with a resort to Suburban Line 1 if problems arise. Ideally, there would be parallel running south of Wolli Creek to support this possibility, or a direct Enfield to Illawarra freight link to avoid sharing all together.

The City Circle has a Town Hall and a St James side, and two of the metro services would be allocated to each. The Revesby via International service has access only to the St James side, while the Homebush service would logically access the Town Hall side. This leaves one side each for Bankstown and Hurstville services which, however, need to share a common track between Sydenham and Redfern. There are implications for the junction arrangements between Sydenham and Wolli Creek, which are covered in a separate document.

Earlier operation of metro style trains, ahead of the provision of a dedicated metro sector, may be warranted for services to Homebush and Revesby. The benefits would be a better combination of local and through trains for the Homebush route and more convenience for Airport customers on the Revesby route. Mixed operation of metro and suburban double deck trains would be required to Homebush and around the City Circle for this to be achieved.

6 Suburban Line 1 (S1)

Suburban double deck operation is envisaged to continue on the Eastern Suburbs and Illawarra Lines, which, due to the establishment of M1, would exclude the all stations to Hurstville/Mortdale services. With Metro Line 2 following closely the Christie Report's River Line, a limited extension of the Eastern Suburbs Line just to Bondi has been shown. Without M2, an extension to UNSW and possibly beyond may be more appropriate, but then this would only be with suburban double deck trains.

Services are split three ways to serve Cronulla, Waterfall and Wollongong, with the latter presumed to experience strong growth if the Waterfall to Thirroul segment is improved. A limited InterCity service to the south coast is also possible from Sydney Terminal, using Suburban Line 2 (Campbelltown express) to Sydenham before diverting to S1. Because Hurstville local services have been diverted to M1 in the Network Plan, south coast InterCity services joining S1 south of Sydenham will reduce the usable track capacity north of Sydenham to Bondi.

Some capacity augmentation north and south of Sutherland may be necessary to accommodate the mix of express, stopping and freight services.

7 Suburban Line 2 (S2)

It is convenient to allocate the label Suburban Line 2 to the services connecting to the southern end of the proposed Chatswood-CBD-Eveleigh link, so that Suburban Line 3 carries on from the existing Sector 3. Because the Liverpool via Granville service has, as a consequence of the M1 metro conversion, been allocated to Suburban Line 3, other services must be displaced from this line and transferred to S2.

There is logic in choosing to allocate the Blacktown to Penrith segment to S2, and providing access from the new CBD link at Redfern to the Main Line near Newtown to do this. The outcome is quite neat, with S2 then carrying both Campbelltown and Penrith express services, and the four InterCity services to Newcastle, Blue Mountains, Southern Highlands and (up to the S1 connection) South Coast. The new CBD link can be fully utilised with this arrangement, as Inter City services to the southern highlands and the south coast will then be able to occupy pathways left available by the Penrith express services branching at Redfern.

The Main Line to Homebush, the express tracks to Blacktown and all four tracks from Blacktown towards Penrith would thus be allocated to S2. Some augmentation of the Revesby to Campbelltown segment of S2 may be necessary to separate adequately fast and stopping services. The Network Plan shows Bringelly services to be fully allocated to Suburban Line 3 and to run via Liverpool, but some leakage to S2 at Glenfield may become necessary due to constraints on Suburban Line 3.

The cross-harbour segment of S2 could use either the two eastern Bridge lanes or a new tunnel. Both have been shown, as alternatives, on the network map. For the former, new road capacity, such as an eastern ring route from Mosman to Woollahra, may need to be provided in order to help free up the required Bridge capacity.

As noted above, there are benefits from establishing two rail links into Warringah, with one being from North Sydney. A key issue is the choice between S2 and Suburban Line 3 to support this connection. S2 has been selected due to the common construction work around Crows Nest and the provision for Link Line 1 capacity that results, compared with the attraction of extending trains otherwise terminating at North Sydney on Suburban Line 3. S2 then connects exclusively to the Chatswood to Epping link north of Crows Nest, avoiding any service mixing with Suburban Line 3. This Warringah branch of S2 would serve Brookvale and points further north.

Some capacity augmentation north of Epping may be needed to accommodate the mix of express, stopping and freight services serving Hornsby and the Central Coast. The North West Rail Link is included in S2, and an alternative route for this link, through Mobbs Hill on the deferred Parramatta Rail Link route and an electricity easement to also serve West Rocks Road before reaching Franklin Road, is also shown on the network map. This alternative may help support the case for Link Line 1. After Box Hill, as already mentioned, S2 diverts to serve Riverstone, Marsden Park and the ADI site before joining the Western Line at the University of Western Sydney for Penrith.

Thus the Penrith services through both Blacktown and Castle Hill will be allocated to S2. Some capacity augmentation between St Marys and Penrith may be needed due to this combined operation.

8 Suburban Line 3 (S3)

Suburban Line 3 is made up from the existing North Shore Line, Harbour Bridge crossing and the Suburban Line to Homebush. From there, S3 is allocated the southern tracks to Granville, the tracks to Glenfield and Bringelly, and the slow tracks to Blacktown (Richmond branch platforms) and the Richmond Line. Additional platforms at Newtown, probably to the west of the King Street overbridge, are shown in the Network Plan to facilitate interchange with Metro Line 3. The Strathfield to Epping service is also included as a third branch of S3. There could be some leakage of Richmond trains onto S2 at Riverstone due to S3 capacity constraints.

North of the Harbour, there is need for an all stations to Gordon service and a key stations to Gordon and all to Berowra service. Therefore, as at present, there will be a service imbalance north and south of the CBD and some trains, at least in peak periods, will start and finish at North Sydney. If S2 crosses the Harbour by tunnel, this arrangement can continue. Otherwise, new turn-back facilities, including a third platform, would need to be established at Waverton.

If, as suggested in the Christie Report, additional capacity to the Central Coast is required, then the North Sydney terminators could be extended to serve this. The Network Plan shows additional tracks from Roseville to Gordon from where a tunnel route to the north can be launched with a portal just south of Pymble. The route of this tunnel would also allow a stub terminal station serving the St Ives town centre to be established, and for the Gordon terminators to be extended to serve it.

Alternate stopping at Waverton and Wollstonecraft could be introduced at the same time to minimise delays, and/or the St Ives to Epping service may be a candidate for metro conversion provided mixed metro and suburban double deck operation is considered acceptable.

9 Link Line 3 (L3)

The concept of Link Line 3 is to provide both Parramatta and Liverpool with direct or one-change access from all of the western rail routes, while minimising new construction in recognition of the limited patronage available. It replaces the core piece of the Cumberland Line, but diverges from it at either end. To the south, L3 takes the proposed Y junction from Casula to Georges River, and from Narwee dives south to a dedicated stub terminal station at Hurstville. There may be some synergy between this proposal and the construction of a direct Enfield to Illawarra freight link. To the north, L3 dives from Toongabbie to Hills Centre and then shares S2 track to Castle Hill station and a turn-back (a separate terminating platform should not be required). This route has been chosen because of its acceptable grade and a minimum of new construction.

Link Line 3 services would probably only stop at key stations in accordance with the concept of providing fast trains between centres that has been espoused by the Warren Centre. Suburban double deck trains would be the preferred choice for L3, considering the route sharing with S2 and S3 services, but the use of metro style trains would reduce the tunnelling costs into Hurstville and Hills Centre.

10 Metro Line 2 (M2)

Metro Line 2 has been taken directly from the River Line of the Christie Report as it clearly provides much that is useful. A pair of spur routes from Kingsford to Little Bay in the east, and from Pyrmont to Five Dock in the west, have been added. These will provide coverage to otherwise neglected areas and increase the service frequency through the CBD.

11 Metro Line 3 (M3)

The southern part of Metro Line 3 from Newtown is as proposed for the Central Line in the Christie Report. However there are several differences to the north of Newtown. A Chatswood to Brookvale link is retained as part of M3, but this has been extended from the interchange with S2 at Brookvale to Manly. As S2 provides a CBD oriented service from Warringah, M3 can continue beyond Chatswood with a complementary role to link other inner areas. Accordingly, the Network Plan has M3 continuing further west through Lane Cove and Hunters Hill to share with M2 the Drummoyne to Rozelle sub-harbour route. Between Rozelle and Newtown, M3 serves Glebe, with interchange to the Five Dock spur, and Sydney University.

Overall, M3 provides a Warringah to Cronulla service through an inner western ring with interchange to all other CBD oriented lines, rather than serving the CBD directly as envisioned for the Central Line in the Christie Report.

12 Link Line 1 (L1)

Link Line 1 provides a service between Parramatta and Crows Nest via Epping and Chatswood. It shares a Parramatta stub with M2, absorbs a duplicated Carlingford Line, shares capacity with S2 between Epping and St Leonards that is available due to S2 having a branch to Warringah, and has a dedicated stub platform at Crows Nest. L1 could also share with S2 the Mobbs Hill to Epping segment if this, rather than the Main Northern Line, is used as an alternative take-off point for the North West Rail Link. Otherwise, this tunnel segment would be solely for L1 services and a less expensive low profile tunnel for metro style trains could then be considered.

The line is not likely to be heavily patronised, and the originally envisaged concept of connecting through Parramatta as a main route to the west conflicts both with sectorisation goals and the poor alignment of the Carlingford Line. However, the cross regional linkages that L1 provides are enticing, the site limitations at Epping preclude the use of other modes for interconnection with S2 and S3 services, and there is only a limited amount of new construction required. It is likely that short trains would be sufficient for the L1 service, and, although suburban double deck trains would be suitable, metro style trains would be necessary if low profile construction were used for the Mobbs Hill, and Parramatta stub, tunnel segments.

13 Link Line 2 (L2)

The concept for Link Line 2 is similar to that for L3, and that is to provide key centres with direct or one-change access from all of the western rail routes. For L2, the key centres are Olympic Park and Bankstown. As with L1 and L3, some shared operation with other lines is envisaged where capacity is available to contain establishment costs.

The first step in establishing L2 would be for the M1 Lidcombe branch service to absorb the Olympic Park shuttle, and also serve Pippita, by providing a through underpass link at Lidcombe. This underpass may have other benefits, such as reducing conflicts or providing an emergency routing, for some CountryLink services. The completion of L2 would involve separating the Bankstown to Olympic Park service from the rest of M1, and extending this service at either end to serve Hurstville and Epping.

The southern extension would require a dive east of Bankstown to serve Roselands, join L3 south of Beverly Hills and share the L3 stub terminal at Hurstville. An interchange station would be established at Beverly Hills. Some synergy with an Enfield to Illawarra freight link may also be possible with these works.

The northern extension would require a dive between Olympic Park and Rhodes to allow L1 services to reach the S3 terminus at Epping. An additional southbound platform, or possibly two new platforms, would be required for L2 services at Olympic Park to accommodate the simultaneous provision of L2 services and S2 based event services from Sydney Terminal and Blacktown.

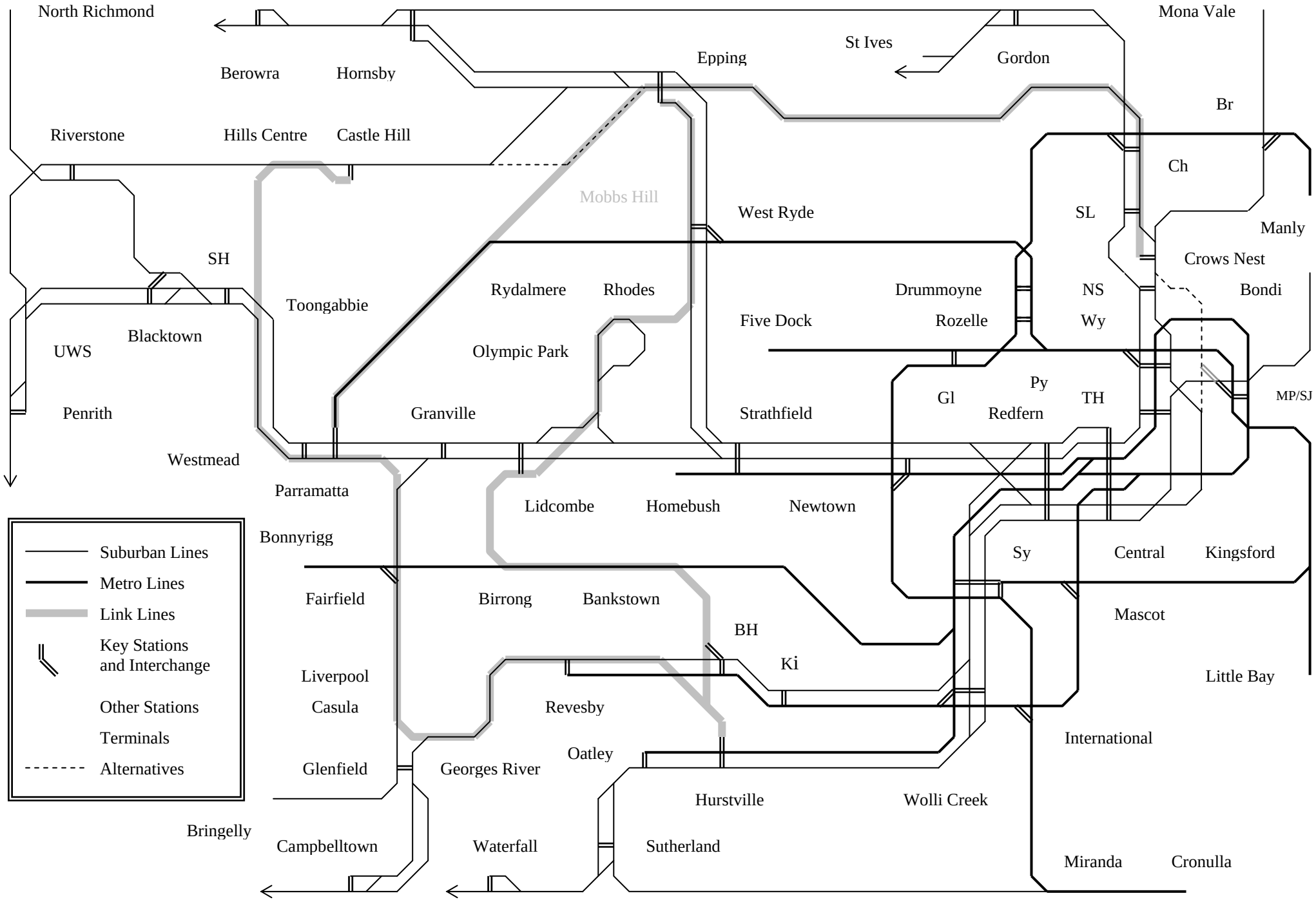
Metro style trains would be provided on L2, probably short trains normally but built up during event loads, and accordingly most tunnelling work could be of low profile construction. L2 services should enable a significant reduction of the event bus task to Olympic Park to be achieved.

14 Network Summary

A brief summary of the individual branches for each of the nine lines that comprise the Network Plan is presented in the following table. A network map is presented on the next page.

Line	Between:	And:
M1	▪ Homebush ▪ Bonnyrigg via Bankstown	▪ Revesby via International ▪ Oatley
M2	▪ Parramatta via West Ryde ▪ Five Dock	▪ Little Bay ▪ Sydenham via Kingsford
M3	▪ Manly via Chatswood	▪ Cronulla via International
S1	▪ Bondi	▪ Cronulla via Hurstville ▪ Waterfall ▪ Wollongong
S2	▪ Penrith via Castle Hill ▪ Hornsby/Wyong via Epping ▪ Mona Vale	▪ Penrith/Springwood via Parramatta ▪ Campbelltown via Sydenham
S3	▪ Berowra via Gordon ▪ St Ives ▪ North Sydney/New Central Coast via Gordon	▪ Richmond via Blacktown ▪ Epping via Strathfield ▪ Bringelly via Granville
L1	▪ Parramatta via Epping	▪ Crows Nest via Chatswood
L2	▪ Epping via Olympic Park	▪ Hurstville via Bankstown
L3	▪ Castle Hill via Parramatta	▪ Hurstville via Revesby

The S3 makeup is potentially the most complex. One service plan of five elements out from Strathfield could be: all Blacktown; all Epping; key Liverpool all Bringelly; key Blacktown all Richmond; and key Granville all Liverpool, which perpetuates the long (up to 15 minutes) waiting time problem for some users at crowded Town Hall. More frequent services (using only three elements) to reduce this waiting time would probably require some peak period leakage into S2 from Bringelly at Glenfield and/or from Richmond at Riverstone to provide enough total capacity on these routes.


North Richmond
Berowra
Hornsby
Epping
St Ives
Gordon
Mona Vale
Br
Riverstone
Hills Centre
Castle Hill
Ch
Mobbs Hill
West Ryde
SL
Manly
SH
Crows Nest
Rydalmere
Rhodes
Drummoyne
NS
Bondi
Toongabbie
Five Dock
Rozelle
Wy
Blacktown
UWS
Olympic Park
Py
Gl
TH
MP/SJ
Penrith
Granville
Strathfield
Redfern
Westmead
Parramatta
Lidcombe
Homebush
Newtown
Bonnyrigg
Sy
Central
Kingsford
Fairfield
Birrong
Bankstown
Mascot
BH
Ki
Liverpool
Little Bay
Casula
Revesby
International
Oatley
Glenfield
Georges River
Hurstville
Wolli Creek
Bringelly
Campbelltown
Waterfall
Sutherland
Miranda
Cronulla
Suburban Lines
Metro Lines
Link Lines
Key Stations and Interchange
Other Stations
Terminals
Alternatives

Liverpool and Penrith

1 Introduction

This submission is a combined response to the separate city centre vision documents for Liverpool and Penrith released on 24 November 2006.

While the reasons for selecting Liverpool and Penrith as additional regional cities, under the overall planning for Greater Sydney, are understood and appreciated, the State Government's transport planning activities seem inadequate to provide the required support and outcome.

In response, this submission covers transport issues, both from the possibility of additional transport development opportunities and the amelioration of adverse transport impacts, which could be addressed by the appropriate agencies.

2 Background

Greater Sydney has many attractions as a place to work, shop and play, but suffers from the growing disadvantage of high triple bottom line (economic, social and environmental) costs due primarily to the low overall density of occupation and the dominance of the off-centre Sydney CBD.

The Department of Planning has commendably responded with a new plan for Sydney's future as a City of Cities. This elevates a number of major centres, including Liverpool and Penrith, to Regional City status. The introductions to the vision for both Liverpool and Penrith explain the need for equitable access to infrastructure and services:

> The Metropolitan Sydney is too big, both geographically and in population terms, to rely solely on central Sydney as the jobs, services, tourism and activities hub. Relying on only one key centre means that many people have to travel long distances for jobs and services. The concentration of functions in the city of Sydney means that cultural service and infrastructure resources are not distributed evenly across the Metropolitan area. The need for a major suburban centre closer to where the bulk of people live was recognised in the 1960s with the designation of Parramatta as a second 'CBD'. With the continued outward growth of the Metropolitan Sydney the new regional strategies are designating additional regional cities.
>
> An underlying principle is that people should be able to access a range of jobs, health and educational services, cultural, entertainment and recreational activities and shopping without travelling long distances. Most people are willing to travel about an hour each day and the regional cities concept is about concentrating services to satisfy this.

Corresponding to this, the State Plan has a target to increase the percentage of the population living within 30 minutes by public transport of a city or major centre in Greater Metropolitan Sydney. Interestingly, the Transport and Population Data Centre's household travel survey from 2004 showed the total daily travel time per person had remained constant since 1999 at 79 minutes; higher than for any other city in Australia. The excess over one hour suggests just one cause of stress, or social cost, from living in Sydney.

The State Plan target should have an impact on how transport planning is being undertaken, as the current network, particularly rail, is highly focused on the Sydney CBD. The recent Urban Transport Statement comprehensively addresses the issue on Pages 6 and 7:

> Since the establishment of the first colony at Sydney Cove, Sydney has expanded to become a city of over 4 million people, occupying an area of around 1700 square kilometres. Its early expansion was to the east and inner west and then to the north. As further development to the north and south has been naturally constrained by the Hawkesbury River and Woronora Plateau, the metropolitan area's most recent growth has been predominantly in the Cumberland Plain, in an arc north-west to south-west from the older urban areas.
>
> Sydney's central business district, however, has remained on the site of the original harbour settlement. As a consequence, Sydney's CBD is nowhere near the geographic centre of metropolitan Sydney, and the pattern of Sydney's transport system – the road and rail spines connecting workplaces, shopping centres, and areas of highest residential density – does not resemble lines radiating from a central hub, as with many typical global cities. Rather, as the *'City of Cities'* map on page 9 indicates, Sydney's urban footprint is a V-shape or U-shape branching northwest and southwest from the CBD at its eastern point.
>
> This V or U, which extends from around Rouse Hill in the northwest to beyond Leppington in the southwest, contains both major roads and rail lines, as well as the Metropolitan Rail Expansion Program's rail links supporting growth in the north and southwest. It includes the Global Economic Corridor from Macquarie Park through North Sydney and central Sydney to the Airport/ Port Botany, in which about 700,000 – or more than a third – of metropolitan Sydney's two million jobs are located. The CBD itself houses more than 300,000 jobs, 13% of the total. As one would expect, it is the most concentrated employment centre in Sydney, and notwithstanding the predicted growth of other major centres, will continue to be a major travel destination.
>
> The particular historic and geographic configuration of metropolitan Sydney thus has its own constraints for transport planning which are in addition to the challenges faced by all modern cities. In Sydney, these challenges are characterised by:
>
> – the diverse travel needs of a global city;
>
> – forecast population growth of more than 1 million over the next 25 years in new and existing areas;
>
> – current and increasing road and rail congestion in both peak and traditionally non-peak periods that are affecting the ability of trains, cars and bus services to meet Sydney's travel needs;
>
> – highly constrained road and rail capacity to accommodate forecast growth in passenger, private vehicle and freight movements.
>
> Sydney's transport system was established with the main objective of providing a largely suburban city with access to its main location of weekday employment: the CBD. Meeting the transport needs of a future Sydney will require a greater focus on cross regional transport and on servicing the regional cities in Western Sydney and other strategic centres around the metropolitan area. While recognising the continuing critical importance of the CBD, transport decisions which the Government makes now must reflect and support those future directions.

The city centre vision document for Penrith expresses the issue more simply on Page 49:

> With Penrith identified as a regional city the provision of regional public transport facilities is important.
>
> The provision of radial rail transport within Metropolitan Sydney dislocates large pockets of the population 'between the spokes' and results in a reliance on private vehicles. The attempt to reduce the reliance on central Sydney as a job location needs to be accompanied by a parallel increase in the provision of regional public transport networks around each of the regional cities to improve accessibility to surrounding and growing residential populations, in particular to areas not currently serviced with adequate public transport facilities.

The need for transport planning changes is clearly apparent from the above extracts, however, unlike the vision, the reality of transport planning appears to fall well short of what is needed for a multi-centred network.

3 Transport Planning

The rail infrastructure plans presented in the Urban Transport Statement are clearly focused on increasing long distance capacity to the Sydney CBD. For the North West Rail Link and the Redfern to Chatswood Rail Link, new services to the Sydney CBD (and the "Global Arc") are the only possibility. The situation is better for the South West Rail Link, as services to the Sydney CBD via Revesby and Liverpool will both be possible. However, existing services from Liverpool would need to be extended, as the only capacity available for new services from the South West Rail Link is via Revesby.

The rail infrastructure plans in the Urban Transport Statement indicate that the South West Rail Link will become part of a new sector, in combination with the Epping to Chatswood Rail Line and the Redfern to Chatswood Rail Link, after 2017. Much of the Clearways program is intended to increase longer distance capacity, such as is needed for the new links, so the long distance and Sydney CBD focus of rail operations will be further reinforced.

The State Plan appears to be designed to accommodate this focus with the following targets:

> increase the percentage of the population living within 30 minutes by public transport of a city or major centre in Greater Metropolitan Sydney;
>
> increase the share of trips made by public transport to and from the Sydney CBD during peak hours to 75% (currently 72%) by 2016; and
>
> increase the proportion of total journeys to work by public transport in the Sydney metropolitan region to 25% by 2016 (currently 20-22%).

The unavoidable logic here is that the second target will be dominant. The first target need not have any direct impact on destination or transport choice, while the third will be partly achieved just with a strong outcome for the second. Having the second target dominate through an increase in long distance commuting will not necessarily, or optimally, deliver the sought after improved triple bottom line outcome.

Rail operations have clearly been tuned to long distance commuting through adopting the present double deck carriage design with its emphasis on seated capacity. Although short distance travel can be handled, due to wide doors and accessible end vestibules, track capacity and journey times suffer with loading increases and station spacing decreases due to long dwell times and mediocre traction performance of Sydney's double deck trains. The recent decision not to purchase single deck trains more suitable for inner areas suggests that the needs of long distance commuting is to remain dominant, although there is possibly also a timing issue here in that single deck operations could not have been fully segregated from other services before completion of the Redfern to Chatswood Rail Link in 2017.

The fare structure also tends to support long distance commuting, due to the tapering fare scales currently in place. These scales also lead to poorer operating cost recovery figures for rail over buses, despite more favourable operating costs per kilometre for rail, due to the longer average distance travelled by rail users.

The strategic bus network plans are a welcome response to the mosaic of centres not adequately served by the present trunk networks. The bus mode here has advantages in quickly and flexibly meeting unsatisfied but uncertain demand. The situation for the newly designated regional cities is different as here the task is to build substantial patronage to support the growth of such cities over a longer term. Rail has a history of more strongly influencing land use outcomes than buses, particularly as many transport experts regard it as a more effective freely chosen alternative to car use than buses. Other experts argue the buses can be improved at a lower capital cost, but some acknowledge that more coercion may also be required to build patronage.

4 Heavy Rail Opportunities

There are opportunities for Sydney's rail network to be adapted to a city of cities environment, and the accompanying <RailPlan.doc> provides an example of what a multi-centred rail network could look like. This document was prepared in 2004 and submitted as a response to the Metropolitan Strategy, sent informally to RailCorp, and became a public document through its attachment to a Cross City Tunnel Inquiry submission (Submission 22).

Specifically for Liverpool, <RailPlan.doc> suggests [with added square bracket comments] a reconfiguration and extension of the Cumberland Line as follows:

> The concept of Link Line 3 is to provide both Parramatta and Liverpool with direct or one-change access from all of the western [and Illawarra] rail routes, while minimising new construction in recognition of the limited patronage available. It replaces the core piece of the Cumberland Line, but diverges from it at either end. To the south, L3 takes the proposed Y junction from Casula to Georges River, and from Narwee dives south to a dedicated stub terminal station at Hurstville. There may be some synergy between this proposal and the construction of a direct Enfield to Illawarra freight link. To the north, L3 dives from Toongabbie to Hills Centre and then shares S2 [North West Rail Link] track to Castle Hill station and a turn-back (a separate terminating platform should not be required). This route has been chosen because of its acceptable grade and a minimum of new construction.

This concept increases the reach of the rail network for Liverpool, and for Parramatta, as is needed to support regional cities, over the predominantly radial access being provided under current plans. A modification of this concept could see the existing Cumberland Line (Campbelltown-Blacktown, extendable to Riverstone after duplication) supplemented, rather than completely replaced, by L3 to achieve even broader direct access to Liverpool and Parramatta, but at some cost to network efficiency.

Other benefits for Liverpool from <RailPlan.doc> include direct services from the South West Rail Line at all times and potentially faster Sydney CBD services via Granville from a suggested sector rearrangement, and a faster alternative route to the Sydney CBD via Revesby using cross platform interchange (eg at a new Georges River station) between L3 and Campbelltown (plus SWRL in peak periods)-Sydney CBD services.

Specifically for Penrith, <RailPlan.doc> suggests that the North West Rail Link be ultimately extended from Rouse Hill through Riverstone to Penrith, rather than to Vineyard as currently envisaged by RailCorp. This alternative would satisfy the operational need for a through connection to a permanent stabling facility, but appears to make better transport and land use sense by linking to a major western anchor (Penrith) and supporting the development of Marsden Park and the former ADI site, and the possible release of the Airservices Australia transmitter site between them. It would join the Western Line at the University of Western Sydney for Penrith and provide an enhanced service frequency in this section.

Another benefit for Penrith from <RailPlan.doc> would result from the suggested sector rearrangement. This rearrangement leads to a “Penrith Express” allocation of the northern pair of western line tracks to the Sydney CBD in a similar fashion to the “Campbelltown Express” route via Glenfield, Revesby and Sydenham being established under the Clearways program, and should result in faster services.

There is also a general network benefit from adapting rail to a city of cities environment, in that the new services, and more points of interconnection, provide many rail travel opportunities that would not be realistic with a strictly radial system. To this end, some cities already have, and other cities are considering, circumferential or ring rail routes to complement their radial rail routes.

5 Rail Impacts

Care needs to be taken with some potentially adverse impacts from heavy rail. The city centre vision for Liverpool notes on Page 44:

> Integration of the city centre with important river assets is an important objective for the three Western Sydney regional cities: Parramatta, Liverpool and Penrith. An important advantage of Liverpool is its location on the Georges River and the proximity of a major activity hub – Moorebank Industrial Area, on the other side of the river. Better utilisation and protection of the environmental values of the Georges River will enhance liveability. On the other hand, the city centre is traversed by the railway line and the addition of the Southern Sydney Freight Line may further dissect the city centre from the river unless new initiatives are put in place.

The Urban Transport Statement reveals that track amplification for the Liverpool – Cabramatta section is envisaged by 2017, which will presumably just add to the adverse impact of the recently approved Southern Sydney Freight Line with respect to separation of the city centre from the river, and the more localised division of the Liverpool Hospital site. There seemed to be (presumably now lost following the SSFL approval) an opportunity to improve the latter situation through a localised lowering of all tracks to avoid the present level crossing.

As rail traffic through Liverpool increases over time it is logical for RailCorp to consider separating the trains from Bankstown from other services to improve reliability, and this is apparently behind the amplification proposal presented in the Urban Transport Statement. However, the fairly low loadings on the Bankstown via Sefton route would indicate that the new tracks could be poorly utilised. <RailPlan.doc> has an alternative suggestion, which is to complement its suggested Liverpool service improvements with a proposal to reroute the Bankstown line west of Villawood to terminate underground at Fairfield.

The benefits would be threefold; to avoid adding to the dissection problems at Liverpool described above, to provide Bankstown access to both Parramatta and Liverpool via one-change access at Fairfield and to facilitate a longer-term extension of the Bankstown Line from Fairfield to Prairiewood (shown as Bonnyrigg in <RailPlan.doc> which predates the announcement concerning this new centre).

While terminating train and stabling impacts can be avoided at Liverpool, they are inherent at Penrith due to its location on the edge of the suburban area. Alternative possibilities for stabling include covering the yards to provide a usable area for other city related activities or building new yards further from the station, the latter perhaps a little to the northwest, to release the presently occupied land for other purposes. Additional stabling for the Northwest Rail Link extension suggested in <RailPlan.doc> could also be included.

6 Light Rail Possibilities

Both Liverpool and Penrith seem suitable for light rail developments, to complement the previously mentioned heavy rail suggestions, in providing the required greater focus on cross regional transport and on servicing the regional cities in Western Sydney.

For Liverpool, light rail links east and west of the city could serve higher density corridors and be connected by a north-south route through the city centre and the rail Station. Similarly for Penrith, light rail links north and south of the city could be connected by an east-west route through the city centre and the rail station.

7 Observations

It seems that while the city of cities concept, which proposes a number of regional cities, is motivated by a desire to bring jobs and key services closer to home, RailCorp planning is still dominated by continuing growth in long distance patronage, particularly work trips to the Sydney CBD and “Global Arc”, which may be contrary to this desire.

<RailPlan.doc> suggests two other important roles for rail, which are more compatible with the desire to bring jobs and key services closer to home. These are inner area services to the Sydney CBD, and cross-regional services for the new regional cities. Inner area services would be improved by a suggested sector reallocation and the possible reintroduction of single deck trains on some lines, made possible by a sector reallocation following the new Redfern to Chatswood Rail Link in 2017, and the construction of metro and/or light rail on some corridors not presently served by rail. The cross regional possibilities specific to Liverpool and Penrith have already been discussed, however others are also suggested in <RailPlan.doc>. The present double deck train design is not necessarily optimum for these other two roles.

Budgetary and timing issues can probably explain the apparent inconsistency between rail planning and the metropolitan strategy. Clearly RailCorp is currently having most difficulty with demand on longer distance services, and the North West Rail Link is already needed as noted in the Preliminary Environmental Assessment:

> Sydney's North West is in the middle of a 60 year expansion (1970-2030) with significant population and employment growth. As a result, there is already a need for a mass trunk public transit scheme to address car dependency and positively influence travel behaviour.

Basically, RailCorp seems to be still predominantly catching up with the past, rather than planning for the future. This presumably stems from Clearways not being funded immediately after the 2000 Olympics, as requested, and the subsequent lack of funding for Action for Transport 2010. Consequently, RailCorp is now probably more than fully stretched, with budget, resources and time constraints, completing the Capacity and Service Improvement Initiatives listed in the Urban Transport Statement for the 2006-2017 period. Being fully stretched is also presumably why the Statement tries to present the strategic bus corridors as the complete supplement to the rail capacity and service improvement initiatives within the 2017 timeframe, when this is a problematical claim in at least two specific areas.

8 Conclusion

It appears that more emphasis should be placed on inner area rail services to the Sydney CBD and on cross-regional rail services to the new regional cities, to better support the desired triple bottom line outcomes for the Metropolitan Strategy. Most of the current rail capacity and service improvement initiatives, however, appear aimed at longer distance services to the Sydney CBD and Global Arc. Realistically, present budgetary, resource and time constraints presumably limit what else can be initiated much before 2017.

Future budgetary constraints may possibly be eased. For example, reducing average travel distances is also likely to improve rail cost recovery, as the fare scales are tapered with distance, and greenhouse concerns are likely to increase the emphasis of budgetary expenditure towards energy saving initiatives.

Sydney Metro Observations

This paper is an amalgamation of two separate submissions to SydLink about metro rail proposals for Sydney. The first, and initial, submission commences immediately below and has two annexes (A & B). The second, submitted after the nominal deadline, now forms an additional Annex (C) to this paper.

1 New SydLink Metro

The announcement that both a metro along Victoria Road and the North West Rail Link are to be completed by 2017 is very welcome. However, is the decision to amalgamate the two into one automated rail project just a marriage of convenience or part of a broader plan for transport infrastructure to better support the new metropolitan strategy? The development is promising, but there is a concern that project considerations are being placed ahead of broader land use integration issues.

This submission to SydLink is, due to limited information, somewhat speculative about possible benefits and problems, and the consequent recommendations made. Both more information, and more time to respond, would have been appreciated.

2 The Marriage

There has been an obvious investment lag in rail transport expenditure. The North West Rail Link (as far as Castle Hill) had been promised by 2010, and in the words of the Preliminary Environmental Assessment:

> Sydney's North West is in the middle of a 60 year expansion (1970-2030) with significant population and employment growth. As a result, there is already a need for a mass trunk public transit scheme to address car dependency and positively influence travel behaviour.

Meanwhile, deteriorating traffic conditions in and around the CBD seem to have brought forward Sydney's first metro line. Making this the Victoria Road metro, and marrying it with the North West Rail Link, enables the work to proceed as a single project. Further, the entire project, rather than just the CBD to Ryde section, can be made independent of CityRail's legacy management and technology practices. Annex A provides some more details about CityRail concerns.

3 Network Impacts

Impacts on the overall rail network in Sydney if the metro proceeds are:

- A compatible train design for both metro and commuting style operation would be necessary, as covered at Annex B.

- North West rail users travelling to all stations from Macquarie University to Milsons Point would need to change at Epping. Additional underground platforms at Epping, accessible to the transfer concourse, would be needed, and the ideal of cross platform interchange to the Epping to Chatswood Rail Link would not be possible without major reconstruction.

- Services between Epping and the lower North Shore would be less frequent, and possibly overcrowded, due to changers from the north West Rail Link adding to patronage from the north of Epping.

- There would need to be an additional section of track, linking Top Ryde to Epping, to consummate the marriage, with an adverse cost impact.
- The Victoria Road metro would not be continued on to West Ryde and Parramatta as originally envisaged.

- The North South CBD Link would not proceed, as the Victoria Road metro provides the sought after increase in rail capacity to the CBD, and there would be a consequent loss of planned CityRail sectorisation benefits, such as reliability.

4 The Metropolitan Strategy

A new metropolitan strategy (City of Cities-A plan for Sydney's Future) was announced in 2006 to cover the next 25 years. It proposed a vision of five waterfront cities (Sydney, North Sydney, Parramatta, Liverpool and Penrith) with "jobs, transport, services, entertainment and recreation close to everyone". It observed, in part:

> An underlying principle is that people should be able to access a range of jobs, health and educational services, cultural, entertainment and recreational activities and shopping without travelling long distances. Most people are willing to travel about an hour each day and the regional cities concept is about concentrating services to satisfy this.

Corresponding to this, the State Plan has a target to increase the percentage of the population living within 30 minutes by public transport of a city or major centre in Greater Metropolitan Sydney. Interestingly, the Transport and Population Data Centre's household travel survey from 2004 showed the total daily travel time per person had remained constant since 1999 at 79 minutes; higher than for any other city in Australia. The excess over one hour suggests just one cause of stress, or social cost, from living in Sydney.

The transport impact of this strategy was presented in the Urban Transport Statement, and is summarised as follows:

> Sydney's transport system was established with the main objective of providing a largely suburban city with access to its main location of weekday employment: the CBD. Meeting the transport needs of a future Sydney will require a greater focus on cross regional transport and on servicing the regional cities in Western Sydney and other strategic centres around the metropolitan area. While recognising the continuing critical importance of the CBD, transport decisions, which the Government makes now, must reflect and support those future directions.

However the Statement lacked a credible rail infrastructure plan to meet those future directions. What it presented, instead, were later stages of the Clearways proposals, drawn from parts of the Christie Report, which, inconsistently with the strategy presented above, showed mainly a continuing growth in outer suburban services to the Sydney CBD and therefore a continuing trend towards longer commutes. The cross regional needs in the Statement were implicitly covered by the strategic bus network.

The strategic bus network plans are a welcome response to the mosaic of centres not adequately served by the present trunk networks. The bus mode here has advantages in quickly and flexibly meeting unsatisfied but uncertain demand. The situation for the newly designated regional cities is different as here the task is to build substantial patronage to support the growth of such cities over a longer term. Rail has a history of more strongly influencing land use outcomes than buses, particularly as many transport experts regard it as a more effective freely chosen alternative to car use than buses. Other experts argue the buses can be improved at a lower capital cost, but some acknowledge that more coercion may also be required to build patronage.

In the absence of a credible rail plan for a multi-centred Sydney, and in reaction to the Christie Report, I generated my own and this 2004 document, A Long-Term Rail Network Plan for Sydney <RailPlan.doc>, accompanies my SydLink submission. This plan anticipated the elevation of Penrith to regional city status, but needs to be adjusted to recognise Prairiewood, rather than Bonnyrigg, as the new regional centre west of Fairfield.

In addition to the heavy rail developments in the above Plan, there would seem to be opportunities to provide light rail services into, and within, Liverpool and Penrith as the heavy rail service is along one axis only. For Liverpool, light rail links east and west of the city could serve higher density corridors and be connected by a north-south route through the city centre and the rail station. Similarly for Penrith, light rail links north and south of the city could be connected by an east-west route through the city centre and the rail station.

5 Land Use and Transport Integration

Sydney seems to have had only mediocre success with the integration of transport with land use planning in the post WW2 period as it expanded beyond the viable size for a single centred city.

The prescriptive land use has been well meaningly designed to support public transport patronage, with designated regional centres first following the rail lines and then the infill areas, as the city has expanded. However, the development of public transport has not kept pace and its market share has declined substantially over the period, despite some more recent increases in absolute patronage numbers. Although it can be noted that some of the worst spatial aspects of edge and out-of-town development experienced by many US cities have been avoided with this prescription, Australian cities spend more of their wealth on transport and have “world leading” congestion costs, according to Professor Currie in his contribution to Forum 5 of the Garnaut review. This suggests an interesting hypothesis; that Australian cities are worse off through prescriptive planning and little public transport follow-through than they would have been with more sprawl.

The key question for the new metro is: does it further the cause of land use and transport integration for the new metropolitan strategy. The answer seems to be both yes and no.

Yes, in that it completes a long overdue link to the North West, provides a new rail link along Victoria Road, introduces new rail technology that is potentially better suited to the emerging metro style of operation that is needed for Sydney's future, and limits the continuing growth in outer suburban services to the CBD from the south that is inconsistently envisaged in the Urban Transport Statement.

No, in that most of the network impacts above appear somewhat negative, and the North South CBD Link could have been used to apply sectorisation differently, as developed in <RailPlan.doc>. This used the new North South link capacity to clear the City Circle of all outer suburban services, as well as to relieve present overcrowding. In turn, the remaining City Circle services (inner suburban to Homebush, Bankstown, Revesby and (newly) Hurstville) could be converted to more frequent metro style operation under CityRail management. I do recognise, however, that either version of sectorisation would have meant that any new rail line north of the harbour serving the CBD, say to Brookvale, would necessarily have had to conform to CityRail standards, because it would be unrealistic for a third north south link across the harbour into the CBD, as envisaged in the Christie Report, to be built.

6 Recommendations

The previous section shows that the new metro would impact both positively and negatively on land use and transport integration. The negatives do not seem sufficient to totally reject the proposal and return to the previous plans, however expenditure on compensatory works to improve the land use alignment seems worthy of consideration in the following three areas. There is an additional suggestion on train design at Annex B.

6.1 It seems logical, that if expenditure to bypass CityRail is warranted, then expenditure to seriously reform CityRail must also be warranted. To date there has been no government position on this issue, and the choice should be based more on expenditure effectiveness than political considerations. The issue of single deck trains for at least some CityRail services should be readdressed as part of this reform. Higher performance single deck trains could be used either on a separate sector, as envisaged above, or mixed with longer distance, limited stop, double deck services on some sections to increase overall track capacity.

6.2 The Epping to Parramatta link should be completed and operated by CityRail to provide a shuttle service from Parramatta to at least St Leonards. This would increase the frequency, and reduce the crowding, of trains on the Epping Chatswood Rail Link which could easily be extended to St Leonards and possibly further south, and provide rail access from Parramatta to both Macquarie/Lower North Shore and Victoria Road stations, the latter through a change at Epping. This access would improve consistency with the metropolitan strategy. Single deck trains could be used for this shuttle service.

6.3 As noted in the network impacts previously, give consideration to providing cross platform transfers, between the North West Rail Link and the Epping Chatswood Rail Link, at Epping.

There is also another longer-term possibility. If, and when, a new North South link through the CBD is built, and built to metro standards, the automated North West metro could be redirected onto the Epping Chatswood Rail Link and an onward connection to the CBD metro link. The loss of CityRail access to the Epping Chatswood Rail Link would need to be assessed in the light of other rail developments at the time. The Victoria Road metro would then be redirected to West Ryde and Parramatta, and the Top Ryde to Epping section abandoned. Being near the West Ryde pumping station, the abandoned tunnels may be useable for water storage.

7 Comments

There is a concern that project considerations are being placed ahead of broader land use integration issues, however there has also been an obvious investment lag in rail transport expenditure in the past that seems to have influenced this. It is also understood that the new SydLink metro proposal will absorb most of the State's transport budget for the next 10 years. Such budgetary problems will make additional expenditure on recommendations such as the above, to achieve better alignment with the metropolitan strategy, difficult to obtain, and the project consequently less worthwhile.

It is also a given that ticket and/or fare integration should be provided to facilitate interchange with CityRail, and other public transport, services, at various locations along the new SydLink metro line.

Annex A - CityRail Concern

There is understandable concern over the effectiveness of the Sydney rail operator. CityRail has reportedly been benchmarked by TMG International against other rail administrations and found to perform poorly in many areas, presumably due to legacy management and technology practices. The original benchmarking information, and comments on necessary allowances for local political and geographical conditions, has not been made public.

One factor is double deck rolling stock, which has slowed the system and made it more difficult to manage, in contrast to the users' desire for speed, convenience, safety and reliability. Long dwell times also limit the frequency of services and have led to larger crowds at stations. The recent trial of a countdown clock (my suggestion) at key city stations during the PM peak, to improve dwell times, is indicative of management difficulties.

Many operators employ double deck trains, but most usually on long commuter runs to a terminal station where internal train flows are unidirectional at each stop and the terminal dwell time on a dedicated track is not important. Sydney's trains are a compromise, having end vestibules and platform level doors to facilitate a mix of a metro and a commuting style of operation. However, with Sydney evolving into a multi-centred city and with more interchange points, the metro (simultaneous loading and unloading) component of the mix has increased, and is likely to do so further, with ongoing adverse operational consequences. The Eastern Suburbs Line is illustrative; users crowd the doorways while many centre saloon seats remain vacant.

The limited power and tractive weight of Sydney's trains also contributes. The introduction of air conditioning has reduced tractive weight from 60% to 50%, making initial acceleration targets even more difficult to achieve in wet conditions. Acceleration also becomes power limited around 30km/h (less for some trains), reducing track capacity and adding to the time between stations.

Along with legacy rolling stock, management has also seemingly struggled:

- A plan to reintroduce single deck trains (which could be one-man operated) on some services did not proceed.

- The timetable has been slowed to improve peak period reliability, but at the expense of more trains (and crew) being required to support each route. Some off-peak services were cut to provide the remaining services with (the necessary) additional trains.

- Train control software limitations prevented faster services being offered at off-peak times when dwell times could be less.

- Energy saving half trains at quiet times were discontinued, again to improve peak period reliability.

- There has been a reluctance to address many seemingly unnecessary speed restrictions.

The government has also contributed, with fare scales that taper with distance travelled while per capita operating costs increase with distance from the CBD. This has increased the public perception of CityRail inefficiency, based on high operating subsidies per km of travel overall, whereas these subsidies are much lower for services on the Cumberland Plain, and less again closer to the CBD.

Industrial relations within CityRail are reported as being difficult and under a micro-management style, but it's not obvious to an outside observer what combination of technology, management and government intervention is responsible for the inadequate quality and consistency of service experienced by users.

Annex B - Train Design

Initial information on the new metro suggested a Hong Kong style train with many doors per long carriage and possibly few seats. The TV animation shows a train with two doors per shorter carriage and possibly more seating.

The joining of an outer suburban route to an already planned inner suburban metro could mean some challenges in optimising the rolling stock design. This is because the attributes of a metro, being high performance, rapid loading and frequent services are less relevant to an outer suburban railway where seating availability has traditionally been considered paramount.

Future rail plans, be they new metro lines and/or extensions, or reform and/or extension of CityRail services, could also have an impact on the final design chosen. For example, <RailPlan.doc> envisages the introduction of single deck trains on some CityRail services and the ultimate extension of the North West Rail Link to Riverstone and Penrith.

My suggestion is to consider the new generation of articulated regional trains being introduced in Europe. To suit Sydney, a half train would consist of a five car articulated set with six bogies. There would be two doorways per car or 10 per 80m half train. Seating could be up to 500 per full train, depending on the mix of longitudinal and transverse seats, or around 15,000 per hour, which is not much less than present double deck operations.

The articulated configuration offers more comfortable curving, due to the absence of car end overhang, and would be more suitable for legacy curved platforms on reformed CityRail lines. By contrast, a half train of three long cars could have 9 or 12 doorways (three or four per car) and would also have six bogies, but would be restricted to nearly straight platforms. Full automation and screen doors would be optional, depending on the route, however one-man operation could be the alternative to automation.

Technically, all axles would be motored and powered in excess of 10kW/tonne to provide good and reliable acceleration through much of the speed range. Total weight would be less than for double deck stock, limiting the increase in total power needed. A higher top speed than is usual for a metro would also appear to be necessary to cover outer suburban conditions beyond Epping.

Annex C – Sydney Metro Configurations

Introduction

Following the deadline for public submissions to SydLink with respect to the proposed North West Metro, a joint Federal/State study of two alternatives for a West Metro has been announced. It appears odd that the new study includes a new north-south CBD connection when a similar (CityRail operated) connection has, due to additional CBD capacity now being provided as part of the North West Metro, just been abandoned. One interpretation could be a preference for each metro to be configured as a point-to-point system. This paper looks at whether this configuration is optimum for Sydney, or if branching could improve the overall return to the community.

A key issue is the expected future loading on each of these point-to-point systems. If, as can be reasonably inferred, there will be significant unutilised capacity, then branching to improve the utilisation in some areas could be introduced. This, in turn, could lead to a mix of more frequent services on the shared sections, opportunities to convert some inner area CityRail lines to metro, and additional service area possibilities. This last possibility is about two-dimensional rail coverage within a core area, a key feature of "European style metro" operation that appears not to have been appreciated in the Sydney metro plans thus far announced.

This paper considers the above in more detail, the impact on the two metro projects already announced, and also the impact on CityRail. It also makes reference to <RailPlan.doc> submitted as part of a previous SydLink submission.

Topology Issues

In general, city rail network topology is a composite of core and spoke components. Within the core, coverage is frequent over an extended period, and a number of intersecting lines with interchanges allow two-dimensional coverage to be provided. Outside the core, rail travel is more one dimensional with a larger commuting component. There, the second public transport dimension is provided by other modes providing feeder and cross regional services, to the extent that it is provided at all.

A common implementation has been suburban rail for the spokes and tram or metro for the core, but with an emerging trend to overlap the role of these two modes to reduce the amount of passenger interchange. Thus suburban rail is being extended through the core, as per Thames 2000/Crossrail or the RER, or metros are being extended along spokes to the suburbs as already happens in London and Tokyo. There is also a tendency for the core, and hence the need for two-dimensional "metro style" rail travel, to spread out over time as higher density development and road congestion extend from the CBD to neighbouring areas.

Rod Eddington's recently released rail plans for Melbourne reflect the core and spoke story. There, it is proposed that the Northern and Caulfield Groups be separated from the existing network at Footscray and Caulfield and be connected instead by a new rail tunnel through Parkville, the CBD and Southbank to expand both the capacity and the coverage area of the inner rail core. These plans are seen as a step towards an evolving "metro style" mode of operation for the Melbourne rail network.

Point-to-point Systems

Many cities use metros in a point-to-point configuration. Benefits include operational simplicity and no merging delays. A key example is Paris where a mesh of almost exclusively point-to-point medium capacity systems, about to be augmented by some peripheral links, covers the internal needs of the Ile de France region. This is in contrast to the higher capacity RER, with its common inner sections that are each shared by several branches, which caters more for commuting from the suburbs. There are also many commuter services that terminate at the various Paris termini. Users of these commuter services tend to experience significantly more reliability problems than with the easier to manage, and more enmeshed, metro lines.

Sydney and Branching

Sydney presently has a fairly compact core, and only a small component of all day two-dimensional rail travel within this core, at present. However the core area is expanding, and traffic congestion even more so, such that a more extensive rail core would be a future expectation. Offsetting this, to some extent, is the metropolitan strategy with its regional cities and the aim of providing jobs and services closer to home. The emphasis on regional cities, and other major centres, could also bring the future possibility of more cross regional rail links.

The dominant CBD commute task is reflected in the topology of the present CityRail network, with its many branches joined by numerous, and mostly flat, junctions. The role of the North West Metro is similar, conveniently marrying the previously proposed CityRail branch from Epping to Rouse Hill with a new radial link along Victoria Road. At this stage the role of the West Metro is less clear, considering that there are two alternatives, each with different potential benefits, although it seems that relief for CityRail capacity is one common consideration.

The discussion above indicates that metro coverage in Sydney initially is likely to be similar to the present CityRail task, even though a larger core component could be an eventual possibility. Information to date also indicates that the North West Metro will be high, rather than medium, capacity and that loadings along the Victoria Road alignment are likely to be modest compared with this capacity. This information, together with the expectation that many users from the northwest will transfer to the ECRL at Epping, suggests that there will be spare capacity in the core section approaching St James. Branching is a logical means of utilising this spare capacity.

Only a simple branching arrangement, whereby two point-to-point links share a common section, is envisaged by this paper for the metro to ensure reasonable (public timetable obviating) frequencies and other benefits of point-to-point operation. Although there could be some merging delays, the operational benefits of an isolated system, including a strong emphasis on product consistency, would be preserved. This contrasts with the present CityRail situation where all resources are considered to be universal and a lowest common denominator approach to operations, with its adverse performance outcome, has necessarily been adopted. For example, there is a lot of variation in braking performance between trains and between drivers, and this, along with overshoot/SPAD penalties and weather sensitivity, has led to a timetable allowance much greater than that implied from train braking specifications alone.

West Metro

Each alternative of the West Metro from Parramatta to the CBD can be seen as comprising three elements; a north south connection through the CBD, a middle section east of Strathfield and an outer section west of Strathfield. Each element has a valid transport purpose and amalgamating all three, as proposed, could understandably be helpful for project delivery. However this ménage à trois (continuing the metaphor) is not necessarily an optimum configuration with respect to land use and transport integration, or for investment timing.

Starting with the middle section of the northern (Leichhardt) alternative, its outer end could usefully turn from Canada Bay to serve the Burwood town centre while the inner end, picking up from the above, could join into the North West Metro just west of Pyrmont to share the section to St James. The (lower priority?) outer section west of Strathfield could, when built, extend from the present Inner West Line (after being converted to metro as discussed below) instead of from the middle section of the new metro, leaving open the opportunity of extending this section to the south of Burwood instead of to the west as envisaged in the study. One possibility for this would be a route through Campsie, Bexley North, and Kogarah to Brighton-le-Sands (each providing other-line interchange, including with an F6 metro) to expand core (two dimensional) travel opportunities, although a lighter (but still with a fully reserved right of way) mode could be more appropriate for this task.

North West Metro

As already mentioned, a branching point west of Pyrmont could be provided to form a lead to the West Metro, assuming the northern alternative is adopted. This allows the possibility of a matching branching point south east of the CBD if the North West Metro is extended to Malabar. As per the Christie Report, a branch after Kingsford could serve East Lakes and interchanges with other lines at Mascot and Sydenham. A key benefit of so extending the core would be to provide greater bi-directional rail access to the peaky traffic generators of Moore Park, Randwick and UNSW.

CityRail Adjustments

The new north south CBD connection, freed from the West Metro, can instead be used to convert the Inner West and Revesby via Airport Lines to metro operation and independence from CityRail. This would require new and modified tunnels to merge these two links and connect them to the upper level at Chalmers St, with perhaps new platforms being needed at Redfern. Better utilisation of the Main Line east of Strathfield would also be required to offset the loss of the Local Line to CityRail while still providing an overall enhancement to other CityRail services. At the eastern end of the Main Line, a connection west of the Illawarra Dive would be needed to access the city circle leads vacated by diverting the Inner West Line. At Strathfield, Platform 2 would need to become a northbound “right turn lane” clear of westbound trains (from Platform 3), at least during peak periods, so that departures from it could be synchronised with eastbound traffic to also avoid delays to eastbound trains (all using Platform 1 at Strathfield during these periods) at the flat junction.

It is clear that the West Metro between the CBD, Pyrmont and Burwood, as described above, would need to be completed before these adjustments could be implemented.

As mentioned in <RailPlan.doc>, a reallocation of continuing CityRail services may be appropriate to match the above, with Epping, Leppington and Richmond trains using the Suburban Line (for the North Shore Line) east of Strathfield, and the outer west (Blacktown and beyond with perhaps some Richmond peak period express) trains, along with InterCity services, using the Main Line. The flat junctions at Homebush would not be needed, under normal operations, with this allocation.

Similarly to the situation before the first metro announcement, the north south CBD connection can extend to the northern suburbs, either using the eastern Bridge lanes or a new Harbour rail tunnel. It is likely that there would be less concern with the grade and length of such a tunnel if it is part of an independent metro, rather than CityRail.

The Bankstown and Hurstville lines, along with the ESR, could also be converted to metro, with appropriate supporting works, at some suitable time. Illawarra services beyond Hurstville would correspondingly be diverted to the City Circle. Six tracks (two metro, two East Hills and two Illawarra) would be needed between Wolli Creek and Erskineville, with matching junction changes at either end. Parallel working on the Wolli Creek to Hurstville section (metro on the inside pair), and isolation of the Sefton route from Cabramatta (underground diversion from Carramar to Fairfield and even Prairiewood is a possibility) after the SSFL is completed, would be preferable.

CityRail operation, and driver presence, would probably be necessary for the Hurstville, Bankstown and ESR metro as complete isolation from other RailCorp requirements appears unlikely in the short to medium term. To complete the metro conversion of all non-express services out of the CBD, an Epping-CBD-Gordon service could be converted and mixed with semi-express double deckers for the other services using the North Shore Line. This would provide speed advantages to all services, but again would need to be under CityRail management.

Observations

While the introduction of metro technology to get around the worst impacts of CityRail's inherent tardiness is a positive development, the lack of branching appears to be unduly restrictive in the context of Sydney's transport needs.

Potential benefits of branching include better capacity utilisation and opportunities to convert CityRail lines to metro. These conversions, in turn, could contribute towards the expansion of two-dimensional rail coverage within a larger inner core. For many cities, it is this combination of metro technology and two-dimensional coverage that is the true measure of "metro style" operation.

The metro conversion plans in <RailPlan.doc> have been reviewed in the light of the announcements of North West Metro and West Metro. The detailed outcome is different, and maybe somewhat better, in that metro conversion would now be applied to the Chalmers Street lines, rather than to the City Circle. This leads to the ESR, and hence all non-express services out of the Sydney CBD, becoming metro, and the City Circle remaining under CityRail control. A metro ring route to the west of the CBD, joining the F6 corridor, the airport, Chatswood and possibly Brookvale, as shown in <RailPlan.doc>, is also still a possibility. This route would have interchanges with all other lines, to further expand the core, but a lower capacity metro may be appropriate considering there would be no branching and the current CBD would be bypassed.