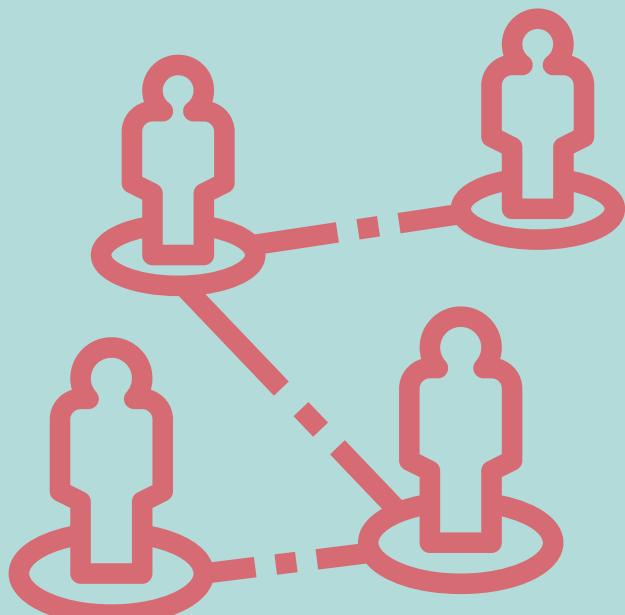


TECHNICAL REPORT A:

POPULATION TRENDS AND DECENTRALISATION OPTIONS

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EXECUTIVE SUMMARY



INTRODUCTION

Australia is one of the most urbanised countries, despite having a low overall population density. Half of our population live in our three largest cities (Sydney, Melbourne and Brisbane) and the proportion is growing. This reflects the historical pattern formed by European settlement, and the dominance of our capital cities has become a self-reinforcing cycle. As Paul Keating once said, "if you're not in Sydney, you're camping out".

On current trends therefore, the issues of congestion, housing affordability etc in our largest cities are likely to become worse over the next forty years, while people outside the bigger cities will increasingly be left behind in terms of opportunities.

Despite the hiatus of the current Corona Virus, our population is likely to continue to increase at a rapid rate, especially in our major capitals. Total population in the Eastern Corridor is likely to grow by around 80% by 2060, with major implications for travel demand.

There have been attempts in the past to encourage decentralisation, but these have been sporadic and have not been able to overcome the dominance of the major capitals. Our reliance on air and car-based travel has tended to further reinforce these cities at the expense of medium and smaller sized cities.

The Corona Virus has however changed work patterns significantly over the last year, and early indications suggest some of these changes will be permanent. This has opened up new opportunities for reducing the pressure on our capital cities and encouraging a more balanced population pattern.

High Speed rail in the Eastern Corridor could further facilitate a significant decentralisation program, by enabling telecommuters and organisation to relocate to regional centres, enhancing regional tourism opportunities and making retirement out of the capital cities more attractive.

A combination of telecommunications, high speed rail and supportive decentralisation policies is considered to have the potential to reduce future population growth in Sydney, Melbourne and Brisbane by 2.5 million by 2061. This population increase could be redirected to medium and smaller cities within the extended corridor between Geelong and the Sunshine Coast. The proposed high-speed rail network to be completed by then would have the capacity to handle the roughly 100 million extra trips generated by this decentralisation.

However, without high speed rail the ability of people and jobs to move out of the capital cities will be limited, because of the limited access to the high-order facilities and services in the big cities, and because of people's natural desire to retain connections to family, friends, clients and others, many of whom will remain in the capitals. Our current lack of high-speed ground transport and our reliance on cars and aircraft therefore needs to change if we are to develop a more balanced population pattern in the East Coast corridor.

1 INTRODUCTION

This report forms one of a number of documents examining a new approach to high speed rail for the East Coast Corridor (Geelong to the Sunshine Coast) in Australia. In this report:

- The **Core High Speed Rail Corridor** extends from Geelong to the Sunshine Coast via Canberra and Sydney, and includes the cities and towns on the direct route.
- The **Extended East Coast Corridor** includes cities and towns nearby which could be connected easily to the high-speed rail corridor (for example Toowoomba, Wollongong, Ballarat) by higher-speed regional services.

As argued in the Main Report, high speed rail in the East Coast Corridor could improve the economic, social and environmental outcomes for 75% of Australians by mid-century, by addressing such issues as congestion, housing costs, greenhouse gas emissions, regional development and transport capacity.

A key way in which this can be achieved is the ability of high-speed rail to facilitate a better population distribution in Australia, by altering accessibility patterns. This cannot be achieved by continuing to focus our transport options on roads and airlines, which only reinforce the dominance of the major capital cities.

This technical report focuses on this question of population management, regional development and decentralisation:

- Part 2 briefly looks at past population patterns and trends in Australia
- Part 3 estimates future “Base Case” population growth in the East Coast Corridor
- Part 4 discusses the changes in working arrangements and lifestyles brought about by the Corona Virus, and how this alters previous assumptions about the likelihood of a shift in population growth to regional areas from the major cities
- Part 5 looks at the decentralisation potential from relocating jobs and population
- Part 6 examines a particular decentralisation scenario to identify what it could mean for future population patterns
- Part 7 looks at the role a high-speed rail corridor on the East Coast could play in facilitating this shift in future growth

The full list of reports in this series (see) includes:

- Summary Presentation
- Main Report
- Technical Report on Population Trends and Decentralisation Options
- Technical Report on High Speed Rail and Freight
- Technical Report on Alternative Routes and Staging Options



2 POPULATION PATTERNS AND TRENDS

Australia is paradoxically a large continent, but with the population heavily concentrated in a few large cities. This reflects the history of European settlement, which started as a series of colonies, each centred on a particular town. Roads and rail routes largely spread out from these towns, which became the hubs of their respective States, and which also became the arrival points for subsequent waves of overseas migration.

Our relatively limited agricultural potential resulting from generally poor soils and unreliable rainfall meant we failed to develop a large population base outside of the capitals. Some medium sized cities did develop, initially around gold mines and later around specific industries such as steel making.

The growth of manufacturing, particularly after World War 2, led to some decentralisation. However, most manufacturing still focused on the capital cities, which could offer skilled labour as well as port and transport facilities.

More recently the growth of the tertiary sector has further reinforced the capital cities, given their advantages in terms of access to markets, transport infrastructure, education facilities and the availability of a large and diverse workforce.

There have been some attempts to reduce the dominance of the State capitals during the 230-year history of European settlement. But these were sporadic and never succeeded in changing the basic forces concentrating our population. The relative decline of our agricultural and manufacturing sectors, together with increasing mechanisation, limited the scope for any move out of the cities. Our reliance on overseas migration further concentrated population growth, as ethnic communities tended to settle in areas where they first arrived, typically around the early migrant settlement facilities in the major capitals.

Australia is therefore one of the most urbanised, or strictly speaking suburbanised, countries on earth. Whilst this has worked well in some ways, we face growing problems of congestion and housing affordability in our capital cities, and growing disparities in educational, health and other opportunities between urban and regional Australia.

These trends have continued and indeed accelerated in recent decades, with the growing global dominance of "world cities". In Australia's case, this mean Sydney and Melbourne, which are now linked more closely in many ways than to the world economy than to our own national economy. Paradoxically, the rapid growth of communications technology, which some thought would lead to the decline of major cities, has reinforced them. This reflects the continuing importance of face-face communication in the finance, high-technology and other emerging industries, and the need for highly specialised skills.

As a result, our largest cities have generally increased their share of national population, while smaller cities and towns have in many cases grown very slowly or not at all, despite Australia's overall high population growth rate.

This can be seen in Table 1 below, which covers the 15 years to 2016 (last available census), for cities and towns in the East Coast Corridor between Geelong and the Sunshine Coast.

Table 1: Population in the Eastern Corridor 2001-2016

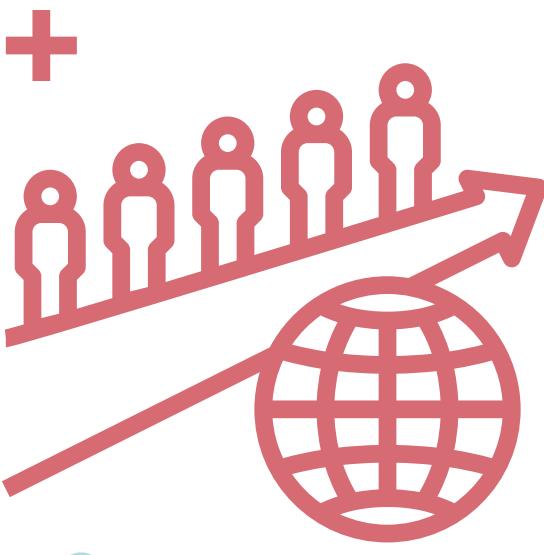
	Total Resident Population				Percent of Australia		
	2001	2016	Change	Change %	2001	2016	Change
Sydney	4,102,580	5,024,923	922,343	22%	21.1%	20.8%	-0.4%
Melbourne	3,500,249	4,714,387	1,214,138	35%	18.0%	19.5%	1.5%
Brisbane	1,693,556	2,362,672	669,116	40%	8.7%	9.8%	1.0%
MAJOR CAPITALS	9,296,385	12,101,982	2,805,597	30%	47.9%	50.0%	2.1%
Gold Coast	379,679	575,303	195,624	52%	2.0%	2.4%	0.4%
Canberra-ACT	321,538	403,104	81,566	25%	1.7%	1.7%	0.0%
Newcastle-Lake Macquarie	321,538	403,104	81,566	25%	1.7%	1.7%	0.0%
Central Coast	294,596	336,631	42,035	14%	1.5%	1.4%	-0.1%
Sunshine Coast	198,931	302,841	103,910	52%	1.0%	1.3%	0.2%
Geelong	191,534	239,529	47,995	25%	1.0%	1.0%	0.0%
OTHER LARGE CITIES	1,707,816	2,260,512	552,696	32%	8.8%	9.3%	0.5%
OTHER CENTRES IN CORRIDOR (a)	649,535	768,616	119,081	18%	3.3%	3.2%	-0.2%
TOTAL CORRIDOR	11,653,736	15,131,110	3,477,374	30%	60.0%	62.5%	2.5%
CENTRES IN WIDER CORRIDOR (b)	1,224,560	1,506,992	282,432	23%	6.3%	6.2%	-0.1%
TOTAL WIDER CORRIDOR	12,878,296	16,638,102	3,759,806	29%	66.3%	68.8%	2.4%
AUSTRALIA	19,410,000	24,190,907	4,780,907	25%	100.0%	100.0%	0.0%

Note: (a) Includes Tweed, Port Macquarie, Byron, Ballina, Lismore, Coffs Harbour, Taree, Southern Highlands, Goulburn, Yass, Gundagai, Junee, Wagga Wagga, Albury-Wodonga, Shepparton, Seymour.

(b) Includes Toowoomba, Ipswich, Gympie, Maitland, Port Stephens, Cessnock, Singleton, Muswellbrook, Wollongong, Shellharbour, Shoalhaven, Kiama, Cooma, East Gippsland, Latrobe Valley, Ballarat, Bendigo, Wangaratta, Griffith South Gippsland.

As can be seen:

- 50% of Australia's population lived in Sydney, Melbourne or Brisbane in 2016, up from 47.9% in 2001.
- Melbourne and Brisbane both grew rapidly between 2001 and 2016, increasing their share of national population, although Sydney grew slightly more slowly than Australia and its share of national population declined slightly.
- The Gold Coast and Sunshine Coast grew very rapidly, increasing their share of national population, but other large cities in the corridor only grew at about the national rate or slower.
- Smaller centres in the core corridor and in the wider corridor grew more slowly as a whole than Australia.
- The wider corridor as a whole increased its share of national population to nearly 70% by 2016.



3 PROJECTIONS FOR THE EAST COAST CORRIDOR

Future population in the Corridor, and its geographic distribution, will obviously depend on overall population growth in Australia, as well as the relative attractiveness (or otherwise) of the various cities and towns in the region. This in turn will depend on issues such as employment growth, housing costs, quality of life, and access to education, health and other services.

As a base case, ABS projections of population have therefore been used for Australia as a whole, assuming medium levels of migration, fertility and mortality. The potential population in each city and town in the corridor has then been projected, based on overall trends for Australia as well as the changes in the share of population for each centre experienced during the 2001-2016 period.

See Table 2 overleaf.

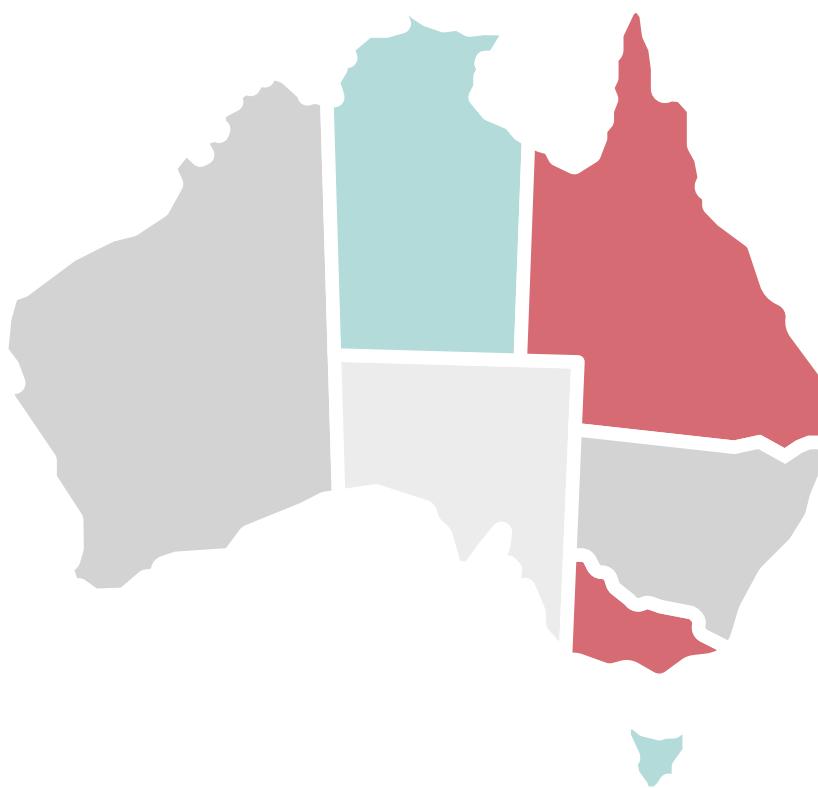


Table 2: Projected base case populations in the Corridor 2001-2061

	2001	2016	2031	2046	2061
Sydney	4,102,580	5,024,923	6,185,834	7,216,326	7,925,222
Melbourne	3,500,249	4,714,387	6,394,847	8,038,501	9,256,860
Brisbane	1,693,556	2,362,672	3,321,938	4,294,472	5,035,855
MAJOR CAPITALS	9,296,385	12,101,982	15,902,619	19,549,298	22,217,936
Gold Coast	379,679	575,303	879,907	1,215,841	1,489,565
Canberra-ACT	321,538	403,104	508,186	603,709	670,626
Newcastle-Lake Macquarie	327,354	363,039	403,707	436,317	457,099
Central Coast	294,596	336,631	385,991	426,801	453,411
Sunshine Coast	198,931	302,841	465,397	645,529	792,862
Geelong	191,534	239,529	301,209	357,137	396,240
OTHER LARGE CITIES	1,713,632	2,220,447	2,944,397	3,685,334	4,259,804
Tweed	73,980	93,742	119,475	143,123	159,829
Port Macquarie-Hastings	64,960	80,073	99,217	116,321	128,146
Lismore	42,721	44,122	45,609	46,717	47,387
Byron	29,453	33,399	37,997	41,769	44,215
Ballina	37,856	42,993	48,988	53,914	57,111
Coffs Harbour	62,582	74,670	89,491	102,300	110,934
Taree	27,164	29,431	31,955	33,931	35,168
Southern Highlands	42,384	48,996	56,851	63,422	67,746
Goulburn	26,401	30,261	34,808	38,579	41,043
Yass	12,002	16,566	23,040	29,532	34,438
Gundagai	11,397	11,291	11,183	11,106	11,061
Wagga Wagga	56,280	63,906	72,805	80,114	84,858
Albury	45,265	52,171	60,351	67,173	71,651
Wodonga	31,964	40,100	50,589	60,130	66,818
Shepparton	57,600	65,100	73,811	80,932	85,537
Seymour (Mitchell)	27,526	41,795	64,059	88,665	108,749
OTHER CENTRES	649,535	768,616	920,227	1,057,729	1,154,689
Toowoomba	135,000	164,200	200,697	232,863	254,871
Gympie	38,100	50,300	66,851	82,713	94,286
Ipswich	123,900	200,100	326,563	475,384	603,133
Maitland	56,100	79,100	112,425	146,579	172,838
Cessnock	46,800	56,700	69,026	79,845	87,225
Port Stephens	58,500	71,100	86,837	100,696	110,172
Singleton	21,100	23,600	26,473	28,798	30,289
Muswellbrook	15,100	16,500	18,072	19,314	20,096
Wollongong	188,300	210,400	235,776	256,281	269,423
Shellharbour	59,400	70,400	83,797	95,296	103,007
Shoalhaven	86,900	101,900	119,975	135,320	145,527
Kiama	19,800	22,100	24,738	26,867	28,231
Cooma	19,400	20,600	21,909	22,914	23,533
East Gippsland	38,800	45,600	53,813	60,801	65,457
South Gippsland	25,700	29,100	33,056	36,297	38,395
Latrobe Valley	69,600	74,600	80,107	84,371	87,020
Ballarat	82,300	103,500	130,897	155,882	173,428
Bendigo	89,100	112,200	142,092	169,389	188,578
Wangaratta	26,260	28,592	31,201	33,254	34,545
Griffith	24,400	26,400	28,624	30,362	31,450
EXTENDED CORRIDOR	1,224,560	1,506,992	1,892,931	2,273,227	2,561,504
POTENTIAL HSR CATCHMENT	12,884,112	16,598,037	21,660,175	26,565,588	30,193,934
AUSTRALIA	19,410,000	24,190,907	30,314,000	35,698,000	40,883,000

Tables 3 and 4 summarise these estimates, grouping cities/towns into the following categories:

- The major capital cities (Sydney, Melbourne, Brisbane)
- Other large cities (Gold Coast, Canberra, Newcastle-Lake Macquarie, Central Coast, Sunshine Coast, Geelong)
- Smaller centres in the direct corridor
- Other cities and towns in the extended corridor which could be affected by high speed rail developments by 2060.

Table 3: Summary of base case population projections 2001-2061

	2001	2016	2031	2046	2061	% Growth 2016-2061
Major Capitals	9,296,385	12,101,982	15,902,619	19,549,298	22,217,936	84%
Other Large Cities	1,713,632	2,220,447	2,944,397	3,685,334	4,259,804	92%
Other Centres	649,535	768,616	920,227	1,057,729	1,154,689	50%
Extended Corridor	1,224,560	1,506,992	1,892,931	2,273,227	2,561,504	70%
Total HSR Catchment	12,884,112	16,598,037	21,660,175	26,565,588	30,193,934	82%
Australia	19,410,000	24,190,907	30,314,000	35,698,000	40,883,000	69%

Table 4: Share of national population 2001-2061 based on base case

	2001	2016	2031	2046	2061
Major Capitals	47.9%	50.0%	52.5%	54.8%	54.3%
Other Major Centres	8.8%	9.2%	9.7%	10.3%	10.4%
Smaller Centres	3.3%	3.2%	3.0%	3.0%	2.8%
Core Corridor **	60.1%	62.4%	65.2%	68.0%	67.6%
Extended Corridor	6.3%	6.2%	6.2%	6.4%	6.3%
TOTAL HSR Catchment	66.4%	68.6%	71.5%	74.4%	73.9%

This suggests that:

- More than two-thirds of Australians will be living in the East Coast high speed rail corridor by 2061, and almost three-quarters in the extended corridor by that time.
- The three largest capital cities will continue to increase their share of national population significantly, and will therefore grow faster than Australia as a whole.
- There will also be faster than average growth in the population in the other major cities in the corridor .
- The share of national population in smaller centres in the main corridor will fall slightly, while cities and towns in the extended corridor are likely to grow at about the same pace as Australia as a whole.

On current trends therefore, the issues of congestion, housing affordability etc in our largest cities are likely to become worse over the next forty years, while people outside the bigger cities will increasingly be left behind in terms of opportunities.

In addition, the overall travel task within the corridor as a whole will become substantially greater, in the order of 80%.

4 THE CORONAVIRUS AND WORKING PATTERNS

The coronavirus has meant that many people, even those usually involved in face-face activities such as teachers or doctors, have been undertaking some of their work remotely via Zoom or other video-conferencing technology. However, many of these workers are returning to more usual work patterns, which requires them to be at their normal workplace and close to their clients.

A proportion of “office” or “white collar” workforce who used to travel to their place of employment are, however, still working from home. This includes such occupations as information technology and other professionals, people running consultancies or other small businesses, clerical, data entry or other staff, people providing on-line or telephone services and even some managers.

Surveys suggest many of these people are relatively happy about working from home at least part of the time, and that an increasing number of employers are becoming more relaxed about this style of working. However, studies also suggest that working remotely from the workplace on an exclusive basis could lead to social isolation as well as missed opportunities for training or promotions.

Other research, summarised below by researcher Suraya Casey for a firm specialising in small business solutions [i], highlights a range of aspects of working from home, including:

- The 2019 IWG Global Workplace Survey of 15,000 professionals in 80 nations found 80 percent of businesses in Germany, 76 percent in Brazil and 58 percent in India had flexible working policies, and working more flexibly is becoming more common. [ii]
- A Stanford study that monitored around 500 employees in China’s largest travel agency for two years found working from home increased productivity by over 20 percent, but that after the trial work-from-home period, around half the participants decided to be office-based in the future. [iii]
- Alan Felstead and Golo Henseke assessed the evidence around remote working’s impacts in 2017, using large-scale studies. They found that homeworkers showed more overall job satisfaction, more commitment to their employer and a greater willingness to go above-and-beyond their role requirements. However, they also found home workers found it harder to “switch off” from work. [iv]
- A 2018 study of 273 self-selecting telecommuters and their supervisors found telecommuting improved performance for three types of employees: those with complex jobs, those who didn’t need others to do their job and those who had low levels of interaction when in the office. They didn’t find any types of jobs where home working decreased employees’ performance. [v]
- Cybercriminals have become more active following the surge of home working as a result of the coronavirus.

- Younger employees (age 16 to 29) are most likely to want to work from home, according to Polycom's 2017 study, with 24,000 respondents in 12 countries. Interestingly, young employees named increased productivity as their top reason for wanting to work from home. [vi]
- Seekout describes remote working as "the single best secret of diversity recruitment." They cite the desire to work remotely as at the top of the list for many job-seekers, attracting more applicants overall, and home working has apparent attractions for women and disabled people.

Further research conducted since the coronavirus suggests remote working and working from home is likely to be much more significant in the future than in the past. For example:

- A report [vii] based on a large-scale survey of firms in the US suggests that a very significant share of the workforce is likely to telework at least one day a week in the future, as noted below:

"Work-from-home arrangements will likely expand beyond the tech world - and beyond the pandemic. Executives at about 1,750 firms from a variety of industries across the country expect about 10% of full-time employees to telework every workday after the pandemic ends according to the May monthly panel survey by economists at the Atlanta Fed, Stanford University and the University of Chicago. The executives expect 30% of their workforce to telework at least one day a week after the pandemic, triple the 10% rate before."

- A study by researchers at the University of Chicago School of Business [viii] found that 37% of jobs in the US can be done entirely at home, and that these jobs account for 46% of US wages. This is because many of the jobs suitable for teleworking have significantly higher than average wages.
- Another study [ix] found that remote working is on the rise in the US, and that it is "helping to send economic activity from the top 15 most expensive parts of the country to less expensive parts". In other words, it is helping to reduce regional income disparities.

It appears that the coronavirus will lead to a significant, and permanent shift in work-life patterns, by making remote working, at least part of the time, a normal and in many cases preferred form of working.

This has major implications for future location choices by the workforce and location decisions by employers. In particular, it could enable a significant number of people to work from home in regional cities, even if their employer remains in the capital city. Equally it could enable some firms to relocate altogether to regional cities.

5 THE POTENTIAL FOR DECENTRALISATION

Previous attempts to encourage decentralisation have tended to focus on:

- Shifting manufacturing companies to regional cities (such as Albury-Wodonga)
- Shifting Government departments / branch offices to regional cities.

However, as discussed below, there are other possibilities as well, including:

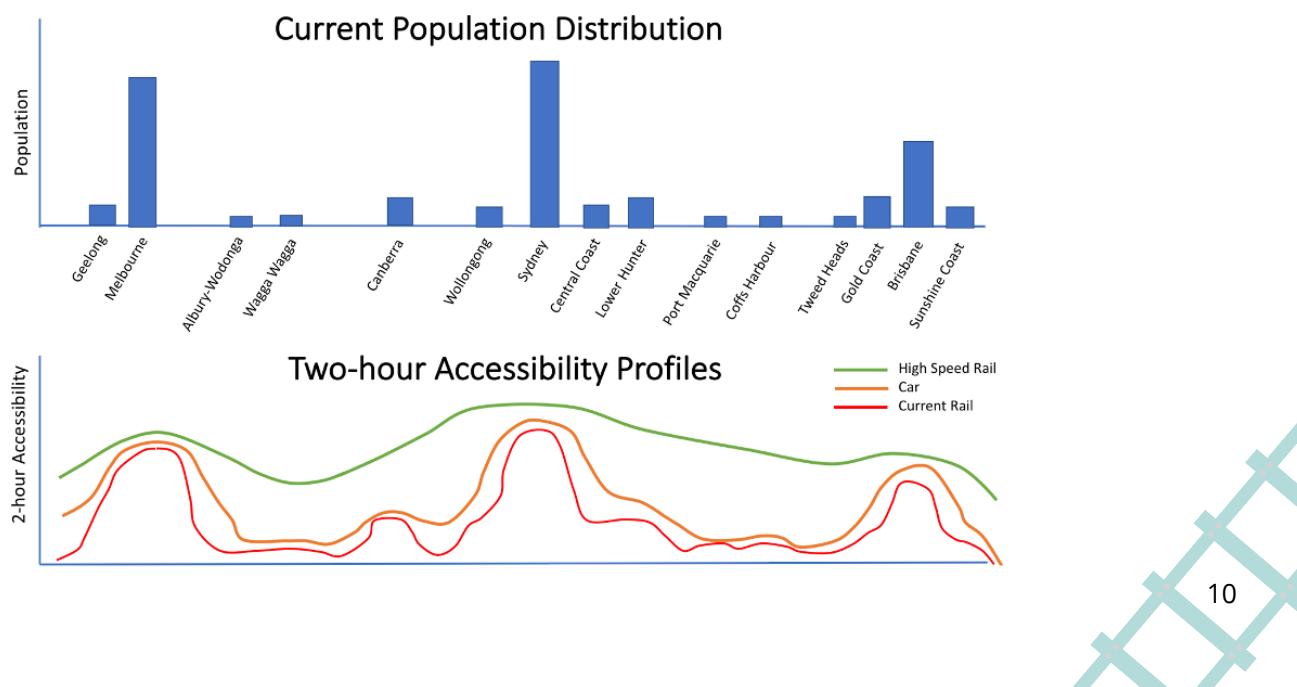
- Telecommuters working from regional cities / towns
- Specialist firms (such as consultancies) relocating to the regions
- Establishing larger scale university campuses, health research facilities and other specialist organisations in regional centres.
- Increasing tourism in regional centres (including international tourism)
- Increased movement of retirees out of capital cities to regional areas.

However, as illustrated below, the current population distribution in the Eastern corridor, coupled with the lack of fast surface transport, means that people living in the three largest cities currently have much higher access to jobs, services and the population generally than people 100 km away, let alone people 300-400 km from the major capitals.

This has severely limited the options for the population to decentralise in the past. High speed rail could alter this significantly, by putting almost all centres in the corridor within 2 hours of a major capital (Note: this assumes that a semi-fast service between Sydney and Brisbane or between Melbourne and Sydney would take approximately 4-4.5 hours, whilst express services between the capitals would take 3.25-3.5 hours.)

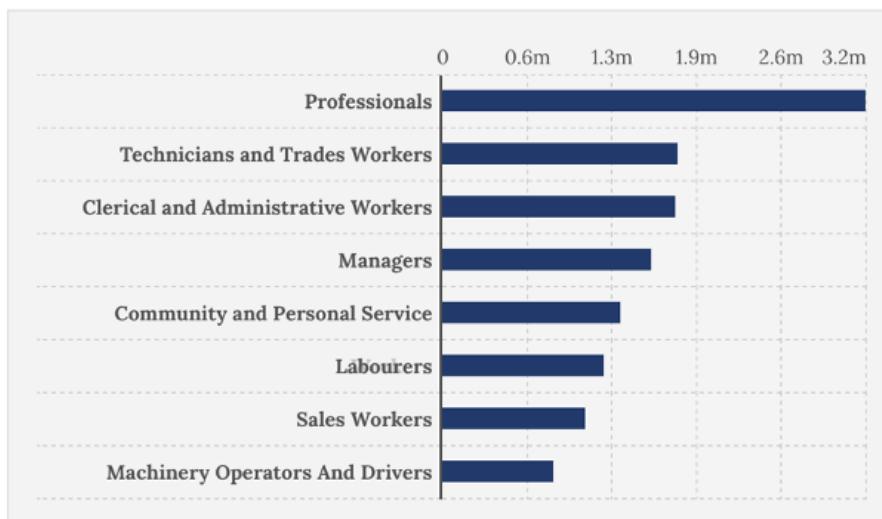
This is illustrated by the gain in accessibility by people living in-between the capitals, represented by the area between the green and red lines in Figure 1B below.

**Figure 1: (Top) Current Population Distribution
(Bottom) Accessibility Profiles along the Corridor**



In order to establish a realistic basis for the potential for decentralisation, it is desirable to consider the occupational structure of the workforce. Figure 2 below shows the current employment distribution in Australia by broad occupational category, as at May 2020.

Figure 2: Employment by occupation - ranked, May 2020



The following analysis looks at various options for decentralisation.

TELECOMMUTERS

Many jobs, especially in occupations such as technicians and trades, community and personal service workers, labourers, sales workers or machinery operators and drivers, have to be undertaken where the work is physically located.

However, some 52% of current workers in Australia are employed as professionals, clerical / administrative workers, or managers. A proportion of these jobs could under suitable circumstances be done from home or from a remote location – including by moving from a capital city to a regional city or town. What is the potential for such decentralisation?

While it is impossible to be precise, the table below provides illustrative estimates. This assumes 7% of professionals, 5% of clerical/admin workers, and 2% of managers based in the biggest three cities could relocate by 2061 to a smaller city or town in the extended corridor, and work remotely at least 3-4 days a week, perhaps travelling back to their nearest capital city a few times a month for meetings etc. The estimates are based on expected population and workforce growth in Sydney, Melbourne and Brisbane by that time on current trends.

Table 5: Potential 'telecommuters' who could relocate from our largest cities by 2061

	2061 Population	Estimated Workforce	Potential for Relocation
Sydney	7,925,222	4,041,863	108,501
Melbourne	9,256,860	4,720,999	126,732
Brisbane	5,035,855	2,568,286	68,944
TOTAL	22,217,936	11,331,148	304,177

These 'teleworkers' would include:

- people whose employer remains in the big cities, but who are able to relocate themselves and their families to a regional centre and telework, at least most of the time, with an occasional visit back to head office
- self-employed professionals and others, who could shift to a regional centre from one of the big cities, and telework from there. They might need to make occasional trips to the major cities to see clients etc.

In both cases the availability of high-speed rail would be a contributing factor by facilitating trips back to the capital city. These people however are not regular five-day a week commuters.

RELOCATING FIRMS

A second category of primary jobs which could shift to regional centres from the big cities are jobs in sectors such as manufacturing, higher education or specialised services, where whole firms or branches of firms (or government agencies or universities) make the move to a regional centre. For example:

- In June 2019, there were 2 million public sector jobs in Australia, 12% in the Federal Government, 80% in State Governments and 8% in Local Governments. The average salary was just over \$80,000. [x] Many of these jobs are currently in Sydney, Melbourne or Brisbane. Moving just 4% of current State and Federal Government jobs out of the three big capitals over time could lead to at least an additional 30,000 jobs in regional cities.
- There were an estimated 130,000 full-time equivalent jobs in Australia's 39 universities before COVID, with the actual number of jobs much higher given the number of part-time and casual staff. At present a significant number are under threat because of the loss of revenues from foreign students – with estimates as high as 30,000. But in the longer term assuming the sector recovers, a shift of some courses and faculties to regionally based universities could add perhaps 15,000 jobs in selected regional cities.
- Manufacturing employs some 800,000 Australians or 7% of the workforce, which is low by international comparisons. While manufacturing employment has been in decline, there are growing calls for Australia to stimulate its manufacturing capabilities and self-reliance in critical areas following the coronavirus and growing world trade tensions. With land and labour costs being important to competitiveness, some firms could be encouraged to relocate to selected regional centres from Sydney, Melbourne and Brisbane. A shift of 8% of current manufacturing jobs in the major capitals to regional centres would lead to an additional 35,000 jobs in those cities and towns. Additional jobs could be shifted from firms in other sectors, such as health, wholesale and retail, and transport and communications.

A proportion of the employees of these relocated organisations might need to travel periodically back to the major capital city for face-face meetings with clients, suppliers etc, but the growing use of telecommunications plus the development of high-speed rail would enable these organisations to move out of the capital cities. In this case, the majority of the employees in the organisations would not need to travel back to the capital cities for work reasons (though they may do so to maintain social / family connections).

REGIONAL TOURISM

A third category of primary businesses in regional centres which could expand as a result of high-speed rail would be tourism operators, based on the ability of tourists to get to their centres more quickly and easily. The majority of domestic tourists, and almost all international tourists in Australia, originate in Sydney, Melbourne or Brisbane, because this is where they live or where they have landed from overseas.

High-speed rail on the East Coast would allow local and international tourists to make more trips to regional tourist attractions in areas such as the Goulburn Valley, the Ski fields, Canberra, the Hunter Valley, the mid north coast of NSW and the Gold and Sunshine Coasts.

MULTIPLIER JOBS AND POPULATION

As a result of these primary job increases, there would be a series of support jobs which would be derived from the increased incomes from the primary jobs. Employment multipliers vary by sector and with other factors, but are typically in the range of 1.8-2.2. The overall population impact of such decentralisation of jobs then depends on the population to jobs ratio, typically 1.9 or so in Australia.

SEA CHANGERS AND TREE CHANGERS

Finally, the availability of high-speed rail could encourage more people in the capital cities to retire to regional centres in the corridor, given that they need to maintain connections with friends and family as well as to have access to specialist medical facilities. High-speed rail could significantly improve this connectivity compared with current options (driving and regional air services). These retirees would further add to the potential population decentralisation enabled by an East Coast high speed rail system.

While the overall impact is speculative, it is considered plausible that the combination of high-speed rail and telecommuting could lead to a shift of around 2.5 million people out of the capital cities and into the other cities and towns in the extended corridor by 2061, compared to the previous 'trend' population estimate, as shown in Table 6.

Table 6: Decentralisation potential from high speed rail and telecommuting

Component of Decentralisation	Primary Jobs	Employment multiplier	Total Jobs	Population Generated
"Teleworkers" Relocating	300,000	2.2	660,000	1,254,000
Government / Higher Education	45,000	2.0	90,000	171,000
Manufacturing / Specialised Services	70,000	2.0	140,000	266,000
Additional Primary Tourism Jobs	90,000	1.8	162,000	307,800
Additional Retirees				500,000
TOTAL POPULATION DECENTRALISED				2,498,800

6 AN ALTERNATIVE POPULATION SCENARIO

What could Australia's population distribution look like in 2061 with 2.5 million fewer people in Sydney, Melbourne and Brisbane, and 2.5 million more in other cities and towns in the extended corridor between Geelong and the Sunshine Coast? Given that the process of decentralisation would probably start slowly but accelerate over time, it is assumed that:

- 10% of the trend population growth otherwise expected in Sydney, Melbourne and Brisbane in the 2016-2031 period, 20% of the expected trend growth in 2031-2046 period, and 30% of the expected trend growth in the 2046-2061 period, would be diverted to other cities and towns in the extended corridor.
- The growth rates of these other cities and towns would accelerate from what was otherwise expected based on current trends:
 - For the cities and towns in the core corridor, the growth rates would be 50% higher in the 2016-2031 period, 100% higher in the 2031-2046 period, and 200% higher in the 2046-2061 period. However, a cap was put on the maximum growth rate for any centre, reflecting both the likely political reaction and other problems which could occur if growth was too fast. The cap was put at 2.5% pa throughout the forecast period for the larger cities (Gold Coast, Canberra, Lower Hunter, Central Coast, Sunshine Coast, Geelong) and 3% p.a. for smaller cities and towns.
 - For cities and towns in the extended corridor, which would be expected to have somewhat less benefit from high speed rail than those in the core corridor, the accelerations were put at 25%, 50% an 100% for the three time periods, and the maximum growth rate was set at 2.5% pa, again throughout the forecast period. In this context it is worth noting that these growth rates are relatively low compared to what was experienced, for example, by Canberra, which in the late 1960's was growing at nearly 10% p.a.
- Finally, it was assumed in this scenario that a number of new towns were developed in the corridor in locations along the high-speed rail, where land was available and suitable. It is considered that at least 8 such locations can be found, and that it is feasible that they achieve a combined population of 400,000 by 2061.

The table below shows the population estimates for such a scenario.

Table 7: Population growth by centre: decentralisation scenario

	2001	2016	2031	2046	2061
Major Capitals	9,296,385	12,101,982	15,486,151	18,180,659	19,664,482
Other Large Cities	1,713,632	2,220,447	3,000,796	4,063,237	5,463,636
Other Centres	649,535	768,616	985,024	1,265,390	1,604,745
New Centres	-	-	50,000	200,000	400,000
Extended Corridor	1,224,560	1,506,992	1,915,320	2,406,324	2,954,289
Total HSR Catchment	12,884,112	16,598,037	21,437,291	26,115,611	30,087,152
AUSTRALIA	19,410,000	24,190,000	30,314,000	35,698,000	40,883,000

The figure below shows the effect of the decentralisation scenario in the Extended Corridor in 2061. Table 8 shows detailed population estimates for all of the centres.

Figure 3: Impact of decentralisation scenario for capital cities and next largest cities

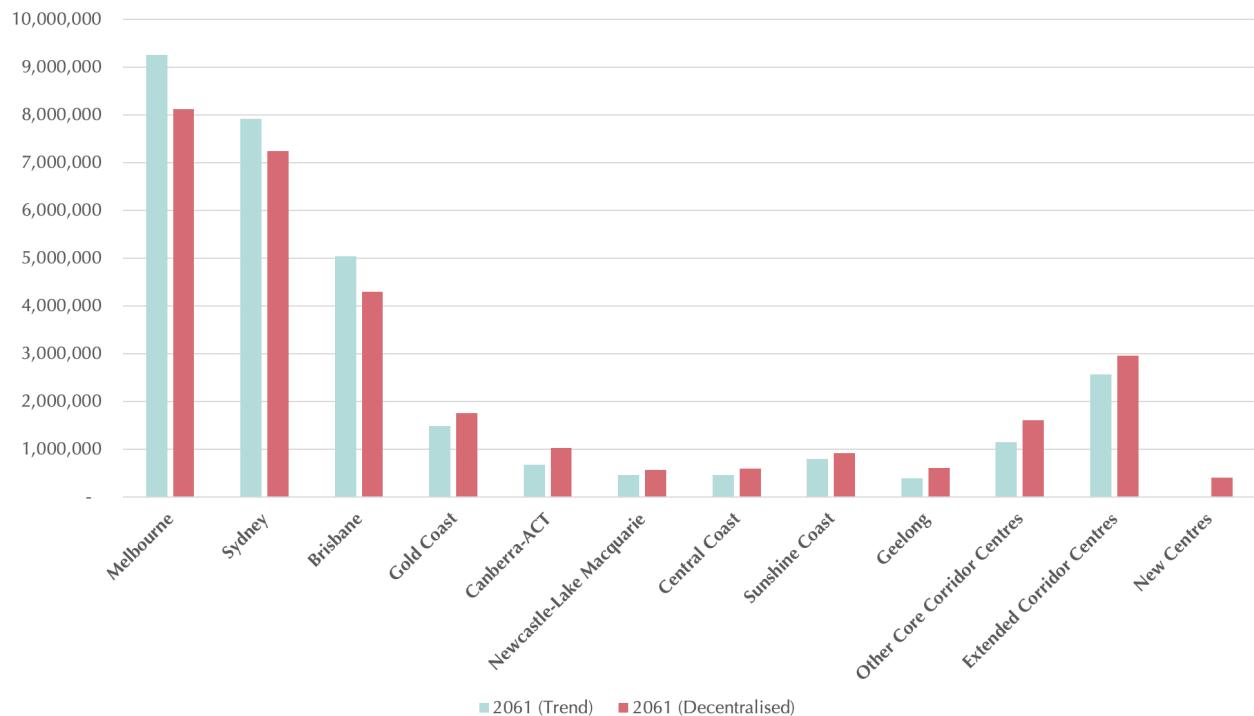


Table 8: Population estimates under the decentralisation scenario

	2001	2016	2031	2046	2061
Sydney	4,102,580	5,024,923	6,069,742	6,838,218	7,241,270
Melbourne	3,500,249	4,714,387	6,226,801	7,443,152	8,120,027
Brisbane	1,693,556	2,362,672	3,189,607	3,899,289	4,303,185
MAJOR CAPITALS	9,296,385	12,101,982	15,486,151	18,180,659	19,664,482
Gold Coast	379,679	575,303	834,189	1,209,575	1,753,883
Canberra-ACT	321,538	403,104	560,727	771,526	1,028,081
Newcastle-Lake Macquarie	327,354	363,039	424,041	492,546	562,928
Central Coast	294,596	336,631	410,671	497,510	590,565
Sunshine Coast	198,931	302,841	439,119	636,723	923,249
Geelong	191,534	239,529	332,049	455,357	604,930
OTHER LARGE CITIES	1,713,632	2,220,447	3,000,796	4,063,237	5,463,636
Tweed	73,980	93,742	132,341	184,731	249,417
Port Macquarie-Hastings	64,960	80,073	108,788	146,297	190,913
Lismore	42,721	44,122	46,352	48,605	50,695
Byron	29,453	33,399	40,296	48,297	56,779
Ballina	37,856	42,993	51,986	62,440	73,547
Coffs Harbour	62,582	74,670	96,902	124,640	156,198
Kempsey	27,164	29,431	33,217	37,325	41,409
Southern Highlands	42,384	48,996	60,778	74,829	90,132
Goulburn	26,401	30,261	37,081	45,115	53,762
Yass	12,002	16,566	25,677	39,800	59,639
Gundagai	11,397	11,291	11,129	10,976	10,842
Wagga Wagga	56,280	63,906	77,254	92,767	109,244
Albury	45,265	52,171	64,440	79,010	94,812
Wodonga	31,964	40,100	55,833	76,895	102,551
Shepparton	57,600	65,100	78,166	93,249	109,166
Seymour (Mitchell)	27,526	41,795	64,782	100,412	155,639
OTHER CENTRES	649,535	768,616	985,024	1,265,390	1,604,745
Toowoomba	135,000	164,200	209,821	260,264	309,460
Gympie	38,100	50,300	70,989	96,255	123,190
Ipswich	123,900	200,100	290,145	420,710	610,030
Maitland	56,100	79,100	114,695	166,308	225,893
Cessnock	46,800	56,700	72,107	89,061	105,525
Port Stephens	58,500	71,100	90,771	112,501	133,677
Singleton	21,100	23,600	27,192	30,773	33,959
Muswellbrook	15,100	16,500	18,465	20,368	22,018
Wollongong	188,300	210,400	242,120	273,704	301,777
Shellharbour	59,400	70,400	87,146	105,084	122,090
Shoalhaven	86,900	101,900	124,494	148,379	170,761
Kiama	19,800	22,100	25,398	28,677	31,588
Cooma	19,400	20,600	22,237	23,766	25,050
East Gippsland	38,800	45,600	55,866	66,748	76,971
South Gippsland	25,700	29,100	34,045	39,051	43,566
Latrobe Valley	69,600	74,600	81,484	87,990	93,514
Ballarat	82,300	103,500	137,747	177,185	217,072
Bendigo	89,100	112,200	149,566	192,665	236,316
Wangaratta	26,260	28,592	31,854	34,998	37,714
Griffith	24,400	26,400	29,180	31,838	34,119
EXTENDED CORRIDOR	1,224,560	1,506,992	1,915,320	2,406,324	2,954,289
POTENTIAL HSR CATCHMENT	12,884,112	16,598,037	21,387,291	25,915,611	29,687,152
AUSTRALIA	19,410,000	24,190,907	30,314,000	35,698,000	40,883,000

7 THE ROLE OF HIGH SPEED RAIL

It is argued in this paper that the purpose of high-speed rail is not to encourage long distance commuting, or to turn our regional cities and towns into "dormitory" suburbs. Instead, high speed rail should be viewed as a way for more people to live outside the capital cities, but to retain connections with them as required. This could include occasional visits, such as to trips for meetings at "head office", for visiting friends and relatives, for specialist medical or other services, or for meeting clients for business.

Just how effective could high speed rail be in achieving this, and would it have the capacity to make any significant difference in settlement patterns?

The 2013 HSR Study estimated patronage in 2065 of 84 million on the high-speed rail system between Melbourne and Brisbane. However, the system proposed here has additional services, serves a larger population, and is estimated to have a capacity of around 127 million passengers in 2061 for essentially the same network. (Note that this estimate does not include such links as Melbourne-Geelong, Bendigo or Ballarat, or Brisbane-Sunshine Coast, which were outside the scope of the 2013 HSR Study).

The main report in this series proposed typical service patterns which could be operating on the high-speed network by 2061, including estimates of potential patronage based on assumed train capacities, turnover and load factors. The trips taken on the high speed rail would include:

- Trips between the three main capitals, e.g. Sydney-Brisbane; Sydney-Melbourne; and Melbourne-Brisbane.
- Trips between other cities and a capital city; e.g. Newcastle-Sydney; Canberra-Melbourne, or Brisbane-Coffs Harbour.
- Trips between the regional cities and towns; e.g. Albury-Central Coast, or Canberra-Wagga Wagga.

The first category of trips is not really relevant to the issue of decentralisation. However, the other two are. The figure below shows the estimated capacity of the system in 2061 by type of train/service.

Table 9: Estimated capacity on the high speed rail core system in 2061

SERVICE TYPE	Trains / weekday (both ways)	Capacity / train	Load factor (1)	Average load / train	Thousand passengers or tonnes / weekday	Million passengers / tonne pa
INTER-CAPITAL	136	450	75%	338	45.9	13.8
INTER-CITY	106	370	120%	444	47.1	14.1
INTER-REGIONAL	84	300	150%	450	37.8	11.3
COMMUTER	488	1000	60%	600	292.8	87.8
SLEEPER	6	400	75%	300	1.8	0.5
TOTAL PASSENGER	820				425.4	127.6
FAST FREIGHT*	32	2700	80%	2160	69.1	20.7

Note: (1) Inter-City and Inter-Regional Trains experience turnover of seats as they cater for trips between cities / towns en route. (*) Assumes 8 fast freights per evening at 15 minute intervals southbound Sydney-Melbourne and Brisbane-Sydney, and similar number northbound. Each train capable of hauling 90 trailers or equivalent container / palletised freight, with 85% slot utilisation.

Note that “commuter” in this discussion is the class of train, not the type of trip, and refers to trains travelling mainly from capital cities to regional centres within about 60 minutes, or around 120-150km, of the relevant capital city. These would cater mainly for people making occasional trips to the capital city rather than daily commuters.

The table below estimates the capacity of high speed rail in relation to the possible demand generated in the proposed decentralisation scenario.

Table 10: Estimated capacity of trips other than capital city-capital city

SERVICE TYPE	Million trips pa	% relevant to decentralisation	Million trips pa
INTER-CAPITAL	13.8	10%	1.38
INTER-CITY	14.1	100%	14.12
INTER-REGIONAL	11.3	100%	11.34
COMMUTER	87.8	80%	70.27
SLEEPER	0.5	0	0
TOTAL	127.6		97.11

How much capacity would that provide for the workers moving to the regions, the additional tourists assumed to be attracted, and the general increase in population in the regional cities and towns? The table below explores that question, making assumptions about how often different groups might use the high speed rail.

Table 11: Indicative usage of high speed rail capacity

Indicative trips per annum on high speed rail	Number	Trips per annum	Total trips	Percent
Primary Teleworkers	100,000	150	15,000,000	16%
Secondary Teleworkers	200,000	50	10,000,000	11%
Government / Higher Education	45,000	20	900,000	1%
Manufacturing / Specialist Firms	70,000	10	700,000	1%
Primary Tourism Workers	90,000	10	900,000	1%
Total Additional Work-Related Trips	505,000		27,500,000	29%
Additional Tourists	6,000,000	2	12,000,000	13%
General Population Increase*	4,479,319	12	53,751,824	58%
TOTAL			93,251,824	100%

A much more detailed analysis would be required to fully explore this issue. However, the analysis suggests the capacity provided would be of the same scale as plausible estimates of the demand generated by the decentralisation scenario.

This would mean that high speed rail could facilitate the suggested decentralisation without requiring massive upgrades to road networks, which would otherwise be needed if there was a significant move to decentralise our population.



8 CONCLUSIONS

This exploration of the potential for significant decentralisation and of the capacity of high-speed rail to support that is indicative only. There are many factors which would bear on these issues. However, it suggests that:

- Decentralisation of a significant number (2.5 million) of people away from Sydney, Melbourne and Brisbane by 2061, from otherwise expected population growth in those cities, to smaller cities and towns in the East Coast corridor is plausible.
- The proposed high-speed rail system would have capacity for around 100 million trips between the capital cities and the smaller cities and towns in the region by that time.
- This would provide for a substantial amount of such travel, if not the majority of such travel, generated by a decentralisation of that scale.
- High housing costs and congestion in the big cities no doubt provides an incentive for people to shift to smaller cities. However, other policies to attract workers, firms and other organisations to the smaller cities and towns, in addition to the additional accessibility provided by high speed rail, would likely be necessary to generate the full opportunity provided by better management of population in the East Coast corridor.

REFERENCES IN TECHNICAL REPORT A

- i. <https://www.kaspersky.com/blog/secure-futures-magazine/work-from-home-research/34196/>
- ii. <https://assets.reglas.com/pdfs/iwg-workplace-survey/iwg-workplace-survey-2019.pdf>
- iii. <https://nbloom.people.stanford.edu/sites/g/files/sbiybj4746/f/wfh.pdf>
- iv. <https://onlinelibrary.wiley.com/doi/full/10.1111/ntwe.12097>
- v. <https://link.springer.com/article/10.1007%2Fs10869-018-9530-4>
- vi. <https://www.polycom.com/content/dam/polycom/common/documents/whitepapers/changing-needs-of-the-workplace-whitepaper-enus.pdf>
- vii. <https://journalistsresource.org/studies/economics/jobs/working-from-home-telework-research/>
- viii. https://bfi.uchicago.edu/wp-content/uploads/BFI_White-Paper_Dingel_Neiman_3.2020.pdf
- ix. https://content-static.upwork.com/blog/uploads/sites/6/2020/07/23063848/Upwork_Report_WhenWorkGoesRemote_July2020-2.pdf
- x. <https://www.abs.gov.au/ausstats/abs@.nsf/mf/6248.0.55.002>

