

Liveable Sydney

How Would High-Speed Rail Change Sydney and NSW?

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INFRASTRUCTURE

Table of Contents

Liveable Sydney: How Would High-Speed Rail Change Sydney and NSW?

Foreword	3
Executive Summary	4
Eurostar and HS1	8
A Long Term Vision for Sydney	9
Gateways to Sydney	10
Integrated High-Speed Rail Planning.....	11
Accessing Sydney	12
High-Speed Rail Option 1	14
High-Speed Rail Option 2	16
High-Speed Rail Option 3	18
High-Speed Rail Integrated Option	20
Integrating High-Speed into Sydney's Network	22
High-Speed Rail Customer Experience	24
Sydney Suburban Network in 2031	26
Approaches to Funding.....	28
Why High-Speed Rail?	30
Where is Sydney Liveable Today?	32
How are we Living in Sydney?	34
Where could Sydney be Liveable?	36
How High-Speed Rail helps make New South Wales Number One	38
Benefits of High-Speed Rail	39
Conclusion	43
References	44

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Foreword

Transport infrastructure is not an end in itself but is a key factor in nation building and economic prosperity. The NSW Business Chamber and Sydney Business Chamber commissioned this paper in support of our view that what is needed is a bold vision and long term planning by the NSW and Australian Governments working together.

A high-speed rail network along the east coast of Australia will offer a range of benefits to NSW, including better connectivity, delaying the need for additional airports and promoting economic development, particularly in our regional areas. This vision will take time to materialise as high speed rail connections are invariably built in sections over time as the economic and development case strengthens to make them financially feasible.

International experience shows that in almost every high-speed rail case study, existing urban rail infrastructure has initially been used through major cities. Dedicated high-speed rail urban infrastructure has followed the growth of patronage and hence, the economic and financial case.

Transport is clearly the biggest single issue for Sydney and we support the NSW Government's decision to develop 20-year plans for infrastructure, transport and metropolitan Sydney.

Since the election of the O'Farrell Government in early 2011, the Chambers have been focused on working with the Government to get the foundations right to ensure we don't repeat the mistakes of the past.

It would be an understatement to say that NSW is suffering from decades of underinvestment in transport infrastructure. A single, integrated vision for transport must be developed for Sydney and NSW out to 2061. This vision cannot be developed by the NSW Government in isolation but must also have buy-in from the Federal Government which not only has a funding program for infrastructure, but is also taking an increasing role in policy-making in this space. What we have seen in the past is NSW missing out on much-needed project funding from Infrastructure Australia because proposals were put forward as stand-alone projects without the context of a broader transport network plan.

In the meantime, it is essential that corridors are preserved and that future urban rail systems are not designed to make the introduction of integrated high-speed rail impossible.

High-speed rail, and Sydney's transport planning, needs to be developed in an integrated manner. However, this is not occurring. Instead, the Federal and NSW Governments are conducting their planning in isolation of the other. While the Federal Government is looking at the feasibility of high-speed rail, the NSW Government is developing its long term transport and infrastructure plans, and yet because the plans are separately tasked by different levels of government they do not have the common objective of maximising Sydney's liveability through rail transport.

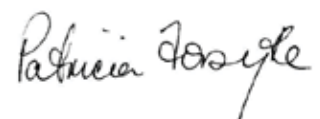
We commissioned this report to highlight the opportunity that could come with both levels of government working together. In addition, there is no doubt that high-speed rail will require considerable public investment and will be one of the more significant pieces of infrastructure built this century. This is seen by some as a reason why high-speed rail shouldn't be built.

However, we believe that governments could do more to minimise these costs and also bring forward the commencement of high-speed rail by examining opportunities for integrating high-speed rail and Sydney's suburban rail infrastructure. This report argues that such integration is possible in the initial period of high-speed rail and needs to be an option put on the table and debated.

While this report uses high-speed rail and Sydney's rail network as the 'case study', it is likely to be relevant to other planning tasks. We hope that this report will make governments aware of the risks and costs of planning in 'silos' over too short a timeframe, and that it will lead to the adoption of a more integrated approach to planning.



Stephen Cartwright
Chief Executive Officer
NSW Business Chamber



The Hon. Patricia Forsythe
Executive Director
Sydney Business Chamber

Executive Summary

The population of the greater Sydney area is predicted to grow to more than seven million in 2036 and to more than eight million in 2056. Given the current and historic rates of housing and transport infrastructure construction, it is likely journey times and housing costs will rise. This is likely to reduce the liveability of Australia's largest city.

The current Federal Government has recognised the importance of productive, sustainable and liveable cities and is taking an increased role in developing urban policies to achieve these outcomes. It is also undertaking Phase Two of its feasibility study into high-speed rail along the eastern seaboard.

At the same time, the NSW Government is developing the *State Infrastructure Strategy* and *Long Term Transport Master Plan*, updating the *Sydney Metropolitan Strategy* and reforming the State's planning system.

Notwithstanding a level of communication between the planning groups, there is currently no evidence to suggest that both Governments are making the most of this opportunity to develop truly integrated transport and land use planning for Sydney. This circumstance is exacerbated with NSW Government's planning horizon being limited to only 20 years—a period too short to consider the strategic value of many transport infrastructure alternatives. The result is a lack of long-term vision for Sydney and a compromised and disconnected collection of projects that risk cutting off the opportunity to improve Sydney and NSW's liveability.

The Federal and NSW Governments are also currently considering Sydney's aviation capacity. However, this is not being considered in light of a potential high-speed rail network along the east coast. Based on experience in comparable locations, a high-speed rail network could delay the need for a second airport in Sydney.

Recommendation

A single transport vision for Sydney out to 2061 should be developed by the NSW and Federal Governments.

Integrated planning is not occurring because there are multiple planning groups within and between governments. While there does appear to be exchange of information between these different groups, ultimately, there is no common planning objective and there are different timeframes involved.

It is clear that this separate approach which both governments have taken to their current rail planning is unlikely to lead to an optimal outcome for Sydney. Both the NSW and Federal Governments need to assume joint responsibility for ensuring optimal outcomes from transport infrastructure, by examining high-speed rail through Sydney from a broader land use planning perspective. This requirement will also need to be reflected in the terms of reference for the high-speed rail feasibility study.

Recommendation

The NSW and Federal Governments should form a joint steering committee charged with determining the design and operation of high-speed rail through Sydney, which will feed into the Federal Government's feasibility study on high-speed rail. Membership of this committee should comprise both government and non-government experts on transport and land use planning. The terms of reference for this group should focus on developing high-speed rail to achieve optimal land use outcomes as well as designing high-speed rail to integrate in the initial period with Sydney's suburban rail network.

How the proposed high-speed rail service accesses Sydney is vital to ensuring patronage and the case for its multi-billion dollar investment. In Phase One of the Federal Government's feasibility study into high-speed rail, the report proposed three alternative routes through Sydney: via Homebush, via Parramatta and via Eveleigh/Central. This report analyses each alternative to demonstrate the significant impacts each option would have on Sydney's already heavily congested transport network. This could mean not only difficulties with high-speed rail passengers accessing their final destination (or equally, difficulties in Sydneysiders accessing high-speed rail from their origin), but it could also have detrimental effects on Sydney's transport network. These factors need to be considered when determining the optimal route through Sydney.

Phase One of the Federal Government's feasibility study did not explore the option which integrates the service with Sydney's suburban rail network in the interim period, until dedicated high-speed rail infrastructure can be justified. This option is consistent with the approach taken in developing almost every existing high-speed service worldwide. A major benefit of this approach is that it prevents the need to immediately construct dedicated infrastructure through Sydney, which would enhance the economic viability of developing a high-speed rail network through Sydney in the shorter term.

Recommendation

The Federal and NSW Government should integrate high-speed rail services with the Sydney suburban rail network as the initial solution until separate high-speed rail infrastructure can be economically justified.

To integrate a high-speed rail service with the Sydney suburban rail network, a second harbour crossing will be needed. However, the recently announced plan by the NSW Government, *Sydney's Rail Future*, does not allow for the integration of high-speed rail with the suburban network. This is because it is generally unviable for high-speed rail services to share with the rapid transit trains proposed to travel the second harbour crossing. In effect, the NSW Government's recent proposal has planned high-speed rail out of the current network, which will mean that the economic gain of integration is not realised, thereby placing the development of a high-speed rail network at risk. In addition, a second harbour crossing which utilised both high-speed rail and suburban rail would likely increase

its viability, and also make a case for joint funding from the NSW and Federal Governments which would reduce the call on either Government's funds.

The North West Rail Link is an important piece of infrastructure to Sydney, but it should be designed to permit both a link to North Western Sydney and the operation of high-speed rail through Sydney's CBD. The current North West Rail Link is configured to improve its attractiveness as a public-private partnership, but doing it in a way which enables high-speed rail into the future can improve the benefit-cost ratio of its individual components. The Government should plan for both.

Recommendation

The NSW Government should revise its recent rail plan, *Sydney's Rail Future*, to ensure it does not prevent high-speed rail from travelling through the Sydney CBD as a result of limiting the second harbour crossing and North West Rail Link to rapid transit rail.

Sydneysiders are currently faced with long commute times, congestion issues and low housing affordability. It is these issues which detract from Sydney's liveability. Journey times to education and employment have a significant impact on the liveability of different areas of Sydney. The current general practice is to focus on proximity to a transport service in land use planning; however, total journey time to areas of education and employment opportunity would be a more apt metric to determine the liveability of pockets of Sydney.

Recommendation

The NSW Government should shift the focus of land use and transport planning from measuring proximity to a transport service to measuring total journey time, to better reflect 'liveability'.

A high-speed rail network would address part of Sydney's housing affordability and transport issues and should be integrated into Sydney's current rail network. This would also provide greater justification and potentially increased access to funding for a second harbour crossing. A broader view of high-speed rail needs to be considered by Governments and this should occur in NSW through inclusion of high-speed rail in the Government's multiple planning mechanisms relating to transport and land use.

It is clear Sydney needs to construct more housing to address Sydney's current housing affordability issues. Sydney needs to construct both infill and greenfield housing. However, space for greenfield development will diminish over time, especially in areas which offer prime agricultural land, and it is unlikely that infill development will occur to the extent that is needed to provide affordable housing for Sydney's growing population.

Yet with Sydney's current and planned transport infrastructure, expanding Sydney's boundaries for residential development is not currently viable as these areas are effectively 'unliveable' due to the length of time it would take to access education and employment opportunities across Sydney. Together with a focus on policies to create jobs across all areas of Sydney, high-speed rail could improve the total

liveability of Sydney through reducing journey times. By providing access to previously 'unliveable' areas, developable land supply increases which will help to address housing affordability issues.

Recommendation

The NSW Government should include high speed rail as part of its *Sydney Metropolitan Plan*, *Long Term Transport Master Plan* and *State Infrastructure Strategy* in order to help address housing affordability and journey time issues.

High-speed rail can only be built over many years and in stages. International experience with high-speed rail shows that it needs to happen incrementally in order to be economically feasible. This could be done in Sydney and this would bring forward the commencement of high-speed rail between Newcastle and Canberra. However, in order for this to occur in Sydney, both Governments need to recognise the broad benefits high-speed rail can provide to cities beyond just improving access between Sydney and Canberra, Newcastle, Melbourne and Brisbane, and incorporate high-speed rail into broader land use planning. If these benefits are recognised, and the integrated option is considered, high-speed rail could become a likely probability.



Eurostar and HS1



Europe's high-speed network was extended to London with the commissioning of the Channel Tunnel in 1994. The Eurostar service linked central London with central Paris and Brussels, and today the service extends to the ski fields in southern Europe. With the opening of the High Speed 1 dedicated line, linking London with the Channel Tunnel, on the 13th anniversary of the service in 2007, the service to Paris now only takes two hours and 15 minutes.

This high-speed service out of the network-integrated St Pancras station is a relatively new experience. For more than a decade the Eurostar service operated on shared infrastructure, some of it more than 100 years old. This integration with suburban rail limited the service to a speed of less than 80 km/h in places and caused the timetable of some services to include complete stops prior to junctions. Still, with a 30 per cent slower total time of just under three hours, the service secured a share of more than 60 per cent of the intercity travel market. Increased speed, frequency and reliability have improved this performance, and the dedicated infrastructure to access London has increased the share over 70 per cent and lifted passenger numbers 10 per cent to more than 9 million per year (Eurostar 2011).

Eurostar proves the benefits of high-speed rail are not dependent on the provision of the fastest possible service on dedicated infrastructure.

A Long Term Vision for Sydney

The recently published Federal Government report *Our Cities, Our Future* presents a clear focus on a productive, sustainable and liveable Australia in the years and decades to come. After the 2011 publication of the NSW Government's *NSW 2021*, which presents 32 goals to 'rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen our local environment and communities', it is timely to have a closer look into ways to make our state more productive and liveable.

Sydney's positive score in liveability surveys obscures the stress many Sydneysiders feel. Even though Sydney proves to be a very liveable city on a worldwide scale, what makes a city liveable in the end comes down to the experience of its inhabitants. The positive score on issues like education and sustainability cannot take away the stress that many Sydneysiders experience due to the long commute times, congestion issues and housing affordability. It is clear how improvements in Sydney's liveability standards can be realised deserves closer analysis.

In increasing liveability with these issues in mind, improving the transport network will play an important role. The loss of productivity from congestion, and stress from unreliable and long commute times will be diminished by a more effective transport network. The extension of Sydney outwards, particularly as it has stretched north beyond Pittwater, makes high-speed rail an option worth looking into.

Ever since the first high-speed train was introduced in Japan in 1964, high-speed rail has increased the capacity to be liveable for cities worldwide. Cities with enviable qualities from a Sydneysider's perspective such as Paris or Barcelona underline this notion. A key part of their liveability stems from an effective transport network integrated with regional and intercity ground transport links, including high-speed rail.

The population of the greater Sydney area is predicted to grow to more than seven million in 2036, and more than eight million in 2056. This growth positions Sydney for considerable change and its stature as a liveable city at considerable risk. A lack of proactive responses in land use and transport policy would shift Sydney's

poor stance of housing affordability to new lows, while congestion would force industry interstate or offshore.

An east coast high-speed rail service akin to that proposed in the Federal Government's recent study would introduce a new transport interchange in Sydney of a scale equivalent to the Sydney Airport today. Over 100,000 journeys would use the station and require convenient interchange and accessibility to the whole of Sydney. This is not something that just any location in Sydney can support.

It is therefore timely to consider high-speed rail in the context of Sydney's transport network. The Federal Government is progressing the high-speed rail study, reviewing the other intercity gateway—Sydney's current airport and potential second airport—and the New South Wales Government is developing the Long Term Master Plan and updating the State Infrastructure Strategy and the Metropolitan Strategy. All these efforts target liveability directly or indirectly.

However, the NSW Government's planning horizon is limited to only 20 years. This period is too short to consider the strategic value of many transport infrastructure alternatives. The result of this is a lack of long term vision for Sydney and a compromised and disconnected collection of projects that risk cutting off the opportunities to improve Sydney and NSW liveability.

Sydney needs a single transport vision out to at least 2061 to sufficiently guide infrastructure and land use planning. This vision should be developed by both the NSW and Federal Governments given their joint role in infrastructure planning for Sydney and NSW. This vision should guide the 20-year plans to ensure these plans address the projected medium-term population growth and settlement patterns without effectively planning future infrastructure solutions out of the system by encroaching on corridors or increasing their costs.

Recommendation

A single transport vision for Sydney out to 2061 should be developed by the NSW and Federal Governments.

Gateways to Sydney

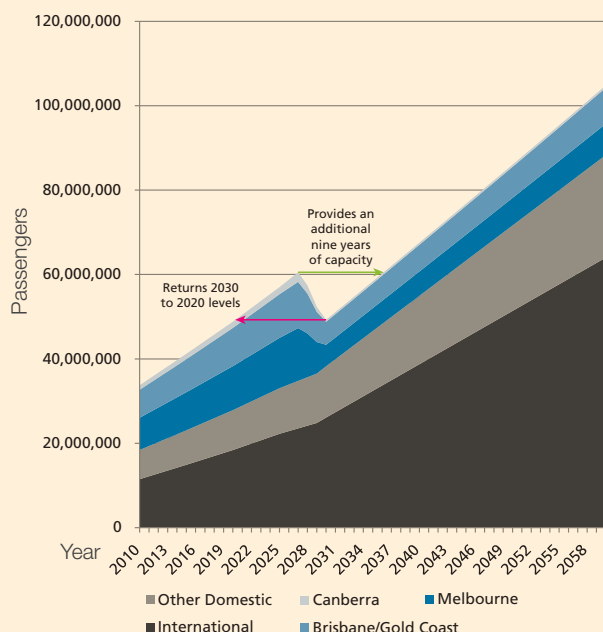
A high-speed rail service extending north of Newcastle and to Canberra and beyond to the south transforms the fast commuter service infrastructure into gateway infrastructure for access to Sydney. The uncompetitive slowness of the existing CountryLink services means that Sydney's only passenger gateway today is Kingsford Smith Airport. The convenient location of the airport to both the economic hub and seaport infrastructure drives investment and creates capacity challenges as Sydney grows.

The central location of Sydney Airport also results in regulatory constraints on the capacity with a curfew and a maximum number of aircraft movements in an hour. Its location, adjacent to commuting corridors, provides good access outside the peak, but causes unreliability for the ground transport links as the gateway and commuter transport compound congestion. As a result, a traveller from Sydney cannot reach Melbourne's CBD before 8:30am and depart for the return journey later than 7:30pm, with little more than 2,000 seats available for a departure after 5pm. A high-speed service would provide equivalent or better journey times from much of the Sydney basin to Melbourne's CBD, do so at a lower cost, be more reliable, be more sustainable, permit the ability to stay connected and work or meet, provide greater capacity when the demand is highest and would not be constrained by the curfew.

It is then no surprise that high-speed services often capture more than 60% of the market share for intercity travel for cities 3–3½ hours apart, and more than 80% for cities as close as Canberra is from Sydney.

The ability to respond to the rapid growth of patronage at Sydney Airport, particularly for international travel, is a topic of national concern. As illustrated in the diagram below, the distribution of the role as a gateway for domestic travel away from Sydney Airport to the high-speed rail stations can provide significant benefit that in combination with a second airport could alleviate any need to upgrade the ground transport links.

Sydney Airport Passenger Volumes



Integrated High-Speed Rail Planning

Integrated planning is not occurring because there are multiple planning groups within and between governments. While there does appear to be exchange of information between these different groups, ultimately there is no common planning objective and difference within some of the timeframes.

It is clear that the separate approach which both governments have taken in their current rail planning is unlikely to lead to an optimal outcome for Sydney. Conflicted or incompatible planning between different tiers of governments is not a new phenomenon, but in this example, it is clear what the consequences will be.

Disjointed planning between the Federal and NSW Governments may ultimately put at risk the presence of a high-speed rail network from Canberra to Newcastle. As this paper will demonstrate, dedicated infrastructure is likely to be prohibitively expensive in the short-medium term, and yet the feasibility study has almost categorically dismissed examining the case for integrating high-speed rail with the suburban network. Not only will an integrated high-speed rail design save billions of dollars, but it is also how almost every international high-speed rail network was built in the initial period.

Conversely, the NSW Government's 20-year transport, infrastructure and planning strategies are unlikely to incorporate high-speed rail because they are only based on a 20-year timeframe and it is generally agreed that the high-speed rail design proposed by the Federal Government will not happen within the next 20 years.

However, planning for high-speed rail is not just about corridor preservation. It is also about adjusting land use and transport plans to both accommodate and benefit from high-speed rail. NSW's plans should begin this process now.

To address this disjointed planning approach, the Federal and NSW Governments should assume joint planning responsibility for the design of high-speed rail through Sydney. The process for deciding on the design for high-speed rail through Sydney should involve both Federal and NSW Governments with representatives from both transport and land use planning agencies, as well as a range of non-government technical experts from these fields. The terms of reference for this group should focus on developing high-speed rail to achieve optimal land use outcomes for Sydney as well as looking for opportunities to integrate high-speed rail with suburban rail. The recommendations of this group will feed into the Federal Government's feasibility process.

Recommendation

The NSW and Federal Governments should form a joint steering committee charged with determining the design and operation of high-speed rail through Sydney, which will feed into the Federal Government's feasibility study on high-speed rail. Membership of this committee should comprise both government and non-government experts on transport and land use planning. The terms of reference for this group should focus on developing high-speed rail to achieve optimal land use outcomes as well as designing high-speed rail to integrate in the initial period with Sydney's suburban rail network.

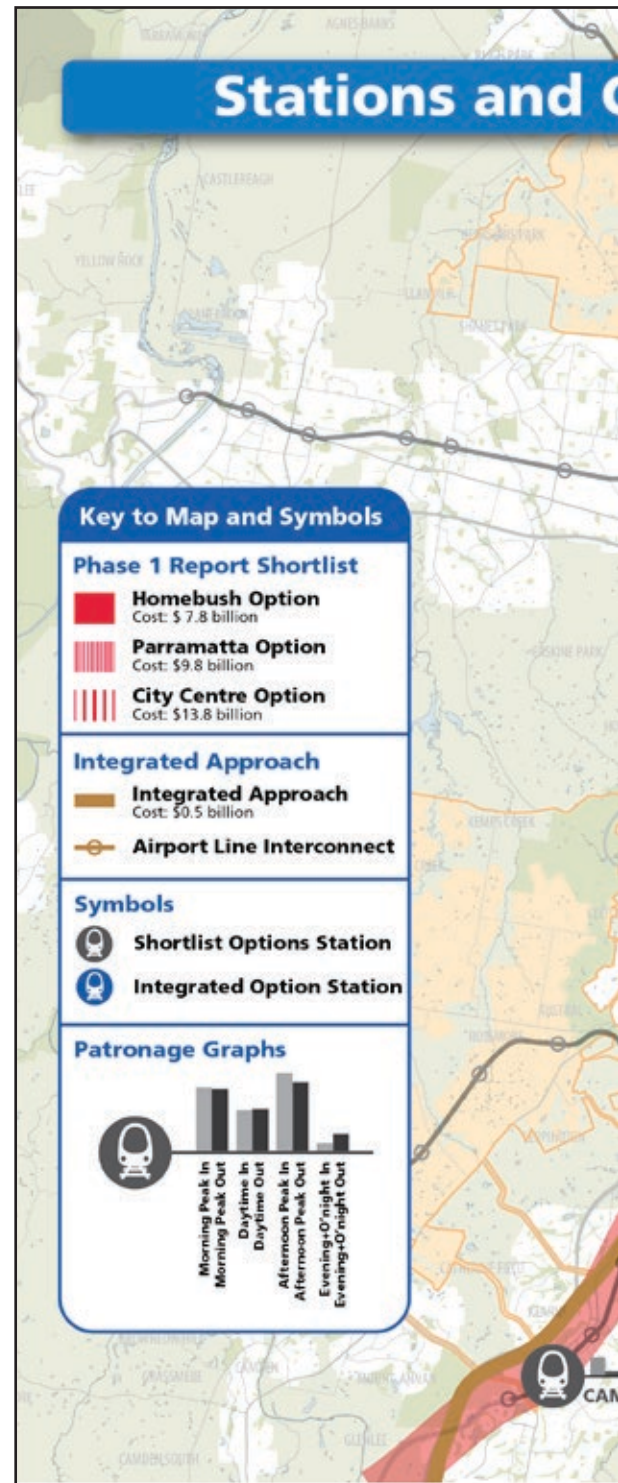
Accessing Sydney

The customer experience is paramount in determining the value of high-speed rail. In absolute speed; it cannot compete with air travel and in convenience; it cannot compete with the car. The requirement to 'split-the-difference' in order to represent an alternative mode means the focus of the design must be the operational service enabled not the infrastructure constructed.

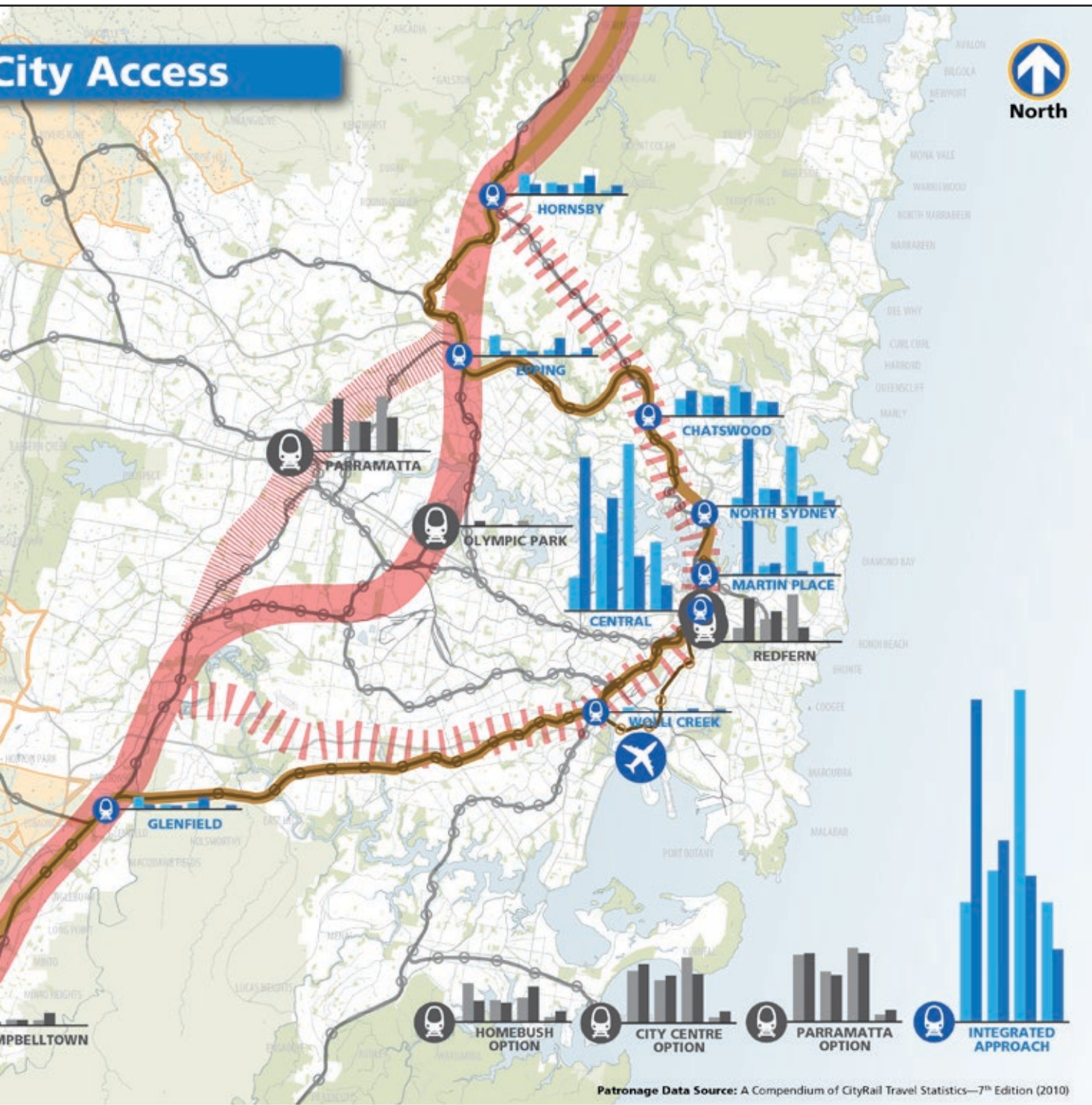
To achieve the differentiated experience that will drive patronage and justify the multi-billion dollar investment, it is the gateways to the service and the destination that will matter. This is no more significant than how the service accesses Sydney.

The Federal Government's High-Speed Rail Study—Phase 1 provides a short-list of three alternatives differentiated by the location of the station expected to service central Sydney. Each alternative seeks to operate the service across the city on dedicated infrastructure with the report estimating costs of between \$7.8 billion and \$13.8 billion. In reaching this conclusion, options such as terminating stations at the periphery and other split-line approaches were examined and dismissed.

One alternative not explored is that of integrating the service with the suburban services, an approach taken in developing almost every existing high-speed service worldwide. The real and opportunity cost of cross-city rail links demand utilisation that high-speed rail can rarely consume alone. In integrating the high-speed services with local services this core infrastructure becomes justifiable.



City Access



High-Speed Rail Option 1

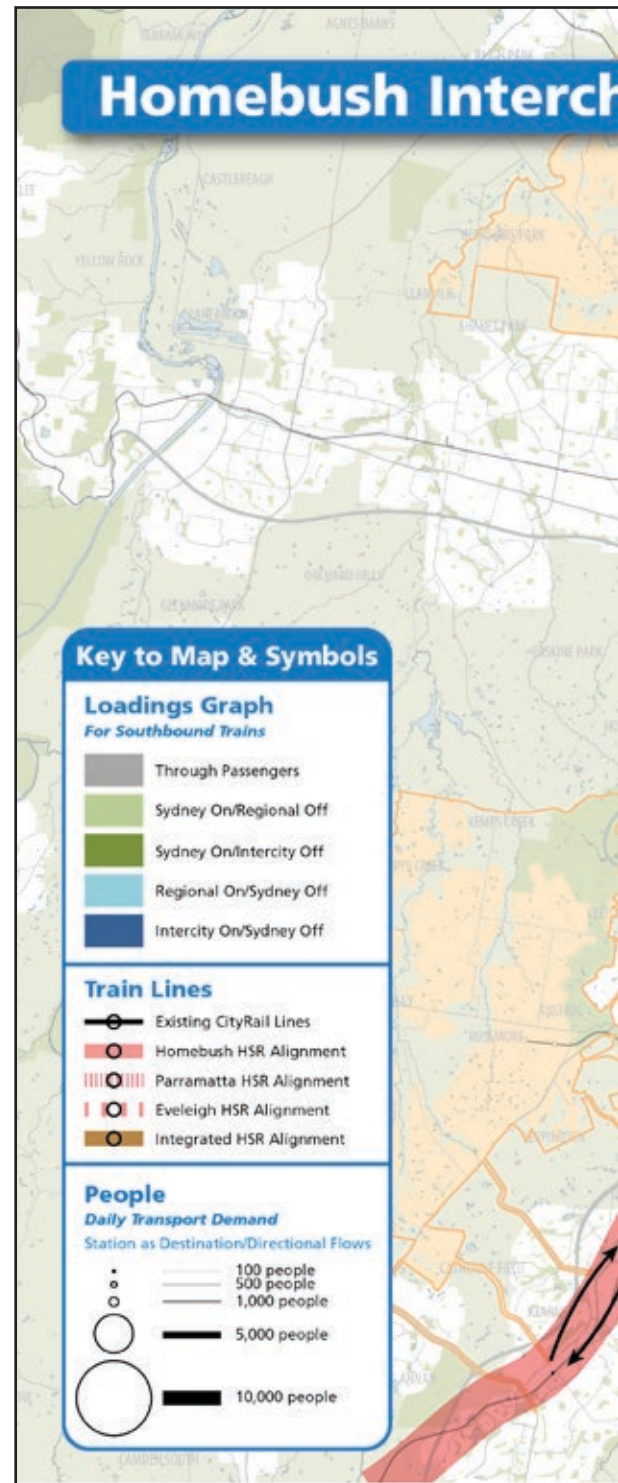
In order of the project cost, the first short-listed option is for the 'central' Sydney station to be located at Homebush. This location is geographically more central than a CBD option, allows for the station to be on the surface and the local land use provides the capacity to use the infrastructure to drive urban regeneration.

Dedicated infrastructure will provide a rapid service and a new surface station in an area of relatively few barriers will ensure excellent customer amenity. However, for Sydney's transport network, Homebush is within an identified corridor with high constraints.

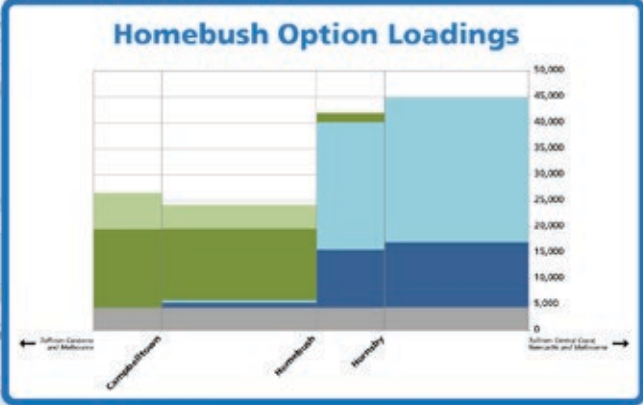
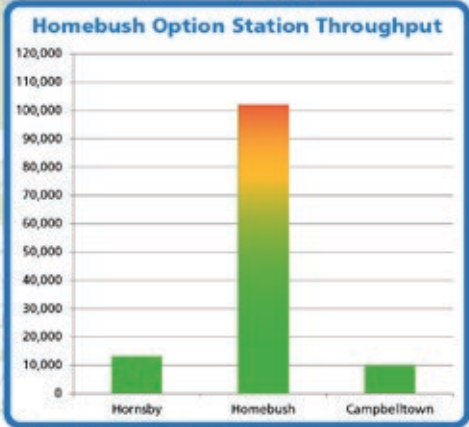
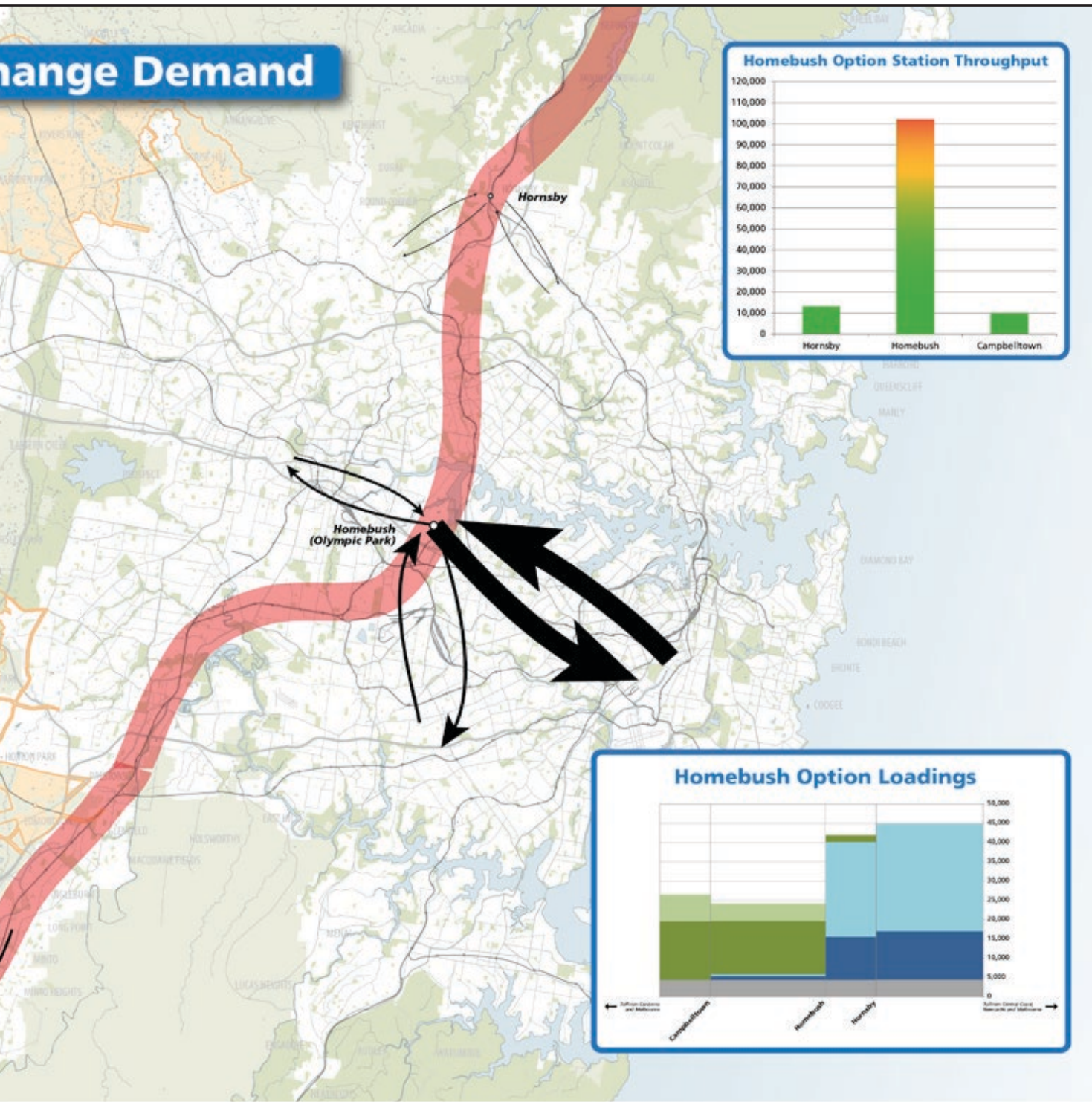
An analysis of the forecast patronage for the service indicates that 98% of the more than 100,000 daily passengers served from the station will require further ground transport. The potential 20,000 regional commuters with city-bound destinations in the morning peak effectively drive a new multi-billion dollar burden on the State to accommodate.

Notwithstanding Sydney's inability to practically service the demand that emerges at the Homebush station, any solution to reliably connect Homebush with the city's core would still provide a longer than 30-minute trip to complete the journey; an impact that effectively destroys the benefit from the pace of the dedicated infrastructure in accessing Sydney.

In terms of the customer experience, locating the gateway to Sydney at Homebush detrimentally affects convenience to the point that the journey time for Sydney to Canberra falls outside the target duration justifying a significant modal shift from air travel, prevents Newcastle from become part of liveable Sydney and more broadly constrains the benefits of the high-speed rail.



Change Demand



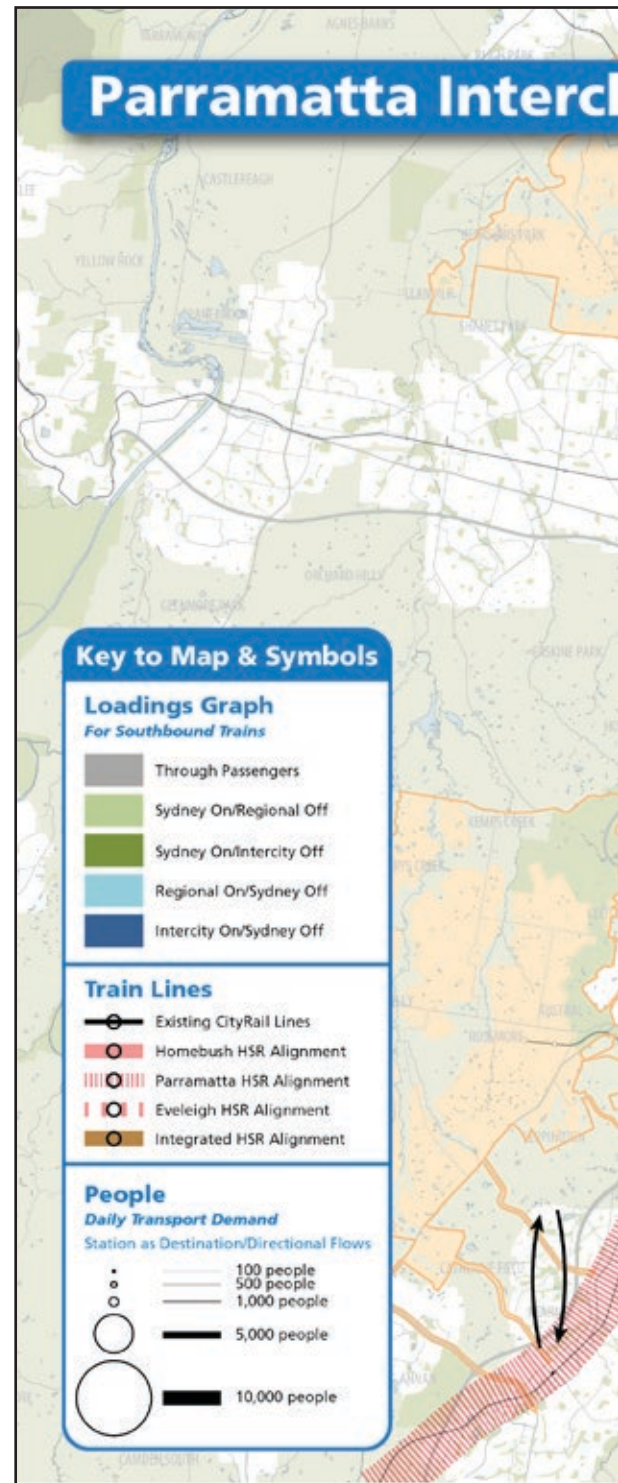
High-Speed Rail Option 2

The next short-listed option for the 'central' Sydney station is for it to be located at Parramatta. This location is close to the geographic centre of Sydney, requires a subsurface station and as a vibrant retail and established commercial centre has constraints for the infrastructure to drive urban regeneration.

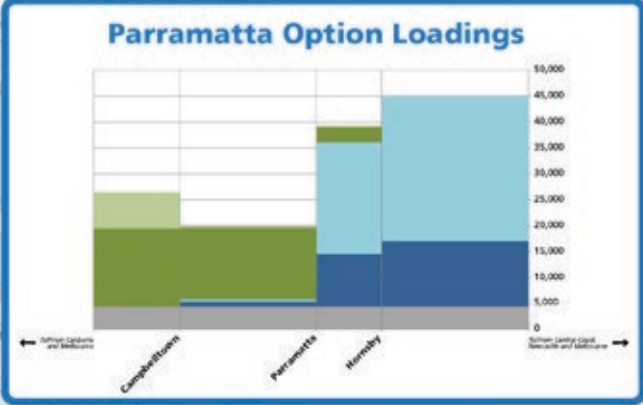
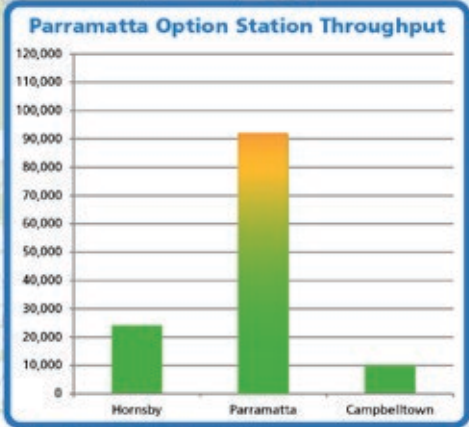
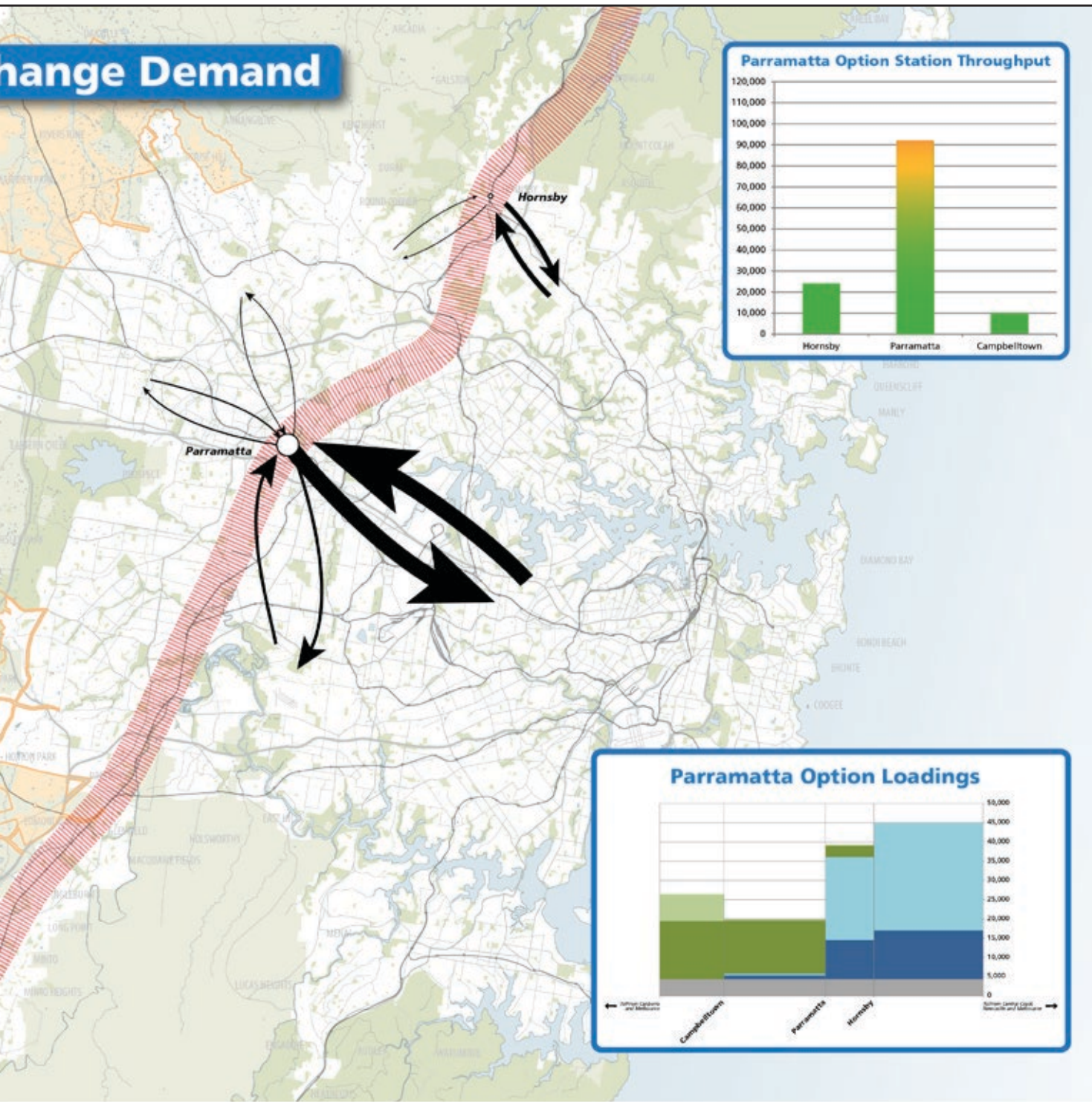
Dedicated infrastructure connecting to the relatively close periphery will provide the most rapid service and a new station provides the potential for suitable customer amenity. Yet, once again, for Sydney's transport network, transport to and from Parramatta utilises an identified corridor with high constraints.

The attractiveness of Parramatta as a destination means that 92% of the 90,000 daily passengers served from the station will require further ground transport. Compared with the previous option, although there would be 25% less demand city-bound, accommodating it would require new infrastructure. A large part of this improvement stems from the change in the relative convenience for disembarking at Hornsby. However, this may result in costs related to servicing the 10,000 additional trips per day that then originate or terminate at Hornsby.

Notwithstanding the lack of capacity, Parramatta is well serviced for connection across Sydney greatly improving the convenience for passengers over Option 1. In terms of the customer experience, locating the gateway to Sydney at Parramatta does not appear to drive the same detrimental effects as indicated for Homebush; however, the lack of capacity in the existing transport network would be expected to reduce the reliability of the door-to-door journey time of high-speed services, a key driver for the connectivity related improvements in productivity and competitiveness against air travel.



Change Demand



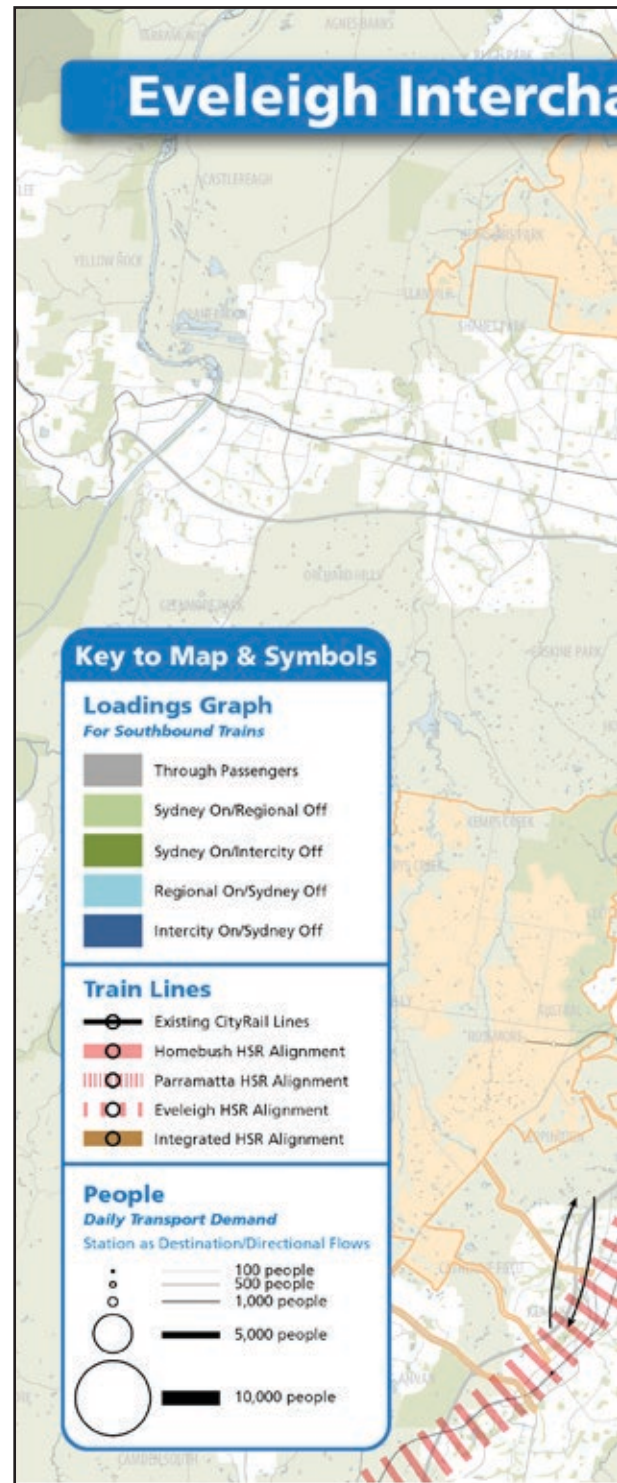
High-Speed Rail Option 3

The final short-listed option for the ‘central’ Sydney station is for it to be located at Eveleigh or Central. In considering this option, the challenge for integrating a high-speed rail station at Central and accommodating the additional 100,000 passenger movements in the immediate area would appear to offset the benefit the proximity to the CBD the alternative provides, particularly as 85% are still expected to require further ground transport. The capacity to support greater passenger amenity from the station at Eveleigh suggest this is more viable option than either Options 1 or 2.

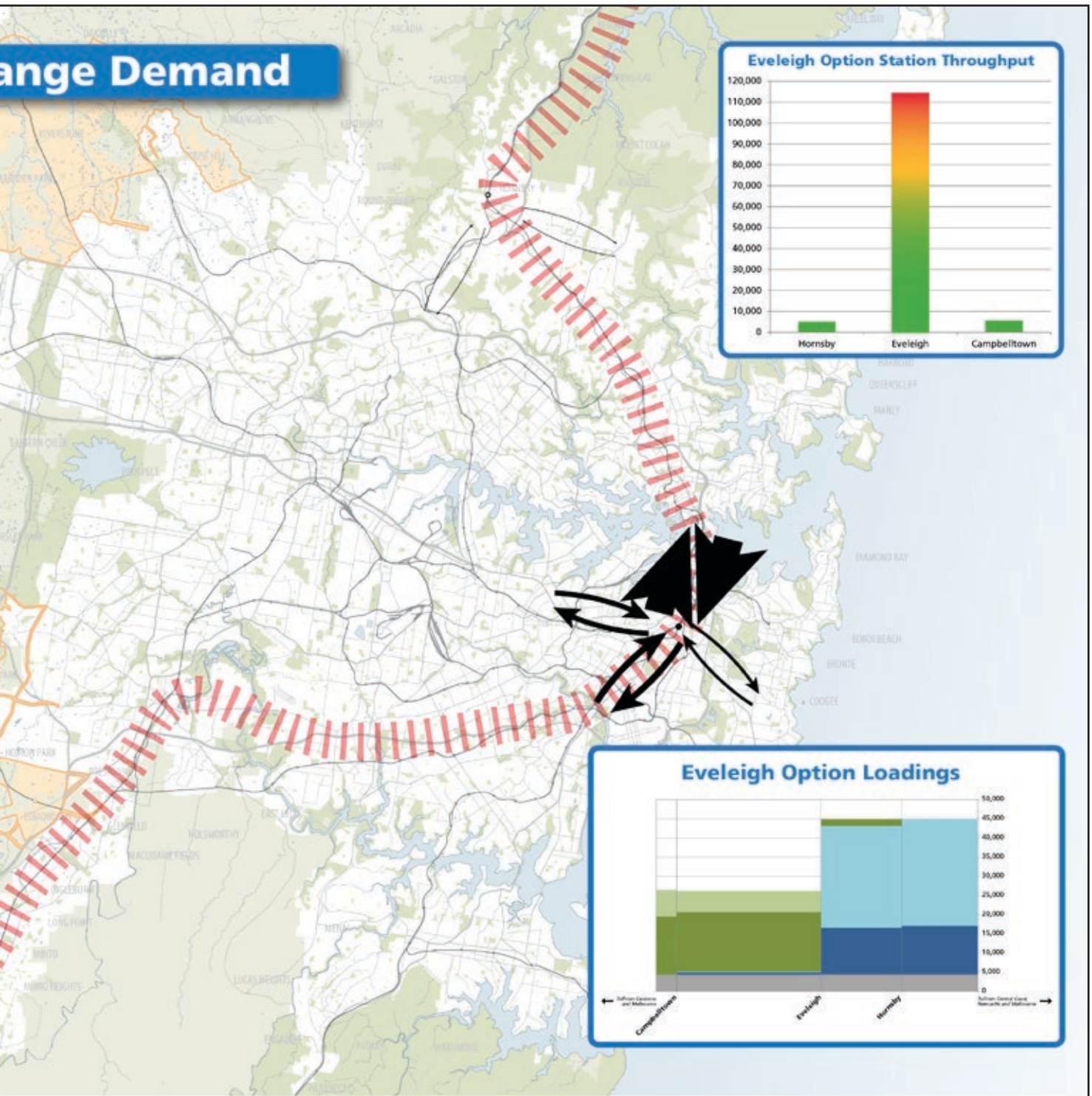
This location is close to Sydney’s CBD and airport and as a non-gentrified inner urban area provides potential for the infrastructure to drive urban regeneration. The dedicated infrastructure will provide a rapid service, albeit the slower service of the study’s short-listed options. The proximity to the CBD provides convenience and as it is close to the core of the transport network, the links across the city are excellent although the close alignment of the peak utilisation of ground transport links by high-speed rail with the commuter peak of the same capacity will exacerbate congestion.

The limited attractiveness of Eveleigh as a destination means that 99% of the 115,000 daily passengers served from the station will require further ground transport. The combination of commuters and intercity patronage will generate 15,000–20,000 peak trips north to the CBD, inclusive of 3,000–5,000 travelling back across the harbour. The shorter distance lowers the scale of the infrastructure that would support this demand, but it remains a demand that the current network could not support without billion dollar investments.

A station at Eveleigh is well serviced for connection across Sydney providing convenience; however, this results in a heavy bias for the patronage at the station requiring a large scale to facilitate. In terms of the customer experience, locating the gateway to Sydney at Eveleigh provides the fastest and most reliable journey times.



Change Demand

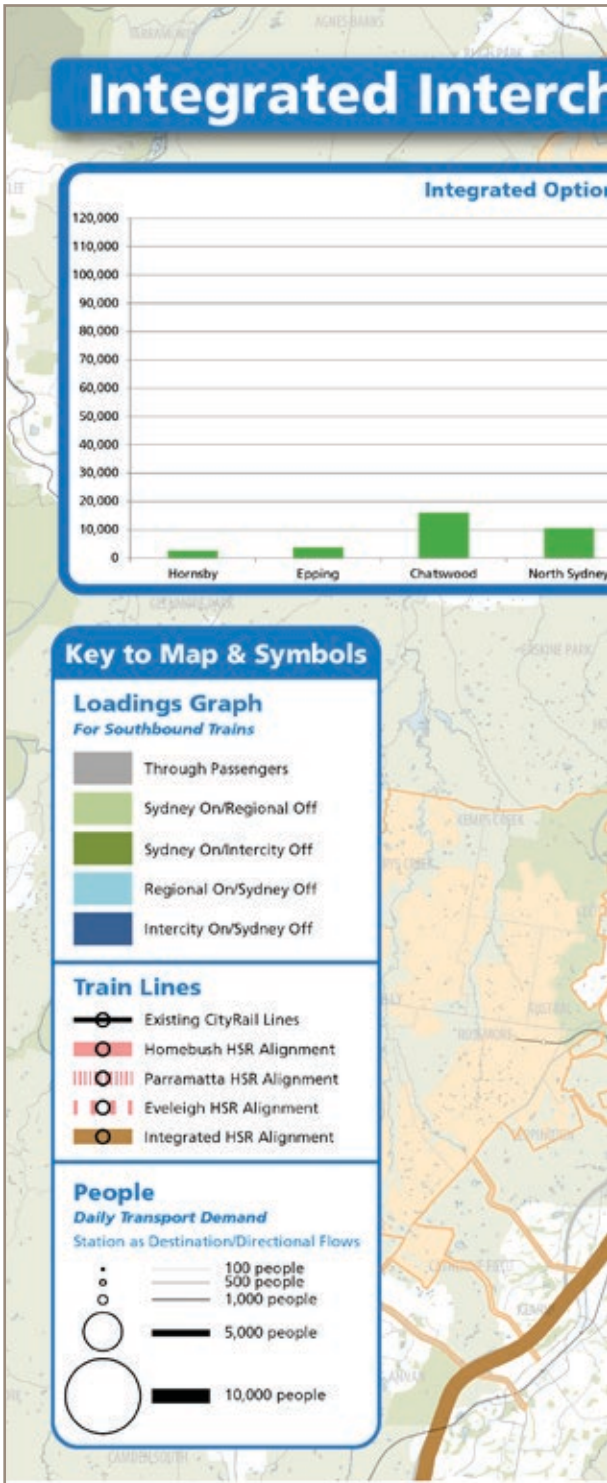


High-Speed Rail Integrated Option

In June 2001, the New South Wales Office of the Co-ordinator General of Rail published the *Long-Term Strategic Plan for Rail*. In order to integrate high-speed services with Sydney's transport network, the Sydney suburban rail network must be expanded and operated in the fashion proposed at that time. In particular, the operational approach for the network must provide a new main line through the city that enables services that directly connect north of Hornsby to both south of Sutherland and south-west of Campbelltown. The expanded capacity of this approach for Sydney's suburban network exceeds the needs of Sydney until at least 2041 and thus, it affords the ability to integrate other services, including high-speed rail. This improves the use of the infrastructure and the justification for its implementation.

This approach also maximises the benefit from the customer experience. The service links directly to desired destinations and conveniently to the high density origins. The requirement to stop more frequently to integrate with the suburban services actually enhances the convenience and more evenly distributes the gateway transport demand across the city to locations better suited to address it. This distribution eliminates the requirement for any significant investment in transport infrastructure specifically to accommodate the gateway demand. The slower operation does extend the journey times, yet this is more than compensated by the convenience for access to the service. The trip from Sydney to Canberra is faster from Sydney CBD than using any other option. The result is that no station need accommodate more than 22,000 passenger movements with as little as 20% requiring further ground transport to complete their journey. This allows for the service to operate without the need for additional platforms at any underground station.

The integration with the suburban network provides direct interchange at each stop to connect across Sydney and expands the liveability of the regional commuter areas the high-speed service serves. In a similar fashion to the implementation of the Eurostar, Sydney could obtain the benefits of high-speed rail for a decade at an entry cost potentially \$10–15 billion less than dedicated options. In so doing it would assist in the justification of the much needed CBD extension and second harbour crossing components of Sydney's suburban rail network expansion.

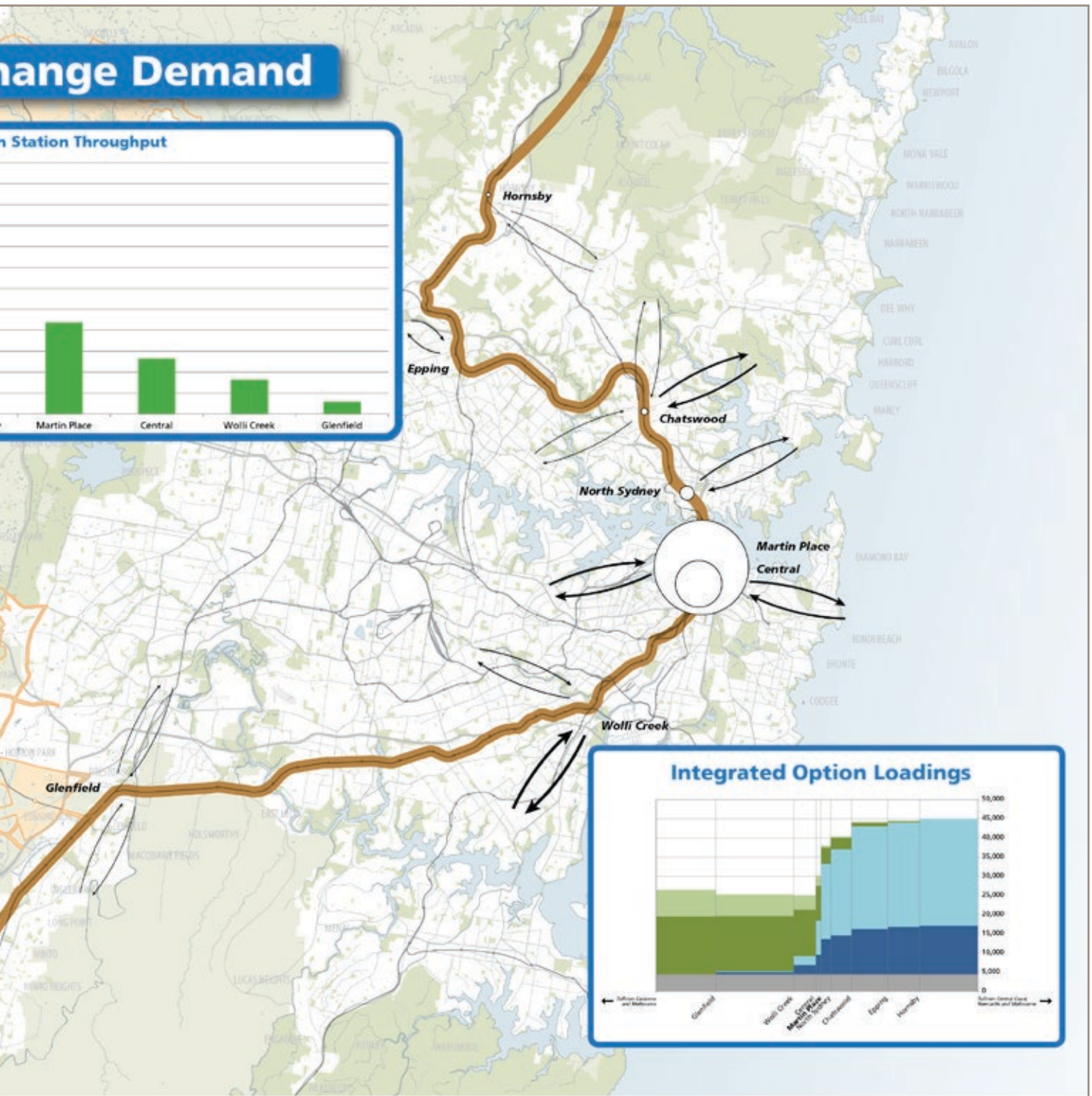
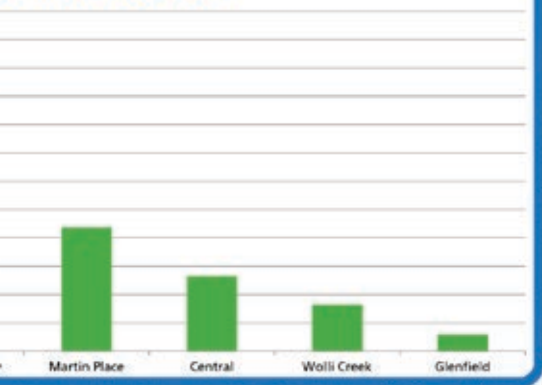


Recommendation

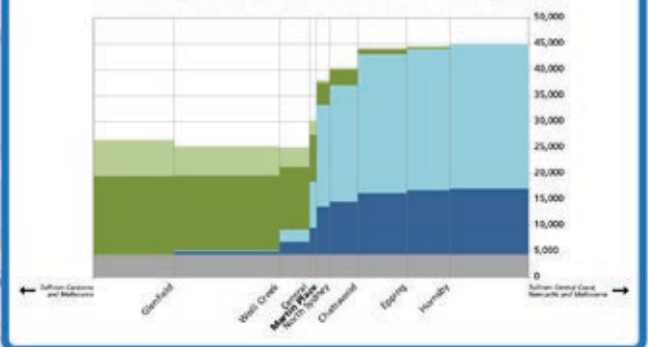
The Federal and NSW Government should integrate high-speed rail services with the Sydney suburban rail network as the initial solution until separate high-speed rail infrastructure can be economically justified.

Change Demand

Station Throughput



Integrated Option Loadings



Integrating High-Speed into Sydney's Network

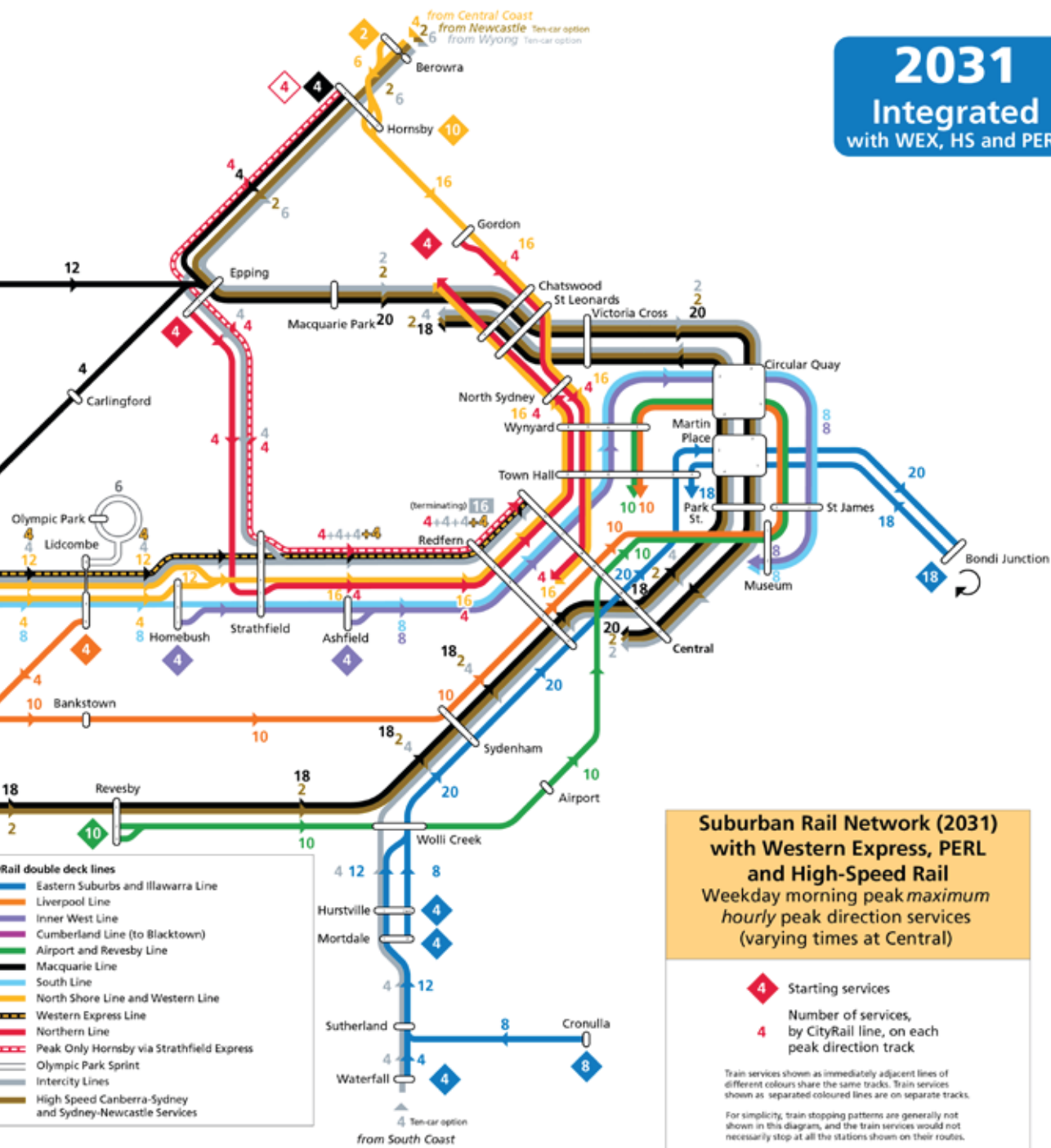
The adjacent diagram is a potential train plan for the morning peak hour operation of Sydney's suburban rail services incorporating integrated high-speed services from Melbourne, Canberra and the Southern Highlands and Gosford, Newcastle and Brisbane. The plan assumes the expansion of the Sydney Rail network proceeds as planned in 2001. The plan represents a service capacity not forecast to be required by Sydney until after 2041 thus allowing additional peak high-speed services to be possible prior to that date.

Nevertheless, the plan still permits high-speed services to deliver the equivalent of 80% of capacity provided by all flights from Melbourne arriving between 7:30 and 8:30am and more than 100% of the capacity provided by all flights from Brisbane and Canberra. Outside these hours, Sydney Rail decreases its utilisation of the network providing an integrated high-speed service the ability to respond to demand for many decades and, via the use of multiple 'train-paths' through the network, improve the customer experience via decreased journey times across Sydney.

The significant benefits from integration do not occur without impacts that the proposed integrated planning between the stakeholders would be able to mitigate. These include selecting the preferred solution to the potential reliability issues due the inter-lining of the services at Epping and the counter-desirable outcome that the slowest journey time occurs during the peak business traveller period.



2031 Integrated with WEX, HS and PERL



High-Speed Rail Customer Experience

Customer experience is not predicated purely by the journey time or the on-board service. The high reliability, load-management based fare pricing, elimination of modal interchange, the ability to continue to stay connected or even undertake meetings on-board are all noted as factors that provide high-speed services an improved customer experience over air travel.

The adjacent table provides indicative detail regarding the cost per one way trip and the total journey times station to station for Regional services and CBD to CBD for Intercity services. These figures are based on our estimates calculated from benchmarking comparable international services.

The regional services are markedly faster, yet the lack of an association between distance and cost in Sydney rail services means that the improved service of high-speed rail, compared to existing options, has a considerable price premium. The extended distance to Melbourne and Brisbane is at the limit of high-speed rail journey time competitiveness but the relatively uncompetitive domestic market for air travel and inconvenient links to the airports provides a competitive experience at considerably lower cost. Notably and in accordance with international experience, Canberra is at a ‘sweet spot’ distance from Sydney and Melbourne to allow high-speed services to provide significantly improved journey time and cost against air travel.

The integrated services are slower, yet with the exception of business travellers to and from Brisbane and commuters in the Gosford region, the 17–26 minutes of additional journey time can be seen not to remove the benefit for commuters or undermine the customer experience outcome for high-speed intercity travel.

	Integrated (Regional)				
	Gold Business	Gold Standard	Silver	Silver Monthly	Senior
Newcastle to Sydney	\$50.60	\$26.00	\$16.40	\$11.80	\$7.10
Newcastle to Chatswood	\$61.10	\$31.30	\$19.80	\$14.30	\$8.50
Gosford to Sydney	\$38.00	\$19.50	\$12.30	\$8.90	\$5.30
Gosford to Chatswood	\$27.50	\$14.10	\$8.90	\$6.40	\$3.80
Bowral to Sydney	\$34.50	\$17.70	\$11.20	\$8.10	\$4.80
Bowral to Chatswood	\$46.20	\$23.70	\$15.00	\$10.80	\$6.40
	Integrated (Intercity)				
	Gold Business	Gold Standard	Off-Peak	Discount	Senior
Sydney to Canberra	\$138.00	\$71.00	\$45.00	\$32.00	\$19.00
Sydney to Melbourne	\$330.00	\$169.00	\$107.00	\$77.00	\$46.00
Sydney to Brisbane	\$414.00	\$212.00	\$134.00	\$97.00	\$58.00
Melbourne to Canberra	\$228.00	\$117.00	\$74.00	\$54.00	\$32.00

	Dedicated (Regional)						CityRail (Regional)					
Journey Time	Gold Business	Gold Standard	Silver	Silver Monthly	Senior	Journey Time	Single	Off-Peak Return	Weekly	Monthly	Senior	Journey Time
1:12	\$70.20	\$36.00	\$22.80	\$16.40	\$9.80	0:46	\$8.20	\$5.70	\$5.90	\$5.12	\$2.50	2:29
0:58	\$84.70	\$43.45	\$27.50	\$19.80	\$11.80	0:41	\$8.20	\$5.70	\$5.90	\$5.12	\$2.50	2:18
0:51	\$52.70	\$27.00	\$17.10	\$12.30	\$7.40	0:25	\$8.20	\$5.70	\$5.90	\$5.12	\$2.50	1:17
0:37	\$38.20	\$19.59	\$12.40	\$8.90	\$5.30	0:20	\$6.40	\$4.40	\$5.00	\$4.33	\$2.50	1:07
1:00	\$47.80	\$24.49	\$15.50	\$11.20	\$6.70	0:43	\$8.20	\$5.70	\$5.90	\$5.12	\$2.50	2:05
1:14	\$64.10	\$32.86	\$20.80	\$15.00	\$8.90	0:48	\$8.20	\$5.70	\$5.90	\$5.12	\$2.50	2:34
	Dedicated (Intercity)						Flight (Intercity)					
Journey Time	Gold Business	Gold Standard	Off-Peak	Discount	Senior	Journey Time	Business Class	Fully Flexible	Flexi Saver	Red eDeal	Discount	Journey Time
1:37	\$191.00	\$98.00	\$62.00	\$45.00	\$27.00	1:20	\$509.00	\$421.00	\$250.40	\$124.40	\$104.40	2:26
3:44	\$458.00	\$235.00	\$149.00	\$107.00	\$64.00	3:23	\$703.00	\$604.00	\$272.40	\$131.40	\$85.40	3:21
3:54	\$484.00	\$248.00	\$157.00	\$113.00	\$68.00	3:28	\$707.00	\$612.00	\$269.40	\$128.40	\$114.40	3:16
2:02	\$267.00	\$137.00	\$87.00	\$63.00	\$37.00	2:02	\$632.00	\$565.00	\$290.00	\$136.00	\$122.00	3:09

Sydney's Suburban Network in 2031

The looming exhaustion of capacity of the rail network has been the subject of long-term rail planning for more than 15 years. In February 2012, the NSW Government's Long Term Transport Master Plan discussion paper was released, including supporting material. This plan will outline the expansion and operational changes forecast to respond to Sydney's increasing population and larger urbanised area. In addition to progressing the North West and South West rail links, the federally-led freight line expansions, and light rail extension and expansion, the discussion paper reaffirms the position from the Long-Term Strategic Plan for Rail of June 2001, stating that Sydney needs a second harbour crossing.

There are a number of approaches to how this second harbour crossing might link into the current network and how the expanded network would operate. The recently released Sydney's Rail Future proposes an operating plan that does not permit the option for integration via the new harbour crossing and as such prevents the spare capacity of this infrastructure to be accessed by any other services.

Alternatively, the original planning for the harbour crossing provides an approach that will support integration with high-speed rail. This approach seeks to expand the network in such a fashion to provide a new north-south main line through the city. Despite Sydney having four rail links into greater New South Wales, the suburban operation of the network prevents direct connection—that is, there is always a requirement to interchange in order to traverse Sydney north-south.

Realising the full benefit of a new harbour crossing depends on integrated planning of the second harbour crossing and the high-speed rail. Configured in stages, first integrating south of Berowra and utilising the spare capacity of the Northern Sydney Freight Line during the peak, then underground at St Leonards, the intercity and regional high-speed services can progressively improve, retain flexibility in configuration and be responsive to the changing operational needs of the Sydney suburban network—exactly as high speed services have most often developed elsewhere.

Operated in partnership with the Sydney Rail services, options such as running some North West Rail Link services via Strathfield, operating the Parramatta-Epping Rail Link as a shuttle during the peak first from Parramatta to Epping and then Parramatta to St Leonards, prevents the need for a dedicated harbour crossing until beyond 2051.

The current configuration of the North West Rail Link and the proposed approach for linking the Parramatta-Epping Rail Link does not allow for this flexibility in operation. It is most likely that the greatest benefit to be gained from the Second Harbour Crossing will be through utilising the spare capacity it provides to a high-speed service—a greater benefit equates to improved funding capacity. Ensuring Sydney's network is correctly configured to inter-operate in or before 2031 is dependent on the planning occurring today.

Recommendation

The NSW Government should revise its recent rail plan, *Sydney's Rail Future*, to ensure it does not prevent high-speed rail from travelling through the Sydney CBD as a result of limiting the second harbour crossing and North West Rail Link to rapid transit rail.

Greater Metropolitan Train Network in 2031

with WEX, PERL, SWRL, NWRL, HSR and 2nd Harbour Crossing

Proposed integrated high-speed rail line running from Melbourne to Sydney to Brisbane via Canberra, with a branch serving Newcastle.

Proposed North West and South West rail links connected via a second harbour crossing.

Proposed second stage dedicated high-speed rail route, bypassing parts of the North Shore and Central Coast.

Proposed new through-running fast interurban train running from the Illawarra/South Coast to the Central Coast via the Second Harbour Crossing.

- Central Tablelands**
 - Bathurst
 - Kello
 - Raglan
 - Yetholme
 - Meadow Flat
 - Mount Lambie
 - Wallerawang
- Blue Mountains**
 - Lithgow
 - Zig Zag
 - Bell
 - Mount Victoria
 - Blackheath
 - Meadow Bath
 - Katoomba
 - Leura
 - Wentworth Falls
 - Bullaburra
 - Lawson
 - Hazelbrook
 - Woodford
 - Linden
 - Falconbridge
 - Springwood

Key to Lines & Symbols

Sydney Suburban Train Lines

- Eastern Suburbs & Illawarra Line** (Wentworthville to Central via Strathfield)
- Liverpool via Bankstown Line** (Liverpool to Museum via Spitalfields)
- Liverpool Express Peak Hours Only** (Liverpool to Museum via Spitalfields)
- Lidcombe via Bankstown Line** (Lidcombe to Town Hall via Spitalfields)
- Inner West Line** (Hornsby to Museum via Strathfield)
- Cumberland Line** (Cumberland to Bankstown via Liverpool)
- Airport Line** (Airport to Town Hall via Airport)
- Macquarie Line** (Parramatta/Harris Park to Star Park/Museum via City)
- Future Extension** (North West Rail Line Extension via Richmond or Macquarie Park)
- South Line** (Leppington to Museum via Strathfield)
- North Shore, Western & Richmond Line** (Epping to Strathfield via Strathfield, Q2 & Chisholm)
- Peak Hours Only** (Central Coast to City via Chisholm)
- Western Express Line** (Epping to Central via Strathfield)
- Northern Line & NWRL** (Northern Line & NWRL to Epping via Chisholm, Town Hall & Strathfield)
- Carlingford Line** (Carlingford to City via Rfiders)
- Olympic Park Sprint & Special Events Services** (Direct services during special events only)

Intercity Train Lines

- East Coast High-Speed Rail Line** (Brisbane to Melbourne via Sydney and Canberra)
- Southern Highlands Line** (Geelong to Central via East Hills)
- South Coast Line** (Perth to Port Kembla to City and Central Coast)
- Blue Mountains Line** (Lithgow to Central via Strathfield)
- Newcastle & Central Coast Line** (Newcastle to City and South Coast)

Regional Train Lines

- Hunter Line** (Some to Dungay to Newcastle via Maitland)

Rail Bus Services

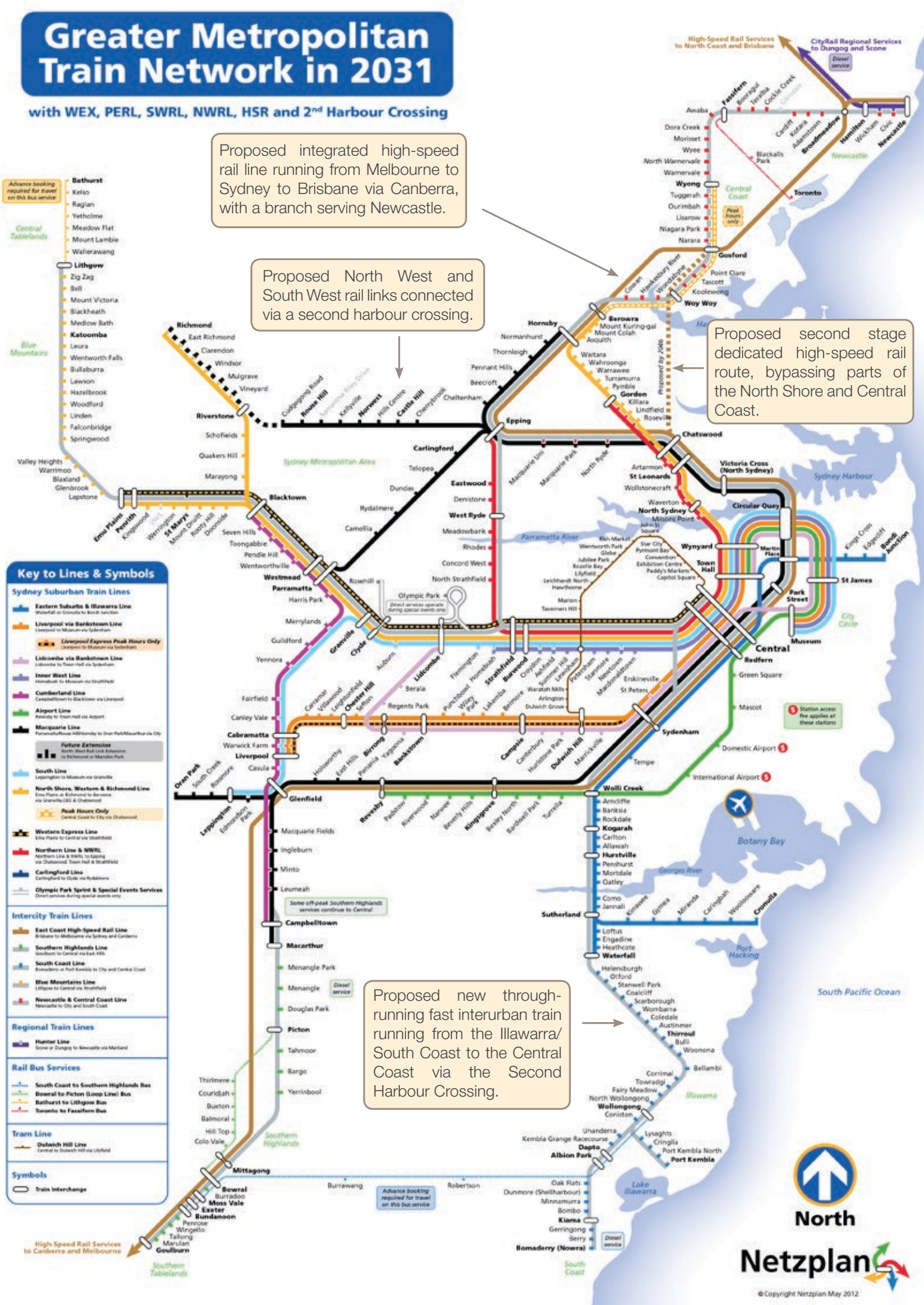
- South Coast to Southern Highlands Bus**
- Bowral to Picton (Loop Line) Bus**
- Bathurst to Lithgow Bus**
- Toronto to Fassifern Bus**

Tram Line

- Dulwich Hill Line** (Central to Dulwich Hill via Uxbridge)

Symbols

- Train Interchange



Approaches to Funding

The uncomfortable reality is that Australia has a far greater need for infrastructure than it can fund. The debate is yet to occur, but nothing will detract from the need to make hard choices as to which projects are progressed in the near term, and which projects that will have to wait until 2030, 2040 or even later. The High Speed Rail Study Phase One report contemplates a \$100 billion project not including the non-trivial ground transport links required to service the new infrastructure. At this cost, the project has no future.

Certainly, there is debate as to the justification of project costs in New South Wales and Australia more generally. We do have higher land costs, our labour costs and conditions are generous in comparison to international standards, and our construction inputs compete with the mining sector. This justifies a premium for infrastructure in Australia, but it is far from clear that it justifies the premium evident in today's project budgeting.

Even with a downward shift in the costing for infrastructure, there remains a gaping chasm between the project pipeline and the available funding. Any high-speed rail project must earn its priority for funding. Part of the challenge for prioritising rail projects stems from their value as a long-term solution—the capacity paid for remains underutilised for decades and thus part of the benefit is transferred too far into the future to be valued today.

The integrated approach considered here is driven by this conundrum. The staging of the implementation to bring forward the highest benefit and delay the highest cost shifts the value proposition. The utilisation of spare capacity in an expanded Sydney rail network improves the justification of the projects that bring that expansion. The requirement to inter-line with suburban operations slows the trip time, but improves the justification through directly connecting the journeys to their destinations and virtually eliminating the gateway ground transport impact. The apparent compromise in the rolling stock to operate through the Sydney network better serves the launch services that are necessarily constrained to commuter operations and provides the option to micro-stage implementation where section-by-section of the existing lines are improved to creep up on a high-speed service.

A dedicated high-speed service may yet be part of Sydney's transport network and access Sydney with a main station in western Sydney; however, targeting this end-game as the initial project may delay its development for forty years or more. In contrast, treating high-speed rail as a strategic customer experience target of a programme of projects allows the improved service to align its development, and therefore, cost with the capacity for the land-use and the community to extract the benefit the service provides.

This greatly improves the viability of the project, but will not be enough to prioritise the first project and start the journey to a high-speed service. Two factors remain to be resolved—the uncertainty for the realisation of the benefits, and the untenable provision of a large part of the benefit to a relatively small pool of private landholders. The two factors are inter-linked. Typically, multi-party private sector interests respond to projects where a clear benefit is provided through increased land values surrounding the project; however, as the size of a project increases, this corresponding scale of uplift becomes progressively less accessible. Experience in Sydney would suggest that it fails at the scale of suburban rail infrastructure and, as such, a more proactive approach will be required to support confidence in high-speed rail and facilitate its prioritisation.

Through agencies such as Urbangrowth NSW, stewardship of the development of master plans of the land most improved by the high-speed rail service will clarify and capture the benefits and, most importantly, ensure their realisation is timely enough to be considered in the evaluation of the programme. In this manner, and in contrast to smaller scale undertakings mostly focused on fixing problems, high-speed rail is capable of justifying itself as a priority project for Sydney, for New South Wales and for Australia.



Why High-Speed Rail?

Transport is not an end in itself. The demand for travel is a response to land use, yet in turn the services available from any land depend on the convenience the transport network affords. It is arguable that if in the past 30–40 years since the early 1970s Sydney had redeveloped the inner suburbs to higher densities with housing suiting today's needs and expectations, a metro network similar to London (inner area density of 25,420 per sqkm, five times Sydney's), Paris (inner area density of 20,169 per sqkm, four times Sydney's) or Barcelona (inner area density of 15,793 per sqkm, three times Sydney's) would have been justified. This alternative path for Sydney's land use would have provided far greater accessibility, improved housing affordability and with that have created a more liveable city. Instead, Sydney has followed what is often seen as a more American model, with lower density and greater distances between the places of abode, employment, education, entertainment and community engagement.

The path taken may not have been chosen, nevertheless, the path followed has run its course. It is no longer sustainable or practical to respond to housing and the use of land for industry and business as has been done in the past. Simply changing direction, however, is also unavailable. Sydney is no longer the city it was in the late 1960s. We have already consumed the land, built much of the infrastructure and become dependent on our cars. This trend is unsustainable and a shift is needed, but it must be a path that responds to the needs of the Sydney of 2012.

In comparison to the planned land release on the fringe of Sydney, the less structured manner inner Sydney has revitalised, as a residential area and as a locale for entertainment and business has given rise to a mismatch with the transport infrastructure to support it. The resulting congestion is the basis of much of the criticism regarding 'liveable' Sydney. The revitalisation has made for a far more acceptable Sydney, but the lack of policy support in doing so means that this has come at the cost of a generational lost opportunity for changes in density. A harsh reality of redevelopment without increasing density is that it comes at the cost of lower housing affordability. Today's Sydney is locked in a cycle of worsening housing affordability and social marginalisation, with many progressively excluded from the liveability that Sydney famously provides.

In order to make Sydney liveable for all the community, we need a higher density in those areas where Sydney is liveable today. In response to this having not already happened, the scope of land that can be liveable must extend to locations not yet influenced by the current trend—that is, at the edges of and beyond the Sydney basin. The first is a matter for urban and environmental planning; the latter is enabled by transport planning incorporating convenient high-speed links.

However, expanding where Sydney is potentially liveable will not result in actually being more liveable without an aligned land use policy. In the areas with established residential land use the infrastructure will improve liveability of the existing population and promote the use of the remaining land in a similar fashion for a similar community.

In the areas lacking significant residential land use there remains a capacity to greatly expand access to liveable Sydney. Realising this capacity as improved liveability requires the housing to be far more affordable—an outcome that typically requires a density 100–200% higher than currently evident on Sydney’s fringe.

Notwithstanding the challenges for achieving affordable housing on Sydney’s fringe, trying to improve liveability solely through new housing in accessible but as yet undeveloped urban areas has a limited scope. The factors for liveability outside of access to work and school cannot be accessed until the area has been developed. Therefore, a comprehensive solution must also add existing developed areas where urban policy can use the lower price of land to make housing more affordable.

In facing similar challenges, the default response for transport planning is to increase the frequency of services to more distant locations. This is not an option for Sydney as the rail lines servicing beyond the Sydney basin include inefficient climbs and/or descents that greatly extend journey time. Instead, the only solution to manage housing affordability while inner Sydney gradually increases in density and the fringe is developed is to expand liveable Sydney via high-speed rail.



Where is Sydney Liveable Today?

What makes a place liveable is as diverse as the people living there. For some a liveable Sydney means a few select houses on a quiet street close to this school or with that view. Yet some will see the city as a more homogeneous place with liveable Sydney as anywhere between the Upper Hunter, the Blue Mountains, the Southern Highlands and the South Coast.

In seeking a more balanced perspective, there appears to be common ground for Sydneysiders to consider housing affordability and access to employment and education as key factors. Housing affordability is sensitive to personal factors which prevents a robust objective evaluation. In comparison, the impact of the journey time to employment or education for the liveability of a place provides a basis for an objective assessment of where Sydney is liveable.

For most people, the essential journeys are those made to work or education and vice versa. In the 1860s most of these journeys were walking distance, but today's land use means that many of these are impractical without a car. Significantly, where once most every form of land use and with it most employment and education were rarely further than a half hour walk, today some types of employment or education can only be found in single locations across the whole 100km span of the city.

Sydney has many centres of employment and education. A truly liveable city provides equitable access to the breadth and opportunity for employment and education. Irrespective of the expanding role of Parramatta, Liverpool or Chatswood, the historic investment in central Sydney will continue to afford it the broadest diversity and greatest prospects.

In this respect, for at least the next 25 years, a focus on the journey time to Sydney's CBD is a robust and balanced approach as a single metric for defining where Sydney is liveable. What then is a liveable journey?

Longer journey times for the essential journeys to places of employment and education has a disproportionate impact of the individual, their family, their employer and thus the wider community and economy. Journey times exceeding an hour have been linked to increased incidence of obesity, of lower back pain, and the likelihood for the commuter to be socially isolated. In addition to the duration, the ease and comfort of the journey itself is a determining factor for the stress experienced and expected. A one hour trip that includes many stops, one or more interchanges between services and malfunctioning air conditioning, gives a very different experience than a seat in a quiet carriage on a 50-minute express train trip.

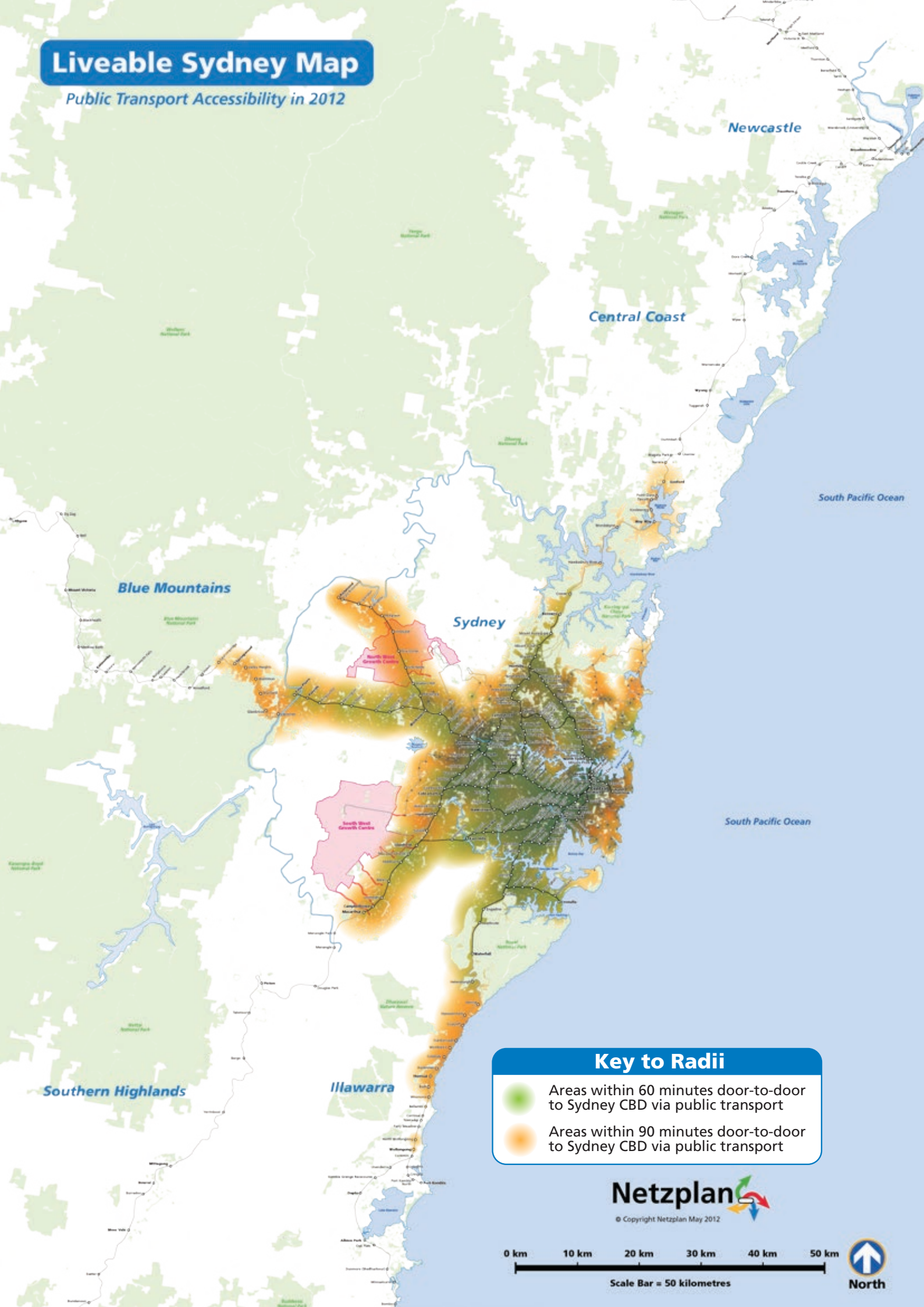
In contrast to the typical approach of considering accessibility to any public transport, the adjacent diagram considers locations as they are serviced by public transport in respect of the journey time to Sydney's CBD—a journey under an hour is shown in green and considered liveable, locations not more than 90 minutes' journey from Sydney's CBD are amber with areas not coloured arguably considered not liveable for the purpose of public transport access.

Recommendation



The NSW Government should shift the focus of land use and transport planning from measuring proximity to a transport service to measuring total journey time to better reflect liveability.

Liveable Sydney Map

Public Transport Accessibility in 2012



Key to Radii

-  Areas within 60 minutes door-to-door to Sydney CBD via public transport
-  Areas within 90 minutes door-to-door to Sydney CBD via public transport

Netzplan 

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0 km 10 km 20 km 30 km 40 km 50 km

Scale Bar = 50 kilometres



North

How are we Living in Sydney?

A city is a dynamic form that is constantly responding to economic and social levers, yet is fixed in its locale and rigid in its infrastructure. The capacity to develop and support various types of land use are defined firstly by fixed characteristics such as the topology, the sources of water, the areas that experience flood, access to deep water and then by the legacy of planning and infrastructure decisions. Defining events for Sydney include the classification of the national parks, allocation of land for use by the military, the location of Central station and the development of the suburban railway, the founding of the hospitals, the development and decommissioning of the tram network, the location of the airport and the resulting protected airspace, the harbour crossings, the founding of the universities and the development of heavy industry such as petroleum refineries. This legacy frames the city that Sydneysiders are so fond of and also provides the complaint-causing constraints.

Achieving a positive rather than negative legacy for any specific project justifies the emphasis placed on its planning. Yet, basing decisions between one alternative or another can miss the impact from the inaction that occurs while the decision is not made and often underestimates the benefits due to too close a project centric evaluation.

Urban Sydney, inclusive of the growth centres, is closing in on the limit of developable lands within the basin. The constraints in servicing the urban fringe appear to have already shifted how Sydney houses its growing population with dwelling density breaching 1,000 per sqkm for the first time in a century and most recently reversing of the long-term trend for lowering population density (as shown overleaf). Notably, forecast to 2031,

the required shift in these metrics far exceeds the trend indicating that, all else being equal, accommodating Sydney's projected population requires an unattainable transformation of Sydney existing urban area.

The historic response is to release additional land; however, the shortfall at current densities requires the impractical release of an additional South West Growth Centre. Clearly, how we are living in Sydney must change. Importantly, this change is not driven by Sydney's population growth itself—Sydney is forecast to grow no faster than has historically been the case. The need for the change emerges due to:

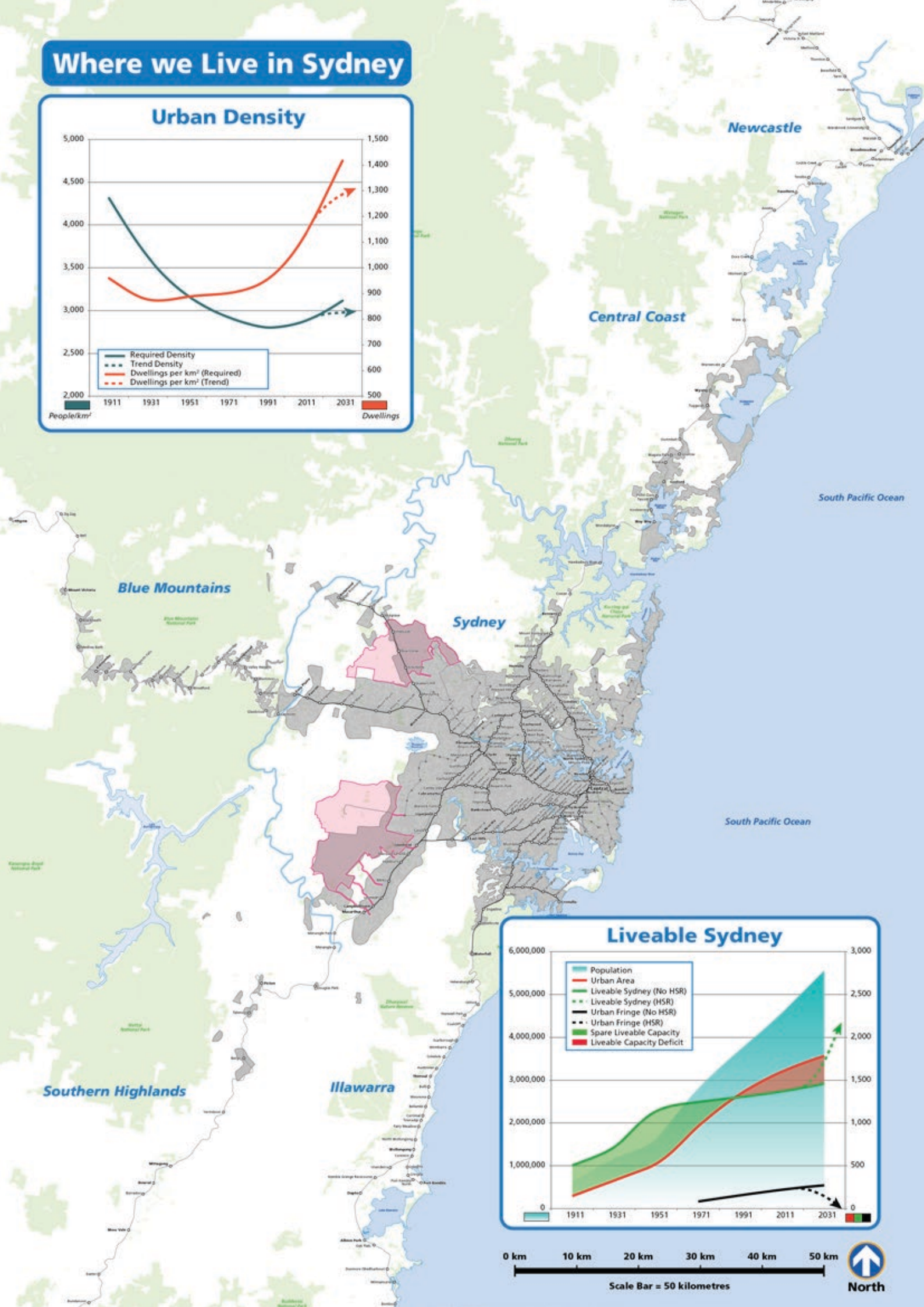
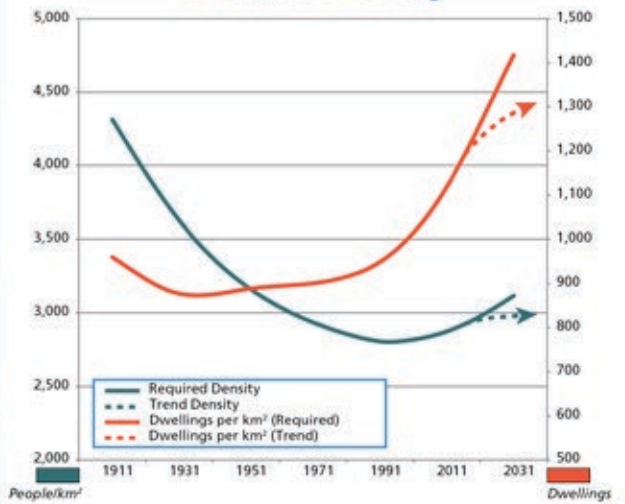
1. land consumption encroaching on the fixed barriers that have not otherwise been surpassed via infrastructure;
2. capital availability and policy capping the rate of densification of existing residential land; and
3. the exhaustion of legacy industrial lands available for residential redevelopment.

The land use option available is to dramatically change the density that is built and the density that is redeveloped; this may occur but such a shift is necessarily slow. In the meantime, housing affordability will worsen and Sydney's productivity will suffer.

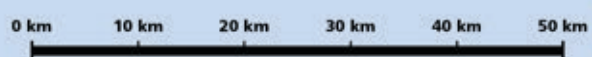
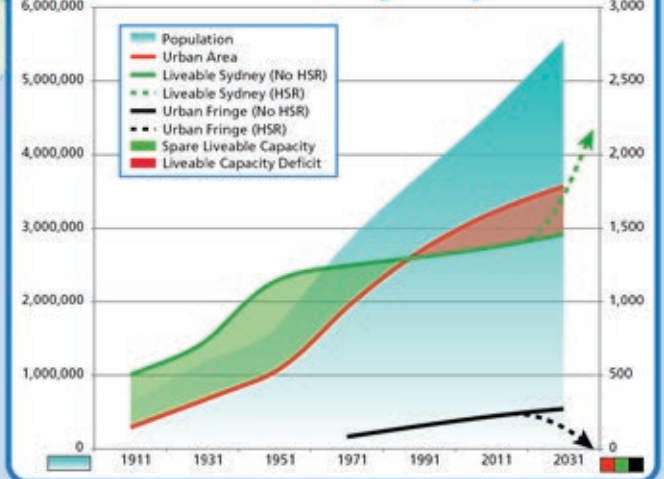
In contrast, an integrated transport and land use option would seek to redress Sydney's dependence on an infrastructure base that is now more suited to a smaller city (as suggested by the emergence of the Liveable Capacity Deficit shown overleaf). The introduction of high-speed rail offers a viable and sustainable path to expand Sydney beyond the fixed barriers and provides a manageable pathway to a more populous Sydney.

Where we Live in Sydney

Urban Density



Liveable Sydney



Scale Bar = 50 kilometres



Where could Sydney be Liveable?

In 2012, a new rail line is being built and a second one is in the final planning stage. The longer term plans indicate additional links and integration improving the capacity and reach for the public transport network. These include a second harbour crossing and improved accessibility of the rail network via bus, light rail and commuter parking. The plans also indicate investment in the road network, but this only curtails increased congestion with the forecasts still indicating car journeys will be 5% slower in 2031 than today, resulting in Sydney's drivers collectively wasting an additional 179,000 hours a year driving the same distance (NSW Bureau of Transport Statistics).

The planning that provided Sydney's core transport infrastructure occurred almost 100 years ago with the majority of the infrastructure itself now having been in place for more than 50 years. It is not an understatement to say that the development of the North West Rail Link is the largest project for Sydney in 80 years. However, to place it in the right context, the project only expands the network from 307 to 315 stations (a 2.6% increase) and from 2060 km of track to around 2120 km (2.9% increase). A fact that shows the value of the existing network.

In the next 25 years, the Sydney population is expected to grow by more than 1½ million. If Sydney is meant to feel as liveable as is fondly remembered, this would suggest the need to build the infrastructure that was in place when Sydney was only that size. For the rail network this equates to the inconceivable development of a North West Rail Link project every year. It is clear that maintaining, improving and expanding liveable Sydney cannot be achieved through the approach that proved so successful 100 years ago. Importantly, our employment, the use of technology, the way we receive education and our expectations regarding housing and our community has changed and will continue to change.

Over the next 20 to 25 years, investment in public transport is likely to address much of the liveable capacity deficit. A metro network repairing gaps in the liveable footprint along the Victoria Road and Anzac Parade corridors may be in place or planned, as well as one into the Northern Beaches. Light rail may have flourished, servicing not only the Sydney CBD, but also the nominated regional cities of Parramatta, Penrith and Liverpool.

Sydney, however, has already and will continue to extend beyond its basin. Without the expanded connection beyond the basin provided by a high-speed rail line from Canberra to Newcastle, Sydneysiders living outside of the basin will be in a disadvantaged and inequitable situation through not having a liveable commute to the city. Furthermore, the lack of liveability in these areas of Sydney creates more pressure for housing and land in the already constrained and limited supply available within the basin and consequently, reducing housing affordability.

High-speed rail along the east coast of Australia could link Martin Place in Sydney with central Canberra in little more than an hour and a half. A trip to central Newcastle could be done in just over an hour, making it within practical commuting and liveable connection of Sydney. Supplemented by a very fast train service to the South Coast, enabled mostly by a new link between Waterfall and Scarborough, and Liveable Sydney could extend 15–20 km further south to truly encompass Wollongong with a train trip of little more than an hour.

Recommendation

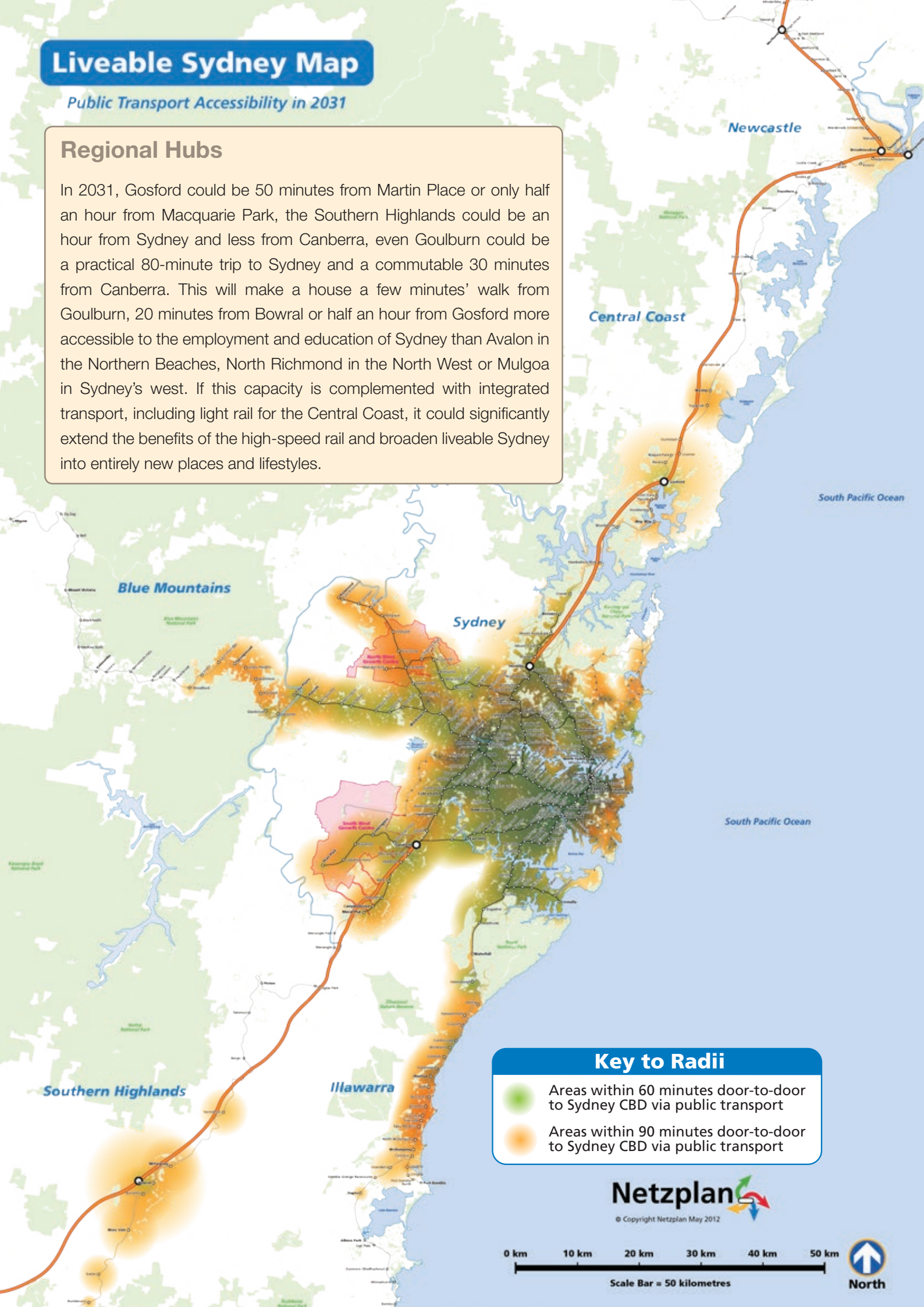
The NSW Government should include high-speed rail as part of its *Sydney Metropolitan Plan, Long Term Transport Master Plan and State Infrastructure Strategy* in order to help address housing affordability and journey time issues.

Liveable Sydney Map



Public Transport Accessibility in 2031

Regional Hubs

In 2031, Gosford could be 50 minutes from Martin Place or only half an hour from Macquarie Park, the Southern Highlands could be an hour from Sydney and less from Canberra, even Goulburn could be a practical 80-minute trip to Sydney and a commutable 30 minutes from Canberra. This will make a house a few minutes' walk from Goulburn, 20 minutes from Bowral or half an hour from Gosford more accessible to the employment and education of Sydney than Avalon in the Northern Beaches, North Richmond in the North West or Mulgoa in Sydney's west. If this capacity is complemented with integrated transport, including light rail for the Central Coast, it could significantly extend the benefits of the high-speed rail and broaden liveable Sydney into entirely new places and lifestyles.



Key to Radii

-  Areas within 60 minutes door-to-door to Sydney CBD via public transport
-  Areas within 90 minutes door-to-door to Sydney CBD via public transport

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0 km 10 km 20 km 30 km 40 km 50 km

Scale Bar = 50 kilometres



North

HOW HIGH-SPEED RAIL HELPS MAKE NSW NUMBER ONE

The commission of a high-speed service linking Sydney at least as far as Canberra and Newcastle supports multiple goals as outlined in the NSW Government's plan for the future of NSW as presented in NSW 2021: A Plan to Make NSW Number One. The plan clarifies the link between improving liveability and the investment in critical infrastructure with the building of liveable cities among the plan's priorities. Adding a high-speed rail network to the larger Sydney region would respond to 12 out of the 32 goals presented in the plan:

GOAL	BENEFITS HIGH-SPEED RAIL
1. Improve the performance of the NSW economy	Lower congestion with improved accessibility to business in Sydney and NSW
3. Drive economic growth in regional NSW	Improve access to markets, lowered isolation supporting tourism and the sense of community
4. Increase the competitiveness of doing business in NSW	Improving productivity and unlocking productive capacity enhancing flexibility and responsiveness
5. Place downward pressure on the cost of living	Expand liveable area of Sydney improving housing affordability
7. Reduce travel times	Significantly lower travel times for the regional commuters with lowered congestion providing network wide improvements
8. Grow patronage on public transport by making it a more attractive choice	Greatly expands the scope for public transport as a viable means for a travel.
9. Improve customer experience with transport services	High-speed rail will be faster, more comfortable and more convenient than current travel options
10. Improve road safety	The shift of journeys from private vehicles to public transport will decrease road incidents and improve road safety
11. Keep people healthy and out of hospital	Reducing journey under 90 minutes greatly increases both psychological and physical well-being of the commuter
19. Invest in critical infrastructure	The benefit of high-speed rail for Sydney establish it as critical infrastructure for a liveable Sydney
20. Build liveable centres	By enhancing accessibility, the high-speed services will create the opportunity for more liveable centres in the wider Sydney region
22. Protect our natural environment	Lessening our impact through shifting commuters out of their cars and increasing the attractiveness of areas with existing basic infrastructure

Benefits of High-Speed Rail

The main benefit high-speed rail can provide is from improving productivity. The core value of transport infrastructure is its role in facilitating our economy, be this the journey to work or education, the journey home, or the movement of freight. However, this value is not the benefit, but rather the function. The benefit is experienced across the economy in how the services using the new infrastructure support the community and business and how the released capacity on existing infrastructure is utilised.

Connection is a key facilitator for improving quality of life and expanding opportunity. In order for a high-speed rail service to represent a new connection and not simply another mode, experience from existing systems indicates that the service must conveniently connect desirable locations in one city to those in another at least twice as fast as by road. In this respect the ability to implement infrastructure that enables the right customer experience encourages new transport demand, supporting the potential for added benefit for the economies serviced by the line or network.

The benefit realised from the infrastructure is directly related to the service it facilitates. Any proposed east coast high-speed rail line enables a number of services and serves a number of distinct demands including the key regional commuting and intercity markets. Maximising the benefit of high-speed rail is reliant on correctly designing the customer experience to serve the different markets.

The utilisation of the infrastructure by different services allows for a staged implementation that provides only the necessary additional capability and connection to launch the expanded service offering. In this way, it is possible to progress in smaller affordable stages to the target infrastructure and bring forward the benefits of high-speed rail.

High-speed rail is a technology. Like all technologies it enables responses not previously available. A potential response to Sydney's liveability challenge enabled by high-speed services is the economically integrated satellite city. Most cities of Sydney's size or larger with at least very fast train services have separate, uniquely identifiable cities that expand their liveable footprint. The introduction of high-speed rail will place Newcastle into this category, greatly shifting the relationship for the benefit of both cities. The greatest opportunity however is in repeating the land use already represented to the north along the southern branch of the line through the Southern Highlands and towards Canberra.

In focusing on the economic benefits, there is the potential error to dismiss the social benefits, particularly in respect of the middle distance connections. An east coast high-speed rail service will lower the isolation of New South Wales' coastal cities from Sydney and Brisbane.

People Benefits

The immediate benefits of high-speed rail services are the time it will save commuters to travel to work or education and improve the access to centrally located social and community infrastructure. Collectively this saving in travel time is far more than the capacity to work or rest more.

Studies into the impact of commuting time show that an increase in travel time affects the commuter's physical and mental well-being. Longer commute times increase back pain, fatigue, stress and obesity. Psychological effects prove to be as damaging as physical effects, extending the impact across the community.

Yet, it is the indirect benefits that provide the greatest value. The service should be designed to promote modal shift away from road transport that then leads to the saving of lives, direct and indirect costs in fewer car accidents and lower pollution.

If correctly integrated into the destination's transport network, the increased accessibility to a wider range of education, employment and entertainment improves social inclusion and addresses contributing factors to inequality in the community.

Coupled with land use policy, the infrastructure can relieve pressure on housing within the Sydney basin extending the benefits beyond the areas directly serviced. This broadens the base for supply underpinning household financial sustainability and assisting in the affordability of housing city-wide.

Business Benefits

Transport networks cannot serve locations across a city equally. Sydney's transport network is no different resulting in disparities in the attractiveness of any location for business. The worsening congestion, the inequitable availability and pricing for travel and parking and the uncertainty of the plan for Sydney transport disproportionately focus business on the matters of location. At the micro-level, and at its worst, a business may lose access to its market simply through the installation of a clearway and a few no-right-turn controls. An outcome that gives primacy to the distant land use at the end of the road over the local land use adjacent to it.

At some point, the sustainability of a business and potentially its success becomes overly sensitive to location. This accelerates the inequity between regions across Sydney, diminishes the affordability of the most desirable locations and increases the tyranny of distance. The inability for business to control such a key factor results in considerable uncertainty.

Materially, this has a multiplied effect on the economy. Small to medium businesses are the engine of employment growth and these businesses by their very nature have fewer resources to deal with uncertainty. The performance of the transport network as it operates beyond its capacity and the lack of consistency for how and when this issue will be addressed is then translated into a disproportionate impact on employment growth.

As a result, Sydney's commercial vitality is codependent on the function of its transport network.

As part of an integrated transport plan for Sydney, high-speed rail responds in two ways: relieving congestion in the transport network; and expanding the supply of land relevant and desirable to business. The first is a potential benefit of any transport project, the second, however, is more elusive.

In co-ordinating policy for land and transport at the origins and destinations of high-speed rail serviced journeys, it will be possible to lower the competition between residential and industrial land use. This will lower the sensitivity of business survival to location lowering the uncertainty for business and allowing for the redirection of resources toward productive capacity.

That is, high-speed services are part of how transport infrastructure can unlock some of the trapped productivity growth from the risk aversion and resource allocation arising from uncertainty—an indirect economy-wide benefit. To achieve this requires the services to be designed to provide the appropriate customer experience for the appropriate market and in Sydney's case, integrated policy between local, State and Federal governments.

The improved journey-to-work for those directly serviced and to a lesser extent elsewhere also provides businesses with a direct benefit in improved productivity from its employees in a more predictable start to the work day, less planning around congestion and unreliability for journey times, lowered stress and fatigue from long distance driving. Coupled with the indirect benefit, the obvious multi-billion dollar cost of congestion that high-speed rail can help to reduce is only a fraction of the benefit it provides.

Network Benefits

A transport network is not designed but rather the outcome of a collection of services and infrastructure. Its performance is measured in how it responds to a dynamic and reactive demand, and it is continuously changing. It is therefore difficult to pinpoint the impact of a single component. In terms of high-speed rail, how the service interfaces with Sydney or any of the capital cities will determine more about the benefit of the infrastructure than the ability to traverse long distances at more than 300km/h.

The main high-speed rail station in Sydney will be a gateway interchange likely to serve more than 100,000 passengers a day not long after the service links Melbourne and Brisbane. Placed in isolation, the location of the station would require greater service from Sydney's transport network than is currently provided to the airport, including a branch of the suburban network with spare capacity of four to six trains an hour, traffic capacity to and from the location from across Sydney for thousands of cars, taxis and new bus services along with the requisite local queuing and short and long-stay parking. That is, place the high-speed rail in Sydney without consideration of the operational impacts for the Sydney transport network will have a negative impact **on the network**.

The negative impact of some alternatives in new infrastructure costs for the State and increased congestion at rail and road bottlenecks could exceed the benefit to the community and industry. The inconvenience and unreliability of the total journey time created for the high-speed service could all but eliminate the differentiation from air or road travel alternatives and with them the project's justification.

The desired success of the service has the potential to stress the transport networks in the proximity to the stations to failure—what would be the impact around Gosford station with a shift from 2,000 to 15,000 commuters using rail? The access points to high-speed rail concentrate the journey patterns from a wide area. This justifies the investment, but requires land use and transport planning to function.

Notwithstanding the risk for negative impacts, high-speed rail has considerable potential to benefit existing and permit the delay or avoidance of future investment. Key to this is the notion that transport services do not generate transport use. A new service may expose and satisfy latent demand but, as a whole, journeys are planned and a mode or set of modes are selected to fulfil them. High-speed rail is no different, with the majority of the projected patronage shifting from a mode already serving them.

In linking most parts of Sydney and central Canberra in under an hour and a half, the service eliminates much of the demand for air travel and a considerable part of the demand for road. Equivalent services in Europe and Asia capture 70% of the market distributing a considerable transport load away from the airport. For Sydney, almost a third of the passenger related ground transport servicing the airport could relocate. This could delay the need for investment in a second airport by 10–15 years. Similar benefits occur for the road links to the Central Coast and the shared rail infrastructure supporting the suburban and freight services north of Hornsby.

These benefits of high-speed rail would be foregone in the short-to-medium-term if the NSW Government's currently proposed North West Rail Link operating plan proceeds in its present form (the operating plan prohibits high-speed rail from integrating with Sydney's suburban rail network's available capacity due to the inability of rapid transit trains to share the same infrastructure as high-speed rail), as the cost of dedicated high-speed rail infrastructure in the first stage of the project would likely make it economically unfeasible for several decades.

Conclusion

Sydney is Australia's gateway to the world, its financial centre and the engine for New South Wales's 30 per cent share of GDP. The New South Wales Government wants to make the state 'number one' again, acknowledging that it isn't and setting a goal to get there.

Potentially, the leading cause constraining productivity in Sydney is the under-servicing of land by transport infrastructure. Long-term planning and delivering on the plans will address this inside the Sydney basin. However, Sydney already stretches beyond the basin with hundreds of thousands of future residents being forced to settle outside the famously liveable Sydney.

In Europe and Asia, high-speed rail is the standard response to this challenge and with it, comparable cities are solving affordability and capacity issues through servicing and being serviced by land over 100 kilometres away.

In cities with established suburban rail networks, this standard response has always been implemented through a staged process utilising the existing rail infrastructure to access the large urban areas. In most cases, the added benefit from even faster services is never justified and the services remain integrated.

The economics are no different in Australia. The business case is not likely to be better in linking the eight million people of Sydney and Melbourne as compared with the 20 million people of London and Paris by the Eurostar service over twice the length of track. That service had to overcome the investment in crossing the English Channel, but in doing so, it did not justify dedicated infrastructure across the United

Kingdom. In short, launching high-speed services on dedicated infrastructure is unlikely to be justified.

Sydney's suburban network does not have the capacity or operational approach to integrate a high-speed service today. However, the long-term plan for Sydney's suburban rail expansion until 2006 provided both: capacity to integrate and an operational approach permitting a new north-south main line.

Even as an integrated service, justifying the cost will require evaluation of the benefits beyond being a rail service to Sydney and New South Wales; Melbourne and Victoria; or Brisbane and Queensland. In keeping with the Federal Government's initiative to study high-speed rail, the infrastructure can be nation-building and has offsetting benefits on gateway infrastructure to the cities served. The longer distance and lack of high-speed rail between Australia's cities causes the astounding result that the Sydney-Melbourne air route is the fifth busiest in the world, servicing more than 90% of the patronage of the Tokyo-Osaka air route—a route that connects almost seven times as many people. That suggests an uncharacteristically high allocation of the airport infrastructure assets for domestic air travel.

Even an integrated service that is evaluated as nationally significant may provide an uncertain justification as a whole. In contrast, a 2,000-kilometre rail service that is built in sections, sections that can be commissioned in stages; and a staged implementation providing benefits sooner on smaller staged costs will be justifiable.

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