The designer of Sydney's famous harbour bridge, Dr JJC Bradfield, also designed Sydney's rail system, but his lofty vision for a metro rail network rivalling that of London or New York could never be realised in the low density city of a century ago. But one hundred years on, as Sydney has passed a population of five million, people the reality of Dr Bradfield's rapid metro rail proposals are now becoming reality. This big difference over this time has been the incredible growth in population but more importantly, it is the greater densities of housing that are making his vision become real.

METRO RAIL
INFRASTRUCTURE
IS THE KEY TO
SYDNEY'S GROWTH

by Chris Johnson, Chief Executive Officer, Urban Taskforce Australia

Developments in Sydney's metro rail network are bringing the network closer to the model of the London Underground.

n 1914, Dr Bradfield was despatched by the government on a research project to investigate the trends towards underground railways. He visited the leading cities that incorporated metro rail networks being New York, Paris and London. Dr Bradfield took a stop watch with him and he recorded the "headway" in each of the systems, which was the time between trains. New York had an impressive headway of two minutes, but Chicago surpassed this with 20 second headways recorded. In London Dr Bradfield found that there were 44 trains an hour giving headways of around 90 seconds.

The London Underground, as it is called even though only 45 per cent is underground, was built in 1863 as the first in the world. Dr Bradfield noted in his report on his tour that the British commuters were very well behaved. The underground sections of London's metro were constructed with large concrete pipes or tubes which led to the more popular title for the network of "The Tube". Most Australians have travelled on the London Tube with its Circle Line and its Central Line.

Paris followed London in 1900 with its Metropolitan Rail network and the system adopted the name of "Metro". New York was not much later with its network built in 1904 and it adopted the name "Subway" which rapidly grew to an extensive network of 469 stations. The New York Subway set a record on the 25th of September 2014 when 6.1 million people used the network.

Dr Bradfield's 1915 report on his trip included a map of his proposal for Sydney that included a Western Line with 65 trains an hour proposed. That means a train every minute. The North Shore line was proposed at 25 trains a minute and the unrealised Bondi route was to be 40 trains an hour. Clearly Sydney's densities in those days did not warrant these fast

headway times and an electric heavy rail network was built.

Fast forward 100 years and Dr Bradfield's vision is now being realised. The New South Wales Government is well down the track on its North West Metro Rail, which connects Rouse Hill through Epping to Chatswood. The government has also announced the next stage of the Sydney Metro as linking Chatswood through North Sydney, Barangaroo, Sydenham and out to Bankstown. It is not hard to see how this could be extended to Liverpool, the Western Sydney Airport and out to Penrith. If this then continued to Rouse Hill, Sydney would have a Circle Line to match London's Circle Line.

The NSW Government has also announced what could become the beginning of Sydney's Central Line, matching London's Central Line. Metro West has been announced as a new metro line linking the Sydney CBD with the growing centre of Parramatta. Along the way there would be stations at the Bays Precinct and Sydney Olympic Park and at a few other locations where new high rise development could be stimulated. So Dr Bradfield's metro rail system is now emerging as Sydney grows from its present five million people to eight million over the next 40 years.

At eight million people Sydney will match the present populations of London and New York with their extensive metro rail networks. So Sydney will have caught up with the cities that set the pace 100 years ago. Of course New York and London will also keep growing and no doubt set examples that a Bradfield of today could learn from.

The Urban Taskforce has developed a structure for Sydney's future rail network with Architectus. This proposal did have a future metro rail network that mirrored London's Circle Line and Central Line. We added to this metro rail framework a series of light rail loops that acted as feeders to the metro and

then suggested that this framework was where future urban density must be located.

Sydney, and other major Australian cities need a long term infrastructure structure like this so that planning decisions on the location of new jobs and homes can relate to the infrastructure provision. Figure 1 shows our diagram for how Sydney's metro and light rail networks could be located.

Very similar networks of metro rail have been rolled out extensively across Asian cities. In India, there has been a major program of metro rail projects constructed in Mumbai, New Delhi and other Indian cities. An even more impressive program of delivering metro rail systems has occurred in China's major cities. Shanghai has built an impressive 1,000km of metro rail in only 25 years and Beijing and many other Chinese cities are following this trend.

Singapore, which has a similar population to Sydney of five million people, has an extensive network of metro rail. Singapore has gone further in its focus on public transport with congestion tolls on cars that vary at differing times to control vehicular traffic in urban areas, and adding significant taxes to the cost of a new car. Importantly the rail network has become the framework for where Singapore locates its new density to handle population growth.

Dr Bradfield would feel positive about the roll out of metro rail across Sydney a hundred years after he produced his plan for fast headways similar to the metro rail systems he saw in New York, Paris and London. The big difference over 100 years has been Sydney's population growth from 750,000 people to today's five million people. But more than the population growth, it is the density of development around railway stations that is moving commuters from being car based to being public transport based.

The beauty of metro rail is that it runs every few minutes so travellers do not need to check timetables for their travel. But this rapid turnover of trains needs travellers in large numbers to work efficiently, hence the importance of greater density within walking distance to the stations. In Sydney, just like New York, London and Paris, this is leading to a boom in apartment construction as the preferred way of living for a growing percentage of the population. Sydney is moving from being a suburban city to becoming an urban city.
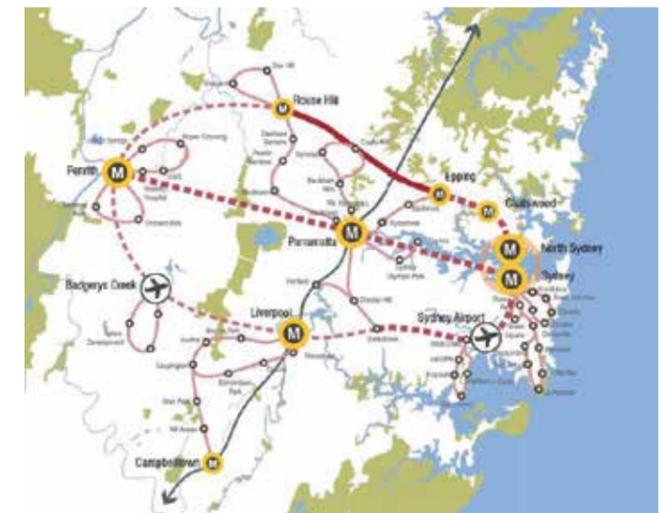
Figure 1. Possible locations for Sydney's metro and light rail networks.

Creating a train network similar to New York's subway system is the key to sustainable growth in Sydney.